

### Sensors and Compliance with the 2011 National Electric Code (NEC®) Requirements for Neutral Conductors

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#### Overview

This application note is intended to address questions about the 2011 edition of the NEC® and how it applies to Lutron® Maestro® Occupancy sensing switches, specifically on the use of Neutral and Ground wires to provide a charging path for operation of the sensor.

The specific section of the 2011 NEC® addressing the installation of a neutral conductor at the switch box location is summarized as follows:

#### **2011 NEC® 404.2(C), Switches Controlling Lighting Loads**

A neutral must be run to the light switch box location unless:

1. Wiring enters the switch box through conduit large enough to accommodate running the neutral later, or
2. The wiring cable (for example, nonmetallic cable like Romex®) enter the switch box through a framing cavity that is open at the top or bottom on the same floor level or is unfinished on one side to accommodate running the neutral later

#### **Notes:**

- The above requirement does not establish a limit for amount of current flowing on the ground wire.
- The above requirement does not require a sensor to have a neutral wire or a neutral terminal.
- The above requirement does not require the neutral wire to be connected to a sensor when the neutral is in the switch box.

While the NEC® ensures safe electrical installations, UL® product safety standards ensure products are designed so that they can be properly installed in accordance with the NEC®. Lutron® sensors are UL® Listed and comply with the UL® limit on the amount of current flowing on the ground wire.

This UL® limit for sensors is summarized as follows:

- Current flowing on the ground wire of a sensor shall not exceed 0.5 mA rms.

#### **Understand Though...**

The NEC® is a document subject to interpretation. Your local city, county, municipality or state authorities have the final authority to approve or disapprove any installation. They must always be consulted for verification of the code, and the manner in which it will be applied, in your area, prior to installation.

Lutron has observed that certain locales have additional requirements that require a Neutral wire to be run to every switch box location, regardless of construction.

Lutron has a sensor option for every application, regardless of how the NEC® code is interpreted. The following table highlights Lutron® Occupancy sensing switch solutions and the requirements for a Ground or Neutral wire for functionality, as well as requirements for minimum load.

Control	Voltage	Minimum Load	Neutral Connection Required	Ground Connection Required for Functionality
MS-OPS2 MS-VPS2	120 V~	0 A	No	Yes
MS-OPS5M MS-VPS5M	120 V~	0 A	No	Yes
MS-OPS6M-DV MS-VPS6M-DV	120 V~/277 V~	25 W	No	No
MS-OPS6M2-DV MS-VPS6M2-DV	120 V~/277 V~	0 A	No	Yes
MS-OPS6M2N-DV MS-VPS6M2N-DV	120 V~/277 V~	0 A	Yes	No

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