

**Catalog Number • Numéro de Catalogue • Número de Catálogo: FD-301**

Country of Origin: Made in China • Pays d'origine: Fabriqué en Chine • País de origen: Hecho en China



## SPECIFICATIONS

|  |                              |
|--|------------------------------|
| Power Supply .....                                 | 24VDC from Wattstopper FS-PP |
| Current Consumption .....                          | 30mA@24VDC                   |
| Ballasts .....                                     | 0–10VDC dimmable ballasts    |
| Wire Length, photosensor to ballast and FS-PP..... | 6' (182cm)                   |
| Maximum Ballasts Controlled.....                   | 50                           |
| Max Sink current .....                             | 50mA                         |
| Min Signal to ballast .....                        | 0.2VDC                       |
| Max Signal to ballast .....                        | 10VDC                        |

## DESCRIPTION AND OPERATION

The FD-301 is a fixture-integrated dimming photosensor. It provides a continuous dimming signal to a 0-10VDC dimming ballast, based on daylight level. It is a low voltage device used in conjunction with a Wattstopper FS-PP power pack. The FD-301 is a “closed loop” system; it considers both daylight and electric light when determining dimming levels. It uses a sliding setpoint control algorithm to maintain the desired illuminance levels for separate night and day target setpoints. The FD-301 slowly raises or lowers the electric lights to avoid sudden changes that can annoy occupants. After the photosensor-equipped fixture is installed, final setup adjustments are made using the LSR-301-S remote control setup tool. After commissioning, the FD-301 automatically adjusts the electric lights to meet target illuminance levels.

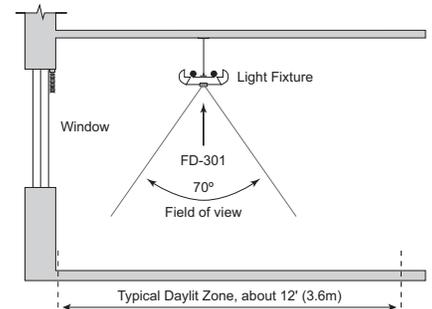
### Additional Control Options

Manual or Automatic **ON/OFF** lighting control can be provided by a switch or fixture integrated occupancy sensor connected to the FS-PP (see Figures 5 and 6 for wiring). Occupant dimming control is provided by the optional LSR-301-P. This remote control allows the occupant to temporarily adjust light levels.

### Photosensor Placement

The FD-301 photosensor works with 0-10VDC dimming ballasts to control lights in areas that receive enough daylight so that the electric lights can be dimmed.

- Avoid installing photosensor-equipped fixtures where the light from one controlled fixture spills over into the view of the next photosensor.
- Avoid locating photosensor-equipped fixtures close to specular surfaces such as highly polished floors or tables, or highly reflective surfaces such as tops of cabinets, and others.



**Figure 1: Placement**

## LAMP BURN-IN

Follow the lamp manufacturer’s recommendation on lamp burn-in for new lamps prior dimming the lamps with the FD-301. If the lamp manufacturer’s guidelines are not followed, premature lamp failure may occur. After the fixture is installed and power is supplied to the FD-301, it will drive the lamps at full output until the Night adjustment has been completed using the LSR-301-S remote control. See the **Photosensor Commissioning** section for more information.

## PHOTOSENSOR COMMISSIONING

The FD-301 is commissioned under two conditions, Night and Day. Either adjustment may be completed first. The red LED under the FD-301’s lens flashes continuously until the Night and Day adjustments are both completed, then it can begin automatic dimming.

### Conditions for Setup

Set up the FD-301 after all furnishings are installed. Placement of furnishings affects the way light reflects from various surfaces.

- Furniture, floor, and wall coverings must be installed and clean.
- All light fixtures must be installed and fully operational.
- Window coverings must be installed, clean, and operable.
- Remove unnecessary objects such as tools and installation materials from the view of the FD-301.
- Do not block primary sources of electric light or daylight from reaching the FD-301’s view.

**Window blinds:** If installed in the area, adjust them to maximize daylight while not allowing direct beam sunlight to enter the controlled area. At night, adjust them so they block lighting from outdoor fixtures.

**Lights from other areas:** If non-dimmed lights in adjoining areas contribute to the light viewed by the FD-301, these lights must be on during both Day and Night adjustments.

### Target Illuminance Levels

Determine the illuminance required in the controlled space. In some applications, a footcandle target may be specified for the controlled space. If this is the case, use a light meter to take measurements before and during the commissioning process. Choose a reference location in the controlled area that is most likely to have the lowest illuminance level when daylight, and is located farthest from the window or skylight. If the illuminance level is too low, select another location, or measure the illuminance level on a brighter day. If no target illuminance is specified, adjustments can be based on user perception or preferences.

### Adjustment Procedure

Initial adjustments to the FD-301 are done using the LSR-301-S remote control. The LSR-301-S has 5 buttons. The LED on the remote control should light every time you press a button. The FD-301's green LED also flickers for the duration of the press.

▲ (up arrow) Press to increase light output.

▼ (down arrow) Press to decrease light output.

**Night:** Press to begin and end the Night adjustment process.

**Auto:** Press to begin automatic dimming.

**Day:** Press to begin and end the Day adjustment process.

### Day Adjustment

Make this adjustment when daylight is providing illumination that is typical of the daytime conditions at the reference location in the controlled area.

1. Press the **Day** button once. The FD-301's green LED flickers.
2. Press ▲ or ▼ to adjust the electric lights to the appropriate light level.  
If an illuminance target is specified by the lighting designer, use a light meter at the workplane to verify the footcandle value.
3. Once the appropriate illuminance level is reached, press and HOLD the **Day** button for 3 seconds. The FD-301 acknowledges setting of the Day target setpoint by lighting the green LED twice for 3 seconds each time.

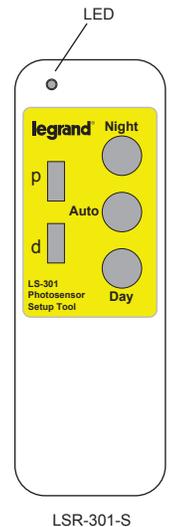


Figure 2a:  
LSR-301-S setup tool

### Night Adjustment

Make this adjustment when there is no daylight illumination at the reference location. To complete the night commissioning during the day, the night environment must be simulated by blocking all sources of daylight.

1. Press the **Night** button once. The FD-301's green LED flickers.
2. Press ▲ or ▼ to adjust light level.  
If an illuminance target is specified by the lighting designer, use a light meter at the workplane to verify the footcandle value.
3. Once the target level has been reached, press and HOLD the **Night** button for 3 seconds. The FD-301 acknowledges setting of the Night target setpoint by lighting the green LED twice for 3 seconds each time.

### Begin Automatic Dimming

To immediately begin automatic dimming after the Night and Day adjustments are BOTH completed, press the **Auto** button. Otherwise, ten minutes after the last adjustment keypress (Step 3):

- If only Night is done, the signal to the ballast remains at the level to which it was adjusted and the red LED continues to flash.
- If only Day is done, the signal to the ballast goes to full output (10VDC) and the red LED continues to flash.
- If Night and Day are done, the FD-301 begins automatic dimming.

## USER DIMMING CONTROL

Using the LSR-301-P, the user can raise the target illuminance level by up to 25% of the target illuminance level set with the LSR-301-S during commissioning, or reduce it to the lamp/ballast minimum. Pressing the ▲ (up arrow) or ▼ (down arrow) temporarily raises or lowers the target illuminance level. The FD-301 controls the lights to maintain the new target level until another button is pressed.

Pressing **Auto** cancels the user adjusted target illuminance level. The FD-301 returns to automatic dimming using the levels set with the LSR-301-S.

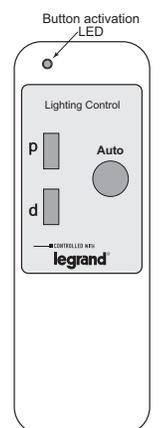


Figure 2b:  
LSR-301-P occupant remote

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## TROUBLESHOOTING

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The red LED will flash until both the Day and Night levels are properly adjusted. The Night level must always require more electric light output than the Day level. If it does not, the red LED on the FD-301 flashes to indicate an invalid setpoint.

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## ON/OFF SWITCHING

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To turn **OFF** fixtures, a manually operated switch, time clock, BAS, or occupancy sensor can be installed in conjunction with the FD-301 and FS-PP. This instruction describes operation with an FS-series occupancy sensor and one option for using a switch. Contact technical support for help with other switching applications.

### Operation with an Occupancy Sensor

When an occupancy sensor is installed in the FD-301 system, the fixture turns **OFF** if no motion is detected in the area for the length of time set in the sensor's time delay, regardless of the light level. When the occupancy sensor detects motion in the area, the fixture initially turns **ON** to full output, then the FD-301 reads the illuminance level and begins automatic dimming to maintain the target illuminance level.

### Operation with a Switch

When a switch is used to turn **OFF** power to the fixture and the FD-301 is wired as shown in Figure 6, the fixture and FD-301 system turn **OFF** when the switch opens. When the switch is again closed, the fixture initially turns **ON** to full output, then the FD-301 reads the illuminance level and begins automatic dimming to maintain the target illuminance level.

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## INSTALLATION IN THE FIXTURE

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Mount the FD-301 so the fixture's lamp output (candlepower curve profile) is outside the sensor's peak sensitivity area.

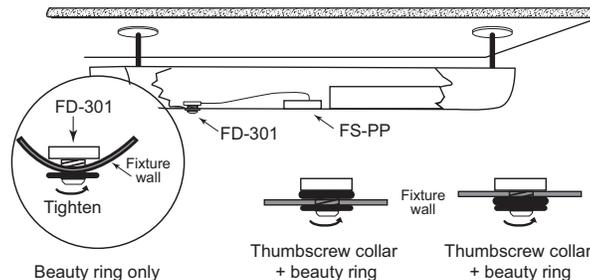


Figure 3: Installing in a light fixture

1. Install the FS-PP as directed in the installation instructions provided with the power pack.
  2. Determine an appropriate mounting location for the FD-301 inside the light fixture. Cut a 3/4" diameter hole through the sheet metal in the bottom of the fixture.  
A beauty ring and thumbscrew collar are supplied to secure the FD-301 lens through the fixture wall. Depending on the wall thickness and curvature, you may need to use the thumbscrew collar on the inside or outside of the fixture, or not at all, as shown in Figure 3.
  3. Remove the beauty ring and thumbscrew collar from the FD-301 lens pipe.
  4. Insert the lens from the inside of the fixture, through the hole in the bottom of the fixture.
    - If the lens extends too far outside the fixture, use the thumbscrew collar to adjust the depth.
    - Tighten it to the outside of the fixture or tighten it against the sensor body before inserting the lens through the fixture wall.
    - Then put the beauty ring onto the lens pipe and tighten it securely.
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## WIRING

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**WARNING: ALWAYS MAKE SURE POWER TO THE FIXTURE IS OFF BEFORE WORKING WITH THE POWER PACK.**

For daylight dimming control (see Figure 4):

1. Plug in the RJ-45 from the FD-301 into the TO SENSOR receptacle on the FS-PP.
2. Connect the purple and pink wires from the FD-301 to the 0-10V inputs on the dimming ballast.

To also provide **ON/OFF** control using an occupancy sensor, see Figure 5, or to provide manual **OFF** control using a local switch, see Figure 6. For other control options, contact technical support.

### Configuring the Optional Occupancy Sensor

Use the instructions supplied with the FS-series sensor to install the sensor in the fixture, connect the sensor to the FS-PP and to set the time delay. Some FS-series occupancy sensors are equipped with a light level sensor. Be sure to set the light level on the occupancy sensor to maximum, meaning that even the brightest ambient light will not hold the lights off.

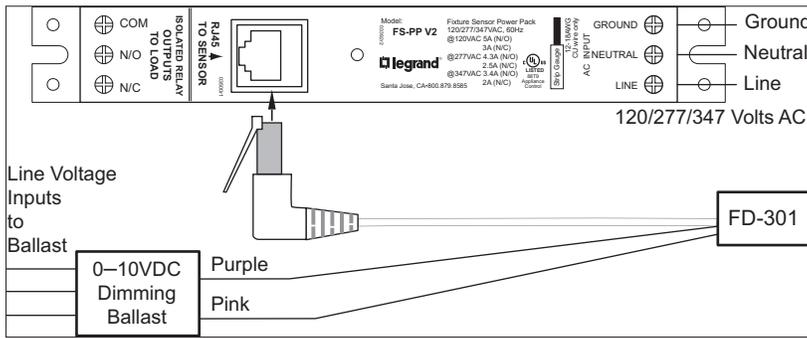


Figure 4: Basic wiring for daylight dimming control

**NOTE:** Per UL, the 0-10V negative dimming wire color has been changed from gray to pink.

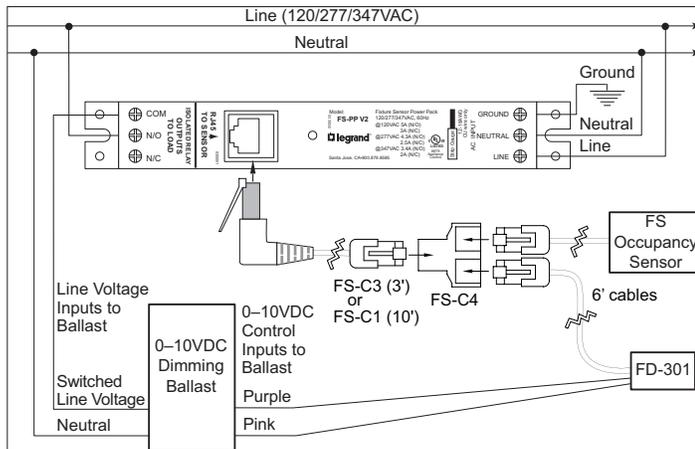


Figure 5: Wiring for daylight dimming w/ occupancy sensor ON/OFF control

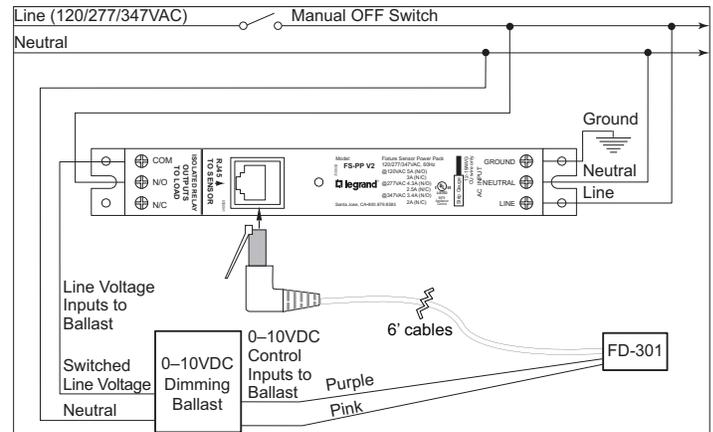


Figure 6: Wiring for daylight dimming plus manual OFF control

## ORDERING INFORMATION

| Catalog Number | Description   |
|----------------|---|
| FD-301         | Dimming Photosensor, 24 VDC   |
| LSR-301-S      | Photosensor Setup Remote Control  |
| LSR-301-P      | Occupant Remote Control   |
| FS-PP v2       | Fixture Mount Power Pack: 120/277/347VAC, 60Hz with NO/NC Relay output  |
| FS-C1          | One 10' cable with a shielded RJ45 male connector at each end   |
| FS-C1-20       | One 20' cable with a shielded RJ45 male connector at each end   |
| FS-C2          | One 6" (152mm) cable with 3 flying leads at one end and a shielded RJ45 male connector at the other   |
| FS-C3          | One 3' cable with a shielded 90° RJ45 male connector at one end and a shielded straight male RJ45 connector at the other end, for space-limited areas |
| FS-C4          | Shielded RJ45 splitter with female to dual female receptacles   |
| FS-C5          | Shielded RJ45 male-to-male coupler  |

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