

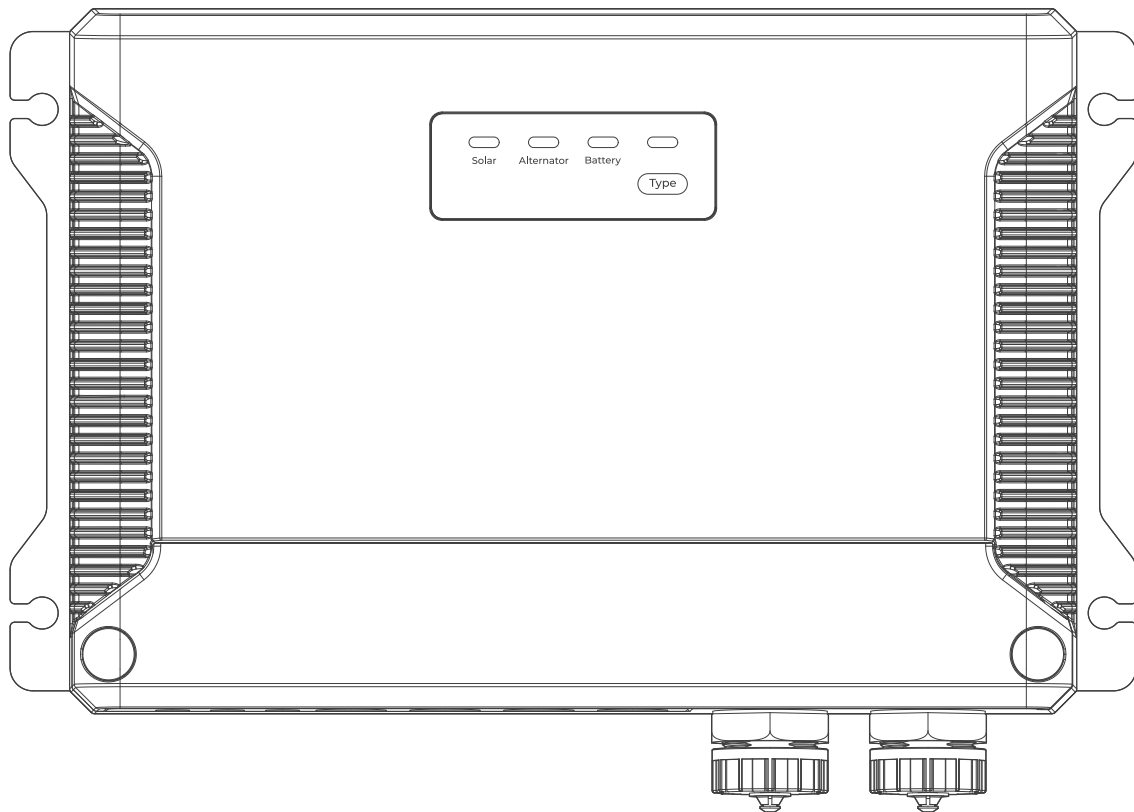
Renogy PRO

Dual Input DC-DC On-Board with MPPT Battery Charger

12V/24V | 50A/60A | IP67

RBC2150DS-21B/RBC2160DS-21B

VERSION A0
March 31, 2026



USER MANUAL

Before Getting Started

The user manual provides important operation and maintenance instructions for Renogy PRO 12V/24V 50A/60A IP67 Dual Input DC-DC On-Board with MPPT Battery Charger (hereinafter referred to as battery charger).

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 battery charger, potentially rendering it inoperable.

- Renogy ensures the accuracy, sufficiency, and the applicability of information in the user manual at the time of printing due to continual product improvements that may occur.
- Renogy assumes no responsibility or liability for personal and property losses, whether directly and indirectly, caused by the user's failure to install and use the product in compliance with the user manual.
- Renogy is not responsible or liable for failures, damages, or injuries resulting from repair attempted by unqualified personnel, improper installation, and unsuitable operation.
- The illustrations in the user manual are for demonstration purposes only. Details may appear slightly different depending on product revision and market region.
- Renogy reserves the right to change the information in the user manual without notice. For the latest user manual, visit [renogy.com](https://www.renogy.com).

Disclaimer

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Online User Manual

Visit your local Renogy website to view the complete user manual.



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1. General Information

1.1. Symbols Used

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

-  **WARNING:** Indicates a potentially hazardous condition that could result in personal injury or death.
-  **CAUTION:** Indicates a critical procedure for safe and proper installation and operation.
-  **NOTE:** Indicates an important step or tip for optimal performance.

1.2. Symbols on Product

Symbol	Description	Symbol	Description
	Read and understand the instruction manual before use.		Do not dispose of the product together with household waste.
	Materials used are recyclable.		Australian compliance certifications
	CE mark of conformity EU/EEA Importer		Product complies with FCC requirements.
	Restriction of Hazardous Substances compliant	 10 R - 06 XXXX	Product complies with ECE Regulation No. 10.

1.3. Introduction

Renogy PRO 12V/24V 50A/60A IP67 Dual Input DC-DC On-Board with MPPT Battery Charger allows you to charge your house (auxiliary) battery from solar panels or the starter battery in your RV. It is a charging device that not only converts direct current to the appropriate voltage for charging a battery but also incorporates MPPT (Maximum Power Point Tracking) technology to optimize power conversion from solar panels.

The battery charger is versatile and can be connected to either 12V or 24V auxiliary batteries. The built-in buck-boost converter module is designed to adapt to different voltage requirements, enabling 12V solar panels to charge 24V batteries and 24V solar panels to charge 12V batteries at their respective native voltages. This bidirectional voltage conversion ensures maximum compatibility across a wide range of solar panel configurations.

In addition, the charger supports input from a 12V or 24V starter battery, with the built-in boost converter stepping up the voltage to efficiently charge a 12V or 24V auxiliary battery — making it a practical solution for dual-battery systems commonly found in RVs, boats, and off-grid vehicles.

Thanks to the exclusive intelligent charging logic, the battery charger prioritizes solar energy and automatically adjusts working modes based on sunlight intensity, efficiently charging your auxiliary battery while easing the load on alternators. For example, when solar input provides only 2A, the remaining 58A is automatically supplemented by the alternator — ensuring a full 60A charging current around the clock. The battery charger seamlessly switches to solar charging in ample sunlight and smoothly transitions to alternator charging during low light, ensuring uninterrupted device power.

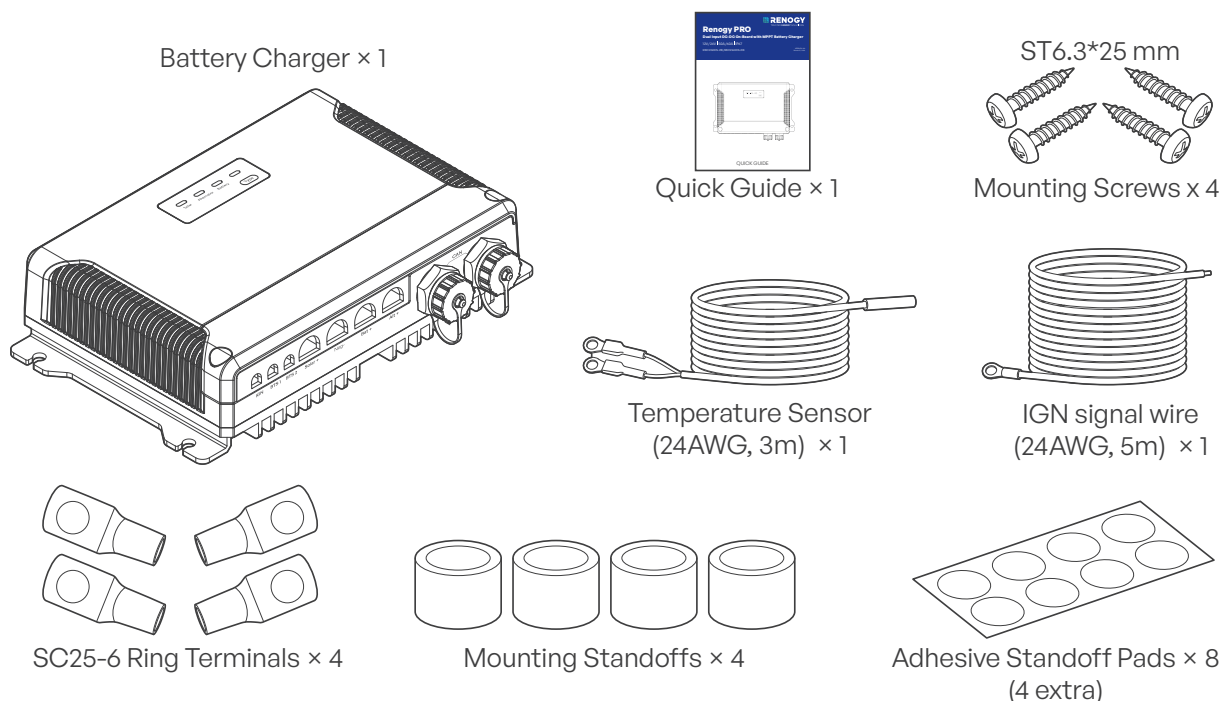
Equipped with intelligent boost and buck logic, it seamlessly accommodates 12V/24V voltage systems, elevating DIY possibilities to the uttermost. Maximizing energy utilization, it boasts a robust 50A/60A current and an impressive 750W/900W output power, making a slim, waterproof dual charging solution perfect for confined spaces. You can embrace an eco-conscious charging experience without compromising efficiency or space, redefining sustainable energy utilization with the battery charger.

1.4. SKU

Renogy PRO 12V/24V 50A IP67 Dual Input DC-DC On-Board with MPPT Battery Charger	RBC2150DS-21B
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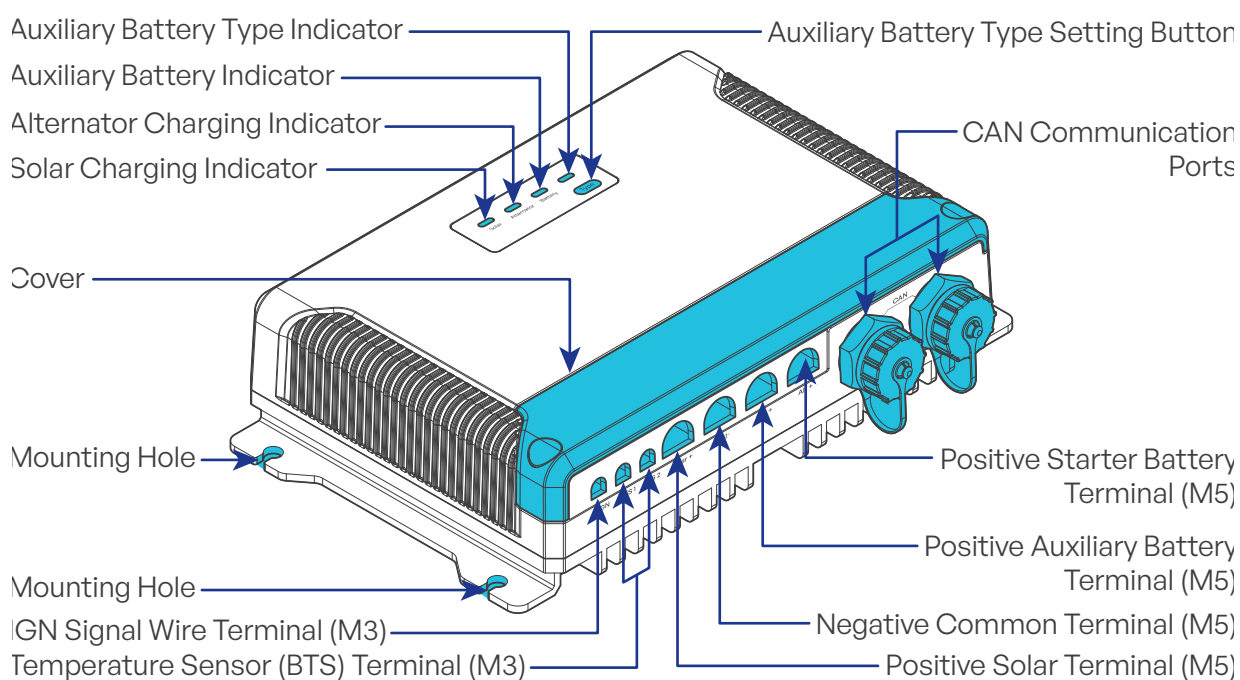
2. Get to Know Battery Charger

2.1. What's In the Box?

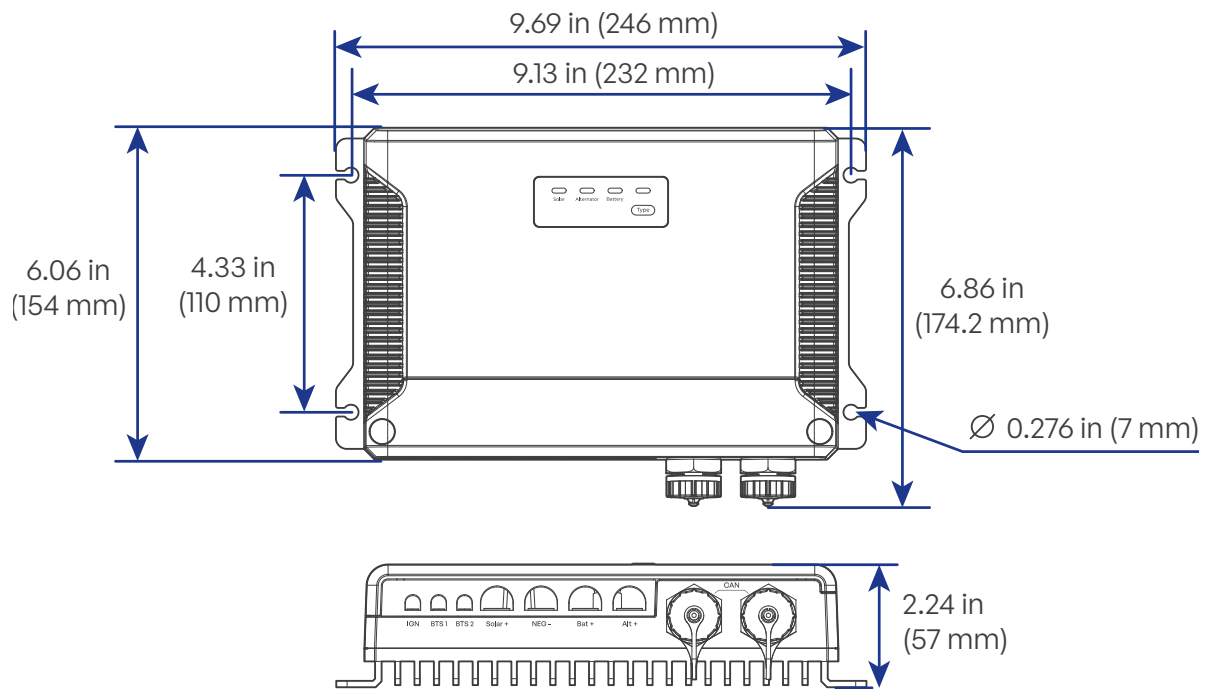


- Make sure that all accessories are complete and free of any signs of damage.
- The accessories and product manual listed are crucial for the installation, excluding warranty information and any additional items. Please note that the package contents may vary depending on the specific product model.

2.2. Product Overview

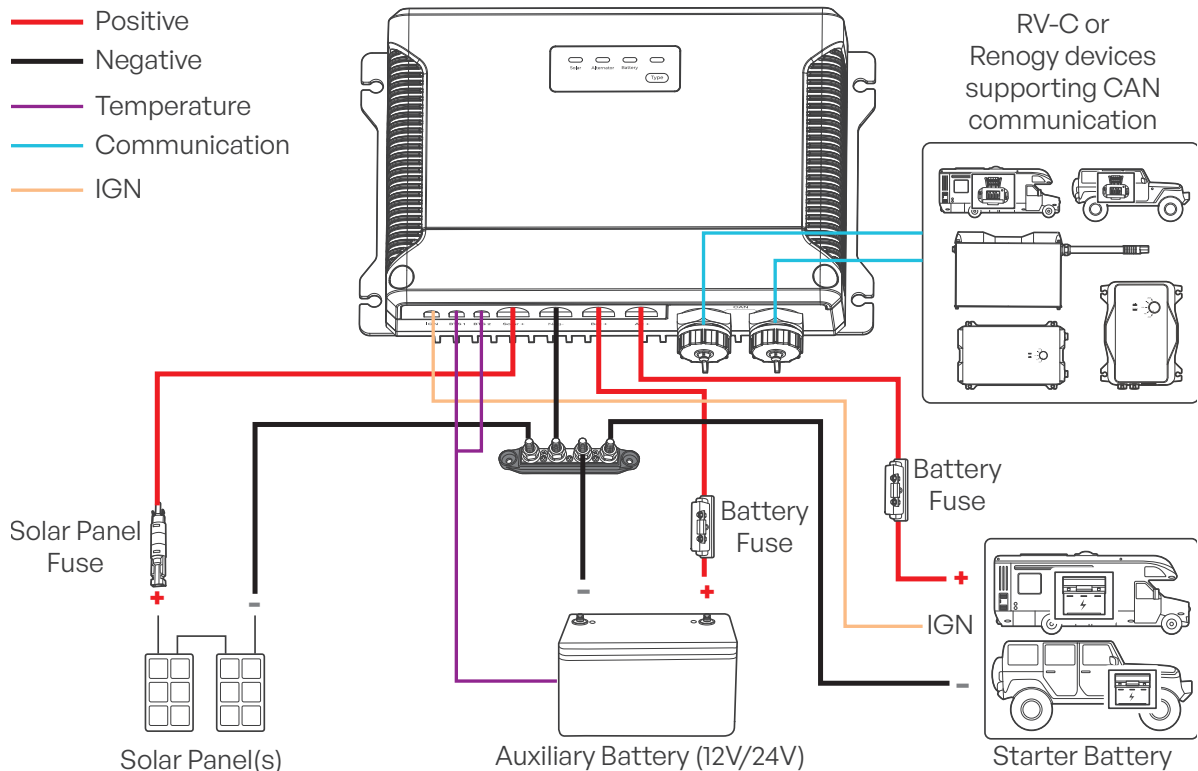


2.3. Dimensions



i Dimension tolerance: ± 0.02 in (0.5 mm)

2.4. System Setup

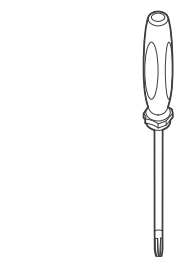


i The wiring diagram only shows the key components in a typical DC-coupled off-grid energy storage system for the illustrative purpose. The wiring might be different depending on the system configuration. Additional safety devices, including disconnect switches, emergency stops, and rapid shutdown devices, might be required. Wire the system in accordance with the regulations at the installation site.

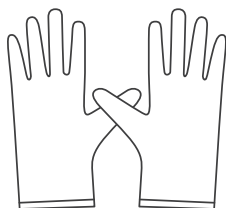
i The battery charger can be connected separately to the solar panel for charging the auxiliary battery or to the vehicle's starting battery for charging the auxiliary battery.

3. Preparation

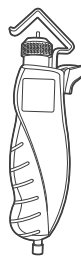
3.1. Recommended Tools & Accessories



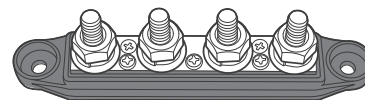
Phillips Screwdriver (#2)



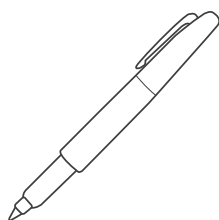
Insulating Gloves



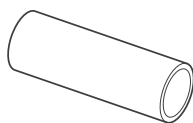
Wire stripper



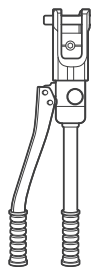
Busbar (60A to 100A)



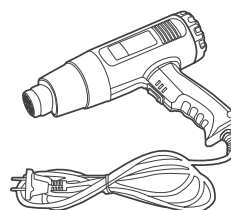
Marker Pen



Heat Shrink Tubing



Manual Hydraulic Pliers



Heat Gun



Prior to installing and configuring the battery charger, prepare the recommended tools, components, and accessories.

3.2. Recommended Fuse Sizing

For your safety, it is recommended to install fuses at both the input and output ends of the battery charger to ensure safe operations.

■ Battery Charger to Auxiliary Battery

Installation Location: To ensure that the auxiliary battery (especially lithium iron phosphate batteries) reaches a 100% charge state, install the charger as close to the battery as possible, ideally within 20 centimeters, and no more than 1.5 meters to minimize voltage loss during the final charging phase.

50A Battery Charger	60A Fuse
60A Battery Charger	80A Fuse

■ Battery Charger to Stater battery

Installation Location: The fuse must be installed on the side close to the positive terminal of the vehicle's stater battery, ideally within 20 centimeters.

50A Battery Charger	70A-80A Fuse
60A Battery Charger	80A-100A Fuse

■ Battery Charger to Solar Panel

Read the user manual of the solar panel to obtain working voltage parameters, and calculate the corresponding fuse specifications according to the formula. In the formula, I_{sc} represents the rated current of the solar panel, and 1, 2 or 3 represents the solar panel number, respectively.

Solar Panel to Battery Charger Fuse = Solar Panel / Solar Panel Array Total Amps * 1.56	
Solar Panels in Series	Solar Panels in Parallel
Total Amps: $I_{sc1} = I_{sc2} = I_{sc3}$ Fuse = $I_{sc1} * 1.56$	Total Amps: $I_{sc1} + I_{sc2} + I_{sc3}$ Fuse = $(I_{sc1} + I_{sc2} + I_{sc3}) * 1.56$

3.3. How to Size Wires?

Wire Standard: Select UL multi-strand soft copper wire with a temperature rating above 221°F (105°C). This type of wire has excellent high-temperature performance and a higher theoretical current-carrying capacity.

Fuse Matching Principle: The fuse specifications should be strictly smaller than the cable's maximum current rating to ensure 100% protection for the cable. The fuse should blow preferentially in the event of overcurrent.

Cable Length: Refers to the sum of the lengths of the positive and negative cables.

-  The cable specifications listed above account for critical, less than 3% voltage drop and may not account for all configurations.
-  The specification of fuse cable is consistent with the input or output cables of the battery charger.
-  In this manual, the red cable represents the positive cable, and the gray cable represents the negative cable.

■ Battery Charger to Auxiliary Battery

Model	Cable Length (ft) / (m)	Cable Gauge Size	Recommended Terminal Types
50A Battery Charger	0 ft to 5 ft (0 m to 1.5 m)	8 AWG (8.37 mm ²)	RNB 8-5 or SC 10-5
	5 ft to 10 ft (1.5 m to 3 m)	6 AWG (13.30 mm ²)	RNB 14-5 or SC 16-5
	10 ft to 16 ft (3 m to 5 m)	4 AWG (21.15 mm ²)	RNB 22-5 or SC 25-5
60A Battery Charger	0 ft to 5 ft (0 m to 1.5 m)	6 AWG (13.30 mm ²)	RNB 14-5 or SC 16-5
	5 ft to 10 ft (1.5 m to 3 m)	4 AWG (21.15 mm ²)	RNB 22-5 or SC 25-5
	10 ft to 16 ft (3 m to 5 m)	4 AWG (21.15 mm ²)	RNB 22-5 or SC 25-5

■ Battery Charger to Stater battery

Model	Cable Length (ft) / (m)	Cable Gauge Size	Recommended Terminal Types
50A Battery Charger	0 ft to 10 ft (0 m to 3 m)	8 AWG (8.37 mm ²)	RNB 8-5 or SC 10-5
	10 ft to 20 ft (3 m to 6 m)	6 AWG (13.30 mm ²)	RNB 14-5 or SC 16-5
	20 ft to 30 ft (6 m to 9 m)	4 AWG (21.15 mm ²)	RNB 22-5 or SC 25-5
60A Battery Charger	0 ft to 10 ft (0 m to 3 m)	6 AWG (13.30 mm ²)	RNB 14-5 or SC 16-5
	10 ft to 20 ft (3 m to 6 m)	4 AWG (21.15 mm ²)	RNB 22-5 or SC 25-5
	20 ft to 30 ft (6 m to 9 m)	4 AWG (21.15 mm ²)	RNB 22-5 or SC 25-5

■ Battery Charger to Solar Panel

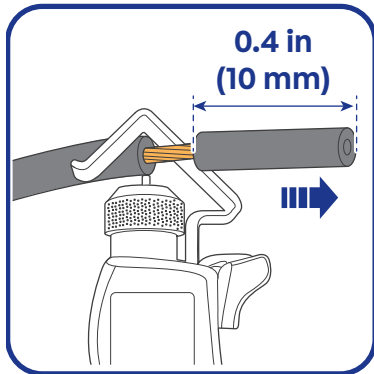
Wire Limitations: Photovoltaic wires available on the market with MC4 waterproof connectors are typically 12 AWG or 10 AWG. To ensure safety, be sure to keep the total input current of the solar array controlled at 20A or below by using series or parallel connections.

Voltage Warning: Connecting in series will increase the voltage. The total open-circuit voltage (Voc) of all series panels must not exceed the maximum allowable input voltage of 60V, as exceeding this limit may cause equipment damage! If the open-circuit voltage exceeds 50V, the device will stop functioning to perform overvoltage protection.

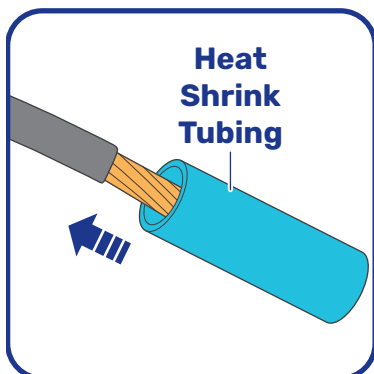
Model	Total output current of Solar Panels	Cable Length (ft) / (m)	Cable Gauge Size	Recommended Terminal Types
50A Battery Charger	0-10A	0 ft to 16 ft (0 m to 5 m)	12 AWG (3.33 mm ²)	RNB 5.5-5
	10-20A	0 ft to 26 ft (0 m to 8 m)	10 AWG (5.26 mm ²)	
60A Battery Charger	0-10A	0 ft to 16 ft (0 m to 5 m)	10 AWG (5.26 mm ²)	
	10-20A	0 ft to 26 ft (0 m to 8 m)	10 AWG (5.26 mm ²)	

3.4. How to Install Ring Terminals on the Cables?

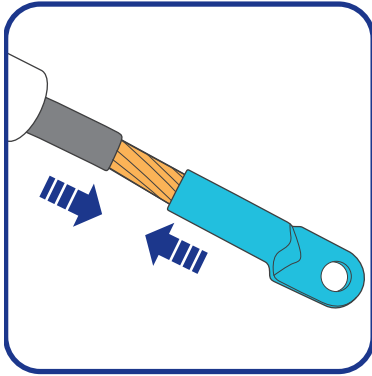
Ring terminals crimp onto cable ends and directly bolt to battery charger terminals for stable current and secure mounting.



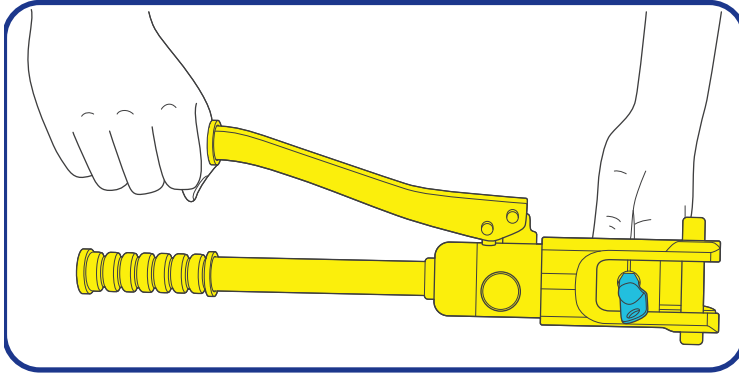
Step 1: Use wire strippers to remove about 0.4 inches (10 mm) of insulation from the end of the cable.



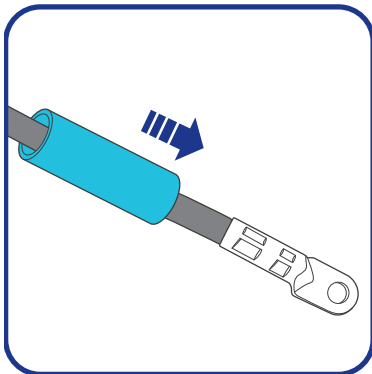
Step 2: Slide a piece of heat-shrink tubing onto the cable.



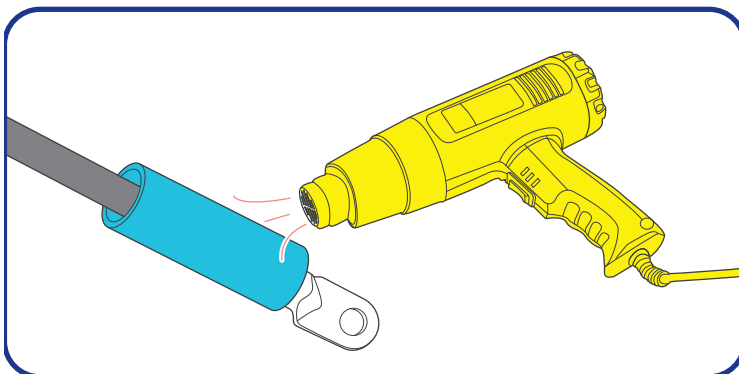
Step 3: Insert the cable into the ring terminal.



Step 4: Use a manual hydraulic crimper to firmly crimp the ring terminal onto the cable.



Step 5: Slide the heat-shrink tubing over the crimped ring terminal.

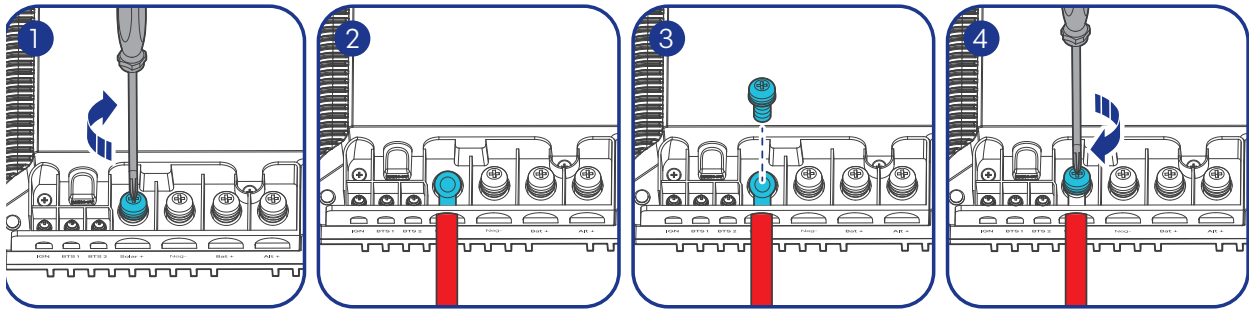


Step 6: Use a heat gun to heat the heat-shrink tubing until it shrinks and forms a tight seal.

3.5. How to Install Cables on the Battery Charger?

The illustration is based on the Solar+ terminal as an example; the wiring methods for all terminals are the same.

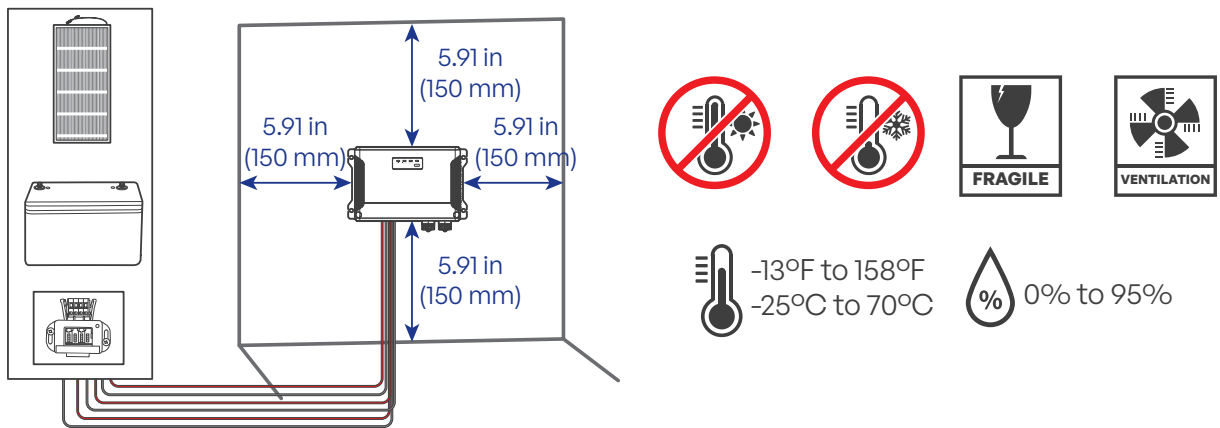
- The torque for the Solar +, Neg -, Bat +, and Alt + terminals: 28kgf·cm
- The torque for the IGN, BTS 1, and BTS 2 terminals: 8kgf·cm



3.6. Plan a Mounting Site

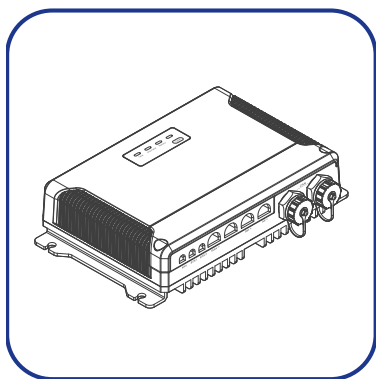
The battery charger requires adequate clearance for installation, wiring and ventilation. The minimum clearance is provided below. Ventilation is highly recommended if it is mounted in an enclosure. Select a proper mounting site to ensure the battery charger can be safely connected to the battery, solar panel(s), and the other necessary devices with the relevant cables.

You can mounting the battery charger vertically on a wall or horizontally on the floor.



- ⚠ Risk of explosion! Never install the battery charger in a sealed enclosure with flooded batteries! Do not install the battery charger in a confined area where battery gases can accumulate.
- ⚠ The battery charger should be installed on a flat surface protected from direct sunlight.
- ⚠ Keep the battery charger out of the reach of children and animals.
- ⚠ Do not expose the battery charger to flammable or harsh chemicals or vapors.
- ⚠ Make sure that the battery charger is installed in a place at ambient temperature from -13°F to 158°F (-25°C to 70°C).
- ⚠ Make sure that the battery charger is installed in an environment with relative humidity between 0% and 95% and no condensation.
- ⚡ If the battery charger is installed improperly on a boat, it may cause damage to components of the boat. Have the battery charger by a qualified electrician.
- i The battery charger should be as close to the battery as possible to avoid voltage drop due to long cables.
- i It is recommended that all cables (except communication cables) should not exceed 10 meters (32.8 feet) because excessively long cables result in a voltage drop. The communication cables should be shorter than 6 m (19.6 feet).
- i Keep the battery charger away from EMI receptors such as TVs, radios, and other audio/visual electronics to prevent damage or interference to the equipment.

3.7. Check the Battery Charger

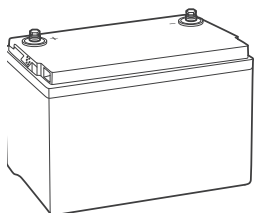


Inspect the battery charger for any visible damage including cracks, dents, deformation, and other visible abnormalities. All connector contacts shall be clean, free of dirt and corrosion, and dry.

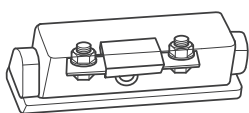
-  Do not use the battery charger if there is any visible damage.
-  Do not puncture, drop, crush, penetrate, shake, strike, or step on the battery charger.
-  There are no serviceable parts in the battery charger. Do not open, dismantle, repair, tamper with, or modify the battery charger.
-  Confirm the polarities of the devices before connection. A reverse polarity contact can result in damage to the battery charger and other connected devices, thus voiding the warranty.
-  Do not touch the connections while the battery charger is in operation.
-  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 charger.
-  Do not dispose of the battery charger as household waste. Comply with local, state, and federal laws and regulations and use recycling channels as required.

3.8. Check the Auxiliary Battery

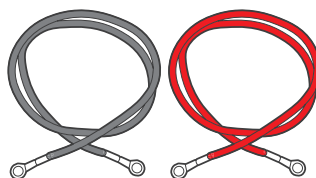
Recommended Components & Accessories



12V/24V Battery
(9V to 30V)



Battery Fuse

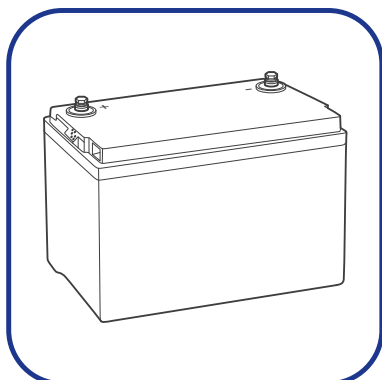


Battery Adapter Cables × 2



Fuse Cable × 1

 Components and accessories marked with “*” are available on renogy.com.



1. Inspect the battery for any visible damage including cracks, dents, deformation, and other visible abnormalities. All terminals shall be clean, free of dirt and corrosion, and dry.

The battery charger can only be connected to 12V or 24V deep-cycle gel-sealed lead-acid batteries (GEL), flooded lead-acid batteries (FLD), sealed lead-acid batteries (SLD/AGM) or lithium iron phosphate batteries (LI).

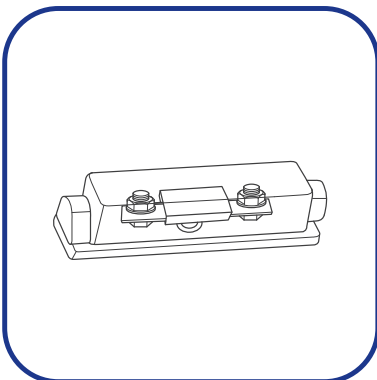
- ⚠ Do not use the battery if there is any visible damage. Do not touch the exposed electrolyte or powder if the battery housing is damaged.
- ⚠ When being charged, the battery may give off explosive gas. Make sure there is good ventilation.
- ⚠ Take care to use a high-capacity lead-acid battery. Be sure to wear protective goggles. If carelessly getting electrolyte in your eyes, flush your eyes with clean water immediately.
- ⚡ Combine batteries in parallel or in series as needed. Prior to installing the battery charger, ensure all battery groups are installed properly.
- i Read the user manual of the battery in use carefully.

Battery or Battery Bank System Voltage	
Battery or Battery Bank System Voltage = System Voltage U	
Batteries in Series	Batteries in Parallel
System Voltage U: $U_1+U_2+U_3$	System Voltage U: $U_1=U_2=U_3$

2. This battery charger works seamlessly with both 12V and 24V battery systems. Please consult the battery manual for accurate system voltage information. Ensure that the 16V overvoltage protection is not triggered for 12V systems and the 30V protection is not activated for 24V systems.

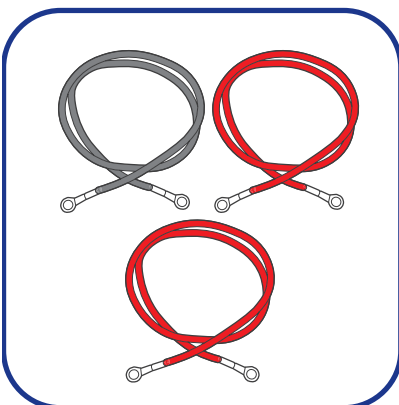
Read the battery user manual for battery voltage parameters, and calculate the voltage of the battery or battery pack system according to the formula to ensure that it does not exceed 30V.

- i In the formula, U represents the battery voltage, and 1, 2, or 3 represents the battery number respectively.



3. Inspect the Battery Fuses for any visible damage including cracks, dents, deformation, and other visible abnormalities. All terminals shall be clean, free of dirt and corrosion, and dry.

- ⚠ Do not use the Battery Fuses if there is any visible damage.
- i For details on how to install and use the Battery Fuse, see its user manual.



4. Inspect the Battery Adapter Cables and Fuse Cable for any visible damage including cracks, dents, deformation, and other visible abnormalities. All connector contacts shall be clean, dry, and free of dirt and corrosion.

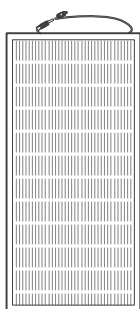
- ⚠ Do not use the battery adapter cables and fuse cable if there is any visible damage.

3.9. Check the Solar Panel(s)

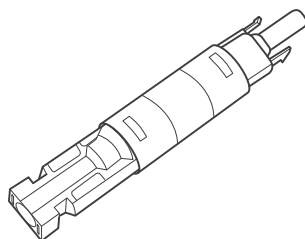
Ensure that the solar module output does not exceed the values specified in the table below. If the output voltage of the solar module exceeds 50V, the battery charger will stop working. **If it exceeds 60V, it will directly damage the battery charger.**

Model	Solar Panels Power	Solar Panels Voltage	Maximum Charging Current from Solar Panels	
			12V Battery	24V Battery
50A Battery Charger	$\leq 750W$	$\leq 50V$	50A	25A
60A Battery Charger	$\leq 900W$	$\leq 50V$	60A	30A

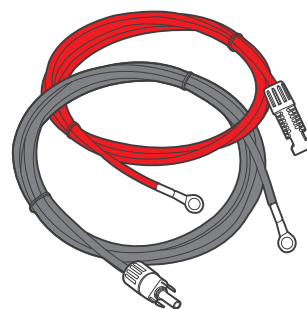
Recommended Components & Accessories



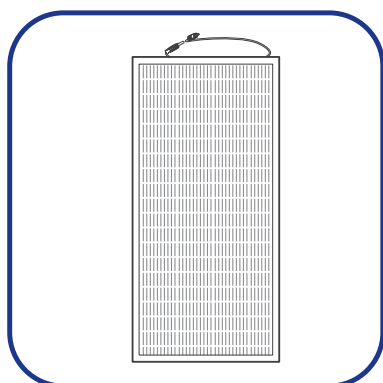
Solar Panel(s)



Solar Panel Fuse



Solar Panel Extension Cables × 2



1. Inspect the solar panel for any visible damage including cracks, dents, deformation, and other visible abnormalities. All connector contacts shall be clean, dry, and free of dirt and corrosion.

-  Do not use the solar panel if there is any visible damage.
-  Cover the solar panel prior to connecting it to the battery charger to prevent any electrical current or voltage from being generated or flowing through the system during the installation process. This reduces the risk of electrical shocks or accidents while making connections, ensuring the safety of the installer and the integrity of the equipment.
-  Do not install the solar panel on a surface constructed from combustible material.
-  Do not expose the solar panel to direct flame or heat sources.
-  Keep the solar panel out of the reach of children.
-  Keep the solar panel away from explosives and corrosive substances.
-  Do not step, walk, stand, or jump on the solar panel. Localized heavy loads may cause damage to the solar cells, which will ultimately compromise the performance of the solar panel.
-  Do not bend the solar panel. Bending the solar panel will cause damage to the cells and affect panel performance.
-  Do not immerse the solar panel in water.

-  Read the user manual of the solar panel carefully before installation.
-  The solar panels can be combined in parallel or in series as needed.
-  Identify the polarities (positive and negative) on the cables used for solar panels. A reverse polarity contact may damage the unit.

Maximum Output Power	
Maximum Output Power of Solar Panel or Solar Panel Array = Maximum Solar Input Power W	
Solar Panels in Series	Solar Panels in Parallel
Maximum Output Power W: $W_1+W_2+W_3$	Maximum Output Power W: $W_1+W_2+W_3$

2. Read the user manual of the solar panel for the maximum output power, and calculate the maximum output power of solar panel or solar panel array according to the formula. Ensure that the maximum output power of the solar panel/solar panel array does not exceed 750W (50A battery charger) / 900W (60A battery charger).

-  In the formula, W represents the output power of the solar panel, and 1, 2, or 3 represents the solar panel number respectively.

Open Circuit Voltage	
Open Circuit Voltage of Solar Panel or Solar Panel Array = Open Circuit Voltage U	
Solar Panels in Series	Solar Panels in Parallel
Working Voltage U: $U_1+U_2+U_3$	Working Voltage U: $U_1=U_2=U_3$

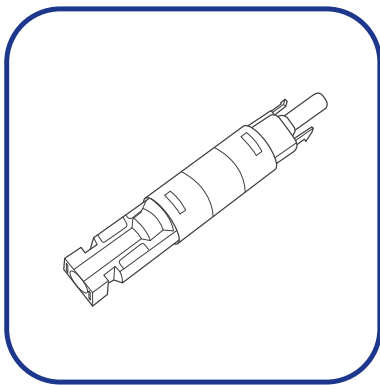
3. Read the user manual of the solar panel for the maximum open circuit voltage, and calculate the maximum open circuit voltage of solar panel or solar panel array according to the formula. Ensure that the open circuit voltage of the solar panel/solar panel array does not exceed 50V.

-  In the formula, 1, 2, or 3 represents the solar panel number respectively.

Short Circuit Current (Isc)	
Short Circuit Current (Isc) of Solar Panel or Solar Panel Array = Short Circuit Current (Isc) I	
Solar Panels in Series	Solar Panels in Parallel
Short Circuit Current (Isc) I: $I_1=I_2=I_3$	Short Circuit Current (Isc) I: $I_1+I_2+I_3$

4. Read the user manual of the solar panel for the short circuit current (Isc), and calculate the short circuit current (Isc) of solar panel or solar panel array according to the formula. Ensure that the short circuit current of the solar panel/solar panel array does not exceed 50A (50A battery charger) / 60A (60A battery charger).

-  In the formula, I represents the short circuit current (Isc) of the solar panel, and 1, 2, or 3 represents the solar panel number respectively.
-  Short circuit current is the abnormal flow of electric current in a power system, occurring between phases or between phase and ground (or neutral) during operation, with values often exceeding the rated current and dependent on the electrical distance from the short-circuit point to the power source. For detailed information, please refer to the specific solar panel manual.



5. The appropriate current rating for the solar panel fuse should be determined by multiplying the total short current amperage of the solar panel array by 1.56.

Rated Current of the Solar Panel Fuse = Short Circuit Current (Isc) of Solar Panel x 1.56

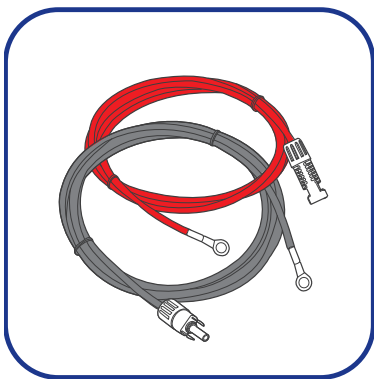
Inspect the solar panel fuse for any visible damage including cracks, dents, deformation, and other visible abnormalities. All terminals shall be clean, free of dirt and corrosion, and dry.



Do not use the solar panel fuse if there is any visible damage.



For details on how to install and use the solar panel fuse, see its user manual.



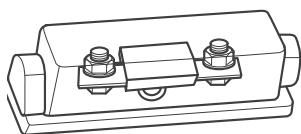
6. Inspect the Solar Panel Extension Cables for any visible damage including cracks, dents, deformation, and other visible abnormalities. All connector contacts shall be clean, dry, and free of dirt and corrosion.



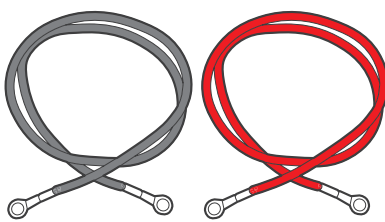
Do not use the solar panel extension cables if there is any visible damage.

3.10. Check the Alternator on Your Automobile

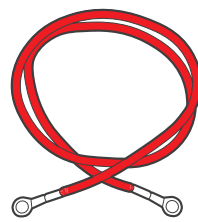
Recommended Components



Battery Fuse



Battery Adapter Cables × 2



Fuse Cable × 1



Accessories marked with “*” are available on renogy.com.

The automobile alternator may be a smart alternator or a traditional alternator. The connection method of a smart alternator or a traditional alternator depends on its parameters. Before installing the battery charger, read the user manual of the vehicle or consult the vehicle supplier to determine the type of alternator.

In addition, you can use a multimeter by yourself to measure the alternator to determine the type of alternator.

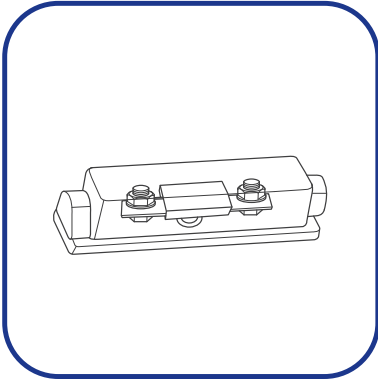
1. Locate your main vehicle battery or the starter battery.
2. Start the engine. Ensure all any fans, radio, lights, and others are turned off.
3. Take a voltage reading across the main vehicle battery.
4. Leave the engine run for around 5 or 10 minutes, then repeat Step 3.

Taking a 12V system as an example, if the vehicle's starter battery is 24V, the following parameters should be multiplied by 2.

Readings around 14.4V DC indicates you most likely have a traditional alternator. If your readings are around 12.5-13.5V, you most likely have a smart alternator.



In general, the working voltage of a traditional alternator ranges from 13.2V to 16V, and that of a smart alternator ranges from 12V to 16V. Consult the vehicle supplier for help if necessary.



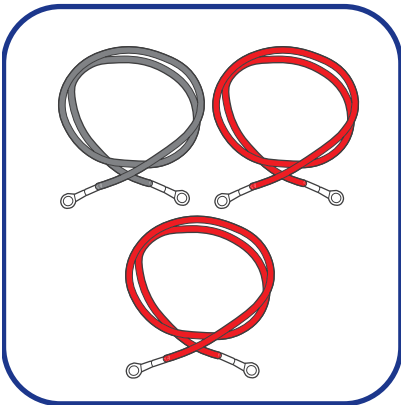
1. Inspect the Battery Fuses for any visible damage including cracks, dents, deformation, and other visible abnormalities. All terminals shall be clean, free of dirt and corrosion, and dry.



Do not use the Battery Fuses if there is any visible damage.



For details on how to install and use the Battery Fuse, see its user manual.



2. Inspect the bare wires for any visible damage including cracks, dents, deformation, and other visible abnormalities.

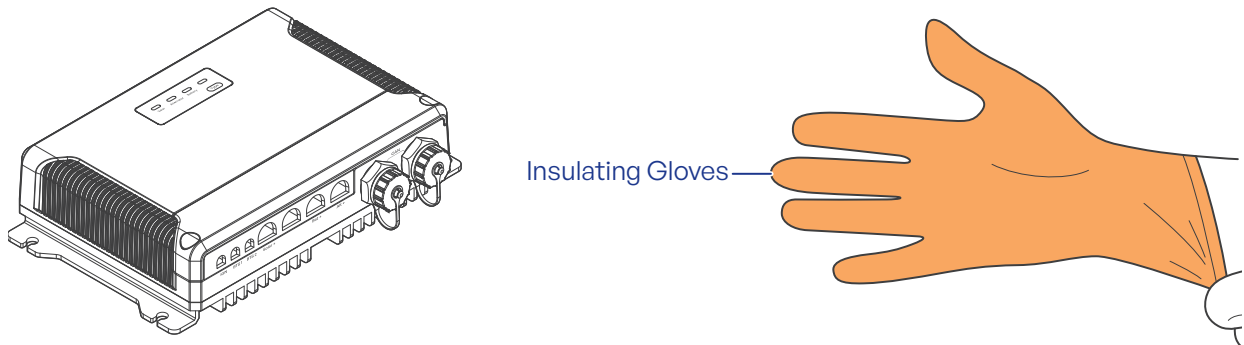


Do not use the bare wires if there is any visible damage.

4. Installation

To ensure safe and efficient operation of the battery charger and to avoid potential damage or hazards, always follow the installation instructions in the sequence described in this manual.

4.1. Wear Insulating Gloves

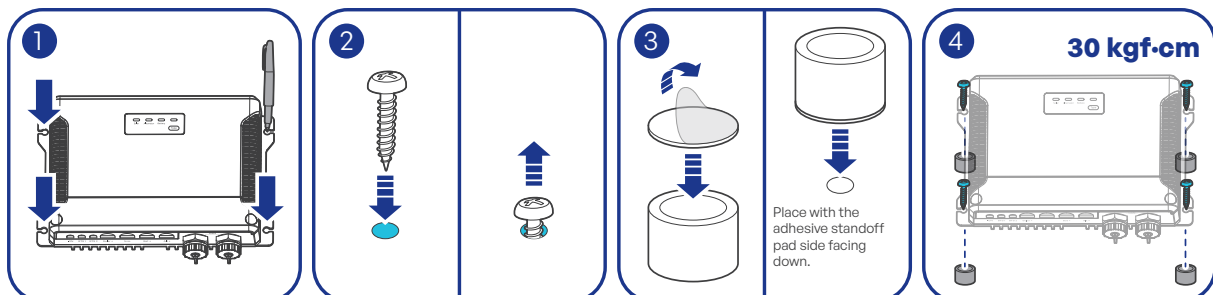


4.2. Mounting

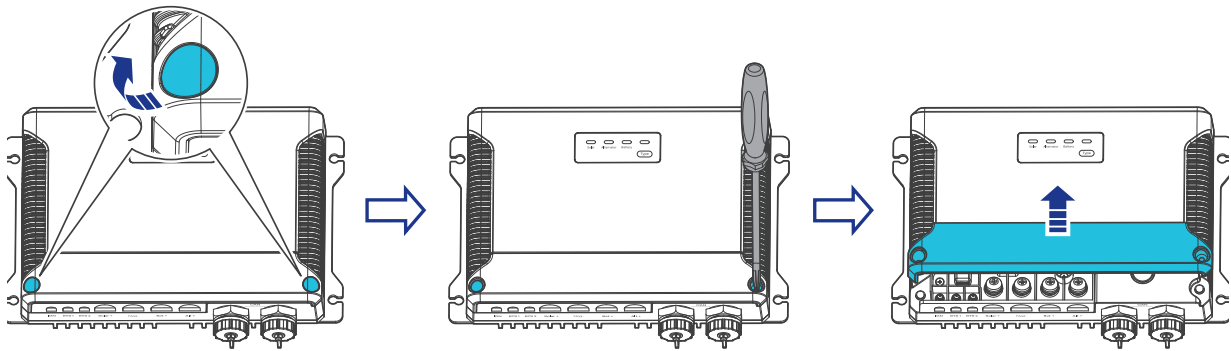
To ensure that the battery charger maintains optimal performance and reliability under all operating conditions, it is strongly recommended to install it using the supplied Mounting Standoffs. This installation method offers the following two key advantages:

- **Enhanced Heat Dissipation:** The Mounting Standoffs create a necessary air gap between the battery charger and the mounting surface, facilitating natural convection and significantly improving airflow around the heatsink. This effectively prevents thermal throttling caused by overheating, ensuring continuous and stable operation of the battery charger and extending its service life.
- **Protection of the Mounting Surface:** The Mounting Standoffs physically isolate the battery charger from the mounting surface, preventing direct heat transfer to the mounting substrate. This design effectively prevents thermal discoloration, scorching, or structural damage resulting from prolonged heat exposure on surfaces such as wood boards or plastic panels, thereby preserving the aesthetics and safety of the installation environment.

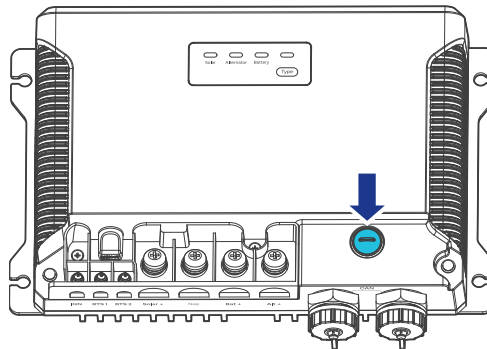
1. Place the battery charger at the intended installation location, and use a marker pen to mark the corresponding positions of the four mounting holes.
2. Use self-tapping screws to pre-drill pilot holes at the marked points to reduce resistance during subsequent fastening.
3. Attach the adhesive standoff pads to the mounting standoffs, and then secure the assembled standoffs onto the positioning holes.
4. Place the battery charger onto the four standoffs. First tighten the two upper mounting screws, and then secure the remaining screws to ensure the entire installation is firm.



4.3. Remove the Cover

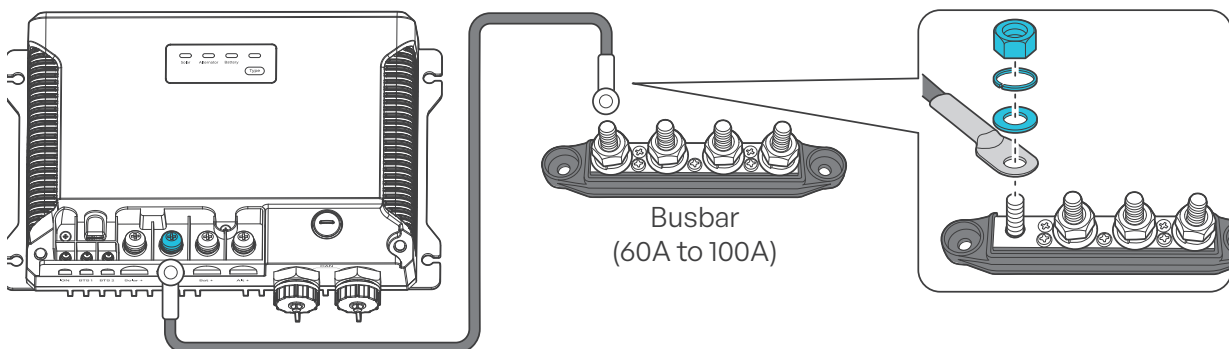


It is strictly prohibited to disassemble the potting holes.



4.4. Connect the Battery Charger to an Busbar

Connect the negative cable to the battery charger Negative Common Terminal (M5), and connect the other end to the busbar.



4.5. Connect the Battery Charger to an Auxiliary Battery

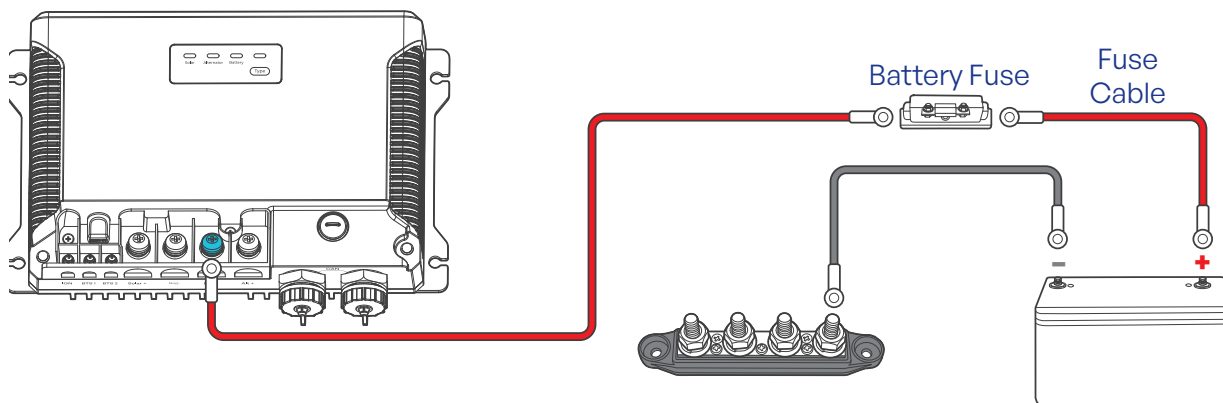
The battery charger can only be connected to 12V or 24V deep-cycle, gel-sealed lead-acid batteries (GEL), flooded lead-acid batteries (FLD), sealed lead-acid batteries (SLD, AGM) or lithium iron phosphate batteries (LI).

Always connect the battery charger to a battery before connecting it to a solar panel to ensure safe and efficient operation.

When wiring, always connect the negative terminal first, followed by the positive terminal.

Step 1: Connect the negative cable to the battery negative terminal, and connect the other end to the busbar.

Step 2: Connect the positive cable to the battery charger Positive Auxiliary Battery Terminal (M5), and connect the other end to the fuse. Prepare a fuse cable, connect one end to the fuse and the other end to the battery positive terminal.



i Tug on all cables to ensure firm connection.

4.6. Connect the Battery Charger to a Solar Panel

Choose proper solar panels based on your power system. Ensure that the solar panel parameters do not exceed 750W / 900W (15V to 50V, $\leq 48A$); otherwise, it may cause damage to the battery charger.

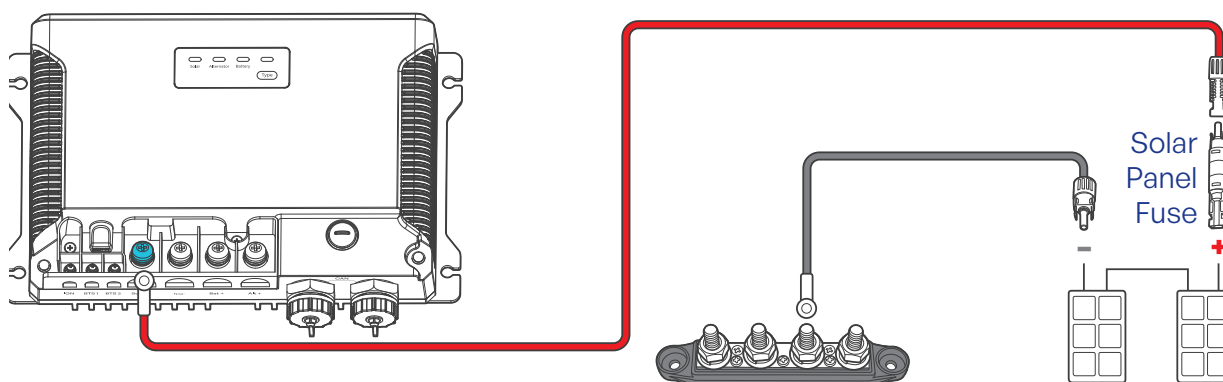
Ensure that the solar module output does not exceed the values specified in the table below. If the output voltage of the solar module exceeds 50V, the battery charger will stop working. **If it exceeds 60V, it will directly damage the battery charger.**

Model	Solar Panels Power	Solar Panels Voltage	Maximum Charging Current from Solar Panels	
			12V Battery	24V Battery
50A Battery Charger	$\leq 750W$	$\leq 50V$	50A	25A
60A Battery Charger	$\leq 900W$	$\leq 50V$	60A	30A

When wiring, always connect the negative terminal first, followed by the positive terminal.

Step 1: Connect the negative cable to the solar panel negative terminal, and connect the other end to the busbar.

Step 2: Insert the fuse into the positive output of the solar panel or solar panel array. Connect one end of the positive cable to the fuse and the other end to the battery charger Positive Solar Terminal (M5).



i Tug on all cables to ensure firm connection.

4.7. Connect the Battery Charger to a Starter Battery

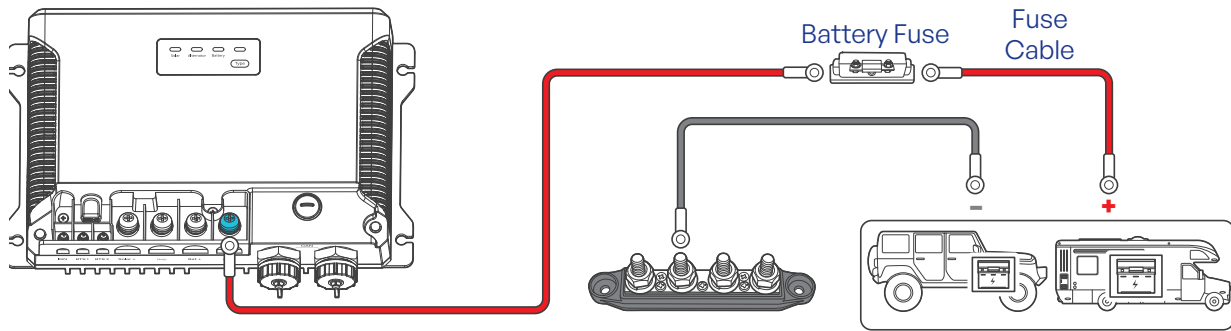
The battery charger can be connected separately to the solar panel for charging the auxiliary battery or to the vehicle's starter battery for charging the auxiliary battery.

After the battery charger has fully charged the auxiliary battery, it can also charge the starter battery. When wiring, always connect the negative terminal first, followed by the positive terminal.

Step 1: Connect the negative cable to the battery negative terminal, and connect the other end to the

busbar.

Step 2: Connect the positive cable to the battery charger Positive Starter Battery Terminal (M5), and connect the other end to the fuse. Prepare a fuse cable, connect one end to the fuse and the other end to the battery positive terminal.



i Tug on all cables to ensure firm connection.

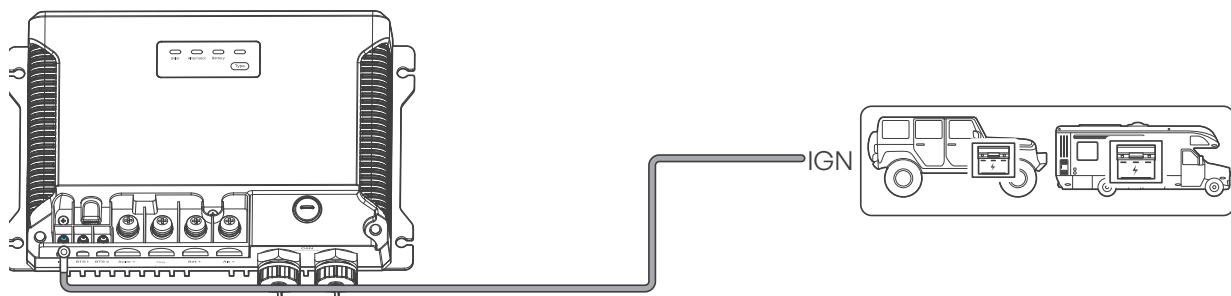
Upon completion of installation, the first step is to set the vehicle alternator type via the Renogy ONE Core or Renogy app.

Subsequently, set the operating mode. The Battery charger supports two operating modes.

■ Mode 1: IGN (Vehicle Engine Detection Mode)

Start condition: When an IGN connection is detected and a high-level signal is received, the Battery charger checks the starter battery voltage. If the voltage is $>12V$ (adjustable) and remains so for 15 seconds, the Battery charger begins charging the auxiliary battery.

When switching to IGN mode, an IGN signal wire must be installed. Connect the IGN Signal Wire's connector to the Ignition Signal (D+) Port on the Battery charger, while the other end connects to the IGN terminal of the alternator. Alternatively, you can connect it to the ignition fuse in the vehicle's fuse box. To do this, pull out the ignition fuse vertically, insert the exposed wire into the pinhole, and then reinsert the ignition fuse vertically.



■ Mode 2: ALT (Alternator Type Selection Mode)

When switching to ALT mode, the Battery charger relies solely on voltage changes from the starter battery to control start/stop. The specific logic depends on the type of vehicle alternator:

● Scenario A: With a Traditional Alternator

Start charging: Starter battery voltage $>13.2V$ for 15 seconds

Stop charging: Starter battery voltage $<12.7V$

● Scenario B: With a Smart Alternator

Start charging: Starter battery voltage $>12.0V$ for 15 seconds

Stop charging: Starter battery voltage $<11.5V$

4.8. Install a Battery Temperature Sensor

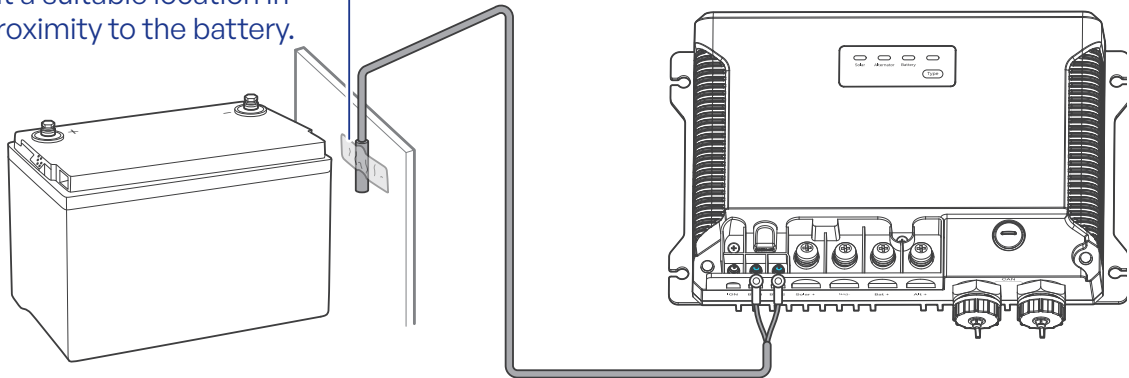
The temperature sensor measures the surrounding temperature of the battery and compensates the floating charge voltage when the battery temperature is low.



Do not use the temperature sensor on a LiFePO₄ (LFP) battery which comes with a battery management system (BMS).

Check the silk screen on the temperature sensor ring terminals. Connect the BTS 1 ring terminal to the BTS 1 terminal of the battery charger, and connect the BTS 2 ring terminal to the BTS 2 terminal. The sensor should be fixed around the battery.

Mount the sensor securely
at a suitable location in
close proximity to the battery.



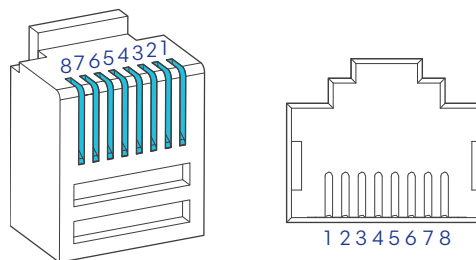
4.9. CAN Communication Wiring (Optional)

Using a communication cables, connect the devices sequentially through their CAN communication ports to establish mutual communication. For details, please visit renogy.com/Support/Learning Center/Communication to view the articles “CAN Communication Connections” and “RV-C Communication Connections.”



For technical support from Renogy, please contact us through renogy.com/contact-us/.

Terminal Definitions

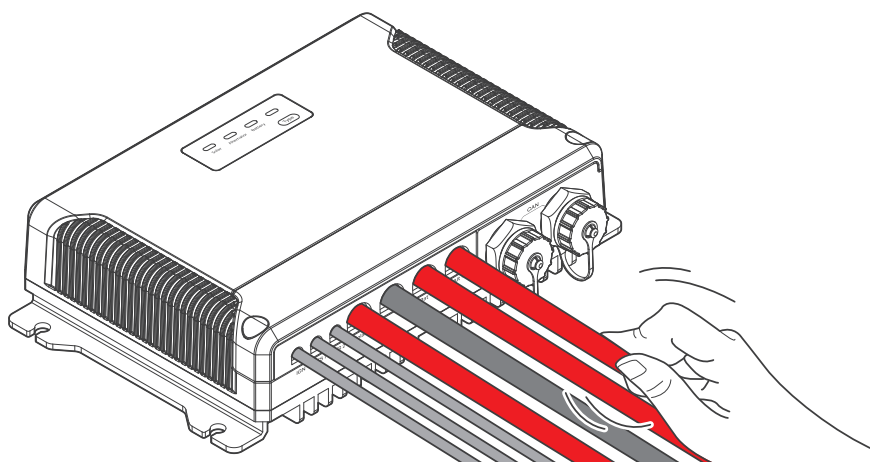


8-Pin RJ45 Connector
(CAT5 or above)

Pinout No.	Definition	Pinout No.	Definition
1	+5V	5	N/C
2	RS-485 A	6	CAN_H
3	RS-485 B	7	N/C
4	CAN_GND	8	CAN_L

4.10. Wire Inspection

Verify that all cable connections are firmly and securely fastened. This step is essential to prevent any loose or unstable connections that could lead to operational issues or safety concerns.



5. LED Indicators

The battery charger turns on automatically after power on with the LED indicators working in accordance with the relative operating status.

Solar Charging Indicator

-  **Off:** Solar panel overvoltage/reverse connection/short circuit.
-  **Solid:** The input voltage is normal.

Auxiliary Battery Type Indicator

-  **Solid:** FLD
-  **Solid:** GEL
-  **Solid:** SLD/AGM
-  **Solid:** 12V LI (Enable lithium battery activation)
-  **Flash:** 12V LI (Disable lithium battery activation)
-  **Solid:** 24V LI (Enable lithium battery activation)
-  **Flash:** 24V LI (Disable lithium battery activation)
-  **Solid:** User Mode (Long press the button for 5 seconds to enter low power mode.)

Alternator Charging Indicator

-  **Off:** Not charging
-  **Solid:** The starter battery is charging the auxiliary battery.
-  **Slow flash:** The solar panel is charging the starter battery.
-  **Double flash:** The auxiliary battery is charging the starter battery.

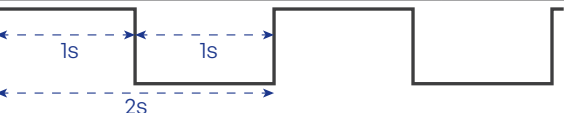
Auxiliary Battery Indicator

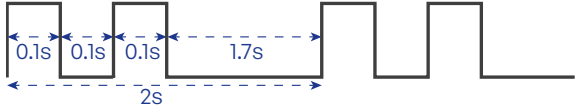
-  **Solid:** Full charge
-  **Slow flash:** Charging
-  **Solid:** Normal voltage
-  **Solid:** Overdischarge warning / No battery detected
-  **Slow flash:** Overvoltage warning
-  **Fast flash:** Battery overtemperature warning
-  **Double flash:** Battery charger overtemperature warning



If an error occurs, refer to “[9. Troubleshooting](#)” for details, or login to the Renogy app for troubleshooting details.

Check out the graphic indications of ON, OFF, Solid, Slow Flash, Fast Flash, Single Flash, and Double Flash of LEDs in the table below:

LED ON		LED OFF	
LED Pattern	Graphic Expression		
Solid			
Slow Flash			

Fast Flash	 Timing diagram for Fast Flash. The diagram shows a sequence of pulses. The first two pulses have a width of 0.1s and a period of 0.2s. The subsequent pulses have a width of 0.1s and a period of 1.7s.
Double Flash	 Timing diagram for Double Flash. The diagram shows a sequence of pulses. The first three pulses have a width of 0.1s and a period of 0.2s. The subsequent pulses have a width of 0.1s and a period of 1.7s.

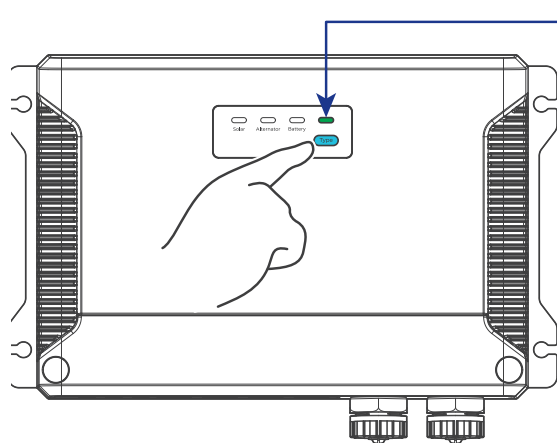
6. Configuration

6.1. Set a Auxiliary Battery Type

Upon installing the battery charger, set a correct battery type by using the Auxiliary Battery Type Setting Button.

Battery Button Interlock Protection:

- When a 12V lithium battery is connected, the purple indicator light (24V LI) will not illuminate.
- When a 24V lithium battery is connected, the blue indicator light (12V LI) will not illuminate.



Auxiliary Battery Type Indicator

- Solid:** FLD
- Solid:** GEL
- Solid:** SLD/AGM
- Solid:** 12V LI (Enable lithium battery activation)
- Flash:** 12V LI (Disable lithium battery activation)
- Solid:** 24V LI (Enable lithium battery activation)
- Flash:** 24V LI (Disable lithium battery activation)
- Solid:** User Mode (Long press the button for 5 seconds to enter low power mode.)



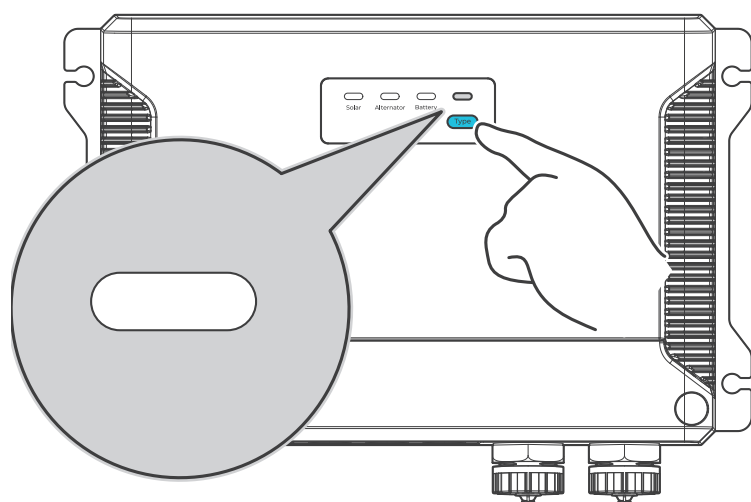
It is essential to ensure that the battery type setting is configured correctly to avoid any potential damage to the battery charger because any damage to the battery charger resulting from an incorrect battery type setting voids the warranty.

6.2. User Mode

Setting the battery type to User Mode allows you to customize your battery parameters. You can modify the parameters in the Renogy app.



Auxiliary battery charging parameters can only be customized through User Mode, and the charger cannot customize starter battery charging parameters. For details on starter battery charging, please refer to section “[8.2. Charging Logic](#)” of this manual.



Before modifying battery parameters in User Mode, check the table below and consult the battery manufacturer to check whether modification is allowed. Incorrect parameter setting will damage the device and void the warranty.



In User Mode, when the Equalization Voltage matches the Boost Voltage and Float Voltage, the activation mechanism for the lithium battery is initiated.

Maximum Combined Charging Current	50A Battery Charger	12V Battery: 50A. Adjustable at 50A, 40A, 30A, 20A, and 10A. 24V Battery: 25A. Adjustable at 25A, 20A, 15A, 10A, and 5A.
	60A Battery Charger	12V Battery: 60A. Adjustable at 60A, 50A, 40A, 30A, 20A, and 10A. 24V Battery: 25A. Adjustable at 30A, 25A, 20A, 15A, 10A, and 5A.
Equalization Voltage	- For lead-acid batteries, please consult your battery manufacturer to obtain the voltage value and then complete the settings according to the feedback. - If equalization charging is not required, set the voltage to boost voltage.	
Boost Voltage	This value affects whether the battery can be fully charged. Please consult the battery manufacturer and set the value properly.	
Float Voltage	This value affects whether the battery can be fully charged. Please consult the battery manufacturer and set the value properly.	
Under Voltage Warning	This voltage value affects the life of the battery. Consult the battery manufacturer and check if this voltage value needs to be set.	
Low Voltage Shutdown		
Boost Duration	Please consult the battery manufacturer if it is necessary to set this parameter value.	
Equalization Duration		
Equalization Interval		

6.3. Configure Charging Parameters

The table below illustrates the default and recommended parameters for auxiliary batteries that can be connected to the battery charger. The parameters may vary depending on the specific battery you use. Read the user manual of the specific auxiliary battery or contact the auxiliary battery manufacturer for help if necessary.



Before modifying battery parameters, check the table below first. Incorrect parameter setting will damage the device and void the warranty.



Read the user manual of the battery when customizing a preset battery. Incorrect battery type selection damages the battery charger and voids the warranty.

The battery charger has a User Mode, and the specific default parameter values and customizable parameters should be primarily based on the actual displays in the Renogy app or Renogy ONE Core.

This table assumes default parameters for a 12V system. If the system voltage is 24V, all voltage values except Overvoltage Shutdown should be doubled.

Battery Type Parameters	SLD/AGM	GEL	FLOODED	LI (LFP)	User-defined	User Setting Range
Overvoltage Shutdown	16.0V 30.0V	16.0V 30.0V	16.0V 30.0V	[16.0V] [30.0V]	16.0V 30.0V	9.0-16.0V 9.0-30.0V
Compensation Voltage Limit Value	15.5V	15.5V	15.5V	15.5V	15.5V	9.0-16.0V

Battery Type Parameters	SLD/AGM	GEL	FLOODED	LI (LFP)	User-defined	User Setting Range
Equalization Voltage	14.6V	—	14.8V	—	14.6V	9.0-16.0V
Boost Voltage	14.4V	14.2V	14.6V	14.4V (Adjustable 9.0-16.0V)	14.4V	9.0-16.0V
Float Voltage	13.8V	13.8V	13.8V	—	13.8V	9.0-16.0V
Boost Return Voltage	13.2V	13.2V	13.2V	13.6V	13.2V	9.0-16.0V
Undervoltage Warning	12.0V	12.0V	12.0V	12.0V	12.0V	9.0-16.0V
Undervoltage Recover	12.2V	12.2V	12.2V	12.2V	[12.2V]	[Undervoltage Warning + 0.2V] (The third over-discharge return is + 1V.)
Low Voltage Shutdown	11.0V	11.0V	11.0V	11.0V	11.0V	9.0-16.0V
Low Voltage Reconnect	12.6V	12.6V	12.6V	12.6V	12.6V	9.0-16.0V
Boost Return Delay	5s	5s	5s	5s	5s	5s
Float Return Delay	5s	5s	5s	5s	5s	5s
Equalization Interval	30 days	—	30 days	—	30 days	0-250 days (0 represents closed)
Equalization Duration	120 min	—	120 min	—	120 min	10-600 min
Boost Duration	120 min	120 min	120 min	—	120 min	10-600 min
Temperature Compensation (mV / °C / 2V)	-3	-3	-3	—	-3	0 / 1 / 2 / 3 / 4 / 5



Parameters in gray cannot be set manually.



Parameters in square brackets ([]) are automatically adjusted according to the relevant settings, and cannot be set directly.



Temperature compensation is not required for lithium batteries, 0 indicates that it is turned off.



When setting the Boost Voltage in lithium battery mode, the Overvoltage Shutdown will be determined by the modified Boost Voltage. For example, if the Boost Voltage is increased by 0.1V, the Overvoltage Shutdown will also increase by 0.1V.

6.4. Activate Lithium Batteries

The battery charger can activate connected lithium batteries. Lithium batteries may enter sleep mode when the built-in protection is triggered. In such cases, the battery charger outputs a boost voltage to reactivate the sleeping lithium battery. Once successfully activated, the lithium battery can be charged normally at the

charger's rated current (provided the input power is sufficient).

■ Operation Condition

Set the battery type of the battery charger to 12V LI (Enable lithium battery activation), 24V LI (Enable lithium battery activation) or User Mode. For details, see "[6.1. Set a Auxiliary Battery Type](#)".

■ Operation Logic

- **For 12V Lithium Battery**

If the battery voltage drops below 9V, the battery charger automatically activates the activation function (on the premise that the activation function is enabled in the Renogy app) and continues to charge the battery using constant voltage until the battery voltage reaches 14.4V.

- **For 24V Lithium Battery**

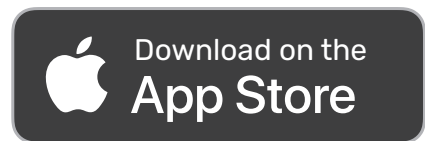
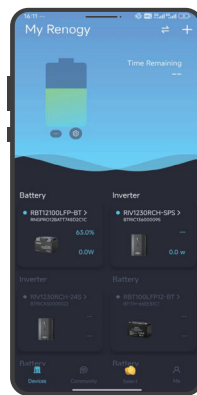
If the battery voltage drops below 18V, the battery charger automatically activates the activation function (on the premise that the activation function is enabled in the Renogy app) and continues to charge the battery using constant voltage until the battery voltage reaches 28.8V.

7. Monitoring

Depending on the specific application, the battery charger 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 Renogy 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 battery charger is properly installed and powered on before it is paired with the Renogy app.
-  To ensure optimal system performance, keep the phone within 10 feet (3 m) of the battery charger.

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



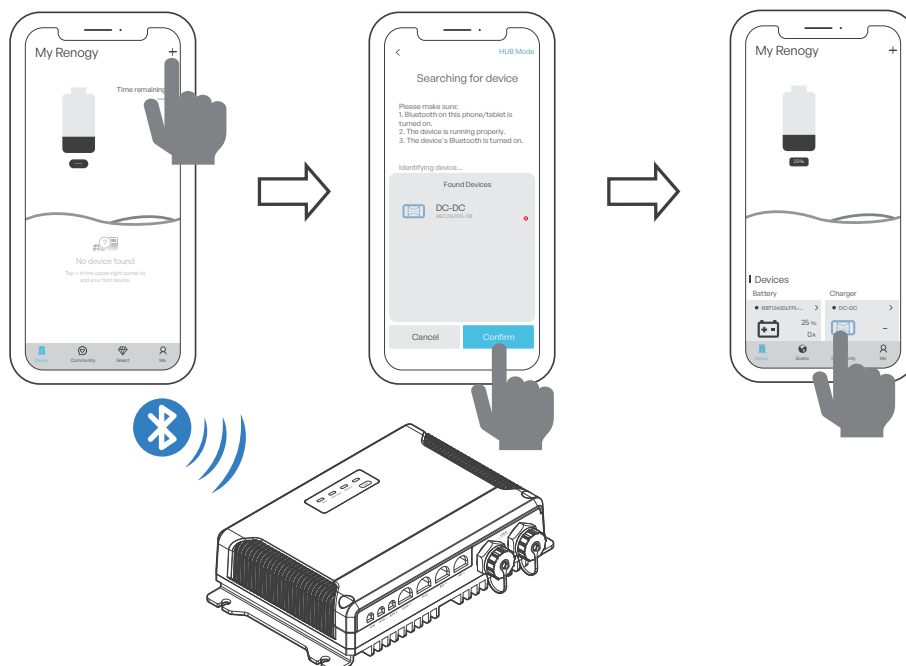
7.1. Short-Range Monitoring

If only short-range monitoring is required, connect the battery charger to the Renogy app directly through the Bluetooth of your phone.

Step 1: Open the Renogy 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 battery charger icon to enter the device information interface.



7.2. Wireless Long-Range Monitoring

If long-range communication and programming are required, connect the battery charger to Renogy ONE Core (sold separately) through Bluetooth, and then pair Renogy ONE Core with the Renogy app.

Recommended Components

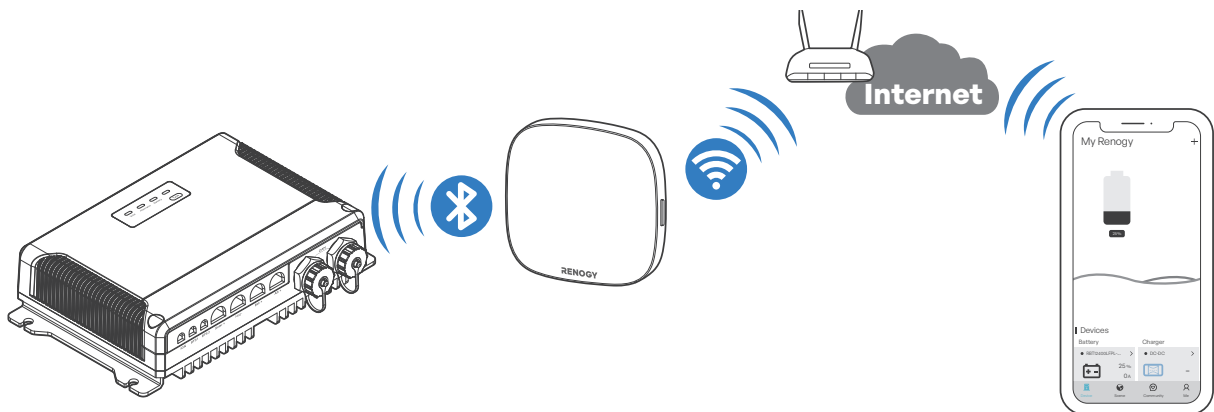


*RENOGY ONE Core

- i** Components marked with “*” are available on [renogy.com](https://www.renogy.com).
- i** Make sure that the Renogy ONE is powered on before the connection.
- i** For instructions on Renogy ONE, see [Renogy ONE Core User Manual](#).
- i** Make sure the battery charger does not communicate with any other device.

Step 1: Connect the battery charger to Renogy ONE Core through the Bluetooth of your phone.

Step 2: Pair the Renogy ONE Core with the Renogy app through Wi-Fi or by scanning the QR code in the Renogy ONE Core. On Renogy ONE Core, go to “**System > Settings > Pair with App**” to get the QR code.



8. Working & Charging Logic

i In this section, current values have a tolerance of ± 2 A.

8.1. Automatic Voltage Matching Function

Whether you are connecting a 12V or 24V solar panel or starter battery, this battery charger will automatically adjust the charging current and voltage values based on the rated voltage of the battery being charged.

■ Charging the Auxiliary Battery

Nominal Voltage			Charging Voltage	Maximum Charging Current	
Auxiliary Battery	Solar Panel	Starter Battery		50A Battery Charger	60A Battery Charger
12V	15V to 50V	12V	12V	50A	60A
		24V			
		12V			
		24V			
24V	15V to 50V	12V	24V	25A	30A
		24V			
		12V			
		24V			

i For details about when the solar panel and/or starter battery charge(s) the auxiliary battery, see “[8.2. Charging Logic](#)” in this manual.

■ Charging the Starter Battery

Nominal Voltage			Charging Voltage	Maximum Charging Current	
Starter Battery	Solar Panel	Auxiliary Battery		50A Battery Charger	60A Battery Charger
12V	15V to 50V	12V	12V	25A	30A
		24V			
		12V			
		24V			
24V	15V to 50V	12V	24V	12.5A	15A
		24V			
		12V			
		24V			

i For details about when the solar panel and/or starter battery charge(s) the auxiliary battery, see “[8.2. Charging Logic](#)” in this manual.

8.2. Charging Logic

Battery charger can be connected to the solar panel and the automobile starter battery simultaneously or to the solar panel or the automobile starter battery separately to charge the auxiliary battery. The charging logic depends on the connection method.

8.2.1. Battery Fully Charged Criteria

First, please refer to the table below to understand the criteria the battery charger uses to automatically determine if the battery is fully charged:

Battery Type	Charging Stage	Battery Fully Charged
Non-lithium batteries	Float charging	Yes
	Non float charging	No
Lithium batteries	Boost charging for approximately 1 hour	Yes
	Non boost charging	No

8.2.2. Connect Only to the Solar Panel

After the battery charger starts to operate, it determines the level of the auxiliary battery automatically. If the auxiliary battery is not fully charged, the battery charger will charge the auxiliary battery.

Solar Panel Voltage	Charging the Auxiliary Battery	Charging Current			
		50A Battery Charger		60A Battery Charger	
		12V battery	24V battery	12V battery	24V battery
≥15.0V, for 10 seconds	Yes	50A Max	25A Max	60A Max	30A Max
<15.0V	No	N/A			

8.2.3. Connect Only to the Starter Battery

After the battery charger starts to operate, it determines the level of the auxiliary battery automatically. If the auxiliary battery is not fully charged, the battery charger will charge the auxiliary battery.

The Auxiliary battery supports two modes, which can be switched via the Renogy app or Renogy ONE Core.

Mode	Principle	Start Condition (15 sec wait)	Stop Condition (any triggers stop)	Protection	
				Trigger	Recovery
IGN mode (Vehicle Engine Detection Mode)	Depends on IGN signal to detect engine status.	1. IGN = becomes high 2. Starter battery voltage > 12.0V (adjustable)	1. IGN becomes low 2. Starter battery voltage < 11.5V (adjustable)	Starter battery voltage > 15.5V	Starter battery voltage < 15V
ALT mode (Alternator Type Selection Mode)	Based solely on starter battery voltage.	Traditional Alternator			
		Starter battery voltage > 13.2V (adjustable)	Starter battery voltage < 12.7V (adjustable)		
		Smart Alternator			
		Starter battery voltage > 12.0V (adjustable)	Starter battery voltage < 11.5V (adjustable)		

You can customize parameters via the Renogy app:

- **Smart Alternator:** Recommended start voltage: 12.0V; stop voltage: 11.5V.
- **Traditional Alternator:** Recommended start voltage: 13.2V; stop voltage: 12.7V.

- i** All voltage parameter values in this section use a 12V system as an example; for a 24V system, they should be multiplied by 2.
- i** When the battery charger is connected only to the starter battery, it can also charge the starter battery from the auxiliary battery when IGN is not connected — this reverse charging feature is available in traditional generator mode.

Charging Current for Auxiliary Battery			
50A Battery Charger		60A Battery Charger	
12V battery	24V battery	12V battery	24V battery
50A Max	25A Max	60A Max	30A Max
Charging Current for Starter Battery			
50A Battery Charger		60A Battery Charger	
12V battery	24V battery	12V battery	24V battery
25A Max	12.5A Max	30A Max	15.5A Max

8.2.4. Both the Solar Panel and Starter Battery are Connected

- i** This chapter uses the 60A battery charger as an example. The 50A battery charger has the same functionality except for the current parameters (60A becomes 50A, 30A becomes 25A, and 58A becomes 48A). Note: For 24V systems, divide the current by 2.
- i** All voltage parameter values in this section use a 12V system as an example; for a 24V system, they should be multiplied by 2.

Hybrid Charging Logic (Solar-Priority Management)

Scenario	Trigger Condition	Device Action
Scenario 1: Sunny highway travel (Pure Solar Mode)	Solar input power is sufficient to cover the auxiliary battery's current charging demand.	Automatically cuts off the alternator (ALT) input and runs 100% on solar power.
Scenario 2: Rainy day or evening driving (Smart Dual-Source Hybrid Mode)	Solar input current is insufficient to maintain full-load charging (e.g., in a 12V CC phase when solar current < 58A).	Alternator seamlessly intervenes, dynamically filling the gap to ensure total output always reaches the system maximum (60A or 30A).
Scenario 3: Cloudy-to-sunny dynamic transition (Smooth recovery)	In hybrid mode, the system detects that solar input power is gradually increasing.	Progressively reduces alternator contribution – the stronger the sunlight, the less the alternator supplies, until a smooth switch back to pure solar occurs.
Scenario 4: Approaching full charge (Alternator smart exit)	Either condition met: ● Auxiliary battery enters float stage. ● In CV phase, alternator supplementary current < 2A.	Alternator automatically stops and the system reverts to solar-only charging for the final stage.

Scenario 5: Long-term camp stay (Starter battery maintenance)	Auxiliary battery is fully charged and solar power is still available.	The charger redirects surplus solar energy to provide float charging for the starter battery, avoiding waste.
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■ Starter Battery Charging Logic (Intelligent Guardian System)

Core principle: The auxiliary battery's safety and power supply always come first. Reverse charging to the starter battery is only allowed when the auxiliary battery is healthy or the starter battery is critically depleted.

Scenario	Trigger Condition	Device Action
Scenario 1: Long-term camp stay (Full-charge trickle maintenance)	Solar is active; auxiliary battery has entered maintenance stage (Boost complete and charging current < 3A).	Redirects surplus solar to the starter battery. When the starter battery is nearly full (>13.8V and current <3A), it enters a "breathing" intermittent mode (charge 60s, pause 30s) to stabilise voltage at 13.7V.
Scenario 2: Long parking – starter battery dead (Solar emergency rescue)	Solar input is available; starter battery voltage drops to 8-10.5V.	● If auxiliary battery is also low – solar rescues the auxiliary battery first, then immediately switches to rescue the starter battery. ● If auxiliary battery is sufficiently charged – works at full power (up to 30A output) to quickly raise starter voltage to the safe start threshold (13.8V).
Scenario 3: Dark night with no sunlight (Internal mutual rescue)	No solar input; starter battery severely depleted (8-10V), but auxiliary battery is healthy (>13.6V).	The auxiliary battery "sacrifices" some power to emergency reverse-charge the starter battery for starting. Safety cut-off: Stops immediately once auxiliary voltage drops to 12.8V, to protect basic living power.
Scenario 4: Both batteries depleted (Sleep alert mode)	No solar; starter battery low; auxiliary battery also low (<12V).	Refuses to execute reverse charging and displays an "Auxiliary Battery Undervoltage" alert.
Scenario 5: Over-temperature protection & troubleshooting	Device triggers over-temp protection or suspected sensor failure.	1. Check installation: ≥150mm clearance on all sides; mount on a flat, hard surface – not on carpet, foam, or soft padding. 2. Restart: Disconnect and let cool for 15-30 minutes until room temperature, then restart. 3. If still showing over-temp after cooling – internal temperature sensor may be damaged; contact customer service for inspection/repair.

Voltage Threshold Adjustment

Mode	12V Reference Threshold	24V Reference Threshold
Emergency rescue (severe depletion)	8 – 10.5V	16V – 21.0V
Normal trickle maintenance (full-charge care)	>13.8V	25V – 26.4V

8.3. Overvoltage Protection

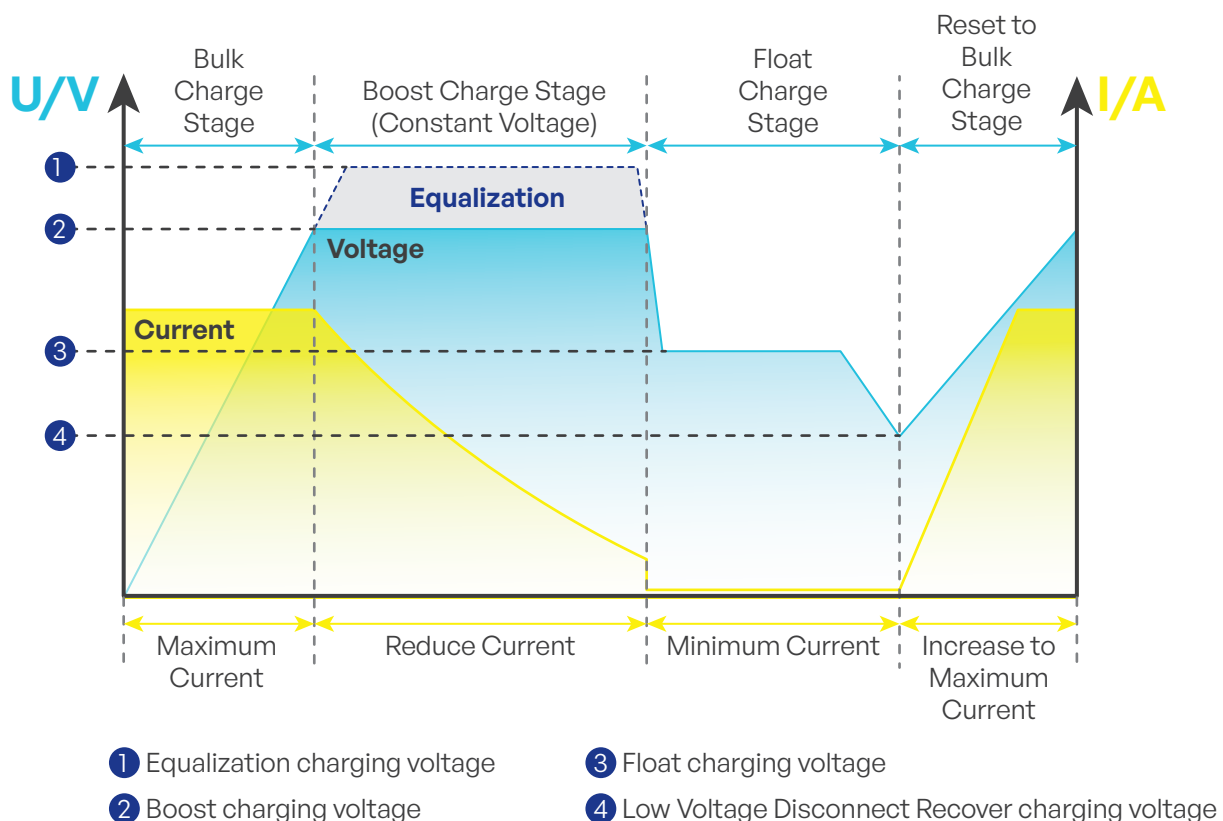
The battery charger is equipped with Overvoltage Protection. When the voltage of the solar panel or starter battery reaches the trigger value, the charger will shut off input to prevent damage. Charging automatically resumes when the voltage returns to the restore value.

Solar Panel Voltage	Starter Battery Voltage		Overvoltage Protection
	12V battery	24V battery	
$\geq 50V$	N/A		Trigger
$\leq 49V$	N/A		Restore
N/A	$\geq 15.0V$	$\geq 30.0V$	Trigger
N/A	$\leq 14.0V$	$\leq 29.0V$	Restore

i The battery charger will immediately stop operating if it triggers the overvoltage protection. It will only resume operation once the voltage reaches the restore value.

8.4. Battery Charging Stages

The battery charger utilizes cutting-edge MPPT technology to efficiently track the maximum power output of solar panels in various conditions, ensuring real-time optimization. It also incorporates four distinct charging stages: bulk, boost, float, and equalization.





Adjust the time depending on the specific battery bank size.

■ Bulk Charge Stage

The battery charger will supply constant current until the battery voltage reaches the boost voltage.

■ Boost Charge Stage

The battery charger will supply constant voltage and reduce the current slowly through this stage.

Default boost duration: 2 hours. After this time, the charger will enter the float stage.



Boost Duration is not applicable to lithium batteries.



The stage is determined by internal software in the battery charger.

■ Float Charge Stage

During this stage the battery charger will supply a constant voltage which is determined by the battery selected and will keep current at a minimum level. This stage acts as a trickle charger.

After reaching a constant voltage in the charging process, the battery charger reduces the voltage to a float level. At this point, the battery is fully charged, and any excess current is converted to heat or gas. The charger then maintains a lower voltage to offset power consumption, ensuring a full battery capacity. If a load exceeds the charge current, the charger exits float mode and returns to bulk charging.



Float charging is not applicable to lithium batteries.

■ Equalization

This stage is only available for batteries with equalization, such as non-sealed, vented, flooded, and wet cell lead acid batteries. During this stage the batteries are charged at a higher voltage than normal and for most batteries this could cause damage. Refer to the user manual of the battery or contact the battery manufacturer to see if this stage is needed.



During Equalization charging, the battery charger remains in this stage until sufficient charging current is sourced from the solar panel. Note that there should be no load on the batteries during Equalization charging..



Overcharging and excessive gas precipitation can harm battery plates, leading to material shedding. Carefully review the battery's specific requirements to avoid damage from prolonged or excessively high Equalization charging .



Equalization may elevate battery voltage to levels that could damage sensitive DC loads. Ensure that the allowable input voltages of all loads exceed the set voltage during Equalization charging..

9. Troubleshooting

This section discusses general troubleshooting tips specific to LED indicator status.

LED	Fault	Possible Cause	Solution
 Solar	Indicates the solar charging fails to function well.	- The output voltage of the solar panel is below 15V. - The output voltage of the solar panel is excessively high, triggering overvoltage protection.	- For solar panel voltage under 15V, ensure there is no shade or damage on the solar panel. - In scenarios where overvoltage protection is triggered, check the way in which the solar panels are connected.
 Alternator	Indicates the starter battery is not charging the auxiliary battery.	The starter battery voltage is below 13.2V.	Recheck the alternator type. For details, see “3.7. Check the Alternator on Your Automobile” in this manual. If the actual output value from the alternator is relatively low, modify the cut-in voltage in the Renogy app.
 Battery Solid	Overdischarge warning	The auxiliary battery is over-discharged.	Disconnect all loads from the auxiliary battery, and charge it immediately.
 Battery Slow flash	Overvoltage warning	The auxiliary battery voltage is high.	1. During charging, if the wiring between the charger and the auxiliary battery becomes loose, a voltage spike may occur momentarily. Please first check whether the output terminal of the charger is loose or has poor contact, and ensure all connections are secure. 2. When multiple charging devices work simultaneously, the instantaneous combined voltage may exceed the battery's safe limit. Please temporarily turn off other charging devices on the RV except for the DC charger, and observe whether the issue is resolved. 3. If the alarm persists after following the steps above, use a multimeter to measure the actual voltage at the charger output. If the voltage is significantly higher than 16V, the charger may be faulty — please contact customer service promptly.

 Battery Fast flash	Battery overtemperature warning	The auxiliary battery is over-charged or at a high temperature.	1. First, rule out temperature sensor installation issues. Check whether the temperature sensor probe is installed near the battery housing, and ensure it is away from heat sources such as RV inverters or parking heater exhaust pipes. 2. If the battery temperature is actually normal (not hot to the touch), try unplugging the temperature sensor connector from the charger, then restart the charger and observe whether the over-temperature fault still occurs (40°C/104°F). 3. Check the battery compartment's ventilation. If the RV has been exposed to summer sunlight or the battery compartment is in a closed, high-temperature corner, open the compartment door to allow physical cooling and wait for the temperature to drop below 40°C (104°F) before attempting to charge again. 4. Check the battery's health condition. If the ambient temperature is cool but the battery casing heats up rapidly shortly after charging begins, stop charging immediately and contact the battery manufacturer for testing.
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 Battery Double flash	Battery charger overtemperature warning	Over-temperature protection for the battery charger.	1. Check whether the charger is installed with at least 150mm (approx. 6 inches) of clearance on all sides. 2. Ensure the “mounting contact surface” on the bottom of the charger is secured to a flat, even mounting plane. Do not place the charger directly on carpet, mattress, sound insulation, or any soft padding materials. 3. After triggering protection, disconnect the charger and let it sit for 15-30 minutes to allow the bottom heat-dissipation fins to cool naturally to room temperature before restarting. 4. If the device has completely cooled (returned to room temperature) but still immediately displays “Device Over-Temperature Protection” upon startup, the internal temperature sensor chip may be damaged and sending a false high-temperature signal to the system. Please contact customer service for inspection and repair.
-	The battery charger stops charging.	Low-temperature protection for the auxiliary battery.	When the temperature of the auxiliary battery drops below -31°F (-35°C), the battery charger will stop charging. Please warm up the auxiliary battery, and charging will resume once the temperature is above -22°F (-30°C).



For technical support, contact our technical service through renogy.com/contact-us.

10. Specifications

Model	RBC2150DS-21B	RBC2160DS-21B
System Voltage	12V/24V to 12V/24V DC	
Nominal Output Power	750W	900W
Auxiliary Battery Voltage Range	9V to 32V DC	
Starter Battery Voltage Range	9V to 30V DC	
Max. Solar Input Voltage	50V	
Maximum Charging Current	50A@12V; 25A@24V	60A@12V; 30A@24V
Battery Type	SLD/AGM, GEL, FLD, LI, and USER	
Auxiliary Battery Charging Mode	MPPT	
MPPT Static Tracking Efficiency	70%-95%	
MPPT Dynamic Tracking Efficiency	99%	
Nominal Charging Efficiency	For 12V batteries: ≥94%; For 24V batteries: ≥92%	
Operating Temperature Range	-13°F to 158°F / -25°C to 70°C	
Storage Temperature	-40°F to 176°F / -40°C to 80°C	
No Load Current	< 50mA	
Humidity	0% to 95%, RH, no condensation	
Dimensions	9.69 x 6.06 x 2.24 in / 246 x 154 x 57 mm	
Protection Rating	IP67	
Weight	5.51 lb / 2.5 kg	
Certifications	CE-EMC, E-amrk R10, RoHS, RCM-EMC, FCC Part 15 Class B	

11. Maintenance

11.1. Inspection

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

- Ensure the battery charger is installed in a clean, dry, and ventilated area.
- Ensure there is no damage or wear on the cables.
- Ensure that the connection is secure and check for any loose, damaged, or burned 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 battery charger is dirty, use a damp cloth to clean the outside of the device to prevent dust and dirt from accumulating. Before the battery charger is powered on, make sure it is completely dry after cleaning.



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! Before touching any connections on the battery charger, ensure that all power sources are turned off.

11.2. Disconnect the Connections from the Battery Charger

Disconnect all devices in the following order:

- Disconnect the connections between the battery charger and the starter battery, starting with the negative cable, then the positive cable.
- Disconnect the connections between the battery charger and the solar panel, starting with the negative cable, then the positive cable.
- Disconnect the connections between the battery charger and the auxiliary battery, starting with the negative cable, then the positive cable.

11.3. Cleaning

Follow the steps below to clean the battery charger regularly.

- Wear proper protective equipment and use insulated tools during operation.
- Disconnect all cables connected to the battery charger.
- Wipe the housing of the battery charger with a dry cloth or nonmetallic brush. If it is still dirty, you can use household cleaners.
- Dry the battery charger with a clean cloth and keep the area around the battery charger clean and dry.
- Before reconnecting the battery charger to the auxiliary battery, starter battery, and solar panel, ensure that all components are completely dry.

11.4. Storage

Follow the tips below to ensure that the battery charger is stored well.

- Disconnect all cables connected to the battery charger.
- Apply insulating grease to each bare wire. Insulating grease provides moisture resistance and protects the bare wires from corrosion.
- Store the battery charger in a well-ventilated, dry, and clean environment with the temperature between -40°F to 176°F or -40°C to 80°C.

12. Emergency Responses

In the event of any threat to health or safety, always begin with the steps below before addressing other suggestions.

- Immediately contact the fire department or other relevant emergency response team.
- Notify all people who might be affected and ensure that they can evacuate the area.



Only perform the suggested actions below if it is safe to do so.

12.1. Fire

1. Disconnect all cables connected to the battery charger.
2. In the event of a fire, use a fire extinguisher suitable for electrical equipment, such as a FM-200, CO₂, or dry powder extinguisher. A fire blanket or sand can also be used to extinguish the fire. If a suitable fire extinguisher is not available, evacuate immediately and contact the fire department.



Do not use type D (flammable metal) fire extinguishers.

12.2. Flooding

1. If the battery charger is submerged in water, stay away from the water.
2. Disconnect all cables connected to the battery charger.

12.3. Smell

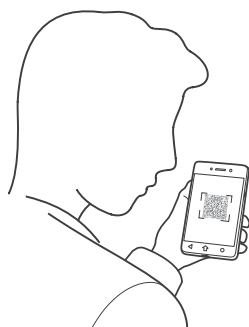
1. Ventilate the room. Disconnect all cables connected to the battery charger.
2. Ensure that nothing is in contact with the battery charger.

Renogy Support

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



contentservice@renogy.com



Questionnaire Investigation



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

 | renogy.com/learning-center



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



support@renogy.com



1(909)2877111

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

Canada |  | ca.renogy.com

Australia |  | au.renogy.com

Spain |  | es.renogy.com

Germany |  | de.renogy.com

Netherlands |  | nl.renogy.com

Other Europe |  | eu.renogy.com

China |  | www.renogy.cn

Japan |  | jp.renogy.com

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- Endless solar project ideas & sources



Warranty Statement

For full warranty terms and conditions, visit the Warranty page of the RENOGY website at <https://www.renogy.com/content/files/Manuals/Warranty.pdf>.

■ Australia

RNG AU PTY LTD, 3/11 David St, Dandenong VIC 3175
Australia.....1800 560 588

■ North America

RNG International Inc., 5050 S Archibald Ave, Ontario,
CA 91762, USA
USA.....+1 (909) 287 7111

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.
- (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 20 cm 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 CO₂ 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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Renogy reserves the right to change the contents of this manual without notice.

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