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Performance**

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Orion Pro Star DO213 Dissolved Oxygen Bench Meter User Manual

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Chapter 1

Introduction

Thank you for choosing the Thermo Scientific™ Orion™ Pro Star DO213 dissolved oxygen bench meter. The Orion Pro Star DO213 meter is designed to simplify analysis while supporting accurate and reliable testing in laboratories that require a modern, easy-to-operate meter with advanced performance and reliable data reporting.

Orion Pro Star DO213 bench meters offer the following measurements:

- Dissolved oxygen as % saturation or concentration in ppm or mg/L with temperature

First time meter startup is made easy with the meter setup wizard, which guides the user through important meter and measurement settings. Utilize onscreen meter tours and guides for calibration, measurements, meter connections and electrode stand assembly to better understand meter operation, warnings and required maintenance. The streamlined, easy to operate user interface includes guided calibrations with step-by-step instructions to help perform calibrations correctly and ensure accurate, reliable and reportable measurements.

Easily view measurements on the large 7-inch color graphic touchscreen display. The responsive touchscreen is angled to help ensure ergonomic viewing and operable with most laboratory gloves or optional USB mouse. Select the basic, advanced or custom measure display format to view only the information you prefer in the measure mode. Select the graph view to display measurements in a graph with temperature for measurement versus time studies.

While taking measurements, enter sample identification information into the meter using an optional meter accessory including USB barcode scanner, USB keyboard or USB mouse. Easily and uniformly stir samples using an optional meter-controlled and meter-powered stirrer probe, which eliminates the need for a magnetic stir plate and bars.

Save, display and export up to 20 calibrations per parameter with date and time stamps to support GLP (Good Laboratory Practice) compliance. Filter calibration logs by user and export calibration logs by date range or all at once.

Easily save measurements to the data log for long-term data retention. Save, display and export up to 10000 data log sets with date and time stamps to support GLP compliance. View individual data log sets with extensive measurement information organized into an easy-to-read onscreen list. Filter data logs by user, date and time or log number and export data logs by date and time range, log number range or all at once.

Output meter data logs, calibration logs and methods to a printer, computer or USB flash drive. Save data to a computer or USB drive as comma separated value (CSV) files for import into programs like Microsoft Excel or save data to a USB drive as report files for printable records. Customize exported files to include all data, advanced, intermediate or basic data, depending on the information needed for your record keeping. Utilize bidirectional communication with remote commands to interface the meter with computer programs including LIMS, HyperTerminal, PuTTY and additional data collection software.

Save measurement settings to standardize your analyses and standard operating procedures (SOPs) using meter methods. Save up to 10 methods. Import methods to and export methods from other Orion Pro Star series meters to standardize your testing across multiple meters.

Activate the secure mode and assign up to 3 administrators and up to 30 users with individual account logins and password protection. Administrators can select from three predefined user access levels or customize each user's access to date and time settings, instrument settings, data logs and calibration logs. Administrators can also export the user list and audit trail to help ensure digital data integrity.

Operate the included electrode stand to facilitate secure, smooth movement of electrodes into and out of solutions. The electrode stand's weighted base allows flexible placement of the stand around the meter. Secure a wide range of electrodes using the various electrode holder options. Neatly organize electrode cables in the built-in side channels of the stand.

All Orion Pro Star DO213 meters include an electrode stand, USB flash drive, computer cable and universal 100-240V 50/60 Hz power adapter with wall plugs for US/Japan, Euro, UK/Singapore, Australia/New Zealand and China. View meter accessories at www.thermofisher.com.

1.1 Intended Use

1.1.1 Intended Use

This device is a bench laboratory meter intended for use in a typical, indoor, controlled, laboratory environment. This device should only be used for analytical testing in accordance with these instructions.

1.1.2 Non-Intended Use

This device is not a Medical Device. It is not intended to be used to diagnose, treat, cure, or prevent disease.

1.1.3 Safety



CAUTION: This symbol, in the context of a CAUTION, indicates a potentially hazardous situation which if not avoided could result in minor to moderate injury or damage to the equipment.



Note: This symbol, in the context of a Note, indicates to follow the manufacturer specified instructions, notes and requirements set out in the manuals.



CAUTION: Before using or maintaining this product, please be sure to read the manual carefully. Failure to follow these instructions may cause the product to malfunction.



CAUTION: Use this product only in the way described in the product literature and in this manual. Before using it, verify that this product is suitable for its intended use. If the product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired.



CAUTION: Do not modify system components. Use only OEM exact replacement equipment or parts. Before use, confirm that the product has not been altered in any way.



Note: Unauthorized repair of your meter will invalidate the warranty. For additional information, contact Technical Support at 1-800-225-1480, +1-978-232-6000 or WLP.TechSupport@thermofisher.com.

1.1.4 Power Connection

See the [Universal Power Supply Assembly](#) section for complete instructions on assembling and installing the included meter power supply.



Note: Position the meter so the user can access power connection and unplug power adapter in the event of a fault, so hazard of electrocution can be removed.

1.2 Cleaning Instructions (Meter Only)

Wipe the exterior surfaces (except the display panel) using a lint-free cloth dampened with clean water.

Wipe the display panel with a clean microfiber cloth, taking care to wipe lightly to avoid scratching the meter display.

The meter housing can also be cleaned using a clean microfiber cloth dampened with IPA (isopropyl alcohol) for disinfection purposes.

Chapter 2

Getting Started

Refer to the [3.9 Information & Help](#) section and Meter Tours to access onscreen tours that explain how to use important meter functions including meter connections and electrode stand assembly.

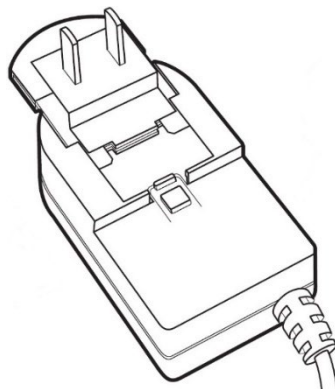
2.1 Universal Power Supply Assembly

A universal power adapter (catalog number PSTAR-PWR) with US/Japan, Euro, UK/Singapore, Australia/New Zealand and China wall plug plates is included with the meter. This power adapter is specifically designed for use with this meter. The use of other power adapters can damage the meter and will void the meter warranty.

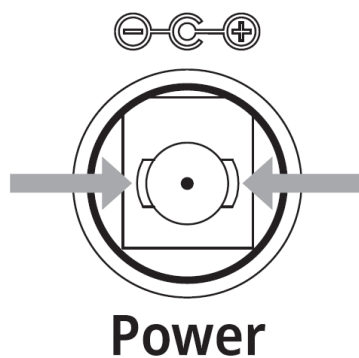


Note: The power adapter plug has 2 prongs that allow it to be securely locked onto the meter input. These 2 prongs must be properly aligned when connecting it to ensure it is fully connected, twisted and locked onto the meter input.

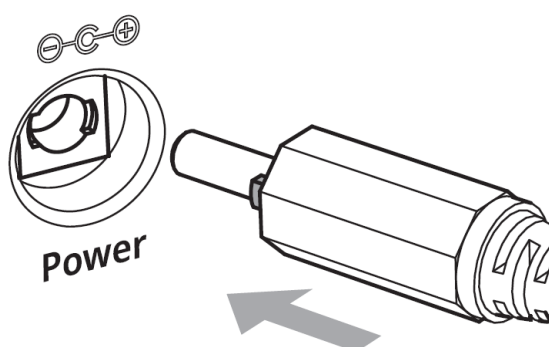
1. Unpack the power supply provided with the meter.
2. Select the appropriate plug plate for the wall power outlet.
3. Slide the appropriate plug plate into the groove on the back of the power adapter.



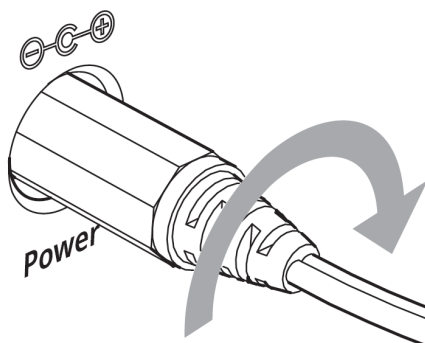
4. Connect the assembled power adapter to the meter input.
 - a. Locate the 2 slots on the meter power input.



- b. Align the 2 tabs on the power adapter plug with the 2 indents on the meter power input.



- c. Insert the power adapter plug into the meter power input and twist clockwise to lock the connection.



5. Connect the assembled power adapter to a power outlet.
6. You are now ready to turn on the meter.

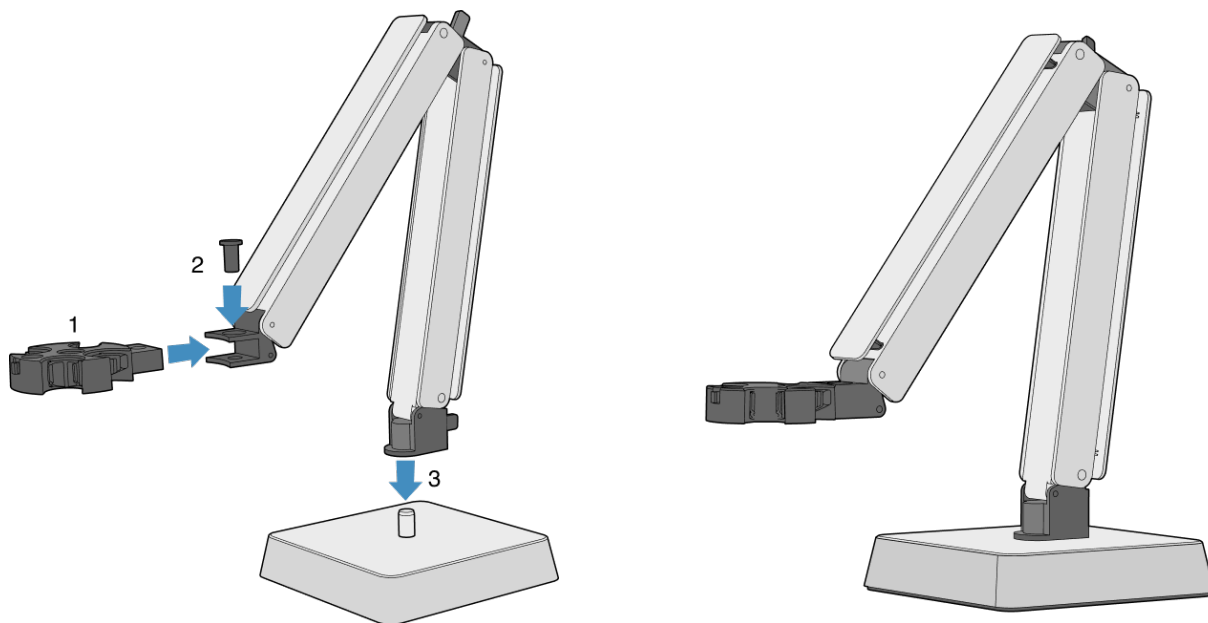


CAUTION: Use of a surge protector or uninterruptible power supply (UPS) is recommended, as an unintended power surge of electricity to the meter may damage the meter and void the warranty.

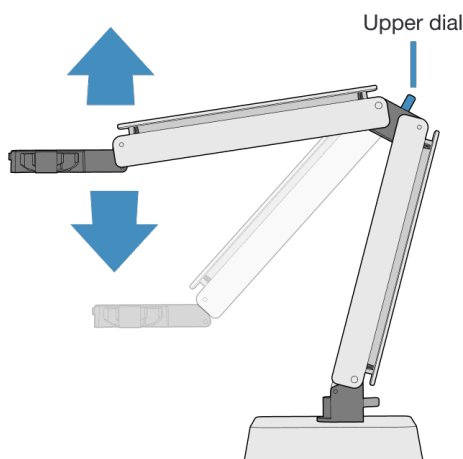
2.2 Electrode Stand Installation

The included electrode stand (catalog number PSTAR-ARM) facilitates secure, smooth movement of electrodes into and out of solutions. A weighted base provides flexible placement of the stand around the meter. Several electrode holder and clip options accommodate a wide range of electrodes. Built-in side channels allow electrode cables to be neatly organized inside the stand.

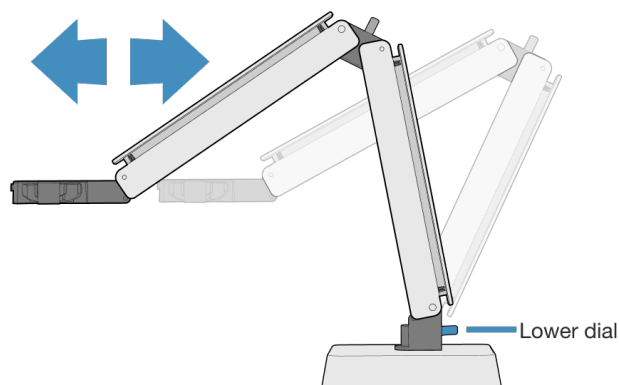
Unpack the electrode stand arm, holder head and base from the meter box.



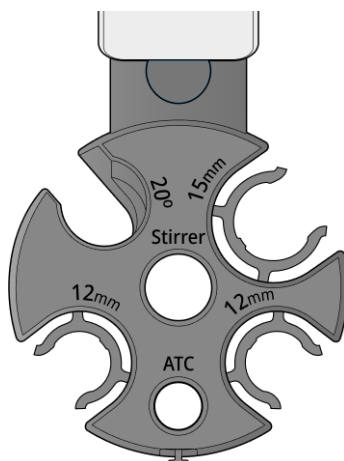
1. Slide the electrode holder head into the U-shaped slot on the arm.
2. Insert the pin into the hole at the top of the U-shaped slot.
3. Lower the electrode arm onto the peg on the base of the stand.
4. Adjust the electrode stand resistance as needed.
 - a. The amount of up and down resistance can be adjusted using the upper dial. Dialing left decreases the resistance, making the arm easier to move up and down. Dialing right increases the resistance, making the arm harder to move up and down.



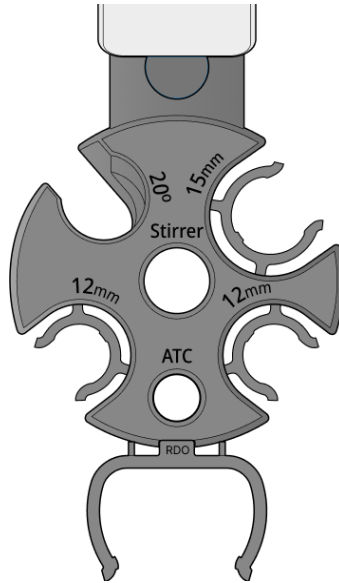
- b. The amount of front and back resistance can be adjusted using the lower dial. Dialing left decreases the resistance, making the arm easier to move forward and backward. Dialing right increases the resistance, making the arm harder to move forward and backward.



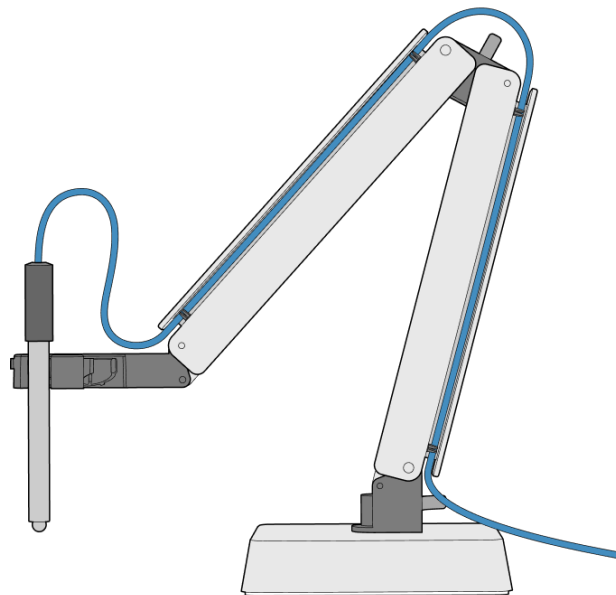
5. Place the electrodes into the electrode holders. The recommended electrode diameter for each slot is indicated on the holder.



- a. The **12mm** clips hold pH electrodes, ORP electrodes, ion selective electrodes (ISEs) and other electrodes with a 12mm electrode body diameter.
- b. The **ATC** holder secures the Orion ATC temperature probe. The height of the ATC probe can be adjusted to match the height of additional electrodes in the holder.
- c. The **Stirrer** holder secures the Orion stirrer probe, catalog number 096019-WA. The Orion stirrer is meter-controlled, meter-powered and works seamlessly with this meter.
- d. The **15mm** clip holds conductivity electrodes, polarographic dissolved oxygen electrodes and other electrodes with a 15mm diameter.
- e. The **20°** angled holder secures gas-sensing ion selective electrodes (ISEs) including the ammonia electrode, catalog number 9512BNWP and high performance ammonia electrode, catalog number 9512HPBNWP.



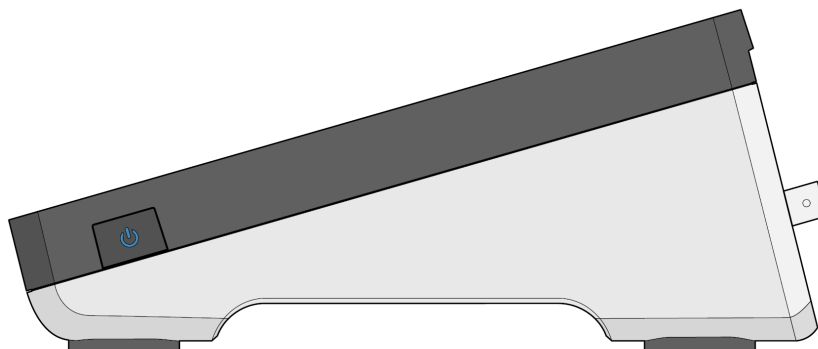
- f. The **RDO** clip holds optical dissolved oxygen electrodes. Attach the RDO clip to the holder head by sliding the clip down on top of the tab on the front of the holder head.
6. Use the side channels built into the electrode arm to organize the electrode cables. Press the electrode cables into the 4 grips inside the arm channels to secure the cables in place.



2.3 Meter Inputs

2.3.1 Power Button

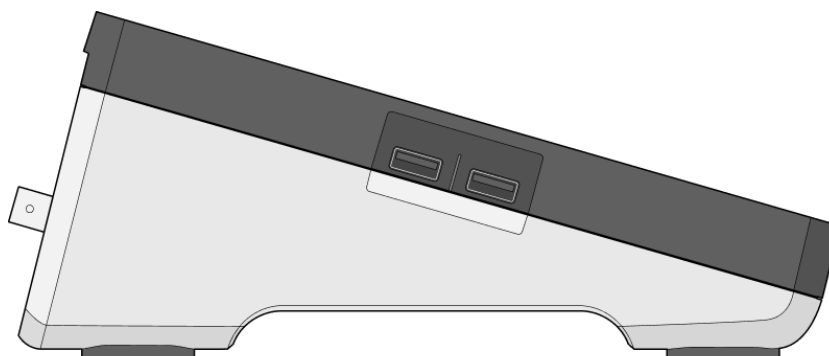
The meter power button is located on the right side of the meter. Press and release the power button to power the meter on or off.



2.3.2 USB Inputs

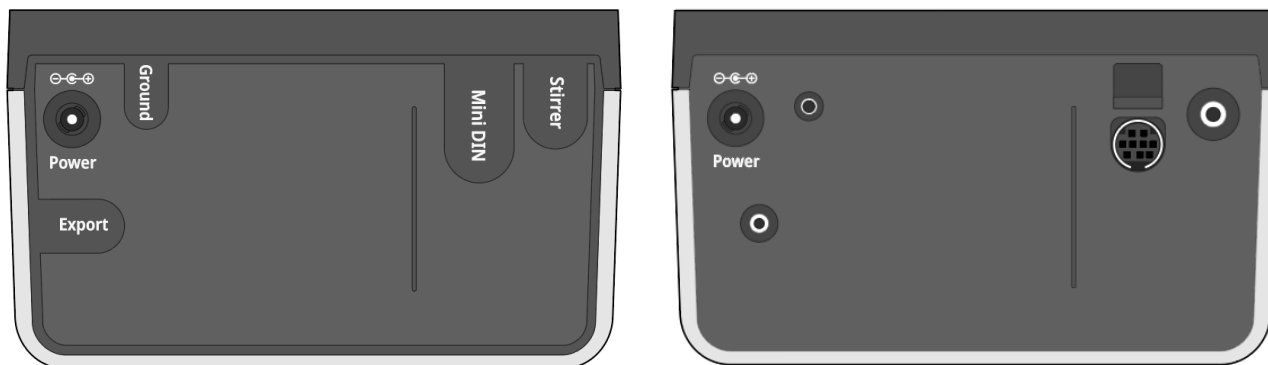
The USB meter inputs are located on the left side of the meter. Each input has a protective cap that protects the meter from dust and water intrusion. For maximum protection, keep the protective caps securely closed unless the input is in use.

- Connect 1 USB flash drive with a USB-A plug to the meter for data transfer.
- Connect 1 USB accessory (barcode scanner, mouse or keypad) with USB-A plug to the meter for alphanumeric character entry into meter fields including sample ID.



2.3.3 Back Panel Meter Inputs

Most meter inputs are located on the back panel of the meter. Each input has a protective cap that protects the meter from dust and water intrusion. For maximum protection, keep the protective caps securely closed unless the input is in use.



Power Input: Connect the power adapter, with twist-and-lock plug, to the meter. To ensure a secure connection:

- Align the 2 tabs on the power adapter plug with the 2 indents on the meter power input.
- Insert the power adapter plug into the meter power input and twist clockwise to lock the connection.

Export Input: Connect a computer or printer cable, with 2.5 mm phono jack plug, to the meter to transfer data.

- Lift the protective cap labeled Export.
- To connect a computer, use the included USB computer cable (catalog number PSTAR-USB) to interface the meter with a computer.
- To connect the Orion ink printer (catalog number STARA-106), use the printer cable included with the printer to interface the meter with the printer.

Ground Input: Connect a ground wire to the meter.

- The meter power supply usually provides optimal measurement performance, so the ground connector is not typically needed.
- However, in certain measurement conditions, for example, where other electrical devices are also placed the same sample, connecting the meter to earth ground via the ground input may reduce interference or noise.

Stirrer Input: Connect the Orion stirrer probe (catalog number 096019-WA), with 3.5 mm phono jack plug, to the meter.

- Lift the protective cap labeled Stirrer.
- Insert the Orion stirrer probe plug fully into the meter input.

- Orion stirrer probes are meter-powered and meter-controlled for easy sample stirring and rinsing.

Dissolved Oxygen Input: Connect an Orion dissolved oxygen (DO) electrode, with 9-pin MiniDIN plug, to the meter.

- Lift the protective cap labeled MiniDIN.
- Insert the Orion DO electrode plug into the meter input. Ensure the plug is fully inserted and the clip is securely in place.

2.4 Meter Startup Sequence

When the meter is powered on, it displays a startup screen and proceeds to the main measure mode.

The first time the meter is powered on, it launches the meter setup wizard. Follow the displayed steps to set critical meter and measurement settings. View detailed information on additional settings in the [3.2 Settings](#) section.

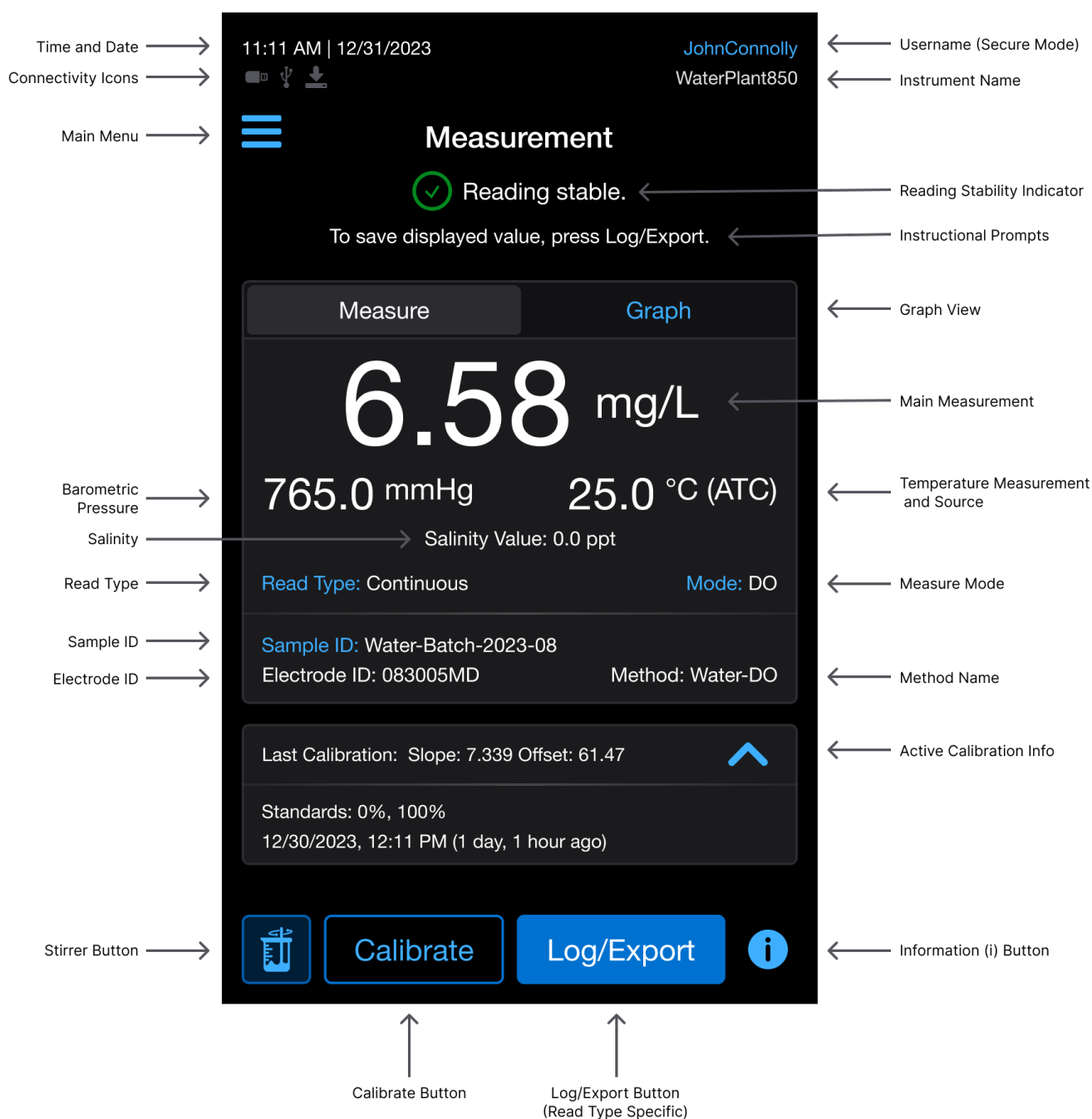
2.5 Touchscreen Functions

Orion Pro Star meters offer a 7" capacitive touchscreen interface that is compatible with most nitrile laboratory gloves.

- Key interaction points on the screen are **blue** for easy navigation.
- For screens with extended data, easily scroll by touching and sliding the display up and down.

Optionally, a USB mouse can be connected to the meter and used to operate the touchscreen interface if direct contact with the screen is not desirable.

2.5.1 Main Measure Mode



Note: User-selectable information (i.e. instrument name) will only be shown on the measure mode display if it is entered in the settings menus.

Connectivity Icons: Indicate connectivity status of USB devices and export device with the meter.

	USB Flash Drive:	Indicates a USB flash drive is connected and communicating with the meter.
	USB Accessory:	Indicates a USB accessory (USB mouse, USB keyboard or USB barcode scanner) is connected and communicating with the meter.
	Export:	Indicates the meter is set to communicate with a computer or the Orion ink printer (catalog number STARA-106).

Read Type: Indicates the active read type for the measure mode.

- **Continuous:** Measurements are continuously updated on the display and measurement stability status is indicated as stabilizing or stable. Tap the Log/Export button to save and export the actively displayed measurement.
- **Auto-Read:** Tap the Measure button to start a measurement. When the measurement is stable, it is frozen/locked on the display until the Measure button is tapped again. When the measurement is stable, it is automatically saved and exported.
- **Timed:** Measurements are continuously updated on the display and measurement stability status is indicated as stabilizing or stable. Measurements are automatically saved and exported at the selected time intervals, from 3 seconds to 2 hours, while in the measure mode.

Stirrer Button: Use to activate or deactivate the Orion stirrer probe. Tap and hold the Stirrer button to adjust the stirrer probe speed.

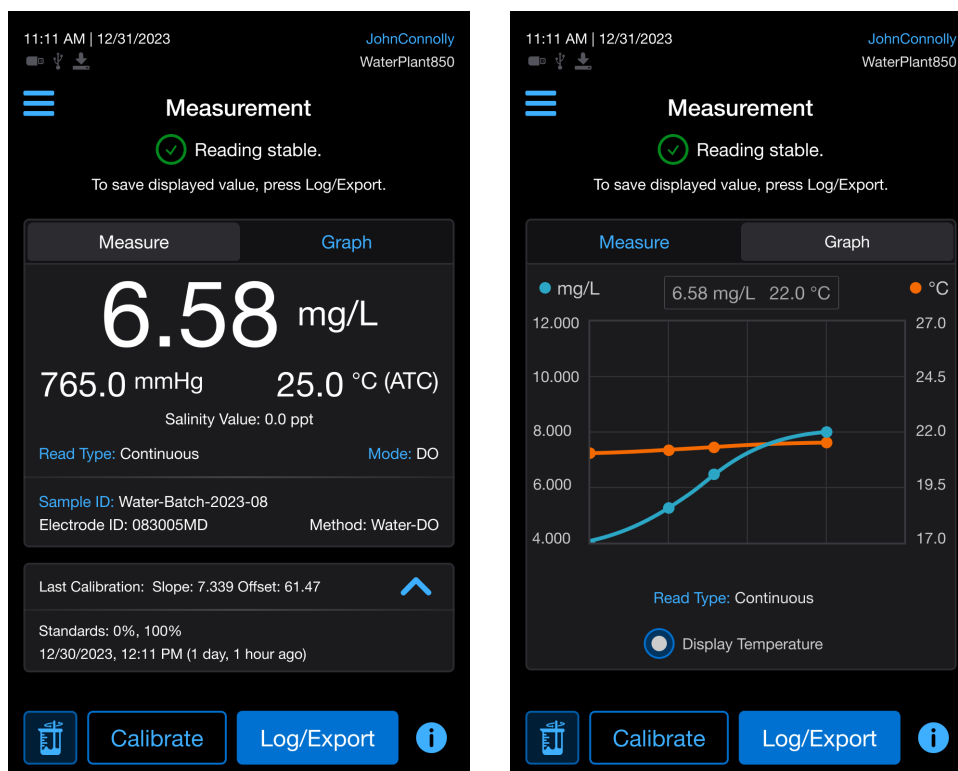
Note: The Stirrer button is hidden if the stirrer function is turned off in the measure mode.

Information (i) Button: Tap to access helpful information and guidance about meter functions.

2.5.1.1 Graph Measure Mode View

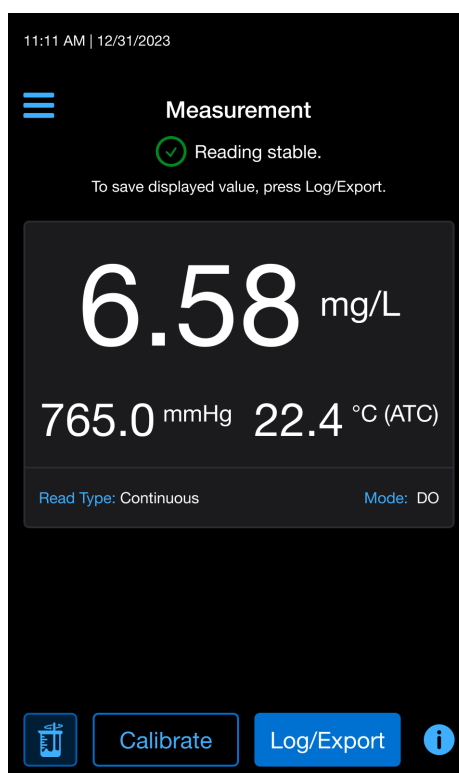
Graph: Tap the blue Graph text to view the current measurement as a graph with temperature.

- Select the Read Type to change how the graph tracks measurements over time.
- Tap the Display Temperature button to show or hide temperature measurements.



2.5.1.2 Basic Measure Mode View

Refer to the [3.2.1 Instrument Settings](#) section and Display settings and select Basic as the Custom Measure Layout to view a simplified version of the measure mode. The default meter setting is Advanced as the Custom Measure Layout and all user-selectable information (i.e. instrument name, sample ID, electrode ID, method) will only be shown when it is entered in the settings menus.



2.6 Electrode Information

The Orion Pro Star DO213 meter is compatible with a DO electrode with 9-pin MiniDIN connector. The Orion Pro Star DO213 meter is available in a meter only configuration (purchase electrode separately) or in meter kits with electrodes and solutions included for different applications.

Refer to the instructions in the electrode user manual for specific care and maintenance procedures. The following are general recommendations for electrode preparation.

Polarographic DO Electrodes

1. Remove the electrode from its packaging.
2. Remove the membrane cap from the electrode and rinse any salt deposits from the sensor and inside/outside of the membrane cap using distilled or deionized water.
3. Fill the membrane cap $\frac{3}{4}$ full of the included electrolyte solution. Screw the membrane cap onto the electrode until the cap is hand-tight.
4. Connect the electrode to the meter. Polarize the electrode for 30 to 60 minutes before use.

Optical DO Electrodes

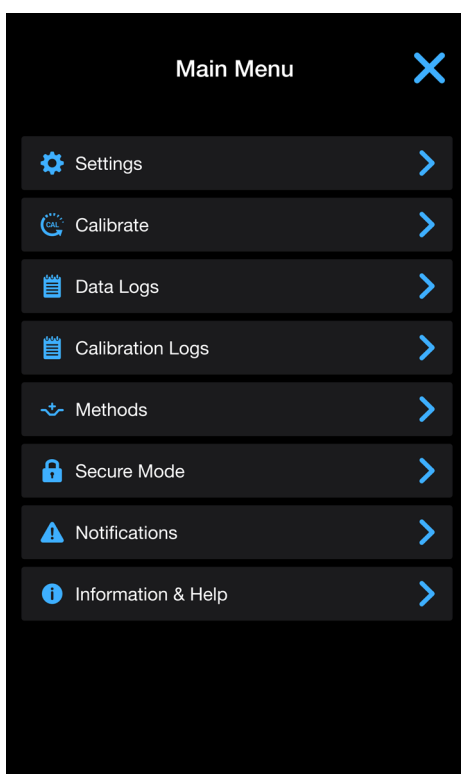
1. Remove the electrode from its packaging and remove the protective cap from the electrode.
2. Lubricate the 2 O-rings on the electrode with a thin film of the included silicone grease.
3. Align the arrow on a new optical cap with the arrow on the electrode. Slide and press the cap onto the electrode until the cap is flush with the electrode body. Do not twist the cap.
4. Connect the electrode to the meter.

Chapter 3

Main Menu

3.1 Main Menu

Tap the Main Menu icon in the measure mode to access the Main Menu.

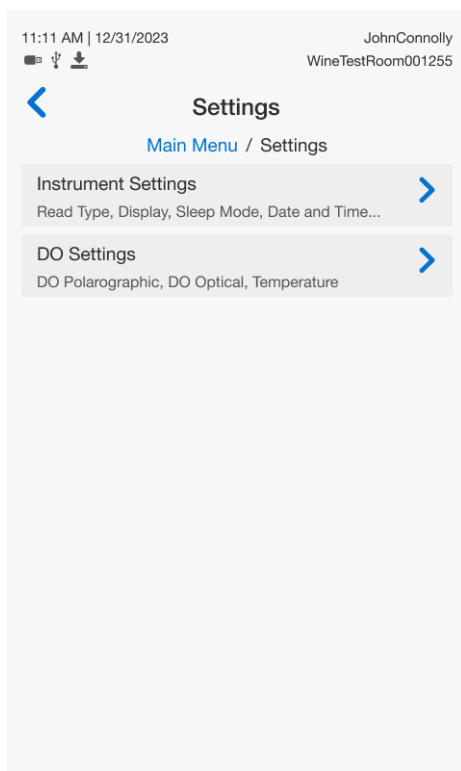


- Settings: View and customize instrument and measurement settings.
- Calibrate: Perform all calibration functions, including temperature and barometer calibrations.
- Data Logs: View, filter and export up to 10000 data sets with time and date stamps.
- Calibration Logs: View, filter and export up to 20 calibration logs per parameter with time and date stamps.
- Methods: View, create, edit and load up to 10 methods. Methods allow measurement settings to be saved to standardize the analysis and SOP.
- Secure Mode: Option to activate Secure Mode and assign up to 3 administrators and up to 30 users, each with an individual account login with password protection and custom access levels.
- Notifications: View a list of the latest warnings, alarms and errors shown on the meter.
- Information & Help: View meter information, user manual and meter tours; perform meter tests

and troubleshooting, setup wizard, software updates and meter reset functions.

3.2 Settings

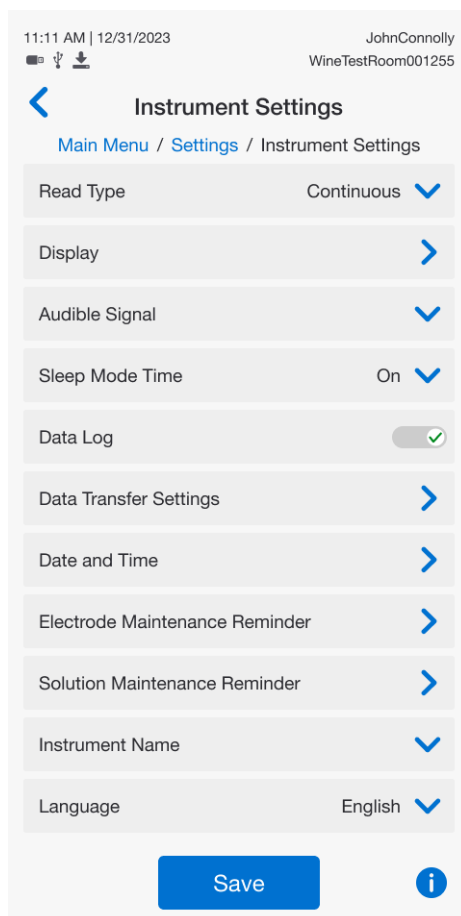
Tap the Settings option in the Main Menu to access the instrument and measurement settings.



- **Instrument Settings:** View and customize instrument settings for the read type, display, audible signal, sleep mode, data log, data transfer, date and time, maintenance reminders and instrument name.
- **DO Settings:** View and customize measurement settings for dissolved oxygen, including temperature, measure mode, sample ID, alarms, resolution, barometric pressure, salinity correction, stability criteria, stirrer and electrode ID.

3.2.1 Instrument Settings

Tap the Instrument Settings option in the Settings list to access the instrument settings.



- **Read Type:** Set the Read Type as Continuous, Auto-Read or Timed to define how measurements are performed, saved and exported. If Timed is selected, set the time interval from 3 seconds (0:00:03) to 2 hours (2:00:00).
 - **Continuous:** In the Continuous measure mode, measurements are continuously updated on the display and the stabilizing or stable icon indicates the measurement stability status. Tap the Log/Export button to save a measurement to the data log and export to an external device according to the Data Transfer Settings.
 - **Auto-Read:** In the Auto-Read measure mode, tap the Measure button to start a measurement. When the measurement is stable, the stable icon is shown and the measurement is locked on the display until the Measure button is tapped again. The stable measurement is automatically saved to the data log and exported to an external device according to the Data Transfer Settings.
 - **Timed:** In the Timed measure mode, tap the Start button to begin taking timed measurements. Measurement values are continuously updated on the display. Measurements are automatically saved at the selected time intervals (3 seconds to 2 hours) to the data log and exported to an external device according to the Data Transfer Settings while the meter remains in the measurement mode. Tap the Stop button or leave the measure mode to stop taking timed measurements.

- Display: Adjust the Brightness and set the Custom Measure Layout of the display.
 - Brightness: Adjust the display brightness by sliding the icon to the left (dimmer display) or to the right (brighter display).
 - Custom Measure Layout: Select an option to customize information in measure mode:
 - Basic: Only critical information is shown in the measure mode, including primary reading, secondary reading (if applicable), temperature, read type and mode.
 - Advanced: All information is shown in the measure mode.
 - Custom: Select or deselect the components to show in the measure mode.
- Audible Signal: Turn the audible signal on or off for notifications and alarms and stable reading (Auto-Read only).
- Sleep Mode Time: Set the amount of time the meter will remain idle before powering off to 5, 10, 20, 30 or 60 minutes or turn off sleep mode so the meter will not power off automatically.
- Data Log: Turn the data log function on or off. When on, measurements are saved to the data log according to the selected Read Type setting. When off, no measurements are saved.
- Data Transfer Settings: Set the Export Destination, Export Baud Rate (when applicable), Custom Data Log Export and Custom Calibration Log Export settings.
 - Export Destination: Select 1 external device for data to be exported from the meter.
 - USB Drive: Data is exported to a USB flash drive when it is connected to the USB port on the side of the meter. Methods and software updates can also be imported from the USB flash drive to the meter.
 - Computer: Data is exported to a computer when a computer is connected to the Export port on the back of the meter.
 - Printer: Data is exported to the Orion ink printer (catalog number STARA-106) when it is connected to the Export port on the back of the meter.
 - Off: No data is exported to an external device.
 - Export Output Format: Set the format of exported files when USB Drive or Computer is selected as the Export Destination.
 - CSV (Comma Separated Values): Plain text file with data delimited by commas, useful for importing into LIMS, Microsoft Excel and similar programs.
 - Report: Formatted file with data organized in separate rows, useful for easily viewing data outside the meter and creating hardcopy records.
 - Export Baud Rate: Set the baud rate the meter will use to export data. Use 115200 for exporting to most computers. Use 9600 for exporting to the Orion ink printer.
 - Custom Data Log Export: Select an option to customize the amount of information exported from the data log. *Select All Data when exporting data to LIMS software.*

- Basic: Only critical data is exported from the data log including date, time, primary reading and temperature.
 - Intermediate: Moderate data is exported from the data log including basic data plus log #, username, measure mode, secondary reading (if applicable) and short calibration log summary.
 - Advanced: Significant data is exported from the data log including intermediate data plus read type, read time, sample ID, method, electrode ID, full calibration log summary and instrument ID.
 - All Data: All data is exported from the data log including advanced data plus meter model, serial number, software revision, export date and export time.
- Custom Calibration Log Export: Select an option to customize the amount of information exported from the calibration log. *Note: Select All Data when exporting data to LIMS software.*
 - Basic: Only critical data is exported from the calibration log including date, time, calibration points (reading with temperature) and calibration results.
 - Intermediate: Moderate data is exported from the calibration log including basic data plus log #, username and calibration points (secondary reading).
 - Advanced: Significant data is exported from the calibration log including intermediate data plus calibration mode, electrode ID, method, calibration points (read time and entry type) and instrument ID.
 - All Data: All data is exported from the calibration log including advanced data plus meter model, serial number, software revision, export date and export time.
- Date and Time: Set the date format (MM/DD/YYYY, DD/MM/YYYY or DD-MMM-YYYY), enter date values, set the time format (12 hour or 24 hour) and enter time values.
 - Electrode Maintenance Reminder: Set up to 5 reminders for electrode maintenance. Each reminder time interval can be set to 3 months, 6 months, 1 year or a custom value from 1 day to 24 months. Each reminder also has a note field to enter information related to the reminder such as “Refill”, “Clean” or “Replace”.
 - Solution Maintenance Reminder: Set up to 5 reminders for solution maintenance. Each reminder time interval can be set to 1 week, 1 month, 3 months, 6 months or a custom value from 1 day to 12 months. Each reminder also has a note field to enter information related to the reminder such as “Pour Fresh”, “Reorder”, “Expires” or “Replace”.
 - Instrument Name: Enter up to 20 alphanumeric characters to identify the meter on the display, in the data log, in the calibration log and on exported records.
 - Language: Set the language for the meter display as Chinese, English, French, German, Italian, Japanese, Korean, Portuguese or Spanish.

Note: Tap the Save button once all changes are made.

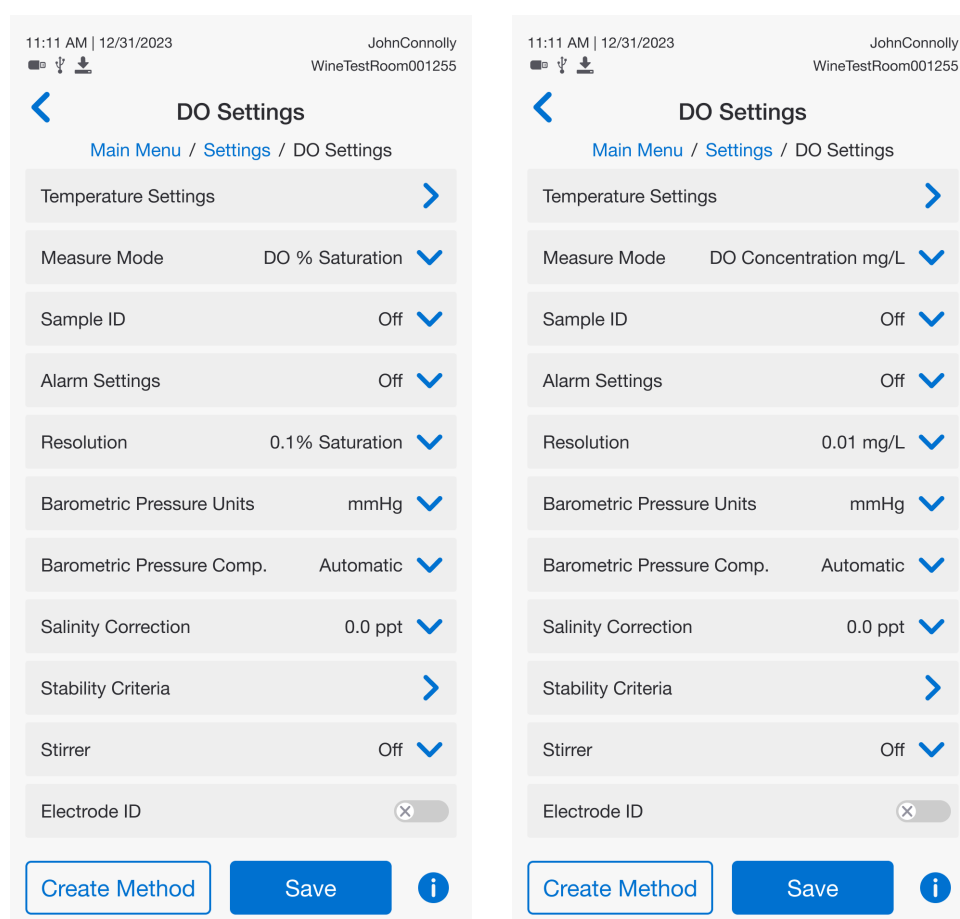
3.2.2 DO Settings

Tap the DO Settings option in the Settings list to access the measurement settings for dissolved oxygen.

The list will update dynamically with setting changes.

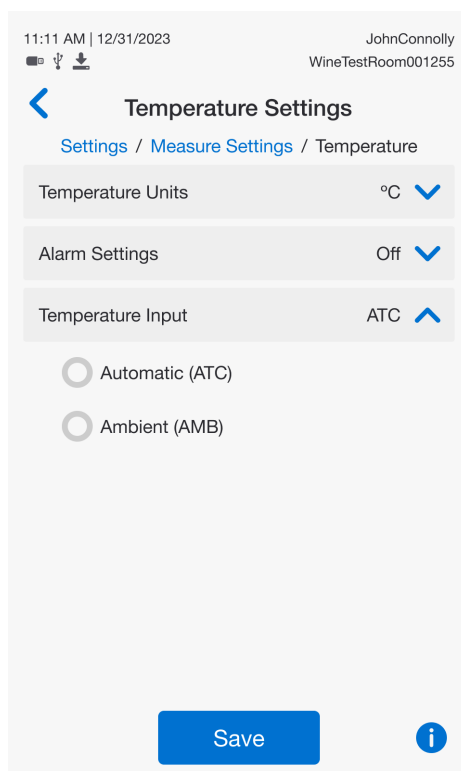
The temperature settings apply to all measure modes.

Example DO Settings:



Temperature Settings: set the temperature settings to be applied to the active measurements, regardless of the selected measure mode.

- Temperature Units: Set temperature units as °C (Celsius) or °F (Fahrenheit).
- Alarm Settings: Set alarm settings for high and/or low temperature values and calibration due reminder as needed.
- Temperature Input: Select the source of temperature readings from the list.
 - Automatic: When an ATC sensor is connected to the meter, the sensor is shown on the list.
 - Ambient: The meter's built-in sensor is used to measure ambient air temperature. While not as accurate as an ATC sensor in sample solution, it is more accurate than not reporting temperature.



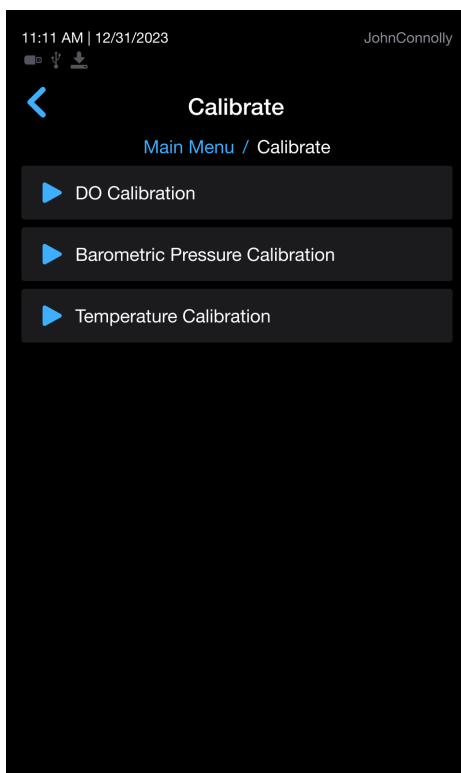
- Measure Mode: Set the main measure mode to DO as % saturation, DO as concentration with mg/L units or DO as concentration with ppm units.
- Sample ID: Set to Auto-incremental, Manual or Off.
 - Auto-incremental: Enter up to 20 alphanumeric characters. The meter will add “00001” to the end of the first sample ID and then automatically increase the sample ID by 1 for subsequent sample IDs.
 - Manual: Enter up to 25 alphanumeric characters or select from the list of previously entered sample IDs.
 - Off: No sample ID is shown for measurements, logs or exported records.
- Alarm Settings: Enable the Set Value Alarm and Calibration Reminder Alarm functions.
 - Set Value Alarm: Set a high value and an alarm will trigger if the measured value goes above the set high value. Set a low value and an alarm will trigger if the measured value goes below the set low value.
 - Calibration Reminder Alarm: Set an alarm interval of 8 hours, 1 day, 7 days or custom time from 1 hour to 30 days. If a calibration is not performed within the set interval, an alarm is shown on the meter.
- Resolution: Set the desired measurement resolution.
 - For DO % saturation, set the resolution as 0.1% saturation or 1% saturation.
 - For DO concentration mg/L, set the resolution as 0.01 mg/L or 0.1 mg/L.
 - For DO concentration ppm, set the resolution as 0.01 ppm or 0.1 ppm.
- Barometric Pressure Units: Set the barometric pressure units as mmHg or bar.

- **Barometric Pressure Compensation:** Set the barometric pressure compensation type used to measure and compensate for barometric pressure during dissolved oxygen measurements.
 - Automatic: Utilize the meter's built-in barometer.
 - Manual: Enter the barometric pressure value.
- **Salinity Correction:** Set the salinity correction value. Enter the salinity value of samples to compensate for sample salinity during dissolved oxygen measurements.
- **Stability Criteria:** Select the Measurement Stability and Measurement Averaging functions.
 - **Measurement Stability:** Select Automatic, Fast, Medium or Slow Stability for measurements. The meter will use specific resolution criteria to determine the wait time before indicating measurements are stable.
 - **Measurement Averaging:** Select Automatic or Off for averaging measurements. When Automatic is selected, the meter will analyze the measurement and stabilize faster when measurements are fluctuating around an averageable value.
- **Stirrer:** Turn the Orion stirrer probe function off or on and set the speed for the stirrer probe.
- **Electrode ID:** Enter up to 20 alphanumeric characters or select from the list of previous electrode IDs; ID is shown on the display, data log, calibration log and exported records.

Note: Tap the *Save* button once all changes are made to preserve the changes or tap the *Create method* button to save the current parameters as a new method.

3.3 Calibrate

Tap the Calibrate option in the Main Menu to access the complete list of calibrations available.



The Orion Pro Star DO213 DO bench meter is capable of performing:

- 1 to 2 point % saturation dissolved oxygen calibration
- 1 point concentration dissolved oxygen calibration
- 1 point barometric pressure calibration
- 1 to 2 point temperature calibration

Refer to the [Chapter 4 Calibration](#) for detailed instructions for each type of calibration.

3.4 Data Logs

Tap the Data Logs option in the Main Menu to access the data logs.

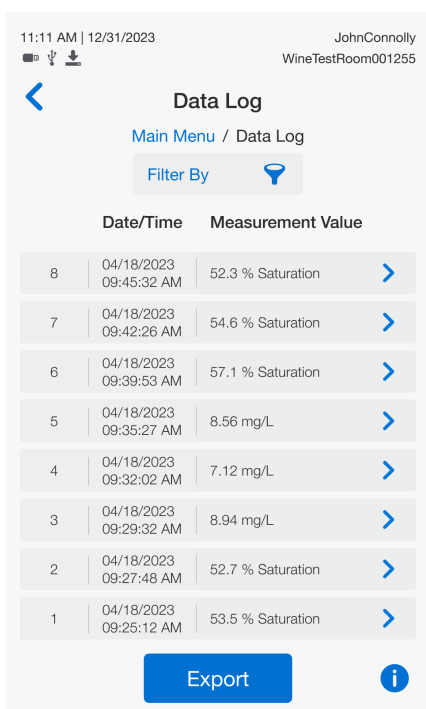
The meter's data log will store up to 10000 data logs with time and date stamps. Each data log includes measurements from when the data log was saved as well as settings, measurement information and meter details.

- Use the Instrument Settings / Data Log setting to turn on the data log functionality.
- Use the Instrument Settings / Read Type setting to set how measurements are saved to the data log in the measure mode.

From the data log list, filter the list, view individual data logs, export the data log and delete the data log (Open Mode only).

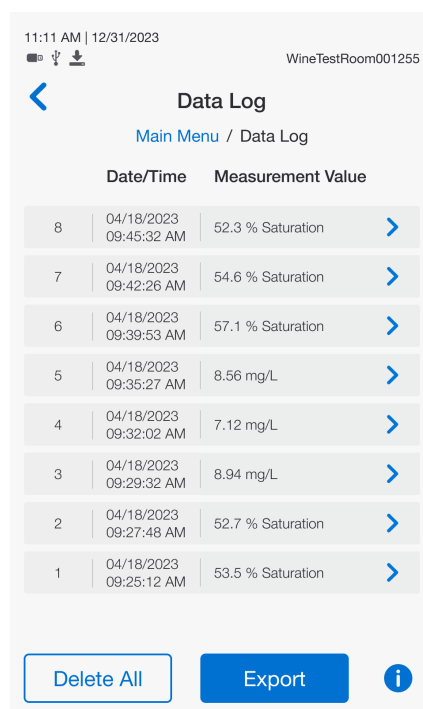
Example Data Log List:

Secure Mode Example



	Date/Time	Measurement Value	
8	04/18/2023 09:45:32 AM	52.3 % Saturation	>
7	04/18/2023 09:42:26 AM	54.6 % Saturation	>
6	04/18/2023 09:39:53 AM	57.1 % Saturation	>
5	04/18/2023 09:35:27 AM	8.56 mg/L	>
4	04/18/2023 09:32:02 AM	7.12 mg/L	>
3	04/18/2023 09:29:32 AM	8.94 mg/L	>
2	04/18/2023 09:27:48 AM	52.7 % Saturation	>
1	04/18/2023 09:25:12 AM	53.5 % Saturation	>

Open Mode Example



	Date/Time	Measurement Value	
8	04/18/2023 09:45:32 AM	52.3 % Saturation	>
7	04/18/2023 09:42:26 AM	54.6 % Saturation	>
6	04/18/2023 09:39:53 AM	57.1 % Saturation	>
5	04/18/2023 09:35:27 AM	8.56 mg/L	>
4	04/18/2023 09:32:02 AM	7.12 mg/L	>
3	04/18/2023 09:29:32 AM	8.94 mg/L	>
2	04/18/2023 09:27:48 AM	52.7 % Saturation	>
1	04/18/2023 09:25:12 AM	53.5 % Saturation	>

When in Open Mode, the meter will save up to 10000 data logs and then automatically overwrite the oldest data log with the newest data log when the limit is reached. Alternatively, tap the Delete button to permanently delete all data logs.

When in Secure Mode, the meter will save up to 10000 data logs and then prompt the Administrator and Level 1 user accounts to export and delete data logs when the limit is reached. When the data log becomes full, data logs must be exported before they can be deleted.

Note: Once data logs are deleted, the action cannot be undone. Create backup records of the data logs as needed before deleting data logs.

3.4.1 Filter the Data Log

Tap the **Filter By** field to select and set parameters for Username (Secure Mode only), Date & Time and Log Number to filter the data log list.

Secure Mode Example

Filter By

Select the filters you wish to apply. You can apply as many filters as needed.

Username

Date & Time

Select the start date & time

MM

DD

YYYY

00:00

Month

Day

Year

Time

Select the end date & time

MM

DD

YYYY

00:00

Month

Day

Year

Time

Log Number

Clear All

Apply

Open Mode Example

Filter By

Select the filters you wish to apply. You can apply as many filters as needed.

Date & Time

Select the start date & time

MM

DD

YYYY

00:00

Month

Day

Year

Time

Select the end date & time

MM

DD

YYYY

00:00

Month

Day

Year

Time

Log Number

Clear All

Apply

3.4.2 View Individual Data Logs

Tap a log on the list to view the individual data log details. You may need to scroll down to view all the included information. Tap the blue arrows to scroll up or down through the individual data logs. Tap the Export button to export the individual data log.

Data Log Details

< 2 of 3 >

Data Log Number	2
Log Date & Time	04/18/2023 09:35:32 AM
Username	JohnConnolly
Read Type	Auto-Read
Mode	DO % Saturation
DO	52.3% Sat.
Current	300.1 nA
Temp. (Solution)	23.6 °C (ATC)
Temp. (Membrane)	23.6 °C (ATC)
Barometric Pressure	765.0 mmHg
Salinity Value	0.0 ppt
Read Time	00:01:48
Sample ID	Off
Method	Water-DO
Electrode ID	083005MD
Calibration Log Number	DO22
Calibration Date & Time	04/16/2023 11:40:05 AM
Slope	7.339 nA/%Sat.

Export

Data Log Details

< 2 of 3 >

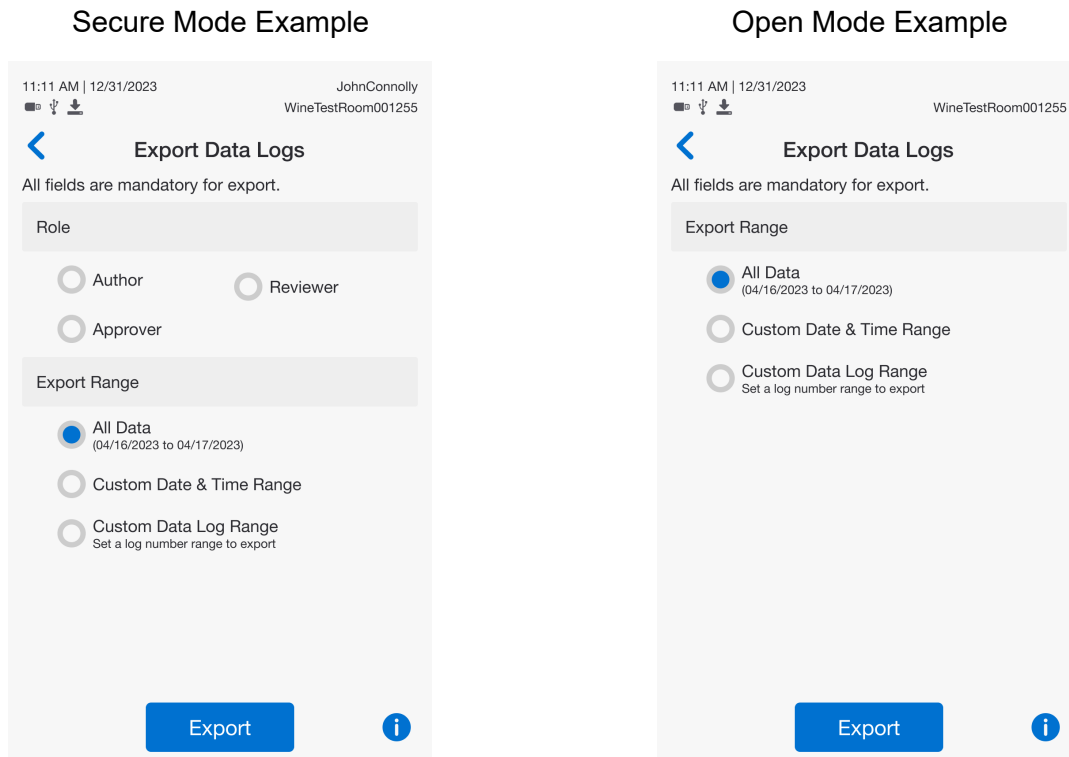
Mode	DO % Saturation
DO	52.3% Sat.
Current	300.1 nA
Temp. (Solution)	23.6 °C (ATC)
Temp. (Membrane)	23.6 °C (ATC)
Barometric Pressure	765.0 mmHg
Salinity Value	0.0 ppt
Read Time	00:01:48
Sample ID	Off
Method	Water-DO
Electrode ID	083005MD
Calibration Log Number	DO22
Calibration Date & Time	04/16/2023 11:40:05 AM
Slope	7.339 nA/%Sat.
Instrument Name	DrinkingWaterPlant05
Meter Model	DO213
Meter Serial #	P123456
Meter Software Revision	3.50

Export

3.4.3 Export the Data Log

Tap the Export button to export the data log to a USB flash drive, computer or printer.

- Use the Instrument Settings / Data Transfer Settings to view and modify the Export Destination, Output Format, Baud Rate and Custom Data Log Export settings.

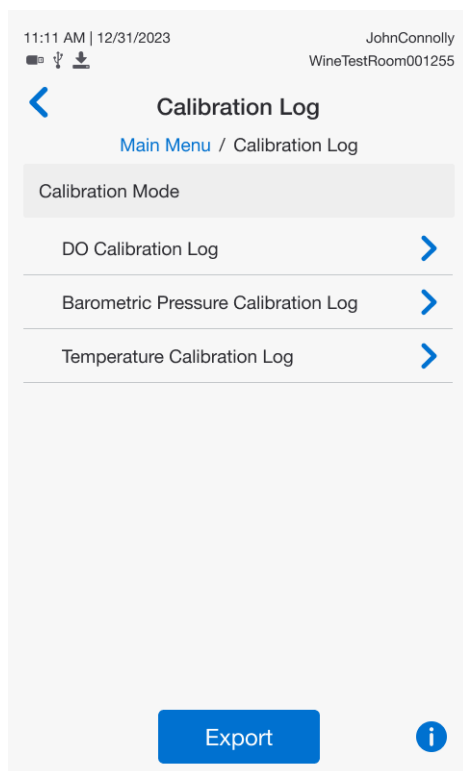


When in Secure Mode, if an Administrator or Level 1 user account is active, that account will have the option to delete the data log after it is exported. When the data log becomes full, it must be exported and then deleted before new data logs can be saved.

3.5 Calibration Logs

Tap the Calibration logs option in the Main Menu to access the calibration logs.

The meter will store up to 20 calibration logs per parameter with time and date stamps. Each calibration log includes calibration data with calculated results.



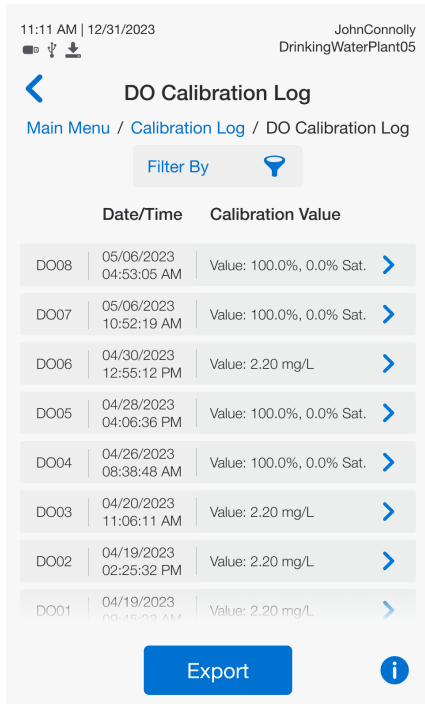
Tap to select a parameter to view the calibration log list for that parameter.

Note: *In Secure Mode, when the calibration log becomes full, the calibration log must be exported before it can be cleared.*

3.5.1 Filter the Calibration Log

From the parameter-specific calibration log list, filter the list (Secure Mode only), view individual calibration logs and export the calibration log.

Secure Mode Example



11:11 AM | 12/31/2023 JohnConnolly
DrinkingWaterPlant05

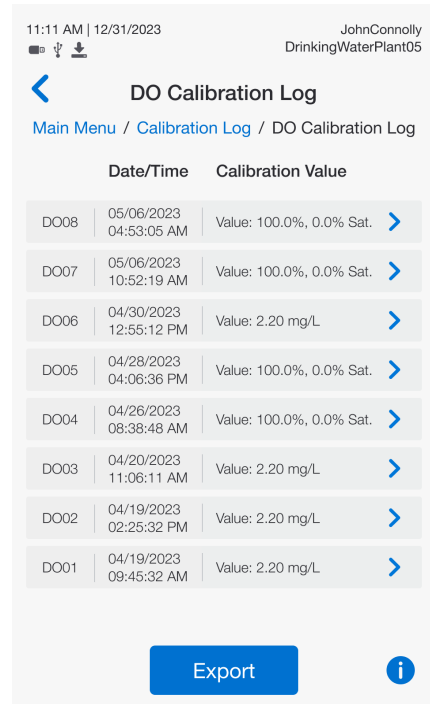
< DO Calibration Log
Main Menu / Calibration Log / DO Calibration Log

Filter By 

	Date/Time	Calibration Value	
DO08	05/06/2023 04:53:05 AM	Value: 100.0%, 0.0% Sat.	>
DO07	05/06/2023 10:52:19 AM	Value: 100.0%, 0.0% Sat.	>
DO06	04/30/2023 12:55:12 PM	Value: 2.20 mg/L	>
DO05	04/28/2023 04:06:36 PM	Value: 100.0%, 0.0% Sat.	>
DO04	04/26/2023 08:38:48 AM	Value: 100.0%, 0.0% Sat.	>
DO03	04/20/2023 11:06:11 AM	Value: 2.20 mg/L	>
DO02	04/19/2023 02:25:32 PM	Value: 2.20 mg/L	>
DO01	04/19/2023 09:45:32 AM	Value: 2.20 mg/L	>

Export 

Open Mode Example



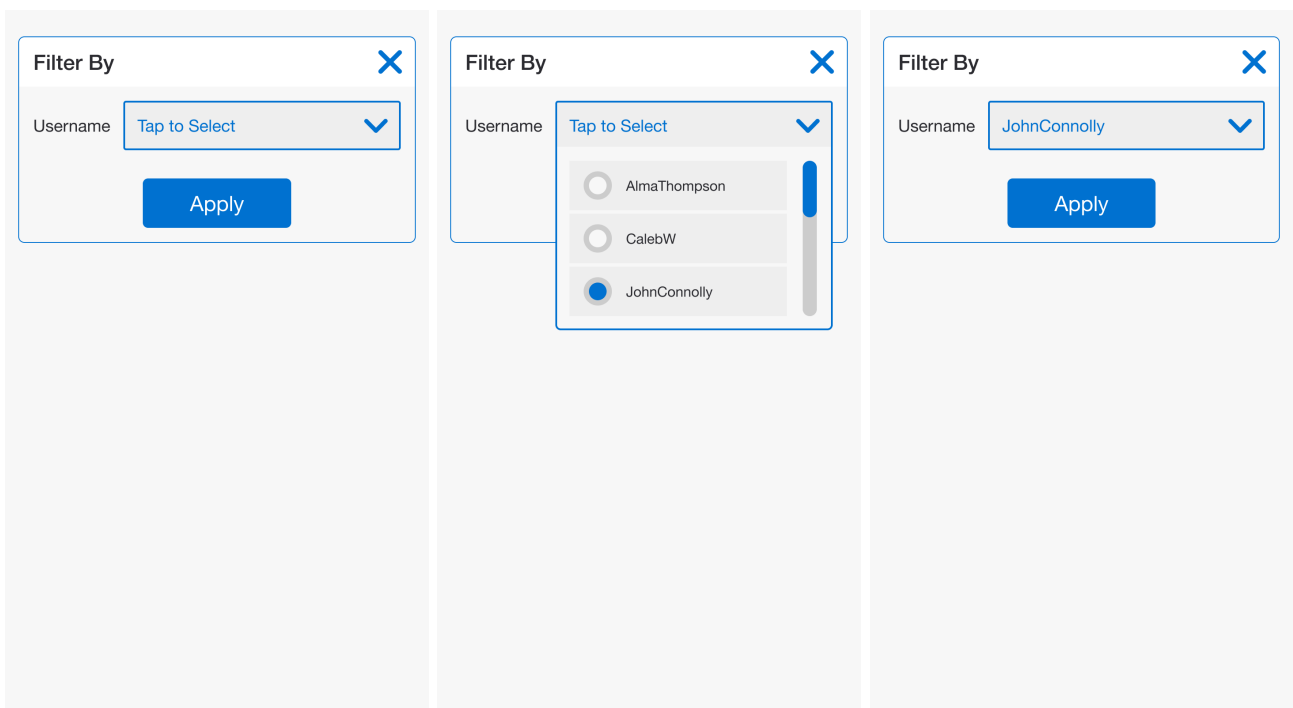
11:11 AM | 12/31/2023 JohnConnolly
DrinkingWaterPlant05

< DO Calibration Log
Main Menu / Calibration Log / DO Calibration Log

	Date/Time	Calibration Value	
DO08	05/06/2023 04:53:05 AM	Value: 100.0%, 0.0% Sat.	>
DO07	05/06/2023 10:52:19 AM	Value: 100.0%, 0.0% Sat.	>
DO06	04/30/2023 12:55:12 PM	Value: 2.20 mg/L	>
DO05	04/28/2023 04:06:36 PM	Value: 100.0%, 0.0% Sat.	>
DO04	04/26/2023 08:38:48 AM	Value: 100.0%, 0.0% Sat.	>
DO03	04/20/2023 11:06:11 AM	Value: 2.20 mg/L	>
DO02	04/19/2023 02:25:32 PM	Value: 2.20 mg/L	>
DO01	04/19/2023 09:45:32 AM	Value: 2.20 mg/L	>

Export 

Tap the **Filter By** field to set parameters for Username (Secure Mode only) to filter the calibration log list.



Filter By 

Username 

Apply

Filter By 

Username 

- ☐ AlmaThompson
- ☐ CalebW
- ☒ JohnConnolly

Filter By 

Username 

Apply

3.5.2 View Individual Calibration Logs

Tap a log on the list to view the individual calibration log details.

- You may need to scroll down to see all included information.
- Tap the blue arrows to scroll up or down through the individual calibration logs.
- Tap the Export button to export the individual calibration log.

Calibration Log Details

<

1 of 2

>

Calibration Log Number	DO02
Calibration Mode	DO Calibration
Log Date & Time	04/19/2023 11:45:32 AM
Username	JohnConnolly
Electrode ID	083005MD
Method	Water-DO

	DO	Current
1	100.0 % Sat.	405.1 nA
2	0.0 % Sat.	0.0 nA

Slope: 7.339 nA/%Sat. Offset: 61.47

	Barometric Pressure	Salinity Value
1	760.0 mmHg	0.0 ppt
2	765.2 mmHg	0.0 ppt

Export

3.5.3 Export the Calibration Log

Tap the Export button to export the calibration log to a USB flash drive, computer or printer.

- Use the Instrument Settings / Data Transfer Settings to view and modify the Export Destination, Output Format, Baud Rate and Custom Calibration log Export settings.

Secure Mode Example

11:11 AM | 12/31/2023 JohnConnolly
WineTestRoom001255

< **Export Calibration Log**

All fields are mandatory for export.

Role

☐ Author ☐ Reviewer

☐ Approver

Export Range

☒ All Data
All Calibration Logs

☐ Custom Date Range

Export ⓘ

Open Mode Example

11:11 AM | 12/31/2023 WineTestRoom001255

< **Export Calibration Log**

All fields are mandatory for export.

Export Range

☒ All Data
All Calibration Logs

☐ Custom Date Range

Export ⓘ

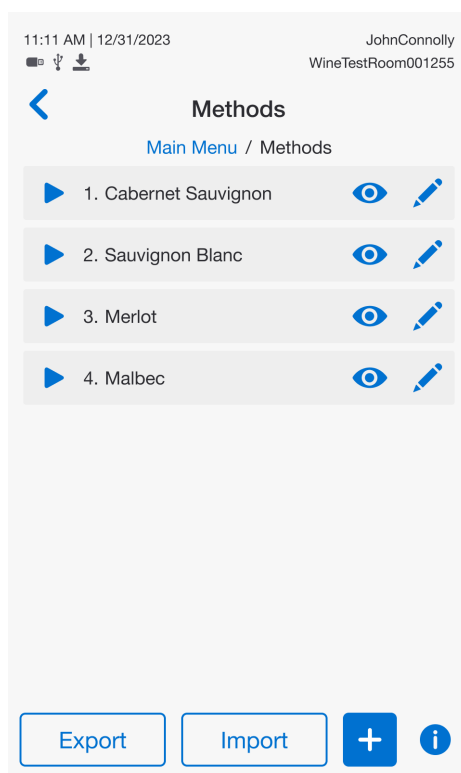
When in Secure Mode, if an Administrator or Level 1 user account is active, that account will have the option to delete the calibration log after it is exported. When the calibration log becomes full, it must be exported and then deleted before new calibration logs can be saved.

3.6 Methods

Tap the Methods option in the Main Menu to access the methods list.

Methods offer the option to save measurement settings to standardize analyses and SOPs.

From the methods list, create new methods; load, view and edit existing methods; export existing methods to a USB flash drive and import methods from a USB flash drive.



3.6.1 Create a New Method

Create up to 10 methods.

1. From the methods list, tap the + icon to create a new method.
2. Set the desired settings for the method.
3. Tap the Save button to save the settings to the new method.
4. Use the alphanumeric keypad to enter the method name using up to 20 characters and then tap the Save button.
5. The new method will be added to the list of methods.

3.6.2 View and Load an Existing Method

1. From the methods list, tap the load (triangle) icon or view (eye) icon to view the method summary information for an existing method on the list.
2. From the method summary screen, perform one of the following actions:
 - a. Tap the Load button to load the method to the measure mode. The meter will use the

settings from the loaded method for all subsequent measurements.

- b. Tap the back arrow to return to the methods list without loading the method.

3.6.3 Edit an Existing Method

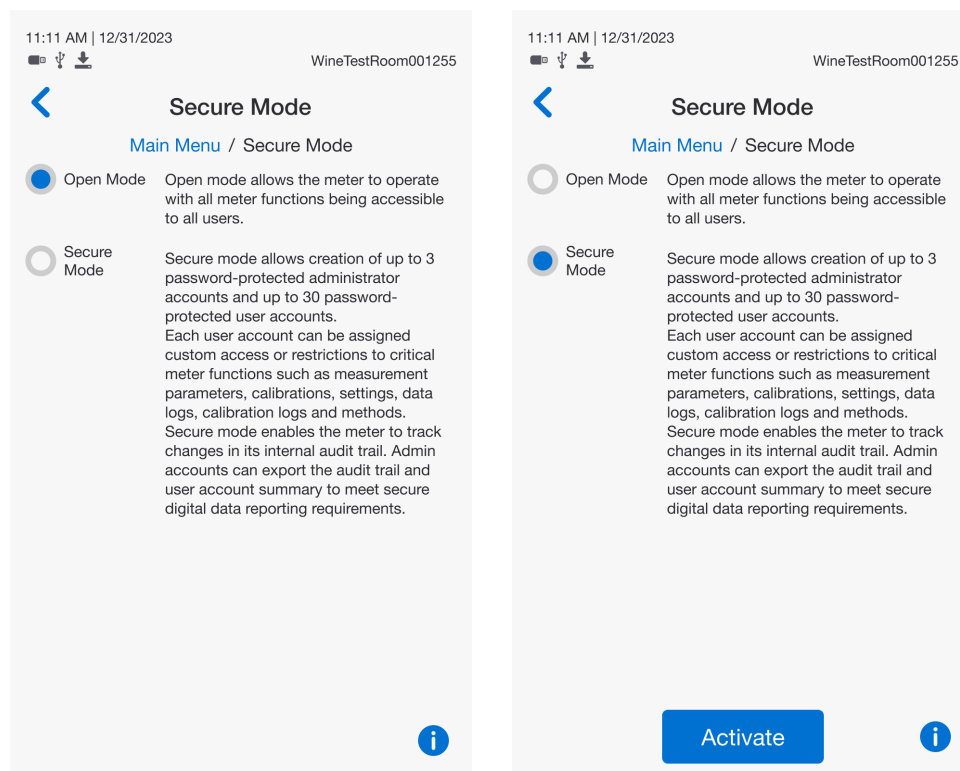
1. From the methods list, tap the edit (pencil) icon to edit an existing method on the list.
2. Update all desired settings for the selected method.
3. Tap the Save button to save the changes made to the method.
4. Use the alphanumeric keyboard to make any desired changes to the method name and then tap the Save button.
5. From the method summary screen, perform one of the following actions:
 - a. Tap the Load button to load the method to the measure mode. The meter will use the settings from the loaded method for all subsequent measurements.
 - b. Tap the back arrow to return to the methods list without loading the method.

3.6.4 Delete an Existing Method

1. From the methods list, tap the edit (pencil) icon to delete an existing method on the list.
2. Tap the Delete button to delete the selected method.
3. Confirm you want to delete the method by tapping the Delete button again.
4. The meter will return to the methods list and the selected method will be removed.

3.7 Secure Mode

Tap the Secure Mode option in the Main Menu to access the secure mode function.



Select the Secure Mode option and tap the Activate button to initiate the Secure Mode.

Once the Secure Mode is activated, create up to 3 administrator and 30 user accounts, each with unique username, password and customized meter access. User permissions are customizable to control each user's access to critical meter settings and functions including date and time settings, instrument settings, methods, calibrations, measurements, data logs and calibration logs. This helps prevent accidental changes by inexperienced or unauthorized users. Administrators can also export the user list and audit trail to ensure data integrity.

3.7.1 Administrator Account Functions

Only admin accounts can create new accounts, edit other user accounts, export the user list, view and export the audit trail, set the password expiration time, deactivate secure mode, set the sleep mode in instrument settings, set the date and time in instrument settings, perform a meter reset and perform a software update.

3.7.1.1 Create First Admin Account

Once the secure mode is activated, an admin account must be created next.

1. Follow all onscreen prompts to enter the first name, last name, username, email, password and 3 security questions for the first admin account.
 - a. The password must contain at least 1 number, 1 uppercase letter, 1 lowercase letter, and 1 special character and must be 6-12 characters long.

2. Tap the Save button.
3. Login to the meter using the created username and password.
4. Create new admin or user accounts, set the password expiration time, set the sleep mode in instrument settings and verify the date and time in instrument settings.

3.7.1.2 Create New Account (Admin Only)

Create up to 2 additional admin accounts and up to 30 user accounts.

1. Tap the Secure Mode option in the Main Menu to access the secure mode list for admins.
2. Tap the User Accounts option.
3. Tap the Add User button.
4. Follow all onscreen prompts to enter the first name, last name, username, email, password and access level for the account. Account access levels are shown in the table below:

Meter Function	Admin	1	2	3	Custom
Help & Information					
Meter Reset	•	---	---	---	---
Meter Software Update	•	---	---	---	---
Meter Tests & Troubleshooting	•	•	•	---	admin set
Settings					
Instrument Settings	•	•	---	---	admin set
Sleep Mode, Date and Time	•	---	---	---	---
DO Settings	•	•	---	---	admin set
Data Log					
Data Log Delete	•	•	---	---	admin set
Data Log Export	•	•	---	---	admin set
Data Log View	•	•	•	---	admin set
Calibration Log					
Calibration Log Delete	•	•	---	---	admin set
Calibration Log Export	•	•	---	---	admin set
Calibration Log View	•	•	•	---	admin set
Methods					
Create Method	•	•	---	---	admin set
Edit Method	•	•	---	---	admin set
Import Method	•	•	---	---	admin set
Load Method	•	•	•	---	admin set
Calibration					
Calibrate	•	•	•	---	admin set
Measure					
Graph	•	•	•	---	admin set
Ready Type	•	•	•	---	admin set
Mode	•	•	•	---	admin set
Sample ID	•	•	•	---	admin set
Obtain Measurements	•	•	•	•	•

5. Record the username and temporary password.
 - a. The first time the user logs into their account, they will need to enter the temporary password and then create their own password.

- b. The first time a new admin logs into their account, they will also need to create 3 security questions.
6. Tap the Save button.

3.7.1.3 Edit Existing Account (Admin Only)

Admins can modify the first name, last name, email and access level of active accounts as well as reset the password.

1. Tap the Secure Mode option in the Main Menu to access the secure mode list for admins.
2. Tap the User Accounts option.
3. Tap the username of the account to be edited.
4. Make any required changes to the account.
 - a. If making changes to an admin account, the 3 security questions can also be modified.
 - b. If making changes to another account, the password can be reset to a temporary password and the user of that account will need to enter the temporary password and then select a new password the next time they login to the meter.
 - c. If making changes to your own account, the password can be updated permanently.
5. Tap the Save button.

3.7.1.4 Audit Trail (Admin Only)

Admin accounts can view, export and delete the audit trail. The audit trail records when accounts login and logout, incorrect login attempts, account changes or password resets, changes to instrument settings, modifications to data logs and calibration logs, modifications to methods, meter software updates and meter resets.

1. Tap the Secure Mode option in the Main Menu to access the secure mode list for admins.
2. Tap the Secure Mode Parameters option.
3. Tap the Audit Trail option.
4. The audit trail can be viewed and exported.
 - a. Once the audit trail is exported, the admin will have the option to delete it. When the audit trail becomes full, it must be exported and then deleted before new audit trail actions can be saved.
5. Tap the back arrow to return to the Secure Mode Parameters screen.

3.7.1.5 Set Password Expiration Time (Admin Only)

Set the password expiration time to 1 month, 3 months, 6 months or 12 months.

1. Tap the Secure Mode option in the Main Menu to access the secure mode list for admins.
2. Tap the Secure Mode Parameters option.

3. Expand the Password Expiration Time option and select the desired expiration period.
4. Tap the Save button.

3.7.1.6 Deactivate Secure Mode (Admin Only)

Deactivate the secure mode and revert the meter to open mode. When secure mode is deactivated, all admin and user login and logout functionality is removed, all meter access restrictions are removed, the audit trail is erased and all user accounts are deactivated.

1. Tap the Secure Mode option in the Main Menu to access the secure mode list for admins.
2. Tap the Secure Mode Parameters option.
3. Tap the Deactivate Secure Mode option.
4. Confirm that you want to deactivate secure mode and tap the Continue button.
5. Select your username, enter your password and tap the Deactivate button.
6. Wait while the meter deactivates secure mode and then use the meter in open mode.

3.7.2 User Account Functions

User accounts can edit their account information in the secure mode.

3.7.2.1 Edit Own User Account

1. Tap the Secure Mode option in the Main Menu to access the secure mode list for users.
2. Tap the User Accounts option.
3. Tap your username.
4. Make any required changes to your account.
5. Tap the Save button.

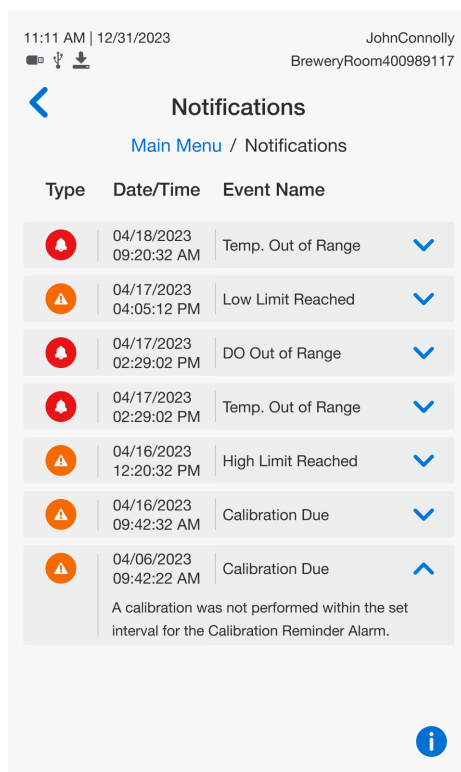
3.7.3 Meter Logout and Login

Logout of the meter whenever it will not be in use. The meter will automatically logout of an account when the sleep mode period of inactivity is reached or when the meter is powered off.

1. To logout of the meter in the measure mode, tap your username in the top right corner of the display. Confirm you want to logout and tap the Logout button.
2. To logout of the meter in the secure mode, tap the Secure Mode option in the Main Menu to access the secure mode list. Tap the Logout button. Confirm you want to logout and tap the Logout button.
3. When no account is logged into the meter, the login screen will be displayed. To login to the meter, select your username and enter your password.

3.8 Notifications

Tap the Notifications option in the Main Menu to view a list of the latest warnings and errors that have been shown on the meter.

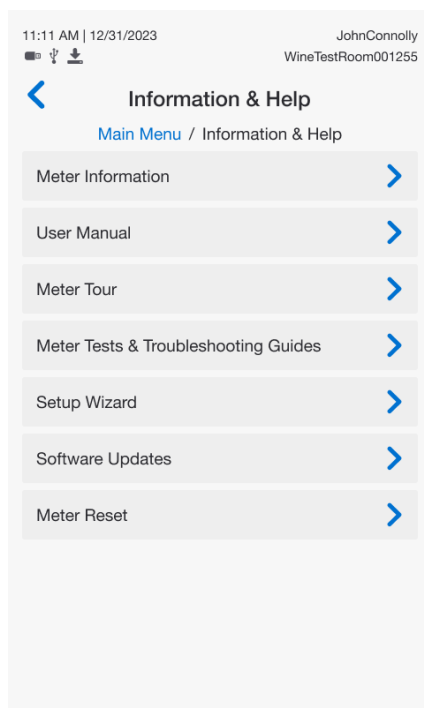


Onscreen notifications include info, success, warning and error notifications.

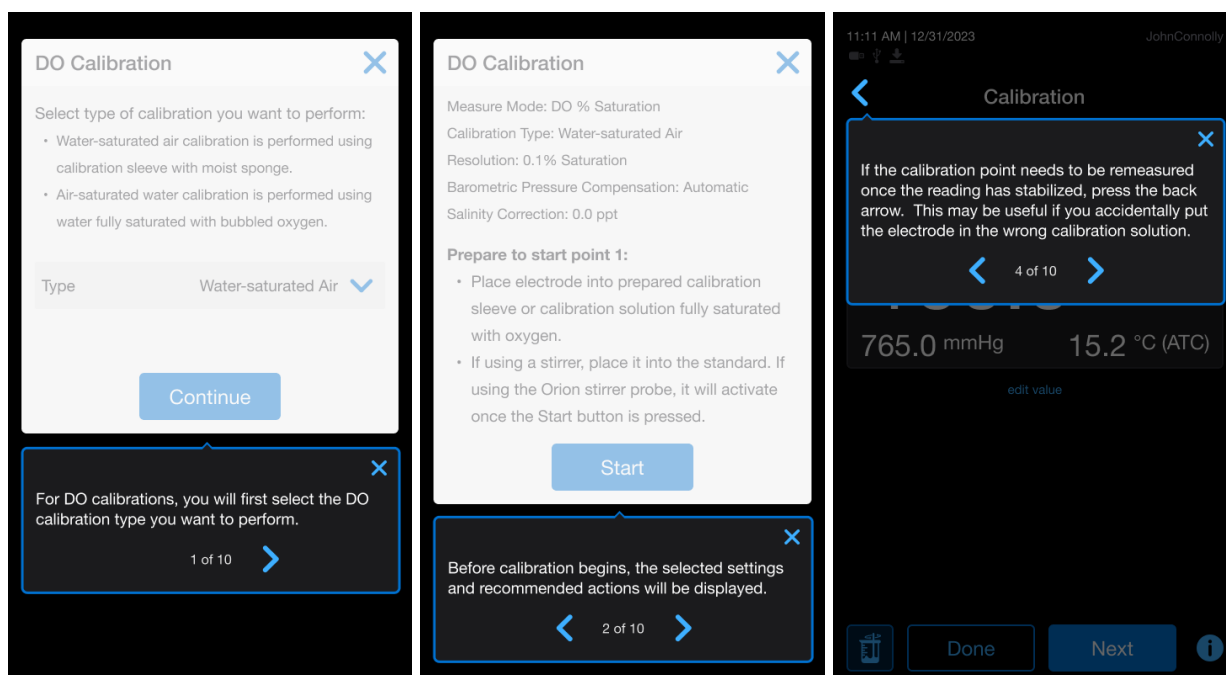
Icon	Notification Description
	Info notifications are triggered when there is a recommendation for the user to perform an action. Example: when it is recommended that the user performs a calibration.
	Success notifications are triggered when an action was completed correctly. Example: When a measurement is successfully logged and exported.
	Warning notifications are triggered when a user set reminder or alarm is activated or when an issue occurs that the user should address. Example: When no calibration is performed for 8 hours and the calibration alarm is set.
	Error notifications are triggered when there is a critical issue that needs immediate attention that the user must address before continuing to use the meter. Example: When the DO measurement is outside the acceptable range of 0.01 to 90.0 mg/L.

3.9 Information & Help

Tap the Information & Help option in the Main Menu to access the meter info, user manual, meter tours, meter tests and troubleshooting guides, setup wizard, software updates and meter reset.



- **Meter Information:** View the meter model, type, serial number and current software version.
- **User Manual:** Access the meter user manual on the meter's display for easy access and use.
- **Meter Tours:** View onscreen tours to learn important meter functions. Tours include DO calibration, measurements, meter connections and electrode stand assembly. The following are example screens from the DO calibration tour:



- **Meter Tests & Troubleshooting Guides:** Perform a meter self test or electrode stability test for troubleshooting purposes. Select the type of test and follow all onscreen prompts to perform the selected test.
 - **Meter Self Test:** Meter will perform a series of internal verification tests to ensure the meter is functioning according to specifications.
 - **Stability Test:** Meter will test the stability performance of an electrode by measuring the electrode's raw input reading per minute drift and noise.
- **Setup Wizard:** Relaunch the meter setup wizard and follow the displayed steps to set critical meter and measurement settings.
- **Software Updates:** Follow onscreen prompts to install the latest meter software version. Refer to the [6.3 Meter Software Update Procedure](#) section for detailed instructions.
- **Meter Reset:** Perform a meter reset for troubleshooting purposes and select the type of reset. Follow all onscreen prompts to perform the selected reset.
 - **Settings Reset:** Erases all meter settings and restores meter settings to their factory default states; however, does not modify the meter's data log, calibration log, methods or secure mode. Performing the Settings Reset is helpful for troubleshooting when a meter setting is suspected to be the root cause of an issue.
 - **Factory Reset:** Restores the meter to its factory default state and erases all meter settings, data log, calibration log, methods, and secure mode settings and data. Performing the Factory Reset is helpful for troubleshooting when the root cause of a meter issue cannot be determined.
 - **Note:** Backup all data before performing a factory reset, as it will be erased when the factory reset is completed.

Note: If Secure Mode is enabled, not all options may be accessible to users in the Information & Help list, depending on each user's meter permissions.

Chapter 4

Calibration

4.1 Dissolved Oxygen Calibration

Refer to the [3.9 Information & Help](#) section and Meter Tours to access onscreen tours that explain how to use important meter functions including DO calibration.

Refer to the [3.2.2 DO Settings](#) section and Alarm Settings to use the Calibration Reminder Alarm to set a reminder if a calibration is not performed within the selected time interval.

4.1.1 DO Calibration Overview

For best results, periodic calibration is recommended.

The meter will apply the most recent dissolved oxygen calibration to all dissolved oxygen measurements, including both % saturation measurements and concentration measurements.

- **% Saturation, Air:** Calibration method that uses water-saturated air produced in a calibration sleeve with moist sponge for a 100% saturation standard. It is typically the simplest and most accurate DO calibration method. For best accuracy, the calibration temperature should match the expected sample temperature.
 - Under equilibrium conditions, the partial pressure of oxygen in air-saturated-water is equal to the partial pressure of oxygen in water-saturated air (air at 100% relative humidity). A DO electrode calibrated in water-saturated air will correctly read the partial pressure of oxygen in a water sample.
 - The % Saturation, Air calibration method has an option to perform a second point for a 0% saturation standard. This uses an oxygen-free solution and is generally recommended when measurements will be below 10% saturation or 1 mg/L.
- **% Saturation, Water:** Calibration method that uses air-saturated water produced in water with air bubbled into it until it is 100% saturated.
 - The % Saturation, Water calibration method has an option to perform a second point for a 0% saturation standard. This uses an oxygen-free solution and is recommended when measurements will be below 10% saturation or 1 mg/L.
- **Concentration, Manual:** Calibration method that uses a standard with known dissolved oxygen concentration value. It is typically used to calibrate the DO electrode to the value achieved by a Winkler titration. However, due to possible titration errors, this method may be less accurate.
- To eliminate temperature errors associated with DO, use a DO electrode with built-in temperature sensor for best accuracy.

Dissolved oxygen levels vary with temperature, barometric pressure and salinity, so calibration must

be performed with consideration of these factors. It is necessary to set the proper temperature, barometric pressure and salinity values prior to performing any DO calibration or measurement.

The non-volatile meter memory retains all data when powered off and in the event of power failure.

4.1.2 % Saturation DO Calibration Procedure

1. Ensure the active measure mode is set to DO.
 - a. If using a method, ensure the method is loaded and active.
2. Tap the Calibrate button to start the calibration.
3. Rinse the DO electrode with purified water and place into the prepared calibration sleeve, water sample, BOD bottle or airtight flask.
 - a. For % Saturation, Air: Use the calibration sleeve included with the Orion DO electrode. Moisten the sponge in the calibration sleeve with purified water and insert the DO electrode into the sleeve. Wait about 5 minutes for the system to equilibrate.
 - b. For % Saturation, Water: Bubble air into a water sample for an extended period, preferably overnight. Insert the DO electrode into the water sample with bubbled air.
 - i. If using a stirrer, place it into the water sample and begin stirring. If using the Orion stirrer probe, it will activate once the button is tapped.
 - c. For 0% Saturation: Prepare a sodium sulfite solution by dissolving approximately 15.0 g Na_2SO_3 in 250 mL distilled water. Transfer the solution to a BOD bottle or airtight flask and insert the DO electrode.
 - i. If using a stirrer, place it into the sodium sulfite solution and begin stirring. If using the Orion stirrer probe, it will activate once the button is tapped.
4. Review the onscreen instructions, then tap the Start button (or Continue button) to begin measuring.
5. Wait for the DO value to stabilize. Once the reading is stable, the 100% value is shown.
6. Proceed to the next calibration point or end the calibration:
 - a. To proceed to the next calibration point, tap the Next button.
 - i. If using the Orion stirrer probe, it will deactivate once the Next button is tapped.
 - ii. Repeat steps 3 to 5 for the 0% saturation solution.
 - b. To complete the calibration, tap the Done button.
7. The meter will automatically save the calibration info to the calibration log and display a summary of the calibration. Tap the Measure button to proceed to the main measure mode.

Calibration Notes

- If a calibration point needs to be remeasured after the reading has stabilized, tap the back arrow. This may be useful if you accidentally put the electrode in the wrong solution.
- If a reading takes longer than 90 seconds to stabilize during the calibration, the [force stabilize](#)

text will appear. This may be helpful if the electrode is responding more slowly than usual. Tap the [force stabilize](#) text to accelerate the reading stability (may give less accurate calibration results).

4.1.3 Concentration DO Calibration Procedure

1. Ensure the active measure mode is set to DO.
 - a. If using a method, ensure the method is loaded and active.
2. Tap the Calibrate button to start the calibration.
3. Rinse the DO electrode with purified water and place into the solution with known dissolved oxygen concentration. A BOD bottle or airtight flask is recommended.
 - a. If using a stirrer, place it into the solution and begin stirring. If using the Orion stirrer probe, it will activate once the button is tapped.
4. Review the onscreen instructions, then tap the Start button to begin measuring.
5. Wait for the DO value to stabilize. Once the reading is stable, enter the value of the solution.
 - a. To edit the DO value, tap the [edit value](#) text.
 - b. Tap the DO value, then use the numeric keypad to enter the desired DO value.
 - c. Tap the Save button to save the entered value.
6. To complete the calibration, tap the Done button.
7. The meter will automatically save the calibration info to the calibration log and display a summary of the calibration. Tap the Measure button to proceed to the main measure mode.

Calibration Notes

- If a calibration point needs to be remeasured after the reading has stabilized, tap the back arrow. This may be useful if you accidentally put the electrode in the wrong solution.
- If a reading takes longer than 90 seconds to stabilize during the calibration, the [force stabilize](#) text will appear. This may be helpful if the electrode is responding more slowly than usual. Tap the [force stabilize](#) text to accelerate the reading stability (may give less accurate calibration results).

4.2 Temperature Calibration

4.2.1 Temperature Calibration Overview

The thermistor sensor used for automatic temperature compensation (ATC) and measurements is both accurate and stable, so frequent calibration is not required. If desired, perform a temperature calibration to calibrate the ATC sensor when it is connected to the meter. A 1 to 2 point temperature offset calibration can be performed, up to $\pm 5.0^{\circ}\text{C}$ for each calibration point.

4.2.2 Temperature Calibration Procedure

1. Tap the Main Menu icon in the measure mode to access the Main Menu.
2. Tap the Calibrate option in the Main Menu.
3. Tap the Temperature Calibration option in the Calibrate list.
4. Place the ATC sensor into a solution with a known, stable temperature and NIST traceable thermometer.
 - a. If using a stirrer, place it into the solution and begin stirring. If using the Orion stirrer probe, it will activate once the Start button is tapped.
5. Tap the Start button to begin measuring the solution.
6. Wait for the temperature value to stabilize. Once the reading is stable, the ATC temperature value is shown and the edit screen will appear.
 - a. Tap the temperature value and use the numeric keypad to enter the desired temperature value from the NIST traceable thermometer.
 - b. Tap the Save button to save the entered value.
7. Proceed to the next calibration point or end the calibration:
 - a. To proceed to the next calibration point, tap the Next button.
 - i. If using the Orion stirrer probe, it will deactivate once the Next button is tapped.
 - ii. Repeat steps 5-7 for the second calibration point.
 - b. To complete the calibration, tap the Done button.
8. The meter will automatically save the calibration info to the calibration log and display a summary of the calibration. Tap the Measure button to proceed to the main measure mode.

4.3 Barometer Calibration

4.3.1 Barometer Calibration Overview

The barometer built into the meter and used for barometric pressure measurements is accurate and stable, so frequent calibration is not required. If desired, perform a barometric pressure calibration to calibrate the barometer. A 1 point offset calibration can be performed, up to ± 15 mmHg or ± 0.02 bar.

4.3.2 Barometer Calibration Procedure

1. Tap the Main Menu icon in the measure mode to access the Main Menu.
2. Tap the Calibrate option in the Main Menu.
3. Tap the Barometric Pressure Calibration option in the Calibrate list.
4. Tap the Start button to begin measuring the barometric pressure.
5. Wait for the barometric pressure value to stabilize. Once the reading is stable, the barometric pressure temperature value is shown and the edit screen will appear.
 - a. Tap the barometric pressure value and use the numeric keypad to enter the desired barometric pressure value.
 - b. Tap the Save button to save the entered value.
6. To complete the calibration, tap the Done button.

The meter will automatically save the calibration info to the calibration log and display a summary of the calibration. Tap the Measure button to proceed to the main measure mode.

Chapter 5

Measurements

5.1 Measure Mode Overview

Refer to the [3.9 Information & Help](#) section and Meter Tours to access onscreen tours that explain how to use important meter functions including measurements.

The Orion Pro Star DO213 meter is capable of measuring dissolved oxygen as % saturation or concentration in ppm or mg/L with barometric pressure and temperature.

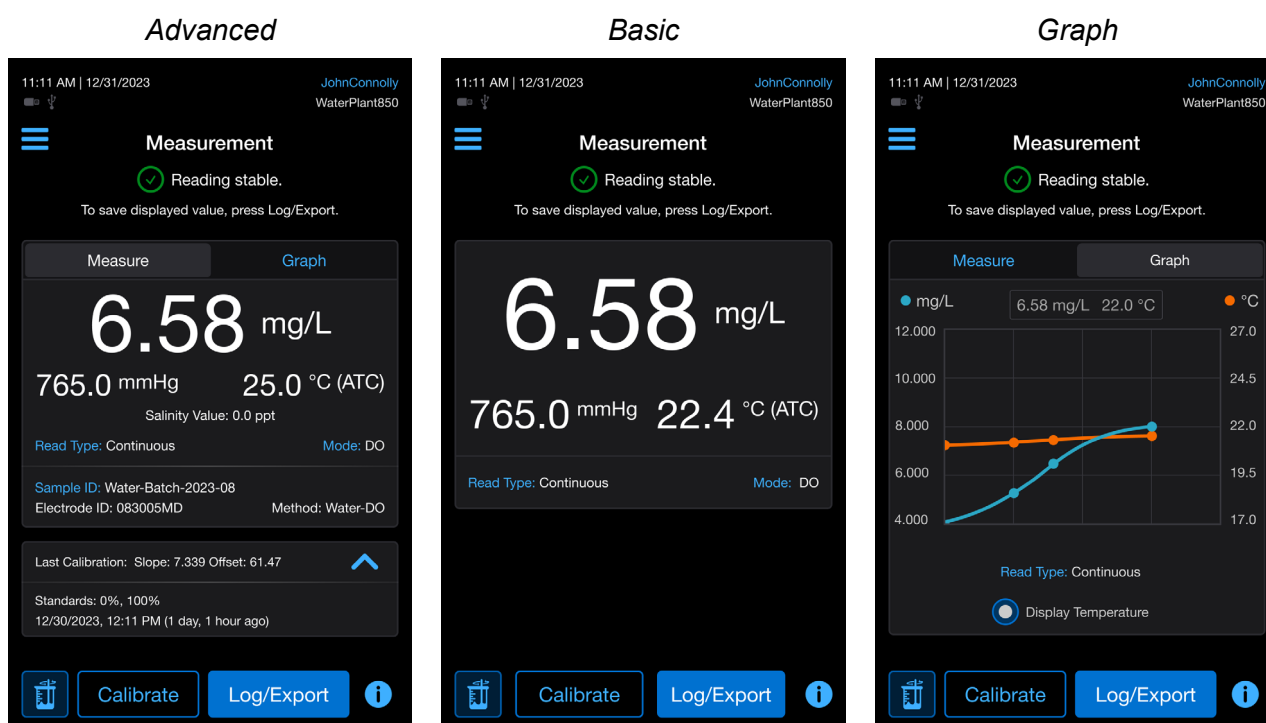
Refer to the [2.5 Touchscreen Functions](#) section for details on the display components and icons. Key interaction points on the screen are [blue](#) for easy navigation. Optionally, a USB mouse can be used to operate the touchscreen interface.

Change the Measurement Mode

Tap the blue [Mode](#) text to change the measurement mode. Set the mode to dissolved oxygen as % saturation, concentration in mg/L or concentration in ppm.

Customize the Display View

Refer to the [3.2.1 Instrument Settings](#) section and Display settings to customize the information shown in the measure mode, including the sample ID, electrode ID and calibration information. Alternatively, select Basic as the Custom Measure Layout in the Display settings to view a simplified measure mode with less information. The measurements can also be viewed as a graph.



View Active Calibration Details

Mode	Example Calibration Details	Notes
DO Calibration	Last Calibration: Slope: 7.339 Offset: 61.47  Standards: 0%, 100% 12/30/2023, 12:11 PM (1 day, 1 hour ago)	Calibration of a polarographic DO electrode.
Optical DO Calibration	Last Calibration: Slope: 7.339 Offset: 61.47   Standards: 0%, 100% 12/30/2023, 12:11 PM (1 day, 1 hour ago) Remaining Cap Life: 190 days	Calibration of an optical DO electrode. Optical DO calibration details include the optical cap life icon, which shows: 3 green bars ≥180+ days remain 2 orange bars = 31 to 180 days remain 1 red bar ≤30 days remain

5.1.1 Measure Mode Read Types

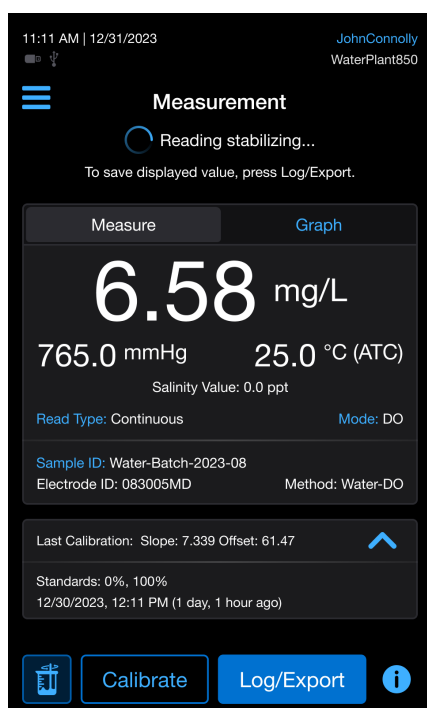
Refer to the [3.2.1 Instrument Settings](#) section and Read Type setting to define how measurements are performed, saved and exported. Tap the blue **Read Type** text to change the selected read type.

Continuous Read Type

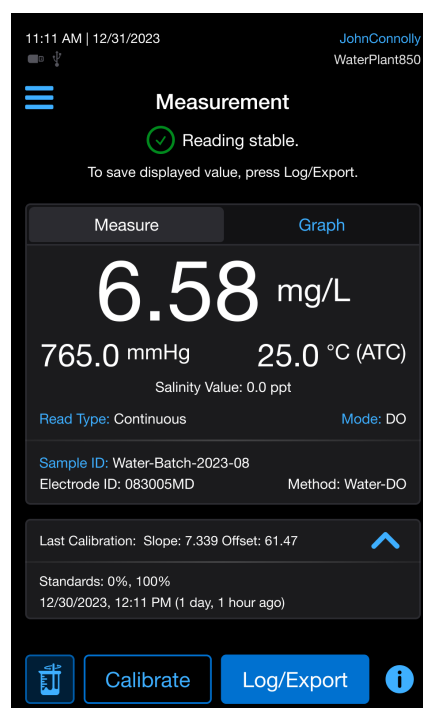
When Continuous is selected as the read type:

- Measurements are continuously updated on the display and the stabilizing or stable icon indicates the measurement stability status.
- Tap the Log/Export button to save a measurement to the data log and export it to an external device according to the Data Transfer Settings in the [3.2.1 Instrument Settings](#) section.
- Tap the Stirrer button to turn the Orion stirrer probe on and off.

Continuous, Reading Stabilizing



Continuous, Reading Stable

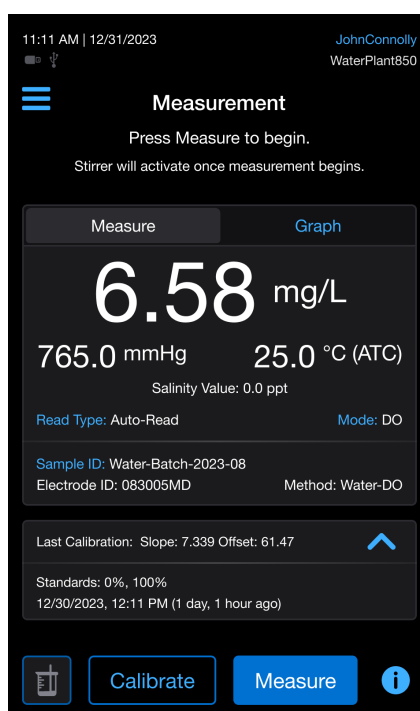


Auto-Read Read Type

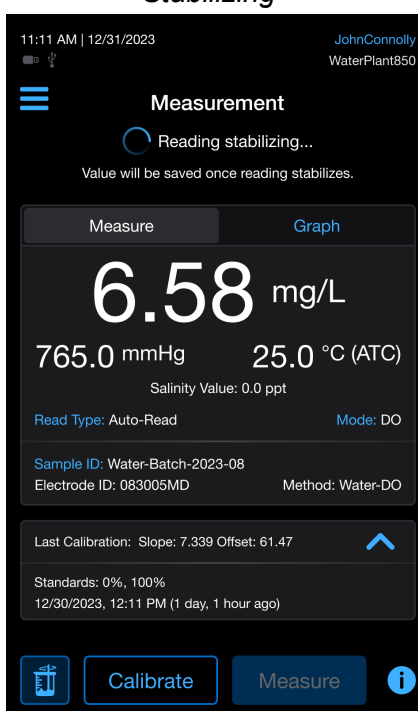
When Auto-Read is selected as the read type:

- Tap the Measure button to start a measurement.
- When the measurement is stable, the stable icon is shown and the measurement is locked on the display until the Measure button is tapped again.
- The stable measurement is automatically saved to the data log and exported to an external device according to the Data Transfer Settings in the [3.2.1 Instrument Settings](#) section.
- Tap the Measure button to start a new measurement.
- The Orion stirrer probe will turn on automatically when the Measure button is tapped. When on, tap the Stirrer button to manually turn off the stirrer probe. The Orion stirrer probe will turn off automatically when the measurement is stable and locked.

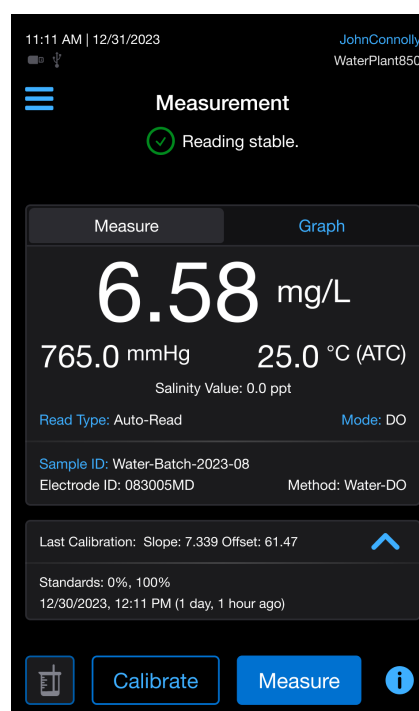
Auto-Read, Waiting



Auto-Read, Reading Stabilizing



Auto-Read, Reading Stable



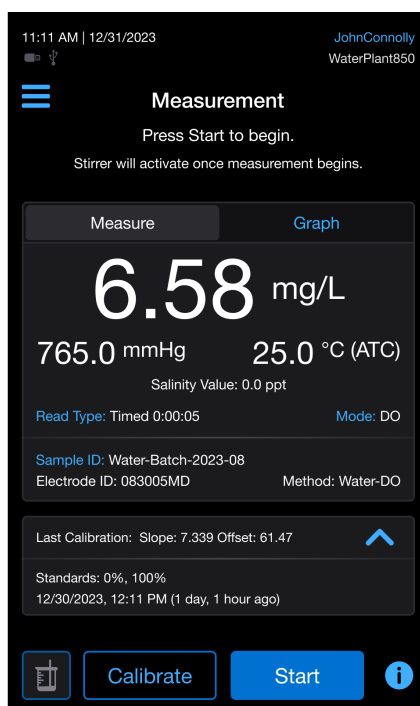
Timed Read Type

Timed intervals can be set from 3 seconds (0:00:03) to 2 hours (2:00:00). When Timed is selected as the read type:

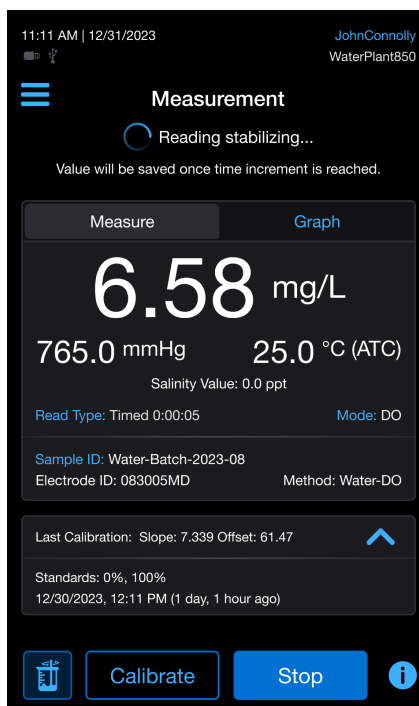
- Tap the Start button to start taking timed measurements. Measurement values are continuously updated on the display.
- Measurements are automatically saved at the selected time intervals to the data log and exported to an external device according to the Data Transfer Settings in the [3.2.1 Instrument Settings](#) section.
- Tap the Stop button or leave the measure mode to stop taking timed measurements.
- The Orion stirrer probe will turn on automatically when the Start button is tapped. When on,

tap the Stirrer button to manually turn off the Orion stirrer probe. The Orion stirrer probe will turn off automatically when the Stop button is tapped.

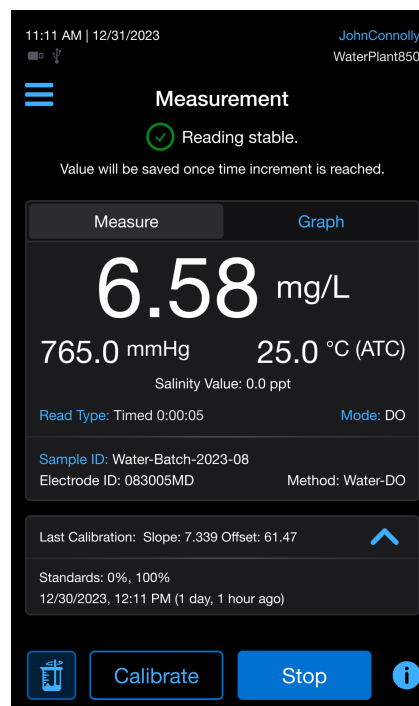
Timed, Waiting



Timed, Reading Stabilizing



Timed, Reading Stable



5.1.2 Sample ID

When using Sample ID to identify samples with measurements, refer to the [3.2.2 DO Settings](#) section and Sample ID setting to turn on sample ID, set the type of sample ID and enter the ID.

Set the Sample ID to Auto-incremental, Manual or Off.

- Auto-incremental: Enter up to 20 alphanumeric characters. The meter will add “00001” to the end of the first sample ID and then automatically increase the sample ID by 1 for subsequent sample IDs.
 - Continuous Read Type: Sample ID will increase when the Log/Export button is tapped.
 - Auto-Read Read Type: Sample ID will increase when the Measure button is tapped.
 - Timed Read Type: Sample ID will increase when the Start button is tapped and each time interval is reached (3 seconds to 2 hours).
- Manual: Enter up to 25 alphanumeric characters or select from the list of previously entered sample IDs.
 - Continuous Read Type: Sample ID entry field will appear when the Log/Export button is tapped. Select the Apply ID to Multiple Readings option to use the same sample ID for subsequent readings and stop the Sample ID entry field from appearing.
 - Auto-Read Read Type: Sample ID entry field will appear when the Measure button is tapped. Select the Apply ID to Multiple Readings option to use the same sample ID

for subsequent readings and stop the Sample ID entry field from appearing.

- Timed Read Type: Sample ID entry field will appear when the Start button is tapped and each time interval is reached (3 seconds to 2 hours). Select the Apply ID to Multiple Readings option to use the same sample ID for subsequent readings and stop the Sample ID entry field from appearing.
- Off: No sample ID is shown for measurements, logs or exported records.

In the measure mode, when sample ID is set to auto-incremental or manual, the sample ID can also be entered by tapping the blue [Sample ID](#) text.

5.1.3 Stirrer Button

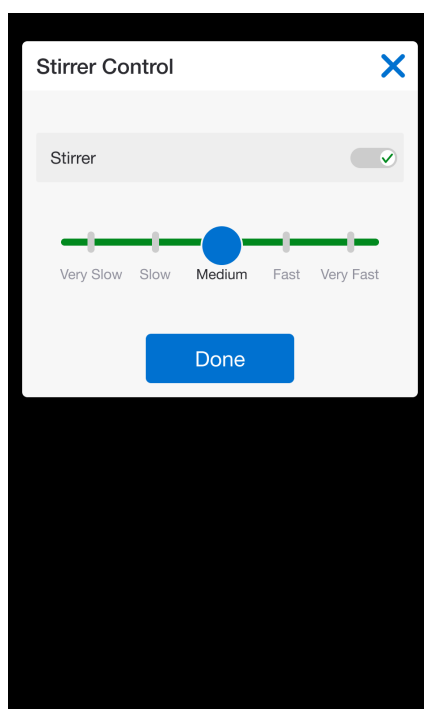
If using an Orion stirrer probe, the [3.2.2 DO Settings](#) section and Stirrer setting to turn the stirrer probe function off or on and set the default speed for the stirrer probe.

Refer to the [3.2.1 Instrument Settings](#) section and Read Type settings to define how the stirrer probe will function in the measure mode.

- Continuous Read Type: Tap the Stirrer button to turn the Orion stirrer probe on and off.
- Auto-Read Read Type: The Orion stirrer probe will turn on automatically when the Measure button is tapped. When on, tap the Stirrer button to manually turn off the stirrer probe. The Orion stirrer probe will turn off automatically when the measurement is stable and locked.
- Timed Read Type: The Orion stirrer probe will turn on automatically when the Start button is tapped. When on, tap the Stirrer button to manually turn off the Orion stirrer probe. The Orion stirrer probe will turn off automatically when the Stop button is tapped.

Press and hold the Stirrer button to access and change the stirrer control settings.

Note: The Stirrer button is hidden if the stirrer function is turned off.



5.2 General Measurement Procedure

Refer to the electrode manuals for detailed instructions on electrode preparation, calibration and usage. Make sure the electrodes are fully prepared, properly calibrated and working correctly before taking sample measurements.

Refer to the [3.2.1 Instrument Settings](#) section and Read Type settings to define how measurements are performed and when measurements are saved and exported.

If using an Orion stirrer probe, the refer to the [3.2.2 DO Settings](#) section and Stirrer setting to turn the stirrer probe function off or on and set the default speed for the stirrer probe.

1. Rinse the electrode with purified water or appropriate solution and lightly blot with a lint-free tissue to remove excess water or solution.
2. Place the electrode into the sample with the sensing element fully submerged in sample.
3. Start the measurement and wait for the reading to stabilize or reach the predefined time. The selected Read Type will determine how measurements are performed and how the Orion stirrer probe will operate:
 - a. Continuous: Wait for the Stable icon to appear.
 - i. Tap the Stirrer button to turn the stirrer probe on and off.
 - b. Auto-Read: Tap the Measure key and wait for the Stable icon to appear.
 - i. The stirrer probe will turn on automatically when the Measure button is tapped. When on, tap the Stirrer button to manually turn off the stirrer probe. The stirrer probe will turn off automatically when the measurement is stable and locked.
 - c. Timed: Tap the Start key and wait for the predefined time intervals to be reached.
 - i. The stirrer probe will turn on automatically when the Start button is tapped. Once on, tap the Stirrer button to manually turn off the stirrer probe. The stirrer probe will turn off automatically when the Stop button is tapped.
4. Record the displayed measurements as required.
5. Remove the electrode from the sample.
6. Repeat steps 1-5 for all samples.
7. When all samples have been measured, store the electrode according to the instructions in the electrode manual.

5.3 Data Viewing

Data Log

When saving measurements to the meter data log, refer to the [3.4 Data Logs](#) section for detailed information and instructions on viewing and exporting the meter's data log.

Save up to 10000 data logs in the meter's non-volatile memory. Each data log is saved with its associated date and time stamp.

- When in Open Mode, the meter will save up to 10000 data logs and then automatically overwrite the oldest data log with the newest data log when the limit is reached.
- When in Secure Mode, the meter will save up to 10000 data logs and then prompt the Administrator and Level 1 accounts to export and delete data logs when the limit is reached.

Calibration Log

Refer to the [3.5 Calibration Logs](#) section for detailed information and instructions on viewing and exporting the meter's calibration log.

Save up to 20 calibration logs per parameter in the meter's non-volatile memory. Each calibration log is saved with its associated date and time stamp.

- When in Open Mode, the meter will save up to 20 calibration logs per parameter and then automatically overwrite the oldest calibration log with the newest calibration log when the limit is reached.
- When in Secure Mode, the meter will save up to 20 calibration logs and prompt the Administrator and Level 1 accounts to export and delete calibration logs when the limit is reached.

Chapter 6

Data Exporting and Importing

6.1 Data Transfer

Export live measurements, completed calibrations, data logs, calibration logs, methods, user lists (Secure Mode only) and audit trails (Secure Mode only) from the meter to a USB flash drive, computer or Orion ink printer (catalog number STARA-106).

To successfully export data:

1. Set all required data transfer settings in the Instrument Settings menu.
 - a. If interfacing with a computer, set the meter's date and time settings to match the computer's date and time settings.
2. Fully connect the meter to the external device.
3. Verify that the destination for data to be transferred is fully functional.

6.1.1 Data Transfer Settings

Refer to the [3.2.1 Instrument Settings](#) section and Data Transfer Settings to set all required options.

- Export Destination: Select one external device destination.
 - USB Drive: Data is exported to a USB flash drive when it is connected to the USB port on the side of the meter. Methods and software updates can also be imported from the USB flash drive to the meter.
 - Computer: Data is exported to a computer when it is connected to the Export port on the back of the meter using the included USB cable.
 - Printer: Data is exported to the Orion ink printer when it is connected to the Export port on the back of the meter using the printer cable included with the printer.
- Export Output Format: Set the format of exported files (for USB Drive and Computer only).
 - CSV (Comma Separated Values): Plain text file with data delimited by commas, useful for importing into LIMS and spreadsheet programs.
 - Report: Formatted file with organized data, useful for hardcopy records.
- Export Baud Rate: Set the data transfer baud rate (for Computer and Printer only).
- Custom Data Log Export: Select the amount of information to be exported from the data log. Select the "All Data" option when exporting data to LIMS software.
- Custom Calibration Log Export: Select the amount of information to be exported from the calibration log. Select the "All Data" option when exporting data to LIMS software.

6.1.2 Connect the External Device

USB Flash Drive

For data transfer using a USB flash drive:

- Power on the meter.
- Insert a USB flash drive with USB-A plug into the USB meter input.

Computer

For data transfer using a computer:

- Power on the meter.
- Use the included USB computer cable and insert the cable into the Export meter input.
- Insert the USB computer cable into a standard USB-A port on the computer.
- Once the cable is connected with the computer, the computer should automatically identify the cable and install the required driver.
 - If the driver is not automatically installed, go to www.thermofisher.com/orionsoftware and download the driver for Orion Pro Star meters.
- Record the COM port location of the computer cable using the computer's Device Manager tool.
- Once the driver is installed, data can be transferred from the meter to a computer using a computer program such as LIMS, Putty, LabView, HyperTerminal or similar program.
 - Review the computer program's data transfer settings and adjust if required to ensure the meter can fully communicate with the computer program.

Printer

For data transfer using the Orion ink printer (catalog number STARA-106):

- Power on the meter.
- Use the printer cable included with the printer and insert the cable into the Export meter input.
- Insert the cable into a communication port on the printer. If needed, use the adapter cable included with the printer to match the current printer port type with the cable.
- Power on the printer. The printer data transfer settings are pre-matched to the meter settings.

Meter Serial Communication Protocol

Computer Setting	Printer Setting
Baud Rate: 115200 bps	Baud Rate: 9600 bps
Data bits: 8	Data bits: 8
Parity: None	Parity: None
Stop bits: 1	Stop bits: 1
Flow Control: None	Flow Control: None

6.1.3 Verify the Data Destination

USB Flash Drive

For data transfer using a USB flash drive, perform a test export of data from the meter to the USB flash drive. Remove the USB flash drive from the meter, insert it in a computer and open the test export on the computer. Once the test is completed successfully, the data destination has been verified.

Computer

For data transfer using a computer, perform a test export of data from the meter to the selected computer program (LIMS, Putty, LabView, HyperTerminal, etc.). The meter's data transfer settings and date and time settings must match the computer program's data transfer settings and date and time settings. Verify the test export was successfully received by the selected computer program, the data is mapped as expected, in the expected format. Once the test is completed successfully, the data destination has been verified.

Printer

For data transfer using the Orion ink printer (catalog number STARA-106), perform a test export of data from the meter to the selected computer program. The meter's data transfer settings must match the printer's data transfer settings. Verify the test export was successfully received by the printer and the test data is printed properly. Once the test is completed successfully, the data destination has been verified.

6.2 Remote Commands

Remote commands allow the meter to be interfaced with computer software like LIMS, Putty, LabView and HyperTerminal.

Note: *When interfacing the meter with LIMS (Laboratory Information Management System), it is recommended that a systems integration specialist ensure the software and hardware components are interfaced correctly.*

The remote engine receives input from the serial port and processes it. Commands sent to the remote interface will be in the form of "OPCODE <OPERAND> CR".

- Only 1 command can be executed at a time. A new command cannot be issued until the previous command is done and prompt is given, shown as the greater than symbol (">") followed by a space.
- Empty commands (i.e. just a <CR>) will be ignored and a new prompt will be issued.
- <CR> (Carriage Return, ASCII 13) is used to terminate a command. Whenever this character is received, the internal buffer will be processed.
- Remote commands are not case sensitive.

Remote Commands List

Remote Command	Action	Example Command
PGETMEAS <CR>	Exports the current measurement of all active channels on the display	PGETMEAS
PGETMEAS <u>Data Count</u> <CR>	Exports the current measurement for a set number of times <u>Data Count</u> = <u>1</u> , <u>2</u> , <u>3</u> , etc.	PGETMEAS 2
GETCALLOG <CR>	Exports all current calibration data If no calibration is saved, returns ">" to receive next command	GETCALLOG
GETCALLOG <u>MODE</u> <CR>	Exports the calibration data for a specific mode <u>MODE</u> = pH = <u>0</u> , ORP = <u>2</u> , Ion = <u>3</u> Conductivity = <u>4</u> , TDS = <u>5</u> , Salinity = <u>6</u> DO % Sat. = 8, DO mg/L = 9, DO ppm = 10 RDO % Sat. = 11, RDO mg/L = 12, RDO ppm = 13	GETCALCAL 0
GETDATALOG <CR>	Exports all logged measurement data Output format is based on the Log Export Type setting If no data is logged, returns ">" to receive next command	GETDATALOG
SYSTEM <CR>	Exports the system information including meter model, serial number, software version, date and time	SYSTEM
SETCSV <CR>	Sets the output format to Comma Separated Values (CSV)	SETCSV
SETEXPORTFORMAT <u>FORMAT</u> <CR>	Sets the data export format. <u>FORMAT</u> = <u>CSV</u> or <u>REPORT</u>	SETEXPORTFORMAT REPORT
SETRTC <u>DD MM YY HH MM SS</u> <CR>	Sets the date and time for the meter DD = Day, MM = Month, YY = last two digits of year, HH = hours in 24 hour format, MM = minutes, SS = seconds	SETRTC 28 12 25 14 22 00
GETRTC <CR>	Exports the current date and time for the meter	GETRTC
SETMODE <u>MODE</u> <CR>	Sets the meter measurement mode <u>MODE</u> = pH = <u>0</u> , mV = <u>1</u> , ORP = <u>2</u> , Ion = <u>3</u> Conductivity = <u>4</u> , TDS = <u>5</u> , Salinity = <u>6</u> , resistivity = <u>7</u> DO % Sat. = 8, DO mg/L = 9, DO ppm = 10	SETMODE 0
GETMODE <CR>	Exports the active measurement mode of all active channels on the display	GETMODE

6.2.1 CSV Measurement Examples

Note: The information exported by each meter will vary depending on its measurement capabilities, software revision, settings and specific record being exported. The information below is provided for general guidance only and is based on an Orion Pro Star MP218 multiparameter (software revision 1.70) with all data fields enabled for custom export settings. **Verify your meter's specific export configuration using the appropriate remote commands.**

Measure Mode	CSV Record Example CSV Header Example
pH	4, 01/30/2026, 11:22:06, AM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 01/30/2026, 11:22:06, AM, JaneSmith, JaneSmith, pH, 6.470, pH, 20.000, pH, -2.000, pH, 30.0, mV, 25.0, C, (MAN), 100.1, %, Sample0050, pH-Water-001, 8302BNUMD-BX1, pH01, 01/30/2026, 11:19:25, AM, Remaining, 6Day 23Hour 57Min, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, pH Value, pH Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Average Slope Value, Average Slope Unit, Sample ID, Method, Electrode ID, Calibration Log #, Calibration Log Date, Calibration Log Time, Calibration Log Time Format, "Remaining", Calibration Alarm Remaining Time,
mV	5, 01/30/2026, 11:31:25, AM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 01/30/2026, 11:31:25, AM, JaneSmith, JaneSmith, mV, 100.0, mV, 2000.00, mV, -2000.00, mV, 25.0, C, (MAN), Sample0050, mV-Water-001, 8302BNUMD-BX1, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, mV Value, mV Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, Temperature Value, Temperature Unit, Temperature Source, Sample ID, Method, Electrode ID,
ORP	6, 01/30/2026, 11:48:36, AM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 01/30/2026, 11:48:36, AM, JaneSmith, JaneSmith, ORP, 150.0, RmV, 2000.00, RmV, -2000.00, RmV, 150.0, mV, 25.0, C, (MAN), ORP, 0.00, mV, Sample0050, ORP-Water-001, 9180BNMD-BX1, ORP01, 01/30/2026, 11:46:06, AM, Remaining, 23Hour 57Min, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, ORP Value, ORP Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, ORP Calibration Type, Offset Value, Offset Unit, Sample ID, Method, Electrode ID, Calibration Log #, Calibration Log Date, Calibration Log Time, Calibration Log Time Format, "Remaining", Calibration Alarm Remaining Time,

Measure Mode	CSV Record Example CSV Header Example
Ion	7, 01/30/2026, 12:04:53, PM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 01/30/2026, 12:04:53, PM, JaneSmith, JaneSmith, Ion, 49.02, M, 19999.0000, M, 0.0001, M, -250.0, mV, 25.0, C, (MAN), F-, -59.20, mV/decade, Sample0050, Ion-Water-001, 9609BNWP-BX1, Ion02, 01/30/2026, 12:02:24, PM, Remaining, 7Hour 57Min, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, Ion Value, Ion Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, ISE Type, Average Slope Value, Average Slope Unit, Sample ID, Method, Electrode ID, Calibration Log #, Calibration Log Date, Calibration Log Time, Calibration Log Time Format, "Remaining", Calibration Alarm Remaining Time,
Conductivity	10, 01/30/2026, 03:50:12, PM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 01/30/2026, 03:50:12, PM, JaneSmith, JaneSmith, Conductivity, 1413, uS/cm, 3000000.000, uS/cm, 0.001, uS/cm, 25.0, C, (MAN), 2990, uS, Linear(1.90), 25.0, C, 0.4750, cm-1, 0.4739, cm-1, Sample0050, Cond-Water-001, 013005MD-BX1, EC01, 01/30/2026, 03:47:02, PM, Remaining, 23Hour 56Min, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, Conductivity Value, Conductivity Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, Temperature Value, Temperature Unit, Temperature Source, Conductance Value, Conductance Unit, Temperature Compensation, Reference Temperature, Reference Temperature Unit, Nominal Cell Constant Value, Nominal Cell Constant Unit, Practical Cell Constant Value, Practical Cell Constant Unit, Sample ID, Method, Electrode ID, Calibration Log #, Calibration Log Date, Calibration Log Time, Calibration Log Time Format, "Remaining", Calibration Alarm Remaining Time,
TDS	12, 02/02/2026, 11:02:52, AM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:02:52, AM, JaneSmith, JaneSmith, TDS, 2327, ppm, 500000.000, ppt, 0.001, ppt, 25.0, C, (MAN), Linear(1.90), 25.0, C, Linear(0.49), 0.4750, cm-1, 0.4739, cm-1, Sample0050, TDS-Water-001, 013005MD-BX1, TDS01, 02/02/2026, 11:00:22, AM, Remaining, 23Hour 57Min, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, TDS Value, TDS Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, Temperature Value, Temperature Unit, Temperature Source, Temperature Compensation, Reference Temperature, Reference Temperature Unit, TDS Factor, Nominal Cell Constant Value, Nominal Cell Constant Unit, Practical Cell Constant Value, Practical Cell Constant Unit, Sample ID, Method, Electrode ID, Calibration Log #, Calibration Log Date, Calibration Log Time, Calibration Log Time Format, "Remaining", Calibration Alarm Remaining Time,

Measure Mode	CSV Record Example CSV Header Example
Salinity	13, 02/02/2026, 11:12:51, AM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:12:51, AM, JaneSmith, JaneSmith, Salinity, 0.03, % NaCl, 400.00, NaCl, 0.01, NaCl, 25.0, C, (MAN), 0.4750, cm-1, 0.4739, cm-1, NaCl, Sample0050, Salt-Water-001, 013005MD-BX1, SALT01, 02/02/2026, 11:09:28, AM, Remaining, 23Hour 56Min, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, Salinity Value, Salinity Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, Temperature Value, Temperature Unit, Temperature Source, Nominal Cell Constant Value, Nominal Cell Constant Unit, Practical Cell Constant Value, Practical Cell Constant Unit, Salinity Type, Sample ID, Method, Electrode ID, Calibration Log #, Calibration Log Date, Calibration Log Time, Calibration Log Time Format, "Remaining", Calibration Alarm Remaining Time,
Resistivity	15, 02/02/2026, 11:18:07, AM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:18:07, AM, JaneSmith, JaneSmith, Resistivity, 21.14, KOhms.cm, 100000000.00, Ohms.cm, 1.00, Ohms.cm, 25.0, C, (MAN), Linear(1.90), 25.0, C, 0.4750, cm-1, Sample0050, Res-Water-001, 013005MD-BX1, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, Resistivity Value, Resistivity Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, Temperature Value, Temperature Unit, Temperature Source, Temperature Compensation, Reference Temperature, Reference Temperature Unit, Nominal Cell Constant Value, Sample ID, Method, Electrode ID,
DO	16, 02/02/2026, 11:34:06, AM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:34:06, AM, JaneSmith, JaneSmith, DO, 71.6, %Sat., 600.00, %Sat., 0.00, %Sat., 24.3, C, (ATC-3), 24.3, C, (ATC-3), 761.0, mmHg, (AUTO), 0.00, ppt, (MAN), 823.17, nA, 10.297, nA/%Sat., 85.44, nA, Sample0050, DO-Water-001, 083005MD-BX1, DO01, 02/02/2026, 11:31:26, AM, Remaining, 7Hour 57Min, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, DO Value, DO Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, Solution Temperature Value, Solution Temperature Unit, Solution Temperature Source, Membrane Temperature Value, Membrane Temperature Unit, Membrane Temperature Source, Barometric Pressure Value, Barometric Pressure Unit, Barometric Pressure Source, Salinity Value, Salinity Unit, Salinity Source, Current Value, Current Unit, Slope Value, Slope Unit, Offset Value, Offset Unit, Sample ID, Method, Electrode ID, Calibration Log #, Calibration Log Date, Calibration Log Time, Calibration Log Time Format, "Remaining", Calibration Alarm Remaining Time,

Measure Mode	CSV Record Example CSV Header Example
Optical DO	17, 02/02/2026, 11:57:29, AM, Continuous, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:57:29, AM, JaneSmith, JaneSmith, Optical DO, 7.50, ppm, 90.00, Optical DO, 0.01, Optical DO, 27.1, C, (ATC-3), 761.0, mmHg, (AUTO), 0.00, ppt, (MAN), 149.93, Torr, 1.586, Torr/Conc, 0.00, Torr, Sample0050, RDO-Water-001, 087010MD, RDO01, 02/02/2026, 11:53:45, AM, Remaining, 23Hour 56Min, >> Log #, Log Date, Log Time, Log Time Format, Read Type, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Mode, DO Value, DO Unit, Alarm High Value, Alarm High Value Unit, Alarm Low Value, Alarm Low Value Unit, Temperature Value, Temperature Unit, Temperature Source, Barometric Pressure Value, Barometric Pressure Unit, Barometric Pressure Source, Salinity Value, Salinity Unit, Salinity Source, Partial Pressure Value, Partial Pressure Unit, Slope Value, Slope Unit, Offset Value, Offset Unit, Sample ID, Method, Electrode ID, Calibration Log #, Calibration Log Date, Calibration Log Time, Calibration Log Time Format, "Remaining", Calibration Alarm Remaining Time,

6.2.1 CSV Calibration Examples

Note: The information exported by each meter will vary depending on its measurement capabilities, software revision, settings and specific record being exported. The information below is provided for general guidance only and is based on an Orion Pro Star MP218 multiparameter (software revision 1.70) with all data fields enabled for custom export settings. **Verify your meter's specific export configuration using the appropriate remote commands.**

Calibration Mode	CSV Record Example CSV Header Example
pH, 5 Points	pH, pH01, 01/30/2026, 11:19:25, AM, LabMeter-001, MP218, P0000000, v1.70, 1/30/2026, 11:19:25, AM, JaneSmith, JaneSmith, pH-Water-001, 8302BNUMD-BX1, 1.678, pH, 315.0, mV, 25.0, C, (MAN), 4.010, pH, 170.0, mV, 25.0, C, (MAN), 6.997, pH, 0.0, mV, 25.0, C, (MAN), 10.013, pH, -180.0, mV, 25.0, C, (MAN), 12.460, pH, -322.0, mV, 25.0, C, (MAN), 105.1, %, -15.9, mV, 96.2, %, -0.2, mV, 100.9, %, -0.2, mV, 98.1, %, -5.2, mV, 100.1, %, >> Mode, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Method, Electrode ID, pH Value, pH Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, pH Value, pH Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, pH Value, pH Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, pH Value, pH Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, pH Value, pH Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Slope Value, Slope Unit, Offset Value, Offset Unit, Slope Value, Slope Unit, Offset Value, Offset Unit, Slope Value, Slope Unit, Offset Value, Offset Unit, Average Slope Value, Average Slope Unit,

Calibration Mode	CSV Record Example CSV Header Example
pH, 1 Point	pH, pH02, 01/30/2026, 11:39:50, AM, LabMeter-001, MP218, P0000000, v1.70, 1/30/2026, 11:39:50, AM, JaneSmith, JaneSmith, pH-Water-001, 8302BNUMD-BX1, 6.997, pH, 30.0, mV, 25.0, C, (MAN), 100.1, %, 29.8, mV, 100.1, %, >> Mode, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Method, Electrode ID, pH Value, pH Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Slope Value, Slope Unit, Offset Value, Offset Unit, Average Slope Value, Average Slope Unit,
ORP	ORP, ORP01, 01/30/2026, 11:46:06, AM, LabMeter-001, MP218, P0000000, v1.70, 01/30/2026, 11:46:06, AM, JaneSmith, JaneSmith, ORP, ORP-Water-001, 9180BNMD-BX1, 237.0, RmV, 237.0, mV, 25.0, C, (MAN), 0.0, mV, ORP, >> Mode, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, ORP Calibration Type, Method, Electrode ID, ORP Value, ORP Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Offset Value, Offset Unit, ORP Calibration Type,
Ion, 5 points	Ion, Ion02, 01/30/2026, 12:02:24, PM, LabMeter-001, MP218, P0000000, v1.70, 01/30/2026, 12:02:24, PM, JaneSmith, JaneSmith, F-, Ion-Water-001, 9609BNWP-BX1, 0.0094, M, -30.0, mV, 25.0, C, (MAN), 0.0301, M, -60.0, mV, 25.0, C, (MAN), 0.0968, M, -90.0, mV, 25.0, C, (MAN), 0.3111, M, -120.0, mV, 25.0, C, (MAN), 1.000, M, -150.0, mV, 25.0, C, (MAN), -59.35, mV/decade, -150.3, mV, -59.14, mV/decade, -150.0, mV, -59.17, mV/decade, -150.0, mV, -59.16, mV/decade, -150.0, mV, -59.20, mV/decade, 0.00000, M, >> Mode, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, ISE Type, Method, Electrode ID, Ion Value, Ion Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Ion Value, Ion Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Ion Value, Ion Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Ion Value, Ion Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Ion Value, Ion Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Slope Value, Slope Unit, Offset Value, Offset Unit, Slope Value, Slope Unit, Offset Value, Offset Unit, Slope Value, Slope Unit, Offset Value, Offset Unit, Slope Value, Slope Unit, Offset Value, Offset Unit, Average Slope Value, Average Slope Unit, Blank Correction Value, Blank Correction Unit,
Ion, 1 Point	Ion, Ion03, 01/30/2026, 12:10:01, PM, LabMeter-001, MP218, P0000000, v1.70, 01/30/2026, 12:10:01, PM, JaneSmith, JaneSmith, F-, Ion-Water-001, 9609BNWP-BX1, 1.000, M, -30.0, mV, 25.0, C, (MAN), -59.15, mV/decade, -30.0, mV, -59.15, mV/decade, 0.00000, M, >> Mode, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, ISE Type, Method, Electrode ID, Ion Value, Ion Unit, mV Value, mV Unit, Temperature Value, Temperature Unit, Temperature Source, Slope Value, Slope Unit, Offset Value, Offset Unit, Average Slope Value, Average Slope Unit, Blank Correction Value, Blank Correction Unit,

Calibration Mode	CSV Record Example CSV Header Example
Conductivity, 5 Points	Conductivity, EC01, 01/30/2026, 03:47:02, PM, LabMeter-001, MP218, P0000000, v1.70, 01/30/2026, 03:47:02, PM, JaneSmith, JaneSmith, Cond-Water-001, 013005MD-BX1, Linear(1.90), 25.0, C, 10.02, uS/cm, 21.10, uS, 25.0, C, (MAN), 0.4750, cm-1, 100.1, uS/cm, 210.6, uS, 25.0, C, (MAN), 0.4753, cm-1, 1413, uS/cm, 2990, uS, 25.0, C, (MAN), 0.4724, cm1, 12.9, mS/cm, 27.03, mS, 25.0, C, (MAN), 0.4777, cm-1, 111.8, mS/cm, 238.0, mS, 25.0, C, (MAN), 0.4690, cm-1, 0.4739, cm-1, >> Mode, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Method, Electrode ID, Temperature Compensation, Reference Temperature Value, Reference Temperature Unit, Conductivity Value, Conductivity Unit, Conductance Value, Conductance Unit, Temperature Value, Temperature Unit, Temperature Source, Practical Cell Constant Value, Practical Cell Constant Unit, Conductivity Value, Conductivity Unit, Conductance Value, Conductance Unit, Temperature Value, Temperature Unit, Temperature Source, Practical Cell Constant Value, Practical Cell Constant Unit, Conductivity Value, Conductivity Unit, Conductance Value, Conductance Unit, Temperature Value, Temperature Unit, Temperature Source, Practical Cell Constant Value, Practical Cell Constant Unit, Conductivity Value, Conductivity Unit, Conductance Value, Conductance Unit, Temperature Value, Temperature Unit, Temperature Source, Practical Cell Constant Value, Practical Cell Constant Unit, Conductivity Value, Conductivity Unit, Conductance Value, Conductance Unit, Temperature Value, Temperature Unit, Temperature Source, Practical Cell Constant Value, Practical Cell Constant Unit, Average Cell Constant Value, Average Cell Constant Unit,
Conductivity, 1 Point	Conductivity, EC03, 02/02/2026, 10:56:37, AM, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 10:56:37, AM, JaneSmith, JaneSmith, Cond-Water-001, 013005MD-BX1, Linear(1.90), 25.0, C, 1413, uS/cm, 2990, uS, 25.0, C, (MAN), 0.4726, cm-1, >> Mode, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Method, Electrode ID, Temperature Compensation, Reference Temperature Value, Reference Temperature Unit, Conductivity Value, Conductivity Unit, Conductance Value, Conductance Unit, Temperature Value, Temperature Unit, Temperature Source, Practical Cell Constant Value, Practical Cell Constant Unit
TDS	TDS, TDS01, 02/02/2026, 11:00:22, AM, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:00:22, AM, JaneSmith, JaneSmith, TDS-Water-001, 013005MD-BX1, Linear(1.90), 25.0, C, Linear(0.49), 696.0, ppm, 25.0, C, (MAN), 0.4750, cm-1, 1. 4739, cm-1, >> Mode, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Method, Electrode ID, Temperature Compensation, Reference Temperature Value, Reference Temperature Unit, TDS Factor, TDS Value, TDS Unit, Temperature Value, Temperature Unit, Temperature Source, Nominal Cell Constant Value, Nominal Cell Constant Unit, Practical Cell Constant Value, Practical Cell Constant Unit

Calibration Mode	CSV Record Example CSV Header Example
Salinity	Salinity, SALT01, 02/02/2026, 11:09:28, AM, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:09:28, AM, JaneSmith, JaneSmith, Salt-Water-001, 013005MD-BX1, 4.34, % NaCl, 25.0, C, (MAN), 0.4750, cm-1, 0.4739, cm-1, >> Mode, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, Method, Electrode ID, Salinity Value, Salinity Unit, Temperature Value, Temperature Unit, Temperature Source, Nominal Cell Constant Value, Nominal Cell Constant Unit, Practical Cell Constant Value, Practical Cell Constant Unit
DO, Water-saturated Air, 100% and 0%	DO, %Sat., DO01, 02/02/2026, 11:31:26, AM, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:31:26, AM, JaneSmith, JaneSmith, %Sat. Air, DO-Water-001, 083005MD-BX1, 100.0, %Sat., 24.3, C, (ATC-3), 24.3, C, (ATC-3), 1116.51, nA, 761.0, mmHg, (AUTO), 0.00, ppt, (MAN), 0.0, %Sat., 24.3, C, (ATC-3), 24.3, C, (ATC-3), 85.44, nA, 761.0, mmHg, (AUTO), 0.00, ppt, (MAN), 10.297, nA/%Sat., 85.44, nA, >> Mode, DO Units, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, DO Calibration Type, Method, Electrode ID, DO Value, DO Unit, Solution Temperature Value, Solution Temperature Unit, Solution Temperature Source, Membrane Temperature Value, Membrane Temperature Unit, Membrane Temperature Source, Current Value, Current Unit, Barometric Pressure Value, Barometric Pressure Unit, Barometric Pressure Source, Salinity Value, Salinity Unit, Salinity Source, DO Value, DO Unit, Solution Temperature Value, Solution Temperature Unit, Solution Temperature Source, Membrane Temperature Value, Membrane Temperature Unit, Membrane Temperature Source, Current Value, Current Unit, Barometric Pressure Value, Barometric Pressure Unit, Barometric Pressure Source, Salinity Value, Salinity Unit, Salinity Source, Slope Value, Slope Unit, Offset Value, Offset Unit,
DO, Concentration	DO, %Sat., DO02, 02/02/2026, 11:39:20, AM, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:39:20, AM, JaneSmith, JaneSmith, Concentration, DO-Water-001, 083005MD-BX1, 8.1, ppm, 24.3, C, (ATC-3), 24.3, C, (ATC-3), 1118.28, nA, 761.0, mmHg, (AUTO), 0.00, ppt, (MAN), 11.595, nA/Conc, >> Mode, DO Units, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, DO Calibration Type, Method, Electrode ID, DO Value, DO Unit, Solution Temperature Value, Solution Temperature Unit, Solution Temperature Source, Membrane Temperature Value, Membrane Temperature Unit, Membrane Temperature Source, Current Value, Current Unit, Barometric Pressure Value, Barometric Pressure Unit, Barometric Pressure Source, Salinity Value, Salinity Unit, Salinity Source, Slope Value, Slope Unit,

Calibration Mode	CSV Record Example CSV Header Example
Optical DO, Water-saturated Air, 100%	Optical DO, %Sat., RDO02, 02/02/2026, 12:01:16, PM, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 12:01:16, PM, JaneSmith, JaneSmith, %Sat. Air, RDO-Water-001, 087010MD, 100.00, %Sat., 24.3, C, (ATC-3), 149.76, Torr, 761.0, mmHg, (AUTO), 0.00, ppt, (MAN), 1.496, Torr/%Sat., >> Mode, DO Units, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, DO Calibration Type, Method, Electrode ID, DO Value, DO Unit, Temperature Value, Temperature Unit, Temperature Source, Partial Pressure Value, Partial Pressure Unit, Barometric Pressure Value, Barometric Pressure Unit, Barometric Pressure Source, Salinity Value, Salinity Unit, Salinity Source, Slope Value, Slope Unit,
Optical DO, Concentration	Optical DO, ppm, RDO01, 02/02/2026, 11:53:45, AM, LabMeter-001, MP218, P0000000, v1.70, 02/02/2026, 11:53:45, AM, JaneSmith, JaneSmith, Concentration, RDO-Water-001, 087010MD, 7.50, ppm, 24.3, C, (ATC-3), 149.63, Torr, 761.0, mmHg, (AUTO), 0.00, ppt, (MAN), 1.586, Torr/Conc., >> Mode, DO Units, Log #, Log Date, Log Time, Log Time Format, Instrument Name, Meter Model, Meter Serial #, Meter Software Revision, Log Export Date, Log Export Time, Log Export Time Format, Log Username, Log Exported By, DO Calibration Type, Method, Electrode ID, DO Value, DO Unit, Temperature Value, Temperature Unit, Temperature Source, Partial Pressure Value, Partial Pressure Unit, Barometric Pressure Value, Barometric Pressure Unit, Barometric Pressure Source, Salinity Value, Salinity Unit, Salinity Source, Slope Value, Slope Unit,

6.3 Meter Software Update Procedure



Note: Before performing the meter software update, back up all meter data (data log, calibration log, methods, audit trail, user information, notification logs, etc.). All data and settings, including secure mode accounts, will be erased when the meter software update is completed.

1. Verify all meter data (data log, calibration log, methods, etc.) has been backed up.
2. Power on the meter.
3. Perform a factory reset on the meter.
 - a. On the meter screen, tap the Main Menu icon in the measure mode.
 - b. Tap the Information & Help option on the Main Menu list.
 - c. Tap the Meter Reset option on the Information & Help list.
 - d. Select the Factor Reset option and tap the Start button. Follow all meter prompts and perform the factory reset.
4. Select a USB flash drive and ensure it is formatted using the exFATFS file system.
5. Download the latest Orion Pro Star meter software package at www.thermofisher.com/orionsoftware.
6. Unzip/extract the downloaded Orion Pro Star meter software package.
7. Copy and paste “ProStar.bin”, “ProStarNew.bin” and “ProStarNew.boot” files to the USB flash drive.
8. Insert the USB flash drive into the USB port on the side of the meter.
9. Wait for the USB flash drive to establish communication with meter.
10. On the meter screen, tap the Main Menu icon in the measure mode, tap the Information & Help option on the Main Menu list and tap the Software Updates option on the Information & Help list.
11. Verify all actions have been completed and tap the Upload button.
12. Wait while the meter software is updating. Do not remove the USB flash drive while the meter software is updating. Removing the USB flash drive during the update can permanently damage the meter hardware and make it unrecoverable.
13. Once the meter software update is complete, follow any onscreen prompts. The meter may restart several times during the software update process. Wait until the meter displays the final startup screen with updated software revision number and then the software update is complete.
 - a. If the software update is interrupted at any point, repeat the procedure.

Chapter 7

Troubleshooting

7.1 Meter Troubleshooting

Meter display not powering on:

- Use a surge protector or uninterruptible power supply (UPS) so an unintended power surge of electricity does not damage the meter or meter power supply.
- Check that the wall outlet is functional.
- Verify that the power cord is fully plugged into the meter and wall outlet.
- The power adapter plug has 2 prongs used to lock it onto the meter; ensure the prongs are properly aligned when connecting it with the meter.
- Press the Power button on the meter.

Meter not responding to any button taps:

- Check that the area being tapped is active for that action.
- Unplug and reconnect the meter power supply.
- Use a USB mouse to operate the touchscreen interface.
- Contact Technical Support.

Meter error shown:

- (Measurement) Out of Range, (Measurement) = Dissolved Oxygen or Temperature:
 - Ensure the electrode is fully connected to the meter.
 - Check that the electrode cable and connector do not have any damage.
 - Check that the electrode does not have any damage, cracks or scratches.
 - Ensure the electrode is properly immersed in the sample solution, with the electrode sensing area submerged below the top of the sample solution.
 - Perform a factor reset on the meter.
 - Replace the electrode.

7.2 Measurement Troubleshooting

Reading is unstable, slow to stabilize:

- Clean the electrode to remove build-up or contaminants. See the electrode user manual for detailed instructions.
- Check the electrode for damage, cracks or breaks
- Check the electrode cables for damage or breaks.
- Replace the old electrode with a new electrode.
- If sample temperature is changing, allow temperature to stabilize.
- Remove any interfering devices from the area.

Reading freezes on display:

- Check the meter's Read Type setting. If the meter's Read Type is set to Auto-Read, tap the "Measure" key to start a new measurement.
- Check the electrode for damage, cracks or breaks.
- Check the electrode cables for damage or breaks.
- Replace the old electrode with a new electrode.

7.3 Calibration Troubleshooting

- Ensure the calibration is at the same temperature as the samples you are measuring. Temperature variations can affect readings.
- Rinse the electrode with distilled or deionized water before and after immersing it in each solution. This prevents contamination and ensures accurate readings.
- Gently stir solutions to ensure uniformity, avoid creating air bubbles that will affect the reading.
- Allow the meter to stabilize and display a steady reading before recording the value during calibration. This ensures that the reading is accurate and not fluctuating.
- After calibration, store the electrode according to the electrode user manual.
- Regularly clean the electrode according to the electrode user manual to prevent buildup of residues or contaminants that can affect readings.

Dissolved Oxygen Calibration:

- Perform maintenance on the DO electrode according to the electrode user manual.
- For polarographic DO electrodes, ensure the DO electrode is fully polarized before calibrating.
- For zero percent saturation calibrations, prepare a sodium sulfite solution by dissolving about 15.0 g Na_2SO_3 in 250 mL distilled water. Transfer the solution to a BOD bottle or airtight flask.

7.4 Technical Support

Contact our Orion Technical Support team at 1-800-225-1480, +1-978-232-6000 or WLP.TechSupport@thermofisher.com. You will need the meter model, meter serial number and meter software revision information.

Chapter 8

Meter Info

8.1 Meter Specifications

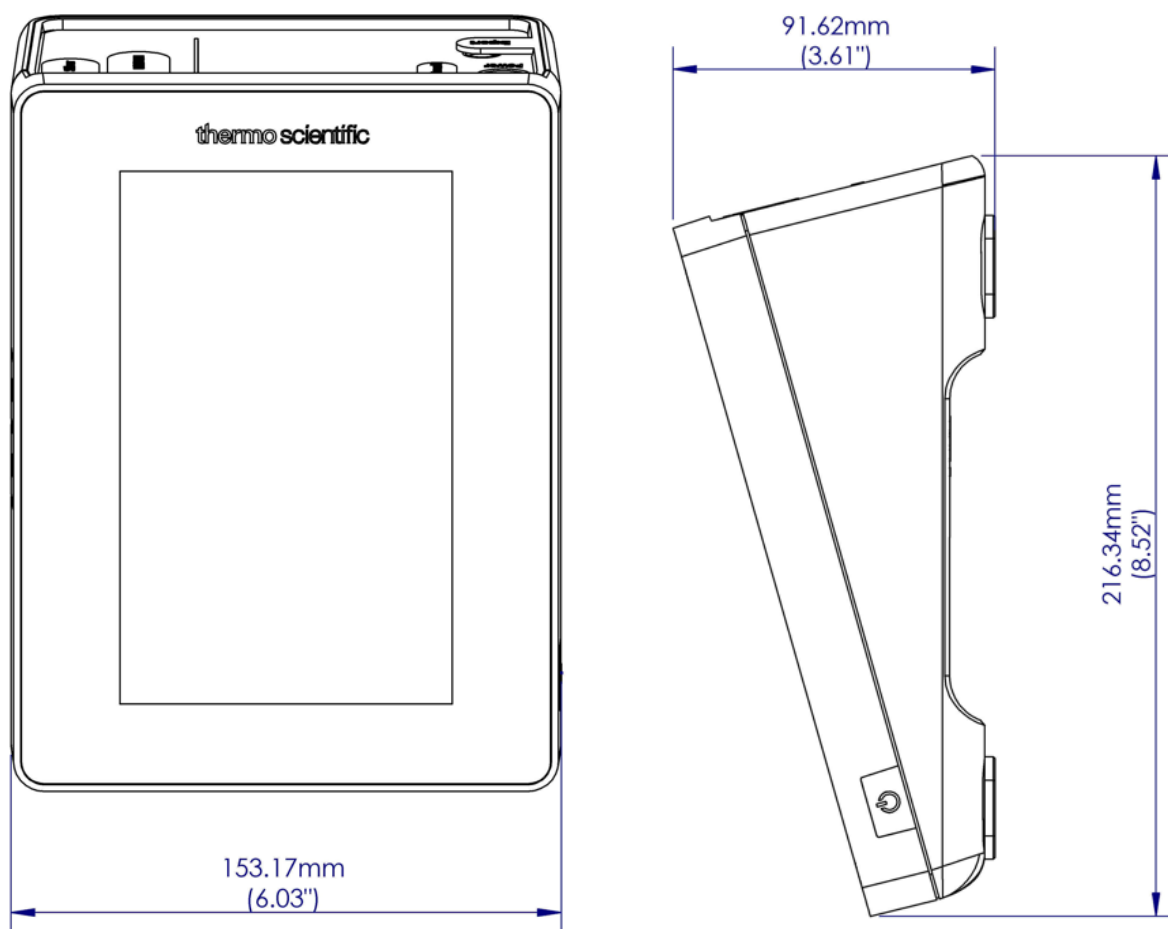
Dissolved Oxygen	
Range	0.0 to 600.0 % saturation; 0.01 to 90.0 mg/L or ppm
Resolution	0.1, 1 % saturation; 0.01, 0.1 mg/L or ppm
Relative accuracy	±2 % saturation; ±0.02 mg/L or ppm
Calibration types	Water-saturated air (100% and 0% saturation), air-saturated water (100% and 0% saturation) or custom value (Winkler)
Barometric pressure correction range	400.0 to 850.0 mmHg; or 0.533 to 1.133 bar; automatic with built-in barometer or manual entry
Barometer relative accuracy	±6.0 mmHg; or 0.008 bar
Barometer calibration	1 point
Salinity correction	0.0 to 50.0 ppt; automatic with manual entry
Electrode type	Polarographic or optical
Temperature	
Range	-30.0 to 130.0 °C, -22.0 to 266.0 °F
Resolution	0.1 °C, 0.1 °F
Relative accuracy	±0.3 °C, ±0.5 °F
Calibration points	1 or 2 points
Offset adjustment	Up to ±5.0 °C
Temperature source	Automatic with ATC sensor, ambient with built-in meter temperature sensor or manual entry
Measurement Functions	
Measurement channels	1
Measurement parameters	Dissolved oxygen as % saturation or concentration (mg/L or ppm) with barometric pressure and temperature
Read types	Continuous, Auto-Read or Timed
Timed reading intervals	3 seconds to 2 hours
Measurement layout	Customizable options for basic, advanced or user-defined

Measurement stability	Automatic, fast, medium or slow
Sample ID	Auto-incremental or manual, up to 25 alphanumeric characters
Electrode ID	Up to 20 alphanumeric characters
Graph / chart view	Single parameter with temperature
Set value alarm	1 high and 1 low value per parameter
Last calibration details	Calibration summary with date and time
Meter Features	
Display	7" high resolution color graphic LCD
Touchscreen type	Capacitive with lab glove compatibility
Onscreen prompts	On-demand information screens; onscreen user guide and step-by-step calibration guidance
Time and date	Yes
Time format	12 hour or 24 hour
Date format	Selectable as MM-DD-YYYY, DD-MM-YYYY or DD-MMM-YYYY
Instrument name	Up to 20 alphanumeric characters
Secure mode	3 administrator and 30 user accounts with individual password protection, custom user access permissions and audit trail
Username	Optional, up to 20 alphanumeric characters
Methods	10
Data outputs	USB flash drive, computer or Orion ink printer
Data output format	Report, CSV or print
Data log	10000 data sets with time and date
Data log export	Customizable options for basic (short), intermediate, advanced or all data
Calibration log	20 per parameter with time and date
Calibration log export	Customizable options for basic (short), intermediate, advanced or all data
Calibration reminder	1 alarm per parameter
Calibration alarm interval	1 hour to 30 days or off
Audible signal	User set for button tap, notifications and alarms, stable reading
Maintenance Reminder	Up to 5 electrode maintenance reminders and up to 5 solution maintenance reminders
Sleep mode	Selectable time interval of 5, 10, 20, 30, 60 minutes or off
Meter tests	Self-test and stability test
Meter tours and guides	Calibration mode, measurement mode, meter connections and electrode stand assembly

Stirrer probe inputs	1
Stirrer probe speeds	5 selectable speeds from 250 RPM to 3600 RPM
Electrode inputs	9-pin MiniDIN
Data outputs	1 USB-A port for USB flash drive; 1 export port for computer or Orion ink printer
Accessory input	1 USB-A port for USB mouse, USB keyboard or USB barcode scanner
Memory	Non-volatile, to preserve data and settings in case of power loss
Display languages	Chinese, English, French, German, Italian, Japanese, Korean, Portuguese or Spanish
Meter warranty	2 years
Certifications	CE, TUV 3-1, FCC Class A
Enclosure	IP-54
Power	100-240 VAC, 50-60Hz, 9 DC adapter, 2.0A
Dimensions (L x W x H)	216.3 mm x 153.2 mm x 91.62 mm, 8.52" x 6.03" x 3.61"
Weight	1.00 kg, 2.20 lbs.
Environmental Conditions	
Environmental conditions	Indoors
Altitude	Up to 2,000 Meters
Operating temperature	5°C to 45°C
Operating relative humidity	5 to 85%, non-condensing
Storage temperature	-20°C to 60°C
Storage relative humidity	5 to 85%, non-condensing
Mains fluctuation	±10% of range (100-240VAC)
Installation category	II
Pollution degree	2
Protection class	III

Note: Specifications subject to change without notice. All relative accuracy values are influenced by the displayed least significant digit and should include ± 1 LSD for all relative accuracy calculations.

8.2 Meter Dimensions



8.3 Warranty

This meter is supplied with a warranty against significant deviations in material and workmanship for a period of 2 years from date of purchase. Electrode warranties are separate from the meter and differ based on the selected electrode.

If meter repair is necessary within the designated warranty period and has not been the result of abuse or misuse, please contact the Technical Support Team at WLP.TechSupport@thermofisher.com for return authorization and a correction will be made without charge. The manufacturer will determine if the meter problem is due to deviations or customer misuse.

Out of warranty products will be repaired on a charged basis.

The warranty on your meter shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer
- Unauthorized modification or misuse
- Operation outside of the environment specifications of the products

8.3.1 Return of Items

Authorization must be obtained from our Technical Support Team or authorized distributor before returning items for any reason. Please include data regarding the reason the items are to be returned. For your protection, items must be carefully packed to prevent damage in shipment and insured against damage or loss. The manufacturer will not be responsible for damage resulting from careless or insufficient packing. A restocking charge will be made on all unauthorized returns.

Note: *The manufacturer reserves the right to make improvements in design, construction, and appearance of products without notice.*

8.3.2 Manufacturer Information

Thermo Fisher Scientific
GPS, Water Analysis Instruments
7 Gul Circle, Level 2M, Singapore 629563

International Phone: (65) 6778 6876

US Toll Free Phone: 1-800-225-1480

US Phone: 1-978-232-6000

Email: WLP.TechSupport@thermofisher.com

Website: www.thermofisher.com

Chapter 9

Regulatory Compliance

9.1 Regional Approvals



European Union: The European CE marking is applied on products that meet all the applicable requirements of the European Directives. Products not marked with a CE marking either do not operate in the 230V / 50Hz voltage range or are not intended to be sold to the EU Member States or European Economic area (EEA).



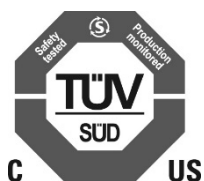
United Kingdom: The UKCA marking is applied on products that meet all the applicable requirements of the UK Directives. Products not marked with a UKCA marking either do not operate in the 230V / 50Hz voltage range or are not intended to be sold to the UK region.



Australia / New Zealand: The RCM marking is applied on products that meet all the applicable requirements of the regulations. Products not marked with the RCM marking either do not operate in the 230V / 50Hz voltage range or are not intended to be sold to the Australian or New Zealand region.

Please contact the manufacturer for declaration requests or questions regarding regulatory conformity.

9.2 Product Safety



This product family has been tested to applicable global product safety standards by TUV SUD a Nationally Recognized Test Laboratory (NRTL) and may bear the NRTL's mark of safety compliance to those applicable standards. Additionally, this testing may be used to secure regional market-specific markings.

It is important to use only accessories as supplied or recommended by Thermo Fisher Scientific.

9.3 Electromagnetic Compatibility

The meter requires special precautions regarding electromagnetic compatibility (EMC) and needs to be installed and put into service according to the EMC information provided in this manual.

Recommendations for actions to ensure the product remains safe regarding electromagnetic disturbances:

1. Do not modify the product beyond the intended user-adjustable settings.
2. It is important to use only accessories as supplied or recommended by Thermo Fisher Scientific.
3. The equipment should be visually inspected regularly for damaged cables and connectors. Damaged cables should be replaced.
4. This equipment should not be used adjacent to or stacked with other equipment. However, if adjacent or stacked use is necessary, the equipment should be observed to verify normal operation in the configuration in which it will be used.

9.3.1 FCC Statement (USA)



This device complies with Part 15 of the FCC Rules. Operation is subject to the following 2 conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

9.3.2 Canadian ICSED IC Notice

This ISM digital apparatus complies with Canadian ICES-001, Class A.

Cet appareil ISM est conforme à la norme NMB-001 du Canada, Classe A.

9.3.3 South Korean KC Registration

사 용 자 안 내 문
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

[Translation of the above user notification: Equipment for business broadcasting and communication specified in Article 11, Subparagraph 1), Items (가), (바), and (사 1). This device has undergone suitability assessment for use in a business environment. If used in a residential environment, there may be concerns regarding radio interference.]

9.4 Environmental Compliance

9.4.1 REACH - Europe

We are committed to meeting all compliance obligations to evaluate, communicate, and register any Substances of Very High Concern (SVHC), substances of authorization and finding alternates where appropriate.

9.4.2 RoHS - Europe

We are determined to reduce the impact we have on the environment, and so can declare that this product fully complies with the European Parliament's RoHS2 and RoHS2 amendment (Restriction of Hazardous Substances) Directive 2011/65/EU and 2015/863/EU, with respect to all the following substances:

- Lead (0,1 %)
- Mercury (0,1 %)
- Cadmium (0,01 %)
- Hexavalent chromium (0,1 %)
- Polybrominated biphenyls (PBB) (0,1 %)
- Polybrominated diphenyl ethers (PBDE) (0,1 %)
- Bis(2-ethylhexyl) phthalate (DEHP) (0,1%)
- Butyl benzyl phthalate (BBP) (0,1%)
- Dibutyl phthalate (DBP) (0,1%)
- Diisobutyl phthalate (DIBP) (0,1%)

Our compliance relies on declarations from our suppliers, testing and evaluations per the assessment requirements defined in standard EN 63000:2018. This confirms that any potential trace contamination levels of the substances listed above are below the maximum level set by the latest regulations or are exempt due to their application.

9.5 WEEE Compliance



WEEE Compliance. This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EU. It is marked with the following symbol. Thermo Fisher Scientific has contracted with 1 or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on our compliance with these Directives, the recyclers in your country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available at www.thermofisher.com.



WEEE Konformität. Dieses Produkt muss die EU Waste Electrical & Electronic Equipment (WEEE) Richtlinie 2012/19/EU erfüllen. Das Produkt ist durch folgendes Symbol gekennzeichnet. Thermo Fisher Scientific hat Vereinbarungen getroffen mit Verwertungs-/Entsorgungsanlagen in allen EU-Mitgliedstaaten und dieses Produkt muss durch diese Firmen wiederverwertet oder entsorgt werden. Mehr Informationen über die Einhaltung dieser Anweisungen durch Thermo Scientific, die Verwerter und Hinweise die Ihnen nützlich sein können, die Thermo Fisher Scientific Produkte zu identifizieren, die unter diese RoHS-Anweisung fallen, finden Sie unter www.thermofisher.com.



Conformità WEEE. Questo prodotto deve rispondere alla direttiva dell'Unione Europea 2012/19/EU in merito ai Rifiuti degli Apparecchi Elettrici ed Elettronici (WEEE). marcato col seguente simbolo. Thermo Fisher Scientific ha stipulato contratti con una o diverse società di riciclaggio/smaltimento in ognuno degli Stati Membri Europei. Questo prodotto verrà smaltito o riciclato tramite queste medesime. Ulteriori informazioni sulla conformità di Thermo Fisher Scientific con queste Direttive, l'elenco delle ditte di riciclaggio nel Vostro paese e informazioni sui prodotti Thermo Scientific che possono essere utili alla rilevazione di sostanze soggette alla Direttiva RoHS sono disponibili sul sito <http://www.thermofisher.com>.



Conformité WEEE. Ce produit doit être conforme à la directive euro-péenne (2012/19/EU) des Déchets d'Équipements Électriques et Électroniques (DEEE). Il est marqué par le symbole suivant. Thermo Fisher Scientific s'est associé avec une ou plusieurs compagnies de recyclage dans chaque état membre de l'union européenne et ce produit devrait être collecté ou recyclé par celles-ci. Davantage d'informations sur la conformité de Thermo Fisher Scientific à ces directives, les recycleurs dans votre pays et les informations sur les produits Thermo Fisher Scientific qui peuvent aider la détection des substances sujettes à la directive RoHS sont disponibles sur <http://www.thermofisher.com>.

9.6 Proper Product Disposal

Some considerations and suggestions are listed below for proper disposal of this product (End of Life Care). While addressing these actions for safe recycling and disposal, please follow all guidelines, Safety Data Sheets (SDS), or regulations applicable to your country and region.

- This product has materials and components that may be recycled or reused according to local guidelines and regulations.
- Clean up any chemical safety hazards using appropriate methods.

Chapter 10

Ordering Info

10.1 Meter Ordering Information

Description	Catalog Number
Orion Pro Star DO213 dissolved oxygen bench meter with electrode stand, includes USB flash drive, computer cable, 100-240V 50/60Hz universal power adapter (purchase electrodes separately)	PSTAR2130
Orion Pro Star DO213 dissolved oxygen bench meter standard DO kit, includes meter with stand (PSTAR2130), polarographic DO/ATC electrode with calibration sleeve (083005MD), polarographic DO electrode maintenance kit, BOD adapter	PSTAR2135
Orion Pro Star DO213 dissolved oxygen bench meter BOD kit, includes meter with stand (PSTAR2130), AUTO-STIR polarographic BOD DO/ATC electrode with calibration sleeve (086030MD), polarographic DO electrode maintenance kit	PSTAR2136
Orion Pro Star DO213 dissolved oxygen bench meter optical DO kit, includes meter with stand (PSTAR2130), optical DO/ATC electrode with calibration sleeve, guard and optical cap (087010MD)	PSTAR2137
Orion bench meter stirrer probe	096019-WA
Orion ink printer, includes meter cable, paper, ink ribbon, 100-240V 50/60Hz power adapter	STARA-106
Orion replacement ink ribbon for printer, 6 pack	STARA-108
Orion replacement paper for printer, 5 pack	STARA-109
Orion Pro Star series USB flash drive	PSTAR-UFD
Orion Pro Star series USB mouse	PSTAR-UMS
Orion Pro Star series USB keyboard	PSTAR-UKB
Orion Pro Star series USB barcode scanner	PSTAR-UBS
Orion Pro Star series electrode stand with base	PSTAR-ARM
Orion Pro Star series holder head for electrode stand	PSTAR-SHH
Orion Pro Star series weighted base for electrode stand	PSTAR-SWB
Orion Pro Star series universal power supply, 100-240V, 50/60 Hz	PSTAR-PWR
Orion Pro Star series USB computer cable	PSTAR-USB
Orion Pro Star series standard protective display cover	PSTAR-SPC
Orion Pro Star series rugged protective display cover	PSTAR-RPC

10.2 Electrode Ordering Info

Description	Catalog Number
Polarographic DO/ATC electrode with calibration sleeve	083005MD
Polarographic AUTO-STIR BOD DO/ATC electrode with calibration sleeve	086030MD
RDO optical DO/ATC electrode with calibration sleeve and protective sleeve	087010MD

[illegible]

Orion Pro Star DO213 Dissolved Oxygen Bench Meter



Scientists have trusted Thermo Scientific Orion Lab Products for over 60 years to provide them with accurate and reliable analytical testing instruments in the lab and in the field. Since 1962, Thermo Scientific Orion products have set the standard for quality in electrochemistry. We offer instruments for analytical and optical measurement that allow scientists to solve some of the most challenging issues facing society today. Whether online in the plant, in the field or in the lab, scientists trust Orion products deliver precise and accurate readings, which help you keep our communities healthier, cleaner, and safer.

Find out more at thermofisher.com/electrochemistry

Contact us today at WLP.TechSupport@thermofisher.com

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