



AM5000
LiFePO4 Battery Specification
Product Version:V1.00



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Revision History

Version	Release Notes	Release Date
V1.00	First Release	



Customer Requirements

Battery Module:AM5000

Product Version: V1.00

The customers will be requested to write down their requirements and communicate with Amensolar in advance. Amensolar could design and produce according to the customer's special requirements if the customer has the special applications or operating conditions that are different from those described in this document.

No.	Special Requirements	Criterion
1		
2		
3		
4		
5		

Customer Code: _____ Signature: _____ Date: _____

Foreword

Manual Description

This manual specifies and describes the specific functions and specifications of the 48V100Ah energy storage system produced by Amensolar and used in parallel with AM5000 batteries, instructions for proper use of this product. Amensolar will reserve the right to revise and update this specification according to the actual situation in different periods.



Notice: The original design of this product is only for energy storage system and shall not be used for other purposes.

Audience

The audience of this manual is the users who use this product. Please read this manual carefully before using the device.

Symbols Used

The following safety symbols may appear in this manual. Please refer to the table below for the meanings of the safety symbols.

Safety Symbols	Meaning
 Warning	Indicates a hazard that, if not avoided, could result in a serious injury incident, equipment damage, or major business interruption.
 Danger	Indicates that if illegal operation, it may cause serious injury accident, the operator will be in danger of electric shock

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Attention	错误！未定义书签。

1. The Product Application and Features

1.1 Product Application

The Amensolar AM5000 battery is the backup battery, mainly used for residential backup power supply, supply the 48V DC power. Supply the power for electric device at the off grid, and make sure the important device work normally (like the Computer, Lights, Refrigerator server and so on).

1.2 Product Features

The features of AM5000 battery as follows:

- High Safety

The battery module that is built by lithium ion battery cell positive electrode material is the LiFePO₄, which has high safety

- Flexible configuration

To support the configuration of multiple sets of batteries in parallel to improve the power supply duration and the output power of the DC power system

- Intelligent management

The battery can automatically complete the collection of battery data, and carry out real-time alarm and protection, and effectively manage the battery module

2. Product Specification

2.1 Appearance and Dimensions

The Battery system appearance of 1~4pcs in parallel As shown in Figure 2-1, the dimension and weight see the table 2-1



Figure 2-1 Appearance

Dimension	387 (W)*581(D)*133(H)mm 15.23(W)*22.87(D)*5.23(H) in
Weight	About 47Kg / 103.61(without frame) lbs

Table 2-1 AM5000 Battery Dimension and Weight

2.2 The main performance parameter Table

Table 2-2 AM5000 Battery Parameters

Battery Model	AM5000 Battery
---------------	----------------

Operation Voltage Range	44.8~57.6 (Nominal 51.2V)
Cell Specification	LFP 3.2V/100Ah
Nominal Capacity@25°C	5.12kWh
DOD %	95%
Cycle Life	>6000
Charge Operation Temperature	5°C~55°C
Discharge Operation Temperature	-20°C~55°C
Standard Continuous Charge-Discharge Current @25°C	50A
Max Charge-Discharge Current @25°C	100A (≤5 times/Month, ≤3 min/Time and Interval time≥24h)
Standard Charge Process	@25°C±2°C, Charging @ 0.5C, and stop charge when the single cell highest voltage of the battery pack reach to 3.60V of end of charge voltage
Standard Discharge Process	@25°C±2°C, Discharging @ 0.5C, and stop discharge when the single cell lowest voltage of the battery pack reach to 2.80V of end of discharge voltage
Storage Temperature Range	-20°C~60°C (If long time storing , suggest 40%SOC、 0~25°C)
Cooling mode	Natural Cooling(Installation environment should be ventilated)
Operation Environment	Indoor or waterproof area, - 20 °C - 42 °C ambient temperature
SOC of Transportation	40% SOC
Communication Mode	External CAN/RS485(choose one only),module to module RS485
Operation RH	0-95%(No Condensation)
Operation Altitude	≤2000m

Attention: For the above performance, it is only applicable to the inspection of new products delivered by Amensolar. The performance of products that have been used by customers or stored for a long time may be different from the above table, which is not within the scope of this specification.

2.3 Components Description

AM5000 battery module components in Figure 2-2



Figure 2-2 Front Panel Diagram

No.	Name	Description
1	CAP Indicator	The CAP light, there are 6 CAP lights,it means the 16.6% of capacity per light
2	Alarm Indicator	ALM light, Red,The light is on when there is a fault in the battery system
3	Run Indicator	Run light, Green,On @ Charging,Flash @ discharging
4	Status light	on/off light,Green, turn on switch, the light is on
5	Switch Button	The System is working on or off status
6	Reset	RST Button,the button could reset the system when the system is abnormal
7	DIP	ADDR,set the module address
8	Dry contact	DO1,DO2,Reserve two dry contact outputs
9	Host computer communication	Rs485,CAN communicate with PCS(choose 1 only),2PCS RJ45 port
10	Debug Port	RS232, Debugging Interface
11	Parallel Communication interface	Parallel RS485,communication between parallel module, 2pcs RJ45
12	Positive terminal	Used for connecting the positive terminals of battery module
13	Negative terminal	Used for connecting the Negative terminals of battery module

Table2-3Front Panel Interface

CAP Information

Status		Charging						Discharging					
Capacity Indicator		L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●	L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●
Capacity (%)	0~16.6%	Off	Off	Off	Off	Off	Flash2	Off	Off	Off	Off	Off	On
	16.6~33.2%	Off	Off	Off	Off	Flash2	On	Off	Off	Off	Off	On	On
	33.2~49.8%	Off	Off	Off	Flash2	On	On	Off	Off	Off	On	On	On
	49.8~66.4%	Off	Off	Flash2	On	On	On	Off	Off	On	On	On	On
	66.4~83.0%	Off	Flash2	On	On	On	On	Off	On	On	On	On	On
	83.0~100%	Flash2	On	On	On	On	On	On	On	On	On	On	On
● Operation Indicator		On						Flash 3					

Table2-4 The CAP Description

Flash Mode	On	Off
Flash 1	0.25S	3.75S
Flash 2	0.5S	0.5S
Flash 3	0.5S	1.5S

Table2-5 LED Flashing Description

The Indicator Description

Status	Normal/ALM/Protection	On/Off	RUN	ALM	The Capacity Indicator LED						Description	
		●	●	●	●	●	●	●	●	●		
Off	Sleeping	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	All Off
Standby	Normal	On	Flash1	Off	According to Energy Indication						Standby	
	ALM	On	Flash1	Flash3							Module Under Charge	
Charging	Normal	On	On	Off	According to Energy Indication						The highest energy LED flash(Flash2) when over charge,ALM no flash	
	ALM	On	On	Flash3	(The energy indication highest LED Flash 2)							
	Over-charge protection	On	On	Off	On	On	On	On	On	On	On	No grid, the indicator become standby
	Temp /Over current / Fail Protection	On	Off	On	Off	Off	Off	Off	Off	Off	Off	Stop Charge
Discharging	Normal	On	lash3	Off	According to Energy Indication							
	ALM	On	Flash3	Flash3								
	Under voltage protection	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Stop Discharge
	Temp/Over Current/Short Circle/Reverse connection/ Fail	On	Off	On	Off	Off	Off	Off	Off	Off	Off	Stop Discharge
Fail		Off	Off	On	Off	Off	Off	Off	Off	Off	Off	Stop Charge-discharge

Table2-6 The Indicator Information

Buzzer action description

In case of fault, it will beep for 0.25S every 1S; in case of protection, it will beep for 0.25S every 2S (except over voltage protection); in case of alarm, it will beep for 0.25S every 3S (except over voltage alarm); the buzzer function can be enabled by the host computer or Disabled, it is disabled by factory default.

Reset (RST) Description

When the BMS is in the sleep state, press the button (3~6S) and release it, the protection board will be activated, and the LED indicators will light up sequentially from "RUN" for 0.5 seconds. When the BMS is active, press the button (3-6S) and release it, the protection board is put to sleep, and the LED indicator lights start from the lowest power indicator for 0.5 seconds. When the BMS is active, press the button (6~10S) and release it, the protection board will be reset, and all the LED lights will light up at the same time for 1.5 seconds

After the BMS is reset, the parameters and functions set by the host computer are still retained.If you need to restore the initial parameters, you can use the "restore default value" of the host computer to achieve, but the relevant operation records and stored data remain unchanged (such as power,cycle times, protection records,etc.)

DIP set



When the PACK are used in parallel, different PACK can be distinguished by setting the address through the DIP switch on the BMS. It is necessary to avoid setting the same address. Refer to the following table for the definition of the DIP switch.

Address	DIP Address			
	#1	#2	#3	#4
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

Table2-7 The DIP Address List

3. The Battery Management System (BMS) Function

3.1 BMS Function

The BMS Main Function as follows:

- (1) Charge-Discharge Management

Control and Manage the charge-discharge according to Different Situations

(2) Voltage, Temperature Monitor, Balance Management

Monitor the system and the cell's voltage, temperature; Balance management for the unbalanced power of each cell

(3) Communication Function

With CAN, RS485 communication function, support host computer monitoring, RS485 network establishment

(4) Safety Protection

Support the over total voltage, under total voltage protection, single cell over voltage protection, single cell under voltage protection, over current protection, short circle protection, reverse connection protection, Low temperature protection, high temperature protection and so on.

(5) SOC Calculate

Calculate and correct SOC accuracy. BMS accurately calculates the SOC of the battery pack by integrating current and time, and the SOC accuracy at room temperature is $\leq 8\%$

(6) Status Indicator

Simple and reliable LED indicator, indicating battery capacity and battery operating status, when an alarm or protection state occurs, the built-in buzzer will alarm immediately.

(7) Real-time important data recording

Built-in real-time clock module and data storage space, which can record important operations and alarm information in the use of the battery system

(8) Function of Charging current Limit

When the charging current higher than turn-on current value (100A), turn off the current limit after 2 minutes, and check whether the charging current $>$ turn-on current value. If yes, turn on the current limit again, and lock the current limit state 10A after times of detection. The condition for unlocking the current-limiting state is that the discharge current is $>$ 1A or the detected current is 0.

3.2 BMS Parameter Settings

In order to ensure the safe and reliable operation of the battery pack, BMS provides comprehensive alarm and protection functions. The factory setting parameters of BMS alarm and protection are shown in the following table

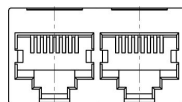
Table3-1 The BMS Alarm and Protection parameter setting Table

No.	Indicator items		Factory default parameters	Settable or not	Remark
1	Single Cell over-charge protection	alarm voltage@Single cell over-charge	3500mV	Yes	
		protection voltage@single cell over-charge	3600mV	Yes	
		protection delay@single cell over-charge	3.0S	Yes	
	single cell over-voltage protection	protection release voltage@single cell over-charge	3300mV	Yes	
		capacity release	SOC < 96%	Yes	
	discharge release	Discharge Current > 1A			
2	single cell over-discharge protection	alarm voltage@single cell discharge	2800mV	Yes	the battery will be at low power mode if it doesn't recovery to above of release voltage after 30s of over-discharge
		protection voltage@single cell over-discharge	2700mV	Yes	
		protection delay@single cell over-discharge	3.0S	Yes	
	single cell over-discharge protection release	protection release voltage@single cell over-discharge	3300mV	Yes	
		release@charging	Charging to active		
3	overall over-charge	alarm voltage@overall over-charge	56.80V	Yes	

	protection	protection voltage@overall over-charge	57.60V	Yes	
		protection delay@overall over-charge	3.0S	Yes	
	protection release @overall over-voltage	protection release voltage@overall over-charge	54.0V	Yes	
		capacity release	SOC < 96%	Yes	
		discharge release	Discharge Current >1A		
4	overall over-discharge protection	overall over-discharge alarm voltage	45.6V	Yes	the battery will be at low power mode if it doesn't recovery to above of release voltage after 30s of over-discharge
		protection voltage@overall over-discharge	44V	Yes	
		protection delay@overall over-discharge	3.0S	Yes	
	protection release @overall over-discharge	protection release voltage@overall over-discharge	48V	Yes	
		release@charging	Charging to active		
5	charging limit-current function	charging limit-current current	10A		The current limit can be set to open, the maximum open current value is 100A
6	charging over-current protection(Triggered when the charging current limiting function is off or fails)	alarm current@Charging over-current	105A	Yes	10 times in a row will lock this state, no longer automatically release
		protection current@charging over-current	110A	Yes	
		protection delay@charging over-current	3.0S	Yes	
	protection release @charging over-current	release automatically	Release automatically after 1 min		charging over-current protection release
discharging release		Discharge Current > 1A			
7	Protection@discharge over-current 1	discharge over-current 1 alarm current	105A	Yes	times in a row will lock this state, no longer automatically release
		protection current@discharge over-current 1	110A	Yes	
		protection delay@discharge over-current 1	3.0S	Yes	
	protection release @discharge current 1	release automatically	Release automatically after 1 min		
		charging release	Charging current > 1A		
8	discharge over-current 2 protection	protection current@discharge over-current 2	≥150A	Yes	10 times in a row will lock this state,no longer automatically release
		protection delay@discharge current 2	100mS	Yes	
	protection release@ discharge over-current 2	release automatically	Release automatically after 1 min		
		charging release	Charging current > 1A		
9	short circle protection	protection current@short circle	≥350A		
		protection delay@short circle	≤300μS		

		protection release@short circle	Short circle protection release @charging Automatically release after removed the load		
10	cell temperature protection	alarm temperature@charging low temperature	8°C	Yes	
		protection temperature@charging low temperature	5°C	Yes	
		protection release temperature@charging low temperature	8°C	Yes	
		alarm temperature@charging high temperature	52°C	Yes	
		protection temperature@charging high temperature	58°C	Yes	
		release temperature@charging high temperature protection	53°C	Yes	
		alarm temperature@discharge low temperature	-15°C	Yes	
		protection temperature@discharge low temperature	-20°C	Yes	
		production release temperature@discharge low temperature	-10°C	Yes	
		alarm temperature@discharge high temperature	52°C	Yes	
		protection temperature@discharge high temperature	58°C	Yes	
		protection release temperature@discharge high temperature	53°C	Yes	
11	Environment temperature alarm	alarm temperature@environment low temperature	-15°C	Yes	
		protection temperature@environment low temperature	-20°C	Yes	
		protection release temperature@environment low temperature	-15°C	Yes	
		alarm temperature @environment high temperature	65°C	Yes	
		protection temperature@environment high temperature	75°C	Yes	
		Protection release temperature @ environment high temperature	65°C	es	
12	balance function	voltage@balance start	3500mV	Yes	
		starting of voltage difference	30mV	Yes	
13	Capacity default settings	alarm threshold of low battery	SOC < 3%	Yes	No alarm @charging

3.3 BMS Communication Interface

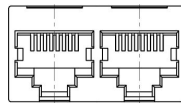


CAN and RS485 Interface

RS485--Adopt 8P8C vertical RJ45 socket		CAN--Adopt 8P8C vertical RJ45 socket	
RJ45 Pin	Definition & Description	RJ45 Pin	Definition & Description
1,8	RS485-B1	9,10,11,14,16	NC
2,7	RE485-A1	12	GANL
3,6	GND	13	CANH
4,5	NC	15	GND

Note: the CAN communication, Default communication rate 500K

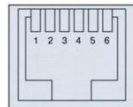
RS485 Parallel Interface



RS485--Adopt 8P8C vertical RJ45 socket		CAN--Adopt 8P8C vertical RJ45 socket	
RJ45 Pin	Definition & Description	RJ45 Pin	Definition & Description
1,8	RS485-B	9,16	RS485-B
2,7	RE485-A	10,15	RE485-A
3,6	GND	11,14	GND
4,5	NC	12,13	NC

With dual RS485 interface, you can check the information of PACK, the default baud rate is 9600bps. If you need to communicate with the monitoring device through RS485, the monitoring device is used as the host to poll data according to the address, and the address setting range is 2~15

RS232 communication Interface



RS232--Adopt 6P6C vertical RJ11 socket	
RJ11 Pin	Definition & Description
2	NC
3	TX(单板)
4	RX(单板)
5	GND

4. Installation and Usage

4.1 Product Using

Normal Use

- (1) After the system is installed, turn on the "ON/OFF rocker switch" for more than 3s, the system will enter the standby working state and the "ON/OFF indicator light" will light up. The system can support 1 battery pack to work alone, or multiple battery packs to work at the same time, just turn on the "ON/OFF boat switch" corresponding to the battery.

- (2) When the communication switching power supply is loaded, the system enters the working state, and the RUN indicator is on, indicating that the system is charging
- (3) When the grid and photovoltaic systems power cut off, the system provides backup power support for external devices without delay, and the RUN indicator flashes, indicating that the system is discharging
- (4) Set the battery which connected with house energy storage system by communication cable as the host when multiple battery packs work at the same time in parallel, and generally set the “ADDR” dial address as the 1; the other batteries are slaves, and set different “ADDR” DIP address respectively, the address setting range is 2~15 (The “ADDR” DIP setting method can be checked in the previous function description)

Sleeping and Wake Up

The system will be low power mode when meet the any conditions as follows:

- (1) The single cell or the battery system over-discharge protection doesn't release within 30S.
- (2) Press the key(3~6s), and then release the key.
- (3) The lowest cell voltage less than the sleeping voltage, and the duration reach to the sleeping delay time (meet the no communication, no balance, no current requirement at the same time)
- (4) The standby more than 24 hours (no communication, no charge-discharge, no grid)
- (5) Forced shutdown through the host computer software

Before entering the sleep mode, make sure that the input terminal is not connected to an external voltage, otherwise it will not be able to enter the low power consumption mode

Wake Up

When the system is in low-power mode and meets any of the following conditions, the system will exit the low-power mode and enter the normal operation mode

- (1) Connect the charger, and the charger output voltage more than 48V
- (2) Press the key(3~6s), then release the key
- (3) RS232 communication active.

Remarks: After single or overall over-discharge protection, it enters low power consumption mode, wakes up regularly every 4 hours, and turns on the charge and discharge MOS. If it can be charged, it will exit the sleep state and enter normal charging; If the Automatic wake-up fails to charge for 10 consecutive times, it will no longer wake up automatically

When the system is defined as the end of charging, the recovery voltage is not reached after 2 days of standby (standby time set value), and the charging is forced to resume until the end of charging again.

4.2 Product Maintenance

Common faults and solutions

No.	Faults Description	Causes Analysis	Solutions
1	No DC output after start	The battery voltage low, over-discharge protection	To Charge
2	The indicator is not light on after start	BMS is in Sleeping status	Reset the RST button
3	Display low power	The charge voltage low	Adjust the float voltage of the switching power

			supply to the required parameters
4	Short power supply time	The battery pack is not full charged	Check the switching power supply charging voltage, charging current and other parameters
5	The output voltage is unstable after startup	BMS disturbed	Reset the RST button
6	Communication Fault	The communication cable problem	Check address switch address settings, check ports and lines

Routine Maintenance

- (1) Check whether the output terminal block screws are loose
- (2) Measure whether the output voltage is within the normal range
- (3) Check whether the communication interface is working normally through the host computer software
- (4) Check the voltage, current, power, temperature, etc. of the battery pack cells through the host computer software

5. Battery system installation and use precautions

The battery system is an energy storage device and a dangerous item. Improper operation and use by non-professionals may cause serious consequences such as electric shock, burning, and explosion. The installation and maintenance of the battery system must be operated by professional technicians, and the use must strictly abide by the relevant safety regulations. It is strictly forbidden for non-professionals to install, repair the battery system and abuse it beyond the range

5.1 Internal connection of battery system

Battery System Connection Involves:

- (1) Each connector must be safe and reliable to ensure that there will be no looseness and virtual contact problems. The connector must have anti-corrosion, wear-resistant and shock-resistant functions.
- (2) Various connections must meet the relevant national standard requirements to strictly prevent various forms of arc discharge
- (3) The connection between the internal cell must have anti-vibration and anti-loosening devices, and the temperature, voltage, and current sensor connections also need to be safe and reliable. Prevent loosening, aging and extrusion. It is strictly forbidden to expose any metal to each induction line.
- (4) Strictly prevent any form of short circuit during connection
- (5) DO NOT to operate with bare hands without wearing protective equipment
- (6) All connections must be made under clear guidance, and any form of guesswork and vague attempts to work are strictly prohibited
- (7) The key points of connection are: make sure the connection is correct, reliable (not loose), good contact (no contact resistance), no short circuit
- (8) After the connection is completed, it must be measured and confirmed point by point
- (9) All connection points must ensure that there is no contact or short circuit with the outer box or other parts
- (10) There are other uncertain factors, you need to consult professionals to confirm before implementation

5.2 Moisture and Waterproof

The battery system is an energy storage device with many control circuits and single cells. The liquid entering the battery system may cause short circuits, leakage, corrosion of the single cells, electronic circuits and connectors. Therefore, it must be ensured that the battery system will not be soaked by various liquids, the humid air will not enter the battery system, and the battery system must not be exposed to the sun and rain. If the battery system is soaked in liquid or exposed to rain, it needs to be maintained immediately. The battery system installation space must fully consider the waterproof function

5.3 Environmental Insulation

The battery system must be kept within the optimal operating temperature range, which can greatly extend the life and improve the safety performance of the battery. The temperature limit should fully meet the various definitions in the specification, and the space where the battery system is installed should be kept ventilated, Insulation function, it is strictly forbidden to directly transfer heat to the battery in direct sunlight or under the sun, or directly dissipate the heat from the battery to the outside in cold winter

5.4 Anti-shock and Anti-collision

The internal cells of the battery system are connected in series and build with the management system and various sensing devices. The battery system must be installed firmly and reliably without any loosening and shaking. It is strictly forbidden to flip or tilt the battery system. At the same time, a shock-proof buffer gasket must be installed at the bottom of the battery system to prevent the battery system from vibrating violently during use and affecting the reliability of the battery connection. The periphery of the installation space of the battery system must be provided with anti-collision protection devices of sufficient strength to ensure that the general collision will not directly damage the battery system and the cell, resulting in battery safety accidents (direct short circuit, overheating, combustion, etc.)

5.5 Precautions

1. Non-professionals are not allowed to carry out installation and maintenance without authorization
2. DO NOT immerse the product in water. When temporarily not in use, it should be placed in a cool and dry environment
3. DO NOT use or leave the product near a source of high heat or high temperature
4. DO NOT use cleaning solutions or corrosive liquids to wipe the surface of the product
5. DO NOT directly connect the "+" and "-" terminals of the product with metal
6. DO NOT disassemble products and components
7. DO NOT knock or throw, step on, bump, or vibrate the product

5.6 Insulation Protection

All power connections build-in the battery system must be provided with sufficient insulation protection measures to ensure that the positive and negative terminals of the battery will not contact the outer box under any circumstances, resulting in leakage and short circuit. It is absolutely necessary to ensure that the positive and negative terminals of the battery system will not be directly short circuited at any time, otherwise major safety and electric shock accidents may be caused

5.7 Accident Handling

In case of abnormalities and accidents in the battery system, correct and effective treatment measures shall be taken in time to eliminate further damage and expanded loss

1. Overheating: under normal circumstances, when the cell of the battery system is overheated, the cooling system of the battery will automatically dissipate heat to cool the battery system to the optimal working temperature range. When the battery system cannot cool to the target temperature within the specified time or the temperature of the battery system exceeds the upper limit of safe use, the management system will give a warning and ask to stop using it immediately. In this case, The battery shall be stopped to use immediately, and relevant technicians shall be notified to conduct comprehensive inspection. It can be used again after troubleshooting
2. Leakage: During use, if the battery system is found to be leaking, the personnel in the energy storage room must be evacuated immediately, and the relevant technical personnel must be notified immediately to deal with it. The battery can be used after troubleshooting. It is strictly forbidden to work or continue to use the battery with illness
3. Over-discharge: When the battery system power is used up, the overall voltage is too low or some individual cell voltage is lower than its normal operating voltage range, the BMS will give a warning and request to stop using the battery and charging immediately, It must be stopped to discharge, and start to charge to the battery. It is strictly forbidden to continue to discharge the battery forcibly at this time, it will damage the performance of the battery, and in severe cases, the battery may be permanently damaged and cannot be used continuously.

4. Short circuit: In case of short circuit of the battery system caused by various reasons, the personnel in the energy storage room must be evacuated immediately, the relevant power supply and electrical equipment (if possible) should be cut off, the connection between the battery and the system should be immediately disconnected, and the relevant technical personnel should be immediately notified to attend the repair. After troubleshooting, the battery that has been severely short-circuited will not be able to be used again. It must be fully inspected by the manufacturer before it can be determined whether it can be partially repaired and used.
5. Combustion: In the event of a combustion accident of the battery system caused by various reasons, the personnel in the energy storage room must be evacuated immediately. At the same time, no unrelated personnel are allowed to approach the energy storage room within the safe range (because there may be a danger of explosion), and special fire extinguishers should be used by professionals. After the fire is extinguished, the personnel wearing the necessary protective equipment should first cut off the power connection line, and the battery system should be fully discharged (voltage to zero volts) with the resistance, and then the battery system can be removed for subsequent operation analysis.
6. Collision of battery system: if the battery system is impacted, deformed or pierced by foreign matters due to various reasons, the power connection line of the battery shall be disconnected immediately and professional technicians shall be notified to deal with it on site. If the battery needs to be removed, the personnel wearing necessary protective equipment shall charge and discharge the battery before disassembly
7. Other accidents: When the battery system needs to be repaired or removed due to other accidents, the battery line should be disconnected first to ensure that the battery will not be short-circuited. If it is damaged in various situations such as inversion, please refer to the above regulations to deal with it.

5.8 Warning


Warning

Batteries are potentially dangerous and proper precautions must be taken during operation and maintenance!
Improper operation of the test experiments described in this specification may result in serious personal injury and property damage!
Batteries must be handled with correct tools and protective equipment!
Maintenance of batteries must be performed by persons with battery expertise and safety training!
Failure to follow the above warnings can result in multiple disasters!

5.9 Maintenance

1. The customer is obliged to formulate a reasonable maintenance plan, such as monthly dust removal, battery performance inspection, etc., to ensure the normal use of the product
2. For scrapped products, they should be recycled immediately by designated qualified manufacturers, and it is strictly forbidden to casually discard them, causing safety accidents or serious environmental pollution
3. During long-term storage, the battery needs to be charged to between 40% and 50% every six months

5.10 Precautions

 Warning	
Power should be reduced during charging and discharging	[Warning]: Warning @Overall voltage high, the power should be reduced during charging
	[Warning]:Warning @Overall voltage low, the power should be reduced during discharging
	[Warning]:the power should be reduced during charging when the single cell voltage is high
	[Warning]:the power should be reduced during discharging when the single cell voltage is low
	[Warning]: the power should be reduced during the charging and discharging@The battery temperature is more than 50°C
	[Warning]: The power should be reduced during the discharging @battery temperature less than -15°C
	[Warning]:The power should be reduced during charging when the charge current more than 50A;Otherwise, the battery life may be affected
	[Warning]:The power should be reduced during discharging when the discharge current more than 50A;Otherwise, the battery life may be affected
The battery needs maintenance	[Warning]:When the voltage difference is too large, maintenance is required;Otherwise, the battery life may be affected
Immediately cut off the circuit when Short circuit	[Warning]:In case of short circuit, the circuit shall be cut off immediately. If fuse is burnt out, it shall be replaced

6 After Sales Service

The Amensolar provides customers with a full range of technical support and after-sales service

- Users can obtain services through our company's service phone

Service line: +86-0512-68243965

- The free warranty service period refers to the contract

The following situations are not within the scope of our company's free warranty service

- (1) Failure to operate in accordance with the instruction manual may cause damage to the system or cause malfunctions
- (2) Failure to wire and power supply in accordance with relevant electrical safety regulations, or damage or failure caused by poor site environment
- (3) User's unauthorized modification, resulting in system damage or resulting failure
- (4) System damage or failure caused by irresistible natural factors such as typhoons, earthquakes, floods, fires, or harsh environments (high temperature, low temperature, high humidity, acid rain, etc.)
- (5) After the failure occurs, the user does not maintain the initial failure state, and does not notify the manufacturer in time to handle it by himself, so that it is impossible to make a realistic failure identification on the cause of the failure



Amensolar Ess Co.,Ltd
Product Manuals

DOC NO.: _____
VER. : _____
FORM NO.: _____

Attention

Dear Mr. _____/Company:

Thank you for purchasing and using our company's products!

Since the product you purchased is a technical product, you need to use it strictly in accordance with the operating instructions on the manual. Please make sure to read and understand the manual carefully before operating the product.

If the operation instructions shown in the manual are violated, the product may be damaged, out of control, smoke, fire and other serious consequences.

Beg to be excused!

Amensolar Ess Co.,Ltd

Date: 2022.03.20