occupancy sensor product guide

LUTRON

Lutron controls your light.™

Wasted lighting energy is the problem
Lighting can account for up to 50% of your building's total energy use. Many building spaces remain unoccupied with the lights on for 40% to 70% of daily operating hours, wasting energy and money.

Lutron occupancy sensors are the solution
Lutron's full line of occupancy sensors automate the switching or dimming of the lights, reducing the energy wasted in unoccupied spaces.

Genzyme Center, Cambridge, MA, USA. Lyme Properties.
Photograph © Peter Vanderwarker. Behnisch Behnisch and Partner Architects.

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Annual electricity use in office buildings [1]

Lighting **44%**

Office equipment 24%

Cooling..14%

Ventilation..8%

Other..8%

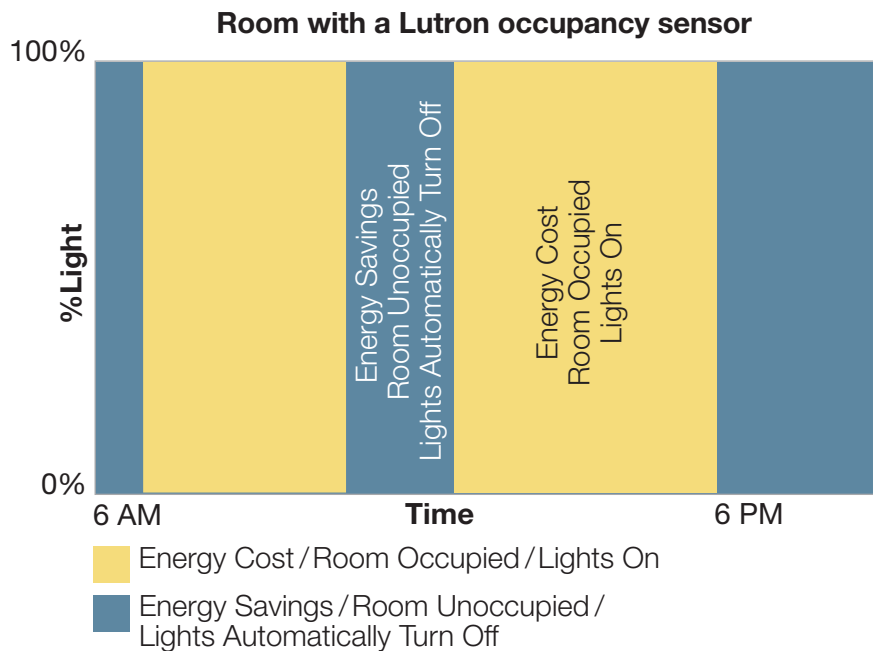Space heating 3%

1 Source: Energy Information Administration Office, Energy Statics from the U.S. Government, Commercial Buildings Energy Consumption Survey.

Reduced energy costs

Lutron occupancy sensors reduce energy consumption in building spaces by automatically shutting off the lights in unocuppied spaces.

Using Lutron occupancy sensors can eliminate 20% – 30% of lighting energy costs.

Room with a Lutron occupancy sensor

100%

%Light

Energy Savings
Room Unoccupied
Lights Automatically Turn Off

Energy Cost
Room Occupied
Lights On

0%

6 AM — **Time** — 6 PM

☐ Energy Cost / Room Occupied / Lights On

☐ Energy Savings / Room Unoccupied /
Lights Automatically Turn Off

Convenience

You never have to worry about turning on or off the lights. Lutron occupancy sensors automatically turn them on and off when you enter or exit a restroom, a classroom, a conference room, a hallway, or your office.

Obtain LEED™ certification points

LEED™ is a voluntary rating system sanctioned by the United States Green Building Council (USGBC) that provides a national guideline for what constitutes a "green" building. Efficient lighting controls may contribute to obtaining up to 22 points in 5 of 6 LEED™ credit categories. A minimum of 26 points is required for Leadership in Energy and Environmental Design certification. Lutron occupancy sensors help you meet the requirements for these certification points.

Comply with building energy codes

Energy codes play a key role in helping us reduce our energy consumption. They set the mandatory performance requirements for building construction. Most commercial energy codes have mandatory requirements that can be cost-effectively and conveniently met with the use of Lutron occupancy sensors.

ASHRAE/IESNA 90.1 Standard

The American Society of Heating, Refrigerating, and Air Conditioning Engineers Inc. (ASHRAE) and the Illuminating Engineering Society of North America (IESNA) jointly sponsor the ASHRAE/IESNA Standard 90.1, "Energy Standard for Buildings Except Low-Rise Residential Buildings."

This standard encourages the use of energy efficient lighting controls in design practice for both interior and exterior lighting. Most states have or will adopt energy codes based on this standard. One of the key lighting requirements in this widely adopted standard is:

Automatic lighting shut-off:
All buildings greater than 5000 square feet shall be equipped with an automatic control device to shut-off building lighting in all spaces. Lutron occupancy sensors that turn lights off within 30 minutes after a space is vacated provide one solution for this requirement.

IECC 2003 Lighting Control Provisions

Similar to ASHRAE/IESNA 90.1, the International Energy Conservation Code (IECC) has been adopted by states for minimum energy efficiency in commercial building design. As in the ASHRAE/IESNA 90.1 Standard, the IECC 2003 also has a mandatory requirement of automatic shut-off of lighting in buildings larger than 5000 square feet. Lutron occupancy sensors are a perfect solution for this requirement. Furthermore, Lutron occupancy sensors provide a solution for the Light Reduction Controls requirement (Section 805.2.2.1), which states that areas having manually controlled lights must also have a manual lighting control that reduces the light level by at least 50% or an occupancy sensor can control the area.

California Energy Commission (CEC) Title 24 Building Standards

The California Energy Commission (CEC) created California's 2005 Building and Energy Efficiency Standards/Regulations for Residential and Nonresidential Buildings (Title 24), which provides mandatory lighting controls requirements for commercial and residential buildings. All Lutron occupancy sensors are CEC Title 24-compliant for commercial buildings. Lutron occupancy sensors provide an excellent solution to these key Title 24 provisions:

Automatic shut-off:
For every floor, all indoor lighting systems shall be equipped with a separate automatic control to shut off the lighting.

Area control:
Each area enclosed by ceiling-height partitions must have an independent switching or control device (occupancy sensor or manual switch) that:
– is readily accessible; and
– is located so that a person using the device can see the lights or area controlled by the switch, or so that the area being lit is annunciated; and
– is able to override other devices

Multi-level lighting control:
Any enclosed space 100 sq. ft. or larger that has a connected lighting load greater than 0.8 watts/sq. ft., and that has more than one luminaire shall use a multi-level lighting control (control that reduces lighting power by either continuous dimming, stepped dimming, or stepped switching while maintaining a reasonably uniform level of illuminance throughout the controlled space). The multi-level lighting controls must have one control step that is between 50% and 70% of design lighting power and at least one step of minimum output operating at less than 35% of full rated lighting system power (this could be completely off). Lutron occupancy sensors that switch alternate rows of lights are a solution for this requirement.

Residential buildings:
For newly constructed or remodeled residential buildings Title 24 requires the use of a manual-on occupancy sensors, fluorescent lights, or dimmers in most rooms of the home such as the bathroom, garage, utility room, hallway, bedroom, and living room. Lutron offers two models of wall switch occupancy sensors to meet this requirement, see pages 14 – 15. These 'M' models turn the lights on manually, when someone pushes the button, and they automatically turn the lights off when the room is unoccupied.
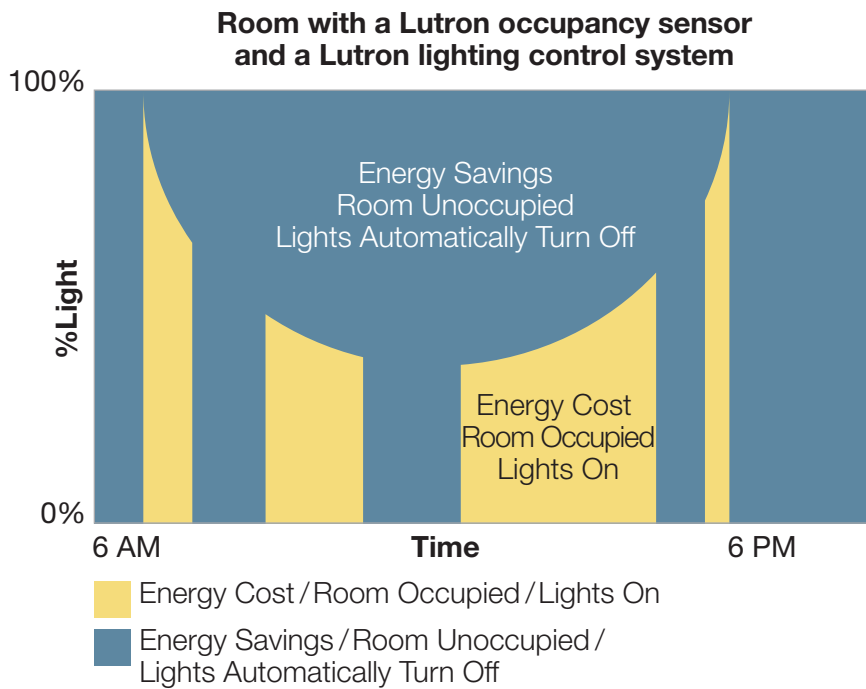
Occupancy sensors are only one component of a larger energy saving strategy, which includes dimming, daylighting, and load shedding. Lutron occupancy sensors offer additional benefits when combined with a complete Lutron lighting control system, such as an EcoSystem™ fluorescent lighting control system or a RadioTouch™ wireless remote lighting control system.

www.lutron.com/occsensors
to order: 1.888.LUTRON1 … 8 am – 8 pm/M-F ET (US/CAN)
technical support: 1.800.523.9466 … 24 hours/7 days (US/CAN)

Using Lutron occupancy sensors and lighting control systems provides even more benefits

Optimized energy savings
Save energy even while the lights are on by turning lights on to a dimmed preset level.

Room with a Lutron occupancy sensor and a Lutron lighting control system

%Light

100%

Energy Savings
Room Unoccupied
Lights Automatically Turn Off

Energy Cost
Room Occupied
Lights On

0%

6 AM   Time   6 PM

Energy Cost / Room Occupied / Lights On

Energy Savings / Room Unoccupied /
Lights Automatically Turn Off

Tuning
Set the right light level for tasks such as presentations or computer work.

Maintain fluorescent lamp life
When occupancy sensors turn off fluorescent lamps many times a day, the expected long lamp life is cut by up to 50%. If the occupancy sensor turns the lamp to 10% light output instead of completely off, the lamp life is unaffected.

Safety and security settings
Keep the lights on to a minimum level when the space is unoccupied for added security and safety.

Flexibility
Easily reassign the lights that are controlled by a particular occupancy sensor without rewiring.

No power pack required[1]
The Lutron lighting control system provides the necessary power, eliminating the need for a power pack with ceiling and wall mount sensors.

Can eliminate 40% – 60% of lighting energy cost by combining:
· dimming
· daylighting
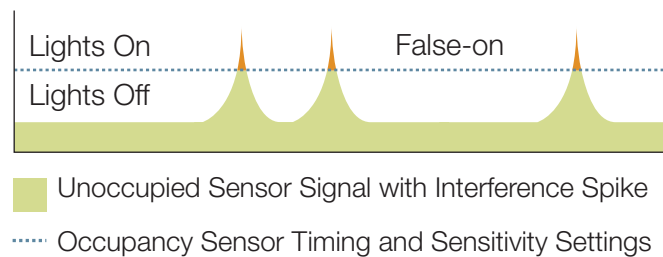· occupant sensing

1 See page 20 for more details.

Lutron occupancy sensors feature self-adaptive technology

Typical occupancy sensors require manual adjustment of time and sensitivity settings to avoid false triggering.
By analyzing occupancy patterns, Lutron self-adaptive occupancy sensors constantly update their time and sensitivity settings to ensure that the sensors have the greatest accuracy. The occupancy sensors learn from their mistakes and make adjustments accordingly. Therefore, no manual sensitivity or timer adjustments are necessary – providing maintenance free "install and forget" operation.
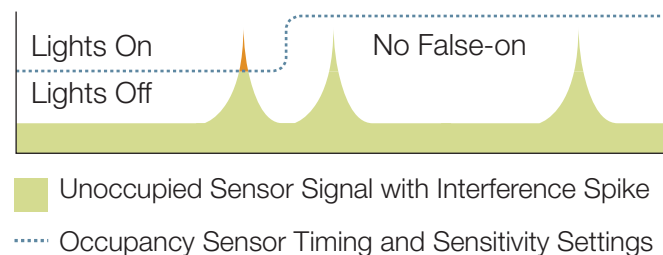
Occupancy sensor without self-adaptive technology
Interference repeatedly causes the occupancy sensor to falsely believe an occupant is in the room so the lights briefly turn on and then off again multiple times.

Lights On   False-on
Lights Off

▧ Unoccupied Sensor Signal with Interference Spike
······ Occupancy Sensor Timing and Sensitivity Settings

Occupancy sensor with self-adaptive technology
Occupancy sensor automatically adjusts timing and sensitivity after the first false-on so the interference will not cause the repeated false-on situation to occur.

Lights On   No False-on
Lights Off

▧ Unoccupied Sensor Signal with Interference Spike
······ Occupancy Sensor Timing and Sensitivity Settings

step **1** technology selection

Choose the technology most appropriate for the
type of activity, pg.8.

step **2** mounting type selection

Determine the mounting type and placement based
on the location of activity within the space, pg.10.

step **3** coverage considerations

Determine the range of coverage ensuring that all appropriate
areas of the space are within the sensor's reach, pg.11.

step **4** family/model selection

Select the appropriate Lutron occupancy sensor
for your application, pg.11.

This selection guide contains general guidelines to help you choose the right
occupancy sensor for your needs. They are meant for information purposes only
as there are numerous variables to consider. For further assistance in designing the
right solution for your space, complete our Occupancy Sensor Design & Layout
Request Form at **www.lutron.com/pdfspecs/occupancy_sensor_design.pdf**
or email us at **occsensorlayouts@lutron.com**

step ① technology selection

Choose the technology most appropriate for the type of activity.

Passive infrared (PIR)

PIR technology senses occupancy by detecting the difference between heat emitted from the human body in motion and the background space. PIR sensors require an unobstructed line-of-sight for accurate detection. These sensors utilize a segmented lens which divides the coverage area into zones. Movement between these zones is interpreted as occupancy. Generally, PIR sensors are good at detecting **major motion** (e.g. walking) and work best in small, enclosed spaces with high levels of occupant movement.

considerations:
· Ensure a clear line-of-sight between the lens and the location of the activity
· Ensure that there is a discernable temperature difference between occupant and ambient temperature

best for use in areas with:
· an unobstructed view
· high air flow
· ceiling fans

Ultrasonic (US)

Ultrasonic technology senses occupancy by bouncing ultrasonic sound waves (32kHz – 45kHz) off objects in a space and detecting a frequency shift between the emitted and reflected sound waves. Movement by a person or object within the space causes a shift in the wave frequency, which is interpreted as occupancy. Ultrasonic occupancy sensors are good at detecting **minor motion** (e.g. typing, reading) and do not require an unobstructed line-of-sight, thus making them suitable for applications such as an office with cubicles or a restroom with stalls.

considerations:
· Do not place within 6ft. of HVAC as this may cause false triggering
· Avoid placement facing doors or exits as coverage may spill into adjacent areas

best for use in areas with:
· low air flow
· partitions and dividers
· a high level of minor motion

Dual technology (DT)

Dual-technology occupancy sensors use both passive infrared and ultrasonic technologies for maximum reliability. These sensors also minimize the risk of false triggering (lights coming on when the space is unoccupied). Both US and PIR technologies must detect occupancy to turn lighting on, while continued detection by only one technology will keep lighting on.
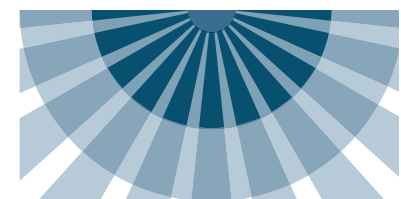
best performing sensor for most applications

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**Suggested technology
by application**

	Passive infrared	Ultrasonic	Dual technology
Classroom	—	●	●
Conference or Meeting Room	—	●	●
Lecture Hall	—	—	●
Lobby	—	—	●
Lunch or Break Room	—	●	●
Open Office	—	●	●
Private Office	●	●	●
Public Restroom (multi-stall)	—	●	●
Storage Area/ Utility Room	●	●	—
Warehouse	●	—	—

step ② mounting type selection

Determine the mounting type and placement based on the location of activity within the space and the following guidelines:

Wall switch pg.14
Use when:
- Need an economical retrofit wallbox solution
- Not integrating with a Lutron lighting control system
- Application does not require dual technology
- Room is small and enclosed with a clear point of entry

Wall mount pg.16
Use when:
- Pendant fixtures present
- Ceiling fans used
- Ceiling height is greater than 12ft.
- Integrating with Lutron lighting control systems or in stand-alone applications

Ceiling mount pg.18
Use when:
- Ceiling height is 12ft. or less
- There are no obstructions such as ceiling fans and pendant fixtures
- Integrating with Lutron lighting control systems or in stand-alone applications

4 ft.
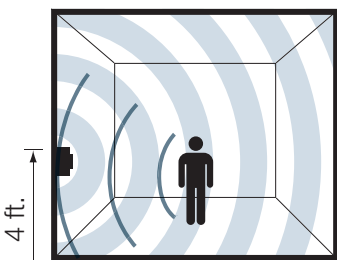
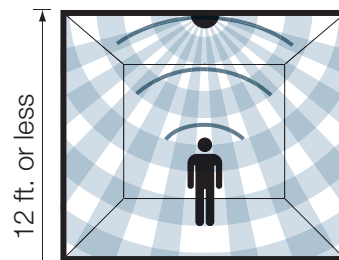example of wall switch occupancy sensor with ultrasonic technology

8 ft. – 12 ft.
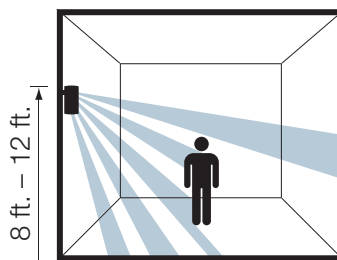
example of wall mount occupancy sensor with passive infrared technology

12 ft. or less

example of ceiling mount occupancy sensor with dual technology

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step ③ coverage considerations

Determine the range of coverage ensuring that all appropriate areas of the space are within the sensor's reach.

You may need to use more than one sensor in order to get the appropriate coverage. To ensure maximum coverage reliability, overlap coverage of each sensor as shown below.
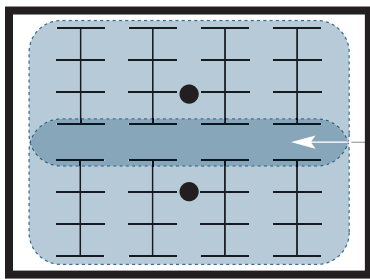
15% – 20% overlap coverage

Considerations:
· Ensure that the activity is within coverage
· For adequate minor motion detection use half of the rated coverage
· Provide overlapping coverage to ensure reliability
· Overlap coverage by 15% – 20%

See product information on pages 14 – 19 for specific range of coverage data.

step ④ family/model selection

Select the appropriate Lutron occupancy sensor for your application.

Use the flowchart on the next page to determine which sensor family is appropriate for your needs. Then go to the indicated page to select the specific model.

For further assistance in selecting the right Lutron occupancy sensor for your space, complete our Occupancy Sensor Design & Layout Request Form at **www.lutron.com/pdfspecs/occupancy_sensor_design.pdf** or email us at **occsensorlayouts@lutron.com**.

start

Is there any minor motion (typing, reading) in the space?

yes

Is the ceiling less than 12 feet high?

yes → **no**

Are there any pendant fixtures or ceiling fans in the space?

yes → Will you be connecting the sensor to a Lutron lighting control system?

no → Is the space small and fully enclosed?

no

Is there a well defined point of entry in the space?

yes

Lutron Wall Mount Dual Technology Occupancy Sensor, pg.16

yes

Lutron Wall Switch Ultrasonic Occupancy Sensor, pg.14

yes → **no**

yes

Lutron Ceiling Mount Dual Technology Occupancy Sensor, pg.18

Will you be connecting the sensor to a Lutron lighting control system?

no → Is the space small and fully enclosed?

yes

no

Lutron Ceiling Mount Ultrasonic Occupancy Sensor, pg.18

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technical support: 1.800.523.9466 … 24 hours/7 days (US/CAN)

Note that power packs are needed for ceiling and wall mount sensors when not connecting the Lutron occupancy sensors to a Lutron control system.

Once an occupant sensor family is selected, see pages 14 – 19 for coverage/color options, etc.

no

Is the ceiling less than 12 feet high?

yes   **no**

Are there any pendant fixtures or ceiling fans in the space?

yes → Will you be connecting the sensor to a Lutron lighting control system? **no** → Is the space small and fully enclosed?

no   **yes**   **no**   **yes**

Will you be connecting the sensor to a Lutron lighting control system?

Lutron Wall Mount Passive Infrared Occupancy Sensor, pg.16

yes   **no**

Lutron Ceiling Mount Passive Infrared Occupancy Sensor, pg.18

Is the space small and fully enclosed?

no   **yes**

Lutron Wall Switch Passive Infrared Occupancy Sensor, pg.14

wall switch occupancy sensors

LOS-SIR-HD-WH
shown actual size

LOS-S Series
The LOS-S series of sensors offer a direct and quick replacement of wall switches for stand-alone line voltage switching of small spaces. Ultrasonic sensors provide excellent detection of minor motion such as typing at a keyboard. Infrared detectors have good false tripping immunity, and are better suited for major motion such as walking.
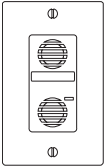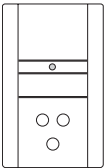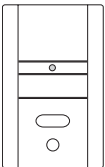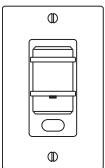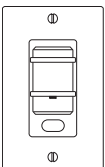
A two-circuit version of the PIR wall switch (LOS-S2IR-HD) is designed for dual-level lighting applications and allows for two primary input circuits, each with independent switching. The 'HD' versions of this series have a hardened lens, which provides a barrier to accidental and vandal-imposed damage.

Lutron offers 'M' models (LOS-SIR-M-WH and LOS-SIR-M-IV), which are manual-on occupancy sensors. Users push the button to turn the lights on and the lights turn off automatically when space is unoccupied. These 'M' models meet Title 24 energy code requirements for residential buildings in California.

Key features:
· Coverage from 900 sq. ft to 1000 sq. ft
· Passive infrared (PIR) and ultrasonic (US) technologies
· LOS-SUS model has self-adaptive technology which automatically adjusts timing and sensitivity
· 120/277 VAC dual voltage operation
· Dual circuit with independent switching model available (LOS-S2IR)
· LED test indicator
· No power pack required
· 2 heavy-duty models 'HD' which are vandal resistant

For more technical information such as submittal sheets, CSI specifications, wiring diagrams, and installation notes, please visit www.lutron.com/occsensors

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technical support: 1.800.523.9466 … 24 hours/7 days (US/CAN)

	Model Number	Technology	Coverage	Color	Field of View
	LOS-SUS-WH **LOS-SUS-IV**	Ultrasonic self-adaptive	1000 sq. ft	White Ivory	180º
	LOS-S2IR-HD-WH	Passive Infrared two circuit heavy duty	1000 sq. ft	White	180º
	LOS-SIR-HD-WH	Passive Infrared heavy duty	1000 sq. ft	White	180º
	LOS-SIR-WH **LOS-SIR-IV**	Passive Infrared	900 sq. ft	White Ivory	180º
	LOS-SIR-M-WH **LOS-SIR-M-IV**	Passive Infrared manual-on residential Title 24-compliant	900 sq. ft	White Ivory	180º

wall mount occupancy sensors
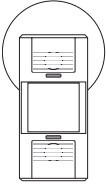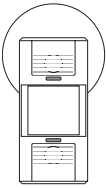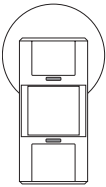
LOS-W Series

The LOS-W series are wall-mounted sensors that are used in spaces with pendant fixtures, ceiling fans, or high ceilings (greater than 12 ft. high). The passive infrared (PIR) version has good false tripping immunity and is well suited for major motion. The dual-technology versions offer excellent minor motion detection via ultrasonic (US) technology to ensure optimal power savings and occupancy detection.

The LOS-W sensors all have self-adaptive technology that eliminates the need for manual range adjustment. After proper mounting, the sensors automatically adjust sensitivity and timing to prevent false-off and false-on conditions. To control other building systems such as HVAC or security systems use the 'R' model, which provides an additional dry contact closure.

Key features:
· Coverage of 1600 sq. ft. if mounted at 8 ft. to 12 ft. from floor
· Passive infrared (PIR), or dual-technology – both PIR and US
· Self-adaptive sensors automatically adjust sensitivity and timing
· 20-24 VDC, Class 2 (PELV) low-voltage wiring
· Integrate with Lutron systems (no power pack needed) or function as stand-alone controls using a Lutron power pack
· Non-volatile memory (saved changes are stored during loss of power)
· Model with additional output (dry contact closure) available
· 8-second test mode to easily confirm proper operation

LOS-WDT-WH
shown actual size

For more technical information such as submittal sheets, CSI specifications, wiring diagrams, and installation notes, please visit www.lutron.com/occsensors

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	Model Number	Technology	Coverage	Color	Field of View
	LOS-WDT-R-WH	**Dual Technology** self-adaptive with second contact closure output	1600 sq. ft	White	110º
	LOS-WDT-WH	**Dual Technology** self-adaptive	1600 sq. ft	White	110º
	LOS-WIR-WH	**Passive Infrared** self-adaptive	1600 sq. ft	White	110º

ceiling mount occupancy sensors

LOS-CDT-2000-WH
actual diameter: 4.5" (114 mm)

LOS-C Series
The LOS-C series ceiling mount sensors offer a wide range of technologies and can either integrate into Lutron systems (no power pack needed) or function as stand-alone controls using a Lutron power pack. The ultrasonic sensors provide excellent detection of minor motion, such as typing at a keyboard. The passive infrared sensors provide false tripping immunity, and are better suited for major motion such as walking. The dual-technology versions combine both features to provide optimal power savings and occupancy detection.

The LOS-C sensors all have self-adaptive technology that eliminates the need for manual adjustments. After correct mounting, the sensors automatically adjust sensitivity and timing to prevent false-off and false-on conditions. To control other building systems such as HVAC or security systems use the 'R' models, which provides an additional dry contact closure.

Key features:
- Coverage from 450 sq. ft. to 2000 sq. ft. mounted on an 8 ft. to 12 ft. ceiling
- Passive infrared (PIR), ultrasonic (US) or dual technology (DT)
- Self-adaptive sensors automatically adjust sensitivity and timing
- 20-24 VDC, Class 2 (PELV) low-voltage wiring
- Non-volatile memory (saved changes are stored during loss of power)
- Model with additional output (dry contact closure) available
- 8-second test mode to easily confirm proper operation

For more technical information such as submittal sheets, CSI specifications, wiring diagrams, and installation notes, please visit www.lutron.com/occsensors

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	Model Number	Technology	Coverage	Color	Field of View
	LOS-CDT-2000R-WH[1]	Dual Technology self-adaptive	2000 sq. ft	White	360°
	LOS-CDT-2000-WH	Dual Technology self-adaptive	2000 sq. ft	White	360°
	LOS-CDT-1000R-WH[1]	Dual Technology self-adaptive	1000 sq. ft	White	180°
	LOS-CDT-1000-WH	Dual Technology self-adaptive	1000 sq. ft	White	180°
	LOS-CDT-500R-WH[1]	Dual Technology self-adaptive	500 sq. ft	White	180°
	LOS-CDT-500-WH	Dual Technology self-adaptive	500 sq. ft	White	180°
	LOS-CUS-2000-WH	Ultrasonic self-adaptive	2000 sq. ft	White	360°
	LOS-CUS-1000-WH	Ultrasonic self-adaptive	1000 sq. ft	White	180°
	LOS-CUS-500-WH	Ultrasonic self-adaptive	500 sq. ft	White	180°
	LOS-CIR-1500-WH	Passive Infrared self-adaptive	1500 sq. ft	White	360°
	LOS-CIR-450-WH	Passive Infrared self-adaptive	450 sq. ft	White	360°

1 Model contains an additional contact closure output to connect to other building systems such as HVAC.

power packs

PP-120H
actual size:
W: 3.69" (94 mm)
H: 2.33" (59 mm)
D: 1.36" (35 mm)

PP Series

A Lutron power pack is required for wall and ceiling mount occupancy sensors used as a stand-alone lighting control. The power pack provides 24 VDC to the occupancy sensor, and accepts control input from the occupancy sensor, which it uses to switch the lighting load. This series includes a full line of voltages.

The PP-SH is an auxiliary relay that allows for control of multiple lighting circuits or load types. The PP-SH draws power from another power pack and takes its control signal from the occupancy sensor. It counts as one of the three occupancy sensors connected to a power pack.

Key features:
- 120, 277, 347 VAC power input @ 60 Hz
- 230 VAC power input @ 50/60 Hz
- 24 VDC, 100 mA power output
- Plenum rated – complies with requirements for use in a compartment handling conditioned air
- Switch rating:
  – 20 A: 120/230/277 V ballast
  – 15 A: 347 V ballast
  – 15 A: 120 V incandescent
- Supports up to 3 Lutron occupancy sensors

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	Model Number	Color	Voltage
	PP-120H	Black	120 VAC
	PP-230H	Black	230 VAC
	PP-277H	Black	277 VAC
	PP-347H	Black	347 VAC
	PP-SH	Black	—

Lutron occupancy sensor power supply options with a Lutron lighting control system

Lutron Lighting Control System	No Power Pack Required	Power Pack Required
Digital microWATT™	•	
EcoSystem™	•	
GRAFIK 5000 – 7000	•+	
GRAFIK Eye® 3000/4000		•
HomeWorks®		•
LCP128™	•+	
microWATT™	•	
RadioRA®		•
RadioTouch™	•	
Softswitch128™	•+	

+ No Power Pack required when using seeTouch™ wallstations with occupancy sensor connections.
See www.lutron.com/occsensors/seetouch_connection for more information.

The following are examples of Lutron suggested solutions to common single room applications. For further assistance in designing the right solution for your space, complete our Occupancy Sensor Design & Layout Request Form at **www.lutron.com/pdfspecs/occupancy_sensor_design.pdf** or email us at **occsensorlayouts@lutron.com**

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meeting room

Description: Medium-size room (approximately 1,000 sq. ft.) used for meetings and presentations. Typically, includes one table and a whiteboard or projection screen.

Lighting control needs: Automatic on/off control so that lights are not being used when the room is unoccupied. Sensor should be able to pick up minor motion, as there is not much movement by occupants when the space is in use.

Lutron solutions:

Shown: LOS-CDT-2000-WH
(examples 1 and 2)

Example 1: occupancy sensor only
- LOS-CDT-2000-WH dual-technology ceiling mount occupancy sensor
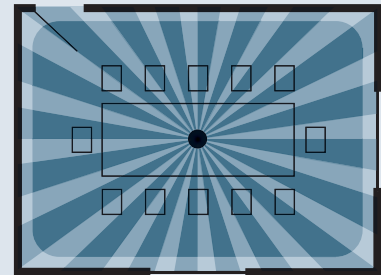- Lutron PP-120H power pack

The dual technology capability of this occupancy sensor provides excellent sensing of both major (walking) and minor (writing) motion activity in the space without false trips. Ceiling mounting will give a birds eye view of the entire room. The sensor should be mounted in the center of the room so that the 360-degree field of view will detect minor motion from anywhere in the space. For adequate minor motion detection, one sensor covering 2000 sq. ft. was used for a 1000 sq. ft. room.

Results: Lights will automatically turn on when someone enters the room and lights will automatically turn off when the occupants leave. However, the lights will not dim during a presentation.

Example 2: occupancy sensor with lighting control system
- LOS-CDT-2000-WH dual-technology ceiling mount occupancy sensor
- Lutron RadioTouch™ wireless remote lighting control system

Since the Lutron occupancy sensor is being used with a Lutron lighting control system, no Lutron power pack is required. The lighting control system will supply the power to the sensor and provide the benefit of dimming and preset lighting. Users can override the occupancy sensor by dimming the lights for presentations. Furthermore, the lights can be set to preset levels for continual energy savings even while the lights are on. For instance, the lights can come on to a 75% light level when the space is occupied and dim to 10% light level or completely off when unoccupied.

For more information on Lutron RadioTouch,
visit www.lutron.com/radiotouch

Results: Lights will automatically turn on to a preset level when someone enters the room and lights will automatically turn off when the occupants leave. Users can dim the lights for presentations.

classroom

Description: K-12 classroom with pendant fixtures (approx. 900 sq. ft.)

Lighting control needs: Automatic on/off control so that lights are not being used when the room is unoccupied. Sensor should be able to pick up minor motion, as there is little movement during long periods such as during reading, writing, or testing times. Lights should be dimmed during presentations.
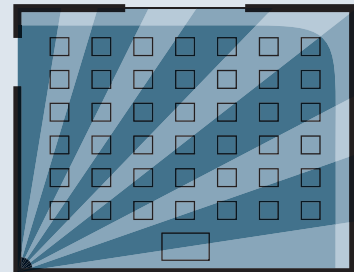
Lutron solution:

Shown: LOS-WDT-WH

Example: occupancy sensor with lighting control system
- LOS-WDT-WH wall mount dual-technology occupancy sensor
- Lutron EcoSystem™ fluorescent lighting control system

The dual-technology capability of this occupancy sensor provides excellent sensing of both major (walking) and minor (writing) motion activity in the space without false trips. Wall mounting the sensor in the corner behind the teacher's desk will give a clear view of the entire room because of the sensor's 110-degree field of view.

Note that a wall mount sensor is used due to the presence of pendant fixtures in the room, which can interfere with ceiling mount sensors. For adequate minor motion detection, one sensor covering 1600 sq. ft. was used for a 900 sq. ft. room.

Since the occupancy sensor is integrated with EcoSystem, no power pack is required. Users can link the occupancy sensor to other rooms and they can easily change can the lights that are controlled by the occupancy sensor without rewiring.

The Lutron lighting control system also provides the benefits of dimming and preset lighting for continual energy savings even while the lights are on. For instance, the lights can come on to a 75% light level when the space is occupied and dim to 10% light level or completely off when unoccupied.

For more information on Lutron EcoSystem, visit www.lutron.com/ecosystem

Results: Lights will automatically turn on to a preset level when someone enters the room and lights will automatically turn off when the occupants leave. The teacher will be able to dim the lights for presentations. In addition, users can easily reconfigure the occupancy sensor to control other rooms or different lights without rewiring as the usage of the room changes.

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hallway

Description: Office building or hotel corridor
(approximately 1000 sq. ft.)

Lighting control needs: Automatic on/off control so that lights
turn on when a person enters the hallway. And lights go out when
the hallway is vacant.

Shown: LOS-CUS-2000-WH
(examples 1 and 2)

Lutron solutions:

Example 1: occupancy sensor only
- LOS-CUS-2000-WH ceiling mount ultrasonic occupancy sensor
- Lutron PP-120H power pack

The ultrasonic technology fills the enclosed hallway and is unaffected
by obstructions such as the doors. Ceiling mounting will give a
birds eye view of the hallway. The sensor should be mounted in
the center of the room so that the 360-degree field of view will
detect occupants from anywhere in the space. For adequate
minor motion detection, one sensor covering 2000 sq. ft. was
used for a 1000 sq. ft. room.

Results: Lights will automatically
turn on when someone enters
the room and lights will auto-
matically turn off when the
occupants leave.

Example 2: occupancy sensor with lighting control system
- LOS-CUS-2000-WH ceiling mount ultrasonic occupancy sensor
- Lutron Softswitch128™ switching system with seeTouch™
  wallstation controller

Provides all the benefits above plus the ability to control multiple
circuits or all the hallways in building with an occupancy sensor.
This provides the occupants with enhanced personal safety, as they
will not see any dark hallways. The central point of control with the
Softswitch128 system also is less labor intensive to install than using
multiple occupancy sensors for each hallway because less wiring
is needed. Also, note that no power pack is required.

For more information on Lutron Switching Systems,
visit www.lutron.com/switchingsystems

Results: The lights in all hallways
will automatically turn on when
someone enters one hallway
and the lights in all hallways will
automatically turn off when all
the hallways are vacant.

small restroom

Description: Small public restroom with a single stall (approximately 100 sq. ft.)

Lighting control needs: Automatic on/off control so that lights are not being used when the room is unoccupied. Sensor should be able to pick up minor motion and sense around obstructions such as the stall door.

Lutron solution:

Shown: LOS-SUS-WH

Example: occupancy sensor only
· LOS-SUS-WH wall switch ultrasonic occupancy sensor

The ultrasonic technology fills the enclosed restroom and is unaffected by obstructions such as the stall door. Since the room is small and enclosed, wall switch mounting and ultrasonic technology are appropriate. Also, the 1,000 sq. ft. coverage of the sensor is sufficient to capture minor motion in the space.

Note that a power pack is not required because Lutron wall switch sensors are designed to accommodate line voltage. Just replace the existing light switch with a Lutron wall switch occupancy sensor, no power pack necessary.

Results: Lights will automatically turn on when someone enters the room and lights will automatically turn off when the occupants leave.

www.lutron.com/occsensors
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technical support: 1.800.523.9466 … 24 hours/7 days (US/CAN)

large restroom

Description: Large public restroom with multiple stalls such as those in restaurants, airports, or hotels. (approximately 400 sq. ft.)

Lighting control needs: Automatic on/off control so that lights are not being used when the room is unoccupied. Sensor should be able to pick up minor motion and sense around obstructions such as stall doors.
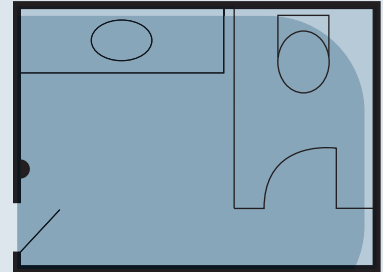
Lutron solution:

Shown: LOS-CDT-1000-WH

Example: occupancy sensor only
· LOS-CDT-1000-WH ceiling mount dual-technology occupancy sensor
· Lutron PP-120H power pack

The dual technology capability of this occupancy sensor provides excellent sensing of both major and minor motion activity in the space without false trips. Ceiling mounting will give a birds eye view of the entire room.

The sensor should be mounted on the ceiling at the center of the wall connected to the doorway. This will allow the sensor's 180° field-of-view to pick up people entering the room without looking out the doorway. The PIR technology of the sensor will clearly detect movement into the space while the sensor's US technology will pick up any minor motion from anywhere in the space. For adequate minor motion detection, one sensor covering 1000 sq. ft. was used for a 400 sq. ft. room.
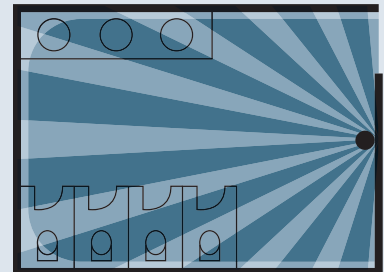
Results: Lights will automatically turn on when someone enters the room and lights will automatically turn off when the occupants leave.

private office

Description: Small enclosed office for one person used for reading, computer work, and meetings. (approximately 200 sq. ft.)

Lighting control needs: Automatic on/off control so that lights are on during periods of use. Sensor should be able to pick up minor motion and sense around obstructions such as chairs.

Lutron solutions:

Shown: LOS-SUS-WH (example 1)

Example 1: occupancy sensor only
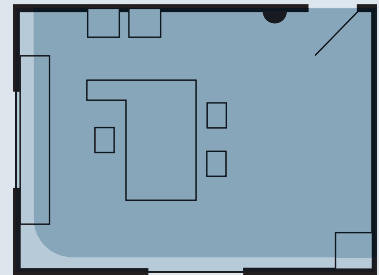· LOS-SUS-WH wall switch ultrasonic occupancy sensor

The ultrasonic technology fills the enclosed office and is unaffected by obstructions such as the chairs. Since the room is small and enclosed, the wall switch mounting and ultrasonic technology are appropriate. Also, the 1000 sq. ft. coverage of the sensor is sufficient to capture minor motion in the space. Note that a power pack is not required because Lutron wall switch sensors are designed to accommodate line voltage. Just replace the existing light switch with a Lutron wall switch occupancy sensor, no power pack necessary.

Results: Lights will automatically turn on when someone enters the room and lights will automatically turn off when the occupants leave. However, the lights can't be dimmed or adjusted remotely for personal control.

Example 2: occupancy sensor with lighting control system
· LOS-CDT-500-WH ceiling mount dual-technology occupancy sensor
· Lutron EcoSystem™ fluorescent lighting control system

Provides all the benefits above plus expansion capability, programming flexibility, and personal control. Users can link occupancy to other rooms and they can easily change the lights that are controlled by the occupancy sensor without rewiring. Occupants have the benefit of remote personal control of their lights so they can adjust their light level to fit their needs from anywhere in the room.

For more information on Lutron EcoSystem, visit www.lutron.com/ecosystem

Results: Lights will automatically turn on to a preset level when someone enters the room and lights will automatically turn off when the occupants leave. Users will be able to dim the lights right from their desks. In addition, users can easily reconfigure the occupancy sensor to control other rooms or different lights without rewiring as the usage of the room changes.

www.lutron.com/occsensors
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open office

Description: Large office space filled with cubicles for multiple people used for mostly computer work (approximately 2000 sq. ft.).

Lighting control needs: Automatic on/off control so that lights are on during periods of occupancy. Sensor should be able to pick up minor motion such as typing and sense around obstructions such as cubical walls.

Shown: Two LOS-CDT-2000-WH (examples 1 and 2)

Lutron solutions:

Example 1: occupancy sensor only
- (2) LOS-CDT-2000-WH ceiling mount dual-technology occupancy sensors
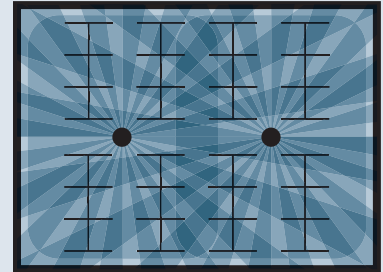- Lutron PP-120H power pack

The dual-technology capability of this occupancy sensor provides excellent sensing of both major (walking) and minor (typing) motion activity in the office space without false trips. Ceiling mounting will give a birds eye view of the entire room. The sensors should be mounted in two zones that overlap to provide complete coverage of the space. For adequate minor motion detection, two sensors covering 2000 sq. ft. each are used for a 2000 sq. ft. room.

Results: Lights will automatically turn on when someone enters the room and lights will automatically turn off when the occupants leave.

Example 2: occupancy sensor with lighting control system
- (2) LOS-CDT-2000-WH ceiling mount dual-technology occupancy sensors
- Lutron EcoSystem™ fluorescent lighting control system

No power packs are necessary. This provides all the benefits above plus preset lighting, expansion capability and programming flexibility. Users can easily link occupancy to other rooms and they can easily change can the lights that are controlled by the occupancy sensor without rewiring.

For more information on Lutron EcoSystem, visit www.lutron.com/ecosystem

Results: Lights will automatically turn on to a preset level when someone enters the room and lights will automatically turn off when the occupants leave, thereby saving energy even when the lights are in use. In addition, users can easily reconfigure the occupancy sensor to control other rooms or different lights without rewiring as the usage of the room changes.

	Technology	Coverage (sq. ft.)[1]	Color	Field of View	Self-adaptive [2]	Special Features
Wall Switch Models: Provide a quick replacement of wall switches for small enclosed areas (120/277 V)						
LOS-SUS-WH	Ultrasonic	1000	White	180°	Yes	
LOS-SUS-IV	Ultrasonic	1000	Ivory	180°	Yes	
LOS-S2IR-HD-WH	Passive Infrared [3]	1000	White	180°	No	Dual circuit, Vandal resistant
LOS-SIR-HD-WH	Passive Infrared [3]	1000	White	180°	No	Vandal resistant
LOS-SIR-WH	Passive Infrared [3]	900	White	180°	No	
LOS-SIR-IV	Passive Infrared [3]	900	Ivory	180°	No	
LOS-SIR-M-WH	Passive Infrared [3]	900	White	180°	No	Manual-on [4]
LOS-SIR-M-IV	Passive Infrared [3]	900	Ivory	180°	No	Manual-on [4]
Wall Mount Models: For spaces with pendant fixtures, ceiling fans, or ceilings more than 12 ft. high (20-24 VDC)						
LOS-WDT-R-WH	Dual Technology	1600	White	110°	Yes	Contact closure [5]
LOS-WDT-WH	Dual Technology	1600	White	110°	Yes	
LOS-WIR-WH	Passive Infrared [3]	1600	White	110°	Yes	
Ceiling Mount Models: For larger open spaces with ceilings less than 12 ft. high (20-24 VDC)						
LOS-CDT-2000R-WH	Dual Technology	2000	White	360°	Yes	Contact closure [5]
LOS-CDT-2000-WH	Dual Technology	2000	White	360°	Yes	
LOS-CDT-1000R-WH	Dual Technology	1000	White	180°	Yes	Contact closure [5]
LOS-CDT-1000-WH	Dual Technology	1000	White	180°	Yes	
LOS-CDT-500R-WH	Dual Technology	500	White	180°	Yes	Contact closure [5]
LOS-CDT-500-WH	Dual Technology	500	White	180°	Yes	
LOS-CUS-2000-WH	Ultrasonic	2000	White	360°	Yes	
LOS-CUS-1000-WH	Ultrasonic	1000	White	180°	Yes	
LOS-CUS-500-WH	Ultrasonic	500	White	180°	Yes	
LOS-CIR-1500-WH	Passive Infrared [3]	1500	White	360°	Yes	
LOS-CIR-450-WH	Passive Infrared [3]	450	White	360°	Yes	

Footnotes:

1 Use approximately half this value for excellent minor motion detection.

2 Self-adaptive technology: Automatic adjustments of sensitivity and timing so no calibration is required.

3 Passive infrared technology does not emit a signal into the space. Therefore, it uses less current and is useful in rooms that may contain sensitive equipment such as medical facilities or laboratories.

4 California Energy Commission (CEC) residential Title 24-compliant.

5 Contact closure for integration with other building systems such as a security system or HVAC system. Also, these models can be used with Lutron RadioRA® and HomeWorks® Systems (power pack required).

Classroom	Conference or Meeting Room	Hallway	Laboratory	Lecture Hall	Lobby	Lunch/Break Room	Open Office	Private Office	Public Restroom (multi-stall)	Public Restroom (single-stall)	Storage Area/ Utility Room	Warehouse
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Note: All Lutron occupancy sensors are California Energy Commission (CEC) commercial Title 24-compliant. All ceiling and wall mount occupancy sensors require a power pack for stand-alone applications.

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