

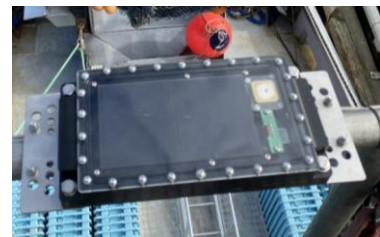
FishSOOP Installation Instructions

Thank you for agreeing to participate in the FishSOOP project, an IMOS Fisheries Ships of Opportunity sub-Facility operated through the University of New South Wales and the Sydney Institute of Marine Science (SIMS; an IMOS partner). We hope that you find the data useful in your fishing operations. The data you collect will greatly assist with our understanding of how the sea temperature is changing, where marine heatwaves are occurring, and improve our abilities to provide accurate marine and land weather forecasts.

What's in the box?

Deck Unit. This is attached to the vessel. It is solar charged and fully self-contained. The Deck Unit receives data from the Moana sensor and transmits it to our secured cloud server.

Moana sensor. The blue sensor attaches to your fishing gear either with or without a yellow protective cover. It is fully automatic, and measures water depth and temperature very accurately.

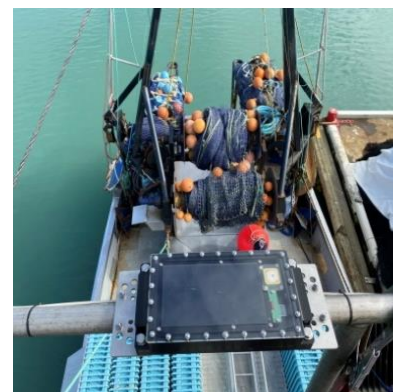
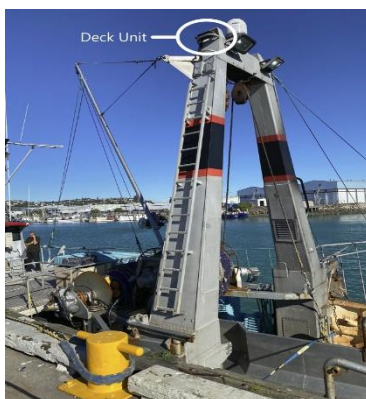


Deck unit and Moana sensor.

1. Installation of the deck unit

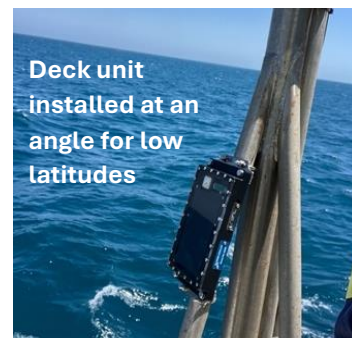
The deck unit must be installed so that it:

1. Has clear sky view for solar charging and GPS reception
2. Is within 20 meters of the working deck
3. Has a clear line of sight with the working deck





For low latitudes (less than $\sim 25^\circ$ N/S), to prevent overheating, the deck unit should be installed at a 45° angle.

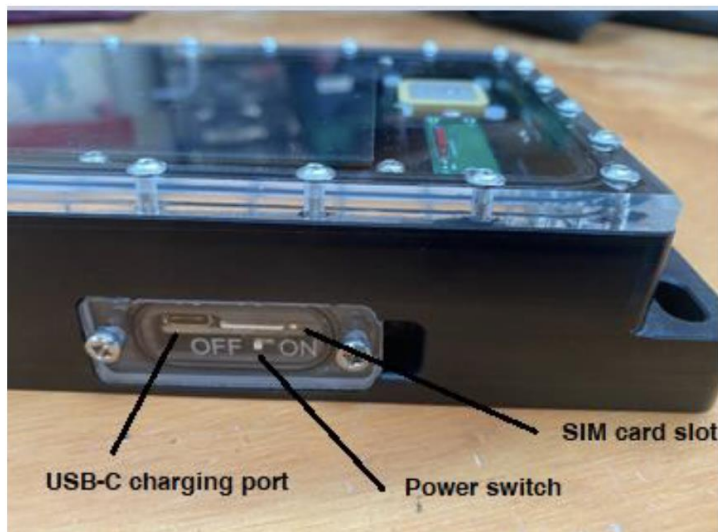


1.1 Power on the deck unit

The Deck Unit will likely be supplied in the power down state. To switch the Deck Unit on you need to open the side cover panel, be careful not to lose the screws or the O-ring. Do not touch the O-ring, to avoid dirt or dust getting on it but make sure it is properly greased.

To open the side panel, you will need a PZ1 Pozi Drive.

Slide the white switch from off to on (left to right). If the Deck Unit is cellular, an active Hologram SIM can be installed into the SIM card slot, if there isn't already one in.



Deck Unit side cover

1.2 Communications with cloud server

Decide do you want the device to transmit via Wi-Fi or Cellular?

If Cellular -

Check cellular connection and communications

- Your device may arrive in the mail with the SIM card installed, if so, just leave it alone.
- If there isn't already a SIM card, open the side door and turn off device.
- Insert SIM card – gold contacts down, triangle to the left.
- Make sure the deck unit is fully charged. You can plug a USB-C cable to the charging port using a simple USB-A phone wall charger (it can NOT be a USB-C wall charger nor a laptop wall charger). When the light labelled “Battery” becomes solid green whilst plugged in, then the deck unit is fully charged.
- Turn the device on (you need to turn on after having inserted the SIM card). Needs to have line of sight to satellite to get a GPS fix after turning on. Confirm the state of the LEDs. Check the deck unit displays 2 green lights → Batt green, GPS green.



Insertion of a SIM card in the deck unit.

2 green lights → Batt green, GPS green.

After turning off and on, **the unit requires a GPS fix** to set the time and date within the unit. Check the 2 lights are green. If it was turned off and on **inside**, it may not have received a GPS fix and therefore will not have tried to connect to the server. It first requires a GPS fix – take the unit outside with clear line of sight of the sky. Wait for both lights to turn green. **Note that you might have to walk 50-100m** as the deck unit automatically goes to sleep when immobile, so it needs to travel a short distance to activate.

The amber Wi-Fi (comms) LED will start blinking. The blue data LED will only blink if the deck unit previously received data from a Moana sensor and is waiting to send that data, otherwise that light will remain off. Once the data is sent, both the Wi-Fi and the Data LEDs should stop blinking.

After the unit has achieved a GPS fix, the deck unit should be contacted by the server. This communication will show up in the deck unit dashboard monitored by UNSW.



Lights visible on the deck unit.



It can take up to 24h for the communication to establish with our dashboard. However, a Moana sensor could be offloaded to prompt a connection to the server once the unit has a GPS fix. A Moana offload occurs when a sensor is lowered in at a depth of at least 3m and raised out of water again (or the atmospheric pressure around the sensor is increased artificially).

Remember – the sensor could offload to any deck unit in range – so **if you are testing a particular unit, be sure to have all other units off, or out of Bluetooth range.**

1.3 Test communication between deck unit and sensor on the vessel

It is important to check the distance between where the sensor will come back on deck, and where the deck unit is located. A distance of < 20m is recommended. Also consider proximity to Wi-Fi if required (see below).

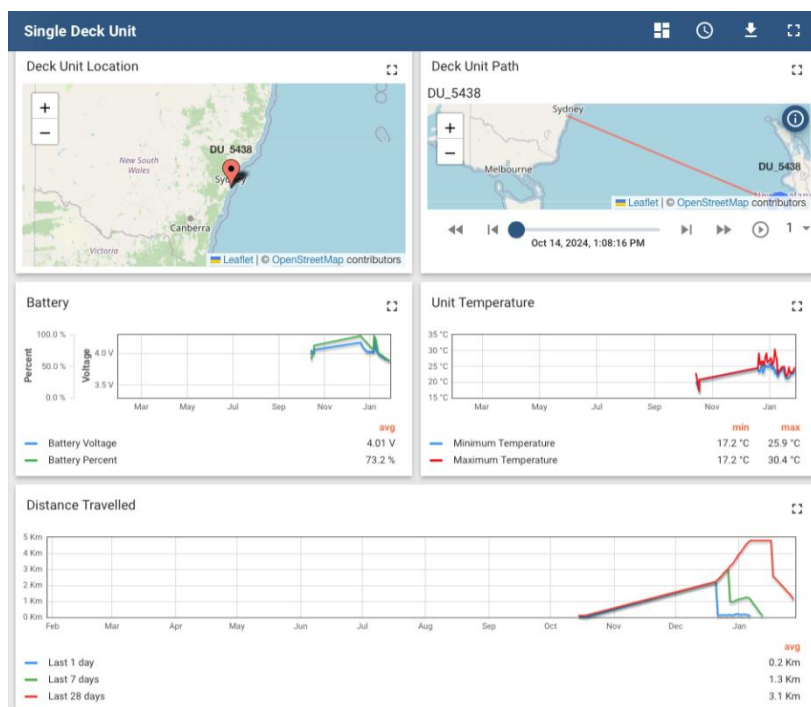
Place the deck unit where you wish to install it, and take the sensor to the part of the vessel where it will be coming on deck.

To do a test cast with the sensor - lower the sensor on a piece of rope to a depth of > 3m.

When lowering the sensor, lower it slowly, 1m per second to give it time to collect data. Let the sensor sit at depth for more than 1 minute, then raise slowly. Hold the sensor below the surface until ready to offload.

Watch the Data LED on the deck unit when raising the sensor out of the water, Data LED turns solid blue momentarily as the sensor is raised and data is offloaded from the sensor to the deck unit.

Data LED turns blue momentarily as the sensor is raised.



Dashboard view of a single deck unit communicating with the cloud server.



If communications have been established with the cloud server (see Section 1.2), our servers and the FishSOOP email address will receive a copy of the raw data file immediately after data offload.

2. Installation of the Moana sensor

Your Moana sensor will be supplied with the appropriate mounting hardware for your fishing method. It is essential that when the sensor comes back onboard, it has a clear line of sight to the deck unit for at least 30 seconds so that data has time to offload to the deck unit.

2.1 Trawl

Attach the sensor to the trawl trap door using the metal saddle clamps around the tough jacket #3. The saddle clamps fit in the grooves of the tough jacket and are screwed onto the trap door of the trawl.

Photo credit: ZebraTech



Alternate attachment for trawl, directly to the net using a lead rope.

If trawl door mounting is not suitable (e.g. if mounted against the side of the vessel), the Moana sensor can be attached to a line on the net using the tough jacket #3 attachment points.

Photo credit: ZebraTech



Moana sensor attached to trawl door using tough jacket #3 and brackets.



2.2 Anchor

The Moana could be attached to the anchor if the risk of gear loss is too high or if the fishing method leads to high uncertainty in the position variable.



Photo credit: ZebraTech



Moana sensor attached to anchors using either tough jacket #3 or tough jacket #4.

2.3 Longline

With drifting longlines, the sensor is attached to the backbone / mainline using a shark clip and short leader and attached to the middle of set. It is recommended that the protective tough jacket #4 is used.

Photo credit: ZebraTech



Photo credit: Fishwell

Moana sensor in tough jacket #4 attached to a shark clip / clasp to be attached to the middle of a set on a longline.

2.4 Netting

The Moana sensor can be clipped onto any net using the tough jacket #3 with the attachment points. Alternatively, the sensor can be weaved into the net using the same attachments on the tough jacket #3.



Moana sensor in tough jacket #3 directly attached to a net or weaved in.

2.5 Purse Seine

With purse seine, the sensor is attached to the lead line. A Tough jacket #1 can be attached directly to the lead line (pictured on the left), or a Tough jacket #4 can be inserted into a net bag (pictured on the right), which is then attached to the lead line.

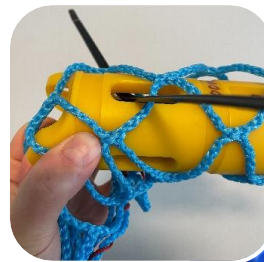


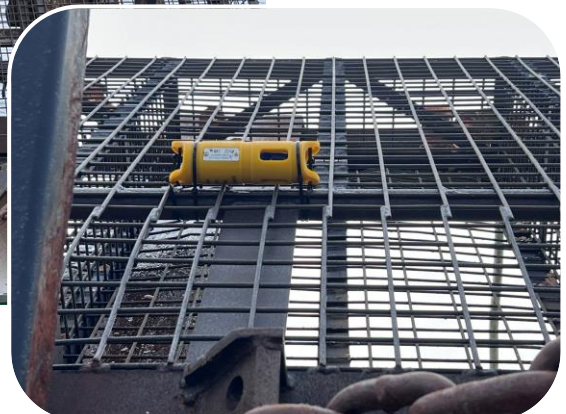
Photo credits: Ocean Data Network



Fitting of the Moana sensor on a purse seine lead line using a tough jacket #4 in a net bag or tough jacket #1 attached directly.

2.6 Dredge

To avoid sediment accumulating around the sensor and blocking water flow, it is recommended to attach the Moana sensor at the top of the dredge to one of the larger frame bars using the tough jacket #3. After a few sets, check that the sensor does not accumulate sediment around the probe: if it does, the sensor should be cleaned and moved.



Moana fitted on the top of a dredge using tough jacket #3 and example of a clogged sensor (red frame).

2.7 Squid Jig

It is not recommended to attach the Moana sensor on a line that is likely to be damaged by predatory fish. If there is an underwater light, the Moana sensor can be attached to that line using a Stauff clamp, metal plate and U-bolts.

Moana fitted on the underwater light for squid jigging using the plate and Stauff clamp.

Photo credit: Fishwell



2.8 Pots and traps

The Moana sensor is designed to fit perfectly in the supplied Stauff clamps and fixed onto the supplied metal plate. The plate can then be attached to the interior of pots and traps using the provided U-bolts.



Photo credit: ZebraTech



Photo credit: Fishwell



Moana fitted on the plate and Stauff clamps for pots and traps.



3. Operating Instructions

Once installed, the system requires minimal intervention. Keep the deck unit solar panel clean for the unit to charge. When the sensor leaves the water, make sure it stays within direct line of sight of the deck unit for at least 30 seconds. When the sensor is due for calibration (at least every 2 years), the FishSOOP team will contact you to arrange a replacement.

3.1 Deck Unit Flashing lights

The Deck Unit has flashing lights on the top. These are labelled GPS, Bat, Data.

Bat flash	GPS flash	Meaning
Green	Green	Operating normally
Yellow	Green	Battery getting low
Red	Green	Battery critically low
Red	Red	Low battery shutdown
Green	Red	No GPS communication
Data		Meaning
Blue flash		Data has not yet been uploaded
Solid blue		The Deck Unit has connected to the sensor and is offloading data
No light		No data held in the Deck Unit internal memory.

3.2 Can you get the data?

Fishers receive the data collected by the Moana sea temperature sensor by email if they wish. It may take up to 24 hours for the data to arrive, or longer depending on cellular coverage, but you will receive the data soon after connection is established and we receive the data. Make sure you sign the vessel agreement by scanning the QR code.





4. Suggested Tool kit for installation



FishSOOP – Toolkit



- A. Precision screwdriver bit set**
Slotted: 1.5mm, 2mm, 2.5mm, 3mm
Hex: 0.9mm, 1.3mm, 1.5mm, 2mm, 2.5mm, 3mm
Phillips: #000, #00, #0, #1
Torx: T5, T6, T7, T8, T9, T10
- B. Hex Key Set**
1.5mm, 2mm, 3mm, 4mm, 5mm, 5.5mm, 6mm
- C. Scissors** **D. Mini Bent Nose Pliers**
- E. Permanent Sharpie** **F. O-ring grease**
- G. Nylon line 0.8mm** **H. M8 nuts**
- I. Spare 50mm U bolts and nuts**
- J. Phillips no.2 screwdriver**
- K. Zip ties** **L. Wall USB-A charger**
- M. USB-A to USB-C cable** **N. Magnet**
- O. Electric tape** **P. Spanners: 10mm, 13mm**
- Q. Spare o-ring, screws, deckbox side cover**
- R. Stickers for sensors, deckbox, tough jacket**

4.1 Additional items for testing the sensors

- 10m rope for vessel tests tied with a snap shackle, with 50cm monofilament (longer than the sensor) attached to a small lead sinker.
- Small plastic syringe for instrument pressure testing on land.

Photo credit: ZebraTech



Equipment for testing the Moana sensors: rope, monofilament and sinker, or a small plastic syringe.

Feedback and questions

Please send your questions and feedback to us via FishSOOP@unsw.edu.au. We are particularly keen to understand which elements of the data you receive are most useful and how we can improve the program.

Thank you

Thank you for your continued support of the FishSOOP program - the data that you help us gather is extremely valuable to the wider community. It will help us improve weather and ocean forecasting models daily, allow us to monitor changes in the oceans, and enable a better understanding of the risks and impacts of climate change, while also contributing to operational decision making at sea, and fisheries stock assessment and research

Professor Moninya Roughan

Chief Investigator

Partners

IMOS Fishing Vessels as Ships of Opportunity sub-Facility is operated through the University of New South Wales and the Sydney Institute of Marine Science (SIMS) an IMOS partner.

Operating Institution

University of New South Wales as a partner in the Sydney Institute of Marine Science

About IMOS

The [Integrated Marine Observing System \(IMOS\)](#) operates a wide range of observing equipment throughout Australia's vast and valuable coastal and open ocean estate.

IMOS makes all of its data openly and freely accessible to the marine and climate science community, other stakeholders and users, and international collaborators.

IMOS is enabled by the [National Collaborative Research Infrastructure Strategy \(NCRIS\)](#). It is operated by a consortium of institutions as an unincorporated joint venture, with the [University of Tasmania](#) as Lead Agent.