English

pH/ISE/ COND/ RDO/DO

Thermo Scientific Orion Star A329 Portable pH/ISE/Conductivity/RDO/DO Meter

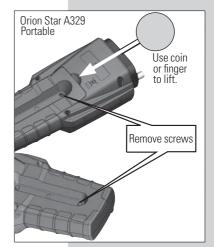
Instruction Sheet

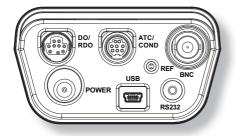
Preparation

Power Source

- 1. Power adapter (sold separately)
 - a. Select the appropriate wall socket plug plate.
 - b Slide off the clear plastic cover from the plug plate.
 - c. Slide the plug plate into the groove on the back of the power adapter.
 - d. Connect the power adapter to the meter and power outlet.
- 2. Batteries (included with meter)
 - a. Select four AA alkaline batteries.
 - b. Confirm that the meter is powered off.
 - c. Remove the battery compartment cover loosen the screws holding the battery cover, release the top portion of the battery cover from the meter (use a coin or your finger) and release the bottom portion of the battery cover.
 - d. Orientate the batteries as shown in the battery compartment housing and insert batteries.
 - e. Replace the battery compartment cover and screws.

Electrodes and Other Connections





- Prepare the pH electrode, ion selective electrode (ISE), conductivity cell, RDO optical dissolved oxygen probe, polarographic dissolved oxygen probe and any other applicable electrodes according to the directions in the electrode user guide.
- Connect the appropriate items as labeled on the meter and as shown in the figure above:

For additional information on meter setup and operation, refer to the reference guide. The reference guide is on the included CD and available at www.thermoscientific.com/water.



	able pH/ISE/Conductivity/RD0/D0 Meters	Image:					
isplay Informa Display Icon	ation Description	- 25.0 °C 7.000					
	Shown when the meter is running on AC power.	ATC 25.0 °C 1413 μ8					
	Shown when the meter has batteries installed.	DO ready 🕰					
	Indicates data is being sent to a computer or printer.	25.0 °F 98.5 %					
	Indicates data is being sent to the data log.	cal sample ID chann					
<u> </u>	Shown when an alarm is set and the alarm value is reached.	ed.					
(******) R 5232	Indicates the meter is set to be interfaced with a printer or computer via the RS232 port.						
R5232	Indicates the meter is set to be interfaced with a printer or computer via the USB port.						
07/09/11 09:15	Displays the time and date entered in the setup menu.						
25.0 °C	Displays the current temperature based on the temperature probe reading or entered temperature value. Shows the origin of the temperature as MAN (entered temperature) or ATC (temperature probe).						
HOLD	Shown when $\underbrace{\operatorname{hot}}_{\operatorname{hot}}$ is pressed and the displayed measurement is frozen.						
Ľ	Indicates a calibration was successfully completed.						
ſL.	Indicates the pH or ion selective electrode condition as good (two bars), fair (one bar) or bad (slash through it), based on the last saved calibration and measurement stability.						
M 100	Indicates a method is in use and the number of the method being used.						
pH	Indicates the type of measurement and determines the type of	f calibration that will be performed.					
ready	Specifies the stability of the electrode as stabilizing or read	у					
AR	Shown when the meter is in AUTO-READ mode. The AB icon will blink while the reading is stabilizing and stop blinking when the reading is stable and the measurement is locked on the display.						
7.000 pH		Displays the measurement value based on the last saved calibration and current electrode reading.					
0.0mV	Shows the raw millivolt reading of the electrode. pH and ISE	modes only.					
BUFFERS: 1.68,	Shows the buffer values used for the last saved calibration. pH mode only .						
STANDARDS: 0.10 1.0 10	Shows the standard values used for the last saved calibration	Shows the standard values used for the last saved calibration. ISE mode only.					
Cell Constant : 0.4750	Shows the cell constant in use from last saved calibration. Conductivity/TDS/Salinity/Resistivity modes only.						
Auto Baro Press : 757.3	Shows the barometric pressure measured by the meter (Auto) or enter dissolved oxygen measurements. RDO/DO modes only.	red by operator (Man.) and used to correct					
Salt: 0.0	Displays the salinity correction factor used to correct dissolved oxygen	measurements. RDO/DO modes only.					
	Shows the operator assigned sample ID number.						
(†) XXXXXXX	Shows the operator assigned user ID number.						
cal	Displays the action that will be performed when f1 is pressed						
sample ID	Displays the action that will be performed when f2 is pressed.						

Displays the action that will be performed when f3 is pressed.

channel

Keypad Display Information

f1 f2 f3	Press the f1, f2 and f3 function keys to perform the action shown above each key on the display.
	Press to turn the meter on.
	When the meter is on, press and quickly release to turn the display backlight on or off or hold down to turn the meter off.
	In the measurement mode, press to take a measurement.
measure (ssc)	In the setup, calibration and other menus, press to escape the current menu and return to the measurement mode.
setup	In the measurement mode, press to enter the setup menu.
	In the setup, calibration and other menus, press to scroll up through a list of options.
hold	In the continuous measurement mode, press to freeze the displayed measurement and press again to unfreeze the measurement.
	In the setup, calibration and other menus, press to scroll left through a list of options.
mode	In the single channel measurement modes, press to change the displayed measurement mode. Options for channel 1 are pH, mV, RmV (relative mV), ORP and ISE. Options for channel 2 are Cond (conductivity), TDS, Salinity and Res (resistivity). Options for channel 3 are %sat (dissolved oxygen in percent saturation), mg/L (dissolved oxygen in milligrams per liter) or °C (probe membrane temperature).
	In the setup, calibration and other menus, press to scroll right through a list of options.
log/print	In the measurement mode, press to log or print a measurement. In the setup, calibration and other menus, press to scroll down through a list of options.

Keypad

- 1. Press (b) to power the meter on. When the meter is on, press and quickly release (b) to turn the backlight on or off or press and hold (c) for about three seconds to power the meter off.
- 2. Press 🔁 to exit any meter function and return to the measurement mode.
- 3. The *f1, f2,* and *f3* function keys perform a variety of meter operations. The menu-specific operation is shown above each key. For example, press *f1* in the measurement mode to start a calibration.
- 4. The (m), (m), (m), (m) or (m) keys are used as navigation keys (up, right, down, left) when selecting from a fixed list or grid of meter options. In the measurement mode, these keys are used to access the setup menu, change the measurement mode, manually log or print a measurement and hold (freeze) a displayed measurement.

pH and ISE Calibration

One to five pH buffers can be used for calibration. Always use fresh pH buffers and select buffers that bracket the sample pH and are one to four pH units apart. Prepare the pH electrode according to the instructions in the electrode use guide. Connect the pH electrode and any other electrodes to be used (ATC probe, reference electrode) to the meter. Power on the meter and set the measurement mode to pH.

One to five standards can be used for ISE calibration. If more than one standard is used to calibration, start with the lowest concentration standard and work up to the highest concentration standard last. Always use fresh standards. Select standards that bracket the sample concentration and are a decade apart in concentration. Prepare the ion selective electrode according to the instructions in the electrode use guide. Connect the ISE and any other electrodes to be used (ATC probe, reference electrode) to the meter. Power on the meter and set the measurement mode to ISE.

- 1. In the measurement mode, press *f1 (cal)*. Press () or () to highlight *pH-Channel* and press *f2 (select)*.
- 2. Rinse the pH or ion selective electrode and any other electrodes in use with distilled water, blot dry with a lint-free tissue and place into the pH buffer or ISE standard.
- 3. When the electrode and buffer or standard are ready, press f3 (start).
- 4. Wait for the pH or concentration value on the meter to stabilize and stop flashing and perform one of the following actions:
 - a. Press f2 (accept) to accept the displayed value.
 - b. Press f3 (edit) to access the numeric entry screen and edit the value.

 - ii. Press f2 (done) to exit the numeric entry screen.
 - iii. Press f2 (accept) to accept the entered value.
- Press *f2 (next)* to proceed to the next buffer or standard and repeat steps 2 through 4 or press *f3 (cal done)* to save and end the calibration. If five buffers or standards are used, the calibration will save and end once the fifth value is accepted.
 - a. If a one point calibration is performed, press *f2 (accept)* to accept the displayed slope value or press *f3 (edit)* to access the numeric entry screen, enter the slope value and press *f2 (accept)*.
- 6. The meter will display the calibration summary including the average slope. Press *f1 (meas)* to export the data to the calibration log or press *f2 (print)* to export the data to the calibration log and a printer or computer. The meter will automatically proceed to the measurement mode.

Conductivity Calibration

One to five conductivity standards can be used for calibration. Always use fresh standards and select standards that are near the sample conductivity. Prepare the conductivity cell according to the instructions in the conductivity cell use guide. Connect the conductivity cell and any other electrodes to be used to the meter. Power on the meter and set the measurement mode to conductivity.

Note: For an automatic calibration, the nominal cell constant of the conductivity cell must be entered in the setup menu before the calibration is performed and Thermo Scientific Orion 100 μ S/cm, 1413 μ S/cm and/or 12.9 mS/cm conductivity standards must be used.

Automatic and Direct Calibration

- 1. In the measurement mode, press **f1 (cal)**. Press **()** or **()** to highlight **Conductivity-Channel** and press **f2 (select)**.
- 2. Rinse the conductivity cell and any other electrodes in use with distilled water, blot dry with a lint-free tissue and place into the standard.
- 3. When the conductivity cell and standard are ready, press f3 (start).
- 4. Wait for the conductivity value on the meter to stabilize and stop flashing and perform one of the following actions:
 - a. Press f2 (accept) to accept the displayed conductivity value.
 - b. Press f3 (edit) to access the numeric entry screen and edit the conductivity standard value.
 - i. Press (Mark), (Mark), (Mark) or (Mark) to highlight a number or decimal point, press **f3 (enter)** to select the highlighted item and repeat until the standard value at the measured temperature is shown.
 - ii. Press f2 (done) to exit the numeric entry screen.
 - iii. Press f2 (accept) to accept the entered conductivity value.
- Press *f2 (next)* to proceed to the next standard and repeat steps 2 through 4 or press *f3 (cal done)* to save and end the calibration. If five standards are used, the calibration will save and end once the fifth conductivity standard value is accepted.
- The meter will display the calibration summary including the average calculated cell constant. Press *f1 (meas)* to export the data to the calibration log or press *f2 (print)* to export the data to the calibration log
 and a printer or computer. The meter will automatically proceed to the measurement mode.

RDO/DO Calibration

Polarographic DO probes only - A polarographic DO probe must be polarized. The probe is continuously polarized when it is connected to the meter. If the probe is not connected to the meter: connect the probe to the meter, connect the meter to a power source and wait 30 to 60 minutes for polarization.

The Orion Star A329 meter can perform a calibration using water-saturated air (*Air*), air-saturated water (*Water*), Winkler titration (*Manual*) or zero point calibration (*Set Zero*). See the reference guide for detailed instructions for each calibration.

Air Calibration

- 1. In the measurement mode, press **f1 (cal)**. Press or to highlight **D0-Channel** and press **f2 (select)**.
- 2. Press () or () to highlight *Air* and press *f3 (select)*.
- 3. Rinse the RDO optical DO probe or polarographic DO probe with distilled water, blot dry with a lint-free tissue and place into the prepared calibration sleeve or BOD bottle. Allow the probe and water-saturated air to reach equilibrium.
- 4. When the probe and water-saturated air are ready, press f3 (start).
- 5. Wait for the dissolved oxygen reading on the meter to stabilize and stop flashing. Once the reading is stable, the meter will display *Accepting Auto % Sat. Calibration* and *100.0* % if using an RDO optical DO probe or *102.3* % if using a polarographic DO probe.
- 6. Press *f3 (cal done)* to export the data to the calibration log or press *f2 (print)* to export the data to the calibration log and a printer or computer. The meter will proceed to the measurement mode.

Set Zero Calibration

A zero point calibration is performed in an oxygen-free solution. A zero point calibration is not generally required unless measurements will be taken below 10% saturation or 1 mg/L. Perform an air or water calibration before performing a zero point calibration.

- 1. In the measurement mode, press **f1 (cal)**. Press **()** or **()** to highlight **D0-Channel** and press **f2 (select)**.
- 2. Press or view to highlight *Set Zero* and press *f3 (select)*.
- 3. Rinse the RDO optical DO probe or polarographic DO probe and any other electrodes in use with distilled water, blot dry with a lint-free tissue and place into the prepared zero oxygen standard. Allow the probe and standard to reach equilibrium.
- 4. When the probe and zero oxygen standard are ready, press f3 (start).
- Wait for the dissolved oxygen reading on the meter to stabilize and stop flashing. Once the reading is stable, the meter will display *Accepting Auto % Sat. Calibration* and *0.00*.
- 6. Press *f3 (cal done)* to export the data to the calibration log or press *f2 (print)* to export the data to the calibration log and a printer or computer. The meter will proceed to the measurement mode.

Measurement

The Orion Star A329 meter is capable of showing three measurements simultaneously on the display. The first channel can be set to measure pH, mV, RmV (relative mV), ORP or ISE. The second channel can be set to measure Cond (conductivity), TDS, Salinity or Res (resistivity). The third channel can be set to measure D0 -%sat (dissolved oxygen in percent saturation), D0 - mg/L (dissolved oxygen in milligrams per liter) or D0 -°C (probe membrane temperature).

The meter can be set to display one, two or all three of these measurement channels, depending on the operator's needs. In the measurement mode, press **f3 (channel)** to scroll through a single measurement display of channel one, two or three; a dual measurement display of channel one and two, two and three or three and one; and a multi measurement display of channel one, two and three. To change the measurement mode of a channel, press **f3 (channel)** until the single measurement display of that channel is shown and then press **()** until the correct mode is shown.

Note: It is highly recommended that any unused channels not be shown on the meter display while taking measurements, since the meter waits for all displayed channels to stabilize before logging the measurement data.

Press while taking a measurement in the continuous measurement mode to freeze the display and press a second time to unfreeze the display and continue the measurement. Press while taking a measurement to manually export the measurement to the data log, if the data log is enabled in the setup menu.

- Rinse the pH electrode or ion selective electrode (ISE), conductivity cell, RDO optical dissolved oxygen probe or polarographic dissolved oxygen probe and any other electrodes in use with distilled water, blot dry with a lint-free tissue and place into the sample.
- 2. Start the measurement and wait for it to stabilize.
 - a. If the meter is in **AUTO-READ** mode (default setting), press to start the measurement. When the AB icon stops flashing, record the applicable measurement parameters and temperature of the sample. Press again to start a new measurement.
 - b. If the meter is in continuous mode, the meter will immediately start taking a measurement and update the display whenever the measurement changes. Wait for the display to show **ready** and record the applicable measurement parameters and temperature of the sample.
 - c. If the meter is in timed mode, the meter will log measurements at the preselected time interval, regardless of the measurement stability. The meter will update the display whenever the measurement changes, so the applicable measurement parameters and temperature of the sample can be recorded when the display shows **ready**.
- 3. Remove the electrodes from the sample, rinse with distilled water, blot dry and place into the next sample.
- 4. Repeat steps 2 and 3 for all samples.
- 5. When all samples have been measured, store the electrodes according to their user guides.

Read Type Selection

- 1. In the measurement mode, press (
- 2. Press (Marcov, (Marcov, Marcov, Marcov, Marcov, Press (Marcov, Marcov, Marc
- 3. Press (or (to highlight *Mode and Settings* and press *f3 (select)*.
- 4. Press () or () to highlight *Read Type* and press *f3 (select)*.
- 5. Press (▲) or (▼) to highlight *Auto, Continuous* or *Timed* and press *f3 (select)*.
 - a. If *Timed* is selected and the time interval needs to be changed highlight *Timed*; press () to highlight hours (HH), minutes (MM) or seconds (SS); press *f3 (edit)* to access the numeric entry screen; use the numeric entry screen to change the values and press *f1 (back)* when the time interval is correct.
- 6. Press (to return to the measurement mode.

Setup Menu

Navigating the Setup Menu

- 1. In the measurement mode, press (****) to enter the main setup menu.
- 2. Press (m), (m), (m) to scroll through the main setup menu options. Press **f3 (select)** to select a main setup menu option.
- 3. Press or we to scroll through setup submenu options. Press **f3 (select)** to select a setup submenu option.
- 4. Perform the appropriate actions to set the desired parameter in the setup submenus.
 - a. To select a value from a list of options, press or to highlight the desired value and press **f3** (select) to set the value.
 - b. To enter a numeric value, use the numeric entry screen.
 - i. Select the value to be entered by pressing *f3 (select)* or *f3 (edit)*. The numeric entry screen will popup on the display.

 - iii. Press *f2 (done)* to save the value and exit the numeric entry screen.
- 5. Press **f1 (back)** and then **(back)** to return to the measurement mode at any time.

pH Channel	COND Channel	DO Channel	Settings	Log View	Diagnostics
Method	Method	Method	Export Data Data Log Date / Time Language Key Press Beep Alarm Beep Contrast Auto Shut Off User ID Sample ID	Data Log Calibration Log	Meter Self Test Factory Reset About Meter
Mode & Settings	Mode & Settings	Mode & Settings			
Measure Mode Read Type Resolution Buffer Group (pH) Or Measure Unit (ISE) Stability Averaging Temp Comp (ISE only) Blank Correct (ISE only) Alarm Settings	Measure Mode Read Type Cell K Stability Averaging Ref Temp Temp Comp. Temp Coeff Alarm Settings Temperature Manual Temp Value	Measure Mode Measure Unit Resolution Read Type Baro Press Salinity Correct Stability Averaging Alarm Settings Temperature Manual Temp Value			
Temperature	Temperature Unit Temperature Unit Temperature Calibration Temperature Input	 Temperature Unit Temperature Calibration Temperature Input 			
Manual Temp Value Temperature Unit Temperature Calibration Temperature Input					

Setup Menu Overview

pH Buffer Group Selection

The selected buffer group allows for the automatic recognition of certain pH buffers during a pH calibration. The USA buffer group includes pH 1.68, 4.01, 7.00, 10.01 and 12.46 buffers and the DIN buffer group includes pH 1.68, 4.01, 6.86, and 9.18 buffers.

- 1. In the measurement mode, press
- 3. Press () or () to highlight *Mode and Settings* and press *f3 (select)*.
- 4. Press (****) or (*****) to highlight *Buffer Group* and press *f3 (select)*.
- 5. Press () or () keys to highlight *USA* or *DIN* and press *f3 (select)*.
- 6. Press to return to the measurement mode.

ISE Measurement Unit Selection

- 1. In the measurement mode, press (
- 3. Press (or (to highlight *Mode and Settings* and press *f3 (select)*.
- 4. Press () or () to highlight *Measure Unit* and press *f3 (select)*.
- 5. Press or which highlight ppm, M, mg/L, percentage (%), ppb or None and press **f3 (select)**.
- 6. Press to return to the measurement mode.

ISE Automatic Blank (Non-Linear) Correction Selection

The automatic blank correction feature uses an algorithm to compensate for the non-linearity of an ion selective electrode in low level standards and samples. The meter determines whether blank correction is the best measurement strategy by analyzing the electrode response during a calibration with at least three calibration points. The average slope displayed when using this feature may be outside the slope range specified in the electrode user guide due to the set of non-linear equations used to calculate the blank correction.

- 2. Press (K), (F), (K) or (K) to highlight *pH Channel* and press *f3 (select)*.
- 3. Press or to highlight *Mode and Settings* and press *f3 (select)*.
- 4. Press () or () to highlight *Blank Correct* and press *f3 (select)*.
- 5. Press () or () to highlight *Yes* or *No* and press *f3 (select)*.
- 6. Press to return to the measurement mode.

Conductivity Nominal Cell Constant Entry

The nominal cell constant value is used during an automatic conductivity calibration and allows the meter to determine which Thermo Scientific Orion conductivity standard is being used for the calibration.

- 1. In the measurement mode, press (
- 2. Press (***), (***), (***) or (***) to highlight *COND Channel* and press *f3 (select)*.
- 3. Press (****) or (*****) to highlight *Mode and Settings* and press **f3 (select)**.
- 4. Press (****) or (******) to highlight *Cell K* and press *f3 (select)*.
- 5. Press f3 (select) to access the numeric entry screen and enter the nominal cell constant of the conductivity cell.
 - a. Press (****), (****), (****) or (****) to highlight a number or decimal point, press **f3 (enter)** to select the highlighted item and repeat until the nominal cell constant value is shown.
 - b. Press f2 (done) to exit the numeric entry screen.
- 6. Press **f1 (back)** and then press **(T)** to return to the measurement mode.

Conductivity Reference Temperature Selection

The reference temperature is the temperature that all conductivity measurements will be reported at by the meter if temperature compensation is enabled.

- 1. In the measurement mode, press $\begin{pmatrix} setup \\ \blacktriangle \end{pmatrix}$
- 2. Press (****), (****), (****) or (****) to highlight *COND Channel* and press *f3 (select)*.
- 3. Press (****) or (****) to highlight *Mode and Settings* and press **f3 (select)**.
- 4. Press (▲) or (♥) to highlight *Ref Temp.* and press *f3 (select)*.
- 5. Press () or () to highlight 5 °C, 10 °C. 15 °C, 20 °C or 25 °C and press **f3 (select)**.
- 6. Press to return to the measurement mode.

Conductivity Temperature Compensation Selection

The temperature compensation can be turned off or set to Linear, nLFn (non-linear ultra pure non-degassed water), nLFu (non-linear ultra pure degassed water) or EP (temperature compensation off and warning is displayed if conductivity values are outside EP requirements for ultra pure water) and is used to report all conductivity measurements at the selected reference temperature.

- 1. In the measurement mode, press
- 3. Press (****) or (****) to highlight *Mode and Settings* and press **f3 (select)**.
- 4. Press (****) or (****) to highlight *Temp. Comp*. and press *f3 (select)*.
- 5. Press (***) or (***) to highlight *Off, Linear, nLFn, nLFu* or *EP* and press *f3 (select)*.
- 6. Press to return to the measurement mode.

DO Probe Type Selection

The Orion Star A329 meter accepts and automatically recognize Orion RDO optical dissolved oxygen probes and Orion polarographic dissolved oxygen probes. If a different probe is used or the probe type needs to be verified, perform the following steps.

- 1. In the measurement mode, press
- 3. Press or to highlight *Mode and Settings* and press *f3 (select)*.
- 4. Press () or () to highlight *Measure Mode* and press *f3 (select)*.
- 5. Press () or () to highlight *DO* (polarographic probe) or *RDO* (RDO optical probe) and press *f3 (select)*.
- 6. Press to return to the measurement mode.

Viewing the Calibration Log

- 1. In the measurement mode, press $\begin{pmatrix} setup \\ \blacktriangle \end{pmatrix}$.
- 2. Press (****)
- 3. Press (****) or (*****) to highlight *Calibration Log* and press *f2 (accept)*.
- 4. Press () or () to highlight *pH Channel, Conductivity Channel* or *DO Channel* and press f2 (select).
- 5. Press (****) or (*****) to highlight *pH*, *RmV*, *ORP* or *ISE* (pH Channel); *Conductivity, Resistivity, TDS*, or Salinity (Conductivity - Channel); DO or RDO (DO- Channel) and press f2 (select).
- 6. The meter will display a list of calibrations for the selected channel and calibration type. The list shows the sequential number of the calibration and the date and time it was saved (07/01/2011 12:45).
- 7. To view the calibration data, press (***) or (***) to highlight a specific calibration and press **f2 (select)**. Press f2 (print) to print the calibration, press f3 (info) to view the electrode slope between pH buffer or ISE standard points (pH - Channel only) or press **f1 (back)** to return to the list of calibrations.
- 8. Press **(** to return to the measurement mode.

Viewing the Data Log

- 1. In the measurement mode, press $\begin{pmatrix} setup \\ \blacktriangle \end{pmatrix}$
- 2. Press (A), (P), (P), (P) or (P) to highlight *View Log* and press *f3 (select)*.
- 3. Press () or () to highlight *Data Log* and press (*accept*).
- 4. Press () or () to highlight *pH Channel, Conductivity Channel* or *DO Channel* and press f2 (select).
- 5. The meter will display a list of the data points. The list shows the sequential number of the data point and the date and time the data point was saved (07/01/2011 12:45).
- 6. To view the measurement information for an individual data point, press (***) or (****) to highlight the data point and press f2 (select). Press f2 (print) to print the data point or press f1 (back) to return to the list of data points.
- 7. Press to return to the measurement mode.

Water Analysis Instruments www.thermoscientific.com/water

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