

LED Driver Selection



Why is a driver module required?

An LED (Light Emitting Diode) is a solid state device, or semiconductor, which converts electricity passed through it into visible light. To maintain the light output, colour, efficiency and maximise the life of an LED, three factors must be controlled:

1. The manufacturing process and composition of the LED itself
2. Thermal management of the heat generated by the LED
3. The electrical supply to the LED

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The driver is the device used to control the electrical supply to the LED. The majority of luminaires in the Eaton's LED ranges require an LED driver. Some luminaires are supplied complete with the appropriate driver, whilst others indicate on the product pages if a driver is needed.

Driver Types

There are essentially two basic types of driver, those supplying a constant current and those supplying a constant voltage. These are then subdivided by other capabilities such as dimming or colour changing.

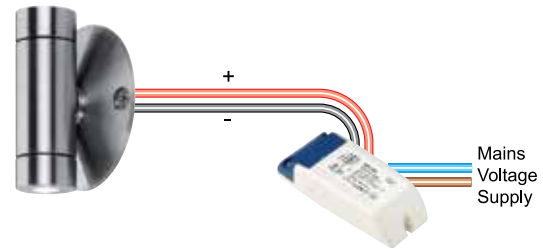
Within the Eaton range there is a wide selection of drivers offering different features and characteristics to provide the right product for the application. There is a choice of constant current or voltage outputs, different levels of ingress protection, dimming methods and colour changing versions as well as different physical sizes.

Constant Current Drivers

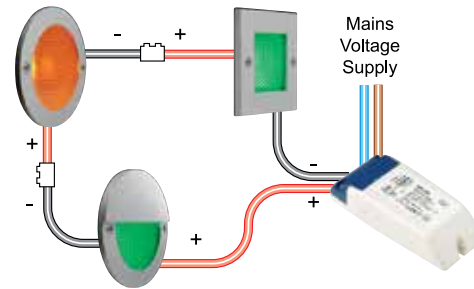
The majority of luminaires operate on a constant current, however not all constant current LEDs operate on the same current. It is therefore important to note the recommended current for the luminaire and select the appropriate driver. It is possible to operate luminaires at a lower current than recommended though this will reduce the light output and can affect the efficiency. If the current is too high it may cause premature failure of the LED.

When connecting multiple luminaires to the constant current drivers they must be wired in series.

Individual Connection



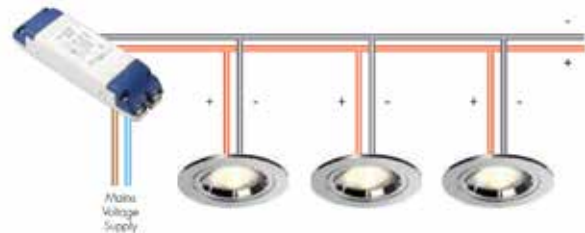
Series Connection



Constant Voltage Power Supply Units

Some of the LED luminaires require a constant voltage, usually 12V DC or 24V DC. When connecting luminaires to these constant voltage drivers they are wired in parallel.

Parallel Connection



Dimming Drivers

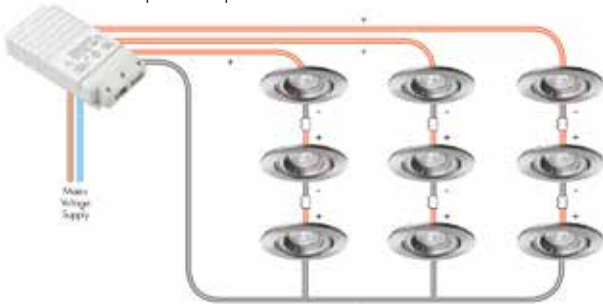
A selection of constant current dimming drivers are available with different switching modes and control language protocol, e.g. retractive switch, 1-10V, DMX and DALI

Colour Change Drivers

LEDs are often associated with colour options and the ability to change the colour emitted from the same luminaire. This is achieved by mixing the output from an array of individual red, green and blue LEDs or specialist 'Tri-chip' LEDs to generate any colour of the visible spectrum. These products are referred to as having the 'RGB' colour option. Several such drivers are included in the range for various budgets, most are DMX compatible. 'DMX' is the type of software protocol used. (Not all luminaires are offered with RGB colour change options).

Some drivers are multi-channel, typically 3 channel. For RGB products each channel is dedicated to a colour, red, green, blue. For fixed colour product the number of luminaires connected should be split evenly between each channel, e.g. for LS-PBX27 the maximum number of 1W LEDs it will operate is 27, split 9 per channel.

3 Channel fixed output multiple connection



Driver Selection

Each range has a recommended driver listed against it though some installations may require different characteristics, for example, particular dimensional requirements or capable of operating more than one luminaire.

The following tables list the range of drivers on offer, supported with technical data and a column indicating the number of 1W LEDs they are capable of driving.

This step by step guide will aid selection of the required driver(s).

- From the information on the product page note the following details:
 - LED type and LED quantity within the luminaire.
 - The recommended drive current or voltage
 - Any dimensional constraints related to the installation, e.g. the cut out aperture of the luminaire.
- Find the appropriate section of the table for the type of driver required:
 - Constant current - fixed output
 - Constant current - dimmable
 - High ingress protection
 - Colour changing
 - Constant voltage - fixed output
 - Constant voltage - dimmable

- Look at the input current or voltage column to find those drivers matching that required by the luminaire.
- Cross check the number of LEDs the driver can operate is sufficient for the product(s)
 - Note some drivers have a minimum load requirement. For example the LS-PD312 needs a minimum of three 1W LEDs to be connected to it for it to operate correctly.
- Check the driver is dimensionally suited to the application.
- This process may show several drivers are suitable for the chosen luminaire. Refine the selection by checking the other characteristics such as IP rating or power factor and also refer to the latest price list to compare the cost.

Driver Selection Examples

Example 1

Four fixed colour GR5-3K2-CW45C in-ground luminaires, with all four to be driven by one fixed output driver.

Each luminaire contains three 1W LEDs and requires a 350mA drive current. Assuming the driver is to be mounted indoors remotely from the product with no dimensional or Ingress Protection constraints.

This produces the following selection results:

LS-PD312 will run up to 12 x 1W LEDs at 350mA so will run the four GR5-3K2 luminaires

LS-PBX27 will run up to 27 x 1W LEDs at 350mA (split over 3 channels) so will run up to nine GR5-3K2 luminaires

In this case the LS-PD312 may be the best choice as it is smaller and lower cost than the LS-PBX27.

Example 2

The same GR5-3K2-CW45C as example 1 but with one driver per luminaire with the driver being installed beneath the fitting assuming in an application where IP40 is suitable protection results in the following option:

LS-MN03 will run up to 3 x 1W LEDs at 350mA so will run one GR5-3K2 luminaire and with its small physical size will fit easily through the cut out and sit within the ground sleeve beneath the luminaire.

Eaton's specialist LED team are able to provide support and assistance with project design and specification. For further details contact our LED technical support and application department on 01302 303240 or to arrange a visit from your local specialist sales engineer, contact our customer care centre on 01302 303303.