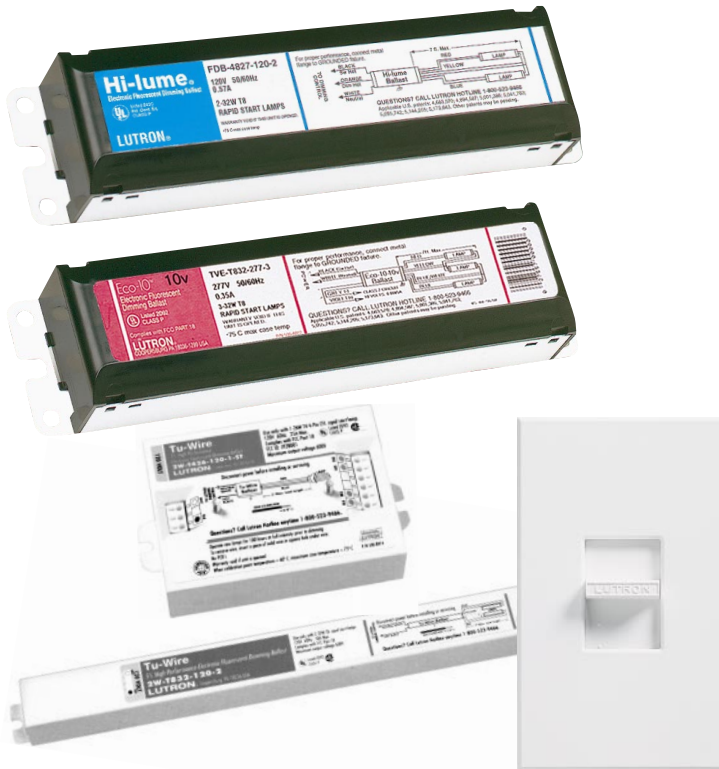


Attention Installers...



Fluorescent Dimming Ballast Installation Guide

- Installation Instructions
- Ballast and Control Wiring Diagrams
- Field Troubleshooting Information
- For Lutron Hi-lume®, Hi-lume Compact™, Tu-Wire™, and Eco-10™ Ballasts

LUTRON®

Installation

Step 1: System Wiring Requirements

Review system wiring requirements and ensure proper wires are pulled for hardware installation.



Caution - Observe all local and national electrical codes and Safety Standards.

Step 2: Turn Power OFF

Before removing existing ballasts or installing Lutron dimming ballasts, turn power OFF at the fusebox or circuit breaker.



Danger - Do not wire with power ON. Wiring with power ON can result in personal injury.

Step 3: Check the Voltage of Existing Ballasts

If this installation is a retrofit, compare the line voltage rating (on the label) of the existing ballast(s) to the rating of the ballast(s) being installed. All ballasts must be rated for the same line voltage.

Step 4: Mount Dimming Ballasts

If necessary, remove existing ballasts. Use hardware provided with the lighting fixture to mount the dimming ballasts.

Step 5: Check for proper socket wiring

Refer to page 3 for information on socket wiring.

Step 6: Control to Ballast Wiring

Refer to page 4 for control to ballast wiring. Follow the proper wiring diagram for the type of control and ballast combination.

Step 7: Ballast to Lamp Wiring

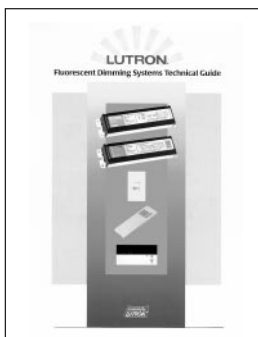
Refer to page 4 for ballast to lamp wiring. Ensure that lighting fixtures are wired as per the proper diagram.

Step 8: Check Operation

Turn power ON only after assuring it is safe to do so. Using the dimming control, make sure that all the connected loads are dimming properly. Refer to the Troubleshooting Section on pages 6-7 if necessary.

Step 9: Season Lamps

If the fluorescent lamps have not been operated at full intensity for 100 hours, refer to page 6 for information on seasoning lamps prior to dimming.



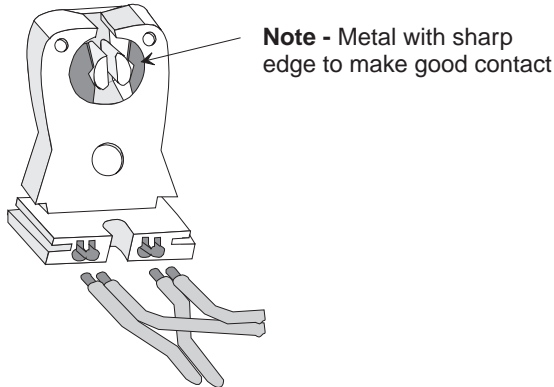
For further information on dimming ballast applications, consult Lutron's Fluorescent Dimming Systems Technical Guide (publication 366-606).

Socket Wiring

Rapid Start Lamp Sockets

When installing Lutron ballasts, socket type and wiring are important. Good filament contact and correct wiring are needed to produce flicker free dimming and to ensure long lamp life. For longest lamp life and best filament contact, use only **Rapid Start Knife Edge Sockets**.

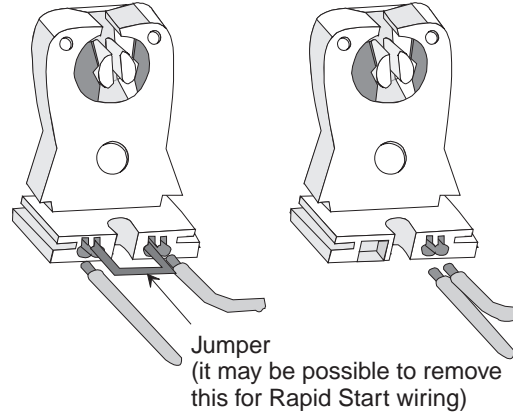
Rapid Start Sockets



Rapid Start Sockets can accept 4 wires (2 for wires from the ballast and 2 for wires to another lamp).

Note - Both Rapid Start and Instant Start fixtures use Rapid Start (4-pin) lamps.

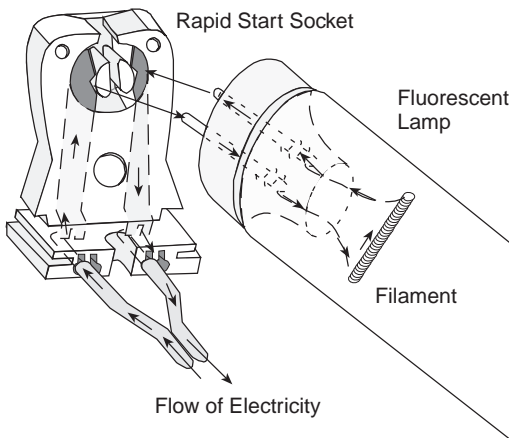
Instant Start Sockets



Instant Start Sockets can only accept 2 wires (1 wire from the ballast and 1 wire to another lamp) and must be replaced with Rapid Start sockets.

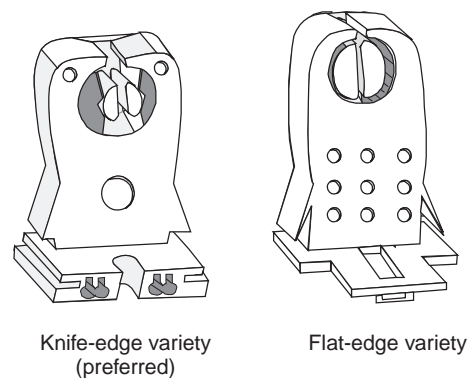
Using Lutron ballasts with Instant Start Sockets can damage the ballasts.

Why are sockets important?



Dimming ballasts must access both lamp pins to heat the lamp filaments—without heating the lamp ends will become black and fail prematurely (it may take a week or several months).

Why use a knife-edge socket?



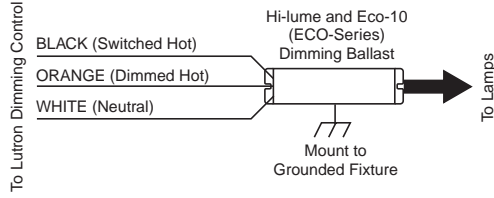
A knife-edge socket makes superior contact with the lamp pin by contacting with a sharp edge rather than a flat surface. Dimming ballasts require good pin contact.

Ballast Wiring

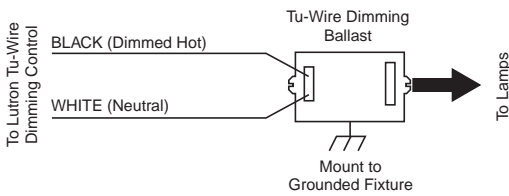
Control to Ballast Wiring

Note: Wire colors shown are for Lutron controls and ballasts only.*

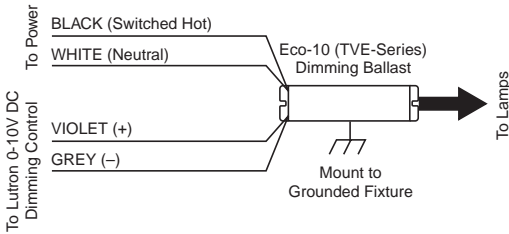
1 Hi-lume and Eco-10 (ECO-Series) Dimming Ballast



2 Tu-Wire Dimming Ballast



3 Eco-10 (TVE-Series) Dimming Ballast

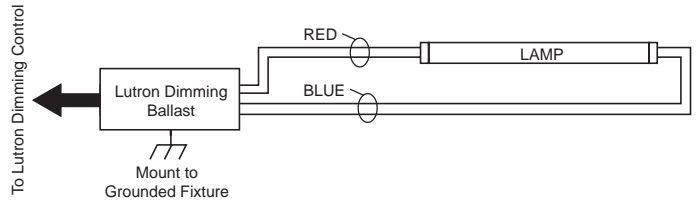


* Control wire colors do not necessarily match ballast wire colors (e.g. control “dimmed hot” may be yellow and ballast “dimmed hot” may be orange).

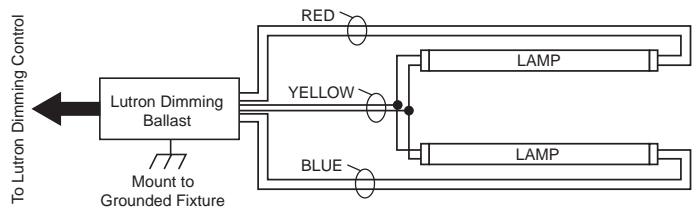
Ballast to Lamp Wiring

Note: Wire colors shown are for Lutron controls and ballasts only.

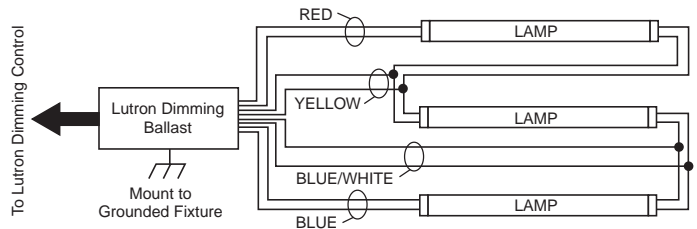
1 One Lamp



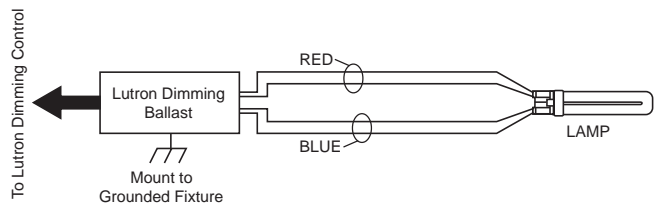
2 Two Lamps



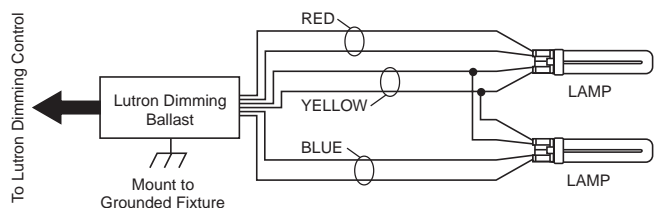
3 Three Lamps



4 One Lamp Compact Fluorescent



5 Two Lamp Compact Fluorescent



Ballast Wiring

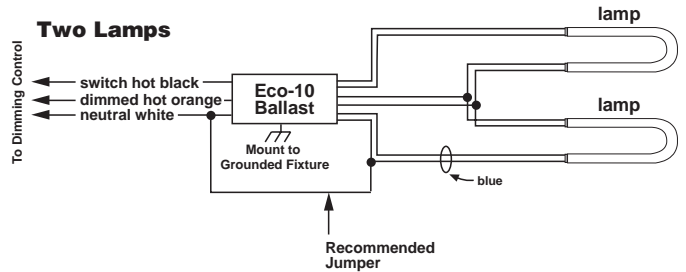
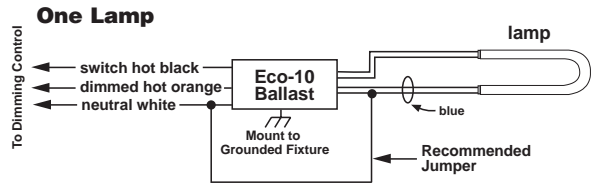
Wiring Eco-10 Ballasts with 1 5/8" T8 U-Bent Lamps

Wiring of one- and two-lamp Eco-10 (ECO-Series) ballasts should be modified to aid striking when the ballasts are used with 31W, 1 5/8" U-bent lamps only. A jumper wire should be connected from either blue wire to neutral. Jumper does not affect UL listing. This jumper is not required for three-lamp ballasts.

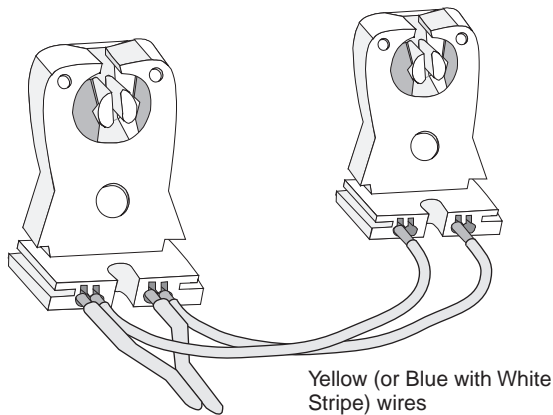
The blue wire to neutral jumper applies **only** to the following four ballast models:

- ECO-T832-120-1
- ECO-T832-120-2
- ECO-T832-277-1
- ECO-T832-277-2

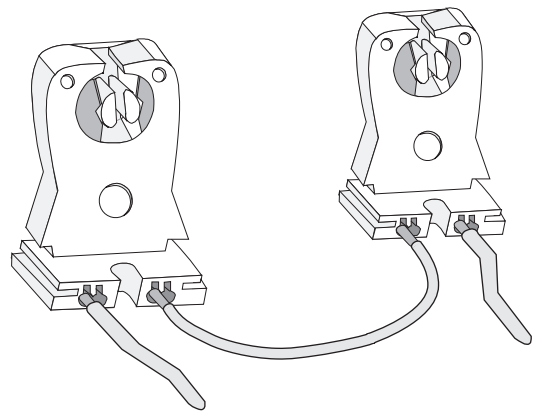
Jumper connections should not be made on any ballast model other than those listed.



Check for proper socket wiring










Correct - wired in parallel.



Wrong - wired in series.

Maximum Lead Lengths

Exceeding maximum lead lengths may cause lamp flicker, improper lamp starting, and reduced lamp life due to reduced lamp and filament voltages supplied by the ballast.

Lutron Ballast Models	Lamp Type	Maximum Lead Length (Ballast to sockets)
Hi-Lume Hi-lume Compact Eco-10 (ECO- and TVE-Series) Tu-Wire Compact	T-4 Compact T-5 Twin Tube   	3 feet (1 meter)
Hi-Lume Eco-10 (ECO- and TVE-Series) Tu-Wire Linear	T-5 Hi Output Linear T-8 Linear and U-Tube T-12 Linear and U-Tube HF 32 EX, FLR40S Linear T8 (26mm) Linear    	7 feet (2 meters)

Lamp Seasoning

New Lamps Must be “Seasoned”

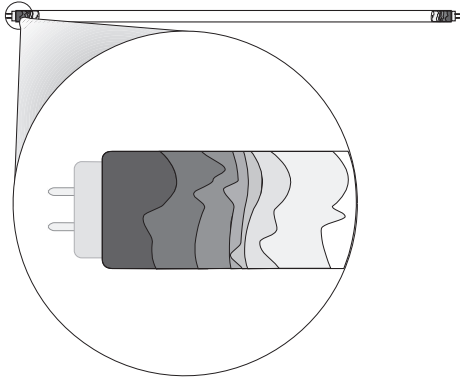
New fluorescent lamps must be “seasoned” for dimming applications by operating at full intensity for their first 100 hours.

Leave the lamps at full intensity for 100 hours. Although this may be inconvenient, it is necessary for good dimming performance, and for achieving normal lamp life.

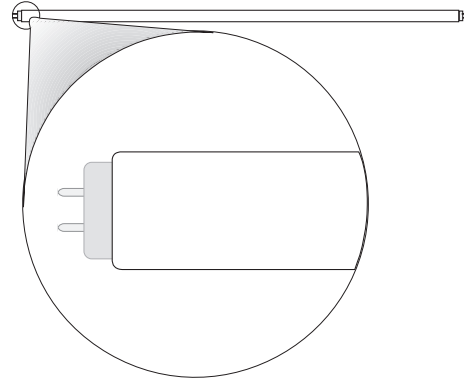


Warning - Lamps must be operated at full intensity for 100 hours before being dimmed. Without these operating hours, lamps may fail prematurely.

Why keep the lamps at full intensity for 100 hours?



Lamp that was **NOT** seasoned for 100 hours.



Lamp that **WAS** seasoned for 100 hours.

New fluorescent lamps have impurities in them which lamp manufacturer cannot eliminate completely. Lamps must be operated at full intensity for 100 hours **before dimming** to neutralize the harmful effects of these impurities. Without the 100 hours at full intensity, the impurities may cause the lamp to fail within a week (or failure may take months depending on usage and the amount of impurities).

Troubleshooting

Symptom	Possible Cause	Solution
Lights are always OFF - there is no glow at the lamp ends, and no flashing.	Power is OFF. System miswired.* Wrong line voltage was applied. No Dimmed Hot signal. Fixture has Instant Start sockets.* Control is OFF. * This may have damaged the ballast.	Verify breaker and wall switch are ON. Check system wiring, connection of socket wires. Check system voltage vs. ballast rating. Check system wiring, measure voltages. Change sockets to Rapid Start sockets. Turn the dimmer ON. After changing the sockets or correcting the system wiring, if system still does not operate, replace the ballast.
Lights are always OFF (or locked at Low End) - but there is a glow at the end of the lamp.	Wrong lamp type for the ballast installed. System miswired. Poor or no connection to sockets or lamp pins. Lamps are too far from a grounded surface.	Verify ballast's lamp type matches lamp. Check for proper ballast-to-socket wiring - particularly the Yellow and/or Blue w/White stripe wires. These wires must be wired in parallel to two lamps (in one side, out the same side to the next lamp), not in series. Check for proper connection of wires to the sockets and lamp pins to sockets. Check for proper grounding of the fixture, and proper space between the ground plane and the lamp (1/2" ± 1/4").

Troubleshooting

Symptom	Possible Cause	Solution
Lights stay at Low End and will not go any higher in intensity.	System miswired. Wrong lamp type for the ballast installed. Lamps are too old.	Check for proper ballast-to-socket wiring, particularly the Yellow and/or Blue w/ White wires. All socket wiring must have wires from the ballast going to each side of the socket-not both wires to one side. Verify ballast's lamp type matches lamp. Relamp the entire fixture.
Lights always stay ON full with little or no dimming.	System miswired.	Check for Dimmed Hot and Hot swapped.
Lights go to full, but not all the way to minimum.	Ballasts not properly grounded. Wrong lamp type for the ballast installed. Lamps are too old.	Check that the fixture is properly grounded and that a ground plane is $1/2" \pm 1/4"$ away from the lamp. Verify ballast's lamp type matches lamp. Relamp the entire fixture.
Black lamp ends or premature lamp failure.	Poor or no connection to sockets or lamp pins. Ballast to Socket wires too long. Lamps were not kept at full intensity for 100 hours before dimming.	Check for proper connection of wires to the sockets and lamp pins to sockets. Shorten the wire between ballast and sockets, total length shall not exceed specified limits (see page 5). This is critical on the Yellow and the Blue with White stripe wires since the length of the wires between sockets is part of the total length. Relamp the entire fixture and leave them at full intensity for 100 hours before dimming.
Lights flicker or drop out at Low End.	Lamps were not kept at full intensity for 100 hours before dimming. Defective or damaged lamps. Lamps are too close to a grounded surface. Poor or no connection to sockets or lamp pins.	Relamp and keep the lamps at full intensity for 100 hours. Replace with new lamps or exchange lamps from a known good fixture. Check that the ground plane is $1/2" \pm 1/4"$ away from the lamp. Check for proper connection of wires to the sockets and lamp pins to sockets.
Lights are flashing or strobing.	Wrong lamp type or voltage for ballast installed. System miswired.	Verify that the ballast lamp type and voltage are correct. Check for Hot and Dimmed Hot swapped, socket wiring correct.
Lamps are not at the same light level.	Ballast to socket wires different lengths. Distance from the lamp to a grounded surface is different from lamp to lamp. Mixture of lamp ages or manufacturers.	Different lengths may cause imbalance (for instance, 3 feet of Red wire and 6 feet of Blue wire). Add wire as needed but do not exceed specified limits (see page 5). Check that the grounded metal is $1/2" \pm 1/4"$ away from the lamp. All lamps in a fixture should have the same distance in order to have the same intensity. Check that all the lamps are the same exact type - both manufacturer and color.
Ballasts buzz or hum.	System miswired. Wrong lamp type for ballast installed. Insecurely mounted ballast.	Check for interchanged Hot, Dimmed Hot, and Neutral wires. Verify the ballast's lamp type and voltage are correct. Tighten the mounting screws after checking for foreign material behind the ballast.

BALLAST WARRANTY

Lutron warrants each new ballast for a period of three years from the date of shipment, to be free from defects in materials or workmanship under conditions of normal use when installed and operated under Lutron product specifications and in accordance with the applicable National Electrical Code and Safety Standards of Underwriters Laboratories. Lutron shall, at its option, repair or replace any defective unit which in its opinion, has not been improperly installed, wired, insulated, used or maintained, provided that Lutron shall not be required to remove, install or re-install any defective unit and provided that Lutron is promptly notified of said defect within the aforementioned warranty period. The foregoing warranty and optional remedies are exclusive and, except for the foregoing warranties, THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR OF ANY OTHER TYPE. In no event shall Lutron or any other seller be liable for consequential or special damages, nor for any repair work undertaken without its prior consent, nor shall Lutron's liability on any claim for damages arising out of or connected with the manufacture, sale, installation, delivery or use of said unit ever exceed the price paid therefor.

Lutron will not be responsible for any ancillary equipment not furnished by Lutron which is attached to or used in connection with the ballast, or for operation of the ballast with any ancillary equipment and all such equipment is expressly

excluded from this warranty. Furthermore, Lutron will not be responsible for any damage to the ballast resulting from the use of ancillary equipment not furnished by Lutron for use with the ballast.

Lutron Electronics Company, Inc., reserves the right to make improvements or changes in its products without prior notice. Although every attempt is made to ensure that this information is accurate and up-to-date, please check with Lutron to confirm product availability, latest specifications, and suitability for your application.

These products may be covered by one or more of the following U.S. patents: 4,663,570; 4,751,399; 4,797,599; 4,835,343; 4,876,496; 4,894,587; 4,954,768; 5,001,386; 5,005,211; 5,041,763; 5,055,742; 5,144,205; 5,146,153; 5,173,643; 5,207,317; 5,224,029; 5,237,264; 5,293,097; 5,309,068; 5,357,170; DES 364,141; DES 370,663; and corresponding foreign patents. Other U.S. and foreign patents may be pending.

Lutron and Hi-lume are registered trademarks and Hi-lume Compact, Eco-10, and Tu-Wire are trademarks of Lutron Electronics Co., Inc.

Optional field commissioning service available—extends warranty to 8 years (limited).

For technical assistance call:

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1-800-523-9466

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Made and printed in the U.S.A. 7/99 P/N 032-089 Rev. A