

# SD 6 Digital Dimmer

## Operations Manual



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## **Introduction**

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Strand Lighting SD6 and dimmer packs are compact, portable dimming units, designed for use in conjunction with lighting control consoles as part of entertainment or architectural lighting installations.

## **Specifications**

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### **Power Requirements**

Voltage: 200 - 260 Volts AC. Frequency: 50 - 60 Hz.

Three phase + Neutral + Earth

*SD6 dimmer packs must be Earthed for safety in use.*

### **Dimming Capacity**

SD6

Each pack contains six dimmers with one socket outlet per dimmer.

Maximum load 13A per dimmer - total 78A per dimmer pack.

Minimum load 60W per dimmer.

### **Dimmer Output Connections**

SD6 packs are available with a variety of socket outlets to suit different operating conditions and national standards.

One socket per dimmer is fitted as standard

### **Control Inputs**

USITT DMX512(1990) multiplexed digital control, via 5 pin XLR connector.

Back up link connector

Physical Dimensions (unpacked)

Height: 90 mm.

Width: 485 mm.

Depth: 395 mm.

Weight: 12Kg (approximately)

Environment (Operating)

Temperature: 0°C - 37°C.

Relative humidity: 0% - 90%.

Condensation level: Zero.

SD6 packs are suitable only for use in a dry, internal environment.

Protection

Classification

IP20 (EN60529).

Equipment Class

Class 1.

## Installation

### **WARNING**

**Hazardous voltages are used in SD6 dimmer packs. Ensure that the mains supply is isolated before opening the equipment for installation or servicing.**

**Dimmer packs should be installed and serviced only by suitably qualified personnel.**

SD6 Dimmer racks are designed for rack mount installation in a standard 19" (600mm) equipment rack.

In order to enhance the reliability of the dimmers, it is recommended that they are operated within the following environmental limits:

Temperature: 15°C - 25°C

Relative Humidity: 60% - 80%

Condensation level: Zero

SD6 dimmers are designed such that Earth leakage currents are minimised, allowing their use on mains power supplies protected by 30mA Residual Current Devices. However, utilising RCD protection in dimming installations may present problems. The dimmers may emit a slight buzzing noise when in operation. They should be installed away from areas where such noise would be undesirable.

The physical dimensions of an SD6 dimmer pack are shown in Figure 1.

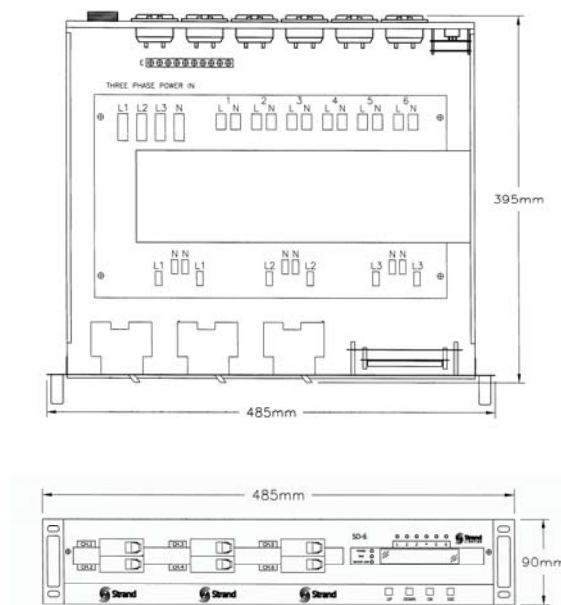


Figure 1

### **Mains Power Input Connections**

SD 6 dimmer packs require a nominal mains input at 230V 50Hz AC. This supply may be either single or three phase (star only), depending on the method of connection. In either case separate Neutral and Earth conductors are required.

### **WARNING**

**SD 6 dimmer packs must be Earthed for safety in operation.**

***In all cases, the Neutral conductor must have the same (or greater) rating, and cross-sectional area, as the Phase conductor(s).  
(Triac and thyristor dimmers operate using 'phase control', which renders the 'balancing' of loads across phases - and thus a reduction in Neutral currents - impossible).***

*SD 6 dimmer packs should be connected to their mains supplies via adequately rated cable, plugs and sockets. Power input connectors must be rated at 60A (or more) for single phase operation, or 20A (or more) for three phase operation. These ratings may only be reduced if the devices protecting the mains supply are selected to limit the current drawn to the rating of the connectors. Racks should be fed from a fused supply.*

*It is strongly recommended that the mains supply to the dimmers is taken via a local isolating switch, so that the supply may be easily disconnected for plugging and unplugging of load connectors, the replacement of fuses, and for service or maintenance.*

*All cables and protection equipment must be selected and installed in accordance with locally prevailing electrical regulations.*

## **Mains Cable Entry**

The mains input cable will enter the pack via the Rear panel.

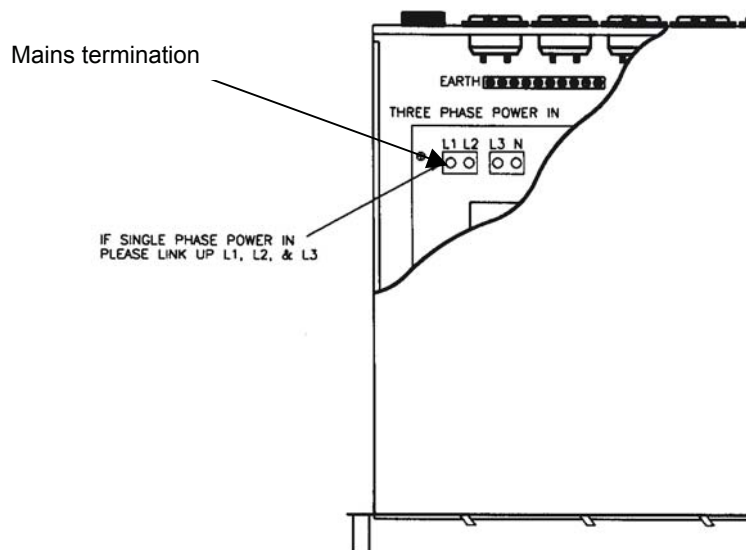


Figure 2

Remove the Top Panel. This is secured to the base by 6 fasteners located at the back and sides.

A 32mm diameter hole is provided in the Panel to permit the mains cable to pass through. This hole should be fitted with an appropriately sized cable gland.

## **Cable Termination**

The mains input is connected at a set of screw terminal blocks, situated inside the pack, at the rear, towards the right hand side (looking from the rear of the pack). The terminals will accept cables of up to 10 mm<sup>2</sup> in size. If it is required to connect an SD 6 dimmer pack to a single phase supply, the link bar supplied with the pack should be used to join the three phase terminals together, as follows (refer to right-hand diagram in Figure 4):

1. Loosen all three phase terminals..
2. Place incoming cable inside terminals and tighten securely.

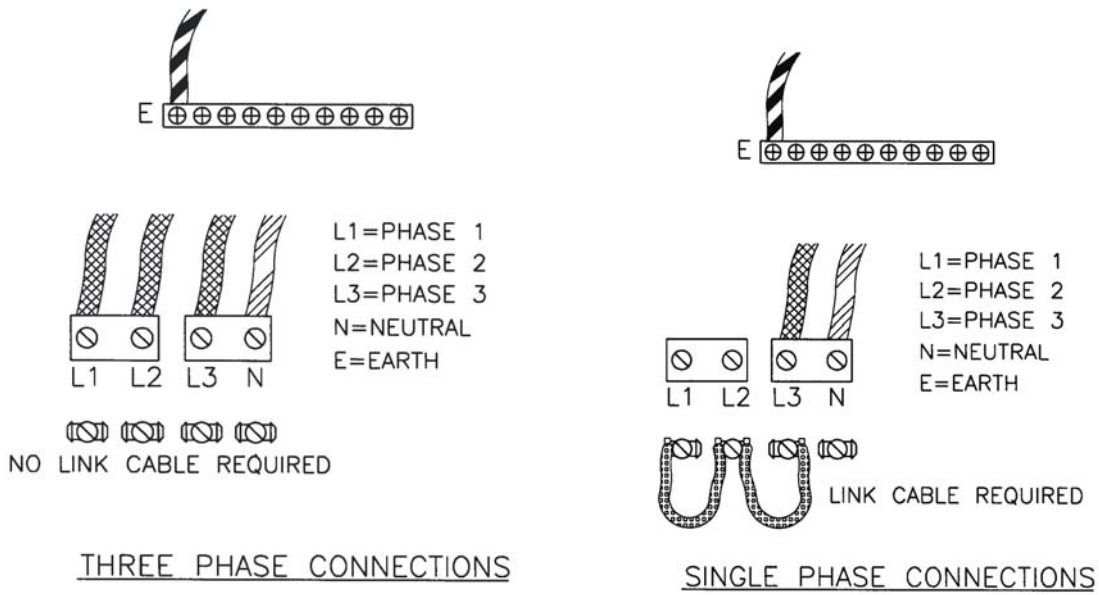
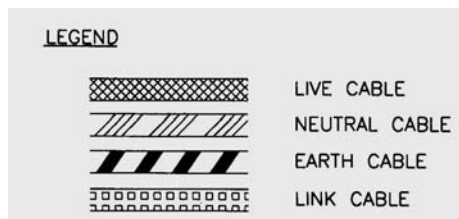


Figure 4 Mains Termination



1. Prepare the cable for connection by stripping back the insulation as shown in Figure 5, and pass it through the cable gland.

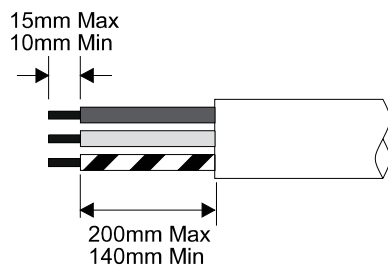


Figure 5. - Mains Cable Preparation

2. Connect the cable ends to the appropriate terminals, ensuring that the retaining screws are sufficiently tight.
3. Replace the Top Panel. Tighten the cable gland to secure the cable.

4. Refit the fixing screws, ensuring that they are replaced in their correct positions and that the shakeproof washers are replaced under the screws.
5. Carry out a Portable Appliance Test or other electrical safety test(s), subject to local regulations.

### **Protection**

The mains supply to each dimmer pack must be protected against external overload. Appropriate fuse or circuit breaker ratings are 20A for a three phase supply. If the available mains supply is not capable of providing the full rated currents, the protection device rating must be reduced accordingly; it will not be possible to use the dimmers with their maximum rated loads.

Protection systems on the supply to each dimmer pack should limit the potential fault current level to 1500A or less.

### **Power Distribution**

To achieve correct Earthing and mains power distribution, it is recommended that all dimmers and lighting control equipment within the installation should draw mains power from one central distribution point. This should be as close as possible to the mains power intake for the site or building. The wiring from the distribution point to the lighting equipment should ideally be used for supplying power to that lighting equipment alone, and not to other appliances or equipment.

### **Rack Mounting**

The SD 6 dimmer pack is designed for rack mounting. Care should be taken to mount the unit securely in an equipment rack designed to hold equipment of this type.

*To prevent overheating of rack-mounted dimmers when in use, a fan, or set of fans, should be fitted to the top of the equipment rack, such that air is extracted upwards. To ensure adequate cooling, the fan(s) should provide an airflow of about 16 litres per second across the top of each dimmer pack.*

*A gap of 1 U (44.5mm) is required between adjacent pairs of dimmer racks.*

*Leave a rear ventilation clearance of 100mm.*

Due to the weight of the unit, rack side supports are recommended, but care must be taken to ensure that these do not obstruct ventilation.

### **Other Mounting and Handling Options**

The unit is supplied with removable fixing brackets for rack/under side/wall mounting applications. Care should be taken to adequately secure the unit to any surface to which it is mounted and that the surface is suitable for this application.

One set of handles is also supplied for portable use.

### **Control Input**

The DMX512 input will accept a multiplexed digital control signal which conforms to USITT specification DMX512 (1990). Details of this specification are available from USITT on request.

The control input is via a five-pin male XLR type connector. Pin connections are shown in Figure 9. A five-pin female XLR connector is also fitted to allow a series of SD 6 packs (or other DMX equipment) to be connected together in 'daisy chain' fashion.

*It is recommended that Control connections are not plugged or unplugged when power is applied to the dimmer pack as this may cause any connected loads to flash up momentarily.*

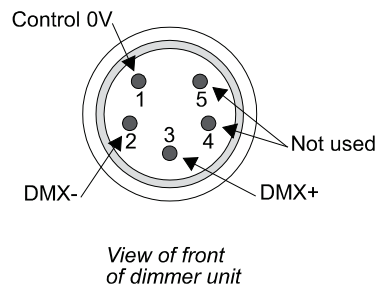


Figure 9

### Dimmer Outputs

Dimmer output connections are by means of socket outlets on all styles of SD 6 dimmer packs, except the terminal strip version. One socket is fitted per dimmer.

When operating from a three phase supply, dimmers 1 and 2 are connected to phase 1, dimmers 3 and 4 to phase 2, and dimmers 5 and 6 to phase 3.

Plug tops used for dimmer output connections must be of the correct type to match the socket outlets.

It is important that plugs are wired correctly. Figure 10 shows the various types of socket outlets fitted to SD 6 dimmer packs.

E = EARTH  
 N = NEUTRAL  
 L = LIVE

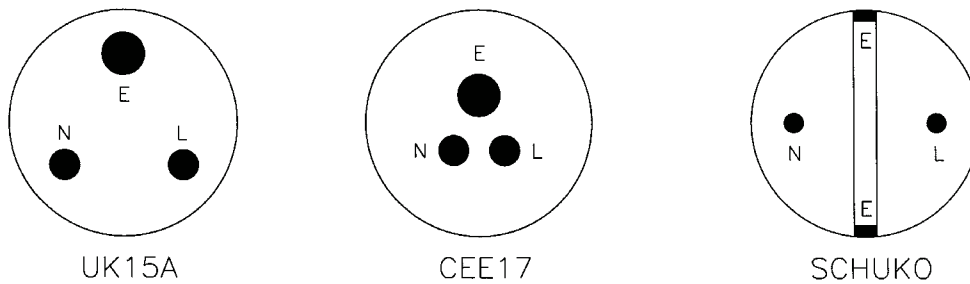


Figure 10

### Service and Maintenance

SD 6 dimmer packs do not require routine maintenance other than external cleaning. However, in common with all electrical equipment, they should be periodically checked to ensure that they remain in good condition. Any repairs or maintenance to the internal electronics, or other circuitry, should be carried out only by authorised Strand Lighting Service personnel or approved Service Providers.



## Safety Tests

SD 6 dimmer packs are subjected to safety inspections and tests prior to despatch from the Strand Lighting factory.

If, as part of routine checks, the packs are to be subjected to electrical safety tests applied using a 'standard' Portable Appliance Tester, the following points should be observed:

The nature of the electronic dimmer circuits means that an 'insulation test' using a voltage in the order of 500V will give a result of approximately 1.7M $\Omega$ . Although this may *appear* as a test failure, the apparently low resistance is normal for an SD 6 dimmer pack and is *not* due to failing insulation. ***User safety is not at risk.***

(Any reading below 1.5M $\Omega$  indicates a problem which must be investigated).

### ***Caution***

***A high voltage 'Flash' test must not be applied to an SD 6 dimmer pack.***

***A high current Earth continuity test must not be applied to the signal ground pins of the control input connector(s).***

## Set up

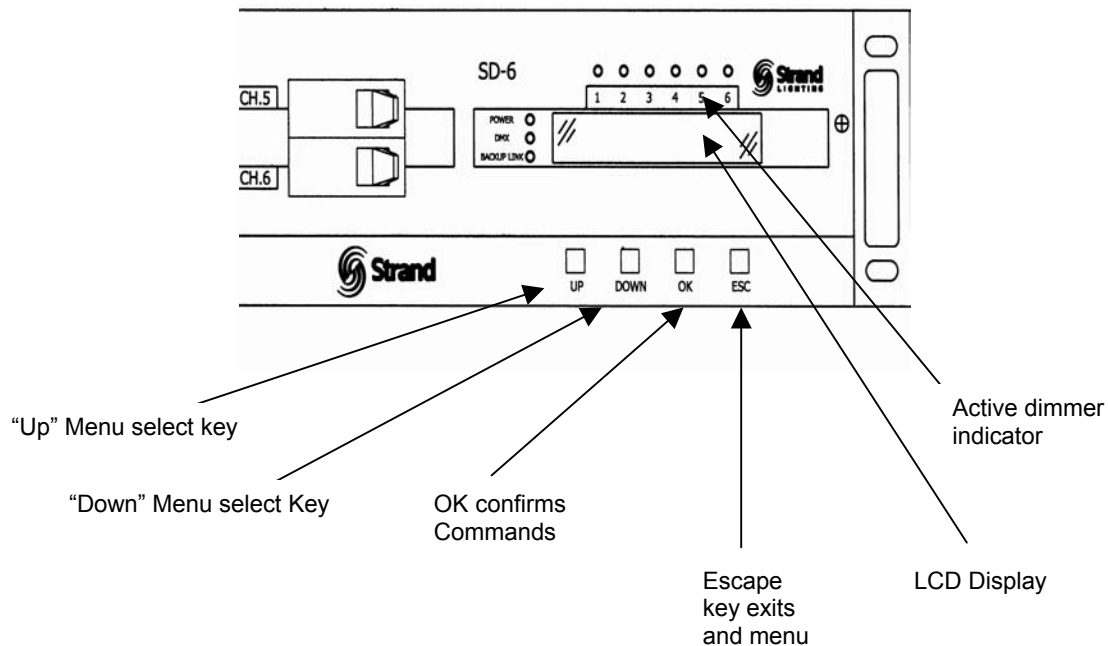


Figure 11 Set up keys and displays

The SD 6 dimmer pack offers a wide range of set up and configuration features which accessed from the front panel with its four set up keys and LCD Display. Menu selections are made with the Up and Down keys and are confirmed with the OK key. To exit any menu or cancel any commands press the ESC escape key.

### DMX Address Menu 1

#### 11 DMX Start Address

Press **Up** to access the DMX address menu and OK to access the DMX start address menu 11. Press **OK** again to select menu 111 to edit the start address for your dimmer pack. Use the **Up** and **Down** keys to select the DMX address required. Note that holding the key will scroll numbers. Press **OK** to confirm your selection or **Esc** to cancel.

#### 12 DMX Dimmer Patch

In addition to setting a DMX start address a specific address may also be assigned to any dimmer using any DMX address from 1 – 512. Select the **Up** key and press **OK** and the **Up** Key again followed by **OK** to go to menu 121. You can now select any dimmer number between 1 and 6 and confirm with **OK** or cancel with **Esc**. Menu 1211 will now appear and allow you to select any DMX address for the dimmer you selected. Use the **Up/Down** keys to make your assignment and Press **OK** to confirm.

### Set Channel Menu 2

Use the **Up** key to select menu 2. This mode allows you to set menu items 21 Minimum level, 22 Maximum output, 23 Fade Curves and 24 Fade Time.

### 21 Minimum Levels

Select Menu item 21 and **OK** to go to menu 211. Select the dimmer you wish to address or A for All and confirm the selection with **OK**. Menu 2111 will appear and you can use the **Up/Down** keys to select the minimum level desired, confirm with the **OK** key.

### 22 Maximum Levels

Use the up key to select Menu item 22 and **OK** to go to menu 221. Select the dimmer you wish to address or A for All and confirm the selection with **OK**. Menu 2211 will appear and you can use the **Up/Down** keys to select the maximum level desired, confirm with the **OK** key.

### 23 Set Curves

Use the up key to select Menu item 23 and **OK** to go to menu 231. Select the dimmer you wish to address or A for All and confirm the selection with **OK**. Menu 2311 will appear and you can use the **Up/Down** keys to select the curve desired, confirm with the **OK** key. There are three curves to choose from Linear for normal fades, Square Law for great low level control and N-D for non dim or switch operation.

### 24 Set Fade Times

Individual fade times may be set for each dimmer. Use the up key to select Menu item 24 and **OK** to go to menu 241. Select the dimmer you wish to address or A for All and confirm the selection with **OK**. Menu 2411 will appear and you can use the **Up/Down** keys to select the fade time desired in .1 second increments, confirm with the **OK** key.

### 25 Set Level

Select menu item 25 using the up key and **OK** to go to menu 251. Select the dimmer you wish to address or A for All and confirm the selection with **OK**. Menu 2511 will appear and you can use the **Up/Down** keys to select either "equal to input" or a defined level between 0-100%. When "equal to input" is selected the dimmer(s) level will be controlled by the incoming DMX signal. If a defined level is selected, the dimmer(s) output will be fixed and the incoming control signal will be ignored.

## Set Scenes Menu 3

Use the **Up** key to select menu 3. This mode allows you to set menu items 31 Play Show, 32 Record, 33 DMX Fail, 34 Preset Map, 35 Fade Times, and 36 No DMX Scene using the Up/Down Keys to make each selection.

### 31 Play Show

Select Menu item 31 and **OK** to go to menu 311. Select the Scene you wish to Run (1-24) (Go Scene 1 is default) using the **Up** key and **OK**, or the **Down** key to select any of the 24 scenes, 10 shows or 90 effects programs and confirm the selection with **OK**. Please note that the Play show function is deactivated when a DMX signal is present. See Appendix 1 for Effect program patterns. Note that each of the effect programs can have a selection of step times as follows:

Effect Time #	Time in Seconds	Effect Time #	Time in Seconds/Minutes
1	.2	6	5
2	.4	7	10
3	1	8	2 mins
4	1.5	9	5 mins
5	2	10	10 mins

### *32 Record*

You may record Back up scenes using this menu and a DMX consoles. First set the desired levels using your console. Next Select Menu item 32 and **OK** to go to menu 321. Select the scene number you wish to record to using the **Up** key. Use the **Down** key to select clear all scenes and OK to confirm.

### *33 DMX Fail*

Use this mode to select what action the dimmer pack should follow on loss of DMX. Select Menu item 33 and **OK** to go to menu 331. Press **Up** to select All Off to have the dimmers fade to black on mux fail. Press Up again to hold the last levels or again to choose a specific scene 24. The next Up selection is Go No DMX to select the No DMX Scene (Set in Menu item 36) and finally Go B. L. to select the Back up Link input (please refer to appendix 2 for Back Up Link application example).

### *34 Preset B.L. (Back Up Link)*

Use this to select the preferred play back for each channel in back up mode. Up to 24 channels can be set. Select Menu item 34 and **OK** to go to menu 341. Use the **Up/Down** keys to select the channel number and confirm with **OK** to go to menu 3411. Use the **Up/Down** keys to select any of the 24 scenes, 10 shows or 90 programs and confirm the selection with OK.

(Note: to use the back up link function when DMX fail, please ensure "B.L." is selected in 33 DMX fail menu.)

### *35 Fade Times*

This menu is used to set the fade time for a selected scene, show or program in play show or back up mode. Select Menu item 35 and **OK** to go to menu 351. Use the **Up/Down** keys to select the desired Scene or A for All followed by OK to go menu 3511 to set the time. You can use the **Up/Down** keys to select the fade time desired in .1 second increments, confirm with the **OK** key.

### *36 No DMX Scene*

Select Menu item 36 and **OK** to go to menu 361. Use the **Up/Down** keys to change the desired Scene followed by **OK** to confirm your selection.

### **Test Channels Menu 4**

Use the **Up** key to select menu 4 and press **OK** to go to menu 41. This mode allows users to turn dimmers on locally to test dimmer output. Use the **Up/Down** keys to select the desired dimmer or A for all. Press **OK** once to turn dimmer(s) on to Full, Press twice for half and three times for Off. Use **Esc** to cancel.

### **Input Menu 5**

This menu allows you to select between DMX control and the B. L. (Back up link) only. Use the **Up** key to select menu 5 and press **OK** to menu go to 51. Use the **Up/Down** keys to select the input source and **OK** to confirm.

Note that when B.L. Only is selected, DMX signal input to the "DMX IN" does not work.

### **Unit Set up Menu 6**

This menu allows you to set up the unit as a Master or Slave. Use the **Up** key to select menu 6 and press **OK** to go to menu 61. Use the **Up/Down** keys to make a selection and **OK** to confirm or **ESC** to cancel. When the unit is set as master, "DMX out" will pass through the normal DMX signal as well as control signal from back up. When set as slave, only normal DMX will be looped through.

## Software Version Menu 7

To see which version of software your system is using use the **Up** key to select menu 7 and to display the current software on your system

## Read Information Menu 8

This menu will allow you to Read Hours use (81) Temperature settings (82), DMX Levels (83), Lock Menu Access (84) and Set Defaults (85). Use the **Up** key to select menu 8 and press **OK**.

### *81 Read Hours*

Use the **Up** key to select menu 8 and press **OK** and the **Up** key to go to menu 81. Select **OK** again to go to menu 811 for total running hours.

### *82 Temperature*

Use the **Up** key to select menu 8 and press **OK** and the **Up** Key to go to menu 82. Select **OK** again to go to menu 821 to see the Max temperature, Minimum Temperature and Present Temperature of the dimmer pack. Select Reset and **OK** to reset all temperature data.

**Note:** If the maximum operating temperature exceeds 70 degrees Celsius the system will reduce all dimmer levels to 50% output and display an OVER TEMPERATURE message. You may use the Reset command to return to normal operation.

When the recorded temperature exceeds 70 degrees and the ambient temperature is also over 70 degrees the system cannot be reset until the over temperature condition is corrected.

### *83 DMX levels*

Use the **Up** key to select menu 8 and press **OK** and the **Up** Key to go to menu 83. Select **OK** again to go to menu 831 to see the current DMX value for each dimmer. Use the **Up/Down** keys to look at each dimmer. Use **ESC** to exit this menu.

### *84 Menu Access*

Use the **Up** key to select menu 8 and press **OK** and the **Up** Key to go to menu 84. Select **OK** again to go to menu 841 to Lock Menu access using the **Up/Down** keys to select "lock" and **OK** to confirm and **ESC** to cancel. To Unlock, go to menu 841 again, press and hold **Up** key for 5 seconds and then press **Down** key while still holding the **Up** key. Select "unlock" and press **OK** to confirm.

### *85 Set Defaults*

Use the **Up** key to select menu 8 and press **OK** and the **Up** Key to go to menu 85. Select **OK** again to reset all systems to default start mode. The System will ask you to confirm with an Are You Sure message. Press **OK** to confirm and **ESC** to cancel.

## Keypad Lock

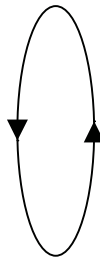
You can lock the system keypad by pressing and holding the **OK** and **ESC** keys simultaneously for 3 seconds. Repeat the process to unlock the keypad.

Note: The keypad will also lock itself out automatically if no selection is made for more than 10 minutes. The keypad may be unlocked with the same procedure.

Appendix 1 – Effect Program Patterns

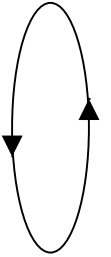
PROG: 1-10

Step \ Channel	I	II	III	IV	V	VI
I	1	0	0	0	0	0
II	0	1	0	0	0	0
III	0	0	1	0	0	0
IV	0	0	0	1	0	0
V	0	0	0	0	1	0
VI	0	0	0	0	0	1



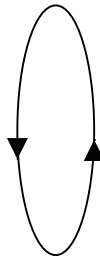
PROG: 41-50

Step \ Channel	I	II	III	IV	V	VI
I	1	1	1	1	0	0
II	0	1	1	1	1	0
III	0	0	1	1	1	1
IV	1	0	0	1	1	1
V	1	1	0	0	1	1
VI	1	1	1	0	0	1



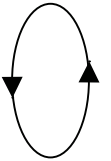
PROG: 11-20

Step \ Channel	I	II	III	IV	V	VI
I	1	1	0	0	0	0
II	0	1	1	0	0	0
III	0	0	1	1	0	0
IV	0	0	0	1	1	0
V	0	0	0	0	1	1
VI	1	0	0	0	0	1



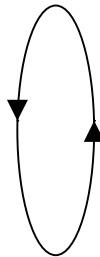
PROG: 51-60

Step \ Channel	I	II	III	IV	V	VI
I	1	1	1	0	0	0
II	0	0	0	1	1	1



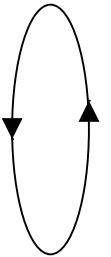
PROG: 21-30

Step \ Channel	I	II	III	IV	V	VI
I	1	0	0	0	0	1
II	0	1	0	0	1	0
III	0	0	1	1	0	0
IV	0	1	0	0	1	0



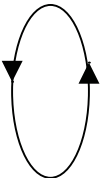
PROG: 61-70

Step \ Channel	I	II	III	IV	V	VI
I	1	0	1	0	1	0
II	1	1	1	1	1	1
III	0	1	0	1	0	1
IV	1	1	1	1	1	1



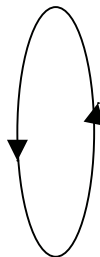
PROG: 71-80

Step \ Channel	I	II	III	IV	V	VI
I	1	1	1	1	1	1
II	0	0	0	0	0	0



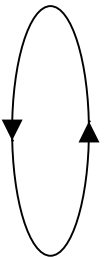
PROG: 31-40

Step \ Channel	I	II	III	IV	V	VI
I	1	1	0	0	0	0
II	0	1	1	0	0	0
III	0	0	1	1	0	0
IV	0	0	0	1	1	0
V	0	0	0	0	1	1
VI	0	0	0	1	1	0
VII	0	0	1	1	0	0
VIII	0	1	1	0	0	0



PROG: 81-90

Step \ Channel	I	II	III	IV	V	VI
I	1	0	0	0	0	0
II	0	0	0	0	0	0
III	0	1	0	0	0	0
IV	0	0	0	0	0	0
V	0	0	1	0	0	0
VI	0	0	0	0	0	0
VII	0	0	0	1	0	0
VIII	0	0	0	0	0	0
IX	0	0	0	0	1	0
X	0	0	0	0	0	0
XI	0	0	0	0	0	1
XII	0	0	0	0	0	0

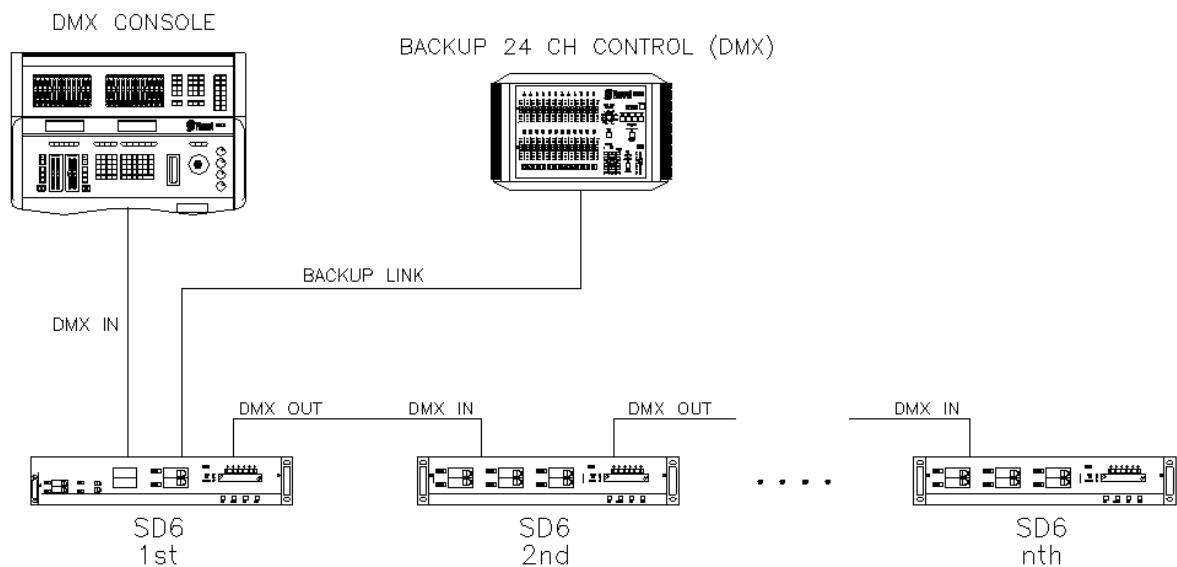


## Appendix 2 – Back Up Link

Application example	Control SD6's in array format			As scenes backup when main DMX failed		
	1st pack	2nd pack	n th pack	1st pack	2 <sup>nd</sup> pack	n th pack
Unit Setup (menu 6)	Master	Slave	Slave	Master	Slave	Slave
Input (menu 5)	B.L. only	DMX only	DMX only	DMX only	DMX only	DMX only
DMX in port	Disable	Enable	Enable	Enable	Enable	Enable
Backuplink port	Enable	Disable	Disable	Enable	Disable	Disable
DMX fail (menu 33)	Don't care	Don't care	Don't care	B.L. activated	Don't care	Don't care

Note :

1. Back up link will be triggered on when input level is more than 30%.
2. Back Up Link will be triggered off when level is less than 3%.
3. Triggering priority from Channel 1 (highest) to Channel 24 (lowest).
4. If back up scenes are to be used, please ensure back up scenes are recorded using “Record” (Menu 32) prior to running the Back Up Link.



Typical Multi packs connection using backuplink as backup to main

## Appendix 3 – Factory Default Value

Menu :

- 11 MX Start Address – Channel 1
- 12 DMX Dimmer Patch – Channel 1
- 21 Minimum Levels – 0% (All Channels)
- 22 Maximum Levels – 100% (All Channels)
- 23 Set Curves – Square (All Channels)
- 24 Set Fade Times – 0 sec (All Channels)
- 25 Set Level – Input (All Channels)
- 31 Play Show – Go Scene 1
- 32 Record – Get Scene 1
- 33 DMX Fail – All off
- 34 Preset Backuplink – Channel 1
- 35 Fade Time – 0 sec (All Scenes)
- 36 No DMX Scene – Do Scene 1
- 4 Test Channel –
- 5 Input – DMX only
- 6 Unit Setup – Slave
- 7 Software Version –
- 8 Read Information –



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