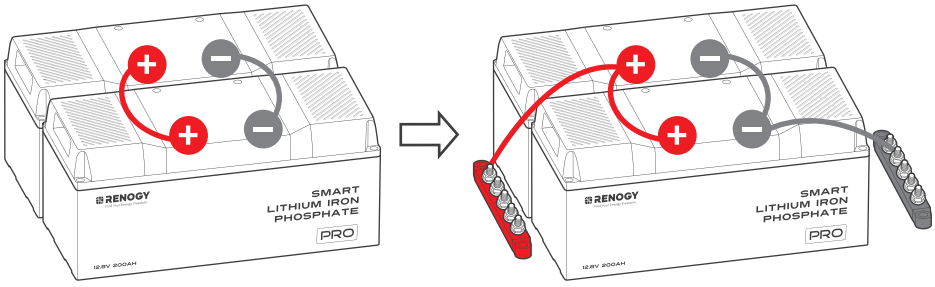
Parallel Connection – Installation Steps

You can choose suitable busbars in parallel connections. Busbars help handle high currents and are typically arranged in a parallel or stacked configuration to distribute electrical power efficiently.

Note that the cable connection methods provided below are for reference purposes only, as the optimal approach may vary depending on the specific situation. It is essential to consider various factors, such as the cable size, equipment used, and environmental conditions.



2P	Battery System	12V (12.8V) 400Ah
	Energy	5120Wh
8P	Battery System	12V (12.8V) 1600Ah
	Energy	20480Wh

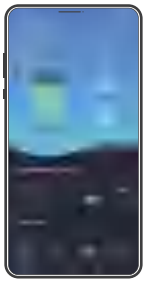
Battery Cell Balancing

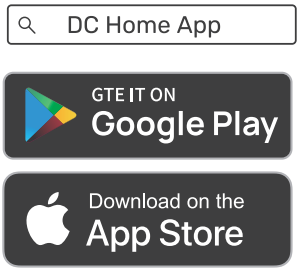
The battery employs bypass circuit to maintain the balance between each battery cell group. Each battery cell group is connected with a bypass resistor and a switch in parallel. During the charging process, if the highest-voltage battery cell group reaches the set balancing starting voltage, and the voltage difference between the highest-voltage and the lowest-voltage battery cell group exceeds the set voltage difference, the switch connected to the highest-voltage battery cell group will be closed. This action shunts the charge current around the highest-voltage battery cell group through the bypass resistor until the voltage difference drops below the set value.

To avoid excessive energy loss, the battery cell balancing is only performed during the charging process.

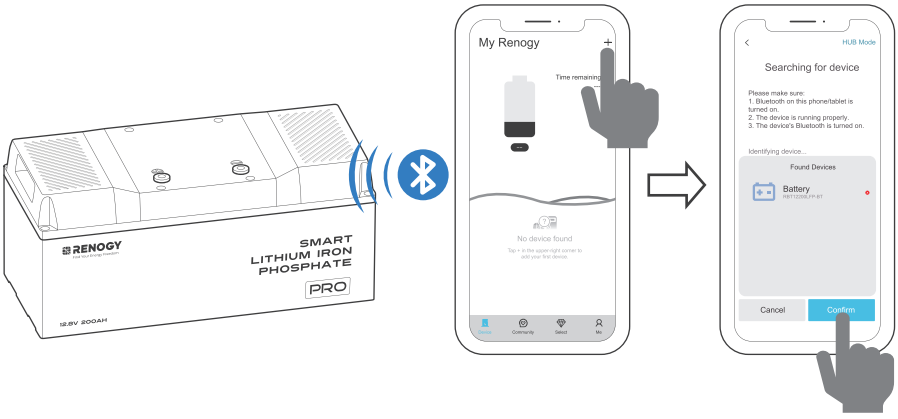
Remote, 24/7 Monitoring via DC Home App

Step 1: Download the DC Home app. Login to the app with your account.





Step 2: Pair the battery with the DC Home app. Monitor and modify the parameters of the battery via the app.



Charging/Discharging Parameter Settings

Charge

Charge/Boost Voltage	14.4V	**Boost Return Voltage**	13.2V
Bulk/Absorption Voltage	14.4V	**Overvoltage Disconnect**	15.0V
Bulk/Absorption Voltage	14.4V / Disabled	**Overvoltage Reconnect**	14.2V

Discharge

Low Voltage Reconnect	12.6V	**Undervoltage Warning**	12.0V
Undervoltage Shutdown	10.0V		

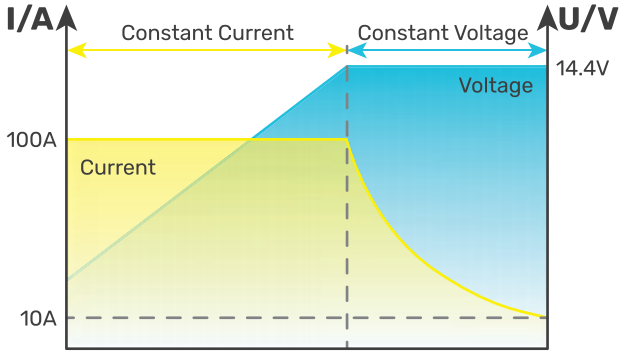
Battery Charging and Discharging Logic

The battery may be received at a partial state of charge (SOC) depending on the time between manufacturing and shipping. It is crucial to fully charge the battery before its initial use. In case the battery shuts off due to low SOC, promptly disconnect it from loads and charge it to prevent irreversible damage. Follow the instructions in this user manual for proper charging and usage to ensure optimal battery performance and longevity.

Charging Logic

The standard charging process for the battery involves charging at a constant current of 100A until the battery voltage reaches 14.4V, followed by charging at a constant voltage of 14.4V while tapering the charge current. The charging process is considered complete when the charge current is less than 10A (also known as tail current).

The standard charging process typically takes 2.5 hours and requires battery temperatures to be between 32°F and 131°F (0°C and 55°C) for safe charging. Leaving the battery on float will continue to balance the battery cells without damaging the battery.



- Lithium batteries are compatible with various charging methods, including MPPT charge controller, AC charger, and DC-DC charger. The crucial parameter setting for these chargers is to set the charge voltage, boost voltage, or bulk voltage at 14.4V (±0.2V).
- Do not overcharge or overdischarge the battery.
- Do not discharge the battery at high temperatures above 140°F (60°C).
- Only charge the battery with a battery charger or charge controller that is compatible with lithium iron phosphate batteries.
- Do not exceed the maximum continuous charge current (200A) of the battery.

Discharging Logic

During standard discharging, the battery is discharged at a constant current of 100A until the voltage drops to 10V. To ensure safe discharging, the battery temperature should be between -4°F (-20°C) and 131°F (60°C).

- To ensure safe and optimal battery usage, it is recommended to pair the battery with discharge equipment that features a low voltage disconnect (LVD) function.
- Do not connect large loads to the battery when it is running low.
- Do not exceed the maximum continuous discharge current (200A) of the battery.

How to Estimate the Battery SOC?

The SOC values listed below are estimated based on the open circuit voltage when the battery is at rest for 30 minutes, not in charging or discharging state.

SOC	Open Circuit Voltage	SOC	Open Circuit Voltage
100%	13.6V	30%	12.9V
99%	13.4V	20%	12.8V
90%	13.2V	14%	12.7V
70%	13.1V	9%	12.6V
40%	13.0V	0%	10.0V

The table above is for reference only because slight variations in battery voltage may occur among different batteries.

Self-Heating Function

The normal operation of the self-heating function requires a stable charge current greater than 6A for each battery in the parallel battery bank. The self-heating function will start operating automatically once the battery and the battery temperature drops below 41°F (5°C) and stop operating automatically once the battery temperature rises above 50°F (10°C). The temperature rise rate is approximately 46.4°F (8°C) per hour when running at full power of 85W (6A).

Battery Management System

This smart battery management system has more than 60 fault alarms and protections to fully protect your battery safety. Below we list some common faults and protections for reference.

Battery Operating Status		Condition (For Reference Only)	
Battery Cell Overvoltage	Protection	Trigger	Battery Cell Voltage ≥ 3.7V
		Recover	Battery Cell Voltage ≤ 3.45V
Battery Cell Undervoltage	Protection	Trigger	Battery Cell Voltage ≤ 2.7V (> 0°C) Battery Cell Voltage ≤ 2.2V (≤ 0°C)
		Recover	Charge current ≥ 0.5A
Cell Undervoltage Permanent Failure	Protection	Trigger	Battery Cell Voltage ≤ 1.8V
Charge High Temperature	Protection	Trigger	Battery Temperature ≥ 131°F (55°C)
		Recover	Battery Temperature ≤ 122°F (50°C)
Discharge High Temperature	Protection	Trigger	Battery Temperature ≥ 140°F (60°C)
		Recover	Battery Temperature ≤ 122°F (50°C)

Battery Operating Status		Condition (For Reference Only)	
Charge Low Temperature	Protection	Trigger	Battery Temperature ≤ 32°F (0°C)
		Recover	Battery Temperature ≥ 37°F (3°C)
Discharge Low Temperature	Protection	Trigger	Battery Temperature ≤ -4°F (-20°C)
		Recover	Battery Temperature ≥ 1.4°F (-17°C)
Charge Overcurrent	Primary Protection	Trigger	Charge Current ≥ 215A (15s)
		Recover	Discharge Current ≥ 0.5A or Recover automatically after 60s
	Secondary Protection	Trigger	Charge Current ≥ 235A (5s)
		Recover	Discharge Current ≥ 0.5A or Recover automatically after 60s
	Ultimate protection	Trigger	Charge Current ≥ 300A (300ms)
		Recover	Discharge Current ≥ 0.5A or Recover automatically after 60s Charging is locked when the Ultimate Protection is triggered three times.
Discharge Overcurrent	Primary Protection	Trigger	Discharge Current ≥ 215A (60s)
		Recover	Charge Current ≥ 0.5A or Recover automatically after 60s
	Secondary Protection	Trigger	Discharge Current ≥ 235A (30s)
		Recover	Charge Current ≥ 0.5A or Recover automatically after 60s
	Ultimate protection	Trigger	Discharge Current ≥ 300A (200ms)
		Recover	Charge Current ≥ 0.5A or Recover automatically after 10s Charging is locked when the Ultimate Protection is triggered three times.
Short Circuit	Protection	Trigger	Discharge Current ≥ 1000A
		Recover	When short circuit is removed.

Troubleshooting

Problem	Possible Causes	Solution
• The battery is unable to be activated with a charge/discharge current greater than 1A • The battery is activated at open circuit voltage below 10V	Severe battery overdischarge due to self-discharge or parasitic loads	Revive the battery with a battery charger or charge controller featuring lithium battery activation or force charging.
The battery shuts off due to undervoltage protection.	The battery voltage drops below the preset threshold	Disconnect the battery from loads, and charge the battery with a current greater than 1A as soon as possible.
The battery cuts off the charging current due to overvoltage protection	The battery voltage exceeds the preset threshold during charging.	1. Disconnect the battery from the charging source. 2. Reduce charge voltage by 0.2V to 0.4V for 6 hours. 3. Attempt to fully charge the battery again with the correct voltage setting. If the problem persists with a lithium iron phosphate compatible charging source and correct voltage setting, repeat the above steps.
The battery temperature gets too high/low during operation and triggers high/low temperature protection	The battery temperature exceeds the preset threshold.	1. Disconnect the battery from the charging source or loads. 2. Cool down/Warm up the battery. 3. The battery recovers from high/low temperature protection automatically and continues operating.
Short circuit protection is triggered.	Short circuit occurs in the battery.	1. Remove the short circuit as soon as possible 2. Charge the battery with a current greater than 1A.
Charge/Discharge over-current protection is triggered due to too high current passing through the battery.	Excessive current flows through the battery during charging or discharging.	Disconnect the battery from the charging source or loads as soon as possible.

For further assitance, contact Renogy technical support service at https://www.renogy.com/contact-us.

Specifications

General

Battery Cell Type	Lithium Iron Phosphate
Rated Capacity (0.5C, 25°C)	200Ah
Nominal Voltage	12.8V
Voltage Range	10V to 14.8V
Cycle Life (0.5C, 25°C)	5000 Cycles (80% DOD)
Dimension	18.4 x 8.4 x 8.2 in / 467 x 212 x 208 mm
Weight	50.7 lbs. / 23 kg
Connection Method	Parallel (Up to 8 batteries)
Terminal Bolt Size	Terminal Bolt: M8 x 1.25 x 12 mm Long Terminal Bolt: M8 x 1.25 x 16 mm
Recommended Terminal Torque	70.8 inch•lbs / 8 N•m
Protection Rating	IP67
Certification	MSDS, UN38.3, FCC, CE, PSE, and UKCA

Operation Parameters

Charge Voltage	14.4V
Maximum Continuous Charge Current	200A
Recommended Charging Current	100A
Maximum Continuous Discharge Current	200A
Peak Discharge Current	270A@30s
Charge Temperature Range	-4°F to 131°F (-20°C to 55°C)
Discharge Temperature Range	-4°F to 140°F (-20°C to 60°C)
Storage Temperature Range	-13°F to 149°F (-25°C to 65°C)
Operation Relative Humidity	10% to 95%

Maintenance & Storage

Inspection

Please perform regular inspections following the steps below:

- Examine the external appearance of the battery. The housing and terminals of the battery shall be clean, dry, and free of corrosion.
- Check battery cables and connections. Replace any damaged cables and tighten any loose connections.

> In certain application scenarios, corrosion may occur around the terminals. Corrosion can cause increased resistance and poor contact. It is recommended to regularly apply insulation grease to each terminal. Insulation grease can form a moisture-resistant seal and protect the terminals from corrosion.

Cleaning

Please clean the battery at regular intervals following the steps below:

- Disconnect the battery from the system.
- Clear the leaves and debris from the battery.
- Clean the battery with a soft, lint-free cloth. The cloth can be dampened with water or mild soap and water if the battery is extremely dirty.
- Dry the battery with a soft, lint-free cloth.
- Keep the area around the battery clean.
- Reconnect the battery to the system.

Checking Voltage

Please check the battery voltage periodically to assess battery health. If the battery is unable to be activated with a charge/discharge current greater than 1A or the battery is activated with a open circuit voltage below 10V, the battery may have been severely overdischarged due to self-discharge or parasitic loads. Please stop using the battery until the fault can be corrected and the battery can be charged.

Storage

Please follow the tips below to ensure that the battery emerges from storage in a good condition:

- Charge the battery to 30% to 50% SOC.
- Disconnect the battery from the system.
- Store the battery in a well-ventilated, dry, clean area with temperatures between -13°F (-25°C) and 149°F (65°C).
- Do not expose the battery to direct sunlight, moisture, or precipitation.
- Handle the battery carefully to avoid sharp impacts or extreme pressure on the battery housing.
- Charge the battery at least once every 3~6 months to prevent it from overdischarge.
- Fully charge the battery when it is taken out of storage.

Important Safety Instructions

Renogy accepts no liability for any damage caused by:

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

General

- Wear proper protective equipment and use insulated tools during installation and operation. Do not wear jewelry or other metal objects when working on or around the battery.
- Keep the battery out of the reach of children.
- Do not dispose of the battery as household waste. Comply with local, state, and federal laws and regulations and use recycling channels as required.
- In case of fire, put out the fire with a FM-200 or CO_2 fire extinguisher.
- Do not expose the battery to flammable or harsh chemicals or vapors.
- Clean the battery regularly.
- It is recommended that all cables should not exceed 10 meters because excessively long cables result in a voltage drop.
- The cable specifications listed in the quick guide account for critical, less than 3% voltage drop and may not account for all configurations.
- Do not expose the battery to strong electrostatic fields, strong magnetic fields, or radiation.

Battery Safety

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

Renogy Support

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

renogy.com/support/downloads

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:

renogy.com/contact-us

1(909)2877111

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

Canada | ca.renogy.com	China | www.renogy.cn
Australia | au.renogy.com	Japan | renogy.jp
South Korea | kr.renogy.com	Germany | de.renogy.com
United Kingdom | uk.renogy.com	Other Europe | eu.renogy.com

Battery Recycling

The proper disposal and recycling of batteries are essential for environment protection and circular economy. We encourage correctly disposing of your batteries when they become depleted.

You can dispose your used batteries at any of Call2Recycle or Earth911 locations that accepts Renogy rechargeable Lithium-ion and Lead-acid batteries (AGM&GEL).

www.call2recycle.org/locator

search.earth911.com

Enjoy our community's incentive program when you properly dispose of your batteries. You can earn $20 gift cards to purchase any products on our website by participating. It's a simple way to be environmentally responsible and be rewarded for recycling.

renogy.com/support

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 20cm between the radiator & your body.

IC Warning

This device complies with Industry Canada's licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil nedoit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

IC RF Statement: When using the product, maintain a distance of 20cm from the body to ensure compliance with RF exposure requirements.

Renogy Empowered

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

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

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

Live Sustainably with Renogy

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

Save 170 pounds of coal from being burned

Save 300 pounds of CO_2 from being released into the atmosphere

Save 105 gallons of water from being consumed

Renogy Power PLUS

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

YouTube @Renogy Solar

@renogyofficial

@Renogy