LEDCONN

— Be the FOCUS —

DRIVERS & CONTROLS

Static White

A guide on wiring, luminaire compatibility, and product availability

LEDCONN — Be the FOCUS —

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TABLE OF CONTENTS

301 Thor Place, Brea, CA 92821 | **tel** (714) 256-2111 | **fax** (714) 256-2118 | sales@ledconn.com | **www.ledconn.com**

WIRING GUIDELINES & DIAGRAMS

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

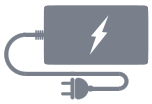
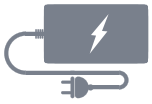
Easy Control

Plug & Play

Quick Dial Dimming

Pulse-Width Modulation

Cost-Effective

INTERFACE +	POWER +	CONTROLS		+	COMPATIBLE LOAD/LIGHT SOURCE
		BRAIN	HARDWARE		*Please confirm custom lighting compatibility with LEDCONN beforehand.*
Pick one	*Pick one*	*Pick one*	*Pick one*		*Pick your load / light source*
 Inline Plug & Play Dimmer with Rotary Knob	 DC12V DC24V Plug-in adapter	Built-in to the interface	Built-in to the interface		 Select the compatible lighting product based on the recommendations on the Load Compatibility table on p.20.
 Mini IR Remote	 DC12V DC24V Plug-in adapter	 IR Dimmer	N/A		

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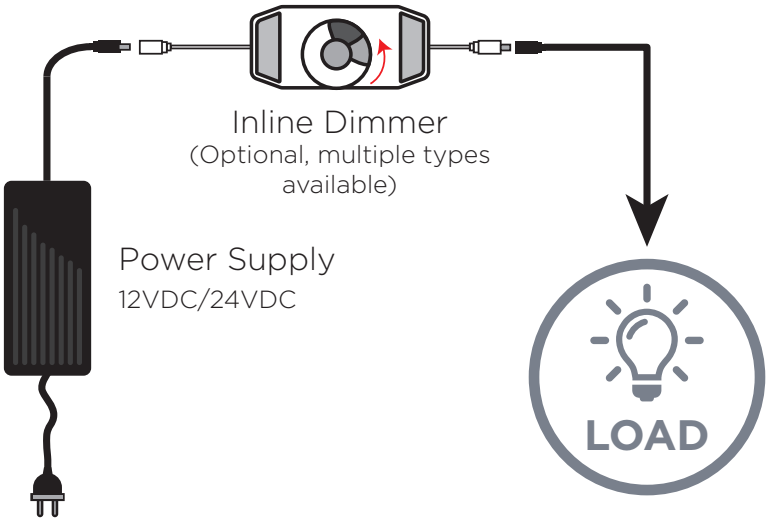
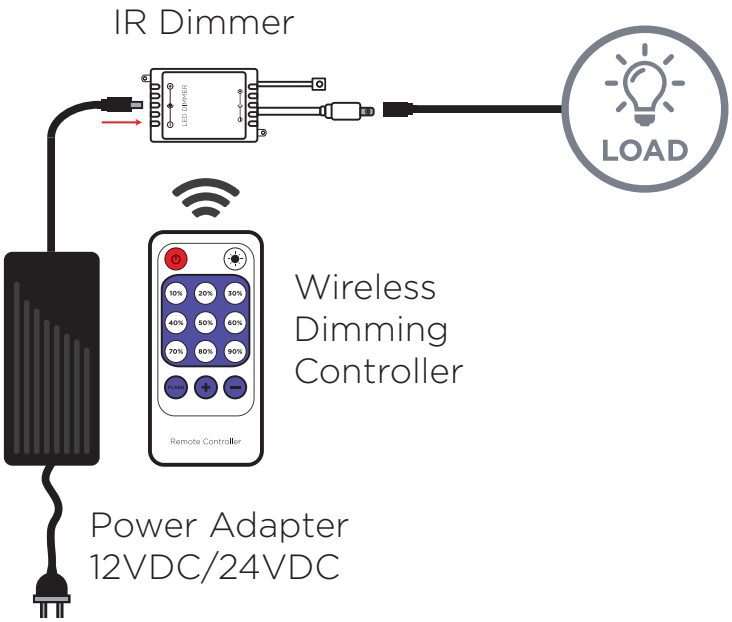
PULSE-WIDTH MODULATION

Wiring Guidelines & Diagrams

INLINE PLUG & PLAY DIMMER



MINI IR REMOTE & IR DIMMER



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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 0V.

Features

Scalable

Hardwired

Quick Slide Dimming

0-10V Dimming

Moderately Priced

INTERFACE +	POWER +	CONTROLS		+	COMPATIBLE LOAD/LIGHT SOURCE
		BRAIN	HARDWARE		*Please confirm custom lighting compatibility with LEDCONN beforehand.*
Pick one	*Pick one*	*Pick one*	*Pick one*		*Pick your load / light source*
 24VDC 0-10V Dimmer Switch	 DC24V Electronic LED driver	 Dimming module	N/A		 Select the compatible lighting product based on the recommendations on the Load Compatibility table on p.20.
 24VDC 0-10V Dimmer Switch	 DC24V 0-10V driver	N/A	N/A		
 Single Pole 0-10V Wall Dimmer Switch	 DC24V 0-10V driver	N/A	N/A		

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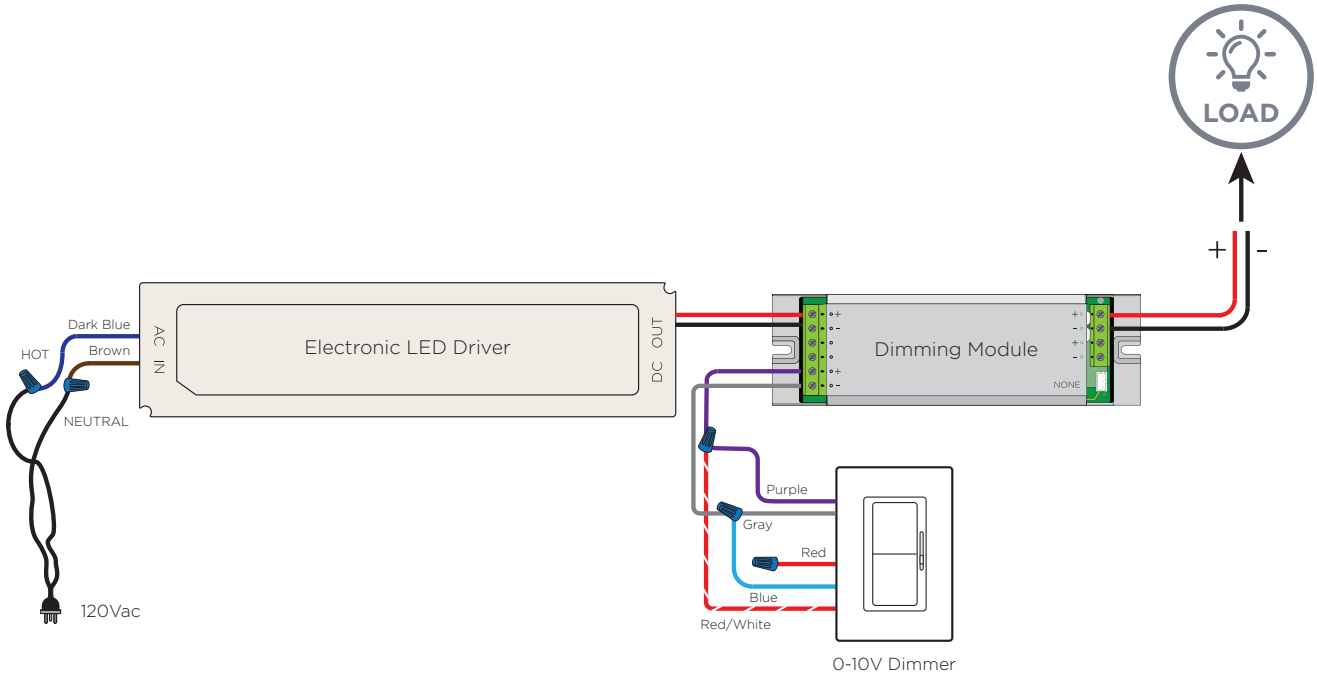
0-10V DIMMING

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

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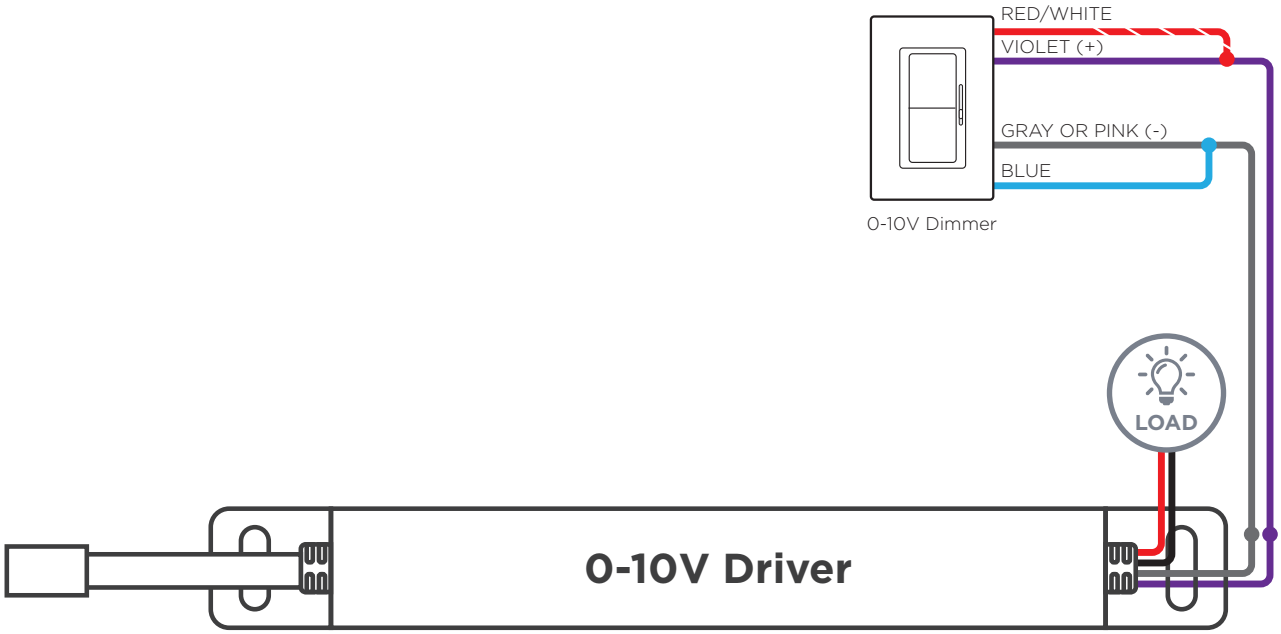
0-10V DIMMING

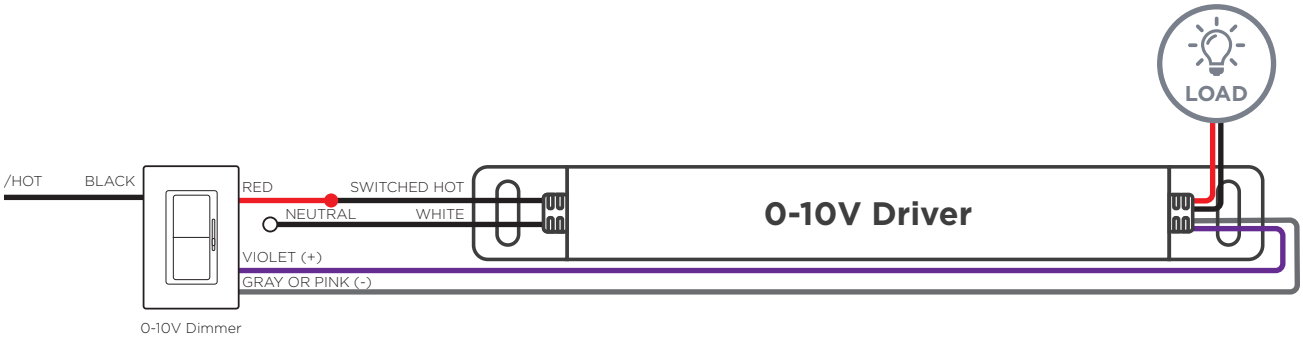
Wiring Guidelines & Diagrams

DIMMABLE ELECTRONIC LED DRIVER: 0-10V



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

SINGLE POLE (GENERAL) 0-10V



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

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MAGNETIC LOW VOLTAGE

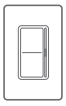
Control System Configuration

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

Scalable

Hardwired



Quick Slide Dimming

MLV Dimming

Moderately Priced

INTERFACE +	POWER +	CONTROLS		+	COMPATIBLE LOAD/LIGHT SOURCE
		BRAIN	HARDWARE		*Please confirm custom lighting compatibility with LEDCONN beforehand.*
Pick one	*Pick one*	*Pick one*	*Pick one*		*Pick your load / light source*
		N/A	N/A		
MLV Dimmer	DC12V DC24V Magnetic Transformer				Select the compatible lighting product based on the recommendations on the Load Compatibility table on p.20.

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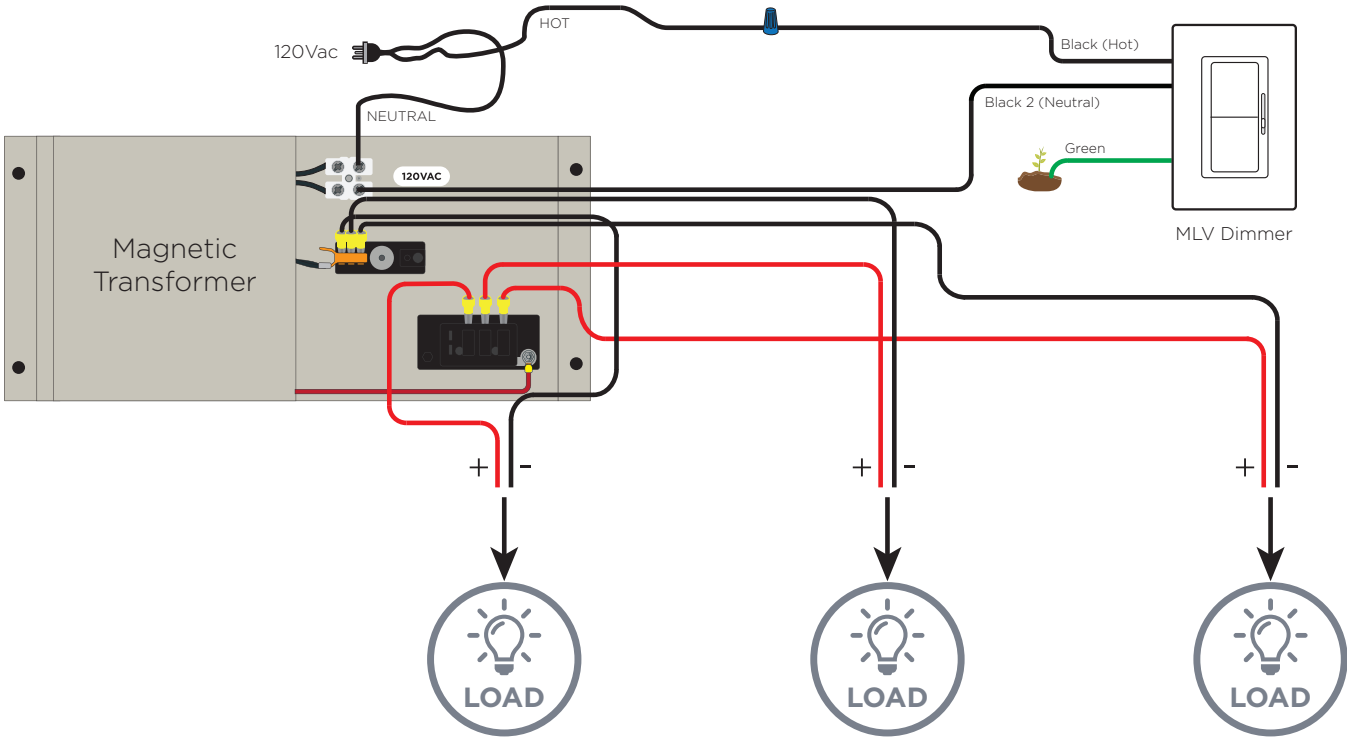
MAGNETIC LOW VOLTAGE

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

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DMX

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

Scalable

Hardwired

DMX

Programmable

Investment

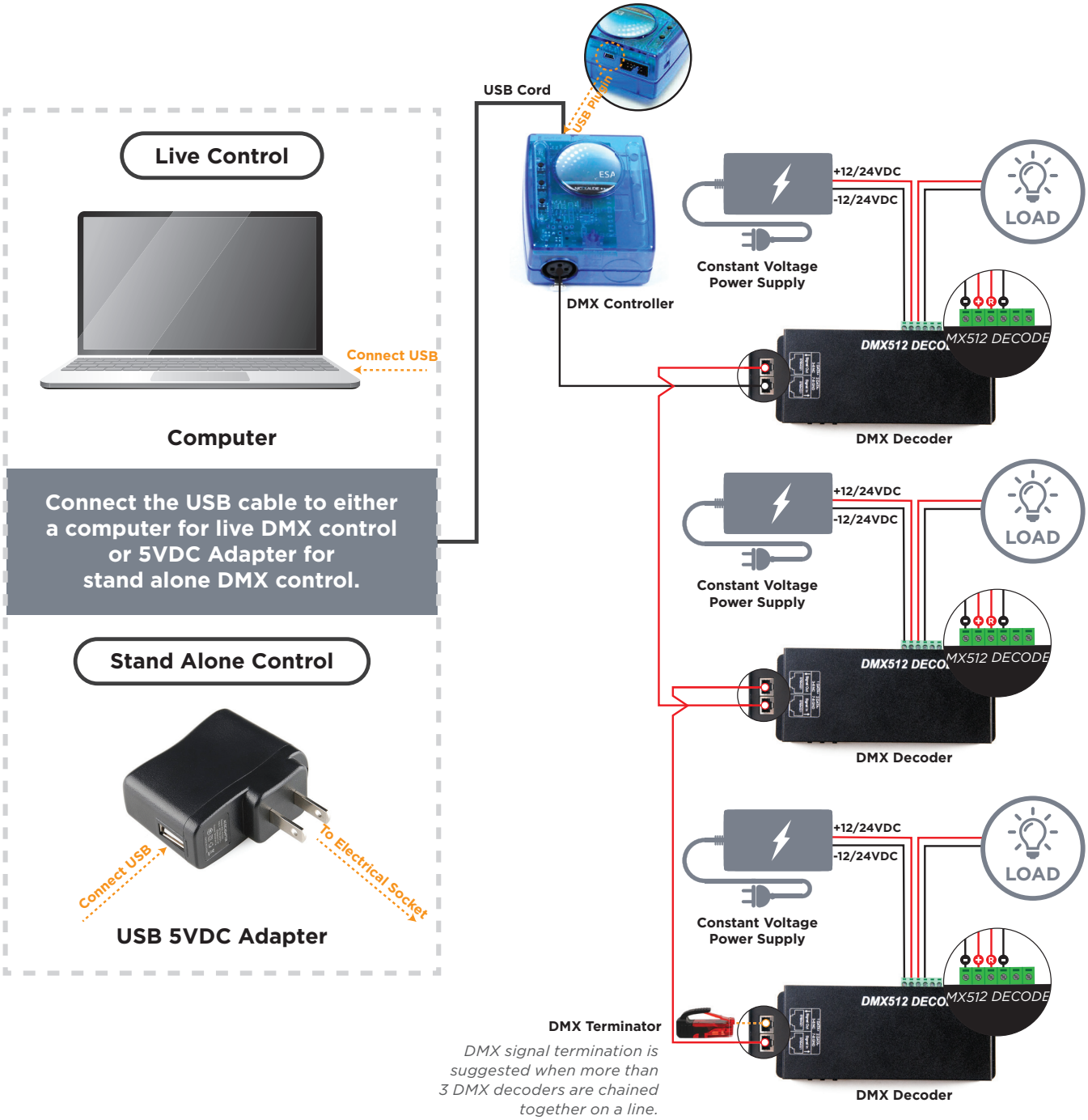
OPTION 1 **LIVE OR STAND ALONE WITH DMX DECODER**

INTERFACE	+	POWER	+	CONTROLS		+	COMPATIBLE LOAD/LIGHT SOURCE
				CONTROLLER	RESPONDER		*Please confirm custom lighting compatibility with LEDCONN beforehand*
Pick one		*Pick one*		*Pick one*	*Pick one*		*Pick your load / light source*
 Nicolaudie Control Software *for Live Control*		 DC12V DC24V Electronic LED driver		 Nicolaudie DMX controller	 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.20.
 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 Electronic LED driver		Built-in to the DMX Controller Interface	 3- or 4- Channel DMX Decoder *chain as many as needed to the DMX controller (max 32 decoders per daisy chain)*		

DMX

Wiring Guidelines & Diagrams

OPTION 1 **LIVE OR STAND ALONE WITH DMX DECODER**



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DMX

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**

INTERFACE	+	**POWER**	+	**CONTROLS**		+	**COMPATIBLE LOAD/LIGHT SOURCE**
				CONTROLLER	**RESPONDER**		*Please confirm custom lighting compatibility with LEDCONN beforehand*
Pick one		*Pick one*		*Pick one*	*Pick one*		*Pick your load / light source*
 Nicolaudie Control Software *for Live Control*		 DC12V DC24V DMX driver		 Nicolaudie DMX controller	N/A		 Select the compatible lighting product based on the recommendations on the Load Compatibility table on p.20.
 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		

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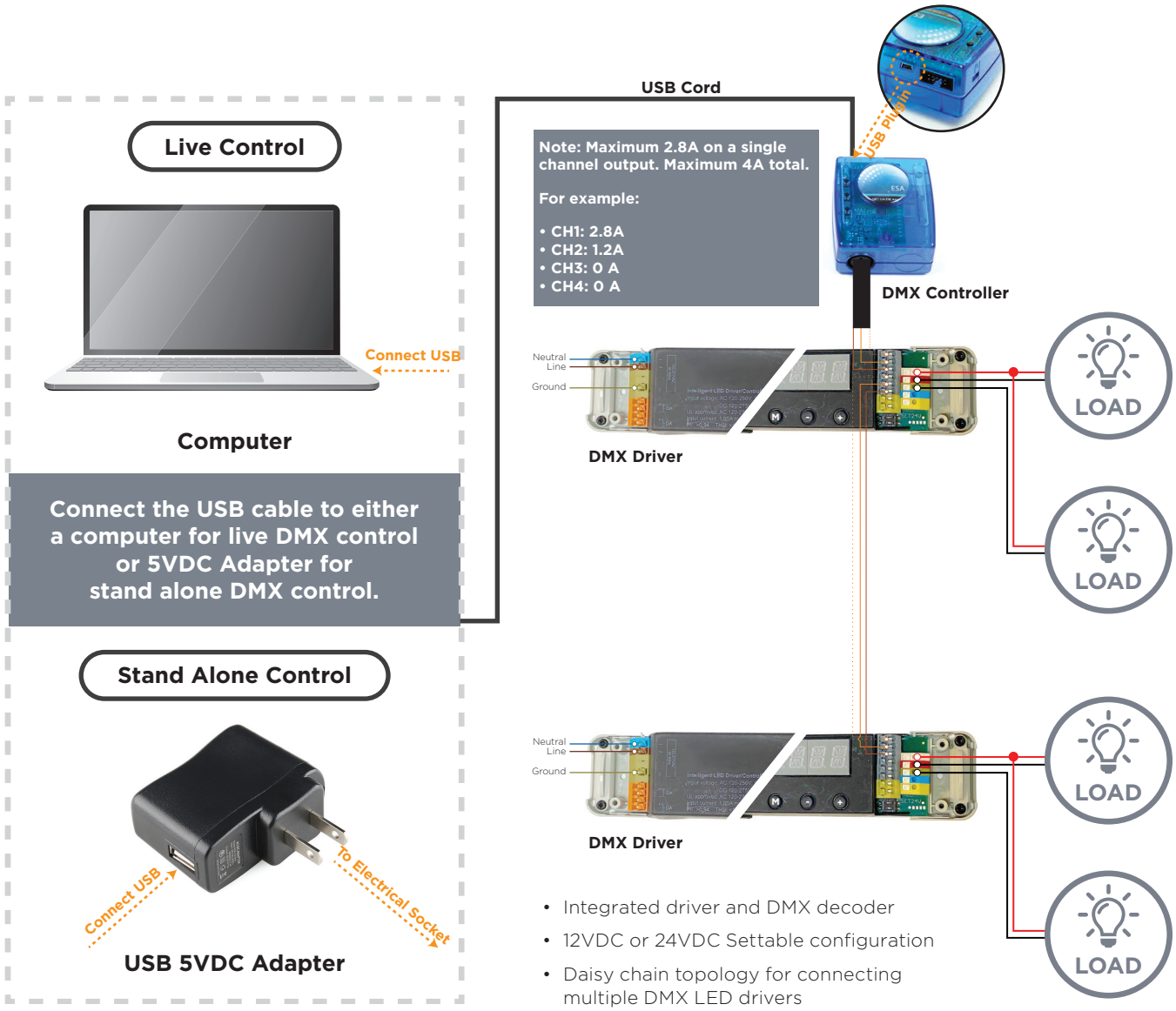
DMX

Wiring Guidelines & Diagrams

OPTION 2 **LIVE OR STAND ALONE WITH DMX DRIVER**



- Integrated driver and DMX decoder
- 12VDC or 24VDC Settable configuration
- Daisy chain topology for connecting multiple DMX LED drivers

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.

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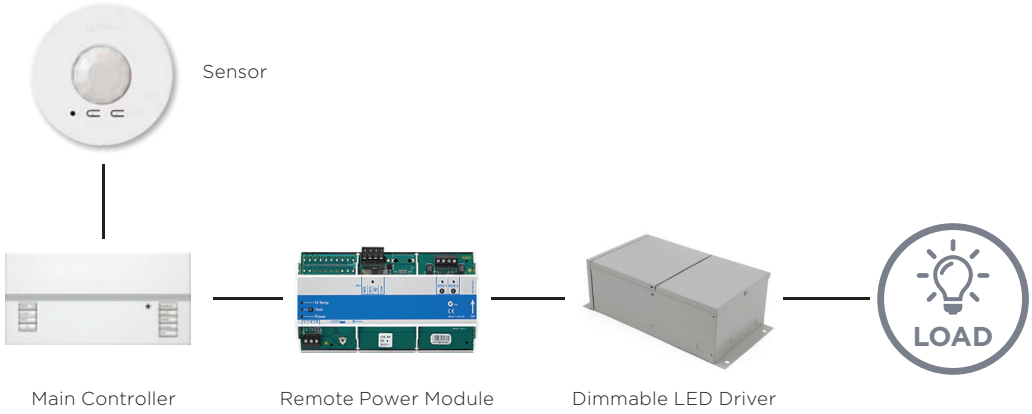
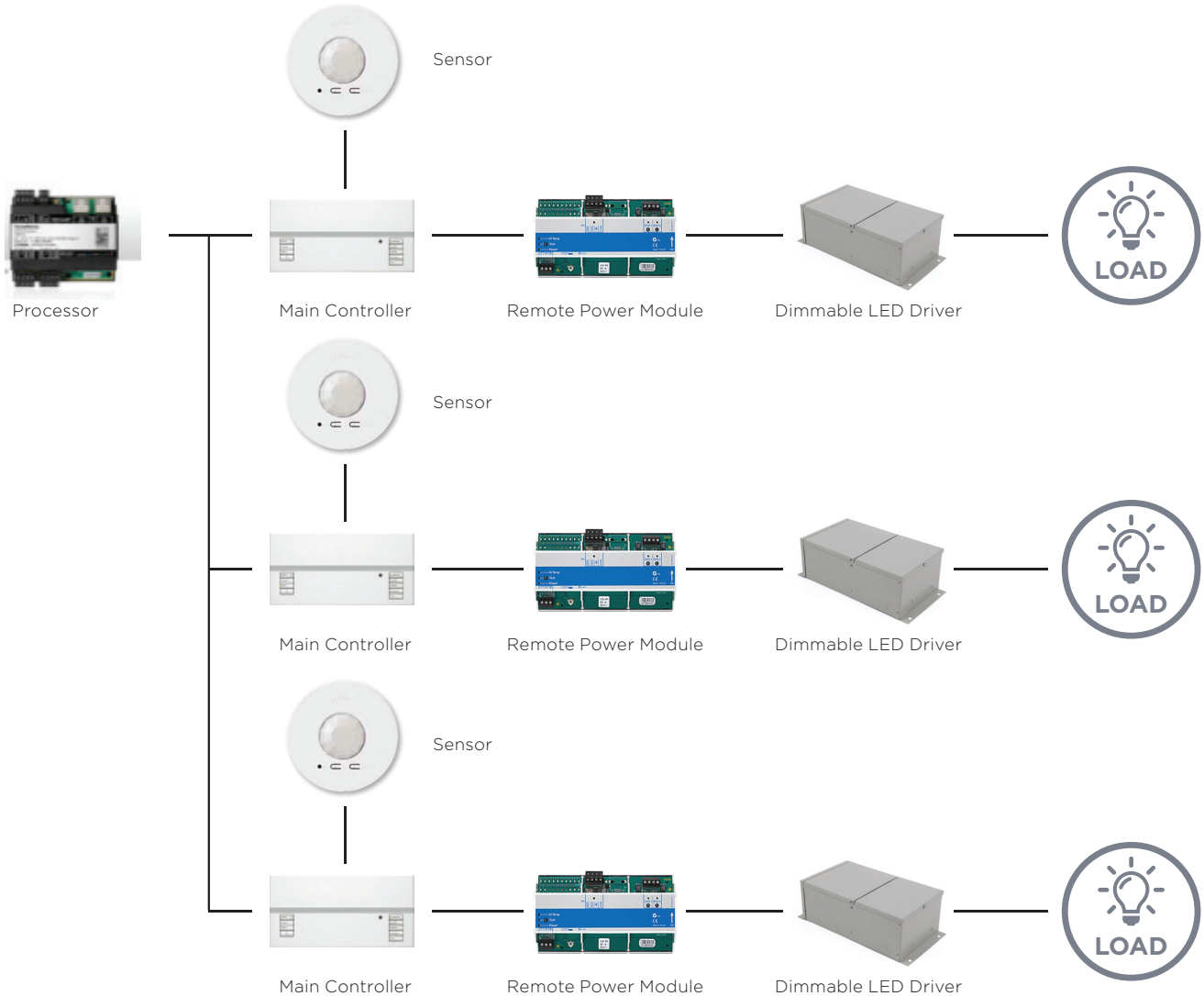
HOME/BUILDING CONTROL

Control System Configuration

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



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



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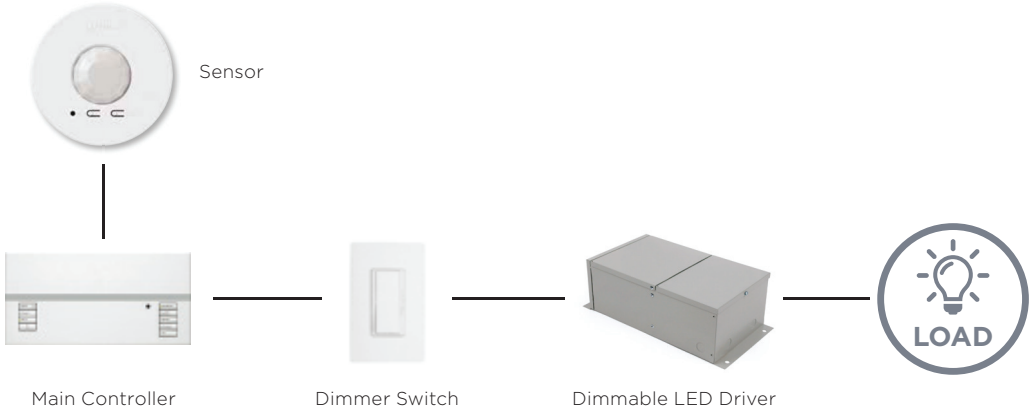
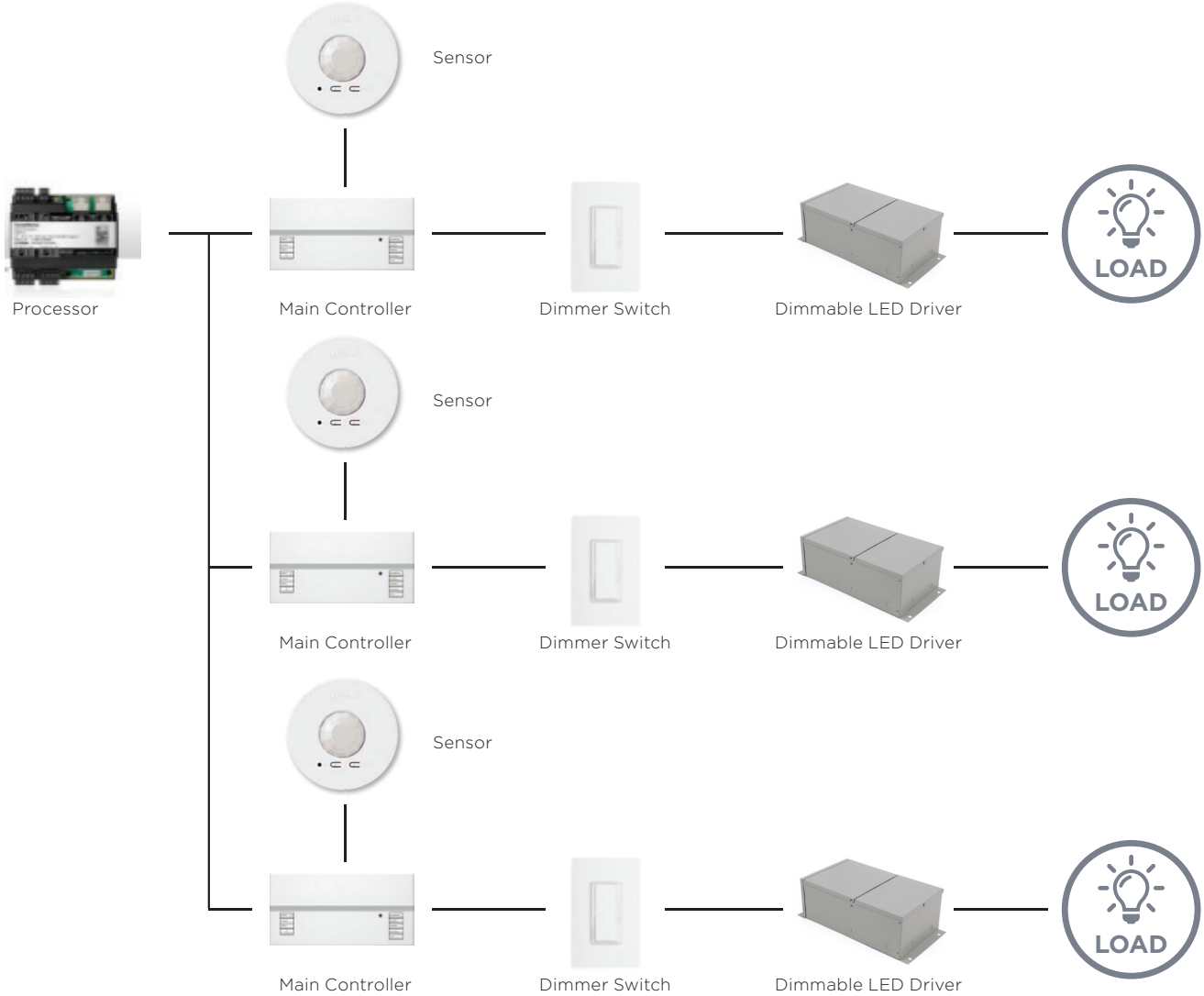
HOME/BUILDING CONTROL

Control System Configuration

SINGLE OR MULTI-ROOM CONTROL WITH DIMMER



WHOLE HOME OR BUILDING CONTROL WITH DIMMER



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NX

Control System Configuration

The following NX building control solutions are designed to integrate lighting and monitor energy management. Many of LEDCONN's Static White LED lighting products are compatible with an array of NX controls by Current.

An interface is required for whole building control integration. The interface provides large scale capabilities by integrating control and communication links between a multitude of system components. Multiple interfaces may be required depending on project size.

Features

Advanced | **Scalable** | **Quick Slide Dimming** | **0-10V Dimming** | **Investment**

INTERFACE +	POWER +	CONTROLS HARDWARE +	COMPATIBLE LOAD/LIGHT SOURCE
Pick one	*Pick one*	*Pick one* *Pick one*	*Please confirm custom lighting compatibility with LEDCONN beforehand* *Pick your load / light source*
 w	 DC12V DC24V 0-10V LED driver	 NX In-Fixture Control Module	 LEDCONN compatible lighting products:
 Smart Device *WiFi enabled tablet/phone (not provided)*	 DC12V DC24V 0-10V LED driver	 NX In-Fixture Control Module	• LUXFIT Classic • LUXMESH • LUXFLEX Standard • LUXFLEX Premium • LUXLINE Static White • LUXNEON Low • LUXNEON Mini Tape • LUXNEON Slim • LUXCANVAS Float Static White • LUXCANVAS w/LUXMESH • LUXCANVAS w/LUXFLEX Standard

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

Current Compatible

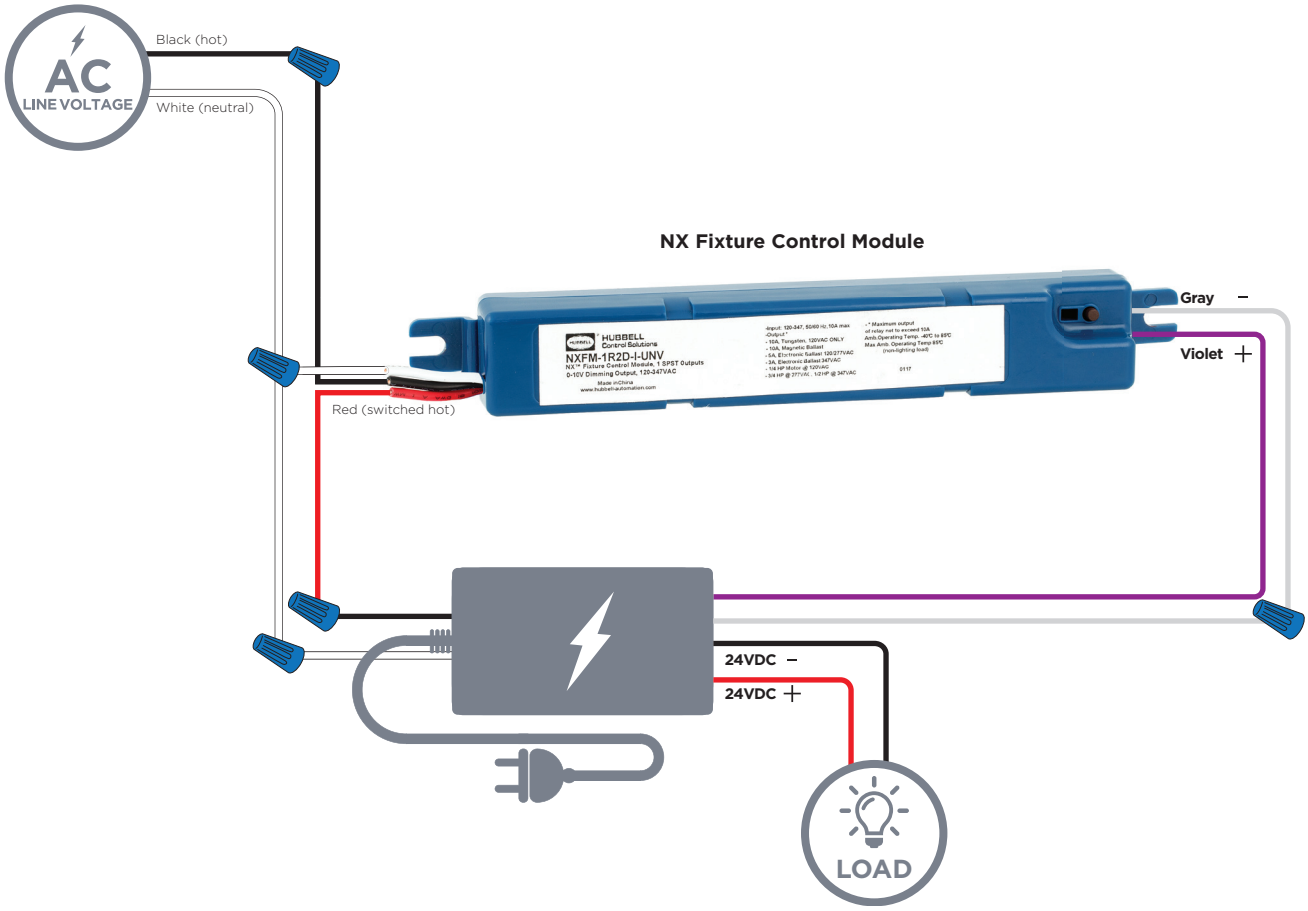
- Energy Savings
- Versatile
- Scalable
- Outdoor Rated
- Wired, Wireless or Hybrid

Contact us to inquire about other compatible controls

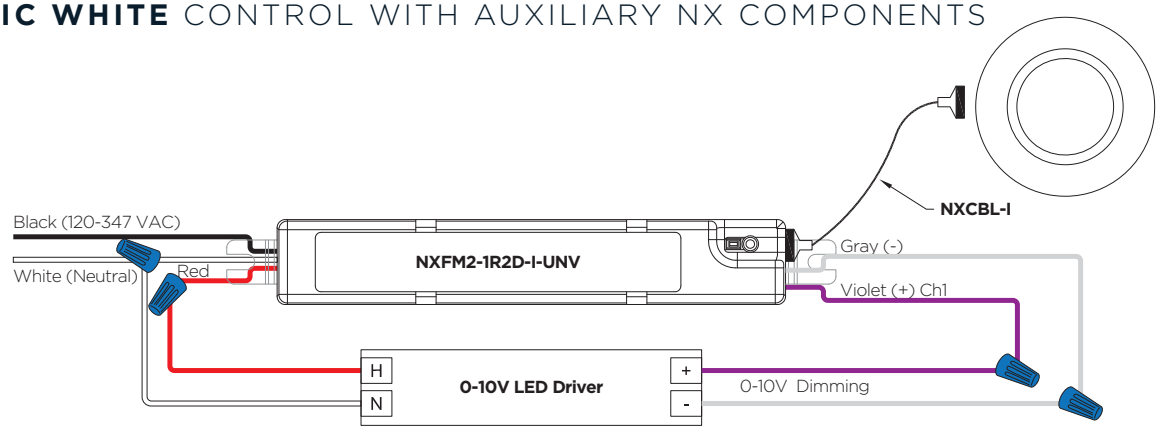
NX

Wiring Guidelines & Diagrams

STATIC WHITE CONTROL WITH AUXILIARY NX COMPONENTS



STATIC WHITE CONTROL WITH AUXILIARY NX COMPONENTS



Current Compatible

NX
- Energy Savings
- Versatile
- Scalable
- Outdoor Rated
- Wired, Wireless or Hybrid

Contact us to inquire about other compatible controls

A WIDE ARRAY OF AUXILIARY NX COMPATIBLE COMPONENTS ARE AVAILABLE.
Please inquire for more information.

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LOAD COMPATIBILITY

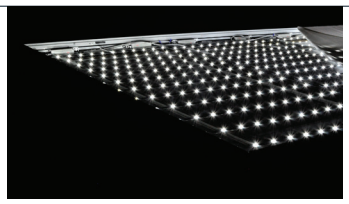
Compatible Load/Light Sources: Static White

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

LUXFIT
Classic

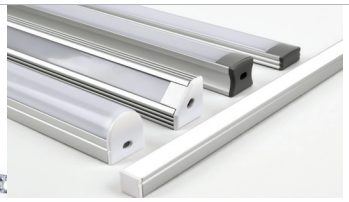
LUXFLEX
Standard
Premium



LUXMESH
Short
Medium
Long

LINEAR

LUXLINE
2835R
2835R0
2016
2835H3
3528H



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

LUXNEON
Classic Side Bend
Slim 0612 Side Bend
Mini Tape 0603 Top Bend
Low 1005 Top Bend

LUXCLARA
Classic
Premium

LIGHT BOXES

LUXARTUS
C
E

FABRIC
45
100
120
200

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AVAILABLE DRIVERS & CONTROLS

PRODUCT AVAILABILITY

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
	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
	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	*12V* 144W *24V* 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
	ZDMDMX512-XLR-4	DMX Decoder	4	12-24VDC	*12V* 192W *24V* 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

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PRODUCT AVAILABILITY

Available Drivers & Controls

UL CLASS 2 POWER SUPPLIES **DC PLUG-IN POWER ADAPTERS**

ENVIRONMENT	Indoor
INPUT VOLTAGE	100-240VAC
OUTPUT VOLTAGE	12VDC / 24VDC
CONNECTION TYPE	Plug-in / DC barrel plug

CERTIFICATION

c UL us LISTED

PRODUCT	P/N	OUTPUT VOLTAGE	INPUT VOLTAGE	OUTPUT POWER	DIMENSIONS	UL
	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	
	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	

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PRODUCT AVAILABILITY

Available Drivers & Controls

UL CLASS 2 POWER SUPPLIES **REGULAR ELECTRONIC LED DRIVERS**

ENVIRONMENT	Indoor
INPUT VOLTAGE	90-265VAC / 90-295VAC / 90-305VAC
OUTPUT VOLTAGE	12VDC / 24VDC
CONNECTION TYPE	Hardwire

CERTIFICATION

c UL us LISTED

c RU us

**Safe for use in indoor and outdoor environments.*

PRODUCT	P/N	OUTPUT VOLTAGE	INPUT VOLTAGE	OUTPUT POWER	DIMENSIONS	UL
	ZTREM12V60WV*	12VDC	90-264VAC	60W	6.40" X 1.67" X 1.26" 162.5mm X 42.5mm X 32mm	UL Recognized
	ZTREM12V60WF*	12VDC	90-305VAC		6.40" X 1.69" X 1.26" 162.5mm X 43mm X 32mm	
	ZTREM24V60WV*	24VDC	90-264VAC		6.40" X 1.67" X 1.26" 162.5mm X 42.5mm X 32mm	
	ZTREM24V60WF*	24VDC	90-305VAC		6.40" X 1.69" X 1.26" 162.5mm X 43mm X 32mm	
	ZTREM24V90WF*	24VDC	90-305VAC	90W	6.34" X 2.40" X 1.42" 161mm X 61mm X 36mm	
	ZTREM24V100WPLN	24VDC	90-295VAC	96W	7.87" X 2.78" X 1.38" 200mm X 70.5 X 35mm	
	ZTREM24V320WHLG*	24VDC	90-305VAC	320W	8.87" X 3.54" X 1.72" 225.2mm X 90mm X 43.8mm	
	ZTREM24V80WHLG*	24VDC	90-305VAC	81.6W	7.70" X 2.42" X 1.53" 195.6mm X 61.5mm X 38.8 mm	UL Listed
	ZTREA24V99WANP-UL*	24VDC	90-305VAC	100W	7.80" X 2.76" X 1.22" 198mm X 70mm X 31mm	

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PRODUCT AVAILABILITY

Available Drivers & Controls

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

ENVIRONMENT	Indoor	**DIMMING**	**CERTIFICATION**
INPUT VOLTAGE	120-277VAC	0-10V	c UL us LISTED, c RU us
OUTPUT VOLTAGE	24VDC		
CONNECTION TYPE	Hardwire		

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
	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	Indoor	**DIMMING**	**CERTIFICATION**
INPUT VOLTAGE	120/277VAC	DMX	c RU us
OUTPUT VOLTAGE	12VDC / 24VDC		
CONNECTION TYPE	Hardwire		

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

PRODUCT AVAILABILITY

Available Drivers & Controls

UL CLASS 2 POWER SUPPLIES **MAGNETIC TRANSFORMER**

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

DIMMING: MLV

CERTIFICATION: ETL LISTED

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

CERTIFICATION: ETL LISTED

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

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ELECTRICAL 101

ELECTRICAL 101

Glossary

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.

Brain

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

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.

Controller

The controller is an electronic device that processes commands to responders.

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ELECTRICAL 101

Glossary

Decoder	An electronic device used to translate digital DMX signals from a control source into an analog signal used to control LED fixtures.
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 Terminator	DMX terminators reduce noise in the DMX transmission line and improves the reliability of the 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.
Driver	Drivers are electronic devices that convert electricity from high (AC) voltage to low (DC) 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.
Interface	The user interface changes the system modes or settings in order to alter the lighting effects.
IR	Infrared (IR) Remotes transmit pulses of light that relay user input commands to a receiver.
Load	The part of a circuit that consumes electricity, usually the light sources.
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-state) - ELV.
Low Voltage Transformer	Low Voltage Transformers are electronic devices that convert electricity from high voltage to 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.
Max Load	The maximum wattage that the driver is designed to support.
Output Power	The power supplied by the LED driver.
Plug-in Adapter	Power supply with integrated output connector.
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	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.
Receiver	Receivers receive and process user input command signals from a number of sources and outputs the user input command to the LED.
RF Remote	Radio Frequency Remotes transmit radio wave signals that relays user input commands to a 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	RGBW is a combination of four LEDs (red, green, blue, and white) in a single package. 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	Single pole switches control one or more light fixtures from a single location.

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ELECTRICAL 101

Glossary

Responder	The responder is an electronic device that processes commands from a 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.

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ELECTRICAL 101

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** *1A*	**24W** *2A*	**36W** *3A*	**48W** *4A*	**60W** *5A*
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** *3A*	**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

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ELECTRICAL 101

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. 0-10V 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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