

Please contact **SUNRNR** of Virginia directly for technical support or any questions concerning your **SUNRNR**. Contact information is below. Units must be returned to factory or authorized **SUNRNR** dealer for service.

Your **SUNRNR** comes with a one year limited Warranty which covers defects in materials or workmanship. (Product registration required – see below).

All Warranty claims must be made in writing directly to:

SUNRNR of Virginia
P.O. BOX 102
PORT REPUBLIC, VA 24471
(540) 234-0164

www.sunrnr.com support@sunrnr.com

Warranty-related Shipping and Handling cost are not covered under Warranty. Consumer is fully responsible for paying any Shipping and Handling costs incurred.

For Product Registration, send:

- name
- address
- phone number
- model and serial number
- date and place of purchase

by mail to the address above, by submitting form on website, or by email to support@sunrnr.com



Model: _____

Serial Number: _____

Date of Purchase: _____

Purchased From: _____

Keep for your records 03/10



SUNRNR

“Sun Runner”

Portable Solar/Wind Generator

STORED SUNSHINE



User's Manual & Warranty Information

SUN110, SUN220, SUNPWR

This manual contains important information regarding safety, operation, maintenance, storage, and warranty of this product. Before use, read and understand all WARNINGS, CAUTIONS, instructions, and product labels. Failure to do so could result in personal injury or property damage. Keep manual for reference. www.sunrnr.com

WARNING - Important Safety Information

To ensure safe and reliable service, your SUNRNR must be operated properly. **READ ALL INSTRUCTIONS BEFORE USING THIS SUNRNR GENERATOR.** Pay particular attention to the WARNING and CAUTION statements in this manual. The WARNING statements identify conditions or practices that may result in personal injury or even death. The CAUTION statements advise against certain conditions and practices that may result in damage to your SUNRNR and other equipment. Failure to comply with these operating instructions will void warranty.

! WARNING !

FOR YOUR SAFETY:

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Read product labels for flammability and other warnings.

TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, EXPLOSION OR INJURY:

- DO NOT locate SUNRNR in an area, room or enclosed space where explosive or flammable fumes might be present - NOT IGNITION PROTECTED.
- DO NOT connect to AC distribution wiring. A SUNRNR is designed for direct use by AC appliances plugged directly in to the AC receptacles on the SUNRNR.
- Remove any appliance plugs from SUNRNR outlets before servicing appliance.
- This is not a toy - KEEP AWAY FROM CHILDREN.
- A SUNRNR produces either 115 or 220 V AC power. Always use the same safety precautions that you would use when using a normal household outlet.
- Never use damaged cords or plugs (no cuts, bare wires, etc) in any SUNRNR or household outlet.
- Never drive over, walk on, or drag any electrical cords including cables to solar panel or other energy source.
- Never leave SUNRNR near stairs, ramps, or drop-offs.
- DO NOT connect the neutral AC output terminal of your SUNRNR to ground - dangerous AC voltages can be present between SUNRNR neutral and SUNRNR ground.
- Do not drop SUNRNR or solar panel.

Specifications (cont)

Charge control is based on three-stage charging algorithm: bulk charge mode (highest rate), constant-voltage mode (pulse), and float mode (maintainer).

Charge Controller	(LEDs only when panel connected)
POWER LED – red	ON – panel properly connected, normal power supply. OFF – no power available or of insufficient voltage.
CHARGING LED – blue lightning bolt	ON – battery charging; bulk charge of virtually all solar power to battery. Flashing – panel voltage too low for charging (insufficient daylight).
CHARGE COMPLETE LED – green, full battery symbol	ON – fully charged; small float charge continues to maintain battery.
Battery GOOD LED – green, ¾-full battery symbol	Battery voltage over 12.5V+/-0.4 and charging
Battery FAIR LED – yellow, ½-full battery symbol	Battery voltage 11.5-12.5V+/-0.4, needs charging
Battery LOW LED – red, ¼-full battery symbol	Battery voltage 11.5V+/-0.4, needs charging
Battery LOW LED – blinking red	Blown 30-amp fuse (battery disconnected)
Operation temperature	41-122 °F
Operation humidity range	0-80% RH
Over temp protection (cutoff)	>176 °F
Over temp protection (restart)	<149 °F

Battery	SUN110, SUN220, SUNPWR
Sealed lead acid absorbed glass mat (AGM) deep cycle	8D 245 amp hours
Realistic Storage Capacity	2000 Whrs
Manufacturer Life Time	5 years

	Size l x w x h (in)	Size l x w x h (cm)
SUNRNR Unit	26 x 14 x 25	66 x 36 x 63
Solar Panel	2.3 (depth w/j-box) x 25.7 x 56.1	5.8 (depth w/j-box) x 65.3 x 142.5

	Weight (lbs)	Weight (kgs)
Unit – SUN110	240	109
SUN220	250	114
SUNPWR	210	95
Solar Panel	27	12

Power Source Requirements

The inverter is well suited for heavy loads such as well pumps, small compressors, small wire feed welders and other loads requiring a high inrush starting current, high amp starting load. Induction motors, as well as some other loads, may require two to six times their rated wattage to start up. A SUNRNR's inverter has a peak watt power rating that may allow such appliances and tools to be operated safely. The equipment needing the highest starting wattage is pumps and compressors that start under load. This equipment can be safely tested and if an overload is detected, the inverter will simply shut down until the overload situation is corrected and the inverter reset.

Appliance Power Consumption

Most electrical tools, appliances and audio/video equipment have labels that show the device's power consumption in amps, watts, or both. If only amps are given, Watts may be calculated by multiplying amps times volts AC (either ~115 or ~220).

Typical Wattages (approximate Watts required per hour at maximum continuous setting/speed/volume):

Light Bulb – 100W equivalent LED	5
Laptop Computer	55
Light Bulb – 100W, incandescent	100
CRT TV	150
Stereo/Amplifier	240
Flat Screen TV	300
Drill, Jig Saw, Sander	360
Computer and Monitor	440
Refrigerator/Freezer (comp on w/defr)	600
Furnace – gas w/ blower	750
Vacuum Cleaner, Washer	820
Coffee Maker - brewing	1000
Compact Microwave Oven	1000
10" Bench Saw	1500
Well Pump	1500
A/C (central w/compressor on)	3500
Clothes Dryer	5500

Specifications

Inverter	SUN110	SUN220
Max Continuous Power	3500 Watts	3500 Watts
Surge Capacity (Peak Power)	7000 Watts	7000 Watts
Waveform	Modified Sine	Modified Sine
Rated Input Voltage	10 - 15 VDC	10.5 – 15 VDC
AC Output Voltage	110 V	220V
Efficiency	~90%	
No Load Current Draw	<0.7 Amp	<0.5 Amps
AC Outlets	4 Std No Amer	2 x 220V AC

Solar Panel Rated Power	130 (+10%, -5%) Watts
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- DO NOT allow the SUNRNR to become inverted or fall on its sides/ends - keep upright on its wheels, handles up.
- DO NOT operate SUNRNR unless it is upright as above.
- SUNRNR weighs more than 200 pounds - DO NOT roll over toes, fingers, feet, pets, or anything that might be damaged or injured and DO NOT lift alone.
- To prevent cuts from sharp edges, use gloves when lifting SUNRNR from the bottom.
- NEVER CONNECT NEUTRAL OR LINE 1, HOT LINE, AC OUTPUT TO GROUND, NEUTRAL MUST FLOAT!
- DO NOT operate SUNRNR if unit is wet; allow to dry thoroughly before operation.
- Do NOT cover or operate unit in unventilated areas.
- The SUNRNR AC outlets have ground fault protection. Always use cords and appliances with grounded, 3 prong plugs, for maximum ground fault safety.
- Cigarette lighters can fit into the 12 VDC socket, become extremely hot, cause serious burns, or start fires – Never touch hot end to something that might burn.
- Always disconnect ALL plugs from outlets or portals by grasping plug only - Never unplug by pulling cords.
- If you see or smell smoke, sparks or fire, turn off the SUNRNR main switch.
- DO NOT plug in battery chargers for cordless power tools if the charger carries a Warning that dangerous voltages are present at the battery terminals.
- Dangerous voltages inside unit and solar panel junction box – DO NOT open unit or junction box.
- Avoid high winds while handling solar panel.
- Not approved for use with medical equipment.

CAUTIONS

- NO USER SERVICABLE COMPONENTS INSIDE.
- OPENING UNIT WILL VOID WARRANTY.
- Do not operate over 3500 Watts continuous.
- Ensure devices to be operated do not exceed Wattage limitations and are OFF before plugging into SUNRNR.
- DO NOT operate SUNRNR if it is wet.
- Keep in well-ventilated area when in use.
- Do NOT use with small, Ni-* battery-operated appliances that plug DIRECTLY into AC receptacle.

BEST PRACTICES:

- Turn off SUNRNR main switch when not in use.
- Keep SUNRNR fully charged for optimal performance.
- Keep wheels on solid surfaces.
- Use LEDs and energy efficient appliances whenever possible.

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Introduction

The SUNRNR portable renewable energy generator has been designed to give you silent, zero-emission quality power with ease of use and reliability. The SUNRNR stores energy produced by the included solar panel (or other optional non-fossil fuel energy generation source) when exposed to sunlight and may be thought of like a bank account for electricity – make withdrawals from the balance as needed and make deposits when possible. The SUNRNR may be charged while off, while in use to extend the run time, or may be used without the solar panel, etc. connected. The auxiliary portal is provided for the use of a wind turbine or other source of energy generation.

A SUNRNR provides 4 outlets for 115 V/60 Hz (SUN110) or 2 outlets for 220 V/50 Hz (SUN220) AC power and will easily run such loads as fans, pumps, lights, furnaces, microwaves, power tools, refrigerators, TVs and most other household appliances. (A SUNPWR Power Module has no inverter or outlets; see pg 7.) Twelve-volt DC power for devices like a cell phone charger is available at the auxiliary socket on the DC end.

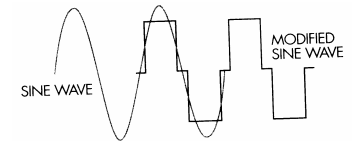
Common Audio/Visual Problems

- “Buzzing” sound in audio systems: Some inexpensive stereo systems’ power supplies may not adequately filter the modified sine wave of the inverter and therefore emit a buzzing sound from their speakers. Use higher quality power amplified/filtered supply sound system.
- Television interference: Although inverter is shielded, some interference may be visible, especially with weak TV signals. Try separating inverter from TV equipment, using shielded antenna cable, adjusting orientation of equipment, attaching “ferrite data line filter” to TV power cord, and do not operate high-power devices concurrently.

Appendices

Power Inverter Output Waveform

The AC output waveform of the inverter is modified sine wave having characteristics similar to the sine wave shape of utility power. This type of waveform is suitable for most AC loads, including linear and switching power supplies used in electronic equipment, motors, and transformers. This waveform has an RMS (root mean square) voltage of 115 volts, which is the same as standard household power. Most AC voltmeters (both digital and analog) are sensitive to the average value of the waveform rather than RMS. They are calibrated for RMS voltage under the assumption that the wave form measured will be a pure sine wave. These meters will not read the RMS voltage of a modified sine wave correctly, reading about 20 to 30 volts low when measuring the output. For accurate measurement of the output voltage of the inverter, use a true RMS reading voltmeter such as a Fluke 179, Fluke 79 III series, Beckman 4410 or Triplet 4200.



CAUTIONS

To avoid inverter shutdown and possible damage, ensure that total continuous power consumption of all tools and/or appliances simultaneously powered by inverter does not exceed continuous watts rating. Larger resistive loads, such as electric stoves or heaters, could draw more wattage than the inverter can deliver on a continuous basis. Also ensure start-up wattage for loads does not exceed peak watts for more than a second. Appliances such as microwave ovens will normally draw more than their rated current and could possibly overload the inverter when operating simultaneously with other appliances. For example, a 600 W microwave oven draws approximately 940 W. The overload protection will automatically shut the unit down if the inverter’s output capacity is exceeded continuously. If overload shutdown occurs, turn OFF inverter, remove excessive load, and restart ON.

Care/Maintenance

- A SUNRNR is virtually maintenance-free as there are no moving parts. However, charging the battery whenever convenient/possible will give the battery its longest life/capacity.
- Dirt, dust, haze, or shadow will degrade solar charging considerably. Wipe panel when necessary using soft cloth (water and mild detergent may be used). The entire panel must be exposed at the same time for maximum energy conversion – even 5% shadow coverage will drastically reduce charge.
- ALWAYS turn master switch at DC end to OFF when not in use. The parasitic load if left ON will deplete a fully charged battery by about 1 amp/hr (less than 10 days).

Troubleshooting

Refer to the following chart for nominal voltage information and troubleshooting. The battery voltage LCD readout provides insight into charge status when taken into account with battery equalization (or “resting”) information as in the chart.

Battery Condition at 77°F	Nominal Battery Voltage 12V
Battery during equalization charge	Over 15
Battery near full charge while charging	14.4 to 15
Battery near full discharge while charging	12.3 to 13.2
Battery fully charged with light load	12.4 to 12.7
Battery fully charged with heavy load	11.5 to 12.5
No charge or discharge for 6 hours – 100% charged	12.7
No charge or discharge for 6 hours – 80% charged	12.5
No charge or discharge for 6 hours – 60% charged	12.2
No charge or discharge for 6 hours – 40% charged	11.9
No charge or discharge for 6 hours – 20% charged	11.6
No charge or discharge for 6 hours – Fully discharged	11.4
Battery near full discharge while discharging	10.2 to 11.2

Inverter Problems (Inverter power ON)

- No AC output/red fault LED lit: Battery below 10 VDC (recharge) or thermal shutdown (turn off, reduce load, allow cool down, restart).
- Motorized power tool will not start: Excessive start-up load – tool incompatible with inverter.
- Power tool operating speed not correct: Purely inductive load - add resistive load by operating incandescent lamp concurrently.

Charging Problems (Battery not recharging)

- Check 30-amp fuse for charging portal in use (upper SOLAR; lower AUX). Replace with similar specification fuse if necessary.

The electricity is stored in a large 245 (8D) amp-hour absorbed glass mat (AGM) deep cycle storage battery. Battery charging by solar panels is controlled by a charge controller (Fig 1). The battery is sealed, but is provided with over pressure vent caps that will allow battery gases (i.e. hydrogen) to escape if the battery becomes over-pressurized due to faults. The battery will normally NOT VENT any battery gases in normal use.

The SUNRNR comes with one weatherproof solar panel that charges the battery at a rate of 130 Watts per hour when exposed to bright sunlight. The solar panel will however charge at a lesser rate when exposed to any light source. Moderate charging can be achieved even on cloudy days. An optional second panel doubles the charging rate, thus halving the charging time. (Two panel maximum.) ***It takes almost 12 hours of bright sunlight to fully charge a fully-depleted SUNRNR when using two panels.***

The panel has a 30-foot cord and small red 50-amp plug for connecting to the DC end's SOLAR portal (Fig 2). The panel(s) may be permanently mounted outside (i.e. roof), may be placed inside in a window, or for portable use, may be temporarily placed facing the sun. The SUNRNR may also be charged by sources other than solar or by our 12V AC/DC charger through the AUX/WIND portal (small red plug with starter cord required; sold separately). Charging is limited to 30 amps by the fuses protecting the small red plug portals and the socket.

Operation

To operate a SUNRNR:

- 1) Turn on the main 12 volt DC switch located in the upper right hand corner of the DC end (Fig 1). This switch should be turned "OFF" when the unit is not in use.
- 2) Turn on the inverter switch located at the AC end of the SUNRNR (Figs 3a and 3b).
- 3) Ensure the AC appliance(s) are switched off and simply plug into the outlets before using as desired. Try to avoid using extension cords. If an extension cord is required, use a 12 gauge 3-prong grounded extension cord no longer in length than necessary (lessens power loss).



Fig 1 – DC End

Charge controller, master switch, SOLAR/AUX portals w/30-amp fuses, large red link portals, 12VDC socket



Fig 2 – Charging plugs/portals

Tabs on red plugs ensure proper orientation. Small left 50-amp portal for SOLAR, right for AUX

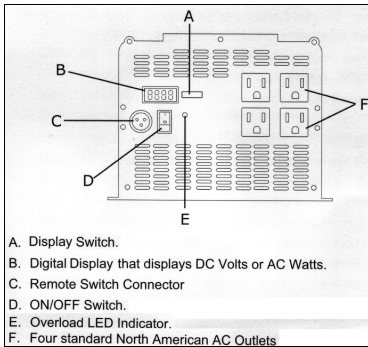


Fig 3a - 110 V AC inverter (SUN110)

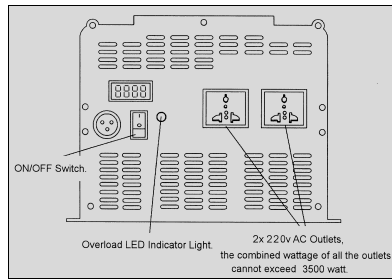


Fig 3b - 220 V AC inverter (SUN220)

Charging via solar: Plug solar panel's cord with small red 50-amp plug into SOLAR (left) portal on DC end as shown in Fig 2. When the panel is connected and has light, the charge controller's LED status lights will activate. Place panel in best direct sunlight. The solar panel cord carries electricity from the solar panel through the charge controller to the SUNRNR battery. The digital charge controller has status lights and symbols described fully under Specifications. The controller's digital LCD readout displays regardless of panel connection and indicates battery voltage when the three-position slide switch is set to "Voltage" or incoming charge in amps when set to "Current". The current/amp reading should be used for directing the solar panel to maximize charge rate. The LCD digital current display will read over 8 amps in bright, direct sunlight (dropping significantly as the battery approaches full charge) and about 0.4 amps when charging through clouds. Slide switch to the middle for OFF when not in use.

Charging via wind, grid, etc: Connect energy source at small red AUX (right) portal which bypasses the solar charge controller.

LED lights on the charge controller give a general indication of battery status (1/4-, 1/2-, 3/4-full, and fully-charged) or battery voltage may be read directly from digital displays on controller or inverter. When fully charged, battery voltage will be approximately 14 volts. When voltage drops to 10.5 +- 0.5 volts, the SUNRNR will begin beeping, warning that the battery is low. To extend run time, reduce AC load if possible or connect charging source. The SUNRNR will continue to run while beeping until the inverter automatically shuts down for low battery voltage at about 10.0 volts, protecting the AC loads from under voltage and the battery from complete discharge.

If the battery becomes overcharged, the inverter will also beep and will not operate until the charging source is removed and the battery voltage is allowed to drop down to "normal". High voltage shutdown is 15.5 volts, protecting the AC load from over voltage. The inverter has a red fault or overload indicator LED light and a cooling fan that is thermally activated and turns off automatically after the inverter has cooled. It may be heard operating intermittently when in normal use. The inverter features a digital display for AC load (Watts) or DC status (Volts). A remote option is available, but not recommended since it only controls inverter outlets, not main power switch.

SUNPWR Power Module

Power Modules are an option for expanding your SUNRNR system. Each SUNPWR has an ON/OFF master switch, 8D battery, charge controller, SOLAR and AUX/WIND small red 50-amp portals with fuses, and heavy-duty quick-connect 175-amp red plug portals. They are essentially SUNRNRs without inverters, therefore doubling (or tripling, etc.) the energy generation and storage of a primary unit. Simply connect a SUNPWR to a SUN110 or SUN220 by the included large cable with the large red plugs (Fig 4). Plugs' tabs prevent improper orientation. Then turn master switch ON to utilize the modules stored energy. Recharging is performed in the same way as for primary unit through SUNPWR unit's small red plug portals (pg 6). Other modules may be connected ("daisy-chained") in parallel. **WARNING:** Turn SUNPWR unit off before connecting or disconnecting any large red plug.



Fig 4 – Linked units