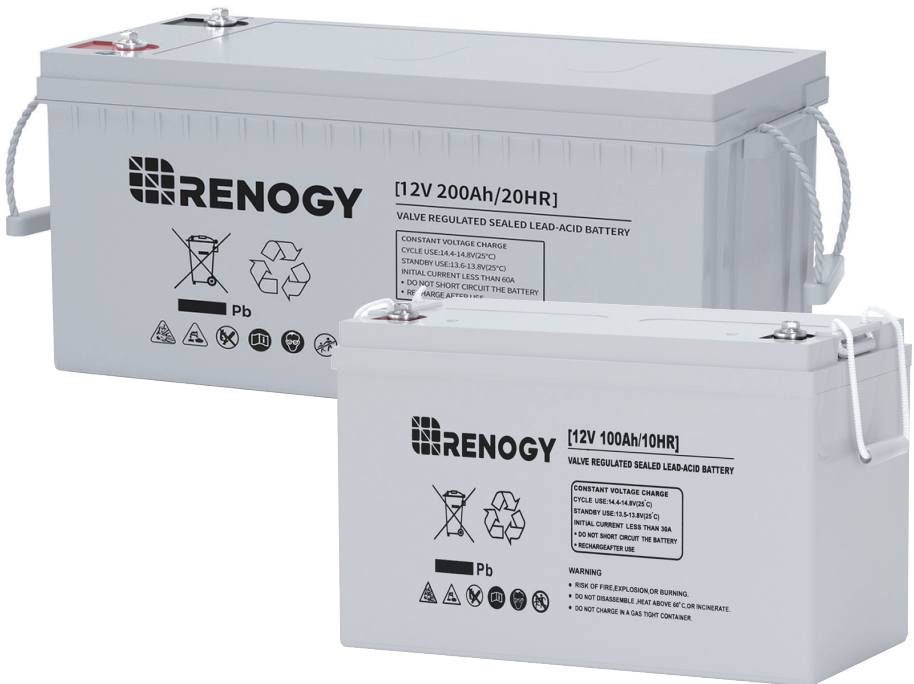


# RENOGY Sealed Lead-acid Battery

12V | 100Ah/200Ah

RNG-BATT-AGM12-100/RNG-BATT-AGM12-200

VERSION A0



## Troubleshooting Guide



## Before Getting Started

The troubleshooting guide provides important operation and maintenance instructions for Renogy 12V 100Ah/200Ah Deep Cycle AGM Battery (hereinafter referred to as battery).

Read the troubleshooting guide carefully before operation and save it for future reference. Failure to observe the instructions or precautions in the user manual can result in electrical shock, serious injury, or death, or can damage the battery, potentially rendering it inoperable.

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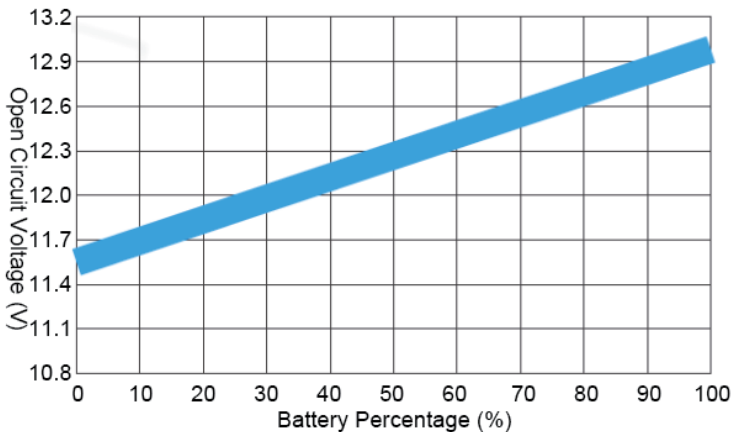
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## 1. Why does the battery percentage on the charge controller increase or decrease instantly? Is my battery failed?

**No**, your battery is not failed. The instant increase or decrease in battery percentage on the charge controller does not really mean the gain or loss of battery capacity. The battery percentage on the charge controller is estimated solely based on the battery terminal voltage. On the charge controller side, the battery is considered as fully charged when the battery terminal voltage rises to 14.4V and is considered as fully discharged when the battery terminal voltage drops to 11.0V. However, the battery terminal voltage can be heavily affected by the charge current and discharge current. The charge current will rapidly raise the battery terminal voltage of a resting battery at the first minute of charge, resulting in an instant increase in battery percentage on the charge controller. Thereafter, the battery percentage will increase steadily with the battery terminal voltage until the end of the charge. But once the charge current is cut off, the battery terminal voltage will rapidly drop to its resting level and cause an instant decrease in battery percentage on the charge controller. Similarly, the discharge current will rapidly lower the battery terminal voltage of a resting battery at the first minute of discharge, resulting in an instant decrease in battery percentage on the charge controller. Thereafter, the battery percentage will decrease steadily with the battery terminal voltage until the end of the discharge. But once the discharge current is cut off, the battery terminal voltage will rapidly rise to its resting level and cause an instant increase in battery percentage on the charge controller. The greater the charge or discharge current, the more obvious the instant increase or decrease in battery percentage on the charge controller.

For a more accurate battery percentage estimation, the easiest way is to measure the battery open circuit voltage and find the corresponding battery percentage in the following chart. The battery open circuit voltage is the voltage between the battery terminals with no load or charge applied. The battery must be disconnected from the system and rest for at least 2 hours before the measurement.

The following symbols are used throughout the user manual to highlight important information.



## 2. How do I prolong the service life of my battery?

- a. Charge and maintain the battery with a three-stage charge controller or battery charger. The three-stage charge controller or battery charger prevents the battery from overcharging and compensates for self-discharge after the battery is fully charged.
- b. Set the charging parameters properly. Proper charging parameters prevent the battery from overcharging or undercharging. Please refer to the following table for recommended charging parameters.

SKU		RNG-BATT-AGM12-100	RNG-BATT-AGM12-200
Product Name		12V 100Ah Deep Cycle AGM Battery	12V 200Ah Deep Cycle AGM Battery
Boost Charge	Charging Voltage (25°C / 77°F)	14.4V to 14.8V	
	Temperature Compensation	-24 mV / °C	
	Maximum Duration	2 to 4 Hours	
Float Charge	Charging Voltage (25°C / 77°F)	13.5V to 13.8V	13.6V to 13.8V
	Temperature Compensation	-18 mV / °C	

- c. Equalize the battery bank periodically. The equalization charge corrects the voltage imbalance between individual batteries in the battery bank due to the manufacturing variances and different charge/discharge histories experienced. Please refer to the following table for recommended equalization charge parameters.

SKU		RNG-BATT-AGM12-100	RNG-BATT-AGM12-200
Product Name		12V 100Ah Deep Cycle AGM Battery	12V 200Ah Deep Cycle AGM Battery
Equalization Charge	Charging Voltage (25°C / 77°F)	14.4V to 14.8V	
	Temperature Compensation	-18 mV / °C	
	Maximum Duration	12 to 24Hours	
	Recommended Interval	30 Days	

- d. Connect battery balancers to the battery bank. The battery balancer compares the voltages of individual batteries in the battery bank and compensate for the voltage imbalance during the charging or discharging process.
- e. Connect only identical batteries in parallel and/or in series. Do not mix batteries with different brands, models, chemistries, nominal voltages, rated capacities, or ages. Doing so could create a dangerous circuit, resulting in shortened battery service life or even battery damage.
- f. Fully charge each battery individually to eliminate the voltage difference before initially connecting the batteries in parallel and/or in series. The voltage imbalance between individual batteries in the battery bank could cause battery overheating, overcharging, or undercharging, resulting in shortened battery service life.
- g. Connect power sources and electric loads on opposite corners of the battery bank. The opposite connection helps even out the charging and discharging of each battery in the battery bank.
- h. Do not discharge the battery below 50%. Discharging the battery below 50% frequently seriously shortens the battery service life.
- i. Fully charge the battery immediately after each discharge. Long-term undercharging could cause the buildup of lead sulfate crystals on the battery plates and lead to early battery failure.
- j. Conform to the maximum charge and discharge current limitations. High charge current or discharge current shortens the battery service life or even damages the battery.
- k. Charge and discharge the battery at room temperature. High temperatures shorten the battery service life and low temperatures reduce the effective battery capacity.
- l. Fully charge the battery before storage. Check the battery open circuit voltage regularly and charge the battery at least once every three months to compensate for the self-discharge.
- m. Store the battery in a cool and dry location. Avoid hot and cold environments to prevent the battery from shortened service life.

### **3. If my battery bank does not accept charge or discharges too fast, how can I tell whether the battery bank is failed?**

#### **Step 1. Identify the lagging battery in the battery bank**

The lagging battery is the battery whose voltage is significantly lower than other batteries in the battery bank. First, charge the battery bank using a three-stage charge controller or battery charger until the charge current tapers to 0.03C. Then, discharge the battery bank at the standard discharge current 0.05C and measure the individual battery terminal voltages. Repeat the above charging and discharging process 3 times. If there is a battery whose terminal voltage is lower than the average terminal voltage of the battery bank by more than 5% in all the 3 discharge processes, that battery can be considered as a lagging battery.

#### **Step 2. Equalize the battery bank**

Equalize the battery bank with the proper equalization charge parameters and repeat the step 1. If the terminal voltage of the lagging battery is still lower than the average terminal voltage of the battery bank by more than 5%, proceed to the step 3.

### ■ Step 3. Determine whether the lagging battery is failed

First, disconnect the lagging battery from the battery bank and charge the lagging battery using a three-stage charge controller or battery charger until the charge current tapers to 0.005C. Then, disconnect the lagging battery from the charge controller or battery charger and rest for 4-12 hours. Use the following 2 methods whichever is applicable to determine whether the lagging battery is failed.

- a. Measure the internal resistance of the lagging battery with a battery tester and compare the result with the rated internal resistance in the following table. If the measured internal resistance is greater than the rated internal resistance by more than 50%, the lagging battery is failed.

<b>SKU</b>	RNG-BATT-AGM12-100	RNG-BATT-AGM12-200
<b>Product Name</b>	12V 100Ah Deep Cycle AGM Battery	12V 200Ah Deep Cycle AGM Battery
<b>Rated Internal Resistance</b>	5mΩ	3.5mΩ

- b. Discharge the lagging battery to the cut-off voltage 10.5V at the standard discharge current 0.05C. Record the start time and end time. Measure the ambient temperature, battery terminal voltage, and discharge current every 30 minutes during the discharging process. The measured discharge current should not deviate from the standard discharge current by more than 1%. The measurement should be performed more frequently near the end of the discharge to catch the cut-off voltage. Calculate the lagging battery capacity using the following formula:

$$\text{Lagging Battery Capacity} = I \times t / [1 + K \times (T-25)]$$

Where I is the standard discharge current, t is the discharge time. K is the temperature coefficient, which is equal to 0.006/°C. T is the average ambient temperature during the discharging process. If the lagging battery capacity is less than 50% of the battery rated capacity, the lagging battery is failed.

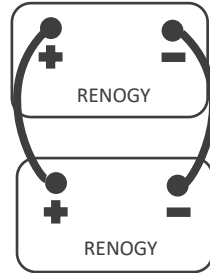
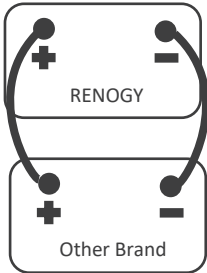
### ■ Step 4. Rejuvenate the battery (Optional)

Disconnect the lagging battery from the power sources and electric loads. Rejuvenate the battery with a battery regenerator and repeat the step (3). If the lagging battery is still failed, replace it.

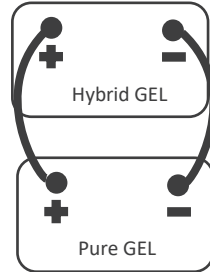
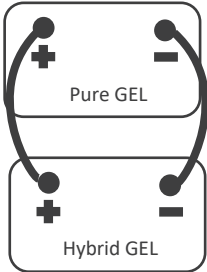
## 4. What should I pay attention to when connecting batteries in parallel or in series?

### ■ DON'TS

a. DO NOT mix brands

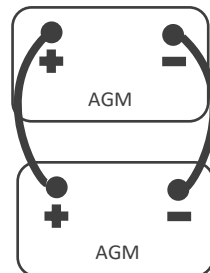
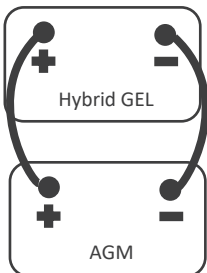


b. DO NOT mix models



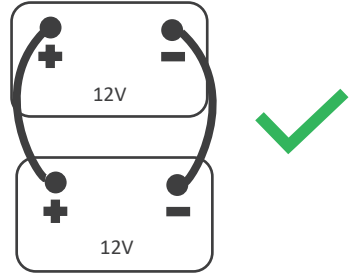
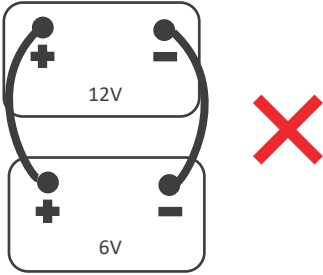
**NOTE:** Pure GEL – SKU: RNG-BATT-GEL12-100, RNG-BATT-GEL12-200; Hybrid GEL – SKU: RBT100GEL12-G1, RBT200GEL12-G1

c. DO NOT mix chemistries

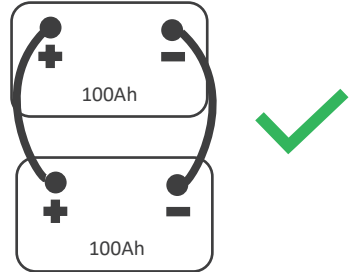
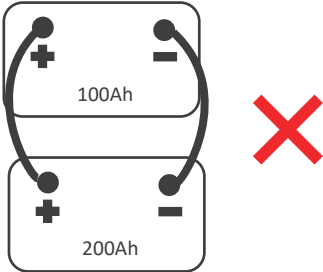




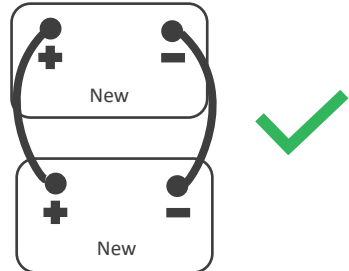
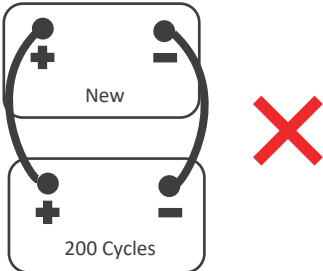
**d. DO NOT mix nominal voltages**



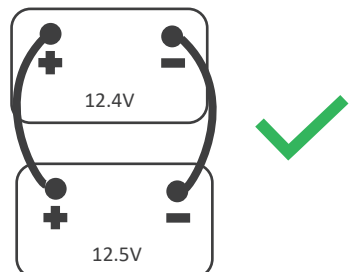
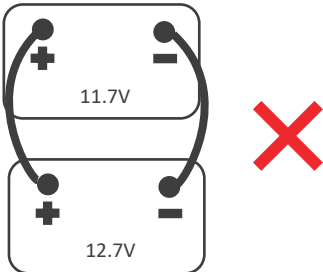
**e. DO NOT mix rated capacities**



**f. DO NOT mix ages**

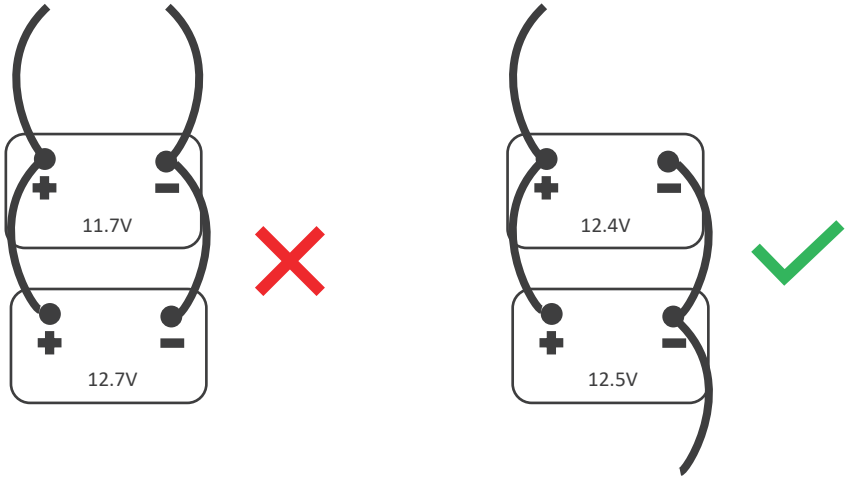


**g. DO NOT connect batteries with an open circuit voltage difference greater than 10% of the nominal voltage**

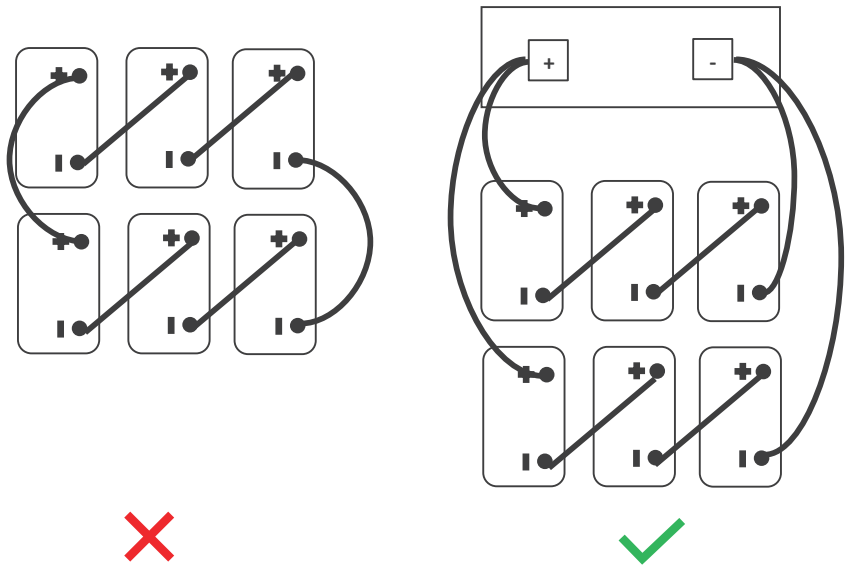


**DOS**

a. Connect power sources and electric loads on opposite corners of the battery bank



b. Connect individual battery strings separately to a common junction point or box for a series-parallel connection



c. Use battery balancers to balance series connected or series-parallel connected battery banks

## 5. Why does my battery lead acid, swell up, or release acid vapors?

### Leak Acid:

The sulfuric acid electrolyte is immobilized and sealed in the battery. The battery should not pose a risk of acid leakage if it is handled properly. However, with a cracked casing, the sulfuric acid electrolyte will eventually start seeping out and cause corrosion to the materials in the surrounding areas. The battery casing may crack due to dropping, collision, or high current charge/discharge.

### Swell Up:

In the battery, the positive and negative plates are placed close together with only the thickness of the divider separating them. The battery is constructed in such a way to allow the absorption of gases generated during the charging process inside the battery. However, the plates will exert pressure on the inner wall of the battery and cause the battery case to swell up. The plates may expand due to overcharging or short-circuiting.

### Release Acid Vapors:

The battery is sealed using safety valves. Under normal operating conditions, the safety valves remain closed so that the gases generated during the charging process can recombine within the battery.

However, if the internal pressure exceeds safety limits, the safety valves will open to allow the excess gases including acid vapors to escape. The internal pressure may increase due to overcharging.

## 6. Specifications

SKU	RNG-BATT-AGM12-100	RNG-BATT-AGM12-200
Product Name	12V 100Ah Deep Cycle AGM Battery	12V 200Ah Deep Cycle AGM Battery
Battery Type	AGM	
Rated Capacity	100Ah (10 Hour Rate to 10.5V)	200Ah (20 Hour Rate to 10.5V)
Nominal Voltage	12V	
Cycle Life	500 Cycles (50% DOD)	
Self-discharge Rate (77°F / 25°C)	< 3% / month	
Connection Method	In Series, and In Parallel (up to 4)	
Automatically Self-heating Function	No	
Dimensions	13.1 x 6.9 x 8.6 in / 332 x 175 x 219 mm	20.6 x 9.4 x 8.8 in / 522 x 240 x 224 mm

<b>Weight</b>	63.9 lbs / 29 kg	127.9 lbs / 58 kg
<b>Housing Material</b>	ABS	
<b>Cycle Use Voltage</b>	14.4V to 14.8V	
<b>Float Charge Voltage</b>	13.5V to 13.8V	13.6V to 13.8V
<b>Maximum Continuous Charging Current</b>	30A	60A
<b>Maximum Discharging Current</b>	1100A (5 seconds)	2000A (5 seconds)
<b>Standard Operation Temperature</b>	77°F ±9°F (25°C ±5°C)	
<b>Storage Temperature</b>	-4°F to 140°F / -20°C to 60°C	
<b>Charge Temperature</b>	32°F to 122°F / 0°C to 50°C	
<b>Discharge Temperature</b>	-4°F to 140°F / -20°C to 60°C	
<b>Built-in Bluetooth</b>	No	
<b>Communication Port</b>	No	
<b>Bolts</b>	M8 x 2	
<b>Material and Workmanship Warranty</b>	2-year	
<b>Certifications</b>	MSDS	

## 7. Important Safety Instructions

The manufacturer accepts no liability for any damage caused by:

- Force majeure including fire, typhoon, flood, earthquake, war, and terrorism.
- Intentional or accidental misuse, abuse, neglect or improper maintenance, and use under abnormal conditions.
- Improper installation, improper operation, and malfunction of a peripheral device.
- Contamination with hazardous substances or radiation.
- Alterations to the product without express written consent from the manufacturer.

### General

- Wear proper protective equipment and use insulated tools during installation and operation. Do not wear jewelry or other metal objects when working on or around the battery.
- Keep the battery out of the reach of children.
- Do not dispose of the battery as household waste. Comply with local, state, and federal laws and regulations and use recycling channels as required.
- In case of fire, put out the fire with a FM-200 or CO<sub>2</sub> fire extinguisher.

- Do not expose the battery to flammable or harsh chemicals or vapors.
- Clean the battery regularly.
- It is recommended that all cables should not exceed 10 meters because excessively long cables result in a voltage drop.
- The cable specifications listed in the quick guide account for critical, less than 3% voltage drop and may not account for all configurations.
- Do not expose the battery to strong electrostatic fields, strong magnetic fields, or radiation.

### **Battery Safety**

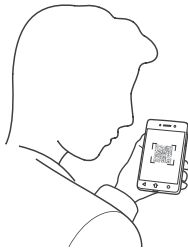
- Please keep the battery away from water, heat sources, sparks, and hazardous chemicals.
- Do not puncture, drop, crush, burn, penetrate, shake, strike, or step on the battery.
- Do not open, dismantle, repair, tamper with, or modify the battery.
- Do not touch any terminals or connectors.
- Please make sure any battery charger or charge controller has been disconnected before working on the battery.
- Do not connect or disconnect terminals from the battery without first disconnecting loads.
- Do not place tools on top of the battery.
- Please use suitable handling equipment for safe transportation of the battery.
- Do not insert foreign objects into the positive and negative terminals of the battery.

## **8. Renogy Support**

**To discuss inaccuracies or omissions in this quick guide or user manual,** visit or contact us at:

 | [renogy.com/support/downloads](https://renogy.com/support/downloads)

 → [contentservice@renogy.com](mailto:contentservice@renogy.com)



Questionnaire Investigation




**To explore more possibilities of solar systems,** visit Renogy Learning Center at:

 | [renogy.com/learning-center](https://renogy.com/learning-center)

**For technical questions about your product in the U.S.,** contact the Renogy technical support team through:

 | [renogy.com/contact-us](https://renogy.com/contact-us)

 1(909)2877111

For technical support outside the U.S., visit the local website below:

Canada |  | [ca.renogy.com](http://ca.renogy.com)

China |  | [www.renogy.cn](http://www.renogy.cn)

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Other Europe |  | [eu.renogy.com](http://eu.renogy.com)

## 9. FCC

### FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- (1) Reorient or relocate the receiving antenna.
- (2) Increase the separation between the equipment and receiver.
- (3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- (4) Consult the dealer or an experienced radio/TV technician for help.

### FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.





## Renogy Empowered

Renogy aims to empower people around the world through education and distribution of DIY-friendly renewable energy solutions.

We intend to be a driving force for sustainable living and energy independence.

In support of this effort, our range of solar products makes it possible for you to minimize your carbon footprint by reducing the need for grid power.



## Live Sustainably with Renogy

Did you know? In a given month, a 1 kW solar energy system will...



Save 170 pounds of coal from being burned



Save 300 pounds of CO<sub>2</sub> from being released into the atmosphere



Save 105 gallons of water from being consumed



## Renogy Power PLUS

Renogy Power Plus allows you to stay in the loop with upcoming solar energy innovations, share your experiences with your solar energy journey, and connect with like-minded people who are changing the world in the Renogy Power Plus community.



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