Occupancy Sensor Power Pack

Cat. No. **OPP20-0D1** (Auto ON), **OPP20-0D2** (Auto/Manual ON, Local Switch), **OPP20-RD3** (Auto ON, Photocell), **OPP20-RD4** (Auto/Manual ON, Local Switch, Photocell)

Load Ratings: 20A, 2400W @ 120V – Incandescent / 20A, 2400VA @ 120V – Fluorescent / 20A, 5540VA @ 277V – Fluorescent
16A, 4430VA @ 277V – Electronic Ballasts / 1/2 HP @ 120V – Motor Load / 2 HP @ 240/277V – Motor Load

For use with OSCxx, OSWxx and OSFHP +24VDC Occupancy Sensors

INSTALLATION AND QUICK START GUIDE

LEVITON®

WARNINGS AND CAUTIONS:
- **WARNING:** TO AVOID FIRE, SHOCK, OR DEATH; **TURN OFF POWER** AT CIRCUIT BREAKER OR FUSE AND TEST THAT POWER IS OFF BEFORE WIRING!
- To be installed and/or used in accordance with appropriate electrical codes and regulations.
- If you are unsure about any part of these instructions, consult an electrician.
- Disconnect power at circuit breaker or fuse when servicing, installing or removing fixture or changing lamps.

WARNINGS AND CAUTIONS:
- Risk of Electric Shock – More than one disconnect switch may be required to de-energize the equipment before servicing.
- **The power pack and load voltage must be connected to the same circuit/phase to operate safely.**
- Use this device with **copper or copper clad wire only**.

FEATURES

- 20Amp latching relay with Return-to-Closed (Fail-ON) capability.
- Power Savings over non latching relay power packs.
- Factory calibrated zero crossing.
- Return to Close Fail-Safe operation in event of power loss or power failure.
- Output short circuit protection.
- Passes strict NEMA 410 test for Electronic Ballasts current overload at 16 Amps.
- Title 24 Compliant (OPP20-0D2, OPP20-RD4 with Manual ON/Auto OFF, local switch).
- Regulated 24VDC, 225mA output.
- Mounts inside or outside Fluorescent Ballast cavity.
- Mounts inside or outside Junction Box.
- Rated for Plenum spaces.
- Teflon coated Class 2 wires.
- UL/cUL Listed Energy Management Equipment, UL 916.

RATINGS

Part Number	**Power Input[1]**
OPP20-0D1,0D2,RD3,RD4	120-277VAC, 50/60Hz
Power Consumption (No Load)	**Power Output (Max)[2]**
7.2mA (260mW) @120V, 10.5mA (550mW) @277V	24VDC, 225mA, 5.4W

[1] Input voltage tolerance 10%, Frequency tolerance 5%.
[2] Output voltage tolerance 10%, Output voltage listed at nominal.

Power Input and Efficiency with maximum output load:
120VAC @60Hz: 7.2Watts, 79% Efficient
277VAC @60Hz: 7.7Watts, 74% Efficient

DESCRIPTION

The power pack contains a power supply and a load switching latching relay. The power supply provides Class 2 low-voltage power for OSCxx, OSWxx, and OSFHP Series Occupancy Sensors. The OPP power packs can also supply power to the OSA20, Add-A-Relay. The relay in the power pack is controlled by the occupancy sensors connected via the 22 Gauge Blue "Auto ON" Occupancy wire and Photocells connected via the 22 Gauge Gray "Photocell" wire for the –RD3, –RD4 models. Additionally the –RD3 and –RD4 models adds two more control wires; a 22 Gauge White/Blue "Manual ON" Occupancy wire and a 22 Gauge Yellow/Orange "Local Switch" wire. Multiple occupancy sensors and/ or photocells can be connected to a single power pack in order to fully cover an area. The power pack includes zero cross switching circuitry to minimize inrush current associated with incandescent and electronic ballasts. This reduces wear and tear on the relay contacts making the power pack last longer.

Application Notes:
Loads that exceed the ratings of a single power pack can be connected to an Add-A-Relay, which is powered from the low-voltage output of the power pack (OPPxx). The Add-A-Relay contains the load switching and HVAC relays and is powered by an OPPxx Power Pack.

1. When a lighting load exceeds a single power pack's rating, the load can be split between multiple power packs. The low voltage occupancy input (Blue wire) and DC return (Black wires) of the power packs must be connected together for all power packs to operate together as one. Connect the Blue (occupancy) wires of all power packs and sensors together. Connect the Black (return) wires of all power packs and sensors together. Connect the Red (+24VDC) wires of the sensors to the Red wires of only one power pack.
2. When more sensors are required than one power pack can supply, multiple power packs can be used to supply power to the occupancy sensor, but not switch any load. The primary power pack is the power pack switching the load. The secondary power packs only provide low voltage power to the occupancy sensor(s). Connect as many sensors to the primary power pack as possible (see current capacity section below), by connecting the Red wires of the sensors to the Red wire (+24VDC) of the primary power pack. Connect the Red wires (+24VDC) of the remaining sensors to the Red wires of the secondary power pack. Connect the Black (return) wires of all power packs and all sensors together. Connect the Blue (occupancy) wire of all sensors together to the Blue wire (occupancy) of the primary power pack. The OPP20 series does not support paralleling of power packs to increase output power so do not connect the Red (+24VDC) wires of two different power packs together to achieve more (>225mA) output power.
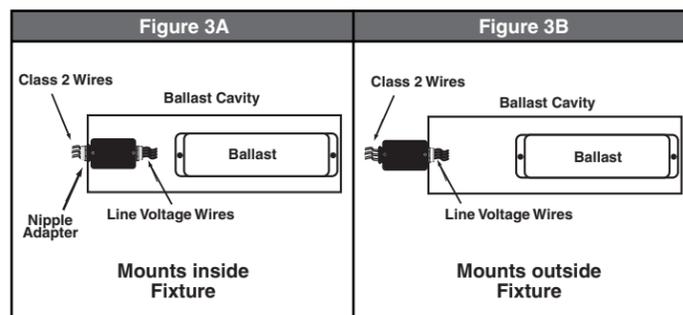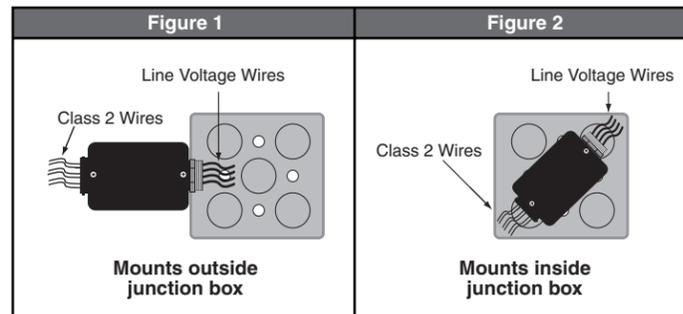
LOW-VOLTAGE CURRENT CAPACITY

NOTE: Add-a-Relay current consumption = 50mA per unit. For OSC, OSW, and OSFHP occupancy sensors please see current datasheet or installation guide for current consumption. The power supply will typically handle five OSC/OSW multi-techs or ten OSC/OSW PIR only units.

OPP20: Total Number of Sensors * Current +Total Number of Add-a-Relays ≤ 225mA

INSTALLATION

1. **WARNING:** TO AVOID FIRE, SHOCK, OR DEATH; **TURN OFF POWER** AT CIRCUIT BREAKER OR FUSE AND TEST THAT POWER IS OFF BEFORE WIRING!
2. Mount power pack per desired application:
   A. To mount outside 4"x4" junction box using 2" EMT nipple, refer to **Figure 1**. Wire per instructions Step **3A** and **3B**.
   B. To mount inside 4"x4" junction box, refer to **Figure 2**. Wire per instructions Step **3A** and **3B**.
      - Ensure that conduit/cable entry clamp is located in corner of junction box.
      - Dress wires to provide enough clearance when device is installed.
      CAUTION: Low-voltage wires (**Class 2**) must also be dressed so they are separate from the high voltage conductors. Refer to local building codes for the appropriate installation requirements for the low voltage wiring. Jacketing over the low-voltage wires may be required to provide appropriate insulation from the high voltage wiring.
   C. To mount inside ballast cavity of light fixture, refer to **Figure 3A**. Wire per instructions Step **3A** and **3B**.
      CAUTION: Low-voltage wires (**Class 2**) must also be dressed so they are separate from the high voltage conductors. Refer to local building codes for the appropriate installation requirements for the low voltage wiring. Jacketing over the low-voltage wires may be required to provide appropriate insulation from the high voltage wiring.
   D. To mount outside ballast cavity of light fixture, refer to **Figure 3B**. Wire per instructions Step **3A** and **3B**.
3A. **Line Voltage Wiring:** Remove 5/8" (1.6 cm) of insulation from each circuit conductor. Make sure that ends of conductors are straight. Connect lead wires from Power Pack to LINE circuit per appropriate WIRING DIAGRAM as follows: Twist strands of each lead tightly and, with circuit conductors push firmly into appropriate wire connector. Screw connectors on clockwise making sure that no bare conductor shows below the wire connectors. Secure each connector with electrical tape.
3B. **Low Voltage (Class 2) Wiring:** Connect Low-Voltage wires from Power Pack to Sensor per appropriate WIRING DIAGRAM as follows: Twist strands of each lead tightly and, with circuit conductors, push firmly into appropriate wire connector. Screw connectors on clockwise making sure that no bare conductor shows below the wire connectors. Secure each connector with electrical tape.
4. Refer to sensor Installation Instructions for further details.
5. Restore power at circuit breaker or fuse. **INSTALLATION IS COMPLETE.**

Figure 1	Figure 2
Line Voltage Wires / Class 2 Wires / **Mounts outside junction box**	Line Voltage Wires / Class 2 Wires / **Mounts inside junction box**

Figure 3A	Figure 3B
Class 2 Wires / Ballast Cavity / Ballast / Nipple Adapter / Line Voltage Wires / **Mounts inside Fixture**	Class 2 Wires / Ballast Cavity / Ballast / Line Voltage Wires / **Mounts outside Fixture**

OPERATION

The Power Pack relay can be turned ON and OFF automatically using an occupancy sensor input, photocell input (–RD3 and –RD4 models), or manually from an optional low voltage switch (–0D2 and –RD4 models). The OPP20 power pack will always power up with the latching relay in the closed (ON) state; 5s after power on the inputs will be monitored to determine the proper relay state.

AUTO ON (See Wiring Diagram): The occupancy sensor input and the optional local switch input can all be used to turn the load ON. When the load is turned OFF using the local switch, the power pack does not turn it ON automatically until after the sensor time delay expires (e.g., presentation mode) and occupancy is detected. Pressing the local switch before the sensor time delay expires turns the load ON. When the occupancy sensor's time delay expires, the power pack reverts to AutoON mode and it turns the load ON with the next occupancy detection input from the sensor.

MANUAL ON (See Wiring Diagram): Occupants must press the low voltage local switch to turn the load ON. When the occupancy sensor is the only input keeping the load ON, the load turns OFF when the sensor time delay expires. If the sensor input re-triggers within 30 seconds after the load turns OFF, the load turns ON again. After the 30 seconds expire with no sensor input it will be necessary to press the local switch to turn the load ON. When in Manual ON mode, with the lights ON, the local switch can be used to force the lights OFF. The lights will remain OFF until the local switch turns the lights back ON again.

PHOTOCELL (See Wiring Diagram): The photocell sensor input can also be utilized with a digital (+24VDC) low voltage switching photocell to control a bank of lights depending on the lighting conditions. The power pack can operate with only a photocell, or together with Occupancy and Switch to achieve numerous lighting conditions where lighting control of a room will depend on current light level.

LOW VOLTAGE INPUTS
24VDC input wires are provided to control the load relay. The inputs may be used in combination or individually, depending on the application(s). See wiring diagrams for connections.

MAINTAINED INPUTS
Occupancy Sensor Auto ON (Blue) - This input is for occupancy sensor AutoON/ AutoOFF. Applying 24V closes the relay (Occupied). Remove the voltage and the relay opens (Vacant).

Occupancy Sensor Manual ON (White/Blue) - This input is for occupancy sensor ManualON/AutoOFF. When the attached occupancy sensor detects motion, no action occurs. A local switch is required to manually turn the load ON. Then the sensor will turn the load OFF when the time delay expires. A 30 second grace period exist when the lights go out where they can automatically turn back ON with occupancy detection.

Local Switch (Yellow/Orange) – This input is for a low voltage momentary or maintained switch. Applying 24VDC momentary input changes the relay to the opposite state. Applying 24VDC or 0VDC as maintain (longer than 1 second) toggles the relay to the opposite state. It overrides the Occupancy Sensor inputs. Note, this switch will not respond to switch presses faster than 250mS. Momentary switches or single button ON/ OFF switches are preferred over maintained switches as the maintained switch can get out of sync when the device turns out the lights based on Occupancy timeout or Photocell control. Recommended Leviton switch catalog numbers are LVS-1W (Low Voltage pushbutton station), and 1081-W (Low voltage toggle switch).

Photocell (Gray) – This input is for a digital low voltage photocell which operates at +24V. When there is sufficient light level in the room the photocell will be at +24V and the OPP20 power pack will open the relay turning the lights OFF. When the light level in the room drops below the threshold set on the digital photocell the +0V signal will result in the OPP20 power pack closing the relay and turning the lights ON. The photocell can work as a stand along device, with local switch or with an occupancy sensor to control the lighting in a room based on light levels:

Stand Alone: Wire Sensor Auto ON lead (Blue) to +24VDC (Red), Photocell (Gray) to Digital Photocell. The photocell will always control light level. On power cycle device will keep lights ON in a dark room.

Local Switch: Wire Sensor Auto ON lead (Blue) and Manual ON lead (White/Blue) to +24VDC (Red), Photocell (Gray) to Digital Photocell, Local Switch (Yellow/Orange) to +24VDC switch. The switch will need to be ON in order for the Photocell to operate. On power cycle device will turn lights OFF and photocell will remain inactive until the local switch is turned ON again.

Occupancy: Wire Auto ON lead (Blue) to Occupancy sensor, Photocell (Gray) to Digital Photocell, Optional: Local Switch (Yellow/Orange) to +24VDC. Only when occupancy exist will the photocell be able to control the lighting. The photocell can HOLD OFF the lights if there is sufficient light available or turn the lights OFF/ON depending on lighting condition with room occupancy.

Wire Designations

Signal Name	Color	Gauge
Line Voltage Wires		
Line 120-277V	Black	18 AWG
Neutral	White	18 AWG
Line	Blue	14 AWG
Load	Blue	14 AWG
Class 2 Wires		
Power (24 VDC)	Red	22 AWG
DC Return	Black	22 AWG
Occupancy Auto ON	Blue	22 AWG
Occupancy Manual ON	White/Blue	22 AWG
Photocell	Gray	22 AWG
Local Switch Input	Yellow/Orange	22 AWG

- All wires rated at 105° C, 600V insulation.
- Class 2 wires are Teflon coated, for plenum applications.

TROUBLESHOTING

Lights are ON after power outage
- This is the normal operation. The power pack has a fail-safe feature which forces the relay to close on loss of power. Five seconds after power ON the device will monitor the inputs to look for occupancy and turn lights ON or OFF accordingly.

Device does not operate immediately after power ON
- This is the normal operation. The device has a 5s startup time before it will respond to the input wires.

Lights Flickering
- Lamp has a bad connection.
- Wires not secured firmly with wire connectors.

Lights did not turn ON
- Circuit breaker or fuse has tripped.
- Lamp is burned out.
- Lamp Neutral connection is not wired.
- Device wired for Manual ON input.
- Low Voltage mis-wired. Verify wiring per appropriate diagram.
- Line Voltage mis-wired. Verify wiring per appropriate diagram.

Lights stay ON
- Constant motion. To Test: adjust occupancy sensor; remove motion source (HVAC vent, PIR mask, or move sensor location).

Lights stay ON too long
- Adjust occupancy sensor settings.
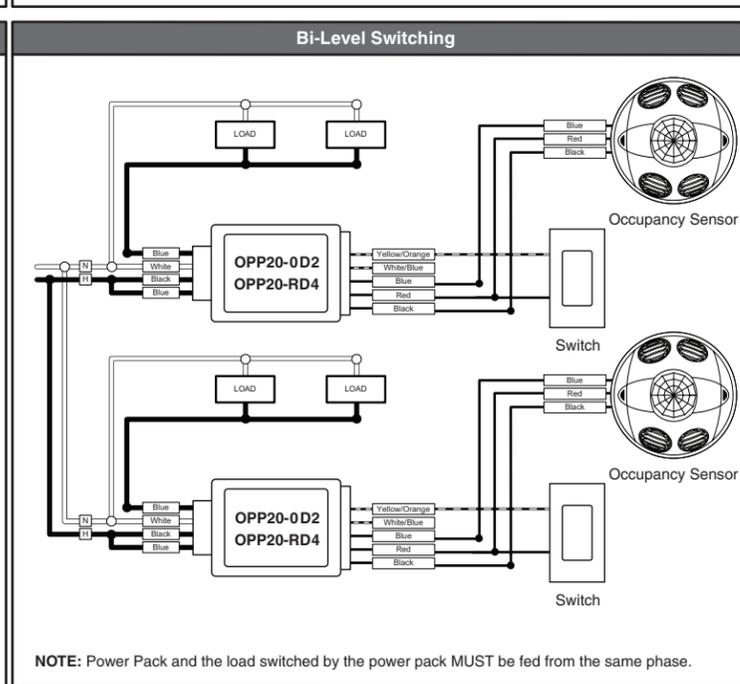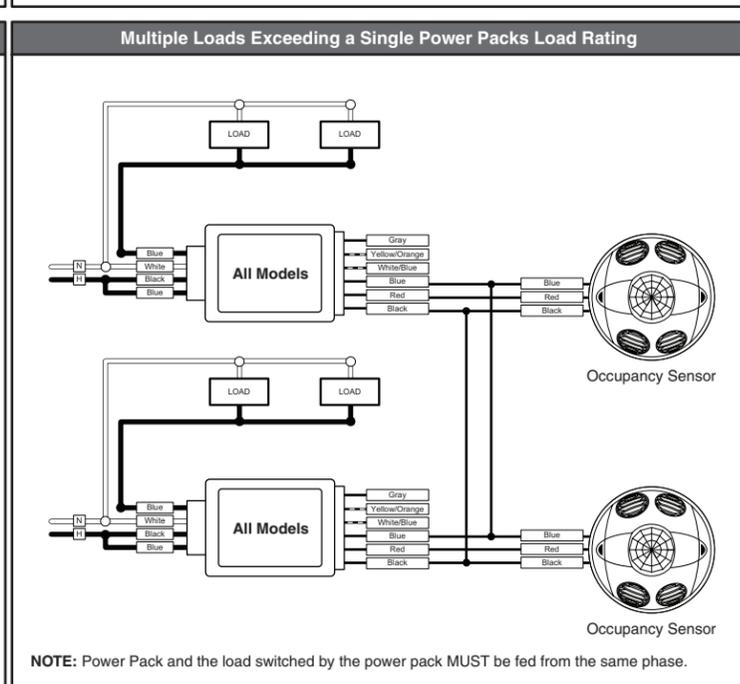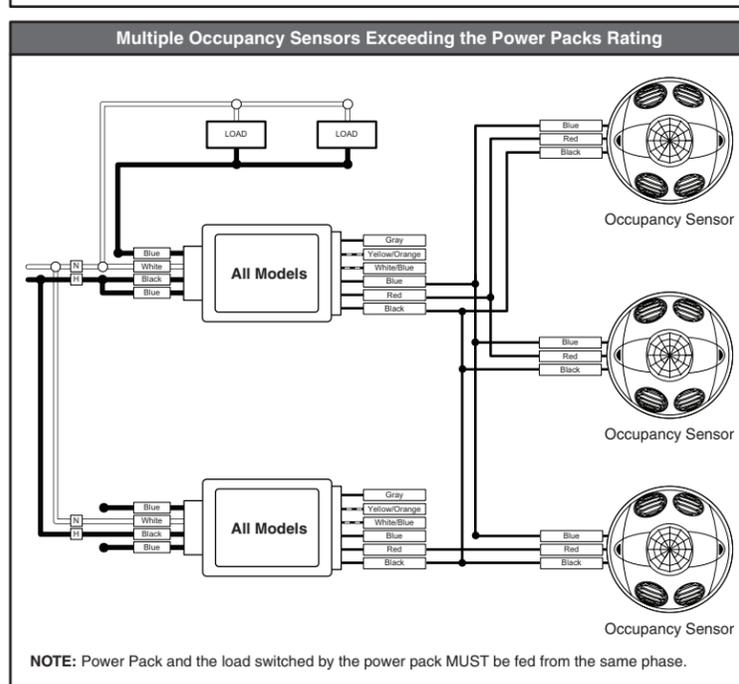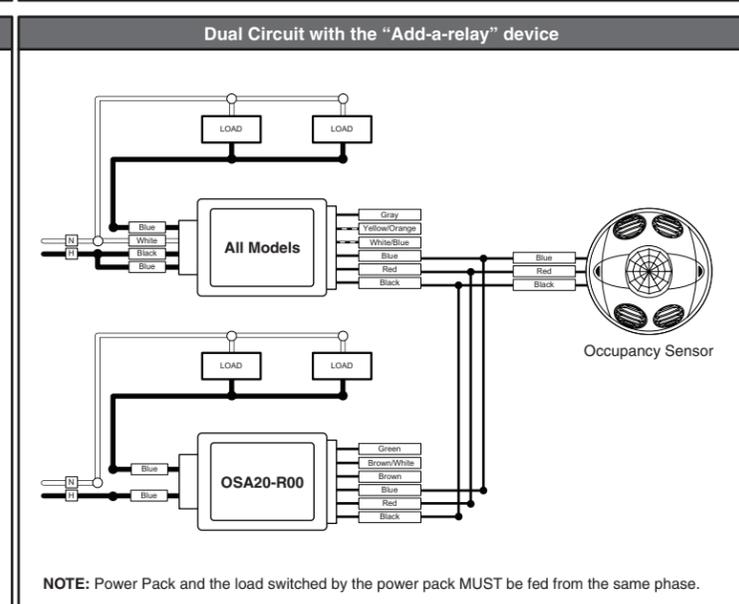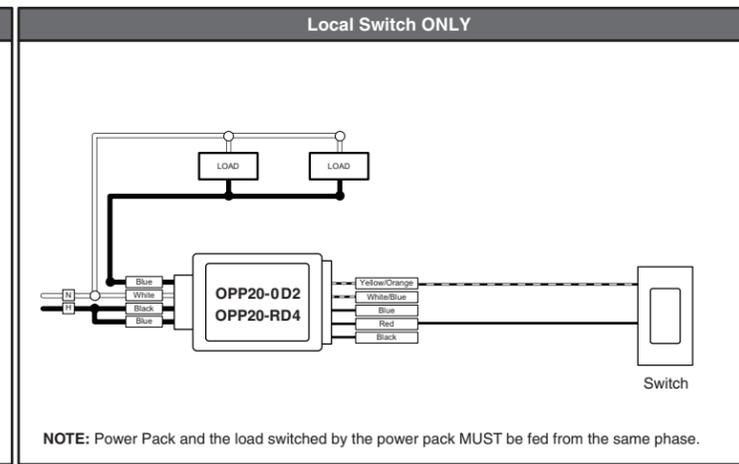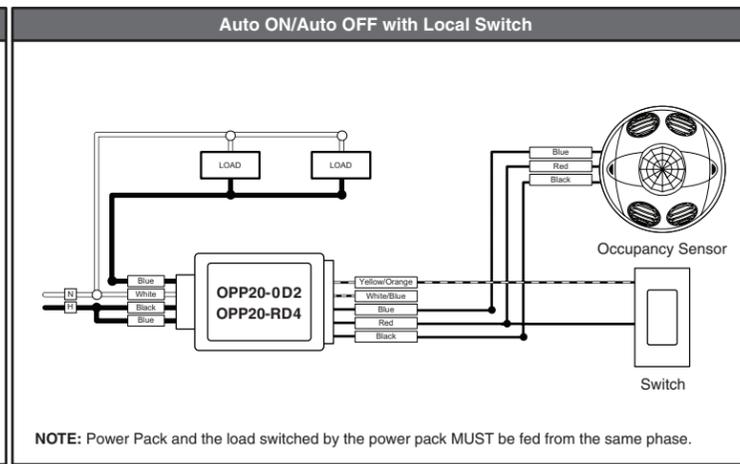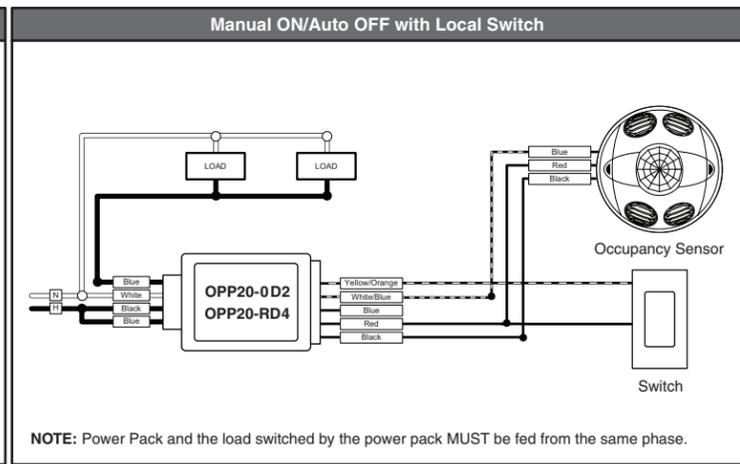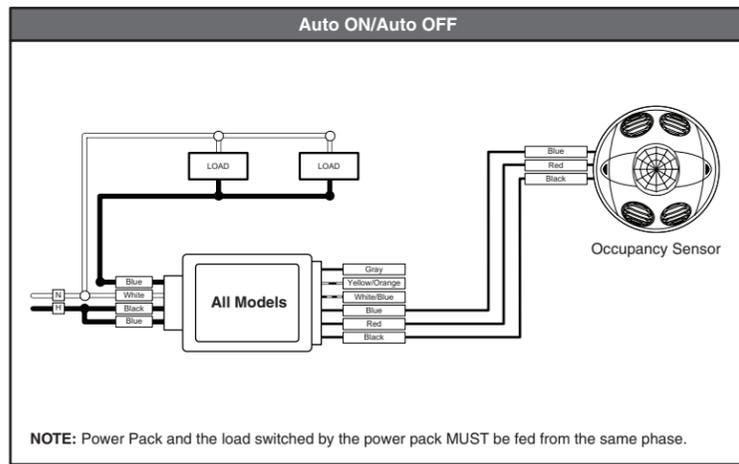
Lights came ON during presentation
- AutoON mode is connected and the time delay expired.
- Increase the sensor time delay or generate more motion during the presentation.
- Wire up with the Occupancy Manual ON wire instead of Auto ON wire.

Maintained light switch is in ON position (UP) but lights are OFF
- This is normal; a maintained switch can get out of sync when lights are manually turned ON but automatically turned OFF by an occupancy sensor. The switch is unaware of the occupancy sensors actions. If desired, the switch can be brought back into sync by toggling ON then OFF quickly.

Pressing Momentary switch does not toggle lights ON, switch requires two presses to turn lights ON
- The OPP20 (-RD4 model) power pack is wired up with a photocell and switch. The switch must be ON for the photocell to operate but the photocell is holding the lights OFF due to room lighting level. In this case the switch will need to be pressed to turn OFF then pressed again to turn lights back ON.

Auto ON/Auto OFF	Manual ON/Auto OFF with Local Switch	Auto ON/Auto OFF with Local Switch	Local Switch ONLY

NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

Photocell ONLY Room Control	Photocell and Occupancy Sensor with Local Switch	Photocell with Local Switch	Dual Circuit with the "Add-a-relay" device

NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

Multiple Occupancy Sensors Exceeding the Power Packs Rating	Multiple Loads Exceeding a Single Power Packs Load Rating	Bi-Level Switching

NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

RoHS:

Leviton certifies that to its knowledge the OPP20 is RoHS compliant, conforming to the requirements of "Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment." This declaration is based on Leviton's current understanding of the RoHS Directive and information provided through supplier material declarations pertinent to the ingredients and materials comprising Leviton's product.

FCC COMPLIANCE STATEMENT:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by Leviton could void the user's authority to operate this equipment.

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For Technical Assistance Call: 1-800-824-3005 (**U.S.A. Only**)

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