

SURE-LITES LIFEWAY II SERIES

MICRO MODULAR
INVERTER SERIES

500W – 2000W

Installation Guide

This unit contains LETHAL VOLTAGES. All repairs and service should be performed by AUTHORIZED SERVICE PERSONNEL ONLY! There are NO USER SERVICEABLE PARTS inside this unit.

IMPORTANT SAFEGUARDS

When using electrical equipment, you should always follow basic safety precautions, including the following:

- 1. READ AND FOLLOW ALL SAFETY INSTRUCTIONS.**
- 2. Do not install the system outdoors.**
- 3. Do not install near gas or electric heaters or in other high-temperature locations.**
- 4. Use caution when servicing batteries. Depending on battery type, batteries contain either acid or alkali and can cause burns to skin and eyes. If battery fluid is spilled on skin or in the eyes, flush with fresh water and contact a physician immediately.**
- 5. Equipment should be mounted in locations where unauthorized personnel will not readily subject it to tampering.**
- 6. The use of accessory equipment not recommended by Manufacturer may cause an unsafe condition and void the warranty.**
- 7. Do not use this equipment for other than its intended use.**
- 8. Qualified service personnel must perform all servicing of this equipment.**

SAVE THESE INSTRUCTIONS

The installation and use of this product must comply with all national, federal, state, municipal, or local codes that apply. If you need help, please call Service at 1-610-868-5400.

CAUTION

**READ ENTIRE MANUAL AND REVIEW ALL DOCUMENTATION BEFORE ATTEMPTING SYSTEM
INSTALLATION!**

FOR SERVICE OR INSTALLATION INFORMATION:
TELEPHONE: (610) 868-5400 (24 HR. HOTLINE)
FAX: (610) 954-8227

FOR YOUR PROTECTION....

PLEASE COMPLETE AND RETURN WARRANTY REGISTRATION CARD IMMEDIATELY.

CHAPTER 1

SAFETY WARNINGS

Read the following precautions before you install the Micro Modular Inverter.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. This manual contains important instructions that you should follow during installation and maintenance of the system and batteries. Please read all instructions before operating the equipment and save this manual for future reference.

DANGER

This system contains **LETHAL VOLTAGES**. AUTHORIZED SERVICE PERSONNEL should perform all repairs and service **ONLY**. There is **NO USER SERVICEABLE PARTS** inside.

WARNING

- Do not install the system outdoors.
 - Do not install near gas or electric heaters or in other high-temperature locations.
 - Use caution when servicing batteries. Battery acid can cause burns to skin and eyes. If acid is spilled on skin or in the eyes, flush with fresh water and contact a physician immediately.
 - Equipment should be mounted in locations where it is not readily subjected to tampering by unauthorized personnel.
 - The use of accessory equipment not recommended by the manufacturer may cause an unsafe condition.
 - Do not use this equipment for other than intended use.
 - Only qualified service personnel (such as a licensed electrician) should perform the system and battery installation and initial startup. Risk of electrical shock.
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CHAPTER 2

INTRODUCTION

Please read this manual thoroughly before operating your safety system. Keep this manual and the system User's Guide.

WARNING

Only qualified service personnel (such as a licensed electrician) should perform the system and battery installation and initial startup. Risk of electrical shock.

Please record your unit's model number, serial number, and part number below. You can find these numbers on the label on the inside of the system's circuit breaker door.

Model Number _____

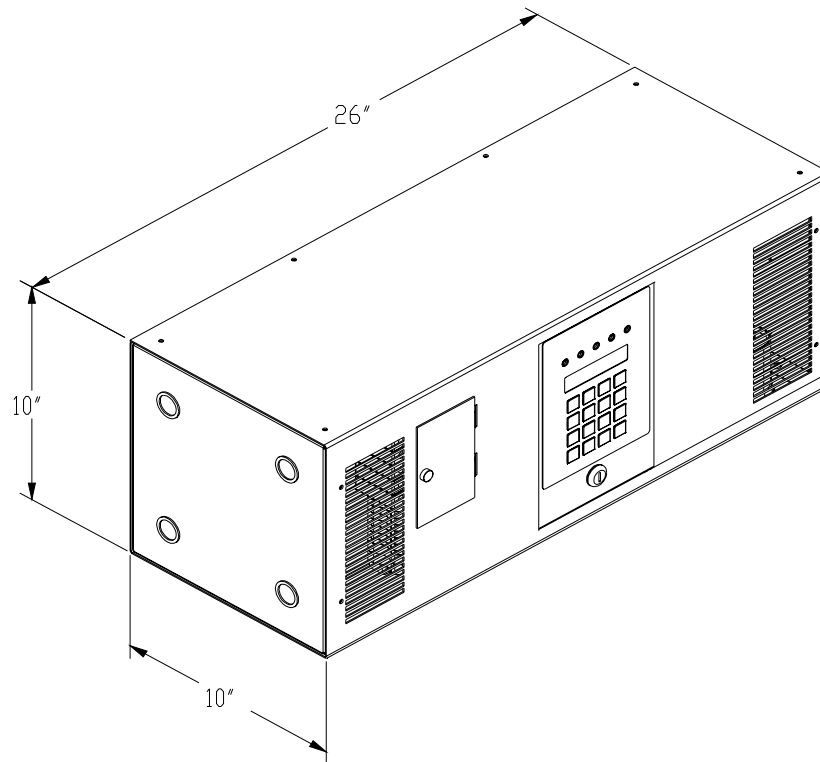
Serial Number _____

Part Number _____

CHAPTER 3

BEFORE INSTALLING THE UNIT

Installation Dimensions and Clearances



INVERTER MODULE DIMENSIONS – 10" X 10" X 26"

INVERTER MODULE WITH BATTERY MODULE DIMENSIONS

UNIT SIZE	WIDTH	HEIGHT	DEPTH
500	26"	20"	10"
1000	26"	30"	10"
1500	26"	40"	10"
2000	26"	50"	10"

Location Guidelines

Keep the following guidelines in mind when choosing the location for your system and batteries:

- Verify that the environment meets the requirements in “Storage and Operating Environment” on page 7. The environment can affect the reliability and performance of both the unit and the batteries.
- Install any separate battery cabinets as close as possible to the unit to reduce the cost of DC wiring and to improve battery performance. We recommend no clearance between the unit and the battery cabinet; in other words, the battery cabinet(s) should be directly under or to the left side of the unit (when you face the front of the unit). If you must place the battery cabinet away from the unit, you must supply the proper length, gauge, and type of battery cables, and you must make sure the installation meets the applicable NEC (CEC) requirements.
- Choose a permanent location for the unit and any battery cabinets. Attempting to move them after you have installed the batteries can damage the batteries and the cabinet.

CAUTION

Do not move the unit or the battery cabinet after you install the batteries. If you do, the unit or battery cabinet and batteries may be damaged.

CEC requires the unit to be located in a service room. If the room is equipped with a sprinkler system, the unit must be provided with sprinkler proof covers.

The system should be connected to the emergency generator, if available.

This equipment is heavy. Refer to Table 3.4 when you choose a site to make sure that the floor can support the weight of the system, the batteries, any separate battery cabinets, and any other necessary equipment.

Table 3.4 System weight [in lbs. (kg)]

	500W	1000W	1500W	2000W
Battery Cabinet	22 (10)	44 (20)	66 (30)	88 (40)
Inverter Cabinet	72 (33)	72 (33)	72 (33)	72 (33)
Batteries	108 (49)	216 (98)	324 (147)	432 (196)
System Total	202 (92)	332 (151)	462 (210)	592 (269)

Receiving and Handling the Unit and the Batteries

This system can weigh several hundred pounds (see Table 3.4; ask your sales representative for additional information). Make sure you are prepared for these weights before you unload or move the unit or the batteries. Do not install any batteries until you have permanently installed the unit with battery cabinets and connected all conduit and wiring.

Storage and Operating Environment

Make sure you store and install the system in a clean, cool, dry place with normal ventilation for human habitation and level floors.

Storage Temperature

Store the batteries at -18 to 40°C (0 to 104°F). Batteries have a longer shelf life if they are stored below 25°C (77°F). Keep stored batteries fully charged. Recharge the batteries every 90–120 days. The system or battery cabinet without batteries may be stored at -20 to 70°C (-4 to 158°F).

Ventilation

The air around the unit must be clean, dust-free, and free of corrosive chemicals or other contaminants. Do not place the system or batteries in a sealed room or container.

Operating Temperature

System can operate from 20° to 30°C (68° to 86°F) and up to 95% relative humidity. The batteries' service life is longer if the operating temperature stays below 25°C (77°F).

Batteries

The temperature should be near 25°C (77°F) for optimum battery performance. Batteries are less efficient at temperatures below 18°C (65°F), and high temperatures reduce battery life. Typically, at about 35°C (95°F), battery life is half of what it would be at a normal temperature of 25°C (77°F). At about 45°C (113°F), battery life is one-fourth of normal.

Make sure that heaters, sunlight, air conditioners, or outside air vents are not directed toward the batteries. These conditions can make the temperature within battery strings vary, which can cause differences in the batteries' voltages. Eventually, these conditions affect battery performance.

Remember that the batteries should be installed as close as possible to the unit to reduce DC wiring costs and improve battery performance.

Do not allow tobacco smoking, sparks, or flames in the system location because hydrogen is concentrated under the vent cap of each cell of the battery. Hydrogen is highly explosive, and it is hard to detect because it is colorless, odorless, and lighter than air.

Every type of battery can produce hydrogen gas, even sealed maintenance-free batteries. The gas is vented through the vent caps and into the air, mainly when the unit is charging the batteries. The batteries produce the most hydrogen when maximum voltage is present in fully charged batteries; the batteries do not produce hydrogen during float charging. The amount of current that the charger supplies to the batteries (not the battery ampere-hour) determines how much hydrogen is produced.

High Altitude Operation

The maximum operating ambient temperature drops 1°C per 300m (2°F per 1000 ft) above sea level. Maximum elevation is 3000m (10,000 ft).

CHAPTER 4

INSTALLATION OVERVIEW

Figure 4.1 shows a typical vertical installation of the system. This drawing depicts a 2000W inverter with battery cabinets. The Micro Modular Inverter is a modular system capable of single-phase power outputs up to 2,000 Watts depending on the number of battery cabinets. The Inverter and Battery modules are shipped separate and require attachment for the depicted typical vertical installation shown in figure 4.1. All instructions included in this literature are for this type of installation.

4 x ¼-20 bolts that the user must install secure each cabinet to each other. There are Electrical Knock-Outs in the vertical and horizontal axis to allow inter-connectivity in multiple configurations. The Vertical installation is the most popular however; allowing the batteries to be mounted separately and horizontally allows the user to fit this system almost anywhere where floor space is tight or not available at all.

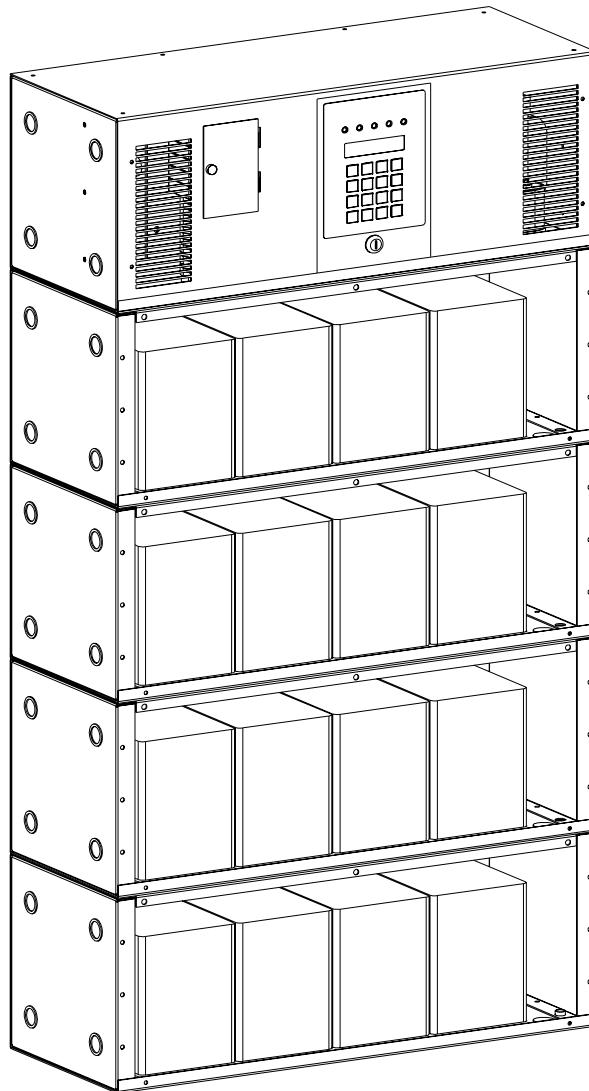


Figure 4.1 Typical Vertical Installation

Inverter Module and Battery Module Assembly

The Inverter Module and Battery Module's cover is easily removed by 10 x 8-32 and 4 x 8-32 screws respectively located on the front and top of the module. There are 4 holes located on each corner that allow the 1/4-20 hardware to attach to the different modules.

There are Electrical Knock-Outs that must be removed on the Inverter Module and the Battery Module to allow passage of the battery cables. After the Electrical Knock-Outs are removed, the factory provided plastic grommet must be inserted through the hole to provide abrasion resistance for the wires. After the plastic grommet is inserted, the bolts, washers and nuts should be inserted and tightened down. Use the plastic grommet as the alignment between the two modules. Shown in figure 4.2 is the exploded view showing the hardware, Electrical Knock-Out and the plastic Grommet.

Battery Module to Battery Module connection is identical to Inverter Module to Battery Module connection.

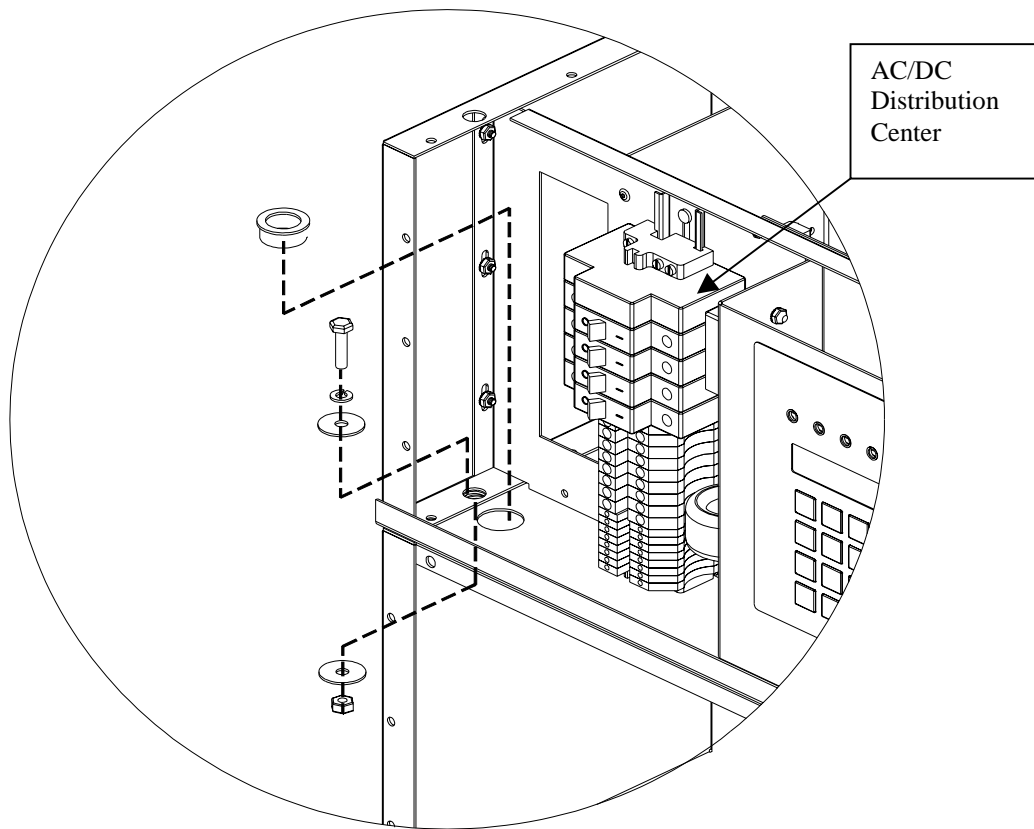
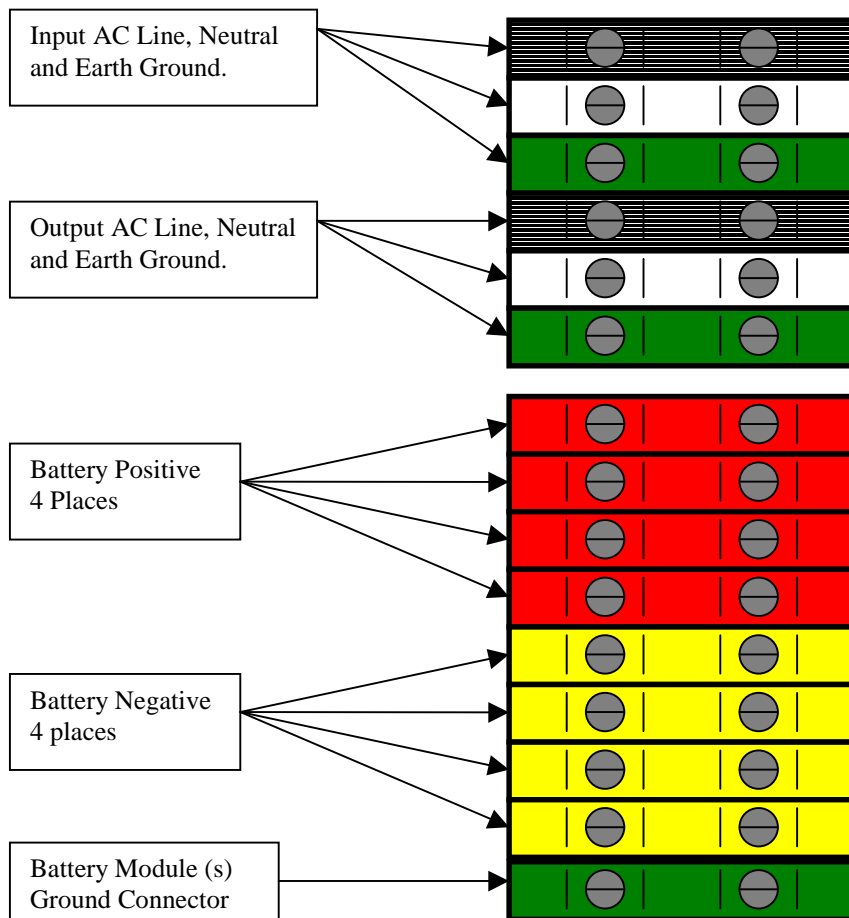
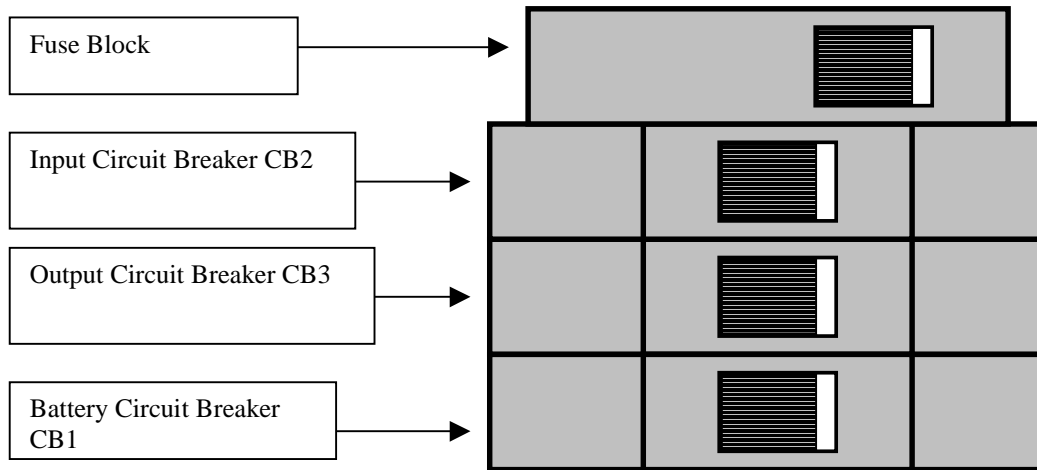


Figure 4.2

TERMINAL BLOCK/CIRCUIT BREAKER STANDARD CONFIGURATION

Micro Modular Inverter



CHAPTER 5

AC INPUT & AC OUTPUT INSTALLATION

WARNING

Only qualified service personnel (such as a licensed electrician) should perform the AC installation. Risk of electrical shock.

Read the following cautions before you continue.

CAUTION

- Unit contains hazardous AC and DC voltages. Because of these voltages, a qualified electrician must install the system, AC line service, and batteries. The electrician must install the AC line service according to local and national codes and must be familiar with batteries and battery installation.
 - Before you install, maintain, or service the unit, always remove or shut off all sources of AC and DC power and shut off the system. You must disconnect AC line input at the service panel and turn off the Installation Switch (S1), the Main AC Input Circuit Breaker (CB2), and the Battery Fuse(s) to make sure the unit does not supply output voltage.
 - Whenever AC and/or DC voltage is applied, there is AC voltage inside the unit; this is because the unit can supply power from AC line or from its batteries. To avoid equipment damage or personal injury, always assume that there may be voltage inside the unit.
 - Remove rings, watches, and other jewelry before installing the AC wiring. Always wear protective clothing and eye protection and use insulated tools when working near batteries. Whenever you are servicing an energized unit with the inside panel open, electric shock is possible; follow all local safety codes. **TEST BEFORE TOUCHING!**
 - To reduce the risk of fire or electric shock, install the unit and its batteries in a temperature- and humidity-controlled indoor area free of conductive contaminants. See page 7 for operating environment specifications.
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1. Remove the Inverter Module's cover. Make sure the installation switch and all the input circuit breaker are off (off = left).
2. Look at the ID label inside the Inverter Module's Circuit Breaker Access Door. Write down the following information:
Input Voltage: _____
Output Voltage: _____
3. Now, make sure the input and output voltages are what you need. **Remember that the system provides single-phase power only.**

- Does the input voltage available for the system at the AC service panel match the input voltage shown on the unit's ID label?

Service Panel Voltage = _____ Input Voltage ___ Yes / ___ No

- Does the output voltage on the ID label match the voltage your loads (protected equipment) need?

Load Voltage = _____ Output Voltage ___ Yes / ___ No

If you answered NO to either of the preceding questions, **call SERVICE**.

- Now, use the information you wrote down in Step 2 to find the correct circuit breaker for the service panel that is for your system.

Table 5.1 Recommended Circuit Breaker for Maximum Input Current

System VA	120VAC	277VAC
500	25A	15A
1000	25A	15A
1500	25A	15A
2000	25A	15A

- Write down the circuit breaker value that applies to your system from Table 5.1:

- Now, look at Table 5.2 below, and use the notes below to find the proper gauge wire for the recommended circuit breaker recorded in step 5.

Table 5.2 Recommended Minimum Wire Sizes

Read These Important Notes!	For this Input Circuit Breaker Size...	Use this Size 90°C Copper Wire	
		AWG	mm ²
This table lists the AWG and mm2 wire size for each circuit breaker size. The minimum recommended circuit breaker sizes for each model and voltage application are listed in Table 5.1. The temperature rating of conductor must not be less than 90° C wire. Based on the ampacities given in Tables 310-16 of the National Electrical Code, ANSI/NFPA 70-1993 (Table 2 of the CEC), and NEC article 220 (CEC Section 4). All circuit conductors, including the neutral and equipment-grounding conductors, must be the same size (ampacity) wires. Code may require a larger wire size than shown in this table because of temperature, number of conductors in the conduit, or long service runs. Follow local code requirements.	10, 15, 20	12	3.31
	25, 30	10	5.26

- The input circuit breaker in the input service panel provides the means for disconnecting AC to the unit. Only authorized persons shall be able to disconnect AC to the unit [see NEC 700-20 and 700-21(CEC Section 46)]. If you are using the input circuit breaker to disconnect AC, you must make sure that only authorized persons have control of the circuit breaker panel to meet the requirements of NEC 700-20 (CEC Section 46).
- Read the following caution; before removing conduit knockouts.

CAUTION

To prevent electrical shock or damage to your equipment, the Keyed Installation Switch (S1), the Main AC Input Circuit Breaker (CB2), and the circuit breaker at the input service panel should all be turned off. The DC Battery Fuse(s) should be removed and the Battery Circuit Breaker should be turned off.

9. Remove knockouts for AC Input and AC Output in the top left or left side of the Inverter Module. AC input conductors and AC output conductors must be installed in separate conduits, and emergency and non-emergency output circuits must be installed in separate conduits.

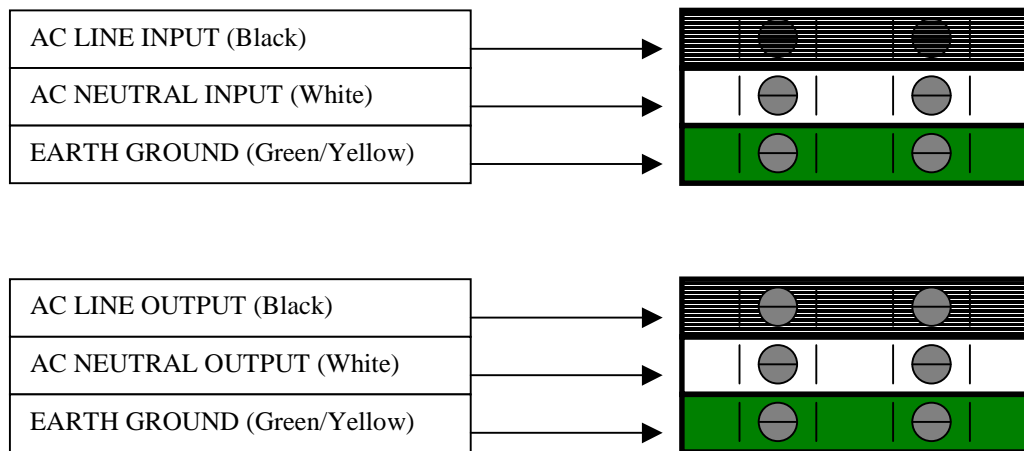
CAUTION

Do not drill the cabinet; drill filings may damage the unit and keep it from operating. If you need larger knockouts, use a chassis punch to punch out the appropriate knockout.

10. Install the conduit. You must run the AC input service conductors and AC output conductors through separate conduits. Emergency output conductors and non-emergency output conductors must also be run through separate conduits. Emergency output circuits shall be installed in dedicated conduit systems and not shared with other electrical circuits as described in NEC 700-9(b) [CEC Section 47-108].

AC INPUT AND OUTPUT CONNECTION

Micro Modular Inverter



Connect the AC Input and Output to the AC Terminal Blocks Labeled AC Input and AC Output. Ensure that the systems ac voltage matches the utility input.

For the AC input, use a minimum 10 AWG wire for Line, Neutral and Ground.
For the AC output, use a minimum 12 AWG wire for Line, Neutral and Ground.

Earth Grounding of the system is achieved through the Ground terminal block. There is a ground terminal block provided for the input and output connections. The terminal block connects to the din rail through a clamping system and the din rail connects to the Chassis through the din rail hardware. No additional Ground lugs are required.

CHAPTER 6

INSTALLING BATTERIES AND DC WIRING

WARNING

Only qualified service personnel (such as a licensed electrician) should perform the battery and DC wiring installation. Risk of electrical shock.

This section explains how to install system batteries, fuses, and cables. An electrician who is familiar with battery installations and applicable building and electrical codes should install the batteries.

WARNING

The batteries that will need to be installed in this system could cause you harm or severely damage the electronics if proper precautions are not followed. Batteries connected in series parallel configuration could produce lethal voltages with unlimited current. All batteries should be inspected for damage prior to installation. Never install a battery that is leaking electrolyte. Battery terminals should be cleaned with a wire brush to remove any oxidation. All tools should be insulated. Rubber gloves and safety glasses are recommended. **IN THIS SYSTEM BATTERY NEGATIVE IS TIED TO GROUND INSIDE THE INVERTER.** This means that the battery cabinet and shelves are at ground potential as soon as negative connections are made to the batteries. It is strongly recommended to make all negative connections to the batteries the last step to prevent any chance of shorting battery positive to ground. With the DC fuse removed, make connections to battery positive first, working your way towards battery negative. Leave individual strings of batteries open at the last battery negative until all batteries are installed. Then connect each strings negative.

Safety Instructions

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This section contains important instructions that a qualified service person should follow during installation and maintenance of the system and batteries. **ONLY** a qualified service person should work with the batteries.

CAUTION

Full voltage and current are always present at the battery terminals. The batteries used in this system can produce dangerous voltages, extremely high currents, and a risk of electric shock. They may cause severe injury if the terminals are shorted together or to ground (earth). You must be extremely careful to avoid electric shock and burns caused by contacting battery terminals or shorting terminals during battery installation. Do not touch uninsulated battery terminals.

A qualified electrician familiar with battery systems and required precautions must install and service the batteries. Any battery used with this unit shall comply with the applicable requirements for batteries in the standard for emergency lighting and power equipment, UL 924 (Canada's National Building Code). Cabinets are designed to be used with, and batteries must be replaced with, manufacturer battery number BAT-CG12042 or a manufacturer approved equivalent (see the battery wiring diagram that came with the battery cables). If you substitute batteries not supplied by manufacturer, the unit's UL (cUL) listing is void and the equipment may fail. Installation must conform to national and local codes as well. Keep unauthorized personnel away from batteries. The electrician must take these precautions:

Wear protective clothing and eyewear. Batteries contain corrosive acids or caustic alkalis and toxic materials and can rupture or leak if mistreated. Remove rings and metal wristwatches or other metal objects and jewelry. Don't carry metal objects in your pockets where the objects can fall onto the batteries or into the system or battery cabinet.

Tools must have insulated handles and must be insulated so that they do not short battery terminals. Do not allow a tool to short a battery terminal to another battery terminal or to the cabinet at any time. Do not lay tools or metal parts on top of the batteries, and do not lay them where they could fall onto the batteries or into the cabinet.

Install the batteries as shown on the battery-wiring diagram provided with the system. When connecting cables, never allow a cable to short across a battery's terminals, the string of batteries, or to the cabinet.

Align the cables on the battery terminals so that the cable lug does not contact any part of the cabinet even if the battery is moved. Keep the cable away from any sharp metal edges.

CAUTION

Install the battery cables so they cannot be pinched by the battery cabinet or the system doors.

External battery cabinet chassis ground (or earth) must be connected to the system's chassis ground (or earth). The ground conductor must be insulated. If you use conduit, this ground conductor must be routed in the same conduit as the battery conductors.

Where conductors may be exposed to physical damage, protect conductors in accordance with the National Electrical Code (NEC) [Canadian Electrical Code (CEC)].

If you are replacing batteries or repairing battery connections, follow the procedure in the system user's Guide to shut down your system and remove both AC and DC input power.

Before Installing the Batteries

Location

Before you start installing the batteries, you must install the Inverter Module and any Battery Modules in their permanent location. If you have not already done this, see “Location Guidelines” on page 6 to choose a location.

CAUTION

To prevent damage to your equipment, do not move the system or separate battery cabinets after the batteries are installed.

To make sure a location is acceptable for the system, review the requirements in Chapter 3.

Tools

CAUTION

Always use insulated tools when you work with batteries. Always torque connections to the manufacturer’s recommendations.

When you work with system batteries, you need the following tools. The tools must be insulated so they do not short battery terminals to the cabinet. Wear the safety equipment required by local code whenever the doors are open and whenever you are working on batteries. Other tools may be necessary for optional batteries.

- Digital volt-ohm meter
- 7/16” open end wrench
- 3” extension socket
- Ratchet
- Wire brush
- Electrical tape
- Conductive grease or petroleum jelly
- Brush (to apply grease or petroleum jelly to terminals)
- Safety equipment required by local codes
- Torque wrench calibrated in inch-pounds or Newton-meters
- 7/16” socket wrench
- Safety glasses with side shields

Battery Cable Sizing

The battery cable or wire used is No. 12 AWG for each string of batteries.

If the batteries must be more than four feet (1.2 meters) from the system, you may need to install larger battery cables between the battery cabinets and the system.

Installing and Connecting the Batteries

Battery Wiring Diagram

You should have received a battery-wiring diagram with your system. This battery-wiring diagram shows how you should install the batteries, make terminal, and fuse connections. Use the diagram as you follow the steps below.

All systems are based on 48 VDC. When higher wattage is needed, the number of battery strings (batteries in parallel) increases. For 500W, one string is required. For 1000W, two strings are required. For 1500W, three strings are required and for 2000W, four strings are required.

Connecting the Modules

Wherever conductors may be exposed to physical damage, you must protect the conductors in accordance with the NEC (CEC). This includes battery cables between the system and a separate battery cabinet and cables between battery cabinets (if you have more than one).

We recommend routing the battery cable through the Electrical Knock-Out's.

If the cabinets must be farther apart, we recommend that you use conduit (cables not included). Install the conduit for the battery cables according to local or national codes. If you are using conduit, you must substitute your own cables for the cables shipped with the unit as you follow the battery installation instructions. Remember that the terminal blocks supplied with the unit and battery cabinets accept up to 10 AWG wire. Use the correct type, length, and gauge of cable; make sure your installation meets all applicable electrical codes.

NOTE As you carry out the following steps, use these guidelines:

If you are using conductive grease, apply a thin coating of high-temperature conductive grease on each post and every cable connector before you assemble and torque the connection to slow corrosion.

If you use nonconductive grease like petroleum jelly, do not apply any grease before you make the connections and torque them. Instead, make the connection first, then torque it to 40 inch pounds. After you make the connection; apply a coating of the nonconductive grease to the hardware at the battery terminals.

Each Battery module has 4 batteries wired in series. Connect the Battery Module's four batteries first and then connect the battery module(s) to the inverter module.

1. Remove the Battery module fuse to isolate the battery module.
2. Start with the Red (+) wire. Connect this wire to battery one positive.
3. Jumper one (factory provided) is from battery one negative to battery two positive.
4. Jumper two (factory provided) is from battery two negative to battery three positive.
5. Jumper three (factory provided) is from battery three negative to battery 4 positive.
6. The final connection is the Yellow (-) wire. Connect this wire to battery four negative.

***** Torque all battery connections to 40 inch pounds.**

There are now 4 batteries connected in series between the red and yellow wire. The red and yellow wires are connected into the Battery Module's terminal blocks.

Measure with a voltmeter between the yellow terminal block (battery -) and the fuse block where the red wire comes into it. There should measure approximately 48 VDC.

The voltage can vary as much as +/- 2 volts depending on the state of charge on the batteries.

CAUTION

If you do not verify that voltage and current direction are correct, the equipment may fail.

Repeat this process for each battery module.

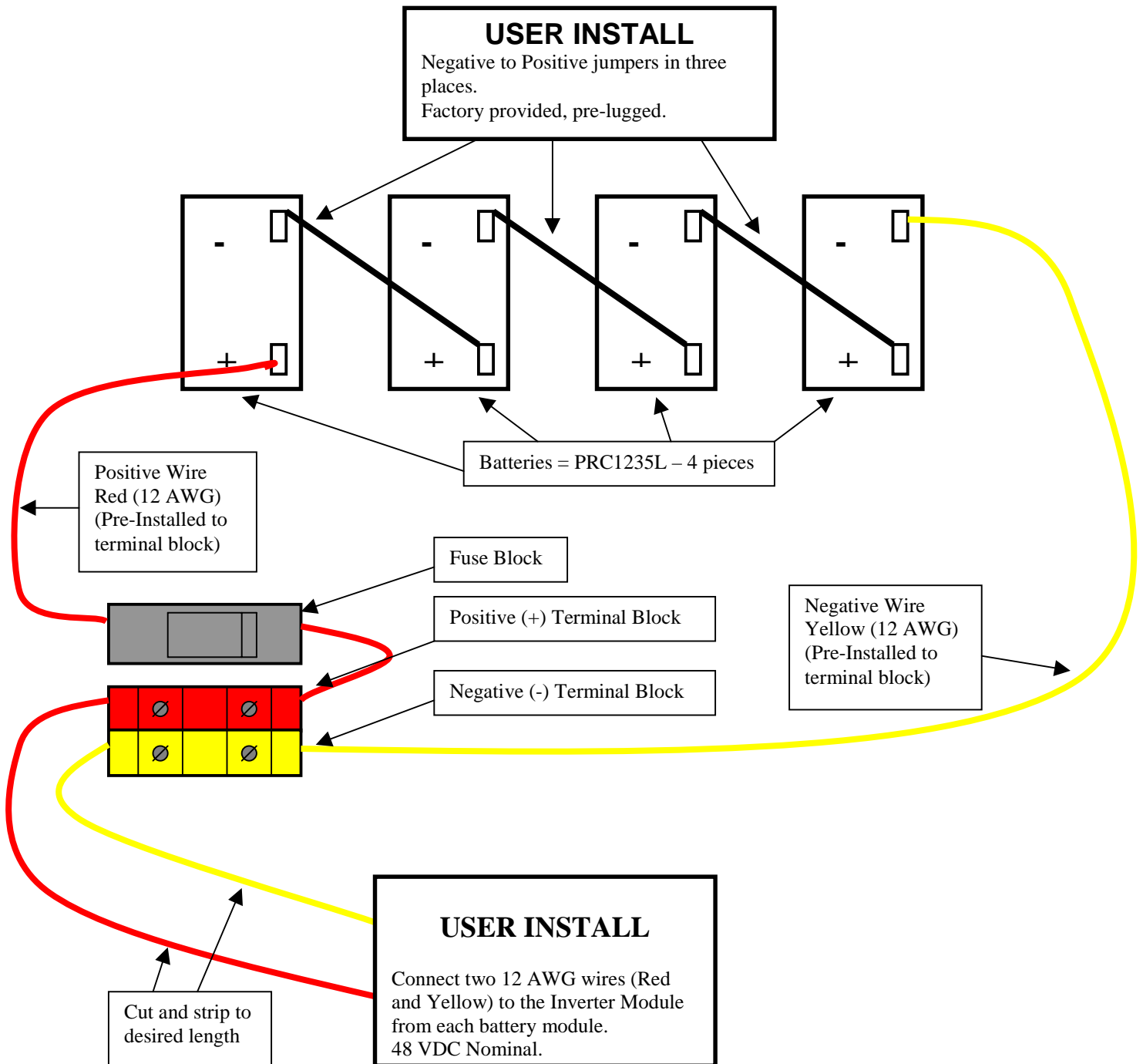
After all of the battery modules are complete, the battery module(s) can be connected to the inverter module.

CAUTION

Hazardous voltage is present! System batteries are high current sources. These batteries can produce dangerous voltages, extremely high currents, and a risk of electric shock.

BATTERY MODULE CONNECTION

Install 4 batteries wired in series to produce 48 VDC nominal. The Positive + wire (Red) and the Negative - (Yellow) are provided pre-installed into the Terminal Blocks. Connect the three jumpers and the positive and negative leads to the batteries as shown. Use the hardware provided (8 x 1/4-20 Bolt and Nut w/flat and Lock washers) and torque to 40-inch pounds (4.5 N-M) maximum.



Electronics Module to Battery Module Connections

NOTE If you are using conduit, you must supply the correct length, gauge, and type of battery cables.

Refer to the battery-wiring diagram to identify the battery cables you use to connect the unit to the battery cabinet(s). Pull the cables through the nipple or conduit. Do not connect any cables at this time.

If your unit has more than one battery cabinet, use the battery-wiring diagram to identify the cables you use to connect the battery cabinets. Pull these cables through the connecting nipple or conduit. Do not connect the cables.

Making the Equipment Ground Connection

CAUTION

All grounding conductors should be insulated. If you are using non-insulated grounding conductors, take special care to make sure that the grounding conductors cannot accidentally contact live wires or the batteries.

In the system, find the ground compression lug labeled “**GROUND**”. This terminal is next to the AC and DC terminal blocks internal to the Inverter Module.

1. There is a Green 12 AWG ground conductor supplied with each Battery Module as part of the cable kit. Cut this wire to the desired length and strip the insulation from both ends 3/8”. Then, connect one end of the conductor to the ground lug in the Inverter Module. There is a dedicated ground terminal block under the battery (-) terminal blocks.
2. Connect the other end of the grounding conductor to the Ground Terminal Block located in the battery module.
3. If the unit has two battery modules, you must connect a ground conductor that connects the Battery Module cabinets. This is easily accomplished by daisy-chaining the ground using the Ground terminal block. Since the Ground terminal block has two ends, simply cut the second ground wire to length and insert into the Ground Terminal Block in Battery Module 1 to Battery Module 2.

NOTE When you connect a separate equipment-grounding conductor directly to building steel, use the knockouts that are already on the unit. Do not make a knockout anywhere on the cabinet where there is not already a knockout.

Fuse

Remove the DC Fuse in each of the Battery Module(s) before connecting the Battery Module to the Inverter Module.

Positive Wire(s)

Included in the battery cable kit is a red wire that will connect the positive conductor from the battery module to the inverter module.

1. Run the wire between the battery module and the inverter module to get the approximate length required. Once the length is established, cut and strip the wire. The wire should be stripped 3/8' from both ends.
2. Insert the stripped wire into the battery positive terminal blocks in the Inverter Module and the Battery Module. Follow the colors - red wire to red terminal block.
3. Torque the battery terminal block to 10 inch pounds to secure the wire into the terminal block.
4. Repeat this process for additional Battery Modules.

Negative Wire(s)

Included in the battery cable kit is a yellow wire that will connect the battery module to the inverter module.

1. Run the wire between the battery module and the inverter module to get the approximate length required. Once the length is established, cut and strip the wire. The wire should be stripped 3/8' from both ends.
2. Insert the stripped wire into the battery negative terminal blocks in the Inverter Module and the Battery Module. Follow the colors - yellow wire to yellow terminal block.
3. Torque the battery terminal block to 10 inch pounds to secure the wire into the terminal block.
4. Repeat this process for additional Battery Modules.

Replacing the Batteries

CAUTION

A battery can present a risk of electrical shock and high short circuit current. A qualified electrician familiar with battery systems should service the batteries.

Review all the safety instructions at the beginning of this chapter before you replace any batteries.

Use the Same Quantity and Type of Battery

CAUTION

You must use the same quantity and type of battery. Substituting batteries not supplied by manufacturer voids the UL (CUL) listing and may cause equipment damage.

To ensure continued superior performance of your system and to maintain proper charger operation, you must replace the batteries in the system or battery cabinets with the same number of batteries. These batteries must be the same types as the original batteries. The replacement batteries should have the same voltage and ampere-hour rating as the original batteries.

Handle Used Batteries with Care!

Assume that old batteries are fully charged. Use the same precautions you would use when handling a new battery. Do not short battery terminals or the battery string with a cable or tool when you disconnect the batteries! Batteries contain lead. Please dispose of old batteries properly.

CAUTION

Do not dispose of batteries in a fire because the batteries could explode. Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

Dispose of Batteries Properly

CAUTION

Batteries contain lead. Many state and local governments have regulations about used battery disposal. Please dispose of the batteries properly.

CHAPTER 7

SETTING THE AUTOMATIC SYSTEM TEST PARAMETERS

Several parameters in the system software determine when and how your system conducts the automatic monthly and annual tests. Refer to “Program Functions” in the “Front Panel Display” chapter of the system user’s Guide for a description of each test.

Starting the Unit

Before you can set the parameters, you must start the system.

WARNING

Verify that the system AC Input Circuit Breaker and Installation Switch are off.

1. Turn on the AC input at the building service panel; ensure that the systems input breaker (CB2) is off.
2. Turn on the Battery Circuit Breaker (CB1).
3. Turn on the System AC input circuit breaker (CB2).
4. Turn on the Installation Switch (S1). Leave the loads (protected equipment) off. Unit will run on batteries, then transfer to normal mode.

Front Panel Display

The Front Panel Display consists of a 2 x 20 alpha numeric LCD display with LED back lighting, 5 status LED indicators and a 4 x 4 keypad for user interface.

Control Panel Keypads

Table 7.1 Keypad Functions

Key Name	Description
Meter (Blue)	Pressing this key will activate Meter Functions
Control (Red)	Pressing this key will activate Control Functions
Program (Black)	Using this key, you can enter passwords or change parameter values. To enter passwords, press [PROGRAM], enter the password, and press [ENTER]. NOTE: A password must be entered to change parameters.
Enter (Grey)	This key records or enters a task you perform using the control panel keys.
[◀]	This key functions as Left scroll key
[▶]	This key functions as Right scroll key
[0]	This key works as a number key; it is also used to display active alarms when in CONTROL Mode.
[1] through [9]	These keys work as number keys. (See User Manual for further specific functions of Keys)

Meter Functions

Meter functions are available by pressing the **METER** keypad to get to the Meter Menu and then pressing the desired function keypad. (See figure 7.3)

Table 7.2 Meter Functions

Function	Description	Keypad Text
Voltage Input	Measures the AC Input Voltage to the Inverter	V IN
Voltage Output	Measures the AC Output Voltage from the Inverter	V OUT
Current Output	Measures the AC Output Current from the Inverter. If optional Normally Off loads are connected, it will read the sum of Normally On and Normally Off outputs.	I OUT
Battery Voltage	Measures Battery Voltage	V BATT
Battery Current	Measures the Battery Current. When in charge mode, the current will be positive. When in Inverter mode, the current will be negative.	I BATT
VA Output	Multiplication of the output voltage and output current	VA OUT
Inverter Watts	Multiplication of the battery voltage and the battery current	INV. WATTS
Inverter Minutes	Total minutes the system has run on inverter	INV. MIN
Temperature	Measures the ambient temperature of the electronics enclosure.	TEMP
System Days	Total days the system has been in service.	SYS. DAYS

Program Functions

All program functions are password protected. The password for user level is 1234. When the **PROGRAM** Keypad is pressed, the display will prompt the user for the password. After the password is entered (**1234** + **ENTER** key), the user can change the Date, Time, Month Test Date, Month Test Time, Yearly Test Date and Yearly Test Time, Load Reduction Fault, Low VAC Alarm, High VAC Alarm, Ambient Temp Alarm and Near Low Battery settings. Time is always in the 24 hour standard. Example 4:00 PM is 16:00.

Table 7.3 Program Functions

Parameter	Format	Factory Default
Date	MM/DD/YY (Month, Date, Year)	Current Date
Time	HH/MM (Hours, Minutes)	Eastern Stand Time
Monthly Test Date	DD (Date)	15 th of the Month
Monthly Test Time	HH/MM (Hours, Minutes)	5:00
Yearly Test Date	MM (Month)	01
Yearly Test Time	HH/MM (Hours, Minutes)	8:00
Load Reduction	AAAA (AMPS)	0.0A
Low VAC Alarm	VVVV (Volts)	1.0V
High VAC Alarm	VVVV (Volts)	999.9V
Ambient Temp Alarm	DDD (Degrees Centigrade)	70°C
Near Low Battery	VVVV (Volts)	43VDC

The Day of the Automatic Tests

Table 7.5 shows the purpose of each parameter and its factory setting.

Table 7.5 Factory Setting for Automatic Test Parameter

Parameter	Determines...	Factory Default
Monthly Test	The time and the day of the month for the monthly tests.	15 th @ 5:00 AM
Yearly Test	The time and the date for the yearly test.	(January) 1 @ 8:00 AM

The Length of the Automatic Tests

Parameters Monthly Test and Yearly Test determine how long the battery test is. Table 7.6 shows the purpose of each parameter.

Table 7.6 Factory Setting for Automatic Test Parameters

Parameter	Purpose	Factory Default for 90 minute systems
Monthly Test	Monthly battery test.	5 Minutes
Yearly Test	Yearly battery test.	90 Minutes

The factory can only reprogram these parameters.

If you would like to change the setting of any of the above parameters, (see table 7.3) follow these steps: (i.e. setting the Time). See Figure 7.3 for Keypad location.

1. Press the **PROGRAM** keypad, enter the user password (**1234**), press the **ENTER** keypad.
2. Press the ► arrow keypad (◀ or ► keypads are used for scrolling through the menu) to the Time parameter (HH/MM) to set the time. **NOTE:** Factory default is Eastern Standard Time and with 24 hour formats. (i.e. 1:00 PM = 1300 hours)
3. Enter correct time for your time zone using the NUMBER keypads, and then press the **PROGRAM** keypad to exit.

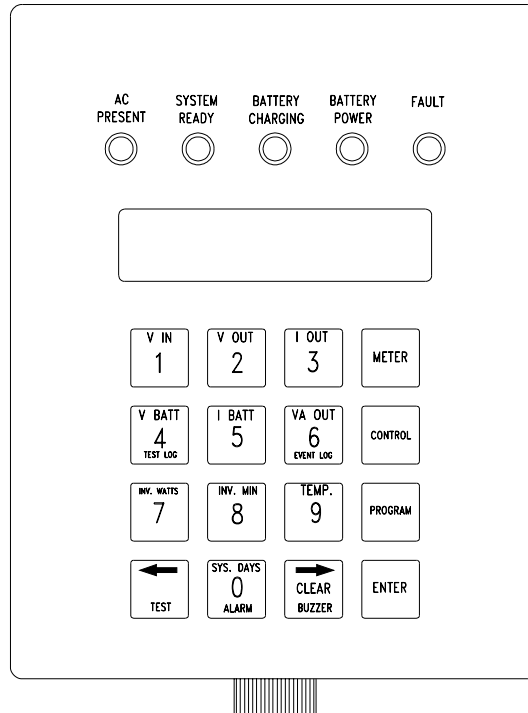


Figure 7.3 Front Panel Display

Completing the Installation

Install the cover to the Inverter and Battery Module. You have finished installing the system. Follow the steps in the Startup and Warranty Validation form to test the installation and startup the system for the first time. After you complete this form, return it to the manufacturer to validate the warranty.

Keep the System Installation Guide and the User's Guide for future reference.

Notes: