A General Guide to Using Dimmers

by Andrew Orange, September 2011

Adding a dimmer switch to a lighting circuit has always been an easy addition to a lighting scheme; it effectively provides that added bit of control. From a simple rotary dimmer to a full blown scene setting system there is a huge choice. I know many designers that use them everywhere they can; like an insurance policy against an over lit space!

However the world of dimming is not always as straight forward as we would like to hope and it is increasingly becoming problematic with the rise of new light sources including LED lamping.

So how do lights dim?

If we reduce the amount of current that gets to the lamps on the lighting circuit, the light output decreases.

Basic principles to consider fall into two sections; firstly the dimming controller and secondly the lamps that are being dimmed.

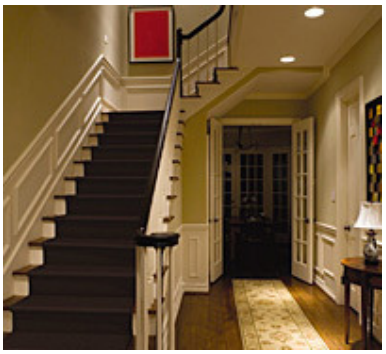
Control

This can be done in many ways but the most commonly used in residential and light commercial (hotels etc) are;
Rotary Knob with *Leading edge mains power dimmer*
Rotary Knob with a *Trailing edge mains power dimmer*
Buttons with *1-10 volt dimming* – touch sensitive buttons
Scene controlling such as Lutron or Rako systems come under the 1-10V category.
DALI – digital dimming increasingly used in commercial lighting.

Buzzing Dimmers?

Rotary dimmers work by creating a resistance to the current within the back of the switch, which can generate a low pitched hum when working hard. This can be avoided by *remotely locating* the kit that dims the current and communicate to this remote dimmer pack via a touch sensitive button. The signal between the dimmer pack and the button is carried on a thin wire between 0 volts (off) and 10 volts (100% on) hence the phrase 1-10 volt dimming

Wireless dimmer switches are another way to communicate with the remote dimmer pack. Wireless dimmers are fabulous when it is difficult to run signal cabling to the back of an existing light switch but there is an opportunity to install a remote dimmer pack. They can save money when on larger projects there are miles of cabling to install. The remote dimmer switch is simply telling the dimmer pack what to do.



Lamps

So a question to ask if you want to dim a circuit, is whether the fittings you have chosen can be dimmed? The answer is not always in the lamp itself. Here is a list of main suspects:

Tungsten
GLS lamps - Yes, good old fashioned, inefficient tungsten dims perfectly and easily.
Mains Tungsten Halogen
GU10 dichroic lamps, G9 capsules – Yes
Low Voltage Lamps
MR16 dichroic lamps used in downlights, G4 small capsule lamps – Yes. However, low voltage lamps need a transformer to reduce the voltage to the lamp and the dimmer needs to be able to communicate to the transformer. This is where the description of 'Leading Edge' and 'Trailing Edge' becomes relevant.
Fluorescent Lamps
Yes. A huge however is that fluorescents need a 'ballast' to create the right frequency for the lamp. These electronic ballasts are within the light fitting next to the lamp and have to be dimmable for dimming to work. The problem is the majority of decorative fittings available do not have a dimmable ballast in them, as they cost more – so be warned!
Compact fluorescent lamps
Now widely replacing GLS lamps and can be dimmable. You must ensure they are from a branded manufacturer and not expect all of them to dim, the overwhelming majority do not.
LED –
Yes. It is the 'driver' that does the job of reducing the current to the LED, that must be compatible with the dimmer.

LED dimming is notoriously tricky, especially if you are mixing other lamp types on the same circuit. For our downlights our recommendation is to use a pretested 'intelligent' dimmer as the complexity of pitfalls is alarming. The objective is to achieve a smooth full dim. Be warned that every LED type and brand has it's own requirements or limitations.

Leading or Trailing Edge?

Next time have a look at a dimmer switch and see if it says whether it is a leading edge or trailing edge fitting? You must specify the correct transformer or driver to match it. The terms leading and trailing are describing how the dimmer works, cutting off the beginning or end of the voltage sine wave which in turn reduces the power in slightly different ways. There is a type of dimmer (RLC Class) that will dim non LED lamping universally.

Colours
Dimming the current to a lamp can change the colour of light output.
Tungsten – the colour warms as the current lowers
Fluorescent – colour remains constant
LED – colour remains constant unless faked with a warm LED chip that kicks in under dimming.

We are delighted to help you specify the correct combination of kit. Do speak to us first when specifying lighting that you want to dim.

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