



EN

User Manual

STE-NS16
51.2V 320Ah

sunways

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» 1 Preface

※ 1.1 Overview

This manual is an integral part of Sunways STE-NS16 series LFP battery system (hereinafter referred to as the battery or STE-NS16 battery). It mainly introduces the assembly, installation, electrical connection, debugging, maintenance and troubleshooting of the products. Before installing and using battery, please read this manual carefully, understand the safety information and be familiar with the functions and characteristics of hybrid battery.

※ 1.2 Target Groups

This manual is applicable to the electrical installers with professional qualifications and end-users. If there are any problems in the installation process, please call Sunways service telephone at +86 400-9922-958 or email Sunways at service@sunways-tech.com for consultation.

About STE-NS16 51.2V 320Ah Battery

51.2V 320Ah battery can be installed in Parallel mode; The battery has the function of automatically assigning addresses. When in parallel, pay attention to the connection of the communication lines between the batteries and do not connect them incorrectly. Please refer to the wiring in 5.2.2.

About This Manual

This manual is intended for the STE-NS16 51.2V 320Ah battery, but the hybrid inverter and any other equipment is not included. The Sunways hot line is available if you want to get additional information.

Declaration

We declare that this 51.2V 320Ah is compliance with the essential requirements.

» 2 Safety Introduction

※ 2.1 Important Safety Instructions

This manual contains important instructions for: 51.2V 320Ah energy storage products and this manual must be followed when installing and using this product.

The product is designed and tested in accordance with international safety requirements IEC 60364, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the product. To reduce the risk of personal injury and ensure the safe installation and operation of the product, you must carefully read and follow all instructions, cautions and warnings in this manual.

※ 2.2 Warnings in This Document

A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the Sunways equipment and/or other equipment connected to the Sunways equipment or personal injury.

Symbol	Description
	Caution, risk of electric shock
	Heavy enough may cause severe injury
	Keep the battery away from open flame or ignition sources
	Keep the battery away from children

Symbol	Description
	Do not dispose of the product with household waste
	Recycling
	Read this manual before installation and operation

For safety reasons, installers are responsible for familiarizing themselves with the contents of this manual and all warnings before performing installation.

※ 2.3 Battery Handling Guide

- Use the battery pack only as directed.
- If the battery defective, appears cracked, broken or otherwise damaged, or fails to operate, contract the Sunways hot line immediately.
- Do not attempt to open, disassemble, repair, tamper with, or modify the battery. The battery pack is not user serviceable.
- To protect the battery and its components from damage when transporting, handle with care.
- Do not subject it to any strong force.
- Do not insert foreign objects into any part of the battery pack.
- Do not use cleaning solvents to clean the battery.

※ 2.4 Response to Emergency Situations

The Sunways lithium battery 51.2V 320Ah is designed with multiple safety strategies to prevent hazards resulting from failures. However, Sunways cannot guarantee their absolute safety for uncertain situations.

▼ 1.4.1 Leaking batteries

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. Electrolyte is corrosive and contact may cause skin irritation and chemical burns. If one is exposed to the leaked substance, do these actions:

Inhalation: Evacuate the contaminated area, and seek medical attention immediately.

Eyes contact: Rinse eyes with flowing water for 15 minutes, and seek medical attention immediately.

Skin contact: Wash the affected area thoroughly with soap and water, and seek medical attention immediately.

Ingestion: Induce vomiting as soon as possible, and seek medical attention immediately.

▼ 1.4.2 Fire

In case of a fire, make sure that an ABC or carbon dioxide extinguisher is nearby and does not use water to extinguish the fire.

 Warning	The battery pack may catch fire when heated above 130° C. If a fire breaks out where the battery is installed, do these actions: 1. Extinguish the fire before the battery catches fire. 2. If the battery has caught fire, do not try to extinguish the fire. Evacuate people immediately.
 Warning	If the battery catches fire, it will produce poisonous gases. Do not approach.

▼ 1.4.3 Wet battery

If the battery is wet or submerged in water, do not try to access it. Contact Sunways hot line or your distributor for technical assistance.

▼ 1.4.4 Damaged battery

If the battery damaged, please contract Sunways hot line or your distributor for help as soon as possible, because damaged battery is dangerous and must be handled with extreme caution. Damaged battery is not suit for use and may pose a danger to people or property. If the battery seems to be damaged, return it to Sunways or your distributor.



Caution

Damaged battery might export electrolyte or flammable gas, so contact Sunways for advice and information immediately we will deal with it within 48h.

※ 2.5 Installers

STE-NS16 51.2V 320Ah is suggested installing by skilled worker or electrician. A skilled worker is defined as a people who had been trained and qualified electrician or had all of the following skills and experience:

- Knowledge of the functional principles and operation of on-grid Energy Storage systems.
- Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods.
- Knowledge of the installation of electrical devices
- Knowledge of and adherence to this manual and all safety precautions and best practices.

※ 2.6 Scrap Battery

For scrap battery(-ies), please treat with local laws or regulations to recycle or scrap.

※ 2.7 Contact Information

Use the contacts below for technical assistance. This phone numbers is available only during business hours on weekdays.

Tel	Country/Region
+86 400-9922-958	ZheJiang Province, China

» 3 Product Introduction

※ 3.1 Appearance

51.2V 320Ah consists of battery module (including cell and mechanical parts), battery management system (BMS) as well as power and communication terminals. Product appearance is shown as following:

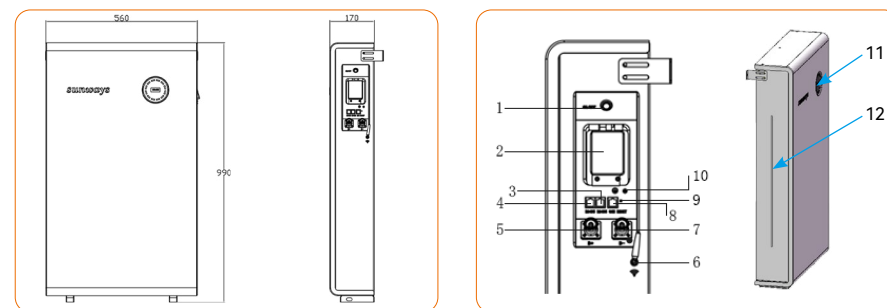


Figure 2-1

Item	1	2	3	4	5	6
1	ON/OFF	Circuit breaker	RS485-1	RS485-2	BAT+	WiFi
2	7	8	9	10	11	12
3	BAT-	PCS	RESET	GND	LCD display	LED indicator light

※ 3.2 Technical Data

Model	STE-NS16
Battery Type	51.2V 320Ah LiFePO4
Nominal Energy (KWh)	16.38
Usable Energy (KWh)	14.74
Peak Output Power (KW, 10 Seconds)	15.36
Round-Trip Efficiency	≥ 97.5%
Nominal Voltage(V)	51.2
Operating Voltage(V)	44-58.4
Nominal Charge/Discharge Current(A)	160/160
Max Charge/Discharge Current(A)	200/200
Communication	CAN, RS485
Enclosure Protection Rating	IP21
Operating Temperature (°C)	-20 - 55
Cooling Type	Natural Cooling
Installation	Free Stand, Indoor
Humidity	5% - 95%
Altitude (m)	< 2,000
Dimension (W*H*D, mm)	573*981*168
Net Weight (kg)	130
Cycles Life	> 6,000 (25°C)
Design Life	20+ Years (25°C @77°F)
Recommend DOD	90%
Warranty	5 Years
Safety Standard	IEC62619/UN38.3
Scalability	Max 16 Pcs in Parallel

Testing conditions based on temperature 25°C at the beginning of life.

*Total Energy/Usable Energy measured under specific conditions from IEC 62619.

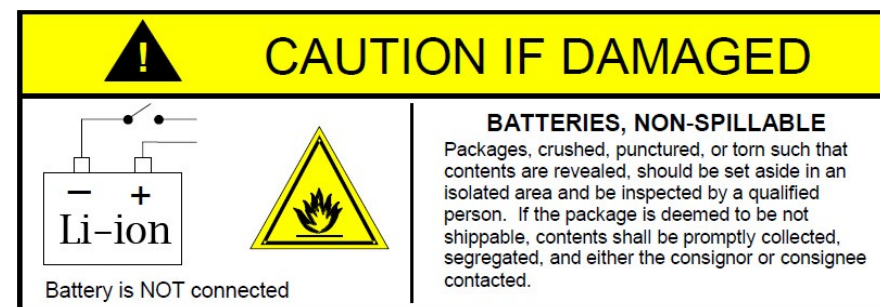
➤ 4 Guidance for Disconnection of Batteries During Shipment

3.1 Wooden boxes that have been crushed, punctured, or torn in such a way that contents are revealed shall be set aside in an isolated area and inspected by a skilled person. If the package is deemed to be not shippable, the contents shall be promptly collected, segregated, and either the consignor or consignee contacted.

3.2 The DC circuit of STE-NS16 has been disconnected before outgoing.

3.3 A precautionary label had been affixed to the shipping carton to alert individuals as to the battery within the package have been disconnected; otherwise, the battery should not be transported.

3.4 We have conducted comprehensive tests to ensure the equipment they distribute around the world is safe for shipping transport. These products shall be handled with care and immediately inspected if visibly damaged. If the cartoon visibly damaged, please contract with Sunways hot line to confirm whether the battery could be used safely or not.



» 5 Installation Prerequisites

※ 5.1 Installation Location

Make sure that the installation location meets the following conditions:

- The building is designed to withstand earthquakes, and the floor is flat and level.
- Far away from the sea to avoid salt water and humidity.
- The installed location should not be access by pet and children.
- No flammable or explosive materials nearby, at least 2.5m far away from combustible.
- Minimal dust and dirt in the area.
- No corrosive gases present, including ammonia and acid vapor.

The battery optimal operate temperature is 15° C to 35° C. Frequent exposure to severe operating condition would exacerbate the performance and lifetime of the battery.

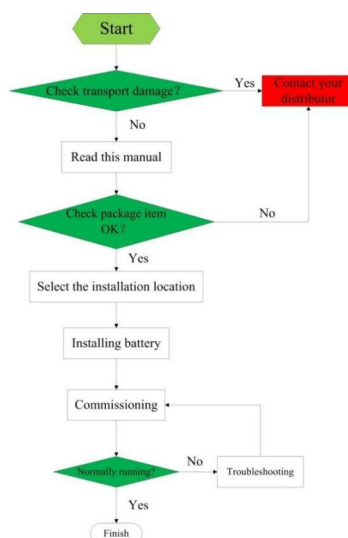
※ 5.2 Installation Requirements

For safety used of battery, please notice following notes when install:

- The installation shall be in a restricted access location/ room or in a cabinet where provides a barriers for the battery terminal.
- The maximum number of batteries shall be not over 16 PCS.

※ 5.3 Installation Process

The battery should be installed according to the following flow chart.



※ 5.4 Installation Materials

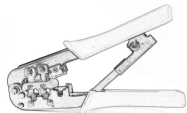
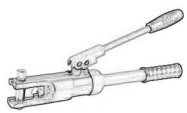
Following installation materials should be prepared by installers.

- Power cable
- Data cable
- Earth cable
- Ground wire
- Bipolar external isolator, when two or more battery systems in parallel, each of them shall have a bipolar isolator. Meanwhile, the isolator shall have ability to break the full load current.

Notice	1.Make sure that the cross-sectional area of charging cables is 50 to 75 mm ² . 2.A breaker between Sunways lithium battery and inverter was recommended to install, and the breaker's min. current should be over 250A or following with local regulations.
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※ 5.5 Tools

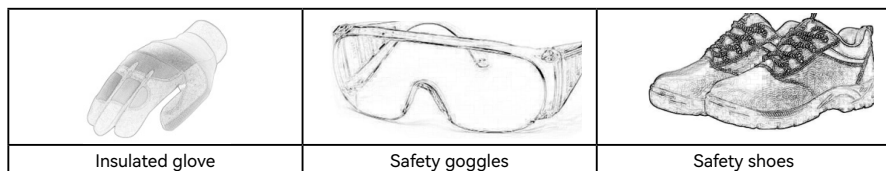
To install the battery pack, those following tools are probably required:

			
Phillips screwdriver	Torque wrench	Cable crimper	Wire clamp
			
Voltmeter	Tape measure	Drill	Flat-head screwdriver

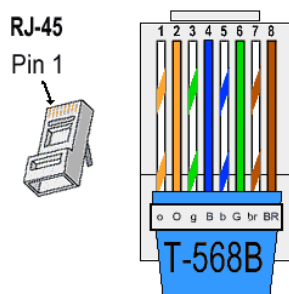
In order to protect operator and installer's safety, please select and use suitable tools and measuring instruments that are certified for precision and accuracy.

※ 5.6 Safety Instruments

When dealing with the battery, following safety gears should be equipped. Installers must meet the relevant requirements of IEC 60364 or the domestic legislation and other relevant international standards.



※ 5.7 Network Cable



If needed, the network cable should be made like that diagram. But the cable should be made following the definition on battery side. If available, use a LAN cable tester to check whether the cable is faulty.

Definition of CAN communication

According to the communication interface definition of each inverter, corresponding to the BMS communication interface. For special inverters whose communication port definitions are inconsistent with those of the BMS, it is necessary to make a network cable yourself. If a regular network cable is used, it may result in the BMS automatically turning on or failing to turn off. Most inverters can communicate using a regular network cable.

Pin order	Definition
1,8	RS485-B
2,7	RS485-A
4	CANH
5	CANL
3,6	GND

Definition of RS-485 communication

Select the corresponding port for BMS internal communication, and select the baud rate as 19200.

Pin order	Definition
1, 2	RS485-B
7,8	RS485-A
3,6	GND
4,5	Automatic address assignment

※ 5.8 Storage

If the battery is not to be installed immediately, or removed from operation and needs to be stored for a long period, please choose an appropriate location to store it. Instructions for storage are:

- Do not stack more than 4 battery boxes.
- The temperature of battery stored recommended in the range of 15° C to 35° C.
- Do not expose to water

The battery box should be upright as shown in the following figure and not stacked upside down when storing the battery box.



If the battery needs to be stored over 3 months, the DC circuit of battery suggests to be disconnecting. Otherwise, the battery would discharge at a minimum rate and capacity degrades depended on storage time, the battery self-consumption less than 5w. And, if the battery stored over 6 months, it is suggested to connect the battery with inverter and commission the system.

» 6 Battery Installation

※ 6.1 Checks Before Installation

There are a few things to check before installing the battery to ensure that it has no defects.

Check item 1: Check the battery voltage.



Warning

If this checking process is executed for any reason after the battery is fully installed, make sure that the inverter is turned off or break the connection between battery and inverter while checking the battery.

Press and hold the panel button and then release it, measure the voltage at the terminal interface with a voltmeter. If the voltage is lower than 44 V, do not use the battery and contact Sunways hot line or your distributor.

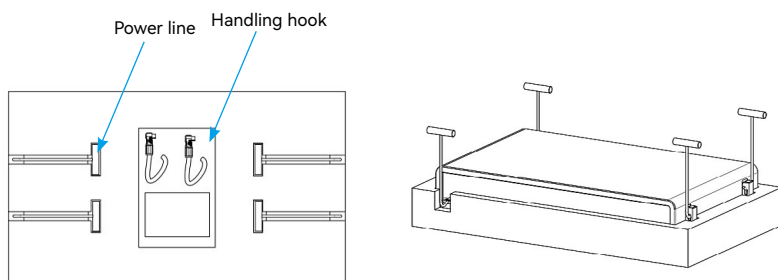
※ 6.2 Installation the Battery

Notice

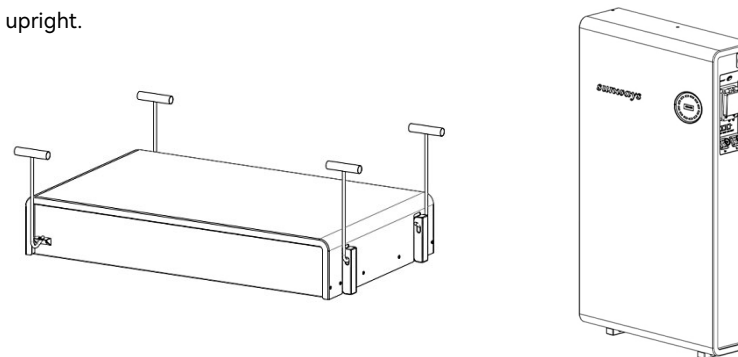
If the battery is installed above the floor or on a platform, make sure that the wall or platform is capable of supporting the battery's weight.

6.2.1 Battery handling

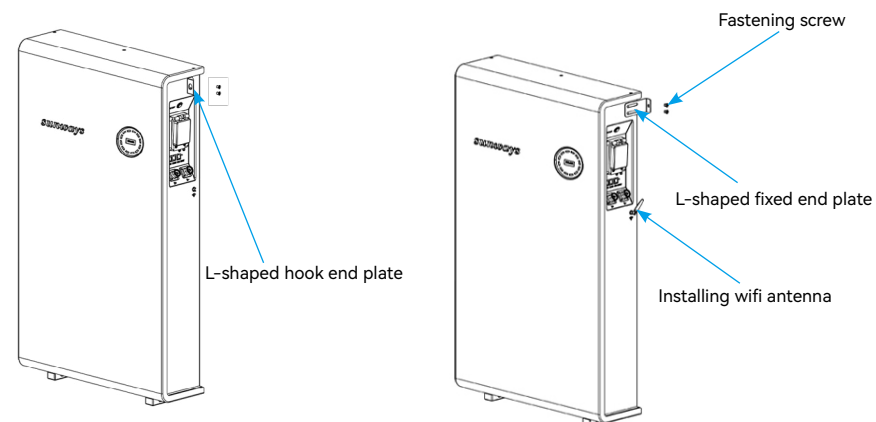
1. Using the handling hook in the accessories, move the battery to the installation location as shown in the figure.



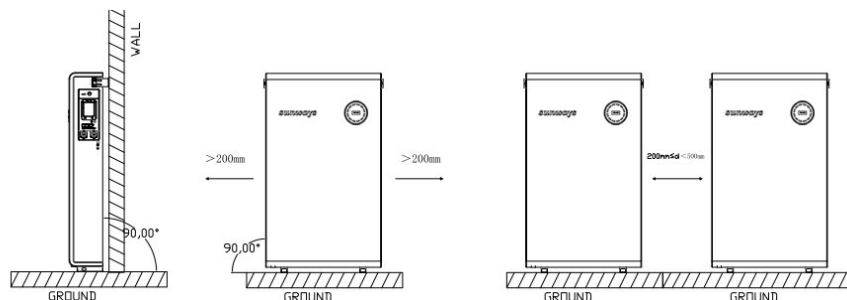
2. After moving the battery to the installation location, place the battery upright.



3. Remove the L-shaped hook end plate, and then replace it with the L-shaped fixed end plate.

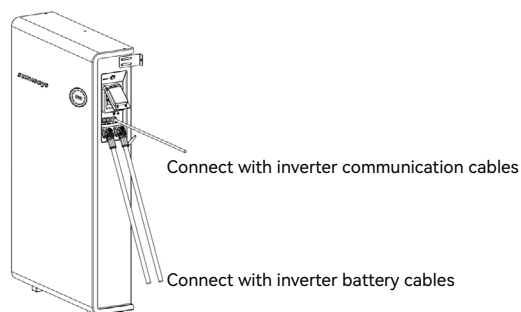


4. Check the installation environment to ensure ground level.

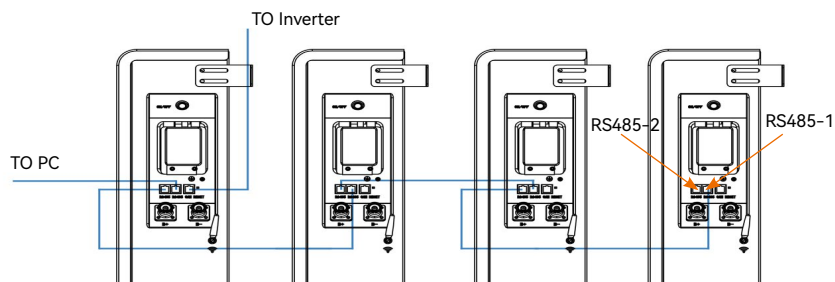


6.2.2 Cable connection

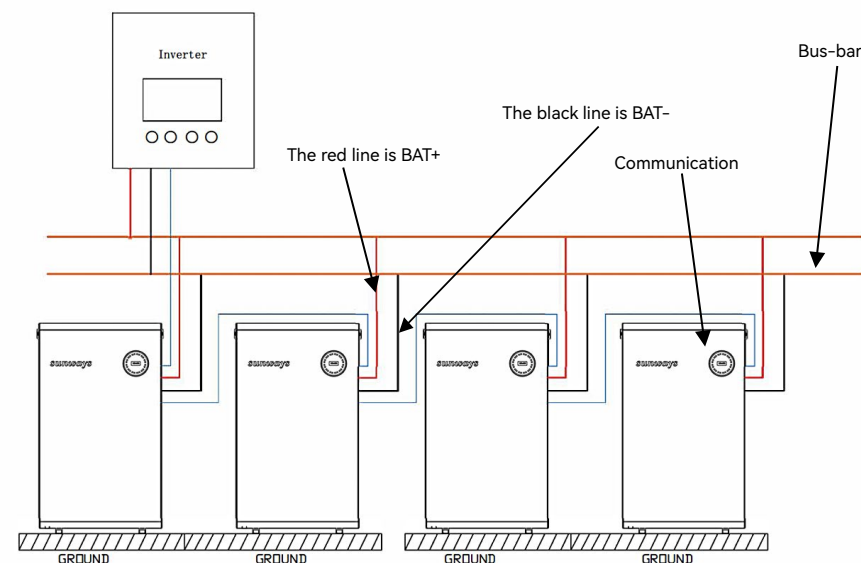
1. One battery cable connection



2. If more than two batteries are connected in parallel, connect the cables to the RS485 port on the left (RS485-2) of the first battery and the RS485 port on the right (RS485-1) of the next battery. The first Can port is connected to the inverter. The RS485-1 of the battery host is connected to the PC upper computer.



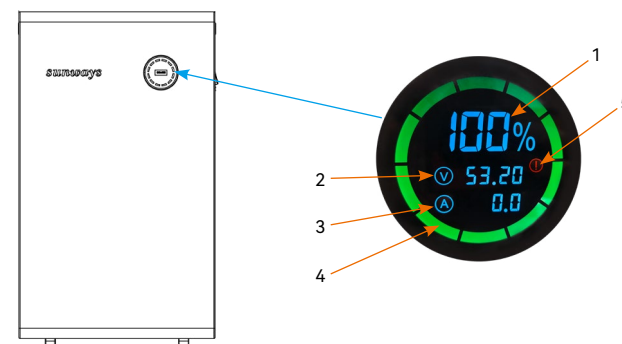
3. If more than two batteries are running in parallel, The positive and negative power cords of each battery should be connected to the busbar before being connected to the inverter.



Notice

Before two or more batteries installed in parallel, please check the voltage of each battery and make sure the voltage different less than 2.0V.

6.2.3 LED indicator light

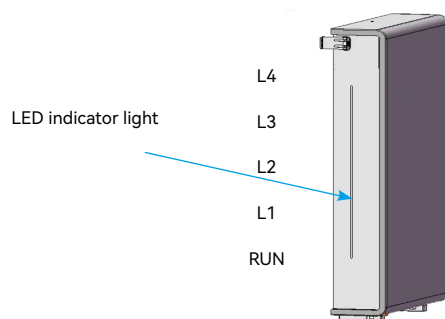


LCD Display Description

After battery power on, the LCD indicator light is always on, and the screen does not support shutdown and wake-up. The display power consumption is about 13mA

serial number	name	explanation
1	SOC	Current battery power remaining
2	Voltage	Battery voltage
3	Current	Battery current
4	Status Indicator	When in standby mode, the current remaining power is displayed proportionally
		Rotate clockWise when charging
		CounterclockWise rotation during discharge
5	Fault indication	The fault light flashes when warning
		The fault light is on during protection

6.2.3 LED indicator light



The alarm light and capacity light are shared. The green light is displayed when the battery goes well. When there is a fault, the red light is on according to the alarm and protection status, and the green light goes off when the red light is on.

Capacity indicator instructions

STATUS		Charge				Discharge			
Battery indicator LED		L1	L2	L3	L4	L1	L2	L3	L4
SOC	75~100%	Constant lighting	Constant lighting	Constant lighting	Blink 2	Constant lighting	Constant lighting	Constant lighting	Constant lighting
	50~75%	Constant lighting	Constant lighting	Blink 2	Goes out	Constant lighting	Constant lighting	Constant lighting	Goes out
	25~50%	Constant lighting	Blink 2	Goes out	Goes out	Constant lighting	Constant lighting	Goes out	Goes out
	0~25%	Blink 2	Goes out	Goes out	Goes out	Constant lighting	Goes out	Goes out	Goes out
RUN		Constant Lighting				Blink 3			

LED working indication state

State	Normal/Alarm/Protect	RUN	Battery indicator LED					ALN	Description
		●	●	●	●	●			
OFF	Hibernation	Goes out	Goes out						All lights out
Standby	Normal	Blink 1	Based on the power indicator						Standby
	ALARM	Blink 1	Goes out					Blink 1	Alarm
Charge	Normal	Constant lighting	Based on the power indicator					Goes out	Max LED blinking2
	Overcurrent alarm	Constant lighting	Based on the power indicator					Goes out	Max LED blinking2
	Overcurrent alarm	Constant lighting	Goes out					Blink 2	Alarm
	Overcurrent alarm	Blink 1	Based on the power indicator					Goes out	Standby
Discharge	Normal	Blink 3	Goes out					Goes out	Constant lighting
	ALARM	Blink 3	Goes out					Blink 3	Alarm
	Low-voltage protect	Goes out	Goes out					Goes out	Shutdown
	Overcurrent protect	Goes out	Goes out					Constant lighting	Protect

Temperature	Charging Alarm	Constant lighting	Goes out	Blink 2	Alarm
	Discharge Alarm	Blink 3	Goes out	Blink 3	Alarm
	Protect	Goes out	Goes out	Constant lighting	Protect

LED flashing description

Flashing status	Light up	Goes out
Blink 1	0.25S	3.75S
Blink 2	0.5S	0.5S
Blink 3	0.5S	1.5S

» 7 Commissioning

※ 7.1 Commissioning Battery

If there is only one battery installed, use the following steps to put it in operation:

1. Switch the circuit breaker of the battery module to ON
2. Then press the reset button of the first machine
3. Make sure that the Run light is on. If it stays off, do not use the battery and contact Sunways or your distributor.
4. Turn the inverter on, and wait for the start-up sequence to complete fully.

※ 7.2 Shutting Down Battery

Shut down the battery only when the battery under standby status.

1. Switch the circuit breaker of the battery module to OFF.
2. Make sure that every light on the battery is off.
3. Make sure the battery has no external voltage output after shutdown.

※ 7.3 When two or more batteries are connected in parallel, before connecting the cables:

1. Check and confirm that each battery can be turned on normally.
2. Make sure the maximum voltage different between batteries less than 2.0V. If not, the installer should balance the battery voltage and then parallel connect batteries together.
3. After the battery circuit breaker is turned off, use a multimeter to measure the DC voltage of the positive and negative terminals as 0V. When there are two or more batteries connected with parallel mode, after the charging cable and the data cable has been connected correctly, follow these steps to put them in operation:
Check that the line is connected correctly (the positive and negative poles cannot be short-circuited, and the communication line should be connected according to the instruction diagram).
Turn on all the battery circuit breaker switches.
Use a fine needle to press and hold the reset button on the battery host

for 1–3 seconds, and release it when the indicator light turns on. Release the panel button, after

4. After the primary battery is successfully turned on, the slave battery automatically turns on and the indicator light turns on.

5. Turn the inverter on, and wait for the start-up sequence to complete fully.

※ 7.4 One-click power on/off

One-touch start-up: Once any one is turned on, it will gradually activate the other batteries.

One-click shutdown: Press the primary's Reset button for 6 seconds until the operation light flashes, then release it. The slaves will shut down one by one, and finally, the primary battery will be shut down.



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