Residential Sensor Specification Guide

LUTRON®

Lutron Residential Sensor Specification Guide

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Save energy effortlessly

Most people accidentally leave the lights on in their home on a fairly regular basis. What they probably don't realize, though, is that lighting accounts for 11% of an average home's energy use*. That's a lot of wasted energy, not to mention wasted money on electric bills.

Lutron has the solutions to eliminate that wasted energy in rooms that aren't occupied: occupancy/vacancy sensors. Lutron occupancy/vacancy sensors automatically turn the lights on and off, and in the process, can help save up to 20% lighting energy.** Lutron manufactures daylight sensors, too, which adjust electric lights based on the amount of daylight in a room.

In addition to saving energy, sensors provide the added convenience of automated light control. Sensors also help meet the mandatory requirements set for commercial projects, building construction and maintenance, as well as contribute to obtaining points in several LEED credit categories.

Beyond light control

Besides controlling lights, occupancy/vacancy sensors can also control other Lutron systems and devices, such as automated shades, temperature controls, and standby power (phantom loads) to small appliances. This additional functionality means increased convenience and energy savings.

Choosing the best sensor for your needs

Not all sensors are suited for every application. On the following pages we've put together a list of questions to consider, as well as product specifics, to help you choose which sensor is right for your space.

*U.S. Department of Energy, 2010
** Source: California Energy Commission, Impact Analysis: 2005 Update to the
California Energy Efficiency Standards for Residential and Nonresidential Buildings

Do you need an occupancy, vacancy, or daylight sensor?

Some rooms in the home are better for one type of sensor than the other.

Occupancy sensor

An **occupancy sensor** automatically turns lights on when you enter a room and off when you leave.

An occupancy sensor is great for rooms you often enter with your hands full—such as laundry rooms, kitchens, and workrooms.

Occupied: On   Vacant: Off
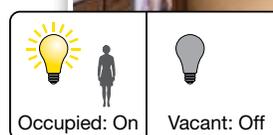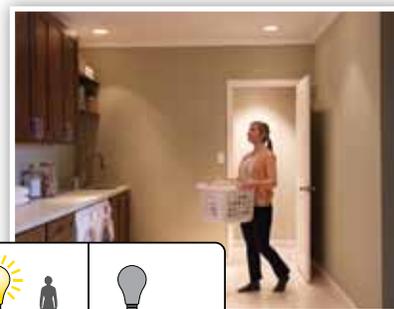
Vacancy sensor

A vacancy sensor also turns lights off when you leave a room—but you need to manually turn them on when you walk into a room.

- A vacancy sensor is ideal for bedrooms, so the lights won't turn on at night if your partner walks in while you're sleeping.
- A vacancy sensor is also the better choice when an auto-on function just wouldn't be practical—for example, if you have pets in your home.

Manual On   Auto Off
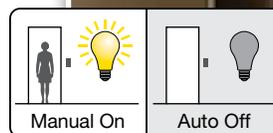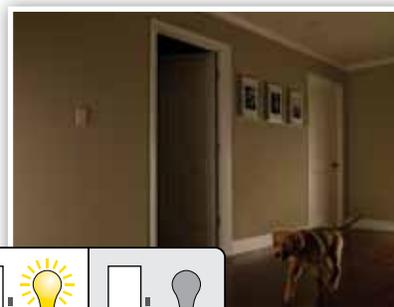
(You can easily convert a Lutron occupancy sensor to a vacancy sensor with a simple press-and-hold set up option. This way, you can always change the setting even after you have installed the sensor.)

Daylight sensor

A **daylight sensor** dims or turns off electric lights when sufficient daylight is available in the room.

A daylight sensor is ideal for rooms with lots of windows, such as a family room or sunroom. This type of sensor takes advantage of available daylight, reducing the need for electric light and helping to reduce electricity costs.

Full On   Dim
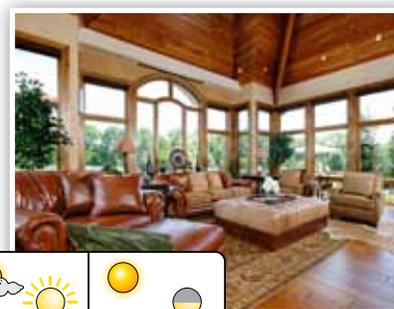
Do you need an all-in-one sensor or a sensor that's comprised of components?

All-in-one sensors

Lutron's all-in-one occupancy/vacancy sensors wire directly into a wall and are available with either a dimmer or a switch. These sensors are perfect for retrofit applications because they don't require any new wiring; you simply replace the current light switch with the sensor, which takes about 15 minutes.

All-in-one
p. 08 and 10

Component sensors

Lutron also manufactures wired and wireless sensors that work in conjunction with either a dimmer or switch, or with our whole-home or whole-building light control systems. Unlike all-in-one sensors, a dimmer or switch is not directly incorporated into these types of sensors.

Wireless sensors don't require any new wiring, are simple to install and program, have a 10-year battery life, and can be easily moved if a space is reconfigured. You can also install additional sensors at any time to expand sensor coverage within the room.

These sensors send radio frequency (RF) signals to dimmers and switches, "telling" them what to do. They communicate via Lutron's proprietary Clear Connect® RF technology, which operates on a low frequency band (434 MHz) to avoid interference from other wireless devices, ensuring superb performance.

Wired sensors are wired directly to the light control, making them ideal for new construction, and never require you to change a battery.

Wireless ceiling-mount
p. 12

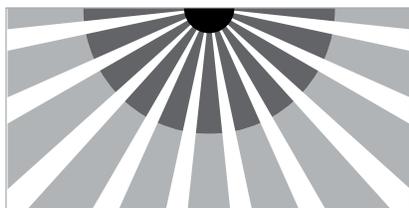Wired ceiling-mount
p. 14

Wireless
wall-mount
p. 16

Wired
wall-mount
p. 18

Wireless
daylight
p. 20

## What type of technology will work best in the application?

Passive Infrared (PIR) technology

• Detects movement by a change in temperature when someone enters a room, which is how the sensor knows to turn the lights on

• Works best in small, enclosed spaces with high levels of occupant movement because the sensors are engineered to detect major motion

• Easily detects people walking in and out of a space
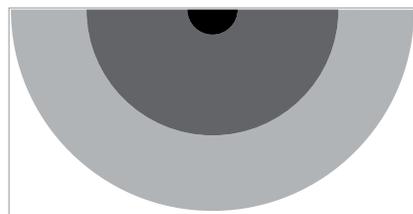
Ultrasonic (US) technology

• Senses when someone is in a room by bouncing ultrasonic waves off of objects in a space and detecting a frequency shift in the emitted and reflected sound waves

• US occupancy sensors are good at detecting minor motion, such as typing, and don't require an unobstructed line of sight
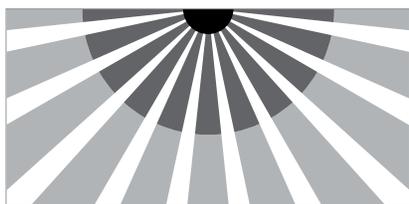
Passive Infrared (PIR) with XCT™ technology

• Uses the same type of technology as PIR but with enhanced sensitivity that detects fine motions, such as writing or turning a page

• XCT is a Lutron exclusive technology
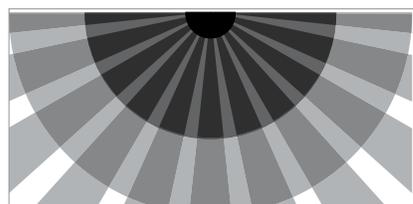
Dual technology

• Uses both PIR and US technologies

• Typically PIR technology is used to detect someone in a room in order to turn the lights on

• Only one of the technologies needs to continually sense the person in order for the lights to stay on

• Dual technology sensors are self-adaptive to automatically adjust sensitivity and timing in order to correct for false trips

System compatibility

Lutron occupancy/vacancy sensors communicate with Lutron systems including Maestro Wireless®, GRAFIK Eye® QS, RadioRA® 2, and HomeWorks® QS, as well as third-party control systems. Daylight sensors are compatible with Maestro Wireless and GRAFIK Eye QS.

Please refer to the "System Compatibility" section for each specific sensor for more information.

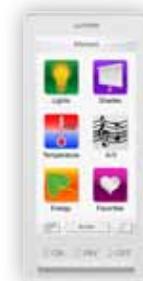Maestro Wireless   GRAFIK Eye QS   RadioRA 2   HomeWorks QS

Bulb compatibility

All-in-one sensors and component sensors are compatible with all bulb types.

Incandescent/ Halogen   Dimmable Compact Fluorescent   Dimmable LED

How will you mount the sensor?

Use the following guidelines to help you determine whether an in-wall, ceiling-mount, or wall-mount sensor will work best in the space.

In wall (all-in-one)

Maestro® occupancy sensing switch p. 08

Maestro occupancy sensor C•L® dimmer p. 10

Use when:
- Need an economical retrofit wallbox solution
- Not integrating with a Lutron light control system
- Room is small and enclosed with a clear point of entry

Ceiling mount

Radio Powr Savr™ wireless ceiling-mount occupancy/vacancy sensor p. 12

LOS-C series ceiling-mount occupancy sensor p. 14

Use when:
- Ceiling height is 12 ft. or less
- There are no obstructions, such as ceiling fans and pendant fixtures
- Integrating with Lutron light control systems (may also be used in stand-alone applications)

Wall mount

Radio Powr Savr wireless wall-mount occupancy/vacancy sensor p. 16

LOS-W series wall-mount occupancy sensor p. 18

Use when:
- Pendant fixtures present
- Ceiling fans used
- Ceiling height is greater than 12 ft.
- Integrating with Lutron light control systems (may also be used in stand-alone applications)

4 ft.
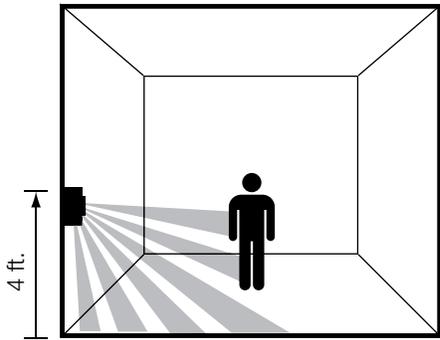
Example of in-wall occupancy
sensor with PIR technology

12 ft. or less
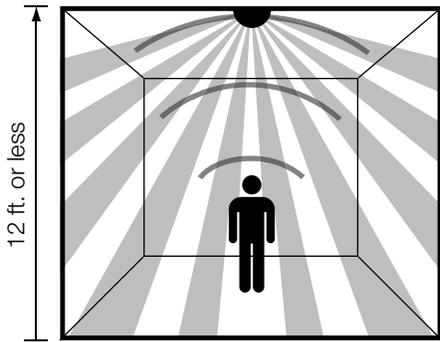
Example of ceiling-mount occupancy
sensor with PIR technology

6 ft. – 12 ft.
depending on model
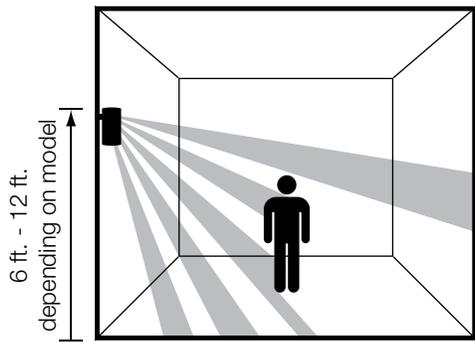
Example of wall-mount occupancy
sensor with PIR technology

Maestro® occupancy sensing switch

4.69 in. (119 mm)

.30 in. (7.6 mm) profile

2.94 in. (75 mm)

Type of Sensor

- All-in-one occupancy/vacancy version can be easily programmed to work as vacancy (manual-on) sensor
- Vacancy-only models also available

Type of Technology

- PIR with advanced XCT™ technology
- High-low sensitivity adjustment (you can adjust your sensor to ignore small movements such as pets)
- Lutron's patented ambient light detection prevents lights from turning on automatically if there is enough daylight already in the space

Type of Mounting and Coverage

- In-wall: sensor replaces a standard switch
- Up to 30 ft. x 30 ft. major motion and 20 ft. x 20 ft. minor motion coverage
- Sensor must have unobstructed view and line-of-sight to room occupants
- 180 degree sensor field-of-view

System Compatibility

- This product is not compatible with a system

Satin Colors®

Snow (SW)	Biscuit (BI)	Eggshell (ES)	Taupe (TP)	Palladium (PD)
Limestone (LS)	Stone (ST)	Desert Stone (DS)	Mocha Stone (MS)	Goldstone (GS)
Greenbriar (GB)	Bluestone (BG)	Terracotta (TC)	Sea Glass (SG)	Turquoise (TQ)
Sienna (SI)	Hot (HT)	Plum (PL)	Merlot (MR)	Midnight (MN)

Designer Gloss Colors

White (WH)	Light Almond (LA)	Almond (AL)	Ivory (IV)

Control Types

- The Maestro occupancy sensing switch is available to control single-pole applications as well as multi-location applications
- A 2A sensor is ideal for small rooms (single pole only)
- A 5A sensor is ideal for large rooms or for a 3A fan

Additional Features

- Adjustable timeout options (the amount of time before the lights turn off) include: 1, 3, 5, 15, or 30 minutes

Model Numbers

Model Number	Product Name	Maximum Capacity
MS-OPS2-CC*	Occupancy sensing switch/small room	120V, 2A
MS-VPS2-CC*	Vacancy sensing switch/small room	120V, 2A
MS-OPS5M-CC*	Occupancy sensing switch/large room	120 V/ 5A lighting; 3A fan
MS-VPS5M-CC*	Vacancy sensing switch/large room	120 V/ 5A lighting; 3A fan

*CC = color code

Maestro® occupancy sensor C·L® dimmer

4.69 in.
(119 mm)

.30 in.
(7.6 mm)
profile

2.94 in.
(75 mm)
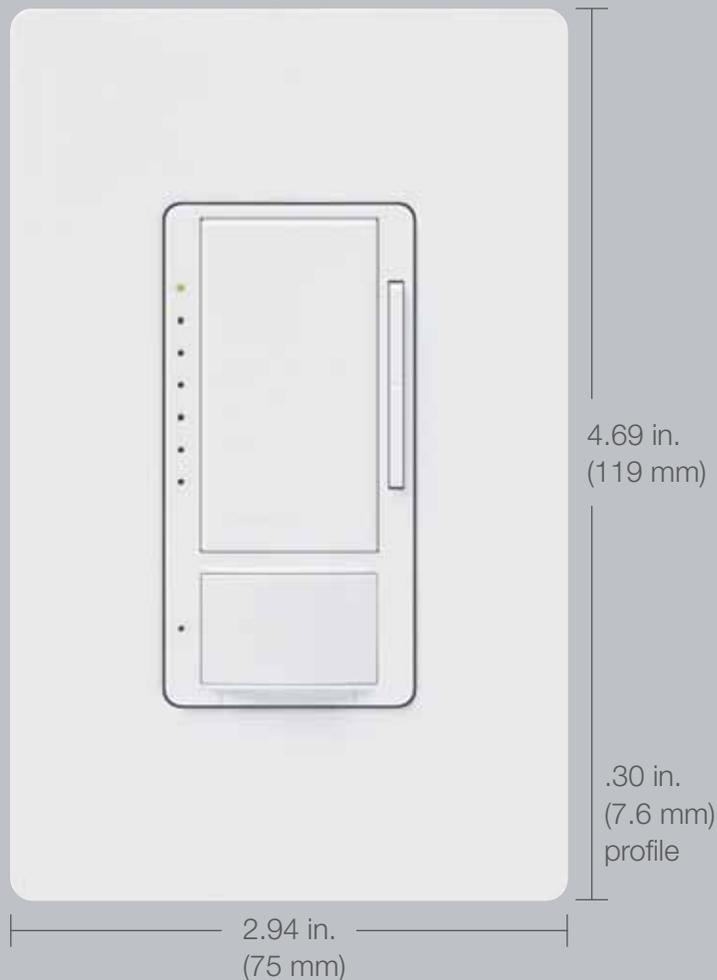
Type of Sensor

- All-in-one with integrated light control
- Occupancy/vacancy version can be easily programmed to work as vacancy (manual-on) sensor
- Vacancy-only models also available

Type of Technology

- PIR with XCT™ technology
- High-low sensitivity adjustment (you can adjust your sensor to ignore small movements such as pets)
- Lutron's patented ambient light detection prevents lights from turning on automatically if there is enough daylight already in the space
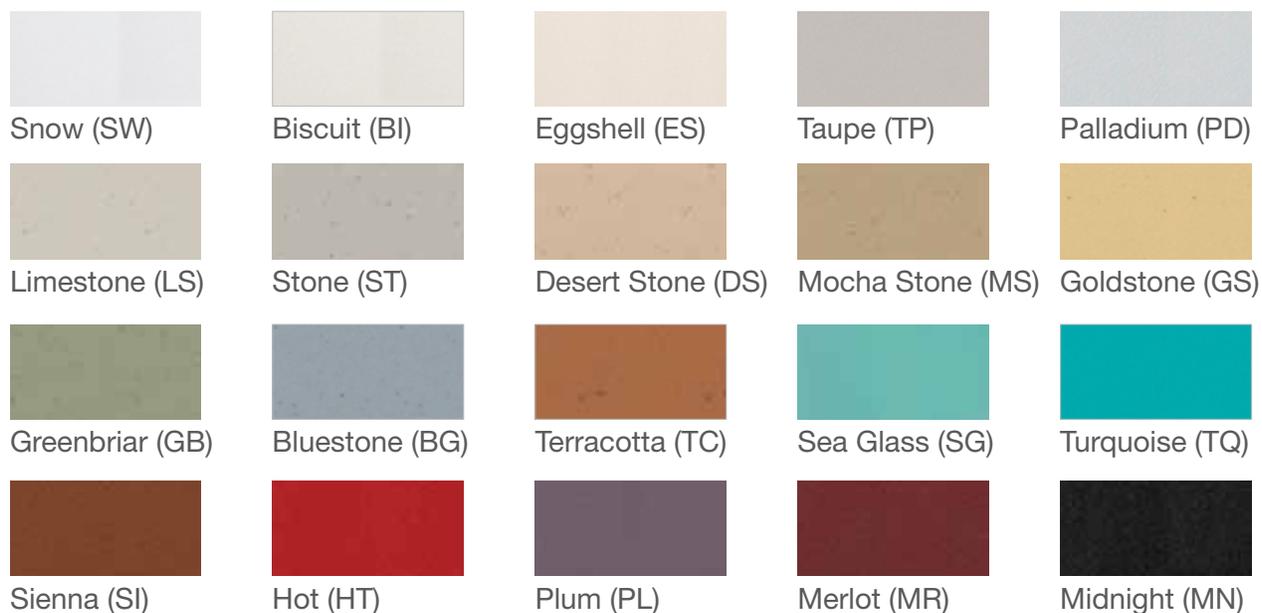
Type of Mounting and Coverage

- In-wall: sensor replaces a standard switch
- Up to 30 ft. x 30 ft. major motion and 20 ft. x 20 ft. minor motion coverage
- Sensor must have unobstructed view and line-of-sight to room occupants
- 180 degree sensor field-of-view

System Compatibility

- This product is not compatible with a system

Satin Colors®

Snow (SW)	Biscuit (BI)	Eggshell (ES)	Taupe (TP)	Palladium (PD)
Limestone (LS)	Stone (ST)	Desert Stone (DS)	Mocha Stone (MS)	Goldstone (GS)
Greenbriar (GB)	Bluestone (BG)	Terracotta (TC)	Sea Glass (SG)	Turquoise (TQ)
Sienna (SI)	Hot (HT)	Plum (PL)	Merlot (MR)	Midnight (MN)

Designer Gloss Colors

White (WH)	Light Almond (LA)	Almond (AL)	Ivory (IV)	Gray (GR)
Brown (BR)	Black (BL)			
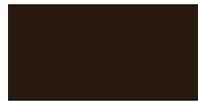
Control Types

• The Maestro occupancy/vacancy sensor is available to control single-pole applications as well as multi-location applications.

Additional Features

• Adjustable timeout options (the amount of time before the lights turn off) include: 1, 3, 5, 15, or 30 minutes
• Multi-location dimming

Model Numbers

Model Number	Product Name	Control Type	Maximum Capacity
MSCL-OP153M-CC*	Occupancy/vacancy sensor	Digital fade dimmer	120 V, 600 W
MSCL-VP153M-CC*	Vacancy sensor	Digital fade dimmer	120 V, 150 W lighting

*CC = color code

Radio Powr Savr™ wireless ceiling-mount occupancy/vacancy sensor

3.572 in. (90.7 mm)

1.30 in. (33 mm) profile

back

Type of Sensor

- Component sensor
- Works with either a dimmer, switch, or a Lutron light control system
- Vacancy-only models available

Type of Technology

- PIR with XCT™ technology
- Communicates via Lutron's reliable Clear Connect® RF technology to other Lutron wireless devices
- Sensor must be accompanied by a light control in another area of the room or house
- Lutron's patented ambient light detection prevents lights from turning on automatically if there is enough daylight already in the space
- High-low sensitivity adjustment (you can adjust your sensor to ignore small movements such as pets)

Type of Mounting and Coverage

- Mount on ceiling within 60 ft. (18 m) line-of-sight or 30 ft. (9.1 m) through walls of the receiving devices
- Can be surface mounted to solid or drop ceilings (mounting hardware included)
- Can be recess mounted (recess mounting kit sold separately; L-CRMK-WH)
- 360 degree coverage
- Recommended for 8-12 ft. (2.4-3.7 m) ceilings

System Compatibility

- Works with Maestro Wireless®, GRAFIK Eye® QS, RadioRA® 2, HomeWorks® QS
- One sensor can control multiple compatible dimmers/switches for spaces that have additional zones of light or multiple sensors can control one or multiple compatible dimmers/switches.

Colors

White (WH)

Additional Features

- Adjustable timeout options (the amount of time before the lights turn off) include:
  1, 5, 15, or 30 minutes
- Simple installation with no wiring required—eliminates power pack and wiring expense
- Requires compatible receiving device (available separately)
- Battery included; 10 year battery life design
- For indoor use only, temperature: 32° F-104° F (0° C-40° C)

Model Numbers

Model Numbers	Product Name
LRF2-OCR2B-P-WH	Ceiling-mount (434 MHz) occupancy/vacancy
LRF2-VCR2B-P-WH	Ceiling-mount (434 MHz) vacancy

LOS-C series ceiling-mount occupancy sensor

1.4 in.
(38 mm)
profile

4.50 in.
(114 mm)

Type of Sensor

• Wired component sensor
• Works with either a dimmer, switch, or a Lutron light control system

Type of Technology

• Models available: PIR, US, and dual technology

Type of Mounting and Coverage

• Ceiling-mount — must be accompanied by a light control in another area of the room
• Coverage available from 450 to 2000 ft.^{2} (137 to 610 m^2) mounted at 8 to 12 ft. (2.4 -3.6 m) from the floor
• 360 degree and 180 degree field-of-view models available

System Compatibility

• Works with GRAFIK Eye® QS, and HomeWorks® QS

Color

White (WH)

Additional Features

- Models available with additional dry contact closures
- For indoor use only, temperature: 32° F-104° F (0° C-40° C)

Model Numbers

Model Number	Product Name
LOS-CIR-1500-WH	Passive infrared 1,500 ft.^{2} (457 m^2), 360º
LOS-CIR-450-WH	Passive infrared 450 ft.^{2} (137 m^2), 360º
LOS-CDT-2000-WH	Dual technology, self-adaptive 2,000 ft.^{2} (610 m^2), 360º
LOS-CDT-2000R-WH	Dual technology, self-adaptive Additional contact closure
LOS-CDT-1000-WH	Dual technology, self-adaptive 1,000 ft.^{2} (305 m^2), 180º
LOS-CDT-1000R-WH	Dual technology, self-adaptive Additional contact closure
LOS-CDT-500-WH	Dual technology, self-adaptive 500 ft.^{2} (152 m^2) 180º
LOS-CDT-500R-WH	Dual technology, self-adaptive Additional contact closure
LOS-CUS-2000-WH	Ultrasonic 2,000 ft.^{2} (610 m^2), 360º
LOS-CUS-1000-WH	Ultrasonic 1,000 ft.^{2} (305 m^2), 180º
LOS-CUS-500-WH	Ultrasonic 500 ft.^{2} (152 m^2), 180º

Radio Powr Savr™ wireless wall-mount occupancy/vacancy sensor

4.35 in.
(110 mm)

1.35 in.
(34 mm)
profile

1.80 in.
(46 mm)

Type of Sensor

- Component sensor
- Works with either a dimmer, switch, or a Lutron light control system.
- Vacancy–only models available

Type of Technology

- PIR with XCT™ technology
- Communicates via Lutron's reliable Clear Connect® RF technology to other Lutron wireless devices

Type of Mounting and Coverage

- Wall-mount must be accompanied by a light control in another area of the room or house
- Mount on wall within 60 ft. (18 m) line-of-sight or 30 ft. (9.1 m) through walls of the receiving devices
- Recommended mounting height 6-8 ft. (1.8-2.4 m) from floor
- Three models available for different coverage patterns:

  Wall-mount: 180 degree field-of-view

  Corner-mount: 90 degree field-of-view

  Hallway: long, narrow field-of-view

System Compatibility

- Works with Maestro Wireless®, GRAFIK Eye® QS, RadioRA® 2, and HomeWorks® QS
- One sensor can control multiple compatible dimmer/switches for spaces that have additional zones of light or multiple sensors can control one or multiple compatible dimmers/switches

Colors

White (WH)

Additional Features

- Adjustable timeout options (the amount of time before the lights turn off) include:
  1, 5, 15, or 30 minutes
- Simple installation with no wiring required—eliminates power pack and wiring expense
- Requires compatible receiving device (available separately)
- Battery included; 10 year battery life design
- For indoor use only, temperature: 32° F-104° F (0° C-40° C)

Model Numbers

Model Number	Product Name
LRF2-OWLB-P-WH	180° wall mount (434 MHz) occupancy/vacancy
LRF2-VWLB-P-WH	180° wall mount (434 MHz) vacancy
LRF2-OKLB-P-WH	90° corner mount (434 MHz) occupancy/vacancy
LRF2-VKLB-P-WH	90° corner mount (434 MHz) vacancy
LRF2-OHLB-P-WH	Hallway (434 MHz) occupancy/vacancy
LRF2-VHLB-P-WH	Hallway (434 MHz) vacancy

LOS-W series wall-mount occupancy sensor

5.25 in.
(133 mm)

3.90 in.
(99 mm)
profile

2.70 in. (69 mm)

Type of Sensor

- Wired component sensor
- Works with either a dimmer, switch, or a Lutron light control system

Type of Technology

- Self-adaptive sensor; automatically adjusts sensitivity and timing
- Models available: PIR and dual technology

Type of Mounting and Coverage

- Wall-mount
- Coverage of 1600 ft.^{2} (488 m^2) mounted at 8 to 12 ft. (2.4-3.7 m) from floor
- 110 degree field-of-view

System Compatibility

- Works with GRAFIK Eye® QS, RadioRA® 2, and HomeWorks® QS

Colors

White (WH)

Additional Features

- Models available with an additional dry contact closure output
- For indoor use only, temperature: 32° F-104° F (0° C-40° C)

Model Numbers

Model Number	Product Name
LOS-WIR-WH	Wall-mounted, passive infrared
LOS-WDT-R-WH	Dual technology, self-adaptive with second contact closure output
LOS-WDT-WH	Dual technology, self-adaptive

Radio Powr Savr™ wireless daylight sensor

.70 in.
(17 mm)
profile

1.60 in.
(40.6 mm)

Type of Sensor

• Wireless daylight sensor

Type of Technology

• Communicates via Lutron's reliable Clear Connect® RF technology to other Lutron wireless devices.

Type of Mounting and Coverage

Determine the daylight sensor mounting location using the diagram on page 21.

• Place the daylight sensor so the viewing area is centered on the nearest window at a distance from the window of one to two times the effective window height (H)
• The effective window height (H) starts at the windowsill or 3 ft. (1 m) up from the floor (whichever is higher) and ends at the top of the window
• Do not position the daylight sensor in the well of a skylight or above indirect lighting fixtures
• For narrow areas where you can't place the sensor 1H-2H from windows, place the sensor near the windows facing into the space
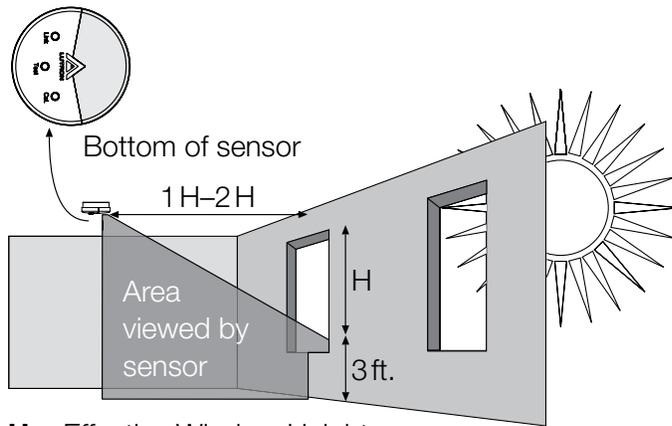
System Compatibility

• Works with Maestro Wireless® and GRAFIK Eye® QS
• One sensor can control multiple compatible dimmer/switches for spaces that have additional zones of light

Sensor placement

Location for average size areas
Arrow points toward the area viewed
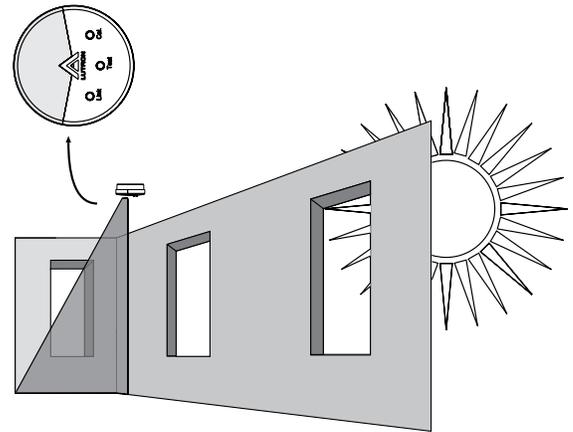by the sensor (toward windows)

Location for narrow areas
(corridors, private offices)
Arrow points toward the area viewed
by the sensor (away from windows)

Bottom of sensor

1 H–2 H

Area viewed by sensor

H

3 ft.

**H** = Effective Window Height

Colors

Gray/White

Additional Features

• When sufficient daylight is available, the sensor will dim or turn off electric light; when insufficient daylight is available, the sensor will increase electric light
• Simple calibration
• Multiple ceiling-mount methods available for different ceiling materials
• Front accessible test buttons make set up easy
• Simple installation with no wiring required
• Battery included; 10 year battery life design

Model Numbers

Model Number	Product Name
LRF2-DCRB-WH	Daylight sensor

Sensor suggestions room by room

1 Master Bedroom

3 Master Bath

Family Room

2

6

Living Room

Foyer

4

Garage
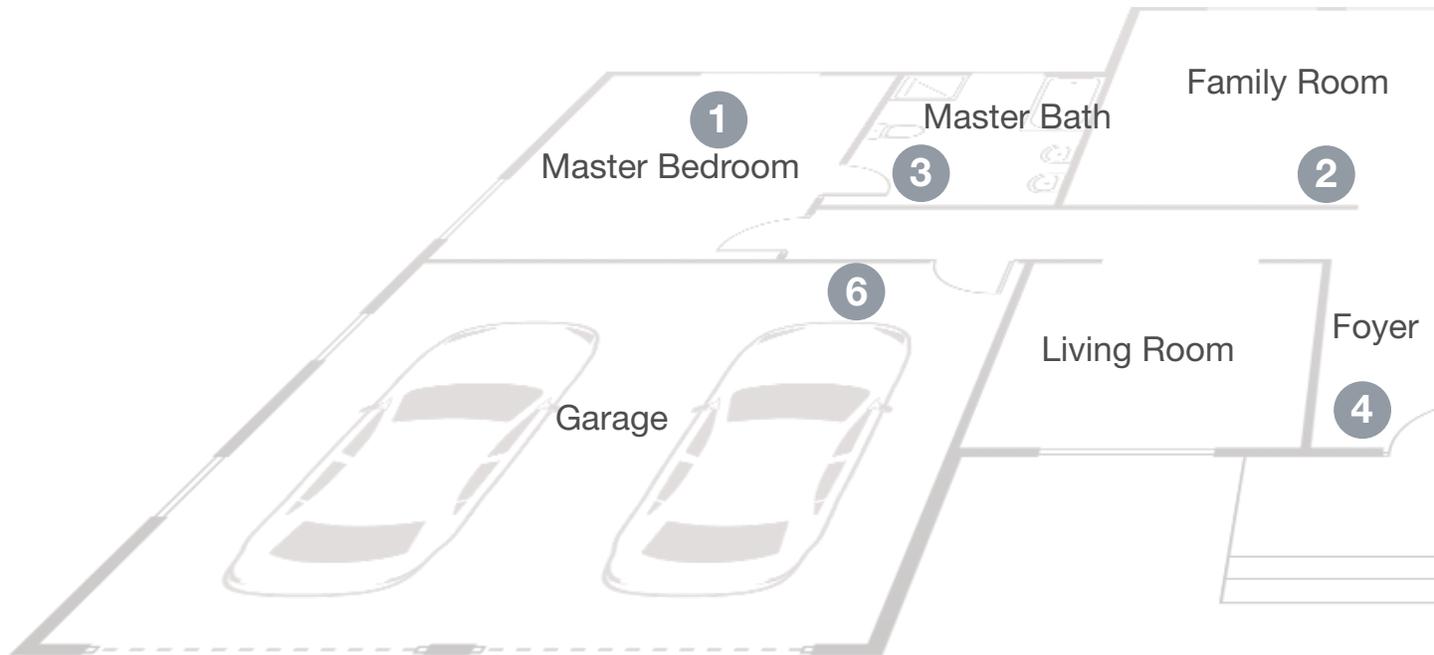
1 Bedroom

- Utilize a vacancy sensor so lights won't turn on while you're sleeping.
- Install in your children's bedrooms—where lights are often left on.

2 Family Room

- Select a sensor with a dimmer so you can control light levels to match the activities going on in the room.
- Install a daylight sensor to automatically dim lights when there's plenty of sunlight in the room.

3 Bathroom

- Sensors in the bathroom help you avoid fumbling for a light switch in the middle of the night; a dimmer version allows you to lower the intensity of the light level for those middle-of-the-night bathroom visits.
- Use an ultrasonic sensor in bathrooms with partial obstructions, such as a shower, so that lights do not turn on or off unnecessarily.
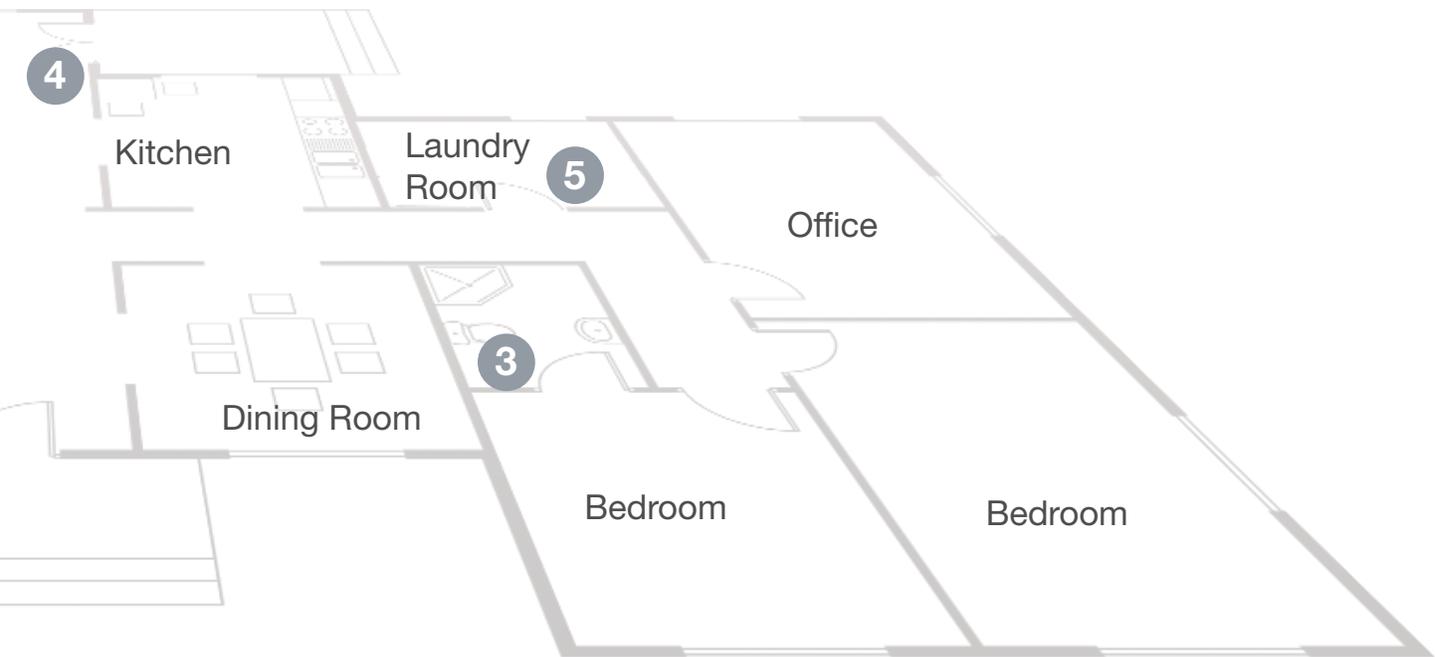
4 **Entry and Exit Points**

- Having lights automatically turn on and off is especially convenient when your hands are full— whether that's in the morning when you have your coffee mug, keys, and lap top bag, or coming home with a couple bags of groceries.

5 **Laundry Room**

- Lights turn on automatically when you walk into the room with a basket full of clothes.

6 **Garage/Basement**

- A vacancy sensor in the garage or basement ensures that lights aren't left on in this minimally used space.

Lutron Experience Centers are designed to put you in the center of the very best in light control. You can see how changes in light transform a space from functional to romantic or from vibrant to relaxing. Additionally, you can review our color palette, collect fabric samples and learn about new trends, technologies, and integration with home audio and security systems.

To experience the possibilities, please schedule a tour at the Experience Center or Specification Office nearest you.

Residential Centers

New York, New York:	979 Third Avenue, New York, NY 10022	212.752.1214
Plantation, Florida:	101 NW 100th Avenue, Plantation, FL 33324	954.577.6294
Irvine, California:	2458 Dupont Drive, Irvine, CA 92612	949.474.4140
Coopersburg, Pennsylvania:	7200 Suter Road, Coopersburg, PA 18036	610.282.6280

Commercial Centers

Washington, DC:	455 Massachusetts Avenue, Suite 770 Washington, DC 20001	202.624.5700

Enhanced Specification Offices

Seattle, Washington:	720 Olive Way, Seattle, WA 98101	206.467.5025
New York, New York:	1 Penn Plaza, Suite 1714, New York, NY 10119	212.989.1300
Chicago, Illinois:	11 E. Adams, Suite 1000, Chicago, IL 60603	312.212.1220

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