DIMMER SYSTEMS

APPLICATION GUIDE FOR DIMMERS & POWER DISTRIBUTION

JANDS

INTRODUCTION

Jands Electronics manufactures a variety of dimming and power distribution devices to suit most applications and budgets. This sheet has been produced in order to help our customers choose the right Jands product for their application.

Many of the major issues involved in deciding which features are necessary for each application are discussed, as is the suitability of each model in the Jands range.

GENERAL INFORMATION

The Jands range of dimming and power distribution systems includes the following products:

Dimmers:

- HP12-TR & HP12WM-TR
- HP12-SC & HP12WM-SC
- HP6c & HP6cWM
- FP12 & FP12WM
- GP12c
- 4 PAK

Power Distribution:

- PDS12
- PDS12R
- PDS450
- PDS450M
- PDIS
- PDIS-RCD

Dimmers with Integral Power & Signal Distribution:

- HUB 24 & HUB 24E

Jands dimmers and Power Distribution Units can be supplied with a variety of output connections to suit various termination requirements. Typically this includes Australian 3-pin sockets, hard-wired output terminals or European sockets. Other specialist output connectors are available on request, including Wieland 10-pole, 16-pole and GST-18 sockets and Socapex 19-pole sockets, with parallel or series outputs.

MOUNTING DIMMERS & DISTRO'S

All Jands dimmers are available either in a 19" equipment rack or wall mounted format. The HUB 24, HUB 24E and GP12c each have optional wall mounting brackets available, while the HP and FP series dimmers have separate wall mounting models available, as indicated by the addition of "WM" in the model names. These latter models have various options for mounting on walls, including optional brackets for surface mounted conduit entry. The dimmers may also be rack mounted.

Whichever mounting option is chosen, all dimmers must be installed in such a way to allow adequate air flow around fan inlets, exhausts and heatsinks, and should be protected from adverse environmental conditions such as moisture and dust. Whether designing a permanent installation, hiring out equipment, or touring a major rock or theatre show, the dimmers should be mounted above the ground and away from the general public.

Jands Power Distribution Units are designed to be rack mounting, with the exception of the PDIS and PDIS-RCD which can either be rack mounted or wall mounted with the supplied hardware.

Jands also manufactures a variety of touring and installation rack hardware and lighting patchbays. Also available for rack mounting equipment is the popular Jands Roobar stackable equipment rollcage.

Always refer to product user manuals for the correct installation instructions of any Jands products.

ELECTRICAL & MECHANICAL NOISE

Introduction to noise & dimmers:

We have all heard the noise associated with dimmer systems before. Such noise is created from either electrical interference or mechanical vibrations, but the reason for both these problems extends from the way in which dimmers manipulate the input voltage to create the dimmed output voltage.

A dimmer typically uses a solid-state device (typically a Triac or Silicon Controlled Rectifier - SCR) that switches the current on at a precisely calculated point during the mains half-cycle, effectively 'chopping up' the AC waveform and delivering only portions of that waveform to the lamp. This interruption of the sinewave causes the lamp filament to 'glow' at a reduced level, but also generates two noise effects:

1) It causes a lamp filament to vibrate (lamp 'sing'), especially if the filament is long and straggly as found in many PAR lamps.

2) The very 'sharp' nature of the chopped wave introduces high frequency harmonics into the waveform, generating electromagnetic radiation from connected cables, which can be passed into a sound system via audio cable, or in some circumstances via a common earth.

1) Reducing noise at the dimmer:

The first step to reducing noise associated with dimmer racks is taken inside the dimmer itself. An inductor ('choke') is placed in series with the SCR or Triac, to create a 'roll-off' effect at the sharp, switch-on points of the AC waveform. By rolling off these switch-on points both the creation of high frequency harmonics and filament vibrations is reduced.

The rate at which the choke causes this rolloff is called 'Risetime', and varies from dimmer to dimmer. The higher the risetime of the dimmer, the quieter the dimmer will be. However the tradeoff is that a higher risetime means bigger chokes, and therefore increased weight and dissipation (heat energy) of the dimmer. A higher risetime will also cause a degree of voltage loss at the lamp, which can be seen as a decrease in light level as well as a decrease in lamp colour temperature (ie: it will create a more yellow light).

As an accepted industry standard, risetime should be measured as the time taken for the output voltage to rise from 10% to 90% of its switch-on level at 50% drive. This method gives a conservative but accurate result.

Using chokes, however, causes a further introduction of noise; at the dimmer itself. This is caused by the choke vibrating as 'chopped' current is passed through it, though for most applications this won't be a problem. IGBT output devices are an alternative to SCR/Triacs and chokes. These devices help to reduce weight and cause little or no audible noise at the rack.

2) Reducing noise through the cables

Wiring layout can have a dramatic influence on the amount of interference transmitted from the lighting cables to the audio or video systems. All dimmed cables should be run seperately to audio or video cables, and never run these cables parallel to each other. If it is necessary for the cables to cross, they should cross perpendicular to each other. Audio lines should be shielded twisted pair cables to reduce their susceptibility to interference. The shield and connectors should be checked regularly to ensure their integrity and earthing.

Ideally the power for a lighting system should be fed from its own mains supply and be connected to a separate earth. Most venues will already be set up this way, both for touring shows and their own in-house lighting systems. All parts of the lighting system should be electrically isolated from other systems. eg: metal parts of microphones should not touch lighting bars, lighting wall plates should be separate to other wall plates, etc. Where moving lights are used, that power should also be fed from the lighting supply.

3) Reducing Noise at the light

In cases where lamp 'sing' may be a serious problem, some thought should be given to the lamps and fixtures used. Fixtures such as PAR cans, scoops, linear lamp flood and cyc lights all generally have large, loose springing filaments that are susceptible to noise and large reflectors that direct noise towards the performance area. The small, compact filaments found in many of todays newer fixtures are far less susceptible to these vibrations, whilst maintaining a high output. Their design is based on new optical design theories relating to small, bright and efficient light sources radiating from a virtual single point rather than the older theory that 'bigger is brighter'.

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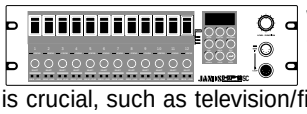
DIMMER TYPICAL APPLICATIONS

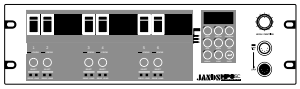
HP12-SC & HP12WM-SC - 12 x 2.5kW



With a high risetime (500µs) and hard-fired SCR's, this dimmer is recommended for anywhere low dimmer noise is crucial, such as television/film studios, concert halls, theatres and other performance spaces where undue noise must be eliminated. The HP's boast an advanced feature set that allows the operator to have control over all the dimmers major functions.

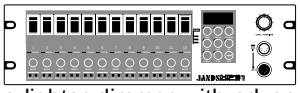
HP6-SC & HP6WM-SC **- 6 x 6kW**

PRELIMINARY INFORMATION



A high power, high risetime dimmer capable of loads up to 6kW per channel, recommended for similar applications as the HP12-SC and HP12WM-SC.

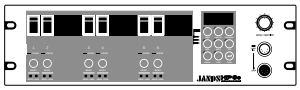
HP12-TR & HP12WM-TR **- 12 x 2.5kW**



The Australian industry standard touring rack, the HP12-TR has a general purpose risetime of 280µs, equating to a lighter dimmer with advanced menu-based software functionality, that gives operators and system engineers the ability to adapt their system to meet any requirement. Designed for companies servicing large and small touring or corporate theatre clients, the rack mountable 'TR can be configured quickly and easily.

The HP12WM-TR suits permanent installations where multiple dimmers are needed, such as large clubs, retail installations, museums and galleries.

HP6c & HP6cWM **- 6 x 6kW**

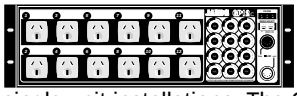


A high power dimmer capable of loads up to 6kW per channel, recommended for similar applications as the HP12-TR and HP12WM-TR.

FP12 & FP12WM **- 12 x 2.4kW**

A light and affordable dimmer rack with a risetime of 150µs. Ideal for driveway hire or single unit installations. The FP12 range feature basic front panel controls that requires minimal knowledge to setup and operate, and circuit breaker protection.

GP12c **- 12 x 2.4kW**



Designed to suit applications where cost effectiveness is a key factor. A risetime of 150µs makes this dimmer ideal for single unit installations. The GP12c features basic front panel control requiring minimal knowledge to setup and operate. Fuse protection allows the output sockets to be mounted on the front panel, while maintaining a small 3RU footprint.

4 PAK II **- 4 x 2.4kW**

A very simple but highly effective lighting controller, the 4 PAK II is a combined console & dimmer cabable of running four channels with a total capacity of 2.4kW over all the channels. The unit has an inbuilt audio trigger and a chase function and is perfect for small bands, schools, shop window displays and anywhere else a small, inexpensive and simple lighting control solution is required.

HUB 24 & HUB 24E **- 15 DIMMER / 9 POWER / 3 DMX**

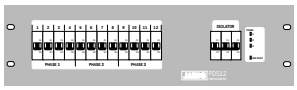
PRELIMINARY INFORMATION

The HUB 24 and HUB 24E represent a new approach to dimmer, power and signal distribution equipment design by combining the three applications into one small, versatile product. Due to its relative light weight, flexibility and low acoustic noise, the HUB is perfect for touring, corporate theatre, dry-hire, exhibition stands, clubs and anywhere lighting control and power distribution is required, especially combined conventional/moving light systems.

The HUB features stand-alone functions for use without a control console, IGBT output devices instead of chokes for its 15 dimmer channels, reducing weight and noise significantly, 9 non-dimmed power distribution outputs and 2 DMX opto-isolated outputs plus loop through.

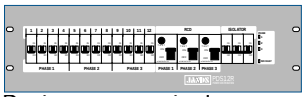
POWER DISTRIBUTION TYPICAL APPLICATIONS

PDS 12 **- 12 x 2.4kW**



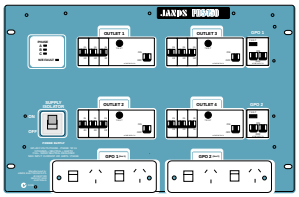
The PDS 12 is a 3 phase input to 12 x 10A single phase outputs distribution unit. It is ideal for applications requiring multiple single phase supplies with seperate breakers for each supply, such as moving light systems and GPO type power for exhibition stands etc. The unit is especially suited for touring and corporate theatre applications as it has the same 3RU footprint as HP rack mount series dimmers and has a similar maximum power draw allowing it to be easily combined with these dimmers in a typical touring rack or in the Jands Roobar rack system.

PDS 12R **- 12 x 2.4kW WITH RCD**



The PDS 12R is suited to the same applications as the PDS 12, but where the added safety of Residual Current Devices are required.

PDS 450 **- 4 x 50A 3ø**

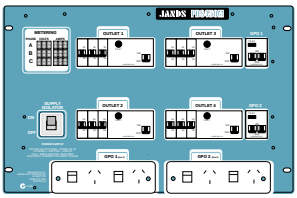


The Jands PDS 450 is a power distribution system designed for use in mobile applications where a single high capacity power feed needs to be broken down into a number of smaller feeds to supply mains powered equipment fitted with 32A - 50A 3 phase and 10A single phase plugs. The PDS 450 allows a show to feed its entire lighting power from one dedicated source. Typically, this includes situations such as large touring and corporate theatre.

Mains power inputs are industry standard 400A 3 phase Litton-Veam Power Lock connectors. All outputs are protected by RCD's, and Power available/ NE fault indicators are provided.

PDS 450M **- 4 x 50A 3ø**

PRELIMINARY INFORMATION



The PDS 450M suits similar applications as the PDS 450, but is supplied with additional features including current and voltage metering facilities and PowerLock loop through connections to allow multiple units to be fed from one supply, useful for larger system configurations and accurate fault diagnosis.

PDIS/PDIS RCD **- 4 x 40A 3ø**

The PDS450 is designed for permanent installations where multiple dimmer racks need to be fed from one high capacity mains supply. The unit provides 4 x 40A output circuits fed from a 160A mains supply isolator. The unit is supplied with a nine-hole cable-in plate which can be mounted on the top or back panel, depending on the installation requirements. A PDIS RCD is also available, with Residual Current Devices protecting each output circuit.

ALL HARD-WIRED CONNECTIONS MUST BE CARRIED OUT BY A QUALIFIED ELECTRICIAN OR SIMILARLY QUALIFIED PERSON.

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