

Water Quality Monitor

External pH and Dissolved Oxygen modules for the Sensordrone.

Document Version 1.0.1

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1 Hardware

The external hardware for the pH and Dissolved Oxygen (DO) external modules for the Sensordrone are made by Atlas Scientific, who specialize in embedded scientific equipment.

Each module, pH and DO, consists of a specialized probe and a circuit board built to interpret the response of the respective probe. We at Sensorcon have adapted the specialized circuit boards and packaged them to easily plug into the Sensordrone, allowing wireless operation of these devices, as well as other useful things such as measurement logging.

Specific information about the pH and DO external modules can be found in Sections 1.1 and 1.2, respectively.

Please note, that although these modules are built for the Sensordrone, the same connector pins can be used to establish connection with the module and other hardware over UART, such as a Raspberry Pi or Arduino. Sensorcon does not provide any such code, however some examples can be found from Atlas Scientific directly (see Section 3).

1.1 pH External Module

The pH external module is a laboratory grade pH measuring system. The pH probe provided with the external module is a scientific grade silver/silver chloride glass electrode. All of the probe circuitry and connectors are contained in the small boot-shaped housing device.

1.1.1 What's Included

The pH module kit contains

- A silver/silver chloride pH glass electrode probe with soaker bottle for storage (see Figure 1).
- A main housing, consisting of the pH circuit with attached connectors for connecting the pH probe and the Sensordrone (see Figure 2).
- Three calibration solutions (pH 4, 7, and 10; see Figure 3).
- Probe storage solution (see Figure 3).

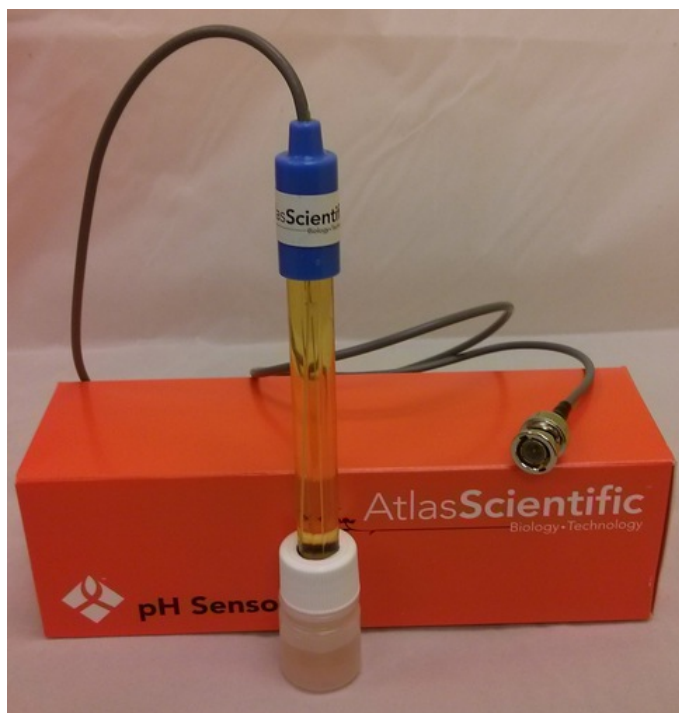


Figure 1: A silver/silver chloride pH glass electrode probe with soaker bottle for storage (see Figure 1).

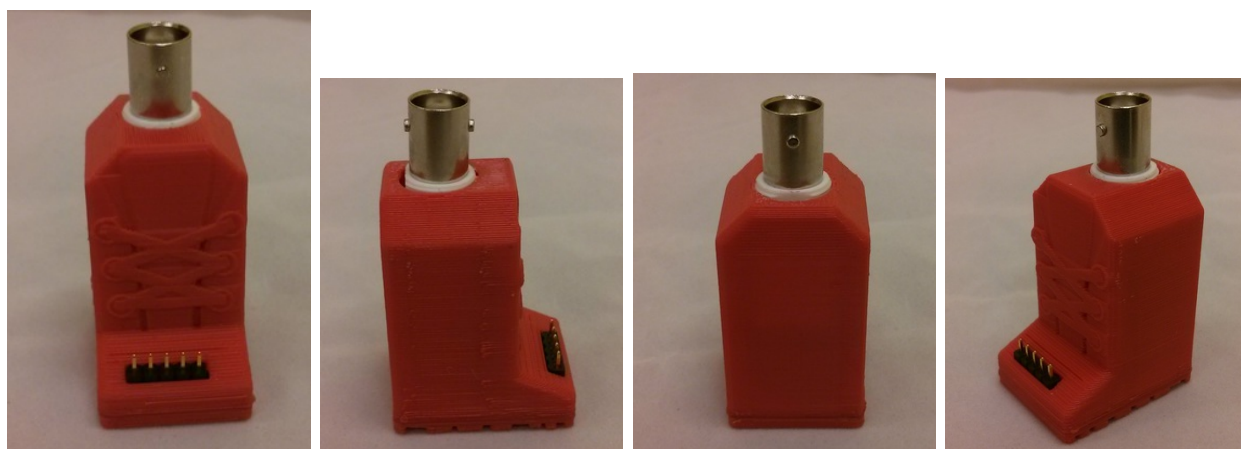


Figure 2: Main housing containing the probe circuitry. Please note that we ship the pH modules with a red housing (shown) and the DO module with a black housing (not shown). Although they appear similar, apart from color, the pH housing cannot be used with a DO probe, and vice-versa!



Figure 3: The pH calibration and probe storage solutions.

1.1.2 Setting Up

The module is powered by the Sensordrone, so the only things needed to perform measurements are a mobile device to run the software, a Sensordrone, the main housing, and the pH probe (see Figure 4).

Start by attaching the probe to the BNC connector of the main housing (see Figure 5). Next, plug the main housing into the Sensordrone (the Sensordrone should be facing out/away from the housing; see Figures 6-7). Be sure your Sensordrone is charged up!

Now you are ready to measure pH using the Water Quality Monitor App (see Section 2).

1.1.3 Maintenance

In order to keep your pH probe in proper working order, the following items should be considered:

- Do not allow the pH probe to dry out.
- Do not allow the pH probe to freeze.
- When not in use, it is best to keep the pH probe in the provided soaker bottle containing a storage solution.
- The storage solution in the soaker bottle should be changed out periodically.

The provided pH calibration solutions and the probe storage solution have a two year shelf life at room temperature.

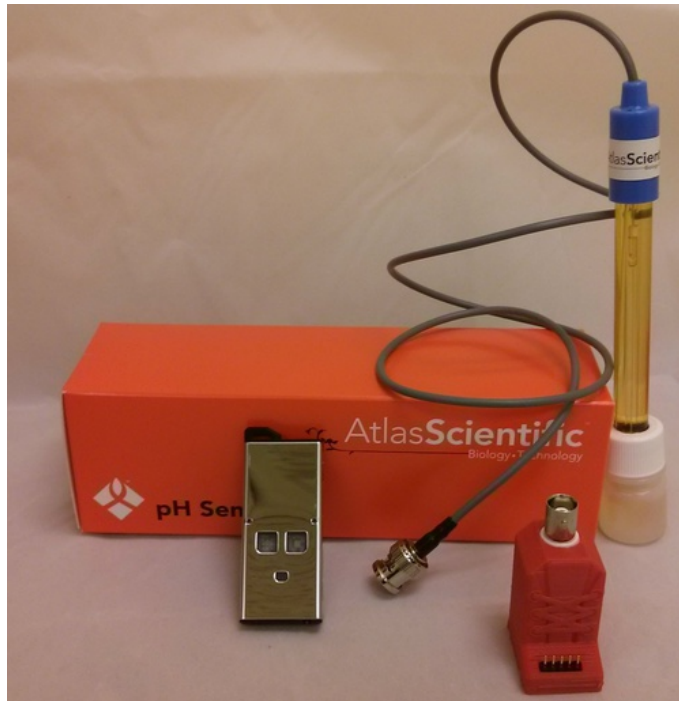


Figure 4: Setting up: Part 1. You will need your Sensordrone, a pH/DO probe, and the corresponding main housing.



Figure 5: Setting up: Part 2. Attach the probe to the BNC connector on the main housing.



Figure 6: Setting up: Part 3. Plug the main housing into the Sensordrone (the Sensordrone should be facing out/away from the housing). Be sure your Sensordrone is charged up!



Figure 7: Setup complete: A side-profile view of everything plugged in together

1.2 Dissolved Oxygen External Module

The Dissolved Oxygen module is a laboratory grade DO measuring system.

1.2.1 What's Included

The DO module kit contains

- A dissolved oxygen probe (see Figure 8).
- A main housing, consisting of the DO circuit with connectors for the probe and the Sensordrone (see Figure 2).
- A 0-Dissolved Oxygen solution, used to confirm that the probe is properly working (see Figure 9).



Figure 8: A dissolved oxygen probe.



Figure 9: A 0-Dissolved Oxygen solution, used to confirm that the probe is properly working.

1.2.2 Setting Up

The module is powered by the Sensordrone, so the only things needed to perform measurements are a mobile device to run the software, a Sensordrone, the main housing, and the DO probe (see Figure 4).

Start by attaching the probe to the BNC connector of the main housing (see Figure 5). Next, plug the main housing into the Sensordrone (the Sensordrone should be facing out/away from the housing; see Figures 6-7). Be sure your Sensordrone is charged up!

Now you are ready to measure DO using the Water Quality Monitor App (see Section 2).

1.2.3 Maintenance

The DO probe requires little maintenance, and should not need servicing unless it has been left dry for over a year.

2 Water Quality Monitor App

Water Quality Monitor is the name of the app we at Sensorcon have made to use with both the pH and DO external modules for the Sensordrone. We have made an Android App, and iOS App is to be released in January. Here is an overview of the app functionality; for more information related to the app, please visit our developer site at <http://developer.sensordrone.com>

2.0.4 Features common to both pH and DO modules

Probe Information Probe information can be accessed, which contains the firmware version and date of the pH/DO circuit enclosed in the main housing.

Set Probe Device ID A four character ID can be assigned to each module. This information is stored on the circuit board enclosed in the main housing, and is remembered between power cycles. This is useful if you need to manage multiple external modules.

Query Probe Device ID The assigned ID can be queried and displayed.

Reset Probe Device ID The assigned ID can be cleared, and reset to the default state of no ID set.

Factory Reset The settings of the circuit board enclosed in the main housing can be reset to the factory default settings.

Temperature Offset The default temperature setting used while measuring pH and DO is 25°C, and can be adjusted.

Measurement Logging See Section 2.0.7 for more information.

2.0.5 pH Features

Calibration 4 Calibration at pH of 4.

Calibration 7 Calibration at pH of 7.

Calibration 10 Calibration at pH of 10.

2.0.6 DO Features

Calibration Calibration of your DO probe.

Conductivity Offset The default conductivity value used for measuring DO is 0 microSiemens (μS) (fresh water). This value can be adjusted. Some other typical values are 19900 μS (brackish water) and 54000 μS (salt water).

2.0.7 Measurement Logging

The Water Quality Monitor app logs all measured data. This means that when you are at the "meter screen" and actively taking measurements, each measurement is also logged to a csv file which can be exported from the "meter screen", or the "App Settings". The data cannot be exported while actively measuring data.

NOTE: For Android, this log is created when the app starts, and automatically removed when the app closes. Be sure to export your data before you exit the app, or else your data will be lost.

NOTE: For Android, the file is written to external storage on your device. If you do not have a micro sd, or other media, in your external storage, then the app will not be able to log, and will inform you that logging has been disabled

3 Useful Links

Sensorcon <https://sensorcon.com>

Sensordrone Developer Site <http://developer.sensordrone.com>

Sensordrone Forum <http://developer.sensordrone.com/forum>

Atlas Scientific <http://atlas-scientific.com>