

# MONITORING SCREEN

FOR SMART LITHIUM BATTERY SERIES



Version 1.2



# **Important Safety Instructions**

**Please save these instructions.**

This manual contains important installation and operation instructions for the Renogy monitoring screen. Please review and observe these instructions and keep them located near the monitoring screen 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 monitoring screen.

**NOTE**

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

## ■ **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.

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## ■ General Safety Information

### WARNING

- DO NOT touch the exposed electrolyte or powder if the battery casing is damaged.
- Uncovered electrolyte or powder that has contacted skin or eyes MUST be flushed out with plenty of clean water immediately. Seek medical attention afterwards.
- 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 wear jewelry or other metal objects when working on or around the battery.
- 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.

### CAUTION

- The monitoring screen is designed for indoor and compartment installation. DO NOT expose it to direct sunlight, rain, snow, moisture, or liquids of any type.
- DO NOT puncture, drop, crush, burn, penetrate, shake, or strike the monitoring screen.
- DO NOT open, dismantle, or modify the monitoring screen.
- The monitoring screen is only compatible with Renogy Smart Lithium Iron Phosphate Batteries. DO NOT attempt to connect the monitoring screen to other batteries or systems.

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## General Information

The Renogy Monitoring Screen for Smart Lithium Battery Series is a high precision meter designed for Smart Lithium Iron Phosphate Batteries in off-grid energy storage systems. Instead of measuring the current flowing in/out of the battery bank, it can communicate directly with the battery management system (BMS) and obtain more accurate state of charge (SoC) readings compared to traditional battery monitors. Other battery bank information including voltage, current, capacity, remaining time, error code, and number of paralleled batteries are also available on the monitoring screen to help users avoid abnormal conditions and extend the lifetime of battery bank.

### ■ Key Features

- **Plug and Play**

Simply connect the monitoring screen to the battery bank using an RJ45 communication cable for real-time monitoring.

- **Accurate Readings**

Obtains battery bank status directly from the battery management system for precise tracking and prediction.

- **Comprehensive Protection**

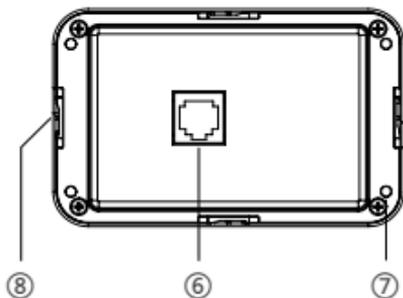
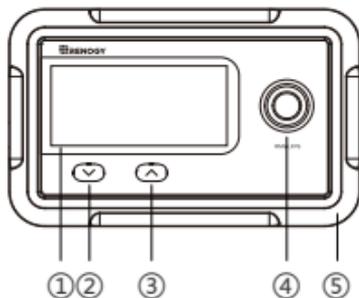
Displays straightforward error codes for the quick recognition of potential abnormal conditions and improper operation.

- **Easy Operation**

Shows detailed battery bank information at the push of a button without the need of system configuration and calibration.

# Product Overview

## ■ Identification of Parts



① LCD Screen

② Page Down Button

③ Page Up Button

④ Power Button

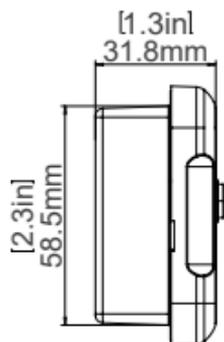
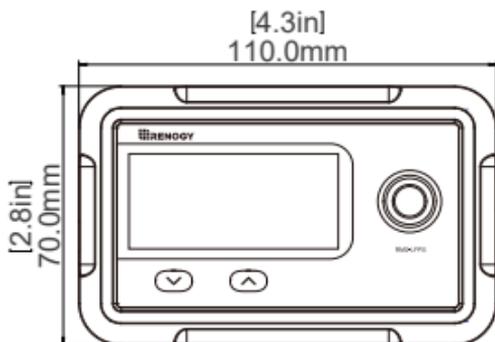
⑤ Front Cover Plate

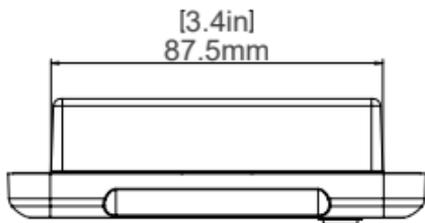
⑥ RJ45 Communication Port

⑦ Mounting Hole

⑧ Snap-Fit Joint

## ■ Dimensions





## ■ Additional Components

### • RJ45 Communication Cable

The RJ45 Communication Cable (5m / 16.4 ft) is used to connect the monitoring screen to the battery bank for power supply and data transmission.



### • Self-Tapping Screws (4)

The Self-tapping Screws (M2.9 x 13) are used to fix the monitoring screen on the mounting surface.



# Installation

## ■ Preparation

Before installing the monitoring screen, it is recommended to have the following tools available:

- Pencil
- Drill
- Jigsaw
- Phillips Screwdriver

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## ■ Choosing an Installation Location

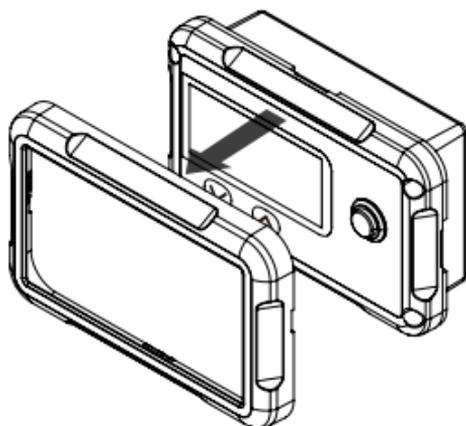
Please choose a clean, dry, protected, and easily accessible indoor location to install the monitoring screen. It is recommended to mount the monitoring screen at eye level for easy access of operational controls and battery information. The RJ45 Communication Port is accessible from the back of the monitoring screen. Clearance of at least 2 inch (50 mm) behind the monitoring screen is recommended to allow for the bending radius of the RJ45 Communication Cable that connects to the monitoring screen.

## ■ Mounting the Monitoring Screen

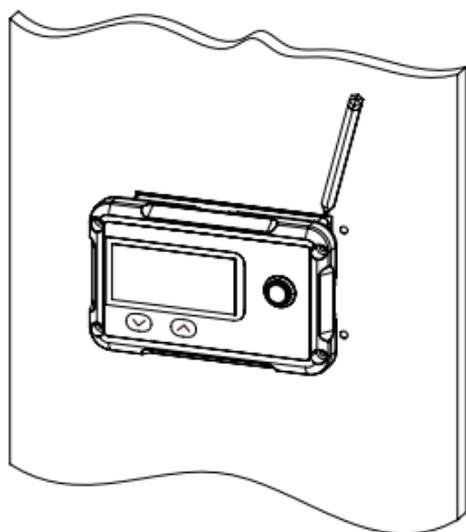
1. Remove the snap-fit Front Cover Plate from the monitoring screen.
2. Use the monitoring screen as a template to mark the screw holes and trace a cut-out area on the mounting surface with a pencil.
3. Cut out a rectangular area for the monitoring screen on the mounting surface with a jigsaw.
4. Pre-drill four screw holes on the mounting surface with a drill.
5. Place the monitoring screen into the cut-out area and align the Mounting Holes on the monitoring screen with the pre-drilled screw holes.
6. Affix the monitoring screen on the mounting surface with the included four Self-Tapping Screws.
7. Re-attach the snap-fit Front Cover Plate to the monitoring screen.

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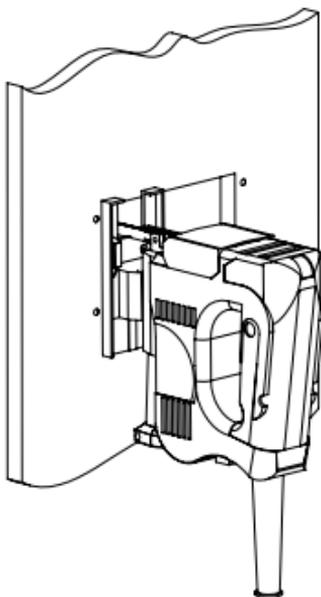


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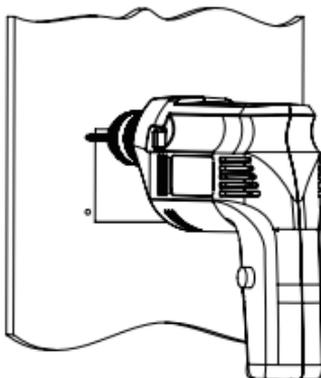




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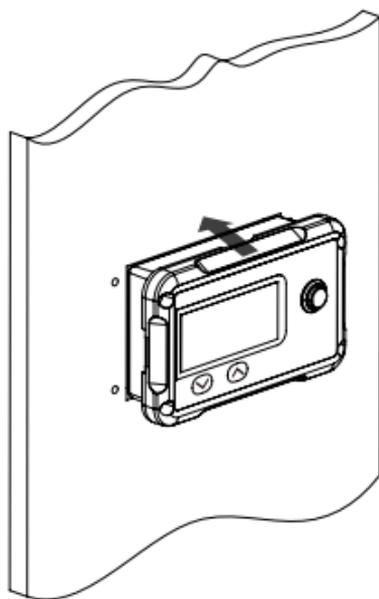


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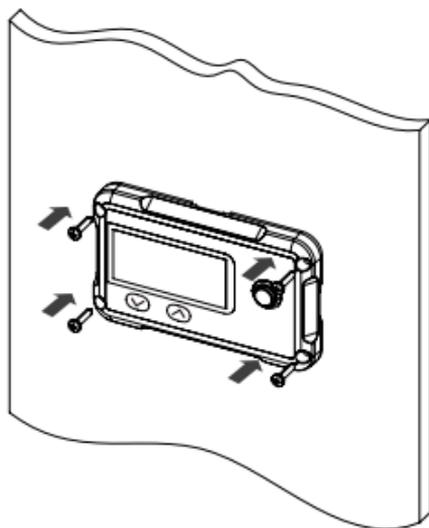


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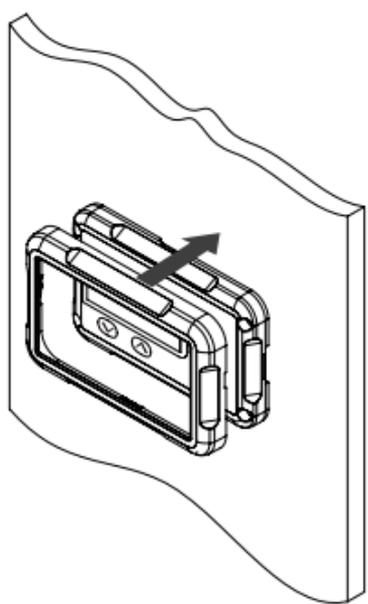
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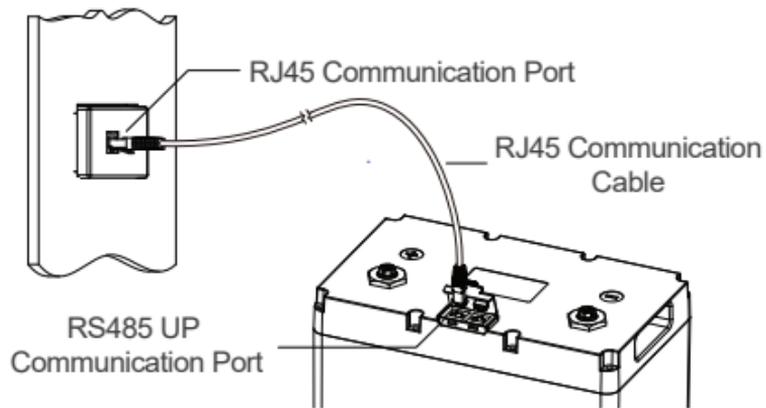


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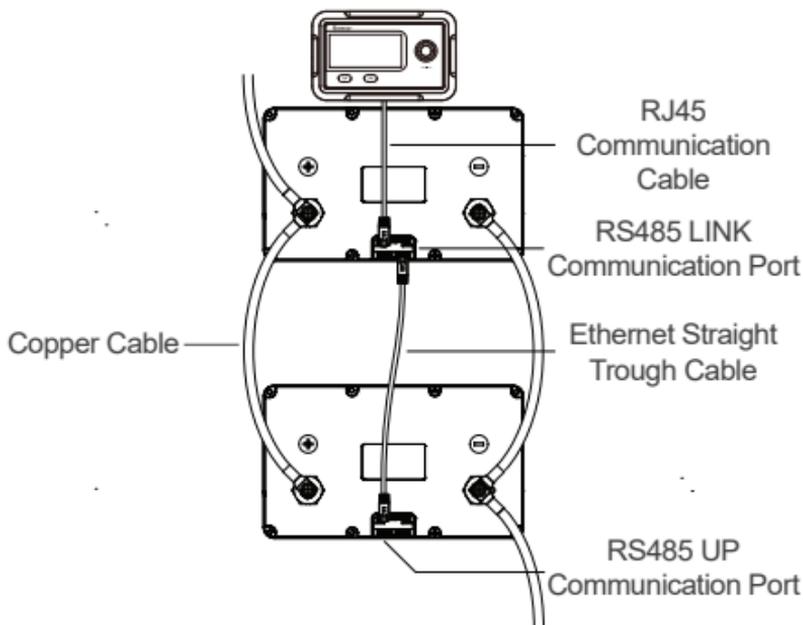
### ■ Connecting to the Battery

Please connect the monitoring screen to the RS485 UP Communication Port of the battery using the included RJ45 Communication Cable to obtain detailed battery information from the battery management system.



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If the monitoring screen is used with a parallel battery bank, the communication between paralleled batteries must be enabled. Please connect the RS485 LINK Communication Ports of the former batteries to the RS485 UP Communication Ports of the latter ones using CAT5 (or above) Ethernet straight through cables (not included). The monitoring screen should be connected to the RS485 UP Communication Port of the first battery.



**WARNING**

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

**CAUTION**

- DO NOT string batteries with different chemistries, brands, models, rated capacities, or nominal voltages 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 copper 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 too many batteries in parallel if taking advantages of the auto-balancing function.
- Please leave the battery in shelf mode during installation. DO NOT switch the battery to active mode until making sure that all the connections are correct and secure. Connecting active batteries to the system may trigger the short circuit protection of the battery.

## Operation

### ■ LCD Information

- Overview



- Present Voltage (V)

8888.8<sup>V</sup>

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The present voltage indicates the real-time terminal voltage of the battery. If the monitoring screen is used with a battery bank, the present voltage will be the average terminal voltage of the batteries in the battery bank.

- **Present Current (A)**

-888.8 A

The present current indicates the real-time current flowing through the battery or the battery bank. If the charge current is higher than the discharge current, the present current will be a positive value. If the discharge current is higher than the charge current, the present current will be a negative value.

- **Capacity (Ah)**

888.8 AH

The capacity indicates the maximum capacity that the battery or the battery bank can deliver under the standard discharge condition when fully charged. The capacity will diminish gradually with the cycling of the battery or the battery bank.

- **State of Charge (%)**

888.8 SOC%

The state of charge indicates the real-time charge level of the battery relative to its capacity. If the monitoring screen is used with a battery bank, the state of charge will be the average charge level of the batteries in the battery bank.

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- **Self-Heating Function Status**



The self-heating function status indicates the operation status of the self-heating function. If the self-heating function is not available or not operating, the self-heating function status will be '0'. If the self-heating function is available and operating, the self-heating function status will be 'H'.

- **Number of Paralleled Batteries**



The number of paralleled batteries indicates the number of batteries connected in parallel in hexadecimal. If the battery is used individually, the number of paralleled batteries will be '1'. If the communication of one or more batteries in the battery bank is accidentally disconnected or the monitoring screen fails to obtain the information of all batteries after the battery bank is recovered from the over-discharge protection, the battery icon next to the number of paralleled batteries will flash. Please check the communication connections and long press the Page Up Button and Page Down Button at the same time for 3 seconds to reset the monitoring screen.

- **Remaining Time (Hour)**



The remaining time indicates the time remaining before the battery or the battery bank will require a recharge based on the current discharge rate. If the battery is being charged, the remaining time will not display. If the battery under-voltage warning is triggered during discharge, the remaining time will be '0.0H'.

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- **Battery Level**



The battery level indicates the real-time charge level of the battery relative to its capacity using four battery segments. If the battery is being charged, the battery segments will illuminate one by one repeatedly until the battery is fully charged. If the monitoring screen is used with a battery bank, the battery level will be the average charge level of the batteries in the battery bank.

- **Error Code**



The error code indicates the warnings and protections for the abnormal conditions of the battery or the battery bank. If the battery or the battery bank operates normally, the error code will not display. If the battery or the battery bank triggers multiple warnings and/or protections, the monitoring screen will scroll display the corresponding error codes. See the following table for error code interpretation. Please refer to the online version user manual of the battery for the triggering and recovery condition of each warning and protection.

Error Code	Battery Operation Status
01	Battery High Temperature Warning (Charge / Discharge)
02	Battery Low Temperature Warning (Charge)
03	Battery Low Temperature Warning (Discharge)

Error Code	Battery Operation Status
04	Battery Over-Voltage Protection / Battery Cell Over-Voltage Protection
05	Battery Under-Voltage Warning
06	Charge Over-Current Warning
07	Discharge Over-Current Warning
08	Battery High Temperature Protection (Charge)
09	Battery Low Temperature Protection (Charge)

**NOTE**

- The communication between paralleled batteries **MUST** be enabled using CAT5 (or above) Ethernet straight through cables before connecting the battery bank to the monitoring screen to obtain the accurate battery bank information.
- If the number of paralleled batteries increases after connecting the battery bank to the monitoring screen, please long press the Page Up Button and the Page Down Button on the monitoring screen at the same time for 3 seconds to reset the monitoring screen and refresh the battery bank information.
- The monitoring screen is **ONLY** able to obtain the information of battery bank with no more than 900Ah rated capacity.

### ■ Button Operation

After connecting the monitoring screen to the battery or the battery bank, please long press the Power Button on the monitor-

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ing for 1 second to switch the battery or the battery bank to active mode. The backlight will be lit and the LCD Screen will display the present voltage. If no operation is made within 25 seconds, the backlight will go out and the LCD Screen will scroll through the present voltage, present current, capacity, and state of charge.

To display a specific parameter, please press the Page Up Button or the Page Down Button repeatedly until the desired parameter shows up. The backlight will be lit once the Page Up Button or the Page Down Button is pressed. If no operation is made within 15 seconds, the backlight will go out again and the LCD Screen will continue scrolling through the present voltage, present current, capacity, and state of charge.

Prior to long periods of storage, please disconnect the battery from the system and long press the Power Button for 3 seconds to switch the battery or the battery bank to shelf mode. In shelf mode, the battery has a low self-discharge rate and can hold the charge for a longer period of time.

## Troubleshooting

If any problems occur during the operation of the monitoring screen, please refer to the following instructions or contact Renogy for assistance:

- If the monitoring screen does not operate after connecting to the battery or the battery bank, please check monitoring screen side and battery side connections. If all the connections are solid, please check if the battery or the battery bank has been switched to active mode. If the battery or the battery bank cannot be switched to active mode using the monitoring screen, it may have entered protection mode and will need special attention. Please refer to the online version user manual of the battery for troubleshooting instructions.

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- If the battery information displayed on the monitoring screen is not accurate, please long press the Page Up Button and Page Down Button at the same time for 3 seconds to reset the monitoring screen and refresh the battery information.
  - If the monitoring screen resets frequently or does not display battery information, please reactivate the battery or the battery bank using the Power Button on the monitoring screen.
  - If the battery or the battery bank is charged immediately after high current discharge, especially when the state of charge is greater than 90%, or discharged immediately after high current charge, especially when the state of charge is less than 10%, the monitoring screen may take a while to calibrate the state of charge.

## Technical Specifications

### Electrical Specifications

Operating Voltage	12VDC
Operating Current	30mA
Power Consumption	<1W
Operating Temperature	-4°F~113°F / -20°C~45°C
Voltage Accuracy	±0.1V
Current Accuracy	±0.1A
Capacity Accuracy	±0.1Ah
Certification	FCC Part 15 Class B, CE, RoHS

### Mechanical Specifications

Communication Port	RJ45 (RS485 Protocol)
Display	Backlit LCD
User Interface	2 Front Panel Menu Buttons, 1 Power Button
Mounting Method	Wall Mount
Dimension	2.8 x 4.3 x 1.3 inch / 70 x 110 x 31.8 mm
Weight	0.14 lbs / 62 g

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## **FCC Compliance:**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must withstand any interference received, including interference that may cause undesired operation.

### **Note:**

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:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



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

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