Your Guide to Dimming from : Hamilton®

R. Hamilton & Co Ltd
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R Hamilton & Co Ltd is one of the leading manufacturers of dimmers in the UK and markets its products under the **Litestat** brand name. We can offer a comprehensive range of equipment to suit most applications, from a standard 40W GLS lamp, to multi-channel systems controlling higher loads up to 5000 watts per channel.

The following information contained within this document is designed to help you decide which the best solution for your particular installation is.

Types Of Dimmers -

Dimmers can be divided into three main groups depending on the light source being controlled

Resistive	These are designed to control lamps that have a filament, which emits heat and visible light. Typical lamps are standard GLS incandescent, Mains halogen, dimmable LED lamp
Inductive	These dimmers are designed to control light sources which use **wire wound components** in the form of transformers. An example of this would be low voltage lighting.
Fluorescent	This light source requires a dimmable 1-10volt High Frequency Regulated Ballast

Resistive dimmers (Leading edge) - are rated by the ***maximum*** recommended wattage the unit will control. Overloading the dimmer or using it to control Inductive loads can cause damage to the dimmer. This dimmer will also dim constant current 230Vdimmable LED drivers. ***Contact our technical department with regards to dimming LED's.***

Resistive dimmers (Trailing edge) – Some of today's electronic transformer require a trailing edge dimmer which offers soft start, smooth control, silent running and multi-way dimming (Touch control) only.

Inductive Dimmers - are rated as VA (Volt amps) and have already been de-rated to allow for the current-in rush from the transformer.

Fluorescent dimmers - It is recommended that where fluorescent installations need to be dimmed, High frequency analogue 1 – 10 volt regulated ballast is used. This will result in lower dimming levels, smoother dimming control and a reduction in RFI. LED's can be dimmed with this dimmer by using ***a Constant Current 0-10V Driver.***
Note an additional 2 core cable is required to be installed between the ballast and the dimmer

Dimming of Electronic Transformers - today most **dimmable** electronic transformers can be controlled by a resistive type dimmer. However there are still some electronic transformers having the characteristics of an inductive load. Always check the transformer instructions to determine the type of load it represents. Another consideration, which needs to be clarified, is - Can the electronic transformer be dimmed with a phase angle ***leading edge*** dimmer, as some electronic transformers require ***trailing edge*** dimmers.

Step-by-Step guide for the layman

Question :	**Answer :**
What is dimming?	Dimming is the reduction of the power into, and therefore out of, a light source.
What are the advantages/uses of this?	Reducing the power into the light source reduces the power in the circuit. This will lead to a saving of energy and hence lower running costs. As a result, the life expectancy of the light source is also increased. Again this lowers the running costs of the system by reducing the amount of maintenance that a system requires. The reasons for using dimming are not all practical. Hotels, restaurants and many other establishments frequently use the dimming of lights to create different atmospheres in areas of a building.
Can any dimmer be used to control any light source?	No. There are various types of light source available. Not all of these are dimmable. Different types may require a different type of dimmer.

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What can I use if there is a large lighting load to consider?

There are three different types of dimmers.

1. The module type of dimmer is suitable for loads up to 1000 watts.
2. The ICDM1000 leading edge Ceiling Dimmer will control loads from 40-1000 watts.
3. Remote dimmer packs can each control loads from 40 watts up to 5000 watts per channel.

Mains Voltage Resistive Loads

This range embraces domestic controls based on the traditional small plate dimmer and is suited to the smaller installations. Alternatively consider using a Mercury Litestat system. This offers additional enhanced atmospheric lighting schemes with a variety of control options. Commercial/industrial projects are also catered for by Mercury Litestat high specification dimmer packs. These offer a wider range of control options and are suitable for larger loads. All small plate dimmers are suitable for 230/240v AC 50HZ and are suitable for control of tungsten filament lamps (general service type to BS161) and most electronic transformers. It is ***recommended*** that you contact the manufacturer of the transformer to confirm that it is suited for dimming applications and that it is considered to be a resistive load, and can be dimmed by either a ***leading*** or ***trailing*** edge dimmer

There are four ratings of tungsten modules available:

250W (Trailing Edge) Module has a range of 25W to 250W. Suitable for multi-way operation with rocker switches. Touch Dimmers are suitable for multi-way dimming with Touch slaves.

400W (Leading Edge) Module has a range of 40W to 400W. Suitable for multi-way operation with rocker switches.

600W (Leading Edge**)** Module has a range of 100W to 600W. Suitable for multi-way operation with rocker switches.

1000W (Leading Edge**)** Module has a range of 150W to 1000W. Suitable for multi-way operation with rocker switches.

ICDM1000. (Leading Edge) Ceiling Dimmer 1000W. This Unit has a range of 40W to 1000W. Suitable form multi-way dimming with a push to make momentary switch and/or Hamilton Touch slaves.

The above are available on all Hamilton Litestat decorative plates. For totals loads higher than 1000W use Mercury Litestat remote dimmer packs.

Operation

Two-way versions have push on/off operation, and are suitable for two-way switching as found in stairways, halls, corridors etc To achieve to way control a second switch must be installed in the circuit which then allows switching from another location

Note: **Only one two way dimmer** can be connected in a two way circuit. The other control point must be a two-way switch.

For tungsten/incandescent loads, providing the total load on the circuit is within the rating of the dimmer and the dimmer selected is suitable for tungsten/incandescent loads, there should be no problems associated with the dimming. (**These dimmers are not suitable for control of energy saving PLC lamps)**

The need to de-rate a dimmer

When using Mains Voltage Halogen lamps such as GU9, GU10, GZ10 and Linear halogen lamps, dimmers should be ***de-rated by 25%,*** this helps compensate for the additional load due to arcing at the end of the lamp life cycle. This extra load can damage the dimmer.

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Where possible use ***branded lamps*** such as those produced by GE, Osram, Philips and Sylvania. Generally these have an in-built fuse link and, should the lamp filament short out, the thermal fuse stops the inrush of current which can damage a dimmer. (LIF Technical Statement No.25).
Many cheaper imported lamps do not have this fusel link.

When using mains halogen lamps the loads the dimmers are controlling must be de-rated because of the heat generated during normal operation.

Inductive Loads Laminated or Toroidal (Wire wound) transformers.

To meet the requirement of dimming these older type transformers Hamilton Litestat has a range of dedicated dimmers, specially designed to cope with the inductive load produced by the transformer current. These controls are referred to as **inductive dimmers.** All plate dimmers are 230/240v AC 50Hz and are suitable to control the primary side of Laminated or Toroidal (Wire wound) transformers.

It is important to check that the transformers you are intending to use are suitable for dimming with a phase angle ***leading edge*** dimmer; this information can be obtained from the transformer manufacturer or supplier.
You must ensure the inductive load does not exceed the **VA** rating of the dimmer as the surges associated with the dimming of inductive loads can cause premature failure on the primary fuse in the transformer. **(Please contact our Technical Department for further advice.)**

The transformers should be as small as possible (e.g. it is better to use 2x100vA than 1x200vA transformer).

Transformers ideally should be fully loaded.

We stress again the total load on the circuit must be within the rating of the dimmer being used otherwise it will cause the dimmer to over heat and malfunction.

These dimmers are available on all Hamilton Litestat decorative plates. Alternatively consider using a Mercury Litestat system. This offers enhanced atmospheric lighting schemes with a variety of control options. For total loads higher than 500va use either the Hamilton **ICDM1000** or Mercury Litestat remote dimmer pack

Leading Vs Trailing Edge

	Simple leading edge dimmer(L400/2)	Intelligent leading edge dimmer (HCDM1000W)	Trailing edge dimmer (L250WVA/H-GDMTM250)
Resistive load	Yes	Yes	Yes
Inductive load	No	No load condition protected	No load condition protected
Capacitive load	For good quality electronic transformer	For good quality electronic transformer	Best solution for electronic transformer
Recoverable Over load protect	Thermal cutoff protected	Recovery over load protected	Yes
Recoverable short circuit protect	No	No	Yes, real time
Recoverable thermal protect	No	Yes	Yes
Non-recoverable overload protected	Thermal cut off protected	Thermal cut off protected	Thermal cut off protected
Non-recoverable thermal protected	Thermal cut off protected	Thermal cut off protected	Thermal cut off protected
Soft start	No	Yes	Yes
Fading off	No	Yes	Yes
Flicker	Flicker free for correct operating condition (loading not less than min. requirement)	Monitored	Flicker free
Audible noise	Yes	yes	No

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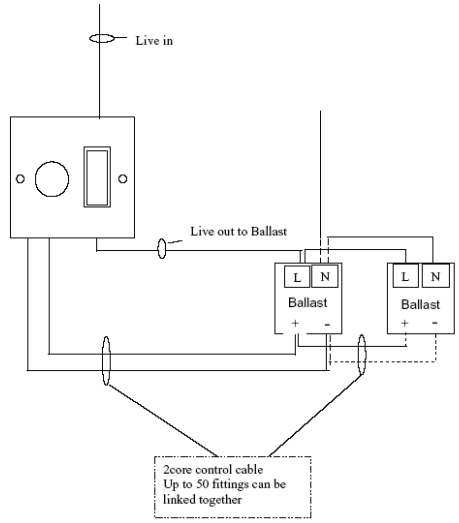
Heat generated	less	less	higher

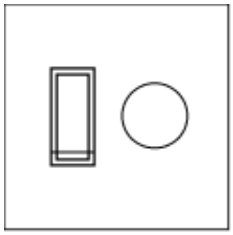
Fluorescent Loads

It is recommended that where fluorescent installations need to be dimmed, a high frequency analogue 1 – 10 volt regulated ballast or the Tridonic Switch Dim ballast is used. See also the Mercury Fluorescent Control Interface.

High frequency analogue 1 – 10 volt regulated ballast

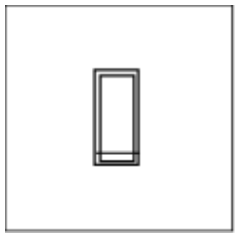
When using a standard 1-10 volt high frequency regulated ballast Hamilton's can offer a control that is suitable to operate up to 50 ballasts on a single circuit. The control consists of a regulator mounted next to a standard 20amp two way switch.





HF10V

Tridonic Switch Dim ballast



Push to Make switch

If using the Tridonic Switch Dim ballast then a standard push to make switch will operate the dimming function.
By keeping your finger on the switch the ballast will run through its dimming cycle.
When the desired level is reached, remove the pressure from the switch. A quick push on the switch will turn the lights on or of at that level.
(Momentary Control).

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Dimmer Module and Plate Loadings

Resistive Loads :

Please note the reduced maximum rating when used with **Mains Voltage Halogen** lamps. It is recommended to contact the **manufacturer of the transformer** to confirm that it is dimmable and is considered to be a resistive load.

Leading Edge Dimmers:

No. of Gangs	Nominal Plate Size (mm)	Dimmer Type	Metal Plates			Wood Plates			Plastic Plates		
			Rating per Gang in Watts (W)			Rating per Gang in Watts (W)			Rating per Gang in Watts (W)		
			Tungsten Filament and Halogen	**Tungsten Filament**	**Halogen**	**Tungsten Filament and Halogen**	**Tungsten Filament**	**Halogen**	**Tungsten Filament and Halogen**	**Tungsten Filament**	**Halogen**
			Min	Max	Max	Min	Max	Max	Min	Max	Max
1	88 x 88	1x400W	40	400	300	40	400	300	40	400	300
2	88 x 88	2x400W	40	300	300				40	**300 ***	300
2	86 x 146	2x400W				40	300	300	40	**300 ***	300
3	86 x 146	3x400W	40	300	300	40	**300 ***	300	40	**250 ***	250
4	86 x 146	4x400W	40	**300 ***	250						
6	150 x 150	6x400W	40	**250 ***	250	40	**200 ***	200			
9	150 x 210	9x400W	40	**250 ***	250						
12	150 x 210	12x 400W	40	**200 ***	275						
1	88 x88	1x600W	100	600	450	100	600	450	100	600	450
1	86 x146	1x1000 W	150	1000	750	150	**800 ***	750			

Note: Maximum recommended load on single plate is 600 watts allowed.

*** de-rated to maximum**

Trailing Edge Dimmers:

No. of Gangs	Nominal Plate Size (mm)	Dimmer Type	Metal Plates			Wood Plates		
			Rating per Gang in Watts (W)			Rating per Gang in Watts (W)		
			Tungsten Filament and Halogen	**Tungsten Filament**	**Halogen**	**Tungsten Filament and Halogen**	**Tungsten Filament**	**Halogen**
			Min	Max	Max	Min	Max	Max
1	88 x 88	1x250W	25	250	250	25	250	250
2	88 x 88	2x250W	25	250	250			
3	86 x 146	3x250W	25	250	250	25	250	250
4	86 x 146	4x250W	25	250	250			
6	150 x 150	6x250W	25	250	250	250	250	250
9	150 x 210	9x250W	25	250	250			
12	150 x 210	12x 250W	25	**200***	200			

*** de-rated to maximum allowed.**

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Dimmer Module and Plate Loadings contd

Inductive Loads :

It is recommended to contact the **manufacturer of the transformer** to confirm that it is dimmable and is considered to be an inductive load.

No. of Gangs	Nominal Plate Size (mm)	Dimmer Type	Metal Plates		Wood Plates		Plastic Plates	
			Rating per Gang in VA		Rating per Gang in VA		Rating per Gang in VA	
			Min	Max	Min	Max	Min	Max
1	88 x 88	1x200vA	25	200	25	200	25	200
2	88 x 88	2x200vA	25	200			25	200
2	86 x 146	2x200vA			25	200		
3	86 x 146	3x200vA	25	200	25	200		
4	86 x 146	4x200vA	25	200				
6	150 x 150	6x200vA	25	200	25	200		
9	150 x 210	9x200vA	25	200	25	200		
1	88 x88	1x300vA	50	300	50	300	50	300
1	86 x146	1x500vA	100	500	100	500		

Fluorescent Loads :

It is recommended to contact the **manufacturer of the ballast** to confirm that it is dimmable by 0 – 10 Volt or Retractive Switch.

No. of Gangs	Nominal Plate Size (mm)	Dimmer Type	Max Ballast per Controller
1	88 x 88	**HHF10VR** – Analogue 0 –10 Volt Controller for High Frequency Regulated Ballasts	50
1	88 x 88	**RR21M** – Retractive Switch for Tridonic Switch Dim Ballasts	Up to maximum loading of switch

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Mercury Litestat Digital Dimmers

Mercury Litestat Digital dimmers can dim resistive, inductive, 0-10V HFR Ballasts, certain mains LED's and LED drivers. With our 10A Volt free Relay unit, it can control any non dim circuit, With an RS232 interface device the system can be controlled by a 3rd party device. They consist of a power pack and a separate control unit be either a push to make retractive switch, Rotary control or a Scene control panel, mounted remotely using a CAT5 cable from the main panel on a standard accessory plate. The system also offers Infra Red control.

Mercury Litestat dimming packs are identified as follows:

SM	+	number	+	D	+	Load/Circuit type
Surface mounted		1		Digital		0.6, 1.2, 2.5, 5.0, VFR or DHF

A system can have a combination of any load or circuit type in one enclosure.

A single dimming circuit is known as a 'Channel'. Multigang dimmers have more than one channel.

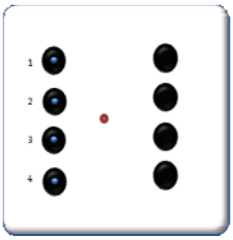
Channels can be controlled individually or together from one control.

Dimmer Pack Ratings: per Channel

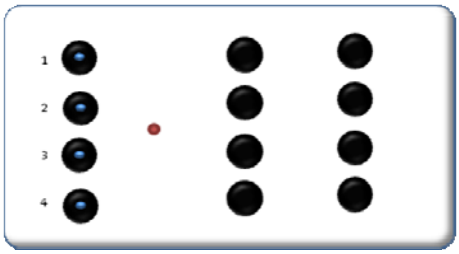
0.6 (600W), **1.2** (1200W), **2.5** (2.5Kw), **5.0** (5Kw), **VFR** (10A Volt Free Relay) or **DHF** (0-10V HF Ballast/Drivers)

On a Multi-gang system there is MCB protection.

Control Panels - Are supplied from an isolated 5V DC supply within the dimmer pack. Wired in CAT5 UTP (unscreened 4 x twisted pairs) or STP (screened 4 x twisted pairs) when running next to mains cable.



IR4B+4M - Master programmable control panel with 4 scene recall buttons with blue LED indication, plus 4 individual buttons to raise/lower and on/off of each circuit. Up to 4 circuits can be controlled with this control panel. Includes a built in Infra Red receiver. This control panel can be mounted from any of the Hamilton ranges of single gang plates.



IR4B+8M - Master programmable control panel with 4 scene recall buttons with blue LED indication, plus 8 individual buttons to raise/lower and on/off of each circuit. Up to 8 circuits can be controlled with this control panel. Includes a built in Infra Red receiver. This control panel can be mounted from any of the Hamilton ranges of double gang plates.

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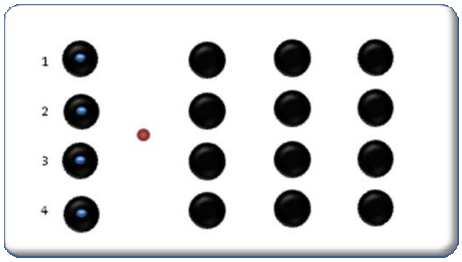
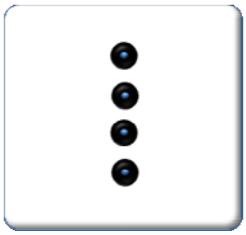
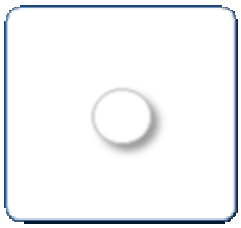


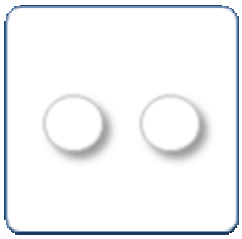
IR4B+12M - Master programmable control panel with 4 scene recall buttons with blue LED indication, plus 12 individual buttons to raise/lower and on/off of each circuit. Up to 12 circuits can be controlled with this control panel. Includes a built in Infra Red receiver. This control panel can be mounted from any of the Hamilton ranges of double gang plates.



4SRC – Non Programmable Scene slave controller, each scene also acts as off button. To be used in conjunction with a Master. For Multi-way scene control. This control panel can be mounted from any of the Hamilton ranges of single gang plates.



RESX1 – 1 gang Rotary decoder. Turn Clockwise to raise light level, anti clockwise to lower the light level. Push to turn the lighting circuit on/off. A pre-longed push of the control knob will also raise/lower the light level. This control panel can be mounted from any of the Hamilton ranges of single gang plates.



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RR1DC – 1 gang push to make retractive switch. A brief Push to turn the lighting circuit on/off. A pre-longed push of the switch will also raise/lower the light level. This control panel can be mounted from any of the Hamilton ranges of single gang plates.

RR2DC – 2 gang push to make retractive switches. A brief Push to turn the lighting circuit on/off. A pre-longed push of the switch will also raise/lower the light level. This control panel can be mounted from any of the Hamilton ranges of single gang plates.

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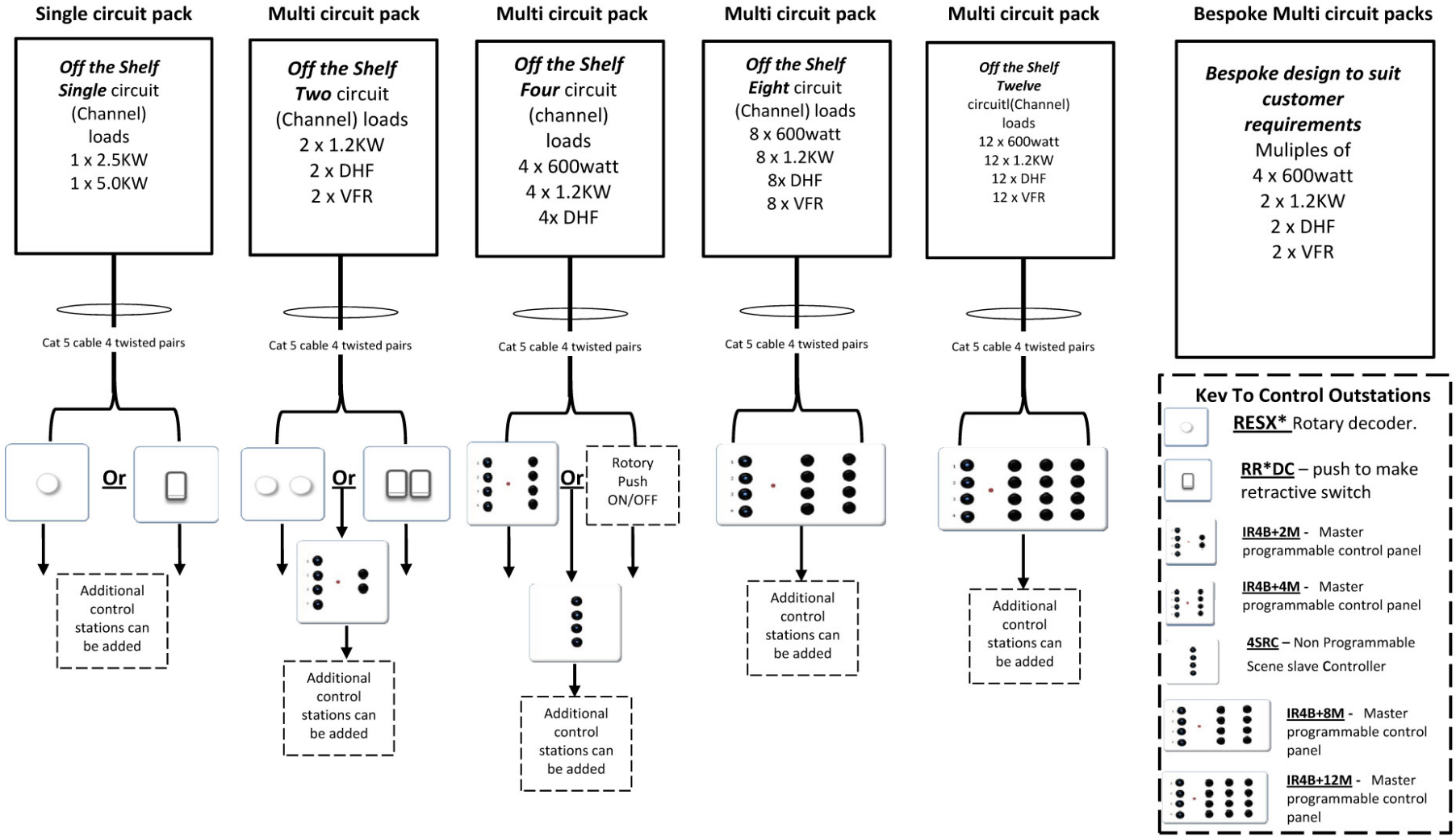

Correct at time of posting. We reserve the right to constantly improve & alter as necessary, particularly in the light of any changes to Standards that may be implemented.

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PLANNING A REMOTE DIMMER INSTALLATION

When planning to use a remote mounted dimming system the following should be taken into account

(1) How many circuits/channels?

(2) What is the total load (wattage) per circuit?

(3) What type of lamp is being used e.g. Tungsten, Low Voltage, LED or Fluorescent?

(4) What type of control is required e.g. Rotary, Momentary or Scene set?

(6) Do you require control of the area from more than one position?

(7) What type of system required e.g. Individual packs or Multi-gang?

(8) The size of area to site the dimmer system? In case special size cabinet is required.

(9) Three Phase & Neutral (TP&N), or Single Phase & Neutral (SP&N)?

(10) What is the supply voltage e.g. (230V/415. 50Hz) (120V/220v.60Hz)?

(11) When dimming Toroidial (wire wound) or laminated transformers use an inductive rated dimmer. Our remote dimmer packs must be de-rated by 20% when dimming this type of load. It is recommended that the VA of the transformers be kept small as possible, ideally no larger than 200VA due to their very high in-rush current.

(12) If Electronic transformers are being used please check to ensure they will dim with leading edge type dimmers, as some require trailing edge. If unsure you should contact the transformer manufacturer.

(13) **Control Panels -** Are supplied from an isolated 5V DC supply within the dimmer pack. Wired in CAT5 UTP (unscreened 4 x twisted pairs) or STP (screened 4 x twisted pairs) when running next to mains cable. Can be wired in star, Radial or as a Ring (preferred).

(14) Fluorescent circuits are suitable using a High Frequency Regulated 1-10V Ballast.

(15) LED's depending on the driver. The 1-10V driver, use the 1-10V PCB. The dimmable constant current driver can be dimmed with a standard Resistive dimmer.