





## Thermo Scientific Orion pH Electrode Features

Select features to meet the needs of your applications

The Thermo Scientific Orion electrode line offers a wide variety of quality pH electrodes to choose from. There are many different factors to consider when you selecting a pH electrode to ensure you select the electrode that will suit your needs. You will need to consider body materials, body styles, and sample requirements. Below is a quick guide to help you choose the correct pH electrode. If you still require assistance, please contact our technical service department at 800-225-1480 or 978-232-6000.

### Body Materials

Glass Body	Epoxy Body
	
Compatible with virtually any sample, including solvents	Extremely durable, rugged body prevents breakage
Easy to clean	Electrode bulb protected by bulb guard
Can handle higher temperature	Low-maintenance gel-filled can be used in higher temperatures than glass low-maintenance electrodes

### pH Body Style

Standard	Semi-Micro
	
12 mm diameter	6-8 mm diameter
Used in a wide variety of samples	For small samples sizes down to 200 µL
Micro	Rugged Bulb
	
1-5 mm diameter	Glass body
For samples as small as 0.5 µL and containers as small as 384 well plates	Extra durable pH bulb to prevent breakage
Spear Tip	Flat Surface
	
For piercing solid or semi-solid samples	For measuring surfaces of solid or gel samples
Can be used for small volumes	For use with small volumes

### Fill Type

Refillable (Glass or Epoxy Body)	Polymer Filled (Sealed Glass or Epoxy Body)	Gel Filled (Sealed Epoxy Body)
Filling solution required	No filling solution needed	No filling solution needed
Easy maintenance, periodic filling and draining needed	Low maintenance, sealed reference	Low maintenance, sealed reference
Longer expected life	Easy to use	Easy to use
For use in a wide variety of applications	For use in a wide variety of applications	General purpose for everyday use
Best precision, 0.01 to 0.02 pH	0.02 pH precision	0.05 to 0.1 pH precision
Most rapid response time	Better response time	Good response time
Longest warranty, 1-2 years (6 months for Ag/AgCl micro electrodes)	1 year warranty	3-6 month warranty (18 months for ROSS 8107 models)

### Reference Styles

ROSS Ultra®/ ROSS Reference®	Double Junction Ag/AgCl	Single Junction Ag/AgCl
0.01 pH precision	0.02 pH precision	0.02 to 0.1 pH precision
Best measurement response time	Better measurement response time	Good measurement response time
Best temperature response	Good temperature response	Good temperature response
Ideal for TRIS, protein and sulfide samples	Ideal for TRIS, protein and sulfide samples	General purpose for everyday use
Variety of body styles and types	Variety of body styles and types	Variety of body styles and types
Refillable or gel filled design	Refillable, polymer or gel filled design	Refillable or gel filled design

### Junctions – Sure-Flow, Sleeve, Open, Ceramic, Wick and Glass Fiber

Sure-Flow®, Sleeve and Open	Ceramic and Glass Capillary	Wick and Glass Fiber
Best junction for dirty, difficult samples and demanding lab use	Better junction for routine lab use in a variety of samples	Good junction for routine lab use or field use in buffers and aqueous samples
Junction is clog free, easy to clean and has longest use life	Junction is high quality and durable	Good junction with durability
Ideal for thick or viscous samples, compatible with all sample types	Ideal for most lab applications and sample types	Ideal for basic lab applications and aqueous samples





## Thermo Scientific Electrode Styles

### Thermo Scientific Orion Electrode Families and Types

Thermo Scientific Orion pH electrodes have a variety of different family of electrodes available to help with your measurements needs. They are designed to meet all your measurement needs.

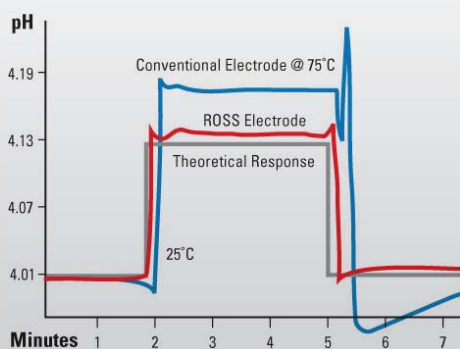
#### Triodes

Combination pH electrode with built-in temperature sensor. Convenience with being able to measure pH and temperature with one electrode. BNC connector for pH measurement and alternative connector for temperature measurement. Compatible with only Thermo Scientific Orion pH meters as temperature connector and temperature element are unique to meter model.

#### ROSS Ultra® and ROSS® Electrodes

The best electrode available anywhere! Has the fastest response, best accuracy and reproducibility despite sample composition. Exhibits unmatched response to temperature variations. Double junction reference for complex samples such as biological media, foods, pharmaceuticals, TRIS, sulfides and proteins. Available in all body styles. ROSS Ultra electrodes have an industry best warranty.

The graph shows how ROSS electrodes respond versus the best of conventional pH electrodes. The ROSS electrode continues to show fast reproducibility and accuracy after many dramatic temperature changes.



Temperature Response of the ROSS Ultra® and ROSS® Electrodes vs. Conventional Electrodes

### AquaPro Professional pH Electrodes

Low maintenance polymer filled double junction electrode. For use in TRIS, sulfides, proteins and biological media. Has an extended life, fast response and clog resistant open junction. Available in standard, semi-micro, rugged bulb and flat surface body styles. The junction must be kept wet.

#### Double Junction

Isolated Ag/AgCl reference system which prevents silver from coming in contact with the sample. Great for measuring TRIS buffer, sulfide and protein samples. Available in standard and micro body styles.

#### No Cal®

Unique reference system that provides quick and accurate measurements. Great for measuring TRIS buffers sulfide and protein samples. No calibration required and accurate to 0.1 pH without calibration. Has the benefit of having a ceramic junction in an epoxy body and also a built-in temperature sensor.

#### Standard

A large variety of electrodes for a wide range of applications. Includes specialty pH electrodes for unique or challenging pH measurements. Available in most body styles. Micro electrodes capable of measuring samples as small as 0.5 µL in containers as small as 384 well plates.

#### KNipHE®

The pH electrode is housed in a body with a stainless steel blade for measuring meat, cheese and sludge samples.

#### Economy or Low-Maintenance

Good performance, valued priced, durable and low maintenance gel-filled pH electrodes. Available in standard, semi-micro and flat surface body styles.

#### Redox/ORP

The ideal choice for measuring the oxidation reduction potential of samples and performing redox titrations.

#### ATC Probes

Automatic temperature compensation probes measure sample temperatures and adjust pH measurements by correcting the electrode slope according to the measured temperature.



## Thermo Scientific Orion pH Electrode Selection Guide

Sample Type	Electrode Recommendations
<b>pH Precision</b>	
<b>Biological/Pharmaceutical – TRIS buffer, proteins, enzymes</b>	Electrodes should have a ROSS or double junction Ag/AgCl reference (no sample contact with silver)
<b>Education/Student Use</b>	Electrodes should have an epoxy body for added durability
<b>Emulsions – Foods, cosmetics, oils</b>	Electrodes should have a Sure-Flow or open junction to prevent the electrode from clogging
<b>Emulsions – Petroleum products, paint</b>	Electrodes should have a glass body that resists damage from the sample and a Sure-Flow or open junction to prevent the electrode from clogging
<b>Flat Surfaces – Cheese, meat, agar</b>	Electrodes should have a flat-surface tip and ROSS or double junction Ag/AgCl reference (no sample contact with silver)
<b>Flat Surfaces – Paper</b>	Electrodes should have a flat-surface tip
<b>General Purpose – Most sample types</b>	All electrodes are suitable for general purpose measurements
<b>Harsh Environments – Field or plant use, rugged use</b>	Electrodes should have an epoxy body for added durability and be polymer or gel filled for easy maintenance
<b>High Ionic Strength – Acids, bases, brines, pH &gt; 12 or pH &lt; 2</b>	Electrodes should have a Sure-Flow or open junction for better contact with the sample and more stable measurements
<b>Large Sample Sizes – Tall flasks</b>	Electrodes should have a long body that fits the container
<b>Low Ionic Strength – Treated effluent, deionized water, distilled water</b>	Electrodes should be refillable for better contact with the sample and more stable measurements
<b>Non-aqueous – Solvents, alcohols</b>	Electrodes should have a glass body that resists damage from the sample and a Sure-Flow junction for better contact with the sample and more stable measurements
<b>Semi-solids – Fruit, meat, cheese</b>	Electrodes should have a spear tip for piercing samples and a ROSS or double junction Ag/AgCl reference
<b>Small Sample Size – Micro-titer plates</b>	Electrodes should have a small diameter that fits the container
<b>Small Sample Size – NMR tubes</b>	Electrodes should have a small diameter that fits the container
<b>Small Sample Size – Test tubes, small flasks and beakers</b>	Electrodes should have a small diameter that fits the container
<b>Small Sample Size – TRIS buffer, proteins, sulfides</b>	Electrodes should have a small diameter that fits the container and a ROSS or double junction Ag/AgCl reference
<b>Titration</b>	Electrodes should have a Sure-Flow or sleeve junction for better contact with the sample and more stable measurements
<b>Viscous Liquids – Slurries, suspended solids sludges</b>	Electrodes should have a Sure-Flow or open junction to prevent the electrode from clogging
<b>Waters – Acid rain, boiler feed water, distilled water, rain water, well water</b>	Electrodes should have a ROSS or double junction Ag/AgCl reference and be refillable for better contact with the sample
<b>Waters – Drinking water, tap water</b>	Electrodes should have an epoxy body for added durability
<b>Waters – Wastewater, seawater</b>	Electrodes should have a ROSS or double junction Ag/AgCl reference and have an epoxy body for added durability



ROSS Ultra®	ROSS®	AquaPro	Standard Ag/AgCl	Green	Micro Ag/AgCl	Double Junction	Economy/Basic
0.01	0.01	0.02	0.02	0.02 to 0.05	0.02	0.02	0.05 to 0.1
8102BNUWP 8107BNUMD 8156BNUWP 8157BNUMD	8102BN 8104BN 815600 8165BNWP 8172BNWP	9102AP 9104APWP 9107APMD 9156APWP		GD9106BNWP GD9156BNWP		9102DJWP 9156DJWP	
8107BNUMD 8156BNUWP 8157BNUMD	815600 8165BNWP	9107APMD 9156APWP	9107BNMD 9156BNWP 9157BNMD	GS9106BNWP GD9106BNWP		9156DJWP	9106BNWP
	8165BNWP 8172BNWP	9104APWP 9107APMD	9165BNWP 9172BNWP				
	8172BNWP	9102AP 9104APWP	9172BNWP				
8135BNUWP	8135BN	9135APWP					
8135BNUWP	8135BN	9135APWP					913600
8102BNUWP 8107BNUMD 8156BNUWP 8157BNUMD	8102BN 8104BN 815600 8165BNWP 8172BNWP	9102AP 9104APWP 9107APMD 9156APWP	9102BNWP 9107BNMD 9156BNWP 9157BNMD	GS9106BNWP GD9106BNWP GS9156BNWP GD9156BNWP		9102DJWP 9156DJWP	9106BNWP
8107BNUMD		9107APMD 9156APWP	9107BNMD	GS9106BNWP GD9106BNWP		9156DJWP	9106BNWP
	8165BNWP 8172BNWP	9104APWP 9107APMD 9102AP	9165BNWP 9172BNWP				912600
8102BNUWP 8156BNUWP 8157BNUMD	8102BN 815600 8165BNWP 8172BNWP		9165BNWP 9172BNWP	GS9156BNWP GD9156BNWP		9102DJWP	
	8172BNWP		9172BNWP				
	8163BNWP					9120APWP	
	8220BNWP				9810BN		
					9826BN		
8103BNUWP 8115BNUWP	8103BN 8115BN 8175BNWP	9103APWP 9115APWP	9103BNWP		9810BN 9826BN	9110DJWP	911600 912600
8103BNUWP 8115BNUWP	8103BN 8115BN 8175BNWP	9103APWP 9115APWP				9110DJWP	
	8162SC 8165BNWP 8172BNWP						
	8165BNWP 8172BNWP	9104APWP 9107APMD	9165BNWP 9172BNWP				
8102BNUWP 8156BNUWP 8157BNUMD	8102BN 815600 8165BNWP 8172BNWP		9165BNWP 9172BNWP	GS9156BNWP GD9156BNWP		9102DJWP	
8156BNUWP 8157BNUMD	815600 8165BNWP	9107APMD 9156APWP	9156BNWP 9165BNWP	GS9106BNWP GD9106BNWP		9156DJWP	9106BNWP
8156BNUWP 8157BNUMD	815600 8165BNWP	9107APMD 9156APWP	9165BNWP	GD9106BNWP GD9156BNWP		9156DJWP	



## Thermo Scientific Orion ROSS pH Electrodes

The Best Choice For Superior Stability, Rapid Response, Accurate and Reproducible pH Measurements

ROSS pH electrodes offer unmatched benefits that you will not find in any other pH electrode. For more than 30 years, ROSS pH electrodes have been providing the best accuracy, stability and response you will find in a pH electrode. Before selecting an electrode, consider the advantages you will have if you choose a ROSS electrode.

### Rapid Response and Superior Stability

Compared to conventional electrodes, the proven ROSS reference system exhibits superior stability in measurements, faster response, greater accuracy and precision when measuring samples that vary in temperature or when calibrating in temperatures that differ from your samples.

ROSS electrodes are much more stable over time and avoid the long term drift that other electrodes exhibit. Electrodes drift by less than 0.002 pH per day so recalibration is minimized.

### Temperature Response

Most ROSS electrodes have a temperature range of 0 to 100 °C and show rapid response and stability even when measuring samples that differ by as much as 50 °C. The readings are much more accurate than standard electrodes in samples with extreme temperature variations. ROSS electrodes provide the correct reading within 30 seconds while standard electrodes are still trying to equilibrate and provide the correct reading after 3 minutes. The graph on page 63 illustrates this response.

### No Sample Contamination

Standard silver chloride electrodes leach metal into the fill solution and eventually into the sample. ROSS electrodes do not contain any silver or mercury to react with the sample or to clog the electrode junction which causes sluggish response or inaccurate readings while also reducing electrode life. ROSS pH electrodes can be used in samples such as biological media, foodstuffs and pharmaceuticals where trace amount of metals cannot be tolerated.

### Double Junction Design

This design allows you more control over an important variable. In order to minimize errors caused by junction potential, you can use a solution that is similar to the sample. The user also has the ability to change filling solutions to minimize contamination when potassium or chloride in the sample are undesirable.

ROSS electrodes have two main families to choose from. Each family has a variety of electrode options to choose from to ensure you have the correct electrode for your measurement needs. All contain the advantages mentioned previously.

### ROSS Ultra®

ROSS Ultra electrodes offer the best stability and drift free measurements of all ROSS electrodes. The reference system is designed to provide an enhanced life. We are so confident of it that the warranty is double that of standard ROSS electrodes. Refillable ROSS Ultra electrodes have a 2 year warranty while the low-maintenance triode™ has an 18 month warranty.

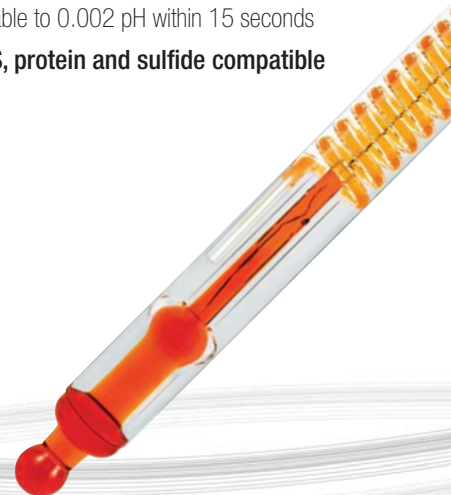
The ROSS Ultra line features glass or epoxy electrodes, refillable or low-maintenance design, flat surface and semi-micro designs. ROSS Ultra Triodes include a built-in temperature sensor and provide faster temperature response than other 3-in-1 electrodes.

### ROSS®

Standard ROSS electrodes provide the same rapid response, accuracy and temperature response of all ROSS electrodes. The reference system provides excellent stability. These electrodes provide a one year warranty. They are available in a variety of styles such as the clog free Sure-Flow junction, glass or epoxy electrodes, flat surface, semi-micro, micro and spear tip designs. All standard ROSS electrodes have a refillable design and do not contain a built-in-temperature element.

### ROSS Electrode Specifications:

- **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 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
- **Mercury free, TRIS, protein and sulfide compatible**





# Thermo Scientific Orion Sure-Flow pH Electrodes

## Clog Free Long Lasting Junction

### 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! The Sure-Flow junction has proven reliability and extends the electrode life.

ROSS electrodes provide unmatched accuracy and response to extreme temperature changes. They are compatible with samples containing organic compounds, proteins, heavy metals, and other compounds that react with silver such as bromides, iodides, cyanides and sulfides.

Silver chloride sure-flow electrodes can be used on tough samples that do not require a double junction electrode to prevent contact with silver.

ROSS Sure-Flows are also available as semi-micro pH and reference half cell electrodes on pages 75 and 80.

### High performance in all samples



#### ROSS® Sure-Flow® combination pH electrode with glass body

- Sure-Flow junction prevents clogging
- For soil, sludge, colloids, viscous material and organic solvents

### Fast response – even in difficult samples



#### ROSS® Sure-Flow® combination pH electrode with epoxy body

- Ideal for soil samples
- Durable epoxy design
- For TRIS, sulfides and proteins

### For all samples including solvents



#### Sure-Flow® combination pH electrode with glass body

- For soil, sludge, colloids, and viscous material
- Chemical resistant glass body

### Fast response in difficult samples & soils



#### Sure-Flow® combination pH electrode with epoxy body

- Rugged, durable epoxy design
- Has removable bulb guard

Cat. No.	8172BNWP	8165BNWP 8165DN	9172BNWP	9165BNWP
<b>pH Range</b>	0-14	0-14	0-14	0-14
<b>pH Precision</b>	0.01	0.01	0.02	0.02
<b>Temp. Range</b>	0-100 °C	0-100 °C	0-100 °C	0-100 °C
<b>Internal Reference</b>	ROSS	ROSS	Ag/AgCl	Ag/AgCl
<b>Junction</b>	Sure-Flow	Sure-Flow	Sure-Flow	Sure-Flow
<b>Fill Solution (Cat. No.)</b>	3 M KCl (810007)	3 M KCl (810007)	4 M KCl w/ Ag/AgCl (900011)	4 M KCl w/ Ag/AgCl (900011)
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm
<b>Connector Type</b>	BNC Waterproof	BNC Waterproof EDIN Waterproof	BNC Waterproof	BNC Waterproof

Cat. No.	Recommended Accessories
<b>810001</b>	ROSS storage solution
<b>810007</b>	ROSS fill solution
<b>900011</b>	Ag/AgCl fill solution
<b>910001</b>	Ag/AgCl storage solution



Key Information
ROSS electrodes are environmentally-safe mercury-free option for TRIS, protein and sulfide
All cap diameters are 16 mm at bottom of cap
All cable lengths are 1 meter



## Thermo Scientific Orion Triode pH Electrodes

Measures pH and Temperature with One Electrode

All Thermo Scientific Orion Triodes™ have built-in temperature sensors allowing you to measure pH and temperature with one electrode. There are a variety of electrodes based on your sample and application.

The ROSS Ultra Triodes offer such great stability and drift that the warranty period is double other electrodes. The refillable electrodes have a two year replacement warranty. The gel-filled ROSS Ultra Triode electrodes have an 18 month warranty.

Complex samples, such as biological media, foods and pharmaceuticals, can be measured easily. All ROSS Ultra electrodes can be used in samples that contain TRIS, sulfides or proteins.

ROSS Ultra electrodes offer the best temperature performance of all other electrodes in repeated, varying temperatures.

The AquaPro Triode has the advantage of having an open junction that does not clog and double junction reference. For use in samples with TRIS, protein and sulfides.

Ag/AgCl Triodes have good response and are ideal for routine measurements.

### Top performance with glass body



#### ROSS Ultra® pH/ATC Triode with glass body

- High performance for QC and research
- Chemical resistant glass body

### Low maintenance with extended life



#### ROSS Ultra® pH/ATC Triode with epoxy body, low maintenance gel

- Low maintenance gel
- Rugged epoxy body

### Refillable, convenience and durable



#### ROSS Ultra® pH/ATC Triode with epoxy body

- General purpose, high performance
- Rugged epoxy body

	<b>Cat. No. 8302BNUMD (Star)</b>	<b>8107BNUMD (Star)* 8107UWMMMD (Star)</b>	<b>8157BNUMD (Star)* 8157UWMMMD (Star)</b>
<b>pH Range</b>	0-14	0-14	0-14
<b>pH Precision</b>	0.01	0.01	0.01
<b>Temp. Range</b>	0-100 °C	0-80 °C	0-100 °C
<b>Temp. Accuracy</b>	±1.0 °C	±1.0 °C	±1.0 °C
<b>Internal Reference</b>	ROSS	ROSS	ROSS
<b>Junction</b>	Ceramic	Glass capillary	Glass fiber
<b>Fill Solution (Cat. No.)</b>	3 M KCl (810007)	—	3 M KCl (810007)
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm
<b>Connector Type</b>	BNC Waterproof - MiniDIN (Star)	BNC Waterproof - MiniDIN (Star)* BNC Waterproof - MiniDIN (Star)* 3 m	BNC Waterproof - MiniDIN (Star)* BNC Waterproof - MiniDIN (Star)* 3 m

<b>Cat. No.</b>	<b>Recommended Accessories</b>
<b>810001</b>	ROSS storage solution
<b>810007</b>	ROSS fill solution
<b>900001</b>	Ag/AgCl fill solution
<b>910001</b>	Ag/AgCl storage solution



**Electrode maintains calibration for one year**



- BEST
- TRIS COMPATIBLE
- SUPERIOR TEMPERATURE CONTROL

**No Cal<sup>®</sup> combination pH electrode with epoxy body and built-in ATC**

- Designed for stable, high performance pH analysis in the field
- Accurate to 0.1 pH without calibration

**Rugged design with clog free open junction**



- BETTER
- TRIS COMPATIBLE

**AquaPro pH/ATC Triode™ with low maintenance polymer, epoxy body**

- Low maintenance for Star meters

**Low maintenance**



- BETTER

**pH/ATC Triode™ with epoxy body, low maintenance gel**

- Low maintenance gel
- Epoxy body for ruggedness

**Low maintenance**



- BETTER

**pH/ATC Triode™ with epoxy body, low maintenance**

- Low maintenance gel
- Epoxy body for ruggedness

**Refillable and durable**



- BETTER

**pH/ATC Triode™ with epoxy body, refillable**

- Long-lasting
- Epoxy body for ruggedness

**Low maintenance and reliable**



- GOOD

**pH/ATC Triode™ with epoxy body, low maintenance gel**

- General purpose
- For Russell RL060P meter

5107BNMD (Star) 5107NC (A+ Series)	9107APMD (Star)	9107BNMD (Star)* 9107WMMMD (Star)* 9107WLMD (Star)* 9107BN (A+ Series) 9107WP†	9109WP 9109WL	9157BNMD (Star) 9157BN (A+ Series)	9147BN
0-14	0-14	0-14	0-14	0-14	0-14
0.01	0.02	0.02	0.02	0.02	0.1
0-100 °C	0-60 °C	0-80 °C	0-80 °C	0-90 °C	0-50 °C
±1.0 °C	±2.0 °C	±2.0 °C	±2.0 °C	±2.0 °C	±2.0 °C
Platinum	Ag/AgCl Double junction	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Ceramic	Open	Wick	Wick	Glass fiber	HDPE pin
No Cal (510011)	—	—	—	4 M KCl w/ Ag/AgCl (900011)	—
L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm Cap D - 22 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm
BNC - MiniDIN (Star) BNC - 8 Pin (A+ Series)	BNC - MiniDIN (Star)	BNC - MiniDIN (Star) BNC - 8 Pin (A+ Series)†	EDIN Waterproof Banana Plug	BNC - MiniDIN (Star) BNC - 8 Pin (A+ Series)	BNC 2.5 mm Phono Tip



**Key Information**

Cable lengths range from 1 to 6 meters  
WMMMD = 3 meters, WLMD = 6 meters,  
9109WL = 6 meters  
9109 cap is for intrinsically safe meters





## Thermo Scientific Orion Glass Refillable pH Electrodes

Chemical Resistant Glass Bodies

Glass body electrodes offer superior chemical resistance. They are also able to withstand higher temperatures than epoxy electrodes, with some models able to be used up to 100 °C. Glass electrodes are also easy to clean as they are compatible with most solvents and inorganic materials.

ROSS Ultra and ROSS electrodes provide unmatched ROSS accuracy and rapid response to temperature extremes. All are TRIS compatible. ROSS Ultra glass electrodes have an industry best 2 years warranty.

AquaPro refillable electrodes are TRIS compatible and have an open junction that does not clog.

Double junction electrodes are recommended for samples containing organic compounds, proteins, heavy metals and other compounds that interact with silver.

Single junction electrodes provide a reliable option for routine pH measurement.

**Top performance for QC and research**



**ROSS Ultra® combination pH electrode with extended life**

- For precise pH determinations
- General purpose, high performance

**Precise yet durable, for QC and research**



**ROSS Ultra® combination pH electrode with rugged bulb, extended life**

- Toughened bulb for rugged lab use

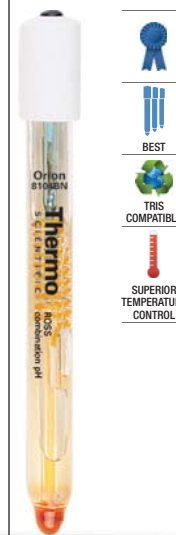
**For precise and reproducible pH determinations**



**ROSS® combination pH electrode**

- General purpose, high performance
- For QC and research applications

**Durable, for precise pH analysis**



**ROSS® combination pH electrode with glass body, rugged bulb**

- Toughened bulb for rugged lab use
- For QC and research applications

Cat. No.	8102BNUWP	8104BNUWP	8102BN 8102SC	8104BN 8104SC
<b>pH Range</b>	0-14	0-14	0-14	0-14
<b>pH Precision</b>	0.01	0.01	0.01	0.01
<b>Temp. Range</b>	0-100 °C	0-100 °C	0-100 °C	0-100 °C
<b>Internal Reference</b>	ROSS	ROSS	ROSS	ROSS
<b>Junction</b>	Ceramic	Ceramic	Ceramic	Ceramic
<b>Fill Solution (Cat. No.)</b>	3 M KCl (810007)	3 M KCl (810007)	3 M KCl (810007)	3 M KCl (810007)
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm
<b>Connector Type</b>	BNC Waterproof	BNC Waterproof	BNC Screw Cap	BNC Screw Cap

Cat. No.	Recommended Accessories
910001	Ag/AgCl storage solution
900011	Ag/AgCl fill solution
910008-WA	3 M KCl double junction fill solution

Cat. No.	Recommended Accessories
810001	ROSS storage solution
810007	ROSS fill solution



**For accurate pH analysis and titrations**



**ROSS® combination pH electrode with 14/15 standard taper**

- For titrators or vessels that require a standard taper joint

**Accurate and reliable**



**Double Junction combination pH electrode**

- General purpose
- Easy-to-clean design

**General purpose for everyday use**



**Combination pH electrode**

- For routine or research applications

**Durable and reliable**



**Combination pH electrode with rugged bulb**

- Toughened bulb for rugged lab use

**General purpose and reliable**



**Combination pH electrode**

- General purpose
- Easy-to-clean design

8162SC	9102DJWP	9102BNWP 9102SC	9104BNWP 9104SC	9142BN
0-14	0-14	0-14	0-14	0-14
0.01	0.02	0.02	0.02	0.1
0-100 °C	0-60 °C	0-90 °C	0-90 °C	0-90 °C
ROSS	Ag/AgCl Double junction	Ag/AgCl	Ag/AgCl	Ag/AgCl
Sleeve	Ceramic	Ceramic	Ceramic	Ceramic
3 M KCl (810007)	3 M KCl (910008-WA)	4 M KCl w/ Ag/AgCl (900011)	4 M KCl w/ Ag/AgCl (900011)	4 M KCl w/ Ag/AgCl (900011)
L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm
Screw Cap	BNC Waterproof	BNC Waterproof Screw Cap	BNC Waterproof Screw Cap	BNC



**Key Information**

All cap diameters are 16 mm  
All cable lengths are 1 meter



# Thermo Scientific Orion Epoxy Refillable pH Electrodes

## Rugged Epoxy Body Prevents Breakage

Epoxy body electrodes are ideal for field measurements or situations where they will be exposed to rugged handling. The electrode body surrounds the glass pH bulb providing further protection.

ROSS Ultra and ROSS electrodes exhibit unmatched accuracy and rapid response to extreme temperature variations. All are TRIS compatible. The ROSS Ultra electrode has an unprecedented 2 year warranty.

Green electrodes are the first lab electrode to contain no lead, mercury or other hazardous substances and are completely ROHS compliant. They are available in single or double junction designs.

Silver chloride epoxy electrodes provide excellent response and performance in routine samples.

**Top performance – precise pH analysis with durability**



**ROSS Ultra® combination pH electrode with epoxy body**

- Top accuracy and rapid response to temperature extremes
- General purpose, high performance
- Extended life

**Durable for precise pH applications**



**ROSS® combination pH electrode with epoxy body**

- Top accuracy and rapid response to temperature extremes
- General purpose, high performance

**Refillable, double junction**



**Green combination double junction refillable pH electrode with epoxy body**

- Ideal for routine or research applications
- Use in dirty water or TRIS, sulfide and protein samples
- Contains no lead

**Refillable, rugged epoxy body**



**Green combination refillable pH electrode with epoxy body**

- Ideal for routine or research applications
- Contains no lead

**General purpose and reliable**



**Combination pH electrode with epoxy body**

- For routine or research applications
- Reliable and durable

Cat. No.	8156BNUWP	815600 8155SC	GD9156BNWP	GS9156BNWP	9156BNWP 9156SC
<b>pH Range</b>	0-14	0-14	0-14	0-14	0-14
<b>pH Precision</b>	0.01	0.01	0.02	0.02	0.02
<b>Temp. Range</b>	0-100 °C	0-100 °C	0-90 °C	0-90 °C	0-90 °C
<b>Temp. Accuracy</b>	–	–	–	–	–
<b>Internal Reference</b>	ROSS	ROSS	Ag/AgCl Double junction	Ag/AgCl	Ag/AgCl
<b>Junction</b>	Glass fiber	Glass fiber	Glass fiber	Glass fiber	Glass fiber
<b>Fill Solution (Cat. No.)</b>	3 M KCl (810007)	3 M KCl (810007)	3 M KCl (910008-WA)	4 M KCl w/ Ag/AgCl (900011)	4 M KCl w/ Ag/AgCl (900011)
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm
<b>Connector Type</b>	BNC Waterproof	BNC Screw Cap	BNC Waterproof	BNC Waterproof	BNC Waterproof Screw Cap

Cat. No.	Recommended Accessories
900011	Ag/AgCl fill solution
810007	ROSS fill solution
910008-WA	3M KCl double junction fill solution





# Thermo Scientific Orion Micro pH Electrodes

## Delicate Electrode for Small Volumes, Fits 384 Microwell Plates

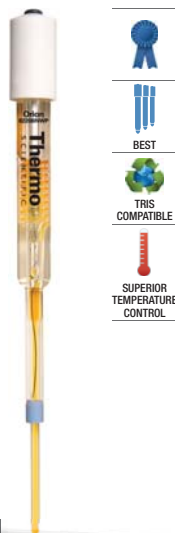
Micro electrodes are designed to measure small volumes down to 0.5  $\mu\text{L}$ . These are extremely delicate electrodes because of their size and should be treated as such. The small stem and bulb diameter allow the electrode to be inserted into small devices such as 384 microwell plates. There are a variety to choose from based on your measurement needs.

The ROSS 8220BNWP micro electrode provides the best accuracy and response time of the micro electrodes. It can be used in biological samples. The 8220BNWP is more durable than the silver chloride electrodes.

Silver chloride micro electrodes are single junction electrodes. They are available to measure samples as small as 0.5  $\mu\text{L}$ , for use in NMR tubes and available with a stainless steel needle tip over the glass stem and bulb.

The double junction micro electrode is for moderate size samples. The double junction design is good for use when measuring TRIS samples, proteins, sulfides or biologicals.

**Accurate in extremely small samples**



**PerpHecT<sup>®</sup> ROSS<sup>®</sup> combination pH electrode with glass body, micro**

- Measures samples as small as 15  $\mu\text{L}$  in 384 well plates
- Minimum depth of immersion is 4.5 mm
- Durable tip design

**Measure samples as small as 0.5  $\mu\text{L}$**



**Micro combination pH electrode with glass body, small tip**

- Designed for gels and small sample volumes
- Measure samples as small as 0.5  $\mu\text{L}$

**For use in NMR tubes**



**Micro combination pH electrode with glass body, long length**

- Ideal for measurements in extremely small vessels

**For piercing septa**



**Micro combination pH electrode with needle tip**

- 16 gauge stainless steel bevel tip

**For samples with size limitations**



**Double Junction combination pH electrode with glass body, semi-micro tip**

- Measure samples as small as 0.2 mL
- Easy-to-clean refillable design

Cat. No.	8220BNWP	9810BN	9826BN	9863BN	9110DJWP
<b>pH Range</b>	0-14	0-14	0-14	0-14	0-14
<b>pH Precision</b>	0.01	0.02	0.02	0.02	0.02
<b>Temp. Range</b>	0-100 °C	0-80 °C	0-80 °C	0-80 °C	0-60 °C
<b>Temp. Accuracy</b>	±0.5 °C	–	–	–	–
<b>Internal Reference</b>	ROSS	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl Double junction
<b>Junction</b>	Sleeve	Ceramic	Ceramic	Ceramic	Ceramic
<b>Fill Solution (Cat. No.)</b>	3 M KCl (810007)	4 M KCl w/ Ag/AgCl (900011)	4 M KCl w/ Ag/AgCl (900011)	4 M KCl w/ Ag/AgCl (900011)	3 M KCl (910008-WA)
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 155 mm T - 3 mm x 40 mm L	L - 120 mm T - 1.3 mm x 37 mm L	L - 228 mm T - 2.5 mm x 2.5 mm L	L - 137 mm T - 1.7 mm x 40 mm L	L - 150 mm T - 4.5 mm x 90 mm L
<b>Depth of Immersion</b>	4.5 mm	1 mm	2 mm	3 mm	–
<b>Connector Type</b>	BNC Waterproof	BNC	BNC	BNC	BNC Waterproof



### Key Information

All cap diameters are 16 mm at bottom of cap except 9810BN, 9826BN & 9863BN  
All cable lengths are 1 meter



## Thermo Scientific Orion Glass Semi Micro pH Electrodes

Measures Samples As Small As 0.2 mL. Fits Test Tubes and Small Containers

Glass body semi-micro pH electrodes provide superior chemical resistance and can withstand high temperatures extremes. There are a variety of options to choose from.

ROSS Ultra and ROSS semi-micro pH electrodes provide optimum accuracy and unmatched response in samples of varying temperatures. They are available in chemical resistant glass bodies. All ROSS electrodes are TRIS compatible.

AquaPro semi-micro electrodes have a clog free open junction and are TRIS compatible.

Silver chloride semi-micro electrodes are durable and provide reliable and accurate measurements of routine samples.

**Ideal for QC samples with size limitations**



**ROSS Ultra® combination pH electrode with glass body, semi-micro tip**

- Extended life
- TRIS compatible
- Fast response at temperature extremes

**Fast, reliable results in small samples**



**ROSS® combination pH electrode with glass body, semi-micro tip**

- TRIS compatible
- Fast response at temperature extremes

**Fast response in small samples**



**AquaPro combination pH electrode with low maintenance polymer, glass body, semi-micro tip**

- TRIS compatible
- Open junction prevents clogging

**For samples with size constraints**



**Combination pH electrode with glass body, semi-micro tip**

- For routine or research applications

Cat. No.	8103BNUWP	8103BN 8103SC	9103APWP	9103BNWP 9103SC
<b>pH Range</b>	0-14	0-14	0-14	0-14
<b>pH Precision</b>	0.01	0.01	0.02	0.02
<b>Temp. Range</b>	0-100 °C	0-100 °C	0-60 °C	0-90 °C
<b>Internal Reference</b>	ROSS	ROSS	Ag/AgCl Double junction	Ag/AgCl
<b>Junction</b>	Ceramic	Ceramic	Open	Ceramic
<b>Fill Solution (Cat. No.)</b>	3 M KCl (810007)	3 M KCl (810007)	-	4 M KCl w/ Ag/AgCl (900011)
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 165 mm T - 6 mm x 95 mm L	L - 165 mm D - 6 mm x 95 mm L	L - 165 mm T - 6.5 mm x 100 mm L	L - 165 mm T - 6.5 mm x 100 mm L
<b>Connector Type</b>	BNC Waterproof	BNC Screw Cap	BNC Waterproof	BNC Waterproof Screw Cap

Cat. No.	Recommended Accessories
910001	Electrode storage solution
900011	Ag/AgCl fill solution
810001	ROSS storage solution
810007	ROSS fill solution



Screw Cap



BNC Waterproof



BNC

### Key Information

All cap diameters are 16 mm  
All cable lengths are 1 meter



# Thermo Scientific Orion Epoxy Semi Micro pH Electrodes

Rugged Body for Small Samples or Narrow Containers

Epoxy body semi-micro pH electrodes provide a rugged design. They are available in double junction or single junction designs as well as refillable or low-maintenance options.

ROSS electrodes offer optimum accuracy and temperature response. AquaPro electrodes provide maintenance-free use. Silver chloride electrodes are for routine measurements.

**For difficult samples with size limitations**



**ROSS® Sure-Flow® combination pH electrode with epoxy body, semi-micro tip**

- Sure-Flow junction prevents clogging
- Measure samples as small as 0.2 mL

**For aqueous samples with size constraints**



**ROSS Ultra® combination pH electrode with epoxy body, semi-micro tip**

- Measures samples as small as 0.2 mL
- Epoxy body for ruggedness and durability

**Dependable results in small samples**



**ROSS® combination pH electrode with epoxy body, semi-micro tip**

- Epoxy body for ruggedness and durability
- Measures samples as small as 0.2 mL

**Fast response in small samples**



**AquaPro combination pH electrode with low maintenance polymer, epoxy body, semi-micro tip**

- TRIS compatible
- Open junction prevents clogging

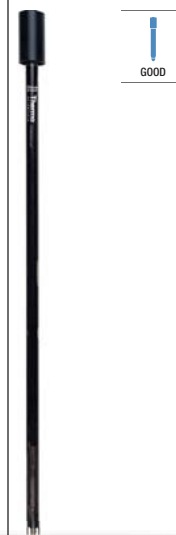
**For everyday use in small samples**



**Combination pH electrode with epoxy body, low maintenance gel, semi-micro tip**

- Measure samples as small as 0.2 mL

**For everyday use in tall containers**



**Combination pH electrode with epoxy body, low maintenance gel, flask length**

- Designed for use in long-necked flasks

Cat. No.	8175BNWP	8115BNUWP	8115BN 8115SC	9115APWP	911600	912600
<b>pH Range</b>	0-14	0-14	0-14	0-14	0-12	0-12
<b>pH Precision</b>	0.01	0.01	0.01	0.02	0.1	0.1
<b>Temp. Range</b>	0-100 °C	0-100 °C	0-100 °C	0-60 °C	0-80 °C	0-80 °C
<b>Internal Reference</b>	ROSS	ROSS	ROSS	Ag/AgCl Double junction	Ag/AgCl	Ag/AgCl
<b>Junction</b>	Sure-Flow	Glass fiber	Glass fiber	Open	Wick	Wick
<b>Fill Solution (Cat. No.)</b>	3 M KCl (810007)	3 M KCl (810007)	3 M KCl (810007)	–	–	–
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 165 mm T - 8 mm x 95 mm L	L - 165 mm T - 8 mm x 95 mm L	L - 165 mm T - 8 mm x 95 mm L	L - 160 mm T - 8 mm x 90 mm L	L - 145 mm D - 6 mm	L - 305 mm D - 8 mm
<b>Connector Type</b>	BNC Waterproof	BNC Waterproof	BNC Screw Cap	BNC Waterproof	BNC	BNC



Screw Cap



BNC Waterproof



BNC

### Key Information

All cap diameters are 16 mm except 911600  
All cable lengths are 1 meter



## Thermo Scientific Orion Low Maintenance pH Electrodes

Never Requires Fill Solution

Low maintenance pH electrodes are easy to use and require minimal maintenance. Since the reference chamber is sealed, you never need to replace fill solution or clean and rinse the reference chamber. You may choose from many styles such as AquaPro, Green electrodes, double junction or silver chloride electrodes to suit your measurement needs.

AquaPro low maintenance pH electrodes offer open junctions that do not clog. Choose between chemical resistant glass bodies or durable epoxy bodies. All AquaPro electrodes are TRIS compatible.

Green electrodes contain no hazardous substances such as mercury or lead and are ROHS compliant.

Double junction electrodes are TRIS compatible and you do not have to worry about interfering substances.

Silver chloride electrodes offer low maintenance as well as reliable measurements for everyday use.

### Reliable and accurate



**AquaPro combination pH electrode with low maintenance polymer, glass body**

- General purpose, high performance

### Precise and durable



**AquaPro combination pH electrode with low maintenance polymer, glass body, rugged bulb**

- Toughened bulb for rugged lab use

### Rugged and accurate



**AquaPro combination pH electrode with low maintenance polymer, epoxy body**

- General purpose, high performance

### Low maintenance, double junction



**Green combination double junction pH electrode, gel with epoxy body**

- Ideal for education, plant or field use
- Use in dirty water or TRIS, sulfide and protein samples
- Contains no lead

Cat. No.	9102AP	9104APWP	9156APWP	GD9106BNWP
<b>pH Range</b>	0-14	0-14	0-14	0-14
<b>pH Precision</b>	0.02	0.02	0.02	0.02
<b>Temp. Range</b>	0-60 °C	0-60 °C	0-60 °C	0-90 °C
<b>Internal Reference</b>	Ag/AgCl Double junction	Ag/AgCl Double junction	Ag/AgCl Double junction	Ag/AgCl Double junction
<b>Junction</b>	Open	Open	Open	Glass capillary
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm
<b>Connector Type</b>	BNC	BNC Waterproof	BNC Waterproof	BNC Waterproof

Cat. No.	Recommended Accessories
910001	Electrode storage solution
910199	All-in-one pH buffer kit



<p><b>Low maintenance, rugged epoxy body</b></p>	<p><b>Durable and low maintenance</b></p>	<p><b>For rugged, everyday use</b></p>	<p><b>Reliable every day use</b></p>
 <p>BETTER</p> <p>LEAD FREE</p>	 <p>BETTER</p> <p>TRIS COMPATIBLE</p>	 <p>GOOD</p>	 <p>GOOD</p>
<p><b>Green combination pH electrode, gel with epoxy body</b></p> <ul style="list-style-type: none"> <li>• Ideal for education, plant or field use</li> <li>• Contains no lead</li> </ul>	<p><b>Double Junction combination pH electrode with epoxy body, low maintenance gel</b></p> <ul style="list-style-type: none"> <li>• Low maintenance gel with durable epoxy body</li> </ul>	<p><b>Combination pH electrode with epoxy body, low maintenance gel</b></p> <ul style="list-style-type: none"> <li>• Ideal for field, plant, or educational applications</li> </ul>	<p><b>Combination pH electrode with epoxy body, low maintenance gel</b></p> <ul style="list-style-type: none"> <li>• General purpose use</li> <li>• Removable bulb guard makes cleaning easy</li> </ul>
<p><b>GS9106BNWP</b></p> <p>0-14</p> <p>0.05</p> <p>0-90 °C</p> <p>Ag/AgCl</p> <p>Glass capillary</p> <p>L - 120 mm</p> <p>D - 12 mm</p> <p>BNC Waterproof</p>	<p><b>9156DJWP</b></p> <p>0-14</p> <p>0.02</p> <p>0-60 °C</p> <p>Ag/AgCl Double junction</p> <p>Wick</p> <p>L - 120 mm</p> <p>D - 12 mm</p> <p>BNC Waterproof</p>	<p><b>9106BNWP</b></p> <p>0-14</p> <p>0.05</p> <p>0-80 °C</p> <p>Ag/AgCl</p> <p>Wick</p> <p>L - 120 mm</p> <p>D - 12 mm</p> <p>BNC Waterproof</p>	<p><b>9146BN</b></p> <p>0-14</p> <p>0.1</p> <p>0-80 °C</p> <p>Ag/AgCl</p> <p>Wick</p> <p>L - 120 mm</p> <p>D - 12 mm</p> <p>BNC</p>



**Key Information**

All cap diameters are 16 mm

All cable lengths are 1 meter





## Thermo Scientific Orion Flat Surface pH Electrodes

Measure Moist Surfaces Such As Agar Gel Plates, Meats and Cheese

Flat surface electrodes are epoxy body electrodes with a flat pH bulb that allow you to measure moist solid samples or small volumes. They can be used on samples such as meats, cheese or in agar gel plates. Flat surface pH electrodes are available in single or double junction designs allowing you to measure samples such as TRIS buffers or samples containing protein, sulfides or other compounds that react with silver. You may also choose from refillable or low maintenance designs.

Thermo Scientific Orion ROSS Ultra and ROSS flat surface electrodes provide optimum accuracy and stability while being TRIS compatible. The ROSS Ultra flat surface electrode has a 2 year warranty.

The AquaPro flat surface electrode is TRIS compatible and has an open junction that does not clog. The 9135APWP AquaPro flat surface electrode is a low maintenance model never requiring fill solution.

The silver chloride 913600 flat surface electrode is a low maintenance electrode that is ideal for routine measurements.

**Ideal for soft solid and semi-solid samples**



**ROSS Ultra® combination pH electrode with epoxy body, flat surface**

- Extended life and 2 year warranty
- Rapid response to temperature extremes

**For soft solid and semi-solid samples**



**ROSS® combination pH electrode with epoxy body, flat surface**

- Premium performance
- Rapid response to temperature extremes

**For soft solids and semi-solids**



**AquaPro combination pH electrode with low maintenance polymer, epoxy body, flat surface**

- Clog free junction for tough samples

**For solids and semi-solids**



**Combination pH electrode with epoxy body, low maintenance gel, flat surface**

- For routine flat surface measurements

Cat. No.	8135BNUWP	8135BN 8135SC	9135APWP	913600
<b>pH Range</b>	0-14	0-14	0-14	0-12
<b>pH Precision</b>	0.01	0.01	0.02	0.1
<b>Temp. Range</b>	0-100 °C	0-100 °C	0-60 °C	0-80 °C
<b>Internal Reference</b>	ROSS	ROSS	Ag/AgCl Double junction	Ag/AgCl
<b>Junction</b>	Glass fiber	Glass fiber	Open	Wick
<b>Fill Solution (Cat. No.)</b>	3 M KCl (810007)	3 M KCl (810007)	-	-
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 110 mm D - 12 mm
<b>Connector Type</b>	BNC Waterproof	BNC Screw Cap	BNC Waterproof	BNC

Cat. No.	Recommended Accessories
910001	Electrode storage solution
900011	Ag/AgCl fill solution
810007	ROSS fill solution
910008-WA	3 M KCl fill solution



Screw Cap



BNC Waterproof



BNC

**Key Information**

All cable lengths are 1 meter



# Thermo Scientific Orion Spear Tip pH Electrodes

For Piercing Fruits, Cheese and Meats

Spear tip pH electrodes can be used for piercing soft samples like cheese or fruit or cutting through tougher samples such as meat. All have refillable designs. They are available in single junction or double junction designs which can be used with TRIS samples, proteins or sulfides.

The ROSS spear tip electrode offers the proven accuracy and response that ROSS electrodes are known for and is a double junction electrode. It is suited for semi-solid samples.

The 9163SC is suited for routine measurements and is for use in semi-solid samples.

The KNiPHE electrode has a glass electrode that is encased in a stainless steel housing with a cutting blade at the tip. It is used for tough samples such as meat. It has a double junction design.

The 9162BNWP can be used for soft samples or routine clean water measurements. It has a single junction design.

**For piercing semi-solid samples**



**ROSS® combination pH electrode with glass body, spear tip**

- For cheese, meat, and fruit samples
- Measure samples as small as 100 µL
- Double junction for TRIS samples

**For piercing soft samples**



**Combination pH electrode, glass body, spear tip**

- For cheese, meat, and fruit samples
- Measure samples as small as 100 µL

**For meat, cheese and sludge samples**



**KNiPHE® Double Junction combination pH electrode with stainless steel cutting blade**

- For meat, cheese and sludge where glass alone may break
- Replacement electrode Cat. No. 9121APWP
- Replacement blade Cat. No. 712001
- Replacement sheath Cat. No. 712002

**Rugged with an easy-to-clean bulb**



**Low resistance combination pH electrode with glass body, rugged bulb**

- For routine or clean water measurements
- For soft samples

Cat. No.	8163BNWP 8163SC	9163SC	9120APWP	9162BNWP
<b>pH Range</b>	0-14	0-14	0-14	0-14
<b>pH Precision</b>	0.01	0.02	0.02	0.02
<b>Temp. Range</b>	0-100 °C	0-90 °C	0-60 °C	0-90 °C
<b>Internal Reference</b>	ROSS	Ag/AgCl	Ag/AgCl Double junction	Ag/AgCl
<b>Junction</b>	Ceramic	Ceramic	Ceramic	Ceramic
<b>Fill Solution (Cat. No.)</b>	3 M KCl (810007)	4 M KCl w/ Ag/AgCl (900011)	3 M KCl (910008-WA)	4 M KCl w/ Ag/AgCl (900011)
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 110 mm T - 4.5 mm x 20 mm L	L - 95 mm D - 6.5 mm x 25 mm L	L - 215 mm D - 16 mm	L - 120 mm D - 12 mm
<b>Connector Type</b>	BNC Waterproof Screw Cap	Screw Cap	BNC Waterproof	BNC Waterproof

Cat. No.	Recommended Accessories
900011	Ag/AgCl fill solution
810007	ROSS fill solution
910008	3M KCl fill solution



**Key Information**

All cap diameters are 16 mm  
All cable lengths are 1 meter



## Thermo Scientific Orion pH Half Cell and Reference Half Cell Electrodes

pH half cells require the use of a reference half cell electrode.

Reference half cells are for use with either a pH half cell sensing electrode or an ISE half cell reference electrode. They are available as single or double reference designs. Clog free Sure-flow junctions are also available extending the life of your electrode.

Ross half cells should be paired together. 900100 and 900200 are silver chloride references for pH and ISE electrodes.

**Accurate, ROSS rapid response in a half-cell design**



**ROSS® pH half-cell with glass body**

- Use with 800300 ROSS Sure-Flow or 800500U ROSS Ultra reference electrodes

**Accurate results in a half-cell**



**pH half-cell with glass body**

- Use with 900100 single junction or 900200 double junctions reference electrodes

**Top performance and long life**



**ROSS Ultra® reference half-cell with glass body**

- Use with 8101BNWP or 8101SC ROSS pH half-cell or 8411BN ROSS sodium half-cell electrodes

**For all samples including solvents**



**ROSS® Sure-Flow® reference half-cell with glass body**

- Sure-Flow junction prevents clogging
- Use with 8101BNWP or 8101SC ROSS pH half-cell or 8411BN ROSS sodium half-cell electrodes

**For use with ISE half-cell or pH electrodes**



**Double Junction Sure-Flow® reference half-cell with epoxy body**

- Sure-Flow junction prevents clogging
- Double junction allows a variety of filling solutions to be used

**For routine pH and many ISE measurements**



**Single Junction Sure-Flow® reference half-cell with epoxy body**

- Use with 9101BN and 9101SC pH half-cell electrodes
- Compatible with several ISEs

	8101BNWP 8101SC	9101BN 9101SC	800500U	800300	900200	900100
<b>Cat. No.</b>	8101BNWP 8101SC	9101BN 9101SC	800500U	800300	900200	900100
<b>pH Range</b>	0-14	0-14	0-14	0-14	0-14	0-14
<b>pH Precision</b>	0.01	0.02	–	–	–	–
<b>Temp. Range</b>	0-100 °C	0-90 °C	0-100 °C	0-100 °C	0-100 °C	0-100 °C
<b>Internal Reference</b>	ROSS	Ag/AgCl	ROSS	ROSS	Ag/AgCl Double junction	Ag/AgCl
<b>Junction</b>	–	–	Ceramic	Sure-Flow	Sure-Flow	Sure-Flow
<b>Fill Solution (Cat. No.)</b>	–	–	3 M KCl (810007)	3 M KCl (810007)	Equitransferent solution (900002) outer (900003)	Equitransferent solution w/ Ag/AgCl (900001)
<b>Dimension D (Dia) L (Length) T (Tip)</b>	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 120 mm D - 12 mm	L - 110 mm D - 13 mm	L - 110 mm D - 13 mm
<b>Connector Type</b>	BNC Waterproof Screw Cap	BNC Screw Cap	Pin Tip	Pin Tip	Pin Tip	Pin Tip

Cat. No.	Recommended Accessories
810007	ROSS fill solution
900001	Single junction reference fill solution
900002	Double junction reference inner fill solution
900003	Double junction reference outer fill solution



**Key Information**

All cap diameters are 16 mm at bottom of cap  
All cable lengths are 1 meter