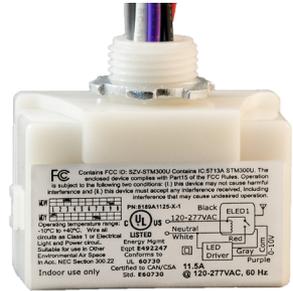


# LED Fixture Controller

## ELED1

### Programming Guide



ELED1-AUN



ELED1-AUS

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# Table of Contents

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## Introduction

Document Conventions.....1

## Overview

Radio Communications .....2

Auto-Detect Dimming .....2

Dimming Output.....3

Near-Cross Relay Technology .....3

## Switch Operation ..... 4

Timed Switches .....4

## Occupancy Based Lighting Applications ..... 5

Grace Timer.....5

Photo Inhibit.....5

Dual Technology Occupancy Sensors.....6

Occupancy Sensors and Partial-ON.....6

Occupancy Sensors and Partial-OFF.....6

Occupancy Sensors with Switches .....6

## Daylight Harvesting Application ..... 7

Daylighting Relay Control .....7

Daylighting Control Override .....8

Closed Loop Daylighting Control .....8

Open Loop Control .....9

Radio Range Confirmation .....10

## Controller Button Interface

LEARN button .....10

CLEAR button .....11

Power LED and Learn LED.....11

Disabling the User Interface LEDs .....11

## Configuring the Controller

Simple Tap™ Instructions ..... 13

Enable/Disable the Repeater Function .....	14
Enable/Disable the Status Telegram.....	14
Set the Partial ON value and Enable/Disable the Automatic Partial-ON feature.....	15
Set the Partial OFF value and Enable/Disable the Automatic Partial-OFF feature.....	15
Set the Occupancy Sensor Auto-OFF timer .....	16
Save State .....	16
Enable/Disable Daylighting Relay Control .....	17
Set the Closed Loop Daylighting Set Point.....	17
Set the Open Loop Daylighting Set Point.....	18

## **Appendix A**

<b>LED Blink Codes and Operation .....</b>	<b>19</b>
Safety Standards Load Ratings .....	20

# Introduction

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This guide covers the Fixture Controller, model numbers ELED1-AUN and ELED1-AUS. The ELED1 is equipped with a 902 MHz radio. The controller uses wireless technology to monitor any room's environment and provides dimming and switching control of an LED fixture. The controller includes Simple Tap™ technology which allows installers and facility operators to manage configuration settings without any tools.

The ELED1 is a fixture controller designed to fit with today's vast number of LED luminaires providing full-off with relay and 0-10V dimming.

The controller provides dimming and switching control with received 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.



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**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 is available for free download from Echoflex Solutions website: [www.echoflexsolutions.com](http://www.echoflexsolutions.com)

# Overview

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The ELED1 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 ELED1 is a wireless device capable of transmitting and receiving telegrams. The controller supports:

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

## Auto-Detect Dimming

The controller automatically detects when the purple and gray dimming wires are connected to a driver or ballast that sources dimming current. When the dimming interface wires are unconnected, dimming will be disabled and fade timers set to 0 seconds so the relay's action is immediate upon a linked switch or sensor's ON/OFF event.

## Dimming Output

The controller's dimming output is a 0-10V output providing linear, proportional dimming control of a dimming driver or ballast. The maximum and minimum levels of the output can be configured using Garibaldi software.

- *Maximum dimming level* - the high level trim of the dimming output, set to 100% by default
- *Minimum dimming level* - the low level trim of the dimming output, set to 0% by default

The dimming output can also be disabled through Garibaldi software allowing for immediate relay control of the lights.

## Near-Cross Relay Technology

The ELED1 monitors the AC voltage waveform so it operates the relay, either open or closed, when the waveform is close to zero. This prevents carbon build-up on the relay contacts ensuring the controller will continue to provide trouble-free operation for years.

## 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. A quick press ON action activates the relay closed (lights on) and the dimming output will ramp to the last manually set dim level. A quick double-press ON will fade up to *maximum dimming level* and accelerate the fade period to ½ second. A quick press OFF action will fade the lights down to the *minimum dimming level* and then open the relay (lights off). A quick double-press OFF will accelerate the fade period to ½ second.

Echoflex switches can also be used as dimmer switches when the *dimming output* of the controller is enabled. 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*.

### Timed Switches

The controller can be configured so any linked single or dual paddle switch becomes a timed switch. A switch ON closes the relay (lights on) and the *timed switch* timer is set. One minute before the timer expires, there will be a flick-warn (lights quick OFF then ON) to warn occupants of the pending OFF event. Once the timer expires, the relay opens (lights off). The timer can be reset at any time by pressing a linked switch ON. A switch OFF event clears the timer and turns the lights OFF. The time period is configurable using Garibaldi software.

# Occupancy Based Lighting Applications



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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.*

---

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.

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 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 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.*

---

The controller will modulate the light intensity from a dimming fixture based on the ambient light level in the room when the dimming output is enabled. 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.



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

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The daylight control application has several configuration variables:

- *Daylighting open/closed loop set points* - the daylight harvesting application serves two separate functions, closed loop control or open loop control.
- *Daylighting relay set point* - the ambient light level that will automate the relay

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.

See the section titled [Photo Inhibit](#) for additional functionality.

## Daylighting Relay Control

When *daylighting relay control* is enabled, the daylighting sequence will open the relay when the light value monitored by the sensor is greater than the *daylighting relay control-off set point* for a period exceeding the *daylighting relay-off pause*.



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**Note:** *The relay will not close when the ambient light reduces. A linked occupancy sensor or wall switch must reactivate the lights after the daylighting relay control has shut the lights off.*

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If the controller has only a photo sensor linked and *daylighting relay control* enabled, the relay will close once the ambient light falls below the *daylighting relay control-on set point* for a period exceeding the *daylighting relay-on pause*.

## Daylighting Control Override

The open or closed loop daylighting features can be temporarily overridden by enabling the *daylighting override* configuration parameter. The override has a timer that will release the override once expired and daylighting control will resume.

When the override is enabled, a switch can operate the relay ON and manually set the dimming level.

Both the *daylighting override timer* and *override enable* parameters are accessible with Garibaldi software.

## Closed Loop Daylighting Control

Closed loop daylighting becomes active when a photo sensor with a maximum detectable range of light less than 2500 lux is linked to the controller. Closed loop daylighting applications are defined when the sensor indirectly monitors the controlled light output from the fixtures plus some of the natural lights contribution.

When the lights are on, closed loop daylighting will try to maintain a given set point level within the space. This level is specified in the *closed loop daylighting set point* configuration parameter. The controller only adjusts the dimming output upon received photo sensor telegrams and only when the relay is closed. If the relay is open, closed loop daylighting is ignored. The *closed loop daylighting set point* is adjustable using [Simple Tap™ Instructions](#) or Garibaldi software.

While maintaining the set point, the dimming output level will only change a small amount of the output's full range with every received photo sensor telegram. The *closed loop maximum output change* is set to 10% by default.



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**Note:**

*Ensure the wireless photo sensor being used has an update rate that is appropriate to indoor closed loop lighting applications. The period between consecutive telegrams should not exceed 200 seconds.*

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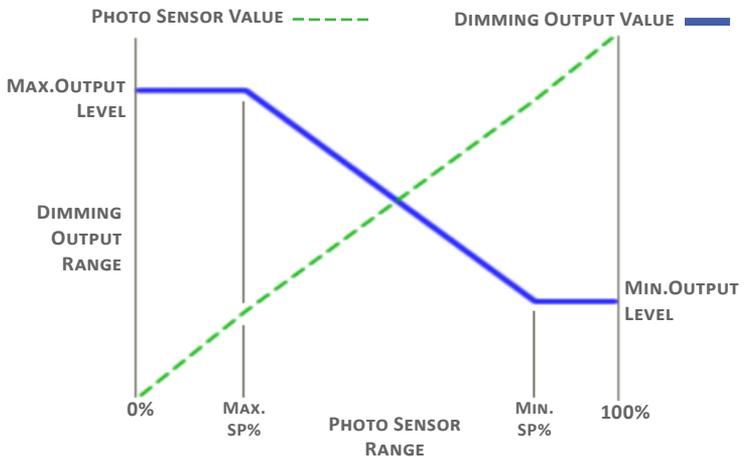
The output dimming level will not change when the photo sensor level is within (+ or -) the *closed loop dead-band* value of the *closed loop daylighting set point*. Both the amount change per telegram and dead-band are configurable parameters accessible using Garibaldi software.

## Open Loop Control

Open loop daylighting becomes active when a photo sensor with a maximum detectable range of light greater than 2500 lux is linked to the controller. 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.

When the light level monitored by the photo sensor is below the *open-loop maximum output set point*, the dimming output will be at the *maximum output level*. When the light level is above the *open-loop minimum output set point*, the dimming output will be at the *minimum output level*.

In the diagram below, the bold blue line indicates the dimming output. The output will begin lowering as the natural light level increases (green dashed line). When the monitored light level is between the set points it will modulate the dimming output proportionally.



The rate the dimming output will change is defined by the configuration parameter *open loop dimming rate* which defines the time for the dimming to go from 0% to 100% or vice versa.

The *open loop maximum output set point* and *minimum output set point* are adjustable using [Simple Tap™ Instructions](#) or Garibaldi software.

## Radio Range Confirmation

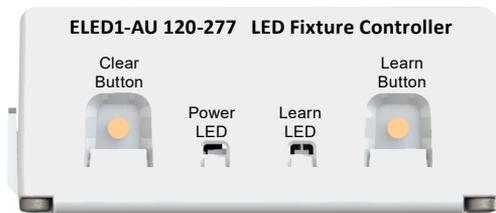
The ER6CD controllers includes patent pending technology that works with all Echoflex sensors equipped with the range confirmation feature to provide visual feedback of a linked sensors signal strength for optimal sensor placement.

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



### 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 green LEARN led will stay ON and the red POWER led will toggle every two seconds.
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 red 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 the User Interface LEDs**

The LEDs can be disabled by adjusting a configuration parameter using Garibaldi software. The variable is a timer in seconds. If disabled, the LEDs will illuminate for the configured 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

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There are two methods of configuring parameters in the controller.

1. Simple Tap™



**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)



**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](#)
- [Enable/Disable Daylighting Relay Control](#)
- [Set the Closed Loop Daylighting Set Point](#)
- [Set the Open Loop Daylighting 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. Release the CLEAR button. The green LEARN and red POWER LEDs will blink the corresponding value of the LEARN button presses.

## **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%). Partial-ON can also be enabled when switches are linked. Follow the directions below to enable Partial-ON and set the Partial-ON value.

1. With the light ON, Dim to the desired partial ON value, using a linked switch.
2. Press the sensors TEACH Button once.
3. Within 5 seconds of pressing the Teach button
  - For Partial ON **enable**
    - Click the switch paddle ON 4 times
  - 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.

1. With the light ON, Dim to the desired Partial OFF value, using a linked switch.
2. Press the sensors TEACH Button once.
3. 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 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*



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**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*

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## 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 relay state / dimming output value after a power cycle. An override enable flag and an override value can be set with Garibaldi Commissioning Software

## Enable/Disable Daylighting Relay Control

You can enable or disable (default) *daylighting relay control*.

If the *dimming output* is disabled and a photo sensor is linked to the controller, *daylighting relay control* will automatically be enabled. When enabled, the daylighting sequence will open the relay when the light value monitored by the sensor is greater than the *daylighting relay control-off set point* for a period exceeding the *daylighting relay off pause*. If the controller has only a photo sensor linked and *daylighting relay control* enabled, the relay will close once the ambient light falls below the *daylighting relay control-on set point* for a period exceeding the *daylighting relay on pause*.

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

1. Press the photo sensor's TEACH button once followed by clicking the switch ON three times within 5 seconds.
2. Either click the switch once more ON to enable *Daylighting Relay Control* or click the switch once OFF to disable *Daylighting Relay Control*.

The relay will cycle once to confirm the change and return to normal operation.

## Set the Closed Loop Daylighting Set Point

A light sensor with monitoring range less than 2500 lux must be linked to the controller plus a switch.



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

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1. With the light on and using a hand-held photometer to measure the light on the task plane, adjust the light level from the fixture using the switch until it matches the target light level.
2. Tap the light sensor's TEACH button 3 times to set the daylight harvesting parameters to closed loop function. The light will blink once to acknowledge the change.
3. Move away from the sensor so your shadow does not affect the light level the sensor records. The light will blink once again after a pause when receiving the next telegram from the sensor. The pause may take up to 150 seconds. After blinking, the controller will return to normal operation

## Set the Open Loop Daylighting Set Point

A light sensor with monitoring range greater than 2500 lux must be linked to the controller.

This process adjusts the *open loop maximum output dimming set point* and the *open loop minimum output dimming set point*. Both set points are also configurable using Garibaldi software.



**Note:** *The set points are in measured in percentage of the photo sensor's full scale range.*

1. With the light on, tap the light sensor's TEACH button three times. The light will blink once.
2. You can tap the TEACH button again referring to the tables below to set the open loop set points. Tapping the TEACH button increments the row selected in the table.
3. The light will be blinking according to the level set to confirm the change after five seconds and return to normal operation.

### Daylighting Set Points - Open Loop Dimming Sensor Range of > 2500 lux to < 11000 lux

Taps	Max. Output SP	Min. Output SP	Light Blinks
0 taps	20%	100%	1 blinks
1 taps	30%	100%	2 blinks
2 taps	40%	100%	3 blinks
3 taps	50%	100%	4 blinks
4 taps	60%	100%	5 blinks

### Daylighting Set Points - Open Loop Dimming Sensor Range of > 11000lux

Taps	Max. Output SP	Min. Output SP	Light Blinks
0 taps	5%	30%	1 blinks
1 taps	10%	35%	2 blinks
2 taps	15%	40%	3 blinks
3 taps	20%	50%	4 blinks
4 taps	25%	55%	5 blinks

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

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.

## Agency Listings and Regulatory Statements

UL Listed Component

Certified UL Standard 60730

Certified CAN/CSA Std E60730

UL 2043 Plenum rated

FCC Part 15.231 : Contains FCC ID: SZV-STM300U

IC RSS-210FCC 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.



### Safety Standards Load Ratings

Electronic Ballast or LED Driver	11.5A @ 120 to 277VAC
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