Thermo Scientific Orion Star A111 Benchtop and Star A121 Portable pH Meters

Reference Guide

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Thermo Scientific Orion Star A111 Benchtop and Star A121 Portable pH Meters

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Chapter 1   Introduction

Thank you for your purchase of the Orion Star A111 benchtop pH or Star A121 portable pH meter. These meters are capable of measure pH, raw millivolts (mV), relative millivolts (Rmv), oxidation-reduction potential (ORP) and temperature.

The Orion Star A111 benchtop pH meters are IP54-rated. The Orion Star A121 portable pH meters feature a waterproof, IP67-rating.

Please read this reference guide thoroughly. Any use outside of these instructions may invalidate your warranty and cause permanent damage to the meter.

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Chapter 2   Meter Overview

Connections

1. Power source:

    a. Power adapter (included with Orion Star A111 benchtop pH meters, sold separately for Star A121 portable pH meters) – Select the appropriate wall socket plug. Slide off the clear plastic cover, and slide on the plug plate into the groove on the back of the adapter.

    b. Batteries (included with and factory installed on Star A121 portable meters, sold separately for Star A111 benchtop meters) – Select four AA batteries. Confirm that the meter is off and remove the battery compartment cover.

    To remove the battery compartment cover:

    > i. Loosen the screws.
    >
    > ii. Release the top portion of the battery compartment from the meter (using a coin or your finger.)
    >
    > iii. Release the bottom portion of the battery compartment (using a coin or your finger).

    Insert batteries as shown in the battery compartment housing.

Orion Star A111 Benchtop

Push down on tab and lift the battery cover

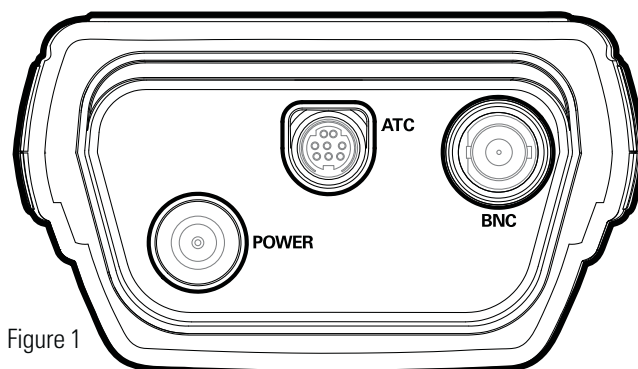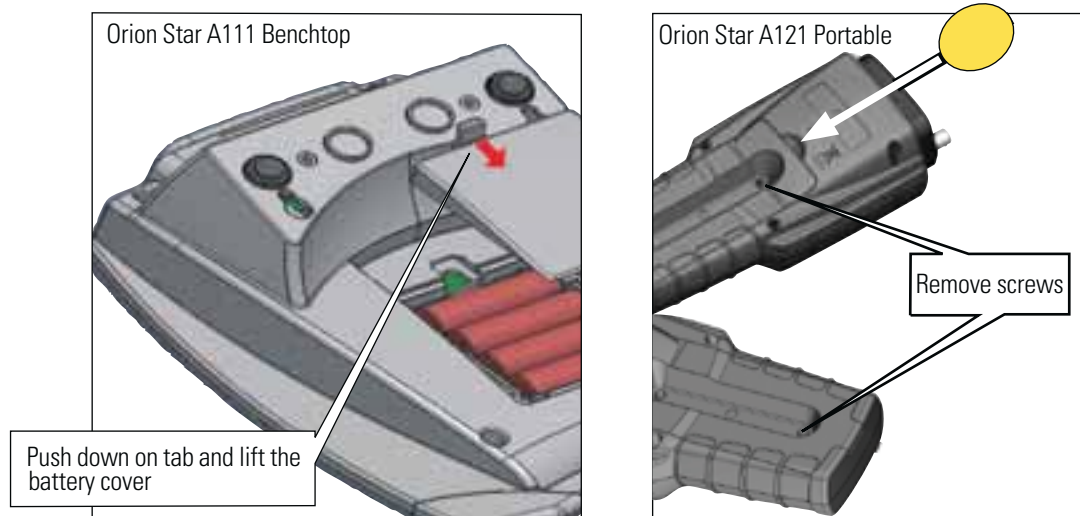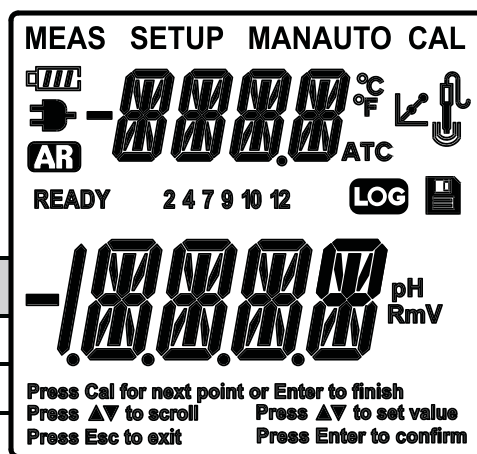Orion Star A121 Portable

Remove screws

ATC

POWER

BNC

Figure 1

2. Prepare the pH electrode according to the electrode instructions.

3. Connect the appropriate items as labeled on the meter and as shown in figure 1.

Display Information

Display Icon	Description
MEAS	Indicates that the meter is in the measurement mode.
SETUP	Indicates that the meter is in setup mode.
CAL	Indicates that the meter is the calibration mode.
MAN	Shown when a manual calibration is being done and complete.
AUTO	Shown when using automatic buffer calibration (default setting) and has been completed.
◁�IIII	Shows the battery status (more bars = more power remaining). Blinks when power is low and the battery needs to be changed. Batteries included with and factory installed in the Orion Star A121 portable pH meter.)
▬►	Shown when the meter is running on AC power. (Adapter included with the Orion Star A111 benchtop pH meter.)
AR	Shown when the meter is on AUTO-READ mode. Default setting. AR and unit of measurement will blink until the reading is stable. When the reading is stable it is held on the screen and AR is lit. Press (measure (esc)) to take a new reading.
READY	Unit of measurement will blink until the reading is stable. When the reading is stable, READY is lit.
2,4,7,9,10,12	Buffer points that have been calibrated are displayed as follows: <table><tr><td>Displayed Buffer Value</td><td>2</td><td>4</td><td>7</td><td>9</td><td>10</td><td>12</td></tr><tr><td>Calibrated USA Buffer Value (at 25°C)</td><td>1.68</td><td>4.01</td><td>7.00</td><td>-</td><td>10.01</td><td>12.46</td></tr><tr><td>Calibrated DIN Buffer Value (at 25°C)</td><td>1.68</td><td>4.01</td><td>6.86</td><td>9.18</td><td>-</td><td>-</td></tr></table>
✓	Appears after a complete calibration.
🌡	Shows the electrode condition. If the icon has a slash through it, the electrode condition is bad. Consult the electrode user guide.
🖫	Displayed when a reading is stored into the memory.
LOG	Displayed when viewing stored readings.
Secondary display	Shows temperature reading in measurement mode and setup menu in setup mode.
Primary display	Larger, lower display shows measured value in selected mode.
Instructions	Located below the primary display. These phrases aid in the setup menu and calibration modes.

Keypad Information

measure (esc)	*In the measurement screen:* Press to take a measurement. *In the setup screen:* Press to escape the setup menu. *In the calibration screen:* Press to abort calibration.		
⏻	Press to turn the meter on or off.	**mode** (enter)	*In the measurement screen:* Press to switch between modes. *In the setup screen:* Press to confirm the selection.
cal	Press to enter the calibration mode.	**setup**	Press to enter the setup mode.
store ▲	*In the measurement screen:* Press to store the data on the screen in continuous read mode and with data logging on. *In the setup screen:* Press to scroll up in the list of options.	▼ **recall**	*In the measurement screen:* Press to see the stored data. *In the setup screen:* Press to scroll down in the list of options.

Meter Maintenance

For routine meter maintenance, dust and wipe the meter with a damp cloth. If necessary, warm water or a mild water-based detergent can be used. Meter maintenance can be performed on a daily, weekly or monthly basis, as required by the environment in which the meter is operated. Immediately remove any spilled substance from the meter using the proper cleaning procedure for the type of spill.

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Thermo Scientific Orion Star A111 Benchtop and Star A121 Portable pH Meters

Chapter 3   Meter Setup

Pressing (setup) will take you to the setup menu.

Navigating the Setup Menu

A complete chart showing the main setup levels and submenus is shown after these steps.

1. In the setup menu, press **store** ▲ or ▼ **recall** until the desired main setup level is shown on the top line.

2. Press (**mode** (**enter**)) to enter into the submenu options.

3. For main setup options with more than one submenu:

   1.0 Configuration

   3.0 Temperature Settings

   6.0 Calibration Data

   a.   Press **store** ▲ or ▼ **recall** until the desired submenu is shown.

   b.   Press (**mode** (**enter**)) to enter into the submenu.

   c.   Press **store** ▲ or ▼ **recall** until the desired option is shown.

   d.   Press (**mode** (**enter**)) to save your selection.

   For main setup options with one submenu:

   2.0 General Meter Setup

   4.0 Read Type

   5.0 Datalog Clear

   7.0 Factory Reset

   a.   Press **store** ▲ or ▼ **recall** until the desired option is shown.

   b.   Press (**mode** (**enter**)) to save your selection.

4. Press (**measure** (**esc**)) to exit the setup menu and return to measurement mode.

Setup Menu Level	Secondary Display	Primary Display	Description	Information
Main	1.0	CONF	Configuration	Select measurement resolution and buffer set
Submenu	RES	0.1, 0.01	Measurement Resolution	0.01 is the default.
Submenu	CAL	AUTO, MAN	To select AUTO or MANUAL calibration	Note: If CAL AUTO is selected, then go to BUF submenu.
Submenu	BUF	USA, DIN	Buffer Set for Automatic pH Buffer Recognition	USA buffers are: 1.68, 4.01, 7.00, 10.01 & 12.46. DIN buffers are 1.68, 4.01, 6.86 & 9.18. USA buffers are the default.
Main	2.0	GEN	General Meter Setup	Automatic meter shut-off
Submenu	AUTO	ON, OFF	Automatic Meter Shut-Off	To save battery life, the meter will turn off after 15 minutes without any key presses. On is the default setting.
Main	3.0	TEMP	Temperature Settings	Select temperature units and the temperature used for manual temperature compensation
Submenu	UNIT	DEGC, DEGF	Temperature Unit	The default setting is for temperature readout to be displayed in °C.
Submenu	DEGC or DEGF	-5.0 to 105.0	Manual Temperature Compensation Value	This value is used when there is no ATC probe connected, and can be set with the meter's temperature ranges. The temperature unit for this value will match the temperature unit already selected. The default setting is 25.0°C.
Submenu	READ	AUTO, CONT	AUTO is for AUTO-READ. CONT is for continuous read.	In AUTO-READ mode, the meter will display the measurement as it stabilizes and lock and hold the measurement when it is stable. Press (measure (esc)) to take a new measurement. In Continuous read mode, the meter will continuously measure and update the display. The unit of measure will flash. When the reading has been stable, "READY" will stop flashing. The default setting is AUTO-READ.
Main	5.0	LOG	Datalog Clear	
Submenu	DATA	ON, OFF	To enable data storage	The default is off.
Submenu	DEL	NO, LAST, ALL	Clears any stored readings in the datalog.	The default is no. "NO" does not delete any readings. "LAST" deletes only the last reading. "ALL" deletes all of the logged data.
Main	6.0	CAL	Calibration Data	Allows for review and clearing of saved data.
Submenu	SLP.1, SLP.2, SLP.A	80.0 to 120.0	Slope Information	This is the slope data from the last calibration. SLP.2 and SLP.A (average slope) will only show if 3 points are calibrated. Press ▲ store and ▼ recall to scroll between them.

Setup Menu Level	Secondary Display	Primary Display	Description	Information
Submenu	BUF.1, BUF.2, BUF.3	Varies according to buffers used.	Calibrated pH Buffer Values	Shows the buffer values used in the last calibration. Press the **store** ▲ and ▼ **recall** arrows to scroll between them. **Note:** *It will only show the values used. For example, if there was only one calibrated value, BUF.2 and BUF.3 will not show.*
Submenu	CLR	NO, YES	Clears the calibration data.	The default is no.
Main	7.0	RST	Factory Reset	
Submenu	RST	NO, YES	Returns all meter settings to the factory defaults and deletes all stored data (calibration and datalog).	The default is no. Before selecting yes, please make sure any data that you would like to keep has been recorded.

Setup Examples

Automatic pH Buffer Recognition Selection

1. In pH measurement mode, press (**setup**).

2. Press (**mode (enter)**) twice.

3. Press **▲ store** to select automatic buffer recognition (AUTO) or manual calibration (MAN).

4. If automatic buffer recognition was chosen, press (**mode (enter)**). Press **▲ store** to select USA or DIN buffer set for automatic buffer recognition.

5. Press (**mode (enter)**) to save configuration and (**measure (esc)**) to return measurement mode.

Read Type Selection

1. In measurement mode, press (**setup**).

2. Press **▲ store** in setup until "4.0" is shown on the top line and "READ" is shown on the lower line. Press (**mode (enter)**).

3. Press **▲ store** or **▼ recall** to select the measurement mode:

   CONT = Continuous

   AUTO = AUTO-READ™

4. Press (**mode (enter)**) to save selection. Press the (**measure (esc)**) key to return to measurement mode.

   Note: *In AUTO-READ mode, the meter will display the measurement as it stabilizes and lock and hold the measurement when it is stable. AR and unit of measure will blink until the reading is stable. When the reading is stable it is held on the screen and AR is lit. Press* (**measure (esc)**) *to take a new measurement.*

   In Continuous read mode, the meter will continuously measure and update the display. The unit of measure will flash. When the reading is stable, "READY" will appear. This read type is useful when performing an experiment that requires continuous measurements to be taken, regardless of the measurement stability.

Reviewing pH Calibration Slope Data

1. In pH measurement mode, press (**setup**). Press **▲ store** five times so that "6.0" is on the top, secondary display and "CAL" is on the larger, primary display.

2. Press (**mode (enter)**) to view slope. If a 3-point calibration was done, press **▲ store** to view the second slope segment, and **▲ store** again to display the average slope (SLP.A).

3. Press (**measure (esc)**) to return to measurement mode.

Chapter 4   Calibration and Measurement

pH Calibration and Measurement

pH Calibration

1. Press (**mode (enter)**) to display pH for pH measurement mode.

2. Select fresh pH buffers. If calibrating more than one point (highly recommended), select pH buffers that bracket the expected sample pH and are at least one pH unit apart.

3. Press (**cal**) . Rinse the electrode (and ATC probe, if separate) with distilled water, blot dry and place into the buffer.

4. Wait for "READY" to appear.

   a. With automatic buffer recognition (default, AUTO CAL appears at the top of the display): to calibrate additional points, repeat steps 3 and 4a.

   b. With manual calibration (MAN CAL appears at the top of the display): press **store** ▲ or ▼ **recall** to set value. To calibrate additional points repeats steps 3 and 4b.

5. When finished, press (**mode (enter)**) to save and end calibration.

   a. For one-point calibration, press **store** ▲ or ▼ **recall** to edit the slope and press the enter key to save and return to measurement mode.

   b. For two- or three-point calibration, the slope will be displayed and the meter will automatically proceed to measurement mode.

pH Measurement

1. Prepare the pH electrode according to the electrode instructions. Press (**mode (enter)**) to display pH for pH measurement mode.

2. Rinse the electrode (and ATC probe, if separate) with distilled water, blot dry and place into the sample.

3. If the meter is in AUTO-READ mode (meter default) press (**measure (esc)**). If the meter is in continuous read mode, the meter will immediately start taking readings. Record the pH and temperature of the sample when "READY" is displayed and "pH" stops blinking.

   Note: *If in AUTO-READ mode and memory storage is enabled, the reading will automatically be stored when the "AR" appears. If in continuous read mode and memory storage is enabled, press* **store** ▲ *to store into the meter's memory.*

4. Remove the electrode (and ATC probe, if separate) from the sample, rinse with distilled water, and blot dry. To continue taking measurements , place electrode (and ATC probe, if separate) into the next sample and repeat steps 3 and 4.

5. When finished measuring all samples, store electrode according to electrode instructions.

mV Measurement and RmV & ORP Calibration and Measurement

mV Measurement

1. In the measurement mode, press **(mode (enter))** to display mV.

2. Rinse the electrode (and ATC probe, if separate) with distilled water, blot dry and place into the sample.

3. If the meter is is AUTO-READ mode (meter default), press **(measure (esc))**.
   If the meter is in continuous read mode, the meter will immediately start taking readings.
   Record the mV reading and temperature of the sample when "READY" is displayed and "mV" stops blinking.

   Note: If in AUTO-READ mode and memory storage is enabled, the reading will automatically be stored when the "AR" icon appears. If in continuous read mode and memory storage is enabled, press **store ▲** *to store the reading into the meter's memory.*

4. Remove the electrode (and ATC probe, if separate) from the sample, rinse with distilled water, blot dry. To continue taking measurements repeat steps 2 through 4.

5. When finished measuring all samples, store electrode according to electrode instructions.

RmV and ORP Calibration

1. In the measurement mode, press **(mode (enter))** to display RmV.

2. When the electrode(s) are ready, press **(cal)**. Rinse the electrode (and ATC probe, if separate) with distilled water, blot dry and place into the standard.

3. Wait for "READY" to stop flashing. Press **store ▲** or **▼ recall** keys to set the value.

4. When finished, press **(mode (enter))** to save and end calibration.

RmV and ORP Measurement

1. In the measurement mode, press **(mode (enter))** to display RmV.

2. Rinse the electrode (and ATC probe, if separate) with distilled water, blot dry and place into the sample. If the meter is is AUTO-READ mode (meter default), press **(measure (esc))**. If the meter is in continuous read mode, the meter will immediately start taking readings.

3. Record the RmV reading and temperature of the sample when "READY" is displayed and "RmV" stops.
   Note: If in AUTO-READ mode and memory storage is enabled, the reading will automatically be stored when the "AR" icon appears. If in continuous read mode and memory storage is enabled, press **store ▲** *to store the reading into the meter's memory.*

3. Remove the electrode (and ATC probe, if separate) from the sample, rinse with distilled water, blot dry. To continue taking measurements repeat steps 2 through 4.

4. When finished measuring all samples, store electrode according to electrode instructions.

Thermo Scientific Orion Star A111 Benchtop and Star A121 Portable pH Meters

Temperature Measurement and Calibration

Temperature Measurement

The meter ATC temperature display is automatically shown for at the top, secondary display on the meter. To read only temperature and see the temperature on the primary, lower display, follow the instructions below.

1. In the measurement mode, press (mode)(enter) to display the temperature value on the primary display. (The temperature value at the top of the meter will match that of the lower, larger display field.)

2. Rinse the ATC probe with distilled water, blot dry and place into the sample. If the meter is is AUTO-READ mode (meter default), press (measure)(esc). If the meter is in continuous read mode, the meter will immediately start taking readings.

3. Record the temperature of the sample when "READY" stops .

    Note: *If in AUTO-READ mode and memory storage is enabled, the reading will automatically be stored when the "AR" icon appears. If in continuous read mode and memory storage is enabled, press* **store** ▲ *to store the reading into the meter's memory.*

4. Remove the ATC probe from the sample, rinse with distilled water, blot dry. To continue taking measurements repeat steps 2 through 4.

5. When finished measuring all samples, store electrode according to electrode instructions.

Temperature Calibration

The meter ATC temperature display has a relative accuracy of ± 0.1 °C. ATC probes have varying temperature accuracies, usually ± 0.5 °C to ± 2 °C. Use this function only if it is necessary to calibrate the temperature readings. Since the temperature offset calculated during the calibration is applied to all future temperature measurements, recalibrate if a different ATC probe is used.

1. In the (measure)(esc), press (mode)(enter) to display the temperature reading.

2. When the ATC probe is ready, press (cal) Rinse the ATC probe and NIST-traceable thermometers with distilled water, blot dry and place into a solution with a known, stable temperature. It is recommended that two NIST-traceable thermometers be used to measure and verify the temperature of the solution.

3. Wait for the readings to stabilize (about 5 to 10 minutes) and "READY" to stop flashing. The meter will display the original temperature read by the ATC probe. Press **store** ▲ or ▼ **recall** keys to enter the temperature value read by the thermometer.

    Note: *The calculated offset will be applied to all future temperature readings. To abort, press* (measure)(esc) *to end without saving and return to the measurement mode.*

4. When finished, press (mode)(enter) to save and end calibration.

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Thermo Scientific Orion Star A111 Benchtop and Star A121 Portable pH Meters

Chapter 5   Data Storage and Review

Orion Star A111 benchtop pH and Star A121 portable pH meters have a 50 point datalog.

Manual Datalog with Continuous Read Mode

1. In measurement mode, press (**setup**) .

2. Press **store** ▲ three times until "4.0" is shown on the top line and "READ" is shown on the lower line. Press (**mode (enter)**) .

3. Press **store** ▲ or ▼ **recall** key to show "CONT" on the second line. Press (**mode (enter)**) to save selection.

4. Press **store** ▲ to show "5.0" on the top line and "LOG" on the lower line. Press (**mode (enter)**) .

5. Press **store** ▲ to show "ON" on the second line. Press (**mode (enter)**) to save selection.

6. Press (**measure (esc)**) to return to measurement mode.

7. In the measurement mode, press **store** ▲ to store the reading into the meter's memory.

Automatic Datalog with AUTO-READ™ Mode

1. In measurement mode, press (**setup**) .

2. Press **store** ▲ three times until "4.0" is shown on the top line and "READ" is shown on the lower line. Press (**mode (enter)**) .

3. Press **store** ▲ or ▼ **recall** to show "AUTO" on the second line. Press (**mode (enter)**) to save selection.

4. Press **store** ▲ to show "5.0" on the top line and "LOG" on the lower line. Press (**mode (enter)**) .

5. Press **store** ▲ to show "ON" on the second line. Press (**mode (enter)**) to save selection.

6. Press (**measure (esc)**) to return to measurement mode. Each time the reading is locked onto the screen with the "AR" icon. The reading will automatically be stored in the datalog.

Viewing the Data from the Last Calibration

1. In measurement mode, press (setup).

2. Press **store** ▲ until "6.0" is shown on the top, secondary display and "CAL" is shown on the larger, primary display.

   a. To view the slope, press (mode (enter)). SLP.1 will be on the top, secondary display. The slope percentage will be on the larger, primary display. If a 3-point calibration was done, press **store** ▲ to view the second slope segment (SLP.2), and **store** ▲ again to display the average slope (SLP.A).

   b. To view the calibration points press (mode (enter)) and then, press **store** ▲ or ▼ **recall** until BUF1, BUF2 or BUF3 is shown at the top of the display. The corresponding buffer value will be shown in the lower, primary display.

   Note: *It will only show the values used. For example, if there was only one calibrated value, BUF2 and BUF3 will not show.*

3. Press (measure (esc)) to exit the setup menu and return to measurement mode.

Viewing Stored Readings (the Data Log)

1. In measurement mode, press ▼ **recall**.

2. Press **store** ▲ or ▼ **recall** to scroll through the memory points.

3. Press (mode (enter)) to review the reading stored at that point.

Chapter 6   Customer Services

Meter Error Codes

Display	Reason	Solution
BUF ERR	No buffer found during automatic buffer calibration	The buffer is not recognized or a recognized value for the automatic buffer calibration. Verify that the buffers you are using are the fresh and recognized values (see Appendix for the listing). Remove the electrode (and ATC probe if separate) from the solution, rinse and press (mode/enter) to re-scan for the buffer standards or press (measure/esc) to escape without saving and return to the measurement mode.
CAL ERR	The same buffer is calibrated twice	The millivolts measured during calibration are the same for two buffers. Review the calibration procedure and verify that the electrode was placed in the correct buffers at the appropriate time. Clean the electrode according to the electrode user guide. Re-calibrate the electrode with fresh buffers.
SLP ERR	Calibration slope error	Clean the electrode according to the electrode user guide. Re-calibrate the electrode with new buffers.
STO FULL Press Esc to exit	Memory is full	The meter will automatically change to the submenu to clear the datalog ("CLR" on the top line, "NO" on the second). If the existing memory's data is still needed: 1. Press (measure/esc) to return to the measurement mode and ▼ recall. Record the memory's data. 2. In measurement mode, press (setup) and then ▲ **store** 4 times. ("5.0" appears on the top line.) 3. Press (mode/enter). Press ▲ **store** to delete the last reading or press ▲ **store** to delete all readings. 4. Press (mode/enter) to save the change and delete the data accordingly. If the existing memory's data can be deleted: 1. Press (mode/enter) change to "YES". 2. Press ▲ **store** to clear the datalog.

Troubleshooting Guide

Problem: The display freezes and the measurement values will not change.

Solution: The meter is in the AUTO-READ measurement mode (the AR icon appears solid on the left of the display). Press (measure (esc)) to start a new reading or select continuous read mode to have readings update constantly.

Problem: How do I abort a calibration?

Solution: Press (measure (esc)) abort any meter operation and return to the measurement mode.

Problem: The meter does not recognize the pH buffer value during calibration.

Solution: Verify that the correct buffer set was selected in the setup menu. The meter uses the raw mV reading of the electrode to recognize a buffer during calibration. As the electrode ages or becomes dirty, its mV readings will drift and you will need to manually enter the pH buffer value when calibrating.

Assistance

After troubleshooting all components of your measurement system, contact Technical Support. Within the United States call 1.800.225.1480 and outside the United States call 978.232.6000 or fax 978.232.6031. In Europe, the Middle East and Africa, contact your local authorized dealer. For the most current contact information, or the latest application and technical resources for Thermo Scientific Orion products, visit www.thermoscientific.com/water.

Warranty and Registration

To register your new meter and for the most current warranty information, visit www.thermoscientific.com/water.

WEEE Compliance

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the symbol above.

Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State and this product should be disposed of or recycled through them. Further information on compliance with these directives, the recyclers in your country, and information on Thermo Scientific Orion products that may assist the detection of substances subject to the RoHS Directive are available at www.thermoscientific.com.

Declaration of Conformity

Manufacturer: **Thermo Fisher Scientific Inc.**

Address: Ayer Rajah Crescent
Blk 55 #04-16/24
Singapore 139949
Singapore

Hereby declares that the following products:

Benchtop meters are rated 100 to 240 VAC, 50/60 Hz, 0.5A.
Handheld meters use four non-rechargeable AA batteries.

Benchtop Meters	**Portable Meters**
Orion Star A111 pH	Orion Star A121 pH
Orion Star A112 Conductivity	Orion Star A122 Conductivity
Orion Star A113 DO	Orion Star A123 DO

Equipment Class:

Measurement, control and laboratory
Orion Star A-series meters are EMC Class A

Conforms with the following directives and standards:

EN61326-1:2006 **Electromagnetic Compatibility (EMC Directive)**
Electrical equipment for measurement,
control and laboratory use - EMC requirements

EN61010-1:2001 **Safety Standards**
UL61010-1:2004 Safety requirements for electrical equipment for measurement,
CAN/CSA C22.2 No. 61010-1-04 control and laboratory use - general requirements

Cheow Kwang Chan
QA/Regulatory Manager

Place and Date of Issue:
June 15, 2011
Singapore

Meter Specifications

Meter Operating Conditions	
Operating Ambient Temperature	5 to 45 °C
Operating Relative Humidity	5 to 85 %, non-condensing
Storage Temperature	-20 to +60 °C
Storage Relative Humidity	5 to 85 %, non-condensing
Pollution	Degree 2
Overvoltage	Category II
Weight	Portable: 450g Benchtop: 850g
Size	Portable: 5.9cm (H) x 10.5cm (W) x 23.1cm (D) Benchtop: 9.3cm (H) x 18.0cm (W) x 23.6cm (D)
Regulatory and Safety	CE, TUV 3-1, FCC Class A
Power Rating	DC Input: 9 VDC 1A Battery: 4 x AA
Shock and Vibration	Vibration, shipping/handling per ISTA #1A Shock, drop test in packaging per ISTA #1A
Enclosure (designed to meet)	Portable: IP67 Benchtop: IP54

Universal Power Adapter Operating Conditions	
Operating Ambient Temperature	0 to 50 °C
Operating Relative Humidity	0 to 90 %, non-condensing
Storage Temperature	-20 to +75 °C
Storage Relative Humidity	0 to 90 %, non-condensing
Pollution	Degree 2
Overvoltage	Category II

Meter Parameter Specifications	
pH	
Range	-2.00 to 16.00
Resolution	0.1, 0.01
Relative Accuracy	±0.01
Calibration Points	up to 3
mV/RmV	
Range	mV:±1600.0 mV ; RmV: ±1999.9 mV
Resolution	0.1
Relative Accuracy	±0.2 mV or ±0.05 % of reading whichever is greater
Temperature	
Range	-5 to 105°C
Resolution	0.1
Relative Accuracy	±0.1
Offset Calibration	1 point

Thermo Scientific Orion Star A111 Benchtop and Star A121 Portable pH Meters

Ordering Information

Benchtop meters include electrode arm. Kits contain meter, probe and appropriate calibration and fill solutions.

CML #	Description
STARA1110	Orion STAR A111 Benchtop pH Meter
STARA1115	Orion STAR A111 Benchtop pH Meter Kit
STARA1120	Orion STAR A112 Benchtop Conductivity Meter
STARA1125	Orion STAR A112 Benchtop Conductivity Meter Kit
STARA1130	Orion STAR A113 Benchtop Dissolved Oxygen Meter
STARA1135	Orion STAR A113 Benchtop Dissolved Oxygen Meter Kit
STARA1210	Orion STAR A121 Portable pH Meter
STARA1215	Orion STAR A121 Portable pH Meter Kit
STARA1220	Orion STAR A122 Portable Conductivity Meter
STARA1225	Orion STAR A122 Portable Conductivity Meter Kit
STARA1230	Orion STAR A123 Portable Dissolved Oxygen Meter
STARA1235	Orion STAR A123 Portable Dissolved Oxygen Meter Kit
STARA-BEA	Benchtop electrode arm for Orion Star A-series meters
STARA-HB	Freestanding Base for use with Orion Star A-series benchtop electrode arm
STARA-CS	Hard Carrying Case for Orion Star A-series Portable Meters
STARA-AR	Armor for Orion Star A-series Portable Meters, includes electrode holders for pH, conductivity and DO probes
STARA-ESPH	pH Electrode Holder for Orion Star A-series Armor
STARA-ESCD	Conductivity and DO Probe Holder for Orion Star A-series Armor
9157BNMD	Orion Triode 3-in-1 pH/ATC Probe, Refillable, epoxy body
9107BNMD	Orion Triode 3-in-1 pH/ATC Probe, Gel-filled, epoxy body
011050MD	Orion 2-Electrode Conductivity Cell, K=1.0
083005MD	Orion Polarographic DO probe , 1.5m cable

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Thermo Scientific Orion Star A111 Benchtop and Star A121 Portable pH Meters

Chapter 7   Appendix

Automatic pH Buffer Recognition Feature

The Orion Star A111 benchtop pH and Star A121 portable pH meters are capable of automatically recognizing pH 1.68, 4.01, 7.00, 10.01 and 12.46 buffers or pH 1.68, 4.01, 6.86, and 9.18 buffers during a pH calibration, depending on the pH buffer set that is selected in the setup menu. During a calibration, the meter uses the selected buffer set and the raw mV reading of the pH electrode in the buffer to recognize and display the buffer value at the measured temperature. The raw mV reading of the pH electrode in the buffer must be about ± 60 mV from the theoretical mV reading of the buffer in order for the meter to automatically recognize the buffer.

USA pH Buffer Set	
Buffer	**mV Range**
1.68	+255 to +375
4.01	+117 to +237
7.00	-60 to +60
10.01	-237 to -117
12.46	-383 to -263

DIN pH Buffer Set	
Buffer	**mV Range**
1.68	+255 to +375
4.01	+117 to +237
6.86	-52 to +68
9.18	-189 to -69

Electrode Condition Icon

The electrode condition icon indicates the performance of the pH electrode, based on the last saved calibration and electrode measurement stability.

Icon	Definition of Icon
	Electrode condition is good and the electrode slope is 95 to 105 %.
	Electrode condition is fair and the electrode slope is 85 to 115 %.
Blinking	Electrode condition is bad and the electrode slope is less than 85 % or greater than 115 %. Consult the electrode user guide for instructions on how to clean, condition and troubleshoot the electrode.

Notes

Thermo Scientific Orion Star A111 Benchtop and Star A121 Portable pH Meters

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