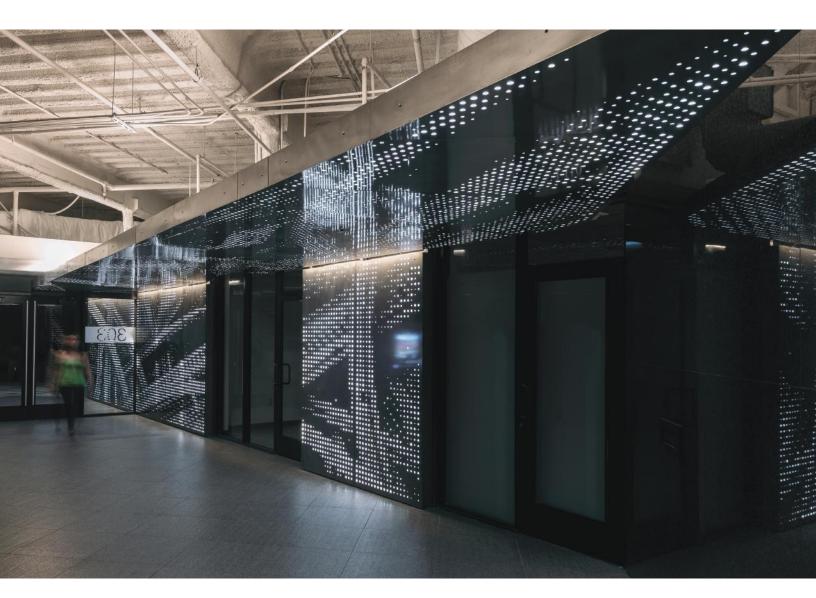


DRIVERS & CONTROLS

Static White



A guide on wiring, luminaire compatibility, and product availability

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PULSE-WIDTH MODULATION

Control System Configuration

Plug and play inline dimmers utilize Pulse-Width-Modulation (PWM) dimming to adjust the brightness of a LED fixture. For use with constant voltage drivers, Class 2 loads only.

Features







Dimming





Easy Control

Plug & Play

Pulse-Width Modulation

Cost-Effective

CONTROLS

INTERFACE + POWER + BRAIN HARDWARE + Please co

COMPATIBLE LOAD/LIGHT SOURCE

Please confirm custom lighting compatibility with LEDCONN beforehand.

Pick your load / light source







DC12V DC24V

Plug-in adapter

Built-in to Built-in to the interface the interface

N/A





Mini IR Remote



DC12V Plug-in DC24V adapter



IR Dimmer

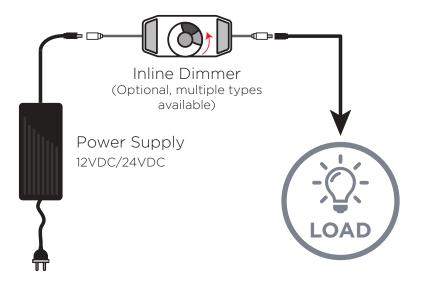
Select the compatible lighting product based on the recommendations on the Load Compatibility table on p.18.



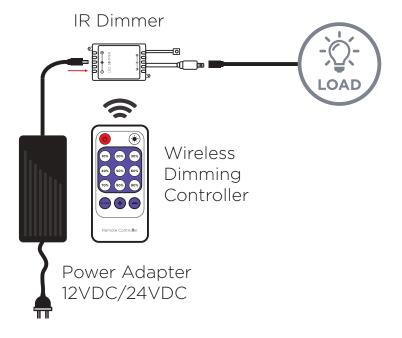
PULSE-WIDTH MODULATION

Wiring Guidelines & Diagrams

INLINE PLUG & PLAY DIMMER



MINI IR REMOTE & IR DIMMER



0-10V DIMMING

Control System Configuration

0-10V dimming incorporates a DC Voltage control signal that can be adjusted between zero and ten volts to tune the brightness of an LED fixture. The brightness of the LED fixture is scaled where the brightness is at 100% when the control signal is 10V, and at the lowest dimming percentage when the signal is OV.

Features







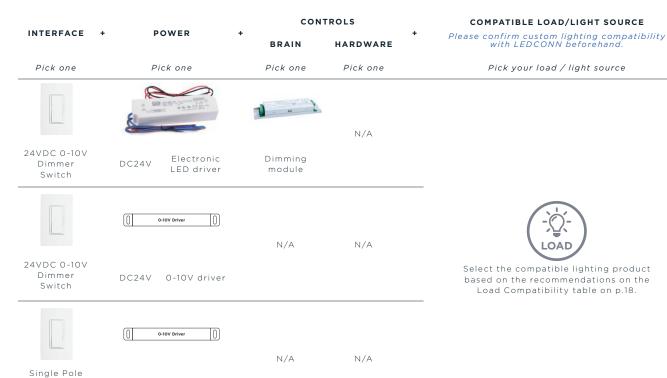
Dimming



Dimming



| Calable | naruwire | | | | |
|---------|----------|--|--|--|--|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |



DC24V 0-10V driver



COMPATIBLE LOAD/LIGHT SOURCE

Pick your load / light source

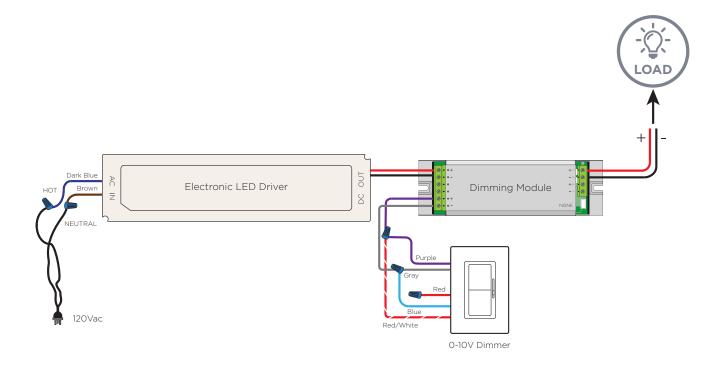
0-10V Wall

Dimmer Switch

0-10V DIMMING

Wiring Guidelines & Diagrams

REGULAR ELECTRONIC LED DRIVER WITH DIMMING MODULE

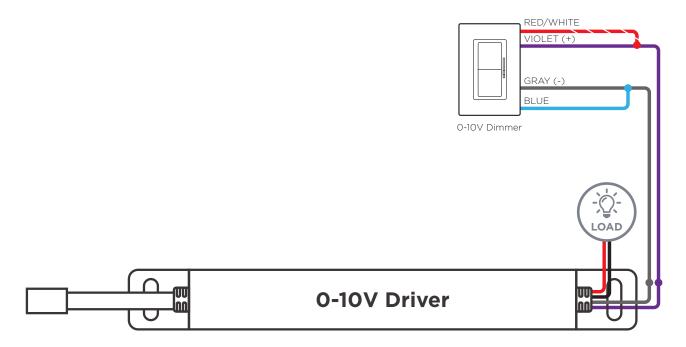


- Utilizes 0-10V dimming to control LED performance
- Lightweight, low profile
- Dimming range 10-100%
- 1% dimming power supply is available upon request
- Short circuit, overload & overheating protection
- UL and cUL recognized components
- Class 2 power unit
- Built-in active PFC function

0-10V DIMMING

Wiring Guidelines & Diagrams

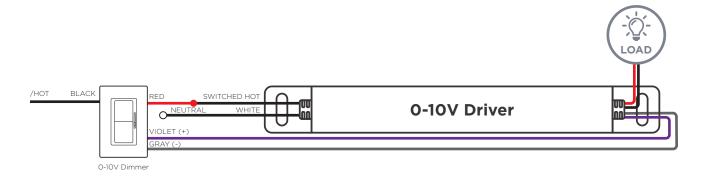
DIMMABLE ELECTRONIC LED DRIVER: 0-10V



- Specialized for sensitive installation environments
- DC voltage output prevents electro-magnetic interference Energy efficient and noise
- Multi-driver control

- Ideal for commercial fluorescent retrofitting

SINGLE POLE (GENERAL) 0-10V



- Supports single pole, 3-Way, or 120-277V wiring
- Multi-driver control
- Energy efficient

MAGNETIC LOW VOLTAGE

Control System Configuration

Magnetic low voltage dimming utilizes forward phase or leading-edge dimming depending on whether or not the forward parts of the sinewave are cut off. The brightness of the LED fixture is determined by the ratio of "on" time to "off" time. This system does not require the use of any additional control electronics as the power itself is dimmable, which makes wiring relatively easy.

Features



MLV Dimmer





Dimming



CONTROLS



DC24V

| INTERFACE | + | POWER | + | | | | |
|-------------------|---|-----------|-------|----------|----------|--|--|
| INTERFACE + POWER | | • | BRAIN | HARDWARE | | | |
| Pick one | | Pick one | | Pick one | Pick one | | |
| | | | I | N/A | N/A | | |
| | | DC12V Mag | netic | | | | |

Transformer



COMPATIBLE LOAD/LIGHT SOURCE

Please confirm custom lighting compatibility
with LEDCONN beforehand.

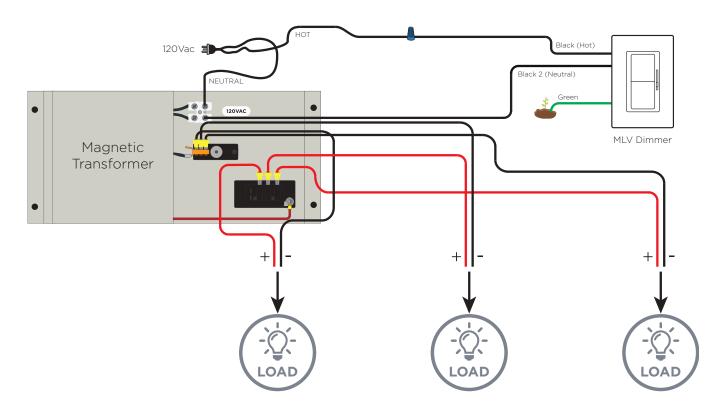
Select the compatible lighting product based on the recommendations on the Load Compatibility table on p.18.

MAGNETIC LOW VOLTAGE

Wiring Guidelines & Diagrams

MAGNETIC LOW VOLTAGE DIMMING

288W Transformer Wiring Diagram Pictured Here



*Please note slight flickering can occur below 40% dimming.

- Fully dimmable with most Magnetic Low-Voltage Wall Mount Dimmers
- 60W, 96W, 196W, 288W Dimmable Magnetic Transformer with 12VDC & 24VDC output
- Meets class 2 output limits

- Meets all UL, cUL, ANSI/UL, CSA requirements
- · Simplified wiring



Control System Configuration

The Nicolaudie DMX controller enables the user to create lighting shows with ease and organization, programmable from a PC or MAC using Nicolaudie control software. Features 2 dynamic controls options, live and stand-alone mode. Live mode enables changes and trigger cues for scenes and different lighting parameters from a connected personal computer. Stand-alone mode enables recording and replaying programmed DMX values without the need of an actively connected computer.

Features





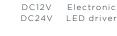






| OF | PTION 1 LIVE OR STA | AND AL | ONE WITH DM | X DEC | ODER | | | |
|----|----------------------------|--------|-------------|-------|------------|---------------------------------|---|----------------------------------------------------------------------------|
| | | | | | CONTROLS | | | COMPATIBLE LOAD/LIGHT SOURCE |
| | INTERFACE | + | POWER | + | MASTER | SLAVE | + | Please confirm custom lighting compatibility with LEDCONN beforehand |
| | Pick one | | Pick one | | Pick one | Pick one | | Pick your load / light source |
| 6 | | | E | | | SSES DECEMBER | | |
| | Nicolaudie Control | | | | Nicoloudio | 3- or 4- Channel DMX Decoder | | |







the DMX

Controller

Interface











Stand alone mode requires upload of programs onto the controllers integrated flash memory.



DC12V Electronic DC24V LED driver



3- or 4- Channel DMX Decoder

chain as many as needed to the DMX controller (max 32 decoders per daisy chain)

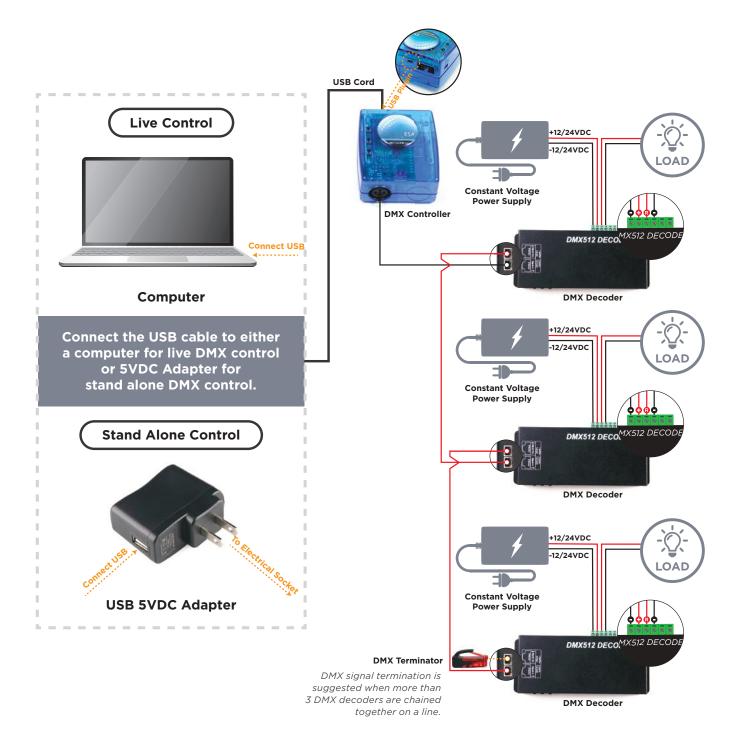


Select the compatible lighting product based on the recommendations on the Load Compatibility table on p.18.

DMX

Wiring Guidelines & Diagrams

OPTION 1 LIVE OR STAND ALONE WITH DMX DECODER





Control System Configuration

DMX LED driver with integrated DMX decoder delivers both power and control in a single package. The DMX LED driver outputs 12VDC or 24VDC constant voltage up to 4 channels.

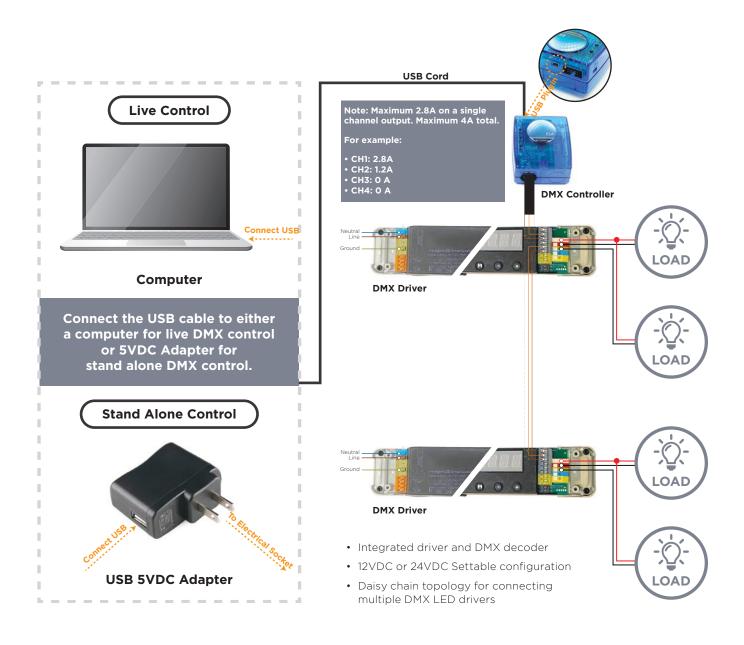
OPTION 2 LIVE OR STAND ALONE WITH DMX DRIVER

| | | | со | NTROLS | COMPATIBLE LOAD/LIGHT SOURCE |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|---------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------|
| INTERFACE | + PO | WER | + MASTER | SLAVE | Please confirm custom lighting compatibility with LEDCONN beforehand |
| Pick one | Pick | kone | Pick one | Pick one | Pick your load / light source |
| | - | | | | |
| Nicolaudie Control Software for Live Control | DC12V DC24V | DMX driver | Nicolaudie DMX controller | N/A | (- <u>-</u> - <u>-</u> - <u>-</u>) |
| | - | | | | Select the compatible lighting product based on the recommendations on the Load Compatibility table on p.18. |
| DMX Controller powered by a 5V AC/DC USB Adapter Stand alone mode requires upload of programs onto the controllers integrated flash memory. | DC12V DC24V | DMX driver | Built-in to the DMX Controller Interface | N/A | |

DMX

Wiring Guidelines & Diagrams

OPTION 2 LIVE OR STAND ALONE WITH DMX DRIVER



HOME/BUILDING CONTROL

Control System Configuration

The following Home or building control solutions are designed to integrate several control sectors including lighting, audio visual, and HVAC systems.

Processors are required for whole home or building control integration. The processor provides large scale capabilities by integrating control and communication links between a multitude of system components. Multiple processors may be required depending on project size.

Each processor contains 2 control links which can integrate the following system component quantities:

- · 16 power interfaces or panels
- · 99 wired or wireless devices

Features



















Advanced

Scalable Hardwired

Quick Slide Dimming

0-10V Dimming

MLV Dimming

ELV Dimming

DMX

Investment

LEDCONN product offering is limited to the LED drivers, DMX decoders, and LED load. All other components in the home and building control system shown are for reference only and sold by others. Please consult local sales representative agency for total system integration.

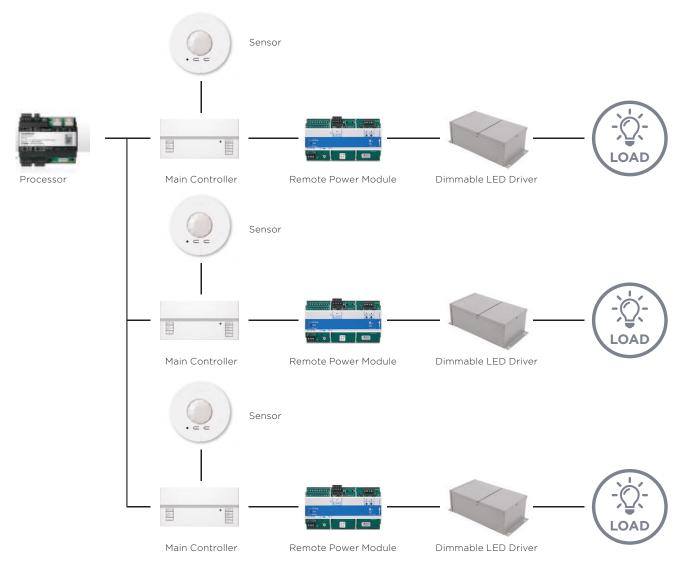
HOME/BUILDING CONTROL

Control System Configuration

SINGLE OR MULTI-ROOM CONTROL WITH REMOTE POWER MODULE (RPM)



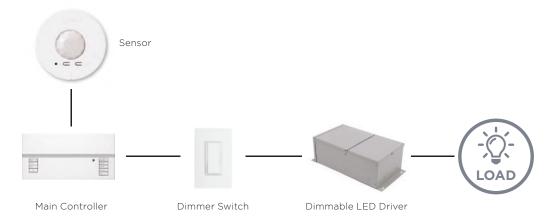
WHOLE HOME OR BUILDING CONTROL WITH REMOTE POWER MODULE (RPM)



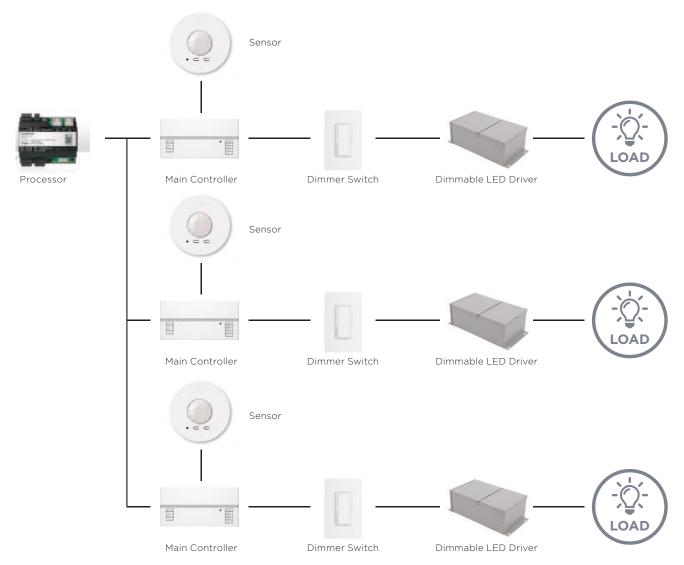
HOME/BUILDING CONTROL

Control System Configuration

SINGLE OR MULTI-ROOM CONTROL WITH DIMMER



WHOLE HOME OR BUILDING CONTROL WITH DIMMER



LOAD COMPATIBILITY

Compatible Load/Light Sources: Static White

The table below shows which of our static white light sources are compatible with the drivers and control systems indicated in this guide. Please always confirm custom lighting compatibility with the LEDCONN team beforehand.

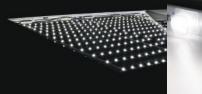
EDGE-LIT & BACKLIGHTING







LUXFLEX Standard Premium



LUXMESH Short Medium Long



PERIMETER POWER Short Medium Long

LINEAR







LUXLINEAR Normal 1715 Low 1707 Slim 1008 Corner 1919 Round 2019 Flat 1408M Square 1513M



LUXNEON Static White

LIGHT BOXES



SOA D



FABRIC 45 100 120 200



Available Drivers & Controls

CONTROLS PWM, 0-10V, & DMX

ENVIRONMENT Indoor CONNECTION TYPE Plug-in / DC barrel plug or Hardwire

CONTROLS PULSE-WIDTH MODULATION (PWM) DIMMING

| PRODUCT | P/N | NAME | # OF CHANNELS | INPUT VOLTAGE | DIMENSIONS | MAX LOAD | CONNECTION TYPE | OPERATING TEMPERATURE |
|---------|-------|----------------------------------|------------------|------------------|---------------------------------------------|-------------|--------------------|--------------------------------|
| | ZDMW | Inline Plug & Play Dimmer | 1 | 12-24VDC | 2.40" X 1.30" X 1.26" 61mm X 33mm X 32mm | 6A | DC Barrel | -4°F - +140°F -20°C - +60°C |
| VE ! | ZDMR2 | Mini IR Remote + IR Dimmer | 1 | 12-24VDC | 2" X 1.38" X 0.24" 85mm X 40mm X 6mm | 6A | DC Barrel | -4°F ~ +140°F -20°C - +60°C |

CONTROLS 0-10V

| PRODUCT | P/N | NAME | # OF CHANNELS | INPUT VOLTAGE | DIMENSIONS | MAX LOAD | CONNECTION TYPE | OPERATING TEMPERATURE |
|---------|-------------|-------------------|------------------|------------------|----------------------------------------------|-------------|--------------------|--------------------------------|
| 1 | ZDMRDIM-240 | Dimming Module | 1 | 10-48VDC | 5.91" X 1.61" X 0.79" 150mm X 41mm X 20mm | 5A | Hardwire | -4°F ~ +122°F -20°C ~ +50°C |

CONTROLS/INTERFACES DMX

| PRODUCT | P/N | NAME | # OF CHANNELS | INPUT VOLTAGE | OUTPUT POWER | DIMENSIONS | MAX LOAD PER CHANNEL | CONNECTION TYPE | OPERATING TEMPERATURE |
|---------------------|-----------------|-------------------|------------------|------------------|------------------------------------|--------------------------------------------------|----------------------------|--------------------|--------------------------------|
| | ZCTDMXU9 | DMX Controller | N/A | 5-5.5VDC | N/A | 3.11" X 3.62" X 1.69" 79mm X 92mm X 43mm | N/A | XLR3 | -4°F ~ +140°F -20°C ~ +60°C |
| | ZDMDMX512-XLR-3 | DMX Decoder | 3 | 12-24VDC | <i>12V</i> 144W <i>24V</i> 288W | 5.77" X 2.60" X 1.59" 146.5mm X 66mm X 40.5mm | 4A/CH | Hardwire | -4°F ~ +140°F -20°C ~ +60°C |
| 100 1772 <u></u> | ZDMDMX512-XLR-4 | DMX Decoder | 4 | 12-24VDC | <i>12V</i> 192W <i>24V</i> 384W | 5.77" X 2.60" X 1.59" 146.5mm X 66mm X 40.5mm | 4A/CH | Hardwire | -4°F ~ +140°F -20°C ~ +60°C |

Available Drivers & Controls

UL CLASS 2 POWER SUPPLIES DC PLUG-IN POWER ADAPTERS

ENVIRONMENT INPUT VOLTAGE **OUTPUT VOLTAGE** Indoor 100-240VAC 12VDC / 24VDC

CONNECTION TYPE

Plug-in / DC barrel plug

CERTIFICATION



| PRODUCT | P/N | OUTPUT VOLTAGE | INPUT VOLTAGE | OUTPUT POWER | DIMENSIONS | UL |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------|------------------|-----------------|-----------------------------------------------------|-----------|
| 3 | ZTREB12V1AN | 12VDC | | 12W | 2.90" X 1.09" X 1.67" 73.7mm X 27.7mm X 42.4mm | |
| | ZTREB12V2AN | 12VDC | | 24W | 3.54" X 1.85" X 1.17" 89.9mm X 46.7mm X 29.7mm | |
| A STATE OF THE STA | ZTREB12V3AN | 12VDC | | 36W | 3.54" X 1.85" X 1.17" 89.9mm X 46.7mm X 29.7mm | |
| | ZTREB12V4AN | 12VDC | | 48W | 4.70" X 2.05" X 1.32" 119.4mm X 52.1mm X 33.5mm | |
| | ZTREB12V5AN2 | 12VDC | 100-240VAC | 60W | 4.70" X 2.05" X 1.32" 119.4mm X 52.1mm X 33.5mm | UL Listed |
| | ZTREB24V1AN | 24VDC | | 24W | 3.54" X 1.85" X 1.17" 89.9mm X 46.7mm X 29.7mm | |
| | ZTREB24V2AN | 24VDC | | 48W | 4.70" X 2.05" X 1.32" 119.4mm X 52.1mm X 33.5mm | |
| | ZTREB24V3AN | 24VDC | | 72W | 4.65" X 2.34" X 1.45" 118.1mm X 59.4mm X 36.8 mm | |
| | ZTREB24V4AN | 24VDC | | 96W | 6.75" X 2.82" X 1.56" 171.5mm X 71.6mm X 39.6mm | |

Available Drivers & Controls

UL CLASS 2 POWER SUPPLIES REGULAR ELECTRONIC LED DRIVERS

ENVIRONMENT Indoor INPUT VOLTAGE 90-265VAC / 90-295VAC / 90-305VAC

12VDC / 24VDC **OUTPUT VOLTAGE** CONNECTION TYPE Hardwire

CERTIFICATION





*Safe for use in indoor and outdoor environments.

| PRODUCT | P/N | OUTPUT VOLTAGE | INPUT VOLTAGE | OUTPUT POWER | DIMENSIONS | UL |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|------------------|-----------------|-----------------------------------------------------|------------------|
| Market Care Control | ZTREM12V60WV* | 12VDC | 90-264VAC | | 6.40" X 1.67" X 1.26" 162.5mm X 42.5mm X 32mm | |
| A STATE OF THE PARTY OF THE PAR | ZTREM12V60WF* | 12VDC | 90-305VAC | 2011 | 6.40" X 1.69" X 1.26" 162.5mm X 43mm X 32mm | _ |
| and condition of the condition | ZTREM24V60WV* | 24VDC | 90-264VAC | 60W | 6.40" X 1.67" X 1.26" 162.5mm X 42.5mm X 32mm | _ |
| A Maria Company | ZTREM24V60WF* | 24VDC | 90-305VAC | | 6.40" X 1.69" X 1.26" 162.5mm X 43mm X 32mm | UL Recognized |
| and the second s | ZTREM24V90WF* | 24VDC | 90-305VAC | 90W | 6.34" X 2.40" X 1.42" 161mm X 61mm X 36mm | _ |
| 2. | ZTREM24V100WPLN | 24VDC | 90-295VAC | 96W | 7.87" X 2.78" X 1.38" 200mm X 70.5 X 35mm | _ |
| A STATE OF THE STA | ZTREM24V320WHLG* | 24VDC | 90-305VAC | 320W | 8.87" X 3.54" X 1.72" 225.2mm X 90mm X 43.8mm | _ |
| · Comment | ZTREM24V80WHLG* | 24VDC | 90-305VAC | 81.6W | 7.70" X 2.42" X 1.53" 195.6mm X 61.5mm X 38.8 mm | |
| 47 | ZTREA24V99WANP-UL* | 24VDC | 90-305VAC | 100W | 7.80" X 2.76" X 1.22" 198mm X 70mm X 31mm | - UL Listed |

Available Drivers & Controls

UL CLASS 2 POWER SUPPLIES DIMMABLE ELECTRONIC LED DRIVERS: 0-10V

ENVIRONMENT
INPUT VOLTAGE
OUTPUT VOLTAGE
CONNECTION TYPE

Indoor 120-277VAC 24VDC Hardwire O-10V

CERTIFICATION





| PRODUCT | P/N | OUTPUT VOLTAGE | INPUT VOLTAGE | OUTPUT POWER | DIMENSIONS | UL |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------|------------------|-----------------|-----------------------------------------------------|------------------|
| | ZTREA24V100W277-H | 24VDC | 120-277VAC | 96W | 14.21" x 1.18" x 0.83" 361mm x 30mm x 21mm | UL Recognized |
| No. of the last of | ZTREM24V96W277-J | 24VDC | 120-277VAC | 96W | 12.10" x 11.40" x 1.40" 307.9mm x 290.5mm x 35mm | UL Listed |
| | ZTREM24V96W277- NO J | 24VDC | 120-277VAC | 96W | 7.5" x 6.80" x 1.40" 191.6mm x 172mm x 35mm | UL Listed |

UL CLASS 2 POWER SUPPLIES DIMMABLE ELECTRONIC LED DRIVERS: DMX

ENVIRONMENT
INPUT VOLTAGE
OUTPUT VOLTAGE
CONNECTION TYPE

Indoor 120/277VAC 12VDC / 24VDC Hardwire

DMX

CERTIFICATION



| PRODUCT | P/N | OUTPUT VOLTAGE | INPUT VOLTAGE | OUTPUT POWER | DIMENSIONS | UL |
|---------|----------------|--------------------------------------------------------------------|------------------|-----------------|-----------------------------------------------|------------------|
| | ZTREE1224V100W | 12VDC or 24VDC (select output voltage with DIP switch) | 120-277VAC | 96W | 15.27" X 1.65" X 1.18" 388mm X 42mm X 30mm | UL Recognized |

Available Drivers & Controls

UL CLASS 2 POWER SUPPLIES MAGNETIC TRANSFORMER

ENVIRONMENT Indoor INPUT VOLTAGE 120VAC 12VDC/24VDC **OUTPUT VOLTAGE CONNECTION TYPE** Hardwire

DIMMING **MLV**



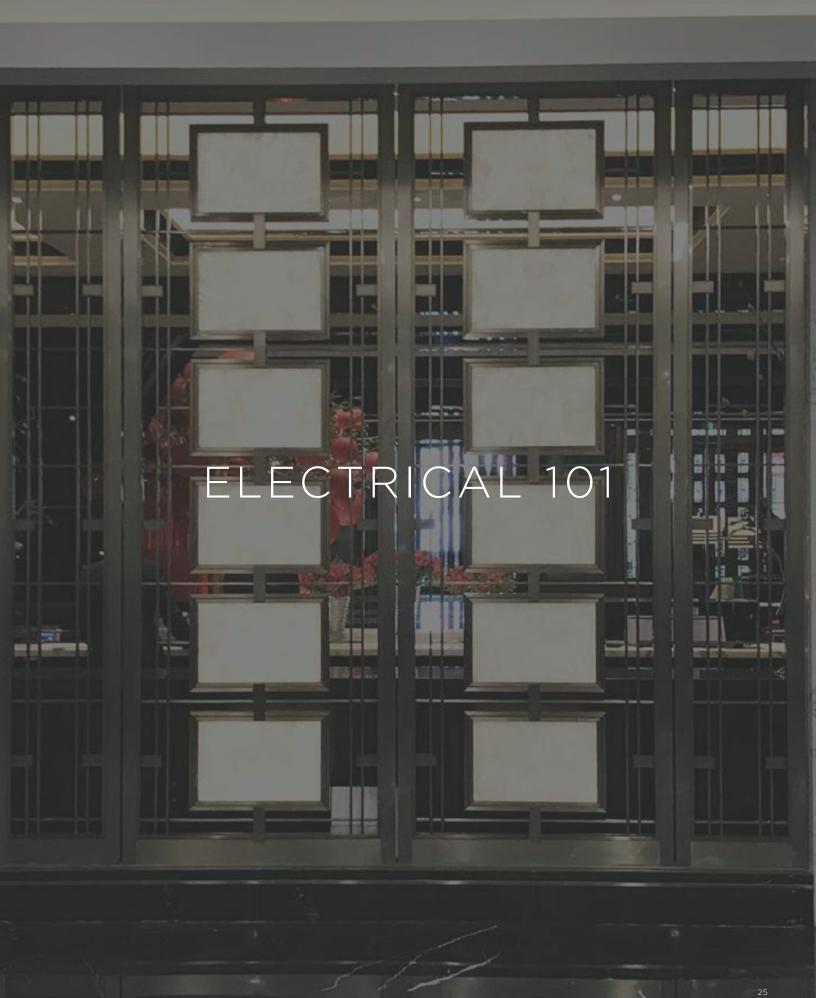
| PRODUCT | P/N | OUTPUT VOLTAGE | INPUT VOLTAGE | OUTPUT POWER | DIMENSIONS | CONNECTION TYPE | OPERATING TEMPERATURE |
|---------|--------------|-------------------|------------------|-----------------|-----------------------------------------------|-----------------|--------------------------------|
| | ZTRMS12V60W | 12VDC | 120VAC | 60W | 8.5" X 3.5" X 3 215.9mm X 88.9mm X 76.2 mm | Hardwire | +32°F ~ +104°F -0°C ~ +40°C |
| | ZTRMS24V96W | 24VDC | 120VAC | 96W | 8.5" X 3.5" X 3 215.9mm X 88.9mm X 76.2 mm | Hardwire | +32°F ~ +104°F -0°C ~ +40°C |
| | ZTRMS24V192W | 24VDC | 120VAC | 192W | 14" X 8" X 5" 355.6mm X 203.2mm X 127 mm | Hardwire | +32°F ~ +104°F -0°C ~ +40°C |
| - | ZTRMS24V288W | 24VDC | 120VAC | 288W | 14" X 8" X 5" 355.6mm X 203.2mm X 127 mm | Hardwire | +32°F ~ +104°F -0°C ~ +40°C |

INTERFACES WALL SWITCHES

ENVIRONMENT Indoor INPUT VOLTAGE 120VAC **CONNECTION TYPE** Hardwire



| PRODUCT | P/N | CONTROL TYPE | INPUT VOLTAGE | DIMENSIONS | CONNECTION TYPE | OPERATING TEMPERATURE |
|---------|--------------|-----------------|------------------|----------------------------------------------|-----------------|--------------------------------|
| | ZDMLDVL10P | MLV | 120VAC | 3.11" X 4.69" X 1.30" 79mm X 119mm X 33mm | Hardwire | +32°F - +104°F -0°C - +40°C |
| | ZDMLDVL600P | MLV | 120VAC | 3.11" X 4.69" X 1.30" 79mm X 119mm X 33mm | Hardwire | +32°F ~ +104°F -0°C - +40°C |
| | ZDMLDVLV603P | MLV | 120VAC | 3.11" X 4.69" X 1.30" 79mm X 119mm X 33mm | Hardwire | +32°F - +104°F -0°C - +40°C |
| | ZDMLDTV010V | 0-10V | 24VDC | 3.11" X 4.69" X 1.30" 79mm X 119mm X 33mm | Hardwire | +32°F ~ +104°F -0°C - +40°C |



Glossary

Brain

We understand that lighting & controls can be confusing. That's why we're so passionate about providing quality consultation and educational resources to better serve you. For further assistance, reach out to any of our in-house LEDCONN lighting gurus!

0-10V 0-10V dimming continues to be an effective method of dimming. A 0-10V dimmer operates

by varying a DC voltage control signal between 10V and 0VDC. Where the light fixture is at maximum output when the unit is set to 10V and at minimum output when the unit is set at 0V.

0-10V offers versatility for retrofit or new installations. Existing 0-10V fluorescent systems can be directly retrofitted to newer 0-10V LED systems. 0-10V systems are intuitive, does not

require specialized software or programming knowledge.

Amplifier An electronic device that increases load capacity and extends the signal of a LED system. This

is done by replicating the signal of the primary LED run to power the secondary LED runs.

The primary device in the system that handles and distributes commands to sub-controllers, sensors, control interfaces, and lighting loads.

Channel Typically used for multi-colored LEDs such as Tunable White, RGB, and RGBW, a channel refers

to the color of an LED output. With a controller, the user will have the ability to control the

output of the channel(s) to generate custom color combinations.

Class 2 is a specification by the NEC (National Electric Code) that standardizes requirements

for power supplies and electrical wiring. These NEC requirements encompass the installation of electrical conductors and equipment within or on buildings as well as define Class 2 circuits, limiting the maximum voltage and current. For electrical work involving low voltage and requiring permits, local and national jurisdictions base their permit approvals on these standards. Class 2 circuits are restricted to 100 Watts, 60VDC, or 5A per circuit. This requires power supply limitations of 60W for 12VDC and 96W for 24VDC for compliance with Class 2 requirements. The limited output power of the class 2 circuit is understood as low risk for fires

and electrical shock which in turn facilitates lower cost wiring practices to be utilized.

Connection Terminology Gender The gender of a connector is referenced to whether the connector plugs in (Male)

or is plugged into (Female).

Polarity Describes the positive and negative orientation of the electronic device. DC

connections can be connected in only one orientation, positive to positive and negative to negative. Connectors typically contain identifiers (+)/(-) to assist in the

correct polarity mating.

Connector Connectors are used to join sections of a system together and are available in

various packages ranging from DC barrels to screw terminals.

Constant Current Constant Current luminaires require a constant current to be supplied from the driver. For these

lights the current is fixed by the driver but the voltage may vary. Constant current lights are ALWAYS wired in series. For industrial lighting, a constant current system is more common; however, a system redesign may be required to account for changes that may occur in the

future.

Constant Voltage Constant voltage luminaires require a steady voltage to be supplied from the driver. For these

lights the voltage is fixed by the driver but the current may vary. Constant voltage lights are ALWAYS wired in parallel. Constant voltage systems feature better flexibility in comparison to

constant current systems.

Most of LEDCONN's products are constant voltage systems

Control A process that converts a user input into a desired fixture response, generally through a remote

controller, smart device, or programming software.

Decoder An electronic device used to translate digital DMX signals from a control source into an analog

signal used to control LED fixtures.



Glossary

Dimmer An electronic device that is connected to light fixtures and adjusts their brightness.

DMX DMX is a control protocol that enables the end-user to control lighting fixtures from a single

source. Since DMX is a digital signal it requires additional components in order to operate, including a computer interfacing console or DMX console and a DMX decoder or DMX enabled

LED driver.

DMX terminators reduce noise in the DMX transmission line and improves the reliability of the **DMX Terminator**

fixtures. DMX terminators are recommended when large amounts of DMX fixtures are on a

single DMX line and connected to the last fixture in the line.

Drivers are electronic devices that convert electricity from high (AC) voltage to low (DC) Driver

voltage, generally from 120V to 12V or 24V.

Electronic Low Voltage

Dimming (ELV)

ELV dimming alters the trailing end of the incoming supply voltage to the driver in order to dim the LED fixture.

Input Voltage Input voltage refers to the voltage required to supply the system.

The user interface changes the system modes or settings in order to alter the lighting effects. Interface

Infrared (IR) Remotes transmit pulses of light that relay user input commands to a receiver. IR

The part of a circuit that consumes electricity, usually the light sources. Load

Low Voltage Dimming When dimming a low-voltage fixture, the dimmer controls the line voltage (VAC) input

to the transformer powering the low-voltage lights. There are two types of transformers manufactured for low-voltage lighting: Magnetic (core and coil) - MLV and Electronic (solid-

Low Voltage Transformers are electronic devices that convert electricity from high voltage to **Low Voltage Transformer**

low voltage, generally from 120V to 12V or 24V.

Magnetic Low Voltage

Dimming (MLV)

MLV dimming alters the leading end of the incoming supply voltage to the driver in order to dim the LED fixture.

Master Controller The master controller is an electronic device that processes commands to slave receivers.

The maximum wattage that the driver is designed to support. Max Load

Output Power The power supplied by the LED driver.

Power supply with integrated output connector. **Plug-in Adapter**

Pre-Set Programming The default settings or programs that are built into the control system by the control

manufacturers.

Programmable Capability of accepting defined user input commands.

PWM dimming dims the LED by switching the low-voltage signal on and off at high frequencies **PWM**

where the duration of the off time determines the dim level.

Receiver Receivers receive and process user input command signals from a number of sources and

outputs the user input command to the LED.

Radio Frequency Remotes transmit radio wave signals that relays user input commands to a **RF Remote**

receiver

RGB RGB is a combination of three LEDs (red, green, and blue) in a single package. RGB LEDs

combine the three colors to produce different hues of light by adjusting the brightness of each

of the three LEDs.

RGBW is a combination of four LEDs (red, green, blue, and white) in a single package. RGBW **RGBW**

LEDs are capable of combining the three RGB colors and white to produce various hues or

illuminating a space with white light.

Single pole switches control one or more light fixtures from a single location. Single-Pole



Glossary

Slave ReceiverThe slave receiver is an electronic device that processes commands from a master controller.

Static White White LEDs that maintain the same color temperature.

Touch Dial A visual dial display interface where the end user has the ability to control the system through

touch gestures.

Tunable White Tunable White is the combination of two LEDs (warm white, and cool white) where the warm

and cool white LEDs are positioned adjacent to each other. Tunable White LEDs combine the

two colors to facilitate the color temperature range of 2400K to 6500K.

UL UL is the abbreviation for Underwriters Laboratories, an organization that is a world leader in

product safety testing and certification. UL is one of several companies approved to perform safety testing by the U.S. federal agency Occupational Safety and Health Administration

(OSHA).

UL Listed/ UL Recognized The UL Listed and UL Recognized Marks indicate that a product has been tested and

has passed the specific requirement in one or more categories for product safety by the Underwriters Laboratories (UL). UL Mark on a product assures the product meets the minimum

safety standard

• Keep in mind that UL Marks may not always be mandatory but are often required for certain specific applications, installations, and inspections.

• Most of LEDCONN's lighting solutions are UL certified products.

Wall Mount/Wall Switch Wall switches are electronic devices that are used to turn lights on & off to reduce or increase

brightness levels.

Wiring Diagram Wiring diagrams are visual representations of a circuit connection or layouts of an electrical

system.



FAQs

Below are answers to some frequently asked questions about electrical fundamentals. For further assistance with understanding these or any other related electrical concepts, reach out to our team of lighting gurus at any time.

Voltage Drop

What is voltage drop?

Voltage drop is an occurrence where the Voltage gradually drops as it travels along a conductor (cable or LED strip) due to resistance in the line. The longer the conductor length, the greater the voltage drop. Voltage drop impacts the LED brightness resulting in the LED being dimmed.

How can I minimize voltage drop?

- 1. Minimize wire length.
- 2. Utilize adeqately sized wire between the LED driver and LED strip. Larger wires have less resistance and can carry power more efficiently
- 3. Minimize LED strip length, split the run into multiple sections and have each section wired directly back to the LED driver.

How can I determine an appropriate wire gauge?

- 1. Determine the total length of wire required from the LED driver to the LED strip.
- 2. Determine the Voltage, Current, and Wattage of the LED strip. The Voltage should be specified by the manufacturer on the specification sheet or on the LED strips themselves. To find the Wattage, multiply the provided wattage per foot by the length of the LED strip. To find the Current, divide the calculated Wattage by the Voltage of the LED strip.
- 3. Reference the tables below matching the calculated Current and wire length to determine the appropriate wire gauge.

12V Wire Gauge Sizing Chart

| Wire Gauge | 12W <i>1A</i> | 24W 2A | 36W <i>3A</i> | 48W 4A | 60W <i>5A</i> |
|------------|----------------------|---------------|----------------------|---------------|----------------------|
| 24 AWG | 9.4 ft | 4.7 ft | 3.1 ft | 2.3 ft | 1.9 ft |
| 22 AWG | 14.9 ft | 7.5 ft | 5.0 ft | 3.7 ft | 3.0 ft |
| 20 AWG | 23.8 ft | 11.9 ft | 7.9 ft | 5.9 ft | 4.8 ft |
| 18 AWG | 37.8 ft | 18.9 ft | 12.6 ft | 9.4 ft | 7.6 ft |
| 16 AWG | 60.0 ft | 30.0 ft | 20.0 ft | 15.0 ft | 12.0 ft |
| 14 AWG | 95.5 ft | 47.8 ft | 31.8 ft | 24.0 ft | 19.0 ft |
| 12 AWG | 152.0 ft | 76.0 ft | 50.6 ft | 38.0 ft | 30.4 ft |
| 10 AWG | 241.5 ft | 120.7 ft | 80.5 ft | 60.4 ft | 48.3 ft |

24V Wire Gauge Sizing Chart

| Wire Gauge | 24W 1A | 48W 2A | 72W <i>3A</i> | 96W 4A | |
|------------|---------------|---------------|----------------------|----------|--|
| 24 AWG | 18.8 ft | 9.4 ft | 6.3 ft | 4.7 ft | |
| 22 AWG | 30.0 ft | 15.0 ft | 10.0 ft | 7.5 ft | |
| 20 AWG | 47.5 ft | 23.8 ft | 15.8 ft | 11.9 ft | |
| 18 AWG | 75.5 ft | 37.8 ft | 25.2 ft | 18.9 ft | |
| 16 AWG | 120.1 ft | 60.1 ft | 40.0 ft | 30.0 ft | |
| 14 AWG | 191.0 ft | 95.5 ft | 63.7 ft | 47.8 ft | |
| 12 AWG | 303.7 ft | 151.9 ft | 101.2 ft | 75.9 ft | |
| 10 AWG | 482.9 ft | 241.5 ft | 161.0 ft | 120.7 ft | |



FAQs

Dimming

Are my LEDs dimmable?

The LED by itself is not dimmable; a dimmable LED driver must be paired with the LED to enable dimming. The type of dimmer switch you use must also match the type of dimming.

What are the available dimming types?

There are 4 main types of dimming; phase dimming, PWM, 0-10V, and DMX.

- 1. Phase Dimming (MLV or ELV): Phase dimming systems dim the LED by altering the incoming supply voltage to the driver.
- 2. PWM Dimming: PWM dimming dims the LED by switching the low-voltage signal on and off at high frequencies where the duration of the off time determines the dim level.
- 3. 0-10V Dimming: 0-10V dimming dims the LED by sending a signal to the LED driver over an additional 2-wire control line. Note the control wires have polarities which must be kept in mind when wiring.
- 4. DMX: DMX is a digital control protocol that allows for control of individual fixtures utilizing a low voltage control signal. DMX utilizes PWM dimming technology to adjust the fixture brightness.

What are the benefits of each dimming type?

- 1. Phase dimming systems adjust the fixture dimming controls via the AC lines, simplifying the installation and wiring.
- 2. O-10V and DMX dimming systems require additional control signals apart from the AC lines for dimming control. The additional control signals add complexity to the installation and wiring, but results in a greater system performance.

What are constant voltage drivers?

Constant Voltage Drivers vary the current to maintain a fixed (constant) voltage across a fixture.

What are the benefits of constant voltage drivers?

Constant Voltage Drivers ensure a fixed voltage across multiple fixtures connected in parallel. In a Constant Voltage fixture system the fixed voltage input reduces complexity in wiring and installation.



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DRIVERS & CONTROLS

Static White



A guide on wiring, luminaire compatibility, and product availability