Catalog Number: Date: Project:

WIRELESS CEILING MOUNT OCCUPANCY SENSOR

BATTERY POWERED

OVERVIEW

The **BL2 SYSTEMS** wireless ceiling mount occupancy sensor is a simple, yet reliable battery powered control solution. Preferred by contractors for their flexible mounting methods, **BL2 SYSTEMS** wireless sensors greatly reduce total installation time and wireless pairing fuss. Requiring just a few seconds per device, **BL2 SYSTEMS** wireless sensors can be linked to one or more wireless load controllers (such as the **BL2-851** wireless wall switch, or a **BL2-950** series wireless power pack). Additionally, these sensors can be configured to work in applications with other wireless or wired ceiling, corner, or hallway sensors to provide extended coverage in large or irregularly shaped spaces.

As with all **BL2 SYSTEMS** products, the latest PIR (passive infrared) technology and techniques are used to provide unmatched occupant detection performance and energy savings. Additionally, units are available with an integrated microphone to provide overlapping passive acoustic detection for rooms with obstructions or where occupant motion is limited. An integrated daylight harvesting photocell is also an available option for PIR only units.

BASIC OPERATION

Sensors detect movement in the infrared energy that radiates from occupants as they move within the device's field-of-view. Once occupancy is detected, the sensor immediately signals a wirelessly linked load controller (e.g. power pack) to switch on or dim up the connected lighting. If equipped with passive dual technology (PIR/Acoustic), the units microphone is then also enabled to further enhance detection while the lights are on. At regular intervals, the sensor will retransmit its latest occupancy status such that the load controller can keep lights on for occupants during brief periods of inactivity, while returning the space to an energy saving lights off (or dim) state once no longer occupied.

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BL2 SYSTEMS

FEATURES

- **Links in Seconds with Wireless Controllers**
- **Passive Infrared (PIR) Detection**
- **Passive Dual Technology (PIR/Acoustic) Detection (Optional)**
- **360° Small Motion Coverage**
- **Compact Size and Matte Finish**
- **Four Contractor Friendly Mounting Methods**
- **Mounting Nipple Attachment with Integrated Hole Saw**
- **Convenient Test Modes**
- **Optional Daylight Harvesting & On/Off Photocell**

SPECIFICATIONS

ELECTRICAL & WIRELESS

BATTERY TYPE
Requires one CR123(A) Lithium Battery

BATTERY LIFE
PIR Model - Designed for 10 yr.
PIR & Daylight Harvesting Model - Designed for 7 yr.
Dual Tech. Models - Designed for 5 yr.
Non-Volatile Memory (saves all settings regardless of battery state)
Blink Warning @10% Life

RANGE
80' line of site w/o obstruction (walls)
40' with obstruction (walls/floors)

FREQUENCY
915 MHz ISM Band

WIRELESS LINKING
Simple 3 sec. Push Button Process

SECURITY
All Wireless Data is Encrypted

ENVIRONMENTAL

OPERATING TEMP
32°F to 122°F (0°C to 50°C) - Standard
-40° F/C (with **-HE** Option)

RELATIVE HUMIDITY
0-95% Non-Condensing, Indoor Use Only

PHYSICAL

SIZE / WEIGHT / COLOR
4.00" Diameter x 1.25" H
(10.16 x 3.17 cm)
4.75 oz
White or Black with Matte Finish

LED INDICATION
Motion Detection (when in Test Mode)
Wireless Linking (Pairing)

OPERATION

OPERATING MODES
Configured at Linked Load Controller(s)
Motion: Occupancy & Vacancy
Photocell: Daylight Harvesting & On/Off

WIRELESS TEST MODE
Button Toggles On/Off Wirelessly Linked Loads

COVERAGE TEST MODE
White LED Illuminates Upon Detection

TIME DELAY OPTIONS
Configured at Linked Load Controller(s)
1, 5, 10, 15, 20, 30 min.

CODE COMPLIANCE

These sensors can be used to meet ASHRAE 90.1, IECC, & Title 24 energy code requirements.

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ORDERING INFO

SAMPLE MODEL # BL2-221-B

	PRODUCT		DETECTION		COVERAGE		POWER		OPTIONS	
BL2 -	Ceiling Mount Sensor	**2**	Passive Infrared (PIR)	**0**	Small Motion 360°	**1**	Battery	**- B**	Low Temp / High Humidity	**- HE**
			Passive Infrared (PIR) + Daylight Harvesting Photocell	**1**					Black Cover Lid & Lens	**- BK** [1]
			Passive Dual Technology (PIR/Acoustic)	**2**						

Note 1: Not available on units w/ Photocells

ACCESSORIES

BL2-299-JP - Ceiling Sensor Trim Ring for Mounting to Single Gang Mudring, Handy Box, or 4" Octagon Box

APPLICATIONS

SMALL SPACES

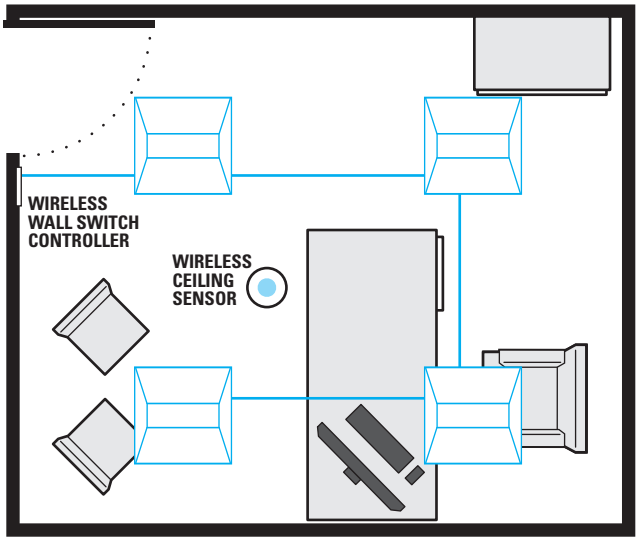
For control of small spaces like a private office, a single sensor linked to a wireless wall switch controller (**BL2-851**) is recommended (see diagram on right). Linking additional sensors is also an option if necessary. Switching from a second location (e.g. 3-way) is achieved by linking a remote wireless wall switch to the wireless switch controller. Both occupancy (auto-on) and vacancy (manual-on) operation are achievable in order to meet energy code requirements. Dual Technology sensors are recommended in spaces where people are seated or where obstructions like bathroom stalls block line of site to the sensors.

- Small Offices
- Copy Rooms
- Private Restrooms

LARGE SPACES

Multiple wireless sensors can be easily linked to a wireless power pack load controller (**BL2-950**) to provide coverage for larger spaces (or larger loads) like an open office. Additional functionality such as switching/dimming from multiple locations (e.g. 3-way) or interfacing with wired control devices is achieved by linking to a wireless power pack with appropriate functionality. Dual Technology sensors are recommended in spaces where people are seated and/or where obstructions like cubicle walls block line of site to the sensors.

- Classrooms
- Conference Rooms
- Break Rooms
- Open Areas
- Hallways



OCCUPANCY W/ INTEGRATED DAYLIGHT HARVESTING PHOTOCELL OPTION (MODEL BL2-211-B)

There are several types of photocell operational modes supported by this option. The mode is selected at the linked wireless power pack or wall switch controller that is wired to the lighting load(s).

DAYLIGHT HARVESTING

- Recommend for spaces where it is important to not distract occupants (e.g., offices, classrooms).
- Lights will gradually dim in order to maximize energy savings while maintaining desired overall lighting level.
- Requires dimming power pack controller.
- Option to dim to low trim or turn lighting off.

ON/OFF PHOTOCELL CONTROL

- Recommended for public spaces (hallways, entryways, etc) where fully switching of lighting off and on will not cause distraction of occupants.
- Lights are switched off if ambient light level surpasses threshold and back on if level drops.

INHIBIT ONLY PHOTOCELL CONTROL

- Lighting is held off if sufficient ambient light level is present upon initial occupancy.
- Lighting will turn on if light level drops below setpoint.
- Once on, lighting will only turn off from vacancy or a manual switch, never from daylight.

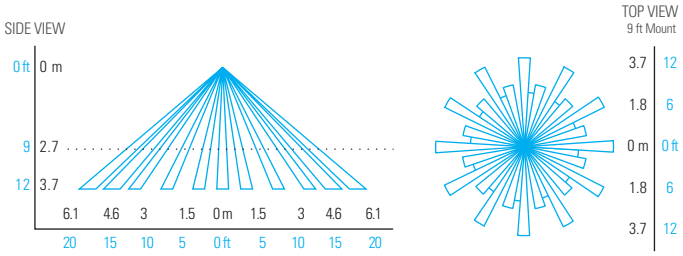
COVERAGE

PASSIVE INFRARED (PIR)

- Detection range improves when walking across beams as compared to into beams.
- Line of site between occupant and sensor is required for detection.
- Sensor can not see through glass windows or doors.
- Spaces with small temperature differential between occupants and ambient may encounter reduced sensitivity/range.

SMALL MOTION 360°

- Excellent detection of small motions from sitting or stationary occupants (e.g. hand motions).
- 8 to 12 ft (2.44 to 3.66 m) mounting height recommended.
- ~500 ft² of coverage



DUAL TECHNOLOGY (PIR/ACOUSTIC)

- Units with dual technology (model **BL2-221-B**) have overlapping acoustic detection of the complete PIR coverage area.
- A PIR event is required to initially enable acoustic detection.
- Sounds indicating occupancy reset the sensor's time delay while non-occupant noises are filtered out. Occupant sounds alone will not keep lights on indefinitely, PIR motion must be periodically detected for lights to remain on for an extended time.
- After sensor time out expires, acoustic detection remains enabled for 15 seconds to enable voice reactivation of lights for additional convenience and safety.

WIRELESS LINKING (PAIRING)

Linking an occupancy sensor with a wireless wall switch controller or power pack load controller is quickly done via the following procedure:

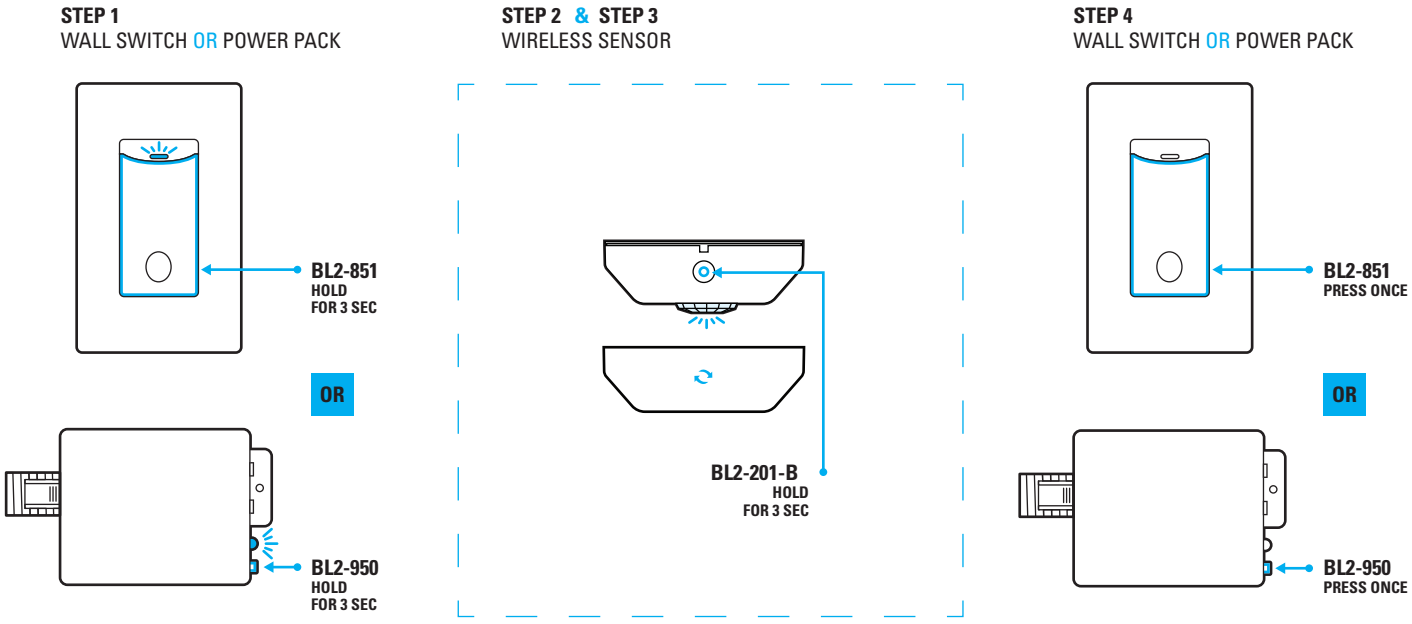
Step 1. Enter learn mode by holding down the wireless load controller's button for 3 seconds until the LED starts alternating white then blue, then release.

Step 2. At the sensor, hold down the programming button for 3 seconds until the LED starts alternating white then blue. Releasing will link the sensor with any device in learn mode (see note 1 below). The lights will toggle once as confirmation.

Step 3. Repeat step 2 to link another sensor or device.

Step 4. When all devices have been linked, exit learn mode on the wireless load controller by pressing the button 1 time. Learn mode will also be automatically closed after 15 minutes of no new devices being linked.

Note 1: When in learn mode, the alternating LED colors on the wireless load controller will periodically pause and blink out the total number of linked devices. There will be no blinks during the pause until the first device is linked.

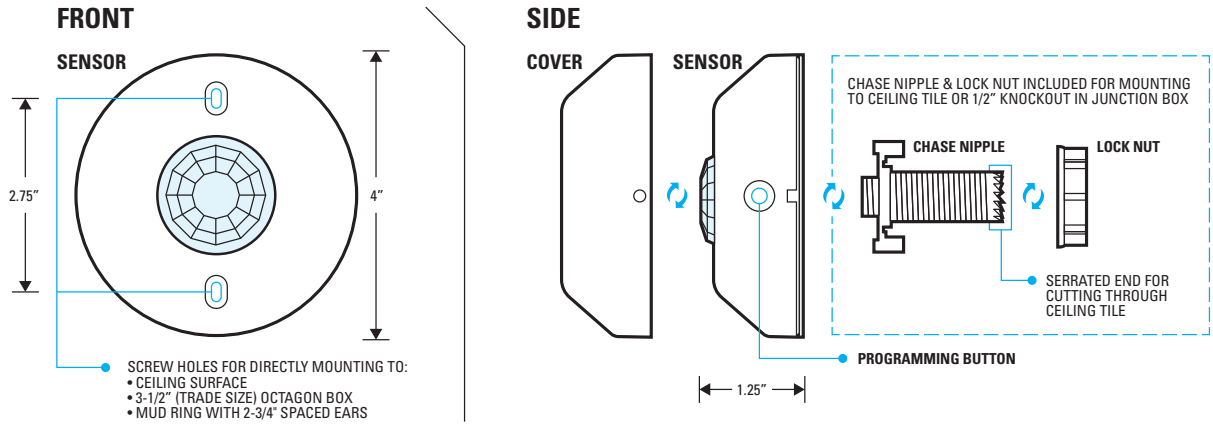


COMPATIBLE WIRELESS DEVICES

The below chart lists the devices that can be used in a **BL2 SYSTEMS** wireless application. Note that occupancy sensors, photocells, and remote switch & dimmers are transmit only devices and therefore must be linked to a load controller for switching or dimming of lighting.

MODEL #	DESCRIPTION	WIRELESS TYPE	POWER TYPE
BL2-201-B	Small Motion 360° Sensor, PIR	Transmit	Battery
BL2-211-B	Small Motion 360° Sensor, PIR w/ Integrated Daylight Harvesting Photocell	Transmit	Battery
BL2-221-B	Dual Technology Sensor (PIR/Acoustic), Small Motion 360°	Transmit	Battery
BL2-401-B	Wide View Sensor, PIR	Transmit	Battery
BL2-421-B	Dual Technology (PIR/Acoustic) Wide View Sensor	Transmit	Battery
BL2-402-B	Long Range Hallway Sensor, PIR	Transmit	Battery
BL2-250-B	Daylight Harvesting & On/Off Photocell	Transmit	Battery
BL2-851-xx	Wall Switch Load Controller, No Neutral Required, <xx = color>	Transmit & Receive	120-277 VAC
BL2-852-B-xx	Remote Switch (On/Off), <xx = color>	Transmit	Battery
BL2-852-2-xx	Remote Line Powered Switch (On/Off), <xx = color>	Transmit	120-277 VAC
BL2-854-B-xx	Remote Dimming Switch (On/Off, Raise/Lower), <xx = color>	Transmit	Battery
BL2-854-2-xx	Remote Line Powered Dimming Switch (On/Off, Raise/Lower), <xx = color>	Transmit	120-277 VAC
BL2-874-ELV-xx	Phase Dimming Load Controller - Reverse (default) or Forward Phase, <xx = color>	Transmit & Receive	120 VAC
BL2-950	Power Pack Load Controller, 20A	Transmit & Receive	120/277 VAC
BL2-951-D1	Fixture Controller, 1A@, 0-10V Dimming	Transmit & Receive	120-277 VAC
BL2-950-D2	Power Pack Load Controller, 20A, 0-10V Dimming	Transmit & Receive	120/277 VAC
BL2-950-AX	Hybrid Wireless/Wired Power Pack Load Controller, 20A	Transmit & Receive	120/277 VAC
BL2-950-AX-D2	Hybrid Wireless/Wired Power Pack Load Controller, 20A, 0-10V Dimming	Transmit & Receive	120/277 VAC

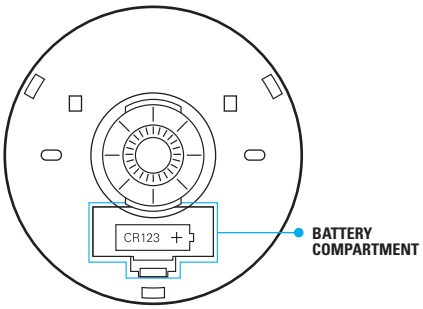
INSTALLATION OPTIONS



Note: If mounting to a Single Gang Mudring, Handy Box, or 4" Octagon Box, a trim ring is required. Part Number: **BL2-299-JP.**

BATTERY INFORMATION

- The sensor runs on one CR123(A) Lithium Battery (included).
- 10 year battery life design for PIR only models. For PIR units with enabled integrated photocells, expected battery life is 7 years. For dual technology units with acoustic detection enabled, expected battery life is 5 years.
- Install battery prior to mounting sensor. Polarity is indicated on the battery compartment door.
- If the sensor's battery life reaches 10%, all wirelessly linked load controllers will blink lights on/off/on upon initial occupancy as a replacement warning.
- Replacement batteries are available at most retailers or home centers where batteries are sold or from **BL2 SYSTEMS**.



OPERATION NOTES

OCCUPANCY ONLY MODELS (BL2-201-B / BL2-221-B)

- Wireless sensors periodically transmit their PIR and/or acoustic (if equipped) occupancy status. Referred to as the sensor's "heartbeat", this period is optimized to conserve battery life.
- If a sensor transmitted "unoccupied" at its last heartbeat, any new PIR detection event will be transmitted immediately.
- Using the information received from linked sensors, wirelessly linked load controllers switch lighting accordingly.
- All load controllers have a master time delay that is initially set only when a PIR occupancy transmission is received from a linked sensor. The time delay will then be reset every time a sensor reports any occupancy (either PIR or acoustic). Lights will be switched off once all linked sensors have continuously reported unoccupied for the duration of the time delay.
- To prevent lights from staying on indefinately from just acoustic events, after ~30 minutes the load controller will stop considering acoustic events from all linked sensors until after a PIR event is received again.
- As an added safety measure after lights are switched off, acoustic detection remains enabled for 15 seconds to enable voice reactivation of lights.
- If a load controller does not receive any heartbeat transmissions from a linked sensor for 10 minutes it will blink out an error code (4 blue blinks, followed by a pause) and consider itself occupied (so as to override the lights on). If more than one sensor is linked, the sensor heartbeats from all sensors must have stopped for the error warning to begin blinking.

OCCUPANCY W/ INTEGRATED PHOTOCELL OPTION (BL2-211-B)

- Sensors with the integrated photocell require auto-setpoint calibration to be initiated from the sensor in order to enable photocell operation.
- Every ~15 seconds the photocell transmits the light level it is measuring in the space.
- Dimming from high trim to low trim (or in reverse) due to daylight harvesting requires ~1.5 minutes.
- The wirelessly linked load controller(s) compares the received light level to the setpoint and controls the connected lighting accordingly.
- Wireless load controllers will only listen to a single wireless photocell sensor. If more than one is wirelessly linked, the unit that last ran the auto-setpoint calibration procedure will be used.
- The photocell control algorithm compensates for the contribution of the controlled lighting to the overall light level of the space. This prevents lights from cycling back on shortly after they are switched off by the photocell operation.
- Refer to the instruction sheets of the wirelessly linked controllers for information on their respective LED blink out behavior when controlled lights are transitioning on or off from photocell operation.
- To accomodate multi-zone photocell applications, wireless power packs can be configured to track according to the received daylight level, but control lights a fixed percentage brighter.

FCC INFORMATION (FCC ID: 2AVRY-SWX0002)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:
1. This device many not cause harmful interference, and
2. This device must accept any interference received, Including interference that may cause undesired operation
Changes and Modifications not expressly approved by BLP Technologies can void your authority to operate this equipment under Federal Communications Commission's rules.
In order to comply with FCC/ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

ISED CANADA INFORMATION (IC: 26012-SWX0002)

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.
In order to comply with FCC/ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
3. Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 20 cm de séparation du corps humain en tout temps