

- Inside this package**
The HOBO H8 Family of loggers are shipped with:
1. One HOBO H8 logger (part number H08-001-02, H08-002-02, H08-003-02, H08-004-02, or H08-007-02)
 2. Mounting Accessories:
Magnet
Hook and loop tape
Double-sided tape

HOBO® H8 Family User's Manual

Requires Onset Computer Corporation's BoxCar® Pro or BoxCar® 3.6 or later software and PC cable for operation.
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Ⓒ The CE mark identifies this product as complying with all relevant directives in the European Union (EU).

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

This manual covers the HOBO H8 family of products. All members share a common feature set, store 7944 time-stamped measurements and are compatible with the HOBO Shuttle allowing for convenient retrieval of field data. The measurements available on each model are:

Model	Part Number	Temp	RH	Light	External
HOBO Temp	H08-001-02	✓			
HOBO Temp/External	H08-002-02	✓			✓
HOBO RH/Temp	H08-003-02	✓	✓		
HOBO RH/Temp/Light/External	H08-004-02	✓	✓	✓	✓
HOBO RH/Temp/2x External	H08-007-02	✓	✓		✓ (2)

Common Specifications

Operating range (logger): -20°C to +70°C (-4°F to +158°F),

0 - 95% RH non-condensing

Time accuracy: approx. ±1 minute per week (±100 ppm at +20°C or +68°F), full dependance shown in Plot A

Measurement capacity: 7944 measurements total, stored in non-volatile memory

Size: 2.4" x 1.9" x 0.8"

Weight: approximately 1 oz.

Battery: CR-2032 (lithium) user-replaceable

Battery life (continuous use): 1 year

Storage temperature: -40°C to +75°C (-40°F to +167°F)

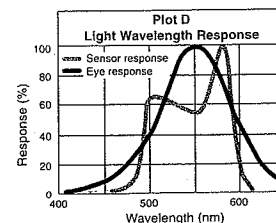
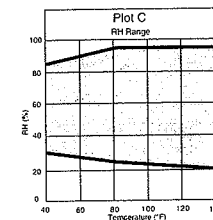
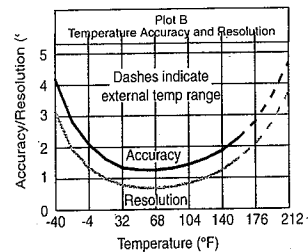
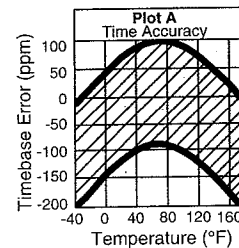
Measurement Specifications

Temperature - Each HOBO H8 logger has an internal temperature sensor on a 4 inch wire which is mounted on the circuit board inside the snap lid case. Typically, the sensor is left inside the case and measures ambient air temperature over the operating range of the logger; -20°C to +70°C (-4°F to +158°F) with a response time of about 15 minutes in still air typical to 90%. The internal sensor can be placed outside the case when a shorter response time is needed (less than 1 minute in air and about 2 seconds in water typical to 90%). The temperature sensor is capable of measuring temperature from -40°C to +120°C (-40°F to +248°F) when extended from the case (see **Using the sensor outside the box** for more information). The HOBO's temperature resolution and accuracy are shown in Plot B. This error includes the measurement uncertainty due to the sensor resolution.

Relative Humidity - The HOBO's user-replaceable relative humidity sensor is temperature compensated, and the logger's relative humidity accuracy is ±5% over the entire +5°C to +50°C (+41°F to +122°F) operating range of the sensor when used with BoxCar Pro 4.3 or BoxCar 3.7.3 or later version. NOTE: Accuracy specifications reflect improvements made to BoxCar Pro 4.3 and BoxCar 3.7.3. Earlier software versions provide ± 5% accuracy except in elevated humidity environments (60% to 95% non-condensing and non-fogging where accuracy is ±10%). Upgrading to BoxCar Pro 4.3 or BoxCar 3.7.3 or later version will bring all current and old data file accuracy to ±5% for the full operating range. The relative humidity sensor's operating RH range is 25% to 95% at +25°C (+77°F) for logging intervals of 10 seconds or longer. Full dependance shown in Plot C. RH sensor drift is < 1% per year. **NOTE: The HOBO's RH sensor will be damaged by condensation. It must not be exposed to fog, mist or other condensing conditions!**

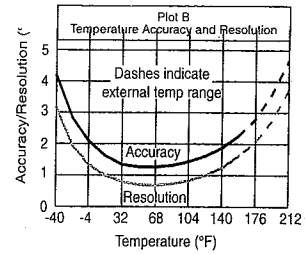
Light Intensity - The HOBO's light intensity sensor approximates the sensitivity of the human eye. The sensor's response versus light wavelength is shown in Plot D (gray line), along with the eye response (black line). The nominal range is 2 to 600 footcandles (lumens/ft²), with an accuracy of ±20% of reading, ± 2 footcandles. The sensor's angular response is roughly cosine dependent, with 0° being directly above the sensor.

External Input with Onset Sensors - The HOBO H8 loggers accept a range of Onset temperature and AC current sensors. For compatible sensors, see the HOBO catalog, contact Onset or contact your Onset authorized dealer.

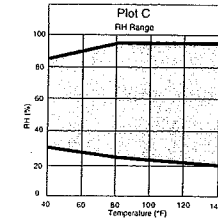


Measurement Specifications

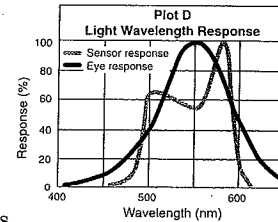
Temperature - Each HOB0 H8 logger has an internal temperature sensor on a 4 inch wire which is mounted on the circuit board inside the snap lid case. Typically, the sensor is left inside the case and measures ambient air temperature over the operating range of the logger; -20°C to $+70^{\circ}\text{C}$ (-4°F to $+158^{\circ}\text{F}$) with a response time of about 15 minutes in still air typical to 90%. The internal sensor can be placed outside the case when a shorter response time is needed (less than 1 minute in air and about 2 seconds in water typical to 90%). The temperature sensor is capable of measuring temperature from -40°C to $+120^{\circ}\text{C}$ (-40°F to $+248^{\circ}\text{F}$) when extended from the case (see **Using the sensor outside the box** for more information). The HOB0's temperature resolution and accuracy are shown in Plot B. This error includes the measurement uncertainty due to the sensor resolution.



Relative Humidity - The HOB0's user-replaceable relative humidity sensor is temperature compensated, and the logger's relative humidity accuracy is $\pm 5\%$ over the entire $+5^{\circ}\text{C}$ to $+50^{\circ}\text{C}$ ($+41^{\circ}\text{F}$ to $+122^{\circ}\text{F}$) operating range of the sensor when used with BoxCar Pro 4.3 or BoxCar 3.7.3 or later version. NOTE: Accuracy specifications reflect improvements made to BoxCar Pro 4.3 and BoxCar 3.7.3. Earlier software versions provide $\pm 5\%$ accuracy except in elevated humidity environments (60% to 95% non-condensing and non-fogging where accuracy is $\pm 10\%$). Upgrading to BoxCar Pro 4.3 or BoxCar 3.7.3 or later version will bring all current and old data file accuracy to $\pm 5\%$ for the full operating range. The relative humidity sensor's operating RH range is 25% to 95% at $+25^{\circ}\text{C}$ ($+77^{\circ}\text{F}$) for logging intervals of 10 seconds or longer. Full dependance shown in Plot C. RH sensor drift is $< 1\%$ per year. NOTE: The HOB0's RH sensor will be damaged by condensation. It must not be exposed to fog, mist or other condensing conditions!



Light Intensity - The HOB0's light intensity sensor approximates the sensitivity of the human eye. The sensor's response versus light wavelength is shown in Plot D (gray line), along with the eye response (black line). The nominal range is 2 to 600 footcandles (lumens/ft²), with an accuracy of $\pm 20\%$ of reading, ± 2 footcandles. The sensor's angular response is roughly cosine dependent, with 0° being directly above the sensor.



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Diagram A - 4-20 mA input cable

4-20 mA Input cable - This cable (part number CABLE-4-20mA) measures currents from 0 to 20.1 mA. The accuracy is $\pm 1\%$ of full scale. The 4-20 mA cable must be connected such that the current flows through, and with the proper polarity, as shown in Diagram A. Do not expose to current above 20 mA or negative current. Do not cut off the end of the gray cable where it connects to the blue and yellow wires as that contains the precision resistor required for current measurement.

Voltage Input Cable Connections	
red wire	switched 2.5 V output
white wire	voltage input
black wire	0 volts

External Input for Sensors with Voltage Output

The external port can alternatively accommodate a voltage input cable (Onset part number CABLE-2.5-Stereo) which allows a single voltage input to be recorded. This input reads 0 to 2.5 DC volts, with a $\pm 0.1 \mu\text{A}$ maximum leakage between measurements and a $\pm 0.4 \mu\text{A}$ during sensor measurements (5.4 ms each). The accuracy is $\pm 10 \text{ mV} \pm 1\%$ of reading. Input impedance is $10 \text{ k}\Omega$. The input line should not be exposed to signals below 0 volts or above 2.5 volts. The external sensor's zero volt input is not the same as the serial port's ground connection. Connecting the zero volt connection to ground may damage the logger.

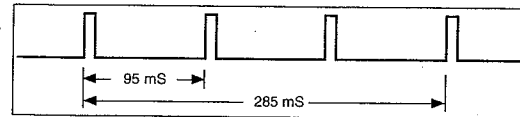


Diagram B

Switched 2.5 V Output - This signal can be used to power a sensor directly (like the H8's external temperature sensor) or it can be used to trigger an external circuit. External sensors should draw no more than 2 mA when powered. The switched 2.5 V output blinks on for about 5.4 ms every time a measurement is made of any channel. A logger with four channels enabled will cause four blinks after each measurement interval expires. The external channels are the last of the blinks whether one, two, three or four channels are enabled. The four enabled channels example is shown in Diagram B.

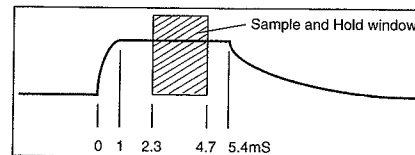


Diagram C

Details of the blink - The input is sampled at a specific point in each blink in Diagram C. The start of the sample window is 2.3 ms after the beginning of the blink, and end 2.4 ms later.

Connecting the Communications Cable and Launching

A Starter Kit, which includes a PC interface cable and software, is required to operate your logger. Connect the interface cable into the 3.5 mm jack on the logger and into a working serial port of your computer. Install and start the logger's software. Select **Launch...** under **Logger** on the menu bar and a launch dialog box will be provided. For a complete explanation on installing the software and launching your logger, please refer to the software manual.

Operation Indicator

The HOBO data loggers have a red LED that blinks while they are logging. The LED blinks brightly at every measurement, and weakly every two seconds if the interval between measurements is longer than two seconds. The blinking LED is most visible when viewed straight on, as shown in Diagram D.

Operation on Computers Equipped with a Power Conservation Mode

Many newer computers, especially laptops, have a power conservation feature which shuts the serial port off after a short period of time. If a HOBO or StowAway logger is still connected to the serial port when this happens, the logger will shut off. Test to see if you will be affected by the power conservation feature. Using BoxCar, launch your logger from the computer that you are testing. If you are using a laptop, it may behave differently when running off battery versus running off the power plug; please test both. After launch, leave the logger attached to the PC interface cable and watch the LED to see if it remains blinking. When a logger is actively logging, the LED will blink faintly every 2 seconds. If the power management is causing a problem, the LED will stop blinking within one minute. When you are using a HOBO Pro logger, the LED is located under the PC interface cable, and is not visible when the cable is plugged in. To test a HOBO Pro, launch the logger to take readings at 10 second intervals. Leave the logger attached to the interface cable for one minute. You can either remove the interface cable at this point and check the LED status, or download the datafile to see how many points were collected. If power management is causing the logger to shut off, you will only see one data point in the file. To resolve power conservation shut off of the serial port, BoxCar Pro 4.0, 4.1, and 4.2.x customers should download the free BoxCar Pro 4.2.10.1 upgrade patch. Similarly, BoxCar 3.6 and 3.7.1 customers should download the free BoxCar 3.7.2 upgrade patch. Both are available for free on our website under Support and Upgrades, Software Upgrades and Utilities.

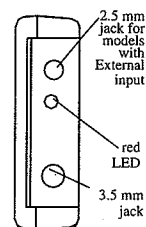


Diagram D

Note: layout is slightly different for RH/Temp/2x External

Mounting Options

Included with your HOBO H8 data logger are three options for mounting it on location: a magnet, hook and loop tape, and double-sided tape. These can be stuck on the back of your HOBO. When using the magnet, note that it works best on flat surfaces.



Diagram E

Readout

Reconnect the HOBO data logger to the PC interface cable, start the logger software, select **Readout** under **Logger** on the menu bar and the data will be displayed in a graphical or tabular form. For a complete explanation on reading out your logger, please refer to the software manual.

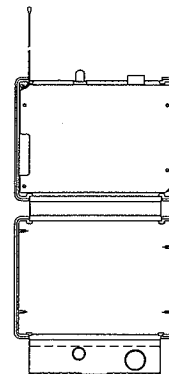
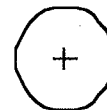


Diagram F

Using the Sensor Outside the Box

In normal operation, the HOBO's internal temperature sensor should be left inside the case. To use the sensor outside the case, open the snap-lid case as shown in Diagram E and remove the circuit board. Unwind the four inch sensor wire from the circuit board and place the board back into the case. When closing the case, make sure the sensor is aligned in the small notch in the case as shown in Diagram F and press the snap-lid closed. **Be careful, the sensor is fragile and easily damaged!** When using the sensor outside the box the logger must still be kept within its operating range of -20°C to +70°C (-4°F to +158°F).

Battery



Battery Holder

Diagram G

Keep it Dry

Your HOBO data logger is meant for **indoor use only** and can be permanently damaged by corrosion if it gets wet. Protect it from water or condensation, which will damage the RH sensor. If the sensor does get wet it will need to be replaced (Onset part number HUM-UPS-500).

Changing the Battery

We recommend changing the HOBO's battery when its level is less than 30% (battery level is displayed on the host computer during Launch, Readout or on the HOBO Shuttle after data offload). Data stored in the HOBO will not be lost when removing the battery. To change the battery, open the case, lift the circuit board and remove the battery by carefully pushing it out with a small screwdriver or other small, blunt instrument. Be sure to install the battery with the printed side away from the HOBO's circuit board as shown in Diagram G. The logger's red LED will blink a number of times after the battery has been installed. If you will not be using the logger right away, bring the logger to the launch window of BoxCar Pro or BoxCar and then select cancel or you can offload the data. This action puts the logger into its low power state to conserve your battery power. **Note: Do not cut open, incinerate, heat above +85°C (+185°F) or recharge lithium battery. Dispose per local regulations.**

Service and Support

HOBO® products are easy to use and reliable. In the unlikely event that you have a problem with the hardware or software, please read the following.

Who do I contact?

Contact the company that you bought the loggers from: Onset Computer Corporation or an Onset Authorized Dealer.

Warranty

The HOBO® products are warranted to be free from defects in material and workmanship for a period of one year from the date of original purchase. During the warranty period Onset will, at its option, either repair or replace products that prove to be defective. This warranty is void if the Onset products have been damaged by customer error or negligence or if there has been an unauthorized modification.

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Before calling, you can evaluate and often solve your problem if you try the following:

1. Read this manual and the ReadMe file on the software disk. It may only take a few moments to get the answers you need.
2. Write down the events that led to the problem. Have you changed anything in your computer recently? Are you doing anything differently?

When contacting Onset Computer Corporation, please indicate that you need Technical Support for HOBO® products.

Be prepared to:

1. Provide the product number which is found on the bottom of the logger, the software version and serial number if present on the diskette.
2. Provide details on the hardware and software configuration of your computer including: manufacturer, model number, peripherals, and version of operating system.
3. Completely describe the problem or question. The more information you provide, the faster and more accurately we will be able to respond.

NOTE: Onset allows one technical support contact for each software license.

Onset Technical Support

Onset Computer Corporation
470 MacArthur Blvd., Bourne, MA 02532
Mailing: PO Box 3450, Pocasset, MA 02559-3450
1-800-LOGGERS (1-800-564-4377)
Phone: (508) 759-9500
Fax: (508) 759-9100
e-mail: loggerhelp@onsetcomp.com

Warranty

The HOBO® products are warranted to be free from defects in material and workmanship for a period of one year from the date of original purchase. During the warranty period Onset will, at its option, either repair or replace products that prove to be defective. This warranty is void if the Onset products have been damaged by customer error or negligence or if there has been an unauthorized modification.

Returning Products to Onset

Direct all warranty claims to place of purchase. Before returning a failed unit, you must obtain a Return Merchandise Authorization (RMA) number from Onset. You must provide proof that you purchased the Onset product(s) directly from Onset (purchase order number or Onset invoice number). Onset will issue an RMA number that is valid for 30 days. You must ship the product(s), properly packaged against further damage, to Onset (at your expense) with the RMA number marked clearly on the outside of the package. Onset is not responsible for any package that is returned without a valid RMA number or for the loss of the package by any shipping company. Loggers must be clean and free of any toxins before they are sent back to Onset or they may be returned to you.

Repair Policy

Products that are returned after the warranty period or that are damaged by the customer as specified in the warranty provisions can be returned to Onset with a valid RMA number for evaluation.

Please contact Onset for more information and prices on:

ASAP Repair Policy

Onset will expedite the repair of a returned product.

Data-back™ Service

HOBO® data loggers store data in nonvolatile EEPROM memory. Onset will, if possible, recover your data to a disk.

Tune Up™ Service

Onset will examine and retest any HOBO® data logger.