

AXESS ELITE

Hardware Installation Guide



SX-AX15E

SX-AX20E

Web-Enabled Power Conditioning and Energy Management System

FIRMWARE VERSION: 1.02.222

Table of Contents

I.	<u>INTRODUCTION</u>	<u>4</u>
II.	<u>INITIAL SET-UP</u>	<u>6</u>
	COMMAND LINE INTERFACE (CLI)	7
	SETTING THE IP ADDRESS	7
III.	<u>INSTALLATION</u>	<u>9</u>
	120 VOLT CONNECTIONS	9
	ETHERNET CONNECTION	9
	RS232 (SERIAL) PORT CONNECTION	9
	TEMPERATURE SENSOR	9
	CONTACT CLOSURE INPUT	9
	AUXILIARY RELAY OUTPUTS	9
IV.	<u>LED INDICATORS</u>	<u>10</u>
V.	<u>WEB SERVER</u>	<u>11</u>
	LOGIN	11
	DEVICE VIEW	11
	GLOBAL VIEW	12
	SETUP	13
	DEVICE SETUP	14
	NETWORK SETUP	15
	NETWORK REPORTING SETUP	16
	USERS SETUP	17
	TRIGGERS SETUP	18
	USER DEFINED TRIGGERS	19
	SEQUENCES SETUP	20
	LINKS SETUP	21
VI.	<u>COMMAND LINE INTERFACE (CLI) PROTOCOL</u>	<u>22</u>
	PROMPTS	22
	SYNTAX	22
	RESPONSES	22
	CLI DOCUMENTATION NOTATION	22
	DEVICE COMMANDS	23
	NETWORK COMMANDS	24
	CALIBRATION COMMANDS	24
VII.	<u>EMAIL NOTIFICATION</u>	<u>25</u>
VIII.	<u>SNMP</u>	<u>25</u>

Table of Contents

- IX. SDXP PROTOCOL **26****

 - OVERVIEW 26
 - HELLO HANDSHAKE 26
 - SDXP PACKET 27
 - TYPES 28
 - DESCRIPTORS 29
 - PAYLOADS 31

- X. FIRMWARE UPGRADES **34****
- XI. SYSLOG **34****
- XII. REAR PANEL RESET BUTTON **34****
- XIII. SPECIFICATIONS **35****

I. Introduction

The SurgeX[®] Axess Elite is a single rack-space, 120V, 15 (20) amp, AC power conditioner that can be controlled over a network or the internet, through a direct serial connection, or through a contact closure input. The simple web server structure allows basic control of the outlets and viewing of status information all from the home page. The extensive programming and setup capabilities are accessed in seven other pages or through a Command Line Interface (CLI).

The Axess Elite incorporates SurgeX Advanced Series Mode[®] power conditioning and surge elimination, SurgeX Impedance Tolerant[®] EMI/RFI filtering, and SurgeX ICE[®] Inrush Current Elimination circuitry (on receptacles 1 and 2). SurgeX ICE eliminates problems associated with inrush currents from large loads such as amplifiers. With SurgeX ICE, it is not necessary to take inrush currents into account when designing the AC power for a system. Special time-delay circuit breakers are not required – it is necessary only to ensure that the average currents of all products plugged into the Axess Elite are within the 15 (20) Amp product rating.

Telnet and serial access use the same Command Line Interface (CLI) structure and syntax to configure, monitor, and control the Axess Elite. The Axess Elite may also be monitored and controlled via SNMP and/or the SDxP API, and may be configured to report to a Syslog server. The internal web server may be secured with Secure Sockets Layer (SSL) encryption.

Two Auxiliary Relay outputs are provided for simple control of other equipment. Connection terminals are provided for each relay's Common, Normally Open, and Normally Closed connections.

Up to 16 Axess Elites can be linked together and controlled from a single web interface. One master Axess Elite provides the communication to the users and receives status information from the rest of the Axess Elites in the cluster. Up to 128 outlets can be controlled in this manner from one IP address.

Up to 16 users can be assigned administrator or user only rights, plus access to specific outlets.

The extensive programming capabilities of the Axess Elite allow sequencing and scheduling to be set up. User Triggers can be programmed to activate on an “if X then do Y then do Z when no longer X” basis. Triggers include: AC line voltage, total unit current draw, individual receptacle current draw, temperature, Net Test, and Contact Closure Input. Actions include: turning receptacles on and off, cycling a receptacle, executing previously-defined sequences, and sending emails. For example, an action can be created to send an email if the rack temperature exceeds 95°F.

The eight rear-mounted receptacles can each be individually controlled, and the current, power, and energy consumption of each receptacle can be obtained through the web page interface and CLI. The metering includes the AC line voltage and current draw, and all measurements (voltage, current and power) are true RMS readings. Thus, the current draw and energy consumption of non-linear electronic loads which have a power factor of less than unity will be correctly reported.

I. Introduction (continued)

Located on the rear panel are the input power cord, circuit breaker (15A or 20A), 8 NEMA 5-15 AC outlets, Serial connection (DCE, 9 pin D-subminiature), Network connection (RJ-45), Temperature Sensor input, Contact Closure input, Auxiliary Relay A/B output connections, and recessed Reset button.

Temperature Sensor		Contact Closure		Auxiliary Relay A			Auxiliary Relay B		
Red	Black	CC1	CC2	NO	COM	NC	NO	COM	NC

The thirteen front panel LEDs provide indications for eight AC outlet On/Off status (green), two Auxiliary Relay Latched/Unlatched status (green), surge protection status (green), Shutdown status (amber), and AC mains power (red).

1	2	3	4	5	6	7	8		A	B		Self-Test		Shutdown		Mains

II. Initial Set-Up

The following tools will be required:

1. A computer with a web browser (Internet Explorer 8 is preferred).
2. Network crossover cable (supplied in the Axess Elite box).
3. The Axess Elite hardware (includes the latest firmware pre-installed).

Initial set-up steps:

1. Disconnect your computer from the current network connection and set the computer to a temporary IP address of "192.168.1.1". Make a note of your computer's original IP settings.
2. Connect a network crossover cable between the computer and the Axess Elite hardware (the Axess Elite must also be connected to ac power).
3. Open a web browser and type the following address in the address bar:
<http://192.168.1.199>
4. Login to the web interface by entering user name: admin and password: admin.
5. Navigate to the "Setup" menu and select "Network".
6. Change the network information to something suitable for your facility and press "Save". After saving, a "Reboot Required" button will be available. Press this button to reboot the Axess Elite with the updated network settings. If it does not, perform a manual reboot by briefly pressing the rear panel reset button.
7. Disconnect the network cables.
8. Restore your computer's original IP settings.
9. Connect the Axess Elite to the network it will be installed on. If manual (static) network settings were used, you may navigate to the specified IP address to access the web pages. If automatic (DHCP) network settings were chosen, you may locate the Axess Elite in your server's DHCP table.

Alternatively, the command line serial interface may be used to perform the initial network set-up. **Default user name and password: admin/admin*

II. Initial Set-Up (continued)

Command Line Interface (CLI)

Many configuration parameters may be set using the Command Line Interface (CLI). The CLI is accessed through the network, using a telnet client, or through the serial port.

Open a telnet client and point it to the current IP Address of the Axess Elite.
(Factory Default is **192.168.1.199**, telnet **Port 23**)

Connect to the Serial port.
(Factory Default is **9600,8,n,1**)

Upon connection, press Enter, and then enter the username and password when prompted.

(Factory Default for username and password is **admin**)

Setting the IP Address

Axess Elite units come with factory default static IP address 192.168.1.199.

There are three techniques to setting the IP address of the Axess Elite:

1. Terminal Client software via Telnet or Serial
2. Web page
3. Automatically from a DHCP Server

To configure the mode to set the IP address, access the Axess Elite's command line interface (CLI) and use the set ipmode command as indicated below.

II. Initial Set-Up (continued)

Setting the IP address using CLI

These are the basic commands to set the network parameters. After setting these parameters, the Axess Elite will need to be rebooted for the settings to take effect. Any command that requires rebooting of the Axess Elite will provide a prompt to do so. All commands may be entered as required before rebooting.

Example: Telnet to default IP address 192.168.1.199 on Port 23.

```
Axess ELITE
Connected to Telnet Session 1

User> admin
Password> *****

Axess ELITE > set ipaddress 192.168.1.3

OK
Axess ELITE Reboot Required> set subnet 255.255.255.0

OK
Axess ELITE Reboot Required> set gateway 192.168.1.7

OK
Axess ELITE Reboot Required> reboot
```

Once the IP address is set, the following command can be used to prevent DHCP from altering it:
set ipmode static

Setting the IP address from a DHCP Server

A DHCP server will automatically assign an IP address (dynamic address) as well as Subnet Mask and Gateway to the Axess Elite.

To enable this feature, configure the Axess Elite with the command **set ipmode dhcp**
Then reboot the Axess Elite, or enter the command **reboot**

To find the IP address of the Axess Elite, you will need to query your DHCP server and locate the MAC address of the Axess Elite in the DHCP server's IP / MAC table. You can also access the CLI via serial and use the **get network** command.

Unix, Linux, MAC and others

Consult your systems administrator for information on how to set an IP Address. The unit should be pinged after the IP Address has been set to confirm proper operation

III. Installation

The SurgeX Axess Elite is designed to be installed in a 19 inch equipment rack and requires one unit (1-U) of rack space. Use the four screws provided with the product to secure the rack ears to the rack rails. These screws can be tightened by hand and do not require tools. Connect power to the unit by plugging the cord into a 120V AC, 15 (20) amp wall or floor receptacle. Do not plug the unit into a relocatable power tap.

120 Volt Connections

The Axess Elite has a total of 8 receptacles. Each receptacle is rated for a maximum load of 15 amps, but the total load of the Axess Elite must not exceed 15 (20) amps. Plug the equipment cords into the receptacles as needed. The receptacles are numbered 1 through 8. This same numbering is used in the control interface.

Ethernet Connection

The RJ45 connector for Ethernet is situated on the rear panel beside the Serial connector. The default IP Address is 192.168.1.199.

RS232 (Serial) Port Connection

The Axess Elite has a 9 pin D subminiature connector for RS-232 serial control. The connector is configured as DCE for direct connection to a laptop or other terminal device. Default serial parameters are 115,200 bps, 8 data, no parity, 1 stop bit (9600,8,n,1).

Temperature		Contact Closure		Auxiliary Relay A			Auxiliary Relay B		
Red	Black	CC1	CC2	NO	COM	NC	NO	COM	NC

Temperature Sensor

In order to obtain a temperature reading, the external temperature sensor must be connected to the first (far left) terminal block. The sensor has two wires: red and black. Connect the red wire to pin 1 and the black wire to pin 2. The sensor can be positioned to read air temperature at any location in the rack, although the top of the rack would be optimal since heat rises; it can also be placed in contact with the chassis of a particular piece of equipment that you want to monitor.

Contact Closure Input

Connect a contact closure control input (if any) to the 2 pins of the second terminal block. Relays, switches, and push buttons are all suitable input types. The actions to be executed upon closing or opening of the contact closure input may be defined as various User Triggers on the Triggers Setup web page.

Auxiliary Relay Outputs

Two auxiliary relay outputs are provided at the third (Aux Relay A) and fourth (Aux Relay B) terminal blocks. Access to the Common, Normally Open, and Normally Closed positions is provided for each relay. The auxiliary relays are controlled in the same manner as the AC outlets, and may be controlled by Sequences, Schedules, and User Triggers.

IV. LED Indicators

There are thirteen LED indicators located on the front panel. Their function is as follows:

1	2	3	4	5	6	7	8	A	B	Self-Test	Shutdown	Mains

LED Indicators		
Indicator	Color	Description
Outlets	Green	When illuminated, the corresponding AC outlet is on.
Aux Relays	Green	When illuminated, the corresponding auxiliary relay is latched.
Self-Test	Green	When illuminated, the surge suppression circuitry is functioning correctly.
Shutdown	Amber	When illuminated, the Axess Elite is in shutdown mode due to out of range line voltage, current, or temperature.
Mains	Red	When illuminated, the Axess Elite is connected to a live wall or floor outlet.

V. Web Server

The web server is built around 4 pages: Login, Device View, Global View, and Setup. Each page is discussed in detail below.

Login

The Login page is the first page displayed when a web browser makes a connection to the Axess Elite. Enter a valid user name and password in the “User Name” and “Password” fields, and press “Login” to log in to the Axess Elite.



Device View

The Device View page provides information and status for the whole unit and individual outlets, as well as basic control of outlets. The top left section of the page provides system status. To refresh the status information, click the “Refresh” button.

For each outlet the Outlet Name, Present State, Current Draw, Power Draw, and Energy Usage are displayed.



V. Web Server (continued)

Device View	
Item	Description
Overall System	Indicates that the surge protection, rack temperature, line voltage, and current draw are at acceptable levels.
Surge Protection	Indicates that the surge protection is fully functional.
Rack Temperature	Displays the temperature of the sensor that is connected to the rear terminal block. If the temperature sensor is not connected, the display will read "NC" for Not Connected.
Line Voltage	Displays the true-RMS AC voltage.
Current Draw	Displays the total current draw of all 8 receptacles in true-RMS Amps.
Power Draw	Displays the total power draw of all 8 receptacles in Watts.
Energy Used	Displays the total energy consumption of the equipment plugged into the unit in KW-Hours since the last counter reset. Pressing "Reset Energy Usage" will reset the KW-Hours count.
On	Turns the selected outlets on, staggered by the Delay time.
Off	Turns the selected outlets off.
Reboot	Turns the selected outlets off for the length of the Reboot Time, and then back on.
History Log	Displays the internal history log (if enabled).

Global View

The Global View page displays the current outlet states and system status for the Axess Elite and expansion units. Up to 15 expansion units may be set up on the Links Setup page.

Outlets and Aux Relays may be commanded to turn On, Off, or Reboot for up to 16 Axess Elite units (1 master and 15 expansions).



In order to have rights to control expansion unit outlets, the user's identical user name and password must be programmed into each expansion Axess Elite to be managed.

V. Web Server (continued)

Setup

Complete setup and configuration of the Axess Elite is provided via 7 Setup web pages. Each setup page is described in the following sections.

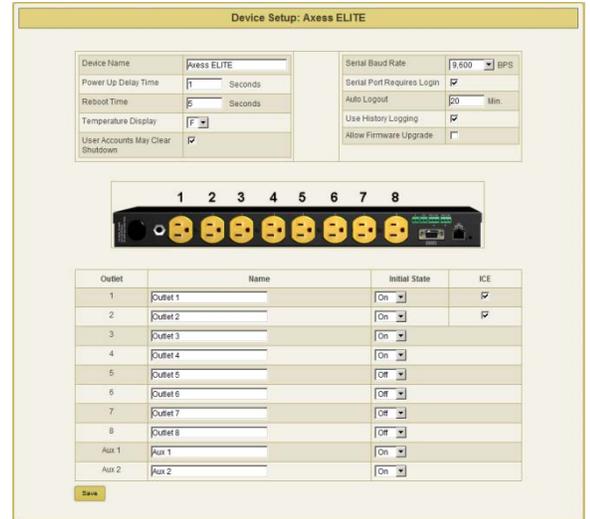
Setup	
Setup Page	Description
Device	Configure basic device parameters
Network	Configure network settings, including the network adapter, email, and time keeping
Network Reporting	Configure SNMP, SDxP, and Syslog reporting
Users	Configure user accounts
Triggers	Configure System Triggers Create and modify User Triggers
Sequences	Create and modify custom Sequences
Links	Create and modify Expansion units and Favorite links

V. Web Server (continued)

Device Setup

The Device Setup page allows for the specification of basic device parameters.

Saving any change which requires a reboot to take effect will result in the addition of a “Reboot Required” button at the bottom of the page.



Device Setup	
Item	Description
Device Name	Specifies the name label to be associated with the Axess Elite.
Power Up Delay Time	Specifies the amount of time in seconds by which to stagger the manual turning on of multiple outlets.
Reboot Time	Specifies the amount of time an outlet is to remain off during a Reboot operation.
Temperature Display	Specifies whether to display temperature in degrees Fahrenheit or Celsius.
User Accounts May Clear Shutdown	Specifies whether or not a non-administrative user account is allowed to manually clear a persistent shutdown state.
Serial Baud Rate	Specifies the baud rate to be used with the serial interface.
Serial Port Requires Login	Specifies whether or not a serial CLI session requires login.
Auto Logout	Specifies the web and telnet security timeout in minutes.
Use History Logging	Specifies whether or not to keep an internal log file.
Allow Firmware Upgrade	Specifies whether or not the Axess Elite is in an upgradeable state.
Outlet Name	Allows for the specification of name labels for each outlet.
Initial State	Specifies the state the outlet will take following a loss of power or the clearing of a shutdown event.
ICE	Specifies whether or not to activate Inrush Current Elimination for outlets 1 and 2.

V. Web Server (continued)

Network Setup

The Network Setup page allows for the specification of network settings, including the network adapter, email, and time keeping.

Saving any change which requires a reboot to take effect will result in the addition of a “Reboot Required” button at the bottom of the page.

Network Setup	
Item	Description
IP Setup	Specifies whether to use Static or DHCP mode.
IP Address	Specifies the address to be used when in Static mode, and displays the assigned address when in DHCP mode.
Subnet Mask	Specifies the subnet mask to be used when in Static mode, and displays the assigned mask when in DHCP mode.
Gateway	Specifies the gateway address to be used when in Static mode, and displays the assigned gateway address when in DHCP mode.
DNS1	Specifies the first DNS server address to be used when in Static mode, and displays the acquired address when in DHCP mode.
DNS2	Specifies the second DNS server address to be used when in Static mode, and displays the acquired address when in DHCP mode.
Web HTTP Port	Specifies the port that the web server will communicate on. If the port number is changed from the default value of 80, the Axess Elite's web pages may be accessed by navigating to "http://IPADDRESS:PORTNUMBER"; for example, "http://192.168.1.199:72".
Web HTTPS Port	Specifies the port that the web server will communicate on when using secure SSL encryption.
SSL Required	Specifies whether or not the internal web server is to use secure SSL encryption.
Enable Telnet	Specifies whether or not to enable the internal telnet server.
Telnet Port	Specifies the port the internal telnet server will communicate on.
Enable Email	Specifies whether or not to enable the sending of email messages.
Email Server	Specifies the IP Address of the SMTP or ESMTP server to be used.
Login Name	Specifies the user name for the mail server.
Login Password	Specifies the password for the mail server.
Return Address	Specifies the return address of the internal email client.
Auto Retry	Specifies the number of retries for failed email reporting.
Test Email	Sends a test email message to the specified address.
Set Time	Specifies whether to use Manual or internet SNTP timekeeping.
SNTP Server	Specifies the address of the internet time server when using SNTP mode.
Time Zone Offset	Specifies the time zone the Axess Elite is in.
Use DST	Specifies whether or not to automatically adjust for Daylight Savings Time
DST Start Date	Specifies the Month, Week, Day, and Time that DST starts.
DST Stop Date	Specifies the Month, Week, Day, and Time that DST ends.
Manual Time Set	Specifies the starting date and time when using Manual mode.

V. Web Server (continued)

Network Reporting Setup

The Network Reporting Setup page allows for the configuration of SNMP, SDxP, and Syslog reporting.

Saving any change which requires a reboot to take effect will result in the addition of a “Reboot Required” button at the bottom of the page.

Network Reporting Setup	
Item	Description
Enable SNMP	Specifies whether or not to enable the SNMP v2c agent.
Read Community	Specifies the read community string.
Write Community	Specifies the write community string.
SNMP Managers	Specifies IP addresses for up to 4 SNMP managers.
Traps Sent	Specifies which specific traps are to be sent.
SDxP Port	Specifies the port to be used with the SDxP exchange protocol. The SDxP protocol is the means of communication between master and expansion units (all of which must use the same SDxP port), and is also the API to be used with the Axess Elite.
SDxP Manager	Specifies the IP address of the SDxP manager.
SDxP Status Broadcast	Specifies whether or not to enable a status broadcast and the frequency of the broadcast messages in minutes.
SDxP Event Reporting	Specifies which items are accessible by the SDxP protocol.
SDxP Encryption	Specifies whether or not to use AES encryption with a shared passphrase.
Syslog Port	Specifies the port to be used with a Syslog server.
Syslog Server	Specifies the IP address of a Syslog server.

V. Web Server (continued)

Users Setup

The Users Setup page allows for the creation, deletion, and editing of up to 8 user accounts. Each user will have a unique user name, password, and email address, and may be assigned access to specific outlet(s).

User	Admin	1	2	3	4	5	6	7	8	Aux 1	Aux 2	Modify
admin	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Edit Delete

User accounts may be of the Administrator or User type. Administrators have access to all functions; Users do not have access to Setup functions.

User authentication is supported for Web, Serial, Telnet, and SDxP interfaces.

Users Setup	
Item	Description
New User	Allows for the creation of a new user account.
Save	Saves the updated user information.
Close	Closes the edit dialogue without saving any changes.

V. Web Server (continued)

Triggers Setup

The Triggers Setup page allows for the modification of System Triggers and creation of User Triggers.

System Triggers define the protective shutdown points for the AC outlets, and take precedence over all other actions, including User Triggers.

Triggers Setup	
Item	Description
Hysteresis	Specifies the amount by which the associated parameter must return closer to nominal following the activation of a System Trigger for the shutdown to be considered clear. For example using an over voltage shutdown point of 150V and a hysteresis of 7: The Axess Elite will enter a shutdown state when the line voltage exceeds 150V and will not leave the shutdown state until the line voltage drops below $150 - 7 = 143V$.
Over-Voltage Auto Shutdown	Immediately shuts off all outlets if the AC line voltage rises above the set value. May not be disabled.
Under-Voltage Auto Shutdown	Shuts off all outlets if the AC line voltage falls below the set value. May be disabled.
Over-Current Auto Shutdown	Shuts off all outlets if the total current draw exceeds the set value. Once this has been triggered, the unit will stay in a persistent shutdown state until manually cleared by pressing "Clear Shutdown" on the Device View page or by issuing the CLI command clear shutdown . The over-current shutdown point should not be set too close to the anticipated normal operating current draw, as this could cause an inadvertent shutdown. May be disabled.
Over-Temperature Auto Shutdown	Shuts off all outlets if the temperature sensed by the external temperature sensor exceeds the set value. Once this has been triggered, the unit will stay in a persistent shutdown state until manually cleared by pressing "Clear Shutdown" on the Device View page or by issuing the CLI command clear shutdown . May be disabled.
Self-Test Failure Auto Shutdown	Shuts off all outlets in the unlikely event that the internal surge protection circuitry fails. Once this has been triggered, the unit will stay in a persistent shutdown state until manually cleared by pressing "Clear Shutdown" on the Device View page or by issuing the CLI command clear shutdown . May be disabled.
Persistent Shutdown State:	The Axess Elite will enter a Persistent Shutdown State upon registering an Over-Current, Over-Temperature, or Self-Test Failure event. While in this state, all 8 receptacles will be turned Off, and the front panel amber LED labeled "Shutdown" will be illuminated. Outlet control will not be restored until the shutdown is manually cleared by pressing one of the "Clear Shutdown" buttons located on the Device View page or by issuing the CLI command clear shutdown . Before clearing the shutdown state, it is advised to verify that the combined current requirement of all equipment powered by the Axess Elite is less than the value specified by the Over-Current System Trigger, and that the measured temperature is less than the value specified by the Over-Temperature System Trigger. Note that Over-Voltage and Under-Voltage shutdown events will clear automatically when the line voltage returns to an acceptable level.

V. Web Server (continued)

User Defined Triggers

User defined triggers that have previously been created are displayed in a list. The name of the trigger is the name that was given to the trigger when it was created. Pressing “Test Alarm” will activate the trigger alarm action, and pressing “Test Clear” will activate the trigger clear action; use these test functions to verify that the trigger will operate as intended.

Pressing “Edit” will open the trigger for editing, and pressing “Delete” will delete the trigger. New triggers may be created by pressing the “New Trigger” button

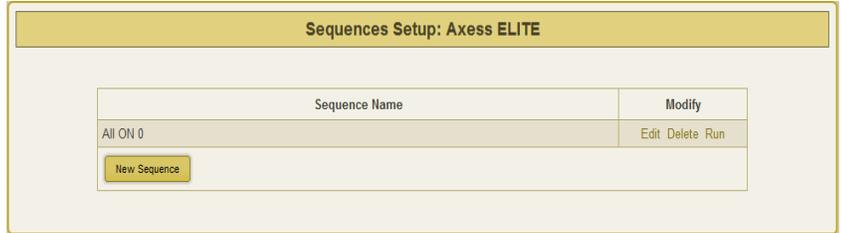
Type		Trigger Executes When:	Trigger Clears When:
Threshold	Temperature High	Temperature > Set Point	Temp < Set - Hysteresis
	Temperature Low	Temperature < Set Point	Temp > Set + Hysteresis
	Voltage High	Voltage > Set Point	Voltage < Set – Hysteresis
	Voltage Low	Voltage < Set Point	Voltage > Set + Hysteresis
	Line Current High	Total Current > Set Point	Current < Set – Hysteresis
	Line Current Low	Total Current < Set Point	Current > Set + Hysteresis
	Outlet Current High	Outlet X Current > Set Point	Current < Set – Hysteresis
	Outlet Current Low	Outlet X Current < Set Point	Current > Set + Hysteresis
Net Test		IP Address Ping Fails	IP Address Ping Succeeds
Schedule		Set Date and Time	NA
Contact Closure		Contact Closure Input Closes	Contact Closure Input Opens

Alarm/Clear Actions	Outlet On	Outlet Off	Outlet Reboot	Run Sequence	Email	None
----------------------------	-----------	------------	---------------	--------------	-------	------

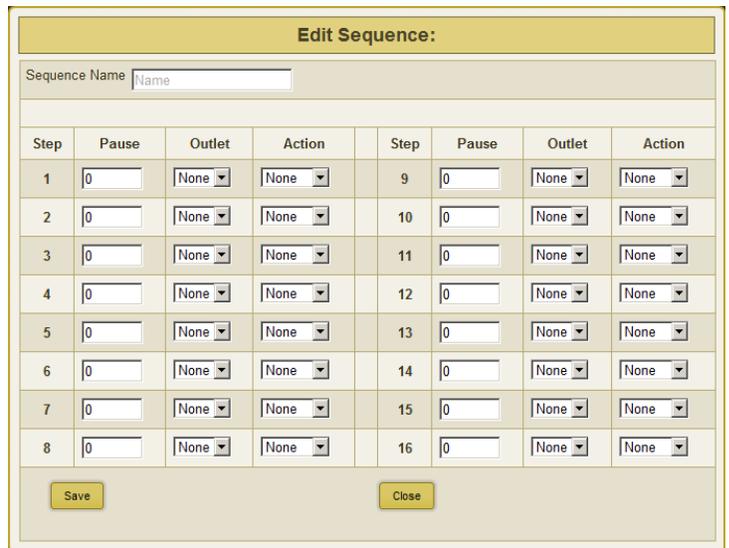
V. Web Server (continued)

Sequences Setup

The Sequences Setup page allows for the creation and modification of sequences. A sequence is a list of outlets, including Auxiliary Relays, that will be turned On, Off, or Rebooted in a predetermined way with a specified delay time between each step. Using sequences avoids manually turning each outlet on or off individually.



A sequence, as defined for this product, is purely a one-way sequence. That is, you do not use the same sequence to turn outlets on as you use to turn the same outlets off in reverse order. One sequence must be created for the turn-on function, and then a second sequence must be created for the turn-off function.



To create a new sequence, press the “New Sequence” button. The new sequence must be given a unique name. This name should clearly indicate what the sequence will do, such as “All On”, “All Off” or “Stage Equipment On”. There may be up to 16 steps in a single sequence. Select the time delay from the “Pause” column. Select the outlet from the “Outlet” column. Select whether the outlet is to turn off, turn on, or reboot from the “Action” column. Press the “Save” button to save the sequence.

To run a sequence to test it, press “Run”. To edit an existing sequence, press “Edit”. To delete a sequence, press “Delete”.

After a sequence has been saved, it will be available at the bottom of the Device View page, and when creating or editing a User Trigger when a sequence is selected as an action.

**Time delay is specified from the previous sequence item, not from the initial starting point. For example, creating a sequence with “Step 1, 1 second, Outlet 1, On” and “Step 2, 1 second, Outlet 2, On” will turn on Outlet 1 after 1 second, and Outlet 2 on 1 second after Outlet 1 has turned on. This sequence will not turn on both Outlets 1 and 2 at the same time.*

V. Web Server (continued)

Links Setup

The Links Setup page allows for the setup of Axess Elite Expansion units and Favorites.

Expansion units are other Axess Elite units which will be available for monitoring and control on the Global View page of the master unit. Up to 15 Expansion units may be defined.

Favorites may be any internet address. Use Favorites to set up shortcuts to earlier versions of the Axess Elite product, other equipment web servers, or Internet web pages.

Axess ELITE Expansion		
Device Name	IP Address	Modify
<input type="button" value="New Expansion Unit"/>		

Favorites		
Favorite Name	URL	Modify
<input type="button" value="New Favorite"/>		

Edit Favorite	
Favorite Name	<input type="text" value="Name"/>
URL http://	<input type="text" value="URL"/>
<input type="button" value="Save"/>	<input type="button" value="Close"/>

Addresses may be specified with a port number in this format:
“http://IPADDRESS:PORTNUMBER”; for example, <http://192.168.1.199:72>.

Saved Expansions and Favorites are available in the Links subsection of the Device View page.

VI. Command Line Interface (CLI) Protocol

The Command Line Interface provides complete setup of all functions of the Axess Elite. The CLI may be accessed either via the network interface using Telnet, or via the serial port using a terminal emulator program. Some commands of the CLI require administrative rights; these are indicated in the following tables.

Prompts

Prompt	Description
User>	Prompt to enter a valid User Name. Not case sensitive.
Password>	Prompt to enter the Password associated with the User Name. Case sensitive.
Axess ELITE>	Standard prompt while logged in.
Axess ELITE Reboot Required>	Prompt after making a change which requires a reboot to take effect.

Syntax

Command	Description	Standard Syntax
Set	This command is used to change a parameter.	set <variable> <specifier> <value>
Get	This command is used to return the value of a parameter.	get <variable>
Add	This command adds an entry row to any array of variables.	add <array> <newentry>
Ren	This command renames an entry in an array.	ren <array> <oldname> <newname>
Del	This command deletes an entry from an array.	del <array> <entryname>

Responses

Response	Description
OK	The command was received and the syntax was validated.
Error	The syntax could not be validated.
Bad command or parameter	An incorrect command or parameter was received.
Invalid Command	An invalid command was received.

CLI Documentation Notation

Notation	Description
Text without brackets	Items you must type as shown
<Text inside angle brackets>	Placeholder for which you must supply a value
Hyphen: -	Range of acceptable numeric values
Vertical Bar:	Separator for mutually exclusive items; choose one

VI. Command Line Interface (CLI) Protocol (continued)

Device Commands

Command	Description	Admin	Fact Def
get all get outlets get status	Returns the status of all AC outlets and the following system level measurements: <ul style="list-style-type: none"> • Device Name • Line Voltage • Total Current Draw • Total Power Draw • Total Energy Used • Reboot Time currently in use • Delay Time currently in use • Temperature • On/Off status of each outlet • Current draw of each outlet • Power Draw of each outlet • Current Firmware Version 	No	
get outlet <1-10>	Returns the status of the specified outlet. AC outlets are numbers 1-8. Aux Relays A and B are numbers 9 and 10.	No	
set outlet <1-10> <on/off/reboot>	Sets the selected outlet to the selected state. The user must have rights to the selected outlet. AC outlets are numbers 1-8. Aux Relays A and B are numbers 9 and 10.	No	
get devicename	Returns the device name.	No	Axess ELITE
set devicename <devicename>	Sets the device name.	Yes	
get reboot	Returns the Reboot Time.	No	
set reboot <1-99>	Sets the Reboot Time in seconds.	No	5
get delay	Returns the Delay Time.	No	
set delay <0-99>	Sets the Delay Time in seconds.	No	1
get console	Returns the current console timeout and baud rate.	No	
set autologout <0-99>	Sets the automatic logout timeout of web and CLI in minutes. 0 = no timeout.	Yes	2
set baud < 2400 9600 57600 115200 >	Sets the serial port baud rate.	Yes	9600
clear shutdown	Clears a persistent shutdown state.	No	
set clear shutdown by user < yes no >	Sets the ability of a user account to clear a persistent shutdown state.	Yes	Yes
get upload enable	Returns the status of the ability to accept a firmware upload.	No	
set upload enable < yes no >	Sets the ability to accept a firmware upload.	Yes	No
clear log	Clears history text log file.	Yes	
set factory defaults	Resets all parameters, except Network Settings, to their factory default settings. Confirmation is required. Note: This command may take up to 30 seconds to execute.	Yes	
logout	Ends the session.	No	
reboot	Reboots the unit. Will not affect the status of the outlets.	No	

VI. Command Line Interface (CLI) Protocol

Network Commands

Command	Description	Admin	Fact Def
get network	Returns the network settings.	Yes	
get mac	Returns the MAC address of the network adapter.	Yes	
set ipmode < static dhcp >	Sets the IP Mode.	Yes	Static
set ipaddress < dotted decimal >	Sets the IP Address in dotted decimal.	Yes	192.168.1.199
set subnet < dotted decimal >	Sets the subnet mask in dotted decimal.	Yes	255.255.255.0
set gateway < dotted decimal >	Sets the gateway in dotted decimal.	Yes	0.0.0.0
set dns1 < dotted decimal >	Sets the DNS server 1 address.	Yes	
set dns2 < dotted decimal >	Sets the DNS server 2 address.	Yes	
set web http port < 1 – 65535 >	Sets the web server port.	Yes	80
set web use ssl < yes no >	Enable or Disable the web server's SSL capabilities.	Yes	No
set web https port < 1 – 65535 >	Sets the SSL web server port.	Yes	443
set telnet enable < yes no >	Enable or disable the telnet server.	Yes	Yes
set telnet port < 1 – 65535 >	Sets the telnet port.	Yes	23

Calibration Commands

IMPORTANT: Each Axess Elite is fully calibrated at the factory. Improper calibration may result in a Persistent Shutdown State!			
Command	Description	Admin	Standard Value
set voltage calibration < 105 – 130 >	Sets the voltage calibration. AC Volts.	Yes	120
set voltage offset < 0 – 130 >	Zeroes the voltage calibration. AC Volts.	Yes	0
set current < 1-8 all > calibration < 1 – 20 >	Sets the individual outlet current calibration. AC Amps.	Yes	
set current < 1-8 all > offset < -20 – 20 >	Zeroes the individual outlet current calibration. AC Amps.	Yes	0
set power < 1-8 all > calibration < 1 – 2400 >	Sets the individual outlet power calibration. AC Watts.	Yes	
set power < 1-8 all > offset < -20 – 20 >	Zeroes the individual outlet power calibration. AC Watts.	Yes	0
set temperature offset < -999 – 999 >	Sets the temperature calibration offset. Degrees F.	Yes	-460

VII. Email Notification

Email can be automatically sent for System Triggers and User Triggers.

Emails generated by the Axess Elite will display the device name and information related to the System Trigger or User Trigger.

Examples:

Subject : Axess ELITE Cabinet_1
Date : Sat, 7 Jul 2012 09:41:00 - 0500
From : <AxessElite@surgex.com>
To : networkadmin@yourco.com

Axess ELITE Cabinet_1 at 192.168.1.199
System Trigger Over Temperature at 115 degrees Alarm

Subject : Axess ELITE Cabinet_3
Date : Sat, 7 Jul 2012 09:46:00 - 0500
From : <AxessElite@surgex.com>
To : <networkadmin@yourco.com>

Axess ELITE Cabinet_3 at 192.168.1.199
schedule1 processed at 09:46 on 07/07/2012

VIII. SNMP

Axess Elite Setup and Control functions can be linked to any SNMP v2c manager. Up to four SNMP managers may be set. Each manager can perform all Setup and Control functions, and may receive Trap notifications for System Triggers, User Triggers, and Manual outlet control.

The Axess Elite MIB is available at surgex.com.

IX. SDxP Protocol

Overview

The SDxP Protocol is a packet-based protocol designed to be extensible. This protocol is transmitted over TCP on a user-defined port. The factory default SDxP port is 9100.

The protocol uses a Hello handshake to establish unique sequence numbers to allow for advanced security when AES encryption is used. With AES enabled, all messages must be encrypted with the AES Passphrase set in the device.

After the Hello, a Command and Response sequence follows. Any number of Command → Response sequences are permitted after Hello.

Hello Handshake

The client sends a Hello message in the form of a text string “hello-000”. The SDxP enabled Axess Elite will respond with a packet containing the unsigned 16 bit sequence number. This sequence number is incremented by the client and server with each correct packet sent.

Example:

Client		Server
hello-000	→	
	←	1234 (seq 1234)
Command (seq 1235)	→	
	←	Response
Command (seq 1237)	→	
	←	Response

IX. SDxP Protocol (continued)

SDxP Packet

The packet is broken up into 2 parts: the Header and the Payload.

Header

The header is used to carry general information, such as is shown in the C programming structure below:

```
typedef struct {
    eType type;
    char[21] uName;
    char[21] password;
    uChar desc;
    uChar param;
    uint16 seq;
} THeader
```

Variable	Description
type	Enumerated type that tells the SDxP server what type of packet is being sent. See the Types subsection for a full list of packet types.
uName	This variable MUST contain a valid user on the target Axess Elite.
password	This variable MUST contain the password for the specified user.
desc	This variable is the type descriptor that describes the type of data that is being sent. By extension, it lets the server know what the payload is. There is a different set of descriptors for each type class. See the Descriptors subsection for a full list of descriptors by type.
param	Reserved for future use. Optional parameter that may be passed to the server in addition to the descriptor.
seq	The packet's sequence number. Used as part of the security scheme.

Payload

The payload is determined by a combination of the type class and the descriptor. The payloads are described by the descriptor; see the Descriptors subsection for details.

IX. SDxP Protocol (continued)

Types

There are currently 2 types. All classes are defined in the C programming enumerated type definition below:

```
typedef enum {  
    eType_null,  
    eType_inform,  
    eType_commands  
} eCmnd;
```

	Command	Description
0	eType_null	This is a null command and should not be sent to the server.
1	eType_inform	Informations are similar to SNMP traps. They are sent from the managed device to the manager on a periodic basis.
2	eType_commands	Used to control and query the managed device.

Descriptors

Descriptors are used to describe the individual commands within a command class and the payload that the packet contains. All of the descriptors and their payloads are outlined by command class below:

eType_Informs

Informations are similar to SNMP traps. They are sent from the managed device to the manager on a periodic basis.

```
typedef enum {  
    eInform_null,  
    eInform_outletStatus,  
    eInform_auxRelayStatus,  
    eInform_lineVoltage,  
    eInform_lineCurrent,  
    eInform_linePower,  
    eInform_outletCurrent,  
    eInform_outletPower,  
    eInform_sysStatus,  
    eInform_poll,  
    eInform_overVoltage,  
    eInform_underVoltage,  
    eInform_overCurrent,  
    eInform_overTemperature,  
    eInform_selfTestFail,  
    eInform_userTriggerClear,  
    eInform_userTriggerFail,  
    eInform_manualControl  
} eInform;
```

IX. SDxP Protocol (continued)

Descriptors

Inform	Description	Payload
eInform_outletStatus	This inform is used to tell the manager the status of all 8 outlets. It is also the response to the getOutletStatus and setOutletStatus commands.	tOutletStatus
eInform_auxRelayStatus	This inform is used to tell the manager the status of the 2 auxiliary relays. It is also the response to the getAuxRelayStatus and setAuxRelayStatus commands.	tAuxStatus
eInform_lineVoltage	This inform is used to tell the manager the line voltage. It is also the response to the getLineVoltage command.	tLineVoltage
eInform_lineCurrent	This inform is used to tell the manager the total line current. It is also the response to the getLineCurrent command.	tLineCurrent
eInform_linePower	This inform is used to tell the manager the total line power. It is also the response to the getLinePower command.	tLinePower
eInform_outletCurrent	This inform is used to tell the manager the current draw of each of the individual outlets. It is also the response to the getOutletCurrent command.	tOutletCurrent
eInform_outletPower	This inform is used to tell the manager the power draw of each of the individual outlets. It is also the response to the getOutletPower command.	tOutletPower
eInform_sysStatus	This inform is used to tell the manager the entire system status (all above metrics). It is sent every X minutes by the managed device to keep the manager in sync. It is also the response to the getSysStatus command.	tSysStatus
eInform_poll	This inform is used as the response to the Poll command. The Poll command is used by the Axess Elite to poll Expansion units.	tPoll
eInform_overVoltage	This inform is sent whenever a System Trigger: Over Voltage occurs.	tInformOverVoltage
eInform_underVoltage	This inform is sent whenever a System Trigger: Under Voltage occurs.	tInformUnderVoltage
eInform_overCurrent	This inform is sent whenever a System Trigger: Over Current occurs.	tInformOverCurrent
eInform_overTemperature	This inform is sent whenever a System Trigger: Over Temperature occurs.	tInformOverTemperature
eInform_selfTestFail	This inform is sent whenever a System Trigger: Self Test Failure occurs.	None
eInform_userTriggerClear	This inform is sent whenever any User Trigger clears.	tInformUserTriggerClear
eInform_userTriggerFail	This inform is sent whenever any User Trigger fails.	tInformUserTriggerFail
eInform_manualControl	This inform is sent whenever a manual outlet state change is made.	tInformManualControl

IX. SDxP Protocol (continued)

eType_Commands

Commands are used to control and query the managed device.

```
typedef enum {
    eCommands_null,
    eCommands_setOutletStatus,
    eCommands_getOutletStatus,
    eCommands_getOutletCurrent,
    eCommands_getOutletPower,
    eCommands_setAuxRelayStatus,
    eCommands_getAuxRelayStatus,
    eCommands_getLineVoltage,
    eCommands_getLineCurrent,
    eCommands_getLinePower,
    eCommands_getSysStatus,
    eCommands_poll
}eCommands;
```

Command	Description	Payload	Response
eCommands_null	This is a null command and should not be used.	None	None
eCommands_setOutletStatus	This command is used to control an individual outlet. <i>Note: The inform returned as a result of the command will reflect the current outlet state, and will not reflect the requested change.</i>	tOutletCommand	eInforms_OutletStatus
eCommands_getOutletStatus	This command is used to get the status of all outlets.	None	eInforms_OutletStatus
eCommands_getOutletCurrent	This command is used to get the current draw of all outlets (Amps).	None	eInforms_OutletCurrent
eCommands_getOutletPower	This command is used to get the power draw of all outlets (Watts).	None	eInforms_OutletPower
eCommands_setAuxRelayStatus	This command is used to set the status of the selected Aux Relay.	tOutletCommand	eInforms_AuxRelayStatus
eCommands_getAuxRelayStatus	This command is used to get the status of both Aux Relays.	None	eInforms_AuxRelayStatus
eCommands_getLineVoltage	This command is used to get the line voltage (AC Volts).	None	eInforms_LineVoltage
eCommands_getLineCurrent	This command is used to get the total line current (Amps).	None	eInforms_LineCurrent
eCommands_getLinePower	This command is used to get the total power draw (Watts).	None	eInforms_LinePower
eCommands_getSysStatus	This command is used to get the system status.	None	eInforms_sysStatus
eCommands_poll	This command is used to poll Expansion units.	None	eInforms_poll

IX. SDxP Protocol (continued)

Payloads

Payload	
tOutletStatus	<pre>typedef struct { eOutletStatus status[8]; }tOutletStatus; typedef enum { eOutletStatus_null, eOutletStatus_on, eOutletStatus_off }tOutletStatus;</pre>
tAuxStatus	<pre>typedef struct { eAuxStatus status[2]; }tAuxStatus; typedef enum { eAuxStatus_null, eAuxStatus_energized, eAuxStatus_deenergized }tAuxStatus;</pre>
tLineVoltage	<pre>typedef struct { float lineVoltage; }tLineVoltage;</pre>
tLineCurrent	<pre>typedef struct { float lineCurrent; }tLineCurrent;</pre>
tPoll	<pre>typedef struct { u8 outletStatus[8]; u8 auxStatus[2]; float lineVoltage; float lineCurrent; float linePower; float outletCurrent[8]; float outletPower[8]; u8 statusFlags; tExpansionUser users[8]; }tPoll;</pre>
tLinePower	<pre>typedef struct { float linePower; }tLinePower;</pre>
tOutletCurrent	<pre>typedef struct { float outletCurrent[8]; }tOutletCurrent;</pre>
Payload	

IX. SDxP Protocol (continued)

(Continued)	
tOutletPower	typedef struct { float outletPower[8]; }tOutletPower;
tSystemStatus	typedef struct { eOutletStatus outletStatus[8]; eAuxStatus auxStatus[2]; float lineVoltage; float lineCurrent; float linePower; float outletCurrent[8]; float outletPower[8]; U8 picFlags; U8 outletRights; U8 relayRights; }tSystemStatus;
tOutletCommand	typedef struct { U8 outlet; //1-8 eOutletStatus status; }tOutletCommand;
tAuxCommand	typedef struct { char relay; //A or B eAuxStatus; //N or F }tAuxCommand;
tInformManualControl	typedef struct{ unsigned char outlet; //id of outlet to change unsigned char status; //the state to change to }tInformManualControl;
tInformOverVoltage	typedef struct{ float voltage; }tInformOverVoltage;
tInformUnderVoltage	typedef struct{ float voltage; }tInformUnderVoltage;
tInformOverCurrent	typedef struct{ float current; }tInformOverCurrent;
tInformOverTemperature	typedef struct{ int temperature; }tInformOverTemperature;

IX. SDxP Protocol (continued)

Payload (Continued)	
tSystemStatus	typedef struct { eOutletStatus outletStatus[8]; eAuxStatus auxStatus[2]; float lineVoltage; float lineCurrent; float linePower; float outletCurrent[8]; float outletPower[8]; U8 picFlags; U8 outletRights; U8 relayRights; }tSystemStatus;
tOutletCommand	typedef struct { U8 outlet; //1-8 eOutletStatus status; }tOutletCommand;
tAuxCommand	typedef struct { char relay; //A or B eAuxStatus; //N or F }tAuxCommand;
tInformManualControl	typedef struct{ unsigned char outlet; //id of outlet to change unsigned char status; //the state to change to }tInformManualControl;
tInformOverVoltage	typedef struct{ float voltage; }tInformOverVoltage;
tInformUnderVoltage	typedef struct{ float voltage; }tInformUnderVoltage;
tInformOverCurrent	typedef struct{ float current; }tInformOverCurrent;
tInformOverTemperature	typedef struct{ int temperature; }tInformOverTemperature;

X. Firmware Upgrades

To Be Determined

XI. Syslog

The Axess Elite contains a built in Syslog client. When enabled, it will send Syslog formatted UDP messages on port 514.

Messages will be sent for the following System Triggers:

- Over-Voltage Auto Shutdown Trigger
- Over-Voltage Auto Shutdown Clear
- Under-Voltage Auto Shutdown Trigger
- Under-Voltage Auto Shutdown Clear
- Over-Current Auto Shutdown Trigger
- Over-Current Auto Shutdown Clear
- Over-Temperature Auto Shutdown Trigger
- Over-Temperature Auto Shutdown Clear
- Self-Test Failure Auto Shutdown Trigger
- Self-Test Failure Auto Shutdown Clear

Example:

```
02-24-2012 13:55:14 System4.Alert 10.1.2.69
02/24/2012 13:55:15 Cabinet_1 System Trigger Over Temperature Alarm
```

XII. Rear Panel Reset Button

The recessed reset pushbutton located on the rear panel to the right of the Network connection performs three functions: Reboot, Password Reset, and Factory Default Reset.

Pressing the reset button once quickly will reboot the Axess Elite. The outlets will be set to the states specified by their Initial State parameters. This operation will also clear a Persistent Shutdown State.

Holding the reset button for 5 seconds or longer will initiate a recovery mode. Once the reset button is released, the user has 30 seconds to log in to the CLI using the username **admin** and password **admin**. While in this mode, the red Mains LED will flash 0.5 seconds on/off.

Holding the reset button for 5 seconds or longer while powering up the unit will enter factory default reset mode. When the button is released, the unit will be reset to factory defaults, including Network Settings.

XIII. Specifications

Parameter		Specification
Load Rating		15/20 Amps at 120 Volts (SX-AX15E / SX-AX20E)
Power Requirement (no load)		5 Watts
Surge Let-through Voltage (6000 Volt Surge)		0 Volts
UL 1449 Adjunct Classification Test Results		1000 Surges, 6000 Volts, 3000 Amps, B3 pulse; measured suppressed voltage, 170 Volts; no failures
Maximum Applied Surge Voltage		6000 Volts *
Maximum Applied Surge Current		Unlimited (due to current limiting) *
Maximum Applied Surge Energy		Unlimited (due to current limiting) *
Endurance (C62.41-1991 category B3 pulses)		1 KV > 500,000; 3 KV > 10,000; 6 KV > 1000
EMI/RFI Filter	Normal mode (50Ω load)	40 dB@100 KHz, 50dB@300 KHz, 50 dB@3 MHz, 50 dB@30 MHz
	Common Mode (50Ω load)	18dB@300 KHz, 30 dB@1 MHz, 50 dB@5 MHz, 50 dB@20 MHz
Under-Voltage Auto Shutdown		Adjustable from 80V to 110V, or disabled.
Over-Voltage Auto Shutdown		Adjustable from 130V to 160V
Over-Current Auto Shutdown		Adjustable from 1A to 20A, or disabled.
Over-Temperature Auto Shutdown		Adjustable from 70 to 100°F, or disabled.
Measurement Accuracy	Voltage	± 1% from 90 – 160 V _{RMS}
	Current	± 1% from 0.1 – 20 A _{RMS} (Resistive)
	Power	± 5% from 0.1 – 2400 W _{RMS} (Resistive)
	Energy	± 5% kWh
	Temperature	± 5.3C from -25 – 105C
Network Port		10/100 Ethernet connection on Female RJ-45, Auto Negotiating with 10/100/1000 network connections with Link and Activity LEDs
Serial Port		RS-232 on Female 9-pin D-subminiature, DCE
Temperature Sensor Input		2 x screw terminal
Auxiliary Relay Outputs		(2) 3 x screw terminal
Contact Closure Input		2 x screw terminal
Dimensions		19" W x 12.25" D x 1.75" H (Single Rack Space)
Weight		13 lb.
Temperature Range:		5C to 35C
Humidity Range		0% to 95% R.H. Non-condensing
Agency Listings		TBD
* 1.2 x 50 microsecond industry standard combination wave surge as per IEEE C62.41		
*CAUTION: Do not install this device if there is not at least 10 meters (30 feet) or more between the electrical outlet and the electrical service panel.		