Inverter Control All-in-one Machine

WAO-MB51200-10KW
WAO-MB51300-10KW
WAO-MB51400-10KW
WAO-MB51600-10KW

Long life and safety

Vertical industry integration ensures more than 6000 cycles with 80% DOD.

Easy to install and use

Integrated inverter design, easy to use and quick toinstall.Small size,minimizing installation time and cost compact and stylish design suitable for yoursweet home emironment.

Multiple working modes

The inverter has a variety of working modes whether it is used for main powersupply in thearea without electricity or backup power supplyin the area with unstable power to deal with suddepower fallure,the system can respond flexibly.

Fast and fexible charging

A variety of charging methods, wwhich can be charged with photowoltaic or commercial power, or both at the same time.

Scalability

Support split phase AC output.Also,it can be max parallel in 6 units.

Contents

1. Instruction 5

1.1 How to use this manual 5

1.2 Symbols in this manual 5

1.3 Safety instructions 5

2. Production Instructions 6

2.1 Instructions 6

2.2 Features 6

2.3 System connection diagram 7

2.4 Production Overview 7

3. Inspections before Installation 8

3.1 Inspection of outer package 8

3.2 Inspection of deliverable 8

4. Installation 9

4.1 Select the mount location 9

5. Connection 9

5.1 Connection Overview 9

5.2 Cable & circuit breaker requirement 13

5.3 AC input & output connection 14

5.4 PV connection 14

5.5 Dry contact connection 15

5.6 Grounding connection 15

5.7 Active Equilibrium Function (Optional) 16

5.8 Fire extinguishing function (Optional) 16

5.9 Parallel wiring 17

5.10 Final assembly 26

5.11 Start up the inverter 26

6. Operation 27
6.1 Operation and display panel 27
6.2 Display panel 32
6.3 AC output mode 41
6.4 Battery charging mode 42
6.5 Time-slot charging/discharging function 44
6.6 Battery parameter 45
7. Communication 47
7.1 Overview 47
7.2 Inverter Communication Interface 48
7.3 Battery Communication Interface 50
8. Fault and Remedy 54
8.1 Fault code 54
8.2 Troubleshooting 55
9. Protection and Maintenance 56
9.1 Protection features 56
9.2 Maintenance 57
10. Datasheet 58

1. Instruction

1.1 How to use this manual

- This manual contains important information、 guidelines、 operation and maintenance for the following products：WAO-MB51200-10KW, WAO-MB51300-10KW，WAO-MB51400-10KW, WAO-MB51600-10KW
- The manual must be followed during installation and maintenance.

1.2 Symbols in this manual

Symbol	Description
DANGER	DANGER indicates a hazardous situations which if not avoided will result in death or serious injury.
WARNING	WARING indicates a hazardous situations which if not avoided could result in death or serious injury.
CAUTION	CAUTION indicates a hazardous situations which if not avoided could result in minor or moderate injury.
NOTICE	NOTICE provide some tips on operation of products.

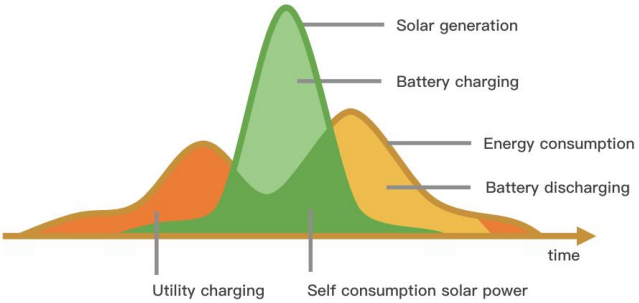
1.3 Safety instructions

DANGER

- This chapter contains important safety instructions. Read and keep this manual for future reference.
- Be sure to comply the local requirements and regulation to install this inverter.
- Beware of high voltage. Please turn off the switch of each power sources before and during the installation to avoid electric shock.
- For optimum operation of this product, please follow required specification to select appropriate cable size and necessary protective device.
- Do not connect or disconnect any connections when the inverter is working.
- Do not open the terminal cover when the inverter working.
- Make sure the inverter is well grounding.
- Never cause AC output and DC input short circuited.
- Do not disassembly this unit, for all repair and maintenance, please take it to the professional service center.
- Never charge a frozen battery.
- Please keep children away from touching or mishandling the inverter.
- Please make sure that this inverter is the only input power source for the load, do not use it in parallel with other input AC power sources to avoid damage.

2. Production Instructions

2.1 Instructions



2.2 Features

- Using the lithium iron phosphate battery cell technology process, with higher safety, 80% DOD charging and discharging under standard conditions, over 6000 cycles.
- Integrated serial port IC, high voltage accuracy (≤ 20mV), high current accuracy (≤ 2% @ FS).
- Short circuit protection function, adjustable overcurrent protection, multiple sleep and wake-up modes, low power consumption.
- Dual RS485 communication, adjustable parameter settings, buzzer alarm function, LED status indication function, and charging equalization function
- Wide temperature range: -20 ℃~60 ℃.
- With a dual activation function when the li-ion battery is dormant; either mains/photovoltaic power supply access can trigger the activation of the li-ion battery.
- Support split-phase and single-phase pure sine wave output.
- Supports four different voltage levels of 100\105\110\120Vac per phase.
- Supports two solar inputs and simultaneous tracking of two solar maximum power charging/carrying capacity functions.
- Dual MPPT with 99.9% efficiency and maximum 22A current in a single circuit, perfectly adapted to high power modules.
- 4charging modes are available: solar only, mains priority, solar priority, and mixed mains/PV charging.
- With the time-slot charging and discharging setting function, you can set the time period for cutting in/out of mains charging and switch the time period between battery discharging and mains bypass power supply mode.
- Energy saving mode function to reduce no-load energy losses.
- With two output modes of utility bypass and inverter output, with uninterrupted power supply function.
- LCD large screen dynamic flow diagram design, easy to understand the system data and operation status.
- 360° protection with complete short circuit protection, over current protection, over under voltage protection, overload protection, backfill protection, etc.
- Support CAN, USB, and RS485 communication.

2.3 System connection diagram

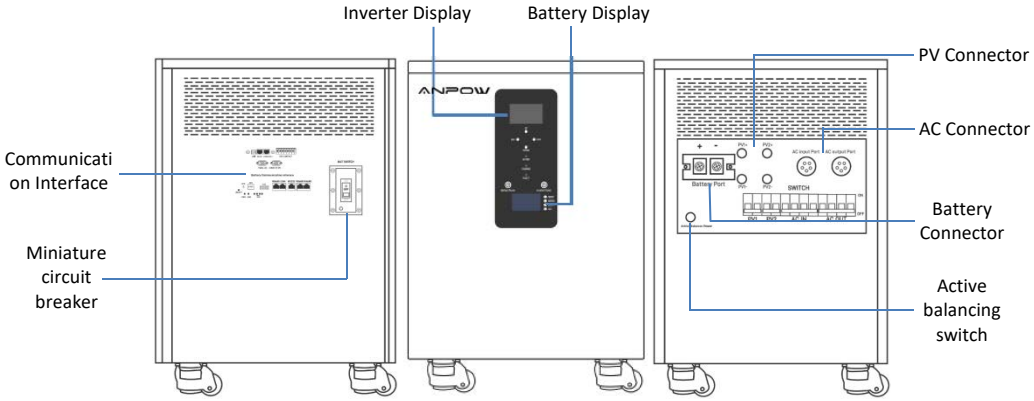
The diagram below shows the system application scenario of this product. A complete system consists of the following components:

1. PV modules: converts light energy into DC energy, which can be used to charge the battery via an inverter or directly inverted into AC power to supply the load.
2. Utility grid or generator: connected to the AC input, it can supply the load and charge the battery at the same time. The system can also operate generally without the mains or generator when the battery and the PV module power the load.
3. Battery: The role of the battery is to ensure the regular power supply of the system load when the solar energy is insufficient and there is no mains power.
4. Home load: Various household and office loads can be connected, including refrigerators, lamps, televisions, fans, air conditioners, and other AC loads.
5. Inverter: The energy conversion device of the whole system.

The actual application scenario determines the specific system wiring method.

2.4 Production Overview

Model	Dimension L× D× H (mm)
WAO-MB51600-10KW	550*750*850
WAO-MB51400-10KW	500×660×850
WAO-MB51300-10KW	470×660×680
WAO-MB51200-10KW	470×660×680



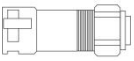
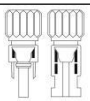
3. Inspections before Installation

3.1 Inspection of outer package

Before opening outer package of the all-in-one machine, check if there is any visible damage on the outer package, such as holes, cracks or other signs of possible internal damage, and check the type of all-in-one machine. If there is any abnormality on the package or model of the all-in-one machine is inconsistent, do not open it and contact us as soon as possible.

3.2 Inspection of deliverable

After opening outer package of the all-in-one machine, check if the deliverable is complete and whether there is any visible external damage. If any items are missing or damaged, please contact us.

No.	Picture	Item	Quantity	Specification
1		All-in-one machine	1	
2		Wiring ring	2	SC70-10/cold-pressed terminal head thickened wire terminal
3		AC plug	2	Connect AC power
4		Photovoltaic connectors	2	Solar panel connecting wire terminal
5		Disassembly and assembly tools for solar panel connectors	1	
6		Product Manual	1	

4. Installation

4.1 Select the mount location

WAO series are designed for INDOOR USE ONLY (IP20). Please consider the followings before selecting the location.

- Adequate heat dissipation space must be provided for the product.
- The ambient temperature should be between-10~55℃ (14~131℉) to ensure optimal operation.

DANGER

- Do not install the inverter where highly flammable materials are near by.
- Do not install the inverter in potential explosive areas.
- Do not install the inverter with lead-acid batteries in a confined space.

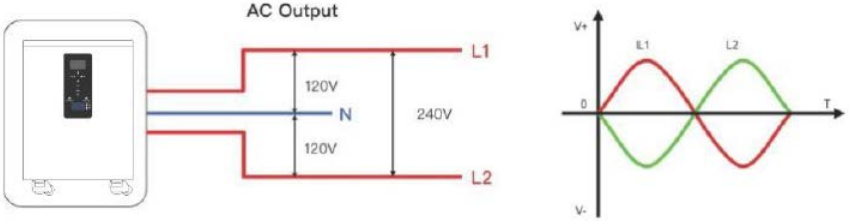
CAUTION

- Do not install the inverter in direct sunlight.
- Do not install or use the inverter in a humid environment.

5. Connection

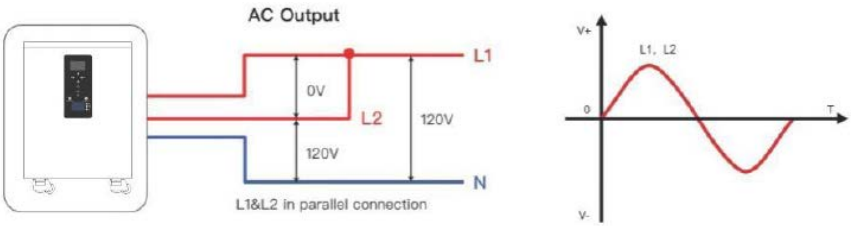
5.1 Connection Overview

- **Split-phase mode(default）**



Item	Description			
Applicable Model	WAO-MB51200-10KW	WAO-MB51300-10KW	WAO-MB51400-10KW	WAO-MB51600-10KW
Output Voltage Range (L-N)	100～120Vac, 120Vac default			
Output Voltage Range (L-L)	200～240Vac，240Vac default			

- **Single-phase mode**



Items	Description			
Applicable Model	WAO-MB51200-10KW	WAO-MB51300-10KW	WAO-MB51400-10KW	WAO-MB51600-10KW
Output Voltage Range (L-N)	100～120Vac, 120Vac default			

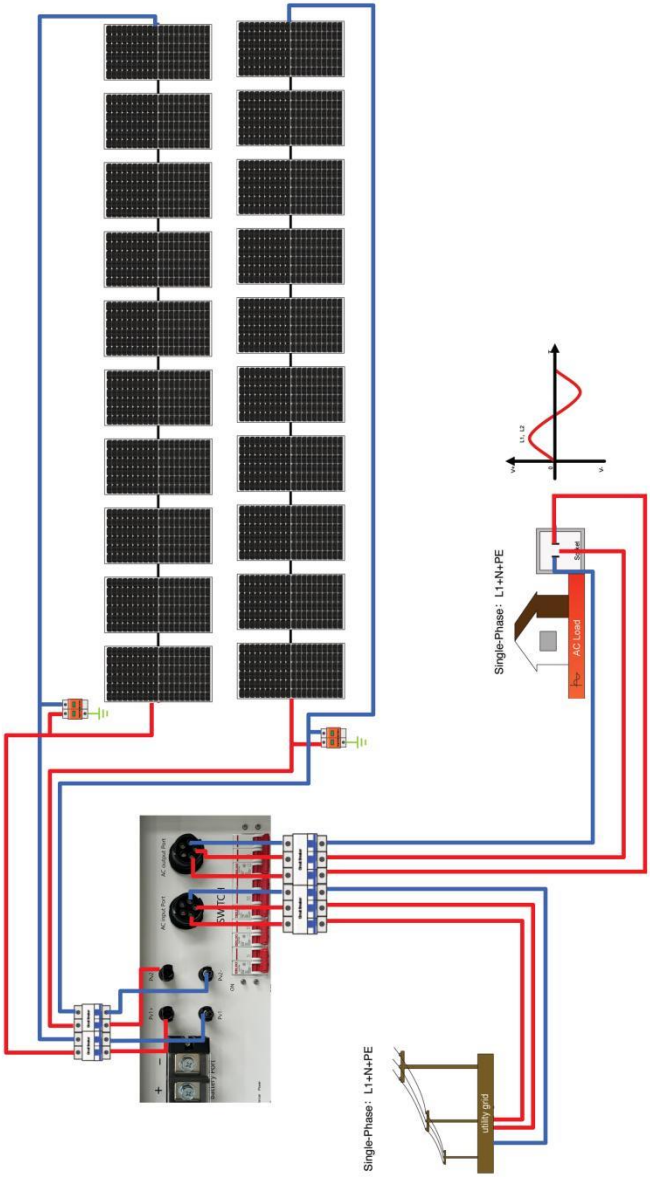
Notice：

Users can change the output phase mode and output voltage by setup menu. Please read the chapter 6.2 Setting.

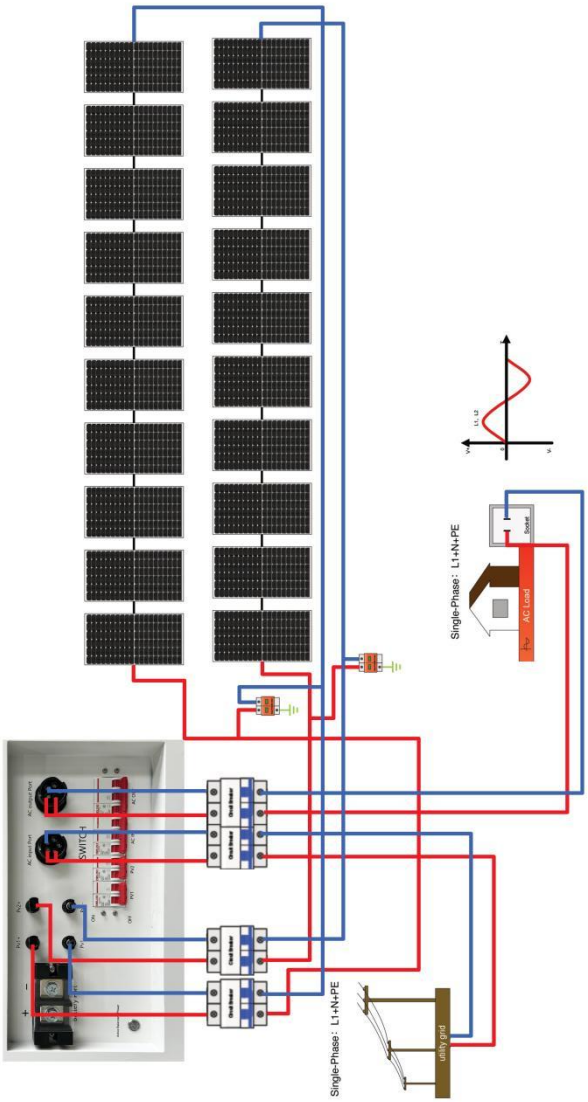
Output phase mode corresponds parameter 39 , when option is 180 indicates split-phase, when option is 0 indicates single-phase.

Output voltage corresponds parameter 38 , the output voltage can be set from 100V to 120V.

Split-phase Model



Single-phase Model

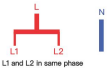


5.2 Cable & circuit breaker requirement

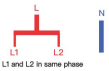
- **PVINPUT**

Models	Cable Diameter	Max. PV Input Current	Circuit Breaker Spec
ASP48100U200-H	5mm²/10AWG	22A	2P-25A

- **AC INPUT**

Models	Output mode	Diagram	Max. Input Current	Cable diameter	Circuit Breaker Spec
ASP48100U200-H	Split-phase		63A(L1/L2/N)	13mm²/6AWG (L1/L2/N)	3P-63A
	Single-phase		63A(L1/L2) 126A(N)	13mm²/6AWG(L1/L2) 26mm²/3AWG(N)	2P-125A

- **AC OUTPUT**

Models	Output mode	Diagram	Max. Input Current	Cable diameter	Circuit Breaker Spec
ASP48100U200-H	Split-phase		63A(L1/L2/N)	13mm²/6AWG (L1/L2/N)	3P-63A
	Single-phase		63A(L1/L2) 126A(N)	13mm²/6AWG(L1/L2) 26mm²/3AWG(N)	2P-125A

- **Battery**

Models	Cable Diameter	Max. Battery Current	Circuit Breaker Spec
WAO-MB51200-10KW WAO-MB51300-10KW WAO-MB51400-10KW WAO-MB51600-10KW	70mm²/1AWG	200A(L/N)	1P-250A

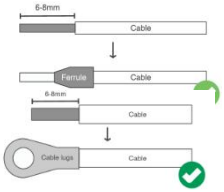
NOTICE

- ACINPUT、ACOUTPUT

1. Use a stripper to remove the 6~8mm insulation of the cable.
2. Fixing a ferrule at the end of the cable.(ferrule needs to be prepared by the user)

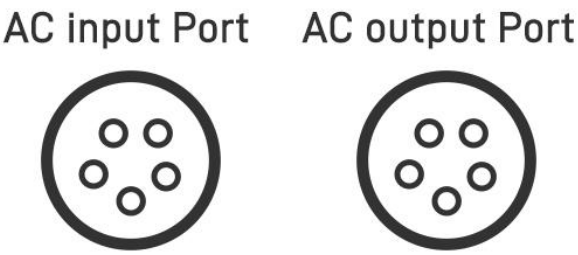
- BATTERY

1. Use a stripper to remove the 6~8mm insulation of the cable.
2. Fixing cable lugs that supply with the box at the end of the cable.



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

5.3 AC input & output connection

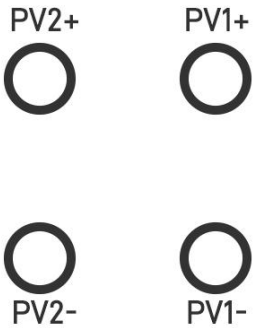


Connect the live, neutral and ground wires according to the cables' position and order shown in the diagram below.

⚠ DANGER

- Before connecting AC inputs and outputs, the circuit breaker must be opened to avoid the risk of electric shock and must not be operated with electricity.
- Please check that the cable used is sufficient for the requirements, too thin, poor quality cables are a serious safety hazard.

5.4 PV connection



Connect the positive and negative wires of the two strings of PV according to the diagram below.

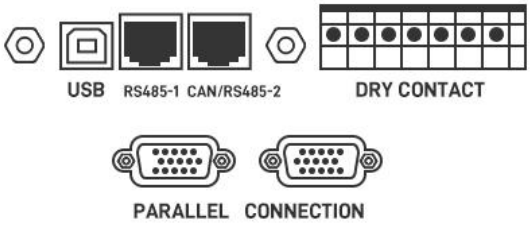
⚠ DANGER

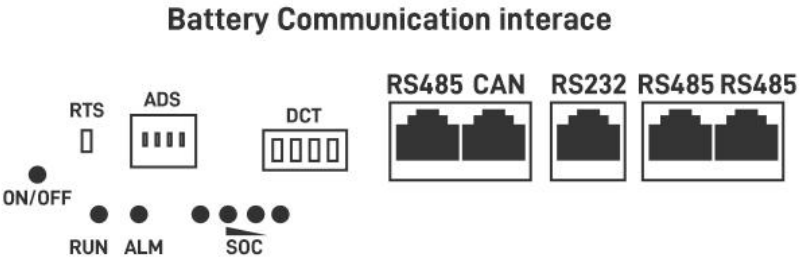
- Before connecting PV, the circuit breaker must be opened to avoid the risk of electric shock and must not be operated with electricity.

Please make sure that the open circuit voltage of the PV modules in series does not exceed the Max. Open Circuit Voltage of the product (this value is 500V), otherwise the inverter maybe damaged.

5.5 Dry contact connection

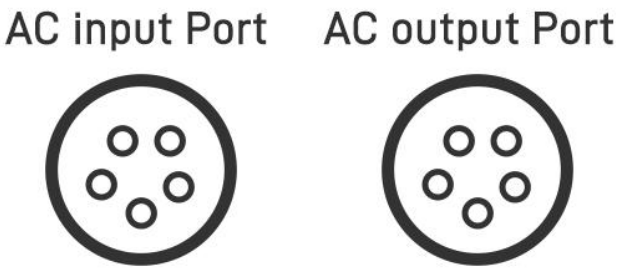
Use a small screwdriver to push back the direction indicated by the arrow, then insert the communication cable into the dry junction port. (Communication cable diameter 0.2~1.5mm²)





5.6 Grounding connection

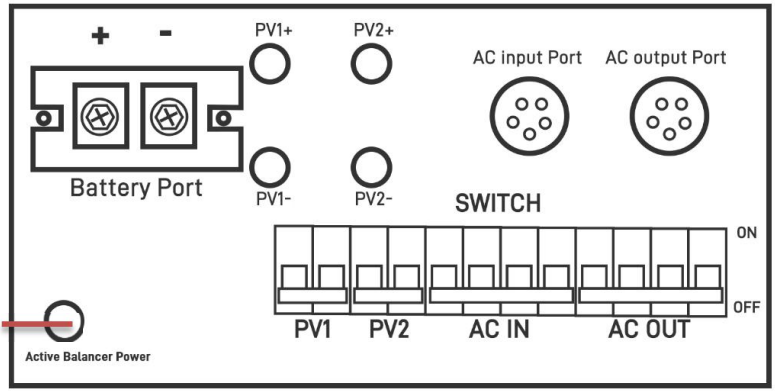
Please make sure the grounding terminal connect to the Grounding Bar.



NOTICE

- The grounding cable should have a diameter of not less than 4 mm² and be as close as possible to the grounding point.

5.7 Active Equilibrium Function (Optional)

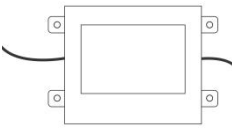


Active Balance Power (Optional)

Test Item	Min	Type	Max
Single IC working voltage (Single series)	1.8V		4.5**V**
Balance opening voltage difference on		/	
Balance closing voltage difference on			
Accuracy of the balance voltage difference		5mV≦	
Balanced turn-on voltage (first string voltage)		2.90V≧	
Balanced turn off voltage (first string voltage)		2.50V≦	
Balanced current (large voltage difference and large current)	0	/	6A
Balanced operating voltage range (B0 to B+ voltage)	46.4V		68.0V
current consumption when working	100uA		1000uA
current consumption when sleeping	0		8.0uA
Working temperature	-40~+85℃		

5.8 Fire extinguishing function (Optional)

The battery is equipped with an aerosol fire extinguishing device. When the battery experiences a short circuit and catches fire, the fire extinguishing device can detect the temperature and automatically extinguish the fire.

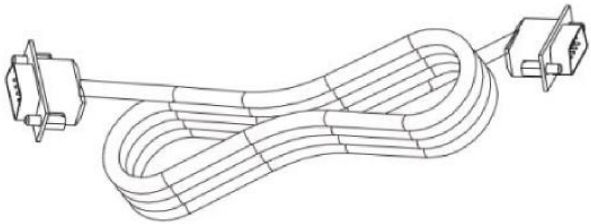


Item	Parameter
Model specifications	QRR0.04G/S-MC-40-F-02-11
Working temperature range	－30℃～＋70℃
Relative humidity of working environment	≤95％RH
Start mode	Hot start
Spray time	≤3s
Starting temperature of thermal initiator	170±10℃

5.9 Parallel wiring

5.9.1 Parallel operation

1. The parallel operation supports up to six solar storage inverters.
2. When using the parallel function, it is necessary to connect the parallel communication cable in a correct and reliable manner. See the figure blow for the communication cable (packaging accessory):
Parallel communication cable*1



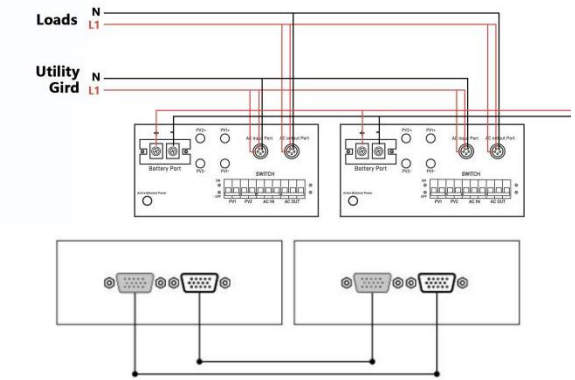
5.9.2 Cautions for parallel connection

Warning:
1. PV wiring:
In parallel connection, the PV array of each inverter must be independent, and the PV array of PV1 and PV2 for one inverter must also be independent.
2. Battery wiring
In single-phase or three-phase parallel connection, all solar storage inverters must be connected to the same battery, with BAT+ connected to BAT+ and BAT- to BAT-, and before power on and start-up, it is necessary to check and ensure correct connection, wiring length, and cable size, so as to avoid the abnormal operation of parallel system output caused by wrong connection.
3. AC OUT wiring:
In single-phase parallel connection, all solar storage inverters must be connected in the manner of L-to-L, N-to-N, and PE-to-PE, and before power on and start-up, it is necessary to check and ensure correct connection, wiring length, and cable size, so as to avoid the abnormal operation of parallel system output caused by wrong connection. In three-phase parallel connection, all solar storage inverters must be connected in the manner of N-to-N and PE-to-PE. The L lines of all inverters in the same phase shall be connected together, but the AC output L lines of different phases shall not be connected together. Other cautions are the same as those for single-phase parallel connection.
4. AC IN wiring:
In single-phase parallel connection, all solar storage inverters must be connected in the manner of L-to-L, N-to-N, and PE-to-PE, and before power on and start-up, it is necessary to check and ensure correct connection, wiring length, and cable size, so as to avoid the abnormal operation of parallel system output caused by wrong connection. Meanwhile, it is not allowed to have multiple different AC source inputs to avoid damage to the external equipment of the inverter. The AC source input shall be consistent and unique.
In three-phase parallel connection, all solar storage inverters must be connected in the manner of N-to-N and PE-to-PE. The L lines of all inverters in the same phase shall be connected together, but the AC output L lines of different phases shall not be connected together. Other cautions are the same as those for single-phase parallel connection.
5. Communication wiring:
Our company's communication cable for parallel operation is a DB15 standard computer cable with shielding function, and it is used for single-phase or three-phase parallel connection. Each inverter shall be connected with one out and one in, that is, the male connector (out) of the inverter is to be connected to the female connector (in) of the parallel inverter, not the one of the inverter. In addition, DB15 terminal screws will be used to tighten the communication cable of each parallel inverter to

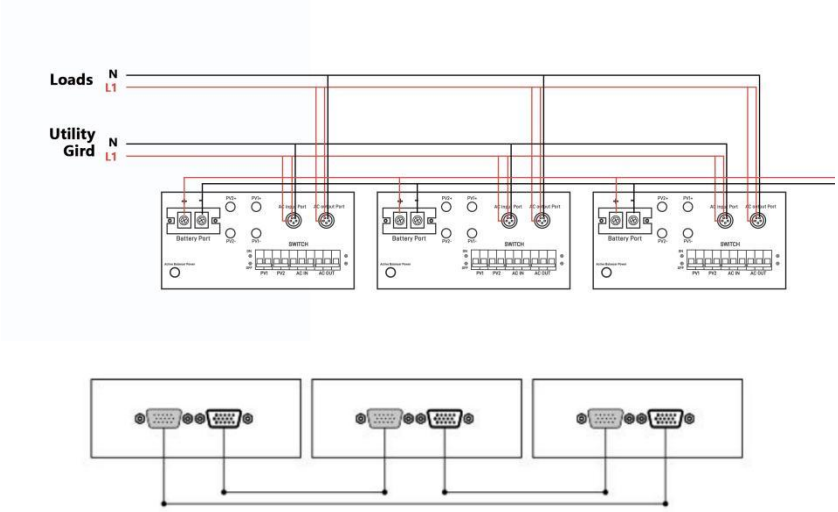
avoid falling off or poor contact of the communication cable, followed by abnormal operation or damage of the system output.
6. Before and after connecting the system, please carefully refer to the following system wiring diagrams to ensure that all wiring is correct and reliable before power on.
7. After the system is correctly wired, powered on, and in normal operation, if a new inverter needs to be connected, make sure to disconnect the battery input, PV input, AC input and AC output, and that all solar storage inverters are powered off before reconnecting into the system.

5.9.3 Wiring diagram for single-phase parallel connection

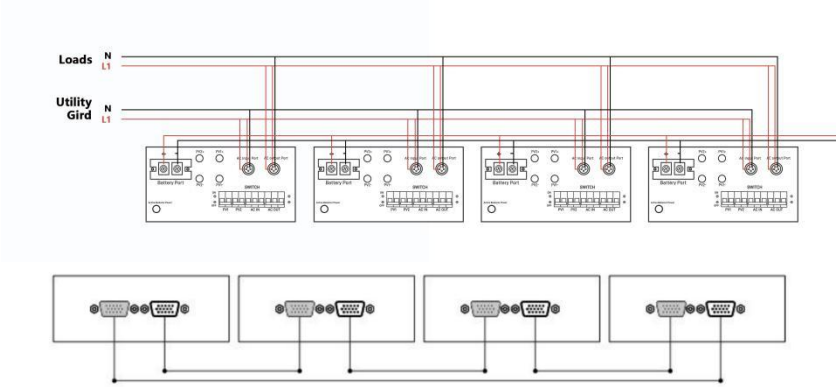
See the diagram below for parallel connection
Set the item [31] to "PAL" and the item [68] to "0°." When setting the item [38] to "120 V," the output L-N voltage is 120 V
1. Two parallel-connected solar storage inverters:



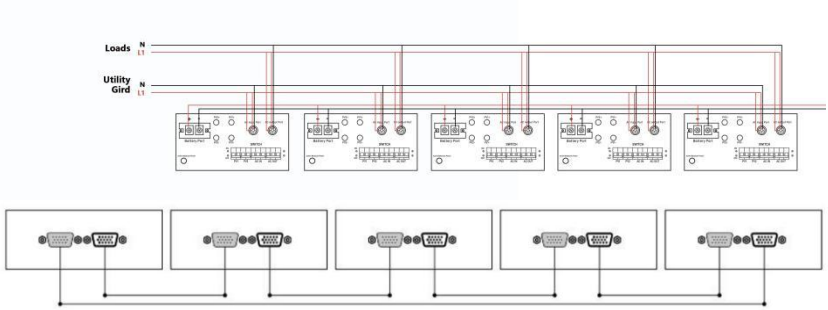
2. Three parallel-connected solar storage inverters:



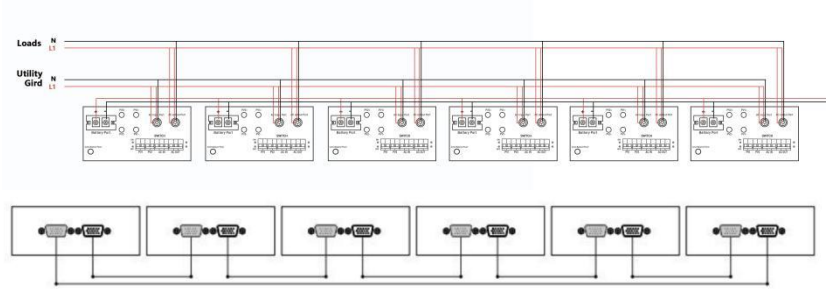
3. Four parallel-connected solar storage inverters:



4. Five parallel-connected solar storage inverters:



5. Six parallel-connected solar storage inverters:

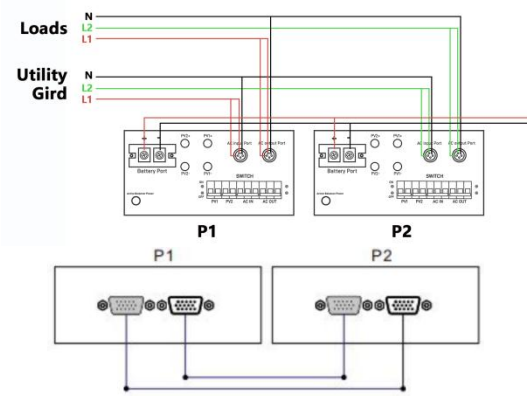


5.9.4 Wiring diagram for two-phase parallel connection

(1) P1: Set the item [31] to "2P0;" P2: Set the item [31] to "2P1," all of the P1/P2 inverter item [68] can not be set, it is default “0°”and the phase difference between P1 and P2 is 120°.
When setting the item [38] to "120 V," the voltage between the live wire L1 of P1 phase and the live wire L2 of P2 phase is 208 V, and the L1-N voltage is 120 V
(2) P1: Set the item [31] to "2P0;" P2: Set the item [31] to "2P2," all of the P1/P2 inverter item [68] can not be set, it is default “0°”and the phase difference between P1 and P2 is 180°.
When setting the item [38] to "120 V," the voltage between the live wire L1 of P1 phase and the live wire L2 of P2 phase is 240 V, and the L1-N voltage is 120 V, L2-N voltage is 120V

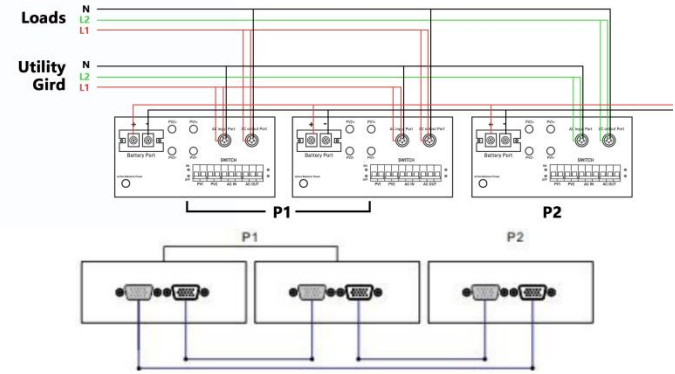
a. Split-phase system

1+1 system:



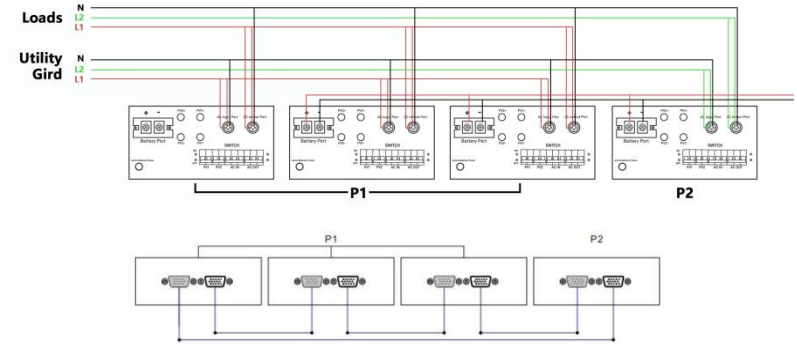
b. Split-phase system (three inverters)

2+1 system

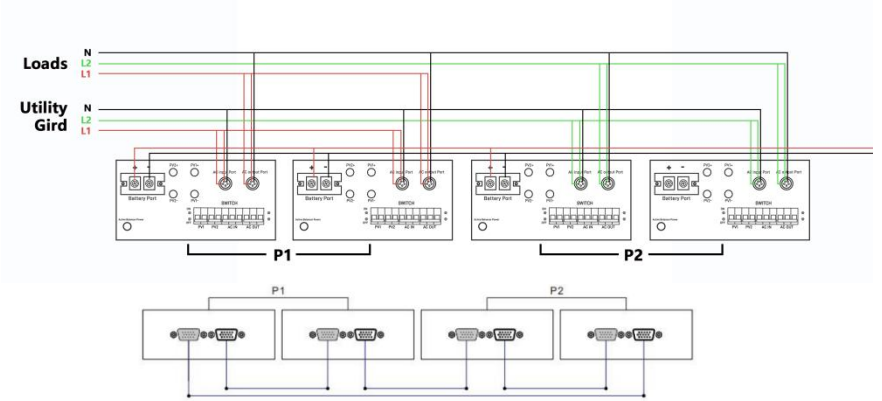


c. Split-phase system (four inverters)

3+1 system:

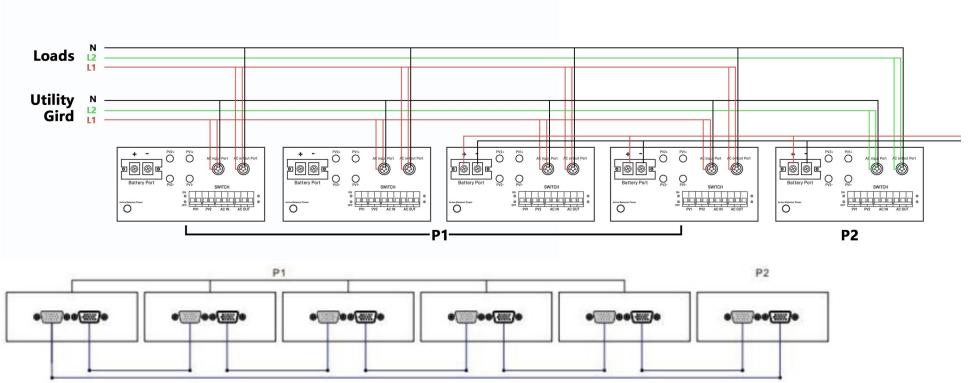


2+2 system:

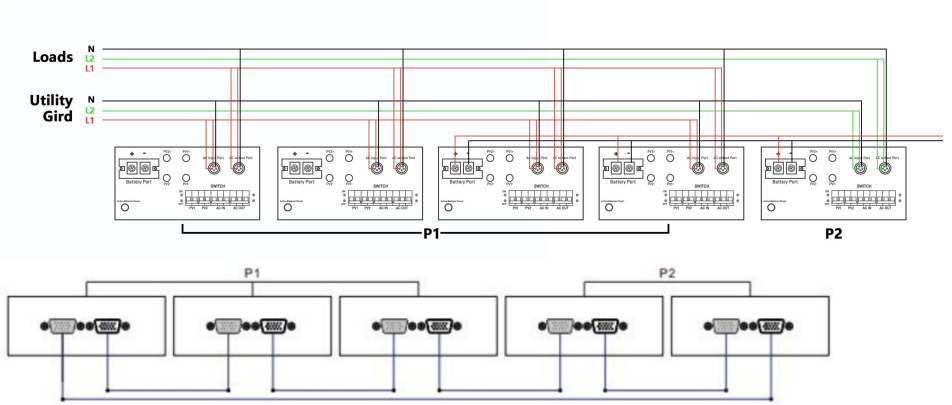


d. Split-phase system (five inverters)

4+1 system:

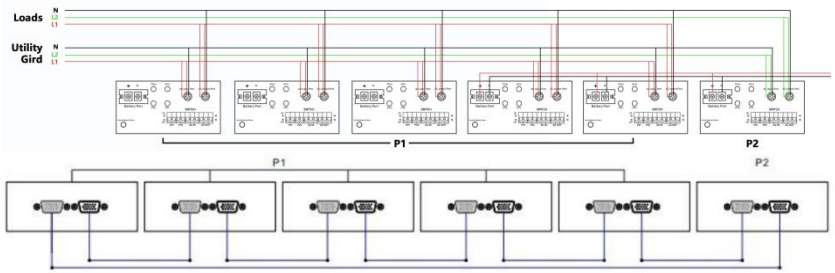


3+2 system:

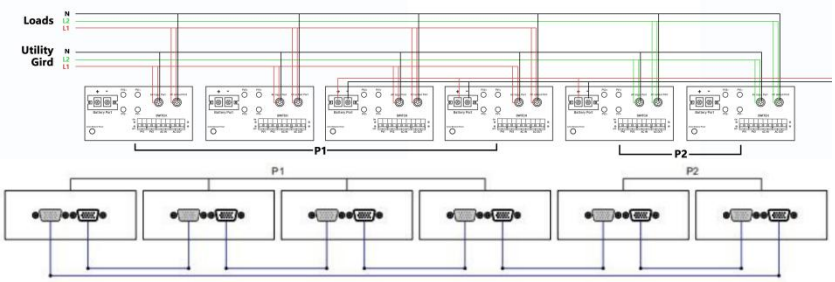


e. Split-phase system (six inverters)

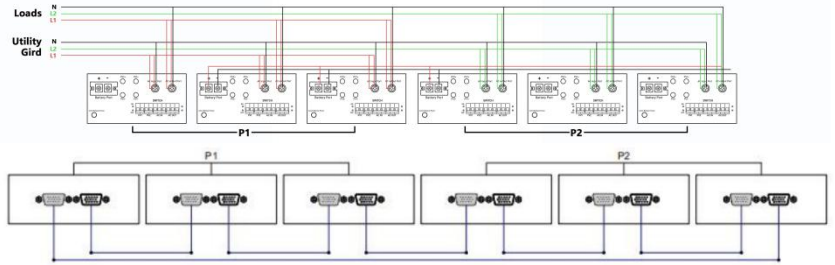
5+1 system:



4+2 system:



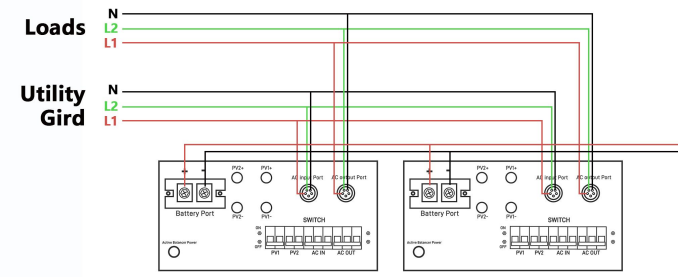
3+3 system:

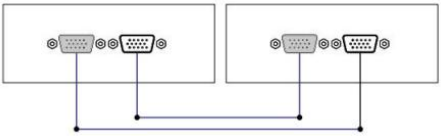


5.9.5 Wiring diagram for split-phase parallel connection

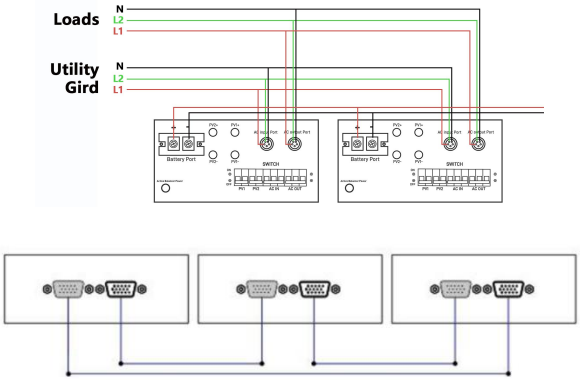
Set the item [31] to PAL, and set the item [68] to 180°. When setting the item [38] to "120 V," the L1-L2 voltage is 240 V, and the L1-N voltage is 120 V, L2-N voltage is 120V

a. Two parallel-connected solar storage inverters:

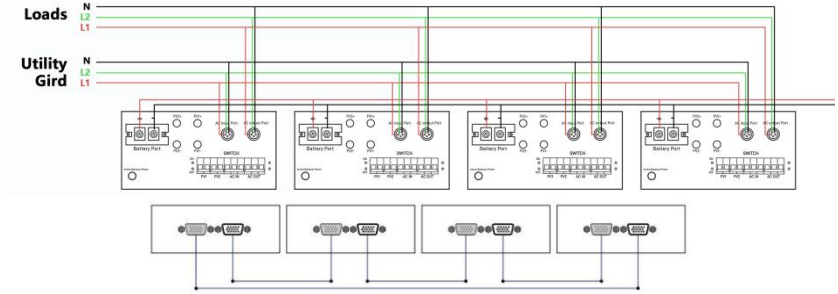




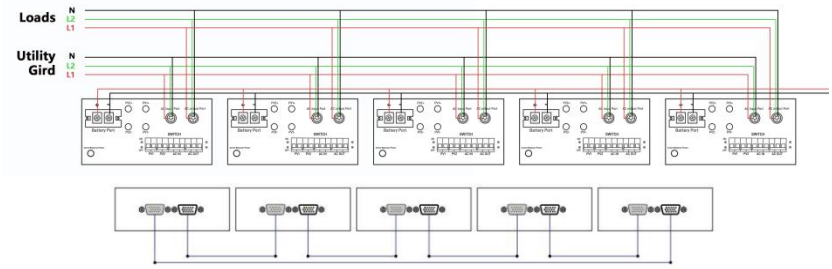
b. Three parallel-connected solar storage inverters:



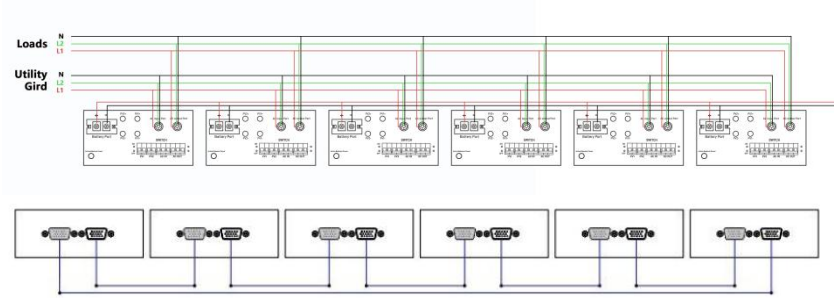
c. Four parallel-connected solar storage inverters:



d. Five parallel-connected solar storage inverters:



e. Six parallel-connected solar storage inverters:



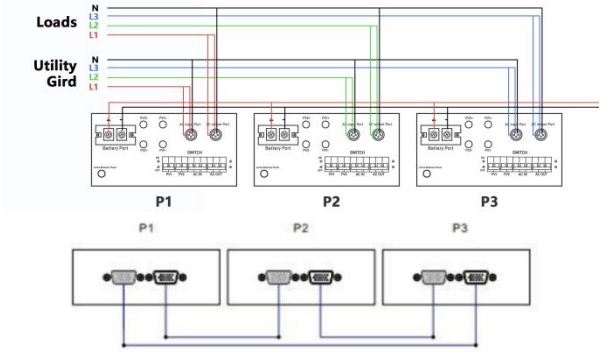
5.9.6 Wiring diagram for three-phase parallel connection

P1: Set the item [31] to "3P1;" P2: Set the item [31] to "3P2;" P3: Set the same to "3P3"， all of P1/P2/P3 inverters item [68] can not be set, it is default “0°”

At this point, the P1-P2, P1-P3, and P2-P3 phase difference is 120°. When setting the item [38] to "120 VAC," the voltage between the live wire L1 of P1 phase and the live wire L2 of P2 phase is 230*1.732=208 VAC. Similarly, the L1-L3 and L2-L3 voltage is 208 VAC:

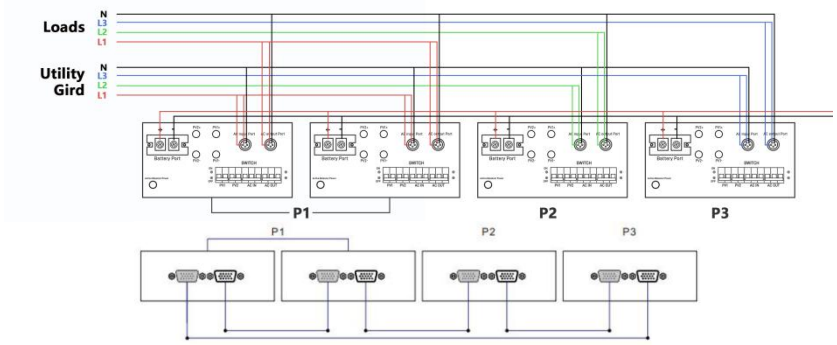
a. Three-phase system (three inverters)

1+1+1 system:



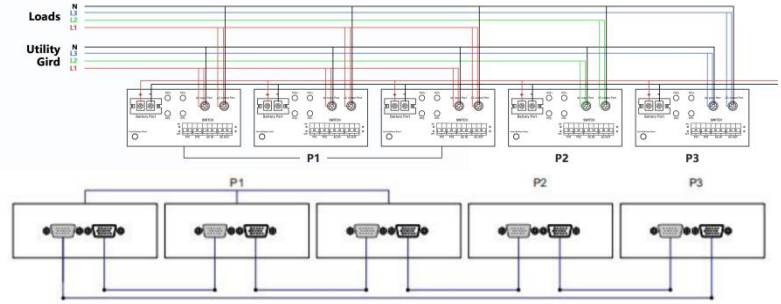
b. Three-phase system (four inverters)

2+1+1 system:

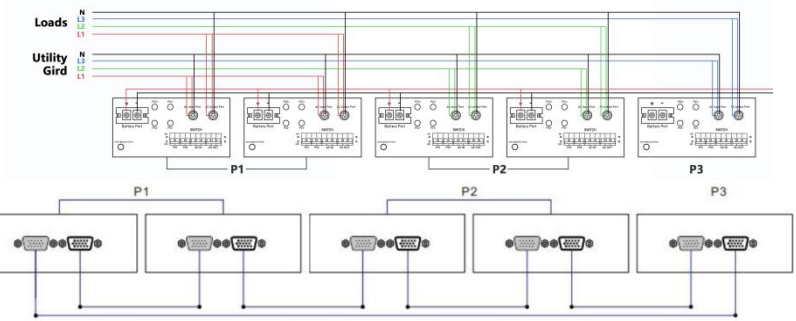


c. Three-phase system (five inverters)

3+1+1 system:

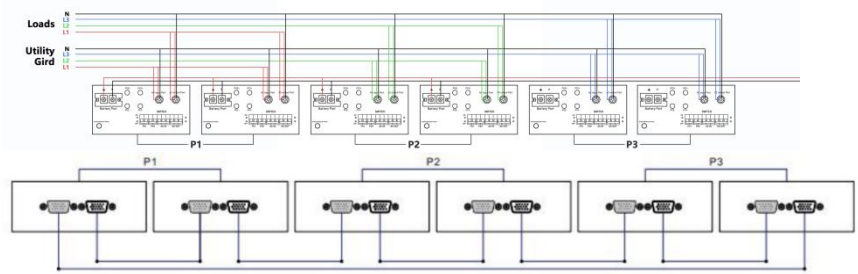


2+2+1 system:

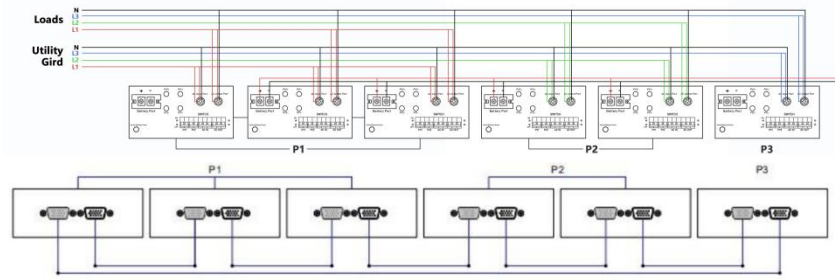


d. Three-phase system (six inverters)

2+2+2 system:



3+2+1 system:



Note:

1) Before powering on and lighting up the screen, check for correct wiring according to the above wiring diagrams to avoid system problems.
2) Check all connections for firm fixing to avoid detachment and abnormal system operation.
3) When connecting the AC output to the load, complete wiring according to the requirements of the electrical load to avoid damage to the load.
4) Set the item [38] to the same parameter, or only set it in the host inverter. During parallel operation, the voltage set in the host shall prevail, so the host inverter will forcibly set the item to the value for slave inverters. Only in standby mode can the item be set.
5) The inverter defaults to single mode at the factory. If using the parallel or three-phase function, set the item [31] on the screen as follows:

Power on one inverter each time, turn off the other inverters, and then set the item [31] according to the on-site system operation mode. After setting the inverter, turn off the inverter, and set the other inverters one by one. After all are set, power on all inverters at one time to enter the working state.

In single-phase parallel operation:

Set the item [31] to "PAL" and the item [68] to "0°." When setting the item [38] to "120 V," the output L-N voltage is 120 V

In two-phase parallel operation:

(1) P1: Set the item [31] to "2P0;" P2: Set the item [31] to "2P1," all of P1/P2 inverters item [68] can not be set, it is default “0°”and the phase difference between P1 and P2 is 120°. When setting the item [38] to "120 V," the voltage between the live wire L1 of P1 phase and the live wire L2 of P2 phase is 208 V, and the L1-N voltage is 120 V

(2) P1: Set the item [31] to "2P0;" P2: Set the item [31] to "2P2," all of P1/P2 inverters item [68] can not be set, it is default “0°”and the phase difference between P1 and P2 is 180°. When setting the item [38] to "120 V," the voltage between the live wire L1 of P1 phase and the live wire L2 of P2 phase is 240 V, and the L1-N voltage is 120 V

In split-phase parallel operation:

Set the item [31] to PAL, and set the item [68] to 180°. When setting the item [38] to "120 V," the L1-L2 voltage is 240 V, and the L1-N voltage is 120 V

In three-phase parallel operation:

P1: Set the item [31] to "3P1;" P2: Set the item [31] to "3P2;" P3: Set the same to "3P3" all of P1/P2/P3 inverters item [68] can not be set, it is default “0°”

At this point, the P1-P2, P1-P3, and P2-P3 phase difference is 120°. When setting the item [38] to "120 VAC," the voltage between the live wire L1 of P1 phase and the live wire L2 of P2 phase is 230*1.732=208 VAC. Similarly, the L1-L3 and L2-L3 voltage is 208 VAC:

6) After the system runs, measure the correct output voltage before connecting to loads.

5.10 Final assembly

After ensuring that the wiring is reliable and the wire sequence is correct, install the terminal protection cover in place.

5.11 Start up the inverter

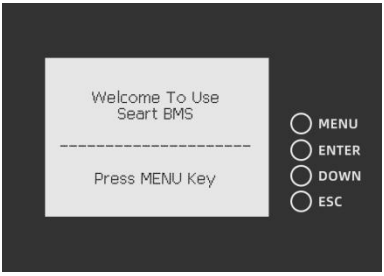
- Step 1: Press the switch on the bottom of inverter , close the circuit breaker of the battery.
- Step 2： Press the switch on the bottom of inverter, the screen and indicators light up to indicate that the inverter has been activated.
- Step 3： Sequential close of the circuit breakers for PV, AC input and AC output.
- Step 4： Start the loads one by one in order of power from small to large.

6. Operation

6.1 Operation and display panel

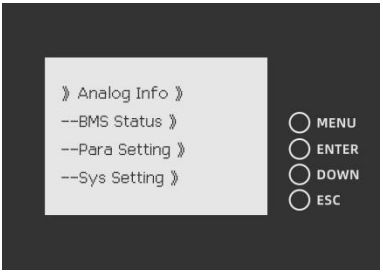
6.1.1 Battery display

Button Description:
MENU: enter the management system.
ENTER: enter the submenu.
DOWN: moves the cursor down or to the next page.
ESC: returns to the previous one



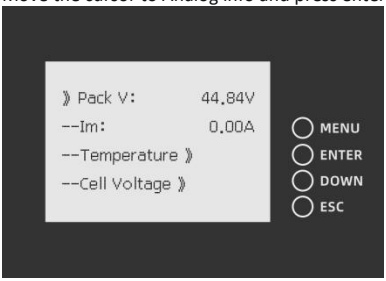
Battery protection status:
Overvoltage: OV
Low voltage: LV
Overtemperature: OTt
Low temperature: IT
Over current: OC
Short circuit: SC
Note: when the battery is protected, the corresponding protection status will be displayed; otherwise, the protection status will not be

Press “MENU” to enter the main menu
Note:“》”indicates that there is a submenu. Press ”enter” to enter the submenu



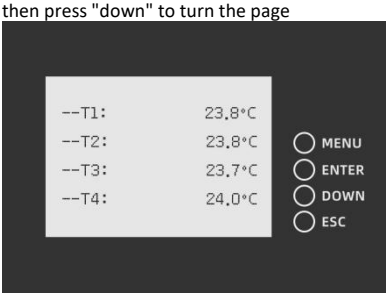
Analog Info	》
BMS Status	》
Para Setting	》
Sys Setting	》

Move the cursor to Analog info and press enter



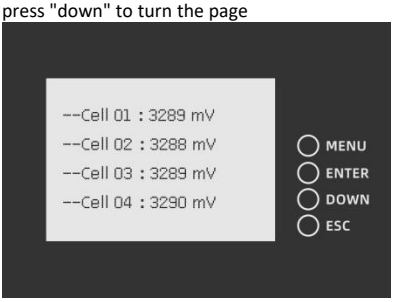
Pack V	
Im	
Temperature	》
Cell Voltage	》
CellCapacity	》

Move the cursor to "temperature" and press "enter" to check the battery temperature information, then press "down" to turn the page



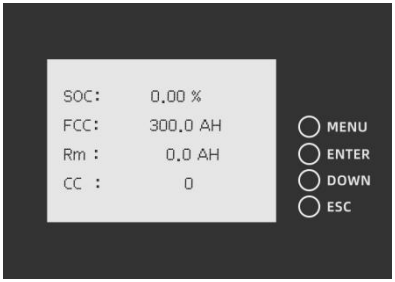
T1	XX℃
T2	XX℃
T3	XX℃
T4	XX℃
PCB-T	XX℃
ENV-T	XX℃

Move the cursor to "cell voltage" and press "enter" to check the battery voltage information, then press "down" to turn the page



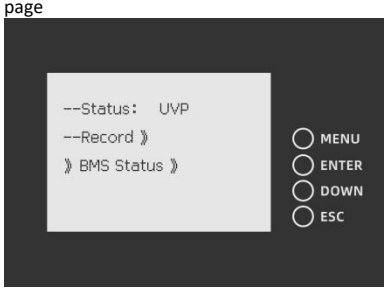
Cell 01	xxxxmV
Cell 02	xxxxmV
Cell 03	xxxxmV
Cell 04	xxxxmV

Move the cursor to “Cell Capacity” and press Enter to check the battery capacity information



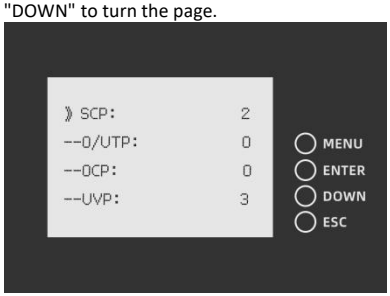
SOC	X%
FCC	XAH
Rm	XAH
CC	0

Move the cursor to “BMS Status”, press Enter to check the battery status, and press “▼” to turn the page



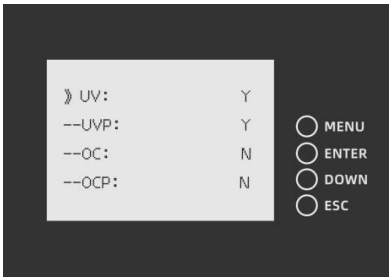
Status	
Record	》
BMS Status	》

Move the cursor to "Record", then press "Enter" to check the battery alarm information, then press "DOWN" to turn the page.



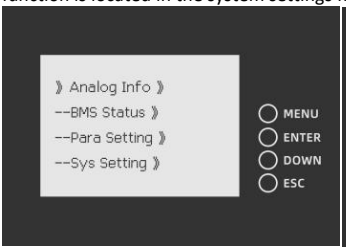
SCP	
0/UTP	
0CP	
UVP	
0VP	

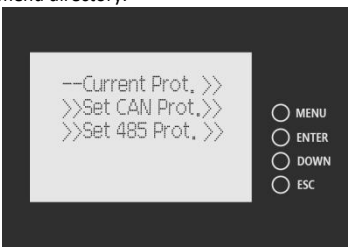
Move the cursor to "BMS Status", then press "Enter" to check the battery protection information, and then press "DOWN" to turn the page.

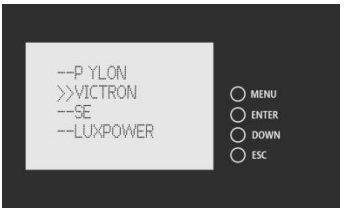


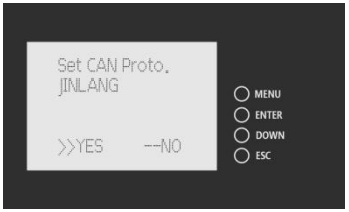
UV	Y/N
UVP	Y/N
OC	Y/N
OCP	Y/N
OT	Y/N
OTP	Y/N
OV	Y/N
OVP	Y/N
SCP	Y/N
Failure	Y/N

The user selects the correct communication protocol version by pressing the button and sends the selected protocol version number back to the BMS motherboard program, thereby changing the default communication protocol between BMS and the upper computer. The selection menu for this function is located in the system settings menu directory.







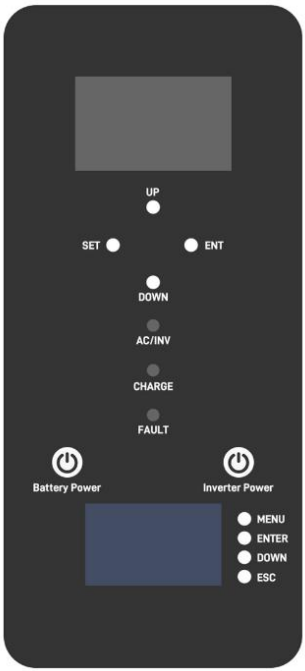


Move the cursor to "Sys Setting", then press Enter to check the version information, and then press "▼" to turn the page.

6.1.2 Inverter display

- The INVENTER DISPLAY

The operation and display panel is as shown below, including 1 LCD screen, 3 indicators and 4 operation buttons.



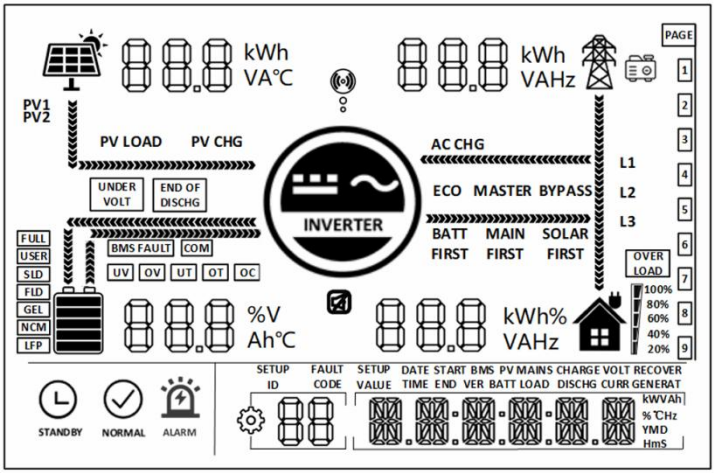
- **Operation buttons introduction**

Function buttons	Description
SET	To enter/exit the setting menu
UP	To next selection
DOWN	To last selection
ENT	To confirm/enter the selection in setting menu

- **LED Indicators**

Indicators	Colors	Description
AC/INV	Green	Continued: utility grid by-pass output
		Flash: inverter output
CHARGE	Yellow	Continued: charging complete
		Flash: charging
FAULT	Red	Flash: error occur

6.2 Display panel



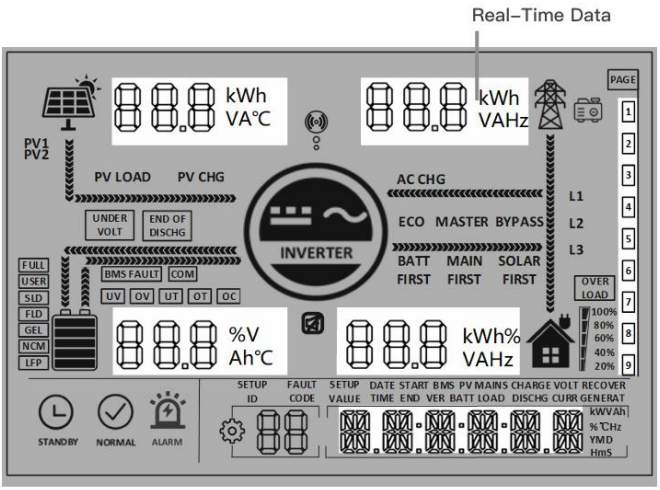
Icons	Functions	Icons	Functions
	Indicates the PV panel		Indicates the utility grid
	Indicates the battery		Indicates the generator
	Indicates the inverter is working		Indicates the home load
	Indicates the inverter is communicating with data collector		Indicates the buzzer muted
		Indicates the direction of energy flow	
	Indicates the inverter is standby		Indicates the inverter is working normally
	Indicates error occur		Indicates setting
	Indicates load power 80%~100%		Indicates battery SOC 80%~100%

	Indicates load power 60%~79%		Indicates battery SOC 60%~79%
	Indicates load power 40%~59%		Indicates battery SOC 40%~59%
	Indicates load power 20%~39%		Indicates battery SOC 20%~39%
	Indicates load power 5%~19%		Indicates battery SOC 5%~19%
UNDER VOLT	Indicates battery under-voltage	END OF DISCHG	Indicates battery discharge
OVER LOAD	Indicates over-load	BMS FAULT	Indicates BMS fault
COM	Indicates system communication error	UV	Indicates system under-voltage
OV	Indicates system over-voltage	UT	Indicates system under-temperature
FULL	Indicates battery is full	OC	Indicates system over-current
SLD	Indicates sealed lead-acid battery	USER	Indicates user defined battery
GEL	Indicates gel lead-acid battery	FLD	Indicates flooded lead-acid battery
LFP	Indicates LFP li-ion battery	ECO	Indicates energy-saving mode
PV LOAD	Indicates PV energy is carrying the load	PV CHG	Indicates PV energy is charging the battery
AC CHG	Indicates ACIN energy is charging the battery	MAIN FIRST	Indicates the inverter output mode is mains power first
BYPASS	Indicates the inverter output mode is bypass	SOLAR FIRST	Indicates the inverter output mode is solar first
BATT FIRST	Indicates the inverter output mode is battery first		

- **View real-time data**

In the main screen, press the UP/DOWN keys to view the real-time data of the inverter during operation.

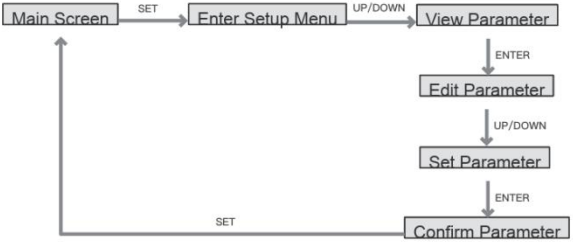
NOTICE

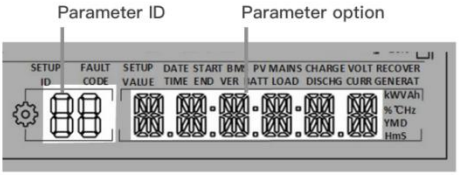


Page	PV side	BAT side	AC IN side	LOAD side	General
1	PV voltage	Batt Voltage	AC in voltage	Single phase voltage	Current Time
2	PV current	Batt Current	AC in current	Single phase Current	Current Date
3	PV power	Batt Voltage	Total AC charging power	Single phase active power	PV Total kWh
4	PV today kWh sink	Batt Current	Today AC charging kWh	Single phase apparent power	Load Total kWh
5	PV side heat temperature	INV Heat Sink Temperature	AC frequency	AC output frequency	RS485 Address
6	PV rated voltage	Batt Rated Voltage	Busbar voltage	AC output rated power	Software Version
7	Max. PV charging current	Max. Batt charging current	Max. AC charging Current	Total AC output active power	/
8			/	Total AC output apparent power	/

- **Setting**

NOTICE





ID	Parameter Meaning	Options	Description
00	Exit	ESC	Exit the setup menu.
01	AC output source priority	UTI (default)	Mains first. Grid power supply is to be applied first. When the PV power is available, and the item 34 is set to "MIX LOD," both the mains and PV power supply power to the load, while the battery only supplies power to the load when the mains is not available.
		SBU	Inverter first. The PV mode is to be applied first for loading, and only when the battery voltage is lower than the set value in the item 4, it will switch to the mains mode for loading. When the battery voltage is higher than the set value in the item 5, it will switch back to the PV mode from the mains mode.
		SOL	The PV mode is to be applied first and when the PV power is unavailable or the battery voltage is lower than the set value in the item 4, it will switch to the mains mode.
02	AC input frequency	50.0	In bypass mode, the AC output frequency will adapt to the mains frequency, and in other cases, the output will follow the preset value.
		60.0 (default)	
03	AC input voltage range	UPS (default)	When output range is 120/110V, input voltage range 90~140V.
		APL	When output range is 100/105V, input voltage range 85~140V.
04	Battery to mains voltage threshold	43.6 (default)	When the parameter item 01 is SBU or SOL and the battery voltage is lower than the threshold, the output switches from inverter to mains.

			Setting range: 40 V−52 V
05	Mains to battery voltage threshold	57.6 (default)	When the parameter item 01 is SBU or SOL and the battery voltage is higher than the threshold, the output switches from mains to inverter. Setting range: 48 V−60 V.
06	Battery charging mode	SNU (default)	When both PV power and mains are used to charge the battery at one time, the PV charge first and when the PV power is insufficient, the mains tags in. Only in bypass mode can both PV power and mains be used to charge the battery at one time, and only the PV charge mode can be enabled during inverter operation.
		CUB	Mains charge first, and enable the PV charge mode only when mains is unavailable.
		CSO	PV charge first, and enable the mains mode only when PV power is unavailable.
		OSO	Do not enable the mains charge mode when in only PV charge mode.
07	Battery charge current	60	Current setting range: 0~200A.
08	Battery type	USER	User-defined, user can set all battery parameter
		SLD	Sealed lead-acid battery.
		FLD	Flooded lead-acid battery.
		GEL (default)	Gel lead-acid battery.
		L14/L15/L16	LFP li-ion battery, 14\15\16 corresponds battery cells number in series.
		N13/N14	Ternary Li-ion battery N13/N14, corresponding to 13 and 14 series of ternary Li-ion batteries
09	Battery boost charge voltage	57.6	Setting range: 48 V−58.4 V, with a step of 0.4 V, available for user-defined and lithium-ion battery types
10	Boost charge duration	120	The continuous charging time when the voltage reaches the set voltage during constant voltage charging, with a setting range of 5 min−900 min and a step of 5 min.
11	Battery floating charge voltage	55.2	Setting range: 48 V − 58.4 V, with a step of 0.4 V. This parameter cannot be set after successful BMS communication.
12	Battery over-discharge voltage (delayed shutdown)	42	When the battery voltage is lower than the voltage and triggers the set value in the item 13, it will turn off the inverter output. Setting range: 40 V−48 V, with a step of 0.4 V
13	Battery over-discharge delay time	5	When the battery voltage is lower than the set value in the item 12 and triggers the delay time set in this parameter item, it will turn off the inverter output. Setting range: 5s−50s, with a step of 5s.
14	Battery under-voltage alarm threshold	44	When the battery voltage is lower than the threshold, it will give an under-voltage alarm and the output will not shut down. Setting range: 40 V−52 V, with a step of 0.4 V

15	Battery discharge limit voltage	40	When the battery voltage is lower than the value, the output immediately shuts down. Setting range: 40 V–52 V, with a step of 0.4 V, available for user-defined and Li-ion batteries
16	Battery equalization charge	DIS	Disable equalizing charge.
		ENA (default)	Enable equalizing charge, but only available for flooded lead-acid batteries, sealed lead-acid batteries, and user-defined ones
17	Equalizing charge voltage	58	Setting range: 48 V – 58 V, with a step of 0.4 V, but only available for flooded lead-acid batteries, sealed lead-acid batteries, and user-defined ones
18	Equalizing charge duration	120	Setting range: 5 min–900 min, with a step of 5 min, but only available for flooded lead-acid batteries, sealed lead-acid batteries, and user-defined ones.
19	Equalizing charge delay time	120	Setting range: 5 min–900 min, with a step of 5 min, but only available for flooded lead-acid batteries, sealed lead-acid batteries, and user-defined ones
20	Equalizing charge interval	30	Setting range: 0 day–30 days, with a step of 1 day, but only available for flooded lead-acid batteries, sealed lead-acid batteries, and user-defined ones
21	Equalizing charge Enable/Disable	DIS (default)	Start equalizing charge immediately
		ENA	Stop equalizing charge immediately
22	Energy-saving mode	DIS (default)	Disable energy-saving mode
		ENA	Enable energy-saving mode, and when the load power is below 50 W, it will turn off the inverter output after a 5-minute delay. When it exceeds 50 W, the inverter will automatically restart.
23	Over-load restart	DIS	Disable overload auto restart and when overload occurs, it will turn off the output and the inverter will no longer resume startup
		ENA (default)	Enable overload auto restart, and If overload occurs, the output will be turned off, and after a delay of 3 min, the output will restart. After 5 cumulative attempts, the inverter will no longer resume startup
24	Over-temperature restart	DIS	Disable over-temperature auto restart and when over-temperature occurs, it will turn off the output and the inverter will no longer turn on the output
		ENA (default)	Enable over-temperature auto restart and when over-temperature occurs, it will turn off the output and the output will restart when the temperature drops
25	Buzzer alarm	DIS	Disable buzzer alarm.
		ENA (default)	Enable buzzer alarm.
26	Mode switch prompt	DIS	Disable prompt when the status of the main input source changes
		ENA (default)	Enable prompt when the status of the main input source changes
27	Inverter to bypass	DIS	Disable auto switch to mains for loading in case

	switch		of inverter overload
		ENA (default)	Enable auto switch to mains for loading in case of inverter overload
28	Max. utility charging current	60 (default)	SPI-10K-UP, setting range: 0 A–120 A
30	RS485 address	ID: 1	Setting range: 1–254
31	Parallel mode	SIG (default)	Single inverter operation.
		PAL	Parallel operation.
		2P0/2P1/2P2	Two-phase parallel operation.
		Set to "2P0" for the machine screens connected to P1 Assuming that the output voltage of the setting item [38] is set to 120 VAC 1) When all the inverters connected to P2 are set to "2P1" on the screen, the voltage phase difference between P1 and P2 is 120°, the voltage between the live wire L1 of phase-P1 and the live wire L2 of phase-P2 is 120*1.732=208 VAC, and the voltage of L1-N and L2-N is 120 VAC. 2) When all the inverters connected to P2 are set to "2P2" on the screen, the voltage phase difference between P1 and P2 is 180°, the voltage between the live wire L1 of phase-P1 and the live wire L2 of phase-P2 is120*2=240 VAC, and the voltage of L1-N and L2-N is120 VAC.	
		3P1/3P2/3P3	Three-phase parallel operation
		Set to "3P1" on the screen for all the inverters connected to P1; set to "3P2"on the screen for all the inverters connected to P2; and set to "3P3" on the screen for those connected to P3. 1) Assuming that the output voltage of the setting item [38] is set to 120 VAC: then the voltage phase difference of P1-P2, P1-P3, and P2-P3 is 120°, the voltage between the live wire L1 of phase-P1 and the live wire L2 of phase-P2 is 120*1.732=208 VAC, and similarly the voltage of L1-L3 and L2-L3 is 208 VAC; the voltage of L1-N, L2-N, and L3-N is 208 VAC.	
32	RS485 communication function	SLA (default)	Enabling PC and remote monitoring protocols
		485	Enabling BMS communication based on RS485
		CAN	Enabling BMS communication based on CAN.
33	BMS communication	Select the corresponding communication protocol in item 33 when you set it to 485 or CAN in item 32	
		PAC = PACE, RDA = Ruida, AOG = Aoguan, OLT = Oliter, HWD = Sunwoda, DAQ = Daqin, WOW = SRNE, PYL = Pylontech, UOL = Vilion	
34	Grid connection and mix loading function	DIS (default)	Disable this function.
		MIXLOD	When item 01 is set to UTI, PV is used first to charge the battery, and then to supply power to the load in case of superfluous energy. Thanks to the anti-reverse current function, PV power will not be fed back into the grid.
		ONGRD	When item 01 is set to UTI, PV is used first to supply power, and then fed back into the grid after satisfying the power demand of the load.
35	Battery under-voltage recovery threshold	52	When the battery is under voltage, the battery voltage needs to be greater than the threshold to restore the AC output of the battery inverter. Setting range: 44 V–54.4 V
37	Recharge voltage threshold for fully charged battery	52	After the battery is fully charged, the inverter stops charging, and recovers charging when the battery voltage is lower than the threshold.

			Setting range: 44 V–54 V
38	AC output voltage	120	Setting range: 100/105/110/120Vac.
39	Charge current limit (when BMS works)	LCSET	The maximum battery charge current is not greater than the set value of [item 07]
		LCBMS (default)	The maximum battery charge current is not greater than the maximum value of BMS
		LCINV	The maximum battery charge current is not greater than the logical judgment value of inverter
40	Period-1 battery charge start time	00:00:00	Setting range: 00:00:00-23:59:00
41	Period-1 battery charge end time	00:00:00	Setting range: 00:00:00-23:59:00
42	Period-2 battery charge start time	00:00:00	Setting range: 00:00:00-23:59:00
43	Period-2 battery charge end time	00:00:00	Setting range: 00:00:00-23:59:00
44	Period-3 battery charge start time	00:00:00	Setting range: 00:00:00-23:59:00
45	Period-3 battery charge end time	00:00:00	Setting range: 00:00:00-23:59:00
46	Timed battery charge function	DIS (default)	Disable this function.
		ENA	After the timed mains charge/loading function is enabled, the power supply mode will turn into SBU, where mains is available for power supply in the set period or after battery over-discharge. If the timed discharge function is enabled at the same time, the power supply mode of the system will be changed into UTI, where mains is only available for power supply in the set charge period, and the system only switches to the power supply of battery inverter during the set discharge period or mains failure.
47	Period-1 battery discharge start time	00:00:00	Setting range: 00:00:00-23:59:00
48	Period-1 battery discharge end time	00:00:00	Setting range: 00:00:00-23:59:00
49	Period-2 battery discharge start time	00:00:00	Setting range: 00:00:00-23:59:00
50	Period-2 battery discharge end time	00:00:00	Setting range: 00:00:00-23:59:00
51	Period-3 battery discharge start time	00:00:00	Setting range: 00:00:00-23:59:00
52	Period-3 battery discharge end time	00:00:00	Setting range: 00:00:00-23:59:00
53	Timed battery discharge function	DIS (default)	Disable this function.
		ENA	After the timed battery discharge function is enabled, the power supply mode will be changed into UTI, where the system only switches to the power supply of battery inverter during the set discharge period or mains failure.
54	Current date	00:00:00	Year/Month/Day Setting range: 00:01:01–99:12:31
55	Current time	00:00:00	Setting range: 00:00:00-23:59:59

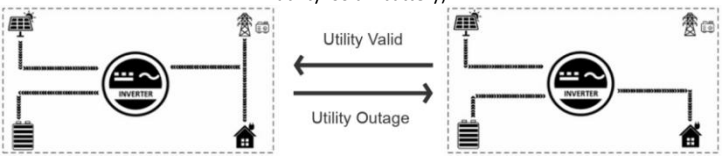
57	Charge stop current	3	The charge stops when the charge current is less than the set value (unit: A)
58	SOC setting for discharge alarming	15	When the capacity is less than the set value, the SOC alarms (unit: %, only available during normal BMS communication)
59	SOC setting for discharge cutoff	5	When the capacity is less than the set value, the discharge stops (unit: %, only available during normal BMS communication)
60	SOC setting for charge cutoff	100	When the capacity is greater than the set value, the charge stops (unit: %, only valid during normal BMS communication)
61	SOC setting for switching to mains	10	When the capacity is less than the set value, it switches to mains (unit: %, only available during normal BMS communication)
62	Switching to inverter SOC	100	When the capacity is greater than the set value, it switches to the inverter output mode (unit: %, only available during normal BMS communication)
63	Auto N-PE connection switch function	DIS (default)	Disable auto N-PE connection switch
		ENA	Enable auto N-PE connection switch
67	Power sales setting	0 (default)	Setting range: 0–rated power
68	AC output phase mode	0	0 represents the single-phase mode Assuming that the AC output voltage of item 38 is 120 V, the phase difference of L1-L2 is 0 ° , and L1/L2 can be connected in parallel, the phase voltage of L1-N/L2-N is 120 V
		180 (default)	180 represents the split-phase mode Assuming that the AC output voltage of item 38 is 120 V, the phase difference of L1-L2 is 180 °, the phase voltage of L1-N/L2-N is 120 V, and the voltage of L1-L2 is 240 V
71	PV energy priority	Charge (default)	PV power is first used to charge the battery
		Load	PV power is first used for the load

6.3 AC output mode

The AC output mode corresponds to parameter setting item 01 and 34, which allows the user to set the AC output power source manually.

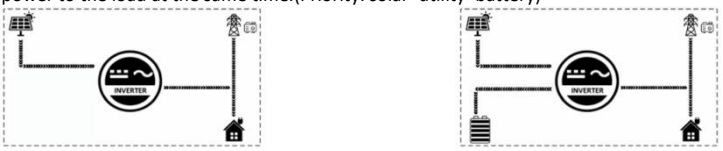
- **Utility Priority Output 01 UTI (default)**

Utility at first priority, utility and solar provide power to load at the same time when solar is available, battery will provide power to load only when utility power is not available.(Priority: utility>solar>battery)



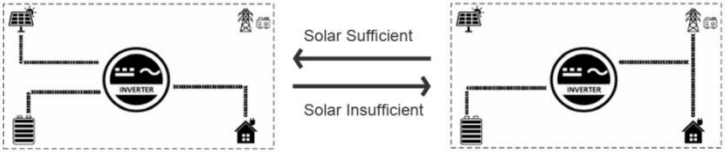
- Solar and Utility Hybrid Output 34 MIX LOD

In UTI mode, when not connected to the battery or when the battery is full, the solar and the utility supply power to the load at the same time.(Priority: solar>utility>battery)



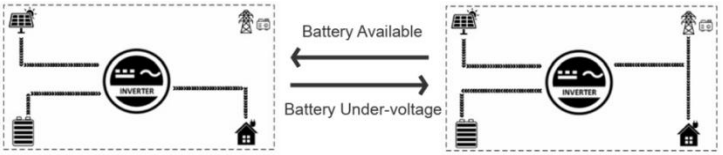
- **Solar Priority Output 01 SOL**

Solar provides power to the loads as first priority. If solar is not available, the utility will be used as a supplement to provide power to the loads. This mode maximises solar energy while maintaining battery power and is suitable for areas with relatively stable power grids.(Priority: solar>utility>battery)



- **Inverter Priority Output 01 SBU**

Solar provides power to the loads as first priority. If solar is not sufficient or not available, the battery will be used as a supplement to provide power to the loads. When the battery voltage reaches the value of parameter 04 (Voltage point of battery switch to utility) will switch to utility to provide power to the load, This model makes maximum use of DC energy and is used in areas where the grid is stable. (Priority: solar>battery>utility)

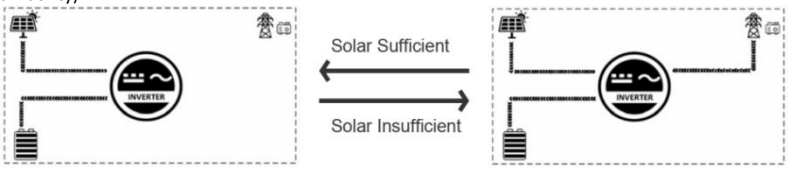


6.4 Battery charging mode

The charging mode corresponds to parameter setting item 06, which allows the user to set the charging mode manually.

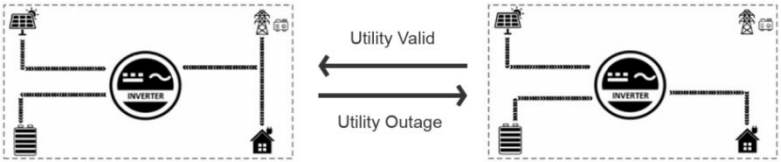
- Hybrid Charging SNU(default)

Solar and utility charging the battery at the same time, solar at the first priority, utility power as a supplement when solar power is not sufficient. This is the fastest way to charge and is suitable for areas with low power supply, providing customers with sufficient back-up power.(Source priority: solar>utility)



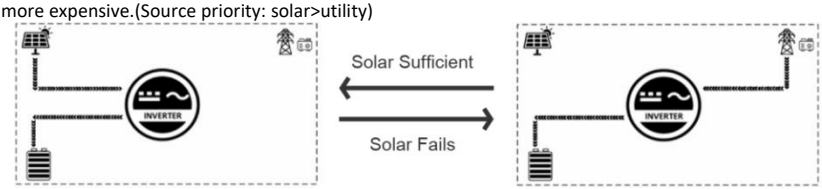
- **Utility Priority Charging CUB**

The utility power gives priority to charging the battery, and PV charging is only activated when the utility power is not available.(Source priority: utility>solar)



- **Solar Priority Charging CSO**

Solar priority charging, with utility charging only activated when the solar fails. By making full use of solar power during the day and switching to utility charging at night, battery power can be maintained and is suitable for applications in areas where the grid is relatively stable and electricity prices are more expensive.(Source priority: solar>utility)



- **Only Solar Charging OSO**

Solar charging only, no mains charging is activated. This is the most energy-efficient method, with all the battery power coming from solar energy, and is usually used in areas with good radiation conditions.

● Divide grid mold settings

Model	Item	Option	Meaning	Electric energy use priority	Characteristic
Output mode	01	UTI	Municipal Power Priority Output Mode	Municipal Electric-Photovoltaic-Battery	This mode is maximized and available, while maintaining it at the same time Holding the battery power as an emergency energy storage, it is suitable for power supply Stable area
		SOL	Photovoltaic priority output mode	Photovoltaic-Municipal Electric-Battery	This uses photovoltaic energy to the greatest extent, while maintaining battery power as emergency energy storage
		SBU	Reverse priority output mode	Photovoltaic-Battery-City Electricity	This model uses DC electricity to the greatest extent to reduce the cost of electricity consumption. It is suitable for areas with expensive electricity but stable power supply.
Charging mode	06	SNU	Municipal Electric Phrase Mixed Charging Mode	Photovoltaic-Mixed Charging-Municipal Electricity	The fastest charging speed
		CUB	Municipal Power Priority Charging Mode	Municipal Electric-Photovoltaic	Starting photovoltaic charging when the municipal power is not available
		CSO	Photovoltaic priority charging mode	Photovoltaic-Municipal Electric	When photovoltaic failure, start the city power charging, suitable for the grid Stable and more expensive areas
		OSO	Only photovoltaic charge mode	Photovoltaic	Only photovoltaic charging, not using city power charging

● Hybrid energy storage application

Model	Item	Option	Meaning	Electric energy use priority	Characteristic
Output mode	34	DIS	**Represents the closing of hybrid energy storage applications, and the system is switched to the application of the network by default.**		
		ON GRD	Grid mode	Can be used by 46, 53, and 71 items	You can feed the excess power or battery energy storage to the power grid to help users obtain power generation income
		MIX LOD	Hybrid output mode		Anti -countercurrents can realize mixed -loading of municipal electricity and photovoltaic, support the use of battery -free, help users reduce the cost of electricity consumption,
Power charging and loading functions during the time period	46	DIS	**Turn off this function, the city power does not charge the battery**		
		ENA	Open the power charging and load function of the time period of the time period	After enabling this function, users can set a time period of 40-45 items. Within the set time period, if there is photovoltaic energy, priority should be given to using photovoltaic energy for charging; When the photovoltaic energy is insufficient, the municipal	Utilize peak and valley electricity prices to store photovoltaic energy and valley price electricity in energy storage batteries

				electricity will be mixed charged, and when there is no photovoltaic energy, the municipal electricity will be charged.	
Time division battery discharge function	53	DIS	**Turn off this function, the battery power cannot be fed back to the power grid or loaded**		
		ENA	Enable phased battery discharge function	After enabling this function, users can set a time period between 47 and 52 items. During the set time period, if the photovoltaic energy is insufficient to load or connect to the grid at full power, it is allowed to use battery energy for load or grid connection	Peak and valley electricity prices can be utilized to reduce the use of electricity during peak periods, or to feed battery energy storage back into the grid, thereby obtaining higher grid connection benefits
Priority of photovoltaic energy	71	CHG	Priority charging of photovoltaic energy	If this option is selected, photovoltaic energy will be charged first. After the battery is fully charged, residual electricity can be connected to the grid	It is possible to maintain the battery level as emergency energy storage and connect the remaining photovoltaic energy to the grid or load it
		LOD	Priority grid connection of photovoltaic energy	If this option is selected, photovoltaic energy will give priority to feeding back energy to the grid. If the energy is sufficient, the excess energy will charge the battery	Not storing battery energy to help users gain more power generation benefits

6.5 Time-slot charging/discharging function

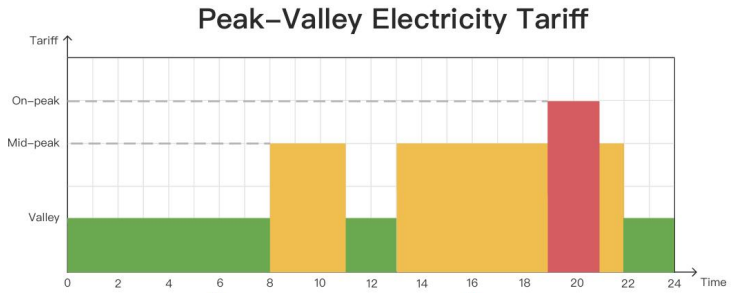
The WAO-MB51200-10KW，WAO-MB51300-10KW，WAO-MB51400-10KW, WAO-MB51600-10KW. is equipped with a time-slot charging and discharging function, which allows users to set different charging and discharging periods according to the local peak and valley tariffs, so that the utility power and PV energy can be used rationally.

When mains electricity is expensive, the battery inverter is used to carry the load; when the mains electricity is cheap, the mains electricity is used to carry the load and charge, which can help customers to save electricity costs to the greatest extent.

The user can turn on/off the time-slot charging/discharging function in setup menu parameter 46 and 53.and set charging and discharging slot in parameter 40-45, 47-52. Below are examples for users to understand the function.

NOTICE

Before using this function for the first time, please set the local time in parameter items 54, 55, then the user can set the corresponding time slot according to the local peak and valley tariff charges.



Time–slot Utility Charging/Carrying Function

With 3 definable periods, the user can freely set the mains charging/carrying time within the range of 00:00 to 23:59. During the time period set by the user, if PV energy is available, PV energy will be used first, and if PV energy is not available or insufficient, utility energy will be used as a supplement.

Time–slot Battery Disacharging Function

With 3 definable time periods, users can freely set the battery discharge time within the range of 00:00 to 23:59. During the time period set by the user, the inverter will give priority to the battery inverter to carry the load, and if the battery power is insufficient, the inverter will automatically switch to mains power to ensure stable operation of the load.

6.6 Battery parameter

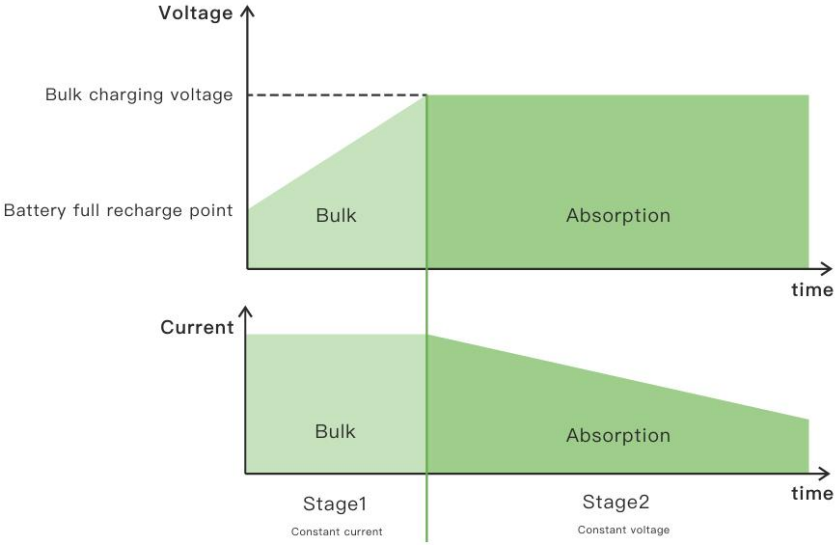
Li-ion battery

Parameter/Battery type	LFP			User-defined
	L16	L15	L14	USER
Over-voltage cut-off voltage	60V	60V	60V	60v
Equalization charging voltage	-	-	-	40~60V settable
Bulk charging voltage	56.8V	53.2V	49.2V	40~60V settable
Float charging voltage	56.8V	53.2V	49.2V	40~60V settable
Under-voltage alarm voltage	49.6V	46.4V	43.2V	40~60V settable
Under-voltage cut-off voltage	48.8V	45.6V	42V	40~60V settable
Discharging limit voltage	46.4V	43.6V	40.8V	40~60V

				settable
Over-discharge delay time	30s	30s	30s	1~30s settable
Equalization charging duration	-	-	-	0~600min settable
Equalization charging interval	-	-	-	0~250d settable
Bulk charging duration	120min settable	120min settable	120min settable	10~600min settable

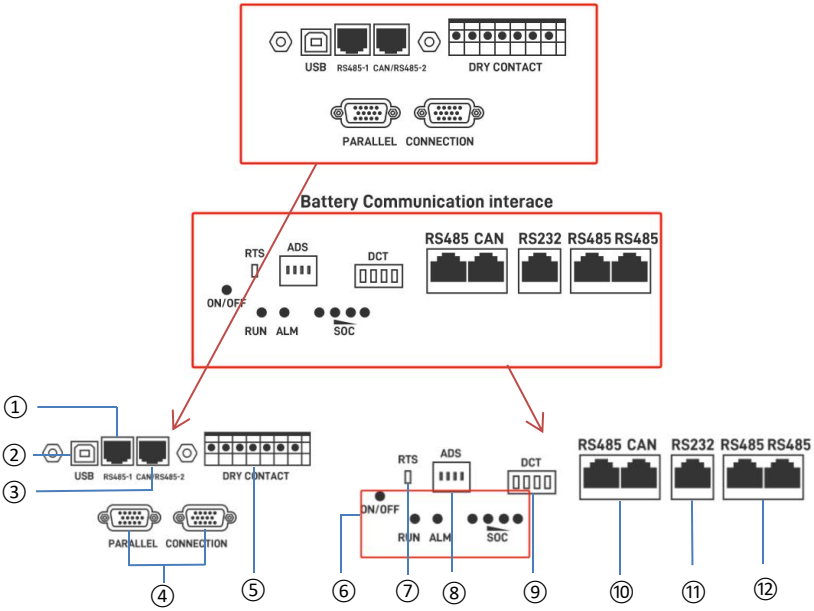
NOTICE

If no BMS is connected, the inverter will charge according to the battery voltage with a preset charging curve. When the inverter communicates with the BMS, it will follow the BMS instructions to perform a more complex stage charging process.



7. Communication

7.1 Overview



Inverter Communication interface	①RS485-1 port	②USB-B port	③CAN/RS485-2 port
	④Parallel connection port		⑤Dry contact port
Battery Communication interface	⑥LED Indicator	⑦RST	⑧ADS
	⑨DCT	⑩RS485/CAN (connect to inverter)	⑪RS232 (connect to computer)
	⑫RS485/RS485 (Parallel connection)		

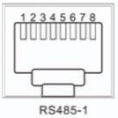
7.2 Inverter Communication Interface

7.2.1 RS485-1 Port

The RS485-1 port is used to connect to the Wi-Fi/GPRS data acquisition module, which allows the user to view the operating status and parameters of the inverter via the mobile phone APP.

NOTICE

The Wi-Fi/GPRS data acquisition module need to be purchased separately. User can scan the QR code to download the mobile APP.



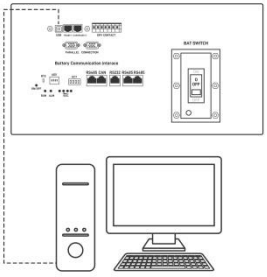
RS485-1

Download on the App Store

GET IT ON Google play

RJ45	Definition
Pin 1	5V
Pin 2	GND
Pin 3	/
Pin 4	/
Pin 5	/
Pin 6	/
Pin 7	RS485-A
Pin 8	RS485-B

7.2.2 USB-B Port

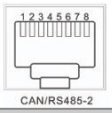



USB typeB

Users can use the host computer software to read and modify the device parameters through this port. If you need the installation package of the host computer software, you can download it from the official website of SRNE or contact us to get the installation package.

7.2.3 CAN/RS485-2 Port

The RS485-2 port is used to connect to the BMS of Li ion battery.



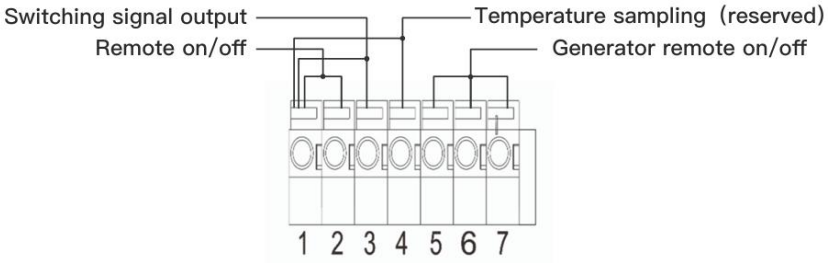
NOTICE

If you use a normal RJ45 network cable, please check the pin assignment, pin 1 & pin 2 usually need to be cut off for normal use.

RJ45	Definition
Pin 1	5V
Pin 2	GND
Pin 3	/
Pin 4	CANH
Pin 5	CANL
Pin 6	/
Pin 7	RS485-A
Pin 8	RS485-B

7.2.4 Dry contact

Dry contact port with 4 functions: 1. Remote switch on/off; 2. Switching signal output; 3. Battery temperature sampling; 4. Generator remote start/ stop



Function	Description
Remote switch on/off	When pin 1 is connected with pin 2, the inverter will switched off the AC output. When pin1 is disconnected from pin2, the inverter outputs normally.
Switching signal output	When the voltage of battery reaches the *under-voltage limit voltage* (parameter 15) , pin 3 to pin 1 voltage is 0V, When the battery charging/discharging normally pin 3 to pin 1 voltage is 5V.
Temperature sampling (reserved)	Pin 1 & Pin 4 can be used for battery temperature sampling compensation.
Generator remote start/stop	When the voltage of battery reaches the *under-voltage alarm voltage* (parameter 14) or *voltage point of utility switch to battery* (parameter 04), pin 6 to pin 5 normal open, pin 7 to pin 5 normal close. When the voltage of battery reaches the *voltage point of battery switch to utility* (parameter 05) or battery is full. pin 6 to pin 5 normal close, pin 7 to pin 5 normal open. (Pin 5/6/7 outputs 125Vac/1A, 230Vac/1A,30Vdc/1A)

NOTICE

If you need to use the remote start/stop function of the generator with dry contact, ensure that the generator has ATS and supports remote start/stop.

7.2.5 Parallel connection port

Introduction:

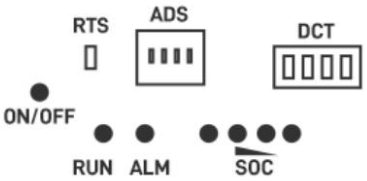
1. Maximum six all-in-one solar charger inverters can be used for parallel operation.

When using the parallel operation function, the following connecting lines (package accessories) shall be firmly and reliably connected:

Parallel communication line*1: **Current sharing detection line*1:**

7.3 Battery Communication Interface

7.3.1 LED Indicator



Four green capacity indicators, a red alarm indicator, a green running indicator and a switch indicator.

7.3.2 SOC capacity indicator

Condition		Charge				Discharge			
Capacity indicator lamp		L1	L2	L3	L4	L1	L2	L3	L4
power （%）	0~25%	Flash 2	OFF	OFF	OFF	ON	OFF	OFF	OFF
	25~50%	ON	Flash 2	OFF	OFF	ON	ON	OFF	OFF
	50~75%	ON	ON	Flash 2	OFF	ON	ON	ON	OFF
	75~100~	ON	ON	ON	Flash 2	ON	ON	ON	ON
Running indicator light		ON				Flash 3			

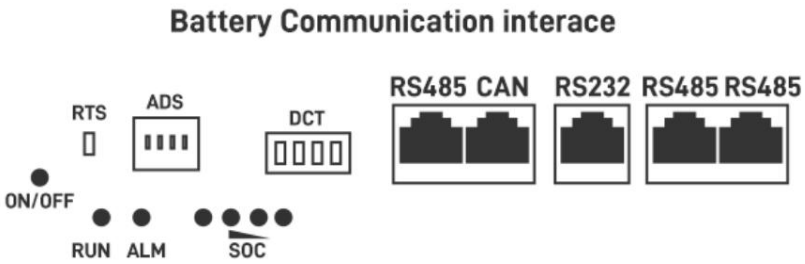
7.3.3 Status indicator

Status	Warning/Normal /Protection	ON/ OFF	Run	Alert	LED Battery Level Indicator				Explain
		●	●	●	●	●	●	●	
Shut down	Sleep mode	ON	OFF	OFF	OFF	OFF	OFF	OFF	Light off
Standby	Normal	ON	Flash 1	OFF	According to the electricity indication				Standby mode
	Warning	ON	Flash 1	Flash 3					Module low voltage
charge	Normal	ON	ON	OFF	According to the power indicator (the maximum LED of the power indicator flashes 2)				The maximum power LED flashes (flash 2),and the ALM does not flash during the overshoot.
	Warning	ON	ON	Flash 3					
	Overcharge Protection	ON	ON	OFF	ON	ON	ON	ON	If there is no mains supply, the indicator turns to standby
	Temperature,over current,failure, protection	ON	OFF	ON	OFF	OFF	OFF	OFF	Stop charging
discharge	Normal	ON	Flash 3	OFF					
	Warning	ON	Flash 3	Flash 3					
	UVLO	ON	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging
	Temperature, over current, short out, reversed polarity ,FAIL-SAFE	ON	OFF	ON	OFF	OFF	OFF	OFF	Stop discharge
Invalid		OFF	OFF	ON	OFF	OFF	OFF	OFF	Stop charging and discharging

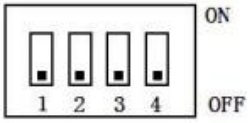
LED flashing description

Flashing mode	ON	OFF
Flash 1	0.25s	3.75s
Flash 2	0.5s	0.5S
Flash 3	0.5s	1.5s

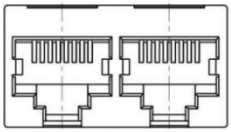
7.3.4 Communication area



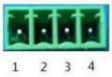
1. RS232: BMS can communicate with upper computer through RS232 interface, so as to monitor various information of battery, including battery voltage, current, temperature, status and battery production information, etc. the default baud rate is 9600bps.
2. RS485: with dual RS485 interface, you can view the information of pack. The default baud rate is 9600bps.If it is necessary to communicate with the monitoring equipment through RS485, the monitoring equipment is used as the host, polling data according to the address, and the address setting range is 1 ~ 15.
3. CAN: CAN communication, baud rate 9600bps.
4. DCT: dry contact interface.
5. Rst: reset button.
6. ADS: dial switch



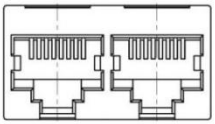
7. Interface diagram



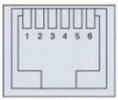
CAN and RS485 interface



Dry contact



Parallel communication port



communication interface

8. Definition of electrical interface

RS232 -- 6P6C vertical RJ11 plug	
RJ11 pin	Definition Description
2	NC
3	TX(Single board)
4	RX(Single board)
5	GND

RS485 - 8P8C vertical RJ45 socket		CAN - 8P8C vertical RJ45 socket	
RJ45 pin	Definition Description	RJ45 pin	Definition Description
1、8	RS485-B1	9、10、11、14、16	NC
2、7	RS485-A1	12	CANL
3、6	GND	13	CANH
4、5	NC	15	GND

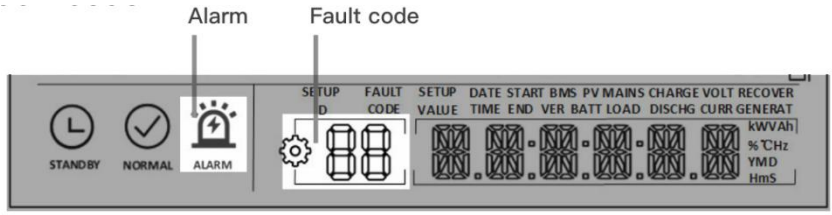
Table 1RS485 and CAN Interface

RS485 - 8P8C vertical RJ45 socket		RS485 - 8P8C vertical RJ45 socket	
RJ45 pin	Definition Description	RJ45 pin	Definition Description
1、8	RS485-B	9、16	RS485-B
2、7	RS485-A	10、15	RS485-A
3、6	GND	11、14	GND
4、5	NC	12、13	NC

Table 2 Parallel communication port

8. Fault and Remedy

8.1 Fault code



Fault Code	Meaning	Does it Affect the outputs	Instructions
01	BatVoltLow	Yes	Battery under-voltage alarm
02	BatOverCurrSw	Yes	Battery discharge over-current, software protection
03	BatOpen	Yes	Battery disconnected alarm
04	BatLowEod	Yes	Battery under-voltage stop discharging alarm
05	BatOverCurrHw	Yes	Battery over-current hardware protection
06	BatOverVolt	Yes	Battery over-voltage protection
07	BusOverVoltHw	Yes	Busbar over-voltage hardware protection
08	BusOverVoltSw	Yes	Busbar over-voltage software protection
09	PvVoltHigh	Yes	PV input over-voltage protection
10	PvBoostOCSw	No	Boost circuit over-current software protection
11	PvBoostOCHw	No	Boost circuit over-current hardware protection
12	SpiCommErr	Yes	Master-slave chip SPI communication failure
13	OverloadBypass	Yes	Bypass overload protection
14	OverloadInverter	Yes	Inverter overload protection
15	AcOverCurrHw	Yes	Inverter over-current hardware protection
16	AuxDSpReqOffPWM	Yes	Slave chip request switch off failure
17	InvShort	Yes	Inverter short-circuit protection
18	Bussoftfailed	Yes	Inverter busbar soft start failed
19	OverTemperMppt	No	MPPT heat sink over-temperature protection
20	OverTemperInv	Yes	Inverter heat sink over-temperature protection

21	FanFail	Yes	Fan failure
22	EEPROM	Yes	Reservoir failure
23	ModelNumErr	Yes	Wrong model
24	Busdif	Yes	Busbar voltage imbalance
25	BusShort	Yes	Busbar short circuit
26	Rlyshort	Yes	Inverter output back flow to bypass
28	LinePhaseErr	Yes	Utility input phase fault
29	BusVoltLow	Yes	Busbar under-voltage protection
30	BatCapacityLow1	No	Battery SOC below 10% alarm (Only enable BMS take effect)
31	BatCapacityLow2	No	Battery SOC below 5% alarm (Only enable BMS take effect)
32	BatCapacityLowStop	Yes	Battery dead (Only enable BMS take effect)
58	BMSComErr	No	BMS communication failure
59	BMSErr	No	BMS failures occur
60	BMSUnderTem	No	BMS under-temperature alarm (Only enable BMS take effect)
61	BMSOverTem	No	BMS over-temperature alarm (Only enable BMS take effect)
62	BMSOverCur	No	BMS over-current alarm (Only enable BMS take effect)
63	BMSUnderVolt	No	BMS under-voltage alarm (Only enable BMS take effect)
64	BMSOverVolt	No	BMS over-voltage alarm(Only enable BMS take effect)

8.2 Troubleshooting

Fault Code	Meaning	Causality	Remedy
/	Screen no display	No power input, or in sleep mode.	Closing the circuit breaker. Ensure the rocker switch is ON. Push any button on the panel to exit sleep mode
01	Battery under-voltage	The battery voltage is lower than the value set in parameter [14].	Charge the battery and wait until the battery voltage is higher than the value set in the parameter item [14].
03	Battery not connected	The battery is not connected, or the BMS in discharge protection	Check whether the battery is reliably connected; check whether the circuit breaker of the battery is not closed; ensure that the BMS of the Li-ion battery can communicate properly.
04	Battery over-discharge	The battery voltage is lower than the value set in the parameter [12].	Manual reset: Power off and restart. Automatic reset: charge the battery so that the battery voltage is higher than the value set in the parameter item [35].
06	Battery over-voltage when charging	Battery is in over-voltage condition.	Manually power off and restart. Check to see if the battery voltage exceeds the limit. If it exceeds, the battery needs to be discharged until the voltage is below the battery's over-voltage recovery point.
13	Bypass over-load	Bypass output power	Reduce the load power and restart the

	(software detection)	or output current overload for a certain period of time.	device. Please refer to item 11 of the protection features for more details.
14	Inverter over- load (software detection)	Inverter output power or output current overload for a certain period of time.	
19	Heat sink of PV input over-temperature (software detection)	Heat sink of PV input temperature exceeds 90℃ for 3s.	Resume normal charge and discharge when the temperature of the heat sink has cooled to below the over-temperature recovery temperature.
20	Heat sink of inversion over-temperature (software detection)	Heat sink of inversion temperature exceeds 90℃ for 3s.	
21	Fan failure	Fan failure detects by hardware for 3s.	Manually toggle the fan after switching off to check for blockage by foreign objects.
26	AC Input relay short-circuit	Relay for AC input sticking	Manually power off and restart; if the fault reappears after restarting, You need to contact the after-sales service to repair the machine.
28	Utility input phase fault	AC input phase does not coincide with AC output phase	Ensure that the phase of the AC input is the same as the phase of the AC output, e.g. if the output is in split-phase mode, the input must also be in split-phase.

NOTICE

If you encounter a fault with the product that cannot be solved by the methods in the table above, please contact our after-sales service for technical support and do not disassemble the equipment yourself.

9. Protection and Maintenance

9.1 Protection features

No	Protection Feature	Instruction
1	PV input current/power limiting protection	When the charging current or power of the PV array configured exceeds the PV input rated value, the inverter will limit the input power and charge at the rated.
2	PV input over-voltage	If the PV voltage exceeds the maximum value allowed by the hardware, the machine will report a fault and stop the PV boost to output a sinusoidal AC wave.
3	PV night reverse current protection	At night, the battery is prevented from discharging through the PV module because the battery voltage is greater than the voltage of PV module.
4	AC input over-voltage protection	When the AC input voltage of each phase exceeds 140V, the mains charging will be stopped and switched to the inverter mode.
5	AC input under-voltage protection	When the AC input voltage of each phase below 90V, the utility charging will be stopped and switched to the inverter mode.
6	Battery over-voltage protection	When the battery voltage reaches the over-voltage cut-off point, the PV and the utility will automatically stop charging to prevent the battery from being overcharged and damaged.

7	Battery under-voltage protection	When the battery voltage reaches the under-voltage cut-off point, the inverter will automatically stop the battery discharge to prevent damage from over-discharging the battery.
8	Battery over-current protection	After a period when the battery current exceeds that allowed by the hardware, the machine will switch off the output and stop discharging the battery.
9	AC output short-circuit protection	When a short-circuit fault occurs at the load output terminal, the AC output is immediately turned off and turned on after 1 second. If the output load terminal is still short-circuited after 3 attempts, the inverter must be manually restarted after first removing the short- circuit fault from the load before the normal output can be restored.
10	Heat sink over-temperature protection	When the internal temperature of the inverter is too high, the inverter will stop charging and discharging; when the temperature returns to normal, the inverter will resume charging and discharging.
11	Inverter over-load protection	After triggering the overload protection the inverter will resume output after 3 minutes, 5 consecutive overloads will switch off the output until the inverter is restarted. (102%<load< load < 125%) ±10%: error and output shutdown after 10s. Load > 125% ±10%: error reported and output switched off after 5s.
12	AC output reverse	Prevents AC back flow from the battery inverter to the bypass AC input.
13	Bypass over-current protection	Built-in AC input over-current protection circuit breaker.
14	Bypass phase inconsistency protection	When the phase of the bypass input and the phase of the inverter split do not match, the inverter disables switching to the bypass output to prevent the load from dropping out or short-circuiting when switching to the bypass.

9.2 Maintenance

To maintain optimum and long-lasting working performance, we recommend that the following items are checked twice a year.
1. Ensure that the airflow around the product is not blocked and remove any dirt or debris from the radiator.
2. Check that all exposed conductors are not damaged by sunlight, friction with other surrounding objects, dry rot, insect or rodent damage, etc. The conductors need to be repaired or replaced if necessary.
3. Verify that the indications and displays are consistent with the operation of the equipment, note any faults or incorrect displays and take corrective action if necessary.
4. Check all terminals for signs of corrosion, insulation damage, high temperatures or burning/discolouration and tighten terminal screws.
5. Check for dirt, nesting insects and corrosion, clean anti insects net as required. 6. If the lightning arrester has failed, replace the failed arrester in time to prevent lightning damage to the inverter or other equipment of the user.

⚠ DANGER

Make sure that the product is disconnected from all power sources and that the capacitors are fully discharged before carrying out any checks or operations to avoid the risk of electric shock.

The Company shall not be liable for damage caused by:

1. Damage caused by improper use or use in a wrong location.
2. Photovoltaic modules with an open circuit voltage exceeding the maximum permissible voltage.
3. Damage caused by the operating temperature exceeding the restricted operating temperature range
4. Dismantling and repair of the inverter by unauthorised persons.
5. Damage caused by force majeure: damage during transport or handling of the product.

10. Data sheet

	WAO-MB51600-10KW	WAO-MB51400-10KW	WAO-MB51300-10KW	WAO-MB51200-10KW
BATTERY TECHNICAL SPECIFICATION				
Battery model	WMB51600-200A	WMB51400-200A	WMB51300-200A-	WMB51200-200A
Number of batteries	1			
Battery Energy	30.72 KWH	20.48 KWH	15.36 KWH	10.24KWH
Battery Capacity	600AH	400AH	300AH	200AH
Dimension L× D× H (mm)	550×750×850	500×660×850	470×660×680	470×660×680
Battery Type	LiFePO4			
Battery Rated Voltage	51.2V			
Battery Working Voltage Range	44.8 ～ 57.6V			
Maximum Charging Current	200A			
Maximum Discharging Current	200A			
DOD	80%			
Designed Life-span	>6000 Cycles @ 0.2C/25℃ Charging/Discharging at 80%DOD, Until 80% Capacity.			
INVERTER TECHNICAL SPECIFICATION				
Inverter model	ASP48100U200-H			
PV CHARGE				
Solar Charge Type	MPPT*2			
Maximum Output Power	5500W+5500W			
PV Charging Current Range	22A+22A			
PV Operating Voltage Range	500Vdc+500Vdc			
MPPT Voltage Range	125～425Vdc			
AC CHARGE				
AC Charging Current Range	0～120A			
Frequency Range	50/60Hz			
Input Voltage Range	90~140Vac			
Bypass Overload Current	63A			
AC OUTPUT				
Rated Output Power	10000W			
Max. Peak Power	20000W			
Rated Output Voltage	120/240Vac（split-phase/single-phase）			
Load Capacity of Motors	6HP			
Rated AC Frequency	50/60Hz			
Waveform	Pure Sine Wave			
Switch Time	10ms（typical）			
BATTERY INVERTER OUTPUT				

Rated Output Power	10000W
Maximum Peak Power	20KVA
Power Factor	1
Rated Output Voltage (Vac)	120/240Vac（split-phase/single-phase）
Frequency	50Hz ± 0.3Hz/60Hz ± 0.3Hz
Auto Switch Period	＜15ms
THD	＜3%
GENERAL DATA	
Protection Degree	IP20，Indoor Only
Operating Temperature Range	-15~55℃,>45℃ derated
Noise	<60dB
Cooling Method	Internal Fan
COMMUNICATION	
Embedded Interfaces	Rs485 / CAN / USB / Dry contact
External Modules （Optional）	Wi-Fi / GPRS