



## Orion Products Brochure



pH / ISE / Dissolved Oxygen  
Conductivity / Titration / Colorimetry

Analyze • Detect • Measure • Control™

**Thermo**  
ELECTRON CORPORATION

**Orion Technology is  
Traveling to Mars**

**Phoenix Mars Lander 2007**

*Exclusively developed for NASA  
using Thermo's core technologies  
found in Orion electrodes, highly  
specialized sensors and solutions  
have been developed to travel three  
hundred million miles to test soil on  
the surface of Mars. Scheduled for  
launch in August 2007, with landing  
anticipated for May of 2008, core  
sensor technology used in  
Orion electrodes, specially developed  
solutions plus an adaptation of the  
unique sample stirrer feature of the  
Orion Star™ Series meters will be  
used to prepare and analyze  
Martian soil.*

## Table of Contents

Orion Products	1
We Have Your Ideal Meter!	2
Orion Electrochemistry Applied	3
Benchtop Meter Selection Guide	4
Portable Meter Selection Guide	6
Convenient Meter Kits	8
Orion Star Series™ Application Kits	10
Orion All-in-One™ Full Kits	11
Orion Meter and Accessories Kits	12
Meter and Sensor Kits	13
Orion Star™ Series Meters	14-17
Orion PerpHecT® LogR™ Meters	18
Orion Aplus Dual Channel ISE/pH Benchtop Meters	19
Portable pH Meters	20
Portable Conductivity Meters	22
Orion Star Navigator 21™ Software	24
Orion Buffers, Solutions, and Accessories	25-26
Potentiometric Titration	27
Volumetric and Coulometric Titration	28
Measurement Automation	29
Orion AQUAfast® Colorimetry	30
Orion AQUAfast Colorimetry Chemistry Guide by Application	32
Service Program Options (Inside Back Cover)	IBC

# Orion products for pH, ORP, ISE, Dissolved Oxygen, Conductivity, Titration, and Colorimetry analysis

1

**Ease-of-use and reliability aren't just features  
– they're fundamentals!**



*"I have been working at Chesterfield County Waste Water Treatment since 1993 and now manage two plants. When I arrived there was a mix of instruments in use but I have gradually converted to all Orion Products because I had very positive experience with Orion products in my prior position."*

**Chesterfield County WWTP  
Wastewater Treatment Plant**

## **50 years and beyond**

Whether you work in aquaculture or agriculture, food science, pharmaceuticals, forensic science, or research and development, Orion products are developed by scientists and engineers who understand your analysis needs. Manufactured and supported by Thermo Electron Corporation, Orion products are built to stand up to the demands of rigorous use under the most severe conditions. In addition to field and laboratory analysis applications, many Orion products are playing an important role in pharmaceutical and biotech research, monitoring water quality, advancing electroplating processes, food processing, and the wine and brewing industries. Our 50 year commitment to developing robust, reliable analytical tools to help protect people and the environment is long-standing and will continue.

## **"Plug & Play" Ease**

To meet your changing work environment, where demands for more efficiency and productivity can never jeopardize accuracy, we have designed our analytical tools to be easy-to-use. For example, the Orion Star™ Series include automatic functions to optimize the measurement process and ensure accurate results, even for non-technical users.

We also have pre-configured meter packages by application. You get everything you need – meter, electrode, Automatic Temperature Compensation (ATC) probe, buffers and standards, reagent solutions, and appropriate accessories – all built to work together flawlessly.

## **Comprehensive Electrochemistry Offerings**

Whether you need a basic portable or laboratory meter, or an advanced, dual channel with multi-parameter capabilities for your high throughput laboratory setting, we have the ideal meter to fit your needs.

Review this catalog for an overview of our complete line of Orion analysis products, then call your local Orion product representative to discuss how Thermo Electron Corporation's global presence and breadth of expertise can best serve your analytical needs.

## We Have Your Ideal Meter!

With the most comprehensive offering of electrochemistry products available, Thermo provides meter options to fit your most challenging applications. Choose from these value-priced options:

- Single or simultaneous multi-channel measurements
- LogR™ or ATC Probe Temperature compensation
- Waterproof connectors and systems
- Intrinsically safe\* for spark-free environments
- Benchtop
- Portable

Achieve the most precise pH measurements possible with the PerpHecT® meters and electrodes. The unique LogR feature with automatic temperature compensation and Auto-Buffer-Recognition allows temperature compensation directly from the pH electrode. PerpHecT® meters and electrodes are the ideal choice for advanced laboratory analytical work.

Dual-channel ISE/pH/mV/ORP/temperature Aplus benchtop meters accept up to five standards for concentration calibration to ensure low-level measurement accuracy.

Combining 50 years of industry-leading electrochemistry innovation, Orion Star™ series meters optimize the sensor technology you've come to expect from Orion. Simplified operational controls and waterproof connectors, plus a variety of models offering single parameter to multi-parameter measurements, make this series a first-choice for a broad range of applications.

Orion 261S/266S and Orion 131S/136S portable meters are intrinsically safe\* for environments where spark could be a concern.

Russell portable meters are rugged, affordable and ideal for basic measurements in the plant or field.

Backed by the world class Orion Products Technical Support Team, Thermo will support you every step of the way. Our services include In Warranty Support, IQ/OQ Documents, and Validation and Calibration Support to minimize downtime and increase productivity. See the inside back cover for details.

To help you choose the proper meter for your application and your working environment, simply refer to the detailed Selection Guides from pages 4-7.

*“Orion products have stood the test of student use year after year. If you want to test-drive a product, give it to students. Orion products really hold up!”*

**University of Minnesota  
Chemistry Department**



\* Does not meet European Intrinsically Safe specification.



# Orion Electrochemistry Applied



The first to develop ISE technology, Orion products are the industry leader in electrochemistry. Our reach is global and our breadth of industry knowledge is unsurpassed. Focusing our general laboratory analysis to specific applications, we now offer product kits designed for key industries.

3



## Environmental

Whether working with wastewater or drinking water, evaluating fresh or salt water, or monitoring soil conditions, Orion products meet the regulatory demands placed on agriculturists and aquaculturists.



## Pharmaceutical

Controlling pH of capsules, ointments, and tablets requires the reliable, repeatable and precise measurement Orion products deliver.



## Food & Beverage

From farm to factory including soil monitoring, food manufacturing and final product QA/QC, Orion products ensure quality control standards are met.



## Consumer Products

Orion products provide the accurate pH and ISE measurements needed for formulation, QA/QC and finished product labeling of cosmetics, toiletries and household products.

***Easy-to-Use / Easy-to-Choose Orion Star™ series packages offer simplicity and convenience. When placing your order through your distributor, a single part number ensures you receive everything you need for your specific application. See page 10 for details.***

## Single Parameter

### Orion Star™ Series

#### 2-Star pH

pgs. 8-17\*

- 0-14 pH range 0.000 - 14.000
- 3 point calibration
- 50 point datalog
- RS232 data output for printer

#### 3-Star pH

pgs. 8-17\*

- Benchtop autostir capability
- -2.000 to 19.999 pH range, mV and E<sub>H</sub> ORP modes
- 5 point calibration
- 200 point datalog
- RS232/USB output for printer or PC
- GLP features

#### 3-Star Cond

pgs. 8-17\*

- Measures Cond, Resistivity, Salinity and TDS
- 0.00-3000 mS/cm, autoresolution with cell constant dependence
- Resolution of 4 significant digits, down to 0.001 µS/cm, cell constant dependent
- Fast auto-calibration w/Orion Standard
- GLP features

#### 3-Star DO

pgs. 8-17\*

- Autostir capability for BOD testing
- Measures DO as concentration (mg/L) or % saturation
- Calibrate as Water Saturated Air, Air Saturated Water, manual to Winkler titration for BOD measurement
- 0 to 45 ppt salinity factor correction
- Automatic barometric pressure from 450-850 mm Hg

#### Key Features

- Informative display including electrode condition
- SMART STABILITY™ & SMART AVERAGING™
- Simple SOP measurement conformance across 3-, 4- and 5-Star meters
- Password protection and method storage (3-Star and up)
- Downloadable software updates
- Optional Star Navigator 21™ software for 21 CFR Part 11 compliance

### PerpHecT® LogR™

#### 320 pH

p. 18

- Easy-to-use basic meter
- 2 point calibration
- No RS232

#### 350 pH

p. 18

- 3 point calibration
- GLP
- ORP modes
- RS232

#### Key Features

- LogR temperature compensation from pH bulb itself - no ATC required
- Simple operation and setup
- Large red LED display
- Auto-Buffer-Recognition plus allows custom buffers
- Automatic temperature compensation
- Available in pH or pH/ISE versions

### Dual Channel

#### 525Aplus pH

p. 19

- 3 point pH calibration

#### Key Features

- Dual BNC and reference channels
- Numeric keys for data entry
- Displays detailed instructions
- Stores each channel's calibration
- Auto-Buffer-Recognition plus allows custom buffers
- Advanced ISE features
- Automatic temperature compensation
- RS232 bidirectional communication
- Orion 607 switchbox connects up to 7 electrodes
- Available in pH or pH/ISE versions

#### \*Orion Star Series Meter Ordering Info

Application Kits	pg 10
All-in-One Full Meter Kits	pg 11
Orion Meter and Accessory Kits	pg 12
Meter and Sensor Kits	pg 13
Meter Only	pgs 16-17

## Dual Parameter

## Multi Parameter

### Orion Star™ Series

#### 4-Star pH/ISE pgs. 8-17\*

- ISE measurement capability
- 5 point pH and ISE calibrations
- Variety of units or unitless results

#### 4-Star pH/Cond pgs. 8-17\*

- Measures Cond, Resistivity, Salinity and TDS
- Complies with USP
- USP 645 package available

#### 4-Star pH/DO pgs. 8-17\*

- Measures DO as mg/L or % saturation
- DO calibration to Winkler titration for BOD measurement
- Add mV,  $E_H$  and ORP
- 5 point pH calibrations

### Key Features

- Simultaneous readings and display of 2 measurements channels
- SMART STABILITY™ & SMART AVERAGING™
- Informative display give all critical information at a glance
- Downloadable software updates
- Method storage, 200 point datalog and GLP documentation
- Complete kits available
- Backlit display for low light locations
- Optional Star Navigator 21™ software for 21 CFR Part 11 compliance

### PerpHecT® LogR™

#### 370 pH/ISE p. 18

- 3 point pH/2 point ISE calibration
- GLP
- RS232

### Key Features

- LogR temperature compensation from pH bulb itself - no ATC required
- Simple operation and setup
- Large red LED display
- Auto-Buffer-Recognition plus allows custom buffers
- Automatic temperature compensation

### Dual Channel

#### 720Aplus pH/ISE p. 19

- 5 point pH and ISE calibration
- ISE autoblack correction for accurate low level measurements

#### 920Aplus pH/ISE p. 19

- 5 point pH and ISE calibrations
- Pre-programmed Double Known Addition and Known Subtraction techniques
- Electrode ID features
- 920Aplus and 607 switchbox allows up to 7 electrodes to be used

### Key Features

- Dual BNC and reference channels
- Numeric keys for data entry
- Displays detailed instructions
- Stores each channel's calibration
- Auto-Buffer Recognition plus allows custom buffers
- Automatic temperature compensation
- RS232 bidirectional communication

### Orion Star™ Series

#### 5-Star pH/ISE/DO/Cond pgs. 8-17\*

- All parameters in one meter
- Measures actual salinity of sample and uses value for salinity correction simultaneously with DO measurement
- Includes Star Navigator 21™ software for 21 CFR Part 11 compliance

### Key Features

- Informative display including electrode condition
- SMART STABILITY & SMART AVERAGING
- Downloadable software
- Simultaneous readings and display of 3 measurements channels
- Economical packages for various applications



## Single Parameter

### Orion Star™ Series

#### 3-Star pH pgs. 8-17\*

- -2.000 to 19.999 pH range, mV and E<sub>H</sub> ORP modes
- 5 point calibration
- RS232/USB output for printer or PC
- GLP features

#### 3-Star Cond pgs. 8-17\*

- Measures Cond, Resistivity, Salinity and TDS
- 0.00-3000 mS/cm, autoresolution with cell constant dependence
- Resolution of 4 significant digits, down to 0.001 µS/cm, cell constant dependent
- Fast auto-calibration w/Orion Standard
- Accepts 2- or 4- cell sensor technology
- Complies with USP
- GLP features

#### 3-Star DO pgs. 8-17\*

- Measures DO as concentration (mg/L) or % saturation
- Calibrate as Water Saturated Air, Air Saturated Water, manual to Winkler titration for BOD measurement
- 0 to 45 ppt salinity factor correction
- Automatic barometric pressure from 450-850 mmHg

### Key Features

- IP67 waterproof portable meters and waterproof locking connections
- SMART STABILITY™ & SMART AVERAGING™
- Informative display gives all key information at a glance
- Downloadable software updates
- Method storage, 200 point datalog and GLP documentation
- Complete field kits available
- Backlit display for low light locations
- Optional Star Navigator 21™

### Russell

#### RL060P pH p. 21

- 0-14 pH range with resolution of 0.01 pH
- Display pH or mV or temp
- 1 to 3 point calibration
- Auto-Buffer-Recognition of US, NIST and Orion Pure Water
- Low-Ionic Strength buffers
- > 200 hours battery life

#### RL060C Cond p. 23

- 0.00 µS/cm - 200 mS/cm autoranging, with range-dependent resolution
- Display conductivity or temp
- Adjustable temperature coefficient, 0.00-3.0%/C
- Uses 2-electrode cell conductivity probes with cell constants of 0.1, 1.0 or 10
- >100 hours battery life

### Key Features

- Basic portable meter
- Temperature calibration feature
- Optional rubber boot for protection and meter stand
- Several meter package options
- Available for pH or Conductivity measurements

### Intrinsically Safe\*\*

#### 261S pH p. 20

- -2.00 to 16.00 pH range
- Displays pH or mV and temperature
- 1000 hours battery life
- No RS232 or datalog

#### 266S pH p. 20

- 100 point datalog stores data by time, differential value or manually
- RS232
- GLP features and data output
- Remote meter operation from PC with included software and cable

#### 131S Cond p. 22

- 0.0 µS/cm to 500 mS/cm (0.00-100.0 µS/cm for K=0.1 cells)
- Displays Conductivity, Salinity or TDS and temperature
- 1000 hours battery life
- No RS232 or datalog

#### 136S Cond p. 22

- 100 point datalog stores data by time, differential value or manually
- RS232
- GLP features, and remote operation data output with included software and cable

### Key Features

- Intrinsically Safe meter and electrode system certified by Factory Mutual (FM) (USA)
- IP66 waterproof meter with sealed inputs
- pH electrode condition indicator
- Up to 3 point calibrations with choice of buffer sets
- Includes built-in electrode holder, hanging hook, foldout meter stand and neckstrap
- Field kits available
- Basic or GLP and datalogging version for pH or Conductivity

\*\* Does not meet European Intrinsically Safe specification.



*“When working in the field, the fact that the Orion Star™ portable meter floats is a real advantage,” says Scott Dowd, a senior aquarist from the New England Aquarium. Scott is working in the Brazilian rain forest with the indigenous population to improve eco-friendly businesses such as the export of tropical fish to American hobbyists.*

**New England Aquarium**

## Dual Parameter

### Orion Star™ Series

#### 4-Star pH/ISE pgs. 8-17\*

- Add ISE capability to pH, mV, E<sub>H</sub> and ORP
- 5 point pH and ISE calibrations
- Exclusive ISE calibration features for better low level measurement accuracy
- Variety of units or unitless results

#### 4-Star pH/Cond pgs. 8-17\*

- Measures Cond, Resistivity, Salinity and TDS, pH, mV, E<sub>H</sub> and ORP
- Complies with USP

#### 4-Star pH/DO pgs. 8-17\*

- pH and DO measurement
- 5 point pH calibration

### Key Features

- IP67 waterproof portable meters and waterproof locking connections
- SMART STABILITY™ & SMART AVERAGING
- Simultaneous readings and display of 2 measurements channels
- Informative display give all key information at a glance
- Downloadable software updates
- Method storage, 200 point datalog and GLP documentation
- Complete field kits available
- Backlit display for low light locations
- Optional Star Navigator 21™

## Multi Parameter

### Orion Star™ Series

#### 5-Star pH/DO/Cond pgs. 8-17\*

- For field measurement
- Measures actual salinity of sample and uses value for salinity correction simultaneously with DO measurement

#### 5-Star pH/ISE/DO/Cond pgs. 8-17\*

- Add ISE capability
- Includes Star Navigator 21™ software for 21CFR Part 11 compliance

### Key Features

- IP67 waterproof portable meters and waterproof locking connections
- SMART STABILITY™ & SMART AVERAGING
- Simultaneous readings and display of 3 measurements channels
- Informative display gives all critical information at a glance
- Downloadable software updates
- Method storage, 200 point datalog and GLP documentation
- Complete field kits available
- Backlit display for low light locations



#### \*Orion Star Series Meter Ordering Info

Application Kits	pg 10
All-in-One Full Meter Kits	pg 11
Orion Meter and Accessory Kits	pg 12
Meter and Sensor Kits	pg 13
Meter Only	pgs 16-17

## Convenient Meter Kits

8

Comprehensive, pre-configured lab kits take the guesswork out of ordering. Every component is matched to your application, with everything required for your particular analysis. No missing pieces and nothing else to order – so right out of the box, you can be up and running. Choose from an Application Kit or an All-in-One™ Full Meter Kit. You may also choose from a variety of Meter and Accessories Kits or a Kit with Meter and Sensor only.

### Ordering is easy

Simply select the kit that suits your needs and place your order through your local distributor using the single catalog number. For Ordering Information Kits, see page 10-13. Additional product information is available at [www.thermo.com/water](http://www.thermo.com/water).

*Refer to pages 10-13 for  
Kit Ordering Information*



### Orion Star™ Series Application Kits

Select from Environmental, Food and Beverage, Pharmaceutical, or Consumer products kits. Everything you need will be shipped to you under one part number. Plus you will receive our step-by-step Method Notes outlining in simple terms how to maximize your success with minimum effort. For details see page 10.

#### Application Kits include:

- Orion Star Series meter
- Sensor and ATC temperature probe (if required)
- Standards, buffers and solutions
- Application-matched accessories – stand, electrode holder, automatic stirrer, and hard or soft field case
- Detailed Method Notes for step-by-step instruction to perform the application

### All-in-One™ Full Meter Kits

Choose a portable or benchtop Full Meter Kit and receive all application matched sensors, solutions and accessories – everything you need appropriate for your measurement. For details see page 11.

### Meter and Accessories Kits

Whether you need a benchtop or portable single, dual or multi-parameter meter, these kits provide the appropriate products for your work station. (Solutions are sold separately.) For details see page 12.

### Meter and Stand only

This customized kit offers the Orion 3-Star pH benchtop meter and our 090043 swing arm electrode stand. Select from our wide range of Orion pH and ORP electrodes to use the best electrode for your sample. For details see page 12.

### Meter and Sensor Kits

Simplicity at its best, these kits come with the meter of your choice matched with the ideal sensor and an ATC where required. For details see page 13.



# Orion Star™ Series Application Kits

● 2-STAR ● 4-STAR  
● 3-STAR ● 5-STAR

10

CAT. NO.	ENVIRONMENTAL
● 1010102	AMMONIA IN DRINKING WATER, BENCHTOP
● 1010109	AMMONIA IN WASTE WATER, BENCHTOP
● 1010114	BOD IN WASTE WATER, BENCHTOP
● 1010118	CHLORIDE IN SOIL, BENCHTOP
● 1010122	CONDUCTIVITY OF SURFACE FRESH WATER, PORTABLE
● 1010127	COPPER IN SURFACE FRESH WATER, BENCHTOP
● 1010106	CYANIDE IN DRINKING WATER, BENCHTOP
● 1010124	CYANIDE IN SURFACE FRESH WATER, PORTABLE
● 1010116	DO IN SALT WATER, PORTABLE
● 1010121	DO IN SURFACE FRESH WATER, PORTABLE
● 1010103	FLUORIDE IN DRINKING WATER, BENCHTOP
● 1010108	NITRATE IN DRINKING WATER, BENCHTOP
● 1010126	NITRATE IN SURFACE FRESH WATER, BENCHTOP
● 1010112	ORP OF WASTE WATER, PORTABLE
● 1010105	ORP OF DRINKING WATER, BENCHTOP
● 1010101	PH OF DRINKING WATER, BENCHTOP
● 1010115	PH OF SALT WATER, PORTABLE
● 1010117	PH OF SOILS, BENCHTOP
● 1010120	PH OF SURFACE FRESH WATER, PORTABLE
● 1010130	PH OF ULTRA PURE WATER OR LOW IONIC STRENGTH WATER, BENCHTOP
● 1010110	PH OF WASTE WATER, PORTABLE
● 1010119	POTASSIUM IN SOIL, BENCHTOP
● 1010104	RESIDUAL CHLORINE IN DRINKING WATER, BENCHTOP
● 1010111	RESIDUAL CHLORINE IN WASTE WATER, BENCHTOP
● 1010128	SALINITY IN SURFACE FRESH WATER, PORTABLE
● 1010107	SULFIDE IN DRINKING WATER, BENCHTOP
● 1010113*	SULFIDE IN WASTE WATER, BENCHTOP
● 1010125	TOTAL ALKALINITY OF SURFACE FRESH WATER
● 1010129	TOTAL HARDNESS OF SURFACE FRESH WATER, BENCHTOP

CAT. NO.	FOOD & BEVERAGE
● 1010149	CALCIUM IN FRUIT JUICE, BENCHTOP
● 1010134	CALCIUM IN MILK, BENCHTOP
● 1010142	CHLORIDE IN CANNED FOOD, BENCHTOP
● 1010146	CHLORIDE IN CHEESE, BENCHTOP
● 1010147	CHLORIDE IN INFANT FORMULA, BENCHTOP
● 1010136	CHLORIDE IN MILK, BENCHTOP
● 1010148	CHLORIDE IN SNACK CHIPS/CRISPS, BENCHTOP
● 1010140	CHLORIDE IN WINE/BEER, BENCHTOP
● 1010138	DO IN WINE/BEER, PORTABLE
● 1010131	NITRATE IN PROCESSED MEATS, BENCHTOP

\* Includes Star Navigator 21™ Software, see page 24.

CAT. NO.	FOOD & BEVERAGE (cont'd.)
● 1010132	NITRITE IN PROCESSED MEATS, BENCHTOP
● 1010143	PH OF CARBONATED BEVERAGES, BENCHTOP
● 1010145	PH OF CHEESE, BENCHTOP
● 1010151	PH OF FRUIT JUICE, BENCHTOP
● 1010137	PH OF MILK, BENCHTOP
● 1010133	PH OF PROCESSED MEATS, BENCHTOP
● 1010139	PH OF WINE/BEER, BENCHTOP
● 1010150	POTASSIUM IN FRUIT JUICE, BENCHTOP
● 1010135	POTASSIUM IN MILK, BENCHTOP
● 1010141	POTASSIUM IN WINE/BEER, BENCHTOP
● 1010144	SODIUM IN CARBONATED BEVERAGE, BENCHTOP

CAT. NO.	PHARMACEUTICAL
● 1010155*	PH OF CAPSULES, BENCHTOP
● 1010156*	PH OF OINTMENTS, BENCHTOP
● 1010154*	PH OF TABLETS, BENCHTOP
● 1010153*	PH USP <791>, BENCHTOP
● 1010152*	WATER CONDUCTIVITY USP <645>, BENCHTOP

Cat. No.	CONSUMER PRODUCTS
● 1010163	FLUORIDE IN DENTAL FLOSS, BENCHTOP
● 1010162	FLUORIDE IN MOUTHWASH, BENCHTOP
● 1010157	FLUORIDE IN TOOTHPASTE, BENCHTOP
● 1010164	IODINE IN OTC ANTISEPTICS, BENCHTOP
● 1010160	PH OF HAIR CARE PRODUCTS, BENCHTOP
● 1010158	PH OF HAND CREAMS, BENCHTOP
● 1010159	PH OF HOUSEHOLD CLEANSERS, BENCHTOP
● 1010165	PH OF SALINE SOLUTION, BENCHTOP
● 1010161	PH OF SOAP/DETERGENT, BENCHTOP
● 1010167	SALINITY OF CONTACT LENS SOLUTION, BENCHTOP
● 1010166	SALINITY OF SALINE SOLUTION, BENCHTOP
● 1010168	SURFACTANTS OF CLEANSERS, BENCHTOP

# Orion All-in-One™ Full Meter Kits

## Includes Meter, Sensor(s), Buffers, Solutions and Accessories

2-STAR 4-STAR  
3-STAR 5-STAR

### CAT. NO. FULL PH/ORP/MULTIPARAMETER KITS

ALL KITS IN THIS SECTION INCLUDE BENCHTOP METERS, 090043 SWING ARM ELEC STAND, 910001 PH ELEC STORAGE SOLN AND PINT BOTTLES(475mL) OF 4, 7, 10 PH BUFFERS

1111001	ORION 2-STAR PH, 9157BNMD REFILLABLE EPOXY PH/ATC TRIODE™
1112001	ORION 3-STAR PH, 9157BNMD REFILLABLE EPOXY PH/ATC TRIODE
1112003	ORION 3-STAR PH, 8102BNUWP ROSS ULTRA® PH, 927005MD ATC PROBE
1112004	ORION 3-STAR PH, 9172BNWP SURE-FLOW® PH, 927007MD ATC PROBE
1112005	ORION 3-STAR PH, 9172BNWP SURE-FLOW PH, 927007MD ATC PROBE
1112006	ORION 3-STAR PH, 8102BNUWP ROSS ULTRA PH, 927005MD ATC PROBE, 700003 PHISA® SOLN
1115001	ORION 4-STAR PH/ISE, 8102BNUWP ROSS ULTRA PH, 927005MD ATC PROBE
1115002	ORION 4-STAR PH/ISE, 9172BNWP SUREFLOW PH, 927005MD ATC PROBE
1115003	ORION 4-STAR PH/ISE, 8102BNUWP ROSS ULTRA PH, 927005MD ATC PROBE, STAR NAVIGATOR 21™ SOFTWARE
1115004	ORION 4-STAR PH/ISE, 9172BNWP SURE-FLOW PH, 927005MD ATC PROBE, STAR NAVIGATOR 21 SOFTWARE
1116001	ORION 4-STAR PH/DO, 8102BNUWP ROSS ULTRA PH ELECTRODE, 081010MD DO PROBE, 927005MD ATC PROBE, 970802 RESERVOIR/STIRRER, 080113 DO PROBE MAINT KIT, 080017 DO CALIBRATION SLEEVE, 080160 BOD ADAPTER
1117001	ORION 4-STAR PH/CONDUCTIVITY, 9157BNMD PH/ATC TRIODE AND 013605MD COND CELL, 011007 COND/TDS STD
1119001	ORION 5-STAR PH/ORP/ISE/COND/DO, 8102BNUWP ROSS ULTRA PH ELECTRODE, 013605MD COND CELL, 081010MD DO PROBE, 927005MD ATC PROBE, STAR NAVIGATOR 21 SOFTWARE, 970802 BOD RESERVOIR/STIRRER, 080113 DO PROBE MAINTENANCE KIT, 080017 DO CAL SLEEVE, 080160 BOD ADAPTER, 011007 COND/TDS STD

ALL KITS IN THIS SECTION INCLUDE WATERPROOF PORTABLE METERS, 910060 PH ELEC STOR SOLN, 10 PACKS OF PH 4,7,10 BUFFER POUCHES. KITS WITH DO ALSO CONTAIN 080113 DO MAINTENANCE KIT, 080045 PROTECTIVE SLEEVE, 080017 DO CAL SLEEVE. KITS WITH CONDUCTIVITY ALSO CONTAIN 011007 COND STD

#### HARD FIELD CASE (1210004)

1212001	ORION 3-STAR PH, 9107BNMD PH/ATC TRIODE, BEAKER, ELECTRODE STORAGE CHAMBER
1212002	ORION 3-STAR PH, 8165BNWP ROSS® SURE-FLOW EPOXY PH ELECTRODE, BEAKER
1215001	ORION 4-STAR PH/ISE, 9107BNMD LOW MAINTENANCE PH/ATC TRIODE
1216001	ORION 4-STAR PH/DO, 9107BNMD LOW MAINTENANCE PH/ATC TRIODE, 083005MD DO PROBE, BEAKER
1216002	ORION 4-STAR PH/DO, 9107WMMD LOW MAINTENANCE PH/ATC TRIODE 3M CABLE, 083010MD DO PROBE, BEAKER
1217001	ORION 4-STAR PH/CONDUCTIVITY, 9107BNMD TRIODE, 013005MD COND CELL
1217002	ORION 4-STAR PH/CONDUCTIVITY, 9107WMMD PH/ATC TRIODE 3M, 013010MD COND CELL 3M
1218001	ORION 5 STAR PH/DO/COND, 9107WMMD PH TRIODE 3M CABLE, 013010MD COND CELL 3M, IMPACT JACKET W/ ELECTRODE STORAGE 083010MD DO PROBE 3M, STAR NAVIGATOR 21 SOFTWARE
1219001	ORION 5-STAR PH/ISE/DO/COND, 9107WMMD PH/ATC TRIODE 3M CABLE, 013010MD COND CELL 3M, 083010MD DO PROBE 3M, IMPACT JACKET W/ ELECTRODE STORAGE, STAR NAVIGATOR 21 SOFTWARE

Note: All ROSS Ultra, ROSS, AquaPro and any Sure-Flow electrodes are compatible with Tris buffers.

### CAT. NO. FULL PH/MULTIPARAMETER KITS (cont'd.)

#### SOFT FIELD CASE (1210005)

1215501	ORION 4-STAR PH/ISE, 9107BNMD TRIODE
1216501	ORION 4-STAR PH/DO, 9107BNMD PH/ATC TRIODE, 083005MD DO PROBE, BEAKER
1216502	ORION 4-STAR PH/DO, 9107WMMD PH/ATC TRIODE 3M CABLE, 083010MD DO PROBE 3M CABLE, BEAKER
1217501	ORION 4-STAR PH/CONDUCTIVITY, 9107BNMD TRIODE, 013005MD COND CELL, BEAKER
1217502	ORION 4-STAR PH/CONDUCTIVITY, 9107WMMD PH/ATC TRIODE 3M CABLE, 013010MD COND CELL 3M, BEAKER
1218501	ORION 5 STAR PH/DO/COND, 9107WMMD PH/ATC TRIODE 3M, 013010MD COND CELL 3M, 083010MD 3M, STAR NAVIGATOR 21 SOFTWARE, BEAKER, IMPACT JACKET W/ ELECTRODE STORAGE
1219501	ORION 5-STAR PH/ISE/DO/COND, 9107WMMD PH ELECTRODE 3M CABLE, 013010MD COND CELL 3M, 083010MD DO PROBE 3M, BEAKER, IMPACT JACKET WITH ELECTRODE STORAGE CHAMBER, STAR NAVIGATOR 21 SOFTWARE
1212503	ORION 3-STAR PH/ORP WATERPROOF PORTABLE METER, 1210005 SOFT FIELD CASE, 9179BNMD ORP/TEMP LOW MAINTENANCE TRIODE, 967961 ORP STD, IMPACT JACKET W/ ELECTRODE STORAGE

### CAT. NO. FULL DISSOLVED OXYGEN KITS

ALL KITS IN THIS SECTION INCLUDE 080113 DO PROBE MAINT KIT, 080017 DO CAL SLEEVE

1113001	ORION 3-STAR DO BENCHTOP METER, 081010MD DO PROBE, 970802 RESERVOIR/STIRRER, 080160 BOD ADAPTER
1213001	ORION 3-STAR DO WATERPROOF PORTABLE METER, 083010MD DO PROBE, 1210004 HARD FIELD CASE
1213101	ORION 3-STAR DO WATERPROOF PORTABLE METER, 083010MD DO PROBE
1213501	ORION 3-STAR DO WATERPROOF PORTABLE METER, 083010MD DO PROBE, 1210005 SOFT FIELD CASE

### CAT. NO. FULL CONDUCTIVITY KITS

ALL KITS IN THIS SECTION INCLUDE BENCHTOP METERS AND THE 090043 SWING ARM ELEC STAND

1114001	ORION 3-STAR CONDUCTIVITY, 013005MD 4-ELECTRODE COND CELL, 011007 COND/TDS STD
1114002	ORION 3-STAR CONDUCTIVITY, 013016MD (K=0.1) COND PROBE, 011008 COND/TDS STD
1114003	ORION 3-STAR CONDUCTIVITY, 013016MD (K=0.1) COND PROBE, 011008 COND/TDS STD, COND CALIBRATION KIT AND STAR NAVIGATOR 21 SOFTWARE

ALL KITS IN THIS SECTION INCLUDE WATERPROOF PORTABLE METERS

1214001	ORION 3-STAR CONDUCTIVITY, 013005MD COND CELL, 011007 COND STD, 1210004 HARD FIELD CASE
1214003	ORION 3-STAR CONDUCTIVITY, 013610MD COND CELL, 011007 COND STD, 1210004 HARD FIELD CASE
1214501	ORION 3-STAR CONDUCTIVITY, 013005MD COND CELL, 011007 COND STD, 1210005 SOFT FIELD CASE
1214503	ORION 3-STAR CONDUCTIVITY, 013610MD COND CELL, 011007 COND STD, 1210005 SOFT FIELD CASE
1214004	ORION 3-STAR CONDUCTIVITY, 013016MD STAINLESS STEEL COND CELL (K=0.1), 011008 COND STD, 1210004 HARD FIELD CASE
1214504	ORION 3-STAR CONDUCTIVITY, 013016MD COND CELL, 011008 COND STD AND 1210005 SOFT FIELD CASE



# Orion Meter and Accessories Kits

● 2-STAR ● 4-STAR  
● 3-STAR ● 5-STAR

12

## CAT. NO. METER, SENSOR & ACCESSORY KITS

BENCHTOP KITS ALL INCLUDE ORION 090043 SWING ARM ELECTRODE STAND

● 1111201	ORION 2-STAR PH, 9165BNWP EPOXY SURE-FLOW® PH ELECTRODE
● 1111202	ORION 2-STAR PH, 9157BNMD REFILLABLE EPOXY TRIODE™
● 1111203	ORION 2-STAR PH, 9156APWP EPOXY AQUAPRO CROSSLINKED POLYMER DOUBLE JUNCTION PH ELECTRODE
● 1111204	ORION 2-STAR PH, 9142BN REFILLABLE GLASS PH ELECTRODE, STAINLESS STEEL BODY ATC 927007MD
● 1111205	ORION 2-STAR PH, 9142BN REFILLABLE GLASS PH ELECTRODE
● 1111206	ORION 2-STAR PH, 9145BN EPOXY GEL PH ELECTRODE
● 1111207	ORION 2-STAR PH, 9107BNMD EPOXY LOW MAINTENANCE PH/ATC TRIODE
● 1111208	ORION 2-STAR PH, 9107APMD AQUAPRO EPOXY CROSSLINKED POLYMER DOUBLE JUNCTION TRIS COMPATIBLE TRIODE
● 1112202	ORION 3-STAR PH, 8172BNWP ROSS® SURE-FLOW® PH ELECTRODE, 927006MD ATC PROBE
● 1112203	ORION 3-STAR PH, 9156APWP EPOXY AQUAPRO CROSSLINKED POLYMER DOUBLE JUNCTION PH ELECTRODE
● 1112204	ORION 3-STAR PH, 9107BNMD EPOXY LOW MAINTENANCE TRIODE
● 1112205	ORION 3-STAR PH, 9156BNWP PH ELECTRODE, 927007MD STAINLESS STEEL ATC PROBE
● 1112207	ORION 3-STAR PH, 9106BNWP LOW MAINTENANCE PH ELECTRODE
● 1112208	ORION 3-STAR PH, 9165BNWP PH ELECTRODE
● 1117201	ORION 4-STAR PH/COND, 9157BNMD PH ELECTRODE, 013005MD COND CELL
● 1119201	ORION 5-STAR PH/ORP/ISE/COND/DO BENCHTOP METER 9107BNMD LOW MAINTENANCE PH/ATC TRIODE, 927005MD ATC PROBE, 081010MD DO PROBE, 013005MD COND CELL, 970802 OVERFLOW FUNNEL, 080113 DO PROBE MAINT KIT, 080017 DO CAL SLEEVE, 080160 BOD ADAPTER, STAR NAVIGATOR 21™ SOFTWARE
● 1116201	ORION 4-STAR PH/DO BENCHTOP METER, 9157BNMD REFILLABLE PH/ATC TRIODE, 081010MD DO PROBE, 970802 OVERFLOW FUNNEL, 080113 DO PROBE SERVICE KIT, 080017 CAL SLEEVE, 080160 BOD ADAPTER

## CAT. NO. METER & STAND ONLY

● 1112002	ORION 3-STAR PH BENCHTOP METER INCLUDES ORION 090043 SWING ARM ELECTRODE STAND, ORDER ELECTRODE SEPARATELY
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## CAT. NO. PORTABLE KITS

● 1212501	ORION 3-STAR PH WATERPROOF PORTABLE METER 9107BNMD TRIODE, ELECTRODE STORAGE CHAMBER, BEAKER, SOFT FIELD CASE
● 1216101	ORION 4-STAR PH/DO WATERPROOF PORTABLE METER 080045 EPOXY PROTECTIVE SLEEVE, 083005MD DO PROBE 1.5M CABLE, 9107BNMD LOW MAINTENANCE TRIODE 1.5M CABLE, 080113 DO MAINT KIT, 080017 DO CAL SLEEVE
● 1216102	ORION 4-STAR PH/DO WATERPROOF PORTABLE METER 9107WMMD PH ELECTRODE 3M CABLE, 083010MD DO PROBE 3M CABLE, 080113 DO MAINT KIT, 080017 DO CAL SLEEVE
● 1217102	ORION 4-STAR PH/CONDUCTIVITY WATERPROOF PORTABLE METER 9107WMMD PH/ATC TRIODE 3M, 013010MD COND CELL 3M CABLE, BEAKER
● 1218101	ORION 5-STAR PH/DO/CONDUCTIVITY WPHH METER 9107WMMD PH ELECTRODE 3M CABLE, 013010MD COND CELL 3M, 083010MD DO PROBE 3M, 080113 DO MAINT KIT, 080045 PROTECTIVE SLEEVE, 080113 DO MAINT KIT, 080017 DO CAL SLEEVE, IMPACT JACKET WITH ELECTRODE STORAGE CHAMBER, STAR NAVIGATOR 21™ SOFTWARE
● 1219101	ORION 5-STAR PH/ISE/DO/COND WATERPROOF PORTABLE METER 9107WMMD PH ELECTRODE 3M CABLE, 013010MD COND CELL 3M, 083010MD DO PROBE 3M, 080113 DO MAINT KIT, 080017 DO CAL SLEEVE, IMPACT JACKET WITH ELECTRODE STORAGE CHAMBER, STAR NAVIGATOR 21™ SOFTWARE



Orion 090043 Swing Arm Stand



Field testing efficiency

# Meter and Sensor Kits

● 2-STAR    ● 5-STAR  
● 3-STAR    ● RUSSELL  
● 4-STAR

13

## CAT. NO. RUSSELL PORTABLE METER & PROBE KITS

● 5122001	RUSSELL RL060P PH METER W/HOLDER & FLIP-OUT STAND, 917004 ATC PROBE, 9146BN GEL EPOXY PH ELECTRODE
● 5122003	RUSSELL RL060P PH METER W/HOLDER & FLIP-OUT STAND, 9147BN 3-IN-1 GEL EPOXY PH ELECTRODE
● 5124002	RUSSELL RL060C CONDUCTIVITY METER W/HOLDER & FLIP-OUT STAND, 014005 CONDUCTIVITY CELL
● 5222004	RUSSELL RL060P PH METER, 917004 ATC PROBE, 9146BN GEL EPOXY PH ELECTRODE
● 5222006	RUSSELL RL060P PH METER, 9147BN 3-IN-1 GEL EPOXY PH ELECTRODE
● 5224003	RUSSELL RL060C CONDUCTIVITY METER, 014005 CONDUCTIVITY CELL

## CAT. NO. ORION 2-STAR BENCHTOP PH METER & PROBE KITS

● 1111101	ORION 2-STAR PH METER, 9165BNWP EPOXY SURE-FLOW® PH ELECTRODE
● 1111102	ORION 2-STAR PH METER, 9157BNMD REFILLABLE EPOXY PH/ATC TRIODE™
● 1111103	ORION 2-STAR PH METER, 9156APWP AQUAPRO EPOXY CROSSLINKED POLYMER DOUBLE JUNCTION PH ELECTRODE
● 1111104	ORION 2-STAR PH METER, 9142BN REFILLABLE GLASS PH ELECTRODE, 927007MD ATC
● 1111105	ORION 2-STAR PH METER, 9142BN REFILLABLE GLASS PH ELECTRODE
● 1111106	ORION 2-STAR PH METER, 9145BN EPOXY GEL PH ELECTRODE
● 1111107	ORION 2-STAR PH METER, 9107BNMD LOW MAINTENANCE EPOXY PH/ATC TRIODE
● 1111108	ORION 2-STAR PH METER, 9107APMD AQUAPRO CROSSLINKED POLYMER DOUBLE JUNCTION PH TRIODE, TRIS COMPATIBLE FOR LIFE SCIENCE APPLICATIONS

## CAT. NO. ORION 3-STAR METER & PROBE KITS

● 1112101	ORION 3-STAR PH BENCHTOP METER, 8102BNUWP ROSS ULTRA® PH, 927007MD ATC PROBE
● 1112102	ORION 3-STAR PH BENCHTOP METER, 8172BNWP ROSS® SURE-FLOW® PH, 927006MD ATC PROBE
● 1112103	ORION 3-STAR PH BENCHTOP METER, 8102BNUWP ROSS ULTRA PH ELECTRODE
● 1112104	ORION 3-STAR PH BENCHTOP METER, 9157BNMD REFILLABLE PH/ATC TRIODE
● 1112105	ORION 3-STAR PH BENCHTOP METER, 9156BNWP EPOXY PH, 927007MD ATC PROBE
● 1112107	ORION 3-STAR PH BENCHTOP METER, 9106BNWP NONREFILLABLE PH ELECTRODE
● 1112108	ORION 3-STAR PH BENCHTOP METER, 9165BNWP EPOXY SURE-FLOW PH ELECTRODE
● 1212101	ORION 3-STAR PH WATERPROOF PORTABLE METER, 9107BNMD LOW MAINTENANCE™ PH/ATC TRIODE
● 1214101	ORION 3-STAR CONDUCTIVITY WATERPROOF PORTABLE METER, 013005MD CONDUCTIVITY CELL

## CAT. NO. ORION 4-STAR METER & PROBE KITS

● 1115005	ORION 4-STAR PH/ISE BENCHTOP METER, 8611BNWP ROSS SODIUM ELECTRODE WITH 900012 AND 900010 ELECTRODE FILLING SOLUTIONS, 841101 SODIUM STORAGE SOLUTION, 841113 SODIUM RECOND. SOLUTION, 841111 SODIUM ISA, 090043 SWING ARM STAND
● 1217101	ORION 4-STAR PH/CONDUCTIVITY WATERPROOF PORTABLE METER, 9107BNMD LOW MAINTENANCE EPOXY PH/ATC TRIODE, 013005MD CONDUCTIVITY CELL



ROSS Sure-Flow



Ion Selective Electrodes

Note: All ROSS Ultra®, ROSS, AquaPro and any Sure-Flow electrodes are compatible with Tris buffers.

# Orion Star™ Series Meters

14

**Results you can count on – every time.**

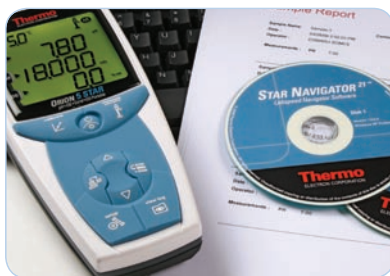
Rugged enough for the most challenging laboratory and field applications, the Orion Star Series meters combine sophisticated technology with simplified operation and exceptional long-life performance.

## Intelligent measurement features

SMART STABILITY™, SMART AVERAGING™, and other automatic functions help to optimize the measurement process and ensure accurate results, even for non-technical users. You can also download software updates via the Web. Simply go to [thermo.com/water](http://thermo.com/water), click “Upgrade your Star Series Software” under resources.

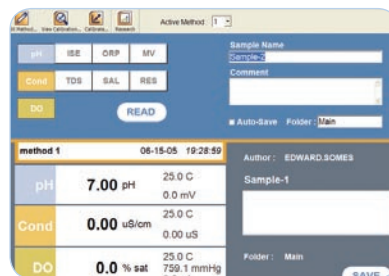
- Automatic calibration or manual calibration with 1 to 5 points (pH, direct ion, and conductivity); automatic calibration reminders

- Automatic or manual temperature compensation
- Selectable calibration to Winkler Titration for BOD measurements
- Automatic recognition of NIST/US and EU/DIN buffers
- Manual ISE calibration with 1 to 5 calibration points; point-to-point ISE calibration, high and low concentration range
- Selectable automatic blank correction
- Accurate DO measurements with automatic salinity correction
- Automatic barometric pressure compensation or view barometric pressure for manual calibration (DO)
- 3 Star and higher meters feature DuraProbe™ 4-cell design which compensates for electrode fouling, cable and connector resistance, and polarization errors



## Full support for 21 CFR Part 11

Star Navigator 21™ data collection software assists regulatory compliance through systems validation, security and audit trails with time date stamps, documentation control, archiving and record retention and recovery.



## Export data to a PC or LIMS

Measurement data can be exported directly to a spreadsheet. It's easy to add ID numbers or comments, prepare graphs, and produce professional reports and presentations.



## Expanded range of NIST/US and EU/DIN buffers

New Orion pH buffers are designed to meet all end user requirements, including laboratory grade and DIN standards. Buffer temperature tables are pre-entered into the meter software for use with the Auto-Buffer-Recognition feature.

### Rugged, reliable, and designed for you

Benchtop meters are rated IP54 dustproof and splash proof. Portable meters are rated IP67 and may be immersed for up to one hour with no water incursion. Simple 3-button operation and consistent user interface across all meter types minimizes personnel training time. Now you and your team can spend more time sampling and analyzing, with no time worrying about your equipment.

- Bright LCD display with ready indication and convenient Quick-Start Guide helps even novices gain confidence
- Record and store up to 10 password-protected setup parameters and calibrations—especially valuable for multi-user labs

- Auto-read/hold function
- Advanced self-tests on meter operation, comprehensive self-diagnostics
- Universal power adapter for worldwide operation
- Three-year replacement warranty.
- CE, CSA, TÜV, UL and FCC Class A limits approval

### Safeguard your data

Take a full day's measurements, and then download to a printer or computer via the standard RS232 connection or optional USB interface. Methods and measurement parameters are stored in non-volatile memory, and will not be lost in the event of power failure or during a battery change.

Orion Star Navigator 21™ software (included with all 5-Star multi-parameter meters) assists your compliance with 21 CFR Part 11, FDA Regulations; it also enables meter operation through a computer keyboard.

### Calibration/Validation and IQ/OQ options

You'll feel confident your results are accurate and exact when taking advantage of Thermo's Calibration and Validation Options. Save time and money when you purchase the IQ/OQ package from Thermo to ensure that your meter performs to the manufacturer's published specifications. See inside back cover for details.



### Simple, instructive Quick-Start Guide

Begin taking effective measurements quickly and efficiently. New and returning users appreciate the reference guide attached to each meter.



### Connectors that stay dry and stay connected

If you have ever lost data – or even an electrode – because of a failed connection, you'll appreciate Star Series' proprietary waterproof BNC and mini-DIN locking connectors. Waterproof BNC connectors are compatible with virtually any meter with BNC input.



### Field testing efficiency

Everything you need for your analysis – meter, appropriate sensors, and required solutions such as buffers or standards – neatly packed in either a soft or hard field case.



## Orion 5-Star Multi Parameter one unit measures all– pH, ORP, ISE, DO, and Conductivity

### 5-Star

Model	Measurement Capability	Cat. No.*
Benchtop	pH, ORP, DO, ISE, Conductivity	1119000
Portable	pH, ORP, DO, Conductivity	1218000
	pH, ORP, DO, ISE, Conductivity	1219000

These highly versatile multi-parameter meters combine a full complement of measurement capabilities in a single compact benchtop or portable unit. Individual readings can be simultaneously displayed. The portable unit is also available in a pH/DO/Conductivity configuration when ISE functionality is not required.

*“The Orion Star™ Meter is durable,  
extremely accurate, and requires  
virtually no maintenance.”*

**Chesterfield County WWTP  
Wastewater Treatment Plant**

## Orion 4-Star Dual Parameters combine pH/DO, pH/ISE, or pH/Cond measurement in one unit

### 4-Star

Model	Measurement Capability	Cat. No.*
Benchtop	pH/ISE	1115000
	pH/DO	1116000
	pH/Conductivity	1117000
Portable	pH/ISE	1215000
	pH/DO	1216000
	pH/Conductivity	1217000

Why purchase two meters when you can choose one meter that can do both measurements? Dual measurement capabilities allow you to exactly match your meter's functionality to your particular analysis.



\* Catalog number are for meter, universal power adapter (Benchtop)  
or batteries (Portable) and user guide manual



## Orion 3-Star Single Parameters for individual measurement of pH, DO, or Conductivity

## Orion 2-Star Single Parameter for pH only measurement

### 3-Star

Model	Measurement Capability	Cat. No.*
Benchtop	pH	1112000
	DO	1113000
	Conductivity	1114000
Portable	pH	1212000
	DO	1213000
	Conductivity	1214000

### 2-Star

Model	Measurement Capability	Cat. No.*
Benchtop	pH	1111000

The NEW Orion 2-Star pH meter offers ease of use with simple three button operation and value pricing for your general purpose pH measurements in the lab. As an extension of the Orion Star™ Series family, Orion 2-Star provides up to 3 point calibration and Auto Calibration for NIST/USA or EU/DIN buffer on all references.

Economical single parameter Star Series meters are designed to do one thing – extremely well. They offer all of the advanced features of the multi-parameter lines on the parameter being measured.



## Specifications for Benchtop and Portable Star Meters

pH	Range:	- 2.000 - 19.999 (2-Star: 0.000 - 14.000)
	Resolution:	0.1/0.01/0.001
	Relative Accuracy:	± 0.002
ISE	Concentration range:	0.0 to 19,900.0
	Units:	M, mg/L, %, ppb, None
	Resolution:	1, 2, or 3 significant
	Relative Accuracy:	± 0.2 mV or 0.05 %, whichever is greater
DO	mV/RmV:	± 1999.9
	Concentration:	0.00 to 90.00 mg/L
	Relative Accuracy:	0.2 mg/L
	% Saturation:	0.0 to 600
	Salinity Factor:	0 to 45 ppt
Cond	Barometric Pressure:	450 - 850 mm Hg
	Range:	0 to 3000 mS/cm cell constant dependent
	Resistivity:	0.0001 to 100 Megohms
	Salinity:	0.01 to 80.0 ppt NaCl
	TDS:	0.0 to 19,999.0 mg/L
	Reference Temperature:	15°, 20°, or 25 °C (default), autoranging
	Cell Constant:	0.001 to 199.9
ORP	mV/RmV/E <sub>H</sub> Range:	± 1999.9
	Resolution:	± 0.1
	Relative Accuracy:	± 0.2 mV or 0.05 %, whichever is greater
	Temperature Range:	- 5 to 105 °C

# Orion PerpHecT® LogR™ Temperature Compensation Meters

18

## LogR temperature compensation from pH bulb itself – no ATC required!

All PerpHecT benchtop meters feature exclusive Orion digital LogR technology. pH is temperature dependent. Knowing the temperature at which the pH was taken is critical. Any Orion pH electrode can utilize the PerpHecT LogR technology, but its greatest accuracy and precision benefit is with small samples. The sample's temperature is taken by a small pH bulb while measuring the pH. PerpHecT ROSS® packages offer outstanding temperature equilibration and performance features. All meters also offer automatic (with an ATC probe) or manual temperature compensation options as well as a three (3) year warranty.

- Orion 320 PerpHecT benchtop meter features pH or mV and temperature measurement on a large bright display for routine pH testing. Custom buffer option allows you to enter non-standard buffer values.
- Orion 350 PerpHecT benchtop meter has more advanced features, including greater resolution, 3 point calibration, GLPcheck™ electrode verification, RS232 and GLPdoc™ data output.
- Orion 370 PerpHecT benchtop adds ISE (concentration) mode with 2 point calibration for basic ISE capability.

Specifications	370 / 350 / 320
<b>pH</b>	
Range	0.000 - 14.000 / 0.000 - 14.000 / 0.00 - 14.00
Resolution	0.001 to 0.1 / 0.001 to 0.1 / 0.01 to 0.1
Relative Accuracy	± 0.005 / ± 0.005 / ± 0.02
Slope	80 to 120% for all
Auto-Buffer Recognition	4.01, 7.00, 10.01 for all
Cal. Points	3 / 3 / 2
<b>Concentration</b>	
Range	0.000 to 19900 / – / –
Resolution	± 3 significant digit / – / –
Relative Accuracy	± 0.2 mV or ± 0.5 % of reading, whichever is greater / – / –
Cal. Points	2 / – / –
<b>Temperature*</b>	
Range	0.0 to 100.0 °C for all
Rel. Accuracy	± 0.1 °C (ATC) for all ± 0.5 °C (LogR) for all
<b>Millivolt and Relative Millivolt</b>	
Range	±1999.9 mV and RmV / ±1999.9 mV and RmV / ±1999 mV only
LogR™ Range	± 1000.0 mV / ± 1000.0 mV / ± 1000 mV
Relative Accuracy (mV and RmV)	± 0.2 mV or ± 0.05 % of reading, whichever is greater / Same as 370 / ± 1 mV or ± 0.1 % of reading, whichever is greater (mV only)
Display	LED for all
Inputs	1 BNC, 1 pin tip ref, ATC, power for all
Outputs	RS232, 2.5 mm Recorder / Same as 370 / –
Power Requirements	AC Line, 110 V, 220 V or 240 V for all
Agency Approvals	CE, CSA, UL for all
Environmental Requirements	5 to 45 °C, 5 to 85% relative humidity, non-condensing for all

Over 20 °C temperature calibration range PerpHecT LogR temperature measurement and compensation specifications are based on the use of PerpHecT and PerpHecT ROSS brand electrodes. Use of other brand electrodes may impact performance.



Ordering	370 / 350 / 320
110V w/Ag/AgCl pH Elect.	037000 <sup>1</sup> / 035000 <sup>1</sup> / 032000 <sup>3</sup>
220V w/Ag/AgCl pH Elect.	037001 <sup>1</sup> / 035001 <sup>1</sup> / 032001 <sup>3</sup>
110V w/ROSS® pH Elect.	0370A0 <sup>2</sup> / 0350A0 <sup>2</sup> / 0320A0 <sup>4</sup>
220V w/ROSS pH Elect.	0370A1 <sup>2</sup> / 0350A1 <sup>2</sup> / 0320A1 <sup>4</sup>
110V w/GLP Pkg	0370G0 <sup>2,5</sup> / 0350G0 <sup>2,5</sup> / –
220V w/GLP Pkg	0370G1 <sup>2,5</sup> / – / –
110V Meter and Adapter	0370A9 / 0350A9 / 0320A9
220V Meter and Adapter	0370A8 / 0350A8 / 0320A8
240V Meter and Adapter	0370A7 / 0350A7 / 0320A7
110V w/9156AP & Stand	– / – / 032004
220V w/9156AP & Stand	– / – / 032005

### Keys:

1. 9272BN PerpHecT Glass Sure-Flow® Combination pH
2. 8272BN PerpHecT ROSS Glass Sure-Flow Combination pH
3. 9202BN PerpHecT Glass Combination pH
4. 8202BN PerpHecT ROSS Glass Combination pH
5. Package Includes PRT300 Printer and Cable to connect to PerpHecT Meter

# Orion Aplus Dual Channel ISE/pH Benchtop Meters

## Less lab setup time and greater sample throughput

The best choice for advanced ISE/pH measurements, these benchtop meters have two electrode inputs, reducing costly setup time. Microprocessor stores each channel's calibration. Easy-to-understand user prompting for each meter operation and numeric keys simplify data input. GLPdoc™ documentation and remote operation through bidirectional RS232 interface to computer or printer. Three (3) year warranty on all models.



- 525Aplus for pH/mV/ORP/BOD/ Temperature measurements offers choice of a 3-point auto-calibration (built-in Auto-Buffer-Recognition of 5 buffers) or manual calibration on each pH channel. Optional DO package for BODs through pH input.
- 720Aplus for ISE/pH/mV/ORP/ Temperature measurements offers full 5-point pH or concentration calibration with automatic blank correction to improve results of low level measurements. Meter expresses concentration results to three significant digits.
- 920Aplus for ISE/pH/mV/ORP/ Temperature measurements broadens the range of ISE capabilities with pre-programmed incremental techniques (Double-Known Addition and Subtraction) for easy analysis of difficult samples. Many additional features, such as calibration edit to determine working range, benefit R&D scientists. Maximize your efficiency using the Orion 607 switchbox, see page 26, allowing up to 7 channels on your meter.

Ordering	920A+ / 720A+ / 525A+
110 V with w/ROSS Ultra® Electrode	0920A0(110V) <sup>1</sup> or 0920A1(220V) <sup>1</sup> / 0720A0(110V) <sup>1</sup> or 0720A1(220V) <sup>1</sup> / 0525A0(110V) <sup>2</sup> or 0525A1(220V) <sup>2</sup>
110 V w/Swing arm stand only	0920A3 <sup>3</sup> / 0720A3 <sup>3</sup> / –
110 V Refillable Triode and Starter Pkg.	– / – / 0525A3 <sup>4</sup>
pH and BOD Electrode	– / – / 0525A4(110V) <sup>2</sup> or 0525A5(220V) <sup>5</sup>
pH and Sure-Flow® ORP Electrode	– / – / 0525A4(110V) <sup>2</sup> or 0525A5(220V) <sup>6</sup>
110 V Meter and Adapter only	0920A9 / 0720A9 / 0525A9
220 V Meter and Adapter only	0920A8 / 0720A8 / 0525A8
240 V Meter and Adapter only	0920A7 / 0720A7 / 0525A7

### Keys:

1. Includes Orion 8102BNUWP electrode
2. Includes Orion 8156BNUWP electrode
3. Order electrode separately
4. Includes Orion 9157BN Triode, 910199 All-in-One™ solutions kit, swing arm stand
5. Includes Orion 970899WP BOD electrode for BNC
6. Includes Orion 9678BNWP ORP electrode

Specifications	920A+ / 720A+ / 525A+
<b>pH</b>	
Range	- 2.000 to 19.999 for all
Relative Accuracy	± 0.02 for all
Slope	80 to 120% for all
Auto-Buffer Recognition	1.68, 4.01, 7.00, 10.01, 12.46 for all
Cal. Points	5 / 5 / 3
<b>Concentration (ISE)</b>	
Range	0.000 to 19900 / 0.000 to 19900 / –
Resolution	± 1 least significant digit / ± 1 least significant digit / –
Relative Accuracy	± 0.5% of reading / ± 0.5% of reading / –
Cal. Points	5 / 5 / –
<b>Temperature</b>	
Range	- 5.0 to 105.0 °C for all
Rel. Accuracy	± 0.1 °C for all
<b>Millivolt and Relative Millivolt</b>	
Range	±1600.0 mV and ± 1999.9 RmV for all
Relative Accuracy	± 0.2 mV or ± 0.05 % of reading, whichever is greater for all
<b>Display</b>	Custom color vacuum fluorescent for all
<b>Inputs</b>	2 BNC, 2 pin tip, ATC, power, RS232 for all
<b>Outputs</b>	RS232, 2.5 mm recorder, Karl Fischer for all
<b>Power Requirements</b>	AC Line, 110 V, 220 V or 240 V for all
<b>Agency Approvals</b>	CE, CSA, UL for all
<b>Environmental Requirements</b>	5 to 45 °C, and < 85% relative humidity, non-condensing for all

# Portable pH Meters

20

## Intrinsically Safe\* pH/mV/ Temperature meters

- Orion 261S waterproof, portable model for basic field measurements
- Orion 266S includes advanced GLPdoc™ 100 point datalogger with time and date stamp documents readings. The manual, interval or event-controlled RS232 and the included software program simplify data collection and remote operation on a computer. Other advanced features include recalibration timer option, calibration printout, and datalog.
- Meter, electrode packages include an Orion Triode™ combination pH electrode with temperature sensor.

Designed for use in hazardous and confined space environments where non-sparking equipment is desired, the Orion 261S and 266S waterproof, portable meters provide accurate field measurements of pH, mV and temperature readings. The meters are waterproof. A large easy-to-read display monitors electrode response condition and calibration status. Both meters feature 3 point auto-calibration with choice of buffers or manual calibration, operate on 4 AA batteries, and carry US intrinsically safe\* approval rating by Factory Mutual (FM).

Specifications	266S / 261S
pH	
Range	-2.00 to 16.00
Accuracy	0.01
Calibration Points	3
Temperature	
Range	-20.0 °C to 120.0 °C
Relative Accuracy	± 0.3 °C
mV	
Range	± 1300.0 mV
Accuracy	0.1% value + 0.30
Display	Custom LCD
Inputs	Waterproof DIN, 4 mm Banana
Outputs	RS232 / –
Power Requirements	3 x alkaline AA batteries
Agency Approvals	CE, FM (intrinsically safe)
Environmental Requirements	-10 °C to 55 °C

Ordering	266S / 261S
Meter and Electrode	0266S0 <sup>1</sup> / 0261S0 <sup>1</sup>
Meter, Electrode & Field Kit <sup>2</sup>	0266S3 / 0261S3
Replacement Field Case Only	026AKT <sup>3</sup> / 026AKT <sup>3</sup>

### Key:

1. Waterproof 9109WP pH Triode™ combination, pH/ATC non-refillable included.
2. Contains meter, 9109WP electrode, neckstrap, manual, case, stand, electrode holder, beakers, 4, 7, 10 buffers (266S also includes RS232 cable and software).
3. Order meter, electrodes and buffers separately. Contains stand, electrode holder and beakers only.

\* Does not meet European Intrinsically Safe specification.





## Basic pH/ Temperature meter Russell RL060P

- Russell RL060P offers 1, 2 or 3 point pH calibration with pH resolution to 0.01.
- Meter and electrode packages include choice of a simple gel epoxy BNC pH electrode or a 3-in-1 gel epoxy BNC electrode with ATC.

A rugged, affordable meter ideal for basic measurements in the plant or field, this meter has a splash-proof keypad with large liquid crystal display providing easy viewing of units of measure or an error.

Auto-Buffer-Recognition provides the user with a choice of NIST/US or DIN/EU and Orion PureWater® low-ionic pH buffer standards. The 3-button calibration provides high accuracy and very simple operation. An optional boot with flip out stand allows conversion to bench top operation. The meter comes with a two (2) year warranty.



Russell RL060P	Specifications*	Benefit
<b>pH</b>		
Range	0.00 to 14.00 pH	pH in any sample
Accuracy	± 0.01	—
Auto-Buffer Recognition	4.01, 7.00, 10.01 4.01, 6.86, 9.18 4.10 & 6.97	Quicker calibration Choice of buffers
Calibration Points	1, 2, 3	Improved accuracy
<b>mV</b>		
Range	- 1000 to 1000 mV	—
Resolution	1 mV	—
Accuracy	± 2mV	—
<b>Temperature</b>		
Range	0.0 to 100 °C	—
Compensation	Auto/Manual	—
Resolution	0.1 °C	—
Accuracy	± 0.5 °C	—
Display	Custom LCD	Easy to read
Auto Off	after 17 minutes	Saves battery life
Power Requirements	4 AAA batteries (Included)	Worldwide operation
Battery Life	> 200 hours	—

\* System accuracy depends on all choice and measurement conditions. Above data generated under optimal/controlled circumstances.

Ordering	Cat. No. for Meter Package	Cat. No. for Replacement Electrode
pH portable meter w/ holder & meter stand, ATC & gel epoxy pH probe	5122001	9146BN
pH portable meter w/ holder & meter stand, 3-in-1 gel epoxy probe	5122003	9147BN
pH portable meter, ATC & gel epoxy pH probe	5222004	9146BN
pH portable meter, 3-in-1 gel epoxy pH probe	5222006	9147BN



## Portable Conductivity Meters

### Intrinsically Safe\* Conductivity/TDS/ Salinity/Temperature meters

*Thermo's conductivity products were pivotal in the recovery, excavation, and now, the conservation of the US Confederate Submarine - The Hunley.*

For use where non-sparking equipment is desired, these meters carry US intrinsically safe approval rating by Factory Mutual (FM)\*. They are compatible with two or four-electrode cell conductivity probes.

- Orion 131S basic waterproof Conductivity/TDS/Salinity/Temperature Meter can be calibrated via cell constant adjustment method or via AUTO-CAL™, which uses direct entry of conductivity standards
- Orion 136S advanced waterproof Conductivity/TDS/Salinity/Temperature Meter features advanced GLP performance, RS232 and data collection and remote operation software, differentiating it from the Orion 131S meter.

Specifications	136S / 131S
Conductivity	
Range	0.0 $\mu\text{S}/\text{cm}$ to 500 $\text{mS}/\text{cm}$ , 4-electrode cell, cell constant 0.55 $\text{cm}^{-1}$ ; 0.0 $\mu\text{S}/\text{cm}$ to 100.0 $\mu\text{S}/\text{cm}$ , 2-electrode cell, cell constant 0.1 $\text{cm}^{-1}$
Accuracy	< 0.5 % of measure value + 1 count for both
Resolution	0.01 at < 99.99 $\mu\text{S}/\text{cm}$ ; 0.1 at > 99.99 $\mu\text{S}/\text{cm}$
Salinity Range	0.0 to 45.0 (10 to 30 °C)
Total Dissolved Solids Range	0 to 1999 $\text{mg}/\text{L}$ (10 to 40 °C)
Cell Constant Range	0.010 $\text{cm}^{-1}$ to 199.9 $\text{cm}^{-1}$
Temperature Compensation	NTC 30 $\Omega$ (automatic detection) or manual, linear TC characteristic; 0.00 to 9.99 %/°C or non-linear for natural waters and ultrapure water (NLF)
Datalogger	100 (automatic storage of measured values, either timer-controlled, event-controlled or manual datalogging) (for 136S only)
Remote Interface	Serial, bidirectional, asynchronous, 600, 1200, 2400, 4800 or 9600 baud rate (for 136S only)
Waterproof Rating	IP66
Agency Approvals	CE, FM* (Intrinsically Safe)
Display	Custom LCD
Inputs	8 Pin WP DIN
Temperature	
Range	-20.0 °C to 120.0 °C
Accuracy	< 0.3 °C + 1 count

Ordering	136S	131S
Meter and Conductivity Cell	0136S0 <sup>1</sup>	0131S0 <sup>1</sup>
Meter and Field Kit	0136S3 <sup>2</sup>	0131S3 <sup>2</sup>

**Key:**

1. Includes Orion DuraProbe™ conductivity cell, 013610.

2. Field kit includes meter, probe or cell, beakers and standards.

\* Does not meet European Intrinsically Safe specification.



## Basic Conductivity/ Temperature meter Russell RL060C

The Russell RL060C Conductivity meter from Thermo Electron is a rugged, affordable meter ideal for measurements in the plant or field. The meter has a splash-proof keypad and has an optional boot that makes bench top operation easy and the large liquid crystal display (LCD) provides easy viewing. Simple four-button operation makes this the meter of choice for many applications.

Auto-ranging capabilities provides  $\pm$  full scale accuracy with fast repeatable results. Meter and electrode packages include a Russell RL060C meter and conductivity probe with the optional boot with flip out stand for ease of use on the laboratory bench.

- Russell RL060C Conductivity/Temperature meter offers 1 to 5 point calibration (1 per range).



Russell RL060C	Specifications*	Benefit
<b>Conductivity</b>		
Range	0 to 199.9 $\mu$ S/cm 0 to 1999 $\mu$ S/cm 0 to 19.99 mS/cm	–
Resolution	0.1 $\mu$ S/cm 1 $\mu$ S/cm 0.01 mS/cm	–
Accuracy	$\pm$ 1% full scale	–
Calibration Points	1 to 5 (1 per range)	Improved accuracy
<b>Temperature</b>		
Range	0.0 to 100 $^{\circ}$ C	–
Compensation	Auto / Manual	–
Resolution	0.1 $^{\circ}$ C	–
Accuracy	$\pm$ 0.5 $^{\circ}$ C	–
Coefficient	2% / $^{\circ}$ C	–
Auto-ranging Capability	Yes	–
Hold function	Yes	–
Display	Custom LCD	Easy to read
Auto Off	after 17 minutes	Saves battery life
Power Requirements	4 AAA batteries (Included)	Worldwide operation
Battery Life	> 100 hours	–

\* System accuracy depends on all choice and measurement conditions.  
Above data generated under optimal/controlled circumstances.

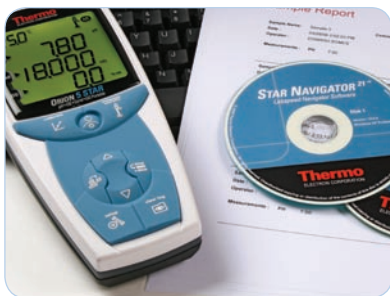
Ordering	Cat. No. for Meter <sup>1</sup> Package	Cat. No. for Replacement Electrode
Conductivity portable meter w/ holder & meter stand, and probe	5124002	014005 <sup>1</sup>
Conductivity portable meter with probe	5224003	014005

#### Key:

1. 014005 - Epoxy-body conductivity cell (K=1.0) with 2-pin stainless steel electrode and built-in temperature sensor.

# Orion Star Navigator 21™ Software

24



See pages 10-13 for Orion kits that include this software.

This data-logging and control software, designed to enable compliance with auditors and regulatory agencies, sets the bar for industry best-practices in the pharmaceutical, food and beverage and environmental industries.

- Provides the tools for FDA 21 CFR Part 11 compliance; on/off mode flexibility.
- Available as a stand alone product (part number 1010007) for use with the Orion 3-Star and 4-Star electrochemistry meters.
- Included in all Orion 5-Star meters/ meter kits as well as in specific Star Application Kits.
- Is compatible with the Windows XP®† operating system.

## Complete control of your meter from your PC

Now you can efficiently edit, create and change methods, take measurements, perform routine data browsing, retrieval, printing and exporting all with a few key strokes from you desk or laptop PC. Microsoft® Windows Operating System defined password protected security parameters enable individual user accounts.

† Registered trademarks of Microsoft Corporation.

- System Access (Login/Logoff) – Login is strictly regulated by entering a valid username and password. Security measures include account lockout after a predetermined number of unsuccessful login attempts and automatic password protected screensavers.
- Password Rules and Management- Complex password capabilities (i.e., a combination of uppercase and lowercase characters, digits, and/or non-alphanumeric characters) may be enforced as a means of extended security.
- Audit Trails – Records important events and includes in the audit trail function which lists user, date, time, event importance, application, description of event, and details of the event.
- Electronic Signatures – All changes are recorded with a digital signature and the users must provide reasons for changes.
- Data Security – All data is stored in a database and it is impossible to remove or alter data in an uncontrolled manner. The database can only be accessed with the proper tools and user rights. Data integrity is verified each time data is accessed.

Ordering	Description
1010007	Orion Star Navigator 21 Software – Includes RS-232 computer interface cable
1010113	Orion 5-Star pH/ISE/DO/Cond benchtop meter – Wastewater Sulfide application kit
1010152	Orion 5-Star pH/ISE/DO/Cond benchtop meter – Pharmaceutical Water Conductivity USP <645> application kit
1010153	Orion 4-Star pH/ISE benchtop meter – pH USP <791> application kit
1010154	Orion 4-Star pH/ISE benchtop meter – pH of Tablets application kit
1010155	Orion 4-Star pH/ISE benchtop meter – pH of Capsules application kit
1010156	Orion 4-Star pH/ISE benchtop meter – pH of Ointments application kit

Features	Benefits
User friendly Windows interface	Easy to install and operate
Complete control from your computer	Allows quick operation of custom Star Series methods
Convenient report templates	Provide framework for compliance reporting, capability to customize
Electronic records, signatures and audit trails	Provide the tools for FDA 21 CFR Part 11 compliance
Enables paperless record system	Saves time and money in the approval process

# Orion Buffers, Solutions and Accessories



## For all your electrochemistry measurement needs

The quality of your analytical results depends upon the quality of your standards, buffers and reagents. Thermo offers a complete selection of quality-assured support solutions for virtually any electrochemistry analysis. New Orion pH buffers are designed to meet all end user requirements,

including laboratory grade and DIN standards. Buffer temperature tables are programmed into the meter software for use with the Auto-Buffer-Recognition feature.

To maximize the life of your electrodes, we offer pH electrode cleaning kits as well as storage and rinse solutions for proper electrode care.

Ordering	Kits and pH Bulk Packs
700001	pH buffer 6.97 (700702), 475 mL (4); pH buffer 4.10 (700402), 475 mL (2); pHISA® Adjuster (700003), 50 mL (2); Application Procedure No. 501 "pH Measurement in Low Ionic Strength Solutions"
700702	Pure Water pH 6.97 buffer A, 475 mL (4)
700402	Pure Water pH 4.10 buffer B, 475 mL (4)
700902	Pure Water pH 9.15 buffer C, 475 mL (4)
700003	pHISA Pure Water Ionic Strength Adjustor, 2 oz (5); one syringe dispenser
700010	Alkalinity reagent (700011), 475 mL, Alkalinity std./control (700012), 475 mL, Total alkalinity conversion chart, Application Procedure No. 517 "Total Alkalinity in Natural Waters"
700010	Total Alkalinity Test Kit
Ordering	pH Calibration Buffers
9116860	Orion pH 1.68 buffer, 60 mL, 5 pk
910168	Orion pH 1.68 buffer, 475 mL
910104	Orion pH 4.01 buffer (pink) 475 mL (1 pint)
910460	60 mL (2 oz.), 5 pk
9104CB	19 L (5 gallon), cubitainer
910410	perpHect® indiv. buffer pouch, 10 pk
910425	perpHect indiv. buffer pouch, 25 pk
910105	Orion pH 5.00 buffer, 475 mL (orange)
916860	Orion pH 6.86 buffer, 60 mL, 5 pk
910686	Orion pH 6.86 buffer, 475 mL
910107	Orion pH 7.00 buffer (yellow) 475 mL (1 pint);
910760	60 mL (2 oz.), 5 pk
9107CB	19 L (5 gallon), cubitainer
910710	perpHect indiv. buffer pouch, 10 pk
910725	perpHect indiv. buffer pouch, 25 pk
9191860	Orion pH 9.18 buffer, 60 mL, 5 pk
910918	Orion pH 9.18 buffer, 475 mL
910110	Orion pH 10.01 buffer (blue) 475 mL (Pint)
911060	60 mL (2 oz.), 5 pk
9110CB	19 L (5 gallon), cubitainer
911010	perpHect indiv. buffer pouch, 10 pk
911025	perpHect indiv. buffer pouch, 25 pk
911260	Orion pH 12.46 buffer, 60 mL, 5 pk
910112	Orion pH 12.46 buffer, 475 mL
910199	Orion pH All-in-One™ buffer kits, 475 mL of 4.01, 7.00, 10.01 buffers, electrode storage solution (910001) and electrode storage bottle

Ordering	pH Storage Solution
810001	New ROSS® storage solution to optimize ROSS Ultra® electrode performance and life, 475 mL
910001	pH Storage Solution, 475 mL
Ordering	ISE Calibration Standards
All are 1 pint (475 mL) bottles unless noted	
951006	For Ammonia electrode 0.1 M NH <sub>4</sub> Cl
951207	100 ppm as N
951007	1000 ppm as N
943506	For Bromide electrode 0.1 M NaBr
922006	For Calcium electrode 0.1 M CaCl <sub>2</sub>
950206	For Carbon Dioxide electrode 0.1 M NaHCO <sub>3</sub>
950207	1000 ppm as CaCO <sub>3</sub> (NaHCO <sub>3</sub> )
941706	For Chloride electrode 0.1 M NaCl
941707	100 ppm as Cl <sup>-</sup>
941708	1000 ppm as Cl <sup>-</sup>
977007	For Residual Chlorine electrode 100 ppm as Cl <sub>2</sub>
942906	For Cupric electrode 0.1 M Cu(NO <sub>3</sub> ) <sub>2</sub>
940906	For Fluoride electrode 0.1 M NaF
940907	100 ppm as F <sup>-</sup>
040906	1 ppm as F <sup>-</sup> with TISAB II
040907	2 ppm as F <sup>-</sup> with TISAB II
040908	10 ppm as F <sup>-</sup> with TISAB II
945306	For Iodide electrode 0.1 M NaI
948206	For Lead electrode 0.1 M Pb(ClO <sub>4</sub> ) <sub>2</sub> Lead
948207	0.1 M Na <sub>2</sub> SO <sub>4</sub> Sulfate
920706	For Nitrate electrode 0.1 M NaNO <sub>3</sub>
930707	100 ppm as N
920707	1000 ppm as N
954606	For Nitrogen Oxide/Nitrite electrode 0.1 M NaNO <sub>2</sub>
921906	For Potassium electrode 0.1 M KCl
941104	For Sodium electrode 5% NaCl (0.856 M)
941706	0.1 M NaCl
941105	10 ppm as Na <sup>+</sup>
941107	100 ppm as Na <sup>+</sup>
841108	1000 ppm as Na <sup>+</sup>
841109	For Known Addition Std. 1000 ppm as Na <sup>+</sup>
923206	For Water Hardness Electrode 100 ppm as CaCO <sub>3</sub>

Ordering	ORP / Conductivity Standards**
967901	ORP Standard, 475 mL (pint)
967961	ORP Standard, 60 mL (2 oz.), 5 pack
01100910	Cond Standard 147 µS/cm, 10 pouches
01100710	Cond Standard 1413 µS/cm, 10 pouches
01100610	Cond Standard 12.9 mS/cm, 10 pouches
01100510	Cond Standard 111 mS/cm, 10 pouches
Ordering	Ionic Strength Adjusters
All are 1 pint. (475 mL) bottles unless noted	
951211*	For Ammonia Electrode pH Adjusting ISA
940011	For Bromide, Cadmium, Chloride, Cupric, Iodide, Silver/Sulfide, Thiocyanate electrodes
932011	For Calcium electrode
950210	For Carbon Dioxide electrode
940909	For Fluoride Electrode TISAB II 1 gal. (3.8 L)
940999	TISAB II 4 gal. (3.8 L x 4)
940911	TISAB III Concentrate
930711	For Fluoroborate, Nitrate, and Perchlorate electrodes
931911	For Potassium electrode
841111	For Sodium electrode
Ordering	Filling / Maintenance Solutions
All are 5 x 60 mL bottles unless noted	
951202	For Ammonia, 1 x 60 mL
900018	For Ammonium
950202	For Carbon Dioxide, 1 x 60 mL
954602	For Nitrogen Oxide, 1 x 50 mL
900012	For Sodium 0.1 M NH <sub>4</sub> Cl for Low Sodium Levels
900010	2 M NH <sub>4</sub> Cl
900046	For Nitrite
900061	For ionplus® Series Optimum Results™ A
900062	Optimum Results B
900067	Optimum Results C
900063	Optimum Results D
900065	Optimum Results E
900046	Optimum Results F
900002	For Double Junction Reference Inner Fill Solution
900003	Outer Fill Solution
900011	For Combination Redox Fill Solution
900001	For Fluoride Combination
900017	For Chloride Combination
900004	For Sodium Microelectrode
080514	For DO Electrolyte Solution

\*\*Visit [thermo.com/water](http://thermo.com/water) for additional conductivity standards

Note: \* Signifies a hazardous solution. See terms and conditions for important shipping information at [thermo.com/water](http://thermo.com/water)



# Orion Buffers, Solutions and Accessories



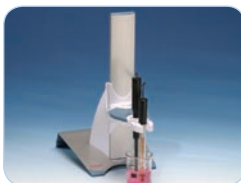
**Orion 090043 Swing Arm Stand**



**Orion Stirrer (096019) and paddle to fit electrode stand**



**Orion Inkjet Printer**



**Orion Star™ Series Stand**



**Orion Rugged Hard Field Case**



**Orion Soft Field Case**



**Orion 607 Electrode Switchbox**



**Orion Star Impact Jacket**

To make sure you have everything you need to attain accurate results for your applications, Thermo offers a multitude of accessories for both field and lab applications. From printers to field cases, electrode stands and stirrers, Thermo has it all. Below are the top selling accessories— for complete details, please visit [www.thermo.com/water](http://www.thermo.com/water).

Ordering	Electrode Body Handles
930000 9300BN 9300SC	For 93 Series U.S. Std. Connector BNC Connector Screw Cap, Requires Separate Cable
9700BN	For ionplus 97 Series BNC Connector
Ordering	Gas Sensing Electrode Membranes
951204	For 9512 Ammonia Electrodes, 20 Loose
951205	3 Bonded Membranes
951004	For 9510 Ammonia Electrode 20 Loose
950204	For Carbon Dioxide Electrode 4 with O-rings
954604	For Nitrogen Oxide Electrode 20 Loose

Note: \* Signifies a hazardous solution.

See terms and conditions for important shipping information at [thermo.com/water](http://thermo.com/water)

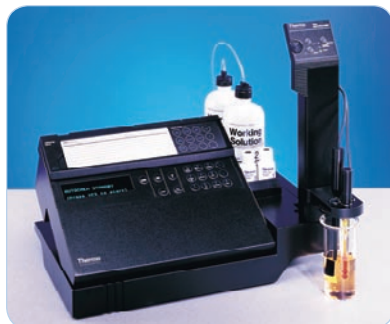
Ordering	Special Reagents
All are 1 pt. (475 mL) bottles unless noted	
951011*	For Ammonia/Cyanide, Electrodes Alkaline Reagent, 10 M NaOH
941709*	For Chloride Electrode CISA Reagent Pack, Complexation Ionic Strength Adjuster Reagents, 2 x 1 pt. (475 mL)
977011*	For Residual Chlorine Electrode, Acid Reagent
977010	Iodide Reagent
930710	For Nitrate Electrode Interference Suppressor
934610	For Nitrite Electrode
956410*	For Nitrogen Oxide Electrode Acid Buffer
941609*	For Silver/Sulfide Electrode SAOB Reagent Pack, Sulfide Anti-oxidant Buffer, 4 x 1 pt. (475 mL)

Ordering	Description
<b>Accessories</b>	
1010003	Spare Universal Power Adapter
1010004	RS232 Cable Set (Computer and Printer)
1010005	Cable Adapter from RS232 to USB
1010007	Star Navigator 21™ Software
1110001	Star Series Electrode Stand, Benchtop
1210001	Star Series Electrode Stand, Portable
1210004	Field Case, Hard
1210005	Field Case, Soft
096019	Automatic Stirrer and paddle (fits electrode stand)
096021	Replacement Paddles
<b>Dissolved Oxygen Probe Accessories</b>	
080113	Probe Maintenance Kit Electrolyte Solution, 2 Membrane Caps, Polishing Disk (for use with 080510 and 081010)
080513	Probe Maintenance Kit Electrolyte Solution, Polishing Disk, 2 Membrane Caps (for use with 083005A, 083010A, 083010F, 083025A, 083060A, 083150A 083300A, 081010F, 081030F, 083005D, 086020A)
970801	Membrane Cap 1 Prefilled Membrane Cap (for use with 970800, 970899)
080010	Membrane Cap 1 Membrane Cap (for use with all 820, 830, 840, 842, 860, 870 and 880 Series Probes)
081003	Membrane Caps 3 Membrane Caps (for use with 080510 and 081010)
080515	Membrane Cap 1 Membrane Cap (for use with 083005A, 083010A, 083010F, 083025A, 083060A, 083150A 083300A, 081010F, 081030F, 083005D, 086020A)
080514	Electrolyte Solution, 1 Bottle (for use with 083005A, 083010A, 083010F, 083025A, 083060A, 083150A 083300A, 081010F, 081030F, 083005D, 086020A)
<b>Electrode Holders and Accessories</b>	
090043	Swing Arm Electrode Stand
910002	Universal Electrode Holder
910003	Electrode Storage Bottles, pkg of 3
910005	Bulbguard for Glass pH Electrode, pkg of 5
900060	ionplus® Stirring Accessory
<b>Waterproof Portable Meter Accessories</b>	
1210002	Rubber Impact Jacket & Storage Sleeve
1210003	Electrode Storage Sleeve (fits Rubber Armor and Storage Sleeve 1210002)
<b>Electrode Adapters - Mini DIN</b>	
1010050	MD series ATC Adapter to 3.5 mm phono tip meter
1010051	MD series ATC to connect to 8 pin DIN meter
1010900	MD series cond MiniDin to 8 pin WPDIN cond meter
1010901	MD series cond to 8 pin DIN cond meter
1010801	MD series DO to 8 pin DIN DO meter
<b>Printer</b>	
1010006	Replacement Star Series Inkjet Printer (110 V/220 V), RS232 Interface Cable included
<b>Electrode Switchbox</b>	
0607CA	Multi-channel electrode switchbox, 110 V cable included
0607CI	Multi-channel electrode switchbox, 220 V cable included

Note: Data transfer settings: BAUD 1200, Parity N, Data 8, and Stop 1



# Potentiometric Titration



## Simple Acid/Base to High Performance Titration

### Ensure High Performance

Service Options are now available for all Orion Titration products to get you up and running quickly and to make sure you are operating at the highest performance possible. See the inside back cover for details.

### Orion 960 Titrator

The Orion 960 is designed for laboratories using automation to overcome problems of sample throughput or analytical complexity. Unlike single parameter analyzers or other automatic titrators, this versatile instrument can be used not only for classical titrations – acid/base, redox, precipitations – but also for automated analysis of any, complex potentiometric species measurable by ion selective and pH electrodes. Utilizing 12 preprogrammed analysis techniques it is easy to operate.

The dispenser is a zero-dead-volume rotary reciprocating pump. There are no valves to switch for refilling. Quick-release fittings make it fast and easy to disconnect one bottle and connect another – no need to stock spare burettes. For maximum versatility, you can integrate up to eight titration workstations and an Orion Autosampler into one system.

### 950 ROSS® FASTQC™ Titrator

This economical yet versatile potentiometric titrator performs Acid/Base titrations, including non-aqueous samples, oxidation-reduction, precipitation and complexometric titrations using ion selective electrode and ROSS pH Technology to deliver fast, accurate titrations. Its unique Assured Accuracy™ feature can perform a gravimetric calibration of the entire dispensing system, making it easy to meet ISO 9000 and GLP requirements.

*Thermo's Titration products, pH and Sodium electrodes are used at global Anheuser-Busch† locations to ensure water quality and beer formulas meet stringent QC specifications for alkalinity and sodium.*

Ordering	Description
096000 Orion 960 Titrator PLUS System	Complete with EA 940 pH/ISE Meter and Orion 960 Titrator Plus Module. Includes: Base assembly, tower assembly, electrode holder, stirrer, two dispenser probes, anti-diffusion dispenser probe with six tips, tubing kit, calibration kit, cable (Orion 960 and EA 940), reference tablet, two working solution bottles, two dip tubes and caps, line cords, and instruction manual. User selectable power requirement 100/115/220/240V ±10%
096002 Orion 960 Titrator PLUS Module	Same as 096000, but module does not include EA 940 pH/ISE Meter
095000 Orion 950 FAST QC Titrator	With printer, includes workstation, control unit, printer, printer paper, ROSS Sure-Flow® Combination pH electrode (Orion 8172BNWP), cables, tubing, instructional manual and line cords, 110 V 60 Hz
095001 Orion 950	Same as 095000, but 220 V 60 Hz
095002 Orion 950	Same as 095000, but without line cord
095003 Orion 950	Same as 095000, but without printer
095004 Orion 950	Same as 095003, but 220 V 60 Hz

† Anheuser-Busch is a registered trademark of Anheuser-Busch Companies, Inc.

Specifications	960 / 950
mV	- 1600.00 to 1600.00 mV for both
Concentration	0.00001 to 99999 / -
pH Range	- 2.000 to 19.999 for both
pH Calibration Points	5 / 2
Temperature	- 5.0 to 105.0 °C for both
Power Requirement:	110/120/220/240 VAC, 50/60 Hz for both
Titration Modes	960: Preset pH Endpoint, Preset mV Endpoint, First Derivative Titration, Second Derivative Titration Single/Double/Multiple Known Subtraction, Multiple Analate Addition, Gran Function, Gran Predict, Standardize System, Help Analysis, pH Read 950: Preset pH Endpoint, Preset mV Endpoint, First Derivative Titration
Methods Saved	Up to 20 / Up to 10
Display	Custom color vacuum fluorescent with 40 character prompt line / Custom color vacuum fluorescent with 17 character prompt line
Variable Speed Stirring Paddle	Yes for both
Input	Two BNC, two pin tip, dual banana jacks for PT-100 / Two BNC, two pin tip, ground, ATC power, RS232 style ATC probe
Output	960: 4 RS232 ports for connection to EA 940, printer, computer and balance; one 15 pin parallel port 950: RS232, recorder
Dimensions (h.w.d.)	With Tower, 16" x 17" x 18" / Meter, 2" x 9" x 7.5"; Dispenser, 16" x 5.5" x 18"
Case	Splash and Chemical Resistant for both
Environmental Requirements	5 to 45 °C and 5 to 85% relative humidity for both
Autosampler Option	Yes / No
Agency Approvals	CE for both

Note: To use with an external printer order Orion 950DPU or 950EPN splitter cable.

# Volumetric and Coulometric Titration

28

## Fast, Accurate Moisture Analysis



### Orion TURBO2® Volumetric Blending Titrator

The system comes with a powerful blender to break up and blend solid samples. Such as food products or dry pharmaceuticals, assuring complete moisture extraction from the sample into solution with little or no sample preparation. The titrator has a fully automated fill and drain pumping system to minimize reagent handling. A large 720 mL vessel allows for multiple sample analysis as well as easy vessel access and cleaning. An optional Water Jacketed Vessel is available to enhance moisture extraction in difficult samples.



### Orion AF8 Volumetric Titrator

Rapid determination of moisture from 50 ppm to 100% moisture in a wide range of materials is possible with the Orion AF8. The peristaltic pump's unique, continuous titrant dispensing system eliminates the inconvenience of refilling burettes. Top-entry vessel opening can accommodate a syringe needle for liquids or solid samples up to 23 mm across.



### Orion AF7 Coulometric Titrator

Utilizing the extremely accurate technique of iodine generation, the AF7 coulometric titrator takes moisture measurement to new limits of accuracy and performance within a wide measuring range of 1 ppm to 100% H<sub>2</sub>O. It is a universal titrator for measuring both high and low moisture giving the user reliable results with unmatched speed of 20,000 micrograms (20 mg) of water titrated per minute.

Ordering	Description
319050001 Orion TURBO2, Blending Volumetric Karl Fischer Titrator	Complete with built-in printer, 750 mL titration vessel, dual RS-232 interface, line cord, spare silicone pump tubing and extra roll of printer paper, 105-120 VAC, 50-60 Hz
319050000 Orion TURBO2	Same as 319050001, but 210-240 VAC, 50-60 Hz
319045001 Orion AF8 Karl Fischer Volumetric Titrator	Complete with built-in printer, large & small titration vessels, and small vessel adapter, dual RS-232 interface, large & small stir bars, reagent & waste bottles, spare silicone pump tubing extra roll of printer paper, 105-120 VAC, 50-60 Hz
319045000 Orion AF8	Same as 319045001, but 210-240 VAC, 50-60 Hz
319035001 Orion AF7 Karl Fischer Coulometric Titrator	Complete with special high/low current titration vessel and electrodes, built-in vessel fill/drain pumping system, built-in printer, (2) reagent and (2) waste bottles, dual RS-232 interface and accessory kit. 105-120 VAC, 50-60 Hz
319035002 Orion AF7	Same as 319035001, but 210-240 VAC, 50-60 Hz

Specifications	TURBO2 / AF8 / AF7
Method	Volumetric / Volumetric / Coulometric
High-Low Speed	– / – / 20 - 2 mg/min
Moisture Range	50 ppm to 100% H <sub>2</sub> O / 50 ppm to 100% H <sub>2</sub> O / 1 ppm to 100% H <sub>2</sub> O
Precision	0.5% at 25 mg H <sub>2</sub> O / 0.4% at 25 mg H <sub>2</sub> O / 0.7% at 10 mg H <sub>2</sub> O
End Point Potential	Variable / Variable / Fixed
Calibration Range	1 to 100 mg H <sub>2</sub> O / 1 to 100 mg H <sub>2</sub> O / –
End-Point Time/Level	1 to 30 seconds / 1 to 30 seconds / 0 to 50 µg/min
Background Correction	Yes / – / Yes
Factor Range	0.1 to 100% for all
Blank Range	0 to 100 mg for all
Programmable Methods	3 stored methods, 2 default methods / 3 stored methods, 1 default method / 3 stored methods, 1 default method
Result Unit	ppm - % - mg for all
Display LCD	2 lines x 20 characters for all
Keyboard	Membrane, 18-function / Membrane, 22-function / Membrane, 24-function
Printer (Internal)	32 character, thermal / 32 character, thermal / 24 character, thermal
Statistics	Up to 25 tests for all
Stirrer Speeds	1000 to 7500 rpm / 200 to 1400 rpm / 200 to 1000 rpm
Interfaces	(2) RS232 for Balance and Computer for all
Balance Recognition	Orion, Mettler, Sartorius, Ohaus, Shimadzu, A&D, Oertling, Denver for all
Vessel Capacity	750 mL / 100/275 mL / 150/200 mL
Reagent Handling	Peristaltic Pump / Peristaltic Pump / Built-in Pump
Titration Vessel (h.w.d.)	27 x 23 x 35 (cm); 10.5 x 9 x 13.7 (in) / Same as TURBO2 / –
Elect. Console (h.w.d.)	20 x 37 x 34 (cm); 8 x 15 x 14 (in) / Same as TURBO2 / 24 x 54 x 35 (cm); 9 x 21 x 13 (in)
Agency Approval	CE for all

## High Sample Throughput



### Orion AutoTraction™-500

The Orion AutoTraction - 500 autosampler performs analyses, calibrations and standardization procedures automatically. It improves data quality by using up to five rinse stations. Durable and corrosion resistant, the sealed electronics chassis and coated metal parts protect against the harshest chemical environments. The autosampler is available with either a 50 or 150 beaker rack and accessories. It is compatible with the Orion 960 TitratorPLUS®, for automated ISE techniques and titrations, and Orion meters with autosampler capability.



### Orion BOD AutoEZ®

- Reads 36 BOD samples in 15 minutes or less
- Automatically calculates results according to Standard Methods (5210) for the Examination of Water and Wastewater
- Customizable report and export options for interfacing with LIMS

The BOD AutoEZ utilizes robotics to measure dissolved oxygen and BOD (Biochemical Oxygen Demand) of water and wastewater. Its powerful software package and patented multiple probe design focuses on maximizing data quality, sample throughput, reduced labor costs while ensuring consistent, accurate results.

Ordering	Description
AT5050 Orion AutoTraction Autosampler	Complete with 48-position beaker rack for 50 mL beakers, small electrode holder, Drip Tray, Cable Management System, BNC Cable Extension, Stirrer Extension Cable, Accessories Package, interface cable, line cord, pkg of (50) 50 mL plastic beakers, instruction manual, and Warranty Card. 115 V/220 V
AT5150	Same as AT5050, but has 28-position beaker each for 150 mL beakers
ATR050	48-position beaker rack for 50 mL beakers
ATR150	28-position beaker rack for 150 mL beakers
ASB050	Beakers, plastic, 50 mL, for 48-position rack, package of 50
ASB150	Beakers, plastic, 150 mL, for 28-position rack, package of 50
096S22	Beakers, plastic, 45 mL, for 48-position rack, package of 50
AT0STD	Electrode holder, standard for AT5150
AT0050	Electrode holder, small for AT5050
10060020	BOD AUTO EZ Analyzer
10060040	BOD AUTO EZ BOD Bottle Trays
10060080	BOD AUTO EZ Replacement Drip Tray
10060003	BOD AUTO EZ Replacement DO Probe

Orion AT-500	Specifications	Benefit
Sample Capacity AT5050 / AT5150	45, 50 mL glass or plastic beakers / 28, 150 mL glass or plastic beakers	Choose the capacity right for your lab
Instrument Interface	RS232	--
Power Voltage	90-240 Vac, 50/60 Hz	Easy to install
50 mL beaker sold with autosampler	Polypropylene, 42 mm diameter	Chemically resistant
150 mL beaker sold with autosampler	Polypropylene, 57 mm diameter	Chemically resistant
Accuracy	± 1.0 mm in all axes	--
Agency Approvals	CE	Worldwide operation
Environmental Requirements	5 to 45 °C and 20 to 80% Relative Humidity	Durable
Compatible Instruments*	Orion 960 Titrator PLUS® (Rev 6.0) Orion 550A, 862A, 162A meters with autosampler capabilities	Automate any analysis
Travel & resolution/precision Maximum X axis travel Minimum X axis resolution/precision Maximum Y axis travel Minimum Y axis resolution/precision Maximum Z axis travel Maximum Z axis resolution/precision Maximum Z axis clearance	510 mm Better than 0.1 mm 270 mm Better than 0.1 mm 160 mm Better than 0.1 mm 140 mm	--
Computer Interface	RS232	--
Power Consumption	100-240 Vac, 50/60 Hz, 100 VA	--

\* Must be this software revision or higher to be compatible

# Orion AQUAfast® Colorimetry

30

These rugged, field-tested products take the guesswork out of colorimetry and turbidity measurement making it easy for users of any experience level to get accurate, reliable results. Each model features easy-to-use controls with bright LED screens. Two-year replacement warranty on all models.

*Dasani<sup>††</sup> bottled water distributed by Coca Cola<sup>††</sup> uses Thermo's colorimetry products to monitor ozone levels for water purity in the bottling process.*

<sup>††</sup> Dasani and Coca Cola are trademarks of The Coca Cola Company



## AQUAfast IV Advanced Colorimeter Orion AQ4000

- Built-in Advanced Auto-ID™ simplifies routines by identifying the species to be measured, then selecting the method, wavelength and reaction time
- Rugged, field-proven IP67 waterproof design
- Selectable display units: concentration, absorbance or percent transmittance

The Orion AQ4000 is an advanced multi-wavelength colorimeter that simplifies the measurement process and assures accurate results. You can store up to 189 pre-programmed methods, and easily download new tests via the Web; it's also easy to create your own custom methods with up to 5 data points and customized calibration. The unit records up to 100 data points in the field with a time and date stamp, for later downloading to a printer or computer.

Auto-ID works with our exclusive Auto-Test™ Ampoules – pre-measured liquid reagent ampoules specially designed for the Orion AQ4000. The meter can also be used with Orion tablets, Orion powders and Orion COD reagents, and accepts 13, 16 and 24 mm round cuvettes.



## AQUAfast IV Turbidimeter Orion AQ4500

- Easy-to-use controls; bright, easily readable LED screen
- Dual light source design to comply with EPA and ISO methods
- Nephelometric and ratiometric measurements with autoranging
- Rugged, field-proven IP67 waterproof design

The new Orion AQ4500 Turbidimeter conforms to both EPA 180.1 and ISO 7027 methodologies. An easy-to-use interface lets you read turbidity in the range of 0-1000 NTU, with your choice of units: NTU, FAU and FNU. It also reads according to EPA GLI method 2 in the range of 0-40 NTU. Portable and fully waterproof, the AQ4500 typically delivers over 1000 service hours on a single set of batteries. The meter accepts standard 24 mm cuvettes and comes with a heavy-duty carrying case.

Visit [thermo.com/water](http://thermo.com/water) for additional turbidity standards

### Lab in a Kit

**Complete portable, easy-to-store water quality testing kits pre-configured by application. Choose from these four options: Choice Clean Water, Clean Water, Dirty Water, or Water Conditioning. Go to [thermo.com/water](http://thermo.com/water) for details.**

Ordering	Orion AQ4000 Colorimeter and Accessories
AQ4000	AQUAfast IV Colorimeter Only (order reagents separately)
AQ40FK	Field Kit for AQ4000
AQ40HS	Orion Cyanide Test Kit
AQ4CBL	RS232 Cable for Data Download & SW Updates
AQ4ZER	AQUAfast Zero Kit
AC2V16	16mm repl. vials, 10 pack
AC2V24	24mm repl. vials, 12 pack

Ordering	AQ4500 - Turbidity
AQ4500	AQUAfast IV Turbidimeter and Calibration Kit
AQ4CBL	RS232 Cable for Data Download and Software Updates
AC45FZ	Formazin Turbidity Standard, 4000 NTU, 475 mL
AC45SI	Silicon Oil and Cloth Kit for AQ4500
AC45ST	Primary Turbidity Calibration Kit
AC2T24	24mm replacement Turbidity vials, 12 pack





## AQUAfast® II Colorimeters

### Orion AQ2070

- Minimize Ramp Up Time
- Simple three-button interface for error-free readings
- Total Chlorine tablets and powders are EPA approved

Battery-powered, weighing only 10 ounces, Orion AQ2070 colorimeters are designed for simple, accurate, single parameter methods. Eleven operational modes allow measurement of over 20 species based on methods accepted by national and international regulatory agencies. Reagents are provided in shelf-stable, rapid-dissolving tablets – eliminating loss of powdered reagent. Order reagent kits separately.



## AQUAfast Chemistries

Orion AQUAfast Tablets - for use with AQUAfast II and IV Colorimeters, are quick-dissolving and easy to add to the sample.

Orion AQUAfast Powders - economical, pre-measured packets dissolve quickly in your sample. Can be used with any colorimeter on the market including our AQ2070 and AQ4000.

Orion AQUAfast Ampoules - self-filling reagent ampoules save time and simplify water testing. Under vacuum, the sample flows into the tube and mixes with pre-formulated reagent. No need to measure sample or reagents.

*Note: See page 32 for Ordering Information.*



## Chemical Oxygen Demand (COD) Testing

Chemical Oxygen Demand (COD) testing uses colorimetric analysis methods to save time, space and money – without compromising accuracy. The simple procedure is ideal for environmental and wastewater applications, in the lab or in the field.

Orion Chemical Oxygen Demand (COD) complies with EPA guidelines, and works with Orion AQUAfast II or IV colorimeters. The COD reactor has a wide range of preset times and temperatures. Just add the sample to the COD vial, digest sample in the Orion reactor, and read results. Convenient, ready-to-use reagent vials are available in three ranges: 0-150 mg/L, 0-1,500 mg/L, 0-15,000 mg/L.

Ordering	AQUAfast II Colorimeters Single Parameter Kits
Each kit includes: Meter, cuvettes, case, stir rod, brush, instructions, and tablet chemistries.	
AQ2070	Chlorine (Free & Total) Kit
AQ2009	Fluoride Kit
AQ2007	Nitrate Kit
AQ2046	Nitrite, Nitrogen Kit
AQ2010	Turbidity
AQ2020	Drinking Water Kit (Aluminum, Chlorine (F&T), Chlorine Dioxide, Fluoride, pH)
Ordering	AQUAfast II Colorimeters Multi-Parameter Kits
Each kit includes: Meter, cuvettes, case, stir rod, brush, and instructions; tablet chemistries sold separately.	
AQ2040	COD AQ II Colorimeter
AQ2001	Multi-One (Alkalinity-m, Ozone)
AQ2002	Multi-Two (Copper/Zinc, Silica)
AQ2003	Multi-Three (Hydrazine, Manganese, Phosphate HR)
AQ2004	Multi-Four (Ammonia as Nitrogen, Phosphate LR, Sulfide)
AQ2005	Multi-Five (Aluminum, Bromine, Chloride, Copper, Iron, Sulfate)
Ordering	Replacement Vials
AC2V16	16mm replacement vials, 10 pack
AC2V24	24mm replacement vials, 12 pack
AC2T24	24mm replacement Turbidity vials, 12 pack

Ordering	COD Reagent Kits, Standards and Thermoreactor
CODS01	COD Standard 1,000 mg/L (475 mL)
CODS10	COD Standard 10,000 mg/L (475 mL)
COD125	COD Thermoreactor, holds 25 vials
CODL00	COD Test Kit*, 0-150 ppm, 25 tests, EPA Approved
CODH00	COD Test Kit*, 0-1500 ppm, 25 tests, EPA Approved
CODHP0	COD Test Kit*, 0-15000 ppm, 25 tests, No EPA requirement

*Note: \* Hazardous shipment.*



# Orion AQUAfast® Colorimetry Chemistry Guide by Application

32

Ordering	EPA Chemistries (EPA Status)	Orion Meter Compatibility	Range (mg/L)	Reagent	No. of Tests
AC2002	Alkalinity & Total Mo	AQ2001, AQ4000	5 - 200	Tablet	100
AC4027	Aluminum	AQ4000	0.05 - 0.25	Liquids	30
AC2027	Aluminum (EE)	AQ2020, AQ2005, AQ4000	0.05 - 0.30	Tablet	50
AC4010	Ammonia, ULR	AQ4000	0.10 - 3.00	Liquids	30
AC4012	Ammonia, LR (IP)	AQ4000	0.50 - 7.00	Liquids	30
AC4011	Ammonia, HR	AQ4000	1.0 - 16.0	Liquids	30
AC4P12	Ammonia Nitrogen	AQ4000	0.01 - 0.50	Powder	100
AC2012	Ammonia Nitrogen, LR	AQ2004, AQ4000	0.05 - 1.0 - 0.5 - 10.0	Tablet	50
AC4035	Bromine	AQ4000	0.75 - 9.00	Liquids	30
AC2035	Bromine, LR (NR)	AQ2005	0.1 - 13.5	Tablet	100
AC4017	Chloride (IP)	AQ4000	2.0 - 40	Liquids	30
AC2017	Chloride, LR	AQ2005, AQ4000	0.5 - 25	Tablet	50
AC4099	Chlorine Dioxide	AQ4000	0.80 - 12.00	Liquids	30
AC2099	Chlorine Dioxide (NR)	AQ2020, AQ4000	0.04 - 2.8	Tablet	100
AC2071	Chlorine, Free (NR)	AQ2070, AQ2020, AQ4000	0.05 - 6.0	Tablet	100
AC4P71	Chlorine, Free, DPD (A)	AQ2070, AQ4000	0.03 - 2.0	Powder	100
AC4070	Chlorine, F & T (A)	AQ4000	0.40 - 6.0	Liquids	30
AC2070	Chlorine, F & T (NR)	AQ2070, AQ2020, AQ4000	0.05 - 6.0	Tablet	50
AC2072	Chlorine, Total (A)	AQ2070, AQ2020, AQ4000	0.05 - 6.0	Tablet	100
AC4P72	Chlorine, Total, DPD (A)	AQ2070, AQ4000	0.03 - 2.0	Powder	100
AC4P29	Copper, Bicinchoninate	AQ4000	0.05 - 5.00	Powder	100
AC2029	Copper, Biquinoline (EE)	AQ2005, AQ4000	0.05 - 5.0	Tablet	50
AC4029	Copper, Soluble (IP)	AQ4000	1.00 - 14.00	Liquids	30
AC2065	Copper, Zinc (EE)	AQ2002, AQ4000	0.02 - 1.0	Tablet	50
AC4006	Cyanide, Free	AQ4000	0.020 - 0.50	Liquids	30
AC4009	Fluoride, SPADNS	AQ4000	0.20 - 2.0	Liquids	30
AC2009	Fluoride, SPADNS (A)	AQ2009, AQ2020, AQ4000	0.01 - 2.0	Tablet	50
AC4030	Hydrazine	AQ4000	0.10 - 1.20	Liquids	30
AC2030	Hydrazine (NR)	AQ2003, AQ4000	0.05 - 0.50	Tablet	30
AC2078	Iron	AQ2005, AQ4000	0.02 - 1.0/0.2 - 10	Tablet	100
AC4P78	Iron, FerroVer	AQ4000	0.02 - 3.00	Powder	100

Ordering	EPA Chemistries (EPA Status)	Orion Meter Compatibility	Range (mg/L)	Reagent	No. of Tests
AC4P79	Iron, TPTZ	AQ4000	0.02 - 1.80	Powder	100
AC4078	Iron, Total & Soluble (IP)	AQ4000	0.45 - 7.00	Liquids	30
AC2055	Manganese, LR (NR)	AQ2003, AQ4000	0.05 - 4	Tablet	50
AC4P55	Manganese, MR	AQ4000	0.2 - 20.0	Powder	100
AC4055	Manganese, HR (IP)	AQ4000	1.0 - 30.0	Liquids	30
AC4042	Molybdate	AQ4000	1.5 - 30.0	Liquids	30
AC4P42	Molybdate, Mb, HR	AQ4000	0.3 - 40.0	Powder	100
AC2007	Nitrate, Nitrogen	AQ2007, AQ4000	1 - 40	Tablet	50
AC4004	Nitrate, LR as N	AQ4000	0.15 - 1.50	Liquids	30
AC4005	Nitrate, MR as N	AQ4000	0.25 - 3.00	Liquids	30
AC4007	Nitrate, HR as NO <sub>3</sub>	AQ4000	5.0 - 60.0	Liquids	30
AC4046	Nitrite (IP)	AQ4000	0.080 - 0.800	Liquids	30
AC2046	Nitrite (A)	AQ2046	0.05 - 0.50	Tablet	100
AC4P46	Nitrite, Nitrogen LR	AQ4000	0.03 - 0.350	Powder	100
AC4008	Oxygen, Dissolved	AQ4000	2.0 - 15.0	Liquids	30
AC4048	Ozone, HR	AQ4000	0.20 - 2.50	Liquids	30
AC2048	Ozone, LR (NR)	AQ2001	0.05 - 0.5	Tablet	100
AC2001	pH	AQ2020, AQ4000	6.5 - 8.4	Tablet	100
AC4095	Phosphate, LR as PO <sub>4</sub>	AQ4000	0.75 - 8.00	Liquids	30
AC2095	Phosphate, LR as PO <sub>4</sub> (A)	AQ2004, AQ4000	0.05 - 4.0	Tablet	50
AC4096	Phosphate, HR as PO <sub>4</sub>	AQ4000	5 - 80	Liquids	30
AC2096	Phosphate, HR as PO <sub>4</sub>	AQ2003, AQ4000	10 - 100	Tablet	50
AC4P95	Phosphate, LR as P	AQ4000	0.07 - 2.50	Powder	100
AC2060	Silica, LR (EE)	AQ2002, AQ4000	0.05 - 4.0	Tablet	50
AC4060	Silica, HR	AQ4000	1.0 - 14.0	Liquids	30
AC4P60	Silica, HR	AQ4000	1.0 - 75.0	Powder	100
AC2061	Silica, PO <sub>4</sub> Removal	AQ2002, AQ4000	NA	Tablet	100
AC4082	Sulfate, HR	AQ4000	5 - 70	Liquids	30
AC2082	Sulfate, HR	AQ2005, AQ4000	5 - 200	Tablet	100
AC4P82	Sulfate, HR (EE)	AQ4000	2 - 70	Powder	100
AC4016	Sulfide, Soluble (IP)	AQ4000	0.20 - 3.0	Liquids	30
AC2016	Sulfide	AQ2004, AQ4000	0.05 - 0.50	Tablet	50
AC4065	Zinc, LR (IP)	AQ4000	0.30 - 3.0	Liquids	30
AC2065	Zinc, Copper/Zinc	AQ2002, AQ4000	0.02 - 1.0	Tablet	50

## Key:

EPA Status: **A** = Approved; **IP** = In Process; **NR** = No EPA Requirement; **EE** = EPA Equivalent Method

# Service Program Options

## Thermo Electron’s leadership shows up in everything we do including:

- Minimize Ramp Up Time
- Ongoing support
- Flexible data reporting and analysis
- Low cost of ownership
- Comprehensive support solutions for all phases of the product life cycle
- Immediate access to experts worldwide

### Service Programs

Thermo’s flexible service programs provide fixed-price solutions, offering benefits over the traditional time and materials, per-quote based model. So you get improved ROI, minimize downtime, unmatched flexibility, better staff utilization and increase productivity.

### Orion Titration Product Service Options

A variety of Service Options are now available for all Titration products to get you up and running quickly and to make sure you are operating at the highest performance possible. Set-up Services and Training Options are available to minimize ramp up time so results are expedited rapidly and accurately. Avoid downtime by choosing a Preventative Maintenance program that meets your high demands for quality and accurate results, or select a two or three year Extended Warranty to ensure you are minimizing the possibility of downtime due to an unforeseen failure.

Ordering	Description	2 Year Extended Warranty	3 Year Extended Warranty	Start-up	Preventative Maintenance
096000	960 Titrator	096000EXT2	096000EXT3	NA	NA
096002	960 Titrator	096002EXT2	096002EXT3	NA	NA
319050001	Turbo II	319050EXT2	319050EXT3	TUR2SU	TUR2PM
319050000	Turbo II (220V)	319050EXT2	319050EXT3		
319045001	AF8	319045EXT2	319045EXT3	0AF8SU	0AF8PM
319045000	AF8 (220V)	319045EXT2	319045EXT3		
319035001	AF7	319035EXT2	319035EXT3	0AF7SU	0AF7PM
319035002	AF7 (220V)	319035EXT2	319035EXT3		
319040001	AF7LC	319040EXT2	319040EXT3	0AF7SU	0AF7PM
319040000	AF7LC (220V)	319040EXT2	319040EXT3		
10060020	BOD AutoEZ	NA	NA	CBODEZ00SU	CBODEZ00PM

**Preventative Maintenance** – (PM) contracts and Start-up/Training (SU) are available in N. America only and are represented by Catalog Numbers ending in PM and SU.

**Extended Warranties** – (EXT) are available world wide and are represented by Catalog Numbers ending in EXT2 (2 year) and EXT3 (3 year).

### Orion Star™ Series Service Options, Calibration and Validation

You’ll feel confident your results are accurate and exact when taking advantage of Thermo’s Calibration and Validation Options. We have a range of testing, validation and calibration programs to satisfy even the most exacting standard. Our dedicated validation and calibration consultants offer in-depth expertise and a full understanding of compliance requirements. Thermo recommends this option is performed annually based on your application demands.

Stay in specification compliance by simply sending your Orion Star Series meter to Thermo, where Calibration and Validation will be performed to your choice of standards. Thermo will return your meter along with a Certificate of Validation that includes calibration details and test results.

### IQ/OQ Package

Save time and money when you purchase the IQ/OQ package from Thermo to ensure that your meter performs to the manufacturer’s published specifications. Thermo offers full IQ/OQ documentation for the Orion Star Series meters to perform a comprehensive Installation and Operation on your meters satisfying the requirements of regulated industries such as pharmaceutical.

### All Orion Products In Warranty Support

Orion Star Series, Aplus™ and PerpHecT® meters carry a three-year warranty which includes Return-to-Factory, Repair or Replace on a reasonable efforts basis, phone support, web support, and any software maintenance releases. Russell meters include a 2 year warranty.

For product failures in the first thirty days after shipment, we issue a product replacement- no questions asked.

Go to [thermo.com/water](http://thermo.com/water) for comprehensive warranty and service option information.

### Spare Parts

To help you keep your instruments operating at the highest levels of accuracy and efficiency, we offer factory authorized parts at prices comparable to those of generics. All Thermo parts, accessories, and consumables are performance-certified and fully warranted to perform to our products’ rigorous design specifications.

*“We experienced great Customer Service while we learned initial setup procedures for the Orion Star-3 Meter. Our lab technicians are really pleased.”*

### Chesterfield County WWTP Wastewater Treatment Plant

Ordering	Star Series Calibration and Validation
111400CAL	3-Star Cond BT
111300CAL	3-Star DO BT
111200CAL	3-Star pH BT
121400CAL	3-Star Cond Portable
121300CAL	3-Star DO Portable
121200CAL	3-Star pH Portable
111700CAL	4-Star pH/Cond BT
111600CAL	4-Star pH/DO BT
111500CAL	4-Star pH/ISE BT
121700CAL	4-Star pH/Cond Portable
121600CAL	4-Star pH/DO Portable
121500CAL	4-Star pH/ISE Portable
111900CAL	5-Star pH/DO/Cond/ISE BT
121800CAL	5-Star pH/DO/Cond Portable
121900CAL	5-Star pH/DO/Cond/ISE Portable

To order, simply drop the last 0 at the end of the meter only catalog number and include CAL

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ORION Series A meters and 900A printer are protected by U.S. patents 5,198,093, D334,208 and D346,753.

ionplus electrodes and Optimum Results solutions are protected by US Patent 5,830,338.

ROSS Ultra electrodes are protected by US patents 6,793,787.

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