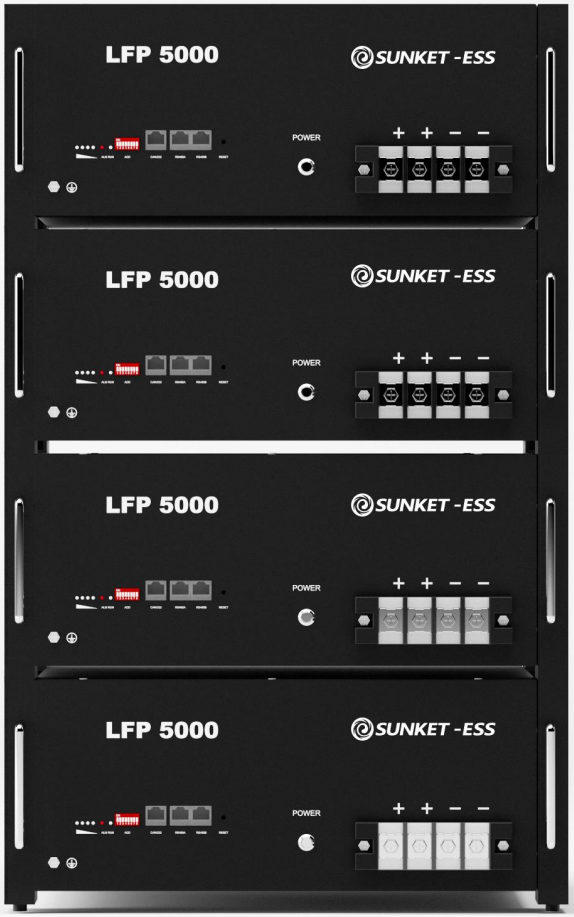
LFP 5000

51.2V 100Ah

RECHARGEABLE LITHIUM BATTERY



User Manual V1.1

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Safety Precautions

Warning

- Please do not put the battery into water or fire, in case of explosion or any other situation that might endanger your life.
- Please connect wires properly while installation, do not reverse connect.
- To avoid short circuit, please do not connect positive and negative poles with conductor on the same device.
- Please avoid any form of damage to battery, especially stab, hit, trample or strike.
- Please shut off the power completely when removing the device or reconnecting wires during the daily use or it could cause the danger of electric shock.
- Please use dry powder extinguisher to put out the flame when encountering a fire hazard, liquid extinguisher could result in the risk of explosion.
- For your safety, please do not arbitrarily dismantle any component in any circumstances. The maintenance must be implemented by authorized technical personnel or our company's technical support. Device breakdown due to unauthorized operation will not be covered under warranty.

Caution

- Our products have been strictly inspected before shipment. Please contact us if you find any abnormal phenomena such as device outer case bulging.
- The product shall be grounded properly before use in order to ensure your safety.
- To assure the proper use please make sure parameters among the relevant device are compatible and matched.
- Please do not mixed- use batteries from different manufacturers, different types and models, as well as old and new together.
- Ambient and storage method could impact the product life span, please comply with the operation envi ronment instruction to ensure device works in proper condition.
- For long-term storage, the battery should be recharged once every 6 months, and the amount of electric charge shall exceed 80% of the rated capacity.
- Please charge the battery in 18 hours after it fully discharged or over-discharging protection mode is activated.
- Formula of theoretical standby time: T=C/ I (T is standby time, C is battery capacity, I is total current of all loads).

Preface

Manual declaration

LFP5000 lithium iron phosphate battery energy storage system can provide energy storage for photovoltaic power generation users through parallel combination. Our product can store extra electricity into battery from photovoltaic power generation system in daytime and supply stable power to user's equipment as power backup at nighttime or any time when needed. It can improve the efficiency of photovoltaic power generation and increase the electric power efficiency by peak load shitting.

This user manual details the basic structure, parameters, basic procedures and mthods of installation and operation and maintenance of the equipment.

1 Introduction

1.1 Brief Introduction

LFP5000 lithium iron phosphate battery system is a standard battery system unit, customers can choose a certain number of LFP5000 according to their needs, by connecting parallel to form a larger capacity battery pack, to meet the user's long-termpower supply needs. The product is especially suitable for energy storage applications with high operating temperatures, limited installation space,long powerbackup time and long service life.

1.2 Product Properties

LFP5000 energy storage product's positive electrode materials are lithium iron phosphate, battery cells are managed effectively by BMS with better performance, the system's features as below:

- Comply with European RoHS, Certified SGS, employ non-toxic, non-pollution environment- friendly battery.
- Anode materials are lithium iron phosphate (Li FePO4), safer with longer life span.
- Carries battery management system with better performance, possesses protection function like over-discharge, over-charge, over-current, abnormal temperature.
- Self-management on charging and discharging, Single core balancing function.
- Intelligent design configures integrated inspection module.
- Flexible configurations allow paralle l of multi battery for longer standby time.
- Self-ventilation with lower system noise.
- Less battery self-discharge, then recharging period can be up to 10 months during the storage.
- No memory effect so that battery can be charged and discharged shallowly.

1 Introduction

1.3 Product identity definition

	Battery voltage is higher than safe voltage, direct contact with electric shock hazard.
	inflammable.
	Read the user manual before using.
	The scrapped battery cannot be put into the garbage can and must be professionally recycled.
	After the battery life is terminated, the battery can continue to be used after it recycled by the professional recycling organization and do not discard it at will.
	Do not place near open flame or incinerate.
	If catch fire, do not put out with water.
	If catch fire, do not put out with dry powder fire extinguisher.
	Do not cut or spear with sharp objects.

2 Product Specification

2.1 Size and Weight

Table 2- 1 LFP5000 Device size

Product	Nominal Voltage	Nominal Capacity	Dimension	Weight
LFP5000	DC51.2V	100Ah	453×433×177mm	≈49.5kg

2.2 Performance Parameter

Table 2-2 LFP5000 performance parameter

Item	Parameter value
Nominal Voltage(V)	51.2
Work Voltage Range(V)	43.2~58.4
Nominal Capacity(Ah)	100
Nominal Energy(kWh)	5.12
Max. Charge Current (A)	50
Max. Discharge Current (A)	50
Max. Charge Voltage (Vdc)	58.4

2.3 Interface Definition

This section elaborates the interface functions of the front interface of the devic

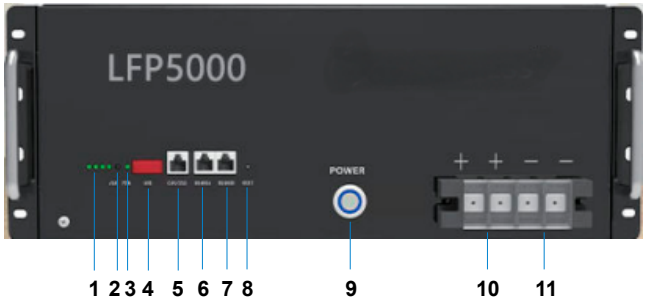


Figure2-1 The sketch of interfac

2 Product Specification

Table 2-3 Interface Definition

Item	Name	Nominal Capacity
1	SOC	The number of green lights shows the remaining power. Table 2-3 for details.
2	ALM	Red light flashing when an alarm occurs, red light always on during protection status. After the condition of trigger protection is relieved, it can be automatically
3	RUN	Green light flashing during standby and charging mode. Green light always on when disc
4	ADD	DIP switc
5	CAN	Communication cascade port, support CAN communication
6	RS485	Communication cascade port, support 485 communication
7	RS485	Communication cascade port, support 485 communication
8	Res	Reset switch
9	power	power switch
10	Positive socket	Battery output positive or parallel positive lin
11	Negative socket	Battery output negative or parallel negative lin

2 Product Specification

DIP switch description:

When the batteries are connected in parallel, the host communicates with the slaves through the 485 interface. The host summarizes the information of the entire battery system and communicates with the inverter through CAN.

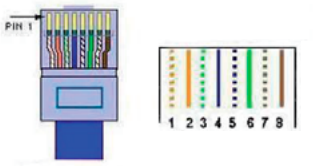


Figure 2-2 CAN/485 interface definition

Table 2-5

Figure 2-2 CAN/485 interface definition

Foot position	Color	Definition
PIN1	Orange / white	NC
PIN2	Orange	NC
PIN3	Green / white	XGND
PIN4	Blue	CAN-H
PIN5	Blue / white	CAN-L
PIN6	Green	XGND
PIN7	Brown / white	NC
PIN8	Brown	NC

485 Pin Definition

Foot position	Color	Definition
PIN1	Orange / white	RS485-B
PIN2	Orange	RS485-A
PIN3	Green / white	XGND
PIN4	Blue	NC
PIN5	Blue / white	NC
PIN6	Green	XGND
PIN7	Brown / white	RS485-A
PIN8	Brown	RS485-B

Tips: Please pay attention of the communication com definition of inverter, in order to avoid voltage in the port to affect communication.

Table 2-6 LED status indicators

Battery Status	SOC	LED4	LED3	LED2	LED1	ALM	RUN
Shutdown	/	off	off	off	off	off	off
Standby	/	off	off	off	off	off	Flashing
Charging	0%<SOC≤25%	off	off	off	Flashing	off	.
	25%<SOC<50%	off	off	Flashing	.	off	.
	50%<SOC≤75%	off	Flashing	.	.	off	.
	SOC>75%	Flashing	.	.	.	off	.
Discharging	0%<SOC≤25%	off	off	off	Flashing	off	Flashing
	25%<SOC<50%	off	off	Flashing	.	off	Flashing
	50%<SOC≤75%	off	Flashing	.	.	off	Flashing
	SOC>75%	Flashing	.	.	.	off	Flashing

● means green light always on

2.4 Battery Management System(BMS)

2.4.1 Voltage Protection

Low Voltage Protection in Discharging: When any battery cell voltage or total voltage is lower than the rated protection value during discharging, the over-discharging protection is activated. Then battery system stops supplying power to the outside. When the voltage of each cell back to rated return range, the protection is over.

Note: After the BMS is turned off after discharging and under-voltage protection, the button is activated or the charging is activated, the BMS will keep output voltage for 1 minute to detect the battery voltage of the inverter,so it is not allowed to discharge within 1 minute.

Over Current Protection in Charging: Battery will stops charging when total voltage or any battery cell voltage reachesthe rated protection value during charging stage. When total voltage or all cell back torated range,the protection is over.

2.4.2 Current Protection

Over Current Protection in Charging:
When the charging current is >50A, the current limit protection mode is activated. If the current does not drop within 10S, the charging current will be limited. It can be restored after 60S or the discharge can be restored immediately.

Over Current Protection in Discharging:
When the discharging current is >50A, the current limit protection mode is activated. If the current does not drop within 10S, the discharging current will be limited. It can be restored after 60S or the charge can be restored immediately.

2.4.3 Temperature Protection

Low/Over temperature protection in charging:
When battery's temperature is beyond range of 0 °C ~+55 °C during charging, temperature protection is activated, device stops charging.
The protection is over when temperature back to rated working range.

Low/Over temperature protection in discharging:
When battery's temperature is beyond range of -20°C ~+55°C during discharging, temperature protection is activated, device stops supplying power to the outside.
The protection is over when temperature back to rated working range.

2.4.4 Other Protection

Short Circuit Protection:
When the battery is activated from the shutdown state, if a short circuit occurs, the system starts short-circuit protection.

Self-Shutdown:
When device connects no external loads and power supply and no external communication for over 48 hours, device will dormant standby automatically.

⚠ Caution

Battery's maximum discharging current should be more than load's maximum working current.

3 Installation and Configuration

3.1 Preparation for installation

This system can only be installed by personnel who have been trained in the power supply system and have sufficient knowledge of the power system.
The safety regulations and local safety regulations listed below should always be followed during the installation.

- All circuits connected to this power system with an external voltage of less than 51.2V must meet the SELV requirements defined in the IEC60950 standard.
- If operating within the power system cabinet, make sure the power system is not charged. Battery devices should also be switched off.
- Distribution cable wiring should be reasonable and has the protective measures to avoid touching these cables while operating power equipment.
- when installing the battery system, must wear the protective items below:


The isolation gloves


Safety goggles


Safety shoe

3 Installation and Configuration

3.1.1 Environmental requirements

Working temperature: -10°C ~ +50°C
Charging temperature range is 0°C~+45°C,
Discharging temperature range is -10°C ~+50°C
Storage temperature: - 10°C~ +45°C
Humidity: Up to 90% (non-condensing)
Elevation: no more than 4000m
Operating environment : Indoor installation, sites avoid the sun and no wind, no conductive dust and corrosive gas.

And the following conditions are met :
- Installation location should be away from the sea to avoid brine and high humidity environment.
- The ground for product arrangement shall be flat and level.
- No flammable explosive materials near the installation site.
- The optimal ambient temperature is 15°C~ 30°C
- Keep away from dust and messy zones

3.1.2 Tools and data

Tools and meters that may be used are shown in table 3- 1.
Table 3- 1 Tool instrument

Name	
Screwdriver(Slotted, Phillips)	Multimeter
Torque wrench	Clamp current met
Diagonal pliers	Insulation tape
Pointed nose plie	Temperature meter
Pliers to hold the wire	Anti-static bracele
Stripping pliers	Cable tie
Electric dril	Tape measur

3.1.3 Technical preparation

Electrical interface check
Devices that can be connected directly to the battery can be user equipment, power supplies, or other power supplies .

- Confirm whether the user's PV power generation equipment, power supply or other power supply equipment has a DC output interface, and measure whether the DC power output voltage meets the voltage range requirements in Table 2-2.

- Confirm that the maximum discharge current capability of the DC power interface of the user's photovoltaic power generation equipment, power supply or other power supply equipment should be higher than the maximum charging current of the products used in Table 2-2.
  If the maximum discharge capacity of the DC power interface of the user's photovoltaic power generation equipment is less than the maximum charging current of the products used in Table 2-2, the DC power interface of the user's photovoltaic power generation equipment shall have a curre.0nt limiting function to ensure the normal operation of the user's equipment.

- Verify that the maximum operating current of the battery-powered user equipment (inverter DC input) should be less than the maximum discharge current of the products used in Table 2-2.

The security check

- Firefighting equipment should be provided near the product, such as portable dry powder fire extinguisher.

- Automatic fire fighting system shall be provided for the case where necessary.

- No flammable, explosive and other dangerous materials are placed beside the battery.

3.1.4 Unpacking inspection

- When the equipment arrives at the installation site, loading and unloading should be carried out according to the rules and regulations, to prevent from being exposed to sun and rain.

- Before unpacking, the total number of packages shall be indicated according to the shipping list attached to each package, and the case shall be checked for good condition.

- In the process of unpacking, handle with care and protect the surface coating of the object.

- Open the package, the installation personnel should read the technical documents, verify the list, according to the configuration table and packing list, ensure objects are complete and intact, if the internal packing is damaged, should be examined and recorded in detail.

Packing list is as follows:

Item	Specification	Quantity	Figure
SKT-48100P	51.2V/ 100Ah	1	
Parallel cablepositive	Red /25mm²/ L250mm	1	
Parallel cablenegative	Black /25mm²/ L250mm	1	
Communication parallel cable	Black / L500mm/ Double RJ45 plug	1	
Ground wire	L500mm,4mm²	1	
User Manual	User manual	1	

3.1.5 Engineering coordination

Attention should be paid to the following items before construction:

- Power line specification.
  The power line specification shall meet the requirements of maximum discharge current for each product.

- Mounting space and bearing capacity.
  Make sure that the battery has enough room to install, and that the brackets have enough load capacity.

- Wiring.
  Make sure the power line and ground wire are reasonable. Not easy to short-circuit, water and corrosion.

3.2 Equipment installation

Table 3-2 Installation steps

Step1	Installation preparation	Confirm that the ON/OFF switch on the front panel of LFP5000 unit is in the “OFF” state to ensure no live LFP5000/ LV User Manual operation.
Step2	Mechanical installation	1. Battery placement position determination 2. Battery module installation
Step3	Electrical installation	1. Ground cable installation 2. Battery module parallel cable installation 3 . Parallel communication cable connection
Step4	Battery system self-test	1. Turn the ON/OFF switch to the "ON" state 2. Press SW button 3S to wake up battery 3. Check the system output voltage and led status 4. Shut dow n the system
Step5	Connecting inverter	1. Connect total positive & total negative cable of the battery system to the inverter 2 Battery module total positive cable installation 3. Battery module total negative cable installation 4. Connect the communication cable from the master CANIN to the inverter 5. Turn on the Power switch and wake up system by SW button 6 Close the DC breaker between inverter and battery 7. Turn on the inverter and check the communication between inverter and battery system

3.2.1 Installation preparation

1. Prepare to install equipment and tools to detect if the battery is off.

2. Confirm the form of the battery. The two forms can be switched as required, as shown in Figure 3-1, and can be used in a matching cabinet, as shown in Figure 3-2, which can be directly stacked. (Picture 3-2 bracket needs to be purchased additionally)



figure3-1.



figure3-2.

3.2.2 Mechanical installation

1. Place the LFP5000, as shown in Figure 3-3, align the upper and lower mounting ears holes, and then assemble by the combination of bolts - spring washers - flat washers - mounting ears - nuts.
   A total of 8 sets of corners need to be assembled.

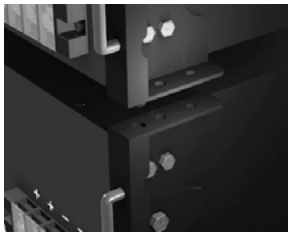




figure3-3.

3.2.2 Electrical installation

Before connecting the power cables, use multimeter to measure cable continuity, short circuit, confirm positive and negative, and accurately mark the cable labels.
Measuri ng methods:

- Power cable check : select the buzzer mode of multimeter and detect the both ends of the same color cable. If the buzzer calls, it means the cable is in good condition.

- Short circuit judgment : choose multimeter resistor file, probe the same end of positive and negative pole, if the resistor shows infinity, means that the cable is available.

- After visual testing of power line connection, the positive and negative poles of the battery shall be connected respectively to the positive and negative poles of the opposite terminal.

It is better to add a circuit breaker between the inverter and the battery system. The selection of the circuit breaker requires:**Voltage:>60V, current:I=Inverter power/51.2V.**

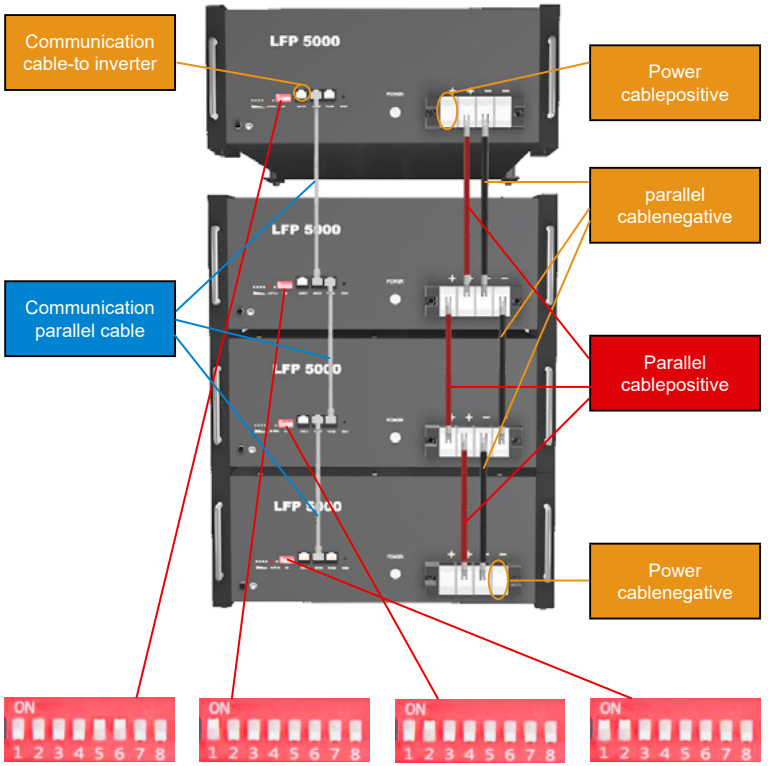


Figure3-4

Note:

1. For more ADD Settings, Reference 2.3. 1 “DIP switch definition and description”

2. After the whole system connection, set the master DIP mode according to the inverter model firstly, then start the battery.

3. The BAT- INV comms cable is from inverter comm port to master CAN IN port, BAT- BAT cable is from master CAN OUT to slave1 CAN IN, slave1 CAN OUT to slave2 CAN IN …

4. Each pair of power cable, it’s limited continuous current is 120A, so if the inverter Max. work current more than 120A, please add power cable according to the proportion.

3.2.4 Battery parameter settings on the inverter

Max Charging(Bulk) Voltage: 58.4V
Absorption Voltage: 56.8V
Float Voltage: 54V
Shut Down(cut off) Voltage: 50V
Shut Down(cut off) SOC: 15%
Max Charge Current : 50A*battery QTY
Max Discharge Current : 50A*battery QTY

4 Use, maintenance and troubleshooting

4.1 Battery system usage and operation instructions

After completing the electrical installation, follow these steps to start the battery system.

1. Refer to the description of the DIP switch of 2.3.1 to prepare the battery module before starting up, then press the ON/OFF button to the ON position, press and hold the SW button for 3 seconds.

2. After the indicator self-test, the RUN indicator will light and the SOC indicator will be on(100% SOC status in the Figure4- 1).

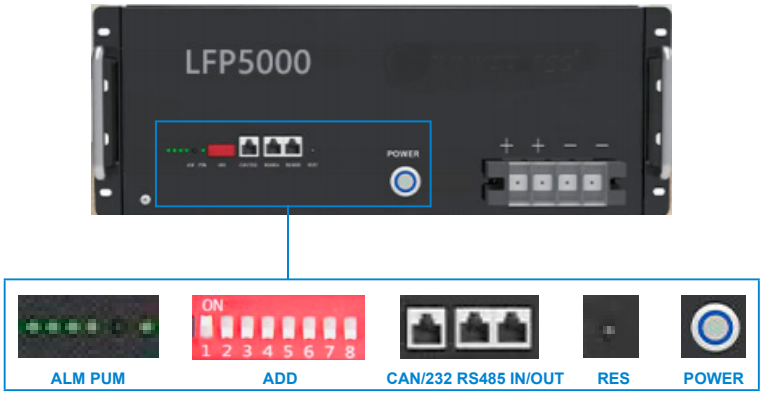


Figure4-1

4 Use, maintenance and troubleshooting

Caution:

1. After pressing the power button, if the battery status indicator on the front panel continues to be red, please refer to the "4.2 Alarm description and processing ". If the failure cannot be eliminated, please contact the dealer timely.

2. Use a voltmeter to measure whether the voltage of the circuit breaker battery access terminal is higher than 48V, and check whether the voltage polarity is consistent with the inverter input polarity. If the circuit breaker battery input terminal has a voltage output and is greater than 48V, then the battery begun to work normally.

3. After confirming that the battery output voltage and polarity are correct, turn on the inverter, close the circuit breaker.

4. Check if the indicator of the inverter and battery connection (communication indicator and battery access status indicator) is normal. If it is normal, successfully complete the connection between the battery and the inverter. If the indicator light is abnormal, please refer to the inverter manual for the cause or contact the dealer.

4.2 Alarm description and processing

When protection mode is activated or system failure occurred, the alarm signal will be given through the working status indicator on the front panel of the LFP5000. The network management can query the specific alarm categories.
If the fault such as single cell over voltage, charging over -current, under-voltage protection, high -temp protection and other abnormalities which affects the output, please deal with it according to Table 4- 1.

Table 4- 1 Main alarm and Protectio

Statue	Alarm category	Alarm indication	Processing
Charge state	Over-current	RED	Stop charging and find out the cause of the trouble
	High temp	RED	Stop charging
Discharge state	Over-current	RED	Stop discharging and find out the cause of the trouble
	High temp	RED	Stop discharging and find out the cause of the trouble
	Total voltage undervoltage	RED	Start charging
	Cell voltage undervoltage	RED	Start charging

4 Use, maintenance and troubleshooting

4.3 Analysis and treatment of common faults

Analysis and treatment of common faults in the Table 4-2:

Table 4-2 Analysis and treatment of common faults

No.	Fault phenomenon	Reason analysis	Solution
1	The indicator does not respond after the power on	Total voltage lower than 35V	Check the total voltage
2	No DC output	Battery data status is abnormal. Battery gets into over-discharged protection	Read the battery information on the monitor.
3	The DC power supply time is too short	Battery capacity become smaller	Storage battery replacement or add more modules
4	The battery can't be fully charged to 100%	Charging voltage is too low	Adjust charging voltage at 57V or 57.6V
5	The power cable sparks once power on and ALM light RED	Power connection short-circuit	Turn off the battery, check the cause of the short circuit
6	Communication fault	The DIP setting of the host is wrong/ the battery type of the inverter is wrong/ Communication cable used incorrectly/The communication cable is incorrectly connected at the battery communication port or the inverter communication port/The battery firmware version is too low to support the inverter	Check these possible causes one by one

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