

Installation

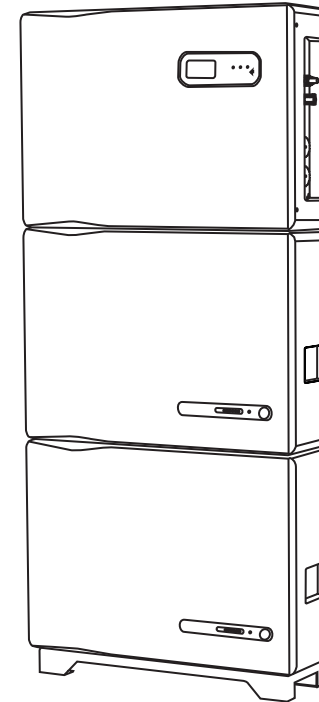
- Make sure the DC and AC input cable have fuses and appropriate circuit breakers.
- Before connecting AC power to the device, please make sure that the AC power is disconnected.
- The equipment must be installed by a professional and must be tested with a properly calibrated voltage tester.
- Make sure using the correct cable specifications while installing
- Do not short-circuit the positive and negative poles or install them in reverse.
- Do not touch DC conductors.
- Do not wipe the system with a wet cloth.
- Do not open the inverter and battery.
- Do not touch uninsulated cable ends.
- If the battery pack is damaged or malfunctions, stop using it immediately
- Do not touch the battery socket (even if the inverter is disconnected from the DC or AC side)

TRANSPORTATION

- If the product is exposed to fire or mechanical shock, the battery casing will be extremely damaged and dangerous substances may be released, causing harm.
- During transport, a certified fire extinguisher with a minimum capacity of 2 kg must be carried with you. Smoking is strictly prohibited in and near the vehicle during loading and unloading.
- During transportation or installation, please ensure that more than 2 people work together to move it to avoid injury, as the product is very heavy.

USER MANUAL

APOLLO Inverter with ESS B Series



PRODUCT PRESENTATION

Home ESS refers to the storage of electricity locally by household energy storage equipment for later use. ESS consists of energy storage batteries, inverters and other components. We use brand new A-grade LiFePo4 battery, equipped with an intelligent battery management system for charging and discharging cycles. The inverter converts DC energy to AC energy to meet the requirements for household electricity. Normally this product is installed in combination with PV system to provide green electricity to household users, reduce energy consumption, and reduce negative impacts on the environment, it's widely used in remote areas or areas with unstable power supply, to provide reliable, stable, and cost-effective energy supply.

SAFETY RULES

Important Warning Signs



Indicates that the equipment is in a dangerous state and the switch should be turned off immediately to prevent injury.



Indicates that the system must be turned off or disconnected for 5 minutes before being touched or put into use to prevent electric shock.



Indicates that the contact surface is at risk of high temperature



Please refer to the operating instructions.

INSTALLATION ENVIRONMENT

- Do not use in high temperature (above 55°C), humid (humidity greater than 90%), or places with danger of gas or dust explosion.
- Do not place heavy objects on top of the device and check that the ventilation holes are not blocked by other components.
- Do not install in living rooms or entrance and exit areas.
- Do not install it in a location with direct sunlight or where the ambient temperature changes greatly.

PRODUCT PARAMETER

Inverter

Model	SCAP-B-512-100	SCAP-B-512-200	SCAP-B-512-300	SCAP-B-512-400
Rated Power				5KW
AC Rated Voltage				230VAC
Rated Frequency				50Hz
Efficiency				>94%
Transfer Time				10ms
Waveform				Pure sinusoidal wave
Battery Overvoltage				58.4V
Battery Undervoltage Alarm				45V
Constant Voltage Charge				58.4V
Float Voltage				56V
Max Charging Current				100A
Communication Interface				RS232 (Inverter)/RS485 (BMS)
Dimension				60*18.3*36.5CM

AC Input

Nominal Voltage	230VAC
Voltage Range	90-280VAC
Rated Frequency	50Hz
Frequency Range	40-70Hz
Rated Current	30A
Max AC Current	60A

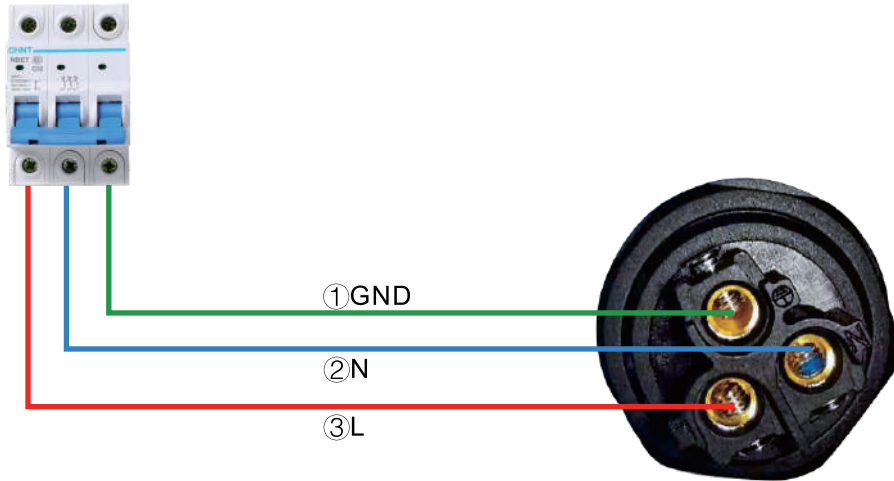
PV Input

Max Voltage	500V
Optimum Voltage	300-400V
Voltage Range	120V-500VDC
Max Power	5500W

Battery

	5120Wh (100Ah)	10240Wh (200Ah)	15360Wh (300Ah)	20480Wh (400Ah)
Rated Capacity				
Nominal Voltage	51.2V			
Discharge Voltage Range	43.2V-58.4V			
Standard Charging Current	50A			
Max Charging Current	100A			
Max Discharging Current	100A			
Depth of Discharge	90%			
Communication Interface	CAN/RS485			
Cycle Life	≥ 6000, 25 ± 2°C, 0.5C, EOL80%			
Working Temperature Range	Charge: 0°C -50°C; Discharge: -10°C -60°C			
Storage Temperature	-20°C -60°C			
Dimension	60*18.3*39CM			

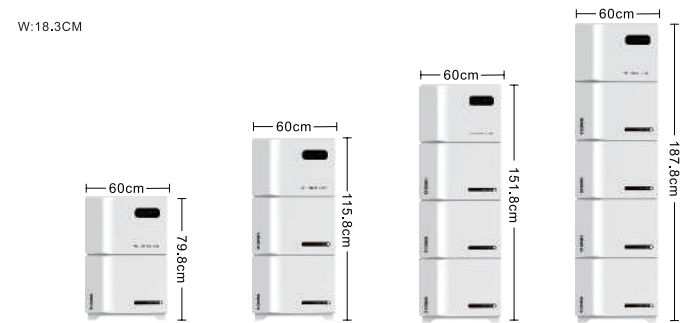
- **Step 7:**
Connect AC input cable according to the terminal on the inverter, firstly "GND", then "N", last "L"



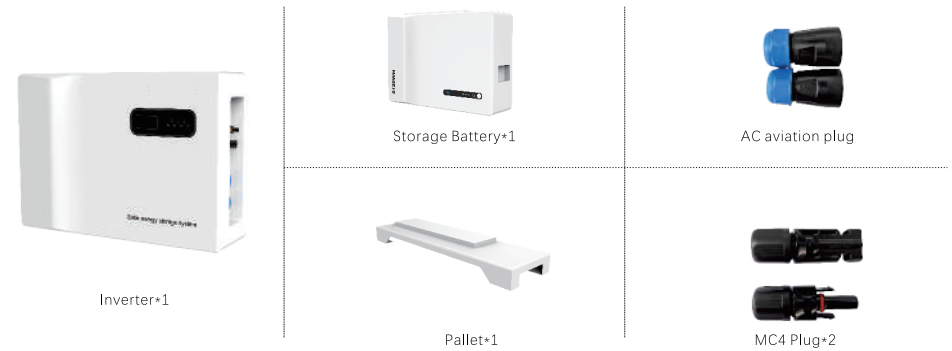
- **Step 8:**
Turn on the power. Firstly turn on all the battery system, then press the inverter switch button. The LCD screen shows a complete link diagram, indicating that the system is in order (see below pictures).



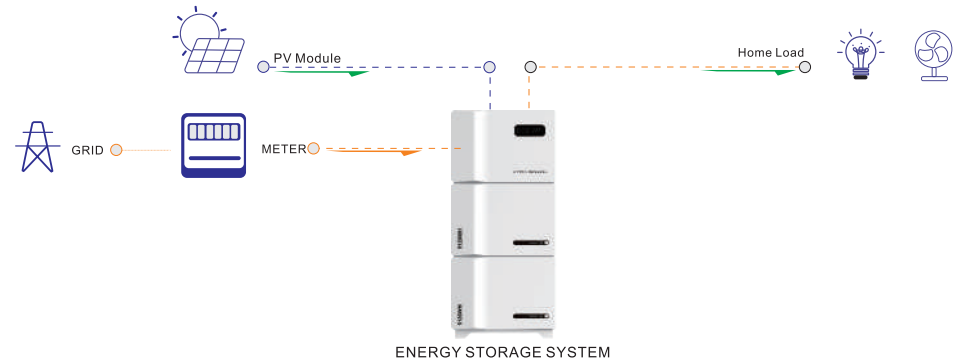
PRODUCT DIMENSION



PACKING LIST



SYSTEM DIAGRAM

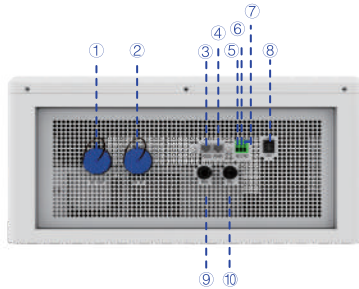


SYSTEM DIAGRAM

Note:
It is recommended to use an AC circuit breaker with a rating of 30A. During installation, make sure all switches are turned off to avoid the risk of electric shock.

- **Step1:**
Take out the pallet, then place it flat and steady on the ground where it needs to be installed.
- **Step2:**
Take out the battery system and inverter from package.
- **Step3:**
Fix the battery system on the pallet one by one.
- **Step4:**
Fix the inverter on the top of battery system.
- **Step5:**
Fix the system onto the wall which supplied brackets and screws to ensure it's firmly installed.
- **Step6:**
Connect PV cable according to the terminal on the inverter.

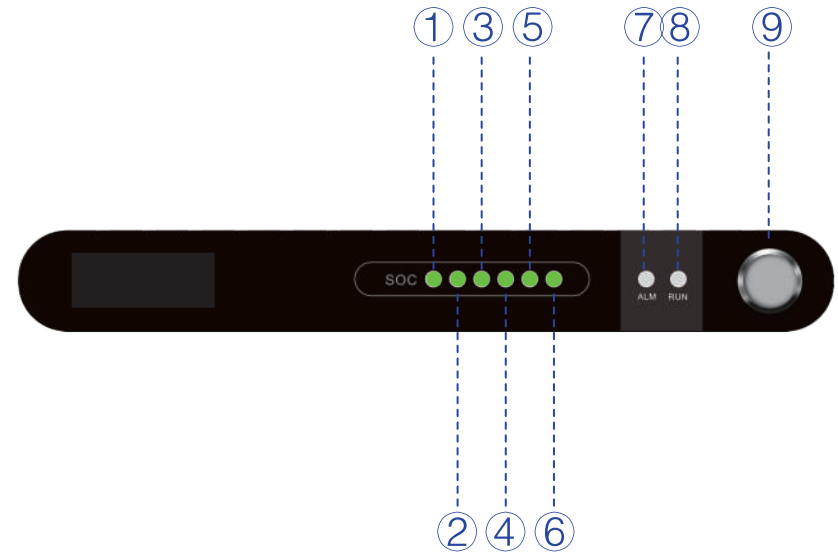
Remark: Inverter Terminal Instruction



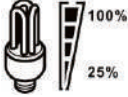









NO.	Interface Instruction
①	AC OUT
②	AC IN
③	Inverter communication port RS232
④	BMS communication port RS485
⑤	Dry contact NC, normally closed contact
⑥	Dry contact C, common contact
⑦	Dry contact NO, normally open contact
⑧	Inverter Switch
⑨	PV+
⑩	PV-

OPERATION FUNCTION

Battery Indicator Light



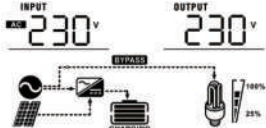
NO.	Port Instruction
①	0%–16.6% capacity
②	16.6%–33.2% capacity
③	33.2%–49.8% capacity
④	49.8%–66.4% capacity
⑤	66.4%–83% capacity
⑥	83.0%–100% capacity
⑦	Warning Light
⑧	Running Light
⑨	Battery Switch

Load Information					
OVER LOAD		Indicates overload.			
		Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.			
		0%~24%	25%~49%	50%~74%	75%~100%
					
Mode Operation Information					
	Indicates unit connects to the mains.				
	Indicates unit connects to the PV panel				
BYPASS	Indicates load is supplied by utility power				
	Indicates the utility charger circuit is working.				
	Indicates the DC/AC inverter circuit is working.				
Mute Operation					
	Indicates unit alarm is disabled.				

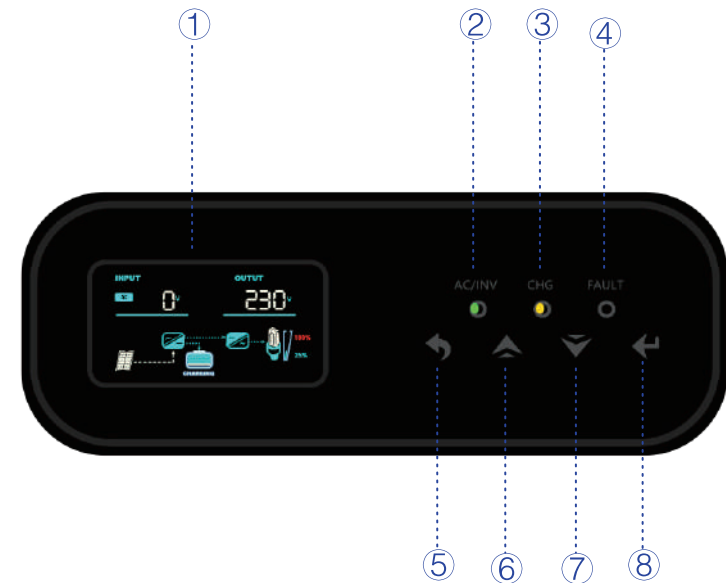
Display Setting

Display Setting

The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order input voltage, input frequency, PV voltage, charging current, charging power battery voltage, output voltage, output frequency, load percentage, load in Watt, load in VA, load in Watt, DC discharging current, main CPU Version.

Selectable information	LCD display
Input voltage /Output voltage (Default Display Screen)	Input Voltage=230V, output voltage=230V 

Inverter LCD Screen

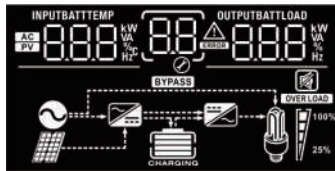


NO.	Name	Instruction
①	LCD Screen	Display system operation data
②	Status Indicator	Always on: grid mode, output from AC Flash: battery mode, output from battery or PV
③	Charging Indicator capacity	Always on: battery fully charged Flash: battery charging
④	Fault Indicator	Always on: Inverter failure Flash: Inverter warning
⑤	ESC	ESC Mode
⑥	UP	Back to last option
⑦	Down	Turn to next option
⑧	Confirm	Confirm a selection in setup mode or enter setup mode

Inverter LCD Display Function

Operation & Display Panel

LCD Display Icons



Icon	Function description
Input Source Information	
	Indicates the AC input.
	Indicates the PV input.
	Indicate input voltage, input frequency, PV voltage, charger current, charger power, battery voltage.
Configuration Program and Fault Information	
	Indicates the setting programs.
	Indicates the warning and fault codes.
	Warning: flashing with warning code
	Fault: lighting with fault code
Output Information	
	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.
Battery Information	
	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

Input frequency	Input frequency = 50Hz
PV voltage	PV voltage = 260V
PV power	PV power = 500W
Charging current	AC and PV charging current = 50A PV charging current = 50A AC charging current = 50A
Load percentage	Load percent = 70%

Fault Reference Code

Function and alarm description

Faults Descriptions

➤ **Fault:** The inverter enters the fault mode, the red LED light is always on and the LCD displays the fault code.

Fault Reference Code

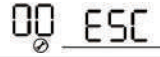
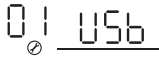
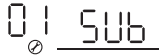
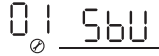

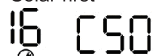
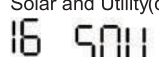
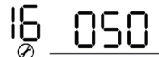
Fault Code	Fault Event	Icon on
01	Fan is locked when inverter is off.	
02	Over temperature or NTC is not connected well.	
03	Battery voltage is too high.	
04	Battery voltage is too low.	
05	Output short circuited or over temperature is detected by internal converter components.	
06	Output voltage is too high.	
07	Over load time out.	
08	Bus voltage is too high	
09	Bus soft start failed	
51	Over currents or surge	
52	Bus voltage is too low	
53	Inverter soft start failed	
55	Over DC voltage in AC output	
57	Current sensor failed	
58	Output voltage is too low	
59	PV voltage is over limitation	

Charging power	<p>AC and PV charging power=500W</p> <p>PV charging power=500W</p> <p>AC charging power=500W</p>
Battery voltage and output voltage	<p>Battery voltage =25.5V, output voltage=230V</p>
Output frequency	<p>Output frequency=50Hz</p>
Load in VA	<p>When connected load is lower than 1kVA, load in VA will present xxxVA like below chart.</p> <p>When load is larger than 1kVA(≥1KVA), load in VA will present x.xkVA like below chart.</p>

Priority Operations

After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press “UP” or “DOWN” button to select setting programs. And then, press “ENTER” button to confirm the selection or ESC button exit.










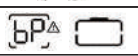
Setting Programs:

Program	Description	Selectable option	
00	Exit setting mode	Escape 	
01	Output source priority: To configure load power source priority	Utility first (default) 	Utility will provide power to the loads as first priority. Solar and battery energy will provide power to the loads only when utility power is not available.
		Solar first 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, Utility energy will supply power to the loads at the same time.
		BU priority 	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.
02	Charger source priority: To configure charger source priority	If this inverter/charger is working in Line, Standby or Fault mode, charger source can be programmed as below:	
		Utility first 	Utility will charge battery as first priority. Solar energy will charge battery only when utility power is not available.
		Solar first 	Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available.
		Solar and Utility(default) 	Solar energy and utility will charge battery at the same time.
		Only Solar 	Solar energy will be the only charger source no matter utility is available or not.
		If this inverter/charger is working in Battery mode, only solar energy can charge battery. Solar energy will charge battery if it's available and sufficient.	

Warning Descriptions






➤ **Alarm:** The red LED flashes, and the LCD displays an alarm code, the inverter does not enter the failure mode

Warning Indicator

Warning Code	Warning Event	Audible Alarm	Icon flashing
01	Fan is locked when inverter is on.	Beep three times every second	
02	Over temperature	None	
03	Battery is over-charged	Beep once every second	
04	Low battery	Beep once every second	
07	Overload	Beep once every 0.5 second	
10	Output power derating	Beep twice every 3 seconds	
15	PV energy is low.	Beep twice every 3 seconds	
16	High AC input (>280VAC) during BUS soft start	None	
E9	Battery equalization	None	
bP	Battery is not connected	None	

Code Reference

Related information code will be displayed on LCD screen. Please check inverter LCD screen for the operation.

Code	Description
60 	If battery status is not allowed to charge and discharge after the communication between the inverter and battery is successful, it will show code 60 to stop charging and discharging battery.
61 	Communication lost <ul style="list-style-type: none"> After battery is connected, communication signal is not detected for 3 minutes, buzzer will beep. After 10 minutes, inverter will stop charging and discharging to lithium battery. Communication lost occurs after the inverter and battery is connected successfully, buzzer beeps immediately.
69 	If battery status is not allowed to charge after the communication between the inverter and battery is successful, it will show code 69 to stop charging battery.
70 	If battery status must to charge after the communication between the inverter and battery is successful, it will show code 70 to charge battery.
71 	If battery status is not allowed to discharge after the communication between the inverter and battery is successful, it will show code 71 to stop discharge battery.

QUALITY ASSURANCE

- If the product failure during warranty, please contact a professional person to repair.
- The product nameplate cannot be torn off; otherwise, warranty service will be void.
- The following 7 points are not included in the warranty scope. If the customer requires repairment, should pay for the maintenance service.
- The equipment is damaged during transportation which is not arranged by our company
- The equipment has been improperly installed, reinstalled or used.
- The equipment operated in harsh environments.
- The malfunction or damage was caused by installation, repair, modification or disassembly.
- Repaired by non-professionals
- By using of non-standard accessories
- Damage caused by unexpected natural factors

Trouble removal

Problem	LCD/LED/Buzzer	Explanation/Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low (<1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication	1. The battery voltage is far too low.<1.4V/Cell) 2. Internal fuse tripped.	1. Contact repair center for replacing the fuse. 2. Re-charge battery. 3. Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct.(UP-->sppliance)
	Green LED is flashing.	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps continuously and red LED is on.	Fault code 07	Overload error. The inverter is overload 105% and time is up.	Reduce the connected load by switching off some equipment.
		If PV input voltage is higher than specification, the output power will be derated. At this time, if connected loads is higher than derated output power, it will cause overload.	Reduce the number of PV modules in series or the connected load.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
		Temperature internal converter component is over 120°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 02	Internal temperature of inverter component is over 100°C	Return to repair center.
	Fault code 03	Battery is over-charged	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 01	Fan fault	Replace the fan.
	Fault code 06/58	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	1. Reduce the connected load. 2. Return to repair center
	Fault code 08/09/53/57	Internal components failed.	Return to repair center.
Fault code 51	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.	
Fault code 52	Bus voltage is too low.		
Fault code 55	Output voltage is unbalanced.		
Fault code 59	PV input voltage is beyond the specification.	Reduce the number of PV modules in series.	

EMERGENCY RESPONSE PROCEDURE

- When the ESS operates abnormally, the inverter, battery, and all load switches must be turned off first.
- If the battery system leaks electrolyte, avoid contact with the leaking liquid or gas. If exposed to the leaking material, take the following measures immediately
- Inhalation: Evacuate contaminated area and seek medical attention.
- Eye Contact: Flush eyes with running water for 5 minutes, then seek medical attention.
- Skin Contact: Wash affected area thoroughly with soap and water and seek medical attention.
- Ingestion: Induce vomiting and seek medical attention.
- In the event of a fire, please do the following:
- Equipment combustion: If the fire is controllable and personnel are safe, please use Novec 1230, FM-200 or dioxin fire extinguisher to put out the fire. If the fire is uncontrollable, do not try to put it out. When the battery is heated to more than 150°C, it may explode. Evacuate personnel immediately to ensure life safety.
- Fire near the equipment: If it is safe, firstly disconnect the battery system circuit breaker to shut down the power charging. Then immediately extinguish the fire and evacuate personnel.

DAILY MAINTENANCE

- Cable Inspection: Check whether the wire connection is loose, aged, damaged, or falling off; check whether the cable terminals are loose or overheated; and the ground connection is good or not.
- Equipment Inspection: Check the battery system equipment for failure or damage every 6 months. When the system is running, check whether there is any abnormal noise in any part of the system. Check the battery voltage, temperature and other parameters. Check whether the equipment parameters are normal when the system is running.
- Equipment Cleaning: After using the equipment for half a year, the filter cotton on the left side of the ventilation needs to be removed, cleaned, dried and reinstalled, and the warning and guidance signs must be clear and intact, and the on-site environment must be clean and tidy.