

## WELCOME

# LINEAR LED T8 REPLACEMENT LAMPS

10/30/14 Webinar Presented by: Greg Murphy





## **WEBINAR TOPICS:**



## MAXLITE PRESENTS: LINEAR LED T8 REPLACEMENT LAMPS

### **Topics:**

- Three Types of LED Linear T8 Lamps
  - Internal driver works with FL ballast
  - Internal driver does NOT work with FL ballast
  - External driver
- Impact on UL of the fixture
- Impact on warranty of the fixture
- What happens if I put fluorescent T8 tubes back into the fixture after I make the modification for LED T8s?
- MaxLite Services
- Q&A







## MAKING THE SWITCH TO LED T8

Does the **T8 LED** really have what it takes to make it worth swapping out your tried-and-true LFLs? To help you decide, take a look at some of the benefits of T8 LEDs:

- Mercury Free Unlike fluorescents, LEDs contain no mercury. This makes them safe for the environment and results in no recycling fees.
- Dimmable Many LEDs have full dimming capabilities, whereas fluorescents are expensive to dim and do so poorly.
- Directional Lighting LEDs offer directional light (illumination exactly where you need it). On the other hand, fluorescents have multi-directional light, which means some light is lost in the fixture and other unnecessary places.
- Work Well with Controls Fluorescent lights tend to burn out faster when integrated with occupancy sensors
  and other controls. In contrast, LEDs work perfectly with control systems, since their life is not affected by
  turning them on/off.
- Better Efficiency The newest T8 LEDs are around 30% more efficient than T8 LFLs.
- Quality Light ¬- Today's LEDs produce light in a variety of color temperatures similar to fluorescent, but don't have any flickering issues that can happen with fluorescent.
- Lifespan The average life of a T8 LED is 50,000 hours, versus only 30,000 hours for an average T8 LFL. One thing to keep in mind though is that there are now linear fluorescent T8 lamps that last up to 84,000 hours.





## MAKING THE SWITCH TO LED T8

While some may complain that LEDs have a lower lumen per watt ratio than fluorescents, judging the two in this category is really like comparing apples and oranges. There simply is no direct comparison. This is because LEDs can get by with less lumens because their directional nature ensures you get a greater concentration of light exactly where you need it. And, as mentioned, fluorescents waste light within the fixture and illuminate unnecessary places. The bottom line is: don't get too hung up on lumens, if you're going to do a comparison, consider the delivered lumens of both the lamp and luminaire together.

The only major downside with T8 LEDs is their cost, which can be five to ten times greater than the price of LFLs. Even so, with **rebates**, **tax incentives**, **and energy savings**, you might see a ROI faster than you'd expect. It's important to crunch the numbers for your particular

situation to see if the initial expense makes sense for your business. MaxLite can help you with a cost/benefit analysis and ensure you consider all factors when deciding between LFL and LED. If you find that you're leaning towards retrofitting your linear fluorescents with T8 LEDs, you have several different options...







## LED LINEAR TUBE OPTIONS

Currently there are three types of LED T8s on the market suitable for retrofits. Primarily they are differentiated by how they interact with existing ballasts. The reason this issue of the ballasts exists at all is because fluorescent tubes need ballasts to operate and LEDs do not. Fluorescent lights require a high voltage burst to get started and then something to regulate the power that comes to the tube — the ballast takes care of all of this. On the other hand, LEDs use a driver which comes in a variety of sizes making several options available.

In an effort to make LED T8s fit into existing linear fluorescent fixtures (for retrofit purposes), manufacturers have come up with a couple different ways of dealing with the unnecessary ballasts. These solutions include bypassing the existing ballast, removing it, or working with it.

To determine what kind of LED T8 might work for your application, consider the pros and cons of each type available today...





## TYPE A: LED tube has an Integrated Driver that Operates on Existing Ballast

#### How it works:

Type A LED tubes have an internal driver that makes it possible for the lights to use existing ballasts and fixtures. They plug directly into the most common linear fluorescent setups, such as T12, T8, and T5.

#### **Pros:**

**Super-easy installation** – Just switch out the old fluorescent tubes for LEDs, and you're done. No other modifications are required.

#### Cons:

**Shorter lifespans** – The life of Type A LEDs is dependent on the longevity of the ballast. This can result in more maintenance costs as compared to other LEDs, since you may need to replace the ballast before you've reached the lifetime of the LED.

Not compatible with all linear fluorescents – Compatibility varies, so check that the make and model of your current fluorescent fixtures are acceptable.

**Not as efficient** – Some power is lost from integration with the ballast. Also, dimming and other types of energy-saving functionalities are limited.







## TYPE B: LED tube has an Internal Driver and is Wired to Main Voltage

#### How it works:

With Type B LED Tubes, the ballasts are removed from the fixture and the power is wired direct to the sockets.

#### **Pros**:

**No power loss** – Unlike Type A bulbs, these LEDs are more efficient, since no power is wasted in the ballast.

**Less long term maintenance costs** – By eliminating the ballast you have one less part to maintain in the future.

#### Cons:

**Electrical modifications are required** – Modifications include, removing the ballasts, replacing the sockets (possibly), and connecting fixture input wires to the sockets.

**Limited dimming** – Even without the ballast, these lights have few dimming options.

**Dangerous installation** – Installers could be exposed to main voltage while connecting sockets to power wires. Strict safety measures are necessary.

**Higher installation costs** – The rewiring, removal, and added safety steps result in longer installation times (i.e. more expensive).





## TYPE B: LED T8/Internal Driver Installation Video



View on MaxLite's YouTube channel or at: <a href="http://youtu.be/Zud4NDWnFEk">http://youtu.be/Zud4NDWnFEk</a>





## TYPE C: LED tube has Remote Driver

#### How it works:

Unlike Type B tubes that have an internal driver, Type C lights use a remote driver to power the LED. The ballasts are removed, which means electrical modifications are still required. However, the operation is much safer, since the low-voltage driver is hooked to the sockets and not the line voltage. One driver can power multiple LED tubes. This system is similar to how LFLs operate now (ballast and lamps).

#### **Pros:**

**Most efficient** – Type C's are more efficient than any other T8 LED tube.

**Highly compatible** – Virtually any fluorescent fixture can be modified to work with these lights.

**Increased functionality** – They are dimmable and work wonderfully with lighting control systems.

#### Cons:

**Higher installation costs** – Similar to Type B tubes, these lights require more extensive installation. However, you can recoup some of this cost through the tubes' efficiency and by using energy-saving control systems.







## Other Considerations

No matter what type of LED T8 tube you choose, there are some other important things to keep in mind before making a purchase:

**Warranty** – Some LED T8 tubes only come with a three-year warranty. Don't waste your time and money on those. Instead, opt for a tube with a five-year, DLC-approved warranty.

**Voltage** – Pay attention to the voltage listed on the light's packaging. Some LED tubes are specified for 120 or 277 volts or can only handle a max of 240 volts. Cover your bases by getting a LED T8 system rated for 120-277 volts.

Ultimately, the efficiency, long life, and functionalities of T8 LEDs make them worthy of potentially replacing standard T8 fluorescent tubes. Of course, every situation is different, so analyze your setup with an expert before making a purchase. MaxLite has the expertise to provide you with the best recommendation for your application. We offer a variety of T8 LED lamps and T8 linear fluorescent lamps to choose from and will help you decide which type works best for you.





## **UL & LED Retrofits of T8 Fixtures**



#### **LED Retrofit Kits**

for Luminaires and Signs

With businesses and consumers looking for ways to cut their energy costs, the use of energy efficient light emitting diode (LED) technologies in new lighting equipment installations is on the rise. There is also a move underway to install LED retrofit kits in existing incandescent and fluorescent luminaires and signs as a less expensive alternative to installing new LED luminaires and signs.

When Listed products are modified in the field, it is not possible for UL to confirm that the product continues to meet applicable certification safety requirements unless the field modifications are investigated by UL. However, an effective alternative to a UL field evaluation is the use of retrofit products and retrofit kits that are specifically investigated and certified by UL for field installation in previously Listed and installed luminaires and signs. As noted below, a number of different LED retrofit kits are currently certified.

#### Luminaire retrofit kits

Luminaire retrofit kits are currently Classified under the Luminaire Conversions, Retrofit (IEUQ) product category. This category covers retrofit devices or kits intended for field installation in UL Listed luminaires, office furnishing luminaires or portable luminaires. These products have been investigated to determine that, when used in accordance with the manufacturer's instructions, they do not adversely affect the operation of the complete unit.

The IEUQ category includes reflector kit retrofits intended to replace reflectors in fluorescent luminaires. Installation may involve relocation, removal or replacement of wiring, lampholders and ballasts. Reflector kits are not intended to be installed on luminaires used as air-handling registers unless the accompanying installation instructions specify the kit is suitable for this use.

This category also includes retrofit kits intended to replace the luminaire's original light source, such as a fluorescent light. LED retrofit luminaire conversion kits are the most common and may be one of several types of LED retrofit kits. The kits either replace ballasts with an LED power supply or remove the ballast and wire the LED module or LED tubular lamp directly to the branch circuit wiring. LED module or light sources consist of a separately installed LED module or a replaceable tubular

LED lamp that may use the original fluorescent lamp holders or be provided with new lamp holders. A luminaire modified in accordance with the retrofit kit instructions to no longer accept the original replaceable lamp has a new label - provided by the retrofit kit manufacturer - affixed near the retrofit kit installer to indicate that the luminaire has been modified and can no longer operate the originally intended lamp(s).

In recognition of the continuous technological advances in LED lighting and the challenges associated with installation of LED retrofit kits with tubular LED lamps, UL has created new categories for LED retrofit kits. These categories cover permanent and portable luminaire conversions (IFAR) and luminaire conversions in commercial refrigerator and freezer lighting (IFAS). All certifications of LED retrofit luminaire conversion kits will be transitioned to these new categories during the next several months.



LED Retrofit Kits (continued)

#### Self-ballasted LED lamps

Self-ballasted LED lamps intended to be installed in Edison screw-type, GU24 and other ANSI lamp bases and connected directly to line voltage supplies are Listed under the Self-ballasted LED Type Lamp category (OOLV). These products may be used in Listed permanently connected and portable luminaires and electric signs. Unlike LED retrofit kits, the Listed self-ballasted LED lamps are intended for use only in luminaires that do not need to be modified or rewired to accommodate Listed self-ballasted LED lamps.

Self-ballasted LED lamps are generally for use in dry, indoor locations unless additionally investigated and marked for applications such as damp locations (not directly exposed to water). Products investigated and marked for wet locations may have additional restrictions regarding use or orientation.

Self-ballasted LED lamps have been investigated for use in the smaller of a 6- or 8-inch diameter totally enclosed recessed luminaire if they will physically fit, unless marked as not for use in a totally-enclosed luminaire. Products marked "Suitable for Use in Open Luminaires" are intended to replace tungstenhalogen lamps in applications where the luminaire is open and does not require an additional lamp containment barrier.

#### Electric sign retrofit kits

LED retrofit kits used to convert non-LED type electric signs are Classified under the Sign Conversions, Retrofit (UYWU) product category. These products consist of a power source, LEDs and the mounting means necessary to change the type of illumination originally contained in the sign to LED illumination. The kit installation instructions specify the type of sign in which the kit is intended to be installed. The kits are also marked to specify use only with the electric signs of specific manufacturers.

#### Exit sign retrofit kits

The Exit Sign Retrofit Kits (GGET) product category covers retrofit kits used to convert exit signs. Products covered under this category are intended for field installation in Listed Exit Fixtures (FWBO) or Listed Exit Lights (FTBR) using no more than two light sources. These devices have not been investigated as replacement light sources in edge-illuminated exit signs.

Exit sign retrofit kits are intended for use in indoor, dry locations unless marked as being suitable for wet locations, for indoor wet locations or for damp locations.

Types EFG (exit fixture general) and EFI (exit fixture independent) retrofit kits are intended for installation into UL Listed products with the product identity of "Exit Fixture" provided as part of the Listing Mark. Type EFG kits are intended for use only in single- or double-faced stencil exit fixtures having specific interior dimensions. Type EFI kits are self-contained assemblies that are independent of the original exit fixture except for mechanical support and electrical supply.

Type ELG (exit light general) and Type ELI (exit light independent) retrofit kits are intended for installation into UL Listed products with the product identity of "Emergency Lighting Equipment" provided as part of the Listing Mark. Type ELG and ELI kits are the same as Type EFG and EFI kits, respectively, except the kits are intended for use only in UL Listed exit lights that are energized by an AC power source in normal mode and by an internal or external DC power source in emergency mode.

#### Installation considerations

When inspecting installations of LED retrofit kits, care should be taken to verify that kits bear appropriate UL Classification Marks and are installed in accordance with the manufacturer's installation instructions. Markings on the kits should also be examined to verify they are being installed in appropriate applications.

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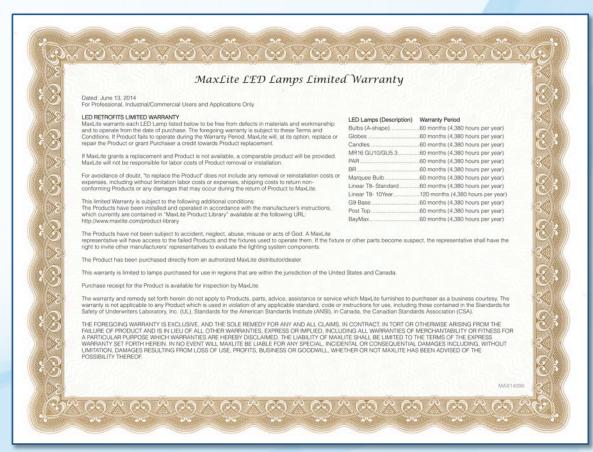
For more information visit www.ul.com





## What Happens To The Warranty?

The housing, lensing, frames etcetera are unaffected by the retrofit. The new light engine is covered under the LED T8 linear tube manufactures warranty. One exception is the Type A LED linear tube whereas the fluorescent ballast is needed for the LED tube circuit. In this case you need to check with the LED tube and fluorescent ballast manufactures.





## What if I put a FL lamp into the fixture after modification? (Type B)













## **LED Linear T8 Lamps Overview**

#### LED Linear T8 - Internal Driver



Validations & Accolades:





#### Overview:

MaxLite's LED Linear T8 with internal driver replacement Lamps are the ideal energy saving choices when upgrading traditional linear T8 or T12 fluorescent lamps in fixtures containing standard non-shunted G13 (medium bi-pin) sockets. These DesignLights Consortium (DLC) qualified LED T8 lamps are designed to provide appropriate light levels while utilizing a dedicated internal driver. With a simple ballast bypass, MaxLite LED T8 lamps can provide up to 44 percent in energy savings when compared to 32-watt fluorescent lamps.



#### LED Linear T8 - External Driver



Validations & Accolades:



#### Overview:

An LED F32 T8 lamp for all locations where four-foot fluorescent tubes are now used, the LED T8 consumes just 20 watts and is powered by either a one- or two-lamp driver configuration, allowing for one to six LED tube configurations within a typical troffer. While fluorescent fixtures can buzz and flicker, and may contribute to headaches and eye fatigue, the LED T8 lamp is constructed with LEDs that enable silent and flicker-free operation for 50,000 hours. The LED T8 lamp is offered in a correlated color temperature (CCT) of 4100K and produces 1550 lumens.





## **LED Linear T8 – Internal Driver**













2' & 4' lamps are DesignLights Consortium® (DLC) qualified

MaxLite LED T8 Linear Replacement Lamps are the ideal energy saving choices when upgrading traditional linear T8 or T12 fluorescent lamps in fixtures containing standard G13 (medium bi-pin) sockets. The LED T8 lamps are designed to provide appropriate light levels while utilizing a dedicated internal driver and require non-shunted G13 medium bi-pin lamp holders.

- · Universal voltage: 120V-277V applications
- Color Rendering Index (CRI): ≥82

PRODUCT DESCRIPTION:

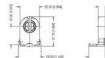
- 50,000 hour life
- THD <20%</li>
- High power factor: ≥.90
- . Easy retrofit into most common linear fluorescent fixtures
- · Simple ballast bypass
- · Instant on
- . Mercury free and virtually no UV or IR light
- · Non dimmable
- · Suitable for enclosed fixture
- · Five year limited warranty (10 Year optional)



Scan QR Code to view Installation Video or visit the following link: http://bit.ly/T8InstallationVideo

L		Т8	SE			
FAMILY	WATTAGE	LAMP TYPE	POWER CONNECTION	LENGTH	сст	WARRANTY
L= LED Linear	10= 10W (2FT & 3FT only) 15= 15W (4FT only) 18= 18W (4FT only) 22= 22W (4FT & 5FT only) 31= 31W (6FT only)	T8= T8 tube	SE= Single end	2= 2FT 3= 3FT 4= 4FT 5= 5FT 6= 6FT	35= 3500K 41= 4100K 50= 5000K	(OMIT)= 5 Years -10= 10 Years

ACCESSORIES					
ORDER CODE	MODEL NUMBER	DESCRIPTION	ACCESSORIES IMAGE		
73978	G13LPNS	G13 Low Profile Non-Shunted Lamp Holder	0		





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#### maxLED MAXLITE

#### LED T8 - LINEAR REPLACEMENT LAMP

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PECIFICATIONS:		2 - FOOT	3 - FOOT		4 - FOOT		5 - FOOT	6-FOOT		
ITEM	SPECIFICATION									
	Power Consumption	10W	10W	15W	18W	22W	22W	31W		
	Lumens Delivered	1,050	1,080	1575	1,960	2,300	2,300	3,250		
	Efficacy	105 lm/w	108 lm/w	105 lm/w	108 lm/w	105 lm/w	105 lm/w	105 lm/w		
GENERAL	CRI	×82								
PERFORMANCE	Beam Angle	120°								
	Color Temperature (CCT)	3500K, 4100K, 5000K								
	Lumen Maintenance (L70)	50,000 hours								
ELECTRICAL	Power Factor	Over 90%								
ELECTRICAL	Input Voltage	120V-277V 5Q/80 Hz								
PHYSICAL	Operating Temperature	-4°F to 122°F								
	Lens	Frosted								
	Certification	UL, LM79, LM80, DLC (2FT & 4FT only)								
OFFICIONION	Material Usage	RoHS compliant; no mercury								
CERTIFICATION	Environment				Dry & Damp					
	Warranty			5 Yes	ars, 10 Years (Opt	ional)				

Lighting layouts and spacing criteria available upon request
Please contact your MaxLite representative to order products that don't have order codes listed here.

ORDER CODE	MODEL	WATTS	LENGTH	CCT	WARRANTY	DIMENSIONS (L" x DIA"
73950	L10T8SE241	10	2FT	4100K	5 Years	23.75" x 1.29"
73951	L10T8SE250	10	2FT	5000K	5 Years	23.75° x 1.29°
73952	L10T8SE341	10	3FT	4100K	5 Years	35.75° x 1.29°
73979	L15T8SE441	15	4FT	4100K	5 Years	47.75" x 1.29"
73980	L15T8SE450	15	4FT	5000K	5 Years	47.75° x 1.29°
74109	L15T8SE441-10	15	4FT	4100K	10 Years	47.75° x 1.29°
74097	L15T8SE450-10	15	4FT	5000K	10 Years	47.75" x 1.29"
73557	L18T8SE435	18	4FT	3500K	5 Years	47.75° x 1.29°
72842	L18T8SE441	18	4FT	4100K	5 Years	47.75" x 1.29"
72841	L18T8SE450	18	4FT	5000K	5 Years	47.75" x 1.29"
73946	L18T8SE435-10	18	4FT	3500K	10 Years	47.75" x 1.29"
73947	L18T8SE441-10	18	4FT	4100K	10 Years	47.75° x 1.29°
73948	L18T8SE450-10	18	4FT	5000K	10 Years	47.75° x 1.29°
73944	L22T8SE441	22	4FT	4100K	5 Years	47.75° x 1.29°
73945	L22T8SE450	22	4FT	5000K	5 Years	47.75° x 1.29°
73953	L22T8SE541	22	5FT	4100K	5 Years	59.75° x 1.29°
73954*	L31T8SE641	31	6FT	4100K	5 Years	71.44" x 1.29"

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## **LED Linear T8 – External Driver**

### F32T8/20LED/741

#### 20W LED LINEAR T8

An LED F32 18 for all locations where four-foot fluorescent tubes are now used, the LED Linear 18 uses only 20 watts and is powered by either a one- or two-lamp driver configuration, allowing for 1-6 LED tube configurations within a typical froffer. The LEDs last up to 50,000 hours based on L70 standards, and have on board cooling fins to extend the lumen life of the lamp. The driver installed inside the fixture body is not exposed to high operating temperatures, enabling longer driver life.

## PROJECT NAME CATALOG NUMBER NOTES FIXTURE TYPE ROOM

#### **FEATURES:**

- Lumens: 1550 at 4100K, 1700 at 5000K
- · 20 watts
- · 50,000 hour life at L70 standards
- · Easy retrofit into most common linear fluorescent fixtures
- Simple ballast bypass
- · High power factor: >.98
- Universal voltage: lamp may be used in 120- and 277-volt applications
- External driver promotes even heat dispersion from LEDs and prevents accelerated decay of LEDs (as seen in most retrofit T8 lamps with an internal driver)
- · No RF interference
- · No need to remove an existing starter
- Instant start
- · Free of mercury and other hazardous materials

#### CONSTRUCTION:

Housing: Acrylic diffuser provides even distribution of light with less breakage than fluorescent tubes. Aluminum body transfers heat from LED chips and extends the useful light output of this lamp. Standard G13 pins assure a simple retrofitting process for installers.



WATTS	ORDER	MODEL NUMBER	LUMENS	LIFE (Hrs.)	Pack Type	Case Pack	ССТ
20	71601	F32T8/20LED/741	1550	50,000	Box	25	4100
20	72038	F32T8/20LED/750	1700	50,000	Box	25	5000

#### **Driver Ordering Information:**

ORDER MODEL NUMBER		DESCRIPTION	VOLTS	
71606	MLEU201LED	DRIVER T8 LED 1X20W NON-DIMMING	120-277V	
71607	MLEU202LED	DRIVER T8 LED 2X20W NON-DIMMING	120-277V	

Lighting layouts and spacing criteria available upon request



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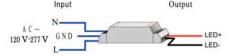
### F32T8/20LED/741

20W LED LINEAR T8

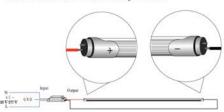


#### **External T8 Tube Driver Installation Guide**

- 1. Please wire the driver and the tube as per below drawing. Driver's input connect to AC-L, AC-N, GND.
- The driver's output part connects the "LED+" red wire, and "LED-" black wire to the socket ends marked "+" "-".
- 3. Please take care of the rating on the drivers' label:
  - . the driver's output current "430mA" = one driver for one tube light, (MLEU201LED)
  - the driver's output current "860mA" = one driver for two tube light, (MLEU202LED)



Please notice the "+" and "-" when connecting to the tube.



#### ONE driver for ONE tube wiring Drawing (MLEU201LED)



ONE driver for TWO tube wiring Drawing (MLEU202LED)



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The department function is to train and provide product training material for all MaxLite representatives, customers and employees. The goal of the department is to educate the staff and rep network to a full and complete understanding of our products, technologies, marketplace, and business environments. We endeavor to educate how and why lighting functions, repair and replacement, as well as compare to competitors or listing requirements. We will accomplish this by providing the tools and services proactively and as needed to supplement.

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- Custom Rebate Calculator
- DLC / ENERGY STAR / LDL Product Listings
- Utility Rebate Paperwork Service

Email Joe Pater at jpater@maxlite.com for more info!



### THANKS FOR ATTENDING!



Special thanks to Premier Lighting for their contribution to this presentation.

For your lighting needs: http://www.premierltg.com

FOR MORE INFORMATION ABOUT OTHER MAXLITE PRODUCTS, OR FOR LIGHTING QUESTIONS IN GENERAL; PLEASE CONTACT:

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