EnvironmentalLights.com Premium High Brightness LED Linkable Dimmable Under Cabinet Lighting - 24 Volt DC

The UL Listed High Brightness LED under cabinet line from Environmental Lights has been very popular because delivers high brightness, excellent color rendering and smooth dimming, all in a thin package that fits in tight spaces under cabinets, in closets—just about anywhere you might need light.

Description	Part Number
LED Light Bars	
LED High Brightness Dimmable Under Cabinet Light 3 inch Soft White	HBSW3
LED High Brightness Dimmable Under Cabinet Light 6 inch Soft White	HBSW6
LED High Brightness Dimmable Under Cabinet Light 12 inch Soft White	HBSW12
LED High Brightness Dimmable Under Cabinet Light 24 inch Soft White	HBSW24
LED High Brightness Dimmable Under Cabinet Light 36 inch Soft White	HBSW36
LED High Brightness Dimmable Under Cabinet Light 48 inch Soft White	HBSW48
LED High Brightness Dimmable Under Cabinet Light 3 inch Neutral White	HBNW3
LED High Brightness Dimmable Under Cabinet Light 6 inch Neutral White	HBNW6
LED High Brightness Dimmable Under Cabinet Light 12 inch Neutral White	HBNW12
LED High Brightness Dimmable Under Cabinet Light 24 inch Neutral White	HBNW24
LED High Brightness Dimmable Under Cabinet Light 36 inch Neutral White	HBNW36
LED High Brightness Dimmable Under Cabinet Light 48 inch Neutral White	HBNW48
Under Cabinet Straight Clip and Screw	Straight Clip
Under Cabinet Angle Clip and Screw	Angle Clip
Bar Joiner Bracket	Linking Clip
Bar Twist Bracket	Turnable Clip

Sample Kits	
LED High Brightness Dimmable Under Cabinet Light 12 inch Soft White Sample Kit	HBSW12 Kit
LED High Brightness Dimmable Under Cabinet Light 12 inch Neutral White Sample Kit	HBNW12 Kit
LED High Brightness Dimmable Under Cabinet Light 12 inch Soft and Neutral White Combo Kit	HBCombo12 Kit

Description	Part Number
Diffusers	
Diffuser for 3 Inch LED Dimmable Under Cabinet Light Bar	Dif3
Diffuser for 6 Inch LED Dimmable Under Cabinet Light Bar	Dif6
Diffuser for 12 Inch LED Dimmable Under Cabinet Light Bar	Dif12
Diffuser for 24 Inch LED Dimmable Under Cabinet Light Bar	Dif24
Diffuser for 36 Inch LED Dimmable Under Cabinet Light Bar	Dif36
Diffuser for 48 Inch LED Dimmable Under Cabinet Light Bar	Dif48

Dimming Supplies (Drivers) and Dimmers	
48 Watt 24 VDC Dimming Power Supply (120 VAC input)	48W24VDim-120AC
96 Watt 24 VDC Dimming Power Supply (120 VAC input)	96W24VDim-120AC
288 (3x96) Watt 24 VDC Dimming Power Supply (120 VAC input)	3x96W24VDimX-120AC
Touch Dimmer for Under Cabinet Lights	TD1
Occupancy Sensor for Under Cabinet Lights	OS1
12 or 24 V LED Dimmer with Rotary Knob (White)	Dim1
12 or24 V LED Dimmer with Rotary Knob (Almond)	Dim2
24 V LED Dimmer with Remote Control (Black)	24VDim3
24 V Under Cabinet Light Controller - 2 Channel	UCC2
24 V Under Cabinet Light Controller - 4 Channel	UCC4
Lutron Diva Magnetic Low Voltage Dimmer; 450 Watt, Single Pole or 3-Way (Multi-location)	DVLV-603P
Lutron Diva Magnetic Low Voltage Dimmer; 800 Watt, Single Pole or 3-Way (Multi-location) White	DVLV-103P-WH
Lutron Skylark Magnetic Low Voltage Dimmer; 450 Watt, Single Pole or 3-Way (Multi-location) White	SLV-603P-WH
Leviton Sureslide Magnetic Dimmer; Single Pole or 3-Way (Multi-location)	6613-PL
Lutron Maestro Wireless Magnetic Low Voltage Dimmer (Spec. Grade); 450 Watt, Single Pole or Multi-location White	MRF2-6ND-120-WH
Pico wireless control, 434 MHz, 3-button with Raise/Lower with light icon engraving	PJ-3BRL-GWH-I01
Pico wireless control, 434 MHz, 3-button with Raise/Lower with light text engraving	PJ-3BRL-GWH-T01

Description	Part Number
Non-Dimming Supplies (Drivers)	
24 Watt 24 VDC Power Supply (North American Plug)	Driver-24-24-NA
35 Watt 24 VDC Waterproof Power Supply	LPV-35-24
60 Watt 24 VDC Waterproof Power Supply	LPV-60-24
65 Watt 24 VDC Power Supply	Driver-65-24
90 Watt 24 VDC Power Supply	Driver-90-24
100 Watt 24 VDC Waterproof Power Supply with PFC	HLG-100H-24
150 Watt 24 VDC Power Supply with PFC	SP-150-24
150 Watt 24 VDC Waterproof Power Supply with PFC	HLG-150H-24
240 Watt 24 VDC Power Supply with PFC	SP-240-24
240 Watt 24 VDC Waterproof Power Supply with PFC	HLG-240H-24
312 Watt 24 VDC Power Supply with PFC	SP-320-24
320 Watt 24 VDC Waterproof Power Supply with PFC	HLG-320H-24
480 Watt 24 VDC Power Supply with PFC	SP-480-24
750 Watt 24 VDC Power Supply with PFC	SP-750-24

DC to DC Converters (Voltage Protection)	
Overvoltage protection-24VDC maximum output, 50 Watt (DC to DC Step Up/Down Buck Boost Converter)	SD-50B-24
Overvoltage protection-24VDC maximum output, 100 Watt (DC to DC Step Up/Down Buck Boost Converter)	SD-100B-24

Description	Part Number
Interconnect Items	
Under Cabinet Bar Joiner	Bar Joiner
Under Cabinet Cord Joiner	Cord Joiner
Under Cabinet Cord Junction	Cord Junction
Under Cabinet Bar Jumper	Bar Jumper
Low Voltage Right Angle Connector Cord (6 feet long)	RACC72
Low Voltage Connector Cord-Locking (4 inches long)	LCC4
Low Voltage Connector Cord-Locking (10 inches long)	LCC10
Low Voltage Connector Cord-Locking (20 inches long)	LCC20
Low Voltage Connector Cord-Locking (40 inches long)	LCC40
Low Voltage Connector Cord-Locking (6 feet long)	LCC72
Bar to Power Connector, 2-Wire Out-Locking (20 inches long)	LCW20
Low Voltage Right Angle Power Supply Cord (20 inches long)	RAPC20
Low Voltage Right Angle Power Supply Cord (6 feet long)	RAPC72
Low Voltage Power Supply Cord-Locking (20 inches long)	LPC20
Low Voltage Power Supply Cord-Locking (40 inches long)	LPC40
Under Cabinet Light Inline Switch (6 feet long)	RAUCIS72
Low voltage Y-Splitter	Y Splitter
PowerPlug Luminaire Disconnect Small	Disconnect 182S
PowerPlug Luminaire Disconnect Large	Disconnect 102
Female Mini Power Supply Plug and 20" Cord	FemaleMiniPlug
Male Mini Power Supply Plug and 20" Cord	MaleMiniPlug

Use our top quality linkable LED under cabinet lighting in kitchens, dens, entertainment centers, laundry rooms, closets—anywhere you want great light in a tight space. They're easy to wire, bright and dimmable, too! They barely use any power, so you'll save on electricity costs.

We also offer sample kits so you can try one or two bars before you buy the whole system. Lighting designers and contractors will find these are handy for gaining owner approvals for bigger projects. Just plug them in, and they work. This sample adapter included with this kit will NOT allow you to demonstrate the dimming performance. You need to buy the special dimming power supplies listed as companion parts to do that. These LED light bar sample kits are available in soft white, neutral white and both colors (combo kit.)

24 inch Soft White LED Bar
3,000°K

24 inch Neutral White LED Bar
4,000°K
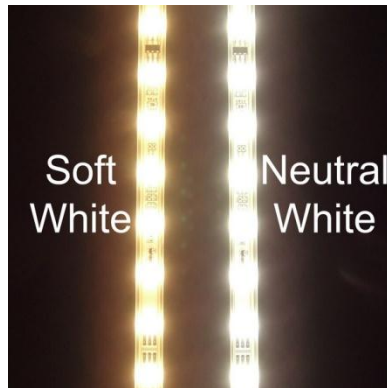
These LED bars will hide behind the lip of almost any cabinet facing because they're only 0.65 inch thick, including the mounting clip. They're much thinner than conventional under cabinet lighting and will fit places no fluorescent or xenon can. They also run much cooler than xenon or halogen so you don't have to worry about heat.

Handy connectors are available to link and extend your system. We have the power and special extension cords you need to make your installation as large as you want.

Light Bars Fit End-to-End

Dimming them is easy and inexpensive with our 60 Watt 12 to 24 VDC Variable Voltage Power Supply. Or, you can select a 48, 96 or 288 watt 24 Volt DC Dimming Power Supply for a fully scalable solution that our customers have used to create larger installations in retail stores and other locations. Or, choose a conventional non-dimming supply and enjoy state-of-the-art affordable LED accent lighting!

It's easier than you probably think to create eye-catching LED lighting projects. We have all the connectors, dimmers and power supplies you need—and this document shows you exactly how to build a system that works great.

We've helped thousands of people design with linear LED light, and they've used our under cabinet lights, ribbon flex and strips to make projects involving bars, restaurants, hotels, casinos, entertainment centers, indirect cove lighting, trade show booths, home theaters, wine cellars, yachts and cruise ships.

Diffusers are available in lengths to fit all the bars. They diffuse as shown below. Just peel and stick onto the light bar.

Dif3, 6, 12, 24, 36 or 48
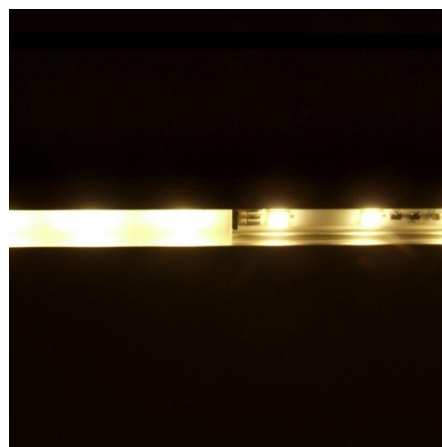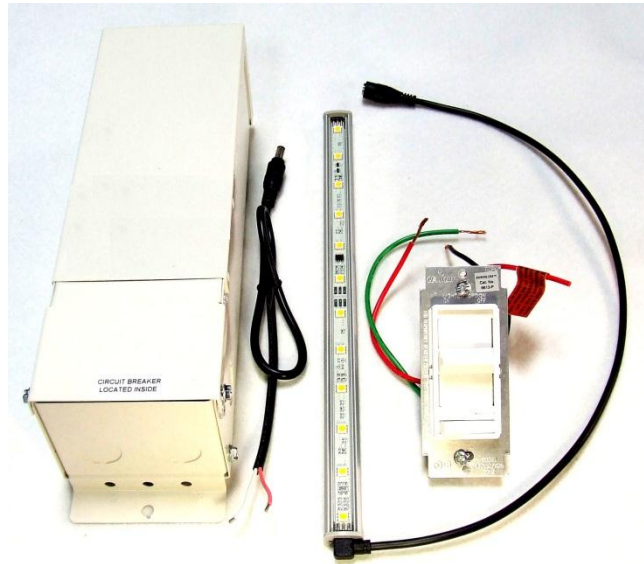

Diffuser applied on left half

Here is what you need to complete a basic system.

Non-Dimming System   Dimming System

You can use a 48, 96 or 288 watt dimming supply for larger installations, as explained later. Please refer to the punch list near the end of this manual to be sure you have what you need.

Each bar comes with an Under Cabinet Bar Joiner to allow you to connect it to another bar:
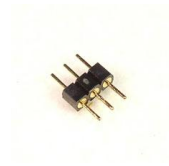
Each bar also comes with handy straight clips and screws so you can easily mount them with a screw driver:

3, 6, 12 and 24 inch bars: 2 clips and screws

36 and 48 inch bars: 3 clips and screws

In-line dimmer: 1 clip and screw

Angle clips are optional.
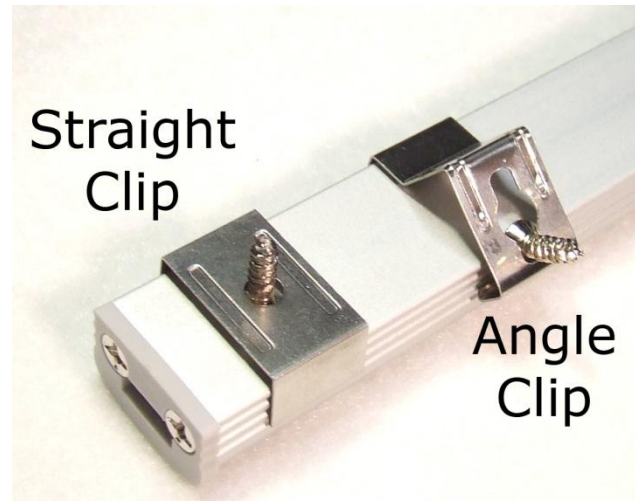
The straight clips can hold the bars flat against the bottom of the shelf or cabinet, or at up to 10° from horizontal, simply by changing which of the grooves on the side of the light bar you use for the clip.
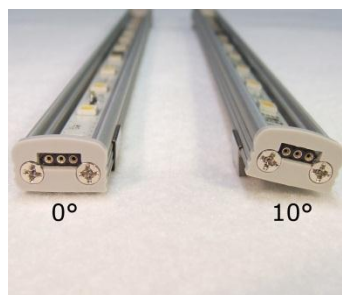
Straight Clip   Adjustment Range   Clip Position

The angle clips can hold the bars at a 45° tilt from horizontal. In the same manner, you can adjust the tilt between 23° and 53°, as shown below.
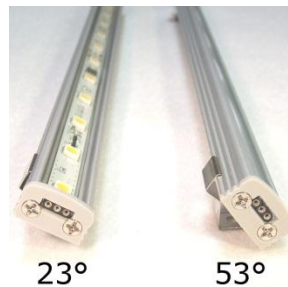
Angle Clip   Adjustment Range   Clip Position

The bar joiner bracket is great for joining 2 bars together. It provides rigidity and keeps the bars from coming apart. It also has a screw-hole on the back, so you can fasten the bracket to the underside of your cabinet or shelf

Bar Joiner Bracket   Installed

This infinitely-variable angle bracket lets you direct your light wherever you want. It's a little higher than the angle clip, but it allows you more flexibility in directing the light. We suggest 2 of these for each bar. They're very sturdy.

Bar Twist Bracket   Installed

Dimming Power Supplies (Drivers)

Most customers want their under cabinet lighting to dim and we have two excellent systems that work on line voltage, plus others that work on 24 volts DC. Here are the two line voltage drivers:

1. A deluxe magnetic dimmer/dimming supply solution for most situations, especially where the under cabinet lights are installed in a home or office and need to be controlled from a wall switch/dimmer.

2. An inexpensive and convenient dimming adapter solution for project work, including small-scale architectural installations where the dimming control does not need to be wall-mounted.

Deluxe solution using magnetic dimmers

You'll need a magnetic dimmer to control the dimming supply, which controls the under cabinet lighting. We are not responsible for damages if you use an incompatible dimming system. Read the guidance below and call if you have questions. Some dimmers, including home automation systems, will damage our dimming drivers.

This dimming supply accepts a magnetic (leading edge) signal and converts it to a constant voltage between 0 and 24 volts, depending on the dimmer's signal. This is not a pulse width modulation dimming supply, and it is superior to other dimming supplies on the market that expose the LEDs to high ripple voltage (and current,) which can significantly shorten LED life.

It has all the required safety protection. It is suitable for indoor or outdoor installation. Outdoors, it should be mounted with the wiring compartment down to allow any moisture that accumulates in there to drain out through the weep holes at the bottom of the unit. The unit has 4 knockout holes for hardwire installation. You can also buy an optional cord kit that contains a 3-conductor plug and wire, along with wire nuts and suitable strain relief for the knockout.

Features:

*   Your in-wall dimmer connects to this supply, which can then drive 24 volt DC LEDs.
*   Works with most conventional household magnetic dimmers, except digital ones. See detailed guidance about dimmer compatibility at the end of this note.
*   This dimming driver is part of a family of drivers with wattages from 36 to 288 watts and DC output voltages of 12 or 24 volts. Choose an output voltage suitable for your product and a size (wattage) sufficient for your load. Always use 24 volts for our under cabinet lights.
*   Designed to drive constant voltage LEDs, including certain LED under cabinet lighting.
*   Very easy to wire: 2 input wires from the dimmer on the primary side and 2 output wires on the secondary side for the load. The 288 Watt 24 volt supply has 3 96-watt terminal block outputs.
*   Indoor/outdoor enclosure; conduit ready
*   NEMA 3R rain tight wet location enclosure with Class 1 conduit access wiring compartment.

- Suitable for hardwiring (contains 1/2 inch knockouts.) Optional power plug kit is available.
- Manual reset overload protection
- UL 1310 listed.
- No external fusing required.
- We suggest de-rating the supplies by 20% in your designs, to be conservative.
- 3 year manufacturer warranty
- Made in America

We recommend the following magnetic dimmers. SOME other magnetic dimmers work. See detailed guidance about dimmer compatibility at the end of this note.

Diva	Skylark	SureSlide
DVLV-603P (450W)	SLV-603P-WH	6613-PL
DVLV-103P-WH (800W)		except for 3x96W24VDimX-120AC

Use Magnetic Low Voltage Dimmers only. Do not use incandescent, Electronic Low Voltage or LED/CFL dimmers.

We offer 3 different sizes of dimming supply: 48, 96 and 288 watts. The 48 and 96 look identical. The 288 has 3 96-watt outputs. You can see the circuit breaker switches inside the cabinets, at top left in the 48/96 watt picture and right and left sides of the 288 picture.

48 or 96 Watt Dimming Supply   288 Watt Dimming Supply

The dimming supply can also be configured as a normal non-dimming supply by simply omitting the dimmer. This can be useful for debugging your system, in case you suspect your dimmer may be faulty or incompatible with the supply. You may buy a 3-conductor power cord, which comes with wire nuts and strain relief. That cord can handle the current of all 3 supplies, including the 288 watt one.

Supply Wired Without a Dimmer
Outputs (secondary) at left. Input (primary) at right

Cord Kit for Dimming Power Supplies
DPS Cord Kit

You may want to consider buying optional female mini plugs (20 inch whips) that mate with our ribbon reels.

Female Mini Power Supply Plug and 20" Cord
FemaleMiniPlug

Dimmers, Controllers and Sensor Switches (24 Volt DC input)

This inline dimmer is the most convenient way to dim your lights:

In-Line Touch Dimmer
TD1

Complete Kit, as it Ships

Installed

You must use the special gray power cord with this dimmer for it to function. Also, you must use one of our non-dimming 24 VDC drivers. The dimming occurs in the dimmer. You may place the dimmer anywhere in your layout, at the head end, tail end or in between. It's very compact and versatile. Just touch to turn on or off. It remembers dimming setting as long as power is applied. Touch and hold to change brightness.

The inline dimmers below are other handy ways of dimming our LED under cabinet lights if you prefer to use 24 Volt DC power instead of 120 Volt AC power. We tell you how much of our LED under cabinet lighting you can use on each dimmer in the Design Criteria section near the end of this document. Note that the second dimmer says 8 amps, but we stipulate only 6 amps sustained power. EnvironmentalLights.com has tested all these dimmers and stipulated our own sustained maximum power ratings, which in some cases are below those of the manufacturer. Most other vendors don't bother to do this, which can cause dimmer failure.

The Design Criteria provides the maximum load you should use. Please call if you have questions.

12 or 24 V LED Dimmer
with Rotary Knob (White)
Dim1

12 or 24 V LED Dimmer
Rotary Knob (Almond)
Dim2

24 V LED Dimmer with
Remote Control (Black)
24VDim3

IR Sensor End
of device pictured below

12 or 24 V Mini
LED Touch Dimmer
Dim8

12 or 24 V Mini LED
IR Sensor Switch
Sensor1

The 2 and 4 channel ones below have 3 modes: manual dimming, auto-fade and flashing. Click on either picture below to go online to the product's web page, where you will find a video demonstrating the dimmers below.

24 V Under Cabinet Light Controller
2 Channel
UCC2

24 V Under Cabinet Light Controller
4 Channel
UCC4

Occupancy Sensor

This inline occupancy will detect presence of a person and turn the lights on for a period of 10 seconds to 12 minutes:

In-Line Occupancy Sensor   Complete Kit, as it Ships   Installed
OS1

You must use the special gray switched power cord with this sensor for it to function. Works with certain dimming supplies we sell, but not with the TD1 touch dimmer. Please see detailed instructions provided on our web site for the OS1.

Non-Dimming Power Supplies (Drivers)

Non-dimming drivers are less complicated and less expensive than dimming drivers. If you don't need dimming, just get one of these. We add drivers to our line from time to time. Consult our web site for the latest complete list.

Adapters

The adapters below are universal (100-240 VAC, 50/60 Hz.)

24 Watt 24 VDC Power Supply
Driver-24-24-NA

65 W 24 VDC Power Supply
Driver-65-24-NA

90 W 24 VDC Power Supply
Driver-90-24-NA

Hardwire Waterproof Supplies

Both of the hardwire waterproof drivers below are universal (100-240 VAC, 50/60 Hz.)

35 W 24 VDC Waterproof Power Supply
(LPV-35-24)

60 W 24 VDC Waterproof Power Supply
(LPV-60-24)

The hardwire waterproof drivers below are universal (90-305 VAC, 50/60 Hz.) This means you can use them on 277 VAC commercial service, as well as 120 VAC, 240 VAC and other commonly-found service voltages.

100 Watt 24 VDC Waterproof
Power Supply with PFC
HLG-100H-24

150 Watt 24 VDC Waterproof
Power Supply with PFC
HLG-150H-24

240 Watt 24 VDC Waterproof
Power Supply with PFC
HLG-240H-24

320 Watt 24 VDC Waterproof
Power Supply with PFC
HLG-320H-24

Enclosed Drivers (Cage Supplies)

These drivers operate on a wide range of voltages, have extra safety features, and most have Power Factor Correction (PFC.) We offer optional power cords for the major regions of the world we serve, and we also offer mounting kits you will find nowhere else.

150 Watt VDC Power Supply with PFC
SP-150-24

240 Watt VDC Power Supply with PFC
SP-240-24

320 Watt VDC Power Supply with PFC
SP-320-24

480 Watt VDC Power Supply with PFC
SP-480-24

750 Watt VDC Power Supply with PFC
SP-750-24

We offer optional power cords for North America (NA), Europe (Euro), United Kingdom/Hong Kong (UK) and Australia, New Zealand and Argentina (Aus) (all sold separately.) These 5-foot cords are very high quality. They use wires thick enough for the largest drivers we sell, and have lugs to facilitate direct connection to the terminal blocks on the driver without having to strip wires.

PowerCord-NA   PowerCord-Euro   PowerCord-UK   PowerCord-Aus

EnvironmentalLights.com offers mounting kits for the above enclosed drivers. These kits allow you to install your driver in variety of situations, including data racks with DIN rails. There are detailed photographs of ways of using each kit on our web site. We also sell every screw, bracket and slide individually in any quantity you desire. Here are some pictures of our popular kit for the SP-150 drivers (150 watts, 12 or 24 volt DC output.)

SP-150 Driver Mounting Kit
SP-150-MK

Surface mount
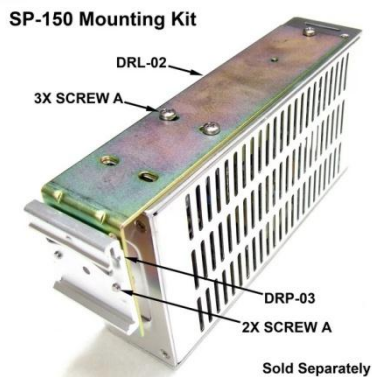
Bracket with DIN Slide

Bracket without DIN Slide

DIN Slide Vertical Mount

DIN Slide Horizontal Mount

<u>DC to DC voltage converters to tame battery system voltages and protect your investment</u>

If you install your 24 volt LEDs in solar or other battery installations, you should protect your LEDs with a voltage regulator. Use one of our DC to DC Buck/Boost converters to Buck (lower) excess voltage due to charging or Boost (raise) sagging voltage due to weak batteries or heavy system load. These converters simply take any DC voltage between about 19 and 36 volts and tame it to 24 Volts. Doing it efficiently is important, if you're on battery power, and these are very efficient. They also behave well over all load levels and contain various types of protection against misuse. Protect your LEDs if you're on battery power or they won't last as long as they should. Also, overdriving white LEDs will burn off the phosphor that makes them white, and they'll turn blue or purple. These protection devices are very easy to wire into your system. Contact us if you need bigger ones.

Overvoltage protection-
24 VDC maximum output,
50 Watt (DC to DC Step Up/Down
Buck Boost Converter)
SD-50B-24

Overvoltage protection-
24 VDC maximum output,
100 Watt (DC to DC Step Up/Down
Buck Boost Converter)
SD-100B-24

Interconnect Items

Bar joiners are handy for joining two bars together. One is included with each bar, and you can order extras.
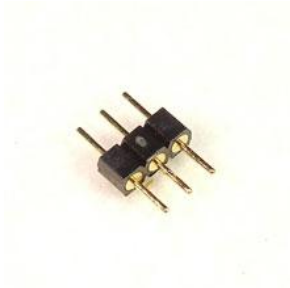
Bar Joiner   Pre-Insertion   Installed

Cord joiners can be used for joining two cords together.
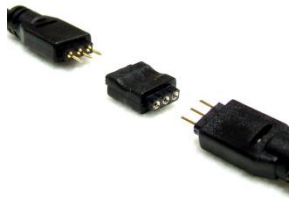
Cord Joiner   Pre-Insertion

Cord Junction   With Power Cord and
4 Outputs to Lights

Bar jumpers are used to gang bars in parallel for additional light output. The limit on one branch is 8 feet of light bars.

Bar Jumper

Pre-Insertion

Serpentine Configuration

Right Angle Connector Cord
(6 feet long)
RACC72

We have improved our straight connectors by making adding interlock barbs. The old connectors will still work with the new lights, but the new connectors will not work with the previous series of lights. The right angle connectors do not have the interlock feature.
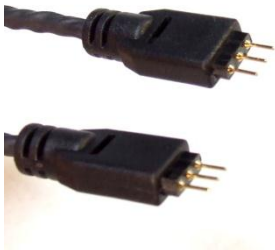
Previous Series

New Interlock Series

Connected

Locking Connector Cords are only 0.47 inches in diameter at their widest, so if you have to drill a hole to get these through, it won't need to be very large.

[LCC4](#)
(4 inches long)

Turn Using LCC4

[LCC10](#)
(10 inches long)

[LCC20](#)
(20 inches long)

[LCC40](#)
(40 inches long)

[LCC72](#)
(72 inches long)

Right angle connectors, used on the jumper and right angle power cords, are tiny. They add just 3/8" to the end of the light, so you can get right up to the barriers (fences) found under many cabinets.

It doesn't matter which way you connect the 3-prong connectors—the bars will accept either orientation.
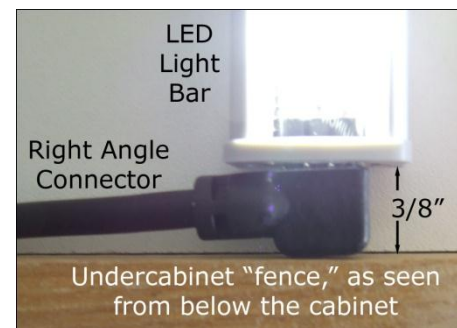
Right Angle Power Supply Cord
(20 inches long)
[RAPC20](#)
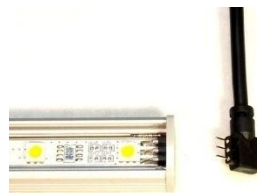
Pre-Insertion

Installed

Right Angle Power Supply Cord
(6 feet long)
RAPC72

Installed

Locking straight power supply cords are also available.

LPC20
(20 inches long)

LPC40
(40 inches long)
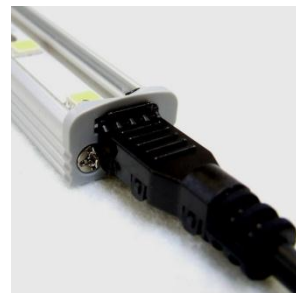
Installed

You can also buy a power cord that gives you bare wires to work with:

Locking Bar to Power Connector, 2-Wire Out (20 inches long)
LCW20

We also offer an in-line switch. It has a right angle connector to connect to the light. About 6 inches away is a switch. The cord length is 6 feet, and it plugs into a power supply on the other end.

Under Cabinet Light Inline Switch
(6 feet long)
RAUCIS72

Ends

Pre-installation

We also offer splitters and luminaire disconnects. The large disconnect is useful for male and female mini connectors and the small one is good for LCW20 connectors.

Low voltage Y-Splitter

Y Splitter

PowerPlug Luminaire
Disconnect Large
Disconnect 102

PowerPlug Luminaire
Disconnect Small
Disconnect 182S

Features of the LED Under Cabinet Light Bar System

- Dimmable high brightness LEDs create state-of-the-art LED lighting.

- Ultrabright, extremely efficient LED lights are economical to operate and maintenance-free.

- Here is a lumen chart. For comparison, a 60 watt incandescent bulb generates around 650 lumens. These under cabinet lights generate the requisite 30-70 footcandles at the work plane if used in lines of 12 inches or longer. Use jumpers to add additional lights if extra brightness is required. The soft white bars create 240 lumens per foot and the neutral white ones create 270 lumens per foot.

Lumens	Soft White	Neutral White
Color Temperature	3,000°K	4,000°K
3 inch (75 mm)	60	68
6 inch (150 mm)	120	135
12 inch (300 mm)	240	270
24 inch (600 mm)	480	540
36 inch (900 mm)	720	810
48 inch (1,200 mm)	960	1080

LEDs are directional, unlike fluorescent and halogen lighting. That means the light shines where you aim it (typically down,) delivering most of the flux to the work surface. Fluorescent and halogen lights have very poor "fixture efficiency" of around 50-60% in most cases, which means half of their lumens are lost in the fixture and are not delivered to the work surface. Therefore, LEDs typically need only half as many lumens as fluorescent sources to get the job done for directional lighting applications such as under cabinet lighting. You may find one LED bar is enough for your application, or you may decide to add one or more additional bars in parallel. They're very compact.

- Here are some illumination charts for the neutral and soft white 12" bars.

Neutral White

Soft White
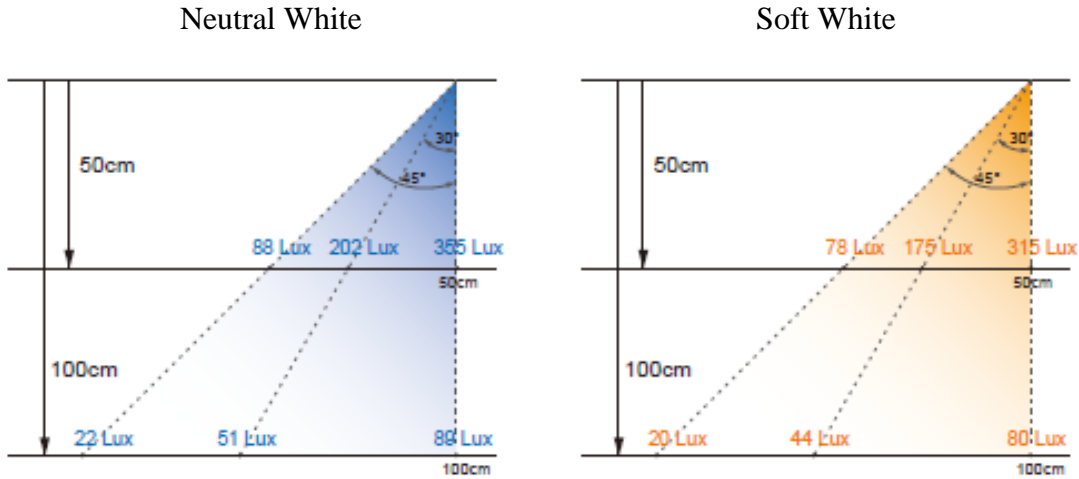
- Extremely easy to install because they're linkable and come with mounting brackets that require just a screw driver and a small hole to install.

- Our LED linkable under cabinet lights dim beautifully using our UL-approved 48, 96 or 288 Watt 24 Volt DC Dimming Power Supply in combination with certain magnetic dimmers. Just put the regular magnetic dimmer in your gang box in the wall, connect it to the LED dimming supply and then to your lights. The wire between the dimming supply and the LEDs can be class 2 wiring, which is easier to work with.

- These under cabinet lights also dim beautifully using our CE-approved 60 Watt 12 to 24 VDC Variable Voltage Power Supply (adapter.) Since the power supply generates low voltage at 60 watts or below, the wire between the dimming adapter and the LEDs can be class 2 wiring, just like the dimming supply in the previous paragraph.

- The LED optics disperse the beam at 110 degrees, perfect for under cabinet lighting

- Strip width is 0.77 inches-very narrow, and suitable for tight spaces

- Strip height is 0.6 inches. It's low-profile and hides under most cabinet fronts, unlike bulkier LED and fluorescent fixtures.

- Modular—it's linkable and easy to connect and disconnect pieces.

- 2 mounting clips and screws are included with 3", 6", 12" and 24"; 3 with 36" and 48"; angle clips are sold separately

- 1 bar joiner is included with each bar.

- Low voltage system is easy to wire.

- Shock resistant, rugged and durable.

- No UV generated, so it's safe for humans and objects, in general. Great for museums, displaying documents, artwork and other UV-sensitive subjects.

- No mercury to contaminate the environment upon disposal, unlike fluorescents.

- No ballast required, so no ballast to burn out and replace.

- Operating range: 0° - 150° F

- Energy-efficient-saves around 85-90% versus incandescent light

- No radio frequency interference

- No buzzing noise

- No flickering

- Instant on

- Lights have up to 40,000 hour lifetime, if properly driven and heat is allowed to escape.

Applications

- Under cabinet lighting, closet and indirect cove lighting applications

- Display cases

- Cubicles

- Work benches

- Back lighting signs

- Hotels, office buildings, homes, casinos, wine cellars, yachts, home theaters

- Downlighting and uplighting architectural features

Instructions

Please take the following general precautions when installing any sort of LED lighting:

1. This equipment, like all electrical equipment, should be installed by a qualified person. You should have the basic tools and knowledge of the trade. If you do not, get help.

2. Never wire systems with the power on. Even if you take care not to hurt yourself, you may damage the LEDs or equipment by creating current spikes. Always shut the power off before making connections.

3. Do not expose LEDs, controllers or other electronics to intense electro-magnetic fields, including lightning.

4. Our controllers, boosters, decoders and power supplies are generally not waterproof. Keep them dry.

5. Always observe proper polarity to avoid damaging components.

6. Supply the LED bars with 24 volts DC only. (24 volt AC systems will light the LEDs, but they will flicker and be dim because they only operate half of each cycle.)

7. If you use your own power supplies, be sure they are regulated. Some inexpensive wall wart supplies and other power supplies allow the voltage to go above the rated voltage in certain low-load situations.

8. It is a good idea to allow around 20-25% or more margin for safety with power supplies. This document explains how to build large scale systems—just be sure to buy enough hardware to get the job done.

When installing LED lighting, it is a good idea to follow this "dry-run" procedure:

1. Be sure you have everything you need before you start.

2. Lay out your lights, controller, power supply and any other required hardware on the floor or table.

3. There is some resistance in the LED lighting. If you see any color fading or dimming at the end of a long run, you may have too many LEDs for your power supply or controller. We usually recommend running no more than about 60 watt's worth of LED under cabinet lighting in one branch. If you need to run more than that, you should split the run into sections. Call if you need assistance with larger projects. We can help you select the required power supplies.

4. Connect everything and test it to be sure it works and you have it connected properly. It is unlikely, but possible, that some part of your system is defective or was damaged during shipment. If that is the case, it will be very helpful to you to know that before you do all the work involved in installing it. You will also know if you damage anything during

installation, which is helpful in trouble-shooting because manufacturing defects and installation damage typically have very different solutions.

5. Damaged and previously installed strips are not returnable, so please call first if you have questions. Our customers have very few problems with our LED lights, as long as they follow the instructions and call if they have questions.

Once you have tested the system successfully, you are ready to install it.

Check List for Your Project

Here are the components you'll need:

Light Bar(s):

(1 bar joiner and straight clips and screws are included with each bar:)

+   + for 6", 12" and 24", 2x   for 36" and 48", 3x

Joiner(s) or Jumper(s) (optional):

Diffusers (optional, in 3", 6", 12", 24", 36" or 48" lengths) Just peel and stick.

Power Cords or Inline Switch:

Mini Female Plug (optional) (mates with Power Cords above, and can be used on the cage supply or dimming supply to create extra branches.) This is the same plug as on our adapters.

PowerPlug Luminaire Disconnects (optional.) Can be used for extending or connecting wires.

Dimming Supply plus Dimmer, or

Non-dimming power supplies:

Optional in-line pulse dimmers to use with non-dimming power supplies:

Optional in-line occupancy sensor or door sensor:

Design Criteria for Dimmers and Power Supplies

The following chart uses 25% oversizing (5/4 of estimated actual power consumption.) These numbers are conservative, since additional margin for error is built into the ratings of the power supplies themselves.

High Brightness LED Under Cabinet Lights

(Power supplies typically are de-rated at 80%)

Recommended Limits Part Name	Part Number	Watts (nominal)	Watts (de-rated)	3" pieces	6" pieces	12" pieces	24" pieces	36" pieces	48" pieces
Power consumption per light bar (watts)				1.25	2.50	5.00	10.00	15.00	20.00
Branch length limit		40		32	16	8	4	2	2
Dimming Supplies (Drivers)									
48 Watt 24 VDC Dimming Power Supply (120 VAC input)	48W24VDim-120AC	48	38	30	15	7	3	2	1
96 Watt 24 VDC Dimming Power Supply (120 VAC input)	96W24VDim-120AC	96	77	61	30	15	7	5	3
288 (3x96) Watt 24 VDC Dimming Power Supply (120 VAC input)	3x96W24VDimX-120AC	288	230	184	92	46	23	15	11
Dimmers (24 Volt DC input)									
12 or 24 V LED Dimmer with Rotary Knob (White)	Dim1	48	48	38	19	9	4	3	2
12 or 24 V LED Dimmer with Rotary Knob (Almond)	Dim2	192	144	115	57	28	14	9	7
24 V LED Dimmer with Remote Control (Black)	24VDim3	96	96	76	38	19	9	6	4
24 V Under Cabinet Light Controller - 2 Channel	UCC2	100	80	64	32	16	8	5	4
24 V Under Cabinet Light Controller - 4 Channel	UCC4	240	192	153	76	38	19	12	9
Non-Dimming Supplies (Drivers)									
24 Watt 24 VDC Power Supply (North American Plug)	Driver-24-24-NA	24	19	15	7	3	1	1	0
35 Watt 24 VDC Waterproof Power Supply	LPV-35-24	35	28	22	11	5	2	1	1
60 Watt 24 VDC Waterproof Power Supply	LPV-60-24	60	48	38	19	9	4	3	2
65 Watt 24 VDC Power Supply	Driver-65-24	65	52	41	20	10	5	3	2
90 Watt 24 VDC Power Supply	Driver-90-24	90	72	57	28	14	7	4	3
100 Watt 24 VDC Waterproof Power Supply with PFC	HLG-100H-24	100	80	64	32	16	8	5	4
150 Watt 24 VDC Power Supply with PFC	SP-150-24	150	120	96	48	24	12	8	6
150 Watt 24 VDC Waterproof Power Supply with PFC	HLG-150H-24	150	120	96	48	24	12	8	6
240 Watt 24 VDC Power Supply with PFC	SP-240-24	240	192	153	76	38	19	12	9
240 Watt 24 VDC Waterproof Power Supply with PFC	HLG-240H-24	240	192	153	76	38	19	12	9
320 Watt 24 VDC Power Supply with PFC	SP-320-24	320	256	204	102	51	25	17	12
320 Watt 24 VDC Waterproof Power Supply with PFC	HLG-320H-24	320	256	204	102	51	25	17	12
480 Watt 24 VDC Power Supply with PFC	SP-480-24	480	384	307	153	76	38	25	19
750 Watt 24 VDC Power Supply with PFC	SP-750-24	750	600	480	240	120	60	40	30
Recommended Wire Gauges for a 40-Watt (1.7-Amp) Branch Using Your Own Wiring									
Cable Length from Power Supply to Lights (feet)		10	20	30	40	50	60	70	80
AWG Gauge Required: use this number or lower (thicker)		22	20	18	16	16	16	16	14

Circuit Diagrams for the Dimming Power Supplies

Monochrome installation using magnetic dimming drivers:

36W12VDim-120AC	60W12VDim-120AC	4x60W12VDimX-120AC
36W12VDim-240AC	60W12VDim-240AC	4x60W12VDimX-240AC
36W12VDim-277AC	60W12VDim-277AC	4x60W12VDimX-277AC
48W24VDim-120AC	96W24VDim-120AC	3x96W24VDimX-120AC
48W24VDim-240AC	96W24VDim-240AC	3x96W24VDimX-240AC
48W24VDim-277AC	96W24VDim-277AC	3x96W24VDimX-277AC
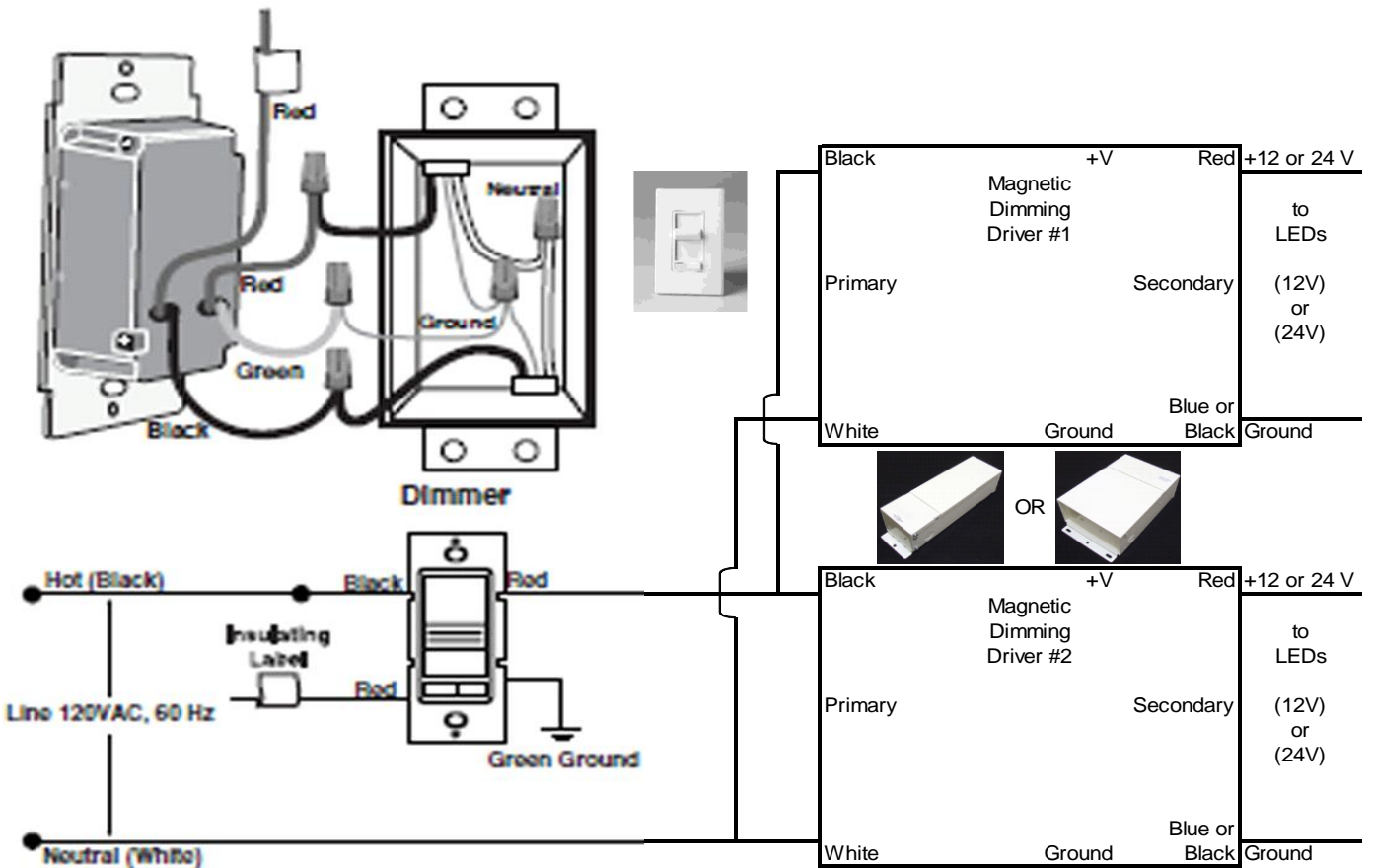
Follow detailed installation instructions for the magnetic dimmer that come with the dimmer. Additional dimming supplies may be used up to the power limit of the dimmer.

Dimmer compatibility:

We recommend the following magnetic dimmers for the 120 VAC power supplies. SOME other magnetic dimmers work. It is rare for us to sell 240 or 277 volt supplies and we do not have recommended dimmers for those voltages.

Diva	Skylark	SureSlide
DVLV-603P-WH (450W)	SLV-603P-WH	6613-PLW
DVLV-103P-WH (800W)		except for
		4x60W12VDimX-120AC,
		3x96W24VDimX-120AC

Use Magnetic Low Voltage Dimmers only. Do not use incandescent, Electronic Low Voltage or LED/CFL dimmers.

For lower wattages (36, 48, 60, 96), we recommend Leviton Sureslide 6613-PL, Lutron Diva (DVLV-603P) and Lutron Skylark (SLV-603P) because they will dim to less than 2%/13% (measured/perceived.) Those dimmers are not as recommended for the larger supplies (240 and 288) because Skylark may flicker slightly and Diva and Skylark will only dim the lights to around 50% perceived. For larger installations using multiple drivers you may have to use the Lutron DVLV-103P, as it can support larger loads. You can put more than one dimming driver on a dimmer, but we recommend keeping the total load wattage under 50% of the dimmer's rating.

For wireless control dimming, the Lutron Maestro Wireless MRF2-6ND-120 is magnificent on all 6 wattages (36, 48, 60, 90, 240, and 288). For large supplies (240 and 288 watts) the MRF2-6ND-120 is strongly recommended over all dimmers we have tested because it goes down to almost 0% with no flicker. It is shown with some of its companion parts below.

The only caveats regarding MRF2-6ND-120-WH are that the dimmer requires a neutral wire in the box and that most of the dimming occurs in the bottom travel of the slide. The top half of the slide is dead travel at full brightness. Of all dimming troubles, this is the least objectionable, and people tolerate it in order to achieve smooth dimming on a specification-grade wireless dimmer.
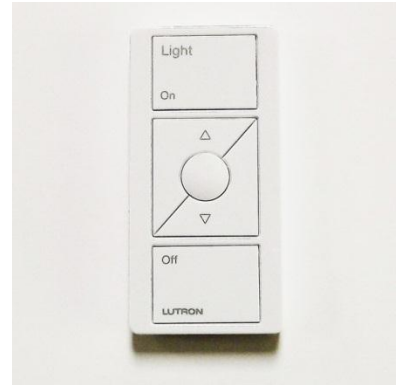
Lutron Maestro Wireless MLV
Dimmer (Spec. Grade) 450 Watt

[MRF2-6ND-120-WH](MRF2-6ND-120-WH)

Lutron Pico Wireless Control
3-Button and Raise/Lower
Icon Engraving
[PJ-3BRL-GWH-I01](PJ-3BRL-GWH-I01)

Lutron Pico Wireless Control
3-Button and Raise/Lower
Text Engraving
[PJ-3BRL-GWH-T01](PJ-3BRL-GWH-T01)

Lutron Pico Wireless Control
Single Pedestal
[L-PED1-WH](L-PED1-WH)

Lutron Pico Wireless Control
Single Pedestal
[L-PED2-WH](L-PED2-WH)

Our customers have also achieved success on the Crestron DIN-1DIMU4 commercial magnetic dimmer. We have tested the Smartlabs In-LineLinc Dimmer #2475D, and seen that it works acceptably, although it has slightly more dead travel at the top of the dimmer than the Lutron MRF2-6ND-120. Wireless remote controls for that dimmer are sold separate from that unit.

If you are using a dimmer other than the ones recommended, listen carefully to the dimming supply when you first connect it to your dimmer. It's also a good idea to try operating the dimming supply on your dimmer with no load (lights disconnected) at first. If the dimming supply makes strange noises or behaves badly, shut it off immediately and do not use that dimmer with this supply.

<u>Dimmer Compatibility Problems</u>

You cannot tell how a dimmer operates by looking at the cosmetics of the front. For example, Lutron Diva dimmers all look the same; yet there are many different types of Lutron Diva dimmers: incandescent, 0-10 volt fluorescent, CFL/LED, magnetic and electronic low voltage, to name five. Do not just use any Diva dimmer.

Just as you cannot tell if a car uses gasoline or diesel by looking at it from a distance, you cannot tell how a dimmer operates by looking at it mounted on the wall behind a cover plate. You must look at identifying marks on the dimmer or car to know what type it is.

DO NOT use:

- Most digital dimmers, including Leviton MDM06-1LW.
- Incandescent dimmers. SAFETY HAZARD. Incandescent dimmers pass a DC voltage and should NEVER be used with a magnetic coil driver. You may cause a fire.
- LED/CFL dimmers, for the same reason.
- Electronic dimmers. This is a magnetic driver. Electronic dimmers DON'T work.
- Some home automation systems. The important consideration is how the dimmer output functions. If it is leading edge (forward phase) AND designed for magnetic loads AND analog, chances are that it will work. But we do not guarantee that it will work. There are thousands of dimmers on the market and we cannot test all.

TESTING a non-approved dimmer:

Wiring should be done by a trained electrician or other person who knows the proper safety precautions. We have given strong guidance above regarding what dimmers to use. If you insist on using a different dimmer, you can send it to us and we will test it for you. If you want to try it yourself, remember this:

- Test it before installing it. You don't want any installation wiring faults affecting your results. Just set the dimmer, driver, lights and connectors on the floor or a bench, follow proper safety procedures and make sure your dimmer is compatible before you punch out the knock-outs, install conduit and so forth. Drivers that have been installed are not returnable.
- If you want to use a non-approved analog magnetic low voltage dimmer, DO NOT test more than ONE dimming driver at a time. If your dimmer is not compatible with one of our dimming drivers, it will not be compatible with ten of them. **There is no excuse for destroying more than one dimming driver by conducting a test with an unknown dimmer.**

The dimming supply can also be configured as a normal non-dimming supply by simply omitting the dimmer. This can be useful for debugging your system, in case you suspect your dimmer may be faulty or incompatible with the supply. You may buy a 3-conductor power cord, which comes with wire nuts and strain relief. That cord can handle the current of any of the 6 supplies, including the 240 and 288 watt ones.

Supply Wired Without a Dimmer
Outputs (secondary) at left. Input (primary) at right

Cord Kit for Dimming Power Supplies
DPS Cord Kit

You may want to consider buying optional female mini plugs (20 inch whips) that mate with our ribbon reels and some of our under cabinet lighting connectors.

Female Mini Power Supply Plug and 20" Cord
FemaleMiniPlug

California Title 24

Compliance with California Title 24 depends on many things, including type of installation (commercial or residential), size of installation, measured in watts, type of driver used (dimming or not dimming, which influences driver efficiency,) and what the room is used for (closet, kitchen, bath, shop, etc.)

Also, the specifications of Title 24 change frequently.

The chart below provides efficacy of the under cabinet bars for the purposes of determining whether or not they comply with Title 24 according to the particular circumstances of your installation.

Part #	lumens	watts	lumens/ watt
HBSW3	60	1.25	48.0
HBSW6	120	2.5	48.0
HBSW12	240	5	48.0
HBSW24	480	10	48.0
HBSW36	720	15	48.0
HBSW48	960	20	48.0
HBNW3	67.5	1.25	54.0
HBNW6	135	2.5	54.0
HBNW12	270	5	54.0
HBNW24	540	10	54.0
HBNW36	810	15	54.0
HBNW48	1080	20	54.0