Wall Switch Sensor Installation Guide

OWS

Product Overview

This guide covers all OWS sensor models.

OWS-IR-UW-120/277	PIR Wall Switch Sensor -line powered
OWS-DT-UW-120/277	Dual Tech Wall Switch Sensor -line powered
OWS-IR-UW-BTY	PIR Wall Switch Sensor -battery powered
OWS-DT-UW-BTY	Dual Tech Wall Switch Sensor -battery powered

U Denotes frequency = 902 MHz; W = White

The product box includes the OWS sensor, two mounting screws and this installation guide.

OWS Wall Switch Sensor Description

The Wall Switch Sensor is a wall mount occupancy sensor with integrated wall switch that transmits occupancy state and switch actions wirelessly. The line powered models of the OWS are a no-neutral conductor powered device connecting to line voltage and earth ground. Battery powered models are designed to operate for at least 12 years in typical office use conditions. The OWS is referred to as a sensor throughout this document.

The OWS is designed for small offices, boardrooms or other small enclosed spaces which require a wall switch and occupancy sensor. The OWS fits well in applications where energy codes require the lights to be manually turned ON and automatically OFF with vacancy. When used with Echoflex Solution's dimming lighting controllers, the switch also provides manual dimming control of the lights. Echoflex controlled receptacles can also be automated with the OWS so plug loads operate ON or OFF with the current occupancy state.

The OWS communicates occupancy state and switch actuation wirelessly to Echoflex controllers. The OWS models include a single method (PIR) or a Dual Technology method of occupancy detection using a PIR sensor and audio interface (any reference to audio in this guide implies DT model only). The combination of PIR sensor and audio sensing ensures positive occupant detection. Passive microphone technology provides full coverage of audible human activity across the entire PIR detection range. Innovative noise filtering is used to prevent false triggers that keep lights on in empty rooms.

The Occupancy Wall Switch Sensor is intended for indoor use only in a dry location.

Wireless Communications

The sensor transmits using EnOcean equipment profiles or EEP's. The sensor uses EEP: A5-07-01 which transmits the occupancy state (occupied or vacant) of the monitored space. The OWS switch uses EEP: F6-02-02 to transmit the switch action (On, Off, Dimming).

Operating Behavior (dual technology)

If the monitored space is vacant for a period of time, only the PIR interface will actively monitor for occupancy. The audio interface will be disabled.

Once the PIR has detected motion, an occupancy telegram is sent immediately and the audio interface is enabled.

Once the audio is enabled, two timers become active that control this interface.

1. The **Audio Enabled Timer** is reset with each PIR event and defines the maximum duration which the audio remains active. If the timer expires, the audio will be disabled, no other action will be performed at that time. Once this timer has expired, only PIR triggers can reset the timer to keep the light on. This timer is used to prevent the lights from staying on for extended periods of time in rooms that have a lot of sporadic background noise such as when somebody has left a radio or television running. The default setting for the Audio Enabled Timer is 60 minutes and is not configurable.

2. The **Sensor Occupancy Timer** is reset whenever an occupancy telegram is transmitted (be it triggered by a PIR or audio detection event.) It defines the time in which and occupancy event (PIR or audio) must be detected to keep the microphone active. The default value for this timer is 20 minutes and it is configurable to values of 5, 10, 15, 20 , 25 minutes or disabled. Once the sensor occupancy timer expires, the OWS will send out a vacancy telegram and 40 seconds later the audio will be disabled. The 40 seconds is grace time that allows an occupant to use sound to reset the sensor occupancy timer and keep the light on.

The audio interface has a sound threshold that when exceeded, will maintain the sensors occupied state while the timers are active. The threshold is slightly higher than the background noise level. The background noise level is averaged over a 30 second window and filtered out. Any other sound louder than this background level will trigger the audio.

For example: If a fan is running in the background while the space is occupied, only a sound slightly louder than the fan noise will trigger the audio.

Either the PIR or audio can maintain the sensors occupied state with telegrams being sent at minimum every 100 seconds. A red LED under the PIR lens will blink when an occupied state telegram is sent. A linked Echoflex controller has an occupancy timer that is reset only when receiving occupied state telegrams so the lights will remain on so long as the sensor continues to sense occupancy.

See the controller install guide for details on setting up this timer and occupancy or vacancy modes of control.

Operating Behavior (PIR model only)

The OWS-IR behaves similarly as the dual tech model; when vacant the PIR monitors for occupancy. Once motion is detected and the occupancy state is transmitted to the receivers, the minimum period to the next telegram is > 100 seconds. If no motion is detected in 200 seconds, a vacant telegram is sent. The sensor will transmit telegrams indicating vacancy every 1000 seconds. So long as linked controllers receive an occupied state telegram before their occupancy timer expires, the lights will remain on.

Preparing to Install the OWS

The OWS uses a PIR sensor that detects motion by measuring the infrared energy given off by objects. The sensor is calibrated to detect the heat range of human body temperature. The sensor has a lens that breaks the viewing angle of the sensor into zones (movement zones). It is the movement of the infrared energy moving in and out of a zone that defines occupancy.

The PIR interface cannot detect motion through solid objects including items placed by a tenant such as file cabinets or bookshelves. Use the dual tech model for spaces with visual obstacles between the sensor and areas of intended motion.

The mounting location of the sensor is important as this will directly affect the receivers reception of the telegrams. Before installing, refer to the sections in the guide detailing the installation of wireless devices, layout tips and test operation modes.

You will require hand tools to gain access to the junction box and remove any cover plates or other hardware.
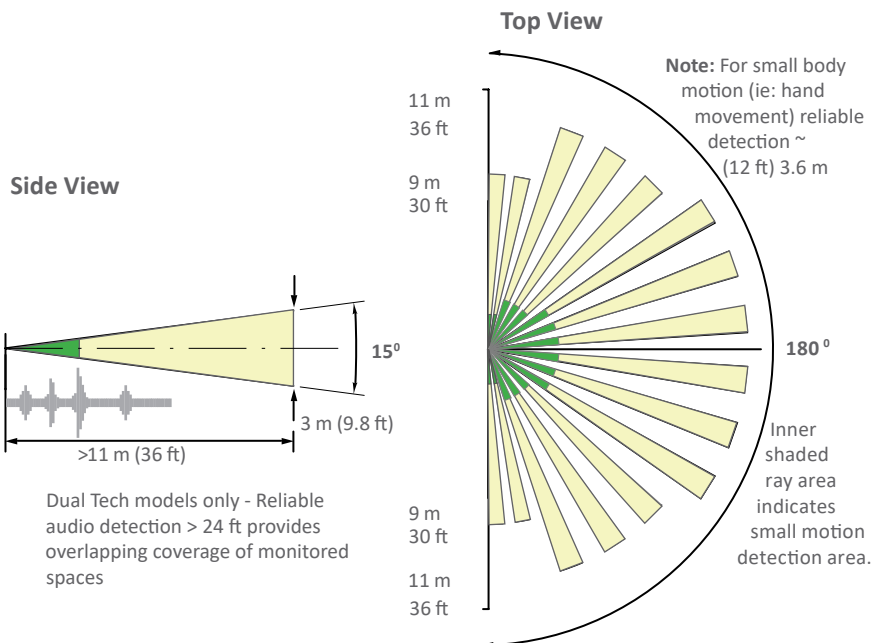
WARNING: ELECTRICAL SHOCK HAZARD - THE LINE POWERED SENSOR USES HIGH VOLTAGE AND SHOULD ONLY BE INSTALLED BY A QUALIFIED INSTALLER OR ELECTRICIAN. BEFORE INSTALLING THE SENSOR, INSURE THE ELECTRICAL POWER IS OFF. FOLLOW THE APPROPRIATE LOCKOUT/ TAGOUT PROCEDURES AS DESCRIBED IN NFPA STANDARD 70E

Installing the OWS

Review these instructions completely before installing the OWS Wall Switch Sensor.

Note: *The OWS should only be installed in an indoor location. It must be mounted in an electrical box, preferably non-metallic.*

Top View

Note: For small body motion (ie: hand movement) reliable detection ~ (12 ft) 3.6 m

11 m
36 ft

9 m
30 ft

Side View

15°

3 m (9.8 ft)

>11 m (36 ft)

Dual Tech models only - Reliable audio detection > 24 ft provides overlapping coverage of monitored spaces

180°

Inner shaded ray area indicates small motion detection area.

9 m
30 ft

11 m
36 ft

Installing the OWS (continued)

1. Locate the circuit breaker panel and turn off the power to the circuit.
2. Remove any face plates from the junction box.
3. The orange antenna wire should be left in the antenna channel as shipped. Do not cut or cap the antenna wire.
4. For battery powered OWS models, ensure the junction box is suitable and safe. (any wires marreted ie.)
5. Refer to the wiring diagram to connect the 120/277 models of OWS to the line power and ground. Use wire nuts on all connections.
6. Restore power to the circuit.
7. Before installing the faceplate, the OWS should be linked to a receiver if not done previously. Refer to the section later in this guide on the linking process.
8. Install the faceplate (not included). A non-metallic faceplate is highly recommended.

Black
120/277VAC
Green

OWS

Orange
Antenna
Wire.
Do not cut
or cap
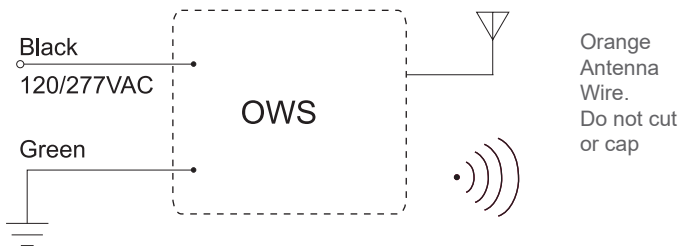
Ground connection is required for proper operation and safety. No-neutral design

Wiring Instructions - (for OWS-IR-UW-120/277 and OWS-DT-UW-120/277)

Power is connected to the Black (120VAC or 277VAC) wire and the Green (Ground) wire is connected to building ground. The OWS is a no-neutral conductor design meaning there is no White (Neutral) wire required.

Wire specifications: Min wire size 300V 14 AWG 60° C

Batteries for the OWS-IR-UW-BTY and OWS-DT-UW-BTY

The battery powered OWS come with 2 x AA Energizer lithium batteries. These batteries are non-serviceable as they are expected to perform for the life of the product.

Indicator LED's

Three LEDs (red, yellow and green) are located behind the PIR lens of the sensor.

During normal operation the red LED will blink when the sensor is sending an occupied telegram.

The LEDs are also used during the selection of the test modes and to indicate status information.

See the Test Mode section for more details.

Linking Process:

The linking process requires the controller or receiver to be mounted, powered and within range of the OWS to be linked. Each Echoflex controller can support up to 20 linked devices. Linking the OWS occupancy sensor and the OWS switch will consume two of the receiver's available linked devices. The controller's blink code will indicate the number and type of objects linked and can be checked to confirm the linking process completed successfully (Consult the manufacturer's controller/receiver install guide for more information).

Linking the Wireless Switch

1. Place the receiver into LEARN mode by pressing the Learn button on the receiver. Consult the manufacturers directions if needed.
2. Quickly click the top side of the switch rocker 3 times.
3. Deactivate LEARN mode at the receiver. Test operation of the switch by switching ON and OFF.

    Note: Repeating these steps will UN-Learn the switch from the controller.

Linking the Wireless Occupancy Sensor

1. Remove the OWS faceplate.
2. Place the receiver into LEARN mode by pressing the Learn button on the receiver. Consult the manufacturers directions if needed.
3. Tap the Teach button (right of the PIR lens).
4. Deactivate LEARN mode at the receiver.

    Note: Repeating these steps will UN-Learn the sensor from the controller.

Test and Configuration Modes

The Test and Configuration Mode provides access to the following facilities:

1. Walk-Test mode

2. Range Confirmation mode (battery powered OWS only)

3. Sensor Settings mode (PIR sensitivity, Audio Sensitivity, Occupancy Timer duration)

4. LED indication enable/disable

The top level Test and Configuration Mode menu is entered by pressing and holding the TEACH button until all LEDs blink simultaneously (about 5 seconds). From there each of the above modes can be selected. Detailed operation of those modes are described in the following sections.

Walk-Test Mode

Walk-test mode allows the installer to verify areas that are within range of the motion sensor. The faceplate must be removed to allow access to the teach button.

To enter walk-test mode, press and hold the teach button until all the LEDs blink simultaneously (about 5 seconds).

5. A quick press of the button at this level will allow you to scroll between the test/setting modes. When the red LED is blinking, go to step 3.
6. Press and hold the button again until the LED stops blinking to select this mode, about 5 seconds.

The red LED will blink every time a PIR motion sensor trigger is detected and green for audio triggers. The test times out in 20 minutes. If a faster exit from walk-test mode is required, press any rocker button or press and hold the teach button for 10 seconds.

> **(i) Note:**   *New settings do not take affect until you save and exit.*

Range Confirmation Test (battery powered OWS only)

This test provides visual feedback of the sensors signal strength by a linked receiver with range confirmation capability.

1. To enter Range Confirmation Test mode, press and hold the teach button until the green LED begins to blink (about 5 seconds).
2. A quick press and release of the button at this point will allow you to select between test modes. Pressing and releasing the teach button scrolls through the LED indicators. When the amber LED is blinking, go to step 3.
3. Press and hold the teach button again for 5 seconds to select Range Confirmation Test.

NOTE: Range Confirmation is only available with "F series" or later Echoflex Controllers

NOTE: Only one receiver can be linked to the sensor for proper operation of the test.

NOTE: Disable repeaters in range for proper test operation.

All three LED's will blink (for 1 second) in this test mode when the sensor transmits or receives a Range Confirmation Telegram followed by the sensor displaying the linked signal strength status for 2.5 seconds, see table below.

LED	Signal Strength
Green - Blinking 2.5 sec	-41 to -70 dBm
Amber - Blinking 2.5 sec	-70 to -80 dBm
Red - Blinking 2.5 sec	-80 to -95 dBm
No LED	No linked receivers detected

The test will repeat every 10 seconds and run for a duration of 3 minutes. You may quit the test at any time by pressing the teach button for 6 seconds.

Sensor Setting Mode

This mode allows adjustment of the PIR Sensitivity, Audio Sensitivity and Sensor Occupancy Timer duration. The faceplate must be removed to allow access to the teach button.

1. To enter sensor setting mode, press and hold the teach button until all the LEDs blink simultaneously (about 5 seconds).
2. A quick press of the TEACH button at this level will allow you to scroll the top level menu of the Test and Configuration mode. Tap the TEACH button until the red and yellow LEDs are blinking simultaneously. Proceed to step 3.Press and hold the button again until the LEDs stop blinking to select this mode, about 5 seconds.
3. A quick press of the button at this level scrolls between:
4. Double Green - PIR Sensitivity
5. Double Amber - Audio Gain (DT model only)
6. Double Red - Occupancy Sensor Timer (DT model only)
7. Press and hold the teach button again for 5 seconds to select the desired sensor setting. The corresponding LED will blink according to the current setting. Press the button to scroll through the available settings.

   PIR Sensitivity - green LED blinks indicate setting
   > 1 blink = high (default)
   > 2 blinks = medium
   > 3 blinks = low

Audio Sensitivity - amber LED blinks indicate setting (DT model only)

> 1 blink = automatic (default)
>
> 2 blinks = low sensitivity
>
> 3 blinks = disabled

> (i) **Note:** *If the disabled setting is selected for Audio Gain, this will disable the audio input however the Sensor Occupancy Timer will remain active.*

Sensor Occupancy Timer - red LED blinks indicate setting (DT model only)

> 1 blink = disabled
>
> 2 blinks = 5 minutes
>
> 3 blinks = 10 minutes
>
> 4 blinks = 15 minutes
>
> 5 blinks = 20 minutes (default)
>
> 6 blinks = 25 minutes

NOTE: If the Disabled setting is selected for the Sensor Occupancy Timer, the audio will remain active the entire 60 minute duration of the Audio Enabled Timer. Disabling both the Sensor Occupancy Timer and Audio Sensitivity setting will have the sensor behave exactly like the IR model.

8. To save the Sensor setting, press and hold the teach button until all the LEDs double blink. The unit will now be in normal operating mode with the new setting in effect.

LED Indication Enable/Disable Mode

During normal operation, the red LED will blink when the sensor transmits status after detecting occupancy. This operation allows the user to turn off the indicator LED. The faceplate must be removed to allow access to the teach button.

> (i) **Note:** *New settings do not take affect until you save and exit.*

1. To enter LED indication mode, press and hold the teach button until all the LEDs blink simultaneously (about 5 seconds).
2. A quick press of the button at this level will allow you to scroll between the test/setting modes. When the green and red LEDs are blinking, go to step 3.
3. Press and hold the button again for 5 seconds to select LEDs On/OFF.
4. A quick press and release of the button at this level toggles between Double Green (LED ON) and Double Red (LED OFF) - When the desired state is displayed, press and hold the button for approximately 5 seconds to save and exit to normal operating mode.

Restore Factory Defaults (battery powered OWS only)"

To restore the OWS to its factory defaults. Press the following button sequence: press and hold the TEACH button; immediately after and while still holding the TEACH button press and hold the ROCKER-UP. Keep holding both TEACH and ROCKER-UP for about 5 seconds until the unit displays it's restart indication: the LED sequence GREEN->YELLOW->RED. Immediately release the buttons while the LED sequence is being displayed.

Wireless System Layout Hints

Avoid locating transmitters and receivers on the same wall.

Avoid locating transmitters and receivers where the telegrams must penetrate walls at acute angles. This increases the material the telegram must pass through reducing the signal power.

Avoid large metal obstructions as they create radio shadows. Place receivers in alternate locations to avoid the shadow or use repeaters to go around the obstacle.

Hardware Specifications

Power Supply (OWS-IR-UW-120/277 and OWS-DT-UW-120/277)

    120 or 277VAC @ 60 Hz
    Power Consumption: 450 µA max

Power Supply (OWS-IR-BTY and OWS-DT-BTY)

    2 x AA Energizer lithium batteries (not user serviceable)

Battery life design target for battery operated models: at least 12 years in typical office use situations at 25°C.

Outputs: [3] LEDs - Green, Red, Yellow

Inputs: Teach button
    Rocker switch
    Communications: 902MHz radio
    with whip antenna

For indoor use only, dry location

Operating Temperature:	14°F to 113°F (-10°C to 45°C)
Relative Humidity:	5% - 95% RH (non-condensing)
Weight:	2.12 ounces (60 grams)
Dimensions:	1.6" x 4.2.5" x 1.7" (41.5mm x107mm x42.5mm)

Safety Certifications

- ETL Listed Component
- Conforms to UL 773A
- Certified to CAN/CSA Std. C22.2 No.284-16

Agency Listings and Compliance

FCC and IC Certifications (902 MHz)

The enclosed device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:

    (I.) this device may not cause harmful interference and

    (ii.) this device must accept any interference received, including interference that may cause undesired operation.

Contains FCC ID: SZV-TCM320U
Contains IC: 5713A-TCM320U

Energy Code Compliance

- California Energy Commission Title 24
- Washington State Energy Code
- ASHRAE 90.1-2013
- IECC 2015