Fish Sense User Manual

Project FishWorks / Alena Chercover - ENGL 271

Electronics and Computer Engineering Technology

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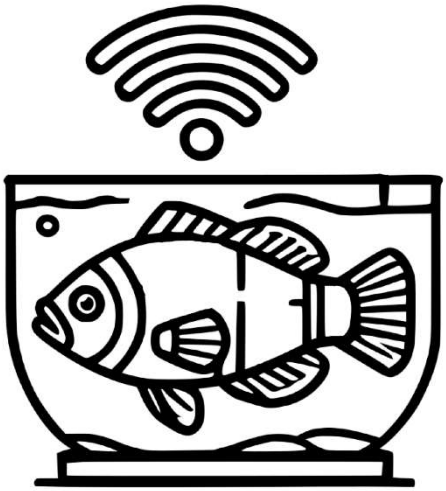


WELCOME TO FISH SENSE

Thank you for your purchase, and welcome to a new level of control and monitoring that will keep your saltwater reef creatures safe and stress-free!

Please take the time to read and understand this manual

This guide will fully explain the system and its interconnectivity. Fish Sense is endlessly configurable, but for simplicity's sake we are using a two-tank setup as our model:

- The display tank (the top tank) features a hang on overflow that uses a syphon to move water from the top to the bottom tank (Figure 1).
- The bottom tank—called a sump—is used to contain filtration systems, monitoring sensors, and a pump to return water to the top display tank.

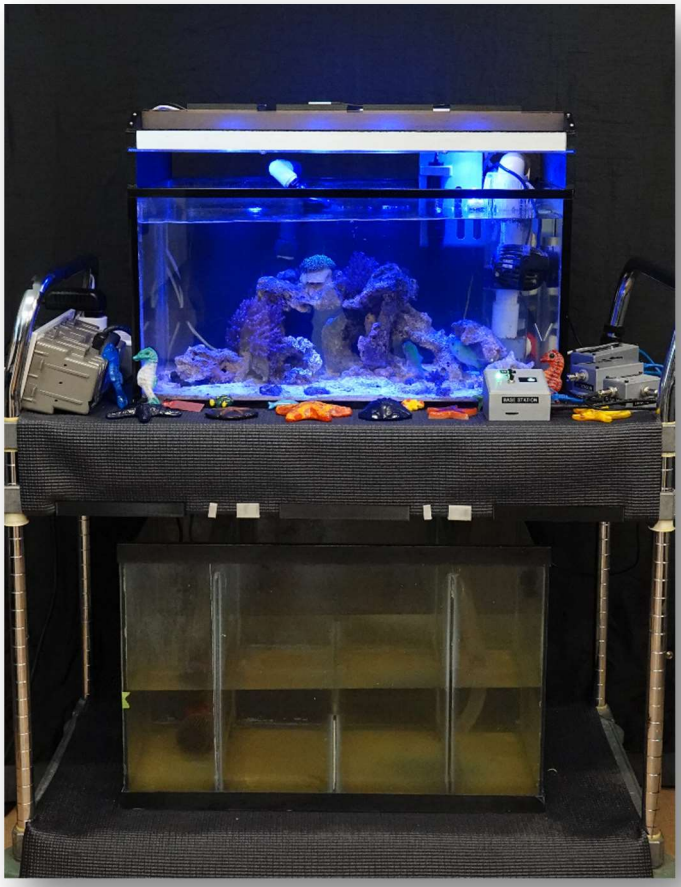


Figure 1 – A two tank aquarium setup with Fish Sense installed.

We are confident that you and your fish will love what our system has to offer.

PARTS LIST

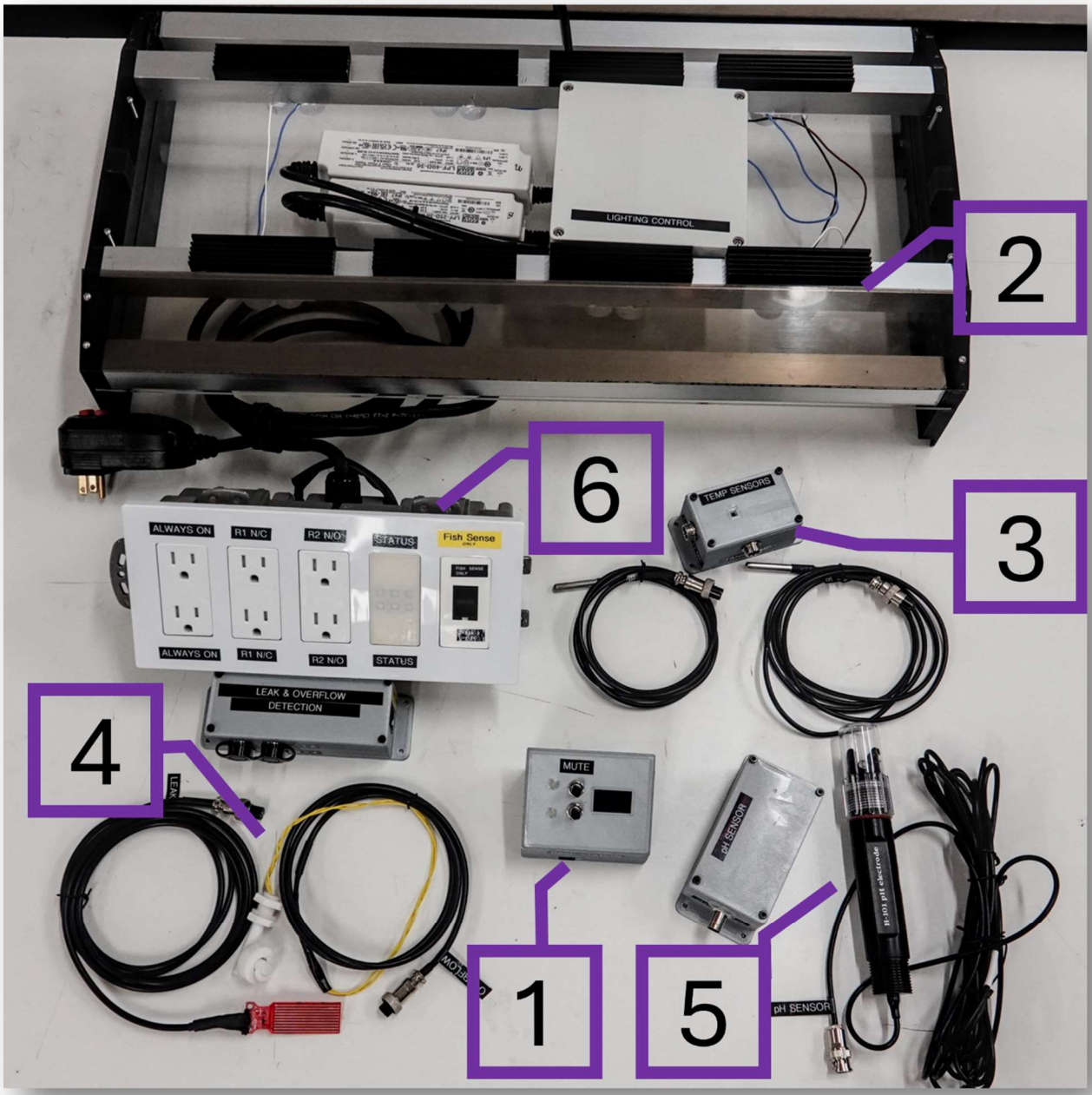


Figure 2 – The parts that come with Fish Sense

The following items will come with your Fish Sense system (Figure 2):

- (1) Base Station
  - Base station
  - Base station power supply
  - Power supply cable
  - 2 x RJ45 termination caps
- (2) Bi-Color LED Lighting Unit
  - Bi-color LED lighting unit with integrated AC power cord
- (3) Temperature & Humidity Sensors
  - Temperature and humidity node
  - Display tank temperature probe
  - Sump tank temperature probe
- (Not Shown) pH and Level Sensor Bracket
- (4) Leak and Water Level Sensors
  - Leak and water level node
  - Water level float switch
  - Leak sensor
- (5) pH Sensor
  - pH sensor node
  - pH probe
  - Probe and float switch mounting bracket
- (6) AC Outlet Control (with current sensing)
- (Not Shown) AC Outlet Control (without current sensing)
- (Not Shown) 7x Fish Sense Device Cables

WARNINGS

Warning:

NEVER, under any circumstance, should you plug a fish sense device into an RJ45 (ethernet) port on **ANY OTHER DEVICE**. This can cause damage to the Fish Sense device, as well as the device being plugged into. All RJ45 (ethernet) ports in the Fish Sense system are marked with a **yellow "Fish Sense Only" label** (Figure 4).

Warning:

NEVER plug or unplug a Fish Sense device from a system **while it is powered**. Doing this **can damage devices** connected to the system at the time.

Warning:

ONLY use Fish Sense Device (FSD) cables to connect system devices and the base station. An FSD cable must meet **ALL** the following requirements:

- Be a Cat5, Cat5E, Cat6, Cat6a, or Cat6e cable;
- Be terminated with RJ45 connectors following the T568B scheme; and
- Be less than 100ft long.

Warning:

DO NOT power the base station until all devices are connected!

CONNECTING DEVICES TO THE SYSTEM

Before beginning to connect your devices, take a moment and plan out where you want everything to be placed. Our system uses several different devices to monitor and control your tanks, and each device will need to be connected to either another device or the base station using a Fish Sense Device Cable (FSD cable). Take this into account when determining the layout of your devices and base station. The base station should be readily accessible, whereas most other devices can be placed somewhere out of sight. The base station is powered by an AC/DC adapter, and all other devices are powered using the FSD cable from the base station (figure 3).

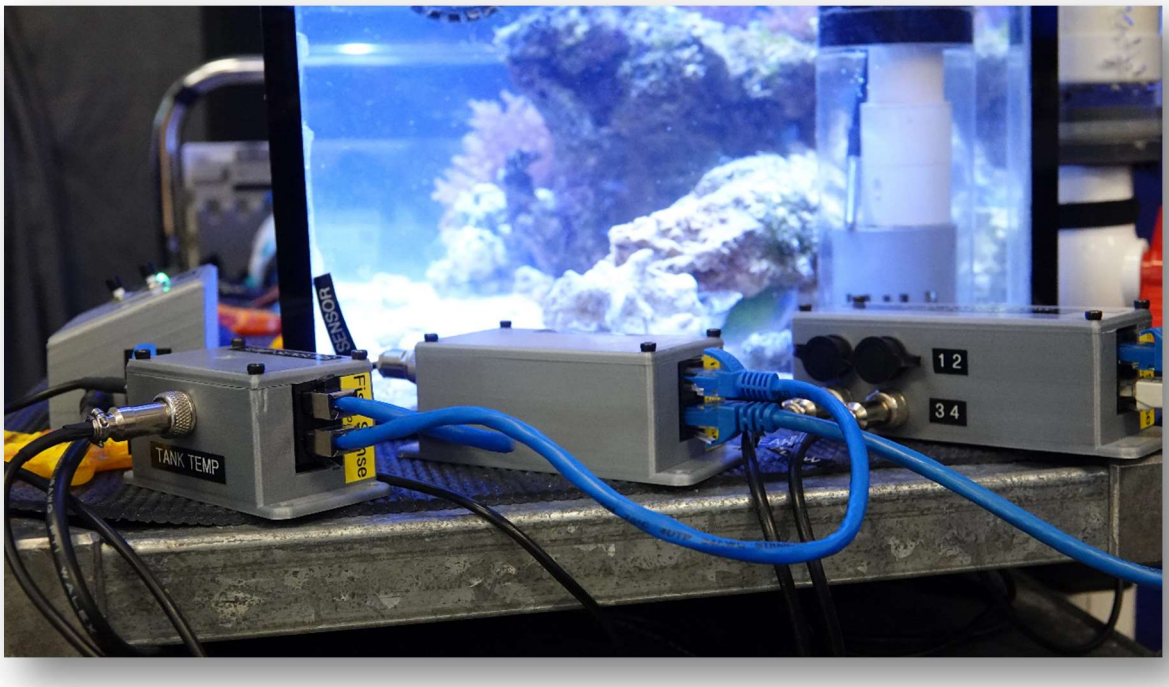


Figure 3 – Several Fish Sense nodes connected with Fish Sense device cables

BASE STATION

The base station is the heart of the system—it sounds alarms and flashes lights when devices trigger alerts. It also has a screen that displays the system status and the current draw of the connected nodes in the system. The base station connects to the internet through Wi-Fi, and is the hub for communication to the web app.

Your base station (Figure 5) includes:

- (#1) Power LED
- (#2) Status LED.
- (#3) MUTE Button
- (#4) MENU Button
- (#5) Display Screen
- (Not Shown) Buzzer

Figure 4 – The front panel of the Base Station with a loading a screen displayed.

1. Connecting a Device to the Fish Sense System

Steps:

1. Place the base station in a location where the user interface is accessible and install the SD card.
2. Plug one end of an FSD cable into either of the RJ45 ports on the base station (Figure 4) and the other end into either of the RJ45 ports on the first device you would like to connect.

Figure 5 - The side of the base station showing both the power input and the two RJ45 ports.

3. Plug one end of another FSD cable into the free RJ45 port on either the base station or the first device and the other end into the RJ45 port on the second device you would like to connect.
4. Repeat step 3 for all the devices you would like to connect to the system.
5. Connect an RJ45 termination cap to any unused RJ45 ports in the system.

Notes:

The base station can be connected at any point in the device "chain." It doesn't need to be the first or last device in the system.

2. Initial Setup & First Boot

When the user first plugs in the base station, nothing will happen. Simply disconnect and reconnect (power cycle) the base station to allow it to boot.

Steps:

1. With the system fully connected, power up the base station by plugging in the AC adapter.
    a. If the system does not power up immediately, power cycle the base station.
2. Once the system displays WiFi information, log into the wireless access point (hotspot).
3. Once connected to the hotspot, your device should automatically open an options page.
    a. Should your device not automatically open to the options, using a web browser, navigate to: http://10.10.1.1/.
4. With the options page open, enter your local Wi-Fi information and the email address that alerts will be sent.
5. Hit the save button on the bottom of the page to restart the system with the new settings.

3. Navigating the Base Station

After the system is finished booting up, it will go into a screensaver routine (figure 6) with a softly breathing green LED and the Fish Sense logo moving on the screen.

Steps:

1. With the system displaying its screensaver, hit the MENU button to scroll through the various menus (described in procedures 5–7).

Figure 6 – The base station sleep screen.

4. Error Page

This page is where you will be able to view the first error and clear it from the base station's memory. When any of Fish Sense's devices detect a parameter out of user-defined limits, the base station will automatically display the error on the screen, light the LEDs in a bright white/red pattern, and beep loudly (Figure 7).

Silencing Alerts:

1. Press the MUTE button to silence the error.
2. Once all errors are silenced, you will be taken to the Error Page.

Figure 7 – The base station silence error screen

Clearing Errors:

1. Navigate to the error page (Figure 8).
2. Press the MUTE button to clear the error.

Figure 8 – Base Station Clear Error Screen

5. Current Monitoring Page

This page (Figure 9) will show you the current draw from all the devices in your system

Figure 9 - The base station device current draw screen

6. Settings Page

On the settings page of the base station, several different options and utilities are at your disposal.

Navigating UI Features:

1. Navigate to the settings page.
2. Short-press the MUTE button to scroll to the next setting.

The opening page of the setting will display the connected network.

The second page is a toggle for the device network (Figure 10):

1. Press and hold the MUTE button for three (3) seconds to toggle the network power to allow for safely adding and removing devices.
2. Press and hold the MUTE button for five (5) seconds to restart it once all devices are installed/removed as needed.

Figure 10 – The CAN Bus power toggle setting screen.

The third page is a mute setting to disable the internal speaker (Figure 11).

1. Press and hold the MUTE button for three (3) seconds to toggle this setting.

Figure 11 – The buzzer mute setting screen.

The fourth page setting is a “dark mode” toggle to shut off all lights when the system is in standby/screensaver mode (Figure 12).

1. Press and hold the MUTE button for three (3) seconds to toggle this setting.

Figure 12 – The dark mode setting screen.

The fifth page is a utility to restart the Base Station and all connected devices (Figure 13).

1. Press and hold the MUTE button for five (5) seconds to restart the system.

Figure 13 – The restart system setting screen.

7. BIOS

The following procedure allows users to access the BIOS menu easily on boot to re-enter the Wi-Fi and email settings

Figure 14 – The bios mode screen.

Steps:

1. Unplug or restart the base station (Procedure 3).
2. As the base station begins to boot, hold down both the MUTE and MENU buttons until the system enters BIOS mode (Figure 14)
    a. Refer to Procedure 3 for BIOS use.
3. To exit, either reboot the system by unplugging it, or save and exit the BIOS from a web browser.

WEB APP

The web app acts as the primary user interface for the system. It will allow you to monitor and control all devices connected to your base station. All connected devices will show a device “widget” on the dashboard page. For more detailed information and controls for a device, navigate to its device page.

8. Logging into the Fish Sense Web App

We’ve made it one of our missions to make your experience with our app as easy and intuitive as we could, including a streamlined and simple login process.

Steps:

1. Open a compatible web browser on your device.
2. Navigate to: https://projectfishworks.github.io/WebApp/.
3. Enter your username and password in the login dialog (Figure 15).
4. Click the Connect button.

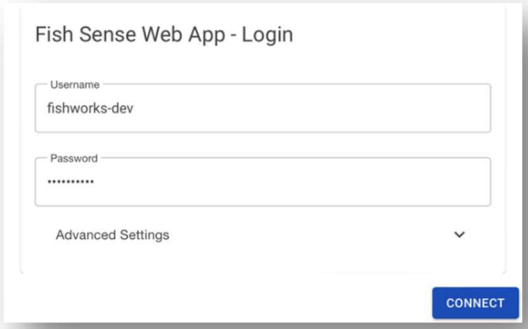


Figure 15 – The login screen for the Fish Sense web app.

Notes:

- The login is successful if the login dialog closes, and the dashboard page is displayed.

9. Navigating to a Device Page

The Device Page is home to all your devices widgets and acts as your aquarium dashboard.

Steps:

1. Identify the desired device widget on the dashboard page.
2. Click the “More Info” button at the bottom of the dashboard device widget (Figure 16).

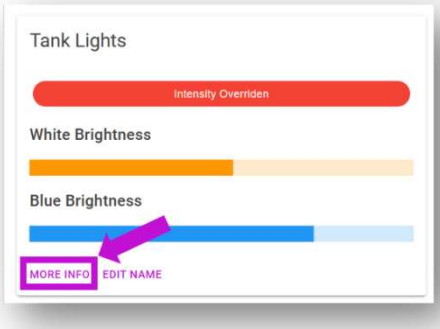


Figure 16 – A example of a device widget on the dashboard page.

LIGHTING CONTROL

Our bi-color light uses high intensity blue and white LEDs that can be independently controlled and programmed through the web app. The lights and controller are an integrated unit that is placed directly on top of the display tank.

10. Setting up the Lighting Control

Lighting is an integral part of the look and style of your aquarium. We are sure your corals will love our deep blue lighting.

Steps:

1. Place the lighting control device on the top of the display tank with the power cable facing the back of the tank.
2. Plug the AC power cord into an available AC outlet.

Note:

- The LED lights should be plugged into an Always On outlet.

11. Manually Overriding LED Brightnesses

For complete control, a constant override brightness of the blue and white LEDs can be set using the web app.

Steps:

1. Navigate to the device page of the lights you would like to adjust (see procedure 10).
2. Toggle the “Override Lighting Intensity” .switch to the right-hand position(on) (Figure 18).
3. Drag the white and blue sliders to set the desired LEDs intensities (Figure 17).

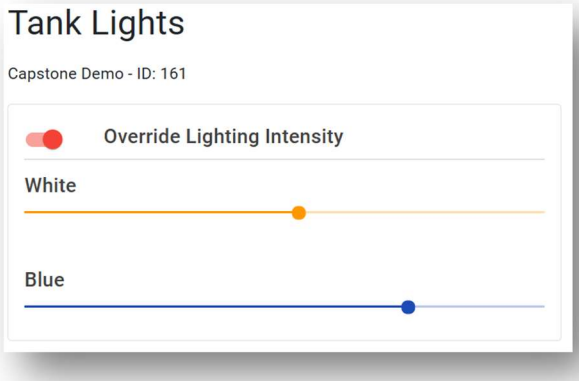


Figure 17 – The blue and white LED intensity sliders when in override mode.

12. Configuring the Demo Lighting Loop

This version of the Lighting Control device does not support a day long lighting routine; however, a short demo loop can be configured to showcase the dimming functionality of the device. The demo loop will repeat continuously unless the lighting control is in override mode.

Steps:

1. Navigate to the device page of the lights you would like to adjust (see procedure 10).
2. Toggle the “Override Lighting Intensity” switch to the left, which is theoff position (see procedure 12).
3. Set each of the demo loop durations to the desired values using the inputs in the “Demo Loop Durations (Seconds)” section (Figure 18).
4. Set the desired max brightnesses (as a percentage of maximum possible brightness) of the white and blue LEDs using the inputs in the “LED Maximum Intensities” section (Figure 18).
5. Set the blue LED brightness such that the white LEDs start turning on during the dawn sequence and turning off during the dusk sequence in the “Dawn/Dusk Intensity” section (Figure 18).

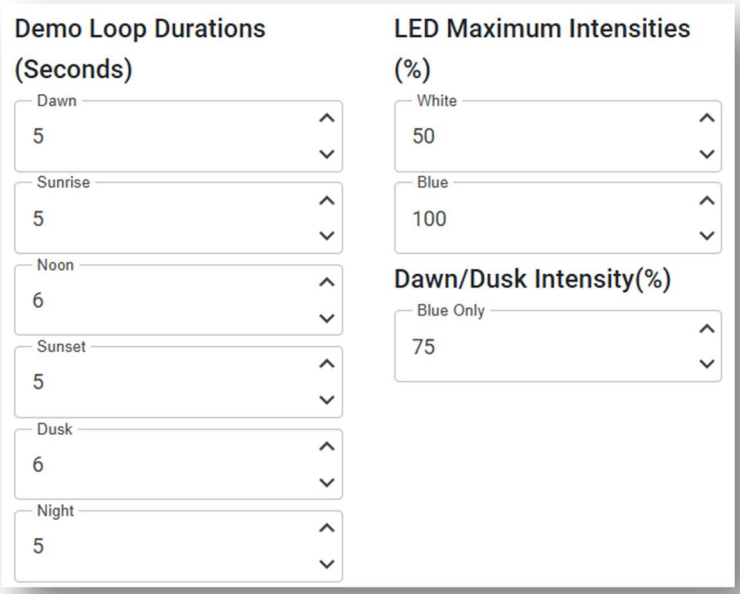


Figure 18 - Lighting demo loop settings

Notes:

- All durations are expressed in seconds.
- All brightnesses are expressed as percentages of the LEDs’ maximum possible brightness.

LEAK AND LEVEL SENSORS

The water level sensor consists of a float switch that sends an alert when the display tank water level reaches a certain height. The water level sensor is normally used in conjunction with the AC outlet control to turn an outlet on or off, depending on the use case. In this case, our level sensor will turn off the circulation pump if the syphon is not functioning correctly and the display tank water level is too high. The leak sensor detects the presence of water to detect leaks in the plumbing or tanks. See procedure 20 for how to use the AC outlet control in conjunction with the leak and water level sensors to turn AC devices on or off.

13. Installing the Water Level Sensor

To keep your floors dry and your creatures wet, please ensure you take care when installing the water level sensor.

Steps:

1. Unscrew the plastic nut from the float switch.
2. Place the switch in either of the two vertical slots in pH probe and float switch bracket (Figure 19).

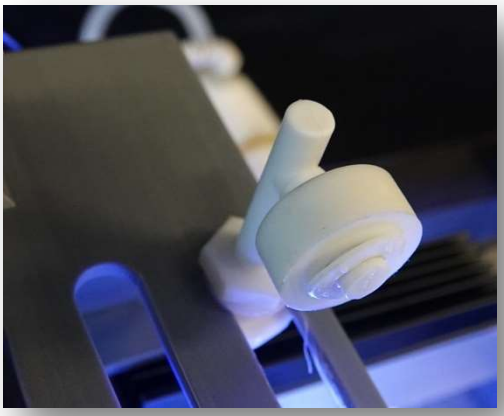


Figure 19 - The float switch mounted to the pH probe and float switch bracket

3. Replace the nut on the float switch attaching it to the bracket.
4. Hang the bracket on the back side of the display tank (Figure 20).
5. Plug the float switch cable into any available plug on the leak and level sensor node.

Figure 20 - The pH probe and float switch bracket mounted to the back of the display tank.

Notes:

- The float switch can slide up and down in the slots on the bracket to adjust the water level that the switch triggers at. The switch should be set so that it triggers above normal operating water level of the tank, but below the point of overflow.

14. Installing the Leak Sensor

You can never plan on a leak, but with this at least you can make plans soon after!

Steps:

1. Place the leak sensor in a location where its exposed traces (Figure 21) will make contact with water in case of a leak.
2. Plug the leak sensor cable into any available plug on the leak and level sensor node.

Figure 21 – The leak sensor placed next to the base of the display tank. Circled are the traces that must make contact with water to trigger an alert.

TEMPERATURE & HUMIDITY SENSORS

The temperature and humidity sensor device monitors temperature and humidity at various locations in your tank setup. The device includes two water temperature sensors—one for the display tank, and one for the sump tank. An ambient air temperature and humidity sensor is in the top of the temperature and humidity node (Figure 22). The web app can be used to monitor parameters and set alarms.

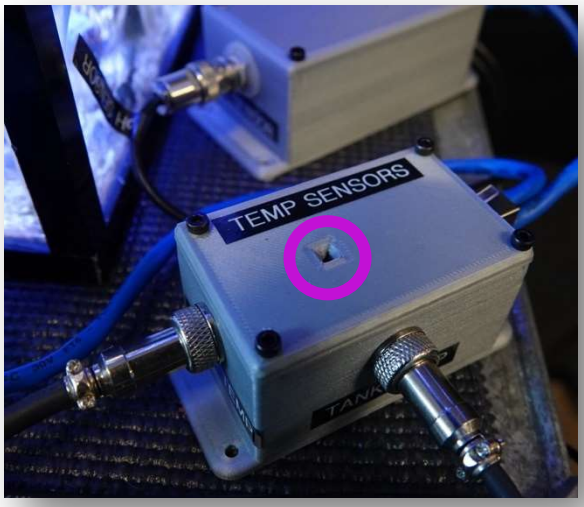


Figure 22 – The temperature and humidity node showing the ambient air and humidity sensor on the top of the node.

15. Installing the Water Temperature Sensors

Picking the best location for your temperature sensors can be hard, but either put it somewhere central, or in a location that sees good water flow.

Steps:

1. Place the display tank probe in the display tank next to the siphon (see Figure 24).
2. Place the sump tank probe in the sump tank, near the return pump.
3. Connect both the probe cables to the plugs on the temperature and humidity node.

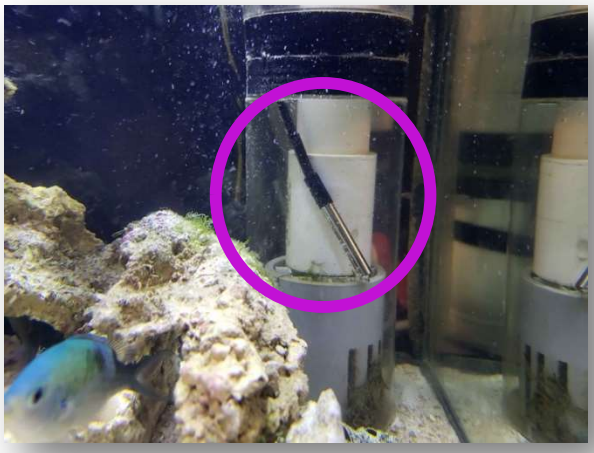


Figure 23 - A water temperature probe installed in the display tank.

16. Setting Temperature or Humidity Alarms in the Web App

Take time to learn about the life you introduce into your aquarium, each species has its own preferred temperatures!

Steps:

1. Navigate to the device page for the temperature and humidity sensor device (see procedure 10).
2. Click on the alarm icon beside the desired parameter to enable alarms for that parameter (Figure 25).
3. Set the desired high and low alarm setpoints using the input boxes (Figure 25).

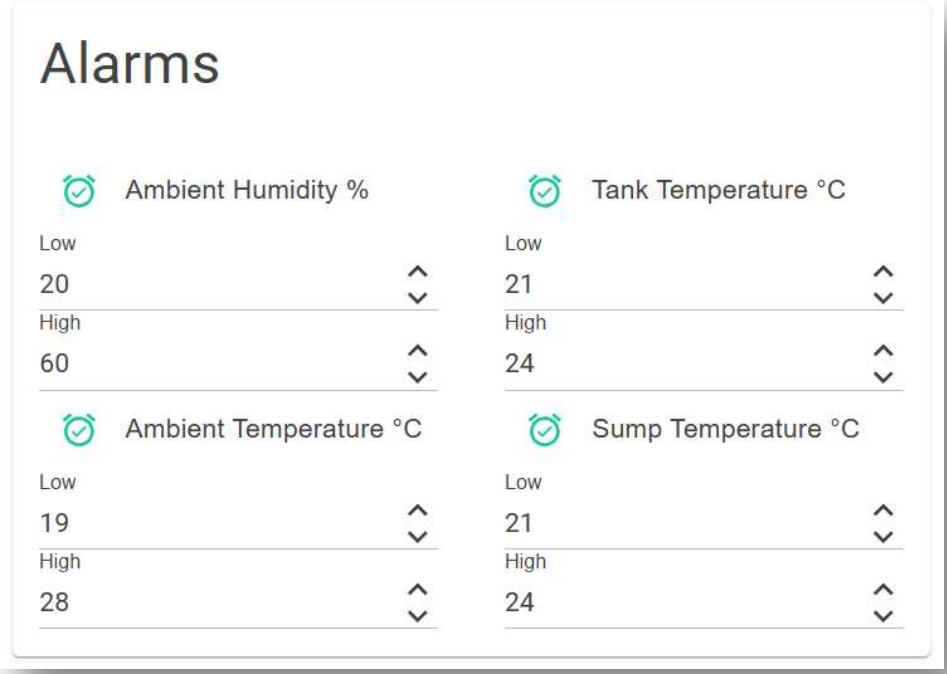


Figure 24 – The alarm setpoint settings on the temperature and humidity sensor device page.

PH SENSOR

The pH sensor device allows you to monitor the health of your tank by continuously monitoring the pH level of the tank water. The web app can be used to monitor pH and set alarms.

17. Installing the pH Sensor Probe.

Take care when handling the probe, the sensor is glass and quite fragile. Keep the protective cover on it until right before submerging it.

Steps:

1. Screw the pH sensor probe to the pH probe and float switch bracket (Figure 26).
2. Hang the bracket on the back side of the display tank (Figure 20).
3. Plug the pH sensor cable into the pH sensor node.

Figure 25 - The pH probe installed on the pH probe and float switch bracket.

18. Setting pH alarms in the Web App

Most saltwater aquariums prefer a pH around 7.5 to 8.5. Make sure to learn about what is best for your unique ecosystem.

Steps:

1. Navigate to the device page for the pH sensor device (see procedure 10).
2. Click on the alarm icon to enable pH alarms (Figure 27).
3. Set the desired high and low alarm setpoints using the input boxes (Figure 27).

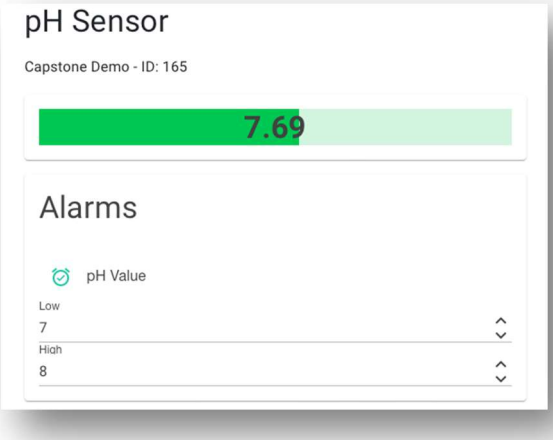


Figure 26 – The alarm setpoints on the pH sensor device page.

AC OUTLET CONTROL

These procedures apply to the AC outlet control with or without current monitoring. The AC outlet control device lets you toggle AC outlets on or off, either manually or in response to an alert from another device in the system. It includes status LEDs that show the states of the corresponding outlets (red for off and green for on).

19. Configuring Alert Behavior in the Web App

Your main line of defence against the unplanned—taking the time to set up your alerts properly—could be the difference between dry floor and soggy carpets.

Steps:

1. Navigate to the device page for the AC outlet control device (see procedure 10).
2. For your desired outlet, select the device you would like the outlet to respond to alerts from—or select “none” to disable to feature (Figure 28).
3. For your desired outlet, slide the toggle switch to the left if you would like the outlet to turn off if an alert is received, or slide it to the right if you would like the outlet to turn on if an alert is received (Figure 28).

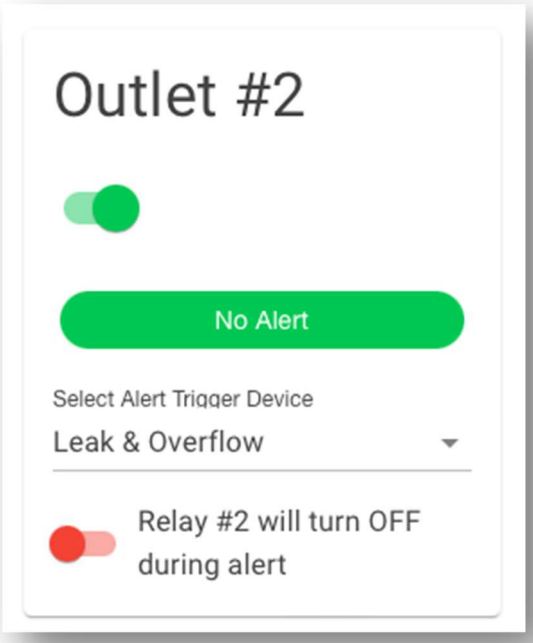


Figure 27 - The alert settings for outlet #2 on the AC outlet control device page.

Notes:

- The AC outlet control devices contain three (3) types of outlets (Figure 29):
    - Always On outlets are always on as long as AC power is supplied to the device.
    - R1 (normally closed) will default to an on state if the base station loses power or malfunctions.
    - R2 (normally open) will default to an off state if the base station loses power or malfunctions.
- If an alert is received from the configured device on a given outlet, a red “Alert” marker will be displayed on the web app, and you will not be able to manually toggle the outlet on or off via the web app until the alert has been cleared.

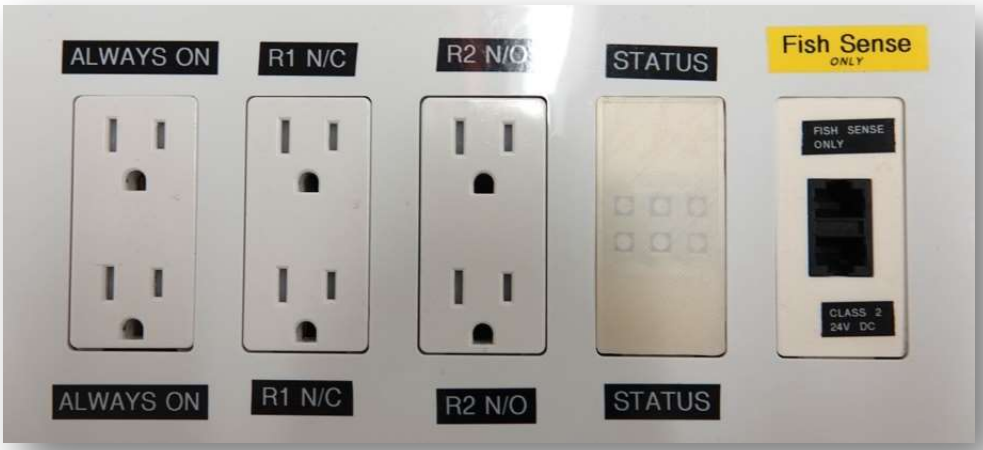
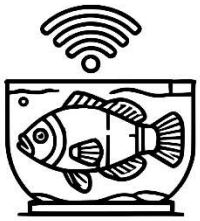


Figure 28 - The front panel of the AC outlet control device.

CONCLUSION & CONTACT

Thank you very much for purchasing Fish Sense. We hope this manual helps you to successfully set up and operate your system. If you have any further questions about Fish Sense, please feel free to contact us through the email address or website below.

Contact Us



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