RENOGY
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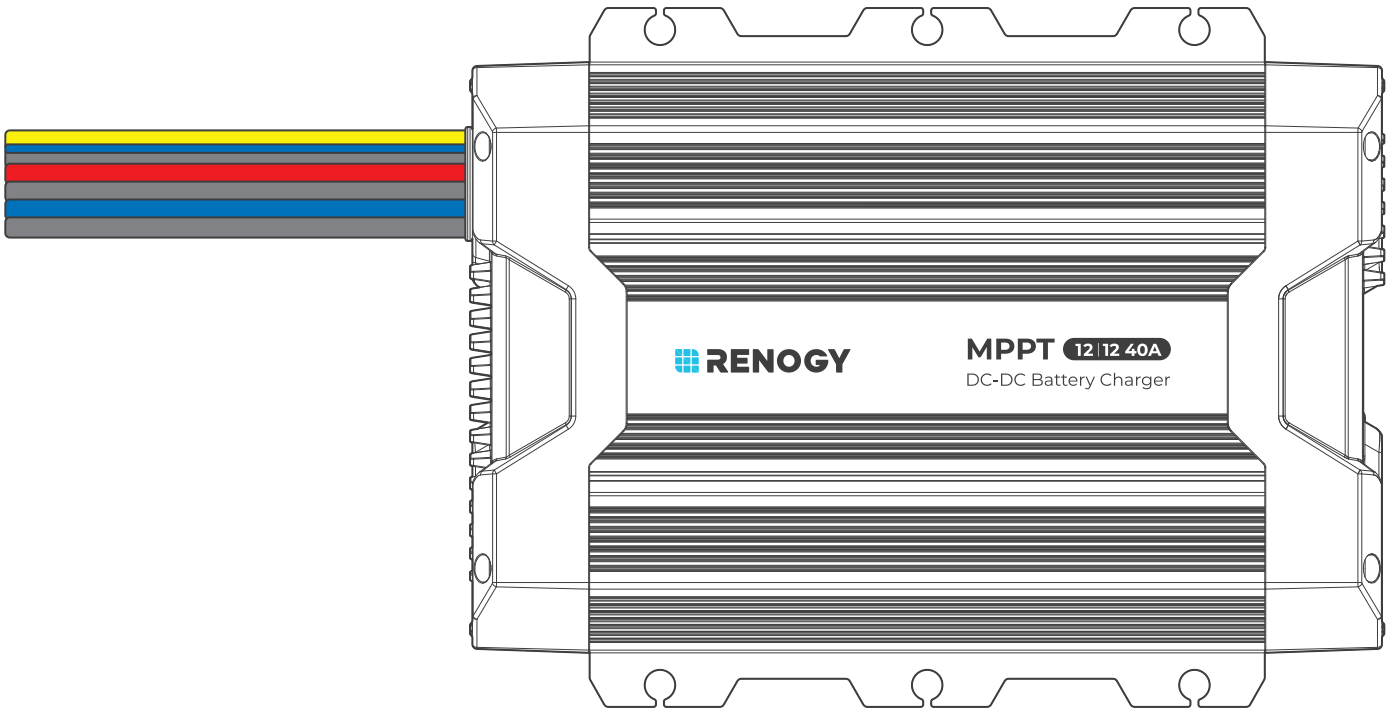
RENOGY

DC-DC Battery Charger with MPPT

12V | 40A

RBC40D1S-G1

VERSION A0
January 1, 2026



USER MANUAL

Before Getting Started

The user manual provides important operation and maintenance instructions for Renogy 12V 40A DC-DC Battery Charger with MPPT (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.

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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. Introduction

Renogy 12V 40A DC-DC Battery Charger, your ultimate solution for on-the-go energy needs. This sleek and versatile battery charger features two efficient charging options, allowing it to seamlessly switch from DC input while you're driving to solar charging when parked, ensuring maximum convenience for your adventures.

This battery charger is compatible with various battery types, including LiFePO4, Gel, Flooded, and Sealed Lead Acid. It also boasts an Efficient Solar Priority Mode, activated with a simple press of the SELECT button, optimizing charging efficiency. Additionally, the system automatically switches to an alternate charging mode if the primary input voltage drops below a set threshold, so your battery stays charged and ready.

Designed with user-friendliness in mind, the battery charger includes lights and buttons for easy operation and error alerts, making monitoring straightforward. It also incorporates comprehensive protections to safeguard your system and batteries.

1.3. Key Features

- **Two Charging Modes for Maximum Efficiency**
  The Renogy 40A DC-DC MPPT charger provides two versatile charging options. It prioritizes DC input by default, then seamlessly switches to the alternate mode when the primary source voltage is insufficient. This intelligent design ensures you harness maximum efficiency for charging your battery, whether you're driving or stationary.
- **Ultimate RV Power Hub**
  Renogy 40A DC-DC MPPT Charger + Solar/Alternator Integration,12v Battery Charger compatibility with LiFePO4, Gel, Flooded, and Sealed Lead Acid batteries. Adaptive 3-stage charging logic dynamically adjusts voltage/current per chemistry. Safely harness solar panels, smart/conventional vehicle alternators, or DC sources with unified control. Engineered for RVs, boats, and off-grid systems demanding seamless multi-source power management.
- **Comprehensive Protection**
  Renogy 40A DC-DC Battery Charger With mppt incorporates comprehensive system protection, offering full safeguarding for solar, generator, and battery connections. 12v 40A Battery Charger effectively handles reverse polarity, over-voltage, under-voltage, and over-temperature conditions, ensuring reliable and safe operation in all scenarios.
- **Easy Operation with Visual Alerts**
  The Renogy DC battery charger is designed for simplicity, featuring intuitive buttons and clear indicator lights. One-touch selection quickly sets the correct battery type, while the LEDs provide visual alerts to promptly notify you of any errors. This user-friendly design ensures a hassle-free and efficient charging experience. (For specific light status meanings, please refer to the user manual.)
- **Certified Reliability&Extreme-Proof Performance**
  RENOGY 40A DC-DC Charger 12V meets FCC/RoHS/CE/SAA safety standards with 2-year warranty. Engineered for desert heat (113°F) to marine cold (-4°F), featuring auto-shutoff for shorts/reverse connections + lead-acid temperature compensation. Includes color-coded cables for 15-minute installs, ensuring durability in truck beds or coastal environments.

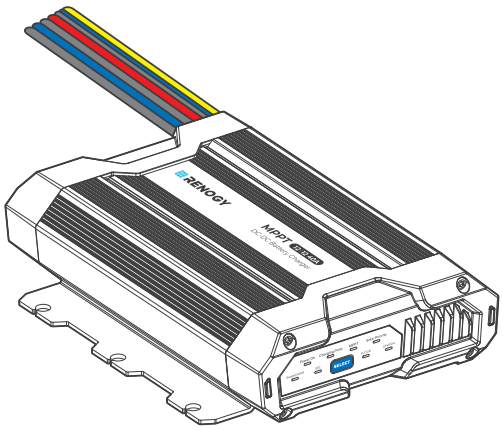
1.4. SKU

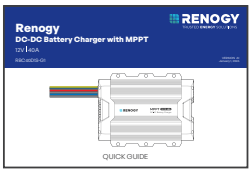
Renogy 12V 40A DC-DC Battery Charger with MPPT	RBC40D1S-G1

2. Get to Know 12V 40A DC-DC Battery Charger with MPPT

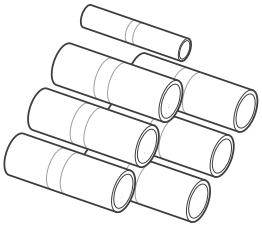
2.1. What's In the Box?

Renogy 12V 40A DC-DC Battery Charger with MPPT × 1





Quick Guide × 1



Heat-shrink Tubings × 7

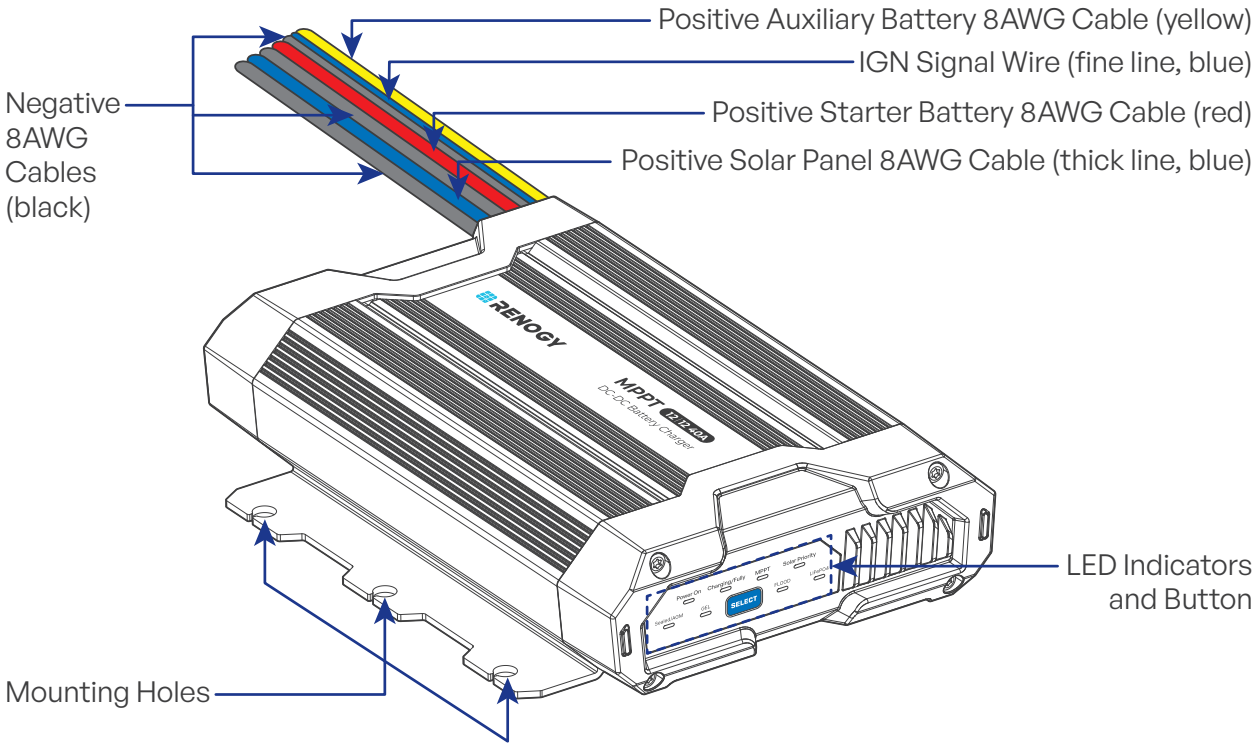


Mounting Screws x 4

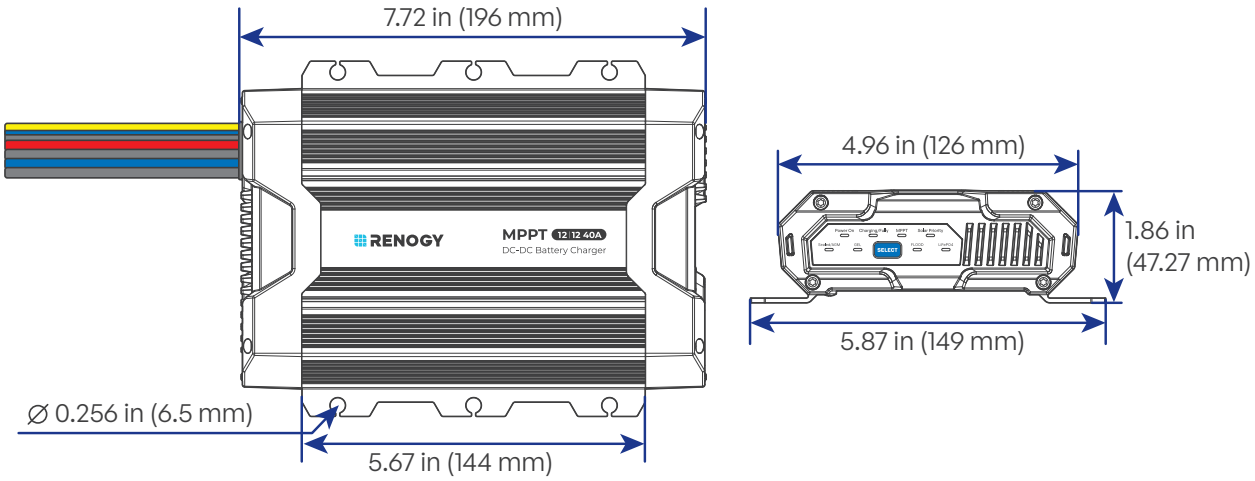
Make sure that all accessories are complete and free of any signs of damage.

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



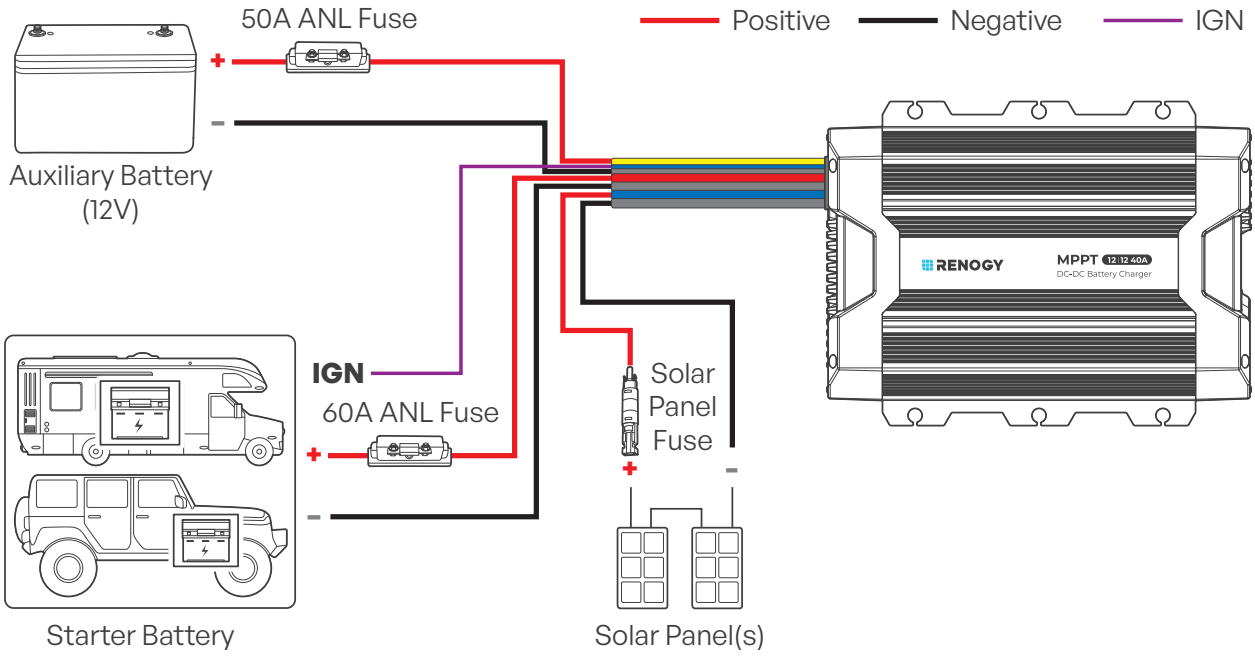
2.3. Dimensions



Dimension tolerance: ±0.2 in (0.5 mm)

2.4. System Setup

Before wiring, confirm the polarity of the equipment and avoid reverse connections. Although the battery charger has reverse polarity protection, this protection will not be functional when the battery type is set to LiFePO4.



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.

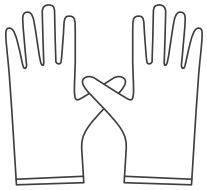
The battery charger can be connected separately to the solar panel for charging the auxiliary battery or to the vehicle's starting battery for charging the auxiliary battery.

3. Preparation

3.1. Recommended Tools & Accessories



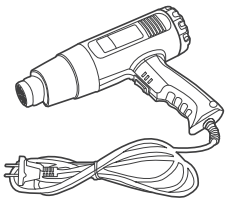
Phillips Screwdriver (#2)



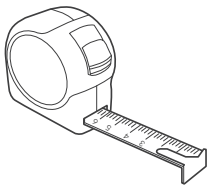
Insulating Gloves



Wire stripper



Heat Gun



Measuring Tape

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

If you don't have a heat gun or the heat gun's power is insufficient, you can use a lighter to heat the heat-shrink tubing when connecting wires. Be careful not to burn the heat-shrink tubing.

3.2. How to Size Wires?

Select proper bare wires based on the cable length in your power system. Refer to the table below for recommended gauge sizes.

Cable	Cable Length	Cable Gauge Size
Output (to Auxiliary Battery) or Input (from Starter Battery)	≤ 26.25 ft (≤ 8 m)	8 AWG (8.36 mm^2)
Input (from Solar Panel)		8 AWG (8.36 mm^2)

The cable specifications listed above account for critical, less than 3% voltage drop and may not account for all configurations.

In the table above, Cable Length refers to the total length of both positive and negative cables combined.

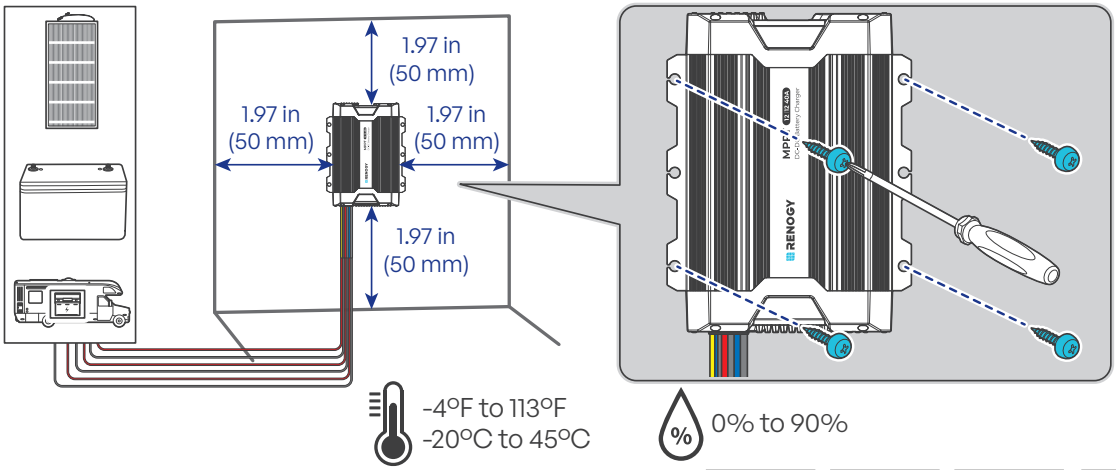
The specification of fuse cable is consistent with the input or output cables of the battery charger.

In this manual, the red cable represents the positive cable, and the gray cable represents the negative cable.

3.3. 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.

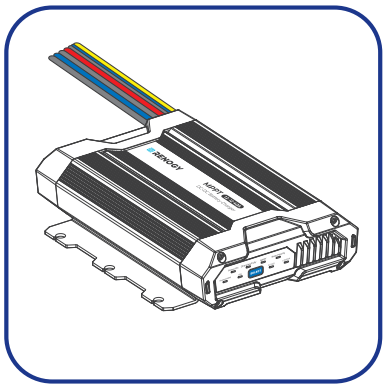
You can mounting the battery charger vertically on a wall or horizontally on the floor.





- 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 -4°F to 113°F (-20°C to 45°C).
- Make sure that the battery charger is installed in an environment with relative humidity between 0% and 90% 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.
- The battery charger should be as close to the battery as possible to avoid voltage drop due to long cables.
- 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.

3.4. Check the Battery Charger

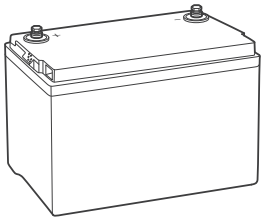


Inspect the battery charger for any visible damage including cracks, dents, deformation, and other visible abnormalities. All connector contacts shall be clean, free of dirt and corrosion, and dry.

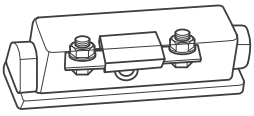
- Do not use the battery charger if there is any visible damage.
- Do not puncture, drop, crush, penetrate, shake, strike, or step on the battery charger.
- There are no serviceable parts in the battery charger. Do not open, dismantle, repair, tamper with, or modify the battery charger.
- Confirm the 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.

3.5. Check the Auxiliary Battery

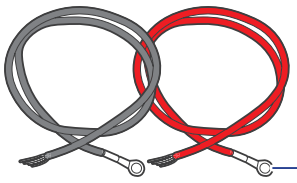
Recommended Components & Accessories



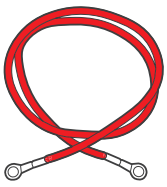
*12V Battery
(7V to 16V)



*ANL Fuse
(50A)

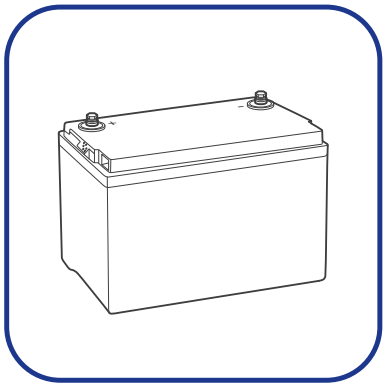


*Battery Adapter Cables × 2



*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 deep-cycle, gel-sealed lead-acid batteries (GEL), flooded lead-acid batteries (FLD), sealed lead-acid batteries (SLD, AGM) or lithium iron phosphate batteries (LiFePO4).

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.

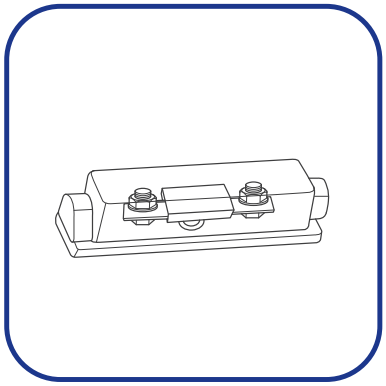
Combine batteries in parallel or in series as needed. Prior to installing the battery charger, ensure all battery groups are installed properly.

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. 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 16V; otherwise, overvoltage protection will be triggered.

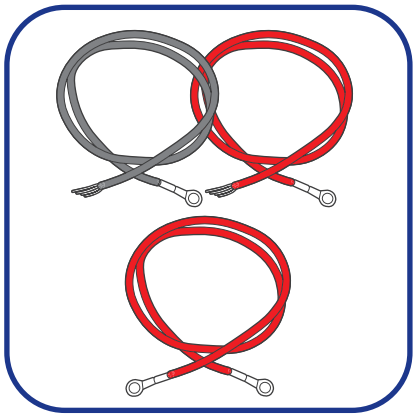
In the formula, U represents the battery voltage, and 1, 2, or 3 represents the battery number respectively.



3. Inspect the ANL 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 ANL Fuses if there is any visible damage.

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

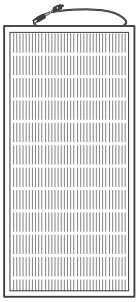


4. Inspect the Battery Adapter Cables and Fuse Cable for any visible damage including cracks, dents, deformation, and other visible abnormalities. All connector contacts shall be clean, dry, and free of dirt and corrosion.

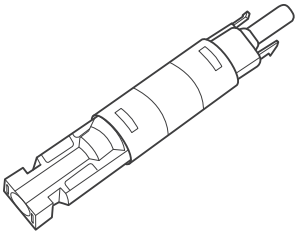
Do not use the battery adapter cables and fuse cable if there is any visible damage.

3.6. Check the Solar Panel(s)

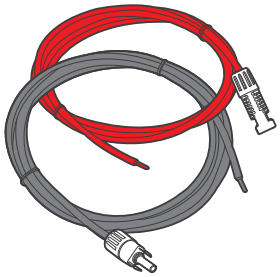
Recommended Components & Accessories



*Solar Panel (s)

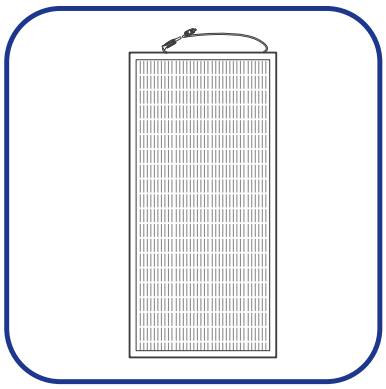


*Solar Panel Fuse



*Solar Panel Extension Cables × 2

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



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 670W.

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 30V.

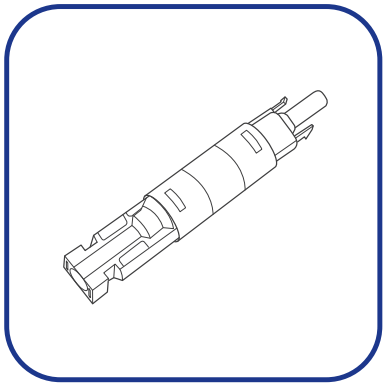
In the formula, 1, 2, or 3 represents the solar panel number respectively.

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 45A.

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.



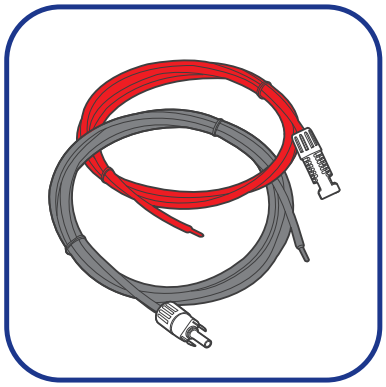
5. The appropriate current rating for the solar panel fuse should be determined by multiplying the total short current amperage of the solar panel array by 1.56.

   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.

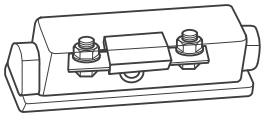


6. Inspect the Solar Panel Extension Cables for any visible damage including cracks, dents, deformation, and other visible abnormalities. All connector contacts shall be clean, dry, and free of dirt and corrosion.

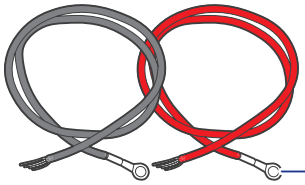
Do not use the solar panel extension cables if there is any visible damage.

3.7. Check the Alternator on Your Automobile

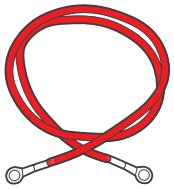
Recommended Components



*ANL Fuse (60A)



*Battery Adapter Cables × 2



*Fuse Cable × 1

Accessories marked with "*" are available on renogy.com.

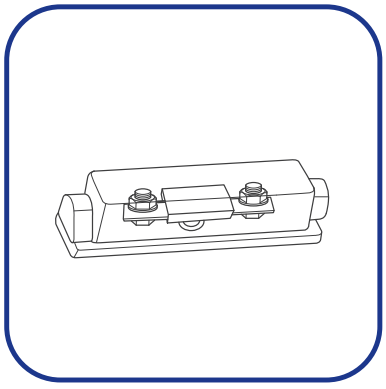
The automobile alternator may be a smart alternator or a traditional alternator. The connection method of a smart alternator or a traditional alternator depends on its parameters. Before installing the battery charger, read the user manual of the vehicle or consult the vehicle supplier to determine the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

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.

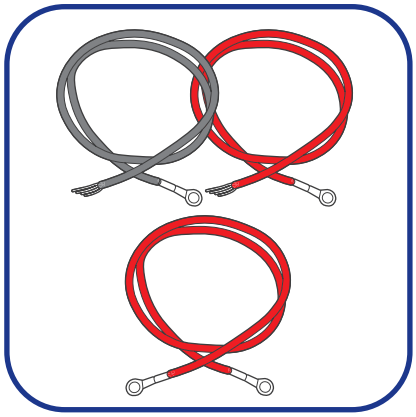
In general, the working voltage of a traditional alternator ranges from 13.2V to 16V, and that of a smart alternator ranges from 12V to 16V. Consult the vehicle supplier for help if necessary.



1. Inspect the ANL 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 ANL Fuses if there is any visible damage.

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

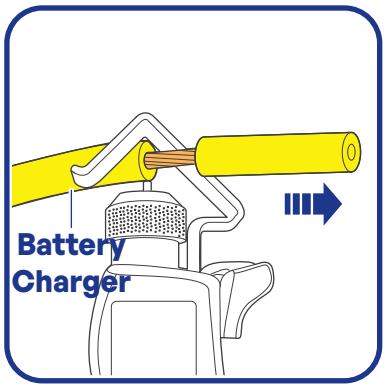


2. Inspect the Battery Adapter Cables and Fuse Cable for any visible damage including cracks, dents, deformation, and other visible abnormalities. All connector contacts shall be clean, dry, and free of dirt and corrosion.

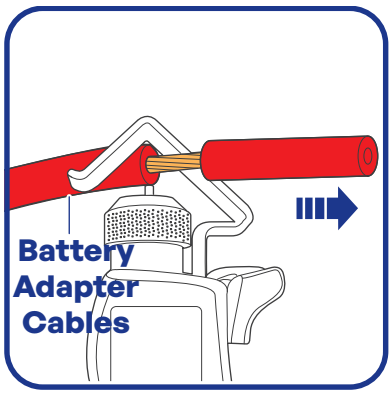
Do not use the battery adapter cables and fuse cable if there is any visible damage.

3.8. How to Install Cables on the Battery Charger?

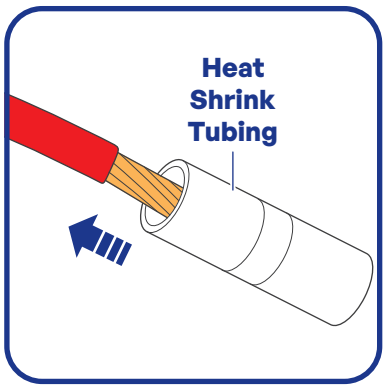
Before connecting the wires, check the stickers on each cable of the battery charger to confirm their polarity. Do not connect the cables to incorrect devices or reverse the connections. The illustrations are based on the Positive Auxiliary Battery Cable.



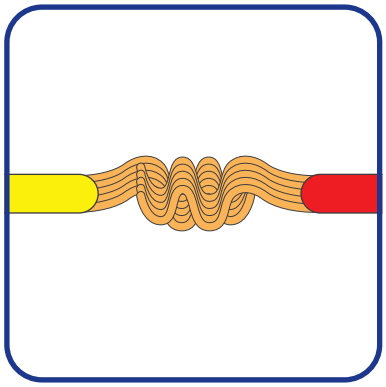
Step 1: Before wiring, wear insulating gloves. Use wire strippers to remove the insulation from the Positive Auxiliary Battery Cable of the battery charger.



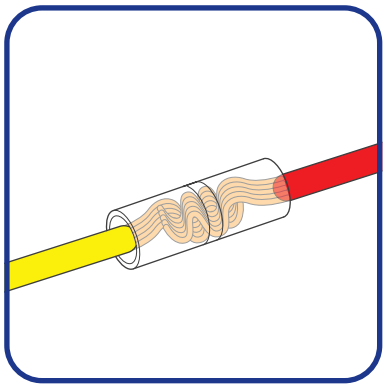
Step 2: Strip the insulation from the bare end of the Battery Adapter Cable as well.



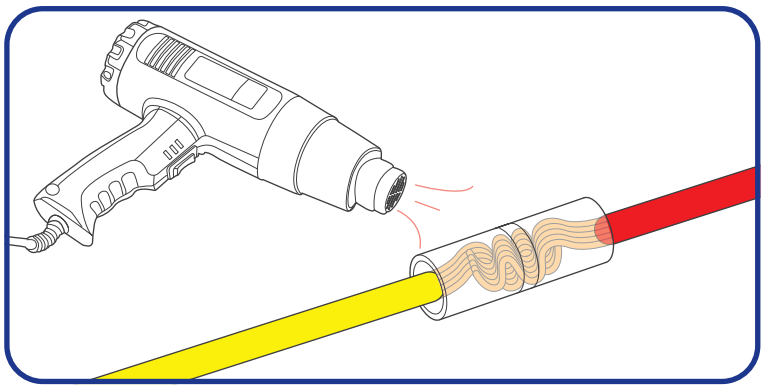
Step 3: Slide a heat shrink tubing over the Battery Adapter Cable.



Step 4: Twist the bare wires of the battery charger's Positive Auxiliary Battery Cable and the Battery Adapter Cable together.



Step 5: Slide the heat shrink tubing over the connection.



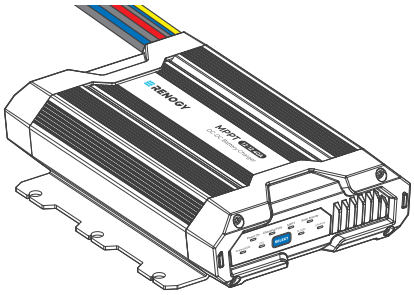
Step 6: Use a heat gun to heat the tubing until the internal solder ring melts, causing the heat shrink tubing to shrink and form a tight seal.

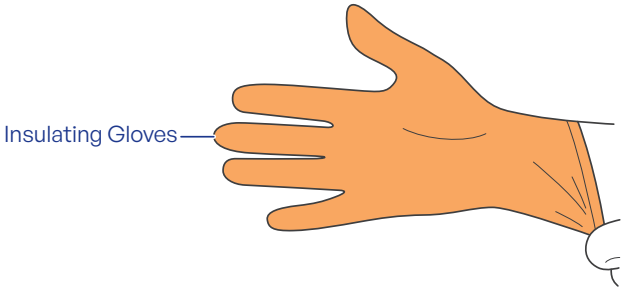
If you don't have a heat gun or the heat gun's power is insufficient, you can use a lighter to heat the heat-shrink tubing when connecting wires. Be careful not to burn the heat-shrink tubing.

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. Connect the Battery Charger to an Auxiliary Battery

The battery charger can only be connected to 12V deep-cycle gel-sealed lead-acid batteries (GEL), flooded lead-acid batteries (FLD), sealed lead-acid batteries (SLD/AGM) or lithium iron phosphate batteries (LiFePO4).

Before wiring, confirm the polarity of the equipment and avoid reverse connections. Although the battery charger has reverse polarity protection, this protection will not be functional when the battery type is set to LiFePO4.

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

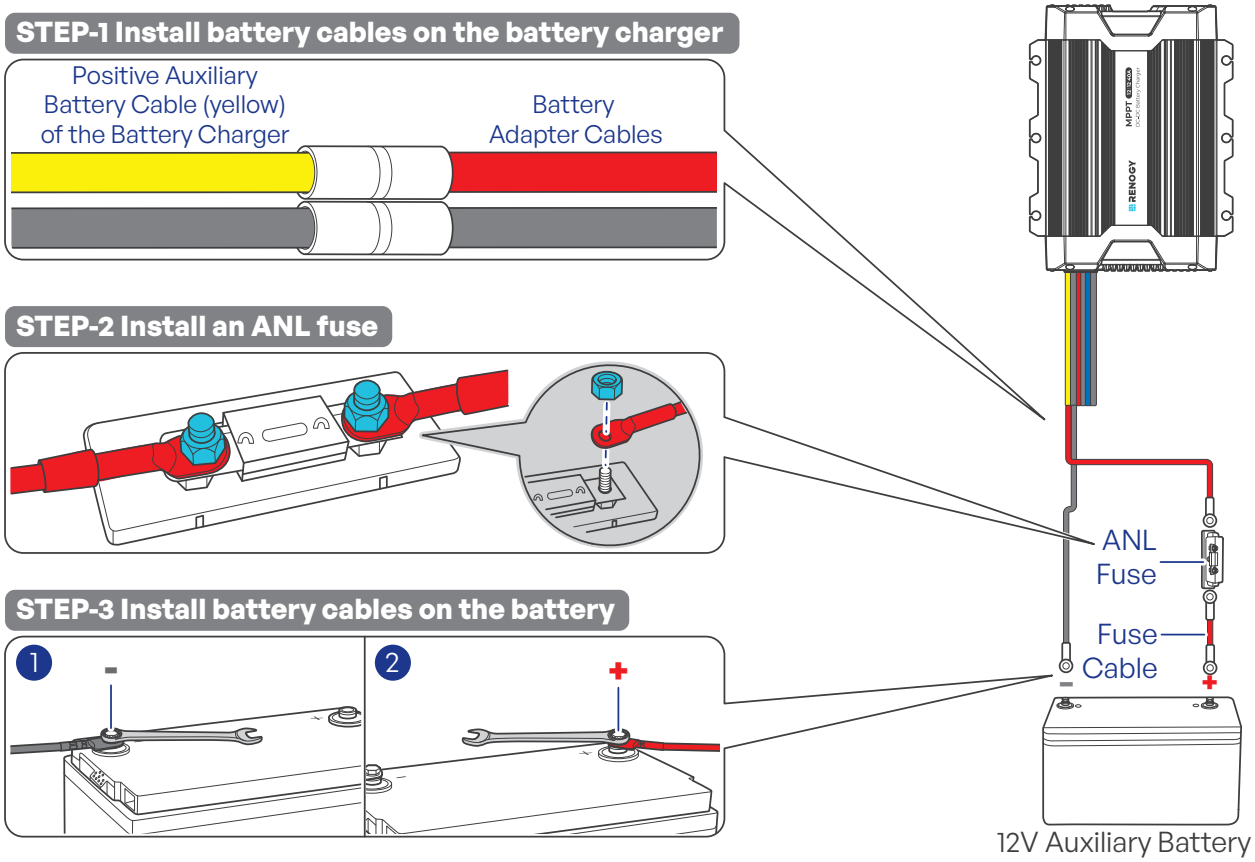
Step 1: Connect positive cable (red) to the positive auxiliary battery cable (yellow) on the battery charger.

Step 2: Connect the other end of the positive cable (red) to an ANL fuse.

Step 3: Connect negative cable (gray) to the either of the black cables on the battery charger.

Step 4: Connect the other end of the negative cable (gray) to the negative terminal of the auxiliary battery.

Step 5: Connect the ANL fuse to the positive end of the auxiliary battery through the fuse cable (red).



Tug on all cables to ensure firm connection.

4.3. 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 670W (13V to 30V, ≤45A); otherwise, it may cause damage to the battery charger.

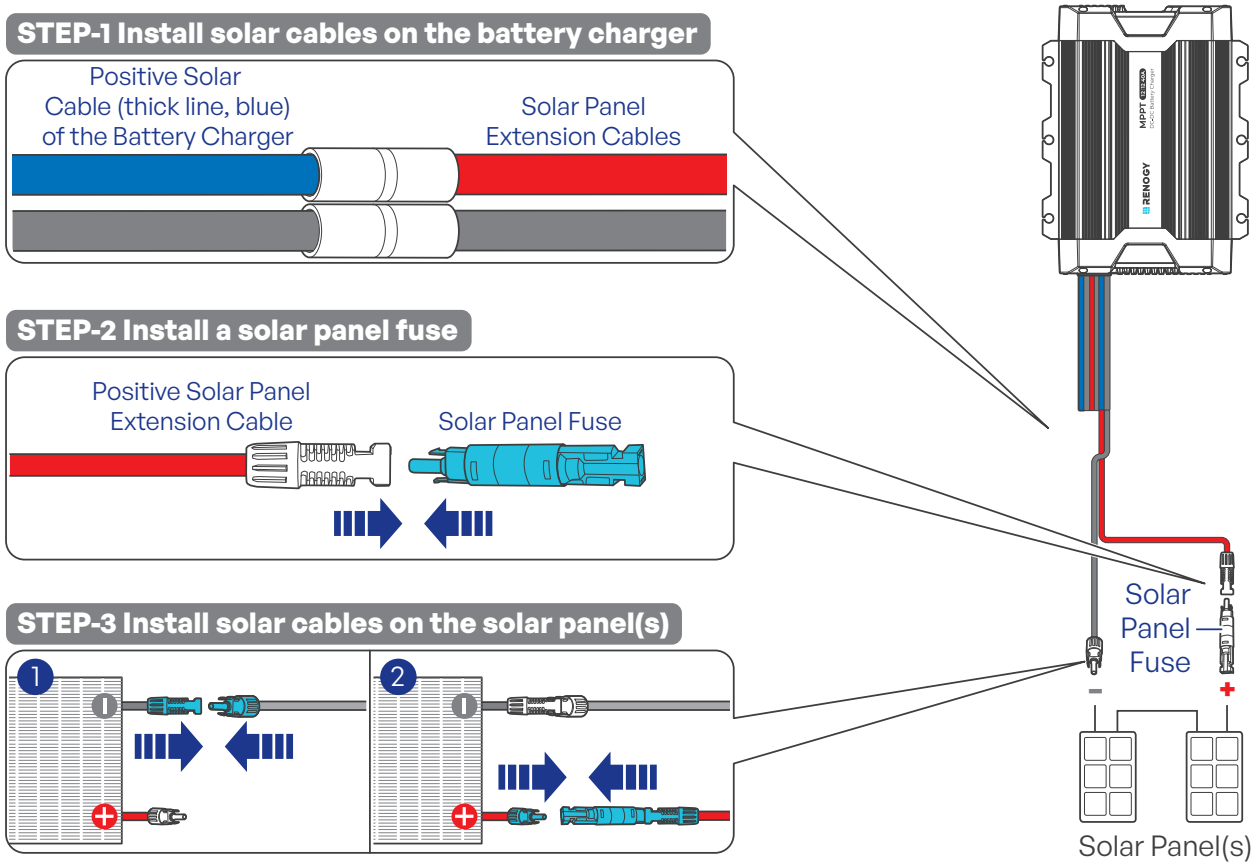
Step 1: Connect the positive solar panel extension cable to the positive solar panel cable (thick line, blue) on the battery charger.

Step 2: Connect the other end of the positive solar panel extension cable to a solar panel fuse.

Step 3: Connect negative solar panel extension cable to the either of the black cables on the battery charger.

Step 4: Connect the other end of the negative solar panel extension cable to the negative of the solar panel.

Step 5: Connect the solar panel fuse to the positive end of the solar panel.



Tug on all cables to ensure firm connection.

4.4. Connect the Battery Charger to a Starter Battery

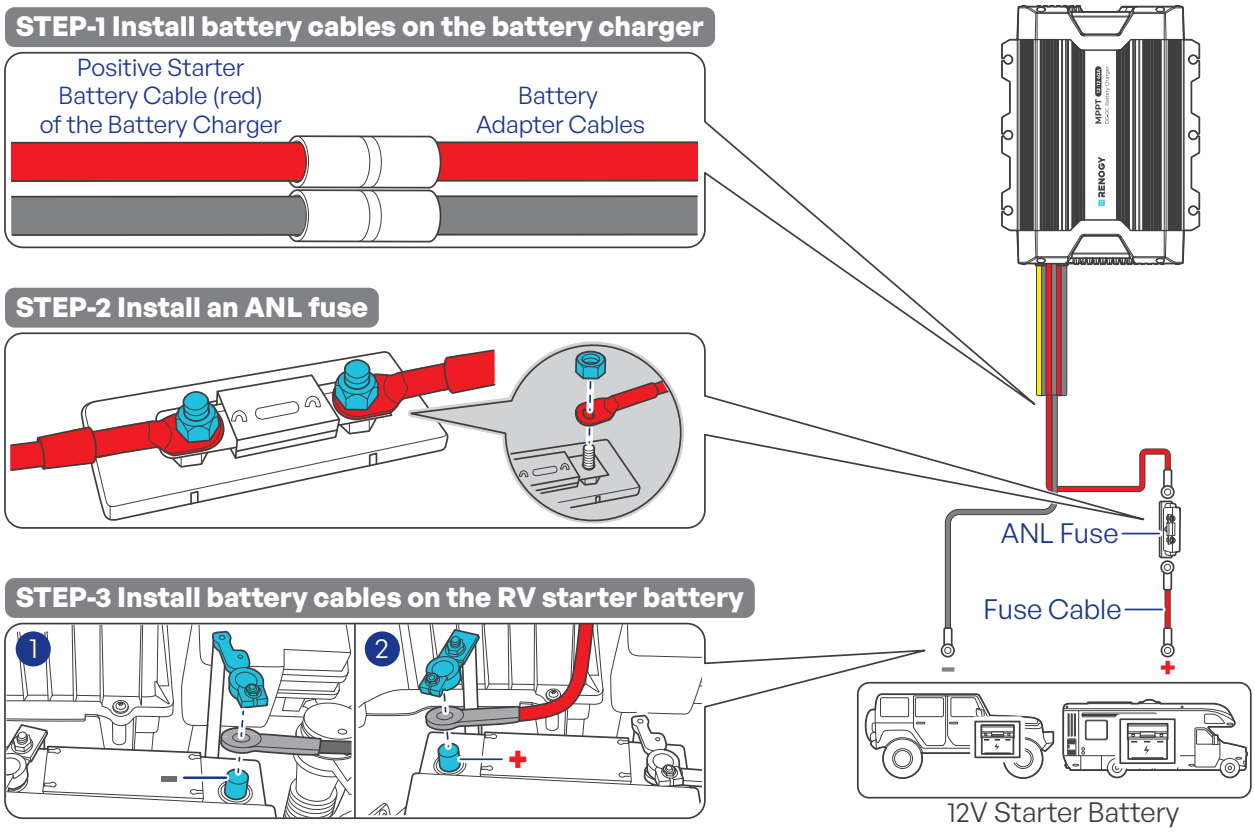
Step 1: Connect positive cable (red) to the positive starter battery cable (red) on the battery charger.

Step 2: Connect the other end of the positive cable (red) to an ANL fuse.

Step 3: Connect negative cable (gray) to the either of the black cables on the battery charger.

Step 4: Connect the other end of the negative cable (gray) to the negative terminal of the starter battery.

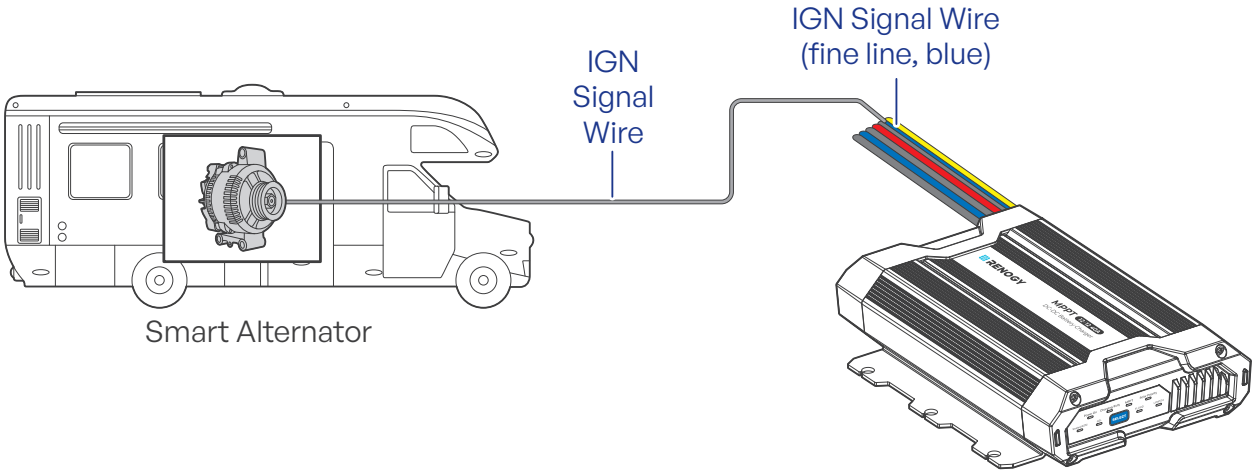
Step 5: Connect the ANL fuse to the positive end of the starter battery through the fuse cable (red).



Tug on all cables to ensure firm connection.

4.5. Install a IGN Signal Wire (for Smart Alternator)

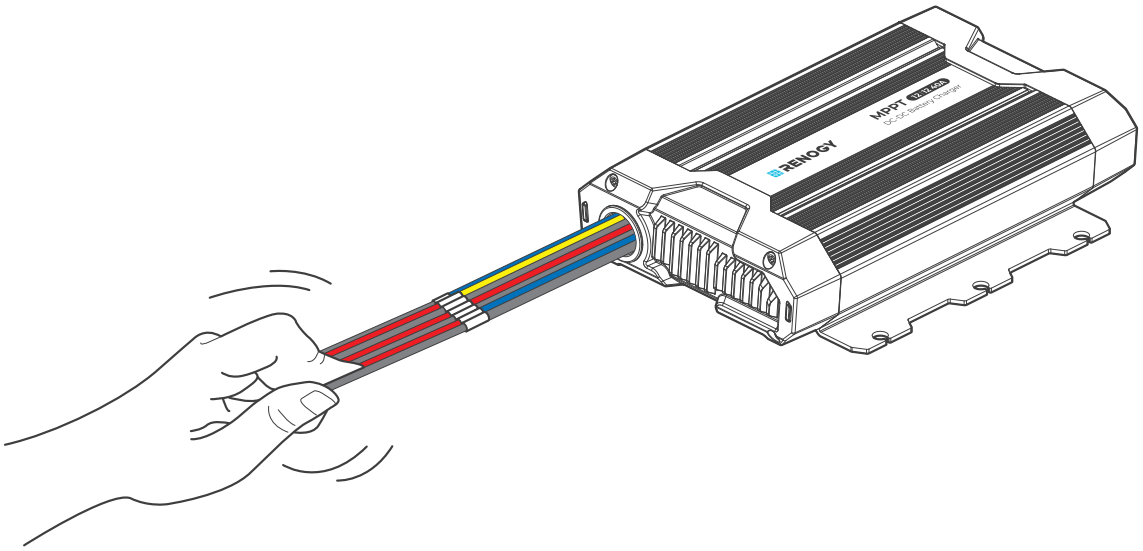
For smart alternators, prepare a signal wire, connecting one end to the IGN Signal Wire (fine line, blue) on the battery charger. Locate the IGN fuse in the vehicle's fuse box, remove the fuse, strip a portion of insulation from the other end of the signal wire, and insert it into the fuse socket. Then, reinsert the IGN fuse.



You can also connect the signal wire to the D+ terminal of the vehicle's alternator. Please consult the vehicle manufacturer for wiring details.

4.6. Wire Inspection

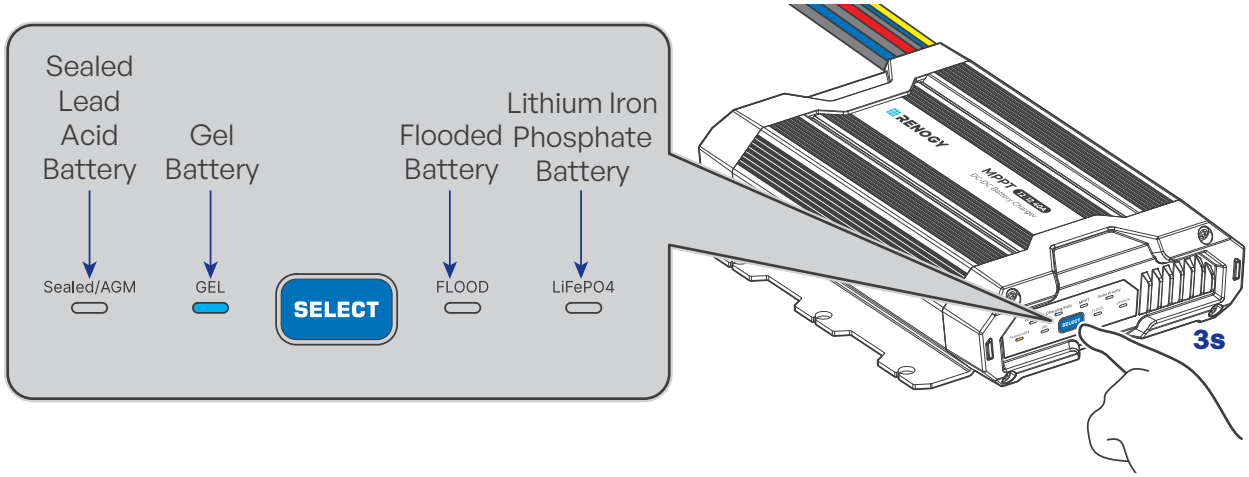
Verify that all cable connections are firmly and securely fastened. This step is essential to prevent any loose or unstable connections that could lead to operational issues or safety concerns.



5. Configuration

5.1. Set a Auxiliary Battery Type

Upon installing the battery charger, set a correct battery type by using the SELECT Button. Press and hold the SELECT button for 3 seconds to switch the battery type, and the corresponding indicator light will turn on.



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.

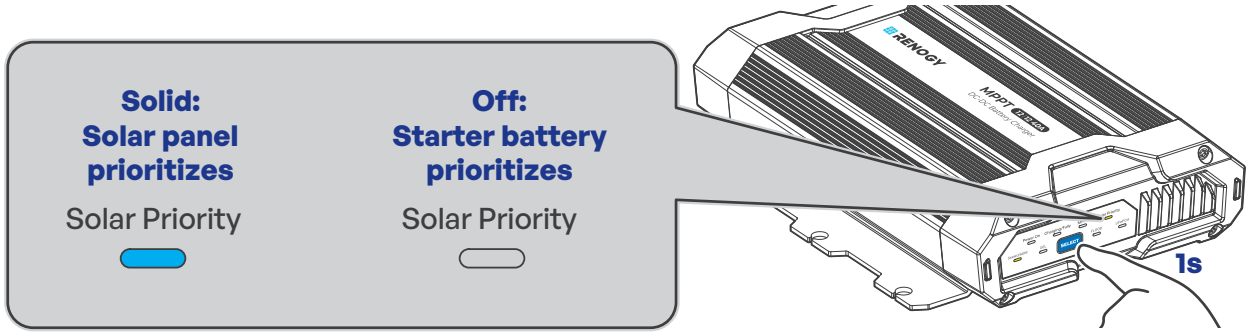
Under normal conditions, the battery type indicator light remains lit. It will begin to blink in case of a fault.

- **Single Flash (blink 1 time, off for 3 seconds):** Reverse polarity protection/overvoltage protection/ overcurrent protection. Check the battery wiring or parameters.
- **Double Flash (blink 2 times, off for 2 seconds):** Charging time exceeded 12 hours; power must be cut off and restarted.
- **Triple Flash (blink 3 times, off for 1 seconds):** Lithium battery BMS protection. When the battery type is selected as a lithium battery, if the battery port voltage suddenly drops during the charging process, it is considered an overcharge protection by the lithium battery BMS, and charging is immediately stopped. The battery type indicator alarms. After five minutes, it reassesses whether to resume charging. Alternatively, a short press of the button can manually silence the alarm and restart charging.

5.2. Set Charging Priority

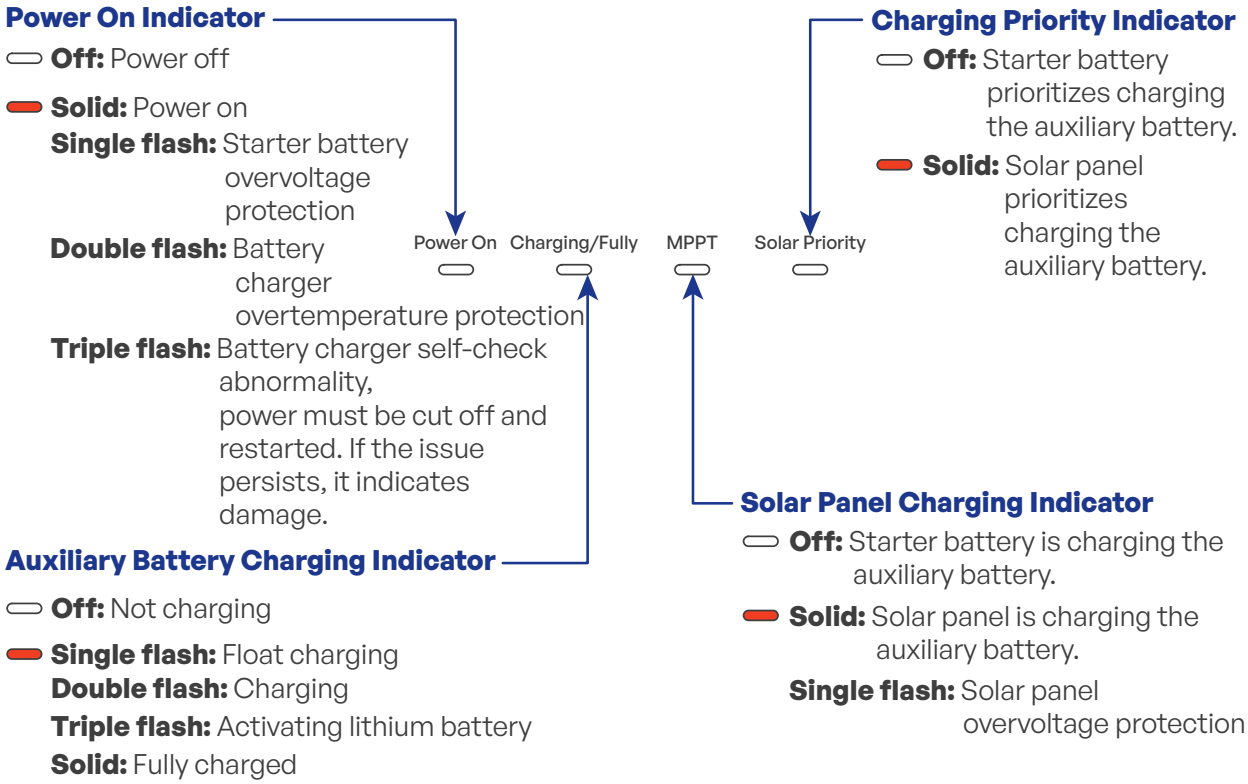
The battery charger can use either the solar panel or the starter battery to charge the auxiliary battery separately. You can short press the SELECT button for 1 second to switch the priority.

- **Solar Priority Indicator Solid:** Solar panel prioritizes charging the auxiliary battery.
- **Solar Priority Indicator Off:** Starter battery prioritizes charging the auxiliary battery.

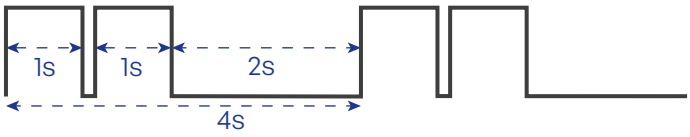
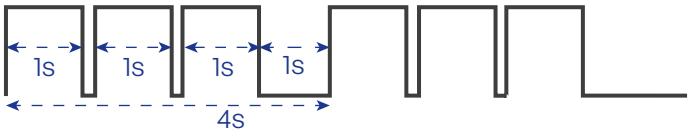


5.3. LED Indicators

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



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

LED ON		LED OFF	
LED Pattern	**Graphic Expression**		
Solid			
Single Flash			
Double Flash			
Triple Flash			

5.4. Activate Lithium Batteries

The battery charger can activate connected lithium batteries. Lithium batteries may enter sleep mode when the in-built protection is triggered. In such case, the battery charger provides a small current to reactivate the sleeping lithium battery. The lithium battery can be charged normally after successful activation.

Set the auxiliary battery type of the battery charger to LiFePO4, if the battery voltage drops below 9V, After 180 seconds, the battery charger will begin to activate the lithium battery. The Auxiliary Battery Charging Indicator (Charging/Fully) will fast flashing. It will pause every 100 seconds to check the battery voltage until the voltage reaches 14.4V.

When activating the lithium battery, all loads connected to the battery must be turned off to prevent activation failure.

6. Charging Logic

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.

6.1. Charging Parameters

Battery Type / Parameters	Sealed/AGM	GEL	FLOODED	LiFePO4
Trickle Charge	<10V	<10V	<10V	<10V
Overvoltage Shutdown	16.0V	16.0V	16.0V	16.0V
Overvoltage Recovery	15.0V	15.0V	15.0V	15.0V
Boost Voltage	14.6V	14.2V	14.6V	14.4V
Float Voltage	13.6V	13.6V	13.6V	-
Low Voltage Reconnect	13.2V	13.2V	13.2V	13.6V
Boost Duration	12 hours	12 hours	12 hours	12 hours

The charging controller can only detect the auxiliary battery and start charging when the battery voltage is greater than 7V.

The maximum current for trickle charge should not exceed 20A. Once the auxiliary battery is fully charged, the charging current from the battery charger should not exceed 4A.

6.2. Connect Only to the Solar Panel

Solar Panel Voltage	Charging the Auxiliary Battery	Charging Current
≥13.0V	Yes	40A Max
<13.0V	No	N/A

6.3. Connect Only to the Starter Battery

Battery charger will only use the starter battery to charge the auxiliary battery and will not charge the starter battery itself.

Alternator Type	Starter Battery Voltage		Charging the Auxiliary Battery	Charging Current
	Before Charging	During Charging		
Smart Alternator	≥12.0V, for 15 seconds	N/A	Yes	40A Max
	<12.0V	N/A	No	N/A
	N/A	≤11.3V	No	N/A

Alternator Type	Starter Battery Voltage		Charging the Auxiliary Battery	Charging Current
	Before Charging	During Charging		
Traditional Alternator	≥13.2V, for 15 seconds	N/A	Yes	40A Max
	<13.2V	N/A	No	N/A
	N/A	≤12.7V	No	N/A

6.4. Both the Solar Panel and Starter Battery are Connected

The battery charger will automatically adjust the charging logic based on the settings. You can check the charging priority using the Solar Priority Indicator on the battery charger.

- **Solar Priority Indicator Solid:** Solar panel prioritizes charging the auxiliary battery.
- **Solar Priority Indicator Off:** Starter battery prioritizes charging the auxiliary battery.

Solar Panel Priority

When the solar panel voltage is greater than 13.0V, the battery charger will use solar panel power to charge the auxiliary battery.

When the solar panel voltage is below 13.0V, the starter battery will be used to charge the auxiliary battery. If the solar panel voltage rises to 13.0V during the charging process, it will automatically switch to solar power for charging the auxiliary battery.

If both the solar panel and the starter battery fail to meet the working conditions, the battery charger will stop operating.

Solar Panel Voltage	Starter Battery Voltage				Power Supply Equipment	Charging Current
	Smart		Traditional			
	Before Charging	During Charging	Before Charging	During Charging		
≥13.0V	N/A	N/A	N/A	N/A	Solar panel	40A Max
<13.0V	≥12.0V	N/A	≥13.2V	N/A	Starter Batter	40A Max
	N/A	≤11.3V	N/A	≤12.7V	N/A	N/A
	<12.0V	N/A	<13.2V	N/A	N/A	N/A

Starter Battery Priority

When the starter battery voltage meets the operational requirements of the battery charger, the charger will use the starter battery to charge the auxiliary battery.

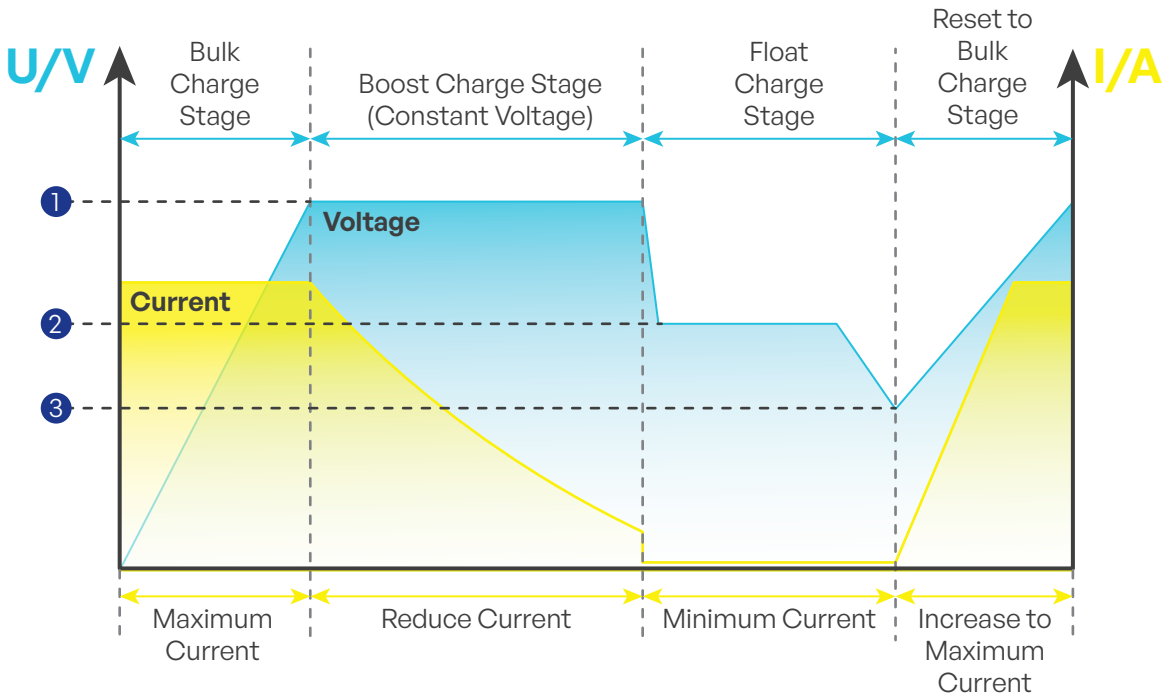
If the starter battery voltage falls below the operational requirements, the charger will use solar panel power to charge the auxiliary battery. During the charging process, if the starter battery voltage recovers to the required operational voltage, it will automatically switch back to using the starter battery to charge the auxiliary battery.

If both the solar panel and the starter battery fail to meet the working conditions, the battery charger will stop operating.

Starter Battery Voltage				Solar Panel Voltage	Power Supply Equipment	Charging Current
Smart		Traditional				
Before Charging	During Charging	Before Charging	During Charging			
≥12.0V	N/A	≥13.2V	N/A	N/A	Starter Batter	40A Max
N/A	≤11.3V	N/A	≤12.7V	≥13.0V	Solar panel	40A Max
<12.0V	N/A	<13.2V	N/A	≥13.0V	Solar panel	40A Max
<12.0V	N/A	<13.2V	N/A	<13.0V	N/A	N/A

6.5. 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 three distinct charging stages: bulk, boost, and float.



1 Boost charging voltage
2 Float charging voltage
3 Low Voltage Disconnect Recover charging voltage

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: 12 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.

7 Troubleshooting

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

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

7.1. Auxiliary Battery Type Indicator Flashing

LED	Fault	Solution
 Single Flash (blink 1 time, off for 3 seconds)	Reverse polarity protection/ overvoltage protection/ overcurrent protection	1. Check Connections: Verify that the wiring between the battery charger and the auxiliary battery is correct, ensuring there are no reverse connections. 2. Check Voltage: Measure the voltage of the auxiliary battery, ensuring it does not exceed 16V. 3. Check Charging Current: Monitor the charging current from the battery charger to the auxiliary battery. If it exceeds 40A, immediately disconnect all cables from the battery charger and then reconnect them.
 Double Flash (blink 2 times, off for 2 seconds)	Charging time exceeded 12 hours	1. Check Battery Capacity: Confirm whether the battery capacity is too large. If the charging time exceeds 12 hours, consider replacing the battery. 2. Check Battery Condition: Ensure that the battery can charge properly. If the battery is damaged, replace it promptly. After completing all checks, make sure to disconnect all cables from the battery charger before reconnecting them.
 Triple Flash (blink 3 times, off for 1 seconds)	Lithium battery BMS protection	When the battery type is selected as a lithium battery, if the battery port voltage suddenly drops during the charging process, it is considered an overcharge protection by the lithium battery BMS, and charging is immediately stopped. The battery type indicator alarms. After five minutes, it reassesses whether to resume charging. Alternatively, a short press of the button can manually silence the alarm and restart charging.

7.2. Power On Indicator Flashing

LED	Fault	Solution
Power On  Single Flash (blink 1 time, off for 3 seconds)	Starter battery overvoltage protection	1. Check Connections: Verify that the wiring between the battery charger and the starter battery is correct, ensuring there are no reverse connections. 2. Check Voltage: Measure the voltage of the starter battery, ensuring it does not exceed 24V. If the voltage exceeds 24V, discharge it first to ensure safety, ensure that it is below 16V.
Power On  Double Flash (blink 2 times, off for 2 seconds)	Battery charger overtemperature protection	When the circuit board temperature exceeds 158°F (70°C), the charging current is automatically reduced. When the circuit board temperature exceeds 176°F (80°C), charging is halted. Charging resumes once the temperature drops below 154.4°F (68°C).
Power On  Triple Flash (blink 3 times, off for 1 seconds)	Battery charger self-check abnormality	If there is a fault with the battery charger, disconnect all connections from the battery charger and then reconnect according to the installation steps in this manual. If the issue persists, please contact Renogy customer service for assistance.

7.3. Solar Panel Charging (MPPT) Indicator Flashing

LED	Fault	Solution
MPPT  Single Flash (blink 1 time, off for 3 seconds)	Solar panel overvoltage protection	1. Check Connections: Verify that the wiring between the battery charger and the solar panel is correct, ensuring there are no reverse connections. 2. Check Voltage: Measure the open-circuit voltage of the solar panel, ensuring it does not exceed 30V.

8. Specifications

General Specifications	
Model	RBC40D1S-G1
System Voltage	12V
Maximum Charging Current	40A
Nominal Output Power	616W
Auxiliary Battery Charging Mode	MPPT
Grounding	Common Negative
Operating Temperature	-4°F to 113°F /-20°C to 45°C
Storage Temperature	-4°F to 140°F / -20°C to 60°C
Humidity	0% to 90%, RH, no condensation
Cooling	Heat Sink
Enclosure Rating	IP31
Dimensions (LxWxH)	195 x 149 x 48 mm / 7.68 x 5.87 x 1.89 inch
Weight	1.2 kg /2.65 lb
Conversion Efficiency Steady Value	> 92%
Max Chargering Efficiency	93%
Idle Power Consumption	< 10 mA
Voltage Accuracy	±0.2V
Current Accuracy	±5%
Regulatory and Safety Specifications	FCC Path 15, Class B, CE, RoHS, SAA
Auxiliary Battery Specifications	
Battery Type	Sealed/AGM, GEL, FLOOD, LiFePO4
Voltage Range	7V to 24V DC
Start Battery Input Specifications	
Maximum Input Power	670W
Voltage Range	7V to 16V DC
Maximum Input Current	45A ±5%
Solar Panel Input Specifications	
Maximum Input Power	670W
Voltage Range	13V to 30V DC
Maximum Input Current	45A ±5%

9. Maintenance

9.1. 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 certain situations, corrosion may occur at the connection point. Corrosion can increase resistance and lead to connection damage. Applying insulating grease at the connection can help. Insulating grease is moisture-resistant and protects the connection from corrosion.

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

9.2. 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.

9.3. Cleaning

Follow the steps below to clean the battery charger regularly.

- Disconnect all cables connected to the battery charger.
- Wear proper protective equipment and use insulated tools during operation.
- 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.

9.4. 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 -4°F to 140°F or -20°C to 60°C.

10. 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.

10.1. 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, CO_2, 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.

10.2. Flooding

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

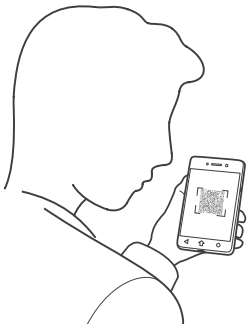
10.3. Smell

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	China	www.renogy.cn
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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.

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



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Save 300 pounds of CO_2 from being released into the atmosphere



Save 105 gallons of water from being consumed

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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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