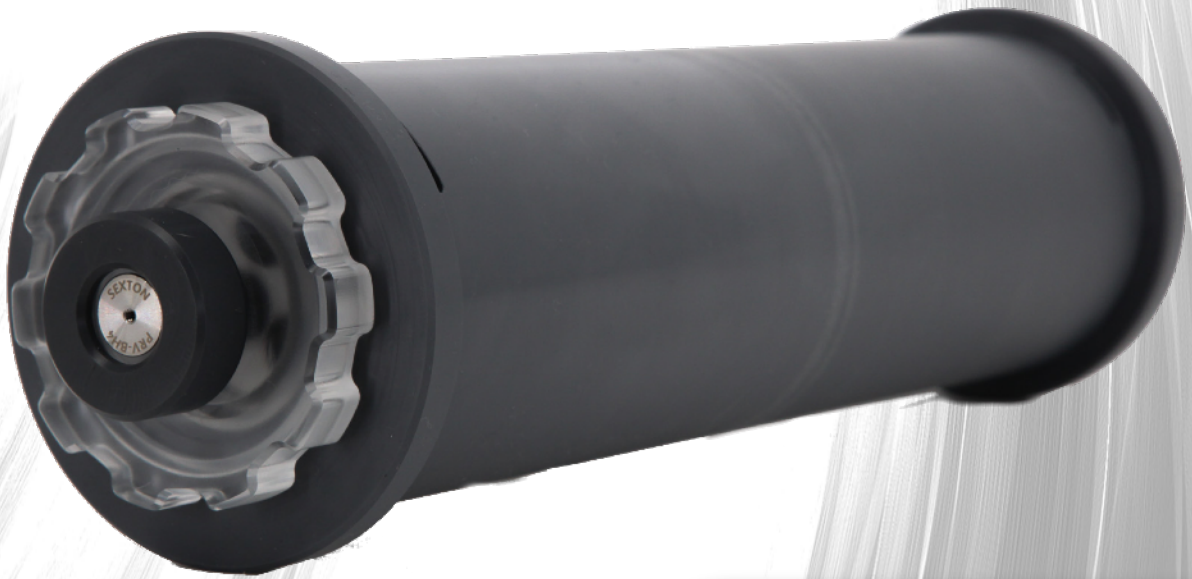


FinDrop



You can start without us, but we'd love to walk you through. To set up an onboarding call, write us at: findrop-support@fisheycollaborative.org

FinDrop - TRL6 Product Guide - 2025



Welcome to FinDrop TRL6

A new kind of Passive Acoustic Monitoring device.

We aim to bring the power of underwater Passive Acoustic Monitoring (PAM) to more people and organizations so they can better study and monitor underwater soundscapes. Managers, researchers, and community organizations need recording devices they can afford **and** depend on. But how can we build a PAM recorder that is more durable, capable of repeated, long-term, and deep deployments, resistant to common errors, *and* affordable? Our answer is FinDrop.

By joining the Synchro-sponsored test group, you've become part of the FinDrop development team and the owner of one of the first 10 FinDrops, currently at TRL6. While FinDrop is designed for diverse scenarios, testing has only been done in the lab and our research site in Curaçao. While FinDrop is a long-term recorder, there hasn't been time with this version for long-term deployments. Your experiences will tell us what we've done right and what still needs work. Your feedback will shape the specifications and features for the final product that we hope to offer later this year.

FinDrop is a partnership between FishEye Collaborative and The Sexton Company, with additional systems engineering from FORTH-ICS and consultation from the Cornell Yang Center. WildLabs started us off with a seed grant. Synchro brought us to you.

Thanks for joining the team.
We can't wait to *hear* what you discover.



An important note on the acoustic sensor.

To achieve our goals for FinDrop, we had to take a different approach, starting with the sensor. Traditional devices rely on piezoelectric hydrophones to convert pressure to voltage fluctuations. However, hydrophones are expensive, representing one of the most costly components of a PAM device.

Inexpensive MEMS microphones work well on land, but using them underwater is challenging. Sound must pass through the housing to reach the sensor. Each transition and material imparts frequency-dependent signal loss. One result is that the housing can't be too strong, or no sound will pass through. The geometry of the system can also impart uneven directionality.

We found another way. We utilize digital MEMS mounted **outside** the pressure housing. Instead, the MEMS array is covered by a proprietary material that protects it from the environment while conducting sound to the tiny capacitance sensors. Under these conditions, MEMS aren't as sensitive as traditional piezoelectric hydrophones. We've closed the performance gap using an array technique. FinDrop has four MEMS, each recording independently. When you download your recordings, you can use FinDrop software to sum the signals, which increases the signal-to-noise ratio by as much as 6 dB. This approach has the added benefit of redundancy. If one MEMS fails, you've got backups. You can keep just the summed audio to save space, or keep all the files and use them as additional fuel to train ML models.

One of our most significant challenges was finding the right membrane material. Most materials are poor conductors of sound, degrade over time, or drop out with increased depth. The proprietary material we've hit on is in a sweet spot. The membrane material is designed for long-term exposure to saltwater, but durations longer than a few weeks have not yet been verified. We have not been able to test for changes in performance over time.

Because of this, we recommend that you start with short test deployments of 1-3 weeks. Please let us know if you see signs of undue wear or degradation of the membrane. We will put out a recorder for continuous deployment to clear the device for months-long service and let you know it is ready for extended deployment. If you wish to do a long-term test sooner, we have included a second shallow-water membrane that will work for extended deployments. This option has lower overall sensitivity and should not be used below 30m.



Confidence

We know what it's like to pick up a PAM recorder and find that you've got nothing. Whether the device is flooded or there's no data, it's a gut-punch. One of our goals for FinDrop is to identify how this happens with other devices and make it exceedingly unlikely that this happens with FinDrop. If your FinDrop TRL6 unit fails for any reason, even a *user error*, we want you to complain. We need to learn from any mistakes.

Opening and Closing FinDrop

We've designed FinDrop so that you don't open the main compartment during regular operation. This keeps the batteries and electronics out of harm's way, and these seals need less maintenance. Here are the ways you can open your FinDrop, and when you should use each.

Twist port - regular access to the control button, USB-C, and charging.

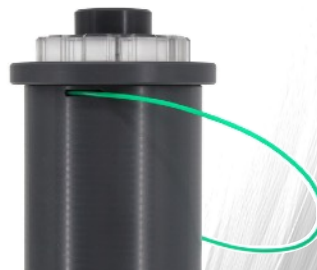
Bottom body cap - This one is for factory use. You shouldn't ever need it.

Upper body cap - Use this to access batteries for shipping mode, and for hard resets.

To open the **twist port**, it's righty tighty, lefty loosey.



To open the **body caps**, remove the green string that locks them in, and shimmy the ends off.



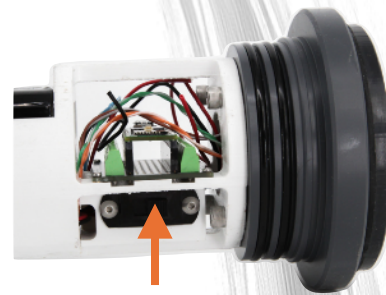
FinDrop has an integrated vacuum port. (See directions on page 7) **Use this before every deployment.** If the unit fails the test, check the last port you opened first.

Before you put FinDrop back together, check your o-rings for damage and debris. If they look imperfect, carefully remove them and condition them with lubricant. Do it with your fingers so you can feel for nicks and dirt. And remember that, when it comes to o-ring grease, less is more. Don't forget to wipe down the mating side of the housing, too. Fibers and sand are your enemies. Then, before you deploy, **run a vacuum test.**

Getting Started

Step 1 - Connect the batteries.

FinDrop ships with its dual 99Wh batteries in a “disconnected” mode. You have to flip a switch to bring all of the batteries online. (You will use this switch in the future when you take FinDrop on a plane.) To access the switch, you must open FinDrop’s upper body cap (see page 4). To do this, remove the green string and shimmy off the end. Then slide the electronics cradle out and flip the switch into the on position



Battery Connection Switch

Step 2 - Locate the “hard reset” button. You might never need it, but you should familiarize yourself with it, just in case.

Step 3 - Reassemble the FinDrop. Put the green string back in the slot. If it doesn’t go in easily, push down on the cap until the groove lines up.

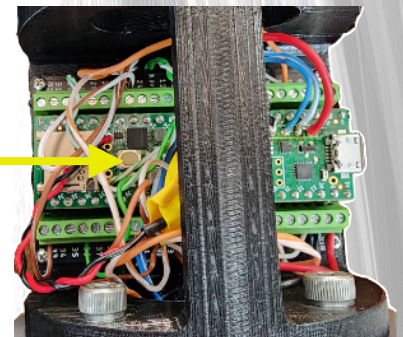
Step 4 - Charge the batteries. The batteries have been shipped at a 30% charge. You should charge them to full before using the unit. Open the **twist port** to access the charging ports. They should be charged independently using the two ports to prevent heat buildup during charging. Please use the included smart charger. See the charger directions for details.

Step 5 - Download the software.

Use the QR code or navigate to the GitHub repository, or navigate your browser to <https://github.com/fisheye-collaborative/findrop-beta>. There you can download the app for your computer. Connect the Fin Drop to your computer with a USB-C cable and open the app. Follow the instructions on the GitHub repository.

Step 5 - Find the software manual. The software manual is only online. It will adapt to changes over time, including new features.


Hard
Reset
Button



FinDrop Plugs and Buttons

Control Button – Activates and displays modes.




USB-C Data Port – Provides app access to set recording parameters and download data.

Battery Charging Ports – Independent charging ports, 1x per 99 Wh battery. 




Pressure Release Valve (PRV) – Safety feature to prevent overpressurization. Also used for pre-deployment vacuum seal checks.



Control Button Instructions

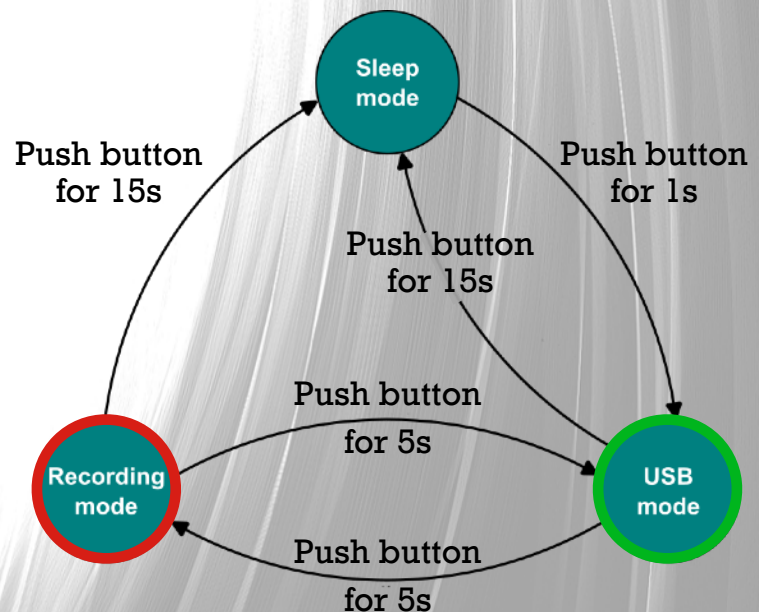
-  **GREEN** - USB mode
-  **YELLOW FLASH** - Error - Missing SD Card
-  **RED** - Recording - turns off after 5 minutes to conserve battery.

Wake up from Sleep - Push the button for 1 second. Now you are in USB Mode.

- If you plug into a computer, you stay in USB mode 
- If you do nothing, after 5 minutes it will go back to sleep 
- If you press the button for 5 seconds, you start recording. 

When you are recording, you can

- Push the button briefly to confirm it is recording. It will turn red for another 5 minutes.
- Press again for 5 seconds to switch to USB mode.
- Push the button for 15 seconds to go to sleep.

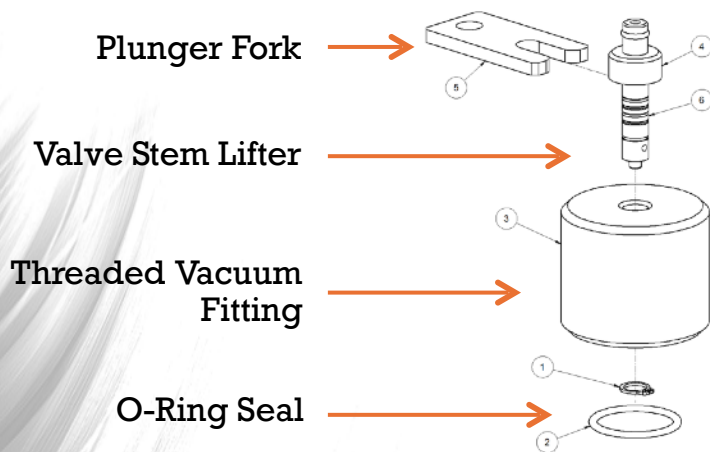


Vacuum Testing the FinDrop

One of FinDrop's innovative features is the integrated vacuum fitting. The PRV protects against internal overpressurization that can occur with heat or battery failure. With the proper fitting, you can use this specially designed valve to test the integrity of your seals. You should do this every time before you deploy.

You'll need a pump with a gauge. A hand pump will do. We have an electric pump we use for multiple FinDrops.

Required
Accessory:
Vacuum pump



Protective
Ring



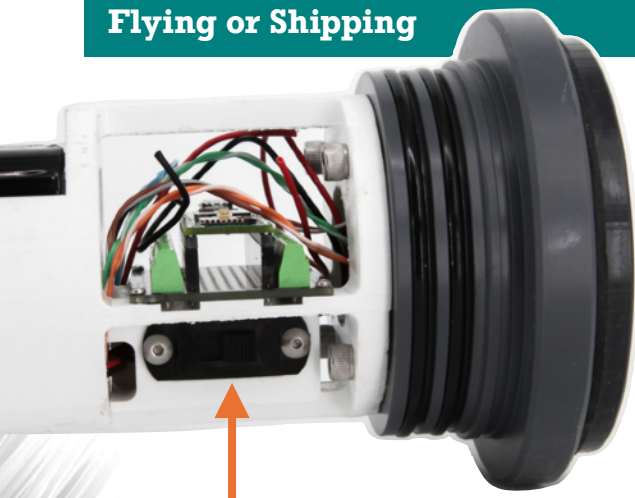
Vacuum Test Procedure

1. Remove the black Protective Ring.
2. Check the threaded vacuum fitting to make sure its o-ring is in place.
3. Attach the vacuum fitting and thread the inner screw into the hole on the stainless steel plunger.
4. Attach your vacuum pump to the tube. Use the included fork to raise the valve stem.
5. Pump device to -10psi and close the pump's valve to lock in the vacuum. Check back after 15 minutes to make sure the pressure is holding steady.

If the pressure stays steady, remove the vacuum fitting by unscrewing the stem lifter, then the vacuum fitting. Check the PRV to make sure it looks properly sealed. (Sometimes the vacuum fitting's o-ring will stick to the PRV.) You're ready to deploy. You can release the vacuum or remove the vacuum adapter with some vacuum remaining.

If the pressure is not steady, inspect and re-grease your O-rings, reassemble, and repeat the vacuum check.

Flying or Shipping



Battery Disconnect Switch

When shipping or traveling with the Fin Drop, move the Battery Disconnect Switch to the off position. This ensures the batteries are electrically separated in compliance with regulations.

Please check airline and government sites for more information. (In the USA see <https://www.faa.gov/hazmat/packsafe/airline-passengers-and-batteries>)

Pro tip: When installed in the device, the batteries are considered part of the portable electronic device. If removed, they are deemed spare batteries and are subject to stricter limits.

Housing Specifications

Exterior Material	Polyvinyl Chloride (PVC)
Acoustical Window	Proprietary
Computer Connections	USB – C
Power	2x 99Wh Lithium Ion
Depth	200m
Buoyancy	.767 lbs positive (seawater)
Weight	6.49 lbs. / 2.94 kg.
Dimensions	(14.0" x 4.5" dia)

Contact

FinDrop email: findrop-support@fisheycollaborative.org

FishEye Collaborative website: fisheycollaborative.org

The Sexton Corporation website: thesextonco.com email: info@thesextonco.com