Fluorescent ballast and LED driver
Selection Guide
Innovation and quality from the world leader in lighting controls

Lutron invented the world’s first electronic dimming ballast more than 30 years ago, and continues to lead the industry with innovative and energy-saving fluorescent dimming options. The company offers an extensive selection of ballasts, drivers and controls, providing complete fluorescent and LED dimming solutions.

How to use this selection guide

The Fluorescent Ballast and LED Driver Selection Guide helps you:

- Determine the dimming range required for your application
- Utilize potential energy-saving strategies
- Choose the appropriate Lutron dimming ballast or LED driver

Find and configure the ballast or driver that best fits your project:
For ballasts: www.lutron.com/BallastTool
For drivers: www.lutron.com/LEDBuildAModel

Fluorescent ballast and LED driver selection guide

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Solutions for projects of every size

Lutron offers an extensive selection of fluorescent ballasts and LED drivers, and can control a variety of sources including EcoSystem®, 3-wire and 2-wire loads, down to 1%.

The extensive selection of Lutron ballasts, drivers and controls offers a flexible, energy-saving dimming solution

**Ballasts**
- Available for 1%, 5% and 10% low-end dimming levels, suitable for a variety of applications
- Compatible with several lamp types including T8 linear and U-bent, T5, T5 HO linear, T5 twin-tube and T4 compact lamps
- Digitally addressable dimming ballasts available, with easy setup and increased flexibility
- Factory-tuned ballast factor available for most models

**Drivers**
- Offers smooth, continuous 1% dimming for virtually any LED fixture
- Works with Lutron 2-wire forward phase controls, 3-wire fluorescent controls and EcoSystem digital controls
- Available in multiple form factors
- Supports a wide range of current and voltage levels
Dimming fluorescent light saves energy

Fluorescent lighting uses much less power than incandescent lighting. In a typical installation, a 32W compact fluorescent lamp provides approximately the same light output as a 100W incandescent lamp. As both sources are dimmed, fluorescent lamps continue to be more energy efficient.

Dimming LED light saves energy

Like traditional light sources, dimming LEDs results in dramatic energy savings. Additionally, the already long life of LEDs can be further extended by dimming.

Lutron quality

Superior components

Lutron ballasts and drivers are manufactured to the highest level of quality, using carefully selected components. Maximum lifetime is achieved by using only long-life components with significant performance history. Increased margins are incorporated into Lutron designs to help ensure that components are not operated outside of their specified limits. In many cases, Lutron works with component suppliers to design custom parts in order to improve overall ballast and driver reliability.

Additionally, Lutron uses metal enclosures for ballasts and drivers allowing for optimal heat transfer to the lighting fixture.

100% Test

Lutron tests the performance of every ballast and driver prior to shipment. This important step eliminates units that do not meet specifications.

100% Burn-in

Lutron “burns in” every ballast and driver prior to shipment. Defects due to faulty components are screened out in this process, resulting in a dramatic reduction of early failures in the field.

Extending lifetime

All electronic ballasts and drivers use components with a finite lifetime. A major factor for ballast and driver lifetime is operating temperature. For every 10°C reduction in case temperature, the lifetime of the ballast or driver will be doubled. Lutron dimming ballasts and drivers are designed to operate at a lower temperature, to maximize the lifetime of the ballast or driver. The operating temperature is influenced by the design of the ballast or driver, and by the characteristics of the fixture in which it is installed.

Thermal foldback

Lutron-patented “Thermal Foldback Technology” is included in most Lutron ballast and driver models. This feature actively monitors the ballast or driver temperature and adjusts the output power to ensure that the ballast or driver will meet its expected lifetime in thermally aggressive applications.

When necessary, power delivery to the output is automatically reduced, or “folded back,” to regulate the ballast or driver temperature, with minimal impact on light output. Thermal foldback is designed to activate only if the ballast or driver is operated in an environment that exceeds its temperature. This technology prevents premature ballast or driver failure due to overheating. In a properly designed application, thermal foldback will not activate.

Lutron product reliability curve

For every 10°C reduction in ballast or driver case temperature, the ballast or driver lifetime will be doubled. Lutron dimming ballasts and drivers are designed to maximize the lifetime of the ballast or driver by operating at a lower temperature.
Measured light vs. perceived light

The human eye responds to low light levels by enlarging the pupil, allowing more light to enter the eye. This response results in a difference between measured and perceived light levels.

A lamp that is dimmed to 10% of its maximum measured light output is perceived as being dimmed to only 32%. Likewise, a lamp dimmed to 1% is perceived to be at 10%.

**Design example**

At full brightness, the measured light in a space is 60 foot-candles. At the lowest dimmed level, 10% perceived light is desired.

<table>
<thead>
<tr>
<th>Measured Light</th>
<th>Perceived Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>1% measured light is perceived as 10% (desired result)</td>
<td>5% measured light is perceived as 22% (2x brighter than desired)</td>
</tr>
</tbody>
</table>

Selecting a Lutron ballast or driver

Lutron offers several ballast and driver families that have various dimming levels and control options to suit any application.

### Fluorescent Ballasts

<table>
<thead>
<tr>
<th>Low-end dimming level</th>
<th>Control options</th>
<th>Ballast family</th>
<th>Available lamp types</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>EcoSystem digital link</td>
<td>EcoSystem H-Series</td>
<td>T8 linear and U-bent, T5 linear, T5 HO linear</td>
</tr>
<tr>
<td></td>
<td>EcoSystem digital link and 3-wire</td>
<td>Hi-lume 3D</td>
<td>T8 linear and U-bent, T5 linear, T5 HO linear</td>
</tr>
<tr>
<td>3-Wire</td>
<td>Hi-lume</td>
<td>T5 HO linear, T4 compact</td>
<td></td>
</tr>
<tr>
<td>5%</td>
<td>EcoSystem digital link and 3-wire</td>
<td>Hi-lume 3D</td>
<td>T5 twin-tube, T5 HO linear</td>
</tr>
<tr>
<td></td>
<td>Tu-Wire®</td>
<td>T8 linear and U-bent, T4 compact</td>
<td></td>
</tr>
<tr>
<td>10%</td>
<td>EcoSystem digital link and 3-wire</td>
<td>EcoSystem</td>
<td>T8 linear and U-bent, T8 reduced wattage, T5 linear, T5 HO linear, T5 twin-tube, T5 twin-tube reduced wattage</td>
</tr>
</tbody>
</table>

### LED Drivers

<table>
<thead>
<tr>
<th>Low-end dimming level</th>
<th>Control options</th>
<th>Driver family</th>
<th>Compatible LED types</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>EcoSystem digital link, 3-wire and 2-wire forward phase</td>
<td>Hi-lume A-Series LED driver</td>
<td>Most LED loads of 40W or less</td>
</tr>
<tr>
<td></td>
<td>EcoSystem digital link</td>
<td>EcoSystem LED driver (CE)</td>
<td>Most LED loads of 25W or less</td>
</tr>
</tbody>
</table>
Energy-saving control strategies

### 1. Personal control
Provide personal choice and control of light levels to accommodate different tasks and activities. Permit control from multiple locations.

**Typical lighting energy savings:**

**10-20%**

### 2. Occupancy/vacancy sensing
Gradually dim lights to a low level or turn lights off when space is unoccupied; turn lights on when someone enters.

**Typical lighting energy savings:**

**20-60%**

### 3. Daylight harvesting
Dim electric light or switch it off during the day to take advantage of available daylight.

**Typical lighting energy savings:**

**25-60%**

### 4. High-end trim
Set the maximum light level in a space based on customer preference or design requirements.

**Typical lighting energy savings:**

**10-20%**

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Additional energy-saving strategies

While it is true that manual dimming of fluorescent lamps and LEDs saves energy, that is only the beginning of the energy-saving features that Lutron ballasts and drivers offer. Utilize one or more of the following features to maximize energy efficiency.

1. **Use occupancy/vacancy sensors**
   Wasted lighting can account for a majority of a building’s total energy usage. Lights left on in unoccupied spaces are a real energy drain. EcoSystem® ballasts communicate through the EcoSystem digital link and are the only ballasts that can connect directly to wired occupancy/vacancy sensors. Other ballasts and drivers can also utilize wireless or wired occupancy/vacancy sensors with a QS sensor module.

2. **Optimize ballast efficiency**
   - **Low standby power:** The EcoSystem H-Series ballast offers extremely low standby power—less than 1 W of power is used when the light source is off.
   - **Luminous efficacy:** With more lamps per ballast, the required startup power is diffused over multiple lamps, conserving energy. The luminous efficacy of a 3-lamp 32 W ballast is an impressive 100 lumens/watt.

3. **Know your space**
   The greatest energy savings can be achieved by deciding on the perfect number of lumens required for a space, avoiding over-lighting and wasted energy.
   - **Custom ballast factor:** Ballast factor is the percentage of light output for a given lamp-ballast combination. By reducing the ballast factor, it is possible to achieve greater energy savings, meet lumen/foot² specifications and even qualify for the highest levels of LEED. Custom ballast factors are available for: EcoSystem H-Series, Hi-lume® 3D, EcoSystem and EcoSystem compact.

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### Literature Cited

Lutron ballast and driver control options

In addition to offering ballasts and drivers with different low-end dimming levels, Lutron offers a variety of control options.

**EcoSystem® digital link**
The EcoSystem digital link is a wired communication technology that facilitates individual ballast addressing, connection of multiple control devices and control of ballasts individually or in groups.

<table>
<thead>
<tr>
<th>Control type</th>
<th>Features</th>
<th>Ideal applications</th>
</tr>
</thead>
</table>
| EcoSystem digital link | • Polarity insensitive, may be wired in any topology  
• May be run with line-voltage wiring (Class 1) or separately from the line-voltage wiring (Class 2)  
• Allows for rezing without rewiring and all links are miswire protected | • Projects requiring digital control for individual fixture addressability  
• Upgrade from analog 0-10V control  
• Multi-zone applications  
• Small, retrofit applications using Lutron Energi TriPak™ |

Available for:
- EcoSystem H-Series ballasts (UL and global models)
- Hi-lume® 3D ballasts
- EcoSystem ballasts
- EcoSystem compact ballasts

**3-Wire**
3-Wire control is a line-voltage phase control dimming method that communicates the dimming signal through a wire called Dimmed Hot.

<table>
<thead>
<tr>
<th>Control type</th>
<th>Features</th>
<th>Ideal applications</th>
</tr>
</thead>
</table>
| 3-Wire | • All three wires are rated Class 1 and run within the same conduit  
• Stable over long wire runs allowing for maximum circuit loading  
• Dimmed Hot control wire allows for more precise performance and less electrical noise  
• Easy to wire | • Fluorescent dimming applications requiring precise control |

Available for:
- Hi-lume® 3D ballasts
- EcoSystem ballasts
- EcoSystem compact ballasts
- Hi-lume® A-Series LED drivers

**Tu-Wire®**
Tu-Wire control is a line-voltage phase control dimming method that uses two wires: Dimmed Hot, which carries the dimming signal; and Neutral.

<table>
<thead>
<tr>
<th>Control type</th>
<th>Features</th>
<th>Ideal applications</th>
</tr>
</thead>
</table>
| Tu-Wire | • All wires are rated Class 1  
• Easy to wire, used to implement dimming in existing fluorescent fixtures | • Small-scale retrofit applications |

Available for:
- Hi-lume® A-Series LED drivers
System compatibility is based on the available control type for each ballast and driver family

<table>
<thead>
<tr>
<th>Control type</th>
<th>Product family</th>
<th>Compatible systems</th>
</tr>
</thead>
</table>
| EcoSystem® digital link | • EcoSystem H-Series  
• Hi-lume® 3D  
• EcoSystem  
• EcoSystem Compact  
• Hi-lume A-Series LED  
• EcoSystem LED (CE models) | • PowPak dimming module with EcoSystem  
• GRAFIK Eye® QS with EcoSystem  
• Energi Savr Node® with EcoSystem  
• Quantum® |
| 3-Wire | • Hi-lume 3D  
• EcoSystem  
• EcoSystem Compact  
• Hi-lume  
• Hi-lume A-Series LED | • 3-Wire wallbox controls  
• Maestro Wireless®  
• GRAFIK Eye QS®  
• GRAFIK Eye 3000®  
• GRAFIK Eye 4000  
• GRAFIK 5000/6000/7000®  
• LCP128®  
• Quantum  
• RadioRA 2  
• HomeWorks® QS®  
• HomeWorks® |
| Tu-Wire® | • Tu-Wire | • Tu-Wire wallbox controls  
• GRAFIK Eye QS®  
• GRAFIK Eye 3000®  
• GRAFIK Eye 4000  
• GRAFIK 5000/6000/7000®  
• LCP128®  
• Quantum  
• RadioRA 2  
• HomeWorks® QS®  
• HomeWorks® |
| 2-Wire forward phase | • Hi-lume A-Series LED | • Select wallbox controls (neutral required)  
• Maestro Wireless®  
• GRAFIK Eye QS®  
• GRAFIK Eye 3000®  
• GRAFIK Eye 4000  
• GRAFIK 5000/6000/7000®  
• LCP128®  
• Quantum  
• RadioRA 2  
• HomeWorks® QS®  
• HomeWorks® |

*Interface required for compatibility.

Control systems compatible with EcoSystem digital link ballasts and drivers

**PowPak dimming module with EcoSystem**

The PowPak dimming module with EcoSystem is a load controller that allows for easy integration of digital lighting loads with wireless occupancy and daylight sensors as well as wireless controls. It uses Lutron EcoSystem technology in intelligent fluorescent and LED lighting control solutions, creating space flexibility that adjusts to the changing needs of any building.

[www.lutron.com/energitripak](http://www.lutron.com/energitripak)

**GRAFIK Eye QS with EcoSystem**

Fully customizable, GRAFIK Eye QS with EcoSystem adjusts lights and shades for any task or activity at the touch of a button. You’ll save energy while meeting the aesthetic, functional, and regulatory needs of any project. GRAFIK Eye QS with EcoSystem includes direct control of EcoSystem, EcoSystem H-Series, and Hi-lume 3D ballasts, and Hi-lume A-Series LED drivers. Using wireless technology, GRAFIK Eye QS with EcoSystem also eliminates communication wiring to shades, sensors, and wireless controls.

[www.lutron.com/qs](http://www.lutron.com/qs)

**Energi Savr Node with EcoSystem**

Energi Savr Node with EcoSystem allows for easy integration of occupancy sensors, daylight sensors and EcoSystem-compatible digital ballasts and drivers. It communicates with wireless devices through the QS sensor module to minimize wiring for easy installation. Energi Savr Node with EcoSystem is simple to setup and manually customize, and has the option of preconfigured occupancy sensing and daylight modes for out-of-the-box functionality.

[www.lutron.com/esn](http://www.lutron.com/esn)

**Quantum Total Light Management™**

Quantum manages both electric light and daylight to not only save energy and simplify operations, but also to improve the comfort and productivity of the people in your building. Quantum automatically dims or switches all electric lighting and controls daylight using automated window shades. It manages, monitors, and reports on all the lighting usage in your building for optimal energy performance and productivity while minimizing maintenance and operating costs.

[www.lutron.com/quantum](http://www.lutron.com/quantum)
Fluorescent and LED lighting is used widely in educational, institutional and commercial buildings. They meet energy-conscious design criteria such as ASHRAE/IESNA 90.1 standards and LEED® guidelines. Fluorescent and LED lighting is also increasingly found in residential spaces, especially in recessed downlights and coves.

Dimming fluorescent lighting instead of repeated switching helps maintain lamp life and also saves energy. All Lutron® fluorescent dimming ballasts and LED drivers are 100% performance-tested at the factory and come with a 5-year limited warranty with Lutron field service commissioning (3-year standard warranty) from date of purchase. Lutron Quality Systems are registered to ISO 9001.2008.

The ballasts and drivers addressed in this guide are specific to each country’s voltage requirements. Please confirm that the products you have selected match the required voltages by country shown on pg. 92.

**Fluorescent ballasts**

- EcoSystem® H-Series digital ballasts
  - EcoSystem digital control
  - pg. 24
  - CE, CSA, CCC AND INMETRO MODELS AVAILABLE

- Hi-lume® 3D digital ballasts
  - EcoSystem digital control
  - 3-wire control
  - pg. 26

- EcoSystem digital ballasts
  - EcoSystem digital control
  - 3-wire control
  - pg. 28

**LED drivers**

- Hi-lume A-Series digital LED drivers
  - EcoSystem digital control
  - 3-wire control
  - 2-wire forward phase control
  - pg. 36

- Hi-lume ballasts
  - EcoSystem digital control
  - 3-wire control
  - pg. 32

- Tu-Wire® ballasts
  - Tu-Wire control
  - pg. 34

For additional information on ballasts, please visit www.lutron.com/ballast

For additional information on LEDs, please visit www.lutron.com/LED
EcoSystem® compatible ballasts and drivers

<table>
<thead>
<tr>
<th>Family</th>
<th>Compatible Lamp Types and Wattages</th>
<th>Input Voltage</th>
<th>Control Options</th>
<th>Available Case Types (pg. 20)</th>
<th>Low-end dimming level</th>
<th>Integral Sensor Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent ballasts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EcoSystem H-Series ballasts pg. 24</td>
<td>• T8 linear and U-bent: 17W, 25W, 32W</td>
<td>• UNV: 120V, 220/240V, 277V @ 50/60Hz</td>
<td>• EcoSystem digital link</td>
<td>M-case</td>
<td>0.7% for T8 1% for T5 and T5 HO</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>• T5 HO linear: 24W, 39W, 54W</td>
<td></td>
<td></td>
<td>G-case</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• T5 linear: 14W, 21W, 28W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EcoSystem H-Series ballasts pg. 24</td>
<td>• T8 linear: 32W</td>
<td>• 127–220V INMETRO @ 50/60Hz</td>
<td>• EcoSystem digital link</td>
<td>M-case</td>
<td>1%</td>
<td>No</td>
</tr>
<tr>
<td>Global models</td>
<td>• T5 HO linear: 24W, 39W, 54W</td>
<td>• 220–240V CE @ 50/60Hz</td>
<td></td>
<td>G-case (for 347V only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• T5 linear: 14W, 21W, 28W</td>
<td>• 220–240V CCC @ 50/60Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• T5 twin-tube: 36W, 40W, 50W</td>
<td>• 347V CSA @ 60Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H-lume® 3D ballasts pg. 26</td>
<td>• T8 linear and U-bent: 17W, 25W, 32W, 40W</td>
<td>• UNV: 120V, 220/240V, 277V @ 50/60Hz</td>
<td>• EcoSystem digital link</td>
<td>C-case</td>
<td>0.7% for T8 1% for T5 and T5 HO</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>• T5 HO linear: 24W, 39W, 54W</td>
<td></td>
<td></td>
<td>G-case</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• T5 linear: 14W, 21W, 28W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• T5 twin-tube: 36W, 40W, 50W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EcoSystem ballasts pg. 28</td>
<td>• T8 linear and U-bent: 17W, 25W, 32W</td>
<td>• UNV: 120V, 220/240V, 277V @ 50/60Hz</td>
<td>• EcoSystem digital link</td>
<td>J-case</td>
<td>10%</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>• T8 linear Reduced Wattage: 25W, 28W, 30W</td>
<td></td>
<td></td>
<td>G-case</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• T5 HO linear: 24W, 39W, 54W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• T5 linear: 14W, 21W, 28W, 35W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• T5 twin-tube: 36W, 39W, 40W, 50W, 55W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• T5 twin-tube Reduced Wattage: 25W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EcoSystem compact ballasts pg. 30</td>
<td>• T4 4-pin quad-tube CFL: 18W, 26W</td>
<td>• UNV: 120V, 220/240V, 277V @ 50/60Hz</td>
<td>• EcoSystem digital link</td>
<td>K-case</td>
<td>5%</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>• T4 4-pin triple-tube CFL: 26W, 32W, 42W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>LED drivers</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hi-lume A-Series LED drivers pg. 36</td>
<td>• LED light engines, up to 40W</td>
<td>• UNV: 120V, 220/240V, 277V @ 50/60Hz</td>
<td>• EcoSystem digital link</td>
<td>K-case</td>
<td>1%</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 120V only for forward phase control models</td>
<td></td>
<td>M-case</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EcoSystem LED drivers pg. 38</td>
<td>• LED light engines, up to 25W</td>
<td></td>
<td></td>
<td>P-case</td>
<td>1%</td>
<td>No</td>
</tr>
<tr>
<td>OE model</td>
<td></td>
<td>• 220–240V CE @ 50/60Hz</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
3-Wire and Tu-Wire® compatible ballasts
(For other 3-wire compatible ballasts, see pgs 16-17)

<table>
<thead>
<tr>
<th>Family</th>
<th>Compatible Lamp Types and Wattages</th>
<th>Input Voltage</th>
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<th>Integral Sensor Connections</th>
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<tr>
<td><strong>Fluorescent ballasts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Hi-lume® ballasts pg. 32 | • T5 HO linear: 24W, 39W, 54W  
  • T4 4-pin triple-tube CFL: 26W, 32W                                                        | • 120V, 277V @ 60Hz          | • 3-Wire                | A-case                      | 1%                    | No                      |
| Tu-Wire ballasts pg. 34 | • T8 linear and U-bent: 25W, 32W  
  • T4 4-pin quad-tube CFL: 18W, 26W  
  • T4 4-pin triple-tube CFL: 18W, 26W, 32W                                                      | • 120V @ 60Hz                | • Tu-Wire (fluorescent) | A-case  
  B-case  
  C-case | 5%                    | No                      |                         |
### Case dimensions

#### A-case

- **A** 4.20 in (107 mm)
- **B** 1.00 in (25 mm)
- **C** 3.00 in (76 mm)
- **D** 4.90 in (124 mm)
- **E** 4.60 in (117 mm)
- **F** 2.00 in (51 mm)
- **G** 1.08 in (27 mm)
- **H** 1.60 in (41 mm)
- **I** 1.39 in (35 mm)

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#### B-case

- **A** 6.00 in (152 mm)
- **B** 1.00 in (25 mm)
- **C** 3.00 in (76 mm)
- **D** 6.75 in (171 mm)
- **E** 6.50 in (165 mm)
- **F** 2.00 in (51 mm)
- **G** 1.16 in (29 mm)
- **H** 1.60 in (41 mm)
- **I** 1.39 in (35 mm)

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#### C- or J-case

- **A** 16.12 in (409 mm)
- **B** 1.00 in (25 mm)
- **C** 1.18 in (30 mm)
- **D** 18.00 in (457 mm)
- **E** 17.70 in (450 mm)
- **F** 6.82 in (173 mm)
- **G** 0.394 in (10 mm)

*Note: Dotted area for sensor attachment applies to EcoSystem® J-case only.*

#### G-case

- **A** 7.13 in (181 mm)
- **B** 1.00 in (25 mm)
- **C** 2.36 in (60 mm)
- **D** 9.50 in (241 mm)
- **E** 8.91 in (226 mm)

*Lamp wires are 36 in (0.90 m) for leaded models. Power and control wires are 18 in (0.45 m) for leaded models.*

*If using 4-hole mount, mounting centers are 9.00 in (229 mm) x 1.06 in (27 mm).*
Case dimensions

**K-case (Ballast)**

Non-studded:

Studded:

8-32 Threaded stud
0.29 in (7.37 mm) long

**K-case (LED Driver)**

Non-studded:

Studded:

8-32 Threaded stud
0.29 in (7.37 mm) long

Case dimensions

**M-case**

For studded models only:
H 1.09 in (28 mm)
I 2.00 in (51 mm)
J 1.60 in (41 mm)

For non-studded models only:
S 1.38 in (35 mm)
T 0.64 in (16 mm)
U 0.88 in (22 mm)
V 1.53 in (39 mm)

Mounting centers

**P-case**

(Internal models only)

A 31.8 mm
B 90 mm
C 154.7 mm
D 134.6 mm
E 13.6 mm
F 6.95 mm
G 76.05 mm

Ballasts and drivers | Quick reference guide
Highest performance dimming to 1% at a low cost
EcoSystem digital link controlled

EcoSystem H-Series digitally addressable ballasts offer a low-cost, flexible solution for any space in an application. Providing industry-leading dimming to 1% or less, they meet the needs of the most demanding applications. The EcoSystem digital link also provides individual control, which eliminates the need to rewire, reduces design time, and provides a scalable solution from a small area to an entire building.

Operating voltage
- Universal input (120 V, 220/240 V and 277 V @ 50/60 Hz) and 347 V @ 60 Hz

Lamp types and wattages
UL Listed (for North America):
- T8 linear and U-bent: 17 W, 25 W, 32 W
- T5 HO linear: 24 W, 39 W, 54 W
- T5 linear: 14 W, 21 W, 28 W

Global models:
- T8 linear: 32 W
- T5 HO linear: 24 W, 39 W, 54 W
- T5 linear: 14 W, 21 W, 28 W

Control option
- EcoSystem digital link

Available case types
- G-case
- M-case
- C-case (347 V only)

Key standards
- California Energy Commission Listed
- UL Listed (evaluated to the requirements of UL 933)
- CSA Certified (evaluated to the requirements of C22.2 No. 74)
- Meets FCC Part 18 Non-Consumer requirements for EMI/RFI emissions
- Select models are NOM listed
- Models are also available to meet global country-specific standards. See pg. 60 for a listing of global model numbers

Features
- Continuous, flicker-free dimming down to 0.7% or 1% of full light output for T8 lamps, 1% for T5 and T5 HO lamps
- The EcoSystem digital link allows for re-zoning without rewiring, and can be wired as Class 1 or Class 2 — perfect for retrofit and new construction
- The EcoSystem digital link supports up to 64 digital ballasts, 64 occupancy sensors, 16 daylight sensors, and 64 wallstations or IR receivers
- The PowPak™ dimming module with EcoSystem supports 32 EcoSystem ballasts or drivers, 9 Pico® wireless controls, 6 occupancy/vacancy sensors and 1 daylight sensor
- Low-voltage, 2-conductor EcoSystem digital link provides individual, reconfigurable fixture control
- Sensors cannot connect directly to EcoSystem H-Series ballasts
- Communicates with wired or wireless sensors and controls via compatible device
- Line-voltage miswire protection of EcoSystem link
- Slim-profile design
- Ballasts maintain consistent light output for different lamp lengths, ensuring fixture-to-fixture uniformity
- Lamps turn on at any dimmed level without going to full brightness
- 100% performance-tested, including burn-in at the factory

Mounting
- Ballast mounts using two screws (or sheet metal feature and one screw) within a fluorescent fixture
- Ballast is grounded via a mounting screw to the fixture
- Lutron® and NEMA® recommend sockets complying with IEC 60400. Sockets must have a UL mark as well. Use rapid start sockets, not instant start sockets.
- Terminals accept 16-18 AWG (0.75 to 1.5 mm²) solid copper or tinned stranded wire

Specifications
- Total Harmonic Distortion (THD): less than 10%
- Power factor greater than 0.95
- Ballast factor equal to 1.0 or 1.17 for T8 lamps
- Ballast factor equal to 1.0 for T5 and T5 HO lamps and all international models
- Non-volatile memory restores all ballast settings after power failure
- Frequency of operation greater than 42 kHz
- Built-in inrush current-limiting circuitry (maximum of 7 amps at 120 V and 3 amps at 277 V)
- Factory-tuned ballast factors available to customize the ballast for different applications (not available for models outside the US)

Environment
- Sound rating: Class A
- Minimum lamp starting temperature 10°C (50°F)
- Maximum ballast case temperature 75°C (167°F)

Wiring
- EcoSystem H-Series ballasts require 4 wires plus Ground (E1, E2, Constant Hot and Neutral); one 16-18 AWG solid copper Class 1 or Class 2 wire per terminal
- The 16 AWG control wire must not exceed 900 ft, and the 18 AWG must not exceed 550 ft; maximum ballast-to-lamp-socket lead length is 7 ft (2 m) for T8, T5 and T5 HO linear lamps
- For control wiring diagrams, see pg. 68, and for lamp wiring diagrams, see pg. 78
Ballasts and drivers | Hi-lume® 3D ballasts

**Highest performance dimming to 1%**
EcoSystem® digital link or 3-wire controlled

Shown above: Hi-lume 3D, G-case

Model numbers are organized by lamp type, refer to pg. 41 for additional information.

Hi-lume 3D is a high-performance, energy-efficient, digitally addressable dimming ballast for demanding architectural applications. Hi-lume 3D is the world’s first fluorescent dimming ballast that dims lights to 1% or less for T8 lamps. With Hi-lume 3D you get the highest performance fluorescent dimming with the same efficiency as non-dimmable ballasts.

**Features**
- Industry-leading ballast efficacy of up to 100 lumens per watt
- Broadest dimming range: continuous, flicker-free dimming down to 0.7% of full light output for T8 lamps, 1% for T5 and T5 HO lamps, and 5% for T5 twin-tube
- The EcoSystem digital link supports up to 64 digital ballasts, 64 occupancy sensors, 16 daylight sensors, and 64 wallstations or IR receivers
- The PowPak® dimming module with EcoSystem supports 32 EcoSystem ballasts or drivers, 9 Picow wireless controls, 6 occupancy/vacancy sensors and 1 daylight sensor
- EcoSystem digital link allows for re-zoning without rewiring, and can be wired as Class 1 or Class 2 — perfect for retrofit and new construction
- Sensors cannot connect directly to the Hi-lume 3D ballasts
- Communicates with wired or wireless sensors and controls via compatible device
- Line-voltage miswire protection of EcoSystem link
- Slim-profile design
- Ballasts maintain consistent light output for different lamp lengths, ensuring fixture-to-fixture uniformity
- Lamps turn on at any dimmed level without going to full brightness
- 100% performance-tested, including burn-in at the factory

**Environment**
- Sound rating: Class A
- Minimum lamp starting temperature 10°C (50°F)
- Maximum ballast case temperature 75°C (167°F)

**Mounting**
- Ballast mounts using two screws (or sheet metal feature and one screw) within a fluorescent fixture
- Ballast is grounded via a mounting screw to the fixture
- Lutron and NEMA® recommend sockets complying with IEC 60400. Sockets must have a UL mark as well. Use rapid start sockets, not instant start sockets.
- Terminals accept 16-18 AWG (0.75 to 1.5 mm²) solid copper or tinned stranded wire

**Wiring**
- **EcoSystem digital link:** Hi-lume 3D ballasts require 4 wires plus Ground (E1, E2, Constant Hot and Neutral); one 16-18 AWG solid copper Class 1 or Class 2 wire per terminal
- **3-Wire:** Hi-lume 3D ballasts require 3 wires plus Ground (Dimmed Hot, Switched Hot and Neutral); one 16-18 AWG solid copper Class 1 wire per terminal
- The 16AWG control wire must not exceed 900 ft, and the 18AWG must not exceed 550 ft; maximum ballast-to-lamp-socket lead length is 7 ft (2 m) for T8, T5 and T5 HO linear lamps, and 3 ft (1 m) for T5 twin-tube lamps
- Ballast is grounded via case
- For control wiring diagrams, see pg. 68, and for lamp wiring diagrams, see pg. 78.

**Specifications**
- Total Harmonic Distortion (THD): less than 10%
- Power factor greater than .95
- Ballast factor equal to 1.0 or 1.17 for T8 lamps
- Ballast factor equal to 1.0 for T5 lamps
- Frequency of operation greater than 42 kHz
- Factory-tuned ballast factors available to customize the ballast for different applications

**Available case types**
- C-case
- G-case

**Lamp types and wattages**
- **T8 linear and U-bent:** 17 W, 25 W, 32 W, 40 W
- **T5 HO linear:** 24 W, 39 W, 54 W
- **T5 linear:** 14 W, 21 W, 28 W
- **T5 twin tube¹:** 36 W, 40 W, 50 W

**Control options**
- EcoSystem digital link
- 3-Wire control

**Key standards**
- California Energy Commission Listed
- UL Listed (evaluated to the requirements of UL 935)
- CSA certified (evaluated to the requirements of C22.2 No. 74, specific model numbers only)
- Meets FCC Part 18 Non-Consumer requirements for EMI/RFI emissions
- Select models are NOM listed

**Environment**
- Sound rating: Class A
- Minimum lamp starting temperature 10°C (50°F)
- Maximum ballast case temperature 75°C (167°F)

**Mounting**
- Ballast mounts using two screws (or sheet metal feature and one screw) within a fluorescent fixture
- Ballast is grounded via a mounting screw to the fixture
- Lutron and NEMA® recommend sockets complying with IEC 60400. Sockets must have a UL mark as well. Use rapid start sockets, not instant start sockets.
- Terminals accept 16-18 AWG (0.75 to 1.5 mm²) solid copper or tinned stranded wire

**Wiring**
- **EcoSystem digital link:** Hi-lume 3D ballasts require 4 wires plus Ground (E1, E2, Constant Hot and Neutral); one 16-18 AWG solid copper Class 1 or Class 2 wire per terminal
- **3-Wire:** Hi-lume 3D ballasts require 3 wires plus Ground (Dimmed Hot, Switched Hot and Neutral); one 16-18 AWG solid copper Class 1 wire per terminal
- The 16AWG control wire must not exceed 900 ft, and the 18AWG must not exceed 550 ft; maximum ballast-to-lamp-socket lead length is 7 ft (2 m) for T8, T5 and T5 HO linear lamps, and 3 ft (1 m) for T5 twin-tube lamps
- Ballast is grounded via case
- For control wiring diagrams, see pg. 68, and for lamp wiring diagrams, see pg. 78.

**Specifications**
- Total Harmonic Distortion (THD): less than 10%
- Power factor greater than .95
- Ballast factor equal to 1.0 or 1.17 for T8 lamps
- Ballast factor equal to 1.0 for T5 lamps
- Frequency of operation greater than 42 kHz
- Factory-tuned ballast factors available to customize the ballast for different applications

**Available case types**
- C-case
- G-case

**Lamp types and wattages**
- **T8 linear and U-bent:** 17 W, 25 W, 32 W, 40 W
- **T5 HO linear:** 24 W, 39 W, 54 W
- **T5 linear:** 14 W, 21 W, 28 W
- **T5 twin tube¹:** 36 W, 40 W, 50 W

**Control options**
- EcoSystem digital link
- 3-Wire control

¹T5 twin-tube models dim to 5%

For system compatibility information, see pg. 12.

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Lutron | 27
Light management performance dimming to 10% EcoSystem digital link or 3-wire controlled

Shown above: EcoSystem ballast, G-case

Model numbers are organized by lamp type, refer to pg. 41 for additional information.

EcoSystem digitally addressable dimming ballasts employ revolutionary technology allowing each device to listen, think, decide, remember, and react to its environment. EcoSystem fluorescent lighting control solutions are built on a simple building block architecture of fluorescent dimming ballasts, sensors, and controls, free from interfaces and power packs. EcoSystem redefines fluorescent lighting control as easy to design, easy to install, to maintain, and cost effective.

### Operating voltage
- Universal input (120 V, 220/240 V, 277 V @ 50/60 Hz)

### Lamp types and wattages
- T8 linear and U-bent: 17 W, 25 W, 32 W
- T8 linear Reduced Wattage: 25 W, 28 W, 30 W
- T5 HO linear: 24 W, 39 W, 54 W
- T5 linear: 14 W, 21 W, 28 W, 35 W
- T5 twin-tube: 36 W, 39 W, 40 W, 50 W, 55 W
- T5 twin-tube Reduced Wattage: 25 W

### Available case types
- G-case
- J-case

### Key standards
- California Energy Commission Listed
- UL Listed (evaluated to the requirements of UL 935)
- CSA Certified (evaluated to the requirements of C22.2 No. 74)
- Select models are NOM listed
- Meets FCC Part 18 Non-Consumer requirements for EMI/RFI emissions

### Control options
- EcoSystem digital link
- 3-Wire control

### Features
- Continuous, flicker-free dimming from 100% to 10%
- EcoSystem digital link allows for re-zoning without rewiring, and can be wired as Class 1 or Class 2—perfect for retrofit and new construction
- The EcoSystem digital link supports up to 64 digital ballasts, 64 occupancy sensors, 16 daylight sensors, and 64 wallstations or IR receivers
- The PowPakTM dimming module with EcoSystem supports 32 EcoSystem ballasts or drivers, 9 Pico® wireless controls, 6 occupancy/vacancy sensors and 1 daylight sensor
- Low-voltage, 2-conductor EcoSystem digital link provides individual, reconfigurable fixture control
- Supports digital control and standard 3-wire line-voltage phase control technology
- Sensors can connect directly to EcoSystem ballasts; all sensor and wallstation wiring is Class 2
- Communicates with wired or wireless sensors and controls via local wired sensor connections or compatible device
- Line-voltage miswire protection of EcoSystem link
- Slim-profile design
- Ballasts maintain consistent light output for different lamp lengths, ensuring fixture-to-fixture uniformity
- Lamps turn on at any dimmed level without going to full brightness
- 100% performance-tested, including burn-in at the factory

### Environment
- Sound rating: Class A
- Minimum lamp starting temperature 10ºC (50ºF)
- Maximum ballast case temperature 75ºC (167ºF)

### Mounting
- Ballast mounts using two screws (or sheet metal feature and one screw) within a fluorescent fixture
- Ballast is grounded via a mounting screw to the fixture
- Lutron® and NEMA® recommend sockets complying with IEC 60400. Sockets must have a UL mark as well. Use rapid start sockets, not instant start sockets.
- Terminals accept 16-18 AWG (0.75 to 1.5 mm²) solid copper or tinned stranded wire

### Wiring
- EcoSystem digital link: EcoSystem ballasts require 4 wires plus Ground (E1, E2, Constant Hot and Neutral); one 16-18 AWG solid copper Class 1 or Class 2 wire per terminal
- 3-Wire: EcoSystem ballasts require 3 wires plus Ground (Dimmed Hot, Switched Hot and Neutral); one 16-18 AWG solid copper Class 1 wire per terminal
- The 16/18 AWG control wire must not exceed 900 ft; the 18 AWG must not exceed 550 ft; maximum ballast-to-lamp-socket lead length is 7 ft (2 m) for T8, T5 and T5 HO linear lamps, and 3 ft (1 m) for T5 twin-tube lamps
- Ballast is grounded via case

### Specifications
- Total Harmonic Distortion (THD): less than 10% (select models are less than 15%)
- Power factor greater than 0.95
- Ballast factor equal to 0.85 for T8 lamps
- Ballast factor equal to 1.0 for T5 and T5 HO lamps
- Non-volatile memory restores all ballast settings after power failure
- Frequency of operation ensures that ballast does not interfere with infrared devices
- Factory-tuned ballast factors available to customize the ballast for different applications

### For system compatibility information, see pg. 12.
High performance dimming to 5%  
EcoSystem digital link or 3-wire controlled

Shown above: EcoSystem compact ballast, K-case

Model numbers are organized by lamp type, refer to pg. 41 for additional information.

EcoSystem compact ballasts provide high-performance dimming for any compact fluorescent application, completing the EcoSystem solution. With a 100% to 5% dimming range for T4 CFL lamps, EcoSystem compact ballasts provide both energy savings and flexibility.

Operating voltage
- Universal input (120 V, 220/240 V, 277 V @ 50/60 Hz)

Lamp types and wattages
- T4 4-pin quad-tube CFL: 18 W, 26 W  
- T4 4-pin triple-tube CFL: 26 W, 32 W, 42 W

Key standards
- UL Listed (evaluated to the requirements of UL 935)  
- UL Type 1 Outdoor for damp locations  
- CSA Certified (evaluated to the requirements of C22.2 No. 74)  
- Select models are NOM listed  
- Meets FCC Part 18 Non-Consumer requirements for EMI/RFI emissions

Control options
- EcoSystem digital link  
- 3-Wire control

Features
- Continuous, flicker-free dimming from 100% to 5% for T4 CFL lamps  
- EcoSystem digital link allows for re-zoning without rewiring, and can be wired as Class 1 or Class 2—perfect for retrofit and new construction  
- The EcoSystem digital link supports up to 64 digital ballasts, 64 occupancy sensors, 16 daylight sensors, and 64 wallstations or IR receivers  
- The PowPak® dimming module with EcoSystem supports 32 EcoSystem ballasts or drivers, 9 Pico® wireless controls, 6 occupancy/vacancy sensors and 1 daylight sensor  
- Low-voltage, 2-conductor EcoSystem digital link provides individual fixture control  
- Communicates with wired or wireless sensors and controls via compatible device  
- Sensors cannot connect directly to EcoSystem compact ballasts  
- Line-voltage miswire protection of EcoSystem link  
- One model can control both 26 W and 32 W T4 lamps  
- Ultra-low standby power (<1W) when lamps are off  
- Ballasts maintain consistent light output for different lamp lengths, ensuring fixture-to-fixture uniformity  
- 100% performance-tested, including burn-in at the factory  
- Non-volatile memory restores all ballast settings after power failure  
- Factory-tuned ballast factors available to customize the ballast for different applications

Environment
- Sound rating: Class A  
- Minimum lamp starting temperature 10º C (50º F)  
- Maximum ballast case temperature 75º C (167º F)

Mounting
- Ballast mounts using two mounting tabs or studs within a fluorescent fixture  
- “No studs” case option available  
- Ballast is grounded via a mounting screw to the fixture  
- Lutron® and NEMA® recommend sockets complying with IEC 60400. Sockets must have a UL mark as well. Use rapid start sockets, not instant start sockets.  
- Terminals accept 16-18 AWG (0.75 to 1.5 mm²) solid copper or tinned stranded wire

Wiring
- EcoSystem digital link: EcoSystem compact ballasts require 4 wires plus Ground (E1, E2, Constant Hot and Neutral); one 16-18 AWG solid copper Class 1 or Class 2 wire per terminal  
- 3-Wire: EcoSystem compact ballasts require 3 wires plus Ground (Dimmed Hot, Switched Hot and Neutral); one 16-18 AWG solid copper Class 1 wire per terminal  
- The 16AWG control wire must not exceed 900 ft, and the 18AWG must not exceed 550 ft; maximum ballast-to-lamp-socket lead length is 3 ft (1 m) for T4 compact lamps  
- Ballast is grounded via case  
- For control wiring diagrams, see pg. 68, and for lamp wiring diagrams, see pg. 78.

Specifications
- Total Harmonic Distortion (THD): less than 10%  
- Power factor greater than 0.95  
- Ballast factor equal to 0.95 for T4 lamps  
- Non-volatile memory restores all ballast settings after power failure  
- Factory-tuned ballast factors available to customize the ballast for different applications

For system compatibility information, see pg. 12.
Operating voltage
• 120 V or 277 V @ 60 Hz

Lamp types and wattages
• T5 HO: 24 W, 39 W, 54 W
• T4 4-pin triple-tube CFL: 26 W, 32 W

Control options
• 3-Wire control

Available case types
• A-case
• C-case

Highest performance dimming to 1%
3-Wire controlled

Shown above: Hi-lume ballast, A-case

Model numbers are organized by lamp type, refer to pg. 41 for additional information.

Experience the benefits of full-range, 100% to 1% fluorescent dimming. Designed to meet the most demanding lighting requirements, Hi-lume ballasts enable you to provide the ideal visual environment for any application. The Hi-lume family is extensive, featuring the world’s only 100% to 1% dimming ballasts for T4 compact fluorescent lamps. Integrating Hi-lume 1% technology into your designs affords you full control over the lighting in any space.

Features
• Continuous, flicker-free dimming from 100% to 1%
• Ballasts maintain consistent light output for different lamp lengths, ensuring fixture-to-fixture uniformity
• 3-Wire line voltage control for consistent fixture-to-fixture dimming
• Sensors cannot connect directly to Hi-lume ballasts
• Line-voltage miswire protection
• Slim-profile design
• Lamps turn on at any dimmed level without going to full brightness
• 100% performance-tested, including burn-in at the factory

Specifications
• Total Harmonic Distortion (THD): less than 10%
• Power factor greater than 0.95
• Ballast factor equal to 0.95 for T4 lamps
• Ballast factor equal to 1.0 for T5 HO lamps

Environment
• Sound rating: Class A
• Minimum lamp starting temperature: 10º C (50º F)
• Maximum ballast case temperature: 75º C (167º F)

For system compatibility information, see pg. 12.
High performance dimming to 5%

Tu-Wire controlled

Shown above: Tu-Wire ballast, B-case

Model numbers are organized by lamp type, refer to pg. 41 for additional information.

Tu-Wire ballasts offer high performance 100% to 5% dimming for linear and compact fluorescent lamps. Retrofit applications can benefit from the ease of installation offered by Lutron Tu-Wire dimming ballasts. Tu-Wire ballasts require only two wires (dimmed hot and neutral) for power and control. Lutron offers a wide range of compatible Tu-Wire controls, making Tu-Wire ballasts a perfect choice for many applications. Additionally, one-lamp T4 models have been designed to meet FCC Part 18 consumer requirements for residential applications.

Operating voltage
• 120V @ 60Hz

Lamp types and wattages
• T8 linear and U-bent: 25W, 32W
• T4 4-pin quad-tube CFL: 18W, 26W
• T4 4-pin triple-tube CFL: 18W, 26W, 32W

Control option
• Tu-Wire control

Available case types
• A-case
• B-case
• C-case

Key standards
• California Energy Commission (CEC) Listed
• UL Listed (evaluated to the requirements of UL 935)
• CSA certified (evaluated to the requirements of C22.2 No. 74)—all models except T8 25W
• 1-lamp ballasts for T4 CFL meet FCC Part 18 requirements for residential use
• Meets FCC Part 18 Non-Consumer requirements for EMI/RFI emissions

Features
• Continuous, flicker-free dimming from 100% to 5%
• Works with all Lutron Tu-Wire fluorescent controls for consistent dimming performance
• Sensors cannot connect directly to Tu-Wire ballasts
• 2-Wire line voltage control ideal for retrofit
• Line-voltage miswire protection
• Slim-profile design
• Low-line voltage protection circuitry prevents damage to the ballast or lamps if the ballast is connected to an incompatible dimmer
• Lamps turn on at any dimmed level without going to full brightness
• 100% performance-tested, including burn-in at the factory

Specifications
• Total Harmonic Distortion (THD) less than 20%
• Power factor greater than 0.95
• Ballast factor greater than 0.95 for T4 lamps
• Ballast factor equal to 1.0 for T8 lamps

Environment
• Sound rating: Class A
• Minimum lamp starting temperature 10ºC (50ºF)
• Maximum ballast case temperature 75ºC (167ºF)

Mounting
• Ballast mounts using two mounting tabs or studs within a fluorescent fixture
• Lutron and NEMAs recommend sockets complying with IEC 60400. Sockets must have a UL mark as well. Use rapid start sockets, not instant start sockets.
• Terminals accept 16-18 AWG (0.75 to 1.5 mm²) solid copper or tinned stranded wire

Wiring
• Tu-Wire ballasts require 2 wires plus Ground (Dimmed Hot and Neutral); one 16-18 AWG solid copper Class 1 wire per terminal
• Maximum ballast-to-lamp-socket lead length is 7 ft (2 m) for T8 lamps and 3 ft (1 m) for T4 compact lamps
• Ballast is grounded via case
• For control wiring diagrams, see pg. 72, and for lamp wiring diagrams, see pg. 78.

For system compatibility information, see pg. 12.
Operating Voltage
- Universal input (120 V, 220/240 V and 277 V @ 50/60 Hz)
- 120 V only for 2-wire forward phase models

Control options
- 2-Wire forward phase control (neutral required at control)*
- EcoSystem digital link
- 3-Wire control

Lamp types and wattages
- LED light engines, up to 40 W*

Shown above: Hi-lume A-Series LED driver, K-case

Model number is determined by load and control type. See pg. 63 for additional information.

Hi-lume A-Series is a high-performance LED driver that provides smooth, continuous 1% dimming for virtually any LED fixture, whether it requires constant current or constant voltage. It is the world’s most versatile LED driver family offered today due to the wide variety of compatible LED arrays, multiple form factors and numerous control options.

Operating Voltage
- Universal input (120 V, 220/240 V and 277 V @ 50/60 Hz)
- 120 V only for 2-wire forward phase models

Control options
- 2-Wire forward phase control (neutral required at control)*
- EcoSystem digital link
- 3-Wire control

Lamp types and wattages
- LED light engines, up to 40 W*

Available case types
- K-case
- M-case

LED operating specifications
Constant Current
- 200 mA–2.1 A (in 10 mA steps)
- 5 W–40 W
- Pulse width modulation (PWM) or constant current reduction (CCR) dimming

Constant Voltage
- 10 V–40 V (in 0.5 V steps)
- 5 W–40 W
- Pulse width modulation (PWM) dimming

Key standards
- UL 8750 Recognized
- FCC Part 15 compliant for commercial applications at 120 V or 277 V and for residential applications at 120 V
- Meets ANSI C62.41 category A surge protection standards up to and including 4 kV
- Models available to meet LED Driver requirements for Energy Star 1.1

Features
- Continuous, flicker-free dimming from 100% to 1%
- Efficiency greater than 80% at 40 W
- A rated lifetime of 50,000 hours
- EcoSystem digital link allows for re-zoning without rewiring, and can be wired as Class 1 or Class 2—perfect for retrofit and new construction
- Standard 3-wire line-voltage phase-control technology for consistent dimming performance and compatibility with all Lutron 3-wire fluorescent dimmers
- Constant current reduction (CCR) and pulse width modulation (PWM) dimming available for constant current light engines; constant voltage light engines operate with pulse width modulation (PWM) dimming only.
- Sensors cannot connect directly to the driver
- Line-voltage miswire protection
- Instant light output at any level when turned on, without flashing to full on

Specifications
- Power factor greater than 0.90 at 40 W
- Inrush current less than 2 A

Environment
- Sound rating: Class A
- Maximum case temperature is 65°C (149°F)

Mounting
- K-case driver typically mounts via studs or tabs to the outside of an LED fixture or on a junction box
- "No studs" case option available
- Any fixture type (downlight, cove light, sconce, under-cabinet, etc.) will work with the Hi-lume A-Series driver family, if the LED light engine operates at either the constant current or constant voltage levels specified

Wiring
- EcoSystem digital link: Hi-lume A-Series LED drivers require 4 wires plus Ground (E1, E2, Constant Hot and Neutral); one 16-18 AWG solid copper Class 1 or Class 2 wire per terminal
- 2-Wire: Requires 3 wires plus Ground (Dimmed Hot, Switched Hot and Neutral); one 16-18 AWG solid copper Class 1 wire per terminal
- 3-Wire forward phase: Requires 2 wires plus Ground (Dimmed Hot and Neutral); one 16-18 AWG solid copper Class 1 or Class 2 wire per terminal
- The 16 AWG control wire must not exceed 900 ft, and the 18 AWG must not exceed 550 ft; maximum driver-to-LED light engine wire length is 10 ft (3 m)
- Driver is grounded by a mounting screw to the grounded fixture (or by terminal connection on the K-case)
- For control wiring diagrams, see pg. 74, and for lamp wiring diagrams, see pg. 80.

For system compatibility information, see pg. 12.

*For a complete list of compatible controls, visit www.lutron.com/HilumeLED
Operating Voltage
• 220–240 V CE @ 50/60 Hz

Control options
• EcoSystem digital link

Lamp types and wattages
• LED light engines, up to 25 W

Available case types
• P-case

LED operating specifications

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<th>Constant Current</th>
<th>0.20 A–1.05 A (in 0.01 A increments)</th>
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<td>6 W–25 W</td>
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<tr>
<td>Pulse width modulation (PWM) or constant current reduction (CCR) dimming</td>
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Constant Voltage
• 8 V–38 V (in 0.5 V increments)
• 5 W–25 W
• Pulse width modulation (PWM) dimming

Key standards
• CE and ENEC Mark
• RoHS 2006 Compliant
• IEC Rated

Features
• Continuous, flicker-free dimming from 100% to 1%
• Efficiency of 80% at 25 W
• Protected from miswires of input power to EcoSystem control inputs
• Constant current reduction (CCR) and pulse width modulation (PWM) dimming available for constant current light engines; constant voltage light engines operate with pulse width modulation (PWM) dimming only
• A rated lifetime of 50,000 hours
• Independent control gear with integral strain relief
• LEDs turn on to any dimmed level without flashing to full brightness
• Sensors cannot connect directly to the driver

Specifications
• Power factor greater than 0.95 at 25 W
• Low harmonic distortion
• Inrush current less than 2 A

Environment
• Sound rating: inaudible in a 27 dB ambient environment

Mounting
• Independent control gear, driver requires no particular mounting means

Wiring
• EcoSystem LED drivers require 4 wires plus Ground (E1, E2, Live and Neutral); one 0.75 mm² to 1.5 mm² solid copper Class 1 or Class 2 wire per terminal
• The 1.5 mm² control wire must not exceed 310 m, and the 0.75 mm² must not exceed 50 m; maximum driver-to-LED light engine wire length is 3 m for any output type
• For control wiring diagrams, see pg. 75, and for lamp wiring diagrams, see pg. 80.
### EcoSystem® ballasts

**EcoSystem® H-Series**

- universal voltage digital dimming ballasts
- Dimming to 1% or less
- Compatible with Lutron EcoSystem digital controls
- Energy saving and cost effective

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<thead>
<tr>
<th>Lamp (Watts)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Lumens (lm)***</th>
<th>System Efficacy (lm/W)***</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
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*For case type information see pgs. 20-23.

**Factory-tuned ballast factors available. To customize, visit [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool).**

*Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.

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**Understanding ballast model numbers**

Lutron® ballast model numbers are designed to illustrate basic information about the ballast. For example:

**EcoSystem® H-Series ballasts**

**EHD T8 32 M U 1 10**

- **Family**
- **Universal voltage**
- **Lamp type**
- **Case size**
- **Lamp quantity**
- **Lamp wattage**
- **Ballast factor**

**EcoSystem® ballasts**

**EC5 T5 36 J UNV 1**

- **Family**
- **Universal voltage**
- **Lamp type**
- **Case size**
- **Lamp quantity**
- **Lamp wattage**

Generate part numbers, confirm ballast performance specifications (input power, system lumens, ballast factor) and select the proper ballast by utilizing the Ballast Selection Tool.

This tool also enables users to choose a Custom Ballast Factor (percentage of light output for a given lamp-ballast combination). Reduced ballast factors achieve greater energy savings and are available for all Lutron ballasts with EcoSystem control.

Updated Ballast Selection Tool with Custom Ballast Factor. Find and configure the ballast that best fits your project: [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)

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For more information, visit [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool).
### Fluorescent Ballast Model Numbers

#### T8 and U-bent (continued)

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<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
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<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>Efficacy System Lumin (lm/1)</th>
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<td>4,446</td>
<td>73</td>
<td>1.92</td>
<td>0.96</td>
</tr>
</tbody>
</table>

*For case type information see pgs. 20-23.

**Factory-tuned ballast factors available. To customize, visit [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)

*Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.
**T8 and U-bent (continued)‡**

### Tu-Wire® (5% dimming) 120V dimming ballasts

- Dimming to 5%
- Compatible with Lutron® Tu-Wire fluorescent controls
- Energy saving

<table>
<thead>
<tr>
<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)</th>
<th>System Lumens (lm)</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
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</thead>
<tbody>
<tr>
<td>25W (36 in)</td>
<td>1</td>
<td>2W-T825-120-1</td>
<td>C</td>
<td>120</td>
<td>0.30</td>
<td>36.0</td>
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<td>1,828</td>
<td>51</td>
<td>2.36</td>
<td>0.76</td>
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<td>2</td>
<td>2W-T825-120-2</td>
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<td>120</td>
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<td>0.85</td>
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<tr>
<td>32W (48 in)</td>
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<td>2W-T832-120-1</td>
<td>C</td>
<td>120</td>
<td>0.37</td>
<td>44.4</td>
<td>0.85</td>
<td>2,550</td>
<td>57</td>
<td>1.91</td>
<td>0.61</td>
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<td>2</td>
<td>2W-T832-120-2</td>
<td>C</td>
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<td>5,100</td>
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</table>

### EcoSystem® (10% dimming) universal voltage digital dimming ballasts

- Dimming to 10%
- Compatible with Lutron 3-wire fluorescent controls and EcoSystem digital controls
- Integral sensor connections

<table>
<thead>
<tr>
<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Lumens (lm)</th>
<th>System Efficacy (lm/W)†</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)†</th>
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<tbody>
<tr>
<td>17W (24 in)</td>
<td>1</td>
<td>ECS T817 J UNV 1</td>
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<td>277</td>
<td>0.08</td>
<td>20.6</td>
<td>0.85</td>
<td>1,190</td>
<td>58</td>
<td>4.13</td>
<td>0.70</td>
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<tr>
<td></td>
<td>2</td>
<td>ECS T817 J UNV 2</td>
<td>J</td>
<td>277</td>
<td>0.10</td>
<td>27.6</td>
<td>0.85</td>
<td>1,188</td>
<td>60</td>
<td>4.25</td>
<td>0.72</td>
</tr>
<tr>
<td>25W (36 in)</td>
<td>1</td>
<td>ECS T825 J UNV 1</td>
<td>J</td>
<td>277</td>
<td>0.11</td>
<td>31.6</td>
<td>0.85</td>
<td>2,550</td>
<td>81</td>
<td>2.69</td>
<td>0.86</td>
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<tr>
<td></td>
<td>2</td>
<td>ECS T825 J UNV 2</td>
<td>J</td>
<td>277</td>
<td>0.13</td>
<td>31.0</td>
<td>0.85</td>
<td>2,550</td>
<td>82</td>
<td>2.74</td>
<td>0.87</td>
</tr>
<tr>
<td>32W (48 in)</td>
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<td>ECS T832 J UNV 1</td>
<td>J</td>
<td>277</td>
<td>0.15</td>
<td>31.3</td>
<td>0.85</td>
<td>2,550</td>
<td>81</td>
<td>2.72</td>
<td>0.87</td>
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<tr>
<td></td>
<td>2</td>
<td>ECS T832 J UNV 2</td>
<td>J</td>
<td>277</td>
<td>0.21</td>
<td>57.4</td>
<td>0.85</td>
<td>5,100</td>
<td>89</td>
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<tr>
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<td>3</td>
<td>ECS T832 G UNV 2L††</td>
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<td>0.22</td>
<td>59.6</td>
<td>0.85</td>
<td>5,100</td>
<td>89</td>
<td>1.43</td>
<td>0.91</td>
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<tr>
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<td>3</td>
<td>ECS T832 G UNV 3L††</td>
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<td>86.5</td>
<td>0.85</td>
<td>7,650</td>
<td>88</td>
<td>0.98</td>
<td>0.94</td>
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<td>3</td>
<td>ECS T832 G UNV 317L††</td>
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<td>10,530</td>
<td>100</td>
<td>1.11</td>
<td>1.06</td>
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</table>

Refer to the online ballast selection tool for additional information, [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)

*For case type information see pgs. 20-23.

†Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.

‡Factory-tuned ballast factors available. To customize, visit [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)

††Ballast ships with leads.
Reduced Wattage T8 and U-bent Ballasts and drivers

- Dimming to 10% for reduced wattage (energy saving) lamps
- Compatible with Lutron® 3-wire fluorescent controls and EcoSystem digital controls
- Integral sensor connections

### EcoSystem- (10% dimming) universal voltage digital dimming ballasts

<table>
<thead>
<tr>
<th>Lamp Watts</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)*</th>
<th>System Lumens (lm)*</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25W (48 in)</td>
<td>1</td>
<td>ECS T8R J UNV 1</td>
<td>J</td>
<td>277</td>
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<td>24.8</td>
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<td>2,061</td>
<td>83</td>
<td>3.43</td>
<td>0.86</td>
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<tr>
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<td></td>
<td>ECS T8R J UNV 2</td>
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<td>24.5</td>
<td>0.85</td>
<td>2,061</td>
<td>84</td>
<td>3.47</td>
<td>0.87</td>
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<td></td>
<td>ECS T8R J UNV 3</td>
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<td>0.17</td>
<td>46.6</td>
<td>0.85</td>
<td>4,123</td>
<td>88</td>
<td>1.82</td>
<td>0.91</td>
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<tr>
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<td>M</td>
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<td>0.10</td>
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<td>0.85</td>
<td>4,123</td>
<td>90</td>
<td>1.85</td>
<td>0.93</td>
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<td>46.5</td>
<td>0.85</td>
<td>4,123</td>
<td>91</td>
<td>1.83</td>
<td>0.91</td>
</tr>
</tbody>
</table>

- Factory-tuned ballast factors available. To customize, visit www.lutron.com/BallastTool

### EcoSystem H-Series (1% dimming) universal voltage digital dimming ballasts

- Dimming to 1%
- Compatible with Lutron EcoSystem digital controls
- Energy saving and cost effective

<table>
<thead>
<tr>
<th>Lamp Watts</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)*</th>
<th>System Lumens (lm)*</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14W (21.6 in)</td>
<td>1</td>
<td>EHD T514 M U 1 10</td>
<td>M</td>
<td>277</td>
<td>0.07</td>
<td>19.4</td>
<td>1.00</td>
<td>1,350</td>
<td>70</td>
<td>5.16</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EHD T514 M U 2 10</td>
<td>M</td>
<td>240</td>
<td>0.08</td>
<td>19.2</td>
<td>1.00</td>
<td>1,350</td>
<td>70</td>
<td>5.21</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EHD T514 M E 1 10</td>
<td>M</td>
<td>277</td>
<td>0.13</td>
<td>36.0</td>
<td>1.00</td>
<td>2,700</td>
<td>75</td>
<td>2.78</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EHD T514 M E 2 10</td>
<td>M</td>
<td>240</td>
<td>0.15</td>
<td>36.0</td>
<td>1.00</td>
<td>2,700</td>
<td>75</td>
<td>2.78</td>
<td>0.78</td>
</tr>
<tr>
<td>14W (548 mm)</td>
<td>1</td>
<td>EHD T514 M E 1 10</td>
<td>M</td>
<td>277</td>
<td>0.09</td>
<td>19.8</td>
<td>1.00</td>
<td>1,350</td>
<td>68</td>
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<td>M</td>
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<td>0.15</td>
<td>36.0</td>
<td>1.00</td>
<td>2,700</td>
<td>75</td>
<td>2.78</td>
<td>0.78</td>
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<tr>
<td>21W (33.4 in)</td>
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<td>EHD T521 M U 1 10</td>
<td>M</td>
<td>277</td>
<td>0.10</td>
<td>26.6</td>
<td>1.00</td>
<td>2,100</td>
<td>79</td>
<td>3.76</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
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<td>EHD T521 M U 2 10</td>
<td>M</td>
<td>240</td>
<td>0.11</td>
<td>26.4</td>
<td>1.00</td>
<td>2,100</td>
<td>80</td>
<td>3.79</td>
<td>0.80</td>
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<tr>
<td></td>
<td></td>
<td>EHD T521 M E 1 10</td>
<td>M</td>
<td>277</td>
<td>0.10</td>
<td>26.6</td>
<td>1.00</td>
<td>2,100</td>
<td>80</td>
<td>3.79</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EHD T521 M E 2 10</td>
<td>M</td>
<td>240</td>
<td>0.11</td>
<td>26.4</td>
<td>1.00</td>
<td>2,100</td>
<td>80</td>
<td>3.79</td>
<td>0.80</td>
</tr>
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<td>21W (488 mm)</td>
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<td>EHD T521 M U 1 10</td>
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<td>277</td>
<td>0.10</td>
<td>26.6</td>
<td>1.00</td>
<td>2,100</td>
<td>80</td>
<td>3.79</td>
<td>0.80</td>
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<tr>
<td></td>
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<td>EHD T521 M U 2 10</td>
<td>M</td>
<td>240</td>
<td>0.11</td>
<td>26.4</td>
<td>1.00</td>
<td>2,100</td>
<td>80</td>
<td>3.79</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
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<td>EHD T521 M E 1 10</td>
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<td>277</td>
<td>0.10</td>
<td>26.6</td>
<td>1.00</td>
<td>2,100</td>
<td>80</td>
<td>3.79</td>
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<td>EHD T521 M E 2 10</td>
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<td>0.11</td>
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<td>26W (45.2 in)</td>
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<td>240</td>
<td>0.22</td>
<td>46.2</td>
<td>1.00</td>
<td>2,900</td>
<td>99</td>
<td>3.03</td>
<td>0.85</td>
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<td>26W (148 in)</td>
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<td>EHD T528 M E 1 10</td>
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<td>277</td>
<td>0.22</td>
<td>46.2</td>
<td>1.00</td>
<td>2,900</td>
<td>99</td>
<td>3.03</td>
<td>0.85</td>
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<tr>
<td></td>
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<td>0.22</td>
<td>46.2</td>
<td>1.00</td>
<td>2,900</td>
<td>99</td>
<td>3.03</td>
<td>0.85</td>
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</tbody>
</table>

- Factory-tuned ballast factors available. To customize, visit www.lutron.com/BallastTool

Please consult lamp manufacturer’s specification to determine the dimmability of the reduced wattage lamp.

**Notes:**

- For case type information see pgs. 20-23.
- *Factory-tuned ballast factors available. To customize, visit www.lutron.com/BallastTool*
- Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.
## T5 Linear (continued)

**Hi-lume® 3D (1% dimming) universal voltage digital dimming ballasts**
- Dimming to 1%
- Compatible with Lutron® 3-wire fluorescent controls and EcoSystem® digital controls
- Energy saving

<table>
<thead>
<tr>
<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Lumens (lm)†</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy Factor (RESE)</th>
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<td>0.07</td>
<td>19.4</td>
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<td>1,350</td>
<td>70</td>
<td>5.16</td>
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<td>0.08</td>
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<td>70</td>
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<td>1,350</td>
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<tr>
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<td>H3D T514 C U 2 10</td>
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<td>277</td>
<td>0.13</td>
<td>36.0</td>
<td>1.00</td>
<td>2,700</td>
<td>75</td>
<td>2.78</td>
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<td>240</td>
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<td>36.0</td>
<td>1.00</td>
<td>2,700</td>
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<td>2.78</td>
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*For case type information see pgs. 20-23.
**Factory-tuned ballast factors available. To customize, visit [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)
†Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.

## T5 Linear (continued)

**EcoSystem (10% dimming) universal voltage digital dimming ballasts**
- Dimming to 10%
- Compatible with Lutron 3-wire fluorescent controls and EcoSystem digital controls
- Integral sensor connections

<table>
<thead>
<tr>
<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Lumens (lm)†</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy Factor (RESE)</th>
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<td>3,650</td>
<td>87</td>
<td>2.38</td>
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*For case type information see pgs. 20-23.
**Factory-tuned ballast factors available. To customize, visit [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)
†Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.
### EcoSystem® H-Series (1% dimming) universal voltage digital dimming ballasts

- Dimming to 1%
- Compatible with Lutron® EcoSystem digital controls
- Energy saving and cost effective

### Ballasts and drivers | Fluorescent ballast model numbers

<table>
<thead>
<tr>
<th>Lamp Watts</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Lumens (lm)**</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
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<tbody>
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<td>62.4</td>
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<td>5.000</td>
<td>80</td>
<td>1.60</td>
<td>0.87</td>
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<td>5.000</td>
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<td>62.4</td>
<td>1.00</td>
<td>5.000</td>
<td>80</td>
<td>1.60</td>
<td>0.87</td>
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<td>62.4</td>
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<td>5.000</td>
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<td>0.88</td>
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### Hi-lume® 3D (1% dimming) universal voltage digital dimming ballasts

- Dimming to 1%
- Compatible with Lutron® 3-wire fluorescent controls and EcoSystem digital controls
- Energy saving

### Ballasts and drivers | Fluorescent ballast model numbers (continued)

<table>
<thead>
<tr>
<th>Lamp Watts</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Lumens (lm)**</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
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<td>1.81</td>
<td>0.87</td>
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<td>0.23</td>
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<td>78</td>
<td>1.57</td>
<td>0.86</td>
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*For case type information see pgs. 20-23.
**Factory-tuned ballast factors available. To customize, visit www.lutron.com/BallastTool
*Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.

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For case type information see pgs. 20-23.
**Factory-tuned ballast factors available. To customize, visit www.lutron.com/BallastTool
*Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.
Refer to the online ballast selection tool for additional information, www.lutron.com/BallastTool

For case type information see pgs. 20-23.

† Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.

T5 HO Linear (continued)

Hi-lume® (1% dimming) 120V and 277V dimming ballasts

- Dimming to 1%
- Compatible with Lutron® 3-wire fluorescent controls
- Energy saving

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<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
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<th>System Lumens (lm)</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
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<td>FDB-T554-277-2</td>
<td>C</td>
<td>277</td>
<td>0.45</td>
<td>124.7</td>
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<td>FDB-T554-120-2</td>
<td>C</td>
<td>120</td>
<td>1.10</td>
<td>132.0</td>
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<td>76</td>
<td>0.76</td>
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<tr>
<td></td>
<td>2</td>
<td>FDB-T554-277-2</td>
<td>C</td>
<td>277</td>
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<td>1.00</td>
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<td>FDB-T554-120-2</td>
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<td>120</td>
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<td>119.3</td>
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<td>10,000</td>
<td>84</td>
<td>0.84</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Select Hi-lume ballasts have been discontinued. Please refer to the Cross-reference guide for discontinued ballasts and drivers on pg. 81.

EcoSystem® (10% dimming) universal voltage digital dimming ballasts

- Dimming to 10%
- Compatible with Lutron 3-wire fluorescent controls and EcoSystem digital controls
- Integral sensor connections

<table>
<thead>
<tr>
<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)</th>
<th>System Lumens (lm)</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
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<tbody>
<tr>
<td>24W (21.6 in)</td>
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<td>ECS T524 J UNV 1</td>
<td>J</td>
<td>277</td>
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<td>30.0</td>
<td>1.00</td>
<td>2,000</td>
<td>67</td>
<td>3.33</td>
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</tr>
<tr>
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<td></td>
<td></td>
<td>240</td>
<td>0.13</td>
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<td>1.00</td>
<td>2,000</td>
<td>69</td>
<td>3.47</td>
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<td>120</td>
<td>0.24</td>
<td>28.8</td>
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<td>2,000</td>
<td>69</td>
<td>3.47</td>
<td>0.83</td>
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<tr>
<td></td>
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<td>240</td>
<td>0.23</td>
<td>54.0</td>
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<td>74</td>
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<td>120</td>
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<td>53.9</td>
<td>1.00</td>
<td>4,000</td>
<td>74</td>
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<td>39W (33.4 in)</td>
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<td>0.16</td>
<td>43.3</td>
<td>1.00</td>
<td>3,500</td>
<td>81</td>
<td>2.31</td>
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<td>240</td>
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<td>0.89</td>
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<td>44.0</td>
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<td>0.89</td>
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<td>J</td>
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<td>1.00</td>
<td>7,000</td>
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<td>1.20</td>
<td>0.94</td>
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<td>0.35</td>
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<td>7,000</td>
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<td>1.19</td>
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<td>120</td>
<td>0.70</td>
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<td>7,000</td>
<td>83</td>
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<td>0.93</td>
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<td>54W (45.2 in)</td>
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<td>56.5</td>
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<td>5,000</td>
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<td>240</td>
<td>0.24</td>
<td>56.0</td>
<td>1.00</td>
<td>5,000</td>
<td>86</td>
<td>1.73</td>
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<td>57.9</td>
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<td>5,000</td>
<td>86</td>
<td>1.73</td>
<td>0.93</td>
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<td>ECS T554 J UNV 2</td>
<td>J</td>
<td>277</td>
<td>0.40</td>
<td>110.1</td>
<td>1.00</td>
<td>10,000</td>
<td>91</td>
<td>0.91</td>
<td>0.98</td>
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<td>0.52</td>
<td>119.0</td>
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<td>10,000</td>
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<td>0.84</td>
<td>0.91</td>
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<td>120</td>
<td>0.99</td>
<td>119.3</td>
<td>1.00</td>
<td>10,000</td>
<td>84</td>
<td>0.84</td>
<td>0.91</td>
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</tbody>
</table>
### T5 Twin-Tube

**Hi-lume® 3D (5% dimming) universal voltage digital dimming ballasts**
- Dimming to 5%
- Compatible with Lutron® 3-wire fluorescent controls and EcoSystem® digital controls
- Energy saving

<table>
<thead>
<tr>
<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Luminas (lm)</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36W (15.5 in)</td>
<td>1</td>
<td>H3D T536 G U 1 10</td>
<td>G</td>
<td>277</td>
<td>0.14</td>
<td>38.4</td>
<td>1.00</td>
<td>2,850</td>
<td>74</td>
<td>2.60</td>
<td>1.04</td>
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<tr>
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<td>2</td>
<td>H3D T536 G U 2 10</td>
<td>G</td>
<td>277</td>
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<td>71.3</td>
<td>1.00</td>
<td>5,700</td>
<td>80</td>
<td>1.40</td>
<td>1.12</td>
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<tr>
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<td>1</td>
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<td>G</td>
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<td>0.17</td>
<td>40.4</td>
<td>1.00</td>
<td>2,850</td>
<td>71</td>
<td>2.48</td>
<td>0.99</td>
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<tr>
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<td>2</td>
<td>H3D T540 G U 2 10</td>
<td>G</td>
<td>277</td>
<td>0.27</td>
<td>74.0</td>
<td>1.00</td>
<td>6,200</td>
<td>84</td>
<td>1.25</td>
<td>1.08</td>
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<tr>
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<td>H3D T540 G U 3 10</td>
<td>G</td>
<td>277</td>
<td>0.40</td>
<td>109.7</td>
<td>1.00</td>
<td>9,300</td>
<td>85</td>
<td>0.91</td>
<td>0.99</td>
</tr>
<tr>
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<td>1</td>
<td>H3D T550 G U 1 10</td>
<td>G</td>
<td>277</td>
<td>0.20</td>
<td>54.8</td>
<td>1.00</td>
<td>4,000</td>
<td>73</td>
<td>1.82</td>
<td>0.91</td>
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<tr>
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<td>2</td>
<td>H3D T550 G U 2 10</td>
<td>G</td>
<td>277</td>
<td>0.23</td>
<td>54.6</td>
<td>1.00</td>
<td>4,000</td>
<td>73</td>
<td>1.83</td>
<td>0.92</td>
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</table>

### T5 Twin-Tube (continued)

**EcoSystem (10% dimming) universal voltage digital dimming ballasts**
- Dimming to 10%
- Compatible with Lutron® 3-wire fluorescent controls and EcoSystem® digital controls
- Integral sensor connections

<table>
<thead>
<tr>
<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Luminas (lm)</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36/39W (15.5 in)</td>
<td>1</td>
<td>ECS T536 J UNV 1</td>
<td>J</td>
<td>277</td>
<td>0.14</td>
<td>38.8</td>
<td>1.00</td>
<td>2,850</td>
<td>73</td>
<td>2.57</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>ECS T536 J UNV 2</td>
<td>J</td>
<td>277</td>
<td>0.26</td>
<td>72.0</td>
<td>1.00</td>
<td>5,700</td>
<td>79</td>
<td>1.39</td>
<td>1.00</td>
</tr>
<tr>
<td>40W (22.5 in)</td>
<td>1</td>
<td>ECS T540 J UNV 1</td>
<td>J</td>
<td>240</td>
<td>0.18</td>
<td>43.2</td>
<td>1.00</td>
<td>3,100</td>
<td>71</td>
<td>2.28</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>ECS T540 J UNV 2</td>
<td>J</td>
<td>277</td>
<td>0.27</td>
<td>74.8</td>
<td>1.00</td>
<td>6,200</td>
<td>83</td>
<td>1.34</td>
<td>1.07</td>
</tr>
<tr>
<td>50W (22.5 in)</td>
<td>1</td>
<td>ECS T540 G UNV 3L††</td>
<td>G</td>
<td>277</td>
<td>0.40</td>
<td>111.3</td>
<td>1.00</td>
<td>9,300</td>
<td>84</td>
<td>0.90</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>ECS T550 J UNV 1</td>
<td>J</td>
<td>277</td>
<td>0.20</td>
<td>55.4</td>
<td>1.00</td>
<td>4,000</td>
<td>72</td>
<td>1.81</td>
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<tr>
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<td>ECS T550 J UNV 2</td>
<td>J</td>
<td>277</td>
<td>0.23</td>
<td>54.0</td>
<td>1.00</td>
<td>4,000</td>
<td>72</td>
<td>1.85</td>
<td>0.93</td>
</tr>
</tbody>
</table>

*For case type information see pgs. 20-23.

†Factory-tuned ballast factors available. To customize, visit [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)

‡Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.

Lamps per Ballast: EC5 T540 G UNV 3L††, EC5 T550 J UNV 1, EC5 T550 J UNV 2, EC5 T550 J UNV 2

Ballast and drivers | Fluorescent ballast model numbers

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*For case type information see pgs. 20-23.

**Factory-tuned ballast factors available. To customize, visit [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)

†Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.

Ballast ships with leads.
Reduced Wattage T5 Twin-Tube

EcoSystem- (10% dimming) universal voltage digital dimming ballasts

- Dimming to 10% for reduced wattage (energy saving) lamps
- Compatible with Lutron® 3-wire fluorescent controls and EcoSystem digital controls
- Integral sensor connections

<table>
<thead>
<tr>
<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Lumens (lm)</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
</tr>
</thead>
</table>
| 25 W (22.5 in)      | 1                 | ECS T540 RW J UNV 1 | J       | 277 0.12 34.3 1.00 2,600 76 2.91 0.73
|                    |                   |              |           | 240 0.14 34.5 1.00 2,600 75 2.89 0.72
|                    |                   |              |           | 120 0.28 34.1 1.00 2,600 76 2.93 0.73 |
|                    | 2                 | ECS T540 RW J UNV 2 | J       | 277 0.21 59.3 1.00 5,200 88 1.68 0.84
|                    |                   |              |           | 240 0.35 61.0 1.00 5,200 85 1.74 0.82
|                    |                   |              |           | 120 0.49 59.3 1.00 5,200 88 1.68 0.84 |

Please consult lamp manufacturer's specification to determine the dimmability of the reduced wattage lamp.

T4 Compact

Hi-lume® (1% dimming) 120 V and 277 V dimming ballasts

- Dimming to 1%
- Compatible with Lutron® 3-wire fluorescent controls
- Energy saving

<table>
<thead>
<tr>
<th>Lamp Watts (Length)</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)</th>
<th>System Lumens (lm)</th>
<th>System Efficacy (lm/W)</th>
<th>Ballast Efficacy Factor (BEF)</th>
<th>Relative System Efficacy (RSE)</th>
</tr>
</thead>
</table>
| 26 W (T4 Triple Tube) | 1              | HL3-T426-277-1-S‡ | A       | 277 0.12 33.2 0.95 1,710 51 2.86 0.74
|                    |                   |              |           | 120 0.26 31.2 0.95 1,710 55 3.04 0.79 |
| 32 W (T4 Triple Tube) | 1              | HL3-T432-277-1-S‡ | A       | 277 0.13 36.0 0.95 2,280 63 2.64 0.84
|                    |                   |              |           | 120 0.35 37.2 0.95 2,280 61 2.55 0.82 |

Refer to the online ballast selection tool for additional information, [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)

*For case type information see pgs. 20-23.
**Factory-tuned ballast factors available. To customize, visit [www.lutron.com/BallastTool](http://www.lutron.com/BallastTool)
‡Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.
‡Mounting studs standard. Delete -S suffix in the model number if mounting studs are not needed.
### EcoSystem® (5% dimming) universal voltage digital dimming ballasts

- Dimming to 5%
- Compatible with Lutron® 3-wire fluorescent controls and EcoSystem digital controls
- Energy saving

<table>
<thead>
<tr>
<th>Lamp Watts</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Luminaries (lm)*</th>
<th>Relative System Efficacy (RSE)</th>
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<tr>
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<td>1</td>
<td>EC3D T418 K U 1 S‡</td>
<td>K</td>
<td>277</td>
<td>0.09</td>
<td>21.4</td>
<td>0.95</td>
<td>1,140</td>
<td>55</td>
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<td></td>
<td>120</td>
<td>0.18</td>
<td>21.3</td>
<td>0.95</td>
<td>1,140</td>
<td>54</td>
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<td>277</td>
<td>0.15</td>
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<td>0.95</td>
<td>2,280</td>
<td>57</td>
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<td></td>
<td></td>
<td>240</td>
<td>0.17</td>
<td>39.4</td>
<td>0.95</td>
<td>2,280</td>
<td>58</td>
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<td>120</td>
<td>0.34</td>
<td>41.1</td>
<td>0.95</td>
<td>2,280</td>
<td>56</td>
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<tr>
<td>26W</td>
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<td>EC3D T4MMW K U 1 S‡</td>
<td>K</td>
<td>277</td>
<td>0.10</td>
<td>27.0</td>
<td>0.95</td>
<td>1,710</td>
<td>63</td>
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<td></td>
<td></td>
<td>120</td>
<td>0.22</td>
<td>26.4</td>
<td>0.95</td>
<td>1,710</td>
<td>65</td>
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<td></td>
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<td></td>
<td>120</td>
<td>0.36</td>
<td>43.2</td>
<td>0.95</td>
<td>3,040</td>
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<td></td>
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<td>85.1</td>
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<td>6,080</td>
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<td>0.73</td>
<td>87.6</td>
<td>0.95</td>
<td>6,080</td>
<td>69</td>
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</tbody>
</table>

### Tu-Wire® (5% dimming) 120 V dimming ballasts

- Dimming to 5%
- Designed for retrofit applications
- Compatible with Lutron Tu-Wire fluorescent controls
- Energy saving

<table>
<thead>
<tr>
<th>Lamp Watts</th>
<th>Lamps per Ballast</th>
<th>Model Number</th>
<th>Case Type*</th>
<th>Input Voltage (VAC)</th>
<th>Input Current (A)</th>
<th>Input Power (W)</th>
<th>Ballast Factor (BF)**</th>
<th>System Luminaries (lm)*</th>
<th>Relative System Efficacy (RSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18W</td>
<td>2</td>
<td>2W-T418-120-2-S‡</td>
<td>B</td>
<td>120</td>
<td>0.41</td>
<td>49.2</td>
<td>0.95</td>
<td>2,280</td>
<td>46</td>
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<td></td>
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<td>0.27</td>
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<td></td>
<td>120</td>
<td>0.33</td>
<td>39.6</td>
<td>0.95</td>
<td>2,280</td>
<td>58</td>
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<tr>
<td>26W</td>
<td>2</td>
<td>2W-T418-120-2-S‡</td>
<td>B</td>
<td>120</td>
<td>0.58</td>
<td>69.6</td>
<td>0.95</td>
<td>4,560</td>
<td>66</td>
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</tbody>
</table>

*For case type information see pgs. 20-23.
**Factory-tuned ballast factors available. To customize, visit www.lutron.com/BallastTool
†Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.
‡Mounting studs standard. Delete -S suffix in the model number if mounting studs are not needed.

Refer to the online ballast selection tool for additional information, www.lutron.com/BallastTool

*For case type information see pgs. 20-23.
†Actual number may vary with lamp model. Please consult the lamp manufacturer for lamp-specific data.
‡Mounting studs standard. Delete -S suffix in the model number if mounting studs are not needed.
The following ballast model numbers have certifications specific to certain countries. For details on these ballast models, visit www.lutron.com.

**Europe (CE)**
- EHD T514 M E 1 10
- EHD T514 M E 2 10
- EHD T521 M E 1 10
- EHD T521 M E 2 10
- EHD T524 M E 1 10
- EHD T524 M E 2 10
- EHD T528 M E 1 10
- EHD T528 M E 2 10
- EHD T539 M E 1 10
- EHD T539 M E 2 10
- EHD T554 M E 1 10
- EHD T554 M E 2 10

**Brazil (INMETRO)**
- EHD T832 M E 1 10-B
- EHD T832 M E 2 10-B
- EHD T832 M E 3 10-B
- EHD T514 M E 1 10-B
- EHD T514 M E 2 10-B
- EHD T521 M E 1 10-B
- EHD T521 M E 2 10-B
- EHD T524 M E 1 10-B
- EHD T524 M E 2 10-B
- EHD T528 M E 1 10-B
- EHD T528 M E 2 10-B
- EHD T539 M E 1 10-B
- EHD T539 M E 2 10-B
- EHD T554 M E 1 10-B
- EHD T554 M E 2 10-B

**China (CCC)**
- EHD T514 M E 1 10-C
- EHD T514 M E 2 10-C
- EHD T528 M E 1 10-C
- EHD T528 M E 2 10-C
- EHD T554 M E 1 10-C
- EHD T554 M E 2 10-C

**Mexico (NOM)**
- H3D T817 G U 1 10 N
- H3D T817 G U 2 10 N
- H3D T817 C U 1 10 N
- H3D T817 C U 2 10 N
- H3D T825 G U 1 10 N
- H3D T825 G U 2 10 N
- H3D T825 C U 1 10 N
- H3D T825 C U 2 10 N
- H3D T832 G U 1 10 N
- H3D T832 G U 2 10 N
- H3D T832 G U 3 10 N
- H3D T832 C U 1 17 N
- H3D T832 C U 2 17 N
- H3D T514 C U 1 10 N
- H3D T514 C U 2 10 N
- H3D T521 C U 1 10 N
- H3D T521 C U 2 10 N
- H3D T524 C U 1 10 N
- H3D T524 C U 2 10 N
- H3D T528 C U 1 10 N
- H3D T528 C U 2 10 N
- H3D T536 G U 1 10 N
- H3D T536 G U 2 10 N
- H3D T539 C U 1 10 N
- H3D T539 C U 2 10 N
- H3D T540 G U 1 17 N
- H3D T540 G U 2 17 N
- H3D T540 G U 3 10 N
- H3D T540 G U 4 10 N
- H3D T550 G U 1 10 N
- H3D T550 G U 2 10 N
- H3D T550 G U 3 10 N
- H3D T550 G U 4 10 N
- H3D T554 C U 1 10 N
- H3D T554 C U 2 10 N

**Canada (CSA)**
- EHD T832 C 347 110
- EHD T832 C 347 210
- EHD T832 C 347 171
- EHD T832 C 347 117
- EHD T832 C 347 110
- EHD T832 C 347 210
- EHD T528 C 347 110
- EHD T528 C 347 210
- EHD T554 C 347 110
- EHD T554 C 347 210

**Japan (PSE)**
- H3 T432 K 100 1 J
- H3 T832 G UNV 1 J

**NOTE:** For specification information, please reference page 50.
How to build a Hi-lume® A-Series LED model number:

Control type:
- 3D = EcoSystem® or 3-wire control
- TE = 2-Wire forward phase control (neutral required)

Case style:
- S = Studded (K-case only)
- N = Non-studded

Case size:
- K = Compact
- M = Stick

Class 2 constant voltage
- A = 10.0 V–12.0 V
- B = 12.5 V–20.0 V
- C = 20.5 V–24.0 V
- D = 24.5 V–38.0 V

Isolated Non-class 2 constant voltage
- X = 38.5 V–60.0 V

LED load output range
(contact fixture manufacturer for specifications)

Class 2 constant current
- A = 0.20 A–0.50 A
- B = 0.20 A–0.70 A
- C = 0.20 A–0.70 A
- D = 0.20 A–0.70 A
- E = 0.20 A–0.50 A
- F = 0.51 A–1.00 A
- G = 0.20 A–0.70 A
- H = 0.71 A–1.05 A
- I = 0.71 A–1.05 A
- J = 0.71 A–1.05 A
- K = 1.06 A–1.50 A
- L = 1.06 A–1.50 A
- M = 1.51 A–2.10 A
- N = 1.51 A–2.10 A

Isolated Non-class 2 constant current
- Y = 0.20 A–0.50 A
- Z = 0.51 A–1.00 A

*For details on control types, see pg. 65
For current/voltage level and driver output information, see pgs. 66 and 67.
Details for building a Lutron® LED driver model number

Choosing a control type input

The following control technologies refer to the signal and wiring between the control on the wall and the LED driver. The compatibility of a dimmer with a particular LED fixture begins with making sure they both use the same control method. These control technologies are used in standalone applications and control systems as well as in wired and wireless lighting controls. Selection of a control is typically driven by the requirements of the project.

### Control type

<table>
<thead>
<tr>
<th>Control type</th>
<th>Features</th>
<th>Ideal applications</th>
</tr>
</thead>
</table>
| 2-Wire forward phase control | • Typically used for incandescent and MLV light sources  
• Generally the only control used for LED retrofit lamps  
• Most common method of dimming control | • Retrofit projects  
• Residential and commercial system applications  
• Applications that have a neutral wire in the backbox |
| EcoSystem digital link control | • Digitally addressable and allows LED drivers to communicate and react to environmental changes  
• Allows for re-zoning without rewiring, and all links are miswire protected | • Projects requiring digital control for individual fixture addressability  
• Upgrade from analog 0-10V control  
• Multi-zone applications  
• Small, retrofit applications using Lutron Energi TriPak™ |
| 3-Wire control | • Requires a third line voltage control wire, resulting in more precise performance and less electrical noise  
• Stable over long wire runs  
• Easily wired | • LED dimming applications requiring precise control |

For more information, please use the following resources:
- LED Driver Selection Tool ([www.lutron.com/LEDBuildAModel](http://www.lutron.com/LEDBuildAModel))
- Lutron LED Control Center of Excellence (1-877-DIM-LED8 or email LEDs@lutron.com)
Choosing an LED driver output

Lutron LED drivers offer models for both constant current and constant voltage applications. These two types of drivers are not interchangeable, and the design of the LED array, decided upon by the fixture manufacturer, determines which driver is appropriate.

The driver’s output is determined by the design of the fixture’s LED array, and must therefore be selected by the fixture manufacturer.

<table>
<thead>
<tr>
<th>Typical applications</th>
<th>Details</th>
</tr>
</thead>
</table>
| Constant current     | - Down light or sconce  
                      |  - One light source per driver (much like a fluorescent lamp with its associated ballast)  
                      |  - For a pre-made LED array designed to operate at or below a set current level |
| Constant voltage     | - Cove, under-cabinet light or an area with a variable number of fixtures  
                      |  - For one or more LED arrays connected in parallel  
                      |  - Similar to electronic or magnetic low-voltage power supplies that often have 12V and 24V outputs |

Choosing an LED dimming method

For constant current LED drivers, there are two mechanisms for dimming: pulse width modulation (PWM) and constant current reduction (CCR). Constant voltage LED drivers always use PWM. In a PWM driver, the current is switched at a high frequency between zero and the rated output current. The ratio of on time to off time determines the perceived light level. In a CCR supply, the current flows continuously at a set amount to achieve a given light level.

Certain applications may favor a particular dimming method for best results. In most cases, either approach is suitable.

<table>
<thead>
<tr>
<th>Driver output</th>
<th>Suitable applications</th>
</tr>
</thead>
</table>
| Pulse width modulation (PWM) | - Fixtures that must be dimmed very low and still maintain consistent color  
                              |  - Color mixing applications that require precise levels for each color  
                              |  - Most commonly used driver output |
| Constant current reduction (CCR) | - Fixtures requiring a UL Class 2 rated output with an output voltage higher than the UL Class 2 PWM voltage level  
                                  |  - Applications where long wire runs may exist between the driver and the light engines and high performance dimming is required  
                                  |  - Applications that have strict EMI requirements, such as medical suites  
                                  |  - Applications with high motion activity or rotating machinery |

For more information, please use the following resources:
- LED Driver Selection Tool (www.lutron.com/LEDBuildAModel)
- Lutron LED Control Center of Excellence (1-877-DIM-LED8 or email LEDs@lutron.com)
- Controlling LEDs whitepaper PYN 367-2005 REV B
**EcoSystem® digital link control**

### Technical wiring details

- The EcoSystem digital link and power terminals only accept one 16-18 AWG (0.75 to 1.5 mm²) solid copper wire per terminal (12–14 AWG wires require a wire nut to connect to terminal).
- Ballasts, drivers and lighting fixtures must be effectively grounded.
- Ballasts and drivers must be installed per national and local electrical codes.
- Driver is grounded by a mounting screw to the grounded fixture (or by terminal connection on the K-case).

### Control wiring overview

- The EcoSystem digital link (E1 and E2) connects the digital ballasts or drivers together to form a lighting control system.
- Control wires (E1 and E2) are not polarity sensitive and can be wired in any topology.
- The EcoSystem digital control device does not have to be located at the end of the digital link.
- The EcoSystem digital link supports up to 64 digital ballasts or drivers, 64 occupant sensors, 16 daylight sensors, and 64 wallstations or IR receivers.
- The PowPak™ dimming module with EcoSystem supports 32 EcoSystem ballasts or drivers, 9 Pico® wireless controls, 6 occupancy/vacancy sensors and 1 daylight sensor.
- Control wire colors may not match ballast or driver wire colors.

### EcoSystem digital link length is limited by the wire gauge used for control wires as follows:

<table>
<thead>
<tr>
<th>Wire gauge</th>
<th>Digital link length (max)</th>
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</thead>
<tbody>
<tr>
<td>12 AWG</td>
<td>2200 ft (670 m)</td>
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<tr>
<td>14 AWG</td>
<td>1400 ft (430 m)</td>
</tr>
<tr>
<td>16 AWG</td>
<td>900 ft (275 m)</td>
</tr>
<tr>
<td>18 AWG</td>
<td>550 ft (170 m)</td>
</tr>
</tbody>
</table>

(Use for North America)

<table>
<thead>
<tr>
<th>Wire size</th>
<th>Digital link length (max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 mm²</td>
<td>830 m</td>
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<tr>
<td>2.5 mm²</td>
<td>520 m</td>
</tr>
<tr>
<td>1.5 mm²</td>
<td>310 m</td>
</tr>
<tr>
<td>1.0 mm²</td>
<td>210 m</td>
</tr>
<tr>
<td>0.75 mm²</td>
<td>155 m</td>
</tr>
</tbody>
</table>

(Use outside of North America)

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### Features

1. Power and digital link terminals accept only one 16-18 AWG (0.75 to 1.5 mm²) wire.
2. See charts on pg. 69 for EcoSystem digital link wiring length details.

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3-Wire control

**Ballast is grounded via case.**

### 3-wire control, C-case, J-case or M-case

- **Features**
  1. Power and terminals accept only one 16-18 AWG (0.75 to 1.5 mm²) wire

### 3-wire control, G-case

### 3-wire control, A-case

### Control wiring overview
- Class 2 must be separated from Class 1 and line voltage wiring by 0.25 in (6 mm) or a physical barrier
- Sensors cannot connect directly to the ballast or driver
- Control wire colors may not match ballast or driver wire colors

### Technical wiring details
- Power input terminals only accept one 16-18 AWG or 0.75 mm²-1.5 mm² solid copper wire per terminal
- Ballasts, drivers and lighting fixtures must be effectively grounded
- Ballasts and drivers must be installed per national and local electrical codes
Tu-Wire® control

** Ballast is grounded via case.

Tu-Wire control, A-case or B-case

Features

1. Power terminals accept only one 16-18 AWG wire

Control wiring overview

- Ballasts that dim T4 compact fluorescent lamps are intended for factory installation by OEM fixture manufacturers
- Control wire colors may not match ballast or driver wire colors

Technical wiring details

- All wiring from the dimming control to Tu-Wire ballasts is line-voltage wiring and may be run together in the same conduit as other line-voltage wires
- Ballasts and lighting fixtures must be effectively grounded
- Ballast must be installed per national and local electrical codes
2-Wire forward phase control

Forward phase control (neutral required at control), K-case
(View from bottom)

Features

1. Power terminals accept only one 16-18 AWG wire

Terminals may be located on side and bottom.
K-case can be grounded via case or ground terminal.

Forward phase control (neutral required at control), M-case

Control wiring overview

- Class 2 must be separated from Class 1 and line voltage wiring by 0.25in (6 mm) or a physical barrier
- Sensors cannot connect directly to the ballast or driver
- Control wire colors may not match ballast or driver wire colors

Technical wiring details

- Power input terminals only accept one 16-18 AWG or 0.75 mm² - 1.5 mm² solid copper wire per terminal
- Ballasts, drivers and lighting fixtures must be effectively grounded
- Ballasts and drivers must be installed per national and local electrical codes

**Driver is grounded via case.

EcoSystem® digital link control for the EcoSystem LED driver

EcoSystem digital link control, P-case

Features

1. Power terminals accept only one 0.75 mm² - 1.5 mm² wire per terminal

2. See table below for EcoSystem digital link wiring details

Control wiring overview

- The EcoSystem digital link wiring (E1 and E2) connects the drivers together to form a lighting control system
- Sensors cannot connect directly to the driver
- E1 and E2 are polarity insensitive and can be wired in any topology
- Each EcoSystem digital link supports up to 64 drivers or ballasts

Technical wiring details

- Terminal blocks on the driver accept one 0.75 mm² to 1.5 mm² solid copper wire per terminal
- Drivers must be installed per national and local electrical codes

EcoSystem digital link length is limited by the wire gauge used for control wires as follows:

<table>
<thead>
<tr>
<th>Wire size</th>
<th>Digital link length (max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 mm²</td>
<td>830 m</td>
</tr>
<tr>
<td>2.5 mm²</td>
<td>520 m</td>
</tr>
<tr>
<td>1.5 mm²</td>
<td>310 m</td>
</tr>
<tr>
<td>1.0 mm²</td>
<td>210 m</td>
</tr>
<tr>
<td>0.75 mm²</td>
<td>155 m</td>
</tr>
</tbody>
</table>

**Driver is grounded via case.**
Class 2 sensor wiring

**G-can with daylight sensor**

- **Features**
  1. Sensor terminals accept only one 22 AWG (1.0 mm²) wire
  2. 100 ft (30 m) maximum wire length

**G-can with wallstation**

**J-can with occupancy sensor**

- **Sensor wiring overview**
  - Sensors connect directly to EcoSystem ballasts; all sensor and wallstation wiring is Class 2
  - Occupancy sensor, daylight sensor, IR receiver and wallstation must be placed within 100 ft (30 m) of the ballast
  - Sensor terminals accept one 22 AWG (1.0 mm²) solid copper wire

For EcoSystem digital link ballasts without integral sensor connections, wired or wireless sensors can connect to ballasts using the following devices:

- PowPak™ dimming module with EcoSystem
- GRAFIK Eye® QS with EcoSystem
- Energi Savr Node™ with EcoSystem
- Quantum® system

For an overview of these devices, see pg. 12.
Lamp wiring diagrams

**Linear 1-lamp**

Available in M-case, C-case, J-case, and G-case

**Linear 2-lamp**

Available in M-case, C-case, J-case, and G-case

**Linear 3-lamp**

Available in C-case, J-case, and G-case

---

**T5 twin-tube 1-lamp**

Available in G-case and J-case

**T5 twin-tube 2-lamp**

Available in G-case and J-case

**T5 twin-tube 3-lamp**

Available in G-case

---

Note: Lamp terminals accept only one 18 AWG (0.75 mm²) wire. Ballast-to-lamp lead lengths must not exceed 7 ft (2 m) for all wiring scenarios shown above.

Note: Lamp terminals accept only one 18 AWG (0.75 mm²) wire. Ballast-to-lamp lead lengths must not exceed 3 ft (1 m) for all wiring scenarios shown above.
T4 1-lamp

Available in K-case and A-case

T4 2-lamp

Available in K-case and B-case

LED light source

Available in M-case and K-case

As Lutron has continued to innovate and develop new products, older technologies have been discontinued. The following list is a summary of all Lutron ballast and driver model numbers that have been discontinued since September 2009. Contact Lutron Customer Service if you have any questions regarding this summary of discontinued ballasts and drivers.

<table>
<thead>
<tr>
<th>Ballast Family</th>
<th>Date of Discontinuation</th>
<th>Discontinued Model</th>
<th>Dimming</th>
<th>Case Size</th>
<th>Ballast Factor</th>
<th>Replacement Model</th>
<th>Dimming</th>
<th>Case Size</th>
<th>Ballast Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>EcoSystem H-Series</td>
<td>02/01/12</td>
<td>EHD1632CU110</td>
<td>1%</td>
<td>C</td>
<td>1.00</td>
<td>EHD1632MU110</td>
<td>1%</td>
<td>M</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EHD1632CU17</td>
<td>1%</td>
<td>C</td>
<td>1.17</td>
<td>EHD1632MU17</td>
<td>1%</td>
<td>M</td>
<td>1.17</td>
</tr>
<tr>
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<td></td>
<td>EHD1632CU210</td>
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* In some applications, the replacement ballast case size may be different. Review dimensions for proper fit.

Note: Lamp terminals accept only one 18 AWG (0.75 mm²) wire. Ballast-to-lamp lead lengths must not exceed 3 ft (1 m) for T4 lamps shown above. The maximum wire length from driver to LED light source is 10 ft (3 m).
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* In some applications, the replacement ballast case size may be different. Review dimensions for proper fit.
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* In some applications, the replacement ballast case size may be different. Review dimensions for proper fit.

**For applications where a Hi-lume studded ballast was used, Lutron adapter plate CFL-JBA-FAB may be required to retrofit the replacement studded ballast. Dimensions for the adapter plate are shown on page 90.
### Compact SE

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<td></td>
</tr>
<tr>
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<td></td>
<td>FDB-184-277-2</td>
<td>5%</td>
<td>B 0.95</td>
<td>EC3DT14277KU11</td>
<td>5%</td>
<td>K</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FDB-184-277-2-S</td>
<td>5%</td>
<td>B 0.95</td>
<td>EC3DT14277MNU2</td>
<td>5%</td>
<td>K</td>
<td>0.95</td>
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</tr>
<tr>
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<td></td>
<td>FDB-184-120-1-S</td>
<td>5%</td>
<td>B 0.95</td>
<td>EC3DT1418MNU1S</td>
<td>5%</td>
<td>K</td>
<td>0.95</td>
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</tr>
<tr>
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<td>FDB-184-277-1-S</td>
<td>5%</td>
<td>B 0.95</td>
<td>EC3DT14277MNU1S</td>
<td>5%</td>
<td>K</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>FDB-184-120-2-S</td>
<td>5%</td>
<td>B 0.95</td>
<td>EC3DT1418MNU2</td>
<td>5%</td>
<td>K</td>
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<td></td>
<td>FDB-184-277-2-S</td>
<td>5%</td>
<td>B 0.95</td>
<td>EC3DT14277MNU2</td>
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<td>K</td>
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<td></td>
<td>FDB-184-277-1-S</td>
<td>5%</td>
<td>B 0.95</td>
<td>EC3DT14277MNU1S</td>
<td>5%</td>
<td>K</td>
<td>0.95</td>
<td></td>
</tr>
</tbody>
</table>

* In some applications, the replacement ballast case size may be different. Review dimensions for proper fit.

**For applications where a Compact SE studded ballast was used, Lutron adapter plate CFL-BEA-BK may be required to retrofit the replacement studded ballast. Dimensions for the adapter plate are shown on page 90.
### Hi-lume® LED drivers

<table>
<thead>
<tr>
<th>Driver Family</th>
<th>Date of Discontinuation</th>
<th>Discontinued Model</th>
<th>Case Size</th>
<th>Current Level</th>
<th>Replacement Model*</th>
<th>Voltage Range</th>
<th>Case Size</th>
<th>Current Level</th>
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<tbody>
<tr>
<td>Eco-10® TVE</td>
<td>6/30/11</td>
<td>TVE-T832-347-1</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TVE-T832-347-2</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BTVF-T832-120-2</td>
<td>10%</td>
<td>700 mA</td>
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<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BTVF-T832-120-3</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
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<tr>
<td></td>
<td></td>
<td>BTVF-T832-277-2</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BTVF-T832-277-3</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TVE-T540-120-2</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TVE-T540-120-3</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TVE-T817-120-1</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
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<tr>
<td></td>
<td></td>
<td>TVE-T817-120-2</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TVE-T825-120-1</td>
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<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
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<td>TVE-T832-120-1</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
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<td></td>
<td>TVE-T832-120-2</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TVE-T832-120-3</td>
<td>10%</td>
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<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
<tr>
<td></td>
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<td>TVE-T832-277-1</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
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<tr>
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<td>TVE-T832-277-2</td>
<td>10%</td>
<td>700 mA</td>
<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
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<td></td>
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<td>TVE-T832-277-3</td>
<td>10%</td>
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<td>L3DA4U1UKS-JC140</td>
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<td>K</td>
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<td>L3DA4U1UKS-JC140</td>
<td>15-38 V</td>
<td>K</td>
<td>1.4 Amp</td>
</tr>
</tbody>
</table>

* The model number suffix will depend on the voltage range that the LED fixture needs. An update to the OEM luminaire UL file may be needed. For questions, please contact the LED Control Center of Excellence at 1-877-DIM-LED8.
Lutron® adapter plates CFL-BEA-BK or CFL-JBA-FAB may be required to retrofit replacement ballasts.

The CFL-BEA-BK is used when a non-studded B-can is being replaced by a non-studded K-can. The CFL-JBA-FAB is used when a studded F-can is being replaced by a studded A-can, B-can or K-can. Dimensions for the adapter plates are shown below.

### CFL-BEA-BK

- **A**: 6.00 in (152 mm)
- **B**: 2.96 in (75 mm)
- **C**: 6.73 in (171 mm)
- **D**: 6.41 in (163 mm)
- **(mounting centers)**
- **E**: 1.58 in (40 mm)
- **F**: 0.69 in (18 mm)
- **G**: 4.61 in (117 mm)
- **H**: 1.43 in (36 mm)

8-32 Threaded stud 0.29 in (7.37 mm) long

### CFL-JBA-FAB

- **A**: 4.19 in (106 mm)
- **B**: 2.96 in (75 mm)
- **C**: 2.04 in (52 mm)
- **D**: 1.09 in (28 mm)
- **E**: 2.00 in (51 mm)
- **F**: 0.52 in (13 mm)

8-32 Threaded stud 0.29 in (7.37 mm) long

Lutron adapter plates CFL-BEA-BK or CFL-JBA-FAB may be required to retrofit replacement ballasts. The CFL-BEA-BK is used when a non-studded B-can is being replaced by a non-studded K-can. The CFL-JBA-FAB is used when a studded F-can is being replaced by a studded A-can, B-can or K-can. Dimensions for the adapter plates are shown below.

### Adapter plates

#### K-can Replacement Scenarios for T4 CFL Lamps

<table>
<thead>
<tr>
<th>Existing Installation</th>
<th>Sample Model</th>
<th>Ballast Can</th>
<th>Adapter Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-can with studs</td>
<td>FDB-CF18-120-2-B</td>
<td>K-can with studs</td>
<td>CFL-JBA-FAB</td>
</tr>
<tr>
<td>F-can without studs</td>
<td>FDB-T418-120-2-E</td>
<td>K-can without studs</td>
<td>NA*</td>
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<tr>
<td>B-can with studs</td>
<td>FDB-T418-120-2-S</td>
<td>K-can with studs</td>
<td>NA</td>
</tr>
<tr>
<td>B-can without studs</td>
<td>FDB-T418-120-2</td>
<td>K-can without studs</td>
<td>CFL-BEA-BK</td>
</tr>
</tbody>
</table>

* Need to drill new mounting holes in the fixture

**Notes**

1. When replacing the F-can or B-can with a K-can, it is important to know whether the ballast is mounted by the studs or the flanges.
2. K-can ballast is wider than the F-can. This may be an issue in narrow fixtures.
3. K-can connector locations don’t exactly match the B-can. They may not line up with fixture mounting plates in some installations.
### Africa

- **Algeria**: 230V (CE)
- **Angola**: 220V
- **Benin**: 220V
- **Botswana**: 230V
- **Burkina Faso**: 220V
- **Burundi**: 220V
- **Cameroun**: 220V
- **Canary Islands**: 220V
- **Cape Verde**: 220V
- **Central African Republic**: 220V
- **Chad**: 220V
- **Comoros**: 220V
- **Congo, Dem. Rep. of (former Zaire)**: 220V
- **Congo, People's Rep. of**: 230V
- **Cote d'Ivoire**: 220V
- **Djibouti**: 220V
- **Egypt**: 220V
- **Equatorial Guinea**: 220V
- **Eritrea**: 230V
- **Ethiopia**: 220V
- **Gabon**: 220V
- **Gambia**: 230V
- **Ghana**: 230V
- **Guinea**: 220V
- **Guinea-Bissau**: 220V
- **Ivory Coast (see Cote d'Ivoire)**: 220V
- **Kenya**: 240V
- **Lesotho**: 220V
- **Liberia**: 120V
- **Libya**: 127V
- **Madagascar**: 220V
- **Malawi**: 230V
- **Mali**: 220V
- **Mauritania**: 220V
- **Mauritius**: 230V
- **Morocco**: 127/220V
- **Mozambique**: 220V
- **Namibia**: 220V
- **Niger**: 220V
- **Nigeria**: 240V
- **Rwanda**: 230V
- **Réunion Island**: 220V
- **São Tomé and Príncipe**: 220V
- **Senegal**: 230V
- **Seychelles**: 240V
- **Sierra Leone**: 230V
- **Somalia**: 220V
- **South Africa**: 220/230V
- **Swaziland**: 230V
- **Tanzania**: 230V
- **Togo**: 220V
- **Tunisia**: 230V
- **Uganda**: 240V
- **Zambia**: 230V
- **Zimbabwe**: 220V

### Asia

- **Afghanistan**: 220V
- **Bahrain**: 230V
- **Bangladesh**: 220V
- **Bhutan**: 230V
- **Brunei**: 240V
- **Cambodia**: 230V
- **China, People's Republic of**: 220V
- **East Timor**: 220V
- **Hong Kong**: 220V
- **India**: 230V
- **Indonesia**: 127/230V
- **Iran**: 230V
- **Israel**: 220V
- **Japan**: 100/200V
- **Jordan**: 230V
- **Kazakhstan**: 220V
- **Kuwait**: 240V
- **Kyrgyzstan**: 220V
- **Laos**: 230V
- **Lebanon**: 110/220V
- **Macau**: 220V
- **Malaysia**: 240V
- **Maldives**: 230V
- **Mongolia**: 220V
- **Myanmar (formerly Burma)**: 230V
- **Nepal**: 230V
- **Oman**: 240V
- **Pakistan**: 220V
- **Philippines**: 220V
- **Qatar**: 240V
- **Russia**: 220V
- **Saudi Arabia**: 127/220V
- **Singapore**: 230V (CE)
- **South Korea**: 220V
- **Sri Lanka**: 230V
- **Syria**: 220V
- **Tajikistan**: 220V
- **Taiwan**: 110V

### Europe

- **Albania**: 220V
- **Andorra**: 230V
- **Armenia**: 220V
- **Austria**: 220V
- **Azerbaijan**: 220V
- **Azores**: 220V
- **Balearic Islands**: 220V
- **Belarus**: 220V
- **Belgium**: 230V (CE)
- **Bosnia**: 220V
- **Bulgaria**: 230V (CE)
- **Channel Islands**: 230V
- **Croatia**: 230V (CE)
- **Cyprus**: 240V (CE)
- **Czech Republic**: 230V (CE)
- **Denmark**: 230V (CE)
- **England (see United Kingdom)**
- **Estonia**: 230V (CE)
- **Faroe Islands**: 220V
- **Finland**: 230V (CE)
- **France**: 230V (CE)
- **Georgia**: 220V
- **Germany**: 230V (CE)
- **Gibraltar**: 240V
- **Great Britain (see United Kingdom)**
- **Greece**: 240V (CE)
- **Hungary**: 230V (CE)
- **Iceland**: 230V (CE)
- **Ireland (Eire)**: 230V (CE)
- **Isle of Man**: 240V
- **Italy**: 230V (CE)
- **Latvia**: 220V (CE)
- **Liechtenstein**: 230V (CE)
- **Lithuania**: 230V (CE)
- **Luxembourg**: 240V (CE)
- **Macedonia (FYROM)**: 230V (CE)
- **Madeira**: 220V
- **Malta**: 240V (CE)
- **Moldova**: 220/240V
- **Monaco**: 127/220V
- **Montenegro**: 220V
- **Netherlands**: 230V (CE)
- **Netherlands Antilles**: 127/220V
- **Norway**: 230V (CE)
- **Northern Ireland (see United Kingdom)**
- **Poland**: 230V (CE)
- **Portugal**: 230V (CE)
- **Romania**: 230V (CE)
- **San Marino**: 230V
- **Scotland (see United Kingdom)**
- **Serbia**: 220V
- **Slovak Republic**: 230V (CE)
- **Slovenia**: 230V (CE)

### North America/ Central America/ Caribbean

- **Anguilla**: 110V
- **Antigua**: 230V
- **Aruba**: 127V
- **Bahamas**: 120V
- **Barbados**: 115V
- **Belize**: 110/220V
- **Bermuda**: 120V
- **Canada**: 120/240V
- **Cayman Islands**: 120V
- **Costa Rica**: 120V
- **Dominica**: 230V
- **Dominican Republic**: 120/240V
- **El Salvador**: 115V
- **Greenland**: 220V
- **Grenada (Windward Is.)**: 230V
- **Guadeloupe**: 230V
- **Guatemala**: 120V
- **Haiti**: 110V
- **Honduras**: 110V
- **Jamaica**: 110V
- **Martinique**: 220V

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* Currently available, but soon to be phased out.
* Scheduled to require products with CE marking in 2011.

Note: Only EcoSystems H-Series ballasts and EcoSystem LED drivers meet CE standards.
### Oceania

<table>
<thead>
<tr>
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<th>Voltage</th>
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<tr>
<td>American Samoa</td>
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<tr>
<td>Australia</td>
<td>240V</td>
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<td>240V</td>
</tr>
<tr>
<td>Guam</td>
<td>110V</td>
</tr>
<tr>
<td>Kiribati</td>
<td>240V</td>
</tr>
<tr>
<td>Marshall Islands</td>
<td>110V</td>
</tr>
<tr>
<td>Micronesia (Federal States of)</td>
<td>120V</td>
</tr>
<tr>
<td>Nauru</td>
<td>240V</td>
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<tr>
<td>New Caledonia</td>
<td>220V</td>
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<tr>
<td>New Zealand</td>
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<td>Palau</td>
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<tr>
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<td>Papua New Guinea</td>
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<td>Vanuatu</td>
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### South America

<table>
<thead>
<tr>
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<th>Voltage</th>
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<tr>
<td>Venezuela</td>
<td>120V</td>
</tr>
</tbody>
</table>

Contact your Lutron representative for countries not listed.

---

**Note:** Only EcoSystem® H-Series ballasts and EcoSystem LED drivers meet CE standards.

---

### Glossary

**ballast**
- An electrical device used in fluorescent and HID fixtures. It furnishes the necessary circuit conditions (voltage, current, and waveform) for starting and operating a lamp.

**ballast efficacy factor (BEF)**
- The ballast efficacy factor directly measures the efficiency of the ballast by illustrating that the higher the light output for a given power rating, the more efficiently the ballast will operate.

\[
BEF = \frac{\text{Ballast factor} \times \text{Input power (W)}}{\text{Ballast's light output}}
\]

**ballast factor**
- A ballast’s light output with respect to a reference ballast’s light output. The reference ballast is a ballast which produces full light output as defined by the American National Standards Institute (ANSI). Ballast factor is expressed in percentage form (e.g. 0.95 or 95%).

**CCC mark**
- A mark that is placed on products that are certified to meet the required product safety standards in China.

**CSA certified**
- Indicates that the product has been evaluated and undergoes continual assessment by CSA International to comply with safety standards established by the Canadian Standards Association.

**CE mark**
- A mark placed on products that are declared to meet the applicable EU directives for a given product type. A CE marked product often meets the requirements of other countries that adhere to the IEC standards.

**CE standard**
- Standards developed and published by the International Electrotechnical Commission.

**current crest factor**
- The ratio of the peak value of lamp current to the root-mean-square (RMS) value of lamp current.

**efficiency**
- See luminous efficacy

**ENEC mark**
- A mark that is placed on electrical products that are compliant with European safety standards.

**filament**
- In fluorescent lamps, the filaments are designed to emit electrons to sustain the arc.

**filter**
- An electrical circuit (capacitor and inductor) intended to reduce radio frequency interference (RFI) and lamp buzz. Most Lutron ballasts and dimmers incorporate a filter circuit.

**fluorescent lamp**
- A low-pressure, gas-filled electric discharge lamp in which a fluorescent coating (phosphor) transforms ultraviolet radiation into visible light.

**footcandle**
- Defines the quantity of illumination on a surface or object, 1 footcandle = 1 lumen per square foot.

**IEC rated**
- Indicates that the product has been certified by the International Electrotechnical Commission. Compliance with IEC’s international standards propagates standardized design that is accepted in many countries around the world.

**IEC standard**
- Standards developed and published by the International Electrotechnical Commission.

**incandescent lamp**
- An electric lamp in which a filament gives off light when heated by an electric current.

**INMETRO mark**
- A mark that is placed on products that are certified to meet required product safety standards in Brazil.

**inrush current**
- The current flow occurring at the instant of turn-on. (The level of inrush current depends on the load type and can be substantially higher than the normal operating current.) All Lutron ballasts incorporate inrush-current-limiting circuitry.

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For a more detailed glossary of terms, go to [www.lutron.com/glossaryofterms](http://www.lutron.com/glossaryofterms).

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**Note:** See luminous efficacy.
**instant-start lamp**
A class of fluorescent lamps which do not require filament preheating and can start instantly. Lutron dimming ballasts cannot be used with instant-start lamps.

**intensity**
The brightness of a lamp as a percentage of maximum brightness (e.g., 66% intensity describes a lamp dimmed to 2/3 of its maximum brightness).

**kilowatt hour (KWH)**
A unit of energy equal to one kilowatt of power expended for one hour.

**lamp**
A device for producing light (such as a bulb or tube).

**LED driver**
Auxiliary device(s) needed to operate and vary the intensity of light output from LED lamp source(s) by regulating the voltage and current powering the source. There are both dimming and non-dimming types.

**line voltage**
The voltage between the lines of a supplying power system.

**load**
The device which a dimmer is controlling (e.g., incandescent lamp, ceiling fan, fluorescent lamp).

**low-end trim**
Adjustable setting on a dimmer that establishes its minimum output, therefore establishing minimum light level.

**lumen**
The quantity of light that is emitted by a lamp, used in reference to efficacy (lumens per watt).

**luminance**
Describes the light emitted or reflected from a source or object in a particular direction. Luminance produces the sensation of brightness and is measured in candelas per square foot (or square meter) of a source or object surface area in the direction of viewing.

luminous efficacy
The ratio of light emitted to the power required for a light source or luminaire. Commonly used to measure energy efficiency, it is the lumens per watt from a light source (amount of light per watt of power).

**lux**
1 lux = 1 lumen per square meter.

**multi-location dimming**
A technology that allows full-range dimming from all locations in 3-way and 4-way circuits. Multi-location dimmers can be used with companion dimmers for full dimming control of the lights from 4 or more locations.

**phase control**
A common method of dimming that removes part of the line cycle, therefore reducing the RMS voltage.

**power factor**
Ratio of the average power delivered to the lamp ballast system to the product of voltage and current (the ratio of the average power to the VA). This shows how effectively available power is being used.

\[
\text{Power Factor} = \frac{\text{Input power}}{\text{Line voltage} \times \text{line current}}
\]

radio frequency interference (RFI)
Electrical noise that may be picked up by sensitive audio and radio equipment. Lutron builds filters into every control and ballast to reduce this noise. Also called electromagnetic interference (EMI). See filter.

**rapid-start lamp**
A class of fluorescent lamps having filaments which must be constantly heated by an external circuit.

**source**
Refers to the type of lamp, (e.g., fluorescent, incandescent, low voltage, HID, etc.).

**relative system efficacy (RSE)**
Relative system efficacy is a metric used to rank ballast and lamp efficacy. It is used almost exclusively to describe dimming ballast efficacy and uses lamp rated efficacy to normalize Ballast Efficacy Factor (BEF).

\[
\text{RSE} = \frac{\text{Ballast factor}}{\text{Ballast input power} \times \text{Total rated lamp power}}
\]

**square law dimming**
Dimming with a direct correlation between the position of the slider and the perceived light level (e.g., if the slider is halfway down the travel, the perceived light level is 50%). With Square Law Dimming, gradual movement of the linear slider results in a proportional change in the perceived light level—allowing for easy, precise adjustment of the light level setting.

**T4**
A compact fluorescent lamp which has a diameter of 1/2" (12.7 mm).

**T5**
A fluorescent lamp which has a diameter of 5/8" (15.9 mm).

**T8**
A fluorescent lamp which has a diameter of 1" (25.4 mm).

**T5 HO**
A fluorescent lamp which has a diameter of 5/8" (15.9 mm) and delivers high lumen output.

**T5 twin-tube**
A fluorescent lamp which has a diameter of 5/8" (15.9 mm) and is bent in a U-shape.

**total harmonic distortion (THD)**
The total amount of current at frequencies other than 60 Hz (the main frequency), expressed as a percent of the 60 Hz current. No power is delivered to the load by current at these other frequencies.

**UL listed**
Indicates that the product has been evaluated and undergoes continual assessment by Underwriters Laboratories Inc. to comply with safety standards established by Underwriters Laboratories Inc.

**3-way dimming**
3-Way dimming control (as opposed to single-pole or multi-location control) allows dimming from one location only (using a 3-way dimmer) and on/off switching from a second location (using a 3-way switch or companion/accessory dimmer).

For a more detailed glossary of terms, go to www.lutron.com/glossaryofterms.
A history of sustainability, innovation and quality

Sustainability
At Lutron®, sustainability is not a new concept. Since 1961, we have been designing industry-leading technology that saves energy and reduces greenhouse gas emissions, and are a proud member of the U.S. Green Building Council.

Our philosophy
Lutron is a company built on a belief in taking care of the people: customers, employees, and the community. We innovate in advance of emerging market needs and continually improve our quality, our delivery, and our value.

Innovation
Lutron owns over 1,700 patents and manufactures more than 15,000 products. For over 45 years, we have met and exceeded the highest standards of quality and service. Every one of our products is quality-tested before it leaves the factory.

Global service and support
You can count on a level of support unequaled anywhere in the industry and anywhere in the world. Lutron provides 24/7 technical phone support. Lutron Field Service, made up of a global network of customer-focused field service engineers, provides world-class services that begin before your building is commissioned and continue throughout the life of your building.

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