Product User Manual
(SAS-AIO-5.12)

Energy Storage Controller

Inverter Integrated Machine

Preface

First of all, thank you for purchasing our Energy Storage Controller Inverter Integrated Machine!

This manual introduces the functional characteristics and usage of Energy Storage Controller Inverter Integrated Machine, including product parameters, installation and commissioning, fault maintenance check, etc. Please be sure to read this manual carefully before use.

Attention
➢ Please read the corresponding warning signs and the corresponding battery type specifications carefully before installing and using the equipment. ➢ Do not disassemble the equipment, if you need equipment repair and maintenance, please go to the designated maintenance center, if improper operation may lead to electric shock or even fire. ➢ To reduce the risk of electric shock, disconnect all circuits before performing repairs and maintenance. ➢ Warning: The battery must be installed by a professional technician. ➢ For maximum product functionality and efficiency, please configure the cable type as specified in the product. ➢ Please be careful to use metal tools for loading and unloading work to avoid short circuit and explosion caused by metal conductors. ➢ Equipment grounding requirements: Please select a permanently fixed place for product wiring! ➢ Do not short-circuit the AC output and DC input. Do not connect the power supply when the DC input is short-circuited. ➢ Warning! Only qualified service personnel should service this equipment. If the error persists after the troubleshooting sheet, return this unit to your local dealer or service center for maintenance.

Table of Contents

Chapter 1 Safety Information and Precautions 1

Chapter 2 Product Information 3

2.1 Introduction 3

2.2 Functional Features 3

2.3 System schematic 3

2.4 Product Size (Unit:mm) 4

Chapter 3 Energy Storage Inverter Product Introduction 6

3.1 Product Size (Unit: mm) 6

3.2 Interface Description 6

3.3 Installation Instructions 7

3.4 Equipment Operation 11

3.5 Fault Codes 26

3.6 Technical Specifications 27

3.7 Troubleshooting 28

3.8 System Maintenance 30

3.9 Other Functions 31

Chapter 4 Storage Battery Introduction 32

4.1 Product Size (Unit: mm) 32

4.2 Appearance is introduced 32

4.3 Technical Specifications 33

4.4 ComparisontableofDIPswitchsettings 34

4.5 LED indicator description 35

4.6 Safety and precautions 38

Chapter 1 Safety Information and Precautions

Safety Definition: In this manual, safety precautions are divided into the following two categories:

⚠ Danger: A situation in which serious injury, or even death, may result from a hazard caused by failure to operate as required;

⚠ Caution: Hazards caussed by failure to operate as required, which may result in moderate injuries or minor injuries, and equipment damage;

Please read this chapter carefully when installing, commissioning and maintaining this system, and be sure to follow the safety precautions required by the contents of this chapter. Any injury or loss caused by irregular operation is not the responsibility of our company.

Usage Stage	Security Level	Item
Before installation	⚠ Danger	➢ Do not install the equipment if you find water, missing parts or damaged parts when you open the box! ➢ If the packing list does not match the actual name, please do not install it!
	⚠ Attention	➢ Handling should be done gently, otherwise there is a risk of damage to the equipment! ➢ Please do not use equipment with damage or missing parts. There is a risk of injury! ➢ Do not touch the components in the equipment with your hands, otherwise there is a risk of electrostatic damage!
At installation	⚠ Danger	➢ Please install on metal and other flame retardant objects; keep away from combustible materials. Otherwise it may cause fire! ➢ Do not unscrew the fixing bolts of the equipment components at will.
	⚠ Attention	➢ You can't just open the device case! ➢ Please install the equipment in a place with little vibration and avoid direct sunlight.
Wiring time	⚠ Danger	➢ The instructions in this manual must be followed and the work performed by professional electrical engineers, otherwise unexpected dangers can occur!
	⚠ Attention	➢ Pay attention to the markings of the terminals, do not connect the wrong line! Otherwise cause equipment damage! ➢ Please refer to the recommendations in the manual for the wire diameter of the wire used. Otherwise accidents may occur!
Before power on	⚠ Danger	➢ Please confirm whether the voltage level of the input power supply is the same as the rated voltage level of this equipment; whether the wiring of the terminals is correct; and check whether there is a short circuit in the peripheral circuit connected with this equipment and whether the connected lines are tight, otherwise it will cause damage to the equipment! ➢ Any part of the equipment does not need to be tested for voltage resistance, the product has been tested at the factory. Otherwise it will cause an accident!
	⚠ Attention	➢ The wiring of all peripheral accessories must comply with the instructions in this manual and be wired correctly according to the circuit connection method provided in this manual. Otherwise cause an accident!

Usage Stage	Security Level	Item
After power on	Danger	➢ Do not open the cover after the power is applied. Otherwise there is a risk of electric shock! ➢ Do not touch the equipment and surrounding circuits with wet hands. Otherwise there is a risk of electric shock! ➢ Do not touch any input and output terminals of the device. Otherwise there is a risk of electric shock!
	Attention	➢ Please do not change the manufacturer's parameters of the equipment at will. Otherwise, damage to the equipment may result!
In operation	Danger	➢ Non-technical professionals should not test the signal while the equipment is in operation. Otherwise it may cause personal injury or equipment damage!
	Attention	➢ When the equipment is running, avoid having something fall into the equipment. Otherwise cause damage to the equipment! ➢ Do not start and stop the equipment frequently, otherwise it will cause damage to the equipment!
Maintenance time	Danger	➢ Do not perform maintenance and repair on the equipment without professional training. Otherwise, personal injury or equipment damage will result! ➢ Please do not carry out maintenance and repair of the equipment with electricity. Otherwise there is a risk of electric shock! ➢ Make sure that the input power of the equipment is disconnected for 10 minutes before implementing maintenance and repair of the equipment, and pay attention to the residual charge on the capacitor when maintenance will cause harm! ➢ All pluggable plug-ins must be plugged in the case of power failure!

Chapter 2 Product Information

2.1 Introduction

The Energy Storage Controller Inverter Integrated Machine combines the functions of inverter, MPPT solar controller and utility charging to provide stable power supply for power-using equipment in areas with no power, lack of power and unstable power. The product is based on a fully digital intelligent design with advanced SPWM technology, outputting pure sine wave, converting DC power into AC power, suitable for AC loads such as household appliances, power tools, industrial equipment, electronic video and audio. LCD screen display design, real-time display of system operation data and operating status. Comprehensive electronic protection function ensures the whole system is safer and more stable.

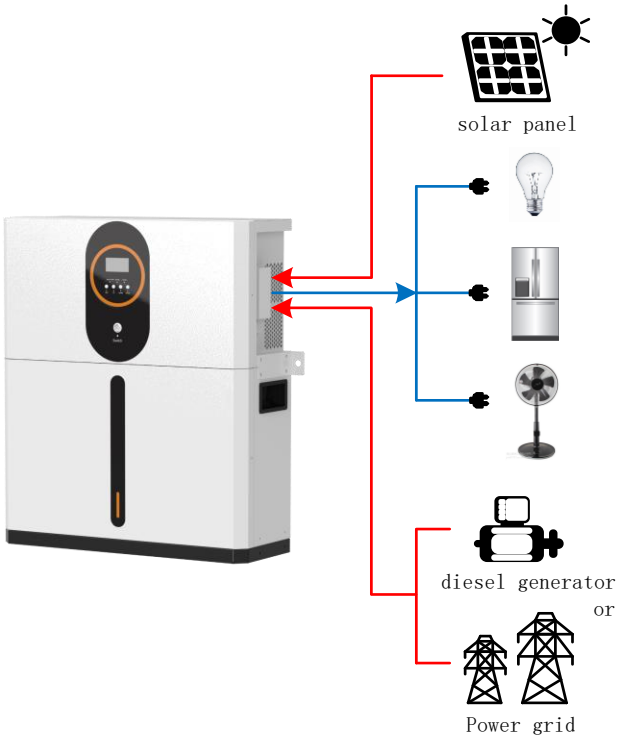
2.2 Functional Features

- Pure sine wave inverters;
- Integrated MPPT controller/charger;
- Settable priority of utility and PV power supply;
- Wide PV input voltage;
- Settable battery type, supporting lead-acid and lithium batteries;
- Functions and parameters can be set via the LCD;
- With battery equalization function to optimize battery performance and extend battery life.

2.3 System schematic

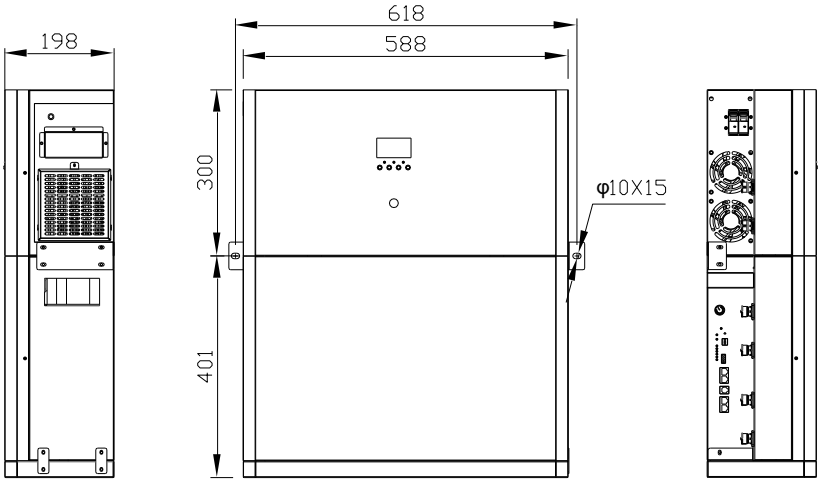
The following figure shows the system application scenario of this product. A complete system includes the following parts:

1. **Photovoltaic module:** Convert light energy into DC electric energy, charge the battery through energy storage inverter, or directly reverse it into AC to power the load.
2. **Utility or generator:** Connected at the AC input, it can supply power to the load and charge the battery at the same time. If no utility or generator is connected, the system can also operate normally, when the load power is provided by the battery and PV module.
3. **Battery:** The role of the battery is to ensure the normal use of power for the system load when the solar energy is insufficient and there is no utility power.
4. **Household load:** It can access various household and office loads, including refrigerators, lamps, TV sets, fans, air conditioners and other AC loads.
5. **Energy Storage Controller Inverter Integrated Machine:** The energy conversion device of the whole system.



System schematic

2.4 Product Size (Unit:mm)



All-in-one assembly steps

① Stack the inverter and the battery vertically, and lock fixing piece;

② Fix the all-in-one machine to the wall;

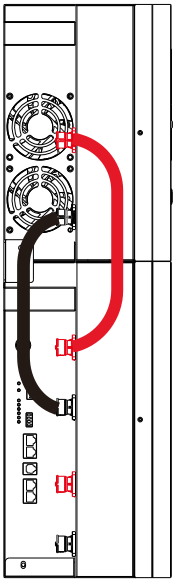
③ Connect the positive and negative terminals of the battery input to the inverter, as shown in the figure on the right;

④ Connect to photovoltaic input;

⑤ Connect to the utility-power input;

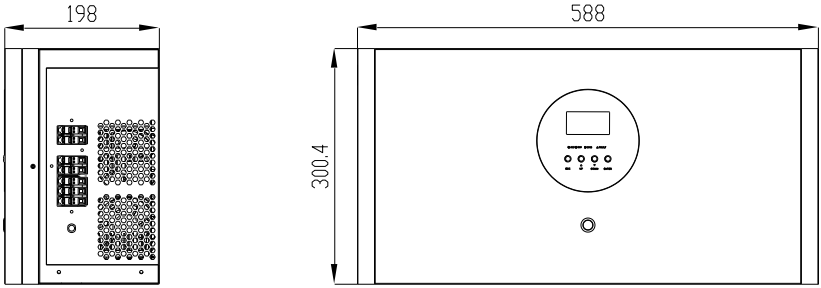
⑥ Connect to AC output load.

（④ ⑤ ⑥ See 3.3.2 connection for details）

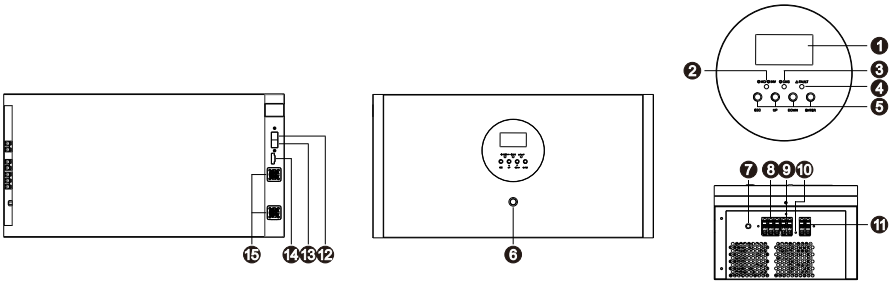


Chapter 3 Energy Storage Inverter Product Introduction

3.1 Product Size (Unit: mm)



3.2 Interface Description



1、LCD display

2、Status indicator

3、Charging indicator

4、Fault indicator

5、Function button

6、Switch button

7、Circuit break switch

8、Mains input interface

9、Load output interface

10、Ground connection

11、PV input interface

12、COM communication interface

13、BMS communication interface

14、Dry contact

15、Battery interface

3.3 Installation Instructions

3.3.1 Wiring specifications and circuit breaker selection

Wiring and installation methods must comply with national and local electrical code requirements.

Recommended PV array wiring specifications and circuit breaker selection: Since the output current of PV array is affected by the type of PV module, connection method and light angle, the minimum wire diameter of PV array is calculated according to the short-circuit current of PV array; please refer to the short-circuit current value in the PV module specification (the short-circuit current remains the same when PV modules are connected in series; the short-circuit current is the sum of the short-circuit currents of all parallel-connected modules when they are connected in parallel) The short-circuit current of the array must not exceed the maximum PV input current.

- **Refer to the following table for PV input wire size and switches:**

Model	Recommended wire diameter	Maximum PV input current	Maximum PV input current
5KW 48V	6mm²/10AWG	18A	2P/25A

Note: The PV panel series time volt input voltage must not exceed the maximum open circuit voltage corresponding to the model.

- **Refer to the following table for recommended AC input wire sizes and switches:**

Model	Recommended wire diameter	Maximum bypass input current	Maximum PV input current
5KW 48V	10mm²/7AWG	40A	2P/40A

Note: There is a corresponding circuit breaker at the utility input wiring, without adding a circuit breaker.

- **Recommended battery access wire size and switch selection**

Model	Recommended wire diameter	Rated battery discharge current	Maximum discharge current	Recommended air switch or circuit breaker models
5KW 48V	30mm²/2AWG	118A	140A	2P/160A

- **Recommended AC output wiring specifications and circuit breaker selection**

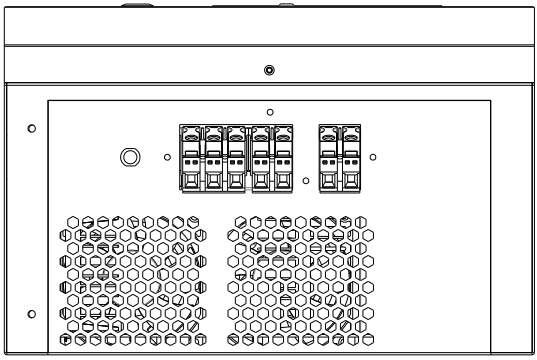
Model	Recommended wire diameter	Rated output current	Bypass maximum current	Recommended air switch or circuit breaker models
5KW 48V	10mm²/7AWG	22.7A	40A	2P/40A

Note: The wire diameter is for reference only. If the distance between the PV array and the storage inverter or between the battery and the storage inverter is long, using a thicker wire can reduce the voltage drop to improve the system performance.

Note: The above wiring diameters and circuit breakers are only recommended, please select the appropriate wiring diameters and circuit breakers according to the actual situation.

3.3.2 connection

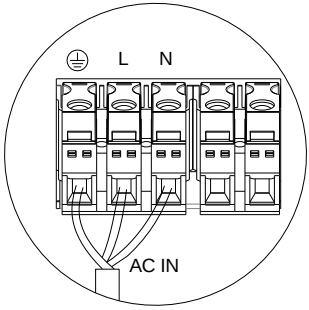
Step 1: Wiring



AC AC input/output wiring method:

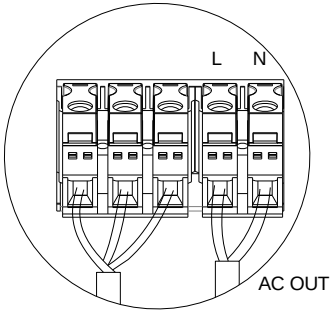
① Disconnect the external circuit breaker before wiring the AC input/output, and verify that the cable used is thick enough;

② Correctly connect the AC input line according to the cable sequence and terminal locations shown in the figure below; please ground the ground wire first, then connect the fire and zero wires;



⏚：Ground Line L：Firewire N：zero line

③According to the cable order and terminal position shown below, correctly connect the AC output line, please ground the wire first, then connect the fire wire and zero wire, the ground wire is connected to the chassis ground screw hole through the O-type terminal.



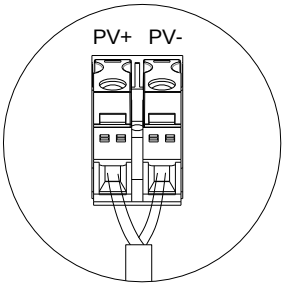
⏚：Ground Line L：Firewire N：zero line

Note: The grounding cable should be as thick as possible (wire cross-sectional area not less than 4mm²), the grounding point should be as close as possible to the energy storage inverter, and the shorter the grounding wire, the better.

PV input wiring method:

① Disconnect the external circuit breaker before wiring and verify that the cable used is thick enough;

② Connect the PV input wires correctly according to the cable sequence and terminal locations shown in the figure below.

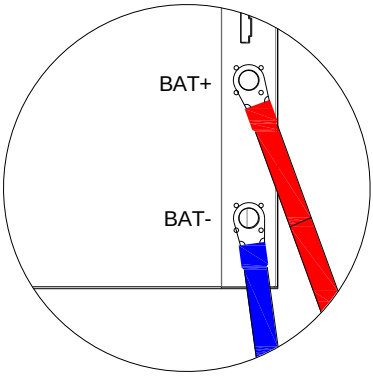


PV+：Input positive pole
PV-：Input negative

BAT Wiring Method:

①Before wiring, disconnect the external circuit breaker and confirm that the cable used is thick enough, the BAT line needs to be connected to the machine through O-terminals, it is recommended to use O-terminals with an inner diameter of 5MM, the O-terminals must be firmly pressed against the BAT line to prevent excessive heating caused by excessive contact impedance;

② Connect the BAT wires correctly according to the cable sequence and terminal positions shown in the figure below.



Warning:

① Utility input, AC output and PV arrays can generate very high voltages; be sure to disconnect the circuit breaker or fuse before wiring;

② During the wiring process, be sure to pay attention to safety; during the wiring process, please do not close the circuit breaker or fuse, and make sure that the "+" and "-" pole leads of each component are connected correctly; a circuit breaker must be installed at the battery end, for its selection, please refer to chapter "Before wiring, be sure to disconnect the circuit breaker to prevent strong electrical sparks during wiring and to avoid battery short circuit during wiring; if the energy storage inverter is used in the area with frequent lightning, it is recommended to install an external lightning arrester at the PV input.

Step 2: Check whether the wiring is connected correctly and firmly, especially check whether the battery input is reversed, the PV input is reversed, and whether the AC input is incorrectly connected to the AC output.

Step 3: Start the energy storage inverter

Firstly, close the circuit breaker of the battery, secondly, press the circular switch on the front of the machine, the "AC/INV" indicator light will flash, which means the inverter is working normally, then close the circuit breaker of PV array and utility, finally, after the AC output is normal, then open the AC load one by one, so as to avoid the large instantaneous shock caused by turning on the load at the same time. The energy storage inverter will work normally according to the set mode.

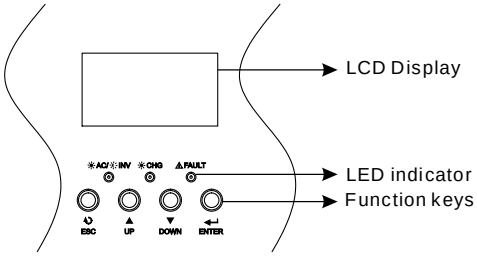
Note: If supplying power to different AC loads, it is recommended to turn on the load with high inrush current first, and then turn on the load with low inrush current after the load has been working stably.

Note: If the energy storage inverter does not work properly or if the LCD or indicator shows abnormal, Refer to 3.7 Troubleshooting.

3.4 Equipment Operation

3.4.1 Running the display panel

The operation display board, as shown in the figure, is located on the front panel of the inverter. It contains 3 indicators, 4 function keys and 1 LCD display for displaying device operation status indication, input and output power information, etc.



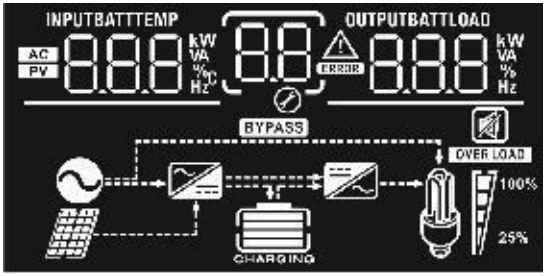
LED indicator

LED indicator			Instruction Information
☀AC/☀INV	Green Light	Always bright	The output is powered by the mains.
		Blinking	The output is powered by batteries or photovoltaic cells.
☀CHG	Green Light	Always bright	The battery is fully charged.
		Blinking	The battery is charging.
⚠FAULT	Red Light	Always bright	The inverter is malfunctioning.
		Blinking	A warning status appears in the inverter.

Function button

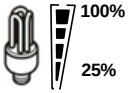
Function Keys	Description
ESC	Return to or exit from setup mode
UP	Go to the previous selection
DOWN	Go to the next selection
ENTER	Press and hold for 3 seconds to enter the setting mode or confirm in the setting mode

3.4.2 LCD display



Icons	Function Description
Input Information	
AC	Prompt utility input
PV	Cue solar input
INPUTBATT 8.8.8 kW VA % Hz	Prompt input voltage, input frequency, PV voltage, battery voltage, charging current, charging power
Configuration items and fault messages	
88	Tip setting items
8.8 ERROR	Prompts a warning or fault code Warning: 8.8 displays a warning code when flashing Fault: 8.8 ERROR light on to show fault code
Output Information	
OUTPUTBATTLOAD 8.8.8 kW VA % Hz	Prompt for output voltage, output frequency, load percentage, load power and discharge current
Battery Information	
CHARGING	Indicates the remaining battery power 0-24%, 25-49%, 50-74%, 75-100%.

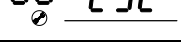
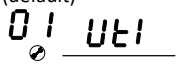
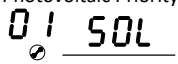
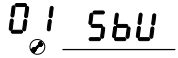
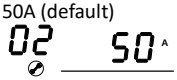
0～24%	25 to 49%	50 to 74%	75 to 100%
			

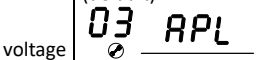
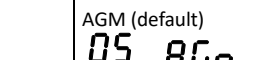
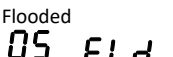
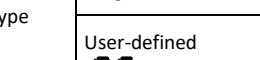
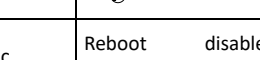
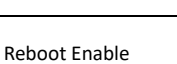
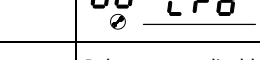
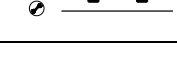
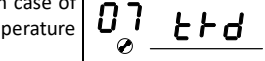
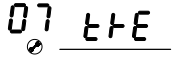
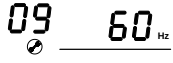
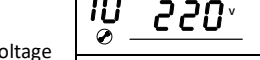
<table>
<tr><th>Icons</th><th colspan="4">Function Description</th></tr>
<tr><td colspan="5">Load Information</td></tr>
<tr><td>OVER LOAD</td><td colspan="4">Prompt overload</td></tr>
<tr><td rowspan="3"> 
</td><td colspan="4">Prompt load capacity: 0～24%, 25～49%, 50～74%, 75～100%</td></tr>
<tr><td>0～24%</td><td>25 to 49%</td><td>50 to 74%</td><td>75 to 100%</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td colspan="5">Mode operation information</td></tr>
<tr><td>  </td><td colspan="4">Indicates that the device is connected to the mains</td></tr>
<tr><td>  </td><td colspan="4">Indicates that the device is connected to the solar panel</td></tr>
<tr><td>BYPASS</td><td colspan="4">Indicates that the load is powered by the mains</td></tr>
<tr><td>  </td><td colspan="4">Indicates that the load charger circuit is operating</td></tr>
<tr><td>  </td><td colspan="4">Indicates that the DC/AC inverter circuit is operating</td></tr>
<tr><td colspan="5">Silent operation</td></tr>
<tr><td>  </td><td colspan="4">Indicates that the device alarm is not available</td></tr>
</table>

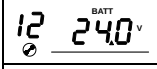
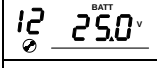
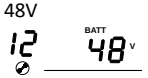
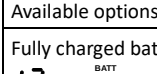
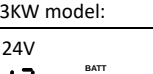
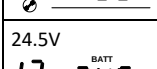
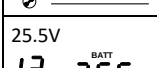
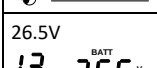
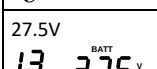
3.4.3 LCD Settings

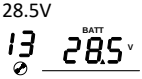
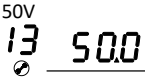
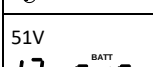
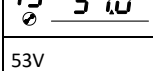
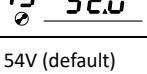
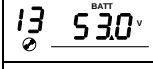
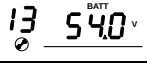
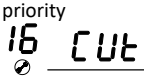
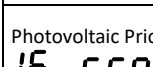
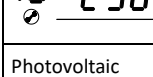
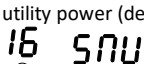
Press and hold the "ENTER" key for 3 seconds, the device will enter the setting mode. Press the "UP" or "DOWN" key to select the setting item. After that, press "ENTER" key to confirm the selection or press "ESC" key to exit.

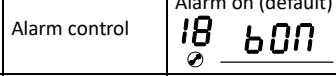
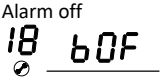
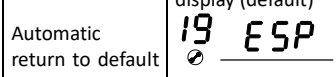
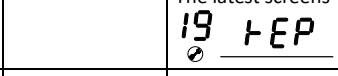
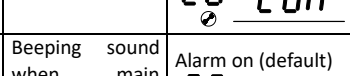
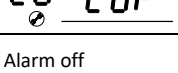
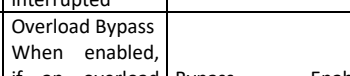
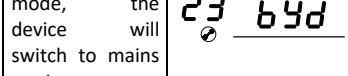
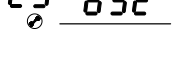
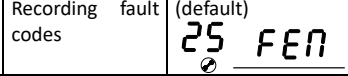
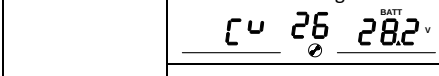
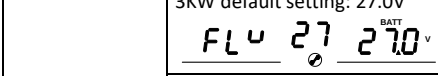
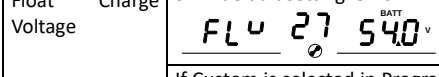
Setting items:

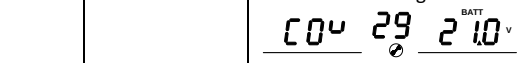
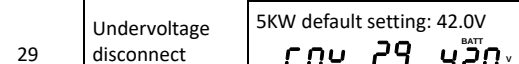
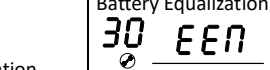
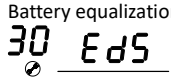
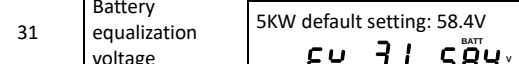
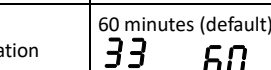
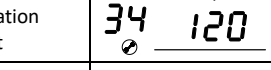
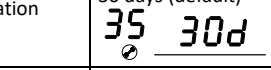
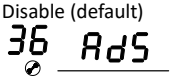
Procedures	Description	Available options	
00	Exit setup mode	Exit 	
01	Output power priority: Configure load power priority	Utility priority (default) 	Utility power will have priority in supplying power to the load. Solar and batteries will only supply power to the load when utility power is not available.
		Photovoltaic Priority 	Solar power is prioritized to provide power to the load. If the solar energy is not enough to power all connected loads, the battery will power the loads at the same time. Utility power is supplied to the load only when any of the following conditions occur: -Solar energy is not available; -The battery voltage drops to the undervoltage warning voltage value or to the setting in program 12.
		SBU Priority 	Solar power is given priority to the load. If there is not enough solar power to supply all connected loads, the battery will supply power to the loads at the same time. Utility power is supplied to the load only when the battery voltage drops to the undervoltage warning voltage value or the set value in program 12.
02	Maximum charge current: The total charge current of the configured solar and mains charger. (Maximum charging current = mains charging current + solar charging current)	50A (default) 	The setting range is from 10A to 100A. The increment per click is 10A. Please refer to " for specific model setting range 3.6 Main technical parameters "

Procedures	Description	Available options	
03	AC input voltage range	Household appliances (default) 	If selected, the acceptable AC input voltage range will be between 90 and 280 VAC
		UPS 	If selected, the acceptable AC input voltage range will be between 170 and 280 VAC
05	Battery Type	AGM (default) 	Flooded 
		User-defined 	If "User defined" is selected, the battery charge voltage and undervoltage values can be set in programs 26, 27 and 29.
06	Automatic restart in case of overload	Reboot disabled (default) 	Reboot Enable 
07	Automatic restart in case of overtemperature	Reboot disabled (default) 	Reboot Enable 
09	Output Frequency	50Hz (default) 	60Hz 
10	Output Voltage	220V 	230V (default) 
		240V 	
11	Maximum mains charging current Note: If the set value in program 02 is less than the set value in program 11, the inverter will apply charging current to the mains charger from program 02.	30A (default) 	Set the range to 2A, and then from 10A to 100A. The increment per click is 10A. Please refer to " for specific models can be set up range 3.6 Main technical parameters "

Procedures	Description	Available options	
12	When "SBU priority" or "PV priority" is selected in program 01, the voltage point setting of the mains power supply is returned.	Available options in the 3KW model:	
		22.0V 	22.5V 
		23.0V (default) 	23.5V 
		24.0V 	24.5V 
		25.0V 	25.5V 
		Available options in the 5KW model:	
		44V 	45V 
		46V (default) 	47V 
		48V 	49V 
		50V 	51V 
13	When "SBU priority" or "solar priority" is selected in program 01, the voltage point setting for battery mode is returned.	Available options in the 3KW model:	
		Fully charged battery 	24V 
		24.5V 	25V 
		25.5V 	26V 
		26.5V 	27V (default) 
		27.5V 	28V 

Procedures	Description	Available options	
		28.5V 	29V 
		Available options for 5KW models	
		Fully charged battery 	48V 
		49V 	50V 
		51V 	52V 
		53V 	54V (default) 
		55V 	56V 
		57V 	58V 
16	Charging power priority: Steps to configure charging source priority	If this inverter/charger is operating in Line, Standby or Fault mode, the charger power supply is programmable as follows:	
		Municipal power priority 	Utility power takes priority for battery charging. Solar power only recharges the battery when utility power is not available.
		Photovoltaic Priority 	Solar power gives priority to charging the battery. Utility power will charge the battery only when solar power is not available.
		Photovoltaic and utility power (default) 	Solar power and utility power will charge the battery at the same time.
		Photovoltaic only 	Solar power will be the only source of charging, regardless of the availability of utility power
		If this inverter/charger is working in battery mode, only solar energy can charge the battery. If there is available and enough solar energy it will charge the battery.	

Procedures	Description	Available options	
18	Alarm control	Alarm on (default) 	Alarm off 
19	Automatic return to default display	Return to default display (default) 	If selected, the default display (input voltage/output voltage) will be automatically returned after 1 minute of not pressing the button, regardless of how the user switches the display
		The latest screens 	If checked, the display will keep the user eventually switching to the latest screen
20	Backlight control	Backlight on (default) 	Backlight off 
22	Beeping sound when main power is interrupted	Alarm on (default) 	Alarm off
23	Overload Bypass When enabled, if an overload occurs in battery mode, the device will switch to mains mode	Bypass Enable (default) 	Bypass Disable 
25	Recording fault codes	Record Enable (default) 	Record Disable 
26	Constant voltage charging voltage	3KW default setting: 28.2V 	
		5KW default setting: 56.4V 	
		If Custom is selected in Program 5, the program can be set. 3KW models are set from 25.0V to 31.5V and 5KW models are set from 48.0V to 61.0V in increments of 0.1V per click	
27	Float Charge Voltage	3KW default setting: 27.0V 	
		5KW default setting: 54.0V 	
		If Custom is selected in Program 5, the program can be set. 3KW models are set from 25.0V to 31.5V and 5KW models are set from 48.0V to 61.0V in increments of 0.1V per click	

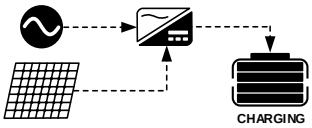
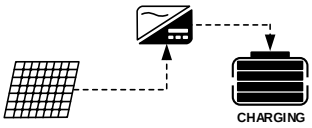
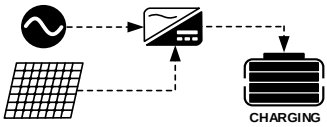
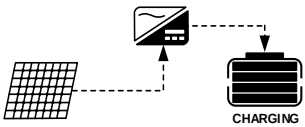
Procedures	Description	Available options	
29	Undervoltage disconnect voltage	3KW default setting: 21.0V 	
		5KW default setting: 42.0V 	
		This program can be set up if Custom is selected in Program 5. 21.0V to 24.0V for 3KW models and 42.0V to 48.0V for 5KW models. 0.1V increments per click. undervoltage disconnect voltage will be fixed at the set value regardless of the percentage of load	
30	Battery Equalization	Battery Equalization 	Battery equalization disabled (default) 
		If "Flooded" or "User Defined" is selected in Program 05, you can set the program	
31	Battery equalization voltage	3KW default setting: 29.2V 	
		5KW default setting: 58.4V 	
		The setting range is 25.0V to 31.5V for the 3KW model and 48.0V to 61.0V for the 5KW model, with increments of 0.1V per click	
33	Battery equalization time	60 minutes (default) 	Set the range from 5 minutes to 900 minutes, with 5 minute increments per click
34	Battery equalization timeout	120 minutes (default) 	Set the range from 5 minutes to 900 minutes, with 5 minute increments per click
35	Equalization interval	30 days (default) 	Set the range from 0 to 90 days, in increments of 1 day per click
36	Equalization starts immediately	Enable 	Disable (default) 
		If equalization is enabled in program 30, you can set this program. If you select "Enable" in this program, battery equalization will be activated immediately and the main LCD page will display "  ". If "Disable" is selected, it will cancel the equalization function until the next active equalization time set according to Program 35. At this time, "  " will not be displayed on the LCD home page.	

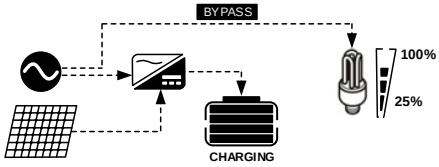
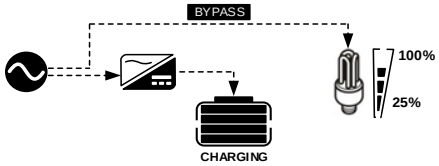
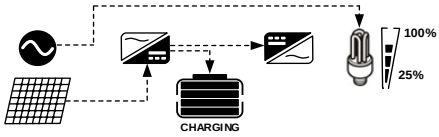
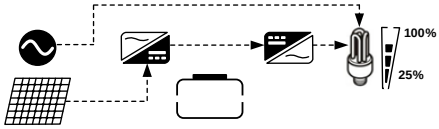
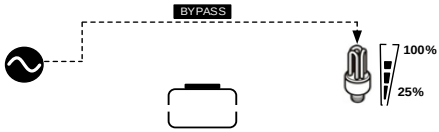
3.4.4 Display Settings

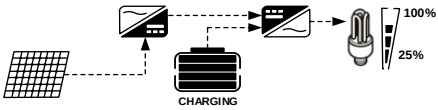
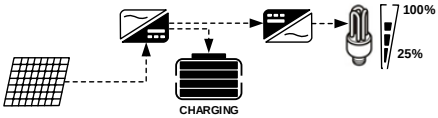
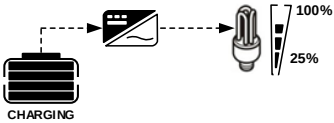
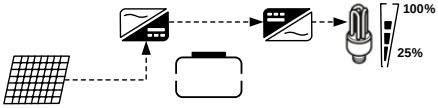
On the main LCD screen, press the "UP" or "DOWN" keys in sequence to page through the inverter's real-time data.

Page	Parameters on the left side of the screen	Middle screen parameters	Parameters on the right side of the screen
1	INPUT AC V (AC input voltage)	Fault Code (fault code, none is not displayed)	OUTPUT V (output voltage)
2	INPUT AC Hz (AC input frequency)		OUTPUT V (output voltage)
3	INPUT PV V (PV input voltage)		OUTPUT V (output voltage)
4	INPUT PV A (PV input current)		OUTPUT V (output voltage)
5	INPUT PV W (PV input power)		OUTPUT V (output voltage)
6	BATT AC/PV A (AC/PV charging current)		OUTPUT V (output voltage)
7	BATT AC/PV W (AC/PV charging power)		OUTPUT V (output voltage)
8	BATT V (battery voltage)		OUTPUT V (output voltage)
9	BATT V (battery voltage)		OUTPUT Hz (output frequency)
10	BATT V (battery voltage)		LOAD % (percentage of load)
11	BATT V (battery voltage)		LOAD VA (Load Apparent Power)
12	BATT V (battery voltage)		LOAD W (load active power)
13	BATT V (battery voltage)		BATT A (battery output current)
14	CPU1 software version number		

3.4.5 Description of operation mode

Operation mode	Description	LCD display
Standby mode Notes: * Standby mode: The inverter is not yet turned on, but at this time, the inverter can charge the battery without AC output.	Inverter does not provide output but can still charge the battery	Charging source from mains and PV 
		Charging source from utility power 
		Charging source from PV 
		No charge 
Fault mode Notes: *Fault mode: errors are caused by internal circuit errors or external causes, such as high temperature, shorted output, etc.	PV and utility power can charge the battery	Charging source from mains and PV 
		Charging source from utility power 
		Charging source from PV 
		No charge 

Operation mode	Description	LCD display
Line mode	The unit will provide output power from the mains. It will also charge the battery in line mode	Charging source from mains and PV 
	The unit will provide output power from the mains. It will also charge the battery in line mode	Charging via mains 
		If "Solar First" is selected as the output source priority and solar is not sufficient to provide load power, solar and utility will provide load power while charging the battery 
		If "Solar First" is selected as the output source priority and no batteries are connected, solar and utility power will supply the load 
		Utility power for the load 

Operation mode	Description	LCD display
Battery mode	The device will provide the output power from the battery and the PV power source.	Load power from battery and PV 
		The PV will supply power to the load while charging the battery. 
		Battery only for load power 
		PV to load power only 

3.4.6 Battery Equalization Description

An equalization function has been added to the charge controller. It reverses the accumulation of negative chemical effects such as stratification in cells where the acid concentration at the bottom is higher than at the top. Equalization also helps to remove sulfate crystals that may build up on the plates. If left unchecked, this condition, called sulfation, will reduce the total capacity of the battery. Therefore, periodic equalization of the battery charge is recommended.

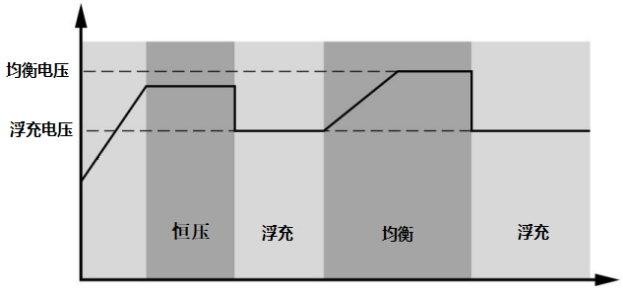
● How to apply the equalization function

The battery equalization feature must first be enabled in LCD setup program 30. You can then apply this feature in the device by any of the following methods:

1. Set the equalization interval in program 35.
2. Active equalization is performed immediately in Program 36.

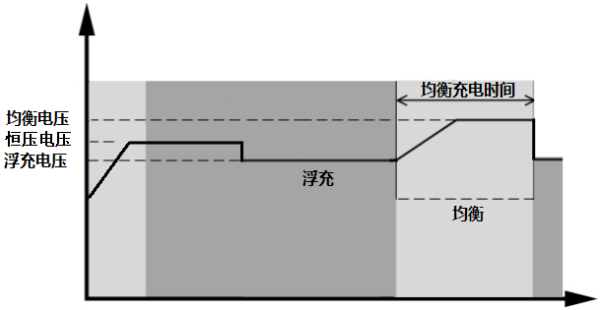
● When to balance

During the float phase, the controller will start to enter the equalization phase when the set equalization interval (battery equalization cycle) is reached or when equalization is activated immediately.

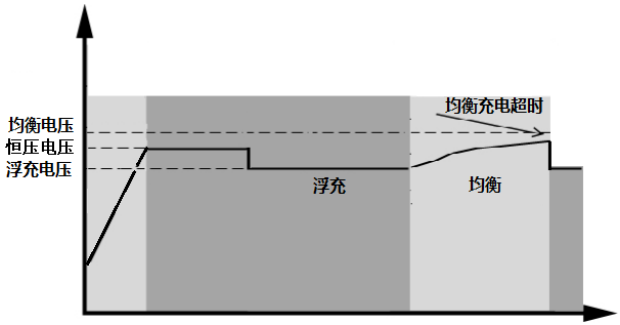


● Balanced charging time and timeout

During the equalization phase, the controller will charge the battery as much as possible until the battery voltage rises to the battery equalization voltage. Then, constant voltage regulation is used to maintain the battery voltage at the battery equalization voltage. The battery will remain in the equalization phase until the set battery equalization time is reached.



However, during the equalization phase, when the battery equalization timeout expires and the battery voltage does not rise to the battery equalization voltage point, the charge controller will extend the battery equalization timeout until the battery voltage reaches the battery equalization voltage. If the battery voltage is still below the battery equalization voltage battery equalization timeout setting ends, the charge controller will stop equalization and return to float charging.



3.4.7 Battery type parameter table

Parameter \ Battery	Sealed Lead Acid (AGM)	Open-ended Lead Acid (FLD)	Customization (USE)
Constant voltage charging voltage	28.2V/56.4V	29.2V/58.4V	25V～31.5V/48V～61V (adjustable)
Float Charge Voltage	27V/54V	28V/55.2V	25V～31.5V/48V～61V (adjustable)
Undervoltage alarm voltage	23V/46V	23V/46V	25V～31.5V/42V～48V
Low voltage disconnect voltage	21V/42V	22V/42V	21V～24V/42V～48V (adjustable)
Over-voltage disconnect voltage	33V/63V	32V/62V	25V～33V/42V～63V
Equalized charging voltage	29.2V/58.4V	30.2V/59.2V	25V～31.5V/48V～61V (adjustable)
Equilibrium duration	120 minutes	120 minutes	5 minutes ~ 900 minutes (adjustable)
Balanced charging interval	30 days	30 days	5 minutes ~ 900 minutes (adjustable)

3.5 Fault Codes

3.5.1 Inverter fault codes

Fault Code	Description
01	Fan failure
02	Over temperature or loose connection of temperature sensor
03	Battery voltage is too high
04	Battery voltage is too low
05	Internal conversion components detect a shorted output or high temperature
06	Output voltage is too high
07	Overload timeout
08	Bus voltage is too high

Fault Code	Description
09	Bus soft start failure
51	Overcurrent
52	Bus voltage too low
53	Inverter soft start failure
55	Excessive DC voltage in AC output
57	Current sensor failure
58	Output voltage too low
59	PV voltage overrun

3.5.2 Inverter Alarm Codes

Warning Codes	Description
01	Fan is locked when inverter is started
02	overheating
03	Battery overcharge
04	Low battery power
07	Overload
10	Output power derating
15	Lower solar voltage
16	High AC input during bus soft start
E9	Battery Equalization
bP	Battery not connected

3.6 Technical Specifications

Power Rating		3.5KW	3KW	5.5KW	5KW	3.5KW	3KW
Output	Voltage (battery mode)	Single-phase 220VAC/230VAC/240VAC settable, ±5%					
	Conversion efficiency (peak)	93%					
	Switching time	10ms (personal computers); 20ms (home appliances)					
	Waveform	Pure sine wave					
Battery	Battery voltage	24VDC		48VDC			
	Constant voltage charging voltage	28.2 VDC		56.4VDC			
	Float Charge Voltage	27VDC		54VDC			
	Overcharge protection	33VDC		63VDC			
Photovoltaic charger	Maximum input power	4KW	3.5KW	6KW	5KW	4KW	3.5KW
	MPP Range @ Operating Voltage	120 to 450VDC					
	Maximum input voltage	500VDC					
	Maximum charging current	100A			80A		
AC Charger	AC input voltage	230VAC					
	Voltage Range	90 to 280VAC (home appliances) / 170 to 280VAC (personal computers)					
	Frequency range	50Hz/60Hz (adaptive)					
	Maximum charging current	100A			60A		
Basic parameters	Dimension (L*W*Th)	588*300.4*198mm					
	Weight (kg)	9			10		
	Communication Interface	RS485/CAN/Dry contact					
Working Environment	Operating temperature	0℃～+50℃					
	Storage temperature	-30℃～+70℃					
	Humidity	5%～95% relative humidity (non-condensing)					
	Protection level	IP20					

3.7 Troubleshooting

Fault name	LCD/LED/Buzzer	Troubleshooting	Troubleshooting countermeasures
Automatic shutdown of the inverter during start-up	LCD/LED and buzzer will activate for 3 seconds, then turn off completely	Battery voltage is too low	1. Recharge the battery. 2. Replace the battery.
No response after power on	No signs	1、Battery voltage is too low 2 、 Battery polarity connection reversed	1、Check if the battery and wiring are well connected. 2. Recharge the battery. 3. Replace the battery.
Power is present, but the inverter is operating in battery mode.	The input voltage is displayed as 0 on the LCD and the green LED flashes	Input protector tripped	Check whether the AC circuit breaker is tripped and whether the AC wiring is good
	Green LED blinking	Inadequate quality of AC power supply	1、Check if the AC line is too thin and/or too long 2. Check that the generator (if applied) is working properly or that the input voltage range is set correctly.
	Green LED blinking	The priority of the output source is set to "PV priority"	Change output source priority to utility priority
Internal relays repeatedly open and close when the unit is opened	LCD display and LED flashing	Battery disconnect	Check if the battery cable is well connected
Buzzer beeps continuously and red LED lights up	Fault code 07	Overload failure. Inverter overload 105% and time is up	Reduce the load on the connection by turning off some devices
		If the PV input voltage is higher than the specification, the output power will be reduced. In this case, if the connected load is higher than the derating output power, it will lead to overload	Reduce the number of series-connected PV modules or connected loads.
	Fault code 05	Output short circuit	Check if the wiring is good and eliminate abnormal load
		Inverter internal temperature exceeds 120°C	Check if the air inlet and outlet of the inverter are blocked or if the ambient temperature is too high.
	Fault code 02	Internal temperature of inverter components exceeds 100°C	

Fault name	LCD/LED/Buzzer	Troubleshooting	Troubleshooting countermeasures
	Fault Code 03	Battery overcharge	Return to the repair center.
		Battery voltage is too high	Check whether the battery specifications and quantity meet the requirements.
	Fault code 01	Fan failure	Fan replacement
	Error code 06/58	Abnormal output (inverter voltage below 190Vac or above 260Vac)	1、Reducing connection and load 2、Return to repair center
	Fault Code 08/09/53/57	Internal Failure	Back to Repair Center
	Fault code 51	Overcurrent or surge	Restart the device and if the error occurs again, return to the service center.
	Fault code 52	Bus voltage too low	
	Fault code 55	Output voltage unbalance	
	Fault code 59	Photovoltaic input voltage is out of specification.	Reduce the number of series-connected PV modules.

3.8 System Maintenance

In order to maintain optimal and long-lasting working performance, it is recommended that the following items be checked twice a year

① Verify that airflow around the storage inverter is not blocked and remove any dirt or debris from the heat sink.

② Check that all exposed wires are not damaged by sunlight, friction with other surrounding objects, dry rot, insect or rodent damage, etc. If necessary, the wires need to be repaired or replaced.

③ Verify that the instructions and displays are consistent with the operation of the device, and note any faults or error displays to take corrective action if necessary.

④ Check all terminals for signs of corrosion, insulation damage, high temperature or burning/discoloration and tighten terminal screws.

⑤ Check for dirt, nesting insects and corrosion, and clean up as required.

⑥ If the arrester has failed, replace the failed arrester in time to prevent lightning damage to the energy storage inverter or even other equipment of the user.

 Warning:

Danger of electric shock! Make sure that all power is disconnected from the storage inverter and that the capacitors are fully discharged before carrying out the corresponding checks or operations!

We will not be responsible for damage caused by:

① Damage caused by improper use or use in an unsuitable place.

② The PV module open circuit voltage exceeds the maximum allowable voltage.

③ Damage caused by operating ambient temperature exceeding the restricted operating temperature range.

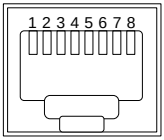
④ Private disassembly and repair of energy storage inverters.

⑤ Damage caused by force majeure: damage occurring during transportation or loading and unloading of the energy storage inverter.

3.9 Other Functions

3.9.1 Communication interface with the host computer/monitoring module

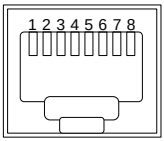
Through COM（RS485-1）communication port and the optional PC/APP developed by our company, the RS485 communication is used to monitor the operation status of Energy Storage Controller Inverter Integrated Machine and set the relevant parameters on the PC/APP.



Pins	Definition	Description
1	RS485_A	RS485 signal A
2	RS485_B	RS485 signal B
4	VCC	Power positive (+12VDC)
8	GND	Power supply negative

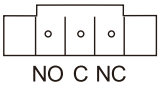
3.9.2 Communication interface with energy storage lithium battery BMS

The BMS（CAN/RS485-2）communication port can be used to communicate with our designated lithium battery BMS, which supports CAN communication by default and has reserved RS485 communication interface.



Pins	Definition	Description
1	RS485_A	RS485 signal A
2	RS485_B	RS485 signal B
4	CAN_H	CAN Communication H
5	CAN_L	CAN Communication L

3.9.3 Dry contact function



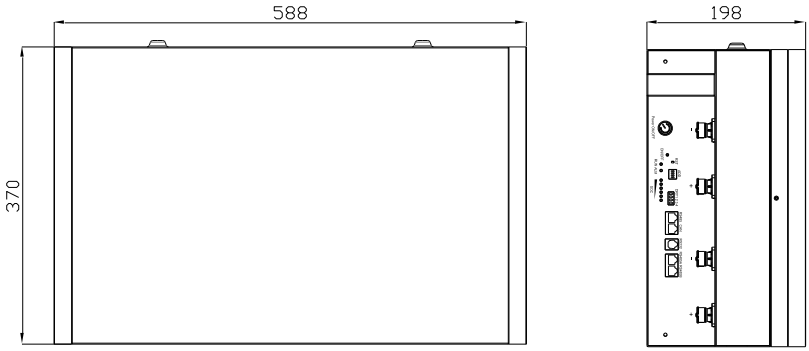
This dry contact can control the diesel generator switch to charge the battery.

Under normal conditions, this terminal is NC-C point closed, NO-C point open; when the battery voltage is lower than the low-voltage disconnect voltage point, the coil of the relay is energized and becomes NO-C point closed and NC-C point open.

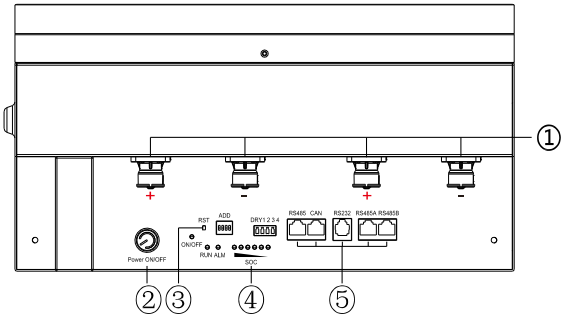
Chapter 4 Storage Battery Introduction

（AIO 5000A 51.2V100AH）

4.1 Product Size (Unit: mm)



4.2 Appearance is introduced



① Output Terminal

② Power Switch

③ Reset Switch

④ Indicator Light

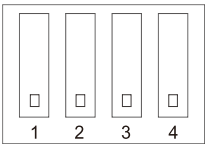
⑤ Communication Interface

4.3 Technical Specifications

Rated capacity	5.12 KWH
Nominal voltage	51.2V
Discharge voltage range	43.2-57.6V
Standard charging current	0.5C@25℃
Max.charging current	1C@25℃
Max.discharge current	1C@25℃
Depth of discharge DOD	0.9
Communication Interface	RS485/RS232/CAN
Cycles	6000 cycles 80%DOD.@25℃
Working Temp.Range	Charge：0℃～ 50°C Discharge：-10℃～ 50°C
Storage temperature(℃)	-15℃～ 50°C
Net weight	44.35/46.4kg
Dimension	588*370*198mm

Recommendation: Charge and discharge the battery every 3 months.

4.4 ComparisontableofDIPswitchsettings



ADS	DIP Switch			
	#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

4.5 LED indicator description

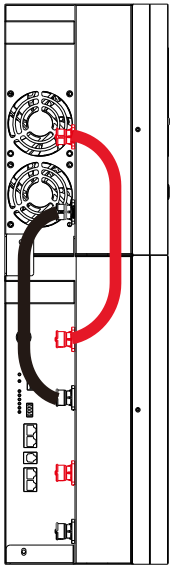
Table 1 LED operating status indication

Status	Normal/Alarm/ Protection	ON/ OFF	RUN	ALM	Power indicator LED						Description
		●	●	●	●	●	●	●	●	●	
Turn off	Dormancy	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Total extinction
Stand-by	Normal	Ever bright	Flash 1	extinguish	Based on power indicator						Standby status
	Alerts	Ever bright	Flash 1	Flash 3							Modular low voltage
Charge	Normal	Ever bright	Ever bright	extinguish	Maximum battery LED flashes (flashing 2), ALM does not flash on overcharge alarm						Maximum battery LED flashes (flashing 2), ALM does not flash on overcharge alarm
	Alerts	Ever bright	Ever bright	Flash 3							
	Overfill protection	Ever bright	Ever bright	extinguish	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	If there is no mains power, the indicator turns to standby
	Temperature,overcurrent, fail-safe	Ever bright	extinguish	Ever bright	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Stop charging
Discha-rge	Normal	Ever bright	Flash 3	extinguish	Based on power indicator						
	Alerts	Ever bright	Flash 3	Flash 3							
	Under-voltage protection	Ever bright	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Stop discharge
	Temperature, overcurrent, short circuit, reverse connection, failure protection	Ever bright	extinguish	Ever bright	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Stop discharge
Failure		extinguish	extinguish	Ever bright	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	Stop charging and discharging

Table 2 Description of capacity indication

Status	Capacity indicator	Amount of electricity						Running light
		0 ~16.6%	16.6 ~33.2%	33.2 ~49.8%	49.8 ~66.4%	66.4 ~83.0%	83.0 ~100%	
Charging	L6	extinguish	extinguish	extinguish	extinguish	extinguish	Flash 2	Ever bright
	L5	extinguish	extinguish	extinguish	extinguish	Flash 2	Ever bright	
	L4	extinguish	extinguish	extinguish	Flash 2	Ever bright	Ever bright	
	L3	extinguish	extinguish	Flash 2	Ever bright	Ever bright	Ever bright	
	L2	extinguish	Flash 2	Ever bright	Ever bright	Ever bright	Ever bright	
	L1	Flash 2	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	
Discharge	L6	extinguish	extinguish	extinguish	extinguish	extinguish	Ever bright	Flash 3
	L5	extinguish	extinguish	extinguish	extinguish	Ever bright	Ever bright	
	L4	extinguish	extinguish	extinguish	Ever bright	Ever bright	Ever bright	
	L3	extinguish	extinguish	Ever bright	Ever bright	Ever bright	Ever bright	
	L2	extinguish	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	
	L1	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	Ever bright	

Connecting Signal Line The signal line delivered with the product together shall be used to connect RS485 interface for each battery module. The communication port of the inverter needs to be connected to the RS485-2 interface.



4.6 Safety and precautions

1. The battery module must be used in conjunction with BMS, and the mixed use of batteries from different manufacturers is strictly prohibited.

2. Check the battery module voltage for damage; if there is any abnormality, please stop using it.

3. It is strictly forbidden to stack the whole trailer battery with fork plate during transportation
and storage,and it is forbidden to stack battery modules when installing and transporting batteries. There are positive and negative lead terminals or sampling line lead ends, and it is strictly forbidden to squeeze, stack and place them down.

4. Parallel matching requirements for battery modules: (Notes before picking and installation)
(1) Two identical models and same capacity, The battery modules of the same voltage are connected in parallel to 51. 2V.
(2) Serial use is strictly prohibited.

5.Parallel wires are included in the battery module packing box, and the parallel wires correspond to the battery modules. Mixed insertion is strictly prohibited.

6.It is forbidden to use or leave the battery module near high temperature and high heat sources, away from fire and water sources.

7.It is forbidden to disassemble the battery module, knock, throw or step on the battery module, and dismantle the BMS and dismantle the yellow tamper-evident sticker without authorization.

8. Before installing the battery module, check whether the open circuit voltage of the battery is within the normal range. The "positive" and "negative" signs are printed on the module, and the electrical properties should be correctly determined. It is strictly forbidden to reverse or short-circuit the battery.

9.Insulation tools and gloves should be used during installation and transportation, and metal-containing conductors such as watches, bracelets (bracelets) and rings should be removed from the wrist to prevent electric shock and short-circuit the positive and negative electrodes. During installation, the battery module poles need to be insulated and protected. If the poles are close to the battery rack and other conductors, the battery poles or battery racks need to be insulated and protected.

10.The recommended transportation method is for two people to carry it at the same time. The transportation tool is a safety rope or a load-bearing net bag. The battery box must be carried to the site. Violent construction is strictly prohibited to damage the product.

11. Installation and maintenance requirements. After the battery module is installed on the wall, the poles and plug-ins are required to achieve frontal maintenance.

12. Please read this installation manual carefully before installation. If you have any questions, please contact your supplizer.