Sensor3

CEM3

User Manual

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Introduction

Welcome to your new CEM3 Power Control system.

This manual is designed to introduce you to the CEM3 user interface and the primary features and functions available to you in the setup and use of your CEM3 power control system.

Using this Manual

The following graphics and conventions are used throughout this manual to convey important information.

Note: *Notes are helpful hints and information that is supplemental to the main text.*

CAUTION: *A Caution statement indicates situations where there may be undefined or unwanted consequences of an action, potential for data loss or an equipment problem.*

WARNING: **A Warning statement indicates situations where damage may occur, people may be harmed, or there are serious or dangerous consequences of an action.**

WARNING: **RISK OF ELECTRIC SHOCK! This warning statement indicates situations where there is a risk of electric shock.**

Text Conventions

- **Bold** is used to indicate something in the CEM3 user interface, such as a parameter or button.
- **[Brackets]** are used to indicate a tactile button on the face of the CEM3 (such as **[Setup]**, **[Test]**, and **[Enter]**).

Please email comments about this manual to: TechComm@etcconnect.com.

Help from ETC Technical Services

If you are having difficulties, your most convenient resources are the references given in this user manual. To search more widely, try the ETC website at etcconnect.com or the Dimming and Networking Systems page at community.etcconnect.com.

If none of these resources are sufficient, contact ETC Technical Services directly at one of the offices identified below. Emergency service is available from all ETC offices outside of normal business hours.

When calling for help, please have the following information handy:

- Product model and serial number (located on the bottom of the CEM3)
- Installation type
- Other components in your system (Unison®, other consoles, etc.)

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Chapter 1

Getting Started

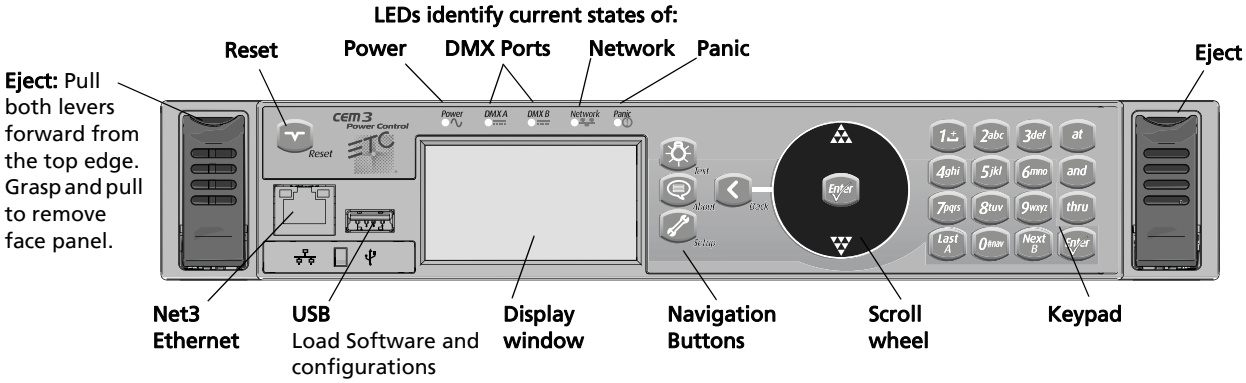
The User Interface

This section explains the physical features of the hardware interface and their general functionality with the software.

CEM3 Face Panel

The diagram below shows the components of the hardware interface. These terms are used throughout this manual.

CAUTION: *Power down the rack before removing the CEM3 face panel.*



Navigation

Scroll Wheel

Use the scroll wheel and up/down arrows to move the selection cursor on any menu screen until the desired item is highlighted. Menus that do not fit on one screen will have a scroll bar on the right side of the display window, and additional menu options can be accessed with the scroll wheel. You can also tap the top or bottom of the scroll wheel to move the display cursor up or down.

The scroll wheel also lets you scroll through number fields (such as circuit number) or through the available options for a selected item (such as Module Type).

The center button of the scroll wheel functions as [Enter]. Press [Enter] to select the highlighted item on the display window or to commit entered data.

Keypad

Use keypad to enter values for any value fields in the display window. When setting levels you can select individual dimmers or ranges of dimmers using the [and] and [thru] buttons.

Both the center button of the scroll wheel and the bottom right keypad button function as [Enter]. Press [Enter] to select the highlighted item on the display window or to commit entered data.

Navigation Buttons

The navigation buttons ([Test], [About], [Setup]) and the [Back] button are used to navigate menus in the display window (see *Menu Structure* on *page 10*). Press [Back] to return to the previous screen on any menu.

Performing a Quick Setup

Quick Setup is used to set up your rack using a minimum amount of data to achieve a basic configuration.

Note: *Prior to performing a Quick Setup, make sure that your rack DIP switch settings are set appropriately for your rack type. See Setting Rack DIP Switches and Termination on page 34.*

CAUTION: *Quick Setup will overwrite some of the data in your rack. Only perform a Quick Setup when you want to reconfigure your system or are instructed to do so by ETC Technical Services.*

You can begin a Quick Setup by selecting Quick Setup from the main screen or by navigating to [Setup]>Quick Setup>[Enter].

From this screen you can use the CEM3 interface to enter data in up to four screens to quickly establish your rack configuration: Module, Circuit, Dimmer Double, and Patching (see below for screen descriptions).

Once you have entered data in the screens, select OK and press [Enter] to save the setup changes.

Module

The current Rack Type is listed. To change the module type select Module. Select a module type and model from the list, then select Next.

Circuit

Set Numbering to either Renumbering or Unchanged to indicate whether to renumber the rack. If you select Renumbering, set these two additional parameters:

- Set the Starting At value to the number for the first circuit in the rack. If this is your first or only rack, this number is typically 1. If this rack is one of many in your system, this number typically continues the numbering sequence from the previous rack. Default is 1.
- Set the Balance type: Straight, 1-Phase, or 3-Phase. The CEM3 processor defaults to the balance type that is appropriate for the detected power source, but you can change this value if desired.
  - Straight results in circuit numbering that will proceed sequentially straight through the entire rack.
  - 1-Phase or 3-Phase results in circuit numbering that distributes the circuits evenly across the different power phases so that neighboring circuits do not place an uneven load on any phase.

These tables compare the circuit numbering of an SR3-6 filled with D20 modules when set to **Straight** numbering, **3-Phase** numbering, or **1-Phase** numbering:

Phase	SR3-6 Straight Circuit Numbering	SR3-6 3-Phase Circuit Numbering
A	1	1
	2	2
	3	7
	4	8
B	5	3
	6	4
	7	9
	8	10
C	9	5
	10	6
	11	11
	12	12

Phase	SR3-6 1-Phase Circuit Numbering
A	1
	2
	5
	6
	9
	10
B	3
	4
	7
	8
	11
	12

Dimmer Double

Choose between **Yes** and **No** to activate or deactivate dimmer doubling for the rack. Default is **No**. See *Dimmer Doubling (UL/ 120V 60Hz Systems Only)* on *page 6*.

You can also set a **DMX Offset** (default = 256) or **sACN Offset** (default =10000), which determines the start address of the B side of the dimmer doubled dimmers.

Patch

Select an automatic patching method to patch the entire rack sequentially.

Note: *Automatic patching is only available for racks with one space. For racks with more than one assigned space, see Patching on page 32.*

There are three automatic patching methods:

- **Simple**: This patching method specifies the same starting address for all three data ports (DMX A, DMX B, and sACN) at once. Enter the starting address for the patch. If the patch count exceeds 512, the patch will "wrap" and start numbering again at 1.
- **Independent**: This method allows you to specify different starting addresses for each data port in the patch (DMX A, DMX B, and sACN). Select a data port and assign the desired starting address for the rack. If the rack count then exceeds 512 (for DMX ports) the remainder of circuits in the rack will be patched to zero for that DMX port.
- **Universe Split**: This patching method should be used when a DMX universe will end midway through the rack's patch. Enter the starting address for the patch. If the patch sequence exceeds 512 (256 if dimmer doubling is enabled) DMX A will patch the rest of the circuits to 0 and DMX B will restart the patch addresses at 1 for those remaining circuits.

Other Setup Functions

Once you have completed the quick setup, you may wish to proceed to these other common setup tasks:

- Setting the module type in *Circuit Assignment* on *page 13*
- *Setting Up Panic* on *page 30*
- *Setting Up CEM3 on the Network* on *page 33*

Chapter 2

System Reference

This chapter includes the general concepts behind the features of your CEM3, the general menu structure of the software, definitions of all dimmer properties, and illustrations of the various dimmer curves available in your system.

Important Concepts

This section introduces some of the primary concepts. Topics are listed alphabetically.

Advanced Features (AF)

Advanced Features (AF) allow you to receive feedback from your dimmer modules about their current state, including the amount of current being drawn on each circuit, whether the module is installed or not, and whether the circuit breaker on the module has tripped. This information is available both at the front panel of the rack and at remote devices, including ETC Eos® and Cobalt® control systems and other ACN-capable devices.

Advanced Features also allow you to monitor circuit loads by recording and running a rig check (see *Rig Check* on *page 10*).

In order to use Advanced Features, you need AF-capable modules (modules with AF in the module name, such as D20AF or ED15AF) and AF cards installed in the rack.

Circuit

A circuit is a user assignable number between 1 and 99999. The circuit is the reference number for that dimmer in the rack. Circuit numbers *must* be unique per space; it is possible to have multiple circuits of the same number, but they must be in different spaces.

Configuration

The rack configuration is a collection of all of the data stored about the rack and all of its circuits. The configuration is stored automatically in the CEM3 whenever you make a change (for example, changing a circuit from switched to dimmed).

The configuration of any rack is automatically stored on both the CEM3 module and the CEM3 backplane. Therefore, you can remove a CEM3, replace it with a new, unconfigured CEM3, and the configuration from the backplane will be loaded to the new CEM3.

You can save and load rack configurations by connecting a USB removable media device to the USB port on the front of the module, by connecting to a computer on the network (using the CEM3 web interface), or by connecting to an FTP server. Saving and loading are performed from the **File Operations** menu. See *Saving or Uploading Files and Firmware* on *page 28*.

Dimmer Doubling (UL/ 120V 60Hz Systems Only)

ETC's Dimmer Doubler™ technology allows you to double the number of controllable circuits in your system without adding dimmer modules or running additional cable. The key to this feature is the Dimmer Doubler two-fer.

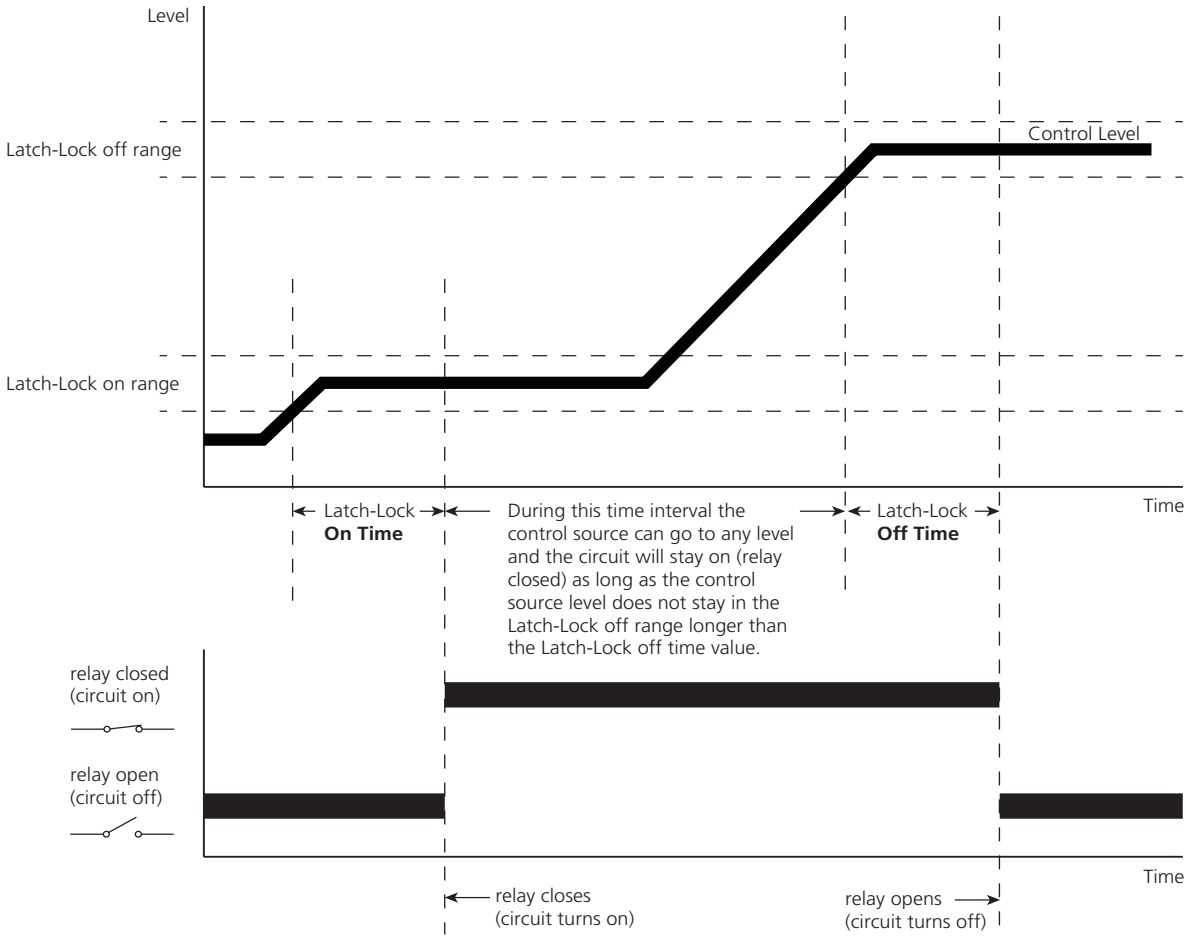
The Dimmer Doubler two-fer is installed between a Sensor dimmer module and two ETC Source Four 77-volt fixtures. It splits the output of a single dimmer into two separately controlled outputs.

Latch-Lock

Latch-Lock is a control mode available to any dimmer circuit (see *Control* on *page 15*). Similar to switched mode, Latch-Lock features an additional safeguard so that circuits cannot be turned on or off as easily. The circuit only turns on when a *defined* control level range is held for a *specified* amount of time, and only turns off when a different control level range is held for another amount of time. Latch-Lock is useful for avoiding accidental dowsing of arc lamps during shows (often caused by running the grandmaster down). By requiring a level range and time, most master fades will not hover in a given range for long enough to trigger on or off.

The level ranges and times can be edited on a per dimmer basis (see *Dimmer Property Definitions* on *page 15*). On and Off level ranges may not overlap.

Diagram of How Latch-Lock is Applied to a Circuit



Lug

"Lug" refers to a physical position in the rack. Lugs are always numbered counting downwards from the top of the rack, starting at 1. Some modules may take up multiple lug positions in the rack.

Panic

CEM3 offers a panic capability that complies with the UL 924 standard.

When a properly connected and enabled CEM3 has a panic "look" stored, it will automatically play the recorded look when it receives a signal over the panic circuit.

Panic can be enabled when a maintained (normally open or normally closed) contact closure is properly wired to the backplane. For more information, see the data termination guide or installation guide that was supplied with the rack.

For information on how to configure panic on your CEM3, see *Setting Up Panic* on *page 30*.

Note: *To configure panic mode through an electrical override without using the CEM3 module software, order the Hardwired Panic Accessory (7140K1002). Contact your local dealer for more information.*

Patch

Patching governs the relationship between control input sources (DMX A, DMX B, and sACN) and the control of circuits in the rack. This relationship can be edited to match the needs of your control sources and rack constraints. For information on patching, see *Patching* on *page 32*.

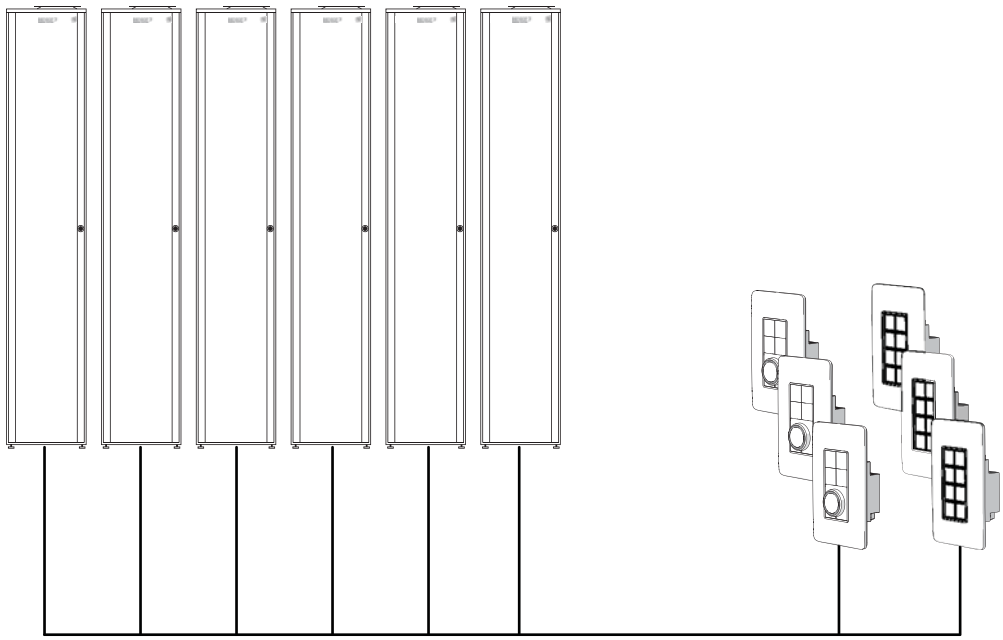
Preset Functions

CEM3 supports a built-in preset control system allowing the recording and playback of preset looks. Once recorded, preset looks can be played back either from the CEM3 face panel, connected Echo preset stations, or the web interface. For more information on recording and playing back presets see *Recording and Playing Presets* on *page 25*.

CEM3 allows the circuits within the rack to be divided up into spaces (performed in *Circuit Assignment* on *page 13*) with up to 64 presets available per space. Each space can only have one active preset at a time.

CEM3 includes default presets that include all circuits in the space. The default presets for any space start with level at 100% and then cycle through 75%, 50%, 25%, 100% and so on.

The built-in EchoConnect® power supply on a Sensor3 rack is limited to powering 6 racks or panels and 6 stations. However, you can expand the system with external equipment. For more information about Echo systems, visit etcconnect.com.



EchoConnect® - Belden 8471 + (1) 14 AWG ESD Ground Wire

CAUTION: *Do not activate station power on more than one CEM3 on the same EchoConnect® bus. Doing so may cause undesirable station function.*

When you activate a preset, this action is propagated across the Net3 network. For example, if you activate a given preset for space 1, all CEM3 modules on the network will activate that preset for space 1.

Rig Check

In Sensor3 racks with Advanced Features (see *Advanced Features (AF)* on *page 6*) you can record a special preset called Rig Check, which includes both circuit levels and the amount of load (current) expected on each circuit.

Once recorded, the Rig Check can be played back, either from the CEM3 face panel or remotely, and the CEM3 will post *load high*, *load low*, or *no load* messages based on how the load of the circuit has changed since you recorded the Rig Check preset. These messages will be available on the CEM3 display or on a connected console that monitors AF feedback.

You can record, run, and clear a rig check on the **Test** menu (see *Test* on *page 11*).

Spaces

Spaces are logical divisions within a system (such as different rooms) that isolate station control (preset and sequence control) to the defined group of controllable outputs in that division. CEM3 supports separation of its controllable circuits into spaces.

Station Functions

Presets can be played back from preset stations in the system.

- Press a preset station button to activate a preset.
- Press it again to deactivate the preset.
- Stations can be configured with an Off button. This option is performed at the station and should only be done by a qualified technician.
- The group of presets controlled by any station can be altered at the station. This should only be done by a qualified technician.

For more information see the *Echo Preset Station Installation Guide* available at etcconnect.com.

Redundant Tracking (ESR and FDX Racks Only)

Redundant tracking provides extra security in the event of system failure, allowing a secondary CEM3 control module to immediately take control of the rack. For more information, see *Redundant Tracking Systems* on *page 59*.

Variable Speed Fan

The variable speed fan reduces the amount of noise generated by a Sensor3 rack, specifically when the rack is lightly loaded. The variable speed fan is supported in the following product models:

- ESR24
- ESR36
- ESR48

The fan operates at two speeds: High and Low. The fan uses the AF Features of the rack to run more slowly when less current is being drawn.

Menu Structure

This section describes the menu structure of the software. Press the desired button to access the menu items below. Use the standard navigation method to select and enter options in the menus (see *Navigation* on *page 3*).

Test

Field	Description
Set Circuits	Set levels for chosen circuits in a space. If necessary, press [Back] to clear the command line during any of the following steps. 1: Use the keypad to enter a circuit number between 1 and 99999. 2: Press **[and]** to enter multiple circuits or press **[thru]** to enter a range of circuits. • Press **[Last/A]** or **[Next/B]** on the keypad to set a level for the A or B side of dimmer doubled circuits. See example below. 3: Press **[at]** or **[Enter]**. The command line ends with "at". 4: Use the keypad or scroll wheel to enter a level if desired. 5: Press **[Enter]**. The selected circuits will be set to the specified level or released if you did not enter a level. The command line ends with "*". 6: If you selected a single circuit, press **[Next]** or **[Last]** on the keypad to increment or decrement the circuit number to set the level of another circuit, if desired.
Dimmer Check	Quickly run through all circuits in a space to test their output at a given percentage.
Release Set Lvls	Release any active levels for a given space at once.
Presets	Record or play back presets. See *Recording and Playing Presets* on *page 25*.
Sequences	Record or play back sequences. See *Recording and Playing Sequences* on *page 27*.
Release All Arch	Release all architectural control such as presets, sequences, and set zone levels.
Record Rig Check	Record a rig check preset to facilitate AF reporting. Rig Check features are only available if the rack property **AF Enabled** is set to **Yes**. See *Rig Check* on *page 10*, *Advanced Features (AF)* on *page 6*, and *Rack Property Definitions* on *page 18* for more information.
Run Rig Check	Run a rig check preset. You will be notified of any load inconsistencies found during the rig check.
Clear Rig Check	Clear the recorded rig check from all racks for a given space.

Example: Setting the A and B sides of one dimmer doubled circuit at a time is straightforward using the A and B keys. It is possible to set ranges of dimmer doubled circuits. The following are valid examples:

A side only

- **1 at 100** or **1A at 100** sets 1A to full
- **1 thru 6 at 100**, **1 thru 6A at 100**, **1A thru 6 at 100**, or **1A thru 6A at 100** sets the A sides of 1 through 6 at full

B side only

- **1B at 100** sets 1B to full
- **1B thru 6B at 100** sets B sides of 1 through 6 at full

Some A and some B sides

- **1 thru 6B at 100** or **1A thru 6B at 100** sets the A and B sides of 1 through 6 to full
- **1B thru 6 at 100** or **1B thru 6A at 100** sets 1B and the A sides of 2 through 6 to full

About

Field	Description
Dimmers	View all properties for any circuit in a space or in any rack on the network. See *Dimmer Property Definitions* on *page 15*.
Rack	View all properties for the host Sensor rack. See *Rack Property Definitions* on *page 18*. • Status: displays "Rack OK" or "Errors Exist" • Panic State: displays "Ready" when not in a panic condition and "Active" when in a panic condition.
Errors	View any current errors or other status messages. See *Error Messages* on *page 56*.
Source Info	View the current control source (Highest-Takes-Precedence or "HTP") and related output level being received by all dimmers in a space. • "DMXA" is DMX Port A • "DMXB" is DMX Port B • "sACN" is Streaming sACN • "AF" means Advanced Features is using the dimmer for load recording • "SetLevels" means Set Levels or Dimmer Check is in use on the dimmer • "ACNDirect" is ACN Direct Control • "Preset" followed by a number means a preset is running on the dimmer • "Panic" means the panic settings are in effect • "--" means no control of the dimmer
About CEM3	Displays the current software version on your CEM3 processor. You can also save a copy of the *CEM3 User Guide* to a USB drive.

Setup

Commonly used features found here include:

- changing dimmer, rack, and network settings
- enabling control ports
- changing operating mode
- upgrading software or backing up the rack configuration
- changing curve and firing mode

Field	Description
Dimmers	View and adjust the settings for any circuit in any rack connected to the network. See *Dimmer Property Definitions* on *page 15*.
Rack	View and adjust the settings for the host Sensor3 rack. See *Rack Property Definitions* on *page 18*.
Circuit Assignment	Assign the space, circuit number, and module type for any circuit slot in the rack. You can auto assign or manually edit the options for any circuit. For single and half-density modules such as the D20F, select **Edit Circuit Layout** to adjust circuit numbering before you perform final patch updates.
Patching	Edit the patch and functionality for any port (DMX or sACN). See *Patching* on *page 32*.
Network	Set up and edit network properties for the CEM3. See *Setting Up CEM3 on the Network* on *page 33*.
File Operations	Save configurations, load configurations, or upgrade CEM3 software using either a USB memory device or an FTP server. See *Saving or Uploading Files and Firmware* on *page 28*.
Panic	Record a panic look and set the specific details (such as fade and delay times) for when a panic look is executed. See *Setting Up Panic* on *page 30*.
Time/Date	Set the rack's time and date, or switch between automatic or manual time setting.
Quick Setup	Quickly set up the rack configuration. For more information see *Performing a Quick Setup* on *page 4*.
UI Preferences	Adjust various settings regarding the user interface. See *UI Preferences* on *page 14*.

UI Preferences

Adjust various settings regarding the user interface. Edit these settings in the **UI Preferences Setup** screen **[Setup]>UI Preferences.**

Field	Description
Backlight Mode	Adjust the settings of the backlight behind the display window. Choices are **On**, **Off**, and **Auto**. **Auto** will illuminate the window after a button press or boot up for the time specified in **Backlight Time**. Default is Auto.
Backlight Time	Appears only when **Backlight Mode** is set to **Auto**. Specify the time in minutes and seconds (between 0:10 and 9:59) for the backlight to stay lit after a reboot or button press. Default is 3:00.
Contrast	Set the contrast of the display window. This can also be done from the home screen by holding the back arrow and using the scroll wheel.
Language	Set the display language for the display window. Default is English.
Temp Locale	Set the units used for the temperature display, Celsius (C) or Fahrenheit (F). Default is F.
sACN	Set the method of displaying sACN addresses: Universe/Channel (**Uni/Ch**) or absolute address (**Abs**). Default is Uni/Ch.

Dimmer Property Definitions

Each dimmer has specific properties that dictate how the dimmer functions and how CEM3 will control it. Edit these properties in the **Dimmer Setup** screen **[Setup]>Dimmers**.

Dimmer Setup screen	Submenu (if applicable)	Definition
Ckt		Circuit Number. A user-assigned number for a unique circuit within a space. Typically the circuit number matches the labelling at the corresponding power outlet.
Module		The type of module controlling the circuit. Defines module density, ratings, and features to ensure proper function of the connected equipment and power devices in the module.
Control		Set the control mode of the dimmer. • **Off**: Circuit ignores incoming levels and will not turn on even with local overrides. • **Switched**: Circuit operates as a relay with output unregulated AC voltage when the control level is above the control threshold level. • **Always-On**: Circuit ignores incoming levels and will not turn off even with local overrides. • **Latch-Lock**: Similar to switched mode, Latch-Lock functions as a relay but features an additional safeguard so that circuits can not be turned on or off so easily. See *Latch-Lock* on *page 7*. • **Dimmable**: Circuit dims according to curve within the minimum and maximum scaled voltages. • **Smoothing**: The dimmer adds a deliberately slow reaction time to changes in control level to "smooth out" dimming performance with loads that react quickly such as LEDs or low wattage lamps. • **TPAuto**: Allows control of ThruPower behavior using one single DMX address, where full closes the relay and any other level is dimmed. • **TPDMX**: Allows control of ThruPower behavior using two DMX addresses; the first address provides control, the second acts as a mode selector.
Firing		The firing mode of the dimmer module. Options are: **Normal**, **Dimmer Double**, or **Fluorescent**. Specific module types will also offer respectively: **Reverse Phase** and **Thru-Power**.

Dimmer Setup screen	Submenu (if applicable)	Definition
Control Settings	Curve	The current operating curve for the dimmer. Options are: **Square**, **Mod-Square**, **Linear**, **Mod-Linear**, and more. See *Dimmer Curves* on *page 19* for a complete listing of curves and their descriptions.
	Threshold%	In switched mode the threshold value defines the control percentage at which the output turns on. In dimmed mode, the threshold defines the level at which preheat is applied. See *Dimmer Output Diagram* on *page 24* for an illustration of how threshold works with other dimmer properties.
	On Level%	**Latch-Lock** only. The control level range (as percentage) that causes the **On Time** to start counting down. Ranges available in 10% increments. Default is 41–50%. See *Latch-Lock* on *page 7*.
	Off Level%	**Latch-Lock** only. The control level range (as percentage) that causes the **Off Time** to start counting down. Ranges available in 10% increments. Default is 81–90%. See *Latch-Lock* on *page 7*.
	On Time (sec)	**Latch-Lock** only. The time that a level must be maintained before a circuit is switched on. Available range is 1–360 seconds. Default is 5 seconds. See *Latch-Lock* on *page 7*.
	Off Time (sec)	**Latch-Lock** only. The time that a level must be maintained before a circuit is switched off. Available range is 1–360 seconds. Default is 5 seconds. See *Latch-Lock* on *page 7*.
Patching	DMX A	The DMXA channel to which the circuit is patched.
	DMX A 16-Bit	Control whether the circuit receives 16-bit data from DMX A. Options are **Yes** or **No** (Default = No).
	DMX B	The DMXB channel to which the circuit is patched.
	DMX B 16-Bit	Control whether the circuit receives 16-bit data from DMX B. Options are **Yes** or **No** (Default = No).
	sACN	The sACN channel to which the circuit is patched. Displayed as either universe/channel or absolute, based on **UI Preference** settings (see *UI Preferences* on *page 14*).
	sACN 16-Bit	Control whether the circuit receives 16-bit data from sACN. Options are **Yes** or **No** (Default = No).

Dimmer Setup screen	Submenu (if applicable)	Definition
Dimming Settings	Min Scale (VAC)	Set the minimum scale voltage of the circuit. See *Dimmer Output Diagram* on *page 24* for an illustration relating to this property.
	Max Scale (VAC)	Set the maximum scale voltage of the circuit. See *Dimmer Output Diagram* on *page 24* for an illustration relating to this property.
	Regulation	Set whether voltage regulation is enabled for the circuit (**Yes**/**No**). Default is Yes.
	Preheat	Set whether the **Preheat** setting is on (**Yes** = On). Default = No (off).
	Time (sec)	Preheat **Time** value allows the preheat level to ramp back in after a blackout to allow rapid snap blackouts. This property specifies the length of time for the ramp back to preheat level. Default = 2 seconds.
	DC Out Prevent	If enabled, ensures that both positive and negative half-cycles of the dimmer output are always equal. This setting is typically used for loads sensitive to DC (for example, transformers and electronic loads). Default is No (**No** = Off, **Yes** = On).
	Inrush Protect	Provides a soft-start feature when lamps are turned on from 0 by ramping up the level over three mains cycles. Default is No (**No** = Off, **Yes** = On).
	Scale Load	The scale load setting allows hyper-accurate regulation of the voltage of the dimmer output. The scale load allows the CEM3 dimming engine to compensate for power losses occurring in the choke of the dimmer. The scale load is calculated as the load on the channel divided by the channel's capacity (in amperes) and is expressed as a percentage. For example, a 5A load on a 20A channel would have a scale load of 25% (5A/20A x 100% = 25%).
Panic/Arch Settings	Allow in Panic	Control whether this circuit is included in the panic look.
	Allow in Preset	Control whether this circuit is included in any presets that may be recorded in the future.
	Arch Zone	Number of the zone for which you are setting the Panic/Arch parameters.
Advanced Features	AF Enabled	Enable or disable advanced features for this circuit. **Yes** = AF enabled. This field is not available for circuits set to **Dimmer Double**.
	AF Mode	Set the load reporting mode for this circuit. Options are: **Off**, **No-Load**, and **Load Change**. Default for AF modules is Load Change. This field is only available if the rack property **AF Enabled** is set to **Yes**. and the Dimmer property **AF Enabled** is set to **Yes**.
	AF Reaction	Set the length of time for an AF reaction to occur. Default = 5 seconds. This field is only available if the rack property **AF Enabled** is set to **Yes**. and the Dimmer property **AF Enabled** is set to **Yes**.
	Sensitivity	Set the threshold a load can be within before triggering a load error. Available in 0.5A increments. 2A is default. This field is only available if the rack property **AF Enabled** is set to **Yes**. and the Dimmer property **AF Enabled** is set to **Yes**.

Rack Property Definitions

Each rack has specific properties that dictate how the rack is identified and functions. Edit these properties in the **Rack Setup** screen (**[Setup]>Rack**).

Rack Property	Definition
Rack Number	Select a rack number between 1–999.
System Number	Select a system number between 1–999. Default is 1. Changing the system number will require a reboot.
DMX A	Enable or disable the DMX A port. When **Disabled** the respective **Priority** field is not visible, and **Off** is displayed on the home screen. Default for DMX A is **Enabled**.
Priority (DMX A)	Visible only when **DMX A** output is **Enabled**. Configure the priority of the DMX A output signal from the rack. Range is between 1–200 (200 = highest priority). Default is 100.
DMX B	Enable or disable the DMX B port. When **Disabled** the respective **Priority** field is not visible, and **Off** is displayed on the home screen. Default for DMX B is **Disabled**.
Priority (DMX B)	Visible only when **DMX B** output is **Enabled**. Configure the priority of the DMX B output signal from the rack. Range is between 1–200 (200 = highest priority). Default is 100.
sACN	Enable or disable the sACN port. When **Disabled**, **Off** displays on the home screen. Default for sACN is **Enabled**.
Arch Priority	Set the priority used for preset playback. Range is between 1–200 (200=highest priority). Default is 100.
Fan	The length of time (in minutes) the rack fan will stay on after the last load in the rack has reached 0%. Select a time between 30–180 minutes or **Always-On**. Default is 30.
AF Enabled	Set whether Advanced Features (AF) are enabled (**Yes/No**). Default is based on the backplane DIP switch setting.
Presets on Boot	If **Enabled** and the rack is rebooted when a preset (or presets) are active, those same presets will be reactivated when the rack reboots.
Setup at Home	Set whether **Quick Setup** is displayed on the home screen. Default is **Yes** for portable racks and **No** for install racks.
Volt High Warn	Set the threshold voltage to report an "over voltage" condition. Default is 140VAC for 100–120VAC systems and 250VAC for 230–240VAC systems.
Temp High Warn	Set the threshold temperature to report an "over temperature" condition. The range is between 32–158°F (0–70C). Default is 149°F (65C).
Station Power	Set whether the preset station power supply for this CEM3 is turned on. Default is **Off** (see *Preset Functions* on *page 9* for more information).
Remote Record	Set whether presets can be remotely recorded from preset stations. Default is **No**.
[Data Loss Behavior]	Opens the **Data Loss Behavior** submenu (see *Setting Data Loss Behavior* on *page 33*).

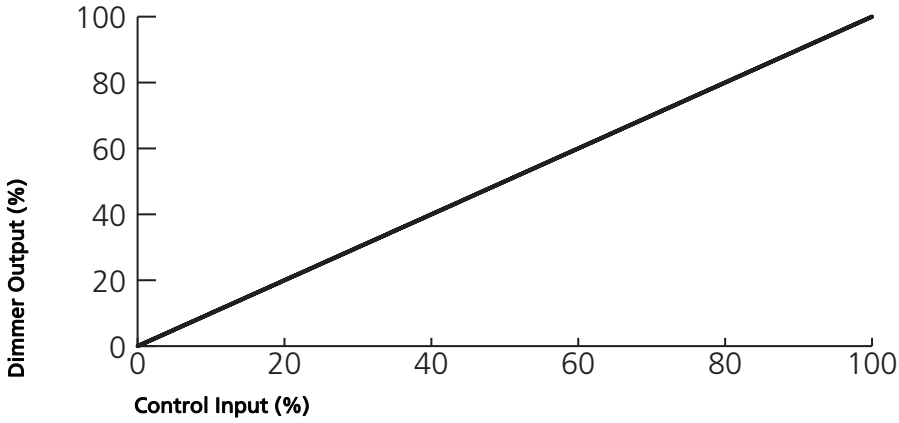
Dimmer Curves

Dimmer curves determine voltage output in response to control signal input. To accommodate designer preferences and load response variations, Sensor3 offers several dimmer curves, which can be applied to individual dimmers (see *Curve* on *page 16*).

The available curves in CEM3 are as follows.

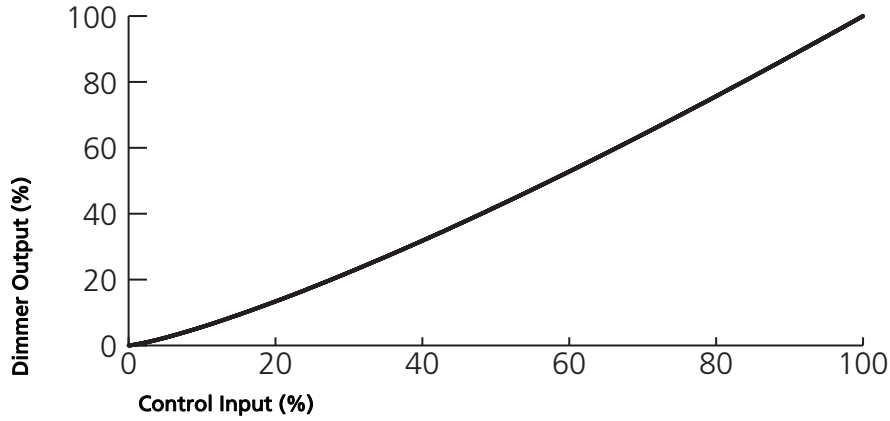
Linear

The linear curve matches the control input percentage to Root Mean Squared (RMS) voltage output. Each percent increase in control level increases dimmer voltage output by the same amount.



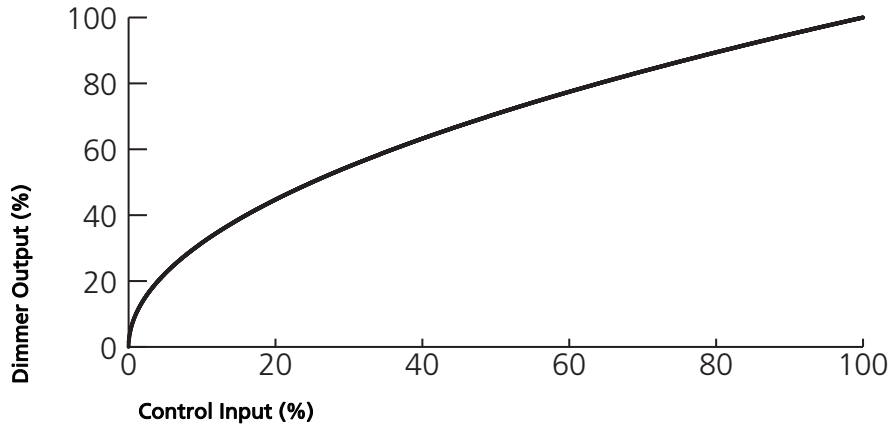
Modified Linear (Mod-Linear)

A modified linear curve reduces the voltage change at low control levels for better performance in low-wattage fixtures.



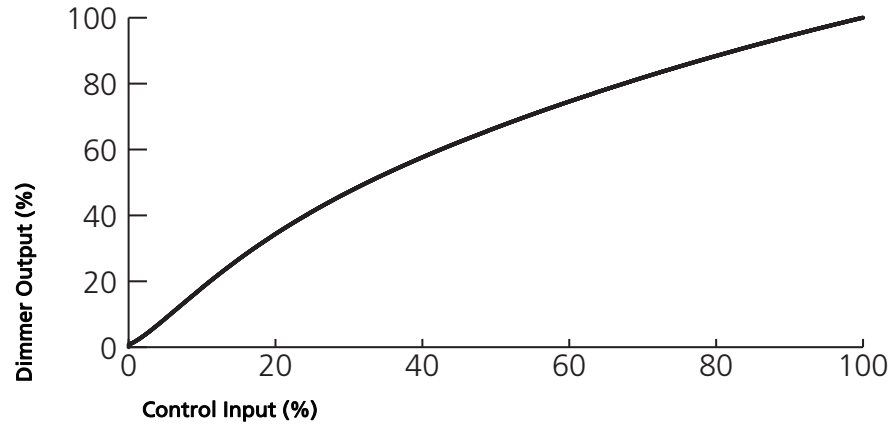
Square Law (Square)

At low control levels, much of a traditional incandescent fixture's light output is in the invisible infrared spectrum. This results in poor visible response to low control levels. A square law curve applies a multiple derived from the square root of the control level (with full output equal to 1.00) to increase voltage response at low control levels to compensate for the infrared loss.



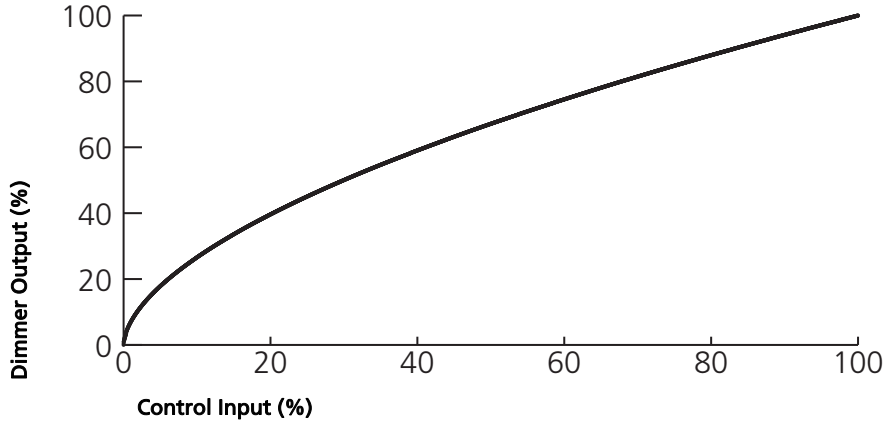
Modified Square Law (Mod-Square)

A standard square law curve may overcompensate for infrared loss, resulting in "steppy" response to incremental control changes at low levels. The ETC modified square law curve applies a second multiple to the standard square law curve for more uniform response to control levels changes across the entire range of dimmer output.



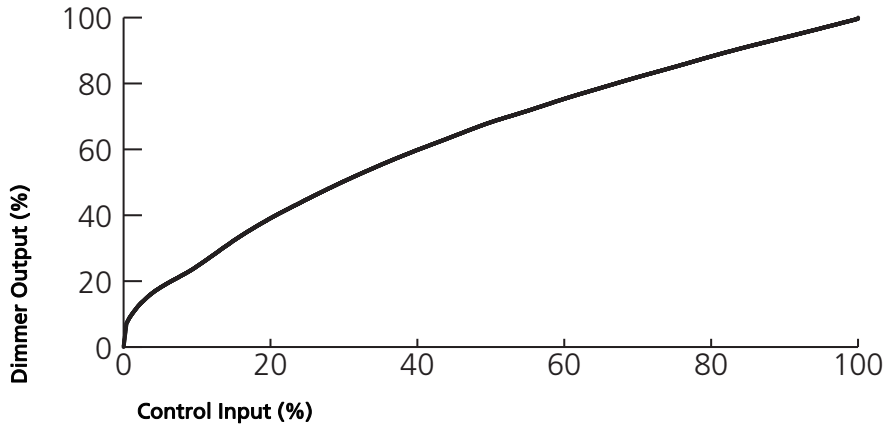
Sensor 2.0

The Sensor 2.0 curve is the previous version of the ETC modified square law curve. It provides backwards compatibility for shows created using earlier versions of ETC equipment and familiar response for designers who prefer the earlier version.



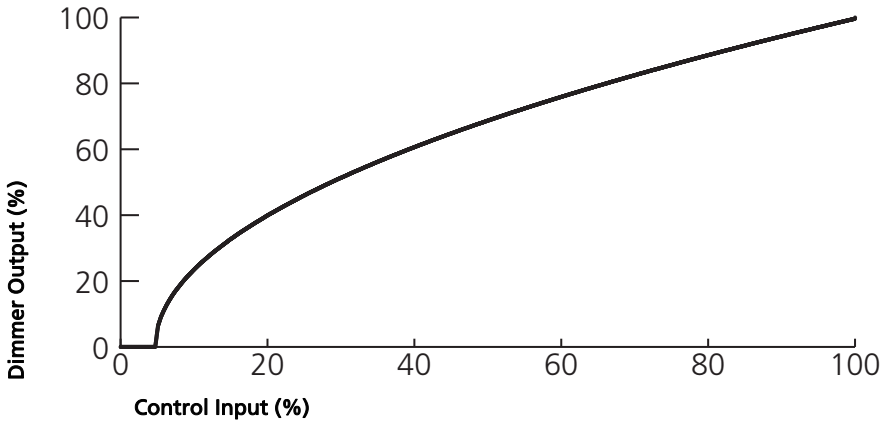
Stage 1

This curve matches the stage curve of the Transtechnik PM90 dimming system.



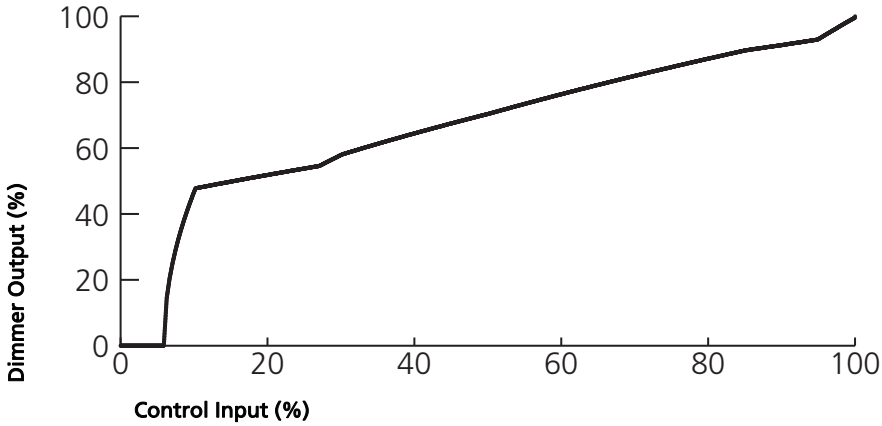
Stage 2

This is a traditional German stage lighting curve.



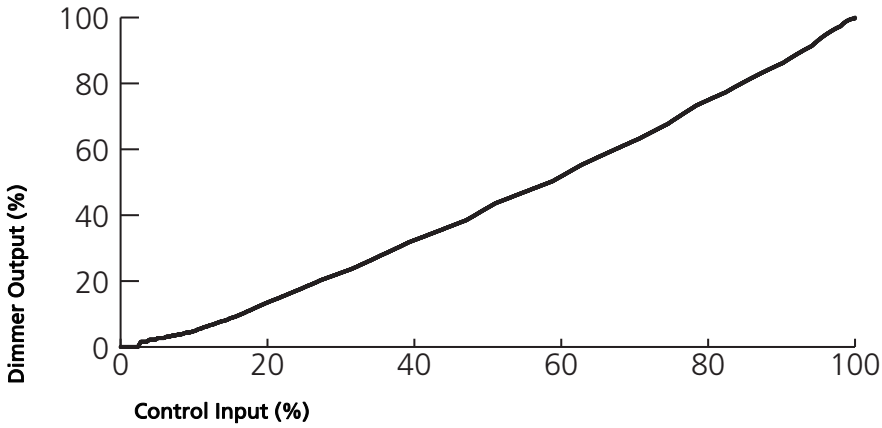
Fluro1

This curve is specifically for Nesys fluorescent devices.



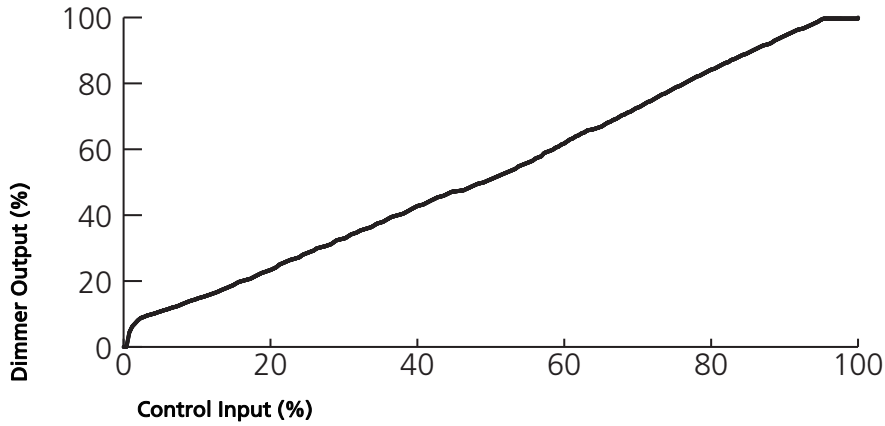
Fluro 2

This curve is tuned to work with common 3-wire fluorescent ballasts.



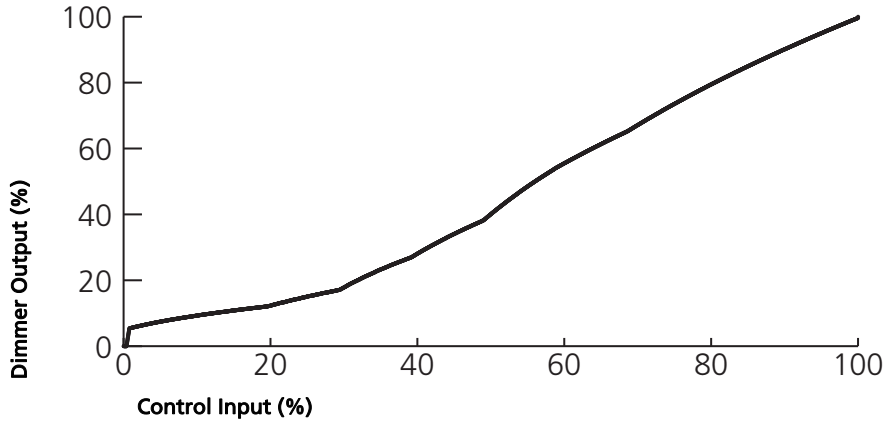
ANDI

This curve is tuned to match the curve of Strand ANDI dimmer systems.



VIP 90

VIP90 is a curve specifically tuned to produce good dimming performance with the VIP-90 fluorescent ballast from SE Light management AG, commonly used in European theatrical fluorescent luminaires.

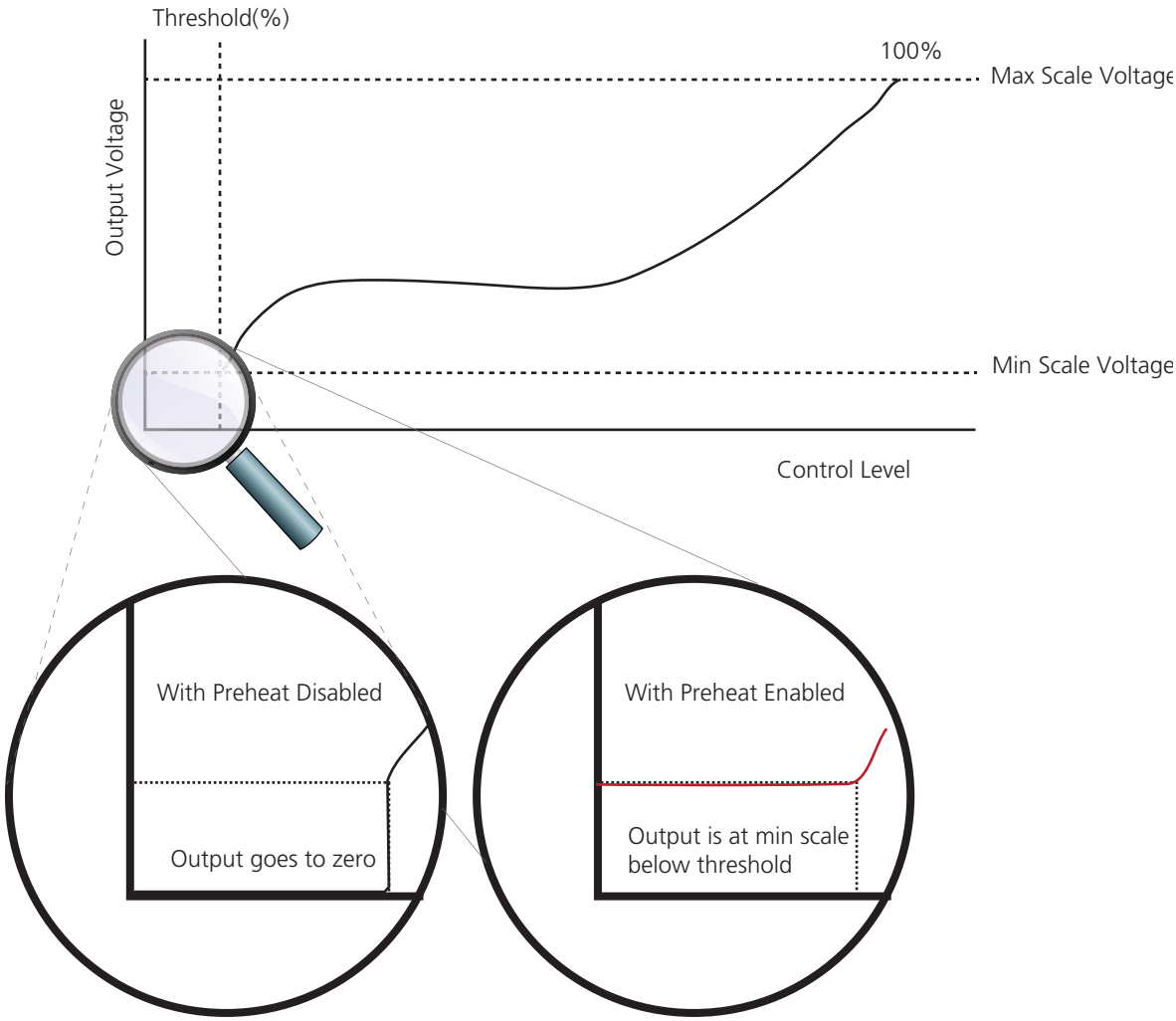


Custom

You can use ETC's Concert software to configure up to five custom curves.

Dimmer Output Diagram

This diagram illustrates the relationship between min scale, max scale, curve, threshold, and preheat for the dimmer output from a CEM3 channel.



Chapter 3

Common Tasks

Replacing the CEM3 Processor

When you remove a CEM3 processor from a rack the CEM3 configuration is stored in the backplane. If you replace the processor with a different CEM3 processor you will be prompted to select the desired configuration.

Configuration Selection

When a CEM3 processor that contains an existing configuration is moved to a different rack, the CEM3 will detect that it has been moved and prompt you to select the rack configuration to use. A timer counts down from 15 seconds before defaulting to **[Use the Rack Config]**. Within 15 seconds you can choose to **[Abort]** the operation.

- If the rack type is suited to work with the backplane configuration or the CEM3 configuration, you can choose to use either configuration.
- If the rack type is not suited to work with the backplane configuration, you will be given an option to select the backplane configuration or to clear the configuration and generate a new configuration.

Incorrect Version

When switching CEM3 processors, the software version of the backplane may not match the software version of the CEM3. This results in a backplane version mismatch. You can either **[Generate New Config]** or **[Use CEM3 Config]**.

When switching CEM3 processors, the rack type configuration may not match the configuration set on the backplane switches. If this occurs the CEM3 processor will display a rack mismatch. Select **[Generate New Config]** to generate a new default configuration.

Recording and Playing Presets

CEM3 has the ability to record and play back snapshot looks called "Presets."

Presets can be recalled from the CEM3 or from any compatible Echo preset stations or the web interface. For information on wiring preset stations, see the *Sensor3 CEM3 Data Terminations Guide* and the *Echo preset Station Installation Guide.*

Up to 64 presets can be recorded for each space, numbered from 1–64. Only one preset can be active at a time in the same space.

Preset Menu

Presets are recorded by taking a snapshot of the current levels for all circuits assigned to the space *that are set to be included in presets* (see *Allow in Preset* on *page 17*). If a circuit is not set to be included in presets, any level it is currently using will be withheld from the record action.

To record or play back a preset:

1: Set the desired output levels for any dimmers in your rack using any method (methods include **[Test]>Set Circuits** on a CEM3 module, using a DMX source, or using a sACN source).

2: Using the CEM3 face panel, navigate to **[Test]>Presets**. The **Select Space** screen will appear (if multiple spaces exist).

3: Select the space for which you want to record the preset (if applicable) and then select **OK**. The **Preset** screen will open.

4: Select the preset (1–64), and then choose the appropriate options:

- **[Activate/Deactivate]**: [Enter] toggles the preset between on and off.
- **[Record]**: [Enter] records the current levels for the space to the selected preset.
- **Fade Time(s)**: Set the desired time (in seconds) for the preset to fade in when activated and fade out when deactivated. Range is from 0–360 seconds. Default is 2 seconds.

5: After you have recorded the preset, release the output levels (**[Test]>Release Set Levels**) or turn off the control source data.

Recording and Playing Sequences

CEM3 has the ability to record and play back a series of steps called Sequences.

Sequences can be recalled from the CEM3 or from any compatible Echo preset stations or the web interface. Only one sequence can be active at a time in the same space.

Sequence Menu

Sequences are recorded by taking a snapshot of the current levels for all circuits assigned to the space that are set to be included in a step. If a circuit is not set to be included in a step, any level it is currently using will be withheld from the record action.

To record or play back a sequence:

1: Set the desired output levels for any dimmers in your rack using any method (methods include **[Test]>Set Circuits** on a CEM3 module, using a DMX device, or using a sACN device).

2: Using the CEM3 face panel, navigate to **[Test]>Sequences**. The **Select Space** screen will appear (if multiple spaces exist).

3: Select the space for which you want to record the sequence (if applicable) and then select **OK**. The **Sequence** screen will open.

4: The **Sequence** screen displays your selected space and whether the sequence is active or deactivated. From this menu you can now perform the following actions:

- **[Activate/Deactivate]**: **[Enter]** toggles the sequence on or off.
- **[Edit Steps]**: **[Enter]** opens the **Edit Step** menu:
  - **Step**: Set the number of the step that you want to edit (maximum of 6 steps).
  - **Fade Time(s)**: Set the desired time (in seconds) for the sequence to fade in when activated. Range is from 0–360 seconds. The default is 0 seconds.
  - **Hold Time(s)**: Set the desired time (in seconds) for the sequence to hold when activated. Range is from 0–360 seconds. The default is 5 seconds.
  - **[Record]**: **[Enter]** records the current levels of the space to the selected sequence step.
  - **[Delete Step]**: **[Enter]** deletes the current selected step.
  - **[Insert Step After]**: **[Enter]** adds a new step to the sequence.
- **[Auto Setup]**: Select **Auto Setup** to create a sequence to turn on all switched mode circuits. Set the number of steps in the sequence. The maximum is 6.

5: Release the output levels (**[Test]>Release All Arch**) or turn off the control source data.

Saving or Uploading Files and Firmware

CEM3 allows you to save configurations to USB removable media, a computer connected to the network (using the CEM3 web interface), or an FTP server on the network. Before you can use an FTP server, you must configure it on the CEM module. See *Working with Net3 Conductor Over FTP* on *page 34*.

You can also upload a configuration or update the CEM3 software using the same methods.

Saving Configurations

To USB Media

1: Navigate to **[Setup]>File Operations>Save to USB**. The **Save As** screen will appear.

2: If desired, edit the name of the configuration using the scroll wheel and keypad.

a: Select the file name using the scroll wheel and press **[Enter]**. The first character of the rack name will be highlighted.

b: Use the keypad to alter the selected character. Keypad numbers have standard keypad text input letters. Multiple presses of any key will cycle through the number, lowercase letters, and then uppercase letters for that key.

c: When the desired character is displayed, use the scroll wheel to move to the next character in the rack name. If you want the name to be longer, press **[Next]** to add another character.

d: Repeat steps b–c until the desired rack name is displayed.

e: When the rack name is correct, press **[Enter]**.

3: Select OK and press **[Enter]**. The configuration will be saved to the device.

To a Computer

To save a configuration to a computer on the system network, see *Using the CEM3 Web Interface* on *page 40*.

To an FTP Server

Navigate to **[Setup]>File Operations>Save to Server**. You can edit the file name prior to saving using the scroll wheel and the keypad to enter letters.

Loading Configurations

From USB Media

1: Navigate to **[Setup]>File Operations>Load from USB**. The **Load File** screen will appear.

2: Use the scroll wheel to navigate the file structure to the desired configuration file (the file name will end in ".etc") and press **[Enter]**. The configuration will load.

From a Computer

To load a configuration from a computer on the system network, see *Using the CEM3 Web Interface* on *page 40*.

From an FTP Server

Navigate to **[Setup]>File Operations>Load from Server** and choose the desired file from the list that appears (CEM3 configuration file names end in ".etc").

Loading CEM3 Software

You can upgrade your CEM3 software using the same methods as loading configurations (see above). CEM3 software can be obtained by contacting ETC Technical Services (see *page 2*).

From USB Media

1: Back up the rack configuration using the steps outlined in *Saving Configurations* on *page 28*.

2: Navigate to **[Setup]>File Operations>Upgrade from USB**. The **Software Upgrade** screen will appear.

3: Use the scroll wheel to navigate the file structure to the desired configuration file (CEM3 software file names will end in ".bld") and press **[Enter]**. A confirmation screen will appear.

4: Select **Yes** to continue, or select **No** to cancel the upgrade. The software upgrade process will take several minutes.

From a Computer

To load a configuration from a computer on the system network, see *Using the CEM3 Web Interface* on *page 40*.

You can also use ETC UpdaterAtor software to upgrade your CEM3. UpdaterAtor can be downloaded from the ETC website at etcconnect.com.

From Net3 Conductor or an FTP Server

Navigate to **[Setup]>File Operations>Load from Server** and choose the desired file from the list that appears (CEM3 software file names end in ".bld"). See *Working with Net3 Conductor Over FTP* on *page 34* or contact ETC Technical Services for assistance with setting up an FTP Server for use with CEM3.

Setting Up Panic

To fully enable panic functionality for your CEM3, the following criteria must be met:

- A maintained contact closure from a UL924-Listed triggering device has been wired to the panic circuit on the CEM3 backplane (for more information, see the *Sensor3 CEM3 Data Terminations Guide* that ships with the Sensor3 rack).
- The Emergency Contact switch on the CEM3 backplane is the correct position for the contact closure type, either normally open (NO) or normally closed (NC).
- A snapshot of the desired panic look has been recorded in the CEM3 software.

Note: *A panic look can be recorded regardless of whether you have a wired panic circuit.*

Note: *To configure panic mode through an electrical override without using the CEM3 module software, order the Hardwired Panic Accessory (7140K1002). Contact your local dealer for more information.*

To set the Emergency Contact switch on the CEM3 backplane:

WARNING: Power must be turned OFF when you perform this procedure. Before removing dimmer or control modules for service, de-energize main feed to dimmer rack and follow appropriate Lockout/Tagout procedures as described in NFPA Standard 70E. It is important to note that electrical equipment such as dimmer racks can present an arc flash safety hazard if improperly serviced. This is due to available large short circuit currents on the feeders of the equipment. Any work on energized equipment must comply with OSHA Electrical Safe Working Practices.

1: Remove the CEM3 control module.

2: Move the switch labeled EMERGENCY CONTACT to the appropriate setting:

- NC: Use this setting if the emergency contact closure is a Normally Closed contact closure.
- Disabled: This setting disables the panic function for this CEM3 control module.
- NO: Use this setting if the emergency contact closure is a Normally Open contact closure.

To record a panic look:

1: Set the desired output levels for any dimmers in your rack using any method (methods include [Test]>Set Circuits on a CEM3 module, using a DMX device, or using a sACN device).

2: Using the CEM3 face panel, navigate to [Setup]>Panic>Record Panic Look>[Enter]. If a panic look was already recorded, a confirmation screen will appear asking you if you wish to overwrite the panic look.

- Select Yes/Save to overwrite the old panic Look. The new look will be saved.
- Select No/Cancel to cancel overwriting the old panic look.

After a panic look is recorded, the panic look will be activated when the emergency contact closure is triggered. When the contact closure is returned to its normal state, the panic look will be deactivated.

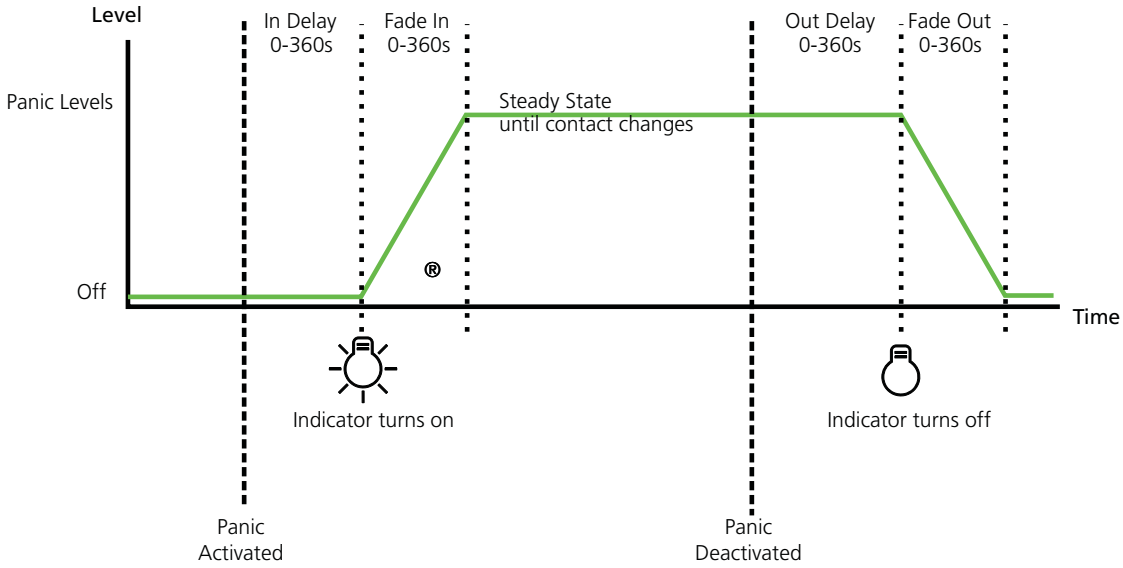
Other Panic Settings

In the **Panic Setup** menu (**[Setup]>Panic**) you can configure the following panic settings:

- **In Delay (sec)**: Length of time (in seconds) for the panic look to delay before activating (default is 0)
- **Out Delay (sec)**: Length of time (in seconds) for the panic look to delay before deactivating (default is 0). To require manual intervention to turn off panic from the face panel or via ACN, press **[Last]** when Out Delay is set to 0 or use the scroll wheel to select **Man**.
- **Fade In (sec)**: Length of time (in seconds) for the panic look to fade in when activated (default is 2)
- **Fade Out (sec)**: Length of time (in seconds) for the panic look to fade out when deactivated (default is 2)
- **Shed Other Loads**: This **Yes/No** setting determines if active levels at the moment of the panic trigger should remain active or be forced off. Default is N (No).

The following image illustrates how these settings affect panic function.

Panic Fade Diagram



Patching

Patching governs the relationship between control sources (DMX A, DMX B, and sACN) and the rack's circuits, and is editable from the CEM3 face panel. Typically, repatching is used in portable rack situations where the dimmer rack must adapt to different control sources and lighting systems. For permanent rack installs, repatching is rarely needed.

You can patch racks that have only one assigned space using one of two methods: manual or automatic. Racks with multiple assigned spaces can only be edited manually. For racks edited using an automatic method, circuits will be numbered sequentially from the specified starting address following the designated **Balance** setting (**Straight**, **1-Phrase**, or **3-Phase**) in **Quick Setup**. See *Performing a Quick Setup* on *page 4*.

Any circuit set to a patch of 0 cannot be controlled from the data source specified.

Automatic Patching

Automatic patching is the final step in the **Quick Setup** utility. See *Performing a Quick Setup* on *page 4*.

Manual Patching

Note: *Module density can affect patching. Prior to patching, make sure you set up the module type in [Setup]>Circuit Assignment.*

Manual patching allows you to patch on a circuit-by-circuit basis. There are two independent options for manual patching: DMX and sACN. Both can be set individually for your needs.

1: Navigate to **[Setup]>[Patching]**, and then select either **Edit DMX Patch** or **Edit sACN Patch**.
2: Press **[Enter]**. The **Select Space** screen will appear (if multiple spaces exist).
3: Select the desired space (if applicable) and then select **OK**. The **Patch Table** will open.
4: Use the scroll wheel or keypad to select the DMX port (A or B) or sACN universe and channel for the desired circuit.
5: Press **[Enter]**. The field will become editable.
6: Scroll to or enter the desired channel from the keypad.
7: Press **[Enter]**.
8: Repeat steps 4–7 for all desired circuits in the space.
9: Press **[Back]** when done. A confirmation dialog will open.
10: Select the appropriate option:
- **[Yes/Save]**: Save the changes
- **[No/Cancel]**: Cancel the changes
- **[Continue Editing]**: Edit additional circuits

11: Repeat steps 2–10 for any additional spaces.

Setting Data Loss Behavior

You can designate the rack's reaction to a loss of data from any of the three data ports (DMX A, DMX B, or sACN). For each of the ports you can select one of the following behaviors:

- Crossfade: On loss of data, the look will transition to a specified internal preset (DMX only).
- Wait & Fade: On loss of data, the rack will wait for a specified amount of time and then fade to black over another specified time.
- Hold Last Look: On loss of data, no transition occurs. The levels will stay at the last known look until data is restored to the port. Resetting the processor will release the levels.
- Hold Last Source: On loss of data, if other sources are available the rack will switch to them. Otherwise, the levels will switch to whichever source was most recently lost.

To set the data loss behavior for any port:

1: Navigate to [Setup]>Rack>Data Loss Behavior. The Data Loss Behavior screen displays.

2: Use the scroll wheel to highlight the desired port behavior (DMX A, DMX B, or sACN) and press [Enter]. The behavior will be highlighted.

3: Use the scroll wheel to select the desired behavior (see above) and press [Enter].

a: Select Fade Time (if applicable) and set the desired time (range is 0–360 seconds).

b: Select Wait Time (if applicable) and set the desired time (range is 0–360 seconds).

c: Select Preset Space (Crossfade only) and select the space that contains the desired crossfade preset.

d: Select Preset Number (Crossfade only) and select the desired preset (1–64) for the crossfade.

4: Repeat for the remaining data ports if desired.

Setting Up CEM3 on the Network

Network setup allows editing of the CEM3 network properties to establish the rack's IP address. Three options for setting network characteristics are available: Link Local, DHCP, and Custom. The default is DHCP.

You can access this menu by navigating to [Setup]>Network>[Enter]. After the desired method is set, a confirmation window will open asking you to confirm or cancel the changes.

Link Local

Choose Link Local if you work in a touring system where equipment changes frequently.

Link Local automatically assigns a randomly generated IP address within a given range.

DHCP

Choose DHCP if your system includes a DHCP server (for example, an Eos console).

This setting will attempt to acquire an IP address from a DHCP server. If the request fails, CEM3 will acquire its address through Link Local (see above) for this boot cycle only. If rebooted, the rack will attempt a DHCP request again.

Custom

With this method you can set the IP address (IP), Subnet (SN), and Gateway (GW) using the keypad. The ETC convention for IP addressing is 10.101.xxx.yy ("x" varies by ETC product line, "y" is an incremental value for products of the same type).

Network Setup for Redundant Tracking Racks

The Redundant Tracking option is only available for ESR and FDX systems.

In a redundant tracking system, each processor has a separate network connection to which a separate IP address may be assigned. When working in a redundant tracking system CEM3 will prompt you to select the processor (A or B) for which you want to change the IP settings.

Working with Net3 Conductor Over FTP

CEM3 supports automatic or manual backup of the dimmer rack configuration to a server on an Ethernet network using the FTP (File Transfer Protocol) standard. See *Saving or Uploading Files and Firmware* on *page 28*. By default, CEM3 is configured to interact with Net3 Conductor.

Before you can save to Conductor, you must set up the server from the CEM3 face panel.

To set up a Net3 Conductor server from CEM3:

1: Navigate to **[Setup]>File Operations>Setup Server**.

2: Press **[Enter]** to change **Enabled** to **Yes**.

3: Specify the IP address of the Net3 Conductor.

4: Specify the file name in **Filename**.

5: Set the **AutoSave** option:

- **Yes**: Every time a change is applied to the configuration, it will be saved to the server.
- **No**: You must manually save configuration changes to the server.

Upgrades and CFG Path display the upgrade file path and configuration path where files will be stored on Conductor.

Contact ETC Technical Services for assistance with configuring an FTP Server for use with CEM3.

Setting Rack DIP Switches and Termination

WARNING: To avoid the possibility of electric shock, power must be turned OFF when you perform this procedure. Before removing dimmer or control modules, de-energize main feed to dimmer rack and follow appropriate Lockout/Tagout procedures as described in NFPA Standard 70E. It is important to note that electrical equipment such as dimmer racks can present an arc flash safety hazard if improperly serviced. This is due to available large short circuit currents on the feeders of the equipment. Any work on energized equipment must comply with OSHA Electrical Safe Working Practices.

On the CEM3 backplane, located in the rack behind the CEM3 control module, there is a small bank of 8 DIP switches. These switches were set when your system was commissioned by an ETC technician to match the specific size, features, and desired behavior of your dimmer rack. Generally, you will not need to alter these settings after commissioning. However, in the event that you must replace your CEM3 control module or backplane, you will need to ensure these settings match the previous controller.

Use this section to determine the required settings for your dimmer rack. There is also a label on the underside of the CEM3 that explains the function of each switch.

When setting the DIP switches, you may also need to check the DMX A and DMX B termination settings for the rack. See the backplane label to determine the appropriate position of the termination switch.

DIP Switch Settings

The eight DIP switches relate to behavior, features, or the module size of the rack. In the descriptions below, switches set in the up position are On and switches set in the down position are Off.

DIP 1 : DBM

This switch disables the backplane memory so that the configuration is not stored on the rack itself. Default is Off.

DIP 2 : AF

This switch should be set to On if your rack has Advanced Features (see *Advanced Features (AF)* on *page 6*).

DIP 3 : HSR 240V

This switch should be set to On if your rack is an HSR rack intended for use with 240 VAC power feeds.

DIP 4 : ESR 230V

This switch should be set to On if your rack is an ESR rack intended for use with 230 VAC power feeds.

Note: *For JSR dimmer racks intended for use with 100 VAC power feeds, both DIP 3 and DIP 4 should be set to On.*

DIP 5 : ND

This switch should be set to On if your rack includes a neutral disconnect.

DIPs 6–8

These DIP switches are used together to determine the number of module slots in your rack. Refer to the table below to find the desired settings for your rack size.

Rack size	DIP Number		
	6	7	8
6 module slots	Off	On	On
12 module slots	Off	On	Off
24 module slots	Off	Off	On
36 module slots	On	Off	Off
48 module slots	Off	Off	Off

DMX Termination Switches

DMX signal requires a a signal termination at the end of a data run. If your rack is the last device on the data run for either DMX A or DMX B, set the termination switch for the appropriate run to ON. The switches are labeled B or A on the backplane label.

If the rack is not the last device on either data run, leave these set to Off.

Maintaining and Cleaning the Rack

Proper air flow is necessary for your Sensor3 rack to function properly and consistently. Perform the following procedures regularly to keep dust and foreign debris from impeding the proper function of your rack.

Cleaning Rack Air Filters

Clean the air filter in the Sensor3 rack door a minimum of every six months, more often if your system operates in a dusty environment. This will also provide an opportunity to inspect the dimmer module air vents and clean them if necessary (see *Vacuuming Dimmer Modules* on *page 37*).

To clean your rack air filter:

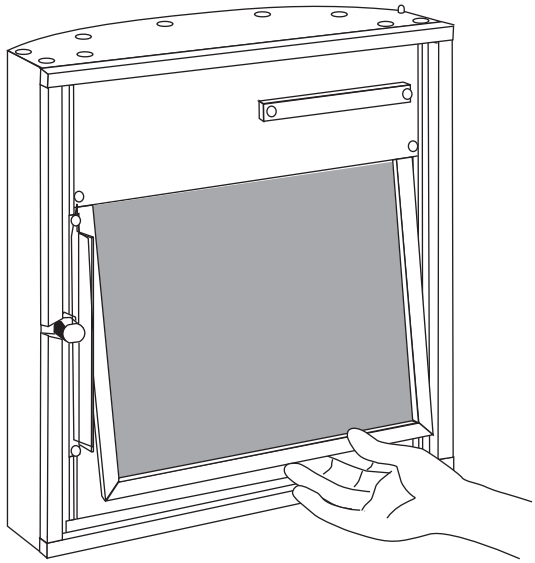
1: Open the dimmer rack door. The air filter is mounted on the inside of the door, secured by a metal lip at the bottom of the door frame.

Note: *Sensor3 48-module racks have two filters, one stacked on top of the other with a retention bar in the middle of the rack. Remove the top filter screen before removing the bottom one.*

2: Slide the filter upwards approximately 0.5 in. (1.25 cm) until the base of the filter clears the top of the metal lip.

3: Pull the bottom of the air filter out and away from the door far enough to clear the retaining lip and slide the filter downwards and out of the door frame.

4: In an area away from your dimmer rack and other dust-sensitive equipment, remove all dust or debris from the filter using either compressed air or a vacuum.



CAUTION: *You may rinse the filter under cold tap water, but it must be completely dry before you reinstall it.*

Do not use soap or other chemical cleaners to clean the filter. They may damage the filter screen.

5: Slide the top of the filter up into the slot at the top of the door until the base clears the metal retaining lip at the bottom.

6: Ease the filter back into the door frame and carefully let it drop back into place.

Note: *For Sensor3 48-module racks, install the bottom filter first. The top filter rests on the top edge of the bottom filter.*

Vacuuming Dimmer Modules

As with cleaning the air filters, you should inspect the dimmer module air vents and SCR power cube inlets every six months and clean if necessary. Clean with greater frequency if your system operates in a dusty environment.

WARNING: **To avoid the possibility of electric shock, power must be turned OFF when you perform this procedure. Before vacuuming dimmer or control modules de-energize main feed to dimmer rack.and follow appropriate Lockout/Tagout procedures as described in NFPA Standard 70E. It is important to note that electrical equipment such as dimmer racks can present an arc flash safety hazard if improperly serviced. This is due to available large short circuit currents on the feeders of the equipment. Any work on energized equipment must comply with OSHA Electrical Safe Working Practices.**

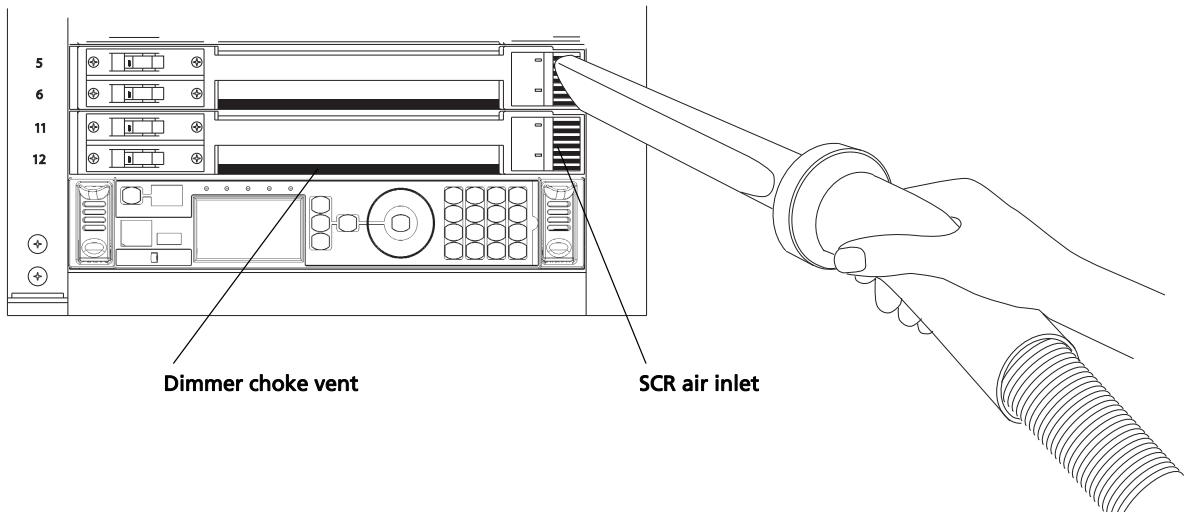
Do not remove dimmer modules when vacuuming. Phase voltages inside the rack can be deadly, and therefore only qualified technicians should be allowed to remove modules and expose the inside of the dimmer rack.

To vacuum the dimmer module air inlets:

1: Open the rack door and inspect the air vents on the CEM3 and the air vents and SCR power cube air inlets on the dimmer modules for any collection of dust or other debris.

2: If necessary, use a vacuum cleaner and nozzle to remove any visible dust or other accumulated matter from the front of the modules ***without removing them from the rack.*** Most dust collects on the dimmer choke vents and SCR power cube air inlets of the modules (shown below).

CAUTION: *Be careful not to push any foreign matter into the module.*



3: Close the rack door when you are finished vacuuming.

Replacing AF Cards

AF cards are located on the right side of the dimmer module slot between the copper neutral busses and the dimming circuitry cards.

WARNING: To avoid the possibility of electric shock, power must be turned OFF when you perform this procedure. Before removing modules or AF cards de-energize main feed to dimmer rack and follow appropriate Lockout/Tagout procedures as described in NFPA Standard 70E. It is important to note that electrical equipment such as dimmer racks can present an arc flash safety hazard if improperly serviced. This is due to available large short circuit currents on the feeders of the equipment. Any work on energized equipment must comply with OSHA Electrical Safe Working Practices.

Phase voltages inside the rack can be deadly, and therefore only qualified technicians should be allowed to remove modules and expose the inside of the dimmer rack.

To replace the AF cards:

1: Note the module types and positions, and then remove the modules from the rack..

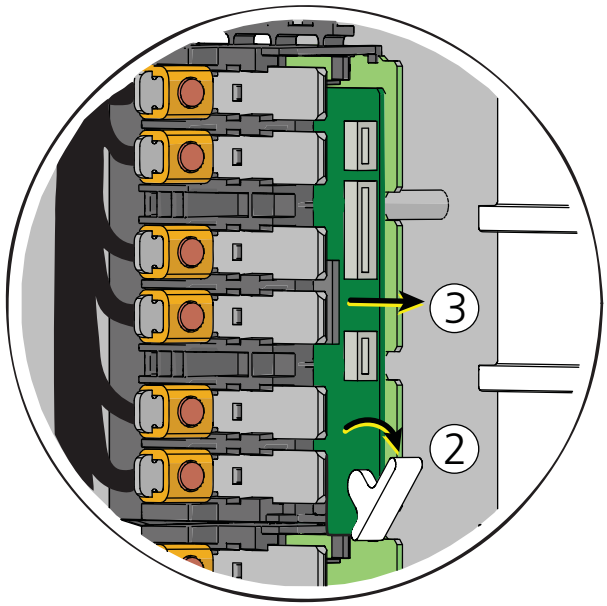
2: Remove the old AF cards by flipping the white tab on the cards into the down position

3: Pull the old cards out of the slots.

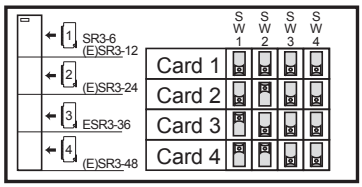
4: Set the DIP switches on the new cards according to the chart below. Only the first two DIP switches are used.

5: Flip the white tab up to prevent it from interfering with the dimmer module.

6: Slide the new AF cards completely into the vacant slots starting with card #1 in the top. The number of cards depends on rack size (see table below).



AF Card Addressing



Restoring Rack Defaults

Restoring rack defaults is a fast way to completely reset all rack settings back to their original state. **This feature is only intended for users with touring or portable racks where a complete reset is a common requirement.**

Restoring defaults on an installed rack is not recommended unless you are expressly told to do so by ETC Technical Services.

CAUTION: *Restoring rack defaults will erase all rack data. Do not perform this procedure unless you absolutely intend to restore the rack back to its original factory settings.*

To restore the factory defaults to your CEM3:

1: Save a backup of the rack configuration (see *Saving Configurations* on *page 28*).

2: Press and hold **[Setup]**.

3: Tap **[Reset]**, found in the upper left corner of the CEM3 interface.

4: Continue holding **[Setup]** until the **Deep Clear** screen appears.

5: Select **Yes** to clear all rack settings and restore the factory defaults, or select **No** to cancel.

Chapter 4

Web Access and Mobile App

This chapter describes the CEM3 web interface and the Sensor3 ThruPower System Reporter.

Using the CEM3 Web Interface

CEM3 features a basic web interface accessible over the system network using any internet browser that allows you to view the system status, perform some basic functions, update software, and upload or download the rack configuration.

To access the CEM3 over the network:

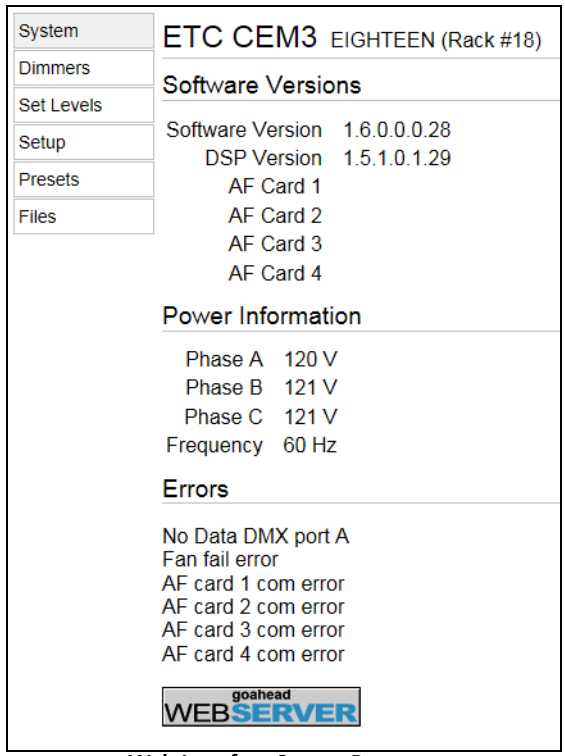
1: Connect an internet browsing device (such as a computer or mobile device) to the system network. You can connect using the network connector on the face of the CEM3.

2: Set the connected device to the proper IP address range if using a system of fixed IP addresses. If your system uses dynamically assigned addresses (DHCP), your address will be assigned from the system server.

3: Open an internet browser on the connected device.

4: In the browser address bar, enter the IP address of the CEM3 you wish to view. The address can be found by navigating to **[Setup]>Network** and noting the digits in the IP: field.The CEM3 System page will appear in the browser.

The home page menu provides access to the five available pages of the interface: **System**, **Dimmers**, **Set Levels**, **Setup**, **Presets**, and **Files**.



Web Interface System Page

System

This page displays the software and power information for the rack, as well as any currently active error messages.

Dimmers

This page allows you to view the current status of all circuits in the rack.

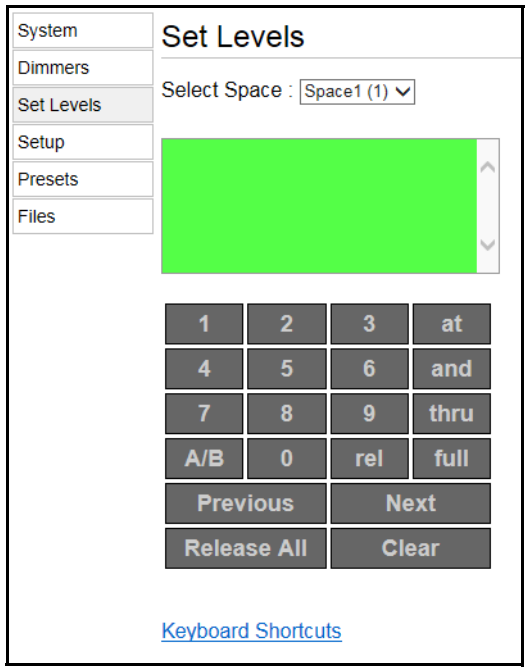
Set Levels

This page allows you to set and release levels for any circuit in the rack.

You can use the displayed keypad or a connected keyboard to input commands into the green command window.

Once the command line reaches complete syntax it will be automatically entered as signified by a "*" at the end of the command line.

- Select the desired space using the **Select Space** field at top (if applicable).
- Use the **and** button and **thru** button to select multiple circuits or ranges of circuits.
- Use the **A/B** button to specify any dimmer doubled circuits (if applicable).
- Use the **rel** button to release channels.
- Use **Release All** to release all current levels.
- Use **Previous** and **Next** to cycle through successive channels.
- **Clear** clears the command line.



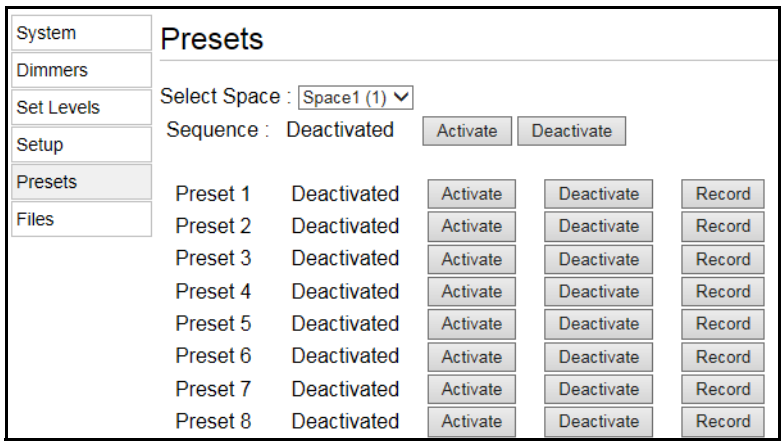
Set Levels Page

Setup

This page allows you to alter the **Control Mode** or **Curve** for any circuit in the rack. Click **Apply Changes** when you have completed all the desired changes.

Presets and Sequences

Use this page to activate or deactivate a sequence or activate, deactivate, or record a preset for a selected space. For more information on presets, see *Recording and Playing Presets* on *page 25*, and for more information on sequences, see *Recording and Playing Sequences* on *page 27*.



Presets Page

Files

This page allows you to upload CEM3 firmware or configurations as well as download the current rack configuration.

1: To upload a file, select the file type (**Configuration** or **Firmware**) by clicking the appropriate box at top.

2: Use the **Browse** button to navigate to the desired file on your connected device.

3: Once the file is selected, click **Begin Upload**.

Using the Sensor3 ThruPower System Reporter

The Sensor3 ThruPower System Reporter app allows you to scan QR codes affixed to distribution using a smart device (smartphone, tablet, etc.) and configure the relevant dimmer.

The ThruPower app is available for download from the App Store® Store (Apple iOS) and Google Play™ store (Android devices).

1: Make sure that your device is connected to a wireless network with access to the racks that you want to configure.

2: Start the ThruPower app. When the app opens, the camera on your smart device becomes active.

3: Center the QR code affixed to the distribution for the dimmer that you want to configure on your smart device screen. The app identifies the QR code and prompts you to configure the dimmer or cancel the action.

4: Tap **Configure**. The app searches for the associated dimmer.

- If only one dimmer is associated with the QR code, the **Configure Dimmer** screen displays.
- If several dimmers are associated with the QR code that you scanned, the app displays the dimmer names. Tap the dimmer that you want to configure. The **Configure Dimmer** screen displays.
- If the app cannot find the associated dimmer, tap **Search Manually** at the bottom of the screen and enter search criteria to identify the dimmer.

5: Modify the dimmer information as needed. See *Dimmer Property Definitions* on *page 15* for information on dimmer configuration parameters.

Appendix A

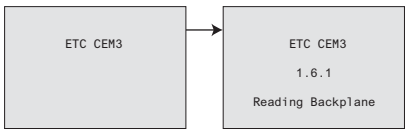
CEM3 Menu Flow Chart

The following screens and menus are covered in this section:

- *Boot Screen*
  - *Normal Operation*
  - *Rack Type Mismatch*
  - *Configuration File Conflict*
  - *Backplane Mismatch*
- *Home Screen*
  - *Normal Operation*
  - *Panic*
  - *AF Card Upgrade*
  - *Battery Backup or RideThru Active*
  - *Redundant Tracking*
- *Quick Setup and Info* menus flow chart. For further information, see *Performing a Quick Setup* on *page 4*.
- *Test* menu flow chart. For further information, see *Test* on *page 11*.
- *About* menu flow chart. For further information, see *About* on *page 12*.
- *Setup* menu flow chart. For further information, see *Setup* on *page 13*.

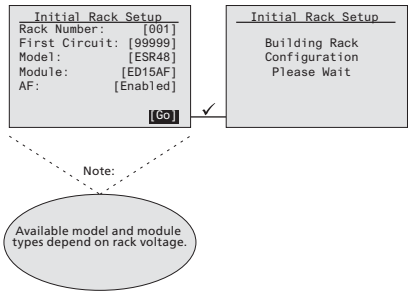
Boot Screen

Normal Operation



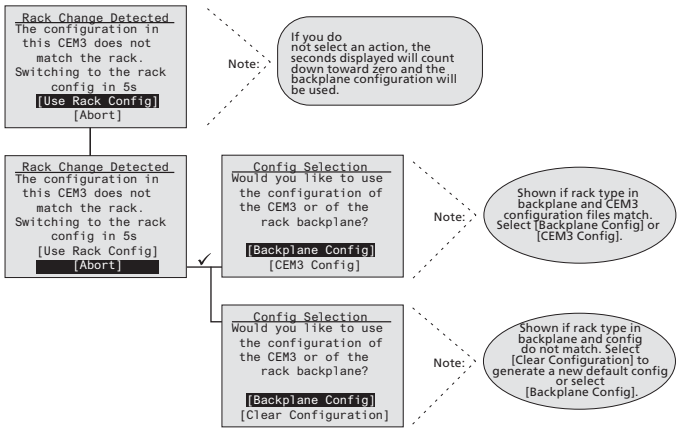
Rack Type Mismatch

This boot screen is shown if the rack type in the CEM3 configuration does not match the rack type detected from the backplane and there is no communication with the backplane processor.



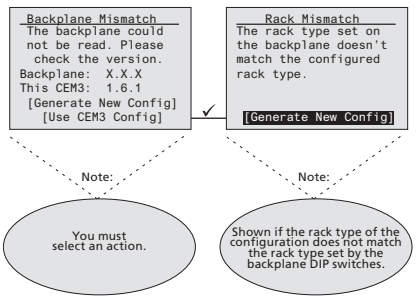
Configuration File Conflict

This boot screen is shown if the CEM3 and the backplane have different configuration files that are both valid for the detected rack type.



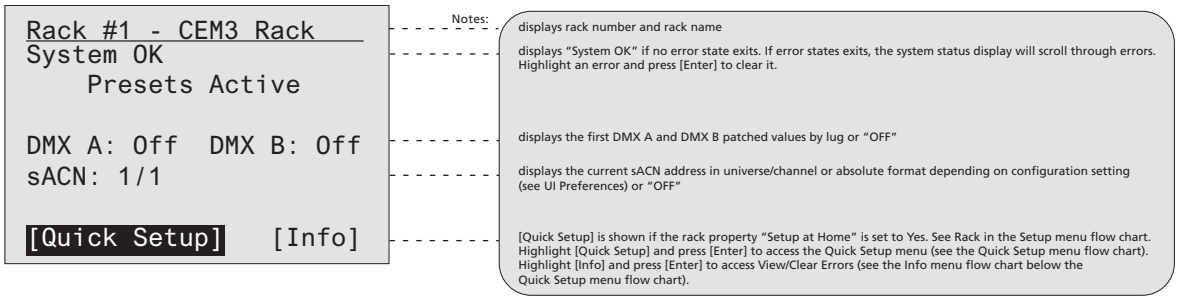
Backplane Mismatch

This boot screen is shown if the version of the binary configuration saved in the backplane does not match the version of the CEM3 and the backplane cannot be read..

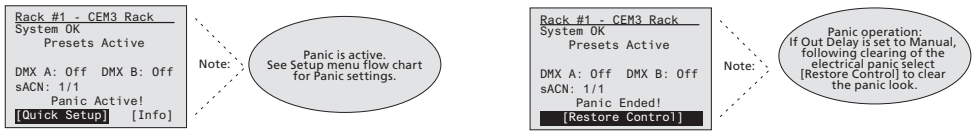


Home Screen

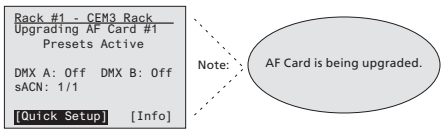
Normal Operation



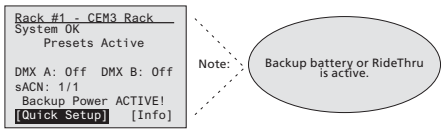
Panic



AF Card Upgrade

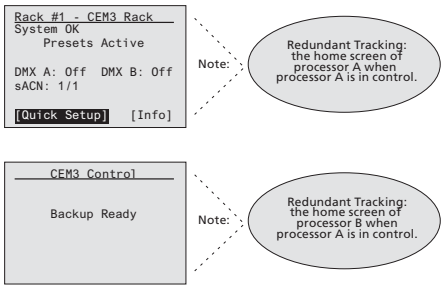


Battery Backup or RideThru Active

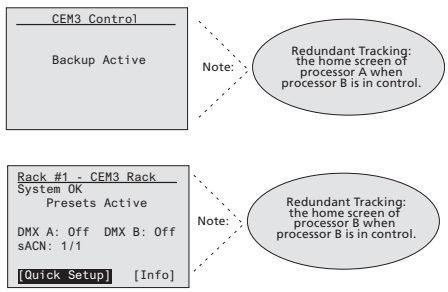


Redundant Tracking

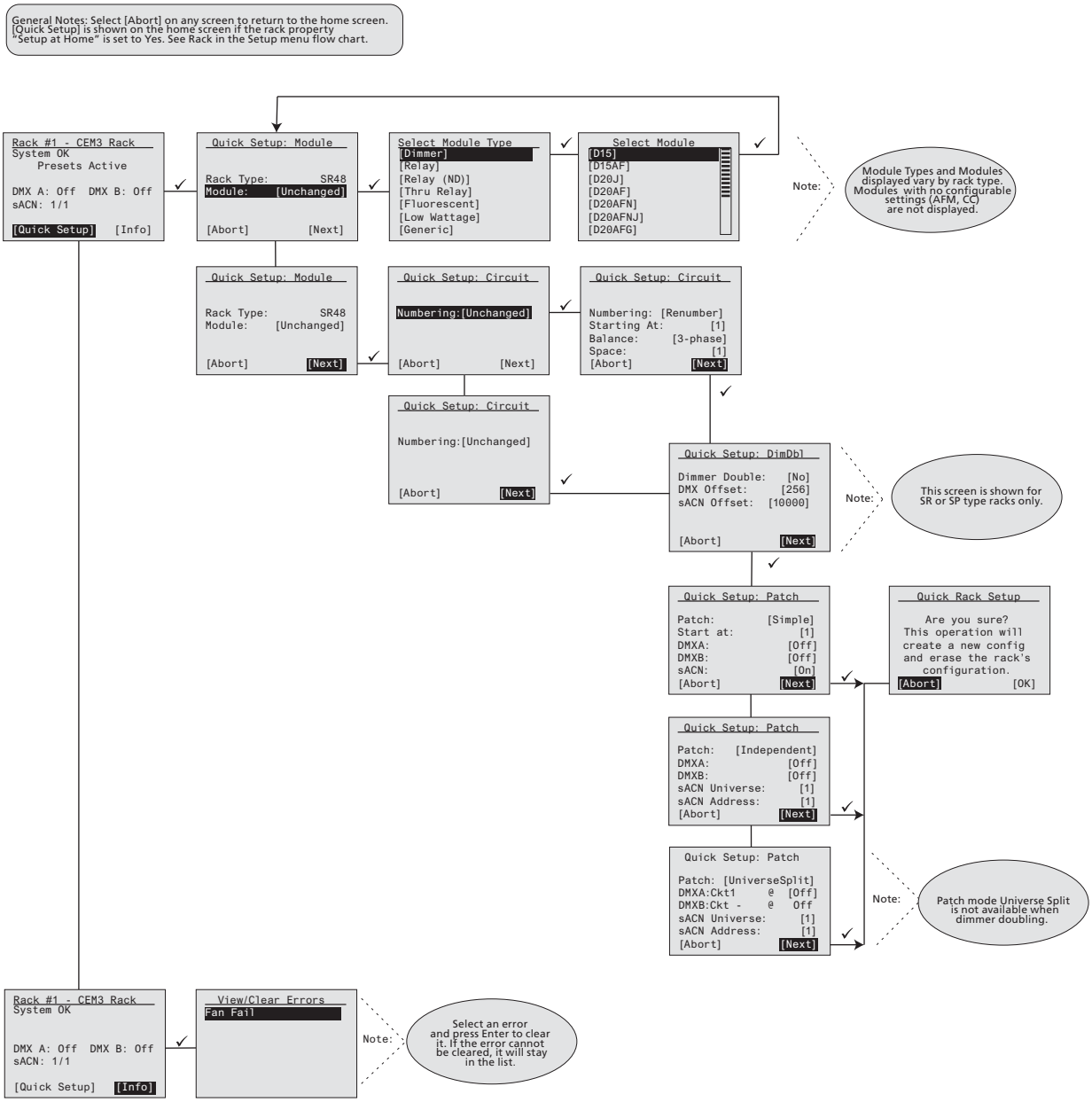
Processor A in Control



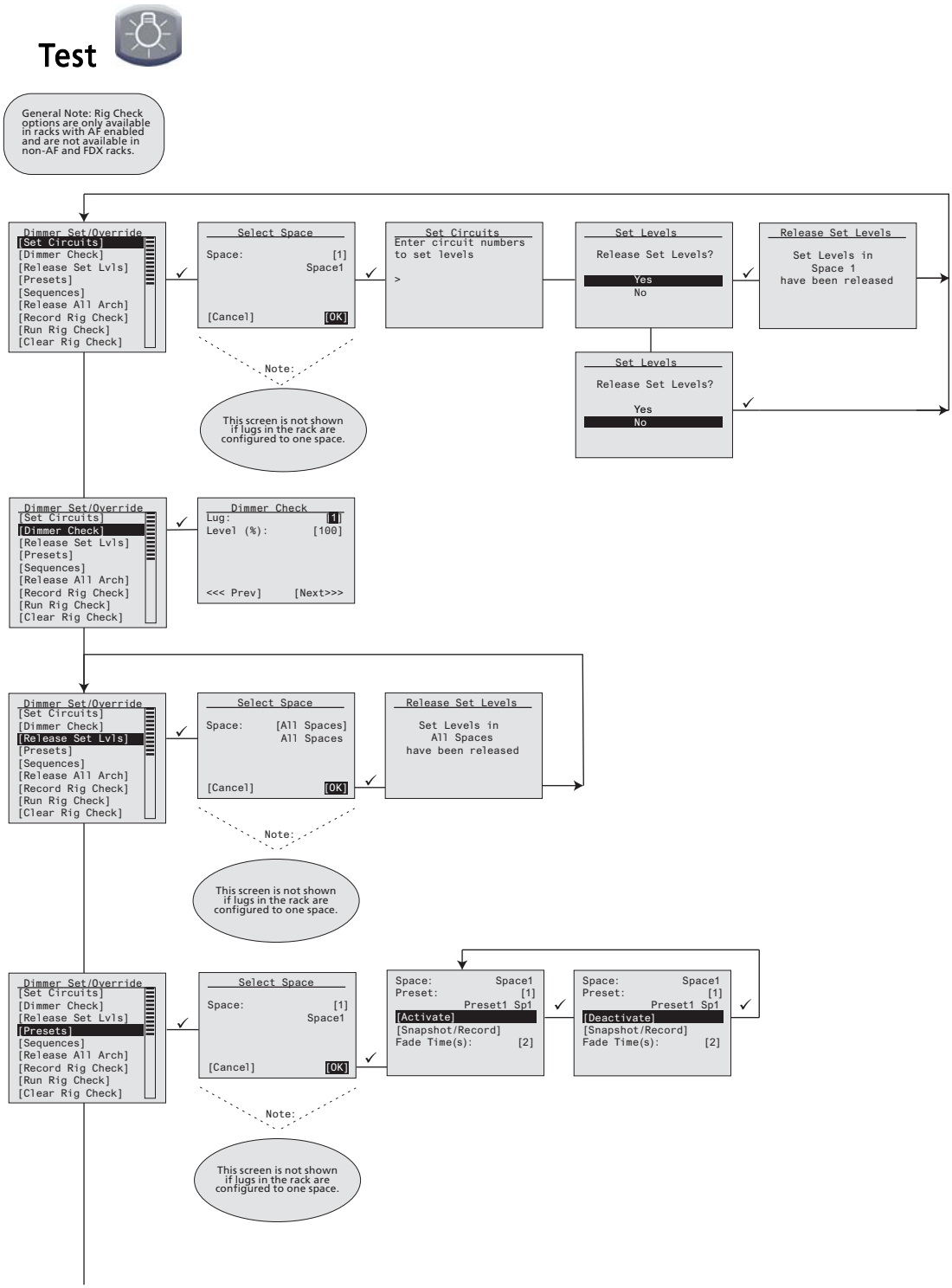
Processor B in Control

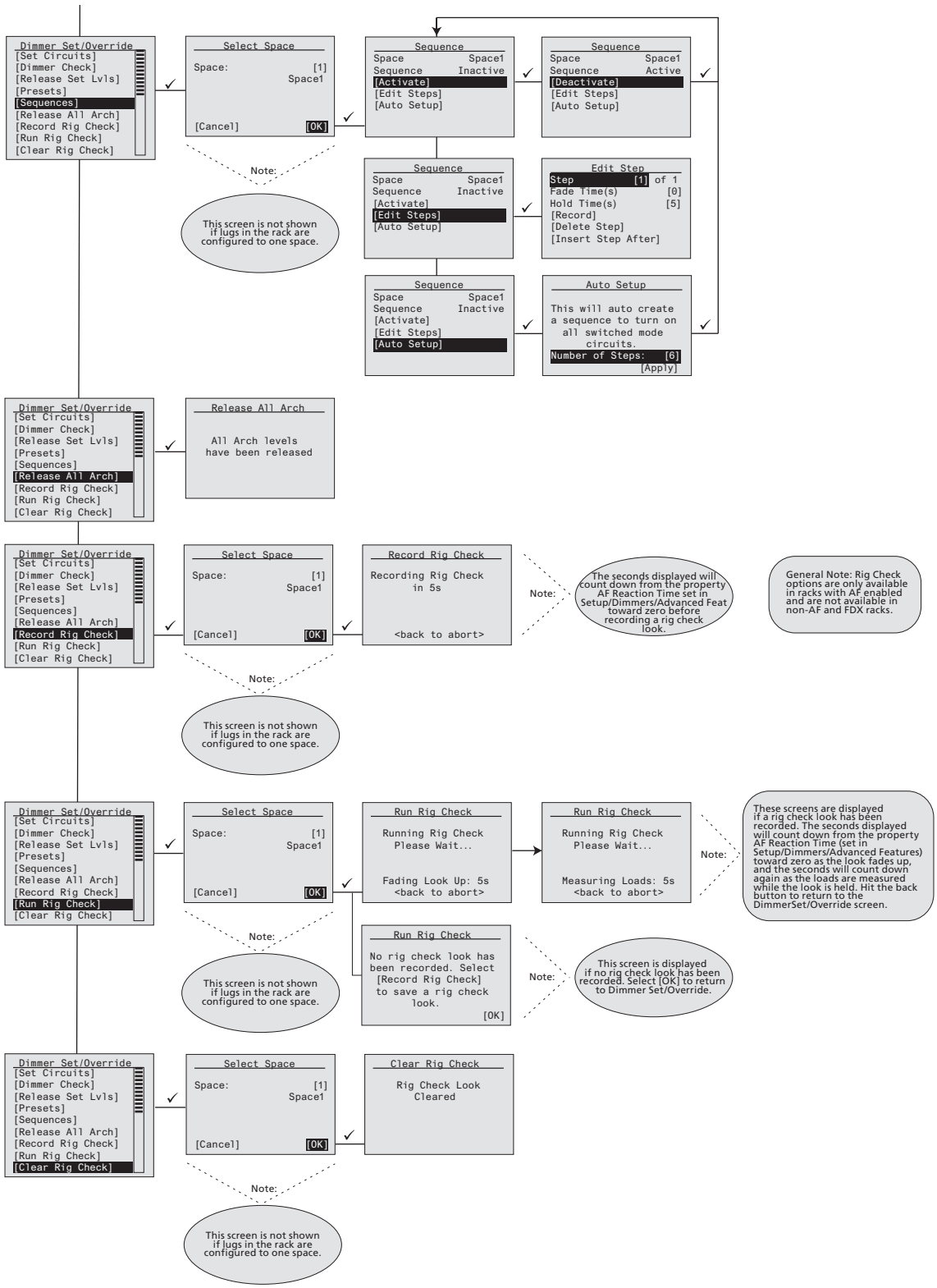


Quick Setup and Info

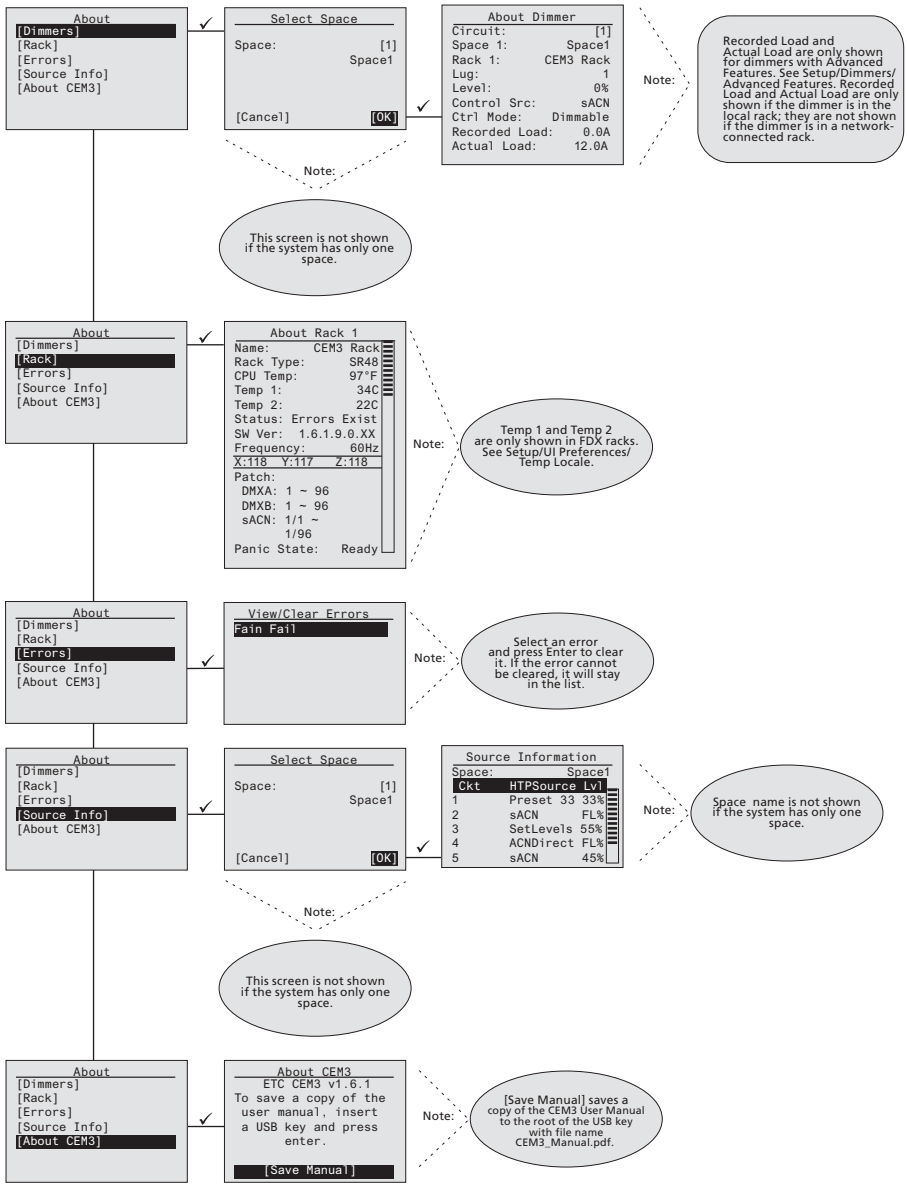


Test

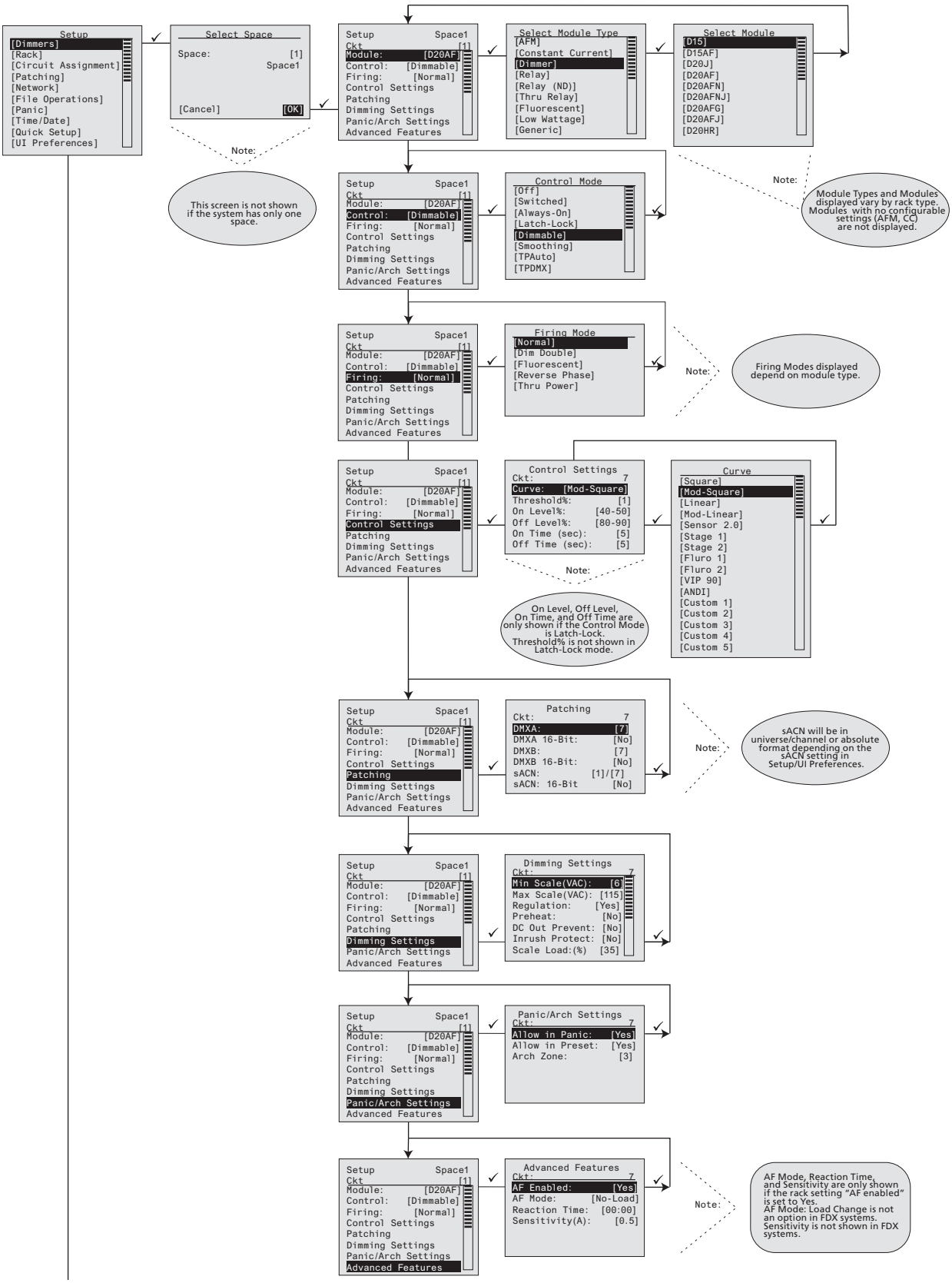

General Note: Rig Check options are only available in racks with AF enabled and are not available in non-AF and FDX racks.
Dimmer Set/Override
[Set Circuits]
[Dimmer Check]
[Release Set Lvls]
[Presets]
[Sequences]
[Release All Arch]
[Record Rig Check]
[Run Rig Check]
[Clear Rig Check]
Select Space
Space: [1]
Space1
[Cancel] [OK]
Note:
This screen is not shown if lugs in the rack are configured to one space.
Set Circuits
Enter circuit numbers to set levels
>
Set Levels
Release Set Levels?
Yes
No
Release Set Levels
Set Levels in Space 1 have been released
Set Levels
Release Set Levels?
Yes
No
Dimmer Check
Lug: [1]
Level (%): [100]
<<< Prev] [Next>>>
Release Set Levels
Set Levels in All Spaces have been released
Space: [All Spaces]
All Spaces
Space: Space1
Preset: [1]
Preset1 Sp1
[Activate]
[Snapshot/Record]
Fade Time(s): [2]
[Deactivate]

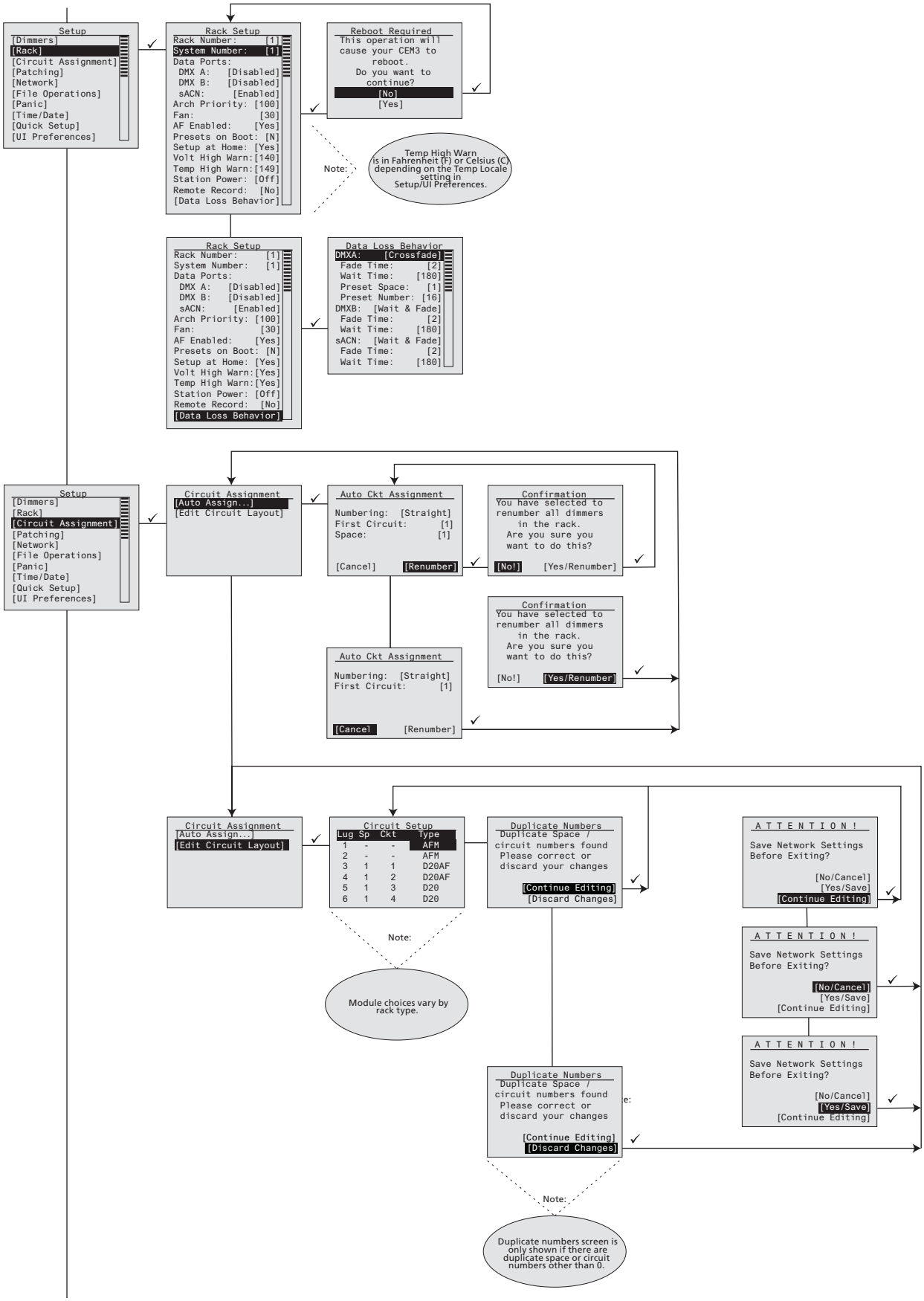

Dimmer Set/Override
[Set Circuits]
[Dimmer Check]
[Release Set Lvls]
[Presets]
[Sequences]
[Release All Arch]
[Record Rig Check]
[Run Rig Check]
[Clear Rig Check]
Select Space
Space: [1]
Space1
[Cancel] [OK]
Note:
This screen is not shown if lugs in the rack are configured to one space.
Sequence
Space Space1
Sequence Inactive
[Activate]
[Edit Steps]
[Auto Setup]
Sequence
Space Space1
Sequence Active
[Deactivate]
[Edit Steps]
[Auto Setup]
Edit Step
Step [1] of 1
Fade Time(s) [0]
Hold Time(s) [5]
[Record]
[Delete Step]
[Insert Step After]
Auto Setup
This will auto create a sequence to turn on all switched mode circuits.
Number of Steps: [6]
[Apply]
Release All Arch
All Arch levels have been released
Record Rig Check
Recording Rig Check in 5s
<back to abort>
The seconds displayed will count down from the property AF Reaction Time set in Setup/Dimmers/Advanced Feat toward zero before recording a rig check look.
General Note: Rig Check options are only available in racks with AF enabled and are not available in non-AF and FDX racks.
Run Rig Check
Running Rig Check Please Wait...
Fading Look Up: 5s
<back to abort>
Measuring Loads: 5s
<back to abort>
These screens are displayed if a rig check look has been recorded. The seconds displayed will count down from the property AF Reaction Time (set in Setup/Dimmers/Advanced Features) toward zero as the look fades up, and the seconds will count down again as the loads are measured while the look is held. Hit the back button to return to the DimmerSet/Override screen.
No rig check look has been recorded. Select [Record Rig Check] to save a rig check look.
[OK]
This screen is displayed if no rig check look has been recorded. Select [OK] to return to Dimmer Set/Override.
Clear Rig Check
Rig Check Look Cleared

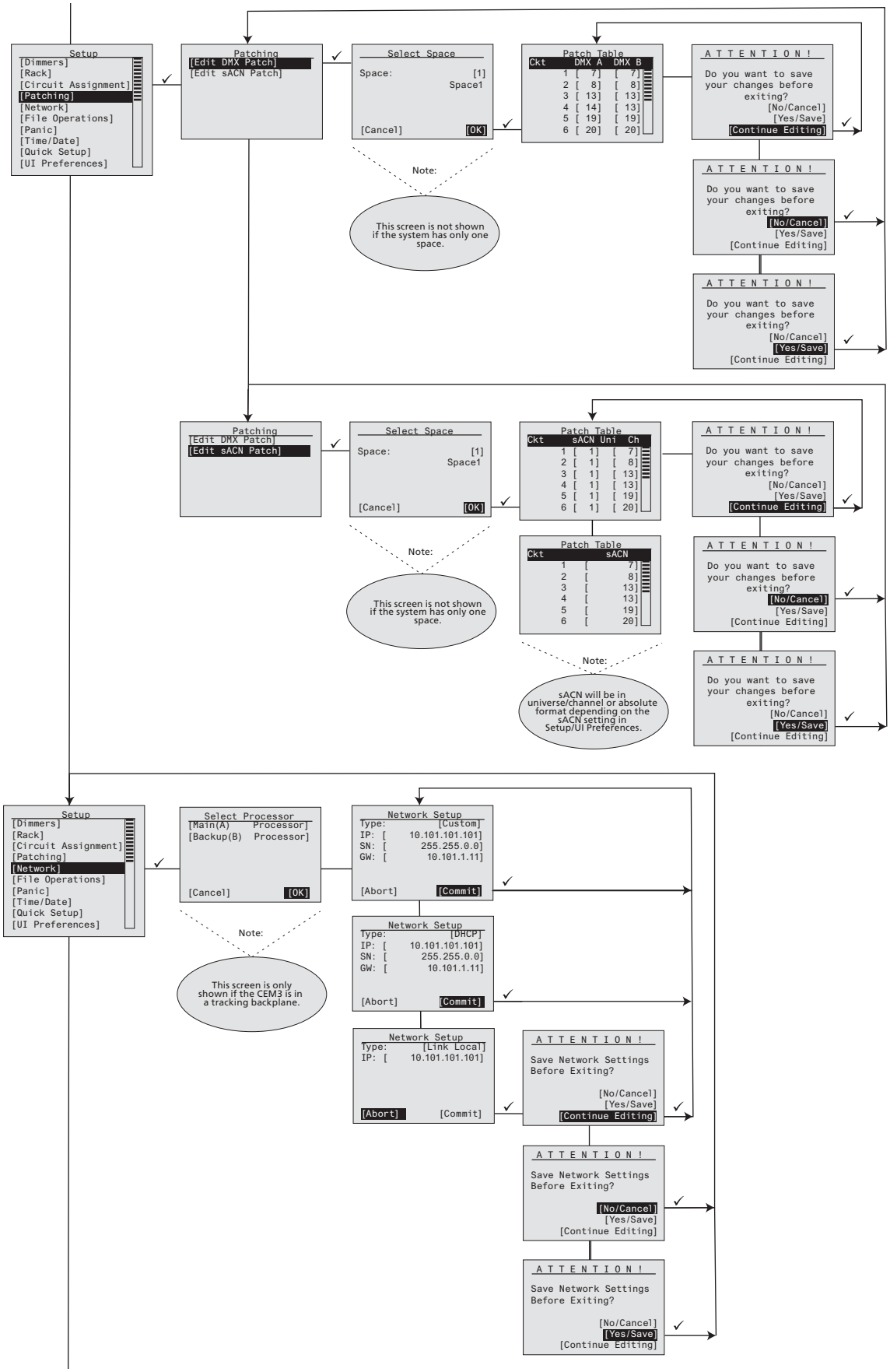
About

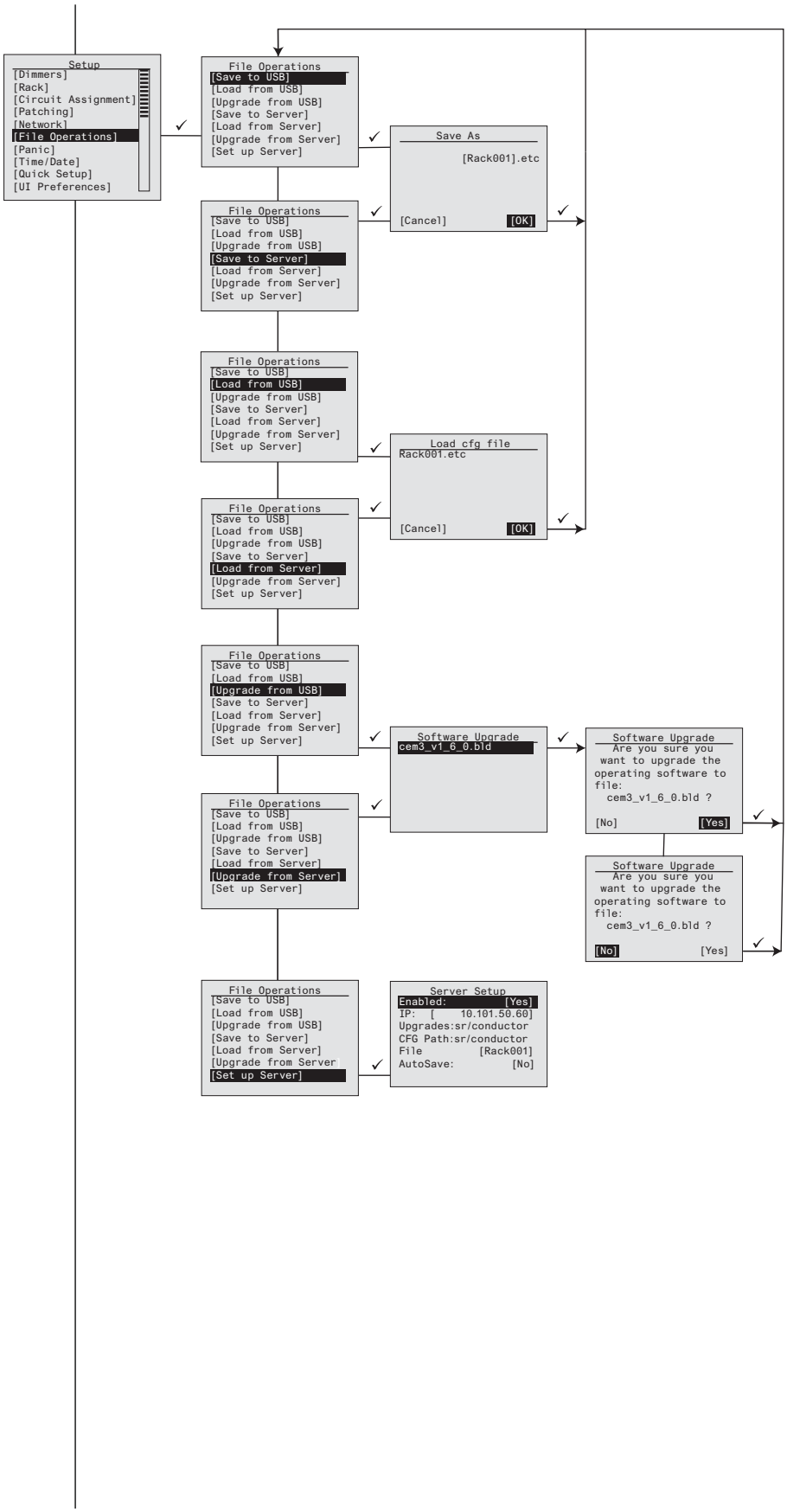

About
[Dimmers]
[Rack]
[Errors]
[Source Info]
[About CEM3]
Select Space
Space: [1]
Space1
[Cancel] [OK]
About Dimmer
Circuit: [1]
Space 1: Space1
Rack 1: CEM3 Rack
Lug: 1
Level: 0%
Control Src: sACN
Ctrl Mode: Dimmable
Recorded Load: 0.0A
Actual Load: 12.0A
Note:
Recorded Load and Actual Load are only shown for dimmers with Advanced Features. See Setup/Dimmers/ Advanced Features. Recorded Load and Actual Load are only shown if the dimmer is in the local rack; they are not shown if the dimmer is in a network-connected rack.
Note:
This screen is not shown if the system has only one space.
About Rack 1
Name: CEM3 Rack
Rack Type: SR48
CPU Temp: 97°F
Temp 1: 34C
Temp 2: 22C
Status: Errors Exist
SW Ver: 1.6.1.9.0.XX
Frequency: 60Hz
X:118 Y:117 Z:118
Patch:
DMXA: 1 ~ 96
DMXB: 1 ~ 96
sACN: 1/1 ~ 1/96
Panic State: Ready
Temp 1 and Temp 2 are only shown in FDX racks. See Setup/UI Preferences/ Temp Locale.
View/Clear Errors
Fain Fail
Select an error and press Enter to clear it. If the error cannot be cleared, it will stay in the list.
Source Information
Space: Space1
Ckt HTPSource Lvl
1 Preset 33 33%
2 sACN FL%
3 SetLevels 55%
4 ACNDirect FL%
5 sACN 45%
Space name is not shown if the system has only one space.
About CEM3
ETC CEM3 v1.6.1
To save a copy of the user manual, insert a USB key and press enter.
[Save Manual]
[Save Manual] saves a copy of the CEM3 User Manual to the root of the USB key with file name CEM3_Manual.pdf.

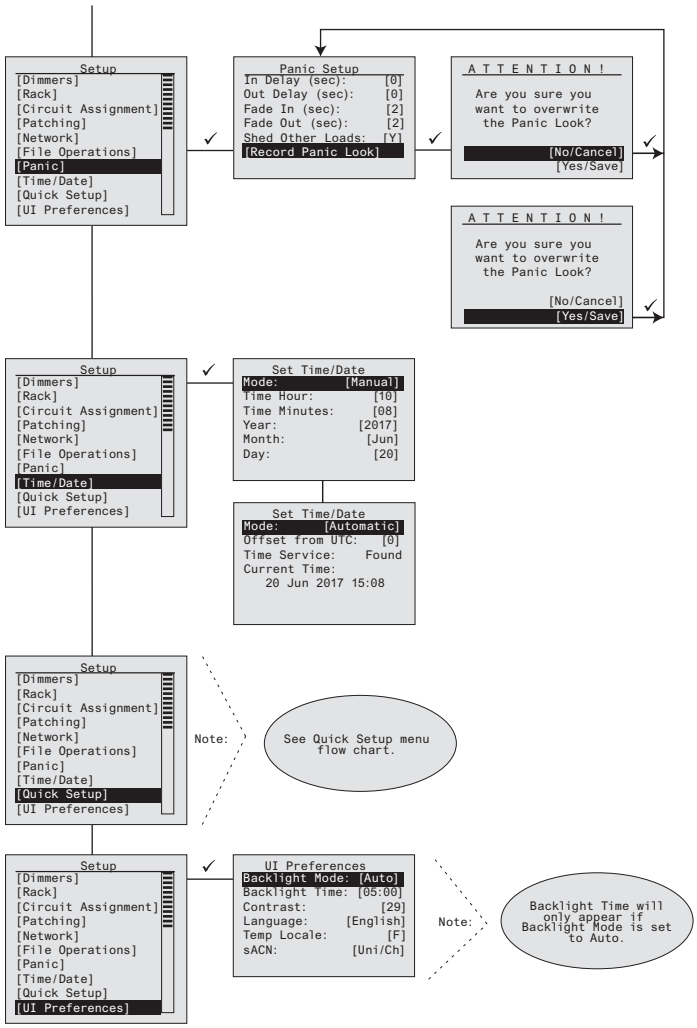
Setup


Setup
[Dimmers]
[Rack]
[Circuit Assignment]
[Patching]
[Network]
[File Operations]
[Panic]
[Time/Date]
[Quick Setup]
[UI Preferences]
Select Space
Space: [1]
Space1
[Cancel] [OK]
Note:
This screen is not shown if the system has only one space.
Setup Space1
Ckt [1]
Module: [D20AF]
Control: [Dimmable]
Firing: [Normal]
Control Settings
Patching
Dimming Settings
Panic/Arch Settings
Advanced Features
Select Module Type
[AFM]
[Constant Current]
[Dimmer]
[Relay]
[Relay (ND)]
[Thru Relay]
[Fluorescent]
[Low Wattage]
[Generic]
Select Module
[D15]
[D15AF]
[D20J]
[D20AF]
[D20AFN]
[D20AFNJ]
[D20AFG]
[D20AFJ]
[D20HR]
Note:
Module Types and Modules displayed vary by rack type. Modules with no configurable settings (AFM, CC) are not displayed.
Control Mode
[Off]
[Switched]
[Always-On]
[Latch-Lock]
[Dimmable]
[Smoothing]
[TPAuto]
[TPDMX]
Firing Mode
[Normal]
[Dim Double]
[Fluorescent]
[Reverse Phase]
[Thru Power]
Note:
Firing Modes displayed depend on module type.
Control Settings
Ckt: 7
Curve: [Mod-Square]
Threshold%: [1]
On Level%: [40-50]
Off Level%: [80-90]
On Time (sec): [5]
Off Time (sec): [5]
Note:
On Level, Off Level, On Time, and Off Time are only shown if the Control Mode is Latch-Lock. Threshold% is not shown in Latch-Lock mode.
Curve
[Square]
[Mod-Square]
[Linear]
[Mod-Linear]
[Sensor 2.0]
[Stage 1]
[Stage 2]
[Fluro 1]
[Fluro 2]
[VIP 90]
[ANDI]
[Custom 1]
[Custom 2]
[Custom 3]
[Custom 4]
[Custom 5]
Patching
Ckt: 7
DMXA: [7]
DMXA 16-Bit: [No]
DMXB: [7]
DMXB 16-Bit: [No]
sACN: [1]/[7]
sACN: 16-Bit [No]
Note:
sACN will be in universe/channel or absolute format depending on the sACN setting in Setup/UI Preferences.
Dimming Settings
Ckt: 7
Min Scale(VAC): [6]
Max Scale(VAC): [115]
Regulation: [Yes]
Preheat: [No]
DC Out Prevent: [No]
Inrush Protect: [No]
Scale Load:(%) [35]
Panic/Arch Settings
Ckt: 7
Allow in Panic: [Yes]
Allow in Preset: [Yes]
Arch Zone: [3]
Advanced Features
Ckt: 7
AF Enabled: [Yes]
AF Mode: [No-Load]
Reaction Time: [00:00]
Sensitivity(A): [0.5]
Note:
AF Mode, Reaction Time, and Sensitivity are only shown if the rack setting "AF enabled" is set to Yes.
AF Mode: Load Change is not an option in FDX systems.
Sensitivity is not shown in FDX systems.


Setup
[Dimmers]
[Rack]
[Circuit Assignment]
[Patching]
[Network]
[File Operations]
[Panic]
[Time/Date]
[Quick Setup]
[UI Preferences]
Rack Setup
Rack Number: [1]
System Number: [1]
Data Ports:
DMX A: [Disabled]
DMX B: [Disabled]
sACN: [Enabled]
Arch Priority: [100]
Fan: [30]
AF Enabled: [Yes]
Presets on Boot: [N]
Setup at Home: [Yes]
Volt High Warn: [140]
Temp High Warn: [149]
Station Power: [Off]
Remote Record: [No]
[Data Loss Behavior]
Reboot Required
This operation will cause your CEM3 to reboot.
Do you want to continue?
[No]
[Yes]
Note:
Temp High Warn is in Fahrenheit (F) or Celsius (C) depending on the Temp Locale setting in Setup/UI Preferences.
Data Loss Behavior
DMXA: [Crossfade]
Fade Time: [2]
Wait Time: [180]
Preset Space: [1]
Preset Number: [16]
DMXB: [Wait & Fade]
Fade Time: [2]
Wait Time: [180]
sACN: [Wait & Fade]
Fade Time: [2]
Wait Time: [180]
Circuit Assignment
[Auto Assign...]
[Edit Circuit Layout]
Auto Ckt Assignment
Numbering: [Straight]
First Circuit: [1]
Space: [1]
[Cancel] [Renumber]
Confirmation
You have selected to renumber all dimmers in the rack.
Are you sure you want to do this?
[No!] [Yes/Renumber]
Circuit Setup
Lug Sp Ckt Type
1 - - AFM
2 - - AFM
3 1 1 D20AF
4 1 2 D20AF
5 1 3 D20
6 1 4 D20
Duplicate Numbers
Duplicate Space / circuit numbers found
Please correct or discard your changes
[Continue Editing]
[Discard Changes]
Module choices vary by rack type.
Duplicate numbers screen is only shown if there are duplicate space or circuit numbers other than 0.
ATTENTION!
Save Network Settings Before Exiting?
[No/Cancel]
[Yes/Save]
[Continue Editing]


Setup
[Dimmers]
[Rack]
[Circuit Assignment]
[Patching]
[Network]
[File Operations]
[Panic]
[Time/Date]
[Quick Setup]
[UI Preferences]
Patching
[Edit DMX Patch]
[Edit sACN Patch]
Select Space
Space: [1]
Space1
[Cancel] [OK]
Note:
This screen is not shown if the system has only one space.
Patch Table
Ckt DMX A DMX B
1 [7] [7]
2 [8] [8]
3 [13] [13]
4 [14] [13]
5 [19] [19]
6 [20] [20]
A T T E N T I O N !
Do you want to save your changes before exiting?
[No/Cancel]
[Yes/Save]
[Continue Editing]
Patching
[Edit DMX Patch]
[Edit sACN Patch]
Select Space
Space: [1]
Space1
[Cancel] [OK]
Note:
This screen is not shown if the system has only one space.
Patch Table
Ckt sACN Uni Ch
1 [1] [7]
2 [1] [8]
3 [1] [13]
4 [1] [13]
5 [1] [19]
6 [1] [20]
Patch Table
Ckt sACN
1 [7]
2 [8]
3 [13]
4 [13]
5 [19]
6 [20]
Note:
sACN will be in universe/channel or absolute format depending on the sACN setting in Setup/UI Preferences.
Setup
[Dimmers]
[Rack]
[Circuit Assignment]
[Patching]
[Network]
[File Operations]
[Panic]
[Time/Date]
[Quick Setup]
[UI Preferences]
Select Processor
[Main(A) Processor]
[Backup(B) Processor]
[Cancel] [OK]
Note:
This screen is only shown if the CEM3 is in a tracking backplane.
Network Setup
Type: [Custom]
IP: [10.101.101.101]
SN: [255.255.0.0]
GW: [10.101.1.11]
[Abort] [Commit]
Network Setup
Type: [DHCP]
IP: [10.101.101.101]
SN: [255.255.0.0]
GW: [10.101.1.11]
[Abort] [Commit]
Network Setup
Type: [Link Local]
IP: [10.101.101.101]
[Abort] [Commit]
A T T E N T I O N !
Save Network Settings Before Exiting?
[No/Cancel]
[Yes/Save]
[Continue Editing]


Setup
[Dimmers]
[Rack]
[Circuit Assignment]
[Patching]
[Network]
[File Operations]
[Panic]
[Time/Date]
[Quick Setup]
[UI Preferences]
File Operations
[Save to USB]
[Load from USB]
[Upgrade from USB]
[Save to Server]
[Load from Server]
[Upgrade from Server]
[Set up Server]
Save As
[Rack001].etc
[Cancel]
[OK]
Load cfg file
Rack001.etc
Software Upgrade
cem3_v1_6_0.bld
Are you sure you want to upgrade the operating software to file:
cem3_v1_6_0.bld ?
[No]
[Yes]
Server Setup
Enabled: [Yes]
IP: [10.101.50.60]
Upgrades:sr/conductor
CFG Path:sr/conductor
File [Rack001]
AutoSave: [No]


Setup
[Dimmers]
[Rack]
[Circuit Assignment]
[Patching]
[Network]
[File Operations]
[Panic]
[Time/Date]
[Quick Setup]
[UI Preferences]
Panic Setup
In Delay (sec): [0]
Out Delay (sec): [0]
Fade In (sec): [2]
Fade Out (sec): [2]
Shed Other Loads: [Y]
[Record Panic Look]
A T T E N T I O N !
Are you sure you want to overwrite the Panic Look?
[No/Cancel]
[Yes/Save]
A T T E N T I O N !
Are you sure you want to overwrite the Panic Look?
[No/Cancel]
[Yes/Save]
Setup
[Dimmers]
[Rack]
[Circuit Assignment]
[Patching]
[Network]
[File Operations]
[Panic]
[Time/Date]
[Quick Setup]
[UI Preferences]
Set Time/Date
Mode: [Manual]
Time Hour: [10]
Time Minutes: [08]
Year: [2017]
Month: [Jun]
Day: [20]
Set Time/Date
Mode: [Automatic]
Offset from UTC: [0]
Time Service: Found
Current Time:
20 Jun 2017 15:08
Setup
[Dimmers]
[Rack]
[Circuit Assignment]
[Patching]
[Network]
[File Operations]
[Panic]
[Time/Date]
[Quick Setup]
[UI Preferences]
Note:
See Quick Setup menu flow chart.
Setup
[Dimmers]
[Rack]
[Circuit Assignment]
[Patching]
[Network]
[File Operations]
[Panic]
[Time/Date]
[Quick Setup]
[UI Preferences]
UI Preferences
Backlight Mode: [Auto]
Backlight Time: [05:00]
Contrast: [29]
Language: [English]
Temp Locale: [F]
sACN: [Uni/Ch]
Note:
Backlight Time will only appear if Backlight Mode is set to Auto.

Appendix B

Error Messages

The table below lists all of the possible error/status messages that may be listed on the CEM3 display followed by the probable cause and any possible corrective action to remedy the error.

If you have any problems resolving errors, or do not feel comfortable performing the corrective action, contact ETC Technical Services (see *Help from ETC Technical Services* on *page 2*).

WARNING: To avoid the possibility of electric shock, power must be turned OFF before removing dimmer or control modules. Prior to any action that involves removing any module, de-energize main feed to dimmer rack and follow appropriate Lockout/Tagout procedures as described in NFPA Standard 70E. It is important to note that electrical equipment such as dimmer racks can present an arc flash safety hazard if improperly serviced. This is due to available large short circuit currents on the feeders of the equipment. Any work on energized equipment must comply with OSHA Electrical Safe Working Practices.

Phase voltages inside the rack can be deadly, therefore only qualified technicians should be allowed to remove modules and expose the inside of the dimmer rack.

Message	Cause	Possible Corrective Action
CPU Temp High	The temperature detected at the CEM3 has exceeded the limit set under the Temp High Warn option in [Setup]>Rack	Decrease ambient temperature, or adjust temperature warning level. Ensure that fan is functioning properly.
DMX Error Port A	The DMX signal on port A is corrupt or invalid	Check DMX wiring and termination
DMX Error Port B	The DMX signal on port B is corrupt or invalid	Check DMX wiring and termination
No DMX Port A	No DMX signal is detected on port A	Check DMX wiring, termination or transceiver chip
No DMX Port B	No DMX signal is detected on port B	Check DMX wiring, termination or transceiver chip
Frequency Error	The power frequency is out the supported range of 47–63Hz	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase A Off	No power is detected on Phase A	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase B Off	No power is detected on Phase B	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase C Off	No power is detected on Phase C	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase A Volts High	The power on phase A is above the volts high warning level (in [Setup]>Rack)	Check the incoming power supply to the rack. Contact a qualified electrician.

Message	Cause	Possible Corrective Action
Phase B Volts High	The power on phase B is above the volts high warning level (in [Setup]>Rack)	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase C Volts High	The power on phase C is above the volts high warning level (in [Setup]>Rack)	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase A Volts Low	The voltage on phase A is below the minimum required value for the CEM3	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase B Volts Low	The voltage on phase B is below the minimum required value for the CEM3	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase C Volts Low	The voltage on phase C is below the minimum required value for the CEM3	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase A Overvolts	The voltage on phase A is above the maximum value for the CEM3	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase B Overvolts	The voltage on phase B is above the maximum value for the CEM3	Check the incoming power supply to the rack. Contact a qualified electrician.
Phase C Overvolts	The voltage on phase C is above the maximum value for the CEM3	Check the incoming power supply to the rack. Contact a qualified electrician.
Rack Memory Error	The CEM3 is unable to communicate with the memory chip on the backplane	Check the CEM3 is seated correctly; Replace backplane
Rack Detect Error	The CEM3 is unable to detect the rack type from the DIP switches on the backplane	Check the CEM3 is seated correctly; Replace the backplane
Fan Fail	The CEM3 detects that the rack fan is drawing current outside the expected value	Check the rack fan and fan fuse.
Config Rejected	A config was loaded that contained invalid data or values	Regenerate configuration; contact ETC Technical Services
AF Card Error 1	The CEM3 is unable to communicate with AF card 1	Check the AF cards and CEM3 are seated correctly; Check rack hardware for damage. Check DIP switch settings.
AF Card Error 2	The CEM3 is unable to communicate with AF card 2	Check the AF cards and CEM3 are seated correctly; Check rack hardware for damage. Check DIP switch settings.
AF Card Error 3	The CEM3 is unable to communicate with AF card 3	Check the AF cards and CEM3 are seated correctly; Check rack hardware for damage. Check DIP switch settings.
AF Card Error 4	The CEM3 is unable to communicate with AF card 4	Check the AF cards and CEM3 are seated correctly; Check rack hardware for damage. Check DIP switch settings.
AF Card 1 Loading	AF card 1 is loading software	Wait until software load has completed
AF Card 2 Loading	AF card 2 is loading software	Wait until software load has completed
AF Card 3 Loading	AF card 3 is loading software	Wait until software load has completed
AF Card 4 Loading	AF card 4 is loading software	Wait until software load has completed

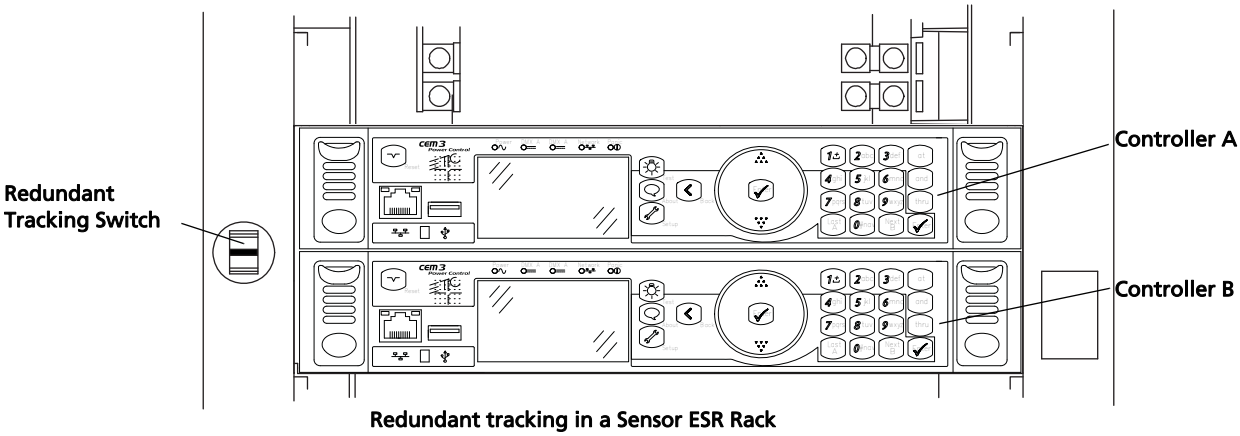
Message	Cause	Possible Corrective Action
AF Dim Removed <Dimmer Nr>	AF detects that a dimmer has been removed	Reinsert dimmer; check dimmer module
AF Bkr Trip <Dimmer Nr>	AF detects that a dimmer circuit breaker has tripped	Reset circuit breaker; check dimmer module
AF RCD Trip <Dimmer Nr>	AF detects that a dimmer circuit with RCD has tripped due to earth leakage	Reset circuit breaker; check dimmer module and load
AF Load High <Dimmer Nr>	AF detects that the current load on a circuit is higher than the recorded load	Check load/lamps
AF Load Low <Dimmer Nr>	AF detects that the current load on a circuit is lower than the recorded load	Check load/lamps
AF No Load <Dimmer Nr>	AF detects that there is no load on a circuit	Check load/lamps
Dim Overtemp <Dimmer Nr>	An overtemperature condition has been detected on a dimmer module	Clear the error from the home screen and see if it returns. Check rack cooling fan is running and that room is in recommended temperature range. If normal temp, replace module.

Appendix C

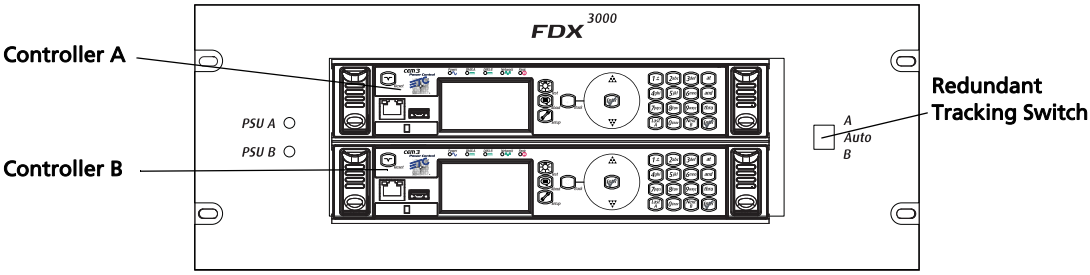
Redundant Tracking Systems

CEM3 features the ability to support dual redundant controllers in ESR24, ESR36 and ESR48 rack types, as well as in the FDX3000 rack.

Redundant controllers provide extra security in the event of system failure, allowing a secondary processor to immediately take control of the rack.



Redundant tracking in a Sensor ESR Rack



Redundant tracking in an FDX3000 Rack

Redundant Tracking Switch

The redundant tracking switch determines which controller runs the output to the dimmers. It has three positions.

- When the switch is set to A (upper position), the upper controller has control of the dimmers.
- When the switch is set to B (lower position), the lower controller has control of the dimmers.
- When the switch is set to Auto (center position), control is automatically allocated based on the health of the system (see below for details).

Automatic Control

Typically, in a redundant tracking system, the switch should be left in the auto position. When the switch is set to auto, the A processor will have control by default. Control will switch to B when any of the following events occur.

Loss of network

If network connectivity is lost to one processor but not the other, control will switch to the one which still has network connectivity.

Loss of DMX

If DMX is lost by one processor but not the other, control will switch to the one still able to receive DMX (note that the DMX data line is interconnected between both, so this would only occur in the event of the failure of a DMX transceiver on the processor itself).

Power errors

If one processor experiences power errors but the other does not, control will switch to the one that does not. Again, note that the same power is connected to both processors so this would only occur in the event of an internal failure in the processor.

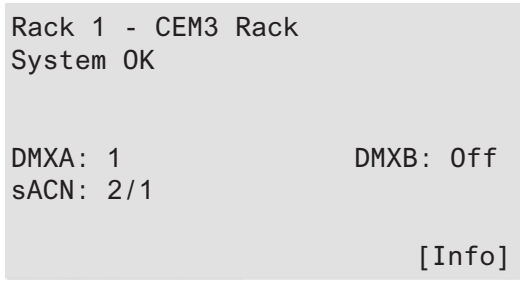
Total processor loss

If communication is completely lost to one processor but not the other, then control will switch to the processor which is still available.

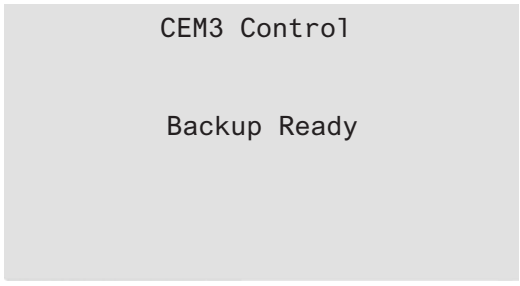
Display Status

When tracking is active and the A processor is in control, the displays will show as follows:

Processor A

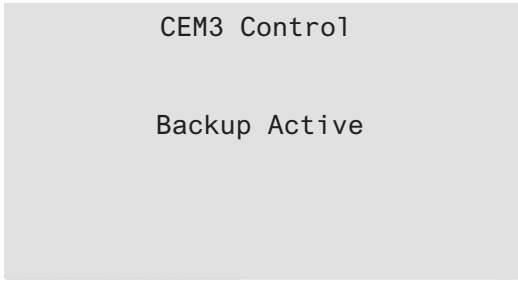


Processor B

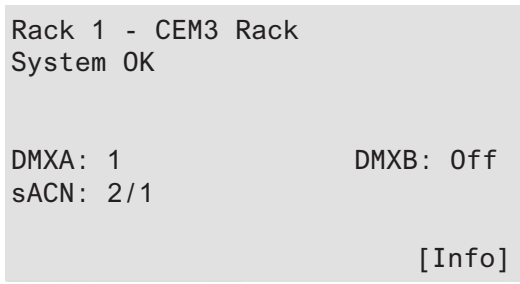


When control switches to the B processor (either by automatic failover or manual control using the switch), the displays change to the following:

Processor A



Processor B



The switchover from A to B for dimming happens instantaneously, so that control of lights is not lost. However, the switchover of the user interface has built in hysteresis to eliminate bounce in certain circumstances (for example, when DMX is lost, both processors may not see and account for the DMX loss at exactly the same time). For this reason it may sometimes appear to take a long time for the user interface of the backup unit to start up; however, bear in mind that despite this apparent delay, dimming control always transfers near-instantaneously.

Configuration Management in Redundant Tracking Systems

In a tracking CEM3 system, the two processors automatically communicate and synchronize their configurations though the backplane. No external Ethernet network is needed for the two processors to synchronize data.

Once you make a configuration change on one processor, that change is automatically transferred to the second processor.

When the system boots up, it is assumed that the A processor has the most recent configuration, so the configuration will be automatically transferred from A to B if B has a different configuration.

Firmware Upgrades in Redundant Tracking Systems

When you upgrade firmware in a redundant system (either via the network or using a USB key), the firmware upgrade is automatically transferred to both processors. Once the firmware is transferred the upgrade will occur on both processors simultaneously. Therefore it is not necessary to update both processors independently in a rack.

Appendix D

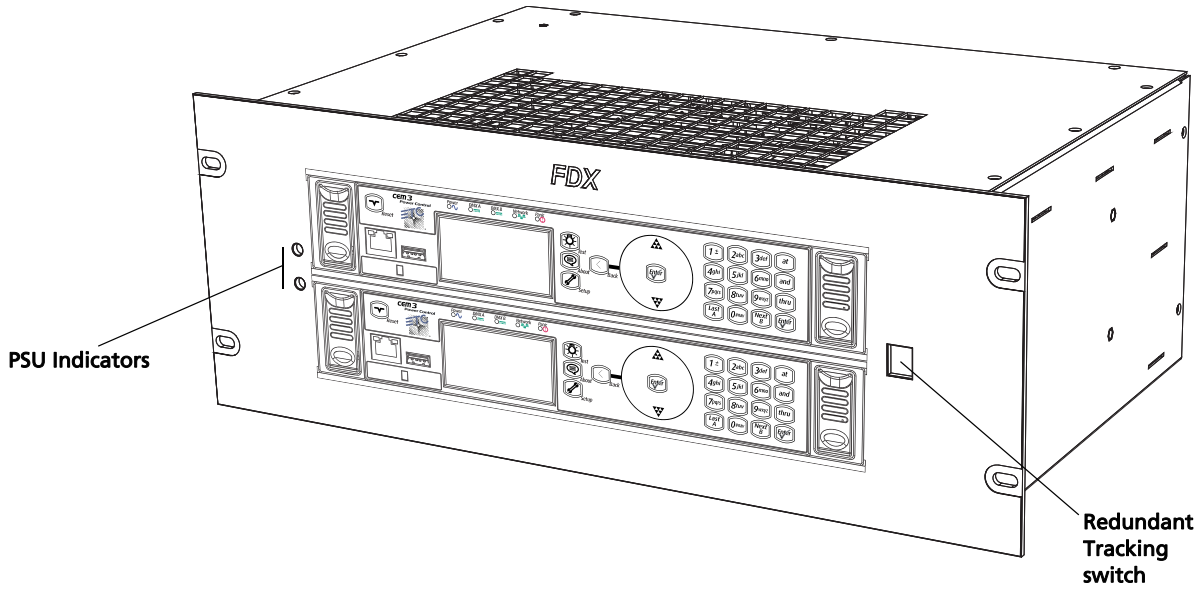
FDX 3000 Dimmer Racks

CEM3 may be used as a control module in the ETC FDX3000 dimming system, providing networking facilities, dual redundant control modules, and precision 16-bit dimming. This appendix provides information needed to work with CEM3 in an FDX3000 system, as well as outlining the hardware of your FDX3000 rack.

Hardware

Front Panel

The FDX3000 carrier contains two CEM3 modules in a dual redundant configuration.



PSU Indicators

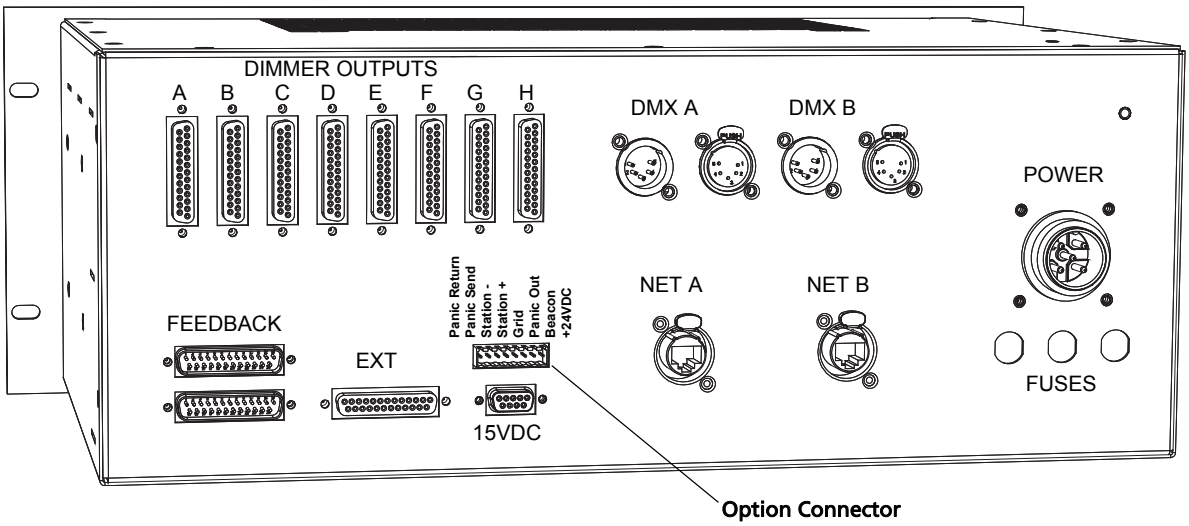
The PSU indicators show the status of the two internal power supplies that supply the 15 VDC required by FDX dimmer modules.

The two indicators should be lit at all times. If either is not lit, this could indicate a failure of the internal power supply. If you see this condition, contact ETC Technical Services (see *page 2*).

Redundant Tracking Switch

The redundant tracking switch allows you to test the ability to switch from the upper (A) processor to the lower (B) processor. If it is set to the (A) or (B) position, the A or B processor will preferentially have control. In normal operation, the switch should be set to the center Auto position. This will ensure that A has control unless communication is lost to A, or certain hardware failures occur on A but not B (for example if A does not see DMX but B does).

Rear Panel



Dimmer Outputs

The dimmer outputs connect from the FDX3000 processor to the dimmer module trays. They should generally be preconfigured from the factory. They are grouped in blocks of 12 dimmers, from A (1–12) through H (85–96).

Feedback

The feedback connections allow the FDX3000 to determine the status of voltage and current for modules that support sensing. The two feedback connections should be made from the factory.

15 VDC

The 15 VDC connection provides 15 V power to the FDX dimmer modules.

Option Connector

The option connector allows field connection of the rack options such as panic (see *page 30*), stations (see *page 10*), and a remote beacon. For information on these connections, see the termination markings on the rear of the FDX3000 carrier.

DMX Connections

The FDX3000 processor features DMX In and Thru connections on two industry-standard 5-pin XLR connectors. The two DMX ports, A and B, are fed to both of the redundant processors.

Ethernet Connections

Two Ethernet connections are provided using Neutrik® etherCON® connectors, which may be either connected to a Neutrik etherCON jack or a standard RJ45 connector. Net A connects to the A (upper) CEM3, and Net B connects to the lower. The CEM3s feature an internal switch allowing use of the rear and front panel Ethernet connections at the same time.

Power Input

The power input connector is a three phase supply, fed from the supply in the rack. The FDX3000 processor will function regardless of any phase loss; as long as at least one phase is still active the processor will still dim any dimmers which still have power.

Fuses

The power input has three panel-mount fuse holders to protect against internal failure. The fuses should only be replaced with the same type (2.5 A, 20 mm).

Regulatory Information

The FDX3000 rack is certified to the following CE standards:

- Safety: EN61439-1 (Low voltage Switchgear and Controlgear assemblies)
- Electromagnetic Immunity: EN61547 (EMC Immunity for Lighting Systems)

Initial Setup

Module Count

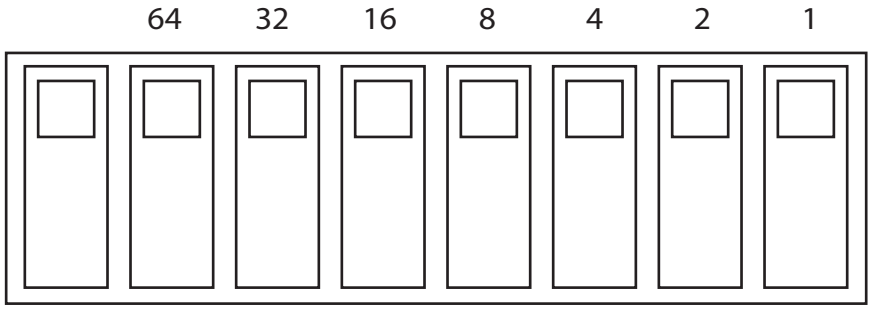
The FDX3000 controller supports between 1 and 96 dimmers. The number of dimmers is configured using DIP switches on the backplane of the controller.

To configure or alter the number of modules configured in your FDX system:

1: Turn off power to the rack.

2: Remove the two CEM3 modules from the FDX3000 carrier.

3: Set the DIP switches in binary to the number of modules in your rack. The DIP switches are counted from left to right as follows:



For example, to set up the rack for 96 modules, set DIP switches 32 and 64 to ON.

4: Reinstall the CEM3 modules.

5: Power up the rack.

Module Types

The following module types are supported in FDX:

- Blank : Used where a blank plate is fitted; gives no control and no feedback
- NoV-NoI : A dimmer module with no current or voltage feedback
- V-NoI : A dimmer module with voltage feedback but no current feedback
- NoV-I : A dimmer module with current feedback but no voltage feedback
- V-I : A dimmer module with voltage and current feedback

Advanced Features in FDX

FDX3000 supports all module types available in the FDX series of racks, including the DP90 and DP90S series of modules.

Advanced Features in an FDX rack allow modules that provide Voltage or Current feedback data to be monitored and to report errors both at the local UI and at ETC console products and feedback software.

Feedback Modes and Module Types

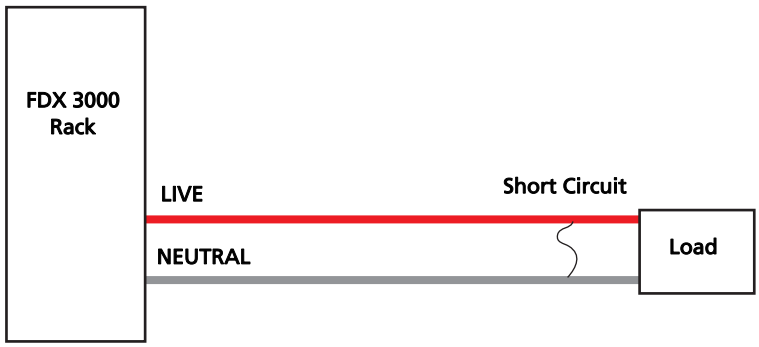
FDX modules may be set to one of the following module types:

Module Type	Purpose	Error Messages
NoV-NoI	Module provides no monitoring	No AF Error messages will be produced
NoV-I	Module monitors current, not voltage	No Load messages will be produced if the channel is turned
V-NoI	Module monitors voltage, not current	Breaker Trip messages will be produced if the channel is turned on with the breaker turned off.
V-I	Module monitors both voltage and current	Both Breaker Trip and No Load messages may be produced and the roasting short protecting feature will be enabled.

To configure the module type see *Menu Structure* on *page 10*.

Roasting Short Protection

FDX3000 features a unique method for providing additional safety in the event of a roasting short. A roasting short can occur when a dimmer is at a low level and driven into a short circuit load with a long cable.



Because the dimmer is at a low level, the roasting short does not draw enough current to trip the circuit breaker. However, a roasting short is still a dangerous condition as currents can flow at a high enough amperage to cause heat or, in extreme circumstances, fire.

The FDX3000 rack has the capability to detect this condition. When a roasting short is detected by a module set to V/I mode, the dimmer is automatically driven to full, allowing the high current of the short circuit to trip the circuit breaker.

This utility is automatically enabled on any modules set to V/I mode.

FDX2000 vs. FDX3000 Dimmer Curve Comparison

Curves in FDX3000 reference *voltage* rather than *power*. Therefore the following table will help to show the correlation between FDX2000 curve names and FDX3000 curve names.

FDX2000 Curve English / German	FDX3000 Curve English	Comment
1 = Linear (default)	Square	Proportional to RMS power output (FDX2000 Linear)
2 = Stage1	Stage 1	Built to match an old Siemens curve
3 = Stage2	Stage 2	Built to match an old Siemens curve
4 = Log	Linear	Proportional to RMS voltage output
5 = Fluor1	Fluor 1	
6 = Fluor2	Fluor 2	
7 = Pow/2	n.a.	Obsolete
8 = 10%	n.a.	Obsolete
9 = VIP90	VIP	
10 = ANDI	ANDI	
n.a	Mod-Square (Default)	
n.a	Mod-Linear	
n.a	Sensor 2.0	Older mod square law

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