A GUIDE TO BUYING
LED DRIVERS

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INTRODUCTION

Welcome to this guide to choosing an LED driver. It includes the basic factors to consider when choosing an LED driver for your application. There is also information behind these factors to help you to make your decision.
RS Components stock a wide variety of LED drivers and power supplies from the most popular brands. They also offer next-day deliver, competitive pricing and bulk discounts.

Before you start…
Have you chosen your LED(s)? We offer a wide variety of LED products to choose from including standard LEDs and LED arrays:

VISIBLE LEDS

These are your standard through-hole and surface mounted LEDs.

COB LEDS

High brightness SMD white LEDs. They consist of multiple chips /dies on one board.

LED ARRAYS

Single or multiple LEDs pre-mounted onto a PCB.

FLEXIBLE ARRAYS

Flexible strips of LEDs available in a variety of different colours and lengths.

LED LIGHT ENGINES

Similar to LED arrays, these also have a driver IC on board.

CONSTANT CURRENT vs. CONSTANT VOLTAGE

All drivers are either constant current (CC) or constant voltage (CV), or both. This is one of the first factors you need to consider in your decision making process. This decision will be determined by the LED or module you will be powering, the information for which can be found on the LED's datasheet.

WHAT IS CONSTANT CURRENT?

Constant current (CC) LED drivers keep a constant electric current throughout an electronic circuit by having a variable voltage. CC drivers are often the most popular choice for LED applications. CC LED drivers can be used for individual bulbs or a chain of LEDs in series. A series means that the LEDs are all mounted together in line, for the current to flow through each one. The disadvantage is that, if the circuit is broken, none of your LEDs will work. However they generally offer better control and a more efficient system than constant voltage.

WHAT IS CONSTANT VOLTAGE?

Constant voltage (CV) LED drivers are power supplies. They have a set voltage that they supply to the electronic circuit. You would use CV LED drivers to run multiple LEDs in parallel, for example LED strips. CV power supplies can be used with LED strips that have a current limiting resistor, which most do. The voltage output must meet the voltage requirement of the entire LED string. CV drivers can also be used for LED light engines which have a driver IC on board.

WHAT IS CONSTANT CURRENT / CONSTANT VOLTAGE?

Some LED drivers may feature both options of CV and CC. As standard they run as CV but, when output current passes the rated current limit, they switch to a CC mode. This functionality is suitable for applications which require a flexible LED Driver.

WHEN WOULD I USE CV OR CC?

Here are some real life examples where you would use each type of driver:

CONSTANT CURRENT

- LED Downlights
- Office Lighting
- Residential LED Lighting
- Mood Lighting
- Retail Lighting
- Entertainment Lighting
- LED Signs

CONSTANT VOLTAGE

- LEDs in parallel
- LED Strips
- LED Light Engines
- Moving Signs
- Stage Lighting
- Architectural Lighting
- Street Lighting
- High Bay
- Outdoor Lighting

FACTORS TO CONSIDER

Here are some of the basic factors you need to consider for constant current LED drivers:

CONSTANT CURRENT

OUTPUT CURRENT	**What current does your LED(s) need?** If your LED needs 700mA your driver needs to have that output too.
OUTPUT POWER (W)	**What is the power requirement of your LEDs?** It is the sum of all the LEDs. You need to choose a driver that provides at least that value.
OUTPUT VOLTAGE (V)	**Find the voltage requirement for your LED(s).** The output voltage of the driver needs to **exceed** the voltage required by your complete LED string. (sum of Vfs)
DIMMING	**Do you need a dimming function?** Is it 0-10V, DALI, PWM, TRIAC, DMX or potentiometer?
PACKAGING / ENCAPSULATION	**How big can your driver be?** Make sure the dimensions are going to fit as some applications can have limited space.
IP RATING	**Where will your driver be going?** Indoor applications (IP20), outdoor applications (IP65) or submersion in water (IP67/IP68).

FACTORS TO CONSIDER

Here are some of the basic factors you need to consider for constant voltage LED drivers:

CONSTANT VOLTAGE

OUTPUT POWER (W)	**What is the power requirement of your LEDs?** You need to choose a driver that provides at least that value.
OUTPUT VOLTAGE (V)	**Find the voltage requirement for your LED(s).** The output voltage of the driver needs to **match** the voltage required by your LED array or LED engine.
PACKAGING / ENCAPSULATION	**How big can your driver be?** Make sure the dimensions are going to fit as some applications can have limited space.
IP RATING	**Where will your driver be going?** Indoor applications (IP20), outdoor applications (IP65) or submersion in water (IP67/IP68).

WHAT DOES IT ALL MEAN? - OUTPUTS

OUTPUT CURRENT (mA)

When using a Constant Current LED driver, observe the current requirements of your chosen LED(s). The CC driver should then reflect that value output. LEDs data sheets state what they require, with the value given in amps (A) or milliamps (mA). 1 A = 1000 mA
There are also variable and selectable output current drivers. They give either a range, for example 0 mA to 500 mA, or stepped values like 350 mA, 500 mA, 700 mA. Your LED must fall within the chosen value(s).
LEDs can be run at a lower current to help extend its life expectancy. Using a higher current could wear the LED out a lot quicker.

OUTPUT POWER (W)

This value is given in watts (W). Use an LED driver with at least the same value as your LED(s).
The driver must have a higher output power than your LEDs require for extra safety. If the output is equivalent to the LED power requirements, it is running at full power. Running at full power may cause the driver to have a shorter life span. Similarly the power requirement of the LEDs is given as an average. With tolerance added on top for multiple LEDs, you need a higher output power from the driver to cover this.

OUTPUT VOLTAGE (V)

This value is given in volts (V). For constant voltage drivers, it requires the same output as your LED's voltage requirements. For multiple LEDs, each LED voltage requirement is added together for a total value.
If you are using constant current, the output voltage must exceed the LED requirements.

LIFE EXPECTANCY

Drivers will come with a life expectancy in thousands of hours, known as MTBF (mean time before failure). You can compare the level you are running it at to work out the advised lifetime. Running your LED driver at the recommended outputs help to extend its life span, reducing maintenance time and costs.

WHAT DOES IT ALL MEAN?

IP RATING

How water/dust resistant does your LED driver need to be? If your driver is going somewhere where it may come into contact with water/dust, you could use an IP65 rated driver. This means it is protected from dust and any water projected at it.
If you need something water-tight, you might need a driver with an IP67 or IP68 rating. The IP rating is given as a number. The first digit represents solid objects and the second is liquids. Here are the definitions:

SOLID		LIQUID	
0	No protection	**0**	No protection
1	Protection against solid objects > 50 mm	**1**	Protection against water droplets
2	Protection against solid objects > 12.5 mm	**2**	Protection against water droplets at a 15° angle
3	Protection against solid objects > 2.5 mm	**3**	Protection against water spray at 60° angle
4	Protection against solid objects > 1 mm	**4**	Protection against water spray at any angle
5	Dust protected	**5**	Protection against water jets from any angle
6	Dust tight	**6**	Protections against powerful jets
		7	Protection against temporary submersion in water up to 1m
		8	Protection against submersion in water over 1m

PACKAGE/ENCAPSULATION

Do you need an LED driver within an enclosure? Or will it be built into a system? Open frame LED drivers are more compact and can be designed into your application. Encapsulations provide IP ratings and protection for stand-alone LED drivers.

TERMINATION METHOD

How will you connect your LED driver to your chosen application? Some LED drivers come with flying wires attached. Alternatively you could need to purchase wires separately. Screw or poke holes also exist for quick mounting of cables to the driver.

DIMMING OPTIONS

If you require a dimming function from your LED driver, there are several options to choose from. Here are some of the possible dimming types you will come across.
Note: some of the dimming functions mean that the driver is designed to work with an external part. It is not necessarily a function of the driver itself.

1-10 V

1-10 V controllers have been around for a long time and could be seen as the most common driver option for simple lighting. They are also known as analogue dimming. They can control lighting efficiently with smooth dimming and they are usually cheaper.

PWM

Some drivers come with dimming capabilities, often using PWM control. This is also known as digital dimming. PWM (Pulse-Width Modulation) dimming works by controlling the supply voltage and current. It switches it on and off multiple times per second, controlling the average power delivered by the length of time that the voltage stays on. Through this, it can dim the LEDs.

DALI

DALI (Digital Addressable Lighting Interface) is not a single component but a range of features that, when combined together, create an intelligent and flexible lighting control system.
DALI LED drivers enable communication each way between the lighting fixtures and the controller. This allows the controller to monitor and control each light. It is also used to connect equipment from different manufacturers.
DALI controllers can have up to 64 devices. Some DALI networks also have the capacity to communicate wirelessly. DALI is ideal for driving and controlling multiple light sources individually, within one circuit.

CONTINUED...

DIMMING OPTIONS

TRIAC PHASE CONTROL

This form of dimming is commonly used in dimming applications, including retrofit. You will often see TRIAC phase control in dimmer switches used in houses. Some drivers are TRIAC dimmable, meaning they are programmed to work with TRIAC dimmers. They transform the AC power from the TRIAC into something that the LED can understand.
The TRIAC dimmer would sit between the power supply and the LED driver to control the voltage that goes into the driver.

POTENTIOMETER

Some drivers are potentiometer dimmable, meaning they are programmed to work with separate potentiometer dimmers (pictured). The potentiometer can be connected directly to an input on the driver to control it internally.
This is usually a simple and cost-effective way to provide a dimming function.

DMX

Digital Multiplex (DMX) dimming methods are ideal for entertainment and architectural lighting due to their ability to control coloured lighting. They provide control of light intensity and fast colour changing. DMX is great for RGB and tuneable white LED applications.