RX3000 Setup with pHionics Water Quality Sensors



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Required Equipment

1. pHionics pH, ORP, Dissolved Oxygen, or Conductivity Sensor
2. HOBO RX3000 with Analog Sensor Module (RXMOD-A1)
3. USB cable (Only necessary for RX3002 - WiFi Model)
    a. Also known as a mini-USB cable
    b. CABLE-USBMB from Onset
4. Ethernet Cable (Only necessary for RX3001 - Ethernet Model)
5. AC-U30 power supply
6. Freshly prepared Calibration Standards (Differs depending on transmitter parameter)
7. Deionized water for rinsing
8. Computer with HOBOware installed (This guide is being made with Version 3.7.21) (may not be necessary with Li-COR Cloud)
9. Small flathead screwdriver

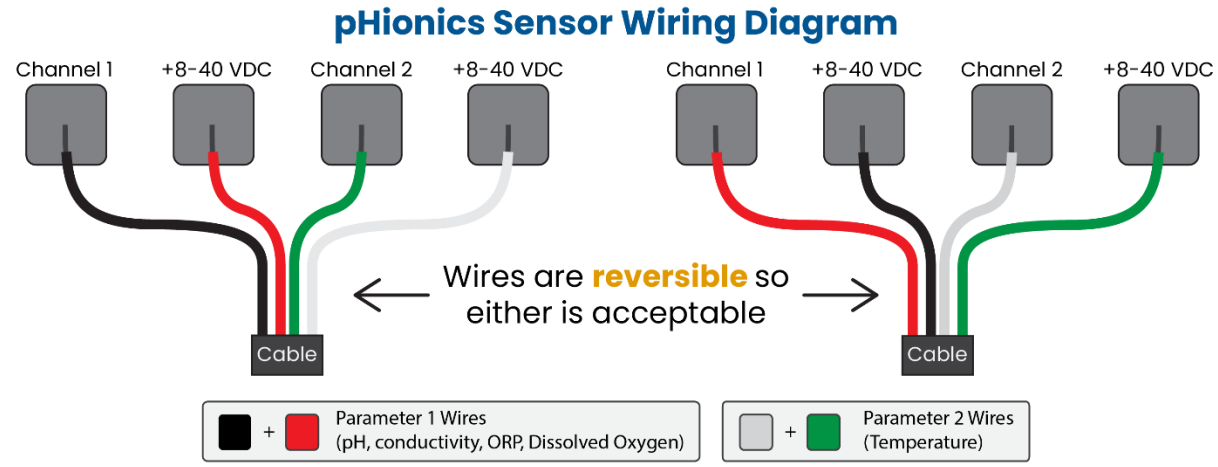
Setting up the HOBO RX3000

Please see Onset's HOBO RX3000 Remote Monitoring Station Quick Start Instructions to set up your RX3000. Follow their instructions to install the Analog Sensor Module.

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Connecting pHionics Sensors to the HOBO RX3000

pHionics sensors use two wires for each parameter, along with a shared shield wire. The red and black wires correspond to the first parameter (pH, ORP, Dissolved Oxygen, or Conductivity) while the green and white wires are for the temperature output. The clear-coated wire is the shield wire. Each pair of wires is **reversible**, so it does not matter whether the red goes in Channel 1 and black in the power supply or vice versa.



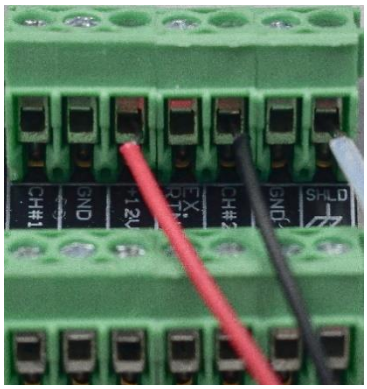
1. Thread the pHionics sensor cable through the access slot at the bottom of the HOBO RX3000.



2. Insert one of the wires for the first parameter (red or black) in the first available channel (**CH#1, CH#2, CH#3, CH#4**) and use a screwdriver to tighten the screw on top of the channel.

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    a. If the wire is loose and falls out during logging, the entire system may require rebooting.
3. Insert the second wire into the **+12V** output and screw it in tightly.
4. *Optional but recommended*: Insert the clear-coated wire into a SHLD connection and screw it in tightly.
    a. The shield wire may provide greater stability and accuracy but is not required.
5. Repeat Steps 2 and 3 for the green and white wires to install the temperature output (OPTIONAL)
    a. A +12V slot accepts more than one wire.
    b. You may not put two wires in a single CH#_ slot.
    c. pHionics sensors have built-in temperature compensation on the main parameter output (red/black wires – pH, ORP, DO, conductivity). You may connect the temperature output but do not need to do so for proper function.
6. Pull lightly on each wire to confirm they are held in place by the screws.

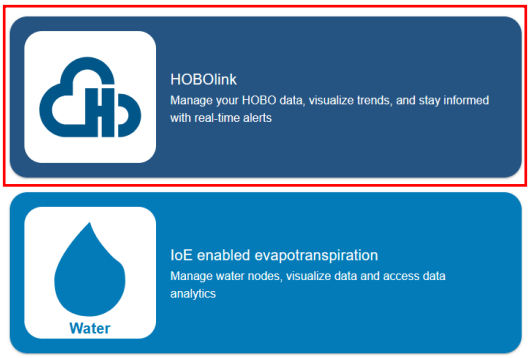


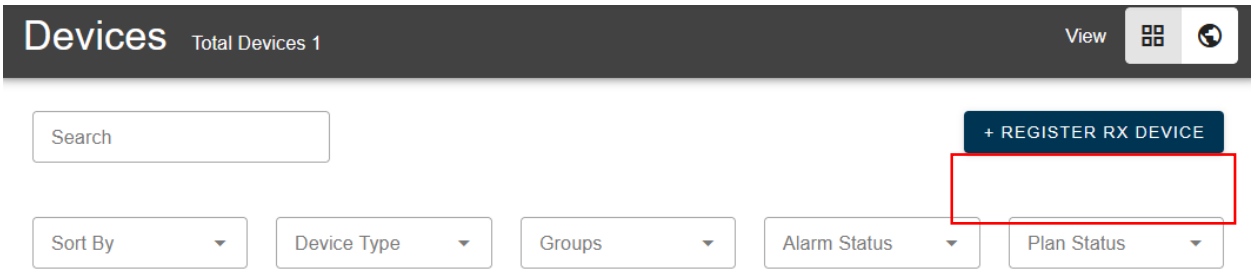
pHionics sensor installed in Channel #2

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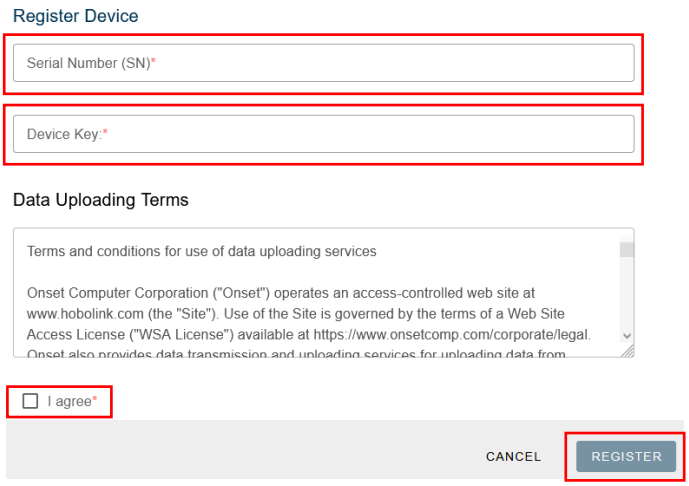
Setting up pHionics Sensors in Li-COR Cloud

1. Sign into https://www.licor.cloud/.
2. Click on the "HOBOlink" button.
3. *If the device has already been registered, skip to Step 7, otherwise complete steps 3-6 to register the RX3000.*
4. Click on "+Register RX Device".





5. Enter the Serial Number (SN) and Device Key (found on inner panel of RX3000 housing) into the blank fields and read through the Data Uploading Terms.
6. Check the box labeled "I agree", then select "Register" at the bottom right of the screen.

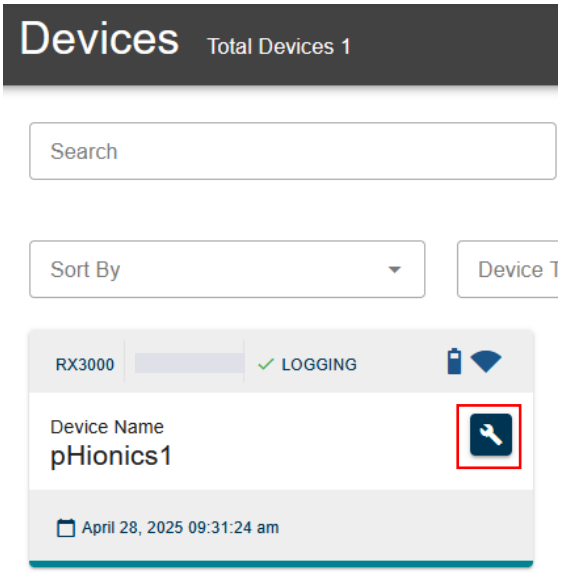


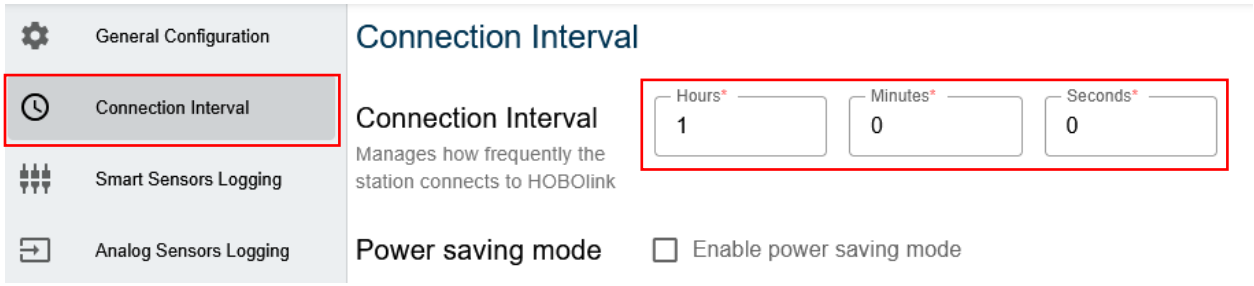
7. Navigate to the "Devices" page and select the wrench icon next to the Device Name to open "Device Configuration" window.

Step 7

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8. Input your desired Device Name and Time Zone, then select "Save".
9. Select "Connection Interval" tab to the right.
10. Set the desired Connection Interval, then select "Save".
    a. This setting controls how often the RX3000 connects to the Licor Cloud to transmit data. A shorter Connection Interval increases how often data is sent but drains the battery faster, and vice versa for a longer interval. The RX3000 also receives updated settings at this interval.
    b. To initiate a data transfer or update manually, press the Cloud button on the RX3000.
    c. You may configure Alarms to trigger at a certain input. Alarms automatically initiate a data transfer regardless of Connection Interval.



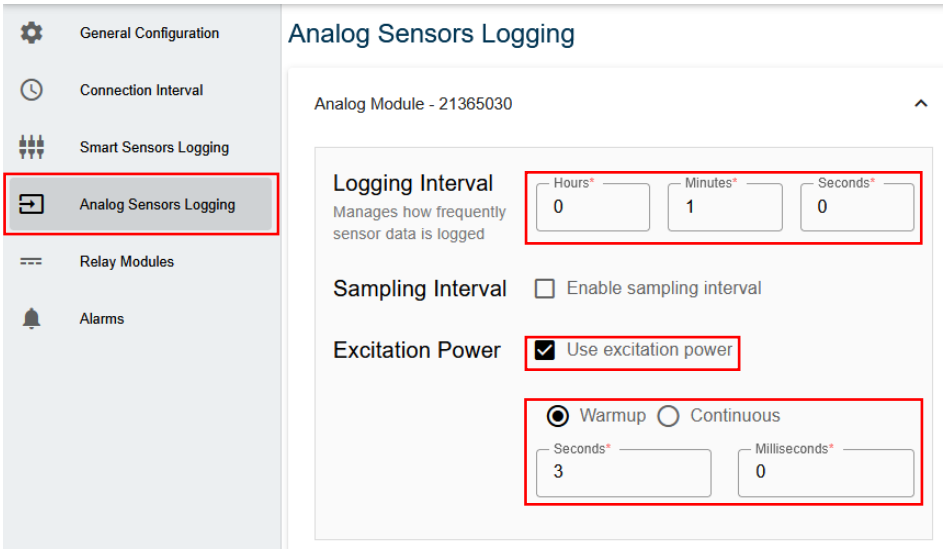


Steps 9-10

11. Select "Analog Sensors Logging" tab in the left menu (see image on next page).
12. Set the Logging Interval to 1 minute to prepare for sensor calibration. Change this setting to your desired interval after calibration is complete.
    a. This is the shortest Logging Interval available for the fastest feedback during calibration.
13. Select "Use Excitation Power".
    a. pHionics sensors cannot function without excitation power.
14. Select "Warmup" and set the time to 3 seconds. Select "Save".

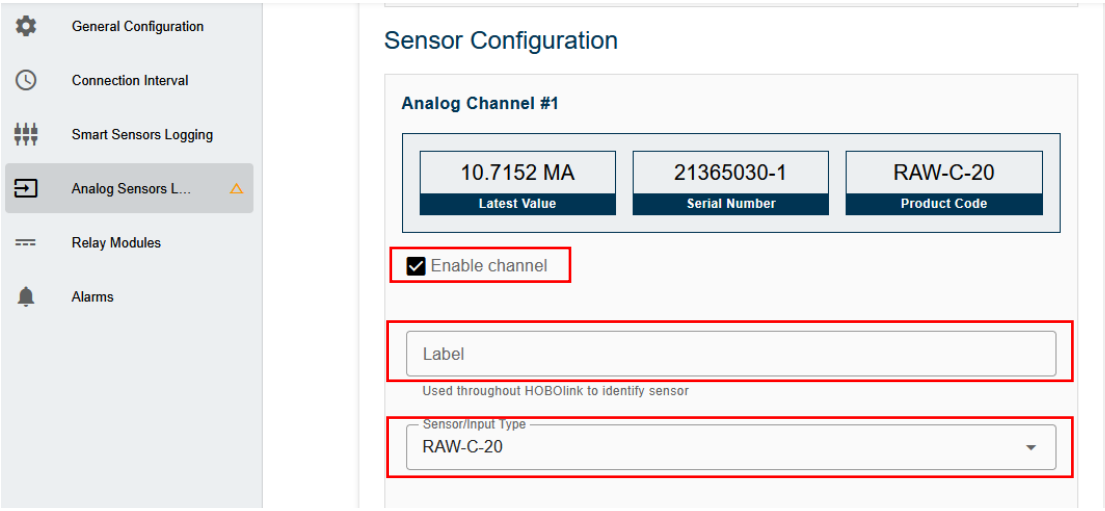
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a. This setting causes the RX3000 to supply power for 3 seconds before each measurement. This power wakes up the sensor and primes it to take a measurement.



Steps 11-14

15. Scroll down to "Sensor Configuration" to find "Analog Channel #1".
16. Select "Enable channel" and input the desired "Label".
    a. In this tutorial, we are connecting a pH sensor so set the Label as **pH**.
17. In the dropdown menu for "Sensor/Input Type", select "RAW-C-20".
18. Select "Save".



Steps 15-17

19. Repeat steps 17-19 to set up a channel for the optional temperature parameter, if desired. Use the channel the green/white wire is connected to.

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Calibrating pHionics Sensors with the RX3000

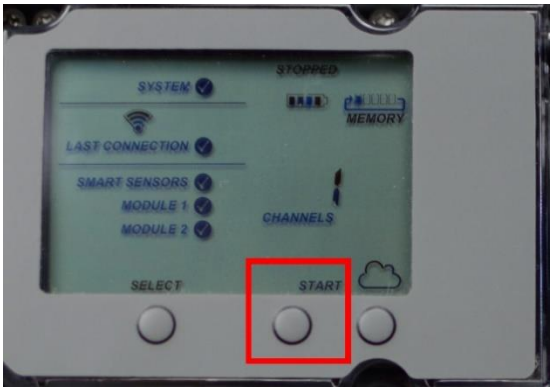
A pH sensor is being calibrated in this example. Other parameters require a similar process with different calibration buffers. For more information, please see our Quick Start Guides or STs Series Manual.

1. Submerse the pHionics sensor in ***freshly prepared*** 7 pH calibration buffer and wait until the output changes no more than ±0.05 mA per minute.
    a. **Always ensure the metal housing is contacting the solution for accurate measurements.**
    b. Standard 50 ml centrifuge tubes work very well for this procedure if properly supported.
    c. This process takes approximately 5 minutes.



Step 1a

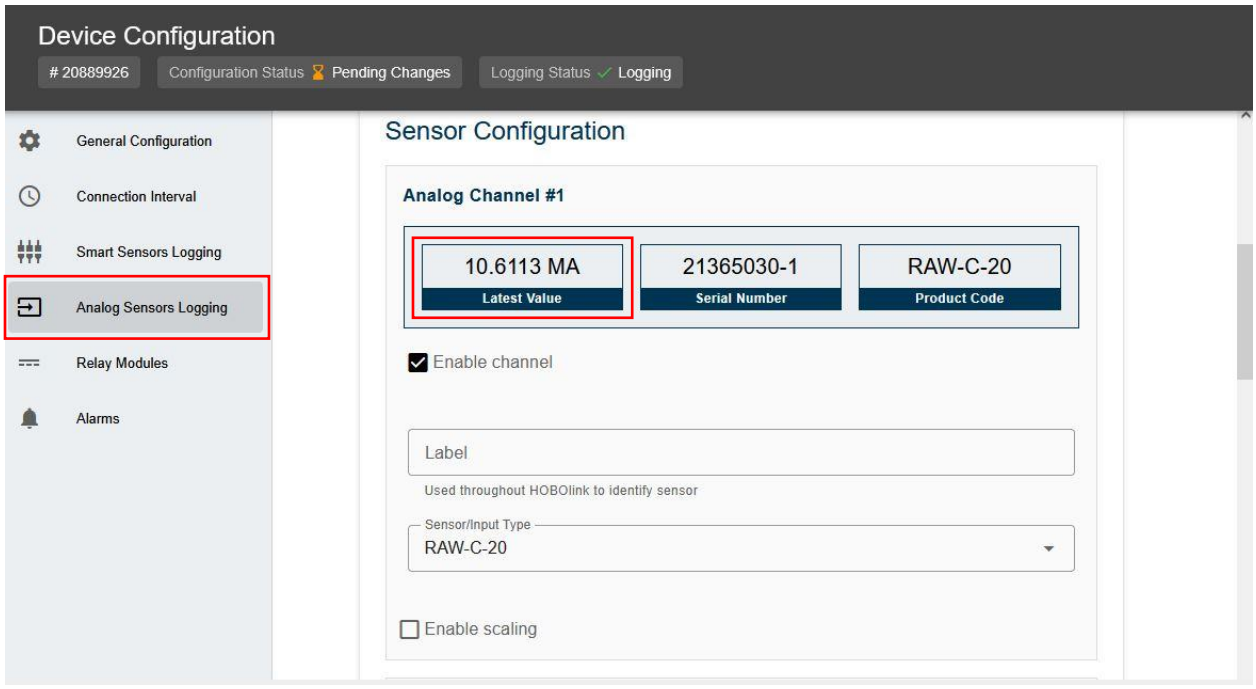
2. If the screen on the RX3000 is blank, press any button to wake it up.
3. Press the middle button under the word "Start" to begin logging.
    a. The words "Last Connection" and the connection symbol should start flashing on the LCD display of the RX3000.



4. Refresh the HOBOlink webpage once "Last Connection" stops blinking and has a checkmark next to it. If the device is already logging, then press the button with the Cloud icon above it to send new data to HOBOlink.
    a. Please note that the RX3000 only records data at set the Logging Interval. If any changes are made to the calibration setup, then it may take a full Logging Interval before the data may be sent to HOBOlink.
5. Open "Device Configuration" by selecting the wrench icon next to the RX3000.

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6. Select the "Analog Sensors Logging" tab, then scroll down to the channel in "Sensor Configuration". Record the latest mA value in the chosen channel of your device on a piece of paper.



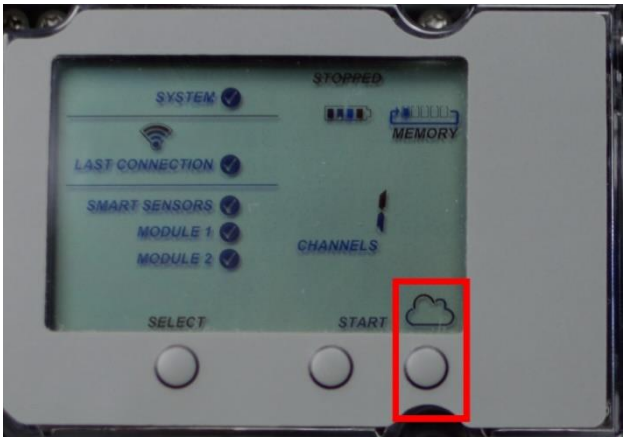
Step 6

   a. For a 7-pH buffer, the mA reading should be 11.50-12.50 mA for a new sensor.
   b. If the reading is less than 4mA, then wait one Logging Interval (1 minute, if following this guide). After waiting, press the far-right button on the RX3000 (the cloud icon). This initiates a connection to HOBOlink. Refresh the HOBOlink page once the 'Last Connection' icon stops blinking and has a checkmark next to it. The updated mA reading should be present. If not, then the wires may not be properly inserted into the **CH#_** or **+12V** slots or the excitation power may not be turned on (Step 14 in *Setting up pHionics STs Series Devices in HOBOlink*)
   c. If the reading is greater than 4mA but outside of the expected range, it is possible the electrode requires cleaning. Follow pHionics Sensor Maintenance Guidelines for cleaning instructions.

7. Remove the sensor from the 7-pH calibration buffer and rinse with purified water (RO/DI or spring water).
   a. Tap water is generally fine but may affect the calibration buffer slight

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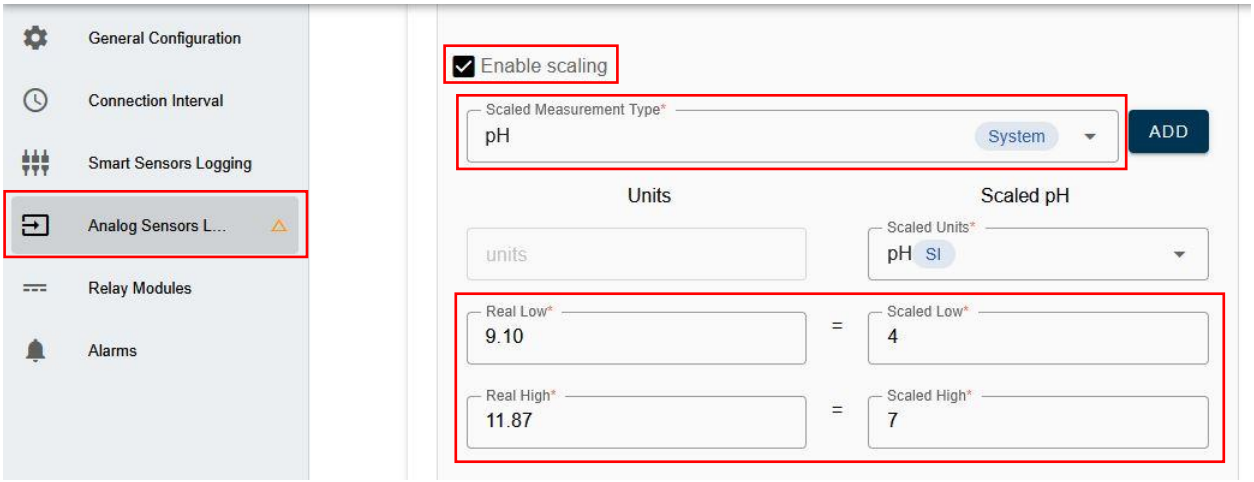
8. Submerse the sensor in the second calibration buffer and wait for the sensor to stabilize (Approximately 5 minutes).
    a. A 4-pH buffer is used in this example because 4-pH buffers tend to be more stable than 10-pH buffers.
9. Initiate a connection to HOBOlink by pressing the far-right button on the RX3000.
10. Wait for the "Last Connection" icon to show a checkmark next to it before refreshing the HOBOlink page.



11. Record the mA value for 4 pH on the same piece of paper used to write down the 7-pH output.
    a. A sensor should output 8.50-9.50 mA in 4 pH buffer.
12. Press the blue wrench icon to access "Device Configuration".
13. Select the "Analog Sensors Logging" tab, then scroll to the channel for the sensor.
14. Select "Enable Scaling".
15. Select "Scaled Measurement Type", then select "pH" from the dropdown menu.
    a. For Conductivity, use "Specific Conductance".
    b. For Dissolved Oxygen, use "Dissolved Oxygen".
    c. For ORP, use "ORP"

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16. Enter in the recorded values. The "Real Low" corresponds to the mA value of the low calibration point (4 pH, in this case) while the pH value is the "Scaled Low". The "Real High" refers to the mA value for the high calibration point (7 pH, in this case) while the pH value (7 pH) is the "Scaled High". (See image below)



Steps 13-16

17. Select "Save".
18. For a temperature channel, use the following numbers to scale it:

	Real	Scaled
Low	4.00 mA	0°C (32°F)
High	20.00 mA	50°C (122°F)

19. Select "Save".
20. Repeat this calibration process for any other pHionics sensors.
21. Once calibration is complete, go to "Device Configuration" (wrench icon) to change Logging Interval to desired interval.
    a. This interval determines the frequency of measurement and affects power usage. A shorter Logging Interval increases the amount of data captured and drains the battery faster than a longer Logging Interval.

The sensor is now ready for use. For any questions or troubleshooting information, please reach out to pHionics.

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