

onset computer corporation

HOBOWare® Lite

Software for HOBO® Data Loggers & Devices

User's Guide

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Thank you for purchasing Onset® products. Our loggers and software are designed to be easy to use, with many powerful capabilities. We recommend that you begin by installing the software, connecting your logger, and following the instructions in the “HOBOWare Lite Quick Start” section on page 3 to get up and running quickly. You can expect to be comfortable with HOBOWare Lite fundamentals within a few minutes. Consult the other sections of this manual or the online help for a more detailed description of software capabilities.

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



Main Onset Web site: <http://www.onsetcomp.com>

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Chapter 1:

Getting started

HOBOWare Lite software is used for launching, reading out, and plotting data from HOBO data loggers. This chapter explains:

- ✓ How to install and start the software
- ✓ How to connect loggers to the computer
- ✓ How to launch, log, and read out loggers

Installing HOBOWare Lite

You must have an administrator login to install HOBOWare Lite. To install the software from CD:

1. Refer to the README file on the installation CD for detailed information about the hardware and software needed to run HOBOWare Lite. If you have additional questions, please check the HOBOWare website at <http://www.onsetcomp.com/products/software>, or call Onset Technical Support.
2. Insert the CD in your computer's CD-ROM drive. Double-click the CD icon in the Finder and double-click the HOBOWareLite.pkg icon to launch the HOBOWare Lite installer.
3. Follow the prompts to install HOBOWare Lite.
4. When you reach the final screen of the installation program, click **Restart**.
5. After restarting, open HOBOWare Lite by double-clicking the HOBOWare Lite icon in your computer's Applications folder.

Connecting devices

HOBOWare Lite supports most HOBO U-Series data loggers, which communicate with the computer by connecting to a USB port.

You can connect most devices to the USB port by using an Onset-supplied USB interface cable. Some loggers require an optic USB base station/coupler to connect to the computer. Consult the manual that came with your device for specific information about required base stations/couplers or cables.

Tip: For instructions on using the HOBO Waterproof Shuttle as a base station, refer to the shuttle's user guide.

Connecting a device to a USB cable

1. Open HOBOWare Lite.

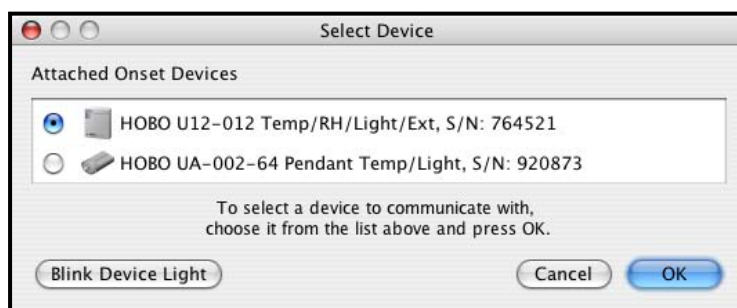
2. Plug the large end of the USB interface cable into a USB port on the computer.
3. Plug the small end of the USB interface cable into the port on the logger. (Refer to the diagram and instructions that came with the logger if you need help finding the port.)
4. When the logger is recognized by HOBOWare Lite, the right side of the status bar at the bottom of the HOBOWare Lite window will update to reflect the number of loggers connected. At this point, you can begin using the logger.
5. To disconnect the logger, simply unplug it from the USB cable.
6. Wait for the status bar to update the number of loggers before continuing.


Connecting a base station/coupler and logger

1. Open HOBOWare Lite.
2. Plug the base station/coupler cable into a USB port on the computer.
***Important:** Make sure the base station/coupler is the correct model for the logger you want to use. Consult the manual that came with the logger if you are not sure.*
3. Attach the logger to the base station/coupler as described in the documentation that came with your logger.
4. When the logger is recognized by HOBOWare Lite, the right side of the status bar at the bottom of the HOBOWare Lite window will update to reflect the number of loggers connected. At this point, you can begin using the logger.
5. To disconnect a logger, simply unplug it from the base station/coupler. Wait for the status bar to update the number of devices before continuing.
6. To attach another logger via a base station/coupler, remove the logger, leaving the base station/coupler connected. Then connect the next logger.
7. To disconnect the base station/coupler, just unplug it from the USB port.

Connecting multiple devices

If the computer has multiple USB ports, you can connect multiple loggers and work with one at a time. When multiple loggers are connected, the Select Device window opens every time you choose the Launch, Readout, Stop, or Status command:




Tip: If you would prefer not to see the Select Device window each time you launch, read out, stop, or check the status when multiple loggers are connected, use the Preferences to turn off the feature. From the HOBOWare Lite menu, go to **Preferences**. On the **General** pane, choose **Selecting Devices**, and click the button next to the **Only show Select Device window if a device has not been selected** option. The selection window will then display automatically only when more than one device is connected and no device is selected. You can still access the window manually by clicking the Select Device icon .

Click the button next to a logger on the list to select it, then click **OK**. The launch, readout, stop, or status check will proceed with the selected logger.

If the **Blink Device Light** button is available, you can click it to verify that you have selected the appropriate logger. This briefly illuminates the light on the logger that you have selected.

If the logger does not have a light, or if the light is not visible when the logger is in the base station/coupler, simply check the serial number (S/N) on your logger to make sure that it matches the one that is selected in this window.

To access the Select Device window at any time, click the Select Device icon  on the toolbar, or choose **Select Device** from the Device menu.


When the Select Device window is not open, you can check the status bar at the bottom of the screen to quickly determine which logger is selected.

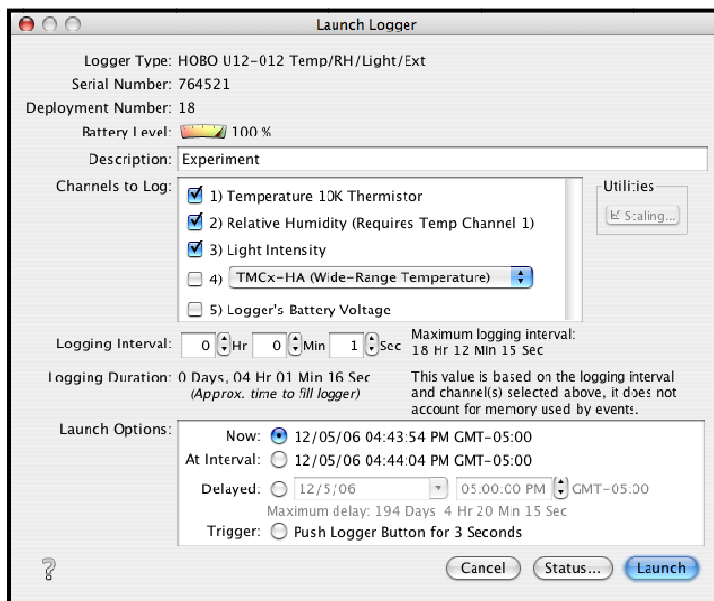


The left side of the status bar indicates the model, description, and serial number of the logger; the right side indicates the total number of loggers connected.

HOBOWare Lite Quick Start

After you have installed and opened the HOBOWare Lite software and connected a logger as described earlier in this chapter, follow these steps for a quick demonstration of launching and collecting data with a logger:

1. Click the Launch icon  on the toolbar. This displays the logger's Launch window. Launch windows vary slightly for each type of logger, but most look similar to this:

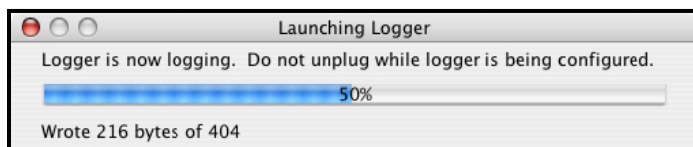



2. Review the default Launch settings and change them if you wish. Enter a new name in the **Description** field, and select or deselect **Channels to Log** (and connect appropriate sensors, if applicable). Make sure that at least one of the channels you log is a measurement of something that will be easy to change, such as light or temperature. Set a short (five seconds or less) **Logging Interval**, and choose the **Now** launch option.

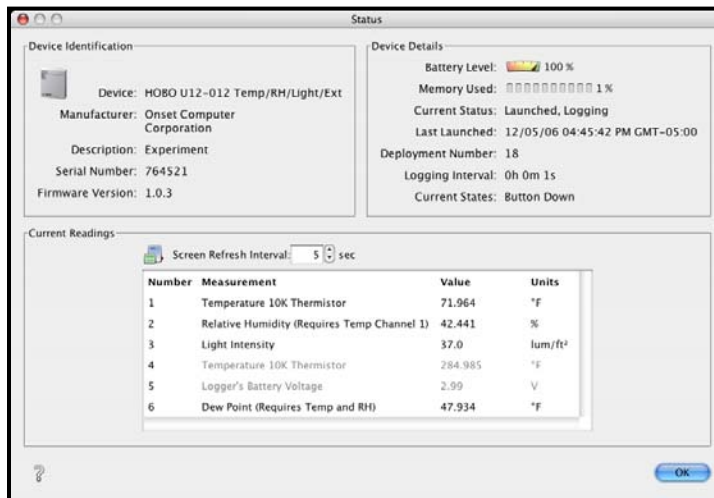
Tip: Launch settings are discussed in depth in “Chapter 2: Working with loggers.”


3. Click **Launch** to begin logging. HOBOWare Lite displays the progress of the launch and warns you not to unplug the logger while it is being configured.

Normally, you will unplug the logger and deploy it when the launch is finished. For this tutorial, leave the logger plugged in.



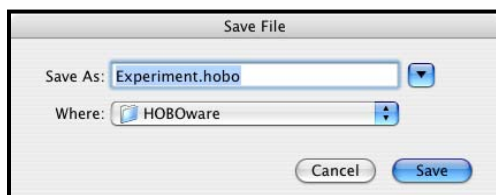
4. On the toolbar, click the Status icon  to open the Status window. Watch as the **Current Readings** update in real time.



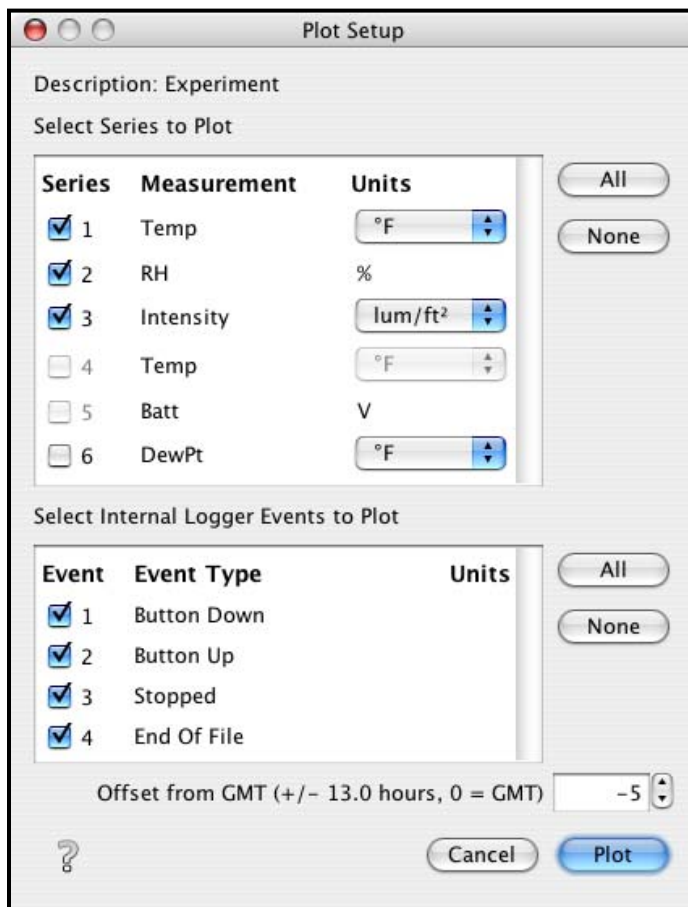
5. Press the logger's event button for several seconds. Watch the **Current States** in the Status window change to Button Down. Release the button.
6. Change the sensor readings by changing the conditions. For example, if you are measuring temperature, change the temperature reading by holding the logger or sensor in your hands for a minute or two. Watch the **Current Readings** in the Status window change as the conditions change.
7. Close the Status window by clicking **OK**.
8. Click the Readout icon  on the toolbar. Click **Stop** when HOBOWare Lite asks if you want to stop the logger before reading out.



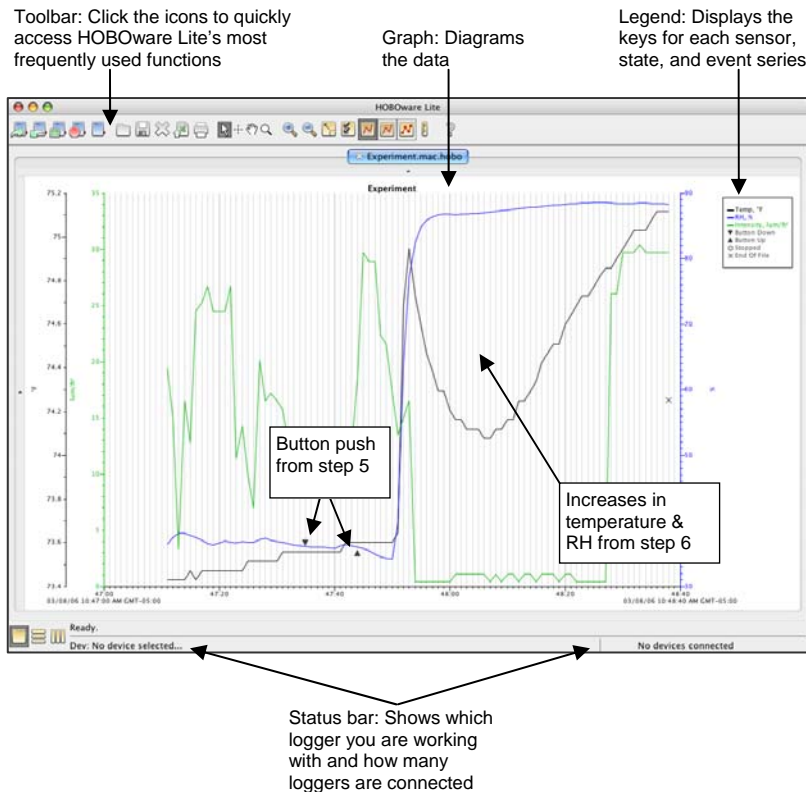
9. After reading out the logger, HOBOWare Lite prompts you to save the datafile. Click **Save**.



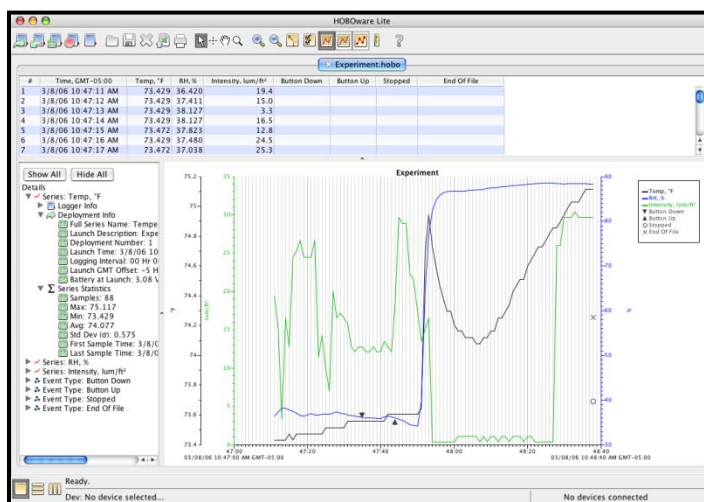
10. Review the settings on the Plot Setup dialog. The channels you enabled in step 2 should be checked, along with button and other events (if applicable). Click **Plot**.



11. View the results of your deployment. Your screen will not match this example exactly, but you should see Button Up and Button Down events (if applicable) and the graph should reflect the change in conditions that you caused in step 6.



12. From the View menu, choose **Details Pane**, then return to the View menu and choose **Points Table**. The Details pane appears to the left of the graph, and the Points table appears above the graph. These panes provide additional information about your data. Refer to “Details pane” on page 21 and “Points table” on page 22. (To hide these panes, go back to the View menu and choose them again.)



13. Use the tools on the toolbar to experiment with the export, print, and many viewing and customization tools available within HOBOWare Lite. Pause the pointer over each icon on the toolbar for a description of each tool.

Tip: Viewing, customization, export, and print options are discussed in depth in “Chapter 3: Working with data.”

14. Choose **HOBOWare Help** from the Help menu. The browser-based Help system provides detailed information on all the features of HOBOWare Lite, in convenient electronic form.
15. If you have an Internet connection, choose **Check for Updates** from the Help menu. It is important to check for updates periodically. By default, HOBOWare Lite automatically asks to perform this check each week. For more information about this and other preference settings, refer to “Preferences” on page 43.

Toolbar icons

The toolbar, located at the top of the main HOBOWare Lite window, allows point-and-click access to HOBOWare Lite’s most frequently used functions. Pause the pointer over each icon on the toolbar for a description of each tool.



Launch (page 10) sets up the logger to begin logging.



Readout (page 16) copies data from the logger to your computer.



Status (page 13) displays the logger’s state and current readings.



Stop (page 17) stops a logging logger.



Select Device (page 2) displays available loggers.



Open (page 19) opens a .hobo or .hsec file.



Save (page 38) saves the plot as a project (.hproj) file.



Close (page 42) closes the currently focused plot.



Export (page 39) creates a text file of the data (in .csv or .txt format) for use in spreadsheet and other applications.



Print (page 42) prints the graph as it appears on your screen.



Arrow (page 31) points to and selects items on the graph to edit their properties.



Crosshair (page 28) displays values for points on the graph and cross-references them to cells in the Points table.



Hand (page 29) scrolls an axis or the entire graph.



Zoom (page 30) adjusts the scaling of an axis or the entire graph.



In (page 30) zooms in on a smaller area of the graph.



Out (page 30) zooms out to a larger area of the graph.



Revert (page 30) rescales the graph to full scale.



Properties (page 31) modifies the properties of various graph items.



Vertical Gridlines (page 37) toggles vertical gridlines on and off.



Horizontal Gridlines (page 37) toggles horizontal gridlines on and off.



Mark Points (page 38) toggles all point markers on and off.



Units (page 37) allows you to convert some or all of the series on the currently focused plot to other units (for example, from degrees Fahrenheit to degrees Celsius).



Help opens HOBOWare Lite's browser-based Help pages.

Chapter 2:


Working with loggers

Use HOBOWare Lite to set up loggers for deployment and then read out the data. This chapter explains how to:

- ✓ Launch a logger
- ✓ Check logger status
- ✓ Read out data from a logger
- ✓ Stop a logger
- ✓ Restore a corrupt device header

Launching a logger

To set up a logger to record data, you must specify several parameters and start, or launch, the logger. To launch a logger:

1. Before opening HOBOWare Lite, check the time on the computer and ensure that it is correct. If it is not, update your computer's clock manually or synchronize it with an online time server (if available). Then open the HOBOWare Lite software application.
2. Connect the logger to the computer.
3. Click the Launch icon  on the toolbar, or choose **Launch** from the Device menu.
4. Different messages may appear, depending on the state of the logger. Answer each of the prompts accordingly.
 - A warning appears if the logger has already been launched. Click **Yes** to continue, or click **No** to cancel. If the logger is currently logging, it will continue to log until you click the **Launch** button on the Launch Logger window.
 - A warning appears if the logger has collected data since its last readout. Click **Yes** to proceed to the launch window, or click **No** to cancel the launch and read out the data first.

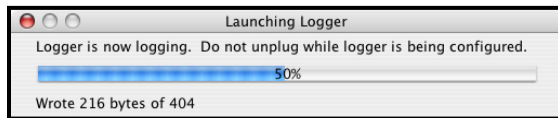
Tip: Because loggers are tested before shipping, there may be data in your logger the first time you launch it. In this case, it is not necessary to read out the logger. Click **Yes** to proceed.

5. When the Launch window appears, configure the launch:
 - Enter a launch description (up to 40 characters)
 - Select the data channels you want the logger to record, if applicable

- Set the logging interval(s), if applicable
- Choose the start mode for the launch — **Now**, **At Interval**, **Delayed**, or **Trigger** (button or coupler, if available).

For details on each of these parameters, refer to the following “Launch window” section.

- To verify that the sensors are working correctly or to review settings from the previous launch, click the **Status** button. Refer to “Checking logger status” on page 13 for details.
- Click the **Launch** button. HOBOWare Lite displays the progress of the launch and warns you not to unplug the logger while it is being configured.

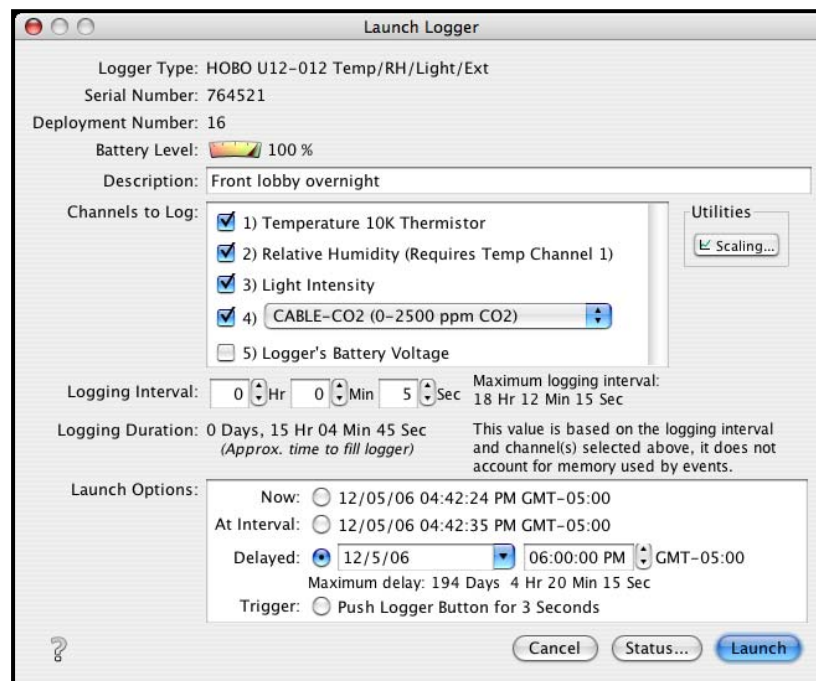


Tip: If the logger was already logging from a previous deployment, it will not stop logging the previous deployment until you perform this step. Click **Cancel** instead of **Launch** if you want to continue the previous deployment.

Once the logger begins logging, it will continue logging until you stop it, the memory fills, or the battery runs out.

Launch window

This is an example of a Launch window for a HOBO U12 Temp/RH/Light/External logger. The Launch window for other loggers may be slightly different. The upper section of the window displays details about the logger, including logger type, serial number, and battery level. The lower section is for entering launch parameters.



The following table explains the elements in the Launch window.

Launch window item	Description
Logger Type	Logger model and description.
Serial Number	Serial number of the logger. Note that some external sensors also have serial numbers, which are not listed here.
Deployment Number	Number of times (including this time) the logger has been launched. Each time you start a new launch, the deployment number increases by one.
Battery Level/Battery State	Condition of the battery when you opened the Launch window. Consult the logger documentation for specifics on battery capacity.
Description	Enter a description for the launch, up to 40 characters, in this field. This description is used as the default file name when you read out and save the data recorded by the logger. It is also the title of the graph.
Event & State Channels (not shown in example)	If your logger supports external events and/or states, you can enter names to identify the event and state channels that are in use. You can also rename the Open and Closed descriptions for each state, and enter increments and units for each event channel.
Channels To Log	<p>Select the data channels, if any, you want the logger to record. Some general information is given below, but you should always refer to the documentation that came with your logger for detailed information about the channels that are available to you.</p> <ul style="list-style-type: none"> Some loggers with RH or pressure sensors require that you also select the internal temperature channel in order to log relative humidity or pressure. Refer to the manual that came with your logger for additional information. When both the internal temperature and RH channels are selected, dew point can be calculated automatically. For loggers with external channels, you must select the part number of the sensor that is attached to ensure data is accurate during logging. The sensor part number is listed on the shrink tube on the sensor cable; make sure it matches the part number you select. If you select an external channel, but do not plug the sensor in, false data will be recorded for that channel. If your logger supports linear scaling or alarms, refer to “Special functions” on page 52 for instructions. You can select the logger’s internal battery channel. The logger’s battery voltage is recorded at each sample time.

Tip: Like the other data channels, logging the internal battery channel consumes some of the logger’s memory. Unless you suspect abnormal battery performance, you probably do not need to log the battery voltage. A U-Series logger will record a bad battery event, even if it is not recording the battery channel.


- If you do not select any channels to log, the logger will record states and events only. For more details on states and events, refer to

Launch window item	Description
	“Viewing the plot” on page 20.
Logging Interval	<p>Choose the rate at which you want the logger to record data. The minimum logging interval is one second and the maximum for most loggers is 18 hours, 12 minutes, and 15 seconds. The shorter the logging interval, the more quickly the memory fills and battery power is consumed.</p> <ul style="list-style-type: none"> ▪ If you did not select any channels to log, this field will be dimmed and unavailable. ▪ If the logger supports multiple logging intervals, refer to “Multiple logging intervals” on page 55 for instructions. ▪ If the logger supports fast logging intervals, refer to “Fast logging intervals” on page 56 for instructions.
Logging Duration	<p>Approximate time it would take to fill the logger memory based on the logging interval and currently enabled sensors, if applicable. This is a theoretical estimate only; battery life and frequent state and event logging will affect your deployment. If you are logging only state changes and events, no estimation is possible.</p>
Launch Options	<p>There are several ways to start the logger:</p> <ul style="list-style-type: none"> ▪ Now. Logging begins as soon as you click the Launch button. ▪ At Interval. Logging will begin at an exact interval (for example, 9:00:00 rather than 8:47:00 when you choose a one-hour logging interval). The exact start time depends on the logging interval you choose. ▪ Delayed. Logging will begin at a date and time you specify, up to approximately six months from the present. ▪ Trigger. (Available only on certain loggers.) Logging will not start until you press the button on the logger and hold it down for at least three seconds, or return the logger to the coupler without the base station for at least three seconds (refer to your logger manual for more information). If the logger has a light, the light will flash quickly when logging begins. ▪ The Launch Option defaults to the option selected for the current logger’s previous launch.

Checking logger status

Use the real-time status display to check the state of the logger, time logging will begin, current readings, logger memory used, etc.

To check the status of a logger:

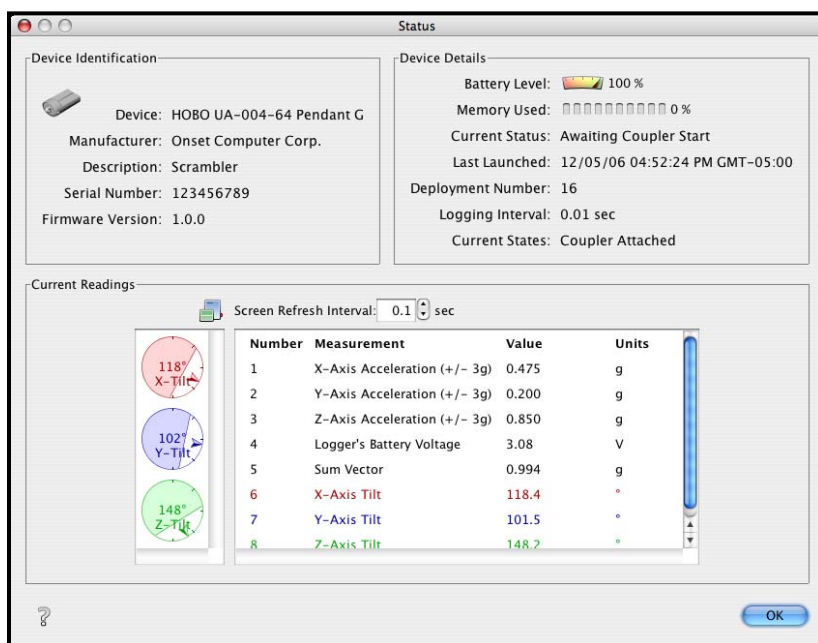
1. Connect the logger to the computer.
2. Click the Status icon  on the toolbar, or choose **Status** from the Device menu. You can also access the Status window by clicking the **Status** button on the Launch window.

3. To close the Status window, click **OK**.

The Status window displays real-time information about the attached logger. You can check the status for a logger whether it is waiting for logging to begin, actively logging, or stopped.

Important: *If you have launched a logger with a fast logging interval (faster than once per second), you may check the logger's status before logging begins, but you must not check status after logging begins. Checking the status of a logger that is logging with a fast logging interval will cause the logger to stop.*

In the following example, a HOB0 Pendant G logger is set up for a trigger (coupler) start.



Important: *Battery power is drained more rapidly while checking status. Keep this in mind when frequently checking status during a deployment. You can significantly reduce the demand on the battery by adjusting the **Screen Refresh Interval** to five seconds or higher (not available on all loggers).*

The following table explains the items in the Status window.

Status window item	Description
Device	Logger model and description.
Manufacturer	Manufacturer of the logger.
Description	Description entered when the logger was last launched. This description will be used as the default file name and the title in the graph.
Serial Number	Serial number of the logger.
Firmware Version	Version number of the logger's firmware.
Battery Level/ Battery State	Condition of the battery. Consult the logger documentation for specifics on battery capacity.

Status window item	Description
Memory Used	Percentage of the logger's memory that is full. Note: If the battery died while the logger was logging, this will be 100% even if only a small amount of the memory was used.
Current Status	Messages that describe the state of the logger: <ul style="list-style-type: none"> ▪ Awaiting Button/Coupler Start. The logger has been launched with a trigger start (if available). Press and hold down the button on the logger for three seconds to begin logging, or follow the instructions that came with your logger if it offers a triggered start but does not have a button. If the logger has a light, the light will flash quickly when logging begins. ▪ Awaiting Delayed Start. The logger will begin recording data at a specific time because either Delayed Start or Start at Interval was chosen at launch. ▪ Launched, Logging. The logger has been launched and is actively recording data. ▪ Logger Is Full. The logger has reached its memory capacity and is no longer recording data. ▪ Logger is stopped. The logger is not logging, is not full, and is not awaiting a delayed or trigger start.
Last Launched	Date, time, and offset to Greenwich Mean Time (GMT), also known as Coordinated Universal Time (UTC), when the logger was last launched. This is not necessarily the time when the first sample was recorded; it is the time all of the launch parameters were loaded in the logger.
Delayed Start (if applicable)	If the logger has been launched, but is waiting for a delayed or interval start, the scheduled start time is shown here in local time.
Deployment Number	Number of times the logger has been launched. The number listed includes the most recent launch.
Logging Interval	Rate at which the logger was set up to record data the last time the logger was launched, if applicable. If the logger supports multiple logging intervals, the interval currently in use (if the logger is logging) will be shown in bold.
Current States	If your logger has an event button, most often the current state will be Button Up, meaning the button is not being pressed.
Screen Refresh Interval	Frequency with which the Current Readings are updated, up to 3600 seconds (one hour). A higher number means less stress on the logger's battery. The Status icon blinks when the readings are updated. Note: For event/state loggers, the interval is set to 0.5 seconds and cannot be adjusted. This ensures that you do not miss events and state changes that take place between refreshes.
Tilt meters (not labeled)	For acceleration loggers only, color-coded meters display X, Y, and Z-axis tilt (relative to vertical, assuming that the only acceleration force on the logger is gravity) graphically.

Status**window item****Description**

Current Readings


Sensor readings, updated in real time.

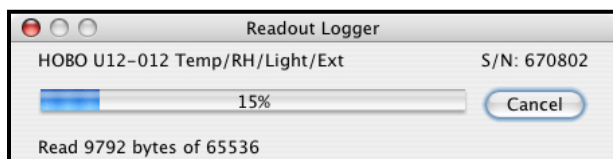
- Readings are displayed for all available sensors, even if they are not being logged. If a channel is not being logged, its name is dimmed in the display.
 - If a logger has channels for external sensors, a description and reading will be given for the external channels even if no sensors are plugged in.
 - For event loggers, the event count in the **Current Readings** box will always start at zero, even if many events have already been logged.
-

Reading out data from a logger

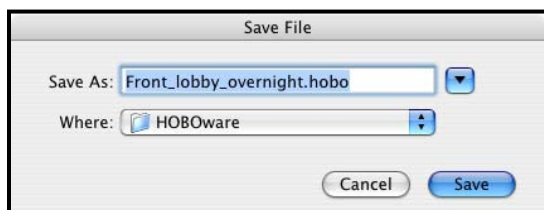
To retrieve data recorded by a logger, you must read out the logger. Reading out the logger copies data from the logger to your computer, allowing you to save the data in a datafile and view the plot.

During readout, the logger continues to record data unless you have stopped the logger or the logger is full. (For details on stopping the logger, refer to “Stopping a logger” on page 17.) To read out a logger:

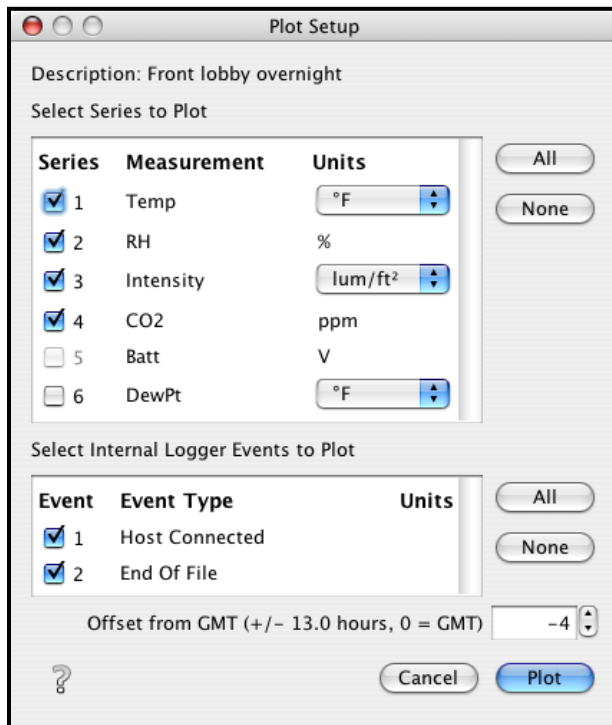
1. Connect the logger to the computer.
2. Click the Readout icon  on the toolbar, or choose **Readout** from the Device menu. If the logger is still logging, a message asks whether you want to stop the logger.
3. Wait while the data is read out from the logger.



4. HOBOWare Lite prompts you to save the data. Accept the default location and name, or enter a new name and click **Save**. By default, the datafile is saved with an extension of .hobo in the HOBOWare folder, located in your Documents folder. (If you save the file to a different folder, HOBOWare Lite will make that folder its new default.)



5. A Plot Setup dialog similar to the following appears.




- Select the series you wish to view on the plot. Click each checkbox individually to select or clear sensor measurements, states, and events, or click the **All** or **None** buttons to select or clear all sensor measurements, states, and events.
 - Select the units you want to display for each series, if available.
 - Adjust the time zone offset, if necessary. By default, data is shown in the offset used to launch the logger. To select a different offset, enter the hours offset from GMT (UTC) in decimal form. In the example above, the time zone is Eastern Daylight Saving Time, which is four hours behind GMT (-4). To change the time zone to Pacific Daylight Saving Time, enter -7. (You may find this useful if you logged in multiple time zones, or if you took the logger to a different time zone after launching it.)
6. When you have made your selections, click the **Plot** button. The plot is displayed. For information about working with the plot, refer to the next chapter, “Working with data.”

Stopping a logger

A logger automatically stops recording data when the memory is full or the battery runs down. You can also stop the logger manually at any time with the stop command.

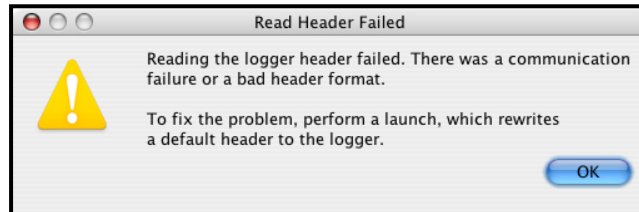
To stop a logger:

1. Connect the logger to the computer.
2. Click the Stop icon  on the toolbar, or choose **Stop** from the Device menu.

After the logger has been stopped, the data remains in the logger until the next launch.

Restoring a corrupted header

Occasionally, when trying to launch, check status, or read out a logger you may receive a “Read Header Failed” message. For example, the following message occurs when you try to check the status of a logger with a corrupted header.



“Read Header Failed” messages occur when a device’s header cannot be read, usually because of a communication error or corrupted header. Disconnect the device from the computer, then reconnect it and try to launch, check status, or read out again.

If you receive the message again, the header has probably become corrupted. The most common cause of header corruption is a communication problem during launch, such as the USB cable coming loose or an optical logger slipping out of its base station/coupler while the Launching Logger progress bar is displayed. In that case, there is a possibility that valid data has been logged, but cannot be read out.

You can restore the header by launching the logger. This will reset the device’s launch options to factory defaults. However, it will also cause any logged data to be lost. If you receive a “Read Header Failed” message and are unable to read out the logger, please contact the vendor that sold you the device. It may be possible to retrieve the logged data.

Chapter 3:

Working with data

This chapter explains how to work with the data read out from loggers, including how to:

- ✓ Open files
- ✓ View the plot
- ✓ Work with the graph
- ✓ Save datafiles and project files
- ✓ Create export and text files
- ✓ Copy graphs and points
- ✓ Print graphs, points, and details
- ✓ Close plots

Opening files

Only files with extensions of .hobo (including files created with Onset's GreenLine[®] software and both Macintosh[®] and Windows[®]-compatible versions of HOBOWare Lite and HOBOWare Pro), .hsec, or .hproj can be opened by HOBOWare Lite.

To open a file:

1. **From the Finder:** Double-click a .hobo, .hsec, or .hproj file. HOBOWare Lite automatically launches itself (if it is not open already) and opens the file.

In HOBOWare Lite: Click the Open icon  on the toolbar, or choose **Open Datafile** from the File menu. Then select a compatible file and click **Open**.

To open a project file, choose **Open Project** from the File menu. Then select a project (.hproj) file and click **Open**.


Or, click the File menu and select a recently opened datafile or project file from the **Recent Files** list.

Tip: If, when opening a .hsec file, HOBOWare cannot verify the digital signature, it will display a message that verification has failed. This means that the file has been altered or become corrupted since it was originally saved. It will offer to display the plot if possible, but will not display the padlock icon in the legend or provide signing details in the Details pane. You will still be able to apply filters, copy and paste series, export the data, save a project file, and perform other typical HOBOWare Lite functions.

2. Datafiles only: Select the series you wish to view in the plot. You also have the option of changing the times on the plot to a different time zone. For more details on the Plot Setup dialog, refer to “Reading out data from a logger” on page 16.
3. When you have made your selections, click the **Plot** button. The plot is displayed.

About secure files

Secure files are created with HOBOWare Pro to assist organizations with 21 CFR Part 11 conformance or if you wish to add a level of security when working with datafiles. Secure files have an extension of .hsec and are digitally signed when the logger is read out. When you open a secure file, HOBOWare Pro or HOBOWare Lite verifies the digital signature to ensure that the data in the file exactly matches what was read out from the logger.

- The padlock icon  appears in the legend next to the series that were verified as original data.
- In the Details pane, audit trail information is displayed under the Data Verification node for each series.
- Series that were created by filtering are not verified.
- Series retain their verification status (and padlock icon) when copied and pasted into other plots.
- Project (.hproj) and export files are not secure, even if you create them from secure files.
- If, when opening a secure file, HOBOWare Lite cannot verify the digital signature, it will display a message that verification has failed. This means that the file has been altered or become corrupted since it was originally saved. It will offer to display the plot if possible, but will not display the padlock icon in the legend or provide signing details in the Details pane. You will still be able to apply filters, copy and paste series, export the data, save a project file, and perform other typical HOBOWare Lite functions.

Viewing the plot

Four kinds of data can be displayed on the plot:

- Sensor measurements
- States
- External events
- Internal logger events

Sensor measurements include the channels you selected to log at an interval during the launch, such as temperature, RH, or battery voltage. This type of data series consists of all the logged data points for that channel. In addition, if the logger recorded both temperature and RH, a dew point series can be plotted.

States are condition changes that can be recorded at any time during deployment, regardless of the logging interval (if any). Only state loggers, such as the U9 and U11, can record state changes.

External events are momentary switch closures (e.g., from turnstiles) that are recorded by loggers with external event channels, such as the U11 logger.

Internal logger events are individually-logged occurrences that can be recorded at any time during deployment, regardless of the logging interval. U-Series loggers record internal logger events. Examples of internal logger events include:

- **End of File:** Marks the last record that was found in the logger.
- **Bad Battery:** Time the battery capacity fell to an extremely low level (if applicable).





Tip: If you see a Bad Battery event, replace the battery before deploying the logger again.

- **Stopped:** Time the logger was manually stopped with the software.
- **Host Connected:** Time the logger was connected to the computer.
- **Coupler Connected/Coupler Disconnected:** Time the logger was connected or disconnected from the coupler, if the logger uses a coupler to communicate with the computer.
- **Button Down/Button Up:** For loggers that have event buttons, each button push of at least one second is logged as a Button Down event and a Button Up event.
- **Interval Change:** For loggers that support multiple logging intervals, an Interval Change event marks the moment when a new logging interval began.

Details pane

To display the Details pane, choose **Details Pane** from the View menu. Choose **Details Pane** again to hide the Details pane.

For each sensor measurement, event, and state series, the Details pane contains information and statistics, including:

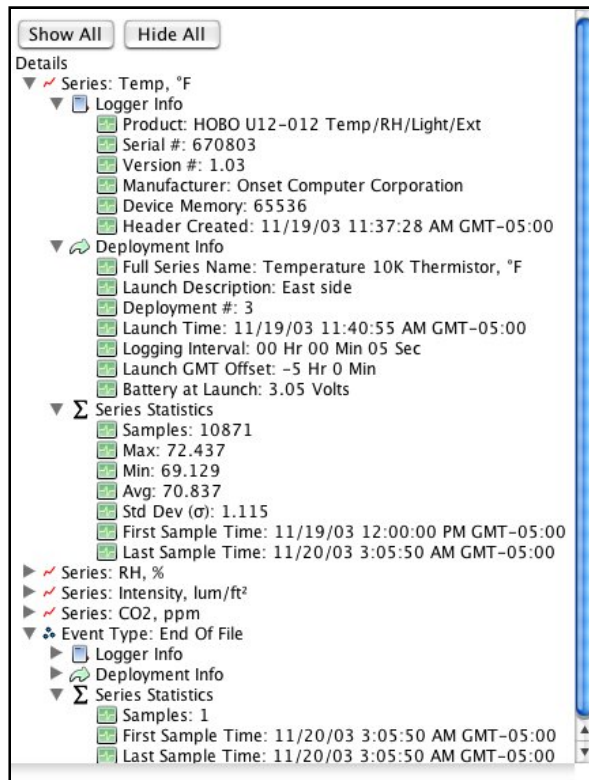
-  Logger information, such as the logger model and serial number
-  Deployment information, such as the launch description, deployment number, start time and time zone, logging interval, and battery voltage at launch
-  Series statistics, including the total sensor samples and events, time of the first and last sample, and the maximum, minimum, average, and standard deviation for each sensor series in the plot
-  Audit trail information for secure (.hsec) files

To fully expand the details tree, click the **Show All** button. To fully collapse the tree, click **Hide All**.

Click a series node in the details tree to select the corresponding series on the graph and corresponding column in the Points table.

To print the details tree, go to the File menu and choose **Print Details**. To export the details tree to a text file, go to the File menu and choose **Export Details**.

To resize the pane, drag the divider between the Details pane and the graph.



Tip: If you want the Details pane to be displayed by default when you view data, go to the HOBOWare Lite menu and choose **Preferences**. On the **Plotting** pane, in **Layout**, enable the “Show the details pane when plotting data” option.

Points table


To display the Points table, choose **Points Table** from the View menu. Choose **Points Table** again to hide the Points table.

The Points table lists the logger data as text. The Points table is linked to the graph: only the data for the sensor measurements, states, and events displayed on the graph are listed in the Points table.

#	Time, GMT-05:00	Temp, °F	RH, %	Intensity, lum/ft²	CO2, ppm	End Of File
9119	11/20/03 12:39:50 AM	69.471	51.046	15.7	628	
9120	11/20/03 12:39:55 AM	69.427	51.106	15.7	628	
9121	11/20/03 12:40:00 AM	69.471	51.141	15.0	629	
9122	11/20/03 12:40:05 AM	69.471	51.109	15.0	630	
9123	11/20/03 12:40:10 AM	69.471	51.109	15.7	630	
9124	11/20/03 12:40:15 AM	69.427	51.106	15.0	631	
9125	11/20/03 12:40:20 AM	69.471	51.141	15.0	634	
9126	11/20/03 12:40:25 AM	69.427	51.138	15.7	635	
9127	11/20/03 12:40:30 AM	69.427	51.138	15.0	636	
9128	11/20/03 12:40:35 AM	69.427	51.138	15.0	636	
9129	11/20/03 12:40:40 AM	69.427	51.138	15.0	636	
9130	11/20/03 12:40:45 AM	69.427	51.138	15.0	637	
9131	11/20/03 12:40:50 AM	69.427	51.169	15.0	637	
9132	11/20/03 12:40:55 AM	69.427	51.169	15.0	636	

The data points are listed chronologically. All the measurements, state changes, and events recorded by the logger at a given time are listed in a single row. Each series is displayed in a

column. You can resize the columns by clicking and dragging the dividers between the column headers.

Use the arrow keys or scroll bars to move up, down, left, and right in the Points table. Additionally, as you click the crosshair tool  in the graph, the corresponding point is selected in the Points table; if you click a value or event cell in the Points table, the crosshair will appear on the graph at the time corresponding to that cell. For more details on using the crosshair, refer to “Using the crosshair tool” on page 28.

To print the points, go to the File menu and choose **Print Points** (available only with Java 1.5 or higher). To copy points, use the mouse to select the cells you want to copy, then press **Command (⌘)-C** to copy them to the clipboard.


Tip: You can also export the data points to a text file for use in Microsoft® Excel® or other programs. For details, refer to “Exporting points” on page 40.

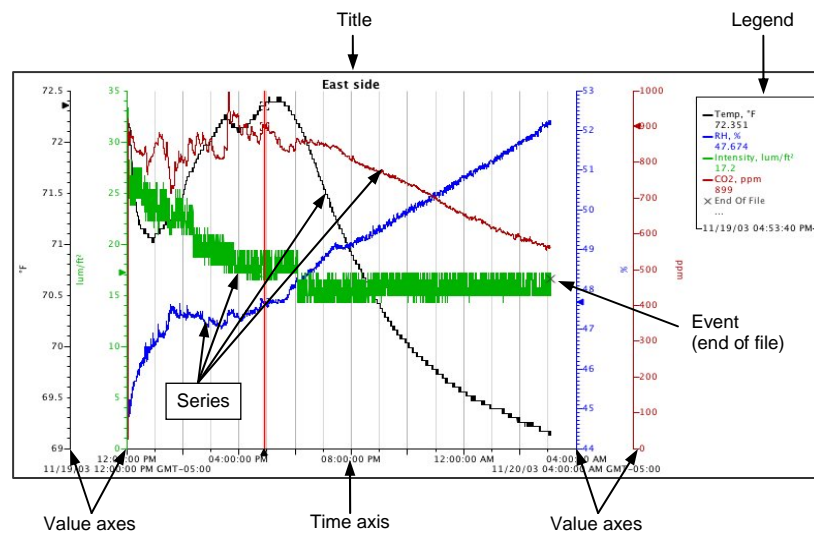
To resize the pane, drag the divider between the Points table and the graph.

Tip: If you want the Points table to be displayed by default when you view data, go to the HOBOWare Lite menu and choose **Preferences**. On the **Plotting** pane, in **Layout**, enable the “Show the points table when plotting data” option.

Graph

The graph contains a visual representation of the series you selected to view when you opened the plot. The graph also includes:

- X axes, called the *time axes*; display the time ranges for the data.
- Y axes, called the *value axes*; display the values for all sensor series, such as temperature in degrees Fahrenheit or Celsius, or battery level in Volts.
- Title, which defaults to the description entered at launch.
- Legend, which displays the keys (colors or markers) for each sensor series, state, and event, as well as the units for each series. For .hsec files, a padlock icon  is shown in the legend next to the names of the series that were verified as original data.



Working with the graph


There are many ways you can adjust and customize the graph:

- Adding and removing series
- Adding labels to the graph
- Using the crosshair tool
- Panning and zooming
- Resetting the scale
- Changing properties
- Miscellaneous plot controls

Tip: After you have adjusted and customized the graph, save your work in a project (.hproj) file. For more information, refer to “Saving a .hproj project file” on page 39.


Adding series by pasting

You can combine data from multiple plots by copying and pasting series. To paste a series:


1. Display the source plot (the plot which includes the series you want to copy) and the destination plot (the plot where you want to paste the series).
2. On the source plot, choose the arrow tool  and select the series you want to copy.
3. Right-click and choose **Copy Series** from the pop-up menu. Or, press **Command (⌘)-C**.
4. With the arrow tool, right-click anywhere on the destination plot and choose **Paste Series** from the pop-up menu. Or, press **Command (⌘)-V**. The new series is added to the graph, the Details pane, and the Points table.

Overlaying series from different times

If the series you are comparing were logged at different times, you will need to make some adjustments to the plot in order to view the series together.


1. Display the source plot(s) and the destination plot.
2. On the destination plot, choose the arrow tool  and double-click the time axis to access the Axis Properties dialog. In the Axis Properties dialog, give the axis a unique **Name** and click **Done**.

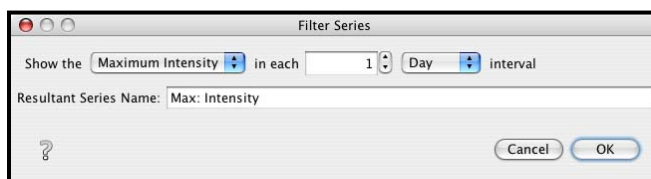
Tip: For more information about time axis formatting options, refer to “Axis properties” on page 32.

3. Copy a series from a source plot into the destination plot. When you paste the series, a new time axis will appear on the graph. Double-click the new time axis to access the Axis Properties dialog. Give the axis a unique **Name** and click **Done**. Repeat this step for each series you want to paste.
4. Identify the periods of interest in each series you want to combine. Note the times for each. Also determine which period is the longest; this should be the length of time shown on each axis.
5. Double-click a time axis and adjust its **Min** and **Max** bounds. The new bounds should include the period of interest for the series, and be the same length as the longest period identified in step 4. Repeat for each time axis.
6. Use the hand tool  on each time axis to adjust the series horizontally as needed.

Adding series by filtering

You can create a new series based on statistical analysis of an existing series over specified periods of time. To use the filtering function:

1. Choose the arrow tool  and select the series you want to filter.
2. Right-click and choose **Filter Series** from the pop-up menu.



3. Choose the type of statistic to use for the filter:
 - For sensor series, you can create a series showing the minimum, maximum, or average over a period of time.
 - For state series, you can create a series showing the percentage of time the state was high, percentage of time the state was low, number of seconds high, number of seconds low, total 0-to-1 changes, or total 1-to-0 changes over a period of time.


- For external event series, you can create a series showing a cumulative sum, or a count over a period of time.
 - For internal logger event series, you can create a series showing a count over a period of time.
4. Specify the interval over which you want these values to be calculated.
 5. Enter a new **Resultant Series Name**, if desired.
 6. Click **OK**. The new series is added to the graph, the Details pane, and the Points table.

Tip: When you apply a filter, the graph rescales to accommodate all of the displayed data.

Removing series from the plot

You can remove sensor, state, and event data series from the plot. This is helpful if the datafile contains multiple series and you cannot easily view them all together.

To remove a series from a plot:

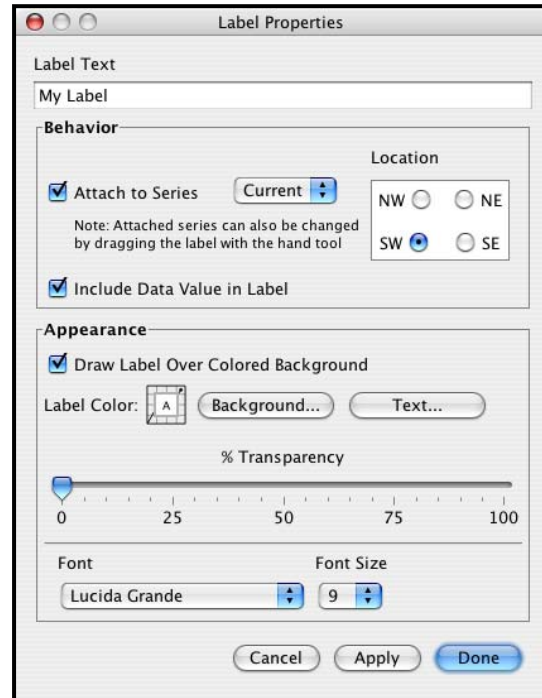
1. Select the arrow tool  from the toolbar.
2. Click the series you wish to remove and press the **Delete** key (**Fn-Delete** on a laptop computer). Or, right-click the series and choose **Remove** from the menu that appears.
3. A warning appears, indicating that the only way to add the series back to the plot is to reopen the plot. Click **Yes**. The series is removed from the graph, the Details pane, and the Points table.

Labeling the graph

You can add labels to the graph. Labels may be positioned to identify specific points, or call attention to a region of the graph.

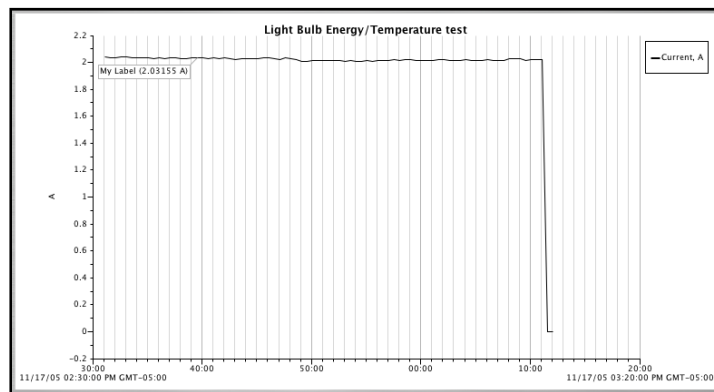
To add a label to the graph:


1. Right-click the graph and choose **Add Graph Label** from the pop-up menu; or, choose **Add Graph Label** from the Edit menu. The Label Properties dialog appears.



2. In the Label Properties dialog, enter a name for the label.
3. Set other properties and click **Done**. (For detailed information about these options, refer to “Label properties” on page 36.)

Important: The **Location** indicates the preferred location of the label (space permitting) with respect to the data point it references. This is available only when the label is attached to a series.



4. Use the hand tool  to drag the label to the desired location. If the label is attached to a series, you can drag the label to attach it to any other point on the graph. (The hand tool must be close enough to a point to attach the label.)

Labels that are attached to a point will move with that point during zooming and panning. Free-floating labels do not move during zooming and panning.

To delete a label from the graph, select the label you wish to remove and press the **Delete** key (**Fn-Delete** on a laptop computer). Or, right-click the label and choose **Remove** from the menu that appears.

Using the crosshair tool ⇄

Use the crosshair tool to zero in on a specific date and time in the plot and any data points associated with that date and time. There are two ways to select the crosshair tool:

- Click the Crosshair icon ⇄ on the toolbar; or
- Press the **C** key on your keyboard

Then, click a point on the graph to mark it. Click another point to move the marker.

Tip: When you click on the graph, HOBOWare Lite selects the nearest data point. When series are very close together, and the location you click is between two points, it is possible that the nearest point is not on the series you clicked.

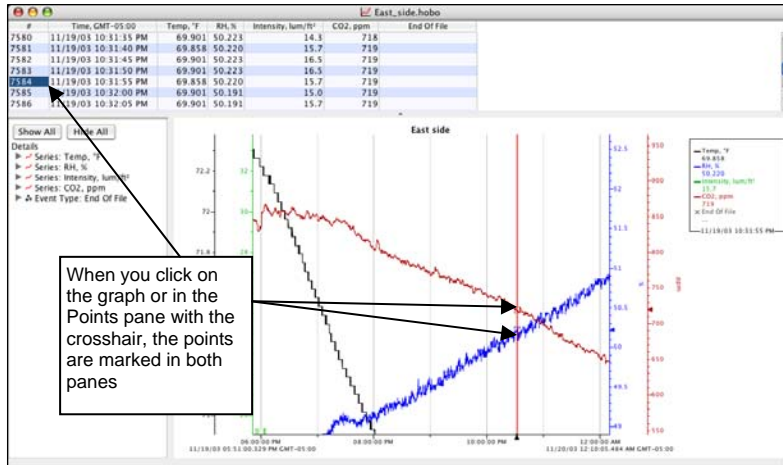
You can also mark the point on the graph by clicking the corresponding cell in the Points table.

The plot changes in several ways when the crosshair is in use. The Points table shifts to the row that contains the data point. Where the crosshair intersects a data point, a square surrounds the data point. The intersection points are also marked by small color-coded arrows on the left and right value axes.

If the legend is displayed next to the graph, the point values for each series are updated to reflect the crosshair location. Values are listed in the legend differently depending on whether the data is a logged sample, state, or event:

- Values that are not in parentheses are actual data points logged at the time selected by the crosshair.
- Values in parentheses are estimated because there were no exact values for the series at the time selected by the crosshair. Zoom in or move the crosshair to see actual values.
- A value of “...” indicates that there is no series data during the time selected. This is seen most frequently for events. If the time selection falls within an event series, but does not contain an event, parentheses surround the “...” value.
- A value of “logged” indicates an internal logger event happened at the selected time.

Tip: The legend must expand in height to list the point values. If your application window is too small to accommodate the expanded height, the values will not be added to the legend. You can still refer to the Points table to find the values of the selected points.




To remove the crosshair from the graph, right-click on the graph and select **Remove Crosshair** from the pop-up menu. Or, choose **Remove Crosshair** from the View menu.

Tip: Normally, if you are zoomed in and click a point in the Points table that is outside the zoom area, HOBOWare Lite will scroll to the marked point's area of the graph. If you do not want HOBOWare Lite to scroll, change the setting under **Points Table & Details Pane** on the **Plotting** preference pane.

Panning

Use the hand tool to move different areas of the graph into view or adjust the position of one series so it can be viewed more easily. This is particularly useful when you are zoomed into the graph and want to see another section of the graph without zooming out and then zooming back in on the new location. There are two ways to select the hand tool:

- Click the Hand icon  on the toolbar; or
- Press the **H** key on your keyboard


Then:

- Click within the graph and hold down the left mouse button to pan a different section of the graph into view. The graph follows the movement of the mouse, and the axes are continuously updated in response to the movement. To stop dragging, release the left mouse button.
- Hold down the **X** key while dragging to restrict motion horizontally. Hold down the **Y** key while dragging to restrict motion vertically.
- To pan one series at a time, click the axis associated with the series and hold down the left mouse button. Only the series connected with the axis will follow the movement of the mouse.

Panning will not work on an axis that is locked. To unlock an axis, double-click the axis with the arrow tool and clear the checkmark next to “Lock Axis Scaling and Tick Marks.”

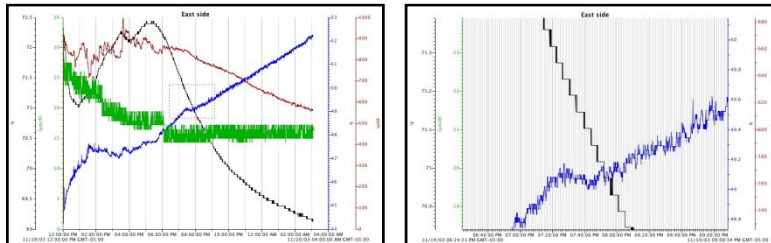
Zooming

Use the zoom tool to focus on one area of the graph, allowing you to see more detail. There are two ways to select the zoom tool:

- Click the Zoom icon  on the toolbar; or
- Press the **Z** key on your keyboard



Then:

- Right-click to toggle between zoom in and zoom out. Check the symbol inside the zoom tool to determine the direction you are zooming. A plus sign (+) or arrows pointing outward will zoom in, while a minus sign (-) or arrows pointing in will zoom out.
- Click an area on the graph inside the axes to zoom one level (a factor of two). Continue clicking to zoom multiple levels.
- Hold down the left mouse button in one location to zoom continuously. Release the mouse button to stop zooming.
- Hold down the left mouse button while drawing a rectangle around the area you wish to zoom in on, then click inside the rectangle. The area inside the rectangle expands to fill the whole graph.




- Hold down the **X** key while zooming to restrict motion horizontally. Hold down the **Y** key while zooming to restrict motion vertically.

Zooming will not work on an axis that is locked. To unlock an axis, double-click the axis with the arrow tool and clear the checkmark next to “Lock Axis Scaling and Tick Marks.”

Tip: If you are currently working with the crosshair, arrow, or hand tool, you can click the Zoom icons  and  on the toolbar to quickly zoom into and out of the middle of the display without changing tools.

Resetting the scale

You can easily reset the scale to accommodate all of the displayed data. This is very helpful when you have zoomed or panned several times and want to quickly go back to the original scale.


Click the Revert icon  on the toolbar, or choose **View Full Scale** from the View menu. The X and Y axes are rescaled to show the full duration and values of all displayed data. Any customizations to properties and crosshair location are retained when you return to the original

graph, but this removes any adjustments to the view that you made by zooming or dragging with the hand tool. (If you deleted any series, they will not be included in the rescaling.)

Changing properties

You can change many different aspects of the graph as you analyze the data. This section describes modifying the properties for all the elements of the graph.

Use the arrow tool to select different components in the graph, such as a specific series, axis, or the legend. There are two ways to select the arrow tool:

- Click the Arrow icon  on the toolbar; or
- Press the **A** key on your keyboard


Tip: If you are currently using another tool and do not want to switch tools, you can press the **N** (next) key on your keyboard to select each graph item (including hidden items, such as value axes for states or events) in sequence.

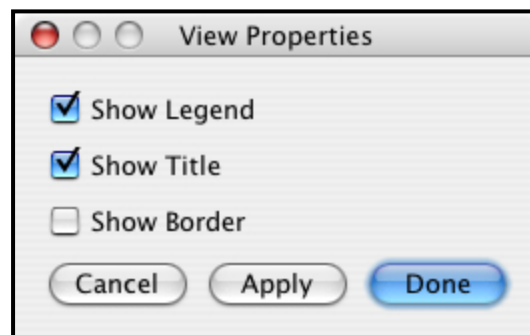
The selected item (if visible) is shaded or boxed. You can then right-click the selected item, double-click it, or press the **Enter** key on your keyboard to open the Properties window for that item.

To deselect, click an area within the axes that does not have series data; click the View menu and choose **Select None**; or press the **D** key on your keyboard.

Important: Property changes are not saved when you close the datafile. To preserve these changes, you can paste a bitmap of the graph into other programs, or save changes to the plot in a HOBOWare Project file. For details, refer to “Copying” on page 41, and “Saving a .hproj project file” on page 39.

View properties

The view controls the general aspects of the graph. To change the view properties, deselect all graph elements, then double-click the plot with the arrow tool. Or, click a blank area of the graph and click the Properties icon .




The following options are available on the View Properties dialog:

- **Show Legend:** Toggles whether the legend is displayed on the graph. The legend is shown by default.

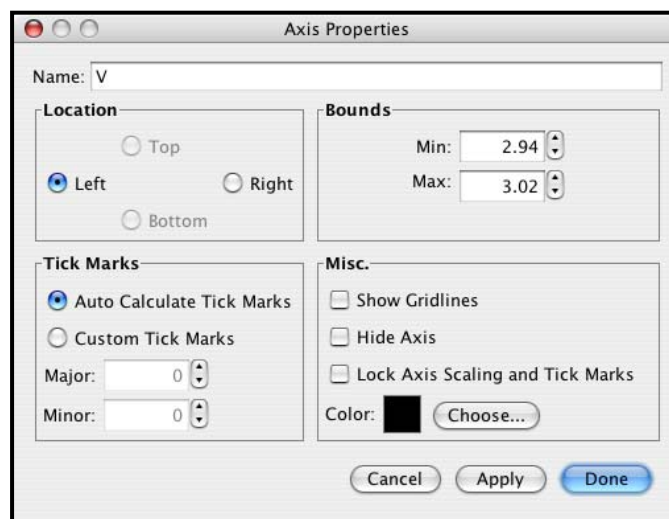
- **Show Title:** Toggles whether the title is displayed for the graph. The title is shown by default.
- **Show Border:** Toggles whether a border is displayed around the graph. By default, a border is not shown.

Axis properties

There are two types of axes: time axes and value axes. The time axis is the x axis, which lists the dates and times for the datafile. The value axis is the y axis, which lists the range of values for the series (for example, the temperature axis displays degrees in Fahrenheit or Celsius). The graph can contain several value axes depending on the number of series displayed.

To change the axis properties, double-click the axis you wish to modify with the arrow tool. Or, select the axis and click the Properties icon .

The following options are available on the Axis Properties dialog:




- **Name:** Enter up to a 40-character name for the axis. The default name for a value axis is the unit type (for example, “°F” is the name for a temperature axis and “%” is the name for an RH axis).

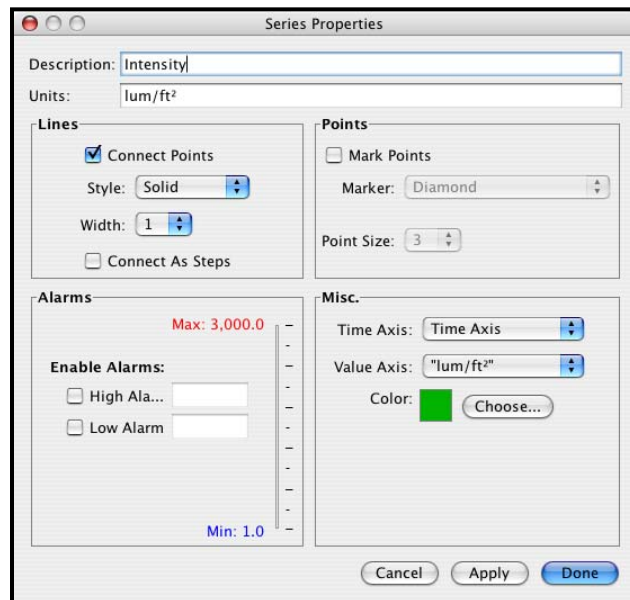
Tip: Normally, the time axis is not named when you display a plot. If you want plots to open with the time axis labeled as “Time” by default, change the setting under **Other Options** on the **Plotting** preference pane.

- **Location:** Change the location of the axis. The time axis can be located at the top or bottom. The value axes can be located on the left or right.
- **Min:** Enter the minimum value you want displayed for the axis. For the time axis, you can select a date and time.
- **Max:** Enter the maximum value you want displayed for the axis. For the time axis, you can select a date and time.

- **Auto-calculate tick marks or custom tick marks:** Tick marks are the lines that represent values on the axis. Numbers or values are listed next to major tick marks; minor tick marks are not numbered. By default, tick marks are automatically calculated for both the time and value axes. Choose the **Custom Tick Marks** option to specify different major and minor tick marks for the axis.
- **Show Gridlines:** Toggles whether gridlines are displayed in the background. By default, gridlines are shown for the time axis only.
- **Hide Axis:** Toggles whether the axis is displayed or temporarily hidden. Axes for sensor series are visible by default.
- **Lock Axis Scaling and Tick Marks:** Toggles whether the axis and associated tick marks remain in the original position when zooming or navigating with the hand tool. Locking the axis and tick marks helps to avoid inadvertently zooming or navigating to an area on the graph without data.
- **Color:** Changes the color of the axis. Black is the default color for the time axis. The color of the value axis matches the series color by default.

Series properties

The series is the group of data points for the sensor measurement, state, or event you selected to display in the plot. To change series properties, double-click the series you wish to modify. Or, select the series and click the Properties icon .



The following options are available on the Series Properties dialog:

- **Description:** Enter up to a 40-character name for the series. The series name is displayed in the legend. The default name for a series with sensor data is the property that was measured and the units used to display the measurements. The default name for a series with event or state data is the type of event or state.


- **Units:** Enter the unit type in this field, if it is different from the default. If, while viewing the plot, you convert to another type of unit, the text you enter here will change to the default name for the unit you chose.
- **Connect Points:** Toggles whether the points in this series are connected. This option is selected by default for most series; it is not selected for internal logger events.
- **Style:** Changes the appearance of the line used to connect the points in a series. The default varies depending on how many series measuring the same property are being viewed.
- **Width:** Changes the size or weight of the line used to connect the points in a series. The default is 1 point.
- **Connect as Steps:** Toggles whether the lines between the points in a series are connected as a curve or a step. When this option is selected, the line drawn between points keeps the value of the previous point until the next point in the series. This is useful for state or event graphs. This option is not selected by default for sensor series.
- **Mark Points:** Toggles whether a marker appears at each data point in this series. By default, this option is selected for any series with event data or only one point; to avoid cluttering the graph, it is not selected by default for other series.
- **Marker:** Changes the shape of the marker used. The default marker varies depending on how many series are being viewed.
- **Point size:** Changes the point size for the marker.
- **Enable Alarms:** Available for sensor measurement series only; not available for state or event series. Toggles whether red and blue alarm lines are shown on the graph for this series. Use an alarm line when you want to indicate a visual threshold over or under which data may be falling (for example, if you want to quickly see how many points fall below 32 degrees). Alarm lines are turned off by default.

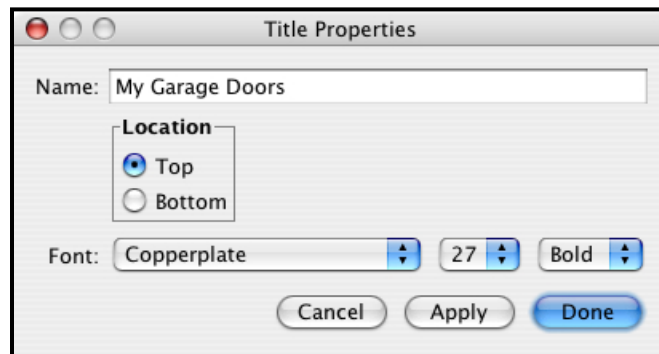
For **High Alarm**, enter a value relative to the series where you want the maximum (red) alarm line to appear.

For **Low Alarm**, enter a value relative to the series where you want the minimum (blue) alarm line to appear.

- **Time Axis:** Allows you to create an additional time axis for this series. This is useful when you want to compare data from two different time periods.
- **Value Axis:** Changes the axis being used for the series. Choose one of the axes already in view, or select **New Value Axis** from the dropdown list to create your own.
- **Color:** Changes the color used for the series. The default color varies depending on how many series are displayed on the graph.

Title properties

The title is the name of the graph. To change the title properties, double-click the title. Or, select the title and click the Properties icon .



The following options are available on the Title Properties dialog:


- **Name:** Enter up to a 40-character title for the graph. By default, the name is the description entered when launching the logger.
- **Location:** Move the title to either the top or bottom of the graph. The default location is the top of the graph.
- **Font:** Select a font type, size, and appearance.

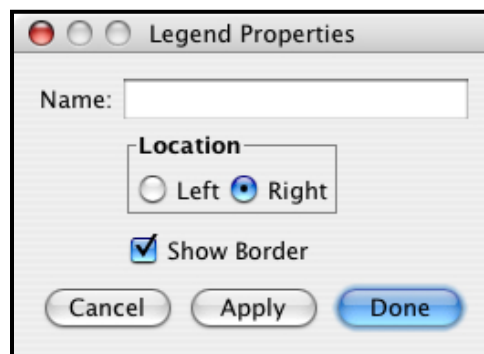
Tip: To quickly hide or display the title, click the View menu and select **Show Title**.

Legend properties

The legend is the area that lists the keys for each series (line colors and marker types). If the crosshair is in use, it also lists the date, time and point values currently selected by the crosshair.

Tip: To quickly hide or display the legend, click the View menu and select **Show Legend**.

To change the legend properties, double-click the legend. Or, select the legend and click the Properties icon .




The following options are available on the Legend Properties dialog:

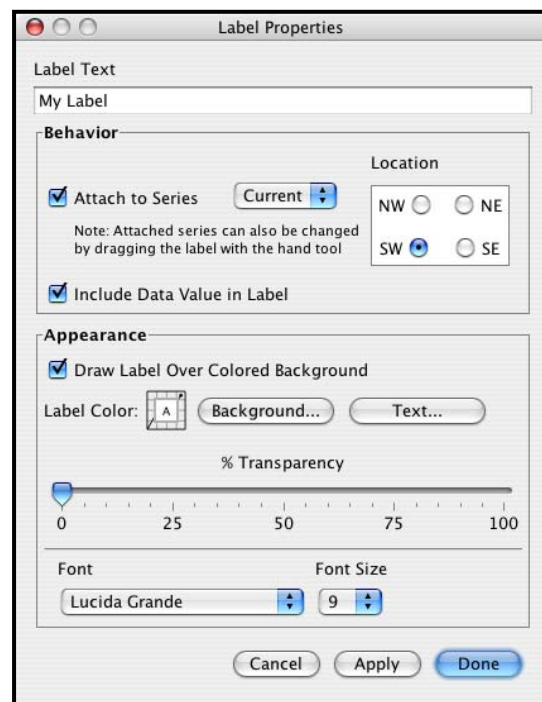
- **Name:** Enter up to a 40-character title for the legend. There is no default name.

- **Location:** Move the legend to either the left or right side of the graph. By default, the legend appears on the right.
- **Show Border:** Toggles whether a box is drawn around the legend. By default, a border is shown.


Label properties

To change a label's properties, double-click the label. Or, select the label and click the Properties icon .

Tip: To add a label to the plot, right-click the graph and choose **Add Graph Label** from the pop-up menu.



The following options are available on the Label Properties dialog:

- **Label Text:** Enter up to a 24-character name for the label.
- **Attach to Series:** To attach the label to a point on a series, check this box and choose the name of the series from the drop-down list. (After you exit this dialog, you can use the hand tool  to drag the label to the correct point.)
- **Include Data Value in Label:** If the label is attached to a series, check this box to have the label show the value of the labeled point.
- **Location:** If the label is attached to a series, choose a compass point to describe the preferred position of the label relative to the labeled point.
- **Draw Label Over Colored Background:** Check this box if you want the label to appear in a box with a colored background.


- **Label Color Background:** If you chose to give the label a colored background, click this button to select a background color.
- **Label Color Text:** Click this button to select a color for the label text.
- **% Transparency:** Adjust the label's transparency. Transparency refers to the ability to see the graph through the label. At 0%, the label is opaque, and you cannot see the graph through it. At 100%, the label is invisible, and only the graph can be seen.
- **Font:** Select a font for the label text.
- **Font Size:** Select a font size for the label text.

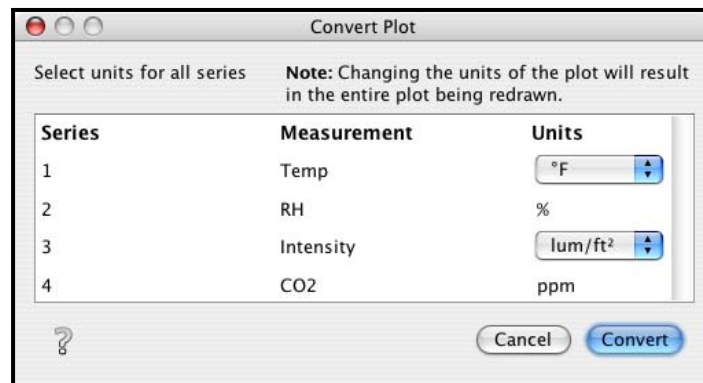
Miscellaneous plot controls

Changing the units

You can switch between US and SI (Metric) measurements while the plot is open.



To change the units of an individual series, right-click the series with the arrow tool and choose **Convert Series Units**. Select the new unit type from the drop-down list.

To change the units for multiple series, click the Units icon  on the toolbar. For each series, select the units from the drop-down list, then click **Convert**.



This changes the units displayed on the axis, in the legend, in the Details pane, and in the Points table.


Displaying gridlines

By default, vertical gridlines are always shown for time axes, and horizontal gridlines are not shown. You can use the gridline icons  and  on the toolbar, or a **Gridlines** item on the View menu, to toggle all horizontal or all vertical gridlines on and off.

You may also toggle gridlines on and off for each axis individually. Using the arrow tool, double-click an axis to get the Axis Properties dialog. Check the **Show Gridlines** box to display gridlines for that axis, or clear the **Show Gridlines** box to hide the gridlines.

Use the **Gridlines** options on the **Plotting** pane in Preferences to control whether plots open with horizontal and/or vertical gridlines displayed.

Marking points

By default, points on a series are usually not marked. You can use the **Mark All Points** item on the View menu or the Mark Points icon  to toggle all point markers on and off.

You may also toggle Mark Points on and off for each series individually. Using the arrow tool, right-click a series to get the context menu, then choose **Mark Points**.

Use the **Mark all points when plotting data** option on the **Plotting** pane in Preferences (under **Other Options**) to control whether plots open with all points marked by default.


Tip: Opening a large plot with all points marked takes longer and consumes more system memory.

Smart scaling

When you first display a graph, the numerical bounds of the axes are on tick marks. After you have panned or zoomed, this may no longer be the case. Use smart scaling to adjust the axes to end on tick marks. With the hand, arrow, or crosshair tool, right-click anywhere on the graph and select **SmartScale Graph**.

Changing the order of series

You can shuffle the order of series by moving a series to the front or back. This is helpful if one series is hidden behind another. It also changes the order of series in the Details pane, Points table, and legend. To change the order of the series:

1. Select the arrow tool  from the toolbar.
2. Click the series you wish to move, right-click, and select either **Bring Series to Front** or **Send Series to Back** from the menu that appears.

Tip: After you adjust the order of the series for optimal viewing, copy the graph as a bitmap to paste into other programs, such as Microsoft Word or PowerPoint®. For details, refer to “Copying” on page 41.

Font size for plots

By default, most text on the graph is at 9 points. You can use the **Font Size for Plots** option on the **Plotting** pane in Preferences to set the text size to a smaller or larger size, from 8 to 14 points.

Saving datafiles and project files

HOBOWare Lite allows you to save data in datafiles and project files:

- A datafile (.hobo) is an unmodified record of the data that was in the logger when you read it out. You can change the appearance of the plot, but if you want to save those changes, you must save a project file. The original datafile remains intact.
- A project file (.hproj) is a plot that has been customized by zooming, panning, adding or deleting series, placing the crosshair, changing series and axis properties, etc. When you open a project file, the plot appears as it did when you saved the project file, and contains all of the same data.

Although you can save a project file without saving the original datafile, we strongly recommend saving datafiles so that you will always have access to the original data that was read out from the logger.

Saving a datafile

After reading out a logger, HOBOWare Lite automatically asks if you want to save the datafile. Onset strongly recommends that you save the datafile at this time.


If you decline, the plot is displayed with a name like “Untitled 1*” on the tab. The asterisk signifies that the data has not been saved. To save the logger data as a datafile:

1. From the File menu, choose **Save Datafile**.
2. Select a location for the file, if necessary, and enter a name for the file.
3. Click the **Save** button.

You can only save the data to a datafile once.

Saving a .hproj project file

Changes that you make to the appearance or content of the plot are not retained when you save the datafile. For example, if you have pasted series from another plot, created new axes and zoomed in, those changes will be lost unless you save them in a project file.

To save your current data with a customized view of the plot, click the Save icon  on the toolbar, or choose **Save Project** from the File menu. To open an existing project file, choose **Open Project** from the File menu.

Exporting

You can export the details associated with the datafile or project file, and the points shown in the Points table, as text files for use in other applications.

Tip: You can configure HOBOWare Lite to automatically export the data to a text file every time the logger is read out. Refer to Export Settings on page 44 for details.

Exporting details text


To export the information in the Details pane to a text file:

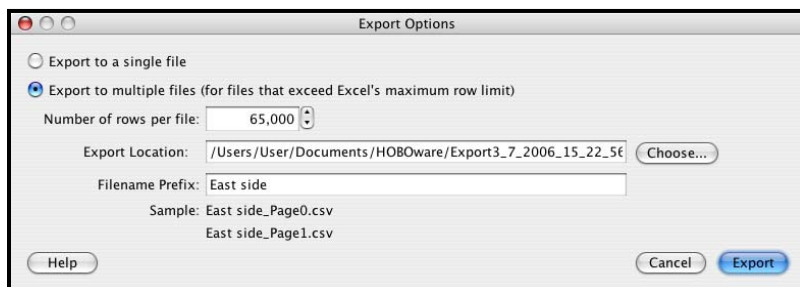
1. Make sure the Details pane includes the series you want to export. This might include series pasted from other datafiles, or series derived through filters.
2. From the File menu, select **Export Details**.
3. Accept the default file name, or type a new name and click **Save**.

Details are exported to a .txt file, which can be opened in any text editor, or imported into many other types of programs (word processors, spreadsheets, etc.).

Exporting points

To export the points shown in the Points table to a text file (.csv or .txt) for importing into Microsoft Excel and other applications:

1. Make sure the Points table includes the series you want to export. This might include series pasted from other datafiles, or series derived through filters.
2. Click the Export icon  on the toolbar, or choose **Export as Excel Text** from the File menu. The Export Options dialog displays.



3. To export all of the data in a single file, choose **Export to a single file** and click **Export**. In the Save dialog, accept the default location and file name, or enter a new location and name and click **Save**.
4. To split the data over multiple files (particularly important if your data cannot fit in a single spreadsheet), choose **Export to multiple files** and make your selections:
 - Indicate the maximum **Number of rows per file**. Consult the documentation that came with your spreadsheet program to find out the maximum number of rows it accepts, and remember to leave room for header rows.
 - Accept the default **Export Location**, or click **Choose** to use a different location. (The default location creates a new folder for the files.)
 - Accept the default **Filename Prefix** (based on the datafile name), or enter a new one. The export file names will consist of this text plus “_PageX,” where X indicates the order of the files (starting with 0).
 - Click **Export**.
5. Open the file(s) in Excel or another package. You can easily view the raw data in a text editor.

Tip: To change the year format and time format, column separators, or include serial numbers in the export file, go to the HOBOWare Lite menu and choose **Preferences**. Year and date format controls are located on the **Display** pane. Column separators (delimiters) and serial number options are located under the **Export Settings** group on the **General** pane.

In Excel, dates and times for each data point may initially appear as #####. Times also may not have seconds listed. To display the full date and time with seconds in Excel:

1. Adjust the time column so you can see the whole date and time.

2. Select the time column from row 3 down.
3. From the Format menu, click **Cells**.
4. Select the **Custom** category and then select **m/d/yyyy h:mm** as the type.
5. Add “:ss” (or “:ss.000” if you used a fast logging interval) to the end of the string in the **Type** field:
 m/d/yyyy h:mm:ss (normal logging interval)
 m/d/yyyy h:mm:ss.000 (fast logging interval)
6. Click **OK**. The seconds should be listed automatically.

Tip: You can export the date and time in separate columns. From the HOBOWare Lite menu, choose **Preferences**. Go to the **General** pane and enable the “Date and time format: Separate into two columns” preference in the **Export Settings** group.

Copying

You can copy data from the Points table. Just select the data with the mouse and press **Command (⌘)-C** to copy it. Then open any text editor, word processor, or spreadsheet software and press **Command (⌘)-V** to paste it in. Fields are delimited by tabs, and records are separated by paragraph returns.

You can also copy the graph as a bitmap for pasting into other programs and documents. The graph must be visible when you do this. From the Edit menu, select **Copy Graph to Clipboard**.

Previewing and printing the graph

You can simply print the graph, or you can set up the page and preview it before printing.


To set up the paper for printing the graph:

1. From the File menu, choose **Page Setup**.
2. Change the paper type, orientation, and margins as necessary and click **OK**.

To preview how the graph will look on the page:

1. From the File menu, choose **Print Preview**.
2. Zoom as necessary, then click the Print icon  to print directly from Print Preview. Or, click **Close** to exit the preview window without printing.

To print the graph:



1. Click the Print icon  on the toolbar, or choose **Print** from the File menu.
2. Select the appropriate printer, if applicable, and click **OK**.

Printing points and details

You can print all of the data in the Points or Details panes. From the File menu, select **Print Points** (available only with Java 1.5 or higher) or **Print Details**.

If you highlight a selection of points with your mouse before choosing **Print Points**, you will also be given the option to print only the selected points.

Closing the plot

To close a plot, click the Close icon  on the toolbar, or choose **Close** from the File menu. You can also click the Close icon  on the tab of the plot; or, if you are not using the tabbed view, you can click the red Close button in the upper-left corner of the internal frame containing the plot.

If you attempt to close a plot showing data that has not been saved as a datafile, a message appears asking if you wish to save the data in a file. Unless you are sure you do not need the data, it is strongly recommended that you save the file.

To close all plots, choose **Close All** from the File menu.

Tip: If you are sure that you do not want HOBOWare Lite to ask to save a plot as a datafile when you close it, go to the HOBOWare Lite menu and choose **Preferences**. On the **Warnings** pane, under the **General** item, clear the checkmark next to **Prompt me if there is any remaining unsaved data when closing plot or application**.

Chapter 4:

Customizing HOBOWare Lite

This chapter explains how to:

- ✓ Use the Preferences to customize the software
- ✓ Adjust the display with the Window menu
- ✓ Use the Help menu to access online help and the latest HOBOWare Lite software updates

Preferences

Preferences are settings that you can adjust to customize the software. Preference settings are unique for each user login on your computer. To change preferences:

1. From the HOBOWare Lite menu, choose **Preferences**.
2. Make the changes and click **OK**.

In addition to the preferences on these panes, HOBOWare Lite also “remembers” the following:

- Each user account’s preferred folder locations for datafiles (.hobo, .hsec), project files (.hproj), and text files (.csv or .txt). The three folder locations are tracked separately based on the folders you last accessed. When you restore the preference defaults, the default folder for each file type is reset to the HOBOWare folder in your Documents folder.
- The date and time of the most recent check for HOBOWare Lite software updates. When you restore the preference defaults, HOBOWare Lite will “forget” this date, and offer to check for updates the next time you restart HOBOWare Lite.

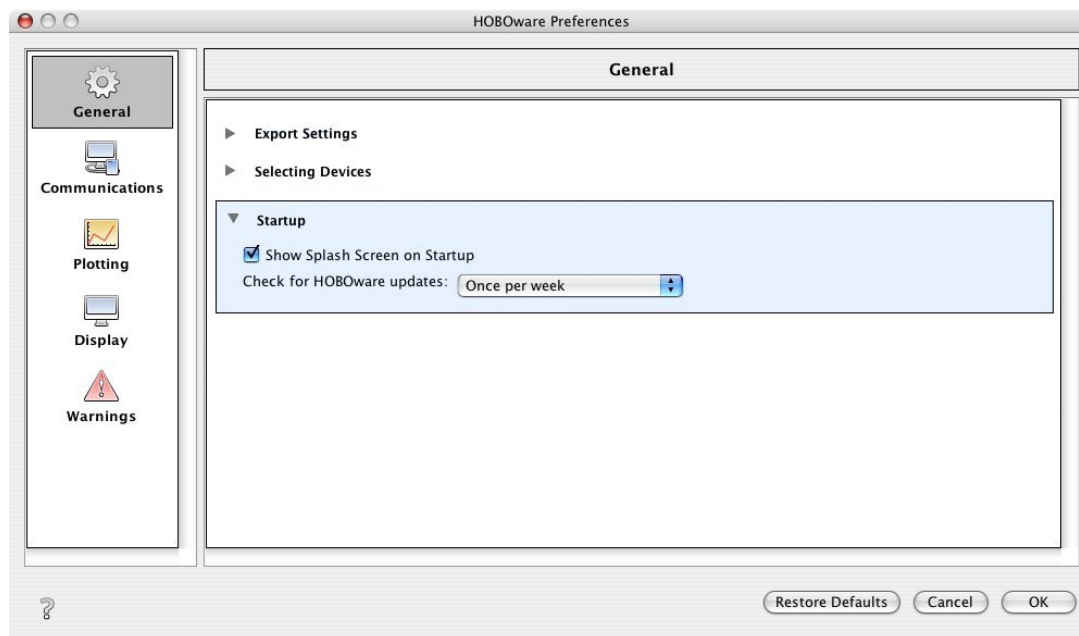
To return all preferences, including folder preferences and software update checks to their original settings for this user login:

1. From the HOBOWare Lite menu, choose **Preferences**.
2. Click the **Restore Defaults** button.
3. A warning appears, asking if you are sure you want to continue. Click **Yes**. The preference defaults are restored.

The following sections explain the settings on each of the panes in Preferences.

General pane

The following preferences are available on the General pane:



Export Settings

- Export table data column separator.** This setting controls how the columns in the Points table are separated in the export file. It also affects the default file type used when exporting points. When **Comma** is selected as the column separator, the default file type is .csv, which can be imported automatically into Microsoft Excel. When **Tab** or **Semicolon** is selected for the column separator, the default file type changes to .txt instead of .csv, and the file will require additional adjustment within Excel.
- Date and time format: Separate into two columns.** By default, date and time are exported as a single column to facilitate graphing in spreadsheet programs. If enabled, this setting splits the date and time into two columns.
- Include logger serial number in column header.** This setting adds the logger's serial number to each column header when you export the Points table. This is especially useful if you have series that were copied and pasted from plots that came from different loggers.
- Automatically export table data upon reading out of a logger (Offloaded datafile must be saved and plotted first).** Enable this setting if you want the data to be exported to a separate text file every time a datafile (.hobo) is saved. (This option does not apply to HOBOWare project files or when reading out a shuttle.) The text file will be saved with the same prefix and in the same location as the datafile. The text file format is determined the preferences set in the Export Settings. By default, the data will be exported to a single text file (controlled by the setting **Bypass multi-file export dialog and save as single file**). Select **Show multi-file export dialog** if you wish to save the exported data to multiple files, which may be helpful if the datafile is very large.

Selecting Devices

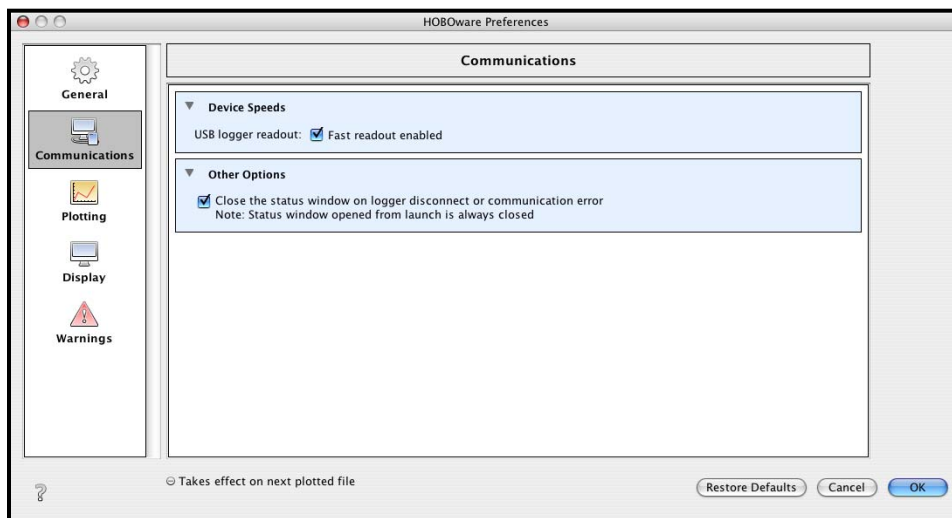
- **On any device operation (Launch, Readout, Status, Stop):** Normally, when multiple loggers are connected, HOBOWare Lite displays a window listing all connected loggers every time you choose a logger operation, such as launch, readout, status, or stop. This allows you to choose the device you want to work with before continuing with the command, and it ensures that you are always working with the logger you expect. If you do not want to be prompted by the Select Device window every time you choose a logger operation, choose the **Only show Select Device window if a device has not been selected** option. You will still be prompted the first time you try to communicate with a logger, but your logger selection will remain in effect until you change it manually with the **Select Device** command on the Device menu.

Startup

- **Show splash screen on startup.** By default, the HOBOWare Lite splash screen appears when you start HOBOWare Lite, to let you know that the software is loading. If you clear this checkbox, the splash screen will not display. You can still display it manually by choosing **About HOBOWare Lite** from the HOBOWare Lite menu.
- **Check for HOBOWare updates.** If you have an Internet connection, HOBOWare Lite can periodically ask if you would like it to check the Onset website for updates to HOBOWare Lite. The default is once per week, but you can configure HOBOWare Lite to check daily or monthly. If you do not have an Internet connection, or if you would prefer to check for updates manually using the **Check for Updates** item on the Help menu, choose **Never**.

Communications pane

The following preferences are available on the Communications pane:



Device Speeds

- **USB logger readout: Fast readout enabled** allows the computer to read out your logger quickly. Disable this option **only** if you are having communication problems with the

logger. Communication between the computer and the logger is slower when this option is turned off.

Other Options

- **Close the status window on logger disconnect or communication error.** When this option is selected, the Status window closes automatically (on the next refresh) if it is open when you remove the interface cable, base station, or coupler from the logger, or if communication is interrupted for another reason. Otherwise, it is left open. (If the Status window was opened from the Launch window, it will close automatically even if this option is not selected.)

Plotting pane

The following preferences are available on the Plotting pane:



Fonts

- **Font Size for Plots.** Controls the size of most text on the graph. The default is 9 points, but you can also choose 8, 10, 11, 12, or 14. The plot title will default to two points larger than the selected font size.

Layout

- **Show the details pane when plotting data.** By default, the Details pane is not open when you display a plot. If you want the Details pane to be shown when you display a plot, check this box.
- **Show the points table when plotting data.** By default, the Points table is not open when you display a plot. If you want the Points table to be shown when you display a plot, check this box.

Points Table & Details Pane

- **When selected value in table is out of plot range, drag series to that value.** Normally, if you are zoomed in and click a point in the Points table that is outside the zoom area,

HOBOWare Lite will scroll the marked point into view while retaining your zoom factor. Clear this box if you do not want HOBOWare Lite to scroll.

Gridlines

- **Enable horizontal gridlines when plotting data.** By default, horizontal gridlines are not displayed when you open a plot. Enable this option if you always want a new plot to display gridlines for all value axes.
- **Enable vertical gridlines when plotting data.** By default, vertical gridlines are always displayed when you open a plot. Clear this checkbox if you never want a new plot to display gridlines for the time axis.

Plot Setup

- **Automatically select all data series for plotting.** By default, when you read out a logger or open a datafile, derived series (such as Dew Point) are not selected for display on the Plot Setup dialog. Enable this option if you want every series to be selected.
- **Automatically select internal events for plotting (e.g. Button Up/Down, Host Connected, EOF).** When you open a plot, internal logger events are selected by default on the Plot Setup dialog. Clear this box if you usually do not want to see these events.

Other Options

- **Mark all points when plotting data.** By default, when you display a plot, point markers are displayed for any series with event data. Otherwise, to avoid cluttering the graph, point markers are not displayed. Enable this option if you want all points to be marked on every series whenever you display a plot.

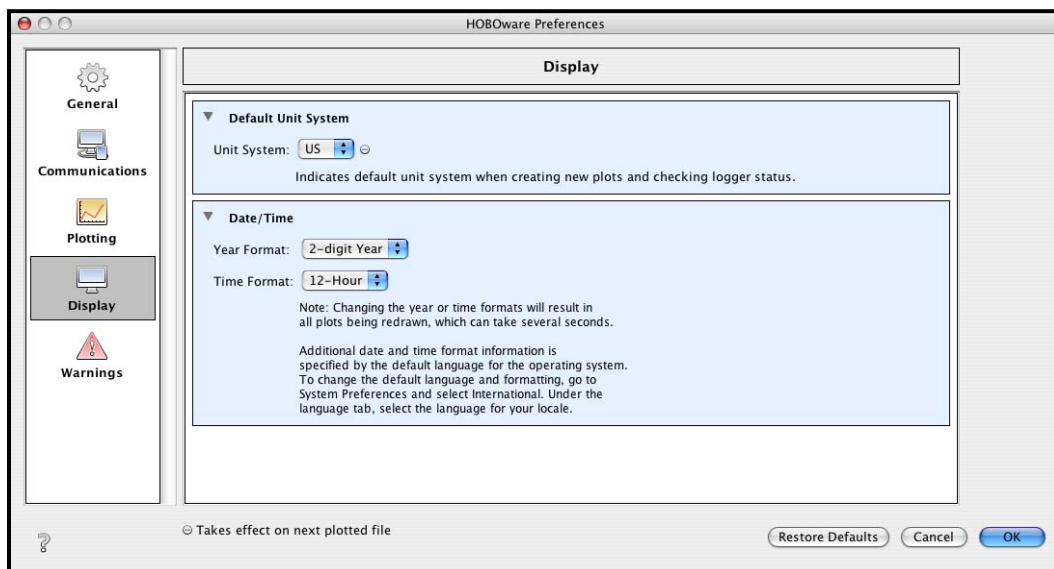
Tip: On a large plot, marking all points takes longer and consumes more system memory.

Series that consist of only one point are always marked.

- **Label the time axis.** By default, the time axis is not labeled when you display a plot. If you enable this preference, the time axis will have a default name of **Time** when you open a plot.
- **When plotting multiple series of the same unit type:** By default, if there are multiple series of the same unit type (for example, temperature and dew point series in degrees Fahrenheit), HOBOWare Lite plots all of the series in the same color, and uses a different line style (solid, dashed, dotted, etc.) for each. Choose **Use a different color for each series** instead if you prefer each series to have a solid line in a different color. The series will still be attached to a single, common axis, but only one series will match the axis color.

Display pane

The following preferences are available on the Display pane:



Default Unit System

- **Unit System:** This setting allows you to set a default of US or SI (Metric) units throughout HOBOWare Lite. It changes the units in the **Current Readings** the next time you display the Status window, and the default units in the axis, legend, points, and details the next time you display a plot. The default is **US**.

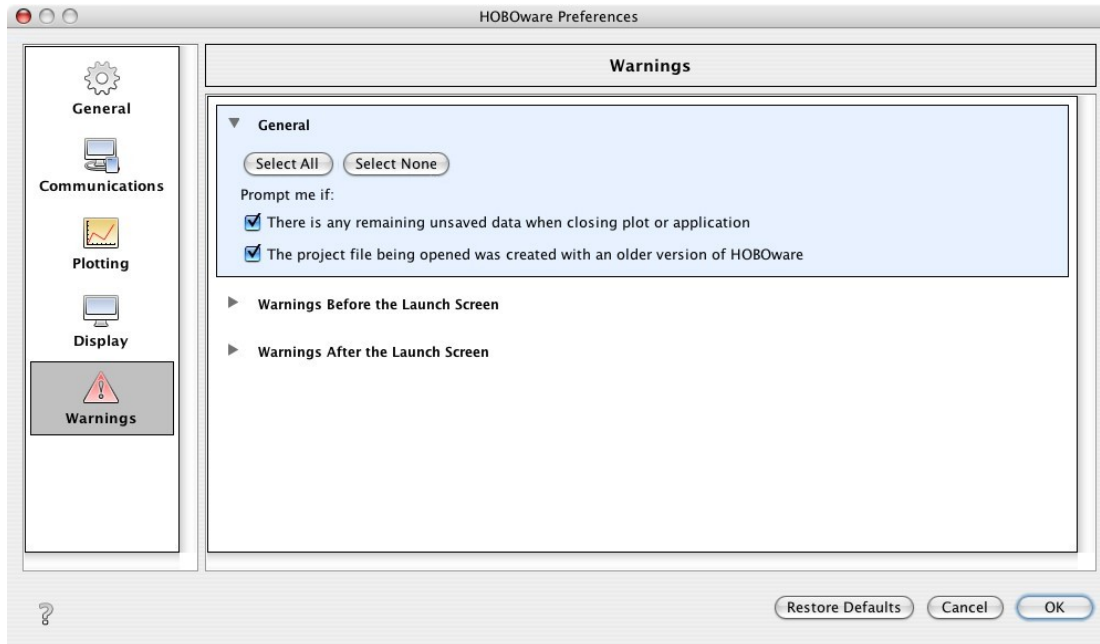
Date/Time

- **Year Format.** Controls whether HOBOWare Lite displays the last two digits of the year, or all four digits. The default is **2-digit Year**. Changing this setting will cause all open plots to be redrawn.
- **Time Format.** Controls whether HOBOWare Lite displays the time in a 12-hour or 24-hour format. The default is **12-Hour**. Changing this setting will cause all open plots to be redrawn.

Tip: When you create an export file, the date and time are exported as they appear in the Points table. If you open the file in Excel, they are automatically reformatted to Excel's default date and time format, which you may customize within Excel.

Warnings pane

The following preferences are available on the Warnings pane:



Some HOBOWare Lite warning dialogs offer you a checkbox to disable the warning so that you do not see it again. You can manage (and re-enable) these warnings in the **Warnings** pane.


Warnings are listed in three groups: general, pre-launch, and post-launch. To enable all of the warnings in a group, click the **Select All** button for that group.

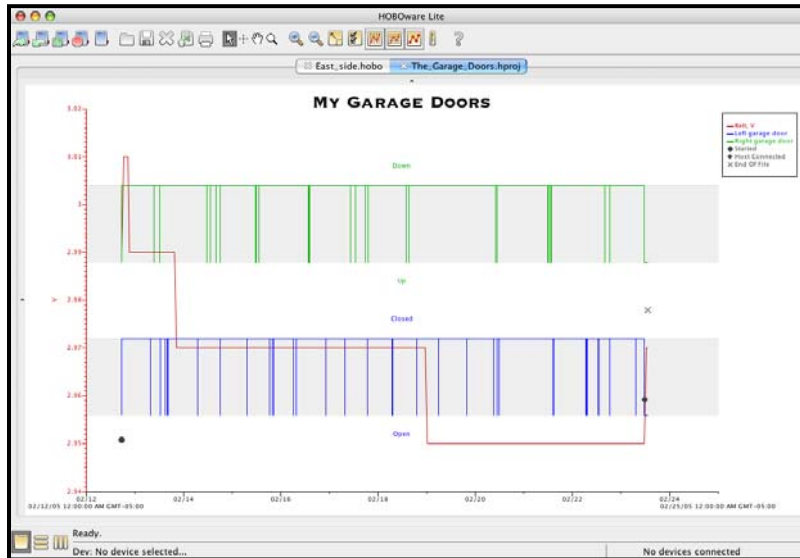
To disable all of the warnings in a group, click the **Select None** button for that group. Before you do so, however, keep in mind that the warnings are intended to help prevent mistakes and inadvertent data loss. Review each warning carefully before disabling it.

Window menu


Use the Window menu to organize several plots. The following selections are available from this menu:

Tabbed View

Layers the plots as tabs so that you can see the file name of each open plot (or “Untitled*” for an unsaved datafile). You can also get to this view by clicking the Tabs icon  in the lower left of the HOBOWare Lite window.




Tile Horizontally

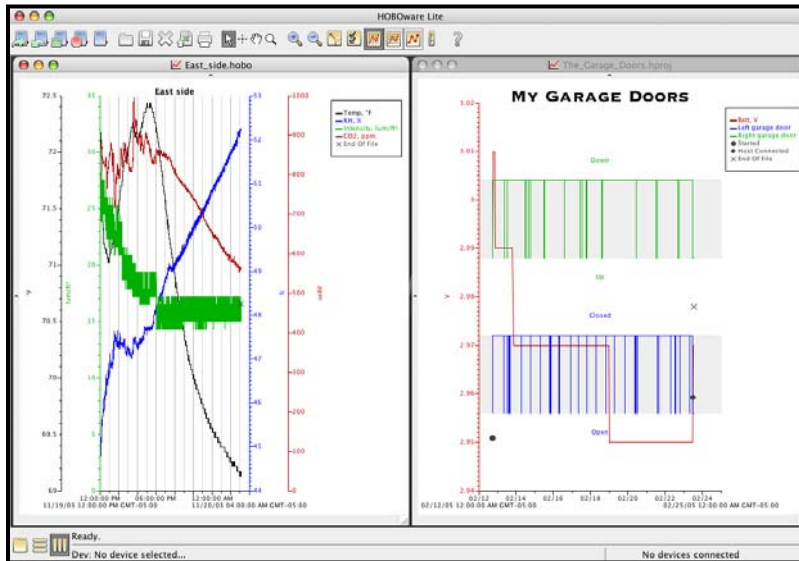
Arranges up to five plots horizontally. If six or more plots are open, they will be tiled as a grid. You can also get to this view by clicking the Horizontal Tile icon  in the lower left of the HOBOWare Lite window.



Tip: You can open the same datafile multiple times to create different views of the graph, then use the Tile commands on the Window menu (or resize and move the windows manually) to see all of them at once. This is helpful if you want to zoom in on several different areas and view them side-by-side, see the detail of a small area while the full graph is still in view, or view each series in a different window.

Tile Vertically

Arranges up to five plots vertically. If six or more plots are open, they will be tiled as a grid. You can also get to this view by clicking the Vertical Tile icon  in the lower left of the HOBOWare Lite window.



Help menu

Use the Help menu to read documentation on software features and access the latest HOBOWare Lite news and software releases. The following selections are available from this menu:

- **HOBOWare Lite Help.** Opens the help documentation in your default web browser.
- **Check for Updates.** Queries the Onset website for updates to HOBOWare Lite. If an update is available, you will be given the option to visit the website, read the update installation instructions, and download the update.

Chapter 5: Special functions

HOBOWare Lite includes functions that are unique to limited types of devices or data. This chapter explains how to:

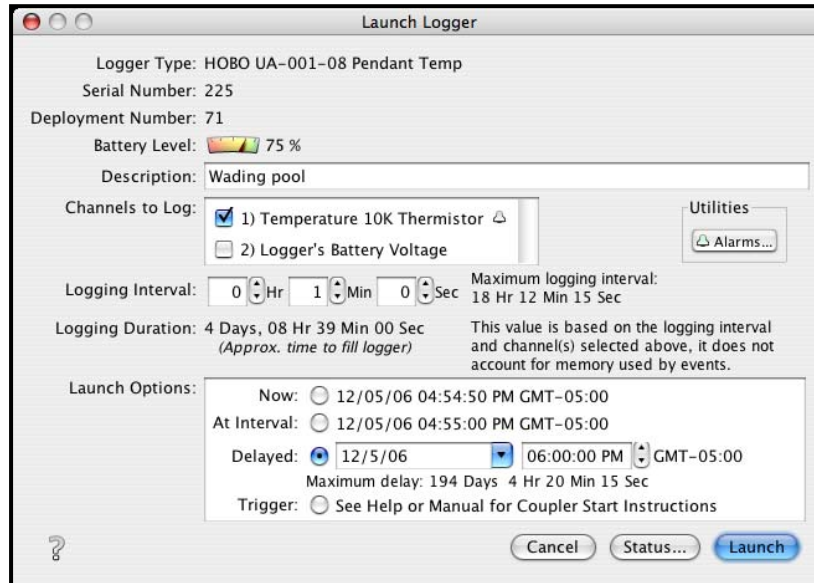
- ✓ Configure alarm settings
- ✓ Set up linear scaling
- ✓ Create multiple logging intervals
- ✓ Use fast logging intervals

Alarm settings

Some loggers include built-in alarm indicators that are triggered when data is logged above or below values that you define. You can set up alarms to be triggered when the data has been above or below an allowed value for a specified amount of time, or when the data has been logged above or below an allowed value for a specified number of times throughout the deployment.

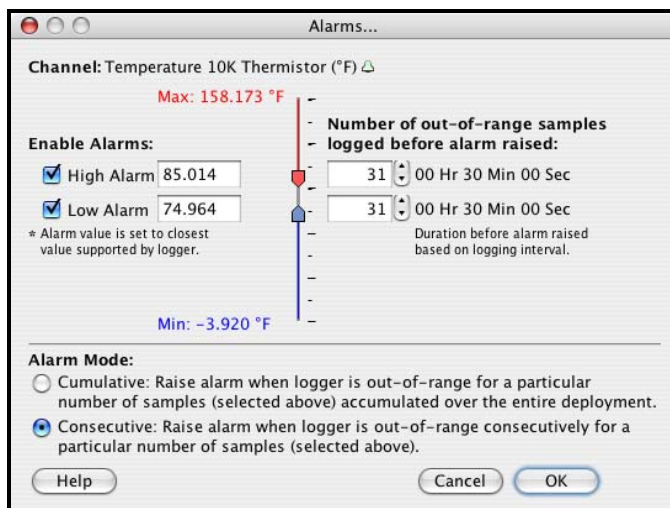
Tip: This feature is available only on specific loggers with built-in alarm indicators (e.g. HOBOPendant model UA-001). Another Onset software product, the Alarm & Readout Tool, works with HOBOWare Pro to monitor HOBOWare-compatible loggers for alarm conditions. When alarms are tripped, the software notifies you by e-mail, mobile phone text message, or pager. For more information, visit our website at:
http://www.onsetcomp.com/Products/Product_Pages/hoboware/alarms_software.html.

If your logger supports alarms, you will see an **Alarms** button on the Launch window for your logger, as shown below.



To set up the alarms:

1. Attach the logger and access the Launch window.
2. Select a channel that supports alarms (it will have a small bell icon next to it) and click the **Alarms** button. An Alarms dialog, similar to the one shown below, will appear.



3. Select the **High Alarm** and/or **Low Alarm**. Use the sliders to set the values that will trigger the high and low alarms, or enter the values manually. (If you enter values manually, the software may adjust them slightly to the nearest values supported by the logger.)
4. In the **Number of out-of-range samples logged before alarm raised** fields, enter the number of samples that are needed to trigger each alarm.
5. Select an alarm mode:

- Choose **Cumulative** if you want the alarm to be triggered after a specific number of samples have been logged above or below an allowed value, even if the samples are not logged consecutively.
 - Choose **Consecutive** if you want the alarm to be triggered only when the value has been above or below an allowed value for a specific amount of time. If the value goes back in range before triggering the alarm, the count is reset.
6. Click **OK** to return to the Launch window and proceed as usual. The small bell icon will now be colored green to indicate that the alarm has been set. Refer to the logger's manual for information about how the logger responds when the alarm is triggered.

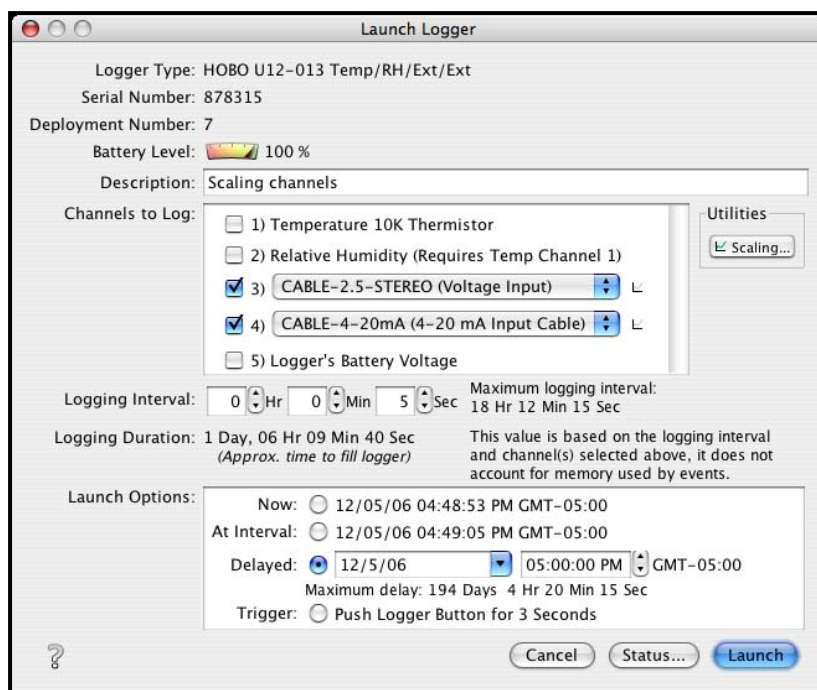
Linear scaling

Linear scaling allows you to convert recorded logger data to some other measurement by entering new values that correspond with the logged values.

The conversion must be based on a linear relationship. If the relationship is based on a curve, linear scaling will not give accurate results.

This feature is supported only on U12 loggers that have external channels that can log voltage or 4-20mA. If your logger supports scaling, you will see a **Scaling** button on the Launch window for your logger.

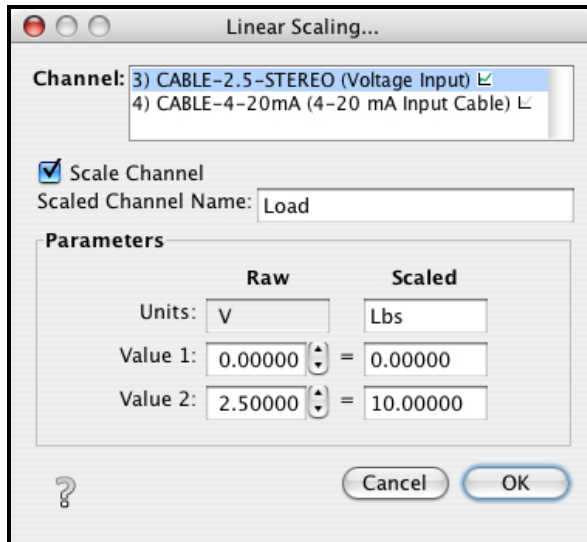
Select an external channel to make the **Scaling** button clickable. If you choose a compatible external input cable, a small icon will appear to signal that scaling is available, as shown below.



To set up scaling for an external channel:

1. Attach the logger and access the Launch window.

2. Select the external channel(s) and choose the applicable input cable(s) from the drop-down list. A small icon will appear next to the input cable name to indicate that linear scaling is available.
3. Click the **Scaling** button. A Scaling dialog, similar to the one shown below, will appear.

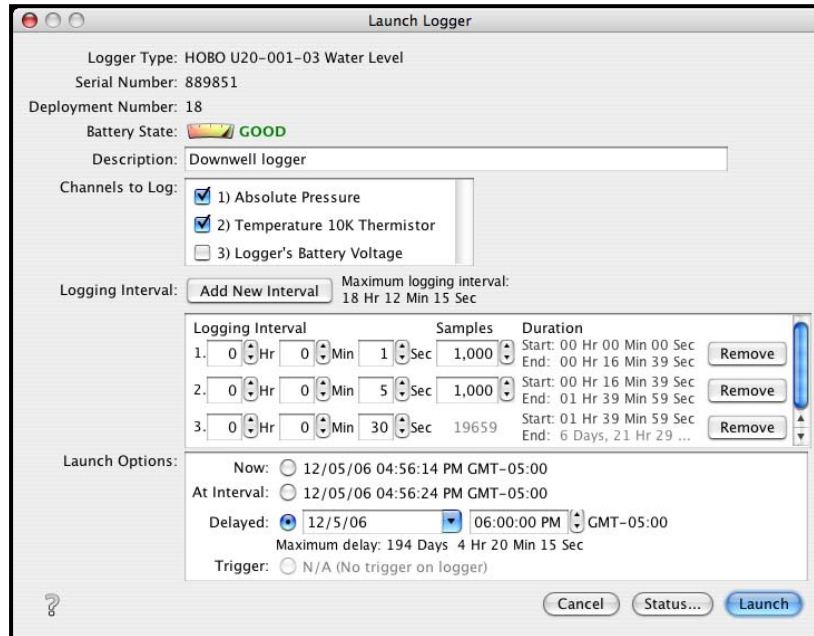


4. Click a channel name in the **Channel** list, then click the **Scale Channel** box to activate scaling for that channel.
5. Enter a descriptive name for the new, scaled channel in the **Scaled Channel Name** field.
6. In the **Scaled** column of the Parameters box, enter the units name for the scaled series, and enter the scaled values in the **Scaled** column to correspond with the numbers in the **Raw** column. (The default values in the **Raw** column are based on the high and low values supported by the input cable, but you may use different values, as long as those values fall within the cable's range.) These values are used to establish a linear relationship between raw and scaled values.
7. To set up linear scaling for another channel, repeat from step 4.
8. Click **OK** to return to the Launch window and proceed as usual. The small icon next to the input cable name will now be colored green to indicate that linear scaling has been set up.
9. When you read out the logger, the new, scaled series will be listed in the **Plot Setup** dialog along with any other channels you logged.

Multiple logging intervals

Some loggers support multiple logging intervals, which allow you to define separate intervals for different phases of the deployment.

If your logger supports multiple logging intervals, you will see an **Add New Interval** button on the Launch window for your logger.



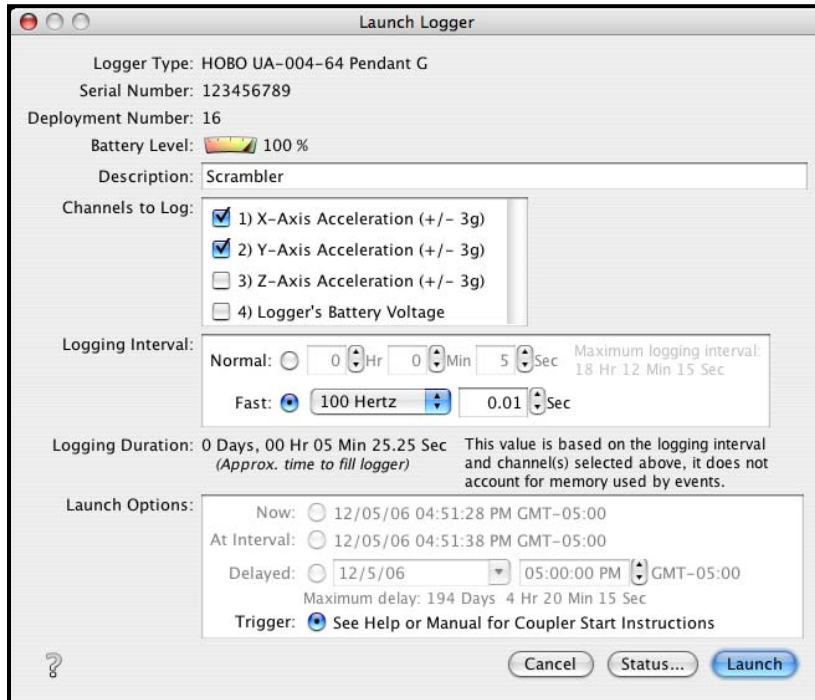
To use this feature, click the **Add New Interval** button until you have as many intervals as you want (up to the number of intervals supported by the logger). Set the hours, minutes, and seconds for each interval, and the number of samples you want the logger to record at each interval. Use the Start and End times in the Duration column to help you decide how many samples to record at each interval.

To delete an interval, click the **Remove** button next to the interval.

Because internal logger events, such as coupler events, do take up some of the logger's memory, the number of samples and end times are only estimates. Frequent events will cause the logger to fill up sooner.

Fast logging intervals

Some loggers support fast logging intervals, which allow you log more than once per second, up to 100 measurements per second (hertz). If your logger supports fast logging intervals, the Launch window for your logger will offer **Logging Interval** choices of **Normal** and **Fast**.



To use fast logging intervals, click the **Fast** button. Then choose a logging frequency from the **Hertz** drop-down list, or enter the logging interval in decimal form in the **Sec** field.

- A logger cannot communicate with a computer while it is logging at a fast interval. Once it has started logging, if you connect it to a computer or base station to check status or read it out, the logger will stop.
- Be aware that a fast logging interval typically means a very short **Logging Duration**. Make sure the logger will run long enough to collect the data you need. Disabling unnecessary channels will give you more time. In the example above, only X- and Y-Axis Acceleration will be logged. The Z-Axis Acceleration and Logger's Battery Voltage channels were disabled to allow a longer logging duration.
- Because fast logging deployments are so brief, the logger must be launched with a trigger start. Follow the instructions that came with your logger for a trigger (coupler or button) start. If the logger has a light, the light will flash quickly when logging begins.

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