English

pH / ISE

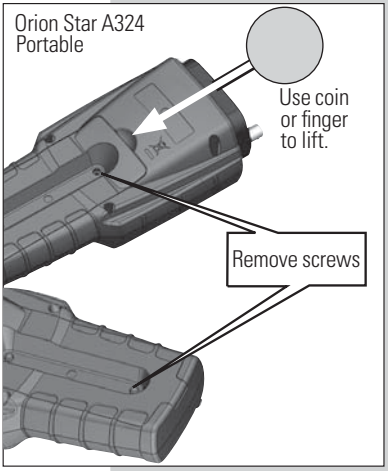
Thermo Scientific Orion Star A324 Portable pH/ISE Meter

Instruction Sheet

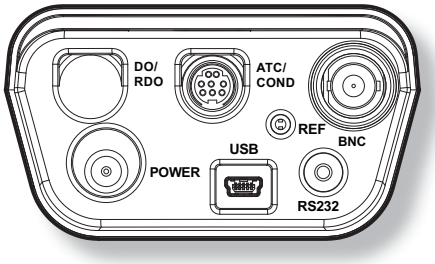
Preparation

Power Source

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



Electrodes and Other Connections



1. Prepare the pH electrode or ion selective electrode (ISE) and any other applicable electrodes according to the directions in the electrode user guide.
2. Connect the appropriate items as labeled on the meter and as shown in the figure above:

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

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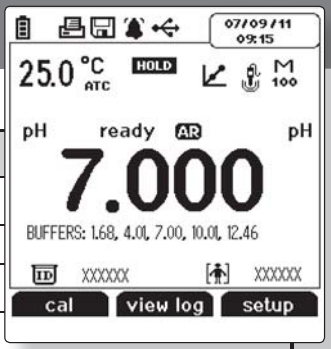

Display Information

Display Icon	Description
	Shown when the meter is running on AC power.
	Shown when the meter has batteries installed.
	Indicates data is being sent to a computer or printer.
	Indicates data is being sent to the data log.
	Shown when an alarm is set and the alarm value is reached.
RS232	Indicates the meter is set to be interfaced with a printer or computer via the RS232 port.
	Indicates the meter is set to be interfaced with a printer or computer via the USB port.
07/09/11 09:15	Displays the time and date entered in the setup menu.
25.0 °C ATC	Displays the current temperature based on the temperature probe reading or entered temperature value. Shows the origin of the temperature as MAN (entered temperature) or ATC (temperature probe).
HOLD	Shown when hold is pressed and the displayed measurement is frozen.
	Indicates a calibration was successfully completed.
	Indicates the pH or ion selective electrode condition as good (two bars), fair (one bar) or bad (slash through it), based on the last saved calibration and measurement stability.
M 100	Indicates a method is in use and the number of the method being used.
pH	Indicates the type of measurement and determines the type of calibration that will be performed.
ready	Specifies the stability of the electrode as **stabilizing** or **ready**.
AR	Shown when the meter is in AUTO-READ mode. The AR icon will blink while the reading is stabilizing and stop blinking when the reading is stable and the measurement is locked on the display.
7.000 pH	Displays the measurement value based on the last saved calibration and current electrode reading. Units are shown to the right of the value.
0.0mV	Shows the raw millivolt reading of the electrode.
BUFFERS: 1.68, …	Shows the buffer values used for the last saved calibration. **pH mode only.**
STANDARDS: 0.10 1.0 10	Shows the standard values used for the last saved calibration. **ISE mode only.**
ID XXXXXX	Shows the operator assigned sample ID number.
XXXXXX	Shows the operator assigned user ID number.
cal	Displays the action that will be performed when ***f1*** is pressed.
view log	Displays the action that will be performed when ***f2*** is pressed.
setup	Displays the action that will be performed when ***f3*** is pressed.

Keypad Display Information

	Press the f1, f2 and f3 function keys to perform the action shown above each key on the display.
	Press to turn the meter on. When the meter is on, press and quickly release to turn the display backlight on or off or hold down to turn the meter off.
	In the measurement mode, press to take a measurement. In the setup, calibration and other menus, press to escape the current menu and return to the measurement mode.
	In the measurement mode, press to enter the setup menu. In the setup, calibration and other menus, press to scroll up through a list of options.
	In the continuous measurement mode, press to freeze the displayed measurement and press again to unfreeze the measurement. In the setup, calibration and other menus, press to scroll left through a list of options.
	In the measurement mode, press to change the displayed measurement mode. Options are pH, mV, RmV (relative mV), ORP and ISE. In the setup, calibration and other menus, press to scroll right through a list of options.
	In the measurement mode, press to log or print a measurement. In the setup, calibration and other menus, press to scroll down through a list of options.

Keypad

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

pH and ISE Calibration

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

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

1. In the measurement mode, press ***f1 (cal)***.
2. Rinse the pH or ion selective electrode and any other electrodes in use with distilled water, blot dry with a lint-free tissue and place into the pH buffer or ISE standard.
3. When the electrode and buffer or standard are ready, press ***f3 (start)***.
4. Wait for the pH or concentration value on the meter to stabilize and stop flashing and perform one of the following actions:
   a. Press ***f2 (accept)*** to accept the displayed value.
   b. Press ***f3 (edit)*** to access the numeric entry screen and edit the value.
      i. Press setup (▲), mode (▶), log/print (▼) or hold (◀) to highlight a number, decimal point or negative sign; press ***f3 (enter)*** to select the highlighted item and repeat until the value at the measured temperature is shown above the numeric entry screen.
      ii. Press ***f2 (done)*** to exit the numeric entry screen.
      iii. Press ***f2 (accept)*** to accept the entered value.
5. Press ***f2 (next)*** to proceed to the next buffer or standard and repeat steps 2 through 4 or press ***f3 (cal done)*** to save and end the calibration. If five buffers or standards are used, the calibration will save and end once the fifth value is accepted.
   a. If a one point calibration is performed, press ***f2 (accept)*** to accept the displayed slope value or press ***f3 (edit)*** to access the numeric entry screen, enter the slope value and press ***f2 (accept)***.
6. The meter will display the calibration summary including the average slope. Press ***f1 (meas)*** to export the data to the calibration log or press ***f2 (print)*** to export the data to the calibration log and a printer or computer. The meter will automatically proceed to the measurement mode.

Measurement

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

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

Read Type Selection

1. In the measurement mode, press setup.
2. Press setup, mode, log/print, or hold to highlight *pH Channel* and press ***f3 (select)***.
3. Press setup or log/print to highlight *Mode and Settings* and press ***f3 (select)***.
4. Press setup or log/print to highlight *Read Type* and press ***f3 (select)***.
5. Press setup or log/print to highlight *Auto*, *Continuous* or *Timed* and press ***f3 (select)***.
   a. If *Timed* is selected and the time interval needs to be changed – highlight *Timed*; press mode to highlight hours (HH), minutes (MM) or seconds (SS); press ***f3 (edit)*** to access the numeric entry screen; use the numeric entry screen to change the values and press ***f1 (back)*** when the time interval is correct.
6. Press measure (esc) to return to the measurement mode.

Setup Menu

Navigating the Setup Menu

1. In the measurement mode, press setup to enter the main setup menu.
2. Press setup, mode, log/print or hold to scroll through the main setup menu options. Press ***f3 (select)*** to select a main setup menu option.
3. Press setup or log/print to scroll through setup submenu options. Press ***f3 (select)*** to select a setup submenu option.
4. Perform the appropriate actions to set the desired parameter in the setup submenus.
   a. To select a value from a list of options, press setup or log/print to highlight the desired value and press ***f3 (select)*** to set the value.
   b. To enter a numeric value, use the numeric entry screen.
      i. Select the value to be entered by pressing ***f3 (select)*** or ***f3 (edit)***. The numeric entry screen will popup on the display.
      ii. Press setup, mode, log/print or hold to highlight a number, decimal place or negative sign; press ***f3 (enter)*** to select the highlighted item and repeat until the desired value is shown on the top of the numeric entry screen.
      iii. Press ***f2 (done)*** to save the value and exit the numeric entry screen.
5. Press ***f1 (back)*** and then measure (esc) to return to the measurement mode at any time.

Setup Menu Overview

pH Channel	Settings	Log View	Diagnostics
Method **Mode & Settings** • Measure Mode • Read Type • Resolution • Buffer Group (pH) ***or*** • Measure Unit (ISE) • Stability • Averaging • Temp Comp (ISE only) • Blank Correct (ISE only) • Alarm Settings • Sample ID **Temperature** • Manual Temp Value • Temperature Unit • Temperature Calibration	• Export Data • Data Log • Date / Time • Language • Key Press Beep • Alarm Beep • Contrast • Auto Shut Off • User ID	• Data Log • Calibration Log	• Meter Self Test • Factory Reset • About Meter

pH Buffer Group Selection

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

1. In the measurement mode, press setup.
2. Press setup, mode, log/print or hold to highlight *pH Channel* and press ***f3 (select)***.
3. Press setup or log/print to highlight *Mode and Settings* and press ***f3 (select)***.
4. Press setup or log/print to highlight *Buffer Group* and press ***f3 (select)***.
5. Press setup or log/print keys to highlight *USA* or *DIN* and press ***f3 (select)***.
6. Press measure (esc) to return to the measurement mode.

ISE Measurement Unit Selection

1. In the measurement mode, press setup.
2. Press setup, mode, log/print or hold to highlight *pH Channel* and press ***f3 (select)***.
3. Press setup or log/print to highlight *Mode and Settings* and press ***f3 (select)***.
4. Press setup or log/print to highlight *Measure Unit* and press ***f3 (select)***.
5. Press setup or log/print to highlight *ppm, M, mg/L, percentage (%), ppb* or *None* and press ***f3 (select)***.
6. Press measure (esc) to return to the measurement mode.

ISE Automatic Blank (Non-Linear) Correction Selection

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

1. In the measurement mode, press setup.
2. Press setup, mode, log/print or hold to highlight *pH Channel* and press ***f3 (select)***.
3. Press setup or log/print to highlight *Mode and Settings* and press ***f3 (select)***.
4. Press setup or log/print to highlight *Blank Correct* and press ***f3 (select)***.
5. Press setup or log/print to highlight *Yes* or *No* and press ***f3 (select)***.
6. Press measure (esc) to return to the measurement mode.

Viewing the Calibration Log

1. In the measurement mode, press setup.
2. Press setup, mode, log/print, or hold to highlight *View Log* and press ***f3 (select)***.
3. Press setup or log/print to highlight *Calibration Log* and press ***f2 (accept)***.
4. Press setup or log/print to highlight *pH – Channel* or *ISE – Channel* and press ***f2 (select)***.
5. Press setup or log/print to highlight *pH, RmV, ORP, ISE* or *Temperature* as the calibration type and press ***f2 (select)***.
6. The meter will display a list of calibrations for the selected channel and calibration type. The list shows the sequential number of the calibration and the date and time it was saved (*07/01/2011 12:45*).
7. To view the calibration data, press setup or log/print to highlight a specific calibration and press ***f2 (select)***. Press ***f2 (print)*** to print the calibration, press ***f3 (info)*** to view the electrode slope between pH buffer or ISE standard points or press ***f1 (back)*** to return to the list of calibrations.
8. Press measure (esc) to return to the measurement mode.

Viewing the Data Log

1. In the measurement mode, press setup.
2. Press setup, mode, log/print, or hold to highlight *View Log* and press ***f3 (select)***.
3. Press setup or log/print to highlight *Data Log* and press ***(accept)***.
4. The meter will display a list of the data points. The list shows the sequential number of the data point and the date and time the data point was saved (*07/01/2011 12:45*).
5. To view the measurement information for an individual data point, press setup or log/print to highlight the data point and press ***f2 (select)***. Press ***f2 (print)*** to print the data point or press ***f1 (back)*** to return to the list of data points.
6. Press measure (esc) to return to the measurement mode.

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