



LIGHTING SYSTEMS

E-Series

DMX512 Digital Dimmers Operator Manual



E Series V2.4.doc

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1.0 INTRODUCTION

1.1 Product description

The LSC **e-Series** portable dimmer product range consists of the **ePAK** and the **ePRO**. Each dimmer model offers high quality, high performance digital dimming that can be installed into either 19" racking systems or free standing applications.

Each dimmer model is powered from a 3 phase power source and provides dimming functionality through an integrated front control panel and DMX512 control input. A wide selection of output connector options are available to deliver power to the load. On site software upgrades can be performed with LSC's **eLINK** software up-load option ensuring the dimmer is operating with the latest optimised software.

The **e-Series** dimmers compact design and rugged construction make them ideal for the rental and touring markets and because of their functionality and pleasing aesthetics, would be equally at home in schools, churches, convention and exhibition centres, the Broadcast Industry and generally anywhere good quality entertainment dimming products are needed.

1.2 Product design features

The **e-Series** dimmers are built around a custom aluminium extruded heatsink that provides central mounting for all major internal components. The overall design concept provides a very efficient air flow path allowing the dimmers to run a 100% duty cycle. A low noise fan is used to circulate cool air over the dimming circuitry and the **ePRO** model has a variable fan speed control, where fan speed increases as the operating temperature of the dimmer rises.

Each channel is protected by a fast acting Miniature Circuit Breaker (MCB) with LSC's proprietary *Current Control Technology*© to minimise nuisance tripping of the MCBs when high inrush currents are suddenly applied. The added benefit is that lamp filaments are also protected from this shock, thus extending lamp life.

High quality toroidal inductors and filtering circuits minimise the possible interference to other electronic equipment by reducing the harmonic waves produced by phase angled control of the power mains.

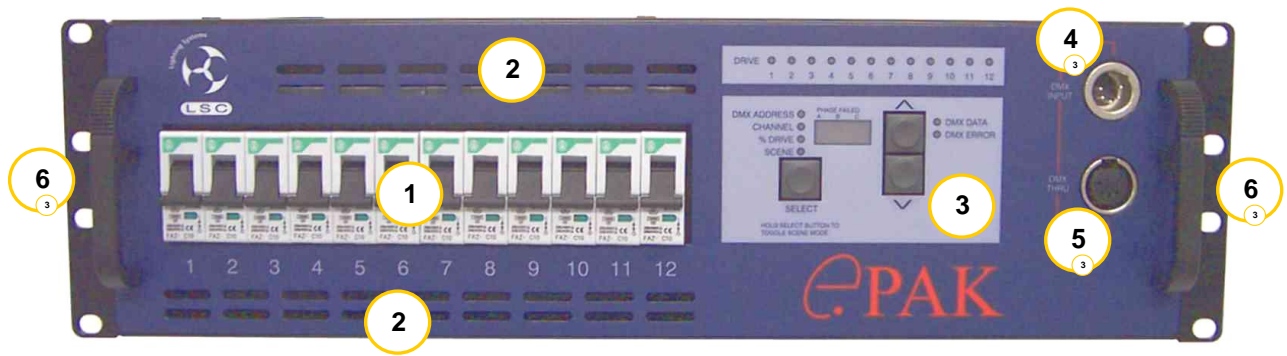
Advancements in electronic componentry, inductor performance and heat dissipation techniques have resulted in a compact and robust design that is ideal for transporting and servicing. Emphasis has been placed on component minimisation to increase product reliability.

Ease of operation is a key element of the **e-Series** dimmers. The clever use of pushbuttons and easy to read displays allow the user to quickly set the DMX512 address, to drive individual channels at varying levels, to create a 12 channel scene that can be stored in non-volatile memory and to set a choice of up to six different fade curves for each dimmer channel (**ePRO** only).

The **ePRO** dimmer utilises Pulse Transformer Fired Dimmer (**PTFD**) Technology. In essence this means the technology used inside the **ePRO** enables it to control virtually any type of connected load. This includes inductive loads (eg. anything with a transformer in it, such as pinspots, 12v EVL dichroic lamp systems, etc) and reactive loads (discharge lamps and fluorescent lamps).

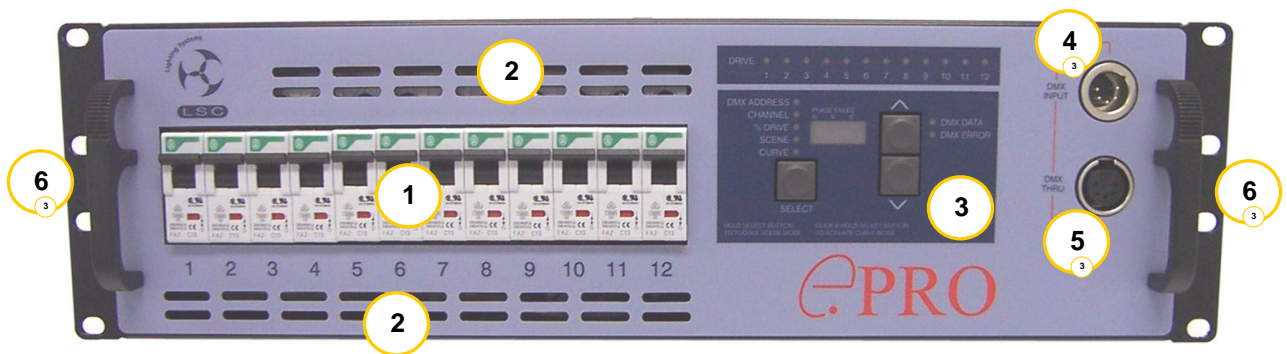
2.0 TECHNICAL SPECIFICATIONS

	ePAK	ePRO	ePRO/6
Number of Dimmer Channels	12	12	6
Rating per Dimmer Channel	10 Amps	13 Amps	25 Amps
Individual Channel Circuit Breaker	1 Pole	1 Pole	1 Pole
Circuit Breaker breaking capacity	6000 Amps	6000 Amps	6000 Amps
Current Control Technology©	Yes	Yes	Yes
Dimmer Curve selection per Channel	No	Yes	Yes
Scene Storage	Yes	Yes	Yes
Power Switching Component	Triac	Triac / SCR	Triac / SCR
Power-up in last known state	Yes	Yes	Yes
Channel Output Level mimic LEDs	Yes	Yes	Yes
Data OK and Error LEDs	Yes	Yes	Yes
Inductor Rise Time (peak to peak)	200-250µs	200-250µs	200-250µs
Number of cooling Fans	1	1	1
Fan Cooling System Control	Two Speed	Variable	Variable
External software upgrading facility	Yes	Yes	Yes
DMX512 input and link-thru	Yes	Yes	Yes
50/60 Hz Frequency Auto-Selection	Yes	Yes	Yes
100/120 Volt Power input (Factory	Yes	Yes	Yes
220/240 Volt Power input (Factory	Yes	Yes	Yes
Meets CE and C Tick requirements	Yes	Yes	Yes
Weight unpacked / packed	18kg / 20kg	18kg / 20kg	18kg / 20kg
Dimensions (mm) : W x H x D	480 x 133 x 275	480 x 133 x 275	480 x 133 x 275
Construction	Corrosion resistant steel finished in black powder coating with rear-screened polycarbonate front and rear panels. Integral 19" rack mounting brackets.		



2.1 ePAK Front Panel Layout

1. Miniature Circuit Breakers (MCB's).
2. Ventilation slots.
3. Integrated Control Panel.
4. DMX input connector.
5. DMX thru connector.
6. Integrated 19" Rackmount brackets.



2.2 ePRO Front Panel Layout

1. Miniature Circuit Breakers (MCB's).
2. Ventilation slots.
3. Integrated Control Panel.
4. DMX input connector.
5. DMX thru connector.
6. Integrated 19" Rackmount brackets.

3.0 GETTING CONNECTED

3.1 Input Supply

The majority of **e-Series** dimmers are intended to be connected to a 3 phase supply and are supplied with a 1.2 metre long 5 wire (6mm²) black rubber insulated power cable terminated inside the dimmer.

Australian models are fitted with a 5 pin three phase plug. The **ePAK** plug is rated at 32 Amps per phase, whilst the **ePRO** power plug is rated at 40 Amps per phase.

Export models have the end of the cable unterminated, and fitted with ferrules and numbers, ready for termination into a suitable three phase plug.

Permanent installation models have a special screw termination rear panel that provides five 10mm² pressure pad screw terminals to connect incoming three phase supply.

Frequency is automatically selected between 50Hz and 60Hz and is sensed and set by the electronics at power up.

Connection is Three Phase Star, however other versions such as single phase(s), two phase and Three Phase Delta wiring are available upon request from the factory. Contact LSC Lighting Systems or your nearest Distributor for further information.

It is imperative that the supply Circuit Breakers to the dimmers are rated equal, if not lower than the dimmer's phase capacity. Correct connection of the Neutral must be maintained, otherwise serious damage could occur to the dimmer or loads connected to the dimmer.

Phase failure is indicated on the front panel by individual LED's for each phase. Refer section 4.6 for more detail.

3.2 DMX Control Input

The dimmers are designed primarily to accept control signals conforming to the DMX512/1990 protocol. Connection is made through the DMX Input connector located on the front control panel. A Thru connector located next to the Input allows the connection of the dimmer to other DMX512 devices downstream. The Thru connection is passive and allows for the pass through of the DMX512 signal, even if there is no power to the dimmer.

LED's on the front control panel indicate the condition of the incoming DMX data. Valid data is indicated with a Green "DMX data" LED. Bad data is indicated with a Red "DMX error" LED.

It is advisable that if the dimmer is the last DMX512 device in a long data stream, a "Terminator" should be connected into the "Thru" connector to stop any possibility of reflections on the DMX512 Network. The "Terminator" can be a mating plug with a 120 Ohm resistor soldered between pins 2 and 3.

3.3 Load Connection

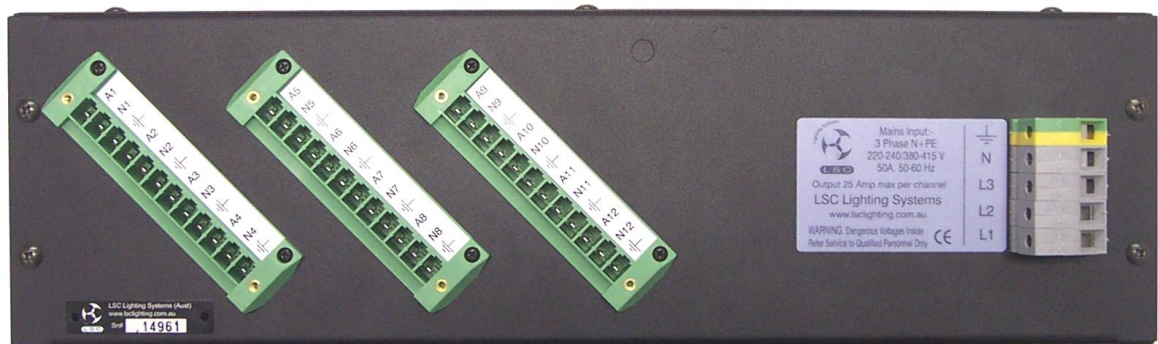
The **e-Series** dimmers are available with a wide selection of output load connectors to suit the many applications and countries of installation. Pin out details for the Multipole connector options are listed in the tables on the following pages.

For Australian versions, the **ePAK** is supplied with twelve 10 Amp HPM No. 38 Sockets. The 12 channel **ePRO** is supplied with twelve 15 Amp HPM No. 38 Sockets and the 6 channel 25A **ePRO** is supplied with 6 sets of 25 Amp and 15 Amp HPM No. 38 Sockets connected in parallel.

For European versions, twelve "Shuko" style 16 Amp Sockets can be supplied for both models of dimmers.

Installation versions are supplied with three (Active, Neutral, Earth) 4mm² pressure pad screw terminals per circuit for the twelve channel dimmers and three (Active, Neutral, Earth) 4mm² pressure pad screw terminals per circuit for the six channel dimmers. For ease of installation a plug-in mating combination screw terminal is provided to allow connection of circuits prior to the dimmer being present. This also allows for quick disconnection of circuits if the dimmer has to be removed.

Rear view of ePRO dimmer with screw terminals



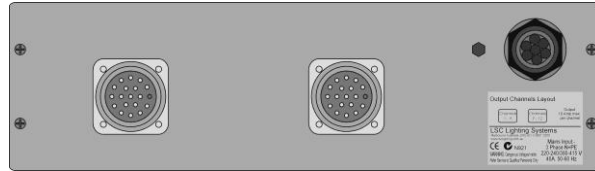
Channel output terminals

Power input terminals

The **ePAK** is a soft-fired dimmer which is suitable for most resistive type loads. The **ePRO** is Pulse Transformer Fired dimmers which are suitable for resistive loads as well as most inductive loads such as fans, motors, ballasts and dimmable fluorescent tubes. Care should be taken when driving inductive loads as not all of these types of loads can be dimmed. If you are in doubt to the dimmers suitability for the intended application, please consult LSC Lighting Systems or your nearest Distributor for further information.

Under all circumstances during the operation of the dimmer, it is highly advisable not to connect or disconnect the load while live, to prevent potential damage to the dimmer, the load connectors or to the load itself.

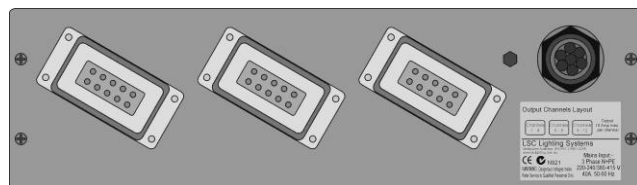
Socapex 19 Pin Multipole Connectors



Connector #1	Function	Connector #2	Function
Pin 1	Chan 1 Active	Pin 1	Chan 7 Active
Pin 2	Chan 1 Neutral	Pin 2	Chan 7 Neutral
Pin 3	Chan 2 Active	Pin 3	Chan 8 Active
Pin 4	Chan 2 Neutral	Pin 4	Chan 8 Neutral
Pin 5	Chan 3 Active	Pin 5	Chan 9 Active
Pin 6	Chan 3 Neutral	Pin 6	Chan 9 Neutral
Pin 7	Chan 4 Active	Pin 7	Chan 10 Active
Pin 8	Chan 4 Neutral	Pin 8	Chan 10 Neutral
Pin 9	Chan 5 Active	Pin 9	Chan 11 Active
Pin 10	Chan 5 Neutral	Pin 10	Chan 11 Neutral
Pin 11	Chan 6 Active	Pin 11	Chan 12 Active
Pin 12	Chan 6 Neutral	Pin 12	Chan 12 Neutral
Pin 13	Earth	Pin 13	Earth
Pin 14	Earth	Pin 14	Earth
Pin 15	Earth	Pin 15	Earth
Pin 16	Earth	Pin 16	Earth
Pin 17	Earth	Pin 17	Earth
Pin 18	Earth	Pin 18	Earth
Pin 19	Spare	Pin 19	Spare

Note: For six channel variants only one Socapex connector is used.

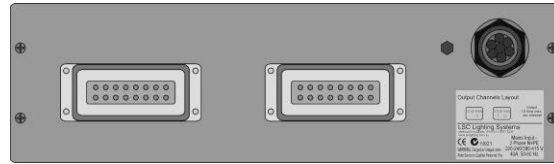
Wieland and Harting 10 Pin Multipole Connectors



Conn #1	Function	Conn #2	Function	Conn #3	Function
Pin 1	Chan 1 Active	Pin 1	Chan 5 Active	Pin 1	Chan 9 Active
Pin 2	Chan 1 Neutral	Pin 2	Chan 5 Neutral	Pin 2	Chan 9 Neutral
Pin 3	Chan 2 Active	Pin 3	Chan 6 Active	Pin 3	Chan 10 Active
Pin 4	Chan 2 Neutral	Pin 4	Chan 6 Neutral	Pin 4	Chan 10 Neutral
Pin 5	Chan 3 Active	Pin 5	Chan 7 Active	Pin 5	Chan 11 Active
Pin 6	Chan 3 Neutral	Pin 6	Chan 7 Neutral	Pin 6	Chan 11 Neutral
Pin 7	Chan 4 Active	Pin 7	Chan 8 Active	Pin 7	Chan 12 Active
Pin 8	Chan 4 Neutral	Pin 8	Chan 8 Neutral	Pin 8	Chan 12 Neutral
Pin 9	Earth	Pin 9	Earth	Pin 9	Earth
Pin 10	Earth	Pin 10	Earth	Pin 10	Earth

Note: Earth connection is via the clips on the side of the socket insert.

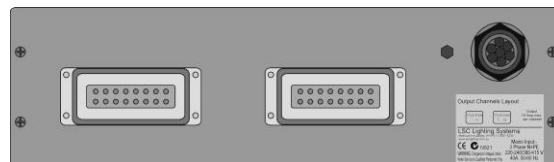
**Wieland and Harting
16 Pin Multipole
Connectors**



Conn #1	Function	Conn #2	Function
Pin 1	Chan 1 Active	Pin 1	Chan 7 Active
Pin 2	Chan 2 Active	Pin 2	Chan 8 Active
Pin 3	Chan 3 Active	Pin 3	Chan 9 Active
Pin 4	Chan 4 Active	Pin 4	Chan 10 Active
Pin 5	Chan 5 Active	Pin 5	Chan 11 Active
Pin 6	Chan 6 Active	Pin 6	Chan 12 Active
Pin 7	Not used	Pin 7	Not used
Pin 8	Not used	Pin 8	Not used
Pin 9	Chan 1 Neutral	Pin 9	Chan 7 Neutral
Pin 10	Chan 2 Neutral	Pin 10	Chan 8 Neutral
Pin 11	Chan 3 Neutral	Pin 11	Chan 9 Neutral
Pin 12	Chan 4 Neutral	Pin 12	Chan 10 Neutral
Pin 13	Chan 5 Neutral	Pin 13	Chan 11 Neutral
Pin 14	Chan 6 Neutral	Pin 14	Chan 12 Neutral
Pin 15	Not used	Pin 15	Not used
Pin 16	Not used	Pin 16	Not used

Note: Earth connection is via the clips on the side of the socket insert.

**Wieland and Harting
16 Pin Multipole
Connectors
(Netherlands Wiring)**



Conn #1	Function	Conn #2	Function
Pin 1	Chan 1 Active	Pin 1	Chan 7 Active
Pin 2	Chan 1 Neutral	Pin 2	Chan 7 Neutral
Pin 3	Chan 2 Active	Pin 3	Chan 8 Active
Pin 4	Chan 2 Neutral	Pin 4	Chan 8 Neutral
Pin 5	Chan 3 Active	Pin 5	Chan 9 Active
Pin 6	Chan 3 Neutral	Pin 6	Chan 9 Neutral
Pin 7	Chan 4 Active	Pin 7	Chan 10 Active
Pin 8	Chan 4 Neutral	Pin 8	Chan 10 Neutral
Pin 9	Chan 5 Active	Pin 9	Chan 11 Active
Pin 10	Chan 5 Neutral	Pin 10	Chan 11 Neutral
Pin 11	Chan 6 Active	Pin 11	Chan 12 Active
Pin 12	Chan 6 Neutral	Pin 12	Chan 12 Neutral
Pin 13	Not Used	Pin 13	Not Used
Pin 14	Not Used	Pin 14	Not Used
Pin 15	Not used	Pin 15	Not used
Pin 16	Not used	Pin 16	Not used

Note: Earth connection is via the clips on the side of the socket insert.

3.4 Overload Protection

Each dimmer is fitted with twelve fast acting Miniature Circuit Breakers (MCB's), one for every output channel. Under normal operating conditions the MCB's pass the rated current and will only trip when there is an overload through the dimmer circuit. Likewise, if there is a short circuit on the load or faulty wiring on the load side, the MCB will trip to protect the internal components of the dimmer.

The MCB's are located on the front panel of the dimmer allowing quick visual access to which channel has a fault or overload condition. Dimmer channels can be manually disabled by switching off the MCB for that particular channel. This is particularly useful for those occasions where a genuine fault has occurred.

3.5 Mounting the Dimmer

The **e-Series** dimmers have been designed to be either free standing or 19" Rack mountable.

In free standing applications, all dimmers have four rubber feet attached to the bottom of the chassis.

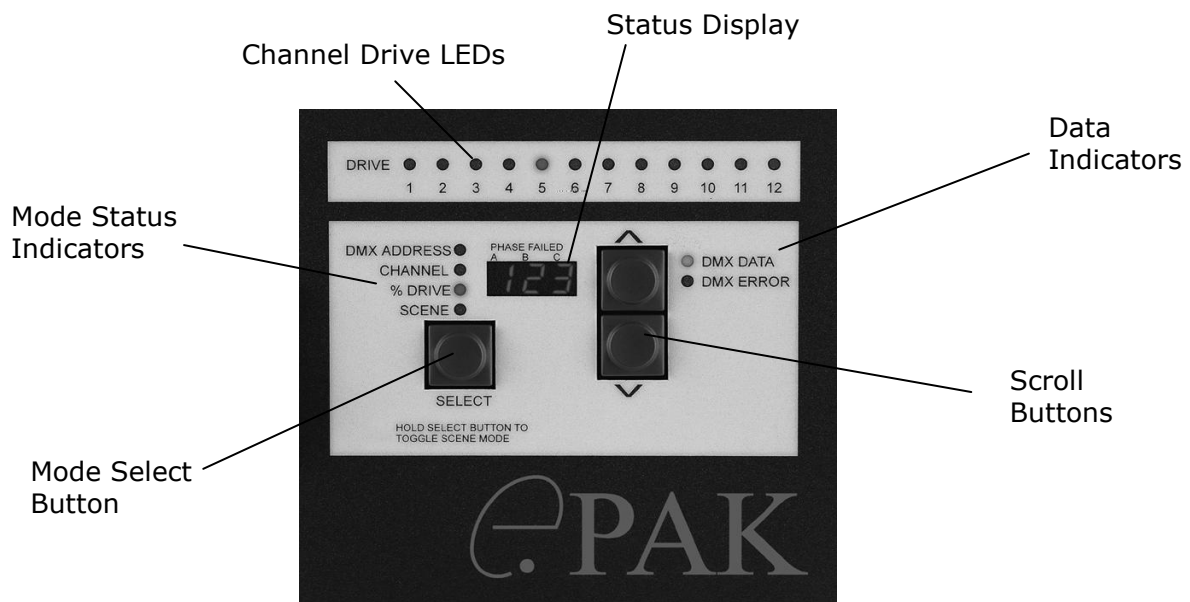
For optimum mounting of the dimmers in 19" Rack frames or Flightcases, LSC recommends that adequate support be given to the rear of the dimmer. The weight of the dimmer must be fully supported to prevent potential strain on the inbuilt mounting brackets.

4.0 DIMMER OPERATION

4.1 Front Panel Controls

Good product design generally relates to good user interface and providing a well laid out, concise, easy-to-read control panel is the key. The design of the **e-Series** dimmers concentrated very heavily on this principle and the end result has produced an easy to use control panel that allows very quick access to all functions and indicators that show the exact status of the dimmers.

The control panel shown below, is for an **ePAK** dimmer. The layout for an **ePRO** dimmer is very similar, differing in that it has a CURVE Status LED. Following is a brief explanation of the switches and displays.



Channel Drive LEDs: These 12 LEDs indicate the channel output status and will glow proportionately to the level of output being generated. In SCENE mode, these LEDs are used to build the desired output levels for the scene to be stored. When the scene is recalled these LEDs will correspond to the output levels stored in memory.

Mode Select Button: This button is used to alter the dimmer's status by allowing the operator to set the DMX512 address, drive individual channel at varying levels, create a scene to be stored in memory and individually set different dimmer curves for each channel (**ePRO** only).

Mode Status Indicators: These LEDs indicate which mode the dimmer is operating in.

Scroll Buttons: These up and down buttons allow the operator to adjust the DMX512 address, channel number and channel output level, in either a up (increment) or down (decrement) direction.

Status Display: The 3 digit display can indicate the current DMX512 address, channel number and the channel output level. The output of the display is dependent on which mode the dimmer is currently in. Under other conditions the display will also scroll prompt and error messages.

Data Indicators: These two LEDs indicate good or bad data being received by the dimmer.

4.2 Setting the DMX512 Address

The dimmer is designed to be controlled by an external DMX512 transmitting device. The DMX512 protocol allows for the high speed transmission of 512 channels of digital data and allows for up to 32 devices to be connected to each DMX512 stream. To enable each device to receive its own relevant information off this DMX512 stream, a DMX512 Start Address is allocated to each device. In other products, this start address is selectable on the device by either switches or thumbwheels and the number displayed corresponds to the first channel of the device.

The **e-Series** dimmers are a twelve channel device and if the start address is set for "001", then the dimmers will respond to the first twelve channels of information on the DMX512 stream. Likewise if the start address is set for "025", then the dimmers will respond to channels 25 to 36 on the DMX512 stream. If two or more devices have the same address setting, these devices will respond to exactly the same data. Care must be taken when setting up all equipment on the same DMX512 network. All data on the DMX512 stream can pass through the dimmer and onto the next device, when the thru connector is utilised.

When the dimmer is powered up for the first time, it will automatically be in the DMX512 Address mode and display channel 1 as its starting address. The user can then set the desired start address by pressing the increment(∧) or decrement(∨) Scroll Buttons. If you decrement from channel 1, the next setting will be 512. To scroll quickly to your desired start address, press and hold the increment or decrement button. The display will then speed up and scroll through the channel numbers.

To increase the start address in banks (groups of 12 for 12 channel dimmers and groups of 6 for 6 channel dimmers), press the increment button quickly once and then press and hold. If the dimmer start address is currently "001", then to select the next bank (start address number 13/7), press the increment button quickly once and then press again and hold. The display will then indicate "'b-2"(Bank number 2) and then it will display channel "13". Repeat this step to move to the next bank. To move the start address backwards in groups of 12, repeat the instructions above using the decrement button.

Once the DMX512 Address has been set, this will be stored in the dimmer's memory. (*Note: The DMX512 address will only be committed to memory approximately 5 seconds after the last address change.*) If the dimmer is powered down and then powered back up, the dimmer will resume at its last known DMX512 setting.

The Data Indicators show the exact status of the DMX512 signal as it relates to that particular dimmer. When the DMX512 connector is plugged into the dimmer and signal is being received, the green data LED will glow to indicate good data being received by the dimmer. If bad data is being received, the red LED will glow. In some instances, the green and red LEDs will intermittently come on and off. This indicates that the data being received is "dirty", in that it is sometimes valid and then becomes invalid.

If the DMX512 input connector is fitted and no LEDs are glowing, this can indicate two things. The first is that the transmitting device has ceased transmitting and the second could mean that the signal is no longer reaching the dimmer due to a fault up line. In both cases, the dimmers will sense the loss of signal and then hold the last known DMX512 state that it received, until the DMX512 data stream is restored or until the dimmer is powered down.

4.3 Test Function

4.3.1 Driving Channels

A very useful feature found on most LSC dimmers is the ability to individually or group select channels and drive the outputs from 0 to 100%, without a control device being connected. This is particularly useful when doing onstage focussing, pre-heating of lamps or general dimmer testing.

To activate, press the Mode Select Switch until the "Channel" LED illuminates. Press the Scroll Buttons until the desired channel is reached. The corresponding channel number will be displayed in the Status Display. At this stage all channels can be activated by pressing the increment Scroll Button once quickly and then pressing and holding until "ALL" is displayed. The "ALL" mode will stay active until either the increment or decrement Scroll Button is pressed. Press the Mode Select Switch to move the function to "% Drive". Again use the Scroll Buttons to adjust the channel(s) output level. The output is displayed as a percentage of the total output, that is "60" is 60% of the output. To adjust another channel, repeat this process by pressing the Mode Select Switch to "Channel" and selecting the next channel. If loads are not to be driven during this stage, they can be isolated by switching the channel MCB off.

The Scroll Buttons can be used to scroll quickly through the "Channel" and "% Drive" levels by either of two methods:

- i) Pressing and holding down the increment or decrement button will move the channel number or output level by a rate that begins slow and then speeds up.
- ii) Pressing the increment or decrement button once quickly and then pressing and holding will snap the output level to either its maximum or minimum setting.

4.3.2 Chase Test Mode

Another useful test feature, is the ability to set the dimmer to sequentially fade through all its channels. In essence, it appears as a single channel chase that fades each channel up and then down. To activate this, select "Channel" on the Mode Selection Switch and then press both Scroll Buttons for less than two seconds and release. The Status Display will show the last known channel number entry and will then automatically scroll through the channels. The "Channel" LED will pulse to indicate that the dimmer is in this *chase test* mode. The output level will default to zero, however pressing the Mode Selection Switch will activate the "% Drive" mode. Use the Scroll Buttons to adjust and set the output level. Press either one of the Scroll Buttons to stop the chase and subsequent presses will increment or decrement the channels. To resume the chase, press both Scroll Buttons quickly.

4.3.3 Pre-Heat

Prior to a show's performance, it is highly recommended to pre-heat the filaments in the fixtures to prevent sudden thermal shock to the lamp, thus reducing the possibility of damage or shortened lamp life. To activate the pre-heat function select "ALL" on "Channel" mode and then drive the outputs to around 8 to 10%. This level should allow sufficient current through the filament to glow slightly, but not produce any noticeable light output on the stage. A time span of 10 to 15 minutes should be enough to warm most types of theatrical lamps. To set a permanent pre-heat, refer to section 4.4 Scene Storage and create a scene that will activated when the dimmer is powered up.

Two things to consider while in the Test Function mode. If a DMX512 controller is connected to the dimmer and begins to transmit, the incoming signal will work on a HTP (Highest Takes Precedence) basis with anything that is set on the dimmer's control panel. That is, if the dimmer is currently set for pre-heat at 10% and the incoming signal has channel data greater than 10%, then the dimmer will output the higher value. Likewise, if the incoming signal drops to 0%, then the output will be at 10%, the pre-heat level. Secondly, if power to the dimmer drops out and is then restored, the dimmer will automatically start at the DMX512 Address mode. All previous settings will be lost.

4.4 Scene Storage

Standard on **e-Series** dimmers is a scene storage facility. This function provides the capability to create a single 12 channel scene using the front panel controls and then store this into the dimmer’s memory for recall at any point while the dimmer is switched on.

To activate the Scene function, press and hold the Mode Select Switch until the “Scene” LED illuminates. The LED will now begin to pulse off and on, indicating the Scene function is activated. The “Channel” LED is also activated (on) at this time indicating the dimmer is now ready to start creating the scene. Using the Mode Select Switch allows the operator to toggle between the “Channel” and “% Drive” modes, whilst the Scroll Buttons allow the selection of the channel number and output level respectively. Once a channel level is set, repeat the above steps to move to the next channel, thus creating the desired scene (group of channels).

The scene is automatically stored in the dimmer’s non-volatile memory, meaning that any changes to the scene will over write the existing stored memory. Similarly any new scenes created will automatically write over the previous stored scene. *(Note: The scene is committed to memory approximately 5 seconds after the last change.)*

If power is switched off or disconnected while the dimmer is in Scene mode, when power is restored, the dimmer will resume in its last known state – “Scene”. Any stored scenes are also retained in memory when power is switched off and can be accessed when power is restored.

To exit Scene mode, press and hold the Mode Select Switch until the “Scene” LED goes out.

4.5 Curve Selection

This function is only available on the **ePRO** dimmer and allows for an individual fade curve selection on any or all dimmer channels. Six different curves are available and are displayed as follows on the Status Display.

S LAW	displayed as	“C1”
SQUARE LAW	displayed as	“C2”
CUBE LAW	displayed as	“C3”
QUAD LAW	displayed as	“C4”
120V CURVE	displayed as	“120”
NON-DIM SWITCHING	displayed as	“non”

The S, SQUARE, CUBE and QUAD Laws are variations on the dimmers fade response to suit performance characteristics of various types of lamps.

The 120V curve is primarily for use with 120 Volt Par 64 lanterns and equates to a standard “S Law” curve for 120 Volt lamps. If this curve is selected take particular note that only 120 Volt lamps can be connected, up to a maximum of 10 Amps per dimmer channel. **LSC Lighting Systems (Aust) Pty. Ltd. takes no responsibility for any possible damage to lamps operated in this mode.**

The NON-DIM curve provides the facility for channels to operate as electrical switches. This is ideal for motor control, smoke machines and other special effects. When activated the dimmer channel will switch on (100% output) when the fader level reaches 60% and switches off (0% output) when the controlling fader level drops to 40%.

To activate the Curve function, double click and hold the Mode Selection Switch until the "Curve" LED illuminates and begins to pulse off and on. The word "Cur" will be visible in the Status display, indicating the Curve function is activated. Press the Mode Selection Switch again. The "Curve" LED will continue to pulse and the "Channel" LED will be illuminated. Using the Scroll Buttons, increment or decrement to move to the channel required. Press the Mode Selection Switch again. The "Channel" LED will go out, the "Curve" LED will stay on full (not pulsing) and the display will show "C1" – the S Law curve, or the last setting previously stored.

The S Law is the factory default setting for all dimmers. In the case of the **ePAK**, all channels are set to the S Law and cannot be changed.

Use the Scroll Buttons to select the desired curve. Once chosen, press the Mode Selection Switch to select the next channel. Repeat all steps above until the set up is complete. To store this setup, press and hold the Mode Selection Switch and the dimmer will exit the Curve function and store the curve set up into memory. The "Curve" LED will remain on, indicating that stored curve set ups are present in the dimmer.

In the event of power down and power then being restored, the dimmer will remember its stored curve set up. *(Note: The Curve Setup will only be committed to memory approximately 5 seconds after the last curve change.)*

4.6 Phase Failure

In the event of a supply phase failure or disconnection, the **e-Series** dimmers will indicate to the operator which phase has dropped out or moved out of specification. The latter means that under certain circumstances, the supply voltage and /or frequency may move outside the acceptable operating specification and will appear as a fault to the dimmer.

Three small red LEDs are located in the top of the Status Display and labelled "A", "B" and "C" for phases 1, 2 and 3 respectively. A LED will flash for the respective phase number when it has failed or been disconnected. If this fault condition occurs, it is highly recommended to shut down the dimmer and correct the fault as soon as possible.

The dimmer's control electronics is powered by all three phases, so in the event of any two phases failing, the electronics will continue to operate.

4.7 Continuous Operation

The **e-Series** dimmers are designed to operate at 100% Duty Cycle, meaning, they will supply full rated load to all outputs continuously. Under these conditions the dimmer's ventilation is critical and good clearance around the dimmer is essential to prevent obstruction to the airflow in and out of the dimmer chassis.

LSC recommends a general clearance of 100mm on either side of the dimmer and 250mm at the front of the dimmer.

4.8 Fan Cooling Operation

The **e-Series** dimmers use high quality ball bearing DC fans to extract hot air from the internals of the dimmer. These fans have been chosen to operate at high temperatures and produce low level audible noise. A temperature sensor is fitted to monitor the temperature of the internal heatsink and vary the fan speed in the following manner:

- **ePAK** dimmers will run the fan at half speed for temperatures up to 50°C and then full speed for temperatures over this limit.
- **ePRO** dimmers will activate the fan when the heatsink temperature reaches 40°C and then increase fan speed in a linear fashion as heatsink temperature increases.
- On all models, the outputs will be automatically shut off when the heatsink temperature reaches 105°C and a message **"too hot"** will scroll across the display. The dimmer will automatically reconnect the outputs when the temperature of the heatsink cools to 90°C. The fan will run at full speed during this cool down period. Dependant on ambient temperatures, this cool down period is generally between five to ten minutes.
- If the temperature sensor fails for whatever reason, the electronics of the dimmer will drive the fans to full speed as a default state. So if the fans are running at full speed when you know the dimmer is running cool, then this will generally mean there is a problem in the sensor circuitry.

4.9 User Interface Lock

The front panel User Interface settings may be locked to protect against accidental pressing of the scroll or selection push buttons or interference from unauthorised personnel.

Note: If an error occurs while the User Interface Lock is active (on), the error messages will scroll across the Status display, but the buttons will still be inactive. You will need to unlock the User Interface to respond to the error.

4.9.1. Locking the User Interface panel

To lock the User Interface panel, the dimmer must be in the "Drive" state of the following three modes. Failure to be in this mode, will result in the user not being able to lock the User Interface panel. The three modes are: a) Channel Drive mode – refer section 4.3.1. b) Scene Drive mode – refer section 4.4. and c) Channel Chase Drive mode – refer section 4.3.2.

Press and hold both Scroll Buttons for five seconds. You will enter the Reset function as described in Section 5.1. The following message will then scroll across the Status Display – **"sys reset inc – yes dec – no"**. INC means the increment(^) Scroll Button and DEC means the decrement(v) Scroll Button. Press the decrement button to move to the next menu. This will bring up a new message on the Status Display – **"total reset inc – yes dec – no"**. Press the decrement button to move to the next menu. The next message on the Status Display will be for the User Interface lock – **"UI loc inc – yes dec – no"**. Press the increment button to lock the User Interface panel.

The Status Display will now scroll the following message – **"UI loc active"**. If you select "no", then the dimmer will return to the condition it was in when you started.

4.9.2 Unlocking the User Interface panel

To unlock the User Interface panel, press and hold all three push buttons simultaneously for 5 seconds. This will return the dimmer to the operating state that was active prior to locking the User Interface panel.

5.0 SOFTWARE

5.1 Resetting the Dimmer

The **e-Series** dimmers can perform two types of reset.

System Reset - saves all stored information, including the DMX512 Start Address into its memory and then does a power down and re-boot of the electronic circuitry. This is useful to reset the dimmer without disconnecting power and maintain all stored memories.

To do a System Reset, press and hold both Scroll Buttons for five seconds. This can be activated from any mode the dimmer is in. The following message will then scroll across the Status Display - "**sys reset inc - yes dec - no**". INC means the increment(∧) Scroll Button and DEC means the decrement(∨) Scroll Button. Press the increment button to do the System Reset.

Total Reset -clears all stored memory and then does a power down and re-boot of the electronic circuitry. This reset returns the dimmer back to its original default position when it left the factory. The DMX512 Start Address defaults back to "1", the Scene Storage is blank and the curve setting for each channel is defaulted to the "S Curve".

For a Total Reset, repeat all the steps to do a System Reset, but press the decrement button to say "No" to the System Reset. This will bring up a new message on the Status Display - "**total reset inc - yes dec - no**". Press the increment button to do the Total Reset.

At this point if you do not wish to proceed with the Total Reset, press the decrement button to exit.

5.2 Software Upgrades

Future Software upgrades are possible by returning the Dimmer to LSC Lighting Systems (Aust) Pty. Ltd. or its distributors, or by the **CodeLINK** option.

CodeLINK is a Windows XP based software program that allows the uploading of Software releases to the dimmer from a PC style computer or laptop. Latest Software releases will be available via email at **techsupport@lsclighting.com.au** or from downloading at LSC's Web site - **www.lsclighting.com.au**. Included with the **CodeLINK** option is a serial cable that connects the computers serial port to the DMX512 input connector on the dimmer, a 3.5" floppy disk containing the latest software and an instruction sheet.

Using the spare two pins on the DMX512 connector, new data can be sent from the PC or Laptop to update the dimmers ROM (Read Only Memory).

CodeLINK Cable connections

Signal	DMX512 Male 5 pin AXR	Comms port 9p Female D-Type
GND	1	5
Tx	4	3
Rx	5	2

5.3 Installing and Running CodeLINK

- 1.** Check all components are included in the option kit. If anything is missing from the kit, contact your point of purchase.
- 2.** Close any open applications on your computer for the duration of the upgrade process.
 - Insert the floppy and run the Setup.exe programme
 - Follow the prompts on the screen, accepting the suggested default settings
 - Once installed click on the CodeLINK programme icon to begin
- 3.** Connect the **CodeLINK** cable between the **Comms** port on your computer and the **DMX512** input connector on the dimmer.
- 4.** Turn the power to the dimmer **OFF**.
- 5.** Follow the detailed operating instructions in the **CodeLINK** help menu for how to use the software
- 6.** When **CodeLINK** asks you to Turn On the dimmer, then switch on the power to the dimmer.
- 7.** The upgrade process will now automatically begin. The Mode Status Indicators will now flash sequentially and the Status Display will now count from "1" to "409". When the display reaches 409, the download process is complete and will restart the dimmer. The start up message will display the latest software version just installed.

Do not turn off the dimmer until the start up message has been displayed.

- 8.** Disconnect the **CodeLINK** cable and the dimmer is now ready for normal operation.

6.0 COMPLIANCE STATEMENTS

6.1 CE Compliance Statement

The **e-Series** dimmers from LSC Lighting Systems (Aust) Pty. Ltd. have been designed and tested to the European Committee for Electrotechnical Standardization (CENELEC) standard for professional entertainment dimmers – EN55015 (Lighting).

6.2 C Tick Compliance Statement

Current Australian Communication Authority regulations do not require C Tick compliance for three phase apparatus, however compliance with the European CE Norms generally far exceeds that required for C Tick certification. To this end LSC has based its compliance on the CE Norms.

6.3 Disclaimer

LSC Lighting Systems (Aust) Pty. Ltd. has a corporate policy of continuous improvement, covering areas such as product design and documentation. In light of this policy, some detail contained in this manual may not match the exact operation of your product.

In any event, LSC Lighting Systems (Aust) Pty. Ltd. can not be held liable for any direct, indirect, special, incidental, or consequential damages or loss whatsoever (including, without limitation, damages for loss of profits, business interruption, or other pecuniary loss) arising out the use or the inability to use this product for its intended purpose as expressed by the manufacturer and in conjunction with this operating manual.

Servicing of this product is recommended to be carried out by LSC Lighting Systems (Aust) Pty. Ltd. or its authorised service agents. No liability will be accepted whatsoever for any loss or damage caused by service, maintenance or repair by unauthorised personnel. In addition servicing by unauthorised personnel may void your warranty.