

Orion Electrode Brochure



PH > ISE > ORP > CONDUCTIVITY > DISSOLVED OXYGEN

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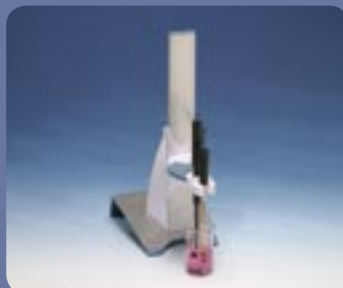
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Orion Stand, Meter and Electrodes



Orion Stand and Electrodes

For more information, please contact us:

ExpotechUSA

10700 Rockley Road

Houston, TX -77099

USA

E-mail: sales@ExpotechUSA.com

Website: www.ExpotechUSA.com

Introduction to Orion pH Electrodes

Thermo Electron offers the widest range of pH electrodes to meet the needs of any application. From critical measurements to simple checks, expect quality pH performance. Match any sample type with an Orion ROSS®, silver/silver chloride, or calomel internal reference. Exhibited by the many different shapes and sizes, Thermo Electron manufactures pH electrodes for almost any sample size and type.

Constructed in glass or epoxy bodies, our pH electrodes are ideal for the lab or field. With a variety of connections, use Orion pH electrodes on virtually any pH meter. The diversity of Orion pH electrodes allows you to choose the right electrode for any sample composition, volume, and temperature!

Orion No Cal® pH Electrodes

The world's first pH electrode that does not require calibration! The No Cal electrode will hold its calibration to ± 0.10 pH unit for one year, as long as the simple storage and care requirements are met. These electrodes utilize a unique reference system that allows for quick and accurate measurement of pH in the field. Just take it out of its storage chamber put it in your sample and measure.

Orion PerpHecT® Line

PerpHecT Electrodes, with either ROSS® or Ag/AgCl references, offer the most accurate pH measurements possible when used with PerpHecT pH meters containing our patented digital LogR™ technology. Only PerpHecT pH meters allow for direct temperature measurement and compensation from the pH electrode. Patented LogR technology makes it all possible; this system is based on using the electrical resistance of the glass-sensing bulb of the electrode as the temperature indicator.

Orion ROSS Ultra®/ ROSS® Line

The ROSS reference, a unique system developed by Thermo Electron, offers stable, fast results regardless of temperature or sample composition. The pH electrodes in the ROSS line contain the patented ROSS reference, giving you the best performance. The Best ...Just Got Better, ROSS Ultra line features greater stability, reliability, and renowned accuracy and temperature response plus a TWO year warranty. ROSS Sure-Flow® Electrodes have a unique reference junction that assures stable, drift-free potentials with an easy-to-clean design. See page 4 for the advantages of the Sure-Flow junction.

Orion AquaPro Professional Line

Thermo Electron's Orion AquaPro Professional line offers enhanced performance Ag/AgCl reference electrodes. The patented reference system and the double

junction design keep silver ions from contacting the sample. Improved electrode lifetime, low maintenance, fast response time and clean junctions are just some of the AquaPro benefits. Several styles make AquaPro electrodes the best choice for difficult applications.

Orion Specialty and ORP

New ORP Triode™ electrodes measure both oxidation-reduction potential and temperature with a single probe. These low maintenance and refillable versions offer accuracy and convenience in a rugged epoxy-bodied electrode.

Orion Standard Line

Silver/silver chloride (Ag/AgCl) references are widely used because of their accuracy and broad temperature range. Thermo Electron's Orion Standard Line offers a variety of electrodes for any application. Steam Sterilizable pH electrodes are also available in the Standard Line.

Orion Tris Calomel Line

Calomel, mercurous chloride, references are a value-priced alternative to ROSS for biotech samples, especially Tris buffers. The KNipHE® pH electrode simplifies pH measurements of meats using a unique spear-tip design with stainless steel blade.

Orion Double Junction Tris Line

Thermo Electron's new Double Junction electrode line features an isolated Ag/AgCl reference system. They are offered as low maintenance gel electrodes or refillable. They offer an alternative to the hazardous calomel reference system.

Orion Economy Line

When price is a factor, try the Economy Line. Using sealed gel Ag/AgCl references, Economy Line pH electrodes require no filling solution for low maintenance. These pH electrodes are the ideal choice for student and rugged use.

Orion pHuture MMS™ Probes

Several Sure-Flow pHuture probes, designed for the pHuture MMS™ systems, allow fast, accurate multiple measurements from one probe.



Orion pH Electrodes



Orion No Cal pH Electrode



Orion ROSS Ultra Electrodes

Orion pH Electrode Specifications

Selecting the Correct Orion Electrode						
Required pH Precision	0.01	0.01	0.02	0.02	0.02	0.05 to 0.1
Sample Type or Condition	PerpHecT® Line	ROSS Ultra®/ROSS® Line	Standard Line	AquaPro/Tris Line/ Double Junction	Micro Line*	Economy Line
General Purpose Most sample types	82-02, 82-56, 82-72, 92-02, 92-06, 92-07, 92-56, 92-72	81-01/80-03, 81-01/80-05U, 81-01/80-05, 81-02, 81-02U, 81-04, 81-04U, 81-56, 81-56U, 81-72	91-01/90-01, 91-02, 91-04, 91-07, 91-09, 91-56, 91-57, 91-62, 91-65, 91-72	71-02, 91-02AP, 91-04AP, 91-56AP, 9120DJWP, 9107APMD, 9156DJWP		91-06
Biological/Pharmaceutical Proteins, Tris, Enzymes	82-02, 82-03, 82-72, 92-72	81-01/80-05, 81-01/80-05U, 81-02U, 81-03U, 81-65, 81-72	91-01/90-02, 91-65, 91-67, 91-72	71-02, 71-03, 71-10, All AquaPro, D/J Tris		
Education/Student Use	82-56, 92-06, 92-07, 92-56	98-30, 81-56/81-56U, 81-65	91-07, 91-09, 91-56, 91-57, 91-65	91-04AP, 91-56AP, 9107APMD, 9156DJWP		91-06
Emulsions Foods, Cosmetics, Oils	82-72, 92-72	81-01/80-03, 81-65, 81-72	91-61/90-01, 91-65, 91-72	All AquaPro, D/J Tris		
Petroleum Products, Paint	82-72, 92-72	81-01/80-03, 81-72	91-61/90-01, 91-72	91-04AP		
Extreme pH - pH > 12 or < 2	82-72, 92-72	81-01/80-03, 81-65, 81-72	91-01/90-01, 91-65, 91-72	91-02AP, 91-03AP, 91-04AP, 9102DJWP		
Acid/Fluoride			93-01/90-02			
Flat Surfaces - Foods, Cheese, Paper, Agar	82-35	81-35, 81-35U	91-67	91-35AP		91-36
Harsh Environments Field or Plant Use	82-56, 92-06, 92-07, 92-56	81-56, 81-56U, 81-65, 81-72	91-07, 91-09, 91-56, 91-65	91-04AP, 91-56AP, 9107APWP, 9156DJWP		91-06
Rugged Use	82-56, 92-06, 92-07, 92-56	81-01/80-03, 81-01/80-05, 81-01/80-05U, 81-04, 81-04U, 81-56, 81-56U, 81-65	91-61/90-01, 91-04, 91-07, 91-09, 91-56, 91-57, 91-62, 91-65	91-04AP, 91-15AP, 91-35AP, 91-56AP, 9107APWP, 9156DJWP		91-06
High Ionic Strength Acids, Bases, Brines	82-72, 92-72	81-01/80-03, 81-65, 81-72	91-01/90-02, 91-65, 91-72	All AquaPro		
Large Sample Sizes Tall Flasks or Bottles					98-26	91-26
Low Ionic Strength Treated Effluent	82-02, 82-72, 92-02, 92-72	81-01/80-03, 81-02, 81-02U, 81-62, 81-65, 81-72	91-01/90-01, 91-61/90-01, 91-02, 91-62, 91-65, 91-72	71-02, 9102DJWP	98-26	91-26
Non-Aqueous Solvents, Alcohols, etc.	82-72, 92-72	81-01/80-03, 81-65, 81-72	91-61/90-02, 91-72	91-04AP		
Semi-Solids - Fruit, Meat, Cheese	82-63	81-63	91-63	71-20, 91-35AP, 9120APWP		
Small Sample Sizes - Test Tubes, Small Flasks	82-03, 82-35, 92-03, 82-63	81-03, 81-03U, 81-15, 81-35, 81-35U, 81-63, 81-75	91-03, 91-67	71-10, 91-15AP, 91-35AP, 9110DJWP	98-02, 98-03, 98-10, 98-26	91-16, 91-26
NMR Tubes					98-26	
Micro-titer Plates			91-67		98-03	
Steam Sterilizable			91-90, 91-91, 91-92, 91-93, 91-94, 91-95			
Titration		81-01/80-03, 81-62, 81-66	91-64, 91-66			
Viscous - Slurries, Suspended Solids, Sludges	82-72, 92-72	81-01/80-03, 81-65, 81-72	91-61/90-01, 91-65, 91-72			
Waters - Acid Rain, Boiler Feed, Distilled, Rain, Well	82-02, 82-72, 92-02, 92-72	81-01/80-03, 81-02, 81-02U, 81-62, 81-65, 81-72	91-01/90-01, 91-02, 91-65, 91-72	71-02, All AquaPro, D/J Tris		
Drinking, Tap	82-02, 82-72, 82-56, 92-02, 92-06, 92-07, 92-72	81-02, 81-02U, 81-04, 81-04U, 81-65, 81-72	91-01/90-01, 91-02, 91-04, 91-07, 91-09, 91-57, 91-65, 91-72	71-02, All AquaPro, D/J Tris		91-06
Sea water	82-72, 92-72	81-01/80-03, 81-65, 81-72	91-02/90-02, 91-65, 91-72	All AquaPro		
Wastewater	82-72, 92-07, 92-72	81-01/80-03, 81-65, 81-72	91-61/90-01, 91-07, 91-09, 91-57, 91-62, 91-65, 91-72	All AquaPro		91-06

Orion pH Electrode Specifications

The Best Just Got Better.





The combination of benefits in the ROSS Ultra® and ROSS® Line cannot be found in any other pH electrode line. Before you make your next buying decision, consider these advantages.

The premium ROSS Ultra line currently contains six combination pH electrode styles and a half-cell reference electrode. These electrodes build upon the ROSS line and offer such great stability and drift improvements that the warranty period has been doubled!

These refillable electrodes have a two year replacement warranty, the best in the business. ROSS Ultra stability over time has been optimized to give less long

term drift. For the user that means more accuracy and less time recalibrating. The non-metallic reference system offers benefits over the calomel and silver reference in both performance and electrode disposal issues. The liquid-liquid equilibration occurs almost instantaneously, saving time plus ensuring accurate results. Complex, delicate samples, such as biological media, foods and pharmaceuticals, can be measured with ease where metallic reference electrodes would contaminate the sample, require excessive cleaning to perform correctly or potentially destroy the electrode in a short time. All ROSS Ultra® electrodes can be used in samples that contain Tris, sulfides or proteins. ROSS Ultra electrodes accommodate a change in filling solution for samples sensitive to potassium or chloride ions. ROSS Ultra offers users the best temperature performance of all other electrodes in repeated, varying temperatures.

Orion ROSS Ultra®

 <p>Orion 800500U ROSS Ultra Reference Half-Cell with glass body Recommended Use: Precise pH determinations for routine or research work. Use with ROSS pH Half Cell electrode, 81-01 and ROSS sodium half cell 8411 Orion # 800500U (2) New</p>	 <p>Orion 8102BNUWP ROSS Ultra Combination with glass body Recommended Use: Precise pH determinations. The general purpose, top performance combination electrode. Ideal for Q.C. and research applications. Orion # 8102BNUWP (1)</p>	 <p>Orion 8103BNUWP ROSS Ultra Combination with glass body, semi-micro bulb Recommended Use: Fits test tubes, measures samples as small as 0.2 mL. For use in clinical, pharmaceutical, and food labs, wherever sample size is a constraint. Orion # 8103BNUWP (1)</p>	 <p>Orion 8104BNUWP ROSS Ultra Combination with glass body, rugged bulb Recommended Use: Toughened bulb for rugged lab use and precise Q.C. measurements. Orion # 8104BNUWP (1)</p>
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 <p>Orion 8115BNUWP ROSS Ultra Combination with epoxy body, semi-micro. Recommended Use: Epoxy body for ruggedness and durability. Same applications as 81-03. Aqueous solutions only. Orion # 8115BNUWP (1)</p>	 <p>Orion 8135BNUWP ROSS Ultra Combination with epoxy body, flat surface Recommended Use: pH of soft, moist surfaces both solid and semi-solid such as agar gel plates, meats, bread dough and similar samples. Small samples in micro sample dish. Orion # 8135BNUWP (1)</p>	 <p>Orion 8156BNUWP ROSS Ultra Combination with epoxy body Recommended Use: General purpose when precise pH determination is required. Epoxy body for ruggedness and durability. Orion # 8156BNUWP (1)</p>
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Orion ROSS Ultra							
	800500U	8102BNUWP	8103BNUWP	8104BNUWP	8115BNUWP	8135BNUWP	8156BNUWP
pH Range	0-14	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C
Internal Ref.	ROSS	ROSS	ROSS	ROSS	ROSS	ROSS	ROSS
Junction	Ceramic	Ceramic	Ceramic	Ceramic	Glass Fiber	Glass Fiber	Glass Fiber
Dimensions	120 mm x 12 mm	120 mm x 12 mm	165 mm x 6 mm (6mm section is 95mm long)	120 mm x 12 mm	165 mm x 6 mm (6mm section is 95mm long)	120 mm x 12 mm	120 mm x 12 mm

Key

(1) BNC connector, 1 m cable. All cap diameters are 16 mm at bottom of cap. See page 13 for Orion pH electrodes cleaning kits. (2) Pin Tip Connector
ROSS and the COIL tradedress are trademarks of Thermo Electron Corporation. US Patent 6,793,787

Orion pH Electrodes

Sure-Flow® Junction

The unique, free-flowing liquid-to-liquid junction assures you of the most stable, drift-free measurements. The easy-to-clean junction never clogs—simply press the cap and flush the junction area. Release the cap and the junction is reset. Now even the most problematic, dirty or viscous samples can be easily measured without a clogged junction!

Faster Response

If you are measuring samples that vary in temperature, or differ in temperature from your calibrating buffers, the ROSS Electrode's special internal system provides superior measurement stability, faster response, greater accuracy and more reproducible results than conventional electrodes. With ROSS Electrodes you avoid long-term drift or inaccurate readings, even in samples that vary in temperature, while conventional electrodes produce unstable results until they reach thermal equilibrium with the sample.

Temperature Response

The typical results in the graph on page 5 show how ROSS Electrodes respond versus the best of conventional pH electrodes. In this case, both electrodes were taken from a pH 4.01 buffer solution at 25 °C and placed in the same buffer at 75 °C. The ROSS Electrode almost immediately reported the correct value of the buffer, pH 4.13, at the new temperature. After three minutes, the conventional electrode had just started to move toward the 4.13 mark. When

both electrodes were put back in the 25 °C buffer, the ROSS Electrode read 4.01 again in less than 30 seconds while the other electrode was considerably in error. The ROSS Electrode continues to show fast reproducibility and accuracy after many, many dramatic temperature changes.

No Sample Contamination

Conventional electrodes can leach metal ions into the filling solution and subsequently into the sample. ROSS® Electrodes do not contain silver or mercury to react with the sample or clog the ceramic frit. Use ROSS pH Electrodes where trace amounts of metal ions, in such samples as biological media, foodstuffs, and pharmaceuticals, cannot be tolerated. All ROSS pH electrodes can be used in samples that contain Tris, sulfides or protein.

Double Junction Design

This construction allows you more control over an important variable. Use a filling solution that is similar to the sample in order to minimize junction potential problems in high or low pH samples or non-aqueous solutions. Also change the filling solution to minimize contamination when potassium or chloride in the sample is undesirable.

Best for Routine pH

Use ROSS Electrodes as your standard for all routine pH determinations. They will provide accurate, stable, fast, and reproducible results.

Orion ROSS®

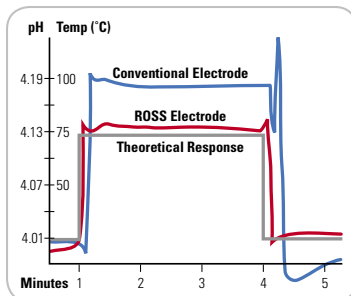
 <p>Orion 81-02 ROSS Combination with glass body Recommended Use: Precise pH determinations. The general purpose, top performance combination electrode. Ideal for Q.C. and research applications. Orion # 8102BN (1) 810200 (2) 8102SC (3)</p>	 <p>Orion 81-03 ROSS Combination with glass body, semi-micro Recommended Use: Fits test tubes, measures samples as small as 0.2 mL. For use in clinical, pharmaceutical, and food labs, wherever sample size is a constraint. Orion # 8103BN (1) 810300 (2) 8103SC (3)</p>	 <p>Orion 81-04 ROSS Combination with glass body, rugged bulb Recommended Use: Toughened bulb for rugged lab use and precise Q.C. measurements. Orion # 8104BN (1) 810400 (2) 8104SC (3)</p>	 <p>Orion 81-15 ROSS Combination with epoxy body, semi-micro Recommended Use: Epoxy body for ruggedness and durability. Same applications as 81-03. Aqueous solutions only. Orion # 8115BN (1) 811500 (2) 8115SC (3) Detachable bulb guard included</p> 	 <p>Orion 81-35 ROSS Combination with epoxy body, flat surface Recommended Use: pH of soft, moist surfaces both solid and semi-solid such as agar gel plates, meats, bread dough and similar samples. Small samples in micro sample dish. Orion # 8135BN (1) 813500 (2) 8135SC (3)</p>	 <p>Orion 81-55/56 ROSS Combination with epoxy body Recommended Use: General purpose when precise pH determination is required. Epoxy body for ruggedness and durability. Orion # 815500 (2) 815600 (1) 8155SC (3)</p>	
 <p>Orion 8175BNWP ROSS Sure-Flow Semi-Micro, epoxy body Recommended Use: For use in test tubes and small samples; recommended for soil and viscous samples. Orion # 8175BNWP (1) Detachable bulb guard included</p> 	 <p>Orion 81-65 ROSS Sure-Flow Combination with epoxy body Recommended Use: Field pH measurement where stability and high performance is desired, on-site soil pH. Rugged durable construction. Orion # 8165BN (1) 8165DN (5) Detachable bulb guard included</p> 	 <p>Orion 81-72 ROSS Sure-Flow Combination with glass body Recommended Use: General purpose, superior performance ideal for dirty, difficult samples such as soils, sludges, colloids, viscous materials and organics. Orion # 8172BNWP (1) 8172DN (5) Detachable bulb guard included</p> 	 <p>Orion 8162SC ROSS Combination with glass body, with 14/15 standard taper, screw cap connector Recommended Use: For many titrators or vessels requiring standard taper joint. Orion # 8162SC (3)</p>	 <p>Orion 81-63 ROSS Combination with glass body, spear tip Recommended Use: pH in semisolid food material such as cheese, meat, fruit, bread, and other similar samples. Sample sizes to 100µL. Orion # 8163BNWP (1) 816300 (2) 8163SC (3)</p>	 <p>Orion 8166SC ROSS Combination Sleeve Junction pH Electrode, screw cap connector Recommended Use: For use with most titrators; use in viscous samples where cleaning is an issue. Orion # 8166SC (3)</p>	 <p>Orion 81-01 ROSS pH Half-Cell with glass body Recommended Use: Precise pH determinations for routine or research work. Use with ROSS Reference Electrode 80-03 or 80-05. Orion # 8101BNWP (1) 810100 (2) 8101SC (3)</p>

Orion pH Electrode Specifications

Specifications Common to all ROSS Electrodes

Slope: 92-102% of theoretical Nernst slope
 Isopotential point: pH 7 Accuracy of measuring a pH 6.86 buffer after standardization at 25 °C: Accurate within 0.03 pH for buffer at any temperature between 0-100 °C using automatic temperature compensation. Speed of response in 6.86 buffer going from 25 °C to 75 °C: Response stable to 0.01 pH within 30 seconds Speed of response between 6.86 and 4.01 buffers at 25 °C: Response stable to 0.002 pH within 15 seconds Reference filling solution: 3M KCl (supplied with electrode), Orion 810007 Cap diameters: 16 mm

Orion ROSS® Reference Half-Cell



Temperature Response of the Orion ROSS Electrode Orion 81-02 vs. Conventional Electrode

Orion ROSS	Orion ROSS Reference							
	81-02	81-03	81-04	81-15	81-35	81-55/56	80-03	80-05
pH Range	0-14	0-14	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C
Internal Ref.	ROSS	ROSS	ROSS	ROSS	ROSS	ROSS	ROSS	ROSS
Junction	Ceramic	Ceramic	Ceramic	Glass Fiber	Glass Fiber	Glass Fiber	Sure-Flow	Ceramic
Dimensions	120 mm x 12 mm	165 mm x 6mm (6mm section is 95mm long)	120 mm x 12 mm	165 mm x 6mm (6mm section is 9mm long)	120 mm x 12 mm	120 mm x 12 mm	120 mm x 12 mm	120 mm x 12 mm

Orion ROSS							
	8175BNWP	81-65	81-72	8162SC	81-63	8166SC	81-01
pH Range	0-14	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C
Internal Ref.	ROSS	ROSS	ROSS	ROSS	ROSS	ROSS	NA
Junction	Sure-Flow	Sure-Flow	Sure-Flow	Ceramic	Ceramic	Glass Sleeve	-
Dimensions	165 mm x 6 mm (6 mm section is 95 mm long)	120 mm x 12 mm	120 mm x 12 mm	120 mm x 12 mm	110 mm x 4.5 mm (4.5 mm section is 23 mm long)	120 mm x 12 mm	120 mm x 12 mm

Key

(1) BNC connector, 1 m cable. (2) US standard connector (3) Screw cap connector, requires separate cable.
 (4) Pin Tip Connector (5) Use with Orion 260A, 261, 261S, 265A, 266, 266S All cap diameters are 16 mm at bottom of cap.
 See page 13 for Orion pH electrode cleaning kits.

Orion pH Electrodes

Orion PerpHect®



Orion 8202BN
ROSS® Combination with glass body
Recommended Use: Precise pH determinations. The general purpose, top performance combination electrode. Ideal for Q.C. and research applications.
Orion # 8202BN (1)



Orion 8203BN
ROSS Combination with glass body, semi-micro
Recommended Use: Fits test tubes, measures samples as small as 0.2 mL. For use in clinical, pharmaceutical, and food labs, wherever sample size is a constraint.
Orion # 8203BN (1)



Orion 8235BN
ROSS Combination with epoxy body, flat surface
Recommended Use: pH of soft, moist surfaces both solid and semi-solid such as agar gel plates, meats, bread dough, and similar samples. Small samples in micro sample dish.
Orion # 8235BN (1)



Orion 8256BN
ROSS Combination with epoxy body
Recommended Use: General purpose when precise pH determination is required. Epoxy body for ruggedness and durability.
Orion # 8256BN (1)



Orion 8263BN
ROSS Combination with glass body, spear tip
Recommended Use: pH in semi-solid food material such as cheese, meat, fruit, bread, and other similar samples. Sample sizes to 100 µL.
Orion # 8263BN (1)



Orion 8272BN
ROSS Sure-Flow® Combination with glass body
Recommended Use: General purpose, superior performance ideal for dirty, difficult samples such as soils, sludges, colloids, viscous materials and organics.
Orion # 8272BN (1)
Detachable bulb guard (Orion 910005) included



Orion 9202BN
Combination with glass body
Recommended Use: General purpose pH for accurate Q.C. and research applications.
Orion # 9202BN (1)



Orion 9203BN
Combination with glass body, semi-micro
Recommended Use: Small samples, test tubes. Minimum sample volume 0.2-0.4 mL.
Orion # 9203BN (1)



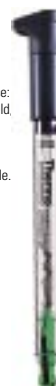
Orion 9206BN
Combination with epoxy body, non-refillable
Recommended Use: Routine pH for rugged use, schools, field and plant applications.
Orion # 9206BN (1)



Orion 9207BN
Epoxy-body, Triode™ 3-in-1 pH/ATC Probe, BNC/phono connectors, non-refillable
Recommended Use: Routine pH. Ideal for field or plant use. Portable, little or no maintenance needed.
Use with Orion PerpHect Meters and SensorLink® Systems.
Orion # 9207BN



Orion 9256BN
Combination with epoxy body
Recommended Use: Routine pH for field, school or lab use. Epoxy body for ruggedness and durability, refillable.
Orion # 9256BN (1)



Orion 9272BN
Glass-body Sure-Flow Combination pH
Recommended Use: General purpose, superior performance ideal for dirty, difficult samples such as soils, sludges, colloids, viscous materials and organics.
Orion # 9272BN (1)

Orion Standard



Orion 91-01
Ag/AgCl pH Half-Cell with glass body
Recommended Use: For accurate, reproducible results. Recommended general use electrode pair. Use with 90-01 Reference Electrode.
Orion # 9101BN (1)
910100 (2)
9101SC (3)
See also ROSS® 81-01 on page 4



Orion 91-02
Combination with glass body
Recommended Use: General purpose pH for accurate Q.C. and research work.
Orion # 9102BNWP (1)
910200 (2)
9102SC (3)
See also ROSS 81-02 on page 5



Orion 91-03
Combination with glass body, semi-micro
Recommended Use: Small samples, test tubes. Minimum sample volume 0.2-0.4 mL.
Orion # 9103BNWP (1)
910300 (2)
9103SC (3)
See also ROSS 81-03 on page 5



Orion 91-04
Combination with glass body, "hard nose" bulb
Recommended Use: For rugged, durable lab use.
Orion # 9104BNWP (1)
910400 (2)
9104SC (3)
See also ROSS 81-04 on page 5



Orion 91-07
Epoxy-Body, Triode™ 3-in-1 pH/ATC Probe. Non-refillable
Recommended Use: Routine pH. Ideal for field or plant use. Portable, little or no maintenance needed.
Orion # 9107BN (1) (4)
9107WP (6) (7) 1M cable
9107WL (6) (7) 6M cable
9107BNMD (9) 1.5M cable
9107WMD (9) 3M cable
9107WLMD (9) 6M cable



Orion 91-09
Epoxy-Body, Triode 3-in-1 pH/ATC Probe. Non-refillable
Recommended Use: Routine pH. Ideal for field or plant use. Portable, little or no maintenance needed.
Orion # 9109WP (5) (7) 1M cable
9109WL (5) (7) 6M cable



Orion 91-55/56
Combination with epoxy body
Recommended Use: Routine pH, for rugged use, for field, school, or lab use. Unbreakable body, refillable.
Orion # 915500 (2)
9156BNWP (1)
9156SC (3)
See also ROSS 81-55/56 on page 5



Orion 91-57
Epoxy-Body, Triode 3-in-1 pH/ATC Probe, BNC/DIN connectors, refillable
Recommended Use: Routine pH. Ideal for field or plant use.
Orion # 9157BN (1) (4)
9157WP (5) (7)
9157BNMD (9) 1M cable



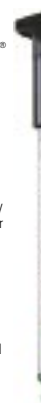
Orion 91-61
Low resistance pH Half-Cell with glass body, rugged bulb
Recommended Use: Routine pH where ruggedness is important. Use with 90-01 Reference Electrode.
Orion # 9161BN (1)
916100 (2)
9161SC (3)



Orion 91-62
Low Resistance Combination with glass body, rugged bulb
Recommended Use: More rugged, use in viscous solutions. Easy-to-clean bulb design.
Orion # 9162BNWP (1)
916200 (2)
9162SC (3)



Orion 9165BNWP
Epoxy-Body Sure-Flow® Combination pH Electrode with BNC Connector
Recommended Use: General purpose, ideal for dirty, difficult samples such as soils, sludges, colloids, viscous solutions. Easy to-clean-junction never clogs.
Orion # 9165BNWP (1)
See also ROSS 81-65 on page 5
Detachable bulb guard included



Orion 91-72
Glass-Body Sure-Flow Combination pH Electrode with BNC Connector
Recommended Use: Same as 9165BN. Ideal for general lab use.
Orion # 9172BNWP (1)
See also ROSS 81-72 on page 4

Orion pH Electrode Specifications

Orion PerpHect®						
	8202BN	8203BN	8235BN	8256BN	8263BN	8272BN
pH Range	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C
Internal Ref.	ROSS	ROSS	ROSS	ROSS	ROSS	ROSS
Junction	Ceramic	Ceramic	Glass fiber	Glass Fiber	Ceramic	Sure-Flow
Dimensions	120 mm x 12 mm	165 mm semi-micro section is 6 x 95 mm	120 mm x 12 mm	120 mm x 12 mm	110 x 4.5 mm 4.5 section is 23 mm	120 mm x 12 mm
Slope	92-102%	92-102%	92-102%	92-102%	92-102%	92-102%
Temp. Acc.	± 0.5 °C	± 0.5 °C	± 0.5 °C	± 0.5 °C	± 0.5 °C	± 0.5 °C

	9202BN	9203BN	9206BN	9207BN	9256BN	9272BN
pH Range	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-90 °C	0-90 °C	0-80 °C	0-80 °C	0-90 °C	0-100 °C
Internal Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Junction	Ceramic	Ceramic	Wick	Glass Fiber	Glass Fiber	Sure-Flow
Dimensions	120 mm x 12 mm	140 mm semi-micro section is 100 x 6.5 mm	165 mm semi-micro section is 95 x 6 mm	120 mm x 12 mm	165 mm x 6 mm (6mm section is 95mm long)	120 mm x 12 mm
Slope	92-102%	92-102%	92-102%	92-102%	92-102%	92-102%
Temp. Acc.	± 0.5 °C	± 0.5 °C	± 0.5 °C	± 0.1 °C (2)	± 0.5 °C	± 0.5 °C

Orion Standard						
	91-01	91-02	91-03	91-04	91-07	91-09
pH Range	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-90 °C	0-90 °C	0-90 °C	0-90 °C	0-90 °C	0-90 °C
Internal Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Junction	NA	Ceramic	Ceramic	Ceramic	Wick	Wick
Dimensions	110 mm x 12 mm	120 mm x 12 mm	140 mm semi-micro section is 100 x 6.5 mm	120 mm x 12 mm	120 mm x 6 mm	120 mm x 12 mm

	91-55/56	91-57	91-61	91-62	91-65	91-72
pH Range	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-90 °C	0-90 °C	0-90 °C	0-90 °C	0-100 °C	0-100 °C
Internal Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Junction	Glass Fiber	Glass Fiber	NA	Ceramic	Sure-Flow	Sure-Flow
Dimensions	120x12 mm	120x12 mm	110x12 mm	120x12 mm	120x12 mm	120x12 mm

Note

Using PerpHect digital LogR™ Meters, 20 °C calibration window (see instruction manual). The PerpHect Triode is offered for measurements where temperature accuracy to 0.1 °C is required, when the digital LogR function is not used. PerpHect LogR temperature measurement and compensation meter specifications are based on the use of PerpHect and PerpHect ROSS brand electrodes. Use of other brand electrodes may impact performance. PerpHect LogR meters and PerpHect ROSS electrodes are protected by U.S. Patents 4,321,544 and 4,495,050; other patents pending. All cap diameters are 16 mm. All PerpHect electrodes have a BNC Connector and 1 m cable.

Key for page 6

- (1) BNC connector, 1 m cable (2) U.S. Standard connector, 1 m cable (3) Screw cap connector, requires separate cable
 (4) Use with Orion 210A/A*, 230A/A*, 250A/A*, 410A/A*, 420A/A*, 520A/A*, 525A/A*, 710A/A*, 720A/A*, 920A/A*
 (5) Use with Orion 260A, 261, 261S, 265A, 266, 266S (6) Use with Orion 260, 265, 1230
 (7) Waterproof EDIN with banana plug (8) MiniDIN connector for Orion Star™ Series meters
 (9) BNC + MiniDIN connector for Orion Star™ Series meters
 All cap diameters are 16 mm except Orion 9157WP, Orion 9109WP and Orion 9109WL are 22 mm maximum See page 13 for Orion pH electrode cleaning kits.

Orion pH Electrodes

Orion KNIpHE®



Orion 71-20
KNIpHE pH Electrode
Stainless steel cutting blade surrounding a special combination pH electrode.
(Available as a kit, see key (3) below)
Recommended Use:
For pH determinations in meats and meat by-products where glass electrodes alone may break
Orion #
7120BN(2) (6)
7121BN Replacement KNIpHE pH Electrode
712001 Replacement Blade
712002 Protective Sheath

Orion No Cal®



Orion 51-07/09
Combination electrode with Epoxy Body
Recommended Use:
Use: Field pH measurement where stability and high performance is desired and when a pH electrode that doesn't require calibration is needed
Orion #
5107NC (4)
5109NC (5)
5107BNMD (7)

New

Orion Economy Line



Orion 91-05/06
Combination with epoxy body.
Non-refillable
Recommended Use:
Routine pH for rugged use, schools, field and plant applications.
Orion #
910500 (1)
9106BNWP



Orion 91-35/36
Combination with epoxy body.
Non-refillable. Flat surface
Recommended Use:
Routine pH for food, agar gel plates.
Orion #
913500 (1)
913600 (2)
See also ROSS Ultra® 81-35U on page 5 and AquaPro below



Orion 91-25/26
Combination with epoxy body.
Non-refillable flask electrode
Recommended Use:
Routine pH for use in long-necked flasks and other tall vessels.
Orion #
912500 (1)
912600 (2)



Orion 91-15/16
Combination with epoxy body.
Non-refillable, semi-micro
Recommended Use:
Routine pH for use in test tubes, small samples.
Orion #
911500 (1)
911600 (2)

Orion Tris Calomel Line



Orion 7102BN
Glass-Body Combination Calomel pH Electrode with screw cap connector
Recommended Use:
Routine pH measurements in all biotech samples. Ideal for use with and in Tris-buffers.
Orion #
7102BN (3)
See also ROSS Ultra® 8102BNUWJP on page 3 and AquaPro below



Orion 7103BN
Glass-Body Semi-Micro Combination Calomel pH Electrode with screw cap connector
Recommended Use:
Small samples, test tubes, same as 71-02. Minimum sample volume: 0.2-0.4 mL.
Orion #
7103BN (3)
See also ROSS Ultra® 8103BNUWJP on page 3 and AquaPro below



Orion 7110BN
Glass-Body Micro Combination Calomel pH Electrode with screw cap connector
Recommended Use:
Very small samples, microtiter plates. Same as 71-02. Minimum volume 0.1 mL.
Orion #
7110BN (3)
711002
Micro Flow Cell For 7110BN Calomel pH Electrode
See also Micro Electrodes on page 10

Orion AquaPro Professional



Orion 9102AP
AquaPro Combination Low Maintenance™ double junction with glass body
Recommended Use:
General purpose pH, double junction, no sample contact with Ag.
Orion #
9102AP (1)



Orion 9103APWP
AquaPro Combination Low Maintenance double junction, glass semi-micro
Recommended Use:
Small samples, test tubes. Minimum sample volume 0.2-0.4 mL.
Orion #
9103APWP (1)



Orion 9104APWP
AquaPro Combination Low Maintenance double junction with glass body, "hard nose" bulb
Recommended Use:
Rugged durable lab use, double junction, no sample contact with Ag.
Orion #
9104APWP (1)



Orion 9115APWP
AquaPro Combination Low Maintenance double junction, epoxy semi-micro
Recommended Use:
Small samples, test tubes. Aqueous solutions only. Minimum sample volume 0.2-0.4 mL.
Orion #
9115APWP (1)



Orion 9135APWP
AquaPro Combination Low Maintenance double junction, epoxy flat-surface
Recommended Use:
pH of moist, surface, both solid and semi-solid such as agar gel plates, meats, bread dough and similar samples. Small samples in micro sample dish.
Orion #
9135APWP (1)



Orion 9156APWP
Combination Low Maintenance double junction with epoxy body
Recommended Use:
Routine pH. Rugged durable lab or field use, double junction.
Orion #
9156APWP (1)

Orion Redox/ORP and ORP Triode™



Orion 9179BNMD
Epoxy Low Maintenance ORP Triode
Recommended Use:
Measurement of oxidation/reduction potential and temperature in water/wastewater, metal plating, and biotech.
Orion #
9179BNMD (7)
9179 (1) (8)



Orion 9180BNWP
Epoxy Refillable ORP Triode
Recommended Use:
Measurement of oxidation/reduction potential and temperature in water/wastewater, metal plating, and biotech.
Orion #
9180BNMD (7)
9180 (1) (8)



Orion 9678BNWP
Epoxy Sure-Flow® Combination Redox/ORP
Recommended Use:
For measurement of reduction/oxidation potential and Redox titrations.
Orion #
9678BNWP (1)
967800 (2)



Orion 9778BNWP
Glass Combination Redox/ORP
Recommended Use:
For measurement of reduction/oxidation potential and Redox titrations.
Orion #
9778BNWP (1)
977800 (2)
9778SC (3)

Orion pH Electrode Specifications

Orion KNIpHE®	Orion No	Orion Tris Calomel Line	Orion Double Junction Ag/AgCl Tris Line*			Orion D/J KNIpHE®*			
	71-20	51-07/09	7102BN	7103BN	7110BN	9102DJWP	9110DJWP	9156DJWP	9120APWP
pH Range	0-14	-2.000 to 16.00	0-14	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-60 °C	0-100 °C	0-90 °C	0-90 °C	0-90 °C	0-60 °C	0-60 °C	0-60 °C	0-60 °C
Internal Ref.	Calomel	Patent pending, Double Junction	Calomel	Calomel	Calomel	Ag/AgCl Double Junction	Ag/AgCl Double Junction	Ag/AgCl Double Junction	Ag/AgCl Double Junction
Junction	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Dimensions	215 mm x 25 mm cap dia 16 mm	120 mm x 12 mm	110 mm x 12 mm (5 mm section is 90 mm long, cap dia 16 mm)	210 mm x 7 mm, cap dia 16 mm	150 mm x 5 mm, 7 mm section is 150 mm long, cap dia 16 mm				

Orion Economy Line					
	91-05/06	91-35/36	91-25/26	91-15/16	91-45
pH Range	0-14	0-12	0-12	0-14	0-14
Temp. Range	0-80 °C	0-80 °C	0-80 °C	0-100 °C	0-80 °C
Internal Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl refillable	Ag/AgCl
Junction	Wick	Wick	Wick	Wick	Wick
Dimensions	120 mm x 12 mm, cap dia 16 mm	110 mm x 12 mm, cap dia 16 mm	165 mm x 6 mm (6mm section is 95mm long)	150 mm x 6 mm	120 mm x 12 mm, cap dia 16 mm

Orion AquaPro Professional							
	9102AP	9103APWP	9104APWP	9107APMD	9115APWP	9135APWP	9156APWP
pH Range	0-14	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-60 °C	0-60 °C	0-60 °C	0-60 °C	0-60 °C	0-60 °C	0-60 °C
Internal Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Junction	Double Junction Open	Double Junction Open	Double Junction Open	Double Junction Epoxy/Open	Double Junction Epoxy/Open	Double Junction Epoxy/Open	Double Junction Epoxy/Open

Orion Redox/ORP and ORP Triode™				
	9179BNMD	9180BNMD	9678BNWP	9778BNWP
Temp. Range	0-90 °C	0-80 °C	0-80 °C	0-100 °C
Internal Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Junction	Wick	Wick	Sure-Flow	Ceramic





Key for page 8

- (1) BNC connector, 1 m cable (2) U.S. Standard connector, 1 m cable (3) Screw cap connector, requires separate cable
 (5) E Din Connector (6) 7120BN KNIpHE Electrode Kit includes: pH Electrode, Electrode Handle, Removable blade, One bottle of Filling Solution and Instruction Manual See page 13 for Orion pH electrode cleaning kits
 (7) BNC Connector MiniDIN Connector for Orion Star™ Series meters 1m cable (8) Same as key 4 on page 7




* Images not available

Orion pH Electrode Specifications

Orion Micro

 <p>Orion 9802BN Glass Micro-pH Electrode, Combination Recommended Use: For test tubes or small containers. Requires only 5 µL of sample. Orion # 9802BN (1)</p>	 <p>Orion 9803BN Small length Glass pH Electrode, Combination Recommended Use: For small test tubes or micro-titer plates. Orion # 9803BN (1)</p>	 <p>Orion 9810BN Glass Micro-pH Electrode, Combination Recommended Use: For gels or smaller sample volumes. Requires only 0.5 µL of sample. Orion # 9810BN (1)</p>	 <p>Orion 9811BN Glass Micro-Sodium Electrode, Combination Recommended Use: Highly selective for sodium. Orion # 9811BN (1)</p>	 <p>Orion 9826BN Glass Micro-pH Electrode, Combination Recommended Use: Designed for NMR cells. Orion # 9826BN (1)</p>	 <p>Orion 9863BN Needle Tip Micro-pH Electrode, Combination 16 gauge, bevel tip Recommended Use: Designed for piercing septa. Orion # 9863BN (1)</p>
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Orion ATC

 <p>ATC Probe with Epoxy Body Recommended Use: Intermittent basis in methanol or ethanol. Orion # 917005 (Pictured) (2) (B) 927005 (3) (C) 917001 (3) (A) 927005MD (6)</p>	 <p>ATC Probe with Glass Body Recommended Use: Solutions containing organic solvents. Orion # 917006 (Pictured) (2) (B) 927006 (3) (C) 917002 (3) (A) 070110 (3) (E) 927006MD (6)</p>	 <p>ATC Probe with Stainless Steel Body Recommended Use: Ideal for in-plant and food applications. Orion # 917007 (Pictured) (2) (B) 917008 (4) (D) 927007 (3) (C) 927007MD (6)</p>
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Orion Micro						
	9802BN	9803BN	9810BN	9811BN	9826BN	9863BN
pH Range	0-14	0-14	0-14	Saturated to 10 ⁻⁶ M Na ⁺	0-14	0-14
Temp. Range	0-80 °C	0-80 °C	0-80 °C	0-80 °C	0-80 °C	0-80 °C
Internal Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Dimensions	150 mm x 6 mm	83 mm x 2.5 mm	120 mm x 6 mm	150 mm x 6 mm	228 mm x 6 mm	137 mm x 7.6 mm
Tip Diameter	2.5 mm	2.5 mm	1.3 mm	3.2 mm	2.5 mm	1.7 mm
Approx. Tip Length	18 mm	48 mm	37 mm	18 mm	228 mm	40 mm
Depth of Immersion	2 mm	2 mm	1 mm	1.5 mm	2 mm	3 mm

Connector Key

(1) All Micro Electrodes have BNC connectors, and 1 m cable (2) DIN Connector (3) Pin Tip Connector (4) Banana Connector (5) BNC connector, 2 M cable (6) MiniDIN connector for Orion Star™ Series meters

Orion Meter Compatibility Key (Denotes Meters Models)

(A) Older Orion Models (B) 210A⁺, 230A⁺, 250A⁺, 290A⁺, 410A⁺, 420A⁺, 520A⁺, 525A⁺, 710A⁺, 720A⁺, 920A⁺ (C) 310, 320, 330, 350, 370, PCM200, PCM500, PCM700, 550A, 535A, 555A, 162A (D) 260, 260A, 261S, 265A, 266S, 545, 550 (E) 399A, 601A⁺, 701A⁺

Orion pH Electrode Specifications

Orion pHuture™

Orion 615700
pHuture Low Maintenance pH Electrode
Epoxy, gel-filled electrode which offers advantage of permanent reference electrolyte.
Recommended Use: When fast pH determination is needed or when glass is undesirable or prohibited.
Orion # 615700 (6) 615701 (7)

Orion 616500
pHuture Sure-Flow pH Electrode
Free-Flowing liquid to liquid junction that ensures stable drift-free measurements and never clogs.
Recommended Use: When glass is undesirable or prohibited. Great candidate for viscous samples, semi-solid materials, slurries or emulsions.
Orion # 616500 (6) 616501 (7)

Orion pHuture MMS™

Orion 616600
pHuture Sure-Flow® pH/Temp Triode Electrode
Free-Flowing liquid to liquid junction that ensures stable drift-free measurements and never clogs.
Recommended Use: Ideal when glass is undesirable or prohibited. For viscous samples, semi-solid materials, slurries or emulsions.
Orion # 616600 (8)

Orion 617900
pHuture Sure-Flow pH/ORP/Temp Quatrode Electrode
Free-Flowing liquid to liquid junction that ensures stable drift-free measurements and never clogs.
Recommended Use: Ideal when glass is undesirable or prohibited. For viscous samples, semi-solid materials, slurries or emulsions.
Orion # 617900 (8)

Orion Sure-Flow® Reference

Orion 900100
Ag/AgCl Single Reference Half-Cell with epoxy body, Sure-Flow junction
Recommended Use: For many ISE determinations. For routine pH measurements with 91-01 or 91-61 Electrodes. Sure-Flow Junction for easy cleaning.
Orion # 900100 (9)

Orion 900200
Ag/AgCl Double Junction Reference Half-Cell with epoxy body, Sure-Flow junction
Recommended Use: Use for all ISE determinations. Use a variety of filling solutions. Sure-Flow junction for easy cleaning.
Orion # 900200 (9)

Orion 900400
Ag/AgCl Reservoir Reference Half-Cell with epoxy body, Sure-Flow junction
Recommended Use: Filling solutions reservoir eliminates need for frequent refilling. For prolonged pH determinations.
Orion # 900400 (9)

Orion Steam Sterilizable

Orion 9190SC
Steam Sterilizable pH Electrode
Recommended Use: pH electrode for cell culture, benchtop fermentation and other applications
Orion # 9190SC (10)

Orion 9195SC
Steam Sterilizable pH Electrode
Recommended Use: Double junction design, provides excellent stability during fermentation cycles
Orion # 9195SC (10)

	Orion pHuture		Orion pHuture MMS™		Orion Sure-Flow® Reference		
	615700	616500	616600	617900	900100	900200	900400
pH Range	0-14	0-14	0-14	0-14	-	-	-
Temp. Range	0-85 °C	0-85 °C	-	-	0-100 °C	0-100 °C	0-100 °C
Rel Millivolt Range	-	-	± 1999.9	± 1999.9	-	-	-
Conductivity Range	-	-	-	-	-	-	-
Connector Type	8 pin DIN	8 pin DIN	13 pin DIN	13 pin DIN	Pin Tip	Pin Tip	Pin Tip
Type Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Junction	Wick	Sure-Flow	Sure-Flow	Sure-Flow	Sure-Flow	Sure-Flow	Sure-Flow
Dimensions	120 mm x 12 mm, cap dia 16 mm	110 mm x 13 mm, cap dia 16 mm	110 mm x 13 mm, cap dia 16 mm	110 mm x 13 mm, cap dia 16 mm	110 mm x 13 mm cap dia 16 mm	110 mm x 13 mm cap dia 16 mm	110 mm x 13 mm cap dia 16 mm

Orion Steam Sterilizable						
	9190SC (10)	9191SC* (10)	919200* (10)	9193SC* (10)	919400* (11)	9195SC (10)
pH Range	0-14	0-14	0-14	0-14	0-14	0-14
Temp. Range	0-130 °C	0-130 °C	0-130 °C	0-130 °C	0-130 °C	0-130 °C
Type Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Junction	Single	Single	Single	Double	Double	Double
Dimensions	120 mm x 12 mm, cap dia 16 mm	230 mm x 12 mm with reservoir (50x25)	120 mm x 12 mm with reservoir (50x25)	230 mm x 12 mm with reservoir (50x25)	110 mm x 12 mm with reservoir (50x25)	100 mm x 12 mm with reservoir (130x25)

* Images not available

Orion pH Electrode Specifications

Orion Specialty




Orion 9163SC
Combination with glass body, spear tip
Recommended Use: For piercing soft, moist samples such as meats, fruits, cheeses, agar plates
Orion # 9163SC (3)
See also ROSS® 81-63 on page 4



Orion 91-64
Ag/AgCl Glass Combination Electrode with 14/15 standard taper and screw cap connector
Recommended Use: For many titrators, or any vessel requiring standard taper joint.
Orion # 9164SC (3) 9164DN (5)
See also ROSS 8162SC on page 4



Orion 9166SC
Combination Glass Body, Sleeve Junction, pH Electrode with screw cap connector
Recommended Use: For use with most titrators, use in thick, viscous samples.
Orion # 9166SC (3)
See also ROSS 8166SC on page 4



Orion 9167SC
Combination Glass Body, Semi Micro, Flat Surface pH Electrode with screw cap connector
Recommended Use: Surface pH in biological samples, microtiter plates and small volume samples.
Orion # 9167SC (3)
See also Micro Electrodes on page 10



Orion 930101
HF-Resistant pH Electrode
Recommended Use: For pH determinations in hydrofluoric or other acid fluoride. Use with 93 Series Electrode body and 90-02 Reference Electrode, see page 30.
Orion # 930101 (4) (Module only)



Orion 9342BN
Surfactant Half-Cell
Recommended Use: For surfactant titrations. Designed for use on 960 autochemistry system.
Orion # 9342BN (2)

Orion Silver Billet/KF Double Platinum



Orion 9780SC
Combination Silver Billet
Recommended Use: For halide titrations.
Orion # 9780SC (3)



Orion 9781SC
Silver Billet Half-Cell
Recommended Use: For halide titrations.
Orion # 9781SC (3)



Orion 977900
Glass KF Double Platinum
Recommended Use: For Karl Fischer titrations.
Orion # 977900 (6)

Orion Specialty

	9163SC	91-64	9166SC	9167SC	930101	9342BN
pH Range	0-14	0-14	0-14	0-14	0-14	-
Temp. Range	0-90 °C	0-100 °C	0-100 °C	0-100 °C	0-40 °C	0-40 °C
Type Ref.	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Junction	Ceramic	Ceramic	Glass Sleeve	Ceramic	-	-
Dimensions	95 mm x 4 mm, (4 mm section is 20 mm long)	100 mm (from joint top) x 12 mm)	125 mm x 6 mm (6 mm section is 15 mm long)	105 mm x 4 mm (4 mm section is 20 mm long)	120 mm x 12 mm	120 mm x 12 mm

Key

(1) U.S. Standard connector, 1 m cable (2) BNC connector, 1 m cable (3) Screw cap connector, requires separate cable (4) Module only requires separate 93 Series electrode body (5) DIN Connector, 1 m cable (6) Double pin-tip connector (for KF titrations), 1 m cable (7) For use with Orion 610 and Orion 620 only (8) pHuture probe with conversion box for electrode use with any pH meter with BNC input (9) For use with Orion 555A, 535A, 635 and 630 only (10) Pin Tip Connector. 1M cable (11) Screw Cap Connector, requires separate cable (See pages 19 and 20) (12) Stripped wires See page 13 for Orion pH electrode cleaning kits.

Orion pH Electrode Support

Thermo Electron offers pH electrode cleaning kits to maximize the life of your pH electrode. The Sample Kit, includes one bottle each of the four Orion cleaning solutions with a beaker and a pipette. The solutions may be purchased in four bottle kits of a single cleaning solution as well. Thermo Electron also offers storage solution and rinse solution for proper electrode care.

Thermo Electron's bulb guard protects 12 mm glass pH electrodes to reduce breakage. ionplus® Stirring Accessory fits all 12 and 13 mm combination electrodes for stirring without stir bars. Storage bottles protect electrode when not in use.



Orion pH Electrode Cleaning Solution Kit

Ordering Information		
For the Following Orion pH Electrode Models	Use the Recommended Orion Filling Solution	Orion #
ROSS Ultra™, ROSS® and PerpHect® ROSS Electrodes: 80-03, 80-05, 80-05U, 81-02, 81-02U, 81-03, 81-03U, 81-04, 81-04U, 81-15, 81-15U, 81-35, 81-35U, 81-55, 81-56, 81-56U, 81-62, 81-63, 81-65, 81-66, 81-72, 81-75, 82-02, 82-03, 82-35, 82-56, 82-63, 82-72, 98-30	3 M KCl (1), five 60 mL bottles	810007
Ag/AgCl D/J Electrodes: 9102DJWP, 9110DJWP, 9120APWP	3 M KCl, five 60 mL bottles	910008
Standard Line Ag/AgCl Electrodes: 91-02, 91-03, 91-04, 91-55, 91-56, 91-57, 91-62, 91-63, 91-64, 91-65, 91-66, 91-67, 91-72	4 M KCl saturated with Ag, five 60 mL bottles or	900011 or
PerpHect Ag/AgCl & Sure-Flow® Reservoir Reference Electrodes: 92-02, 92-03, 92-56, 92-72, 90-04	2 M KCl saturated with Ag (for low ionic strength samples), five 60 mL bottles	900004
Ag/AgCl Micro pH Electrodes: 98-02, 98-03, 98-10, 98-26, 98-63	4 M KCl saturated with Ag, five 60 mL bottles	900011
Micro Sodium Electrode: 98-11	2 M KCl saturated with Ag, five 60 mL bottles	900004
Steam Sterilizable Electrodes: 91-90, 91-91, 91-92, 91-93, 91-94, 91-95	Viscous 3 M KCl, five 60 mL bottles	900019
Tris Line and KNlpHE® Electrodes: 71-02, 71-03, 71-10, 71-20	4 M KCl for calomel electrodes, five 60 mL bottles	900014
pHuture® pH Electrode: 61-65, 61-66, 61-79	KCl saturated with Ag for pHuture Sure Flow, five 60 mL bottles	610011
Sure-Flow Single Junction Reference Electrode: 90-01	Equitransferent solution saturated with AgCl (2), five 60 mL bottles	900001
Sure-Flow Double Junction Reference Electrode: 90-02	Equitransferent solution saturated with AgCl for Inner chamber (2), five 60 mL bottles 10% KNO ₃ for Outer chamber (2), five 60 mL bottles	900002 900003
No Cal® pH Electrode: 51-07, 51-09	No Cal Electrode Filling Solution, five 60 mL bottles	510011

Ordering Information	
Description	Orion #
pH Storage Solution 475 mL (Pint) bottle 60 mL (2 oz.) bottles, 5 pack 19 L (5 gallon) cubitainer	910001 910060 9100CB
pH Rinse Solution perpHect® individual rinse pouch, 10 pack perpHect individual rinse pouch, 25 pack	911110 911125
pH Electrode Cleaning Solutions pH Cleaning Solution Sample Kit – Includes one bottle each of cleaning solutions A, B, C and D, 15 mL Beaker and Pipette pH Cleaning Solution A – For removing protein contaminants. Includes four 1 oz. bottles, 15 mL Beaker and Pipette pH Cleaning Solution B – For general cleaning and removing bacterial contaminants. Includes four 2 oz. bottles, 15 mL Beaker and Pipette pH Cleaning Solution C – For general cleaning. Includes four 1 oz. bottles, 15 mL Beaker and Pipette pH Cleaning Solution D – For removing oil and grease contaminants. Includes four 2 oz. bottles, 15 mL Beaker and Pipette	900020 900021 900022 900023 900024
Bulb Guard, pack of 5	910005
12 mm Electrode Storage Bottles, pack of 3	910003
ionplus Stirring Accessory	900060
8 mm Electrode Storage Bottles, pack of 3	910004
6 mm Electrode Storage Bottles, pack of 3	910006

Keys

(1) Use only ROSS Reference Filling Solution, Orion 810007, to prevent damaging ROSS Ultra and ROSS Electrodes (2) When Sure-Flow Reference Electrodes are used with Orion Ion Selective Electrodes, consult your Orion ISE instruction manual for recommended filling solutions.

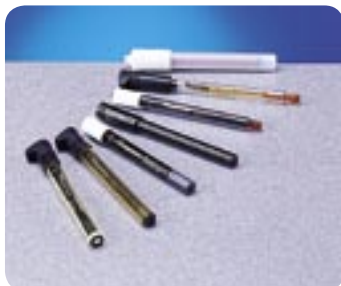
Introduction to Orion ISE & ORP Electrodes

Application

Measurement by ion selective electrode (ISE) is applicable in virtually every laboratory. Measure ion concentrations in such samples as water, food, pharmaceuticals, and biological samples. Analytical methods using ISEs have been developed and published throughout the world. The main advantages of electrode technology are the variety of analytical methods available. Choice of measurement method improves accuracy and reproducibility of results. Direct measurement is the most commonly used electrode method. Sample concentration is directly read on a specific ion meter or from a calibration curve. Incremental methods increase the number of measurable species. With these methods, electrode calibration is unnecessary, making them useful when measuring complex samples. Electrodes can also be used as end point detectors in titrations.

Save Time and Money

Electrode measurements are simpler and faster than other analytical techniques. Time-consuming sample preparation steps such as filtrations and distillations are rarely needed. Analysis time is typically under one minute. A direct readout meter displaying concentration in units of your choice is the fastest, easiest ISE measurement system. Orion ISE/pH meters display concentration in units of your choice, completing the ISE measurement system. In comparison to other methods, such as atomic absorption or ion chromatography, the initial cost of setup is less and does not require additional expensive readout equipment. Methods are adaptable to both lab and field use. Sample color or turbidity does not affect the measurement. ISEs are inexpensive. Typically, the cost per test is only a few cents. The design of the sensing element determines the sensitivity and selectivity for the ion of interest. Orion ISEs have been designed to provide you with the optimum in performance and reliability.



Orion Ion Selective Electrodes

Half-Cell Ion Selective Electrodes

Solid State Half-Cell Ion Selective Electrodes

- Fluoride, Bromide, Cadmium, Chloride, Cupric, Cyanide, Iodide, Lead, Silver/Sulfide, Thiocyanate

Plastic Membrane Half-Cell Ion Selective Electrodes

- Ammonium, Calcium, Chloride, Fluorocarbonate, Nitrate, Nitrite, Perchlorate, Potassium, Water Hardness

ROSS® Half-Cell Ion Selective Electrodes

- Sodium

Gas Sensing Combination Ion Selective Electrodes

Gas Sensing Combination Ion Selective Electrodes

- Ammonia, Carbon Dioxide, Nitrogen Dioxide, Oxygen/BOD

ionplus® Sure-Flow® Combination Ion Selective Electrodes

96 Series ionplus Sure-Flow Combination Ion Selective Electrodes

- Fluoride, Chloride, Bromide, Cadmium, Cupric, Cyanide, Iodide, Lead, Silver/Sulfide

97 Series ionplus Sure-Flow Combination Ion Selective Electrodes

- Calcium, Nitrate, Potassium, Nitrite

ROSS Sure-Flow Combination Ion Selective Electrodes

- Sodium

Redox (ORP) Electrodes

Epoxy ORP Triodes™

- Refillable and Low Maintenance

Combination ORP

- Epoxy Sure-Flow®, Glass

Orion ISE Electrode Specifications

Orion ISE									
Species	Catalog number	Connector number	Construction	Construction range	Optimum temperature range	Required reference catalog number	Reference filling solution catalog number	Calibration standards catalog number	Required ISA(1) catalog number
Ammonia (NH ₃)	951201, 9512BNWP	U.S. Std., BNC (4)	Gas sensing combination	1.0 to 5 x 10 ⁻⁷ M 17,000 to 0.01 ppm	0 - 50 °C	Included	951202 inner	0.1 M NH ₄ Cl / 951211	951006
Ammonium (NH ₄ ⁺)	931801	Sensing module (3)	Plastic membrane half-cell	1.0 to 5 x 10 ⁻⁷ M 17,000 to 0.01 ppm	0 - 50 °C	900200	900002 inner / 900018 outer	1000 ppm as N / 951007	-
Bromide (Br ⁻) ionplus® Design	963500, 9635BNWP	U.S. Std., BNC (4)	ionplus Sure-Flow® solid state combination	1.0 to 5 x 10 ⁻⁶ M 79,900 to 0.40 ppm	0 - 80 °C	Included	900063	0.1 M NaBr / 940011	940011
Bromide (Br ⁻)	943500, 9435BN, 9435SC	U.S. Std., BNC (4), screw cap (2)	Solid state half-cell	1.0 to 5 x 10 ⁻⁶ M 79,900 to 0.40 ppm	0 - 80 °C	900200	900002 inner / 900003 outer	0.1 M NaBr / 943506	940011
Cadmium (Cd ²⁺) ionplus Design	964800, 9648BNWP	U.S. Std., BNC (4)	ionplus Sure-Flow solid state combination	10 ⁻¹ to 10 ⁻⁷ M 11,200 to 0.01 ppm	0 - 80 °C	Included	900061	Consult instruction manual	940011
Cadmium (Cd ²⁺) ionplus Design	944800, 9448BN, 9448SC	U.S. Std., BNC (4), screw cap (2)	Solid state half-cell	10 ⁻¹ to 10 ⁻⁷ M 11,200 to 0.01 ppm	0 - 80 °C	900200	900002 inner / 900003 outer	Consult instruction manual	940011
Calcium (Ca ²⁺)	932000, 9320BN	U.S. Std., BNC (4)	Plastic membrane half-cell	1.0 to 5 x 10 ⁻⁷ M 40,100 to 0.02 ppm	0 - 40 °C	900100	900011	0.1 M CaCl ₂ / 922006 100 ppm CaCO ₃ / 923206	932011
Calcium (Ca ²⁺) ionplus Design	9720BNWP	BNC (4)	ionplus Sure-Flow Plastic membrane combination	1.0 to 5 x 10 ⁻⁷ M 40,100 to 0.02 ppm	0 - 40 °C	Included	900061	0.1 M CaCl ₂ / 922006 100 ppm CaCO ₃ / 923206	932011
Carbon Dioxide (CO ₂)	950200, 9502BNWP	U.S. Std., BNC (4)	Gas sensing combination	10 ⁻² to 10 ⁻⁴ M 440 to 4.4 ppm	0 - 50 °C	Included	950202	0.1 M NaHCO ₃ / 950206 1000 ppm as CaCO ₃ / 950207	950210
Chloride (Cl ⁻) ionplus Design	961700, 9617BNWP	U.S. Std., BNC (4), screw cap (2)	Solid state half-cell	1.0 to 5 x 10 ⁻⁶ M 35,500 to 1.8 ppm	0 - 80 °C	900200	900002 inner / 900003 outer	0.1 M NaCl / 941706 100 ppm Cl ⁻ / 941707 1000 ppm Cl ⁻ / 941708	940011 or 941709 / CISA
Chloride (Cl ⁻)	941700, 9417BN, 9417SC	U.S. Std., BNC (4), screw cap (2)	Solid state half-cell	1.0 to 5 x 10 ⁻⁶ M 35,500 to 1.8 ppm	0 - 80 °C	900200	900002 inner / 900003 outer	0.1 M NaCl / 941706 100 ppm Cl ⁻ / 941707 1000 ppm Cl ⁻ / 941708	940011 or 941709 / CISA
Chloride (Cl ⁻)	931701	Sensing module (3)	Plastic membrane half-cell	1.0 to 5 x 10 ⁻⁶ M 35,500 to 0.18 ppm	0 - 50 °C	900200	900002 inner / 0.1 M KCl outer	0.1 M NaCl / 941706 100 ppm Cl ⁻ / 941707 1000 ppm Cl ⁻ / 941708	None required
Chloride (Cl ₂)	977000, 9770BNWP, 9770SC	U.S. Std., BNC (4), screw cap (2)	Solid state combination	3 x 10 ⁻⁴ to 10 ⁻⁷ M 20 to 0.01 ppm	0 - 50 °C	Included	None required	100 ppm as Cl ₂ / 977007	977010 / iodide reagent 977011 / acid reagents
Cupric (Cu ²⁺) ionplus Design	962900, 9629BNWP	U.S. Std., BNC (4)	ionplus Sure-Flow Solid state combination	0.1 to 10 ⁻⁸ M 6350 to 6.4 x 10 ⁻⁴ ppm	0 - 80 °C	Included	900063	0.1 M Cu(NO ₃) ₂ / 942906	940011
Cupric (Cu ²⁺)	942900, 9429BN, 9629SC	U.S. Std., BNC (4), screw cap (2)	Solid state half-cell	0.1 to 10 ⁻⁸ M 6350 to 6.4 x 10 ⁻⁴ ppm	0 - 80 °C	900200	900002 inner / 900003 outer	0.1 M Cu(NO ₃) ₂ / 942906	940011

Orion ISE Electrode Specifications

Orion ISE									
Species	Catalog number	Connector number	Construction	Construction range	Optimum temperature range	Required reference catalog number	Reference filling solution catalog number	Calibration standards catalog number	Required ISA(1) catalog number
Cyanide (CN ⁻) ionplus Design	960600, 9606BNWP	U.S. Std., BNC (4)	ionplus Sure-Flow® solid state combination	10 ⁻² to 8 x 10 ⁻⁶ M 260 to 0.2 ppm	0 - 80 °C	Included	900062	Consult instruction manual	951011
Cyanide (CN ⁻)	940600, 9406BN, 9406SC	U.S. Std., BNC (4), screw cap (2)	solid state combination	10 ⁻² to 8 x 10 ⁻⁶ M 260 to 0.2 ppm	0 - 80 °C	Included	900062	Consult instruction manual	951011
Fluoride (F ⁻) ionplus Design	960900, 9609BNWP	U.S. Std., BNC (4)	ionplus Sure-Flow® solid state combination	Saturated to 10 ⁻⁶ M saturated to 0.02 ppm	0 - 80 °C	Included	900061	0.1 M NaF/940906 100 ppm F ⁻ / 940907 1 ppm F ⁻ w/TISAB II / 040906 2 ppm F ⁻ w/ TISAB II / 040908	940909 / TISAB II 940911 / TISAB III
Fluoride (F ⁻)	940900, 9409BN, 9409SC	U.S. Std., BNC (4), screw cap (2)	Solid state half-cell	Saturated to 10 ⁻⁶ M saturated to 0.02 ppm	0 - 80 °C	900100	900001	0.1 M NaF/940906 100 ppm F ⁻ / 940907 1 ppm F ⁻ w/TISAB II / 040906 2 ppm F ⁻ w/TISAB II / 040907 10 ppm F ⁻ w/TISAB II / 940908	940909 / TISAB II 940911 / TISAB III
Fluoroborate (BF ₄ ⁻)	930500, 9305BN	U.S. Std., BNC (4)	Plastic membrane half-cell	1.0 to 7 x 10 ⁻⁶ M 86,800 to 0.6 ppm	0 - 40 °C	900200	900002 inner dilute ISA outer	Consult instruction manual	930711
Iodide (I ⁻) ionplus Design	965300, 9653BNWP	U.S. Std., BNC (4)	ionplus Sure- Flow solid state combination	1.0 to 5 x 10 ⁻⁸ M 20,700 to 0.2 ppm	0 - 80 °C	Included	900063	0.1 M NaI / 945306	940011
Iodide (I ⁻)	945300, 9453BN, 9453SC	U.S. Std., BNC (4), screw cap (2)	Solid state half-cell	1.0 to 5 x 10 ⁻⁸ M 127,000 to 5 x 10 ⁻³ ppm	0 - 80 °C	900200	900002 inner / 900003 outer	0.1 M NaI / 945306	940011
Lead (Pb ₂ ⁺) ionplus Design	968200, 9682BNWP	U.S. Std., BNC (4)	ionplus Sure- Flow solid state combination	0.1 to 10 ⁻⁶ M 20,700 to 0.2 ppm	0 - 80 °C	Included	900062	0.1 M Pb(ClO ₄) ₂ / 948206 0.1 M Na ₂ SO ₄ / 948207	Consult instruction manua
Lead (Pb ₂ ⁺)	948200, 9482BN, 9482SC	U.S. Std., BNC (4) screw cap (2)	Solid state half-cell	0.1 to 10 ⁻⁶ M 20,700 to 0.2 ppm	0 - 80 °C	900200	900002 inner / 900003 outer	0.1 M Pb(ClO ₄) ₂ / 948206 0.1 M Na ₂ SO ₄ / 948207	Consult instruction manual
Nitrate (NO ₃ ⁻) ionplus Design	9707BNWP	BNC (4)	ionplus Sure- Flow plastic membrane combination	1.0 to 7 x 10 ⁻⁶ M 14,000 to 0.1 ppm as N	0 - 40 °C	Included	900046	0.1 M NaNO ₃ / 920706 1000 ppm N / 920707 100 ppm N / 930707	930711 or 930710 / nitrate ISS
Nitrate (NO ₃ ⁻)	930700, 9307BNWP	U.S. Std., BNC (4)	Plastic membrane half-cell	1.0 to 7 x 10 ⁻⁶ M 14,000 to 0.1 ppm as N	0 - 40 °C	900200	900002 inner / 900046 or dilute ISA outer	0.1 M NaNO ₃ / 920706 1000 ppm N / 920707 100 ppm N / 930707	930711 or 930710 / nitrate ISS
Nitrite (NO ₂ ⁻) ionplus Design	9746BNWP	BNC (4)	ionplus Sure- Flow plastic membrane combination	1.4 x 10 ⁻² to 3.6 x 10 ⁻⁶ M 100 to 0.02 ppm	0 - 40 °C	Included	900046	0.1 M NaNO ₂ / 954606	934610
Nitrite (NO ₂ ⁻)	934600, 9346BN	U.S. Std., BNC (4)	Plastic membrane half-cell	1.4 x 10 ⁻² to 3.6 x 10 ⁻⁶ M 100 to 0.02 ppm	0 - 40 °C	900100	900046	0.1 M NaNO ₂ / 954606	934610
Nitrogen Oxide (NO _x)	954600, 9546BN	U.S. Std., BNC (4)	Gas sensing combination	5 x 10 ⁻³ to 4 x 10 ⁻⁶ M 230 to 0.18 ppm	0 - 50 °C	Included	954602	0.1 M NaNO ₂ / 954606	956410
Oxygen (O ₂)	970800, 9708BNWP	U.S. Std., BNC (4)	Gas sensing combination	0 to 14 ppm (nominal)	0 - 45 °C	Included	None required	None required	None required

Orion ISE & ORP Electrode Specifications

Orion ISE									
Species	Catalog number	Connector number	Construction	Construction range	Optimum temperature range	Required reference catalog number	Reference filling solution catalog number	Calibration standards catalog number	Required ISA(1) catalog number
Perchlorate (ClO ₄ ⁻)	938101	Sensing module (3)	Plastic membrane half-cell	1.0 to 7 x 10 ⁻⁶ M 99,500 to 0.7 ppm	0 - 40 °C	900200	900002 inner / dilute ISA outer	Consult instruction manual	930711
Potassium (K ⁺) ionplus® Design	9719BNWP	BNC (4)	ionplus Sure-Flow® plastic membrane combination	1.0 to 10 ⁻⁶ M 39,000 to 0.04 ppm	0 - 40 °C	Included	900065	0.1 M KCl / 921906	931911
Potassium (K ⁺)	931900, 9319BNWP	U.S. Std., BNC (4)	Plastic membrane half-cell	1.0 to 10 ⁻⁶ M 39,000 to 0.04 ppm	0 - 40 °C	900200	900002 inner / dilute ISA outer	0.1 M KCl / 921906	931911
Redox/ORP	967800, 9678BNWP	U.S. Std., BNC (4)	Epoxy Sure-Flow combination	–	0 - 80 °C	Included	900001 or 900011	967901 or 967961	None required
Redox/ORP	977800, 9778BNWP	U.S. Std., BNC (4)	Glass combination	–	0 - 75 °C	Included	900001 or 900011	967901 or 967961	None required
Redox/ORP/Temp	9179BNWP	BNC, 8 pin, DIN ATC (4)	Epoxy Triode™ Low Maintenance	–	0 - 80 °C	Included	None required	967901 or 967961	None required
Redox/ORP/Temp	9180BNWP	BNC, 8 pin, DIN ATC (4)	Epoxy refillable Triode	–	0 - 80 °C	Included	900011	967901 or 967961	None required
Silver/Sulfide (Ag ⁺ /S ₂ ⁻) ionplus Design	961600, 9616BNWP	U.S. Std., BNC (4)	ionplus Sure-Flow solid state combination	1.0 to 10 ⁻⁷ M 107,900 to 0.01 ppm as Ag ⁺ ; 32,100 to 0.003 ppm as S ₂ ⁻	0 - 80 °C	Included	900062 or 900067 for Ag ⁺ or 900061 for S ₂ ⁻	Consult instruction manual	940011 for Ag ⁺ 941609 for S ₂ ⁻
Double/Platinum (KF)	977900	Double pin tip	Glass	Endpoint indicator	0 - 40 °C	None required	None required	None required	None required
Silver/Sulfide (Ag ⁺ /S ₂ ⁻)	941600, 9416BN, 9416SC	U.S. Std., BNC (4), screw cap (2)	Solid state half-cell	1.0 to 10 ⁻⁷ M 107,900 to 0.01 ppm as Ag ⁺ ; 32,100 to 0.003 ppm as S ₂ ⁻	0 - 80 °C	900200	900002 inner / 900003 outer	Consult instruction manual	940011 for Ag ⁺ 941609 for S ₂ ⁻
Silver Billet	9780SC	Screw cap (2)	Silver combination	Endpoint indicator	0 - 80 °C	Included	900011	Call Thermo for information	None required
Silver Billet	9781SC	Screw cap (2)	Silver half-cell	Endpoint indicator	0 - 80 °C	900200	900002 inner / 900003 outer	Call Thermo for information	None required
Sodium (Na ⁺)	8411BNWP	BNC (4)	ROSS® half-cell	Saturated to 10 ⁻⁶ M saturated to 0.02 ppm	0 - 100 °C	800500 800300, or 800500U	900010 or 900012 for low level Na ⁺	10 ppm Na ⁺ / 941105 100 ppm Na ⁺ / 941107 1000 ppm Na ⁺ / 841108 KA Std KA Kit, 1 M NaCl / 650700 0.1 M NaCl / 941706	841111 / 841113 / recondition solution
Sodium (Na ⁺)	8611BNWP	BNC (4)	ROSS Sure-Flow combination	Saturated to 10 ⁻⁶ M saturated to 0.02 ppm	0-100 °C	Included	900010 or 900012 for low level Na ⁺	10 ppm Na ⁺ / 941105 100 ppm Na ⁺ / 941107 1000 ppm Na ⁺ / 841108 KA Std, KA Kit, 1 M NaCl / 650700 0.1 M NaCl / 941706	841111
Surfactant	9342BN	BNC (4)	Plastic membrane half-cell	Endpoint indicator	0 - 40 °C	900200	900002 inner / 810007 outer	0.5 M Hyamine titrant 654201	654203 / sample additive
Thiocyanate (SCN ⁻)	945800, 9458BN, 9458SC	U.S. Std., BNC (4), screw cap (2)	Solid state half-cell	1.0 to 5 x 10 ⁻⁶ M 58,100 to 0.29 ppm	0 - 50 °C	900200	900002 inner / 900003 outer	Consult instruction manual	940011
Water Hardness (X ²⁺)	933200, 9332BN	U.S. Std., BNC (4)	Plastic membrane half-cell	1.0 to 6 x 10 ⁻⁶ M	0 - 50 °C	900100	900011	100 ppm CaCO ₃ / 923206 0.1 M CaCl ₂ / 922006	None required

Key

- (2) Screw cap connector requires separate cable
- (3) Sensing modules require 93 Series electrode handle
- (4) U.S. Std. and BNC electrodes have 1 m cables

Orion Star Series™ Electrode Connectors

Connectors that stay dry and stay connected

Connector/cable close-up. If you have ever lost data – or even an electrode – because of a failed connection, you'll appreciate Star Series' proprietary waterproof BNC and MiniDIN locking connectors used to connect Orion Star™ Series electrodes with MiniDIN connectors to older Orion meters.



New Connector MiniDIN

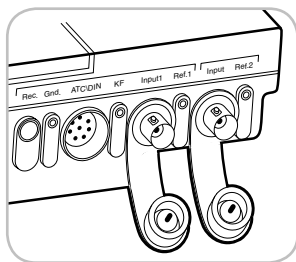
Orion Star Series Electrode Adapter Cables		
Description	Orion Meter Capabilities	Orion #
MiniDIN ATC to 3.5 mm PINTIP	Used on Orion 310, 320, 330, 370, PCM200, PCM500, PCM700, 550A, 535A, 555A, 162A	1010050
MiniDIN ATC to 8 PIN DIN ATC	Used on Orion 210A ⁺ , 230A ⁺ , 250A ⁺ , 290A ⁺ , 410A ⁺ , 420A ⁺ , 520A ⁺ , 525A ⁺ , 710A ⁺ , 920A ⁺	1010051
MiniDIN DO to 8 PIN WPDIN DO (Waterproof)	Used on Orion 830A, 835A and 862A	1010800
MiniDIN DO to 8 PIN DIN DO (Not Waterproof)	Used on Orion 805, 810, 850 and PCM800	1010801
MiniDIN Conductivity to 8 PIN WPDIN Conductivity (Waterproof)	Used on Orion 1230, 555A, 550A, 550, 162A, 162, 142, 135, 130, 128	1010900
MiniDIN Conductivity to 8 PIN PIN Conductivity (Not Waterproof)	Used on Orion 150, 145, 125, 115, 105, PCM100	1010901

Orion Electrode Connectors

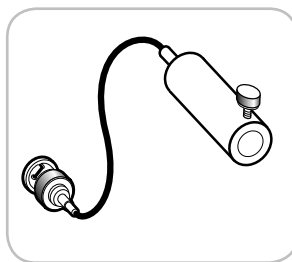
Thermo Electron offers many pH/ISE and ATC probes with different cable connectors. With Orion electrode adapters and detachable electrode cables, you can use many of Thermo Electron's Orion pH/ISE and ATC probes on many

different brands of meters. Refer to the table on the following page to select the appropriate cable or adapter to fit your meter or titrator. One electrode cable or adapter assembly is interchangeable between different Orion electrodes.

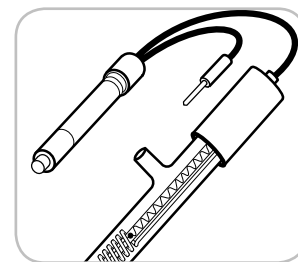
Guide to Orion Adapters



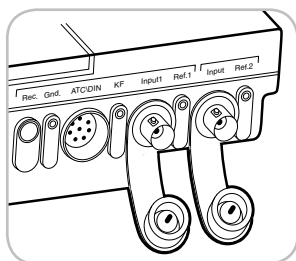
Meter or Titrator



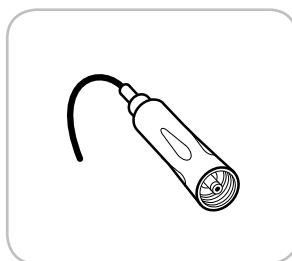
Adapter



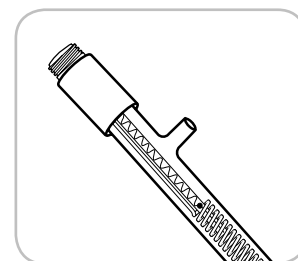
Electrode



Meter or Titrator



Screw Cap Cable Assembly



Screw Cap Electrode



1. BNC Connector



2. U.S. Standard Connector



3. Screw Cap Connector



4. Pin Tip Connector

Types of Connectors on Orion Electrodes:

- | | |
|-------------------------------------|--|
| 1. BNC Connector | Most designated with a (BN) on the end of Electrode Orion # (Ex. Orion 9409BN) |
| 2. U.S. Std. Connector | Most designated with a (00) on the end of Electrode Orion # (Ex. Orion 813500) |
| 3. Screw Cap Connector | Most designated with a (SC) on the end of Electrode Orion # (Ex. Specialty/Titration Electrodes) |
| 4. Pin Tip Connector | Designated with (00) on the end of Electrode Orion for Reference Electrode in Half-Cell Systems (Ex. Orion 800500) |
| 5. MiniDIN | Designated with a (MD) on the end of Electrode Orion # (Ex. 927007MD) |
| 6. 8 Pin H ₂ O proof DIN | Most designated with (A) on end of Electrode Orion # (Ex. 013005A) |
| 7. 8 Pin DIN | Most designated with (00) on end of Electrode Orion # (Ex. 081010) |

Orion Electrode Connectors

Ordering Information					
Meter Brand	Meter Input	Electrode Connector	Adapter Needed	Orion #	
Orion (1) Accumet Barnant Beckman (1) Cole Parmer Corning (1) Denver Electrofact (1) Fisher (1) Great Lakes Hach Hanna Horiba Ionics/Whatman	Jenco Jenway Kent EIL (1) LaMotte Markson Oakton Omega Phillips Radiometer (1) Tacussel (1) Tytronics Unicam VWRbrand	BNC	U.S. Standard Connector Screw Cap Connector Orion Karl Fischer (Orion 977900)	US Standard to BNC Adapter Detachable Cable w/ BNC Connector Karl Fischer Adapter	090033 91CBNC 090048
Orion (2) Beckman (2) Corning (2) Fisher (2) Kyoto	U.S. Standard	BNC Connector Any comb. electrode w/ Screw Cap Connector Any half cell electrode w/ Screw Cap Connector	BNC to U.S. Standard Adapter Detachable Cable w/ U.S. Std Connector Detachable Cable w/ Half-Cell Std. Connector	090032 91USCB 91USHC	
Metrohm (1)	F LEMO	BNC Connector Screw Cap Connector	BNC to F LEMO Adapter Detachable Cable w/ Screw Cap Connector	090036 91CLFO	
Mettler (1)	LEMO Miniature	BNC Connector Screw Cap Connector	BNC to LEMO Miniature Adapter Detachable Cable w/ LEMO Connector	090035 91CLMO	
Electrofact (2) Phillips (2)	Phillips	Screw Cap Connector	Detachable Cable w/ Phillips Connector	91CBNL	
Kent EIL	British	Screw Cap Connector	Detachable Cable w/ British Connector	91CBBR	
Knick Metrohm (2) Mettler (2) Schott WTW	E DIN	BNC Connector Screw Cap Connector	BNC to E DIN Adapter Detachable Cable w/ Type E Din Connector	090034 91CDIN	
Radiometer (2)	Radiometer No. 7	BNC Connector Screw Cap Connector	BNC to Radiometer Adapter Detachable Cable w/ Radiometer No. 7 Connector	090037 91CBRA	
Meter with w/ 2mm Pin Tip Reference Connector	2 mm Pin Tip	Screw Cap Connector	Detachable Cable w/ Pin Tip Reference Connector	91USRF	
Other Meter Type	OTHER	Screw Cap Connector	Detachable Cable w/o Meter Connector (Stripped End)	91CBNT	

Ordering Information		
Description	For electrodes with these connectors	Orion #
15 ft. Extension Cable, with U.S. Standard connector	All U.S. Standard half-cell electrodes	910025
15 ft. Extension Cable, with pin tip connector	All pin tip reference electrodes	910026
15 ft. Extension Cable, with BNC connector	All BNC electrodes	910027
15 ft. Extension Cable, with DIN connector	pHuture® pH Electrodes (Orion 6157 and Orion 6165), ATC Probes Orion 917005, 917006, 917007	910028
15 ft. Extension Cable, with phono ATC	All phono tip ATC probes	910029
15 ft. Extension Cable, with BNC/phono ATC	All PerpHecT® Triode™	910030
15 ft. Extension Cable, with banana jack adapter	All banana tip ATC probes	910031

Key

(1) Most current models (2) Most older models

Orion Conductivity Cells

Orion DuraProbe™ 4-Electrode Conductivity Cells

DuraProbe 4-Electrode Cells for laboratory or field applications are designed to be durable and extremely accurate under a wide range of conditions. A variety of accessories are available for laboratory, plant, and field applications.

Orion 2-Electrode Conductivity Cells

There is a wide choice of 2-Electrode Cells for laboratory and field applications. A variety of accessories and standards are available for most applications.

Orion DuraProbe 4-Electrode Conductivity Cells



Orion 2-Electrode Conductivity Cells



See Specifications on pages 21 and 23.

Orion Conductivity Cell Specifications

Orion Conductivity								
Orion #	Use with Meters	Application	Cell Constant	Cell Materials & Dimension	Recommended Application Range	Cable Length	Min/Max Immersion	Cable Connection
A, 013005A 013010A 013030A 013060A	1230, 555A, 550A, 550, 162A 162, 142, 135 series 130 series, 128	Field and laboratory applications	0.475 (cm ⁻¹)	Epoxy/Graphite 15 mm dia x 163 mm L	1 µS/cm to 200 mS/cm	1.5 m, 3 m, 10 m, 20 m	35/NA mm	8 pin Waterproof DIN
013005D 013010D	150, 125, PCM100	Field and laboratory applications	0.475 (cm ⁻¹)	Epoxy/Graphite 15 mm dia x 163 mm L	1 µS/cm to 200 mS/cm	1.5 m, 3 m	35/NA mm	8 pin DIN
013005MD 013010MD 013025MD	1119000, 1218000, 1219000, 1117000, 1217000, 1114000, 1214000					1.5 m, 3 m, 10 m		8 pin Waterproof MiniDIN

Orion Conductivity Cell Specifications

Orion Conductivity								
Orion #	Use with Meters	Application	Cell Constant	Cell Materials & Dimension	Recommended Application Range	Cable Length	Min/Max Immersion	Cable Connection
B. 013610 013660	555A, 550A, 550, 162A, 162, 142, 135 series, 130 series	Field and laboratory applications	0.55 (cm ⁻¹)	Epoxy/Graphite 12 mm x 163 mm L	10 µS/cm to 200 mS/cm	3 m, 20 m	35/NA mm	8 pin Waterproof DIN
013605MD 013610MD	1119000, 1218000, 1219000, 1117000, 1217000, 1114000, 1214000					1.5 m 3 m		8 pin Waterproof MiniDIN
C. 013010F 013300A	1230, 142, 135 series, 130 series, 128	Rugged cell with guard for depth applications. Also for applicable in bore holes ≤ 2 inch dia.	0.475 (cm ⁻¹)	Epoxy/Stainless Steel/ Graphite 38 mm dia x 250 mm L	1 µS/cm to 200 mS/cm	1.5 m, 3 m, 100 m	35/NA mm	8 pin Waterproof DIN
D. 018020A (1)	555A, 550A, 550, 162A, 162, 136 135A, 131, 130A	High electrolyte concentrations, e.g. acids, lyes, industrial process water, sea water	approx. 10 (cm ⁻¹)	Glass/Platinum, platinized 20 mm dia x 120 mm L	10 µS/cm to 2000 mS/cm	1 m	55/110 mm	8 pin Waterproof DIN
018020D (1)	150, 145, 125, 115, 105, PCM100					1 m		8 pin DIN
018020MD (1)	1119000, 1218000, 1219000, 1117000, 1217000, 1114000, 1214000					1.5 m		8 pin Waterproof MiniDIN
E. 011010	150, 145, 125, 115, 105, PCM100	Standard laboratory applications	1.0 (cm ⁻¹)	Glass/Platinum, platinized 13 mm dia x 120 mm L	1 µS/cm to 200 mS/cm	1 m	25/120 mm	8 pin DIN
011010A	555A, 550A, 162A, 136, 135A,					1 m		8 pin Waterproof DIN
9901BN (1)	Meters with BNC adapter					1 m		BNC
F. 011020	150, 145, 125, 115, 105, PCM100	Standard laboratory applications	0.1 (cm ⁻¹)	Glass/Platinum, platinized 17 mm dia x 22 mm L 13 mm dia x 120 mm L flat portion	0.1 µS/cm to 100 µS/cm	1 m	25/120 mm	8 pin DIN
011020A	555A, 550A, 162A, 136, 135A, 131, 130A					1 m		8 pin Waterproof DIN
9902BN (1)	meters w/BNC connection					1 m		BNC
G. 013016A (2)	555A, 550A, 550, 162A, 162, 142 135 series, 130 series	Boiler feedwater, ultra-pure water (Includes flow cell)	0.1 (cm ⁻¹)	Steel, V4A 13 mm dia x 120 mm L Flowcell Vol. 8-12 mL	0.01µS/cm to 300 µS/cm	1 m	35/110 mm	8 pin Waterproof DIN
013016D (2)	150, 145, 125, 115, 105, PCM100					1 m		8 pin DIN
013016MD (2)	1119000, 1218000, 1219000, 1117000, 1217000, 1114000, 1214000					1.5 m		8 pin Waterproof MiniDIN

Orion Conductivity Cell Specifications

Orion Conductivity								
Orion #	Use with Meters	Application	Cell Constant	Cell Materials & Dimension	Recommended Application Range	Cable Length	Min/Max Immersion	Cable Connection
H. 011050	150, 145, 125, 115, 105, PCM100	Field and laboratory applications	approx. 1.0 (cm ⁻¹)	Epoxy/Platinum, platinized 12 mm dia x 100 mm L	1 µS/cm to 20 mS/cm	1 m	20/90 mm	8 pin DIN
011050A	555A, 550A, 162A, 162, 136, 135A, 131, 130A					1 m		8 pin Waterproof DIN
011050MD	1119000, 1218000, 1219000, 1117000, 1217000, 1114000, 1214000					1.5 m		8 pin Waterproof MiniDIN
I. 011510	150, 145, 125, 115, 105, PCM100	Field and laboratory applications	approx. 1.0 (cm ⁻¹)	Epoxy/Graphite 17.8 mm dia x 134 mm L	10 µS/cm to 200 mS/cm	3 m	35/NA mm	8 pin DIN
011510A	555A, 550A, 162A, 162, 136, 135A, 131, 130A					3 m		8 pin Waterproof DIN
011510MD	1119000, 1218000, 1219000, 1117000, 1217000, 1114000, 1214000					3 m		8 pin Waterproof MiniDIN

Key

(1) No temperature compensation (2) Replacement Flow cell, Orion 013017 is available

Orion DO Probes and Specifications

Thermo Electron offers a complete line of polarographic and galvanic dissolved oxygen probes for applications from BOD analysis to field use. Galvanic MSR™ and AUTO-STIR™ probes offer convenience, quick response, and long life between servicing. All feature automatic

temperature compensation and convenient screw on membrane caps. Most Orion DO probes require no zero current adjustment for ease of use and for the highest possible accuracy. Many rugged Orion field DO probes are available with cable lengths up to 100 meters.

Orion D.O. Probes

	Orion # A 081010 081010MD		Orion # B 083005A 083010A 083025A 083060A 083005D 083005MD 083010MD 083025MD 083060MD		Orion # C 086020A 086030MD New		Orion # D 083150A 083300A		Orion # E 081010F 081030F 083010F 080510MD		Orion # F 080510	Orion # G* 970800 (3) 9708BNWP (4) * Images not available
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See Specifications on pages 24

Orion DO Probes and Specifications

Orion DO							
Orion #	A/F 081010MD 081010/080510	B 083005A, 083010A, 083025A, 083060A, 083005D, 083005MD, 083010MD, 083025MD, 083060MD	C 086020A Auto-Stir, 086030MD	D 083150A, 083300A	E 081010F, 081030F 083010F, 080510MD	F 080510	G* 970800 (3), 9708BNWP (4)
Probe Type	Polarographic	Polarographic	Polarographic	Polarographic	Polarographic	Polarographic	
Response Time	90% of final value in 10 sec 95% of final value in 16 sec 99% of final value in 60 sec	90% of final value in 10 sec 95% of final value in 15 sec 99% of final value in 60 sec	90% of final value in 10 sec 95% of final value in 15 sec 99% of final value in 60 sec	90% of final value in 10 sec 95% of final value in 18 sec 99% of final value in 60 sec	90% of final value in 10 sec 95% of final value in 18 sec 99% of final value in 60 sec	96% response in less than 30 sec between	96% response in less than 30 sec between oxygen-free and air saturated water at 22 °C
Minimum Sample Flow	20 cm/sec	10 cm/sec	10 cm/sec	20 cm/sec	10 cm/sec	-	
Oxygen Consumption	–	0.008 µg/h (mg/L) ⁻¹ at 20 °C	0.008 µg/h (mg/L) ⁻¹ at 20 °C	0.06 µg/h (mg/L) ⁻¹ at 20 °C	0.008 µg/h (mg/L) ⁻¹ at 20 °C	0.1 (mg/L)	0.1 mg/hr
Max. Allow. Overpressure	–	6 BAR	6 BAR	10 BAR	10 BAR	-	
Sample Temperature	0 to 50 °C	0 to 50 °C	0 to 50 °C	0 to 50 °C	0 to 50 °C	0 to 45 °C	0 to 45 °C
Temperature Sensor	Single thermally separated	Dual, (2) thermally separated	Dual, thermally separated	Dual, thermally separated	Dual, thermally separated	Dual, thermally separated	Dual, thermally separated
Drift	< 1%/day	approx. 0.1%/day	approx. 0.1%/day	< 0.3%/day	approx. 0.1%/day	-	
Electrolyte Lifetime (1)	180 days	180 days	180 days	180 days	180 days	-	
Storage Temperature	-5 to 50 °C	-5 to 50 °C	-5 to 50 °C	-5 to 50 °C	-5 to 50 °C	-	
Probe Style	Laboratory/Field	Laboratory/Field	Laboratory	Rugged Field/Plant w/ Protective Guard	Field	Laboratory	Laboratory
Cable Length	081010 - 3 m 080510 - 3 m 081010MD - 3 m	083005A - 1.5 m 083010A - 3 m 083025A - 10 m 083060A - 20 m 083005D - 1.5 m 083005MD - 1.5 m 083010MD - 3 m 083025MD - 10 m 083060MD - 20 m	086020A - 2 m 086030MD - 2 m	083150A – 50 m 083300A – 100 m	081010F - 3m 081030F - 10m 083010F - 3m 080510MD 3m	1 m	1 m
Used on Meter Models	081010, 08510 - Orion 810, 850, 805, PCM800 - 081010MD - Orion 1119000, 1218000, 1219000, 1116000, 1216000, 1113000, 1213000	083005A, 083010A, 083025A, 083060A - Orion 830A, 835A, and 862A, 083005D - Orion 810, 850, and PCM800 - 083005MD, 083010MD, 083025MD, 883060MD - Orion 1119000, 1218000, 1219000, 1116000, 1216000, 1113000, 1213000	08620A - Orion 862A 80603MD - Orion 1119000, 1116000, 11130000	Orion 835A, Orion 830A	081010F, 081030F - Orion 810, 850, and PCM800, 083010F - Orion 830A, 835A 080510MD - Orion 1119000, 1218000, 1219000, 1116000, 1216000, 1113000, 1213000	970800 - pH meter with US Std. Connector 910899WPP pH meter	970800 - pH meter with US Std. Connector 9708BNWP - pH meter with BNC Connector
Accuracy							± 0.05 ppm or 2% of reading, whichever is greater
Battery Life							One year based on 4 hours/day operation

Key

(1) Typical average life, may vary with conditions of use (2) Orion 083005D has a single temperature sensor (3) US Std. Connector (4) BNC Connector

For more information, please contact us:

ExpotechUSA

10700 Rockley Road

Houston, TX -77099

USA

E-mail: sales@ExpotechUSA.com

Website: www.ExpotechUSA.com