Echoflex Installation Guide
## Photo & CCT Sensors TAP-31 TAP-41

Overview

The Photo Sensor (TAP-31) and CCT & Photo Sensor (TAP-41) are wireless solar-powered sensors that provide a reliable and simple method for increasing energy savings by adding daylight harvesting capability to an Echoflex lighting control system.

The TAP-31 supports two equipment profile settings that measure ambient light intensity in two ranges: 0–1,020 lux (0–95 fc) and 0–65,535 lux (0–6,090 fc).

The TAP-41 combines correlated color temperature (CCT) and light intensity monitoring to match fixture output with outdoor values or predefined color temperature values. The sensor supports four equipment profile settings that monitor exterior light levels up to 100,000 lux (9,290 fc) and a color temperature range of 2,000–7,500 kelvin to maximize the lighting adjustment for a tunable white LED fixture throughout the day.
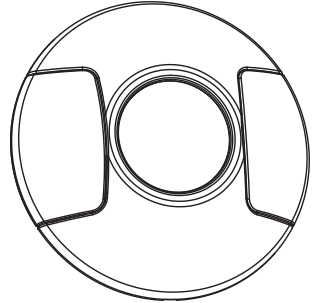
This document covers installation, testing, and settings that apply to all TAP-31 and TAP-41 models. The product package includes the sensor and two wire staples.

Prepare for Installation

To ensure optimal function, consider the installation environment and the following guidelines:

- For indoor use only. Operating temperature -25°C to 65°C (-13°F to 149°F), 5%–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) unobstructed view. Consider adding a repeater to extend the wireless signal, if required.
- Before linking the sensor, expose it to a good light source for at least five minutes at 200 lux (19 fc).

Supplies required to install (not provided):

- Two #6 screws, double-sided tape, or Velcro®

Echoflex Installation Guide
Photo & CCT Sensors

Installation

The sensor should be installed in a location where it has direct exposure to a window or skylight. For example, mount the sensor on the ceiling, aligned with a window about 1.2 m (4 ft) away.

The sensor can be attached to most surfaces; suspended ceiling tile, finished wallboard, or other surfaces using a flexible adhesive.

Note: *A concrete or metal mounting surface can limit radio communication. Create some separation by mounting the sensor first on non-metalic material, e.g., 1/2-inch plywood.*

The location and position of the sensor directly affects the quality of messages received by the linked controller. Determine the installation method and follow the instructions.

Note: *Consider linking the TAP-31 TAP-41 while you have access and before replacing the cover. See **Link to a Controller on the facing page**.*

Wire Staples to Ceiling Tile

1. Use your fingers to remove the sensor's cover, flexing it gently to release the tabs that hold it in place. If you have difficulty, try inserting a small flatblade screwdriver under one of the release tabs.
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.

Keyhole
Pinholes
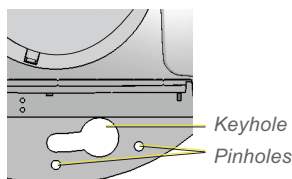
Wallboard Ceiling

1. Use your fingers to remove the sensor's cover, flexing it gently to release the tabs that hold it in place. If you have difficulty, try inserting a small flatblade screwdriver under one of the release tabs.
2. Mark the location of the keyholes on the ceiling.
3. Bore two holes and insert screw anchors (not provided).
4. Attach the sensor to the ceiling with screws (not provided).
5. Replace the sensor cover.

Echoflex Installation Guide
Photo & CCT Sensors

Integrated Magnets

Attach the sensor directly to the suspended ceiling T-bar frame using the two integrated magnets.

Adhesive

Use double-sided tape or Velcro (not provided). Cut a piece of double-sided adhesive tape or adhesive-backed Velcro to the appropriate length and press firmly in place.

Link to a Controller

The compatible target controller must be installed, powered, and within range of the TAP-31 TAP-41.

> **Note:** *The linking process can be used both to link a device to a controller and to unlink a linked device from a controller.*

1. Use your fingers to remove the sensor's flexible cover and access the **[Teach]** button. If you have difficulty, consider inserting a small flatblade screwdriver under one of the release tabs.
2. Press the **[Learn]** button on the controller to activate Link mode. If necessary, refer to the controller product documentation.
3. Press the **[Teach]** button on the sensor once to send a link message. An LED blinks to confirm a successful transmission.
4. Deactivate Link mode on the controller before attempting to link to any other controllers.

Battery holder

Teach button
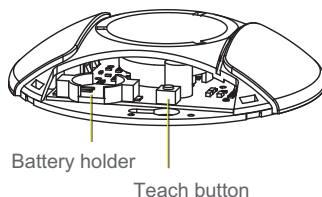
Battery Power

A CR1632 battery is not required for normal operation if the sensor receives adequate natural or artificial light. See the table in the ***Light Level Test on page 5***. A battery (not provided) may be required to run installation tests or when the artificial light is insufficient to power the sensor.

To install the battery:

1. Use your fingers to remove the sensor's cover, flexing it gently to release the tabs that hold it in place. If you have difficulty, try inserting a small flatblade screwdriver under one of the release tabs.
2. Insert a new battery in the holder with the + positive side facing up and press in place.
3. Replace the sensor cover.

Echoflex Installation Guide
Photo & CCT Sensors

Sensor Operation

The sensor records sample values at a rate based on the current ambient light level and the stored energy in the sensor. The sensor is configured to transmit messages at a heartbeat rate and immediately when daylight levels change more than 12%. During normal operation, the heartbeat rate is 10 times longer than the sample rate.

The table below shows the range of ambient light values that determine the sample rate compared to the heartbeat rate. The sample rate marks the recording of daylight level values used to calculate the percent of change, while the heartbeat rate marks the transmission of a message.

Ambient Light Value Lux (Footcandles)	Sample Rate	Heartbeat Message Rate
< 10 (< 1)	128 seconds	> 21 minutes
< 50 (< 4.6)	64 seconds	10 minutes
< 100 (< 9.3)	32 seconds	320 seconds
> 100 (> 9.3)	16 seconds	160 seconds

For the sensor to send an on-change message, it needs sufficient power:

- Stored energy above 3.5 V, or
- Ambient light level above 300 lux (27.9 fc), or
- An installed battery

On-Change Formula

The sensor compares the current sample value to an average of the last three readings. If the difference is more than 12%, the sensor transmits the value immediately.

The averaged reading ensures that the sensor sends multiple messages if a large change occurs before it returns to sending messages at the default heartbeat transmission rate.

If both the average lux value and the current lux value are less than 50 lux, the on-change transmission behavior is disabled.

Note: *On-change behavior for the TAP-41's CCT value is determined in a similar way as the lux level. If a large step change occurs, the CCT in kelvin can be smoothed out using a calculated average reading.*

Echoflex Installation Guide
Photo & CCT Sensors

Tests and Settings

Use the **[Teach]** button and color LEDs to navigate the Tests and Settings menu. Remove the cover to access the **[Teach]** button located beside the battery clip. The LEDs display through the front lens.

ℹ️ **Note:** *A battery is required to run tests or change settings. If you cannot access the LED blink menu, install a good battery. See* ***Battery Power on page 3*** *for installation instructions.*

- *Light Level Test* (green LED)
- *Range Confirmation* (blue LED)
- *Rapid Response Test* (red LED)
- *EEP Select* (blue and red LEDs)

The menu times out after two minutes of inactivity.

Light Level Test

The Light Level Test quantifies the amount of energy produced by the solar cells and confirms a good installation location.

1. Press and hold the **[Teach]** button until the green LED is displayed. Release the button to enter the menu and display the first item, the blinking green LED.
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. The sensor reevaluates the light level every two seconds.

Blinks	Ambient Light Lux (Footcandles)	Time to Fully Charge	To Maintain Charge
0	< 40 (< 3.7)	Non-operational	N/A
1	40–100 (3.7–9.3)	Operational	N/A
2	100–200 (9.3–18.6)	30–60 hours	8 hours per day
3	200–400 (18.6–37.2)	15–30 hours	4 hours per day
4	400–1000 (37.2–92.9)	7–15 hours	2 hours per day
5	> 1000 (> 92.9)	3–7 hours	1 hour per day

The test repeats every two seconds and runs for 100 seconds. To exit before the time-out, press and hold the **[Teach]** button for 10 seconds.

Echoflex Installation Guide
Photo & CCT Sensors

Range Confirmation

The Range Confirmation test quantifies the strength of the wireless signal to a linked controller that has range confirmation capability.

> ⓘ **Note:** *Only one controller can be linked to the TAP-31 TAP-41 to run the test properly. Disable repeaters that are in range.*

1. Press and hold the **[Teach]** button until the green LED is displayed. Release the button to enter the menu and display the first item, the blinking green LED.
2. Press and release the **[Teach]** button to cycle through the menu of color LEDs and stop when the blue LED is blinking.
3. Press and hold the **[Teach]** button until the LED stops blinking to initiate the Range Confirmation test.

   After the TAP-31 TAP-41 transmits and receives a Range Confirmation message, the signal strength status is displayed as an LED blink color.

LED Blink	Signal Strength
Green	-41 to -70 dBm (best)
Blue	-70 to -80 dBm (good)
Red	-80 to -95 dBm (poor, move closer)
No LED	No linked controllers detected

The test repeats every five seconds and runs for 50 seconds. To exit before the time-out, press and hold the **[Teach]** button.

Rapid Response Test

The Rapid Response Test confirms the settings on powered controllers to which the TAP-31 TAP-41 is linked. The test accelerates the sensor's message rate, making the controller respond to light level changes faster. The transmission rate is increased to every 16 seconds for 100 seconds and then returns to normal operation.

1. Press and hold the **[Teach]** button until the green LED is displayed. Release the button to enter the menu and display the first item, the blinking green LED.
2. Press and release the **[Teach]** button to cycle through the menu of color LEDs and stop when the red LED is blinking.
3. Press and hold the **[Teach]** button to initiate the Rapid Response Test.
4. Vary the light level on the sensor to test the dimming and recovery response of the connected light fixture.
5. To exit before time-out, press and hold the **[Teach]** button.

Echoflex Installation Guide
Photo & CCT Sensors

EEP Select

The default EEP setting is configured to work with Echoflex controllers. You can configure the sensor to be compatible with controllers that use an alternate profile.

1. Press and hold the **[Teach]** button until the green LED is displayed. Release the button to enter the menu and display the first item, the blinking green LED.
2. Press and release the **[Teach]** button to cycle through the menu of color LEDs and stop when the blue and red LEDs are both blinking.
3. Press and hold the **[Teach]** button until the LEDs stop blinking to select EEP Select. The blue and green LEDs blink code displays the current setting.
4. Press and release the **[Teach]** button to navigate the options.

Indication	Setting
1 blue and green blink	EEP A5-06-02 Light Sensor • Light: 0–1,020 lux (0–95 fc) • Supply voltage: 0–5.1 V
2 blue and green blinks	EEP A5-06-04 Curtain Wall Brightness Sensor (default) • Light: 0–65,535 lux (0–6,090 fc) • Battery level: 0–100%
3 blue and green blinks	EEP D2-14-25 Light Sensor and CCT * • Light: 0–100,000 lux (0–9,290 fc) • CCT: 0–32,767 kelvin
4 blue and green blinks	General Profile* • Light: 0–100,000 lux (0–6,090 fc) • CCT: 0–10,000 kelvin
* TAP-41 model only	

5. Press and hold the **[Teach]** button to make a selection.

Echoflex Installation Guide
Photo & CCT Sensors

Compliance

For complete regulatory compliance information, see the datasheets for the Photo & CCT Sensors at **echoflexsolutions.com**.

FCC Compliance

Echoflex Photo & CCT Sensors
(For any FCC matters):
Echoflex Solutions, Inc.
3031 Pleasant View Road
Middleton, WI 53562
+1 (608) 831-4116
echoflexsolutions.com

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.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Any modifications or changes to this product not expressly approved by Electronic Theatre Controls, Inc. could void the user's authority to operate the product. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.

Contains FCC ID: STM300U

ISED Compliance

This device contains a license-exempt transmitter/receiver that complies with Innovation, Science, and Economic Development Canada's license-exempt RSSs. 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.

Contains IC ID: 5713A-STM300U

Conformité ISDE

Cet appareil contient un émetteur/récepteur conforme aux CNR d'Innovation, Sciences et Développement économique Canada (ISDE) applicables aux appareils radio exempt de licence. Son fonctionnement est soumis aux deux conditions suivantes:

1. L'appareil ne doit pas produire d'interférences.
2. L'utilisateur de l'appareil doit accepter toute interférence, même si l'interférence est susceptible d'en compromettre le fonctionnement.

Contient ID IC: 5713A-STM300U