

Occupancy Sensors Save Energy & Money By Controlling Your Lighting

FACT SHEET



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Lighting any workplace costs money, yet businesses lose profits every day by paying to operate lights in unoccupied rooms. A better solution is to install automatic lighting controls—called occupancy sensors—that can switch lights on and off based on occupancy, time of day, and the room’s ambient light level.

Are occupancy sensors a smart solution for your business? Read on to learn more about these energy-saving devices and how they may be able to help your business save energy and money.

WHY INSTALL OCCUPANCY SENSOR CONTROLS?

Lighting occupancy sensors save energy and money by detecting activity in work areas and automatically turning lights on when people enter a room and off when people have left. Used properly, occupancy sensors can be a cost-effective way to reduce the operating time of lighting systems, resulting in outstanding energy savings.

One type of occupancy sensor is called a vacancy sensor. Vacancy sensors must be manually turned on by an occupant entering a space, but will automatically turn the lights off if no activity is sensed after a set period of time. Vacancy sensors work best in smaller enclosed areas where occupants entering a room can easily access the sensor.

Occupancy sensors are most effective in spaces that are frequently unoccupied, including offices, warehouses, storerooms, restrooms, loading docks, corridors, stairwells, office lounges and conference rooms. Open-plan office spaces, where activity level may be high throughout the workday, may not be good candidates for occupancy sensors that control the general lighting, but may be a good place to consider sensors that control plug-in office equipment and lighting at workstations.

The U.S. Environmental Protection Agency estimates average saving potential

Space Type	Savings Potential
Private office	13–50%
Conference room	22–65%
Classroom	40–46%
Restrooms	30–90%
Corridors	30–80%
Store areas (including warehouses)	45–80%

HOW OCCUPANCY SENSORS WORK

Occupancy sensors typically consist of a motion detector, electronic control, controllable switch (relay) and power supply. Most units detect motion by sensing heat (infrared radiation), shifts in the frequency of reflected ultrasonic waves, or a combination of the two. When the sensor detects motion, the electronic control sends a signal to the relay, which opens or closes the power circuit, turning the lights on or off.

TYPES OF TECHNOLOGIES

Passive Infrared (PIR) Occupancy Sensors

Infrared sensors detect the difference in heat emitted by humans in motion from heat emitted by the background space. While they are resistant to false triggering, they require a direct line of sight to sense motion.

The sensitivity of PIR sensors to small movements decreases at distances greater than 15 feet. As a result, these sensors are best suited for smaller, enclosed spaces where the sensor has a view of the activity in the room and warehouse aisles. The sensor's field of view can be adjusted and should not be directed toward an open door where it may pick up people who are passing the doorway, but not entering the room.

Ultrasonic Occupancy Sensors

Ultrasonic sensors emit a high-frequency signal that is undetectable by humans and animals. This signal bounces off objects, surfaces and people in a space. It then returns to the sensor, which interprets change in the frequency as motion. While these sensors do not require a line of sight and can sense movement around corners and objects, they may be prone to false triggering if placed too close to an HVAC vent. Ultrasonic sensors are highly sensitive to small movements up to 25 feet. They typically offer a larger coverage area than PIR sensors, but should not be mounted in high ceiling applications (over 14 feet).

Dual-Technology Sensors

Dual-technology sensors employ both PIR and ultrasonic technologies for maximum coverage and reliability with fewer false triggers. Because these sensors activate lights only when both technologies detect movement, and because either of the two technologies is enough to hold the lights on, these sensors significantly reduce the possibility of false on and off triggers.

High-Bay Sensors

One of the most cost effective applications for occupancy sensors is in warehouse aisles because these areas are not occupied on a constant basis. For warehouses with high-intensity discharge (HID) light sources, lighting can be switched to a lower level, but it can't be turned completely off. HID light sources need time to cool down and warm back up to full light output. This process takes too long and is not practical for those who need to perform tasks in the space. "High/low" occupancy controls can switch lighting from full light output to approximately one-third light output (which uses about half the power) when the area is unoccupied. When the sensor detects activity, the light level and power are restored to full almost immediately.

For even greater savings and instant on/off capability, consider replacing HID fixtures with high-bay fluorescent fixtures. High-bay fluorescent fixtures use much less energy than HID, and can be switched on and off as occupancy and vacancy is detected in a space. High-bay sensors can be individually fixture mounted, or a single sensor can control a full aisle of light fixtures. Placement and delay settings are important to prevent false triggering by detection of activity in the main walkway that does not move into the actual controlled aisle. Placement is also important to make sure that the sensor can "see" any activity anywhere in the aisle being controlled to prevent the occupant from being left in the dark.

WILL OCCUPANCY SENSORS WORK FOR YOU?

While occupancy sensors may reduce lighting by 50 percent or more in some circumstances, the savings could be much smaller, so it's important to consider a wide range of issues before installing a sensor in a particular location.

To determine how much benefit you will gain in a given application, monitor lighting use patterns and occupancy patterns simultaneously. From this, you can calculate the number of hours your business will save in lamp operation, and then determine your energy savings.

You can establish lighting use patterns in a number of ways—by observing and recording when the lights in different parts of your facility are left on, including after hours; by talking with custodial staff and security personnel; and by reviewing the settings on lighting timers. You can also use a device called a datalogger, which counts lighting hours and logs lighting times and durations. A lighting professional can help you with this process.

COMMISSIONING: AN IMPORTANT STEP

An essential part of a successful installation of occupancy sensors is the final commissioning. Verify that sensors are properly positioned in the room and adjustable features such as sensitivity and time delays have been fine-tuned to the room and occupant needs. Make sure that the maintenance staff and room occupants understand how the controls work and save energy, so that they do not override or bypass the settings.

Look to your preferred lighting professional to help you consider your options, analyze your workplace lighting patterns and choose the best occupancy-sensor solution for your situation. For more information, call **800.762.7077** or visit **focusonenergy.com**.