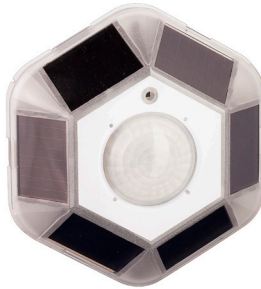# MOS-MT wireless ceiling mount IoT sensor
Installation Guide

Overview

This guide covers the MOS-MT IoT Ceiling Sensor.

1. MOS-MT-*x*A Motion, photo, temperature and audio sensor with small motion short range lens (1000 sq. ft.)
2. MOS-MT-*x*B Motion, photo, temperature and audio sensor with large motion large range lens (1900 sq. ft.)

Where x is the frequency of the unit: U=902 MHz or Y=868 MHz.

The package includes the occupancy sensor, lens mask sticker, mounting plate with integrated magnets for T-Bar ceiling, wire straps and installation guide. A programming guide with detailed information on implementation is available for download on www.echoflexsolutions.com.

Sensor Description

The MOS-MT IoT ceiling sensor is a self-powered wireless sensor offering occupant detection, light level, temperature and sound level monitoring for the collection of and sharing of data for Internet of Things. Facility operations use the IoT sensor data via gateways or interfaces to track occupancy levels and environment mapping for building-use optimization. Areas not being used can be placed into set-back mode to conserve energy. The detector is optimized for ceiling heights of 8 - 10 feet (2.4 - 3 meters).

These sensors are intended for indoor use only.

> (i) **Note:** *The MOS is a solar powered device that absorbs solar energy storing it for use during low light periods. Before assigning the MOS device to a receiver/controller, the device should be exposed to a good light source for a minimum of 5 minutes or install the start assist battery.*

Sensor Operation

The MOS-MT IoT sensor monitors occupancy, light level, temperature and sound level in interior spaces. The sensor is powered by solar energy from natural or artificial light sources. Powered by six solar cells, the sensor can operate without battery up to 5 days. The sensor will operate even with a brief exposure to light, however for best results the sensor should be mounted in a location with exposure for 2.5 hours of natural or artificial light (minimum of 500 lux or 46 foot-candles) on a daily basis.

The sensor must be within range of any receiving gateway or interface. The MOS-MT and gateway/interface should be installed within 80' (24m) of each other. For applications exceeding 80' (24m) range, telegram repeaters may be needed to extend reception range.

Wireless System Layout Hint

- Reception range of 24 m (80 ft) - commercial office spaces (typical), up to 100m (330 ft) line of sight
- 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.
- Do not locate receivers close to other high frequency transmitters.
- Leave at least 3' between the receiver and any other source of interference including, ballasts, LED drivers, computers, video equipment, Wi-Fi/LAN routers, GSM modems and monitors.
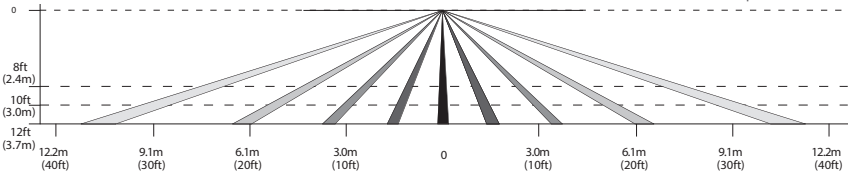
Sensor Range

The sensor is offered with different lens options.

There is a lens with a high sensor ray density pattern (lens A) suitable for small motion detection, however this lens has shorter detection range.

Short Range Lens (A)
1000 sq.ft @ 8 ft.
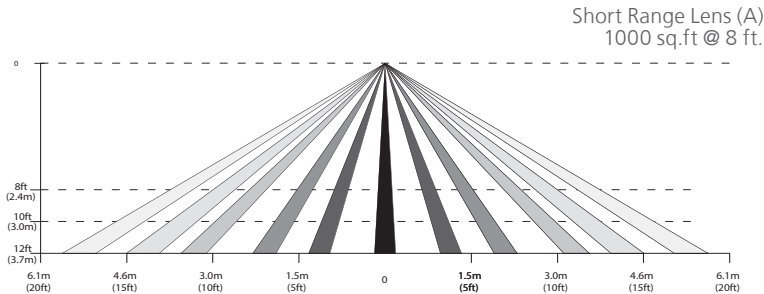
The second lens (B) has a broader range but is less sensitive for small motion detection.

8ft (2.4m)								
10ft (3.0m)								
12ft (3.7m) 12.2m (40ft)	9.1m (30ft)	6.1m (20ft)	3.0m (10ft)	0	3.0m (10ft)	6.1m (20ft)	9.1m (30ft)	12.2m (40ft)

Mounting the Sensor

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.

> **i** **Note:** The sensor cannot detect motion through solid objects including items placed by a tenant, such as file cabinets or shelves.

> **i** **Note:** Do not locate the sensor near forced air vents as hot moving air may cause the sensor to false trigger movement. Leave at least 4' (1.2 m) minimum between air vents and the sensor

For the best sensor performance, mount the sensor so at least one of the solar cells is facing a light fixture. The sensor will operate in low light levels however for best performance, a minimum of 5 foot candles (54 lux) must be maintained. If the controlled lights in the space are dimmable either manually or via daylight harvesting, insure the light level at the lowest dimmed level meets this 5 FC requirement. If the light value does not meet this requirement, install a battery.

Installing or Replacing the Start Assist Battery

The battery is not required for normal operation. The battery (model CR2032) may be useful for installation purposes (test mode operation and linking) or for applications where there are long periods of no light.

1. Using a small screwdriver for leverage, insert under the clear plastic cover at one of the relief tabs in the base plate and pull up. You will need to repeat with at least two tabs until the cover pops free.
2. Using a small flat head screwdriver or pen as a lever, insert pointed end under the clear plastic battery retaining clip's edge and pop the clip off. Using a finger, remove the old battery by pulling the battery free from the holder.
3. Insert the new CR2032 coin cell battery with the + positive side facing up and press in place with your finger.
4. Align the two straight edges of the retaining clip with the battery holder and press the clip in with your finger.
5. Replace the cover over the sensor aligning the button hole with the teach button and press in place.

Installation Instructions.

Choose a mounting method.

1. The axillary mounting plate allows mounting with the integrated magnets to a steel T-bar ceiling frame or other metallic surface by placing the sensor on the metal rail.

2. With screws and anchors (not provided) to a wall-board ceiling.
   i. Use a pencil to mark the mounting base screw hole locations (sensor unattached).
   ii. Using a drill, bore the two holes and insert the anchors.
   iii. Install the mounting plate adapter to the ceiling with the screws.
   iv. Place the sensor so the keyholes are over the pegs on the mounting plate adapter and slide the sensor sideways to align the sensor and mounting plate.

3. With the provided wire straps to a soft ceiling tile.
   i. Mark the sensor mounting location on the ceiling tile with a pencil. Remove the ceiling tile from the T-bar frame.
   ii. Insert the soft ceiling tile adapters through the pair of small holes beside both keyholes on the sensors mounting plate.
   iii. Poke the tines through the ceiling tile, then bend each tine over in opposite directions for a secure fit.
   iv. Replace the ceiling tile and attach the sensor to the mounting plate.

4. With double sided tape or Velcro™, not provided. Cut two lengths of tape and remove the backing. Place on the mounting surface of the sensors back plate, pressing down. Remove the backing from the tape's other side and place the sensor on the ceiling surface, pressing firmly.

Lens Masking

Lens mask stickers are provided in the packaging for your convenience to block areas (such as a door way to a hall ie.)

1. As needed, peel off the lens masks to fit the desired area to be blocked.

2. Apply the mask gently to the section of the lens exterior to block the required area from occupancy sensing.

Linking the Sensor to a Receiver

The MOS-MT must be linked with a receiver, via the steps below if using the default VLD standard EnOcean EEP of D2-14-52

1. Activate LEARN or LINK mode at the receiver, if necessary refer to the manufacturers documentation.

2. Press the MOS-MT's teach button.

3. Deactivate LEARN mode at the receiver.

If you require General Purpose telegrams, see the EEP select mode section in

this guide. Also, a GP teach-in process is required before its data messages can be properly interpreted. See the programing guide (URL on page 8) for more information

Test Operating Modes

The following tests can be selected when in test mode:

- Light Level Test
- Walk Test Mode,
- PIR Audio / EEP configuration mode
- Occupancy LED indication enable/disable

> **i** **Note:** There a 3 LED colors, green, blue and red. Some units may have an amber LED in place of the blue LED. For clarity this guide assumes a blue LED. Blue(A) will be used when discussing this colored LED..

Light Level Test: This test provides visual feedback of the immediate energy produced by the solar panels.

1. To enter Light Level Test mode, press and hold the teach button until the green LED begins to blink (about 6 seconds).
2. Press and hold the teach button again until the green LED stops blinking, about 6 seconds. The green LED will start blinking faster in accordance to the light level it is detecting, see table below.

Light Level Test Indication

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

The time to fully charge is based on the storage capacitor charging from a non-operational condition. Discharge time indicates how long a fully charged sensor will operate in the dark. The test will repeat every 2 seconds and run for a duration of 100 seconds. You may quit the test at any time by pressing the teach button for 6 seconds.

Walk Test Mode

Walk test mode allows the installer to verify areas that are within range of the motion sensor.

1. To enter walk test mode, press and hold the teach button until the green LED begins to blink (about 6 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 red LED is blinking, go to step 3.
3. Press and hold the teach button again for 6 seconds to select walk test.

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The red LED will blink every time a motion sensor trigger is detected. The test times out in 100 seconds. If a faster exit from walk test mode is required, press and hold the teach button for 10 seconds.

PIR Audio / EEP configuration mode Mode

The PIR Audio /EEP configuration mode has a sub menu which allows:

- PIR sensitivity select
- Occupancy duration select
- EEP setting select

The **PIR sensitivity select mode** allows the user to change the PIR sensitivity. False occupancy states caused by other elements can be reduced by selecting the minimum sensitivity level. The default setting is high sensitivity.

1. To enter sensitivity adjust mode, press and hold the teach button until the green LED begins to blink (about 6 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 red and blue(A) LEDs are blinking, press and hold the teach button again for 6 seconds to enter PIR Audio /EEP configuration mode.

3. A quick press and release of the button at this point will allow you to select between sub menu modes. When the green LED repeats double blinks, hold the teach button for 6 seconds to select sensitivity adjust mode.

A press and release of the button will allow you to scroll through the settings as shown in the table below.

Setting	Indication
High	1 blinki
Medium	2 blinks
Low	3 blinks

To select a setting press and hold the teach button for 6 seconds when the desired LED is blinking. To exit without saving, allow the test to time-out in 60 seconds.

Occupancy duration select allows the user to change the amount of time an occupancy event will hold before an unoccupied signal is transmitted.

To enter occupancy duration select mode,

1. Press and hold the teach button until the green LED begins to blink (about 6 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 red and blue(A) LEDs are blinking, press and hold the teach button again for 6 seconds to enter PIR Audio /EEP configuration mode.

3. A quick press and release of the button at this point will allow you to select between sub menu modes. When the red LED repeats double

blinks, hold the teach button for 6 seconds to select occupancy duration select.

A press and release of the button will allow you to scroll through the settings of a repeated blink pattern as shown in the table below. The default duration is 15 minutes.

Occupancy Duration	Indication- Red LED
Disabled	1 blink
5 minutes	2 blinks
10 minutes	3 blinks
15 minutes	4 blinks
20 minutes	5 blinksg
25 minutes	6 blinks

To select a setting, press and hold the teach button for 6 seconds when the desired LED pattern is blinking. To exit without saving, allow the test to time-out in 60 seconds.

The **EEP select mode** allows the user to change from EnOcean's Variable Length Data EEP of D2-14-52 (Sound, Pressure, Illumination, Presence and Temperature Sensor) to a Generic Profile telegram.

To enter **EEP select mode**, press and hold the teach button until the green LED begins to blink (about 6 seconds).

1. 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 red and blue(A) LEDs are blinking, press and hold the teach button again for 6 seconds to enter PIR Audio /EEP configuration mode.

2. A quick press and release of the button at this point will allow you to select between sub menu modes. When the red and blue(A) LEDs repeats double blinks, hold the teach button for 6 seconds to select EEP select mode.

A press and release of the button will allow you to toggle between the two options: Double blue(A) and red blink to select the VLD EEP - D2-14-52 or Single blue(A) and red blink to select a Generic Profile telegram.

To select a setting press and hold the teach button for 6 seconds when the desired LED pattern is blinking. To exit without saving, allow the test to time-out in 60 seconds.

Occupancy LED Indication Enable/Disable

Note: The settings do not take effect until you save and exit.

1. Enter Test mode as usual, press and hold the teach button until the green LED begins to blink (about 6 seconds).

2. A quick press and release of the button at this point will allow you to select between test modes. When the green and blue(A) LEDs are both blinking simultaneously, go to step 3.

3. Press and hold the teach button again for about 6 seconds until they stop blinking.

4. A blink will resume. The red LED blinking indicates the motion detection LED is active (default). The green LED blinking indicates the LED is inactive. Tapping the teach button will toggle between these two states.

5. Save and exit by press and holding the teach button for 5 seconds.

Energy Code Compliance

California Energy Commission Title 24

The MOS-MT sensor is built in an ISO9001 certified facility and is RoHS compliant

Agency Listings

FCC Part 15.231 (902 MHz models only)

Contains FCC ID: STM300U

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.

IC RSS-210 (902 MHz models only)

Contains IC: 5713A-STM300U

CE (868 MHz models only)

CE Marking

ARIB STDT108 (928MHz models only)

Complies with the Japanese radio law and is certified according to ARIB STDT108. This device should not be modified (otherwise the granted designation number will become invalid)

R 206-000372

End of life: Must be taken apart to recycle: Plastic case - 7 / Remove battery / Remove PCB assembly

For more information see the programming guide:

https://www.echoflexsolutions.com/files/8DC-5757-MOS-MT-Programming-Guide.pdf

Scan the QR code to see the programming guide

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