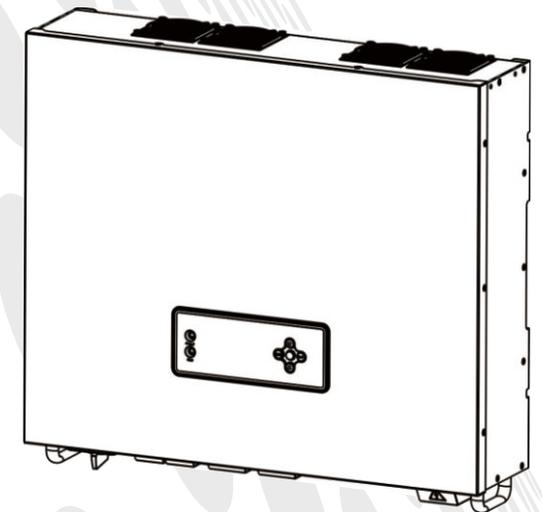


# User Manual

Hybrid Solar Inverter

5 kW



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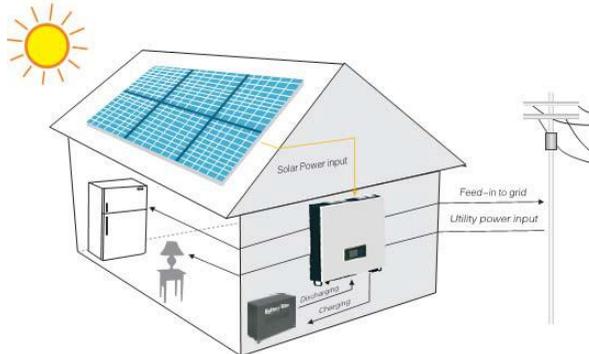
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# 1 Product Description

Hybrid (Bi-direction) Solar Inverter is PV energy combined with energy storage systems. It utilizes solar power, utility power and battery power to ensure continuous power supply, and users can store the unused energy produced during the day by PV system in the battery and use it whenever they need, even at night, it help increase self-consumption and achieve greater energy self-sufficiency.



## 2 Safety Information

- The product's degree of protection is IP20, which is suitable for the environment of pollution degree 2.  
Pollution degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.
- Make sure not to keep or use the product in following environment.
  - No good air circulation
  - Place having flammable gas or corrosive material or lots of dust
  - Place under abnormal high or low temperature (above 40°C or below 0°C), or high humidity (above 90%)
  - Place where there is direct sunlight or near the heating appliance
  - Place where there is violent vibration
  - Outdoor
- Please install a small breaker in the input and output terminals of the inverter (The minimum rated voltage and current of PV side DC circuit breaker is 550V.dc/15A.dc, the minimum rated voltage and current of AC circuit breaker on the grid side is 400V.ac/32A.ac, and the minimum rated voltage and current of the DC circuit breaker on the battery side is 60V.dc/100A.dc), so that in emergency situation the switch can be disconnected and power supply can be cut off.
- Cut off power rapidly if inverter works abnormally, and contact your local dealer.
- It is normal that the case surface temperature goes up to 50°C during using.
- Do not use inverter with overload.
- Do not open the inverter cover in case of danger of electric shock. Maintenance should be done by technicians.

- Inverter inner short circuit will cause electric shock or fire danger. Do not put any liquid vessel on inverter.
- Do not use liquid extinguisher if there is a fire, a dry powder extinguisher is recommended.

### Important Safety Information

- Read these instructions carefully and look at the equipment to become familiar with it before trying to install, operate or maintain it.
- Ensure that the inverter is reliably grounded before running. Grounding resistance needs to be less than 1 ohm..
- All terminals of the inverter must be equipped with protective cover. Observe the corresponding signs and symbols on the device during operation..
- When the inverter works, the battery terminal may be charged. If there is no connection to the battery, please cover with the protection of pearl cotton in the protective cover.
- If this is your first time to use the inverter, please make sure that all the parameters are set correctly, especially the parameters of the battery and the working mode (ANTI-TIED or GRID-TIED).
- The connection to the Grid must be done only after receiving approval from the distribution utility as required by national and state interconnection regulations, and can be done only by qualified personnel.
- The external CT must be connected to the inverter correctly and reliably before use, otherwise the external CT port may be at high voltage.

	<p><b>DANGER!</b></p> <p>Unauthorized removal of the necessary protections, improper use, wrong installation or wrong operation will result in serious injury or equipment damage. Transport, handling, installation, start-up and maintenance must be performed by qualified and trained personnel.</p>
 	<p><b>DANGER!</b></p> <p>After disconnecting the inverter from the Grid, wait for 60 seconds until the internal capacitors are discharged to a safe voltage before servicing or touching any electrified parts and electric connection.</p>
	<p><b>DANGER!</b></p> <p>It's forbidden to connect the load N line to the Grid N line. It may cause serious damage to the machine and the load.</p>
	<p><b>DANGER!</b></p> <p>The internal heatsink of the inverter is ungrounded, it may be electriferous during operation.</p>

	<p><b>WARNING!</b></p> <p>The installation must be performed in full compliance with national and local standards and regulations.</p>
	<p><b>WARNING!</b></p> <p>You can only use monocrystalline silicon and polycrystalline silicon modules due to non-isolated topologies of PV and Grid side of the inverter.</p>
	<p><b>WARNING!</b></p> <p>When the photovoltaic array is exposed to light, it supplies a DC voltage to the PCE. To ensure a safe work environment, keep the whole surface of the photovoltaic panel covered with opaque material to solar radiation before connecting panel to equipment.</p>
	<p><b>WARNING!</b></p> <p>Ensure that the PV generators open voltage does not exceed 550V, otherwise it will cause damage to the inverter permanently and cause other losses (Please consider the influence of the temperature factor, usually the PV module voltage will be about 15% higher in winter (-20°C) than that in summer (30°C). Do not connect any source of energy other than PV modules to the inverter PV input.</p>
	<p><b>WARNING!</b></p> <p>Do not change the internal components of the inverter without permission.</p>
	<p><b>WARNING!</b></p> <p>The equipment must be connected to the ground before connecting to the Grid, ensure that the ground connection is reliable. Loss of abnormal operating is enormous; Do the operation according to the specifications of the operation manual.</p>

## 3 Product Overview

### 3.1 Specifications

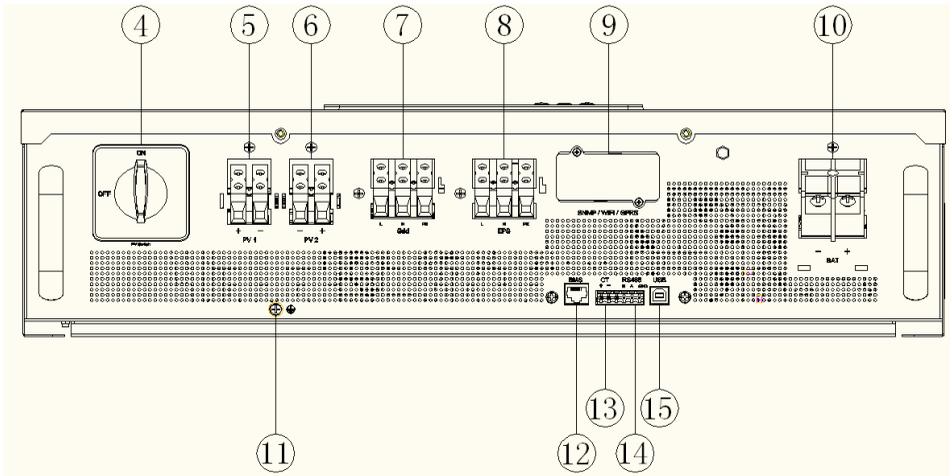
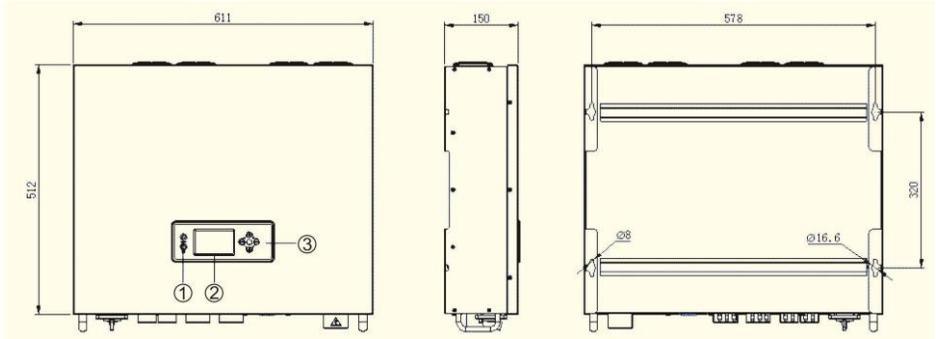
MODEL	5 kW
Rated power	5000 W
Operating mode	Flexible setting via upper computer software or LCD interface
PV INPUT	
Max. input power	5500 W
Max. input voltage	550 V.dc
Rated input voltage	360 V.dc
Start-up voltage	115 V.dc
Initial feeding voltage	150 V.dc
MPPT voltage range (full load)	120 V.dc ~ 530 V.dc (250 V.dc ~ 450 V.dc)
Max. input current	12 A/12 A
PV short circuit current	15 A/15 A
Number of MPPTs	2
BATTERIES	
Battery type	Lead-acid battery
Rated voltage	48 V.dc
Voltage range	40 V.dc ~ 58 V.dc
Battery type	Li-ion battery
Rated voltage	51.2 V.dc
Voltage range	46.4 V.dc ~ 57.6 V.dc
BMS Communication	RS485
Max. charger power	2500 W
Max. charging current	50 A (10 A ~ 50 A settable, 20 A default)
Charging curve	3-Stage
Max. charge efficiency	94%
Max. discharge power	2500 W
Max. discharge current	50 A
Discharge depth (%)	80% default (50%Lead-acid / 90%Lithium ,optimized)
Max. discharge efficiency	94%
Reverse polarity protection	Yes
AC OUTPUT	
Rated AC power	5000 VA / 5000 W
Rated AC voltage	230 V.ac
AC voltage range	170 V.ac ~ 280 V.ac

Rated AC current	21.7 A
Rated Grid frequency	50 Hz / 60 Hz
Grid frequency tolerance	50 ± 5 Hz / 60 ± 5 Hz
Power factor	0.9 leading ~ 0.9 lagging
THD	≤ 3%
<b>EPS OUTPUT</b>	
Rated EPS power	3000 VA / 3000 W
Over load	4000VA/1min
Rated EPS voltage	230 V.ac (208 / 220 / 240 V.ac settable)
Rated EPS current	13 A (14.4A / 13.6A / 12.5 A)
EPS voltage range	184 V.ac ~ 276 V.ac
Rated frequency	50 Hz / 60 Hz
Frequency precision	± 1%
Voltage precision	± 1%
Peak factor	3 : 1
THD	≤ 3% (linear load)
<b>TRANSFER TIME</b>	
EPS mode → On-grid mode	0 ms
On-grid mode → EPS mode	10 ms
<b>EFFICIENCY</b>	
MPPT efficiency	99%
Max. PV efficiency	96%
<b>GENERAL DATA</b>	
Communications	USB / RS485 (standard), SNMP / Wi-Fi / GPRS (optional)
IP rating	IP 20
Operating temperature	0 ~ 40°C (> 40°C derating)
Max. relative humidity	0 ~ 90%
Max. altitude	< 1000 m (> 1000 m derating)
Cooling	Forced ventilation
Alarm	LED, buzzer
Display	LED, LCD
Noise	≤ 50 dB
Topology	Transformerless (PV to Grid)
Dimensions (WxDxH) (mm)	611x547x150
Net weight (kg)	22.3

**Note:**

The anti-reflux function of models with digital meter / CT needs a digital ammeter or external CT, and it is suitable for lithium battery and lead-acid battery that supports deep circulation charge and discharge.

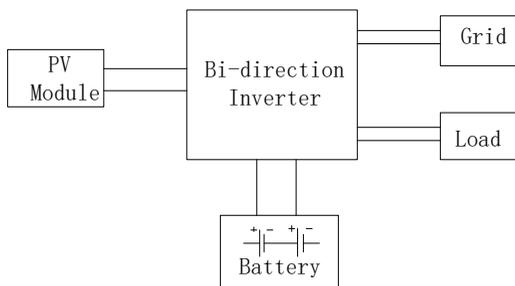
### 3.2 Panel Features



No.	Mark	Usage
1	LED Indicator	Indicate the operating status
2	LCD	LCD display panel
3	Buttons	Operation buttons
4	PV Switch	Disconnect / connect PV
5	PV1 + -	PV connectors
6	PV2 + -	PV connectors
7	Grid	Grid connectors
8	EPS	Load connectors
9	SNMP	SNMP card / Wi-Fi / GPRS (Optional)

10	BAT + -	Battery connectors
11	PE	Grounding
12	BMS	BMS communication port
13	CT	Connect external CT (Optional)
14	RS485	RS485 communication port
15	USB	USB communication port

### 3.3 System Principle



## 4 Installation

### 4.1 Unpacking Inspection

Inspect the contents upon receipt. Notify the carrier and dealer if the unit is damaged.

#### Standard configurations

No.	Designation	Quantity
1	Inverter	1
2	User manual	1
3	Battery connector	2
4	Ground connector	1
5	Wiring sheath	10
6	USB cable	1
7	Fixed screws	4
8	carrier ring	4
9	Expansion tube	4

#### Optional 1:

No.	Accessories	Quantity	Others
1	CT	1	Model with external CT anti-reflux
2	3 Pin terminal	1	

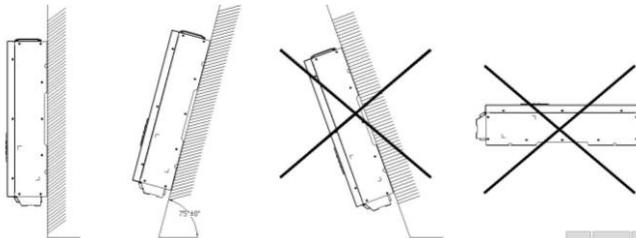
**Optional 2:**

No.	Accessories	Quantity	Others
1	Crystal joint	1	Model with digital meter anti-reflux
2	22 cm network cable	1	
3	3 M network cable	1	
4	3 Pin terminal	1	
5	Digital meter	1	

**4.2 Mounting**

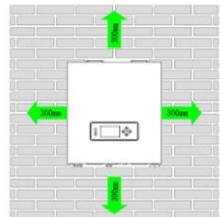
**4.2.1 Mounting Location**

- The ambient temperature should be between 0°C ~ +40°C and relative humidity should be between 0% ~ 90% (non-condensing) to ensure optimal operation.
- Mount indoor only. Suitable for drying, without excessive dust, and with sufficient air flow the protection level.
- The inverter can make noises (< 50dB) when in use, mount the inverter away from people's living area.
- The mounting location and method must be suitable for the weight and dimensions of the inverters.
- Mount vertically or tilted backwards by max. 15°. Never mount it with a forward tilt. Do not mount in a horizontal position.
- Mount the inverter in such a way that the display is at eye level in order to allow the operating state to be read at all times.
- Regularly clean the fan filter.
- The wiring terminal should be installed protective covers.



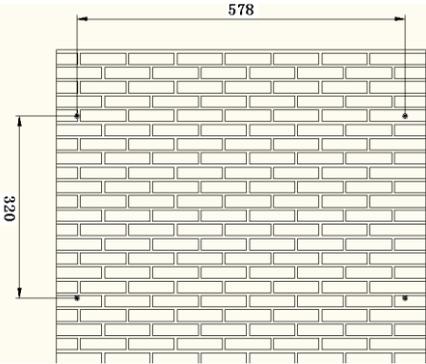
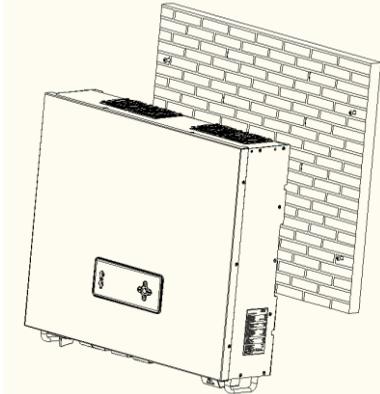
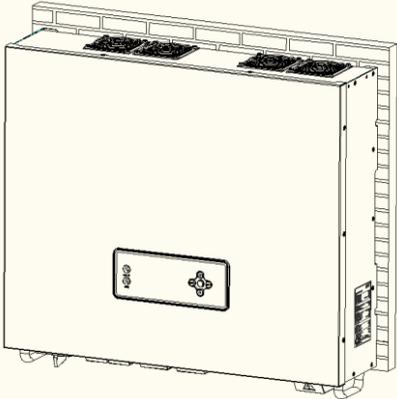
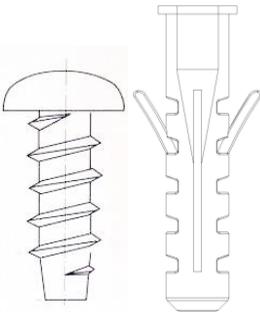
In order to maintain sufficient ventilation, when installing the inverter, a minimum clearance that is not less than below distances.

- The top: 300 mm      The bottom: 300 mm
- The front: 300 mm      Both sides: 300 mm



## 4.2.2 Installation Procedure

1. Drill four holes at the marked locations with four screws according to dimensional layout. It is recommended to use M6-8 screws and matched bulged tube. Ensure the inverter LCD screen height is flush with the eyes of the user for easy operation.
2. There are 4 gourd-shaped mounting holes on the rear panel of the inverter, align the mounting holes with the fixed 4 screws, then attach the inverter to the wall. Remember that this inverter is 23kg. Be careful when mounting.
3. Check if the inverter is firmly mounted.

Step 1	Step 2
	
<p>Step 3</p> 	<p>Note: use screws and expansion tube in the accessories.</p> 

## 5 Electrical Connection

When selecting external wiring cables, cable current capacity and system overload capacity should be considered, as well as environment temperature and physics support. The following table is a proposal for cable selection. Engineers should refer to the relevant local standards and the table below to make a comprehensive selection. The length of the cables is generally 2 to 10 meters; long cable will cause the voltage drop, the corresponding cable cross-sectional area sizes should be increased.

Item	Conductor Cross-sectional Area	Breaker Type
Grid (L,N,PE)	4 ~ 6 mm <sup>2</sup>	400 V.ac / 40 A
EPS (L,N,PE)	4 ~ 6 mm <sup>2</sup>	-
PV1 / PV2 (+,-)	4 ~ 6 mm <sup>2</sup>	600 V.dc / 25 A
BAT (+,-)	20 ~ 25 mm <sup>2</sup>	60 V.dc/ 100 A

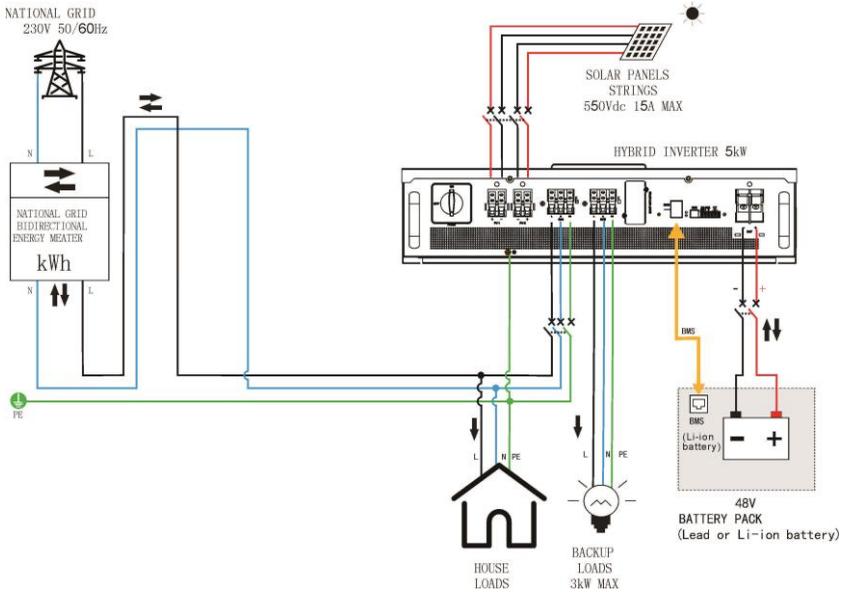
### Note:

The Grid input, AC output, PV input cables should be installed with insulated cord end terminals. Use crimping tool to make the terminal fixed firmly. These terminals should be clamped properly, which will make the system wiring more secure and reliable.

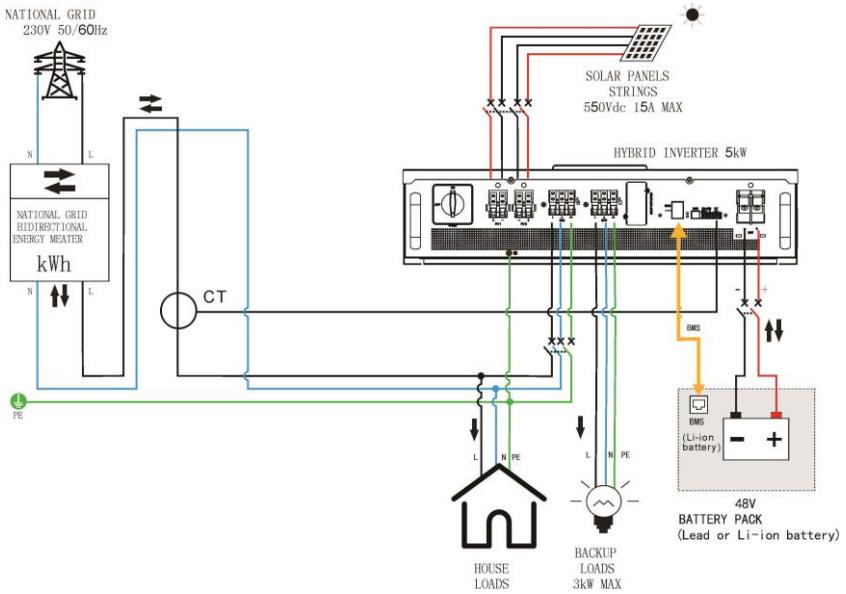


## 5.1 System Connection

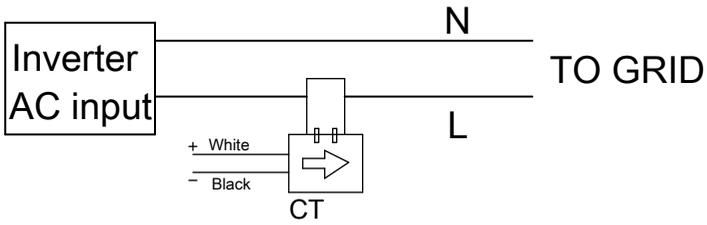
NOTICE	
	<ol style="list-style-type: none"> <li>1. Before the Inverter is installed and used, a special wire with a wire ear (4 to 6 mm<sup>2</sup>) must be used for special protective grounding.</li> <li>2. The output capability of the inverter EPS output port is described as follows:            Inductive load (such as air conditioner, washer, motor etc): Single inductive load power ≤ 1.5 kVA, total Inductive load power ≤ 2 kVA            Capacitive load (such as computer, switch power etc): Total capacitive load power ≤ 2 kVA</li> <li>3. The capabilities described above require the system to be connected to the grid or to a battery with sufficient energy. If the energy is only provided by PV, the maximum single off-grid load is typically less than half of the PV real-time power.</li> </ol>



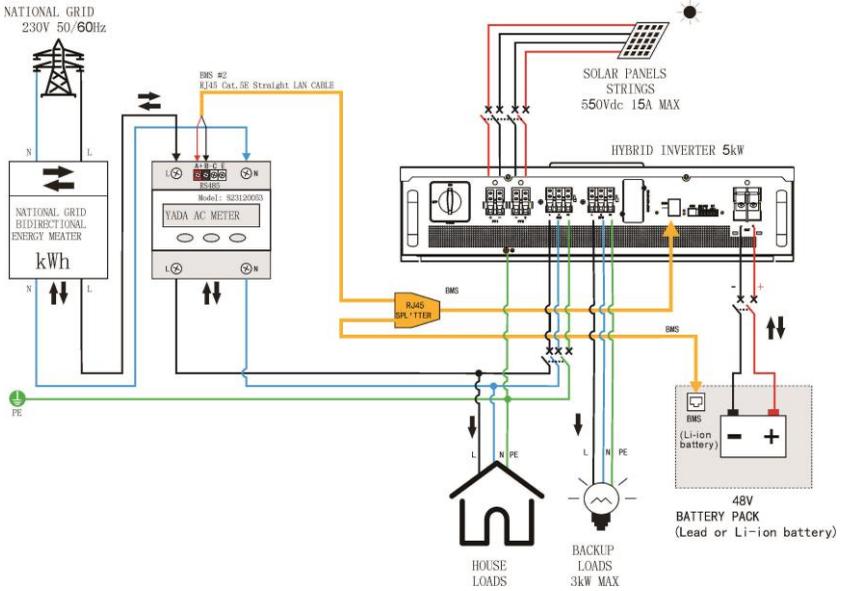
Wiring diagram (standard model)



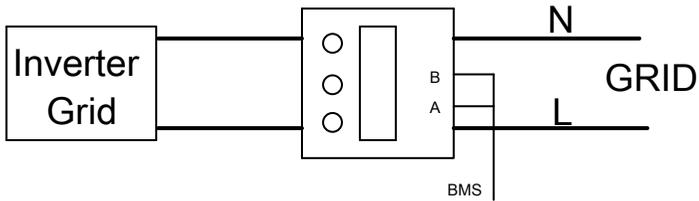
Wiring diagram (CT type)



CT connection



Wiring diagram (Digital meter type)



Meter connection

## 5.2 Connect Utility Grid

### Requirements

1. Install an AC circuit breaker between inverter and power grid before connecting to Grid.
2. The Grid voltage and frequency must be within the permissible range.

### Procedures

1. Ensure that the circuit breaker is disconnected.
2. Strip the insulation layer of L, N and PE by 10 mm.
3. Connect PE protective conductor first, then connect N and L. The recommended colours of the cables connecting each polarity are shown as follows : PE → ground (yellow-green), N→ Neutral wire (black/blue), L→L→Live wire (red/brown).
4. Ensure that all conductors and wires are firmly connected. The reference tightening torque is 1.5 N.m.
5. After connecting the AC cable, place the protective cover and fix it with screws.

	<b>NOTICE</b>
	Ensure the ground wire is properly earthed before operating this hybrid inverter whether the Grid is connected or not, do NOT connect the backup loads to "AC Input Connector", otherwise the inverter cannot provide power supply for load after the power is cut off.

## 5.3 Connect PV

### Requirements

1. All PV modules must be of the same type and have the same tilt angle.
2. The thresholds for the input voltage and the input current of the inverter must be adhered to the requirements of the inverter specification.

### Procedures

1. Disconnect all circuit breakers.
2. Check connection cable of one PV array string for correct polarity. Ensure that the maximum input open circuit voltage does not exceed 550 V (The open circuit voltage of the PV module in lower temperature is higher than in normal temperature, suggest to ensure the voltage does not exceed 500V while operating in normal temperature). The maximum allowable short-circuit current of the connected modules does not exceed 18A.
3. Remove insulation sleeve 10 mm for positive and negative conductors.
4. Check correct polarity of connection cable from PV modules and connect PV+ cable to positive pole (+) of PV input connector. Connect PV- cable to negative pole (-) of PV input connector.
5. Ensure that all conductors and wires are firmly connected. The reference tightening torque is 1.5 N.m.
6. After connecting the PV cable, place the protective cover and fix it with screws.



### **WARNING!**

You can only use monocrystalline silicon and polycrystalline silicon modules due to non-isolated topologies of PV and Grid side of the inverter.

## **5.4 Connect the Battery**

### **Procedures**

1. Check that if the battery polarity and voltage are normal, and detect that if the battery voltage is within the allowable range of the inverter specification.
2. There are battery cable connection terminals attached with the packing. Strip the insulation layer of the battery cable by 5 mm, put the cable in the terminal line hole through the mounting hole of protective cover, and press it firmly with a crimping plier. Insulate the terminal tail with insulation tape or thermoplastic tube. Pay attention to do the insulation treatment, otherwise it may cause battery short-circuit during installation.
3. Through the terminal of the battery cable, connect the positive side of the battery connection cable to the positive side of the battery; the negative side of the battery connection cable to the negative side of the battery.
4. Ensure that all conductors and wires are firmly connected. The reference tightening torque is 2.5 N.m.
5. After connecting the battery cable, place the protective cover and fix it with screws.



### **NOTICE**

1. Before connecting the lead-acid battery, install a DC circuit breaker between the inverter and the battery. When using a lithium battery, the lithium battery can be turned off first.
2. When using the battery to connect the inverter for the first time, you should check the default battery type of the inverter, as well as important parameters such as charging voltage, charging current and discharge cut-off voltage. These can affect the life of the battery.

## **5.5 Connect the Load**

### **Procedures**

1. Disconnect the circuit breaker between the inverter and load.
2. Strip the insulation layer of L, N and PE by 10 mm.
3. Connect PE protective conductor first, then connect N and L to the load terminal. The

recommended colours of the cables connecting each polarity are shown as follows : PE → ground (yellow-green), N→Neutral wire (black/blue), L→Live wire (red/brown).

PE→Ground (yellow-green), N→Neutral wire (black/blue), L→Live wire (red/brown)

4. Ensure that all conductors and wires are firmly connected. The reference tightening torque is 1.5 N.m.
5. After connecting the load cable, place the protective cover and fix it with screws.

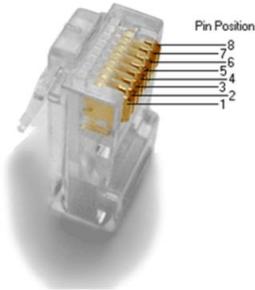
	<b>WARNING!</b>
	As long as the inverter is working, the load output has electricity, do not touch the load output and its connection cables.

## 5.6 Communications

The inverter is equipped with RS485, BMS and USB ports and it is also equipped with a slot for SNMP card communication interfaces (optional) in order to communicate with a PC with corresponding software.

### Note:

1. If use BMS and electricity meter at the same time, please set BMS to add 1 (EAST ) or BMS to add 2 (Pylontech).
2. If the BMS cannot communicate, please change the BMS address (1-8) .At the same time, check whether it is consistent with the address of the battery module (generally, the lithium battery module has a dial switch to set the communication address).

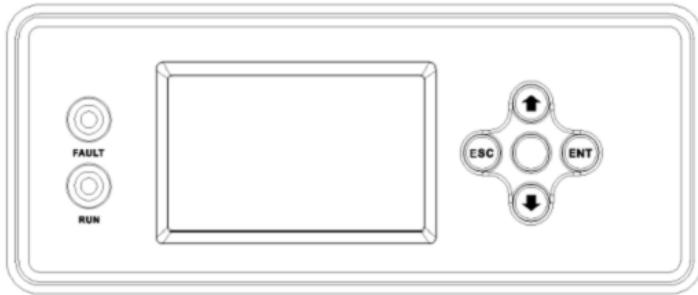
<p><b>RJ45 connector</b></p> 	<p>Pin1 : Reserved</p> <p>Pin2 : Reserved</p> <p>Pin3 : Reserved</p> <p>Pin4 : RS485 B- (T/R-)</p> <p>Pin5 : RS485 A+ (T/R+)</p> <p>Pin6 : Reserved</p> <p>Pin7 : Reserved</p> <p>Pin8 : Reserved</p>
<p>For BMS connector (A matching protocol is required for normal communication. For specific agreements, please apply to the agent).</p>	

## 6 Operation

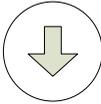
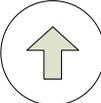
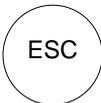
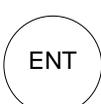
Before performing normal use, please ensure that the switch of the battery and the grid is disconnected. Only turn on the PV or grid switch. After power-on, enter the “Main Menu” and “Power On/Off” to manually shut down the inverter, and then enter “System Settings”. Advanced settings”, set grid parameters and battery parameters. After making the necessary settings, power off and restart. Inverter will start automatically when the PV panels or the battery have enough energy.

### 6.1 Control Panel

The display is operated by four buttons.



### 6.2 Button Description

Symbol	Description	
	Down	Press and hold for 0.5 s to select menu or number
	Up	Press and hold for 0.5 s to select menu or number
	Escape button	Press this button to go back, press this button in main interface to mute audible alarm.
	Enter button	Press this button to confirm the operation



This is the default interface, and the LCD will automatically skip to this interface when the system starts up successfully or not operate the buttons for a period of time.

Press “↑, ↓” buttons to select , , ,  icon, press “ENT” to view the relevant information via “grid, battery, output, PV”.

(Note: the new version add the SOC setting, but it effective only with BMS.)

BATTERY INFO.	ADVANCED SET	P4/4
VOLTAGE (V) : 45.6	 SOC Up Limit : 50	%
CURRENT (A) : 0.0	SOC Low Limit: 5	%
SRATUS : NONE		
SOC (%) : 23		

### 6.5 System Information Inquiry

MENU
 RUNNING INFO.
HISTORY RECORD
POWER ON / OFF
SYSTEM SET
PRODUCT INFO.

In the standby interface, press “ENT” button to enter the main menu.

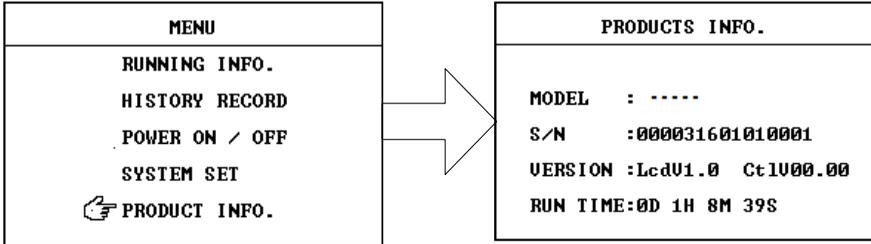
The “RUNNING INFO.” shows the running conditions such as grid power, load power, as below.

Display	Description
GRID POWER (W)	Grid input power “+” indicates feeding power back into the Grid; “-” indicates getting power from the grid
LOAD POWER (W)	System present load power
PV E. DAILY (KWH)	PV Daily generated power
PV E. TOTAL (KWH)	PV Total generated power
SYS TEMP (°C)	Internal temperature
SYS WARNING	Fault and alarm records

**Note:** GRID POWER indicates the input and output power from the inverter grid port. LOAD POWER indicates power of backup load.

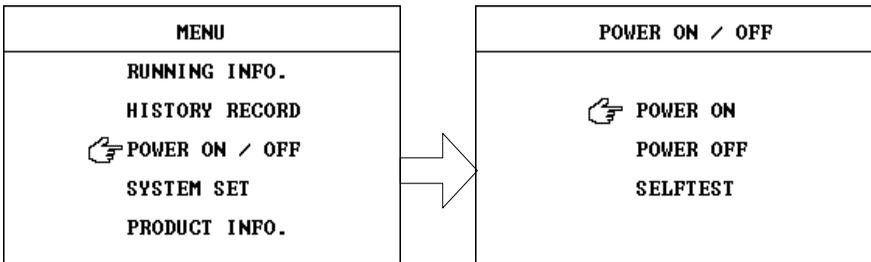
## 6.6 Factory Information Inquiry

Enter "Main Menu" → "PRODUCT INFO", product information is as follows.



## 6.7 Switching On and Off

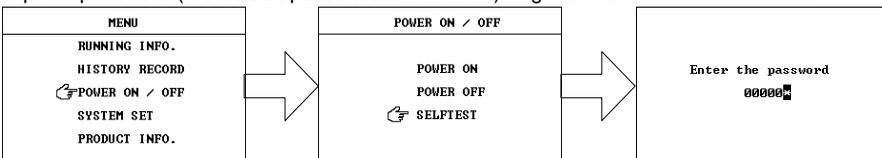
In the Main Menu, you can select the "Power On/Off" item to operate.

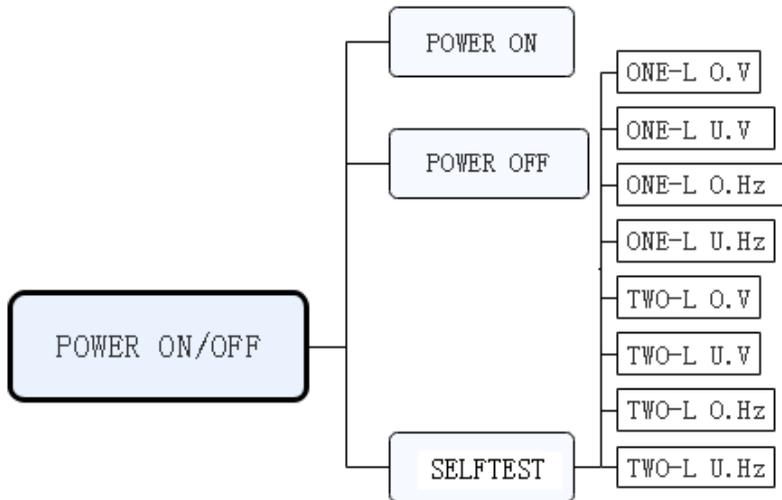


**Note:** In normal condition, the system will perform startup and shutdown according to the AC input and battery status.

## 6.8 Self-Test

It requires password (the default password is "000000") to get into the self-test interface.





Press "ENT" to start the selection, use "↑, ↓" to select the parameter for self-test, press "ENT" to confirm your selection. The self-test function allows you to test the following items: "One-Level Under Voltage", "One-Level Over Frequency", "One-Level Under Frequency", "Two-Level Over Voltage", "Two-Level Under Voltage", "Two-Level Over Frequency", "Two-Level under frequency".

During the test, the threshold of selected parameter changed with a ramp ratio  $\leq 0.05$  Hz/s or  $0.05$  Vn/s to the rated value until the coincidence between the threshold and current measured value. After that, the inverter sends a tripping signal to the tripping device according to the setting. A report will be displayed on the screen as the self-test is finished. The parameters of the report are listed below:

- Threshold setting value: The value set in the SPI
- Threshold setting trip time: The trip time set in the SPI
- Threshold self-test value: Threshold when the threshold is consistent with the current measurement
- Threshold self-test trip time: The time from the coincidence between the threshold and current to the trip signal of disconnection switch
- Current measured voltage or frequency value: The threshold value and the current measured value is corresponding to the measured value of the grid voltage or frequency

If the self-test is not successful, the inverter will automatically disconnect from the grid. The results of the test pass meet the following tolerances:

Voltage threshold  $\leq 1\%$

$\pm 20$  mHz for frequency thresholds

Trip time  $\leq 3\% \pm 20$  ms

**Note:**

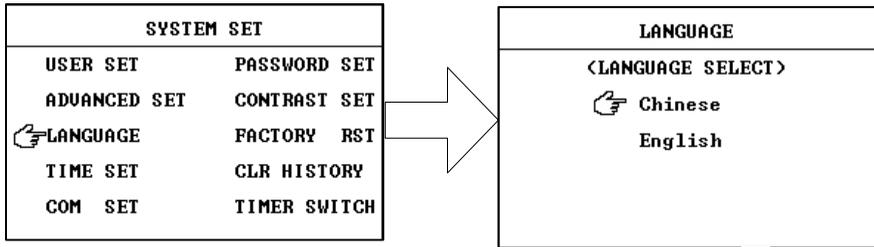
- The self-test function can be run only when the grid is connected and the inverter is turned on.
- It will be turned off automatically after self test, which is normal. It will be turned on automatically a few minutes after recovering from a failure.
- Do not perform other operations during the self-test.
- There may not be self-test function for the versions in some countries.

## 7 Settings

In the “Main Menu”, get into “SYSTEM SET” for more setting.

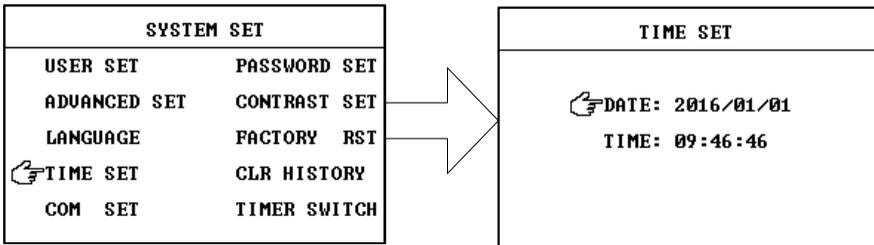
### 7.1 Language

Enter “Main Menu ”-> “SYSTEM SET” → ”LANGUAGE” to select the language (Chinese & English) .



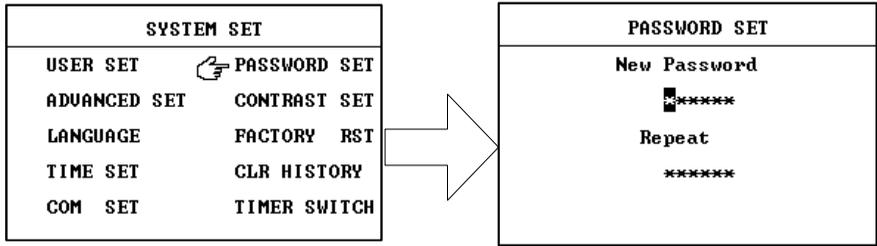
### 7.2 Time Settings

Enter “Main Menu ”-> “SYSTEM SET” → “TIME SET” to set time and date



### 7.3 Password Settings

Enter “Main Menu ”-> “SYSTEM SET” → “PASSWORD SET” to set a new password



## 7.4 Advanced Settings

After installing, it needs to make the necessary project settings.

Enter “Main Menu ”→ “SYSTEM SET” → “ADVANCED SET” with advanced password to perform advanced setting.

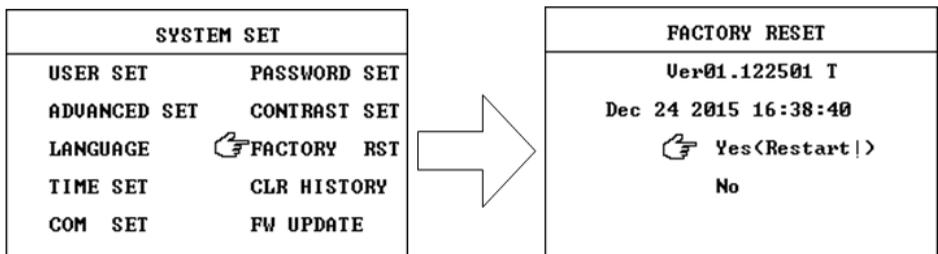
Setting Item	Explanation
“RUN MODE SET”	Run mode: “GRID-TIED”: Allow the energy output to the grid. “Anti-reflux”: The energy output to the grid is prohibited.
“RATED VOLT ”	208V/220V/230V/240V , Rated output voltage of EPS without power grid.
“RATED FREQ ”	50Hz/60Hz ,Rated output frequency of EPS without power grid
Battery parameters	<p>BATT TYPE SET: lithium battery, or Lead acid battery (default) (supports deep circulation charge and discharge)</p> <p>Default parameters of lead-acid battery (Please adjust the parameters according to the actual battery):            Rated voltage: 48 V; BAT CHG CURR: Battery charging current, 20 A (default), 10 A ~ 50 A (settable)            EQUAL VOLT: equalizing charge voltage 56 V;            FLOAT VOLT: floating charge voltage 54 V;            DOD: depth of discharge 45 V;            EOD: end of discharge 42 V;</p> <p>When the external battery uses the BMS function, the parameters such as the battery discharge depth are set by the SOC.</p> <p>SOC up limit: refers to the minimum remaining capacity required for the battery discharge to stop discharging due to exceeding the set discharge depth, and then can be discharged again. This value can be set from 50% to 80%.</p> <p>SOC Low limit: refers to the maximum depth that allows the battery to discharge. When the remaining capacity of the</p>

	<p>battery is lower than this value, the battery is not allowed to re-discharge. This value can be set in the range of 5%~30%.</p> <p>Default parameters of lithium battery (Please adjust the parameters according to the actual battery) :</p> <p>Rated voltage: 51.2 V; BAT CHG CURR: Battery charging current, 20 A (default), 10 A ~ 50 A (settable)</p> <p>EQUAL VOLT: equalizing charge voltage 58.5 V;</p> <p>FLOAT VOLT: floating charge voltage 57 V;</p> <p>DOD: depth of discharge 45 V;EOD: end of discharge 42 V;</p>
PV CONNECT	<p>INDEPEND: Ports of PV1 and PV2 are respectively connected to different solar panels (default).</p> <p>PARALLEL: Ports of PV1 and PV2 are connected to the same solar panel.</p>
METER-CT	<p>NULL: CT or electricity meter are not used.</p> <p>CT: Connect and use an external CT.</p> <p>METER: Connect and use a digital meter.</p>

	<b>WARNING!</b>
	<ul style="list-style-type: none"> <li>➤ After the advanced settings is completed, the inverter must be powered off and restarted, or the invert will not operate according to the settings.</li> <li>➤ Improper setting can result in violation of local electrical regulations. It may cause faults of inverters and external devices, and may also affect the normal service life of batteries.</li> <li>➤ If it needs adjustment, it must be authorized by a qualified technician or contact your local dealer.</li> </ul>

## 7.5 Factory Reset

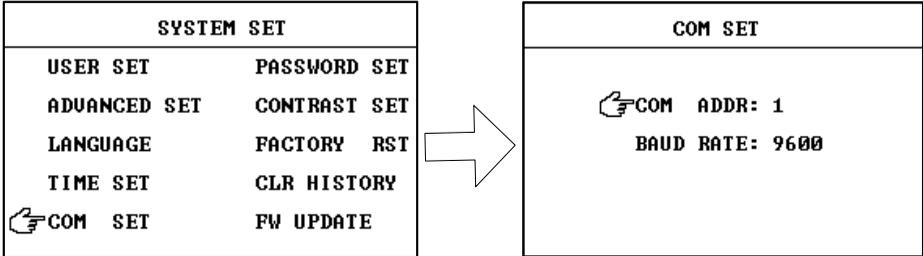
This interface is for user to restore factory settings. After restoring factory settings is complete, all parameters except the current date and time will restore the default factory settings. However, the operating information, alarm records and system logs will not be cleared or modified. Enter "Main Menu" → "SYSTEM SET" → "FACTORY RESET" to reset parameters.



	<b>WARNING!</b>
	<ul style="list-style-type: none"> <li>➤ After completing factory reset settings, the inverter must be powered off and restarted, otherwise may result in abnormality of the inverter.</li> <li>➤ If it is not necessary, do not perform this setting rashly. If necessary, contact the technical staff.</li> </ul>

## 7.6 Communication Settings

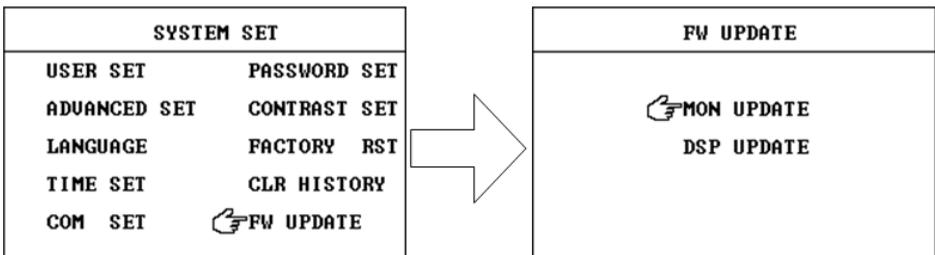
Enter "Main Menu " → "SYSTEM SET" → "COM SET" to perform communication setting.



	<b>WARNING!</b>
	<p>Incorrect settings will result in the abnormality of device communication and monitoring. This setting must be performed by qualified technicians. The default should be set to 2400.</p>

## 7.7 FW Update

Enter "Main Menu " → "SYSTEM SET" → "FW UPDATE" to perform a update, select "MUN UPDATE" for monitoring board, select "DSP UPDATE" for control board.



**Note:** The firmware upgrade port is inside the inverter and needs to be disassembled for operation.

## 8 Work Mode

<b>Grid-Tied Mode</b>	
E GEN.PRIO I	PV energy priority for load, excess energy is delivered to the Grid, what finally remaining is used to charge the battery.
	when PV energy isn't sufficient, the insufficient part is supplemented by the battery. the energy priority for load, Other to the Grid.
	The Grid does not provide energy to the battery.
E SAV.PRIO I	PV energy priority for charging the battery, excess energy is used to load, what finally remaining is delivered to the Grid.
	When PV energy isn't sufficient for load, the insufficient part is supplemented by the Grid.
	When PV energy isn't sufficient for charging, the insufficient part is supplemented by the Grid, load are powered by the Grid.
AC CHA.OFF I	PV energy priority for charging the battery, excess energy is used to load, what finally remaining is delivered to the Grid.
	When PV energy isn't sufficient for load, the insufficient part is supplemented by the Grid.
	When PV energy isn't sufficient for charging, the GRID powers the load, but it does not supplement charge
<b>Anti-Reflux Mode</b>	
E GEN.PRIOII	PV energy priority for load, excess energy is used to charge the battery, no energy to the Grid.
	When PV energy isn't sufficient, the insufficient part is supplemented by the battery. no energy to the Grid.
	The Grid does not provide energy to the battery.
E SAV.PRIOII	PV energy priority for the battery, excess energy is for loads, no energy to the Grid.
	When PV energy isn't sufficient for load , the insufficient part is supplemented by the Grid.
	When PV energy isn't sufficient for charging, the insufficient part is supplemented by the Grid, load are powered by the Grid.
AC CHA.OFF II	PV energy priority for the battery, excess energy is for loads. no energy to the Grid.
	When PV energy isn't sufficient for load, the insufficient part is supplemented by the Grid.
	When PV energy isn't sufficient for charging, the GRID powers the load, but it does not supplement charge
<b>Bypass Mode</b>	
---	When PV and battery are disconnected, the Grid directly supply power to the load by the relay
<b>Off Grid Mode (No Grid)</b>	
---	PV energy priority for load, excess energy is used to charge the battery.
	when PV energy isn't sufficient, the insufficient part is supplemented by the battery.

**Note:**

1. The Operating status of inverter will be adjusted automatically according to the state of the power grid, PV and the battery. However, you need to manually set the working mode (grid or backflow mode).
2. When the battery and the grid supply at the same time, if the battery voltage is lower than the DOD, the battery will stop discharging and the load will be powered by the grid. The discharge capacity will not be re-enabled until the PV charges the battery to the “equal charge” status (the battery charge voltage reaches EQUAL VOLT).when the grid disappears, If the battery voltage is lower than the DOD but higher than the EOD, the battery discharge will be re-enabled to ensure the backup load is running.
3. Off-Grid Mode: The battery voltage below DOD will warn “BATT UNDER VOLT” in the discharge. The battery voltage below EOD, inverter will shut down discharge function. At this time, the PV access inverter will enter the mandatory charging mode. In this mode, the inverter will only charge the battery until the equalizer charge, and the inverter will return to normal working mode. During the mandatory charging mode, Grid access will end the mandatory charging and re-discharge capacity.
4. “Grid-Tied” means the energy transfer from the “AC input” interface of the inverter.
5. The “ANTI- TIED” of the standard model uses AC INPUT interface as the demarcation point of selling & buying electricity; the inverter with digital meter or CT uses digital meter or CT as the demarcation point of selling & buying electricity.

## 9 Maintenance

### 9.1 Preventive Maintenance

To ensure the reliability and long service for the inverter system, do following checking each month:

- Shut down the inverter, disconnect the switches on input and output sides;
- Ensure that the ventilation holes are not blocked;
- Check if there is too much dust on the cover;
- Ensure the products are not damp;
- Close the switches on input and output sides and turn on the inverter.

### 9.2 Battery Maintenance

	<b>WARNING!</b>
	Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions.

	<b>WARNING!</b>
	<ul style="list-style-type: none"> <li>➤ A battery can present a risk of electrical shock and high short-circuit current.</li> <li>➤ Do not dispose of batteries in a fire. The batteries may explode.</li> <li>➤ Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes, and may be toxic.</li> </ul>

### Battery safety

- Before installing or replacing the batteries, remove all jewelry from hands such as wristwatches and rings. High short circuit current through conductive materials could cause severe burns.
- Wear safety goggles and plastic gloves.
- Work away from open flames and no smoking, hydrogen gas.
- Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground.

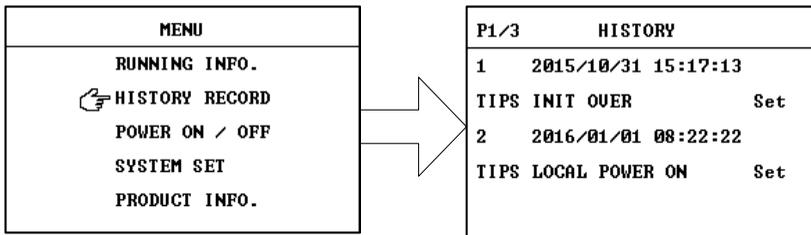
Environmental factors affect battery life. Elevated ambient temperatures, poor quality utility power, and frequent short duration discharges will shorten battery life. Battery maintenance is an important issue. Follow the simple check below every month:

- The battery should be clean. Clean terminals and connectors as necessary.
- Cable connection needs to be clean and tightened.
- Don't mix size and types of batteries. Be sure to replace the correct same type of battery.

## 10 Troubleshooting

### 10.1 History Records

In the Main Menu, press “↓, ↑” to select “HISTORY RECORD” and view historical record; press “ESC” to return to main menu interface.



P1/3: P1 is the current number of pages, 3 refers to the total page number of historical records; 1 refers to the first historical record, 2015/10/31 means the date that history occurred. 15: 17: 13 refers to a specific time that history occurred.

### 10.2 Clear History Records

In the “SYSTEM SET” interface, select “Clear history record”, press “ENT.” and enter the correct

password to enter “Clear history” interface, use the “↓, ↑”to select “YES” or “NO”; press “ESC” to return to system setting interface.



### 10.3 Fault List

The users can remove faults and take the corresponding measures according to the fault prompts of the inverter. The inverter mainly has the following three kinds of common faults:

**Major:** LCD displays the current specific faults, red LED indicator keeps on, green LED indicator is off, buzzer begins to emit an alarm, it will be automatically muted after the fault disappears, and it can be muted manually. The inverter is turned off, and it will automatically restart after the fault is disappeared.

**Minor:** LCD displays the current specific faults, red LED indicator flashes, green LED indicator is off, and the buzzer is mute. The inverter can be operated and the corresponding alarm will disappear after the fault disappears.

**Warning:** LCD displays the current specific faults, red LED indicator is off, green LED indicator keeps on, and the buzzer is mute. The inverter operates normally.

Common alarm information and solutions:

Problem	Possible Cause	Corrective Action
NO BATT	1.The battery is not connected properly. 2.Battery fuse blown.	If batteries are connected: 1. Check if battery cable is connected firmly. 2. If error message remains, please contact your installer.
NO PV	1.PV connection is not correct. 2.PV voltage is too low.	If PV are connected: 1. Check if PV cable is connected firmly. 2. If error message remains, please contact your installer.
BATT UNDER VOLT	1.Battery voltage is abnormal. 2.The battery is fully discharged.	1. Check if the connection between battery and inverter and the battery voltage is normally. 2. The battery line is too thin. 3. Restart the inverter, if error message remains, please contact your installer.
BATT OVER VOLT		
NO GRID	1.The grid is not connected properly. 2.Mains fuse blown.	If Grid are connected: 1. Check if Grid cable is connected firmly. 2. If error message remains, please contact your installer.
PV SHORTAGE	The PV power is too low to initiate the inverter.	The inverter detects its external working conditions in real time, and therefore the inverter automatically recovers to the normal operating status after PV power reach enough to initiate the inverter.

PV OVER VOLT	Photovoltaic open circuit voltage is too high.	Check whether the large number of PV modules connected in series make the open circuit voltage of the PV arrays greater than the maximum input voltage of the inverter. If yes, adjust the number of PV arrays connected in series to decrease the output voltage of PV arrays to meet the voltage requirements for the inverter. If no, contact your installer. After the adjustment, ensure that the inverter works properly.
PV REVERSE	The cables between PV arrays are connected reversely during inverter installation.	Check whether the cables between PV arrays and the inverter are connected reversely. If they are connected reversely, reconnect the cables properly.
BUS UNDER VOLT	The inverter input is suddenly disconnected, or the PV array to be obstructed result in a sharp change in output power.	<ol style="list-style-type: none"> <li>1. The inverter detects its external working conditions in real time, and therefore the inverter automatically recovers to the normal operating status after the fault is rectified.</li> <li>2. If the alarm occurs repeatedly, contact your installer.</li> </ol>
BUS OVER VOLT	The sharp change of Grid voltage cause inverter input energy short period of time can't be vented so that the internal voltage increases.	<ol style="list-style-type: none"> <li>1. The inverter detects its external working conditions in real time, and therefore the inverter automatically recovers to the normal operating status after the fault is rectified.</li> <li>2. If the alarm occurs repeatedly, contact your installer.</li> </ol>
INV OVER VOLT	The output voltage of the inverter is beyond the acceptable range.	<ol style="list-style-type: none"> <li>1. The inverter detects its external working conditions in real time, and therefore the inverter automatically recovers to the normal operating status after the fault is rectified.</li> <li>2. If the alarm occurs repeatedly, contact your installer.</li> </ol>
INV UNDER VOLT		
ISLAND	Islanding condition is detected.	<ol style="list-style-type: none"> <li>1. Check whether AC circuit breaker is triggered and whether AC cables are all firmly connected.</li> <li>2. Check whether Grid is not in service.</li> <li>3. If all conditions are OK and this fault sill occurs in the LCD screen, contact your installer.</li> </ol>
GRID OVER VOLT	The inverter will turn to Off-Grid mode, the inverter automatically recovers to the normal operating status after the fault is rectified.	<ol style="list-style-type: none"> <li>1. Check the voltage or frequency of the Grid.</li> <li>2. If the Grid voltage or frequency exceeds the permissible range of inverter protection parameters, ask utility Grid company for solution.</li> <li>3. If the Grid voltage or frequency is within the permissible range, contact your installer.</li> </ol>
GRID UNDER VOLT		
GRID OVER FREQ		
GRID UNDER FREQ		
BUS HARD OVER VOLT	Abnormal external conditions trigger the protection for the DC circuit inside the inverter.	<ol style="list-style-type: none"> <li>1. The inverter detects its external working conditions in real time, and therefore the inverter automatically recovers to the normal operating status after the fault is rectified.</li> </ol>
BUS UNDER VOLT		
BUS OVER VOLT		

		2. If the alarm occurs repeatedly, contact your installer.
GRID DC OVER CURR	The DC component of AC current exceeds inverter limit.	1. Wait a moment for inverter recovery. 2. If the fault occurs repeatedly, contact your installer.
INV DC OVER CURR		
BATT OVER CURR	Inappropriate battery specifications are used.	1. Check whether battery voltage exceeds the permissible range of inverter. 2. If the fault occurs repeatedly, contact your installer.
BATT CHG HARD OVER CURR		
DISCHG HARD OVER CURR		
GRID RELAY FAULT	Relay fault is detected.	1. Power off and restart the inverter. 2. If the fault occurs repeatedly, contact your installer.
INV RELAY FAULT		
LOAD RELAY FAULT		
BUS SOFT START FAIL	1. Bust voltage soft-start is time-out. 2. Battery capacity is too low.	1. Wait a moment for inverter recovery. 2. Charge the battery. 3. If the error message still remains, please contact your installer.
INV SOFT START FAIL	Battery Inverter output soft-start is time-out.	
INV LOCK PHASE FAULT	Phase Locked Loop fault.	1. Turn off the inverter. 2. Then restart the inverter. 3. If the error message still remains, please contact your installer.
EEPROM ERROR	EEPROM fault is detected.	1. Turn off the inverter. 2. Then restart the inverter. 3. If the error message still remains, please contact your installer.
BOOST1 HARD OVER CURR	Boost1 over current is detected.	1. Wait a moment for inverter recovery. 2. If the fault occurs repeatedly, contact your installer.
BOOST1 SOFT OVER CURR		
LEAKAGE CURRENT	The insulation resistance against the ground at the input side becomes lower in operating mode, which causes excessively high residual current.	1. If the fault occurs accidentally, the possible cause is that the external circuits are abnormal accidentally. The inverter automatically recovers to the normal operating status after the fault is rectified. 2. If the fault occurs repeatedly and lasts a long time, check the insulation resistance against the ground of PV arrays is excessively low.
INV GND OVER CURR		
ISO RES FAULT	The insulation resistance against the ground for PV arrays is less than the minimum value. The possible causes are as follows:	1. Check the insulation resistance against the ground for the outputs of PV arrays. If a short circuit occurs, rectify the fault. 2. If the insulation resistance against the ground is less than the default value in a rainy environment, set the insulation resistance

	<ol style="list-style-type: none"> <li>1. The ground cable for the PV arrays is short-circuited.</li> <li>2. PV arrays are installed in a long-term moist environment.</li> </ol>	threshold.
Fan fault	Fan Device Fault.	<ol style="list-style-type: none"> <li>1. Please check if fans are running ok.</li> <li>2. If fans are running ok, please shut down inverter first and then, restart it.</li> <li>3. If fans are stop running or error message remains after restart the inverter, please contact your installer.</li> </ol>
DSP SOURCE FAULT	DSP board power low.	<ol style="list-style-type: none"> <li>1. Turn off the inverter.</li> <li>2. Then restart the inverter.</li> <li>3. If the error message still remains, please contact your installer.</li> </ol>
GF OUT SHORT CIRCUIT	Load output short circuit.	<ol style="list-style-type: none"> <li>1. Turn off the inverter and disconnect all circuit breakers.</li> <li>2. Check if load output circuit is ok. After removing the error, turn on breaker and the inverter.</li> <li>3. If error message remains, please contact your installer.</li> </ol>
GRID LOAD REVERSE	Reverse connection of AC input and load output wires.	<ol style="list-style-type: none"> <li>1. Turn off the inverter and disconnect all circuit breakers.</li> <li>2. Check if AC input wires (Grid wires) are connected to load output terminals. If mis-connected, re-connect it correctly. And turn on circuit breakers and the inverter again.</li> <li>3. If error message still remains, please contact your installer.</li> </ol>
SOFT VER ABNORMA	Version Mismatch.	<ol style="list-style-type: none"> <li>1. Shut down the inverter completely.</li> <li>2. Restart the inverter to see if it's ok.</li> <li>3. If error message still remains, please contact your installer.</li> </ol>
ON GRID OVER LOAD 110%	Overload fault.	<ol style="list-style-type: none"> <li>1. Remove excessive loads. Be sure that total connected loads are less than maximum power consumption this inverter can support.</li> <li>2. Then, restart the inverter.</li> </ol>
ON GRID OVER LOAD 125%		
ON GRID OVER LOAD 150%		
ON GRID OVER LOAD 170%		
RADIATOR OVER TEMP	<ol style="list-style-type: none"> <li>1. The inverter installation location is not well ventilated.</li> <li>2. The environment temperature is too</li> </ol>	Check whether the operating temperature of the inverter exceeds the upper limit. If yes, improve ventilation to decrease the temperature.

	high. 3. The internal fan is not working.	
TIPS UPPER COM FAIL	1. The communication address and baud rate are set incorrectly. 2. The communication cable is loose.	1. Check the communication address and baud rate setting (try to change baud rate to 2400). 2. Check if the communication cable is loose. 3. If error message still remains, please contact your technical staff.
TIPS DSP COM FAIL		
BATT REVERSE	The cables between battery and inverter are connected reversely during the inverter installation.	Disconnect all circuit breakers, check whether the cables between battery are connected reversely. If they are connected reversely, reconnect the cables properly. Contact your installer to check if there is anything damaged.
GRID SHORT CIRCUIT	The inverter AC input cable short-circuit.	1. Check whether the inverter AC input cable is short circuit. 2. If the alarm occurs repeatedly, contact your installer.
INV HARD OVER CURR	Inverter output current is too high.	1. Remove excessive loads. 2. Restart the inverter.
INV SOFT OVER CURR		

## 11 Appendix

### 11.1 Terminology paraphrase

(Note: the appendix2 just paraphrase for the terminology that unfamiliar, EAxKHD, the x can be 3,3.6 or 5)

<b>ANTI-TIED</b>	It means that the inverter power is prohibited from flowing into the grid, but the grid energy can flow into the inverter, usually using an electric meter or CT as the boundary between the inverter and the grid.
<b>GRID-TIED</b>	Refers to allowing the inverter to send electrical energy to the grid
E GEN.PRIO	It mains inverter supplies power to the load firstly, and charge for the battery secondly .view chapter 8 for details.
E SAV.PRIO	It mains inverter charge for the battery firstly, and supplies power to the load secondly .view chapter 8 for details.
AC CHA.	Refers to allowing the inverter get electric energy from the Grid to charge for the battery.
TIMER.SWITCH	The timer switch says you can set the inverter that which mode to run at a certain period of time.

SOC	State of charge, The state of charge of the battery, also known as the remaining capacity, refers to the ratio of the current available charge of the battery to the charge at full charge, expressed as a percentage, ranging from 0% to 100%.
SOC up limit	refers to the minimum remaining capacity required for the battery discharge to stop discharging due to exceeding the set discharge depth, and then can be discharged again
SOC Low limit	Refers to the maximum depth that allows the battery to discharge. When the remaining capacity of the battery is lower than this value, the battery is not allowed to re-charge.
BMS	Battery manage system
EOD	End of discharge, In the photovoltaic energy storage products of this series, it refers to the voltage point or SOC point that prohibits the battery from discharging. If the battery voltage is lower than this value or the SOC is lower than the lower limit, the inverter will report the "battery under voltage" warning and prohibit the battery from discharging.
DOD	Depth of charge. the voltage of the battery discharge depth, It is a way to show the depth of battery discharge, another way is the SOC
equalizing charge	Refers to the constant current charging phase, in which the charging voltage will gradually increase until the average charging voltage is reached.
EQUAL VOLT	Refers to the target voltage value achieved by constant current charging, which is configurable within the established range.
floating charge	Refers to the constant voltage charging phase, in which the charging current is gradually reduced, maintaining the battery voltage at the set float voltage value.
FLOAT VOLT	Refers to the voltage value of constant voltage charging. This value can be set within the specified range.
House Load	Refers to the load connected between the "AC input " port of the inverter and the CT/meter accessory. The power of this load is not limited by the inverter (refer to 5.1. System Connection Diagram)
Back Load	Refers to the load connected to the inverter's Load port. When Hybrid invertore off-grid operation, The power of this load is limited by the inverter's load capacity.
EPS	Emergency Power Supply. In Hybrid Inverter series, the silk-screen of the off-grid output port may be "load output" or "EPS". Here, they have the same meaning. they all refer to the "off-grid load" port.

## 11.2 Running mode (Products series)

Running mode	Hybrid Inverter Mode				
	3KW	3.6KW (Meter Type)	5KW (Meter Type)	3.6KW (CT Type)	5KW (CT Type)
GRID-TIED	Y	Y	Y	Y	Y
ANTI-TIED	Y	Y	Y	Y	Y
E SAV.PROI	Y	N	N	N	N
AC CHA	Y	N	N	N	N
TIMING FUN	Y	N	N	N	N

Note: Y-it has this running mode    N-it doesn't have this running mode