

BATTERY

SMART LITHIUM IRON
PHOSPHATE

12V 100Ah

Version 1.1



Important Safety Instructions

Please save these instructions.

This manual contains important installation, operation, and maintenance instructions for the Smart Lithium Iron Phosphate Battery. Please observe these instructions and keep them located near the battery for further reference. The following symbols are used throughout the manual to indicate potentially dangerous conditions or important safety information.

WARNING Indicates a potentially dangerous condition. Use extreme caution when performing this task.

CAUTION Indicates a critical procedure for the safe and proper installation and operation of the battery.

NOTE Indicates a procedure or function that is important to the safe and proper installation and operation of the battery.

Disclaimer

The manufacturer accepts no liability for any damage caused by:

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

General Safety Information

WARNING

- Please keep the battery away from water, heat sources, sparks, and hazardous chemicals.
- DO NOT puncture, drop, crush, burn, penetrate, shake, or strike the battery.
- DO NOT open, dismantle, or modify the battery.

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- DO NOT touch any terminals or connectors.
 - Any uncovered battery material, such as electrolyte or powder, that has contacted skin or the eyes must be flushed out with plenty of clean water immediately. Seek medical attention afterwards. Spillages on clothing should be rinsed out with water.
 - DO NOT touch the exposed electrolyte or powder if the battery casing is damaged.
 - Please make sure any battery charger(s) or charge controller(s) are disconnected when working on the battery.
 - DO NOT connect or disconnect terminals from the battery without first disconnecting loads.

CAUTION

- DO NOT place tools on top of the battery.
- Please keep the battery out of the reach of young children.
- Please wear proper protective equipment when working on the battery.
- Please use insulated tools when working on battery.
- DO NOT wear jewelry or other metal objects when working on or around the battery.
- Please ensure adequate and secure mounting of the battery and always use suitable handling equipment for transportation.
- DO NOT dispose of the battery as household waste. Please use recycling channels in accordance with local, state, and federal regulations.

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General Information

The Renogy Smart Lithium Iron Phosphate Battery enables auto-balance among parallel-connections and provides more flexibility for battery connections. The integrated smart battery management system (BMS) not only protects the battery from various abnormal conditions but monitors and manages the charging/discharging process. The state-of-the-art battery cells ensure a long cycle life and exceptional discharge performance.

■ Key Features

- **Auto-Balance**

Connects multiple batteries in parallel safely without internal state non-uniformity issues.

- **Ultra-Safe**

The battery management system (BMS) provides comprehensive protection to the battery and smartly manages the charging/discharging process.

- **Uncompromised Quality**

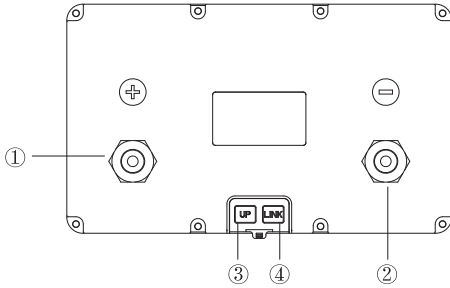
State-of-the-art battery cells ensure a lifespan of more than 4000 cycles, a 100A continuous discharge current, and a wide range operation temperature.

- **Communication Port**

The RJ45 communication ports enable data transmission to meet the needs of different usage scenarios.

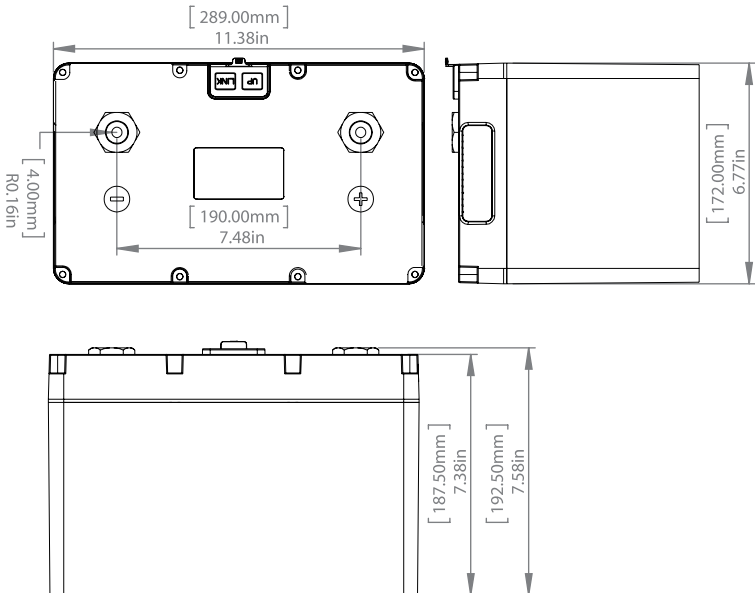
Product Overview

Identification of Parts



- ① Positive Terminal
- ② Negative Terminal
- ③ UP Communication Port
- ④ LINK Communication Port

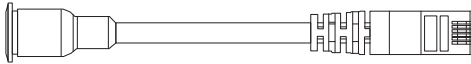
Dimensions



Additional Components

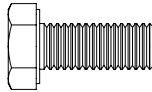
Activation Switch

The Activation Switch is used to switch the battery between active mode and shelf mode.



Long Terminal Bolts (2)

The Long Terminal Bolts (M8x1x20mm) are used to secure multiple cable lugs on one battery terminal.



Preparation

Before the installation and operation of the battery, it is recommended to have the following equipment or tools available:

- Proper protective equipment
- Insulated tool(s)
- Multimeter
- Battery cable
- Battery charger / charge controller

Battery Installation

Safe and reliable installation requires trained and certified technicians. Therefore, the purpose of this section is only to serve as a guideline as all scenarios cannot be covered.

WARNING

- DO NOT short-circuit the battery terminals. Doing so can cause bursts in amperage and lead to irreversible damage to the system and the battery.

- Please verify the polarity before connecting wiring. Reversing polarity can and will destroy the battery.
- Please use circuit breakers, fuses, or disconnects appropriately sized by a certified electrician, licensed installers, or regional code authorities to protect all electrical equipment.

■ Inspection

Please check for visible damage including cracks, dents, deformation, and other visible abnormalities. The top of the battery and terminal connections should be clean, free of dirt and corrosion, and dry. If any problems are detected with the battery, please contact us for assistance. Refer to the last page of the manual for contact information.

■ Cable Sizing

Battery cables (sold separately) should be appropriately sized to handle the expected load. Please refer to the following table for the ampacities of copper cables with different gauge sizes.

Copper Cable Gauge Size (AWG/mm ²)	Ampacity (A)
14 (2.08)	20
12 (3.31)	25
10 (5.26)	35
8 (8.36)	50
6 (13.3)	65
4 (21.1)	85
2 (33.6)	115
1 (42.4)	130
1/0 (53.5)	150
2/0 (67.4)	175
4/0 (107)	230

The above values are from NEC Table 310.15(B)16 for copper cables rated at 35°C (167°F), operating at an ambient temperature of no more than 30°C (86°F). Lengths in excess of 6 feet (1829 mm) may require heavier gauge cable to avoid unacceptable voltage drop.

■ Connecting Batteries in Banks

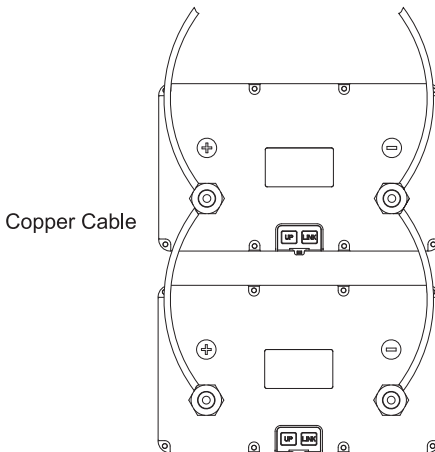
WARNING

- DO NOT string the battery in series. Doing so can cause catastrophic failure.

CAUTION

- DO NOT string different types of batteries, batteries with different rated capacity, or batteries from different manufacturers in parallel.
- Please avoid too high a voltage difference between paralleled batteries, despite the auto-balancing function, to avoid triggering the over-current protection.
- In parallel battery banks, the cables between each battery should be of equal length to ensure that all batteries in the system can work equally together.
- It is not recommended to connect more than 4 batteries in parallel if taking advantages of the auto-balancing function.

To string multiple batteries in parallel, first connect the positive terminals of batteries to each other. Then do the same with the negative terminals. Finally, connect the positive and negative terminals of the first battery to the system. This type of arrangement is used to increase the overall battery capacity while keeping the voltage the same.



■ Securing Cable Connections

CAUTION

- Please secure all cable connections to the proper specification in order to ensure good contact between the cable lugs and the terminals. Over-tightening cable connections can cause terminal breakage and loose cable connections can cause terminal meltdown or fire.
- Please use an insulated Philips screwdriver to tighten the cable connections.
- To ensure good contact between the cable lugs and the terminals, please use the appropriate number of washers to allow for as much thread engagement as possible without bottoming out the terminal bolt. The correct number of washers can be determined by hand-tightening the terminal bolt with just the cable lug in place and observing the gap that is present. Use the number of washers needed so that the washer stack is slightly larger than the observed gap.
- It is very important to ensure the cable lug contacts the top surface of the terminal and that a washer is placed on top of the lug. Do not place a washer between the battery terminal and the cable lug as this can cause high resistance and cause excessive heating of the connection.

NOTE

- Please use the included Long Terminal Bolts when needed to secure multiple cable lugs on one battery terminal.

■ Installation Environment

To ensure good contact between the cable lugs and the terminals, please use the appropriate number of washers to allow for as much thread engagement as possible without bottoming out the terminal bolt. The correct number of washers can be determined by hand-tightening the terminal bolt with just the cable lug in place and observing the gap that is present. Use the number of washers needed so that the washer stack is slightly larger than the observed gap.

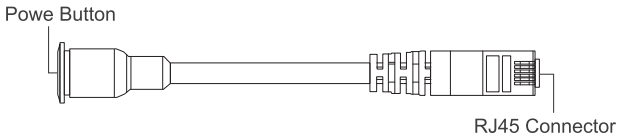
Battery Operation

CAUTION

- DO NOT over-charge or over-discharge the battery.
- DO NOT charge the battery at temperatures lower than 0°C (32°F) and discharge at temperatures higher than 60°C (140°F).

■ Activation Switch Operation

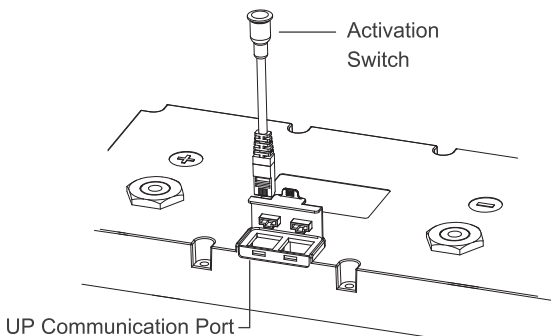
The included Activation Switch is used to switch the battery between active mode and shelf mode.



When the battery is in shelf mode, plug the RJ45 Connector of the Activation Switch into the UP Communication Port of the battery. The LED light on the Power Button will become dim blue to indicate that the battery is in the shelf mode.

Press the Power Button to activate the battery. The LED light on the Power Button will become bright blue to indicate that the battery has been switched to active mode.

Prior to long periods of storage, connect the Activation Switch to the battery using the same method and long press the Button for 3 seconds to put the battery into shelf mode. The bright blue LED light on the Power Button will go dim to indicate that the battery has been switched to shelf mode. In shelf mode, the battery has a very low self-discharge rate and can hold the charge for a longer period of time.



CAUTION

- Please leave the battery in shelf mode during installation. DO NOT activate the battery until making sure all the connections are correct and secure.

NOTE

- Paralleled batteries can be activated simultaneously using the Activation Switch. But if you want to put them into shelf mode, please first disconnect each battery and use the Activation Switch to put each battery into shelf mode.
- The battery leaves the factory in shelf mode. Please activate the battery prior to first use by charging it or using the Activation Switch.
- It is not mandatory to connect the Activation Switch to the battery during operation or storage. Users may take it off after battery mode switching and keep it properly.

■ Charging the Battery

CAUTION

- DO NOT exceed maximum charging current to the battery.
- ONLY charge the battery with a battery charger or charge controller that is compatible with lithium iron phosphate batteries.

NOTE

- Depending on the length of time between manufacturing and shipping, the battery may be received at a partial state of charge. Please fully charge the battery prior to initial use.

During standard charging, the battery is first charged at 20A constant current until the battery reaches 14.4V. Then, the battery is charged at a constant voltage of 14.4V while tapering the charging current. Charging is considered complete when the current is less than 2A. However, leaving the battery on float will continue to balance the cells and will not harm the battery. Safe charging requires temperatures between 0°C and 55°C (32°F and 131°F) and takes approximately 7 Hours.

■ Discharging the Battery

CAUTION

- DO NOT exceed maximum discharging current to the battery.
- DO NOT connect large loads to the battery when the battery is running low.

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- If the battery shuts off due to low state of charge (SoC), please disconnect the battery from your equipment to eliminate potential parasitic loads and recharge the battery as soon as possible. Failure to do so may cause irreversible damage to the battery.
 - It is highly recommended to pair the battery with low voltage disconnect devices in the system setup.

During standard discharging, the battery is discharged at 20A constant current until the battery reaches 10V. Safe discharging requires temperatures between -20 °C and 60 °C (-4 °F and 140 °F).

Battery Maintenance

■ Inspection

Please perform regular visual inspections by following these steps:

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

■ Cleaning

Please clean the battery at regular intervals by following these steps:

- Disconnect the battery from your charging source or load.
- Put the battery in shelf mode using the Activation Switch
- Clean the top of the battery, terminals, and connections with a damp cloth or non-metallic brush. If the battery is extremely soiled, a household cleaner may be used.
- Dry the battery with a clean cloth and keep the area around the battery clean and dry.
- Ensure the battery is completely dry before reactivating it and/or reconnecting to your charging source or load.

CAUTION

- Please keep terminals and connectors free of corrosion. Terminal corrosion may adversely affect the performance of the battery and present a safety hazard.

■ Voltage Checking

Please check the voltage of the battery periodically to assess battery health. If the battery voltage is under 10V at room temperature, the battery has been over-discharged or is self-discharging due to defects or parasitic loads. Please stop using the battery until the fault can be corrected and battery can be charged.

Battery Storage

Please follow these tips to ensure that your battery emerges from storage in good condition:

- Charge the battery to 30%~50% and put the battery into shelf mode using the included Activation Switch before long periods of storage.
- Disconnect the battery from equipment to eliminate any potential parasitic loads that may discharge the battery.
- Store the battery in an open, well ventilated, dry, clean area in temperatures between -25 C and 65 C (-13 F and 149 F).
- Handle the battery carefully to avoid sharp impacts or extreme pressure on the battery casing.
- Charge the battery at least once every 3 months to prevent over-discharge.
- When the battery is taken out of storage, it should be given a full charge prior to use.

CAUTION

- DO NOT expose the battery to the extreme temperatures over 65 C (149 F).
- DO NOT expose the battery to heat sources.
- DO NOT expose the battery to direct sunlight, moisture, or precipitation.

Battery Management System

■ Protection

The Smart Lithium Iron Phosphate Battery contains a battery management system (BMS) that protects the battery from over-discharge, over-charge, over-current, short-circuit, etc.

Please refer to the following table for the triggering and recovery condition of each protection.

Protection	Condition	
Battery Over-voltage	Triggering Condition	Battery Voltage \geq 14.8V
	Recovery Condition	Battery Voltage \leq 13.8V
Battery Cell Over-voltage	Triggering Condition	Battery Cell Voltage \geq 3.7V
	Recovery Condition	Battery Cell Voltage \leq 3.45V
Battery Under-voltage	Triggering Condition	Battery Voltage \leq 10V
	Recovery Condition	Battery Voltage \geq 12.4V
Battery Cell Under-voltage	Triggering Condition	Battery Cell Voltage \leq 2.5V
	Recovery Condition	Battery Cell Voltage \geq 3.1V
Battery High Temperature (Charging)	Triggering Condition	Charging Temperature \geq 55 C (131 F)
	Recovery Condition	Charging Temperature \leq 50 C (122 F)
Battery High Temperature (Discharging)	Triggering Condition	Discharging Temperature \geq 60 C (140 F)
	Recovery Condition	Discharging Temperature \leq 50 C (122 F)
Battery Low Temperature (Charging)	Triggering Condition	Charging Temperature \leq 0 C (32 F)
	Recovery Condition	Charging Temperature \geq 5 C (41 F)
Battery Low Temperature (Discharging)	Triggering Condition	Discharging Temperature \leq -20 C (-4 F)
	Recovery Condition	Discharging Temperature \geq -17 C (1.4 F)
Charging Over-current	Triggering Condition (Primary Protection)	Charging Current \geq 100A
	Triggering Condition (Secondary Protection)	Charging Current \geq 120A
	Recovery Condition	Charging Current \leq 55A
Discharging Over-current	Triggering Condition (Primary Protection)	Discharging Current \geq 130A Delay Time 1min
	Triggering Condition (Secondary Protection)	Discharging Current \geq 150A Delay Time 300ms
	Recovery Condition	Discharging Current \leq 105A
Short Circuit	Triggering Condition	Battery Current \geq 500A Delay Time 300 μ s
	Recovery Condition	Remove Shorted Loads / Charge the Battery

■ Cell Balancing

The Smart Lithium Iron Phosphate Battery employs bypass resistors to maintain balance between each group of cells within the battery. During the charging process, balancing will start when the highest voltage cells reach a specified threshold voltage and the voltage difference between the highest and lowest voltage cells exceeds the setting value. The bypass resistor will continuously draw energy from the highest voltage cell and dissipate the energy as heat until the voltage difference is less than the setting value. This behavior will slowly bring the entire array into balance and allow the battery to deliver full capacity without any cells experiencing an over-voltage or under-voltage condition.

Troubleshooting



If any problems occur during battery operation, please refer to the following instructions or contact us for assistance:

- If the Activation Switch is plugged into the UP Communication Port of a battery in active mode, but the LED light on the Power Button does not become bright blue, the battery may have entered protection mode and is in need of special attention.
- When the battery voltage is too low to reliably power loads, please charge the battery as soon as possible.
- If the battery temperature is too high or too low, please cut off all connections and let the battery stand by until it cools down or warms up to room temperature.
- When too high of a current passes through the battery and causes battery failure, please disconnect the load until the battery resumes normal operation.
- If the battery fails due to a short-circuit, please remove the short circuit immediately and the battery will resume normal operation.
- When the battery is locked out due to over-discharge, please activate the battery using an external charging device that has the lithium battery activation function.

Specifications

General	
Rated Capacity (0.2C)	100Ah
Nominal Voltage	12.8V
Voltage Range	10V ~ 14.8V
Cycle Life (0.2C, 25 C)	80% DOD 4000 Cycles
Insulation Resistance	500VDC, $\geq 10M\Omega$
Dimension	289 x 172 x 187.5 mm 11.38 x 6.77 x 7.38 inch
Weight	11.8 kg / 26 lb.
Protection Rate	IP54
Communication Port	RJ45 (RS485 Protocol)
Connection Method	Parallel
Certifications	UN38.3, MSDS, UL1642 (Lithium Cell)
Operation Parameters	
Charging Voltage	14.4V
Maximum Continuous Charging Current	50A
Discharging Voltage Range	10V~14.4V
Maximum Continuous Discharging Current	100A
Standard Operation Temperature	25 C ± 5 C (77 F ± 9 F)
Charging Temperature Range	0 C ~55 C (32 F ~131 F)
Discharging Temperature Range	-20 C ~60 C (-4 F ~140 F)
Storage Temperature Range	-25 C ~65 C (-13 F ~149 F)
Relative Humidity	5%~95%
Altitude	≤ 4000 m (13123.4 ft)

Renogy reserves the right to change the contents of this manual without notice.

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