

**HOBO® U12 4-External Channel
Outdoor/Industrial Data Logger
(Part # U12-008)**

Inside this package:

- HOBO U12 4-External Channel Outdoor/Industrial Data Logger
- Desiccant pack
- Mounting/spare parts kit: two socket head screws, dome plug and O-ring, O-ring lubricant, four mounting screws, four flat washers, Allen wrench, and four tie wraps.


Thank you for purchasing a HOBO data logger. With proper care, it will give you years of accurate and reliable measurements.

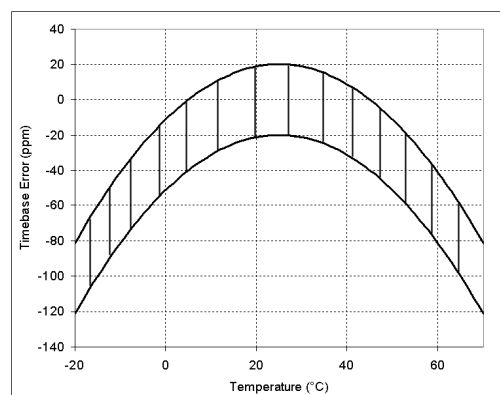
The HOBO U12 4-External Channel Outdoor/Industrial data logger has a 12-bit resolution and can record up to 43,000 measurements or events. The four external channels accept a wide range of Onset and third-party sensors/transducers with a 0-2.5 VDC output, including external temperature, AC current, pressure, air velocity, and kW sensors. Specifications for Onset sensors can be found at www.onsetcomp.com or by contacting your Onset Authorized Dealer. For 0-5 VDC, 0-10 VDC, or 4-20mA output, use optional Onset Part No. CABLE-ADAP5, CABLE-ADAP10, or CABLE-4-20mA respectively.

The logger uses a direct USB interface for launching and data readout by a computer. Onset software is required for logger operation. Visit www.onsetcomp.com for details.



Specifications

Measurement range	External input channels (see sensor manual): 0 to 2.5 VDC (with CABLE-ADAP5) and 0 to 10 VDC (with CABLE-ADAP10)
Accuracy (logger only)	$\pm 2 \text{ mV} \pm 2.5\%$ of absolute reading $\pm 2 \text{ mV} \pm 1\%$ of reading for logger-powered sensors
Resolution	0.6mV
Time accuracy	± 1 minute per month at 25°C (77°F), see Plot A.
Operating range	-20 to 70°C (-4° to 158°F) Weatherproof case tested to NEMA 6 standard
Operating temperature	Logging: -20° to 70°C (-4° to 158°F) Launch/readout: 0° to 50°C (32° to 122°F), per USB specification.
Battery life	1 year typical use (see The Battery on page 4 for details)
Memory	64K bytes (43,000 12-bit measurements)
Weight	200 g (7 oz)
Dimensions	140 x 137 x 32 mm (5.5 x 5.38 x 1.25 inches)
	The CE Marking identifies this product as complying with all relevant directives in the European Union (EU).



Plot A

Accessories

- Replacement Parts Kit (Part # H8X4-BK)
- Replacement Desiccant (Part # DESIC-PACK)
- U-Bolt (Part # U-BOLT-KIT)

4-20mA Input Cable

This cable (part number CABLE-4-20mA) measures current from 0 to 20.1 mA. Do not expose to current above 20 mA or to negative current. Do not cut off the end of the gray cable where it connects to the blue and yellow wires, as it contains the precision resistor required for current measurement.

If you are using this cable outdoors, you will need to ensure that the connection to your sensor or device is also weatherproof. The connection between the gray cable and yellow and blue wires is splash-proof, but not weatherproof.

Voltage Input Cable

The logger's external inputs can accept the voltage input cable (Onset part number CABLE-2.5-STEREO), which allows a voltage to be recorded. The input line must not be exposed to signals below 0 V or above 2.5 V.

If you are using this cable outdoors, you will need to ensure that the connection to your sensor or device is also weatherproof.

Voltage Input Cable Connections

Wire	Connection
Red	Switched 2.5 V output
White	Voltage input
Black	Ground

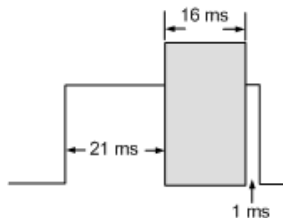
Other External Sensors

Onset has a range of external temperature sensors, AC current sensors, and cables for incorporating other sensors that are compatible with the U12 4-External Channel Data Logger. Measurement specifications for using Onset temperature and AC current sensors with this logger are provided in the sensor manuals. Visit www.onsetcomp.com for details on compatible sensors.

Switched 2.5 V Output

The external input channels have a switched 2.5 V output. This signal can be used to power a sensor directly, or it can be used to trigger an external circuit. External sensors should draw no more than 4 mA total when powered.

The switched 2.5 V output turns on about 1 ms before the external channels are measured and stays powered for 21 ms after the external channels are measured, as shown in the diagram. The grey area shows the 16 ms period during which the logger samples the input signals.



When using multiple voltage and/or current inputs, the (-) from your current source(s) and the 0 V line of your voltage source(s) are tied together at the logger. If these lines are at different voltage potentials, this may cause inaccurate readings or even damage your logger.

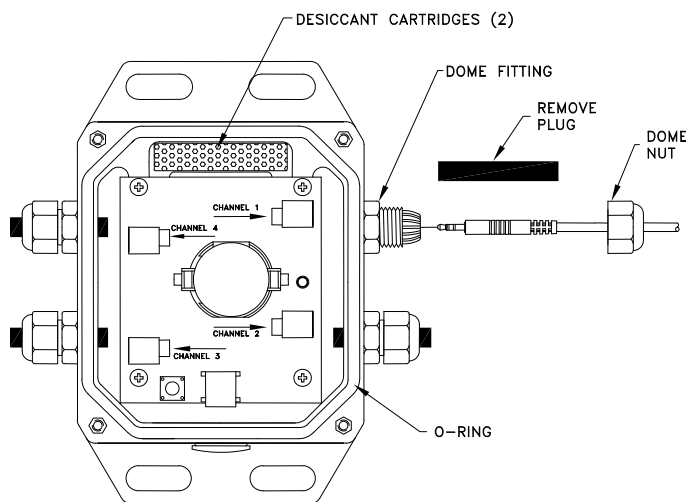
Keep in mind that these lines may also be tied to earth ground through your PC interface cable when connected to your

computer. Special precautions may be necessary if any of your voltage or current source common lines are not tied to earth ground. Input isolators may be needed in industrial environments to prevent errors caused by ground loops.

CAUTION: Analog channel input cannot exceed 2.5 VDC. For sensor outputs up to 10 VDC, use appropriate voltage adapter cable.

Attaching the Sensors

1. Remove the socket head screws in the corners of the cover and lift the cover from the device. Save the screws to reattach the cover later.
2. Using a 15 mm wrench, remove the dome nut for the channel you wish to connect to.
3. Pull the exposed end of the black rubber plug to remove it from the fitting. **Do not throw these plugs away!** These plugs are needed to maintain a weatherproof seal for channels that are not connected to sensors or input cables.
4. Slide the dome nut over the plug end of the cable. The dome nut's threads should face towards the case.
5. Feed the plug end of the cable from the outside of the case through the dome fitting of the channel you want to use (refer to label on the logger's cover) and plug it into the corresponding port as shown in the diagram. **The sensor cable must be inserted through the fitting to ensure proper logger operation.** If you have difficulty inserting the plug through the fitting, a small amount of dishwashing liquid can be used as a lubricant on the plug. (Do not use O-ring lubricant.)



6. Thread the dome nut back onto fitting and hand-tighten it. Tighten an additional half-turn with a 15 mm wrench.

7. Make sure the desiccant cartridges are fresh. (If you are using the logger for the first time, remove the two desiccant cartridges from the foil pouch and install them in the cavity at the top of the case.) Cartridges are blue when new, and fade to pale pink when they need to be replaced. If they are pale pink, discard them and replace them with two new (blue) ones (part # DESIC-PACK).
8. Close the logger's case as described in the "Closing the logger" section of this manual.

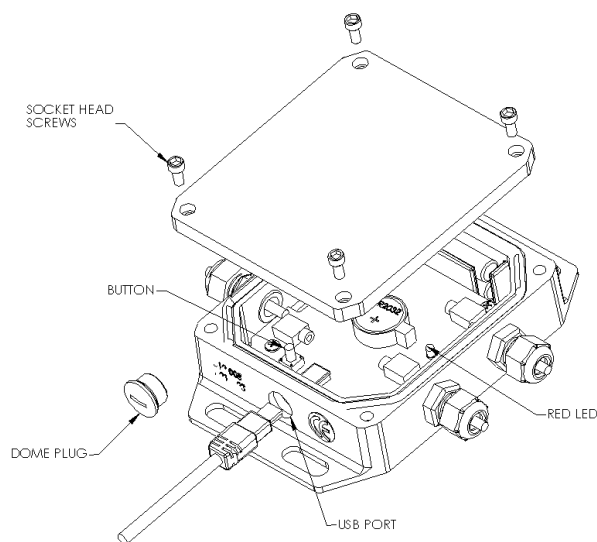
Replacing Desiccant Cartridges

Periodically check the desiccant cartridges by looking through the viewing window on the logger's case. The cartridges are blue when new, and fade to pale pink when they need to be replaced. Discard the old cartridges and replace them with two new blue ones (part # DESIC-PACK).

Connecting the Logger

The U-Family logger requires an Onset-supplied USB interface cable to connect to the computer. If possible, avoid connecting at temperatures below 0°C (32°F) or above 50°C (122°F).

1. Using a screwdriver, small coin, or similar object, turn the dome plug counter-clockwise and set it aside.
2. Plug the large end of the USB interface cable into a USB port on the computer.
3. Plug the small end of the USB interface cable into the logger as shown in the diagram. (You may find it easier to see the port if the logger's cover is off.)



If the logger has never been connected to the computer before, it may take a few seconds for the new hardware to be detected. Use the logger software to launch and read out the logger.

After you disconnect the logger from the computer, remember to put back the dome plug. Make sure that the dome plug O-ring is still in place. Then, turn the dome plug clockwise until the O-ring is snug.

Launching the Logger

Be sure to plug the external sensors into the logger before launching. Also select the correct sensors and activate the external channels in the logger software when configuring the launch. **Important: If you select an external channel, but do not plug the probe in, false data will be recorded for that channel.**

If you configured the logger to start with a button start, press and hold down the button on the front of the logger for at least three seconds when you want to begin logging data. **Then close the logger's cover.**

You can read out the logger while it continues to log, stop it manually with the software, or let it record data until the memory is full.

Refer to the software user's guide for complete details on launching, reading out, and viewing data from the logger.

Protecting the Logger

Static electricity may cause the logger to stop logging. To avoid electrostatic discharge, transport the logger in an anti-static bag, and ground yourself by touching an unpainted metal surface before handling the logger. For more information about electrostatic discharge, visit our website at <http://www.onsetcomp.com/Support/support.html>.

Closing the Logger

Follow these steps to ensure a secure, weatherproof seal.

1. Make sure the dome plug is in place.
2. Lubricate and install the large O-ring around the face of the logger. It should be clean, lubricated, and fully seated into the groove. (Additional O-ring lubricant is available from Onset Computer; part # 85-SILICONE-1.)
3. Place the cover on the case. The clear area on the label should be positioned over the desiccant cavity.
4. Attach the cover loosely using the two socket head screws set aside in Step 1 of Attaching the Sensors and the two identical screws in the mounting/spare parts kit. Make sure the O-ring is still seated properly.
5. Starting at any corner, tighten a socket head screw, then tighten the screw in the opposite corner. Tighten the two remaining screws and inspect O-ring through the clear cover to ensure proper sealing all around. **Make sure all four screws are in place.**

Sample and Event Logging

The logger can record two types of data: samples and events. Samples are the sensor measurements recorded at each logging interval (for example, the temperature every minute). 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, the end of a data file once the logger is stopped, and button pushes (if applicable).

Since you must remove the logger's cover to access the button, button pushes should be done only if the logger is adequately protected from moisture and other environmental factors that could damage it. To mark an event, press the button for at least one second. Both a button up and a button down event will be recorded.

The logger stores 64K of data, and can record up to 43,000 samples and events combined.

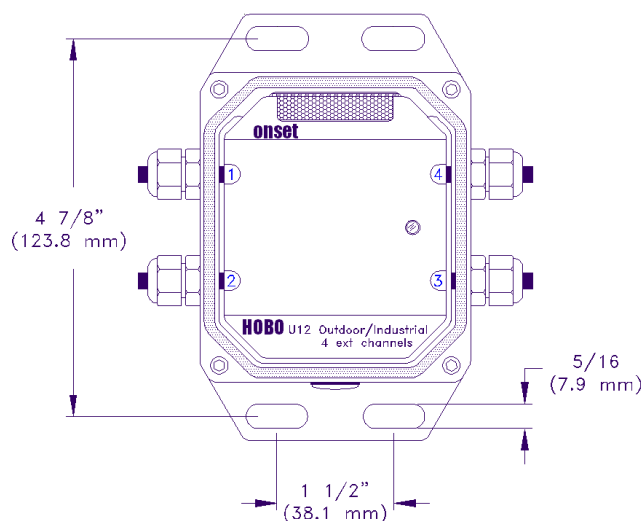
Operation

A light (LED) on the front of the logger confirms logger operation. The following table explains when the logger blinks during logger operation:

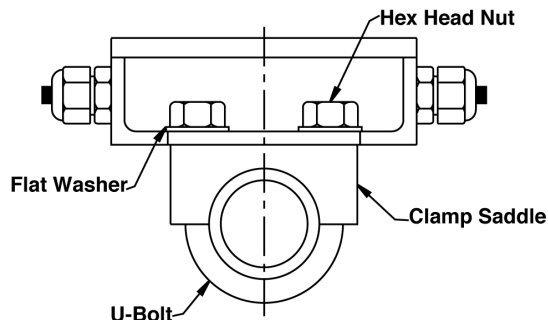
When:	The light:
The logger is logging	Blinks once every one to four seconds (the shorter the logging interval, the faster the light blinks); blinks when logging a sample
The logger is awaiting a start because it was launched in Start At Interval, Delayed Start, or Button Start mode	Blinks once every eight seconds until launch begins
The button on the logger is being pushed for a Button Start launch	Blinks once every second while pressing the button and then flashes rapidly once you release the button. The light then reverts to a blinking pattern based on the logging interval

Mounting

Four mounting screws and washers are included with your logger. Use these screws to mount the logger to a wooden post. UV-stable tie wraps also work well.



U-bolt clamps (part # U-BOLT-KIT) are preferred for mounting to a 1" pipe (1.3" outside diameter), as shown.



The Battery

The logger requires one 3-Volt CR-2032 lithium battery. Expected battery life varies based on the temperature and the frequency at which the logger is recording data (the logging interval). A new battery will typically last one year with logging intervals greater than one minute. Deployments in extremely cold or hot temperatures or logging intervals faster than one minute may significantly reduce battery life. Onset recommends that you install a fresh battery before every deployment if temperatures below 0°C (32°F) are expected.

To replace the battery:

1. Disconnect the logger from the computer.
2. Use the Allen wrench to remove the four socket head screws on the logger's cover. Then remove the cover.
3. Carefully insert a thin screwdriver blade between the edge of the battery and the battery contact that is farther from the red LED. Gently pry up the edge of the battery, popping it out of the holder.
4. Slide the new battery, positive side up, under the two small tabs of the contact that is closer to the red LED. Press down on the battery until it snaps into place. The logger's LED will blink several times.
5. When the new battery is secure, close the logger's case as described in the "Closing the logger" section of this manual.

⚠ WARNING: Do not cut open, incinerate, heat above 85°C (185°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