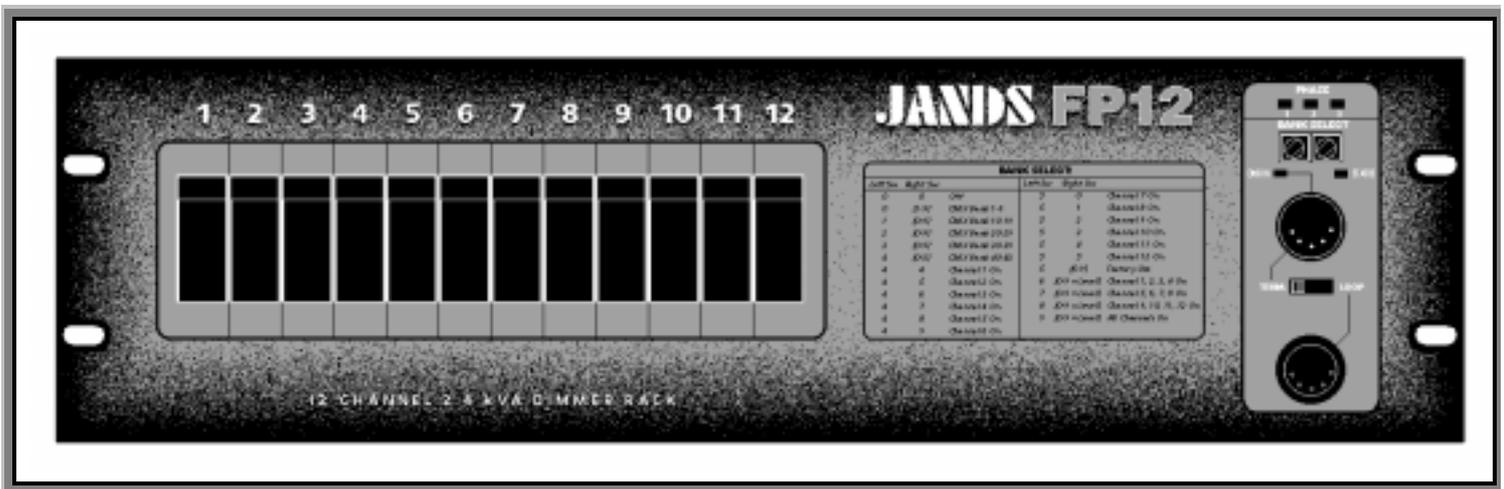


FP12

Digitally Controlled Dimmer Rack



OPERATING MANUAL



EMC COMPLIANCE



This product is approved for use in Europe and Australia/New Zealand and conforms to the following standards:

European Norms	Australian / New Zealand Standards
EN 55014-1	AS/NZS 1044
EN 55014-2	AS/NZS 4251.1
EN 60335-1	AS/NZS 3350.1

To ensure continued compliance with EMC Directive 89/336 and the Australian Radiocommunications Act 1992, use only high quality data cables with continuous shield, and connectors with conductive backshells. Examples of such cables are:

DMX: Belden 8102 100% Aluminium foil screen, 65% Copper braid.

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JANDS FP Series dimmers must only be used for the purpose they were intended by the manufacturer and in conjunction with this operating manual.

Disconnect mains power when not in use.

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1.0 Introduction

The JANDS FP12 is a high quality, rugged, 12 channel, 2.4kVA per channel (10A/240V) dimmer rack specifically designed for demanding touring and theatre applications.

The FP12 can be powered from three-phase or single-phase mains supplies. The FP12 features opto-controlled Triacs and medium risetime chokes protected by thermal/magnetic circuit breakers. The FP12 uses microprocessor-based digital control for accurate dimming and in-built test functions. Digital control is via standard DMX-512 protocol.

The FP12 features toroidal output chokes. These chokes provide excellent high frequency noise suppression and, together with the temperature-controlled fan, low acoustic noise.

Control signal to the dimmer is via a standard DMX-512 socket at the front panel, while the dimmed outlets and three phase power entry are located on the rear panel.

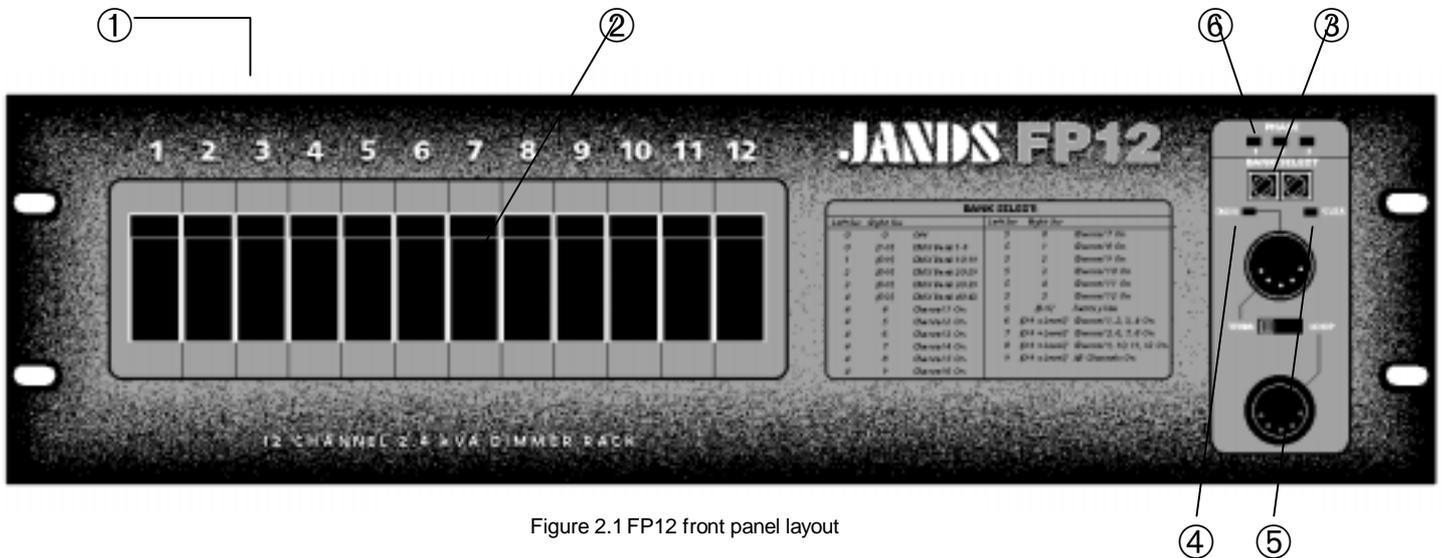
Features

- 12 x 2.4KW dimming channels
- DMX-512 digital control protocol
- DMX terminating switch
- Suitable for both touring and permanent installations
- Soft turn on characteristic
- Low acoustic/electrical noise
- Toroidal output chokes
- Circuit breaker protection of output devices
- Three mains phase indicator LEDs
- Built in test facilities
- Dimmer curve set for linear relationship between the control input and output power
- Compensates for fluctuations in the mains supply voltage, and filters superimposed mains control tones, ensuring a constant light output and increased lamp life
- Rack mounted (3 rack units)
- Microprocessor control
- Temperature-controlled cooling fan
- Temperature monitor and thermal cut-out
- Dimmer will hold last DMX value should control data be interrupted
- 50/60Hz operation
- CE and C-Tick approved

2.0 Equipment Description

2.1 Front panel layout

Refer to Fig 2.1 (below) for a description of the front panel controls.



1. **Channel output sockets (rear panel):** The twelve output sockets are each rated at 10 amps.
2. **Channel circuit breakers:** If a breaker trips during use ensure the fault has been cleared before resetting.
3. **Bank select switches:** These switches select the DMX start bank and the Test functions.
4. **DMX IN LED:** A red LED indicates the presence of DMX signals. If there is no DMX signal, the LED will flash at a rate of approximately 2 seconds on - 2 seconds off.
5. **STATUS LED:** A red LED flashes in the presence of a fault. In normal operation this LED should be off.
6. **PHASE LEDs:** Three blue LEDs (one for each phase) indicate that the three phase mains supply is available.

3.0 Getting Started

The FP12 would normally be rack mounted before any wiring is terminated. Refer to section 6.0 Installation for installation details.

3.1 Connecting power

The FP12 dimmer is supplied with a flexible cable fitted with a multipin power plug for the connection of incoming mains power. The FP12 is ideally powered from a three phase star (four wire plus earth) supply. If the dimmer power cable is damaged it must be replaced with another cable available from JANDS or its service agents.

The upstream supply must be protected by fuses or circuit breakers at not more than the rated maximum.

The power plug should be connected to an appropriately rated socket outlet. The plug's retaining lock ring (if present) must be screwed home.

WARNING

DAMAGE TO THE PLUG MAY OCCUR IF THE RETAINING LOCK RING IS NOT PROPERLY SECURED.

Ensure adequate mains plug access once the dimmer is installed.

3.2 Setting the mains frequency

The FP12 can be configured to run from either 50Hz or 60Hz mains power. As supplied from the factory the dimmer is configured for 50Hz.

The dimmer operating frequency may be changed as follows:

- Disconnect the mains supply to the dimmer
- Remove the lid
- Change the three jumpers on the main circuit card as shown in Figure 3.4
- Replace the lid and reconnect power

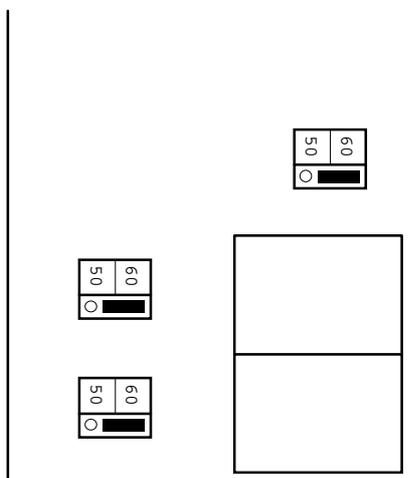


Figure 3.4: 60Hz jumper locations

3.3 Powering up

Turn on the power and check that the three PHASE indicator LEDs are on before connecting any loads. If any of the PHASE LEDs are dim or off, power down and remedy the fault before trying again. Refer to section 5.3 *Phase fault indication*.

If all is well, power down and connect loads.

3.4 Connecting loads

The standard output connectors are twelve Clipsal 415P 10 amp sockets (export models may differ from these configurations). Ensure any plugs are pushed firmly into their sockets.

The FP12 will drive most incandescent loads as well as pinspots, fans, and dimmable fluorescent tubes. The load should be within the specified limits.

3.5 Connecting DMX-512 input

The input signal to the dimmer should conform to the USITT DMX-512 1990 specification. The DMX input connects to the frontpanel socket labelled “DMX IN”. The DMX signal may be daisy-chained to the next dimmer via the connector labelled “LOOP”.

The red DMX IN LED indicates the presence of DMX signals.

The DMX receiver input is protected against extreme over-voltages across any input pins and from any input to chassis. The “terminating” resistor is not protected against over-voltages.

3.6 DMX Termination

In any DMX-512 system the signal should be terminated at the last dimmer or receiver in the chain, and the FP12 can provide this function. To terminate the DMX signal, set the frontpanel slide switch from “Loop” to the “Term” position. Note that in this position no signal is present at the “Loop” connector.

3.7 Power-up sequence

When powering up lighting systems, the following sequence should be used:

1. First the control desk;
2. Then any softpatches and/or DMX receivers;
3. Finally the dimmers, preferably one at a time starting from the first dimmer rack in the DMX loop.

This procedure minimises the risk of lamps and fixtures responding to any false DMX data produced by control desks or ancillary equipment at turn-on (producing the lighting equivalent of an audio “thump”) and prevents damage to lamps, dimmers, and other controlled devices.

Use the reverse procedure when powering down.

Disconnect mains power when not in use.

4.0 Dimmer Operation

This section assumes the dimmer has been correctly connected to three phase power and a source of DMX-512 control signal.

4.1 Operating modes

The FP12 has two operating modes:

1. **DMX mode:** the dimmer is controlled from an external DMX-512 control console,
2. **Test mode:** the dimmer is controlled by the internal microprocessor.

4.1.1 DMX mode

In this mode, the DMX Bank Select switches are used to select which bank of 12 channels from the 43 possible DMX-512 banks will control the FP12.

See Table 4.1 (below) for a list of banks and their corresponding Channels.

Decide which bank of channels is required, and rotate the selector switches to the desired setting. For example, if DMX Channels 25 to 36 are desired (ie. bank 3), set selectors to “03”. FP12 Channel #1 is now DMX Channel #25. A FP12 with this setting ignores DMX Channels 1 to 24 and 37 to 512, and only decodes Channels 25 to 36 as it’s dimmer information.

Setting the Selectors to “00” puts the dimmer in a standby state, with all channels off.

Bank	Channels	Bank	Channels	Bank	Channels	Bank	Channels
00	Outputs Off	11	121 - 132	22	253 - 264	33	385 - 396
01	1 - 12	12	133 - 144	23	265 - 276	34	397 - 408
02	13 - 24	13	145 - 156	24	277 - 288	35	409 - 420
03	25 - 36	14	157 - 168	25	289 - 300	36	421 - 432
04	37 - 48	15	169 - 180	26	301 - 312	37	433 - 444
05	49 - 60	16	181 - 192	27	313 - 324	38	445 - 456
06	61 - 72	17	193 - 204	28	325 - 336	39	457 - 468
07	73 - 84	18	205 - 216	29	337 - 348	40	469 - 480
08	85 - 96	19	217 - 228	30	349 - 360	41	481 - 492
09	97 - 108	20	229 - 240	31	361 - 372	42	493 - 504
10	109 - 120	21	241 - 252	32	373 - 384	43	505 - 512

Table 4.1 DMX bank / Channel allocation

4.1.2 Test mode

In this mode, the FP12’s internal controller is used to drive the dimmer channels. It is accessed by setting the Selector switches to banks between “44” and “99”. No DMX control is necessary, but a control signal may be left connected if desired.

This mode is split into two sections with individual Channel testing from banks “44” to “59” and group channel testing from banks “60” to “99”. The first section is not level controllable and each channel is driven to full.

Refer to Table 4.2.

Selector Switches	Channel Under Test	Output Level
44	Channel 1	Full
45	Channel 2	Full
46	Channel 3	Full
47	Channel 4	Full
48	Channel 5	Full
49	Channel 6	Full
50	Channel 7	Full
51	Channel 8	Full
52	Channel 9	Full
53	Channel 10	Full
54	Channel 11	Full
55	Channel 12	Full
56 - 59	12 Step Chase	Full

Table 4.2 TEST MODE – Individual Channel Selection

The second section is level controllable, the level being set by the right hand Selector switch. The left-hand Selector switch changes the grouping. Refer to Table 4.3.

Selector Switches Right		Channel Grouping	Channel Left Level
6	0-9	Channels 1-4 ON (Phase A)	0-9
7	0-9	Channels 5-8 ON (Phase B)	0-9
8	0-9	Channels 9-12 ON (Phase C)	0-9
9	0-9	Channels 1-12 ON	0-9

Table 4.3 TEST MODE – Group Selection

4.2 Status LED

The Status LED is used to indicate fault conditions. In normal operation this LED should not illuminate. When active this LED will either be flashing or on continuously.

1. When the LED is flashing an over-temperature or over-voltage condition is present, and the dimmer outputs will be off until the over-voltage or over-temperature condition is removed.
2. When the status LED is on continuously, one or more of the following error conditions have occurred:
 - Over-voltage
 - Over-temperature
 - Serial data errors
 - Software failure

The dimmer outputs are active while the Status LED is on continuously.

If the Status LED is on it may be cleared by changing the setting of the bank select switches or by switching the dimmer off momentarily.

5.0 Fault Diagnosis

NOTE

Contact your authorised JANDS Distributor for repairs or servicing.

In Australia refer all repairs to an authorised JANDS service agent or return the faulty unit in suitable packaging to:

JANDS ELECTRONICS Service Dept,

40 Kent Rd

Mascot NSW 2020

Australia

5.1 Output protection

Each of the twelve output circuits is protected by a 10 amp fast-acting thermal/magnetic circuit breaker. These breakers are designed to pass the rated current, but will disconnect the output circuit for any overload condition (the larger the overload, the quicker the disconnection).

NOTE: 3-pin GPO outlet sockets are rated at 10 amps. Dimmer channels should not be loaded beyond the socket capacity.

The breakers protect the dimmer's output devices from short-circuit loads and faulty wiring looms, and save on expensive dimmer repairs. A tripped circuit breaker indicates a load fault that requires immediate attention.

If a short-circuit lamp or output cable is plugged into the dimmer, the breaker will trip to disconnect the fault from the dimmer. In nearly all circumstances, this is quick enough to prevent damage to the output devices.

In some circumstances however, a triac failure may be experienced, although these devices are usually quite reliable and robust. If a triac does fail, it will either turn a channel on to full (triac short-circuit), or turn it off (triac open-circuit). If a triac fault should occur, that channel may be isolated by tripping that channel's circuit breaker.

These breakers have been specified for electrical protection, reliability and safety. They will allow repeated turn-on surges to cold lamps without failure, while still protecting the triacs. The breakers will interrupt large short-circuit fault currents without damage.

5.2 DMX faults

The FP12 dimmer features an "Output Hold" facility that "remembers" the last received DMX message. In the event of a cable being unplugged or severed, the FP12 dimmer rack will continue to output the "Held" DMX levels until a new DMX message is provided.

The **DMX IN** LED will "flash" slowly if the DMX signal is removed.

Note that control consoles, when powered down, may transmit spurious DMX data which can unintentionally cause dimmer channels to turn on. Disconnect mains power when not in use.

The DMX receiver input is protected against extreme over-voltages across any input pins and from any input to chassis. The "terminating" resistor is not protected against over-voltages.

5.3 Phase fault indication

The three blue **PHASE** LEDs will show when all three power input phases are present.

WARNING

IF ONE OR MORE PHASE LEDS IS OFF, IMMEDIATELY DISCONNECT POWER TO THE DIMMER AND CHECK THE MAINS SUPPLIES AND WIRING BEFORE RE-CONNECTING POWER TO THE DIMMER.

Although the dimmer will survive most power supply faults, indications of unusual or potentially dangerous power conditions should never be ignored.

5.4 Thermal protection

The FP12 dimmers feature temperature-controlled fan cooling. As the internal temperature of the dimmer increases, the fan speed also increases.

The internal heatsink temperature is constantly monitored by the dimmer. If the heatsink temperature rises above the specified maximum, the dimmer will automatically shut down the output drive. The fan will continue to cool the heatsink during the shut down period.

The electronic shutdown is backed up by a buried cutout, which shuts down power to all electronics other than the cooling fan should the temperature continue to rise.

Even though the FP12 is a fan-cooled dimmer, it is very important that adequate ventilation is provided when in use, particularly around the sides of the chassis. If air circulation to the air vents is blocked and/or the ambient air temperature is too high, the dimmer will shut down and the status LED will flash until the temperature is reduced.

Refer to section 6.1 *Dimmer Ventilation* regarding FP12 ventilation requirements.

5.5 Over-voltage

The FP12 incorporates an over-voltage cutout that constantly monitors the incoming mains voltage. If the mains voltage rises above the specified maximum the dimmer will shut down and the status LED will flash until the over-voltage condition is removed.

5.6 Fault finding guide

FAULT SYMPTOM	POSSIBLE CAUSE	REMEDY
Breaker trips when desk channel flashed to full or near full	Large incandescent load Excessive load	Use console preheat facility Reduce channel loading
Breaker trips after prolonged operation	Excessive load Lamp or wiring fault	Reduce channel loading Check lamps and wiring
Breaker trips immediately when channel is driven	Output short Triac short	Check lamps and wiring Factory service
One channel flickers when dimmed Same load flickers on another Channel	DMX source problem Faulty dimmer channel Insufficient or very inductive load	Softpatch another console fader Service console Factory service Connect >100W incandescent lamp in parallel
Radio interference	Faulty EMC filtering	Factory service
All Channels flicker when dimmed	Incorrect DMX protocol / wiring Unterminated DMX line Mains control tones exceed limits	Replace DMX source / wiring Set Terminate switch on last DMX receiver to TERM Contact factory
Signal LED flickers	Faulty DMX wiring/connections Faulty console Faulty dimmer rack	Repair Repair Factory service
Status LED flashing	Over-voltage Over-temperature	Check mains connection/supply Improve dimmer cooling
Status LED on continuously	Recent over-voltage Recent over-temperature DMX control errors Software failure	Check mains connection/supply Improve dimmer cooling Check DMX wiring, console Factory service
No signal at DMX Loop output	Terminate switch set to TERM	Set Terminate switch to LOOP

6.0 Installation

The FP12 dimmer is designed for use in 19 inch racks or a 19 inch bar frame, and occupies 3 rack units (export models may differ). The dimmer is supplied with rear rack mounting support brackets, which provide additional support for touring applications.

The three phase power cable entry is located at the rear right side of the rack when viewed from the front. Ensure adequate access to the power plug when mounting dimmers in racks.

6.1 Dimmer Ventilation

The FP12 dimmer is fan-cooled, with the air intake at the right and air exhaust at the left when viewed from the front. All racks must have adequate ventilation for the side-to-side airflow of the dimmers. Fully enclosed racks will cause overheating problems.

Racks must allow **at least** 100 square centimetres of air venting per dimmer at each side of the rack, level with the dimmer's intake and exhaust slots. Additional venting area will serve to further reduce internal dimmer temperatures and will enhance the dimmer's operational reliability.

Dimmers may be stacked in racks without intervening rack spaces as long as the racks are adequately vented.

Racks of dimmers must be placed such that one rack does not breathe the hot exhaust of the rack to its right. Allow at least 0.5m (18") between racks unless duty cycles are light.

7.0 Maintenance

With care, the FP12 dimmer will require little or no maintenance.

Periodic electrical safety checks may be required by law in some applications.

WARNING

DO NOT ALLOW THE ENTRY OF LIQUIDS OF ANY SORT INTO THE DIMMER CHASSIS.

EXTERNAL CLEANING:

If the front panel requires cleaning, wipe with a mild detergent on a damp soft cloth.

DO NOT spray liquids onto the front panel.

DO NOT use solvents for cleaning the front panel.

INTERNAL CLEANING:

The FP12 dimmer will require little internal maintenance other than periodic flushing of dust build to prevent the fan and air-path becoming clogged with dirt or fluff.

- ISOLATE POWER to the dimmer (by disconnecting the power cable or locking off the mains supply isolator).
- Remove the lid.
- Blow clean the fan and internals with compressed air from left to right.
- DO NOT "spin" the fan with compressed air - the blades may break off.
- When the fan and internals are clean, replace the lid and screws, and re-connect the power cable.

ROUTINE MAINTENANCE:

Installed dimmers should be routinely flushed of dust at six- to twelve-month periods.

Touring dimmers may need a more rigorous maintenance routine, which should include:

- Inspection of chassis for evidence of impact damage and physical abuse
- Inspection of outlets for wear and damage
- Inspection of power cable for wear and damage
- Electrical checking of ground integrity from power cable to chassis
- Electrical checking of ground integrity from power cable to outlet grounds
- Flushing of dust buildup
- Testing the operation of all frontpanel switches and breakers

8.0 Technical Data and Specifications

PARAMETER	FP12
No. of Channels:	12
Input Power Requirements: 3 phase Star only	415 VAC Phase-Phase @ 40A/phase protected at 50A/phase Full size neutral required
Maximum Power / Channel	2.4 kW
Minimum Power/Channel	25W
Maximum Dissipation	<24 W/channel (<300 W total)
Maximum Ambient Temp	40°C
Control Signal	DMX-512 (1990) Protocol
DMX Input	5 pin AXR male / female
Test Function Level	Individual Channels @ 100% Group Channels @ 10% steps
LED Indicators	DMX IN, STATUS, Phases A, B, and C
Output Protection	12 x 10 Amp thermal/magnetic circuit breakers
Over-temperature cutout	Electronic: 83°C rising, 78°C falling Mechanical: 90°C
Over-voltage cutout	Average 290VAC
Ingress protection	IP20
Size (mm)	482 (w) x 133 (h) x 250 (d)
Weight	16 kg net
Rack mounting requirements	3 x 19" rack spaces / standard spacing for mounting holes Ventilation required at sides of rack No blank spaces required between units Power inlet at rear right (looking from front of unit) Rear access required for patching outputs

8.1 DMX connector pin-outs

PIN No	CONNECTION (DMX IN)	CONNECTION (LOOP)
1	SHIELD	SHIELD
2	IN-	OUT-
3	IN+	OUT+
4	nc	nc
5	nc	nc

The DMX shield connection is tied to chassis by a 47K resistor and a RF bypass capacitor.

8.2 DMX bank allocations

BANK	CHANNELS	BANK	CHANNELS
00	Off	22	253 – 264
01	1 – 12	23	265 – 276
02	13 – 24	24	277 – 288
03	25 – 36	25	289 – 300
04	37 – 48	26	301 – 312
05	49 – 60	27	313 – 324
06	61 – 72	28	325 – 336
07	73 – 84	29	337 – 348
08	85 – 96	30	349 – 360
09	97 – 108	31	361 – 372
10	109 – 120	32	373 – 384
11	121 – 132	33	385 – 396
12	133 – 144	34	397 – 408
13	145 – 156	35	409 – 420
14	157 – 168	36	421 – 432
15	169 – 180	37	433 – 444
16	181 – 192	38	445 – 456
17	193 – 204	39	457 – 468
18	205 – 216	40	469 – 480
19	217 – 228	41	481 – 492
20	229 – 240	42	493 – 504
21	241 – 252	43	505 – 512

8.3 Mains wiring colour codes

	FLEXIBLE TAILS	INSTALLED WIRING
PHASE A	BROWN	RED
PHASE B	WHITE	WHITE
PHASE C	BLACK	BLUE
NEUTRAL	BLUE	BLACK
EARTH	GREEN / YELLOW	GREEN / YELLOW

8.4 Internal Mains Wiring

The FP12 dimmer has been designed to run from most commonly used power systems.

8.4.1 Normal Three Phase plus Neutral Operation

The FP12 is normally supplied with a three-phase power cable and plug attached, suiting the vast majority of available mains supplies (ie. three phase and neutral).

The incoming mains supply must be protected at not more than the specified maximum. Mains supplies are generally protected at lower currents (32 amps or 40 amps at most Australian venues). It is the responsibility of the user to ensure that the dimmer is used in a manner that does not exceed the available supply capacity.

The power cable is terminated within the dimmer at a six-way terminal block and an earthing stud. The six-way terminal block has three poles for the three live mains phases (labelled A1, A2, A3), and three poles for the mains neutral (N1, N2, N3). The three neutral poles are bridged by a copper link, with the incoming mains neutral connected to terminal N2.

8.4.2 Single Phase Operation

The dimmer may be configured for single phase operation where three phase mains supply is unavailable.

The dimmer should be supplied with three same-phase actives and three neutrals. The three active lines must each be protected at not more than the specified maximum. The three neutral conductors must each be rated at the same current as the actives. The earth conductor should be similarly rated.

The bridge between the three neutral terminal poles (N1, N2, N3) must be removed before the three incoming neutral lines are connected.

Although it is possible to supply the dimmer with one large single phase feed, the dimmer's breakers may not be rated to clear faults if the supply is protected at currents greater than the specified maximum.

The overvoltage detection will operate as normal.

8.4.3 Delta Supply Operation

The available venue mains supply in some countries (eg. the Philippines) is in the form of three phases (220 volts between phases) with no neutral connection. The dimmer may be configured for operation from 220V delta supplies.

The bridge between the three neutral terminal poles (N1, N2, N3) must be removed before the three incoming active lines are connected.

- The first incoming active is connected to terminals A1 and N3.
- The second incoming active is connected to terminals A2 and N1.
- The third incoming active is connected to terminals A3 and N2.

WARNING

This connection is ILLEGAL in Australia, Europe and the U.K.

This connection renders the output socket's neutral pins LIVE.

Note that a dimmer wired in this fashion will be subjected to CONTINUOUS OVERVOLTAGE if connected to the 415V wye or star three-phase supply of most countries.

The three active lines must each be protected at not more than the specified maximum. The earth conductor must be rated the same as the active lines.

☞ **MANUAL ENDS** ☞