

High Bay Occupancy Sensors

Delivering Energy Savings and Fast Return on Investment

Today, smart facility managers are looking for just about any way to reduce costs. Energy is a significant expense in most operations and inefficient lighting systems are the main culprit. Estimates vary on how much energy is consumed by lighting but range as high as 70% or more, in certain applications. It's easy to see that conservation here can yield significant results to overall operational costs.

There are two ways to realize cost savings: 1) upgrade your luminaires and 2) install lighting controls. Fluorescent High Bay and Low Bay luminaires - now the mainstay of industrial, warehouse and gymnasium lighting due to their obvious energy savings - are rapidly replacing existing metal halide and high pressure sodium luminaires. However, many people overlook the fact that an additional savings of 50-75% can be realized when high-bay occupancy sensors are also incorporated into the lighting system. This layered approach of efficient lighting and occupancy based controls significantly reduces energy and maintenance costs.

Why Use Occupancy Sensors?

Applications like warehouses, distribution centers, production facilities and other industrial spaces with occupancy less than 50% and with high ceilings (15 – 45 ft) are ideal candidates for sensors. Lit by high bay fluorescent or HID fixtures, high bay lights draw significant energy and often burn when the space is empty or unused. What's more, because most facilities don't have the ability to control their lighting, these fixtures continue to stay lit and waste energy and money, even when the space is unoccupied. Occupancy sensors save energy and money by delivering light only where you need it, when you need it.

Consider a large warehouse with many long rows of racks/shelves loaded with merchandise. A "pick order" is issued, the picker identifies the aisle and drives a forklift truck into the space to pick the appropriate order. If no sensors are in use, the entire area is lit before and after the picker enters the space – even if there is no one else in that area. This wastes energy and contributes to higher costs. Now, with high-bay occupancy sensors, the sensors will see the movement of the approaching forklift and turn on the lights only where there is movement or occupancy – significantly reducing energy consumption and costs. Sensors coverage patterns are broad enough to identify movement and turn on the lights well before the forklift enters the space. Plus, with the programmable timer, the lights will again be turned off after a set period of inactivity – usually 10 – 15 minutes.

This is just one example of how occupancy sensors can cut costs and reduce energy consumption.



How Do Sensors Work?

Sensor Switch Passive Infrared Technology

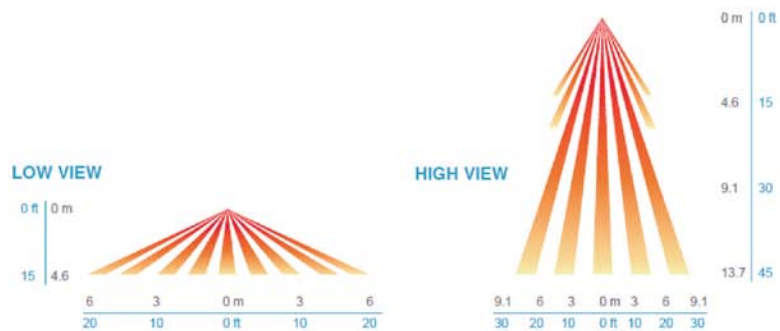
All occupancy sensors are not created equal. Sensor Switch, an Acuity Brands Company, manufactures sensors that are 100% digital, ROHS compliant, and Made in the USA. These sensors use a digital Passive Infrared (PIR) dual element detector located behind a multi-segmented Fresnel lens. Each lens segment generates a pair of collector beams. As infrared heat, given off by the human body, moves in and out of the beams, the detector "sees" this and triggers the occupancy mode. The lens creates a continuous array of beams that provide even coverage over a space so that occupants are detected anywhere within the coverage pattern.

Which Coverage Pattern Best Suits Your Application?

One of the key components of a high bay occupancy sensor is the lens that determines the coverage pattern for the particular sensor. In high bay applications, the most common types of coverage patterns are 360 degree and aisleway coverage patterns.

High Bay 360° Lens

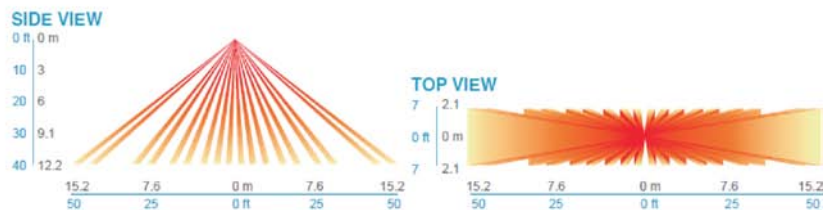
- Best choice for 15 to 45 ft (4.57 to 13.72 m) mounting heights
- 15 to 20 ft (4.57 to 6.10 m) radial coverage overlaps area lit by a typical high bay fixture
- Excellent detection of large motion (e.g., walking) up to a 35 ft (10.76 m) mounting height
- Excellent detection of extra large motion (e.g., forklifts) up to a 45 ft (13.72 m) mounting height



The image above illustrates the coverage pattern for a high bay occupancy sensor with a 360 degree field of view. This device looks down from either the high bay fixture or the junction box that it is mounted on, and covers a circular area extending out from the point directly below the mounting position. The size of this circle depends on the mounting height.

High Bay Bi-Directional Aisleway Lens

- Provides 50° bi-directional and 10° wide coverage pattern
- 1.2x mounting height equals approximate detection range in either direction
- Typical 40 ft (12.19 m) mounting detects 50 ft (15.24 m) in either direction



The image above shows the coverage pattern for the Sensor Switch Aisleway occupancy sensor. This sensor has a special lens that directs coverage on the aisleway instead of areas with racking. The segments of the lens also enhance the coverage of the sensor so that fewer units can be used in an aisleway application

Selecting the Right Sensor

Sensor Switch offers a wide array of sensor for high-bay applications. The most popular High Bay Lighting Controls are the CMRB 6 and CMRB 50 Series passive infrared (PIR) sensors. These units are line powered and can switch a large range of line voltages directly without the need for a power pack. Both the CMRB 6 and CMRB 50 mount directly to the end of a fluorescent fixture using an extended 1/2 inch chase nipple that easily mounts through a 1/2 inch knockout. With mounting heights up to 45 ft, these sensors are perfect for High Bay Lighting Controls and provide coverage in a 20 ft radius.

The aisleway version, the CMRB 50, provides Bi-Directional High Bay Aisleway coverage extending out 1.2X the mounting height in either direction. The sensor's coverage pattern provides coverage of an area that is roughly as large as three typically spaced High Bay fixtures. Therefore, when mounted directly to a fixture, the coverage area extends out to the area that is lighted by the neighboring fixtures. This is useful when traveling in a fork-lift truck, since lighting needs to be switched "ON" ahead of the truck, as in the example above.

Sensor Switch also offers a variety of high bay sensors in surface mount and embedded fixture housings.

Return on Investment

It's easy to understand that occupancy sensors will reduce costs. It's a simple fact: when lights are off, cost is \$0. The challenge is to understand how much that unidentified savings can be. That's why Sensor Switch created the Data Logger system. With this system, building owners and facility managers can get true data on how much they can save by installing sensors. Data Loggers are placed in the facility for two weeks. Over that time they capture data about occupancy and the amount of time lights are on. The two are then compared to show the amount of time lights are on in the space when the space is unoccupied. This represents the potential savings. Best of all, these Data Loggers are available at no charge for qualified projects.

Sensors quickly can pay for themselves. The examples below represent actual data captured using Data Loggers from 100K – 250K ft² warehouse facilities and clearly illustrate savings of up to 69% or more – simply by using occupancy sensors.

Area Type Averages				Normalized Weekly Lights On					Normalized Weekly Occupied					
Area Type	Qty	Watts	Peak	Off	Shldr 1	Shldr 2	Total	Peak	Off	Shldr 1	Shldr 2	Total	% sav	
Warehouse	W	20	366	148.25	0.00	0.00	0.00	148.25	65.49	0.00	0.00	0.00	65.49	55.82%
Building Average			7320	148.25		0.00	148.25	65.49			0.00	65.49	55.82%	

Area Type Averages				Normalized Weekly Lights On					Normalized Weekly Occupied					
Area Type	Qty	Watts	Peak	Off	Shldr 1	Shldr 2	Total	Peak	Off	Shldr 1	Shldr 2	Total	% sav	
Warehouse	W	11	465	111.83	0.00	0.00	0.00	111.83	33.97	0.00	0.00	0.00	33.97	69.62%
Building Average			5115	111.83		0.00	111.83	33.97			0.00	33.97	69.62%	

Area Type Averages				Normalized Weekly Lights On					Normalized Weekly Occupied					
Area Type	Qty	Watts	Peak	Off	Shldr 1	Shldr 2	Total	Peak	Off	Shldr 1	Shldr 2	Total	% sav	
Warehouse	W	11	400	167.98	0.00	0.00	0.00	167.98	102.22	0.00	0.00	0.00	102.22	39.15%
Building Average			4400	167.98		0.00	167.98	102.22			0.00	102.22	39.15%	

It's then easy to multiply your annual energy bill by the savings to reach the annualized savings by installing sensors. In some applications, payback for installation is measured in months.

Conclusion

High bay lighting controls represent a significant opportunity to cut overall energy consumption. By installing high-bay occupancy sensors, facilities can quickly and easily save thousands of dollars annually. What's more, the reduced run time extends the calendar life of the lamps in the fixtures, minimizing both lamp replacement costs and maintenance costs for replacing burned out lamps. And now, with Sensor Switch LampMaximizer[®] Technology, all sensors are designed to *further* maximize lamp life while still aggressively cutting energy consumption. For more information about High Bay Occupancy Sensors and the new LampMaximizer technology, please visit www.sensorswitch.com.



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