

PHILIPS

Strand Lighting

S2ITM DIMMING SYSTEM



Dimmer Strip:
71400, 71401,
71402, 71403,
71404, 71405



Dimmer Plug Box:
71420, 71421, 71422,
71423, 71424, 71425

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S21™ Dimming System Installation & Operation Guide

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IMPORTANT SAFEGUARDS

When using electrical equipment, basic safety precautions should always be followed including the following:



- a. **READ AND FOLLOW ALL SAFETY INSTRUCTIONS.**
- b. Do not use outdoors.
- c. Do not mount near gas or electric heaters.
- d. Equipment should be mounted in locations and at heights where it will not readily be subjected to tampering by unauthorized personnel.
- e. The use of accessory equipment not recommended by the manufacturer may cause an unsafe condition.
- f. Do not use this equipment for other than intended use.
- g. Refer service to qualified personnel.

SAVE THESE INSTRUCTIONS.



WARNING: You must have access to a main circuit breaker or other power disconnect device before installing any wiring. Be sure that power is disconnected by removing fuses or turning the main circuit breaker off before installation. Installing the device with power on may expose you to dangerous voltage and damage the device. A qualified electrician must perform this installation.

WARNING: Refer to National Electrical Code® and local codes for cable specifications. Failure to use proper cable can result in damage to equipment or danger to persons.

WARNING: This equipment is intended for installation in accordance with the National Electric Code® and local regulations. It is also intended for permanent installation in indoor applications only. Before any electrical work is performed, disconnect power at the circuit breaker or remove the fuse to avoid shock or damage to the control. It is recommended that a qualified electrician perform this installation.

CAUTION: Wire openings **MUST** have fittings or lining to protect wires/cables from damage. Use 75° C copper wire only! Aluminum wire may not be used.

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PREFACE

1. About this Guide

The document provides installation and operation instructions for the following S21™ products:

- S21™ Dimmer Plug Box (71420, 71421, 71422, 71423, 71424, 71425)
- S21™ Dimmer Strip (71400, 71401, 71402, 71403, 71404, 71405)

Please read all instructions before installing or using this product. *Retain this guide for future reference.*

2. Additional Manuals

Manuals specific to the installation of S21 components are also available as follows:

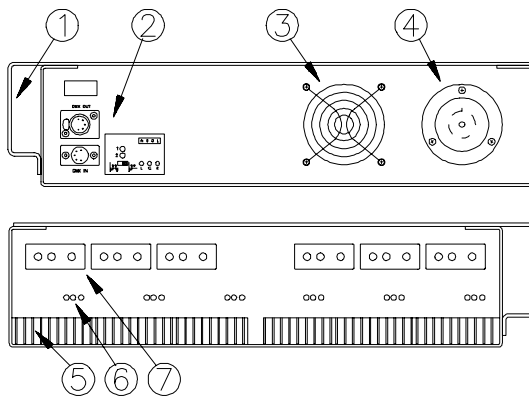
- S21 Dimmer Plug Box Up & Running Guide
- S21 Dimmer Strip Up & Running Guide

Product manuals may be downloaded at www.strandlighting.com

S21 DIMMER SYSTEM OVERVIEW

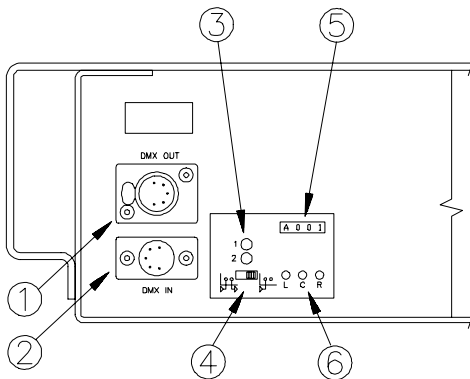
1. Dimmer Plug Box Components and Controls

Dimmer Box



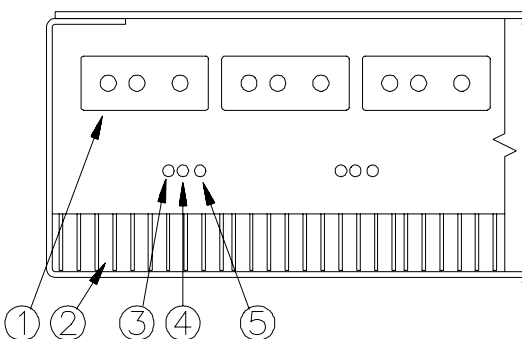
- 1) Carry Handle
- 2) Head-End Processor & DMX512 Connectors
- 3) Fan (Air Inlet)
- 4) Power Inlet Connector.
- 5) Dimmer Heatsink (Typical of 6 or 3)
- 6) Dimmer Focus Button and Indicator LEDs (Typical of 6 or 3)
- 7) Load Receptacle (Typical of 6 or 3)

Head-End Processor



- 1) DMX512 Pass-Through Connector
- 2) DMX512 Input Connector
- 3) Red LED Error Indicators
- 4) DMX512 Termination Switch
- 5) 4-Digit LED Display
- 6) Function Select Push Buttons

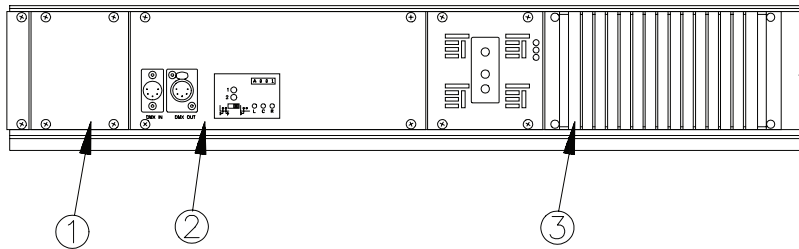
Dimmers



- 1) Load Receptacle
- 2) Heatsink (Air Exhaust)
- 3) Green LED
- 4) Red LED
- 5) Focus Button

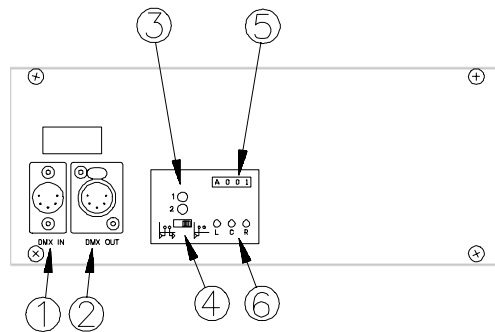
2. Dimmer Strip Components and Controls

Dimmer Strip



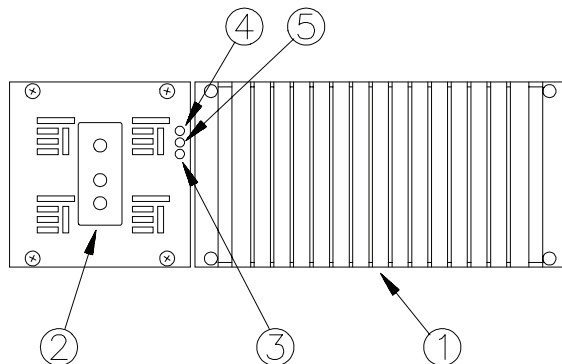
- 1) Field Wiring Compartment
- 2) Head-End Processor
- 3) IGBT Dimmer (Typical of 6 or 3)

Head-End Processor



- 1) DMX512 Input Connector.
- 2) DMX512 Pass-Through Connector
- 3) Red LED Error Indicators.
- 4) DMX512 Termination Switch.
- 5) 4-Digit LED Display.
- 6) Function Select Push Buttons.

Dimmers



- 1) Dimmer Heatsink
- 2) Load Receptacle
- 3) Focus Button
- 4) Green LED
- 5) Red LED

3. Power Requirements

S21™ 1200 and 2400 Watt dimmer systems are designed to operate on a 50 or 60 Hertz, 20 Amp, 120/208 VAC, three phase "WYE" power service. These systems, however, will tolerate a wide variety of input voltages. For them to function normally the Phase to Neutral voltage must be in the range of 90 to 140 VAC.

If a system is mis-wired to voltages greater than 180 VAC, the dimmers will shut down and flash the 'Mis-Wire' warning. Dimmers will not attempt to bring up loads when in over-voltage shutdown. S21 is designed to safely tolerate a 230 VAC line indefinitely, and a 280 VAC line for 15 minutes. Line voltages greater than 280 VAC may destroy the over voltage protection components in the dimmers and the Head- End Processor.

4. Connecting Power

Field wiring of the S21 dimming system is straight forward. A total of 5 wires need to be brought to the unit: The three "phase" wires, a Neutral, and a Ground. The "phase" wires carry up to 20 amps each, and the Neutral carries the "unbalanced" current.

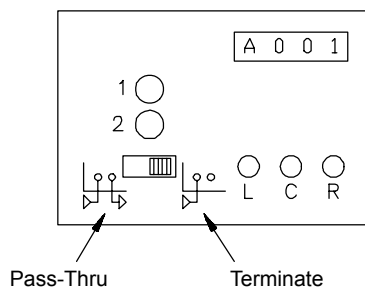
1200 and 2400 Watt systems use a NEMA type L21-20 connector. Recommended cable is 10/5 type SO. The wires feeding all dimmers and dimmer outlets are wired in the same order. The following scheme is suggested:

Connector	Wire	Conductor
"X" or "A"	Black	Phase A
"Y" or "B"	Red	Phase B
"Z" or "C"	Blue or Orange	Phase C
"W" or "N"	White	Neutral
"G"	Green	Ground

5. Connecting to the DMX512 Network

Basic DMX512 installation consists of Connecting S21 units together in "daisy-chain" fashion. A cable runs from the control console to the "DMX IN" connector on the first S21 unit. Another cable runs from the "DMX OUT" connector on the first unit to the "DMX IN" connector on the second unit. All units are connected together in this fashion.

Setting the Termination Switch



In addition to connecting the cables, the termination switches must be set correctly on each S21 unit. The rules for setting these switches are as follows:

- If a unit has cable plugged into its "DMX OUT" connector which runs to another S21 unit or other DMX512 device, the termination switch should be in the left hand (unterminated) position.
- If a unit does not have a cable plugged into its "DMX OUT" connector, the termination switch should be set to the right hand (terminated) position.
- No more than one (1) termination switch may be set to the right hand position "terminate" on any one cable run.

Setting the Dimmer Address

Each S21™ dimmer package must have a unique starting address within the DMX512 network. S21 system addresses are set electronically in the Head-End Processor and retained indefinitely in nonvolatile memory. S21 addresses represent the DMX ID number of the first dimmer in the S21 package. For instance, if the address is set to 007, then the first dimmer in the unit will be dimmer 7, the second will be dimmer 8, etc. For talkback to work properly, each S21 package must decode a unique range of addresses and must not overlap with other S21 units. If the unit mentioned above at address 007 contains six dimmers, the next unit must be set to address 013 to avoid overlapping address ranges.

S21 addresses are set with the buttons and display on the Head-End Processor. Buttons are identified as 'L', 'C', and 'R' (short for Left, Center, and Right).

Set the S21 starting address as follows:

Step 1. Press the 'L' button once. This places the display in the "Display/Set Address" mode (indicated by "A" in left most digit).

A 0 0 1

Step 2. Press the 'C' button to increase the address by three. Press the 'R' button to decrease the address by three.

Step 3. When the display shows the correct address, press the 'L' button again. (The display will blank after about one minute)

To verify the address, or make a change, press the 'L' button several more times until the "Display/Set Address" mode shows again.

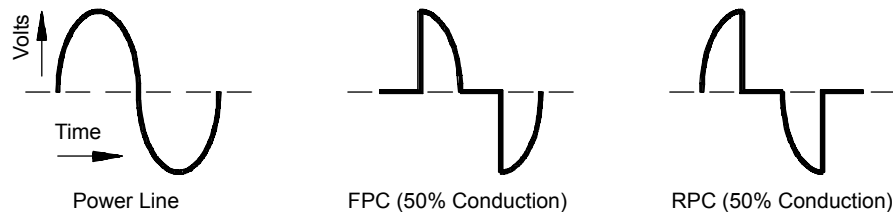
DIMMER SYSTEM FUNDAMENTALS

1. S21 Dimmer Systems

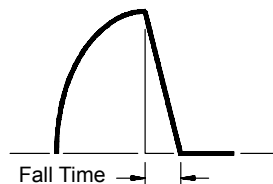
The S21™ dimmer is a multi-mode unit which automatically analyzes its connected load and picks the most appropriate dimming technique. Depending on the load, the dimmer will use either Reverse Phase Control (RPC) or Forward Phase Control (FPC). Whenever possible, the dimmer will choose RPC because of the advantages it offers in terms of reduced lamp noise and increased regulation accuracy. Both techniques control the average power applied to the load by limiting current flow to only certain portions of each power line half cycle.

Forward Phase Control is the technique used by all previous electronic dimmers, although earlier implementations have been far less sophisticated than S21. This scheme only allows current to flow during the latter portion of each half cycle. As the relative duration of the conducting portion is increased, so is the average power applied to the load, and hence its brightness.

Reverse Phase Control, on the other hand, limits current flow to the early portions of each half cycle. The dimmer monitors the power applied to the load in real time during the half cycle and adjusts its switch-off point as needed to regulate the light output.



When switching-off the output in each half cycle, it is important to control the slope of the falling wave form so as to minimize the acoustic noise made by the lamp filament, and the radio frequency noise radiated by the dimmer. Previous dimming technologies accomplished this by placing a large coil of wire in series with the output of the dimmer. The unique power stage in S21 dimmers allows this function to be performed directly in the dimmer. By stretching this fall time out to 450 or even 800 μ S, S21 dimmers achieve exceptionally quiet operation without high insertion losses, and without the line distortion caused by inductors.

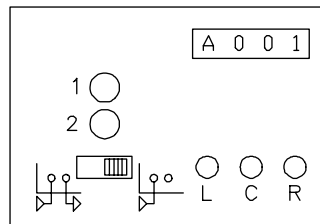


Note: Some manufacturers sometimes refer to "Forward Phase Control" as "Leading Edge" and "Reverse Phase Control" as "Trailing Edge."

HEAD-END PROCESSOR OPERATION AND PROGRAMMING

1. Basic Concepts

The Head-End Processor is the communications manager for the S21™ dimmer system. It receives the DMX512 data stream, determines which portion of the data is applicable and then instructs the dimmers to go to output levels accordingly. It queries the dimmers for operating status, and makes this data available both on the local 4 digit display and over the DMX512 network. It accepts control input from its three push buttons to allow operating modes to be selected and data to be displayed.



The 4 digit display is the primary indicator of the Head-End operating state. In normal operation, it displays a dash "-" character which repeatedly marches across the digit positions. Head-End menus are selected with the 'L' button and are indicated by letter or number codes on the display. No matter what menu is selected, after a couple of minutes the Head-End automatically returns to the "Normal" state.

The two individual LEDs (1 and 2) are used to indicate special conditions. LED 1 indicates that a DMX512 data stream is not present, and LED 2 indicates that the dimmer system is in Preset Playback mode.

2. Head-End Processor Menus

Normal

<p>Display reads: [- - -] Dashes march through digits.</p> <p>Operation: L Button: Change to "Display/Set Address" menu. C Button: No action. R button: No action.</p>
--

This is the state the dimmer system will maintain during normal remote control operation.

"Display/Set Address" Menu

<p>Display reads: [A x x x] A = Menu indicator. x x x = Address in decimal.</p> <p>Operation: L Button: Change to "Playback Preset" menu. C Button: Increase Address by 3. R Button: Decrease Address by 3.</p>
--

This menu allows the DMX512 network address of the first dimmer in the unit to be examined and set. To set the address, change the number in the display with the 'C' and 'R' buttons, and then exit the menu by pressing the 'L' button.

"Playback Preset" Menu

<p>Display reads: [P L A x] P L A = Menu indicator. x = Preset number. (1 -6 or "-")</p> <p>Operation: L Button: Change to "Local Dimmer Control" menu. C Button: No Action. R Button: Select next Preset.</p>

This menu allows one of the six internal presets to be selected for playback. To choose a preset, change the number in the display with the '**R**' button, and then exit the menu by pressing the '**L**' button. A preset selected in this manner will automatically come on any time the dimmer system is powered. To disable preset playback, press the '**R**' button until the display shows a dash "-" and then exit the menu as above.

"Local Dimmer Control" Menu

<p>Display reads: [L x y y] L = Menu indicator. x = Dimmer number. (1 -6) y y = Locally set level in Decimal. (00 -99, FL)</p> <p>Operation: L Button: Change to "Record Preset" menu. C Button: Select next dimmer. R Button: Increase level of selected dimmer.</p>
--

This menu allows individual dimmer levels to be set from the Head-End keyboard.

Select the dimmer to set with the '**C**' button. Set the dimmer's level with the '**R**' button. Exit the menu with the '**L**' button. If no DMX512 data stream is present, these locally set levels will remain on indefinitely. If console data is present, the levels will be terminated as soon as the menu is exited.

"Record Preset" Menu

<p>Display reads: [r E C x] r E C = Menu indicator. x = Preset number. (1 -6 or "-")</p> <p>Operation: L Button: Change to "Display/Set Dimmer Preheat" menu. C Button: No Action. R Button: Next Preset.</p>
--

This menu allows levels which have been set from the console, by the "Local Dimmer Control" menu, or by the individual dimmer Focus Buttons to be saved into internal presets for later playback. To record a preset, first set the desired levels, then enter this menu. Select the preset number to record with the '**R**' button and then exit the menu with the '**L**' button. If the dash "-" is displayed when the menu is exited, no preset record will take place.

"Display/Set Dimmer Preheat" Menu

<p>Display reads: [P = x x] P = = Menu indicator. x x = Preheat mode. ("-" or "On")</p> <p>Operation: L Button: Change to "Display/Set Dimmer Response Speed" menu. C Button: No Action. R Button: Toggle Preheat Setting.</p>
--

This menu allows dimmer preheat operation to be enabled or disabled for all dimmers in the unit . Change the setting with the **'R'** button, then exit the menu with the **'L'** button.

When preheat is set to "On", the dimmers will automatically apply a small voltage to lamps which are off to keep them from getting "cold". This is useful when it is necessary to get large wattage lamps to come on as quickly as possible.

It is not a good idea to enable preheat in all of the dimmers in a venue as this will cause tremendous amounts of current to be drawn from the power service even though no lights are on. Use the preheat function judiciously on the lamps which really need it, but otherwise leave it off.

"Display/Set Dimmer Response Speed" Menu

<p>Display reads: [S P x x] S P = Menu indicator. x x = Speed Indicator. (20 -55 or "FA")</p> <p>Operation: L Button: Change to "Display/Set Fan Mode" or "Display Console Data" menu. C Button: Next Response Selection. R Button: Enable Controlled Response.</p>

This menu allows the dimmer response time for all dimmers in the package to be set to one of 9 values. Enable controlled response with the **'R'** button. Select the response time with the **'C'** button, then exit the menu with the **'L'** button.

The Speed indicator is decoded as follows:

- FA = As fast as possible
- 20 = 200mS
- 25 = 250mS
- 30 = 300mS
- 35 = 350mS
- 40 = 400mS
- 45 = 450mS
- 50 = 500mS
- 55 = 550mS.

Controlled response time is used to normalize the amount of time different sized lamps take to come on. The factory default setting is 350mS. When set to **"FA"**, low wattage lamps will come on noticeably faster than high wattage lamps.

"Display/Set Fan Mode" Menu

<p>Display reads: [F = x x] F = Menu indicator. x x = Mode indicator. ("°C" or "On")</p> <p>Operation: L Button: Change to "Display Console Data" menu. C Button: No Action. R Button: Toggle Fan Mode.</p>
--

This menu only appears on S21 Dimmer Plug Box series dimmer systems. It allows the fan operation mode in these units to be set. Select the mode with the '**R**' button, then exit the menu with the '**L**' button. When the mode indicator reads "°C" the fan will come on if any dimmer in the box exceeds 45° C and will go off again when all dimmers are below 35° C. When it reads "On," the fan will come on any time a DMX512 signal is present, and will go off again when the signal is removed and all dimmers are below 35° C.

"Display Console Data" Menu

<p>Display reads: [d x y y] d = Menu indicator. x = Dimmer number. (1 -6) y y = Console level in Hexadecimal. (OO -FF)</p> <p>Operation: L Button: Change to "Display/Set Non-Dims" menu. C Button: Select next dimmer. R Button: No action.</p>

This menu displays the actual DMX512 level which has been set for each dimmer.

"Display/Set Non-Dims" Menu

<p>Display reads: [n x y y] n = Menu indicator. x = Dimmer number. (1 -6) y y = Non-Dim threshold level in decimal ("- ", 01 - 98)</p> <p>Operation: L Button: Change to "Analog Input Trim" menu, "Display/Set Demo Unit Input Mode" menu, or "Display/Set Address" menu. C Button: Select next dimmer. R Button: Increase threshold level.</p>

This menu allows individual dimmers to be configured for "Non-Dim" operation. Select the dimmer to configure with the '**C**' button, set the "Non-Dim" threshold level with the '**R**' button, then exit the menu with the '**L**' button. The "Non-Dim" threshold is the input level at which the dimmer will switch from full off to full on. Select a threshold of "- -" to convert a dimmer back to normal operation. When selected as a "Non-Dim", a dimmer will not attempt to regulate its output.

"Analog Input Trim" Menu

Display reads:	[A n x x]
A n	= Menu indicator.
x x	= Trim operation to perform. ("-", "FL", "00")
Operation:	
L Button:	Change to "Display/Set Demo Unit Input Mode" menu, or "Display/Set Address" menu.
C Button:	Select trim operation.
R Button:	Execute trim operation.

This menu only appears on legacy S21 dimmer systems which have a discontinued AMX192 or Analog input option installed. It allows the analog input section to be calibrated to the actual control voltage used by the control console.

For AMX, set the first dimmer on the data link to FULL. For Discrete Analog set all control inputs to FULL. Select the "FL" trim function with the 'C' button, then execute the function with the 'R' button. Return all control levels to Zero. Select the "00" trim function with the 'C' button, then execute the function and the 'R' button. Exit the menu with the 'L' button.

"Display/Set Demo Unit Input Mode" Menu

Display reads:	[- x x -]
- -	= Menu indicator.
x x	= Input mode indicator. ("-CO", or "-PC")
Operation:	
L Button:	Change to "Display/Set Address" menu.
C Button:	No action.
R Button:	Toggle input mode.

This menu only appears on S21 demonstrator units. It allows the DMX512 input to be configured for either normal console operation (-CO-), or for connection to a custom personal computer with specialized trade show demonstration software (-PC-). Press the 'R' button to toggle the mode selection, then press the 'L' button to exit the menu.

Diagnostic Error Report

Display reads:	[E r r x]
E r r	= Menu indicator.
x	= Error Code. (1 - 7)
Operation:	
L Button:	Change to "Display/Set Address" menu.
C Button:	No action.
R Button:	No action.

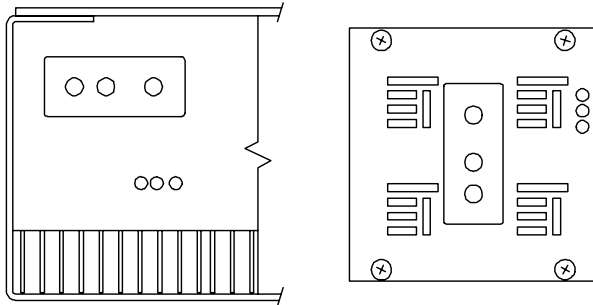
This display will only be seen if the dimmer system detects an internal error upon power-up. Error codes are:

Code	Definition
1	Head-End ROM Checksum error.
2	E2PROM was blank, or invalid and has been re-initialized.
3	One or more of the dimmers are absent or not responding.
4	Reserved.
5	Head-End and dimmers are not all configured for the same voltage.
6	One or more dimmers have reported a fatal error.
7	Unit is mis-wired to high voltage.

DIMMER OPERATION

1. Controls and Indicators

Each dimmer in an S21™ system is a self contained micro-computer system having a power supply, a micro-processor, memory, and a communication channel as well as power control and sensing electronics. Each dimmer is capable of determining both the line and load voltage, the load current, and its own operating temperature, and adjusts its operation accordingly.



Focus Button

S21 dimmers normally operate under the control of the Head-End processor. When conditions require an operator to locally turn on a circuit, the "Focus" button is used. The action of this button is a function of the current state of the dimmer.

If the dimmer is set to a level of zero by the control console (or the Head-End processor) then the Focus button behaves as follows: If the dimmer is presently off, a tap on the button will take it to full on. If the dimmer is presently on, a tap will turn it off. Whether on or off, pressing and holding the button will cause the dimmer to ramp up in intensity. Releasing the button will then cause the dimmer to hold an intermediate level.

Lights turned on in this fashion will remain on indefinitely. However, when the control console (or Head-End) subsequently sets a non-zero level for a dimmer, the focus level will be canceled, and the dimmer will once again follow the higher priority control.

If the dimmer is already set to a non-zero level by the control console (or Head-End) the Focus button becomes a "Flash-to-Full" control, overriding the set level only while the button is pressed.

LEDs

The two LEDs associated with each dimmer report various operating conditions. The indications are as follows:

Red LED	Green LED	Condition
Off	Off	Normal Operation
Off	Flashing	No Load
Off	On	Focus Mode
Flashing Quickly	Off	Over-Sized Load or Overload
Flashing Slowly	Off	Over Temperature
On	Off	Other Error (Query Status Monitor)
Flashing	Flashing	Mis-Wire to Line Voltage

2. Load Types

S21™ dimmers are designed to operate a wide variety of lighting loads of up to their rated capacity. The range of load types which may be connected includes incandescent lamps, and a number of "well-behaved" inductive loads such as low-voltage (step-down transformer) incandescent lamps, fluorescent lamps, and most types of small motors.

S21 dimmers are NOT designed to drive large motor loads (3 Amps or greater), or motors with start-up capacitors. Attempting to drive such loads may damage the dimming electronics.

When operating low-voltage type fixtures, observe the following precautions: If the fixture has a conventional magnetic transformer, be sure it has internal fusing and is approved for dimming by its manufacturer. Load the S21 dimmer to only 80% of its capacity (960VA for a 1.2KW dimmer) to compensate for losses in the transformers. If the fixture has an "electronic transformer", make sure it is approved for dimming by its manufacturer.

Neon signs can be particularly difficult to dim as they tend to reflect back nearly all of the energy which is applied to them. For best results with neon, an S21 dimmer should be loaded to no more than 50% of its capacity (600VA for a 1.2KW dimmer), should be configured for Forward Phase Control operation, and should have an incandescent load of 100 to Dimmer Operation 200 watts added to help absorb the reflected energy. Failure to take these precautions may result in damage to the dimming electronics.

Also, for best results, increase the neon transformer voltage 50% over the normal requirements for the selected length and diameter of the tube. Use only Low Power Factor (without power factor compensation), current limiting, high-voltage transformers. Mount the transformer with the lamp it operates. This will increase lamp stability and dimming range. Neon tubes must be pumped for a hard vacuum to minimize impurities in the lamp to insure flicker-free operation at low light levels.

To place a dimmer into Forced Forward Phase Control mode, follow this procedure:

On the Head-End Processor, press the 'L' button until you are in the "Playback Preset" menu. Press and hold the 'C' button until the left hand digit changes to 'H'. Press the 'L' button three more times until the left hand digit changes to 'C'. Press the 'C' button until the second digit shows the number of the dimmer you wish to modify (1 - 6). Press the 'R' button until the third digit shows '2'. Press the 'L' button three more times until the left hand digit changes to 'A'.

To return a dimmer to normal dimming operation, follow the same procedure as outlined above, except when pressing the 'R' button change the third digit to '0', instead of '2'.

3. Dimming Modes

The S21 dimmer is capable of several operational modes, and automatically selects the one which is best suited to the particular load and power service to which it is connected. As the dimmer brings a load up from zero it performs an analysis of its output voltage and current to determine which mode to use. The operator will never be aware that this has occurred, except by noting the reported dimming mode on the Status Monitor.

The four modes in which the dimmer may operate are Trial, Warm-up, Normal FPC, and Normal RPC. In each mode the dimmer analyzes its operating parameters to determine if it is permissible to move to the next mode.

When coming up from a level of zero, the dimmer is in the Trial mode and makes an initial determination of the character of the load. If it appears to be a normal incandescent lamp which is already warm, the dimmer will move immediately to the Normal RPC dimming mode. Otherwise it moves to the Warm-up mode.

In Warm-up mode the dimmer applies power to the load in a current limited fashion bringing it to the point of incandescence as rapidly as possible. When the voltage and current on the load indicate that it is thoroughly heated, the dimmer moves to the Normal RPC dimming mode.

In normal RPC mode the dimmer handles the load with a reverse phase control wave form which is optimal for normal incandescent lamps. Unless the load exhibits some aberrant behavior, the dimmer will stay in this mode until the level is returned to zero. If the load or the service shows a significant inductive characteristic, the dimmer will switch to Normal FPC mode as this is the best way to handle an inductive load.

In Normal FPC mode, the dimmer behaves much like a conventional SCR based dimmer, handling the load with a forward phase control wave form.

Non-Dim Operation

When set for Non-dim operation, the S21™ dimmer bypasses the dimming modes mentioned above, and simply switches into full conduction. Normal overload protection is still active, but the dimmer does not attempt to regulate its output voltage. Non-dim mode is intended to control small motors and fans such as those found in color scrollers and scenic projectors. It is NOT designed to run large loads or flash pots!

Thermal Protection

The portion of the S21 output wave form which generates the most heat is the transition from on to off (off to on for FPC). This portion is known as the transition time, and its duration directly affects the amount of heat generated. The S21 dimmer can control the duration of this portion of its output wave form and thus, to a certain degree, its operating temperature.

If the dimmer is in its normal operating temperature range, it will use the longest transition time available (800 μ S for 2.4KW, 450 μ S for 1.2KW dimmers). Should its operating temperature reach 85° C (likely only if the ambient temperature is very high), it will automatically select a shorter transition time to reduce the amount of heat generated. In many cases this will be sufficient to stabilize the temperature. Should the temperature continue to rise, and reach 95° C, the dimmer will completely shut down to prevent an over temperature failure. After an over temperature shut-down the temperature must drop to 50° C and the level must be reset to zero to resume normal operation.

4. Overload Protection

The S21 dimmer can detect an overload in one of two ways:

- 1) By calculating the load size from the measured voltage and current. This protects the dimmer from mis-sized loads, such as 2000 watts connected to a 1.2KW dimmer.
- 2) By the hardware current limiter tripping and shutting down the dimmers output. This protects the dimmer from catastrophic faults like short circuits.

The Over-sized load threshold is about 35% above the nominal dimmer capacity, roughly 1600 Watts for a 1.2K, 3200 Watts for a 2.4K. This gives enough latitude for lamp manufacturing tolerances and load shift with temperature, yet still protects the dimmer from gross loading errors.

Once an overload has been detected, the dimmer spends about 5 seconds monitoring the load before deciding to shut down. If the hardware current limit caused the fault, the load is monitored at extremely low voltages. If the fault has not cleared at the end of this time, the dimmer shuts down and reports the error. Depending on the cause, the Status Monitor will show either "Over-sized Load", or "Overload".

The load must be reduced to the correct size and the level must be reset to zero before the dimmer will resume normal operation.

5. Lamp Response Controls

In almost all cases it is desirable to have lamps of different wattages and types respond to level changes at the same rate. Yet the intrinsic physical properties of different lamp types cause each one to respond differently. The S21 system contains two features which help blend across these differences, Controlled Response Time, and Lamp Preheat. While these are technically Head-End functions, they significantly affect the perceived performance of the dimmer and so warrant discussion here

Controlled Response Time sets the maximum rate at which changes in level can occur. This has the effect of "slowing down" small lamps so they behave more like larger ones. Studies in an actual production environment showed that a response time of 350 μ S adequately blends all typical theatrical lamps without adding significant "lag" to the system. S21 units may be set to any of nine values from "as fast as possible" up to 550 μ S. An example which would use a setting of "as fast as possible" is the traditional "marquee" chase in which small wattage lamps are switched on and off in rapid succession. A long response time will tend to blur the individual steps of this kind of effect.

As somewhat the inverse of controlled response, Lamp Preheat is used to "speed up" large wattage lamps so they behave more like smaller ones. This function applies a very small voltage to a lamp when it is set to a level of zero to warm its filament and hence shorten the time it takes to come on.

Note: Preheating every lamp in a venue will cause a tremendous amount of electricity being consumed even though no light is being produced. If you have a few small lamps in a rig, set a long response time on the small lamps rather than preheating all the large ones.

S21 CATALOG NUMBER REFERENCE

1. S21 Dimmer Strips, 120 Volt

Catalog#	Description
71400	6 x 1200w 450ms S21 Dimmer Strip with GP connectors
71401	6 x 1200w 450ms S21 Dimmer Strip with GTL connectors
71402	6 x 1200w 450ms S21 Dimmer Strip with GR connectors
71403	3 x 2400w 800ms S21 Dimmer Strip with GP connectors
71404	3 x 2400w 800ms S21 Dimmer Strip with GTL connectors
71405	3 x 2400w 800ms S21 Dimmer Strip with GR connectors

2. S21 Dimmer Strips Accessories

Catalog#	Description
71430	2-ft AWG #10/5 power input cable with L21-20P GTL plug
71431	4-ft AWG #10/5 power input cable with L21-20P GTL plug
71432	6-ft AWG #10/5 power input cable with L21-20P GTL plug
71433	8-ft AWG #10/5 power input cable with L21-20P GTL plug
71434	12-ft AWG #10/5 power input cable with L21-20P GTL plug
71435	4-ft AWG #10/5 power extension cable with L21-20P GTL connectors
71436	6-ft AWG #10/5 power extension cable with L21-20P GTL connectors
71437	8-ft AWG #10/5 power extension cable with L21-20P GTL connectors
71438	12-ft AWG #10/5 power extension cable with L21-20P GTL connectors
82019	Pipe Clamp
71343	Cheeseboro clamp
71344	Wall Mount Bracket
71345	Network Coupler - 5 pin turn female to female turnaround
71346	DMX Terminator

3. S21 Dimmer Plug Box, 120 Volt

Catalog#	Description
71420	6 x 1200W, 450µs Dimmer Plug Box with GP connectors
71421	6 x 1200W, 450µs Dimmer Plug Box with GTL connectors
71422	6 x 1200W, 450µs Dimmer Plug Box with GR connectors
71423	3 x 2400W, 800µs Dimmer Plug Box with GP connectors
71424	3 x 2400W, 800µs Dimmer Plug Box with GTL connectors
71425	3 x 2400W, 800µs Dimmer Plug Box with GR connectors

Note: Load Connector Types: GP - Grounded Stage Pin, GTL - Twist Lok, GR - Edison

4. S21 Dimmer Plug Box Accessories

71435	4-ft AWG #10/5 power extension cable with L21-20P GTL connectors
71436	6-ft AWG #10/5 power extension cable with L21-20P GTL connectors
71437	8-ft AWG #10/5 power extension cable with L21-20P GTL connectors
71438	12-ft AWG #10/5 power extension cable with L21-20P GTL connectors
82019	C-Clamp
71442	Wall Mount Strip Hanger (2 required per box)

Note: Load Connector Types: GP - Grounded Stage Pin, GTL - Twist Lok, GR - Edison

Notes



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