



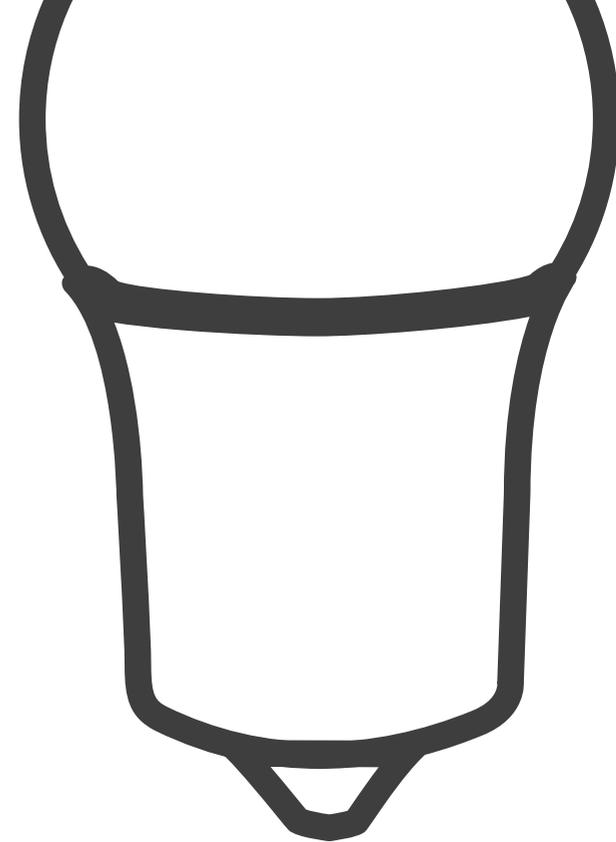
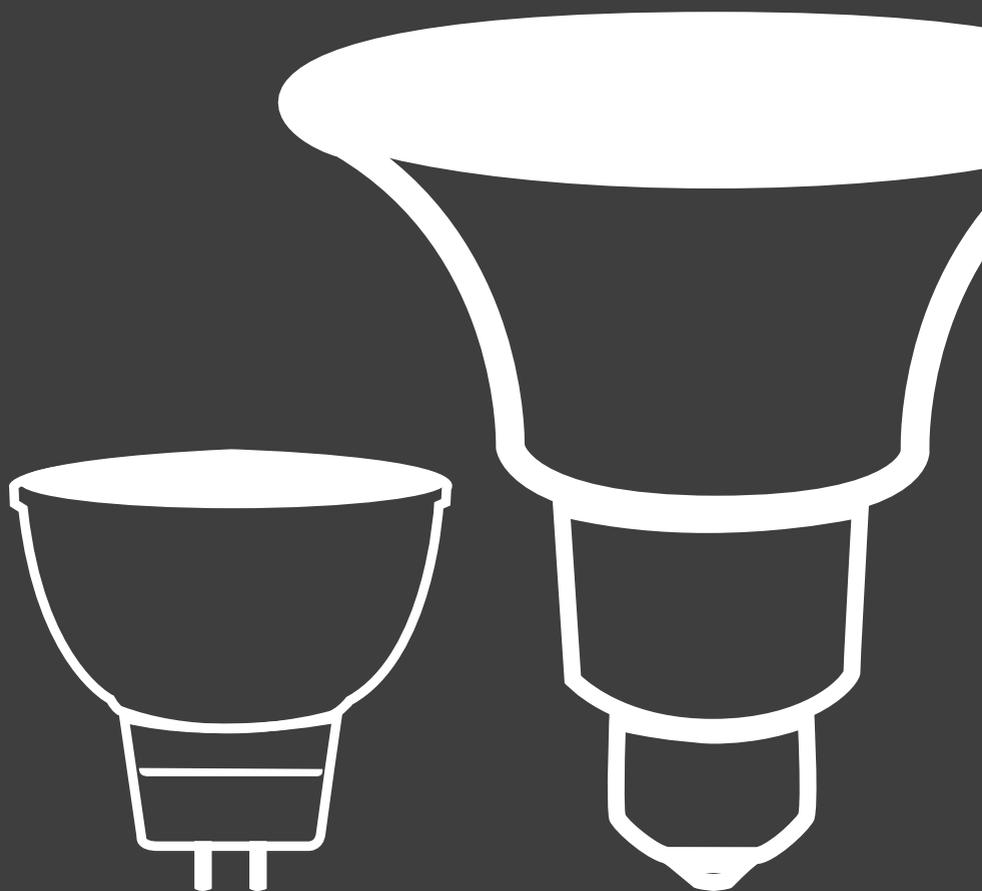
ALL THE KNOWLEDGE YOU NEED



WHAT YOU SHOULD KNOW BEFORE INSTALLING

LED LIGHTING





[LED LIGHTING]

With the rapid uptake of LED lighting in recent years the choice in LED products has escalated astronomically. There are a variety of both LED luminaires (new lighting fixtures with LED light sources incorporated) and LED direct replacement lamps available to help you achieve more efficient and economical lighting in a range of applications; whether it be industrial, commercial, residential, or street lighting. This publication however, will focus specifically on how to effectively assess your needs for LED lighting in commercial and residential applications.

If you have ever had questions or concerns about how to upgrade your current incandescent, halogen or PAR lamps to LED lighting then the information presented here will give you the knowledge to make the right decisions.

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FEATURES & BENEFITS OF LED LIGHTING



[FEATURES & BENEFITS OF LED LIGHTING]

Sustainability LED lighting supports environmental sustainability through lower energy consumption*, fewer replacements (or waste), removal of hazardous mercury from the design and easier disassembly for recycling

Extremely long life span** while a standard 60W incandescent lamp has a life of 1,000 to 2,000 hours a standard LED bulb has a life expectancy of up to 50,000 hours (which is up to 20 years in limited residential use)

Maintained illuminance well-designed LED luminaires can retain 70% of their initial output for up to 50,000 hours

Provide the same or greater level of brightness in comparison with conventional luminaires LED light sources can produce the same or greater level of brightness when measured on the light delivered*** principle

Directionality LED light sources tend to be more directional (narrower distribution) than traditional light sources such as incandescent and halogen lamps. For this reason, LED light sources require fewer beam-shaping optics resulting in a more efficient light fixture.

A variety of colour temperatures and illumination levels are available

Instant light LED light sources provide maximum light output at start-up unlike Fluorescent and HID light sources

Won't fade colours LED lamps do not emit excess heat like conventional lamps and therefore will not fade colours of objects they illuminate

+ Most beneficial for illuminating paintings/ display cabinets

Reduced UV output ensures minimal appeal to insects

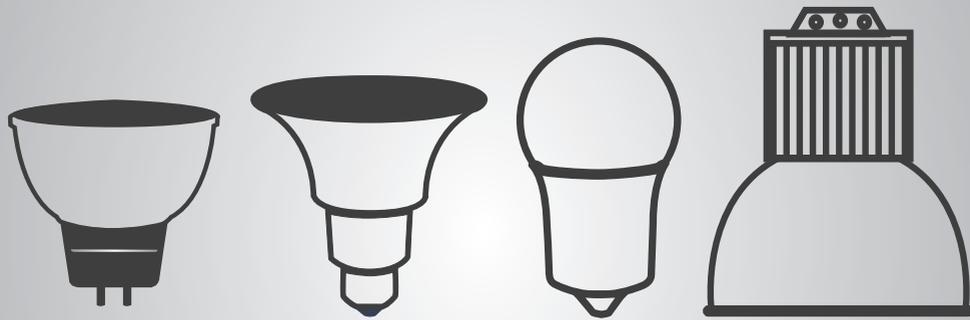
Heat management Managing the heat output and potential fire hazard of a typical PAR lamp can prove challenging. LED PAR lamps are designed to operate at a much lower temperature and also include a heat sink to direct heat away from the lamp electronics thus solving this dilemma (LED PAR lamps ONLY).

Operation at lower ambient temperatures LED PAR lamps can operate in much lower temperatures than previous PAR technologies (up to -40°C) removing the cold start issues and providing more versatility with their application (LED PAR lamps ONLY).

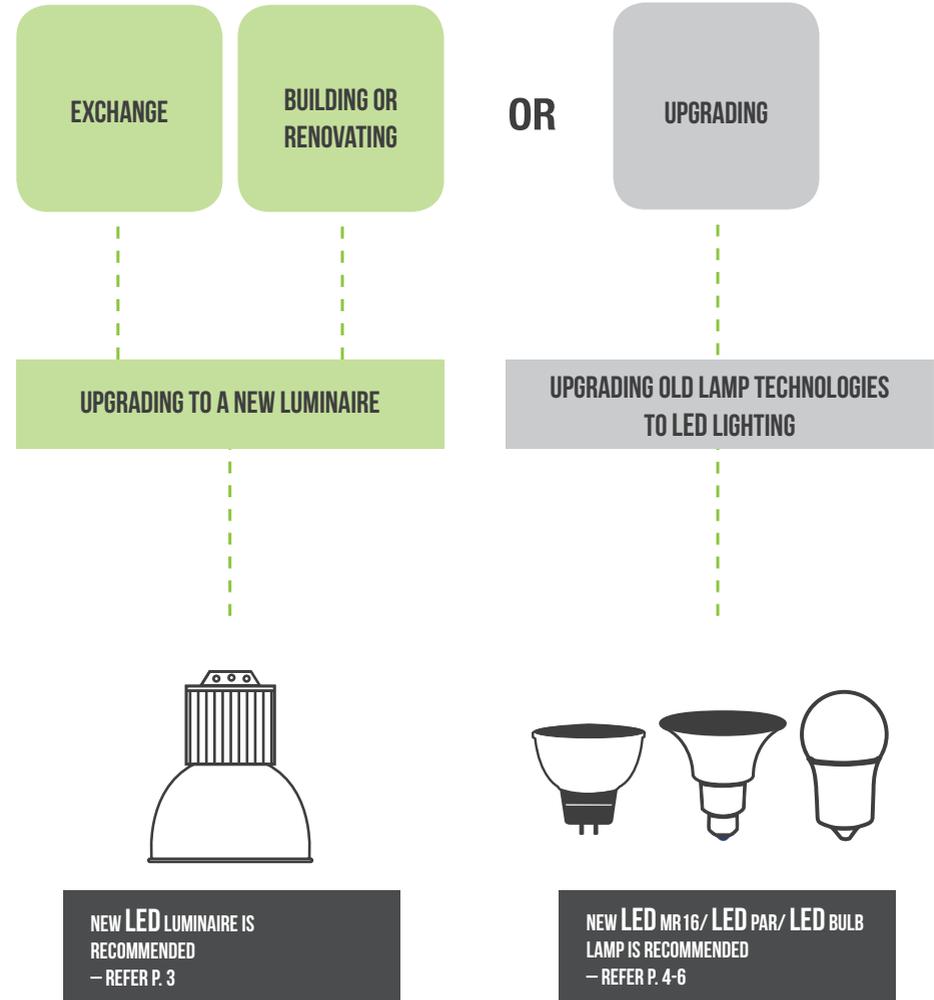
*A standard LED Bulb is up to 85% more efficient than a standard incandescent lamp

**Life is referred to as the time after which 70% of the original light output remains, not when the source has completely burnt out.

***Lumen output is a poor indicator of the performance of a given light source, a more appropriate indicator is 'light delivered'. That is to say, how much light is delivered to a surface or area, as measured in lux (lx) or footcandles (fc).



EXCHANGE AND UPGRADE OPTIONS FOR LED LIGHTING



LED LUMINAIRE CONSIDERATIONS



[LED LUMINAIRE CONSIDERATIONS]

Whether you are looking to build, renovate or simply wanting to install a new fixture to upgrade to LED lighting there are many types of LED luminaires to choose from. Here are a few points to consider when selecting the correct luminaire for your chosen application:

- 1. General Office Lighting**
LED luminaires may be suitable for some indoor areas which do not require high lumen output, for example, toilets and circulation spaces. However in main office areas high lumen output packages using fluorescent or HID will offer better, more cost effective task lighting solutions.
- 2. Bracket Lighting**
Fixtures with adjustable brackets allow the user to alter the level of illuminance in the room by simply adjusting the bracket to show more or less light from the fixture. If an LED light source is used inside one of these luminaires the fixture positioning may have to be altered to account for the additional brightness of the LED light source.
- 3. Step Lighting**
The compact size and lower power consumption of LED lamps make them perfectly suited to step lighting.
- 4. Multiple lamp arrangements**
An LED light source in a multi-lamp arrangement is an optimal replacement for individual non-LED lamp arrangements – combating the common occurrence of over-illumination. Over-illumination occurs when too much light is created in a particular space. By using LED lamps in a multi-lamp arrangement the direction and brightness of the light source can be controlled by adjusting the individual lamp holders and benefitting from the more directional beam of the LED lamp.
- 5. Downlighting and beam angles**
The LED downlight is available in two beam types: wide flood beam and narrow flood beam. The wide beam type is used to create uniform illuminance. The narrow beam type is used to highlight a particular area creating contrasting light and dark spaces. Choice of beam type is not designated by the size of the room but rather the effect you want to create - it is recommended that you consult with a lighting designer to plan your optimal lighting scheme.
- 6. Outdoor lighting**
The LED lamp is well suited to outdoor lighting because of its energy efficiency, durability and compact size. Using LED lamps in combination with sensors for porch lights and garden lights will achieve additional energy efficiencies. Flashing LED sensor lamps are also available and are effective as a deterrent to crime.

Note: An LED light source will always achieve greater efficacy than that of the LED fixture so it is imperative that when analysing the performance of an LED fixture you should refer to the appropriate fixture data not the LED light source data.

If you have decided to keep an existing light fixture and simply upgrade to an LED light source there are a number of LED direct replacement options to consider – LED MR16 lamps, LED PAR lamps and LED Bulbs.

LED 12V MR16 lamps with a GU5.3 base have been developed specifically to directly replace Halogen 12V MR16 lamps (GU5.3 base). The only draw-back to this direct replacement option is that halogen lamps operate from external transformers which are sometimes incompatible with LED MR16 lamps.

The most common form of transformer designed to run halogen lamps is the electronic transformer which is rated at 60 watts. When combined with an LED lamp instead of a halogen lamp the transformer may occasionally fail to operate as the wattage from the LED lamp is too low to register.

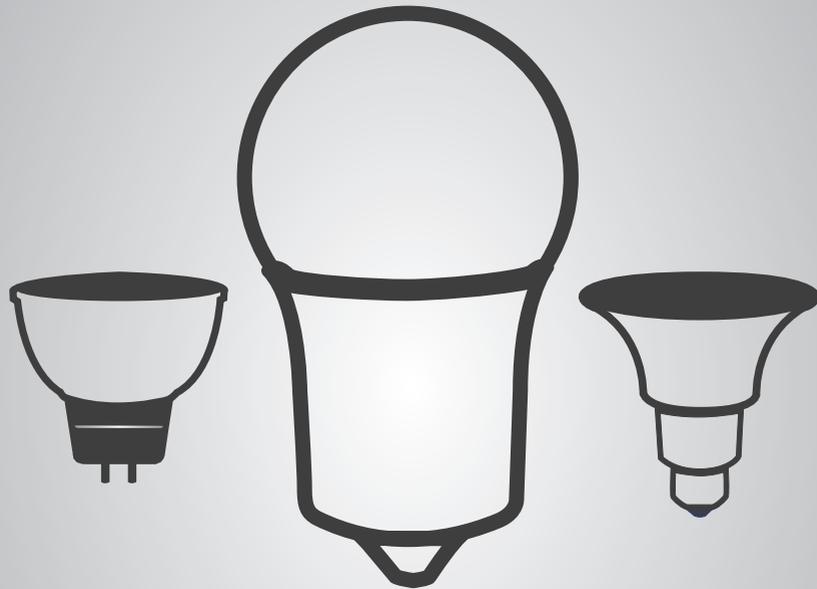
It will become immediately obvious if the existing transformer is incompatible with the LED 12V MR16 light source as a constant flicker will become apparent. By upgrading to a DC Constant Voltage LED specific driver you will be able to experience maximum efficiencies of the LED lamp, save additional power through the driver itself and the lamp will run at a cooler temperature.

To avoid upgrading to an LED driver there is one alternative which exists. LED 12V MR16 lamps which are sold with a rectifier will convert AC to DC allowing the LEDs to perform at their normal capacity. Labelled with the code '**12V AC/DC**' these LED lamps can operate on iron cores and a few electronic transformers.

LED PAR lamps act as a direct replacement for existing halogen and incandescent PAR lamps. The LED lamp can screw directly into the current socket used for the previous lamp. Featuring all the same benefits of older PAR lamps but achieving greater efficiencies and longer life resulting in less replacements.

LED Bulb lamps are a direct replacement for all existing incandescent, ball and mini krypton lamps. Simply remove the existing lamp and screw in the LED Bulb lamp.

The wide angle distribution LED Bulb has a similar light distribution angle to that of an incandescent lamp and is therefore recommended for usage in living room downlighting. On the other hand, the narrow angle distribution LED Bulb is most appropriate for hallway downlighting, lighting of toilets/ bathrooms and for highlighting pictures and paintings.



LED LIGHT SOURCE CONSIDERATIONS

SELECTING THE RIGHT LED LIGHT SOURCE — MR16 LAMPS/ PAR LAMPS/ BULBS

APPLICABLE PRODUCT KEY

LED MR16 lamps



LED PAR lamps



LED Bulbs



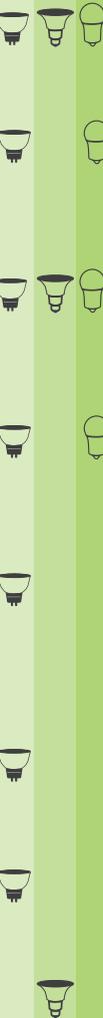
[SELECTING THE RIGHT LED LIGHT SOURCE MR16 LAMPS/ PAR LAMPS/ BULBS]

- 1. Choose the Correct Base Size**
Choose the size of the lamp base equivalent to the lamp that was previously installed - match type and dimensions.
- 2. Light Output**
The brightness of an LED light source cannot be compared by wattage because this represents power consumed rather than light output, instead one should refer to the amount of exit lumens the LED lamp produces in comparison to the lamp being replaced.
- 3. Choose the Light Distribution Angle**
Matching the correct beam angle of the existing lamp will ensure you will not be left with dark spots or over-illumination. If you cannot determine the beam angle of your current lamp perform a quick search for the lamp model number on the manufacturer's website.
- 4. Choose the Colour Temperature**
There are three colour temperatures available – warm white, daylight and cool white. Warm white is usually preferred for bedrooms, while daylight is usually used for living rooms and cool white for office areas.
- 5. Check to Ensure the LED Lamp is Compatible with Existing Switch**
Do not put a non-dimmable light source with a dimmable switch or vice versa. If the LED is dimmable ensure it uses a specific LED dimmer as some LED light sources are not compatible with halogen/ incandescent dimmers (the EYELITE range of direct replacement LED lamps are developed to operate on most existing dimming switches from reputable manufacturers).
- 6. Check the Fixture**
LED lamps require extra space to dissipate the heat and should not be used in fully-enclosed fixtures.
- 7. Operating Temperature**
Check the appropriate ambient temperature that the LED lamp can safely operate within and ensure it matches the temperature of the application where you plan to install it.
- 8. Size of the PAR Bulb**
It is important to correctly match the bulb size of the LED PAR replacement product with the existing PAR lamp. The size can be easily determined by referring to the name of the lamp i.e. PAR 38 - the two numbers correlate to the bulb diameter in eighths of an inch (in this case $38/8 = 4.75$). Most common PAR lamp sizes are as follows: **PAR16 LED Bulb: 2"**; **PAR20 LED Bulb: 2.5"**; **PAR30 LED Bulb: 3.75"**; **PAR38 LED Bulb: 4.75"**.

LED MR16 lamps

LED PAR lamps

LED Bulbs





[CAUTION POINTS]

1. Confirm the size and weight of the LED replacement lamp against the lamp being replaced.
2. Ensure the existing socket attachment position for downlights is a match to the light distribution of the replacement LED lamp. Failure to check the downlight position may result in the light beam being cut-off in the fixture and therefore not producing the required illumination level.
3. When installing an LED lamp in a luminaire with a dimmer or a closed cover check the compatibility of the particular LED bulb.
4. LED Bulbs cannot be used in outdoor luminaires.
5. Confirm the appropriate ambient temperature that the LED light source can operate within.

[A FEW FINAL POINTS OF ADVICE]

1. After installation the standard period before maintenance or exchange is 8 to 10 years.
2. Select the correct colour temperature and brightness to suit the application because an LED life span is up to 50,000 hours.
3. Reconfirm the position and the light distribution angle when upgrading to an LED lamp - for general illuminance such as in pendant or floor lamps choose a wide distribution LED lamp.
4. When deciding whether to upgrade to an LED luminaire or to an LED lamp:

Replace the lamp:

- + If the installation is between 1 to 5 years old.

Replace the luminaire:

- + If it is between 5 to 10 years old and you are thinking of moving or renovating
- + If the installation is 10 years or older.



A FEW FINAL POINTS OF ADVICE



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