ONSET

HOBOlink® User's Guide

Onset Computer Corporation
470 MacArthur Blvd.
Bourne, MA 02532

www.onsetcomp.com

Mailing Address:
P.O. Box 3450
Pocasset, MA 02559-3450

Technical Support:
Phone: 1 508-759-9500 (U.S. and International)
1-800-LOGGERS (1-800-564-4377) (U.S. only)
Fax: 508-759-9100
www.onsetcomp.com/support/contact

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Chapter 1
Getting Started

HOBOlink is web-based software for configuring and monitoring RX3000 Remote Monitoring Stations and RX2100 MicroRX & MicroRX Water Level Stations. You can also use HOBOlink to manage data uploaded from MX series loggers in HOBOconnect™. This section provides an overview for getting started with HOBOlink.

Getting Started with an RX3000 or a MicroRX Station (RX2101, RX2102, RX2105, or RX2106)

Step 1: Create a HOBOlink account or log in to an existing account at www.hobolink.com.

Step 2: Register the station.

1. Log in to your HOBOlink account.

2. Click Devices, then RX Devices, and then click Register a Device.

3. Type a nickname for the station.

4. Type the serial number and the device key from the label inside the station door.

5. Read the terms of use and check the "I agree" box.

6. Click Register. Click Devices then RX Devices to see the station.

Step 3: Set up the hardware for the station as described in the Quick Start Guide or manual.

- For instructions on setting up an RX3000 station, refer to the HOBO RX3000 Remote Monitoring Station manual at www.onsetcomp.com/manual/rx3000.

- For instructions on setting up an RX2101, RX2102, RX2103, or RX2104 station, refer to the HOBO MicroRX Station manual at www.onsetcomp.com/support/manuals/23808-rx2100-manual.

- For instructions on setting up an RX2105 or RX2106 station, refer to the HOBO MicroRX Station for HOBOnet manual at www.onsetcomp.com/support/manuals/24500-rx2105-and-rx2106-manual.

- For documentation on specific sensors, motes, or other devices, go to http://www.onsetcomp.com/support/manuals.

Step 4: Configure the station.

1. Click Devices, then RX Devices, and then the arrow next to the 🔧 icon. Select a configuration option from the drop-down menu. Or click the station name and then click 🔧 at the top of the station page. Make changes and click next to move through each of the configuration screens. Configure the station logging interval, connection interval, sensors, and more. See Chapter 2 for more details.

> **Important:** If you installed a water level sensor module in your RX3000 station, then do not configure the water level and water flow channels yet. Set the logging and sampling interval for the water level sensors module. After the station starts logging, obtain a reference water level reading, noting the date and time, and then configure the water level and water flow channels. See Setting up Water Level and Water Flow Channels in Chapter 2 for more details.

2. Start logging.

Note: If you are performing a pre-deployment test configuration, consider setting the connection interval in Readout Configuration to a faster rate than the one you will be using during deployment. This will allow you to verify proper operation of the device without having to wait a long time between readouts. For devices using a communications plan, this rate will be

limited by the fastest connection allowed by your plan. Once you confirm the readouts are occurring as expected, then change the connection interval to the desired schedule for deployment.

Step 5: The station will connect to HOBOlink based on the connection interval selected in Readout Configuration. After it has started connecting to HOBOlink, you can monitor the latest conditions, set up dashboards, and more. Refer to Chapter 3 for details. You can also view or export data from the device as described in Chapter 4.

Getting Started with a MicroRX Water Level Station (RX2103 or RX2104)

Step 1: Create a HOBOlink account or log in to an existing account at www.hobolink.com.

Step 2: Register the station.

1. Log in to your HOBOlink account.

2. Click Devices, then RX Devices, and then click Register a Device.

3. Type a nickname for the station.

4. Type the serial number and the device key from the label inside the station door.

5. Read the terms of use and check the "I agree" box.

6. Click Register. Click Devices and then RX Devices to see the station.

Step 3: Set up the hardware for the station as described in the Quick Start Guide or manual.

- For instructions on setting up an RX2100 micro station, refer to the HOBO Micro RX Station (RX210x) manual at www.onsetcomp.com/support/manuals/23808-rx2100-manual.

- For documentation on specific smart sensors, go to http://www.onsetcomp.com/support/manuals.

Step 4: Configure the station.

1. Click Devices, then RX Devices, and then the arrow next to the 🔧 icon. Select a configuration option from the drop-down menu. Or click the station name and then click 🔧 at the top of the station page. Make changes and click next to move through each of the configuration screens. Configure the logging interval, connection interval, and other settings for smart sensors. See Chapter 2 for more details.

   > **Important:** Do not configure the water level and water flow channels yet. Set the logging and sampling interval for the water level sensors module and optionally add labels, scaling, or enable graphing.

2. Start logging.

Step 5: Obtain a reference water level reading, noting the date and time. Configure the water level and water flow channels. Click Devices, then RX Devices, and then the arrow next to the 🔧 icon. Select Module/Sensor Configuration and then Water Level and Water Flow under Module 2: Water Level Sensors Logging. See Setting up Water Level and Water Flow Channels in Chapter 2 for more details.

The station will connect to HOBOlink based on the connection interval selected in Readout Configuration. After it has started connecting to HOBOlink, you can monitor the latest conditions, set up dashboards, and more. Refer to Chapter 3 for details. You can also view or export data from the device as described in Chapter 4.

Getting Started with MX Devices

You can upload data from MX series loggers to HOBOlink via an MX Gateway or the HOBOconnect app.

1. Create a HOBOlink account or log in to an existing account at www.hobolink.com.

2. In HOBOconnect, go to Settings and connect your HOBOlink account to the app. Make sure Upload Data is enabled.

3. When configuring a logger, select to upload data via the gateway or HOBOconnect.

If you selected to upload data via the gateway, the MX Gateway will regularly check the logger and upload data to HOBOlink.

If you selected to upload data via HOBOconnect, data will be uploaded to HOBOlink every time the logger is read out with the app.

Click Devices and then MX Devices to view a list of MX logger deployments uploaded from either the gateway or HOBOconnect. For details on the MX Devices list, see Chapter 3. For details on working with the uploaded data, see Chapter 4. For details on the app, see the HOBOconnect User's Guide at www.onsetcomp.com/hoboconnect.

HOBOlink Basics

Use the left menu to navigate HOBOlink and use this button [≡] to collapse or expand the left menu (not available on mobile phones).

Select this:	To do this:
Dashboards	Set up or view a custom dashboard showing graphs and data from your sensors and devices. See Using Dashboards for details.
Devices	View a list of all RX devices registered to this account. Check the status of an RX station, including when it last connected to HOBOlink and whether an alarm has tripped. You can also click a station name to view device details.
	View a list of MX Gateways and MX Devices. Check the status of an MX Gateway, set up MX Gateway alarms, and check the list of MX series logger deployments uploaded from either the MX Gateway or HOBOconnect.
	Click Map to set up or view a map of all stations and any wireless sensor motes.
	See Chapter 3 for details.
Data	Create new exports, access existing exports, schedule automatic delivery of exports, download U30 station data files, and work with data feeds. See Chapter 4 for details.
Calculated Channels	Create a reference evapotranspiration channel. See Setting up a Reference Evapotranspiration Calculated Channel in Chapter 3 for details.
User Settings	Change account settings, units, and export settings or grant public access to station pages. See Chapter 5 for details.

Chapter 2
Configuring Stations

There are several settings you can configure on a station, including the logging interval, connection interval, sensor scaling, alarms, and more. To configure your station:

1. Click Devices, then RX Devices.

2. Find the station in the list, click the arrow next to the ⚒ icon, and select a configuration option from the drop-down menu.
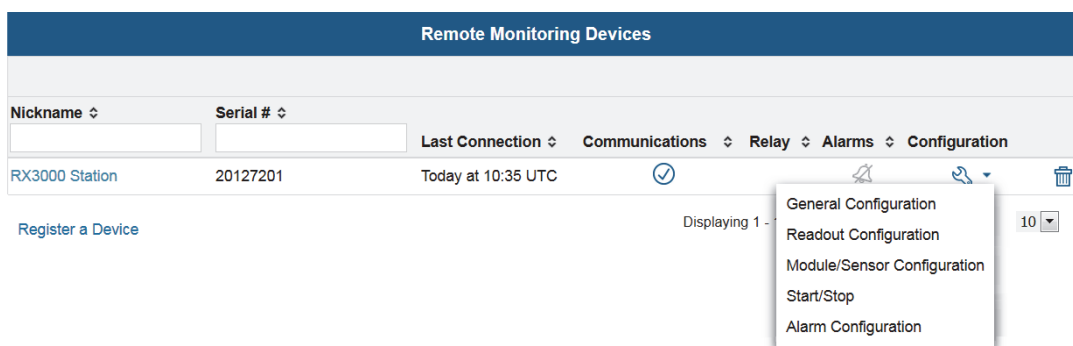
Or, click the station name, click ⚒, and select a configuration option from the drop-down menu.
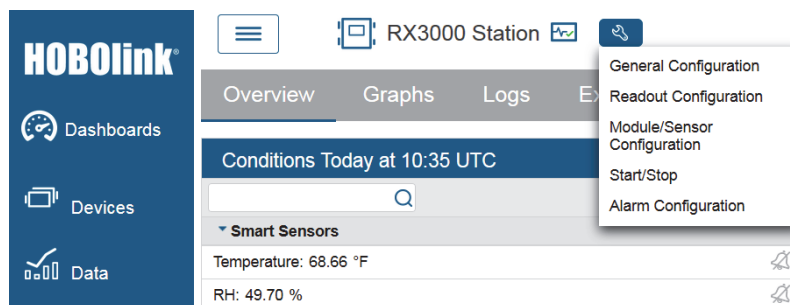
3. Once a configuration screen is open, you can use the left menu or click the Next button to move from one screen to the next. Any changes you make are saved by either clicking Next or Save in the configuration pages. You will lose any changes made if you click Back without clicking Next first. A circle icon ⊙⊙⊙ indicates a saved configuration change is pending.
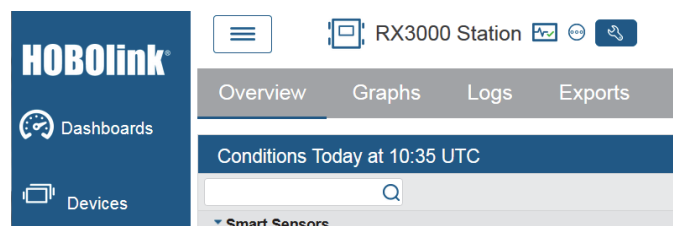
General Configuration

On the General Configuration page, you can change the station nickname, time zone, and image. For U30 stations, you can also control whether the device wraps (continues logging) when the memory fills.

To change the nickname or time zone (all stations) and wrap settings (U30 stations only):

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the icon and select General Configuration.

2. In the Nickname field, type a name that identifies the device.

3. In the Time Zone field, select the time zone where the device is located. This setting ensures that the time stamp associated with each logged data point is displayed properly for your region. If the time switches between Daylight Saving Time and Standard Time during logging, the time shown on the graphs on your device page will be adjusted automatically.

4. For U30 stations only: Select the "Wrap when memory fills" checkbox if you want the U30 station to wrap rather than stop logging after the memory is full. If wrap is enabled, newly recorded data will overwrite the oldest logged information once the memory is full. If this checkbox is not enabled, then the U30 station will stop recording data when the memory is full and you will need to restart it. Changing this setting will cause the U30 station to be relaunched the next time it connects to HOBOlink. (Note: RX3000 and RX2100 stations always wrap when memory fills.)

5. Click Save (or click Next to move to the next configuration page). Changes to the nickname will take effect immediately. Changes to the time zone will not be reflected in the device graphs until the next time the device connects with HOBOlink. When you change the time zone for the device, also double-check the night mode settings in Readout Configuration to ensure the start and end time is still set correctly.

The image selected in General Configuration is displayed on the banner at the top of your device page and on the map. You can keep the default image of the device or choose your own image. To change the image:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the icon and select General Configuration.

2. Click the Choose Image button.

3. Select the image you want to use. An image file must be a .jpg, .gif, or .png format and less than 1 MB.

4. Click the Upload button to use the newly selected image. The new image will be used in HOBOlink immediately.

To revert to the original image for the device, click the Use Default button.

Launch Configuration (U30 Stations)

On the Launch Configuration page, you can enter a launch description, set logging and sampling intervals, and select other settings for U30 stations only. Any changes you make on this page will result in the device being relaunched the next time it connects to HOBOlink. Launch Configuration is only available for U30 stations. (**Note:** See Module/Sensor Configuration for setting logging and sampling intervals for RX3000 and RX2100 stations.)

To change the launch settings for your device:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the icon and select Launch Configuration.

2. In the Launch Description field, type a name for the launch. The launch description is used as the file name for data readouts.

3. Select a logging interval, which is the rate at which the device will record sensor data. The minimum logging interval is 1 minute and the maximum is 18 hours. The logging interval must be no more than half the connection interval, which is set in Readout Configuration. Keep in mind that the faster the logging interval, the more quickly memory fills and battery power is consumed. If your device has a communications plan associated with it, you will also see the percentage of the plan used so far for the month as well as the estimated total usage for the month based on the logging interval settings. You may need to adjust the logging interval to fit within your communications plan. For more details, see Managing a Communications Plan.

4. If one or more of the sensors connected to the device support measurement averaging, then you can set a sampling interval for those sensors. Select the Enable checkbox and set the sampling interval, which must be less than or equal to the logging interval (up to four minutes). A sampling interval rate faster than 1 minute will reduce the device's battery life.

What is a sampling interval?
When a sampling interval is configured, the station will take multiple measurements within a given logging interval and then average them together to create a single logged data point. This is only an option if the smart sensor supports measurement averaging. Smart sensors that support measurement averaging are temperature (S-TMB-M0xx), PAR (S-LIA-M003), solar radiation (S-LIB-M003), barometric pressure (S-BPA-CM10 and S-BPB-CM50), 4-20mA input (S-CIA-CM14), 12-bit voltage input (S-VIA-CM14), and FlexSmart TRMS module (S-FS-TRMSA-D). Disable the sampling interval if none of your smart sensors support measurement averaging to avoid unnecessary drain on the battery power.

5. Select the "Force relaunch on next connection" checkbox only if you have not changed any other settings in Launch Configuration and you wish to relaunch the device. You may need to force a relaunch if the device has stopped logging because the memory is full (if "wrap when memory is filled" was disabled in General Configuration) or if you need to add or remove sensors.

6. Select the "Full readout upon power reset" if you want all data to be offloaded after turning off the device power. **This will take a significant amount of time and is not recommended.** If you are concerned about losing important data, you can configure a frequent Connection Interval in Readout Configuration, or if you lose power, you can manually read out data from the device via a direct USB connection and HOBOware.

7. Click Save (or click Next to move to the next configuration page). Any changes made will take effect the next time the device connects to HOBOlink. Changes to the Launch Description, Logging Interval, or Sampling Interval will cause the device to be relaunched, as will enabling the "Force relaunch on next connection" checkbox.

Notes:

- Although you can launch the U30 station with HOBOware, it is strongly recommended that launching be done exclusively through HOBOlink. HOBOlink launch settings take precedence over HOBOware settings. Therefore, any settings in the Launch Configuration page in HOBOlink will override the settings in Launch Logger window in HOBOware. For example, if you launch the device in HOBOware with a 30-second logging interval and you set the logging interval to 1 minute in HOBOlink, the device will be relaunched with the 1-minute interval the next time it connects to HOBOlink.

- The delayed launch feature in HOBOware in which you select logging to begin on a specific date/time is not supported with HOBOlink. The device will begin logging at the next scheduled launch time as configured in HOBOlink with the first sample logged at the next even logging interval.

Readout Configuration

On the Readout Configuration page, you can set how frequently the device connects to HOBOlink and reads out the latest data. You can also set up an alternate "night mode" connection schedule. Data from RX3000 and RX2100 stations is saved in a database and can be accessed by setting up data exports, which can be run as needed or delivered to an email or FTP/SFTP address automatically on a regular basis. Data from U30 stations is saved to a data file and optionally to a text file that you can download (you can also set up export and data delivery of files from U30 stations). For more information, see Manage and Share Data.

To change readout settings:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Readout Configuration.

2. Select the connection interval for the device. This will control how often the device connects to HOBOlink and is offloaded, or read out. At each connection interval, data is uploaded to HOBOlink and your device's page is updated with the latest details, such as sensor readings and graphs. Keep in mind that frequent connections will reduce battery life. The Readout Configuration page shows how many connections will take place per day based on the connection interval you select (not including any connections due to alarms). If your device has a communications plan associated with it, you will also see the percentage of the plan used so far for the month as well as the estimated total usage for the month based on the readout settings. You may need

to adjust the connection interval to fit within your communications plan. For more details, see Managing a Communications Plan.

3. Select the "Night mode" checkbox if you wish to set up a second readout schedule using a different connection schedule during a time frame that you specify. This allows you to set up two readout schedules: one with more frequent connections during a specified period and the other with less frequent connections during a different period. This can help preserve battery power and minimize connection charges (if applicable) if there is a part of the day when you don't need as many data readouts. Select when you want night mode to begin and end for the device's time zone (note that "night mode" does not need to be at night). Enter a different rate in the hours, minutes, and seconds fields than you entered in the Connection Interval fields. Note that the second readout schedule will not begin at precisely the hours you select. Rather, it will begin and end with 1 to 59 minutes of the hours that you selected.

4. For U30 stations only: Select the "Save data as text file" checkbox if you want the data offloaded from the device to be saved in text file format (.csv) in addition to the default HOBOware format (.dtf). Be sure to select this checkbox if you have any sensors that were scaled in HOBOlink (such as pulses scaled as kWh, for example) because scaled data will not be available in the .dtf file.

5. Click Save (or click Next to move to the next configuration page). The changes will take effect the next time the device connects to HOBOlink.

> **Important**: Changes made on the Readout Configuration page will not force the device to restart. To restart an RX3000 or RX2100 station, select Start/Stop under Configure in HOBOlink or use the Start/Stop button on the device to stop and then start it again when desired. To restart a U30 station, select "Force relaunch on next connection" in the Launch Configuration page.

Notes:

- If you are performing a pre-deployment test configuration with your device, consider setting the Connection Interval to a more frequent rate than the one you will be using during deployment. This will allow you to verify proper operation of the device without having to wait a long time between readouts. For devices using a communications plan, this rate will be limited by the fastest connection allowed by your plan. Once you confirm the readouts are occurring as expected, then change the Connection Interval to the desired schedule during deployment.

- If an alarm trips, the connection schedule will restart from the time of the alarm (unless the device is in night mode). For example, if the device has been connecting every hour (1:00, 2:00, and 3:00) and then an alarm trips at 3:15, the device will connect again at 4:15 instead of 4:00.

- When you change the time zone for the device, also double-check the night node settings to ensure the start and end time is still set correctly.

- For U30 stations only: An alternative to changing the connection interval is to manually connect to HOBOlink for a test using HOBOware. Connect the device to a computer, open HOBOware and click the Status button on the toolbar (or select Status from the Device menu). Click the Contact HOBOlink button in the Status window. This will force the device to connect to HOBOlink. Disconnect the device from the computer once the test is complete. The device will then connect to HOBOlink at the next scheduled time as determined by the connection interval.

- For U30 stations only: You can manually read out the device with HOBOware. Connect the device to the computer and open HOBOware. From the Device menu, select Readout. When the readout is complete, disconnect the device from the computer. If you are using the device with HOBOware during the device's regularly scheduled connection time, it will not connect to HOBOlink. When you are finished using the device with HOBOware, it will connect at the next scheduled connection time instead.

Module/Sensor Configuration

For RX3000 and RX2100 stations, select Module/Sensor Configuration to configure smart sensors and modules, wireless and analog sensors (RX3000 models), and water level channels (RX2103 and RX2104 models or RX3000 stations with a water level sensor module installed).

For U30 stations, select Modules/Sensor Configuration to set up each smart sensor and select Launch Configuration to set logging and sampling intervals.
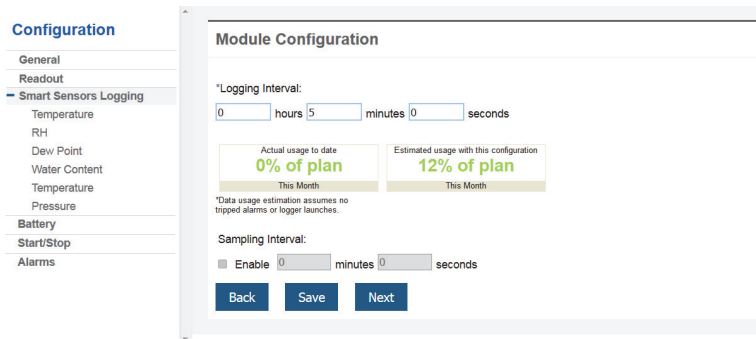
Configuring Smart Sensor Logging (RX3000 and RX2100 Stations)

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Select Smart Sensors Logging from the menu on the left.

3. Select the logging interval. This logging interval will be used by all enabled smart sensors. It can be different than the logging interval used for other sensors. Minimum logging intervals are determined by the device model and communications plan.

4. Enable the sampling interval and enter the rate to use in minutes and seconds (only used with smart sensors that support sampling; refer to the sensor manual at www.onsetcomp.com/support/manuals).

   What is a sampling interval?
   When a sampling interval is configured for smart sensors, the station will take multiple measurements within a given logging interval and then average them together to create a single logged data point. This is only an option if the smart sensor supports measurement averaging. Smart sensors that support measurement averaging are temperature (S-TMB-M0xx), PAR (S-LIA-M003), solar radiation (S-LIB-M003), barometric pressure (S-BPA-CM10 and S-BPB-CM50), 4-20mA input (S-CIA-CM14), 12-bit voltage input (S-VIA-CM14), and FlexSmart TRMS module (S-FS-TRMSA-D). Disable the sampling interval if none of your smart sensors support measurement averaging to avoid unnecessary drain on the battery power.

5. Click Save (or click Next to move to the next configuration page).

Configuring Smart Sensors (RX3000, RX2100, and U30 Stations)

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration (RX3000 and RX2100 stations) or Sensor Configuration (U30 stations).

2. Select the sensor from the menu on the left.

3. To add a label to a sensor, type a name in the Label field. Labels are helpful if you are using more than one sensor of the same type, especially if you will be setting up dashboards. The label for the sensor will be listed in parenthesis following the sensor measurement type.

4. Click Enable Graph to show a graph of data for the sensor on the device page.

5. Click Enable Graph Totals to display filtered totals from rain gauge and pulse input adapter sensors or from the Time On channel for runtime sensors on RX stations. For more details on graph totals, see Viewing Station Details in the next chapter. (Totals will be displayed on the graph the next time the station connects to HOBOlink.)

6. Click Enable Scaling to set up scaling for the sensor. Fill in the scaled units, multiplier, offset, and scaled measurement type fields. For more details, see Scaling Sensor Data later in this chapter.

7. Click Save (or click Next to move to the next configuration page).

Configuring a Water Level Sensor Module (RX2100 Stations or Stations with RXMOD-W1)

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Select Module 1 (or 2): Water Level Sensors Logging from the menu on the left.

3. Select the logging interval. This will be used by all water level sensor channels, including water level and water flow (if enabled). It can be different than the logging interval used for other sensors. Minimum logging intervals are determined by the device model and communications plan.

4. Enable the sampling interval (optional) and enter the rate to use in minutes and seconds. The station will take multiple measurements at that rate within a given logging interval and then average them together to create a single logged data point.

5. Click Save (or click Next to move to the next configuration page).

To configure barometric pressure, water pressure, differential pressure, or water temperature:

1. Under Module 1 (or 2): Water Level Sensors Logging, select Barometric Pressure, Water Pressure, Diff Pressure, or Water Temperature. (To get to Module 2, Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration).

2. To add a label to the sensor, type a name in the Label field. The label for the sensor will be listed in parenthesis following the sensor measurement type.

3. Click Enable Graph to show a graph of data for the sensor on the device page.

4. Click Enable Scaling to set up scaling for the sensor. Fill in the scaled units, multiplier, offset, and scaled measurement type fields. For more details, see Scaling Sensor Data later in this chapter.
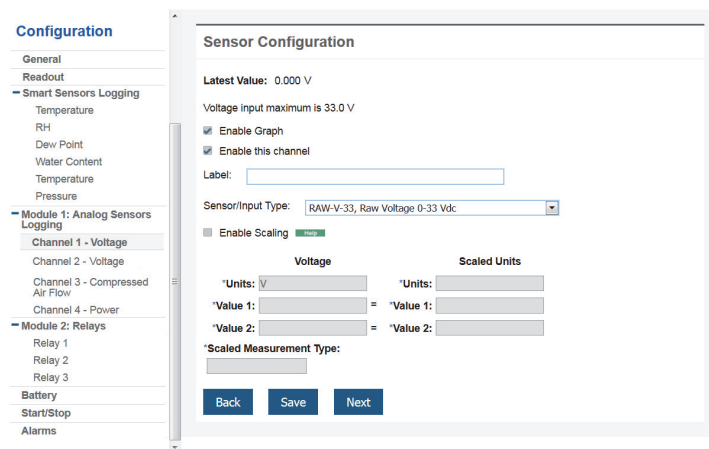

To configure water level or water flow, see Setting up Water Level and Water Flow Channels later in this chapter.

Configuring Analog Sensors Logging (RX3000 Stations)

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Select Module 1 (or 2): Analog Sensors Logging from the menu on the left.

3. Select the logging interval. This will be used by all enabled analog sensors for this module. It can be different than the logging interval used for other sensors. Minimum logging intervals are determined by the device model and communications plan.

4. Click the Enable checkbox under Sampling Interval if you want to log statistics. Enter the sampling interval to be used for calculating statistics (must be a factor of the logging interval). Select the statistics to be logged: minimum, maximum, average, and standard deviation. Statistics will be calculated between each logging interval at the sampling interval rate you select. Each statistic value will then be logged at each logging interval.

5. Enable "Use excitation power" if you want the sensor to use excitation. Select Warmup and enter the seconds or milliseconds or select Continuous.

   - With Warmup, the device supplies excitation power for a brief period prior to each measurement. This allows you to select the minimum warm-up time needed to allow for sensor stabilization while conserving battery power. For example, if you specify a warm-up of one second and set the logging interval for the module to one minute, the device will power the external sensor for one second, log a measurement, and then turn off the excitation power for the next 59 seconds. Note that the excitation mode is automatically set to Continuous if the warmup time selected is within one second of or greater than the logging or sampling intervals.

   - With Continuous, the device supplies constant excitation power to the sensor for the entire duration of the deployment. Continuous mode is required if the sensor needs more than two minutes of warm-up time. Continuous mode greatly affects battery life and is generally not recommended.

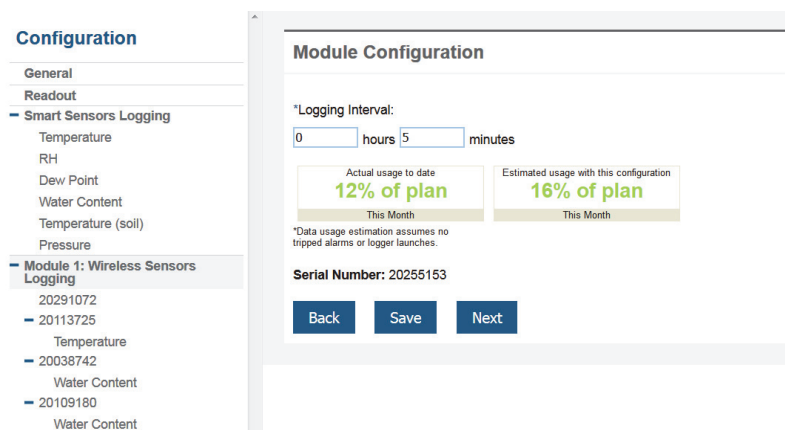6. Click Save (or click Next to move to the next configuration page).

Configuring Analog Sensors (RX3000 Stations)

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Click an analog sensor channel from the left menu.

3. Select Enable Graph to show a graph for the sensor on the device page.

4. Select "Enable this channel" if you want the device to record data for this channel.

5. Type a name for the channel in the Label field.

6. Select the sensor or input that you will be using for this channel in the Sensor/Input Type drop-down list. This is needed to set the voltage or current range for the analog input.

7. Select Enable Scaling and then enter the scaled unit name and values as defined in the sensor manual. The raw unit name and values will be pre-filled based on the sensor/input type selected. Type the name for the scaled measurement in the Scaled Measurement Type.

8. Click Save (or click Next to move to the next configuration page).

Configuring a Manager Module for a Wireless Sensor Network (RX3000, RX2105, and RX2106 Stations)

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Select Module 1 (or 2): Wireless Sensors Logging from the menu on the left.

3. Select the logging interval. This will be used by all wireless sensors in the network. It can be different than the logging interval used for other sensors. Minimum logging intervals are determined by the device model and communications plan.

4. Click Save (or click Next to move to the next configuration page).

Configuring Motes for a Wireless Sensor Network (RX3000, RX2105, and RX2106 Stations)

To add a label to a mote or to add a battery graph for the mote to the device page:

1. Click Devices and then RX Devices, and find the station with the motes that you want to configure. Click the arrow next to the icon and select Module/Sensor Configuration.

2. Select the mote from the menu on the left.

3. Type a name in the Label field. The label will replace the mote serial number and will be applied to all mote sensors without a default label. **Note:** You can change the label for the mote sensor as described in the next set of steps to configure a wireless sensor.

4. Click Enable Battery Graph to show a graph of the mote battery voltage on the device page.

5. Click Save (or click Next to move to the next configuration page).

Note: If you click Delete, this removes the mote from the wireless sensor network. The mote will no longer appear in the left menu.
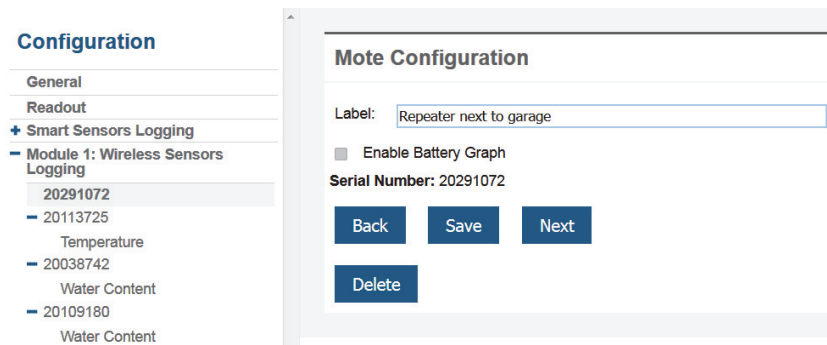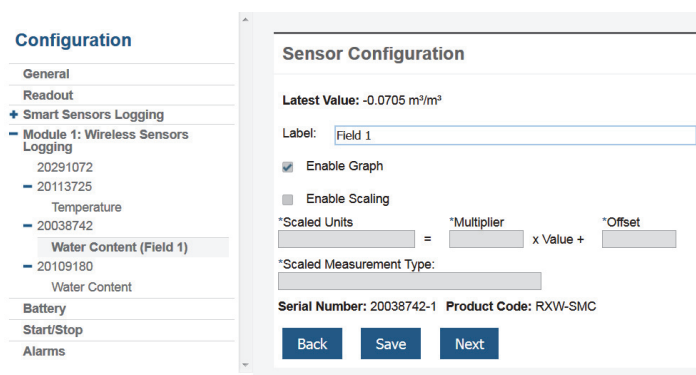
To configure a wireless sensor:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the icon and select Module/Sensor Configuration.

2. Select a wireless sensor measurement type from the menu on the left.

3. To add a label to the wireless sensor, type a name in the Label field. Labels are helpful if you are using more than one wireless sensor of the same type, especially if you will be setting up dashboards. The label for the sensor will be listed in parenthesis following the sensor measurement type. **Note:** You can also add a label to the mote as described in the previous set of steps to configure the mote.

4. Click Enable Graph to show a graph of data for the sensor on the device page.

5. For the rain gauge wireless sensor, click Enable Graph Totals to add a dashed line to graphs for filtered totals. The dashed line will be added graph on the device page the next time the device connects to HOBOlink. Past Day graphs note the total rainfall or pulses in the past day and the dashed line represents hourly totals. For Past Week and Past Month graphs, the total rainfall or pulses for the past week or month is noted and the dashed line represents daily totals.

6. Click Enable Scaling to set up scaling for the wireless sensor. Fill in the scaled units, multiplier, offset, and scaled measurement type fields. For more details, see Scaling Sensor Data later in this chapter.

7. Click Save (or click Next to move to the next configuration page).

Setting up Water Level and Water Flow Channels

You can set up water level and water flow channels for RX2103 and RX2104 stations with an installed water level sensor or for RX3000 stations with a water level sensor module (RXMOD-W1). Water level and water flow are calculated at each logging interval based on the measurements from the pressure and temperature channels and the settings and values that you enter in the configuration screens. **Note:** If a water level sensor is not physically connected to the station, barometric pressure will be the only channel logged and you will not be able to set up water level and water flow channels.

If you need to set up the logging interval for the water level sensor module or add labels, enable graphs, or set up scaling for pressure and temperature channels, see Module/Sensor Configuration earlier in this chapter.
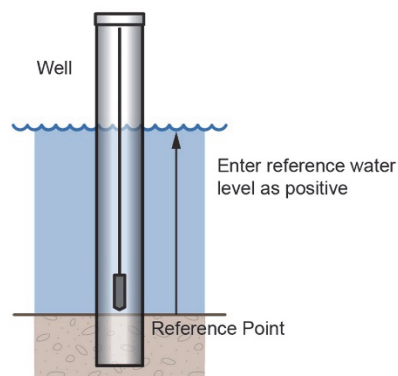
Water Level Configuration

Important: Make sure the station has started logging and you have then taken a reference water level reading from the location where the sensor is deployed with the date and time of the reading before performing these steps.

To set up a water level channel:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Under Module 1 (or 2): Water Level Sensors Logging on the left menu, select Water Level.

3. Click the checkbox to Enable Channel.

4. Click the checkbox to Enable Graph and type a label (optional).

5. Enter the reference water level and date and time the reading was taken.

   - If the water level surface is *below* the reference point as shown, enter the reference water level as a negative number.
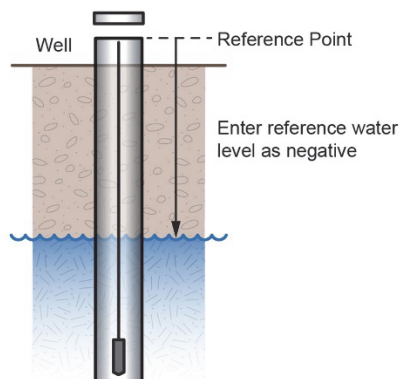
   - If the water level surface is *above* the reference point as shown, enter the reference water level as a positive number.


6. Select the appropriate water density for your deployment location. If selecting static density, enter the value in kg/m^3 or lb/ft^3.

7. Click Save (or click Next to move to the next configuration page).

Water level will be calculated starting with the next connection to HOBOlink. Note that the reference water level information entered in this step will not affect any previously logged water level data. It will only be used for data logged from the point of the next connection to HOBOlink forward. If this is the first time that water level has been configured for this station, then the data stored will go back to the date and time of the reference water level. If you make other updates to the reference water level, then the data will only be updated from the time of the next connection to HOBOlink.

Water Flow Configuration: V-Notch Weir

If you are using a v-notch weir similar to the diagram below on the left along with the water level sensor, then HOBOlink can calculate the flow rate for each water level reading using the following two values that you enter:

- The notch (vertex) angle in degrees or radians, which is represented as θ in the diagram below on the right.

- The distance from the reference point to the v-notch vertex, which is represented as WLv in the diagram below on the right. This value must be entered in the same units as the reference water level you entered for the water level channel (meters or feet).
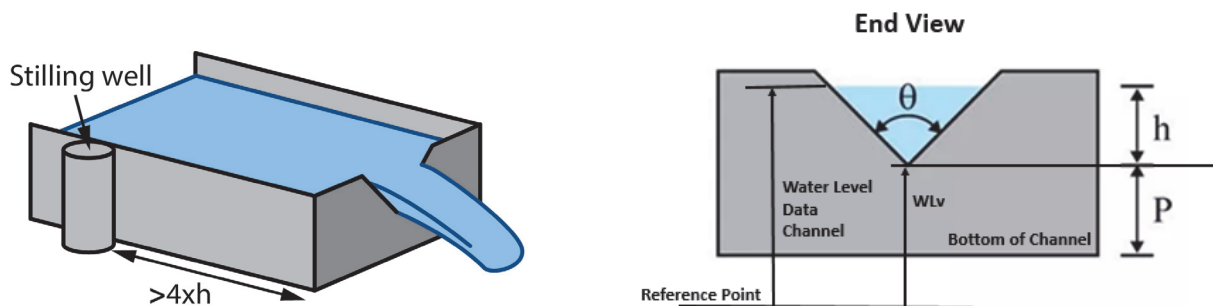
The HOBOlink water flow calculations for a v-notch weir assume the following:

- The stilling well with the water level sensor should be placed at a distance of at least 4 x hmax upstream of the weir.

- In general, if the notch area is small relative to the area of the approach channel, the weir is "fully contracted" and these flow equations will work. More specifically, the ratio of the channel width to the v-notch width should be greater than 3, and the ratio of hmax/p should be less than 1. It may also work for weirs not meeting these guidelines if the approach channel is smooth, straight, and rectangular.

- The weir should be between 0.8 and 2 mm (0.03 and 0.08 inches) thick in the v-notch. If the bulk of the weir is thicker than 2 mm (0.08 inches) the downstream edge of the v-notch can be chamfered at an angle greater than 45° (60° is recommended) to achieve the desired thickness of the edges. Avoid water clinging to the downstream face of the weir.

- The head height (h) must be no more than 35% of the distance from the channel bottom to v-notch vertex (P).

- The head height must be at least 0.06 m (0.2 ft). When the head height is less than 0.06 m (0.2 ft), the flow calculation will not be as accurate.

- The average width of the approach channel should be greater than 0.91 m (3 ft).

- The bottom of the v-notch should be at least 0.45 m (1.5 ft) above the bottom of the upstream channel.

Configuring a Flow Channel for a V-Notch Weir

Important: Make sure the station has started logging and you have configured the water level channel with a reference level reading before completing these steps.

To set up a water flow channel using a v-notch weir:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Under Module 1 (or 2): Water Level Sensors Logging on the left menu, select Water Flow.

3. Click the checkbox to Enable Channel.

4. Click the checkbox to Enable Graph and type a label (optional).

5. For the Measurement Method, select V-Notch Weir.

6. Enter the notch (vertex) angle of the weir in degrees or radians.

7. For the "Water level at vertex," enter the distance from the reference point to the v-notch vertex in either meters or feet (using the same reference point and units you used for the reference water level in the water level channel).

   - If the vertex is the reference point, then enter 0.

   - If the reference point is the bottom of the channel, then the value is represented as P in the diagram earlier in this section.

   - If the reference point is above the water level (such as when using ground level as the reference point in a storm sewer), then enter a negative number.

   - If the reference point is below the water level, then enter a positive number.

8. Click Save (or click Next to move to the next configuration page).

Water flow will be calculated starting with the next connection to HOBOlink.

Tip: It is good practice to set an alarm for the water level just below the top of the v-notch so you know when the flow data is close to exceeding its valid range. See Sensor Alarms in Chapter 2 for details on setting up an alarm in HOBOlink.

Water Flow Configuration: Rectangular Weir

If you are using a rectangular thin-plate weir similar to the diagram below on the left along with the water level sensor, then HOBOlink can calculate the flow rate for each water level reading using four values that you enter. Note that these values must be entered in the same units as the reference water level you entered for the water level channel (meters or feet). The values are:

- The notch width, which is represented as b in the diagram below on the right.

- The channel width, which is represented as B in the diagram below on the right.

- The notch height above the channel floor, which is represented as P in the diagram below on the right.

- The distance from the water level reference point to the notch crest, which is represented as WLc in the diagram below on the right.
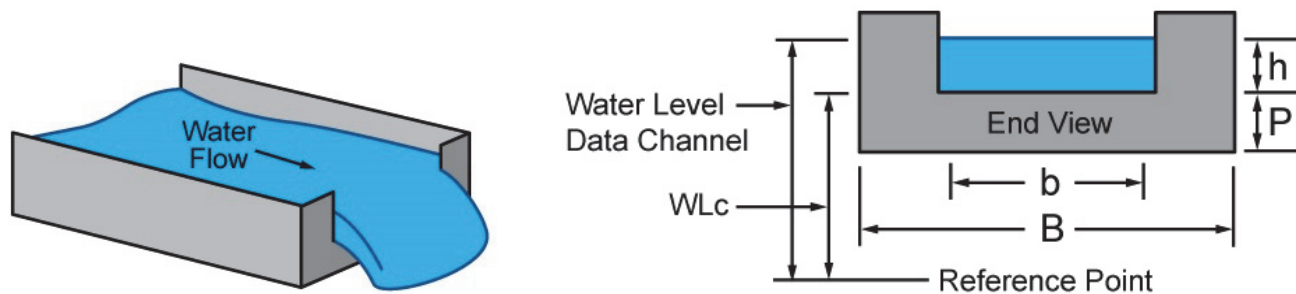
The HOBOlink water flow calculations for a rectangular weir assume the following:

- The range for the weir opening width is 0.15 to 6 m (0.5 to 20 ft).

- The notch height (P) must be at least 0.1 m (0.33 ft).

- Either B = b (full-width weir) or B - b must be at least 0.2 m (0.66 ft) (contracted weir).

- The weir should be between 1 to 2 mm (0.03 to 0.08 inches) thick in the opening. If the bulk of the weir is thicker than 2 mm (0.08 inches), the downstream edge of the opening can be chamfered at an angle greater than 45° (60° is recommended) to achieve the desired thickness of the edges, and avoid water clinging to the downstream face of the weir.

- The range for the head height (h) is 0.03 to 1.4 m (0.18 to 4.5 ft).

- The range for the flow rate is from 3.45 to 17,188 l/s (0.122 to 607 ft^3/s).

- The value of h/p cannot be greater than 2.5.

- Water surface downstream of the weir should be at least 0.06 cm (2.36 inches) below the weir crest (i.e. below the bottom of the opening).

Configuring a Flow Channel for a Rectangular Weir

> **Important:** Make sure the station has started logging and you have configured the water level channel with a reference level reading before completing these steps.

To set up a water flow channel using a rectangular weir:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Under Module 1 (or 2): Water Level Sensors Logging on the left menu, select Water Flow.

3. Click the checkbox to Enable Channel.

4. Click the checkbox to Enable Graph and type a label (optional).

5. For the Measurement Method, select Rectangular Weir.

6. Enter the notch width in either meters or feet. **Note:** Use the same units for this and all rectangular weir values as you entered for the reference water level in the water level channel.

7. Enter the channel width in either meters or feet.

8. Enter the notch height above the channel floor in either meters or feet.

9. For the Distance from Water Level Ref Point to Notch, enter the distance from the reference point to the notch crest in either meters or feet.

   - If the notch crest is the reference point, then enter 0.

   - If the reference point is the bottom of the channel, then the value is represented as P in the diagram earlier in this section.

   - If the reference point is above the water level (such as when using ground level as the reference point in a storm sewer), then enter a negative number.

   - If the reference point is below the water level, then enter a positive number.

10. Click Save (or click Next to move to the next configuration page).

Water flow will be calculated starting with the next connection to HOBOlink.

Water Flow Configuration: Trapezoidal Weir

If you are using a trapezoidal or Cipoletti thin-plate weir similar to the diagram below on the left along with the water level sensor, then HOBOlink can calculate the flow rate for each water level reading using two values that you enter. Note that these values must be entered in the same units as the reference water level you entered for the water level channel (meters or feet). The values are:

- The width at the base of the notch, which is represented as b in the diagram below on the right.

- The distance from the water level reference point to the notch crest, which is represented as WLc in the diagram below on the right.
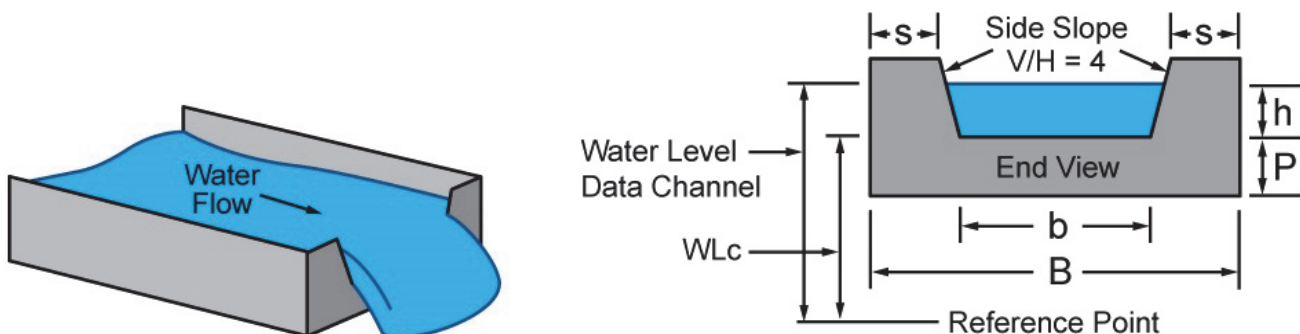
The HOBOlink water flow calculations for a trapezoidal weir assume the following:

- The slopes of the notch sides must be 4 (vertical change / horizontal change).

- Head height (h) should be measured at a distance of at least 4 x hmax upstream of the weir.

- The weir should be between 1 to 2 mm (0.04 to 0.08 inches) thick in the opening. If the bulk of the weird is thicker than 2 mm (0.08 inches), the downstream edge of the opening can be chamfered at an angle greater than 45° (60° is recommended) to achieve the desired thickness of the edges and avoid water clinging to the downstream face of the weir.

- Water surface downstream of the weir should be at least 0.06 m (0.2 ft) below the weir crest (i.e. below the bottom of the opening).

- The head height (h) must be at least 0.06 m (0.2 ft), but less than b/3.

- The crest height above the channel floor (P) is measured from the bottom of the upstream channel and should be greater than 2 x hmax.

- "S" is measured from the sides of the channel and should be greater than 2 x hmax.

Configuring a Flow Channel for a Trapezoidal Weir

> **Important:** Make sure the station has started logging and you have configured the water level channel with a reference level reading before completing these steps.

To set up a water flow channel using a trapezoidal weir:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Under Module 1 (or 2): Water Level Sensors Logging on the left menu, select Water Flow.

3. Click the checkbox to Enable Channel.

4. Click the checkbox to Enable Graph and type a label (optional).

5. For the Measurement Method, select Trapezoidal Weir.

6. Enter the notch width at the bottom in either meters or feet, using the same units as you entered for the reference water level in the water level channel.

7. For the Distance from Water Level Ref Point to Notch, enter the distance from the reference point to the notch crest in either meters or feet (using the same reference point and units you used for the reference water level).

   - If the notch crest is the reference point, then enter 0.

   - If the reference point is the bottom of the channel, then the value is represented as P in the diagram earlier in this section.

   - If the reference point is above the water level (such as when using ground level as the reference point in a storm sewer), then enter a negative number.

   - If the reference point is below the water level, then enter a positive number.

8. Click Save (or click Next to move to the next configuration page).

Water flow will be calculated starting with the next connection to HOBOlink.

Water Flow Configuration: General Flume

If you are using a flume along with the water level sensor, then HOBOlink can calculate the water flow using a general flow equation supported by a wide range of flumes that require only one water level measurement to calculate flow, including ramp, cutthroat, Parshall as well as broad-crested rectangular weirs. The equation that HOBOlink uses is: Water Flow (Q) = C * (Water Level - Head Offset)^n. Flumes that require require two or three water level measurements to calculate flow are not supported.

For this equation to be accurate, there are constraints on the flow conditions and flume design, including:

- Minimum and maximum flow rates

- Minimum and maximum head levels

- Ratio of the width of the weir/flume to the head

- Ratio of the height of the weir/flume to the head

- Location in the flume or weir for measuring the head.

The constraints depend on the type and characteristics of the flume you are using, which can be obtained from the flume manufacturer.

*Configuring a Flow Channel for a General Flume*

> **Important:** Make sure the station has started logging and you have configured the water level channel with a reference level reading before completing these steps.

To set up a water flow channel using a general flume:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Under Module 1 (or 2): Water Level Sensors Logging on the left menu, select Water Flow.

3. Click the checkbox to Enable Channel.

4. Click the checkbox to Enable Graph and type a label (optional).

5. For the Measurement Method, select General Flume.

6. For the Flume Coefficient, enter the C value listed in your flume's equation table, which can typically be found in the flume manufacturer's documentation. The Flume Coefficient may also be labeled K by some manufacturers so be sure to check how the coefficient is being used in their equation to make sure it is the right one to enter here.

7. For the Head Offset, enter the value in either meters or feet, using the same units as you entered the reference water level in the water level channel. An example of Head Offset is shown in the following diagram of a ramp flume.

   - If you are using a ramp flume as shown in the diagram below and the top of the ramp is the reference point, then enter 0.

   - If you are using a ramp flume and the bottom of the channel leading to the ramp (or crest) is the reference point, then enter the height of the ramp or crest for the Head Offset (represented as P in the diagram).
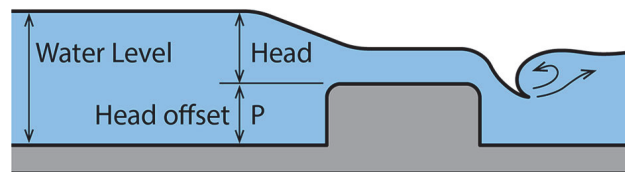
   For other types of flumes, such as this example diagram where the water level (or H) is being measured from the bottom of the flume:
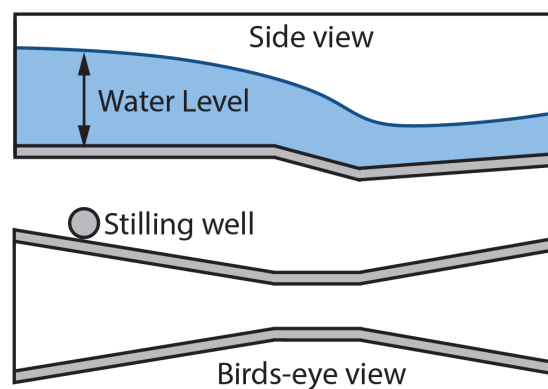
   - If the bottom of the flume is the reference point for both the water level and head, then enter 0 for the head offset.

   - If the reference point is above the water level (such as when using ground level as the reference point in a storm sewer), then enter a negative number.

   - If the reference point is below the water level, then enter a positive number.

8. For the Head Exponent, enter the n value listed in your flume's equation table, which can typically by found in the flume manufacturer's documentation.

9. Click Save (or click Next to move to the next configuration page).

Water flow will be calculated starting with the next connection to HOBOlink.

Water Flow Configuration: Stage-Discharge Table

You can set up a water flow channel that is calculated based on up to 20 stage-discharge points that you enter. Keep in mind that the units of the stage discharge table for water flow are assumed to be the same as those entered for the reference water level. If the reference water level was entered in meters, then points in the table must be entered in meters and l/s (liters per second). If the reference water level was entered in feet, then points in the table must be entered in feet and cfs (cubic feet per second).

Before you begin setting up the channel, you will need to determine the values to enter into the stage-discharge table. HOBOlink does not derive a stage discharge curve. Use another method to determine the stage-discharge curve for your site and then enter points from that curve into the HOBOlink stage-discharge table. HOBOlink linearly interpolates between the points that you enter. You can estimate and enter intermediate points as needed to match your stage-discharge curve as best as possible. HOBOlink does not extrapolate beyond the lowest and highest stage values that you enter so make sure to enter values that span the full range of potential stage levels for your site, including flood conditions. Any measured water levels that are outside of the range you enter will be shown as sensor errors (-888.88) for the water flow channel.

Guidelines for Getting a Stage-Discharge Rating Curve for your Site

- If you are working with a USGS gaging site, you can use the USGS WaterWatch Customized Rating Curve Builder to get the rating curve for that site at https://waterwatch.usgs.gov/?id=mkrc.

- If there is not an existing stage-discharge rating curve for your site, then you will need to build one. This requires measuring stage and discharge at multiple stage levels over time and then creating a stage-discharge curve. A good reference on measuring stage and discharge is at https://www.usgs.gov/special-topic/water-science-school/science/how-streamflow-measured?qt-science_center_objects=0#qt-science_center_objects. More detailed information can also be found at https://pubs.usgs.gov/tm/tm3-a8/pdf/tm3-a8.pdf.

  Once you have enough stage and discharge measurements for your site, you can use those measurements to create the stage-discharge curve for the site. There are two common ways to do this:

  - Use a commercially available rating curve software tool, such as AQUARIUS or DataWise.

  - Create your own stage-discharge curve fit for your stage-discharge measurements with a spreadsheet, such as Excel, or with a statistical program, such as R. The most common equation used for stage-discharge curves is Manning's Equation.

    o Once you have selected the type of equation to use, try different coefficients in the equation to determine which ones provide the best fit for your stage-discharge measurements.

    o Use the selected equation to determine a set of values to enter in the HOBOlink stage-discharge table. If there are any levels at which there is a significant change in the stream profile, you will need to account for those as well. For example, when a stream overflows its banks, the stage-discharge relationship will change dramatically. The curve fit equation will no longer be valid so you will need a different curve-fit equation for stage levels in this range.

Configuring a Flow Channel for a Stage-Discharge Table

Important: Make sure the station has started logging and you have configured the water level channel with a reference level reading before completing these steps.

To set up a water flow channel using a stage-discharge table:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Under Module 1 (or 2): Water Level Sensors Logging on the left menu, select Water Flow.

3. Click the checkbox to Enable Channel.

4. Click the checkbox to Enable Graph and type a label (optional).

5. For the Measurement Method, select Stage Discharge Table.

6. Enter each pair of stage-discharge points. Click Add A Row to add up to 20 pairs of points.

   - If you entered the reference water level in meters when setting up the water level channel, then the points in the table must be entered in meters and l/s.

   - If you entered the reference water level in feet when setting up the water level channel, then the points in the table must be entered in feet and cfs.

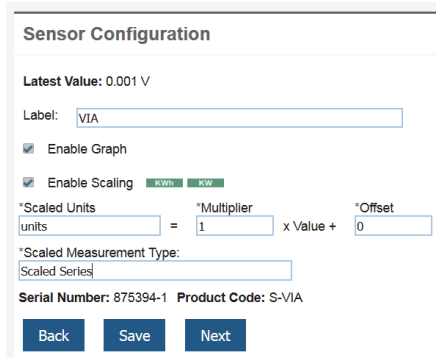7. Click Save (or click Next to move to the next configuration page).

Water flow will be calculated starting with the next connection to HOBOlink. **Note:** If you set up water flow sensor alarms, be sure the alarm limits are within the range of the stage-discharge values that you have entered.

Scaling Sensor Data

You can configure a sensor to scale logged data into a different engineering unit than its default unit. This includes linear and pulse scaling, which allows scaling for kWh, kW, or for any device data that is output in electronic pulses, as well as analog inputs from the S-CIA and S-VIA analog input adapters and scaling for the E50B2 Power & Energy Meter.

Configuring Scaling for a Smart Sensor, Wireless Sensor, or Water Level Sensor

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. From the menu on the left, select the smart sensor (all stations), wireless sensor (RX3000 stations), or one of the four water level sensors (barometric pressure, water pressure, differential pressure, and water temperature in RX2100 stations or RX3000 stations with a water level sensor module installed). **Note:** Scaling a pressure or temperature sensor will not affect water level calculation.

3. Enter a name in the Label field if you want to identify a sensor location (for example, air temp or soil temp for a temperature sensor).

4. Select the Enable Scaling checkbox.

5. In the Scaled Units field, type the unit name (up to 20 characters) for the scaled data (e.g. kWh). **Note:** If you will be using this sensor to create a calculate channel in dashboards, the sensor must be scaled to SI units for the measurement type.

6. HOBOlink converts the raw values to scaled values using the following equation: y = m * x + b

   Where:

   y = scaled units

   m = multiplier, in scaled units

   x = unscaled value

   b = offset, in scaled units

   In the multiplier field, type the numerical value (up to 10 digits) used to scale the units. In the Offset field, type the numerical value (up to 10 digits) in the scaled units if applicable.

   If you are setting up scaling for an S-CIA or S-VIA analog input adapter with a sensor attached, refer to the sensor documentation for scaling values. For WattNode sensors, see Calculating Energy in kWh and Calculating Power in kW. See also Scaling Factors for a FlexSmart TRMS Module and Sensors and Scaling Factors for the E50B2 Power & Energy Meter. If you are using a Veris Industries H8051/H8053 kWh transducer, note that these devices provide a choice of "kWh per pulse" rate selectable with dip switches located on the transducer/CT. Make sure the scaling factors entered in these fields matches your choice. If you do not have a multiplier and offset, you can calculate them using the raw output range and the corresponding measurement range as described in Calculating Multiplier and Offset for Smart Sensors.

7. In the Scaled Measurement Type field, type a name (up to 30 characters) for the scaled series (e.g. Energy Used). Do not use quotation marks (") in the series name if you plan to use .csv files with Microsoft Excel. **Note:** When setting up scaling for temperature and RH sensors, make sure the names entered in this field are "temperature" and "RH" if you also want to view

measurements for the dew point calculated channel. If you enter other names in these fields, the dew point channel will not be available. Use the Label field described in step 3 for custom sensor names instead of the Scaled Measurement Type field.

8. Click Save. In the Conditions panel on your device page, the measurement type for that sensor will be changed to the name you entered in the Scaled Measurement Type field followed by the name you entered for the scaled units. Enabled graphs will display the scaled series name, units, and data the next time the device connects to HOBOlink.

> **Important note for U30 stations:** Scaled sensor data will only appear in text files and not in the raw .dtf files. Make sure you select the "Save data as text file" checkbox in Readout Configuration for any device with a scaled sensor.

To remove scaling from a sensor, deselect the Enable Scaling checkbox for that sensor on the Sensor Configuration page.

Calculating Multiplier and Offset for Smart Sensors, Wireless Sensors, and Water Level Sensors

Both a multiplier and offset (also referred to as slope and intercept) are needed to scale the data for a sensor. If the sensor documentation does not have this information, you can calculate them using the sensor's specifications for raw output range (raw values) and the corresponding measurement range (scaled values). You will need two raw values and their corresponding scaled values:

raw1 -> scaled1

raw2 -> scaled2

To calculate the multiplier (m), use the following equation:

m = (scaled2-scaled1)/(raw2-raw1)

If both raw1 and scaled1 are zero, calculate the multiplier using the following equation: m = scaled2/raw2. In this case you do not need to enter an offset in the scaling configuration pane.

Once you have determined the multiplier, calculate the offset (b) using the following equation:

b = scaled1 - (m * raw1)

For example, you have a water level sensor that measures 0–10 feet, output as 4-20mA to your device. In this case:

> raw1 = 4 mA
>
> raw2 = 20 mA
>
> scaled1 = 0 feet
>
> scaled2 = 10 feet

Therefore, the multiplier equation for this sensor is:

> m = (10-0)/(20-4)
>
> m = 0.625

and the offset equation is:

> b = 0 - 0.625 * 4
>
> b = -2.5

Some manufacturers provide their offsets in raw units so you must convert that value to scaled units (multiply by multiplier) using the following formula:

b (offset in scaled units) = m (slope) * offset in raw units.

Smart Sensor Scaling Example 1: Counts to Liters

In this example, counts are converted to liters to measure water usage during peak hours. Given a ratio of 1 count (raw1 value) equal to 5 liters (scaled1 value), the multiplier is 5 (5/1 = 5). The scaled units are liters, the scaled measurement type is Water Usage, and there is no offset. In addition, the sensor label should be "peak hours." With this information entered, the sensor on the Sensor Configuration page looks like this:

And then appears like this in the device overview page:

Smart Sensor Scaling Example 2: Current to Inches of Water Column

In this example, current in mA is converted to inches in water column (in WC) to measure air duct pressure. Assuming the following values: raw1 = 4 mA, raw2 = 20 mA, scaled1 = 0 in WC, and scaled2 = 10 in WC. Therefore the multiplier calculation is: (10.0 - 0.0)/(20 - 4) = 0.625. The offset calculation is: 0 -(0.625*4) = -2.5. The scaled units are in WC, the scaled measurement type is Pressure, and the optional label is "air duct bldg 3." With this information entered, the sensor on the Sensor Configuration page looks like this:

And then appears like this in the device overview page:

Configuring Scaling for an Analog Sensor (RX3000 Stations)

1. Click Devices and then RX Devices, and find the RX3000 station you want to configure. Click the arrow next to the 🔧 icon and select Module/Sensor Configuration.

2. Click an analog sensor channel from the left menu.

3. Make sure "Enable this channel" is selected.

4. Select the sensor or input that you will be using for this channel in the Sensor/Input Type drop-down list. This is needed to set the voltage or current range for the analog input.

5. Select Enable Scaling and then enter the scaled unit name and values as defined in the sensor manual. The raw unit name and values will be pre-filled based on the sensor/input type selected. Type the name for the scaled measurement in the Scaled Measurement Type. **Note:** If you will be using this sensor to create a calculate channel in dashboards, the sensor must be scaled to SI units for the measurement type.

6. Click Save. In the Conditions panel on your device page, the measurement type for that sensor will be changed to the name you entered in the Scaled Measurement Type field followed by the name you entered for the scaled units. Enabled graphs will display the scaled series name, units, and data the next time the device connects to HOBOlink.

Notes:

*   If you configure an alarm for a sensor with scaling, make sure you enter the values on the Alarm Configuration page in the scaled units. If you configure scaling and have existing alarms, you must modify the alarms to use the scaled units.

*   If you unplug a scaled sensor and then plug it back in, the scaling configuration will be deleted. Reconfigure the scaling after reconnecting the sensor.

Calculating Energy in kWh

To calculate energy in kilowatt-hours, you need the kilowatt-hours per pulse. When configuring scaling for smart sensors, type the value for kilowatt-hours per pulse in the Multiplier field and enter 0 in the Offset field. Type kWh for the Scaled Units and Energy for the Scaled Measurement Type.

To find the value for kilowatt-hours per pulse for a WattNode sensor, refer to WattNode Scaling Factors for Energy below. (These values are for the Standard Bidirectional Output model WattNode sensors only. Scaling factors for other WattNode models can be found in the WattNode manufacturer's manual included with each WattNode sensor.) To find the value for other manufacturers, refer to the documentation that came with the sensor. The E50B2 Power & Energy Meter uses different scaling factors; see Scaling Factors for the E50B2 Power & Energy Meter in this chapter for details.

WattNode Sensor Scaling Factors for Energy

Kilowatt-hours per pulse

CT Size (amps)	Model #: 3Y-208/3D-240	Model #: 3Y-400/3D-400	Model #: 3Y-480/3D-480	Model #: 3Y-600
5	0.000125	0.0002396	0.0002885	0.0003615
15	0.000375	0.0007188	0.0008656	0.0010844
20	0.0005	0.0009583	0.0011541	0.0014458
30	0.00075	0.0014375	0.0017313	0.0021688
50	0.00125	0.0023958	0.0028854	0.0036146
60	0.0015	0.002875	0.0034625	0.0043375
70	0.00175	0.0033542	0.0040396	0.0050604
100	0.0025	0.0047917	0.0057708	0.0072292
150	0.00375	0.0071875	0.0086563	0.010844
200	0.005	0.0095833	0.011542	0.014458
250	0.00625	0.011979	0.014427	0.018073
300	0.0075	0.014375	0.017313	0.021688
400	0.01	0.019167	0.023083	0.028917
600	0.015	0.02875	0.034625	0.043375
800	0.02	0.038333	0.046167	0.057833
1000	0.025	0.047917	0.057708	0.072292
1200	0.03	0.0575	0.06925	0.08675
1500	0.0375	0.071875	0.086563	0.10844
2000	0.05	0.095833	0.11542	0.14458
3000	0.075	0.14375	0.17313	0.21688

Calculating Power in kW

Power in kilowatts is calculated by multiplying the pulse count by the multiplier. To calculate the multiplier, use the following equation:

(3600 ÷ Logging Interval in seconds) ÷ pulses per kWh = multiplier

When configuring scaling for smart sensors, type the result of that equation in the Multiplier field and enter 0 in the Offset field. Type kWh for the Scaled Units and Power for the Scaled Measurement Type.

To determine the value for the pulses per kWh, refer to the WattNode Scaling Factors for Power below. For other manufacturers, refer to the documentation that came with the sensor. The E50B2 Power & Energy Meter uses different scaling factors; see Scaling Factors for the E50B2 Power & Energy Meter later in this chapter for details.

Note: If you change the logging interval for a device with a sensor scaled for kWh, you will need to recalculate the scale factor.

WattNode Sensor Scaling Factors for Power

Pulses per kilowatt hour

CT Size (amps)	Model #: 3Y-208/3D-240	Model #: 3Y-400/3D-400	Model #: 3Y-480/3D-480	Model #: 3Y-600
5	8000.00	4173.91	3465.70	2766.57
15	2666.67	1391.3	1155.24	922.19
20	2000.00	1043.48	866.450	691.643
30	1333.33	695.652	577.617	461.095
50	800.000	417.391	346.570	276.657
60	666.667	347.826	288.809	230.548
70	571.429	298.137	247.550	197.612
100	400.000	208.696	173.285	138.329
150	266.667	139.13	115.523	92.219
200	200.000	104.348	86.643	69.164
250	160.000	83.478	69.314	55.331
300	133.333	69.565	57.762	46.11
400	100.000	52.174	43.321	34.582
600	66.667	34.783	28.881	23.055
800	50.000	26.087	21.661	17.291
1000	40.000	20.87	17.329	13.833
1200	33.333	17.391	14.440	11.527
1500	26.667	13.913	11.552	9.2219
2000	20.000	10.435	8.6643	6.9164
3000	13.333	6.9565	5.7762	4.611

Calculating Power Examples

Example 1: WattNode Transducer Model WNB-3Y-208-P with 50 Amp CT

The logging interval is set to 1 minute, or 60 seconds and the pulses per kWh for this transducer is 800 (see table above). Therefore the multiplier equation is (3600 ÷ 60) ÷ 800 = 0.075. The offset is 0, the scaled units name is KW, and the scaled measurement type is power. With this information entered, the sensor on the Sensor Configuration page looks like this:

Example 2: WattNode Transducer Model WNB-3D-240-P with 100 Amp CT

The logging interval is set to 15 minutes, or 900 seconds and the pulses per kWh for this transducer is 400 (see table above). Therefore the multiplier equation is (3600 ÷ 900) ÷ 400 = 0.01. The offset is 0, the scaled units name is KW, and the scaled measurement type is power. With this information entered, the sensor on the Sensor Configuration page looks like this:

Scaling Factors for FlexSmart TRMS Module and Sensors

When configuring scaling for a FlexSmart TRMS (S-FS-TRMSA-D) module and associated sensors, use the following table to fill in the appropriate fields. For your sensor model part number, enter the Scaled Units, Multiplier, Offset, and Scaled Measurement Type listed below in each of the fields. See Scaling Sensor Data for additional information on scaling.

Sensor Model	Scaled Units	Multiplier	Offset	Scaled Measurement Type
T-ACT-0750-020	Amp	0.0600006	0	Current
T-ACT-0750-050	Amp	0.1500015	0	Current
T-ACT-0750-100	Amp	0.300003	0	Current
T-ACT-0750-250	Amp	0.7500075	0	Current
T-MAG-0400-005	Amp	0.01501502	0	Current
T-MAG-0400-010	Amp	0.03003003	0	Current
T-MAG-0400-020	Amp	0.06006006	0	Current

Sensor Model	Scaled Units	Multiplier	Offset	Scaled Measurement Type
T-MAG-0400-050	Amp	0.15015015	0	Current
T-MAG-0400-075	Amp	0.22522523	0	Current
T-MAG-SCT-005	Amp	0.01501502	0	Current
T-MAG-SCT-020	Amp	0.06006006	0	Current
T-MAG-SCT-050	Amp	0.15015015	0	Current
T-MAG-SCT-100	Amp	0.3003003	0	Current
T-MAG-SCT-200	Amp	0.6006006	0	Current
T-MAG-SCT-600	Amp	1.8018018	0	Current
T-MAG-SPT-150	VAC	0.34534535	0	Voltage
T-MAG-SPT-300	VAC	0.69069069	0	Voltage
T-MAG-SPT-600	VAC	1.38138138	0	Voltage

Scaling Factors for the E50B2 Power & Energy Meter

If you are using the E50B2 Power & Energy Meter (T-VER-E50B2), you can apply scaling to the Counts channel. The following table lists the names and values you should enter in the Scaling fields. The default settings for the three native E50B2 data outputs are listed as well as all supported scaling values. These scaling factors must match the configuration entered into the device or inaccuracies will result. Documentation on the E50B2 is available at http://www.onsetcomp.com/products/sensors/t-ver-e50b2.

For Scaled Units, Enter this:	Choose a Multiplier to Enter:	For Scaled Measurement Type, Enter this:
VARh	1 VARh per pulse (Default) 10 VARh per pulse 100 VARh per pulse 1,000 VARh per pulse 10,000 VARh per pulse	Reactive Energy
Wh	1 Wh per pulse (Default) 10 Wh per pulse 100 Wh per pulse 1,000 Wh per pulse 10,000 per pulse	Real Energy
Ah	0.001 Ah per pulse 0.01 Ah per pulse (Default) 0.1 Ah per pulse 1 Ah per pulse 10 Ah per pulse	Amp Hours

In addition to the three native data outputs (VARh, Wh, and Ah), you can also calculate other types of data outputs. To do this, download the .csv file and follow the instructions in the Microsoft Excel file located here: http://www.onsetcomp.com/files/manual_pdfs/Derived-Channels.zip.

That file uses the following calculations for each additional type of data output:

Data Output	Unit	Calculation
Reactive Power	VAR	VARh/h
Volt-Amps	VA	SQRT (Wh^2 + VARh^2/h)
Volts	V	SQRT (Wh^2 + VARh^2)
Power Factor	PF	Wh/SQRT (Wh^2 + VARh^2)
True Power	W	Wh/h
True Power	KW	W/1000
Kilowatt Hours	KWh	Wh/1000
Amp	A	Ah/h

(where 'h' is hours = Logging Interval/3600)

Relay Configuration (RX3000 and U30 Stations)

Configuring the Relay Module in an RX3000 Station

The RX3000 station can include an optional relay module with three individual relays for connecting devices. To configure the relay module in an RX3000 station:

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the ⚙ icon and select Relay Configuration. Or, click the station name to open its detailed page, click the arrow next to the Configure button, and select Relay Configuration.

2. Click a relay on the left menu to configure it.

3. Type a label and select Open or Closed for the Normal Relay State. The label can be used to show what Open or Closed corresponds to in your system (for example, "closed relay turns pump on").

4. Select what should happen on the station's next connection to HOBOlink: open relay, close relay, or leave relay in its current state.

5. Click Save (or click Next to move to the next configuration page).

6. Repeat steps 2 through 5 for any additional relays you want to configure.

See Sensor Alarms for details on configuring a relay to open, close, or pulse for one second when a sensor alarm trips.

Refer to the RX3000 station manual for information on connecting devices to the relay module.
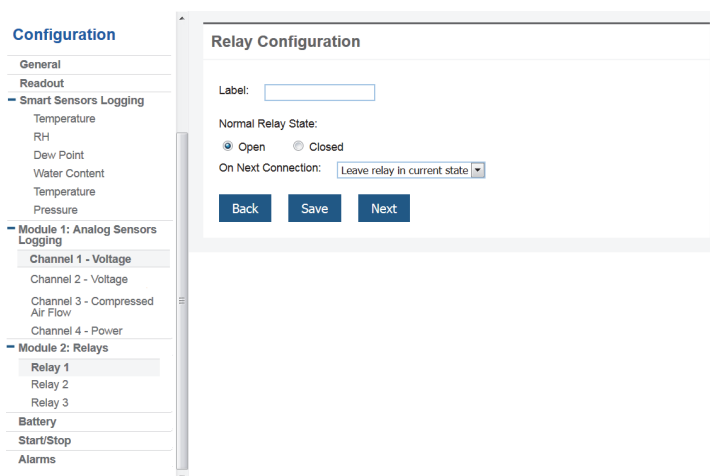
Configuring the U30 Station Relay Contact

The relay contact on a U30 station can be opened, closed, or pulsed to control the operation of an external device, such as an irrigation system or fountain, when an alarm is tripped. Setting up the relay is a two-step process. First, use HOBOware to set the default deactivated state of the relay to open or closed (the factory default is normally open). Then, set the alarm action for the appropriate sensor to activate, deactivate, or pulse the relay in HOBOlink.

To configure the relay in a U30 station:

1. With the device connected to the computer, open HOBOware and select Manage U30 > Control U30 Relay > Set default (deactivated) state.

2. Select Open if you want the relay to open when there is a sensor alarm (such as an irrigation system that shuts off when it is raining or a fountain that shuts off when it is too windy).

   Select Close if you want the relay to close when there is a sensor alarm (such as an irrigation system that turns on when the temperature drops below a specific reading to avoid frost damage to an orchard or cranberry bog).

   Select Pulse if you will be setting up a pulse relay in which the relay will close briefly to activate a piece of equipment and then reopen (such as if you want to trigger a water sample when the water level reaches a certain amount).

3. If you are setting up a pulse relay in which the relay will close, select Device > Manage U30 > Configure U30 Alarms in HOBOware. In the Sensor Alarms window, set the pulse width (the default is 1 second) and click Set.

4. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the ⚒ icon and select Alarm Configuration.

5. Click an existing sensor alarm or click Add a Sensor Alarm to create a new one. Set or edit the fields under Sensor Condition (see Working with Sensor Alarms in this chapter for more details).

6. Under Actions, select Activate Relay (Close) or Pulse Relay as needed if the default state was set to Open in HOBOware. Select Deactivate Relay (Open) if the default state was set to Closed in HOBOware.
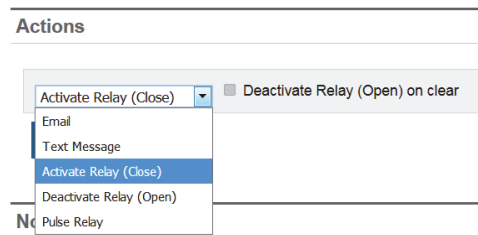
7. If you selected Activate Relay (Close), you also have the option to deactivate the relay (reopen it) when the alarm clears. Select the Deactivate Relay (Open) on clear checkbox if desired. Another option would be to create a second alarm with a Deactivate Relay (Open) action and the conditions set to the values you wish to use to clear the relay (or stop the equipment).

8. Add or edit any additional actions for this alarm, such as sending an email or text message.

9. Click Save. Connect the equipment to the device and run a test to make sure the relay operates as expected. You can view the device relay state as of the last time the device connected to HOBOlink on the device overview page.
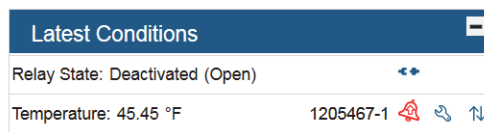
Refer to the U30 user guide for information on connecting equipment and examples of starting and stopping equipment.

Start/Stop (RX3000 and RX2100 Stations)

For RX3000 stations, you can start or stop logging as needed from within HOBOlink or by pressing the Start/Stop button on the device.

To start or stop logging with HOBOlink:

1. Click Devices then RX Devices and find the station you want to start or stop. Click the arrow next to the ⚒ icon and select Start/Stop.

2. Click Start if you want the device to start logging data or click Stop if you want the device to stop logging data.

The device will start or stop logging the next time it connects to HOBOlink.

Alarm Configuration

There are two types of alarms that can be configured in HOBOlink:

- System alarms, where an alarm trips if the device misses a connection, the battery is low, or there is a sensor error. For U30 stations, there is also an alarm for low memory.

- Sensor alarms, where an alarm trips if the sensor or calculated channel reading falls above or below a specific value or outside of a specified range.

Note: Alarms can have a significant impact on the communications data usage for cellular devices. The amount of allocated data available for your communications plan should be considered when configuring alarms.

To set up an alarm, click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the ⚒ icon and select Alarm Configuration. On the Alarms page, you can then create, edit, or delete system and sensor alarms and view a list of the latest tripped alarms in the alarm logs.
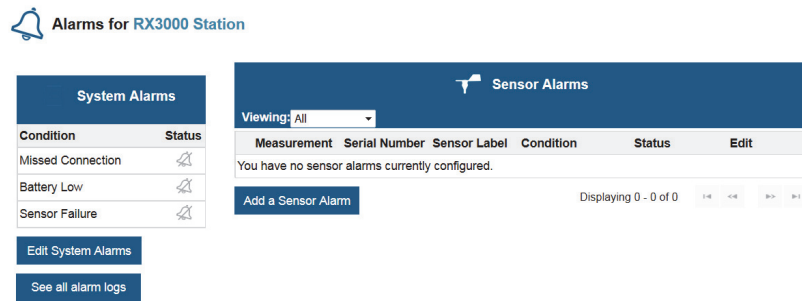
System Alarms

You can receive email or text notifications when a station has a missed connection, low battery, low memory (U30 stations only) or a sensor failure.

Types of System Alarms

The following system alarms can be configured for the device:

- **Missed Connection.** The device has missed its regularly scheduled connection to HOBOlink by a specified amount of time.

- **Battery Low.** The station battery has dropped below the recommended operating voltage or the wireless sensor battery has dropped below 35% and needs to be recharged. Note that the station will stop communications after the battery drops to a low voltage.

- **Memory Low (U30 stations only).** There is less than 12.5% memory remaining for the device (only available if the "Wrap when memory fills option" is disabled in General Configuration).

- **Sensor Failure.** A sensor error is detected or a wireless sensor has been offline for 30 minutes. Enable this alarm if you've set up a sensor alarm.

How to Set Up a System Alarm with Email or Text Notifications

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the icon and select Alarm Configuration.

2. On the Alarms page, click Edit System Alarms under the System Alarms panel.
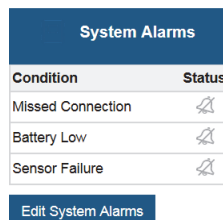
3. Under Communication, select the Missed Connection checkbox if you wish to set up a Missed Connection alarm. Select how long (in minutes, hours, or days) HOBOlink should wait to trip the alarm after a missed connection. The current connection schedule is displayed for your reference, with the regular interval listed first followed by the night mode interval. In the following example, the device is connecting every 4 hours and then every 8 hours during night mode and 10 minutes has been selected for the amount of time to wait before the alarm will trip after a missed connection.
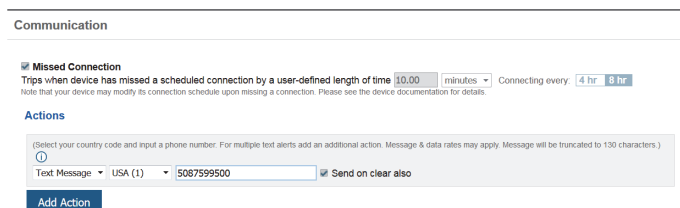
4. Select the notification action to be taken when the Missed Connection alarm trips to send an email or a text message (the default is to send an email to the address associated with the HOBOlink account).

- **For email notifications:** Select Email from the drop-down list and enter an address in the field. Select the "Send on clear also" checkbox if you want an email to be sent when the alarm condition clears.

- **For text notifications:** Select Text Message from the drop-down list. Select one of the default country prefixes and type the cell phone number without hyphens to receive text messages as shown in the previous example. If your country is not listed, then contact Onset Technical Support at www.onsetcomp.com/support/contact. Select the "Send on clear also" checkbox if you want a text message to be sent when the alarm condition clears.

> **Important:** Standard data fees and text messaging rates may apply when using text notifications for system alarms. Onset does not charge a fee or guarantee delivery of text alerts, which is subject to your carrier's service and location. See How to Edit or Delete an Alarm Notification Action later in this section for details. If you text STOP in response to a text message from HOBOlink, Onset will disable all texts to that phone number. Because this means you will no longer receive any alarm notifications at that phone number, make sure you change the alarm notification settings to use an alternate phone number or email address to continue receiving notifications. If you text STOP and later wish to resume texts to that phone number, contact Onset Technical Support at www.onsetcomp.com/support/contact. Note that if you text STOP twice in a 30-day period, you must wait 30 days before Onset Technical Support can re-enable your phone number.

- **To add an additional email or text notification:** Click the Add Action button and repeat this step.

5. Under Device, select the checkboxes for the device alarms that you wish to set up: Battery Low, Memory Low (U30 stations only), and Sensor Failure. Repeat step 4 to add an email or text notification

> **Important:** A separate action must be set up for the device alarms even if you created an action under Communication for the Missed Connection alarm, and even if the action you want to take is the same for all the alarms under Communication and Device.

6. Click Save when you are finished configuring the alarms. Click Back to Alarms if you do not want to save your changes. Check the System Alarms panel to see the status of the alarms you have configured (hover over an alarm icon to see if it is active, pending, tripped, or inactive).

How to Disable System Alarms

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the ⚒ icon and select Alarm Configuration.

2. On the Alarms page, click Edit System Alarms under the System Alarms panel.

3. Click the checkbox next to the system alarms you want to disable to remove the checkmark and click Save. The alarm icon for any disabled alarms will be gray (hover over the icon to see that it has an inactive status). Any notifications associated with the disabled alarms will be saved and still in place if you re-enable the alarm in the future.

How to Edit or Delete an Alarm Notification Action

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the ⚒ icon and select Alarm Configuration.

2. On the Alarms page, click Edit System Alarms under the System Alarms panel.

3. To edit an alarm notification action, make changes to the applicable email or text fields and click Save.

4. To delete an email or text alarm notification action, click the 🗑 icon next to the one that you want to delete and click Save. Note that an enabled alarm requires at least one notification action. If you are deleting a text alarm notification because you no longer want to receive text alerts and do not already have an email notification action set up, change the settings in the text message action to email instead.

Notes about System Alarms

- When a Missed Connection alarm is enabled, HOBOlink checks every 5 minutes to see if the device has surpassed the specified late time. If it has, the alarm is tripped and the notification action (email, text, or both) is initiated. The Missed Connection alarm will clear after the device successfully connects. You will then receive notification of the cleared alarm if the "Send on clear also" setting is enabled if the device was able to reconnect on its own. The Missed Connection alarm will also clear if the device is relaunched or if you edit the alarm settings, but a notification will not be sent in those situations because the device did not resolve the missed connection on its own.

- **For RX3000 and RX2100 stations:** A tripped Battery Low and Sensor Failure alarm will clear automatically when the station stops logging. Otherwise, the Battery Low alarm will trip and clear depending upon the battery level.

  - When a Sensor Failure alarm trips for a smart sensor, you can either click the Clear checkbox on the Alarms page or press the stop button on the station. If you click Clear, the station automatically stops logging and then HOBOlink checks for all connected smart sensors and starts logging again. If you press the stop button on the station instead of clicking Clear, inspect all smart sensors. Use the Select button to switch to the smart sensors screen on the LCD and then press the Search button (under the magnifying glass icon) so that the station can locate all connected sensors. Press the Start button to start logging again when ready.

  - When a Sensor Failure alarm trips for a wireless sensor that has been offline for 30 minutes, the alarm will clear automatically when the mote is back online. If the mote does not come back online, inspect the mote to make sure it is not damaged. Check the mote deployment location for any potential obstructions that could be interfering with the signal strength and reposition the mote as necessary. If the mote still does not return online, try bringing it closer to the station to increase the signal strength and make sure it is still operational. Consider then leaving the mote in the location with the increased signal strength or using a repeater to extend the transmission range if you need to keep the mote in its original location.

  - When a Sensor Failure alarm trips because a there is an error with a wireless sensor and the mote is still online, there will also be a warning icon on the mote LCD. Check the sensor portion of the mote reporting the error and make any adjustments as necessary following the sensor deployment guidelines in each product manual available at www.onsetcomp.com/support/manuals. (Note that wireless sensor errors are not available for RXW Davis Wind Speed and Direction or RXW Davis Rain Gauge Sensors.) Inspect the cable and the sensor probe for cracks or damage. You may need to replace the mote if there is damage and erroneous information is logged. Contact Onset Technical Support for help if the sensor failure persists.

- For details on tripped sensor alarms, see Viewing Tripped Alarms in the next chapter.

- **For U30 stations:** When any one of the three device alarms (Battery Low, Memory Low or Sensor Failure) trips, the other configured device alarms are automatically disabled. (The Missed Connection alarm, which is a communication alarm, will remain enabled if configured.) After you resolve the problem with the device, click Edit System Alarms to re-enable the device alarms and click Save, which will automatically clear the alarm. If you select the Clear checkbox on a tripped alarm, it will not re-enable the alarm. The alarm will remain disabled until you select that alarm in the Edit System Alarms page and click Save.

> **Important note for U30 stations:** If you re-enable the Memory Low or Sensor Failure alarms, the device automatically relaunches.

Sensor Alarms

You can set an alarm to trip and receive an email or text notification when a sensor or calculated channel reading is above or below a level you select or outside a normal operating range that you set for a specific number of readings. You can also configure a relay to open or close when a sensor alarm trips (not available for a calculated channel). Sensor alarms (except calculated channels) are checked by the station at the logging interval, and if an alarm condition is detected, the station connects to HOBOlink so that notifications are sent as soon as possible. For calculated channels, the alarms are checked at the station's connection interval.

How to Set Up a Sensor Alarm with Email or Text Notification

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the 🔧 icon and select Alarm Configuration. Or, click the station name to open its detailed page, click the arrow next to the Configure button, and select Alarm Configuration.

2. On the Alarms page, click Add a Sensor Alarm under the Sensor Alarms panel.
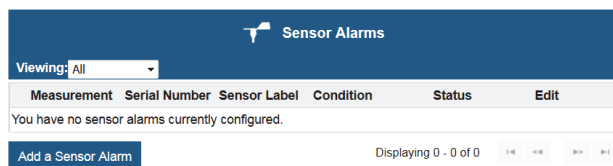
3. Set up the Sensor Condition for the alarm:

   a. Select a sensor or calculated channel from the drop-down list.

b. **For rain gauge sensors on RX2100 and RX3000 stations:** The rain gauge sensor alarm on RX2100 and RX3000 stations is based on accumulated rainfall in inches or mm (depending on the units set under User Settings) over a period of minutes or hours (up to 24). The station uses a moving accumulation window that includes all rainfall during the selected time period through the most recently logged value. Enter the number of minutes or hours you want the rainfall to be accumulated over, and the amount of rain in inches or mm you want to trigger the alarm. Skip to step 4.

Notes:

- The accumulation counter resets to zero after each accumulated rainfall alarm. Another rainfall alarm is generated each time the alarm threshold is reached again.

- The accumulated rainfall alarm clears after a period equal to the accumulation period. For example, if you set the alarm to trip for 2 inches of rainfall accumulated in 4 hours, then it will be 4 hours before an alarm clear message is sent after the alarm is triggered--unless enough rain has continued to accumulate that causes the alarm to trip again.

- Only one accumulated rainfall alarm can be set per station.

- For RX3000 stations with older firmware, the accumulated rainfall alarm is not available. Follow step c for setting up a sensor alarm instead or set up an accumulated rain calculated channel on your dashboard (see Working with Calculated Channels in Dashboards in Chapter 3).

c. **For all other sensors, channels, and stations:** Select the threshold for the alarm to trip: above, below, or outside range. If you select above or below, the alarm will trip if the sensor reading rises or falls below the value entered respectively. If you select outside range, the alarm will trip if the sensor or calculated channel reading falls outside the range you select.

d. Type the value for the threshold, or two values for a range. If scaling was configured for this sensor, make sure the value entered is for the scaled units. Note that the actual values for the alarm limits are set to the closet values supported by the sensor. **Note:** If you are setting up a sensor alarm for a water flow channel that is using a stage-discharge table, be sure the alarm limits are within the range of the stage-discharge values you are using.

e. Type the number of sensor or calculated channel readings you want to be logged before the alarm trips. The current logging interval is listed for your reference.

f. **For RX2100 and RX3000 stations:** If you had selected above or below for the alarm threshold, then you can also select when the alarm should clear. Select above or below the same value or above or below a different value and then enter the value in the field that appears.

In the example below, a temperature sensor alarm was configured to trip when the temperature falls below 32°F for 4 consecutive data points. Because the logging interval is set to 5 minutes, this means an alarm will trip if the temperature falls below 32°F for 20 minutes.

4. Select the notification action to be taken when the alarm trips: send an email or a text message, or activate, deactivate, or pulse the relay. The default is to send an email to the address associated with the HOBOlink account.

- **For email notifications:** Select Email from the drop-down list and enter an address in the field. Select the "Send on clear also" checkbox if you want an email to also be sent when the alarm condition clears.

- **For text notifications:** Select Text Message from the drop-down list. Select one of the default country prefixes and type the cell phone number without hyphens to receive text messages as shown in the next example. If your country is not listed, then contact Onset Technical Support at www.onsetcomp.com/support/contact. Select the "Send on clear also" checkbox if you want a text message to be sent when the alarm condition clears.

> **Important:** Standard data fees and text messaging rates may apply when using text notifications for system alarms. Onset does not charge a fee or guarantee delivery of text alerts, which is subject to your carrier's service and location. See How to Edit or Delete a Sensor Alarm and Notification Action later in this section for details. If you text STOP in response to a text message from HOBOlink, Onset will disable all texts to that phone number. Because this means you will no longer receive any alarm notifications at that phone number, make sure you change the alarm notification settings to use an alternate phone number or email address to continue receiving notifications. If you text STOP and later wish to resume texts to that phone number, contact Onset Technical Support at www.onsetcomp.com/support/contact. Note that if you text STOP twice in a 30-day period, you must wait 30 days before Onset Technical Support can re-enable your phone number.

Actions

(Select your country code and input a phone number. For multiple text alerts add an additional action. Message & data rates may apply. Message will be truncated to 130 characters.) ⓘ

[Text Message ▼] [USA (1) ▼] [5087599500] ☑ Send on clear also

[Add Action]

- **For relay switches with RX3000 stations:** Select Open or Close for one of the three relays or select Pulse for one of the three relays from the drop-down list. For details on the relay module, see Relay Configuration in this chapter.

- **For relay switches with U30 stations:** Select Activate Relay (Close), Deactivate Relay (Open), or Pulse Relay from the drop-down list. The default relay setting for the device is normally open, which can only be changed in HOBOware. For details on the relay, see Relay Configuration later in this chapter.

5. Click the Add Action button if you wish to set up more than one notification action when the alarm trips (for example, you want to send an email and activate the relay). Fill out the appropriate fields as needed.

   There can only be one type of relay action per alarm (you can, however, set up a second alarm on the same sensor with a different relay action).

6. Type any notes about the alarm that you want to be included in the email when the alarm trips (if an email action has been configured). This helps to differentiate between multiple sensor alarms.

Notes

(Ex. "Grove East Too Cold" or "Damp Basement")

7. Click Save. The alarm is added to the list of Sensor Alarms as shown in the following example. Click the + to the left of the sensor name to see any notes related to the alarm. Alarms for sensors will be in a pending state until the next time the device connects. At that time, it will then remain active until it trips or is deleted or modified. Alarms for calculated channels will take effect immediately.

📡 Sensor Alarms						
Viewing: All ▼						
Measurement	**Serial Number**	**Sensor Label**	**Condition**	**Status**	**Edit**	
+ Temperature	1161585-1		below 32.00 °F	🔔	🛠	🗑
[Add a Sensor Alarm]			Displaying 1 - 1 of 1	◄◄ ◄ **1** ►► ►►		

To add another alarm to the same sensor or a different one, click Add a Sensor Alarm and follow steps 3 through 7. **Note:** There is a limit of eight alarms allowed for all water level sensor channels (this includes barometric pressure, water pressure, differential pressure, water temperature, water level, and water flow).

You can also change the view of the Sensor Alarms panel to show all alarms or to only show the alarms that have tripped, have changes pending, or are inactive because the sensor is currently unavailable on the device. Click the drop-down arrow next to Viewing in the Sensor Alarms panel and choose the desired view.

Sensor Alarms Checked by the Station

If an alarm trips on a smart, wireless, analog sensor, or water level sensor, the station will automatically connect to HOBOlink to report the tripped alarm. Alarms for calculated channels, however, are checked at the connection interval for the station. For example, if the connection interval for the station is set to 4 hours, then any alarms that you set up for calculated channels will only be checked every 4 hours. This is because calculated channels are generated from the data uploaded at each connection interval. Note that for water level and flow alarms, HOBOlink calculates the corresponding differential pressure value so that this can trigger an alarm by the station the same as other sensors, and trigger an immediate connection if there is an alarm condition.

For accumulated rain alarms on RX2100 and RX3000 stations, an alarm is triggered by the station as soon as the alarm conditions are met.

Tip: Consider setting up a test alarm for a smart, wireless, analog, or water level sensor using a value that will trip immediately to ensure you receive an email or text as expected.

For details on tripped sensor alarms, see Viewing Tripped Alarms in the next chapter.

How to Edit or Delete a Sensor Alarm and Notification Action

1. Click Devices and then RX Devices, and find the station you want to configure. Click the arrow next to the ⚒ icon and select Alarm Configuration.

2. Click the ⚒ icon for the alarm you want to edit.

3. Make any changes to the applicable fields. If you want to delete an email, text, or relay action, click the 🗑 icon for the action that you want to delete and click Save. Note that an enabled alarm requires at least one action. If you are deleting a text alarm notification because you no longer want to receive text alerts and do not already have an email notification action set up, change the settings in the text message action to email instead.

To delete an alarm, click the 🗑 icon for the alarm you want to delete.

Battery Configuration

1. Click Devices then RX Devices and find the station you want to configure. Click the arrow next to the ⚒ icon and select any option (RX3000 and RX2100 stations) or Sensor Configuration (U30 stations).

2. Select Battery from the left Configuration menu. Battery is listed below modules for RX3000 stations and with smart sensors for U30 stations.

3. Type an optional label.

4. Select Enable Graph to show a graph for the battery voltage for the station on the device page.

5. Deselect Enable Scaling (scaling is not needed for a battery).

6. Click Save (or click Next to move to the next configuration page).

Chapter 3
Monitoring Devices

There are several ways to monitor your devices:

- Click Devices and select RX Devices to view a list of stations or select MX Devices to view lists of MX Gateways and MX series logger deployments.

- Click Map to view stations and motes by location.

- View device details, including latest conditions, graphs, logs, and more.

- Set up private or public dashboards to show data in a variety of graphs and widgets.

- Add a calculated channel to monitor specific conditions, such as accumulated rainfall and reference evapotranspiration.

- Share a device page so that others can monitor your station.

- Create a summary page for a U30 Station with customized monitoring.

- Check for tripped alarms.

Remote Monitoring Devices List (RX3000, RX2100, and U30 Stations)

Click Devices and select RX Devices to view a list of all stations registered to your HOBOlink account.

- Devices are sorted by their nickname in ascending alphabetical order. Click a column heading to change the sort order.

- Use the Nickname and Serial # fields at the top of the columns to refine the list of devices shown. Type part or all of a device name in the Nickname field or part or all of the device serial number in the Serial # field. The Device page will then be updated to only show those devices that match the characters you entered. For example, "RX3000" was entered in the Nickname field and only those devices that have "RX3000" as part of the nickname are displayed in the list.

- To register a new station, click the "Register a Device" link. Type a nickname for the station. Enter the serial number and device key found on the sticker inside the device and click Register.

- To remove a station, click this icon and follow the instructions. See Removing a Device for more details.

- **For U30 stations:** Click the Summary button to go to a different login page where you can access a tool for creating a customized summary page of your device. Refer to Using the U30 Summary Page for more information.

These are the columns in the list:

Column Name	Description
Nickname	The name given to the station, which can be changed in General Configuration. Click this name to view the device page.
Serial #	The device serial number.
Last Connection	The date and time the station last connected to HOBOlink. If the station has never connected to HOBOlink, the status will be listed as "awaiting its first call."
Communications	The current status of the station communications: • ✓ indicates the station is operating normally. • ⓘ indicates there is a message regarding the station. Hover over the icon to view the message, which could include that the station has not yet called in, the station has stopped logging, or the station is approaching either the limit or expiration date of its communications plan. • ❗ indicates there is a warning regarding the station. Hover over the icon to view the warning, which could include that the station has missed its last expected connection by 10 or more minutes, there is an error with the station as indicated by the status in the Device Information panel, the station has exceeded the limit of its communications plan, or the plan has expired.
Relay	Two icons indicate whether the relay content on the station is open ◄► or closed ◄►. For RX3000 stations, click the information icon ⓘ to see the status of the relays, if the station has a relay module.
Alarms	Four icons indicate the station's current alarm status: • 🔔 indicates an alarm is configured and active, but is not currently tripped. • 🔔 indicates a change to an alarm setting is pending and will take effect the next time the device connects to HOBOlink. • 🔔 indicates an alarm has tripped. Click the icon to view the tripped alarm on the Alarms page. • 🔕 indicates that either no alarms have been set up or previously configured alarms are not currently active.
Configuration	Click the arrow next to this icon 🔧 and select an option to configure the station.

MX Gateways and Devices Lists

Click Devices and select MX Devices to view a list of all MX Gateways associated with your HOBOlink account, set up MX Gateway alarms, and view a list of MX series logger deployments that have been uploaded to your HOBOlink account from the MX Gateway or HOBOconnect. For details on setting up a gateway or configuring loggers for upload to HOBOlink, see Getting Started in the first chapter.

MX Gateways

- Check the MX Gateways list to see all gateways associated with your HOBOlink account. For each gateway, you can view the name of the gateway as entered in HOBOconnect, the gateway serial number, the current status, and date and time of the last upload to HOBOlink. A status of "Missing" means the gateway has not sent a heartbeat to HOBOlink in at least 15 minutes. Check the gateway to make sure it is plugged in, the network settings are correct in HOBOconnect, and it is within range of the loggers.

- Use the Name and Serial # fields at the top of the columns to refine the list or to search for a particular gateway. Click a column heading to change the sort order of the column.

- Click this icon to unregister a gateway from your account. Any data that had been uploaded via that gateway will remain in HOBOlink.

To set up an alarm for the gateway:

1. Click Devices and select MX Devices.

2. Click Configure Gateway Alarms below the MX Gateways list.

3. Click Add New Alarm.

4. Select the alarms you want to add for the gateway:

   - **Missing gateway.** A gateway has not sent a heartbeat to HOBOlink for 15 minutes.

   - **Missing logger.** A logger has not been found by the gateway for 30 minutes.

   - **Logger alarm.** A logger being monitored by the gateway has tripped or cleared a sensor alarm.

   - **Logger low battery.** A logger being monitored by the gateway has a low battery.

5. Select whether you want gateway alarm notifications sent via email or text.

6. Enter the email address or country code destination plus cell number.

7. Click Save Alarms. You will receive an email or text whenever the selected alarms trip.

MX Devices

- Check the MX Devices list for all MX series logger deployments that have been uploaded to your HOBOlink account either by a gateway or HOBOconnect. Loggers must be configured in HOBOconnect to upload data to HOBOlink from a gateway or from HOBOconnect. See the HOBOconnect User's Guide at www.onsetcomp.com/hoboconnect for details. When data is uploaded for the first time for a logger deployment, a new entry is added to the list. Otherwise, an existing deployment in the list will be updated if data was previously uploaded for that logger deployment.

- Use the "Show latest deployment only" checkbox to toggle the view between all deployments and the most recent deployments only for each logger. When the checkbox is not selected, an orange dot will be displayed next to the latest deployment(s) as shown in the example.

- Use the Name, Serial #, Model, Groups, and Last Data From at the top of the columns to refine the list or to search for a particular deployment. Click a column heading to change the sort order of the column.

- Click this icon to delete an individual deployment or use the checkboxes and then click "Remove Selected Deployments" to delete multiple deployments at a time.

These are the columns in the MX Devices list:

Column Name	Description
Name	The name given to the logger when it was configured. If no name was entered, then the logger serial number is used by default.
Serial #	The logger serial number.
Model	The logger model number.
Group	The group assigned to the logger in HOBOconnect (if applicable).

Column Name	Description
Last Data From	The source of the uploaded data: either HOBOconnect or the gateway name.
Last Sensor Reading	The date and time of the last reading from the most recently uploaded data.
Config Date	The date and time the logger was configured. Each time a logger is configured in HOBOconnect, a new deployment is started.

Working with a Map

Use the Map feature to monitor your station and motes on Google Maps™. To help accurately position the motes for an RX Wireless Sensor Network on the HOBOlink map, consider logging into your HOBOlink account on your phone and walking to each mote as you place them on the map. You can use the My Location ⊕ tool on Google Maps in HOBOlink to automatically move to your current position (this requires location services being enabled).

To place a station and motes on the map:

1. Click Devices and then Map. (Log into HOBOlink from your phone if you will be walking to each mote in the network as you set up the map.)
2. Navigate to the area on the map where your station is physically located. If you are standing near the station with your phone, tap ⊕ in the lower right corner of the map to automatically move the map to your location. You may be prompted to give HOBOlink access to your phone's location services.
3. Click or tap the marker ⍟ next to your station in the side menu (upper left corner of map, click ✚ to expand the Settings menu if necessary). Click or tap the location on the map where the station is physically located to place the marker.
4. If placing motes on the map: Navigate to the area on the map where one of the motes in the network is physically located. If you are using your phone to mark the location of the motes, walk to the closest mote and tap ⊕ to move the map to your location. Note that if the mote is not far from your last position, the map may not move.
5. If placing motes on the map: Click or tap the marker ⍟ next to the mote in the side menu (upper left corner of map, click ✚ to expand the station menu if necessary). Click or tap the location on the map where the mote is physically located to place the marker. If you are in a different location than the network, use the distance scale in the bottom right corner of the map to estimate the distance between the station and the mote. The distance scale changes as you zoom in and out of the map.
6. If placing motes on the map: Repeat steps 4 and 5 for each additional mote in the network.

You can also do the following:

- Click 🗺 in the upper right corner if you want to change the location of the station or mote icon on the map. Once moving is enabled, click the station or mote icon and drag it to another place on the map. Click 🗺 once the icon is in the desired location.

- Enable the "Show wireless paths" checkbox in the Settings menu in the upper left corner of the map to show a graphical representation of the wireless connections in the network. When this option is enabled, orange lines are added to the map along with arrows that point in the direction of the data transmission from one mote to the next and ultimately back to the station.

- Hover over the station icon to view information about the station from the last connection to HOBOlink, including the alarm status and readings for all smart sensors, water level sensors, analog sensors, and calculated series (such as dew point), and the percentage of remaining station battery power. Wireless sensor information is not included with the RX3000 station information; this is reported separately for each mote placed on the map. **Note:** If your device uses a custom image set in General Configuration, then that image will also be used as the icon on the map. In addition, if you cannot view the sensor information, make sure 🗺 appears in the upper right corner. You cannot view sensor information when moving is enabled. Click 🗺 to disable moving.

- If zoomed in on the map, check the label next to each mote icon to see the sensor reading from the last connection to HOBOlink for each measurement type or calculated series associated with that mote. **Note:** if the mote is a repeater, the label displays the network connectivity health.
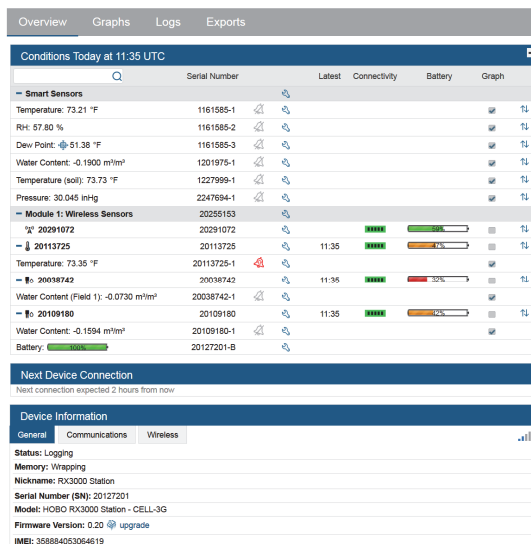
- Hover over a mote icon to view information about that particular mote in the network as of the last connection to HOBOlink, including the alarm status and sensor readings for each measurement type or calculated series, the percentage of remaining battery power, the network connectivity health, and the mote signal strength. See Working with Wireless Sensors in the last chapter for more details on connectivity and signal strength.

- Click the arrow in the upper left corner of the map to expand or collapse the side menu.

- Use the Nickname field in the Settings menu to search for a station or mote. Type one or more characters to refine the list of stations or motes.

- Click a station name to quickly navigate to the device overview page.

- Click ⊙ to highlight the device location on the map.

- Use the navigation controls in the lower right corner for zooming in and out or centering the map. You can also grab the map with the hand icon to change the view.

Viewing Station Details

You can view the overview, graphs, logs, and exports for each station registered to your HOBOlink account. Click Devices, then RX Devices or Map, and then click a station name to view this information. The device image and nickname appear at the top of the page. For RX3000 and RX2100 stations, this icon 📈 at the top of the page indicates whether the station is currently logging or stopped 📉 while this icon ⊙⊙⊙ indicates a configuration change has been made and is waiting for the next connection. Click the 🔧 icon to change the settings for your station.

Overview

Click Overview to see the latest conditions, next scheduled connection, and device information panels. Use the ➖ and ➕ icons at the top right corner of each panel to expand or collapse the three panels in the device overview.

- **Latest Conditions.** This panel is divided into sections based on the sensors and modules installed on your station and shows the sensor readings and alarm conditions from the last time the station connected to HOBOlink.

  - At the top of the panel, use the search field to find a specific item in the list. Type one or more characters to refine the list of sensors, modules, or motes.

  - For wireless sensors, click the ➕ or ➖ to expand or contract the list of series associated with each mote. Note that repeaters do not have any data series associated with them as they only relay information to and from sensor motes and the station.

  - If the sensor has a label, it will be listed in parenthesis following the sensor measurement type. If a mote has a label, the name will be used instead of the mote serial number.

  - If an analog sensor has been configured to log statistics, click the sensor description to view the latest statistics.

- For relay modules, the state of each relay (open or closed) is shown.

- For RX3000 and RX2100 stations, select or deselect the graph checkbox to show or hide sensor graphs for the device (accessible by clicking Graphs in the top menu).

- For U30 stations, click 🔧 next to the sensor you want to include in the graphs. Select or deselect the Enable Graph checkbox and click Save to show or hide the sensor graph.

- Click this ⇅ icon to drag the sensor up and down in the list. Any changes you make to the sensor order will also be reflected in the graphs (if graphs have been enabled for the sensors).

- Click this 🔧 icon to configure a sensor (RX3000, RX2100, and U30 stations) or module (RX3000 and RX2100 stations only).

- For wireless sensors, the time when data was last uploaded from the mote to HOBOlink is listed in the Latest column. In addition, the network connectivity health and percentage of remaining battery power is listed for each mote. See Tips for Working with Wireless Sensors in the last chapter for more details on network connectivity.

- The battery level for the RX3000 and RX2100 station is listed after all sensors and modules.

- **Next Device Connection.** This panel shows the time of the next expected connection for the station or the time elapsed since the last expected connection if it is overdue.

- **Device Information.** The upper right corner of this panel shows the signal strength for the station (if applicable). Click the General tab to view the following:

  - **Status.** This is the current logging status of the station.

  - **Memory.** For U30 stations, this indicates that the station is configured to continue logging when the memory is full (wrapping) or displays the remaining memory available if the station is configured to stop logging when full. For RX3000 and RX2100 stations, this displays "wrapping" because the station records data continuously.

  - **Nickname.** This is the name assigned to the station.

  - **Serial Number (SN).** This is the serial number for the station as listed inside the door.

  - **Model.** This is the model name for the station.

  - **Firmware Version.** This is the current version for the station's firmware. If a newer version of the firmware is available, click the Upgrade link. See Updating Device Firmware in the last chapter for details.

  - **IMEI:** This is the number assigned to RX3000 and RX2100 cellular models to enable it to work on mobile networks.
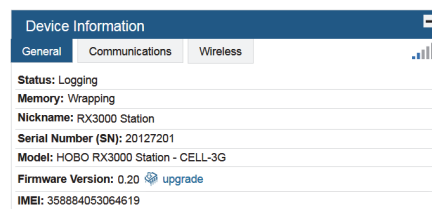
Click the Communications tab to view the details for your station's communication plan, including the plan number and start and end date. For cellular models, you can view monthly cell use, which is the percentage of the allocated data that has been used for the current month based on your communications plan. For additional details on communications plans, see Managing a Communications Plan in the next chapter.
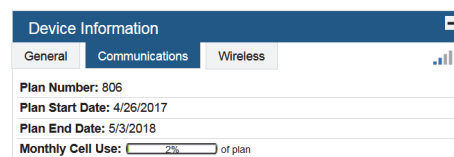

Click the Wireless tab to see the current firmware version installed for the manager module and each mote in your wireless sensor network. This 📶 icon is displayed if newer firmware is available an upgrade is available for the module or mote. See Updating Device Firmware in the last chapter for details on how to upgrade the firmware.

Graphs

Click Graphs to see sensor data plotted in graphs (only sensors with graphs enabled are shown). The default view displays all the data from the past day, based on when the station last connected to HOBOlink. Click the Past Week or Past Month tabs to change the view for all graphs to either a week or a month of data.
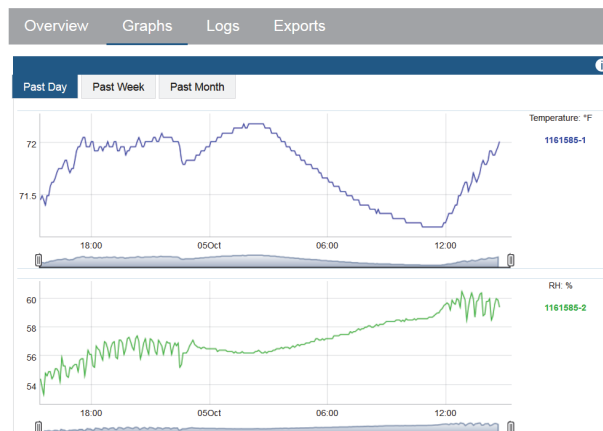
The order of the graphs is the same as the sensors listed in the Conditions panel. To change the order of the graphs, click the ⇅ icon and drag the sensor up or down in the list.

Graphs are not available for series with this ⊕ icon in the Latest Conditions panel on the device overview page. However, all channels can be graphed and displayed in various forms in dashboards (see Using Dashboards in this chapter).

For graphs from RX3000 and RX2100 stations:

- Hover over a series to see individual data points. The data point resolution for graphs is one minute for Past Day, 10 minutes for Past Week, and 30 minutes for Past Month. If the station is logging at faster intervals than those resolutions, the data is aggregated.

- Use the sliders below each graph to zoom in and zoom out.

- Sensor labels that were set in Sensor Configuration appear in parenthesis following the sensor name to the right of the graph.

For graphs from U30 stations:

- The data shown in the Past Month graphs are limited by the maximum data file size of 512K, which may be less than a month in some cases. The amount of days included in a data file depends on the logging interval as set in Launch Configuration and the number of sensors.

- Sensor labels set in Sensor Configuration appear in the upper left corner of the graph.

- A graph is available for the U30 station dew point series because this channel is created using a different process than the default RX3000 and RX2100 station dew point series.

Graph Totals

Graph totals are available for rain gauges and pulse input adapters and for the Time On channel from runtime sensors (RX stations only). Select Enable Graph Totals in Sensor Configuration to view graph totals, which take effect the next time the station connects to HOBOlink. When graph totals are enabled:

- For rain gauge and pulse input adapters, Past Day graphs note the total rainfall or pulses in the past day and the dashed line represents hourly totals. Dashed lines on Past Week and Past Month graphs represent daily totals.

- For the Time On channel from runtime sensors, the dashed line represents the sum of all logged seconds (i.e. when the contact switch was closed) for hourly or daily totals. For the Past Day graph, the point or hover dot on a dashed line is the sum of all logged seconds in an hour. For Past Week/Month graphs, it is the sum of all logged seconds in a day.

- For the Time On channel from runtime sensors, the solid line represents the sum of all logged seconds in 1-minute, 10-minute, or 30-minute intervals depending on the graph. For the Past Day graph, the point or hover dot on a solid line is the sum of all logged seconds per 1 minute. For the Past Week graph, it is the sum of all logged seconds per 10 minutes. For the Past Month graph, it is the sum of all logged seconds per 30 minutes.

- For the Percent On channel on runtime sensors, there are no totals displayed. Instead, points are an average of all logged seconds in the period.
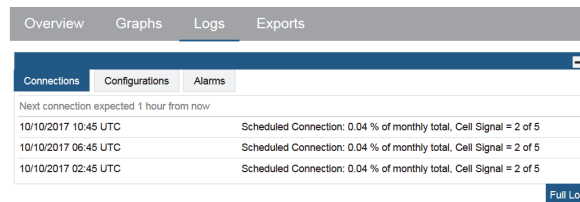
Logs

Click Logs to show device activity. Click one of these tabs:

- **Connections.** This tab displays a list of recent connections between the station and HOBOlink. A status message at the top of the list shows the time of the next expected connection for the station or the time elapsed since the last expected connection if it is overdue. A station can occasionally miss a connection if its Wi-Fi or cellular signal is weak.

- **Configurations (RX3000 and RX2100 stations).** This tab displays the most recent changes made to the station, such as the station was started or stopped, a sensor or mote was added or configured, or the power was reset.

- **Alarms.** This tab displays the most recent tripped or cleared alarms.

Click Full Log at the bottom of the Logs panel to view complete connection, configuration, and alarm logs. On the Connections log, you can click the Filter By drop-down arrow to change the view from the default of All Connections to either Only Errors or Scheduled Connections. On the Alarms log, you can click the 🗑 icon to delete an entry or select checkboxes for multiple alarm entries and then click the Delete button.
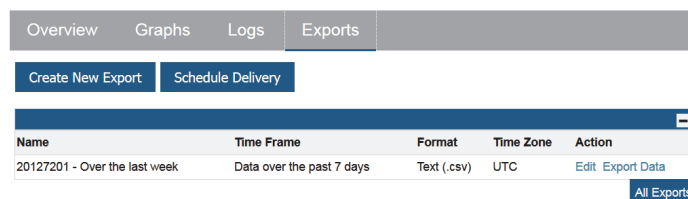

Exports

Click Exports to view saved export settings for the station, including the export name, time frame for the data to be included in the export, the format, and time zone. (For U30 stations, these are found on the Exports tab.) You can also:

- Click Create New Export to set up a new export.

- Click Schedule Delivery to set up a schedule for automatically generating and delivering the exported file.

- Click Edit to change the settings for the export.

- Click Export Data to generate an exported file as defined in the export settings.

- Click All Exports to view all exports in your HOBOlink account.

For more details on exported files, see Exporting Data in chapter 4.

For U30 stations, click the Data Files tab to view the most recent data files that have been read out from the station. Click a file to download it. Both text (.csv) and HOBOware (.dtf) files are available if the station is set to "Save data as text file" in Readout Configuration. To view a list of all available files for the device, click All Files at the bottom of the tab. For more information about data files, see Downloading U30 Files in chapter 4.

Using Dashboards

Dashboards are custom pages that you can create and share, showing a personalized view of data from sensors or calculated channels using graphs, charts, and other widgets. You can create up to ten dashboards. This section covers the following:

- Creating a New Dashboard
- Sharing a Dashboard
- Editing a Dashboard
- Viewing Your Dashboards
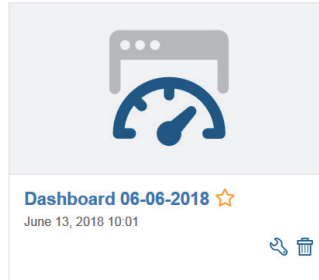- Changing Widget Properties

Creating a New Dashboard

1. Click Dashboards from the left menu.

2. Click Create New Dashboard.

3. In the top menu, click [icon] to select an image to use for the dashboard thumbnail (optional).

4. Type a name for the dashboard. If no name is entered, a default name of "Dashboard <today's date>" is used.

5. Select the default time frame to use for the data displayed in the dashboard: the past day, past week, or past month.

6. Select the default units to use for data displayed in the dashboard: US units or SI units. This can be different than the default units selected in User Settings and displayed in other HOBOlink pages.

7. Select the time zone to use for the data displayed in the dashboard.

8. Add up to 20 widgets to the dashboard. To add a widget, you can either:

   - Click the [icon] next to the station name and click one of the preassigned sensor widgets from the list to add it to the dashboard.

   or

   - Click a blank widget from the top menu to add it to the dashboard. Click [icon] in the upper right corner of the widget to select a channel for the widget and any other settings (see Changing Widget Properties for more details). If you create a calculated channel or add a new sensor, there is a delay before it is available to be selected in widgets while data is first being collected and transferred to HOBOlink. For details on adding calculated channels in dashboards, see Working with Calculated Channels in Dashboards.

9. Click [icon] to adjust the position of the widget on the dashboard, which is set up in columns and rows. Drag the widget to a new location on the dashboard and it will snap to the grid (automatically placing it in the nearest column or row).

10. Click Save. Your new dashboard is displayed in view mode instead of edit mode.

> **Important:** If you click [icon] before saving a new dashboard, you will lose any changes to the dashboard and have to rebuild the dashboard.

   - Click [icon] for a preview of how the dashboard would look if you choose to share it.

   - Click [icon] and select Sharing to create a public URL linking to the dashboard that you can give to others (see Sharing a Dashboard for more details).

   - Click [icon] and select Edit Dashboard if you need to make changes (see Editing a Dashboard for more details).

   - You can hover over some of the widgets to get more information (e.g. hover over a line chart to see data points).

   - Change the time frame at the top of the dashboard to switch between past day, past week, or past month view. Widgets are automatically refreshed based on the time frame you select.

- Click ⬅ to return to a list of all dashboards. The new dashboard is added to the Your Dashboards page and appears like this in tile view:

Dashboard 06-06-2018 ☆
June 13, 2018 10:01

Or like this in list view:

Your Dashboards			
Name ⇕	**Modified** ⇕		
☆ 🖼 Dashboard 06-06-2018	June 06, 2018 12:28	🔧	🗑

Note that in these examples the default image and name were used for the dashboard.

Sharing a Dashboard

You can create a URL linking to a dashboard so that people can view details about your station on a public web page. Click 🖥 to see a preview of how the dashboard would look if you choose to share it.

To share a dashboard:

1. Click Dashboards and go to the list of your dashboards.

2. Click the dashboard you want to share (click the link of the dashboard name, not 🔧, to open the dashboard in view mode rather than edit mode).

3. Click 🔧 ▾ and select On or Sharing. This creates a URL for the dashboard that you can share with others.

   - You can change a portion of the URL to a name you specify. Click ✏ to view the part of the URL that can be edited. Make your changes to the editable part of the URL and click ✔ to save the new name.

   - Click 📋 to copy the URL to the clipboard to paste it elsewhere for sharing with others.

4. Click ⬅ to return to Your Dashboards. This 👁 Public icon is added to the dashboard in both the tile and list view.

To revoke public access to a dashboard:

1. Click Dashboards and go to the list of your dashboards.

2. Click the dashboard you no longer want to share (click the link of the dashboard name, not 🔧, to open the dashboard in view mode rather than edit mode).

3. Click 🔧 ▾ and select Off or Sharing.

4. Click Revoke Access to confirm that you want to turn sharing off for this dashboard and revoke public access. Any URLs you shared for this page will no longer be active and this 👁 Public icon is removed from the Your Dashboards page.

Editing a Dashboard

To make changes to your dashboard:

1. Click Dashboards and go to the list of your dashboards.

2. Click ⚒ for the dashboard you want to edit. **Note:** If you need to enable or disable sharing, click the name of the dashboard instead (see Sharing a Dashboard for details). This presents the dashboard in view mode rather than edit mode. You can click ⚒▾ and select Edit Dashboard when in view mode.

3. Change the image, name, or default settings in the top toolbar.

4. Make any changes to widgets:
   - Add or edit existing widgets. See Changing Widget Properties for more details.
   - Click ✥ to adjust the position of a widget. Drag the widget to a new location on the dashboard and it will snap to the grid (automatically placing it in the nearest column or row).
   - Click the bottom right corner ◸ of the widget to resize it.
   - Click 🗑 to delete a widget.

5. Click Save when done editing the dashboard.

> **Important:** If you click ← before saving, your edits will be lost, ***including saved changes to widgets***.
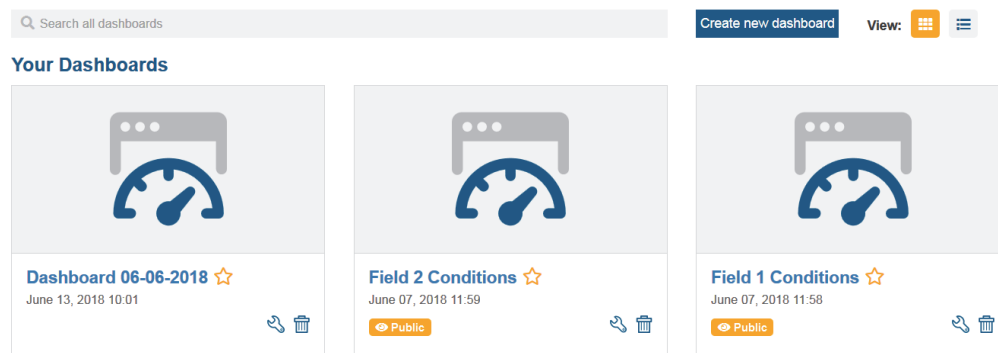
Note: When editing a dashboard, click ⚒▾ and select Clear Dashboard if you want to remove all the widgets from the dashboard or select Delete Dashboard to remove the entire dashboard.

For details on editing calculated channels in dashboards, see Working with Calculated Channels in Dashboards.

Viewing Your Dashboards

Click Dashboards from the left menu to view all your dashboards. Use the Search bar at the top of the Your Dashboards page if you have numerous dashboards and want to quickly find one. Begin typing the name of the dashboard and the page will be automatically refined to show the dashboard(s) that match your search criteria.

Click ▦ to show your dashboards in a tile view.

Click ![list icon] to show your dashboards in a list view. Click a column heading to change the sort order of the column.

- Each dashboard in both the tile and list view includes the image selected for the dashboard, the dashboard name, and the date it was last modified.

- Click the dashboard name to veiw the dashboard and enable or disable public sharing (see Sharing a Dashboard for details). This ![Public] icon is displayed for dashboards with sharing enabled.

- Click ![wrench] to make changes to the dashboard image, name, default settings or widgets (see Editing a Dashboard or Changing Widget Properties).

- Click ![trash] to delete a dashboard.

- Click ![star] to mark a dashboard as a favorite. Only one dashboard can be labeled as a favorite, which is marked with ![filled star] and will display by default when you select Dashboards from the main menu.

Changing Widget Properties

Each widget on the dashboard can be customized, whether you are adding a new widget or want to make changes to an existing one. To add or edit a widget to a dashboard:

1. Click Dashboards and either click Create New Dashboard or click ![wrench] for the dashboard with the widgets you want to add or modify. Or, if you are currently viewing a dashboard, click ![wrench dropdown] and select Edit Dashboard.

2. If you need to add a widget:

   - Click the ![plus] next to the station name and click one of the preassigned sensor widgets from the list to add it to the dashboard or
   - Click a blank widget from the top menu to add it to the dashboard.

3. Click ![wrench] in the upper right corner of the widget to change the settings or select a channel if necessary.

4. Make any changes to the widget and click Save in the widget properties window; refer to the table below for details on specific widgets.

5. Click Save at the top of the dashboard to save your changes. Your revised dashboard is displayed in view mode instead of edit mode.

> **Important:** If you click ![back arrow] on the dashboard edit page before saving, your edits will be lost, ***including saved changes to widgets***.

Notes:

- When selecting a channel to associate with a widget, only the channels that are relevant to the widget will be listed (for example, only temperature series are available for the thermometer widget). In addition, there is a delay before new calculated channels or sensors are available for widgets.

- Data presented in the widgets is based on the time frame selected for the dashboard. When you switch between past day, past week, or past month view at the top of the dashboard, widgets are automatically refreshed based on the time frame you select. Similarly, units displayed in the widgets are based on the unit type selected at the top of the dashboard. When you switch between US and SI units, the widgets are automatically updated to show the new units

- If a widget is displayed wireless sensor data and the mote is in data recovery, the most recent data will be unavailable until the mote is out of recovery mode.

- If you make a configuration change to the sensor (such as adding a label), it will take a few minutes before the the change is available for new widgets. Changes will not be made to existing widgets. For example, if you change the label on a temperature smart sensor and you have a line graph widget for that smart sensor, the box label for that widget will not be updated to match the new smart sensor name. However, if you were to add a new line graph widget, then the new label would be used.

This table lists the widgets available for dashboards and the settings that can be selected for each one.

Widget Name	Icon	Details and Properties for this Widget
Line Chart		This shows a line graph of up to 20 channels. Hover over the plotted lines in the graph to view individual channel values and dates or times in the legend.

- Click Data and select channels(s) for the line chart. Click in the left side of the Channels box and then select a channel from the drop-down menu that appears. Repeat for any additional channels. Click the X next to a channel to remove it from the widget.

  Select an aggregation range to use for the widget depending on the time frame selected for the dashboard. For example, if you select 1 hour for the aggregation range and the dashboard is viewing the past week, then each data point represented on the widget is an aggregate of 1 hour of data. The faster the aggregation range, the more granularity is displayed on the widget.

- Click X to set the properties for the x-axis including:
  - **X-axis Label.** Type a label that will appear below the x-axis and the default x-axis tick mark labels.
  - **X-axis Label Font Size.** Type the pixel size to use for the x-axis label.
  - **X-axis Line Color.** Select the color to use for the x-axis.
  - **X-axis Line Width.** Type the pixel thickness to use for the x-axis line.

- Click Y to set the properties for the y-axis including:
  - **Y-axis Label.** Type a label that will appear to the left of the graph along the y-axis.
  - **Y-axis Label Font Size.** Type the pixel size to use for the y-axis label.
  - **Y-axis Line Color.** Select the color to use for the y-axis.
  - **Y-axis Line Width.** Type the pixel thickness to use for the x-axis line.
  - **Include Zero.** Choose Yes if you want to include zero as the lowest value in the y-axis. Choose No if you want a value to be chosen automatically that is closer to the lowest value in the data.

- Click Y2 and click Yes or No to add or remove a Y2-axis respectively and set the following properties. Note that you will need to assign a channel to the Y2-axis by clicking Legend, otherwise the Y2-axis is not visible on the line chart.
  - **Y2-axis Label.** Type a label that will appear to the right of the graph along the y2-axis.
  - **Y2-axis Label Font Size.** Type the pixel size to use for the y2-axis label.
  - **Y2-axis Line Color.** Select the color to use for the y2-axis.
  - **Y2-axis Line Width.** Type the pixel thickness to use for the y2-axis line.
  - **Include Zero.** Choose Yes if you want to include zero as the lowest value in the y2-axis. Choose No if you want a value to be chosen automatically that is closer to the lowest value in the data.

- Click Legend to specify the label and color for the channels displayed on the line chart and assign a Y or Y2 axis (if applicable). For each channel, set the following properties:
  - **Legend Label.** Type a label for the channel, which is displayed to the right of the graph.
  - **Color.** Select the color to use for the plotted channel, which is also used for the legend label.
  - **Legend Axis.** If you set up a y2-axis for the line chart, select the axis each channel should use: y or y2. **Note:** An enabled Y2 axis will not display unless you have selected y2 as the legend axis for at least one channel.

- Click Grid to enable or disable x, y, and y2 (if applicable) grid lines on the line chart. If you want grid lines to display for a specific axis, select Yes and then select the color for the grid line and type the pixel thickness to use. If you do not want grid lines to display for a specific axis, select No.

- Click Slider and select Yes or No to add or remove a slider below the line chart for zooming in and out. You can set the following slider properties:
  - **Foreground Line Width.** Type the pixel thickness of the lines that are adjusted as you move the

Widget Name	Icon	Details and Properties for this Widget

slider.

- ▪ **Foreground Line Color.** Select the color of the lines that are adjusted as you move the slider.
- ▪ **Height.** Type the pixel height of the slider.
- ▪ **Plot Fill Color.** Select the background color for the slider.

- Click Goals if you want to set a goal line on the line chart. Select the color for the goal and type a number to use as the horizontal goal line. This should be a number in relation to the data for the channels on the line chart. The portion of the line chart below that goal line is shaded in the color you select. Click Add to add an additional goal line.

- Click Box Properties to change the title for this widget.
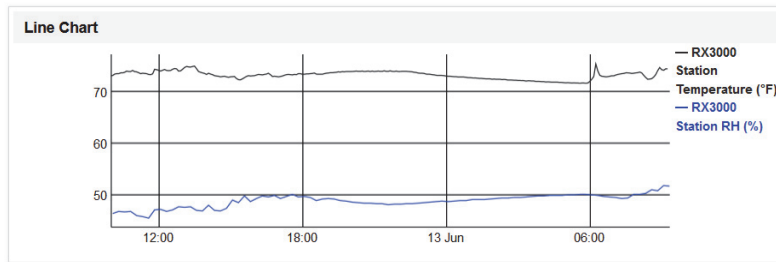
Bar Chart — This shows a bar graph of up to 20 channels. Hover over the bars in the chart to view individual channel values and dates or times in the legend.

- Click Data and select channels(s) for the bar chart. Click in the left side of the Channels box and then select a channel from the drop-down menu that appears. Repeat for any additional channels. Click the X next to a channel to remove it from the widget.

- Click X to set the angle of the labels that appear below the x-axis. Type a number to set how far the angle is in degrees from the horizontal x-axis.

- Click Y to add a prefix to the y-axis tick mark labels. Type the characters you want to add to the beginning of each label. When more than one channel is selected for this widget, select Yes if you want the bars representing each channel to be stacked or select No if you want individual bars in parallel for each channel.

- Click Legend to set specify the label and color for the channels displayed on the bar chart. For each channel, set the following properties:

- ▪ **Legend Label.** Type a label for the channel, which is displayed to the right of the bar chart.
- ▪ **Color.** Select the color to use for the bars for this channel. This color is also used for the legend label.

- Click Goals if you want to set a goal line on the bar chart. Select the color for the goal and type a number to use as the horizontal goal line. This should be a number in relation to the data for the channels on the bar chart. Click Add to add an additional goal line.

- Click Box Properties to change the title for this widget.
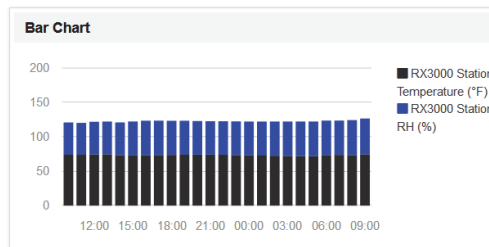
Area Chart — This shows an area graph of up to 20 channels. Hover over the plotted area in the chart to view individual channel values and dates or times in the legend.

- Click Data and select channels(s) for the area chart. Click in the left side of the Channels box and then select a channel from the drop-down menu that appears. Repeat for any additional channels. Click the X next to a channel to remove it from the widget.

- Select an aggregation range to use for the widget depending on the time frame selected for the dashboard. For example, if you select 1 hour for the aggregation range and the dashboard is viewing the past week, then each data point represented on the widget is an aggregate of 1 hour of data. The faster

Widget Name	Icon	Details and Properties for this Widget

the aggregation range, the more granularity is displayed on the widget.

- Click X to set the angle of the labels that appear below the x-axis. Type a number to set how far the angle is in degrees from the horizontal x-axis.

- Click Y to add a prefix and suffix to the y-axis tick mark labels. Under Y-axis Label Prefix, type the characters you want to add to the beginning of each label. Under Y-axis Label Suffix, type the characters you want to add to the end of each label.

- Click Legend to set specify the label and color for the channels displayed on the area chart. For each channel, set the following properties:

  - **Legend Label.** Type a label for the channel, which is displayed to the right of the bar chart.

  - **Color.** Select the color to use for the plotted channel, which is also used for the legend label.

- Click Goals if you want to set a goal line on the area chart. Select the color for the goal and type a number to use as the horizontal goal line. This should be a number in relation to the data for the channels on the area chart. Click Add to add an additional goal line.

- Click Box Properties to change the title for this widget.
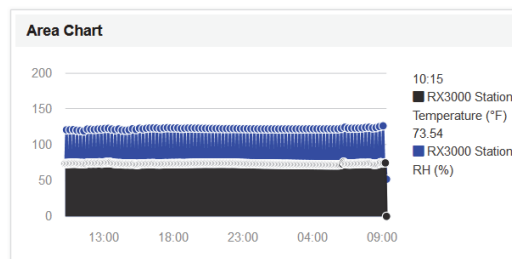
Gauge — The shows the most recent data point available for a single channel as related to range that you specify.

- Click Data and select a channel to use for the gauge from the drop-down list.

- Click Format to change the following:

  - **Gauge Value Text Color.** Select the color of the number and unit type shown on the gauge.

  - **Label.** Type a label that will appear below the gauge.

  - **Label Color.** Select the color to use for the gauge label.

  - **Gauge Background Color.** Select the color to use for the background of the gauge curve.

  - **Decimals.** Type the number of decimal places to use for the number shown on the gauge.

  - **Level Colors.** Select the color to use on the gauge showing the level of the data point in relation to the the maximum range on the gauge. Click Add if you want to use additional colors within the range, from low to high.

- Type the minimum and maximum values to use for setting the range of the gauge. These values are shown be default below the gauge; click No if you do not want them displayed.

- Click Box Properties to change the title for this widget.
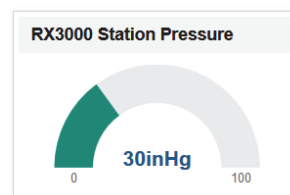
Thermometer — This displays the temperature from one channel.

- Click Data and select a temperature channel to use for the thermometer from the drop-down list.

- Click Format and set the interval between the degree tick marks on the thermometer.

  Set the color and low and high temperature ranges for the gradient on the thermometer or click Add to create an additional range. **Tip:** The high range for one color should be the same as the low range for the next for the gradient to display correctly.

- Click Box Properties to change the title for this widget.

Widget Name	Icon	Details and Properties for this Widget
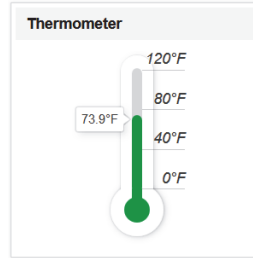
Wind Rose		This can display both wind direction and wind speed, with wind speed represented in different colors based on set ranges. The length of each wedge on the compass will indicate the percent of the total wind speed readings in the indicated direction within the time frame selected on the dashboard. The colors within the wedge are similar to a stacked bar chart, ordered by wind speed with the lowest speed at the center and highest speed at the outer edge. When the dashboard is not edit mode, you can hover over the wind rose to view precise readings.

- Click Data and select a wind direction and wind speed channel from the two drop-down lists. Choose the aggregation range to use for the widget depending on the time frame selected for the dashboard. For example, if you select 1 hour for the aggregation range and the dashboard is viewing the past week, then each data point represented on the widget is an aggregate of 1 hour of data. The faster the aggregation range, the more granularity is displayed on the widget.

- Click Format and set the color and low and high temperature ranges for the gradient on the thermometer or click Add to create an additional range. **Tip:** The high range for one color should be the same as the low range for the next for the gradient to display correctly.

- Click Box Properties to change the title for this widget.
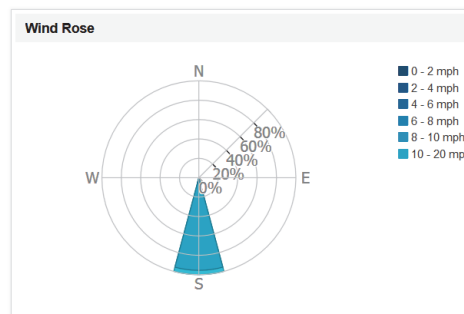
Odometer		This shows the most recent data point available for a single channel.

- Click Data and select a channel to use for the odometer from the drop-down list.
- Click Box Properties to change the title for this widget.
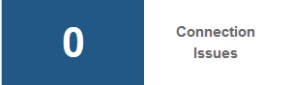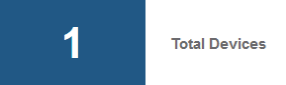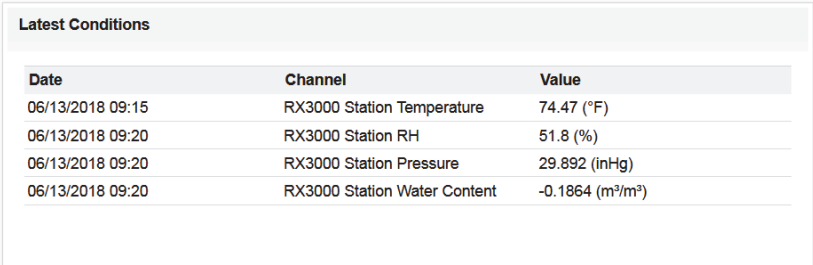
Connected Devices		This shows the number of devices that connected to HOBOlink for your account at the current time. You can change the following formatting:

- **Number Text Color.** Select the color to use for the number displayed in the left side of the widget.

- **Number Background Color.** Select the color to use for the background behind the number on the left side of the widget.

- **Message Text Color.** Select the color to use for the text shown in the right side of the widget.

- **Message Background Color.** Select the color to use for the background behind the text on the right side of the widget.

Widget Name	Icon	Details and Properties for this Widget
Connection Issues		This shows the number of connection issues (e.g. errors, warnings, or missed HOBOlink connection) for devices from your account at the current time. You can change the following formatting: • **Number Text Color.** Select the color to use for the number displayed in the left side of the widget. • **Number Background Color.** Select the color to use for the background behind the number on the left side of the widget. • **Message Text Color.** Select the color to use for the text shown in the right side of the widget. • **Message Background Color.** Select the color to use for the background behind the text on the right side of the widget. **0** Connection Issues
Total Devices		This shows the number of devices registered to the HOBOlink account at the current time. You can change the following formatting. • **Number Text Color.** Select the color to use for the number displayed in the left side of the widget. • **Number Background Color.** Select the color to use for the background behind the number on the left side of the widget. • **Message Text Color.** Select the color to use for the text shown in the right side of the widget. • **Message Background Color.** Select the color to use for the background behind the text on the right side of the widget. **1** Total Devices
Latest Conditions		This shows the latest conditions for the selected channel(s), including the data and time, channel name, and latest data point. • Click Data to select channels(s). Click in the left side of the Channels box and then select a channel from the drop-down menu that appears. Repeat for any additional channels. Click the X next to a channel to remove it from widget. • Click Box Properties to change the title for this widget.

Latest Conditions

Date	Channel	Value
06/13/2018 09:15	RX3000 Station Temperature	74.47 (°F)
06/13/2018 09:20	RX3000 Station RH	51.8 (%)
06/13/2018 09:20	RX3000 Station Pressure	29.892 (inHg)
06/13/2018 09:20	RX3000 Station Water Content	-0.1864 (m³/m³)

Configuring Calculated Channels

A calculated channel is a derived data series that is created by applying logged sensor data to a specific formula. The following calculated channels are available:

- **Reference Evapotranspiration.** You can create this channel from the main HOBOlink menu. See Setting up a Reference Evapotranspiration Calculated Channel for details. Note that this calculated channel could previously only be created via dashboards.

- **Dew Point.** This channel is automatically logged for RX3000 and RX2100 stations with temperature and RH sensors. You can also create a dew point channel via dashboards (see Working with Calculated Channels in Dashboards).

- **Accumulated Rain.** This channel calculates the amount of rainfall over a period of time you specify (for example the total rainfall in one day). Rainfall is calculated over even accumulation windows, such as from the start of each day for daily totals, or from the start of each hour for hourly totals. These rainfall totals are calculated at the end of the time interval, such as the end of the

day for daily accumulations. This channel requires a rain gauge sensor and can be created via dashboards (see Working with Calculated Channels in Dashboards). **Note:** RX2100 and RX3000 stations have a separate accumulated rainfall sensor alarm that does not require creating a calculated channel in a dashboard. See Sensor Alarms in Chapter 2 for details on how to set this up.

Setting up a Reference Evapotranspiration Calculated Channel

Reference evapotranspiration (ETo) is the daily water for a grass reference surface based on the weather, specifically solar radiation, temperature, RH and wind speed. ETo is used to help determine when to irrigate. A new reference evapotranspiration reading is calculated at the top of the hour (if you select an hourly time frame) or at midnight local time (if you select a daily time frame). Hourly readings are based on an average of all the sensor readings logged within the hour while daily readings are generated by summing hourly calculations over the past 24 hours.

To set up a reference evapotranspiration channel:

1. From the main HOBOlink menu, click Calculated Channels and select Reference Evapotranspiration.

2. Click New Configuration.

3. Type a name for the reference evapotranspiration configuration.

4. Select hourly and/or daily for the time frame.

5. Select the temperature, RH, solar radiation, and wind speed channels to use (it is recommended that all the sensors selected are located on the same weather station).

6. Enter the height of the wind speed sensor above the ground in meters or feet.

7. Type the latitude and longitude of the station in degrees (use + for north and west, and use - for south and east). Consider using Google Maps or similar app on a mobile phone at the station location to obtain the latitude and longitude.

8. Type the elevation of the station in meters or feet above sea level. Consider using Google Maps or similar app on a mobile phone at the station location to obtain the elevation.

9. Select the time zone for the station.

10. Click Save. Go to the station page to see the latest values and graphs for the calculated channel. The channel is also available for maps, alarms, exports, and dashboard widgets.

To edit a reference evapotranspiration channel:

1. From the main HOBOlink menu, click Calculated Channels and select Reference Evapotranspiration.

2. Select the reference evapotranspiration configuration you want to edit.

3. Make changes to any settings except the sensors selected. If you want to use different sensors, then you must create a new configuration.

4. Click Save.

To delete a reference evapotranspiration channel:

1. From the main HOBOlink menu, click Calculated Channels and select Reference Evapotranspiration.

2. Select the reference evapotranspiration configuration you want to delete and click .

Working with Calculated Channels in Dashboards

To create a calculated channel in dashboards:

1. Click Dashboards and either click Create New Dashboard or click for an existing dashboard. Or, if you are currently viewing a dashboard, click and select Edit Dashboard. **Note:** You can choose any dashboard to add a calculated channel because it will be available from all dashboards once created.

2. Under Calculated Channels, select "Add new calculated channels."

3. Under Select Formula, select the formula you want to use for the calculated channel.

- For Accumulated Rain, type the channel label, select the rain channel, the time frame, and the time zone to use from the drop-down lists. **Note:** RX2100 and RX3000 stations have a separate accumulated rainfall sensor alarm that does not require creating a calculated channel in a dashboard. See Sensor Alarms in Chapter 2 for details on how to set this up.

- For Dew Point, type the channel label, select the temperature and RH channels from the drop-down lists.

- For Reference Evapotranspiration, create the channel via the HOBOlink main menu as described in Setting up Evapotranspiration Calculated Channels because this functionality will soon be retired in dashboards.

Note: If the sensor you select for a calculated channel has scaling configured, the sensor must be scaled to SI units for the measurement type (i.e. the scaled units must be millimeters instead of inches). In addition, when setting up scaling for temperature and RH sensors, make sure the names entered in this field are "temperature" and "RH" if you also want to view measurements for the dew point calculated channel. If you enter other names in these fields, the dew point channel will not be available. Use the Label field for custom sensor names instead of the Scaled Measurement Type field. See Scaling Sensor Data in chapter 2 for details on changing scaling.

4. Click Save. The new channel is added to the list of calculated channels in all your dashboards. It will take several minutes before the channel is available to add to widgets, alarms, etc.

Note: The serial number associated with the calculated channel is based on the sensor used for the channel. A number is appended to the end of the serial number of the first measurement channel selected when creating the new channel. You can view this serial number on the device overview page (click Devices > RX Devices > your station name > Overview). Under the latest conditions on the overview page, use the ⇅ icon for the calculated channel if you want to change its position in the list.

To edit a calculated channel in dashboards:

1. Click Dashboards and either click Create New Dashboard or click 🔧 for an existing dashboard. Or, if you are currently viewing a dashboard, click 🔧▾ and select Edit Dashboard.

2. Under Calculated Channels, click ⓘ for the channel you want to edit.

3. Make any changes to the name and click Save. If you need to change any other settings, create a new channel instead.

To delete a calculated channel in dashboards:

1. Click Dashboards and either click Create New Dashboard or click 🔧 for an existing dashboard. Or, if you are currently viewing a dashboard, click 🔧▾ and select Edit Dashboard.

2. Under Calculated Channels, click 🗑 for the channel you want to delete.

Sharing a Device Page

Your station's device page is only viewable when you are logged into your account unless you grant public access to the page. To share your device page with others:

1. Click User Settings and then Public Access.

2. Under By Device, click the checkbox next to each station that you wish to share with others.

3. Click Save. This creates a URL for each of the stations selected. Click a URL to preview the page. Note that device information, graphs, and data are available on the public page, but the ability to change device settings is disabled.

4. Copy the URL and then share it with others.

Public sharing is available with dashboards. Consider setting up a custom dashboard and making it public rather than sharing the default device page. See Sharing a Dashboard earlier in this chapter for details.

To disable public access to device page:

1. Click User Settings and then Public Access. Deselect the checkbox next to any device that you do not want to share with others.

2. Click Save. The URL associated with that device will no longer function and you will only be able view the device page when logged into your HOBOlink account. You can reselect the checkbox to reactivate the URL and grant public access again.

Note for U30 stations: If you are using the Summary page feature, you can make that page public as well as the device page. To share the summary page:

1. Click User Settings and then Public Access.

2. Click the My Summary checkbox and click Save. This creates a URL for your custom U30 summary page. Note that when you enable this setting, all stations will be automatically granted public access. Click the URL to preview the page. Copy the URL and then share it with others.

Viewing Tripped Station or Sensor Alarms

In addition to any notifications you may receive or relay switches when an alarm trips, there are several ways to check if the station has any tripped alarms within HOBOlink. (For details on MX Gateway Alarms, see MX Gateways at the beginning of this chapter.)

- Check for a tripped alarm icon 🔔 in the Devices list.

- The station or mote icon on the map will be red instead of blue if an alarm has tripped. Hover over the station or mote icon to see details about the type of alarm, such as a sensor error, low mote battery, missing wireless mote, the station has missed a connection, or a sensor alarm has tripped. See Tips for Working with Wireless Sensors for information about missing wireless motes.

- Check for a tripped alarm icon with an arrow indicator 🔔 next to a sensor in the latest conditions panel, on the map, or on the device overview page. The arrow indicator shows whether the sensor reading is above the threshold (up arrow) or below the threshold (down arrow), or outside the range (up and down arrow).

- Look for red or blue shading on the device graph for the sensor with the tripped alarm. Red shading on the graph indicates the sensor reading was above the specified threshold while blue shading indicates the reading was below the threshold. **Note:** Graphs in dashboard widgets will not display this shading. However, you can set goal lines for line chart, bar chart, and area chart widgets. For example, if a sensor alarm is configured to trip when the temperature is above 32 degrees and you have a line chart widget set up for that sensor, you can set a goal line with a value of 32 for the widget. This will give you a visual representation of readings above the alarm threshold of 32 degrees. See Changing Widget Properties earlier in this chapter for details.

- When configuring alarms, any tripped alarms are displayed in red.

- Check the Alarms log for full details about the alarm, including whether it tripped or cleared, any notes, the sensor reading (if applicable), and the date and time the event occurred. To view the log, go to the Alarms page and click See All Alarm Logs or go to your device page, click Logs and then click Full log on the Alarms tab.

- Set up an alarms widget in dashboards to show the number of sensor alarms that have tripped in the time frame selected. See Using Dashboards earlier in this chapter for details.

All alarms remain enabled when they trip or clear on RX3000 and RX2100 stations. On U30 stations, the Battery Low, Memory Low, and Sensor Failure alarms all are disabled as soon as one trips and must be re-enabled once the condition is resolved. See System Alarms in the previous chapter for details.
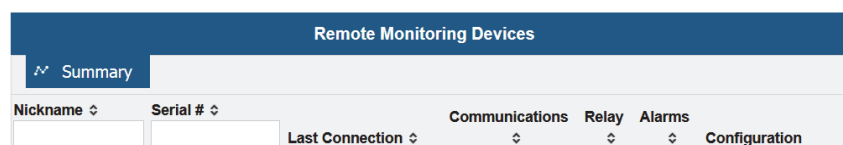
Using the U30 Summary Page

Note: The Summary page is a deprecated feature. It is recommended that you create a custom dashboard instead (see Using Dashboards earlier in this chapter).

The Summary page is a separate HOBOlink tool that allows you to create a customized view of your U30 stations using widgets (this page is not available for RX3000 stations). You can then share the Summary page with others or to make it easier for you to view by marking it for Public Access under User Settings.

To access the Summary page:

1. Click Devices then RX Devices. Click the Summary button above the Nickname column.

2. Log in to the HOBOlink Summary page using the same username and password as your HOBOlink account.

3. Click Edit to modify an existing Summary page or add widgets to create a new one as described next.

4. There are three types of widgets that you can add to the Summary page:

- **Device widget.** Displays sensor information, relay state, and battery voltage for your device.

- **Graph widget.** Displays the graph for a specific sensor.

- **Measurement widget.** Displays sensors of a specific measurement type, such as temperature or wind speed, from one or more devices.

5. Click Edit to add widgets to an existing device page. While in Edit mode, you can also reposition the widget by clicking ▤ at the top of the widget and then dragging the widget to the new position. To remove a widget, click ⊗ at the top right corner of the widget in Edit mode.

Adding a Device Widget

To add a device widget to the Summary page:

1. Click a Device icon (like Bog 1 in the following example) to add it to the grid.
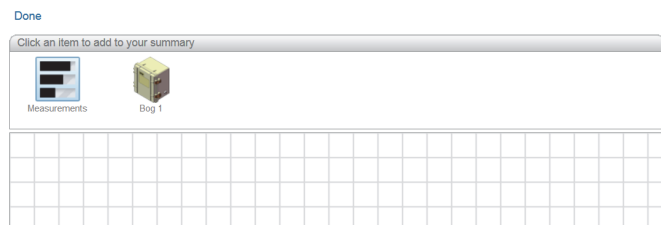
2. Select or deselect the checkboxes to show or hide the relay state, sensors, and battery voltage for the device. Once a checkbox is deselected, the item is removed from the widget. Click ⬆ to see the item and then select the checkbox to add it back.
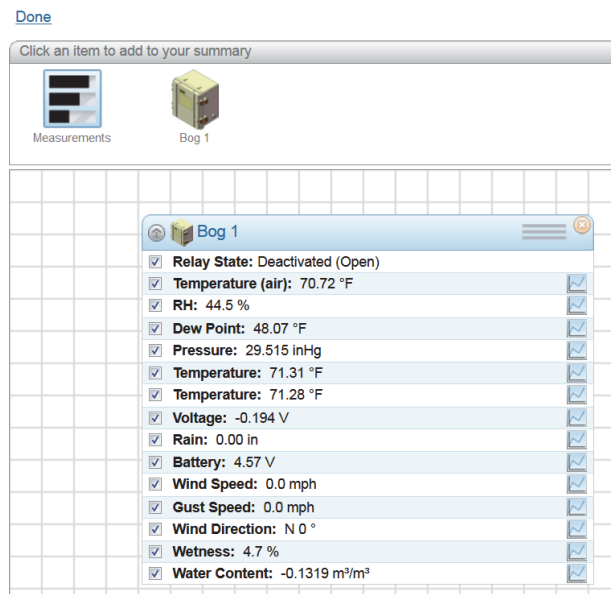
3. Click Done to view the widget on the Summary page. The items you selected are displayed in the widget along with the current alarm state for all sensors. The last connection date/time is listed at the top of the widget with a device communication status icon. The icon in the example below indicates that there is an informational message about the device. To view more details

about the communication status as well as other information about the device, return to the main HOBOlink system. To change the order of the measurements in the device widget, you must change the order of the sensors in the Latest Conditions panel on your device page in the main HOBOlink system.
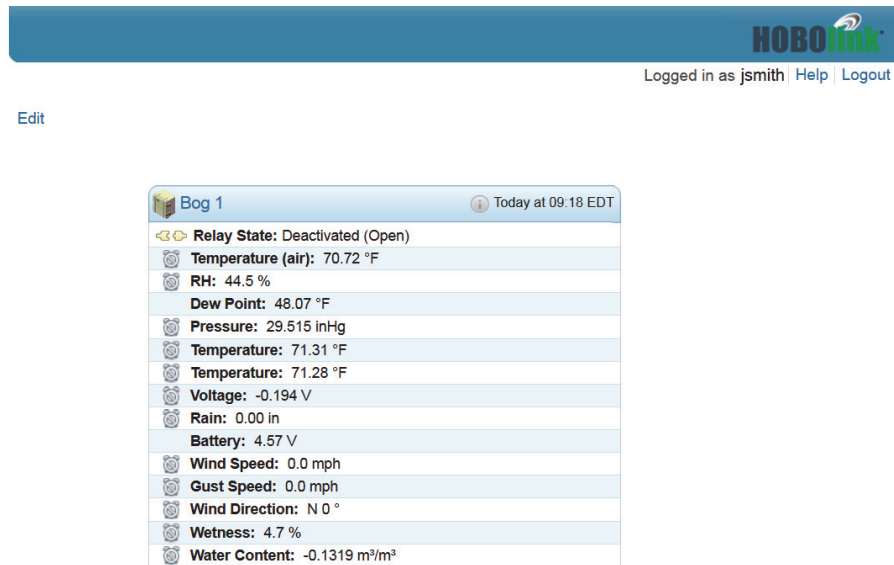
Adding a Graph Widget

To add a graph widget to the Summary page:

1. Click Edit if a device widget is already on the page. If not, add a device widget as described in the previous section.

2. Click the graph icon next to a sensor to add the graph to the page. Click the Past Day, Past Week, or Past Month tab to change the default view to that tab. Use the arrow icons at the bottom of the graph to change the default sensor.
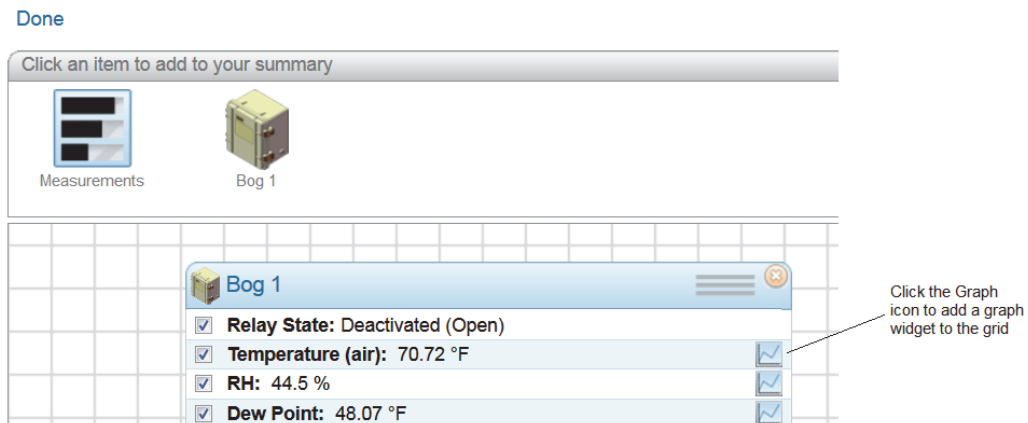
3. Click Done to view the widget on the Summary page. Click the tabs at the top of the graph to switch the views between the Past Day, Past Week, and Past Month (if available). As with the device widget, the last connection date/time and communication status icon is at the top of the graph. Although the default view for the graph is for the sensor that you selected, you can also click the left and right arrow buttons at the bottom of the graph to view other sensor graphs for the device.

You can also add a graph widget by clicking a graph icon within the measurement widget.

Adding a Measurement Widget

To add a measurement widget to the Summary page:

1. Click a Measurements icon to add it to the grid.

2. Type a name for the measurement widget to replace "My Measurements."
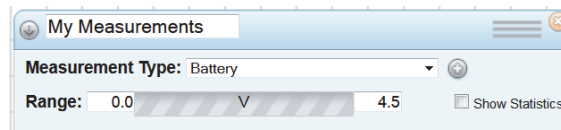
3. Select the measurement you wish to add from the Measurement Type drop down list.

4. By default, the minimum and maximum supported values for the measurement type are listed for the range. Edit this to other values within the range if desired.

5. Click to add the selected measurement type entry to the widget.
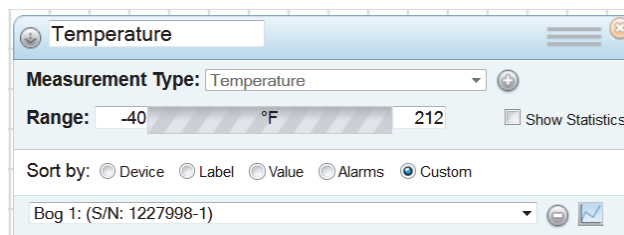
6. Any sensors associated with the measurement type from all your devices are displayed in the drop-down list. Select the sensor you wish to include in the widget or select "Mean of widget's sensors" to show an average of all sensors associated with that measurement type.
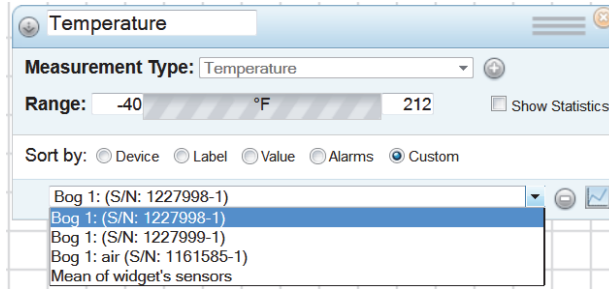
7. Repeat steps 3–6 for any additional sensor you wish to add to the widget for this measurement type. In this example, one additional sensor was added along with an entry for the mean of the widget's sensors. To remove a sensor from the list, click the ⊖ in the row for the sensor you wish to delete. Note that you cannot change the measurement type for the widget without first deleting all sensors from the list.
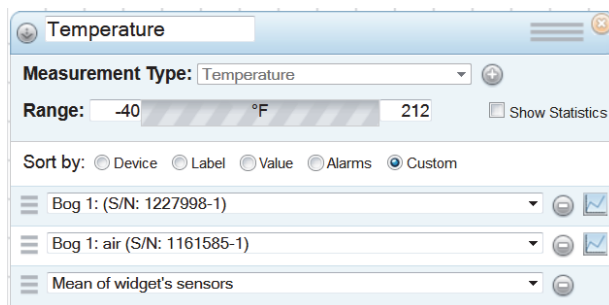
8. Select how the sensors will be sorted in the widget:

   - **Device.** Sensors are sorted alphabetically by device description/nickname. Within a device group, sensors are then sorted by sensor label.

   - **Label.** Sensors are sorted alphabetically by sensor label.

   - **Value.** Sensors are sorted by sensor reading (for example, highest temperature to lowest).

   - **Alarms.** Sensors are sorted by alarm status in the order of tripped, active, and inactive.

   - **Custom.** This allows you to drag the sensors in the order you choose. Click and hold ☰ next to the sensor you wish to reorder and drag it to the desired position.

9. Select the Show Statistics checkbox to include a sidebar on the widget with the Minimum, Maximum, Standard Deviation, and Mean calculated for the sensors in the widget.

10. Click Done to view the widget on the Summary page. The values for each sensor as of the last connection time are displayed in the widget along with statistics, if enabled.
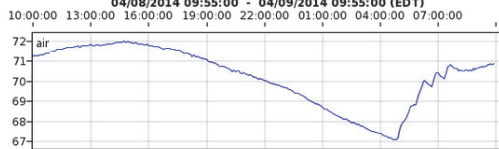
You can share the Summary page with others or to make it easier for you to view by marking it for Public Access under User Settings.

Chapter 4
Managing and Sharing Data

For remote monitoring stations, sensor data is recorded at each logging interval as defined in Module Configuration (RX3000 and RX2100 stations) or Launch Configuration (U30 stations). The data is stored on the device and then uploaded to HOBOlink at each connection interval as defined in Readout Configuration. Data is then handled differently depending on the type of device you are using. **Note:** You can also share a dashboard with others by setting up public access. See Sharing a Dashboard in the previous chapter for details.

For MX series loggers, data is automatically uploaded to HOBOlink either by a gateway or when a logger has been read out in HOBOconnect (see the first chapter for details on setting up an MX Gateway or MX series loggers).

Data from RX3000 and RX2100 Stations

With an RX3000 or RX2100 station, data uploaded to HOBOlink is saved to a database, with data points saved at each logging interval. This gives you the flexibility to choose the precise sensor data you want from any point or any number of stations in a custom export that you can view in other programs or share with others. For example, you can set up an export that includes all sensor data or one that has only smart sensor data. Or, you can set up one export that has just temperature data and another that has just barometric pressure data. There are numerous ways to customize your data. You can set up or access existing exports from the Exports tab on the device page or by clicking Data and then Exports (see Exporting Data). You can also have it automatically delivered to any email address or FTP/SFTP location on a schedule that you select (see Scheduling Data Delivery).

> **Important:** It is recommended that you use scheduled data downloads to archive all the data in a safe location as a backup. Consider setting up an export that includes all sensor data (see Exporting Data) and is delivered to an email address or FTP/SFTP location on a regular schedule (see Scheduling Exported Files for Data Delivery). You can then keep those files to retain a full data history as needed.

Data from U30 Stations

With a U30 station, data uploaded to HOBOlink is saved to a database, with data points saved at a one-minute resolution (data logged at faster intervals is aggregated). In addition, all logged data is available in a HOBOware-compatible file format (.dtf) and an optional text file format (.csv) if "Save data as text file" was selected in Readout Configuration. The file name consists of the description entered in Launch Configuration followed by a sequence number identifying the order in which the files were created. The first time the device connects to HOBOlink after being launched, the new .dtf and .csv files (if applicable) are created. At each subsequent readout, new data recorded after the previous readout is added to the .dtf file until the device stops logging, is relaunched, or the memory wraps (because the device is set to "Wrap when memory fills" in General Configuration). At that point, new .dtf and .csv files (if applicable) are created with a new sequence number. The following figure illustrates how data files are created when memory wraps.
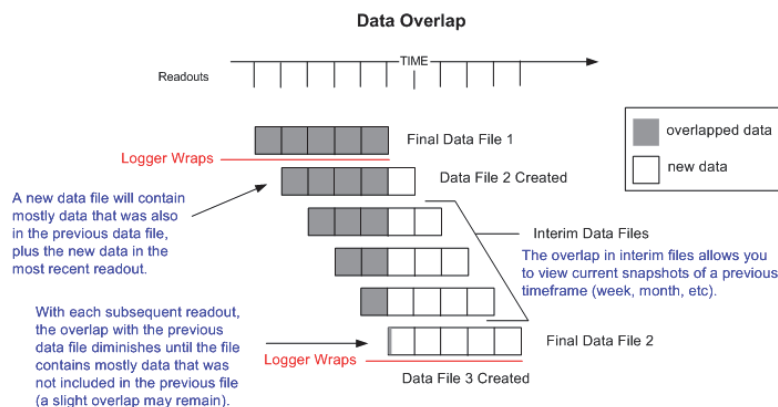
You can access these files from either the Exports tab on your device page or on the Data Files tab on the Data page. For details on downloading and opening these files, see the next chapter.

You can also create your own custom exported data in which you select the devices, sensors, and time frame you want to include in the file. Exported files can be created as needed or generated automatically for delivery via FTP/SFTP or email on a schedule you specify. For more details, see Exporting Data and Scheduling Data Delivery later in this chapter.

Data from MX Series Loggers

You can set up HOBOconnect to automatically upload data to HOBOlink from MX series loggers via an MX Gateway or HOBOconnect once a readout is complete (see the first chapter for details on setting up an MX Gateway or MX series loggers). When data is uploaded for the first time for a logger deployment, a new entry is added to the MX Devices list (click Devices and then MX Devices to view the list). Otherwise, an existing deployment in the list will be updated if data was previously uploaded for that logger deployment. You can access the data by clicking Data and then Exports (see the next section). You can also configure HOBOlink to automatically deliver exported data to any email address or FTP/SFTP location on a schedule that you select (see Scheduling Data Delivery) or create a custom dashboard to share (see Using Dashboards).
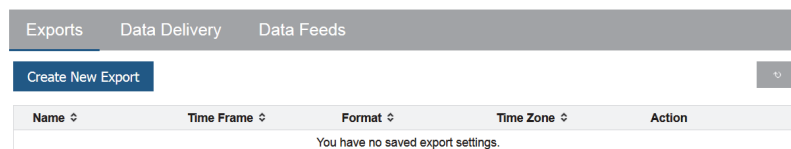
Exporting Data

You can export data from a remote monitoring station or standalone device deployment to a text (.csv), Microsoft Excel (.xlsx), or HOBOware .csv file for analysis in other programs and sharing with others. Exported files can either be downloaded as needed or scheduled for automatic delivery via FTP/SFTP or email. To export data, you must first select a time frame for the data (e.g. all data from last week or all data between specific dates) and select which devices, configurations, and sensors you want to include in the exported file. Then you can choose to export the data immediately, save the settings for a future export, and set up a schedule for delivering the exported data. **Note:** If an export contains more than one million data points, it is divided into multiple files, each with a maximum of a million data points. The files are compressed into a .zip file available for download or sent via your data delivery schedule as applicable.

Creating a New Export

To create a new export:

1. Click Data and then Exports.

2. Click Create New Export or skip to the next step if the Create Export Settings page is already open.

3. Under Export Settings, type a name for the export, select a file format (Text, Excel, or HOBOware), and select a time zone (it is recommended that you select the same time zone as the device). Choose one of the following time frames for exporting data:

   - **Between two dates/times.** Select "between" from the drop-down list and then select a date/time on the calendar for both the start and end date.

   - **Before a specific date/time.** Select "before" from the drop-down list and then select a date/time on the calendar.

   - **After a specific date/time.** Select "after" from the drop-down list and then select the date/time on the calendar.

   - **Over the past <x> days, hours, or minutes.** Select "over the past" from the drop-down list. Type the number in the field and then select days, hours, or minutes. *You must choose this time frame if you are planning on setting up a schedule to have the exported file delivered via email or FTP/SFTP on a recurring basis.*
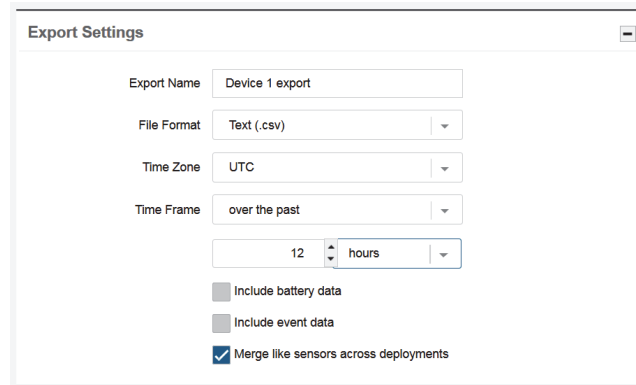
   > **Important:** Make sure the selected time frame accounts for the night mode schedule if applicable. This time frame should be at least as long as the night mode interval. For example, if the normal readout schedule is every 2 hours and the night mode readout schedule is every 6 hours, then the export time frame should be at least 6 hours. If you choose a shorter time frame (such as every 4 hours), then some of your export files may not have any data if they are generated during night mode.

   Select "Include battery data" if you want device battery info included in the file.

   Select "Include event data" if you want the logger's internal events to be included in the file (available for standalone device deployments only). **Note:** "Include events" is disabled when the File Format is HOBOware CSV because this format does not support events.
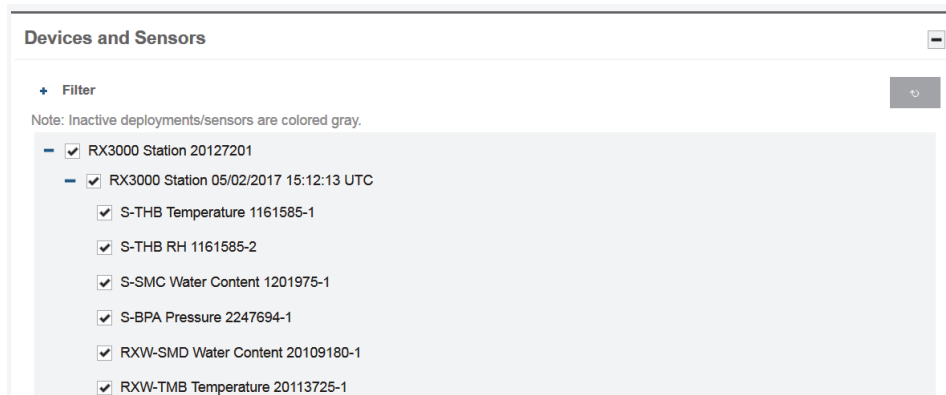
   "Merge like sensors across deployments" is selected by default. Deselect this checkbox if you do not want sensors of the same measurement type to be merged into one series for all deployments in the export. Note that when this option is enabled, a

successful merge requires mostly identical sensor information. For example, you cannot merge a temperature sensor from one logger with another logger into the same export. You also cannot merge the same sensor with the same logger if the logger deployment name is different.

4. Under Devices and Sensors, click ✚ to open this section and view the devices and sensors available for export. Click ✚ to the left of the device checkbox to show the list of available deployments for the device. Click ✚ to the left of the deployment to view the list of sensors (only those sensors that have data for the time frame you selected will be displayed). Custom labels (if applicable), product code, measurement type, and serial number are listed for each sensor. Select the sensors you want to include in the export.

You can also filter the list to refine the available choices. Click ✚ to the left of Filter. You can filter by product model (e.g. RX2102 or RX), measurement type (e.g. temperature or soil moisture), a label that you have entered, or serial number. Type your filter text into one of the fields and the list of available devices and sensors will be updated automatically. You can also click ✚ to add additional filter categories (e.g both temperature and RH).

Tips on selecting devices, configurations, and sensors:

- To quickly select all sensors for the export, click the checkbox next to a deployment. This will automatically select all the sensors for that device deployment. Similarly, click the checkbox next to a device to include all deployments and all sensors in the export.

- When using filters, click the Clear Filters button to clear all filter fields. You can also clear an individual filter by deleting the text in the field. Click 🗑 following a filter category to delete it.

- Active sensors and deployments are black and inactive ones are gray. You can select either active or inactive sensors, or a combination of both to include in the export.

- There is a delay before new channels or sensors display in the list as data is first being collected and transferred to HOBOlink.

- For stations, a new deployment is created when a station nickname is changed or if the station is registered to a new HOBOlink account. Station deployments are not created for changing other settings, restarting or stopping logging, or other changes that are displayed in the device configurations log.

- For stations, a new sensor entry is added to the list when the sensor label or scaling is changed or it is moved to another station. A new entry is also created when its product type is changed (for example, choosing a new analog sensor type for an analog channel).

- If you select a station deployment or device, then any configuration or sensor changes that occur within that deployment or device will be automatically included in the export. However, if you select individual sensors, then you will need to edit your export settings when sensor changes occur.

- For MX logger deployments, a new deployment is created each time the logger is reconfigured.

- Click [⟲] to refresh the devices/sensors list.

5. Under Devices and Sensors Order, click [＋] to view the list of sensors that will be included in the export based on your selections in section 2. The sensors will be listed in the order they appear in section 3 in the exported file. To change this order, use the arrow buttons or drag and drop the sensor to the desired position.

6. To export the data immediately, click the Export Data button. A file will be generated that you can download and save.

7. Click the Save button to save this export.

> **Important:** The settings will not be saved if you only click the Export Data button and do not click the Save button.

After saving, the new export is added to the exports list.

For details on setting up a data delivery schedule that automatically creates and delivers exported files via email or FTP/SFTP, see Scheduling Data Delivery in this chapter. For details on changing the default time and number format in exported files, see Changing Export File Settings In this chapter.

Working with Existing Exports

You can edit, copy, or delete existing exports or export data as needed. To work with an existing export:

1. Click the Data and then Exports.

2. Click [＋] to expand the export, device, and deployment to see what sensors are included in the export.

3. Select one of the following four actions for an export in the list:

- **Edit.** Click Edit to change settings for this export. You can also click Edit if you need to change the order of the sensors listed. Make the changes and then click Save. Remember that only exports with a time frame of "over the past" can be scheduled for automatic delivery via email or FTP/SFTP. Note that the entire list of available devices and sensors will be displayed; any filters used to select the devices and sensors when the export was created will no longer be applied. You can reapply new filters as needed.

- **Copy.** Click Copy to create another export that has the same settings as an existing one. Select the copied export settings entry and click Edit as described in the previous step to make any changes. This is a quick way to create a new export that is similar to an existing export.

- **Delete.** Click Delete to permanently remove the export from the list.

- **Export Data.** Click Export Data to immediately generate a file with data as defined by these settings.

Scheduling Data Delivery

You can configure HOBOlink to automatically deliver exported data files to an email address or FTP/SFTP site on a schedule that you specify. Before you can set up data delivery, you must first select the device and sensor data you want to include in the export as described in Exporting Data in this chapter. **Note: Data delivery is only available for exports that are configured with a time frame of "over the past."**

To set up a new scheduled delivery:

1. Click Data and select Data Delivery.

2. Click Create New Delivery.

3. Under General Settings, type a name for the new delivery schedule.

4. Select how often you want the exported file to be delivered (every "x" minutes, hours, days, or weeks).

5. Make sure the Active checkbox is selected. If the box is not selected, then the data will not be delivered.

6. Select the "Email on delivery failure" checkbox if you want to be notified when the exported file is unable to be delivered.

7. Under Select Data to Export, select the checkbox(es) next to the data you wish to export or click the checkbox in the column header row to quickly select all exports listed. If there are no options in this list, make sure you have selected the device and sensor data to include in an export as described in Exporting Data. Note that only ongoing exports (those configured to occur over the past "x" number of days, hours, or minutes) will display in this list. If you have set up an export to occur before or after a specific date or between two dates, then the export will not display in the list.

8. Under Data Destination, select the FTP (or SFTP) checkbox if you want the exported data file to be delivered to an FTP/SFTP address. Enter the following information for the server where you want exported files to be delivered:

    - **Server.** Type the name of the server (e.g. ftp.companyname.com).

    - **Port.** Type the port number used for the server or leave the field blank if the server uses the default port.

    - **Remote Folder**. Type the name of the folder on the server where you want the exported files to be delivered. Folders beginning with a slash (/) are expected to be root directory paths. Folders without a slash are assumed to be relative to your home directory.

    - **Username.** Type the username for the account used to access the server.

    - **Password.** Type the password to access the server.

    - **Compress uploaded files.** Select this option if you want to compress the file before delivering it to the server.

    - **Use secure connection.** Select this option if the server is secure (SFTP). If this option is selected, then click the Use certificate checkbox if the server uses a digital certificate for authentication. See the next section on SFTP Certificate Setup for more details.

    - **Use passive mode.** Select this option if the server runs in passive mode (necessary if the server is running behind a firewall). This option is not available if you have selected the Use secure connection checkbox.

    Click Test Connection to make sure HOBOlink can connect to the server using the settings entered.

9. Select the Email checkbox if you want the exported data file to be sent to an email address. Change the default email address listed if necessary. Select the "Compress email file attachments" checkbox if you want the export file size to be as small as possible.

10. Click Save when done. The new scheduled delivery will be listed with a status that the email or FTP/SFTP delivery is pending and the next run time for the export. If you have configured the file to be delivered via email, the email message indicates the time period included in the file. The first delivered file will contain data from the time frame selected in the export settings. Subsequent files will contain all data logged since the last file delivery.
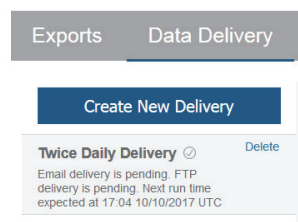
Tips:

- To make changes to a scheduled delivery, select the delivery from the list, enter the changes, and click Save.

- To create a new delivery based on an existing delivery, select the delivery from the list and click Save As. Type in the new delivery name and then make any other changes and click Save.

- To delete a scheduled delivery, click Delete next to the delivery you want to remove.

- To activate or deactivate a scheduled delivery, select the delivery from the list and click the Active checkbox. Click Save.

- If there is a problem with the delivery, it will be flagged in this list of scheduled deliveries. Select the delivery and revise any settings as necessary.

- If an export contains more than one million data points, it is divided into multiple files, each with a maximum of a million data points. If you selected "Compress uploaded files" or "Compress email file attachments," the files are compressed into a .zip file. Otherwise each file is uploaded or emailed individually. If multiple files cannot fit in a single email message, then multiple emails will be sent. In addition, if a file is too large to send as an attachment, the email delivery will fail.

- If the data in the file is a different time period than the device, check the time zone selected in the export settings to make sure it is the same one as the device.

- For U30 stations only, data delivery is only recommended for devices with logging intervals of 1 minute or greater. This is because data is temporarily stored or "binned" at 1-minute intervals before being saved to the HOBOlink database, where it is then retrieved for exports and data delivery as needed.

- If using data delivery with MX logger deployments, files may contain all events recorded instead of just the latest events. In addition, you may receive files with no data if the data was not uploaded from HOBOconnect to HOBOlink as expected.

SFTP Certificate Setup

If you selected the Use certificate checkbox for the SFTP settings, this means you can use a digital certificate with public key authentication on your SSH server. These instructions are for installing the HOBOlink-generated public to your OpenSSH server. If your SSH server uses other software or you are not authorized to log into the server, consult your IT administrator for help.

1. Log into the SSH server.

2. Go to the .ssh subdirectory of your account's home directory or create one if needed. (You may need to show hidden files if you are not able to view the .ssh directory.) The recommended permissions for the .ssh directory is 700.

3. Open the authorized_keys file for editing or create one if needed. The recommended permissions for the file is 600.

4. In HOBOlink, go to the FTP or SFTP settings (under User Settings > Export or when setting up data delivery). Make sure all fields are completed for SFTP and the Use certificate checkbox is enabled.

5. Click Download Public Key. Copy the generated key to your clipboard.

6. Return to the authorized_keys file and paste the key into the file. Make sure all the text from copied key is in one line in the file and save the file.

7. Make sure your account home directory, your .ssh directory, and the authorized keys file are not group-writable or world-writable.

8. Test the connection in HOBOlink.

9. Save the SFTP settings in HOBOlink.

Downloading U30 Data Files

Data files that are read out from a U30 station when the device connects to HOBOlink are available for download. Data is available in .dtf format and optional text file format (.csv) if "Save data as text file" was selected in Readout Configuration.

To download a single file:

1. Click Data and then Data Files.

2. Click a file to download it.

3. Save the file or open it immediately as prompted by your browser. Use HOBOware® to open a .dtf file or Microsoft® Excel® or a similar program to open a .csv file.

To download multiple files:

1. Click Data and then Data Files.

2. Check the box next to the files you wish to download.

3. Click the Download as Zip button at the bottom of the page. A zip file is created in the default location determined by your browser settings. When opening the zip file, the files will be extracted and saved in the default location controlled by your browser.

A new icon appears next to the file name if it has not been downloaded.

To change the list of data files displayed, select one or more drop down menus at the top of the list. You can change the list to show all files or only data (.dtf) or text (.csv) files from all devices or a single device for the past day, week, month, year, or all time.

To delete a single file, click the 🗑 icon at the end of the row for the file you wish to delete. To delete multiple files, click the checkbox next to each file name and then click the Delete button at the bottom of the page.

To browse through multiple pages of files, use the arrows, page number icons, or page number drop-down list at the bottom right of the page.

Working with .dtf Files

When you open a .dtf file in HOBOware, a Plot Setup window appears in which you can select the series you want to display, use applicable data assistants as desired, and adjust the Offset from GMT if needed. This offset is automatically set based on the time zone selected in General Configuration when the device was launched. While the graphs viewed in HOBOlink automatically account for switches between Daylight Saving Time and Standard Time, files in HOBOware do not. If a switch to Daylight Saving Time or Standard Time occurs during the period of time included in the data file, the Offset from GMT will be the one in place at launch time. For example, if the device was launched in September during Eastern Daylight Time, the Offset from GMT would be -4. If you then were to open a .dtf from that device with data from September through December, the Offset from GMT in HOBOware would still be -4 even though there was a switch to Eastern Standard Time during that time period. You could change the Offset from GMT in the Plot Setup window to -5 if desired. If you were to then relaunch the device in December and open the subsequent data file in HOBOware, the Offset from GMT would then be -5 as that device was relaunched during Eastern Standard Time.

Working with .csv Files

Text (.csv) files contain two sections: a header that is formatted using YAML (Yet Another Markup Language, see YAML.org) and a data section in comma delimited format. If you open the text file in Excel, the Text Import Wizard gives you the option to "Start Import at Row x." Type in the first row of the data section to remove the header information from the file.

The sample text file in this section shows the header and data sections of the file. Within the header, there are the following three subsections:

- **Data Format**. This section includes information about how the text file is formatted:

    - **dateTimeDelimiter, decimalSeparator, and dateDelimiter.** These entries identify (between double quotation marks) the character used to separate date time, the character used as a decimal, and the character used to separate data values from one another respectively.

    - **dateFormat and timeFormat.** These entries describe the way dates and times are formatted within the file as determined by the preference settings in HOBOware and the regional format settings of your operating system. For example, 07/31/13 would be represented by MM/dd/yy (single-digit values have leading zeros). The syntax is as follows: HH = 24-hour time (e.g. 15:00:00) and hh = 12-hour-time (e.g. 3:00:00 PM); this time format is followed with "a" to denote an AM/PM indicator (i.e. hh:mm:ss a). MM = months and mm = minutes. SS = milliseconds and ss = seconds.

    - **gmtOffset and daylightSavings.** These entries indicate the offset in hours from GMT on the computer that launched the device and whether the computer was in Daylight Saving time (true or false).

Data Format:
    dateTimeDelimiter: " "
    decimalSeparator: "."
    dataDelimiter: ","
    dateFormat: M/d/yy
    timeFormat: HH:mm:ss ;
    gmtOffset: "-5"
    daylightSavings: false

Logger Info:
    - &1
    launchDescription: "Sample Text File"
    model: U30-001
    vendor: Onset Computer Corporation
    serialNumber: 1156303
    memorySize: 512
    firmwareVersion: 0.953
    firmwareVersionRaw: 0
    deploymentNumber: 48
Series Info:
    - name: "Voltage"
    type: value
    unitName: "V"
    OMClassName: OMeasurementH21
    OMPartNumber: 91-U30-CVIA-XX
    OMUnitIndex: 0
    OMChannelType: 4
    OMValuePattern: "#,##0.000;-#,##0.000"
    logger: *1
    - name: "Current"
    type: value
    unitName: "mA"
    OMClassName: OMeasurementH21
    OMPartNumber: 91-U30-CVIA-XX
    OMUnitIndex: 0
    OMChannelType: 4
    OMValuePattern: "#,##0.000;-#,##0.000"
    logger: *1
    - name: "Temp"
    type: value
    unitName: "°C"
    OMClassName: OMTemp12bit_HWS
    OMPartNumber: S-TMB-XXXX
    OMUnitIndex: 0
    OMChannelType: 1
    OMValuePattern: "#,##0.00;-#,##0.00"
    logger: *1
    - name: "Batt"
    type: value
    unitName: "V"
    OMClassName: OMVoltage_PipeBattery
    OMPartNumber: U30 BATTERY
    OMUnitIndex: 0
    OMChannelType: 5
    OMValuePattern: "#,##0.00;-#,##0.00"
    logger: *1

Data is separated from the file header by a row of hyphens.

"#","Time, Eastern Daylight Time","Voltage, V","Current, mA","Temp, °C","Batt, V"
1,11/30/07 15:32:07 PM,-0.193,0.000,20.91,4.48
2,11/30/07 15:32:08 PM,-0.193,0.000,20.91,4.48
3,11/30/07 15:32:09 PM,-0.193,0.000,20.91,4.47
4,11/30/07 15:32:10 PM,-0.193,0.000,20.91,4.47
5,11/30/07 15:32:11 PM,-0.193,0.000,20.91,4.46
6,11/30/07 15:32:12 PM,-0.193,0.000,20.91,4.46
7,11/30/07 15:32:13 PM,-0.193,0.000,20.91,4.46
8,11/30/07 15:32:14 PM,-0.193,0.000,20.91,4.46
9,11/30/07 15:32:15 PM,-0.193,0.000,20.91,4.46
10,11/30/07 15:32:16 PM,-0.193,0.000,20.91,4.48
11,11/30/07 15:32:17 PM,-0.193,0.000,20.91,4.48

(data continued in actual file)

Header

Data

- **Logger Info.** This section lists information about the device associated with the file, including the launch description, model number, and serial number.

- **Series Info.** This section lists each data series in order by column, excluding the first column (the number '#" column) and the date/time column. Each series has its own subsection that includes the series name, type, and unit name.

The header and data sections in the text file are separated by a row of hyphens. Within the data section, the first row consists of the column headings, with each heading enclosed by double quotation marks (" ") and separated by a comma. The first column header is "#" for number and the second column header is "Time" for the date/time. The remaining columns identify each series name and unit type, if applicable, in the format "Series Name, Unit" (enclosed in double quotation marks). Each series has its own column. No zeros or spaces are used for fields that do not contain values. Rows of data are separated with a paragraph return. Thousands separators are not used. For example, two thousand is expressed as 2000, not 2,000.

Working with Data Feeds

You can set up a data feed in which your station data is regularly pushed to Weather Underground, the Network for Environment and Weather Applications (NEWA), or AQUARIUS software.

Setting up a Weather Underground Data Feed

1. Make sure the station is configured with a minimum connection interval of 10 minutes and a minimum logging interval of 5 minutes. The data feed will not work with connection intervals faster than 10 minutes and logging intervals faster than 5 minutes.

2. If you do not have an account with Weather Underground, go to http://www.wunderground.com and create one.

3. Follow the instructions on Weather Underground for signing up your station. For information on setting up a weather station, see http://www.wunderground.com/weatherstation/overview.asp.

4. After you sign up your station with Weather Underground, write down the Station ID and key from Weather Underground. **Note:** If you have more than one station, you can register each station individually with Weather Underground and then set up a data feed for each station.

5. In HOBOlink, click Data and Data Feeds.

6. Click Create New Data Feed.

7. For Destination, select Weather Underground.

8. For Device, select the station you registered with Weather Underground. If you have multiple devices, you can also start typing a station nickname to pare down the list before selecting it.

9. Type in the Station ID you received from Weather Underground. Enter the key you received from Weather Underground as the password.

10. Click Auto Assign to automatically match each sensor on your selected station to the corresponding Weather Underground measurement. Alternatively, to manually assign sensors (or to make corrections if necessary after clicking Auto Assign), click the drop-down arrow and select the sensor. If there is more than one sensor, select the one you want to use for this measurement (or start typing the sensor label to pare down the list before selecting the sensor). Sensors are listed with their serial number and any label assigned. In this example, the temperature sensor labeled "air" is selected for assignment to Outdoor Temperature 1. If the drop-down list has no sensors, it is because the station does not have a sensor that corresponds to the measurement. In addition, some measurements available in HOBOlink are not supported by Weather Underground.

11. Click Save. The data feed is added to the list in HOBOlink and data from each assigned sensor will be pushed to Weather Underground each time the station connects to HOBOlink. **Note:** There may be up to a 15-minute delay from the time the device connects to HOBOlink until the data appears in Weather Underground. In addition, the Weather Underground data feed will only send data at a minimum ten minute interval. If the logging rate on the station is faster than ten minutes, a data point will only be sent to Weather Underground if it is at least ten minutes after the last data point was sent. For example, if the logging interval is 1 minute and the first data point is sent to Weather Underground at 10:03, then the next data point will be sent at 10:13 even though data is logged every minute between 10:03 and 10:13.

You can sort data feeds by Feed Type, Nickname (for the station), or status.

Click Test to verify that the station ID and password entered in HOBOlink is recognized by Weather Underground.

Important: When registering a new station with Weather Underground, there is a wait time up to 30 minutes before the Station ID/Password can be validated by HOBOlink due to constraints on the Weather Underground system.

Click Edit to make changes to the data feed and then click Save.

Click Delete if you want to delete the data feed from HOBOlink. This does not remove the station from Weather Underground, but it will stop the push of data for that station from HOBOlink to Weather Underground.

Notes

- HOBOlink pushes data to the Weather Underground Tabular Data only. HOBOlink does not control the Weather Underground Summaries or Stickers. If you are using Summaries or Stickers, be aware that there may be instances where the values do not match the HOBOlink data due to limitations in Weather Underground.

- If the Weather Underground push service becomes temporarily unavailable, data that was uploaded to HOBOlink while that service is unavailable will not appear in Weather Underground immediately. Any data uploaded to HOBOlink while the connection to Weather Underground is unavailable will be pushed when the service comes back online.

- Do not use the same station ID for multiple devices because Weather Underground is only able to display one data record per logging sample time. Instead, register each of your stations in Weather Underground separately, creating individual station IDs for use in HOBOlink.

Setting up a NEWA Data Feed

1. Make sure the station is configured with a connection interval of 10 minutes and a logging interval of 5 minutes. If your data plan does not support that logging interval, then set this to the maximum rate supported by the plan you have. See Readout Configuration and Module/Sensor Configuration in Chapter 2 for details on setting the connection interval and logging interval respectively. See also the quick start for setting up a station for NEWA at www.onsetcomp.com/support/manuals/23631-RX3000-QS-NEWA.

2. In HOBOlink, click Data and Data Feeds.

3. Click Create New Data Feed.

4. For Destination, select NEWA.

5. For Device, select the station.

6. Assign the sensors by selecting the sensors that will feed into each NEWA measurement type. For Soil Temperature and Soil Moisture, select the depth for the sensor.

7. Click Save. Refer to the quick start at www.onsetcomp.com/support/manuals/23631-RX3000-QS-NEWA for details on contacting NEWA to link the station to the network.

Setting up an AQUARIUS Data Feed

The following diagram is an overview of how data from HOBOlink can feed into an AQUARIUS Time-Series via AQUARIUS Connect.
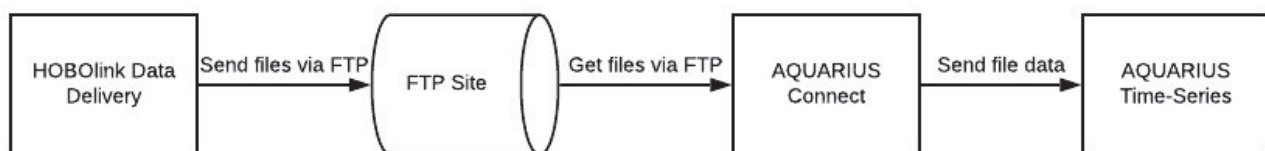
Before You Begin

To set up this data feed, you must first do the following:

1. Create and run an export with Text (.csv) as the selected file format and all of the sensors selected that you want to include in the data feed. See Exporting Data earlier in this chapter for details. You will need to reference the exported .csv file when setting up AQUARIUS Connect.

2. Set up a data delivery schedule using the export created in the previous step and select FTP as the data destination. See Scheduling Data Delivery earlier in this chapter for details. This data feed requires an FTP site to receive regularly delivered HOBOlink files. Make sure at least one file has been delivered to the FTP site to test AQUARIUS Connect and that AQUARIUS Connect has access to the FTP site.

3. Make sure you have AQUARIUS Time-Series admin credentials.

4. Set up an AQUARIUS Time-Series and create the desired Time-Series Location. Refer to the AQUARIUS Time-Series documentation for details. If any parameters or units were added or modified to the AQUARIUS Time-Series, you will need those items as well.

Setting up AQUARIUS Connect

Follow these steps for setting up AQUARIUS Connect and then testing the data feed. Make sure all the steps described in Before You Begin have been completed first.

Step 1: Create a Location.

1. Click Locations in the left menu.

2. Click +Create Location.

3. Populate the fields as follows:

    a. Set the Identifier to the Location Identifier from AQUARIUS Time-Series.

    b. For Name, enter an identifiable name.

    c. Set Time Zone to the time zone of Location in AQUARIUS Time-Series.

    d. For Description, describe the location if desired.

4. Click Save in the upper right. **Note:** If you have more than one location, repeat these steps.

Step 2: Create a Connector.

1. Click Connectors in the left menu.

2. Click +Create Connector.

3. For Name, enter an identifiable name.

4. For Description, enter details if desired.

5. Click Single Location. **Note:** You can also use Multi-Location if you are using more than one location.

6. Click the Location row and select the location created in Step 1 from the drop-down list.

7. Set the drivers and rules as follows:

    a. Click the Extraction Driver rule and select CSV Extraction Driver from the drop-down list.

    b. Click the Inbound Connection Driver row and select the FTP Inbound Connection Driver from the drop-down list.

    c. Under Extraction Rule, complete the following:

        i. Set Header Row to 1.

        ii. Set First Data Row to 2.

        iii. Set Date Column to 2.

        iv. Set Date Column Format to MM/dd/yy HH:mm:ss.

    d. Under Inbound Connection Rule, complete the following:

        i. Set the FTP Server to the FTP server name used for data delivery.

      ii.   Set the User Name to the FTP server user name.

      iii.   Set the Password to the FTP server password.

      iv.   Set the Source Path to the path on the FTP server where the exported HOBOlink files are delivered followed by /*.csv (i.e. <path to files>/*.csv).

8. Click Save in the upper right to save the connector.

Step 3: Create Connector Data Set Rules.

Note: Steps 3 through 7 in this section must be repeated for each sensor that is included in the exported .csv file.

1. Click Connectors in the left menu.

2. Click the connector created in Step 2.

3. Click +Add Data Set Rule near the bottom.

4. Referring to the exported .csv file, set the Data Set Identifier to the column number of the data to load. For example, if the sensor data is in the third column of the .csv file, then set the Data Set Identified to 3.

5. Enter the name of the Data Set under Display Name. This will be saved in AQUARIUS Connect.

6. Add an Export Target.

   a.   Click + Add Export Target.

   b.   Enter the name of the Export Target under Display Name. This will be saved in AQUARIUS Connect.

   c.   Click Export Driver and select AQUARIUS Time-Series Export Driver from the drop-down list.

   d.   Expand Export Rule.

   e.   Expand Aquarius Time-Series Authentication.

      i. Set AQUARIUS Time-Series Username to the admin username of the AQUARIUS Time-Series instance.

      ii. Set AQUARIUS Time-Series Password to the admin password of the AQUARIUS Time-Series instance.

   f.   Set the Parameter Identifier based on the measurement type of the data being loaded. Use the following Parameter Identifiable table for reference.

Measurement Type	Identifier
Water Temperature	Water Temp
Air Temperature	Air Temp
Internal Temperature	Internal Temp
Atmospheric Pressure	Atmos Pres
Relative Humidity	Rel Humidity
Precipitation Incremental	Precip Increm
Evapotranspiration Amount	Evapotrans
Total Incoming Solar Radiation	Solar Rad
Wind Direction	Wind Dir
Wind Speed	Wind Vel
Wind Gust Speed	Wind Cust Vel
Depth	Depth
Voltage	Voltage
Photosynthetically Active Radiation	PAR

Measurement Type	Identifier
pH	pH
Water Level	Water Level

Note: There are many other parameters available. If the one you require is not listed, consult your AQUARIUS Time-Series instance.

g. Enter the desired label of the new Time-Series under Time-Series Label. This will be saved in AQUARIUS Time-Series.

h. Expand Time-Series Creation.

    i. Uncheck Inherit from Profile next to Time-Series Creation Mode.

    ii. Set Time-Series Creation Mode to Create Basic Time-Series.

    iii. Set Interpolation Type for the new time-series to Type 1.

    iv. Set Unit for New Time-Series based on the data being loaded. Use the following Units table for reference.

Unit Name	Unit Identifier
Fahrenheit	degF
Celsius	degC
Pound per Square Inch	psi
Pascal	Pa
Kilopascal	kPa
Inch	in
Millimeter	mm
Foot	ft
Meter	m
Radian	rad
Degree	deg
Mile per hour	mph
Meter per second	m/s
pH Unit	pH Units
Volt	V
Millivolt	mV

Note: If the unit you require is not listed, consult your AQUARIUS TIme-Series instance.

i. Expand Outbound Connection Rule.

j. Set Address to the URL of the AQUARIUS Time-Series instance.

7. Click Save in the upper right to save the data set rule.

8. Repeat 3 through 7 for each column of data in the .csv file to be loaded into the connector.

Step 4: Test the Connector.

1. Click Connectors in the left menu.

2. Click the connector created in Step 2.Click Run Connector in the upper right.

3. Check AQUARIUS Time-Series to ensure the Time-Series and data points are added. Note: Connectors may take a few minutes to run

4. If data is present, then the test is complete. Continue to Step 5 to create a schedule.

If data is not present, click Event Log in the upper right. If the most recent line is marked as "Processing," then wait a few minutes and click Refresh. if the most recent line is marked as "Error," then double-check that the data set rules were configured correctly.

Step 5: Create a Schedule.

Note: The schedule you create in AQUARIUS depends on the data delivery schedule set in HOBOlink. The following steps assume exported files are being delivered to the FTP site every 30 minutes.

1. Click Schedules in the left menu.

2. Click +Create Schedule.

3. Set the Name to something identiable.

4. Enter a Description if desired.

5. Click Enabled.

6. Click +Add Trigger.

    a. Click Never and set to Daily.

    b. Set Step to 00:30 (substituting for 30 the interval of your data delivery schedule).

    c. Set From Time to 00:00.

    d. Set To Time to 23:59.

7. Click Save in the upper right to save the schedule.

Step 6: Assign the Schedule to the Connector.

1. Click Connectors in the left menu.

2. Click the connector created in Step 2.

3. Click Edit Connector in the upper right.

4. Click Schedule.

5. Select the schedule created in Step 5.

6. Click Save in the upper right.

Once the schedule is assigned to the connector, AQUARIUS Connect will follow that schedule to retrieve the data delivery files on the FTP site and add the data from them into AQUARIUS Time-Series.

Important: AQUARIUS Connect currently cannot clean up files from an FTP site and will therefore process all files present every time it runs. It is recommended that you periodically remove old files from the FTP site to reduce the processing required by AQUARIUS Connect.

Changing Export File Settings

Click User Settings and then Export to change the following:

Export File Format Settings

To change the export file format settings:

1. Click User Settings and then click Export.

2. Under File Format Settings, change the following settings as desired. You can preview changes made to the date and time format in the Date Sample field.

    - **Default File Format.** Choose one of three ways for the exported data to be saved: Text (.csv), Excel (.xlsx), or HOBOware CSV (.csv). The "HOBOware CSV" file type will set up the exported file with the preferred settings for importing into HOBOware (settings that are ignored when selecting "HOBOware CSV" are marked on this tab). Note that YAML header information will be included HOBOware CSV files, but not in Text (.csv) or Excel (.xlsx) files.

    - **Column Separator.** Choose whether the data in the file should be separated by tabs, commas, or semi-colons.

- **Date Format.** Choose how the date will be listed in the exported file: Month Day Year, Day Month Year, or Year, Month, Day.

- **Date Separator.** Select the character that will separate the date in the exported file: Slash (/) or Dash (-).

- **Time Format.** Select how the time will be listed in the exported file: in 12-hour format or 24-hour format.

- **Default Time Zone.** Select which time zone should be used for the exported file.

- **Positive # Format.** Select how positive numbers will be formatted in the exported file based on these examples: 1,234.56; 1 234,56; 1.234,56; or 1.234 56.

- **Negative # Format.** Select how negative numbers will be formatted in the exported file based on these examples: -123; 123-; or (123).

- **Separate date and time into two columns.** Select this option if you want the date and time to be in two columns instead of combined into one in the exported file.

- **Include line number column.** Select this option if you want the exported file to contain a separate column to the left of the data that lists a line number for each data point.

- **Include logger and sensor label in column header if available.** Select this option to add any logger or sensor labels/names to the sensor column header in the exported file.

- **Include logger and sensor serial number in column header if available.** Select this option to add any serial numbers for the logger and sensors as well as the sensor product code to the corresponding column header in the exported file.

- **Include export settings in header.** Select this option to include the export name and time frame as defined in the export.

3. Click Save when done.

Default FTP (or SFTP) Settings

To change the default FTP/SFTP settings used with exported files:

1. Click User Settings and then click Export.

2. Under Default FTP (or SFTP) Settings, enter the following information for the server where you want exported files to be delivered:

   - **Server.** Type the name of the server (e.g. ftp.companyname.com).

   - **Port.** Type the port number used for the server or leave the field blank if the server uses the default port.

   - **Remote Folder.** Type the name of the folder on the server where you want the exported files to be delivered. Folders beginning with a slash (/) are expected to be root directory paths. Folders without a slash are assumed to be relative to your home directory.

   - **Username.** Type the username for the account used to access the server.

   - **Password.** Type the password to access the server.

   - **Compress uploaded files.** Select this option if you want to compress the file before delivering it to the server.

   - **Use secure connection.** Select this option if the server is secure (SFTP). If this option is selected, then click the Use certificate checkbox if the server uses a digital certificate for authentication. See the section on SFTP Certificate Setup earlier in this chapter for more details.

   - **Use passive mode.** Select this option if the server runs in passive mode (necessary if the server is running behind a firewall). This option is not available if you have selected the Use secure connection checkbox.

3. Click Test Connection to make sure HOBOlink can connect to the server using the settings entered.

4. Click Save when done. These FTP/SFTP settings will automatically be available for exports on the Data Delivery tab. You can override these default settings for a specific Data Delivery without impacting the defaults.

Default Email Settings

To change the default email settings used with exported files:

1. Click User Settings and then click Export.

2. Under Default Email Settings, type the email address to be used for delivering exported files. This email address is associated with exported files only. To change the email address for your HOBOlink account, click the Account Info tab.

3. Select "Compress email file attachments" if you want to minimize the size of the exported file before emailing it.

4. Click Save when done. These email settings will automatically be available for exports on the Data Delivery tab. You can override these default settings for a specific Data Delivery without impacting the defaults.

Chapter 5
Reference

Click Support in HOBOlink to view the current supported browsers, terms of use, and new features.

This chapter includes the following reference topics:

- Changing User Settings
- Tips for Working with Wireless Sensors
- Updating Device Firmware
- Managing a Communications Plan
- Removing a Device
- Troubleshooting
- FAQs
- PDF Guides

For additional help, contact Onset Technical Support at 1-800-LOGGERS or 508-759-9500 or visit www.onsetcomp.com/support/contact.

Changing User Settings

Click User Settings to change account settings, units, public access, and export settings.

Account Info

Click User Settings and then Account Info to see the first and last name, email address, and username associated with your HOBOlink account.

- To change the name associated with the account, type the new first or last name in the First Name and Last Name fields and click Save.
- To change the email address associated with the account, type the new address in the Email Address field and click Save.

> **Important:** The email address listed here will be used for all correspondence related to this device, including device communications plan expiration warnings and plan renewal information if applicable. Alarms and Data Delivery emails, however, can be sent to any email address.

- To change the password, click the Change Password link, type the old password and then the new password twice and click Save.
- You cannot change the username you selected when you created the account.

Units

Click User Settings and then Units to display the current default units selected for all devices registered to your HOBOlink account. Click the drop-down arrow to select US or SI (Metric) units and click Save. The sensor readings displayed on the device page are updated immediately to reflect a change in units as are graphs for RX3000 and RX2100 stations. Device graphs for U30 stations, however, will not display the new units until the next time device connects to HOBOlink.

Public Access

Click User Settings and then Public Access to make your device and U30 summary pages public. See Sharing a Device Page for details. You can also share dashboards. See Sharing a Dashboard in chapter 3 for details.

Export

Click User Settings and then Export to change the preferences used for exporting data, including file format, FTP/SFTP, and email settings. See Changing Export File Settings for details. Note that the email address listed for Export is associated with exported files only and can be different than the one used for your HOBOlink account.

Tips for Working with Wireless Sensors

If you are using wireless sensor motes with your station, you can monitor mote battery level and network connectivity health to make sure data is being transmitted across the network to the station as expected.

Checking Mote Battery Power

There are two ways to check the remaining battery power in a mote:

- Click Devices, then List, and click the station. Click Overview and check the Battery column for the wireless sensors under the current conditions. The percentage of battery power remaining for each mote is listed.

- Click Devices, then Map, and hover over a mote to see the percentage of battery power remaining.

Motes with rechargeable batteries installed require regular sunlight to remain charged. If the remaining battery percentage for a mote is regularly lower than expected, you may need to readjust it so that the built-in solar panel receives optimal sunlight. Mote position may also need to be adjusted periodically as the path of the sunlight changes throughout the year or if tree and leaf growth alters the amount of sunlight reaching the solar panel. Older rechargeable batteries eventually lose their charge and will need to be replaced.

If the mote has non-rechargeable batteries installed, monitor the remaining power and replace the batteries when it gets low (under 10 percent).

Monitoring Network Connectivity

In the RX Wireless Sensor Network, data is transmitted wirelessly across the network to and from the station, which then uploads the data to HOBOlink. This data transmission relies on the ability for one mote to send data to the next, finding an alternate mote within range if the closest mote is unavailable. HOBOlink includes a network connectivity health rating so that you can check whether a particular mote is reliably connecting to the network and if not, make an adjustment to its position or proximity to neighboring motes to increase its connection reliability.

There are two ways to check network connectivity:

- Click Devices, then List, and click the station. Click Overview and check the Connectivity column for the wireless sensors under the current conditions.

- Click Devices, then Map, and hover over a mote to see the connectivity level. This also shows the signal level, which indicates how strong the wireless signal is between motes (this is also available on the mote LCD). Signal strength correlates with network connectivity: the stronger the signal, the better the network connection.
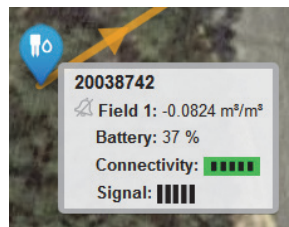
These are the network connectivity levels:

- Green with five bars indicates the mote is regularly connecting to the network successfully and is within range of neighboring motes.

- Orange with two to four bars indicates the mote does not always connect to the network successfully. The more bars, the higher percentage of successful transmission. Consider checking on the mote and adjusting its position or the location of neighboring motes if necessary.

- Red with one bar indicates the mote is not regularly connecting to the network and needs to be repositioned for reliable communications.

- White with no bars indicates the mote is offline and not connecting to the network. If the mote has been newly added and waiting for its first sensor reading, no action is needed. If you expected it to connect, check the mote for errors.

Follow these guidelines when network health is poor:

- Make sure there is full line of sight between motes because obstructions prevent reliable network communication. If the mote is blocked by a small obstruction (e.g. a pole, the station, shrubbery), then move the mote to a location where the obstruction is not blocking the path to the nearest mote. If there is a change in elevation between motes or a large obstruction is in the way (e.g. a building or tree), then either reposition the mote until there is full line of sight to the next mote or add a repeater between them.

- If you move the mote to a new position, check the signal strength on the mote LCD in the location where you want to place the mote. If there is only one or two bars on the signal strength indicator, look for a location where the signal strength is stronger.

- Make sure the mote is mounted vertically a minimum of 1.8 m (6 ft) from the ground or vegetation to help maximize distance and signal strength. Consider using plastic poles such as PVC to mount the mote as certain types of metal could decrease signal strength.

- There should not be more than five motes in any direction at their maximum transmission range from the station. Data logged by a wireless sensor must travel or "hop" across the wireless network from one mote to the next until it ultimately reaches the manager at the station. To make sure the data can successfully travel across the network, the mote should not be more than five hops away from the station.

- For optimal network health, consider placing several motes within range of each other to provide multiple paths for transmission of data should one mote be temporarily unavailable.

What happens when a mote goes offline?

If a mote is temporarily offline, any logged data is saved until it is back online. In addition, if a mote is offline for 30 minutes, the station will automatically connect to HOBOlink and trip a system alarm to report the mote as missing. A mote can go offline if there is not enough battery power, it loses its wireless signal, or other error. If a mote is offline longer than expected, check it and make any adjustments as necessary as described in the previous two sections. Once the mote is back online, it enters a period of data recovery, during which all the data that was logged while the mote was offline is uploaded to HOBOlink. When a mote is in data recovery mode, sensor data for that mote will be temporarily unavailable for data delivery, data feeds, and dashboards. Graphs on the device page may also temporarily have gaps as new data may be plotted before all data is updated for the time frame when the mote was offline. New data will also be uploaded to HOBOlink at the same time so there may be readings reported from the last connection on the device overview page even though all older data is still being processed.

Any sensor alarms that should have tripped while the mote was offline will be added to the alarms log for the station, but no notifications will be sent because the alarm condition may no longer be in effect. Any alarms that trip for newly logged data will result in notifications and updates to graphs, but will not appear in dashboards until data recovery is complete.

A note appears next to the mote in the conditions panel indicating the mote is in data recovery mode. In addition, an event is recorded in the station connections log every time a mote enters and exists data recovery mode. To check the log:

1. Click Devices, then List, and click the station.

2. Click Logs and then click Connections. You may need to select Full Log at the bottom of the Logs panel to see the data recovery events. Select Only Errors for the filter at the top.

Updating Device Firmware

Firmware updates may occasionally be required for stations and motes.

To update the station firmware:

1. Click Devices and then RX Devices, and click the station.

2. On the Device Information panel, click the General tab.
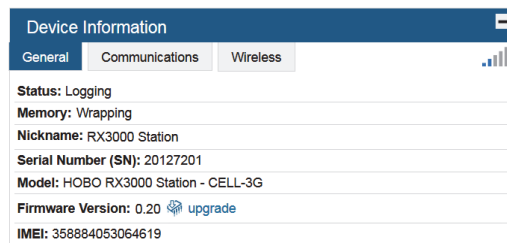
3. Click the upgrade link.

4. Select the Upgrade on Next Connection checkbox and click Save. The station will update automatically the next time it connects to HOBOlink. If the cellular or wireless signal is weak and the firmware upgrade cannot be completed, contact Onset Technical Support at www.onsetcomp.com/support/contact for help.

To update the firmware on wireless sensor motes:

1. Click Devices and then RX Devices, and click the station.

2. On the Device Information panel, click the Wireless tab. This icon appears next to the mote if there is a new version of firmware available.

3. Click the upgrade link. Click Download and save the firmware .bin file to your computer.

4. Connect the mote to the computer with a USB cable (open the mote door and use the USB port to the right of the LCD). The blue LED is illuminated while connected.

5. The mote appears as a new storage device in the computer's file storage manager. Copy the downloaded firmware file to the new storage device (the mote). The blue LED will blink slowly while the file is copying.

6. After the file is copied to the mote, the LED will stop blinking and remain a steady blue. Eject the storage device from the computer and disconnect the cable from the mote. The firmware installation process will begin automatically on the mote. The blue LED will blink rapidly while the firmware is installed. Once the firmware installation is complete, the LCD symbols return and the mote will automatically rejoin the network.

Notes:

- **Mac® users:** A message may appear indicating the disk has not ejected properly when disconnecting the mote from the computer. The mote is operational and you can ignore the message.

- If the blue LED turns off abruptly while copying the file or installing the firmware, a problem has occurred. Contact Onset Technical Support for help.

Managing a Communications Plan

A communications plan is required for cellular, Wi-Fi, and Ethernet stations. The Communications tab in the Device Information panel on your station's page displays details about your station's communications plan, including the plan number, start and end date, signal strength (cellular and Wi-Fi models only), and the monthly cellular usage (cellular models only). The plan options vary depending on the model and your connection needs. Contact Onset or your Onset Authorized Dealer for details on communications plans.

Tracking Plan Usage

Some communication plans are set up to allow a specific amount of data usage per month. To check the percentage of your plan used so far in a month, view the Communications tab on the Device Information panel on your device overview page. The bar for Monthly Cell Use indicates the percentage of the plan used so far in the month. The color of the bar changes from green to orange or red depending on how close the device is to exceeding its plan limits.
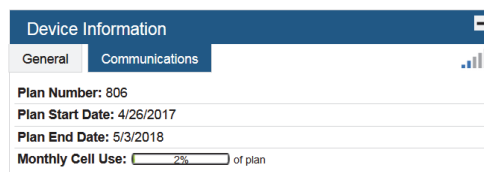
Another way to track monthly plan usage is to open Launch Configuration (for U30 stations), Module Configuration (for RX3000 and RX2100 stations), or Readout Configuration. These show the actual usage to date (for example, 26% of the plan) and the estimated usage based on the current settings. As you change the logging interval or the connection interval, the estimated usage will automatically update so that you can determine whether your communication plan can support the revised settings.

> **Important:** The estimated usage assumes the device will not be restarted and that there are no tripped alarms. A tripped alarm uses approximately 7K of communications data depending on your configuration and the number of sensors. Be sure to factor in the number of alarms you expect to receive when selecting logging and connection intervals. Also try to minimize the number of times the device is restarted in a month as this requires data from your plan.

HOBOlink issues several notifications if the device is close to exceeding or has exceeded the byte allocation for your data plan:

- Launch Configuration (for U30 stations), Module Configuration (for RX3000 and RX2100 stations), and Readout Configuration display the date on which the plan usage will reach 100% based on the current settings.

- A warning appears at the top of your device page.

- An email is sent to the email address for the HOBOlink account.

- The icon in the Communications column on the RX devices list changes to (i) or (!) to indicate there is a caution or warning. Hover over the icon to view the message.

- The status on the General tab of the Device Information panel changes if the monthly data usage has been exceeded.

If you see any warnings in HOBOlink or receive an email that the station is in danger of exceeding its plan limit, adjust the logging interval and/or the connection interval immediately to avoid suspension of service. If the station has already exceeded its limit, all alarms will be disabled and the station will not connect to HOBOlink again until the first day of the next month. Change the logging and/or connection

interval to avoid exceeding the plan next month or contact Onset or your Onset Authorized Dealer about changing to a plan that better suits your data requirements.

Plan Expiration

The plan expiration or end date is listed on the Communications tab in the Device Information panel. If the plan is nearing expiration, an email will be sent to the email address for the HOBOlink account. The icon in the Communications column on the RX devices list will

change to ⓘ if the plan is nearing expiration or ⊘ if it is past the expiration. A warning will also be displayed at the top of the device page like this:
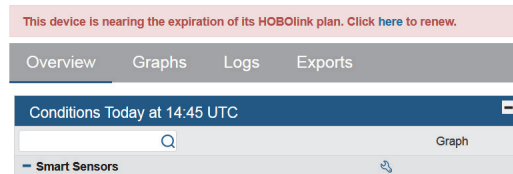
> **Important:** Failure to renew your plan before the expiration date may require the station to be returned to Onset for service.

Contact Onset or your Onset Authorized Dealer to renew a plan.

For U30 stations: If you change the plan prior to its expiration date (which will result in an additional fee), you must follow these steps:

1. Remove or unregister the device from your HOBOlink account.

2. Remove the power sources from the device and then plug them back in to force a connection to HOBOlink. Allow the device to make one full connection to HOBOlink.

3. Re-register the device (click the Register a Device link on the Devices page). The device is now registered to your account with the new communications plan. The minimum logging and connection interval values supported by the plan are automatically entered in HOBOlink by default.

Removing a Device

To remove or unregister a station from your HOBOlink account:

1. For U30 stations: Download all the data files for the station because you will not be able to use HOBOlink to access files from that station once it is removed.

    For RX3000 and RX2100 stations, export any data (see Exporting Data in Chapter 4) you want to keep as you will not be able to use HOBOlink to access data from that station once it is removed.

2. Click Devices and then RX Devices.

3. Click the 🗑 icon to remove the device. Confirm that you want to remove the station when prompted.

The station is no longer registered to your account and will not automatically connect to HOBOlink anymore. The station can be registered to another account or re-registered on the same account in the future. For RX3000 and RX2100 stations, press the Connect button on the station to connect to HOBOlink once it is re-registered. For U30 stations, once the station is registered again, you can force it to connect to HOBOlink by cycling the power (disconnect the battery and AC adapter or solar panel, wait 20 to 30 seconds and then reconnect the battery first and then the AC adapter or solar panel) or by using the Contact HOBOlink button in the Status window in HOBOware.

To remove a mote from the RX Wireless Sensor Network:

1. Click Devices and then RX Devices, and find the station with the mote you want to delete. Click the arrow next to 🔧 and select Module/Sensor Configuration.

2. Select the mote from the Configuration menu (do not click the measurement type for the mote).

3. Click Delete to remove the mote from the network.
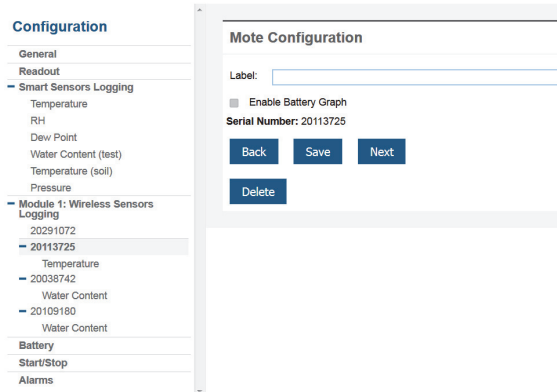
4. If the mote you are deleting is currently active on the network (i.e. powered up and transmitting data), the station will need to connect to HOBOlink to complete the removal process. Otherwise, the mote will not officially leave the network and can attempt to automatically rejoin the network in the future. To connect to HOBOlink, press the Connect button on the station. Once the station is connected, a command is sent to the station and the mote permanently leaves the network.

Troubleshooting

Check this list or the frequently asked questions in this chapter if you are having trouble with your device. For additional help, contact Onset Technical Support at 1-800-LOGGERS or 508-759-9500 or at www.onsetcomp.com/support/contact, or contact your Onset Authorized Dealer.

Too many calls are being made to HOBOlink.
- Select a slower connection interval in Readout Configuration.

- Consider setting up a second connection schedule at a less frequent rate by enabling Night Mode in Readout Configuration.

- The cellular signal at the device location may be weak or there may have been an interruption in cellular service. Consider repositioning the device to a location with a stronger signal if the problem persists.

Too much battery power is being used by the RX3000, U30, or my solar-powered RX2100 station.
- If you are using an external solar panel, make sure it is installed properly and functioning. The solar panel should provide enough power to recharge the battery during the day.

- Use the AC adapter to recharge the battery.

- RX2100 stations using the built-in solar panel may need to be repositioned if it is not receiving enough sunlight to keep the battery charged. Or, you can add an external solar panel.

The power has run out for a station with rechargeable batteries.
Recharge the battery for 12 hours with the AC adapter. If the battery cannot be recharged, you will need to replace the battery. Contact Onset Technical Support or your Onset Authorized Dealer. It is always recommended that either a solar panel or AC adapter be connected all the time to provide a trickle-charge to the battery.

Important: The station uses durable, high-capacity Flash memory so data is retained even when the battery runs out of charge. Do not restart the device until the data has been recovered. If the battery cannot be recharged and you are still unable to read out the device, contact Onset Technical Support or your Onset Authorized Dealer as it may be possible to retrieve the logged data.

I tried to install a new module in an RX3000 station, but it isn't displaying in HOBOlink.
The RX3000 station should be powered down before installing a new module. Try unplugging the battery and any power charging devices (AC adapter, solar panel). If you installed an RXW Manager module, make sure it is plugged into the manager mote. Wait a few seconds and then reconnect the power. If the mote still isn't recognized, turn the power off again and make sure the module is installed properly with the pins fully inserted in the connector on the station.

One or more of the installed smart or analog sensors are not logging.
- For RX3000 or RX2100 stations: Check that the sensor appears in Sensor Configuration. If it does not, then use the Search button on the station to find the connected sensor and then press the Cloud/Connect button reconnect to HOBOlink. For analog sensors, make sure "Enable this channel" is selected in Sensor Configuration.

- For U30 stations: If a sensor was added or changed while the device is logging, the device must be relaunched to detect the changes and begin recording data. Select "Force Relaunch on Next Connection" in Launch Configuration.

- Check for a loose connection in the sensors that are not logging.

- For U30 stations: If you are using the smart sensor expander board, make sure it is connected to the device's built-in smart sensor board with the short expander cable. See the U30 stations User's Guide for more details.

- Make sure you have not exceeded 100 meters (328 ft) of network cable for all smart sensors.

- Make sure you have not exceeded 15 smart sensor channels. Note that some smart sensors use multiple data channels. For RX3000 and RX2100 stations, check the smart sensor count on the LCD. For U30 stations, use HOBOware to see a list of all installed smart sensors in the Launch Logger window. Sensors are listed in ascending order by serial number. If more than 15 data channels are connected, the sensors with the higher serial numbers will be ignored and their data will not be recorded.

Changes I made to Launch Configuration (U30 stations), Module Configuration (RX3000 and RX2100 stations), or Readout Configuration haven't taken effect.
Any changes that you made in Launch Configuration or Readout Configuration will not take effect until the next time the station connects to HOBOlink. For example, if the connection interval for the station was set to two hours, then any change you made in Launch Configuration or Readout Configuration won't take effect until the next connection on that two-hour schedule.

The wireless sensor is offline.
If it has only been offline for less than hour, the mote may be temporarily offline due to a poor network connection. If the sensor has been offline for a long time, check its position and the battery. See Tips for Working with Wireless Sensors for details.

There is no data in HOBOlink from my MX series logger.
When configuring a logger with HOBOconnect, you must select whether data should be uploaded to HOBOlink from a gateway or from HOBOconnect. This also requires that HOBOconnect is connected to your HOBOlink account (check Settings in HOBOconnect). If you are using a gateway, make sure it is set up as described in the HOBO MX Gateway Manual. If any loggers were already logging before you set up the gateway, then you will need to reconfigure them and make sure to select to upload data via a gateway.

If you are not using the gateway, data will not appear in HOBOlink until you read out the logger with HOBOconnect. Your phone or tablet must have access to the internet to then upload the data from HOBOconnect to HOBOlink. See the HOBOconnect User's Guide at www.onsetcomp.com/hoboconnect for details on using the app.

There are no status indicators blinking on the U30 station.
- The indicators are very faint under direct sunlight. If no indicators appear to be blinking, shield the device from the light and check the indicators again.

- Check the Device Information panel on the device page and make sure the battery power is not too low. There needs to be at least 3.5 volts for logging to continue and 3.9 volts for cellular communication.

- The memory may be full if the device was not set to "Wrap when memory is filled" in General Configuration. Read out the device and relaunch it.

- The device may not have been launched. Check the Connections tab in the Activity Log panel to see when the device is scheduled to connect or if it is awaiting its first call.

U30 stations: The data file contains errors.
If you are missing data for a particular sensor, check that it was properly installed and configured. Remove and reconnect the sensor and check the status in HOBOware to verify that it can report accurate readings. If you find that it is not communicating, it may be damaged. Contact Onset Technical Support or your Onset Authorized Dealer.

U30 stations: The data file cannot be opened.
In rare circumstances, a data file may become corrupt. Contact Onset Technical Support or your Onset Authorized Dealer.

I launched the U30 station in HOBOware, but my settings are not being logged.
Launches attempted with HOBOware will be overridden the next time the device connects to HOBOlink. If the HOBO U30 stations is communicating with HOBOlink, then it most likely has been relaunched in HOBOlink.

U30 stations: I configured the launch settings, but the station is not logging.
If this is the first time the device has been launched, make sure you have set the connection interval in Readout Configuration.

If this is not the first launch and the device is connecting but still not launching, then select "Force Relaunch on Next Connection" in Launch Configuration and wait for the next connection.

I exported data on my iPhone or iPad and opened the file in Google Chrome. When I try to share the file, a link is shared instead of the file itself.
There is a known limitation with sharing files downloaded from HOBOlink on an iPhone or iPad using Google Chrome. Switch to Safari to open and share the file. Or, if the problem persists, use a computer or Android device to export the data and then open and share the file.

The data file from my export won't open on my iPhone or iPad.
Data files downloaded from HOBOlink on an iPhone or iPad that are very large may not always open as expected. Change the parameters for the export to create a smaller file (i.e. reduce the time frame, sensors, or devices included in the export). Or, switch to a computer or Android device.

FAQs

Check this list or Troubleshooting in this chapter if you are having trouble with your device. For additional help, contact Onset Technical Support at 1-800-LOGGERS or 508-759-9500 or at www.onsetcomp.com/support/contact, or contact your Onset Authorized Dealer.

Where do I find my station serial number and device key?
The serial number and device key are found inside the door of the station. Keep track of these values as you will need them to register the device to your HOBOlink account.

How do I stop my station from connecting to HOBOlink?
You cannot stop regular connections to HOBOlink for a registered, powered station even if it is not logging. You can change to a slower connection interval in Readout Configuration. Unplug all power sources if you do not want it to connect to HOBOlink.

Can I set the order that my graphs are displayed on my device page?
Yes. The graphs are displayed in the same order as the sensors are listed in the Conditions panel on the device overview page. Drag the sensors in the Conditions panel to the desired order and then the graphs will automatically be updated to the same order. Note that graphs must be enabled to appear on the page.

Why does rainfall show as zero in the Conditions panel even though it has been raining?
The Conditions panel shows the rain that fell in the last logging interval only. For example, if the logging interval is set to 1 minute and there wasn't a tip in the rain gauge bucket during that minute, then the rainfall shows as zero.

Why is the channel count on my manager module so high?
The channel count on the station for a manager module reflects the measurement channels and battery for all motes in the wireless sensor network. For example, if the network has one temperature mote, one soil moisture mote, and one temperature/RH mote, then the channel count reported on the station LCD would be 7: one for the temperature channel, one for the soil moisture channel, two for the temperature and RH channels plus three mote battery channels.

How can I increase the signal between my wireless sensor motes?
If the motes in your wireless sensor network have a poor connectivity rating or low signal strength, make sure there are no obstructions between the motes and that it is within communication range of the next mote. See Tips for Working with Wireless Sensors for monitoring network connectivity and adjusting mote positions.

Why isn't my MX Gateway listed in HOBOlink?
If you do not see your MX Gateway in the list when you click Devices and then MX Devices, make sure you have set the HOBOlink settings in the HOBOconnect app, the gateway is powered up, and the network settings have been configured correctly. See Getting Started with MX Gateways in chapter 1 for details.

Why don't my graphs for the U30 station update when I switch from US to Metric (SI)?
To ensure graphs can be viewed in HOBOlink without a delay, they are created at the time the device contacts HOBOlink. Therefore, graphs in the new units will be available after the next time the device connects.

Why don't my sensor labels show up immediately on the HOBOlink graphs for the U30 station?
Since graphs are created at the time the device connects, the new labels will not appear on the graphs until the next time the device connects to HOBOlink.

How do I configure the analog sensor port on the U30 station?
You must use HOBOware to configure an analog sensor port. Connect the device to a computer with HOBOware and select Manage U30 from the Device menu. Channels configured in HOBOware will appear in HOBOlink. See the HOBOware User's Guide for more details.

How do I toggle the relay or set the default state of the relay on the U30 station?
You must use HOBOware to set the default state of the relay in real time. While you can see the state of the relay and set up alarm conditions to trip the relay in HOBOlink, it does not allow real-time control of the relay.

I launched the U30 station in HOBOware, then it was relaunched by HOBOlink. Why did this happen?
HOBOlink is designed to be the primary software for the U30 stations. If you launched your device in HOBOware with different launch or readout settings than HOBOlink, the U30 stations will be relaunched the next time it connects to ensure it is configured to match the settings in the HOBOlink account.

How do I stop the U30 station from logging?
You cannot stop a powered U30 stations from logging or connecting with HOBOlink as it is designed to run continuously without any user interaction. To stop logging and/or connecting to HOBOlink, unplug the battery. When you are ready for the device to begin logging again, you will likely need to select the Force Relaunch on Next Connection setting under Launch Configuration.

How did my U30 station system alarms become disabled?
As soon as one system alarm trips on a U30 station, all system alarms are disabled. For example, let's say the Battery Low and Sensor Failure alarms have all been configured and the Battery Low alarm trips. The Sensor Failure alarms will then be disabled until the Battery Low alarm is resolved and you re-enable all the system alarms.

If I modify any Launch Configuration setting, will the U30 station be relaunched automatically?
If you change the launch description, logging interval, sampling interval, or select Force Relaunch on Next Connection, the device will relaunch automatically. If you only change the Full Readout Upon Power Reset setting, then the device will not be relaunched at the next connection.

Why is there a gap in the data between subsequent data files from the U30 station?
If the device's memory fills in a time period that is less than the length between scheduled connections, some of the data will be overwritten in the device. This can happen on devices that have a full suite of sensors, are set to a 1-minute logging interval, and have a connection/readout interval of more than 24 hours. To avoid this problem, set the connection interval in Readout Configuration to less than 24 hours or increase the logging interval.

Why don't the labels that I added to the dew point sensor and battery display in HOBOware for the U30 station?
Because the battery is not a sensor and the dew point is a derived channel (temperature and RH data is needed to calculate the dew point), they do not have a presence in the header of the .dtf file. Therefore, there is no place to store those values for use in HOBOware. The labels for battery and dew point are saved in HOBOlink and only viewable there. Labels from all other channels are displayed in HOBOware when opening the downloaded .dtf file.