LUTRON ®

PowPak® Fixture Controls
Additional Programming, Installation, and Troubleshooting Help

PowPak® Fixture Controls

Wireless Fixture Control Models:
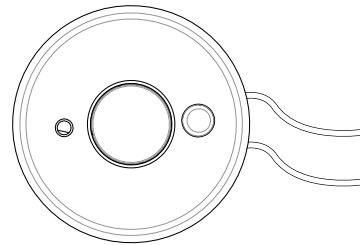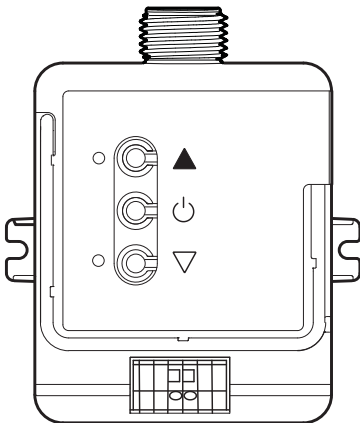
- FCJ-010
- FCJ-ECO

Fixture Sensor Models:

- FC-SENSOR (Occupancy)
- FC-VSENSOR (Vacancy)

Overview

This document serves as a supplement to the PowPak® Fixture Control Installation Guides.

PowPak® Wireless Fixture Control

PowPak® Fixture Sensor

Note: For more information, see 369866 at www.lutron.com
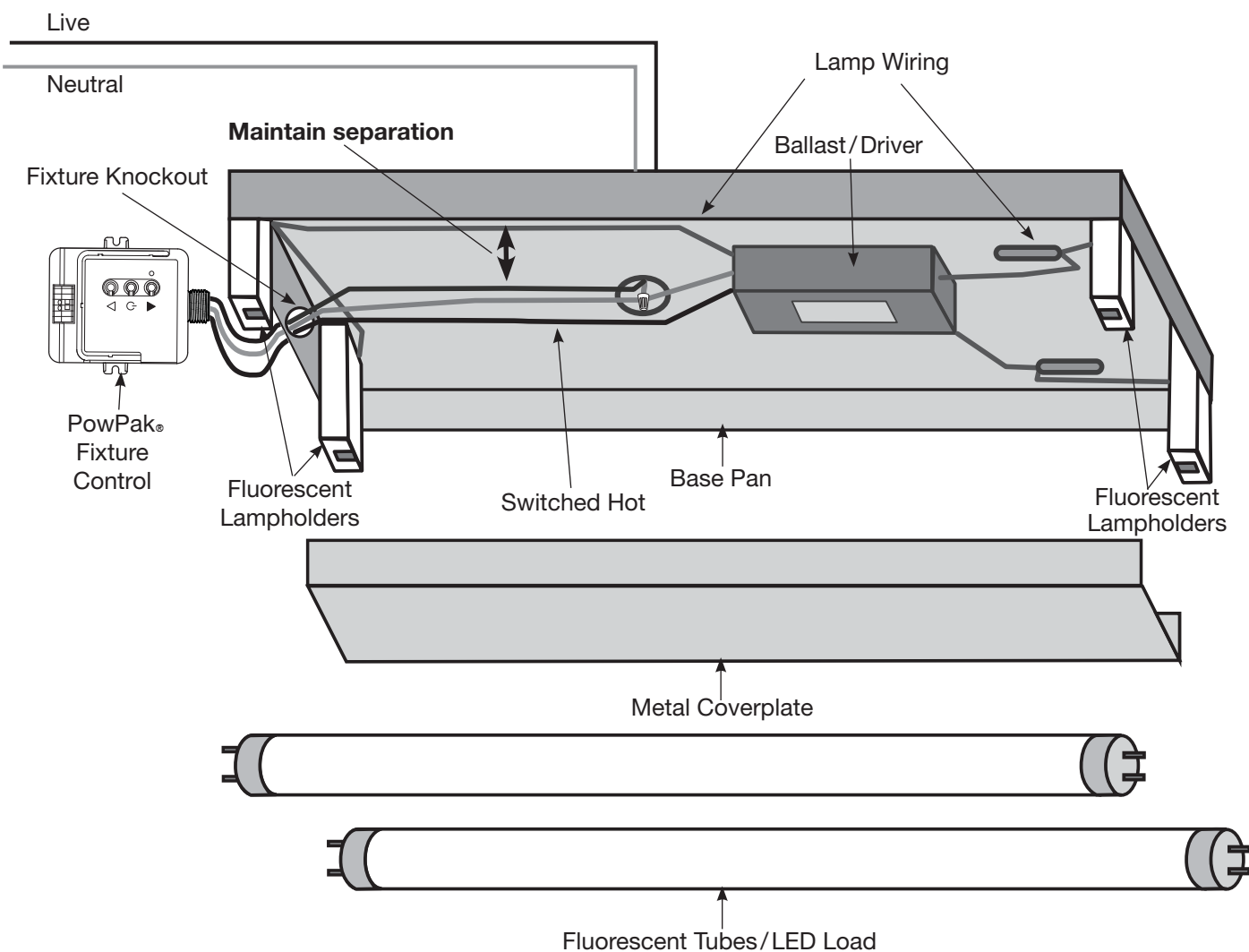
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PowPak® Wireless Fixture Control with EcoSystem®

The PowPak® wireless fixture control with EcoSystem® (FCJ-ECO) is "broadcast only." This means all EcoSystem® drivers and ballasts (3 maximum) controlled by the PowPak® wireless fixture control will comprise a single zone of lighting, and the fixture control only sends a command to "go to light level". Addressing is not possible. If more than one control zone is necessary, an RMx-ECO32-DV-B is required (see http://www.lutron.com/TechnicalDocumentLibrary/369427g_ENG.pdf).

Optimize Radio Frequency Performance

To optimize radio frequency performance of the product:

- Keep the lamp wiring as short as possible to reduce the radiation from the lamp wires.

- Keep the lamp wiring as far as possible from the PowPak® wireless fixture control mounting location.

Live

Neutral

Maintain separation

Lamp Wiring

Fixture Knockout

Ballast / Driver

PowPak®
Fixture
Control

Fluorescent
Lampholders

Switched Hot

Base Pan

Fluorescent
Lampholders

Metal Coverplate

Fluorescent Tubes / LED Load

FC-SENSOR vs. FC-VSENSOR

FC-SENSOR is factory configured to function like an occupancy sensor.
FC-VSENSOR is factory configured to function like a vacancy sensor.

Note: An FC-VSENSOR, requires a Pico® wireless control to turn the lights ON. The sensor turns the light off when the occupant leaves the room after the timeout period has expired.
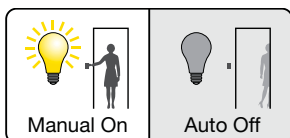
Occupancy Sensors vs. Vacancy Sensors

Occupancy Sensors

An occupancy sensor automatically turns the lights on when you enter a room and off when you leave, making this type of sensor the most convenient, since you never have to touch the lighting controls.

| Auto On | Auto Off |
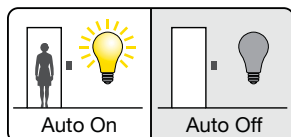
Vacancy Sensors

A vacancy sensor only turns lights off when you leave a room – you must manually turn the lights on when you enter a room. Vacancy sensing maximizes the energy savings from the sensor because it's not always necessary to turn lights on when you enter a room.

| Manual On | Auto Off |

Many codes, ex. California Energy Commission's Title 24, require vacancy, and not occupancy sensors, because occupants are less likely to turn lights on when temporarily entering a space, or when there's sufficient light.

FC-SENSOR and FC-VSENSOR Suggested Mounting

1. For Drop Ceilings

A. Drill a 3/16 in (4.76 mm) hole in the tile using the template provided below (or push a screwdriver through the tile) where the sensor is to be centered.

Drill Template

3/16 in (4.76 mm) maximum hole
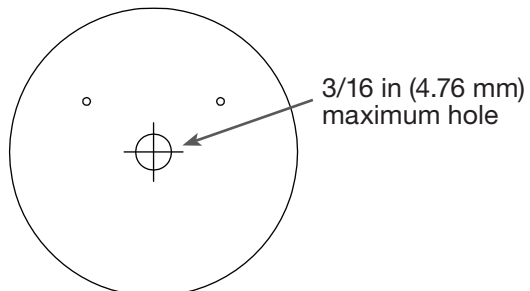
B. Insert the wireform into the retention snaps on the back of the sensor.

Wireform clip

Arms
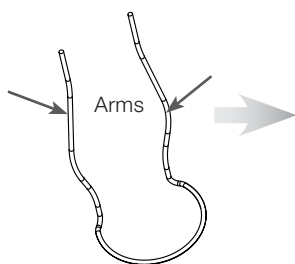
Retention snaps

Sensor with wireform clip properly installed

C. Feed the two blue wires through the hole then push the wireform though the tile as shown below. Bend/twist the wireform on the back side of the ceiling tile to secure the sensor.

Secure the sensor

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FC-SENSOR and FC-VSENSOR Suggested Mounting (continued)
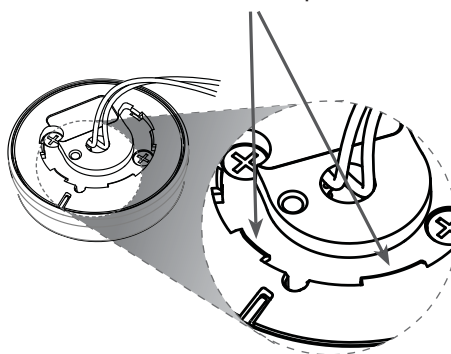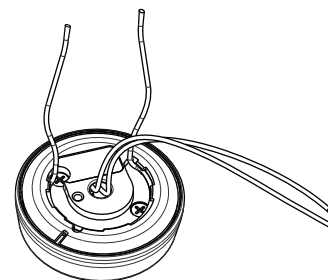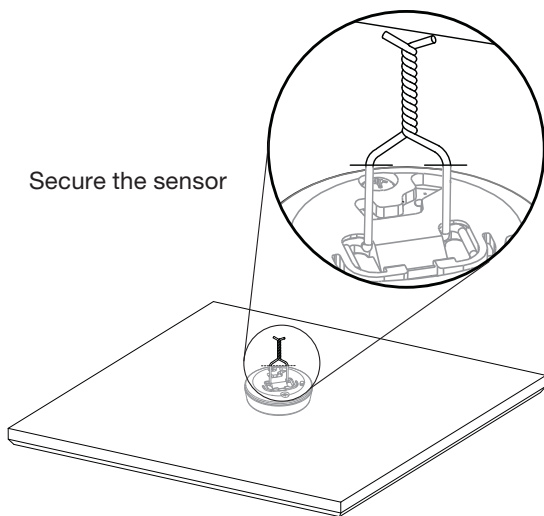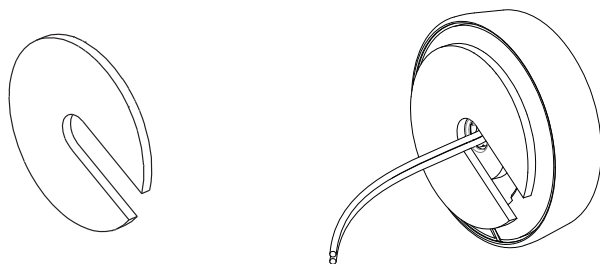
2. **For Solid Ceilings** (or other surfaces where the wireform cannot be utilized)
   Use the supplied adhesive-backed disc (shown below) to adhere the sensor to desired location on the ceiling or on the fixture.

Notes:
- Avoid placing the sensor in direct sunlight or facing the light emanating from the fixtures in the space. This can cause the sensor's readings to be skewed and can adversely affect the daylighting function.
- Recommended mounting height for the fixture sensor is 8 ft to 12 ft (2.4 m to 3.7 m).
- For best results, do not place the sensor within 6 ft (1.8 m) of air vents, air handlers, windows, fans, etc., as this may cause false triggering.
- If hanging pendant fixtures, the maximum wire length between fixture sensor and wireless fixture control is 12 ft (3.7 m). Sensor should be mounted no more than 2 ft (0.6 m) from the fixture.
- The PIR lens should have line of sight access to the space in which the PowPak® fixture sensor is sensing occupancy. Ensure that the sensor is unobstructed by pendant fixtures (if any).

Pendant Fixture

Incorrect

Pendant Fixture
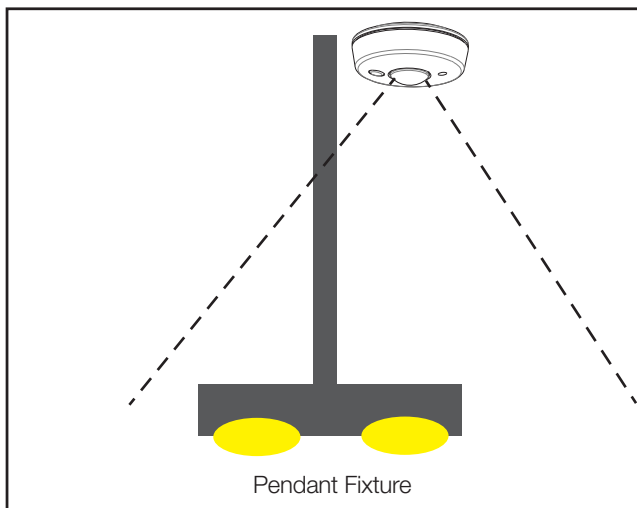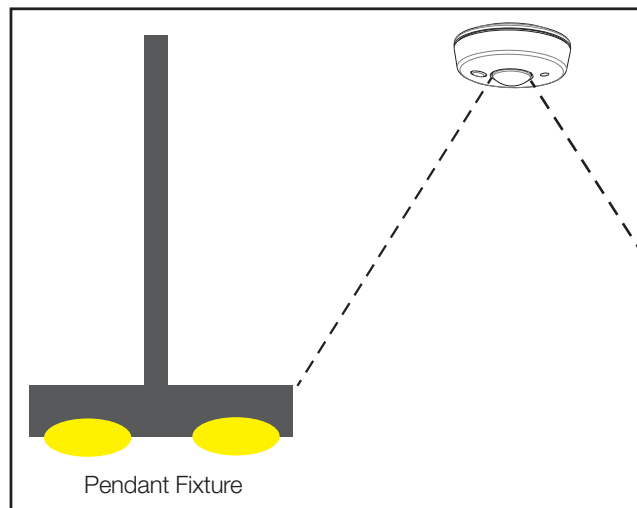
Correct

Daylighting: PowPak® Fixture Sensor (FC-SENSOR or FC-VSENSOR) vs. Radio Powr Savr Sensor™

The PowPak® wireless fixture control has two options for daylighting:
- The PowPak® fixture sensor can be used for simple, out-of-the-box daylighting.
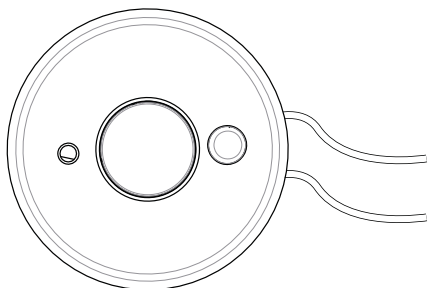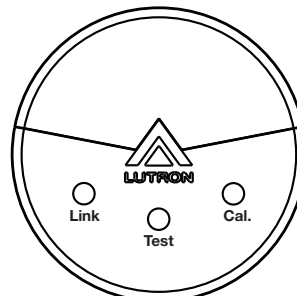- The Radio Powr Savr™ wireless daylight sensor can be added for the ability to adjust and fine-tune daylighting settings.

PowPak® Fixture Sensor (FC-SENSOR or FC-VSENSOR)

- Simple, out-of-the-box daylighting
- Automatic calibration
- Provides daylight control for only 1 fixture control

Radio Powr Savr™ Wireless Daylight Sensor

- Adjust and fine-tune daylighting settings
- Wireless technology allows for flexible placement resulting in optimal performance
- Provides daylight control for an entire group of fixtures

Radio Powr Savr™ daylight sensors provide the ultimate flexibility in daylighting. Target light level (tuning) and gain value (through calibration) can be adjusted independently. Daylighting rows/zones can be setup so that multiple fixtures dim in unison (also known as "grouping"). Radio Powr Savr™ daylight sensors can be placed anywhere since they are completely wireless, and performance can be optimized through placement and fine tuning.

PowPak® fixture sensors are an easy way to add simple daylighting to a localized area without requiring setup. PowPak® fixture sensors are quick to install with a two-wire connection, and calibrate automatically. Each PowPak® fixture sensor should be mounted within 2 ft (610 mm) of the fixture it is controlling.
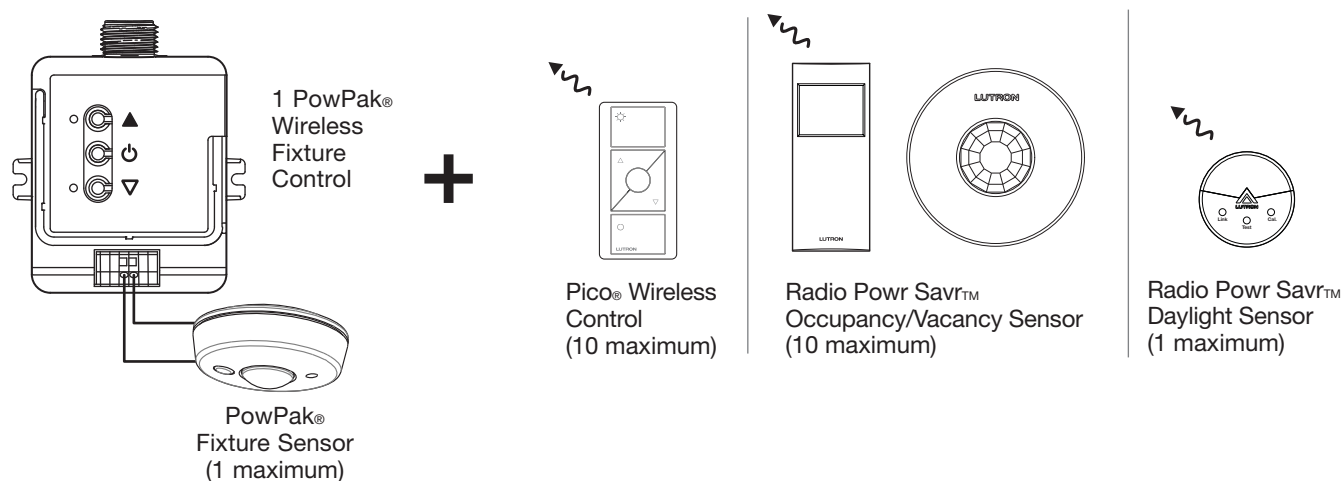
For more information about daylighting or on how to daylight within other Lutron® systems, please contact your local Lutron® sales representative.

Using Radio Powr Savr™ Sensors with a Pow Pak® Wireless Fixture Control

Radio Powr Savr™ occupancy and daylight sensors can be used with a PowPak® wireless fixture control.

- When using a Radio Powr Savr™ daylight sensor in conjunction with both a PowPak® wireless fixture control and PowPak® fixture sensor, the Radio Powr Savr™ daylight sensor will provide the daylighting input to the fixture control, and the **PowPak® fixture sensor's daylighting input will be ignored**.

- When using a Radio Powr Savr™ occupancy sensor in conjunction with both a PowPak® wireless fixture control and PowPak® fixture sensor, occupancy data from both sensors is used; either one detecting occupancy will turn the lights on, and the lights turn off automatically only when both sensors have gone vacant (no longer detect occupancy).

- For fixture grouping see "*Grouping Wireless Fixture Controls Using Radio Powr Savr® Sensors or a Pico® Wireless Control*".

- Radio Powr Savr™ occupancy sensors can be used with the PowPak® fixture sensor to increase coverage area.

System Limitations

1 PowPak® Wireless Fixture Control

PowPak® Fixture Sensor (1 maximum)

+

Pico® Wireless Control (10 maximum)

Radio Powr Savr™ Occupancy/Vacancy Sensor (10 maximum)

Radio Powr Savr™ Daylight Sensor (1 maximum)

Notes:
- There is no limit (other than RF range) to the number of fixture controls that can be associated to each wireless transmitter.
- Only one PowPak® wireless fixture control can be used per PowPak® fixture sensor, and only one PowPak® fixture sensor can be used per PowPak® wireless fixture control.
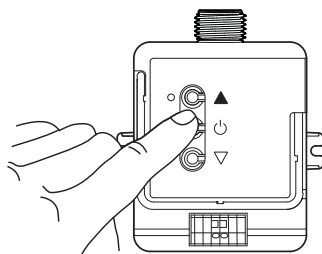
Grouping Wireless Fixture Controls Using Radio Powr Savr® Sensors or a Pico® Wireless Control

Multiple fixtures can be programmed to "Auto-ON" as a group upon occupancy detection.
Radio Powr Savr™ occupancy sensors must be used to achieve this functionality.
Alternatively, multiple fixtures can be grouped together and controlled using a Pico® wireless control.
To create a group of fixtures, follow the steps below.

1. Initiate association mode on the fixture control using one of the two methods described below:

   A. Press and hold the **Toggle** button " ⏻ " for 6 seconds on the fixture control until the load attached to the fixture control starts flashing (every 2 seconds).

   B. Shine a green laser pointer (available at hardware or office supply stores) at the laser detection hole on the sensor until the load attached to the control module starts flashing (every 2 seconds).

Laser Detection

OR

WARNING   **DANGER**

Green laser specifications
(by others):
- Wave output: constant
- Wavelength: 532 nm
- Output power: 5 mW maximum

Eye injury and/or blindness hazard; avoid direct eye exposure to laser beam.
- Use of laser pointer is NOT recommended for use with Lutron® products located near reflective surfaces.
- Do NOT aim or shine laser pointers at any person, pet, vehicle, or aircraft directly, or through reflection by mirrors or other shiny surfaces. Do NOT view the laser beam through binoculars, magnifying glass, or other optical devices.
- Do NOT allow children to use laser pointers.
- **Read and follow the laser pointer manufacturer's instructions on safe use.** In the event of injury, get medical attention immediately.

2. Repeat one of the steps above to put all the fixtures that are part of the group into association mode.

3. Hold the indicated button on the Radio Powr Savr™ sensor or on the Pico® wireless control for 6 seconds or shine a green laser pointer at the laser detection hole in the Radio Powr Savr™ sensors. For more detailed information please refer to document 048407 at www.lutron.com. The fixtures will flash to show that wireless transmitters have been associated. Fixtures in association mode have now been grouped together.
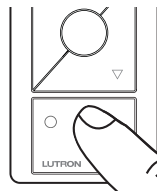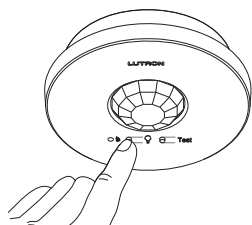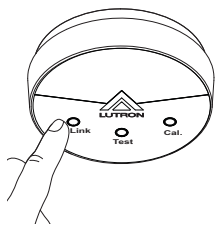
Set Occupied Light Levels with Radio Powr Savr® Occupancy Sensors

Wireless fixture controls associated to a Radio Powr Savr™ occupancy sensor can "Auto-ON" to a desired light level.

1. Set desired occupancy light levels:

   Use **Raise/Lower** buttons "▲/▽" on the PowPak® wireless fixture control or **Raise/Lower** buttons "△/ ▽" on all associated Pico® wireless controls.

2. Save occupancy light levels:

   Press and hold **"Test"** button for 6 seconds on any associated Radio Powr Savr™ occupancy sensor without a **"Lights On**" button. Release when sensor lens starts to flash.
   Or, press and hold "**Lights On"** button for 6 seconds on any associated Radio Powr Savr™ occupancy sensor. Release when sensor lens starts to flash.
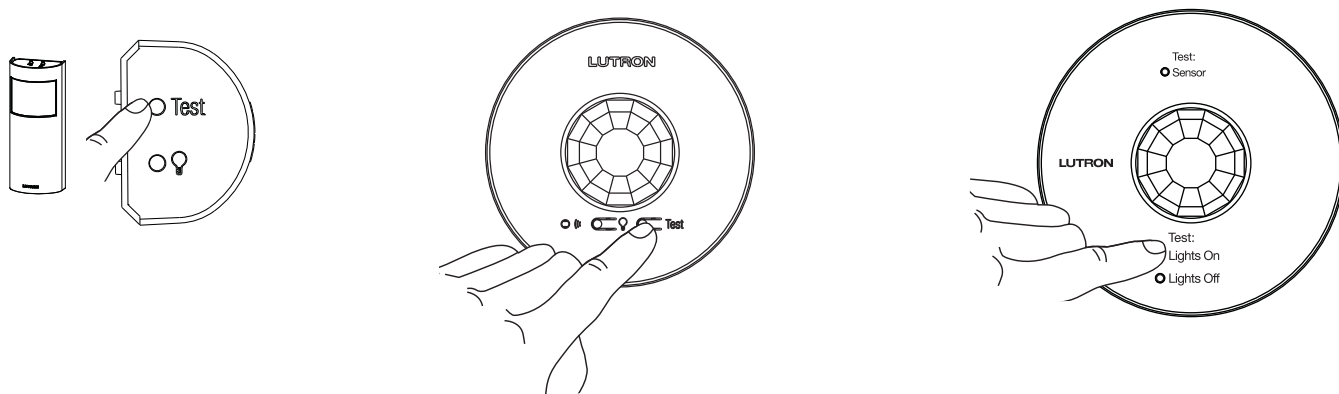
To set the occupied level in installations which only involve the PowPak® fixture sensor (FC-SENSOR), you may temporarily use a Radio Powr Savr™ sensor as follows:

1. Associate the Radio Powr Savr™ sensor to the desired fixture controls.

2. Set the occupied level as shown above.

3. Restore the Radio Powr Savr™ sensor to factory default settings to remove the association.

4. The fixture control will still Auto-ON to the occupied level set with the Radio Powr Savr™ sensor.

Notes:
- When using a fixture sensor in conjunction with a Radio Powr Savr™ sensor, the fixture will Auto-ON to the level set by the Radio Powr Savr™ sensor.
- Unoccupied light level is always the minimum light level and cannot be adjusted.
- Reset the fixture control to factory defaults to remove a defined Auto-ON occupied light level.

Adjusting Minimum (Low-End) or Maximum (High-End) Light Level

For best results, minimize the amount of sunlight entering the room before performing the following procedures.

- Depending on the fixture manufacturer or load, low-end trim and high-end trim may need to be adjusted.
- Trim low-end to ensure a stable light level because some loads will flicker or drop out if trimmed too low.
- Trim high-end for further energy savings or to reduce the maximum light level output of the fixture.
- Be sure that you can turn on the lights to the low-end trim level without any abnormal operation.

1. Using the Buttons on the Wireless Fixture Control

Low-End Trim

A. **Enter low-end trim adjustment mode:** Press and hold the **Lower** button "▽" for 12 seconds. The lights will flash and the load status LED will begin flashing.

B. **Adjust the low-end trim:** Use the **Raise** button "▲" and **Lower** button "▽" on the fixture control to adjust and set the lights to the desired low-end (See table at right).

Low-End	FCJ-010	FCJ-ECO
Minimum	0.20 V⎓	0.1%
Default	0.75 V⎓	1.0%
Maximum	5.00 V⎓	50%

C. **Save the low-end trim:** Press and hold the **Toggle** button "⏻" for 6 seconds to save setting. The load status LED will begin flashing and then turn solid to indicate new level has been saved.
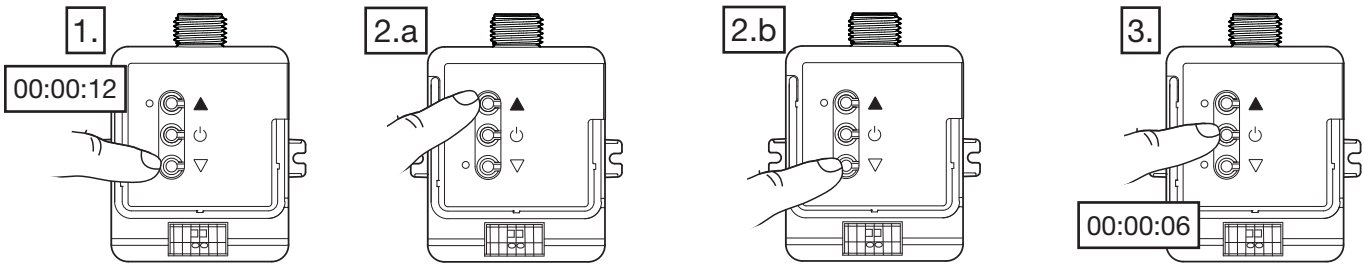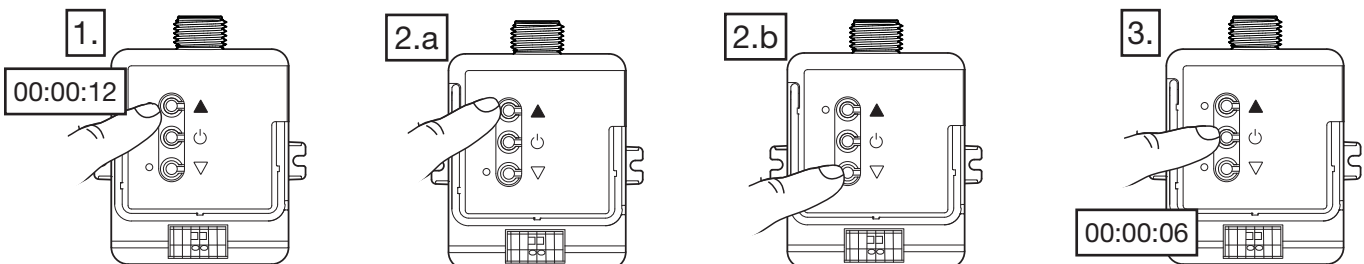

High-End Trim

A. **Enter high-end trim adjustment mode:** Press and hold the **Raise** button "▲" for 12 seconds. The lights will flash and the load status LED will begin flashing.

B. **Adjust the high-end trim:** Use the **Raise** button "▲" and **Lower** button "▽" on the fixture control to adjust and set the lights to the desired high-end (See table at right).

High-End	FCJ-010	FCJ-ECO
Minimum	6.0 V⎓	50%
Default	10.5 V⎓	100%
Maximum	11.0 V⎓	100%

C. **Save the high-end trim:** Press and hold the **Toggle** button "⏻" for 6 seconds to save setting. The load status LED will begin flashing and then turn solid to indicate new level has been saved.

Adjusting Minimum (Low-End) or Maximum (High-End) Light Level (continued)

2. Using a Pico® Wireless Control

The low-end and high-end light level can be adjusted using a Pico® wireless control that is associated to a wireless fixture control.

Low-End Trim
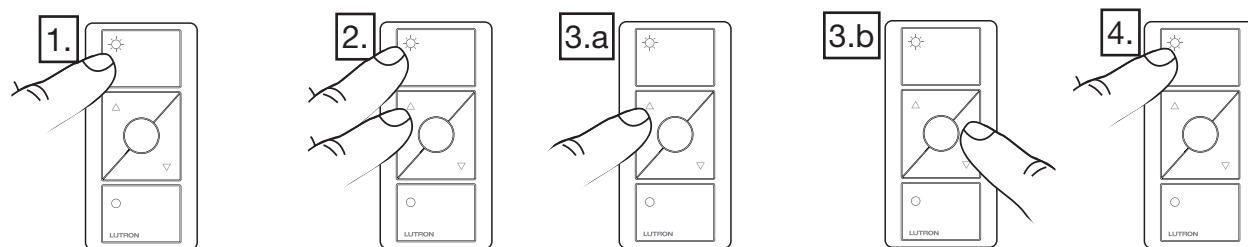
A. Press the **Off** "○" button on the Pico® wireless control.
B. **Enter low-end trim adjustment mode:** Simultaneously press and hold the **On** "☼" and **Raise** "△" buttons on the Pico® wireless control.
    The lights will flash and then stop at the current low-end. The Pico® wireless control LED* will steadily flash letting you know you are in the programming mode.
C. **Adjust the low-end trim:** Using the **Raise** "△" and **Lower** "▽" buttons on the Pico® wireless control.
D. **Save the low-end trim:** Press and hold the **Off** "○" button for 6 seconds to save the low-end trim level.
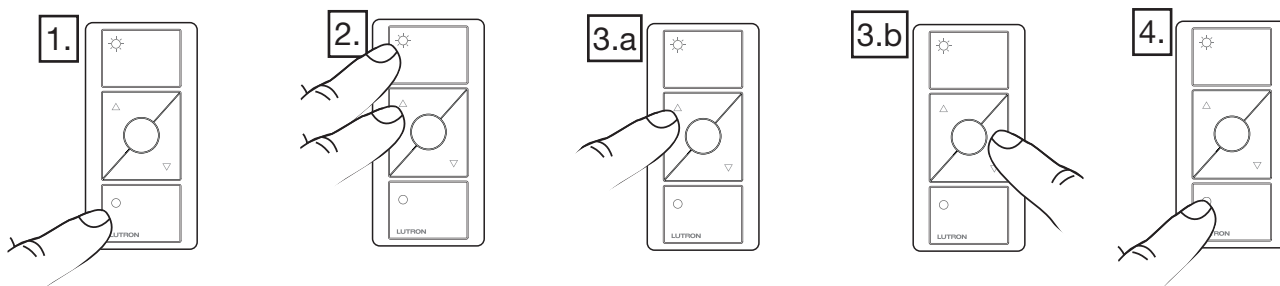
High-End Trim

A. Press the **On** "☼" button on the Pico® wireless control.
B. **Enter high-end trim adjustment mode:** Simultaneously press and hold the **On** "☼" and **Raise** "△" buttons on the Pico® wireless control.
    The lights will flash and then stop at the current high-end. The Pico® wireless control LED* will steady flash letting you know you are in the programming mode.
C. **Adjust the high-end trim:** Using the **Raise** "△" and **Lower** "▽" buttons on the Pico® wireless control.
D. **Save the high-end trim:** Press and hold the **On** "☼" button for 6 seconds to save the high-end trim level.

Notes:
*   In either high-end or low-end trim adjustment mode, pressing the Pico® wireless control buttons to turn the load ON or OFF will not result in a response from the fixture control. You must exit trim adjustment mode in order to restore normal functionality for the ON and OFF buttons on the Pico® wireless control.
*   Both the high-end and low-end trim adjustment mode will exit automatically after 10 minutes of inactivity.

*   Some Pico® wireless control models do not have an LED on the top left corner. For such models, follow the same steps (A-D) to adjust low-end and high-end trim. Note that when entering the programming mode, step B, there will be no LED feedback.

Chicago/Egress Mode

Under normal operation, the lights controlled by a wireless fixture control turn OFF when an occupancy sensor reaches the end of its time-out or when the **Off** "💡" button is pressed on an associated Pico® wireless control. "OFF" is the minimum light level.

By activating Egress mode, lights will go to the low-end level instead of turning OFF. When the **Off** button is pressed on an associated Pico® wireless control or if the associated sensor(s) do not detect motion for a set period of time, the lights go to the low-end level.

The low-end level can be re-defined by adjusting the low-end trim (see "*Adjusting Minimum (Low-End) or Maximum (High-End) Light Level*").

Enable Egress Mode

1. Simultaneously press and hold the **Toggle** button "⏻" and the **Lower** button "▽" for 12 seconds.
    Lights will flash and stop at high-end.

2. Press the **Raise** button "▲" to select low-end level as the minimum light level. The lights will fade to low-end.

3. Press and hold the **Toggle** button "⏻" for 6 seconds to exit.
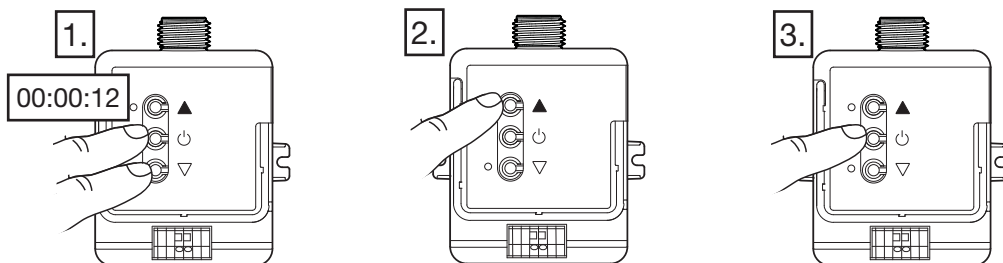
Disable Egress Mode

1. Simultaneously press and hold the **Toggle** button "⏻" and the **Lower** button "▽" for 12 seconds. Lights will flash and stop at low-end.

2. Press the **Lower** button "▽" to select "OFF" as the minimum light level.
    The lights will fade to off.

3. Press and hold the **Toggle** button "⏻" for 6 seconds to exit.
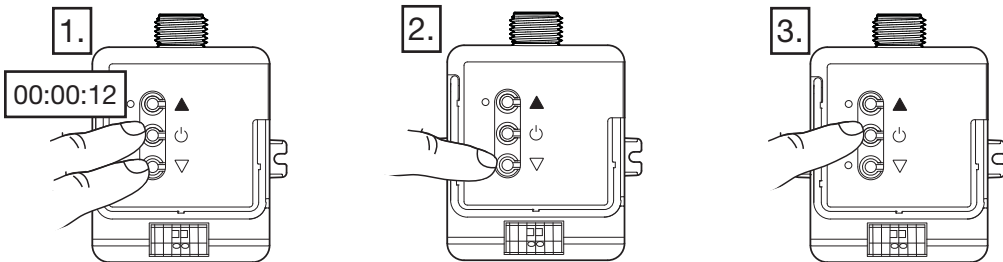
Notes:
*   Egress mode will automatically exit after 10 minutes of inactivity. In this event, the setting will be the same as it was prior to entering egress mode (automatic exit does not save changes).

Changing Fixture Sensor Settings for Wired Sensors (FC-SENSOR or FC-VSENSOR)

To enter the sensor settings menu, press and hold the **Raise** button "▲" and the **Lower** button "▽" for 6 seconds until both LEDs start flashing as described below.
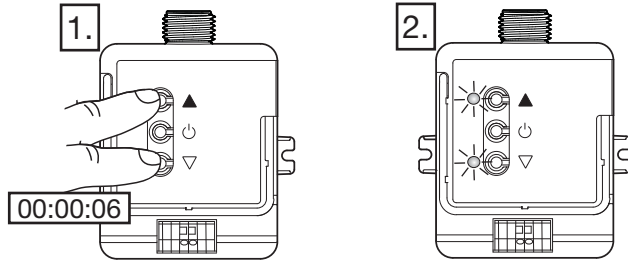
The bottom LED blinks a certain number of times to indicate the selected menu. Immediately after, the top LED blinks the number of times corresponding to the options listed under Time-Out, Sensitivity, Occupancy "Occ" Mode and Daylight Tuning. This is repeated every 3 seconds.

Press the **Lower** button "▽" to cycle through the menu options.
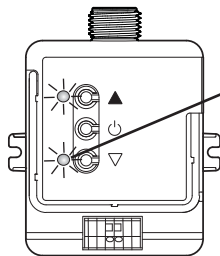
Number of Lower LED Flashes	Menu Options
1	Time-Out
2	Sensitivity
3	Occupancy "Occ" Mode
4	Daylight Tuning (FC-SENSOR only)

1. Change Time-Out

After entering the sensor settings menu, press the **Lower** button "▽" to cycle through the menu options until the bottom LED flashes 1x for "Time-Out."

The Top LED flashes 1x, 2x, 3x or 4x according to the corresponding Timeout setting. Press the **Raise** button "▲" to cycle through the "Time-Out" options.

Simultaneously press and hold the **Raise** "▲" and the **Lower** buttons "▽" for 6 seconds to save and exit.

1x every 3 seconds
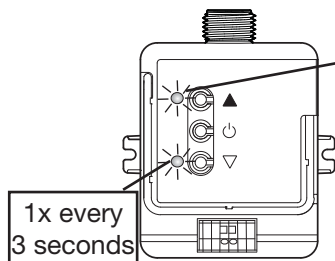
Number of Upper LED Flashes	Time-Out Options
1	1 minute
2	5 minutes
3	**15 minutes** (default)
4	30 minutes
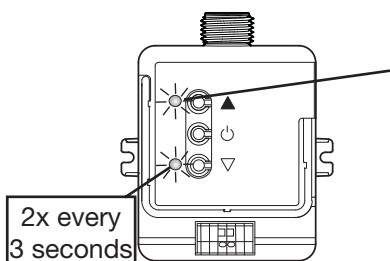
Changing Fixture Sensor Settings (continued)

2. Occupancy/Vacancy Sensor Sensitivity Adjustment

After entering the sensor settings menu, press the **Lower** button "▽" to cycle through the menu options until the bottom LED flashes 2x for "Sensitivity."

The Top LED flashes 1x, 2x, 3x or 4x according to the corresponding Sensitivity setting. Press the **Raise** button "▲" to cycle through the Sensitivity options.

Simultaneously press and hold the **Raise** "▲" and the **Lower** buttons "▽" for 6 seconds to save and exit.

2x every 3 seconds

Number of Upper LED Flashes	Sensitivity Options
1	Ultra low
2	Low
3	**Medium (default)**
4	High
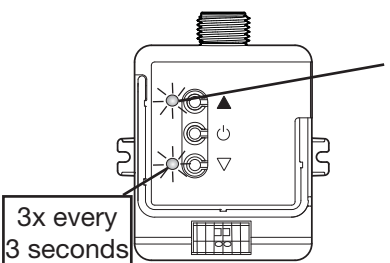
3. Occupancy Mode Adjustment (FC-SENSOR only)

After entering the sensor settings menu, press the **Lower** button "▽" to cycle through the menu options until the bottom LED flashes 3x for "Occ mode."

The Top LED flashes 1x, 2x, or 3x according to the corresponding Occ mode setting.

Press the **Raise** button "▲" to cycle through the Occ mode options.

Simultaneously press and hold the **Raise** "▲" and the **Lower** buttons "▽" for 6 seconds to save and exit.

3x every 3 seconds

Number of Upper LED Flashes	Occ Mode
1	**Occupancy (default)**
2	Vacancy
3	Disabled

Notes:
- "Occ Mode" can be adjusted only with a FC-SENSOR.
- FC-VSENSOR acts as a vacancy sensor by default. This cannot be changed.

Changing Fixture Sensor Settings (continued)

4. Daylight Tuning

Daylight tuning can be used to change the fixture sensor's response when it senses daylight.
After entering the sensor settings menu, press the **Lower** button "▽" to cycle through the menu options until the bottom LED flashes 4x for "Daylight Tuning."
The Top LED flashes 1x, 2x, 3x, 4x or 5x according to the corresponding light level that should be maintained at the task surface.

Press the **Raise** button "▲" to cycle through the light level options.
Press the **Raise** "▲" and the **Lower** buttons "▽" for 6 seconds to save and exit.

Number of Upper LED Flashes	Light Level Options
1	Less bright
2	**Normal (default)**
3	More bright
4	Very bright
5	Daylight sensor disabled

Resetting Fixture Control and Fixture Sensor to Factory Default Settings

1. Rapidly tap the **Toggle** button "⏻" on the fixture control three times and hold on the fourth until the LED begins to flash slowly; release button.

2. As soon as the LED flashes the first flash, again rapidly tap the **Toggle** button "⏻" three times and the LEDs will flash rapidly indicating that the unit has been reset to factory defaults.

Note: Any associations or programming previously set up with the fixture control will be erased and will need to be re-programmed.

Troubleshooting   www.lutron.com

Symptom	Solution
Ballasts / drivers cannot be controlled locally from the fixture control.	• Ensure that the breaker(s) to the fixture control is / are energized. • Ensure that the fixture control switched hot lead is wired to the ballast / driver (FCJ-010). • Ensure that the fixture control lines (FCJ-010: violet / gray, FCJ-ECO: violet / violet) are wired to the ballast / driver. • Verify the driver/ballast is: 0–10 V if using FCJ-010; or Lutron® EcoSystem® driver / ballast if using FCJ-ECO.
	Reset to factory defaults.
Lights do not dim or turn ON as expected.	• Ensure that control lines are wired properly (FCJ-010: violet / gray-polarity, FCJ-ECO: violet / violet) • Ensure that the wires are connected between the fixture sensor and the fixture control. • FCJ-010 only: Make sure that 0–10 V fixture is at low-end (at 0 V), not OFF (at 0 V). If OFF (at 0 V), adjust low-end trim. • FCJ-010 only: Ensure that fixture does not require an inverted signal (10–0 V⎓ control). • FCJ-010 only: Verify that the voltage across the gray and violet wires is between 0 and 10 V⎓. • FCJ-010 only: Disconnect the Violet / Gray wires from the fixture control. Verify that the lights go to 100%. Short the Violet / Gray wires on the ballast / driver, verify that the lights go to the low-end. • FCJ-ECO only: Disconnect the Violet / Violet wires from the fixture control. Verify that the lights go to 100%.
Lights turn ON/OFF but do not dim.	• Ensure that control lines are wired properly (FCJ-010: violet/gray-polarity, FCJ-ECO: violet/violet) • FCJ-010 only: Ensure that fixture does not require an inverted signal (10–0 V⎓ control). • FCJ-010 only: Verify that the voltage across the gray and violet wires is between 0 and 10 V⎓.
Lights do not respond to wireless transmitter(s).	• Ensure that the breaker(s) to the fixture control and ballasts / drivers are energized. • Ensure that wireless transmitters are associated to the fixture control.
	Reset to factory defaults.
Wireless transmitter(s) cannot be associated to the fixture control.	• The maximum number of wireless transmitters have been associated to the fixture control. To remove a previously set up wireless transmitter, tap any button on the wireless transmitter three times; on the third tap, hold for three seconds and then tap three more times. • The fixture control may be in high-end/low-end trim adjust mode. See page 12 for more information.
RF range between wireless controls is diminished below 30 ft (9 m).	• Keep the ballast/driver wiring as short as possible and well organized to avoid excess wire being bunched up. • Keep the first 7-12 in (20-30 cm) of the wires coming out of the fixture control knockout separated as much as possible from any nearby ballast/driver/lamp wires. • Contact Lutron® technical support for further assistance.
Lights are unstable at low-end.	• Adjust low-end trim.
Fixture sensor does not turn the lights ON.	• Check that fixture sensor wires are connected to fixture control. • FC-VSENSOR is vacancy only (it will not turn the lights on). • Wait for the fixture sensor to complete 2 minute warm-up period.
FCJ-ECO cannot be addressed.	• All drivers/ballasts connected to an FCJ-ECO function as a single zone. If more than one zone is required, use RMJ-ECO32-DV-B.
The association step fails.	• If the allowed number of transmitters per fixture control is exceeded, the association step fails. See page 8 for details on the maximum number of wireless transmitters allowed.

For more information on the PowPak® fixture controls visit www.lutron.com

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