FieldKit Product Guide

Last Revised 7 April 2026

In this guide, we explain what a FieldKit station is and help you set up and deploy your own station with detailed step-by-step instructions.

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Before Setting Up Your FieldKit

What is a FieldKit Station?

A FieldKit station is a sensing ecosystem.

If you're setting out to use FieldKit for environmental sensing, chances are you'll start by buying (or borrowing) a FieldKit station.

Stations, Modules and Sensors

A station is a home for multiple sensor modules. Modules group together sensors and their data according to distinct environmental factors, e.g., weather or pH. Sensors are physically located at various points across the hardware (via circuit boards or instruments), and the hardware itself is packaged together in products that we call Sensor Packs.

Plugging a sensor pack into your station activates the corresponding module, and data enters the station's ecosystem as part of that module.

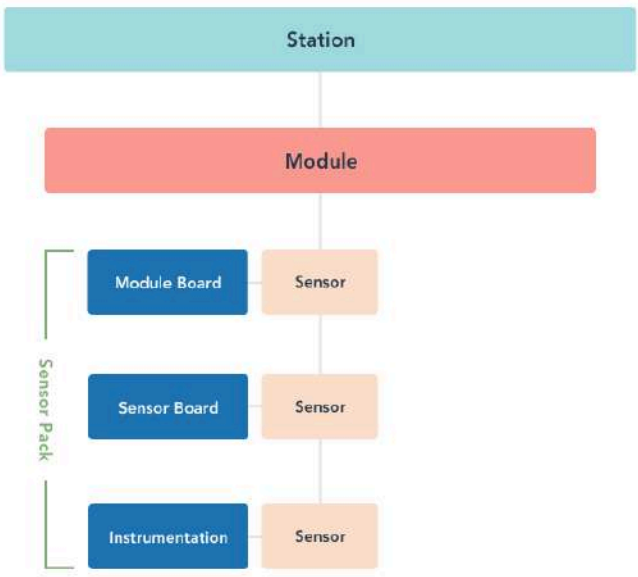


Diagram of a Station with one Module and its Sensors

While there is no limit to the number of modules that can be associated with a FieldKit Station over its lifetime, a station physically has four bays for each sensor pack to individually plug into

(by way of their module board) and the associated circuitry to handle and store the data that they collect.

A module's hardware can be changed out in case you need to replace an entire sensor pack or just one component, such as the module board.

> *Example: I buy a FieldKit Weather station (which comes with a Weather Pack that includes the weather module board), but after a while I experience issues with the weather module board. FieldKit sends me a replacement module board, and from a data perspective, the same weather module just picks up where it left off and starts recording data with this new module board. On the web portal, I only see one weather module, but the system knows that two module boards were used.*

Most often, a station lives inside of a weatherproof case, which keeps everything dry. The case has holes in the cable plate on the bottom to pass through cables for external sensors. A station is powered by a battery (which lives in the case), and the battery can be charged by a solar panel (which lives outside of the case) or by using Micro-USB power.

A Flexible System

The core of a FieldKit station is the same, no matter if you are using it to measure water quality, monitor local weather conditions, or find out how clean the air is near your local school. Indeed, the biggest strength of FieldKit is that a station can be almost anything, depending on which sensor packs you plug into it at any given time. It can be a weather station, or a water station, or a weather-and-water station or a hybrid weather-and-water station or weather-and-water-level-and-dissolved-oxygen station.

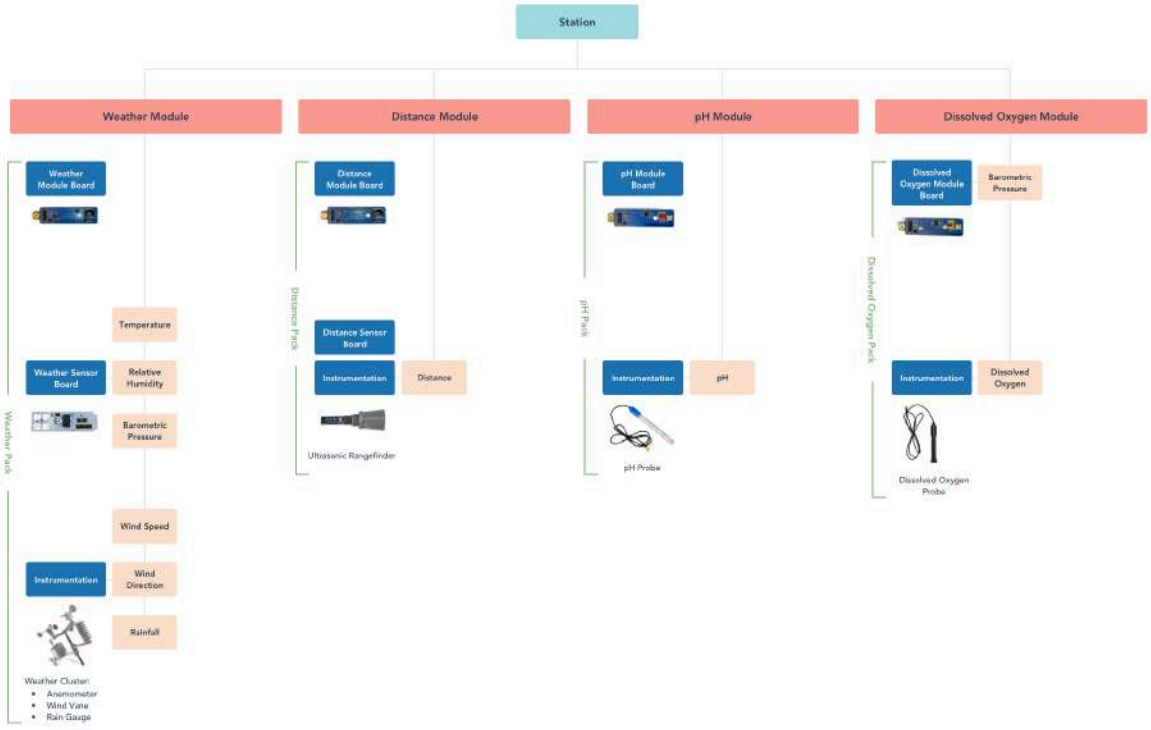


Diagram of a Station with multiple Modules and Sensors

We launched FieldKit with six modules, which means with the four available bays there are almost 360 possible module combinations. As our community grows and more developers contribute to building modules, we believe there will be hundreds of thousands of possible FieldKit configurations to be put together and put out into the world.

And remember, though there are only four bays available at any given time, that doesn't mean that you can't put your station to different uses at different times. In terms of data, stations may have more than four modules associated with them over their lifetime.

> *Example: I plug in four sensor packs in January (pH, Dissolved Oxygen, Conductivity, and Temperature), and then in August decide that I no longer want pH, and instead plug in a Distance/Level Pack. My station now has five modules (it's just that one of them is no longer receiving data). So I can go to the web portal and review data for five modules.*

A FieldKit station knows which sensor packs are plugged into it. This means there's no extra configuration necessary to add or remove a sensor pack. Your weather station can become a water station, just by switching sensor packs. There is little extra cost to add an extra sensor

pack to a station, which means you can collect more data about a place while deploying the same amount of hardware.

Data and Power

When we talk about data, we mean two things: the data readings measured by the sensors and metadata about your sensor configuration. All data is stored on the FieldKit station. Eventually, if your station is near a WiFi network, data can be uploaded automatically to the web portal on FieldKit.org (this functionality is coming soon). If your station is somewhere more remote, you can use our app (available on iPhone and Android) to transfer data and then upload it when connectivity permits. You can also use the app to configure the station—such as to change how often it takes measurements or to re-calibrate sensors.

FieldKit can be powered by its battery, by plugging directly into a power source using Micro-USB, or by using a solar panel. Solar or Micro-USB deployments are recommended to ensure continuous data collection. You can monitor power consumption via the app, which is particularly useful when the station is powered by a solar panel.

Technical Details

The module base allows for up to four module boards. It supplies power to them, as well as mechanically coupling them to the case. The base attaches to the lower board by way of a single connector, and the upper board connects to the lower via standard 0.1 inch (2.54 mm) headers.

All of the module boards for a FieldKit unit can technically be used on their own, if you know how to interface with them via I2C* or SPI. However, we make it much easier for you to get data from them by giving you the brain box: the Upper Board powered by an SAMD51P series 32-bit low-power microcontroller. This gives you the ability to store data locally on a microSD card or to eventually send data back via WiFi and/or LoRa.

We have designed a weatherproof custom case for FieldKit stations which is water and impact resistant. FieldKit stations can be used in other enclosures provided there are appropriate fastening surfaces.

Complete design files for the FieldKit core and sensor modules are available in our GitHub repository.

Download the App and Create an Account

The FieldKit mobile app connects you to your station in the field via the Station WiFi (an access point created by the station). You'll want to download the app and create an account for connecting to the FieldKit product ecosystem.

If you haven't done it yet, sign up for an account at the FieldKit Portal. That way, when you come to sync your station's data to the web portal, you'll be ready to go. You'll use this same account to log in via the app and the portal.

Download the FieldKit app for iOS at the Apple Store: iOS app store

Download the FieldKit app for Android at the Google Play Store: Android app store

Now would be a great time to obtain the following:

MicroSD card

We highly recommend always using a microSD card in your station. This allows you to save a backup of your data and will keep all logs in case something goes wrong. You'll also need one to update your firmware. Your FieldKit ships with one, and we recommend keeping extras around just in case. We don't sell these, but you should be able to pick one up pretty easily online or at a local retailer.

Calibration standards

Some sensors need to be calibrated to set a baseline for accurate readings and will also require periodic recalibration. We don't sell calibration standards, but we can advise you on what you need to purchase. If you have not had your sensors pre-calibrated in our lab before shipment, you may want to go ahead and purchase calibration standards before assembling your kit, so you can be ready to go when you set up your station. Check out the Sensor Setup and Calibration section for more details and feel free to reach out to our team with questions about your particular sensors.

The FieldKit Ecosystem

The FieldKit mobile app allows users to interface with their station and the data it gathers in a comprehensive, user-friendly way. When initially setting up a new station, the app walks you through the process of assembly and calibration so that you're ready to get your FieldKit station into the field and gathering data. The app also guides you through the station deployment process, recording the station location and setting its data capture schedule.

When you return to your station, you can use the wireless access point built into it to connect to the app. From here, you can use the app to download the readings the station has gathered to your phone for later upload to the FieldKit Portal. The app will also provide you with information on the station's battery life, the amount of memory used, and the total time it has been deployed. It serves as a bridge between the FieldKit hardware and the data interface on the portal.

The FieldKit portal provides users with a place to upload, review, and interact with their data, as well as comment on and share it if they choose to do so. Within the portal, stations can be assigned to a larger project, providing a wide-range view of a particular area of research. Data on the portal can be set to private, visible to team members, or open to the public, allowing for the degree of collaboration that works best for you.

Within the portal, you can zoom into particular timeframes, compare readings from multiple sensors, and comment on data points. Data within the portal can be shared via a link to a data view or exported for use in other programs. The FieldKit portal is intuitive, free for anyone to use, and will always give its users the ultimate control over the data they gather.

Learn more about projects in the portal in the section on Managing Your Project.

Parts of the FieldKit

A FieldKit station is composed of many parts. We outline these parts below.

1. Core

The Core is the central hub of the Station, responsible for logging and sending data from the environmental sensors to the FieldKit mobile app and web portal. It is made up of 3 boards:

- Upper Board
- Lower Board
- Module Base

Upper Board

The Upper Board consists of a microcontroller, onboard memory, a microSD card for data backup, real-time clock (powered by an onboard super-capacitor), and an organic light emitting diode (OLED) interactive display screen. This is the brains of the station and runs the main firmware.

Lower Board

The Lower (Radio) Board is equipped with battery and solar connectors, a WiFi module, GPS, and a connector for optional LoRa wireless communications (using a separate LoRa Radio Pack). This is the communications center of your kit.

Module Base

The Module Base attaches to the Upper and Lower Boards. It is the platform on which to attach module boards.

2. Sensors

A Sensor Pack is a set of board(s), cables and instruments that plug into the Core to gather readings on a specific environmental factor, e.g., weather or pH. A Sensor Pack might measure one or multiple parameters relevant to that factor. For instance, the Weather Pack measures temperature, relative humidity, barometric pressure, wind speed and direction, and rainfall, whereas the pH Pack measures just pH.

Sensor

A Sensor detects physical changes in its environment and communicates that data to the station Core. A sensor might sit directly on the module board, on an external sensor board, or

within instrumentation like a probe, rain gauge, anemometer or wind vane. (These instruments are often themselves just called “sensors.”)

Module Board

A Module Board is a board that sits on the Module Base and acts as the interface to the instruments. It communicates environmental data gathered from its attached Sensors to the Core. It is possible to use between one and four Module Boards within a station at a time.

Sensor Board

A Sensor Board is a board that sits inside an external enclosure and connects to the internal module board. It communicates environmental data gathered from its attached sensors to the module board. FieldKit Weather and Distance modules utilize a sensor board.

Probe

A Probe is an instrument (or sensor) used for measuring, testing or obtaining data. FieldKit water chemistry sensor modules come with probes (for example, temperature and pH).

Cluster

A Cluster is a set of instruments (or sensors) that are located in the same place, such as a weather cluster that contains a rain gauge, anemometer, and wind vane.

3. Power

To be able to power the electronics to gather and sync data, you will need a reliable power source. A FieldKit station can be plugged into a power source like your computer or the wall using the micro-USB cable. For remote deployments, you can use a charged battery, which will need to be recharged periodically. You can also use a battery plugged into a solar panel for ongoing charge, as long as you have a good source of sunlight

Micro-USB Cable

Plugging a Micro-USB Cable from a power source into the Lower Board will turn on and power your system. If a Battery is plugged into your FieldKit, it will recharge it.

Battery

The standard Battery Pack includes three 3350 mAh 18650 Li-polymer batteries. These batteries are rechargeable either through a USB plug-in or a supplementary solar panel.

Solar Panel

A Solar Panel absorbs sunlight and converts it into electricity to power the electronics. We use a 10 watt solar panel for our system, but if you're a pro who has the skills to mix and match, then FieldKit can work with any 12V panel as long as the cable terminates in a JST-PH and it observes the appropriate polarity. Just please note that FieldKit tech support does not cover non-FieldKit products.

4. Case

The FieldKit Case is a custom-designed case that allows for multiple mounting configurations and installation positions. It secures and protects FieldKit electronics from the elements.

Wake Button

The Wake Button on the Case wakes up the station and turns on the station WiFi signal. This enables you to connect to the station with your phone and sync station data.

Cable Plate

A Cable Plate is a customizable part of the case system with different opening configurations that allow cables to pass in and out of the case. Each case comes with a cable plate, but you might consider buying additional alternative configurations to suit different module setups. We offer blank fiberglass plates that can be drilled out and customized according to your needs. You can also opt to laser cut or 3D print your own plate.

Gland

A Gland is a portal in the case system. Each gland contains a cable insert with holes that allow specific cables to pass through while keeping the interior elements protected from the outside.

5. Station

When we talk about a Station, we mean the combination of the hardware and software listed above that collects and syncs data with the FieldKit mobile app and web portal.

Assembling Your Station

Prepare to Assemble

Check that you have all necessary parts to assemble your FieldKit station. We strongly recommend going through the set-up of your station at home. This allows you to assemble your station fully, calibrate accurately, and connect to the internet for troubleshooting before you go into the field. Here's a list of parts you'll need to proceed:

CORE

A) Upper Board

B) Lower Board

C) Module Base

SENSORS

D) Module Board(s), found in each Sensor Pack

POWER

E) Battery

F) Micro-USB cable

G) Solar Panel and Cable (optional)

CASE

H) FieldKit Case

I) Cable Plate Packs

J) Station Screw Packs

You will also need the following (not included):

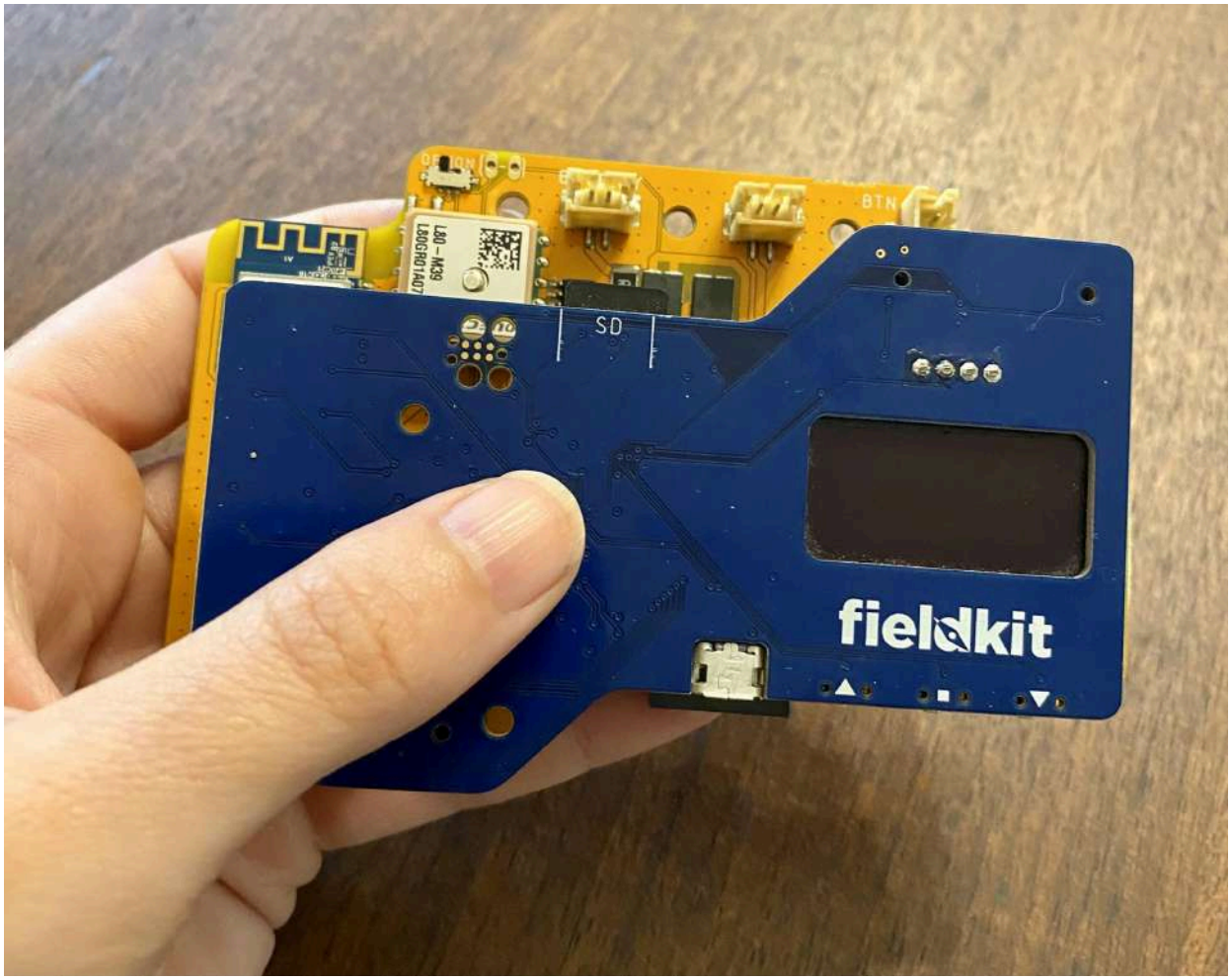
–Phillips screwdriver*

–USB wall charger

*Some people prefer to use a small jeweler's screwdriver while others are more comfortable with a regular sized screwdriver. Test out what works for you. Also, you might also like to have a small dish to hold the tiny screws.

Assemble Station Core

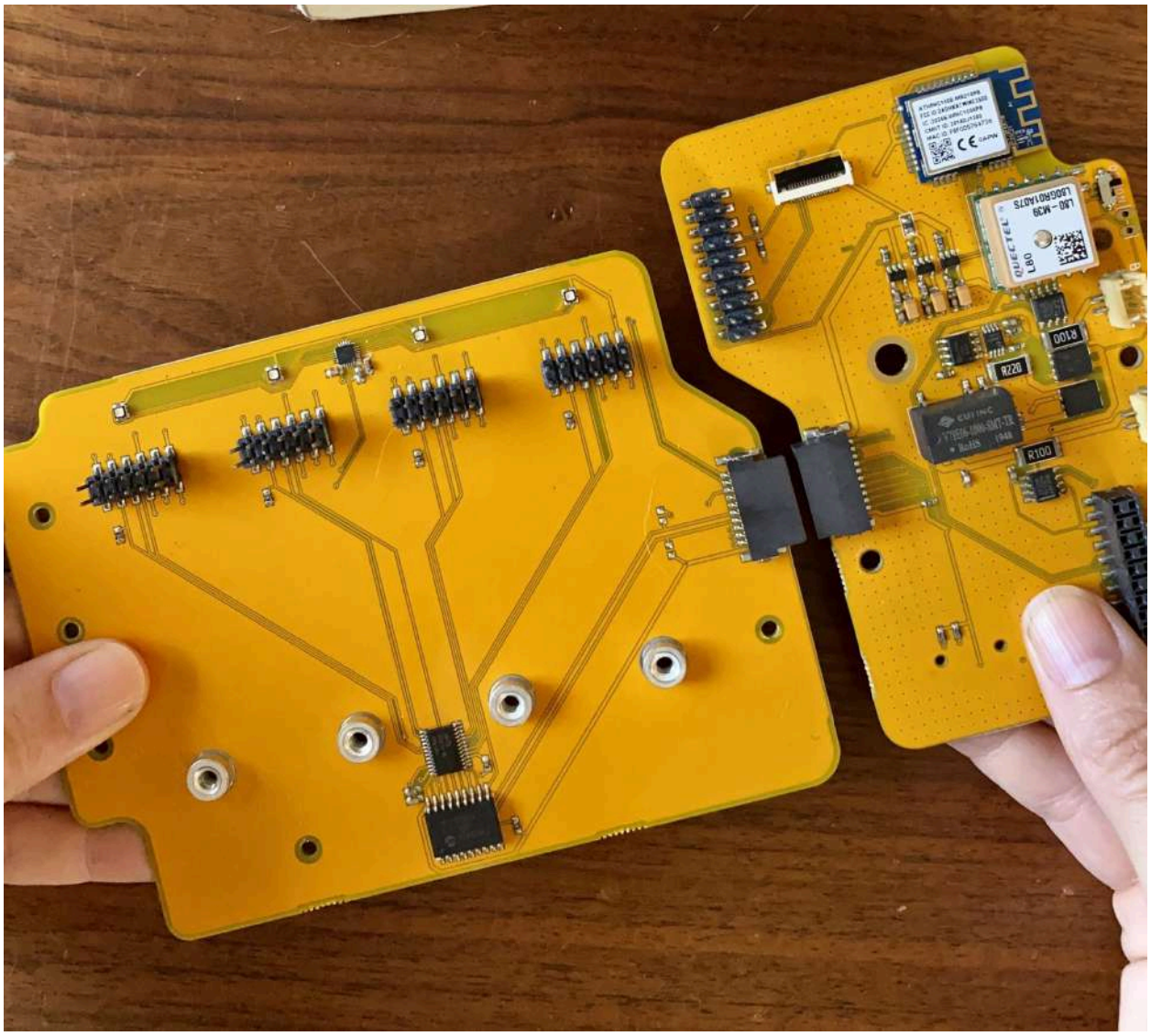
1. The Upper and Lower Boards come pre-assembled to protect the pins, so you'll need to pull them apart in order to secure the Lower Board to the case, before re-assembling them.



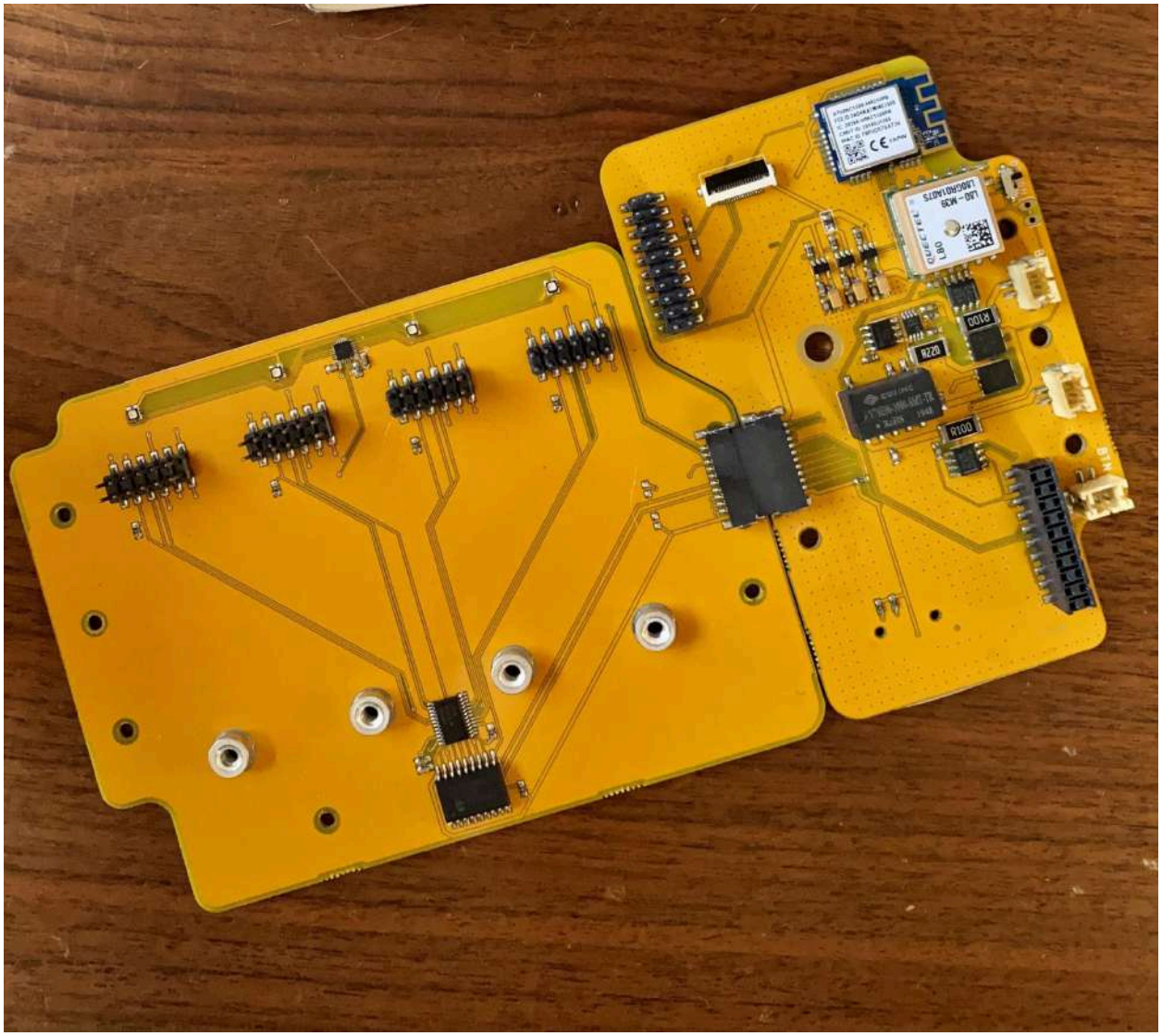
Pick up the combined Upper and Lower Boards. Hold the Upper Board between your thumb and forefinger, and the Lower Board similarly.

Then, rock the boards back and forth gently on a diagonal plane to pull them apart. Set the Upper Board aside for now.

2. Attach the Lower Board to the Module Base.



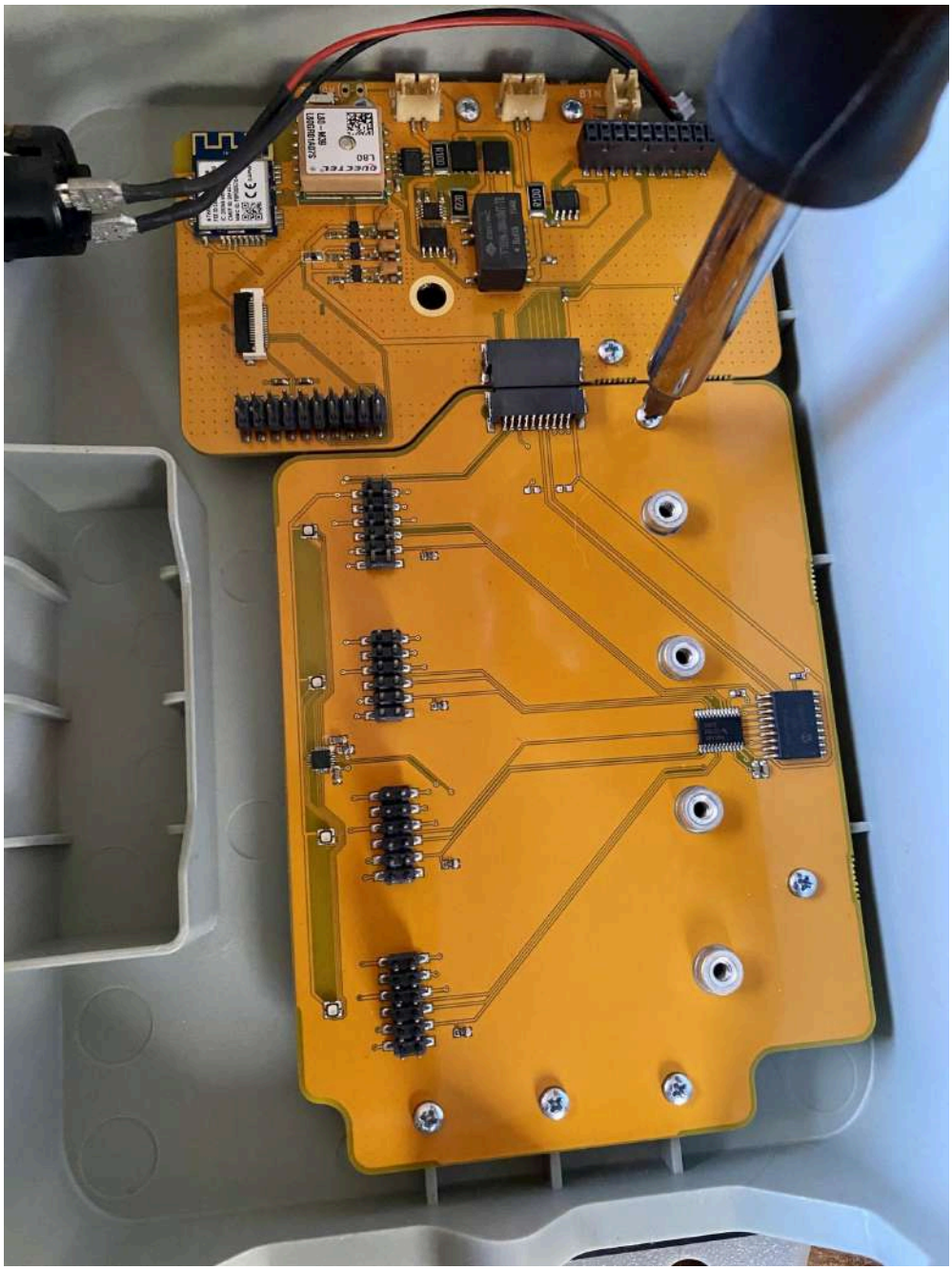
Line up the Lower Board with the Module Base.



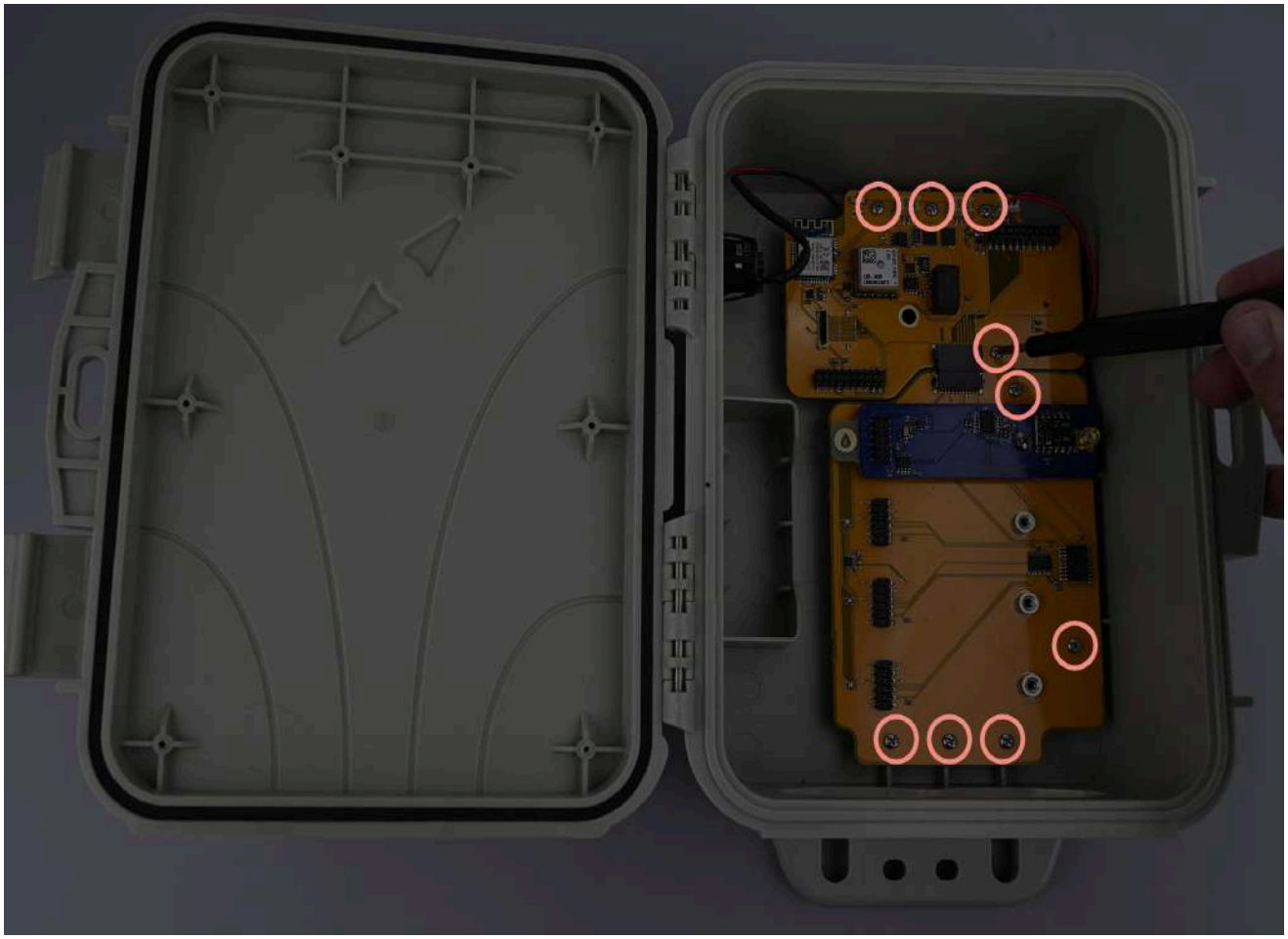
Press together. You’re now ready to start securing your boards in the case.

3. Place your assembled components inside the Case. The wire coming out of the WiFi button on the left can be run along the boards at the top and then re-emerge on the right side, as pictured.

Secure everything down with the included screws (in the packet marked ‘Core to Case Screws’) so that the hardware doesn’t move around and risk damaging the boards. Be sure you're using the correct screws, as using the wrong size will thread incorrectly into the case.

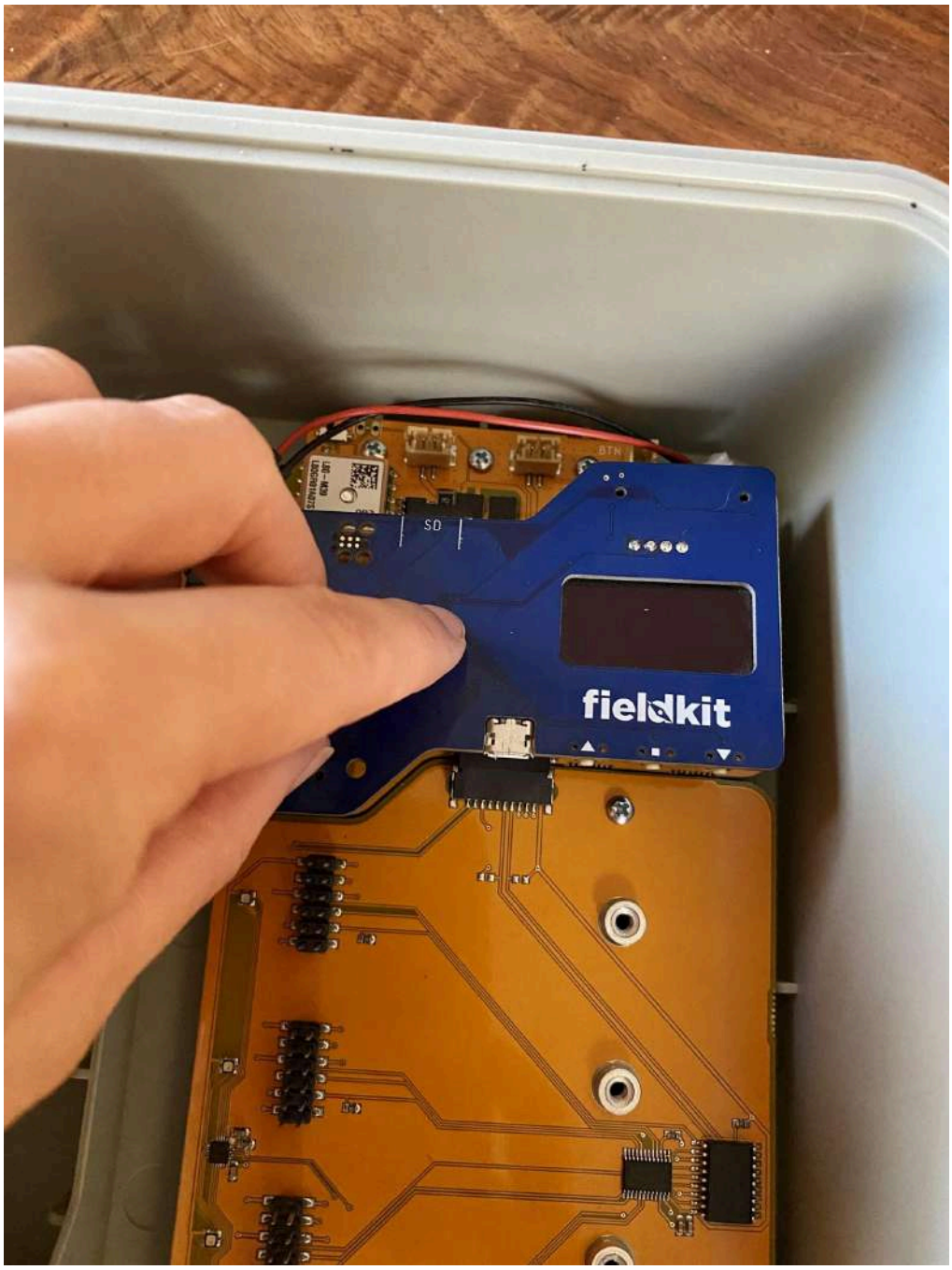


Make sure you've screwed in the screws that will be covered up once you put the Upper Board and Module Boards on. We recommend screwing down all nine screws for maximum security.



The screws might feel as if they’re too tight as you screw them into the plastic for the first time. They are thread forming screws, so expect some resistance as you’re screwing the threads into the smooth plastic.

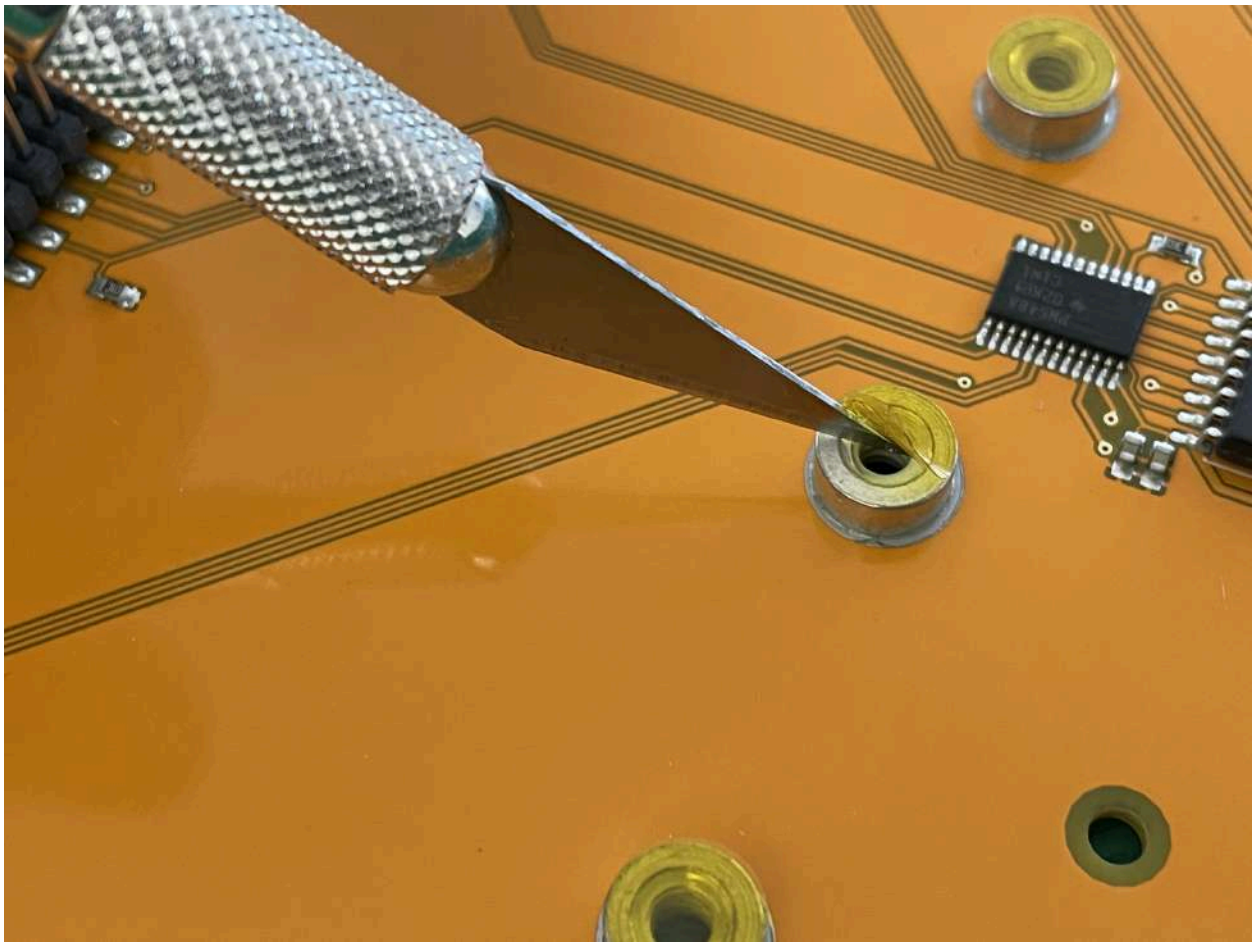
4. Locate the Upper Board that you previously set aside. Hover the Upper Board above the Lower Board that is now secure in the case. Be sure to line up the pin headers and sockets. Then press them together firmly.



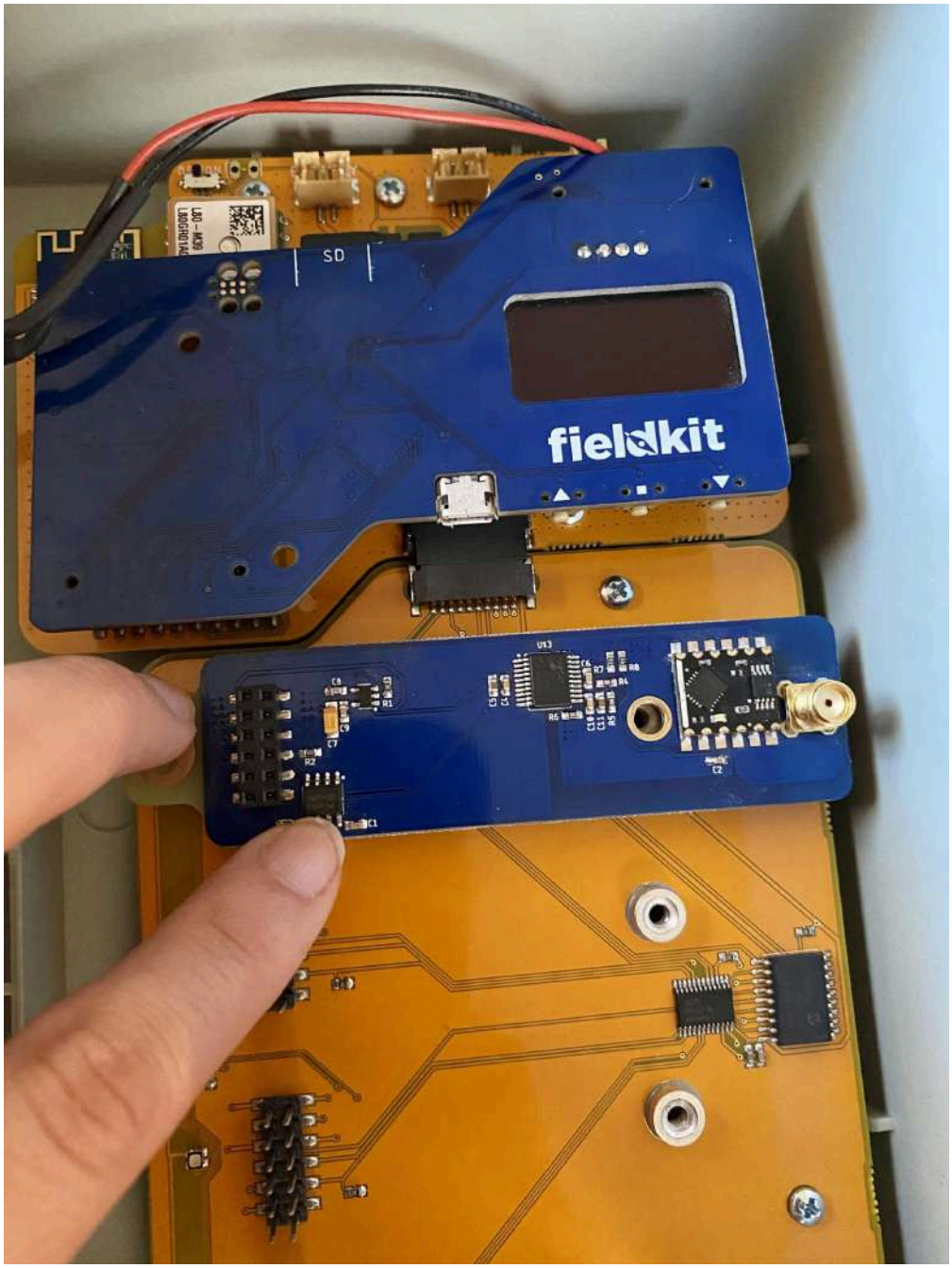
Warning: Use caution to avoid bending the Lower Board and Module Base pins, and make sure the pins never touch each other, as it could damage the board.

Attach Module Boards

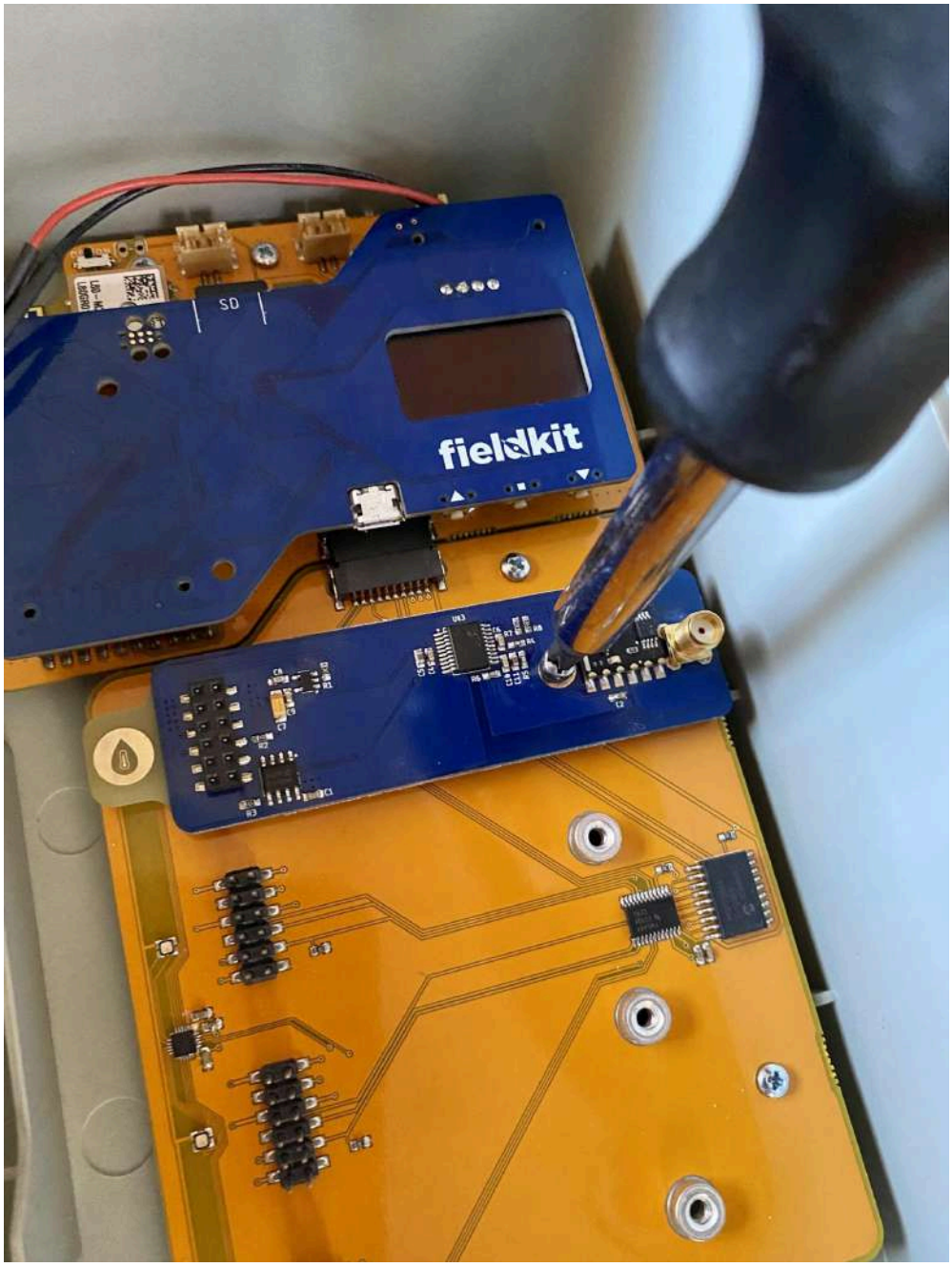
1. Now it's time to attach your Module Boards. You'll find your Module Board(s) in the Sensor Pack(s) you bought.



Remove the small transparent yellow tape circles from the standoffs where you'll attach your Module Board(s) to the Module Base.



Line up the Module Board with the pins on one of the bays on the Module Base. Carefully press down the Module Board into place over the pins, applying gentle, even pressure.



Secure it down with the included screws (in the packet marked ‘Module Board Screws’). Repeat with all Module Boards.

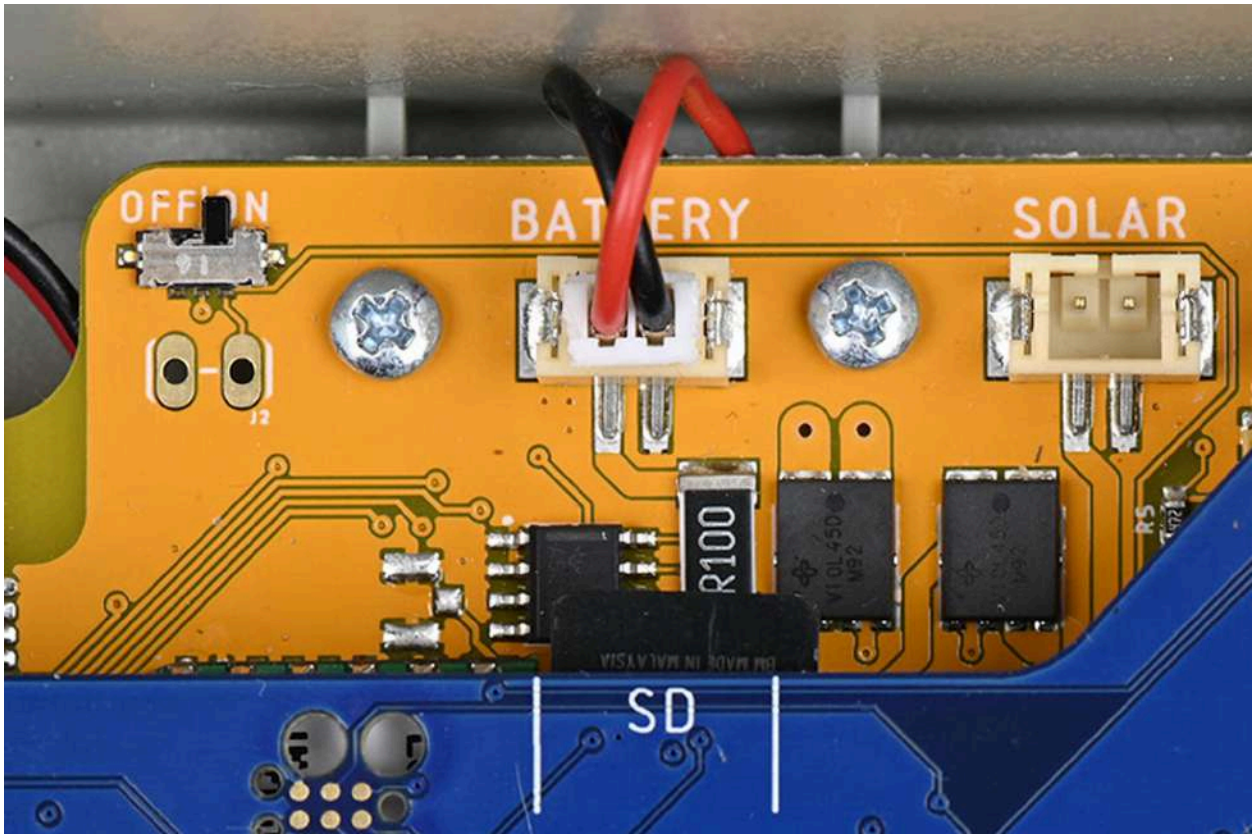
You will connect the module boards to the sensing instrumentation in a later step.

Finish Station Assembly and Charge Station

1. Now you will attach the station Battery.

Warning: Before inserting the battery, solar, and button cables, double check that you are connecting them to the correct sockets (labeled “BATTERY”, “SOLAR” and “BTN”). Inserting cables into the wrong sockets can permanently damage your FieldKit.

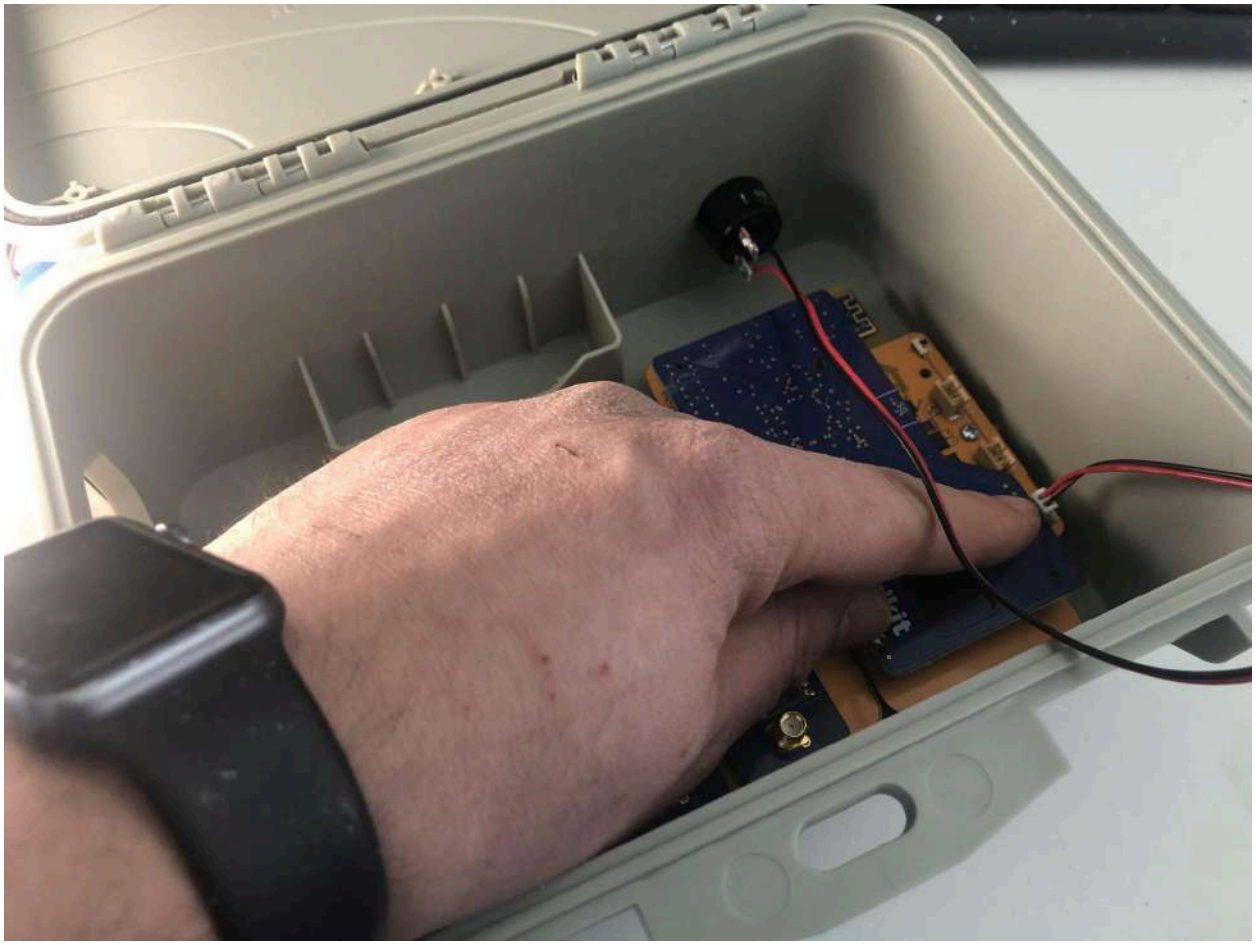
Place your Battery into the battery holder on the left hand side of the core.



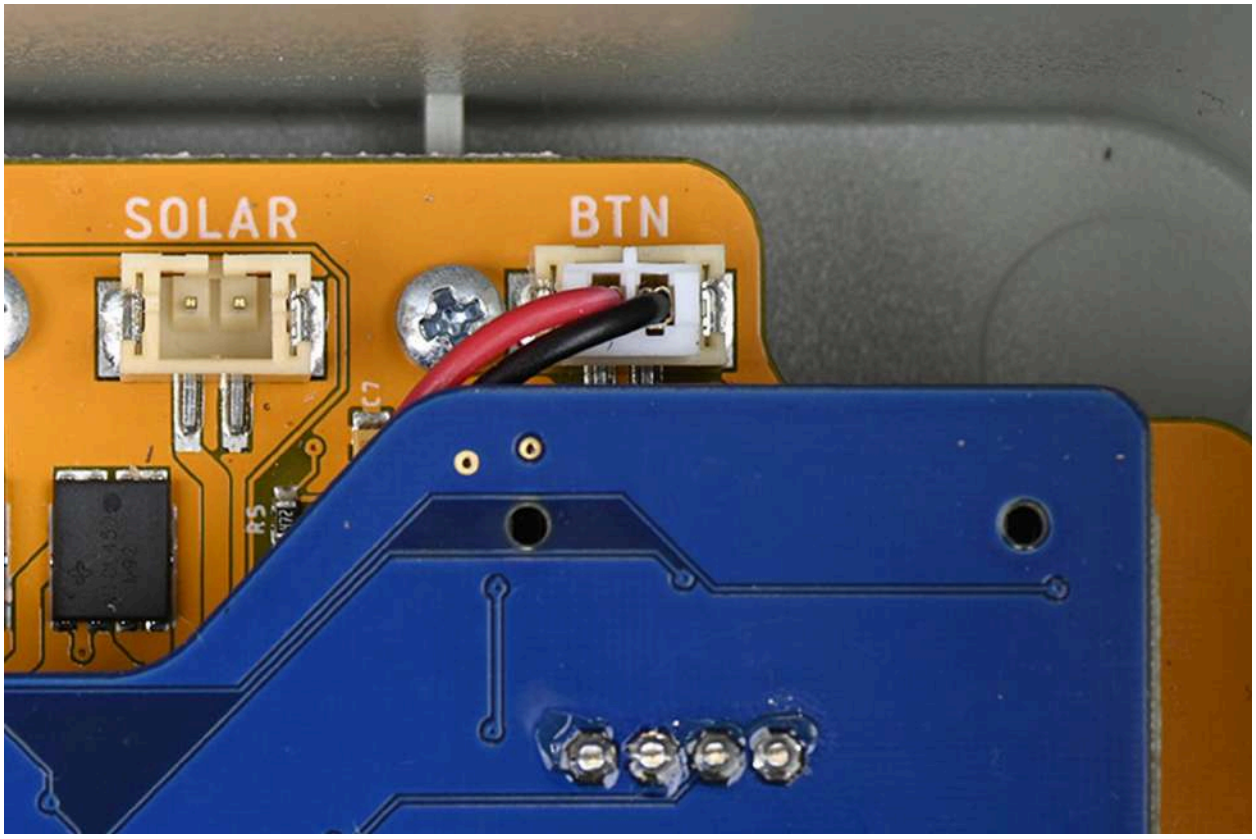
Insert the red and black battery cable into the socket on the top left hand side of the Upper Board where it says “BATTERY”.

2. Attach the station's Wake Button.

Warning: Before inserting the battery, solar, and button cables, double check that you are connecting them to the correct sockets (labeled "BATTERY," "SOLAR" and "BTN"). Inserting cables into the wrong sockets can permanently damage your FieldKit.



On the left hand outer wall of the Case, you'll see a big black button. This is the Wake Button that you'll later use to wake up the station and turn on the Station WiFi signal.If you follow the button into the interior left hand wall of the Case, you'll see two metal prongs with a red and black cable attached. That's the button cable.



Take the button cable and insert it into the socket on the top right hand side of the Upper Board where it says “BTN”.

3. Plug in Micro-USB Cable to Charge Station

As part of your station, you'll find a black Micro-USB Cable that you will use to charge the Battery.

Plug in the Micro-USB cable to a power source (e.g., a USB wall charger) to start charging the Battery. Your station takes 6-12 hours to fully charge, and it should be fully charged before you deploy. It charges faster when switched off.

Note: If you have issues charging your station, potential culprits could be the USB charger, using a cable other than the one provided by FieldKit, or using a USB battery bank.

For recommendations on what kind of charging equipment to use, please see our FAQ knowledgebase.

Assemble Cable Plate

Cable Plate assembly depends on your sensor and power configuration.

The Cable Plate Pack is designed to fit onto the FieldKit Case, and includes a plastic Cable Plate with custom glands and cable inserts, allowing specific configurations of cables to pass into the case. The Cable Plate best suited for your needs will depend on your intended sensor and power configuration, therefore don't worry if your glands don't look exactly like the images below.

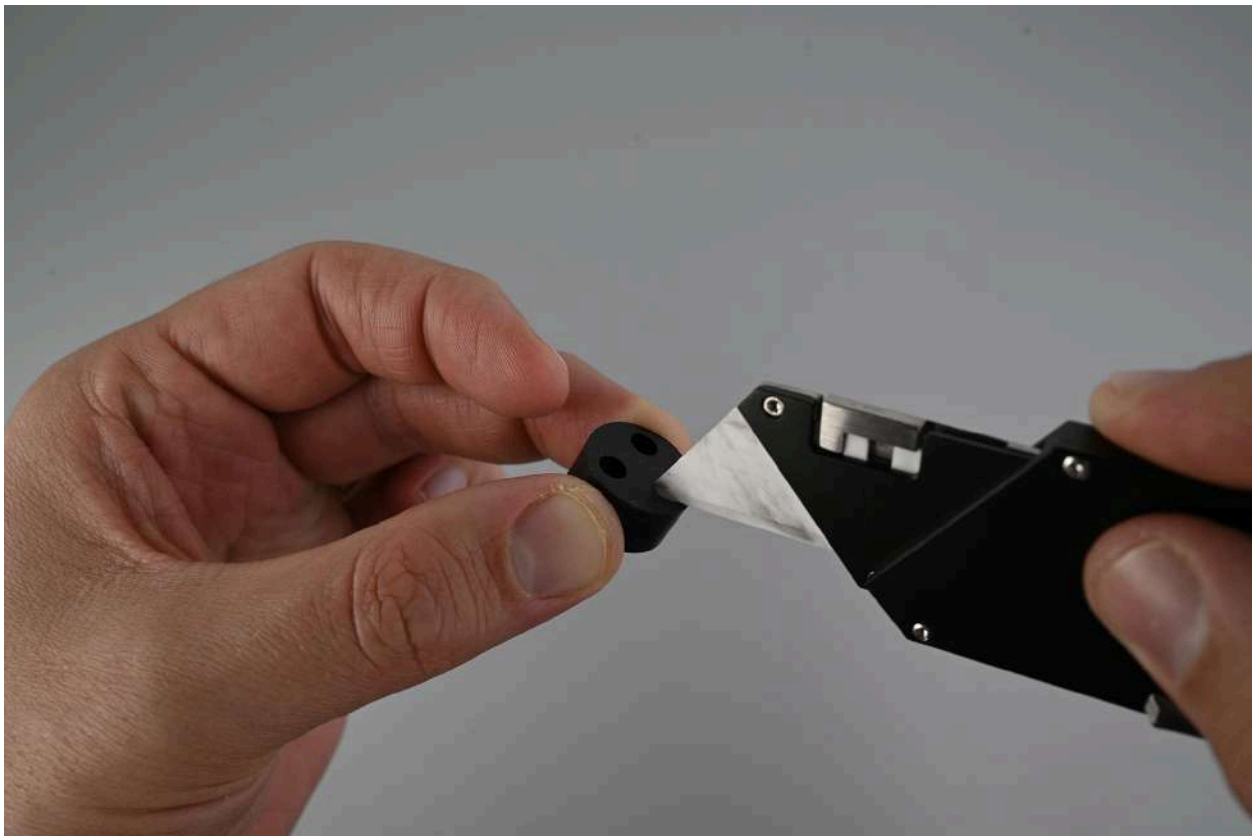
This process can be pretty involved, so you might choose to do this as part of the next step, sensor module setup, or at the very end of station setup. No matter what, you can complete the steps in this section when it makes sense for you. Ensure your FieldKit Core is screwed into the case before beginning cable plate installation.

Quick Tip: When assembling the Cable Plate, the gland for the power cables (if used) generally goes on the left side of the plate and the gland for the sensor cables goes on the right. You can check to make sure which is which by sizing using the gland with the nut removed.

1. Gather your gland components.
2. If you are setting up a FieldKit using water chemistry modules, remove the front cap on the gland and remove the insert. For glands with a free floating insert, skip this step. Additionally, you will not need to remove nor modify the insert in the CAT5 cable plate gland used with the FieldKit weather module, so you may disregard steps 3, 4, and 6 below in that case.

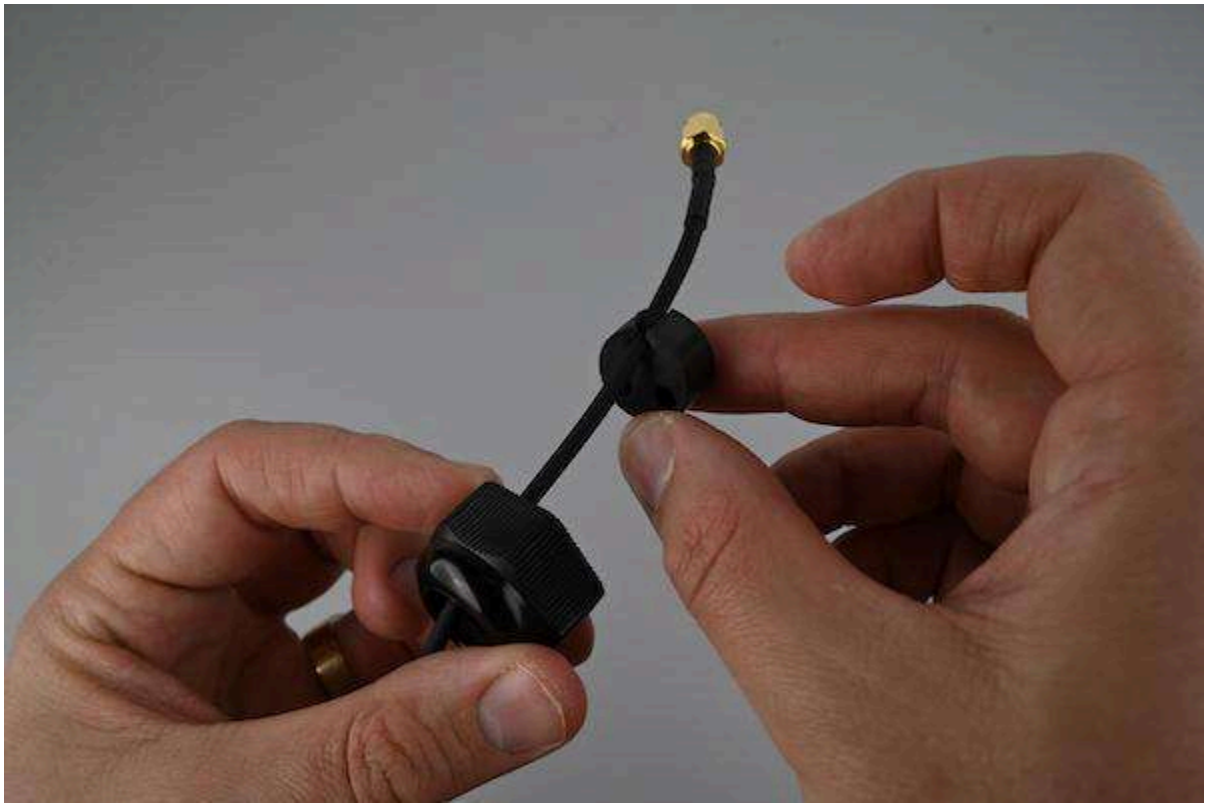
Note: If your gland came with a multi-hole insert, also look inside the gland and remove the large ring-shaped insert that comes inside. If you have issues fitting the multi-hole insert into the gland, this additional ring-shaped insert is likely the culprit.

3. The cable connector is too wide to thread through the diameter of the insert hole. Therefore, you'll have to cut a slit next to each insert hole to provide a way for the cable body (the thinner part) to slot in from the side. Using scissors or a box cutter, carefully cut a slit that runs from the outside of the insert to the outer edge of the hole for each cable.



4. Run the cable connector that plugs into the module board through the front cap (front to back).

5. On the far side of the cap, slot the cable into the insert hole sideways using the slit you've just cut. Repeat steps 3-5 as necessary for all cables going through that insert.

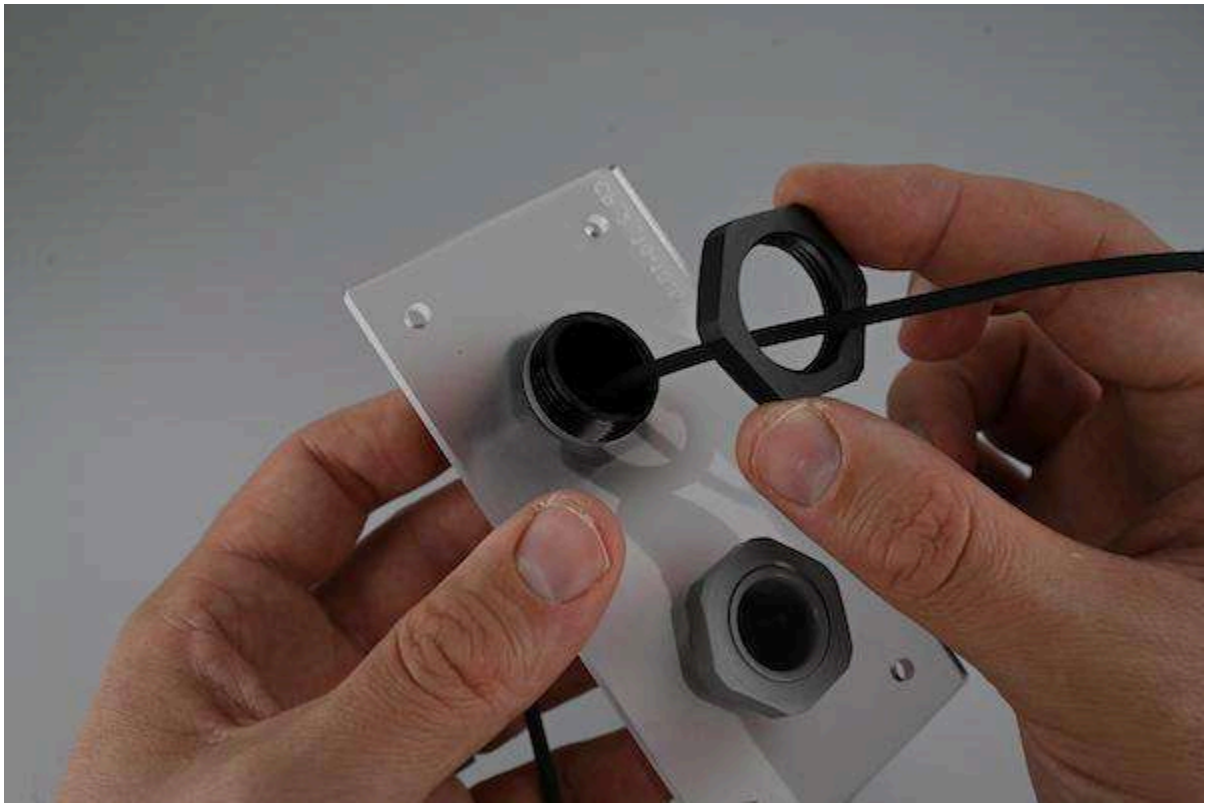


6. Now that the insert is attached to the cables, thread them into the gland body, front to back, so they exit the locking nut.

7. Secure the insert by softly screwing on the front cap to hold the insert loosely in place.

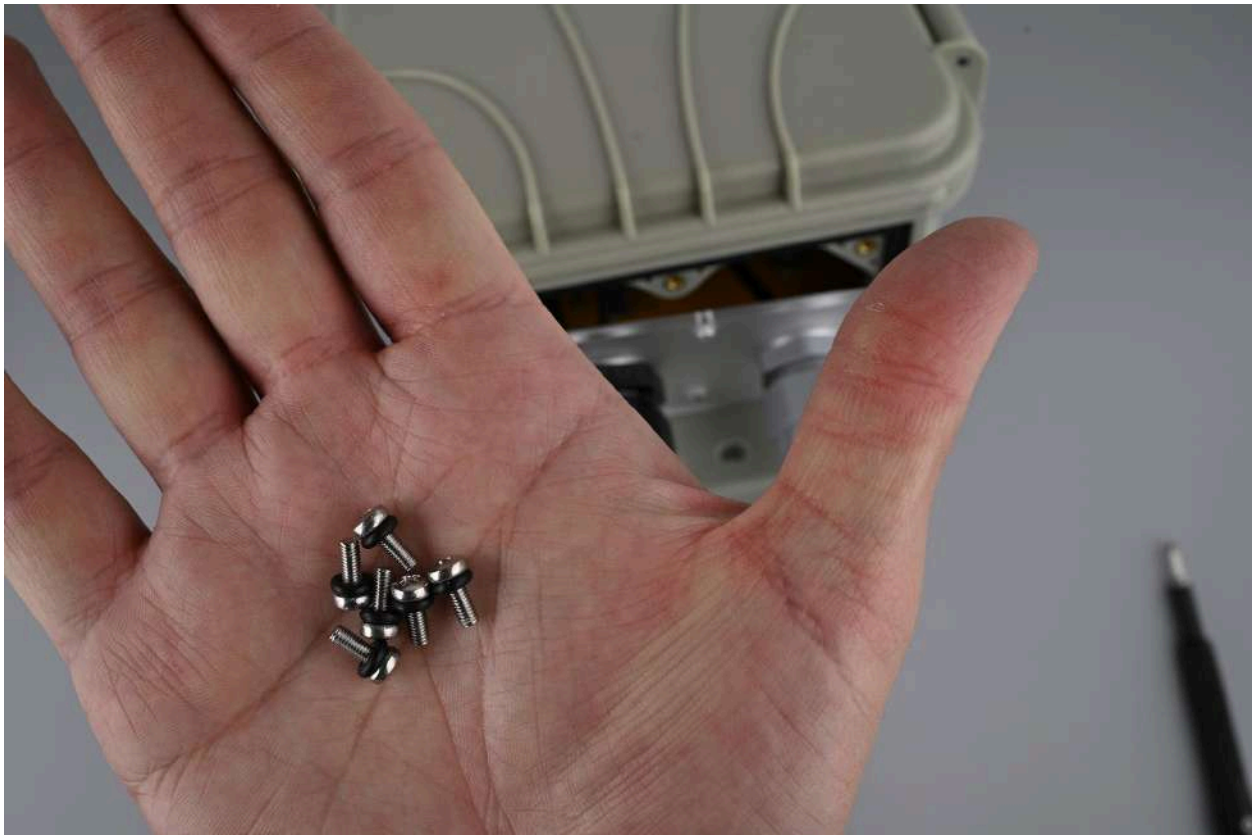
8. Remove the locking nut from the back of the gland, insert the threaded side of the gland into the cable plate hole. Note that when assembling the Cable Plate, the gland for the power cables (if used) generally goes on the left side of the plate and the gland for the sensor cables goes on the right.

9. Replace the locking nut, tightening until it stops. Repeat the above steps as necessary for all glands.



10. Once all your cables with inserts are in their respective glands and attached to the cable plate, you're ready to screw your cable plate into place on your case by tightening the locking nut back into place.

11. Open the packet marked ‘Cable Plate Screws’, and ensure that the included o-rings are fitted onto the cable plate screws. This provides optimal weather protection.



12. Next, check that the gasket is pressed into the case groove to form a snug fit. Then screw your cable plate into place using the Cable Plate screws. It should be screwed in tightly, but be careful not to over-tighten the screws. The o-rings should be slightly compressed but not completely flattened.

13. Finally, loosen the front cap on the gland and adjust the length of your cables so that they reach their respective connectors on the FieldKit station without too much extra slack. Tighten the front cap on the glands until they're snug and the cables no longer slide.

Regardless of assembly order (either assembling the cable plate alongside module setup, or at the very end once you're ready to deploy), be sure to follow each cable from the instrument to the module board to ensure that it is plugged into the right module board. It may be easier to run your finger along the cable to make sure you have the right one.

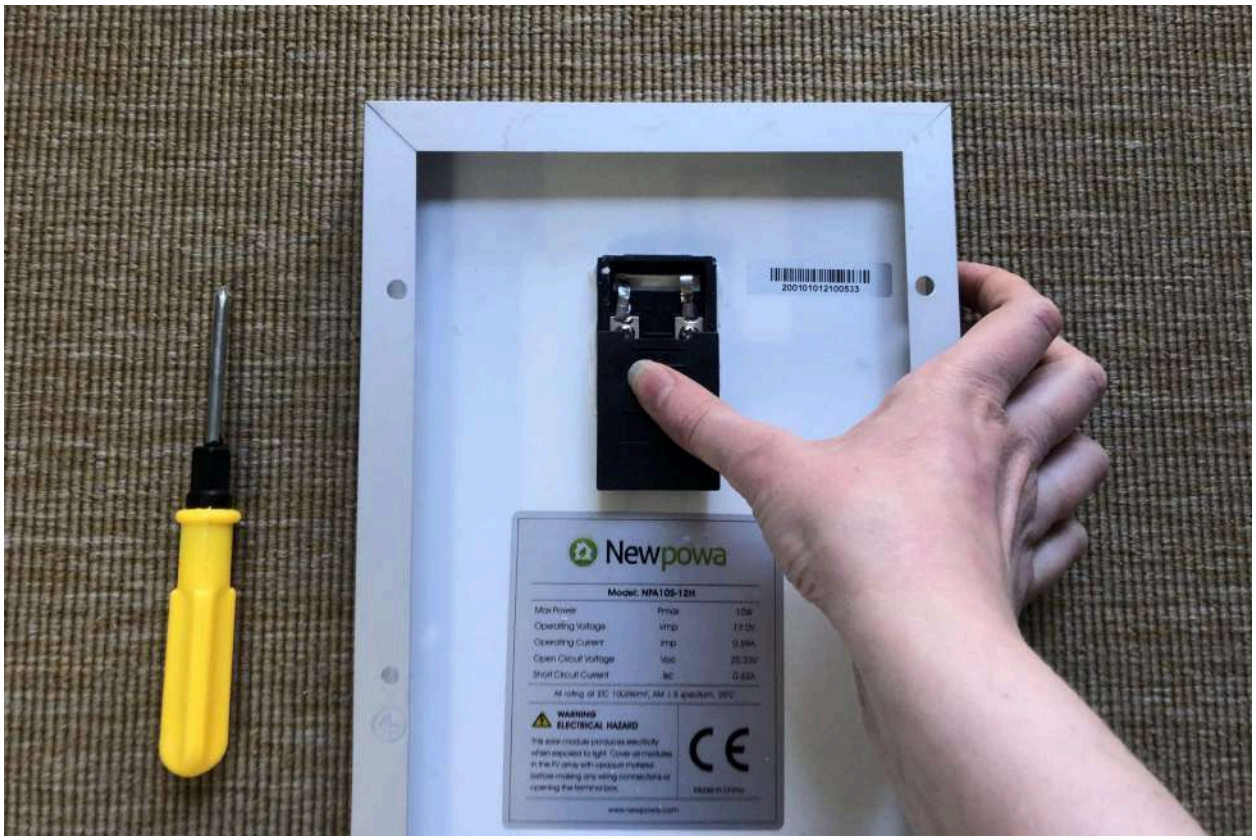
Optional: To improve water resistance, silicone can be used on the inserts to create a seal.

Solar Panel Assembly

If you purchased a FieldKit Solar Panel, we recommend assembling and testing the panel before leaving home or the lab, so that you know everything is in working order and you have a plan for deployment. If you prefer to transport the cable separately from the panel, you can simply disassemble them before heading out to the field and re-assemble onsite.

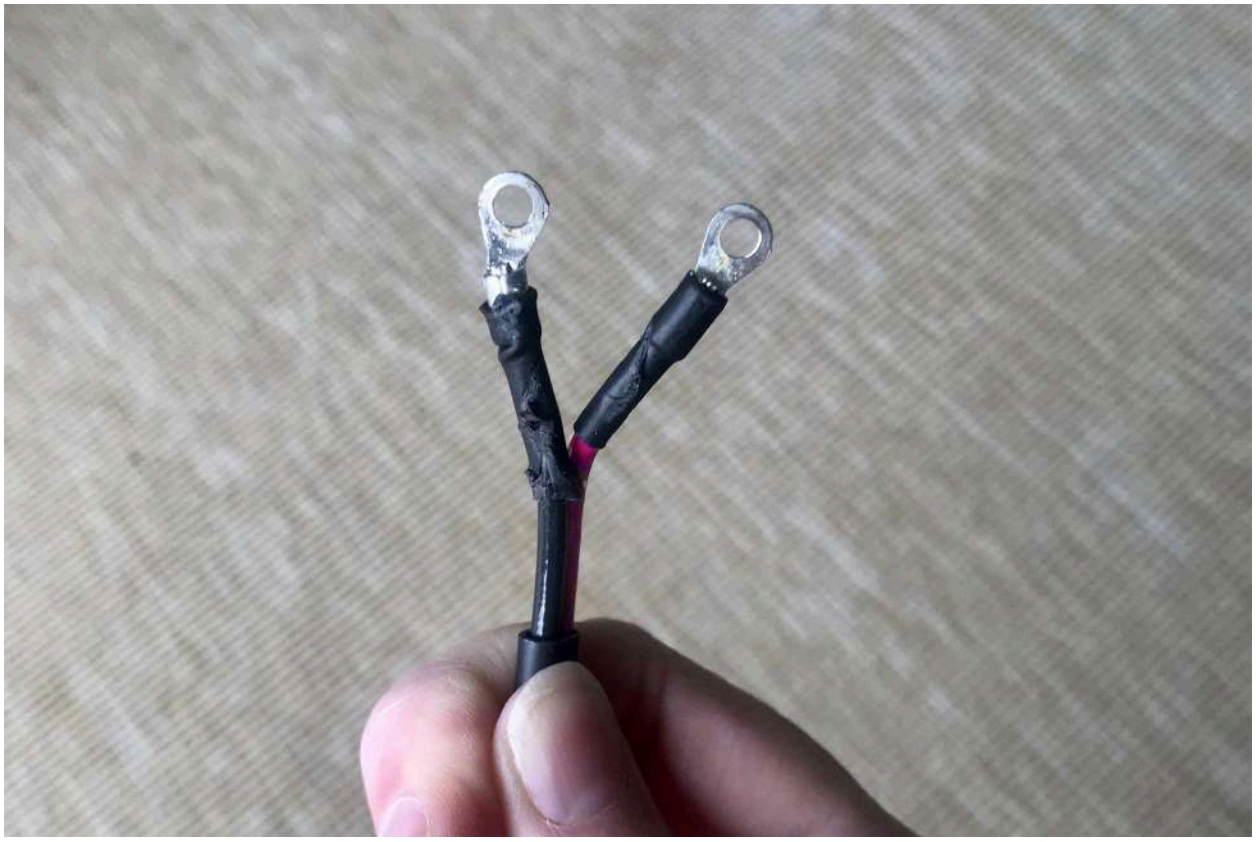
Note: High-pitched whining or beeping noises may sometimes be audible, especially when charging from solar power; these are expected and part of normal operation.

1. Turn the panel onto its front, so the back side is facing up. You'll see a black box on the back of the panel. Slide off the box lid by applying some pressure where it says "OPEN" and pulling down.



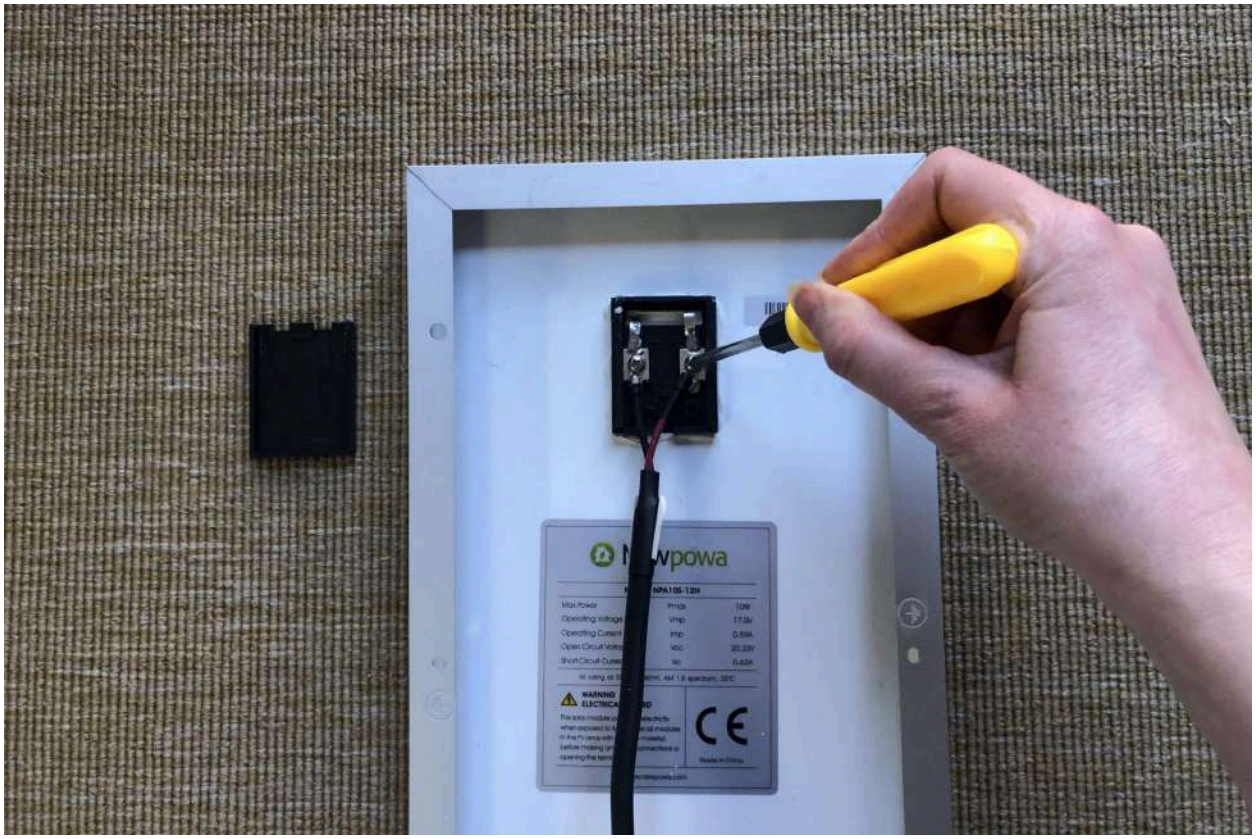
2. Remove each of the two screws and washers from the threads within the box.

3. Locate your solar panel cable. Take the end that terminates in two wires, one red and one black, each attached to a metal lug (a circular metal finding).



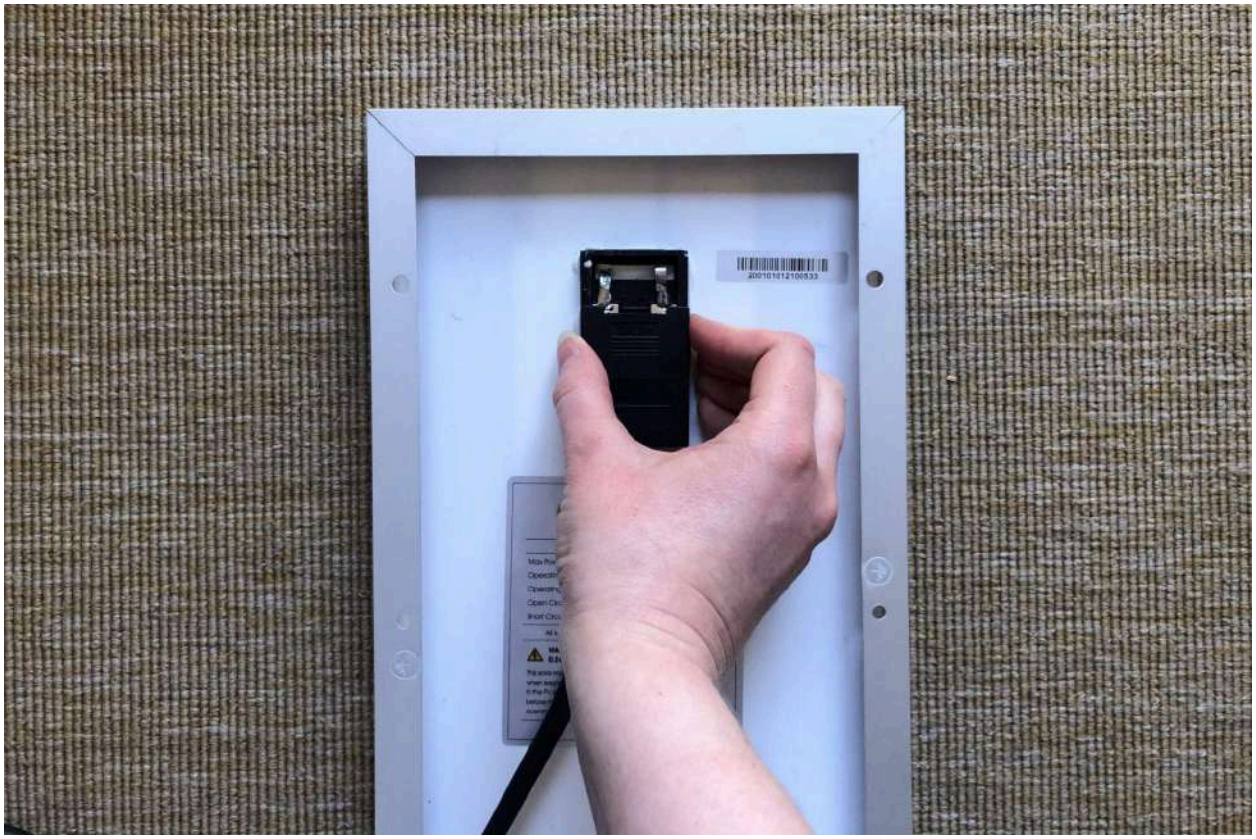
4. Place the two lugs over the threads in the box, then reinstate the screws and washers. Screw them back into place.

Note: Be sure to assign the lug on the red cable to positive (+) and the lug on the black cable to negative (–).

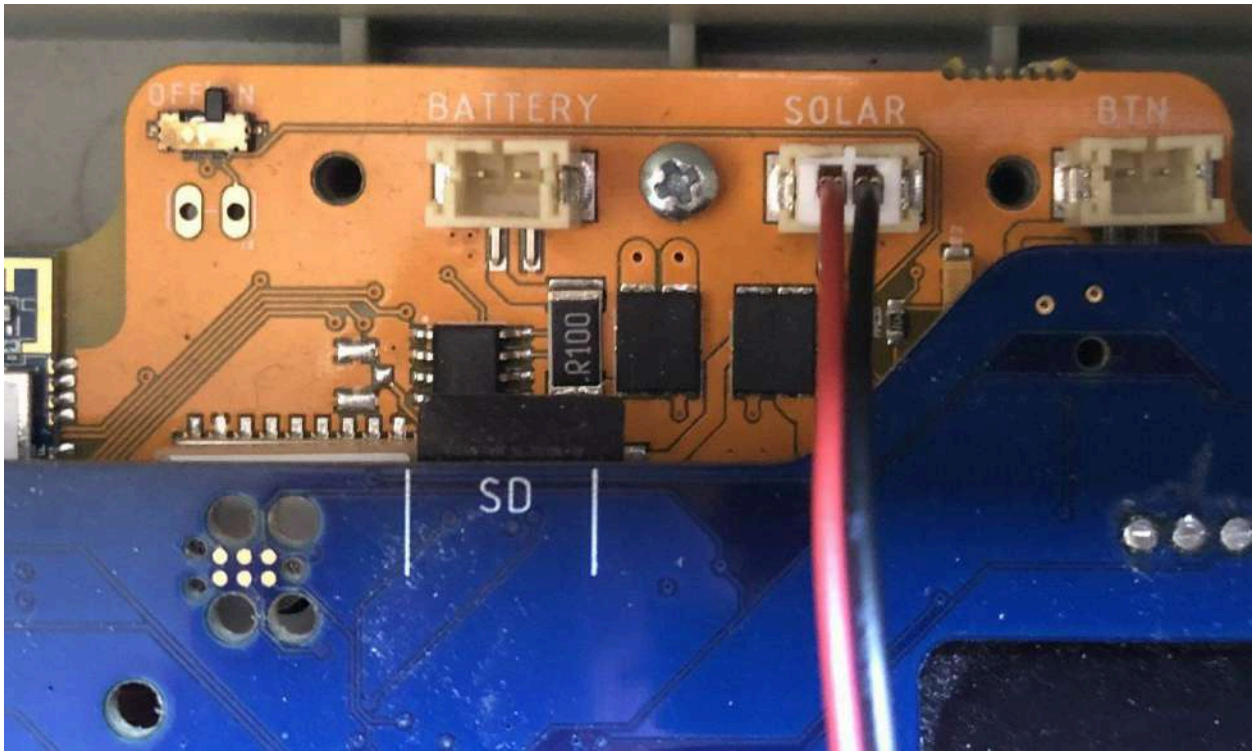


5. Bend and mold the wires so that they fit into the groove. They are quite stiff, so don't be afraid to push them with some force. It will be a snug fit.

6. Make sure everything is sitting as flat as possible. Then, apply some pressure and slide the lid back onto the box.



7. Take the other end of the solar cable and insert it into the top middle socket of the Upper Board where it says “SOLAR.” When inserted, the cable should have the red wire on the left and the black wire on the right–if this is not the case with your cable, please reach out to FieldKit so that we may replace your cable.



Warning: Before inserting the battery, solar and button cables, double check that you are connecting them to the correct sockets (labelled “BATTERY,” “SOLAR” and “BTN”). Inserting cables into the wrong sockets can permanently damage your FieldKit.

8. During deployment, you’ll need to ensure you’re placing your solar panel in the optimum conditions to charge the battery that’s powering your station. Read more about this in our section on Solar Panel Deployment and in our knowledgebase.

Connecting to Your Station

1. Flip the small switch in the top left of the Upper Board to the "ON" position, so your FieldKit station comes to life, and you're ready to connect. You can do this with either the tip of your finger or your fingernail, or even the tip of your screwdriver. Once you've turned it on, the screen display turns on and the display startup sequence begins. The Conservify logo appears briefly followed by the station name and startup diagnostics. After the station has successfully booted up, the display turns off after a few minutes. Pressing any button below the screen (or the Wake button) turns the display back on. After a period of inactivity, the display will then turn off.

Quick Tip: The system charges whether switched on or off, but having the station switched on allows you to intermittently check battery life on the station screen. However, it charges faster when switched off.

2. Next, you'll connect to the station WiFi. Each FieldKit has an access point with its own WiFi signal. It acts like a hotspot so you can connect to it via your mobile device and transfer data (though note that it does not connect to the wider Internet). Press the button to enable the station's Access Point (AP). WiFi can also be turned on using the menu on the Station screen by clicking the center button and navigating to Network > Enable. This button will also connect the station to the last network it was connected to if a network has been saved in the app's station settings.
3. From here, go to your mobile phone WiFi settings and select the station name displayed on the station screen. The name will default to a random combination of a descriptive adjective, a name of an animal, and a number, such as Friendly Squid 42 or Gentle Eagle 23.
4. Next, you will return to the app, which will automatically search for nearby FieldKit stations that have their WiFi enabled. Choose the one you are setting up (the same one as the previous step).
5. Once the app confirms that your station is connected, you can choose to name your FieldKit Station something different than the default. Providing a unique name or number for each station can help you personalize and remember each one. You can always skip this part and change your station name later.

Note: Changing your station name will change the Station WiFi name immediately in your phone's WiFi settings, and upon restart of the station and enablement of the Station WiFi on your station screen.

6. If you have renamed your station, re-connect to your station's new name as listed in your phone's WiFi settings.
7. If returning to a station after days, weeks, or months, the FieldKit app should be able to detect the Station WiFi and connect automatically after hitting the Wake button. In situations where the mobile app and station do not auto-detect one another, open up your phone's WiFi settings to reconnect. For more information on this, see the section on Syncing FieldKit Data Using the App.

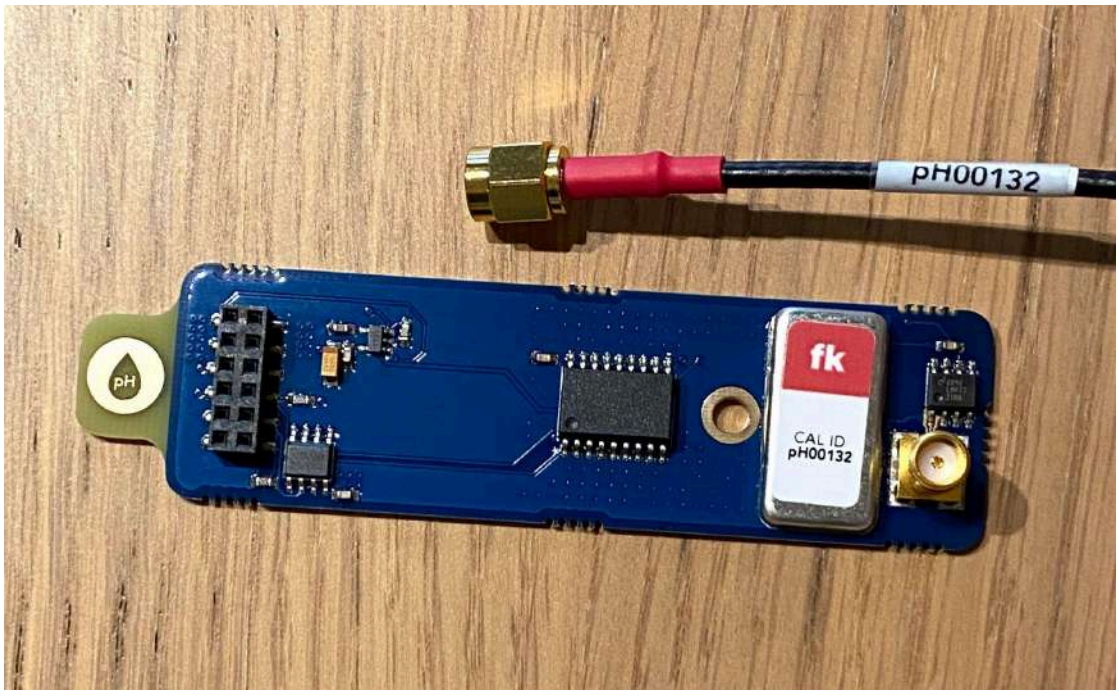
Sensor Setup and Calibration

Calibrating Sensors for Accurate Readings

What is Calibration?

Calibration is essential for accurate data readings. Modern sensors and transducers are electronic devices, and their behaviors may drift over time due to temperature, pressure, changes in ambient conditions, or for other reasons, resulting in inaccurate readings. Therefore, calibration is necessary to periodically correct a sensor's baseline readings, and is necessary before collecting readings from all new sensors. Later on, you will likely need to recalibrate your FieldKit sensors at regular intervals to keep them accurate. Check your particular sensors for CAL ID decals to determine whether they have been calibrated in our lab and how frequently they require recalibration.

Note: Before calibration, examine your module board and probe cable for a Calibration ID (CAL ID) decal. All probes and module pairs that have the same CAL ID printed on them have been calibrated together in the lab and may not require calibration before their initial use. Additionally, if you have multiple probes of the same type, take care to match the CAL ID number on the probe cable and the module board when setting up the station. Failure to do so may result in inaccurate data and a need to recalibrate. Additionally, if you are using SMA extension cables, your sensors should be recalibrated before use with the extension cables in place. You will need to use the same extension cable you calibrated with when deploying.



How do I do it?

For calibration, you'll need trusted calibration standards—read on for our recommendations. Standards come in a few different forms (see below). In all cases, you'll use the readings that you get from your standards (the standard value) as a source of truth to correct the FieldKit sensors' baseline readings (the sensor value).

The app will guide you through the process, which follows three main steps per sensor, done three times for each module in order to establish a three-point calibration:

1. Test using the following:

    - FieldKit sensor
    - External standard(s)

2. Enter the standard value into the app

3. Hit "calibrate." This will record both the current sensor value and the standard value together, which allows us to later calibrate the sensor.

Calibration Standards

Calibration standards provide a source of truth to correct the FieldKit sensors' baseline readings and can take the form of physical quantities, standard solutions, or measurement devices. There are two main methods of calibration, each using different types of standard: direct and transfer. Below we explain what this means and the science behind it, but you can skip ahead to "Which calibration standards do I need to source?" if you wish.

Direct Calibration

This method corrects the FieldKit sensor's baseline readings with trusted standard inputs, like solutions that have been reliably pre-mixed to a specific quantity, a calibrator that gives a known voltage, or a resistance substitution box that gives a known resistance.

Example: For pH you can use a pH 4.00 standard, made in a lab to be exactly 4.00.

It's called a direct calibration because you take the measurement with your FieldKit sensor directly from the value of the reliable external standard that is also the quantity (the bottle says "pH 4.00").

Transfer Calibration

This method corrects the FieldKit sensor's baseline readings with the readings of a separate measuring device that you already trust to be precise, known as your transfer standard. The

same thing (what's known as the transfer medium) is measured by your FieldKit sensor and the external measurement device at the same time.

Example: For temperature, you can use boiling water and a standard thermometer.

It's called a transfer calibration because the precision of measurement of the trusted device, or standard (e.g., the standard thermometer), is being transferred through simultaneous measurement of the same quantity (boiling water) to the thing being calibrated (the FieldKit sensor), which is referred to as the Device Under Test or DUT.

When doing a calibration, you're actually doing two different tasks, one after the other. The first one is known as characterization, and it's how you determine how the sensor is behaving relative to your standard. In our case, that involves taking a series of measurements, pairs of numbers we can represent like (x, y), where) (x) is the value of the sensor, and (y) is the value of the standard. Next, we do some math to see if there's a line that will go through all of these (x, y) pairs, and the function that makes that line on a graph is what's known as our calibration function.

Which calibration standards do I need to source?

For calibrating your FieldKit sensors, we recommend the following or equivalents. Most of these can be sourced online, while others you can find around your home or workplace. If you expect to encounter numbers outside of these ranges in deployment, it's fine to use other standards (e.g., for conductivity).

- pH: 4.00, 7.00, and 10.00 pH standard buffer solutions and Extech PH100 pH meter (or equivalent)
- Electrical Conductivity: 100 and 3000 µS/cm conductivity standard solutions and Extech EC400 electrical conductivity meter (or equivalent)
- Temperature: ice water and Traceable 90225-15 thermometer (or equivalent)
- Dissolved Oxygen: aquarium air pump, cup of water, and Extech DO600 Dissolved Oxygen meter (or equivalent)

How often do I need to calibrate my sensors?

We recommend, at minimum, recalibrating your sensors according to the following schedule:

- pH: every 3 months
- Dissolved Oxygen: every 6 months (also recondition the probes at this time)
- All other sensors: 1 year

In addition, if you notice a significant, consistent drift in a certain direction outside of the above schedule, especially one that starts at an identifiable point in time (for example, right after a big storm), that may be a sign that something has affected your sensor in the field and it's time to

bring it in for recalibration. To recalibrate your sensors, you can use the same process you used for the original sensor calibration.

Weather Module Assembly and Setup

Your Weather Pack consists of a Weather Module Board, Weather Sensor Board, a CAT5 cable and a Weather Instrument Cluster (Rain Gauge, Anemometer, and Wind Vane) plus accompanying cables and hardware.

Ensure you have:

1) Weather Module Board

2) Weather Sensor Board

3) CAT5 Cable

4) Stevenson Screen + Arm (in box marked “mounting arm short”)

5) Rain Gauge + Arm (in box marked “mounting arm short”)

6) Anemometer, Wind Vane + Arm (in box marked “stander”)

7) Mounting Pole (2 parts)

8) Hose Clamp

9) Weather Instrument Cluster Screws

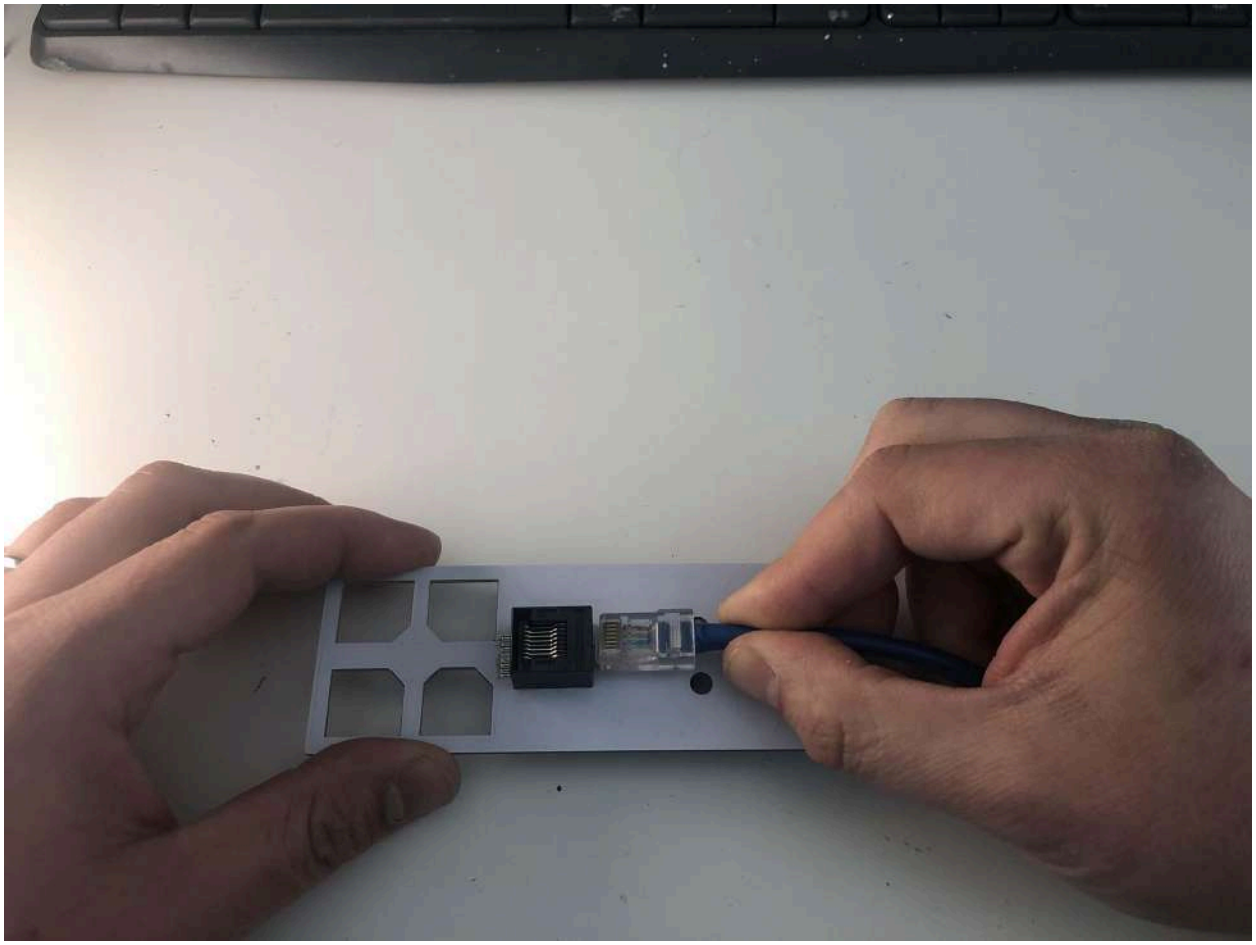
The Weather Module Board should already be attached to your station.

You will also need a compass—we recommend the Suunto A-10 Compass or equivalent—to align the wind vanes when installing the Weather Instrument Cluster at your site.

Note: As you unbox your weather instrument cluster, you will notice that the screws to construct each piece are packaged with the corresponding parts of the cluster. This is in addition to the screws that come with the rest of your FieldKit station.

1. Start by attaching the blue Weather Module Board to your station if you haven’t already.

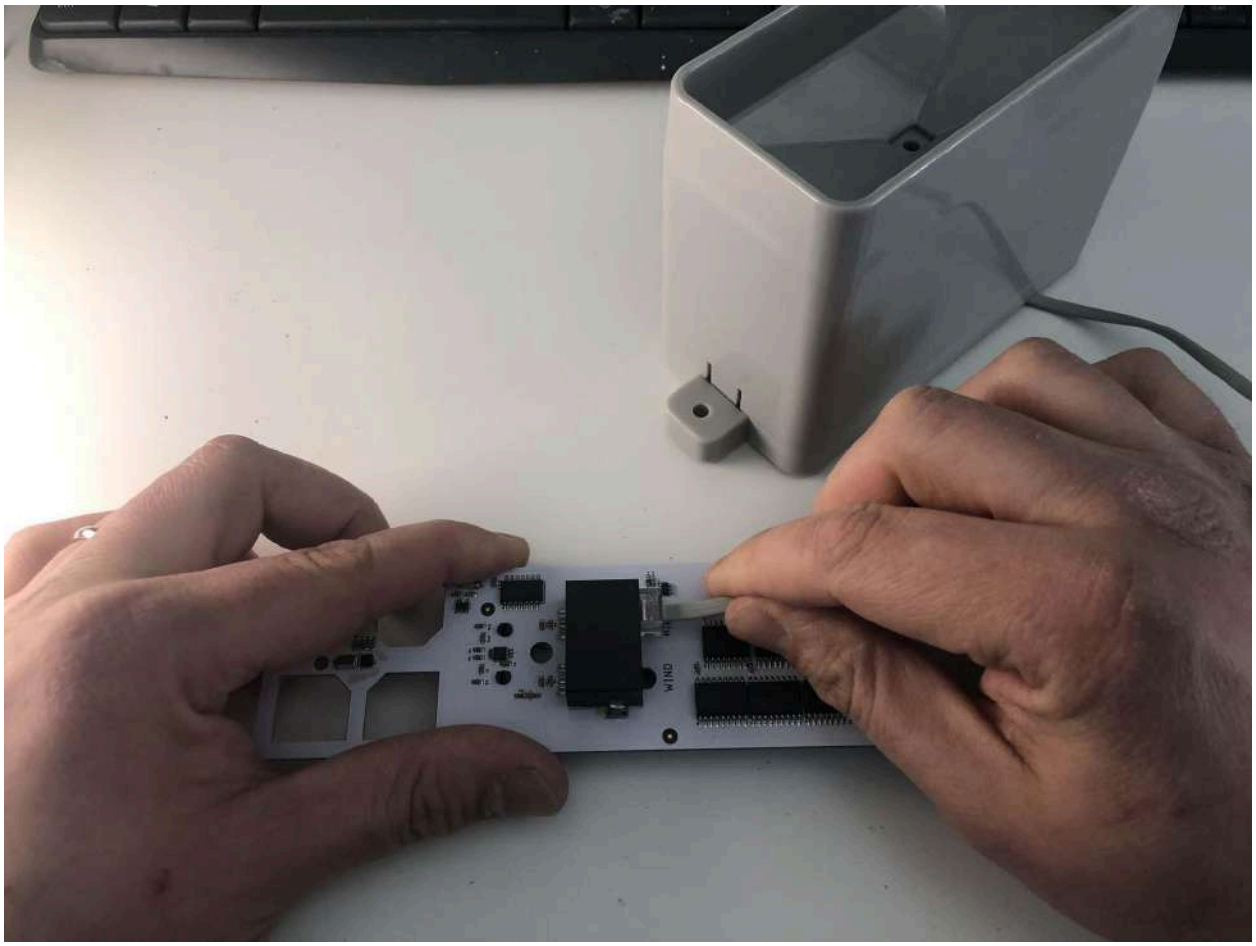
2. Insert one end of the CAT5 cable into the Weather Sensor Board on the back. Make sure it's inserted in the right direction!



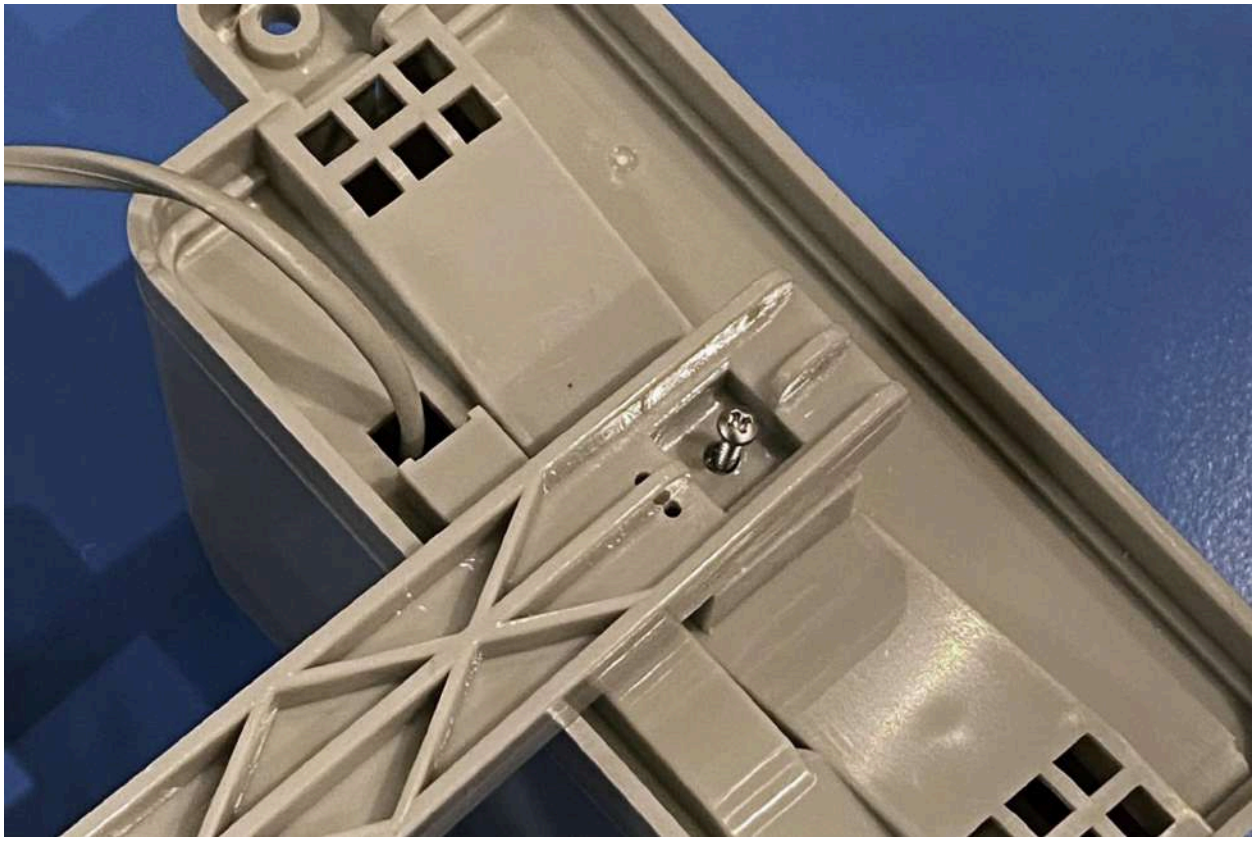
Rain Gauge

The Rain Gauge measures rainfall. It doesn't require emptying, as it's a tipping-bucket type. Inside is a tipping bucket (a bit like a see-saw) with areas where rain collects. When one side is full, it tips over, emptying out the water. Push in the tabs on the sides of the housing and open it up to see how it works!

3. Unravel the rain gauge wire. Note that that rain gauge wire has two wires exposed in the clear end of the connector (versus the wind gauge wire which has four exposed). Turn over the weather sensor board, and insert the RJ11 jack from the rain gauge into the slot on the weather sensor board marked "RAIN."



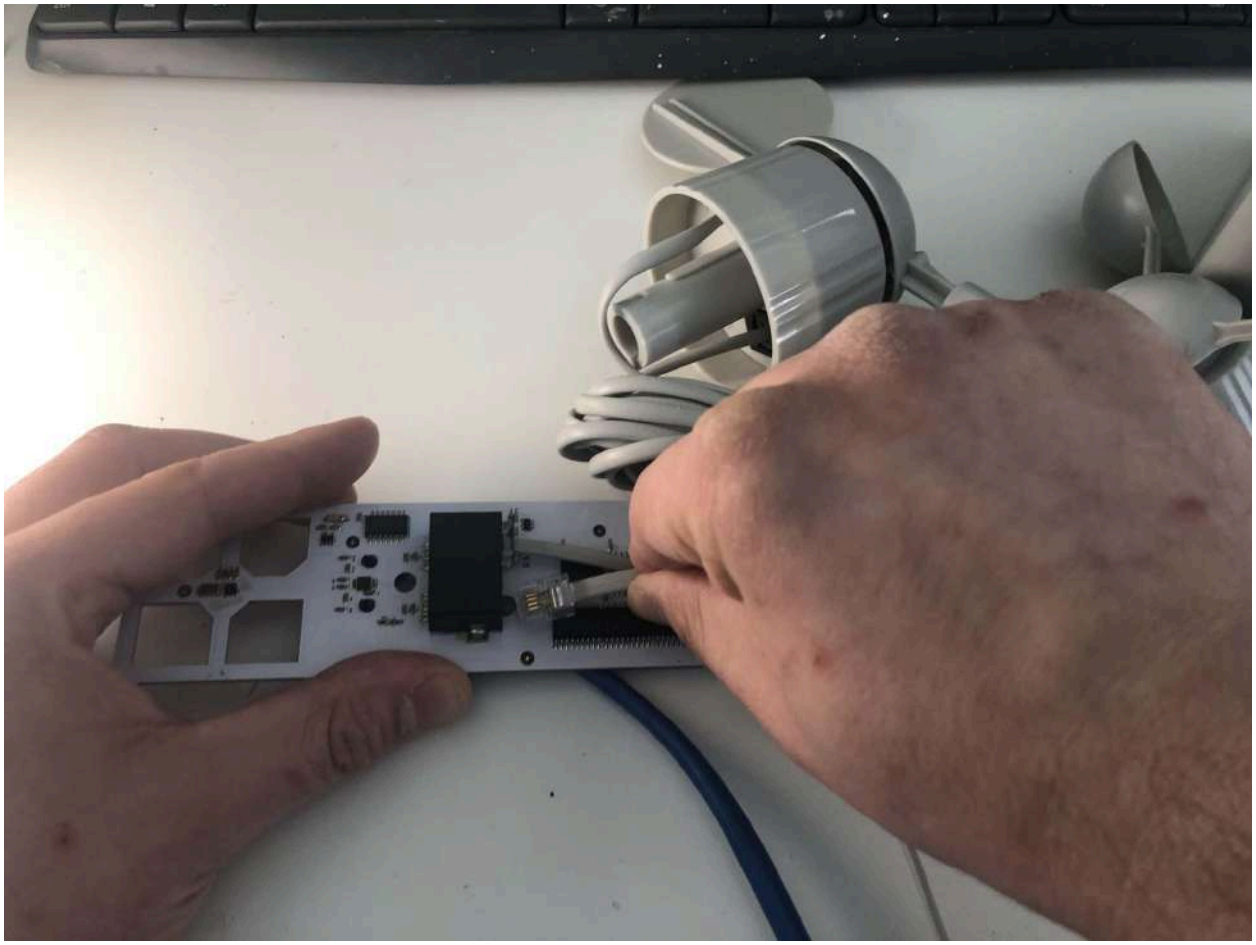
4. Attach the rain gauge to the arm with the screw provided. The arm will be marked “mounting arm short” and the screws will be in a bag marked “rain gauge screws”.



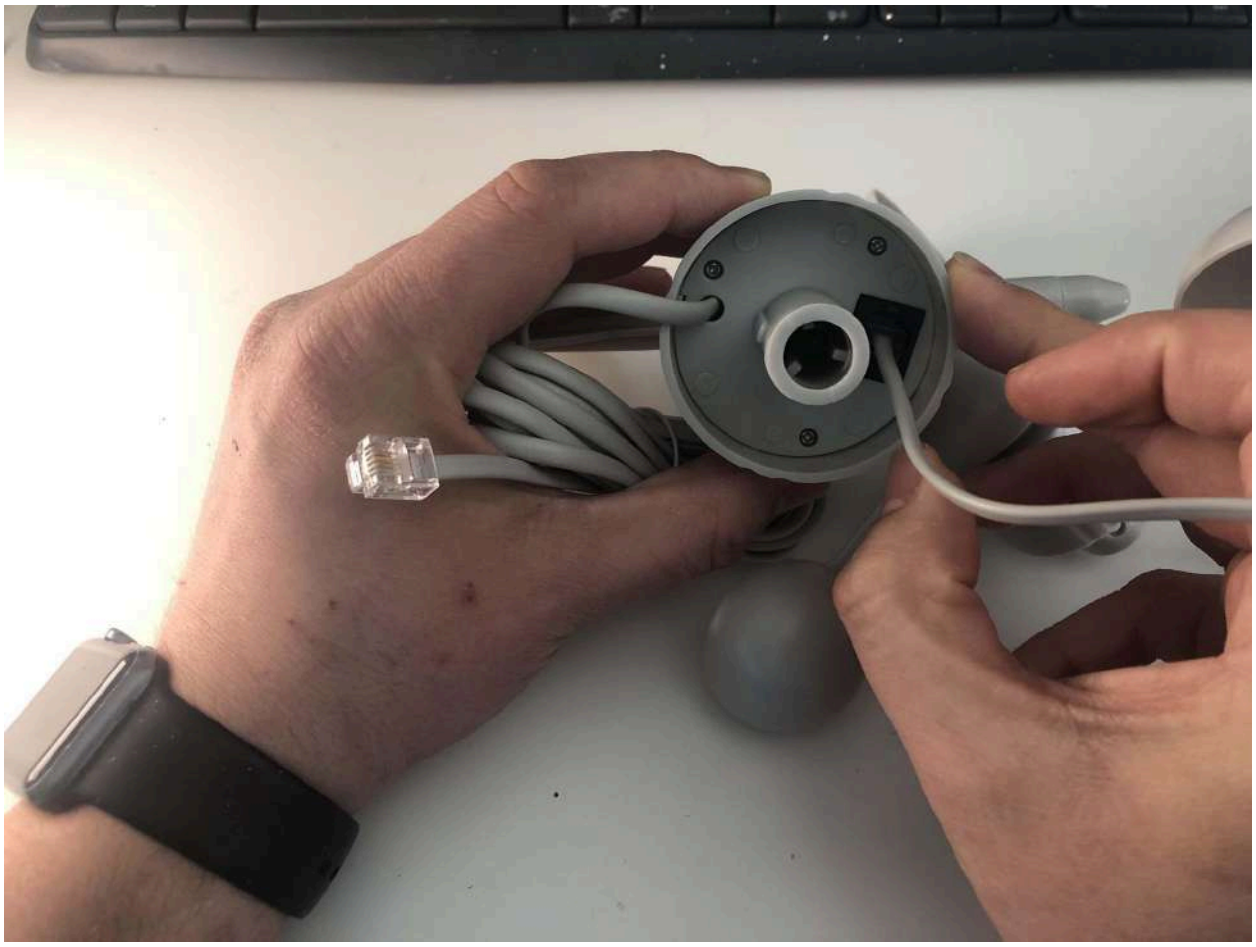
Wind Vane and Anemometer

The Wind Vane shows you the direction that the wind is blowing, and the Anemometer measures wind speed. The wind vane is in a box marked “wind direction” and the anemometer is in a box marked “wind speed.” The arm for mounting these is in a box marked “stander.”

5. Unravel the wires from the wind vane and anemometer. Note that that wind vane wire has four wires exposed in the clear end of the connector and the anemometer wire has two wires exposed (same as the rain gauge wire which also has two exposed). Insert the RJ11 jack from the wind vane into the slot on the weather sensor board marked “WIND.”



6. Insert the RJ11 jack from the anemometer into the wind vane so that they are connected (the anemometer switch conductors are shared between the anemometer and the wind vane).

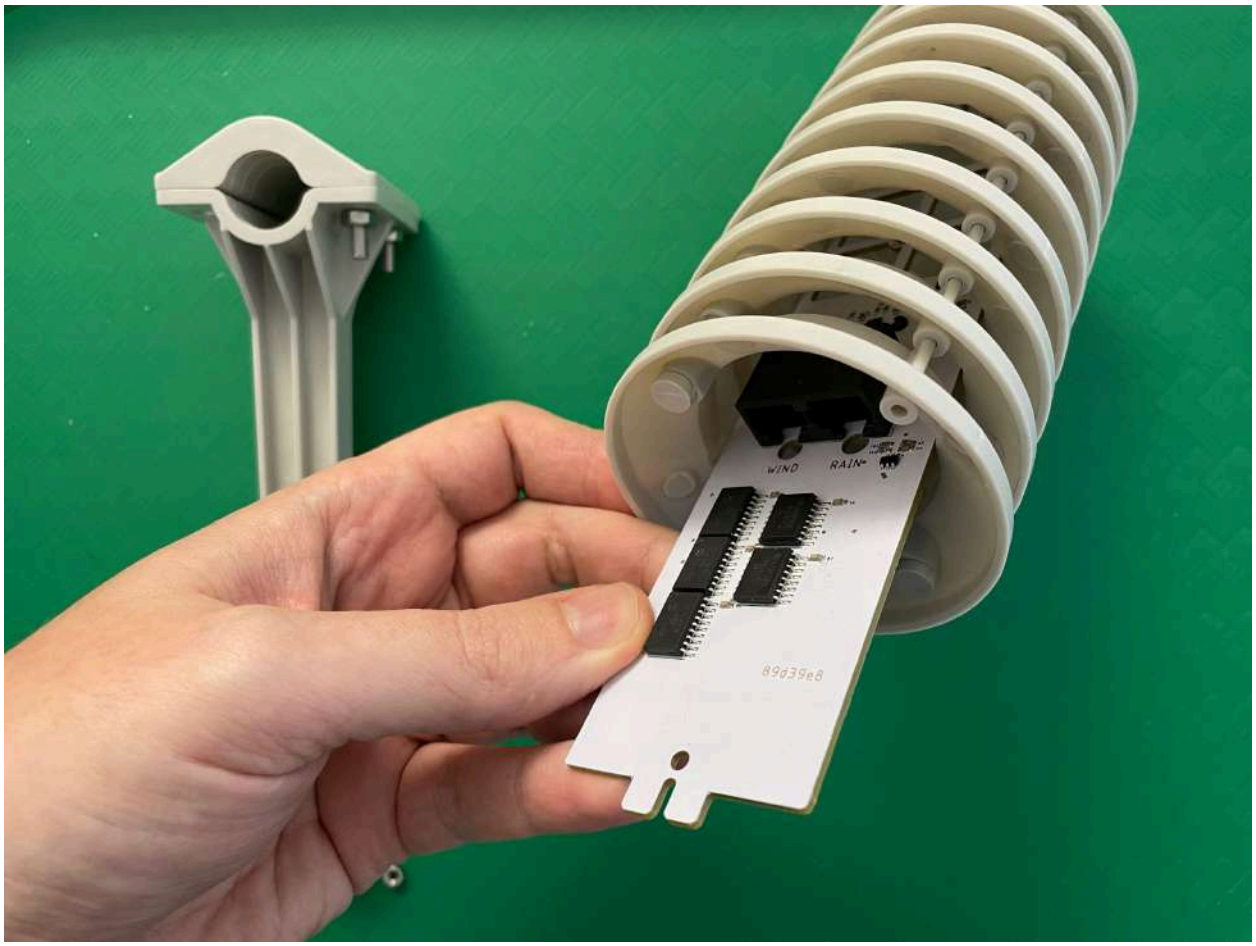


7. One by one, push the anemometer and wind vane onto the Arm and screw them in. The screws and nuts for this are provided alongside the arm. Put nuts on the ends of the screws, and set aside one screw/nut combo for when you assemble the full cluster later.

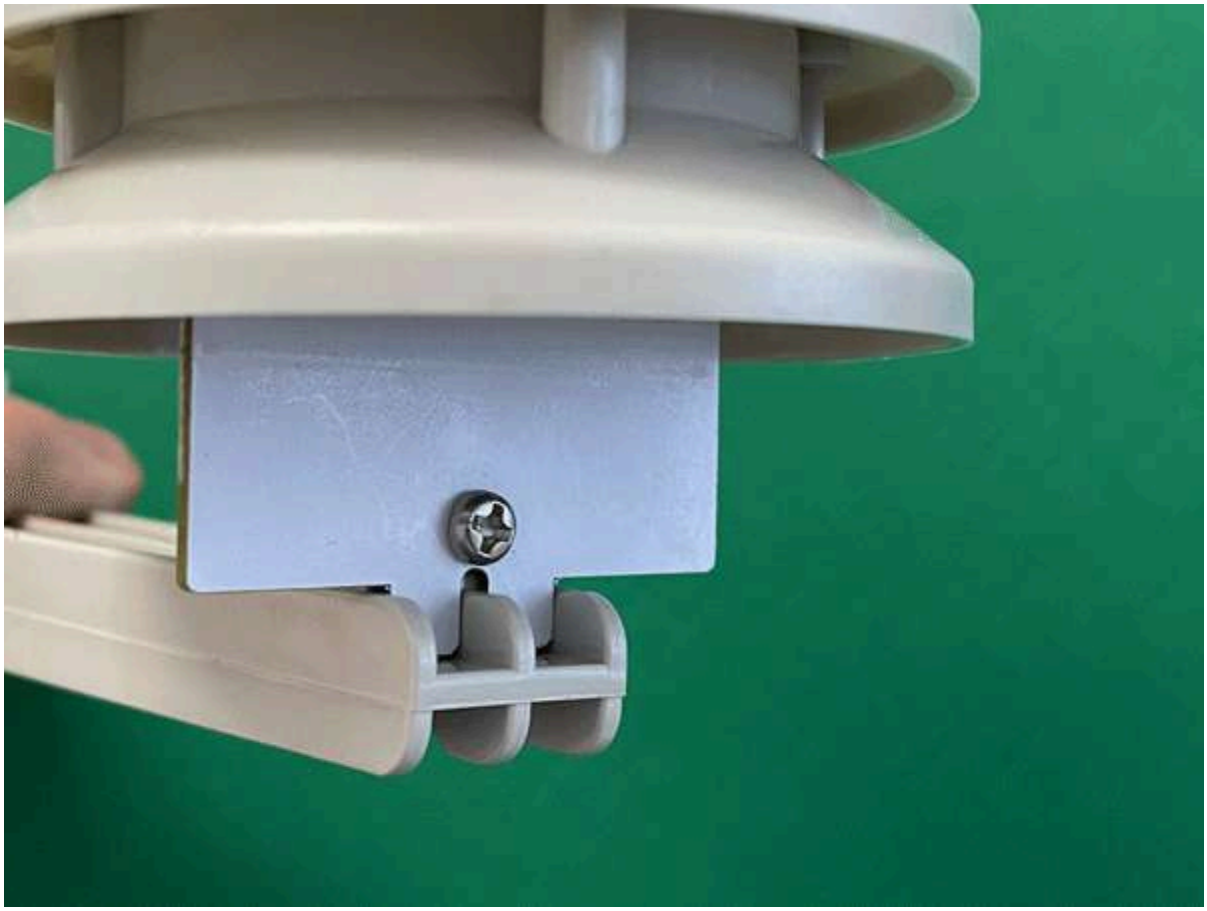
Stevenson Screen

The Stevenson Screen is a breathable enclosure that protects the weather sensor board circuitry from the elements without interfering with the sensors.

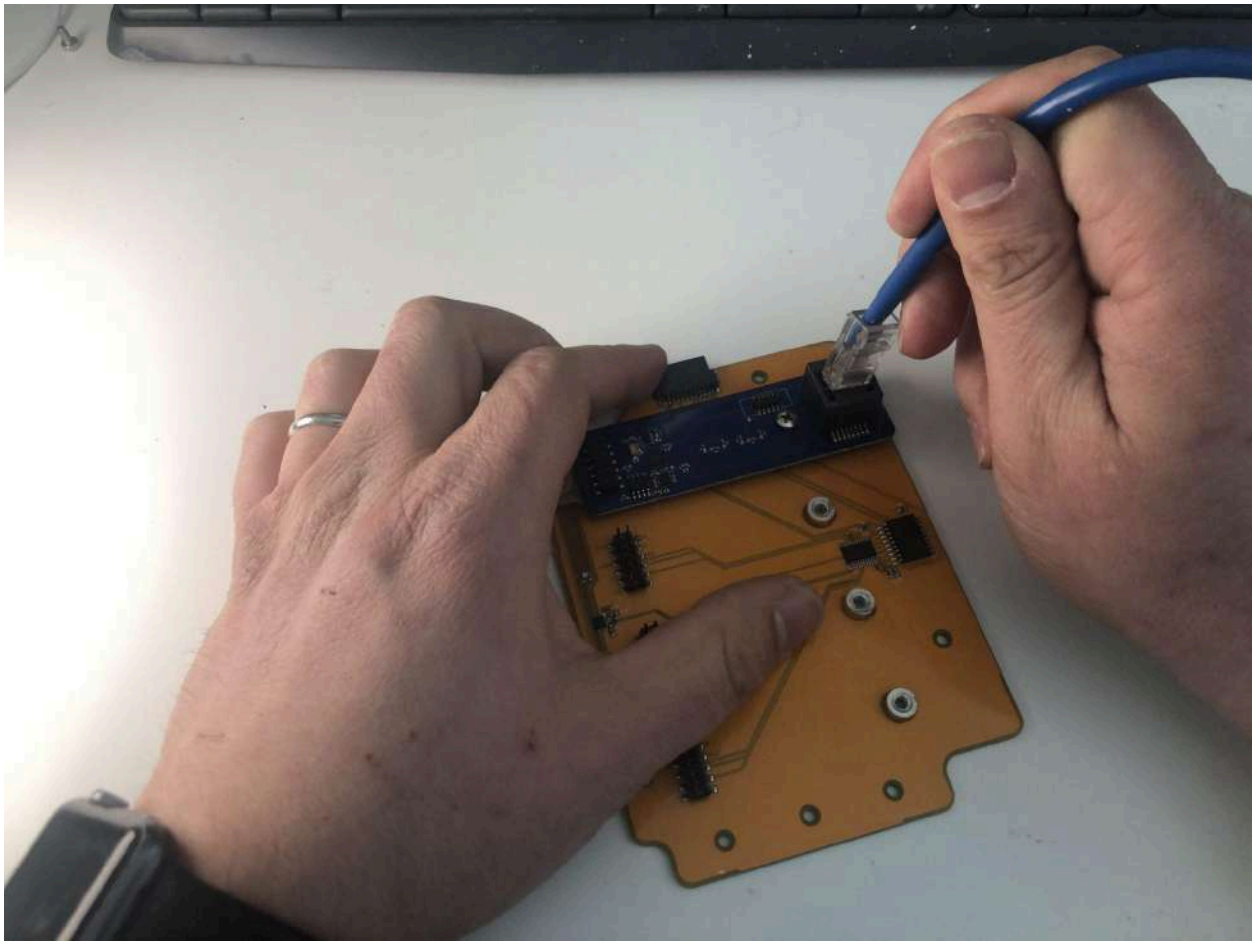
8. Insert the Weather Sensor Board into the Stevenson Screen. The side of the sensor board with cutouts is up and the side with a tab is down.



9. Attach the enclosed board to the arm with the screw and nut provided in the packet marked “weather sensor board screws”. To tighten, we recommend holding the nut with a pair of needle-nose pliers and tightening the screw by hand with your screwdriver.

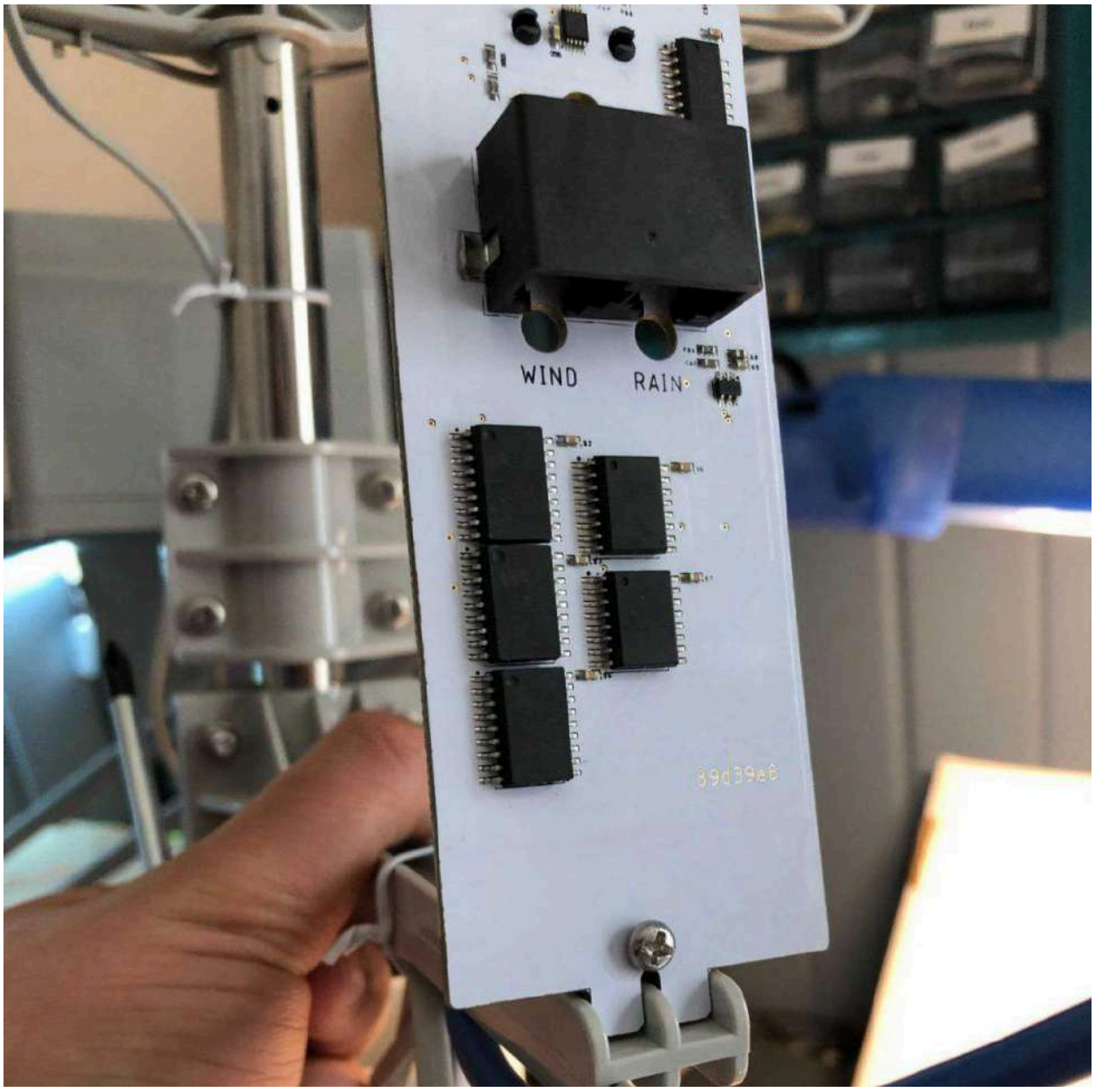


10. Make sure that the other end of the CAT5 cable is securely inserted into the weather module board.



11. Now that everything is connected, assemble the pole and mount your instruments. It's a good idea to do all this before you head out into the field to gather any extra hardware needed, and land on an optimum configuration. The mounting pole comes in two pieces. Take a moment to identify which piece has a notch at the end, then slide the two pieces together to create one longer pole. The notched end should be at the top of the assembled mounting pole when completed.
12. Add the anemometer and wind vane arm to the top of the assembled pole and snugly line up the notch at the end of the mounting pole with the corresponding area on the arm and note the screw holes in each. Use the included screw set aside during wind vane construction to secure the arm to the mounting pole.

13. Take the Stevenson screen arm and rain gauge arm, and loosen the pole openings by unscrewing the screws slightly. Slide the one assembled pole through the instrument arms, and tighten the screws so that they are secure on the pole.



Note: As the anemometer and wind vane should ideally be at least 5 m above open ground to give you representative wind data, the cables are long for the benefit of those who choose not

to place the Stevenson screen close by. If the instruments are placed near one another, please use the included zip ties for cable management.

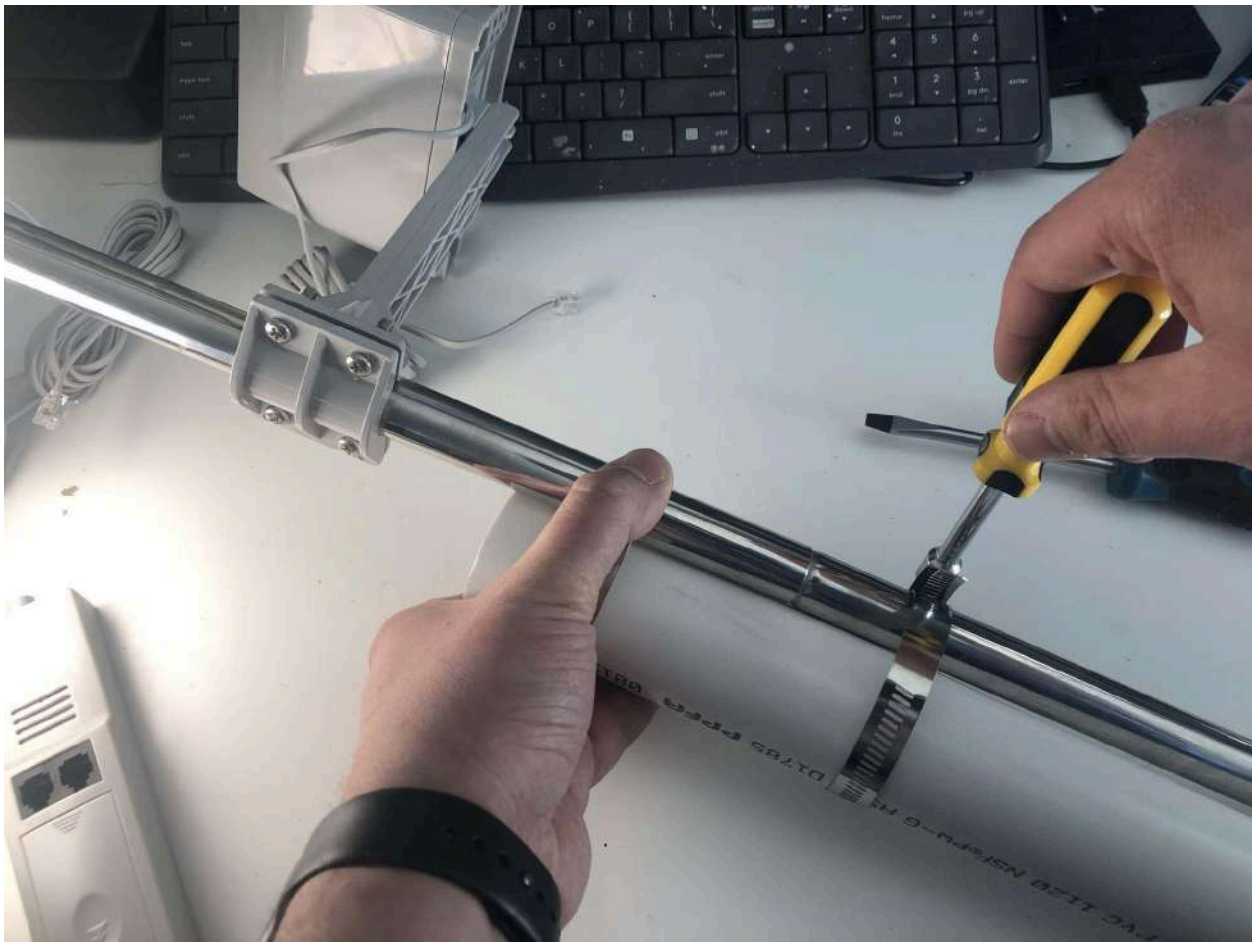
14. On the bottom side of the anemometer and wind vane arm there are clips to hold the wires in place. Slide the wire from each instrument into the clips.

15. Run all of the remaining wires down the assembled pole, and secure them with the hose clamps and zip ties. This will avoid them being yanked out of the circuit boards by strong winds.

Mounting Your Weather Instrumentation

There are many ways to approach mounting. Experiment and find a mounting solution that will work for your particular deployment location.

You can use the Hose Clamps to help mount and secure your weather cluster. They are useful to hold your hanging cables against the pole and attach the pole itself to a mast in the environment that reaches the appropriate height to take accurate measurements (more than 5 m above the ground.) Tighten the hose clamps using a flat head screwdriver.



Plan for the terrain of your deployment location, and identify which type of mast in the environment you will use to mount your Weather Instrument Cluster. The mast you have in mind might be thicker than the diameter of the Hose Clamps provided, so you may need to visit your local hardware store for something with the right specifications.

Check out the Weather Station Deployment section for more ideas and tips for installing your weather station.

Note: The sensors belonging to the Weather module are factory calibrated and do not require additional field calibration.

Distance/Level Module Setup and Calibration

Your Distance/Level Pack consists of a Distance/Level Module Board, a Distance/Level Sensor Board, a CAT5 cable, and an Ultrasonic Rangefinder that acts as a Distance/Level Sensor.

Warning: The Ultrasonic Rangefinder is waterproof, but its connection on the back is not. You will need to put it inside an enclosure or under a hood of some sort, based on your specific deployment situation. If you're using an external enclosure, this will need to have a threaded opening for a ¾" NPT connection. An easy option is combining a weatherproof outlet box like this one, a weatherproof cover like this one, and a ¾" NPT cable gland.

Photos coming soon

1. Attach the blue Distance/Level Module Board to your FieldKit station.
2. Insert one end of the CAT5 cable into the red Distance/Level Sensor Board. Make sure you insert it in the right direction.
3. Place the Ultrasonic Rangefinder into the enclosure that you have identified as the best fit for your particular deployment.
4. Plug the Distance/Level Sensor Board into the 7-pin connector on the distance/level sensor. Note that both the connector bodies should be on the same side of the circuit boards, so that the pins are connected correctly and not flipped.
5. Make sure that the other end of the CAT5 cable is securely inserted into the Distance/Level Module Board.
6. As the Ultrasonic Rangefinder may need to be some distance from the FieldKit station itself, the cables are long for the benefit of those who may need to place it further away. If the instruments are placed near one another, please use the included zip ties for cable management.

Note: There are a few ways to approach mounting. Experiment and find a mounting solution that will work for your particular deployment location. You can use zip-ties to help mount and secure your Distance/Level Sensor Enclosure. They are also useful to hold your hanging cable against whatever your Distance/Level Sensor Enclosure is mounted to. You can also use a 1" hole in the cable plate on the FieldKit itself to mount the Distance/Level Sensor with a ¾" NPS/NPT nut.

You should now have an assembled Distance/Level Sensor! Make sure you know how to place your Distance/Level Sensor before heading out into the field. If you have questions, feel free to reach out to the FieldKit team.

pH Module Setup and Calibration

Your pH Pack consists of a pH Module Board and a pH Probe. The pH Pack components for FieldKit are color-coded red.

Note: Before calibration, examine your module board and probe cable for a Calibration ID (CAL ID) decal. All probe and module pairs that have the same CAL ID printed on them have been calibrated together in the lab and will not require calibration before their initial use. Additionally, if you have multiple probes of the same type, take care to match the CAL ID number on the probe cable and the module board when setting up the station. Failure to do so may result in inaccurate data and a need to recalibrate.

Connecting the Sensor

1. Collect the pH Probe. The pH Module Board should already be attached to your station.
2. Screw the pH Probe cable into the pH Module Board. Never use tools to tighten these connectors!
3. Your pH Module is now installed and ready for calibration.

Note: The pH Probe has an end cap containing a buffer solution that helps to maintain the life of the probe. This end cap will need to be removed when using the probe. More information on working with the pH Probe, end cap and buffer solution can be found under Water Station Deployment.

Calibrate pH Sensors

Calibrate the sensors on your pH module for accurate data readings.

pH is a logarithmic measure of free protons (or hydrogen ions) in a given solution. Chemically, it is expressed as -log([H+]) which is the negative base ten logarithm of the concentration of hydrogen. This is the molar concentration, essentially what fraction of 6.02*10^23 free protons exist in one liter of solution. That means that pH is measured in -log(mol/L) but it's easier to just denote it with the leading symbol pH.

Three-point Calibration

During this calibration process, you'll enter three separate and distinct calibration points that correlate with readings from an external standard. This will take the form of three pH standard solutions in order to make certain that the probe and module board are behaving in the way that we expect them to. All three of these standard solutions are known as buffers, which means that they can be concentrated or diluted by an appreciable amount before changing

their pH. This means that pH buffers can be left out for a while without having to worry about their pH changing due to evaporation. These buffers are not toxic, and should be able to be rinsed down a drain when being disposed of (check the label of the buffer you're using to be sure and follow the instructions listed).

While the order of buffers doesn't strictly matter, we normally go from low to high and the following instructions will proceed in this order. Regardless, the app process will work in any order, so long as you're entering your standard values to calibrate your actual probe readings at each point.

Equipment

- pH Pack (module board and probe)
- Cup or other container
- 3 x pH standard solutions (we recommend pH 4.00, 7.00, and 10.00)
- Extech PH100 pH meter (or equivalent)
- De-ionized, distilled, or tap water
- Clean towel for drying probes in between standards

1. Do you have everything?

Make sure you have 3 different pH standard solutions. We recommend pH 4.00, 7.00, and 10.00. These instructions will proceed as if you are going from lowest to highest pH but the order in which you perform the calibration does not matter.

2. Calibration Point 1

- Insert the pH probe and meter into a container with at least enough pH 4.00 standard solution to completely cover the glass and electrode portion sticking out of the plastic at the base of the pH probe.
- Allow time for the reading on the pH probe to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the value from the pH standard solution into the app field.
- When the timer stops, press the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to later calibrate the sensor.

3. Calibration Point 2

- Rinse off the probe and the meter ends with water. You can either use a bottle with a nozzle for this, or just dip the probe end into water (do not re-use the water between calibration points). Dry using your clean towel.

- Place the pH probe and meter into the container with at least enough pH 7.00 standard solution to completely cover the glass and electrode portion sticking out of the plastic at the base of the pH probe.
- Allow time for the reading on the pH probe to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the value from the pH standard solution into the app field.
- When the timer stops, hit the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to later calibrate the sensor.

4. Calibration Point 3

- Rinse off the probe and the meter ends with water. You can either use a bottle with a nozzle for this, or just dip the probe end into water (do not re-use the water between calibration points). Dry using your clean towel.
- Place the pH probe and meter into the container with at least enough pH 10.00 standard solution to completely cover the glass and electrode portion sticking out of the plastic at the base of the pH probe.
- Allow time for the reading on the pH probe to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the value from the pH standard solution into the app field.
- When the timer stops, hit the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to complete calibration.

5. Congratulations!

You've now completed your pH calibration.

Temperature Module Setup and Calibration

Your Temperature Pack consists of a Temperature Module Board and a Temperature Probe. The Temperature Pack components for FieldKit are color-coded black.

Note: Before calibration, examine your module board and probe cable for a Calibration ID (CAL ID) decal. All probe and module pairs that have the same CAL ID printed on them have been calibrated together in the lab and will not require calibration before their initial use. Additionally, if you have multiple probes of the same type, take care to match the CAL ID number on the probe cable and the module board when setting up the station. Failure to do so may result in inaccurate data and a need to recalibrate.

Connecting the Sensor

1. Collect the Temperature Probe. The Temperature Module Board should already be attached to your station.
2. Screw the Temperature Probe cable into the Temperature Module Board. Never use tools to tighten these connectors!
3. Your Temperature Module is now installed and ready for calibration.

Calibrate Temperature Sensors

Calibrate the sensors on your Temperature module for accurate data readings.

Temperature is measured in degrees Celsius (°C). In this case, we're using a thermistor, which is a resistive device that changes the amount of electric current it will allow through based on the temperature at which it is operating. These have to operate in a narrow band of electric currents: too much, and you risk the thermistor self-heating and creating a measurement error; too little, and the electrical noise overwhelms our temperature signal. We calibrate to make certain that the probe and module board are behaving as we expect them to in this case, and correct if they're not.

Three-Point Calibration

During this transfer calibration process, you'll enter three separate and distinct calibration points and check that they correlate with readings from an external standard. This will take the form of ice water, room temperature, and boiling water- in order to make certain that the probe and module board are behaving in the way that we expect them to.

Equipment

- Temperature Pack (module board and probe)
- De-ionized, distilled, or tap water (any will do)
- Ice

- Pot, tea kettle, or other device for heating water
- Cup, glass, or mug, capable of withstanding boiling temperatures
- Standard thermometer

1. Do you have everything?

Make sure you have three temperature sources and a standard thermometer.

We recommend using the following sources in this order: a container of ice water (0°C), room temperature water, and a container of warm water.

2. Low-Point Calibration

First, you'll measure a low temperature. Usually here we'd use a physical constant. In this case it's the triple point of water, 0 °C, the temperature at which water can exist as a solid, a liquid, and a gas.

- Place some ice cubes into a container of water. Thoroughly mix it together.
- Place the temperature probe and standard thermometer into the container of ice water that's been thoroughly mixed.
- Allow time for the readings on the standard thermometer to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the value from the standard thermometer into the app field.
- When the timer stops, hit the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to later calibrate the sensor.

3. Mid-Point Calibration

Then, you'll measure an arbitrary temperature, probably between 0 and 100 °C. Usually ambient or room temperature is used for this.

- Dry off the temperature probe and standard thermometer.
- Place the standard thermometer and temperature probe in contact with one another in a container of room temperature water.
- Allow time for the readings on the standard thermometer to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the value from the standard thermometer into the app field.
- When the timer stops, hit the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to later calibrate the sensor.

4. High-Point Calibration

Finally, you'll use the warm water as your high point for calibration. Thus make certain to enter the temperature from your standard thermometer into the calibration temperature field in the app.

- Heat some water and pour it into a container that is capable of withstanding high temperatures.
- Place the temperature probe and standard thermometer into the container of hot water.
- Allow time for the readings on the standard thermometer to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the value from the standard thermometer into the app field.
- When the timer stops, hit the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to complete calibration.

5. Congratulations!

You've now completed your temperature calibration.

Conductivity Module Setup and Calibration

Your Conductivity Pack consists of a Conductivity Module Board and a Conductivity Probe. The Conductivity Pack components for FieldKit are color-coded green.

Note: Before calibration, examine your module board and probe cable for a Calibration ID (CAL ID) decal. All probe and module pairs that have the same CAL ID printed on them have been calibrated together in the lab and will not require calibration before their initial use. Additionally, if you have multiple probes of the same type, take care to match the CAL ID number on the probe cable and the module board when setting up the station. Failure to do so may result in inaccurate data and a need to recalibrate.

Connecting the Sensor

1. Collect the Conductivity Probe. The Conductivity Module Board should already be attached to your station.
2. Screw the Conductivity Probe cable into the Conductivity Module Board.
3. Your Conductivity Module is now activated and ready for calibration.

Calibrate Conductivity Sensors

Calibrate the sensors on your Conductivity module for accurate data readings.

Conductivity is measured in Microsiemens Per Centimeter (µS/cm). This means measuring the amount of electrical current that flows across a gap between two graphite electrodes in the probe, along with the voltage drop across them, and dividing one by the other, and by the distance between the two electrodes. Calibration is necessary because mineral deposits can form on the electrodes and other factors can interfere with the measurement. Unlike the buffer solutions used for pH calibration, the standard solutions used in this calibration are extremely sensitive to concentration or dilution, and so need to be protected from evaporation by being left in sealed containers when not in use. As a general practice, it is best to replace the solution in between each calibration. The solution is essentially salt water and can easily be disposed of by dumping it down the drain in the small quantities used in this calibration (but we recommend you check the label of your solution for further instructions).

Three-Point Calibration

Make sure you have two different conductivity standard solutions plus distilled water or a dry probe. We recommend 100 and 3,000 µS/cm if this is appropriate for the environment you will be measuring.)

During this transfer calibration process, you'll enter three separate and distinct calibration points and check that they correlate with readings from an external standard. This will take the form of three conductivity standard solutions in order to make certain that the probe and module board are behaving in the way that we expect them to.

Equipment

- Conductivity Pack (module board and probe)
- Cup or other container
- 2 x conductivity standard solutions (we recommend 100 and 3,000 µS/cm standards)
- Distilled water
- Clean towel for drying probes in between standards

Note: If you have older conductivity standards, you may need to replace them. If you're not able to, or if you're reusing standards for multiple calibrations, consider using a conductivity meter as a standard, such as the Extech EC400 or equivalent.

1. Do you have everything?

Make sure you have two different conductivity standard solutions plus distilled water or a dry probe. We recommend 100 and 3,000 µS/cm. These instructions will proceed as if you are going from lowest to highest concentration of salt, but the order in which you perform the calibration does not matter.

2. Calibration Point 1

First, you'll put the conductivity probe into the lowest conductivity solution—distilled water—and measure what that conductivity is so you can compare it with the standard's expected value. You can also leave the probe dry for this point and just enter a conductivity of 0.1 µS/cm.

- Insert the conductivity probe into a container with at least enough distilled water to completely cover the hole near the end of the probe.
- Allow time for the reading on the conductivity probe to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the value from the distilled water into the app field.
- When the timer stops, press the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to later calibrate the sensor.

3. Calibration Point 2

- Rinse off the probe end with water. You can either use a bottle with a nozzle for this, or just dip the probe end into water (do not re-use the water between calibration points). Dry using your clean towel.
- Place the conductivity probe into a container with at least enough 100 µS/cm standard solution to completely cover the hole near the end of the probe.
- Allow time for the reading on the conductivity probe to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the value from the conductivity standard solution into the app field.
- When the timer stops, hit the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to later calibrate the sensor.

4. Calibration Point 3

- Rinse off the probe end with water. You can either use a bottle with a nozzle for this, or just dip the probe end into water (do not re-use the water between calibration points). Dry using your clean towel.
- Place the conductivity probe into a container with at least enough 3000 µS/cm standard solution to completely cover the hole near the end of the probe.
- Allow time for the reading on the conductivity probe to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the value from the conductivity standard solution into the app field.
- When the timer stops, hit the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to complete calibration.

5. Congratulations!

You've now completed your conductivity calibration.

Dissolved Oxygen Module Setup and Calibration

Your Dissolved Oxygen Pack consists of a Dissolved Oxygen Module Board and a Dissolved Oxygen Probe. The Dissolved Oxygen Pack components for FieldKit are color-coded yellow.

Note: Before calibration, examine your module board and probe cable for a Calibration ID (CAL ID) decal. All probe and module pairs that have the same CAL ID printed on them have been calibrated together in the lab and will not require calibration before their initial use. Additionally, if you have multiple probes of the same type, take care to match the CAL ID number on the probe cable and the module board when setting up the station. Failure to do so may result in inaccurate data and a need to recalibrate.

Connecting the Sensor

1. Collect the Dissolved Oxygen Probe. The Dissolved Oxygen Module Board should already be attached to your station.
2. Screw the Dissolved Oxygen Probe cable into the Dissolved Oxygen Module Board. Never use tools to tighten these connectors!
3. Your Dissolved Oxygen Module is now installed and ready for calibration.

Important Note: Dissolved oxygen probes require reconditioning every 3-6 months to maintain accuracy. For more information on reconditioning your dissolved oxygen probe, please read our FAQ entry.

Calibrate Dissolved Oxygen Sensors

Calibrate the sensors on your Dissolved Oxygen module for accurate data readings.

There are two ways to measure percentage of dissolved oxygen (DO): saturation and volume per volume. The air in the atmosphere has a volume per volume percentage of 20.9% and a saturation percentage of 100%. FieldKit measures Dissolved Oxygen in volume per volume percentage (%). Dissolved oxygen measurements come from what's essentially a tiny battery made from a concentrated salt and water solution and a porous plastic membrane, along with two metal electrodes. Since any of those parts of the probe can get dirty, or otherwise damaged, we need to calibrate the probe and module board to correct for any errors.

Three-point Calibration

Make sure you have a container of water, an aquarium air pump, and a standard Dissolved Oxygen meter.

During this transfer calibration process, you'll enter three separate and distinct calibration points and check that they correlate with readings from an external standard. This will take the form of a Dissolved Oxygen meter in order to make certain that the probe and module board are behaving in the way that we expect them to.

*Note: If your Dissolved Oxygen meter is measuring in units of saturation percentage (%), you may need to convert the measurement using the following equation: DO (volume per volume) = DO (% saturation)*0.209.*

Equipment

- Dissolved Oxygen Pack (module board and probe)
- Container of water
- Aquarium air pump, tubing, and airstone
- Standard Dissolved Oxygen meter

1. Do you have everything?

Gather together a container of water, an aquarium air pump, tubing and airstone, and a standard Dissolved Oxygen meter.

The Dissolved Oxygen meter will likely need to self-calibrate before use. Power it on and perform this process before getting started.

2. Calibration Point 1

First, you'll get a baseline reading of the amount of oxygen in the air that you're using for the calibration. Atmospheric air is always at 20.9% saturation volume per volume.

- -Set out the dissolved oxygen probe on a table with the probe face exposed to the air.
- Allow time for the reading on the dissolved oxygen probe to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the reading from the dissolved oxygen meter into the app field.
- When the timer stops, press the "Calibrate" button. This will record both the current sensor value and the standard value together, which allows us to later calibrate the sensor.

3. Calibration Point 2

Then, you'll measure the concentration of oxygen dissolved in regular water.

- Place the standard dissolved oxygen meter in your container of water and measure the percentage of dissolved oxygen. Remove the DO meter from the water.
- Place the FieldKit dissolved oxygen probe in the cup of water.

- Allow time for the reading on the dissolved oxygen probe to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the reading from the dissolved oxygen meter into the app field.
- When the timer stops, hit the “Calibrate” button. This will record both the current sensor value and the standard value together, which allows us to later calibrate the sensor.

4. Calibration Point 3

Finally, you’ll attempt to saturate the water with as much oxygen as it can hold to calibrate the upper end of the probe’s range.

- Place the aquarium pump air stone and standard dissolved oxygen meter in the container.
- Turn the air pump to high for three to five minutes. The DO level in the cup of water will start to stabilize with the bubbler on.
- Measure the %DO in the cup with the bubbler on using the DO meter. Remove the meter from the cup.
- Place the FieldKit DO probe in the cup of water with the bubbler on.
- Allow time for the reading from the dissolved oxygen probe to stabilize. In the app, the timer will count down. As you wait for the timer to count down, enter the reading from the dissolved oxygen meter into the app field.
- When the timer stops, hit the “Calibrate” button. This will record both the current sensor value and the standard value together, which allows us to complete calibration.

5. Congratulations!

You’ve now completed your dissolved oxygen calibration.

Deploying Your Station

Pre-Deployment Checklist

Now that you know your live data readings are accurate, you're almost ready to deploy your station.

Before heading out into the field, take the time to plan your deployment. How often and at what time of day will you take readings? Consider where you're going. Think through the land regulations, safety considerations, tools needed for the job, replacement parts, and the weather conditions.

Pre-Deployment Checklist

1. Data Capture Plan

Consider the appropriate data capture schedule for your project. How often and at what time of day will you take readings? Where will you deploy your station?

2. Take Notes and Pictures!

Plan to help your team and the community better understand their environment, and improve future troubleshooting with some contextual notes and pictures. You'll use the app to do this in the field once you initiate the deployment process.

3. Access Issues

Check-in with landowners and stakeholders before deploying your FieldKit. If deploying on state- or federally-owned land, review protocols or contact park personnel. Obtain permits as needed.

4. Double-check Station

Ensure your FieldKit Station is fully constructed and operational before taking it into the field.) Assemble your cable plate if you haven't done so already. If you are shipping your FieldKit or otherwise expect a long journey, we recommend transporting your station with the cable plate and probes removed and safely packaged and then re-assembling your cable plate when you reach your destination.

Note: Check out our instructions on FieldKit Station Care to ensure you're setting yourself up for success.

5. Data Storage Back-up and Firmware Updates

We recommend that you check for firmware updates and update your station firmware when you are near your station and have a reliable internet connection. Do this before you go into the field to deploy your station or plan to leave it alone for a long period of time. For detailed instructions on how to update your firmware, check out Updating Your FieldKit. In order to back up your data and update your firmware, make sure a microSD card is in the cardholder on the Upper Board.

6. Verify Power Source

What are your power sources? If you're not using a solar panel or plugging into power directly, is your FieldKit fully charged or equipped with fresh batteries?

7. Consider Mounting Materials

Are you mounting your FieldKit to a post? To a tree? If leaving it in the field for an extended period, make sure you've got the materials to attach it safely and securely without damaging the environment.

8. Leave (Almost) No Trace

Beyond your FieldKit station, be sure to clean up after yourself and leave the location as you found it, so take a trash bag. In the future, when you've completed your deployment and removed your FieldKit, it should be like you were never there!

9. Weather Forecasting and Extra Tools

Check the weather forecast and prepare accordingly. Bring a multitool with a screwdriver for last-minute adjustments in the field.

10. Take Care of Yourself!

Tell someone where you're going, especially if it's going to be remote. Respect nature—beware of rough terrain or dangerous animals. Read more on Safety in the Field in our Product Guide.

Unsure About Anything?

If you have any questions or concerns about deployment, the FieldKit Community Forum is a great place to go for help. Unsure how to set up your station in a new environment? Curious about how to plan for bad weather? Here you can learn from other people using FieldKit stations (as well as the FieldKit team). Visit the Community Forum

Deploying the FieldKit Station

It's time to put your FieldKit Station to work and start recording environmental data out in the world.

Take your station to your deployment location, choose a data capture frequency, and document the process. The more information you gather in photographs and field notes during deployment, the more context you and your team will have to work with when analyzing and sharing the data later.

1. Mount the case securely to a post, tree, buoy, or whatever location suits it best with non-invasive mounting solutions, so that your station is protected from the elements and any curious animals! Installation can be tricky, so don't be afraid to reach out to our team or post on the FieldKit Community Forum for help planning.
2. Once your station is secured, make sure that external instruments like probes or the weather cluster are properly set up. For more information, see our general Station Care tips and the sensor-specific deployment guidance sections of the Product Guide. Ensure your power sources are in place (battery, micro-USB, or solar). See theSolar Panel sections for guidance on setting up your solar panel if you are using one.
3. In the app, name your location for future reference. Depending on your connectivity, we will also detect your GPS coordinates or locate your position on a map.

Note: The default data capture schedule when a station is not connected to the app is 1 hour. When a station is connected to the app, the data capture schedule is every 10 seconds, except for conductivity which is 1 minute (which cannot be more frequent to maintain accuracy). When a station is connected to the app, the data capture schedule will be as described, regardless of what it might have been changed to.

4. Check the FieldKit app to ensure each sensor is still reading live data. These data readings are not being recorded at this stage. Your FieldKit station won't be recording data until you complete the deployment process and hit "Record Data." Set your preferred data capture schedule. Indicate when and at what interval data readings should be recorded. Note that more frequent intervals of data capture drain the battery faster.

   Example:
   Simple Data Capture Schedule
   Set your station to take data readings at a set interval of minutes or hours. This is useful for projects that need a consistent amount of data over a 24-hour period.
   Example: Every 5 minutes
   Example: Every 1 hour

Example:
Complex Data Capture Schedule
Set your station to take data readings at one or multiple specific times of the day, each at a set interval of minutes or hours. This may be useful for projects where most data is best gathered around certain events like sunrise or sunset, thus you'll save battery by not recording (at all or at the same rate) around the clock.
Example:
Capture Time 1: Starts at 04:00 and ends at 07:00 and records every 1 minute
Capture Time 2: Starts at 07:00 and ends at 17:00 and records every 1 hour
Capture Time 3: Starts at 17:00 and ends at 19:00 and records every 1 minute
Capture Time 4: Starts at 19:00 and ends at 04:00 and records every 1 hour

5. Now you can fill out Field Notes. By providing some context to your deployment, not only are you helping the wider community better understand their environment—you're also helping your future self and your teammates gain clearer insights from the data. Plus, if your station encounters issues, a little admin work now could save you lots of time and headache in the future, especially if your FieldKit station is deployed in a remote location. If your hands are full, you can take an audio recording of yourself through the app to capture your thoughts in the moment. You can do this by clicking into a section of the Field Notes and then clicking the microphone icon at the lower right hand side of the screen. Otherwise, type detailed notes that can inform data analysis and future visits to the station. Then snap some pictures of your deployed FieldKit station and the surrounding area. Is it set up near any landmarks? Are there any hazards around?

6. Hit "Record Data" to begin data capture. We recommend hanging around to gather a few readings to sync that initial data capture to the FieldKit app. This will verify that your FieldKit is recording data properly.

Note: If your readings look a little off at first, don't worry! FieldKit probes, like all probes, take a few minutes to stabilize and the readings will adjust shortly.

7. Before walking away, make sure that the gaskets in your FieldKit Case (lid and cable plate) are sitting snugly in the grooves, nice and flat, not stretched or twisted, and the lid is properly closed using the lid clasps for maximum water resistance. Clear up after yourself, leave the location as you found it, and leave with the peace of mind that your station is secured and working.

Weather Station Deployment

Here are some things to think about when deploying Weather sensors.

- Make sure your Rain Gauge is clear of the Anemometer and Wind Vane and did not shift during assembly and transit to your deployment location.
- Ensure the Weather Instrument Cluster is set up in an area with unobstructed air flow and is attached to a mast more than 5 meters above the ground. This is to avoid boundary effects and record accurate measurements. If this is not possible, just know that higher mounting will improve accuracy.
- Ensure the whole instrument cluster is plumb (standing up straight). To do this, tie a string with a weight on it to the top of the Wind Vane arm, then adjust the mast until it is parallel with the string. You can also simply place a bubble level on top of the Rain Gauge.
- Locate the cardinal directions on the Wind Vane—you'll place it in the field with the "N" mark facing north. You can use a traditional compass or the compass built into your phone.
- Anchor your station securely in place when leaving it in the field, especially if your location might experience intense winds.
- Use some sort of cable cover (such as wire loom or metal cable jacketing) to prevent the cables from being chewed on by rodents or other wildlife.

Water Station Deployment

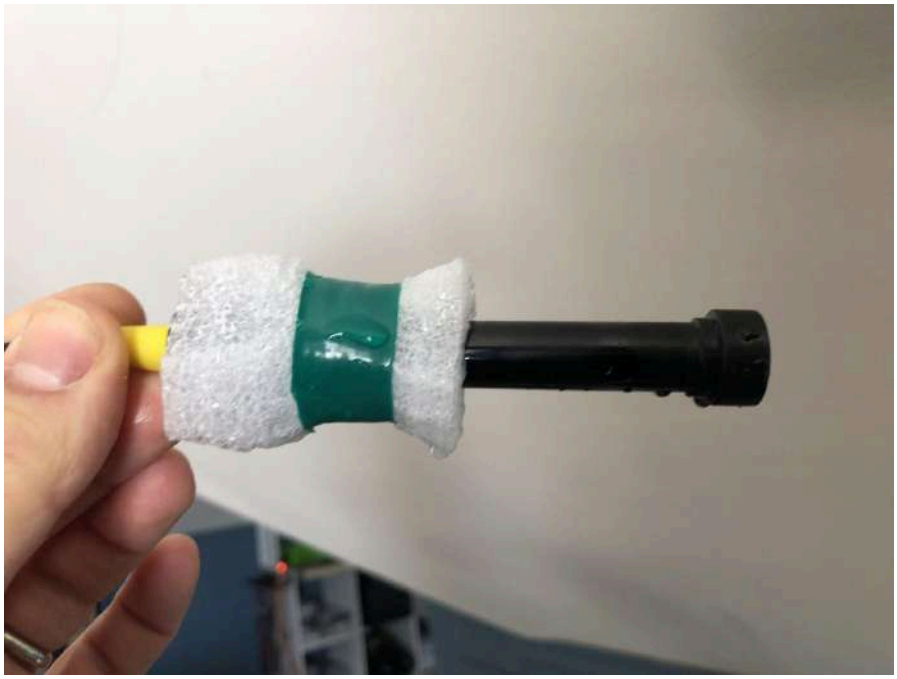
Here are some things to think about when deploying Water sensors.

- If you need to use extension cables with the water chemistry probes, stations will need to be recalibrated with the cables in place, and you should consider the extension cable used as part of a calibration cohort with the module board and probe (i.e. do not swap between extension cables after calibrating with them in place).
- The Dissolved Oxygen and Electrical Conductivity probes have black protective end caps that must be removed before deployment. Retain these caps and replace them on the ends when not using the probes to protect your equipment, after rinsing your probes in clean water. The Dissolved Oxygen probe cap should be pulled off, not unscrewed, as unscrewing can disturb the probe's membrane. The pH probe has an end cap containing a buffer solution and an o-ring to prevent leakage of the solution. When removing this cap, take care not to lose the o-ring nor spill the solution, as these should be replaced on the end of the pH probe when not in use. While in the field, you can keep the solution from spilling by placing cling wrap or a square piece cut from a plastic bag over the top of the jar and then screwing the lid into place.

Warning: The buffer solution used with the pH probe is important for maintaining the life of the probe. If you spill the solution, fill the cap with clean water temporarily and replace the solution as soon as possible. The solution used in the FieldKit pH probes is a 4M potassium chloride solution (KCl). To replace it, you can purchase pH storage solution from a laboratory supplier or use the instructions in our knowledgebase. The solution will not cause harm to the skin but

should not be ingested. Never store your pH probe in deionized or distilled water, as this can deionize the probe, rendering it unusable.

- Ensure that the bottom of each probe is submerged in the water by at least 5 cm (~2 inches). The entire probe and its cable are waterproof and can be fully submerged safely.
- Make certain that pH, Electrical Conductivity, and Dissolved Oxygen probes are not allowed to freeze in place, as this will damage them. The temperature probe will be fine in freezing conditions.
- For measurement of stage height in bodies of water with the distance sensor, make certain to first get a measurement of the height of the sensor above the bed directly below it using a plumb bob in order to know what distance to subtract from to get your stage height.
- If deploying in moving water, consider putting your probes in what is known as a stilling well: a section of pipe held above the bed to allow for water to slow down and allow sufficient contact time with probes to make an accurate measurement.
- Use some sort of cable cover (such as wire loom or metal cable jacketing) to prevent the cables from being chewed on by rodents or other wildlife.
- If deploying in water with a changing level, probes may be attached so that they're entirely submerged, but dissolved oxygen is measured with respect to overpressure, which is the sum of atmospheric pressure and the pressure of the water column. In order to keep this as simple as possible, we recommend putting this probe on a float inside of a stilling well so that it's always submerged by the same amount. A simple float can be made from open cell poly packing foam and electrical tape. Just make sure that the bottom of the probe is submerged by 5 cm!



Solar Panel Deployment

Here are some things to think about when deploying solar panels.

Warning: Before inserting the battery, solar and button cables, double check that you are connecting them to the correct sockets (labelled "BATTERY", "SOLAR" and "BTN"). Inserting cables into the wrong sockets can permanently damage your FieldKit.

- Optimize sun exposure for solar panels. Make certain that your solar panels are facing the direction where they will be getting the most sun (i.e. not being shaded by trees or buildings). A general guideline is to mount them at an angle corresponding to your latitude and toward the sun.

  Example: if I were at 42° N and I had trees screening to my east, I would aim my panel to the southwest at an angle of 42° from a line parallel to the ground. If I were at 31° S, with trees screening to my northwest, I would aim my panel northeast at 31° degrees.

- Use some sort of cable cover (such as wire loom or metal cable jacketing) to prevent the cables from being chewed on by rodents or other wildlife. Read FieldKit Station Care for more help.

If you still need help with your solar panels, ask the FieldKit Community.

Retrieving Your Data

Syncing FieldKit Data Using the App

The FieldKit app serves as an easy way to interface with the station, allowing you to easily download data without using the microSD card. Syncing your data to your phone and, subsequently, the FieldKit web portal allows you to visualize station data, discover trends and patterns, and share your findings with anyone.

Use the app to connect wirelessly to the station via the Station WiFi, which will sync station data to your phone only. When you have an internet connection later, you can upload that data to the FieldKit web portal.

Note: If you're planning on syncing station data after a long period of data capture, you run the risk of consuming more storage than is available on your phone. Thus, you may want to free some up before leaving for the field.

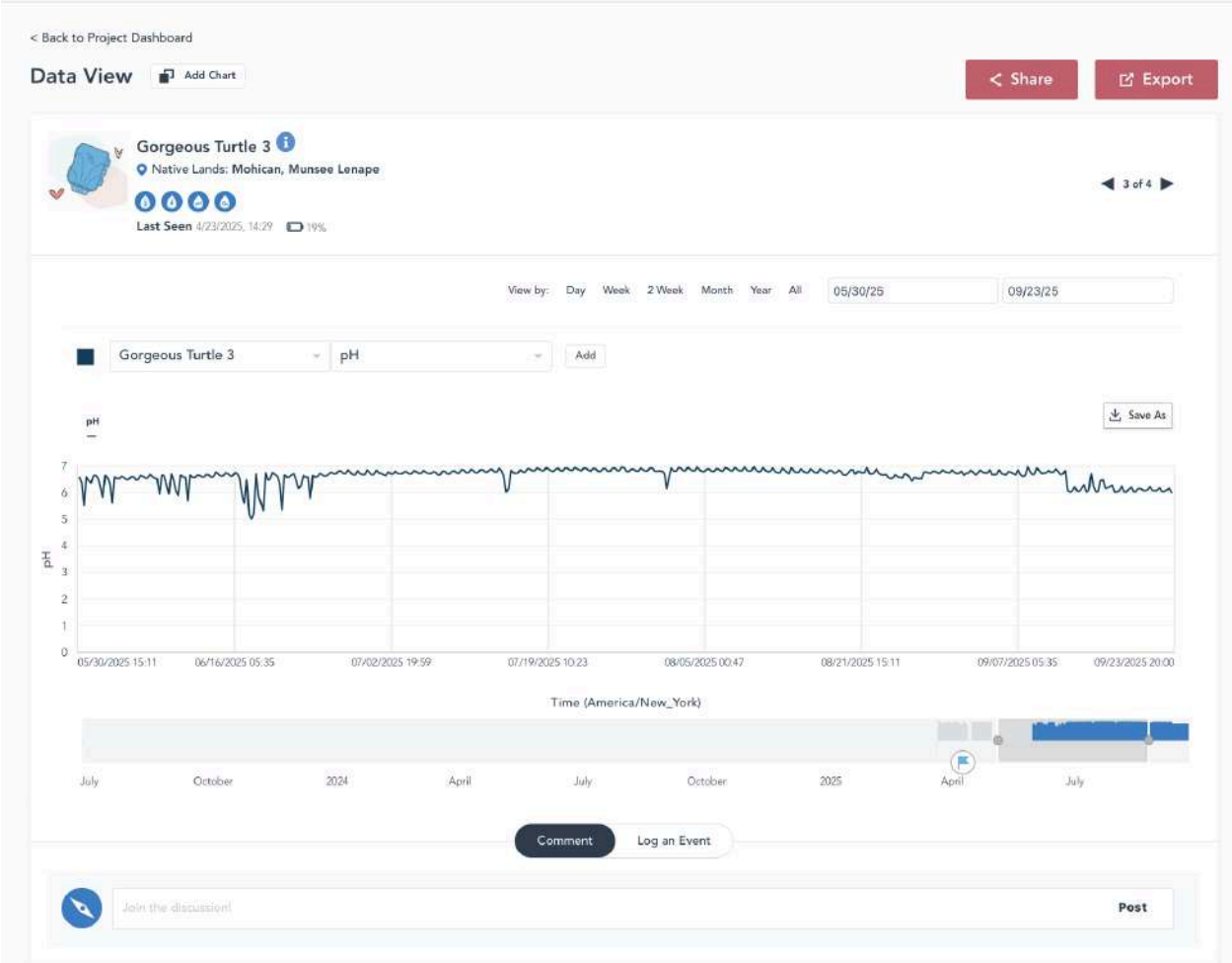
1. Your station has an access point (AP) with its own WiFi signal it can use to connect to the FieldKit app (but not the wider Internet). It acts like a hotspot so you can connect to it via your mobile device and transfer data. Press the button to enable the station AP.
2. Go to your mobile phone WiFi settings and select the station name displayed on the station screen.
3. Return to the app. Press the download icon on the "Data" screen to manually download the data. Once downloaded, it will confirm how many data readings have synced.
4. Once you have returned to a place with internet access, you are ready to sync your data to the FieldKit web portal. Using either a cellular network or a WiFi, hit the upload icon on the "Data" screen to manually upload the data to the portal.

Reviewing and Sharing Data in the FieldKit Portal

Once your station is installed and your data is synced to both your FieldKit app and the FieldKit web portal, you can easily interact with your data.

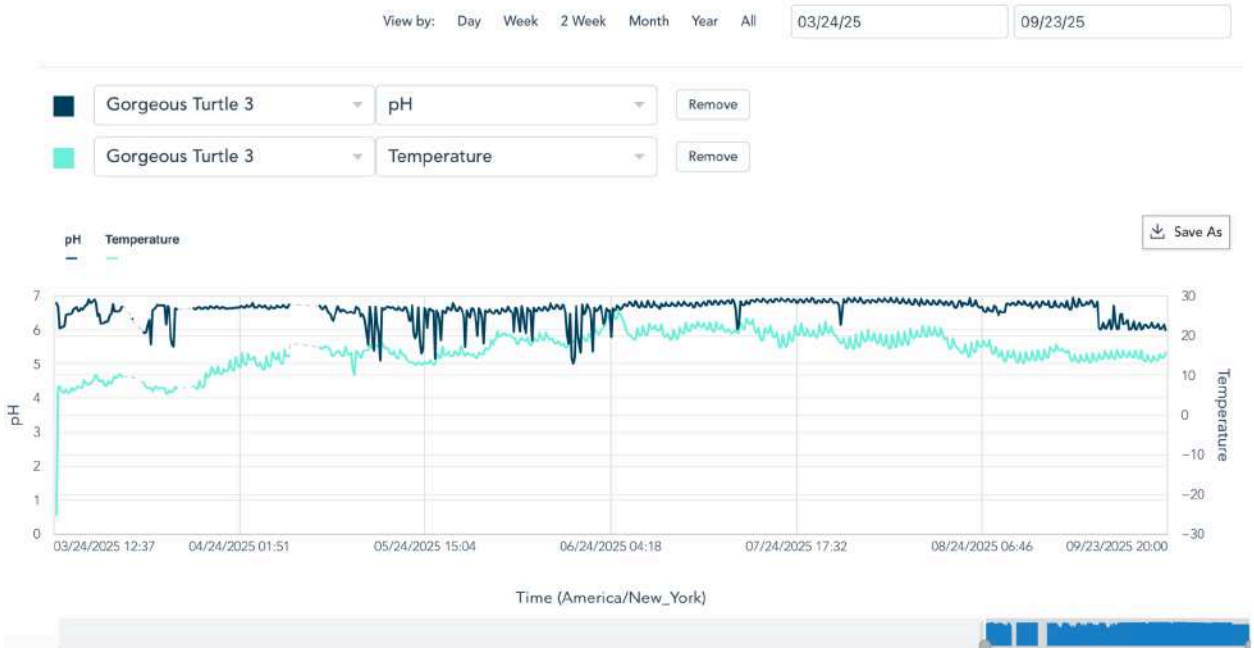
Our visualization and conversation interface allows you to spot patterns, trends, and anomalies, as well as to flag, comment on, and share them for collaborators and the FieldKit community. The best experience for reviewing data is on a desktop.

You can review your data on the FieldKit portal by going to portal.fieldkit.org and logging in with the same account you use for the FieldKit app.



Compare Data

Compare data from two different sensors or stations within the same chart area by clicking "Add" on the station data page next to the drop downs for the station name and sensor type.



You can also compare more than three charts at a time by using the "Add Chart" functionality next to the Data View heading.

Comment on Data

You can leave a comment on a data view via the portal and/or log meaningful events (like hurricanes or station downtime for maintenance and calibration) to create a holistic picture of the data landscape.

Share Data as a URL, via Email, or on Social Media

Use the Share Menu on the upper right hand corner of the data view page to send the URL of a data view as a link, email, or social media post.

Export Data

Export your data as a .CSV using the Export menu on the upper right hand corner of the data view page for processing on other platforms.

Managing Your FieldKit

Managing Your Project

Stations and the data that they gather come to life within the FieldKit portal. The web portal organizes this information into projects. Projects in the portal are private by default and only visible to the project team members but can be set to public to be visible to the world.

You can explore your project by going to portal.fieldkit.org and logging in with the same account you use for the FieldKit app.

Within the portal, you will see the stations that belong to you, the projects you are a member of, and any projects that are set to be visible to the public.

When you set up a new station, it will be added to a Default FieldKit Project. You will be an administrator of this project and be able to add stations that you own as well as remove stations. You can also create a new project and add stations to that if desired. Stations can belong to only one project.

Project Dashboard

On your Project Dashboard, you will see details about your project, the stations associated with it, notes and comments on the project, and the project team.

Project Details

Project administrators can edit the Project Details from the Project Dashboard by clicking “Edit Project.” These details include:

- Project name
- A short description of the project
- Project goal
- The header image for the project in the portal
- Project location
- Project start and end dates
- Tags for the project
- Project public/private status
- Show Stations/Hide Stations: Whether the exact location(s) of station(s) in the project appear on the map or not

Under Project Details, you will also see information showing the Indigenous territories associated with the project location under Native Lands: [Group Name]. This information comes from Native Land Digital. We encourage you to learn more about the land on which your FieldKit is deployed and its history.

Managing Your Stations

Many projects may only ever have one station associated with them, but larger projects involve dozens, even potentially hundreds of stations. In this case, you can add and remove stations from your project, as long as you are a project administrator and the station owner.

Clicking the blue "i" icon next to a station in your project takes you to the Station Details page. Here you will find more information about a particular station, including the deployment location and the battery power and readings from the last time it synced to the portal. If you are a project administrator, you can also add photos and field notes to the station details, which gives useful information and context for a station deployment.

Note:nIf you don't see your station listed when logging in to your portal account, it's possible that the station may "belong" to a different user. This can sometimes occur if different people are involved in setting up stations. If this happens, just send us a support ticket with the name of the station and the account it should be under, and we will be happy to help!

Managing Your Project Team

Projects can have more than one person associated with them, all part of a project team. Project teams have two roles: member and administrator. A project's team members can view a project and data that belongs to it, comment on that project, sync station readings from their app to the portal, and sync some metadata. Project administrators can do everything a team member can do, plus edit the project details, manage the project team, add and remove stations from a project, and make a project public or private.

You can add team members to your project by scrolling to the bottom of your Project Dashboard, adding the email address of the person you wish to invite, selecting their role, and then clicking "Invite" – this will send an email invitation to the project. When you click on the link in that email (or when you visit the portal when logged in under that account), you will receive a prompt to accept or decline the invitation to that project.

You can also adjust the roles of existing team members under Manage Team. There is no limit to the number of administrators a project can have.

Connecting to the FieldKit Community

FieldKit is dedicated to supporting a strong community of users and developers, building both local and global connections. On the FieldKit platform, you can engage in discussions with scientists, educators, tech experts, and curious individuals—all working to document our ever-changing environment and advocating for a better future.

We invite everyone in the FieldKit community—users, researchers, enthusiasts and anyone else who is interested—to join us in the FieldKit community forum at https://community.fieldkit.org. Together, our members share resources, ask questions, think through problems, collaborate on new ideas, and work to build a better world. As a FieldKit user, it's also a great place to learn from others using the FieldKit technology.

Upon joining the Forum, you will have access to a Main Community Hub (for general discussions) as well as a FieldKit Help area (to troubleshoot specific problems with your station, the app, or the portal). More content, members and subject areas are being added to the Forum as our user base grows, so check in frequently!

Station Care and Maintenance

FieldKit Station Care

Here are some care recommendations for your FieldKit.

Water Intrusion

We have built the FieldKit Case to be highly water-resistant.

However, to further protect your FieldKit hardware, we strongly suggest using a desiccant inside the case to reduce the potential for moisture damage. Our recommendation is a refreshable aluminum dehumidifier canister (such as those manufactured by Dry-Packs) but any desiccant that doesn't interfere with the hardware will work. Also, make sure that the gaskets in your FieldKit Case (lid and cable plate) are sitting nice and flat, not stretched or twisted, and the lid is properly closed using the lid clasps for maximum water resistance.

Securing Your Circuit Boards

Never just leave your circuit boards in the FieldKit Case unsecured. Secure them down with screws so they don't move around and risk getting damaged. That goes for everything else in the case too, e.g., the battery, microSD cards, your lucky screwdriver—you should secure everything firmly to keep things from moving around, which could damage the boards. Screws appropriate for each component of a FieldKit Station are included in every FieldKit Station order. Sometimes issues can be resolved just by reseating boards onto their pins.

Placing Your FieldKit

To protect your FieldKit, anchor it securely in place when leaving it in the field, especially if your location might experience intense winds. If you are using the FieldKit Weather station, to ensure effective measurement, your sensor cluster should be a minimum of five meters (15 feet) off the ground to avoid boundary layer effects. If you are using a solar panel, you should ensure that it receives 6-8 hours of full sun each day, and it should be pointed in the compass heading appropriate with the location. Additionally, we recommend camouflaging your FieldKit as much as possible to prevent interference or damage by humans. The lid has a hole for a lock in case you would like to install one to minimize tampering.

Cold Temperatures

In very cold weather (i.e. -20 °C or lower), the battery for FieldKit will not work as effectively and may be damaged even by storage in these temperatures. The screen on the FieldKit's internal hardware also may become sluggish in extreme cold. Additionally, the pH, Dissolved Oxygen and Conductivity Probes used in the FieldKit Water station could crack in freezing weather and should be protected from freezing by deep submersion into water that remains unfrozen all year. If you plan to deploy your FieldKit for a longer period of time in extreme cold, please contact us for recommendations on alternate sensors and batteries you might explore.

Hot Temperatures

The pH probe may be damaged by immersion in extremely hot temperatures (e.g. in water at or near the boiling point). If you plan to deploy your FieldKit in extremely hot water, please contact us for recommendations on alternate sensors you might explore.

Temperature Variations

If you deploy your FieldKit in an environment with extreme temperature variability (e.g. Death Valley, California), the case could possibly seal itself. If this occurs, do not attempt to open your FieldKit by prying it with a screwdriver. Instead, loosen the nuts on the cable glands slightly. A vent can also be installed in the cable plate to help mitigate this (FieldKit does not currently sell vents as part of our product range, so please source a vent separately and purchase a blank cable plate to drill in your own hole configurations).

Biofouling

If algae, plants, animals, or microorganisms accumulate on parts of your FieldKit, we recommend cleaning them with a nylon bristled brush abrasive sponge and a biodegradable cleaning product. We recommend Simple Green All-Purpose Cleaner if it is available to you, but water and a toothbrush will also do a great job!

Adding Voltage

It is possible to utilize external power sources with your FieldKit, and in extreme conditions this may even be preferable. If you choose to do this, note that plugging a 12V battery into the battery terminal will cause it to fail; it will need to be plugged into the solar terminal as that has the proper protections to accept that voltage. If you plan to use a solar panel that is not one provided by FieldKit or otherwise would like feedback on how to add voltage to the system without overloading it, please feel free to contact us for advice.

Sensor and Cable Care

Probe Breakage

Many of the sensors used with FieldKit are fragile. The pH, Conductivity, and Dissolved Oxygen Probes in the FieldKit Water station are prone to breakage if dropped or subjected to freezing temperatures. Additionally, the anemometer and wind vane in the FieldKit Weather station are also prone to breakage.

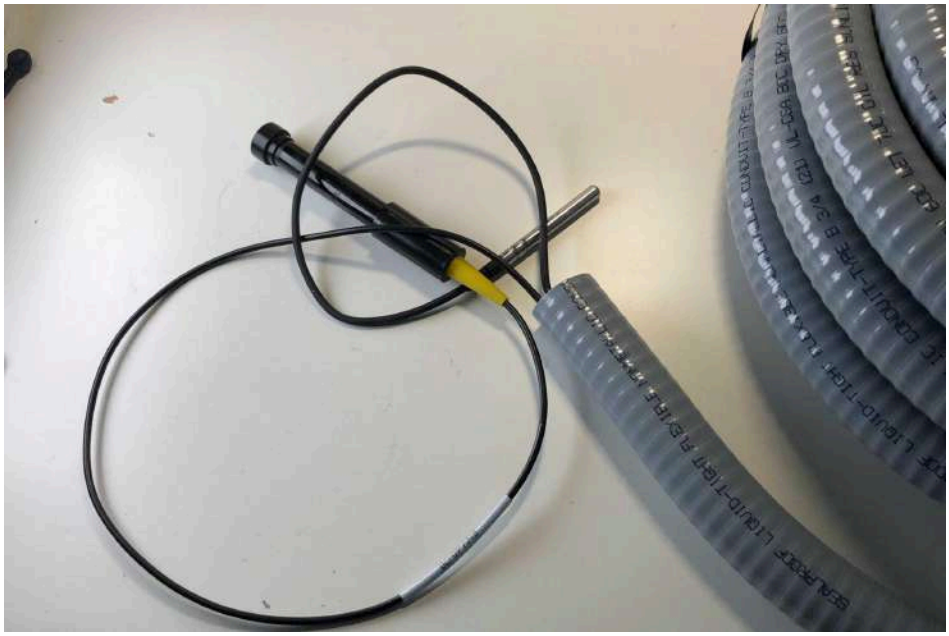
Sensor Lifespan

Most of the sensors used with FieldKit will last indefinitely with proper care and regular cleaning. However, the pH and Dissolved Oxygen sensors used in the FieldKit Water station have an expected lifespan of two years. After two years, these sensors will have drifted significantly, such that their measurements might not even be correctable by calibration, and they will have lost significant sensitivity. Additionally, the Dissolved Oxygen probe requires reconditioning every 3-6 months, which is performed by rinsing out the accumulated white zinc oxide powder and refilling the probe with electrolyte solution. You can find instructions for doing so in our knowledgebase. Do not go more than six months without reconditioning. Failure to recondition the Dissolved Oxygen probe may cause it to fail prior to the full two year lifespan.

Cable Care

Sensor cables are a key wear point. The most common issues affecting cables are UV damage and animal abrasion. If it is possible to shade your FieldKit (without shading the solar panel, if you are using one), we recommend doing so to reduce UV damage to the cables. You will know that UV damage is occurring if the cable insulation becomes brittle or discolored.

Animals will also sometimes chew on cables. To prevent this, you can choose to apply a mixture of petroleum jelly (or other grease) and cayenne pepper to the cables. This mixture is waterproof but may need to be reapplied every few weeks or months, depending on your environment. You can also purchase an armored sheath (also known as a metal wireloom) to protect your cables. We recommend using one made of aluminum, as galvanized steel sheaths eventually corrode and can be sharp on the inside, leading to cable damage.



Updating Your FieldKit

To keep up-to-date and running smoothly, your FieldKit needs regular attention, whether that be the software, firmware, or physical hardware.

Update the App

Make sure you have the latest version of the mobile app installed on your phone. You can do this through your phone's settings just like with any other mobile app.

Update the Firmware

Make sure you have the latest version of the firmware installed on your station. You can do this in one of two ways, via the mobile app or via the station screen interface.

Note: In either situation, you need to ensure that you have a microSD card in the Station microSD card holder. You need a microSD card to collect logs for diagnostics and troubleshooting, back up your data, and update your firmware.

Update Firmware through the Mobile App

To update your station's firmware through the mobile app, you will first need to check for new firmware (by logging into the app while connected to the internet), and then have an active phone-to-station connection.

1. Ensure there is a microSD card into the microSD card holder on the Station.
2. Log into the app.
3. Connect to your FieldKit Station via the Station WiFi.
4. Back up your data by syncing it to the portal before you proceed.
5. On the station page, click Settings > Firmware. The Settings menu is in the upper right hand corner.
6. If your firmware is up to date, you're all set. If new firmware is available, click "Update Firmware."
7. The app screen should now confirm the new firmware build number.
8. If it's nearby, you can double check that your Station has rebooted and the screen now displays the new firmware build number as Build #XXX.

Update Firmware through the Station

To update your station's firmware through the station itself, you have to download the latest firmware version onto a microSD card, configure it, and use the Station screen menu.

1. Back up your data by syncing it to the portal before you proceed.
2. Insert a microSD card into a microSD card reader attached to your computer.
3. Download this file: https://code.conservify.org/fk-firmware.zip
4. Uncompress the zip file into the root folder of the microSD card.
5. Transfer all files from within the uncompressed zip file into the top level of the microSD, so that there are no subdirectories.
6. Eject the microSD card from your computer and insert into your Station.
7. On your Station screen, go to **Tools** > **SD Upgrade**.
8. The station will turn off its network, the screen will say "updating," and then, if successful, it will say "Ok! Restarting" and restart. You can confirm the new firmware build by clicking the right-hand button under the station OLED screen twice.

Recalibrate your Sensors

You need to recalibrate your sensors at regular intervals to keep them accurate. Check the Sensor Setup and Calibration section of the Product Guide and navigate to your particular sensor for details on how often to recalibrate.

Care for the Hardware

The better you look after your physical hardware, the longer it will last. Check out our instructions on FieldKit Station Care.

Safety

You are in charge of your own safety, so do your research and plan ahead, but here are some suggestions to help guide you.

Feel free to ask questions or share concerns via the FieldKit community forum; both other community members and our team will be happy to share our experiences and advice from our years in the field.

Station Safety

- Avoid deploying your FieldKit near power lines or other utilities.
- Avoid installing your FieldKit with the cable plate facing any direction other than down to avoid water intrusion.
- Make certain to firmly close the clasps of your case after working on the internal components of the FieldKit.
- You may want to invest in a microSD-to-SD adapter cable to make servicing your microSD card easier, and to make it easier to see the card if you drop it.
- Check any batteries to make certain that the connector is correctly polarized: red is (+) and black is (-).
- If deploying your FieldKit in a tree, on a post, or anywhere more than two meters above the ground, make certain that your attachment points are secure.
- Make certain to use some sort of protection (like cable loom tubing, cable armor, or a grease-and-cayenne-pepper combination) on your sensor cables so that they won't be chewed on by animals.

Check out our FieldKit Station Care instructions for more details.

Personal Safety

- If deploying your FieldKit above head level, please wear a helmet.
- If running power to your FieldKit outside, make certain the low voltage DC part of the power run is the one exposed to the elements, not the wall power (high voltage AC) side.
- Always get permission to deploy your FieldKit in any particular environment.
- Do not short or puncture the battery pack.
- Tell someone where you're going, especially if it's going to be remote.
- Respect nature—beware of rough terrain or dangerous animals.

Recalibrating Your Sensors

All sensors will need periodic recalibration.

We recommend, at minimum, recalibrating your sensors according to the following schedule:

- pH: every 3 months
- Dissolved Oxygen: every 6 months (also recondition the probes at this time)
- All other sensors: 1 year

Additionally, if you notice consistent drift in a particular direction—for example, your conductivity numbers are significantly higher than usual for weeks after a big storm—it's a sign that you might need to recalibrate. To recalibrate your sensors, you can use the process used for sensor calibration outlined in the FieldKit App or the Product Guide under Sensor Setup and Calibration.