Hybrid Solar Inverter

HE-V-6500

User Manual

V1.0

Table Of Contents

1. Information on this Manual

1.1 Purpose

This manual is valid for the following devices:

HE-V-6500 inverter

1.2 Scope

This manual describes the assembly, installation, operation and troubleshooting of this unit.Please read this manual carefully before installations and operations.

1.3 Target Group

This document is intended for qualified persons and end users. Tasks that do not require any particular qualification can also be performed by end users. Qualified persons must have the following skills:

· Knowledge of how an inverter works and is operated

· Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations

· Training in the installation and commissioning of electrical devices and installations

· Knowledge of the applicable standards and directives

· Knowledge of the compliance with this document and all safety information

1.4 Label Description

In order to ensure the user's personal safety when using this product, the inverter and manual provides relevant identification information and uses appropriate symbols to alert the user, who should carefully read the following list of symbols used in this manual.

Labels on Inverter

	Caution! Failure to observe a warning indicated in this manual may result in injury.
	Danger of high voltage and electric shock!
	Danger of hot surface!
	Component of the product can be recycled.
	This side up!The package must always be transported, handed, and stored in such away that the arrow always points upwards.
	Product should not be treated as household waste.
	Package and products should be handled carefully and never be tipped over or slung.
	Please refer to the operating instructions.
	Keep dry! The package and product must be protected from excessive humidity and must be stored under cover.
	Inverter can be touched or operated at least 5 minutes after being turned off to prevent any electric shock or injury.

1.5 Safety Instructions

01.Before using the unit, read all instructions and cautionary marking on the unit, the batteries and all appropriate sections of this manual. The company has the right not to quality assurance, if not according to the instructions of this manual for installation and cause equipment damage.

02.All the operation and connection please professional electrical or mechanical engineer.

03.All the electrical installation must comply with the local electrical safety standards.

04.When install PV modules in the daytime, installer should cover the PV modules by opaque materials, otherwise it will be dangerous as high terminal voltage of modules in the sunshine.

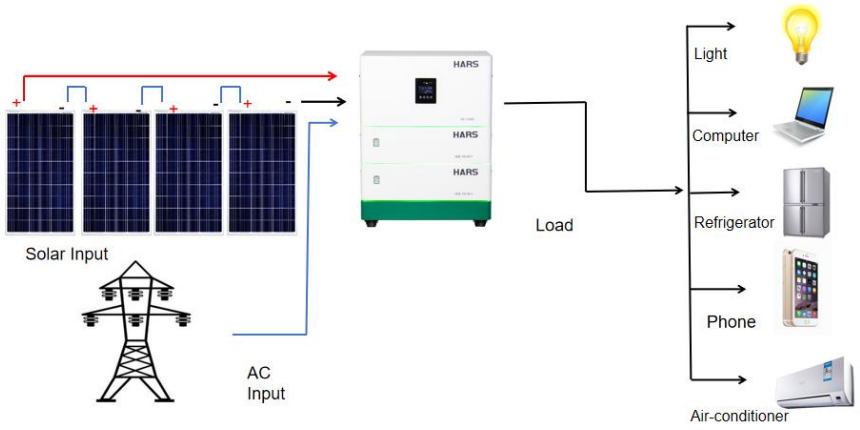
05.Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.

06.To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.

07.For optimum operation of this inverter, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter.

08.Make sure the inverter is completely assembled, before the operation.

2. Introduction



This is a multi-functional solar inverter, MPPT solar charging controller, high frequency pure sine wave inverter and UPS function module in one, suitable for off-grid backup power supply, lithium battery and inverter combined, easy installation, small area, beautiful design, suitable for home use.

The whole system also need other devices to achieve complete running such as PV modules, generator, or utility grid. Please consult with your system integrator for other possible system architectures depending on your requirements. The WiFi /GPRS module is a plug-and-play monitoring device to be installed on the inverter. With this device, users can monitor the status of the PV system from the mobile phone or from the website anytime anywhere.

2.1 Features

·MPPT ranges 120V~450V, 500Voc

·High frequency inverter with small size and light weight

·Pure sine wave AC output

·Solar and utility grid can power loads at the same time

·With CAN/RS485 for BMS communication

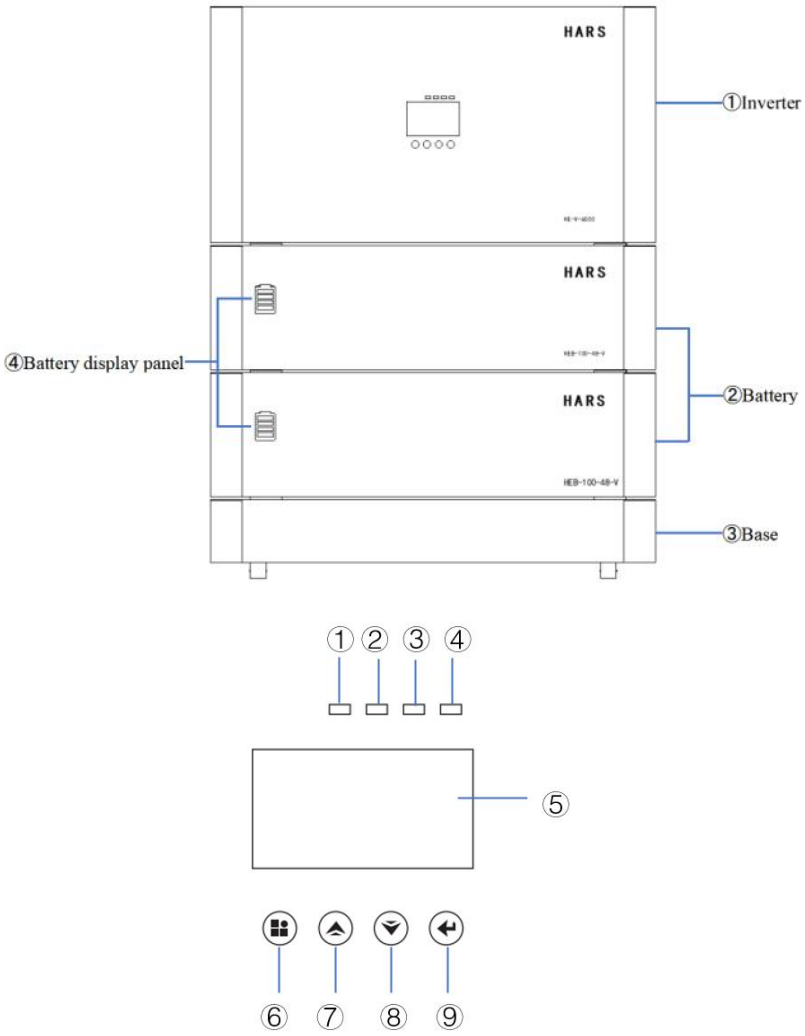
·With the ability to work without battery

·WIFI/ GPRS remote monitoring (optional)

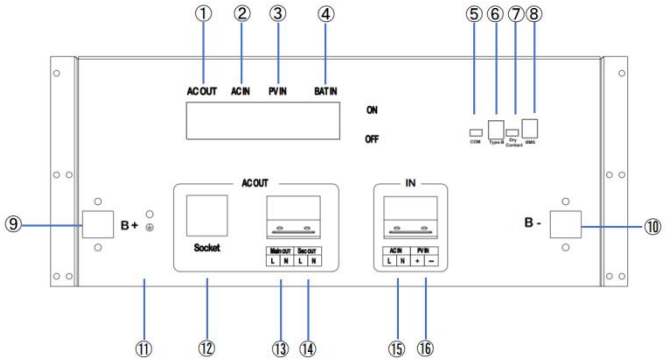
·Dual AC output

·Feed-in to grid

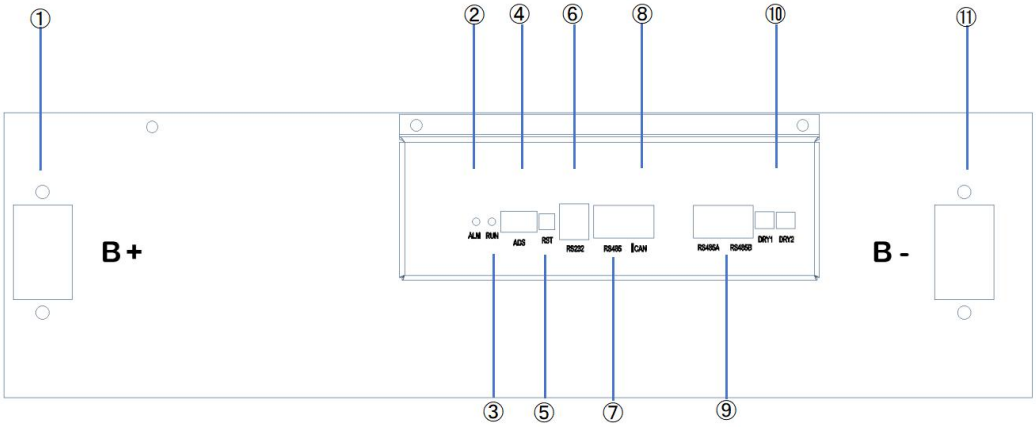
2.2 Product Overview



①AC Indicator	④Fault Indicator	⑦Up Button
②Invert Indicator	⑤LCD Display	⑧Down Button
③Charging Indicator	⑥ESC Button	⑨Enter Button



①AC Output Air Switch	⑨Battery Input Positive
②AC Input Air Switch	⑩Battery Input Negative
③PV Input Air Switch	⑪Ground Connection
④Battery Input Air Switch	⑫Universal socket
⑤WiFi/GPRS Port	⑬Main Output
⑥USB Communication Port	⑭Second Output
⑦Dry Contact	⑮AC Input
⑧BMS Communication Port (Support Can/RS485 Protocol)	⑯PV Input



①Battery Positive	⑦RS485 Port
②Battery Alarm Indicator	⑧CAN Port
③Battery Run Indicator	⑨Parallel port
④Dip switch	⑩Dry Contact
⑤Reset key	⑪Battery Negative
⑥RS232 Port	/

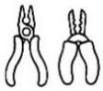
3. Installation

3.1 Unpacking and Inspection

3.1.1 Open-box Inspection

Products have been strictly tested before leaving the factory. Please sign for them after inspection. If the product is damaged, please contact the local distributor. Please open the box to check whether the outer packaging is intact or damaged, whether the internal equipment is damaged.

Installation Tools

Installation Tools	Multi-meter 	Protective gloves 	Insulated anti-smashing shoes 
	Safety glasses 	ESD wrist strap 	Hammer drill 
	Electric screwdriver 	Cross screwdriver 	Rubber mallet 
	Spirit level 	Wire cutter/ stripper 	Terminal crimping tool 

3.1.2 Packing List

No.	Category	Item	Quantity	Description
1	Inverter Box	Solar Inverter	1	
		User manual	1	English
2	Battery Box	Battery	1	
		Straight connector	2	
		Battery Cable	2	1red 1black(0.2m)
		Battery communication line	1	0.5m
		Screw（M5-12）	8	
3	Base Box	Base	1	
		Triangle connector	2	
		Screw（M5-12）	8	

3.2 Mounting Unit

Please refer to the following precautions before installing the device:

01.Please avoid direct sunlight and rainwater infiltration when installing indoors or outdoors;

02.It is required to be installed on a flat ground that can withstand at least 300kg, with a distance of no less than 300mm between the back of the device and the wall. The installation site must be free of flammable and explosive materials and kept clean and dry;

03.The operating temperature of the equipment should be between -10-55 ℃;

04.Ensure that the polarity between the product and the solar panel, between the product and the battery is correctly connected;

05.All wiring must be tightened to avoid detachment;

06.Prohibit photovoltaic inverters from sharing the same set of solar panels;

07.Parameters of the battery and solar panel must be within the product's parameter range;

08.Do not disconnect the battery during system operation;

09.In areas with high levels of dust, regular cleaning is necessary to prevent excessive dust from affecting heat dissipation;

The following locations are not allowed for installation:

01.Under the entrance and exit areas or stairs/passages;

02.Places can reach freezing point, such as garages, carports, basements,other wet places;

03.Additional safety equipment needs to be installed in earthquake prone areas;

04.Areas with an altitude of over 3000 meters;

05.Places with direct sunlight or significant temperature changes in the environment;

06.Within a 600mm range of any heat source, such as a water heater, gas, heater, etc

07.Within 600mm from any window;

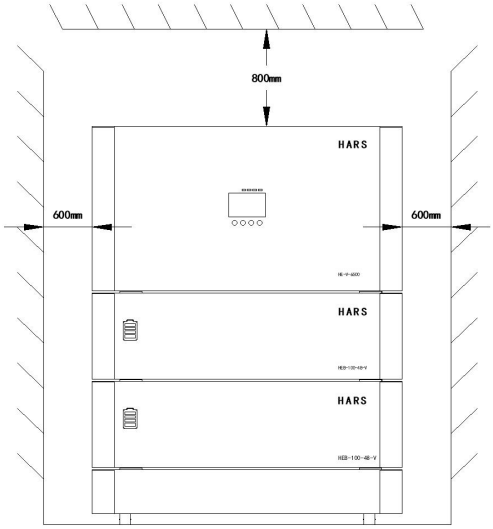
08.Within the 900mm range of connecting to 220/230/240VAC;

09.Within 600mm of the side of other devices;

The following distance must be kept empty:

(1)600mm beside the equipment;

(2)800mm above the equipment;



Follow the installation steps:

Step 1: Remove the base from the base box

Step 2: Install the battery onto the base

After the base connector is placed, install the battery.

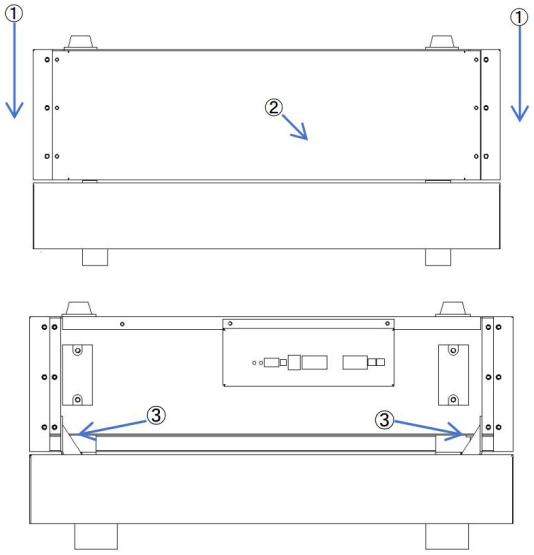
①Remove the battery from the battery packaging box and install it on the base;

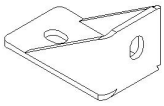
②Remove the rear cover plate;

③Screw the triangle connector to the base.

Follow the preceding steps to install other batteries

Note: The base contains wheels, be careful to the slide of base when placed.





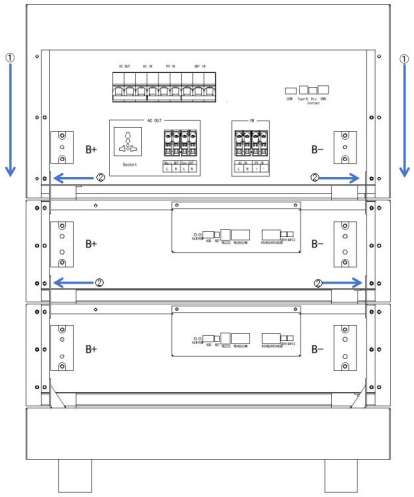
triangle connector

Step 3 : Installation inverter

After the battery is placed, install the inverter.

①Remove inverter from the box and place it steadily on the battery;

②After removing the inverter rear cover, use screws to secure the inverter to the battery by securing the square connector



square connector

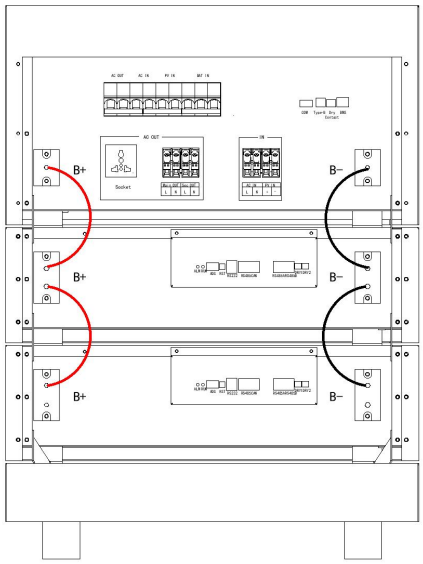
3.3 Battery Connection

Before installation, ensure that all switches on the equipment are turned off.To reduce the risk of electric shock, please wear insulated gloves when operating.Company does not bear the risk of accidents caused by users operating with bare hands or not following the installation manual.

WARNING! Shock Hazard

Do not touch the positive and negative battery terminals with both hands at the same time

First of all, connect the lithium battery, take out the red and black connection wires in the battery compartment, fix the positive and negative electrodes of the battery with a screwdriver, and connect the positive and negative electrodes of the inverter in the same way after the connection is completed.



BMS setting:

There' re two connectors on the lithium battery, RJ45 port of BMS and Wifi port.

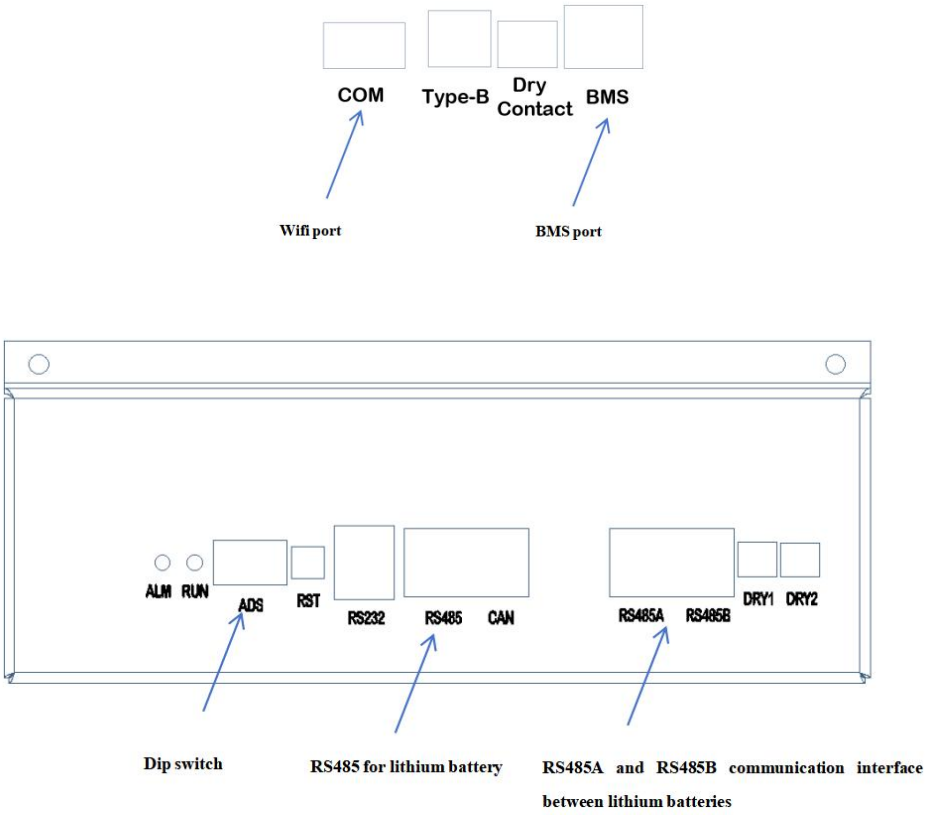
Please follow below steps to implement lithium battery connection:

1.Follow the preceding steps to connect the battery to the inverter.

2.Remove the communication cable from the battery compartment.

3.Complete the connection between the inverter and the battery with the communication cable.

4.In the same way to complete the communication between the battery, the interface between the lithium battery is RS485A and RS485B, and the dip switch of one battery is set to 1.



Note: If choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. You need to choose battery type as “lithium battery” during inverter setting.

Lithium battery communication and setting:

In order to communicate with battery BMS, you should set the battery type to “LIb” in Section4.2.2 Program 17. Make sure the lithium battery BMS port connects to the inverter is Pin to Pin, the inverter BMS port pin assignment shown as below:

Pin number	BMS port
1	RS485B
2	RS485A
3	—
4	CANH
5	CANL
6	—
7	—
8	—

Communicating with battery BMS in parallel system:

If need to use communicate with BMS in a parallel system, you should make sure to connect the BMS communication cable between the battery and one inverter of the parallel system.

3.4 AC Input/Output Connection

CAUTION!

There are four terminal blocks with “Main OUT”, “Sec OUT”, “AC IN”,“PV IN”markings. Please do NOT mis-connect input and output connectors.

WARNING!

All wiring must be performed by a qualified personnel.

WARNING!

It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

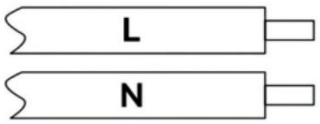
Model	Gauge	Cable(mm²)
HE-V-6500	9 AWG	6

WARNING!

Make sure AC power is disconnected before attempting to connect AC power to the unit.
All operations during the electrical connection process, as well as the specifications of cables and components used, must comply with local laws and regulations. The cable color mentioned below is for typical reference.

Please follow the following steps to connect AC In/AC Out:

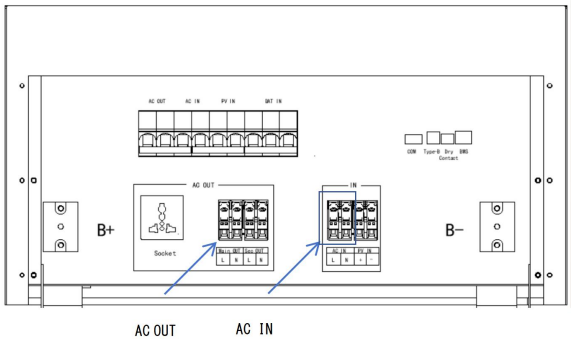
1.Peel off the L/N cable end with a length of 7mm and connect it accordingly.



2.Insert AC input/output cables according to polarities indicated on terminal block and tighten the terminal screws.

L → LINE (red)

N → Neutral (black)



3.Make sure the cables are securely connected

3.5 PV Connection

WARNING!

Do not ground the positive or negative terminals of the PV modules, as this can severely damage the inverter.

WARNING!

Exposure to sunlight can generate lethal high voltages in photovoltaic strings, so strictly adhere to the safety precautions listed in the photovoltaic string and related documents.

WARNING!

Make sure to connect the PV terminals to the corresponding ports on the inverter, as reversing the polarity can damage the inverter.

WARNING!

All wiring must be performed by a qualified personnel.

WARNING!

It' very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below. The cable color mentioned below is for typical reference.

Model	Gauge	Cable(mm²)
HE-V-6500	12AWG	4

PV Module Selection:

When selecting proper PV modules, please be sure to consider below parameters:

1.Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.

2.Open circuit Voltage (Voc) of PV modules should be higher than start-up voltage.

INVERTER MODEL	HE-V-6500
Max. PV Array Open Circuit Voltage	500Vdc
Start-up Voltage	150Vdc
PV Array MPPT Voltage Range	120Vdc~450Vdc

WARNING!

Please do not connect any DC switches or AC/DC circuit breakers before completing the electrical connections.

Please follow below steps to implement PV module connection:

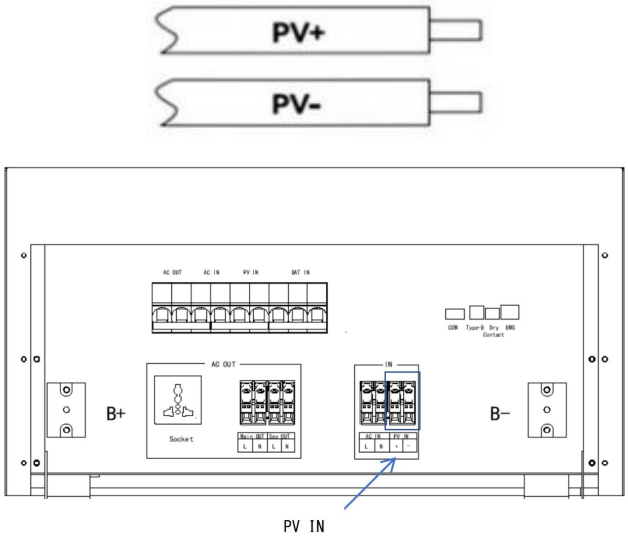
1.Peel off the PV+/PV- cable end with a length of 7mm and connect it accordingly.

2.Use multi-meter check to ensure the polarities are correct.

3.Insert PV cables according to polarities indicated on terminal block and tighten the terminal screws.

PV+ →+ (red)

PV- → - (black)



4.Make sure the cables are securely connected.

3.6 Smart Communication Stick Connection (Optional)

The smart communication stick is used to connect to the cloud platform. Please insert the stick into COM port directly.For details, see 3.3 Battery Connection.

4. Operation

4.1 Power ON/OFF

Before starting the device, check that all the cables are connected correctly, and the polarity of the solar panel and the battery are prohibited from being reversed!

Step 1: First press the ON/OFF button on the side of all battery.

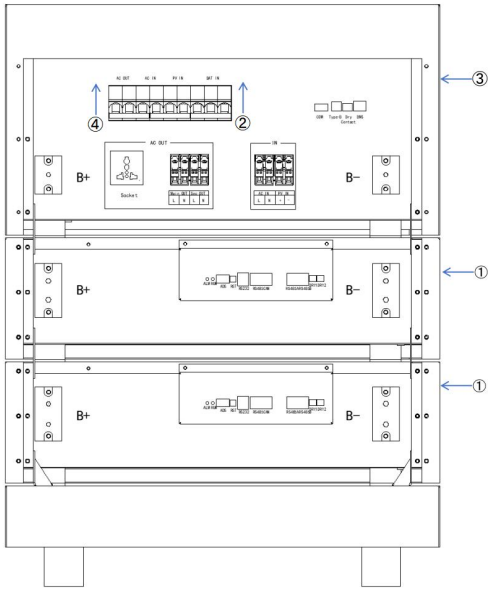
Step 2: Turn on the battery circuit breaker.

Step 3: Press the ON/OFF button on the side of inverter.

Step 4: Turn on the AC IN/PV IN circuit breaker.

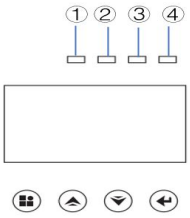
Step 5:Finally ,turn on the AC OUT circuit breaker.

Turn off the machine in order of load, mains/PV input, battery input.



4.2 Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes four indicators, four function keys and a LCD display, indicating the operating status and input/ output power information.

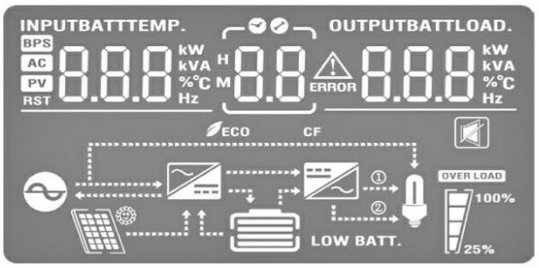


LED Indicator			Messages
① AC	Status indicator (Green)	Solid On	The mains power is normal and enters the mains power operation.
		Flashing	The mains power is normal, but it has not entered mains power operation.
		Off	The mains power is abnormal.
② Inverter	Invert indicator (Yellow)	Solid On	Output is powered by battery or PV in battery mode.
		Off	Other states.
③ Charging	Charging indicator (Yellow)	Solid On	The battery is in float charging.
		Flashing	The battery is in constant voltage charging.
		Off	Other states.
④ Fault	Fault indicator (Red)	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.
		Off	The inverter is working properly.

Function Buttons

Button	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

4.2.1 LCD Display Icons



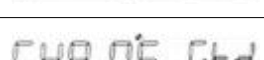
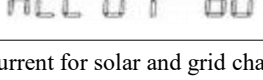
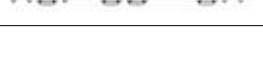
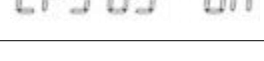
The specific icons and descriptions are introduced as follows:

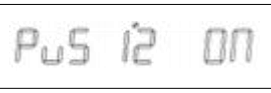
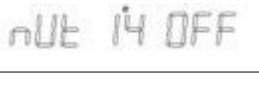
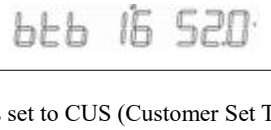
Icon	Description
AC Input Information	
	AC input icon.
	Indicate AC input power, AC input voltage, AC input frequency, AC in put current.
PV Input Information	
	PV input icon.
	Indicate PV power, PV voltage, PV current, etc.
Output Information	
	Inverter icon.
	Indicate output voltage, output current, output frequency, inverter tempe rature.
Load Information	
	Load icon.
	Indicate power of load, power percentage of load.
OVER LOAD	Indicate overload happened.
Battery Information	
	Indicate battery level by 0-24%,25-49%,50-74% and 75-100% in battery mode and charging status in line mode.
	Indicate battery voltage, battery percentage, battery current.
Other Information	
	Indicate alarm code or fault code.
ERROR	Indicate a fault is happening.
	Indicate the alarm is disabled.
ECO	Indicate power saving mode.

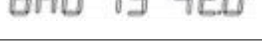
4.2.2 LCD Setting

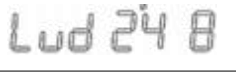
After pressing and holding ENTER button for 2 seconds, the unit will enter setting mode. Press “UP” or “DOWN” button to select setting programs. Then press “ENTER” button to confirm the selection or ESC button to exit.

Program	Description	Setting Option	
01	Output voltage		
		230V (default) Adjustable/ settable value: 208V, 220V, 230V, 240V	
02	Output frequency		
		50Hz (default) Adjustable/ settable frequency: 50Hz, 60Hz	
03	Output source priority	Solar first	
		Solar energy provides power to the loads as first priority. If solar energy is sufficient, battery will be charged with solar energy. If solar energy is not sufficient to power all connected loads, Grid will supply power to the loads at the same time. The extra power will charge the battery. If solar energy and grid are not sufficient, battery will supply power to the loads at same time. If solar, grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.	
		Grid first (default)	
		Grid provides power to the loads as first priority. Solar power will charge the battery. If solar is not sufficient to charge battery, grid will charge the battery at the same time. If grid is not sufficient to power all connected loads, solar energy will supply power to the loads at the same time. If solar energy and grid are not sufficient, battery will supply power to the loads at same time. If solar, grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.	
		PBG priority	
		Solar energy provides power to the loads as first priority. If solar energy is sufficient, battery will be charged with solar energy. If solar energy is not sufficient to power all connected loads, battery will supply power to the loads at the time. If solar energy and battery are not sufficient, grid will supply power to the loads at same time. If solar, grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.	

04	Output mode	APP: Appliance (default)	
		Applied to household appliances	
		UPS	
		Applied to computer and other devices. Typical switching time is 10ms.	
05	Charger source priority	PNG: PV and Grid (default)	
		OPV: Only PV	
		GRD: Grid first	
		PV: PV first	
		There are four options for charging priority. The default is PNG (PV and Grid). PV and Grid are charged at the same time;. The second is OPV (Only PV). Only PV charge. The third is GRD (Grid). Grid charging takes priority. The fourth is PV. PV gives priority to charging.	
06	Grid charging current		
		30A (default) Setting range is[2,80A]	
07	Maximum charging current		
		Set total charging current for solar and grid chargers. The default is 60A. Available options: 2/10/20/30/40/50/60/70/80A	
08	Menu Default		
		During setting: Set to ON. If the current page is not on the first page and no operation with 1 min, the system will return to display the first page.Set to OFF. If the current page is not on the first page and no operation with 1 min, the system will stay on the current page.	
09	Auto restart when overload occurs	The default is ON.	
10	Auto restart over temperature occurs	The default is ON.	

11	Main input cut warning	 Enable/ Disable Mains or PV loss alarm. The default setting is ON. If the main input detected lost, the buzzer will sound for 3 seconds. when set to OFF, after the main input is lost, the buzzer will not sound.
12	Energy-saving mode	 The default setting is OFF. When set to ON, in battery mode, if the load is lower than 50W, the system will stop output for a period then resume. If the load is still lower than 50W, the system will do the loop stop then resume. If the load is higher than 100W, the system will resume continuous normal output.
13	Overload transfer to bypass	 The default setting is OFF. When set to ON, in the case of PV priority output, if there is an overload, the system will immediately transfer to bypass mode (utility power output, also known as bypass mode).
14	Silent mode setting	 Enable/ disable buzzer sound. The default setting is OFF. When set to ON, in any situation such as alarms or faults, the buzzer will not sound. This setting can be applied to all modes.
15	Battery return to mains voltage point	 When the battery is set to the CUS (Customer Setting Type) mode. The adjustable range is [44V, 52V]. . When the battery is set to the AGM (Lead Acid Battery Type) or FLD (Flooded Battery Type) mode. The default setting is 46V, and it can be adjusted within a range of [44,52V]. When the battery is set to the LIB (Lithium Battery Type) mode. The default is 47.6V, and it can be adjusted within a range of [40, 50V].
16	Switching back to battery mode voltage points	 When the battery is set to CUS (Customer Set Type) mode, The default setting is 52V, The voltage range is [48, 58V].

<table>
<tr><td></td><td></td><td colspan="2">When the battery is set to AGM (Absorbent Glass Mat) or FLD (Flooded) mode, The default is 52V. It can be adjusted within a range of [48,58V].</td></tr>
<tr><td></td><td></td><td colspan="2">When the battery is set to LIB (Lithium Battery) mode, The default setting is 54.4V. It can be adjusted within a range of [46, 58V].</td></tr>
<tr><td rowspan="4">17</td><td rowspan="4">Battery type</td><td>AGM (default)</td><td>  </td></tr>
<tr><td>Flooded</td><td>  </td></tr>
<tr><td>Lithium</td><td>  </td></tr>
<tr><td>User-Defined</td><td>  </td></tr>
<tr><td rowspan="3">18</td><td rowspan="3">Battery low voltage point</td><td colspan="2">  </td></tr>
<tr><td colspan="2">It is not possible to set the battery definition mode to AGM or FLD mode. The initial default setting is 44V. When the battery type is set to CUS, the adjustable range for the battery voltage is [42,54V].</td></tr>
<tr><td colspan="2">Battery low voltage alarm setting.
When the battery type is set to LIB, the default setting is 47.6V.
The adjustable range for the voltage is [41.2, 50V].</td></tr>
<tr><td rowspan="3">19</td><td rowspan="3">Battery shutdown voltage point</td><td colspan="2">  </td></tr>
<tr><td colspan="2">The battery low voltage shutdown point setting function cannot be adjusted when the battery is defined as AGM or FLD mode. The default setting is 42V.
When the battery type is set to CUS, the default setting is 42V.
The adjustable range for the voltage is [40, 48V].</td></tr>
<tr><td colspan="2">When the battery type is set to LIB, the battery shutdown point can be modified. The default setting is 46V, and the adjustable range is [40, 48V].</td></tr>
<tr><td rowspan="2">20</td><td rowspan="2">Constant voltage mode voltage point setting</td><td colspan="2">  </td></tr>
<tr><td colspan="2">When the battery is defined in AGM or FLD mode, the voltage set point cannot be configured. The default setting for AGM mode is 56.4V, for FLD mode is 58V.
When the battery type is CUS, It can be set within the range of [48,60V] for the constant voltage charging set point. It is important to note that the constant voltage set point voltage needs to be higher than the float charge set point voltage.</td></tr>
</table>

		When the battery type is set to LIB, the default constant voltage charging set point is 56.4V, and it can be adjusted within the range of [48, 60V]. It is important to ensure that the constant voltage set point voltage is higher than the float charge set point voltage.
21	Floating charge mode voltage point setting	
		When the battery is defined in AGM or FLD mode, the voltage set point cannot be configured. The default setting for AGM/FLD mode is 54V. When the battery type is CUS, It can be set within the range of [48, 60V] for the floating charging voltage set point. If the battery type is LIB, the default setting for the floating charging point is 55.2V. The setting range is between 50V and 58V. It is important to note that the constant voltage point voltage should always be set higher than the floating charge point voltage.
22	Grid low voltage point setting	
		If output mode is APP, Grid low voltage point can be set within a range of 90V to 154V. The default setting is 154V.
		If output mode is UPS, Grid low voltage point can be set within a range of 170V to 200V. The default setting is 185V.
23	Grid high voltage point setting	
		If output mode is APP, Grid high voltage point can be set within a range of 264V to 280V. The default setting is 264V.
		If output mode is UPS, Grid high voltage point is set as 264V.
24	Low power discharge time setting	
		When in battery mode and operating under a low load, unrestricted discharge for an extended period can deplete the battery, affecting its lifespan. When the inverter reaches the set low power discharge time, the low voltage shutdown point will be raised to 44V. The default low power discharge time is 8 (8 hours), adjustable range [1, 8]. In inverter mode, the low power discharge time setting, the default is 8 (8 hours), the setting range is [1,8].
		In battery mode, after the continuous discharge time exceeds 8 hours and the battery shutdown point has not been reached, the battery voltage shutdown point will be modified to 44V, and the system will alarm for 1 minute when the battery continues to discharge to 44V. Then shut down again. When the battery voltage exceeds 52.8V exceeds 30s, the battery discharge time will be reset..

25	Inverter soft start setting	 Default setting is OFF. If it set to ON, the inverter output gradually increases from 0 to the target voltage value. If OFF, the inverter output directly increases from 0 to the target voltage value. Setting Condition: It can be set in single-machine operation mode.
26	Reset factory setting	 Restore all settings to factory default values. Before the setting, this interface is displayed as OFF. When set to ON, the system will restore to default settings. After the setting is completed, this interface will display OFF again. The setting can be applied immediately in mains and standby modes, but cannot be set in battery mode.
27	Parallel mode setting	 Set the parallel operation mode. It can be set in mains mode and standby mode (Stand By: no output but screen is on), but cannot be set in battery mode. Other models cannot be set. The default setting is SIG (single mode), which can be set to PAR (parallel mode) single-phase parallel operation mode,3P1 (R phase mode),3P2 (S phase mode),3P3 (T phase mode). When using the parallel operation function, first connect the parallel system correctly, and then set the parallel operation mode of each machine correctly. If there is a machine set to SIG in the parallel system, it will report a fault 24. If there are machines set to 3P1,3P2, and 3P3 in the parallel system, all machines must be set to one of these three modes, and at least one machine must be set for each mode. Otherwise, all machines set to these three modes will report a fault 24.
28	Battery Disconnection Alarm	 Enable/ Disable battery disconnection alarm. Default setting is OFF. When set to OFF, there will be no battery disconnection, low battery voltage, or battery under voltage alarms when the battery is disconnected.

29	Battery Equalization Mode	 Enable/ Disable Battery equalization. Default setting is OFF. If it is set to ON, the controller will start to enter the equalization phase when the set equalization interval (battery equalization period) is reached during the float charging stage, or the equalization is activated immediately.
30	Equalization Voltage Point Setting	 The default setting is 58.4, with a configurable range of [48,60V].
31	Equalization Charging Time Setting	 During the equalization stage, the controller will charge the battery as much as possible until the battery voltage rises to the battery equalization voltage. Then, it will adopt constant voltage regulation to maintain the battery voltage. The battery will remain in the equalization stage until the set battery equalization time is reached. The default setting is 60 minutes, with a configurable range of [5,900], and an increment of 5 minutes for each setting.
32	Equalization Delay Time Setting	 During the equalization stage, if the battery equalization time expires and the battery voltage has not risen to the battery equalization voltage point, the charging controller will extend the battery equalization time until the battery voltage reaches the battery equalization voltage. When the battery equalization delay setting is completed and the battery voltage is still below the battery equalization voltage, the charging controller will stop equalization and return to the floating stage. The default setting is 120 minutes, with a configurable range of [5,900], and an increment of 5 minutes for each setting.
33	Equalization Interval Time Setting	 When the battery connection is detected during the float phase with the equalization mode turned on, the controller will start to enter the equalization phase when the set equalization interval (cell equalization period) is reached. The default setting is 30 days, the settable range is [1,90], and the increment of each setting is 1 day.

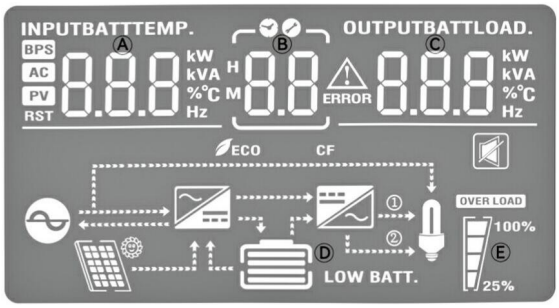
34	Enable Equalization Immediately	 The default setting is OFF, the function is not turned on; when it is set to ON, in the float charging stage when the equalization mode is turned on and the battery connection is detected. The balance charging is activated immediately, and the controller will start to enter the equalization stage.
35	Grid-tie inverter function	 Set whether the inverter should feed power to the grid in PV pri ority grid mode or PBG grid mode. The default setting is OFF, and the function is not enabled. When set to ON, the inverter tracks the maximum power point, and the excess energy is fed into the mains. After the function is turned on, if a communication ab normality occurs, an alarm 56 is generated, and the inverter no longer determines the operation logic according to the BMS information.
36	Battery dual output low voltage shutdown point	 When enabled, the secondary output of the inverter is enabled by default. In battery mode, when the battery voltage drops below the set point, the secondary output is turned off. When the battery voltage rises above the set value plus 1V per additional battery cell, the secondary output is turned on. The default setting of 48V, with a configurable range of [44,60] V. When the set point is higher than the constant voltage charging (CV) point-1V per cell, the recovery voltage is set to the constant voltage charging point.
37	Battery dual output duration	 When enabled, the secondary output of the inverter is enabled by default. In battery mode, when the battery discharge time reaches the set point, the secondary output is turned off. Default setting is OFF, the function is not enabled. The configurable range is [5,890] in minutes. When set to FUL, the secondary output has unlimited output time.
38	BMS Communication Function	 Enable/ Disable lithium battery communicates with inverter. Default setting is OFF, if a communication abnormality occurs, alarm56 is generated and the inverter no longer operates based on the BMS information.

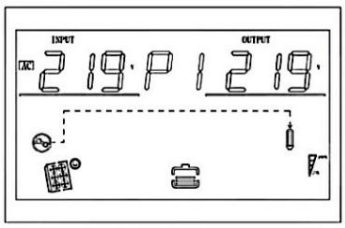
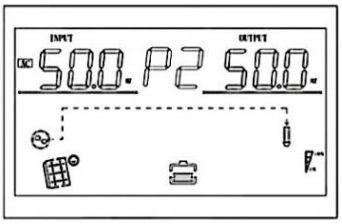
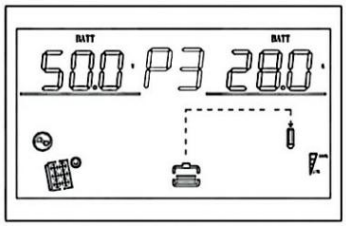
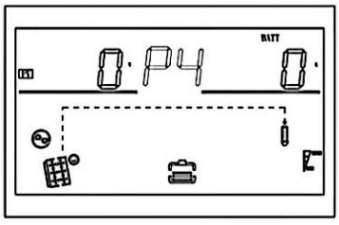
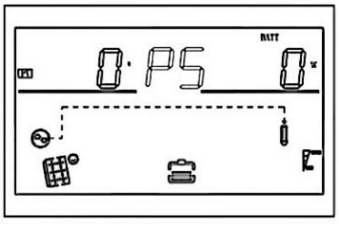
39	Low SOC Shutdown	 Set the inverter to shut down when the State of Charge (SOC) of the battery is low. Default setting is 20, with a configurable range of [5,50]. When the lithium battery SOC reaches the set value in battery mode, the inverter shuts down and generates alarm 68. The alarm 68 is cleared when the SOC return s to the set value + 5%. In standby mode, the inverter can switch to battery mode only when the SOC reaches the set value + 10%. If it does not reach this threshold, alarm 69 is generated. Once the function is enabled, alarm 69 is triggered when the lithium battery SOC reaches the set value + 5%, and it is cleared when it returns to the set value + 10%. It can be set to OFF, in which case the inverter no longer performs shutdown, startup, or alarm operations based on the SOC condition. Once the function is enabled, if a communication abnormality occurs, the inverter no longer operates based on the SOC information and clears the related alarms.
40	High SOC to Battery	 Set the SOC value for the inverter to switch to battery mode. Default setting is 95, with a configurable range of [10, 100]. In PBG priority mode, when the lithium battery SOC reaches the set value in normal grid mode, the inverter switches to battery mode. Once enabled, the inverter will only switch to battery mode when the SOC is above the set point and the battery voltage is higher than the voltage point to switch back to battery mode It can be set to OFF, in which case the inverter no longer switches from grid mode to battery mode based on the SOC condition. Once the function is enabled, if a communication abnormality occurs, the inverter no longer operates based on the SOC information and clears the related alarms.

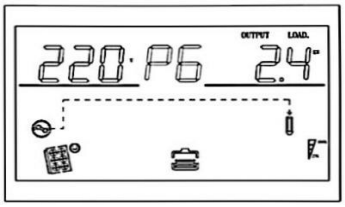
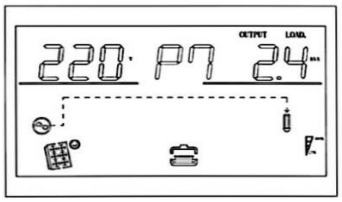
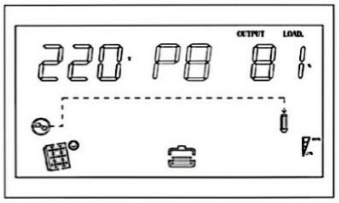
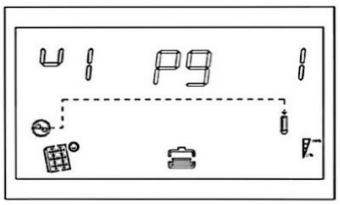
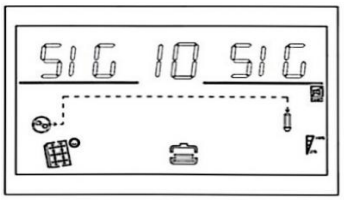
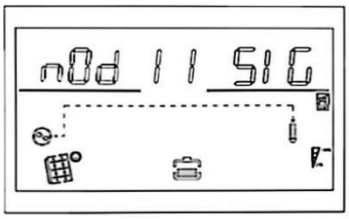
41	Low SOC to Grid	
		Set the SOC value for the inverter to switch to grid mode. The default setting is 50, with a configurable range of [10,90]. In PBG priority mode, when the lithium battery SOC reaches the set value in battery mode, the inverter switches to grid mode. Once enabled, the inverter will switch to grid mode when the SOC is below the set point or the battery voltage is lower than the voltage point to switch back to grid mode It can be set to OFF, in which case the inverter no longer switches from battery mode to grid mode based on the SOC condition. Once the function is enabled, if a communication abnormality occurs, the inverter no longer operates based on the SOC information and clears the related alarms. When this setting is higher than the STB point, STB and STG will no longer take effect after the next activation.

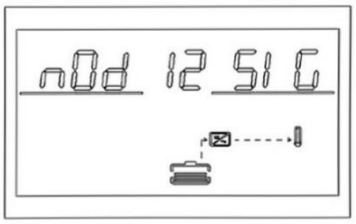
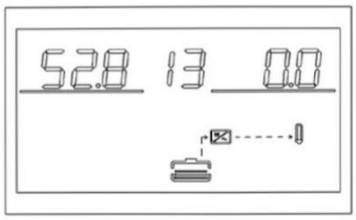
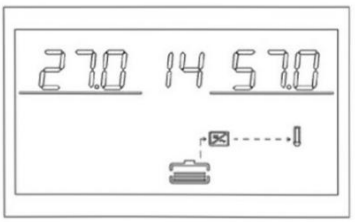
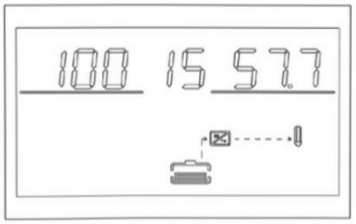
4.3 Display Information

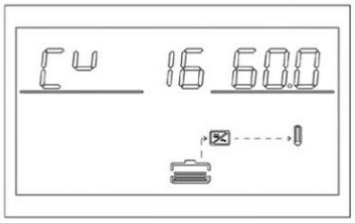
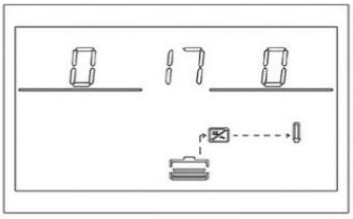
The LCD display information will be switched in turns by pressing “UP” or “DOWN” key. The select table information is switched as below order: voltage, frequency, current, power, firmware version.



Information	LCD display
ⒶAC Input voltage ⒷAlarm or Fault code (Default Display Screen) ⒸOutput voltage ⒹBattery capacity ⒺLoad percentage	
ⒶAC Input frequency ⒷAlarm or Fault code ⒸOutput frequency ⒹBattery capacity ⒺLoad percentage	
ⒶBattery voltage ⒷAlarm or Fault code ⒸOutput current ⒹBattery capacity ⒺLoad percentage	
ⒶPV voltage ⒷAlarm or Fault code ⒸPV charging current ⒹBattery capacity ⒺLoad percentage	
ⒶPV voltage ⒷAlarm or Fault code ⒸPV power ⒹBattery capacity ⒺLoad percentage	

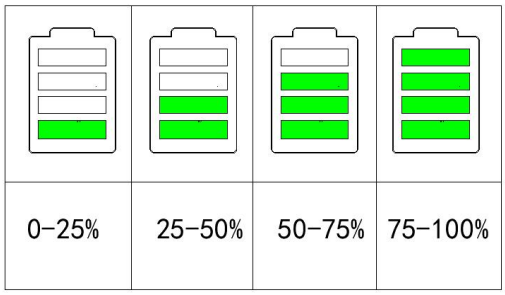
Ⓐ Output voltage Ⓑ Alarm or Fault code Ⓒ active power output Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ Output voltage Ⓑ Alarm or Fault code Ⓒ complex power output Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ Output voltage Ⓑ Alarm or Fault code Ⓒ load percentage Ⓓ Battery capacity Ⓔ Load percentage	
Display software version	
Display photovoltaic power generation	
parallel operation status display photovoltaic power generation	

After enabling BMS, the following pages are available	
Network status of lithium battery When the upper right display shows SIG constant, the battery pack is operating as a single group; When it shows PAR constant, the battery pack is operating in multiple groups in series and parallel; When it flashes PAR, the battery pack is establishing a state of multiple groups in series and parallel	
Lithium battery voltage and current information; The upper left displays BMS battery voltage information; The upper right displays BMS battery current information. When BMS communication fails, both the upper left and upper right displays will flash ERR	
Lithium battery temperature and SOC; The upper left displays BMS temperature information; The upper right displays BMS SOC information. When BMS communication fails, both the upper left and upper right displays will flash ERR	
Lithium battery capacity; The upper left displays rated capacity; The upper right displays current capacity. When BMS communication fails, both the upper left and upper right displays will flash ERR	

Lithium battery constant voltage point; The upper left displays the fixed letter CV; The upper right displays the BMS constant voltage charging point. When BMS communication fails, the upper right display will flash ERR	
Lithium battery fault alarm information; The upper left displays BMS alarm information; The upper right displays BMS fault information. When BMS communication fails, both the upper left and upper right displays will flash ERR	

4.4 Battery Icon

According to the method in **Section4.1**, press the battery switch button, and different display strips will be displayed depending on the power level.



5. Fault Reference Code

Fault display:

Function description: If alarm occurs, Fault indicator flashes and buzzer sounds every one second for 1 minute, then stop. If fault occurs, the fault indicator is always on, the buzzer sounds 10 seconds then stops. System will try restart aromatically. If the machine does not work after six times' restart, the machine and LCD display will always in the fault status. You need to completely power off (off the screen) or wait for 30 minutes to restart the machine.

The fault LCD display is shown in the figure above. In fault mode fault icon is bright, in alarm state alarm icon is flashing, and contact the manufacturer to troubleshoot the abnormal situation according to the fault information.

Fault: The inverter enters fault mode, with a constant red LED light and LCD displaying a fault code.

Fault code sheet

Fault code	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault/ Alarm
1	Bus soft boost start failed	Turn fault mode	Bus voltage does not reach set value for more than 30s.	Cannot restore.	Fault
2	Bus voltage high	Turn fault mode	The bus voltage is higher than protection point.	Cannot restore.	Fault
3	Bus voltage low	Turn fault mode	Bus voltage is below the under voltage protection point.	Cannot restore.	Fault
4	Battery over current	Turn fault mode	TZ interrupt triggered more than2 times within 2ms.	Cannot restore.	Fault
5	Over temperature	Turn fault mode	The PFC temperature exceeds the protection threshold. Fan stuck for more than 5 min	Tried to restart six times, if failed, cannot restore.	Fault
7	Bus soft start fault	Turn fault mode	Turn fault mode.Soft start process has exceeded,voltage has not reached set value.	Cannot restore.	Fault
8	Bus short circuit	Turn fault mode	Inverter on or PFC on, bus voltage below threshold.	Cannot restore.	Fault
9	Inverter soft start fault	Turn fault mode	The bus voltage is higher than protection point, or the DC component is greater than 20V. or the inverter is not completed within 5 min	Cannot restore.	Fault
10	INV over voltage	Turn fault mode	The inverter voltage is higher than the set value [276V].	Cannot restore.	Fault
11	INV under voltage	Turn fault mode	Battery mode and there is no short circuit in the inverter, the inverter voltage is lower than 160V.	Cannot restore.	Fault

12	INV short circuit	Turn fault mode	In battery mode or Standby mode, if the inverter voltage is lower, current is greater than set value.	Tried to restart six times, if failed, cannot restore.	Fault
13	Negative power protection	Turn fault mode	Battery mode, the load power is lower than set value (negative power, such as 1200W).	Cannot restore.	Fault
14	Over load	Turn fault mode	Overload exceeds limit (list in specification).	Tried to restart six times, if failed, cannot restore.	Fault
15	Model fault	Turn fault mode	Cannot match any model in model number detection.	Cannot restore. Check whether the control board is assembled incorrectly or whether the program is burned incorrectly.	Fault
16	No boot loader	Turn fault mode	No boot loader.	Cannot restore. Try to send command TIDA1911000000000	Fault
17	Program updating	Turn fault mode	Inverter receive updating task.	Restore after updating.	Fault
19	Same SN	Turn fault mode	Same series number in parallel.	Cannot restore.	Fault
20	CAN Communicate fault	Turn fault mode	Wrong number of slave machine.	Cannot restore.	Fault
21	Large voltage difference of the parallel battery	Turn fault mode	The voltage difference of the parallel battery is too large.	Cannot restore.	Fault
22	Voltage difference of the parallel inverter	Turn fault mode	The difference in mains voltage exceeds set value between parallel inverter.	Cannot restore.	Fault

23	Frequency difference of the parallel inverter	Turn fault mode	The difference in mains frequency exceeds set value between parallel inverter.	Cannot restore.	Fault
24	Parallel configuration difference	Turn fault mode	The local inverter is single mode, but there is a parallel machine on the bus.	Restore after set to single machine operation and disconnect parallel communication, or parallel operation condition recover.	Fault
25	Parallel disconnection	Turn fault mode	Synchronization signal lost.	Cannot restore	Fault
26	BMS fault	Turn fault mode	Error code in BMS message.	Turn off BMS communication function or BMS fault recovery.	Fault
29	Inverter over current	Turn fault mode	Instantaneous current of inverter is higher than set value.	Tried to restart six times, if failed, cannot restore.	Fault

6. Alarm Reference Code

Alarm: the inverter does not enter the fault mode, LED red light flashing, LCD displays the Alarm code

Alarm code	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault/ Alarm
50	Battery open	Alarm,battery does not charge.	Battery voltage is below set point.	Restore after battery voltage recover.	Alarm
51	Battery low voltage shutdown	Alarm, battery low voltage shutdown or cannot power on.	Battery voltage is below set point.	Restore after battery voltage recover.	Alarm
52	Battery low voltage	Alarm	Battery voltage is below set point.	Restore after battery voltage recover.	Alarm
53	Charger short circuit	Warning, battery does not charge.	The battery voltage is less than 5V and the charging current is greater than 4A.	Cannot restore.	Alarm
54	Low power discharge	Alarm	The battery voltage is greater than 52.8V and the discharge time exceeds the set low-power discharge time.	Restore after battery voltage recover.	Alarm
55	Battery over charge	Alarm,battery does not charge.	Battery voltage is higher than the set value.	Can restore.	Alarm
56	BMS disconnect	Alarm, lock standby mode.	No correct BMS communication response within 10s.	Restore-after communication recover.	Alarm
57	Over temperature	Alarm, battery does not charge.	The temperature of PFC or INV is above the set value.	Restore after temperature is under set value.	Alarm

58	Fan error	Alarm, if one fan fails and the other fan is running at full speed.	Fan speed is less than the set value.	Restore after fan recover.	Alarm
59	EEPROM error	Alarm	Numerical calibration error.	Restore after calibration right.	Alarm
60	Overload	Alarm, battery does not charge.	When not in mains mode or the PV is normal and the output priority is not mains priority, the load exceeds 102% and the duration is 200-220 ms.	Restore after load back to normal	Alarm
61	Abnormal generator waveform	Alarm,continuous operating in battery mode.	Generator waveform detection result is abnormal.	Can restore.	Alarm
62	PV Energy Weak	Alarm, turn off PV output and charging.	When the battery is not connected, the bus voltage is lower than the set value.	Restore after 10mins.	Alarm
63	Synchronization signal fail	Alarm, turn fault mode.	Host or slave with host present, no synchronization signal restored within set value.	Restore after signal recover.	Alarm
64	Parallel configuration incompatible	Alarm, turn standby mode.	When parallels with 3 phases, there is one phase loss setting.	Restore when three-phase setting is correct.	Alarm
65	Parallel version incompatible	Alarm, turn standby mode.	There is an incompatible version number in the parallel system.	Restore when machine versions in the parallel system are compatible with each other.	Alarm
66	Parallel Communicate Fault	Alarm, turn standby mode.	The slave machine cannot be detected in a parallel system.	Restore after detecting slave machine access or set to stand-alone mode to restore.	Alarm

67	Line difference of the parallel inverter	Alarm	The host determines that the difference between the local mains voltage and any slave mains voltage exceeds set value.	Cannot restore.	Alarm
68	SOC Under	Alarm, turn standby mode.	Lithium battery SOC is lower than the set value.	Restore after turning off the low SOC shutdown function, or turning off the BMS communication function, or when the SOC returns to the set value+ 5%.	Alarm
69	SOC Low	Alarm, if it is in standby mode, it will remain in standby mode and not power on.	Lithium battery SOC is lower than the set value+ 5% (mains mode or battery mode), lower than the set value + 10% (standby mode).	Restore after turning off the low SOC shutdown function, or turning off the BMS communication function, or when the SOC returns to the set value + 10%.	Alarm

7. Specifications

7.1 Line Specifications

Model	Item	Value	Comments
Input Voltage	Main topology	L +N	
	Nominal voltage	220VAC	Settable: 208/220/230/240 Vac
	Input Voltage Range	90~280Vac	Settable
	Input Low Loss	154Vac (default) Settable: 90-154	Appliance mode
		185Vac (default) Settable: 170-200	UPS mode
	Input Low Comeback	Low Loss voltage +9V	
	Input High Loss	264Vac (default) Settable:264-280	Appliance mode
		264Vac	UPS mode
	Input High Comeback	High Loss voltage - 9V	
Input Frequency	Nominal Frequency	50/60Hz	
	Frequency Range	40/70Hz	
	Freq. Low loss / Comeback	40/43.5Hz@50Hz (UPS mode) 40/40.5Hz@50Hz (APP mode)	
		50/53.5Hz@60Hz (UPS mode) 50/50.5Hz@60Hz (APP mode)	
	Freq. High loss/ Comeback	60/56.5Hz@50Hz (UPS mode) 70/69.5Hz@50Hz (APP mode)	
		70/66.5Hz@60Hz (UPS mode) 70/69.5Hz@60Hz (APP mode)	
Input Current	Max Current (RMS)	40A	40A

Note: When the specification of the external circuit breaker is greater than 40A, the max input current is **40A**. When the external circuit breaker specification is less than 40A, the max input current depends on the external circuit breaker specification.

7.2 Charger Specifications

	Item	Value	Comments
Charger (line mode)	Charging voltage	FV MODE:54V Settable: 53.2~55.6V CV MODE: 56.4V Settable:56~58V	
	Temperature Compensation	No	
	Charging Current	2~80A	Settable
	Default Charging Current	30A	
	Charging mode	Two/ Three/ Auto Settable	Three states: CC/CV/ Float Two states: CC/ Float
	Charge Voltage Accuracy	±5%	Calibrated by RS232
Charger (PV)	PV Charging method	MPPT	
	PV Maximum Input Power	6000W	
	Efficiency	99.5% max	
	Battery Voltage Accuracy	±0.3%	
	PV Voltage Accuracy	±2V	
	MPPT	120~450Vdc	
	Max PV voltage	500Vdc	
	Max PV charge current	80A	
Max charging current	/	80A.max Default: 60A	Settable

7.3 Output Specifications

	Item	Value	Comments
Output power rating	Output topology	L1+N1+L2+N2	
	Output power	5000W	When setting the Output voltage to 208V, the Output Power rating will be reduced to 90%.
Output voltage	Nominal Voltage	208/220/230/240 Vac	Default 220V, manual set by RS232 or LCD
	Waveform	Sinusoidal	
	Voltage Regulation	±5%	
	DC offset	±100mV (Bat mode)	Empty load and linear load mode
Output frequency	Nominal Frequency	50/60Hz	50/60Hz auto selection (default on)
	Line Mode	50Hz: (43.5-56.5)Hz(UPS mode) (40-70)Hz(APP mode) 60Hz: (53.5-66.5)Hz(UPS mode) (40-70)Hz(APP mode)	
	Battery Mode	50/60Hz	
	Frequency regulation	0.1%	
Charger (PV)	102%< Load≤110%	1 min minimum, then alarm and turn off output (operation environment temperature-10 - 40℃)	
	110%< Load≤130%	10s minimum, then alarm and turn off output	
	130%< Load≤150%	3s minimum, then alarm and turn off output	
	Load>150%	200 ms minimum, then alarm and turn off output	
Output short Circuit protection	Battery mode	Current limitation	
	Line mode	Breaker(40A)	

7.4 Switch Time Specifications

	Item	Value	Comments
Switch time	Line Mode To Battery Mode	10ms (typical)	UPS mode
		10ms (typical)	Appliance mode

7.5 Efficiency Specifications

	Item	Value	Comments
Efficiency	Line Mode	>99.5%@3Kva >99.5%@5Kva	Full R load, without battery connect.
	Battery Mode	>93.5%@1Kva >93.5%@3Kva >91.5%@5Kva	Full R load.
	Standby power	<50W	Empty load mode,battery disconnected.

8. Trouble Shooting

Problem	Fault Event	Trigger conditions	What to do
LED screen display fault code 5	Over temperature	1.PFC temperature exceeds the protection threshold [85℃ when not locked rotor,65℃ when locked rotor] for more than 20 seconds. 2.Fan lock exceeds 5 minutes.	Please check if the fan is not connected or if there are loose wiring issues. If the fan is not connected for more than 5 minutes, the machine will report fault code 5.
LED screen display fault code 12	Inverter short circuit	In battery mode or standby mode, if the inverter voltage is lower than 100V and the inverter current is greater than 40A, it should respond within 80-100ms.	1.Check if there is a short circuit at the output terminals (such as a screw piercing through the locking terminal causing a LN short circuit). 2.Verify if the inverter voltage and inverter current meet the triggering conditions.
LED screen display fault code 15	Model malfunction	The model number detection does not match any model number.	Check if the control board is assembled incorrectly or if the program is burned incorrectly.
LED screen display fault code 16	No boot program	The third digit of the communication is not 1.	Send command: TIDA1911000000000000

LED screen display fault code 20	CAN communication error	In battery mode, if the battery mode is set to mains power mode and the parallel mode is set to mains power mode, the number of responses from the slave devices does not match the previously defined number of slave devices. Receiving communication from two or more devices with a slave number of 0 consecutively.	1.Check if the parallel mode is set but the machine is turned on in single machine mode. 2.Check if the parallel connection cable and the parallel board are connected according to the parallel SOP (Standard Operating Procedure)
LED screen display fault code 58	Fan malfunction	Any of the fans rotating less than 8 times within 2s.	1.Check if the fan is not connected properly or if there are any loose connections. 2.If the fan is properly connected: a) Check if there is any issue with the fan detection circuit, usually caused by excessive soldering underneath the control board socket. b) Check if the fan itself is damaged.
Unable to start	Battery	Due to the need for a voltage of ≥11.5V/N to start the machine in battery mode, common reasons for failure to start include improper calibration or insufficient battery voltage.	1.Check if the battery voltage sampling is functioning properly and if the battery voltage has been calibrated. 2.Use a multimeter to measure the voltage at the battery terminals (using a DC power supply or a real battery) to see if it reaches the minimum voltage of 11.5V per cell for startup. Note: It is crucial to configure the battery voltage according to the machine model. Connecting the wrong battery voltage can cause capacitor explosion.

	Utility power		1.Check for any short circuits at the mains terminal (such as a screw piercing through and causing a short circuit between the live and neutral terminals). 2.Check if there are any wiring errors, such as mistakenly connecting the mains input to the output terminals.
	PV		1.Check if the PV input voltage is too close to the critical threshold. 2.For low voltage versions of the machine, check if the software version numbers of the main control is compatible. If the software versions differ significantly, the machine may not be activated.
PV not charging			1.For low voltage versions of the machine, check if the software version numbers of the main control is compatible. If the software versions differ significantly, the machine may not be activated. 2.Connecting the wrong battery voltage can result in damage to the auxiliary power supply on the PV side, causing a loss of power and inability to communicate with the main control.

The instructions are subject to change without prior notice and are subject to the actual product.