



## Guide to Choosing Occupancy and Light On-Off Data Loggers – 5 Important Considerations



## Introduction

In 2010, the residential and commercial sectors in the United States used approximately 499 billion kilowatt-hours (kWh) of electricity for lighting, equal to 13% of all electricity used nationwide (U.S. Energy Information Administration). In commercial buildings alone, 35% of all energy cost is attributed to lighting (2005 Buildings Energy Data Book, U.S. Department of Energy).

The movement toward increased energy efficiency is growing globally. In a recent worldwide survey of 4,000 building owners and managers (JCI/IFMA/ULI 5th Annual Global Energy Efficiency Survey 2011), 70% said energy management is important and cited their primary motivation for implementing energy management programs as cost savings. In addition, 80% of respondents expected energy prices to rise by more than 10% in the next year.

Clearly there is and will continue to be great benefit in tightening up energy use for cost savings, good business practices, energy security, and environmental protection.

Fortunately, addressing lighting use in existing buildings is one of the easiest and most cost-effective ways to save money and power. The U.S. Environmental Protection Agency estimates that by installing occupancy sensor controls for lighting, potential average savings for various building space types are as follows:

<b>Space type</b>	<b>Estimated savings</b>
private office	13-50%
conference room	22-65%
classroom	40-46%
restrooms	30-90%
corridors	30-80%
storage areas/warehouses	45-80%

Enacting a lighting control project in an existing building not only can save money, but also can enhance a brand or public image and affect employee perceptions – no one likes to see money and resources being wasted. It's also a smart first step in any wide-scale energy efficiency program, as the savings are almost immediate and the early insights gained by capturing use data can help enroll more support for energy-efficiency projects moving forward.

Often the first step in any new facilities project is convincing decision makers that a project is worthwhile and will pay off. Before committing to costly equipment upgrades and making changes to electrical systems by installing hard-wired light sensors, it's a good idea to first acquire data on room occupancy and lighting use in a facility to determine where best to implement permanent changes.

Portable occupancy and light on/off data loggers are the solution. They are battery-powered, matchbox-sized devices that can be easily mounted on ceilings, light fixtures, and stairwells – anywhere data are needed. The loggers have two integrated sensors, and together they continuously collect time-stamped data at user-defined intervals. Reusable occupancy and light on/off data loggers can be deployed anywhere in a building, over and over again – a toolkit of a dozen can easily be used to assess the lighting throughout a small office building. The data can quickly be downloaded to a computer and formatted for whatever presentation style is necessary.

There are some important features to consider when choosing an occupancy and light on/off data logger, and this guide will walk you through them so you can make the best decision for your application.

1. Logger Accuracy and Range
2. LCD Display
3. Logger Calibration
4. Speed of Deployment
5. Time-Saving Software Features



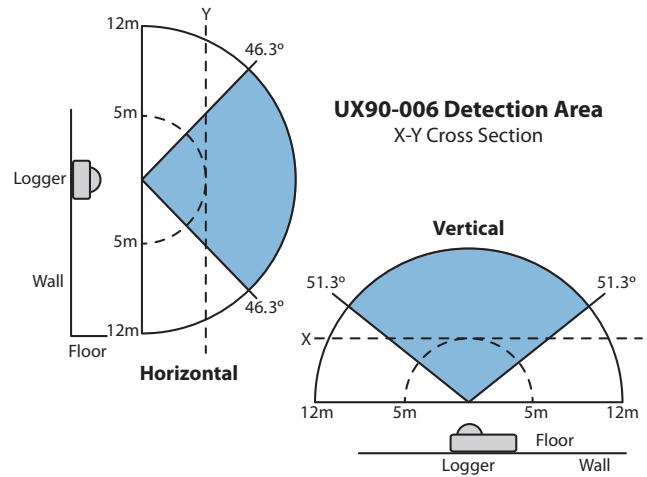
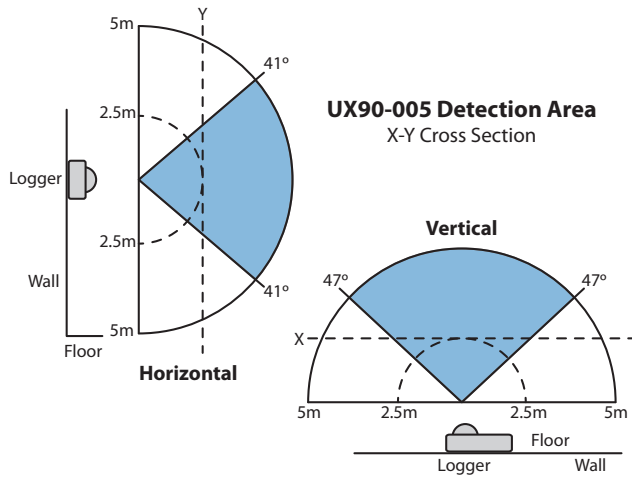
## 1. Logger Accuracy and Range

Occupancy sensors are typically based on two types of technology. A passive infrared (PIR) sensor takes advantage of the fact that all objects radiate infrared light. Though humans can't see that light, the electronic sensor can, and it designates changes in position of infrared light-radiating objects in its field of view as an occupied state. Ultrasonic sensors actively generate high-frequency sound waves and use the echo received to determine whether a space is occupied or unoccupied. This ultrasonic type of sensor is more energy-intensive than the PIR sensor. Most battery operated data loggers use the PIR technology since ultrasonic technology requires constant power.

In both cases, the sensors have a “cone” of sensitivity that determines their effective range (see illustration below). The wider the base of the cone (= the farther the distance from the sensor), the larger the occupant's movement in the space must be for the sensor to log an “occupied” state.

Therefore, it is important that you choose an occupancy logger with the sensitivity and range right for the size of the space to be monitored and the activities that take place there. For example, you will need different logger sensitivities for a busy forklift-filled warehouse versus a classroom of seated students.

Discuss your application(s) with the logger manufacturer's application specialists to ensure you get the right sensor for the job.



Onset's HOB0 UX90-005 logger has a detection range of 5m (16.4 ft) This range is well-suited for offices, conference rooms, and other small rooms.

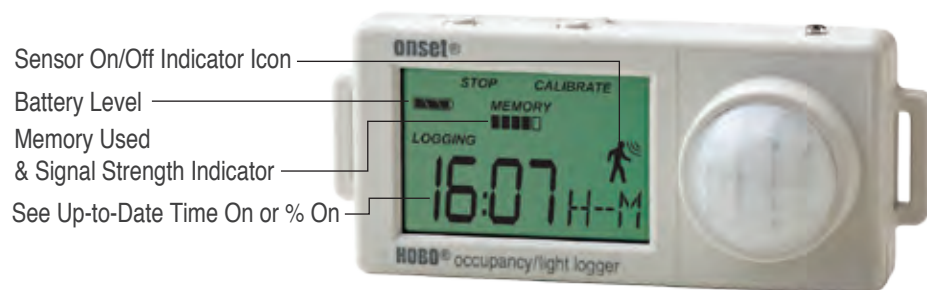


Onset's HOB0 UX90-006 logger has a detection range of 12m (39.4 ft) This range is well-suited for larger spaces such as cafeterias, and gymnasiums.

## 2. LCD Display

It's well worth the peace of mind and time savings to choose an occupancy and light on/off data logger with an LCD display. Some loggers just have LED light indicators, but with an LCD screen you can, at a glance, confirm successful deployment, signal strength, battery levels, and other levels and settings. You will save time during routine checks to ensure the logger is working properly, and you'll realize the value of actually capturing the data you need.

**Tip: Interference** – ask the logger manufacturer about any possible sensor interference from HVAC, vibration, heat sources, etc.



*HOBO UX90 Occupancy and Light data logger features*

## 3. Logger Calibration

How does the logger determine when the lights are on? Light emits from ceiling and wall fixtures and task lighting, of course, but it also comes from windows, spillover from adjoining spaces, reflection, and other sources.

A logger that allows you to easily set the on and off thresholds at a particular deployment location ensures that you will be collecting valid information on the lighting source you want to target. The logger should have an easy way to set the on and off threshold for a specific lighting source. Some data loggers use a sensitivity control that must be adjusted with a screwdriver, while other loggers with LCD screens use a bar signal strength indicator and an auto-calibration feature to lock in the on and off threshold.

In the second type of logger, the signal strength shown on the LCD allows you to easily determine if the logger's light sensor is aimed toward the target lighting source. In some cases an optional fiber optic attachment is needed to differentiate between the target light source and other lighting interference (sunlight, etc.). Follow the manufacturer's instructions to set the threshold; in some models this involves simply pushing a button.

You'll also have to determine your logging interval; whether it's every few seconds or every few minutes, look for a logger and associated setup software that allows for this flexibility.

**Tip: Mounting options** – depending on the surface, will you want to mount the data logger with magnets, zip ties, adhesive strips or something else? Good loggers come with flexible mounting options.

## 4. Speed of Deployment

When choosing an occupancy and light on/off logger, consider the entire deployment and readout process:

- **Configuring** – Determine start/end logging time and other settings. This is typically done through the logger's software while the logger is hooked up to a computer, though some functions can be set at the deployment site.
- **Battery check** – It's a good time to check battery strength and, for models that allow it, replace the battery yourself.
- **Mounting** – Gather the necessary logger mounting materials (built-in magnets, zip ties, adhesive strips, etc.), as well as any equipment required (ladders, tools, etc.). At the deployment site, point the light sensor (or optional fiber optic attachment) toward the target light source while ensuring the occupancy sensor has a clear "view" of the space. If the logger has an LCD screen or LED lights, make sure you can see them from a distance. Secure the data logger in place.
- **Setting the threshold** – Occupancy sensors don't need adjustment, but the threshold must be set for the light on/off sensor. In some models, this can be done conveniently with the auto-calibrate and signal strength feature, with the push of a button.
- **Launch** – You may have already set a launch time during configuration; if not, do it manually now.
- **Verification of operation** – Check signal strength, battery levels, deployment "on" time, and successful data logging. You may do this routinely throughout the deployment time to ensure all is well, and with loggers with LCD screens, it's easy to get the information you need.
- **Data download** – Once you've retrieved the loggers, download the data by connecting to a computer. The fastest models connect via a standard USB cable, and data download takes ten seconds or less.



*Mounting of a data logger can be quick and easy with built in rare earth magnets.*



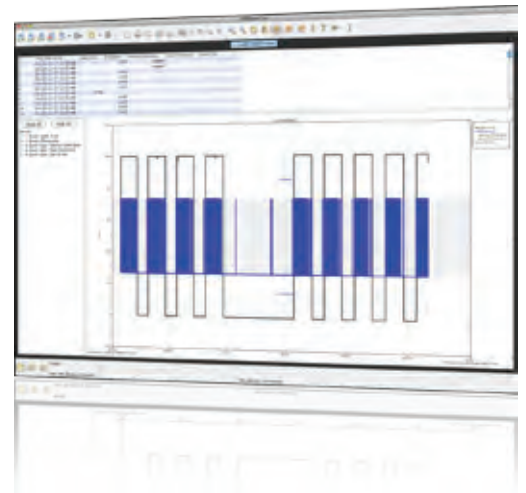
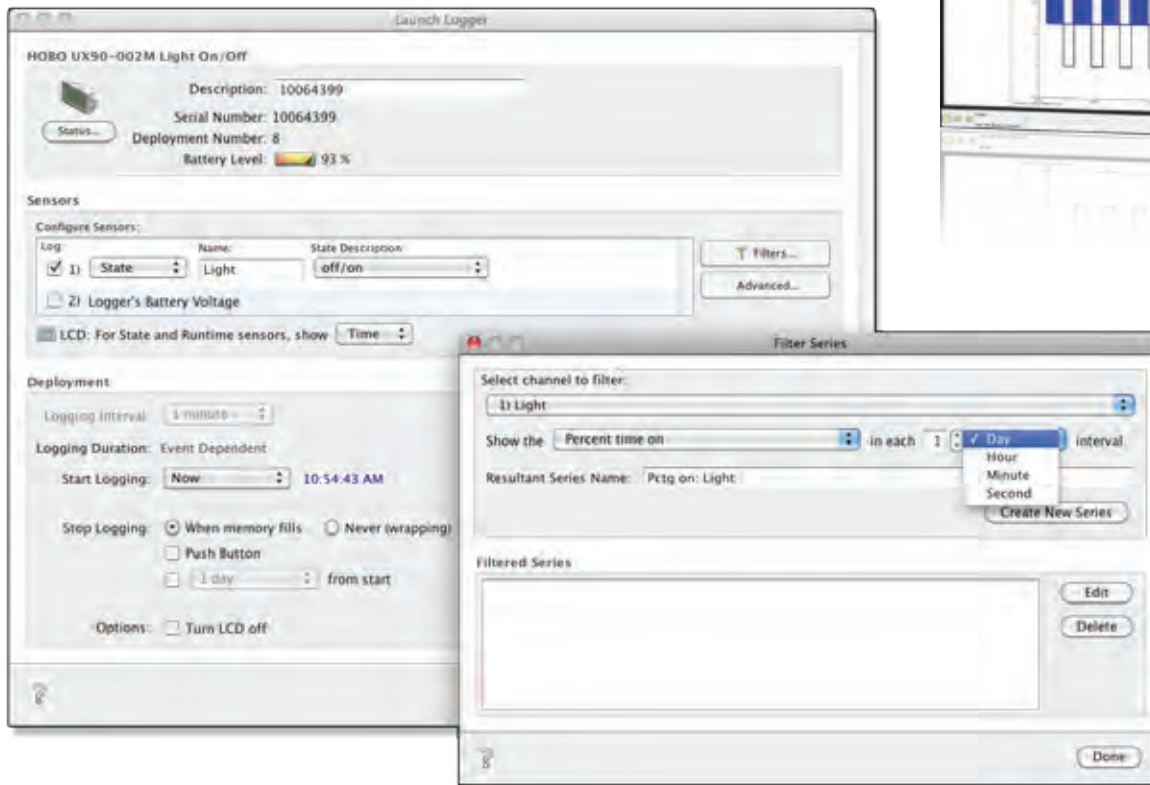
*A fiber optic light pipe helps target a specific light source*

## 5. Time-Saving Software

When looking at occupancy and light on/off data loggers, it's important to consider not only the device itself, but also the accompanying software. Look for software that will help make deployment fast and easy, from initial setup to later data analysis. Consider:

- Batch configuration and readout – The latest software allows you to configure and read out multiple data loggers in a fraction of the time it would take with previous generations. This time-saving feature is a particular advantage in applications requiring dozens or hundreds of data loggers.
- Pre-launch filtering and scaling – This feature enables you to pre-configure data loggers so that upon readout, the data will display total usage per hour and per day and will be automatically plotted to scale in real-world engineering units.
- Bulk export – Provides quick and easy export of data files to text format for use in Microsoft Excel and other programs. Bulk export automates file naming and management tasks to streamline the export process and save time.

**Tip: Software requirements –** check that the logger's software runs on the latest operating systems, and with both Mac and PC platforms, if necessary.



## Other informational resources available from Onset:

### Analyzing Air Handling Unit Efficiency with Data Loggers

Operating a heating, ventilation and air conditioning (HVAC) system at optimum efficiency in a commercial setting is complicated, to say the least. There is a very real chance that any number of setpoints, levels, and feedbacks at boilers, chillers, pumps, fans, air delivery components and more can cause costly inefficiencies.

### Finding Hidden Energy Waste with Data Loggers: 8 Cost-Saving Opportunities

The first step to reducing building energy costs is identifying energy waste. Statistics on utility bills or name plates on equipment, while useful, are not enough to identify what practices and equipment are contributing to high energy use. Portable data loggers can be used to obtain critical energy use information in a wide range of commercial building types – from manufacturing plants to office buildings.

### Monitoring HVAC Performance with Data Loggers

Building operators and managers have the difficult job of providing comfortable working conditions and coaxing aging mechanical equipment to operate at peak performance while minimizing energy costs. If the mechanical equipment is old or has inadequate controls, maintaining comfort at a reasonable cost may prove difficult or impossible. Although energy costs typically represent only 1% of a building's operating expense when occupant salaries are included, they are easily managed expenses. Energy cost savings flow directly to the bottom line as increased profits.

### The Energy Professional's Guide to Data Loggers & Building Performance

This 30-page guide, developed in conjunction with Stetz Consulting LLC, details how portable data loggers can be applied in a number of building monitoring applications, such as HVAC systems monitoring, commissioning, Measurement & Verification, and load profiling. The guide offers practical tips and techniques on a range of topics, including data logger installation, monitoring plan development, safety, and data interpretation.

### Monitoring Geothermal Heat Pump Performance

This paper discusses how portable data logging technology can be used to measure, record, and document the performance of geothermal heat pumps, and provides specific case study examples of how the technology is being applied in geothermal system monitoring applications.

### Optimizing Solar Thermal Performance with Data loggers

This paper discusses how solar thermal systems, with the help of portable data loggers, can be optimized to deliver the financial benefits residential and commercial users hope to achieve through their investments. The paper shows installers and engineers how portable data logging devices can be used to measure performance of solar thermal systems, pinpoint any defects or inefficiencies, and optimize performance for greater return on investment.

### Measurement & Verification: Tapping into ARRA Stimulus Funds

This paper provides guidance on identifying potential sources of ARRA stimulus funding for energy performance monitoring projects. It details new programs from the ARRA, explains the growing importance of Measurement Verification (M&V) services, and discusses specific ways ESCOs can apply portable data logging technology to document building energy savings.

### Using Data Loggers to Meet LEED® Existing Building Certification Credits

This paper provides information about how data loggers can make it simple to satisfy many LEED Existing Buildings Operations & Maintenance credits. It discusses how the devices can help with the certification process and documenting performance improvements for submission to the U.S. Green Building Council.

### Air Compressor Energy Savings: Finding the Low-Hanging Fruit

This paper discusses different ways to measure compressed air system performance and identify savings opportunities. It provides insight into how portable data loggers can be used to monitor compressor power, and references various compressed air upgrade funding programs throughout the United States.

### Data Logger Essentials for Building Commissioning

This paper provides building owners, building commissioners, performance contractors, HVAC engineers, and others with valuable tips and advice on effectively using data loggers to analyze building performance.

### Evaluating and Applying Data Loggers for Pharmaceutical Monitoring

This paper provides quality assurance managers, regulatory compliance specialists, engineers, and others with valuable tips on evaluating data loggers for pharmaceutical monitoring. It discusses how portable data loggers can be used in a broad range of projects, from analyzing temperatures in an incubation chamber to monitoring packaging and shipping conditions.

Access our full resources library at: [www.onsetcomp.com/resources](http://www.onsetcomp.com/resources)



## About Onset

Onset is the world's leading supplier of data loggers. Our HOBO data logger products are used around the world in a broad range of monitoring applications, from verifying the performance of green buildings and renewable energy systems to agricultural and coastal research.

Based on Cape Cod, Massachusetts, Onset has sold more than 2 million data loggers since the company's founding in 1981.

## Contact Us

Our goal is to make your data logging project a success. Our product application specialists are available to discuss your needs and recommend the right solution for your project.



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- Email your inquiry to [sales@onsetcomp.com](mailto:sales@onsetcomp.com)
- Go to [onsetcomp.com](http://onsetcomp.com) to browse our white papers, application stories, videos, and webinars