

## **Survival Kit**

Emergency Kit 30W, 60W and 100W

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# 1. General Information

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## 1.1 Product Description

The Renogy **Solar Suitcases** combine highly efficient Renogy Solar Panels and a fully adjustable 10 Amp PWM Solar Charge Controller with LCD to create an easy-to-use, 'plug and play' system.

This system is specifically designed for mobile off-grid applications, where space and weight limitations are abundant. The Solar Suitcase 100W supports 12V deep cycle battery varieties such as sealed lead acid, gel, and flooded. With built-in tilting stands, these panels can be adjusted at different angles to maximize the power output throughout the seasons.

The alligator clips included in this package make it easy to connect the panel to a battery in seconds. If one ever needs to connect a battery with a different type of end terminal, the alligator clips are attached via an Anderson plug connector (50A SB housing).



Scan the QR Code to visit the download page.  
Or visit: <http://goo.gl/NrqNn5>

## 2. Emergency 30

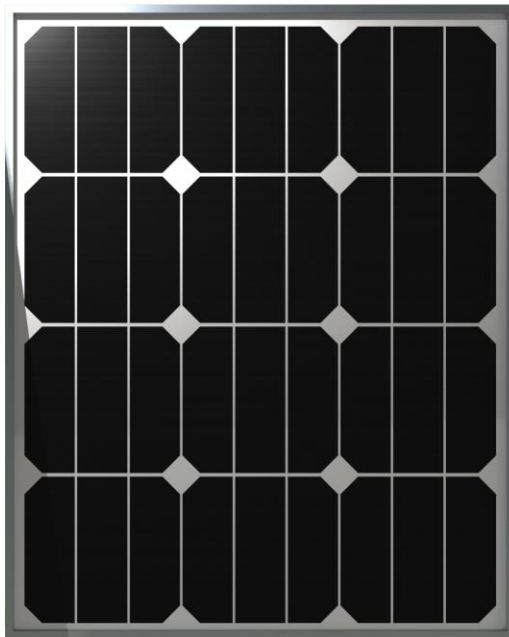
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### 2.1 Components

The Emergency 30 Watt kit comes with:

1. Renogy 30W monocrystalline Solar Panel
2. 15 AH Battery
3. Tray Cable 5'
4. 500 Watt Inverter

### 2.2 Renogy 30 Watt Solar Panel



#### Key Features

The Renogy 30 Watt monocrystalline solar panel has a high PTC Rating and high module conversion efficiency. This solar panel guarantees no hot spots and every panel is 100% EL Tested.

#### Application

- Off-grid rooftop/ground mounted
- Residential/Rural
- 12V Battery charging

### Electrical Characteristics

Description	Parameter (30W)
Maximum Power	30W
Open Circuit Voltage (Voc)	21.6V
Short Circuit Current (Isc)	1.85
Maximum Power Voltage (Vmp)	17.5V
Maximum Power Current (Imp)	1.71A
Cell Type	Monocrystalline
Cell Efficiency	19.0%
Maximum System Voltage	600 VDC

### Mechanical Characteristics

Description	Parameter (30W)
Solar Cell	Monocrystalline 125
Number of Cells	12 (4x3)
Dimensions	13.5 x 23.8 x 1 in.
Weight	7.7 lbs
Front Glass	.13 in tempered glass
Frame	Anodized aluminum alloy
Junction Box	IP65 Rated
Output Cables	31.5 inches
Connectors	Alligator Connectors
Fire Rating	Class C

### Temperature Characteristics

Description	Parameter (30W)
Nominal Operating Cell Temperature	116 °F±4
Operating Module Temperature	-40°F to 176°F

## 2.3 UPG Sealed Lead-Acid Battery

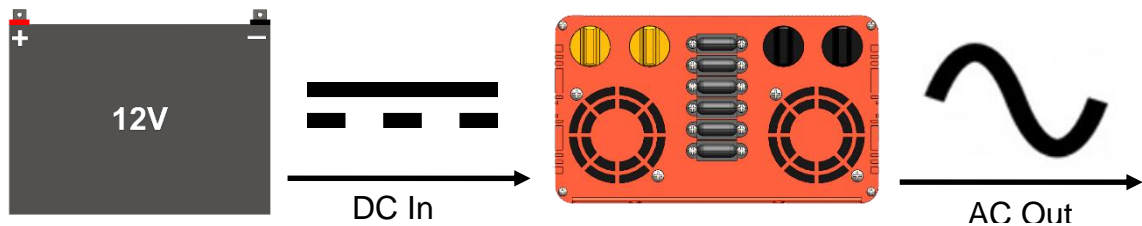
### Specification

Description	Parameter (30W)
Nominal Voltage	12V (6 Cells)

Nominal Capacity	15.0 AH
20-hr (0.75A)	13.95 AH
10-hr (1.395A)	12.75 AH
5-hr (2.55A)	9.0 AH
1-hr (9.0A)	9.2 lbs.
Approximate Weight	18mΩ
Internal Resistance	
Shelf Life	3 Months – 91%
	6 Months – 82%
	12 Months – 64%
Temperature Dependency of Capacity	
	104°F – 102%
	77°F – 100%
	32°F – 85%
	5°F – 65%
Float Use	13.6-13.8

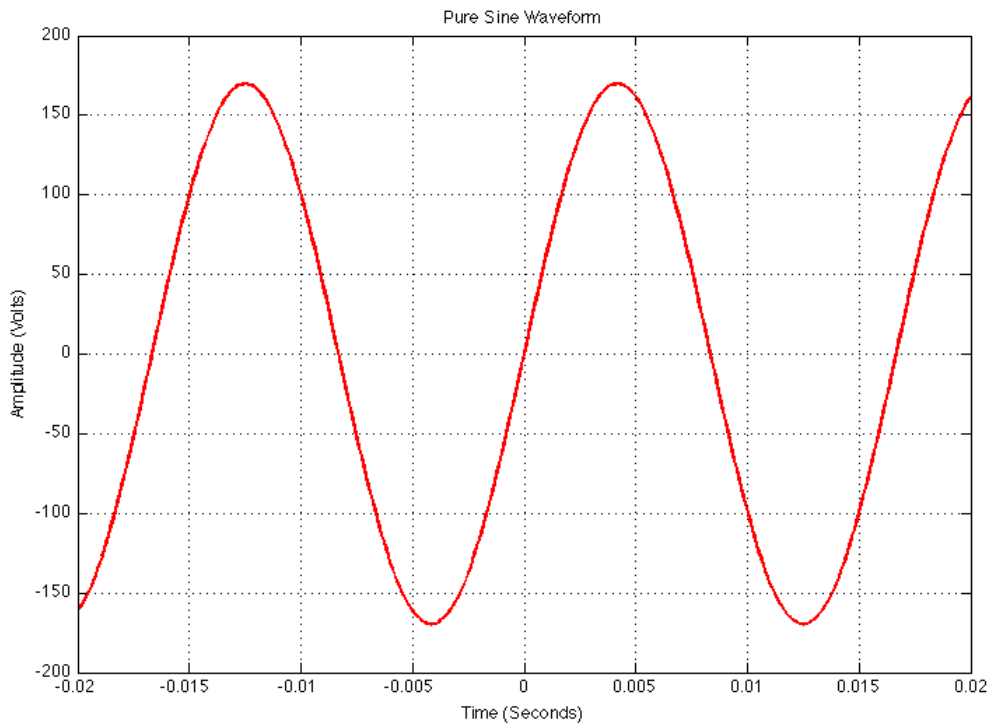
## 2.4 Renogy 500 Watt Inverter

A power inverter, or inverter, is an electrical device that changes direct current (DC) to alternating current (AC); the converted AC can be at any required voltage and frequency with the use of appropriate transformers, switching, and control circuits.



**Fig. 1** Simple diagram on how the inverter works

The AC output of these **RENOGY** Inverters it's a Pure Sine Wave. This type of waveform is typically found in a house AC power outlet as shown in **Fig. 2**.



**Fig. 2 Pure Sine Waveform**

### Safety Instructions



**Warning!**

Please read the instruction manual carefully before attempting to carry out any installation and wiring. Contact Technical support for any questions concerning the installation.

This equipment should be installed, adjusted, and serviced by qualified electrical maintenance personnel familiar with the construction and operation of the equipment and the hazards involved. Failure to observe this precaution may result in bodily injury.

- Do not connect the unit to the AC distribution wiring, such as main circuit breaker box.
- Keep the unit away from water. Do not allow water to drip or splash onto the inverter. Do not insert or pull out any AC plug with wet hands.
- Keep the unit in cool environments. Ambient air temperature should be between 14 °F and 122 °F (-10 °C and 50 °C). Keep from direct sunlight and away from heating vents.

- Keep the unit way from flammable materials or in any location where may accumulate flammable fumes or gases, such as the battery compartment of a car, boat, RV or truck.
- With the heavy use, the unit will become warm and possibly hot. Keep the unit away from any heat sensitive materials.
- Make sure the opening to the fan and vent holes are not blocked.
- Do not open the unit. High voltages are inside when the device is powered.
- Use proper size wiring. High power inverters can draw many amps from the DC source and can melt wires if not fused and sized properly.
- Make sure a proper connection is made between the inverter and the battery (ies). Reverse polarity connection may melt or blow the inverter's fuses. Turn off the unit when not in use.
- Before cleaning the equipment, switch the power off, clean dry cloth. Do not use wet cloth or cleanser to clean it.

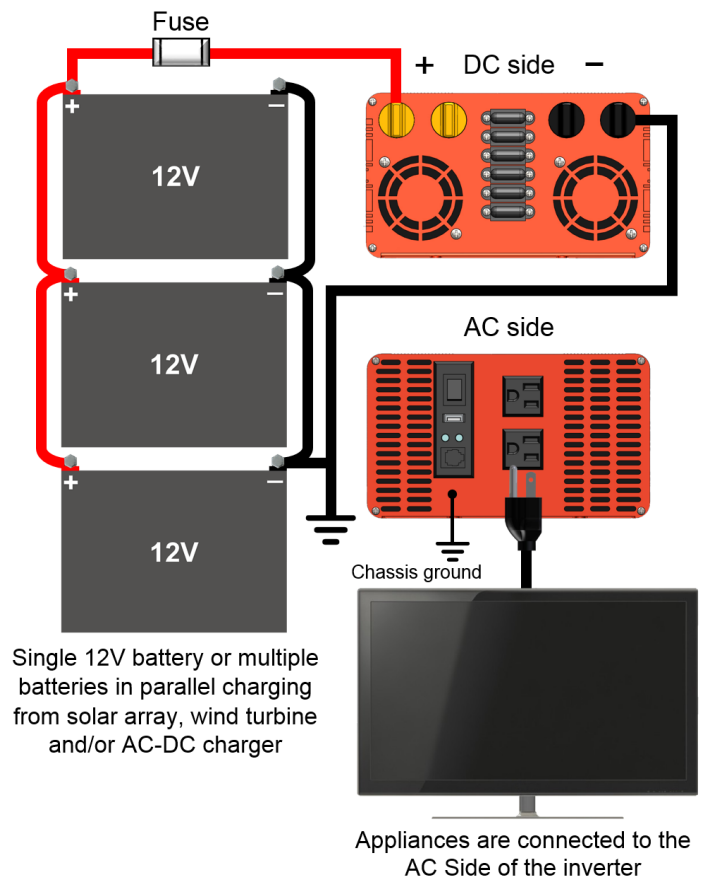
## Wiring Instructions

### **Step 1: Select the right input voltage**

Input voltage can be 12V/24V/48V subjecting to the products. It is recommended that the inverter be powered by a battery or battery bank, as the current draw from the inverter can get really high.

### **Step 2: Connecting inverter to battery**

Set the switch to **OFF** position (inverter and appliances). Connect the battery cables to their respective colors on the inverter i.e. black cable goes to the black terminal on the





inverter, and the red cable goes to the red terminal on the inverter. Please refer to **Fig. 3**. Each end of the battery tray cables should have an “O-ring” type of connector. These connectors make it easy to achieve a secure and strong connection. Once the cables are connected and bolted down to the inverter, connect the black cable to the negative post of the battery (-). Then connect the red cable to the positive post of the battery (+). If connecting to a battery bank, make sure that the black cable connects to the negative

**Fig. 3** wiring diagram

battery post (-) at the end of the bank (opposite to the positive battery post as shown on **Fig. 3**). It is recommended that a fuse be placed on the hot line (positive) between the battery and inverter. Please refer to **Section 5** for the proper wire gauge size and the fuse ratings for each inverter.



**Ground!**

**The battery negative terminal and the chassis ground of the inverter should be connected to a system ground. This a safety measurement to prevent electric shock!**

### **Step 3: Connecting electrical appliances to inverter**



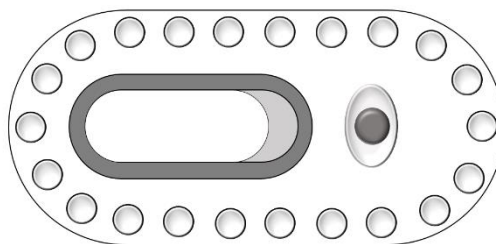
**Caution!**

Make sure the power load is within the rated power of the inverter. The start power of the appliances should not exceed the peak power of the inverter.

Once the devices are connected to the AC outlet, they are ready to be powered. When the inverter is not being use, it is recommended to turn off the inverter (switch in **OFF** position).

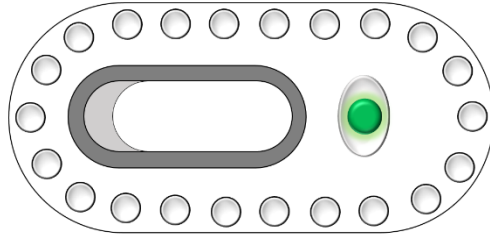
### **Step 4 (optional): Connecting remote ON/OFF switch to inverter**

The 1000-2000W inverters have a built-in RJ11 connector for remote ON/OFF switch. This allows to easily shut-off the inverter from a remote location.



**Fig. 4** remote switch in OFF position

Make sure that, both, main inverter and remote switch are in the OFF position (**Fig.4**). Then connect, the remote into the RJ11 port on the inverter.



**Fig. 5** remote switch in ON position

Flip the switch, and the inverter should power up, and the remote LED with lit solid green (**Fig.5**).

### Wire and In-Line Fuse Size



**Warning!**

Make sure the correct wire gauge size is used. Inverters draw a large amounts of amps, and if the wire is not sized properly, the wires can melt and catch on fire. Please refer to **Table 1** for the recommended wire sizing.

12V Power inverters tend to draw large amount of current based on the appliance load. The reason behind this, is because the voltage ratio (AC/DC) is as follows:

$$120\text{Vac} / 10\text{Vdc} = 10$$

This means that a 500W load on the AC side (connected on the AC power outlet of the inverter) is going to draw from the battery

$$500 / 10 = 50 \text{ Amps}$$

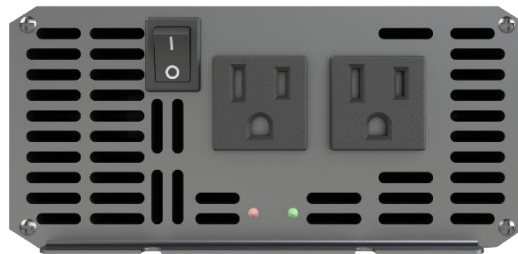
This current draw can be achieved with multiple devices connected to the inverter or running single appliances such as microwaves, toasters, blenders, etc. For this reason, it is required that the inverter is properly fused, and that the correct wire gauge size is used.

Model	Fuse Size	Gauge Size
RNG-500INV-P	75A	#6
RNG-1000INV-P	150A	#4
RNG-1500INV-P	200A	#2
RNG-2000INV-P	300A	#00 (2/0)

**Table 1.** Fuse and wire size

## Indicators

The LED indicators on the inverter are essential to differentiate between working mode and alarm/warning states. [Tables 2](#) and [Table 3](#) describe these indicators.



**Fig. 6** RNG-500INV-P AC side

### Working Mode

During normal operation the inverter “Working” indicator will be on.

Model	LED Name	Color
RNG-500INV-P	Work	Solid green
RNG-1XXXINV-P	Inv	Solid green

**Table 2.** Working Mode LEDs description

### Alarm/Warning

Whenever the inverter is malfunctioning, the “Alarm/Warning” LED will turn on. This can be caused by low input voltage, over-voltage, short circuit, overload, or thermal protection.

Model	LED Name	Color
RNG-500INV-P	Fault	Flashing red
RNG-XXXXINV-P	Char	Solid red

**Table 3.** Alarm/Warning LEDs description



**Warning!**

**Do not ignore these warning indicators. Please refer to [Section 7](#) & [8](#) for troubleshooting the inverter.**

## Protection Function

### **Low voltage input protection**

A buzzer will alarm when the battery voltage is low. This indicates that your battery (ies) need to be recharged. When the input voltage is below 10V +/- 0.5V (for 12V input inverter) or 20V +/-1.0V (for 24V input inverter), the AC output will be automatically shut off. At this point, the buzzer alarm will turn on, and the "Fault/char" LED will turn red at the same time.

### **Over voltage input protection**

When the input voltage reaches 15V +/- 0.5V (for 12V input inverter) or 30V +/-1.0V (for 24V input inverter), the AC output will automatically shut off. At this point, the buzzer alarm will turn on, and the "Fault/char" LED will turn red at the same time.

### **Short circuit protection**

In case of a short circuit, the AC output will shut off automatically, and the "Fault/char" LED will turn red.

### **Overload protection**

When overload happens, the AC output will shut off automatically, and the "Fault/char" LED will turn red.

### **Reverse polarity input protection**

If the battery terminals are reversed by accident, the inverter is equipped with fuses to prevent internal damage to the inverter and to protect any electronic device connected to the unit. The fuses are located externally for inverters sizes 1000W and up.

### **Inverter thermal protection**

When the inner temperature exceeds 167 °F (75 °C), the AC output will shut off automatically, and the "Fault/char" LED will turn red. At this point the inverter needs to cool down for at least 15 minutes until it can be used again.

### **Load thermal protection**

As the load increases the chassis will start to get warm, if the temperature of the chassis exceeds 122 °F (50 °C), the inner fan will automatically turn on to cool down the inverter.

## Troubleshooting

### **TV Interference**

The inverter may cause minimal interference with a television. It is recommended that the inverter is place far away from the television and/or the antenna.

### **Inverter has no response**

- (a) Poor connection between batteries and inverter, reconnect them.
- (b) If polarities were reversed by accident, probably a fuse or multiple fuses are blown. Disconnect the inverter from the battery and replace the blown fuse(s) with a new one of the same size, when done, reconnect the battery and power the inverter.

### Output voltage very low

- (a) Power overload. Load power exceeds rated power, shut off some of the devices connected to the inverter and restart the inverter by turning it off and back on.
- (b) Input voltage too low. Make sure input voltage is within the rated range.

### Low voltage alarm

- (a) Battery has insufficient power (low voltage). The battery might be over-discharged, and is necessary to recharge the battery for the inverter to continue to work properly.
- (b) Poor connection. Check terminals on the inverter and battery post for loose connections. If the terminals are dirty, clean them with a dry cloth.

### Inverter has no output

- (a) Battery voltage might be too low, recharge the battery (s) or replace them.
- (b) Load power too high. If the load exceeds the rated power of the inverter, the output will be automatically shut off. In this case, please turn off some of the devices connected to the inverter. This will reduce the load drawn from the inverter. Restart the inverter.
- (c) Inverter thermal protection. The inverter might be too hot to operate, if the inverter exceeds 167 °F (75 °C) the output power will automatically shut off. Cool the inverter and place it in a place with good ventilation. Wait at least 15 minutes before resuming its use.
- (c) Reverse polarity. If accidentally the polarity for the input voltage is reversed, a fuse or multiple fuses might blow up. This prevents from damaging the internals of the inverter or any device connected to the unit. Disconnect the inverter from the battery and replace the blown fuse(s) with a new one of the same size, when done, reconnect the battery and power the inverter.

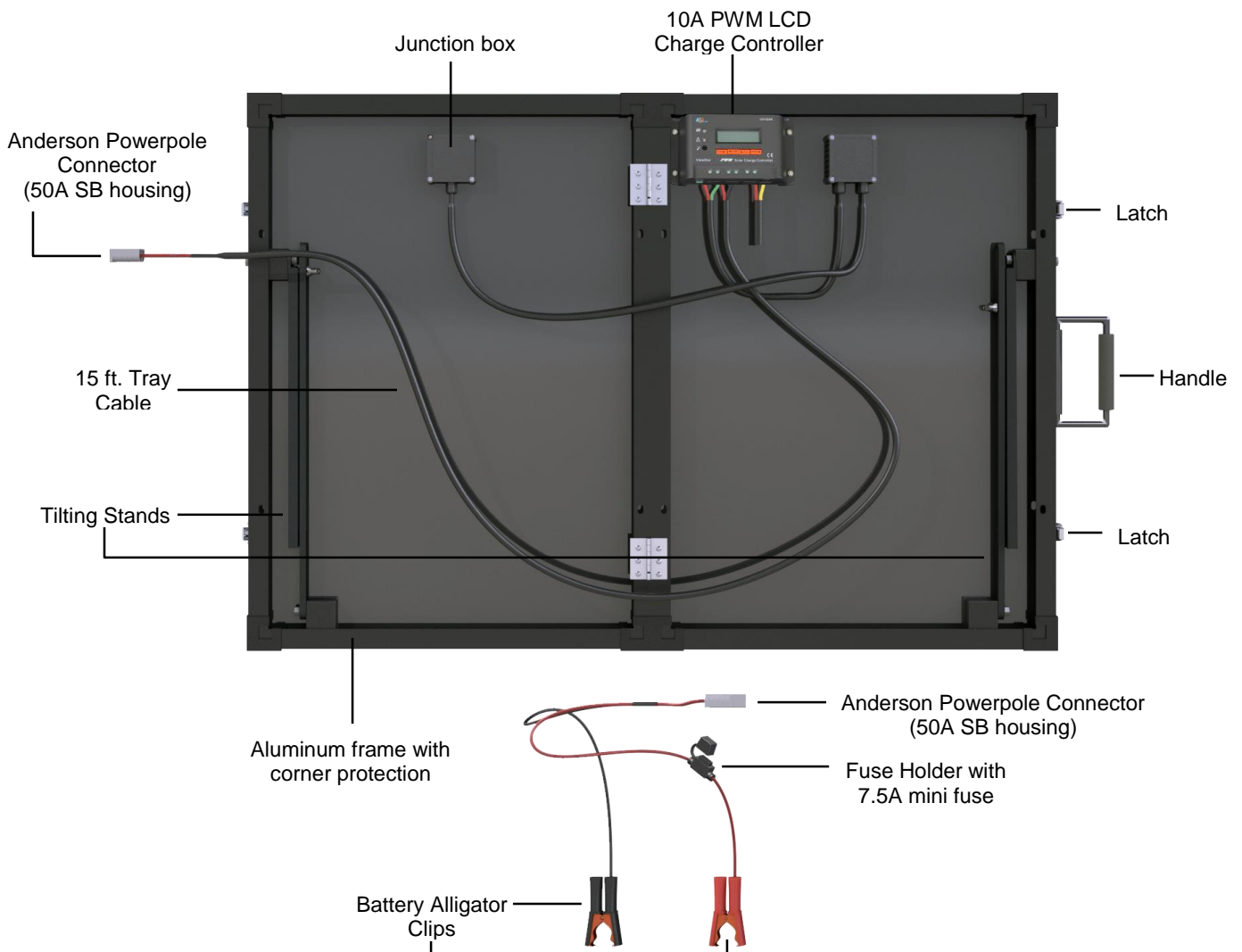
# 3. Emergency 60

## 3.1 Components

The Emergency 60 Watt kit comes with:

1. Renogy 100W Foldable Solar Suitcase
2. 60 AH Battery
3. Tray Cable 5
4. 1000 Watt Inverter

## 3.2 Renogy 60 Watt Foldable

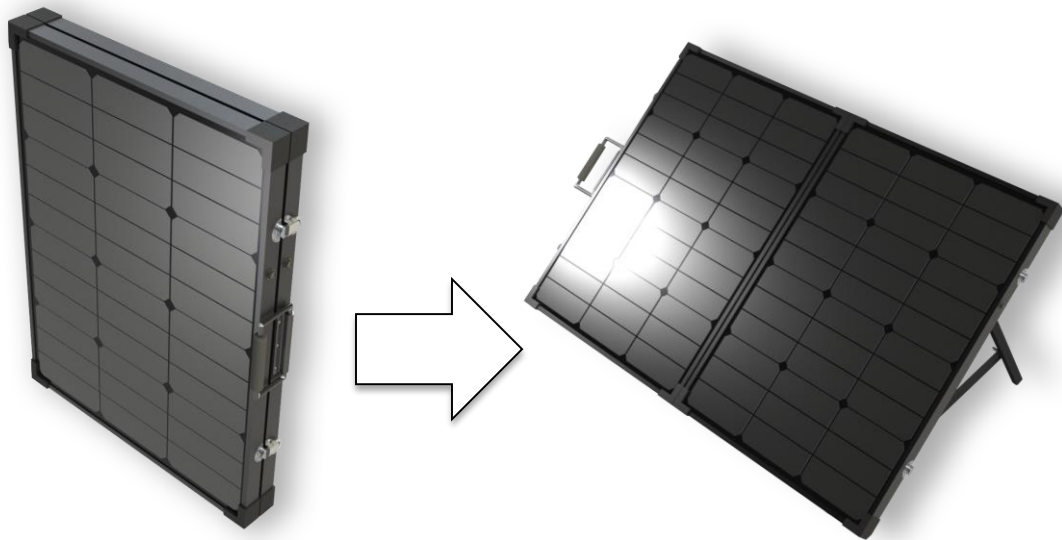


**Also included but not depicted:**

- Storage Case

**Installation**

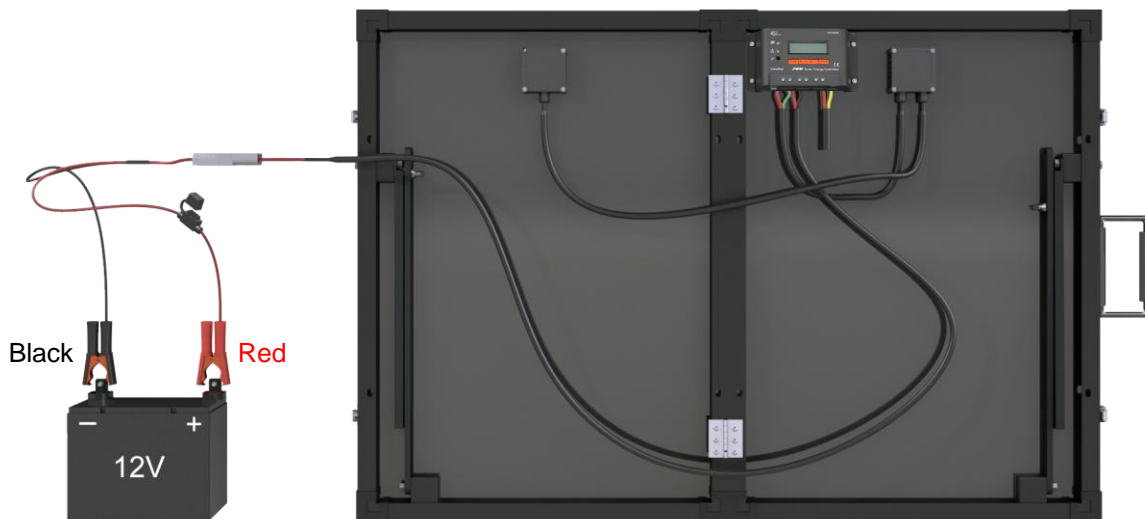
1. Unclip the two latches on the side of the unit and unfold the two panels outward. Extend the stands to support the solar panels.



2. The controller is mounted on metal plate. The plate is attached to the back of the panel with Velcro. The hinges attached to the metal plate allow the user to swivel the charge controller to get a better look at the LCD display. The Velcro allows the re-attachment of the charge controller back under the panel.



3. Fully extend battery leads. Connect the red alligator clip to the positive (+) battery terminal and the black alligator clip to the negative (-) battery terminal on a 12V battery. Ensure that the connections are secure.



**Note:** The kit should be connected to a battery generating at least 9V to start the charge controller. If the 12V battery is fully discharged, charge it for a short period of time by other means to reach 9V.

4. When you connect the kit to the battery, the charge controller will display a boot up message as follows:



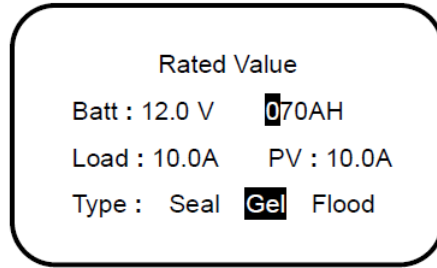


**5. Adjusting Battery Size and Type:** Press **MENU/←** to enter to the options, press **↑ / +** or **↓ / -** to navigate to the menu options.



When the inverse cursor rests on **5. Rated Value**, press **ENTER / →** to enter into the nominal parameter interface. Once again, press **MENU / ←** or **ENTER / →** to move between the adjustable parameters. Pressing **MENU / ←** will move the inverse cursor to the right. While pressing **ENTER / →** will move it to the left. If the inverse cursor is at the very beginning, press **MENU / ←** to jump back to the main menu screen. When the inverse cursor rests at some parameter, the contents of the parameter can be modified. To modify a parameter, press **↑ / +** to increase the current parameter, or press **↓ / -** to reduce it.

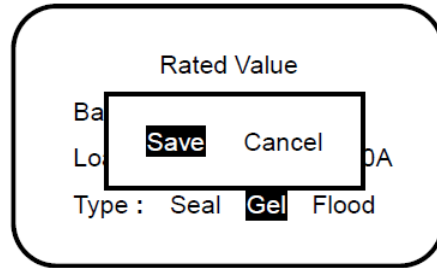
In this screen the battery type and capacity can be modified. The battery capacity ranges from 1-999 AH.



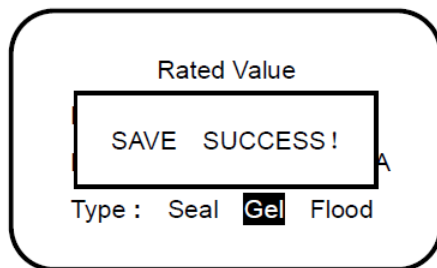
After the last digit of the battery capacity, Press  or  to select the type of battery.

**Seal** = Sealed Lead Acid (AGM), **Gel** = Gel Battery, **Flood** = Flooded (wet cell) battery

Settings can be saved by pressing  until the last adjustable parameter is reached, in this case will be the **Battery Type**. Press  or  to choose between Save or Cancel. The inverse cursor will rest on the selected option.

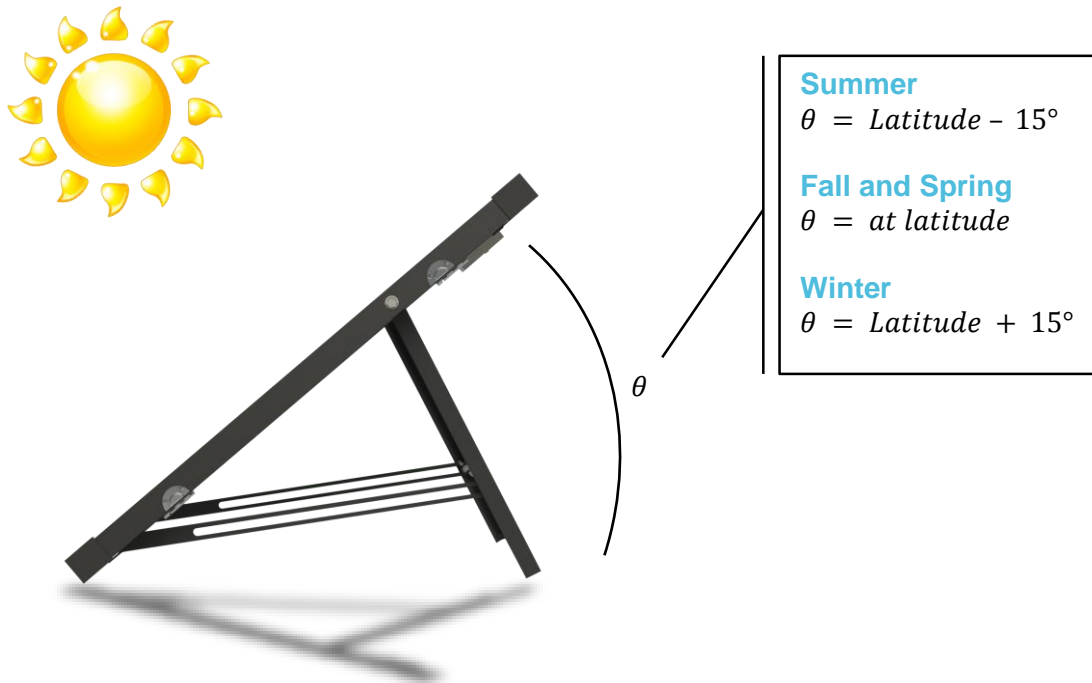


Press  to confirm the selection. If the Save option is chosen, then the parameters will be saved. If Cancel was chosen, then parameters won't be saved, and the screen will jump back to the main menu interface. When saving, the controller will check and confirm valid parameters. If the parameters are correctly set, and success message will appear as shown below:



After successfully saving the parameters, press **ENTER/→** to exit to the main menu. The controller should now have the correct parameters for the battery selected. If there is a need to use different charging parameters, the controller is fully adjustable. Please refer to the charge controller manual.

6. Find a clear sunlit area, free from overhanging tree branches, obstructions or shading. The panel should be facing south, and the tilting angle should be adjusted as follows:



**Note:** To maximize the output, adjust the position of the kit regularly to track the sun movement throughout the day

**7. Remote Temperature Sensor (optional):** The charge controller (ViewStar) has a built-in temperature sensor. This is used for temperature compensation of the charging parameters. During a hot summer day, the local temperature on the controller might register a higher temperature than that from the battery if the battery is under shade.



For this reason, the controller also has a 2ERJ-3.81 port for a Remote Temperature Sensor (*Model: TS-R*). The **RTS** can be placed next to the battery (ies). This optional accessory can be purchased separately.

## Charge Controller LEDs



### Charging Indicator

The green LED indicator will turn on whenever sunlight is available for battery charging. Under normal charging conditions, the green charging LED will stay on at all times.

Color	Indication	Operating State
Green	On solid	Charging

**Table 1** Charging LED indicators

### Fault Indicator

When the following cases occur the fault indicator will be flashing red:

#### Solar module

- Over-current
- Error while trying to measure the voltage
- Reverse-protection MOS-I short

- MOS-C short
- MOS-I or MOS-C disconnection
- MOS break in control section

### Battery

- Over-voltage
- Error while trying to measure the voltage
- The temperature is above range (battery too hot)

### Load

- Over load
- Short
- Discharging MOS Short
- Error while trying to measure the voltage

### Device

- Controller is operating too hot

For trouble shooting please refer to the charge controller manual (Chapter 5).

Color	Indication	Operating State
Red	Flashing	<b>PV:</b> Over-current, Measure error, MOS-I Short, MOS-C Short or MOS Break
		<b>BATT:</b> Over-voltage, Measure error or Running too hot
		<b>LOAD:</b> Over load, Short, Discharging MOS short, or Measure error
		<b>DEVICE:</b> Running too hot

Table 2 Fault indicators

## Frequently Asked Questions

### Q. What type of batteries can be used with this kit?

A. Any sealed lead acid, gel, or flooded 12V battery (typically used in caravans, motorhomes, boats etc.) is appropriate for use with this kit.

### Q. Can this kit charge a 24V battery?

A. No, because this kit is designed to charge a 12V battery. Technically, it's possible to change solar panel connections to enable the kit to work in 24V mode; however, a qualified, knowledgeable individual should only do this.

**Note: unauthorized modification to 24V will void the warranty.**

**Q. Can the kit charge two or more 12V batteries connected in parallel?**

A. Yes, it's possible if the batteries have the same type and capacity and are wired in parallel as a single 12V battery bank.

**Q. Is there any risk that the solar kit will over charge my battery?**

A. One of the functions of the solar charge controller is to ensure that your battery is not over charged; therefore there is no risk of overcharge.

**Q. Can I extend the battery leads?**

A. Yes, it's possible – please choose the same size of cable for extension. However, the longer the extension, the greater the line loss. Bigger gauge will be required for longer runs.

**Q. Do I need to clean the solar panels?**

A. Yes, it is recommended for better performance. Dust and dirt should first be swept off the panel surface using a soft brush. When the sweeping is complete, use a wet cloth to wipe the panel surface to remove remaining dirt and grime.

**Q. Can rain damage the solar kit?**

A. The solar panels are fully waterproof (IP66 class), the controller is not. We recommend protecting the kit from rain, since water into controller may damage the internal circuitry.

## **Trouble Shooting**

- Check all connections to ensure they are secure and clean
- Check polarity of the battery connection and make sure the battery generates at least 9V
- Ensure the solar panels are exposed to sufficient light – ideally position them to face the sun directly

- For more information refer to the Troubleshooting section of the Solar Controller Manual (skip anything which relates to load work in the controller manual as the load terminals of the controller are not used)

## Specifications

### Solar Panels

Description	Parameter (60W)	Parameter (100W)
Maximum Power	60W	100W
Open Circuit Voltage (Voc)	21.6V	21.6V
Short Circuit Current (Isc)	3.62	6.17A
Maximum Power Voltage (Vmp)	18.0V	17.5V
Maximum Power Current (Imp)	3.34A	5.71A
Cell Type	Monocrystalline	Monocrystalline
Operating Temperature	-40°F to +185°F	-40°F to +185°F
Folded Size	13.60 x 25.40 x 2.80 "	19.88 x 27.17 x 2.36 "
Net Weight	21.20 lbs.	24.69 lbs.

**Table 3** Solar panels specifications

Specifications under standard test conditions (STC): 1000W/m<sup>2</sup>, AM 1.5, 25 °C. Specifications are stated for the solar panels only without the effect of the charge controller.

### Charge Controller

Description	Parameter
Nominal System Voltage	12VDC/24VDC Auto recognition
Rated Charge Current	10A, 30A
Rated Discharge Current	10A, 30A
Maximum Battery Voltage	32V
Max. Solar Input Voltage*	48VDC
Max. PV Input Power	120W (12V)
Self-consumption**	≤18mA
Charge Circuit Voltage Drop	≤ 0.24V
Discharge Circuit Voltage Drop	≤ 0.15V
Communication	TTL232 / 8 pin RJ45
Remote Temperature Sensor	2ERJ-3.81
Ground	VSxxx24N: Negative ground
Battery Type	Gel, Sealed (AGM), and Flooded

**Table 4** Electrical Parameters

\*Array voltage should never exceed maximum PV input voltage. Refer to the solar module documentation to determine the highest expected array V<sub>oc</sub> (Open Circuit Voltage) as defined by the lowest expected ambient temperature for the system location.

### Charging Parameters

Control Parameter				
	Battery type	Gel	Sealed	Flooded
High Volt Disconnect	<b>Default</b>	<b>16.0V; x2/24V</b>	<b>16.0V; x2/24V</b>	<b>16.0V; x2/24V</b>
	Max	17.0V; x2/24V	17.0V; x2/24V	17.0V; x2/24V
	Min	15.0V; x2/24V	15.0V; x2/24V	15.0V; x2/24V
Charging Limit Voltage	<b>Default</b>	<b>15.5V; x2/24V</b>	<b>15.5V; x2/24V</b>	<b>15.5V; x2/24V</b>
	Max	16.0V; x2/24V	16.0V; x2/24V	16.0V; x2/24V
	Min	14.0V; x2/24V	14.0V; x2/24V	14.0V; x2/24V
Over Voltage Reconnect	<b>Default</b>	<b>15.0V; x2/24V</b>	<b>15.0V; x2/24V</b>	<b>15.0V; x2/24V</b>
	Max	16.0V; x2/24V	16.0V; x2/24V	16.0V; x2/24V
	Min	14.0V; x2/24V	14.0V; x2/24V	14.0V; x2/24V
Equalization Voltage	<b>Default</b>	<b>N/A</b>	<b>14.6V; x2/24V</b>	<b>14.8V; x2/24V</b>
	Max	N/A	15.2V; x2/24V	15.2V; x2/24V
	Min	N/A	14.2V; x2/24V	14.2V; x2/24V

**Table 5** Battery Parameters

Boost Voltage	Default	<b>14.2V; x2/24V</b>	<b>14.4V; x2/24V</b>	<b>14.6V; x2/24V</b>
	Max	15V; x2/24V	15V; x2/24V	15V; x2/24V
	Min	13.8V; x2/24V	13.8V; x2/24V	13.8V; x2/24V
Float Voltage	Default	<b>13.8V; x2/24V</b>	<b>13.8V; x2/24V</b>	<b>13.8V; x2/24V</b>
	Max	14.2V; x2/24V	14.2V; x2/24V	14.2V; x2/24V
	Min	13.2V; x2/24V	13.2V; x2/24V	13.2V; x2/24V
Boost Return Voltage	Default	<b>13.2V; x2/24V</b>	<b>13.2V; x2/24V</b>	<b>13.2V; x2/24V</b>
	Max	13.5V; x2/24V	13.5V; x2/24V	13.5V; x2/24V
	Min	12.7V; x2/24V	12.7V; x2/24V	12.7V; x2/24V
Low Voltage Reconnect	Default	<b>13.2V; x2/24V</b>	<b>13.2V; x2/24V</b>	<b>13.2V; x2/24V</b>
	Max	13.5V; x2/24V	13.5V; x2/24V	13.5V; x2/24V
	Min	12.7V; x2/24V	12.7V; x2/24V	12.7V; x2/24V
Under Voltage Recover	Default	<b>12.2V; x2/24V</b>	<b>12.2V; x2/24V</b>	<b>12.2V; x2/24V</b>
	Max	12.6V; x2/24V	12.6V; x2/24V	12.6V; x2/24V
	Min	11.8V; x2/24V	11.8V; x2/24V	11.8V; x2/24V
Under Voltage Warning	Default	<b>12.0V; x2/24V</b>	<b>12.0V; x2/24V</b>	<b>12.0V; x2/24V</b>
	Max	12.4V; x2/24V	12.4V; x2/24V	12.4V; x2/24V
	Min	11.6V; x2/24V	11.6V; x2/24V	11.6V; x2/24V



Low Voltage Disconnect	Default	<b>11.1V; x2/24V</b>	<b>11.1V; x2/24V</b>	<b>11.1V; x2/24V</b>
	Max	11.8V; x2/24V	11.8V; x2/24V	11.8V; x2/24V
	Min	10.5V; x2/24V	10.5V; x2/24V	10.5V; x2/24V
Discharging Limit Voltage	Default	<b>10.8V; x2/24V</b>	<b>10.8V; x2/24V</b>	<b>10.8V; x2/24V</b>
	Max	11V; x2/24V	11V; x2/24V	11V; x2/24V
	Min	10.5V; x2/24V	10.5V; x2/24V	10.5V; x2/24V
Equalize Duration	N/A	N/A	2 hours	2 hours
Boost Duration	N/A	2 hours	2 hours	2 hours

Table 5 Continued

### Threshold Voltage

Description	Parameter	
NTTV (Night Time Threshold Voltage)	Default	<b>5V; x2/24V</b>
	Max	10V; x2/24V
	Min	1V; x2/24V
DTTV (Day Time Threshold Voltage)	Default	<b>6V; x2/24V</b>
	Max	10V; x2/24V
	Min	1V; x2/24V

Table 6 Threshold Voltages

### Temperature Compensation

Description	Parameter	
Temperature Compensation Coefficient (TEMPCO)*	Default	<b>-3mV/°C/2V (25°C ref)</b>
	Max	0mV/°C/2V
	Min	-9mV/°C/2V

Table 7 Temperature Compensation

\*Compensation of equalize, boost, float and low voltage disconnect voltage

### Environmental Parameters

Environmental	Parameter
Working Temperature Range	-35 °C to +55 °C (-31 °F to +131 °F)
Storage Temperature Range	-35 °C to +80 °C (-31 °F to +176 °F)
Enclosure	IP30

Table 8 Environmental Parameters

### Mechanical Parameters

Mechanical	Parameter
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Terminal

VS1024N: 4 mm<sup>2</sup> (up to #12 AWG)

VS3024N: 16 mm<sup>2</sup>(up to #6 AWG)

Weight

VS1024N: 0.44 lbs.

VS3024N: 1.54 lbs.

**Table 9** Mechanical Parameters

## Warranty

By acquiring the products of RNG Group Inc. ("Renogy"), you have purchased quality. As a sign of confidence in this quality, we are pleased to grant you the following warranties and guarantees for our photovoltaic products.

**LIMITED WARRANTY:** Renogy warrants this product will be free from defects in material and manufacturer for the following periods from the date of purchase:

- Five (5) years on the solar panel
- Two (2) years on charge controller
- One (1) year on the rest of the kit components

This warranty extends only to the original purchaser. The Customer's sole and exclusive remedy and the entire liability of Renogy, its suppliers and affiliates for breach of the warranty is, either to replace the Product or component parts or to refund the purchase price of the Product. This warranty does not cover labor. Repaired or replaced products are warranted for the remainder of the original warranty period only. No employee, agent, dealer or other person is authorized to give any warranties on behalf of Renogy not expressly set forth in this limited warranty.

The warranty does not cover failures result from incorrect handling, product modifications, installation, conversion or additions, supplements, operation, natural elements, excessive or deficient energy supply, chemicals, the effect of solid bodies or deliberate damage. If Renogy determines that the problem with the Product is not due to a manufacturing defect in Renogy's workmanship or materials, or otherwise does not qualify for warranty repair, then the Customer will be responsible for the costs of all necessary repairs and expenses incurred by Renogy.

The warranty shall be asserted with Renogy in writing enclosing a copy of the invoice and a description of the defect/loss of performance within the warranty period. Renogy shall accept no returns of modules without the previous written request for this. Within five (5) business days of the date of notification, Renogy will provide the Customer with an RMA number and the location to which the Customer must return the defective Product. Any Product returned for warranty service shall be shipped at the expense and risk of the Customer. The Customer must return the entire Product (or, if authorized by Renogy, the defective component parts), within fifteen (15) days after issuance of the

RMA number. Renogy will be under no obligation to accept any returned Product that does not have a valid RMA number. All parts that Renogy replaces shall become Renogy’s property on the date Renogy ships the repaired Product or part back to the Customer. Renogy will use all reasonable efforts within thirty (30) days of receipt of the defective Product to repair or replace such Product. If a warranty claim is invalid for any reason, the Customer will be charged at Renogy’s then-current rates for services performed and will be charged for all necessary repairs and expense incurred by Renogy. If Renogy determines that a warranty claim is valid, it will ship the repaired or replaced Product to Customer at Renogy’s cost.

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Some states do not allow the exclusion or limitation of incidental or consequential damages, so these limitations may not apply to you. Neither Renogy nor its affiliates or suppliers will be held liable or responsible for any damage or loss to any items or products connected to, powered by or otherwise attached to the Product. The total cumulative liability to Customer, from all causes of action and all theories of liability, will be limited to and will not exceed the purchase price of the Product paid by Customer. This warranty gives you specific legal rights and you may also have other legal rights that vary from state to state.

**3.3 UPG Sealed Lead-Acid Battery 35Ah**

**Specification**

Description	Parameter (30W)
Nominal Voltage	12V
Nominal Capacity	
20-hr (1.75A)	35.0 Ah
10-hr (3.26A)	32.55 Ah
5-hr (5.95A)	29.75 Ah
1-hr (21.00A)	21.0 Ah

Approximate Weight	22.5 lbs.
Internal Resistance	12mΩ
Shelf Life	3 Months – 91%
	6 Months – 82%
	12 Months – 64%
Temperature Dependency of Capacity	104°F – 102%
	77°F – 100%
	32°F – 85%
	5°F – 65%
Float Use	13.6-13.8

### 3.4 Renogy 1000 Watt Inverter

- See section 2.3 Renogy 500 Watt Inverter for specifications.

## 4. Emergency 100

### 4.1 Components

The Emergency 100 Watt kit comes with:

1. Renogy 100W Foldable Solar Suitcase
2. 85 AH Battery
3. Tray Cable 5'
4. 2000 Watt Inverter

### 4.2 Renogy 100 Watt Foldable

- See section 3.2 Renogy 100 Watt Foldable for specifications.

### 4.3 UPG Sealed Lead-Acid Battery 50Ah

#### Specification

Description	Parameter (30W)
Nominal Voltage	12V
Nominal Capacity	
20-hr (2.50A)	50.0 Ah
10-hr (4.65A)	46.5 Ah
5-hr (8.50A)	42.5 Ah
1-hr (30.00A)	30.0 Ah
Approximate Weight	30.2 lbs.
Internal Resistance	11mΩ
Shelf Life	
	3 Months – 91%
	6 Months – 82%
	12 Months – 64%
Temperature Dependency of Capacity	
	104°F – 102%
	77°F – 100%
	32°F – 85%
	5°F – 65%
Float Use	13.6-13.8

### 4.4 Renogy 2000 Watt Inverter

- See section 2.3 Renogy 500 Watt Inverter for specifications.