METHODE ELECTRONICS, INC.   **ACTIVENERGY**

AC 6000

Operation & Installation Manual

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Document Part Number: 10001 Revision 0.9
January 2016

Products

The following are products of Methode Electronics, Inc.:

Methode AC6000

Special Symbols

The following icons are used on the AC6000 or accessories to serve as alerts for important information:

ELECTRIC SHOCK RISK - Observe the hazards associated with this risk of electric shock symbol.

WARNING: REFER TO USER'S MANUAL Warnings may cause operator injury or damage to the AC6000. There, you may find additional information, such as specific operating and maintenance guidance..

CAUTION: REFER TO USER'S MANUAL – Cautions are advisories which ensure normal product operation. Refer to your user's manual for additional information for a particular circumstance.

ESD: ELECTROSTATIC DISCHARGE – Use electrostatic discharge procedures when handling the AC6000. Ensure you are SAFELY grounded with the appropriate personnel grounding equipment.

DISPOSAL – This symbol indicates that you should not discard the UPS in the trash. This product contains sealed, lithium ion cells and must be disposed of properly. Additionally, this symbol indicates that you should not discard waste electrical or electronic equipment (WEEE) in the trash. For more information, contact Methode agent for service, recycling, and disposal instructions

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Changes

Date	Page	Description	By	Reviewed
6/01/2014	ALL	Began creation	BB	ES
6/28/2014	ALL	Added line art	BB	ES
7/3/2014	ALL	Updated Tables	BB	ES
8/1/2014	ALL	Added procedures, updated tables, added callouts.	BB	ES
3/2/2015	ALL	Updated safety and procedures	ES	ES
4/3/2015	ALL	Add input cabling instructions.	ES	RM
5/29/2015	ALL	Added FPC new menu, troubleshooting. Fixed table and figure captions.	SD	ES
12/18/2015	ALL	Removed USB. Added RS232 commands and protocol.	ES	RM
12/31/2015	ALL	Updated default configurations.	GF	ES
1/15/2016	ALL	Updated FPC flowchart, added website information.	ES	RM

1. AC6000 Safety Information

1.1 *Handling and Electrical Safety Information*

IMPORTANT SAFETY INSTRUCTIONS — SAVE THESE INSTRUCTIONS

This document contains important information and direction that should be followed during installation, maintenance, and usage of this product. Before installing or operating this equipment, please read all instructions, warnings and cautions. Save this manual for future reference.

DANGER

- This UPS contains **LETHAL VOLTAGES**. All repairs and service should be performed only by **METHODE-AUTHORIZED SERVICE PERSONNEL.**

- Fuses are permanently installed. There are **NO SERVICEABLE PARTS** inside this product.

WARNING

- Only trained, qualified personnel should be allowed to install, configure, or replace this equipment.

- It is important to note that this UPS contains its own energy source (lithium-ion cells). Its output may produce high voltages and currents even when it is not connected to AC mains.

- This system contains live batteries that may present a shock hazard even when disconnected. Output safeguards such as disconnect switches, interlocks, etc. must be provided by user.

- Connect only to a mains provided with branch circuit overcurrent protection. This must be performed in accordance with the National Electrical Code® (NEC) ANSI/NFPA 70 and applicable codes of local jurisdictions. .

- Leakage current of this UPS and all connected equipment must not have an earth leakage current greater than 3.5 miliamperes per international standards and wiring regulations.

- For 230V/50Hz models, cables should not exceed ten meters in length.

- Lithium ion is a Class 9 hazardous material and must be shipped in accordance with CFR 49. Please contact your Methode representative when shipping a unit for return or other purposes.

- Contact Methode agent for service, recycling, and disposal instructions.

- Damage will occur if the input or output AC terminals are shorted. Methode is not responsible for damages to the UPS incurred in the manner.

CAUTION

- This unit is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

- Install this UPS in a clean, temperature- and humidity-controlled indoor location in order to reduce the risk of fire or electric shock. Ambient temperature must not be above 40°C (104°F) or below 0°C (32°F). Do not locate near water or excessive humidity (95% maximum).

- It is advisable to not bring superfluous conductors into the installation area. Before beginning maintenance or installation, please remove jewelry (e.g. watches, rings and necklaces). Metal conductors have the potential to short between power terminals (power and ground, commonly) and nearly instantly heat to very high temperatures when connected between them. This can cause serious burns and/or weld a metal object to the terminals.

- This system is cooled through forced air convection. Do not block air flow of fans and allow adequate space on the front and rear of the unit for proper ventilation.

- This equipment has been tested and found to comply with the limits for a Class-A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference that the user must correct, including the expense of all corrective modifications.

- This system is suitable for IT (impedance-grounded) systems.

1.2 *Disclaimers*

Modification or changes to the AC6000 not performed or expressly approved by Methode Data Systems may void the unit's warranty.

The integral battery is not field-replaceable. There are no user-replaceable fuses within. Contact Methode Customer Support for assistance.

The AC6000 is designed for installation in temperature-controlled, indoor areas free of conductive contaminants. See Technical Specifications for more information.

1.3 *Life Support Applications*

Methode does not recommend the use of the AC6000 in life support applications where failure or malfunctions of the unit can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. Methode does not recommend the use of the AC6000 for direct patient care.

Methode will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to Methode.

The AC6000 does not meet medical standard requirements for use in direct patient care.

2. Introduction

The Methode AC6000 is a line-interactive uninterruptible power system (UPS) designed to protect servers in data center settings.

This line-interactive approach captures the best features of UPS topologies: Its electronics are mostly inactive, but always "armed". They're at the ready for the next power interruption. Switchover to UPS Mode occurs within the next ¼ to ½ cycle of the 60 Hz mains.

This translates to full power available with an interruption of 4 to 8 thousandths of a second. Most, if not all, IT equipment is designed to never notice this very high-speed handoff.
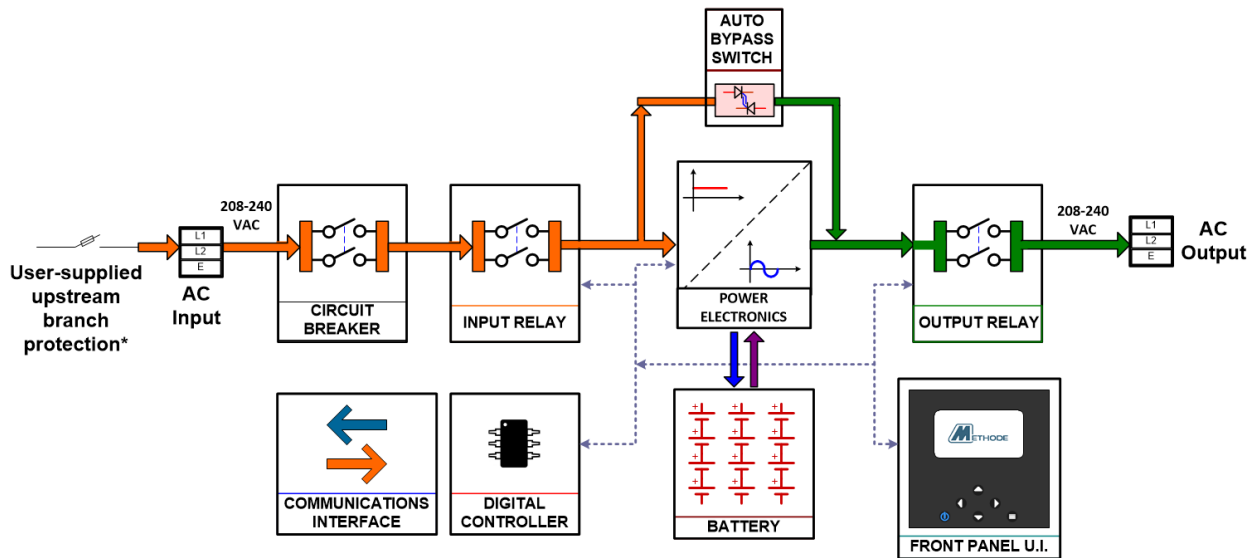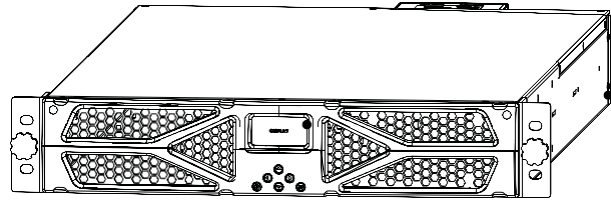
*User must provide branch circuit protection upstream of the AC6000.
For 24 A input installations, branch circuit protection must not exceed 30 A.
For 37 A input installations, branch circuit protection must not exceed 50 A.

Figure 1. AC6000 System Overview

While double conversion products work continuously so no switchover occurs, their electronics are, therefore, converting power for their loads 24 hours a day, 7 days per week. This operational distinction is costly: The dual conversion method requires nearly 8,800 hours of operation per year. Consequently, component wear mechanisms are orders of magnitude higher than for their line interactive counterparts. Energy is wasted and heat is generated, accelerating component wear. Naturally, MTBF is lowered. Finally, the more complex electronics result in an increase in product size and weight, increasing both initial and maintenance costs due to higher component and cooling demands.

The AC6000 is versatile and extensible. It can serve to supplement mains power during peak energy consumption times using unique peak shaving technology. This highly efficient unit operates with an input and output of 208, 230, or 240 VAC. It is capable of supporting equipment

drawing up to 6kW. This power-dense 2RU unit contains highly efficient power electronics and a safe, the state-of-the-art lithium-ion battery pack.

2.1 *AC6000 Features*

- Supplies up to 6000 watts of power for 6 minutes
- Uses compact, safe lithium-ion technology for energy storage.
- Rapid recharge
- Peak shave capability to supplement power supply during high demand
- Plug-and-play parallel operation-ready

2.2 *Advanced Battery Management System*

- Leverages years of automotive research
- Maintains battery cell power balance
- Highly efficient power management with low quiescent draw
- Integrated safety electronics
- Provides active thermal management of cells

2.3 *Automated Software Interface*

- Supports serial or SNMP communication
- Reports critical performance metrics
- Allows for firmware updates of internal microprocessors
- Provides for network communication configuration

Alerts are generated for indicating low remaining power, announcing operational modes and notification of performance-related issues

2.4 *User Interface – Front Panel with Bezel*
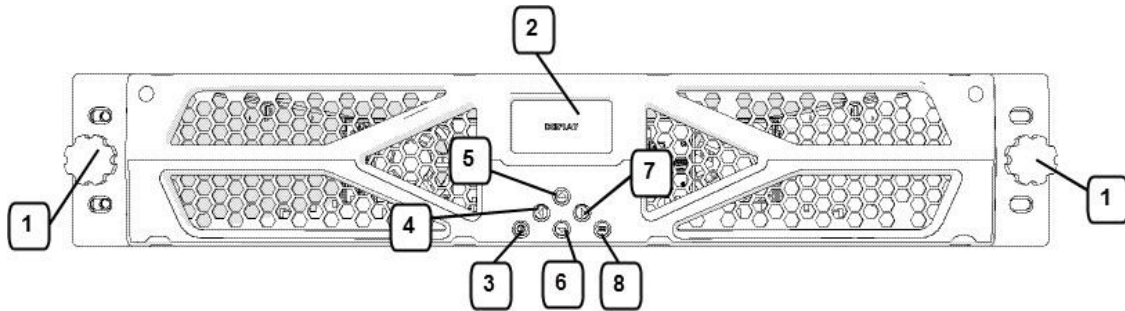
Figure 2. AC6000 Front Panel Callouts

Table 1. User Interface and Controls

No.	Item	Type	Name	Description
1	Knob	Fastener	Bezel Screw	Screw with molded knob / thumbscrew.
2	Display	LCD	User Interface Screen	LCD screen which shows status, battery, power, and alert/fault conditions and allows unit
3	Button	Momentary	Power	Applies power or shuts down the AC6000.
4	Button	Momentary	Left	Navigation button to move selection on display
5	Button	Momentary	Up	Navigation button to move selection on display up.
6	Button	Momentary	Down	Navigation button to move selection on display down.
7	Button	Momentary	Right	Navigation button to move selection on display
8	Button	Momentary	Menu	Navigation button to display the Main Menu.

2.5 Connectors and Controls – Rear Panel

Figure 3. AC6000 Rear Panel

The AC6000 comes equipped with forced air convection cooling, multiple standard WIP configurations, and is Ethernet or serial compatible.

Table 2. AC6000 Rear Panel Detail

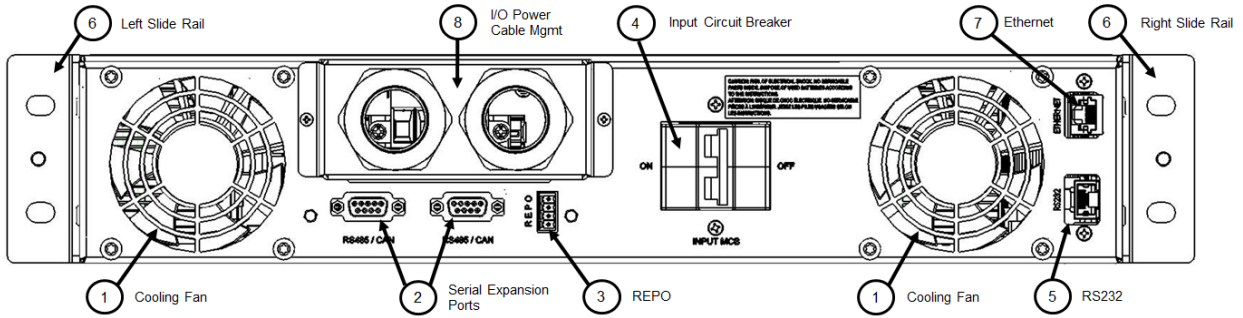| No.	Item	Type	Name	Description
1	Fan	Ventilation	Cooling Fan	Extracts air from the AC6000 enclosure. Speed controlled by internal temperature regulation. Air flows from the enclosure bezel cold side.
2	Connectors	DB9	RS485.CAN	DB-9 female connector reserved for future use.
3	Connector	Phoenix	REPO (Remote Emergency Power Off)	Depending on user preference, the REPO feature can be configured in three ways:: 1 not used 2 normally open (top two positions) 3 normally closed (bottom two positions) The default configuration is normally closed.
4	Switch	Circuit Breakers	Power Switch	Manual or automatic power interrupt for power input to the AC6000. Double-ganged single throw switches.
5	Connector	RJ45	RS232 Serial	RS232 console for configuration and monitoring.
6	Rail	Slide Rail	Left & Right Slide Rails	Allows the AC6000 to be extracted from the enclosure for service.
7	Connector	RJ45	Ethernet port	Ethernet port provides network connectivity.
8	Cable Management	Compression Clamps	Input / Output	Secures the power cable connections for power I/O.

3. Methode AC6000 Technical Specifications

Table 3. AC6000 Technical Specifications

System Specifications	
Efficiency	93%
Power Protection	Mechanical Circuit Breaker (MCB), electronic monitoring and control, fusing, fuse links
System Power Factor	>0.9
Battery Protection	Discharge, Overcharge, Overcurrent, Thermal
6000 W, max.	6 minutes
Environmental	
Operating Temperature Range	0°C to +40°C
Storage Temperature Range	-20°C to +60°C
Humidity	0% to 95%, Non-Condensing
Cooling Method	Integrated Forced Air
Physical Specifications	
Case Material	Steel
Dimensions, Inches	2U: 3.5 H x 19.0 W x 32.0 D
Weight	approx. 90 lbs.
Battery Capacity	1000 Watt-Hours

Electrical Power Connectors	Standard:
	    Input: NEMA L630R (24A input)
	    Output: NEMA L630P
	
	Optional:
	    For 6kW output on 50A service:
	    Option 1 - CS8265/4
	    Option 2 - Hardwire I/O
	    (Intended for loads in excess of 5kW to accommodate full power at low line conditions.)
	    Option 3 - For Europe, 24A input using 332C6/P6.
	
	Note: User must include upstream branch protection. For standard configuration and option 3, branch protection must not exceed 30 A. For Options 1 & 2, branch protection must not exceed 50 A.

4 AC6000 Installation Procedure

4.1 *About This Procedure*

This procedure covers installation of the AC6000 UPS into a standard 19 inch rack enclosure.

4.1.1 AC6000 Mount Example
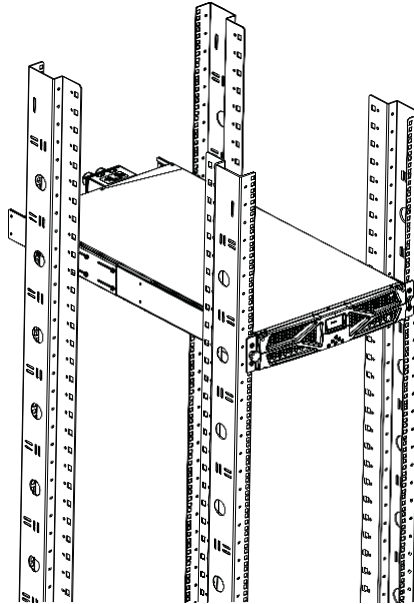
Figure 4. AC6000 Example Installation

4.2 *Materials Needed*

- qty. 1   Set of AC6000 UPS and Hardware
- qty. 2   Slide Rails (Methode or your choice)
- qty. 8   Screws to mount outer slide rails
- *qty. 8*   Cage nuts
- qty. 12   #12-24 Cage Nuts (Rack Solutions P/N: CAGENUT-1224-25PK)
- qty. 8   #12-24 x 5/8" Pilot Point Machine Screw
             (Rack Solutions P/N: SCREW-1224-625-25PK)
- qty. 4   #12-24 x 1" Machine Screw (McMaster P/N: 91772A296)

4.3 *Box Contents*

The AC6000 container should have the following items:

- User Manual
- AC6000 with input and output power cables
- Mounting rails with hardware (optional)
- DB9 to DB9 cable (for expansion applications only)

Table 3. AC6000 Connector Chart

Connector	Port	Purpose	Description
1	Fan	Cooling	Variable speed cooling fans.
2	RS485S	Communications	2 - 8 pin male RS485 hooded connectors.
3	Terminal Block	Power control	Remote Emergency Power Off connector (REPO).
5	RJ45	Communications	RS232 serial communication.
7	RJ45	Ethernet	For network communication.
8	Power	Input/Output Power	Power cables for input/output

4.4 *Slide Rail Assembly (optional)*

Select installation height on the rack posts where you will mount left and right outer slide rails.
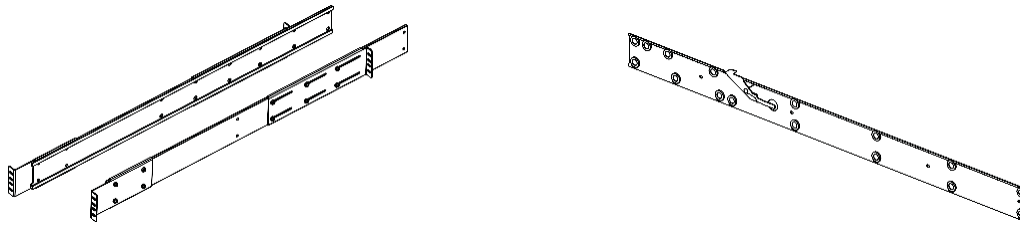
Figure 5. Methode adjustable mounting rails.

Slide rail assemblies are recommended for mounting the AC6000 UPS. The configuration should include four 2RU angle brackets and mounting screws.

4.4.1 Installing the Inner Slide Rails on the AC6000

Materials Needed

- M3 x 8 Phillips Head Screws (qty. 8)
- Inner Slide Rails (qty. 1 set)

Tools Required

- Phillips Head Screwdriver
- Cage Nut Compressor Tool

The optional inner slide rails attach to the left and right sides of the AC6000 enclosure. They are fastened to the enclosure with screws and PEM nuts. The illustration below shows the interior of the AC6000. PEM rivet nut locations circled in red.

Figure 6. Slide Rail Mounting.

Follow this procedure if the left and right slide rails are not pre-attached to the unit:

1. Remove the slide rail assembly from its packing materials.

2. Remove the inner rails and extract them from the outer rail channels.

3. Fasten the inner rails to the AC6000 enclosure. The illustration below shows   their proper orientation.
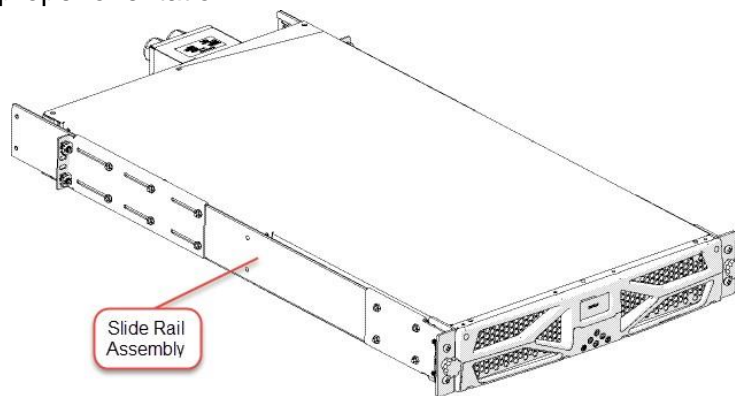
Figure 7. AC6000 Enclosure with Optional Methode Slide Rails Attached

4.5 Field Wiring

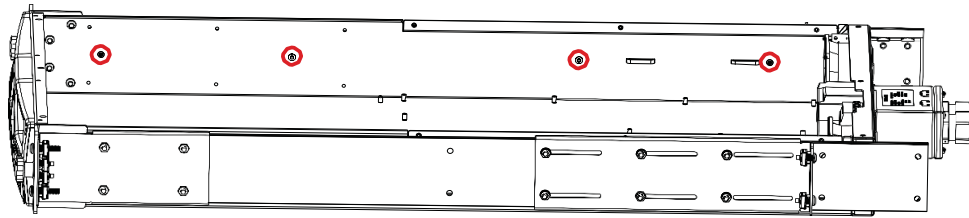To wire the unit in the field, ensure that the electrical service is properly rated for the desired output.

Use stranded copper conductors rated to a minimum of 300 VAC and 90°C between 5.26-13.3 mm^2.

See Table 5 below for wiring requirements based upon available service and desired power output levels.

Table 4. Field Wiring Requirements

Location	Wire Name	30A Service (24A max)	50A Service (37A max)
Input	Input Line 1 (pos 3)	Min. 5.26 mm^2 (10AWG)	Min. 13.3 mm^2 (6AWG)
	Input Line 2 (pos 4)	Min. 5.26 mm^2 (10AWG)	Min. 13.3 mm^2 (6AWG)
Output*	Output Line 1 (pos 1)	Min. 5.26 mm^2 (10AWG)	Min. 13.3 mm^2 (6AWG)
	Output Line 2 (pos 2)	Min. 5.26 mm^2 (10AWG)	Min. 13.3 mm^2 (6AWG)
Safety Ground**	Input Safety Ground	Min. 5.26 mm^2 (10AWG)	Min. 13.3 mm^2 (6AWG)
	Output Safety Ground	Min. 5.26 mm^2 (10AWG)	Min. 13.3 mm^2 (6AWG)

*For hard-wired solution, user must provide a mechanical disconnect between the AC6000 output and the load. Mechanical disconnect is NOT provided by Methode.

**Attach input safety ground first, secure with M6 nut and affix output safety ground with second M6 nut last.

For detail on hard-wiring unit, please see Figure 8 below.

Figure 8. Hard wiring inspection and assembly.

5 Power-up and Shutdown Procedure

5.1 *About This Procedure*
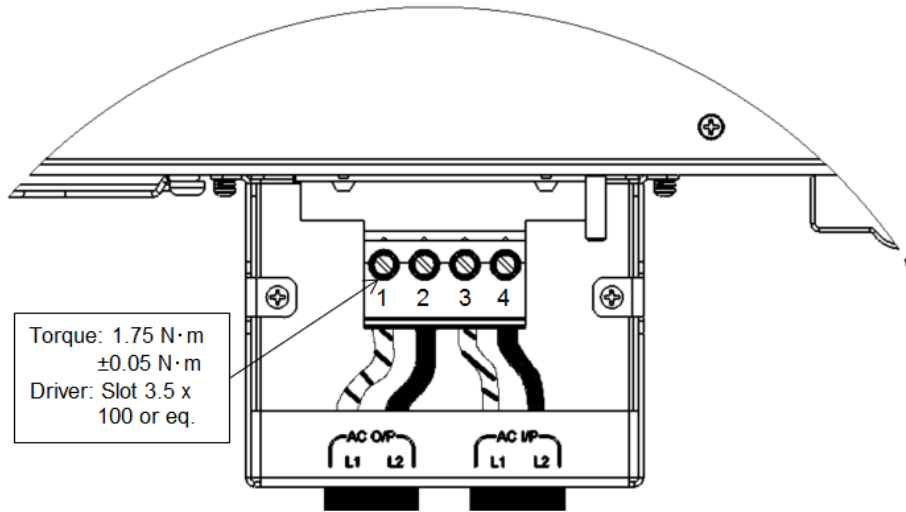
This procedure covers powering up the AC6000 UPS after the unit is installed into a standard 4 post 19 inch rack enclosure. See Installation Procedure for more information.

> ESD: ELECTROSTATIC DISCHARGE - Use electrostatic discharge procedures when handling the AC6000. Ensure you are SAFELY grounded with the appropriate personnel grounding equipment.

5.2 *Powering Up the AC6000*

Once the AC6000 is installed and the required cables have been connected, follow this procedure.

Warning: DO NOT connect the power cables to the outlets if the unit's back switch (circuit breaker) is in the ON position. This switch lever must be oriented **away from** the power cabling junction box.

To power up the AC6000, follow this basic procedure:

Step 1: Insert the input cable into a Power Distribution Unit (PDU) or wall receptacle.

Step 2: Connect the output cable into a PDU or load.

Step 3: Switch the power switch (Input MCB) to the **ON** position.

MCB is Altech 2BU50R (277VAC/50A).
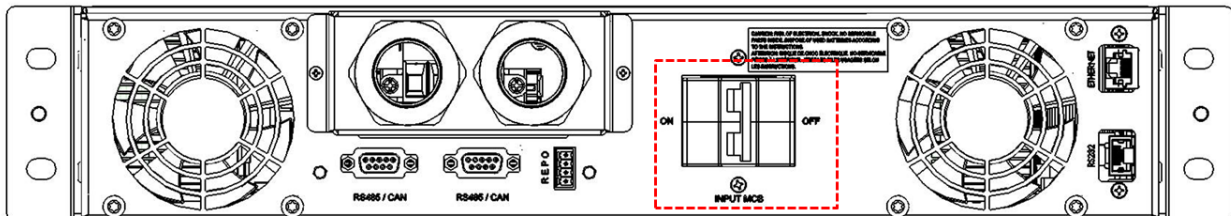
Figure 9. AC6000 Rear Panel Showing the Input Circuit Breaker in the OFF position.

Press and hold the power button on front of unit for three seconds. As the AC6000 begins initialization, the power symbol will begin blinking. Note: if the power symbol does not begin blinking, the power button may not have been held down for a sufficient amount of time.
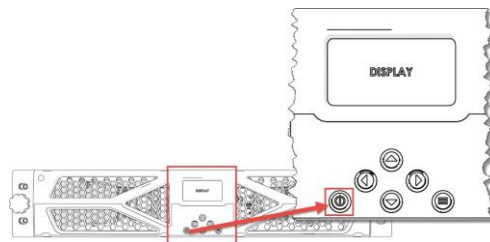
Figure 10. Power Button Location

To shut-down the AC6000, simply hold the power button for three-seconds. Countdown will be initiated. Power icon will disappear when shutdown is complete and it is safe to disconnect.

5.3 *Visual Verification*

Check for display illumination and fan activity with no abnormal sounds.

Upon successful power up, the display will indicate no faults or alerts. The default display icons and their meanings are listed below. See Alerts for more information.

> **Note:** The unit will be in <u>Standby Mode</u>. The output connector will have no voltage present unless **auto-power on** is configured for the unit and the unit is recovering from a power failure.

Table 6. AC6000 Display

Icon	Indicator	Description
METHODE	Methode logo	Appears once the MCB is turned to the ON position.
▭	Battery status	Battery status animates when charging. Otherwise, it indicates the battery charge state
⌁	System mode	A plug is shown when the unit has valid input power to the system (voltage and frequency in range)
∿	System mode	This sine wave indicates that the unit is in UPS mode
⏻	Power Icon	Initialization: blinking Normal: steady

5.4 *Bringing the AC6000 Online*

To put the system into Normal mode, allow power through, and provide UPS functionality, use the   following procedure:

<u>Step 1</u>: Ensure that the unit has AC power connected and that the switch on the rear panel is in the ON position. This is defined as <u>Standby Mode</u>.

<u>Step 2</u>: Verify the AC plug icon is on the LCD screen Main menu. This plug icon indicates that valid AC power is available.

<u>Step 3</u>: Press and hold the power button for 3 seconds. A countdown will appear on the screen while the button is depressed.

<u>Step 4</u>: Ensure the Power icon is blinking in the lower right corner of the LCD. This indicates that the system is in a Pre-charge Mode.
Pre-charge Mode moves energy from the battery in order to charge a large bank of capacitors. This charge time is dependent upon how much remaining energy the capacitor bank has remaining since last power up.

5.4.1   After 3 minutes maximum, the Power icon becomes solid. This indicates that the system is in Normal Mode. (i.e. the Static Bypass Switch (SBS) is closed and the unit will transition to UPS Mode if AC power is lost.)

5.5 Communicating with the AC6000

Communication with the AC6000 is necessary for either advanced unit configuration or for field updates of component firmware. Figure 11 shows available physical connection ports.
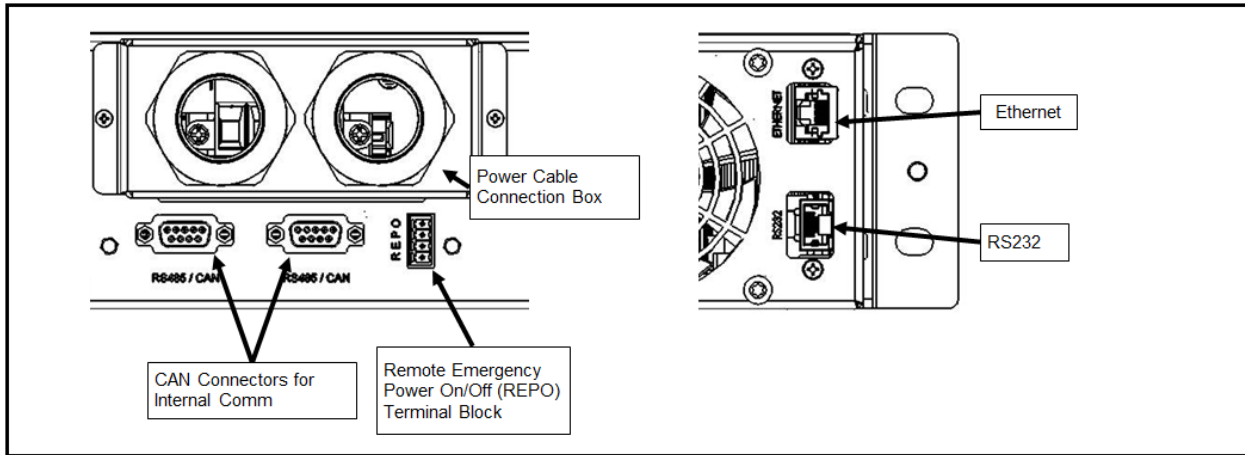
Figure 11. AC6000 Rear-Panel Communication Ports for Paralleling

5.5.1 Webpage (HTTP) Configuration

The AC6000 webpage provides an intuitive and user-friendly interface for configuring the UPS. The configuration page can be opened by simply opening a web browser on a computer connected to the same subnet as the UPS and entering the IP address of the AC6000 into the browsers URL field.

On the first attempt to access the webpage, the UPS will prompt for a username and password. The default values are:

Table 7. Webpage Default Username and Password

Username	Password
admin	admin

The Home page displays a log of past events in the UPS as well as current status information about the UPS. The Network Configuration tab is where IPv4, Ipv6, SNMP and SMTP parameters can be viewed or changed. The UPS Configuration tab controls various functions of the UPS, including output configuration, peak-shaving and the webpage username and password. The Control page can be used to cycle the output of the system and to restart the system. The System Status page is periodically updated and displays vital information about the UPS and the battery. The System Information page provides a reference of the hardware and software configuration of the UPS which would be necessary information if the AC6000 needs to be serviced or updated.

Table 8. List of Configurable Settings on Web Page

	Parameter	Default Value	Options	Description
Network Configuration – IPv4	Enable IPv4	True	True, False	Enables or disables the IPv4 interface.
	Enable DHCP	False	True, False	Enables or disables DHCP.
	DNS Name	AC6000_UPS	User configurable	Sets the display string of the AC6000 to a DNS server.
	Domain Name	SYSTEM	User configurable	Sets the domain name of the AC6000.
	Static IP	10.45.10.223	User	Sets the static IP address of

				configurable or set by DHCP	the AC6000 if DHCP is not enabled.
	Gateway	10.45.10.254	User configurable or set by DHCP	Sets the gateway IP address of the AC6000 if DHCP is not enabled.
	Subnet Mask	255.255.255.0	User configurable or set by DHCP	Sets the subnet mask if the AC6000 DHCP is not enabled.
	DNS Server 1, 2	10.45.1.10	User configurable or set by DHCP	Sets the DNS server address of the AC6000 if DHCP is not enabled.
Network Configuration – IPv6	Enable IPv6	True	True, False	Enables or disables the IPv6 interface.
	Static IP	fdf8:f53b:82e4:0000: 0000:0000:0000:0053	User configurable	Sets the static IP address of the AC6000.
	Gateway	fdf8:f53b:82e4:0000: 0000:0000:0000:0001	User configurable	Sets the gateway IP address of the AC6000.
	DNS Server 1, 2	ff02:0000:0000:0000: 0000:0000:0000:0000	User configurable	Sets the DNS server address of the AC6000.
Network Configuration – SNMP	SNMPv3 Auth Protocol	MD5	MD5, SHA1	Sets the SNMPv3 authentication protocol.
	SNMPv3 Priv Protocol	AES	AES	Sets the SNMPv3 privacy protocol.
	Username	AC6000	User configurable	Sets the SNMPv3 read-only user's username.
	Password	Aes@123	User configurable	Sets the SNMPv3 read-only user's password.
	Admin Username	Methode	User configurable	Sets the SNMPv3 administrator user's username.
	Admin Password	Meth@123	User configurable	Sets the SNMPv3 administrator user's password.
	IPv4 Trap Table – Index	1	1, 2, 3, 4	Selects the trap table index to configure.
	IPv4 Trap Table – Enable	False	False, True	Enables or disables a trap receiver.
	IPv4 Trap Table – Trap Receiver Address	0.0.0.0	User configurable	Sets the trap receiver's IP address.
	IPv4 Trap Table – Trap Community IP	public	public, private, user configurable	Sets the trap receiver's community.
	IPv6 Trap Table – Index	1	1, 2, 3, 4	Selects the trap table index to configure.
	IPv6 Trap Table – Enable	False	False, True	Enables or disables a trap receiver.
	IPv6 Trap Table – Trap Community IP	public	public, private, user configurable	Sets the trap receiver's community.
	IPv6 Trap Table – Trap Receiver Address	0000:0000:0000:0000: 0000:0000:0000:0000	User configurable	Sets the trap receiver's IP address.
Network Configuration – SMTP	SMTP Server Name	Blank	User configurable	Sets the user's SMTP server address. Address may be either an IPv4 address or the mail server's host name.

	SMTP Port	25	1 - 65535	Sets the user's SMTP server port.
	From Address	Blank	User configurable	Sets the AC6000's mail address when sending messages to the server.
	Password	Blank	User configurable	User's SMTP server authentication password (leave blank if no authentication necessary).
	Username	Blank	User configurable	User's SMTP server authentication username (leave blank if no authentication necessary).
	Configure Mail Recipients – Mail Addresses Index	1	1, 2, 3, 4	Selects the mail recipients table index to configure.
	Configure Mail Recipients – Recipient Mail Address	Blank	User configurable	Sets a mail recipients mail address.
	Configure Mail Recipients – Enable Recipient	False	False, True	Enables a mail recipient.
	Send Test Mail			Sends a test message to the message recipient selected by the Mail Addresses Index.
UPS Configuration	Auto Output	True	True, False	Automatically determines input Voltage and Frequency to use during UPS mode.
	Output Voltage Level	208V	208V, 230V, 240V	Sets the output voltage level if Auto Output is false.
	RS232 Baudrate	9600	9600, 19200, 38400, 57600, 115200	Sets the RS232 baudrate.
	Output Frequency	60 Hz	50 Hz, 60 Hz	Sets the output frequency if Auto Output is False.
	Auto Start	True	False, True	Enables or disables the auto-start feature of the AC6000. Once initialized, unit will automatically return to online mode after a power failure unless user initiates a power off.
	Diagnostic test schedule	8 Days	1-30 Days	Performs a diagnostic test on the power electronics every 1-30 days.
	Min. SOC Threshold	70%	30%, 40%, 50%, 60%, 70%, 80%, 90%	Sets the battery state of charge threshold where peak shaving is no longer available.
	Max. UPS Power Supplement	1.0 KW	0.5 KW, 1.0 KW, 1.5 KW, 2.0 KW, 2.5 KW, 3.0 KW	Maximum amount of power the AC6000 supplies during peak shave.
	Rack Power Threshold	6 KW	0 KW, 1 KW, 2 KW, 3 KW, 4 KW, 5 KW, 6 KW	Sets the threshold of power that the server rack pulls through the AC6000 before peak shaving is enabled.

	Username	admin	User configurable	Sets the username for access to the AC6000 web page.
	Password	admin	User configurable	Sets the password for access to the AC6000 web page.
Control	Output Cycle Time	1 sec	1 - 20 sec	Sets the amount of time to shut the output off when Cycle Power is selected.
	System	Off	Off, On	Turns the system on or off.
	Cycle Power			Cycles output power.
	Clear Faults			Attempts to clear any fault conditions on the AC6000.

5.5.2 SNMP Configuration

The AC6000 has support for SNMP versions 1 through 3. When the AC6000 is configured to work with SNMPv3, SNMPv1 and v2 SET/GET commands will be ignored. The default username and password for the SNMPv3 Admin user is Methode and Meth@123. The default username and password for the SNMPv3 Read-Only user is AC6000 and Aes@123. To configure the AC6000 to work with SNMPv3:

Step 1:   Set the SNMPv3 Admin Username and Password by issuing a SET command to OID .1.3.6.1.4.1.36027.2.1.1.4.5 for Username and .1.3.6.1.4.1.36027.2.1.1.4.6 for Password. These credentials will allow a user to read and write any SNMP field.

Step 2:   Set the SNMPv3 Read-Only Username and Password by issuing a SET command to OID .1.3.6.1.4.1.36027.2.1.1.4.3 for Username and .1.3.6.1.4.1.36027.2.1.1.4.4 for Password. These credentials will allow a user to have read-access to SNMP fields.

Step 3:   Set the SNMPv3 authentication protocol by issuing a SET command to OID .1.3.6.1.4.1.36027.2.1.1.4.1 and the desired authentication protocol: MD5 (1) (default) or SHA (2).

Step 4:   Only the Admin or Read-Only user may be configured to receive traps when configured to SNMPv3. If the Admin user is the intended trap receiver:

    i. Set the Admin Message Process Model OID .1.3.6.1.4.1.36027.2.1.1.4.10 to 3.

    ii. Set the Admin Security Model OID .1.3.6.1.4.1.36027.2.1.1.4.12 to 3.

    iii. Set the Read-Only Message Process Model OID .1.3.6.1.4.1.36027.2.1.1.4.9 to 0 (for v1) or 1 (for v2).

    iv. Set the Read-Only Security Model OID .1.3.6.1.4.1.36027.2.1.1.4.11 to 1 (for v1) or 2 (for v2).

If the Read-Only user is the intended trap receiver:

    i. Set the Read-Only Message Process Model OID .1.3.6.1.4.1.36027.2.1.1.4.9 to 3.

    ii. Set the Read-Only Security Model OID .1.3.6.1.4.1.36027.2.1.1.4.11 to 3.

    iii. Set the Admin Message Process Model OID .1.3.6.1.4.1.36027.2.1.1.4.10 to 0 (for v1) or 1 (for v2).

    iv. Set the Admin Security Model OID .1.3.6.1.4.1.36027.2.1.1.4.12 to 0 (for v1) or 1 (for v2).

Up to 4 trap receivers can be configured. For IPv4, the trap table is at OID .1.3.6.1.4.1.36027.2.1.1.2.10. For IPv6, the trap table is at .1.3.6.1.4.1.36027.2.1.1.3.10.

Step 1:   For receiver 0, set the receivers IP address at TRAP_TABLE.1.3.0.

Step 2:   Set the receivers community access (public or private) at TRAP_TABLE.1.4.0

Step 3:   Enable the receiver by setting the enabled field at TRAP_TABLE.1.2.0 to 1.

For additional configuration, please see the AC6000 MIB file.

6 AC6000 Display

6.1 *LCD Display Icons*

The AC6000 front panel displays system information about its operational state (see Table 6 for more detail.)

6.2 *Default Screen*

The Default screen displays when there are no system faults or alerts. This screen consists of the Methode Logo, battery status, system mode, and status indicators.

- Battery Status – animates when the battery is charging or indicates the battery charge level.

- AC-plug Icon – Indicates the unit has a valid AC voltage and frequency.

- Initialization – The power icon blinks until the unit is initialized. Steady indicates normal operation.

- UPS Mode – A sine wave icon indicates the system is in UPS mode

6.3 *Navigation*

The menus can be navigated using the UP/DOWN keys to navigate within a menu and LEFT/RIGHT to move into or out of a menu. The Menu key can also be used as a BACK button.
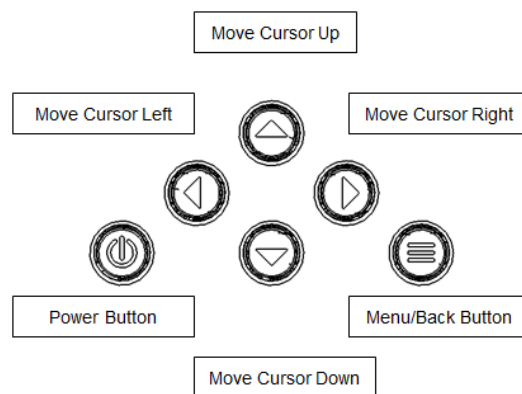

Figure 12 - AC6000 User Input Controls

6.4 *Main Menu*

From Default screen press Menu button to enter Main Menu screen. Main Menu screen has four options

- Status
- Settings
- IP Configuration

- About

Table 9. Front Panel Menu

	Parameter	Default Value	Options	Description
Status Menu	Mode	STANDBY	STANDBY, BMS PRECH, NORMAL, FAULT	Current system mode.
Status Menu - UPS	Volt		Read-only	Input and output voltage of the AC6000.
	Curr (A)		Read-only	Input and output current of the AC6000.
	Pow (W)		Read-only	Input and output power of the AC6000.
	Freq (Hz)		Read-only	Input and output frequency of the AC6000.
Status Menu - Battery	Volt		Read-only	Battery voltage.
	Curr (A)		Read-only	Battery current.
	SOC (%)		Read-only	Battery state of charge.
	SOH (%)		Read-only	Battery state of health.
	C – Time (min)		Read-only	Battery charge time to full in minutes.
	D – Time (min)		Read-only	Battery discharge time to empty in minutes.
Status Menu – Self Test	Start			Start self-test mode.
	Result	NOT RUN	NOT RUN, PASS, FAIL	Displays the result of the last self-test. If self-test was not run since the last power cycle, self-test displays NOT RUN.
Settings	Auto Start	ON	OFF, ON	Enables the auto start feature.
Settings – Output Settings	Auto	ON	OFF, ON	Enables auto setting of output voltage and frequency based on input voltage and frequency.
	Output Volt	208V	208V, 230V, 240V	Sets the output voltage of the AC6000. This setting cannot be changed when the Auto output is ON.
	Output Frequency	60 Hz	50 Hz, 60 Hz	Sets the output frequency of the AC6000. This setting cannot be changed when the Auto option is ON.
Settings – Peak Shave	Peak Shave	DISABLED	DISABLED, ENABLED	Enables or disables peak shave.
	Rack Pwr Thresh	6 KW	0 KW, 1 KW, 2 KW, 3 KW, 4 KW, 5 KW, 6 KW	Rack power threshold. Amount of power the rack must draw from the AC6000 before peak shaving starts.
	Max Sup Pwr	1 KW	0.5 KW, 1 KW, 1.5 KW, 2 KW, 2.5 KW, 3 KW	Maximum amount of power the AC6000 supplies during peak shave.
	SOC Thresh	70%	30%, 40%, 50%, 60%, 70%, 80%, 90%	Sets the battery state of charge threshold where peak shaving is no longer available.
Settings	RS232 Baudrate	9600	9600, 19200, 38400, 57600, 115200	Sets the baudrate of the RS232 bus.
Settings – Date and Time	Date	00/00/00		Current date in DD/MM/YY format.
	Time	00:00		Current time in 24 hour format.
Settings	Restore Defaults			Restores the factory default settings.
IP Config – IPv4	Enable	ENABLED	ENABLED, DISABLED	Enables or disables the IPv4 interface.
	DHCP	DISABLED	DISABLED, ENABLED	Enables or disables DHCP.
	IP	10.45.10.223		IPv4 address of the AC6000.
	Gateway	10.45.10.254		Gateway IP address of the AC6000.
	Subnet	255.255.255.0		Subnet mask of the AC6000.
	DNS 1, DNS 2	10.45.1.10		Sets the DNS server address of the AC6000 if DHCP is not enabled.
IP Config – IPv6	Enable	ENABLED	ENABLED, DISABLED	Enables or disables the IPv6 interface.
	IP	fdf8:f53b:82e4:0000: 0000:0000:0000:0053		Static IPv6 address of the AC6000.
	Gateway	fdf8:f53b:82e4:0000: 0000:0000:0000:0001		Gateway IP address of the AC6000.
	DNS 1, DNS 2	ff02:0000:0000:0000: 0000:0000:0000:0000		DNS server address of the AC6000.
IP Config	MAC Address			Displays the AC6000 MAC address.
	Test Mail			Sends an SMTP test mail message to a configured SMTP receiver.
About – Hardware	Power Board	00-00-00	Read-only	Hardware revision of the power board assembly.
	Battery	00-00-00	Read-only	Hardware revision of the battery assembly.
	Front Panel	00-00-00	Read-only	Hardware revision of the front panel assembly.
About – Plug Config	Type		L630x, CS8264xC, Hardwire, 332x6, Parallel	Plug type. This field is read-only.
	Current Lmt (A)		26A, 37A	Plug current limit. This field is read-only.
About	Serial Number		Read-only	Unit serial number.

About	Manufacture Date	00/00/00	Read-only	Unit manufacturing date in DD/MM/YY format.
	Startup Date	00/00/00	Read-only	Unit startup date in DD/MM/YY format.
	Uptime	0	Read-only	Unit uptime in seconds.

Methode Electronics

Main Menu
Status
Settings
IP Config
Diagnostics
About

Status
UPS
Battery

MODE:

Settings Menu
System
Auto Start
Output
Peak Shave

IP Config
IPv4
IPv6
MAC Address
Test Mail

Diagnostics Menu
Diag Test now
Schedule: # Days

About
System Info
Plug Config
Hardware Rev

UPS Status
                    Input   Output
VOL (V):
Pow (W):
FRQ (Hz):
CUR (A):

Battery Status
Batt Volt (V):
Batt Curr (A):
Batt SOC (%):
Batt SOH (%):
C – Time (min):
D – Time (min):

System Menu
RS232 Baud
Date & Time
Restore Defaults

RS232 Settings
Baud: 9600-115200

Date and Time
Date: MM/DD/YYYY
Time: HH:MM:SS

Restore Defaults
RESTORING DEFAULTS...

UPS Config
Auto: Enable/Disable

PS Config
PeakShave: Disable
Grid Lim PS: 0-6 kW
MAX PS Pwr: 0.5-3 KW
PS SOC Lim: 30-90%

IPv4 CONFIG
Enable
IP
DNS

IPv4 Settings
IPv4: Enable/Disable
DHCP: Enable/Disable

IP:
    10.45.10.223
Gateway:
    10.45.10.254
Subnet:
    0.0.0.0

DNS1
    0.0.0.0
DNS2
    0.0.0.0

IPv6 CONFIG
Enable
IP
DNS

IPv6 Settings
IPv6: Enable/Disable

IPv6:
0000.0000.0000.0000
0000.0000.0000.0000
Gateway:
fdf8.f53b.82e4.0000
0000.0000.0000.0001

DNS1
0000.0000.0000.0000
0000.0000.0000.0000
DNS2
0000.0000.0000.0000
0000.0000.0000.0000

MAC Address
d8:80:39:10:63:df

Test Mail
TEST MAIL SENT

System Info
Sernum: 00000
Startup: MM/DD/YY
Mfg Date: MM/DD/YY
Uptime: ## Mins

Plug Info
Type: L630x
Curr Lmt: 26.0

Hardware Info
Pwr Board: #.#.#
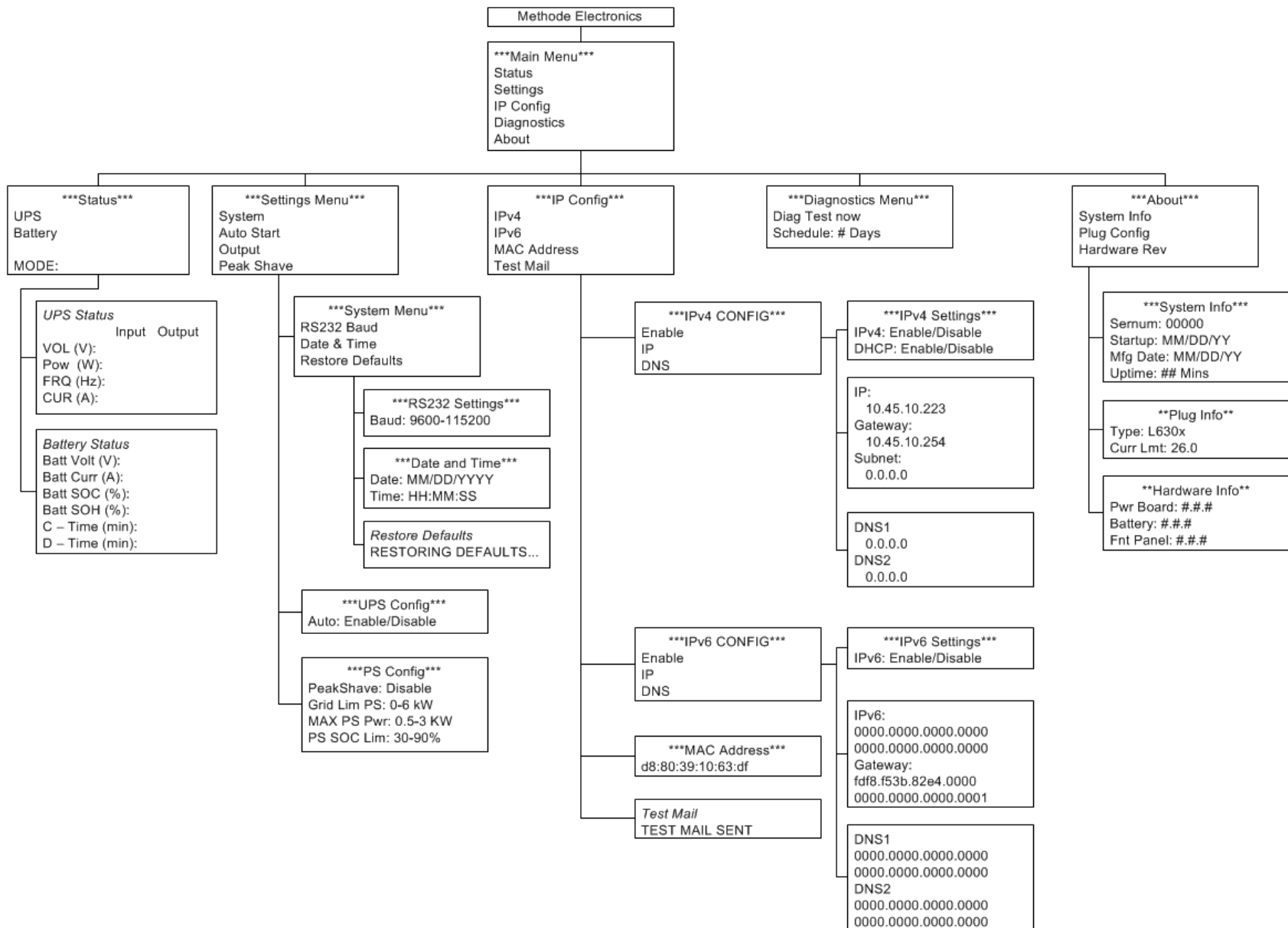Battery: #.#.#
Fnt Panel: #.#.#

Figure 13. AC6000 Front Panel Menu

6.5 *Reset to Factory Default Settings*

The system settings can be reset to factory default settings by pressing and holding the UP, LEFT, and MENU buttons simultaneously for 3 seconds.

6.6 *Faults and Alerts*

The Faults and Alerts screen displays automatically when an issue occurrences.

When an alert/fault occurs, the system beeps and the display blinks until the issue is acknowledged.

The system beep codes are as follows:

Table 10. AC6000 Beep Codes

Beep Code	Description
1 second on 3 seconds off	alert condition exists.
1 second on 1 second off	fault condition exits.

Table 11. Beep Code Control

Control	Description
Left button	Mutes system beeps
Right button	Clears all faults
Menu button	Displays the default screen
Default Screen	Alerts / faults cleared. Displays when any button is pressed Display light timeout – 3 minutes

Table 12. Fault Messages and Descriptions

Sl.No	Messages	Descriptions
1	SYS OV TEMP	System over temperature.
2	OVR TEMP	Over temperature.
3	IP AC	Input AC fault.
4	OP AC PS	Output AC Peak Shave fault.
5	OP AC POW	Output AC power fault.
6	DC LNK VLT	DC link voltage fault.
7	BMS FAULT	BMS fault.
8	BMS SOC FAULT	BMS State of Charge fault.
9	TRIP ZONE	Inverter fault
10	OP VOLT OFF	Output voltage off.
11	OP PWR PS	Output power Peak shave fault.
12	IP PWR	Input power fault.
13	BATT CHRGR	Battery charger fault.
14	LOAD CAP OV	Loading capacitor over voltage.
15	POW MOD FLT	Power module fault.
16	CAP OV VOLT	Capacitor over voltage fault.
17	HVBMS OVERCURRENT	HVBMS over current fault.
18	HVBMS MEMORY FAULT	HVBMS memory failure.
19	HVBMS TEMP FAULT	HVBMS Temperature fault
20	MEMORY FAULT	Memory failure.
21	MAIN COMM FAULT	Communication Failure.
22	SYS CNTRL COMM FAULT	Communication Failure.
23	HVBMS COMM FAULT	Communication Failure.

Table 13. Alert Messages and Descriptions

Sl.No	Messages	Descriptions
1	IP AC VOLT	Input AC voltage.
2	OP VOLT PS	Output voltage peak shave.
3	OP PWR OFF	Output power off.
4	DC LNK VOLT	DC link voltage alert.
5	HVBMS SOC	HVBMS State of charge is less than 20%.
6	OP VOLT OFF	AC6000 unit is now working in offline UPS mode and output voltage is beyond set range
7	INPUT POW	Input AC power more than 7700VA.

7 AC6000 Website

The AC6000 can be monitored and configured remotely by accessing its IP address via a shared secure network.

7.1 *Home Page*

The AC000 home page provides a snapshot of the current status, such as input and output power. It also provides a log of recent events.

7.2 *Network Configuration*

The Network Configuration page allows the user to view and alter IPv4, IPv6, SNMP and SMTP settings. The IPv4 and IPv6 tabs provide the system DNS Name, MAC address, static IP address and more.

The SNMP tab allows the user to set the protocol and password, as well as configure the SNMP traps.

The SMTP tab allows the user to configure e-mail alerts and security settings.

7.3 *UPS Configuration*

This page allows the user to configure the UPS system, including the following items:

- AC line voltage and frequency
- Configure peak shave settings (for units equipped with this feature)
- System date and time
- Wake-on-LAN configuration
- Set system username and password
- Set threshold for over-power and over-temperature warnings

7.4 *Control*

From this page, the user can power the system on and off, clear faults, and schedule a power test.

7.5 *System Status*

The System Status page displays current voltage, current, and temperature data of both the power electronics and battery. The state-of-charge and available run-time of the battery are also displayed.

7.6 *System Information*

The System Information page displays information unique to an individual unit, such as serial number, IP address, and hardware and software revision numbers.

8 DB9 and REPO Port Pin Outs

The following illustrations show the pin outs for the DB9-RS232 and REPO ports on the rear of the AC6000.
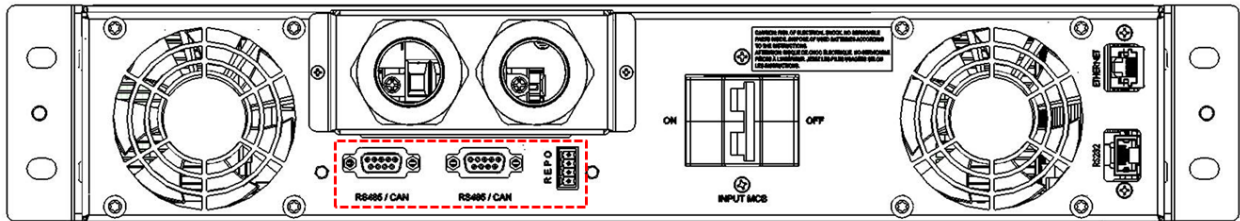

Figure 14. Expansion Communication Ports and REPO Connector

8.1 *REPO Connector*

The REPO connector can be removed to facilitate termination. Gently pull the connector to slip out. The REPO connector pin out is shown in the illustration below.
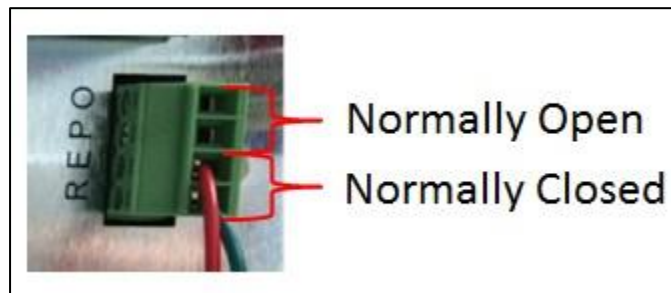

Figure 15. REPO Connector Pin Out

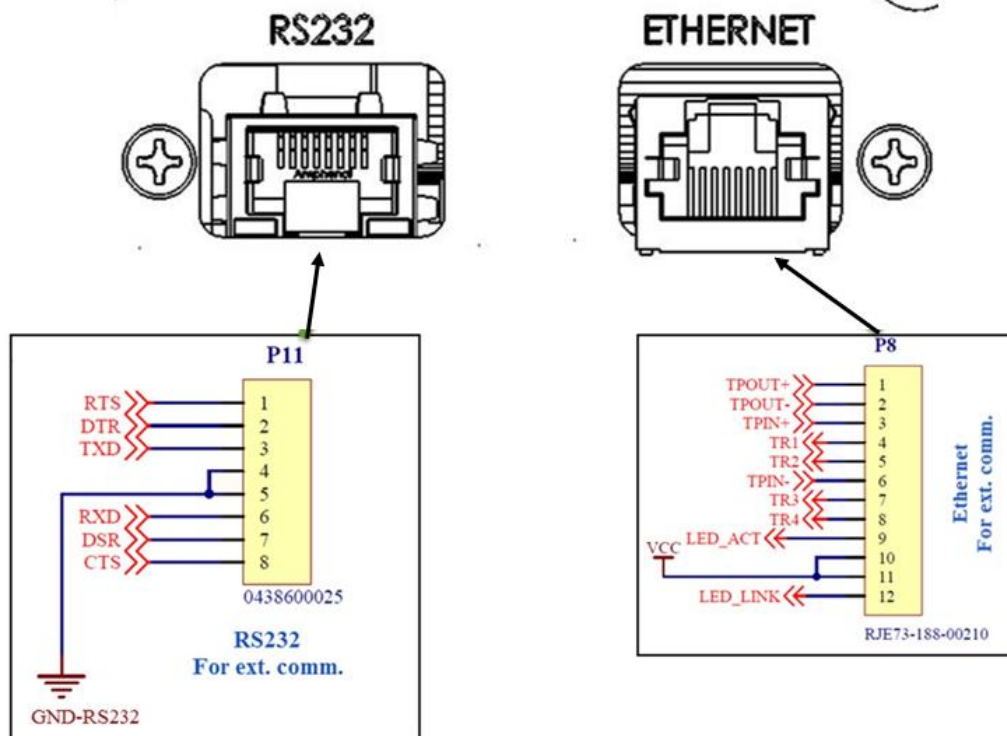## 8.2 *Serial Communication*

Figure 16. Serial and Ethernet Pin-Outs

NOTE: Older models may have a physical connector for USB B. However, this feature is inactive and will not provide communication for the device.

9 Troubleshooting

Below is a list of issues that may be experienced by the user.

Table 15. AC6000 Troubleshooting Guide

Problem or Symptom	Solution
AC6000 will not turn on.	- Check that AC input and output are connected to the AC6000.
	- Check that the main circuit breaker (MCB) is switched to the ON position.
No output power.	- Check that the REPO connector is plugged in and configured correctly.
	- Check that the AC6000 is in normal mode
	- Check that the AC6000 output is connected.
AC6000 turns on but screen is flickering or fans ramp speed up and down continuously.	- Check that AC input voltage is 208V or greater. Plugs that run 208/230/240V can sometimes be configured for 120V.
AC6000 front panel or network controller is not responsive.	- Hold the Power button on the front panel down for 15 seconds then release. Wait 1 minute for controllers to restart.
	- Place the unit in standby mode, power off the unit from the main circuit breaker (MCB), wait 30 seconds, power the unit on from the MCB, wait 60 seconds.
AC6000 front panel displays a fault or is beeping at a one second on/one second off rate.	- Mute the fault by pressing the left arrow key on the front panel.
	- Refer to 6.6 for description of faults.
AC6000 front panel displays an alert or is beeping at a one second on/three seconds off rate.	- Mute the alert by pressing the left arrow key on the front panel.
	- Refer to 6.6 for description of alerts.

The AC6000 makes use of three-digit error codes. The code displayed on the front panel display is translated below.

Table 16. AC6000 Error Codes

Error Code	Message	Description
201	INVSB OVR TEMP	Inverter & SBS Over temperature
202	INVSB UNDER TEMP	Inverter & SBS Under temperature
203	IP AC FAULT	Input AC fault
204	OP AC PS FLT	Output AC Peak Shave fault
205	OP AC POW	Output AC power fault
206	OV BULK HW	DC link Over voltage Hardware fault.
207	BATT FAULT	Battery fault
208	BMS SOC FAULT	BMS State of Charge fault
209	IP PWR FAULT	Input power fault
210	BATT CHRGR FLT	Battery charger fault
211	HVBMS OVERCURRENT	HVBMS over current fault
212	HVBMS MEMORY FAULT	HVBMS memory failure
213	HVBMS TEMP FAULT	HVBMS Temperature fault
214	NWHR MEMORY TO	Network Hardware Memory Time Out
215	MAIN COMM FAULT	Communication Failure

216	SYS CNTRL COMM FAULT	Communication Failure
217	HVBMS COMM FAULT	Communication Failure
301	CHGR OVTEMP	Charger Over Temperature
302	OUTPUT OVER LOAD	Output Over Load
303	OP OC SW	Output Over Current Software Fault
304	OV BULK SW	Bulk over voltage SW Fault
305	INV OCIND HW	Inverter Inductor Over current Hardware Fault
306	INV OUPUT FAIL	Inverter Output fault
307	INV OCIND SW	Inverter Inductor Over current Software Fault
308	PC TIME OUT	Pre-charge Time Out
309	BATT PC TO	Battery Pre-charge Time Out Fault
310	FAST PC TO	Fast Pre Charge Time Out
311	UV BULK SW	Under Voltage Bulk software
312	UV BULK HW	Under Voltage Bulk Hardware
313	BATT FUSE BLOWN	Battery Fuse Fail
314	INV.CTRL WDOG	Inverter Control system watch Dog
315	BATT COOLDOWN TO	Battery Cool down Time out
316	OUTPUT RL SHORT	Output Relay Shorted
317	INV RL SHORT	Inverter Relay Shorted
318	SBS SHORT	Static Bypass Switch Shorted
319	BULK VSENSOR FLT	Bulk Voltage sensor Fault
320	SBS OVERPOWER	Input current limit exceeded (26A for 30A service)
401	BATT OV/UV	Battery Over voltage/Under Voltage
402	LTC TEMP SHUTOFF	LTC Thermal Shutdown
403	BATT MONITOR ERR	Battery Monitor Error
404	BATT SERVICE	Severe battery fault; contact your service rep.
405	BATT CONTCTR FAIL	Battery Contactor Failed
406	BATT OVER DISC	Battery Over Discharged
407	BATT MONITOR TO	Battery Monitor Time Out
408	BATT FAN FAIL	Battery Fan fault
409	RP FAN FAIL	Rear Panel Fans Failure
410	BST COM TO	Boost Communication Time Out
411	BST FAULT	Boost circuit Fault
412	BST IND OVER CURR	Boost Inductor Over Current Fault
413	BST INPUT BATTOV	Boost Input Battery Over Voltage
414	BST BULK OV	Boost Bulk Over Voltage Fault
415	BST BULK UV	Boost Bulk Under Voltage Fault
416	BST OVER TEMP	Boost Heat sink Over Temperature
417	BST WATCHDOG TO	Boost Watch Dog time Out
418	BST SW RESET	Boost Software Reset
419	BST BULKPC FAIL	Boost Bulk Pre charge Failed
420	BST INTL1 FAIL	Boost Interleaved1 Failed
421	BST INTL2 FAIL	Boost Interleaved2 Failed