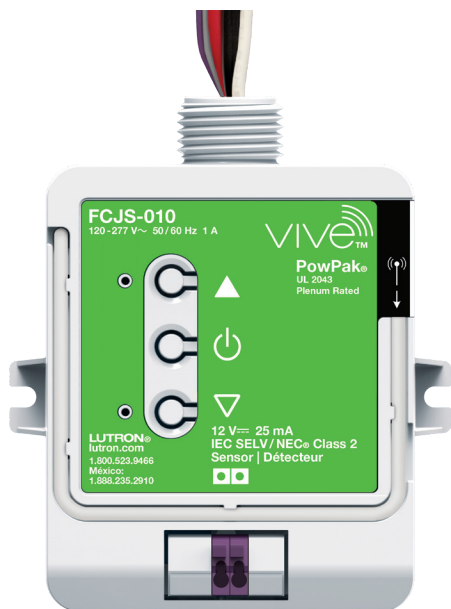


PowPak Wireless Fixture Control Supplemental Design and Application Guide



Model Numbers

FCJS-ECO	RMKS-8T-DV-B
FCJS-010	RMKS-5R-DV-B
FC-SENSOR	RMKS-DAL32-SZ
FC-VSENSOR	RMKS-DAL4-SZ
	RMMS-DAL32-SZ
	RMMS-DAL4-SZ



NOTICE: Improper installation can result in degraded wireless communication and/or intermittent or sustained communication failures, and will not be covered under warranty.

Purpose of Document

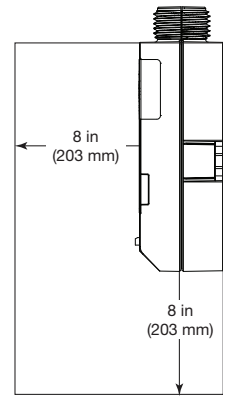
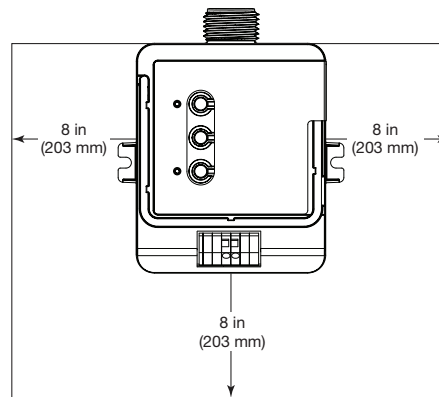
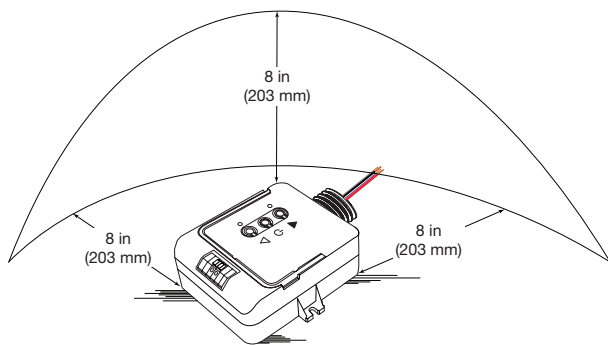
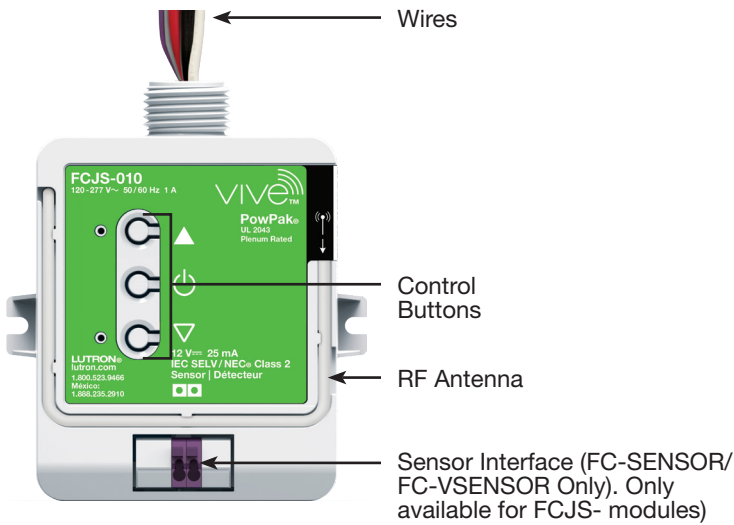
This document is intended to help OEMs integrate Lutron PowPak fixture control modules and sensors into their fixtures and provide guidance on how to achieve **optimum** performance from their Lutron controlled equipment.

General Guidelines

- When mounting to the fixture, avoid contact with metal other than the rear (side opposite of the buttons) and the end where the wires exit the unit. See "Control Descriptions" for more information.
- NEVER** mount the control module in such a way that the buttons are inaccessible. Doing so will inhibit use of the equipment, affect RF Range, or both. Do not fully enclose in metal. Some applications (in U.S.A.) require the PowPak fixture control to be installed inside an additional junction box. For information about how to perform this installation, please see Lutron Application Note #423 (P/N 048423) at www.lutron.com
- Keep the top surface (the surface with the buttons) of the module clear of metal and any wiring for 8 in (200 mm) per the figure on page 2. There is no minimum clearance distance for the bottom of the unit.
- For more information about PowPak fixture controls, please see Lutron Application Note #556 (P/N 048556) at www.lutron.com
- The FC-Sensor should be mounted so that the light produced by the attached fixture does not impede daylight operation.
 - It is suggested that the sensor be mounted below the lit surface of the fixture.
 - Orient the sensor so that the lit surface of the fixture is not directly visible to the daylight lens.
 - Mount the sensor so that the occupancy lens is aimed directly at the the floor of the space.
- When packaging the completed fixture, be aware of the sensor. Damage can occur to the sensor or its lens when subjected to contact with the packaging (as in a stack of boxed fixtures).
- LED drivers and fluorescent lamp ballasts can generate interference that may affect the performance of wireless controls. Follow the wiring layout guidelines outlined in Appendix 1 to reduce the likelihood of wireless performance issues.

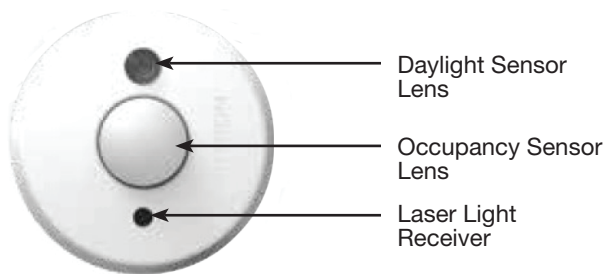
Control Descriptions

Fixture Control Module



No metal should exist within 8 in (203 mm) of the top of the control module.

Fixture Sensor



Note: See PowPak Fixture Controls spec submittal for more information on the Fixture Sensor use and applications (P/N 369866).

Different Scenarios For Mounting a PowPak Fixture Control to a Fixture

The following images show examples of proper and improper mounting of the fixture control to a fixture.

Proper Installation

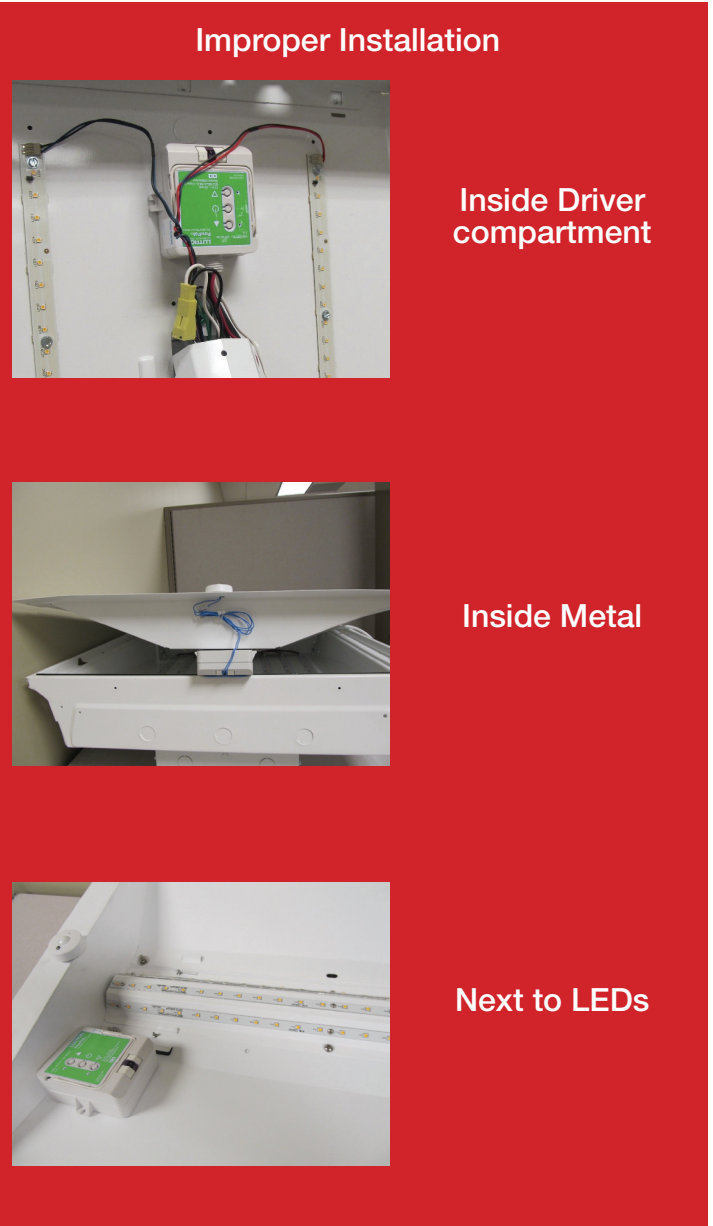
The control module is mounted to the exterior of the fixture.



Improper Installation

Mounting: The control module is mounted inside the fixture, inside of the channel meant for the driver.

- Issue:**
1. The buttons on the control module are inaccessible.
 2. The antenna is inside of a metal enclosure which will significantly reduce the RF range.



Improper Installation

Inside Driver compartment

Mounting: The control module is mounted inside the fixture, behind the LED surface.

- Issue:**
1. The buttons on the control module are inaccessible.
 2. The antenna is inside of a metal enclosure which will significantly reduce the RF range.



Inside Metal

Mounting: The control module is mounted in the diffuser space.

- Issue:**
1. The LEDs can create RF interference, reducing the RF range of the control module.



Next to LEDs

Different Scenarios For Mounting a PowPak Fixture Control to a Fixture *(continued)*

The following images show examples of proper and improper mounting of the fixture controller to a fixture.

Proper Installation

The control module is mounted to the rear or top of the fixture. The antenna and buttons are clearly exposed to the space and pointed away from the metal of the fixture.



Improper Installation

Mounting: The control module is mounted to the rear of the fixture with the buttons and antenna against the surface of the fixture.

- Issue:**
1. The buttons on the control module are inaccessible.
 2. The antenna is against a metal plane which will significantly reduce the RF range.



Other Mounting Considerations For Mounting a PowPak Fixture Control

For certain fixture types, suspended pendant for example, the PowPak Fixture Control may need to be mounted to a junction box in the ceiling rather than directly to the fixture. Be aware of other metal objects near the control module.

Proper Installation

The control module is mounted to a junction box in the ceiling. The antenna and buttons are clearly exposed to the space and pointed away from the metal of the junction box.

Proper Installation



Improper Installation

Mounting: The control module is mounted to a junction box in the ceiling with the buttons and antenna against the surface of the steel I-beam.

- Issue:**
1. The buttons on the control module are inaccessible.
 2. The antenna is against a metal plane which will significantly reduce the RF range.

Improper Installation



Buttons Not Accessible

Other Mounting Considerations For Mounting a PowPak Fixture Control *(continued)*

For certain fixture types, suspended linear pendant for example, the PowPak Fixture Control may need to be mounted to a junction box rather than directly to the fixture. Be aware of other metal objects near the control module.

Proper Installation

The control module is mounted to a junction box adjacent to steel conduit. The antenna and buttons are clearly exposed to the space and pointed away from the metal of the junction box and the conduit.



Improper Installation

Mounting: The control module is mounted to a junction box with the buttons and antenna hidden behind the steel conduit.

Issue:

1. The buttons on the control module are inaccessible.
2. The steel conduit is within the 8 in (200 mm) radius of the antenna which will significantly reduce the RF range.

Mounting: The control module is mounted to a junction box adjacent to steel conduit with the buttons and antenna against the surface of the fixture.

Issue:

1. The buttons on the control module are inaccessible.
2. The antenna is against a metal plane which will significantly reduce the RF range.



Improper Installation

Buttons
Not
Accessible

Different Scenarios For Mounting a Fixture Sensor to a Fixture

The following images show examples of proper and improper mounting of the fixture sensor (FC-SENSOR, FC-VSENSOR) to a fixture.

Proper Installation

The sensor is mounted in front of the LED strips with a clear field of view into the space.



Improper Installation

Mounting: The sensor is mounted recessed into the fixture.

- Issue:**
1. LED strips are in front of the sensor surface resulting in interference with the daylight sensor.
 2. LED light is visible to the sensor.

Improper Installation

LED Light is Visible

Field of View is Blocked

Mounting: The sensor is mounted inside the fixture, behind the fixtures baffles.

Issue:

1. The baffles on the fixture severely restrict the sensor's field of view resulting in poor occupancy sensor performance.

LED Light is Visible.
Sensor is Not Pointed Toward the Floor.

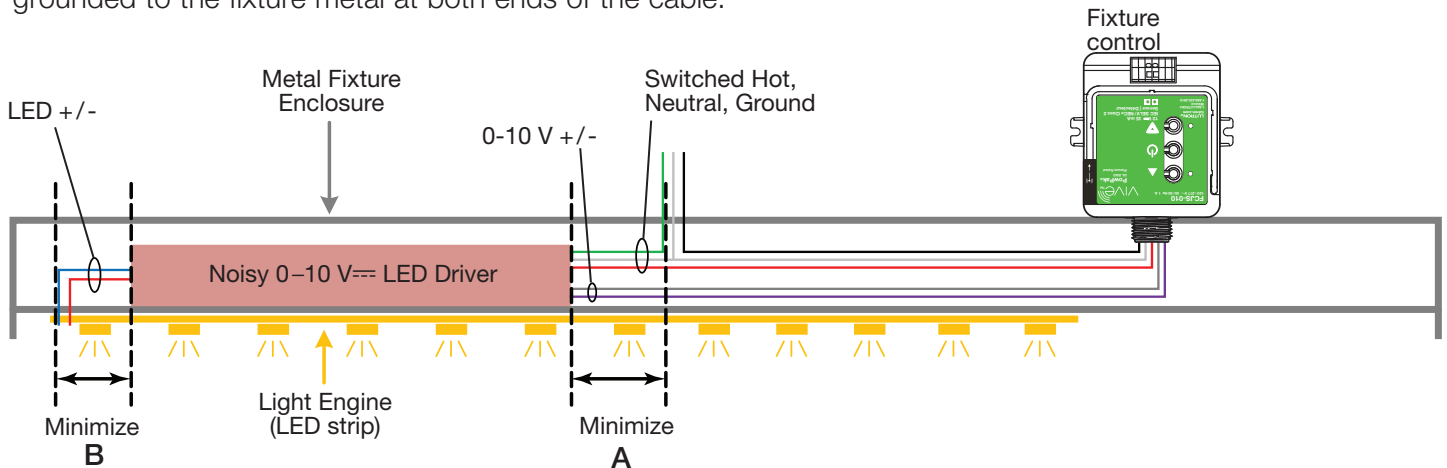
Mounting: The occupancy sensor in the fixture so that it is not pointed into the space.

- Issue:**
1. The occupancy sensor is not pointed into the space resulting in poor occupancy sensor performance.
 2. The LED strips are visible to the daylight sensor resulting in poor daylight sensor performance.

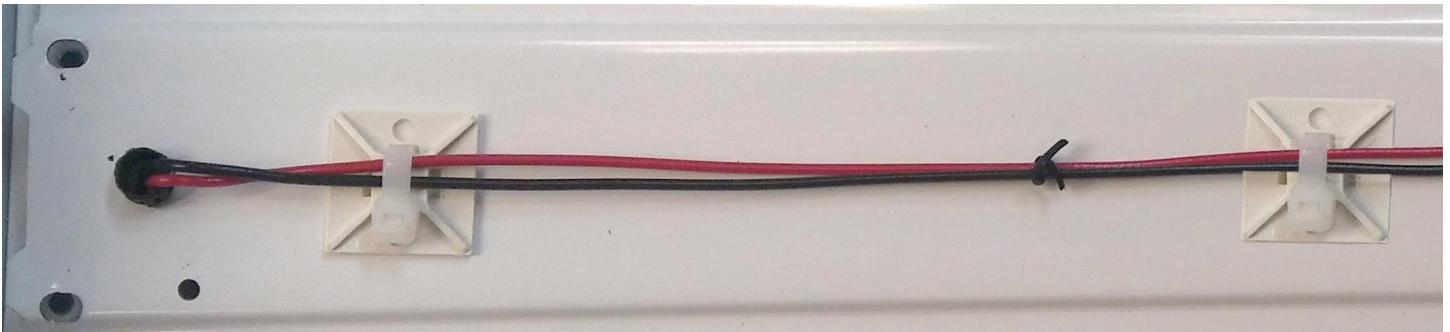
Appendix 1: Wiring Guidelines for Optimal Performance

NOTE: It is understood that these recommendations may not be able to be followed for all types of fixtures. Please apply where possible using engineering judgement.

1. Where possible, minimize all wire lengths to achieve the connections in a well organized manner. Avoid leaving unnecessary slack in the wires. Driver line voltage wiring should exit the fixture wiring channel as close as possible to the driver to minimize any internal coupling to the fixture control (A). LED/lamp wiring should be routed away from the fixture control wherever possible (B). In cases where the OEM must provide longer wire lengths to allow for the removal of fixture trays for fixture mounting, recommend that the OEM utilize shielded cable if the wiring is to be looped together for storage inside the fixture. Ensure that the shielding is properly grounded to the fixture metal at both ends of the cable.

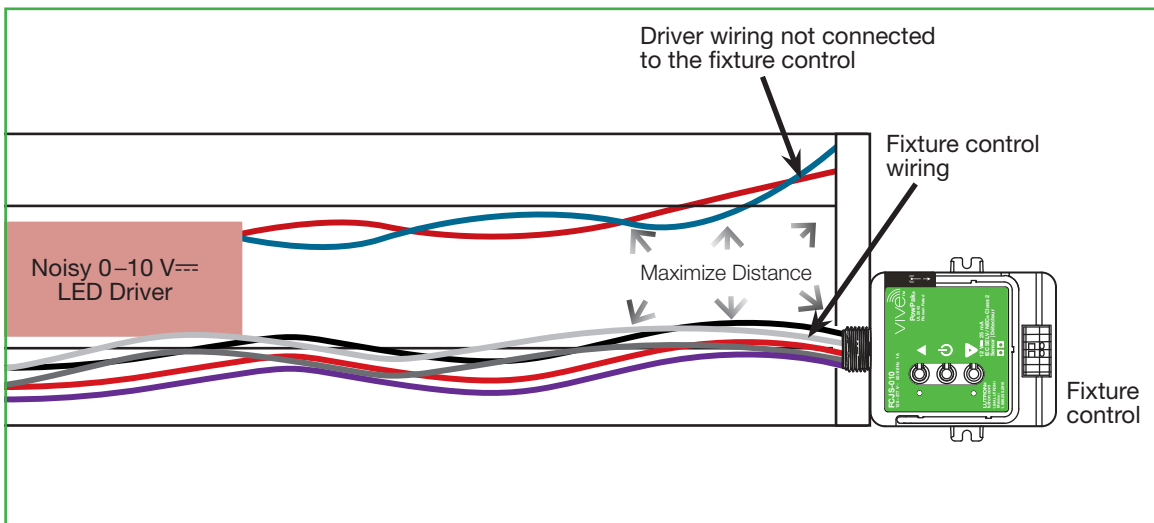
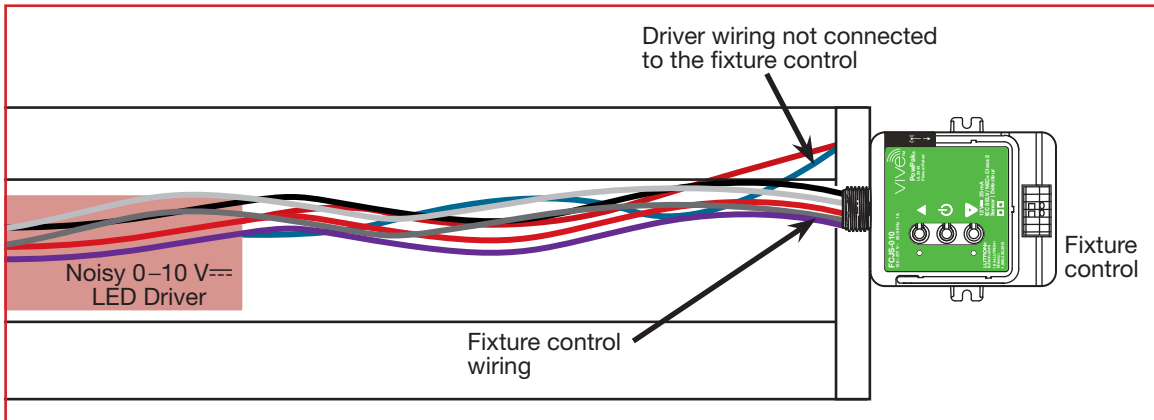


2. If the driver is provided with a ground terminal, this terminal should be electrically connected to the grounded fixture metal as close to the driver as possible.
3. Where possible, mechanically affix wires to the fixture wall so that they are kept as close as possible to the grounded fixture metal.

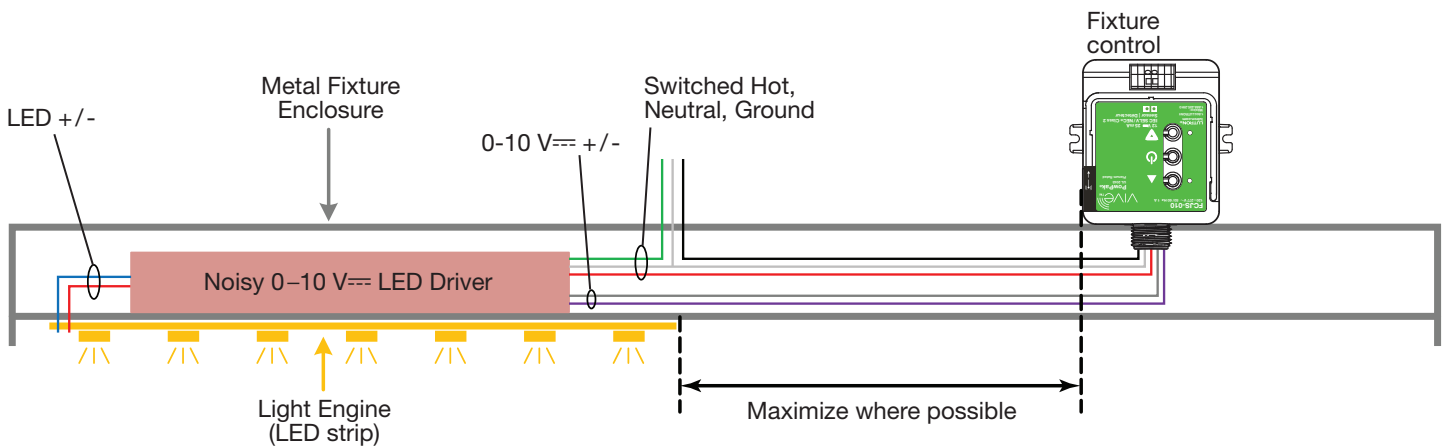


Wiring Layout Guidelines for Optimal Fixture Control Performance *(continued)*

4. Avoid routing wiring from the driver and wiring from the fixture control side by side.



5. If possible, ensure that the fixture control is mounted away from the LED strips to minimize coupling from the strips into the fixture control. It may be possible to use the metal from the fixture to shield the fixture control.



Appendix 2: Driver + RF Module Compatibility Check

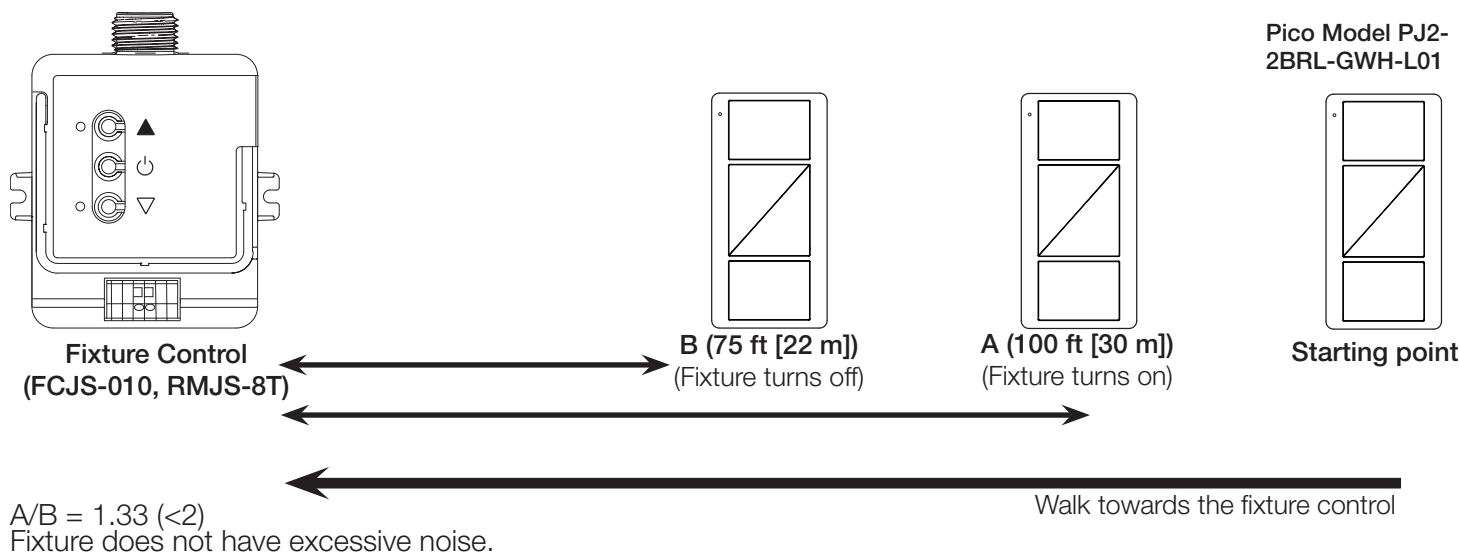
This procedure provides a test which can be performed at an OEM to check for gross driver compatibility issues. It does not guarantee that an issue will not occur in the field due to driver compatibility/noise, however it can identify moderate and severe issues which would be likely to affect a large number of fixtures. The test should take about 15 minutes to perform once a fixture is wired up and positioned for the test.

Required Materials:

- (1) FCJS-010 RF module
- (1) Fixture + 0-10V LED driver
- (1) PJ2-2BRL-GWH-L01 Pico RF remote control

1. Ensure a Pico control is associated to the load control. If not, please associate one to it (see FCJS-010 installation instructions on www.lutron.com for details).
2. Turn off all lights in the space or perform this test outside in a flat area like a parking lot. This is to eliminate as many noise sources as possible. If this cannot be done outside, use a wide open area inside.
3. Move as far away from the test fixture as possible so that you are out of the range of the Pico control (~100 ft (30 m) or more, depending on conditions).
4. Verify the Pico control does not turn on the fixture. If it does, turn it off (you may need to move closer to do so) and continue to move farther away.
5. When you are no longer able to turn on the fixture, start slowly moving closer to the fixture while using the Pico control to try and turn it on.
6. When the fixture turns on, stop. This is point A. Measure the distance to the fixture.
7. Start trying to turn off the fixture. If it does not immediately turn off, start moving closer, while trying to turn it off.
8. When the fixture turns off, stop. This is point B. Measure the distance to the fixture.
9. Divide distance A over B. If the ratio of A/B is 2 or less, the driver is likely not emitting noise of a level which will interfere with the Clear Connect communication.
10. If the ratio of A/B is greater than 2, the driver is likely emitting noise at a level which may interfere with Clear Connect communication. Check the wiring inside the fixture to ensure that recommended practices from Appendix 1 were followed as much as possible (if necessary, correct) or change the driver. In both cases, repeat the test to evaluate improvement.

Example:



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