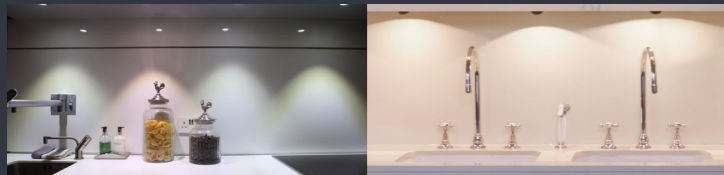


COLOUR CONSISTENCY



POOR COLOUR CONSISTENCY GOOD COLOUR CONSISTENCY

White LEDs vary in colour so to achieve colour consistency use high quality and good LEDs that are precisely selected or binned. All John Cullen fittings are selected from the same bin for the same area when despatched.

LUMENS EXPLAINED

LED source lumens - refers to the amount of light emitted from the light source.

Luminaire lumens - refers to the amount of light emitted by the luminaire itself.

It is the luminaire lumen that gives the figure of light output when using the fitting.

COLOUR RENDERING INDEX

CRI (Colour Rendering Index) is an indication of how accurate a "given" light source is at rendering colour when compared to daylight on a scale of 0-100.

The higher the CRI, the better the colour rendering ability. Good is between 80-90, superior 90+.



HEAT MANAGEMENT

It is a myth that LEDs do not produce heat. LEDs need quality thermal management to dissipate heat in order to maintain colour consistency, lumen output and expected lamp life.

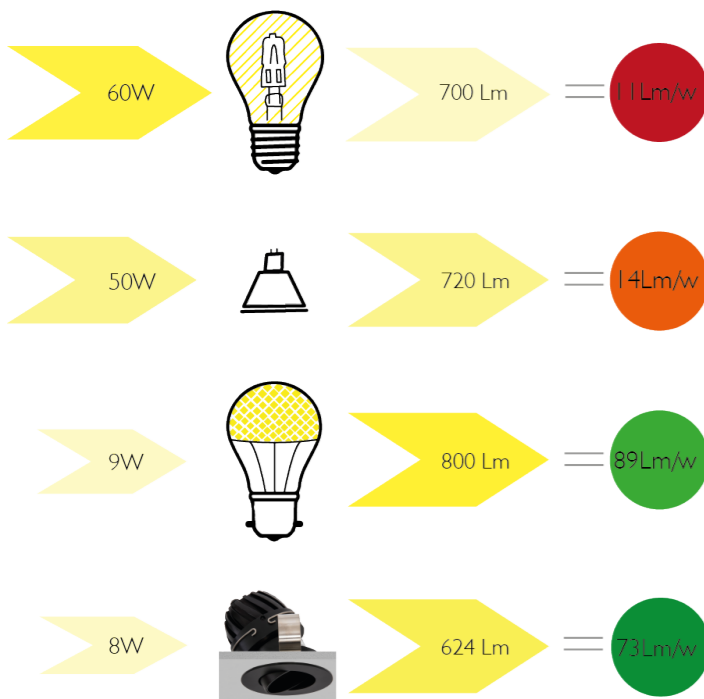
LED light fixtures need a gap around them to allow for the heat to disperse. This will vary product to product. Do see the data sheet for details.

WATTS, LUMENS & EFFICIENCY

Watts - Measurement of energy consumed - W

Lumens - Measurement of light output - Lm

Efficiency - Number of lumens generated for each Watt of energy consumed - Lm/W



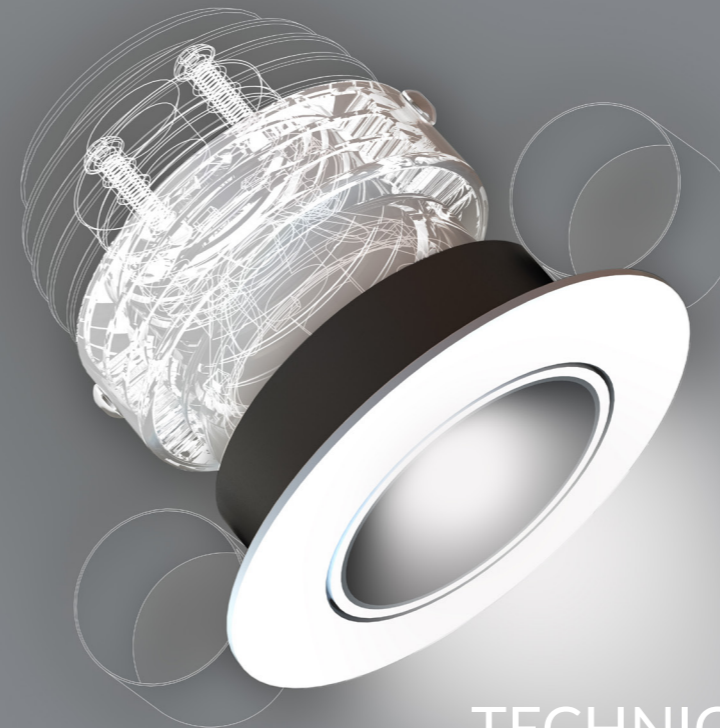
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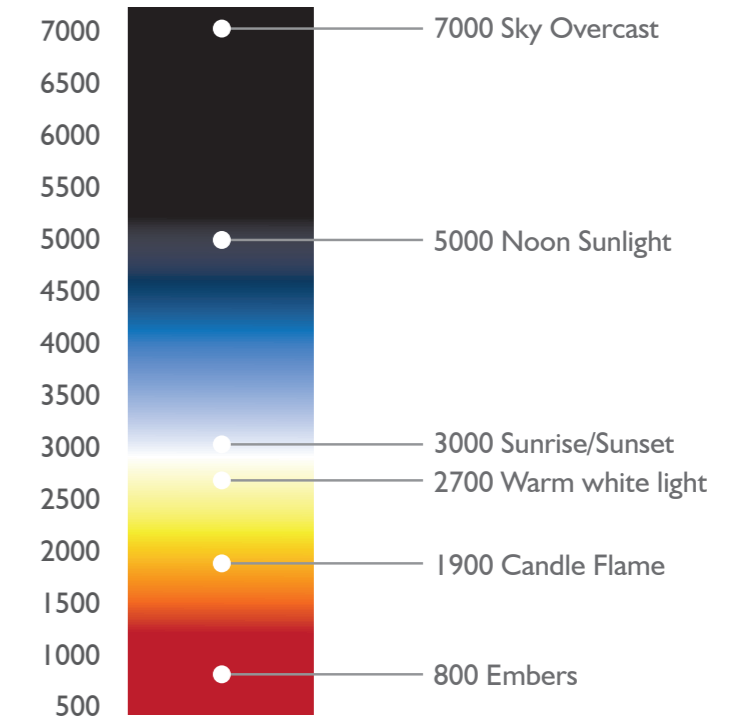
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TECHNICAL
LED
JARGON BUSTER

COLOUR TEMPERATURE

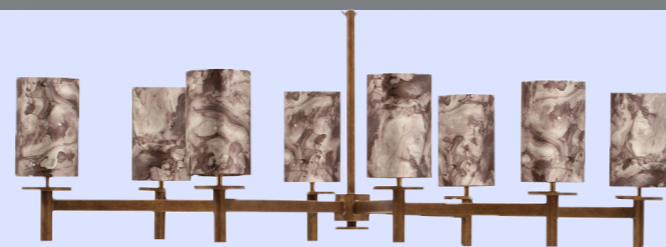


Colour temperature of light is measured in Kelvin. A warm white colour is ideal, which can vary between 2200K and 3200K.

We recommend using products at 2400K, 2700K or 3000K.

DECORATIVE LIGHTS

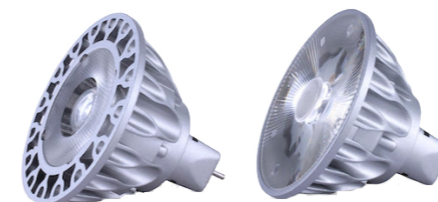
If you want to have the same lighting effect throughout the home, select a bulb for your table lamps that is the same colour temperature as the rest of your lighting scheme. 2700K works well for both daytime and night time, but 2400K works well in areas where the lamps are only used in the evenings as they give out a warmer colour.



Lampshades can also be used to manipulate the effect. For example a shade with a gold lining will warm up the light. An opaque shade will provide light both up and down but not sideways. A more transparent shade will provide a soft diffuse sideways light. The choice is yours.

LED RETROFIT WITH BULB

When replacing a halogen downlight, an LED retrofit bulb may seem a simple and cheaper solution rather than replacing the entire fitting, however they will not last as long or perform as well as a dedicated LED engine. There may also be issues with dimming and a new driver may be required. You can expect a retrofit LED bulb to last for 20,000 hours.



LED RETROFIT WITH ENGINE

If you are looking to upgrade your downlights, it is better to switch to a dedicated LED fitting with an LED engine and driver. This will provide the best quality of light in terms of lumen output, colour consistency, colour rendering, dimming performance and choice of beam angle. The typical lifetime of the bulb is 50,000 hours.



DRIVERS FOR EXTERIORS

IP67 external drivers need to be installed in an IP rated enclosure.

The individual cable needs to be taken back from each light fitting to a central location where the driver is installed and the series connections are made using IP rated crimps.

Alternatively you can run a cable from the driver/IP rated enclosure to a more central location and then fittings to make the series connections in a separate enclosure.

DIMMING PERCEPTION

Your eyes see dimmed lights differently to how they have dimmed. This is because the lower the light gets, the more our pupils expand letting us take in more light. This means the ratio between the measurable amount of light and how much light we perceive is not one-to-one.

For example even though you have dimmed your lights to 7%, your eyes adjust to the dimmed lights so your brain perceives the light as 30%.

LEADING V TRAILING EDGE

Leading edge - These dimmers were originally used for incandescent and halogen lamps. These dimmers therefore have a high minimum load, making them less useful for low energy lighting such as LEDs.

Trailing edge - These dimmers have many benefits over the leading edge type. These include smoother dimming with less buzzing and interference. Trailing edge dimmers have a much lower minimum load than leading edge, making them far more suitable for powering LEDs.

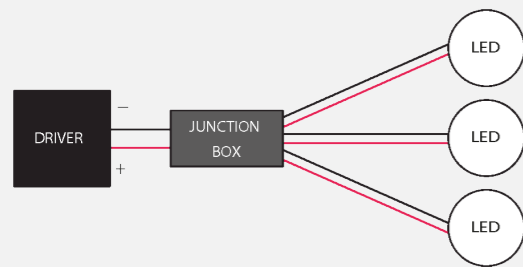
SDCM

SDCM is an acronym which stands for Standard Deviation Colour Matching. The colour difference is defined by steps of MacAdam ellipse which is the scale set by ANSI Chromaticity Standard. In short, the smaller the ellipse value (size), the smaller the colour difference.

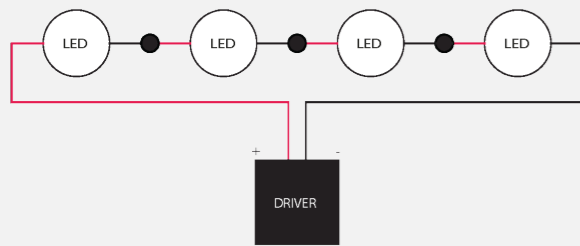
Our LED chips come from the smallest bin possible and are batched together when dispatched to allow for consistency across the range.

SERIES V PARALLEL WIRING

Parallel wiring is used for constant voltage products as this allows the voltage to stay the same. When wiring you need to take into consideration the wattage. For example 3 Vorsa spotlights connected at 8W each at 24V will require at least a 24W 24V power supply.

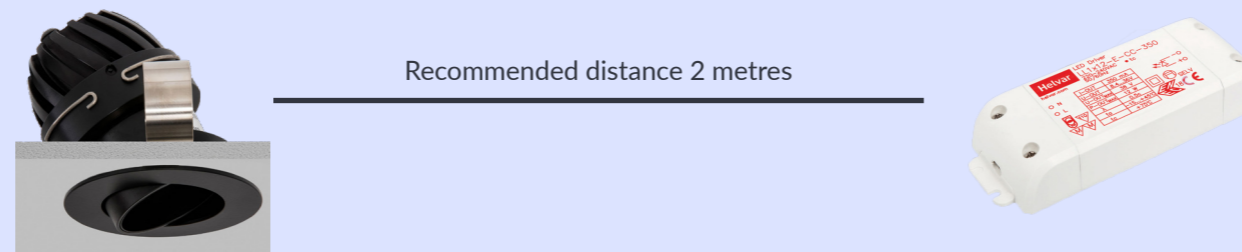


Series wiring is used for constant current products where the voltage increases but the mA stays the same. For example 4 x Lucca uplights which are 1W 3V 350mA wired in series would require a driver of at least 12V minimum load, at more than 3W and at 350mA.



DRIVER DISTANCE TO LUMINAIRE

Driver manufacturers state a maximum distance of 2 metres to guarantee optimal performance due to EMI (Electro Magnetic Frequency) and RFI (Radio Frequency Interference). However drivers can be located further than 2 metres at the discretion of the installer with other aspects, such as the cables resistant and volt drop calculations, taken into consideration.



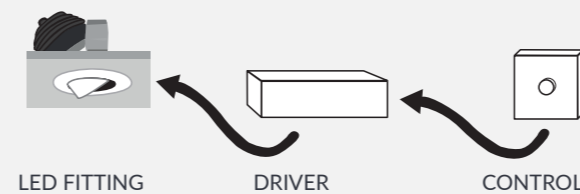
FLICKERING LIGHTS

Flickering lights normally occur due to incompatibility issues with mains dimming, requirement of leading v trailing edge and minimum loads levels.

LEDs can also flicker or struggle if the minimum load of drivers is not met or if they have not been wired in a series correctly.

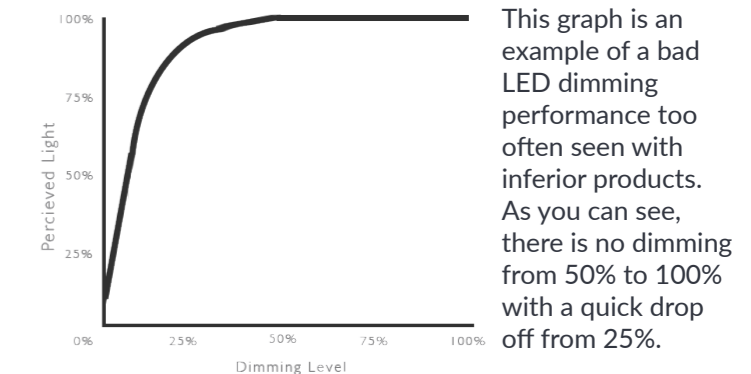
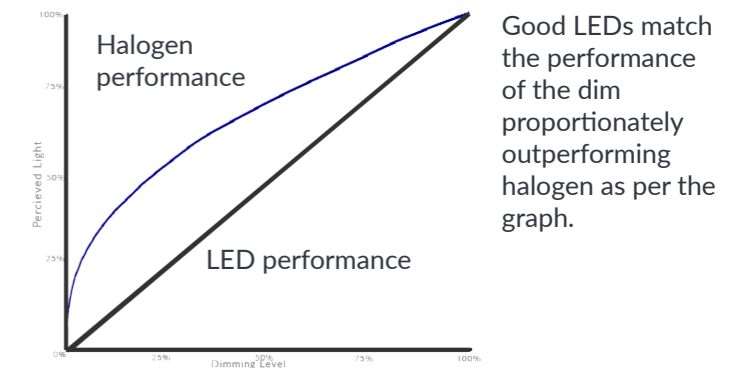
DRIVERS AND DIMMING

LED fittings need quality drivers to provide a constant power to them. Compatibility of quality LED fittings, drivers and controls will ensure flicker free dimming.



DIMMING PERFORMANCE

To achieve excellent LED dimming, good quality compatible LED fittings and drivers are required.



DIMMING AND CONTROL SOLUTIONS

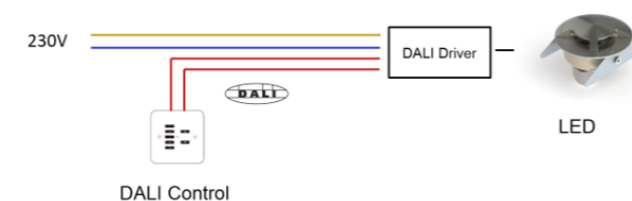
Switched - This solution is just the basic on/off switch.



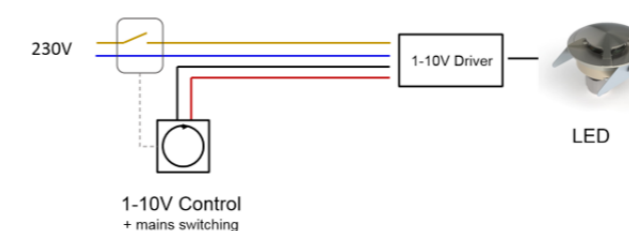
Mains Dimmable (Phase Cut) - This solution allows you to increase or decrease the light output. Most commonly seen as a rotary dimmer.



DALI (Digital Adjustable Lighting Interface) Dimming - This solution is only possible with a control system which allows for minimum level of dimming (0.1%). This is a fully scalable solution from one room to a whole house and flexibility to use with a smart control solution.



1-10V Dimming - This is an analogue method of dimming to around 10%, which can be used in a form of a rotary dimmer or full control system.



For further expert opinion and advise, visit our website for lighting inspiration, tips and our unique collection of products, all designed in-house supporting British manufacturing. Alternatively call our technical experts on 020 7371 9000.

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