



# 600 Watt Phase Dimming Controller

## ER6CD *Programming Guide*



ER6CD-AU

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# Introduction

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This guide covers all models of the ER6CD lighting controller. The ER6CD is equipped with a 902 MHz radio and uses wireless technology to monitor any room's linked sensors to provides dimming and switching control. The controller is a 600 Watt phase dimming controller. The model ER6CD-AU-120 is phase adaptive and model ER6CD-AU-277 provides reverse phase dimming control. Both controllers provide dimming control for line voltage tungsten lamps, 2-wire fluorescent ballasts and line voltage LED drivers. The ER6CD-AU-120 also controls 120V electronic low-voltage transformer loads. Neither of these controllers can accommodate magnetic, or step-down transformer loads. The controller includes Simple Tap™ technology which allows installers and facility operators to manage configuration settings without any tools.

These controllers have a single channel dimming output and provides dimming and switching control with received wireless input from a linked sensor or switch. As a lighting controller, it operates lights based on:

- ambient light levels monitored by a wireless photo sensor
- occupancy state monitored by a wireless occupancy sensor
- switch action from a wireless wall switch
- gateway control implementing scheduled and demand response events

## Document Conventions

This document includes the following conventions to draw attention to important information.



**Note:** *Notes are helpful hints or information that supplement the main content.*

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Echoflex's user documentation is designed for print or electronic use. Benefits to using the electronic format include using the table of contents to jump to a desired page by clicking on the heading or using word search to find a specific topic.

Cross references highlighted in this document are links to the referenced section of the guide.

Configuration parameters are emphasized throughout the guides content in *italics*. Additionally, button and switch actions (ON/OFF) and relay events (lights ON/OFF) are emphasized throughout this guide in ALL CAPS.

This guide, along with the installation guide is available for free download from Echoflex Solutions website: [www.echoflexsolutions.com](http://www.echoflexsolutions.com)

# Overview

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The ER6CD controller is a 600 Watt phase dimming controller. It is a complete stand-alone lighting controller requiring only remote linked devices to provide input on light level, occupancy state and switch operation.

The controller will perform common lighting control applications:

- Vacancy Sensor Mode - partial OFF or fully OFF
- Occupancy Sensor Mode - partial ON or fully ON and photo inhibit
- Wall Switch - ON/OFF, manual adjustment of dim level and timed switch
- Daylight Harvesting - open loop or closed loop
- Demand Response - sets a temporary hard limit to the maximum dimming output
- Scheduling via interfaces or gateways

## Radio Communications

The ER6CD is a wireless device capable of transmitting and receiving telegrams. The controller supports:

- Telegram repeating, single and dual hop
- Controller status broadcast

## Dimming Output

The dimming mode for the ER6CD-AU-120 Phase Adaptive Dimmer is detected automatically by default. The dimming mode for the ER6CD-AU-277 is reverse phase by default. At the device, you can change the dimming mode manually, entering forward phase, reverse phase, or automatic phase dimming.

### To manually configure dimming mode

Simultaneously, press and hold the “Learn” and “Clear” buttons for five seconds, then release. The CLR/LRN and Status LEDs will begin to flash.

The LEDs indicate which dimming mode is active.

- Both Green: Forward Phase dimming
- Both Red: Reverse Phase dimming

If the dimmer is in Automatic dimming mode, the Status LED will flash amber, and the CLR/LRN LED will indicate the current mode with specific LED colors. (red is Reverse Phase dimming mode and green is Forward Phase dimming mode).

To change the current mode, press and hold the “Learn” and “Clear” buttons until the LEDs change to the desired dimming mode according to the LEDs state.



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**Note:** The device will return to normal operation, exiting the dimming mode menu, 10 seconds after the last interaction.

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## Switch Operation



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**Note:** *The parameters discussed in this section are configurable. Refer to [Configuring the Controller](#) for more details on accessing these parameters.*

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The controller operates with single and dual-paddle wall, wave and hand-held Echoflex switches. Echoflex switches can be used as dimmer switches. Press and hold the ON or OFF side to modulate the dimming output up to the *maximum dimming level* or down to the *minimum dimming level*.

A switch ON action will ramp the dimming output to the last dimmed level set by a switch. If a photo sensor is linked to the controller as well, the output ramps to full output over 2 seconds. A quick double-press ON will ramp up to maximum output and accelerate the fade period to ½ second. A press OFF action will fade the lights down over 2 seconds. A quick double-press OFF will accelerate the fade period to ½ second.

### Timed Switches

The controller can be configured so any linked single or dual paddle switch becomes a timed switch. An ON action turns the lights ON and a timer is set to count down. Once the timer expires, the lights fade to OFF.

The time period is configurable and has 5 settings: no timer (default), 5 minutes, 15 minutes, 30 minutes and 1 hour. Additionally, if the user presses the rocker switch ON multiple times ( to a total of 5 presses), the timer interval is added for each ON press. If ON is pressed while the lights are on and the timer is counting down, an additional period of time is added to the timer total.

Example: if the timer setting is 1 hour and the user presses the switch ON twice, the total timer period is 2 hours. If there is 30 minutes left on the timer and ON is pressed again, the timer is extended to 1 hour 30 minutes before the lights will turn off.

The controller will ramp the light output down then up (flick-warn) 1 minute before the timer is due to expire to warn users of the pending OFF event.

The time period is configurable using Garibaldi software.

# Occupancy Based Lighting Applications



**Note:** *The parameters discussed in this section are configurable. Refer to [Configuring the Controller](#) for more details on accessing these parameters.*

The controller will turn the lights OFF or fade down to a preset level when there is no motion detected in the room indicated by all linked occupancy sensors. If the application requires the lights to remain ON during vacant periods but at a dimmed level (i.e. warehouse or stairwell applications), a configuration property accessible using Garibaldi software can enable this feature.

**Occupancy sensors only:** When only occupancy sensors are linked to the controller, the sensor will automate the lights both ON and OFF.

**Occupancy sensors with switches:** When switches and sensors are linked, the controller will assume manual-ON, auto-OFF operation referred to as Vacancy Sensor Mode.

There is a configurable time period that must expire first before the controller completes the vacancy action. The *occupancy auto-off timer* is set to 15 minutes by default but can be changed using [Simple Tap™ Instructions](#) or Garibaldi software.

## Grace Timer

The controller includes a *grace timer* that starts counting down once the vacancy action has been activated. The *grace timer* is a short period of time allowing an occupant to return the lights to the previous occupied state; either through motion detection or audio input in the case of dual-tech sensors.

## Photo Inhibit

This feature requires a linked photo sensor in addition to the occupancy sensor and *partial-ON* enabled (see [Occupancy Sensors and Partial-ON](#)). When *photo-inhibit* is enabled, the *partial-ON* feature will be ignored when the natural light level measured by the light sensor is above the *daylighting relay control set point*. The *photo inhibit* feature will not turn lights OFF if the light is already ON.

Photo Inhibit Operation:

- Light level is < *daylighting relay set point* – The lights turn ON automatically when you enter the room.
- Light level is > *daylighting relay set point* – The lights do not turn ON automatically when you enter the room.
- Lights are ON and the light level increases past the *daylighting*

*relay set point* – the lights stay ON.

- Lights are OFF and the light level decreases past the *daylighting relay set point* – the lights will turn ON and ramp to the dim level defined in the *partial-ON* setting upon the next motion detected by the occupancy sensor.

## Dual Technology Occupancy Sensors

Echoflex dual technology sensors have built-in occupancy timers that manage the transition from occupied to the vacant state. The controller should be configured to allow the dual-tech sensor control of the vacancy action by setting the controllers *occupancy auto-off timer* to 0 seconds. To change this timer, refer to the [Simple Tap™ Instructions](#).

## Occupancy Sensors and Partial-ON

When only occupancy sensors are linked to the controller, the sensor will automate the lights both ON and OFF. The dimming output for the ON action will adjust to the *partial-ON dimming level* (default 100%). This value is configurable to accommodate partial-ON applications using the [Simple Tap™ Instructions](#) or Garibaldi software.

## Occupancy Sensors and Partial-OFF

If the application requires the lights to remain ON during vacant periods but at a dimmed level (partial-OFF), the *partial-OFF dimming level* configuration property accessible through the [Simple Tap™ Instructions](#) or by using Garibaldi software can enable this feature.

## Occupancy Sensors with Switches

When switches and sensors are linked, the controller will assume manual-ON, auto-OFF operation referred to as Vacancy Sensor Mode. The controller can be configured to turn the lights ON immediately with motion (partial-ON) using [Simple Tap™ Instructions](#) or Garibaldi software .

When the switch is used by pressing on or off, this action will reset the *occupancy auto-off timer* and set the sensor state to occupied.

## Daylight Harvesting Application

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**Note:** *The parameters discussed in this section are configurable. Refer to [Configuring the Controller](#) for more details on accessing these parameters.*

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The controller will modulate the light intensity from a dimming fixture based on the ambient light level in the room. The controller can also be configured to turn the light off with sufficient natural light. A linked photo sensor monitors the ambient light level and transmits this value to the controller.



**Note:** *The controller will only allow 1 linked photo sensor.*

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The daylight control application has several configuration variables:

- Maximum dimming level - the highest level the dimming output will reach.
- Minimum dimming level - the lowest level the dimming output will reach.
- Lighting set point - the daylight control set point serves two purposes, closed loop control and open loop control.

The daylight harvesting application does not affect the operation of the wall switch or occupancy sensor when the light is on. If the light is ON, either the switch or occupancy sensor can override the light OFF or dim down below the daylighting control value.

## Closed Loop Daylighting Control

When the controller is configured for daylight harvesting and set to closed loop control, the set point becomes the absolute value in percent of light the controller will try to attain.

Closed Loop Daylight Control example: A project specification item details that a certain value of light must be measured on a desktop. The dimming light fixture providing light to the desktop is controlled. The light sensor is located over the desk facing downwards. Place a hand-held light sensor on the desktop and using a linked switch, dim the lights up or down until the sensor matches the specification value. Use Simple Tap to capture the light level as the daylight control set point

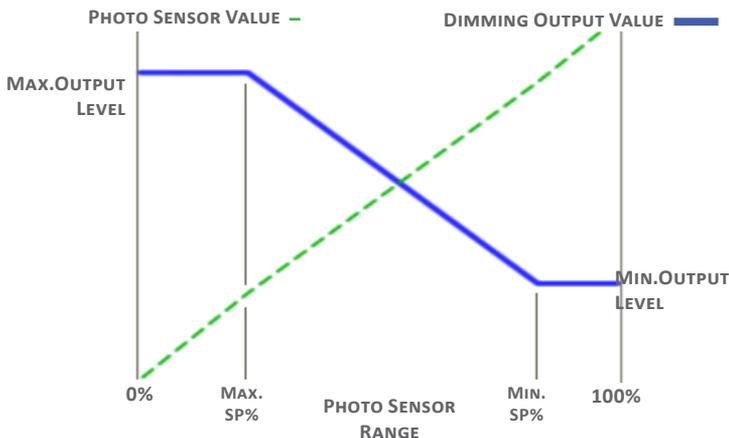


**Note:** *This process is best performed when there is no natural light; either close the blinds or complete this step at night.*

The output dimming level will not change when the photo sensor level is within (+ or -) the *closed loop dead-band* value of the *closed loop daylighting set point*. Both the amount change per telegram and dead-band are configurable parameters accessible using Garibaldi software.

## Open Loop Control

When the controller is configured for daylight harvesting and set to open loop control, the set point is where the dimming output begins to dim the fixture as the natural light increases. Open loop daylighting applications are defined when the sensor is monitoring the natural light contribution and is not affected by the controlled fixture's light output.



Open Loop Daylight Control example: A project requirement item details that the open area office lights shall dim down when sufficient natural light is present. Mount the wireless light sensor so it is facing downwards and monitoring reflected natural light. The Echoflex light sensor has two ranges; 0-512 lux (0-50 foot-candles) and 0-1024 lux (0-100 foot-candles). The lighting set point default value is 60% of the sensors Full Scale Range (FSR). If the range is set to 50FC (512 lux), the controller will begin dimming down when the sensor records 30FC (300 lux) and will reach the minimum dimming level at 100% or 50FC (512lux).



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**Note:** *The TAP light sensor is desired to be mounted indoors to monitor reflected (not direct) natural light levels*

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Setting the set point is covered later in this document under “Configuring the Controller”.

The daylight harvesting application can override the Partial-ON feature of occupancy sensors if the light level is sufficient and calls for the lights to be off. The daylight harvesting application can be overridden by a manual wall switch when the light is dimmed to off by clicking the switch on. If the light level remains above the Light- OFF-Set point, the controller will turn the light off again after 250 seconds. The daylight harvesting application does not affect the operation of the wall switch or motion sensor when the light is on. If the light is on, either the switch or motion sensor can override the light off. See the section on Occupancy Based Lighting Application - Photo Inhibit for alternative functionality.

## **Demand Response**

If a gateway is linked to the controller using the Demand Response profile, it can be used to set a temporary maximum dimming level. Switches and sensors will continue to operate and behave normally with the controller however the controller output will not exceed the temporary maximum dimming level while the demand response event is active.

## Radio Range Confirmation

The ER6CD controllers includes patent pending technology that works with all Echoflex sensors equipped with the range confirmation feature to provide visual feedback of a linked sensors signal strength for optimal sensor placement.

To evaluate the radio signal strength, the sensor must be also support the test and be linked to the controller. Check the sensors documentation to find out if it supports radio range confirmation testing. Do not have any repeaters in the controllers vicinity enabled during the test.

The range confirmation test is invoked at the sensor and sends unique telegrams to the controller. The controller will evaluate the signal strength from the sensor and send back a unique telegram containing the strongest signal value received. This value is displayed at the sensor using color LEDs.

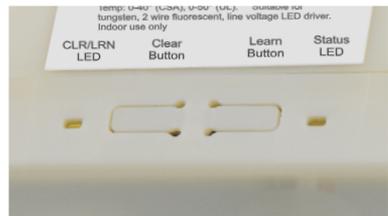
Consult the sensor installation guide for more details.

# Controller Button Interface

## Linking the First Switch

Use this method to link the first switch (If no other devices are linked). Use the learn button to link additional devices.

Click the wireless switch paddle ON three times, OFF three times and ON three times sequentially within 5 seconds. The relay will toggle and the red POWER LED will begin a repeating blinking pattern to indicate the linked switch, see the section on LED blink codes.



**Note:**

*The linking method described above will link the switch to any controllers that are within radio range that do not already have switches or sensors linked to them.*

## LEARN button

The LEARN button is used to link switches or sensors to the controller.

1. Press the button marked LEARN for a half second. In link mode the LEARN LED will stay ON and the POWER LED will toggle every 2 second.
2. When linking a wall switch, press the switch paddle ON three times. If linking a sensor, press the sensor's TEACH or LINK button, refer to the sensor's documentation. The POWER LED will remain lit for four seconds while it links the new device. It will resume toggling allowing you to link another device up to a total of twenty devices.



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**Note:**

*Linking a switch or sensor that is already linked to a controller, will remove or unlink it from the controller.*

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3. To exit link mode, press the LEARN button on the controller again for a half second. Link mode will time out after no activity in thirty seconds.

## CLEAR button

Using the CLEAR button can reload the controller to the factory pre-commissioned settings with linked devices OR it can load the factory default parameters and remove all linked devices.

- To return the controller to the factory pre-commissioned state, press the CLEAR button until the red POWER and green LEARN LEDs start blinking, approximately 5 seconds. Release the button and the red POWER led will begin blinking indicating the factory commissioned pre-linked devices.
- To completely CLEAR the controller back to factory default settings removing any linked devices, press the CLEAR button until the red POWER and green LEARN LEDs come on solid, about 15 seconds. The POWER led will stay ON solid indicating the factory default state.

## Power LED and Learn LED

The Power LED is red and when blinking, provides information on the number and type of linked devices to the controller.

The Learn LED is green and indicates when the controller is in Learn mode.

Refer to [LED Blink Codes and Operation in Appendix A](#).

## Disabling LEDs

The LEDs can be disabled by adjusting a configuration parameter using Garibaldi software. If disabled, the LEDs will illuminate for a brief period of time when either controller button is pressed, when in link mode or if the remote management *Action* command is used to toggle the relay.

# Configuring the Controller

To manually configure the dimming mode of the controller, see [Dimming Output](#). There are two other methods of configuring parameters in the controller.

### 1. Simple Tap™



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**Note:** *Simple Tap™ is a quick method of changing a parameter's setting, one at a time.*

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### 2. Garibaldi Commissioning Software (not covered in this guide)



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**Note:** *Contact Echoflex Solutions for more information on Garibaldi software.*

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## Simple Tap™ Instructions

Simple Tap™ uses the switches and sensors that are linked to the controller to set the associated configuration parameters. You must be able to access the sensor's teach button and/or the switches to perform Simple Tap™.

If the sensor is linked to multiple controllers and you do not want to make changes to all, turn the controllers relay off (lights off) to ignore the Simple Tap™ changes.

Simple Tap™ allows you to:

- [Enable/Disable the Repeater Function](#)
- [Enable/Disable the Status Telegram](#)
- [Set the Partial-ON and Partial-OFF feature and Set the Partial OFF value and Enable/Disable the Automatic Partial-OFF features](#)
- [Set the Occupancy Sensor Auto-OFF timer](#)
- [Daylight Harvesting or Photo Inhibit Mode](#)
- [Set the Lighting Set Point](#)

## **Enable/Disable the Repeater Function**

Enabling the repeater function will repeat received telegrams when:

- the telegram has not been previously repeated.
- in the case of dual hop repeating, have been repeated once previously

This sequence requires access to the controller. The repeater function can be enabled/disabled by accessing the controller's buttons and supports single and dual hop repeating.

1. Press the CLEAR button and hold
2. Quickly tap the LEARN button;
  - once to disable repeating
  - twice to enable single hop repeating
  - three times to enable dual hop repeating
3. The green LEARN LEDs will blink the corresponding value of the LEARN button presses. Release the CLEAR button.

## **Enable/Disable the Status Telegram**

The controller can broadcast a telegram per EEP: A5-11-01 Status Feedback Telegram. The telegram will broadcast every 100 seconds. The status telegram can be enabled/disabled by accessing the controller buttons.

1. Press the LEARN button and hold, quickly tap the CLEAR button once to disable, twice to enable.
2. Release the LEARN button. The green LEARN and red POWER LEDs will blink the corresponding value of the CLEAR button presses.

## Set the Partial ON value and Enable/Disable the Automatic Partial-ON feature

When only occupancy sensors are linked to the controller, the sensor will automate the lights both ON and OFF. The dimming output for the ON action will adjust to the *partial-ON dimming level* (default 100%).

With the light ON, Dim to the desired partial ON value, using the linked switch.

Press the sensors TEACH Button once.

Within 5 seconds of pressing the Teach button

Click the switch paddle ON 4 times to **enable** partial-ON

For Partial ON **disable**:

Click the switch paddle 3 times ON followed by one OFF

## Set the Partial OFF value and Enable/Disable the Automatic Partial-OFF feature

When the application requires the lights to remain ON during vacant periods but at a dimmed level (partial-OFF), the *partial-OFF dimming level* is used.

With the light ON, Dim to the desired Partial OFF value, using the linked switch.

Press the sensors TEACH Button once.

Within 5 seconds of pressing the Teach button

For Partial OFF **enable**:

Click the switch paddle OFF 3 times followed by one ON

For Partial OFF **disable**:

Click the switch paddle OFF 4 times

## Set the Occupancy Sensor Auto-OFF timer

1. With the light ON, tap the occupancy sensor's TEACH button three times to edit the timer period. The relay will blink the light to acknowledge.
2. Tap the TEACH button again to match the desired timer period. There are six possible settings, see the table below. The relay will further blink the light a set number of times based on the setting chosen and return to normal operation.

**Simple Tap Occupancy Timer Values**

Taps	Occ. Sensor Timer	Light Blinks
3 taps*	0 sec.	1 blink
4 taps	5 min.	2 blinks
5 taps	10 min.	3 blinks
6 taps	15 min.	4 blinks
7 taps	20 min.	5 blinks
8 taps	25 min.	6 blinks

*\* uses the sensor's timer*



**Note:**

*When setting the timer to 15 minutes, the light will blink 5 times total - once on the third press then 4 more after the last button press*

## Daylight Harvesting or Photo Inhibit Mode

You can select daylight harvesting mode (default) or Photo Inhibit mode. For more information on these operating modes, see the sections at the beginning of this guide titled Photo Inhibit and Daylight Harvesting Application.

A light sensor and wall switch must be linked to the controller before proceeding.

1. Press the photo sensors Teach button once followed by clicking the switch ON three times within 5 seconds.
2. Either:
  - click the switch once more ON to activate Photo Inhibit operating mode.
  - or click the switch once OFF to activate Daylight harvesting

operating mode.

The set point values are a percentage of the full range of the linked photo sensor. The light will blink down then up to confirm the change

## Set the Lighting Set Point

The controller will modulate the dimming output based on the measured light level from the light sensor.

The lighting set point is used to adjust how the dimming output responds to the ambient light levels.

There are two methods of setting the set-point.

### 1. Closed Loop

You can use the light sensor to function as a closed loop sensor. When set as a closed loop sensor, the controller will dim the lights until the light level recorded at the sensor meets the set point value. For more information on this operating mode, see the section at the beginning of this guide titled [Daylight Harvesting Application](#). A light sensor must be linked to the controller before proceeding.



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**Note:**

*This process is best performed when there is no natural light; either close the blinds or complete this step at night.*

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1. With the light on, adjust the light level from the fixture using the switch until it matches the desired light level.
2. Tap the light sensors teach button 3 times to set the daylight harvesting parameters to a closed loop function. Move away from the sensor so your shadow does not affect the sensor reading. The light will blink once to acknowledge the change.

## 2. Open Loop

The lighting set-point can be set to an absolute value useful in open-loop sensor applications. The absolute value selected becomes the maximum dimming set-point.

1. With the light on, tap the light sensors teach button 4 times to set the set point to 20%.
2. Tap the button additional times incrementing the set point value by 20%. Five (5) taps would equal 40%, seven (7) taps would be 80%.
3. The light will blink once at three taps and then begin blinking according to the level set to confirm the change after 3 seconds.

Taps	Max. Dim SP	Min. Dim SP	Blinks
4 taps	20%	100%	2 blinks
5 taps	40%	100%	3 blinks
6 taps	60%	100%	4 blinks
7 taps	80%	100%	5 blinks

### Save state

The controller will save its state when power is cycled. The save state function can be overridden with a value that will be used to recall a particular dimming output value after a power cycle. An override enable flag and an override value can be set with Garibaldi Commissioning Software

This concludes the configuration directions for the controller.

# Appendix A

## LED Blink Codes and Operation

The tables below describe the LED activity & associated mode of the controller.

If the controller was factory pre-commissioned, upon power up it will immediately begin blinking the red POWER LED based on the type and count of linked devices. The type is indicated by long blinks followed by short blinks counting the number of devices linked. This pattern will repeat after a short pause.

The table below describes the number of LED blinks for each device type.

### POWER LED Blink Codes

Factory Default	ON Solid
switch(es)	1 long blink followed by short blinks counting switches
occupancy sensor(s)	2 long blinks followed by short blinks counting sensors
photo sensor(s)	3 long blinks followed by short blinks counting sensors
central command	4 long blinks followed by short blinks counting devices
demand response	5 long blinks followed by short blinks counting devices

### Operating Mode and LED Activity

Mode	Green LEARN led	Red POWER led	Relay/Light
LINK mode	ON	Toggle	Toggle
Storing ID	ON	ON 4 sec.	ON 4 seconds
Clearing ID	ON	OFF 4 sec.	OFF 4 seconds
Factory Default	OFF	ON solid	ON

## Agency Listings and Regulatory Statements

ETL Listed Component

Conforms to UL Standard 508

Certified to CAN/CSA Std C22.2 No.14

CEC Title 24 compliant

UL 2043 Plenum rated

FCC Part 15.231 :

Contains FCC ID: SZV-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

Contains IC: 5713A-STM300U





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