Mobile Solar Generators

Technician Guide

Mobile Solar Generators Technician

Quick Guide

Printed in the U.S.A.

Warning:
Electrical Hazard
Authorized
Personnel Only
Use Caution
When Using This
Equipment

by Model				
MODEL		**XC5**	**XC10**	**SCT20**
Dimensions	Transport/ Deployed	12'L X 9'W X 7'6"H/ 12'L X 11'W X 6'6"H	22'' L X 8'W X 7'6"H/ 22'' L X 12'6"'W X 6'6"H	22'L X 8'W X 7'6"H/ 22'L X 12'6"W X 6'6"H
	GVWR	3,400 lbs	5,200 lbs	8,400 lbs
	Hitch	Pintle	Pintle	Pintle
PV Panels				
	Total Input (Watts)	1,600W	2,400W	2,400W
	Movement	Manual	Manual	Manual
AC output				
	Nominal AC voltage	120V	120V	120V
	Nominal frequency	60Hz	60Hz	60Hz
	Continuous AC output at 77 °F/ 113 °F(25 °C /45 °C)	5000w/ 4000w	5000w/ 4000w	5000w/ 4000w
	AC output power at 25°C (77°F) for 30 min/1min/3s	6500W/8400W/ 11000W	6500W/8400W/ 11000W	13000W/16800W/ 22000W
	Nominal AC current/ Max. Ac current (peak)	41.7A/ 180A for for 60ms	41.7A/ 180A for for 60ms	41.7A/ 180A for for 60ms
	THD output voltage/ power factor	<3%/-1 to +1	<3%/-1 to +1	<3%/-1 to +1
AC Input				
	Input voltage	120V	120V	**
	Input frequency	60Hz	60Hz	**
	Maximum AC input current	14A	14A	**
Battery DC Input				
	Battery voltage	48V	48V	2x 48V
	Maximum battery charging current/ Continuous charging current		120A/100A	2x 120A/100A
	Battery Type	FLA	FLA	FLA
	Battery Capacity	400 Ah DC 200 Ah AC	510 Ah DC 205 Ah AC	1,020 Ah DC 510 Ah AC
Non PV Charge				
	120V Male Battery remaining % 15/50/75		14.9/ 8.8/ 4.4 hrs	
	SB Connector Battery remaining % 15/50/75		4.5/2.7/1.3hrs	

Standard Features on All Models

- Ruggedly mobile with a polyurethane-coated steel frame
- Designed for on and off-road conditions
- Motion shock-absorbers for solar panel safety in movement
- Deep-cell industrial batteries with extended life and center-mounted for stability in transit
- Capable of being setup by a single adult and generating renewable energy in under 5 minutes
- No special permits or licenses required to operate or be towed in transit
- Flush mounted exterior outlets and breakers with backup generator and shore-power options
- Custom designed for rapid deployment and minimum maintenance
- Manufactured with high-efficiency polycrystalline solar modules
- Utilizes pure sine-wave outdoor rated inverters and equipment lockers
- 100% UL-Approved components with 10 year product warranty
- Designed and manufactured in the United States of America


Inverter
KEYPAD
BREAKER
Job Box
Battery
BREAKER BOX
CHARGE CONTROLLER
Spider Box
POWER OUTLETS
GFCI

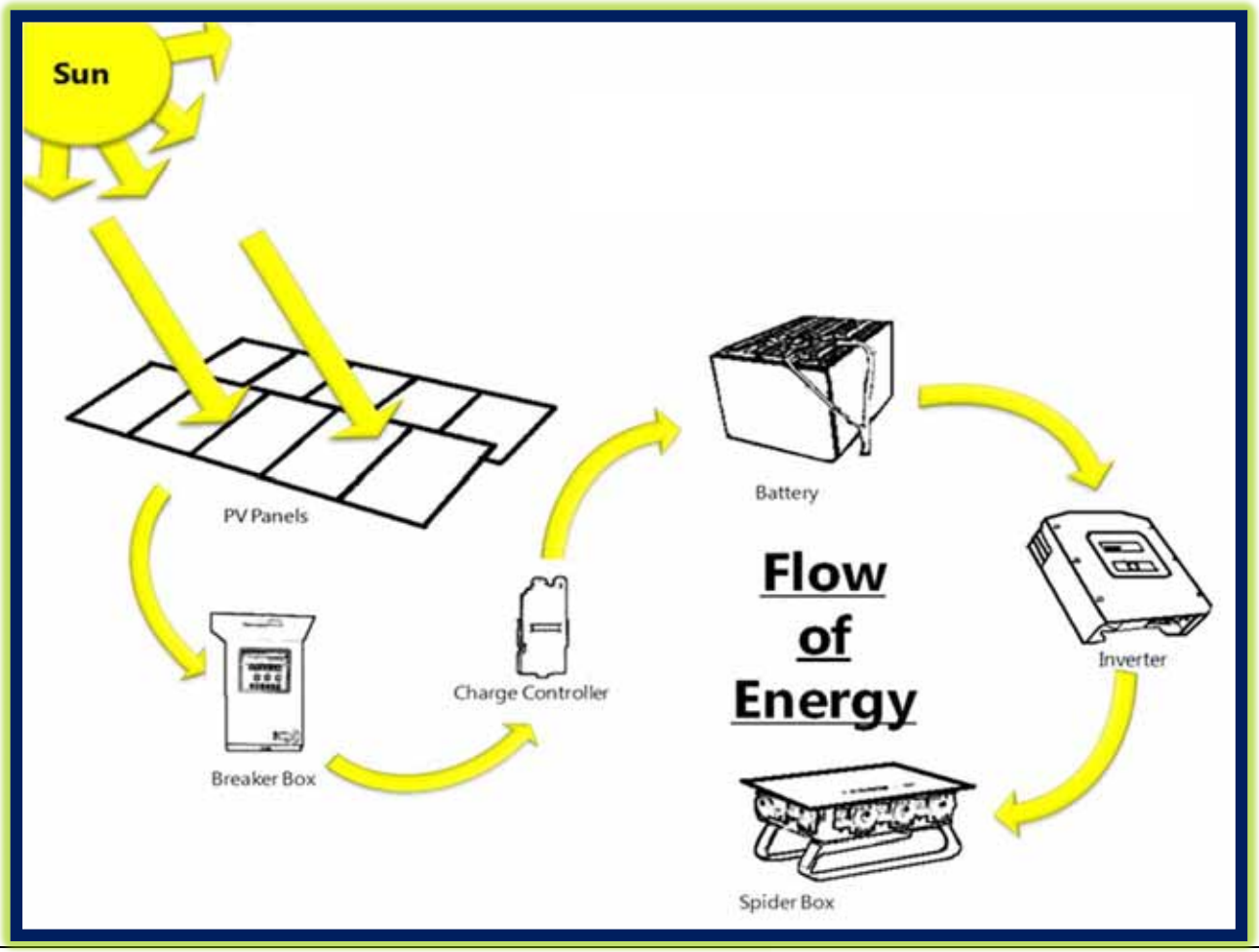

Sun
PV Panels
Breaker Box
Charge Controller
Battery
Inverter
Spider Box
Flow of Energy

Table 1 **Approximate Run time**

This is intended to serve as a guide to illustrate the approximate run time End Users may expect before complete depletion of the Battery (15%) occurs and recharging of the unit is required.

The green cells indicate that, under the given parameters, the battery would never be drawn down, nor require external recharging. Other factors, such as array shading, lower rate of solar insolation, or inconsistent draw may affect performance and run time.

The red cells indicate that, under the given parameters, the battery would require recharging before one "Work Day" was accomplished. Such a situation would require a Hybrid unit that has been upgraded with a backup generator to recharge the battery.

Full Sun (Hours)	Daytime Use (Hours)	Nighttime Use (Hours)	Average Draw (Amps)	Usable Work Days By Model		
				XC10	STC20	2XSCT20
5.5	8	0	15	17.3	34.7	-
5.5	8	0	20	3.5	6.9	-
5.5	8	0	30	1.3	2.7	17.3
5.5	8	0	40	0.8	1.7	3.5
5.5	8	0	50	0.6	1.2	1.9
5.5	8	0	60	0.5	0.9	1.3
5.5	12	0	15	2.5	5.0	-
5.5	12	0	20	1.3	2.7	17.3
5.5	12	0	30	0.7	1.4	2.5
5.5	12	0	40	0.5	0.9	1.3
5.5	12	0	50	0.4	0.7	0.9
5.5	12	0	60	0.3	0.6	0.7
5.5	8	4	15	2.5	5.0	-
5.5	8	4	20	1.3	2.7	17.3
5.5	8	4	30	0.7	1.4	2.5
5.5	8	4	40	0.5	0.9	1.3
5.5	8	4	50	0.4	0.7	0.9
5.5	8	4	60	0.3	0.6	0.7
5.5	12	12	15	0.7	1.4	2.5
5.5	12	12	20	0.5	0.9	1.3
5.5	12	12	30	0.3	0.6	0.7
5.5	12	12	40	0.2	0.4	0.5

Table of Contents

Section

General Operations:

1.1 Quick Starting the Unit

Getting Started
Park the Unit in an open area free from shade, the hitch should point East and West for optimum performance.

Deploying Solar Panels
1st - Identify the spring- locking "L" shaped pins at each end of the PV panels and pull out on the handle.
2nd - Rotate the PV panel to desired angle. ** Note, We recommend this is carried out by two adults.
3rd - Secure the PV panels after rotation by turning the spring-locking "L" shaped pins and locking it into place.

Identifying the Equipment
Standing at the hitch;
Spider Box with outlets (On trailer flatbed),
Locked Job Box (Left side, can be identified by the key lock),
the Inverter (Right side, has keypad with plastic covering), and
the Battery (located on the rear of the trailer).

Turning On
At the outlet Spider Box,

1. **Remove** *any equipment* plugged into the outlets on Spider Box.

At the Inverter

2. **Lift** plastic protective covering from bottom upwards to access breaker.
3. **FLIP UP** black breaker labeled "DC Disconnect".
4. *Wait until display reads***:**

5. **Press and hold "ENTER"**
   Hold until display bar descends:

6. **Replace** plastic protective covering.

At the outlet Spider Box,

7. *Verify* both GREEN & RED LED lights are "on" next to each outlet.

At the locked Job Box,

8. **Unlock** and **open** door. Identify the two different types of equipment found inside:
   Left - Gray Breaker box
   Right - Charge Controller (Black with LED screen)
9. On the left - **Open** Gray Breaker box from bottom upwards.

10. **FLIP UP** breakers 1-6.
11. On the right- Visually verify LED display on meter is now on.
12. **Leave** the door to the Job box **OPEN** for cooling while in use.

You are now ready to plug your equipment into outlets on the Spider Box.

Shutting Down

At the outlet Spider Box,

1. **Remove** *any equipment* plugged into the outlets on Spider Box.

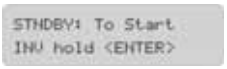
At the locked Job box, (door should already be open for cooling).

2. On the left - **Open** Gray Breaker box from bottom upwards.
3. Next, **FLIP DOWN** breakers 1-6.
4. On the right- Visually *verify* LED display on Charge Controller is now off.
5. **Close** door to Job Box.

At the Inverter,

6. **Lift** plastic protective covering from bottom upwards to access the breaker.
7. **Press** and **hold "ENTER"**
   Hold until display bar descends:

8. *Inverter display reads*:



9. Flip **DOWN** black breaker labeled "DC Disconnect".
10. *Wait* a moment and verify display turns off.
11. **Replace** plastic protective covering.

Cleaning and General Maintenance

Keep panels free of dust and dirt for optimal usage. Use **ONLY WATER**, soft bristle brush, towel and squeegee for cleaning. **NEVER USE any soaps or chemicals and NEVER power wash;** this will DAMAGE the solar panels and will void the warranties.

Section

Photovoltaic (PV) Solar Panels

After this section you will:

- ✓ Recognize safety measures while transporting or shipping the Unit
- ✓ Understand optimal Positioning of the Unit
- ✓ Safely deploy the PV panels

2.1 Trailer

Overview

There are two rows of PV panels on the Unit. Each row consists of five panels.

Figure 1 Vertical position of the PV panels for transporting.

Transporting

Anytime the Unit is towed or shipped, the PV panels need to be in the upright/vertical position for safe transportation. **Figure 1**

When towing the Unit,

- First, secure the pintle/ ball hitch
- Then, attach the 7-way connector, the two safety chains, and brake cable to the main vehicle. **Figure 2**

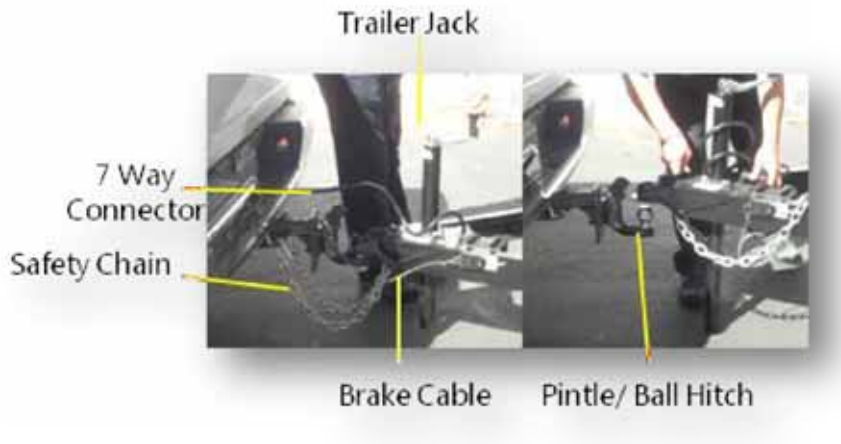


Figure 2 Identifying equipment on hitch

Parking/ Positioning the Unit

Park the Unit in an open area, free from shade. Remember to park it in a location that has adequate clearance to deploy the panels.

Anytime the Unit is not in motion, place a block or wedge under the tires to prevent the Unit from rolling.

For the best results, point the Unit's hitch toward East or West. However, environmental constraints may require the hitch to be pointed South or North.

Avoid any shading on the PV panels.

2.2 Positioning the PV Panels

To safely deploy the PV panels, We recommend two adults deploy each row of panels; one near the hitch and the other at the rear.

There are two “L” shaped, spring-loaded, pins per row of PV panels, and four in total on the Unit. **Figure 3**

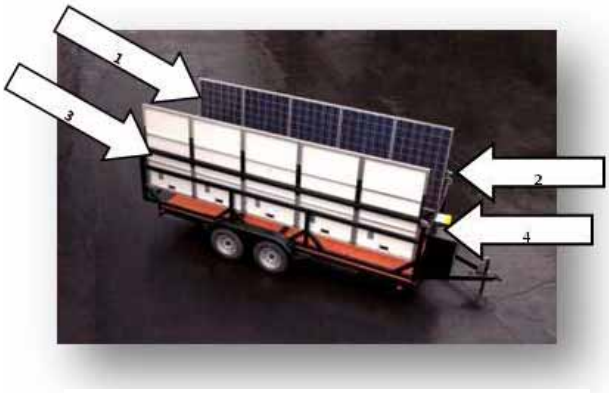


Figure 3 The four locations of the spring-loaded, locking pins

Locate the “L” shaped spring-loaded, locking pin.

The locking pins allow the PV panels to change positions. There is one position for transportation and storage; as there are three positions for deployment.

Deployment of PV Panels

Pull out on the “L” pins (on each end of the row of panels), adjust panel to desired angle, then turn “L” to lock panel into position on both sides of the PV

panel. **Figure 4**. Repeat this for both of the PV rows of panels. Adjust the angle of the PV panels and confirm they are free from any shading. If shading is present, readjust panels until they are free of shade.

Shade will decrease the PV arrays absorbed by the panels, thus reducing efficiency.

In general, if the Unit is parked with the hitch pointed East and West, the panels can be deployed flat. If no shading occurs, the panels are able to remain flat. However, if the Unit's hitch is pointed South and North, then adjustment of the PV panels may be necessary throughout the day.

Watch your head!! Be aware of your surroundings. The PV panels hang low. The corners on PV Panels are marked with caution tape for your protection.

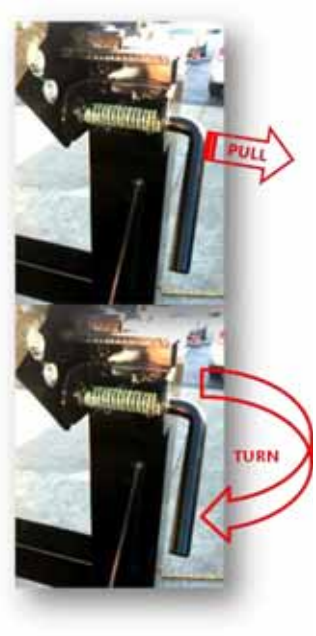


Figure 4 explains how to adjust the angle of the PV panels

2.3 Frequently Asked Questions

Q: Do I need to change the angle of my PV panels throughout the day?

There are many factors that contribute to orientation of the PV Panels. As a general rule, be aware of any shading on the PV panels throughout the day and make any necessary adjustments.

Optimal use of PV panels occurs when the unit's hitch is pointed East or West. Therefore, adjustment of the PV panels may not be necessary.

However, if the unit is pointed North and South, adjustment to the angle of the PV panels may be necessary to reach efficiency.

Q: The PV Panels look dirty, are they still able to charge?

Dust or dirt on the panels reduces the amount of solar arrays needed to produce electricity; therefore it is recommended that the panels are free of any surface dirt or dust.

Q: Can I tow the Unit with PV Panels deployed?

No! Do not attempt to tow the Unit with panels deployed.

Q: The PV panels are deployed, is my battery charging even though I haven't turned any on the equipment

No! The PV panels will only charge the battery when all breakers (1-6) on the Combiner/ Breaker box, (located in the Job Box) are all flipped up into the "ON" position.

Section

Spider Box[1]

[1] (Construction Electrical Products)

This section will inform you how to:

- ✓ Safely Use the Spider Box
- ✓ Understand Components
- ✓ Test Procedures

3.1 Outlets

Outlets

The Spider Box is equipped with different types of outlets.

Table 2 Summarizes each model and its available outlets.

Outlets	XC5	XC10	SCT20
20A Edison	6	6	6
20A Twist Lock	-	-	-
30A Twist Lock	1	1	1
120/240 50-Amp Hubbell Twist	1	1	1

3.2 GFCI Circuits

GFCI Circuits

Each outlet on the spider box as a GFCI Circuit associated to it. **Figure 5**

GFCI Circuit modules are designed to protect against ground faults. However, they are not designed to protect against overloads or short circuits.

The GFCI Circuit module does not eliminate the hazard of shock; however, it does limit the duration of the shock to a period that is considered safe for a normally healthy person. Use caution when in contact.

Figure 5 GFCI Circuit Model on the left and the outlet on the right.

Test Procedure

There are two buttons associated with each GFCI Circuit module, labeled “test” and “reset”. The green LED light indicator is associated with the “test” and the red LED indicator is associated with the “reset”. **Figure 6**

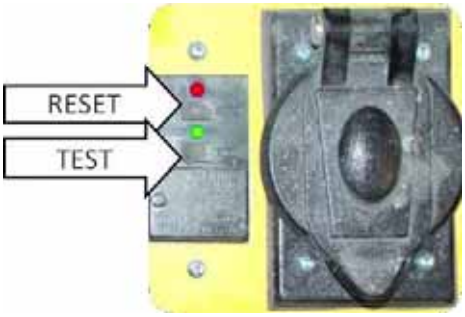


Figure 6 identifies the reset and test on the GFCI Circuit module.

Both red and green indicators must be visible to ensure safe use of the outlet. Every outlet on the Spider Box have both a “test” and “reset” with LED indicators on the Spider Box.

Tripping the GFCI Circuit Modules

If GFCI Circuit modules trips;

First, attempt to reset it by following the test procedure. If after resetting a GFCI Circuit modules and it trips again immediately, the fault is still present. Unplug all equipment plugged into the Spider Box. Then, reset every GFCI Circuit Modules on the Spider Box. Reconnect the each plug into outlet one at a time; the GFCI Circuit module will trip when the faulted load is reconnected.

Figure 7 Circuit Breaker and its cover

3.3 Circuit Breaker

Circuit Breaker

The circuit breaker is located on the rear of the Spider Box and is covered. Lift the cover to expose.

Figure 7. The circuits should remain in the “on” position.

Tripping the Circuit Breaker

An overload or short circuit will cause the Circuit Breaker to trip. Once the fault is corrected or removed the circuit breaker can be reset by switching the breakers in the “OFF” position and then to the “ON” position.

3.4 Frequently Asked Questions

Q: How do I verify power on the Spider Box?

- Check the GFCI buttons, and perform the test procedures if necessary.
- Verify that the Inverter is powered on.
- Check the breakers on the Spider Box (located on back of the Spider Box).
- Verify equipment you are attempting to power is functioning by testing it on another power source.

Q: One outlet in the Spider Box doesn't work.

Check the GFCI reset buttons next to the outlet.

Q: The Green LED is "ON" but the Red LED is "OFF" and the outlet is still working on the Spider Box, is it ok to continue use?

STOP!! The RED LED is an indicator to identify when the outlet is GFCI protected. Therefore, if the GREEN LED is on but the RED LED is off the outlet is not protected. Continued use can result in injury.

Q: How do I reset a single outlet on the Spider Box?

Press the Green "test" button, and then press the Red "reset" button.

Q: I forgot to unplug my equipment from the outlets before shutting down the Inverter, is that a problem?

This should not affect Inverter negatively, but it is recommended to remove your equipment before to shutting down the Inverter.

Q: It is raining and I have my equipment plugged into the Spider Box, what do I do?

The sockets are protected from water by the GFCI. Turn off equipment and following shut down procedures from the Quick Start Instructions found in Section 1 of this manual and also found in the Job Box on the Unit.

Q: What's the length of power cord can I use before losing current?

It is not recommended to use a power cord longer than 250 feet.

Section

Inverter[2]

[2] (SMA America, LLC, 2010)

After this section you will understand:

- ✓ Safety and the Inverter
- ✓ Accessing the Menu and Submenus
- ✓ How to handle Errors and Failures
- ✓ Accessing an External Charge

4.1 Overview

The Inverter pulls DC current from the Battery. Just as its name implies, the Inverter inverts DC into AC Current. This AC current is made accessible on the Spider Box.

4.2 Display

The display has two lines, each with 16 characters. The top line is the menu number and the menu name, or the name of the parameter where applicable. The lower line has a series of symbols indicating the status of the Inverter. **Figure 8**

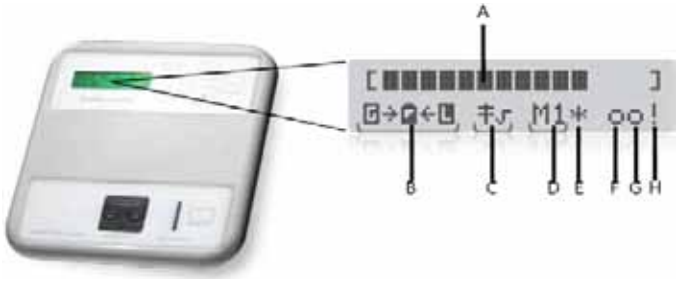


Figure 8 Display of the Inverter

Table 3 Inverter's display markers and descriptions.

Marker	Description
A	Output Pwr / Charging Pwr (load Status)
B	Direction of energy flow and system status
C	Displays if the Inverter parameters for grid operation or parameters for generator operation
D	Device assignment
E	Status of the external source (Asterisk, question mark or exclamation mark)
F	Relay 1 Status
G	Relay 2 status
H	Warning message (Exclamation Mark)

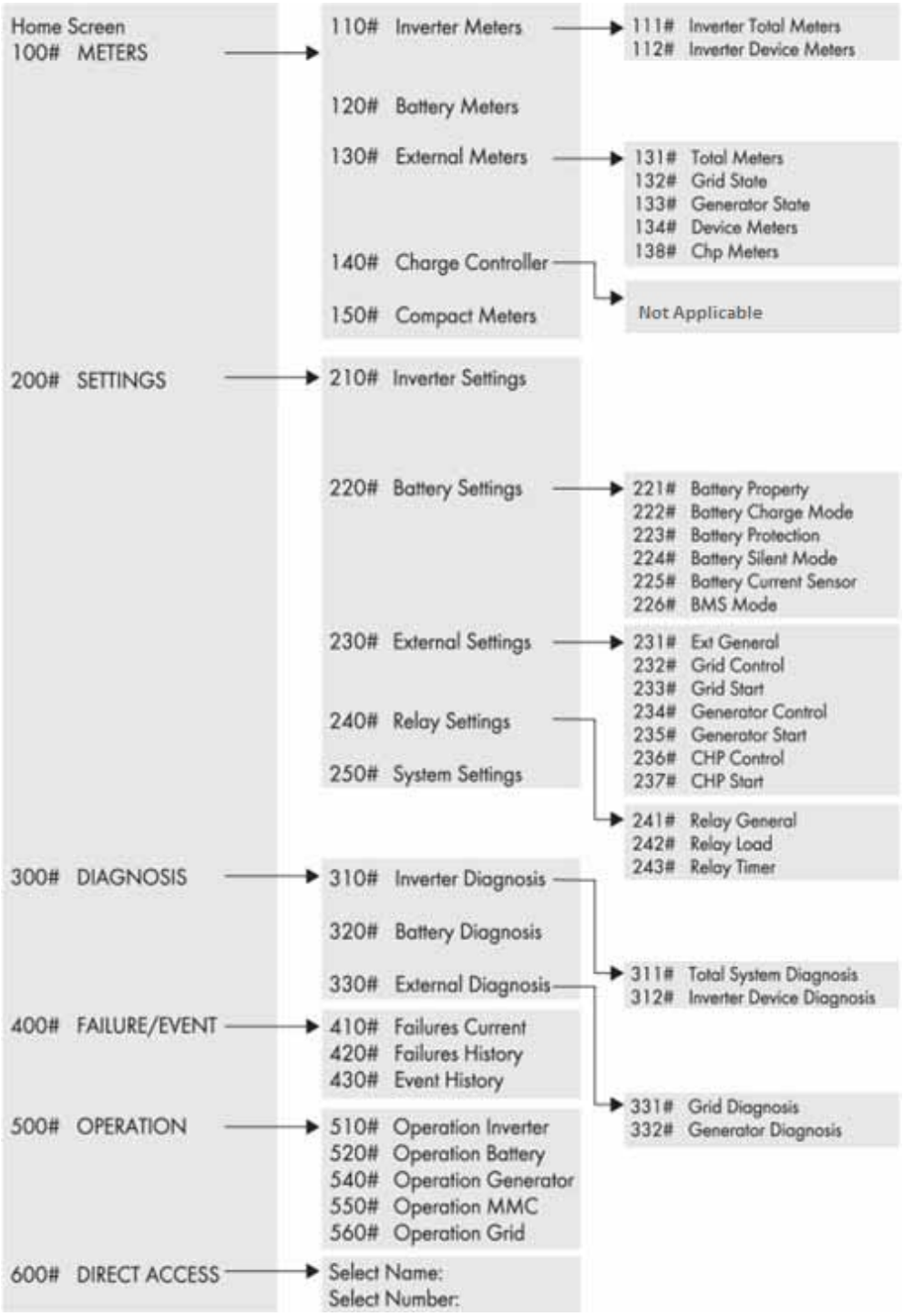
Table 4 Inverter symbol meaning

Symbol	Meaning
]	Nominal power
>	Nominal load exceeded.
←→	Direction of energy flow between grid/generator side, battery and load side.
G	Generator/grid side is on.
	Battery
L	Load side (loads/Sunny Boys)
╪	Power pole
╪	The inverter is working with grid limits.
╪×	The Inverter is working with generator limits.
M1	The Inverter is configured as master.
*	Status of the external source:
?	Voltage and frequency of the generator/grid are within set limits. Status of the external source: Voltage and frequency of the generator/grid are not within set limits. In this case, the Inverter does not connect the generator to the off-grid power system.
!	Status of the external source is displayed (at position E): The maximum admissible generator reverse power was exceeded; the Inverter has disconnected the generator from the off-grid power system.
B	Request reason “**B**attery”: The generator has been requested as a result of the battery charge level.
C	Request reason”**C**ycle”: The generator was requested via the generator operation's time-dependent repetition cycle (parameter: 235.17 GnTmOpCyc).
	This symbol can only be shown in Multicluster operation.
E	Request reason “**E**xternal”: The generator was requested via the extension cluster. This request can only take place in multicluster operation.
L	Request reason “**L**oad”: The generator has been requested as a result of the load-dependent generator request.
S	Request reason “**S**tart”: The generator has been requested by the operator manually setting the generator request in the Inverter from “Auto” to ”Start”. The generator is then **no longer** automatically controlled or switched off by the Inverter.

T	Request reason “**T**ime”: The generator was started for one hour using the “Run1h” setting in the Inverter. Once this time has passed, the Inverter automatically switches off the generator.
○●	Display for relays (solid circle = the relay is activated / empty circle = the relay is deactivated).
!	Warning message is displayed (at position (H): This symbol blinks until you have confirmed the warning or the error in the menu”#410 Failures Current” or ”#420 Failure History”.

4.3 Menu Structure

Table 5 Outlines Inverter menu hierarchy



4.4 Events, Warnings & Failures

In general, the Inverter distinguishes between events and errors.

- Events describe state changes or transient states (e.g. generator connection).
- Failures describe states that are not permitted or are only permitted up to a certain rate. This includes warnings, failures and errors. A user interaction is generally required.

Display of Events

The Inverter can display a list of events: The running count of the events is on the upper line; the date and time display changes in 2-second intervals on the lower line are the number of the event and the corresponding short text. **Figure 9**

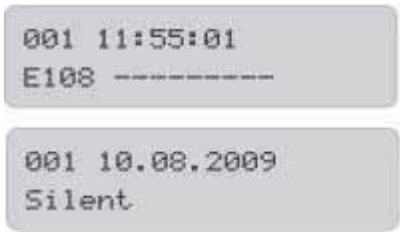


Figure 9 Display of events

Display of Warning and Failures

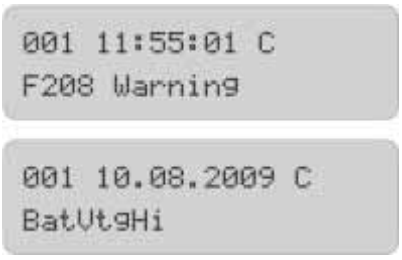


Figure 10 Display of warning and failures

The Inverter can display a list of errors and warnings: The running number (quantity) of the errors is on the upper line; the time and date display changes in 2-second intervals. On the lower line is the number of the error and the corresponding error short text. A "!" on the right on the upper line indicates when the warning and/or error occurred. A "C" on the right on the upper line indicates when the warning or the error was confirmed or cleared. **Figure 10**

Direct Access to the Error List: As a shortcut, press ESC and the arrow up button simultaneously to go directly to the error list (#420 Failure History).

Failure Confirmation

If there is a disturbance or failure, the Inverter goes into standby.
Proceed as follows to confirm a failure:
1. Remove the cause.
2. Confirm failure with <ENTER>.
3. Start the Inverter again.

Display Code of Warning and Failures

In the event of a failure, and provided it is recorded, "!" is displayed for a failure that has occurred and "C" is displayed for a failure that has stopped.

Each failure and each event have a unique three-digit display number that is created according to the parameter/measuring value assignment. The events and failures have the identical numerical range:

- 1xx - INV – Inverter
- 2xx - BAT - Battery
- 3xx - EXT - Extern
- 4xx - GEN - Generator
- 5xx - GRD - Grid
- 6xx - RLY - Relay
- 7xx - SYS – System
- 8xx - AUX - external devices and components

Table 6 Warning and Failures Codes; "F" marks a failure; "W" marks a warning

Display	Level	Description
F109	3	Transformer over temperature
F113	3	Over temperature on heat sink
F117	2	AC current limit (short-circuit control active for too long)
F121	3	Inverter overvoltage
W137	1	Derating due to temperature (heat sink or transformer
F141	2	Inverter under voltage
F158	2	Voltage on output AC1
F201	2	Measuring range of battery voltage exceeded
F206	3	Battery over temperature
F208	3	Battery excess voltage
W209	1	Battery excess voltage
W210	1	Battery overvoltage warning
W211	1	Low battery temperature warning
W212	1	High battery temperature warning
W220	1	Warning SOH < 70 %

W309	1	Relay Protection
F314	2	External voltage failure
W315	1	Grid/generator disconnection due to insufficient external voltage
W319	1	Grid/generator disconnection due to excessive external voltage
W323	1	Grid/generator disconnection due to insufficient external frequency
W327	1	Grid/generator disconnection due to excessive external frequency
W331	1	Grid/generator disconnection due to anti-islanding
W335	1	Disconnection from grid/generator due to violation of voltage limits (redundant measurement)
W339	1	Grid/generator disconnection due to voltage rise protection
W343	1	Disconnection from the external source, because the elation of the external voltage to the battery voltage is too high.
W347	1	Disconnection from external source due to excessive load
W351	1	Disconnection from external source due to external short-circuit
W401	1	Reverse power protection (generator)
W501	1	Grid reverse current prohibited (quick grid disconnection)
F605	4	Transfer relay does not open
F702	5	DSP reset
F703	2	Timeout during a task
F704	4	Invalid DSP calibration
W705	1	DSP watchdog has been triggered
F706	4	Watchdog meter has expired (watchdog triggered several times in succession)
F710	4	Auto-start meter has expired (several auto -starts in succession)
W713	1	Watchdog has been triggered
F716	2	Measuring range of battery voltage exceeded
F720	4	Short-circuit or cable break on transformer temperature sensor
F721	4	Short-circuit or cable break on heat sink temperature sensor
W722	1	Short-circuit battery temperature sensor
W723	1	Cable break on battery temperature sensor
F731	4	Error in the cluster configuration
F732	4	Error in the address assignation of the cluster devices
W738	1	Synchronization not successful
F739	3	Internal communication of the master is interrupted
F743	3	Internal CAN communication of the master is interrupted
W753	1	Invalid system time
F754	2	Communication with Multicluster Box interrupted
W755	1	Battery Preservation Mode 1 (LBM)
W756	1	Battery Preservation Mode 2 (LBM)
W757	1	Battery Preservation Mode 3 (LBM)
W758	1	No output voltage measured from the main cluster
W782	4	Failure of the grid monitoring
F801	4	4 Plausibility check of the contactors in a Multicluster Box has failed
W804	1	Grid operation not possible
W805	1	Generator operation not possible
F806	4	Multicluster Box settings do not correspond to the software settings.
W807	1	No valid grid voltage with the requested grid operation
W808	1	Fault in contactor Q4

F809	4	Fault in contactor Q10 (load shedding)
F810	4	Error in 15 V supply of the Multicluster Box
F811	4	Error in 24 V supply of the Multicluster Box
W815	1	Fault in contactor Q5
F816	2	Fault in contactor Q7
F818	4	A phase is missing, Multicluster Box goes into ”Failure” status
W851	1	Pole of battery connection is reversed or short-circuit on the Sunny
W852	1	Battery overvoltage Inverter Charger
W853	1	Overvoltage PV generator Inverter Charger
W854	1	No PV voltage or short-circuit on Inverter Charger 1
W855	1	Sensor error (or under temperature) on Inverter Charger 1
W856	1	Over temperature Inverter Charger 1
W857	1	No communication with Inverter Charger 1 for more than 24 h
W861	1	Pole of battery connection is reversed or short-circuit on the Inverter Charger 2
W862	1	Battery overvoltage Inverter Charger 2
W863	1	Overvoltage PV generator Inverter Charger 2
W864	1	No PV voltage or short-circuit on Inverter Charger 2
W865	1	1 Sensor error (or under temperature) on Inverter Charger 2
W867	1	No communication with Inverter Charger 2 for more than 24 h
W871	1	Pole of battery connection is reversed or short-circuit on the Inverter Charger 3
W872	1	Battery overvoltage Inverter Charger 3
W873	1	Overvoltage PV generator Inverter Charger 3
W874	1	No PV voltage or short-circuit on Inverter Charger 3
W875	1	Sensor error (or under temperature) on Inverter Charger 3
W876	1	Over temperature Inverter Charger 3
W877	1	No communication with Inverter Charger 3 for more than 24
W881	1	Pole of battery connection is reversed or short-circuit on the Inverter Charger 4
W882	1	Battery overvoltage Inverter Charger 4
W883	1	Overvoltage PV generator Inverter Charger 4
W884	1	No PV voltage or short-circuit on Inverter Charger
W885	1	Sensor error (or under temperature) on Inverter Charger
W886	1	Over temperature Inverter Charger 4
W887	1	No communication with Inverter Charger 4 for more than 24 h
F890	2	Fault at the external measuring point of the Multicluster Box

Handling Pending Failures during the Booting Procedure

During the booting procedure, all pending failures are generally confirmed without an entry being made in the history. This way, after the booting procedure failure that is still pending will be re-entered, or if the system detects that this failure has stopped, it is entered as no longer being present.

4.5 Red & Green LEDs

Green LED

The GREEN LED indicates the inverter is in operation or standby.
Figure 11

Red LED

The RED LED indicates a disturbance or fault.

Figure 11 Indentifying LEDs and Keypad

Both the RED and GREEN LEDs light simultaneously during initialization.

4.6 Keypad

The keypad allows the user to access the menus and submenus on the Inverter.
Figure 11

Use “Enter” as Confirmation or yes, navigate one menu level down and to START and STOP device (when held down).

Use “ESC” to cancel a function, answer no, or to navigate one menu level higher.

Use the arrow keys to navigate through the menus.

The Inverter display will go into sleep mode after a short time of no action being taken on the screen. The display will turn off. Simply press the any key to wake the display.

4.7 Breaker and SD Card

Breaker

The breaker is located on the front of the Inverter, Labeled “DC Disconnect”. The breaker is the main on/ off switch for the Inverter. **Figure 12**

When flipped up in the “ON” position, the Inverter is connected to DC power.

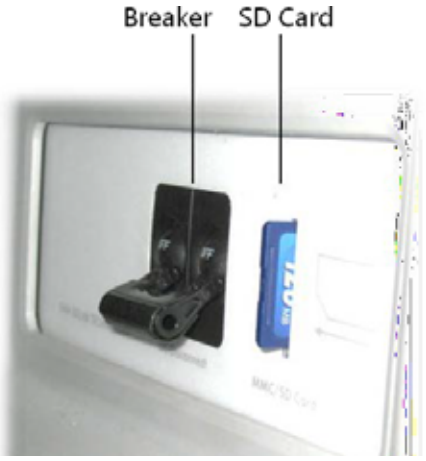


Figure 12 Breaker and SD card

SD Card

The SD card is found to the right of the breaker. It serves as two critical functions for the Inverter; it maintains parameters designed specifically for the Unit and it archives crucial data. **Figure 12**

The SB card saves all disruptions, allowing technicians to monitor problems with the unit. Therefore, the SD CARD should never be removed unless by authorized personnel.

4.8 Non-PV Charge

Figure 13 Non-PV charge

2/O SB Industrial Connector[3]

The SB Industrial Connector is located under the front, right side of the inverter. It is a 350 amp, 600 volts. This industrial connector is used for supplemental or addition battery charge. **Figure 13**

“Male” Plug

The “Male” Edison plug is located under the front, right side of the Inverter, next to the SB Industrial Connector. The 120 v, 15 Amp “Male” Wall Plug enables the Inverter to plug into any standard Edison “Female” outlet. **Figure 13**

[3] (Anderson Power Products®)

4.9 Frequently Asked Questions

Q: Can I remove the SD card?

Never, remove SD card. Removal of SD could harm the integrity of device. Only qualified technicians are allowed to remove.

Q: The SD card has been removed and is missing, what do I

do? Contact a qualified electrical technician.

Q: What if I flipped down the breaker but forgot to Press and Hold "Enter"? (step #7 on the Shutting Down on the Quick Start Guide)

This is a safety measure for the device, always power down properly before shutting off the Inverter's breaker.

Q: The Inverter screen is blank, what do I do?

- Check breaker to verity it is flipped upward in the "on" position.
- Press Enter on the Keypad, The display goes into sleep mode.
- Verify that battery is plugged in the Inverter.
- If the battery may have dropped below 15%. Shut off breaker on inverter by flipping down. Then wait 15 minutes and retry powering on procedures (You may need to do this twice).

Q: The Inverter screen asked me for a password, what's the password for the inverter?

Password protected portions of the Inverter are for technicians only.

Q: The display has a flashing exclamation point (!), what does this mean?

An error or warning has occurred.

Q: How do I find the error code?

Go to menu #400 Events (hit "enter"), then to #410 failures current, (hit "enter") this will display current error

Q: How do I know how much power I am drawing?

From the home screen, down arrow to #100 meter (hit “enter”) then arrow down to 150# Compact meters

Q: Can I need to plug this system into a wall socket?

A 15 amp “Male” plug can be found on the front of the inverter. The Inverter should be turned on before plugging into wall socket.

Section

Job Box

After this section you will:

- ✓ Know where important paperwork can be found
- ✓ Identify equipment found in the Job Box
- ✓ Be able to read and understand the display on the Charge Controller

5.1 Important Material Found in Job Box

Key

The key locks the Job Box and protects all of its contents; do not lock the Job Box when the Unit is in use. Leave the Job Box door open for ventilation.

Registration

A laminated copy of the registration can be found in the Job Box.

The Department of Motor Vehicles (DMV) requires that all vehicles carry its registration on board. The registration identifies the vehicle identification number (VIN) and the license plate number.

Quick Start Instructions

Also found in the Job Box are the Basic operating instructions of the Unit (Also found in Ch1).

5.2 Combiner/Breaker Box[4]

The Combiner/ Breaker Box is located on the upper left side of the Job Box. Inside are 6 breakers:

- Breakers 1-2 manage the left row of PV panels.
- Breakers 3-4 manage the right row of PV panels.
- Breakers 5-6 power the Charge Controller.

The breaker box will have a main power switch on the front of the breaker box as in figure 14. The power should be manage from the large red switch on front of the box. **Figure 14**

[4] (MidNite Solar Inc., 2010)

However, in some cases the breaker box may not have the main power switch located on the front. If this is the case then the breakers will need to be turned on individually.

To expose the breakers:

- Lift up on the cover from the bottom. The cover is able to be held open on its own. **Figure 15**

Figure 15 Combiner/ Breaker box, accessing breakers

The breaker box found in the job has to be in on position (flipped up) when the Unit is in use.

Figure 14 Combiner/ Breaker box with single power switch

5.3 Charge Controller Overview

The Charge controller doesn't require any programming. It is delivered already configured for optimal use. **Figure 16**

The Charge Controller blocks reverse current and to protect the battery from overcharge, which in turn, lengthens the life of the battery.

Figure 16 Charge Controller

5.4 Frequently Asked Questions

Q: Why do I need to leave the door open?

The door to the job box must be left open during operation to prevent the Charge Controller from overheating.

Q: Some rain got in the Job Box, what should I do?

Make sure the drainage hole at the bottom of job box is free of debris to allow drainage.

Q: I lost the key, what do I do?

Contact a qualified locksmith. We suggest making a spare key in advance.

Q: I lost the Quick Start Instructions and now I don't know how to turn it on. Section 1 of this manual has the Quick Start Instructions.

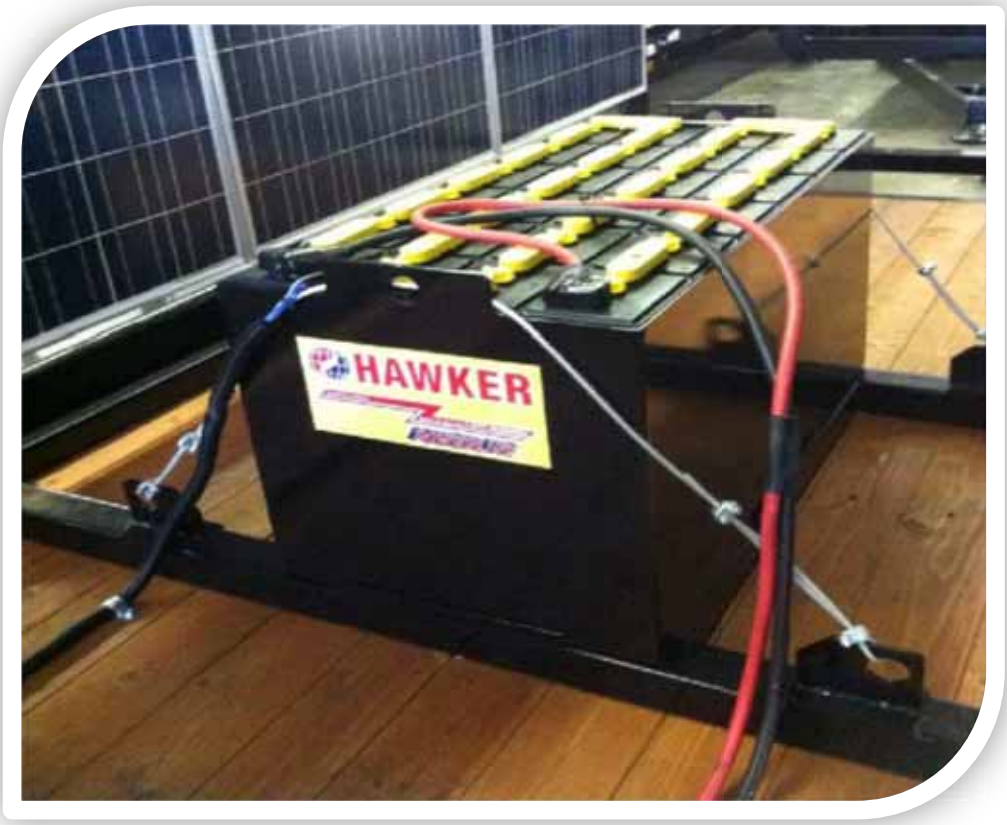
Q: How do I adjust the charge controller?

Do not make adjustments to the Charge Controller. They are delivered to the customer preset. Any adjustments could cause malfunctions of the equipment.

Q: Do all six breakers need to be in the "ON" position?

Yes.

Section



Battery

After this section you will:

- ✓ Be able to identify the battery
- ✓ Understand the battery status on the Inverter and Charge Controller

6.1 Battery

Overview

The 48v Flood Lead Acid (FLA) battery[5] is located towards the rear of the Unit. Depending on the model, the system can be equipped with one or two batteries.
Figure 17

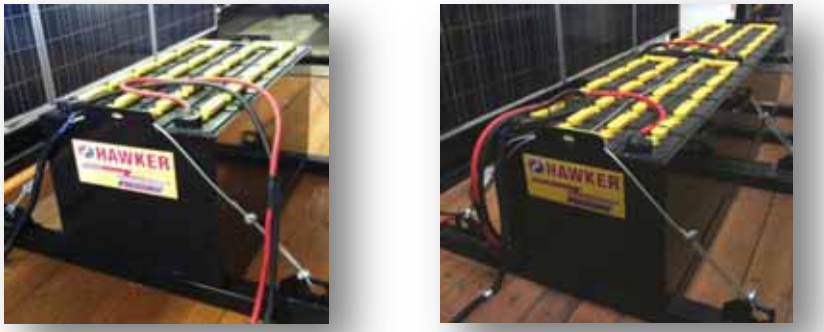


Figure 17 Single Battery and Double Battery

6.2 Battery Metering on the Inverter[6]

Accessing Meters

From the home screen, down arrow to #100 meter (hit "enter") then arrow down to 150# Compact meters

A. Meter name
B. % of Battery
C. % Error accuracy
D. Current of charge or discharge
E. Temperature of Battery

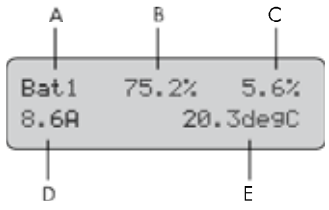


Figure 18 Accessing battery meter on Inverter

[5] (Hawker, 2012)

[6] (SMA America, LLC, 2010)

6.3 Battery Charge Stages and Meanings on the Charge Controller[7]

Bulk MPPT

This stage of the Charge Controller means; that the Charge Controller will be putting out as much current as it can trying to charge the batteries to the absorb voltage set point. This is also known as constant current mode.

Absorb

This stage means that the Charge Controller will maintain the absorb set point voltage until the batteries are charged or it reach Float stage. At this stage the Charge Controller is not putting out maximum current, as that would increase the battery voltage over the Absorb set point. This is also referred to as constant voltage mode.

The absorb time is proportional to the bulk time. (i.e. the time bulk takes to reach the absorb voltage.) The battery it's considered —full at the end of the absorb charge cycle.

Float

A Float cycle follows after the Absorb cycle is completed; Float is displayed on the screen. Battery voltage is held at the float voltage set point, float time can be changed by the user.

Equalize

Equalization function has to be enabled by the user, refer to page 25. The intent of an equalization charge is to bring all battery cells to an equal voltage by a deliberate overcharge. The goal is to return each battery cell to its optimum condition through a series of voltage controlled chemical reactions inside the batteries.

The main function of a charge controller or regulator is to protect your battery from overcharge and block a reverse current. If a non-self-regulating solar array is connected to lead acid batteries with no overcharge protection, the life of your batteries will be compromised.

[7] (MidNite Solar Inc., 2010)

Simple controllers contain a transistor that shunt the PV charging circuit, terminating the charge at a pre-set high voltage and, once a pre-set reconnect is reached, opens the shunt, allowing charging to resume.

6.4 Non-PV Battery Charge

At the battery can be charged from additional sourcesAs mentioned in section 4.8, the battery can be charged by the SB Industrial Connector and the Male Wall Connector.

To use an external (non PV) charge, the Inverter breaker needs to be in the “ON” position and the display must be in the standby mode.

Table 7 The battery life remaining at 15%, 50% and 75%

and the amount of time it takes using each external charge method.

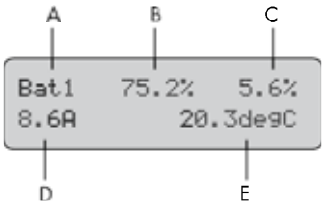
Battery life Remaining	**Time to % in hrs**	
	SB	**Male wall plug**
15%	**4.5**	**14.9**
50%	**2.7**	**8.8**
75%	**1.3**	**4.4**

6.5 Frequently Asked Questions

Q: How do I know how much battery power I have left?

From the home screen on the Inverter, down arrow to #100 meter (hit "enter") then arrow down to 150# Compact meters

A. Meter name
B. % of Battery
C. % Error accuracy
D. Current of charge or discharge
E. Temperature of Battery



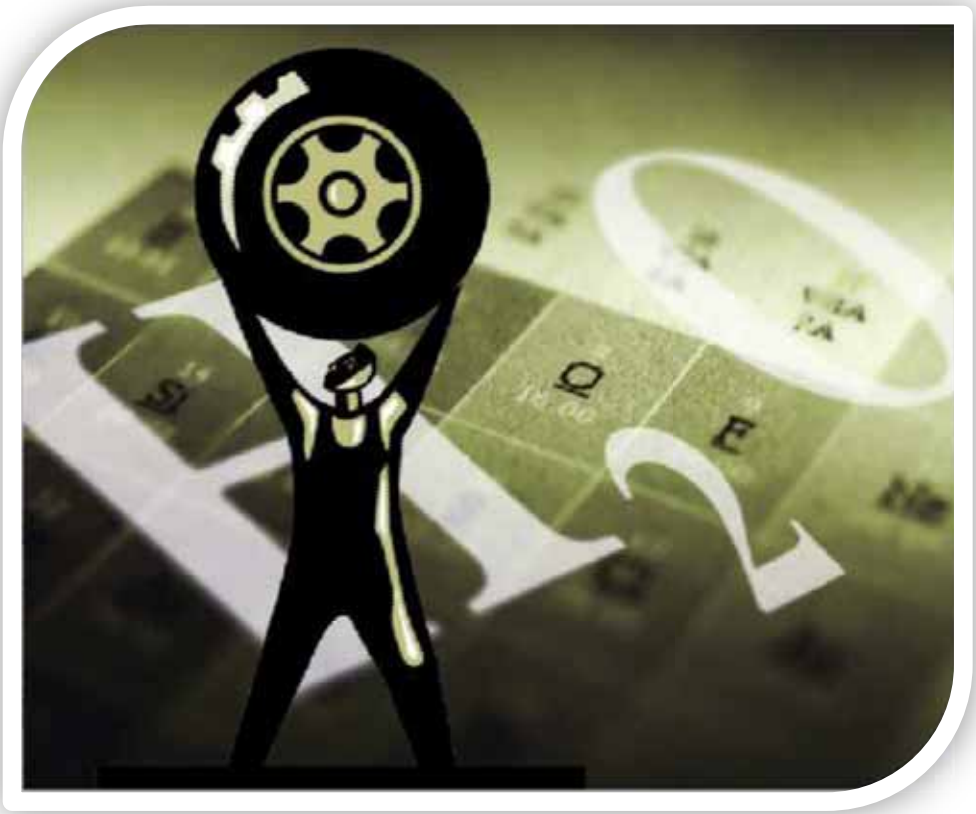
Q: Do the Inverter and the Charge Controller monitor the same battery characteristics?

No, the Charge Controller monitors voltage while the Inverter monitors amps. However, the Inverter is plugged into a non-PV source it will monitor volts.

Q: What is the most efficient non-PV charge?

The SB industrial Connector is the most efficient.

Section



Maintenance

After this section will:

✓ Know the responsibilities required to maintain the Unit.

7.1 Maintenance of the Unit

The Unit requires relatively low maintenance; however there are a few simple maintenance procedures that will ensure the longevity of the Unit.

Trailer

The "L" shaped locking pins need lubrication

- Use super white multi-purpose grease,

Tires

- Maintain a tire pressure of 65psi.

PV Panels

Keep panels free of dust and dirt for optimal use.

- Clean with ONLY WATER, soft bristle brush, towel and squeegee for cleaning. NEVER USE any soaps or chemicals and NEVER power wash; this will DAMAGE the solar panels and will void the warranties.

Spider Box

There isn't any routine maintenance for the Spider Box.

However, it is important to be aware of the status of the GFCI light indicators. See Section 3 for Spider Box.

Inverter

Firmware update

- Contact the Inverter manufacturer when updates are needed.

Plastic cover

- If there are any rips or cracks on the plastic cover, contact the manufacturer immediately for replacement.

Job box

Ventilation

- The Job Box must remain open while in operation for ventilation.

Water drainage

- In the bottom of Job Box, keep the drainage hole clear.

Battery[8]

There are 24 water reservoirs on each battery. After a full charge:

- Each of reservoirs should be filled with distilled water 1/4 inch over the battery plate. **Figure 19** & **Figure 20**

Figure 20 Automatic shut-off battery filler

Figure 19 Battery reservoir plate

[8] (Hawker, 2012)

7.2 Frequently Asked Questions

Q: Can I power wash the PV Panels on low and be really careful?

No! Power washing of any kind is not allowed and will void any warranties. NEVER POWER WASH,

Q: What kind of cleaning products can I use to clean the PV panels?

Never use any kind of chemical or soaps on PV Panels. Use Water only.

Q: The PV panels still look dirty after I washed them with water, what can I do to clean them better?

Rewash the PV panels with water using only towels, soft bristle brushes or squeegees, never power wash.

List of Figures

List of Tables

References

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