

# **Renogy** Solar MPPT Charge Controller 12V/24V/36V/48V | 60A

RCC60RVRE

VERSION A0 June 4, 2024



USER MANUAL

## **Before Getting Started**

The user manual provides important operation and maintenance instructions for Renogy 12V/24V/36V/48V 60A Solar MPPT Charge Controller (hereinafter referred to as charge controller).

Read the user manual 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 charge controller, potentially rendering it inoperable.

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## **Online Manual**



User Manual



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## **Symbols Used**

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

A WARNING: Indicates a potentially dangerous condition which could result in injury or death.

- **CAUTION:** Indicates a critical procedure for safe and proper installation and operation.
- **i NOTE:** Indicates an important step or tip for optimal performance.

#### **Symbol Description**

Icons	Name	Description
Â	High Voltage	High voltage device. Installation should be performed by an electrician.
	High Temperature	This device will produce heat. Mount device away from other items.
X	Environmental Hazard	Electronic Equipment. Do not put in landfill.
ĥ	Wire Cutter	A wire cutter is needed for cutting and stripping wires prior to connection.
	Multi-meter	A multimeter is needed for testing equipment and verifying polarity of cables.
	Anti-static Glove	Anti-static gloves are recommended to prevent controller damage caused by static electricity.
~~0	Electrical Tape	Electrical tape is recommended to safely insulate spliced or bare wires.
	Screwdriver	A common size screwdriver is needed to attach wires to the controller.

## **Safety Tips**

- Review this manual thoroughly before attempting installation.
- Beware of any nearby electrical equipment that may interfere with installing this device.
- Solar panels can generate high voltages and currents, make sure your solar panels are completely covered from sunlight during installation. It is recommended that installation be performed by a quali fied electrician.
- Connecting wires to this device can generate sparks, please wear proper insulation gear while installing this device.
- To avoid damage to the battery or controller, use proper fuses in wiring. Please do not hesitate to contact the professionals if you need help with fuse sizing.
- Always keep children away from this device.
- Be certain to use the correct gauge of wire, see below for a table of recommended wire size for various current loads.

Solar Input Current	5A	10A	20A	30A	40A	60A
Wire Cross Section Area (mm <sup>2</sup> )	1.5	2.5	5	8	10	12
Wire AWG	15	13	10	8	7	6

#### **Product Features**

Thank you for choosing our products. This MPPT solar charge controller is a device for solar charge regulation and direct current output load control. This device is mainly used in small and medium sized off-grid solar power systems.

These MPPT charge controllers have features as follows:

- By continuously checking solar panel power output changes, the controllers employ multiple MPPT charge algorithms in combination to boost charging efficiency in different weather and temperature conditions.
- Built-in buffer, allows max 25% exceeding rated power input.
- Charging modes available for most common deep-cycle battery types in the market, including AGM (sealed lead acid batteries), GEL, Flooded, and Lithium.
- Auto recognition of 12V/24V/36V/48V battery system voltage. Lithium battery excluded from this feature.
- Supports recording of system running data including power generated and power utilized for up to 300 days, compatible with monitoring App through IOS and Android.
- Provides multiple load control mode options for light based, time based and manually adjusted scenarios. Low no-load loss.
- Industrial grade design with reverse polarity protection for solar panels, battery and load.
- After installing the Renogy BT-2 Bluetooth module on this charge controller, you can view the working status of the charge controller through the DC Home APP and RENOGY Core.

## **Device Diagram**



# **Mounting Instruction**



**Step 1**: Find a cool, dry and weather safe location for installation.



**Step 3**: Drill holes in the marked mounting hole location.



Step 5: Fasten the controller into the pilot screws. .



**Step 2**: Mark the controller's mounting holes on the mounting surface.



**Step 4**: Insert pilot screws in the mounting holes.



**Step 6**: Continue to wire battery. solar DC load and other accessories to the controller

#### **Wire Connection Sequence**



During installation of the controller, please follow the order of connection below:

- 1. Connect the positive battery wire followed by the negative battery wire.
- 2. Make sure your solar panels are fully covered to prevent electrical shock.
- 3. Connect the positive solar array output wire followed by the negative solar array output wire.
- 4. Connect DC load wires to the DC load output (if applicable).

5. Connect the external temperature sensor to its terminal shown above, and attach or stick the temperature sensor to the battery side.

#### Monitoring via DC Home or Renogy ONE

With a Renogy BT-2 Bluetooth Module, the charge controller can be connected to the DC Home app for remote device monitoring. You can monitor and modify parameters of the charge controller through the DC Home app.

**Recommended Components** 



\*Renogy BT-2 Bluetooth Module

- Step 1: Connect the Renogy BT-2 Bluetooth Module to the RS485 Communication Interface on the charge controller. After the connection, the Bluetooth Module POWER indicator light will remain solid green.
  - E POWER INK O вт-2 0000 ° ó Renogy BT-2 **Bluetooth Module**

Step 2: Place the Bluetooth module in a suitable site.

Depending on the specific application, the charge controller can establish either short-range or long-range communication connections with monitoring devices. These monitoring devices facilitate real-time monitoring, programming, and complete system management, offering comprehensive control and enhanced flexibility.

- Make sure the Bluetooth of your phone is turned on.
- The version of the DC Home app might have been updated. Illustrations in the user manual are for reference only. Follow the instructions based on the current app version.
- Make sure that the charge controller is properly installed and powered on before it is paired with the DC Home app.
- To ensure optimal system performance, keep the phone within 10 feet (3 m) of the Renogy BT-1 Bluetooth Module or a Renogy BT-2 Bluetooth Module.

To ensure optimal connection performance, download the latest DC Home app. Login to the app with your account.





#### Short-Range Monitoring

If only short-range monitoring is required, connect the charge controller to the DC Home app directly through the Bluetooth of your phone.

Step 1: Open the DC Home app. Tap + to search for new devices.

Step 2: Tap Confirm to add the newly found device to the device list.

**Step 3**: Tap the charge controller icon to enter the device information interface.



#### Wireless Long-Range Monitoring

**Recommended Components** 

If long-range communication and programming are required, connect the charge controller to Renogy ONE (sold separately) through Bluetooth, and the Renogy ONE to the DC Home app through Wi-Fi.



\*RENOGY ONE Core

- **i** Components marked with **\*\*** are available on <u>renogy.com</u>.
- i Make sure that the Renogy ONE is powered on before the connection.
- For instructions on Renogy ONE, see <u>Renogy ONE Core User Manual</u>.
- i Make sure the charge controller does not communicate with any other device.

**Step 1**: Connect the charge controller to Renogy ONE through the Bluetooth of your phone. **Step 2**: Pair the Renogy ONE with the DC Home app by scanning the QR code on Renogy ONE.



## LCD Display Interface Overview



<b>Display Section</b>	Display Layout
Active Functions	🜉 🗰 🌾 🛆 12V 🛛 🐼
Charge Mode & Parameter	MPPT BOOST FLOAT CHG-V LDV-V
Charge Status	

# **LCD Status Information**

Status Icon Indication Status		Description	
	Solar Charge	Flowing	Solar Power Charging Battery
	Indication	Off	Solar Power Not Charging Battery
	DC Load	Flowing	DC Load Drawing Power
	Indication	Off	DC Load Off
MPPT			MPPT Charge Mode
BOOST	Charge Mode	Steady On	Boost Charge Mode
			Float Charge Mode
FLUAT		Off	Not Charging
CHG-V	Voltage Setting	On	Setting Charge Voltage
		Off	Charge Voltage Has Been Set
	Over Discharge Volt Settings	On	Setting Charge Voltage
		Off	Charge Voltage Has Been Set
	Solar Icon	Steady On	Daylight Detected
		Off	No Daylight Detected
		Flash	Solar System Over Voltage
		Steady On	Battery Connected and Functional
+ -	Battery Icon	Off	No Battery Connection
		Flash	Battery Over-Discharged
		On	Load On
	Load Status	Off	Load Off
<b></b>		Flash	DC Load Short Circuit or Over-Load

# **Key Functionality Chart**

System Mode	Function Key	Input	Input Function
		Short Press	View the previous page.
		Short Press	View the next page.
View Mode	<u>```¢`</u>	Short Press	DC Load On/Off (Only applicable when the Load Mode is set to "15". For details, see <u>Load Mode</u> <u>Settings</u> .)
	\$	Long Press	Enter Setting Mode.
		Short Press	Increase the parameter value.
		Short Press	Decrease the parameter value.
Set Mode	-ġ- <b>◆</b>	Short Press	Exit Setting Mode without saving.
	<b>\</b>	Long Press	Save the settings and exit the Setting Mode.
		Short Press	Jump to next parameter settings.

# **LCD Display Rules & Cycles**

The pre-startup display cycle occurs when the MPPT controller is powered on, typically lasting several seconds, during which the controller assesses the operating environment.



## **LCD Screen Display Cycle**

The battery voltage view will be displayed by default. Use the A and T functional keys to cycle through different views. The battery voltage view will resume upon 30 seconds of inactivity. The error code view will be displayed when an error is detected. The backlight in the screen will be on for 20 seconds with any button operation.



## **Setting Battery Mode**

Enter Setting mode by pressing the 🔅 in any view page other than Load Mode Or Controller Temperature. Use the 🔺 and 💌 arrow keys to select battery mode, then long press 🔅 to save the settings.



Abbreviations	Battery Types	Description
FLd	Flooded Battery	
581	Sealed/AGM Battery	parameters set for each type of batteries.
58L	Gel Battery	

Abbreviations	Battery Types	Description	
LI	Lithium Battery (Lithium battery activation disabled)	Low temperature protection (Frozer charge forbid). Some parameters ca	
Lithium Battery (Lithium battery activation enabled)		be customized.	
USE	Advanced User Mode	Most parameters can be customized.	

## **Advanced Battery Settings**

Pressing 😰 to enter Setting mode. Choose LI, ALI or USE mode, short press the 😰 again to cycle through each parameter view. Use the  $\land$  and  $\bigtriangledown$  arrow key to adjust parameter value, then long press 🔅 to save.

## **Battery Type: LI/ALI**

Low Temperature Protection (Low Tem Protect)



LDV-V

Over-discharge Voltage Over-discharge Recovery Equalize Charge Interval

Float Charge Voltage

## Load Mode Settings

Enter Load Setting Mode by pressing 🔅 in Load Mode view only. Use the 🔺 and 💌 functional keys to cycle through load modes before long pressing 🔅 to save and exit. Short pressing 😵 will exit without saving the settings.



Long press 😰 to save settings and exit the setup interface.

Short press to cancel the settings and exit the setup interface.

Mode	Definition	Description
0	Daylight Auto-Control	DC load turns on when no daylight is detected.
1 to 14	Daylight On / Timer Off	DC load turns on when no daylight is detected. DC load turns off according to timer.
15	Manual Mode	DC load turns on/off by pressing 😵 🔶.
16	Testing Mode	DC load turns on and off in a quick succession.
17	Always On	DC load stays on.

## **Temperature Unit Setting**

In the temperature display interface, enter the temperature unit setting mode by long pressing You can switch between °F (Fahrenheit) and °C (Celsius) by pressing and functional keys. Long press to confirm saving and exit, and short press to exit the setting without saving.



# Error Code Chart

Code	Error	Description & Quick Troubleshoot
E00	No Error	No action needed.
E01	Battery Over-discharged	Battery voltage is too low. DC load will be turned off until battery re-charges to recovery voltage.
E02	Battery Over-voltage	Battery voltage has exceeded controller limit. Check battery bank voltage for compatibility with controller.
E04	Load Short Circuit	DC load short circuit.

Code	Error	Description & Quick Troubleshoot
E05	Load Overload	DC load power draw exceeds controller capability. Reduce load size or upgrade to a higher load capacity controller.
E06	Overheating	Controller exceeds operating temperature limit. Ensure the controller is placed in a well-ventilated cool, dry place.
E07	Environmental Overtemperature	The environment temperature sampled by the external temperature probe is too high.
E10	Solar Over-voltage	Solar array voltage exceeds controller rated input voltage. Decrease the voltage of solar panels connected to the controller.
E13	Solar Reverse Polarity	The solar input wires are connected with reverse polarities. Disconnect and re-connect with correct wire polarities.
E14	Battery Reverse Polarity	Battery connection wires connected with reverse polarity. Disconnect and re-connect with correct wire polarity.

For further assistance, contact Renogy technical support service at <u>https://www.renogy.</u> <u>com/contact-us</u>.

## **Charging Parameters**

The variable "n" is adopted as a multiplying factor when calculating parameter voltages, the rule for "n" is listed as the following: if battery system voltage is 12V, n=1; 24V, n=2; 36V, n=3; 48V, n=4.

For example, the equalize charge voltage for a 12V FLD (Flooded) battery bank is 14.8V\*1=14.8V. The equalizing charge voltage for a 24V FLD (Flooded) battery bank is 14.8V\*2=29.6V.

Battery Type Parameters	SLD/ AGM	GEL	FLD	LI/ALI	USE (Default)	USE (Recommended Range)
Overvoltage Shutdown	16.0V *n	16.0V *n	16.0V *n	16.0V *n	16.0V *n	9V to 17V *n
Overvoltage Reconnect	15.0V *n	15.0V *n	15.0V *n	15.0V *n	N/A	N/A
Equalization Voltage	14.6V *n	N/A	14.8V *n	N/A	N/A	9V to 17V *n
Boost Voltage	14.4V *n	14.2V *n	14.6V *n	<b>14.4V *n</b> (Range: 9V to 17V)	14.2V *n	9V to 17V *n
Boost Return Voltage	14.0V *n	13.8V *n	14.2V *n	14.0V *n	13.8V *n	9V to 17V *n
Float Voltage	13.8V *n	13.8V *n	13.8V *n	N/A	13.8V *n	9V to 17V *n

Battery Type Parameters	SLD/ Agm	GEL	FLD	LI/ALI	USE (Default)	USE (Recommended Range)
Undervoltage Warning	12.0V *n	12.0V *n	12.0V *n	12.0V *n	12.0V *n	9V to 17V *n
Undervoltage Alarm Recovery	12.2V *n	12.2V *n	12.2V *n	12.2V *n	12.2V *n	9V to 17V *n
Low Voltage Warning	11.0V *n	11.0V *n	11.0V *n	11.0V *n	11.0V *n	9V to 17V *n
Low Voltage Alarm Recovery	12.6V *n	12.6V *n	12.6V *n	12.6V *n	12.6V *n	9V to 17V *n
Equalization Interval	30 days	N/A	30 days	N/A	N/A	0 to 250 days (0 represents equalization charged disabled)
Equalization Duration	120 min	N/A	120 min	N/A	N/A	10 to 600 min
<b>Boost Duration</b>	120 min	120 min	120 min	N/A	120 min	10 to 600 min

## **Activate Lithium Batteries**

To enable the lithium battery activation function, set the battery type to ALI on the charge controller. With the function enabled, when the connected lithium battery voltage of the charge controller is 0V, the lithium battery activation function is triggered automatically. The charge controller will activate the lithium battery at a constant voltage of 14.4V (for 12V systems), 28.8V (for 24V systems), 43.2V (for 36V systems), or 57.6V (for 48V systems).

After a period of constant charging, the LCD screen of the charge controller will show AALI, until the charging current from the charge controller to the battery exceeds 300mA. At this point, the lithium battery activation is successful, and the charge controller automatically exits the lithium battery activation mode.



**Specifications** 

Model	RCC60RVRE		
System Wiring Grounded	Negative Grounded		
Battery System Voltage	12V/24V/36V/48V • Auto (FLD/GEL/SEL/USE) • Manual (LI/USE)		
No-load Loss	<ul> <li>12V: 15mA</li> <li>24V: 11mA</li> <li>36V: 8mA</li> <li>48V: 7mA</li> </ul>		
Max Solar Input Voltage (Voc)	< 150V		
Rated Solar Charge Current	60A		
Max Solar Input Power	<ul> <li>12V: 900W</li> <li>24V: 1800W</li> <li>36V: 2600W</li> <li>48V: 3200W</li> </ul>		
Light Control Voltage	5V*n		
Light Control Delay Time	5mins		
Rated Load Current	20A		
Operating Temperature	-31°F to 113°F / -35°C to 45°C		
IP Protection	IP32		
Net Weight	7.72 lbs / 3.5 kg		
Communication Port	RS485		
Operating Altitude	≤ 3000 meters		
Dimension	12 × 8.07 × 3.9 in / 305 × 205 × 99 mm		

## Dimensions



Dimension tolerance: ±0.2 in (0.5 mm)

## Maintenance

#### Inspection

For optimum performance, it is recommended to perform these tasks regularly.

- Ensure the charge controller is installed in a clean, dry, and ventilated area.
- Ensure there is no damage or wear on the cables.
- Ensure the firmness of the connectors and check if there are any loose, damaged or burnt connections.
- Make sure the indicators are in proper condition.
- Ensure there is no corrosion, insulation damage, or discoloration marks of overheating or burning.
- If the charge controller is dirty, use a damp cloth to clean the outside of the device to prevent dust and dirt from accumulating. Before the charge controller is powered on, make sure it is completely dry after cleaning.
- Make sure the ventilation holes are not blocked.
  - In some applications, corrosion may exist around the terminals. Corrosion can loosen springs and increase resistance, leading to premature connection failure. Apply dielectric grease to each terminals contact periodically. Dielectric grease repels moisture and protects the terminals contacts from corrosion.
  - Risk of electric shock! Make sure that all power supplies are turned off before touching terminals on the charge controller.

#### Cleaning

Follow the steps below to clean the charge controller regularly.

- Disconnect all cables connected to the charge controller.
- Wear proper protective equipment and use insulated tools during operation. Be careful when touching bare terminals of capacitors as they may retain high lethal voltages even after power is removed.
- Wipe the housing of the charge controller and connector contacts with a dry cloth or nonmetallic brush. If it is still dirty, you can use household cleaners.
- Make sure the ventilation holes are not blocked.
- Dry the charge controller with a clean cloth and keep the area around the charge controller clean and dry.
- Make sure the charge controller is completely dry before reconnecting it to the solar panel and battery.

#### Storage

Follow the tips below to ensure that the charge controller is stored well.

- Disconnect all cables connected to the charge controller.
- By applying dielectric grease to each terminals, the dielectric grease repels moisture and protects the connector contacts from corrosion.
- Store the charge controller in a well-ventilated, dry, and clean environment.

#### **Important Safety Instructions**

#### 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 charge controller.
- Keep the charge controller out of the reach of children.
- Do not dispose of the charge controller 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.
- Installing the charge controller improperly on a boat may cause damage to components of the boat. Have the devices installed by a qualified electrician.
- Do not expose the charge controller to flammable or harsh chemicals or vapors.
- Clean the charge controller regularly.
- Do not puncture, drop, crush, penetrate, shake, strike, or step on the charge controller.
- Do not open, disassemble, repair, tamper with, or modify the charge controller.
- Connect the negative prior to the positive terminal when connecting any device.
- 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.

#### Charge Controller Safety

- Install the charge controller on a vertical surface protected from direct sunlight, high temperatures, and water. Make sure there is good ventilation.
- Keep the charge controller away from heating equipment.
- Do not insert foreign objects into the charge controller.
- Confirm the polarities of the devices before connection. A reverse polarity contact can result in damage to the charge controller, thus voiding the warranty.
- Do not touch the connector contacts while the charge controller is in operation.
- Disconnect all connectors from the charge controller before maintenance or cleaning.

#### Battery Safety

- Do not use batteries if there is any damage.
- Do not touch the exposed electrolyte or powder if the battery is damaged.
- Risk of explosion! Never install the charge controller in a sealed enclosure with flooded batteries! Do not install the charge controller in a confined area where battery gases can accumulate.
- Prior to installing the charge controller, ensure all battery groups are installed properly.

#### Solar Panel Safety

- Do not use the solar panel(s) if there is any damage.
- Prior to connecting the charge controller to the solar panel(s), shade the solar panel(s).
- Always connect the charge controller to the battery first before connecting it to the solar panel. This prevents damage caused by open-circuit voltage from the solar panel.

## **Renogy Support**

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



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



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

G | renogy.com/contact-us ক্ৰিন্দ 1(909)2877111

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

Canada   @   ca.renogy.com	China   🌐   www.renogy.cn
Australia   🌐   au.renogy.com	<b>Japan</b>   $\oplus$   jp.renogy.com
South Korea   🌐   kr.renogy.com	Germany
United Kingdom   🌐   uk.renogy.com	Other Europe   @ eu.renogy.com

## **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.

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) Orient 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 $_{2}$  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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