5KVA/6KVA

Hybrid On-off Grid

Solar Inverter

Table Of Contents

ABOUT THIS MANUAL

Purpose

This manual provides instructions for the assembly, installation, operation, and troubleshooting of this unit. Please read it thoroughly before beginning any installation or operation. Keep this manual for future reference.

Scope

This manual includes safety and installation guidelines, as well as information on tools and wiring.

SAFETY INSTRUCTIONS

WARNING: This chapter includes important safety and operating instructions.

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries, and all appropriate sections of this manual.
2. CAUTION --To reduce the risk of injury, only rechargeable batteries such as deep cycle lead-acid or lithium batteries can be charged. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. If service or repair is required, take it to a qualified service center. Incorrect reassembly may result in a risk of electric shock or fire.
4. To reduce the risk of electric shock, disconnect all wiring before attempting any maintenance or cleaning. Turning off the unit does not eliminate this risk.
5. **CAUTION** – Only qualified personnel should install this device with a battery.
6. Never charge a frozen battery.
7. For optimal operation of this inverter/charger, please follow the required specifications to select the appropriate cable size. Correct operation of this inverter/charger is very important.
8. Be extremely cautious when working with metal tools on or around batteries. Dropping a tool could cause sparks or short-circuit the batteries or other electrical parts, leading to an explosion.
9. Strictly follow the installation procedures when disconnecting AC or DC terminals. Refer to the **INSTALLATION** section of this manual for details.
10. **GROUNDING INSTRUCTIONS** – This inverter/charger should be connected to a permanently grounded wiring system. Ensure compliance with local requirements and regulations when installing this inverter.
11. Never short-circuit the AC output and DC input. Do not connect to the mains when the DC input is short-circuited.
12. **Warning!** Only qualified service personnel should service this device. If errors persist after following the troubleshooting table, please return this inverter/charger to your local dealer or service center for maintenance.

OPERATION SECTION

Introduction

This is a multi-function inverter/charger, combining functions of inverter, MPPT solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

Technical Feature

1. **Efficient Utilization**: Employs MPPT control for maximum solar energy use, features high-frequency isolation, and reduces energy losses.
2. **Flexible Configuration:** Offers multiple charging options—including photovoltaic, mains electricity, and diesel generator—and power options from battery, mains, or diesel generator. Compatible with both lithium and lead-acid batteries.
3. **AC Coupling Mode**: Capable of operating in AC coupling mode with grid-connected Zero export limit current protection, and supports operation without battery load.
4. **Exceptional User Experience**: Boasts a stylish and attractive design, lightweight construction, easy installation and debugging, convenient wiring with clear labels, and a large screen display.
5. **Ultra-Wide Voltage and Frequency Input Range**: Suitable for areas with extremely unstable power grids due to its wide voltage and frequency input tolerance.
6. **Wi-Fi and Mobile App Monitoring**: Supports monitoring via Wi-Fi and mobile app for convenient oversight and control.

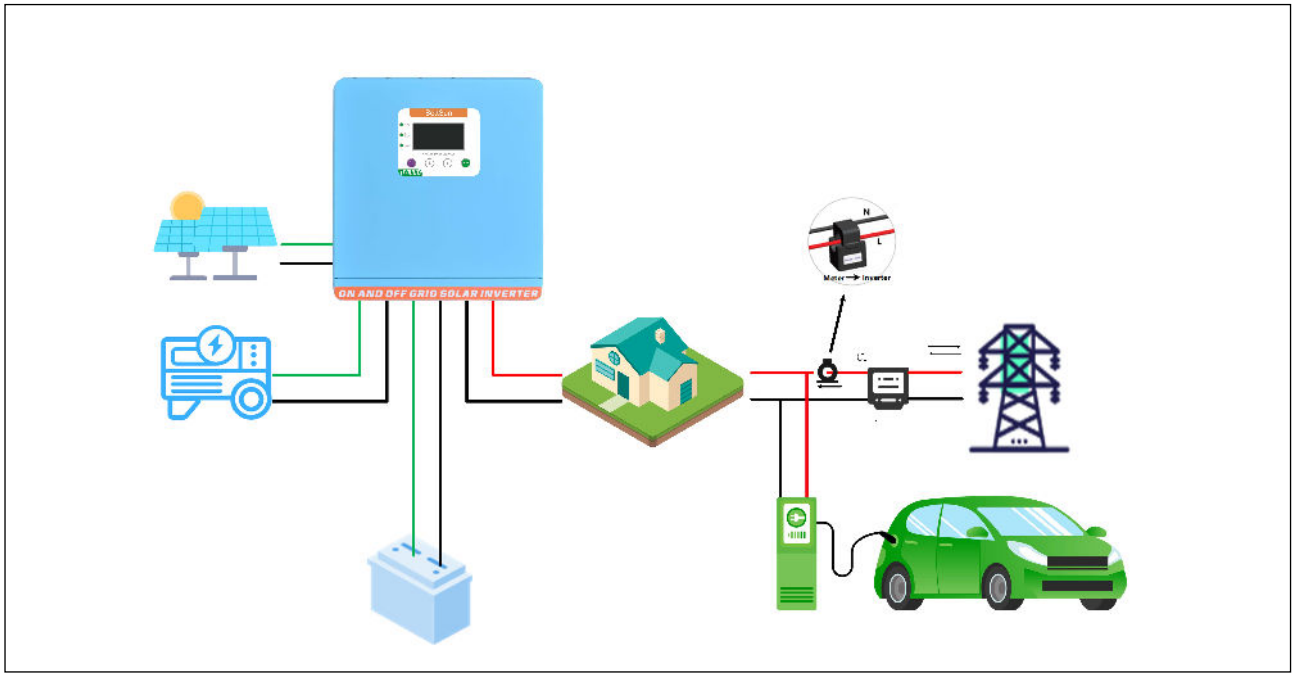
Basic System Architecture

The following illustration shows a basic application for this inverter/charger. It includes the following devices to create a complete running system:

Generator or Utility PV Modules

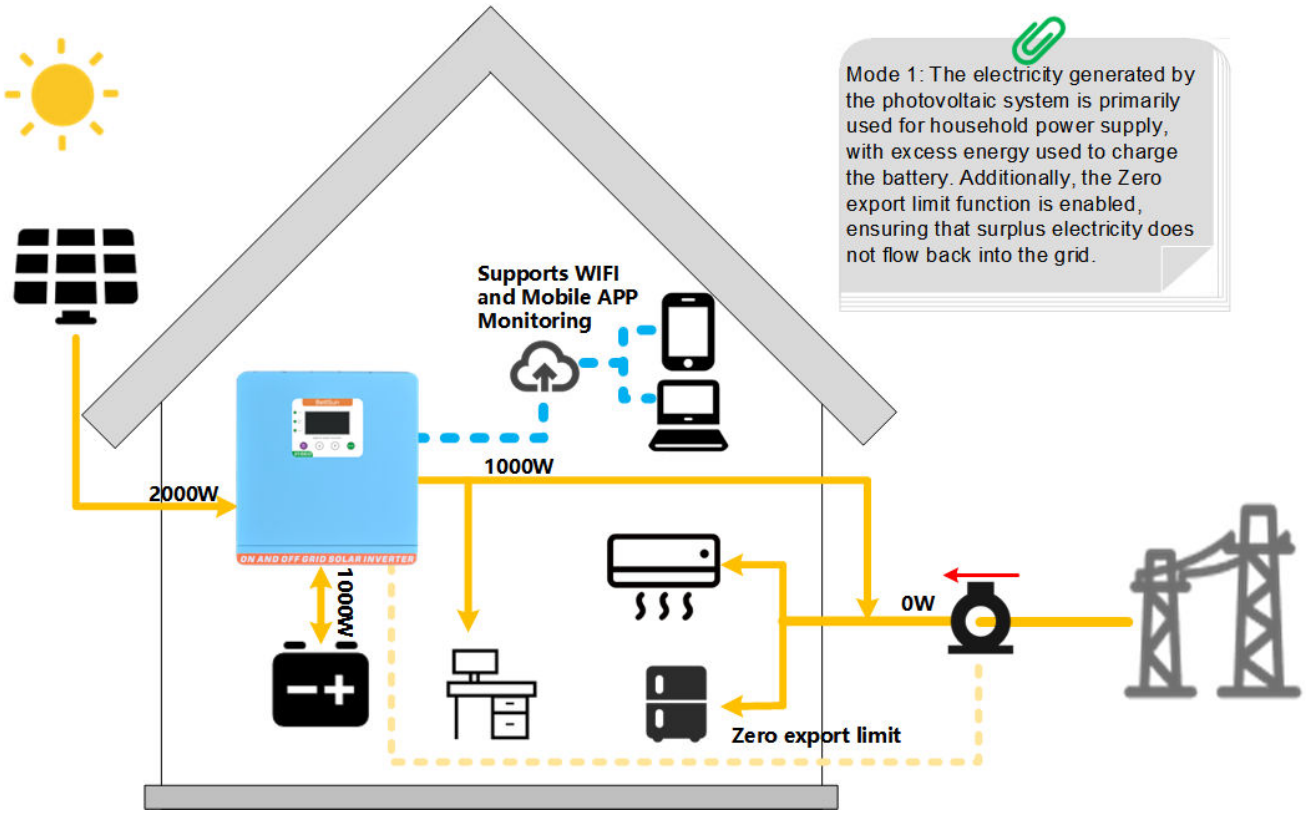
This inverter can power all kinds of appliances in a home or office environment, including motor-type appliances such as tube lights, fans, refrigerators, and air conditioners.

Consult with your system integrator for other possible system architectures based on your requirements.

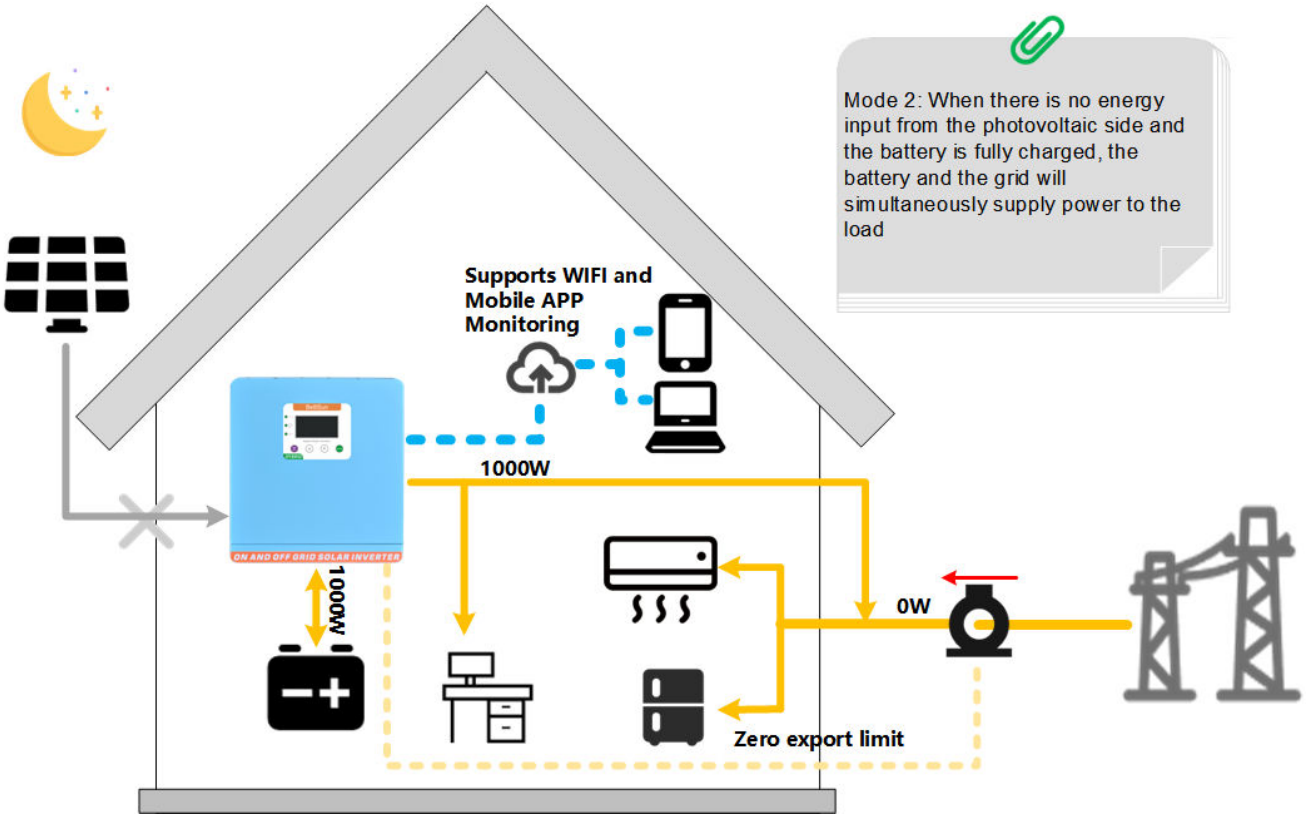


Hybrid Power System

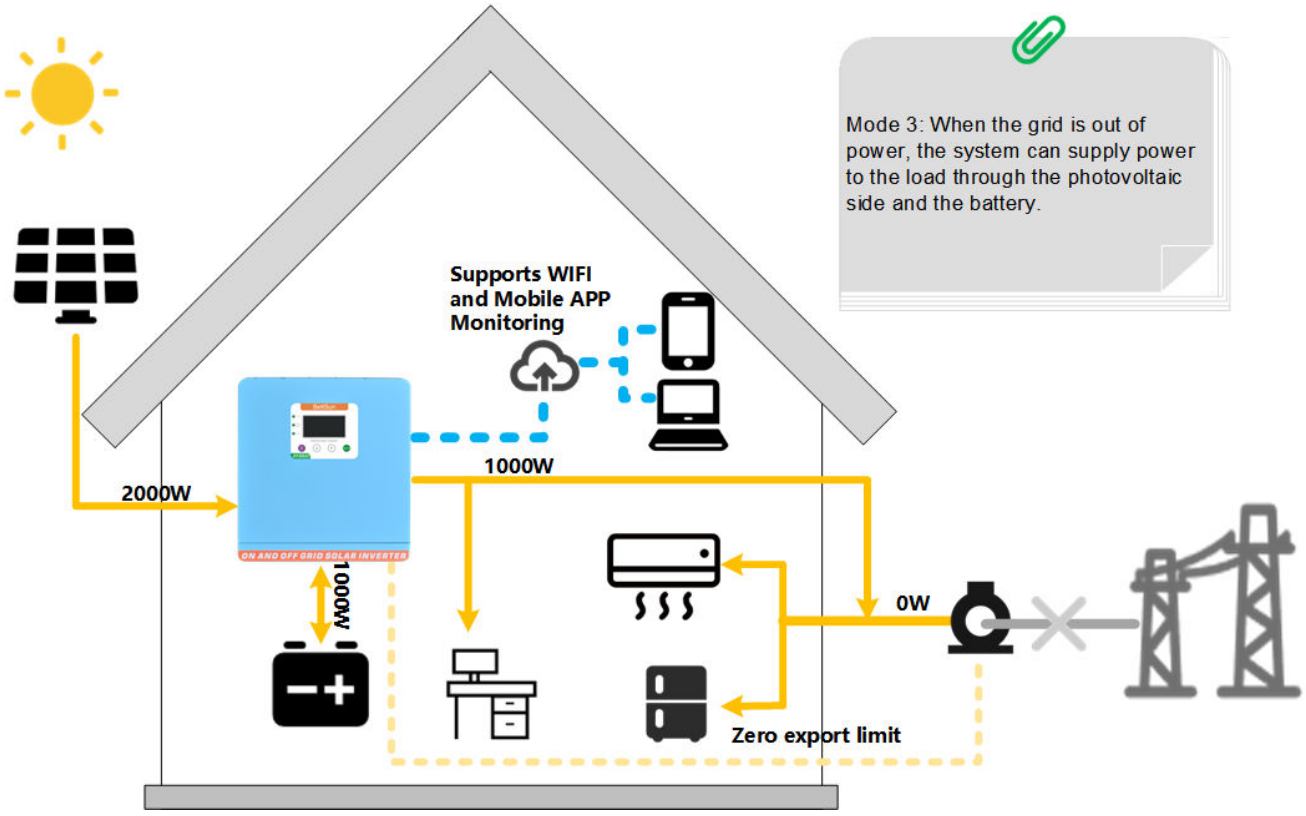
Mode 1


Mode 1: The electricity generated by the photovoltaic system is primarily used for household power supply, with excess energy used to charge the battery. Additionally, the Zero export limit function is enabled, ensuring that surplus electricity does not flow back into the grid.
Supports WIFI and Mobile APP Monitoring
2000W
1000W
1000W
0W
Zero export limit

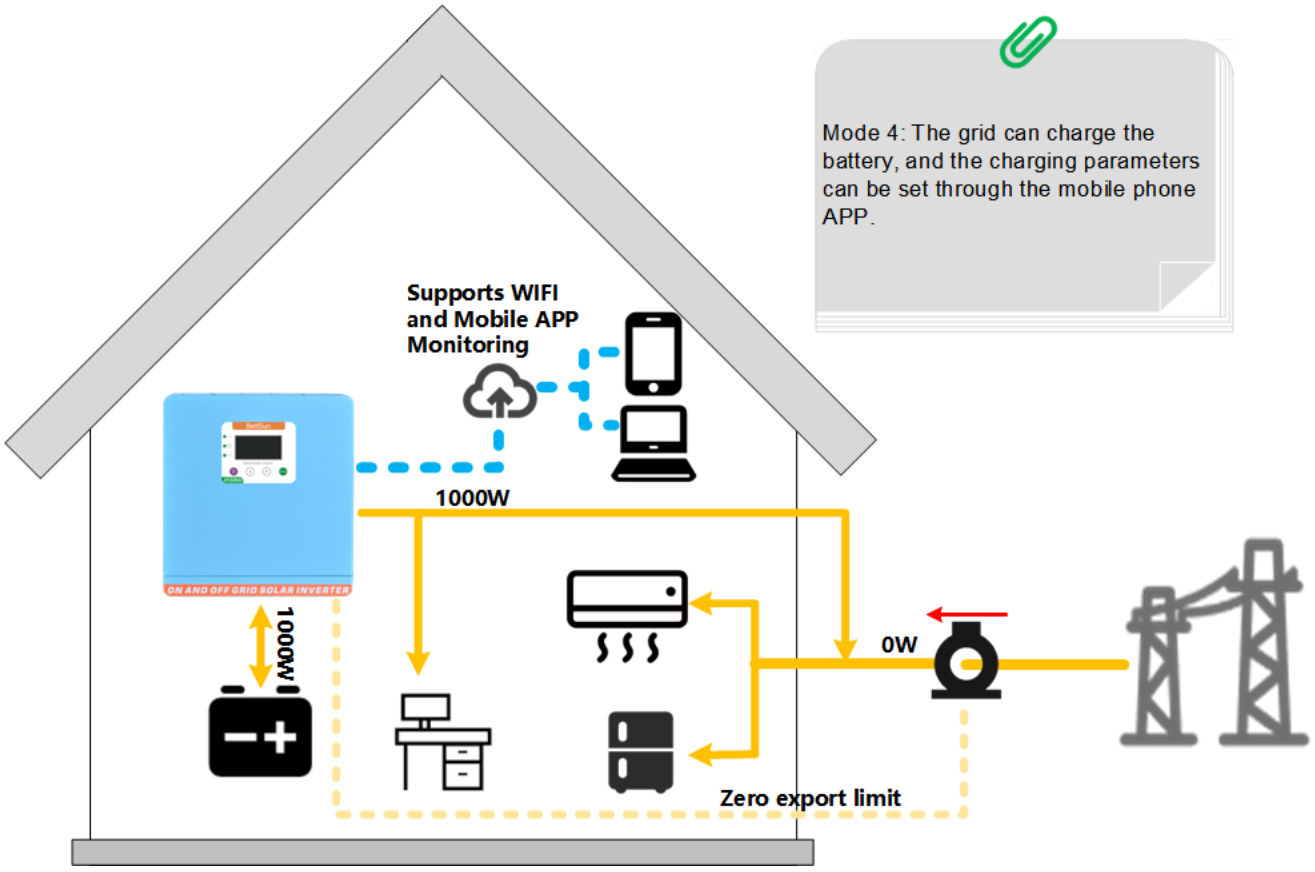
Mode 2


Mode 2: When there is no energy input from the photovoltaic side and the battery is fully charged, the battery and the grid will simultaneously supply power to the load
Supports WIFI and Mobile APP Monitoring
1000W
1000W
0W
Zero export limit

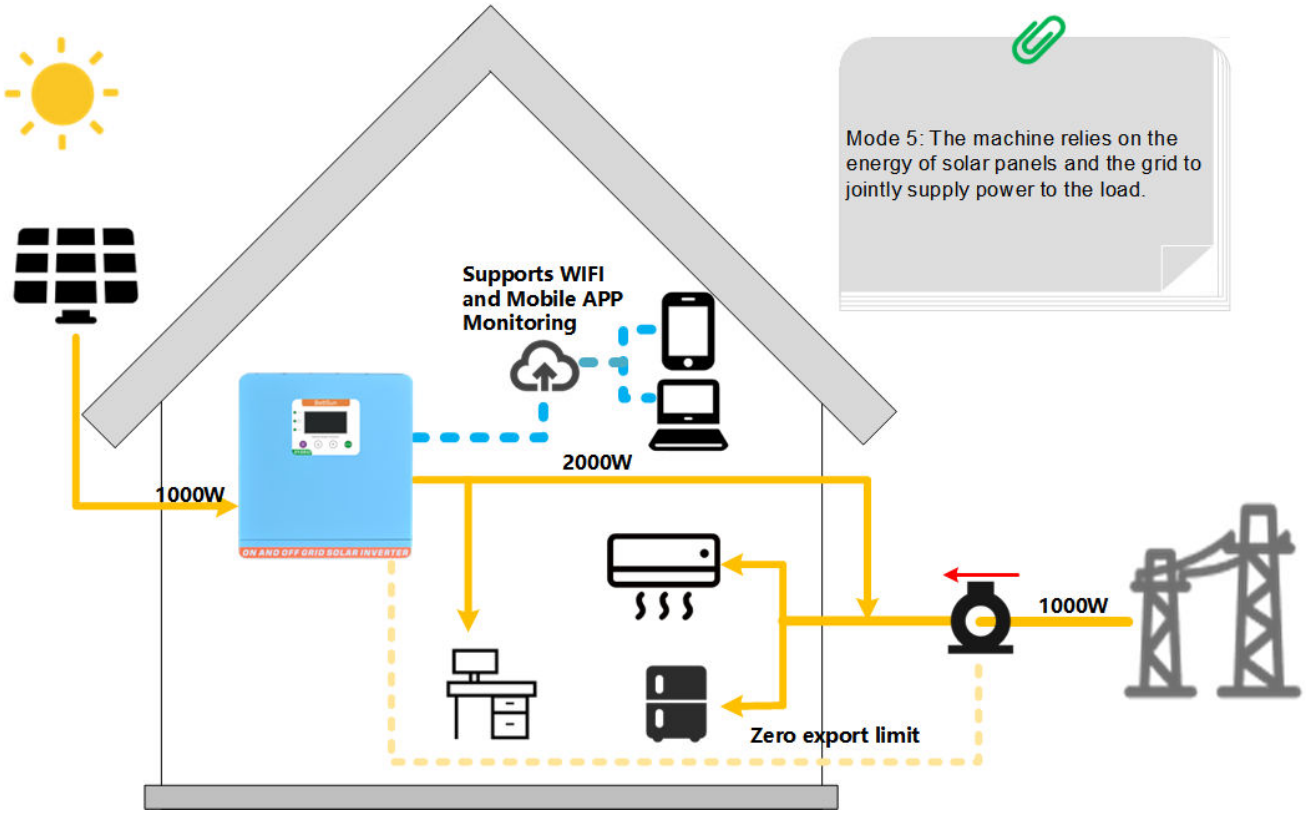
Mode 3


Mode 3: When the grid is out of power, the system can supply power to the load through the photovoltaic side and the battery.
Supports WIFI and Mobile APP Monitoring
2000W
1000W
1000W
0W
Zero export limit

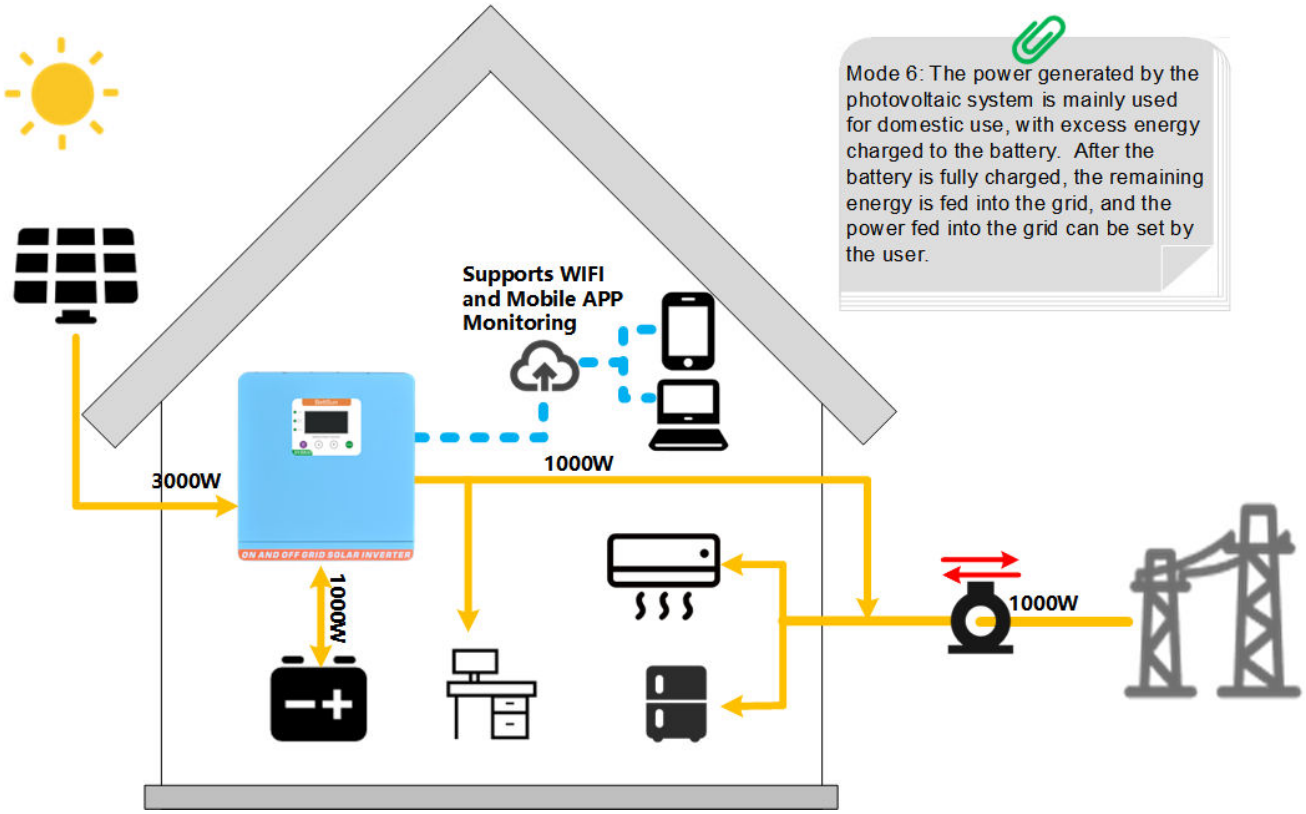
Mode 4


Mode 4: The grid can charge the battery, and the charging parameters can be set through the mobile phone APP.
Supports WIFI and Mobile APP Monitoring
1000W
1000W
0W
Zero export limit

Mode 5

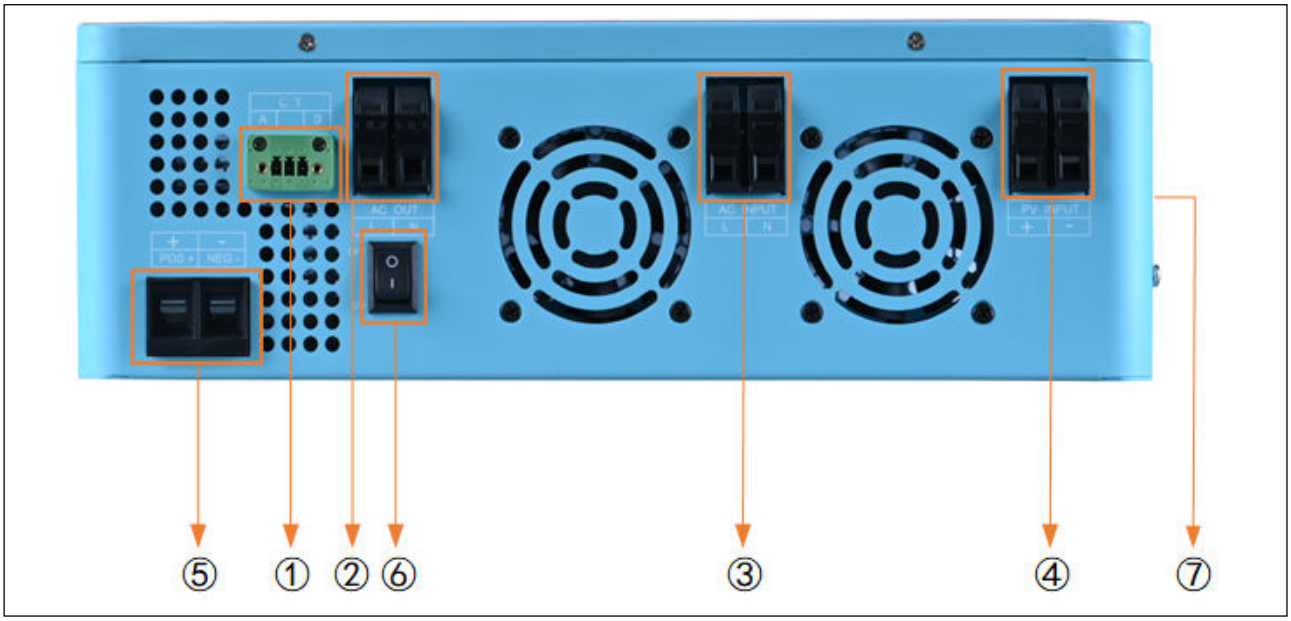

Mode 5: The machine relies on the energy of solar panels and the grid to jointly supply power to the load.
Supports WIFI and Mobile APP Monitoring
2000W
1000W
1000W
Zero export limit

Mode 6


Mode 6: The power generated by the photovoltaic system is mainly used for domestic use, with excess energy charged to the battery. After the battery is fully charged, the remaining energy is fed into the grid, and the power fed into the grid can be set by the user.
Supports WIFI and Mobile APP Monitoring
1000W
3000W
1000W
1000W

Product Overview

At the bottom:



Item	Describe
1	**CT**
2	**AC Output:** It is used to connect to home appliances
3	**AC Input:** connector to parallel off-grid controlbox(to grid)
4	**PV Input:** It connects to the solar panel. "+" (positive) to PV+ and "–" (negative) to PV-
5	**Battery Terminal:** Connects to the battery. Positive ("+") to Battery+, and the negative ("–") to Battery–.
6	**Machine switch**
7	**Wi-Fi Port:** After connecting the Wi-Fi module, you can enjoy remote service through the app.

INSTALLATION

Unpacking and Inspection

Before installation, please inspect the unit thoroughly. Ensure that nothing inside the package is damaged. You should have received the following items inside the package:

- The unit x 1
- User manual x1
- Fixed bracket x2
- CT x1
- Battery communication cable x1

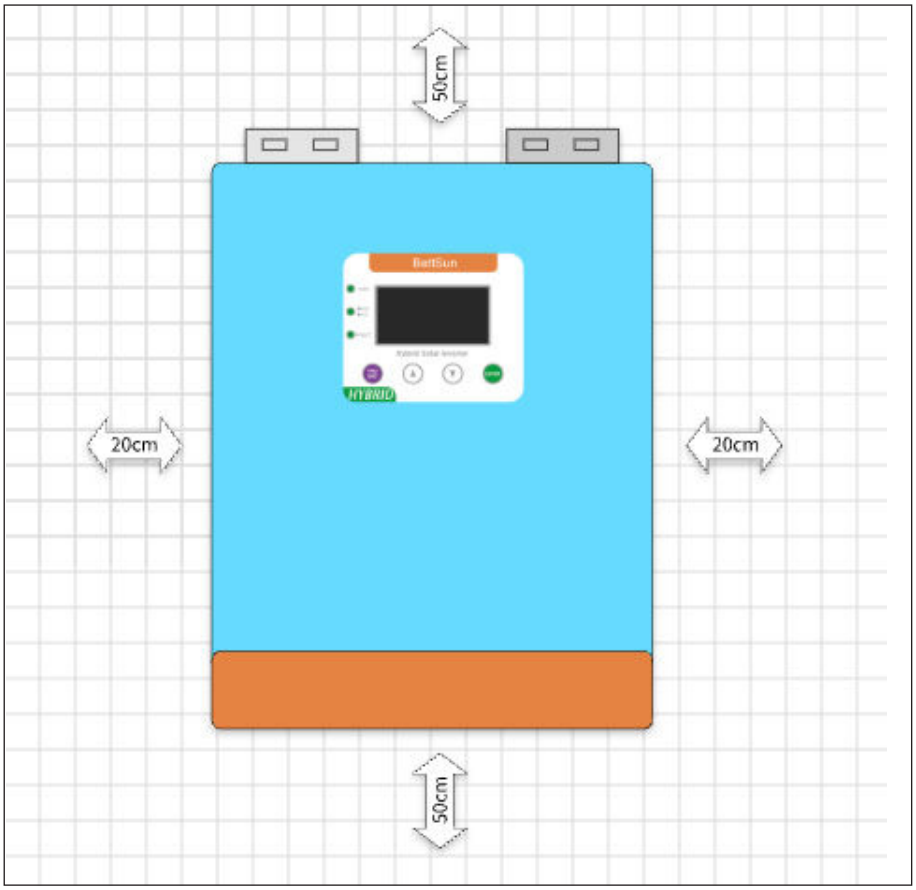
Mounting the Unit

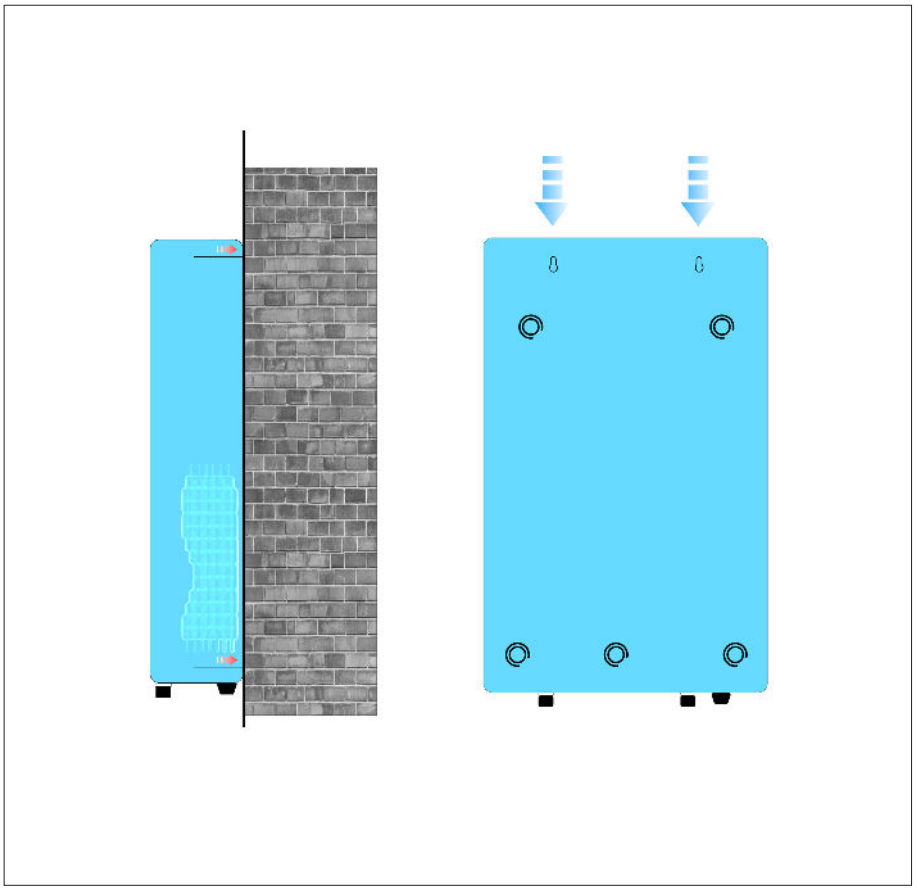
Before selecting an installation location, please consider the following points:

1. Do not mount the inverter on flammable construction materials.
2. Mount the inverter on a solid surface.
3. Install the inverter at eye level to ensure the LCD display can be read at all times.
4. Maintain an ambient temperature between -20°C and 50°C to ensure optimal operation.
5. The recommended installation position is on the wall.
6. Keep other objects and surfaces at the distances shown in the diagram to guarantee sufficient heat dissipation and to provide enough space for wiring.

Suitable for mounting on concrete or other non-combustible surfaces only.

Install the unit using three screws; it is recommended to use M4 or M5 screws.





CONNECTED AND OPERATED

Preparation

Before connecting all wiring, please remove the bottom cover by unscrewing the four screws as shown below.

AC Input/Output Connection

CAUTION: Before connecting to the AC input power source, please install a separate AC circuit breaker between the inverter and the AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from overcurrent from the AC input.

CAUTION: For areas with a stable power supply, there is no need to connect the AC OUTPUT. Simply connect the AC INPUT and enable the Zero export limit mode to achieve unlimited load capacity.

For areas with an unstable power supply, connect AC INPUT to the grid and AC OUTPUT to household loads. Ensure the load's maximum power does not exceed the inverter's capacity. Enable the Zero export limit mode to achieve seamless UPS switching functionality.

Suggested cable requirement for AC wires

Model	Gauge	Cable (mm²)	Torque Value
5KVA	8AWG	6	1.4-1.6Nm
6KVA	8AWG	6	1.4-1.6Nm

Recommended circuit breaker type for AC input / output

Models	Maximum bypass input current	Recommended circuit breaker
5KVA	30A	2P-50A
6KVA	50A	2P-50A

Battery Connection

CAUTION: For safe operation and regulatory compliance, it is required to install a separate DC circuit breaker between the battery and the inverter. Please refer to the typical amperage in the table below to determine the required fuse or breaker size.

Next, insert the AC output wires according to the polarities indicated on the terminal block and tighten the terminal screws. **Important**: Be sure to connect the PE protective conductor (yellow-green) first.

Model	Gauge	Cable (mm²)	Torque Value
5kVA	1 AWG	25	2 Nm
6kVA	1 AWG	25	2 Nm

PV Connection

CAUTION:

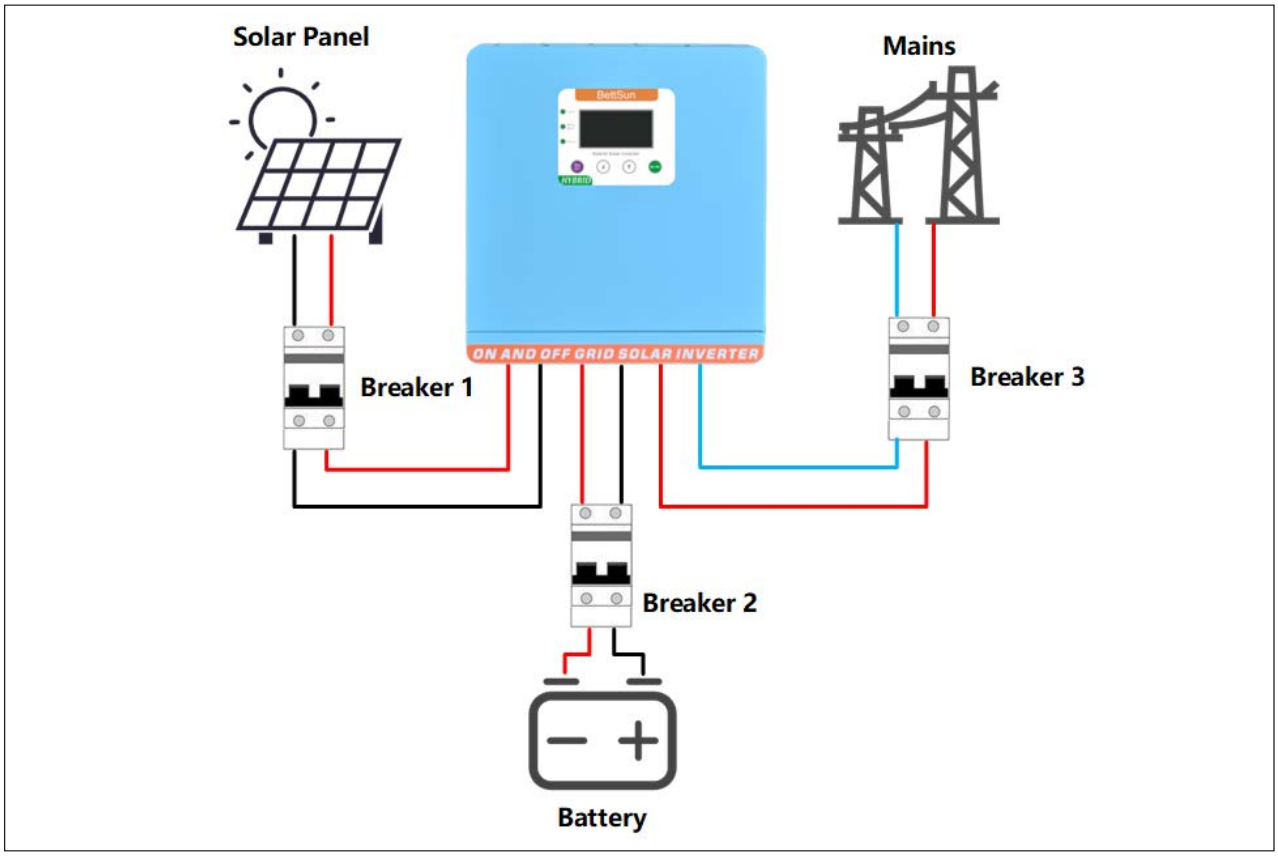
Before connecting to the PV modules, please install a separate DC circuit breaker between the inverter and the PV modules, as shown in the following figure.

Before selecting a suitable solar module, please refer to the following requirements:

1. **Maximum Open-Circuit Voltage**:
   The open-circuit voltage (Voc) of the solar module must not exceed the inverter's maximum open-circuit voltage (< 450 VDC).
2. **Minimum Open-Circuit Voltage:**
   The open-circuit voltage (Voc) of the solar module should be higher than the inverter's minimum PV input voltage (> 110 VDC).

Since this product has internal settings for photovoltaic power generation limiting parameters (page d14), even if the solar panel power exceeds the limit, it will not affect the operation, as the power generation will ultimately be based on the set power. If economic conditions allow, increasing the power of the solar panels is advisable to ensure more power generation even on cloudy or overcast days. The following table can be used as a reference for comparison:

PV Power	Rated Voltage / Rated Current	Open-Circuit Voltage / Short-Circuit Current	Number	Total rated power/ Total rated voltage
380Wp	40.10V/9.49A	48.82V/9.99A	8 pieces in series and 2 pieces in parallel	6080Wp/321V
500wp	40.08V/12.48A	47.28V/12.18A	10 pieces in series	5000Wp/361V
550wp	40.05V/13.73A	46.30V/13.50A	10 pieces in series	5500Wp/360V
590Wp	39.09V/15.09A	47.30V/15.85A	9 pieces in series	5310Wp/352V
615Wp	39.96V/15.39A	48.30V/16.10A	9 pieces in series	5535Wp/360V
660Wp	38.10V/17.33A	45.70V/18.42A	9 pieces in series	5940Wp/343V
710Wp	40.69/17.45	48.94V/18.45A	9 pieces in series	6390Wp/366V



Installation of circuit breakers is required for the Utility AC input, the battery, and the solar panel input. The specifications for these circuit breakers are as follows:

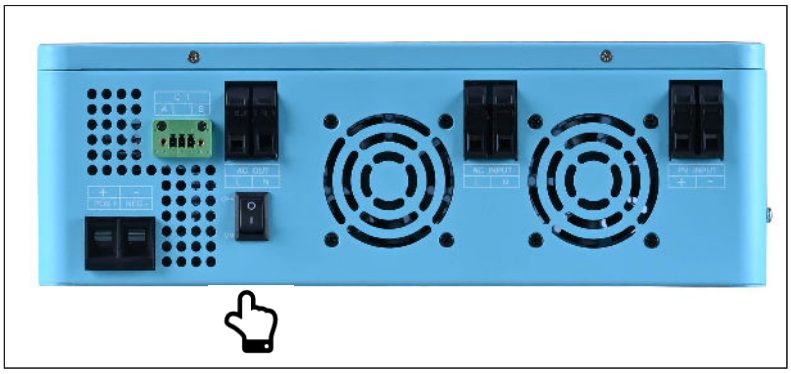
Breaker1	PV Input	5KVA: 32A DC Breaker
		6KVA: 32A DC Breaker
Breaker2	Battery Input	5KVA: 200A DC Breaker
		6KVA: 200A DC Breaker
Breaker3	Grid AC Input	5KVA: 63A AC Breaker
		6KVA: 63A AC Breaker

Final Assembly

After connecting all the wiring, please reattach the bottom cover by tightening the four screws.

OPERATION

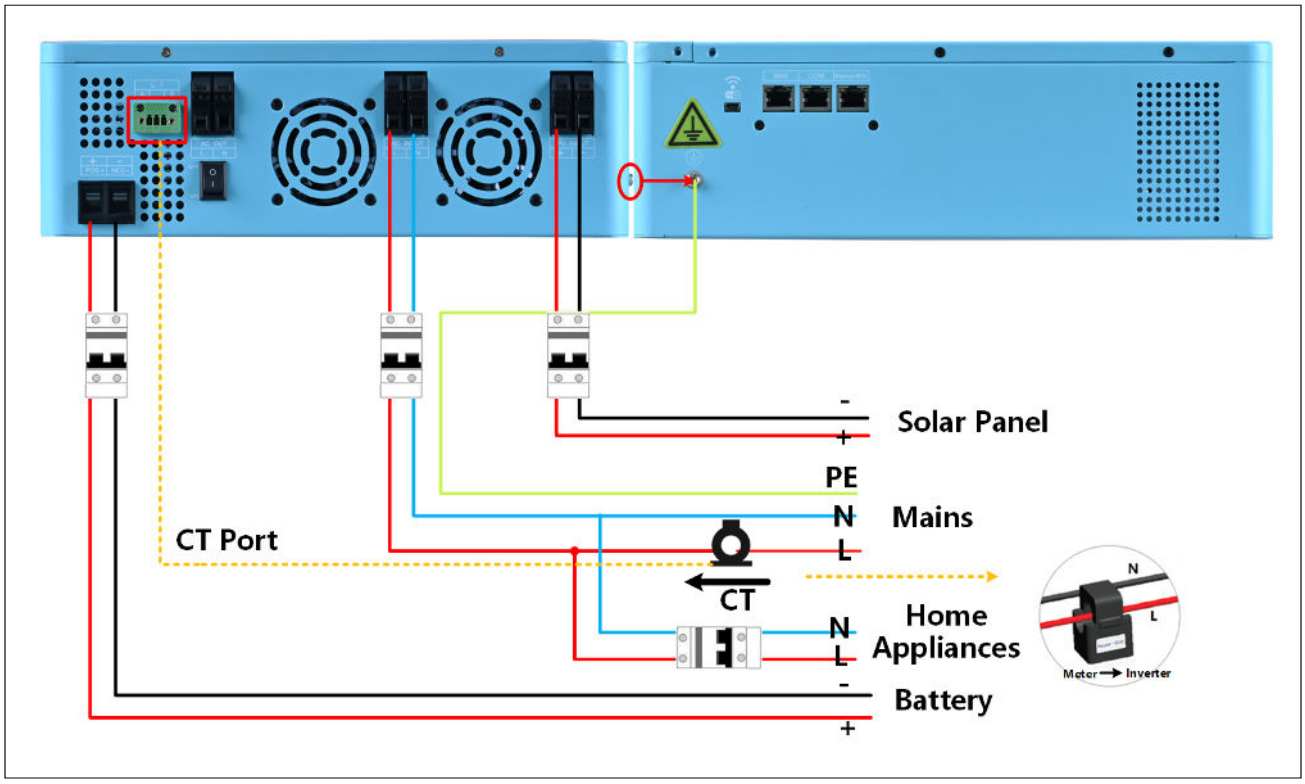
Power ON/OFF



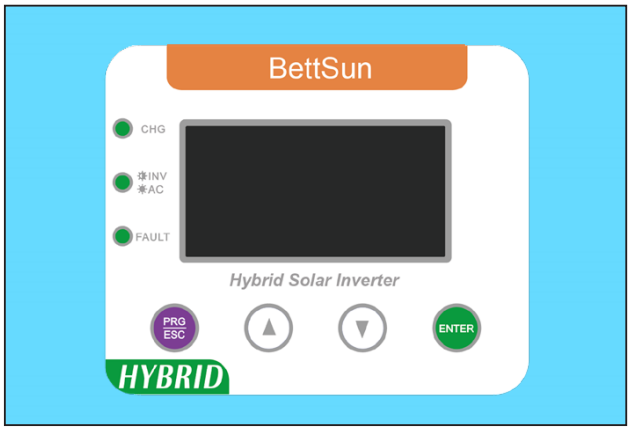
Once the unit has been properly installed and the batteries are securely connected, simply press the On/Off switch (located on the bottom of the case) to turn on the unit.

Single-phase CT Connection:

Note: When the power grid is out of service, the AC OUT port still provides a 220V AC output. Connecting your household loads to this port allows the inverter to continue supplying power during outages. For users who do not experience frequent power outages, the off-grid load port (AC OUT) can be left unconnected.



Operation and Display Panel



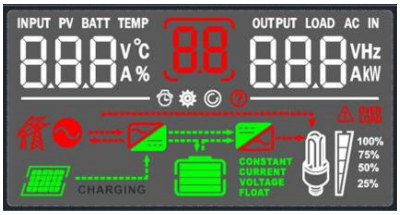
LED Indicator

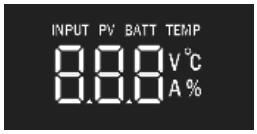
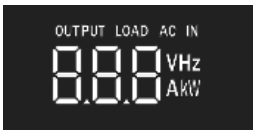
LED Indicator			Messages
CHG	RED	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
AC / INV	Green	Solid On	Output is powered by untility in line mode.
		Flashing	Output is powered by batterty or PV in battery
⚠ FAULT	Yellow	Solid On	Fault occurs in the inverter .
		Flashing	Warning condition occurs in the inverter.

Function Keys

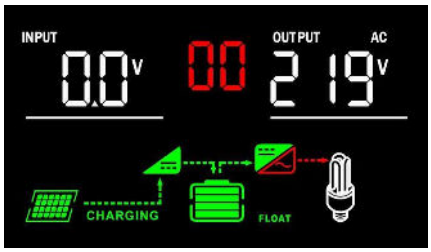
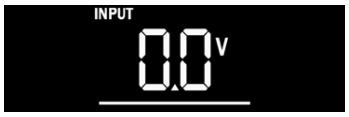
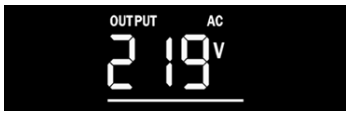
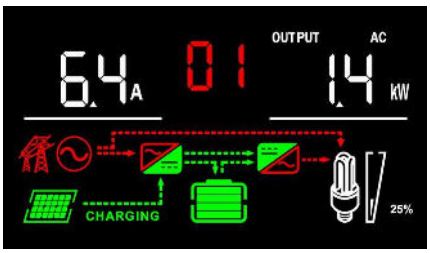
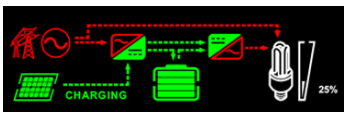
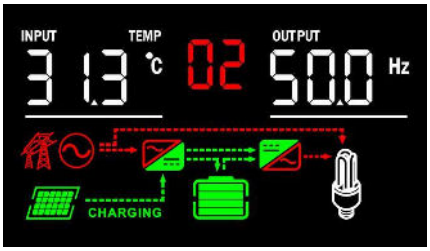
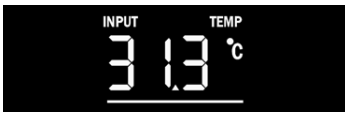
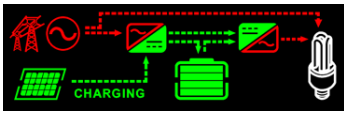
Function Key	Description
PRG/ESC	To enter setting mode or exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode

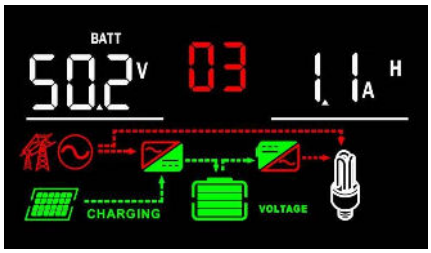
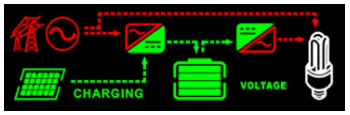
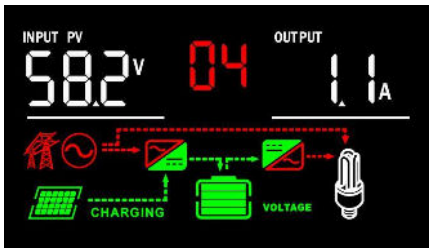
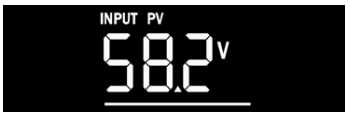
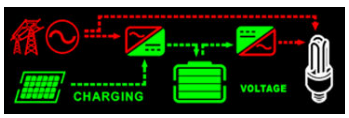
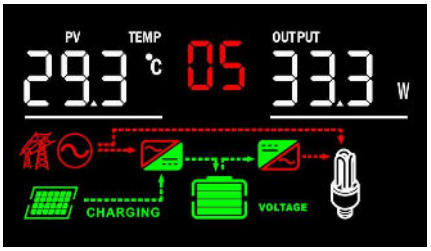
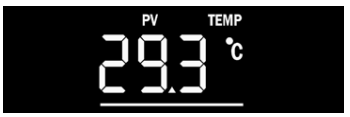
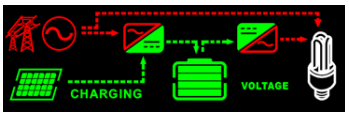
LCD Display Icons

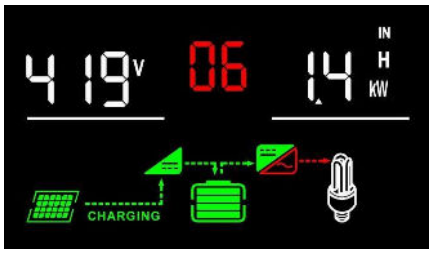
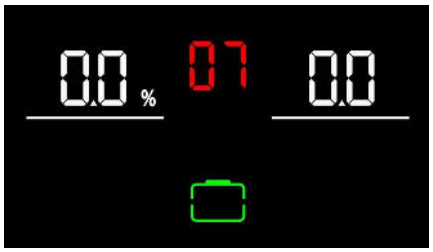
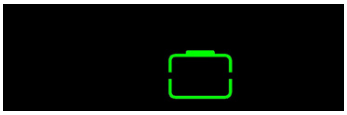


Icon	Function description
Input Source Information	
PV	Indicates the PV input
	Indicates the AC input
	Indicate input voltage, input current, PV voltage, battery voltage and charger current.
Configuration Program and Fault Information	
	Indicates the setting programs Indicates the warning and fault codes
Output Information	
	Indicate output voltage, output frequency, load in watt .
Battery Charging and Load Identification	
	Battery charging label
Load Information	
	Indicates overload
	Indicates the load
	Indicates unit connects to the solar panel.
	Indicates the utility / MPPT charger circuit is working.
	Indicates the DC/AC inverter circuit is working.

LCD Display

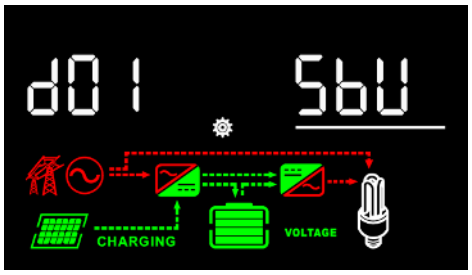
Item	Home screen	Icon	Note
0			Indicates an input AC voltage of 0 V.
			"00" indicates that the current page is page 0.
			The AC output voltage of the all-in-one machine is 219 V.
			The green icon indicates that the PV MPPT is charging. FLOAT signifies that the system is currently in a float charging state. The symbol indicates that the inverter is currently supplying power to loads using energy from the battery.
1			The displayed 6.4 A indicates that the inverter's current AC output is 6.4 amperes.
			This indicates that the current page being displayed is page 1.
			The displayed 1.4 kW indicates that the current output power to the load is 1.4 kilowatts.
			The flashing red CHG LED light indicates that charging is currently in progress. The flashing green INV indicator light shows that the machine is currently supplying power to the load via the inverter.
2			The inverter's current temperature is 31.3 °C.
			This indicates that the current page being displayed is page 2.
			The inverter's current output frequency is 50 Hz.
			This indicates that the inverter is currently supplying power from the batteries.

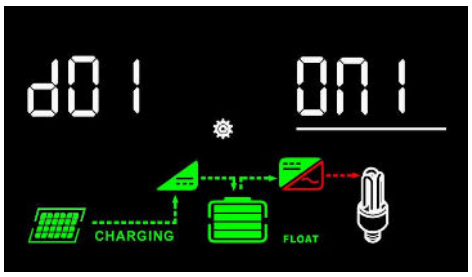
3			This represents the battery's charging current.
			This indicates the voltage of the battery.
			This indicates that the current page being displayed is page 3.
			The voltage displayed at the bottom indicates that the current charging operation is in the constant-voltage equalization stage.
4			The solar panel's voltage is currently 58.2V.
			This indicates that the current page being displayed is page 4.
			The current display value of the representative photovoltaic panel is 1.1A.
			The voltage indicates that the current charging process is in the constant voltage equalization stage.
5			The solar MPPT's current operating temperature is 29.3°C.
			This indicates that the current page being displayed is page 5.
			The current power generation of the solar energy system is 33.3W.
			The voltage displayed at the bottom indicates that the current charging operation is in the constant voltage equalization stage.

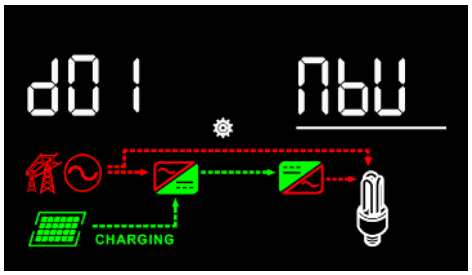
6			Busbar Voltage
			This indicates that the current page being displayed is page 6.
			Cumulative Power Generation
			The float indicator at the bottom shows that the current charging operation is in the floating charge stage.
7			Indicates the current battery SOC (State of Charge) display.
			This indicates that the current page being displayed is page 7.
			SOH: Represents the ratio of the actual battery capacity to the designed capacity.
			Displays the current battery SOH (State of Health).

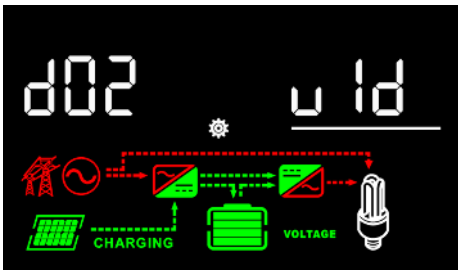
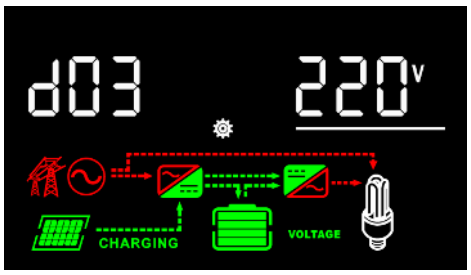
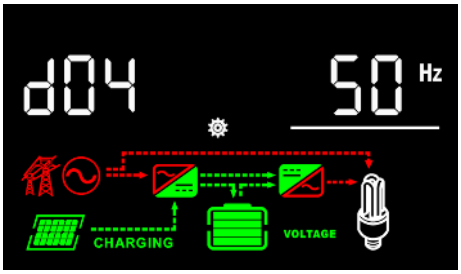
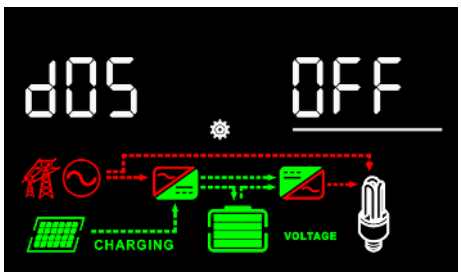
LCD Setting

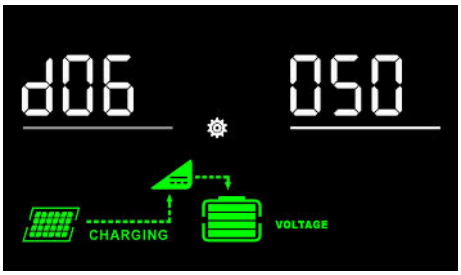
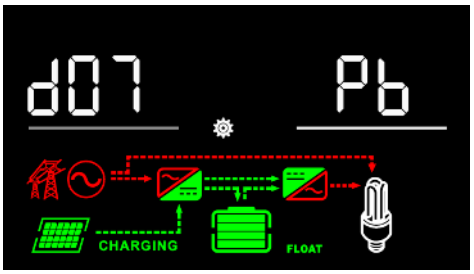
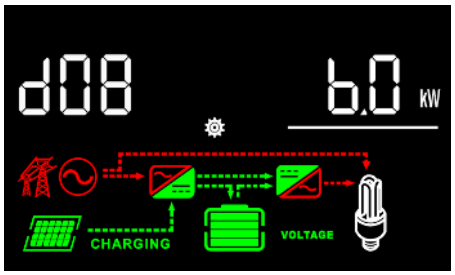
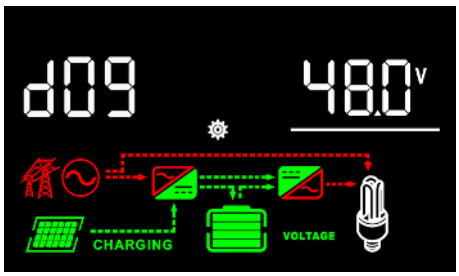
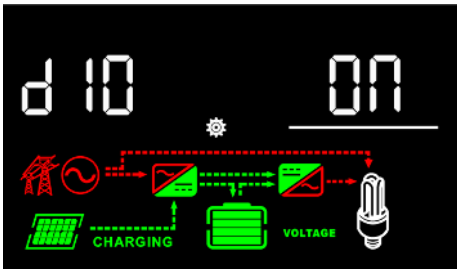
Press the **PRG** button to initiate flashing. Use the **UP** or **DOWN** buttons to navigate and select the desired program. Press **ENTER** to adjust the parameters, then press **ENTER** again to confirm the settings. To cancel or exit, press the **ESC** button.

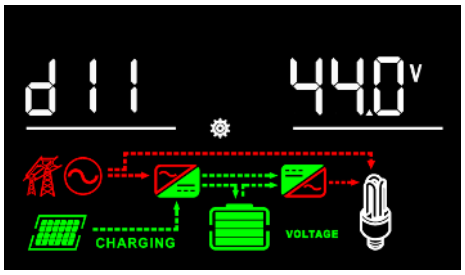
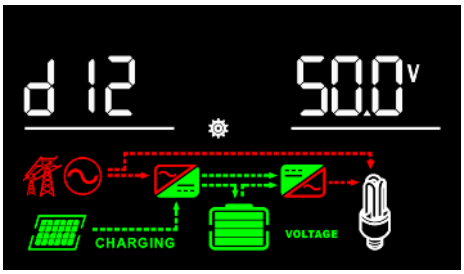
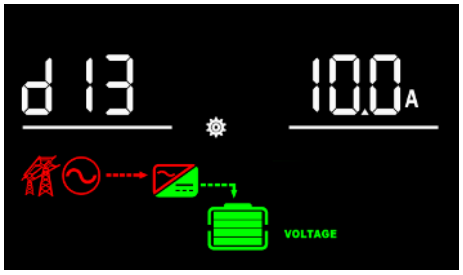
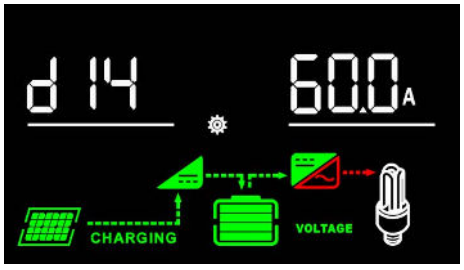
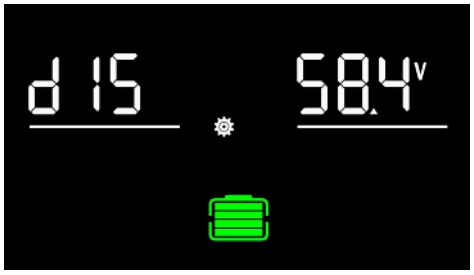
<table>
<tr><th>Item</th><th>Setting</th><th colspan="2">Description</th></tr>
<tr><td>d01</td><td>Set the working mode of the machine
 

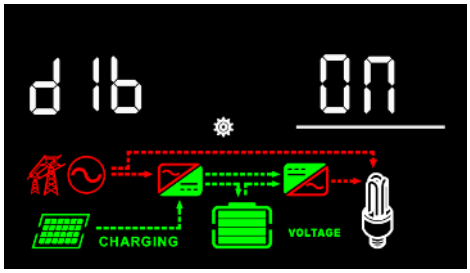
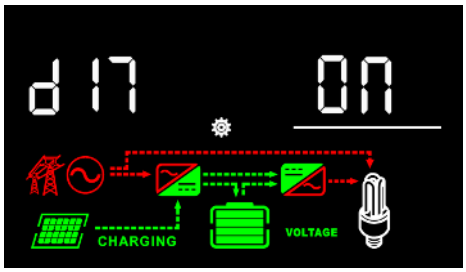
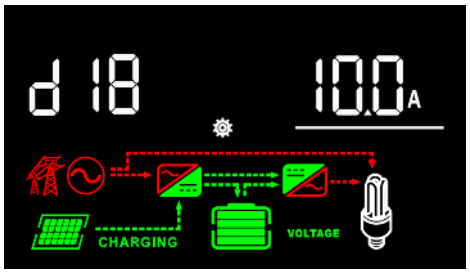
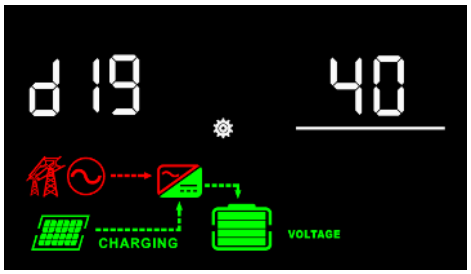
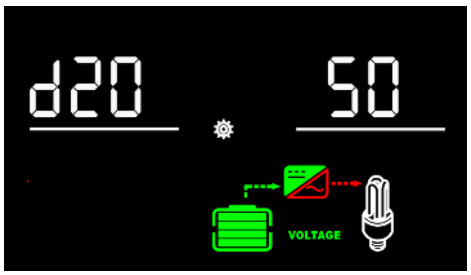


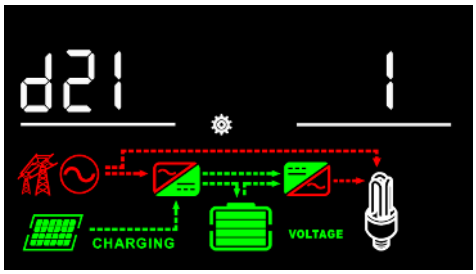
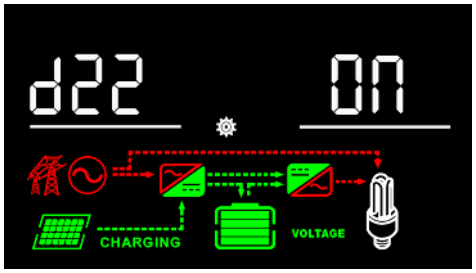
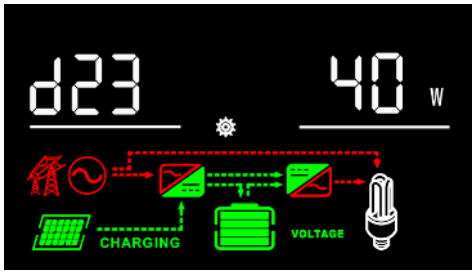

</td><td>SUB</td><td>Solar->Grid->Storage Mode Operation: This mode prioritizes solar power for discharging. When solar power is insufficient, the grid provides supplementary power. In the event of a power outage, both the storage system and solar power supply the load. When the grid is available:
In this mode, the system enters discharge mode when the battery voltage reaches the value set by parameter d12 and the battery current is below 10A. If the battery voltage drops 2V below the value set by d12, it switches to charge mode.
When the grid is unavailable:
The energy storage inverter powers the load. When the battery voltage falls below parameter d11 and the battery current is less than 10A, the inverter stops outputting. In cases of sufficient PV power, this mode allows the maximum battery charging voltage to reach the value set by parameter d15.</td></tr>
<tr><td></td><td>UFI</td><td>Grid Priority Mode Operation:
In this mode, the solar energy or power grid ensures that the battery remains fully charged at all times. If the power grid fails, the system immediately switches to inverter operation. When the power grid is available:
Once the battery voltage reaches the cut-off voltage set by parameter d15 for 10 minutes, the system enters discharge mode. If the battery voltage drops 2V below the value set by d15, the system switches to charging mode.
When the power grid is unavailable:
The energy storage inverter supplies power to the load. Inverter output will be stopped when the battery voltage drops below parameter d11 and the battery current remains under 10A.</td></tr>
<tr><td></td><td>SBU</td><td>Solar Energy -> Energy Storage -> Grid Mode Operation:
Discharge mode is activated when the battery voltage reaches the value set by parameter d12 and the battery current remains below 10A. Charging mode is initiated when the battery voltage falls below the value set by parameter d11 while maintaining a current under 10A.
When the power grid is available:
With photovoltaic (PV) available: Once the battery voltage reaches the value set by parameter d12 for 10 minutes, the system enters discharge mode. If the battery voltage drops below the value set by parameter d11, the system switches to charging mode.
Without photovoltaic (PV): When there is no photovoltaic power generation, the system will enter charging mode if the battery voltage drops below the d11 setting and the current remains under 10A. Once charged to the d15 voltage setting, the system will maintain a non-discharge state until the next PV cycle resumes. This mode relies entirely on the d11, d12, and d15 parameter values to manage the switching interaction between the grid and the inverter.
When the power grid is unavailable:
The energy storage inverter powers the load. Inverter output will be terminated when the battery voltage drops below the d11 threshold while maintaining a current below 10A. Under sufficient PV generation conditions, this mode permits the battery to charge up to the d15 voltage setting.</td></tr>
<tr><td></td><td>ONI</td><td>Pure Inverter Priority Mode Operation:
The system enters discharge mode 10 minutes after the battery voltage reaches the d15 setting. It switches to charge mode when the battery voltage falls below the d11 threshold while the current remains under 10A.</td></tr>
<tr><td></td><td>NBU</td><td>Battery-Free AC Coupling Mode Operation:
In this mode, the system can operate using solar panels and the grid without requiring a battery. For example, if the solar panels provide 1kW of power while the load requires 2kW, the grid will supply the additional 1kW to meet the load demand. If the load power decreases to 500W, the grid will stop supplying power, and the load will be fully powered by solar energy. At this point, any excess 500W of solar power will not flow into the grid, as the system operates in a grid-connected mode with Zero export limit flow functionality.</td></tr>
<tr><td colspan="4">Note: All the above working modes (except UFI mode) prioritize supplying energy to the load whenever solar energy is available. Regardless of the load power, if the solar energy output significantly exceeds the load demand, the excess energy will not flow into the grid or rely on it but will also not backfeed into the grid.</td></tr>
</table>

<table>
<tr><td rowspan="2">d02</td><td rowspan="2">Set the acceptable input range for the grid voltage of the machine
 
</td><td>WID</td><td>Wide input voltage range (90-270VAC).</td></tr>
<tr><td>NOR</td><td>Standard input voltage range (160-240VAC).</td></tr>
<tr><td rowspan="5">d03</td><td rowspan="5">Configure the AC voltage output of the machine（Read Only）
 
</td><td>110V</td><td rowspan="2">This applies to machines with 110/120V AC output, which can only be configured for machines with 110V/120V specifications set at the factory.</td></tr>
<tr><td>120V</td></tr>
<tr><td>208V</td><td rowspan="3">This applies to machines with 220/240V AC output, which can only be configured for machines with 220V/240V specifications preset at the factory.</td></tr>
<tr><td>220V</td></tr>
<tr><td>230V</td></tr>
<tr><td colspan="4">Attention: This option cannot forcibly change machines with 220/240V specifications to 110/120V AC output, as it may lead to excessive temperature rise during operation and result in malfunctions!</td></tr>
<tr><td rowspan="2">d04</td><td rowspan="2">Configure the AC output frequency of the machine
 
</td><td colspan="2">Output AC frequency: 50Hz</td></tr>
<tr><td colspan="2">Output AC frequency: 60Hz</td></tr>
<tr><td rowspan="2">d05</td><td rowspan="2">Configure the machine's energy-saving mode
 
</td><td>OFF</td><td>Disable the energy-saving mode</td></tr>
<tr><td>ON</td><td>Activate the energy-saving mode</td></tr>
</table>

d06	**Configure the machine's charging priority** 	CSO	Set priority to solar charging.
		CUT	Set priority to mains electricity charging.
		SNU	Solar energy and the power grid charge the batteries simultaneously.
		OSO	Use solar energy exclusively to charge the battery.
d07	**Configure the type of battery connected to the machine（Read Only）** 	Pb	Compatible with lead-acid batteries (this setting enables float charging mode).
		LI	Compatible with lithium batteries (this setting disables float charging mode, and the maximum cut-off voltage of the battery is limited by parameter d15).
d08	**Configure the maximum output power of the inverter（Read Only）** 	This parameter is tied to the factory settings and machine specifications and cannot be modified by the user. It is only intended to display the current machine specification parameters. For example, as shown in the figure: the maximum output power of the inverter is 6kW.	
d09	**Configure the rated voltage of the machine's battery** 	This parameter is tied to the factory settings and machine specifications and cannot be modified by the user. It only displays the current machine specification parameters, with the right side indicating the rated voltage of the 48V battery.	
d10	**Factory settings** 	OFF	Do not restore factory settings.
		ON	Restore factory settings.

d11	**Configure the minimum battery voltage for the machine** 	Set the minimum battery voltage for the machine. The inverter will automatically ensure the battery voltage does not drop below this value. When the battery voltage falls below this threshold and the discharge current is less than 10A, the inverter will enter standby mode. In this state: The load will be powered by the grid. The battery stops discharging energy externally. Example: If the battery voltage drops below 44.4V and the discharge current is below 10A, the inverter enters standby mode, and the battery ceases discharging.
d12	**Configure the starting discharge voltage of the machine's battery** 	Set the Battery Discharge Initiation Voltage: When the inverter is in standby mode (with loads powered by the grid), if solar MPPT charging or grid charging raises the battery voltage to the set value and the charging current drops below 10A, the machine will restart. The inverter will activate, and loads will switch to inverter power. At this point: The battery and solar energy will jointly power the loads. Excess solar energy will be stored in the battery. Example: Once the battery voltage exceeds 50V and the charging current is below10A, the inverter activates.
Attention: The d11-d12 parameters are closely related to the machine's priority working mode. The two working modes, "SUB" and "SBU," in parameter setting d01 rely on the values of the d11-d12 parameters to function properly. To prevent incorrect parameter settings, the machine will verify the user's input and ensure that there is a difference of 4-5V between the two parameters. Failure to maintain this difference may cause the machine to repeatedly switch between the inverter and the power grid. As explained above, the proper configuration of the d11-d12 parameters can maximize battery life and minimize deep discharges. At the same time, it takes full advantage of solar power generation to achieve the optimal state of solar energy utilization, providing energy for loads that require it. Additionally, since the battery always retains a portion of its energy, in the event of a grid failure or power outage, there will still be sufficient energy in the battery to sustain the load, ensuring uninterrupted power supply, similar to UPS mode.		
d13	**Configure the charging current value from the power grid to the machine's battery** 	As shown in the example, the charging current from the machine's power grid to the battery is 10A (which must be less than the machine's rated current).
d14	**Configure the current value of the machine's solar panel for charging the battery** 	As shown in the example, the current value supplied by the solar energy to charge the battery is 60A (which must be less than the machine's rated current).
d15	**Configure the cut-off voltage value for fully charging the battery** 	This parameter represents the voltage at which the battery is fully charged, serving as the final constant voltage value. It is the final constant voltage holding value for both lithium and lead-acid batteries. When parameter d07 is set to a lead-acid battery, this parameter functions as an average recharge voltage, while float charging will automatically operate at the preset value of 13.8V/cycle. (Users can adjust the float charging voltage via the mobile app.) When parameter d07 is set to a lithium battery, this parameter acts as the final average charging voltage, with the battery voltage ultimately stabilizing at 58V to balance the voltage across each cell string in the lithium battery. Users can modify this parameter to match the voltage requirements of their specific battery system.

d16	**Zero export limit** 	OFF	When D16 is set to "ON," "zero export limit" is disabled, and the inverter operates at full power, feeding electricity into the grid for sale.
		ON	when D16 is set to "OFF." the zero export limit mode is enabled under grid-tied conditions, the inverter will output power according to the load's consumption. If the load demand exceeds the inverter's output capacity, the insufficient portion will be supplemented by the grid.
d17	**System operational status (On/Off)** 	OFF	Currently inactive (Off).
		ON	Currently active (On).
d18	**Configure the maximum current of the inverter to the load** 	The maximum AC output current setting of the inverter is typically configured below the machine's rated current and must not exceed it. As shown in the example, the maximum current output by the inverter to the load is 10A (adjustable between 0-25A). This parameter, when the machine is operating in grid-tied anti-backflow mode, can equivalently control the inverter's output power. This function operates "Zero export limit mode" is activated when D16 is set to "OFF."	
d19	**Discharge Cut-off SOC Setting:** 	Discharge Cut-off SOC Setting: When the battery's State of Charge (SOC) falls below the configured threshold, discharging is halted.Example:If set to 40%, the battery stops discharging once the SOC drops below 40%.Adjustable range: 0–90%. Configuration rule: The cut-off SOC must be lower than the discharge initiation SOC (typically set as discharge initiation SOC minus 10%).	
d20	**Discharge Initiation SOC Setting:** 	Discharge Initiation SOC Setting: Refers to the threshold at which the battery begins discharging when its State of Charge (SOC) exceeds the set value, triggering the inverter to activate. Example:When the SOC rises above 50%, the battery initiates discharging.Adjustable range: 0–100%.	

<table>
<tr><td>d21</td><td>Setting up the machine for charging and discharging
 
</td><td colspan="2">When set to 1, the system switches to charging mode; when set to 2, the system switches to discharging mode. This parameter automatically resets to 0 after the charging or discharging process is completed.</td></tr>
<tr><td rowspan="2">d22</td><td rowspan="2">Switch setting of remote and off-grid control box
 
</td><td>OFF</td><td>Deactivate the remote and off-grid control box.</td></tr>
<tr><td>ON</td><td>Activate the remote and off-grid control box.</td></tr>
<tr><td>d23</td><td>Zero export limit activation value
 
</td><td colspan="2">As shown in the figure, this parameter indicates that the inverter will activate the "Zero export limit" protection only when the load power exceeds 40W. If the load power is less than 40W, the "Zero export limit" protection will remain inactive. This means that the "Zero export limit protection only compensates for the portion of the load power exceeding 40W.

Purpose: To allow users to adjust the zero point of the "Zero export limit" protection, eliminating any deviation power that might feed into the grid due to sensor accuracy errors. (Adjustable range: 20~200W).

Recommended setting: 70W.</td></tr>
</table>

tips:①grid = utility = electricity grid
②load=Household appliances
③Energy storage=battery

APP Connection

APP download

If your phone system is iOS, please search for "Wonderfree" in the APP Store to download;

The APP Store download link is as follows:

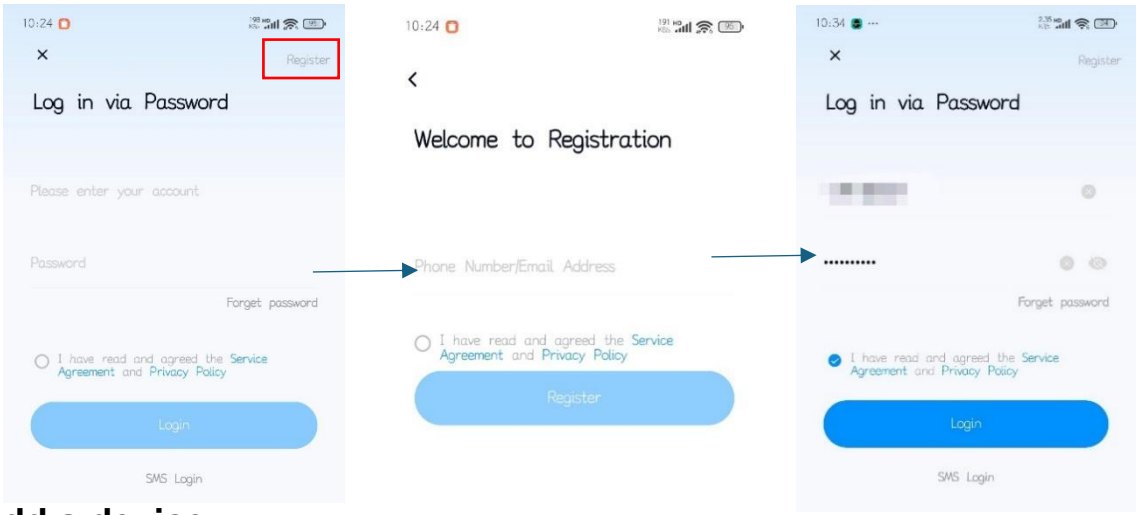
“ https://apps.apple.com/gb/app/wonderfree/id6450249586 “

If your phone is Android, please search for " Wonderfree " in Google Store to download

The Google download link is as follows:

“ https://play.google.com/store/apps/detai ls?id=com.quectel.commonappeu&hl=en “

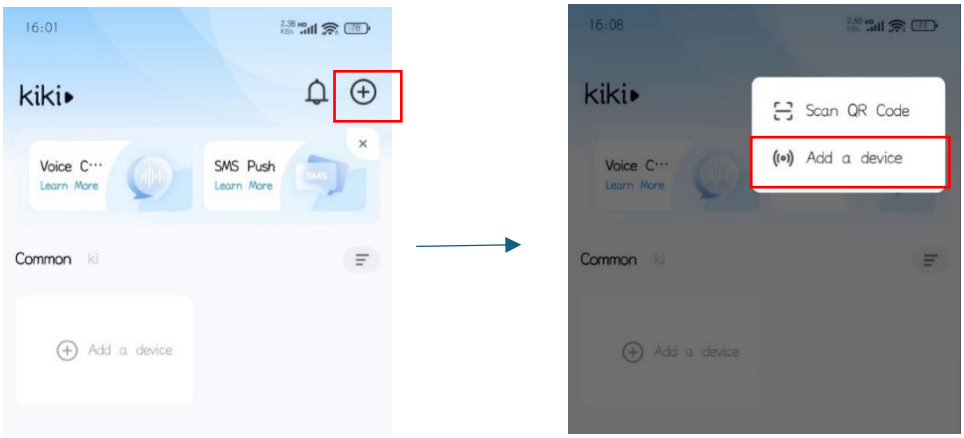
Log In>>>Register>>>Login

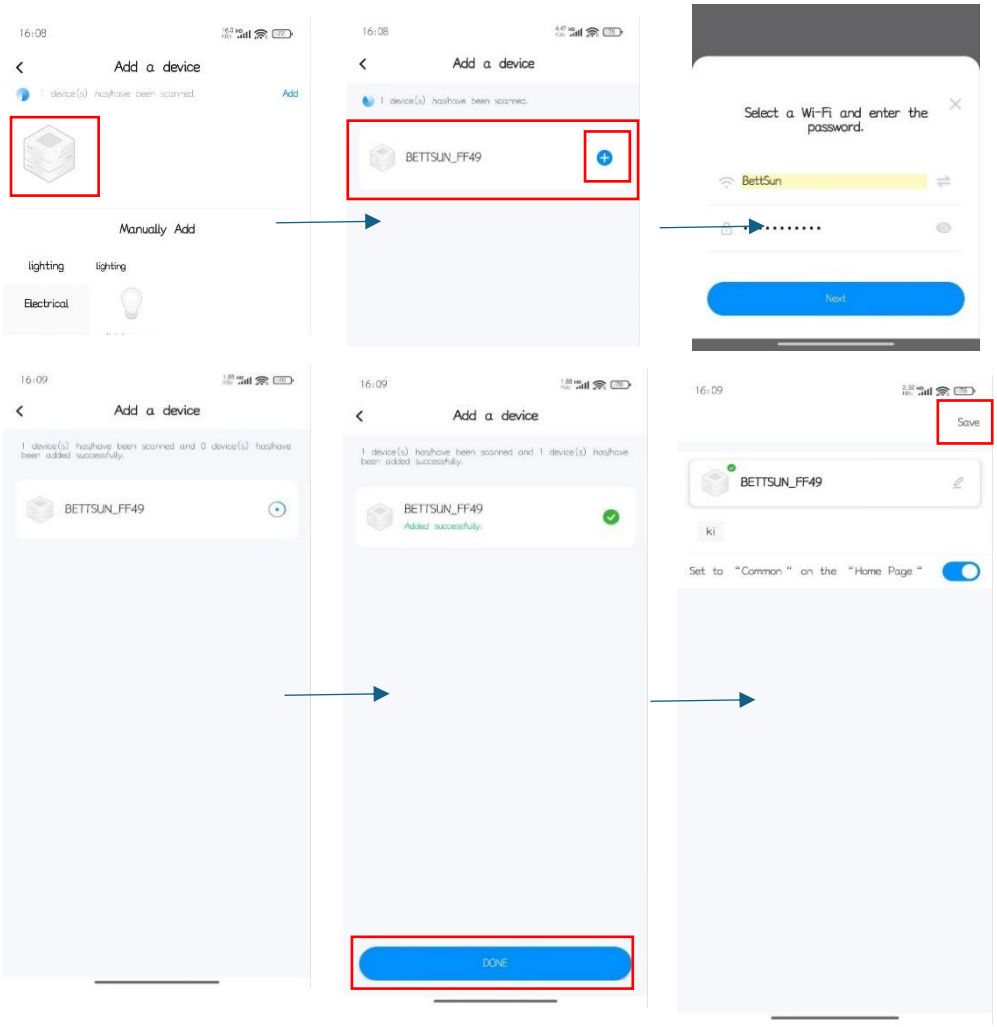


Add a device

Turn on the Bluetooth and Wi-Fi on your phone (note: Wi-Fi can only use 3G or 4G, not 5G),

and wait for the machine to scan.

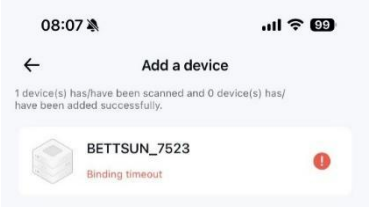




If you encounter errors such as connection timeout (a red exclamation mark appears on the right side of the machine)

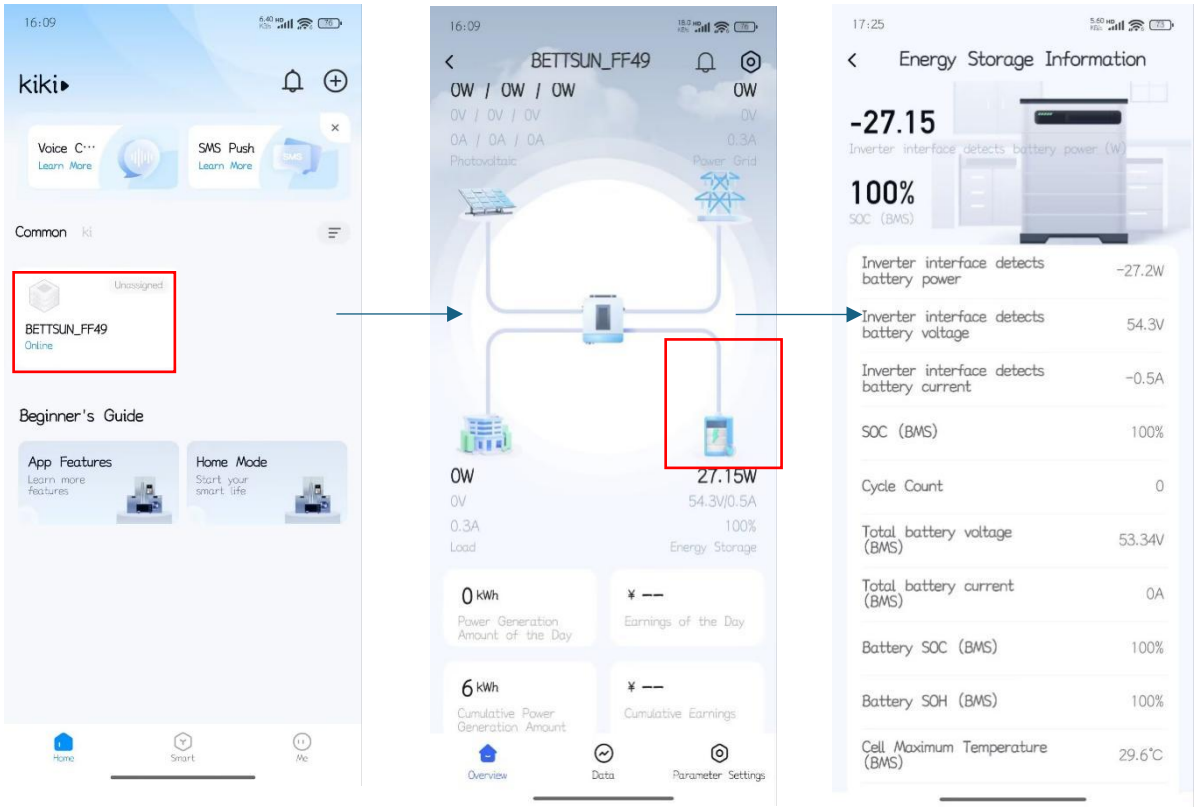
- please try to unplug and replug the WiFi module, then press and hold the reset button at the top of the module. When the lights of the module start flashing, it indicates that the network reconfiguration has begun.
- Connect again following the above process, or use another mobile phone to reconnect according to the above process.

If none of the above methods can successfully establish the connection, please contact us.



The application of the APP

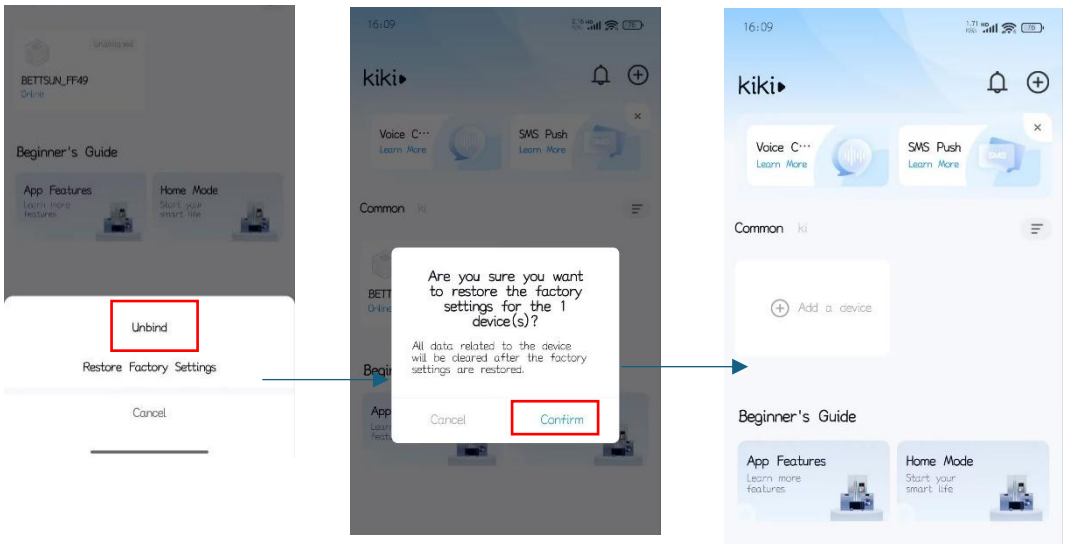
After successfully connecting to the machine, click on the machine icon on the home page, and you will enter the detailed information dashboard for the photovoltaic system.You can click on the corresponding icon, and you can view the physical data represented by that icon.



Remove a device

A single device is only permitted to have two mobile phones operating simultaneously.

To remove the inverter from this mobile device, press and hold the machine icon and select "Remove". Once the pop-up window appears, choose "Unbind" to confirm the removal.



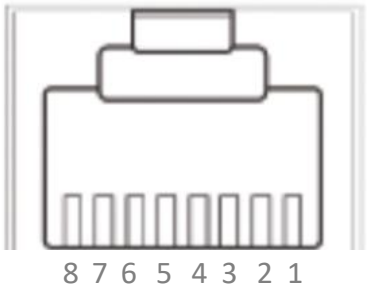
Troubleshooting

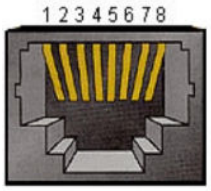
Fault Code	Fault Event	Explanation / Possible cause	What to do
E0	Input Voltage Undervoltage Protection	The grid input voltage is too low.	If the power grid requires a wider range, set d02 to WID. If the issue persists after setting d02 to WID, check whether the input voltage is too low.
E1	Input Voltage Overvoltage Protection	The grid input voltage is too high.	To select a wider range for the power grid, set d02 to WID. If the issue continues after setting d02 to WID, verify whether the input voltage is too high.
E2	Input Overfrequency Protection	Input voltage frequency is outside the set range.	For a 50Hz system, the input voltage frequency range is 45Hz to 55Hz. For a 60Hz system, the input voltage frequency range is 55Hz to 65Hz. If the system frequency exceeds 65Hz, an overfrequency fault will be triggered, and the power grid frequency should be checked.
E3	Input Underfrequency Protection	Input voltage frequency is below the set range.	For a 50Hz system, the input voltage frequency range is 45Hz to 55Hz. For a 60Hz system, the input voltage frequency range is 55Hz to 65Hz. If the system frequency drops below 45Hz, an underfrequency fault will be triggered, and the power grid frequency should be checked.
E4	Grid Switching Back and Forth	Frequent switching between the power grid and the inverter is a common issue during energy storage operations, often caused by poor battery performance.	1: Due to battery limitations, if the battery powers a large load below the d11 parameter, it will automatically switch to grid operation. During this time, if photovoltaic charging continues, the battery voltage will quickly rise and exceed the d12 parameter, causing the system to switch back to inverter operation. This can result in frequent switching, occurring more than 8 times within an hour. 2: If the battery has poor performance, such as lead-acid batteries, and needs to handle a large load, it is recommended to use SOL mode. Set the d11 parameter to the lowest value and the d12 parameter to the highest value to reduce the frequency of switching. 3: Replacing the battery with a higher-performing lithium battery can resolve the issue. Once the fault code appears, the system will lock the current state for one hour and automatically recover afterward. However, the current state may lead to a shutdown. 4: Many users may assume the battery is fully charged, unaware that they are observing a false high voltage under load. In this scenario, the voltage drops sharply, triggering machine protection. After the protection is activated, the load disconnects, and the battery voltage quickly rises again, creating the illusion of a charged battery. This issue is common with lead-acid batteries.
E5	Inverter Short Circuit	The inverter has encountered a short circuit fault.	Disconnect the connection between the load and the inverter, thoroughly inspect the load for short-circuit points, and reconnect the inverter output to the load using an air switch for added protection.
E6	Inverter Overload	The inverter has an overcurrent or overload fault.	When the inverter is operating in off-grid mode, check if the load terminal is overloaded or if the load current is excessively high. When the inverter is operating in charging mode, verify whether the charging current is set too high or if there is a short circuit at the battery terminal. When the inverter is operating in grid-connected mode, ensure that the grid connection current is not set too high.
E7	Inverter Bus Overvoltage	Mains voltage abnormality.	Check the external AC input voltage. If the mains voltage is too high, it may cause the machine to malfunction. Disconnect the external AC voltage connection.
E8	PV1 Input Overvoltage	The operating voltage of the solar panel connected to the PV1 terminal is high.	Check the operating voltage of the solar panel; an open-circuit voltage of 400V is recommended for optimal performance.
E9	PV2 Input Overvoltage	The operating voltage of the solar panel connected to the PV2 terminal is high.	Check the operating voltage of the solar panel; an open-circuit voltage of 400V is recommended for optimal performance.
EA	PV1 Overcurrent Protection	The PV1 port has an overcurrent condition.	Check the operating voltage of the solar panel. The recommended open-circuit voltage is 400V for optimal performance. Additionally, inspect the PV terminals for any misconnection or damage.
EB	PV2 Overcurrent Protection	The PV2 port has an overcurrent condition.	Check the operating voltage of the solar panel. The recommended open-circuit voltage is 400V for optimal performance. Additionally, inspect the PV terminals for any misconnection or damage.
EC	Charging Overcurrent Protection	During charging, the battery current exceeds the rated current of the machine.	Check if the battery is damaged or if the battery port is short-circuited.
ED	Charging Overvoltage Protection	The battery terminal voltage is excessively high.	Check if the D15 parameter is set too high or if the battery port voltage is excessively high.
EE	Battery Voltage Protection	The battery voltage exceeds the set parameters or is fully discharged.	1. The battery may be disconnected from the machine; check the grounding wire, and ensure the lithium battery is properly connected to the BMS. 2. The battery may be discharged or unable to support a large load and should be replaced with a higher-performing battery.

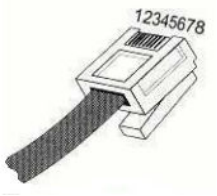
EF	Inverter Overtemperature Protection	The machine temperature has surpassed 85°C.	Ensure proper ventilation and heat dissipation. Use the correct installation method and allow the machine to cool down and recover on its own.
EG	MPPT1 Overtemperature Protection	The temperature of the MPPT1 unit has exceeded 85°C.	Ensure adequate ventilation and heat dissipation. Follow the proper installation method and allow the machine to cool down and recover automatically.
EH	MPPT2 Overtemperature Protection	The temperature of the MPPT2 unit has exceeded 85°C.	Ensure adequate ventilation and heat dissipation. Follow the proper installation method and allow the machine to cool down and recover automatically.
EI	BMS Fault	Battery BMS error.	The BMS connection has been lost. Please reconnect it.
Attention: The display showing "99" indicates a normal state.			

Appendix 1

1、Inverter Communication Port Pin Definition





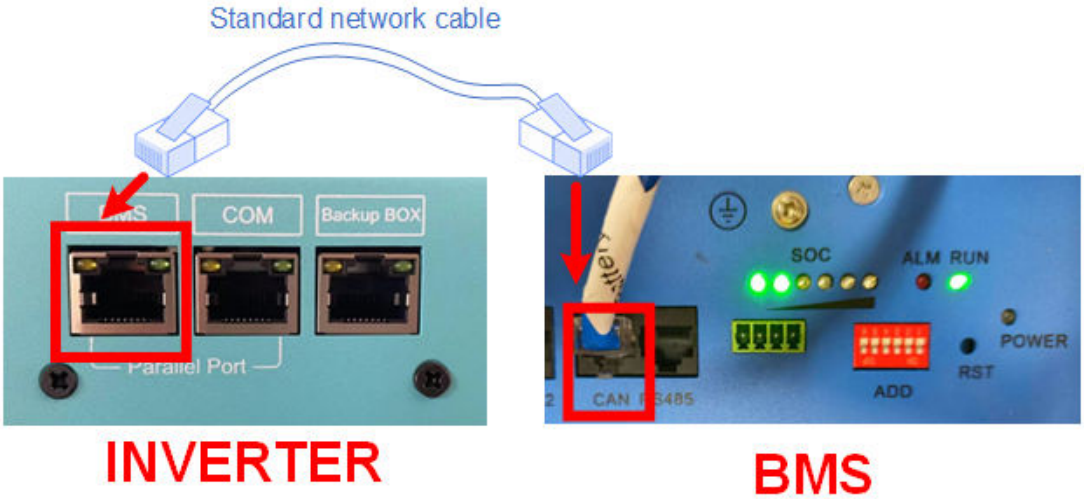


RJ45	Definition
Pin 1	×
Pin 2	×
Pin 3	×
Pin 4	CAN-H （Internal BMS）
Pin 5	CAN-L （Internal BMS）
Pin 6	×
Pin 7	×
Pin 8	×

2、Inverter to BMS Communication Wiring:

1）Inverter communication board network port Pin5 (CAN-L) connects to BMS board network port Pin x (CAN-L);

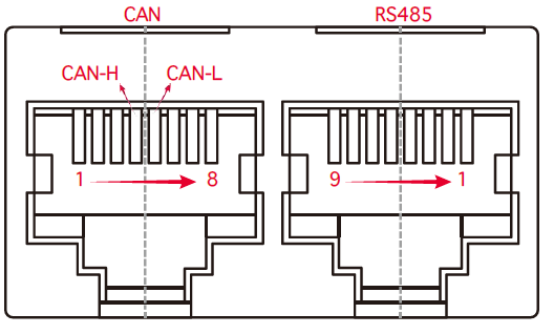
2）Inverter communication board network port Pin4 (CAN-H) connects to BMS board network port Pin x (CAN-H);



Take the itel Lithium-ion Battery Pack as an example for communication.

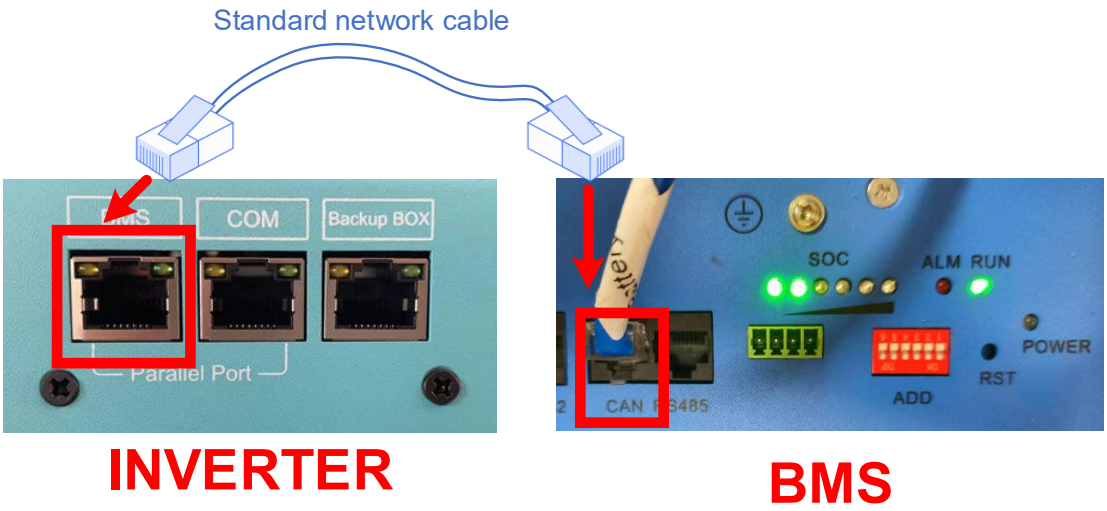
If CAN communication is required to connect to the battery's BMS, according to the specification sheet provided by the battery manufacturer, the positions of CAN_L and CAN_H on the RJ45 connector can be identified.

(1) Interface diagram



CAN and RS485 interfaces

As shown in the figure: pins 4 and 5 correspond to CAN_H and CAN_L, respectively. Connect and crimp the wires at pins 4 and 5 of the RJ45 connector, then insert this end into the BMS port.

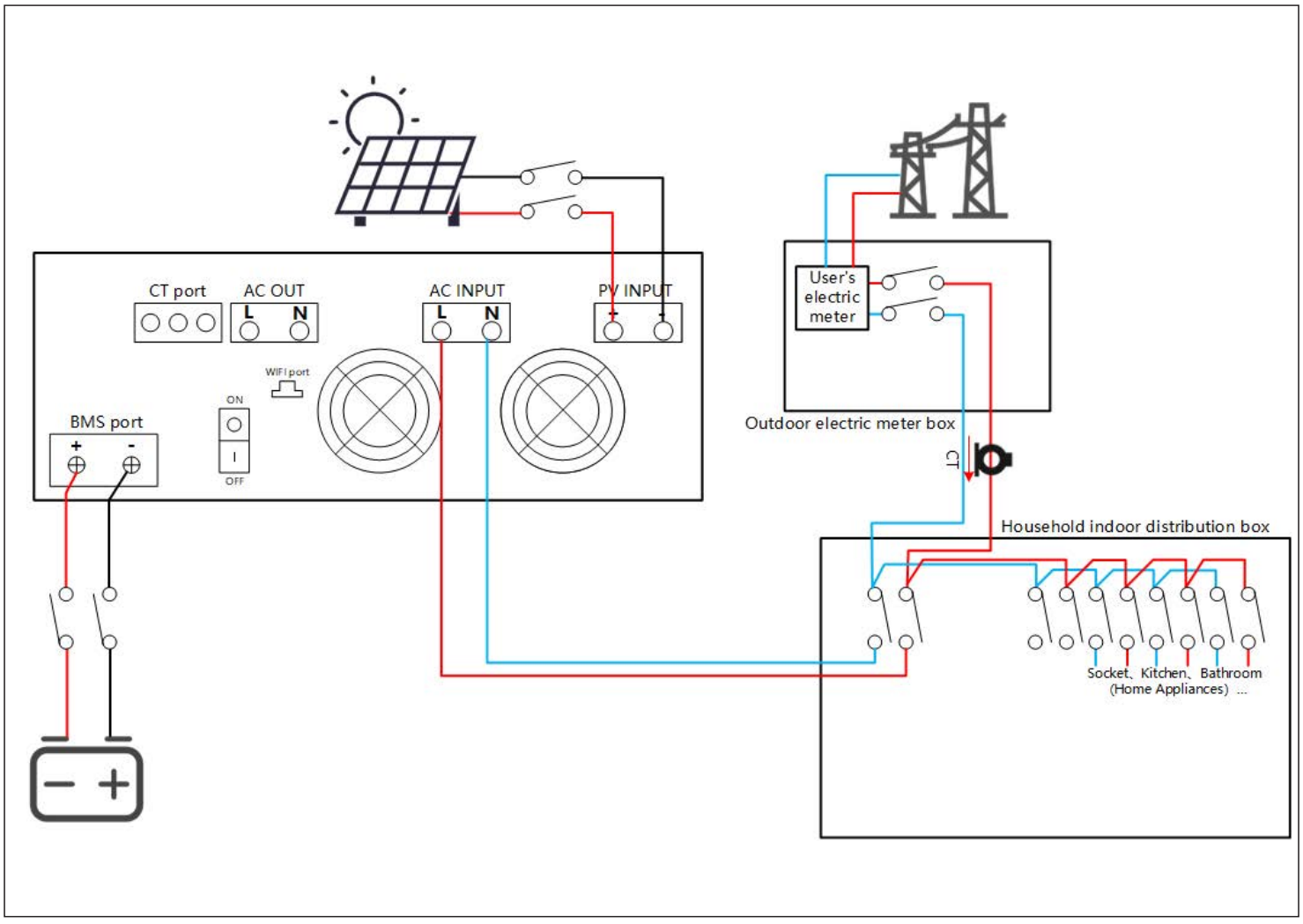


On the inverter side, CAN_H and CAN_L correspond to pins 4 and 4 of the RJ45 connector, respectively. Connect the CAN_H from the battery BMS side to pin 4 of the inverter's RJ45 connector, and connect the CAN_L from the battery BMS side to pin 5 of the inverter's RJ45 connector.(Just use a standard network cable.)

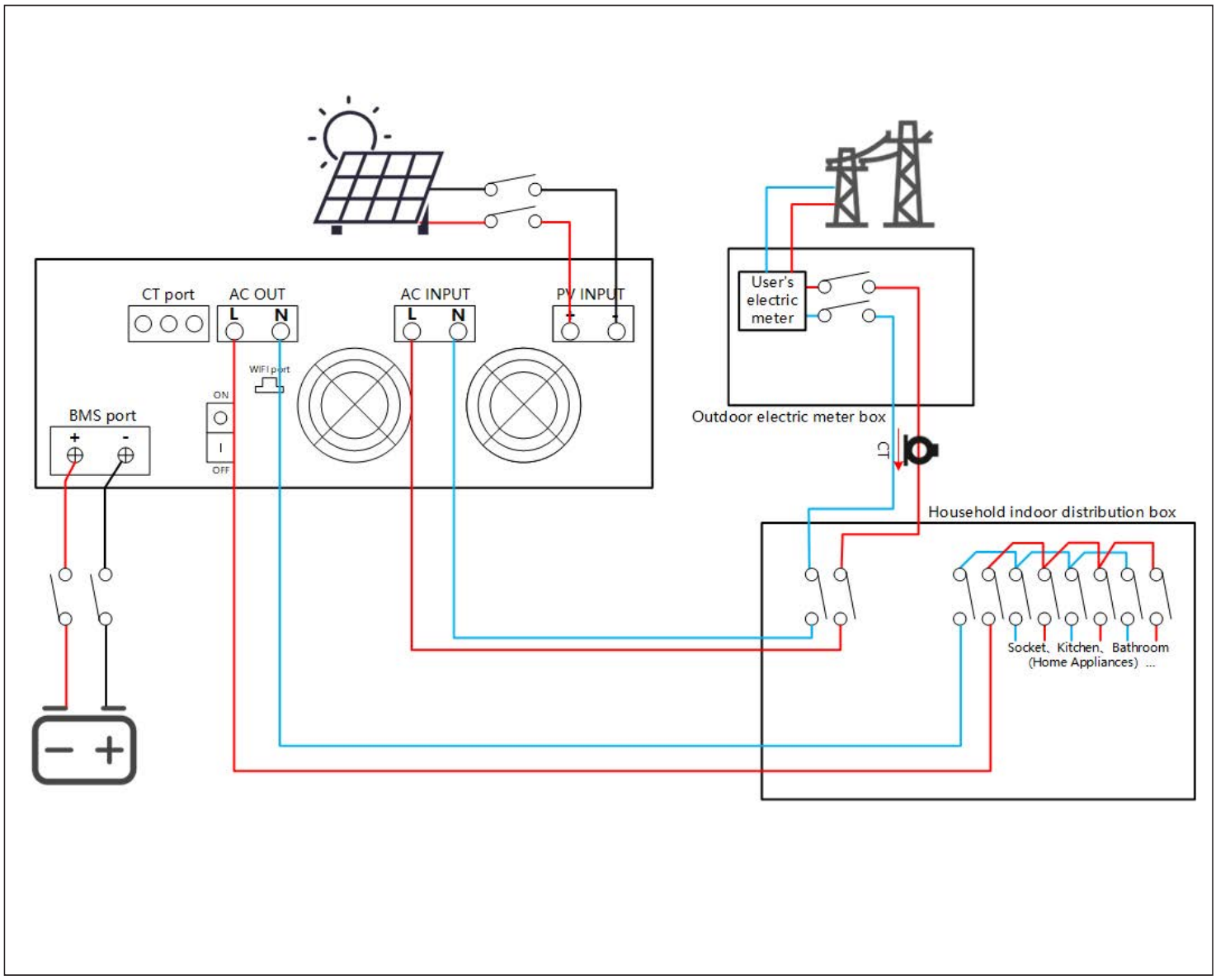
This completes the crimping of a network cable that supports CAN communication.

Appendix 2

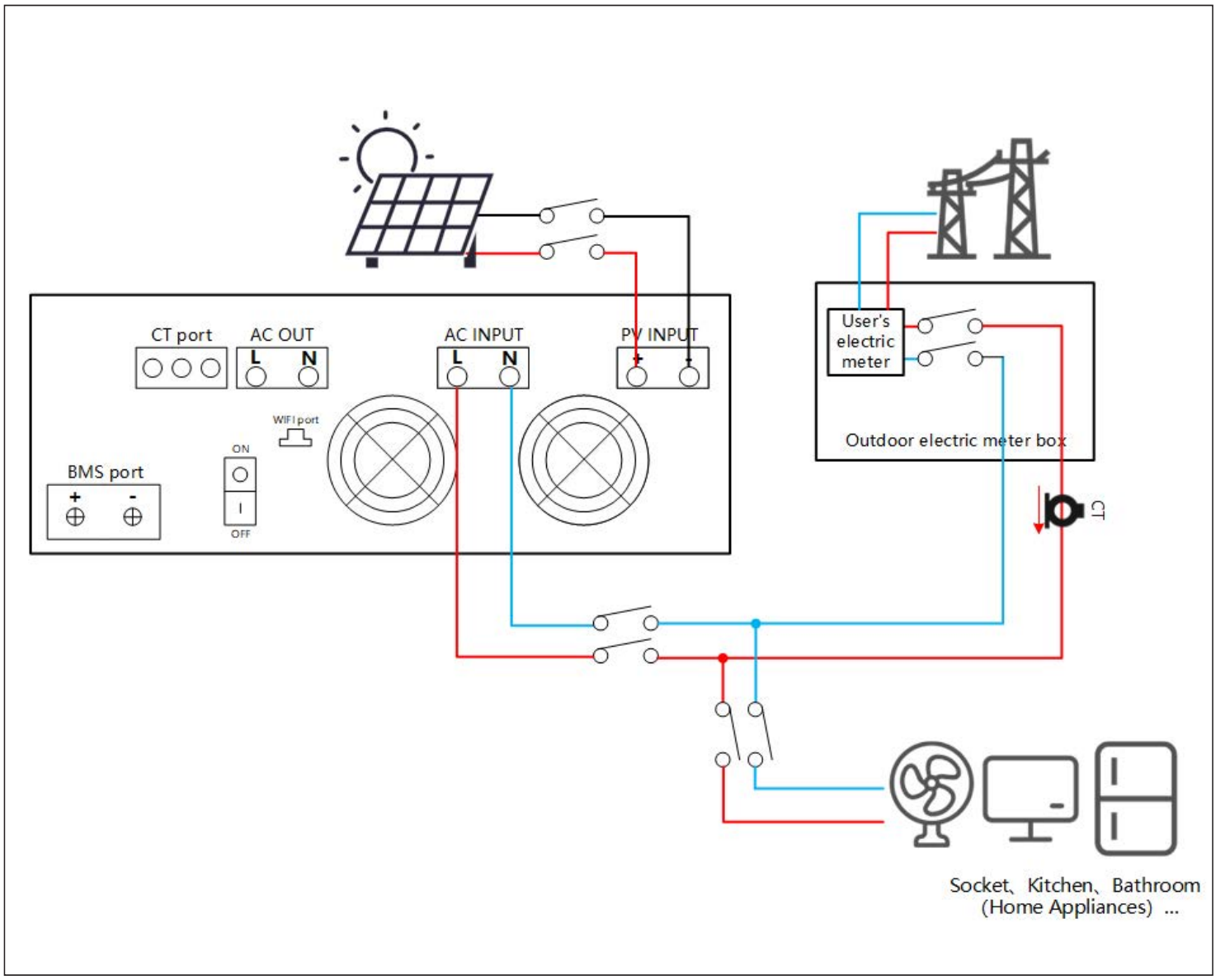
1、Single-phase Zero export limit wiring Can support unlimited load, suitable for areas with infrequent power outages (unlimited load - depends on the capacity of the household distribution box and wiring). After a grid power outage, the AC OUT port still provides 220V output, which can be separately connected to a load for use. At this time, d01 is set to the default factory setting SUb.When the battery is a lead-acid battery, d15 can be set to 13.8V; when the battery is a lithium battery, d15can be set to 58V. Users can also modify this parameter to match the voltage requirements of their specific battery system.If you need to enable the "Zero export limit" function, it is recommended to set the d23 parameter to 70W.



2、Single-phase Zero Export Limit Wiring Scheme： Uninterrupted Output, Suitable for Areas with Frequent Power Outages. After a grid power outage, the load remains powered (similar to a UPS power supply). At this time, set d01 to SbU.When the battery is a lead-acid battery, d15 can be set to 13.8V; when the battery is a lithium battery, d15 can be set to 58V. Users can also modify this parameter to match the voltage requirements of their specific battery system.If you need to enable the "Zero export limit" function, it is recommended to set the d23 parameter to 70W.



3、Battery-less mode wiring: It is necessary to set the mode in the d01 page to NBU. Both photovoltaic (PV) and grid power must be connected for the inverter to operate normally. The load will prioritize using the electricity generated by the PV system, and any shortfall will be supplemented by the grid. Excess electricity can be managed through the d16 page, which can be set to ON (Zero export limit enabled - no power is fed back to the grid) or OFF (Zero export limit disabled - power is fed back to the grid)If you need to enable the "Zero export limit" function, it is recommended to set the d23 parameter to 70W.



Appendix 3

1、 **Q:** How many years is the warranty for the main unit?

A: The main unit comes with a one-year warranty. During the warranty period, if any issues arise, we provide free replacement parts or motherboards. If the warranty period has expired, we will supply the necessary components for repair, but material costs will be charged.

2、 **Q:** If the CT fails, does the "Zero export limit" still take effect?

3、 **A:** If the CT fails, is damaged, or is connected incorrectly, the machine will be unable to detect the CT signal. In this case, the machine's output power will be 0, and the "Zero export limit" will still be in effect.

4、 **Q:** After connecting the battery data cable, the BMS does not read the information.

A: First, check if the battery data cable is plugged in backwards or if the cable is damaged. Next, ensure that the battery data cable is correctly and securely connected to both the BMS and the battery, and check for any damage or looseness in the connectors. If the wiring issues are ruled out and the user has privately crimped the network cable themselves, it is necessary to verify whether the

communication protocol between the BMS and the battery is compatible. Finally, restart the machine and attempt to read the data again.

5、 **Q:** In Battery-Free AC Coupling Mode, if the photovoltaic system is not generating power at night, how much standby current does the inverter draw from the grid at this moment, and what is the active power?

A: It is approximately within 0.2~0.4 A. The active power is within 20~40W.

6、 **Q:** In Battery-Free AC Coupling Mode, PV can generate 1KW, and the grid is connected to the AC INPUT, but a load of 5KW is connected to the AC OUT port. What state does the inverter enter at this moment, and will the grid compensate for the insufficient 4KW?

A: Yes, it will compensate for 4KW. Our machine can precisely and rapidly control the anti-backflow process, preventing a scenario where the PV could generate 1KW but only 500W is used from the PV, and 4500W is drawn from the grid.