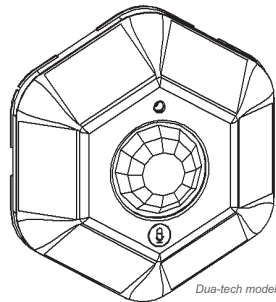


# Echoflex Installation Guide

## Ceiling-Mount Occ/Vac Sensor (MOS)

### Overview

The MOS model ceiling-mount occupancy/vacancy sensor is a wireless, energy harvesting sensor that is available as either a passive infrared (PIR) or a Dual Technology model. The Dual Technology sensor uses PIR and passive microphone technology to provide full coverage of audible human activity across the entire PIR detection range. Innovative noise filtering prevents false triggers that could keep lights on in empty spaces.

Model	Detection	Coverage	
MOS-IR-xA*	Lens A: small motion, short range	93 m <sup>2</sup> at 2.4 m (1000 ft <sup>2</sup> at 8 ft)	
MOS-IR-xB*	Lens B: large motion, broad range	176 m <sup>2</sup> at 2.7 m (1900 ft <sup>2</sup> at 9 ft)	
MOS-IR-xC*	Lens C: high bay coverage	585 m <sup>2</sup> at 12 m (6300 ft <sup>2</sup> at 40 ft)	
MOS-DT-xA*	Lens A: small motion, short range, and audio	93 m <sup>2</sup> at 2.4 m (1000 ft <sup>2</sup> at 8 ft)	
MOS-DT-xB*	Lens B: large motion, broad range, and audio	176 m <sup>2</sup> at 2.7 m (1900 ft <sup>2</sup> at 9 ft)	

\*Where x is the radio frequency: U=902 MHz, Y=868 MHz and J=928 MHz.

This document covers installation, testing, and settings that apply to all MOS models. The package includes the sensor, lens mask stickers, mounting plate with integrated magnets, wire staples (902 mHz models only), and the installation guide.

### Prepare for Installation

Ceiling-mount occupancy sensors are intended for installation on a finished ceiling surface or suspended ceiling tile. Echoflex recommends paying special attention to the installation environment.

- For indoor use only. Operating temperature -10°C to 45°C (14°F to 113°F), 5% to 92% relative humidity (non-condensing).
- High density construction materials and large metal appliances or fixtures in the space may disrupt wireless transmissions.
- Install the sensor within range of linked receivers or controllers, 24 m (80 ft). Consider adding a repeater to extend reception range.
- Ensure the sensor model's lens is suitable for your ceiling height.



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Echoflex intends this document to be provided in its entirety. Product information and specifications subject to change.

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# Echoflex Installation Guide

## Ceiling-Mount Occupancy/Vacancy Sensor

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- PIR sensing must have an unobstructed view of the space. Do not mount behind or near tall cabinets, shelves, or hanging light fixtures.
- Avoid locating the sensor where it can easily sense movement outside of the intended space, such as hallways, glass partitions, or adjacent rooms. If these conditions are unavoidable, use lens mask stickers to block off specific areas. See [Lens Masking](#) on [page 4](#).
- Do not install within eight feet of an HVAC airflow duct or vent.

## Installation

The sensor can be attached to a suspended ceiling or finished wallboard ceiling. An auxiliary mounting plate with integrated magnets is also provided. Determine the installation method and follow the instructions.

### Integrated Magnets

Attach sensor directly to the suspended ceiling steel T-bar frame or other metallic surface using the auxiliary mounting plate's integrated magnets.

### Double-sided Tape or Velcro™ (not provided)

Cut two lengths of tape to the appropriate size and adhere one side to the mounting plate and the other to the ceiling. Press firmly in place.

## Wire Staples to Ceiling Tile

1. Remove the sensor cover to gain access to the mounting pinholes.
2. Mark the sensor mounting location on the ceiling tile.
3. Remove the ceiling tile from the T-bar frame.
4. Insert the wire staples (provided) through the pinholes on the sensor, one set located on each side near the keyholes.
5. Poke the tines through the ceiling tile, then bend each tine over in opposite directions for a secure fit.
6. Replace the ceiling tile and reattach the sensor cover.

## Wallboard Ceiling

1. Remove the sensor cover to gain access to the mounting keyholes.
2. Mark the location of the keyholes on the ceiling.
3. Bore two holes and insert the anchors (not provided).
4. Attach the sensor to the ceiling with the screws (not provided).
5. Replace the sensor cover.

## Sensor Operation

The sensor's six solar cells harvest and store solar energy from natural or artificial light sources and provide sufficient power to operate without a battery up to seven days for the DT models, and nine days for the PIR. It can

# Echoflex Installation Guide

## Ceiling-Mount Occ/Vac Sensor (MOS)

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operate with a brief exposure to light, however for best results the sensor should be exposed to two hours of natural or artificial light (160 lux or 15 footcandles) on a daily basis. A CR2032 coin battery must be installed in the MOS-IR-xC sensor for use in high bay applications.

### Sensing Technology

**PIR sensing** is calibrated to detect motion in the human body heat range. The lens divides the viewing angle into zones to detect when infrared energy moves in and out of a zone. Movement detection is stronger when people are closer to the sensor.

**Audio sensing** filters out background noise level averaged over a 30 second window and sets its threshold slightly higher. If sound exceeds the threshold while the timers are active, the sensor's occupied state is maintained. For example, if a fan is running in the background of an occupied space, only a sound slightly louder than the fan registers.

### Key Timers

The **Audio Enabled Timer** defines the maximum duration that audio sensing is active. Each PIR detection resets the Audio Enabled Timer. The timer setting is 60 minutes, not configurable.

The **Sensor Occupancy Timer** defines the time that detection, PIR or audio sensing, is required to keep the audio active. Each audio or PIR event resets the timer. The default setting is 20 minutes and is configurable.

The sensor transmits an occupied or vacant message to the controller:

- Every 100 seconds, or
- Immediately when a change in the occupied state is detected

See the controller's Configuration Guide for details on setting up timers and occupancy or vacancy modes of control.

### Dual Technology (DT models)

When both PIR and audio sensing are enabled, the following logic is used:

- When the space is occupied, PIR and audio detection, can reset both the Sensor's Occupancy Timer and the Controller's Occupancy Timer.
- When the space is vacant and all timers have expired, only PIR detection or manual control can change the state to occupied.
- When audio is detected in the space, the Sensor's Occupancy Timer is reset, but not the Audio Enabled Timer; it expires after 60 minutes or is reset by PIR detection.
- Vacancy message is sent after 20 minutes (default) of no detection.

### PIR Sensing Only (IR models)

For PIR sensing only, the following logic is used:

# Echoflex Installation Guide

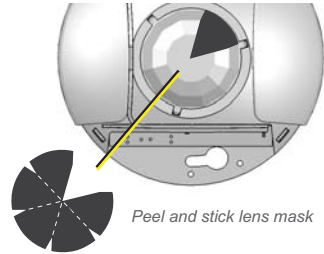
## Ceiling-Mount Occupancy/Vacancy Sensor

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- When the space is occupied, PIR detection and manual control can keep the lights on and reset the Controller's Occupancy Timer.
- When the space is vacant and controller is configured for *occupancy*, a PIR detection or manual control can change the state to occupied.
- When the space is vacant and the controller is configured for *vacancy*, only manual control can change the state to occupied.
- Vacancy message is sent after 200 seconds of inactivity, and then subsequent messages every 1000 seconds.

### Lens Masking

Lens mask stickers are provided to block a section of the lens from detecting occupancy. To attach, remove the backing and stick the mask on the sensor lens to cover the target section. Cut to size, if required.



### Linking to a Controller

The target controllers must be installed, powered, and within range of the sensor. The following process also can be used to unlink the sensor.

1. Press the **[Learn]** button on the controller to activate Link mode. If necessary, refer to the related product documentation.
2. Tap the **[Teach]** button on the sensor once.
3. Deactivate Link mode on the controller.

### Installing or Replacing the Battery

A battery is not required for normal operation of the A and B lens models if the sensor receives adequate natural or artificial light. A CR2032 may be required for installation tests, or for environments where there are long periods of inadequate light.

A battery is supplied with the IR\*C lens model only. It may be factory installed or packed separately according to shipping regulations. Insert the battery or, if installed remove the protective plastic tab.

1. Insert a screwdriver under the clear plastic cover at one of the relief tabs in the base plate and pull up. Repeat with at least two tabs until the cover pops free.
2. Use your finger to remove the old battery from the holder. Insert a new battery with the + positive side facing up and press in place.
3. Replace the cover over the sensor aligning the button hole with the **[Teach]** button and press in place.

# Echoflex Installation Guide

## Ceiling-Mount Occ/Vac Sensor (MOS)

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### Tests and Settings

The **[Teach]** button and color LEDs (green, blue, and red) are used to navigate the tests and settings menu:

- Light Level Test
- Range Confirmation Test
- Walk Test
- Sensor Setting Mode
- Change LED Display



**Note:** *Some older devices have an amber LED in place of blue.*

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### Light Level Test

The Light Level Test verifies the energy produced by the solar panels.

1. Press and hold the **[Teach]** button until the green LED starts blinking.
2. Press and hold the **[Teach]** button again until the green LED stops blinking. The green LED then repeats a number of blinks according to the detected light level (see table below).

Blinks	Lux (Footcandles)	Time to Fully Charge	Discharge Time
0	0 (0)	non-operational	n/a
1	20 to 40 (2 to 4)	operational	n/a
2	40 to 80 (4 to 8)	48 hours	100 hours
3	80 to 160 (8 to 16)	24 hours	150 hours
4	160 to 320 (16 to 32)	12 hours	200 hours
5	320+ (32+)	6 hours	225 hours

The time to fully charge the storage capacitor is from a non-operational condition. Discharge time indicates how long a fully charged sensor operates in the dark. The test repeats every two seconds and runs for 100 seconds. To exit before the time-out, press and hold the **[Teach]** button.

### Range Confirmation Test

The Range Confirmation Test verifies the wireless signal strength with a linked controller that has range confirmation capability.



**Note:** *The sensor must be fully charged or use a battery to run the test. Only one controller can be linked to the sensor to run the test properly. Disable repeaters in range.*

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1. Press and hold the **[Teach]** button until the green LED starts blinking.

# Echoflex Installation Guide

## Ceiling-Mount Occupancy/Vacancy Sensor

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2. Press and release the **[Teach]** button to cycle through the mode menu. Stop when the blue LED starts blinking.
3. Press and hold the **[Teach]** button again until the LEDs stop blinking to select Range Confirmation Test.

All three LEDs blink once when the sensor transmits or receives a Range Confirmation message. The signal strength status is then displayed (see table below).

LED Blinking	Signal Strength
Green - 2 seconds	-41 to 70 dBm
Blue - 2 seconds	-70 to -80 dBm
Red - 2 seconds	-80 to -95 dBm
No LED	No linked controllers detected

The test repeats every 10 seconds and runs for three minutes. To exit before the time-out, press and hold the **[Teach]** button.

### Walk Test Mode

The Walk Test verifies the boundaries of the motion sensor.

1. Press and hold the **[Teach]** button until the green LED starts blinking.
2. Press the **[Teach]** button to cycle through the mode menu. Stop when the red LED starts blinking.
3. Press and hold the **[Teach]** button again until the LEDs stop blinking to select Walk Test.
4. Move throughout the space including corners and areas that may be obscured from line of sight to the sensor. Each time the sensor detects movement, the red LED blinks. If audio sensing is enabled (DT model), the green LED blinks when sound is detected.
5. Adjust the lens masking, if required, to block certain areas of the installed space from sensor detection. See [Lens Masking](#) on [page 4](#).

The Walk Test times out after 100 seconds of inactivity. To exit before the time-out, press and hold the **[Teach]** button for 10 seconds.

### Sensor Setting Mode

The Sensor Setting adjusts PIR Sensitivity, Audio Sensitivity, and Sensor Occupancy Timer duration. False occupancy states caused by external elements can be reduced by adjusting the sensitivity levels.

1. Press and hold the **[Teach]** button until the green LED starts blinking.
2. Press the **[Teach]** button to cycle through the mode menu. Stop when the red and blue LEDs are blinking.

# Echoflex Installation Guide

## Ceiling-Mount Occ/Vac Sensor (MOS)

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3. Press and hold the **[Teach]** button again until the LEDs stop blinking to select Sensor Setting.
4. Press the **[Teach]** button to cycle through the options:
  - Two green blinks - PIR Sensitivity
  - Two blue blinks - Audio Sensitivity (DT model only)
  - Two red blinks - Occupancy Timer (DT model only)
5. Press and hold the **[Teach]** button again to select an option. The corresponding LED blinks according to the current setting.
6. Press the **[Teach]** button to cycle through the settings.

Blinks	PIR Sensitivity Green LED	Audio Sensitivity Blue LED	Occupancy Timer Red LED
1	High (default)	Automatic (default)	Disabled
2	Medium	Low	5 mins
3	Low	Disabled	10 mins
4			15 mins
5			20 mins (default)
6			25 mins

7. Press and hold the **[Teach]** button for 10 seconds to select, save, and exit the mode.



**Note:** *If the Occupancy Timer is disabled, the audio remains active the full duration of the Audio Enabled Timer. Disabling both the Occupancy Timer and Audio Sensitivity sets the sensor to behave like the IR model.*

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## Change LED Display

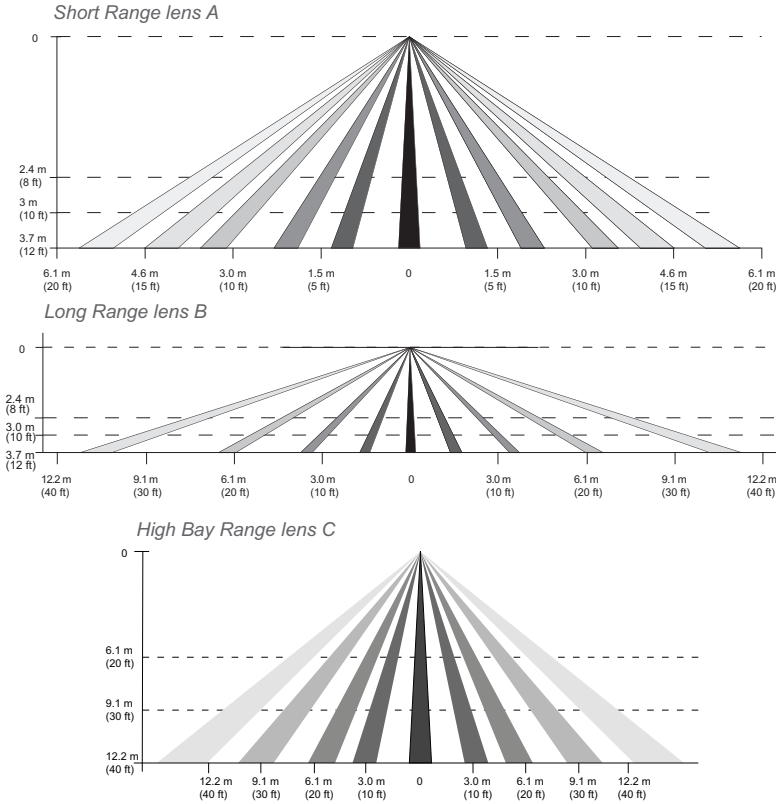
The LED Display enables or disables the LEDs. Blinking LEDs are informative, but not suitable for every installation.

1. Press and hold the **[Teach]** button until the green LED starts blinking.
2. Press the **[Teach]** button to cycle the mode menu. Stop when the green and red LEDs are both blinking.
3. Press and hold the **[Teach]** button again until the LEDs stop blinking to select Change LED Display.
4. Press the **[Teach]** button to toggle between the two states:
  - Red LED blinking - enable LEDs for motion detection
  - Green LED blinking - disable LEDs for motion detection
5. Press and hold the **[Teach]** button for five seconds to select, save, and exit.

# Echoflex Installation Guide

## Ceiling-Mount Occupancy/Vacancy Sensor

### Sensor Coverage



### Compliance and Listings

For complete regulatory compliance information, see the Echoflex MOS datasheets at [echoflexsolutions.com](http://echoflexsolutions.com).

FCC Part 15.231 Contains FCC ID: SZV-STM300U  
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1.) this device may not cause harmful interference and (2.) this device must accept any interference received, including interference that may cause undesired operation.



IC RSS-210 (902 MHz models only). Contains IC: 5713A-STM300U  
CE (868 MHz models only). CE Marking

ARIB STDT108 (928 MHz models only). Any modification to this device will make the granted designation number invalid.



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