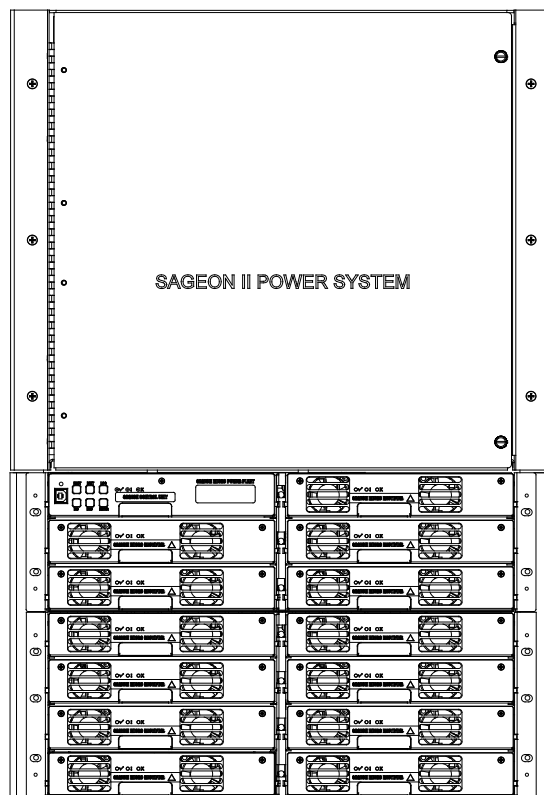




**Sageon II™**  
**Power Distribution System**  
**Product Manual**  
**SAGEON**



## RECEIVING INSTRUCTIONS

### and

## GENERAL EQUIPMENT INFORMATION

*Please Note: For your protection, this product manual should be read and thoroughly understood before unpacking, installing, using, or servicing the described equipment.*

UNIPOWER, LLC presents all equipment to the delivering carrier securely packed and ready for transport. Upon acceptance of the equipment from us, the delivering carrier assumes responsibility for its safe delivery to you. Once you receive the equipment, it is your responsibility to document any damage to the equipment that was sustained during transport to you and to file your claim with the carrier promptly and accurately.

### PACKAGE INSPECTION

Examine the shipping container for any visible damage: punctures, dents, and any other signs of possible internal damage.

Describe any damage or shortage on the receiving documents and have the carrier's representative sign his/her full name.

If you're receiving freight bill notes that a Tip-N-Tell is attached to your freight, locate the indicator and note the color of the arrow. If the Tip-N-Tell arrow has turned even partially blue, this means the freight has been tipped in transport. Make sure the carrier notes this on your receipt before you sign for the freight.

### EQUIPMENT INSPECTION

Promptly upon receipt of shipment, open the container and inspect the contents for damage. If it is necessary to move or otherwise handle the shipment, refer to the next section, Handling, for instructions and warnings.

Unpack the shipment carefully to avoid scratching or otherwise marring the exterior finish. Be careful not to discard any included equipment, parts, or manuals. If damage is detected, call the delivering carrier to determine appropriate action. The carrier may require an inspection.

**IMPORTANT:** If damage is detected, save all shipping material for the carrier's representative!

If damage is detected, also notify UNIPOWER; contact information is in Section 1.6 Product Support. UNIPOWER will determine if the equipment should be returned for repair. If it is determined that the equipment should be returned to UNIPOWER, ask the delivering carrier to send the packages back to UNIPOWER at the delivering carrier's expense. Be sure that the equipment is properly packaged for shipment.

If repair is necessary, UNIPOWER will invoice you for the repair so that you may submit the bill to the delivering carrier with your claim form.

It is your responsibility to file a claim with the delivering carrier. Failure to properly file a claim for shipping damages may void warranty service for any physical damages later reported for repair.

### HANDLING

The Power System is heavy in weight. Use sufficient personnel and power equipment to ensure safe handling.

Use extreme care in handling and unpacking the Power System. Refer to Section 2.2.3 Moving and Mounting the Power System before attempting to move the Power System.

## NAMEPLATE

A UNIPOWER product is identified by a nameplate that includes model number, part number, and serial number information, as appropriate. Please include this information, shown in *italic* in the label drawing below, in all correspondence with UNIPOWER. A sample nameplate is shown below.

SAGEON II POWER MODULE

PART NUMBER: SAGEON2.L45

INPUT RATING: 100-240VAC, 16A max,  
45-66Hz (each rectifier)

OUTPUT RATING: 48V, 400A

SERIAL #: D5S0412345

225.8001.00

## INITIAL SETTINGS

All equipment is shipped from the factory *fully inspected and adjusted*. Read the technical reference or product manual before installing or making any adjustments.

## SPARE PARTS

See Chapter 7 Spare and Replacement Parts for a list of the items that should be immediately available to minimize downtime should a failure occur.

**REVISION HISTORY**

<b>Rev</b>	<b>Description</b>	<b>Checked/Approved &amp; Date</b>
8	See PCO 45402	CJM / 8-8-19

**DOCUMENT SUMMARY**

Thank you for purchasing the Sageon II Power System. We at UNIPOWER are proud of the quality of our products and welcome any suggestions to further improve our design to fit your needs.

This product manual provides installation, commissioning, configuration/operation, SageView, maintenance, and spare/replacement parts for the UNIPOWER Sageon II Power System and its optional components. It also consists of a packet of drawings following the text. The drawings supplement the provided descriptions and procedures.

**PROPRIETARY AND CONFIDENTIAL**

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Throughout the remainder of this manual, "UNIPOWER" will mean "UNIPOWER, LLC."

**PERSONNEL REQUIREMENTS**

Installation, setup, operation, and servicing of this equipment should be performed by qualified persons thoroughly familiar with this Product Manual and Applicable Local and National Codes. A copy of this manual is included with the equipment shipment.



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ABBREVIATION, ACRONYM OR SYMBOL	MEANING
ANSI	American National Standards Institute
AWG	American wire gauge
BATT	Battery
CEV	controlled environment vault
CFA	converter failure alarm
CM	circular mils
DIP	dual in-line package
EMC	electromagnetic compliance (or compatibility)
EMI	electromagnetic interference
ESD	electrostatic discharge
FA	fuse and breaker alarm
HVA	normally energized high voltage alarm
IEC	International Electrical Commission
IEEE	Institute of Electrical and Electronic Engineers
LED	light emitting diode
LSD	least significant digit
LVA	low voltage alarm
LVD	low voltage disconnect
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
OLCD	Organic Liquid Crystal Display
PCA	Printed circuit assembly
PCB	Printed circuit board
REC/RECT	Rectifier (see SMR)
RBOC	Regional Bell Operating Company
RFA	rectifier failure alarm
SBM	Sageon II Battery Monitor
SCU	Sageon II Control Unit
SMR	Switch-Mode Rectifier (see REC/RECT)
UBC	Uniform Building Code
UL	Underwriters Laboratory
UPS	Uninterruptible Power System

DOCUMENT NUMBER	TITLE
ANSI C 39.1	Requirements for Electrical Analog Indicating Instruments
ANSI T1.311-1991	DC Power Systems - Telecommunications Environment Protection
ANSI/IEEE C 62.41-1980	IEEE Guide for Surge Voltages in Low-Voltage AC Power Circuits, ANSI 1980
IEC 801-2	IEC Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment, October 1987
NEC 1993	NEC Handbook 1993, National Fire Protection Association
No Number	OI-28 Standards
No Number	Central Office Telecommunications Equipment Engineering Standards, December 1984
PUB 77350	U S West Telecommunications Equipment Installation & Removal Guidelines, May 1990
PE-7-1985	Communications Type Battery Chargers, NEMA/ANSI
STD 487-1980	IEEE Guide For The Protection of Wire-Line Communications Facilities Serving Electrical Power Stations
TR-EOP-000151	Bellcore Generic Requirements for 24-, 48-, 130-, & 140-Volt Central Office Sageon II Power System Rectifiers, May 1985
TR-EOP-000154	Bellcore Generic Requirements for 24-, 48-, 130-, & 140-Volt Central Office Sageon II Power System Control and Distribution, May 1985
TR-NWT-000063	Bellcore Network Equipment-Building System Generic Equipment Requirements, Rev. 8 July 1991
TR-TSY-000078	Bellcore Generic Physical Design Requirements for Telecommunication Products and Equipment
UL489	UL Molded Case Circuit Breaker Enclosures, May 1984
J SAGEON2.LXX	Sageon II Power System Physical Description Drawing Set
SD SAGEON2.LXX	Sageon II Power System Schematic Drawing Set

## 1.0 INTRODUCTION

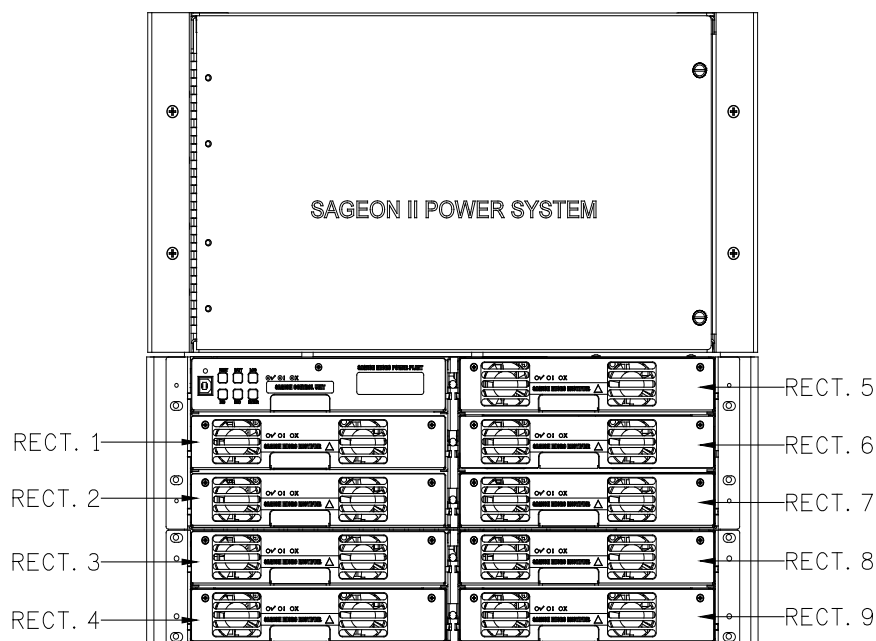
The SAGEON II Power Plant provides -48 vdc, 400 or 600 ampere maximum distribution in a variety of rack combinations for standard floor mounting. Based on modular switched-mode rectifier technology, the plant allows custom configurations in multiples of 50 amperes with plug-in -48 vdc rectifier modules. List 44, 45, 46, or 47 power plants with -48V/50A rectifiers can be configured for, 400 amps total capacity (N+1). List 64, 65, 66, or 67 power plants with -48V/50A rectifiers can be configured for 600 amps total capacity (N+1). Rectifier modules, optional power shelves, and additional distribution option must be ordered separately.

The -48-volt distribution section provides positions for up to 20 bullet, AM1-type 5 to 100-ampere circuit breakers (40 breakers in 2-tier distribution). Circuit breakers 50 amperes and under require one breaker position while breakers 60 amperes and over take up two breaker positions. Two-hole lug landings are provided with 1/4"-20 studs on 5/8" centers for each circuit breaker. An adapter is provided for 60 amp and larger breakers that combines two STD output buses into a single 3/8" stud connection (2-hole landing). Circuit breakers must be ordered separately.

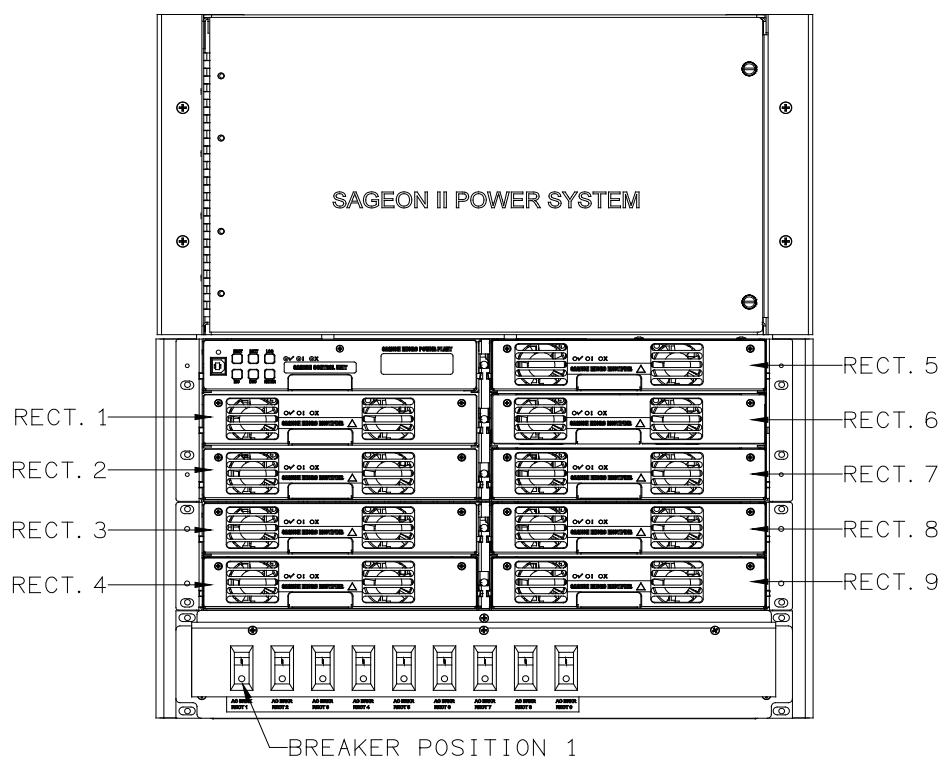
The distribution cabinet bus work provides landings for four strings of battery cables. The ground return supports 20 two-hole lugs back to back terminations with 1/4"-20 studs on 5/8" centers.

Basic list numbers for plant configurations are without the low-voltage battery disconnect (LVBD). A 600 amp battery disconnect can be ordered as an option.

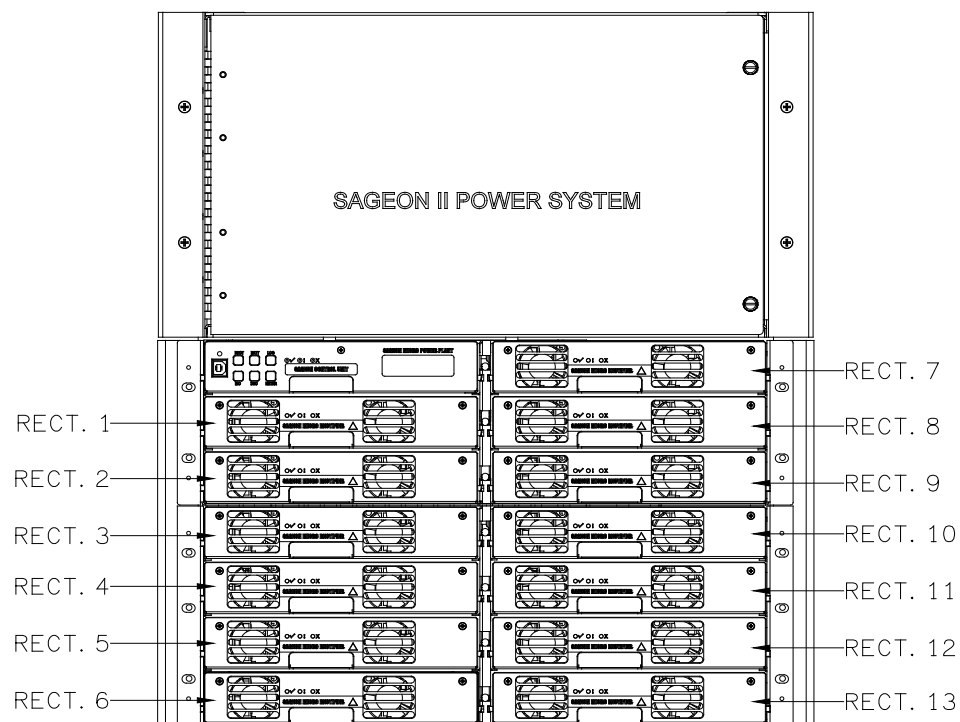
This product manual describes installation, operation, and servicing of UNIPOWER Sageon II Power System and optional components. The Sageon II Power System is available as a 48V System with up to 600-or 400-ampere at 48V. Illustrations of the Sageon II Power Systems are provided in Fig. 1-1 through 1-8.



**FIGURE 1-1 SAGEON2.L44; 400A, 1 TIER DISTRIBUTION**

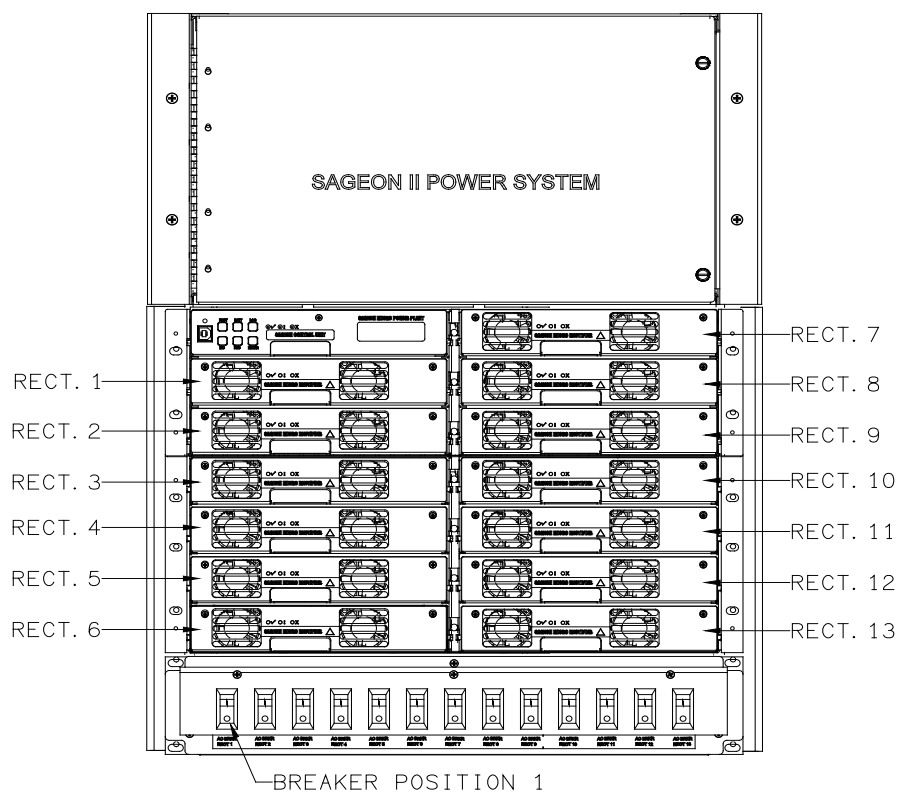


**FIGURE 1-2 SAGEON2.L45; 400A, 1 TIER DISTRIBUTION WITH AC BREAKERS**

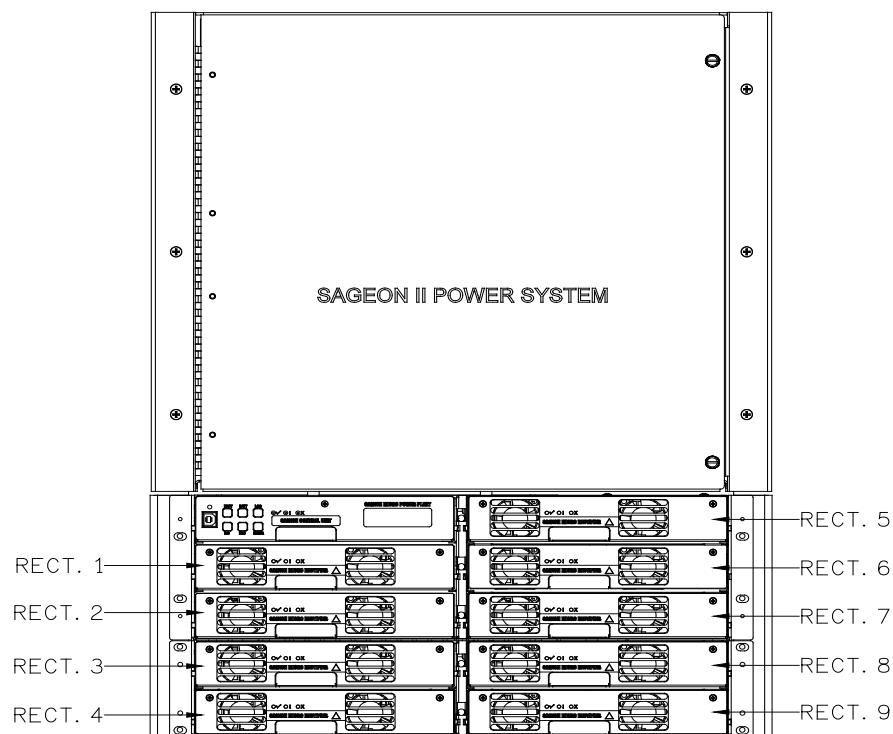


**FIGURE 1-3 SAGEON3.L64; 600A, 1 TIER DISTRIBUTION**

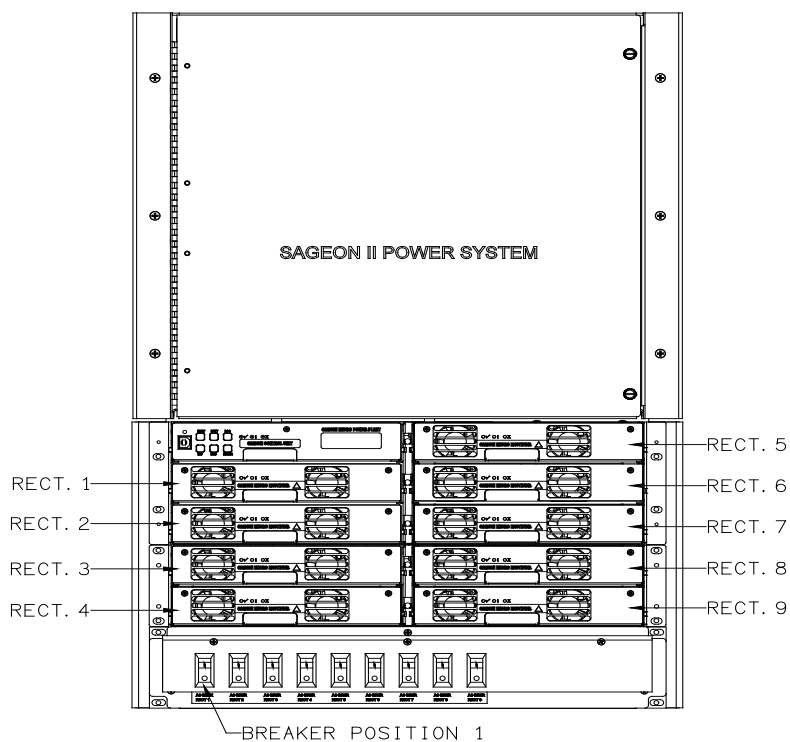




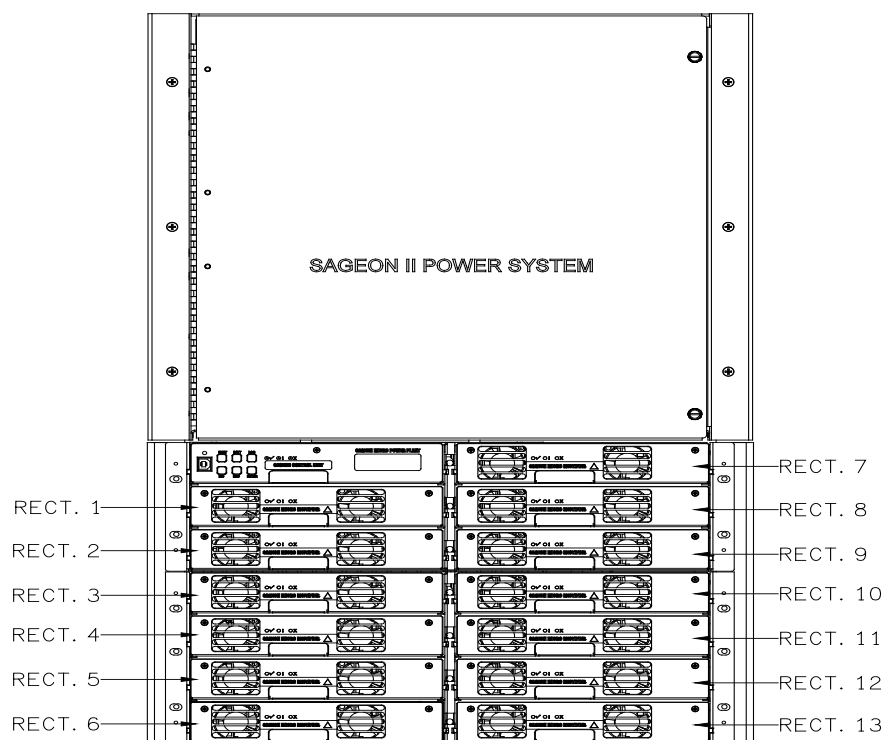
**FIGURE 1-4 SAGEON2.L65; 600A, 1 TIER DISTRIBUTION WITH AC BREAKERS**



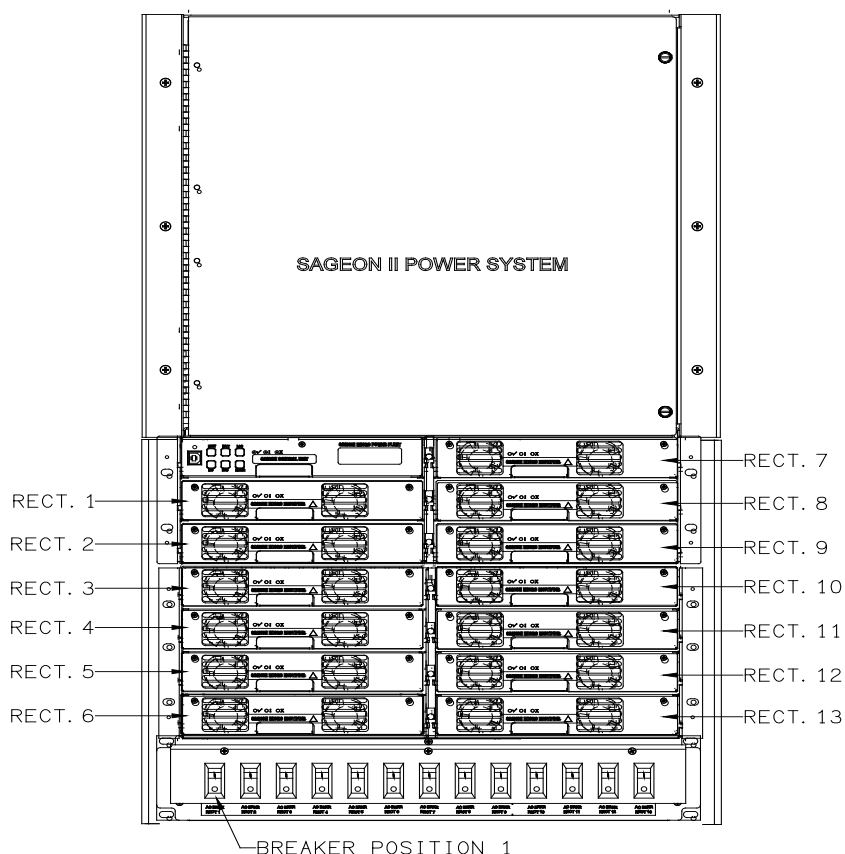
**FIGURE 1-5 SAGEON2.L46; 400A, 2 TIER DISTRIBUTION**



**FIGURE 1-6 SAGEON2.L47; 400A, 2 TIER DISTRIBUTION WITH AC BREAKERS**



**FIGURE 1-7 SAGEON2.L66; 600A, 2 TIER DISTRIBUTION**



**FIGURE 1-8 SAGEON2.L67; 600A, 2 TIER DISTRIBUTION WITH AC BREAKERS**

## 1.1 PRODUCT DESCRIPTION

The Sageon II Power System is intended for Cellular, PCS, and other applications that demand stable, reliable, high current, DC operating power. It provides either 48 Vdc output and 400 A or 600A (N+1) depending upon the number of Rectifiers ordered by the user. The Systems are ordered for mounting in either a 19 or a 23-inch rack.

### Power Conversion

The Rectifier available is a 2400 watt<sup>1</sup> consistent power (50A @ 48Vdc). Modular switched-mode rectifier technology is used for highly efficient, low cost, reliable operation. The quantity of Rectifiers is determined by the user to accommodate the application. A maximum of 13 rectifiers can be installed in a 600A Sageon II Power System and 9 rectifiers in a 400A Sageon II Power System.

### Distribution

The Sageon II Power System comes with provisions for 20 AM1 bullet style breaker distribution (L44, 45, 64, 65), or 40 AM1 breakers (L46, 47, 66, 67), low-voltage battery disconnect (LVBD), and a current transducer. Please refer to drawing sets for details.

### Battery Strings

The Sageon II Power System comes with two Battery landings. Two rear-mounted output bus bars have connections for two-hole lugs with 3/8" diameter holes on 1" centers, accommodating up to 4 battery strings.

<sup>1</sup>At input voltages below 185Vac derating is required; 770W @ 85Vac linearly to 2400W @ 185Vac.

## Operator Panel

Mounted in the system is a modular, hot-swappable controller which includes a high-resolution 2-line digital display for monitoring of the Sageon II Power System output current and voltage. Six push buttons are available for operating the Sageon II Power System, selecting display information, and for changing editable parameters. A complete System configuration can be created at the operator panel. Three System status LEDs are provided.

## Communications

PC-based configuration and monitoring is available with the UNIPOWER SageView™ software. SageView is a tool to exchange configurations and operating data between the Sageon II Power System and the PC on which SageView is running. Local PC access is provided through a supplied USB-B connector on the front panel of the controller using the SageView software..

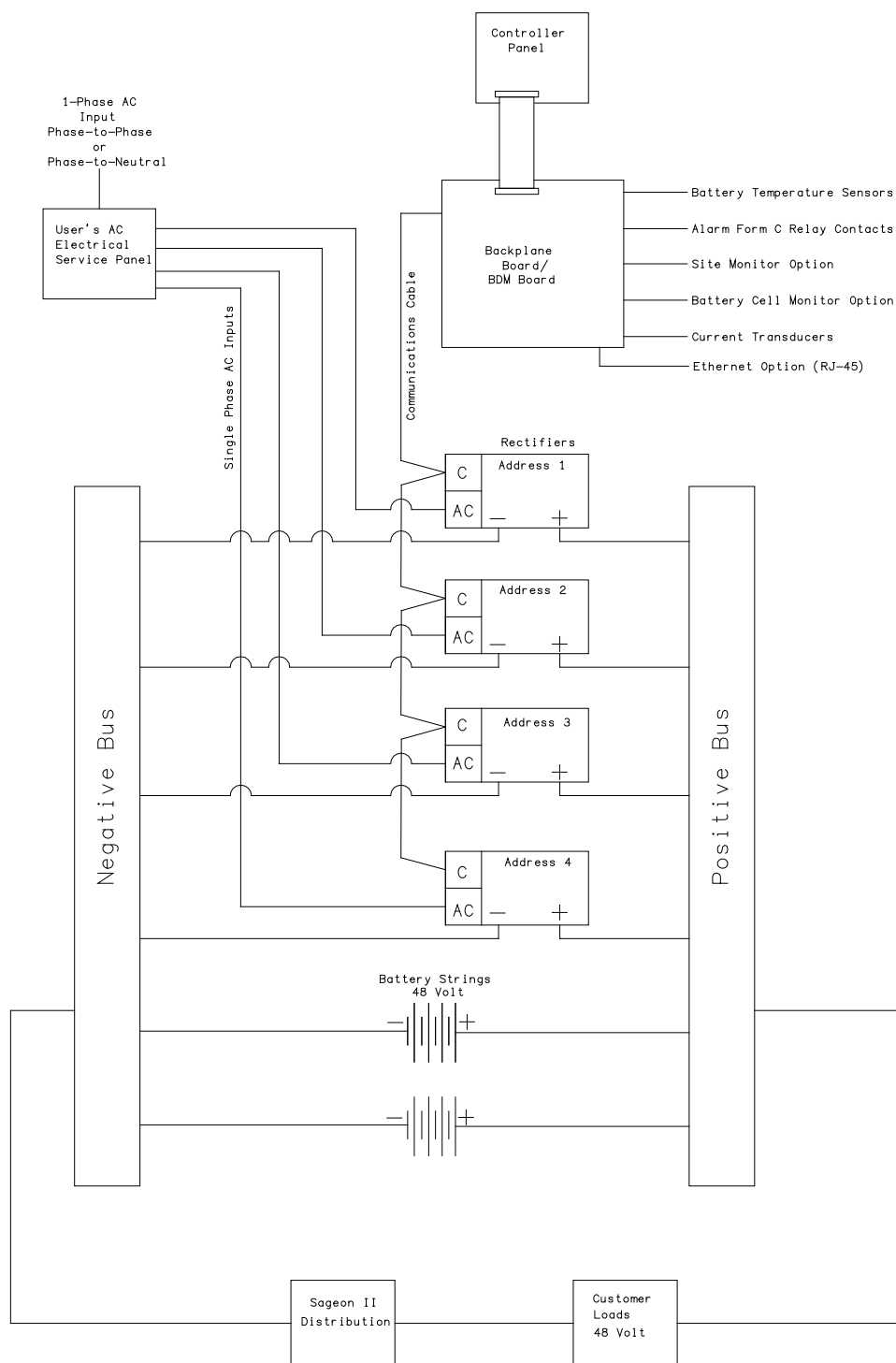
Remote PC access across an Ethernet network is optionally available. The PC must be running SageView software and have a unique IP address on the network. An Ethernet RJ-45 jack is provided for connecting to your company's intranet or to the Internet. A unique IP address is required for each Sageon II Power System. Remote access is also available via an optional SNMP/Ethernet board or Ethernet board (without SNMP support).

## Alarms

Activation of customer-supplied alarm annunciators is accommodated by form-C relays. The relay state is user selectable between normal mode (normally de-energized) and failsafe mode (Normally energized). These relays provide for external annunciation of the following alarms: Rectifier shutdown, High Voltage HV shutdown, and three user defined relays. Refer to SageView help for configuring these relays.

## Block Diagram Description

A simplified block diagram of a 48V Sageon II Power System is shown in Figure 1-9. Single-phase or three-phase power is supplied from the user's AC electrical service panel.



**FIGURE 1-9 SIMPLIFIED BLOCK DIAGRAM, 48V SAGEON II POWER SYSTEM**

Sageon II Power System operation can be monitored at the operator panel on the front of the Sageon II Power System, at a PC connected to the operator panel, or at a PC connected to the Sageon II Power System over an Ethernet network. Sageon II Power System configuration can be performed from the operator panel or at a PC.

Printed circuit boards, in the distribution area contains terminals for user connections to alarm relays, battery temperature compensation sensors, communications, and other internal and external functions. In addition, most signals destined for the SCU are routed first to the BDM board or backplane board.

The operator panel provides user access to the configuration and monitoring capabilities of the SCU. For security, a parameter lock feature is included and PC access can require a password. A PC that is to be connecting to the Sageon II Power System must have the optional SageView software installed and operating.

## 1.2 SPECIFICATIONS

This section contains physical, environmental, and electrical specifications for the Sageon II Power System and its major assemblies.

### 1.2.1 19" Sageon II Power System Physical Specifications

Dimension	400A Sageon II Power System	600A Sageon II Power System
Width	19.0" (48.3 cm)	19.0" (48.3 cm)
Depth	9.0" (22.9 cm)	9.0" (22.9 cm)
Height	See J-SAGEON2.LXX drawing set	
Weight	Varies	

**IMPORTANT:** The Sageon II Power System is shipped without Rectifiers. Weight of Rectifiers is additional.

### 1.2.2 23" Sageon II Power System Physical Specifications

Dimension	400A Sageon II Power System	600A Sageon II Power System
Width	23.0" (58.4 cm)	23.0" (58.4 cm)
Depth	9.0" (22.9 cm)	9.0" (22.9 cm)
Height	See J-SAGEON2.LXX drawing set	
Weight	Varies	

**IMPORTANT:** The Sageon II Power System Expansion is shipped without Rectifiers. Weight of Rectifiers is additional.

### 1.2.3 Sageon II Power System Environmental Specifications

#### Temperature

Operating..... -25° to +70°C (-13° to +158°F)

Sustained Full Power ..... -25° to +55°C (-13° to +131°F)

Storage ..... -40° to +70°C (-40° to +158°F)

#### Shipping and Handling

Sageon II Power System ..... Shipped fully assembled in a box designed to withstand the shock and vibration normally encountered in shipping and handling

Rectifier Systems ..... Encased and shipped in protective individual boxes

Humidity ..... 0 to 95% non-condensing

### Note

When operating the Power Plant in an extremely low humidity environment (<10%), additional site ESD (Electrostatic Discharge) mitigation is recommended. The installation of ESD conductive floor covering or coating per ANSI EOS/ESD S7.1 and use of dissipative foot straps per ANSI EOS/ESD S9.1 whenever servicing the equipment is recommended. The use of an anti-static wrist strap per EOS/ESD S1.0 Wrist Straps is always recommended and is mandatory whenever servicing the Power Plant in an extremely low humidity condition.

Altitude ..... 9,800 feet (3,000m); Contact the factory for de-rating above specification

Heat Dissipation..... <1,000 BTU/Hr. maximum per rectifier @ full load (rated input)

#### Cooling

Rectifier Systems ..... Fan forced air, front to back with built-in over temperature

Audible Noise ..... <55dB (A weighting)

### 1.2.4 Sageon II Power System Electrical Specifications

#### Output Current

600Adc or 400Adc over Standard operating temperature range of -25°C to 55°C

300Adc or 200Adc over Extended operating temperature range of -25°C to 70°C

### 1.2.5 General Specifications

Battery Temperature Compensation ..... Adjustable 0.1 to 6 mV/°C/cell

### 1.2.6 Bus Specifications

Bus Structure Amperage Rating ..... Per American National Standards Institute's Telecommunications Protection Specifications (ANSI T1.311-1991) ampere tables

Voltage Drop ..... 0.08V maximum

### 1.2.7 EMC Specifications

#### Emissions:

Category	Tested To	Class
Harmonics	IEC 61000-3-2	A
Flicker	EC 6100-3-3	B
Conducted RF	AC Terminals: CISPR 22; DC Terminals: CISPR 22	B / A
Radiated RF	CISPR 22	B

<sup>1</sup>Derating required at input less than 185Vac; worst case 2013 BTU/hr @ 85Vac (calculated) per rectifier.

## Immunity:

Category	Tested To	Criterion
Electrostatic Discharge (ESD)	IEC 61000-4-2 (Level 4: Air 15kV, Contact 8kV)	A
Radiated RF	IEC 61000-4-3 (Level 4: 10V/m, 1kHz 80% AM)	A
Electrical Fast Transient (EFT)	IEC 61000-4-4 (Level 4: 4kV on AC lines) (Level 3: 2kV on load and 1kV on comms lines)	A A
Surge Protection	ANSI C62.41-1991 category B3 – AC lines (Combination Wave 6 kV/3 kA; Ring Wave 6 kV/500A)  IEC 61000-4-5 (Impulse) (6 kV/3 kA Common Mode [CM] on AC lines) (6 kV/3 kA Differential Mode [DM] on AC lines) (Level 3: 2kV CM, 1kV DM on DC lines)  IEC 61000-4-12 (Ring Wave) (6 kV/500A, 100 kHz CM & DM on AC lines) (Level 3: 2kV CM, 1 kV DM on DC lines)	B B B  A B
Conducted RF	IEC 61000-4-6 (Level 3: 10V on AC, load and comms lines)	A
Voltage Dip, Interruptions	IEC 61000-4-11 (Level: 100% dip for 10 ms) (Level: 30% dip for 500 ms) (Level: 60% dip for 1000 ms) (Level: 100% dropout for 5s)	A A B B

## 1.2.8 Rectifier Specifications

**Input: 48V Rectifiers**

## Rated Input

Range, Nominal .....	208-240 Vac
Range, Tolerance .....	185-275 Vac
Connection.....	Single phase; Phase-to-Phase or Phase-to-Neutral
Current.....	12.4 @ 208 Vac; 10.8 @ 240; 16A max @ 120V or below
Frequency .....	45-66 Hz

## Extended Input (with output de-rating)

Low .....	85-185 Vac
High .....	275-285 Vac

Guaranteed Start ..... 90 Vac

Soft Start ..... 8 seconds ramp-up to full load

Efficiency..... Greater than 90% @ &gt;50% load, 230 Vac input, 25°C (77°F)

Power Factor..... Greater than 0.98 at 50% to 100% of rated load

## Protection

Internal Protective Devices.....	Double Fused (input)
External Protective Device .....	Optional thermal circuit breaker (input)
Fully Protected.....	440 Vac, indefinitely
Over-Voltage Shutdown .....	300 Vac
Under-Voltage Shutdown .....	85 Vac

Service ..... Hot swappable (i.e. Can be installed in or removed from an operating Sageon II Power System)



**Output, 48V Rectifiers**

Float Voltage	
Nominal .....	54.2 Vdc
Range .....	42-58 Vdc
Equalize Voltage.....	45-59.9 Vdc
Current Limit .....	10% to 110% of rated output
Temperature Derating .....	25A @ 158°F (70°C)

**Output Rectifiers**

Power Limit .....	Foldback current limiting
Static Regulation	
Line .....	Better than +/-0.05%
Load .....	Better than +/-0.05%
Dynamic Regulation .....	+/-2% for 10% to 90% to 10% step load change +/-1% of final value within 1 ms of step change +/-0.2% for a 25% step change in AC input voltage
Electrical Noise.....	<0.96 mV RMS Psophometrically weighted
Wide-Band Noise.....	<10 mV RMS (10 kHz-100 MHz)
Peak-to-Peak Ripple .....	<100 mV (10 kHz-100 MHz)
Load Sharing.....	<+/-5% of full scale with active current sharing from SCU
Protection	
Internal.....	Fuse
Over Current .....	Can sustain a short circuit at output terminals indefinitely
Temperature.....	Gradual reduction of power limit if heatsink temperature exceed preset limit

**SCU programmable**

Battery menu .....	Float and equalize voltages
Rectifier menu .....	Current limit, high and low voltage alarm limits, HVSD, and HVSD reset

**1.2.9 Safety Specifications**

The following were used as guidelines in the specifications of all components and wiring, with particular attention to safety ratings and OI-28 flammability requirements.

- Underwriters Laboratory Standards of Safety (UL 60950)
- Bellcore Network Equipment-Building System (GR-1089-CORE)

**1.2.10 Monitoring Specifications**

Operator panel voltage and current.....	2-line digital display
Operator panel accuracy	
Voltage accuracy .....	0.50% +/- least significant digit
Current accuracy.....	1%
System status .....	Green, yellow, and red LEDs
Local Communications .....	USB (SageView required)
Remote Communications (optional) .....	Ethernet/SNMP

**1.2.11 Alarm Specifications**

Each of following alarms is annunciated by a lighted LED on the operator panel and by a relay state change. Relay contact output terminals are on the alarm PCB in the distribution.

**A. User Alarm Annunciation**

Five user programmable relays. One form C contacts rated 1A resistive @ 24Vdc, 0.5A resistive @ 48Vdc.

**B. Rectifier Front Panel**

Three status LEDs (Green, Amber, and Red) are located on the Rectifier front panel.

**C. Battery Current Temperature**

Battery Temperature Sensor Input ..... Compensation and alarm annunciation, 1 ambient, 1-4 battery

Battery Current Transducer Input ..... 1-4 battery strings; accuracy 1%

User connections..... No. 6 screw terminals; lugless compression type

**D. Sageon Battery Monitor**

Battery strings ..... 4 maximum

Battery voltage ..... 75V maximum

Cells (single cell or monoblock) ..... 24 maximum per SBM board

Cell voltage ..... 2V, 4V, 6V or 12V (maximum input 3.33V, 6.66V, 10V, and 20V respectively)

Accuracy ..... +/-10mV at 0°C to 40°C

Resolution ..... 5mV per cell (2V, 4V, and 6V ranges)

10mV per cell (12V range)

Sampling interval ..... 1-60 minutes

SBM boards ..... 4 maximum

Interconnection ..... 16-conductor ribbon cable; 30 feet (10m) maximum length

**E. Site Monitor**

Analog inputs ..... 8

Signal range ..... 0-5V

Input protection ..... Over-voltage and reverse polarity

Signal scaling and alarm levels ..... Scale factor and low and high alarm thresholds are user programmable at operator panel

Digital inputs ..... 12

Signal source ..... Voltage free contacts

Logic of digital input ..... User defined from operator panel

Control outputs ..... 4

Output signal source ..... Voltage free form C relay contact; 1A @ 30 Vdc

**1.3 PRODUCT SUPPORT**

Product support can be obtained using the following addresses and telephone numbers.

Corporate office:  
UNIPOWER, LLC  
210 N University Dr  
Coral Springs, FL 33071  
United States

Manufacturing facility:  
UNIPOWER, LLC  
65 Industrial Park Rd  
Dunlap, TN 37327  
United States

Manufacturing facility:  
UNIPOWER Slovakia SRO  
ZLATOVSKA 1279  
Business Center 22  
91105 Trencin, Slovakia

Phone: +1-954-346-2442

Toll Free: 1-800-440-3504

Web site – [www.unipowerco.com](http://www.unipowerco.com)

When contacting UNIPOWER, please be prepared to provide:

1. The product model number, spec number, S build number, and serial number - see the equipment nameplate on the front panel
2. Your company's name and address
3. Your name and title
4. The reason for the contact
5. If there is a problem with product operation:
  - Is the problem intermittent or continuous?
  - What revision is the firmware?
  - What actions were being performed prior to the appearance of the problem?
  - What actions have been taken since the problem occurred?

**GENERAL WARNING**



1. This equipment has been designed to be used only in restricted access areas.
2. This equipment must only be serviced by authorized and qualified service personnel.
3. Operators should not attempt to repair faulty units. There are no operator serviceable parts inside. All fuses are only replaced as part of a repair procedure in a repair facility by authorized personnel and not as a maintenance procedure on site.
4. The power Module magazine should be mounted in a rack that satisfies the requirements for electrical enclosures and fire enclosures according to IEC60950 or equivalent standard. For open rack use, the back of the magazine must be fully enclosed by its covers and the AC wiring terminations must be protected by either a grounded casing or an enclosure that provides double insulation.
5. The power shelves must be used with sufficient ventilation. After mounting, the air flow paths into and out of the rectifiers must be unrestricted. Allow adequate flow for exhaust air out of the rack.
6. Rectifiers are live at all times when the rectifier is plugged into the backplane connector. The input AC disconnection device is the rectifier backplane connector, unless AC breaker list system is ordered.
7. When removing modules, especially if the ambient temperature is high and the unit has been operating at maximum load, avoid skin contact with the metal casing as it may be too hot to touch. Pull the unit halfway out of the magazine and let cool for 2-3 minutes before handling.

## 2.0 INSTALLATION

This chapter describes installing a Sageon II Power System. If questions or problems arise during installation, please refer to Section 1.6 Product Support and contact a UNIPOWER field service technician for assistance.

The Sageon II Power System is factory assembled and tested. Rectifiers are shipped in separate, protective package for on-site installation.

The Sageon II Power System is designed for top-entry of battery cabling. AC input cabling enters the System through Conduit holes in the side of the system. All cabling is user-supplied.

 <b>WARNING</b>
<b>ELECTRICAL SHOCK HAZARD</b>
<p>Hazardous voltage can cause death or serious injury.</p> <p>Remove power from all wires and terminals before working on equipment.</p>


**IMPORTANT:** All wiring must meet the National Electrical Code and other applicable industry and local codes.

### CAUTION



Use ESD (Electrostatic Discharge) safe handling procedures when installing an electronic assembly with the Power Plant.

### Connection of Battery and Load Cables

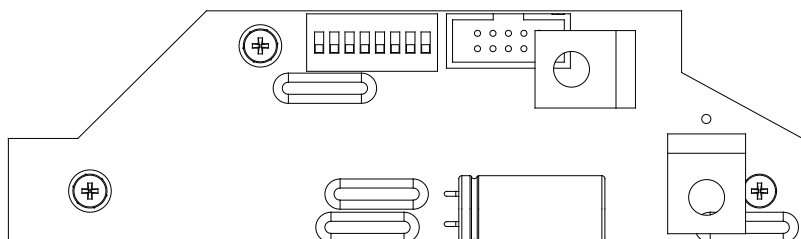
The following recommendations apply to battery and customer load connections.

- Use two-hole compression lugs for battery connections.
- Use wiring with copper conductors only.
- Coat bare conductors with antioxidant before crimp connections are made.
- Bring unplated connectors and connections to a bright finish and coated with antioxidant before being connected.

### Rectifier Position Address

Each rectifier position is factory-assigned a unique, sequential address within the Sageon II Power System. The System operator uses this address when configuring and operating the System to identify and access a specific Rectifier. The AC Backplane board at each rectifier position has one DIP switch on which the address is set. See the illustration below.

**IMPORTANT:** Do not change the factory-set switches. If inadvertently changed, go to Section 6.6 for a procedure to set the switches to the proper address.



## 2.1 INSTALLATION SUMMARY

A typical installation sequence is provided below. References to appropriate sections in this manual are included.

1. Review the list of user-supplied tools and accessories in Section 2.2.
2. Select a location for the Sageon II Power System.
3. Select battery, AC input, and distribution wire sizes based on current load and length of run.
4. Anchor the Sageon II Power System to the floor.
5. Install a user-supplied AC electrical service panel (as needed) for powering Rectifiers. Install AC input cabling between the user's AC electrical service panel and the Sageon II Power System.
6. Connect the AC input cabling to DIN AC terminal connections.
7. Install battery cabling. See Section 2.5.
8. Route and connect supply and return cabling to customer loads.
9. Connect external alarm annunciators. See Section 2.7.
10. Install options: Battery Temperature Sensors, Battery Current Transducers, Sageon II Battery Monitor, Site Monitor, and communications (SNMP, Ethernet). See Sections 2.8 through 2.11.
11. Install Rectifiers. See Section 2.13.
12. Commission the System. See Chapter 3 Commissioning and Chapter 4 Configuration and Operation.

## 2.2 REFERENCE MATERIAL

This section contains lists, tables, and methods that are referenced in subsequent procedures. Three subsections comprise the Reference Material section.

- Tools and Accessories – Read the included list for a preview of the user-supplied items that will be referenced during the installation and servicing procedures.
- Selecting and Sizing DC Power Cables – Proper cable sizing is critical to system performance. This section provides a formula and table that simplify cable selection.
- Torque Specifications – The torque specification table in this subsection is referenced in procedures that include hardware.

### 2.2.1 Tools and Accessories

To install the Sageon II Power System, the following user-supplied items should be available.

- Equipment to move Sageon II Power System to installation site
- Overhead wire racks for AC power and distribution cabling
- Standard insulated installation tools (e.g. hand tools, socket set, cable cutters, cable insulation strippers)
- Torque wrench to ensure correct tightening of hardware; see Table 2-1 for torque specifications
- Electrical service panel circuit breakers
- Digital Voltmeter with: 4-1/2 digit display
- Cables and lugs; appropriate crimping tools
- Conduit, conduit connectors, and conduit bending tools
- Anti-Static Service Kit with static dissipative mat and wrist strap for handling electronic circuit boards (e.g. Interface Board); available from electronic supply sources
- Engineering drawing sets (J, and SD drawings)

## 2.2.2 Selecting and Sizing Copper DC Power Cables

Protective circuits, overall system performance, and safety depend on the proper sizing of DC cables for ampere ranges and acceptable DC voltage drop.

Perform the following procedure to determine wire size.

1. Calculate the minimum circular mils (CM) required for copper wire using the following formula:

$$CM = \frac{22.2 \times I \times L}{V}$$

where:

CM = minimum area of circular mils in the cable

I = maximum current (in amps)

L = one-way cable length (in feet)

V = allowable loop voltage drop (in volts)

Example: Assume a maximum output current of 100 amperes, an allowable loop voltage drop of 0.25 volts, and a distance of 50 feet between the Sageon II Power System and the load.

I = 100 amperes

L = 50 feet

V = 0.25 volts

$$CM = \frac{(22.2)(100)(50)}{(0.25)}$$

CM = 440,000

2. After calculating the minimum circular mils, select the proper copper wire size from Table 2-1; always choosing the next larger wire size if the resistance rating falls between values. For the above example, select 500 MCM wire.
3. Determine the minimum wire size for ampacity according to the code authority having jurisdiction in your location.
4. Select the larger of the sizes calculated for voltage drop or ampacity.

**TABLE 2-1 WIRE SIZING**

SIZE AWG NO.	AREA IN CM	CURRENT CARRYING CAPACITY*		DIA BARE COND INCHES	RHW DIA OVER INS INCHES	RHW BEND RADIUS INCHES	RHW NET WEIGHT PER 1000 FT IN POUNDS	RHW MAX SHIP LENGTHS PER REEL IN FEET
		OPEN AIR	ENCLOSED					
14	4,110	15	15	0.064	0.19	0.95	26	5,000
12	6,530	20	20	0.081	0.21	1.05	35	3,000
10	10,380	30	30	0.102	0.24	1.20	49	3,000
8	16,510	45	45	0.146	0.31	1.55	84	3,000
6	26,250	70	65	0.184	0.40	2.00	126	2,000
4	41,740	100	85	0.232	0.45	2.25	190	1,500
2	66,370	135	115	0.292	0.51	2.55	278	1,000
1/0	105,500	185	150	0.373	0.63	3.15	443	1,000
2/0	133,100	210	175	0.418	0.68	3.40	540	1,000
4/0	211,600	300	230	0.528	0.78	3.90	814	1,000
350 MCM	350,000	425	310	0.681	0.98	4.90	1,310	750
500 MCM	500,000	525	380	0.814	1.12	5.60	1,815	500
750 MCM	750,000	660	475	0.998	1.34	6.70	2,700	360

\* Data based on NEC Handbook 1993, Table 310-17 adjusted for 50°C (122°F) ambient temperature.

### 2.2.3 Torque Specifications

Proper System performance requires that the hardware employed during installation be tightened securely but not over tightened. Use a torque wrench to ensure that hardware is tightened to the specification provided in the table below.

**TABLE 2-2 TORQUE SPECIFICATIONS, STEEL FASTENERS**

<b>Bolt Size</b>	<b>Inch/Pounds</b>	<b>Foot/Pounds</b>	<b>Newton-Meters</b>
4-40	4.5	0.375	0.51
4-48	5.4	0.450	0.61
6-32	9.0	0.750	1.02
6-40	10.8	0.900	1.22
8-32	17.1	1.425	1.93
8-36	18.0	1.500	2.03
10-24	24.3	0.025	2.75
10-32	27.9	2.325	3.15
1/4-20	59.4	4.950	6.71
1/4-28	70.2	5.850	7.93
5/16-18	118.8	9.9	13.42
5/16-24	129.6	10.8	14.64
3/8-16	216.0	18.0	24.40
3/8-24	248.4	20.7	28.07
7/16-14	324.0	27.0	36.61
7/16-20	378.0	31.5	42.71
1/2-13	540.0	45.0	61.01
1/2-20	594.0	49.5	67.11
9/16-12	756.0	63.0	85.42
9/16-18	864.0	72.0	98.62

### 2.3 SELECTING A LOCATION

Install the Sageon II Power System in a location that provides the following.

- Access to a source of reliable, stable, electrically clean AC power
- A dry, well ventilated room that meets the conditions stated in Section 1.2.3 Sageon II Power System Environmental Specifications
- Sufficient access for system installation and servicing
- Sufficient ceiling height to permit use of overhead cable trays for AC input cables and DC load supply and return cables
- A level, flat floor capable of supporting the weight of the Sageon II Power System and rack
- A pest and vermin free area

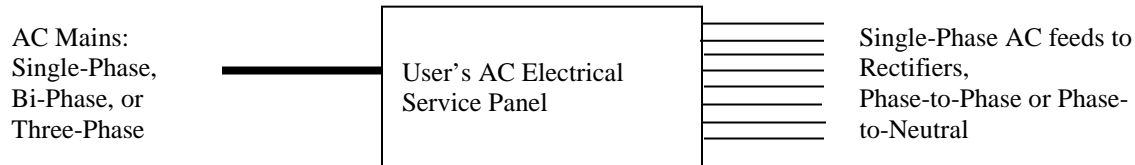
To move and mechanically secure the Sageon II Power System:

1. Prepare the installation site. Install equipment rack as needed.
2. Carefully transport the Sageon II Power System to the installation site.
  - Be careful not to bend or otherwise damage the System.
  - Be careful not to mar or otherwise damage the front bezels of the Rectifiers.

3. Place the Sageon II Power System in a location that provides a cool, dry, vibration-free environment. See Section 2.3 Selecting a Location and Section 1.2.3 Sageon II Power System Environmental Specifications for details.
4. Securely fasten the Sageon II Power System to the anchored rack.
5. Allow 3RU minimum above Sageon II Power System for cabling and service.

## 2.4 CONNECTING AC POWER TO THE SAGEON II POWER SYSTEM

This section describes connecting AC power to the Sageon II Power System. Connect three-phase or single-phase AC power to a user-supplied AC electrical service panel. Then connect single-phase power, through a circuit breaker, to the System. See Section 1.3.8 Rectifier Specifications for voltage and current requirements.



This section also describes earth/safety ground connection. These connections are typically required by national and local electrical codes.

### 2.4.1 Sageon II Power System Connections to Ground

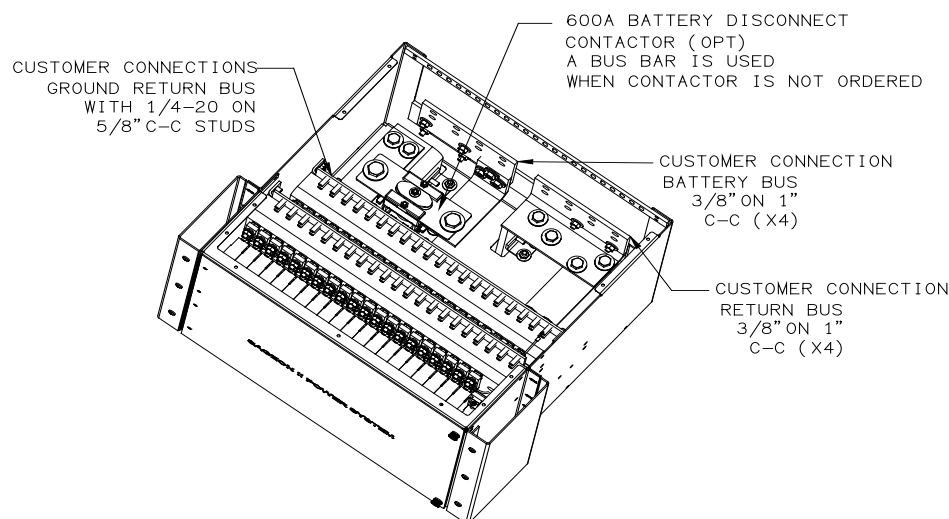
Electrical codes typically require that the System Housing be connected to the site earth ground.

#### System Housing:

Ground the Sageon II Power System Housing to the site's central frame ground. 3/8" on 1" c-c holes threaded studs for bolting an earth/safety ground wire to the Housing are provided on the side of the AC cover. Connect this ground wire to your site's earth/safety ground in accordance with the applicable electrical code(s).

#### Bus Bars:

Connect the System's proper bus to the site's central office ground. Select a cable size capable of carrying the fault current from any installed device. Since this is typically a high current connection, secure the wire lug with a 3/8" bolt on the bus. The bus bars, mounted on the back of the System, are electrically connected. See Figure 2-1 for bus locations.



**FIGURE 2-1 RETURN BUS LOCATION**




### 2.4.2 Lightning and Transient Suppression

Rectifiers contain basic transient suppression in the form of Metal Oxide Varistors (MOVs). MOVs are installed from L1 to L2, L1 to earth, and L2 to earth. They are sized to provide protection from line transients in an industrial environment according to ANSI C62.41-1991 for Class B3 equipment and IEC 61000-4-5.

Supplementary transient protection is needed in a more severe environment with, for example, a high incidence of lightning strikes (indirect or direct) and/or severe switching transients beyond the levels indicated in the above standards. Install higher rated suppression devices to the AC electrical service where appropriate.

### 2.4.3 User's AC Electrical Service Panel

The AC electrical service panel and wiring from the service panel to the Sageon II Power System  is supplied by the user.

1. Electrical shock hazard – Remove power from all involved wires and terminals before proceeding.
2. Determine the number of AC breaker positions needed. Allow one breaker position for each Rectifier to be installed in the Sageon II Power System. Alternatively, up to two Rectifiers can be fed from one breaker provided the breaker and wiring meet local and national electrical code requirements.
3. Select a location for the service panel. Locate the service panel as close as possible to the Sageon II Power System. Wiring between the service panel and the Sageon II Power System should be kept as short as possible. A long wire run or too small a cable can cause a significant voltage drop interfering with Rectifier operation and causing a fire hazard.

Refer to the National Electrical Code (NEC) and applicable local requirements to determine cable size. Sageon II Power System terminals with AC breakers will accept 14-10 AWG (2.1-5.3 mm<sup>2</sup>).

4. Securely mount the service panel and connect it to a source of electrically clean, stable, reliable three-phase or single-phase AC power.
5. Route the needed quantity of AC power cables from the service panel to the Sageon II Power System. Label each breaker position and both ends of each AC power cable with the Sageon II Power System number and rectifier position address to which it will be connected (e.g. P1R1 = Sageon II Power System 1, Rectifier position 1). Rectifier positions on the DIN terminal block are numbered from top to bottom as shown below.

AC Power Connection Area of Power System 400A Rect 1-9	Rectifier 1
	Rectifier 2
	Rectifier 3
	Rectifier 4
	Rectifier 5
	Rectifier 6
	Rectifier 7
	Rectifier 8
	Rectifier 9
AC Power Connection Area of Power System 600A Rect 1-13	Rectifier 10
	Rectifier 11
	Rectifier 12
	Rectifier 13

6. At each breaker position, install a delayed-trip circuit breaker for each cable. Refer to Table 2-3 for breaker recommendation.
7. Ensure that all circuit breakers are in the Off position.
8. Connect the power cables to the service panel.

**TABLE 2-3 CIRCUIT BREAKER SELECTION, AC POWER**

Rectifiers Powered	Breaker Rating
1	20A
2	40A

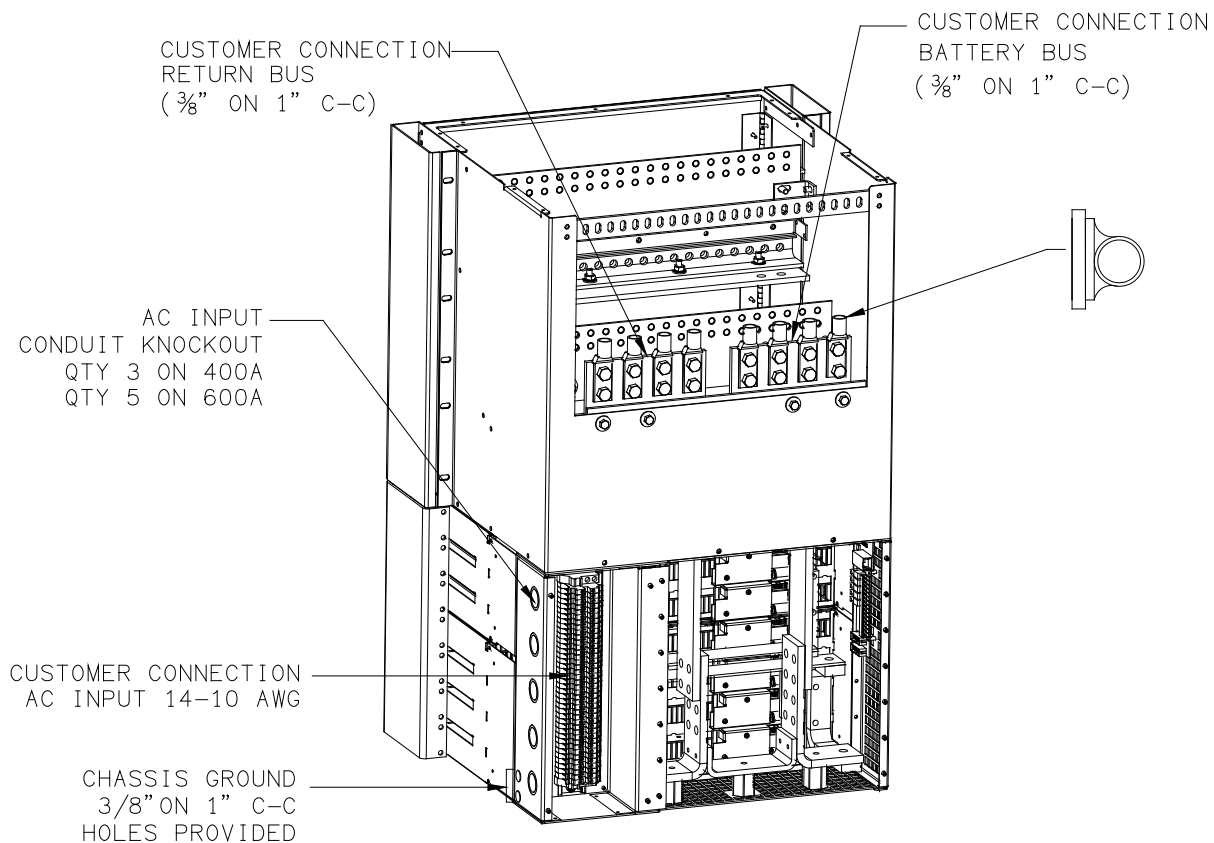
#### 2.4.4 AC Input Cabling

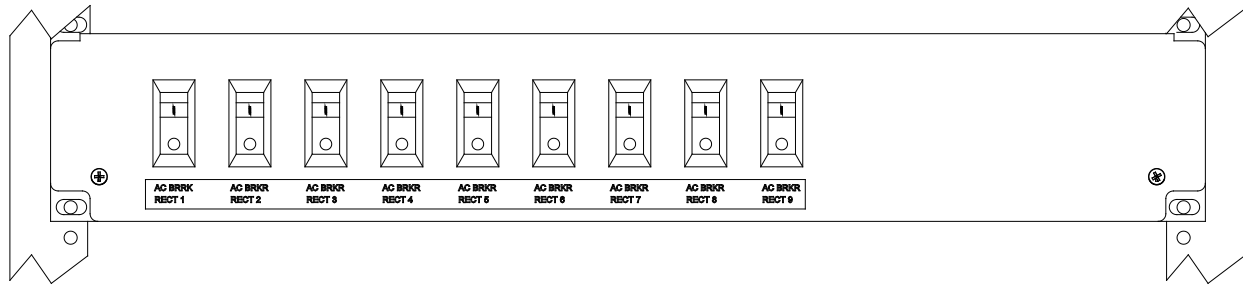
This section describes connecting the AC input cables within the Sageon II Power System. The AC input cable enters the System through the rear side enclosure conduit holes.

For each ordered Rectifier, connect an AC input cable AC input connection terminal blocks. See Figure 2-2 for the location of the connections.

- Switch Assembly – The switches are pre-wired from the factory. Connect the AC input cable directly to the AC input connection terminal blocks.
- No Switch Assembly – Connect the AC input cable directly to the AC input connection terminal blocks.

**IMPORTANT:** Do not change the factory-set rectifier position address. The address is set on the AC Backplane board, in switches S1. If inadvertently changed, go to Chapter 6-6, Installation for a procedure to set the address.


**FIGURE 2-2 TYPICAL AC INPUT & BATTERY CONNECTION (L66 SHOWN)**



**FIGURE 2-3 RECTIFIER BREAKER LOCATION (400A SHOWN)**

#### 2.4.5 Installing AC Power Input Cables

NOTE: The rectifiers are powered by single phase (phase to phase or phase to neutral) AC power ONLY. The rectifiers may be wired as a single phase load connected to a three phase source. See Chapter 3 for possible configurations. It is imperative that local and national electric codes be followed and good wiring practices be observed when wiring the Sageon II System. Only qualified licensed personnel should install this system.

5. Electrical shock hazard – Remove power from all involved wires and terminals before  proceeding.
6. Route the AC input cables into the rear conduit holes of the Sageon II Power System.
7. Prepare the AC cable by stripping the cable jacket approximately 4" (10.2 cm) to expose three wires. Strip each three wire end 0.5" (12.7 mm).
8. Identify Rectifier 1 of the Sageon II Power System by locating the top connector blocks. Rectifier positions are sequentially numbered from top to bottom and left to right.
9. Remove the screws holding the AC box cover plate. See Figure 2-2 and Figure 2-10.
10. Route and connect the prepared AC cable as described below. See Figure 2-2, 2-7, 2-9, 2-10, and 3-5.
  - Route the cable through the side conduit holes to the AC input connection terminal blocks. Insert L1, L2, and ground wires into the labeled terminals on the DIN block pass-through connector and tighten the terminal screws. Dress the cable to prevent interference with the remaining cables to be run.
11. To connect the remaining Rectifiers:
  - If each Rectifier is to be powered through a dedicated breaker and AC input cable, repeat the above steps at each rectifier position until all AC input cables are connected.
  - If two Rectifiers are to be powered through a single main breaker and AC input cable, “daisy chain” the selected number of AC input connectors. Then repeat the above steps for the next pair of Rectifiers.

## 2.5 CONNECTING BATTERY CABLES

Routing the stiff, heavy gauge battery cables is difficult. Two people may be needed. Exercise **extreme caution** to avoid a short circuit across the battery terminals.

**WARNING****ARCING HAZARD**

Arcing can cause equipment damage, load interruptions, and personal injury.

Remove watch and jewelry. Use insulated tools and extreme caution when working with a battery string.

Carefully insulate un-terminated battery cable ends.

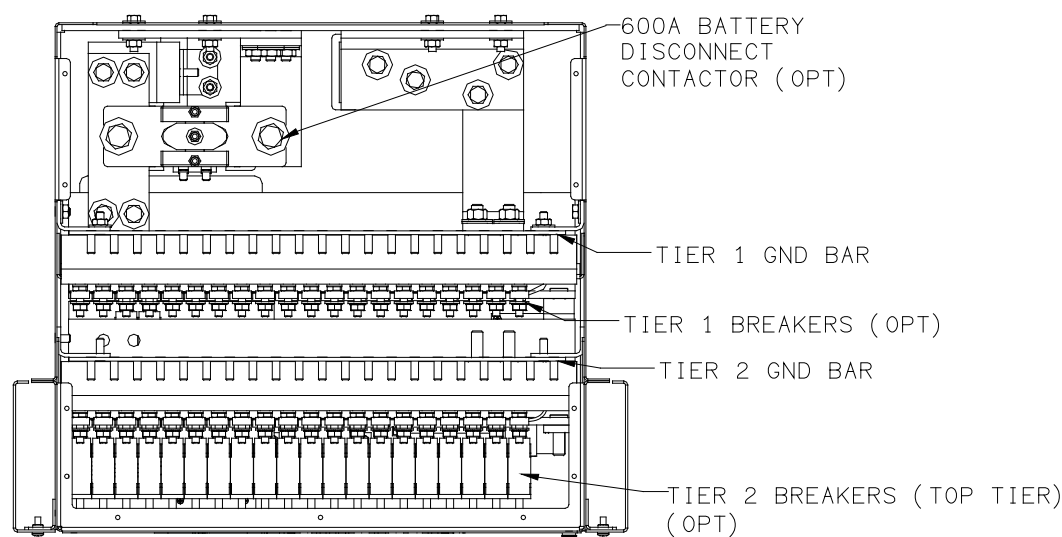
The Sageon II Power System has landings for battery cables; connect to the battery Negative bus and Positive bus. Each bus will accept terminals for 2-hole lugs for 3/8" bolts (1" center-to-center).

### 2.5.1 Installing the Battery Cables

This procedure includes the installation of the optional battery current transducers. Transducer mounting and wiring information is found in Section 2.9. Ignore references to transducers in the following procedure if not part of your installation.

If the installation includes a battery disconnect switch, modify the procedure accordingly.

1. Determine the correct battery cable size and shortest cable run. See Section 2.2.2 Selecting and Sizing DC Power Cables. The top of the distribution section is made of Lexan that can be cut for easy access when routing battery cables between the battery string and the Sageon II Power System battery charge bus and return bus. See Figure 2-2 for the location of the battery charge bus and return bus (battery) within the system.
2. Mount the optional battery current transducer and connect the transducer cable between the transducer and the Sageon II Power System as indicated in Section 2.9. Be sure that a transducer's battery cable opening is large enough for the selected cable diameter and the number of cables.
3. Run cables between the System and battery string 1. Route either battery cable (+ or -) through the optional battery current transducer; all battery cables routed through a transducer must be the same polarity. Transducers are marked, typically with an arrow, to indicate the direction of positive (battery charge) current flow. See section 2.9 for details.



**FIGURE 2-4 DC OUTPUT BUS (LOAD) LOCATIONS (600A, 2 TIER SHOWN)**

4. At the Sageon II Power System, strip the insulation from the cable ends and install a 2-hole crimp-on lug for 3/8" bolts (1" center-to-center) on each cable end.



The following connections are dependent upon System voltage (The Sageon II is available in a -48V system only).

**-48V System:**

- 1) Secure the negative cable to the negative bus (**right-hand** landing as viewed from the rear).
- 2) Secure the positive cable to the positive bus (**left-hand** landing as viewed from the rear).

**NOTE:** See table 2-2 for torque specifications.

5. At the battery string, strip the wire ends and install the needed battery terminals/clamps. **Confirm polarity with a voltage meter** and connect the wires to the battery string terminals.
6. Repeat the above steps for each battery string to be connected.

## 2.6 CONNECTING CUSTOMER LOADS

Customer loads are (See section 2.14) connected directly to the Sageon II Power System DC distribution hot and return busbars in accordance with site requirements and regulations. Distribution circuit breakers are not supplied with the Sageon II Power System.

Route distribution supply and return cables through overhead cable racks or trays as required.

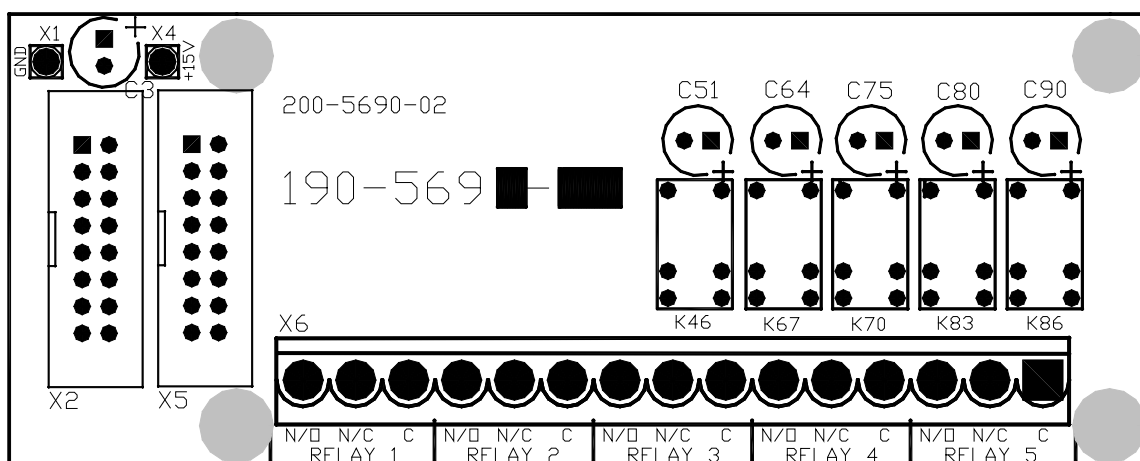
## 2.7 CONNECTING EXTERNAL ALARM ANNUNCIATORS

Five form C relay contact outputs are available for connection to external, user-supplied alarm annunciators. Figure 2-5 shows the Interface Board and the row of connectors (X6) provided for these connections. Review the alarm and relay contact specifications in Section 1.2.11 Alarm Specifications to ensure compatibility with external annunciators and other equipment before proceeding.

Alarm relay outputs are provided for remote annunciation of fault conditions. All relays are user programmable through the SageView software.

As shown in Figure 2-5, each relay has three connections: common, normally open, and normally closed. The normally open (NO) and normally closed (NC) labels are for an un-powered Sageon II Power System. Relay coils are energized during normal Sageon II Power System operation. During an alarm, the appropriate relay coil is de-energized. Form C contacts are assigned to each alarm.

**IMPORTANT:** When the relay contacts are connected to a reactive load, such as a solenoid or relay coil, the load must be shunted by a transient suppression diode to prevent damaging relay contacts.

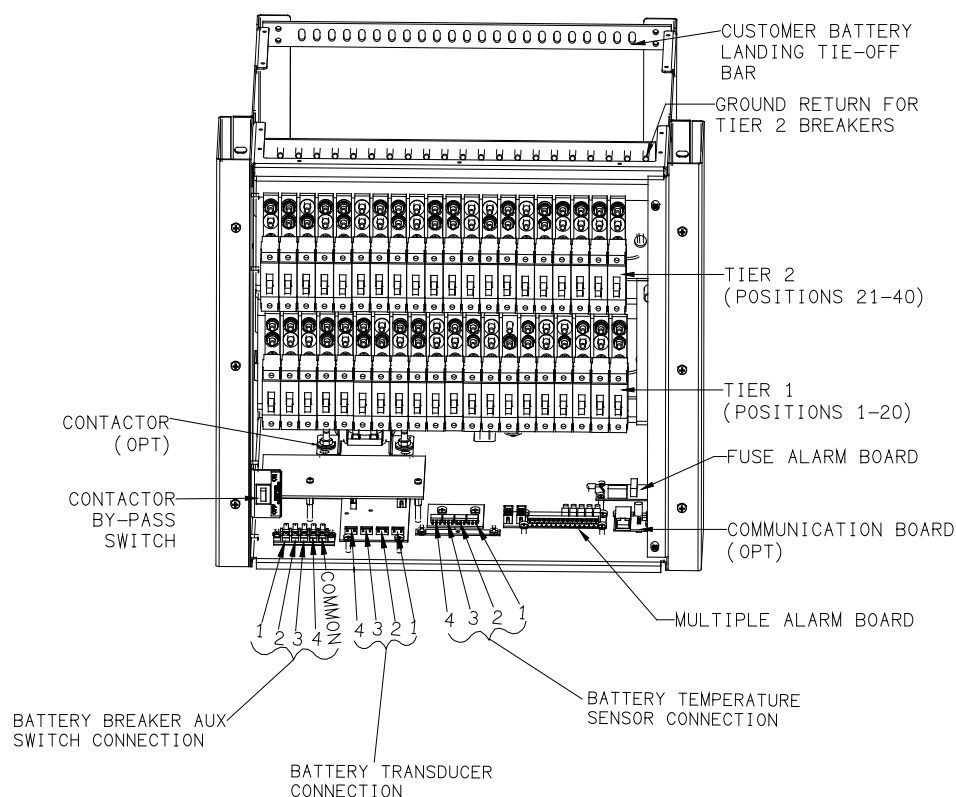


**FIGURE 2-5 INTERFACE BOARD, CUSTOMER CONNECTIONS**

## 2.8 BATTERY TEMPERATURE SENSORS AND KITS (OPTION)

The Multiple Battery Temperature Board is included in the Sageon II distribution. It can accommodate up to four battery temperature sensors. Temperature sensors are ordered separately. If ordered with the system, the sensors are connected to the Multiple Battery Temp Board and the sensors and wires then coiled and tied to the return bus.

If not ordered with the Sageon II Power System, an Ambient and a single Battery Temperature Sensor can be ordered separately. See J-SAGEON2.LXX drawing set for Temperature Sensor Kits.



**FIGURE 2-6 BATTERY CONNECTIONS**

### 2.8.1 Installing the Sensors

1. Open the distribution door and locate the Multiple Battery Temperature Board. Locate the coiled sensors.
2. If not already connected, plug the battery temperature sensor connectors and the ambient temperature sensor into the Controller backplane board. See Table 2-4 for the connectors and Figure 2-6, 2-11, and 2-12 for a view of the board. The connectors are keyed.

**TABLE 2-4 BATTERY TEMPERATURE SENSOR CONNECTIONS**

Sensor	Connector
Battery String 1 Temperature	X1
Battery String 2 Temperature	X2
Battery String 3 Temperature	X3
Battery String 4 Temperature	X4
Ambient Temperature	X3

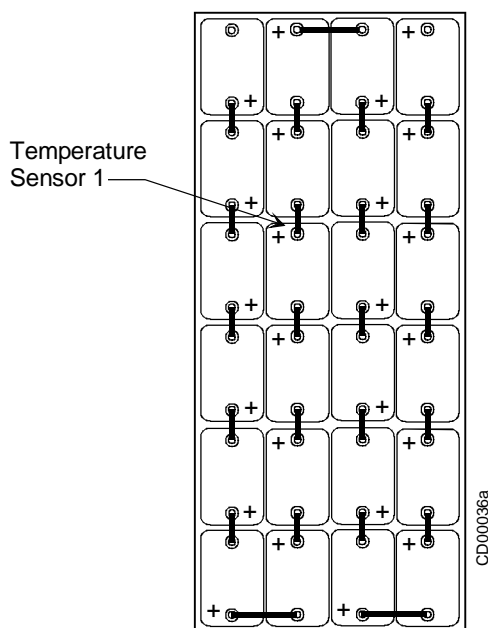
3. Select a location for mounting the ambient temperature sensor ring lug. The temperature of this mass should have a fairly long thermal time constant (e.g. temperature should not cycle with short-term temperature changes due to normal environmental heating and cooling cycles).
4. Fasten the ambient temperature sensor to the selected point using appropriate user-supply hardware. Typically this could be the equipment rack the Sageon II system is mounted in.
5. Route the 4 battery temperature sensors to the battery string(s). Typically somewhere close to the string midpoint.
6. Determine which battery posts will have sensors attached. Suggested location is shown in the adjacent battery string drawing.

Note: The highest of the four battery temperature readings is used for compensation. Locate a sensor at the warmest battery, generally one at the center of a battery group.

7. Determine the charge/discharge status of the battery string. Connecting the sensors may result in a momentary battery string open circuit when the terminal bolt is removed.

**CAUTION: DO NOT** proceed if the battery string is being charged or discharged at a high rate. Continue only when the charge or discharge rate is at a safe level.

8. Remove the bolt holding the inter-cell battery strap in place. Insert the bolt through the battery temperature sensor ring lug, through the strap, and into the battery terminal. Tighten the bolt as recommended by the battery manufacturer.
9. Repeat steps 7 and 8 to install the remaining battery temperature sensors.
10. Bundle and secure excess wiring.
11. Enable compensation using the operator panel push buttons and menus or a PC running SageView.
12. If installing the Sensor Kit, get the compensation chart label. Remove the backing from the label and place the label on the inside of the distribution area door.



**FIGURE 2-7 TEMPERATURE SENSOR LOCATION**

## 2.9 INSTALLING A BATTERY CURRENT TRANSDUCER (OPTION)

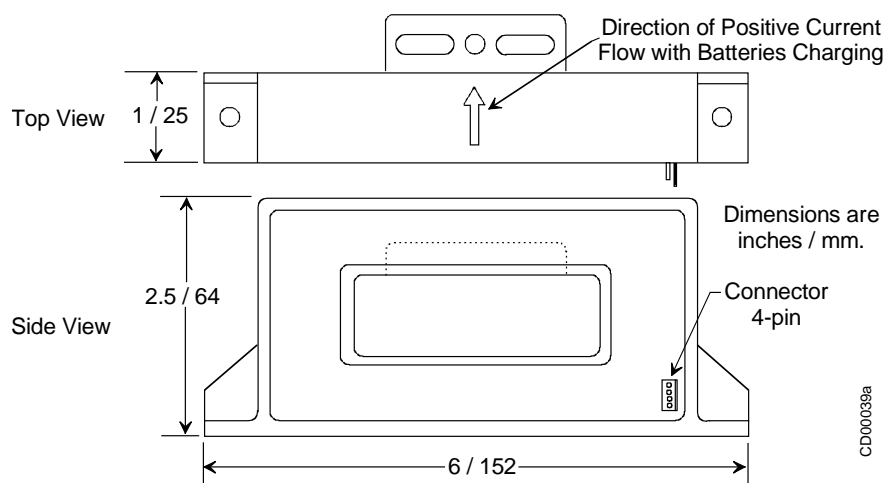
The optional battery current transducer senses the battery current for display on the operator panel. When installed, the battery current transducer also allows the user to configure the SCU to limit the recharge current to the battery string in order to extend battery life; and set a fixed, repeatable discharge current for battery discharge tests.

Install one battery current transducer per battery string (up to four transducers). If not ordered with the Sageon II Power System, a Battery Current Transducer Kit is available.

To install a transducer kit:

1. Mount the transducer(s) with user-supplied hardware. Figure 2-8 shows a typical transducer. Often, transducers are mounted on the battery rack. The location must allow for convenient routing of one or more battery cables, or intercell connectors, through each of the transducers. The three possible installation options are:
  - a. If transducer is installed on the positive lead(s) of the battery string, the arrow will point toward the battery string's positive post.
  - b. If the transducer is installed on the negative lead of the battery string, the arrow will point toward the system loads – away from the battery string's negative post.
  - c. If the transducer is installed on one of the intercell connectors the arrow on the transducer will always point to the positive post of the next battery cell in the battery string. If the intercell strap will not fit through the current transducer, the strap may be replaced with a short cable, lugged on both ends that will fit through the transducer.
2. Open the distribution door and locate the supplied battery current transducer cables; there is one cable per transducer. The 4-conductor cables are coiled and tied to the return bus (loads) in the distribution area of the Sageon II Power System. The length of the supplied cables is 4 ft. (29.1m).
3. Refer to Table 2-5 and connect the battery current transducer cable(s) to the Battery Distribution Module connector(s). See Figure 3-9 for a view of the Battery Distribution Module.
4. Route the cable through overhead cable trays to the transducer. Connect the cable to the transducer.





**FIGURE 2-8 TYPICAL BATTERY CURRENT TRANSDUCER**

**TABLE 2-5 BATTERY CURRENT TRANSDUCER CONNECTIONS**

Battery Current Transducer	Battery Distribution Module Board
1	X22
2	X18
3	X17
4	X12

## 2.10 SAGEON BATTERY MONITOR (OPTION)

The UNIPOWER Sageon Battery Monitor (SBM) is an add-on System for the Sageon II Control Unit (SCU). It is used to monitor individual cells of a battery during float or equalization operation, or during a discharge. Each SBM unit is capable of monitoring up to 24 cells or monoblocks. Up to four SBM units can be used to monitor up to 4 battery strings of 24 cells or monoblocks each.

Using the ability of the SCU to communicate to a remote or local PC, cell voltage data accumulated during a discharge can be transferred to a PC and saved. The cell voltages can also be viewed in real time when the SCU is connected to a PC. The SageView software that is running on the PC can display the cell voltage data in various convenient formats to ascertain the state of health of batteries.

In addition to the real time or historical representation of the data on SageView, the cell voltages can also be observed in real time on the SCU display.

In the event that the battery behaves in a way that is less than ideal during a test or actual discharge, a number of pre-programmed parameter levels are used to generate alarms. Alarms are annunciated on the SCU front panel by a LED and screen message and remotely via voltage free contacts or via the USB communications port that can connect directly to a PC locally or remotely via a modem or Ethernet.

*Refer to the Sageon Battery Monitor Manual (PM990-4209-00) for detailed information.*

## 2.11 SITE MONITOR SYSTEM (OPTION)

The Site Monitor System is used to monitor the status of equipment external to the Sageon II Power System. It has 12 digital inputs, 8 analog inputs, and 4 form-C user assignable alarm relay contacts. Digital inputs are often used to monitor site

security, such as door or window openings, or other on/off function, such as a pump switch or motor starter. Analog inputs frequently used to monitor a fuel level or other variable such as a voltage, current, or frequency.

*Refer to the Sageon Site Monitor Application Note (AN103-4012-00) for detailed information.*

## 2.12 COMMUNICATIONS

Communication choices include operator panel mounted USB (standard) and an Ethernet network (optional) with or without SNMP support. The following devices can access the SCU and the data it has stored for System configuration, System operation, and troubleshooting alarm events:

- Connect a local PC running SageView (included) to the SCU by way of the operator panel mounted USB connector and a user-supplied USB-A plug to USB-B plug type.
- Connect a remote (i.e. network connected) PC running SageView (included) to the SCU by way of the company's intranet, the Internet.
- Connect a remote (i.e. network connected) PC running standard SNMP based monitoring software (customer supplied) to the SCU by way of the company's intranet or the Internet.

For NEBS compliance, use shielded Ethernet communications cables for Ethernet communications.

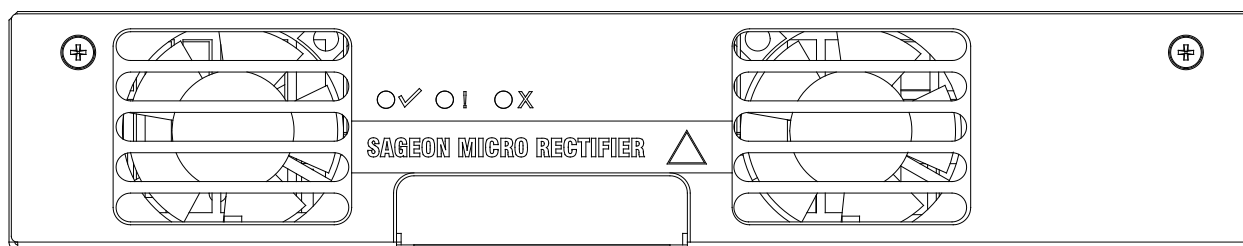
For additional information about SageView, refer to Chapter 5.

**IMPORTANT:** Always consult your company's network administrator before connecting local or remote equipment to the SCU or to the company network. Security must be a primary concern.

**Note:** Consult your company's network administrator about system communication and data compatibility, communications cable specifications, cable routing, and methods of connecting to a network.



## 2.13 INSTALLING AND REMOVING RECTIFIERS

When ordered with a Sageon II Power System, each Rectifier is shipped in a separate package. A Rectifier is shown in Figure 2-9.



**FIGURE 2-9 RECTIFIERS**

A Rectifier can be installed or removed "hot" (i.e. with AC power and DC load applied) with no interruption of Sageon II Power System service. When removing a Rectifier, there must be sufficient remaining current capacity to supply the load.

	<b>WARNING</b>
<p>Electrical shock hazard</p> <p>Hazardous voltage can cause death or serious injury.</p> <p>240 VAC may be present at the Rectifier Switch Assembly and AC Backplane.</p> <p>Always use insulated tools.</p>	
	



#### Installing a Rectifier:

1. Remove a Rectifier from its shipping container. Save the packaging materials.
2. Select a position in which to install the Rectifier.
3. The optional AC breaker should be in the OFF position.
4. To install a Rectifier:
  - a) Note the voltage and current ratings of the rectifier. Use only 48V rectifiers in the system.
  - b) Slide the Rectifier slowly into the Housing until the Rectifier's rear connectors just engage the Housing connectors. Fully seat the Rectifier in the Housing to properly engage the connectors.
5. Check to be sure that the locking mechanism has engaged with the rectifier.
6. If step 3 was performed: Apply power to the newly installed rectifier by turning on the AC breaker.
7. Repeat the preceding steps for each Rectifier to be installed.

To commission the Rectifier(s), go to Chapter 3 Commissioning.

#### Removing a Rectifier:

1. Optional: Remove power from the Rectifier. Set the breaker to the OFF position.
2. Lift the locking mechanism.
3. Grasp the rectifier handle and pull the Rectifier forward 2" to 3".
4. Grasp the Rectifier and pull it straight out from the Housing. The Rectifier weighs approximately 5 lbs (2.3kg).
5. Set the Rectifier aside and attach a tag stating its operating status (e.g. OK, needs servicing).

	<b>CAUTION</b>
<p>Electrical shock hazard</p> <p>After removing a rectifier, be careful not to touch the rear connector. The rectifier will take approximately 1-2 minutes to self discharge. The red LED will flash during this time.</p>	
	

## 2.14 CONFIGURATION

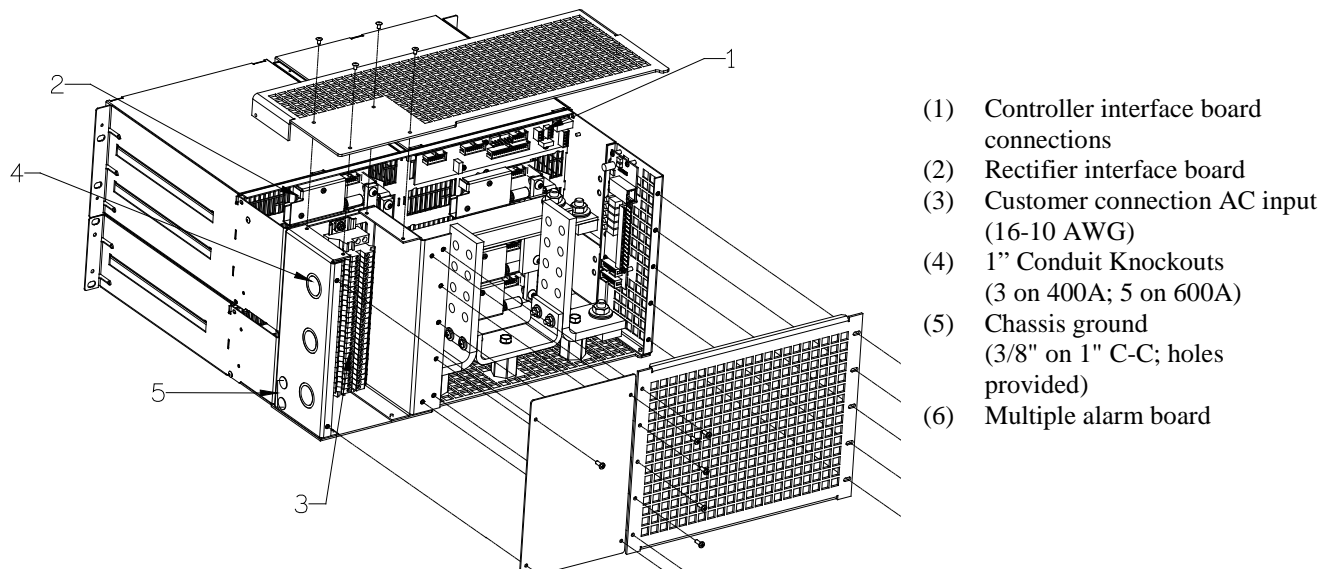
### 2.14.1 General Description

Sageon II Power Module systems are turn-key DC uninterruptible power supply solutions (DC UPS) for powering 48VDC telecommunications and industrial equipment. The Power Module provides integrated battery management functions for a

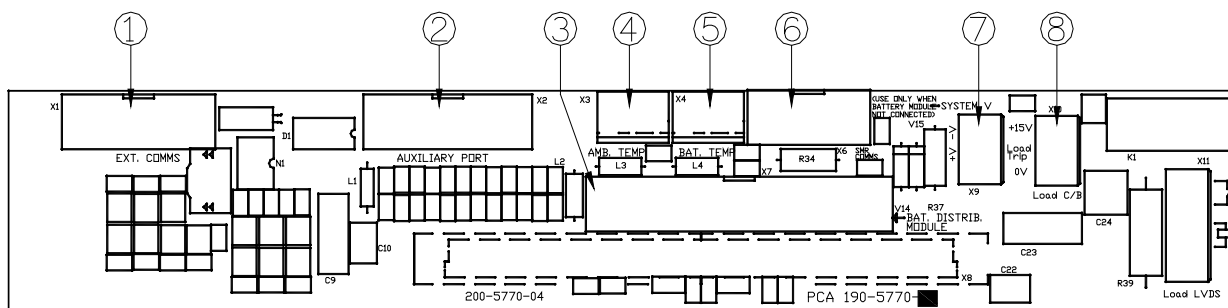
range of battery types (VRLA, flooded Lead-acid, NiCad, Ni-MH, Li-polymer) to enable easy commissioning of a DC UPS or it can be used as a standalone DC source when no batteries are used.

The Power Module provides the following integrated features:

- power distribution
- battery charge current limiting (opt)
- battery temperature sensing(opt)
- accurate temperature compensated Float and Equalization voltages (opt)
- optional modules for monitoring site status and battery cell voltages
- optional AC breakers
- n+1 redundant rectifiers
- short circuit and reverse polarity protection
- a monitoring and control module (Controller)
- super capacitor backed real-time system clock
- optional remote communication capability, including web-based protocols
- all rectifiers and the controller are hot-swap and plug-and-play capable



**FIGURE 2-10 REAR VIEW OF CONNECTIONS**



**FIGURE 2-11 CONNECTIONS ON CONTROLLER BACKPLANE**

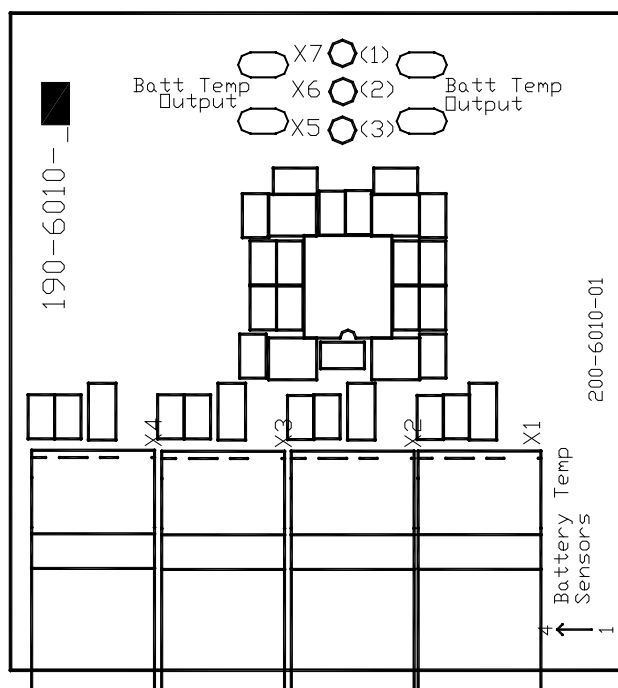
- (1) Remote communications module connection (14-way ribbon)
- (2) Auxiliary peripheral module (relays, battery cell monitor, etc) connection (16-way ribbon)\*
- (3) Battery (& load) distribution module connection\*\* (34-way ribbon)
- (4) Ambient temperature sensor connection
- (5) Battery temperature sensor connection
- (6) Rectifier isolated communications connection (10-way ribbon)\*

- (7) Standalone system voltage connection (Controller power and voltage sensing)
- (8) Load circuit breaker trip detection circuitry connection

Notes:

\* Devices and cable connections are pre-wired as part of the supplied and tested Power Module

\*\* This connection can be left unused if the system has no requirement for control and maintenance of batteries (i.e. standalone DC power supply)



**FIGURE 2-12 TEMPERATURE CONCENTRATOR BOARD**

### 3.0 COMMISSIONING

This chapter describes commissioning a Sageon II Power System. Individual system settings can vary widely so it is important that those performing the commissioning fully understand the system at hand. Modify these procedures as needed to accommodate the installed equipment and your company's commissioning procedures.

#### 3.1 PREPARATION

Perform the following steps prior to commissioning a Sageon II Power System.

1. Gather system wiring diagrams, battery data sheets, and other site documentation for ready reference should it be needed.
2. Complete all installation steps. Refer to Chapter 2 Installation as necessary.
3. Review the steps in Section 3.2 Commissioning a System.
4. Become familiar with operator panel LEDs, front panel displays, push buttons, and menus by reading Chapter 4 Configuration and Operation.
5. Start up configuration parameter values:
  - Battery String Connected to System (without LVD option)– The string will power the SCU prior to starting the first Rectifier, assuming at least a minimal battery charge, and the SCU 2-line display and status LEDs will be active. See Table 4-1 for a list of default parameters and values.
  - No Battery String Connected to System (or battery connected and LVD option system) – When the first Rectifier starts and powers the SCU, the SCU will load a default System configuration. You may then use the operator panel to change many of these default parameter values to accommodate the application. See Table 4-1 for a list of default parameters and values.

Alternatively, edit the configuration parameter values, or load a new configuration, from a PC connected to the USB port on the System operator panel or from a PC connected to an Ethernet network (an IP address must be entered). The PC must be running the SageView System Monitor software.

6. Become familiar with the Rectifier LED codes in Section 4.3.
7. The system may be commissioned with the battery string(s) connected or disconnected, however, consider the configuration statements in paragraph 5 above.
8. Finally, perform the steps in Section 3.2 Commissioning a System.

#### 3.2 COMMISSIONING A SYSTEM

This procedure assumes a newly installed system that includes connected batteries and loads.

1. Before applying AC power, check that:
  - All AC input cables are connected to the correct terminals and that connections are tight
  - All load (supply and return) and battery cables are correctly connected and that connections are tight; check polarity as well
  - All alarm wiring is correct and tight, and that alarm annunciators function
  - The System housing and return bus are connected to the site earth ground
2. Read the operator panel display and note LED indications.
  - If a connected battery string is supplying sufficient power to the SCU, the operator panel 2-line display will be active and show System voltage and current. The LEDs should also be active with an alarm showing since all Rectifiers are Off. The factory-installed or uploaded configuration will specify the number of Rectifiers. See Table 4-1 for default parameters and values.
  - If a battery string is not connected or the string cannot supply sufficient power, the SCU will not be operating. There will be no operator panel display or lighted LEDs until a Rectifier is started later in this Section.

3. Ensure that the circuit breakers in the user's AC electrical service panel are Off.
4. Disconnect all loads from the system by turning Off all load breakers.
5. The Rectifier On/Off breaker of each Rectifier, is set to Off. See Figure 2-3.
6. Turn On power to Rectifier 1.

The top-most Rectifier in the stack will perform a power-up self-test lighting the three LEDs on the rectifier. After a brief period, the red and yellow LEDs will extinguish and green LED will remain lighted (Float mode). Refer to the following note and to Section 6 Troubleshooting should the red or yellow LEDs remain lighted.

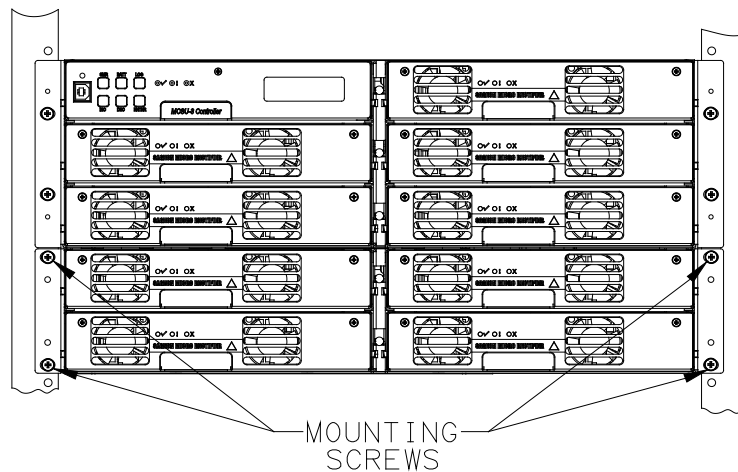
**Yellow LED Note:** When starting the System for the first time, it may be necessary for the rectifiers to supply significant current for initial battery charging. A lighted yellow LED on a rectifier may not be due to a rectifier problem but rather indicate that the rectifier is operating in the over-current mode due to a discharged battery string. If this is the case, continue with the procedure to bring additional Rectifiers on-line.

7. Read the rectifier current and voltage on the operator panel 2-line display. The Red LED on the panel will be lighted unless the number of operating Rectifiers equals the number of Rectifiers in the System configuration, in which case the Green LED will be lighted. Refer to Section 6 Troubleshooting as needed.

155A 54.2V FL
------------------
8. Connect a 10 to 50A load to the System through a distribution breaker or fuse. Refer to Chapter 4 Configuration and Operation and use the operator panel push buttons and menus to:
  - 1) Turn Off battery temperature compensation. (Note: If the float voltage is set at high or low battery temperature with battery temperature compensation turned On, compensation may adjust the System voltage by as much as 2 volts.)
  - 2) Connect the load to the System by closing the distribution breaker.
9. Repeat Steps 7 through 10 until all Rectifiers are on-line and taking load. As Rectifiers are brought on-line, the load may be increased.
10. At the operator panel, verify that each Rectifier is sharing current and the Sageon II Power System voltage is set to the desired Float voltage, generally  $-54.2 \text{ Vdc} \pm \frac{1}{2} \text{ volts}$ . (Panel display accuracy is  $\pm 5\%$  full scale.)
11. Configure the Sageon II Power System as described in Chapter 4 Configuration and Operation. If the configuration has been created on a PC and is to be uploaded to the operating Sageon II Power System, also refer to Chapter 5 SageView.
12. Thoroughly test the new configuration to ensure that all configurable parameters are correct. Test the alarm circuits to ensure correct activation.
13. As needed, operate the system for 15-20 hours to charge the battery string(s) before placing the system on-line.

### 3.3 MOUNTING THE POWER MODULE

The Power module is mounted into a standard 19" or 23" rack using 12-24 screws. A minimum of 8 screws are required to secure the Power Module into the rack. It is recommended to initially install the Power Module into the rack without either the Controller or the rectifiers in place. (Racks are required and ordered as line items with the Sageon II system. Systems will typically be mounted at the factory and shipped as a complete unit.)



**FIGURE 3-1 MOUNT POINTS FOR SECURING POWER MODULE IN A RACK**

Wiring for the standard Distribution Power Module is front and rear access.

#### Tools Required for Installation

- No. 2 screwdriver (for tightening rack bolts)
- No. 1 screwdriver
- ½" insulated wrench
- Small flat-blade screwdriver (for tightening DIN rail terminal screws)

### 3.4 GAINING ACCESS TO REAR WIRING

**NOTE:** Access to the rear wiring should be limited to qualified service personnel. It is recommended to remove the AC power before gaining access to the rear wiring due to the safety hazard present inside the electrical enclosure. Similarly, the energy hazard associated with the batteries connected to the DC bus must be addressed through the use of appropriately insulated tools and other measures to prevent accidental short circuits to the DC bus.

To open the rear cover, remove the rear screws securing the cover to the back. The back cover and AC box cover plate can be removed to provide access to the wiring. (See Figure 2.10)

### 3.5 OVERVIEW OF EXTERNAL WIRING CONNECTIONS

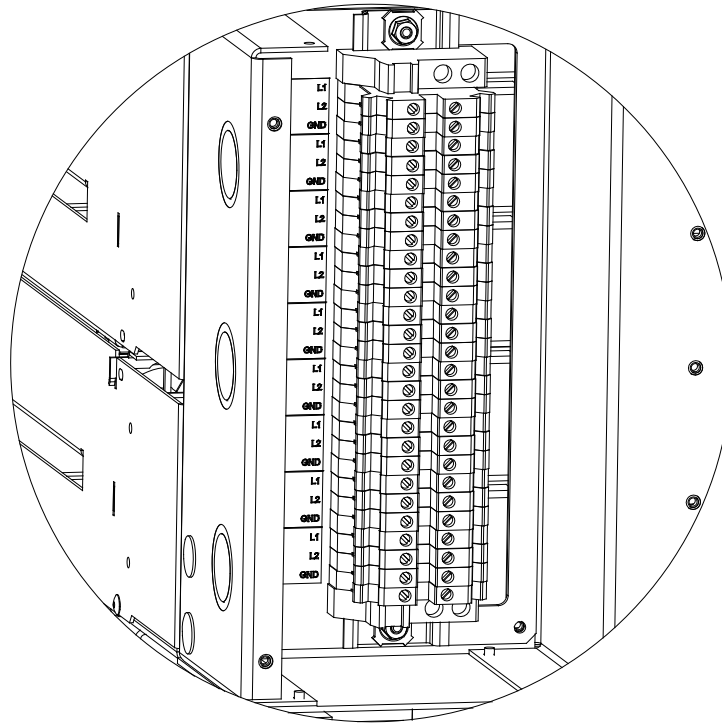
SD-SAGEON2.L2X drawings located in the back of the manual show the internal and interface schematic for the Sageon II Power Module with distribution. For the purpose of indicating how a system is connected, the same schematic applies to other Power Module products.

The system shown is for a -48V system where the positive side of the DC bus is tied to ground, usually on the common return bar. It is also possible to float the output, but under these conditions, there is no guarantee that all voltages on the DC bus will stay below the Safety Extra-Low Voltage (SELV) limits with respect to ground during fault conditions.



The power distribution DC output connections are shown in Figure 2-4. The positive terminal bus is located on the right side, looking from the back. Battery connections are shown in figure 2-2.

The AC input connections are located on the left side of the module. There are  $\frac{3}{4}$ " and  $\frac{1}{2}$ " concentric conduit knockouts located along the left side, looking from the back, for the electrician. The AC feed should be wired as individually protected feeds for each rectifier (recommended and preferred) to provide discrimination of fault protection devices. Where the AC breaker option is integrated into the Power Module, each rectifier feed is individually protected and the installer is only required to connect a single AC supply (1 phase) to the AC DIN rail terminations.



**FIGURE 3-2 AC FEED TERMINATIONS**

### 3.6 FACTORY SUPPLIED CONFIGURATIONS

Power shelves internal AC distribution, are configured with each rectifier AC line being terminated in an individual DIN rail terminal. The grounding wire connects to the green/yellow terminal block.

#### 3.6.1 Single phase – individual protected external feeds

Connect each of the circuit breaker protected phase wires to the individual terminal blocks, labeled L1, that feed each rectifier. Connect the neutral (or phase 2) wires to the terminal labeled L2 for each rectifier.

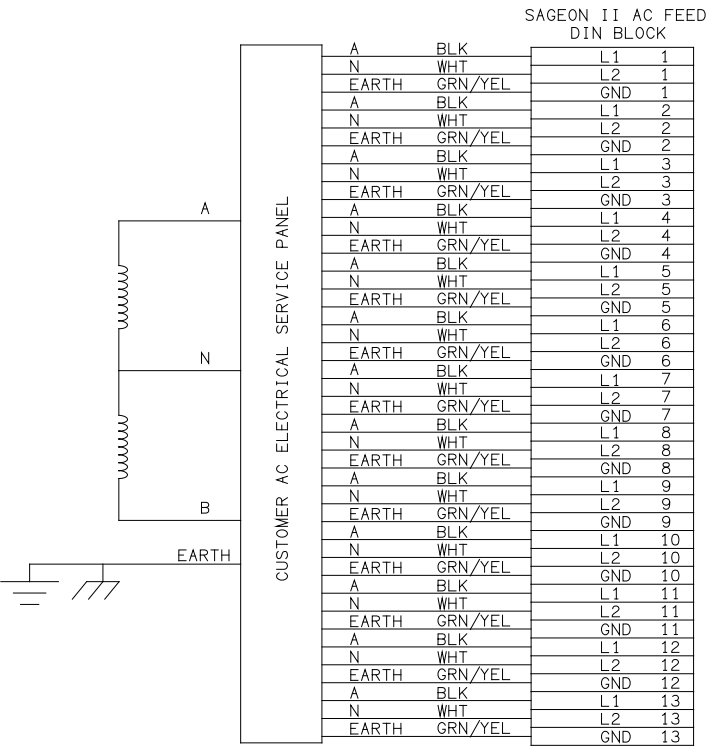


FIGURE 3-3 SINGLE PHASE FEED (PHASE TO NEUTRAL)

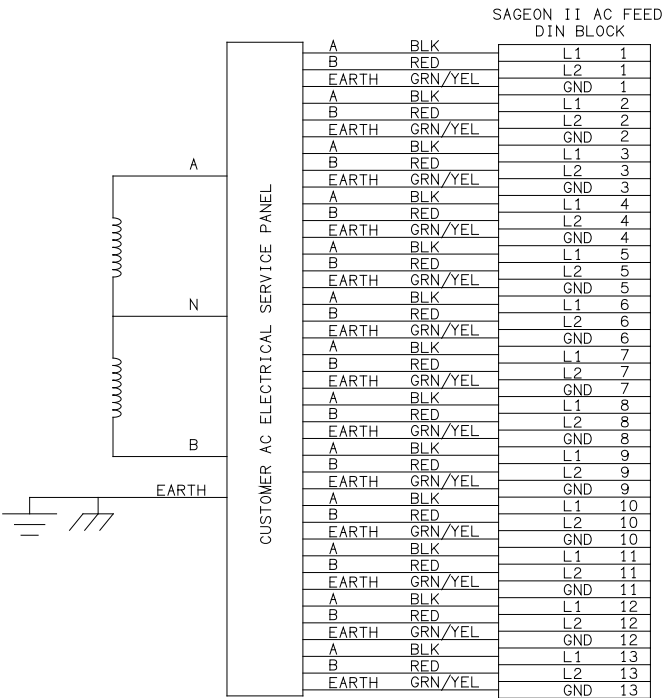


FIGURE 3-4 SINGLE PHASE FEED (PHASE TO PHASE)

NOTE: PHASE "A" WILL  
BE UNBALANCED.

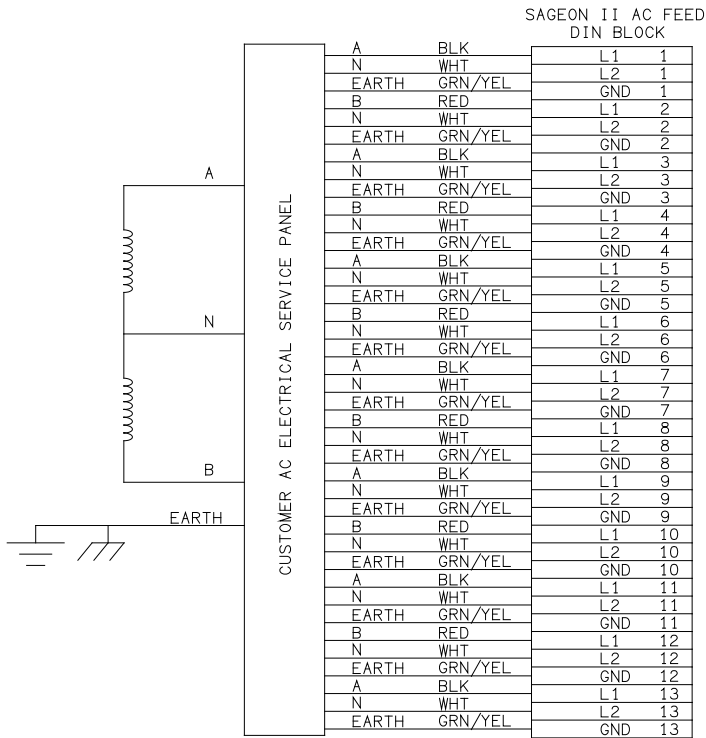


FIGURE 3-5 SPLIT SINGLE PHASE FEED (PHASE TO NEUTRAL)

NOTE: PHASE "A" WILL BE  
UNBALANCED.

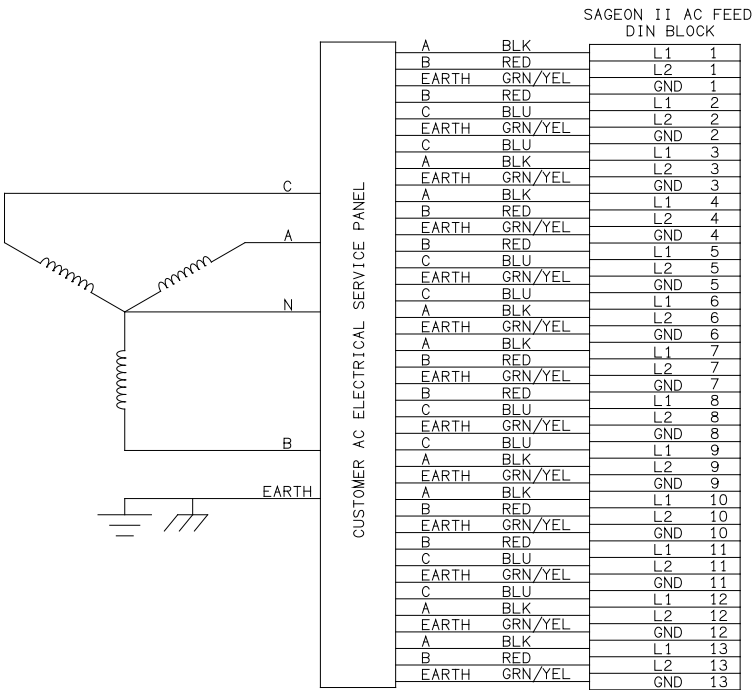
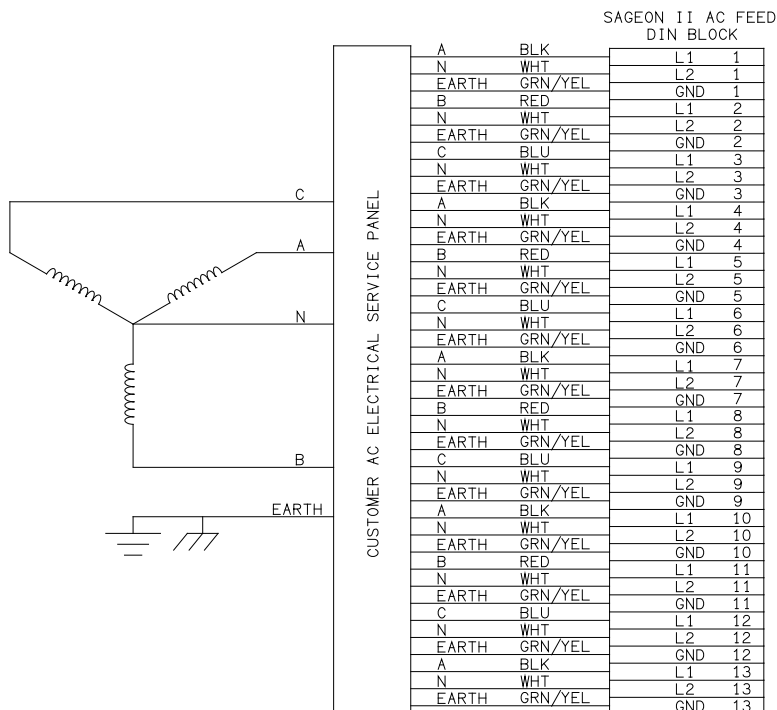


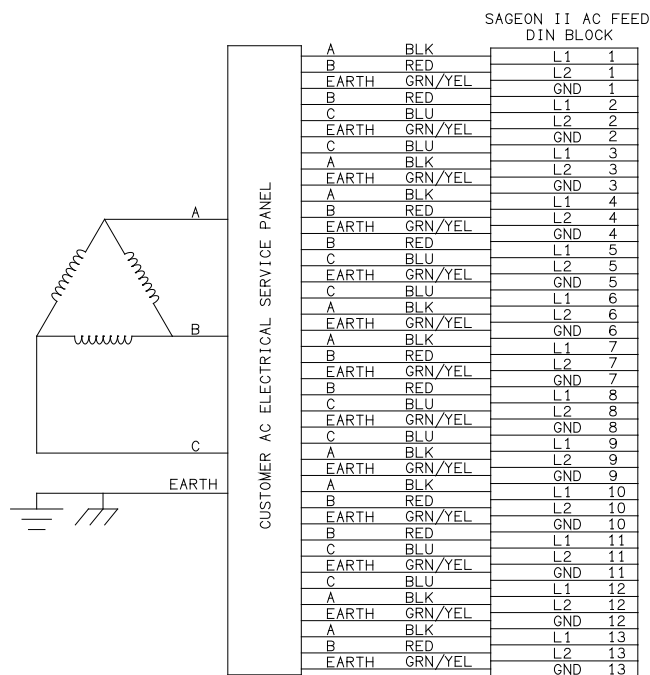
FIGURE 3-6 Y-THREE PHASE FEED Δ-CONNECTED RECTIFIERS (PHASE TO PHASE)

NOTE: PHASE "A" WILL BE  
UNBALANCED, AND NEUTRAL  
WILL CARRY CURRENT.

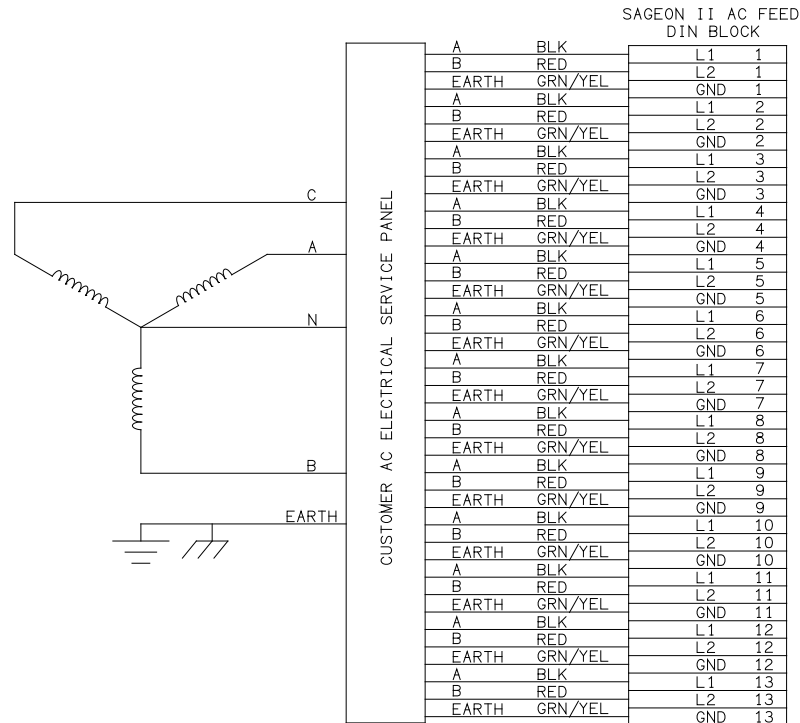


### FIGURE 3-7 Y-THREE PHASE FEED (PHASE TO NEUTRAL)

NOTE: PHASE "A" WILL  
BE UNBALANCED.

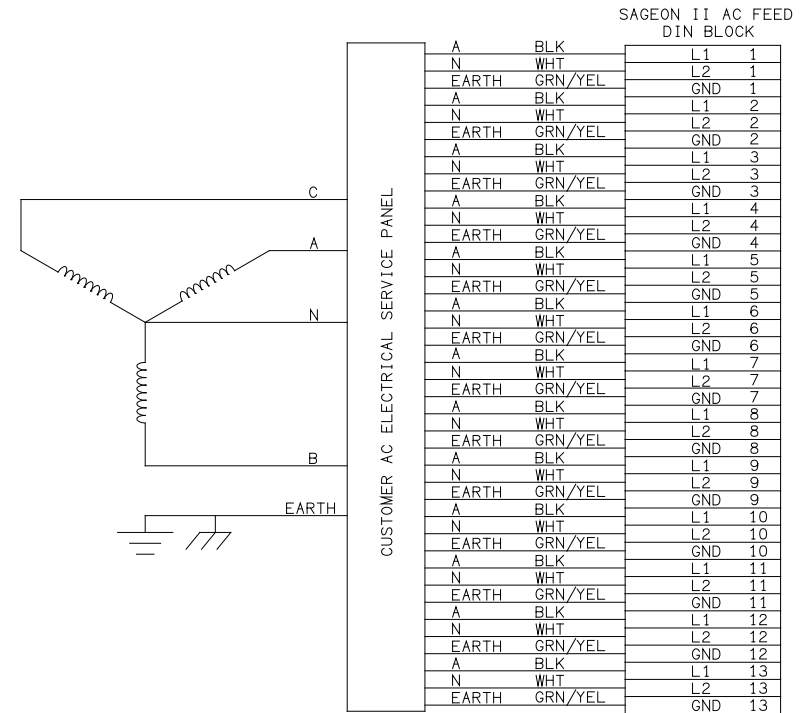


**FIGURE 3-8  $\Delta$ -THREE PHASE FEED (PHASE TO PHASE)**



**FIGURE 3-9 Y-THREE PHASE FEED; SINGLE PHASE TO RECTIFIERS (PHASE TO PHASE)**

NOTE: PHASE "A" WILL BE UNBALANCED, AND NEUTRAL WILL CARRY CURRENT.

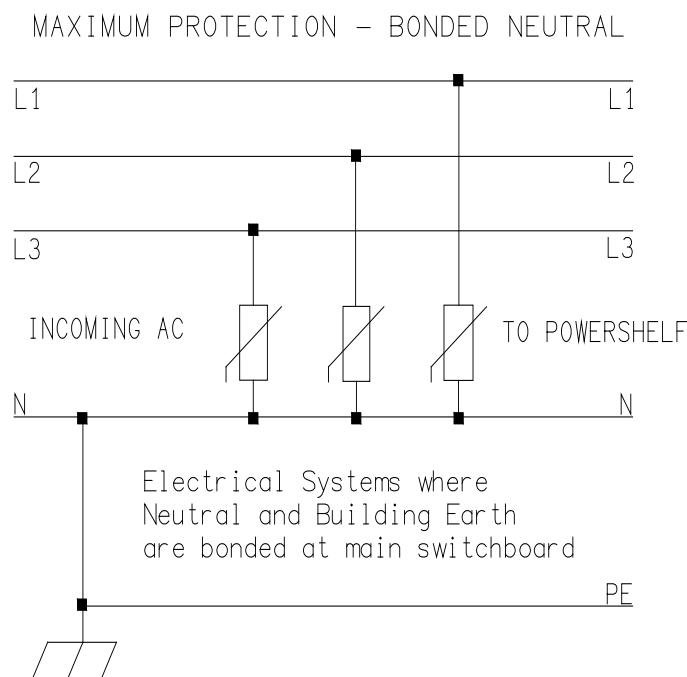


**FIGURE 3-10 Y-THREE PHASE FEED; SINGLE PHASE TO RECTIFIERS (PHASE TO NEUTRAL)**

### 3.6.2 Surge protection requirements

The rectifiers are internally protected for surges up to 6kV/3kA. For higher levels of protection, particularly for sites with high incidence of lightning or switching surges, additional surge protection is required on the AC feed to the Power Module. Typically surge arrestors with a 10kA-40kA rating are required with the highest level of protection being provided when arrestors are connected between phase-neutral (x3 phases) and between phase/neutral-earth (x 3 phases).

Other arrangements (for 3-phase “Y”) with similar levels of protection are also possible as shown below. The voltage rating of the arrestor should be selected based on the maximum AC voltage likely to appear on the line. The arrestor should limit the voltage to <1200V – 1400V at the rated maximum pulse current.



**FIGURE 3-11 SURGE PROTECTION**

#### Battery connections

The cables can be either brought out through the cut out at the rear of the unit, or through the cutouts made in the top cover.

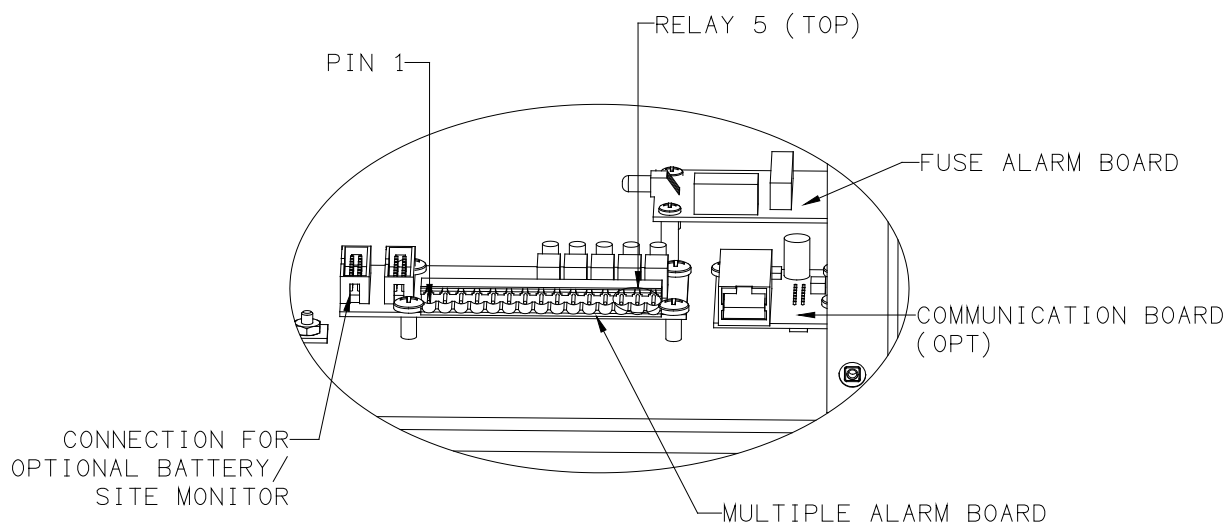
This cable must be sized accordingly to carry the battery short circuit current for the time required to clear the battery protection devices.

**Note:** Ensure the battery circuit breakers are open before connecting the batteries. Connect the switched cable connections first, followed by the common return cable connections.

### 3.7 TEMPERATURE SENSORS

The optional sensors for measuring ambient and battery temperature are the same device (Part No. 385-5941-03, -06, -15, -30). The system auto-detects if the sensor is plugged into one of the positions (4) or (5). If no sensor is installed, the Controller will show “Not Available” in the menu items for the temperature measurements. Locate the ambient sensor close to the intake air zone of the Power Module. Locate the battery sensor on a battery block in the middle Module of the battery bank (likely hot zone).

### 3.8 AUXILIARY RELAY CONNECTIONS



**FIGURE 3-12 COMMUNICATION INTERFACE BOARD (OPT) & MULTIPLE ALARM BOARD**

The user configurable auxiliary relays contacts are shown above. The contacts are rated for 1A 250VAC or 1A 32VDC and have >1kV isolation to the coils.

The pin configuration is: (Pin 1 shown in Figure 3-16)

Relay #	Pin #	Pin function
1	1	N.O. (normally open)
	2	N.C. (normally closed)
	3	C (common)
2	4	N.O.
	5	N.C.
	6	C
3	7	N.O.
	8	N.C.
	9	C
4	10	N.O.
	11	N.C.
	12	C
5	13	N.O.
	14	N.C.
	15	C

The relays, being user configurable, can be arranged to activate for multiple alarm conditions or a single alarm only. The logic can be inverted for individual relays so that one becomes a controller failure indicator (use the normally closed contact as this will also indicate if the relay power has failed).

### 3.9 CONTROLLER POWER CONNECTIONS

Power for the Controller and its peripherals is derived from the DC bus or the highest charged battery. The Battery distribution module has reverse polarity protection circuit that also serves to provide an “or-ing” of the highest supply voltage for the Controller. No additional user connections are required to power the Controller or provide system voltage regulation, if the battery distribution module is used.

### 3.10 FRONT PANEL USB COMMUNICATIONS CONNECTION

The front USB port on the Controller is configured as USB-slave and has a B-type connector. A standard USB A-to-B cable is required. The Controller can only communicate via the USB port to a PC running the Sageview software.

The USB connection requires that a USB driver be installed on the PC. The first time the Controller is plugged into the PC via the USB port, a Microsoft® Windows dialogue box will appear asking the user to install the Controller USB Interface

drivers. The Microsoft® Windows operating system should be able to find the drivers automatically on the Sageview CD-ROM, assuming it is in the CD-ROM drive of the PC.

If Sageview is running when the unit is plugged in, a Windows dialogue box will appear asking the user if they wish to connect to the unit immediately. Otherwise the user will need to select the Controller from the available controller USB devices in USB section in the Connection Setup.

### 3.11 REMOTE COMMUNICATION CONNECTION

The optional remote communications modules can be one of the following:

<i>P/N</i>	<i>Description</i>
385.4014.25	TCP/IP Interface Card
<del>385.4015.25</del>	<del>Ethernet TCP/IP Interface Card w/SNMP</del>
385.4036.25	Ethernet TCP/IP Interface Card w/SNMP v3

{ Superseded by 385.4036.25

The following sections describe the interfaces in more detail and cover some of the set up requirements for the more advanced interfaces.

Termination of the line with resistors generally is not required. However, if high rate of data corruption is experienced (slow data update in monitoring program), line termination resistors should be installed at both ends of the network. The value of the resistors depends on the gauge of the twisted pair and should be equal (or closest) to line characteristic impedance. I.e. for a twisted pair of 24AWG wires characteristic impedance of 100ohm – use a 100ohm resistor.

#### 3.11.1 TCP/IP and Sageview Interfaces

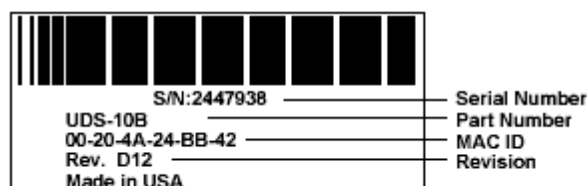
The interface is a 10/100BASE-T Ethernet adaptor. The TCP/IP port sends Controller data over a network to a PC running Sageview control and monitoring software. The Sageview interface provides this function for up to 2 PCs on the network simultaneously as well as providing SNMP traps on alarms, system time synchronization to a global clock if access to the internet is available, and a simplified system status Webpage (HTTP). Both units have the same footprint and connections. If direct connection to a PC network port is required, a cross-over network cable should be used. To set up Sageview, follow the instructions on the installation CD.

To enable network access on the TCP/IP port, an IP address must be assigned to the port. If access over the Internet is considered, the gateway address must be programmed as well. There are several methods to do that, two are recommended and are described in section 7.1. Other operating parameters of the interface are pre-programmed and should not be changed. Factory default IP address is 192.168.10.251.

To be able to assign a network address, the Ethernet address (referred to also as hardware address or MAC ID) of the interface must be known. On the Power Module top cover is a small label indicating the MAC ID similar to one shown below.

Note: The interface IP address cannot be changed until the Power Module has been commissioned and the Controller is operational.

The MAC ID can have format  
00-20-4A-24-BB-42 or  
00:20:4A:24:BB:52.

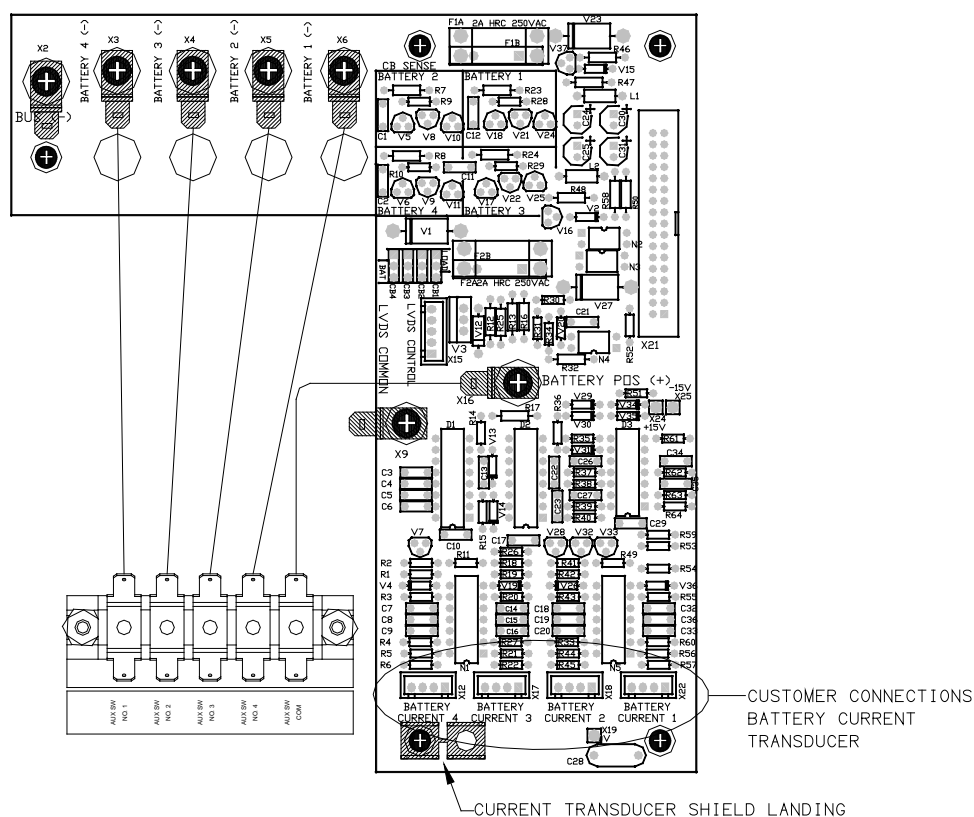


### 3.12 BATTERY DISTRIBUTION MODULE

The battery distribution module is capable of handling up to four battery strings. Optional extra battery connections may also have been supplied and pre-wired from the factory as ordered.



Connect the current transducer signal cable to the appropriately labeled connector on the circuit board.



**FIGURE 3-13 BATTERY DISTRIBUTION MODULE (BDM)**

### 3.13 ADDING AUXILIARY EXPANSION MODULES

Modules such as the Sageon Battery Monitor, AC monitor, and site monitor are daisy chained from the unused ribbon cable connection provided on the Auxiliary programmable relay board. All of these expansion modules are required to be mounted external to the Power Module, and a single 16-way ribbon cable connected to the available box-header.

For more detailed installation information for each of these modules, refer to the Sageon Battery Monitor Operation Manual (PM990-4209-00) and the Sageon Site Monitor Application Note (AN103-4012-00).

## 4.0 CONFIGURATION AND OPERATION

The Sageon II Power System is locally configured and operated from the operator panel. See the SageView chapter for remote configuration and operation. The operator panel is mounted at the top of the system.

The operator panel consists of a 2-line alphanumeric display, six push buttons with tactile feedback, three status LEDs, and a USB communications connector. Menus, data, status/alarm messages, and parameter values appear on the display. Display contents are selected using the six buttons. System status is also shown by the three LEDs below the display. A USB-B port is provided on the left side of the operator panel for connecting a personal computer (PC). Operator panel operation, displayed data, and communications are all controlled by the SCU (Sageon II Control Unit). The operator panel is the Sageon II Power System's HMI (human machine interface).

Complete Sageon II Power System configurations can be created at the operator panel. Alternatively, the System can be configured from a personal computer (PC) running SageView System Monitor software. When the System is initially powered, the configuration stored in the SCU provides the System operating parameters. This configuration can be the default, factory-installed configuration or a configuration you created on a PC and uploaded to the SCU. Table 4-1 lists the default values; note that some default values will vary with customer specified equipment, such as the number of Rectifiers installed. Many values are user configurable and a column is provided in the table for recording of user-selected values.

To configure the System from the operator panel, review the screen sequences described in the following sections and enter the requested data. To download a configuration to a PC or to upload a configuration from a PC, refer to Chapter 5 SageView. The SCU must be powered during any configuration efforts.

In this chapter, Sections 4.1 and 4.2 describe the “Home” screen and use of the operator panel push buttons. Sections 4.3 and 4.4 address the status LEDs and alarm messages. Sections 4.5 through 4.9 explore the menu options available for configuration and operation of the System.

**TABLE 4-1 SUMMARY OF DEFAULT SYSTEM (SCU) PARAMETERS**

Parameter	Description	48V System Range	48V System Default	User Value
<b>Base (Home) System Menu</b>				
Amb Tmp Alm	Ambient temperature alarm level	30-99°C	55°C	
Volts High	System output volts high threshold	48-65V	57.5V	
Volts Low	System output volts low threshold	44-54V	48.0V	
No. of RECs	Set number of Rectifiers in system	0-225	1	
Num Batteries	Number of battery strings installed	1-4	1	
FS Batt 1	Battery current transducer full scale rating	10-30,000A	100A	
FS Batt 2	Battery current transducer full scale rating	10-30,000A	100A	
FS Batt 3	Battery current transducer full scale rating	10-30,000A	100A	
FS Batt 4	Battery current transducer full scale rating	10-30,000A	100A	
SCU #	SCU access code (7 digits)	0-9999999	0000000	
Date	Current system date			
<b>Battery Monitor menu (after enabling Battery Monitor)</b>				
Bat Config	Battery monoblock size x number (see SBM section of manual for more detail)	Various Configurations	2V x 24	
SBM Batteries	Number of battery banks to be monitored	1-4	1	
Vhi Cell	Cell high voltage alarm	2.0-16.0V	2.5V	

Parameter	Description	48V System Range	48V System Default	User Value
Vlow Cell	Cell low voltage alarm	1.0-12.0V	1.8V	
+dVc Cell	Cell positive deviation alarm	5-99%	10%	
-dVc Cell	Cell negative deviation alarm	5-99%	10%	
<b>RECT Menu</b>				
RECT V high	Rectifier high voltage alarm	48-65V	57.5V	
RECT V low	Rectifier low voltage alarm	44-54V	48V	
RECT HVSD	Rec. high voltage shutdown	48-66V	57.5V	
RECT limit	Rectifier current limit	4-60A	60A	
<b>BATT Menu</b>				
B Dis Alarm	Battery discharge alarm threshold	44-52V	47.0V	
Disch I Diff	Battery string discharge current difference alarm	5-99A	20A	
Batt T Alarm	Battery temperature alarm threshold	30 to 90°C	40°C	
Bat Rated	Ampere-hour rating of batteries	20-9,999AH		
BTC	Battery temperature coefficient	0-6 mV/°C /cell	0 mV	
Number Cells	Number of chemical cells in battery string	4 - 24	24	
B I Lim Vb<Vdd	Battery charging current limit for Vb<Vdd	5-999A	50A	
Vdd Level	Battery deep discharge voltage threshold	40-47V	45V	
B I Lim Vb<Vfl	Battery charging current limit between Vdd & Vfl	5-999A	50A	
Sys Float	System float voltage (Vfl)	48-58V	54.2V	
Sys Drop	System voltage drop	0.0-2.0V	0.5V	
Equalization	Enable/disable Eq function	On/Off	On	
FS Load I	Full Scale Load Current sensor value	50 – 3000	100	
Load Sensor	Enable/disable Load Sensor	On/Off	Off	
B I Lim Vb>Vfl	Battery charging current limit in equalize Vb>Vfl	5-999A	50A	
Sys Equal	System equalize voltage (Veq)	50-61V	56V	
V Start Eq	Enable/disable discharge voltage initiation of Eq	On/Off	Off	
V Eq trigger	Discharge voltage threshold for Eq charging	44-50V	48V	
Q Start Eq	Enable/disable battery charge depletion trigger	On/Off	Off	
Q disch Trig	Charge depletion threshold for Eq charging	5-999AH	15AH	
Eq End Current	Equalization termination for I bat < Eq End	1-2,000A	5A	
Eq duration	Maximum duration of Equalization charging	3-48Hr	20Hr	
Eq period	Time between periodic Equalization charging	0-52wk	12 Wk	
Manual Stop/Start Eq	Force stop/start of Equalization charging	Toggle state		

Parameter	Description	48V System Range	48V System Default	User Value
LVDS Trip	Battery voltage below which LVDS will open	40-48V	42.6V	
BDT Per	Period between consecutive discharge tests	0-365 days	0 days	
BDT Time	Time of day to begin BDT (hr:min)	00:00-23:59	02:00	
BDT Dur	Maximum duration of BDT	5-1,440 min	180 min	
BDT Curr	Discharge test current	0-5,000A	50A	
BDT End V	Battery voltage limit to terminate BDT	36-48V	44V	
BDT End Q	Battery capacity limit to terminate BDT	25-9,995AH	300AH	
Temp Sen Alarm	Enable/disable temp. sensor failure alarm	On/Off	On	

#### 4.1 THE “HOME” SCREEN

The Home screen, shown at right, is the default screen. It shows Sageon II Power System output current and voltage. This screen also shows the present mode: FLoad or Equalize. If an activity such as battery discharge is being performed, the current and voltage are displayed continuously while the second line alternates between the mode and the activity status, for example “BDT in progress.”

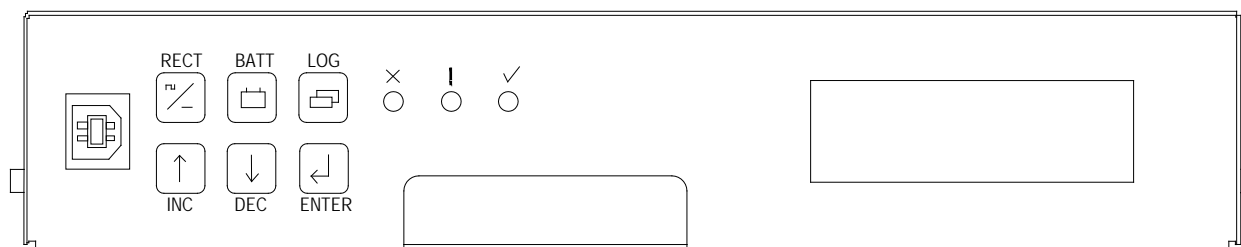
155A 54.2 FL
-----------------

The Home screen is the first to appear when power is applied to the System. Since the Home screen is the default screen, the display will revert to the Home screen from any other screen if an operator panel push button is not pressed for approximately one minute. Section 4.5 describes in detail the selections available from the Home screen.

#### 4.2 USING THE OPERATOR PANEL PUSH BUTTONS

Use the six buttons to view System data, individual rectifier data, battery data, or the alarm log. In addition, programmable parameter values can be viewed and changed. Each button is described below.

The HOME screen shows the System voltage and current. The data will initially be located in the center of the display and after a brief period will scroll right to left. From the HOME screen, press “up arrow” or “down arrow” to move through the series of menus described in Section 4.5.



**FIGURE 4-1 OPERATOR PANEL**

**RECT** (RECTifier) – Press to access a menu of rectifier related parameters as well as to view the output current and heat sink temperature of each rectifier. See Section 4.6 for the screens displayed in the RECT menu.

**BATT** (BATTery) – Press to access a menu of battery parameters. See Section 4.7 for the screens displayed in the BATT menu.

**LOG** – Press to view a menu of the 99 most current alarms in chronological order. Section 4.8 shows the screens.

The alarm log number and alarm description are displayed first. Two seconds later, the alarm log number and the date and time of the alarm occurrence are displayed. These two screen then alternate at a two second rate.



(Increment) – Press the “up-arrow” to scroll through a menu, selected using an SMR, BATT, or LOG button, from the first menu screen to the last. When editing a flashing parameter, press to increase the parameter value.



(Decrement) – Press the “down-arrow” scroll through a menu, selected using an SMR, BATT, or LOG button, from the last menu screen to the first. When editing a flashing parameter, press to decrease the parameter value.



(Enter) – With a editable parameter displayed, press Enter to cause the value to flash indicating that the “up arrow” or “down arrow” button can be used to change that value. Press ENTER to store the edited value.

When setting a parameter with multiple digits (e.g. access code, time, date), set the left-most digit as described above. Then press ENTER to cause the second digit to flash. Press “up arrow” or “down arrow” to set the flashing digit to the desired value. Repeat until each digit is set to the desired value.

When an alarm condition exists and you are prompted to press ENTER, the ENTER button will cause alarm details to be displayed.

### CAUTION

*Setting correct parameter values is critical.* Incorrect values can result in unsatisfactory performance, unexpected shutdown, and other unanticipated performance characteristics.

Moving from one menu to another:

To move from any menu to any other menu, simply press the desired button.

To move to the Home menu from any other button, press the button for the current menu. For example, if battery parameters are presently being displayed, press BATT to access the Home menu.

To change a parameter when the security function is activated:

A “Panel Locked” message will appear when an attempt is made to alter any parameter while security is activated. The security On/Off selection is located in the HOME menu, Section 4.5.

To change a parameter, simultaneously press and hold the “up arrow”, “down arrow” and ENTER buttons for 3 seconds. Parameters may now be changed as described above.

## 4.3 READING THE OPERATOR PANEL SYSTEM STATUS LEDS

The table below describes the indications presented by the system status LEDs.

**TABLE 4-2 READING OPERATOR PANEL SYSTEM STATUS LEDS**

Symbol	LED Color	State	Meaning
✓	Green	On	System OK
		Off	A failure or alarm condition exists
!	Amber	Flashing	Alarm - Alarm condition exists in the system or a Rectifier
		On	Plant is in Equalize Mode
		Off	No alarm condition exists in the Sageon II Power System
✗	Red	On	Rectifier Shutdown - One or more Rectifiers has shut down
		Off	All Rectifiers are operating

If all three LEDs are Off:

- There may be no System output or battery string DC to power the SCU
- The SCU may have failed
- There may be no AC power to the System
- On initial startup; all 3 LEDs may be off for approximately 10 seconds while the system boots up.

#### 4.4 READING ALARM MESSAGES

If an alarm exists, an alarm message will alternate with the Home screen (the status LEDs will also indicate the presence of an alarm). The alarm message will display for two seconds every six seconds. A sample alarm message is shown below.

3 Alarms  
Press ENTER

This message states that three alarms exist and they can be viewed by pressing the ENTER button. When the button is pressed, the name and description of the most recent alarm are displayed, as shown below. Press either the “up arrow” or “down arrow” button to view remaining alarms. Pressing ENTER, or not pressing any button for ten seconds, will display the Home screen.

Alarm 1  
Amb Temp High

To read the time and date of any alarm, press the LOG button and use the “up arrow” or “down arrow” button to scroll to the desired alarm(s).

A list of all operator panel annunciated messages is found in Table 4-3.

**TABLE 4-3 OPERATOR PANEL ANNUNCIATED ALARM MESSAGES**

Alarm Name	Comment	LED ON/FL
SMR Alarm	Combination of one or more SMR alarms	Amber (FL)
SMR Urgent	One or more SMRs have shut down	Amber+Red
SMR HVSD	SMR shut down due to output over-voltage	Amber+Red
UNIT OFF	SMR is off	Amber+Red
No Response	A particular SMR is not responding to the SCU	Amber (FL)
Power Limit	SMR is in Power Limit	Amber (FL)
No Load	SMR output current less than minimum for SMR type	Amber (FL)
Current Limit	SMR in current limit	Amber (FL)
Voltage High	Voltage measure by SMR too high	Amber (FL)
Voltage Low	Voltage measure by SMR too low	Amber (FL)
UNCAL SMR	SMR internal adjustment for current sharing out of limits	Amber (FL)
EEPROM Fail	EEPROM failed (SCU or SMR)	Amber (FL)
Fan Fail	SMR internal fan failure alarm	Amber (FL)
Relay Fail	SMR output relay contacts failure	Amber (FL)
No Demand	Control loop in SMR not in normal state	Amber (FL)
H/S Temp High	SMR heatsink temperature too high	Amber (FL)
Temp Sensor Fail	Temperature sensor in SMR microprocessor circuit failed	Amber+Red
Vref Fail	Voltage reference in SMR microprocessor faulty	Amber+Red
AC Volt Fault	None of the SMRs are responding (AC failure assumed), or if AC monitor is used, AC voltage is out of limits	Amber+Red
AC Freq Fault	AC frequency lower or higher than preset value	Amber (FL)
Battery switch	One or more battery switches open	Amber (FL)
Cct Breaker	Fuse or circuit breaker in load distribution open	Amber (FL)
LVDS Open	Low Voltage Disconnect switch open	Amber (FL)

Alarm Name	Comment	LED ON/FL
Sys Volts High	System output voltage too high	Amber (FL)
Sys Voltage Low	System output voltage too low	Amber (FL)
Cell V High	One or more cells being monitored by SBM are too high	Amber (FL)
Cell V Low	One or more cells being monitored by SBM are too low	Amber (FL)
Cell %dev High	One or more cells being monitored by SBM are too high % deviation from the mean battery cell voltage	Amber (FL)
Cell %dev Low	One or more cells being monitored by SBM are too low % deviation from the mean battery cell voltage	Amber (FL)
Range SMR	SMR parameter range error. SCU could not overwrite values	Amber (FL)
Site Monitor	Alarm preset from the site monitor System. See site monitor menu for details of alarm channel	Amber (FL)
Battery Disch	Batteries are discharging	Amber (FL)
Disch Tst Fail	Battery discharge test failed to reach a programmed end point	Amber (FL)
SMR Comms Fail	One or more SMRs are not responding	Amber (FL)
Amb Temp High	Ambient temperature higher than preset limit	Amber (FL)
Batt Temp High	Battery temperature higher than preset limit	Amber (FL)
Batt Temp Sens	Battery temperature sensor not connector or failure	Amber (FL)
Batt I-Limit	Battery charging current is being limited to preset value	Amber (FL)
Bat Sym Alarm	Battery discharge currents from battery strings not sharing load equally	Amber (FL)
Equalize	System is in equalize mode	Amber (On)

Table Notes: FL = LED Flashing; On = LED On Steady

## 4.5 HOME MENU SCREENS

With the Home screen displayed, pressing the “up arrow” or “down arrow” button will move through a series of screens showing ambient temperature, a series of editable parameters (e.g. float voltage high and low, security, number of batteries), and enabling and disabling of auxiliary parameters (e.g. battery cell voltage monitoring). The following map summarizes the available menu screens.

Home Screen	System current, voltage and mode	
	Ambient temperature	
	3-Phase AC Monitor option	
	Programmable	Ambient temperature alarm
		Voltage, high alarm
		Voltage, low alarm
		Failsafe Alarms: on/off
		Bat Cur Sensor: on/off
		Security: on/off
		Password setup
		Test indicators
		Number of Rectifiers (SMRs)
		Number of battery strings connected
		Full scale battery current
		Load sensor on/off
		FS Load Current
		Access code (7 digit number)
		Date format
		Date/time set
		Alarm report: on/off
		Daily report: on/off
		Daily report time
		Modem on/off
		Phone numbers 1, 2, and 3
		Audio alarm: on/timeout/off
		Cct input: no/nc/disable*
		Battery switch: no/nc/disable*
		LVDS: no/nc/disable*
		Auxiliary units, press ENTER
		1-ph AC monitor: on/off
		3-ph AC monitor: on/off
		Sageon II Battery Monitor: on/off
		Battery configuration
		Number of batt strings monitored
		Cell voltage high/low/differential
		Site monitor, press ENTER
		Outputs 1-4, on/off status
		*no = normally open; nc = normally closed

When viewing another screen, the Home screen will reappear in ~60 seconds if no button is pressed.



**Note:** The screen examples in this and subsequent sections will vary with System voltage, loads, environment, battery quantity, type, and condition, included System options, and other factors.

**Note:** Screens for options will not be viewable unless the option is installed and/or enabled.

Access the screen series shown here by pressing the “up arrow” button. Press the “down arrow” button to access the screens in reverse order.

Home screen

155A 54.2V  
FL

“C” indicates that the battery temperature compensation is active

155A 54.2V  
FLC

Ambient temperature is displayed in degrees Centigrade

Ambient Temp  
31°C

Ambient temperature alarm level

Ambient Temp Alarm  
45°C

3-Phase AC monitor voltage, current, and frequency

3-Ph AC1 Volts  
216V

Use “up arrow” or “down arrow” to scroll through the three AC inputs for each parameter. AC monitor option must be installed to view these screens.

Programmable parameters:

This series of screens contain programmable parameters. To change a parameter value:

1. Scroll to the desired screen using the “up arrow” or “down arrow” button.
2. Press the ENTER button; the selected value will flash.
3. Use the “up arrow” or “down arrow” button to edit that value. Press ENTER to store the new value or to move to the next number to be set in a series of numbers.

Float voltage high level: Set to the desired high alarm value.

Volts High Alarm  
57.5V

Float voltage low level: Set to the desired low alarm value.

Volts Low Alarm  
48.0V

Failsafe Alarms: When Failsafe alarms is on, all alarm relays will be normally energized when no alarm condition is present. Relays will de-energize when an alarm occurs.

Failsafe Alarms  
On

Battery current sensor: When Battery current sensor is turned on, the controller will read battery current from the installed battery current transducers.

Bat Cur Sensor  
On

Security on/off toggle: When security is On, no parameter values may be edited. Panel Locked will be displayed in response to an attempt to edit.

Security  
On

To allow editing, display the Security On screen and simultaneously press and hold for 3 seconds the ENTER, “up arrow” and “down arrow” buttons. The system will revert to the Panel Locked state if no button is then pushed for 2 minutes.

Security  
Panel Locked

Password Setup: When Ethernet or other remote communication method is used a password can be entered for security. Refer to Section 5.9.2.1 Password – Remote PC or SageView help for additional details.

Password Setup  
Press ENTER

Display test: All LEDs on the rectifiers and operator panel will flash when ENTER is pressed, and the screen will alternate between the SCU software version and an all pixels on screen (not shown).

Test Indicators  
Press ENTER

Number of SMRs (Rectifiers) in system: This number must be entered to prevent the operator panel from indicating that some SMRs are not responding.

Number of SMRs  
15

Number of battery strings: Set to the number of connected battery strings.

Num of Batteries  
2

Battery current transducer full-scale rating: Set to the full-scale rating of the battery current transducer.

FS Batt Current  
200A

Load sensor:

On = SCU displayed System current is derived from the voltage across System shunt.

Off = SCU displayed System current is the sum of the Rectifier currents.

Load Sensor  
ON

Full Scale Load Current: Set to the full scale rating of the installed plant system shunt.

FS Load  
2500A

SCU Access Code (i.e. System ID): Type a unique 7 digit number for each Sageon II Power System in your network. Be sure to record your access code(s) and store in a secure location.

Access Code  
1252636

Date format: Set the date format: DD/MM/YYYY, MM/DD/YYYY, or YYYY/MM/DD.

Date Format  
MM/DD/YYYY

Clock set: Set the date and time. Note that this is a 24-hour clock.

Date 12/31/2003  
Time 21:58:34

Alarm report on/off toggle: When on, the system will dial the Phone 1 number, see the Phone 1 screen below. If there is no answer, Phones 2 and 3 will be dialed in turn. The cycle will continue until a connection is made. See Note following Phone 3 below.

Alarm Report  
On

Daily report on/off toggle: When on, the system will log in to the telephone numbers below at the time set in the following screen and download the status and all operating parameters. See Note following Phone 3 below.

Daily Report  
On

Time of daily report: Note that is a 24-hour clock.

Daily Report  
15:15

Modem enable on/off toggle: The Phone number screens will appear only when the modem is toggled on.

Modem  
On

Phone 1: Set the first number to be dialed when an alarm occurs. Up to 20 digits can be stored. Numbers longer than 10 digits are shown on two screens.

Phone 1  
0398887788

Second screen example.

Phone 1 Cont  
2323

Phone 2: This number will be dialed when the above number does not answer.

Phone 2  
0398880033

Phone 3: This number will be dialed should the previous number not answer.

Phone 3  
0398880003

Note: To send Alarm Report or Daily Report to a local PC, set the Report to On and Modem to Off.

Audio alarm on/off toggle: Set to On to audibly announce an alarm. Press ENTER to silence (acknowledge) the alarm.

Audio Alarm  
On

Circuit breaker auxiliary contact input: Configure options are normally closed, normally open, or disabled (not used).

Cct Input  
Used – N/C

Battery circuit breaker auxiliary contact circuit input: Configuration options are normally closed, normally open or disabled (not used).

Bat Sw Input  
Used – N/O

Battery low voltage disconnect switch auxiliary contact circuit input: Configuration options are normally closed, normally open or disabled (not used).

LVDS Input  
Used – N/O

Press ENTER to access the single-phase and three-phase monitors, the Sageon Battery Monitor, and the site monitor. Press “up arrow” to go to the top of the menu string.

Auxiliary Units  
Press ENTER

**Note:** Screens for installed options (e.g. Sageon II Battery Monitor, Site Monitor) appear next. If no options are installed, the HOME screen will appear.

#### 4.5.1 Sageon Battery Monitor

**Note:** See Section 4.9 Sageon Battery Monitor Setup for additional information.

When battery cell voltage monitoring is included in software, the window at right will appear next.

Battery Monitor  
Press ENTER

Battery monitor on/off toggle: Press ENTER to display the current On/Off status (flashing). Press “up arrow” or “down arrow” to set the desired state, then press ENTER to store.

Battery Monitor  
On

The following screens *will not appear* if Off has been entered.

Battery configuration: Set the number of cells in a battery string and the number of battery strings connected to the monitor. See Section 4.9 Sageon II Battery Monitor Setup for details.

Bat Config  
24 cells

After pressing ENTER, “current configuration” will flash. Scroll through the available configurations and press ENTER again once the correct battery type is chosen.

Battery strings: Set the number of connected battery strings. The maximum is four.

Note: This number must equal to or be less than the Num of Batteries entered in the Home, Programmable Parameters series of screens.

SBM Batteries  
2

High voltage alarm threshold: Set the cell voltage above which an alarm will be generated.

Cell Vhi Alm  
2.48V

Low voltage alarm threshold: Set the cell voltage below which an alarm will be generated.

Cell Vlo Alm  
1.44V

Delta positive voltage threshold: Set the percentage of nominal cell voltage by which any individual cell voltage can exceed the nominal. Above this value, an alarm will be generated.

Cell +dVc Al  
10%

Delta negative voltage threshold: Set the percentage of nominal cell voltage by which any individual cell voltage can be less than the nominal. Below this value, an alarm will be generated.

Cell -dVc Al  
10%

#### 4.5.2 Site Monitor

When the Site Monitor is included in the software, the window at right will appear next.

Site Monitor  
Press ENTER

Site monitor on/off toggle: Press ENTER to display the current On/Off status (flashing). Press “up arrow” or “down arrow” to set the desired state, then press ENTER to store.

Site Monitor  
On

Contact the factory for additional details concerning this feature.

## 4.6 RECT (RECTIFIER) MENU SCREENS

Enter this series of menus by pressing the REC (SMR) button. Press “up arrow” or “down arrow” to select the Rectifier number (i.e. rectifier position address) and press ENTER. Press “up arrow” to scroll through the screens in the order shown. Repeat for each Rectifier. The following map summarizes the available menu screens.

RECT Button	————	Select Rectifier number* (1-24); read number, current, and temperature	
		Press ENTER for firmware version	
		Float voltage	
		Equalization voltage	
		Programmable	————
			Voltage, high/low alarm
			Voltage, high voltage shutdown
			Current limit
			Fault, reset SMR

\* The Rectifier number is the “rectifier position address” of the target Rectifier (e.g. SMR “4”).

SMR no response: A No Response message appears when the target Rectifier is not installed, not connected, not switched On, or is faulty.

SMR1  
No Response

SMR initial display: When a Rectifier is online and operating normally, its output current and heatsink temperature are shown.

SMR1  
92A 29°C

SMR version and temperature: Press enter display Rectifier’s software version.

SMR1  
G1045a

SMR output current: Press the “up arrow” button to display the output current from other Rectifiers.

SMR2  
91A

Float voltage: This parameter is globally (and indirectly) set in the Batt menu. It cannot be changed in this screen.

SMR Float  
54.2V

Equalization voltage: This parameter is globally (and indirectly) set in the Batt menu. It cannot be changed in this screen.

SMR Equalize  
57.0V

Programmable Parameters:

The following screens allow access to the SMR programmable parameters. Note that the parameter values apply to ALL installed SMRs. To change a parameter value:

1. Scroll to the desired screen using the “up arrow” or “down arrow” button.
2. Press the ENTER button; the selected value will flash.
3. Use the “up arrow” or “down arrow” button to edit that value. Press ENTER to store the new value.

SMR high voltage alarm threshold:

SMR V high Alarm  
57.0V

SMR low voltage alarm threshold:

SMR V low Alarm  
48.0V

SMR high voltage (DC) shutdown:

SMR HVSD  
58.0V

SMR current limit:

SMR I Limit  
50A

Fault reset: Press ENTER to reset latched alarms, such as HVSD. The Rectifier will restart unless damaged or faulty.

Reset SMR Fault  
Press ENTER

**Note:** Pressing “up arrow” button will display the HOME screen.

## 4.7 BATT MENU SCREENS

Enter this series of menus by pressing the BATT button. Press the “up arrow” button to scroll through the screens in the order presented. Repeat the series for each battery string. The following map summarizes the available menu screens.

BATT Button —	Battery string (1-4) current*
	Battery string temperature
	Estimated charge (1-4)
	Programmable —
<p>* Press ENTER to read individual cell voltages if SBM option is installed and enabled.</p> <p>Complete descriptions for testing vented lead acid and VRLA batteries are beyond the cope of this manual but are discussed in detail in IEEE STD-450-2002 (or its latest revision) and IEEE 1188-1996, respectively, battery specific manuals, and other professional society standards.</p> <p><b>It is important to recognize that standby batteries/cells are designed for emergency standby operation and excessive testing or cycling of a battery can materially shorten the life of a battery.</b></p>	Battery discharge alarm voltage
	Battery temperature alarm
	Battery Ah rating
	BTC on/off
	BTC Temperature coefficient
	BTC Temperature compensation nominal
	Number of cells per string
	Battery charge current limit: <Vdd
	Battery deep discharge voltage: Vdd
	Battery charge current limit: from Vb<Vfl
	System float voltage
	System voltage drop
	Equalization on/off
	Charge current limit: >Vfl
	Equalization voltage
	Equalization trigger voltage
	Equalization no trigger voltage
	Equalization trigger charge: Ah
	Equalization trigger discharge rate: Ah
	Equalization no trigger discharge rate: Ah
	Equalization end charge current
	Equalization end charge: Ah
	Equalization end duration: hours
	Equalization auto-initialize: weeks
	Equalization end: manual
	Equalization start: manual
	LVDS trip voltage
	LVDS mode: auto/closed/open
	Temperature sensor alarm on/off
	Discharge current and battery voltage
	BDT period: 0-365 days
	BDT start time: hours, minutes
	BDT duration: hours, minutes
	BDT current: 0-5000A
	BDT end voltage
	BDT end charge: Ah
	BDT alarm reset
	BDT end, manual
	Last BDT results: pass, fail, abort, etc.
	Last BDT time/date; duration
	Last BDT battery string voltage and charge

**IMPORTANT:** The number of the target battery string (e.g. Battery 1) must be entered!

Battery 1 current:

Press ENTER to display cell voltages for selected string if Battery Monitor option is installed and enabled. Press “up arrow” or “down arrow” to scroll through cells.

Battery 1  
12A

Battery 2 current: If additional battery strings are connected, set the number of that string; a maximum of four battery strings may be connected.

Battery 2  
11A

Battery temperature: This screen shows the highest battery temperature when temperature sensors are installed on the battery string.

Battery Temp  
31°C

If sensors are not installed, Sensor Not Attached will be displayed.

Estimated battery charge:

Estimated Q Bat 1  
300Ah

Battery discharge alarm threshold: Set to the voltage to which the battery string falls during discharge. When battery voltage reaches this value, an alarm will be generated.

Battery Disch Alarm  
47.0V

Battery discharge current differential threshold: The allowable battery string discharge current difference is entered at this screen.

A reasonable value is 20% of the total discharge current. An alarm is generated when the differential exceeds the value entered.

Disch I Diff  
20A

When two or more battery strings are connected, the value in this screen is read by the SCU when an AC outage occurs and the battery strings are supplying the load current. A difference in discharge current is an indication of the state of the battery strings.

Battery over temperature alarm threshold: Set the maximum allowable battery temperature.

Batt Temp Alarm  
50°C

Ampere-hour battery rating: Set the battery string's A/H rating.

Battery Rating  
500Ah



### 4.7.1 Battery Temperature Compensation

Battery temperature compensation on/off toggle:

Batt Temp Comp  
Off

Battery temperature compensation (BTC): Enter the temperature compensation coefficient in mV per degree C per cell in this screen. The allowable range is 0.1 to 6 mV/Cell/°C. If the value is less than 0.1, the display will show Off. See “BTC Notes” below.

BTC Coeff  
3.2 mV/C/°C

For UNIPOWER Liberty 1000 and 2000 batteries, enter 3.6 mV/C/°C (2 mV/C/°F). Normal operating temperature is 25°C (77°F).

BTC nominal temperature: When battery temperature compensation is active, type the temperature at which system voltage is NOT corrected. This temperature must be between 18°C and 27°C. Note that compensation range is 10-35°C. See the Notes below.

BTC Nominal  
20°C

Battery cells per string: Set the number of physical cells in a string.

Number of Cells  
12

#### BTC Notes:

- If the battery temperature sensor is not connected, compensation is based on the ambient temperature sensor.
- If battery and ambient temperature sensors are connected, compensation is based solely on the battery sensor.
- When temperature compensation is active, the SMR voltage setting is automatically adjusted by the SCU as needed.

Battery charging current limit: Set the maximum battery charge current when the voltage across the two battery strings is less than the deep discharge voltage (Vdd).

BILim Vb<Vdd  
34A

Battery deep discharge voltage (Vdd):

Vdd Level  
21.0V

Battery charging current limit: Set the current when the battery voltage is between Vdd and the float voltage (Vfl). This current is typically higher than that for the deeply discharge battery.

BILim Vb<Vfl  
52A

System float voltage: Set the system output voltage at the output bus bar terminals.

System Float  
54.2V

System voltage drop: Set the maximum voltage drop as defined by: maximum rectifier output – system float voltage. A typical value is 0.6V.

System V Drop  
0.6V

#### 4.7.2 Equalization

Equalization on/off toggle:

If equalization is off, the following screens will not appear.

Equalization  
On

Battery charging current limit: Set the maximum equalization charging current ( $V_{battery} > V_{float}$ ). This applies when batteries are being equalized.

BILim  $V_b > V_{fl}$   
25A

Equalization voltage: Set the maximum voltage reached during equalization of the batteries.

System Equalize  
57.5V

Equalization on/off toggle:

On – voltage trigger

Off – ampere/hour trigger

Volts Start Eq  
On

Equalization trigger, voltage: Set the voltage at which equalization will be initialized, during battery discharge.

Volts Eq Trig  
48.0V

Equalization on/off trigger:

On – voltage trigger

Off – ampere/hour discharge trigger

Volts Start Eq  
Off

Equalization A/h on/off toggle:

On – ampere/hour discharge trigger

Off – voltage trigger

Q Start Eq  
On

Equalization trigger, A/h: Equalization is initialized when the charge supplied to the load exceeds the value set in this screen.

Qdis Trig  
10Ah

Equalization A/h on/off toggle:

On – ampere/hour discharge trigger

Off – voltage trigger

Q Start Eq  
Off

Equalization termination: Equalization can be terminated based on charging current or charging time.

EQ End Current  
25A

If equalization is to end at a specific charging current, set that current in this screen.

If equalization is to end after a specific time, reduce the value in this screen to less than 5% of the A/H rating of the battery string. The ampere value entered will be replaced by Off.

Equalization termination time: Set the period of equalization. If equalization is to be based only on the A/h discharge method, set the period to maximum: 48 hours.

EQ Duration  
20 hours

Force equalization: If equalization does not occur due to battery discharge, set the period after which equalization should be forced.

EQ Period  
12 Weeks

Equalization manual termination: To manually terminate equalization, at this screen press ENTER. The system must be in equalization mode for this screen to appear.

Manual Stop EQ  
Press ENTER

When ENTER is pressed, the system reverts to Float mode and the screen changes to that shown at right, ready for manual equalization manual start. The system must be in Float mode for this screen to appear.

Manual Start EQ  
Press ENTER

#### 4.7.3 Battery Low Voltage Disconnect (BLVD)-(LVLD Screens)

BLVD switch trip voltage: Set to establish the voltage at which the batteries will be disconnected from the load to prevent excessively discharging the battery string (LVLD).

LVLD Trip  
45.0V

BLVD Off/On: Set to Off or On depending on whether or not your system has BLVD.

Low Voltage Load Dis.  
On

NOTE: LVDS screens have no functioned control over the contactor; use LVLD screens.

Temperature sensor alarm toggle: Set to On when sensors are connected. Set to Off if sensors are not connected.

Temp. Sen. Alarm  
On

**Note:** Battery discharge test screens are shown next; go to Section 4.7.1. If the test screen shows Off, the Last BDT screen appears next; see Section 4.7.2.

#### 4.7.4 Battery Discharge Test Screens

The battery discharge test performs a periodic, controlled discharge of the connected battery string(s). The test confirms battery string capacity and uses the customer loads to discharge the battery string(s) so no battery strings need to be disconnected and individually loaded, as would be the case in a typical manual discharge test.

To access test parameters, press the BATT button and then press “down arrow” to access the following screens.

While the test is in progress:

- The display will alternate between the Home screen and the BDT in Progress screen shown at right.
- The system alarms Battery Discharge, Voltage Low and SMR Voltage Low.
- Low Load alarm will be suppressed.
- SMR alarms will be shown in the SMR status.

50A 54.1V  
BDT in Progress

Test time interval: The interval between tests can be set to 0-365 days.

BDT Period  
14 Days

When set to zero, the automatic execution of the test is disabled (set to Off). Display messages below will be shown only if the test is enabled.

Time of test: Set the time of day the test is to be performed. This is a 24-hour clock.

BDT Time  
17:35

Test duration: Set the duration of the test. Duration can be set from 5 minutes to 24 hours in increments of 5 minutes.

BDT Duration  
1h30min

Discharge rate: Set the rate of discharge. Rate can be set from 0 to 5000A. If rate is set to zero, the control function is disabled and the battery will discharge under full load current.

BDT Current  
50A

Note: The total load supplied by the system during the test must exceed the desired battery discharge current by at least 10%. Rectifiers will supply the additional load, leaving the battery string to supply a user defined current to the load.

End of test: Set the battery voltage that will terminate the test if reached before the test duration set above.

BDT End V  
47.0V

At the end of test, whether ended by test duration or end voltage, normal operation is restored and recharging of the battery string(s) is begun. The test result will be “Fail.” Battery string end of voltage depends upon system voltage:

- 48V system 36V to 48V

Battery end of capacity: Set the remaining battery capacity at which the test must end. Capacity can be set from 25Ah to 9995Ah. If rate is set to zero, the control function is disabled and the battery will discharge under full load current.

BDT End Q  
500Ah

Reset of failed test alarm: This message appears when the preceding test fails and is not reset. Press ENTER to reset the alarm and hide the message.

BDT Alarm Reset  
Press ENTER

Abort MBT: This screen is available when a discharge test has been started.

BDT in Progress  
ENTER to abort

#### 4.7.5 BDT Results Screen

The final screen contains a brief test result message. The message appears on the second line of the Last BDT display. Each message is explained below.

Last BDT  
N/A

N/A – Not Available: No test has been performed.

Passed – Test ran for programmed duration without reaching an “End V” or “End Q” value.

Failed – Test terminated prematurely after reaching an “End V” or “End Q” value before the test duration expired. This will trigger a “BDT Fail” alarm.

AC Lost – Test terminated due to loss of AC supply. Detected by the AC monitor or by all SMRs being Off.

Cell V Low – A cell in a battery string discharged below a safe level. Alarm issued. Available only when BDM is active. BDT flagged as having failed.

No Control – Test aborted due to loss of control of rectifiers. No alarm issued.

Low Load – Test aborted due to load current being too low to control discharge current. No alarm issued.

SMR Overload – Test aborted due to load current being too high to support controller discharge. No alarm issued.

User Aborted – Test terminated manually by user from the SCU.

#### 4.7.6 BDT Results Screen, Additional Details

To view additional details about the preceding test, press ENTER while viewing one of the above Last BDT screens. These sub-menu details appear on the second line of the Last BDT screen.

22/01/2003 – States the date of preceding test in a day/month/year format.

Dur 1h18min – Provides the duration of preceding test.

EndV 47.0V – Shows the battery string voltage when test was terminated.

EndQn 380Ah – States the remaining estimated capacity of the battery string at the time the test was terminated, where “n” is the number of the string.

#### 4.7.7 BDT Disabled

The battery discharge test function is disabled for 2 minutes if any of the following has occurred. If an automatic test is scheduled during this period, it will be performed at the next opportunity, at the BDT Time.

- SCU has recently been powered up.
- An AC supply failure has been recorded.

### 4.8 ALARM LOG SCREENS

An alarm log resides in SCU memory and these alarms can be viewed by momentarily pressing the Alarms Log button. The following map summarizes the available menu screens.

LOG Button	Alarm number and description
	Alarm date and time
	Clear alarm log

Initial Alarm Log screen: Log 1 is the most recent alarm. Previous alarms are number in sequence, 2 through “n.” The second line provides the alarm name.

Press and hold the “up arrow” button for 2 seconds to display the preceding alarm (Log 2). Press again to display the preceding alarm, Log 3.

Momentarily (less than 2 seconds) press the “up arrow” button to display a screen showing the date and time alarm occurred. The date format is day/month/year; the time format is 24 hours.

Clear Alarm Log: From any alarm log screen, press ENTER and then press “down arrow” to clear all log entries. A deletion confirmation screen will be displayed.

The alarm log can only be cleared from the front panel. There are no means to clear the alarm log entries remotely.

Log 1 AC Freq Fault
Log “n” Alarm Name
Log 1 29/02/2003 13:55
“Down arrow” to Clear Log Entries
LOG No Alarms

## 4.9 SAGEON BATTERY MONITOR SETUP

With the SBM option enabled, SBM parameters must be set before monitoring can be performed. From the HOME screen, scroll through the operator display screens shown in Section 4.5.2 to the Auxiliary, “Bat Config” and “SBM Batteries” screens and there declare the number of battery cells per battery string (2-24) and the number of battery strings (1-4) whose cell voltages are to be monitored by the SCU.

*Refer to the Sageon Battery Monitor Manual (PM990-4209-00) for detailed information.*

The quantity of SBM boards needed for the above selection is calculated by the SCU based on battery type and configuration. The relationship between battery configuration and quantity of SBM boards is shown in the table below.

**TABLE 4-4 SBM BOARDS NEEDED FOR VARIOUS BATTERY CONFIGURATIONS**

<b>48V Battery</b>	<b>SBM Batt = 1</b>	<b>SBM Batt = 2</b>	<b>SBM Batt = 3</b>	<b>SBM Batt = 4</b>
24, 2V Cells	1 SBM Board	2 SBM Boards	3 SBM Boards	4 SBM Boards
12, 4V Cells	1 SBM Board	1 SBM Board	2 SBM Boards	2 SBM Boards
8, 6V Cells	1 SBM Board	1 SBM Board	2 SBM Boards	2 SBM Boards
4, 12V Cells	1 SBM Board	1 SBM Board	1 SBM Board	1 SBM Board

### 4.9.1 Frequency of Measurement

The frequency of cell voltage polling is programmable from 10 minutes to 8 hours in 1-minute steps. A typical polling interval is 4 minutes, which yields 15 points for a 1-hour discharge. For a programmed test discharge of 30 minutes, a polling interval of 2 minutes might be used. This parameter is not accessible from the operator panel. A PC running SageView is needed.

### 4.9.2 Battery Cell Measurements

When SBM is active, individual cell voltages can be monitored on the operator panel by selecting a battery from the BATT menu and pressing ENTER. The cell information will appear on the screen and the next and previous cells can be selected by pressing the “up arrow” and “down arrow” buttons.

Select battery: Battery 1 screen appears after pressing the BATT button. Press ENTER.

Battery 1  
12A

Battery cell parameter: Battery 1, Cell 01 values are displayed. As shown here, the cell voltage is 2.225V, which is a deviation of +12% from the average cell voltage in this battery string.

Battery 1 Cell01  
2.225V +12%

Battery cell voltage deviation: Battery 1, Cellmm, cell voltage n.nnnV is deviating +/-pp% from the average cell voltage in this battery string. Press “up arrow” or “down arrow” to change the cell number.

Battery 1 Cellmm  
n.nnnV ±pp%

## 4.10 COMMISSIONING

With all the batteries, load and AC cabling wired, and checked for correct polarity, the system is commissioned by the following steps:

- Ensure no rectifiers are installed in the Power Module and no load is applied.
- Plug in the Controller – it should power up off the battery. If not, it is possible that the battery polarity is reversed.
- Set up the Controller menu items for:
  - number of batteries and size (Ah),
  - number of rectifiers,
  - set the required float and equalize voltages,
  - set BLVDS option to Auto and set the BLVDS Aux to “Normally Open”

- set the Battery Switch to “Normally Open”
- set the Cct Switch to “Normally Open”
- set the Battery Transducer FS as size according to ordered transducers.
- set the amount of battery temperature compensation voltage adjustment if used and after confirming that the battery temperature is being measured
- set the battery charging current limit to 10% of the Ah rating (i.e. if 150Ah battery is used, set the limit to 15A) – this value can be adjusted later to meet your specific charging requirements.

In many cases, these values are set up in the factory and will only require modification if the particular battery being used requires a different set up.

- Close the remaining battery circuit breakers if more than one string is used.
- Insert a switch-mode rectifier in position 1 and apply the AC power. The rectifier unit should power up and begin charging the battery bank/s.
- Insert all the remaining rectifiers and apply AC power to them.
- Check that the bus voltage is increasing toward the float voltage.
- Close the load circuit breakers and check that the loads power up.
- Wait for 1 minute and check that the rectifiers are all sharing the load current to within +/-2A of the average rectifier current.
- The system is up and operational. Adjust any operational monitoring or setup details as required (see the next section on Operation or refer to the Controller Operation Manual on the CD for a detailed explanation of the functions).

#### 4.11 OPERATION

System operation is controlled by the Controller system controller. As a result, operation information for the system is directly related to the operation of the Controller as described in this section.

#### 4.12 SUMMARY OF CONTROLLER FRONT PANEL CONTROLS

There are four Menus which can be viewed using the INC or DEC buttons:

- a) The default or "Home" menu which contains general system information;
- b) RECTIFIER menu - contains all the parameters relating to the switch-mode rectifiers (RECTIFIER);
- c) Battery menu - contains all the parameters relating to the batteries;
- d) Alarms log - which is a chronological record of the last 100 alarms.

##### **Moving from one menu to another**

If no button has been pressed for two minutes, the display will revert back to the Home screen. This shows the output voltage and load current.

To move from any menu to any other menu, press the corresponding button. e.g. to move to the Battery Menu from any other menu, momentarily press the BATT button.

To move to the Home menu from any other menu, press the button of the current menu. e.g. if in the RECTIFIER menu, press RECTIFIER button to return to the Home menu.

##### **Scrolling through the Menus:**

To scroll through any menu from the first screen to the last, press the INC button;

To scroll to the last (bottom) screen first, then upwards through the menu to the first screen, press the DEC button.

##### **Incrementing and decrementing programmable parameters**

To change a programmable parameter press ENTER; the value will flash on and off. To increase the number, press INC; to decrease the number press DEC. When the desired number is on the screen, press ENTER again.

##### **To change parameters when the security function is activated**

If an attempt is made to alter any parameter when the security function is activated, the display will show the message "Enter Password".

To change a parameter, enter a valid password. Then proceed to change the parameter in the normal way.

##### **When scrolling through the Alarms log**

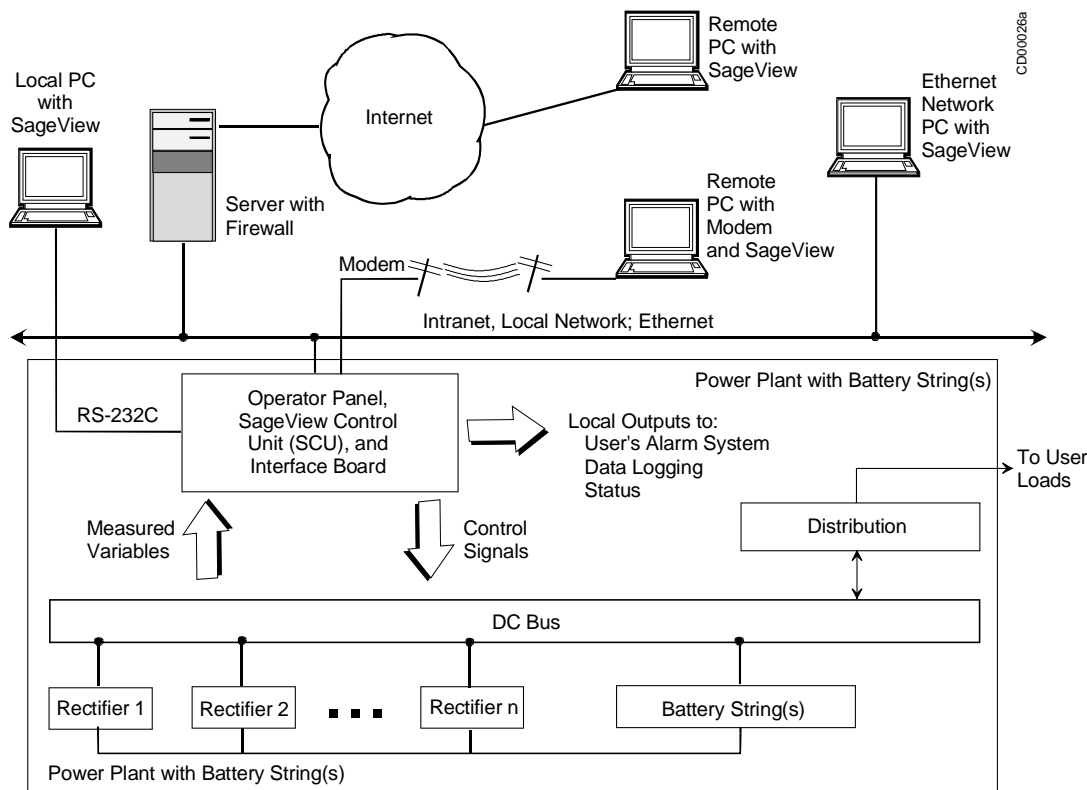
To observe the date and time of a given alarm, do not press any button for at least two seconds. The date and time will display for two seconds and then the alarm name will be displayed for two seconds. The display will alternate between the two screens in this manner until a button is pressed.

## 5.0 SAGEVIEW

SageView™ System Monitor software enables configuring and monitoring of a Sageon II Power System from a local or remote personal computer (PC). Figure 5-1 shows the various access options.

Local monitoring involves a PC connected to the USB connector on a System's operator panel.

Remote monitoring also connects a Sageon II Power System to a PC, however, they can be separated by a few feet or by hundreds of miles. Your company's Ethernet network or intranet, the Internet, or a pair of telephone modems can provide the interconnection. Refer to TG990.4262.10 for more details on SageView.



**FIGURE 5-1 NETWORK CONNECTIONS**

### 5.1 CONFIGURATION

Use SageView to develop a completely new configuration and then upload this configuration to a connected Sageon II Power System. If an operating configuration requires minor parameter value changes, download the configuration from the System to the PC, edit as needed, and then upload to the same System or to another connected System.

#### 5.1.1 SageView benefits:

- Saves time since configuration development and Sageon II Power System installation can proceed simultaneously
- Reduces configuration errors since the configuration can be developed and checked for accuracy at a PC before being uploaded to the System
- Includes on-line security with access code and password protection
- Provides a permanent configuration record for comparison with operating cost data and service records



## 5.2 MONITORING

SageView screens provide for efficient, effective monitoring of System operation. System output voltage and current, alarms, battery status, and many other performance parameters are read on a single PC display.

SageView includes comprehensive Help. It provides the latest information about program installation and operation, communication options, and other topics.

## 5.3 SECURITY

Security is a major consideration when deciding upon a communications strategy that involves sending proprietary data over your company's intranet, the Internet, or telephone lines. Before enabling local or remote communications, carefully review your company's electronic security policies. Contact your company's network administrator for details about network structure and security. The administrator can also furnish an IP (Internet Protocol) address when Ethernet access is needed.

## 5.4 CABLE AND NETWORK CONNECTIONS

Figure 5-1 shows typical connections for local and remote access to Sageon II Power System data. Additional information is provided in the SageView Help topic titled Connection Setup.

Local connection details are provided below. Guidelines for remote connections are also provided. Remote connection specifics are beyond the scope of this manual since actual connections and required hardware are determined by the systems operating within your System. Consult your company's network administrator.

## 5.5 LOCAL CONNECTION, STANDARD

For a local connection, cable the serial port on the Sageon II Power System's operator panel to the USB port on a Windows-based PC. A customer supplied USB-A to USB-B cable is required.

## 5.6 REMOTE CONNECTION, ETHERNET, OPTION

When the Ethernet option is ordered, the Sageon II Power System includes an RJ-45 connector for the Ethernet network cable. As shown in Figure 5-1, a remotely located Windows-based PC can be connected to your System's Ethernet network. With the addition of the necessary hardware (e.g. server with firewall), a remote PC can connect to your System's network over the Internet.

## 5.7 PC REQUIREMENTS

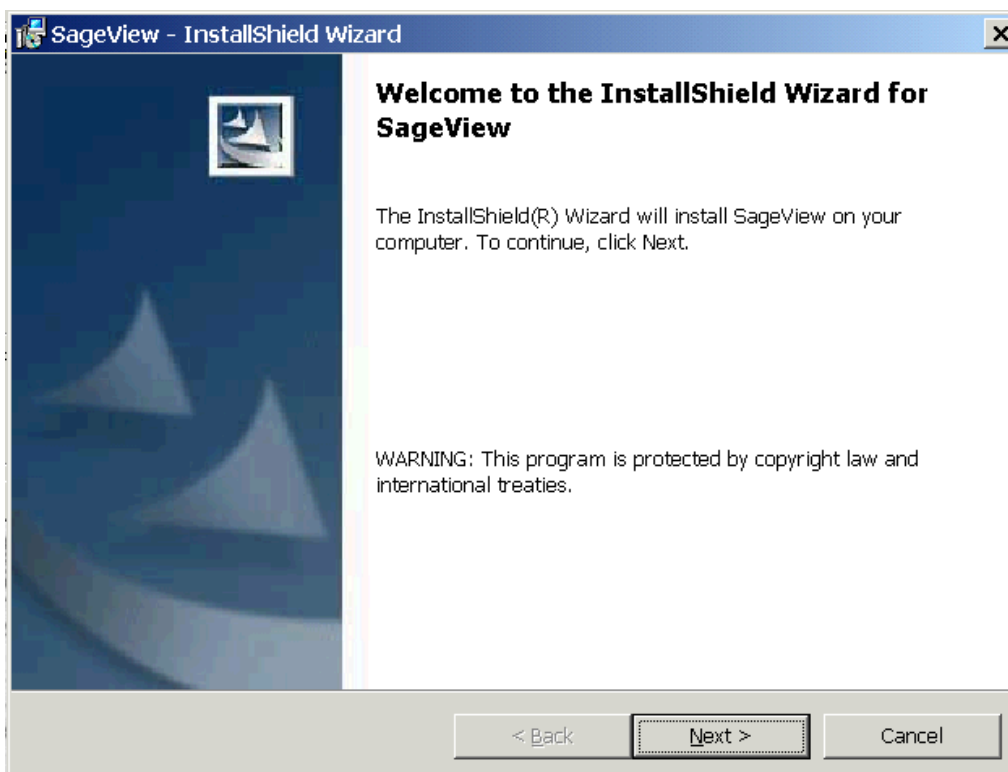
- Microsoft® Windows® 98, ME, NT4, 2000, or XP
- Pentium III or better microprocessor
- 128 KB or more RAM
- 10 MB unused hard disk space for program and database files
- CD-ROM drive
- USB port, with USB-A to USB-B cable.

## 5.8 INSTALLING SAGEVIEW

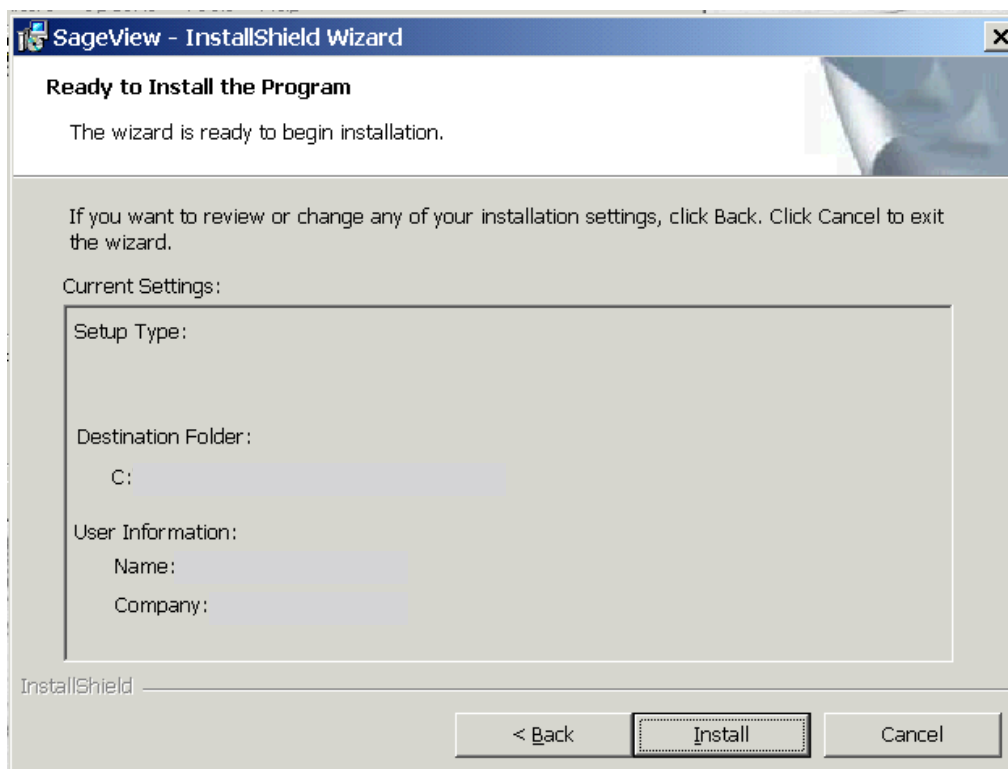
Before beginning the installation, review the PC requirements above to be sure the PC at hand meets the minimum requirements. Also, read the ReadMe.txt file on the CD for the latest information about installing and using SAGEVIEW.

1. Insert the SAGEVIEW CD in your computer's CD-ROM drive. The opening screen will appear. If it does not appear, click **Start** and then click **Run**. In the **Run** dialog box type d:\setup.exe. Substitute your CD-ROM's drive letter for "d" as needed.

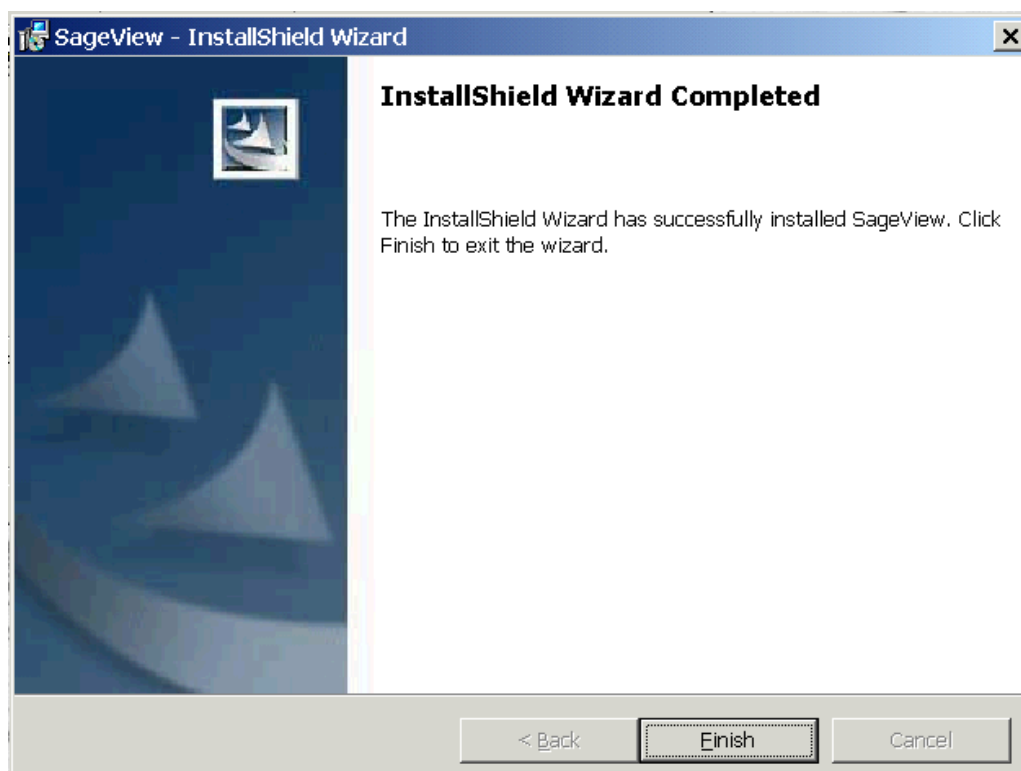
- Windows' InstallShield will start and the screen shown below will appear. Click **Next** to continue the installation or click **Cancel** to exit the installation.



- In the Choose Destination Location screen, click **Next** to accept the default location for installation of the SageView program. Alternatively, type another path or browse to another location for installation of the program and then click **Install**.



4. The final installation screen is the Setup Complete screen. Click **Finish** to complete the installation.



## 5.9 OPERATING SAGEVIEW

This section is intended to familiarize the new SageView user with the main screen and to suggest a series of initial steps to ensure that necessary settings are entered and saved.

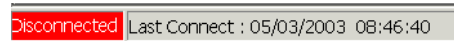
Comprehensive Help is provided. First read Section 5.9.1 Main Screen in this manual to become familiar with the information areas. Then click **Help** in the SageView menu bar and read the provided operating information.

**IMPORTANT:** To display the main screen, as shown in Figure 5-2:

- Install all needed cabling, network devices, and SageView software.
- Complete the needed initial settings. See Section 5.9.2 Initial Settings.

If the initial settings are not completed or completed incorrectly:

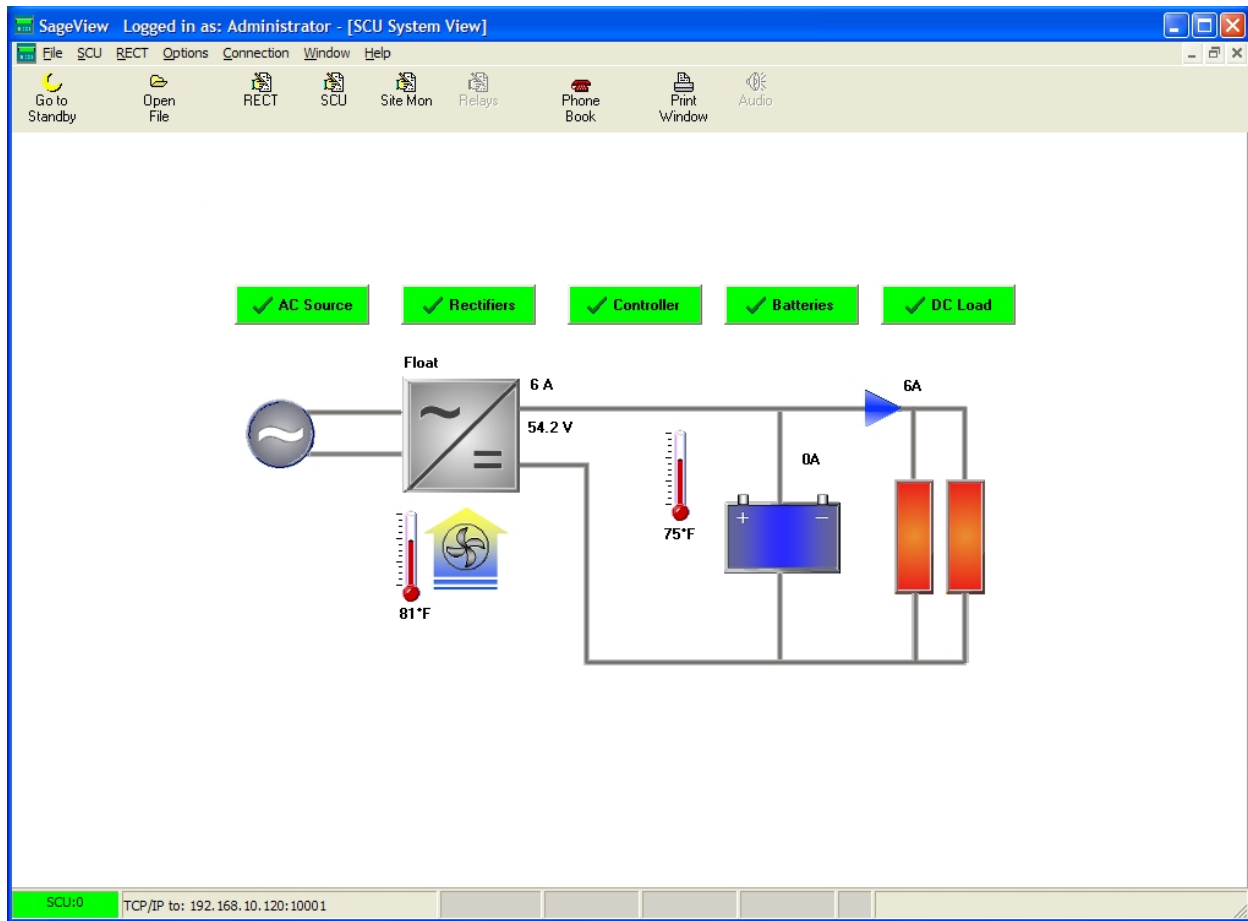
- An error message similar to that shown below may appear.
- “Disconnected” on a red background may appear at the lower left corner of the screen. If this is an initial installation, the Last Connected portion of the message may not appear.
- The main screen may be incomplete and unpopulated with data.



### 5.9.1 Main Screen



To start SageView, click **Start** and then click **Programs**. Locate and click **SageView**. Allow a brief period for the program to load and then to communicate with the Sageon II Power System and acquire data. The system status screen, with example data, is shown below in Figure 5-2.



**FIGURE 5-2 SYSTEM STATUS SCREEN**

### 5.9.2 Initial Settings

The following settings should be made when SageView is initially installed: password, access code, and communication selections (e.g. phone numbers, modem characteristics). The password and access code functions provide security to prevent unauthorized access to the SCU in the Sageon II Power System and to your company's data.

Communications between the SCU and a local or remote PC can be enabled once the initial security measures are in place.

#### 5.9.2.1 Password - Remote PC

When password protection is enabled at a remote PC, the ability to change critical SageView screens and upload to the Sageon II Power System is restricted to those able to enter the password. The password is not uploaded to the Sageon II Power System or to any other connected PC. It is in effect only on the PC at which it was entered. If several PCs are networked and able to read Sageon II Power System data, each can have a unique password or they can have the same password.

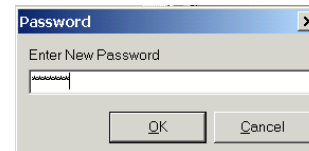
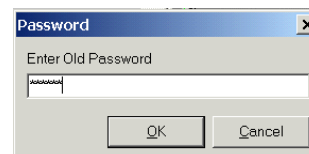
**IMPORTANT:** A secure password is required for a secure installation.

#### Password guidelines

- The default password is "SageView", without the quotation marks. The default password should be changed and the new password kept secure to prevent unauthorized access to critical data and control functions.
- The password should not be a word or an easily guessed variation of a word. However, it should be easily remembered.
- The password should contain 6-14 characters with letters, numbers, and special characters, for example: uke45%.
- The password is not case sensitive.

### Changing a password

1. To change the default password, click **Options** and then click **Change Password**. An **Enter Old Password** dialog box appears. Type the default or present password. Click **OK**.
2. The **Enter New Password** dialog box appears. Type the new password and click **OK**.
3. A **Confirm Password** dialog box will appear. Type the new password again and **OK** to save the new password.



OK.  
click

If you mistype the confirmation, your password will default to the previous password.

#### 5.9.2.2 Access Code - Local PC

The access code is a security feature for use with a PC connected to the USB connector on the Sageon II Power System front panel. For this PC running SageView to communicate with the Sageon II Power System, the access code entered in the PC must match the access code stored in the Sageon II Power System. The user-selected access code is a 7-digit number. The default access code is 0000000. No letters, spaces, or special characters may be used.

In multiple Sageon II Power System systems, each System should have a unique access code.

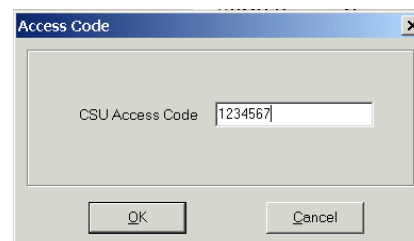
If a PC running SageView attempts to access a Sageon II Power System that has a different access code than the PC:

- The SageView background screens will be displayed
- There will be no data populating the screens
- An error message will appear at the PC, e.g. Error, Device on COM1 not responding
- The communication status in the lower left corner of the PC screen will display “disconnected” on a red background

Note: The Access code in the Sageon II Power System is entered from the operator panel. It cannot be downloaded from a PC. Refer to Section 4 Operation.

Note: An Access Code is required for communication between a remote, network-connected PC and the Sageon II Power System. **The default access code is 0000000.**

1. To enter an Access Code in SageView, click **SCU** and then click **Access Code**.
2. In the Access Code dialog box, type the Access Code that was entered in the Sageon II Power System with which communications is to be established. Click **OK**.



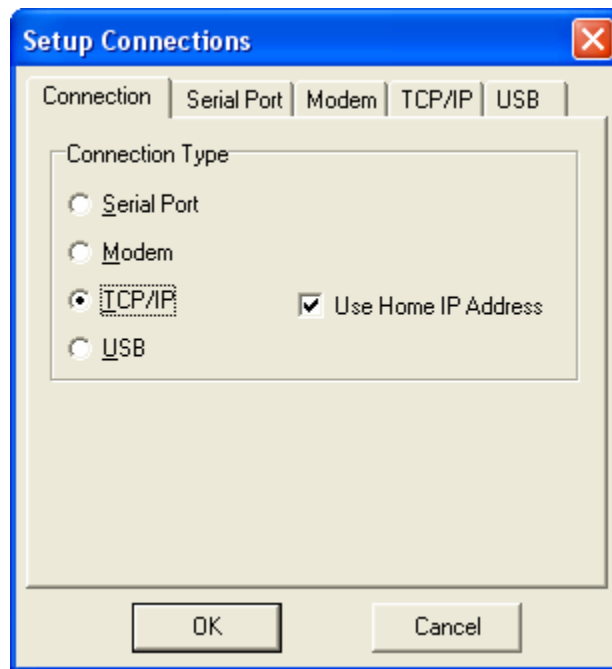
#### 5.9.2.3 Communications

The selections in this screen allow you to communicate with the Sageon II Power System from a remote location; see Figure 5-1. However, security is a major consideration when deciding upon a communications strategy that involves your company's intranet, the Internet, or telephone modems. Before enabling communications, carefully consider your company's electronic security policies. Your company's network administrator can provide details about network security and furnish an IP (Internet Protocol) address.

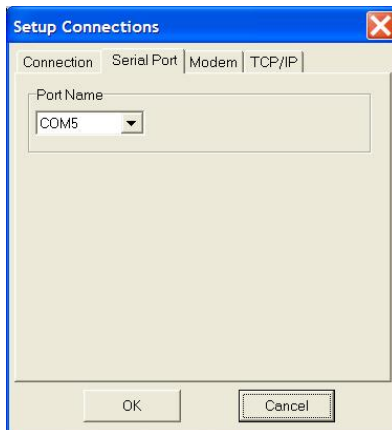
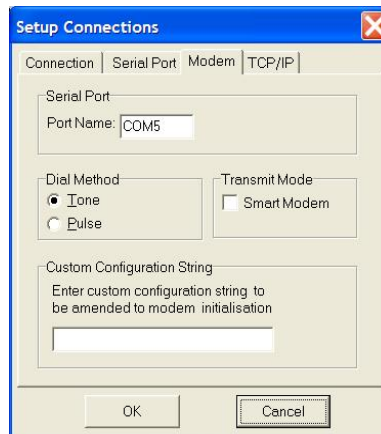
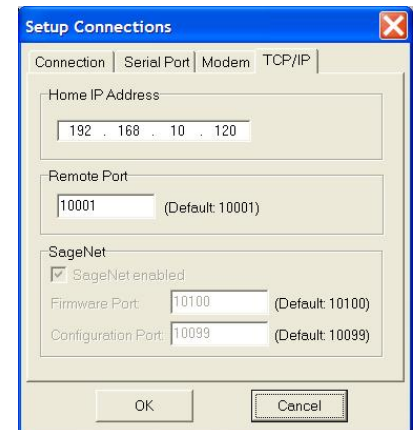
The Help program contains articles to assist you in completing dialog box entries, for example: TCP/IP, Understanding IP Addresses, Understanding Modems, Use Home IP Address.

1. In the menu bar, click **Options** and then click **Connection Setup**.

2. In the **Connection Setup** dialog box, select the option button adjacent to the desired communication method: Serial Port, Modem, or TCP/IP.



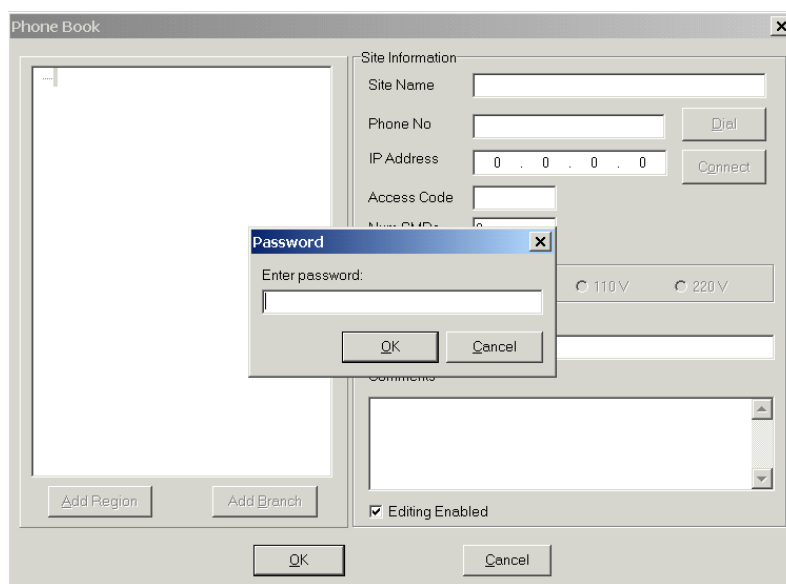
3. Click the tab for the **Connection Type** selected and enter the requested information.

**Serial Port****Modem****TCP/IP**

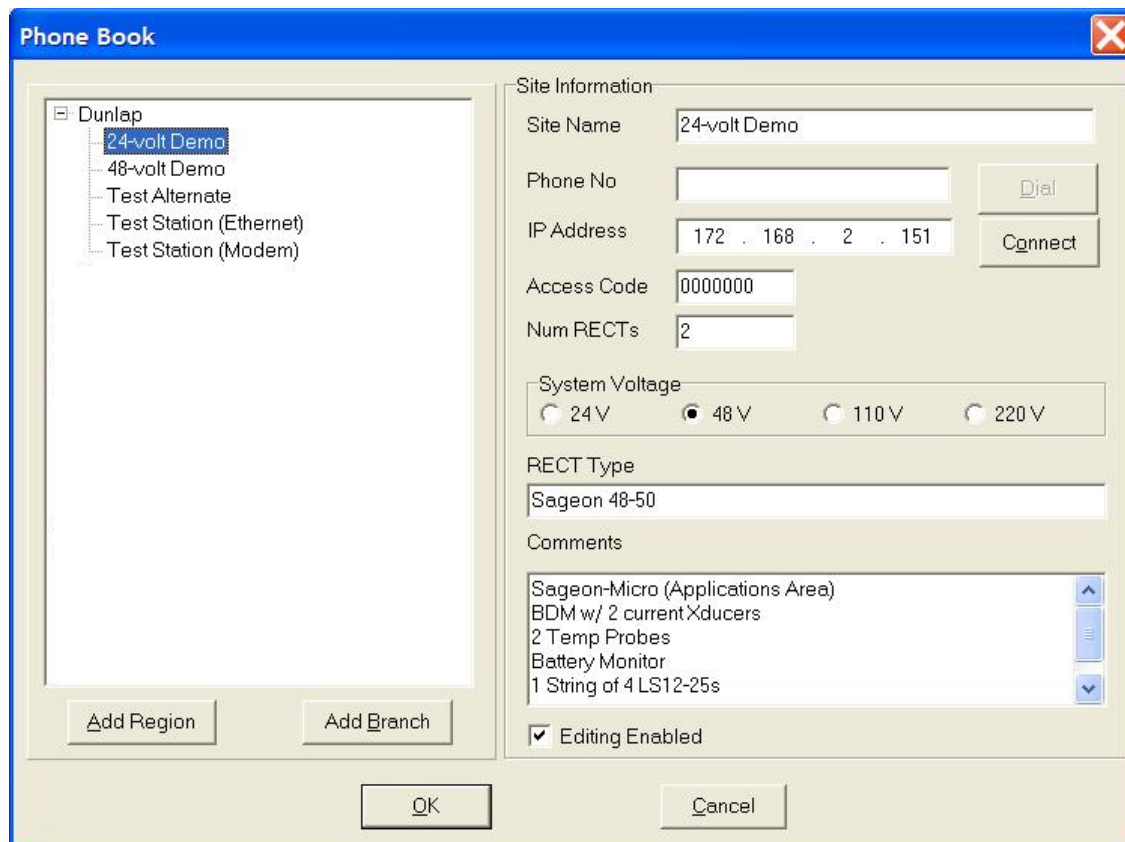
After entering the requested information:

- For modem communications, go to Step 4.
- For serial and TCP/IP communications, this concludes initial setup.

4. For modem communication, in the menu bar, click **Communication** and then click **Phone Book**.



5. Select the **Editing Enabled** check box to display the **Password** dialog box.
6. Type the password and click OK.
7. Type the requested information and click **OK**. Refer to Help for information about each of the entries.





## 5.10 CONFIGURATION

A completed configuration will contain the Sageon II Power System, battery, and site parameter values that are to be measured, monitored, and, when user-specified values are exceeded, used to generate an alarm. You can create a configuration using either of the following methods.

- **Create a New Configuration** – To create a new configuration only a PC running SageView is needed. This method is used to develop the initial configuration and allows a configuration to be created while the Sageon II Power System is being installed. It can also be used to develop a configuration that is significantly different from other on-site configurations, where the benefit derived from editing an existing configuration is minimal.

A network connection is not required to create the configuration, however, one will be needed to transfer the configuration to the Sageon II Power System.

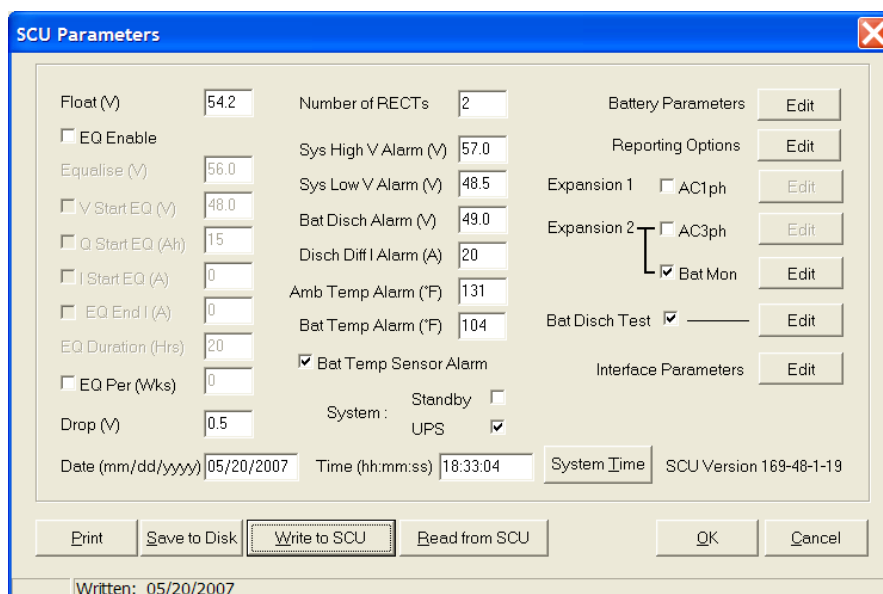
- **Edit an Existing Configuration** – When the configuration to be developed is similar to an existing configuration, considerable time can be saved by downloading a similar configuration from a configured Sageon II Power System. Developing the configuration is then a simple matter of editing parameters, saving the new configuration, and uploading to the same or another Sageon II Power System.

### 5.10.1 Create a New Configuration

1. Load SageView on the PC as described earlier in this chapter.
2. Start SageView. The main screen will appear.
  - If there is no network connection, the main screen will be incomplete and there will be no parameters or parameter values. The network status in the lower left corner of the screen will be red with “Disconnected” displayed. See the background screen in Figure 5-3.
  - If there is a network connection to a configured Sageon II Power System, the screen in Figure 5-2 will appear.
3. Click the **SCU** icon in the toolbar to display the **SCU Parameters** screen. Figure 5-3 below shows the **SCU Parameters** screen overlaying the SageView **Main** screen.
4. Type the requested parameter values into the screen’s text boxes.
5. Click the **Battery Parameters** button in the upper right corner of the screen. Type the requested data. When the entries are complete, click the **OK** button. The dialog box will close and a yellow dot will appear on the button.
6. Click the **Reporting Options** button and type the requested data. Type the requested data. When the entries are complete, click the **OK** button. The dialog box will close and a yellow dot will appear on the button.
7. Click the **Save to Disk** button. When saving the screen for later download, be sure to name the file for easy identification. This is particularly true when creating several configurations.

If a parameter is out of range, a Warning box will be displayed stating the allowable range. Close the box and correct the entry. Again, click the **Save to Disk** button. If another parameter is out of range, another message will appear stating the allowable range for the parameter. This process will continue until all parameters are within range.

8. Click the **RECT** icon in the toolbar to display the **Rectifier Parameter** dialog box. See Figure 5-4.
9. Type the requested data.
10. Click the **Save to Disk** button. When saving the screen for later download, be sure to name the file for easy identification. This is particularly true when creating several configurations.
11. Click **OK** to close the dialog box.
12. Click the **Site Monitor** icon in the toolbar to display the **Site Monitor** dialog box. See Figure 5-5.
13. Type the requested data.
14. Click the **Save to Disk** button. When saving the screen for later download, be sure to name the file for easy identification. This is particularly true when creating several configurations.
15. Click **OK** to close the dialog box.

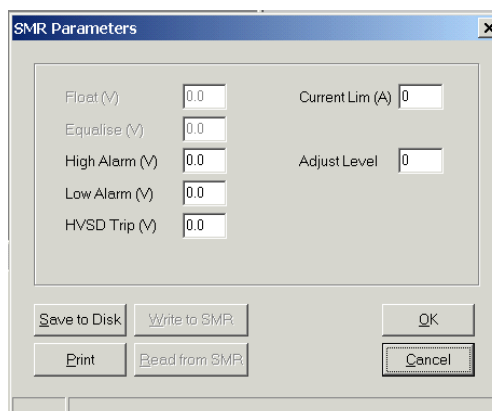


The SCU Parameters dialog box is a software interface for configuring the SCU (System Control Unit) parameters. It features a blue title bar with the text "SCU Parameters" and a close button (X). The main area is divided into several sections:

- Float (V):** 54.2
- Number of RECTs:** 2
- Battery Parameters:** Edit
- EQ Enable:** ☐
- Equalise (V):** 56.0
- Sys High V Alarm (V):** 57.0
- Reporting Options:** Edit
- V Start EQ (V):** 48.0
- Sys Low V Alarm (V):** 48.5
- Expansion 1:** ☐ AC1ph Edit
- Q Start EQ (Ah):** 15
- Bat Disch Alarm (V):** 49.0
- Expansion 2:** ☐ AC3ph Edit
- I Start EQ (A):** 0
- Disch Diff I Alarm (A):** 20
- Bat Mon:** ☒ Edit
- EQ End I (A):** 0
- Amb Temp Alarm (°F):** 131
- Bat Disch Test:** ☒ Edit
- EQ Duration (Hrs):** 20
- Bat Temp Alarm (°F):** 104
- Interface Parameters:** Edit
- EQ Per (Wks):** 0
- Bat Temp Sensor Alarm:** ☒
- Drop (V):** 0.5
- System:** Standby ☐ UPS ☒
- Date (mm/dd/yyyy):** 05/20/2007
- Time (hh:mm:ss):** 18:33:04
- System Time:** SCU Version 169-48-1-19

Buttons at the bottom: Print, Save to Disk, Write to SCU, Read from SCU, OK, Cancel.

Written: 05/20/2007

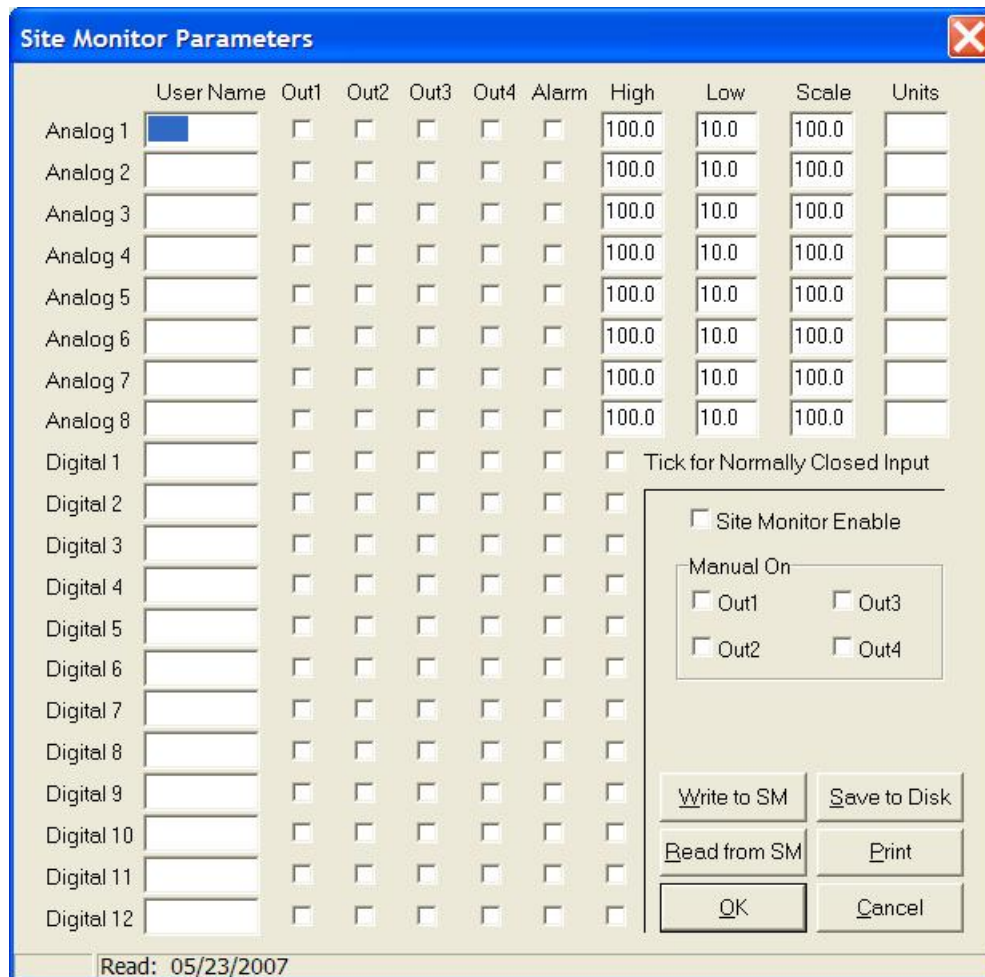
**FIGURE 5-3 SCU PARAMETERS DIALOG BOX**

The SMR Parameters dialog box is a software interface for configuring the SMR (System Monitor Relay) parameters. It features a blue title bar with the text "SMR Parameters" and a close button (X). The main area is divided into several sections:

- Float (V):** 0.0
- Current Lim (A):** 0
- Equalise (V):** 0.0
- High Alarm (V):** 0.0
- Adjust Level:** 0
- Low Alarm (V):** 0.0
- HVSD Trip (V):** 0.0

Buttons at the bottom: Save to Disk, Write to SMR, OK, Print, Read from SMR, Cancel.

**FIGURE 5-4 RECTIFIER PARAMETER DIALOG BOX**



The dialog box is titled "Site Monitor Parameters" and contains a table for configuring analog and digital inputs. The table has columns for User Name, Out1, Out2, Out3, Out4, Alarm, High, Low, Scale, and Units. There are 8 rows for Analog inputs (Analog 1 to Analog 8) and 12 rows for Digital inputs (Digital 1 to Digital 12). The High and Low columns are pre-filled with 100.0 and 10.0 respectively. The Scale column is pre-filled with 100.0. The Units column is empty. Below the table, there are checkboxes for "Site Monitor Enable" and "Manual On". The "Manual On" section has checkboxes for Out1, Out2, Out3, and Out4. At the bottom right, there are buttons for "Write to SM", "Save to Disk", "Read from SM", "Print", "OK", and "Cancel". A status bar at the bottom left shows "Read: 05/23/2007".

	User Name	Out1	Out2	Out3	Out4	Alarm	High	Low	Scale	Units
Analog 1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100.0	10.0	100.0	
Analog 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100.0	10.0	100.0	
Analog 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100.0	10.0	100.0	
Analog 4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100.0	10.0	100.0	
Analog 5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100.0	10.0	100.0	
Analog 6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100.0	10.0	100.0	
Analog 7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100.0	10.0	100.0	
Analog 8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	100.0	10.0	100.0	
Digital 1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tick for Normally Closed Input		
Digital 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 10		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 11		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Digital 12		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

Read: 05/23/2007

FIGURE 5-5 SITE MONITOR DIALOG BOX

### 5.10.2 Edit an Existing Configuration

1. Start SageView.
2. Download parameter data from a Sageon II Power System with a similar configuration. When SageView is started, data will be automatically downloaded if a valid network connection is present. If the PC is connected to the serial connector on the Sageon II Power System operator panel, it may be necessary to enter the correct access code. Figure 5-2 shows a populated SageView main screen.
3. When data has populated the SageView main screen, click on the **SCU** icon and edit the parameter values as needed.
4. Type the new parameter values into the screen's text boxes.
5. Click the **Battery Parameters** button in the upper right corner of the screen. Type the new data. When the entries are complete, click the **OK** button. The dialog box will close and a yellow dot will appear on the button.
6. Click the **Reporting Options** button and type the new data. When the entries are complete, click the **OK** button. The dialog box will close and a yellow dot will appear on the button.
7. Click either the **Save to Disk** button or the **Write to SCU** button.
  - **Save to Disk** - When saving the screen for later download, be sure to name the file for easy identification. This is particularly true when creating several configurations.
  - **Write to SCU** - A dialog box will appear allowing selection of the target SCU.

**Warning Box** - If a parameter is out of range, a Warning box will be displayed stating the allowable range. Close the box and correct the entry. Again, click the **Save to Disk** (or **Write to SCU**) button. If another parameter is out of range, another message will appear stating the allowable range for the parameter. This process will continue until all parameters are within range.

8. Click **OK** to close the dialog box.
9. Click the **RECT** icon in the toolbar to display the **Rectifier Parameter** dialog box. See Figure 5-4.
10. Type the new data.
11. Click either the **Save to Disk** button or the **Write to RECT** button.
  - **Save to Disk** - When saving the screen for later download, be sure to name the file for easy identification. This is particularly true when creating several configurations.
  - **Write to SCU** – A dialog box will appear allowing selection of the target SCU.
12. Click **OK** to close the dialog box.
13. Click the **Site Monitor** icon in the toolbar to display the **Site Monitor** dialog box. See Figure 5-5.
14. Type the new data.
15. Click either the **Save to Disk** button or the **Write to SM** button.
  - **Save to Disk** - When saving the screen for later download, be sure to name the file for easy identification. This is particularly true when creating several configurations.
  - **Write to SCU** – A dialog box will appear allowing selection of the target SCU.
16. Click **OK** to close the dialog box.

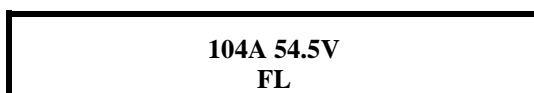
*Refer to the SageView Technical Guide (TG990-4212-10) for detailed information on all features of the SageView software.*

## 5.11 CONTROLLER COMPONENTS

### 5.11.1 Alpha-numeric Display

The user interface is a two-line by 16 character alphanumeric LED display. The 5mm high characters normally display output voltage and current as well as the system status - Float (FL) or Equalize (EQ). This is the default or “home” screen.

If an activity such as battery discharge testing is being performed, the current and voltage are always displayed, while the second line alternates between the system status (FL/EQ) and the activity status, for example “BDT in progress”.



***Whenever there is no push-button activity for more than one minute, the display always reverts to this home screen. Note: the examples shown are for 48V systems.***

### 5.11.2 Front Panel Pushbuttons

There are six pushbuttons associated with the LED screen for the purpose of entering different Menus and for scrolling through the menus. The layout of the pushbuttons is shown below:



Apart from the base menu (system parameters), there are three other menus which can be accessed by momentarily pressing the relevant pushbuttons:

- RECTifier** menu, which includes the rectifier related programmed parameters as well as the output current and heat-sink temperature for each rectifier;
- BATTery** menu in which all the parameters relating to the batteries are found;
- Log** which stores the individual alarm event information together with date and time starting with the most recent alarm. A total of 100 alarms are stored.

### 5.11.3 Status Indicating LEDs (Controller)

SYSTEM OK		Green LED
ALARM		Amber LED
RECTIFIER SHUTDOWN		Red LED

All LEDs off, indicates the unit is off due to either DC power not present, or there is an internal failure of Controller

The amber LED indicates any alarm condition, either system or rectifier related.

The red LED indicates that one or more of the rectifiers in the system is shut down.

## 5.12 CONTROLLER SECURITY & ALARMS

### 5.12.1 Password security

Controller features password security for setting of parameter. A valid password is an alphanumerical code having minimum three and maximum eight characters.

Units leave the factory without a pre-programmed password and the security function is not active. To activate the security, a password must be programmed. Once that is done, security can be enabled.

#### 5.12.1.1 Entering a password to gain access to parameters change

When the security function is active any changes to the system settings can be done only after a valid password was entered. When the ENTER key is pressed to change a parameter, the display will show a message “Enter Password” on the top line and a blinking cursor on the right hand side of the bottom line. Using INC and DEC keys scroll to the first character of the password and press ENTER. The character will be substituted by an asterisk (\*) displayed to the left of the cursor. Enter all characters of the password the same way. If the password is less than eight characters long press ENTER again after last character. If the entered password was correct the display will return to the selected parameter ready for modification. If the entry was incorrect following will be displayed.

**Wrong Password  
Panel Locked**

There is no limit on password entry re-tries. To abort password entry any of the top row buttons should be pressed. The display will return to the selected parameter. Once unlocked, the security is disabled until there is no keypad activity for >1 minute.

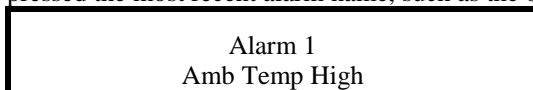
### 5.12.2 When an alarm condition exists

If one or more alarm conditions exist at any time the following message will alternate with the “home” screen for 2 seconds every six seconds in addition to warning LED indicators:

3 Alarms  
Press ENTER

In this case, the message indicates that there are three alarms present and they can be observed by pressing the ENTER button.

When the ENTER button is pressed the most recent alarm name, such as the one shown below will appear on the display.



If no button is pressed again for one minute, the display will revert to the “home” screen and the sequence begins again.

To view the remaining alarms, use INC and DEC buttons. Pressing the ENTER button will return the display to the “home” screen. The time and date of any given alarm can be obtained by entering the ALARM LOG menu.

### 5.12.3 Controller Alarms

A list of all the possible alarms that can be enunciated is shown in the following table.

Alarm Name	Comments	LED
RECTIFIER Alarm	Combination of one or more RECTIFIER alarms	A
RECTIFIER Urgent	One or more RECTIFIERS have shut down	A+R
RECTIFIER HVSD	RECTIFIER shut down due to output over-voltage	A+R
UNIT OFF	RECTIFIER is off	A+R
No Response	A particular RECTIFIER is not responding to the Controller	A
Power Limit	RECTIFIER is in Power Limit	A
No Load	RECTIFIER output current less than minimum for RECTIFIER type used	A
Current Limit	RECTIFIER in current limit	A
Voltage High	Voltage measured by RECTIFIER too high	A
Voltage Low	Voltage measured by RECTIFIER too low	A
UNCAL RECTIFIER	RECTIFIER Internal Adjustment for current sharing out of limits	A
EEPROM Fail	EEPROM failed (CSU or RECTIFIER)	A
Fan Fail	RECTIFIER Internal Fan failure alarm (only possible on RECTIFIERS with fans)	A
Relay Fail	RECTIFIER output relay contact failure	A
No Demand	Control loop in RECTIFIER not in normal state	A
H/S Temp High	RECTIFIER heatsink temperature too high (where available)	A
Temp Sensor Fail	Temp sensor in RECTIFIER faulty - S/C or O/C (where available)	A+R
Vref Fail	Voltage reference in RECTIFIER microprocessor circuit faulty	A+R
HVDC not OK	DC/DC converter (boost) voltage in RECTIFIER not OK	A+R
AC Volt Fault – detected by RECTIFIERS	All RECTIFIERS are reporting AC fault. Available only on some RECTIFIER models.	A+R
AC Volt Fault – detected by Controller	None of RECTIFIERS are responding (AC fail assumed), or if AC monitor is used, AC voltage is out of limits set (When no AC monitoring module is used, this comes together with “RECTIFIER Comms Fault”)	A
AC Freq Fault	AC frequency lower or higher than preset value	A
Battery Switch	One or more battery switches open	A
Cct Breaker	Fuse or CB in load distribution open	A
LVDS Open	Low Voltage Disconnect switch open	A
Sys Volts High	System output volts too high	A
Sys Volts Low	System output volts too low	A
System V Clamp	CSU can not reach desired system voltage. This can be due to possible excessive voltage drop along bus bars or “System V Drop” parameter has value too low.	A
Cell V High	One or more cells being monitored by BCM is too high in voltage	A
Cell V Low	One or more cells being monitored by BCM is too low in voltage	A
Cell %dev High	One or more cells being monitored by BCM is too high % deviation from the mean battery cell voltage	A

Alarm Name	Comments	LED
Cell %dev Low	One or more cells being monitored by BCM is too low % deviation from the mean battery cell voltage	A
Range RECTIFIER	RECTIFIER parameter range error. Controller could not overwrite values	A
Site Monitor	Alarm present from the site monitor module. See site monitor menu for details of alarm channel.	A
Battery Disch	Batteries are discharging	A
Disch Tst Fail	Battery discharge test failed to reach a programmed end point	A
Bat Disch Low	Alarm flags only if the system voltage falls below Discharge Alarm level while the battery is discharging	A
Lo Electrolyte	Alarm generated for NiCad batteries using special sensor and software	A
RECTIFIER Comms Fail	One or more of RECTIFIERS are not responding	A
Amb Temp High	Ambient temperature higher than preset limit	A
Batt Temp High	Battery temperature higher than preset limit	A
Batt Temp Sens	Battery temperature sensor not connected or failure	A
Batt I-Limit	Battery charging current is being limited to preset value	A
Bat Sym Alarm	Battery discharge currents from battery strings not sharing load equally	A
Earth Leak Alarm	Earth leakage current greater than the limit set	A
Equalize	System is in equalize mode	A *

R = red LED on

A = amber LED flashing

\* not flashing

#### 5.12.4 User programmable relay functions

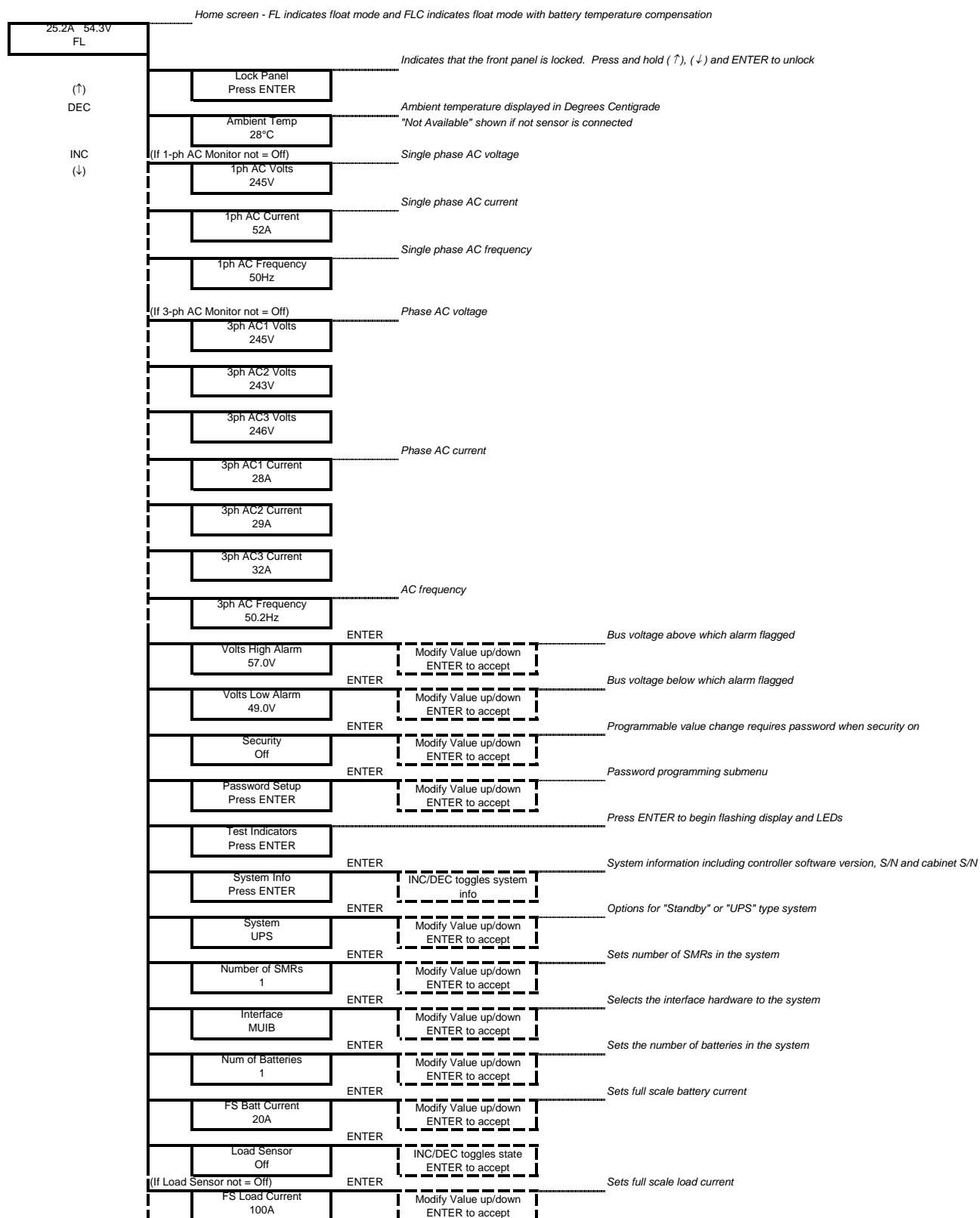
Units are shipped with factory default relay assignments (see below). The relay logic of the default settings is contact closure on an active alarm. Relay functions can be re-assigned only from a PC running monitoring program Sageview (either through the front panel USB or remote communications port).

Refer to Sageview Help for instructions.

<i>Relay Default Assignments</i>				
1	2	3	4	5
Not Assigned	Not Assigned	HV Shutdown	General Alarm	RECTIFIER Shutdown
<i>Customer Relay Assignments (User to complete)</i>				

## 5.13 NAVIGATING CONTROLLER FUNCTIONS

## 5.13.1 Base Menu (System Level Functions)

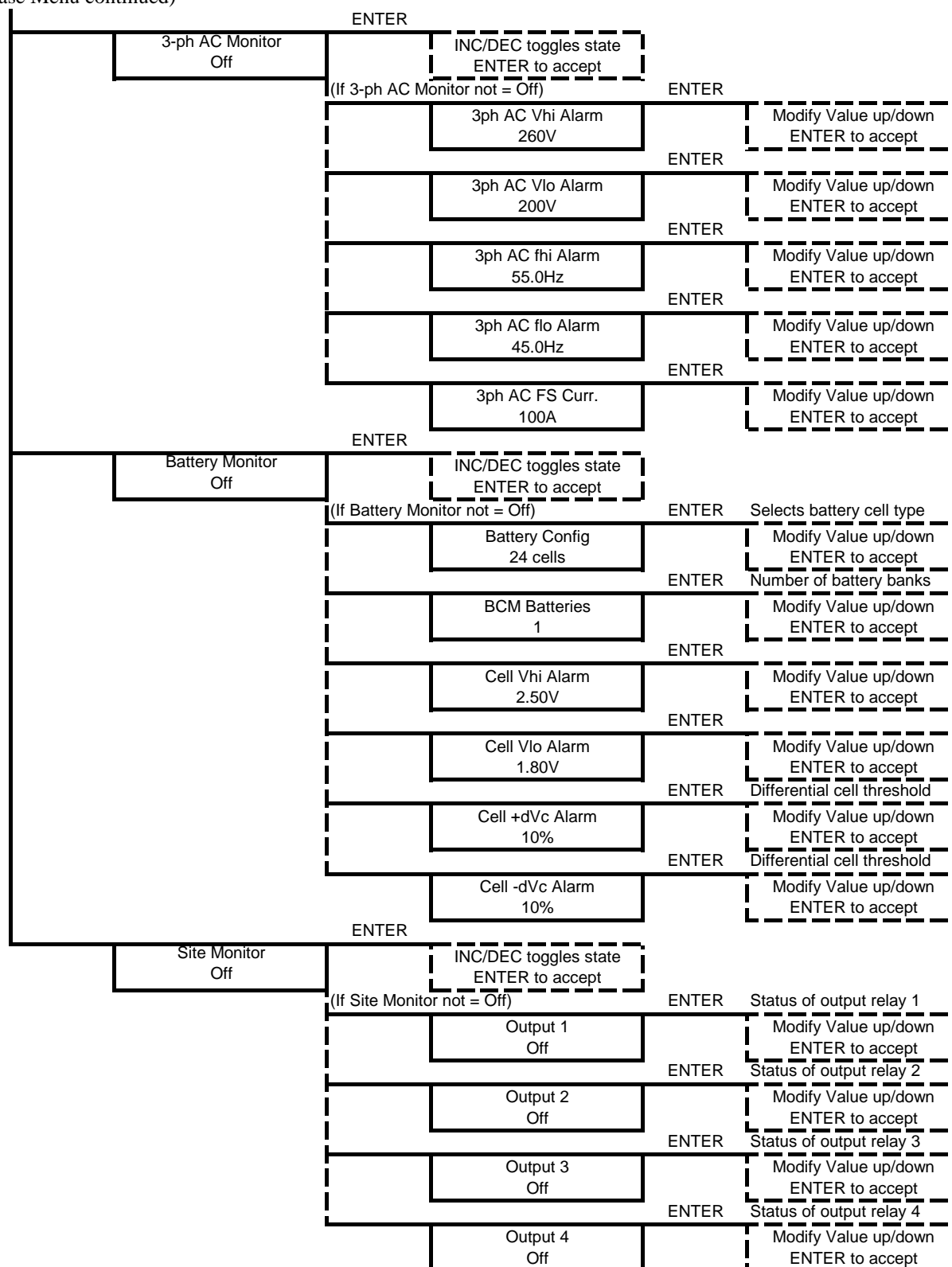




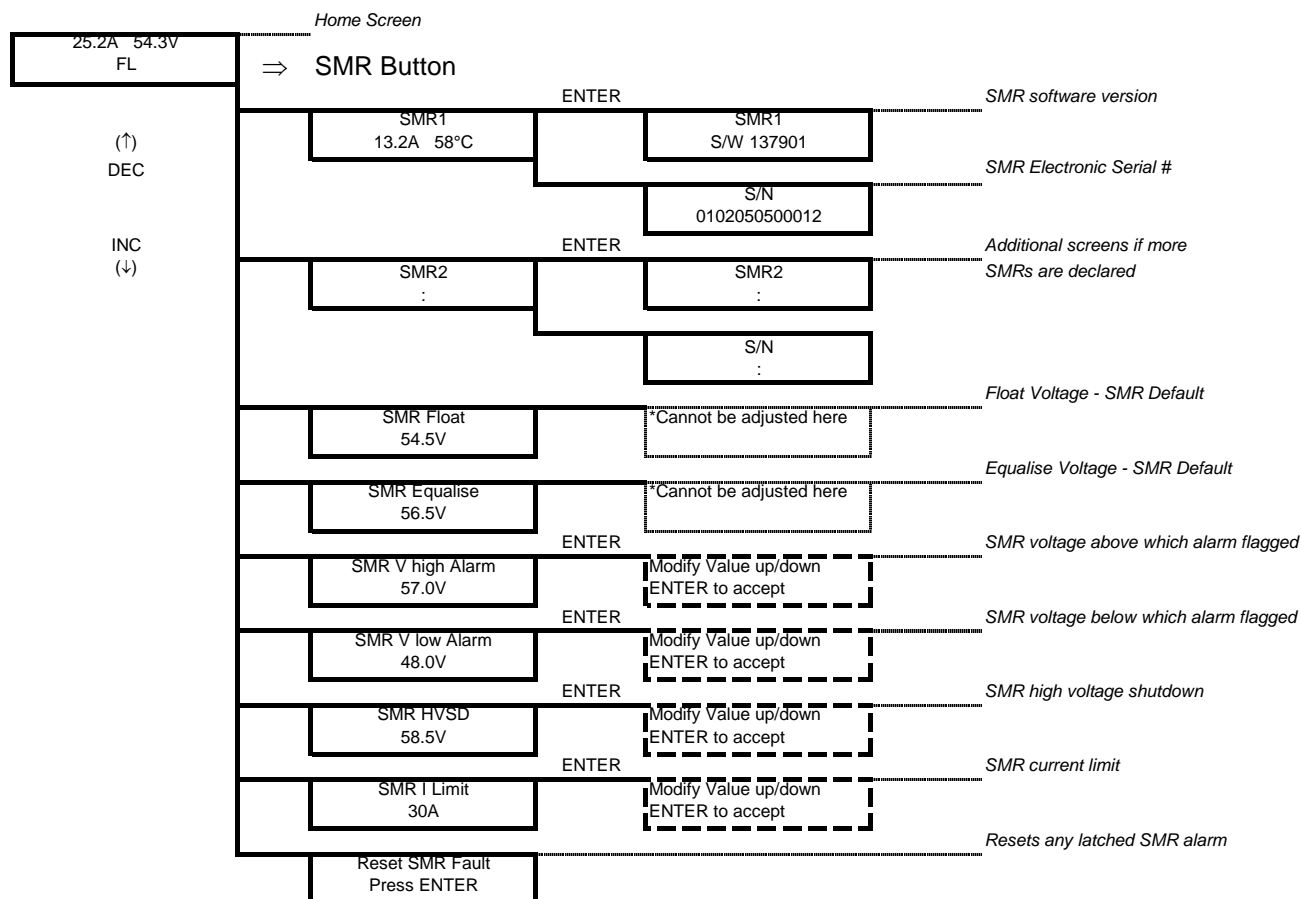
(Base Menu continued)

Access Code 000000		ENTER	Modify Value up/down ENTER to accept	Sets MiniCSU-3 access code address
Date Format DD/MM/YYYY		ENTER	Modify Value up/down ENTER to accept	
Date 25/12/2005 Time 01:11:11		ENTER	ENTER selects hours, minutes, day, month or year INC/DEC modifies value	
Alarm Report Off		ENTER	INC/DEC toggles state ENTER to accept	
Daily Report Off		ENTER	INC/DEC toggles state ENTER to accept	
(If Daily Rep not = Off)		ENTER		
Daily Rep Time 15:15		ENTER	INC/DEC toggles state ENTER to accept	
Modem Off		ENTER	INC/DEC toggles state ENTER to accept	
(If Modem not = Off)		ENTER		
Country Code 61		ENTER	Modify Value up/down ENTER to accept	
Cust Init String None		ENTER	Modify Value up/down ENTER to accept	External modem initialisation string
Phone 1 0398887788		ENTER	Modify Value up/down ENTER to accept	
Phone 1 Cont 2323		ENTER	Modify Value up/down ENTER to accept	
Phone 2 0398887788		ENTER	Modify Value up/down ENTER to accept	
Phone 2 Cont 2323		ENTER	Modify Value up/down ENTER to accept	
Phone 3 0398887788		ENTER	Modify Value up/down ENTER to accept	
Phone 3 Cont 2323		ENTER	Modify Value up/down ENTER to accept	
Audio Alarm Off		ENTER	INC/DEC toggles state ENTER to accept	
Cct Input Not Used		ENTER	INC/DEC toggles state ENTER to accept	Circuit breaker auxiliary contact circuit input configuration
Batt Switch Input Not Used		ENTER	INC/DEC toggles state ENTER to accept	Battery circuit breaker auxiliary contact circuit input configuration
LVDS Input Not Used		ENTER	INC/DEC toggles state ENTER to accept	Battery low voltage disconnect switch auxiliary circuit input configuration
Auxiliary Units Press ENTER		ENTER	1-ph AC Monitor Off	
		ENTER	INC/DEC toggles state ENTER to accept	
		ENTER	(If 1-ph AC Monitor not = Off)	
		ENTER	1ph AC Vhi Alarm 260V	Modify Value up/down ENTER to accept
		ENTER	1ph AC Vlo Alarm 200V	Modify Value up/down ENTER to accept
		ENTER	1ph AC fhi Alarm 55.0Hz	Modify Value up/down ENTER to accept
		ENTER	1ph AC flo Alarm 45.0Hz	Modify Value up/down ENTER to accept
		ENTER	1ph AC FS Curr. 100A	Modify Value up/down ENTER to accept

(Base Menu continued)

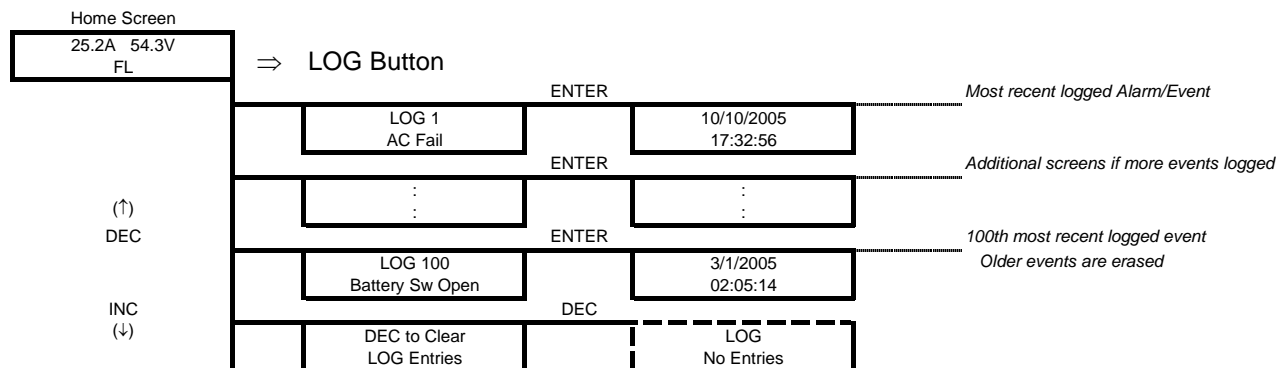


### 5.13.2 Rectifier Menu (Rectifier Specific Functions)

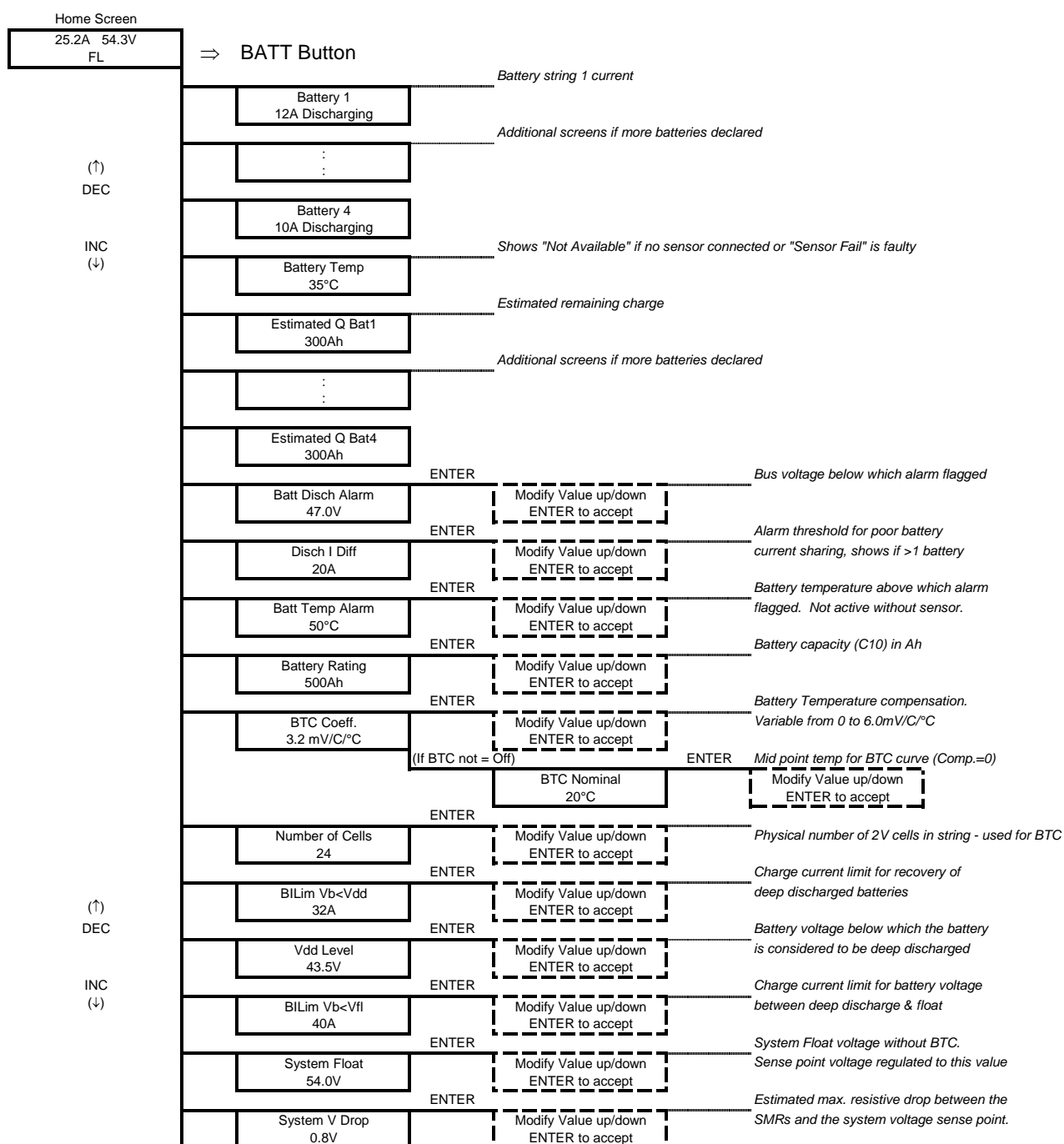


The RECTIFIER Float and Equalize voltages are the default values set in the rectifier that will be used if the Controller fails to operate. They are a copy of the raw values set in the BATTERY menu without battery temperature compensation and system drop adjustments.

### 5.13.3 Alarm Log



## 5.13.4 Battery Menu (Battery Specific Functions)



## (Battery Menu continued)

(↑) DEC  INC (↓)	ENTER		Enable/disable Equalisation charging
	Equalisation On	ENTER toggles state Off / On	
	ENTER		Charge current limit for battery voltage between float & equalise
	BLim Vb>Vfl 20A	Modify Value up/down ENTER to accept	
	ENTER		System Equalise voltage without BTC.
	System Equalise 56.5V	Modify Value up/down ENTER to accept	Sense point voltage regulated to this value
	ENTER		Enable/disable bus voltage discharge triggering of equalisation charging
	Volts Start Eq On	ENTER toggles state Off / On	
	ENTER		Threshold below which Eq is triggered
	Volts Eq Trigger 46.0V	Modify Value up/down ENTER to accept	
	ENTER		Enable/disable battery capacity loss triggering of equalisation charging
	Q Start Eq On	ENTER toggles state Off / On	
	ENTER		Threshold below which Eq is triggered
	Q Loss Trigger 25Ah	Modify Value up/down ENTER to accept	
	ENTER		Battery charging current below which equalisation charging terminates
	EQ End Current 15A	Modify Value up/down ENTER to accept	
	ENTER		Maximum duration of equalisation
	EQ Duration 3 hours	Modify Value up/down ENTER to accept	
	ENTER		Periodic equalisation charging trigger
	EQ Period 12 Weeks	Modify Value up/down ENTER to accept	Set to zero to disable
	ENTER		Manual control of equalisation
	Manual Start Eq Press ENTER	ENTER toggles state Start / Stop	
	ENTER		Battery voltage below which the LVDS opens when in Auto mode.
	LVDS Trip 43.0V	Modify Value up/down ENTER to accept	
	ENTER		LVDS (where used) operation mode. [Auto, Open, or Closed]
	LVDS Mode Auto	Modify Value up/down ENTER to accept	
	ENTER		Enable/disable battery overtemperature alarm - set to off if no sensor used.
	Temp Sen Alarm On	ENTER toggles state Off / On	
	ENTER		Periodic battery discharge test trigger
	BDT Period 14 Days	Modify Value up/down ENTER to accept	Set to zero to disable
	ENTER		Time of day to begin automatic discharge testing
	BDT Time 21:35	Modify Value up/down ENTER to accept	
	ENTER		Maximum duration of a discharge test
	BDT Duration 1h30min	Modify Value up/down ENTER to accept	
	ENTER		Discharge test current (controlled) Load must be > the value programmed
	BDT Current 50A	Modify Value up/down ENTER to accept	
	ENTER		Battery voltage below which the BDT terminates.
	BDT End V 46.5V	Modify Value up/down ENTER to accept	
	ENTER		Battery loss of capacity below which the BDT terminates.
	BDT End Q 150Ah	Modify Value up/down ENTER to accept	
	ENTER		Result of the Last discharge test
	Last BDT Passed		

More detailed explanations of all the menu items are available in the Controller Operation PDF on the Manual CD

## 6.0 MAINTENANCE

This chapter provides periodic maintenance procedures and assembly replacement procedures. If troubleshooting is required, refer to the SD drawings in Chapter 3 for schematic representations of Sageon II Power System circuits. A list of spare and replacement parts is located in Chapter 7.

**IMPORTANT:** Regularly monitor the LEDs on the operator panel, and Rectifiers. Review the alarm log regularly to detect minor problems before they become significant problems.

### 6.1 CIRCUIT BOARD HANDLING



Semiconductors such as ICs (integrated circuits), diodes, and transistors must be protected against damaging electrostatic discharges. A properly grounded wrist strap must be worn whenever a circuit board is handled or touched. A service kit with a wrist strap and static dissipative work mat is available from both mail order and local electronic supply companies.

Always store circuit boards in anti-static bags.

### 6.2 PERIODIC MAINTENANCE

Perform the following periodic maintenance procedures at least twice a year.

1. Thoroughly review the Alarm Log at the operator panel or at a local or remote PC. Look for repetitive alarms, determine their cause(s), and take steps to correct events that result in alarms.
2. Check operator panel LEDs. Refer to Chapter 4 Configuration and Operation for details.
3. Check all Rectifier LEDs. Refer to Section 4.3 for details.
4. Check all electrical connections. Check that all breakers and fuses are fully seated. Tighten connections as required. Seat breakers and fuses as required. Look for signs of overheating, arcing, and accumulation of dust, dirt, and other contaminants. Refer to Chapter 2 Installation and the drawing package at the back of the manual for factory installed and customer installed connections.

		<b>WARNING</b>
Electrical shock and arcing hazard		
Hazardous voltage can cause death or serious injury.		
Use extreme care when performing maintenance on an operating Sageon II Power System.		
Use insulated tools. Remove watch and jewelry.		

5. Verify the Sageon II Power System configuration and all parameter values. Refer to Chapter 4 Configuration and Operation for operator panel and PC screens.
6. Confirm that all alarm annunciators are functioning. Refer to Chapter 4 Configuration and Operation for operator panel and PC screens.
7. Verify BLVD parameter values. Refer to Chapter 4 Configuration and Operation for operator panel and PC screens.
8. Confirm that all Rectifiers are on-line and sharing current. From the operator panel or a PC, check each Rectifier for voltage and current output. Refer to Chapter 4 Configuration and Operation for operator panel and PC screens.
9. If load requirements allow, remove Rectifier Systems one at a time. Use low-pressure air to clean Systems. Clean dust and lint from Rectifier fans. Refer to Section 2.13 Installing and Removing Rectifiers for procedures.
10. Verify communications with remote PCs, dial-up connections, and databases as appropriate.

11. Test any spare Rectifiers.
  - a) Insert a spare device.
  - b) Test the device to ensure correct operation.
  - c) If the device is to remain a spare, remove it and repeat the above steps until all spares are tested. If spares are to remain installed, for run-time equalization, repeat the above steps until the spare devices are installed.

### 6.3 TROUBLESHOOTING

Troubleshooting is based on displayed alarm messages and error codes that appear in response to a detected change in status of the Sageon II Power System, batteries, or environment; see Table 6-1.

**TABLE 6-1 ALARM MESSAGES AND ERROR CODES**

Location	Display Method	See Chapter or Section
Operator Panel	LED	Chapter 4 Configuration and Operation
Operator Panel or connected personal computer	Text message	Chapter 4 Configuration and Operation
Rectifier front panel	LED	Section 6.3.1

It is possible for a configuration mistake to cause an error or change in status display. If this occurs after editing the configuration or uploading a new configuration from a PC to the Sageon II Power System, carefully check the configuration's programmable parameter values before changing a hardware assembly.

#### 6.3.1 Reading Rectifier Status Led Codes

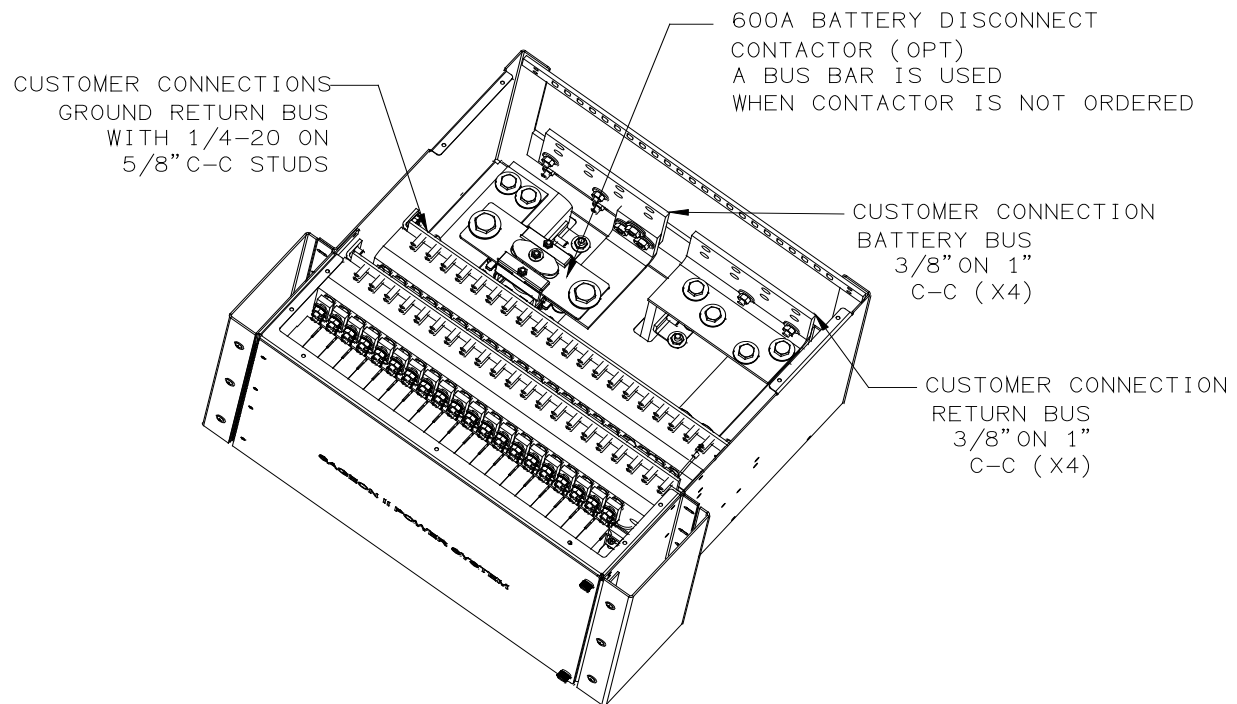
There are 3 LEDs on a Rectifier's front panel to indicate operating status; see the following table.

**TABLE 6-2 RECTIFIER LED CODES**

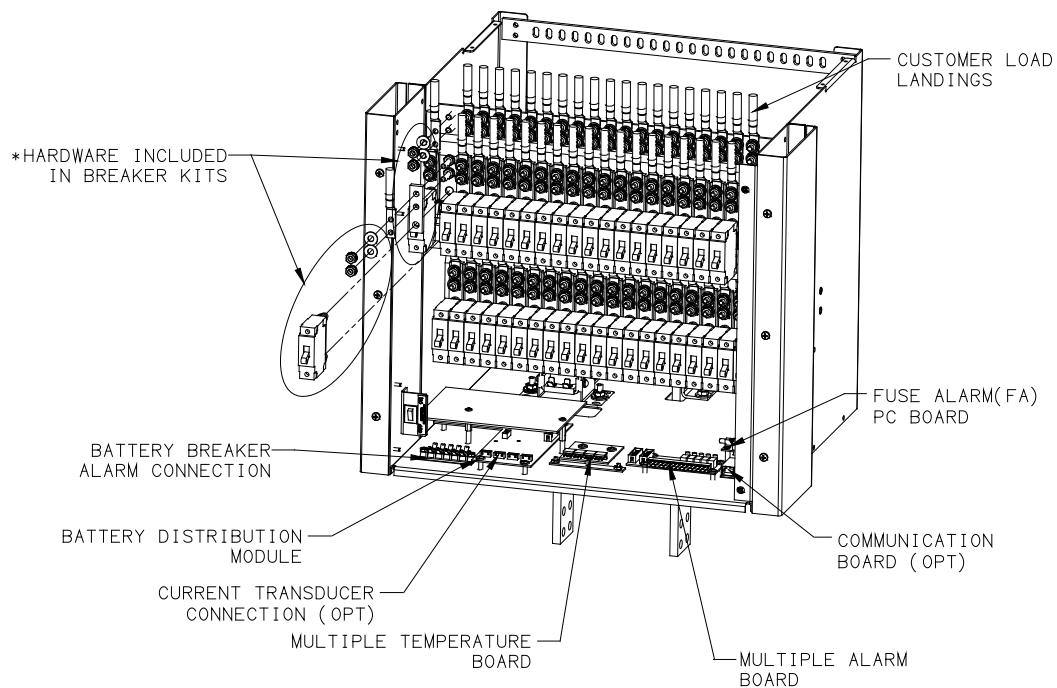
Green ✓	Yellow !	Red x	Meaning	User Action
Off	Off	Off	No AC power to Rectifier.	Apply AC power to Rectifier
Flashing	Off	Off	AC input is too low or too high. Primary circuit is faulty.	Troubleshoot AC input to Rectifier; replace Rectifier
On	Off	Off	Rectifier functioning normally in Float mode.	No action needed
On	Flashing	Off	Alarm condition.	Refer to Chapter 4 Operations and Replacing a Rectifier in Chapter 6 Maintenance
On	On	Off	Rectifier functioning normally in Equalize mode.	No action needed
Off	Flashing	On	Rectifier shut down by remote control. Rectifier not inserted in holder properly. Internal control circuit fault.	No action needed Remove and reseal Replace Rectifier
Off	Off	On	SCU microprocessor fault.	Replace SCU

### 6.3.2 Component and Bus Locations

This section identifies the location of many replaceable components. It also identifies the locations of the major buses in a System.



**FIGURE 6-1 OUTPUT BUS CONNECTIONS**



**FIGURE 6-2 CIRCUIT BOARD LOCATIONS**



## 6.4 REPLACING A RECTIFIER

In the event of Rectifier failure, replace the unit. There are no user-serviceable parts in the Rectifier.

A rectifier is identified by a label in the bezel recess and on the rear of the rectifier. Be certain you are installing the correct model Rectifier. Only 48V/50Amp rectifiers ( p/n 100.7675.4850) are available with the Sageon II System.

To replace a Rectifier, refer to Section 2.13 Installing and Removing Rectifiers.

## 6.5 REPLACING THE SAGEON II CONTROL UNIT (SCU)

In the event of SCU failure, replace the assembly. There are no user-serviceable parts in the SCU.

The Sageon II Power System SCU can be hot-swapped. Be certain a replacement SCU is on hand before beginning this procedure.

### 6.5.1 Configuration Considerations

The System configuration is stored in non-volatile memory on the SCU Backplane board. The SCU plugs into the SCU Backplane board so the SCU can be replaced without affecting the configuration.

It is recommended that if you have not previously recorded System configuration values and the SCU is functioning, do so now before performing the replacement.

Alternatively, download the SCU configuration to either a local PC plugged into the operator panel USB connector or a remotely connected PC. If the SCU is malfunctioning and you believe the configuration values may not be correct, save the file under a new filename to prevent overwriting earlier good data. (SageView System Monitor software must be installed in the PC.)

If the SCU is not functioning, the replacement unit will power up with the configuration stored on the SCU Backplane, which can then be edited from the operator panel or a PC.

To remove the Controller Assembly

1. Check that a known good replacement Controller Assembly is on-hand for immediate installation.
2. Lift the locking mechanism and remove the SCU.
3. Re-install the new SCU

## 6.6 REPLACING AN AC BACK PLANE BOARD

1. The system us be powered down to replace a rectifier back plane board.

**IMPORTANT:** Each rectifier position address must be unique; do not use an address number more than once. Addresses must be in numerical order with the uppermost (in the System) Rectifier having address 1. The address number increases by 1 with each Rectifier installed.

2. To install the Rectifiers, go to Section 2.13 Installing and Removing Rectifiers.

**TABLE 6-3 RECTIFIER POSITION ADDRESSES 1 THROUGH 13**

Table Notes:

ADR = Rectifier position address

ADR↓	SW1 Switch Positions							
	1	2	3	4	5	6	7	8
1	Off	Off	Off	Off	Off	Off	Off	On
2	Off	Off	Off	Off	Off	Off	On	Off
3	Off	Off	Off	Off	Off	Off	On	On
4	Off	Off	Off	Off	Off	On	Off	Off
5	Off	Off	Off	Off	Off	On	Off	On
6	Off	Off	Off	Off	Off	On	On	Off
7	Off	Off	Off	Off	Off	On	On	On
8	Off	Off	Off	Off	On	Off	Off	Off
9	Off	Off	Off	Off	On	Off	Off	On
10	Off	Off	Off	Off	On	Off	On	Off
11	Off	Off	Off	Off	On	Off	On	On
12	Off	Off	Off	Off	On	On	Off	Off
13	Off	Off	Off	Off	On	On	Off	On

Addresses 10 through 13 are used by the 600A System.

**Troubleshooting**

<i>Symptom</i>	<i>Likely Causes</i>	<i>Action</i>
Rectifiers do not power up – no LEDs lit on front panel	AC power is not connected or internal fuse blown or rectifier not properly plugged in.	Re-insert rectifier(s) and make sure the rear connections are good. Confirm that AC power is available to the rectifier backplanes. Replace the rectifier module if the unit is suspected to have failed.
No output current from rectifiers and the Green LED on each rectifier blinks occasionally	AC power either <70VAC or >320VAC. An internal relay will be heard open and close periodically if the AC voltage is excessive.	Check that the AC supply voltage and connection arrangement are correct and match the expected system supply wiring.
Over-temperature alarm or fan failure alarm present	High ambient temperature. Fan air intake/exhaust vents are blocked or a fan is jammed with a foreign object or excessive dust.	Check the ambient temperature and improve site cooling if possible. Check and remove obstructions from the air vents. Replace the module or remove and replace the fan assemblies in the module (requires only that the rectifier lid be removed)
BLVD will not close	One or more batteries are reverse polarity.  No battery is connected to the battery distribution module.  Fuse link blown in the battery distribution module (BDM).  Controller setting for LVLD is “Off”.	Check battery wiring polarity. Connect a battery.  Check that the Controller is powered up even when no rectifier is operational. If not, service the fuses in the BDM.  Set LVLD to “On”.

<i>Symptom</i>	<i>Likely Causes</i>	<i>Action</i>
	Low Voltage Load Disconnect setting is greater than the current bus voltage.	Power up the rectifiers and reduce the load until the bus voltage increases to the float voltage.
Load or Battery circuit breaker alarm does not set when the breaker is opened or is incorrectly alarmed as battery switch instead of load trip or visa-versa.	No battery or load alarm/aux switch is connected to the circuit breaker connection. Alarm link in BDM is incorrectly configured.	Check load and battery alarm/aux switch connections to the BDM and that the alarm links are correctly configured.
Battery or Ambient temperature sensor reading is indicated as "Not Available"	Sensor / cable faulty. Sensor connector reversed. No sensor installed.	Turn cable connector around and reconnect. Replace faulty sensor assembly.
Battery current indicated does not match independent measurement.	Full-scale current of the DC hall effect current transducer is incorrectly set and will result in an error larger than +/- 5% at more than 50% full-scale current.	Change the setting of the "FS Batt Curr" value in the Base Menu of Controller to the correct full-scale value.
Battery current indicates 0A when more than 5A is flowing in the battery or is inaccurate at low currents (<5A)	Transducer is not calibrated DC hall effect transducer or wiring is faulty. Current transducer sensitivity is too low for 1A measurement.	Calibrate transducer Service the DC current transducer – check the wiring is intact and still connected properly, or replace the DC CT is suspected to be faulty Revise size of DC CT full-scale value for the size of the load and battery charging requirements.
Load current indicates 0A when known to be >5A	Number of RECTIFIERS is incorrectly set too low or the battery current FS is set too high. The load current is calculated from the sum of the RECTIFIER currents minus the measured battery currents	Check that the number of RECTIFIERS in the Controller Base menu matches the actual number of rectifier modules installed. Check the Battery DC CT rated full-scale value is correctly set in the Base menu.
One unit is alarmed as HVSD (high voltage shutdown) and is latched off.	The unit has developed a fault that causes it to output a voltage above the HVSD protection limit and has been supplying load current while above this voltage limit. A random event on the DC bus has occurred that forced a unit into HVSD.	Replacing the rectifier module is recommended. However, a random event may have triggered the HVSD and to determine if the unit has a real fault, the HVSD latched alarm can be reset using the "Reset Latched Alarm" function in the Controller RECTIFIER Menu. (If the system does not have any batteries, cycling the AC power will have the same effect). If the unit does not recover by latching off again, it is faulty.
"RECTIFIER Urgent" alarm activated	One or many RECTIFIERS are off due to AC power failure, internal faults, incorrect command signal from Controller or all rectifiers are in current limit	Check the AC power and restore. Replace faulty rectifier modules. Check for DC bus overload faults.
All units are latched off as HVSD	Absolute Overvoltage shutdown protection activated. The system is likely to have no load and without a battery. An event on the DC bus has caused the voltage to exceed 70V for 48V systems. The event could be caused either by a faulty rectifier or other equipment connected to the bus.	Add a small amount of load (>2A per rectifier) to the system and check for a faulty rectifier. Check for other faulty equipment connected to the bus that could cause the overvoltage transient. Use the "Reset Latched Alarm" from the Controller to reset the system.
A rectifier is indicating "RECTIFIER Off" or "No Response" on the Controller RECTIFIER display	An AC failure to the rectifier is the most likely cause. While the rectifier internal power rails are still available, the unit will communicate with "RECTIFIER Off" if the AC has failed on its input. Once the	Check the AC feed to the rectifier for a tripped circuit breaker, blown fuse or faulty connection.

<i>Symptom</i>	<i>Likely Causes</i>	<i>Action</i>
CONTINUE: A rectifier is indicating “RECTIFIER Off” or “No Response” on the Controller RECTIFIER display	internal power dies, the unit will no longer communicate and Controller will indicate “No Response”.  “No Response” all the time and the RECTIFIER is known to have AC power indicates a communications wiring problem.	Check the RECTIFIER communications 10-way ribbon cable for broken connections and replace cable if necessary.
One or more rectifiers has a current limit or power limit alarm activated	Total load, including battery charging current is equal to the output limits of the rectifiers. (System overload)  One rectifier in current limit only indicates a likely calibration problem with the module. The Controller can usually compensate for an out of calibration unit in a system and will take a few minutes to adjust the unit to correctly share the load.	Revise the load level on the system and expand the number of rectifiers as required to remove the overload condition.
One rectifier has an “UNCAL RECTIFIER” alarm	The Controller has not been able to make the unit share the load with the other units. Either the RECTIFIER is faulty (excessive internal voltage drop) and cannot be adjusted to share load, or it is too far out of calibration.	Replace the rectifier module. Send the unit for repair and re-calibration.
“System Voltage Clamp” alarm activated	Controller cannot reach the desired system voltage. This can be due to possible excessive voltage drop along the DC bus bars, inside one or more rectifiers or “System V Drop” parameter has been set too low.  If this alarm comes up during equalize, the maximum output voltage from the rectifier may not be high enough to overcome the system drops to the sense point and allow the system to regulate at the desired high equalize voltage.	Increase “Sys V Drop” parameter. Replace faulty rectifier (unlikely to current share as well). Check that the number of RECTIFIERs in the system is correctly set (more RECTIFIERs than declared can generate this problem). Revise the requirements for high equalize voltage level.
RECTIFIER “EEPROM Fail” alarm is activated as indicated at the RECTIFIER Menu for a particular RECTIFIER.	Corrupted data found on the EEPROM inside the rectifier that is outside the allowable data range. The rectifier software has attempted to over-write and has failed due to the memory cell being damaged.  Note: excessive electrical noise can corrupt the read data transfer, which can lead to the same alarm being generated.	Replace the faulty rectifier if the memory cell is confirmed to have failed. This can be done by, modifying each of the RECTIFIER parameters on the Controller and checking to see if the alarm clears. (EEPROM corrects the data).  Check for EMC problems and remove/reduce the source of electrical interference where possible.
“EEPROM Fail” alarm for the Controller is activated.	Corrupted data found on the backplane EEPROM that is outside the allowable data range. (similar to RECTIFIER corruption above)	Replace the faulty backplane if the memory cell is confirmed to have failed.
“Range RECTIFIER” alarm for the rectifier is activated.	Corrupted data found on the EEPROM inside the rectifier that is inside the allowable data range but does not match the value programmed.	Try adjusting the RECTIFIER parameters to see if the EEPROM cells can be updated. If not, replace the faulty rectifier.

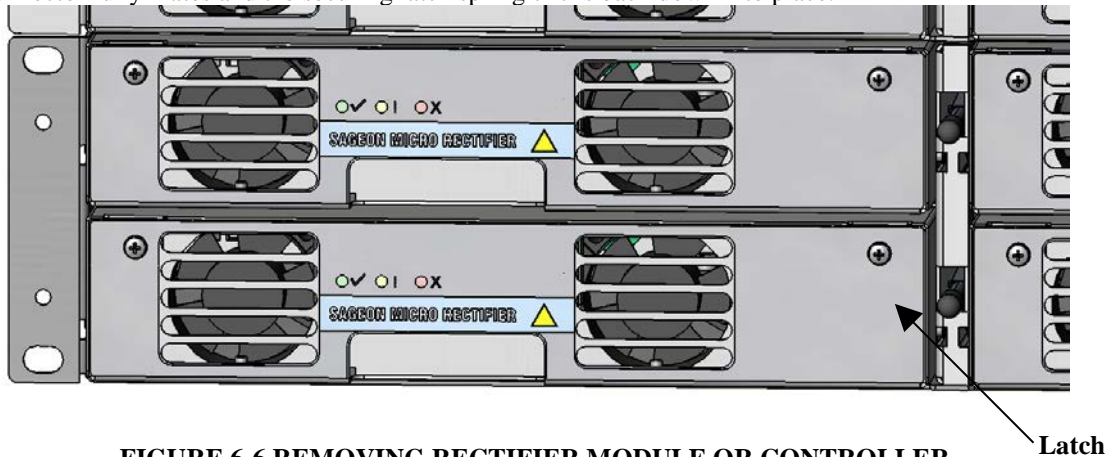
## 6.7 TO REMOVE A RECTIFIER MODULE OR A CONTROLLER

Lift the securing latch in the centre divider adjacent to the module and pull the module out of the Power Module.

When removing modules, especially if the ambient temperature is high and the unit has been operating at maximum load, avoid skin contact with the metal casing as it may be too hot to touch. Pull the unit halfway out of the magazine and let cool for 2-3 minutes before handling.

## 6.8 TO INSERT A RECTIFIER MODULE OR A CONTROLLER

Insert the module into the slot and ensure alignment with the fold-out rails in the magazine. Push the module all the way in so the rear connector fully mates and the securing latch spring clicks back down into place.



**FIGURE 6-6 REMOVING RECTIFIER MODULE OR CONTROLLER**

## 7.0 SPARE AND REPLACEMENT PARTS

To minimize downtime should maintenance be required, a supply of spare circuit breakers and fuses, circuit boards, rectifiers, and other recommended components should be immediately available. See the Recommended Spare Parts List below.

Please refer to the UNIPOWER part number when placing orders. For assistance in ordering spare parts, call UNIPOWER and ask to speak with Order Entry. The telephone number is found in Section 1.6 Product Support.

**TABLE 7-1 PARTS LIST**

Description	Part Number
<b><i>Circuit Boards</i></b>	
Rectifier Backplane Board	ERT190-5540
Controller Backplane Board	ERT190-5770
Controller Backplane w/ Temp Comp	ERT190-5770T
<b><i>Unit</i></b>	
Sageon II Control Unit (SCU), 48V	103-4130-48
Ethernet Board	103-4014-25
<del>SNMP Board</del>	<del>103-4015-25</del>
SNMP v3 Board	103-4036-25
<b><i>Modular Assemblies</i></b>	
Rectifier, 48V	100-7675-4850
<b><i>Individual Parts</i></b>	
Temperature Sensor, 10 Ft (3m)	385-5941-03
Temperature Sensor, 20 Ft (6m)	385-5941-06
Temperature Sensor, 45 Ft (15m)	385-5941-15
Temperature Sensor, 90 Ft (30m)	385-5941-30
<b><i>Documentation</i></b>	
Sageon II Power System Product Manual	990-5202-00
Sageon II Power System General Arrangement	J-SAGEON2.LXX
Sageon II Power System Schematic Diagrams	SD-SAGEON2.LXX

{ Superseded by 103.4036.25

### Appendix A – Setting Up Network Interfaces

#### 7.1 PROGRAMMING IP ADDRESSES USING DEVICE INSTALLER SOFTWARE

This is the simplest way of programming the interface operating parameters; no high level of computer skills is required. Device Installer is a software utility package developed by Lantronix. It includes a number of handy tools making programming of various parameters and firmware update very easy. The installation package is available for free download from Lantronix. At the time of publication it was located at following Web address:

<http://www.lantronix.com/support/utls/dst/index.html>

Run DeviceInstaller.exe. You will be guided through the installation process.

##### 7.1.1 Preparations for local address set up

- From your network administrator obtain the new IP address. Also ask for your network class.
- Connect PC to the controller's network interface (directly or via a network).
- Power-up the controller.
- Start Device Installer program.

### 7.1.2 Local IP address set up procedure

- On Device Installer tool bar click “IP” button. A new window “Assign IP Address” will open.
- Enter the unit Ethernet address/MAC ID as stated on information label.
- Enter assigned new IP address.
- Select correct network class.
- Click “Set IP Address” button.

The process takes several seconds to complete and the progress is indicated below IP address field. When completed, a dialog box will pop-up showing a success message, or the one below.



Often it is a false alarm. To verify if the unit has in fact been programmed, do following:

- On Device Installer tool bar click “Search Network” button (first on the left hand side). A new window “Search Network for Devices” will open
- In the new window check selection of the network class, then click “Start Search” button. After search is completed, check the window for address you just tried to program (there may be many addresses listed).
- If the new address is listed, click “Save” button. Details of new device will be added to the Device Installer data base.
- If the new address is NOT listed, repeat the programming procedure.

### 7.1.3 Preparations for gateway address set up

- From your network administrator obtain the gateway IP address
- Connect a PC to the controller’s network interface (directly or via a network).
- Power-up the controller.
- Start Device Installer program.

### 7.1.4 Gateway IP address set up procedure

- In Device Installer device list select the address of the unit you want to configure.
- On Device Installer tool bar click “Manage device configuration button”. A new window “Device Management” will open.
- Click “Telnet to Device” button.
- Telnet window will open, showing a message similar to the one below:

```
*** Lantronix Cobox Universal Device Server ***
Serial Number 1297-041 Software Version V03.9 (000211)
```

Press Enter to go into Setup Mode

*Note: If Enter is not pressed within 3 seconds the connection will be terminated.*

- If Enter was pressed within time-out window, a message similar to the sample below will be printed to Telnet window:

```
*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.000.098, no gateway set
```

```
***** Channel 1 *****
```

Baudrate 09600, I/F Mode 4C, Flow 00  
 Port 10001  
 Remote IP Adr: --- none ---, Port 00000  
 Connect Mode: C0 Disconn Mode: 00  
 Flush Mode: 00

Change Setup : 0 Server configuration  
                   1 Channel 1 configuration  
                   7 Factory defaults  
                   8 Exit without save  
                   9 Save and exit           Your choice ?

Type 0 followed by Enter.

The first item in server configuration is local IP address. That has been programmed already, but it is necessary to go through all bytes. Information in brackets shows current setting, which can be modified by typing new entry followed by Enter key. Next item after IP address reads:

Set gateway IP address (N) [or (Y)]

If value is (Y) – just press Enter, if (N) – press ‘Y’ followed by enter. Next item will be:

Gateway IP address (nnn)

Enter assigned gateway address, then press Enter at each item until set up menu is shown again.

Terminate Telnet session by typing 8 or 9.

## 7.2 PROGRAMMING IP ADDRESSES USING ARP AND TELNET ACCESS

Procedure described below is recommended for advanced users with understanding of operation of networks.

### 7.2.1 Preparations for local address set up

- From your network administrator obtain new IP address. Also ask for your network class.
- Connect PC to the controller’s network interface (directly or via a network).
- Power-up the controller

### 7.2.2 Local IP address set up procedure

***The following section is excerpted from Lantronix "Embedded Integration Kit" Revision D 06/03/02, Part Number 900-226.***

The unit’s IP address must be configured before a network connection is available. If the unit has no IP address, you can use Address Resolution Protocol (ARP) method from Windows-based systems to assign a temporary IP address. If you want to initially configure the unit through the network, follow these steps:

1. On a Windows-based host, create an entry in the host's ARP table using the intended IP address and the hardware address of the unit, which is found on the product label on the bottom of the unit.

```
arp -s 191.12.3.77 00-20-4A-xx-xx-xx
```

*Notes:*

- i. *The IP address used here is an example and a value within the range of allowable IP addresses in your network may need to be used. The DOS command ipconfig with display the IP address of the Windows-based host machine.*
- ii. *For the ARP command to work on Windows 95, the ARP table on the PC must have at least one IP address defined other than its own.*



2. If you are using Windows 95, type ARP -A at the DOS command prompt to verify that there is at least one entry in the ARP table. If the local machine is the only entry, ping another IP address on your network to build a new entry in the ARP table; the IP address must be a host other than the machine on which you are working. Once there is at least one additional entry in the ARP table, use the following command to ARP an IP address to the unit:

```
arp -s 192.168.0.97 00-20-4a-xx-xx-xx
```

3. Open a Telnet connection to port 1. The connection will fail quickly, but the unit will temporarily change its IP address to the one designated in this step.

```
telnet 192.168.0.97 1
```

4. Finally, open a Telnet connection to port 9999, and press Enter within three seconds to go into Setup Mode. If you wait longer than three seconds, the unit will reboot.

```
telnet 192.168.0.97 9999
```

5. Set all required parameters

Note: The IP address you just set is temporary and will revert to the default value when the unit's power is reset unless you log into the unit and store the changes permanently. Refer to the chapter on configuration for instructions on permanently configuring the IP address.

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### 7.2.3 Configuring the Unit

*The following section is excerpted from Lantronix "Embedded Integration Kit" Revision D 06/03/02, Part Number 900-226.*

You must configure the Lantronix Interface so that it can communicate on a network with WinCSU-2 and communicate with the Sageon II Controllers unit via the serial port.

The unit's configuration is stored in nonvolatile memory (NVRAM) and is retained without power. You can change the configuration at any time. The unit performs a reset after the configuration has been changed and stored.

#### 7.2.3.1 Using a Telnet Connection

To configure the unit over the network, establish a Telnet connection to port 9999.

1. From the Windows Start menu, click **Run** and type the following command, where x.x.x.x is the IP address and 9999 is the unit's fixed network configuration port number.

```
telnet x.x.x.x 9999 (Example: telnet 192.168.100.123 9999)
```

Note: Be sure to include a space between the IP address and 9999.

2. Click **OK**.

3. The Lantronix Universal Device Server window displays.

```
*** Lantronix Cobox Universal Device Server ***
```

```
Serial Number 1297-041 Software Version V03.9 (000211)
```

Press Enter to go into Setup Mode

4. To enter the Setup Mode, you must press Enter within 3 seconds.

```
*** basic parameters
```

```
Hardware: Ethernet Autodetect
```

```
IP addr 192.168.000.098, no gateway set
```

```
***** Channel 1 *****
```

```
Baudrate 09600, I/F Mode 4C, Flow 00
```

```
Port 10001
```

Remote IP Addr: --- none ---, Port 00000  
Connect Mode: C0 Disconn Mode: 00  
Flush Mode: 00

Change Setup : 0 Server configuration  
1 Channel 1 configuration  
7 Factory defaults  
8 Exit without save  
9 Save and exit                      Your choice ?

5. Select an option on the menu by entering the number of the option in the **Your choice ?** field and pressing **Enter**.

6. To enter a value for a parameter, type the value and press **Enter**, or to confirm a current value, just press **Enter**.

7. When you are finished, save the new configurations (option **9**). The unit will reboot.

#### 7.2.4 Server Configuration (Network Configuration)

These are the unit's basic network parameters. The following parameters are displayed when you select login into the unit:

\*\*\* basic parameters  
Hardware: Ethernet Autodetect  
IP addr 192.168.000.098, no gateway set

Select 0 and press Enter to configure the Lantronix Interface Server's basic parameters

##### **IP Address**

The IP address must be set to a unique value in your network.

**Note:** *Lantronix Interface cannot connect to the network if the assigned IP address is already in use by another device.*

##### **Gateway Address**

The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the *Lantronix Interface*.

**Note:** *The gateway address must be within the local network.*

##### **Subnet Mask**

A netmask defines the number of bits taken from the IP address that are assigned for the host section.

**Note:** *Class A: 24 bits; Class B: 16 bits; Class C: 8 bits.*

The *Lantronix Interface* prompts for the number of host bits to be entered, then calculates the netmask, which is displayed in standard decimal-dot notation when the saved parameters are displayed (for example, 255.255.255.0).


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TABLE A EQUIPMENT ORDERING								
COL	A	B	C	D	E	F	G	H
	EQUIPMENT	NOTES	RATING	LIST	CKTS AND FIGS EQUIPPED			
	-48VDC 400A (N+1) 19" BULK POWER INCLUDES: CONTROLLER, MULTI-ALARM BOARD. 5RU POWER SHELF SET UP TO ACCOMMODATE 9 RECTIFIERS WITH 9 AC FEEDS		400A	SAGEON2.L40		1		
	SAME AS SAGEON2L40, EXCEPT 7RU WITH BATTERY DISTRIBUTION BOARD, EXPANDED BATTERY TEMPERATURE MODULE, 9 AC CIRCUIT BREAKERS		400A	SAGEON2.L41		2		
	-48VDC 400A (N+1) 19" POWER SYSTEM INCLUDES: 20 AM1 BREAKER POSITIONS, CONTROLLER, MULTI-ALARM BOARD, BATTERY DISTRIBUTION BOARD, EXPANDED BATTERY TEMPERATURE MODULE. 11RU POWER SHELF SET UP TO ACCOMMODATE 9 RECTIFIERS WITH 9 AC FEEDS		400A	SAGEON2.L44		5		
	SAME AS SAGEON2L44, EXCEPT 13RU WITH 9 AC CIRCUIT BREAKERS		400A	SAGEON2.L45		6		
	-48VDC 400A (N+1) 19" POWER SYSTEM INCLUDES: 40 AM1 BREAKER POSITIONS, CONTROLLER, MULTI-ALARM BOARD, BATTERY DISTRIBUTION BOARD, EXPANDED BATTERY TEMPERATURE MODULE. 15RU POWER SHELF SET UP TO ACCOMMODATE 9 RECTIFIERS WITH 9 AC FEEDS		400A	SAGEON2.L46		9		
	SAME AS SAGEON2L46, EXCEPT 17RU WITH 9 AC CIRCUIT BREAKERS		400A	SAGEON2.L47		10		
	-48VDC 600A (N+1) 19" BULK POWER INCLUDES: CONTROLLER, MULTI-ALARM BOARD. 7RU POWER SHELF SET UP TO ACCOMMODATE 13 RECTIFIERS WITH 13 AC FEEDS		600A	SAGEON2.L60		3		
	SAME AS SAGEON2L60, EXCEPT 9RU WITH BATTERY DISTRIBUTION BOARD, EXPANDED BATTERY TEMPERATURE MODULE, 13 AC CIRCUIT BREAKERS		600A	SAGEON2.L61		4		
	-48VDC 600A (N+1) 19" POWER PLANT INCLUDES: 20 AM1 BREAKER POSITIONS, CONTROLLER, MULTI-ALARM BOARD, BATTERY DISTRIBUTION BOARD, EXPANDED BATTERY TEMPERATURE MODULE. 13RU POWER SHELF SET UP TO ACCOMMODATE 13 RECTIFIERS WITH 13 AC FEEDS		600A	SAGEON2.L64		7		
	SAME AS SAGEON2L64, EXCEPT 15RU WITH 13 AC CIRCUIT BREAKERS		600A	SAGEON2.L65		8		
	-48VDC 600A (N+1) 19" POWER PLANT INCLUDES: 40 AM1 BREAKER POSITIONS, CONTROLLER, MULTI-ALARM BOARD, BATTERY DISTRIBUTION BOARD, EXPANDED BATTERY TEMPERATURE MODULE. 17RU POWER SHELF SET UP TO ACCOMMODATE 13 RECTIFIERS WITH 13 AC FEEDS		600A	SAGEON2.L66		11		
	SAME AS SAGEON2L66, EXCEPT 19RU WITH 13 AC CIRCUIT BREAKERS		600A	SAGEON2.L67		12		

TABLE B ASSOCIATED DOCUMENTS	
NAME	NUMBER
SCHEMATIC & WIRING DIAGRAMS	SD-SAGEON2.LXX
SAGEON II BULK SYSTEM MANUAL	PM 990-5201-00
SAGEON II PLANT SYSTEM MANUAL	PM 990-5202-00

TABLE C DRAWING CONTENT	
SHEET	CONTENT DESCRIPTION
A1	SHOP & INSTALLATION NOTES TABLE A: EQUIPMENT ORDERING TABLE B: ASSOCIATED DRAWINGS TABLE C: DRAWING CONTENTS
A2	TABLE D: OPTION ORDERING TABLE E: BATT. CURRENT TRANSDUCER WIRE LIST TABLE F: TYP "AM1" BULLET CIRCUIT BRKR KITS
A3	TABLE H: POWER PLANT CABLING REFERENCES TABLE J: STD 19" FLOOR MTG RELAY RACKS TABLE K: STD 23" FLOOR MTG RELAY RACKS TABLE L: WIRE SIZING TABLE
A4	ENGINEERING NOTES
B1	FIG. 1: L40; 400A, BULK PLANT, SHOWN IN 19" RACK FIG. 2: L41; 400A, BULK PLANT W/ AC BREAKERS, SHOWN IN 19" RACK FIG. 3: L60; 600A, BULK PLANT W/ 385.5202.6023 KIT, SHOWN IN 23" RACK FIG. 4: L61; 600A, BULK PLANT W/ AC BREAKERS, SHOWN IN 19" RACK
B2	FIG. 5: L44; 400A, 1 TIER DISTR. W/ 385.5202.4419 KIT, SHOWN IN 19" RACK FIG. 6: L45; 400A, 1 TIER DISTR. W/ 385.5202.4523 KIT, SHOWN IN 23" RACK FIG. 7: L64; 600A, 1 TIER DISTR. W/ 385.5202.6419 KIT, SHOWN IN 19" RACK FIG. 8: L65; 600A, 1 TIER DISTR. W/ 385.5202.6519 KIT, SHOWN IN 19" RACK
B3	FIG. 9: L46; 400A, 2 TIER DISTR. W/ 385.5202.4623 KIT, SHOWN IN 23" RACK FIG. 10: L47; 400A, 2 TIER DISTR. W/ 385.5202.4719 KIT, SHOWN IN 19" RACK FIG. 11: L66; 600A, 2 TIER DISTR. W/ 385.5202.6619 KIT, SHOWN IN 19" RACK FIG. 12: L67; 600A, 2 TIER DISTR. W/ 385.5202.6723 KIT, SHOWN IN 23" RACK
B4	FIG. 13: TYPICAL AC INPUT & BATTERY CONNECTION FOR BULK SYSTEMS (L41 SHOWN) FIG. 14: TYPICAL AC INPUT & BATTERY CONNECTION FOR PLANT SYSTEMS (L66 SHOWN) FIG. 15: POWER DISTRIBUTION (L46 SHOWN)
B5	FIG. 16: POWER DISTRIBUTION (2 TIER SHOWN) FIG. 17: 2 POLE CIRCUIT BREAKER ADAPTER PLATE FIG. 18: 2 POLE CIRCUIT BREAKER ADAPTER (209.5626.00) & 2 POLE RETURN BUS ADAPTER (209.5625.00)
B6	FIG. 19: BREAKER LOCATION FIG. 20: INSIDE DOOR/ BREAKER ID FIG. 21: 600A DISTRIBUTION TOP VIEW (2 TIER SHOWN)
B7	FIG. 22: SAGEON II BATTERY MONITOR FIG. 23: SAGEON II SITE MONITOR FIG. 24: BATTERY SENSE WIRE FIG. 25: BATTERY POST PIG TAIL

ISSUES		
ISSUE #	DESCRIPTION	ISS. BY ISS. DATE
7	UPDATED UNIPOWER LOGO. SEE PCO# 44417.	WD 6/12/17

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES ± TOLERANCES ON:		APPROVALS	DATE
HOLES	+0.004 -0.002	DRAWN WD	10/8/09
FRACTIONS	±1/32	CHECKED MCM	10/9/09
DECIMALS (xx)	±0.020	APPROVED CJM	10/8/9
DECIMALS (xxx)	±0.010	APPROVED	
ANGLES	±1/2°		
SQUARE CORNERS AND ANGLES ARE 90° UNLESS OTHERWISE SPECIFIED.			
WORKMANSHIP: PER SPEC ENG032			
MATERIAL:			
FINISH:			
PROPRIETARY INFORMATION NOT TO BE COPIED, USED, TRANSMITTED, OR DISCLOSED WITHOUT PRIOR WRITTEN PERMISSION FROM UNIPOWER, LLC.			
			
SAGEON II POWER SYSTEM			
SIZE B	DOC TYPE / NUMBER J SAGEON2.LXX	ISSUE 7	
SCALE: N/A	SHEET: A1 OF	FILE NAME: J-SAGEON2.LXX_SHT_A1_ISS_7	

SH NO	A1	A2	A3	A4	B1	B2	B3	B4	B5	B6	B7
ISSUE	7	5	2	4	3	2	2	2	2	3	2

SHEET INDEX NOTE:  
THE ISSUE OF SHEET A1 REFLECTS THE LATEST ISSUE OF THE DRAWING SET. WHEN THE DRAWING SET IS REVISED, ONLY THE ISSUE NUMBERS OF MODIFIED SHEETS ARE CHANGED. THE ISSUE NUMBERS OF UNMODIFIED SHEETS ARE NOT CHANGED.

SHOP	INST	SHOP & INST NOTES
✓	✓	1. [ ] INFORMATION FOR REFERENCE ONLY -NOT TO BE STAMPED.
✓	✓	2. REFER TO APPLICABLE ENGINEERING NOTES.
✓		3. APPLY STD BUS BAR IDENTIFICATION LABELS.
✓	✓	4. ENTER BREAKER RATING AND LOAD INFO ON DIST, LOG SHEET INSIDE AUX PANEL FRONT DOOR

TABLE D															
OPTION ORDERING															
EQUIPMENT: ORDER BY PART NUMBER	NOTES	RATING	PART NUMBER	LIST 40	LIST 41	LIST 44	LIST 45	LIST 46	LIST 47	LIST 60	LIST 61	LIST 64	LIST 65	LIST 66	LIST 67
RACK MOUNTING															
19" RACK FLUSH MOUNT															
SAGEON2.L40		STD		X											
SAGEON2.L41		STD			X										
SAGEON2.L60		STD								X					
SAGEON2.L61		STD									X				
19" RACK MID MOUNT															
SAGEON2.L44		OPT	385.5202.4419			X									
SAGEON2.L45		OPT	385.5202.4519				X								
SAGEON2.L46		OPT	385.5202.4619					X							
SAGEON2.L47		OPT	385.5202.4719						X						
SAGEON2.L64		OPT	385.5202.6419									X			
SAGEON2.L65		OPT	385.5202.6519										X		
SAGEON2.L66		OPT	385.5202.6619											X	
SAGEON2.L67		OPT	385.5202.6719												X
23" RACK FLUSH MOUNT															
SAGEON2.L40		OPT	385.5202.4023	X											
SAGEON2.L41		OPT	385.5202.4123		X										
SAGEON2.L60		OPT	385.5202.6023							X					
SAGEON2.L61		OPT	385.5202.6123								X				
23" RACK MID MOUNT															
SAGEON2.L44		OPT	385.5202.4423			X									
SAGEON2.L45		OPT	385.5202.4523				X								
SAGEON2.L46		OPT	385.5202.4623					X							
SAGEON2.L47		OPT	385.5202.4723						X						
SAGEON2.L64		OPT	385.5202.6423									X			
SAGEON2.L65		OPT	385.5202.6523										X		
SAGEON2.L66		OPT	385.5202.6623											X	
SAGEON2.L67		OPT	385.5202.6723												X
RECTIFIERS Up to 9 rectifiers on List 40, 41, 42, 44, 45, 46, 47 and up to 13 rectifiers on List 60, 61, 62, 64, 65, 66, 67															
48V 2400W @ 208-240Vac	54	OPT	100.7675.4850	X	X	X	X	X	X	X	X	X	X	X	X
BLANK COVERS	55	REQ	124.0073.00	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY CURRENT TRANSDUCERS (UP TO 4)															
200 amps Closed Window (EXTERNAL)	73	OPT	385.5971.200		X	X	X	X	X		X	X	X	X	X
200 amps Split Window (EXTERNAL)	73	OPT	385.5972.200		X	X	X	X	X		X	X	X	X	X
400 amps Closed Window (EXTERNAL)	73	OPT	385.5971.400		X	X	X	X	X		X	X	X	X	X
400 amps Split Window (EXTERNAL)	73	OPT	385.5972.400		X	X	X	X	X		X	X	X	X	X
600 amps Closed Window (EXTERNAL)	73	OPT	385.5971.600		X	X	X	X	X		X	X	X	X	X
800 amps Split Window (EXTERNAL)	73	OPT	385.5972.800		X	X	X	X	X		X	X	X	X	X
LOW VOLTAGE BATTERY DISCONNECT (LVBD)															
600 AMP CONTACTOR	71	OPT	385.5202.11			X	X	X	X			X	X	X	X
COMMUNICATIONS															
Ethernet TCP/IP	57	OBS	385.4014.00	X	X					X	X				
Ethernet TCP/IP/SNMP	57	OPT	385.4015.00	X	X					X	X				
Ethernet TCP/IP/SNMP v3	57	OPT	385.4036.00	X	X					X	X				
Ethernet TCP/IP	57	OBS	385.4014.25			X	X	X	X			X	X	X	X
Ethernet TCP/IP/SNMP	57	OPT	385.4015.25			X	X	X	X			X	X	X	X
Ethernet TCP/IP/SNMP v3	57	OPT	385.4036.25			X	X	X	X			X	X	X	X
TEMPERATURE SENSORS															
LISTS 40 & 60 CAN ACCOMMODATE 1AMB, 1BAT; LISTS 41-47 & 61-67 CAN ACCOMMODATE 1AMB, 4BAT															
10' (3m) CABLE LENGTH	72	OPT	385.5941.03	X	X	X	X	X	X	X	X	X	X	X	X
20' (6m) CABLE LENGTH	72	OPT	385.5941.06	X	X	X	X	X	X	X	X	X	X	X	X
50' (15m) CABLE LENGTH	72	OPT	385.5941.15	X	X	X	X	X	X	X	X	X	X	X	X
100' (30m) CABLE LENGTH	72	OPT	385.5941.30	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY MONITOR															
(REQUIRES BOTH BATTERY WIRE & POST ADAPTOR)	75	OPT	385.5202.20	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY SENSE WIRE SUPPORTS UP TO 24 CELLS															
BATTERY SENSE length 10'	72	OPT	350.7812.10	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY SENSE length 25'	72	OPT	350.7812.25	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY SENSE length 50'	72	OPT	350.7812.50	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY SENSE length 100'	72	OPT	350.7812.100	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY POST LUG SIZE SUPPORTS UP TO 24 CELLS															
BATTERY POST ADAPTOR KIT #10	72	OPT	385.6151.03	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY POST ADAPTOR KIT 1/4" (6mm)	72	OPT	385.6151.04	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY POST ADAPTOR KIT 5/16" (8mm)	72	OPT	385.6151.05	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY POST ADAPTOR KIT 3/8 (10mm)	72	OPT	385.6151.06	X	X	X	X	X	X	X	X	X	X	X	X
BATTERY POST ADAPTOR KIT 1/2" (12mm)	72	OPT	385.6151.07	X	X	X	X	X	X	X	X	X	X	X	X
SITE MONITOR (external panel)															
	76	OPT	385.5202.21	X	X	X	X	X	X	X	X	X	X	X	X

TABLE E		Number of Wires that fit in the window									
BATTERY Current Transducers	Window	500 MCM	350 MCM	4/0	2/0	1/0	2 AWG	4 AWG	6 AWG	8 AWG	10 AWG
200 amps Closed Window (EXTERNAL)	1.25" dia	1	1	1	1	1	3	5	7	11	19
200 amps Split Window (EXTERNAL)	0.84" dia	0	0	1	1	1	1	1	2	4	8
400 amps Closed Window (EXTERNAL)	1.25" dia	1	1	1	1	1	3	5	7	11	19
400 amps Split Window (EXTERNAL)	0.84" dia	0	0	1	1	1	1	1	2	4	8
600 amps Closed Window (EXTERNAL)	0.82" x 2.5"	0	0	3	3	4	5	7	12	18	28
800 amps Split Window (EXTERNAL)	1.57" x 4.0"	3	4	9	11	12	21	26	33	56	90

TABLE F		
TYPE "AM1" BULLET CIRCUIT		
AMP RATING	PART NUMBER	# OF POSITIONS REQUIRED
1	274-3840-01	1
3	274-3840-03	1
5	274-3840-05	1
10	274-3840-10	1
15	274-3840-15	1
20	274-3840-20	1
25	274-3840-25	1
30	274-3840-30	1
40	274-3840-40	1
50	274-3840-50	1
60	274-3840-60	1
70	274-3840-70	1
80	274-3840-80	1
90	274-3840-90	1
100	274-3841-100	1
125*	274-3841-125	2
150*	274-3841-150	2
200*	274-3841-200	2

\*INCLUDES CIRCUIT BREAKER ADAPTERS.  
PROVIDE 3/8"-16 X 1" CC LANDING BUS  
SEE FIG. 18  
KITS INCLUDE BREAKER, BUS

SEE NOTE 64

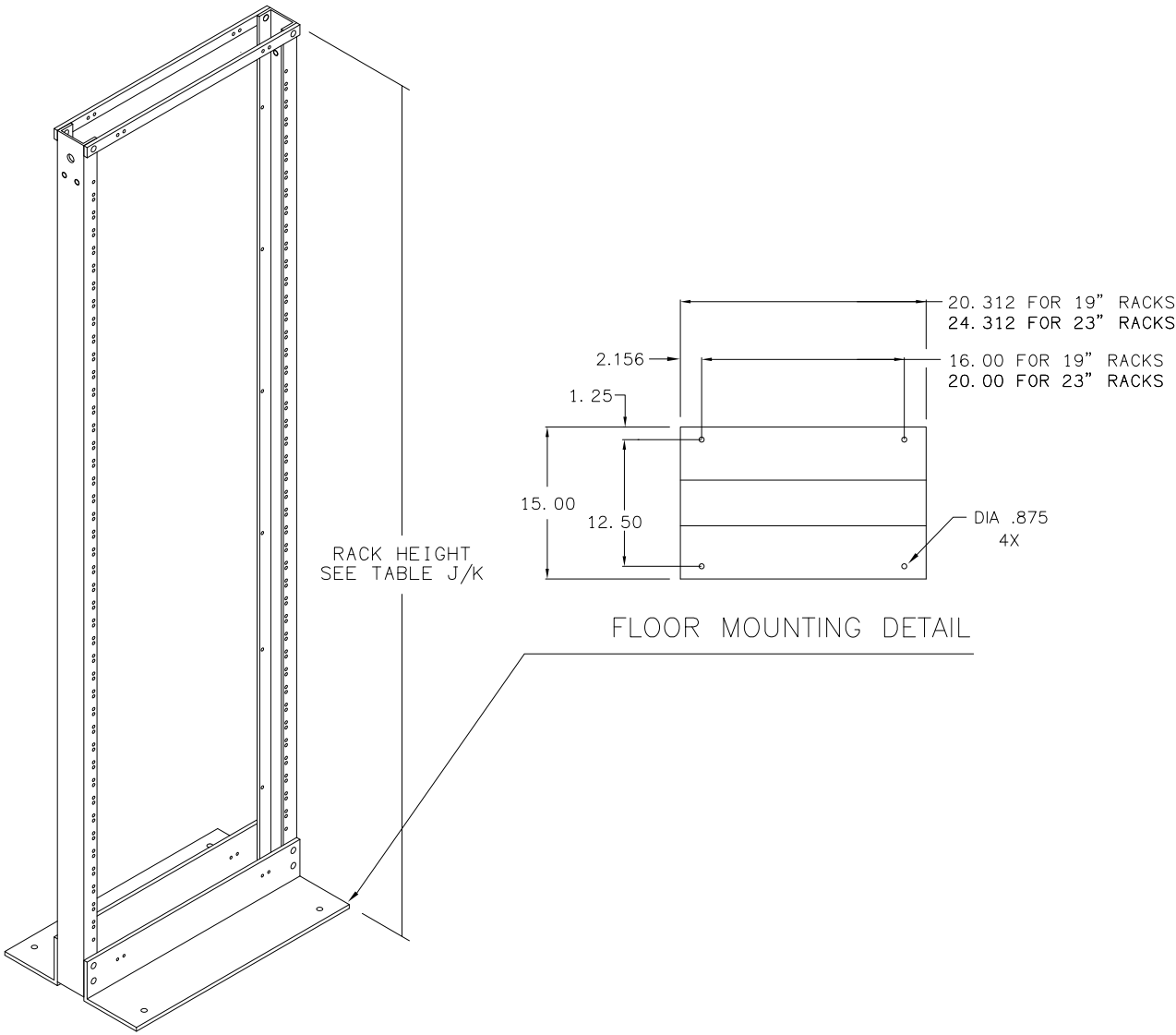
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TABLE H					
POWER PLANT CABLING REFERENCE					
LUG INFORMATION			CABLE INFORMATION		
C&D P/N	MG. & P/N	LUG TYPE	GAGE	*AMPS	WHERE USED
253-0210-00	HW R4115B	22-16, INS, RG, LUG	18 GA	3A	TYPICAL WIRE AND LUGS FOR LIGHT DISTRIBUTION LOADS
253-0410-01	MR R4170F	16-14, INS, RG, LUG	16 GA	8A	
253-0410-01	MR R4170F	16-14, INS, RG, LUG	14 GA	15A	
253-0310-03	MR R4161F	12-10, INS, RG, LUG	12 GA	20A	
253-0940-00	T&B 54123	2-HOLE LUG 1/4" ON 5/8" cc	10 GA	30A	TYPICAL WIRE AND LUGS FOR MEDIUM DISTRIBUTION LOADS
253-0944-00	T&B 54204		8 GA	45A	
253-0945-00	T&B 54205		6 GA	65A	
253-0950-00	T&B 54206		4 GA	85A	
253-0952-00	T&B 54207	2-HOLE LUG 3/8" ON 1" cc	2 GA	115A	TYPICAL CABLE AND LUGS FOR BATTERY CONNECTIONS. LARGE RESERVE CAPACITIES WILL REQUIRE MULTIPLE CABLE RUNS
253-0956-00	T&B 54209		1/0 GA	150A	
253-0958-00	T&B 54210		2/0 GA	175A	
253-0960-00	T&B 54212		4/0 GA	230A	
253-0961-00	T&B 54213		250 MCM	290A	
253-0962-00	T&B 54215		350 MCM	310A	
253-0964-00	T&B 54218		500 MCM	380A	

TABLE J			
STANDARD 19" FLOOR MOUNTING RELAY RACKS (TELCO GRAY)			
PART NUMBER	HEIGHT	1.75" MOUNTING SPACES	
170-0010-10A	7'0"	44	
170-0011-10A	7'6"	47	
170-0012-10A	8'0"	50	

TABLE K			
STANDARD 23" FLOOR MOUNTING RELAY RACKS (TELCO GRAY)			
PART NUMBER	HEIGHT	1.75" MOUNTING SPACES	
170-0023-10A	7'0"	44	
170-0022-10A	7'6"	47	
170-0020-10A	8'0"	50	

TABLE L				
2005 NEC CABLE RATING (90 C WIRE)				
	FREE AIR	FREE AIR	ENCLOSED	ENCLOSED
SIZE	30 C RATING	50 C RATING	30 C RATING	50 C RATING
14	35	29	25	21
12	40	33	30	25
10	55	45	40	33
8	80	66	55	45
6	105	86	75	62
4	140	115	95	78
2	190	156	130	107
1/0	260	213	170	139
2/0	300	246	195	160
3/0	350	287	225	185
4/0	405	332	260	213
250 MCM	455	373	290	238
300 MCM	505	414	320	262
350 MCM	570	467	350	287
400 MCM	615	504	380	312
500 MCM	700	574	430	353
(TABLE 310-17)			(TABLE 310-16)	



STANDARD FLOOR MOUNT  
RELAY RACK (TYP)

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A

B

C

D

ENGINEERING NOTES:

51. ORDER EQUIPMENT PER TABLES A, D, F, J, AND K.
52. THIS PRODUCT IS AVAILABLE IN ANSI-61 GRAY.
53. TO ALLOW FOR MAXIMUM VERSATILITY, SYSTEMS DO NOT INCLUDE A SPECIFIC RELAY RACK. RELAY RACKS MUST BE ORDERED FROM TABLE J OR K AS SEPARATE LINE ITEMS.
54. SAGEON II LIST SYSTEMS ARE DESIGN WITH N+1 RECTIFIER REDUNDANCY. RECTIFIERS MUST BE ORDER AS LINE ITEMS FROM TABLE D.
55. BLANK RECTIFIER COVERS MUST BE ORDERED TO COVER ALL UNUSED RECTIFIER POSITIONS. COVERS MUST BE ORDER AS A LINE ITEM FROM TABLE D.
56. ALL LIST SYSTEMS INCLUDE A CONTROLLER AND A MULTIPLE ALARM RELAY BOARD.
57. ALL LIST SYSTEMS INCLUDE A MOUNTING LOCATION FOR AN OPTIONAL COMMUNICATION BOARD. 103.4015.xx HAS BEEN SUPERCEDED BY 103.4036.xx. BOARD MUST BE ORDER AS A SEPARATE LINE ITEM FROM TABLE D. SNMP v3 IS COVERED BY MANUAL 990.4036.00.
58. LIST 40 & 41 ARE 400 AMP BULK POWER SYSTEMS (NO DISTRIBUTION).
59. LIST 44 & 45 ARE 400 AMP SYSTEMS WITH 20 POSITION AM1 STYLE BREAKERS. ORDER BREAKERS AS SEPARATE LINE ITEMS PER TABLE F.
60. LIST 46 & 47 ARE 400 AMP SYSTEMS WITH 40 POSITION AM1 STYLE BREAKERS. THE BREAKER CAPACITY SHOULD BE SPLIT BETWEEN THE TWO TIERS. ORDER BREAKERS AS SEPARATE LINE ITEMS PER TABLE F.
61. LIST 60 & 61 ARE 600 AMP BULK POWER SYSTEMS (NO DISTRIBUTION).
62. LIST 64 & 65 ARE 600 AMP SYSTEMS WITH 20 POSITION AM1 STYLE BREAKERS. ORDER BREAKERS AS SEPARATE LINE ITEMS PER TABLE F.
63. LIST 66 & 67 ARE 600 AMP SYSTEMS WITH 40 POSITION AM1 STYLE BREAKERS. THE BREAKER CAPACITY SHOULD BE SPLIT BETWEEN THE TWO TIERS. ORDER BREAKERS AS SEPARATE LINE ITEMS PER TABLE F.
64. LIST 46, 47, 66, & 67: TOP DISTRIBUTION TIER (TIER 2) LIMITED TO 100 AMP RATED BREAKER AND 300 AMP TOTAL CAPACITY.
65. LIST 40, 41, 60, 61: MOUNT FLUSH IN A STANDARD 19" RELAY RACK.
66. LIST 44, 45, 46, 47, 64, 65, 66, 67 GROUPS: MUST BE ORDERED WITH RELAY RACK MOUNTING BRACKETS AS A SEPARATE LINE ITEM FROM TABLE D.
67. LIST 40, 44, 46 INCLUDE NINE (9) INDIVIDUAL AC RECTIFIER INPUT TERMINAL BLOCKS. THE BLOCKS WILL ACCEPT 26-10 AWG WIRE. THREE (3) 1" CONDUIT KNOCKOUTS ARE LOCATED ON THE RIGHT BACK SIDE OF THE RECTIFIER SHELF.
68. LIST 41, 45, 47 INCLUDE NINE (9) INDIVIDUAL AC BREAKERS (20A) AND RECTIFIER INPUT TERMINAL BLOCKS. THE BLOCK WILL ACCEPT 26-10 AWG WIRE. THREE (3) 1" CONDUIT KNOCKOUTS ARE LOCATED ON THE RIGHT BACK SIDE OF THE RECTIFIER SHELF.

69. LIST 60, 64, 66 INCLUDE INDIVIDUAL AC RECTIFIER INPUT TERMINAL BLOCKS. THE BLOCKS WILL ACCEPT 26-10 AWG WIRE. FIVE (5) 1" CONDUIT KNOCKOUTS ARE LOCATED ON THE RIGHT BACK SIDE OF THE RECTIFIER SHELF.
70. LIST 61, 65, 67 INCLUDE THIRTEEN (13) INDIVIDUAL AC BREAKERS (20A) AND RECTIFIER INPUT TERMINAL BLOCKS. THE BLOCKS WILL ACCEPT 26-10 AWG WIRE. FIVE (5) 1" CONDUIT KNOCKOUTS ARE LOCATED ON THE RIGHT BACK SIDE OF THE RECTIFIER SHELF.
71. LIST 44, 45, 46, 47, 64, 65, 66, 67 WILL SUPPORT AN OPTIONAL 600 AMP BATTERY DISCONNECT ORDER AS A SEPARATE LINE ITEM FROM TABLE D.
72. LIST 40 AND 60 WILL SUPPORT ONE AMBIENT TEMPERATURE AND ONE BATTERY TEMPERATURE SENSOR. LIST 41, 44, 45, 46, 47, 61, 64, 65, 66, 67 WILL SUPPORT ONE AMBIENT TEMPERATURE AND UP TO FOUR BATTERY TEMPERATURE SENSORS. EACH TEMPERATURE SENSOR MUST BE ORDER AS A SEPARATE LINE ITEM FROM TABLE D.
73. LIST 41, 44, 45, 46, 47, 61, 64, 65, 66, 67 INCLUDE A BATTERY DISTRIBUTION MODULE THAT ALLOWS MONITORING UP TO 4 BATTERY CURRENT TRANSDUCERS AND BATTERY BREAKER AUXILIARY SWITCH INPUTS. CLOSED AND SPLIT WINDOW TRANSDUCERS. REFER TO TABLE E FOR THE NUMBER OF WIRES THAT CAN FIT THROUGH THE WINDOW. EACH BATTERY TRANSDUCER MUST BE ORDERED AS A SEPARATE LINE ITEM FROM TABLE D.
74. THE SAGEON II MUST HAVE ACCESS TO THE REAR FOR INSTALLATION AND SERVICING.
75. SAGEON BATTERY MONITOR IS AN EXTERNAL UNIT THAT CONNECTS TO THE SAGEON II POWER SYSTEM VIA A RIBBON CABLE. EACH BATTERY MONITOR CAN MEASURE UP TO 24 INDIVIDUAL CELLS. EACH BATTERY MONITOR REQUIRES A BATTERY SENSE CABLE AND A BATTERY POST (PIG-TAIL) KIT. BATTERY MONITOR, BATTERY SENSE CABLE, AND BATTERY POST KIT MUST BE ORDERED AS SEPARATE LINE ITEMS PER TABLE D.
76. SAGEON SITE MONITOR IS AN EXTERNAL BOX THAT CONNECTS TO THE SAGEON II POWER SYSTEM VIA A RIBBON CABLE. THE SITE MONITOR CAN MEASURE 12 DIGITAL AND 8 ANALOG INPUTS. ORDER AS A SEPARATE LINE ITEM PER TABLE D.
77. LIST 46, 47, 66, 67 REQUIRE A MINIMUM OF 3" ABOVE THE DISTRIBUTION PANEL FOR CABLE ROUTING.

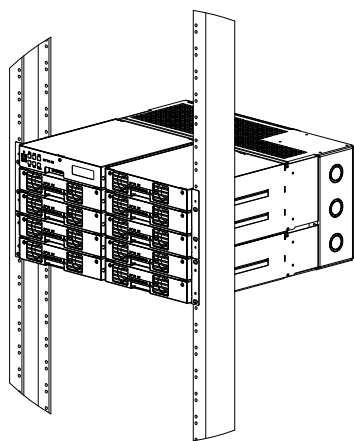
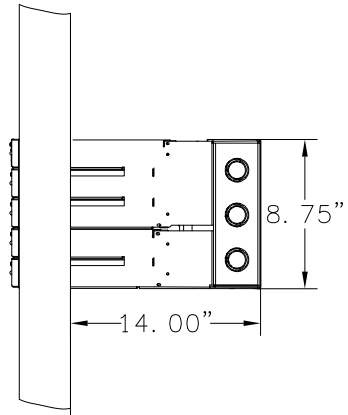
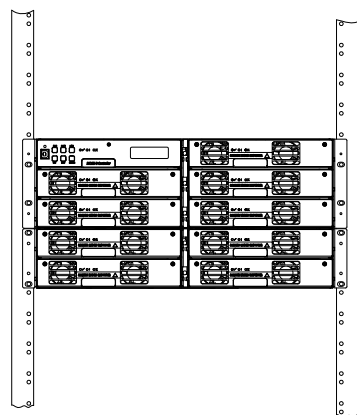
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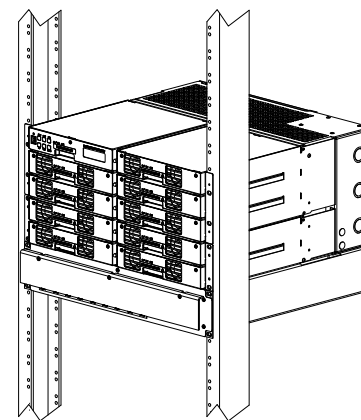
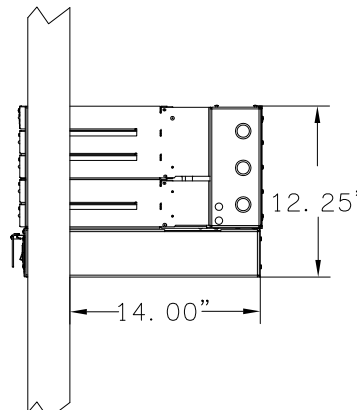
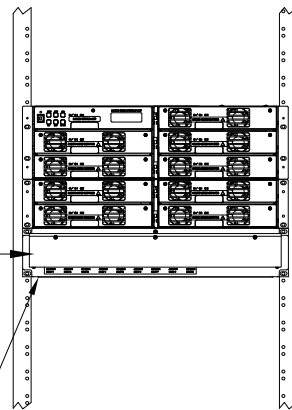
B

C

D



SAGEON2. L40

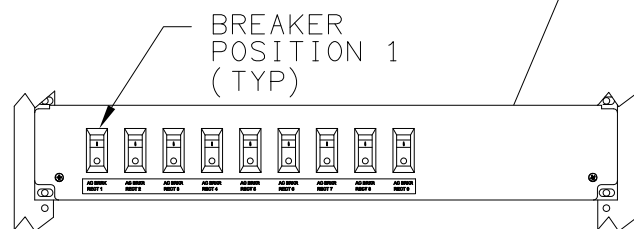
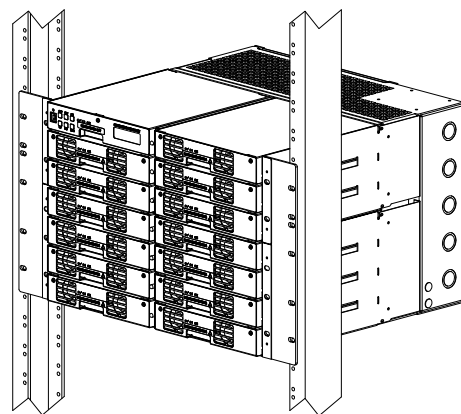
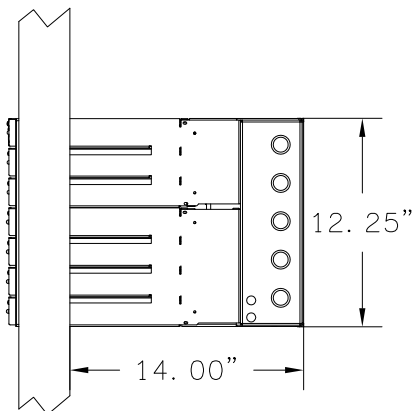
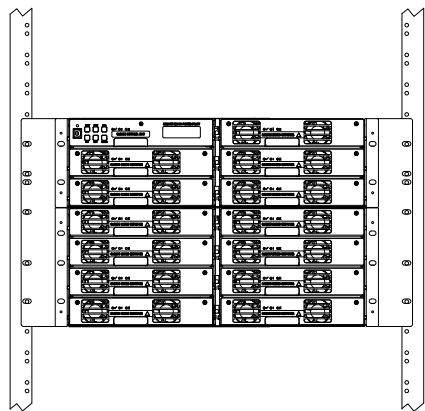
PLASTIC  
BREAKER  
COVER  
(TYP)

SAGEON2. L41

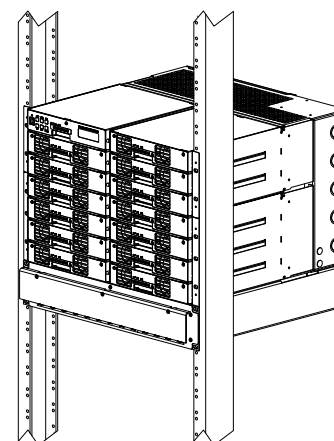
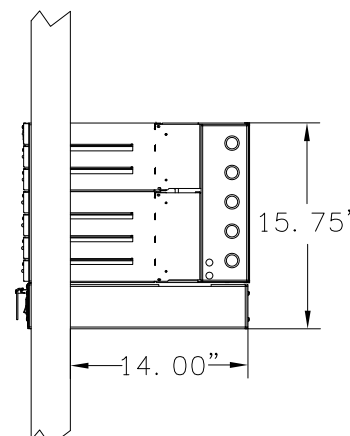
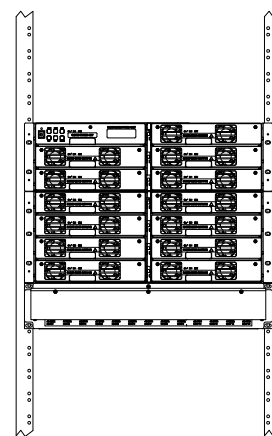
FIG 1

SAGEON II: 400A, BULK PLANT  
SHOWN IN 19" RACK

FIG 2

SAGEON II: 400A, BULK PLANT  
WITH AC BREAKERS; SHOWN IN 19" RACKBREAKER  
POSITION 1  
(TYP)

SAGEON2. L60



SAGEON2. L61

FIG 3

SAGEON II: 600A, BULK PLANT  
WITH 385.5202.6023 KIT; SHOWN IN 23" RACK

FIG 4

SAGEON II: 600A, BULK PLANT  
WITH AC BREAKERS; SHOWN IN 19" RACK

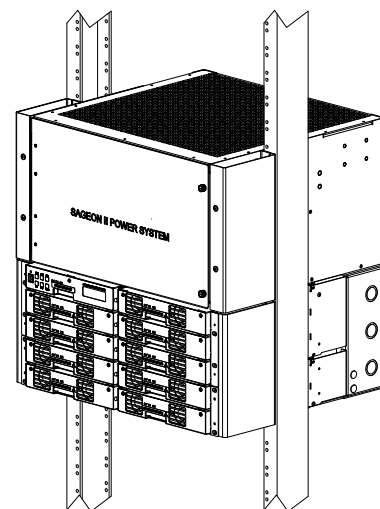
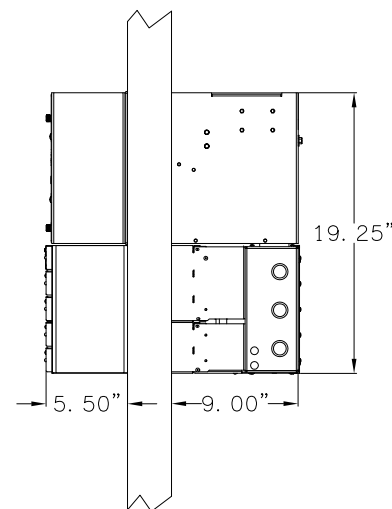
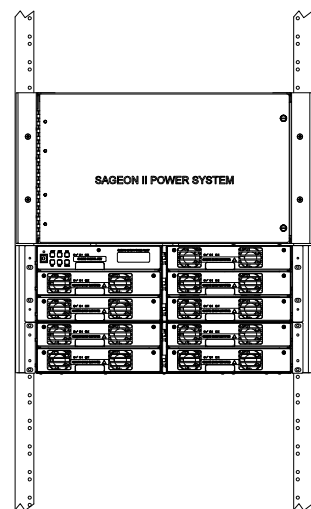
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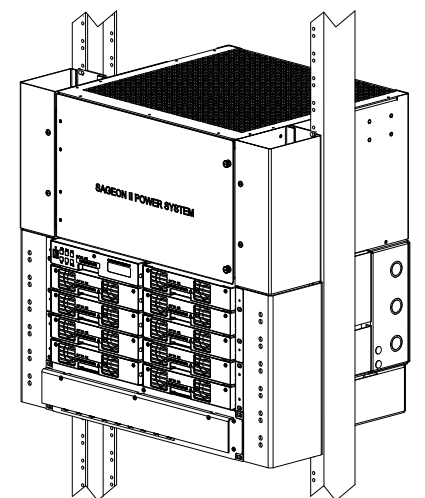
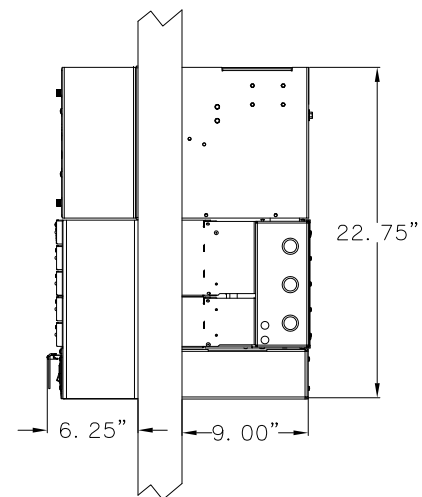


SAGEON2. L44

FIG 5

SAGEON II: 400A, 1 TIER DISTRIBUTION  
WITH 385.5202.4419 KIT; SHOWN IN 19" RACK

B



SAGEON2. L45

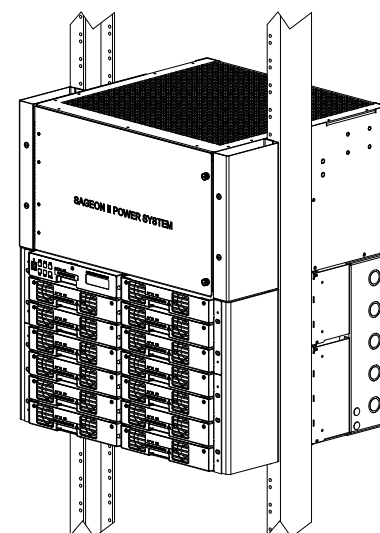
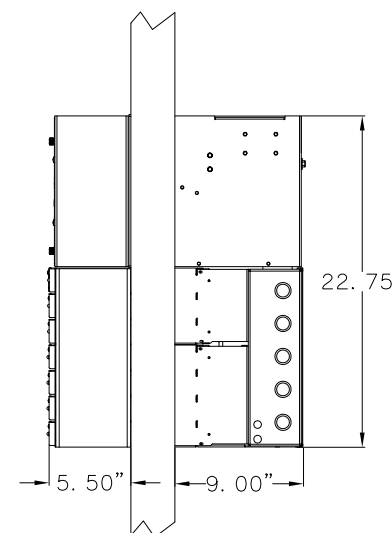
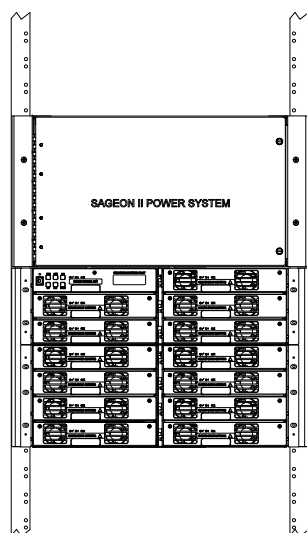
FIG 6

SAGEON II: 400A, 1 TIER DISTRIBUTION  
WITH 385.5202.4523 KIT; SHOWN IN 23" RACK

A

B

C

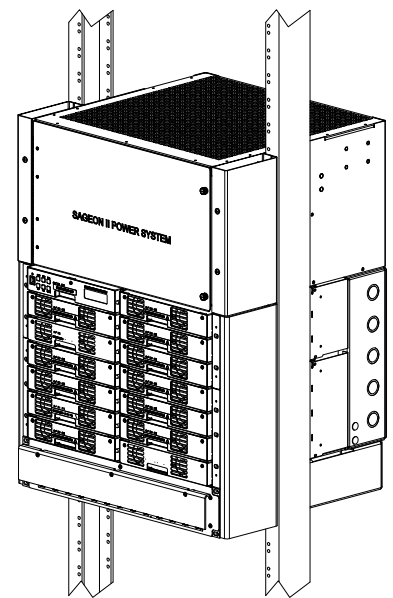
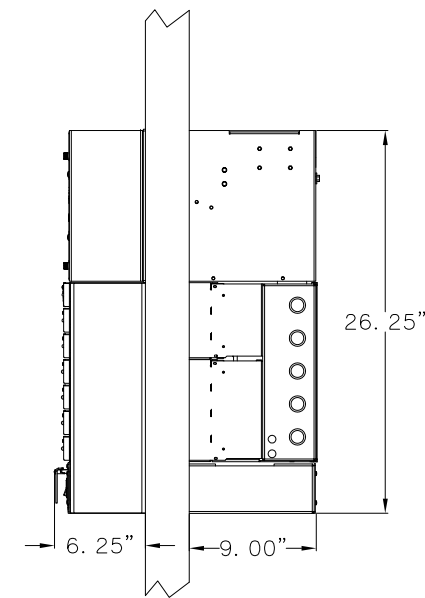
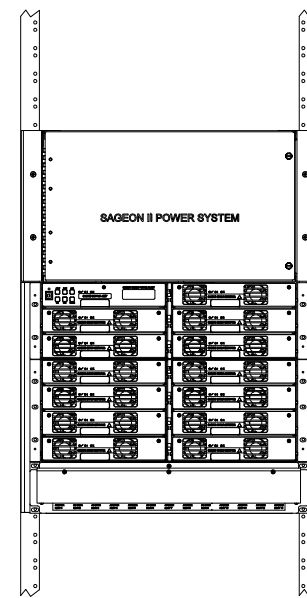


SAGEON2. L64

FIG 7

SAGEON II: 600A, 1 TIER DISTRIBUTION  
WITH 385.5202.6419 KIT; SHOWN IN 19" RACK

D



SAGEON2. L65

FIG 8

SAGEON II: 600A, 1 TIER DISTRIBUTION  
WITH 385.5202.6519 KIT; SHOWN IN 19" RACK

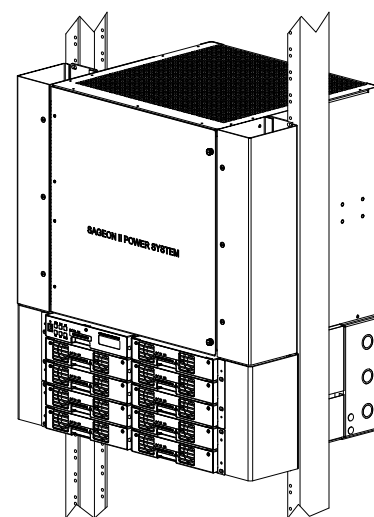
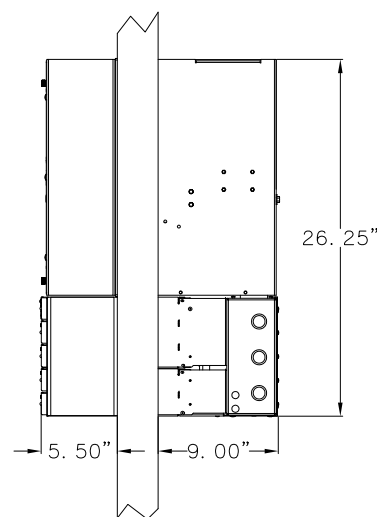
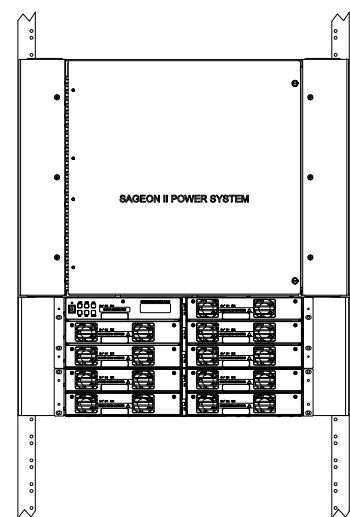
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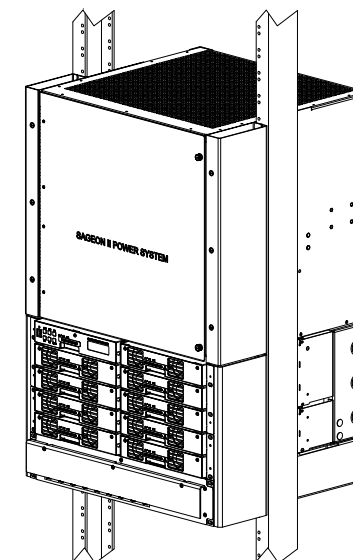
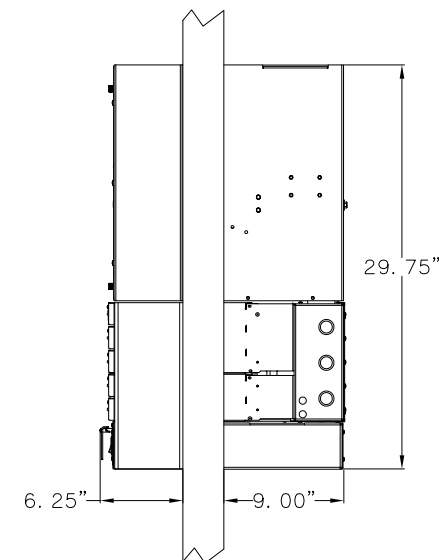
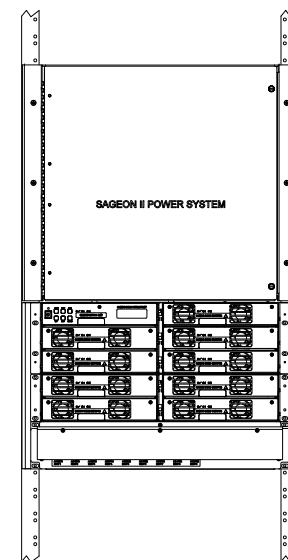
A



SAGEON2. L46

FIG 9

SAGEON II: 400A, 2 TIER DISTRIBUTION  
WITH 385.5202.4623 KIT; SHOWN IN 23" RACK



SAGEON2. L47

FIG 10

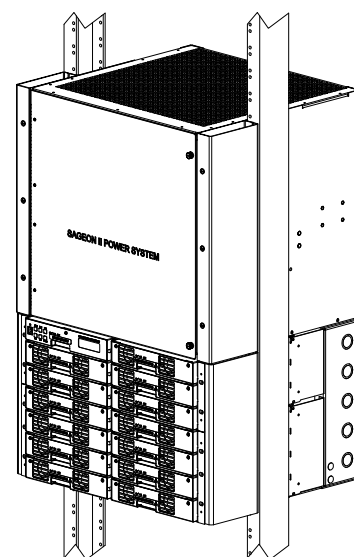
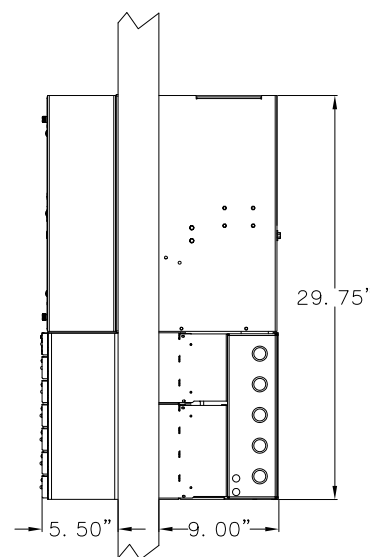
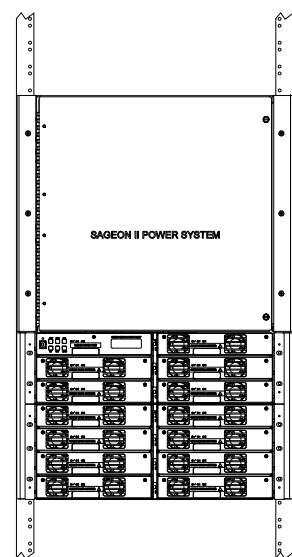
SAGEON II: 400A, 2 TIER DISTRIBUTION  
WITH 385.5202.4719 KIT; SHOWN IN 19" RACK

B

B

C

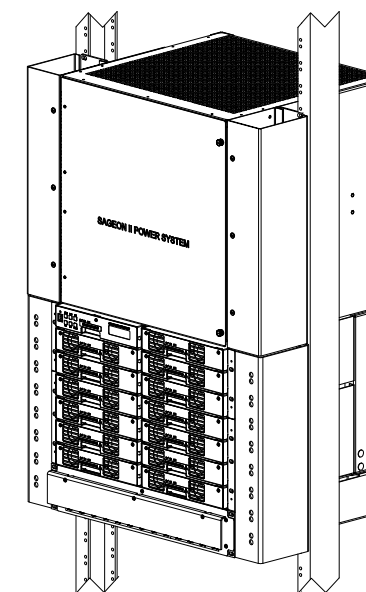
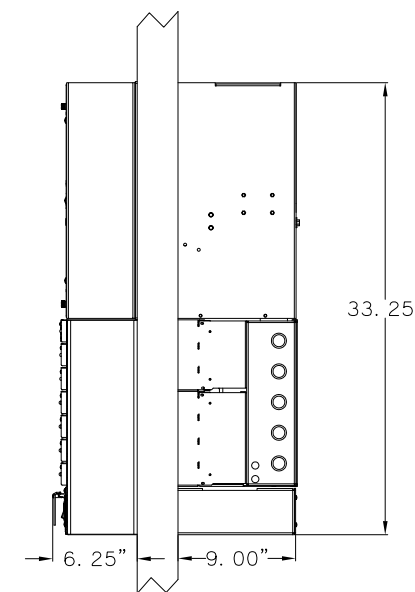
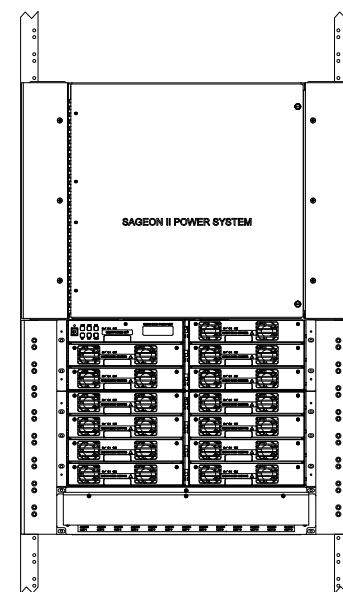
C



SAGEON2. L66

FIG 11

SAGEON II: 600A, 2 TIER DISTRIBUTION  
WITH 385.5202.6619 KIT; SHOWN IN 19" RACK



SAGEON2. L67

FIG 12

SAGEONII: 600A, 2 TIER DISTRIBUTION  
WITH 385.5202.6723 KIT; SHOWN IN 23" RACK

D

D

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SCALE: NONE	SHEET: B3 OF -	FILE NAME: J-SAGEON2. LXX_SHT_B3_ISS_2

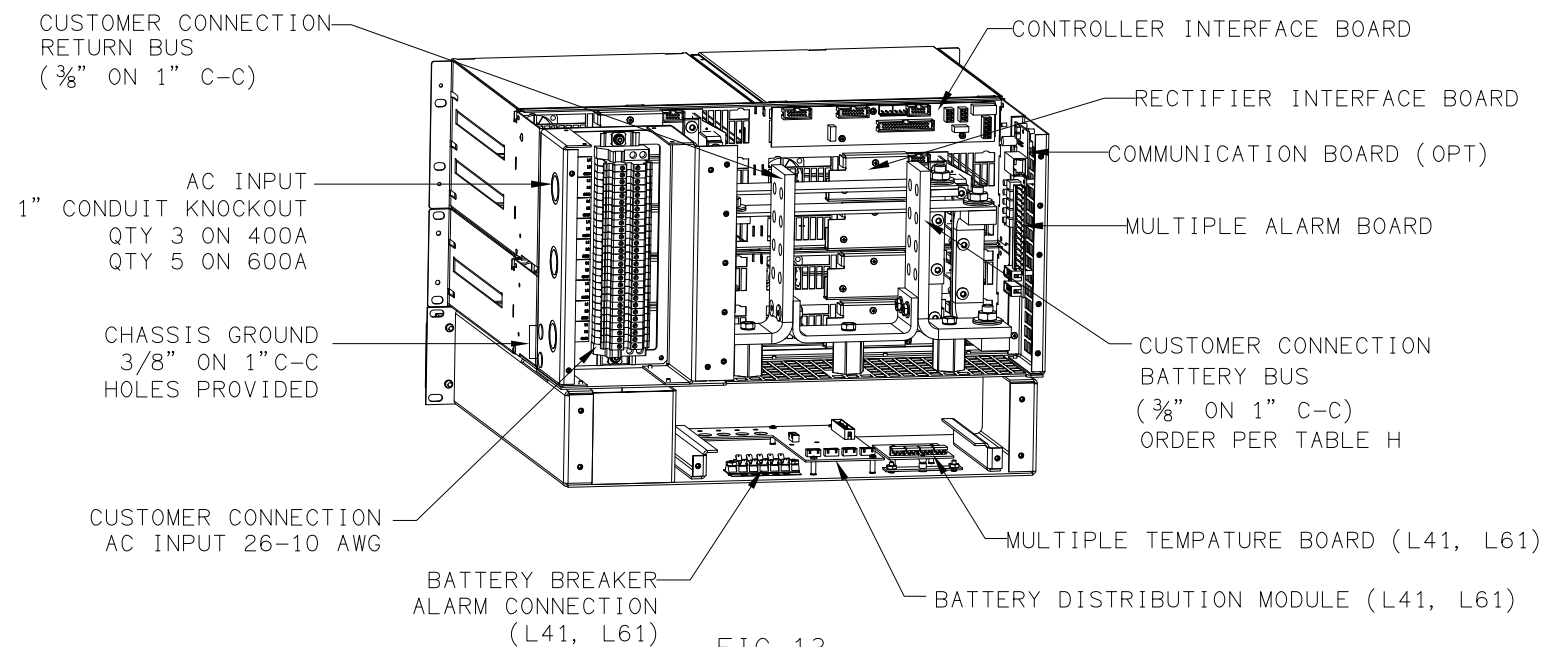


FIG 13

TYPICAL AC INPUT & BATTERY CONNECTION  
FOR BULK SYSTEMS  
L41 SHOWN

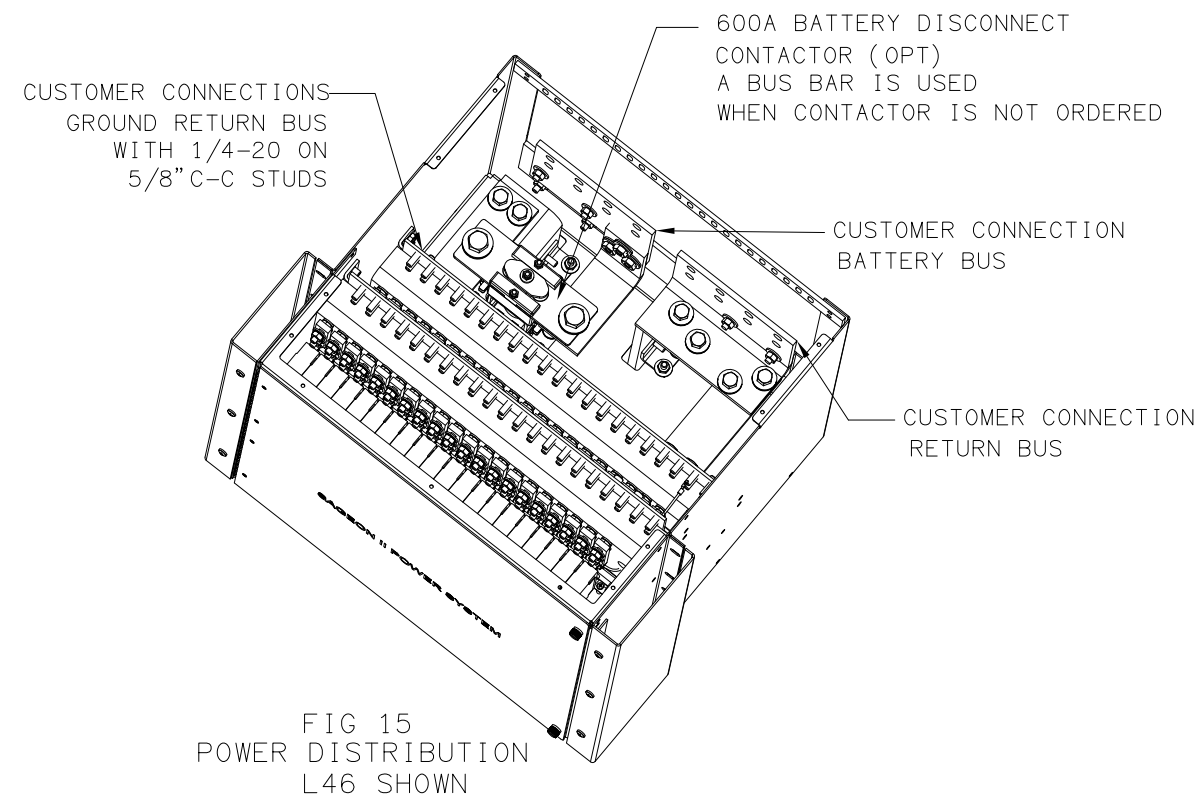


FIG 15  
POWER DISTRIBUTION  
L46 SHOWN

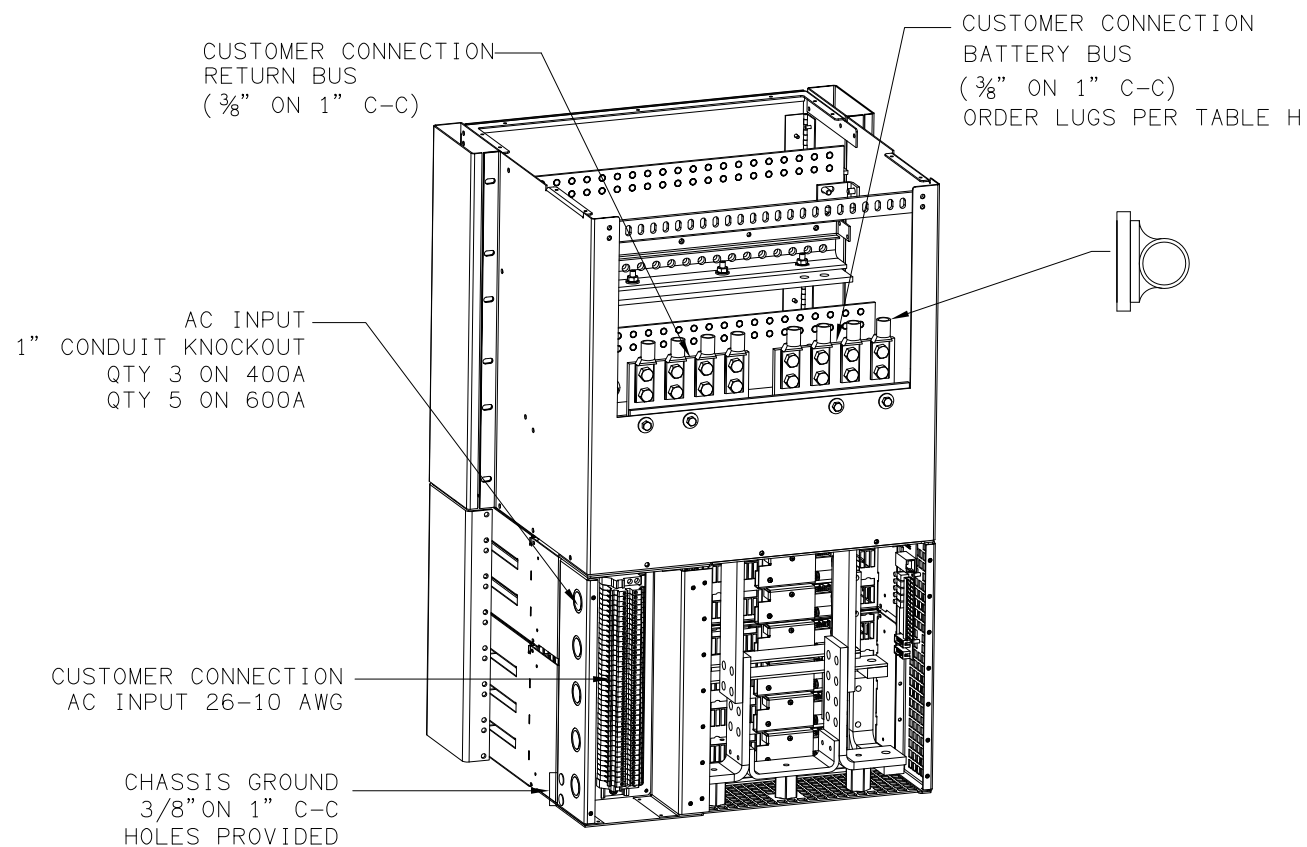


FIG 14

TYPICAL AC INPUT & BATTERY CONNECTION  
FOR PLANT SYSTEMS  
L66 SHOWN

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SCALE: NONE	SHEET: B4 OF -	FILE NAME: J-SAGE0N2. LXX_SHT_B4_ISS_2

\*HARDWARE INCLUDED  
IN BREAKER KITS;  
ORDER PER TABLE F

BATTERY BREAKER  
ALARM CONNECTION

BATTERY DISTRIBUTION  
MODULE

CURRENT TRANSDUCER  
CONNECTION (OPT)

MULTIPLE TEMPERATURE  
BOARD

MULTIPLE ALARM  
BOARD

FUSE ALARM(FA)  
PC BOARD

COMMUNICATION  
BOARD (OPT)

FIG 16  
POWER DISTRIBUTION  
2 TIER SHOWN

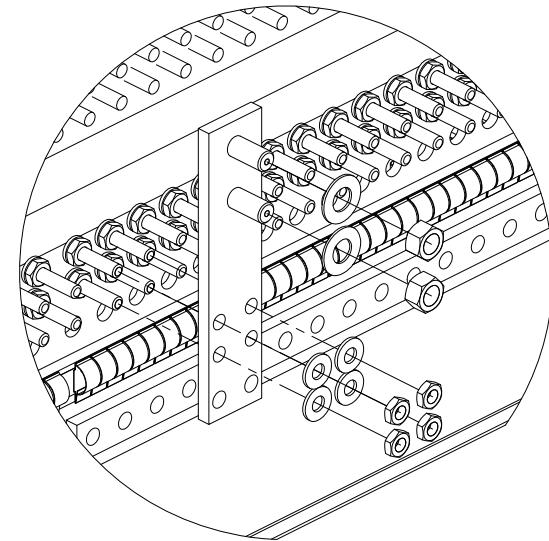


FIG 17  
2 POLE  
CIRCUIT BREAKER  
ADAPTER PLATE

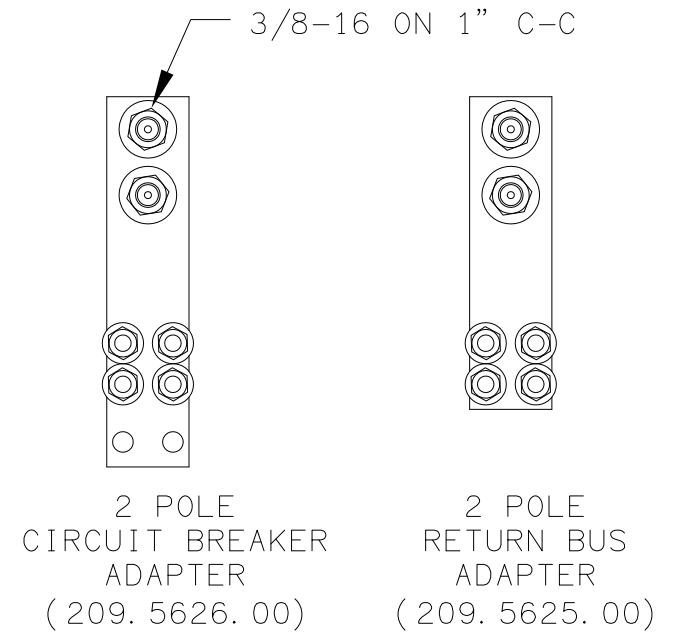


FIG 18  
ADAPTOR BUS BARS FOR 125A  
TO 200A BRAKERS

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SCALE: NONE	SHEET: B5 OF -	FILE NAME: J-SAGE0N2. LXX_SHT_B5_ISS_2

A

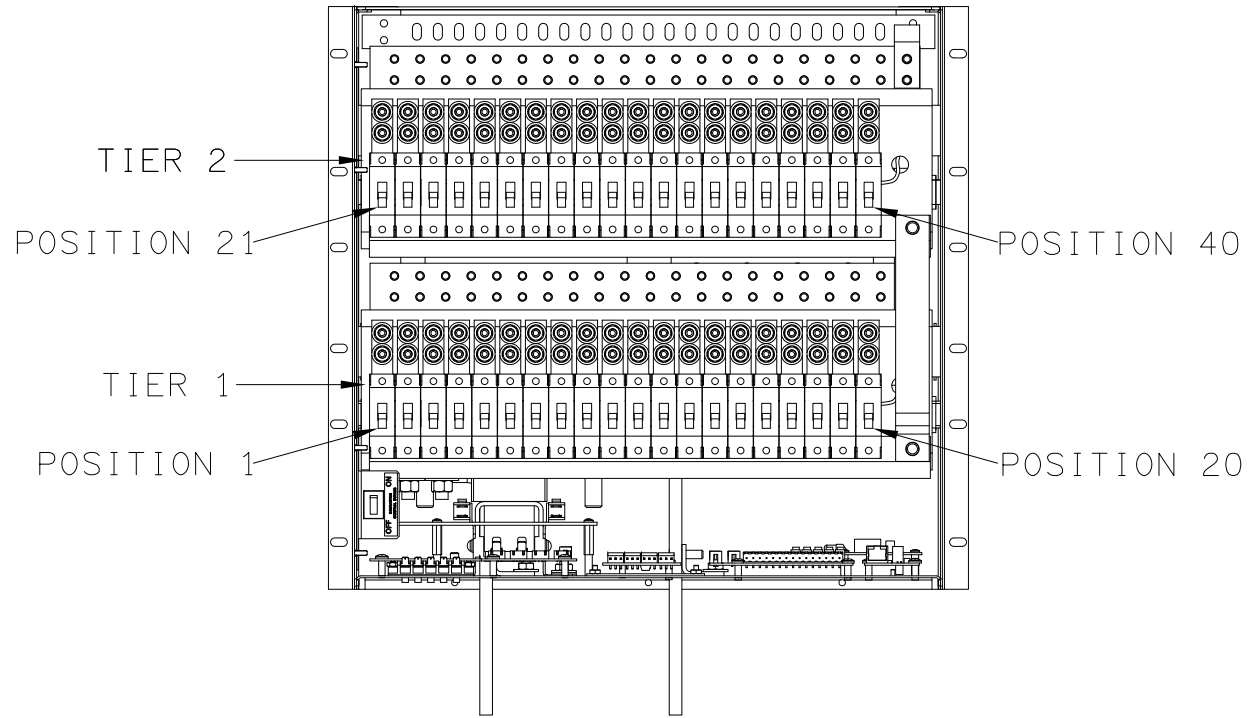


FIG 19  
BREAKER LOCATION

B

C

D

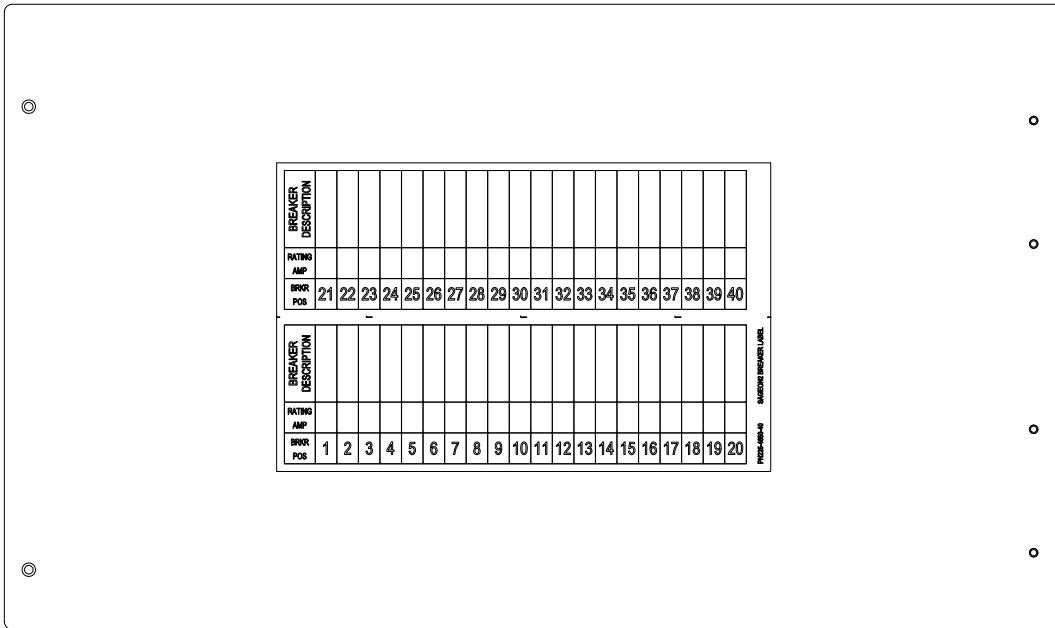


FIG 20  
INSIDE DOOR W/BREAKER ID

A

B

C

D

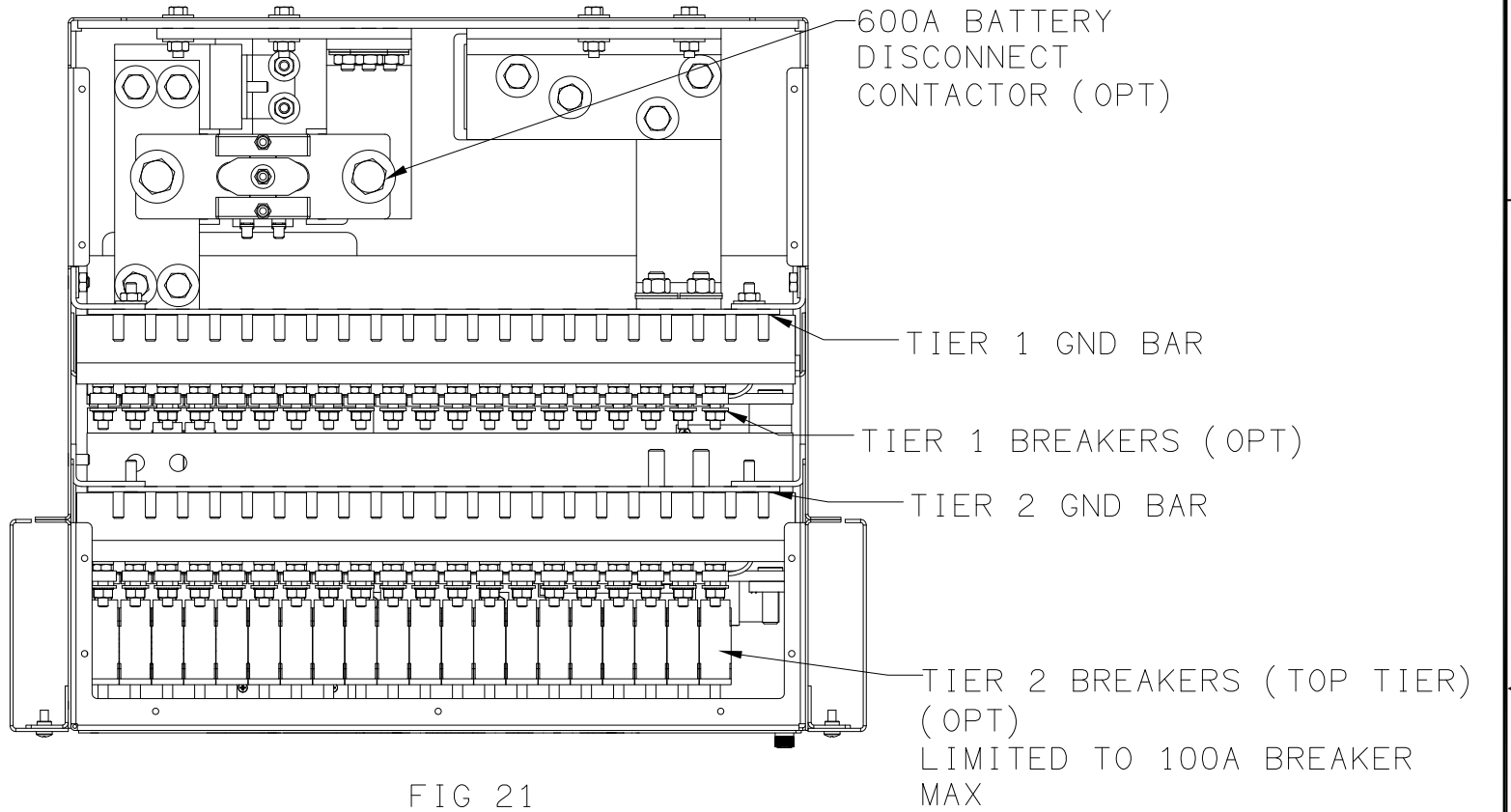


FIG 21  
600A DISTRIBUTION TOP VIEW  
2 TIER SHOWN

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SCALE: NONE	SHEET: B6 OF -	FILE NAME: J-SAGE0N2. LXX_SHT_B6_ISS_3

A

A

B

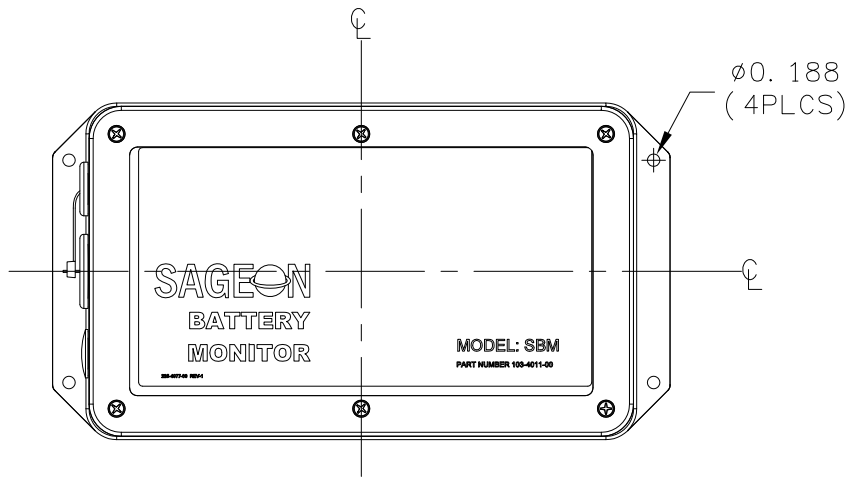
B

C

C

D

D



NOTE: DIMENSIONS ARE THE SAME ON BOTH MONITORS.

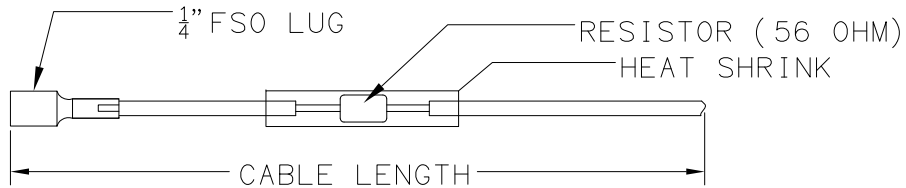
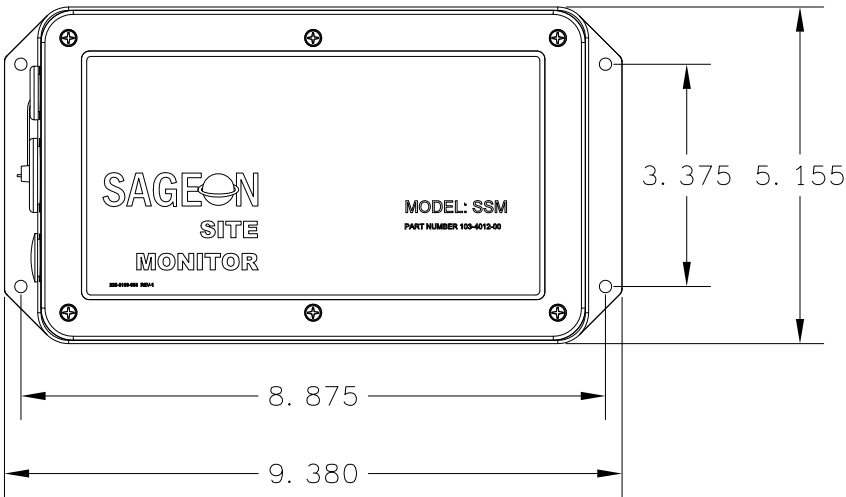


FIG 24  
BATTERY SENSE WIRE

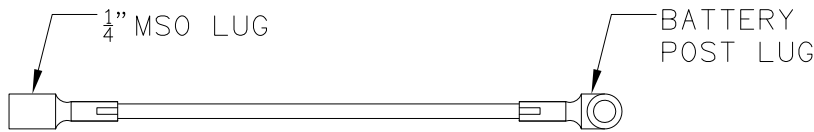


FIG 25  
BATTERY POST PIG TAIL

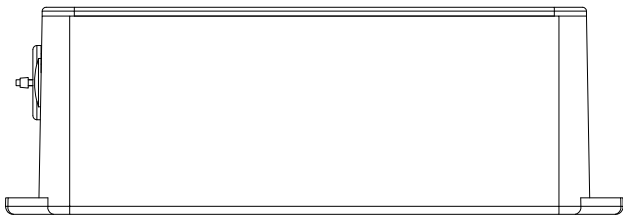


FIG 22  
SAGEON II BATTERY MONITOR

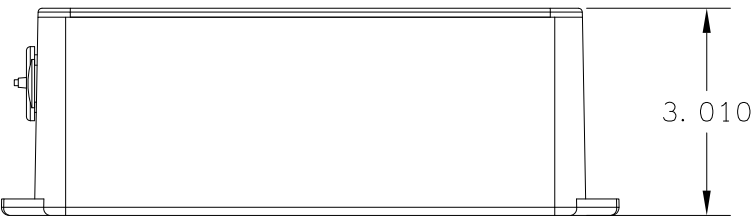


FIG 23  
SAGEON II SITE MONITOR

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SCALE: NONE	SHEET: B7 OF -	FILE NAME: J-SAGEON2. LXX_SHT_B7_ISS_2

ED991-5001-B1 Issue 3

1

2

3

4

ISSUES

ISSUE #	DESCRIPTION	ISS. BY ISS. DATE
11	UPDATED UNIPOWER LOGO. SEE PCO# 44417.	WD 6/12/17

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON:

Holes	+0.004 -0.002	DRAWN WD	9/28/09
FRACTIONS	±1/32	CHECKED MCM	9/29/09
DECIMALS (XX)	±0.020	APPROVED DBW	9/30/09
DECIMALS (XXX)	±0.010	APPROVED	
ANGLES	±1/2°		

SQUARE CORNERS AND ANGLES ARE 90° UNLESS OTHERWISE SPECIFIED.


WORKMANSHIP:  
PER SPEC ENG032

MATERIAL:

FINISH:

PROPRIETARY INFORMATION

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UNIPOWER  
POWERING TECHNOLOGY

SCHEMATIC DIAGRAM  
SAGEON II  
POWER SYSTEM

SIZE B	DOC TYPE / NUMBER SD SAGEON2.LXX	ISSUE 11
SCALE: 1=1	SHEET: 1 OF 7	FILE NAME: SD-SAGEON2.LXX_SHT_1_ISS_11

NOTES:

1. ALARM CONTACTS ARE RATED 2 AMP RESISTIVE AT 48 VDC.

2. ALL WIRES ARE 20 GA MINIMUM UNLESS OTHERWISE NOTED.

3. CURRENT TRANSDUCER OPTIONS: L41-47, L61-67 SELECT UP TO 4 EXTERNAL INDIVIDUAL BATTERY STRING CURRENT TRANSDUCERS.

4. L40 & L60 SUPPORT 1 AMBIENT AND 1 BATTERY TEMPERATURE SENSOR. ALL OTHER SYSTEMS SUPPORT 1 AMBIENT TEMPERATURE SENSOR AND UP TO 4 BATTERY TEMPERATURE SENSORS. ORDER SENSORS PER J-SAGEON2.LXX TABLE D.

5. INDIVIDUAL 20AMP AC BREAKERS INCLUDED IN L41, L45, L47, L61, L65, L67.

6. DASHED LINES DENOTE CUSTOMER CONNECTIONS OR EXTERNAL PANEL CONNECTIONS.

7. DASH-DOT LINES DENOTE COMPONENTS INTERNAL TO SAGEON II OR AC BREAKER SHELF.

8. BATTERY DISCONNECT PANELS ARE NOT INCLUDED AND MUST BE ORDERED AS A SEPARATE LINE ITEM. SHOWN HERE FOR ILLUSTRATION OF TYPICAL APPLICATION ONLY.

9. BATTERIES ARE NOT INCLUDED AND MUST BE ORDERED SEPARATELY. SHOWN HERE FOR ILLUSTRATION OF TYPICAL APPLICATION ONLY.

10. SHEET 2 SHOWS L40 & L60.  
SHEETS 3 & 4 SHOWS L41 & L61.  
SHEETS 5, 6, & 7 SHOWS L44, L45, L46, L47, L64, L65, L66, & L67

SHEET INDEX NOTE:

THE ISSUE OF SHEET 1 REFLECTS THE LATEST ISSUE OF THE DRAWING SET. WHEN THE DRAWING SET IS REVISED, ONLY THE ISSUE NUMBERS OF MODIFIED SHEETS ARE CHANGED. THE ISSUE NUMBERS OF UNMODIFIED SHEETS ARE NOT CHANGED.

SH NO	1	2	3	4	5	6	7
ISSUE	11	5	5	7	6	8	2

A

B

C

D

A

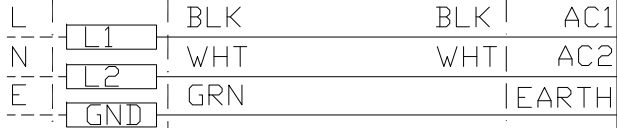
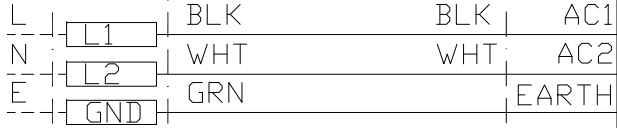
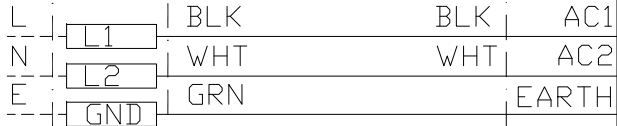
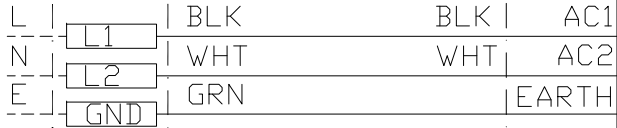
B

C

D

CUSTOMER AC CONNECTIONS

AC FEED BOX  
ACCEPTS 14-10 AWG



PLANT SIZE	MAX # RECTS.
400A	9
600A	13

SAGEON II BULK SYSTEM

RECTIFIER BACKPLANE

RECTIFIER  
48V / 50A  
100-7675-4850\_#1

RECTIFIER BACKPLANE

RECTIFIER  
48V / 50A  
100-7675-4850\_#2

RECTIFIER BACKPLANE

RECTIFIER  
48V / 50A  
100-7675-4850\_#N

RECTIFIER BACKPLANE

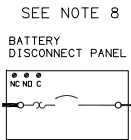
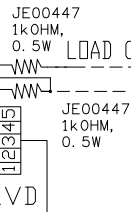
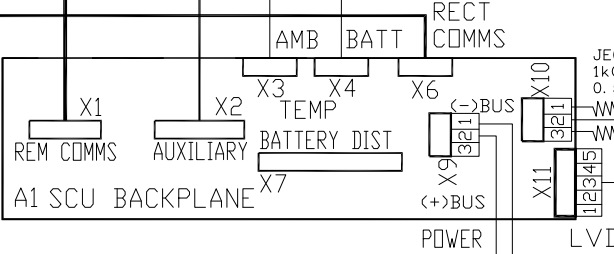
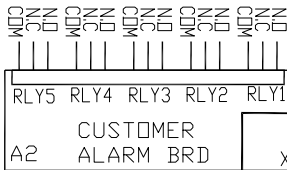
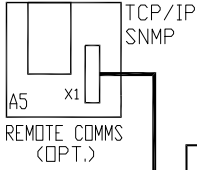
RECTIFIER  
48V / 50A  
100-7675-4850\_#N+1

RECTIFIER COMMS

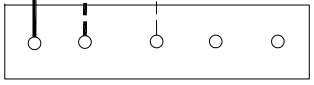
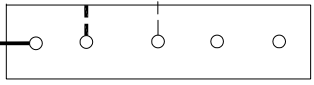
RECTIFIER BUS (+)

RECTIFIER BUS (-)

L40, 60



CUSTOMER LOADS



BATTERY/LOAD LANDING TERMINAL (-)  
4 LANDINGS  
2-HOLE  
3/8" ON 1" C-C

BATTERY/LOAD LANDING TERMINAL (+)  
4 LANDINGS  
2-HOLE  
3/8" ON 1" C-C

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SCALE: NONE	SHEET: 2 OF 7	FILE NAME: SD-SAGEON2. LXX_SHT_2_ISS_5

A

B

C

D

A

B

C

D

CUSTOMER AC CONNECTIONS

AC FEED BOX  
ACCEPTS 14-10 AWG

AC BREAKERS  
L41, 61

PLANT SIZE	MAX # RECTS.
400A	9
600A	13

SAGEON II SYSTEM

RECTIFIER  
BACKPLANE

RECTIFIER  
48V / 50A  
100-7675-4850\_#1

RECTIFIER  
BACKPLANE

RECTIFIER  
48V / 50A  
100-7675-4850\_#2

RECTIFIER  
BACKPLANE

RECTIFIER  
48V / 50A  
100-7675-4850\_#N

RECTIFIER  
BACKPLANE

RECTIFIER  
48V / 50A  
100-7675-4850\_#N+1

RECTIFIER COMMS

RECTIFIER  
BUS (+)

RECTIFIER  
BUS (-)

SCU BACKPLANE

TCP/IP  
SNMP  
A5 X1  
REMOTE COMMS  
(OPT.)

RLY5 RLY4 RLY3 RLY2 RLY1  
A2  
CUSTOMER  
ALARM BRD  
X5 X2

COMMS X6  
X3 X4  
X7  
BATTERY DIST.  
X10  
LOAD CB  
X11  
LVD

JE00447  
1kOHM,  
0.5W

JE00447  
1kOHM,  
0.5W

C  
NO

TO ALARM RELAY  
CONTACTS

TO  
PAGE  
4

L41, 61

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SCALE: NONE	SHEET: 3 OF 7	FILE NAME: SD-SAGEON2. LXX_SHT_3_ISS_5



A

B

C

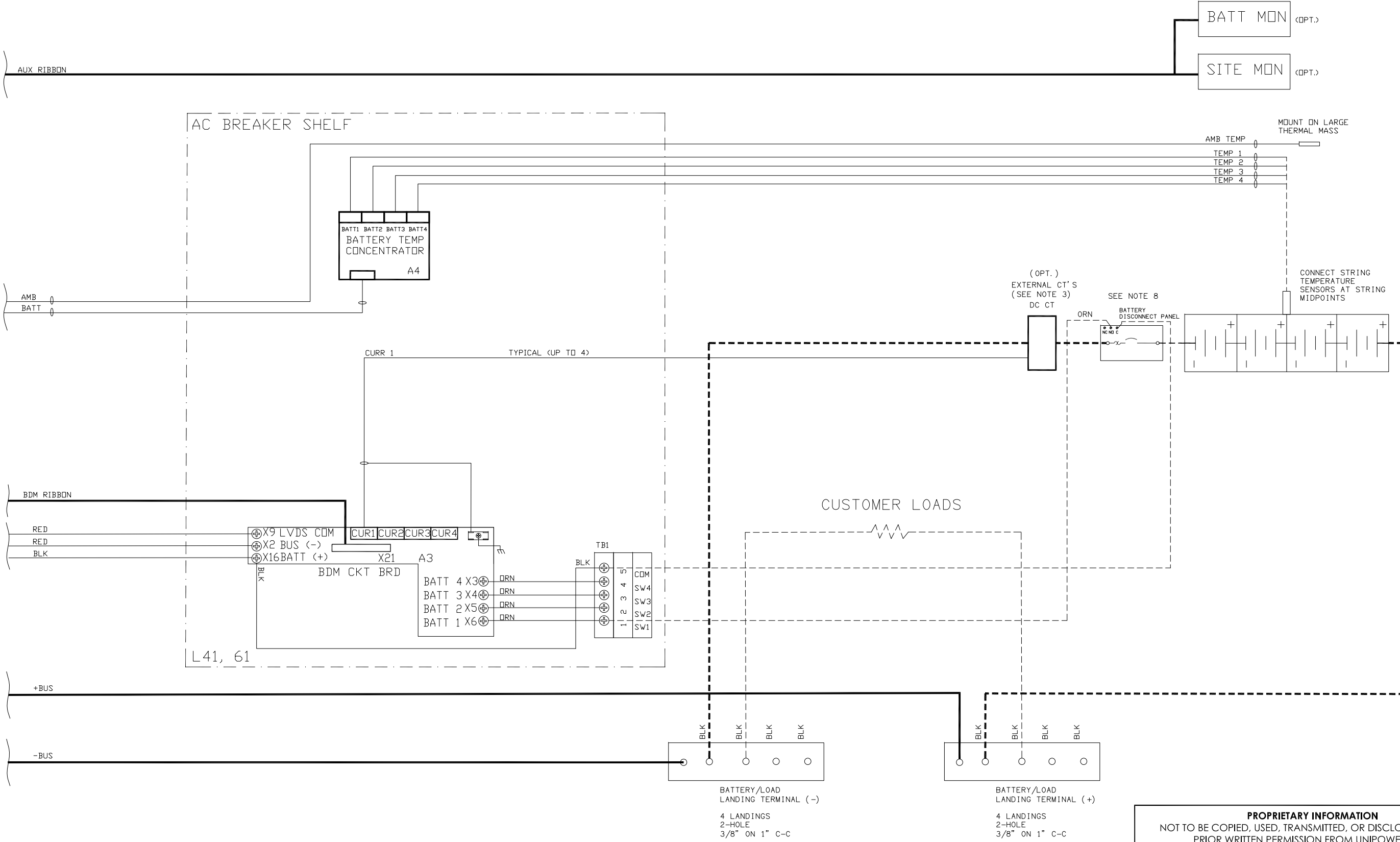
D

A

B

C

D



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SCALE: NONE	SHEET: 4 OF 7	FILE NAME: SD-SAGE0N2. LXX_SHT_4_ISS_7

A

B

C

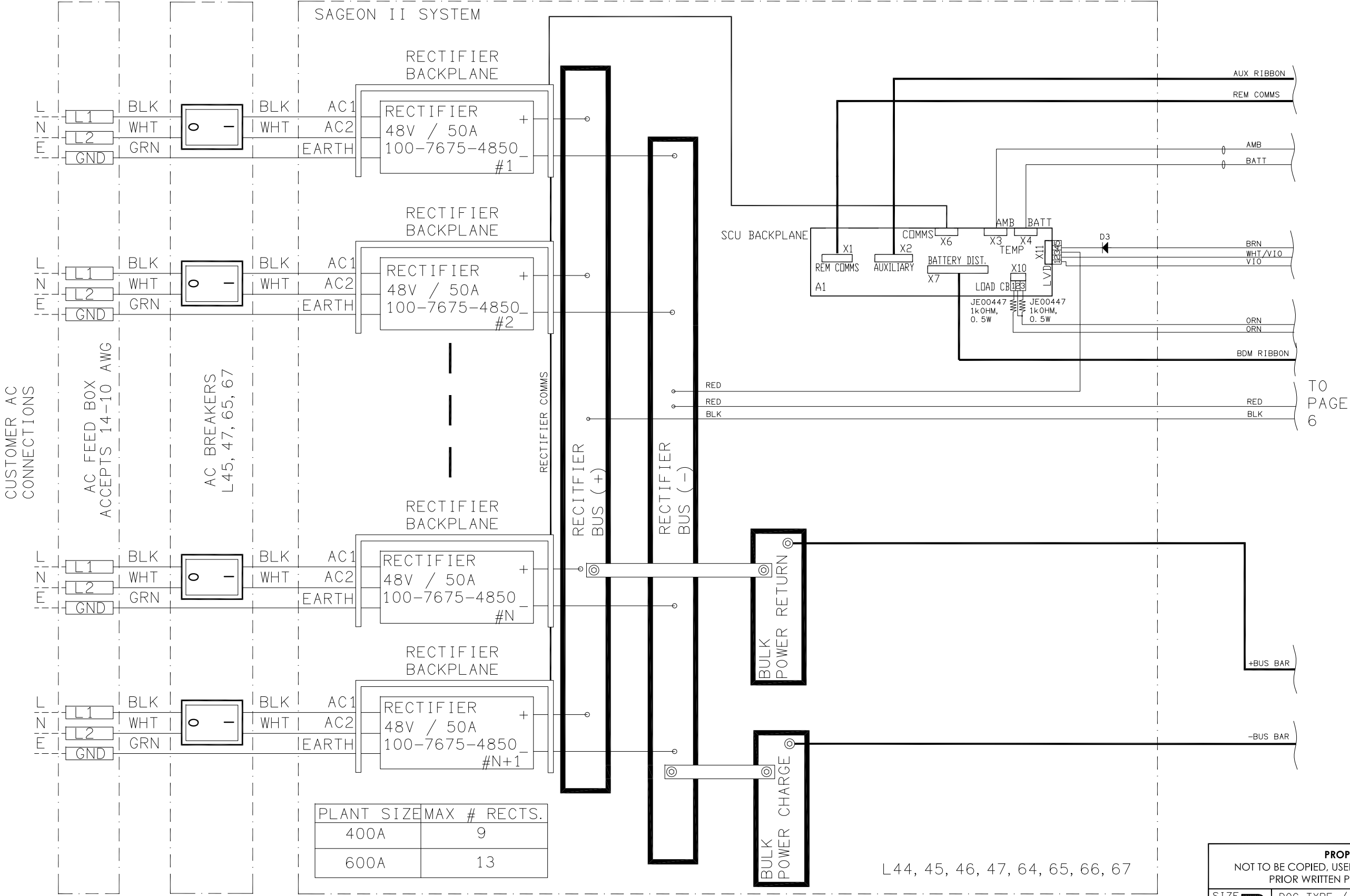
D

A

B

C

D



PLANT SIZE	MAX # RECTS.
400A	9
600A	13

L44, 45, 46, 47, 64, 65, 66, 67

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SCALE: NONE	SHEET: 5 OF 7	FILE NAME: SD-SAGEON2. LXX_SHT_5_ISS_6



A

B

C

D

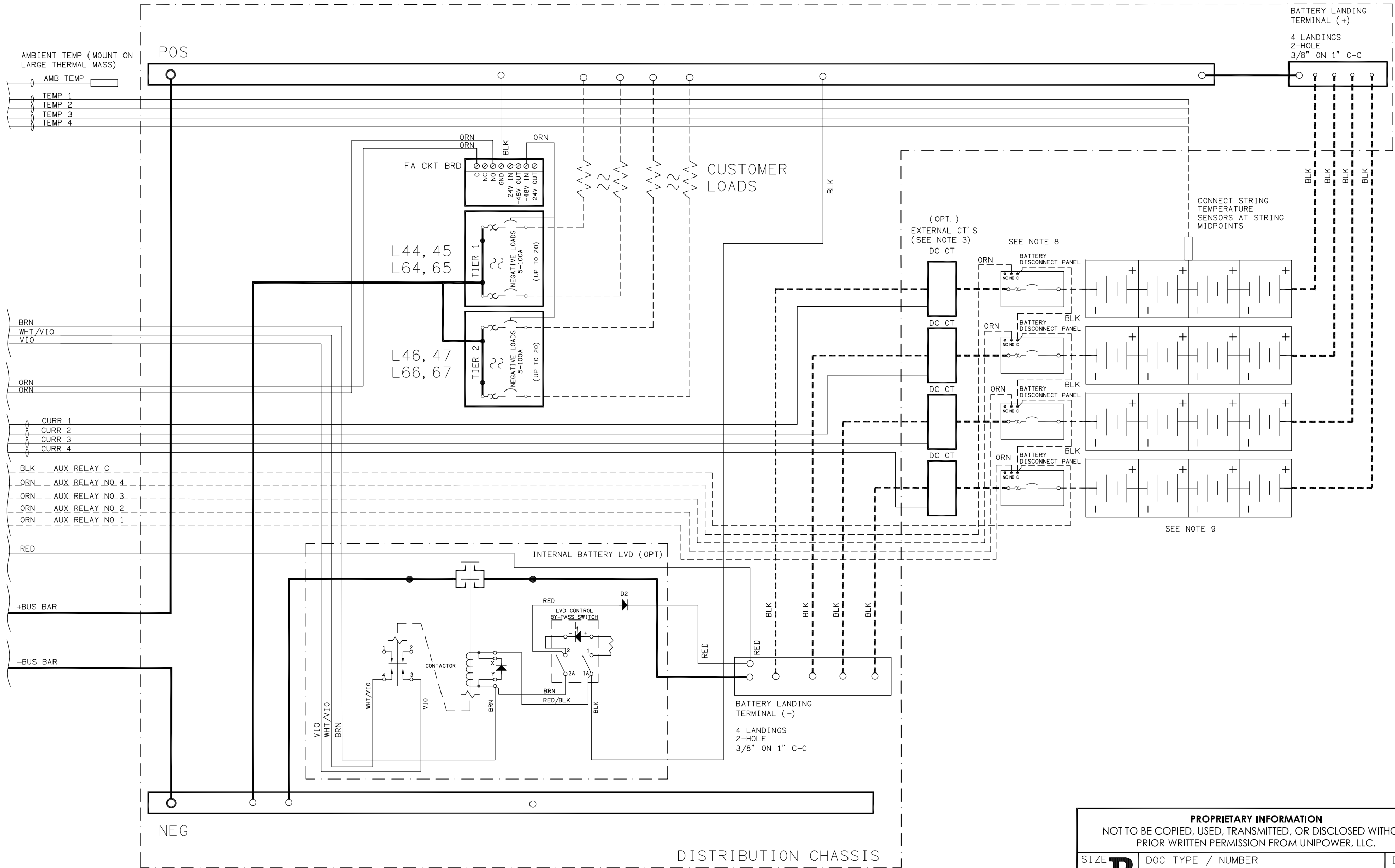
A

B

C

D

TO  
PAGE  
6



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SCALE: NONE	SHEET: 7 OF 7	FILE NAME: SD-SAGEON2. LXX_SHT_7_ISS_2