ILLUMRA
SELF-POWERED WIRELESS CONTROLS

Installation Guide

Light Sensor

E3T-SLICP

Overview

The Illumra Light Sensor is a battery-free wireless transmitter that communicates with a wide variety of receivers. The Light Sensor is used to adjust artificial light when sufficient natural light is available helping facility managers conserve energy and shave utility costs. Energy is harvested from the light captured by the solar cells on the Light Sensor. This energy is used by a built-in transmitter to send wireless signals regularly that command a designated receiver to control lighting levels.

Compatible Devices
- BACnet gateway, E3X-BACFP
- 3-Wire Relay; E3R-Rxx-3HOBP
- 5-Wire Relay; E3R-Rxx-5IBBP
- Plug-in Relay; E3R-R12GP
- Room Controller; E3X-MRCFP-xx
- LED Dimmer E3R-D02FP
- 0-10V Dimmer E3R-D01FP
- More receivers available

Components Included
- A -- (1) Light Sensor
- B -- (1) Back Plate
- C -- (1) Mini Screw Driver
- D -- (1) Optional External Antenna Sheath

Tools Needed for Installation
- Non-conductive stylus (pencil or ballpoint pen)
- Screw driver (for mounting)/Screws optional
- Adhesive (for mounting) optional
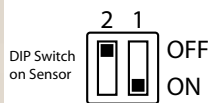
Teaching/Learning and Activation
(receiver learns a sensor, sensor teaches a receiver)

The Light Sensor can operate in one of two modes ON/OFF mode or Light Level mode:

ON/OFF mode is used to control relays and other two-state devices.

Light Level mode is used to control the light level of dimming devices. The Light Sensor will transmit the light level every 30 seconds or longer depending on light levels. The dimming device can use this information to adjust brightness.

Use the DIP switch on the back of the Light Sensor to set the mode. DIP switch number one in the ON position is the ON/OFF mode, and DIP switch one in the OFF position is the Light Level mode.

DIP Switch on Sensor

2 1

OFF
ON

Step 1: Choose which mode you want to operate in and set the DIP switch accordingly.

Step 2: Do not mount the Light Sensor until after it has been taught to all appropriate receivers. Test the range of the Light Sensor before mounting.

Step 3: Make sure the sensor is within 15 feet (5 meters) of the desired receiver when teaching. Receivers have reduced range during learn mode.

Step 4: Teaching/Learning: To teach a Light Sensor to a receiver, simply press the transmit button on the Light Sensor (middle button with the radio wave icon) while the receiver is in the desired Learn Mode (see receiver instructions for information on how to teach the receiver).

Step 4: Activation: Once a Light Sensor has been taught to a receiver, set the desired light level using the adjustment on the Light Sensor.

Note:
To ease the adjustment process when using the ON/OFF mode, press the Teach button for about 7 seconds. The LED inside the sensor will begin blinking once per second for one minute. If the measured light level is above the potentiometer turn-on threshold, the LED will blink once, indicating that the room lights should be off at the current light level. If the measured light level is below the potentiometer turn-on threshold, the LED will double-blink each second. It is critical that the sensor be sufficiently charged before attempting this adjustment method, or that a battery is installed at least temporarily during the procedure.

Note that the presence of a person near the sensor will affect the light reading, and depending on room light and the color of the person's clothing, the reading may be either higher or lower.

Remember when adjusting the sensor that transmissions occur relatively slowly.

❙ "ON"

)))) Teach Button

◯ "OFF"

Functionality

Transmit Interval
The Light Sensor transmits every 30 seconds in the presence of very bright light (several hundred lux or more). An abundance of light allows for more energy to transmit, so transmissions occur more often. Also, when there is more light, generally it is more likely that people are present, and the system will respond more quickly with more frequent transmissions.

The sensor wakes up every few seconds to measure the light when there is an abundance of light available.
If the light level changes quickly, the sensor may transmit within a few seconds of the change. If the light continues to fluctuate, however, the sensor will not continue transmitting every change of light level. The FCC limits the number of transmissions per hour.

In lower light levels, the transmission rate slows down, and when in darkness (or near it) transmissions only occur every 15 minutes. At this slow rate, the sensor only wakes up to check the room light level every 90 seconds. This conserves energy but still provides data to wireless receivers often enough to maintain system integrity.

Light Level Sensing
See specifications table for minimum and maximun operating light levels.
The light level seen by a sensor on the ceiling of a typical office may be in the range of 120 to 200 lux. The light on the work surfaces is generally higher than this.

The Light Sensor operates wirelessly and battery free as long as the device receives at least 200 lux for 3 hours a day (or less light for a longer time period each day). Before installing, charge the internal energy storage by placing the sensor in bright light (1000 lux or more) under a desk lamp or similar for 8 to 10 hours. If the device is not pre-charged in this manner, the sensor will not operate in darkness for several days or more (depending on ambient light level). Avoid placing the light sensor in direct sunlight.

Backup Battery
An internal battery option is available to operate in dark environments. The battery is a 1/2 AA 3.6V long-life lithium battery. When light is present, the battery is not used, making the life mostly dependent on the self-discharge characteristics of the battery. In darkness, the sensor requires less than 10 microamps of current. For a 1000 mA-hour 3.6 V lithium battery, this equates to a 100,000 hour life, or about 10 years. However, the battery self-discharge reduces this life, and the self-discharge rate depends on battery brand, temperature, and other factors.

Two wiring connections are provided for external power sources. The wires accept either AC or DC power from 5 to 30 VAC or VDC.

Buttons
The Center button, with a radio wave symbol, transmits a "teach" telegram (radio signal) so receivers can learn, or associate with, the sensor.
The "I" button (capital i) sends a message that no light is present (0 foot candles/lux), so if the controller is designed to do so, the lights will turn on.
The "O" button (capital o, not zero) sends a message that 1020 lux (or more) of light is present, so the controller (generally) will turn the lights off. The I and O buttons are for testing the system.
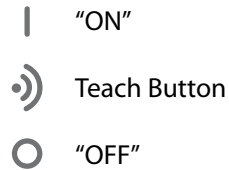
The buttons will respond, at most, once per second. Pressing them more quickly than this will not cause the device to transmit more quickly. When using the buttons, press the button and release it. Wait at least one full second before pressing any of the three buttons again.

External Antenna
When greater range is desired (than is possible with the antenna routed internally) the antenna can be routed externally through the hole in the side of the enclosure and for best appearance can be placed in the antenna sheath. When mounting the sensor on or near metal, the external option is highly recommended. In general it will always increase range, so unless the external antenna creates aesthetic issues, it is recommended to use it. The antenna can also exit the wall plate up into ceiling cavities.

Adjustment Tool
The small plastic screwdriver is used for adjusting the sensor level, when used in the ON/OFF mode. When the sensor has the first DIP switch (inside the back cover) turned off, the sensor will transmit the actual measured light level (0 to 1020 lux). Some controllers do not have knobs or other adjustments to set the desired room light level, so another mode is provided. The sensor ships, by default, with the first DIP switch in the "on" position. In this mode the sensor will only transmit a level of 0 lux or 1020 lux. If the light detected by the sensor is below the lower threshold (see graph) the light sensor transmits a "0 lux" message (even though the actual measured light is not zero, it allows the controller to look for a simple on/off message) causing the lights to turn on. When the light detected by the sensor is above the upper threshold, the sensor transmits a "1020 lux" message, causing the room lights to turn off. In between the two thresholds is a deadband, an area where the sensor transmits no messages. Without this deadband, the lights could cycle on and off when the room light is near the threshold level.
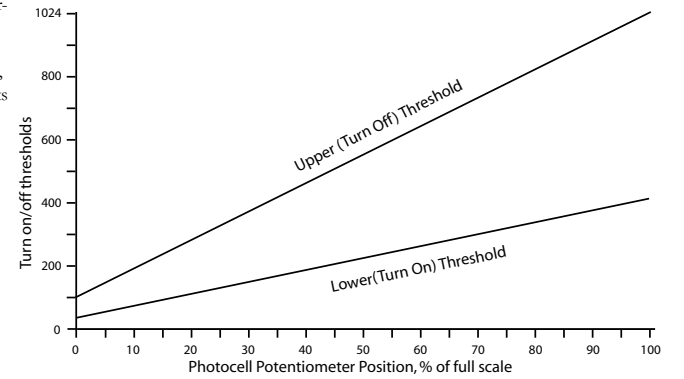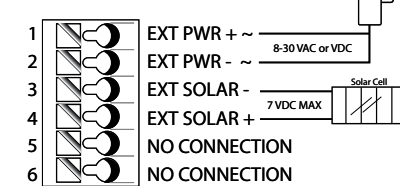
DIP Switch

Backup Battery

Internal Antenna Routing

For example, if the adjustment knob is at it's lowest (counter-clockwise) position, and it detects a light level greater than 100 lux, it will send a "1020 lux" message, turning the lights off. If the sensor detects a level between 40 lux and 100 lux, it will not transmit, leaving the lights unchanged. If it detects a light level below 40 lux, it will send a "0 lux" message, turning the lights on.

If the adjustment knob were at the highest (clockwise) position, the sensor would not turn the lights on until the sensor measures 408 lux or more.

Location of the Light Sensor is important. Amount of artificial and natural light seen by the sensor needs to be taken into account in adjusting to reach desired results.

Optional External Connections

1	EXT PWR + ~	8-30 VAC or VDC
2	EXT PWR - ~	
3	EXT SOLAR -	Solar Cell / 7VDC MAX
4	EXT SOLAR +	
5	NO CONNECTION	
6	NO CONNECTION	

Mounting

The Light Sensor can be mounted on a ceiling or on a wall using screws or adhesive.

Screw Surface Mount:
Step 1: If necessary, drill pilot holes into the wall or ceiling.
Step 2: Use suitable screws (not included) to mount the Light Sensor to the wall or ceiling.
Step 3: Attach the Sensor to the Back Plate by snapping into position.

An optional anti-tamper set screw can be installed to discorage tampering.

Adhesive Surface Mount:
Step 1: Attach the Sensor to the Back Plate by placing the sensor and turning.
Step 3: Apply adhesive tape to the Back Plate of the sensor.
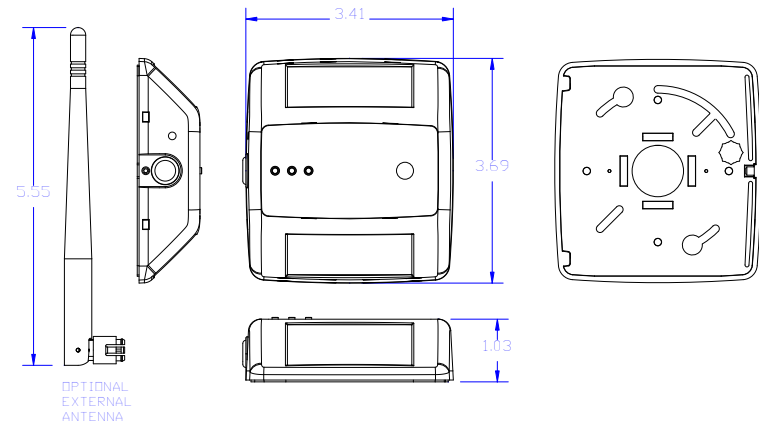Step 4: Affix the Sensor to the wall.

The antenna can be positioned internally for best appearance or externally for best performance.

Specifications

		E3T-SLICP
Range		20-50 feet (internal antenna)* 50-150 feet (external antenna)
Frequency		315 MHz
Power Sources	Internal Solar Cells	Requires 3 hours of 200 lux per day for continuous operation
	Internal Battery (optional)	1/2 AA, 3.6 V Lithium
	External Solar Cell (optional)	7VDC max.
	External Power (optional)	5-30 VAC or VDC, 10 mA
Contact Input (optional)		Optional External Dry-Contact
Operating Temperature		-25C to +60C
Storage Temperature		-40C to +60C
Illuminance Range		0- 1024 lux
Illuminance Accuracy		+/- 10%
Field of View		60°
Dimensions		3.5 (W) x 3.7 (H) x 1.1 (D) inches
Radio Certification		FCC (United States):Pending IC (Canada): Pending

* Extended range with optional repeaters sold separately.

Diagrams

3.41

3.69

1.03

5.59

OPTIONAL
EXTERNAL
ANTENNA

FC

Pending
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.

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