HOBO® U12 Deep Ocean Temperature Logger (U12-015-03) Manual

The HOBO U12 Deep Ocean Temperature Logger is a single-channel temperature logger with 12-bit resolution that can record up to 43,000 measurements. With its robust titanium housing, this logger is designed to withstand the rigors of saltwater deployment. It has a depth rating to 11,000 meters and a temperature range from -40° to 125°C, making it the ideal logger to handle the ocean extremes of depth and temperature.
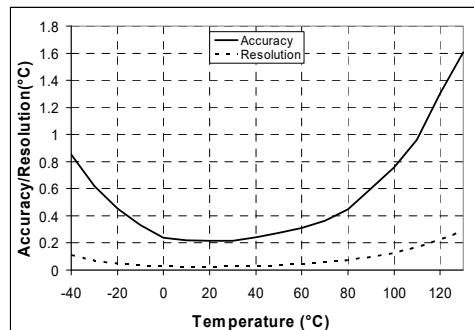
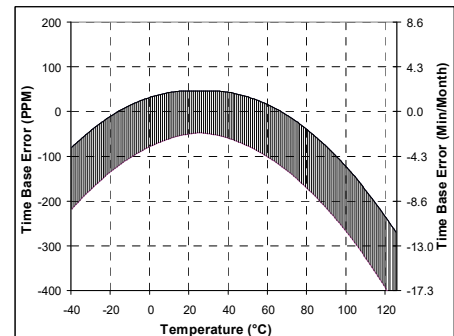## HOBO U12 Deep Ocean Temperature Logger

U12-015-03

Included Items:

- O-ring replacement kit (U12-015-03-ORING-KIT), which includes 4 blue O-rings, 4 orange backup rings, and silicone-based O-ring lube

Required Items:

- HOBOware® Pro 3.2 or later (go to www.onsetcomp.com/hoboware-free-download)
- USB Cable

Specifications

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Measurement Range	-40° to 125°C (-40° to 257°F)
Accuracy	±0.22°C at 25°C (±0.4°F at 77°F), see Plot A
Resolution	0.025°C at 25°C (0.045°F at 77°F), see Plot A
Drift	0.05°C/year + 0.1°C/1000 hrs above 100°C (0.09°F + 0.02°F/1000 hrs above 212°F)
Response Time in Water	< 4 minutes, typical to 90%
Time Accuracy	±2 minute per month at 25°C (77°F), see Plot B
Operating Environment	Air, water, steam, 0 to 100% RH
Operating Temperature	Logging: -40° to 125°C (-40° to 257°F) Launch/Readout: 0° to 50°C (32° to 122°F), per USB specification
Battery Life	3 years typical use, factory replaceable
Memory	64K bytes (43,000 12-bit measurements)
Construction	Titanium with O-ring seals and backup rings
Weight	105 g (3.7 oz)
Size	114 x 20.6 mm diameter (4.5 x 0.81 in. diameter)
Depth Rating	11,000 m (36,080 ft)
Environmental Rating	IP68
NIST Certificate	Available for additional charge; temperature range -30° to 120°C (-22° to 248°F)
CE	The CE Marking identifies this product as complying with all relevant directives in the European Union (EU).

Plot A

Plot B

Connecting the Logger

To launch or read out the logger, use the USB cable supplied with HOBOware to connect to the computer.

1. Remove the titanium end-cap from the logger by turning it counter-clockwise. If the cap is difficult to turn, place the stem of a small screwdriver through the hole in the end-cap for better leverage.

2. Plug the large end of the cable into a USB port on the computer, and the small end into the logger as shown in the following diagram.
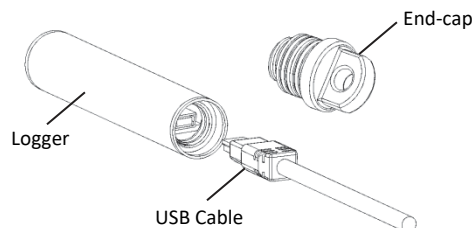
3. If the logger has never been connected to the computer before, it may take a few seconds for the new hardware to be detected.

4. Open HOBOware and click the Launch icon on the toolbar to set up the logger. Refer to the HOBOware Help for additional details on launching.

5. After the logger has started logging, you can read it out while it continues to log, stop it manually with the software, or let it record data until the memory is full. Refer to the HOBOware Help for more details.

6. After the logger is disconnected, reinstall the end-cap. To install the end-cap, press it in until it snaps in place with only the second set of O-rings showing, and then screw the end-cap into the logger housing. The end-cap must be securely in place with no visible gap between the housing and the end-cap.

Note: Before opening the end-cap for read out, make sure that the logger is clean and dry. The logger should always be capped when it is not connected to a computer.

Important: USB communications may not function properly at temperatures below 0°C (32°F) or above 50°C (122°F).

Sample and Internal Event Logging

The logger can record two types of data: samples and internal events. Samples are the sensor measurements recorded at each logging interval (for example, the temperature every minute). Internal events are independent occurrences triggered by a logger activity. Examples of events recorded asynchronously during deployment include when the logger is connected to the host, when the battery is low, and the end of a datafile once the logger is stopped. The logger stores 64K of data, and can record up to 43,000 samples.

Mounting

Use the 6.4 mm (0.25 in.) diameter hole in the end-cap to secure the logger to an object.

Battery Information

Expected battery life varies based on the temperature and the frequency at which the logger is recording data (the logging interval). With no more than 60 minutes of operation at 125°C (257°F) per day, a new battery will typically last approximately three years with logging intervals greater than one minute. Deployments in extremely cold or hot temperatures or logging intervals faster than one minute will significantly reduce battery life.

The logger has the ability to report and log its own battery voltage. If the battery falls below 3.1 V, the logger will record a "bad battery" event in the datafile. If the datafile contains "bad battery" events, or if logged battery voltage repeatedly falls below 3.3 V, the battery is failing and the logger should be returned to Onset for battery replacement.

Do not attempt to replace the battery. If the battery needs to be replaced, contact Onset or an Onset Authorized Dealer for factory replacement battery service.

⚠ **WARNING:** Do not cut open, incinerate, heat above 150°C (302°F), or recharge the lithium battery. The battery may explode if the logger is exposed to extreme heat or conditions that could damage or destroy the battery case. Do not dispose of the logger or battery in fire. Do not expose the contents of the battery to water. Dispose of the battery according to local regulations for lithium batteries.
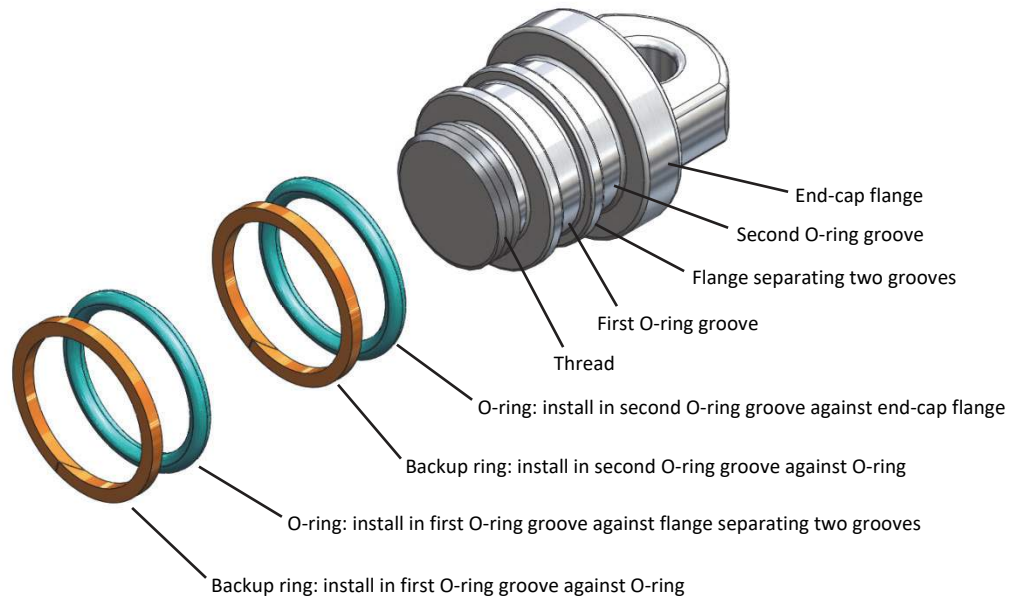

Care and maintenance of the logger

The logger can be permanently damaged by internal corrosion from condensation or foreign matter entering the case. The logger is shipped with installed Resilon™ O-rings and backup rings. The logger electronics depend on the integrity of the O-ring/backup ring seal

for protection. Because pressure, temperature, and duration of deployment can affect O-rings and backup rings over time, it is important to inspect the rings before a new deployment. Replace the rings if they are beginning to deform in shape or if you have any doubt about the integrity of the seal. To replace the rings:

1. Unscrew the end-cap and remove the orange and blue rings. You may need to use a plastic O-ring tool or similar plastic tool to remove the blue O-rings. Do not use a screwdriver or sharp metal tool as this could damage the O-ring grooves.

2. Clean the two grooves on the end-cap with isopropyl alcohol.

3. Lightly lubricate the blue O-rings with the silicone-based O-ring lube (included).

4. Work one blue O-ring with your fingers or a plastic O-ring tool over the thread into the first O-ring groove and up into the second O-ring groove (flush with the end-cap flange). Do not use a screwdriver or sharp metal tool as this could damage the O-ring groove or the O-ring itself.

5. Install the next blue O-ring over the thread and up to the flange that separates the two grooves.

6. Next, install the orange backup rings below each O-ring. The backup rings are "scarf" cut to make them easier to install.

7. Screw the end-cap back onto the logger. Make sure the backup rings are seated properly when the end-cap is screwed into the logger housing. The end-cap must be securely in place with no visible gap between the housing and the end-cap.

Note: Static electricity may cause the logger to stop logging. To avoid electrostatic discharge, always transport the logger with its end-cap on, or in an anti-static bag. Ground yourself by touching an unpainted metal surface before handling the logger. For more information, search for "static discharge" on www.onsetcomp.com.

End-cap flange
Second O-ring groove
Flange separating two grooves
First O-ring groove
Thread
O-ring: install in second O-ring groove against end-cap flange
Backup ring: install in second O-ring groove against O-ring
O-ring: install in first O-ring groove against flange separating two grooves
Backup ring: install in first O-ring groove against O-ring

End-cap with the correct order of O-rings and backup rings

Assembled end-cap