

Hybrid Inverter

G5000

USER MANUAL



Document version

V.1.03(202203)

Purpose

The purpose of this manual is to provide details about the configuration, operation, maintenance, and troubleshooting for the hybrid inverter G5000.

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1. Precaution

1.1 Important Notice

This manual contains important instructions for the hybrid storage inverter. It describes the assembly, installation, commissioning, maintenance and fault diagnosis of the product. Please read it carefully before operating. Store this manual where it will be accessible at all times.

This manual is only for G5000 products, including the devices below:

G5000 Hybrid inverter A PV inverter with battery storage



- Before performing operations, read through this manual and follow all the precautions to prevent accidents. The "DANGER", "WARNING", "CAUTION", and "NOTICE" statements in this document do not represent all the safety instructions. They are only supplements to the safety instructions.
- Only certified electricians are allowed to install, connect cables, commission, maintain, and troubleshoot these products.

1.2 Personnel Requirements

Only certified electricians are allowed to install, connect cables, commission, maintain, troubleshoot, and replace the inverter.

- Operation personnel should receive professional training.
- Operation personnel should read through this document and follow all the precautions.
- Operation personnel should be familiar with the safety standards relevant to electrical systems.
- Operation personnel must wear proper personal protective equipment (PPE).

1.3 Protective Labels

- Labels on the enclosure contain important information about safe operation. Do not scrawl or damage these labels.
- The nameplate on the enclosure contains important product information. Do not scrawl or damage the nameplate.

1.4 Symbols used



DANGER !

"Danger" indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING !

"Warning" indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION !**

“Caution” indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

**NOTE !**

“Note” provides tips that are valuable for the optional operation our product.

**IMPORTANT SAFETY INSTRUCTIONS**

SAVE THESE INSTRUCTIONS — THIS MANUAL CONTAINS IMPORTANT SAFETY INSTRUCTIONS.

2. Safety Instructions**2.1 Installation****WARNING**

RISK OF ELECTRIC SHOCK FROM STORED ENERGY. WAIT 5 MIN AFTER DISCONNECTING ALL SOURCES OF SUPPLY BEFORE ACCESSING.

- Ensure that the hybrid inverter is not connected to a power supply or powered on before finishing installation or during replacement and maintenance.
- Install where children cannot access.
- Make sure DC input voltage does not exceed the maximum input voltage of the inverter.

2.2 Electrical Connection**WARNING**

THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT SPECIFIED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

**DANGER**

ENSURE THAT THE INVERTER IS SECURED IN POSITION BEFORE CONNECTING CABLES OR IT CAN CAUSE PERSONAL INJURY.

**WARNING**

ALL ELECTRICAL INSTALLATIONS MUST BE CARRIED OUT IN ACCORDANCE WITH THE LOCAL ELECTRICAL STANDARDS AND THE NATIONAL ELECTRICAL CODE ANSI/NFPA 70 OR THE CANADIAN ELECTRICAL CODE CSA C22.1.

**DANGER**

ENSURE THAT THE CABLES USED IN THE SYSTEM ARE PROPERLY CONNECTED AND INSULATED AND MEET ALL SPECIFICATION DANGER REQUIREMENT.

**WARNING**

ENSURE THAT ALL INPUT VOLTAGES OF THE INVERTER IS WITHIN SPECIFICATION, OR IT WILL CAUSE DAMAGE TO THE INVERTER.

2.3 Operation**WARNING**

A BATTERY CAN PRESENT A RISK OF ELECTRICAL SHOCK, BURN FROM HIGH SHORT-CIRCUIT CURRENT, FIRE OR EXPLOSION FROM VENTED GASES. OBSERVE PROPER PRECAUTIONS.

**WARNING**

WHEN REPLACING BATTERIES, USE THE SAME TYPE OF BATTERIES THAT HAVE BEEN RECOMMENDED BY THE MANUFACTURER OF THE INVERTER. PROPER DISPOSAL OF BATTERIES IS REQUIRED. REFER INVERTER IS OPERATING, DO NOT DISCONNECT UNDER LOAD.

**WARNING**

DO NOT TOUCH AN ENERGIZED INVERTER AS THE HEAT SINK WILL GET VERY HOT.

2.4 Maintenance

- When the inverter is operating, do not disconnect under load.
- Do not touch an energized inverter as the heat sink will get very hot.

**WARNING**

OBSERVE ESD PRECAUTIONS AND WEAR ESD GLOVES DURING MAINTENANCE.

**DANGER**

HIGH VOLTAGE MAY CAUSE ELECTRIC SHOCK, WHICH RESULTS IN SERIOUS PROPERTY DAMAGE, SERIOUS INJURY, DEATH, OR SERIOUS PROPERTY DAMAGE PRIOR TO MAINTENANCE. POWER OFF THE INVERTER AND STRICTLY COMPLY WITH THE SAFETY DANGERPRECAUTIONS IN THIS DOCUMENT.

**WARNING**

BEFORE PERFORMING MAINTENANCE TASKS, POWER OFF THE INVERTER AND WAIT AT LEAST 5 MINUTES.

2.5 Battery Safety Instruction

The G5000 inverter should be worked with low voltage batteries. The battery must comply with UL 1973 and must be intrinsically safe.

3. Product Introduction

3.1 Basic Functions

The G5000 is a bi-directional PV inverter with battery storage functions that can convert solar energy to feed the AC grid or store energy into a battery for future use.

Users can select different work modes to achieve different goals like self-consumption, time of use or backup use.

The inverter can also provide power to loads for emergency use by using energy from battery PV arrays.

3.2 Dimension

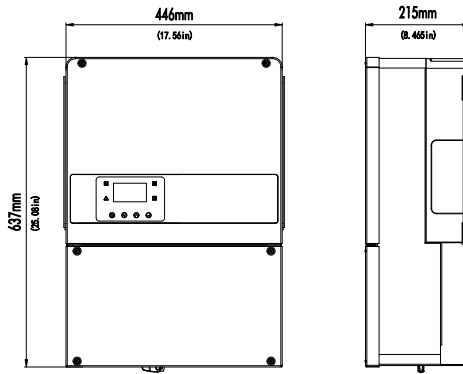


Fig.3-1 Enclose dimension

3.3 Appearance and port

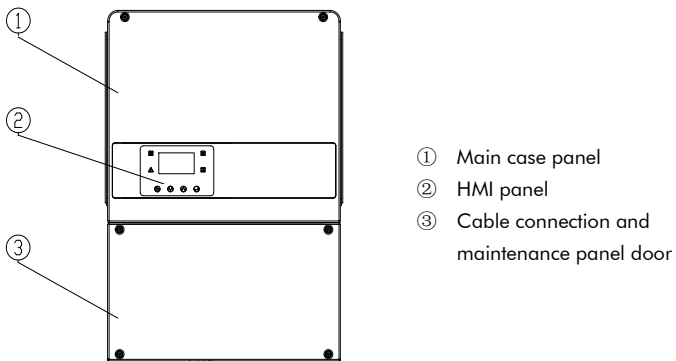


Fig.3-2 Front view

3.4 Symbols description

► Symbols on the Typelabel

Symbol	Explanation
	Danger of hot surface Avoid contacting inverter surface during operation
	Danger of high voltage only certified elec tricians are allowed to operate
	Danger
	Risk of electric shock
	There is residual voltage existing in the inverter after powering off which need 5 min to discharge wait 5 min before opening the case panel of the inverter
	Find more information from uses documents
	CSA certified
	Type 1 Arc-Fault Circuit interrupter in PV side

Fig.3-3 Warning symbol

3.5 Label description

G5000		1
PV Input		
Range of PV Input Operating Voltage (Vdc)	100 - 535V	2
Max. PV Input Current Per MPPT (A dc)	11 A	
Max. PV Input Power Per MPPT (W)	2800W	
No. of MPPT/Strings per MPPT	2/1	
Grid Terminal Parameters		
Nominal AC Output Voltage (Vac)	240 Vac (L-L)	3
Nominal AC Output Frequency (Hz)	60Hz	
Operating Frequency Range (Hz)	59.3Hz - 60.5 Hz	
Max. Continuous AC Output Current (Aac)	22A	
Max. Continuous AC Output Power (VA)	5000VA	
Output Power Factor Rating	>0.99	
Nominal AC Input Voltage (Vac)	240Vac	
Nominal AC Input Frequency (Hz)	60Hz	
Max. Continuous AC Input Current (Aac)	22A	
Backup Terminal Parameters		
Nominal AC Output Voltage (Vac)	240 Vac (L-L)	4
Nominal AC Output Frequency (Hz)	60Hz	
Max. Continuous AC Output Current (Aac)	22A	
Max. Continuous AC Output Power (VA)	5000VA	
Battery Terminal Parameters		
Battery Type	Li-Ion	
Nominal Voltage (Vdc)	48V	5
Range of DC Operating Voltage (Vdc)	42 - 58V	
Max. Charging Current (A dc)	80A	
Max. Discharging Current (A dc)	100A	
Enclosure Type	Type 3R	
Operating Temperature Range	-20°C to 60°C	
SN: <input type="text"/>		6

- 1 Company logo and inverter model name
- 2 PV input parameters
- 3 Grid-tied AC output parameters
- 4 Off-grid AC output parameters
- 5 Battery parameters
- 6 Warning symbols

Fig.3-5 Nameplate of inverter

► Symbols on the Inverter

Symbol	Explanation
	Blinking yellow light indicate that BMS communication well
	Blinking blue light indicate that METER communication well
	Blinking green light: Waiting self-test Steady green light: Normal operation
	Blinking red light indicate inverter fault
	return key
	up forward key
	down forward key
	enter key

Fig.3-4 Inverter HMI symbol

AT5000W		1
Split Phase Auto-transformer		
Input (from converter load terminal)		
Nominal Input Voltage (Vac)	240 Vac (L-L)	
Max. Continuous AC Input Current (L-L) (A)	20.8 A	
Nominal AC Input Frequency (Hz)	60 Hz	
Max. Continuous AC Input Power (L-L) (VA)	5000 VA	
Output (to panelboard backup load)		
Nominal AC Output Voltage (Vac)	120/240 Vac split phase	2
Max. Continuous AC Output Power (VA) Max.	5000 VA	
Max. Continuous AC Output Current (L-N) (A)	20.8 A	
Max. Continuous AC Output Current (L-L) (A)	20.8 A	
Nominal Operation Temperature Range	-20°C to 60°C	
Enclosure Type	Type 3R	
WARNING/CAUTION		3
	This Split Phase Auto-transformer shall only be installed as part of the Manufacturer's Energy Storage System, connected to and protected by Manufacturer's Power Convert System.	
	Hot surface.	
	Risk of electric shock. Do not remove upper front cover. No user serviceable parts inside. Refer servicing to qualified service personnel. Disconnect all sources of supply before servicing.	
AVERTISSEMENT/ATTENTION		
	Cet autotransformateur à phases divisées ne doit être installé que dans le Système Energy Storage du fabricant. Connecté à et protégé par Système de conversion de puissance du fabricant.	
	Surface chaude.	
	Risque d'électrocution. Ne pas enlever le capot avant supérieur. Aucune utilisateur pièce réparable à l'intérieur. Référez le service à personnel de service qualifié. Couper toutes les sources d'alimentation avant de faire l'entretien et les réparations.	

- 1 Company logo and model name
- 2 Auto transformer input and output parameters
- 3 Warning symbols and information

Fig.3-6 Nameplate of auto transformer

4. System Introduction

4.1 System diagram

The G5000 hybrid inverter is used to configure a residential grid-tied system. This system consists of the PV string, grid-tied hybrid inverter, power distribution unit (PDU) and electricity meter. For further information, please refer to Appendix I.

The autotransformer is used only when there is a 120 V load, and the power grid is 240/120 split phase or 240 delta configuration.

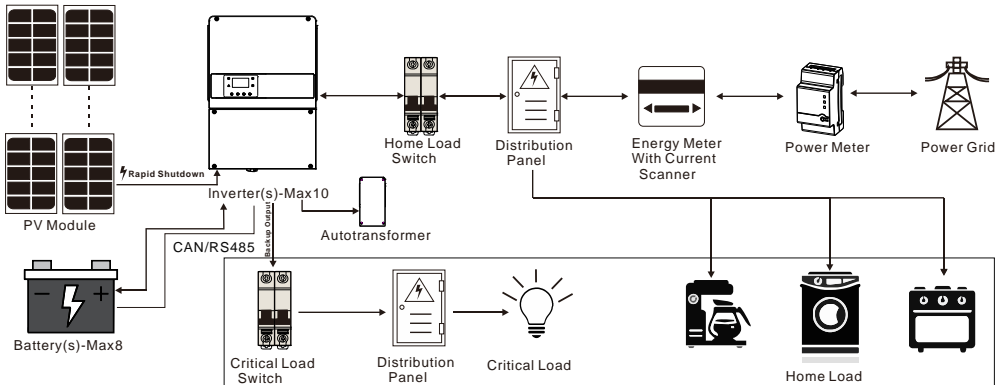
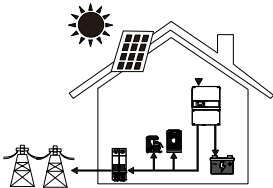


Fig.4-1 Typical system diagram

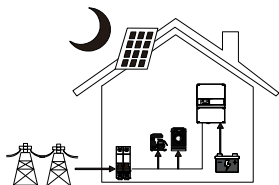
4.2 System work modes



Work modes: Residential (with PV Power)

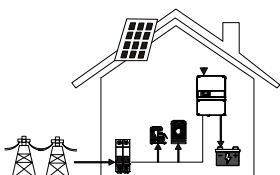
This mode is recommended for users who have lower export grid credit and high energy prices.

The power generated from the PV will be used to supply the local loads first, then charge the battery. The extra power will be exported to the public grid.



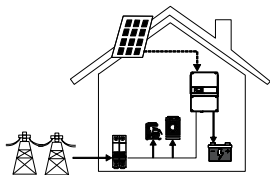
Work modes: Residential (without PV Power)

When no PV is supplied, the battery will supply power for local loads first and the grid will supply power to the loads when the battery capacity is not enough.



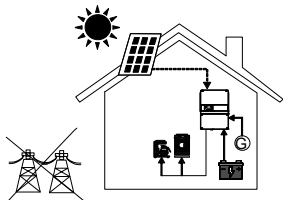
Work modes: Time of Use (TOU)

This mode works best for users who experience large price differences between peak and off-peak times. Users can charge their battery during off-peak time. Flexible for users to set up their own charging and discharging time.



Work modes: Backup

This mode works best for users who experience frequent power outages. The battery will be used to power your home when the grid is off. In this mode, the battery will be fully charged and will not be discharged when the grid is on.



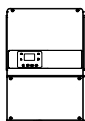
Work modes: Off-grid

In off-grid mode, the system will be powered only by the PV and battery. When the grid is connected, the inverter will not have output from the backup port.

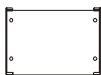
5. Installation

Prior to installation, please check if the outer appearance of the machine is intact and the parts in the attachment bag are consistent with the list provided. If any damage is found or any component is missing, contact your supplier.

5.1 Packing list



1



2



3



4



5



6

Fig.5-1 Packing in delivery

Table 1 Delivery items in package

NO.	Name	Quantity	Description
1	Inverter	1	Power storage inverter
2	Installation pendants	1	Used for wall mount installation of the inverter
3	Expansion anchor screw	4	Used for fixing the installation pendants
4	User manual	1	Guidance for installation, operation, maintenance, fault diagnosis
5	Battery connector terminals	2	Crimp battery wire
6	Power meter	1	Use for monitoring grid current

5.2 Installation preparation

5.2.1 Mounting position

The inverter can be installed indoors or outdoors. Given the cooling and water-proof features of the machine. It is

recommended to install the inverter in a well-ventilated and sheltered place. Places affected by direct sunlight, rain exposure and snow lay up should be avoided. This helps extend the operational life of the inverter.

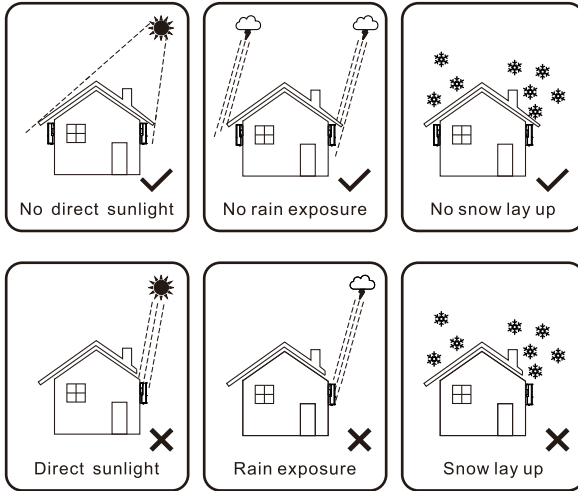


Fig.5-2 Recommend installation position

5.2.2 Mounting Angle

- The inverter should be installed vertically or tilted no more than 15°.
- Do not install the inverter on a forward-leaning or horizontal plane.
- Install the inverter on a solid and ventilated surface.

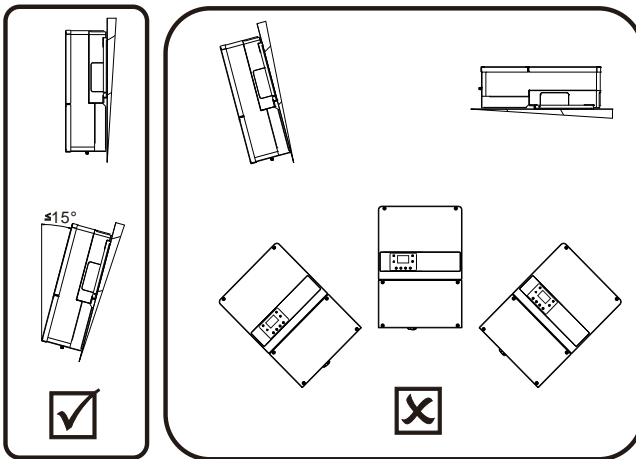


Fig.5-3 Recommend installation angle

5.2.3 Mounting Clearance

To secure good heat dissipation and easy dismantlement, the minimum clearance around the inverter should not be smaller than the below values.

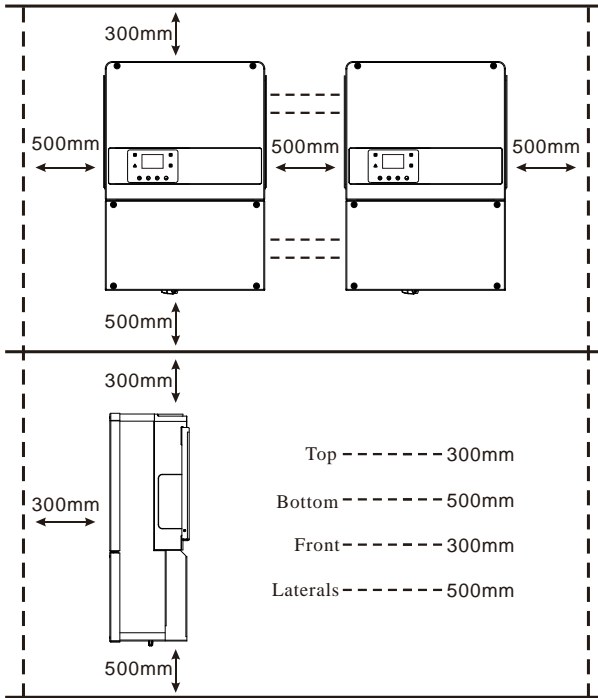


Fig.5-4 Recommended installation space

5.2.4 Mounting Tools

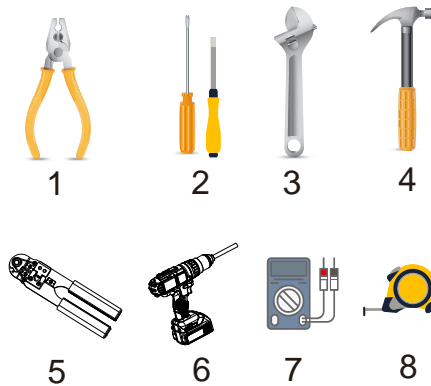


Fig.5-5 Tools and torques

Table 2 Required torques for mounting

NO.	Part	Required torque
1	Mounting expansion nut	8N.m (92 lbf.in)
2	Straight screwdriver for communication board terminal and electricity meter	0.2N.m (2.3 lbf.in)
3	Install hex socket screws	4N.m (46 lbf.in)
4	Install a waterproof plug	1.2N.m (13.8 lbf.in)
5	Lock the communication board screw inside the box	1.2N.m (13.8 lbf.in)
6	Straight screws for terminal board and grounding bar	4N.m (46 lbf.in)

5.3 Installation

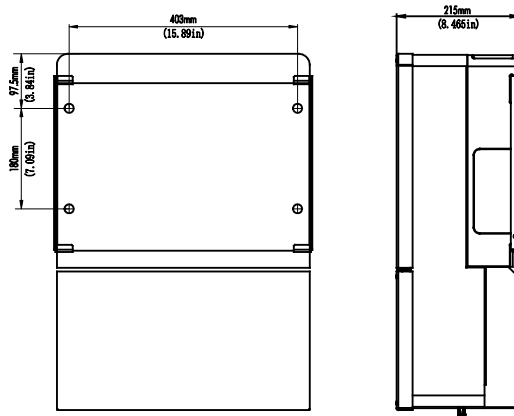


Fig.5-6 Mounting bracket location

Step 1: Install the bracket

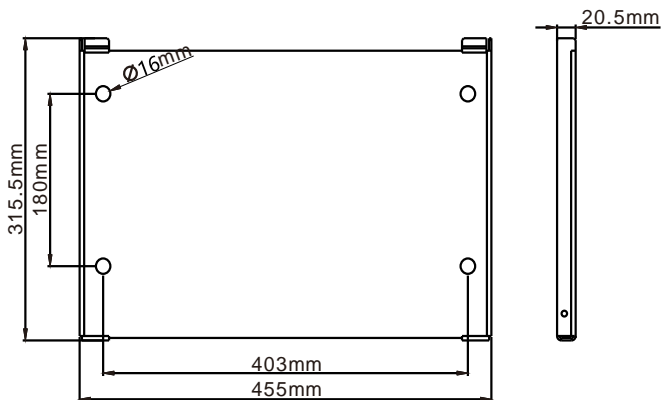


Fig.5-7 Drilling hole distance

Place the pendant in the marked drilling position on the wall of the selected area. Please refer to Figure 8 for specific pendant dimensions. Perforate in the drilling position marked in Figure 9. Use a $\varnothing 10$ percussion drill as the tool. Drilling should be positioned as accurately as possible.

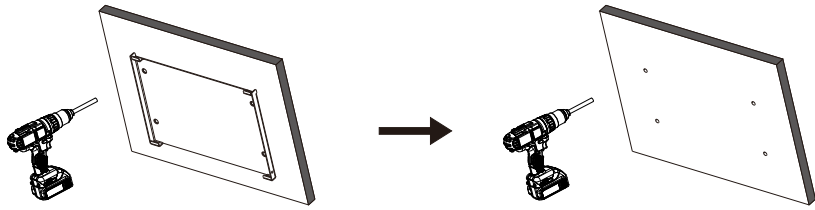


Fig.5-8 Drilling position



DANGER

Avoid drilling holes into the utility pipes and/or cables attached to the back of the wall.

Remove the dust inside and outside the hole. Insert the expansion anchor into the hole completely with a hammer.

Install the bracket as shown in Fig.5-9.

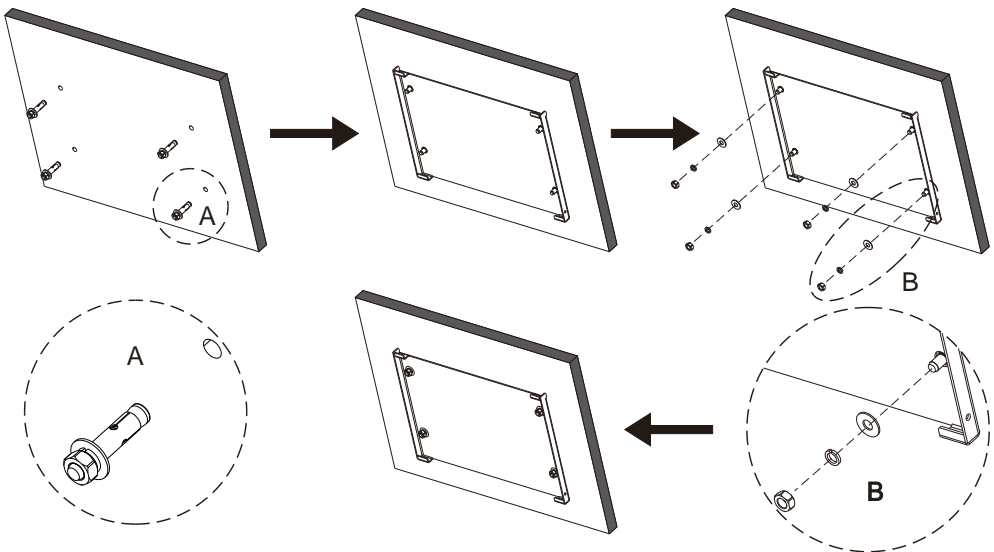


Fig.5-9 Bracket Installation

Step 2: Place the inverter on the wall mounted bracket. Gently hang the inverter onto the rack top-down. Lock the setscrews flanking the inverter, and make sure they are mounted correctly.

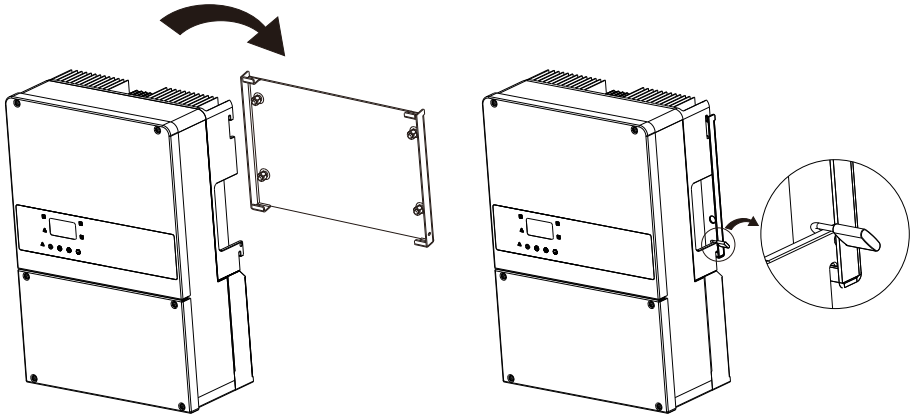


Fig.5-10 Inverter Installation

DANGER



- To prevent personal injury and damage to the inverter, take care to keep your balance when moving the inverter.
- Do not use the wiring terminals and ports at the bottom to support any of the inverter's weight.
- Use foam or other protective materials to prevent damage to its enclosure.

6. Electrical Connections

Precautions.

DANGER



- Before connecting the cables, ensure that the DC switch on the inverter and all switches connecting to the inverter are OFF. Otherwise, the high voltage of the inverter may result in electric shock.

WARNING



- Any equipment damage caused by incorrect cable connections is not covered by the warranty.

6.1 System overviews

Fig.6-1 Bottom view of the inverter

Object	Description
A	Backup load cable hole
B	Grid cable hole
C	Battery negative cable hole
D	Battery positive cable hole
E	PV cable hole
F	Inverter parallel communication cable

Object	Description
G	Communication cable for BMS
H	Communication cable for meter
I	USB port for firmware update
J	Waterproof valve
K	WiFi connection port
L	DC switch

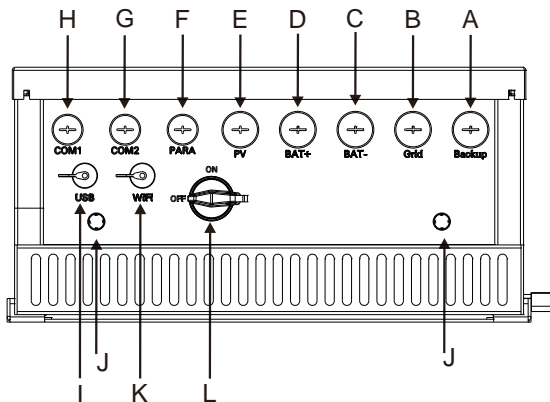


Fig.6-1 Bottom view of the inverter

6.2 Moving the wiring box cover and waterproof plugs

Step 1: Turn the DC switch to the "OFF" position. Please note the cover cannot be removed when the DC switch is in the "ON" position.

Step 2: Remove the 4 cover screws and the cover as shown in Fig.6-2.

Step 3: Remove the waterproof plugs by placing a flat blade screwdriver in the slot on the conduit plug face. Turn while gripping the nut on the inside of the enclosure to ensure it does not slip.

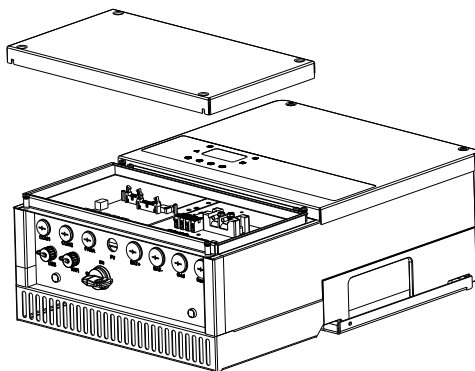


Fig.6-2 Internal cable connection part

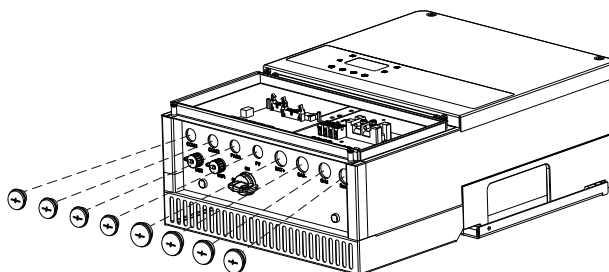


Fig.6-3 Cable Connection Interface of the Inverter

6.3 Installing conduits and wire

Operator should use the standard size conduit which must fit with the holes on the bottom of the inverter. Conduit fittings need to be waterproof. Once the conduit and fittings are installed, wirings should go through the conduit and be locked into the related terminals.

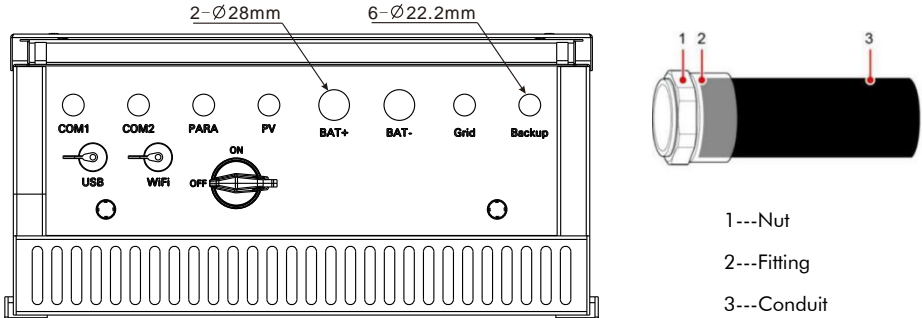


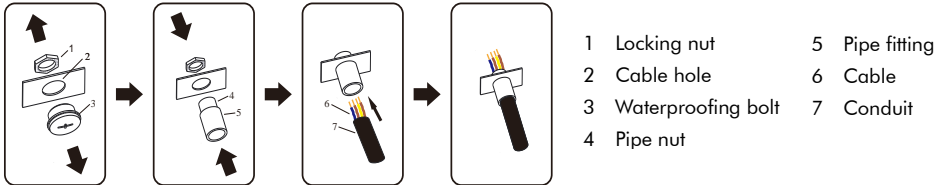
Fig.6-3 Pipe for routing cables

Step 1: Remove the locking nut and waterproofing bolt.

Step 2: Secure the pipe fitting to the enclosure using the nut provided with the pipe.

Step 3: Route cables through the conduit and then secure the conduit to the pipe fitting.

Step 4: Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fitting are secured reliably before sealing the cable holes.



- | | |
|----------------------|----------------|
| 1 Locking nut | 5 Pipe fitting |
| 2 Cable hole | 6 Cable |
| 3 Waterproofing bolt | 7 Conduit |
| 4 Pipe nut | |

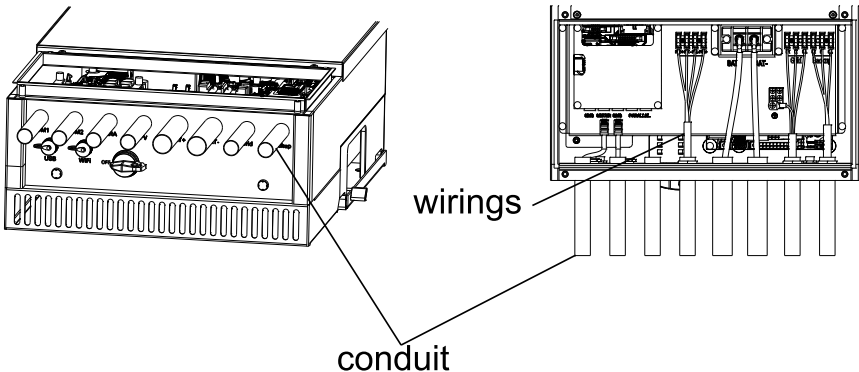
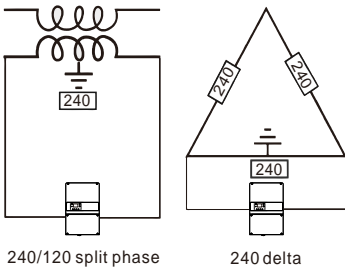


Fig.6-4 Installing a Pipe for routing cables

6.4 AC Grid Wiring

Supporting grid configuration as shown below. The neutral line is optional to be connected to the inverter.



NOTICE

Please select the right voltage within the specification of the AC side electrical parameter or the inverter won't work and might be damaged.

Fig.6-6 Supported grid

Install the AC wiring following the steps below:

- Step 1:** Install the pipe fittings. For details, see 6.3 Installing Conduits and wires.
- Step 2:** strip the wire insulated material as shown in Fig.6-6
- Step 3:** Route the AC output power cable through the conduit and then the pipe fitting.
- Step 4:** Connect the AC output power cable to the terminal block.
- Step 5:** Secure the fitting to the conduit.
- Step 6:** Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fittings are secured reliably and properly sealed.
- Step 7:** Keep the maintenance compartment clean.

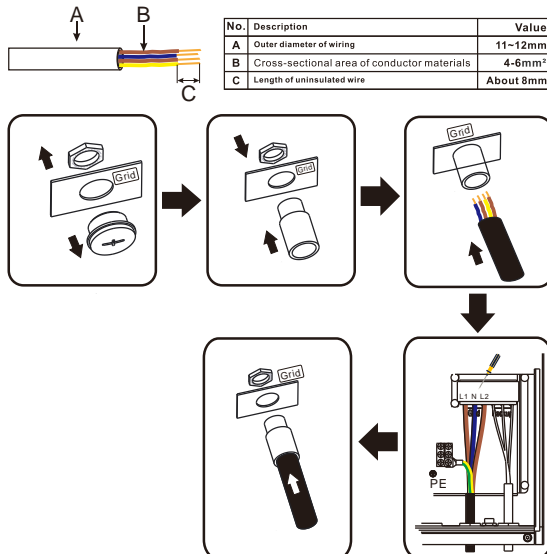


Fig.6-6 AC grid wiring

6.5 Auto-transformer and Backup Load Wiring

The inverter has both an on-grid and off-grid function. The inverter will deliver power through both the grid port and load port when the grid is on and will deliver power through just the load port when the grid is off. Only loads connected to the backup load port can be powered. An auto-transformer shall be applied to generate 120VAC power.

Install the AC critical load wiring following the steps below:

- Step 1:** Install the pipe fittings. For details, see 6.3 Installing Conduits and wires.
- Step 2:** Strip the wire insulating material as shown in Fig.6-7
- Step 3:** Route the AC output load cable through the conduit and then the pipe fitting.
- Step 4:** Connect the auto-transformer cable to the terminal block.
- Step 5:** Secure the fitting to the conduit.
- Step 6:** Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fitting are secured reliably and properly sealed.
- Step 7:** Keep the maintenance compartment clean.

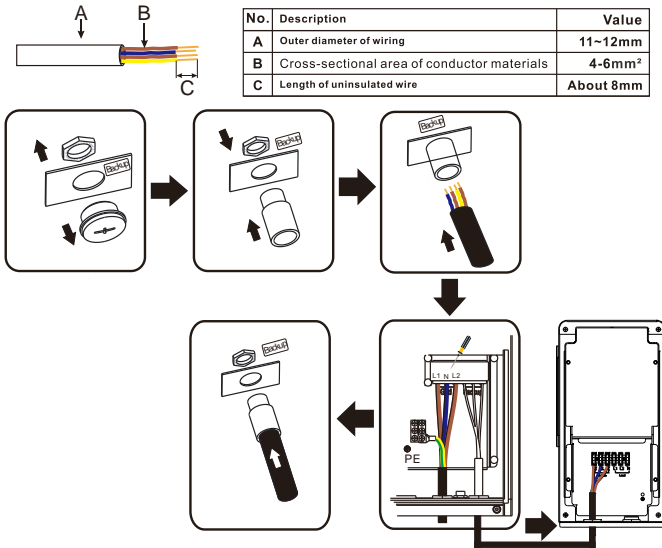


Fig.6-7 backup cable wiring

Auto-transformer installation:

- Step 1:** Install the pipe fittings. For details, see 6.3 Installing Conduits and wires.
- Step 2:** Strip the wire insulating material as shown in Fig.6-8
- Step 3:** Route the AC output load cable through the conduit and then the pipe fitting.

Step 4: Connect the auto-transformer cable to the terminal block.

Step 5: Secure the fitting to the conduit.

Step 6: Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fitting are secured reliably and properly sealed.

Step 7: Keep the maintenance compartment clean.

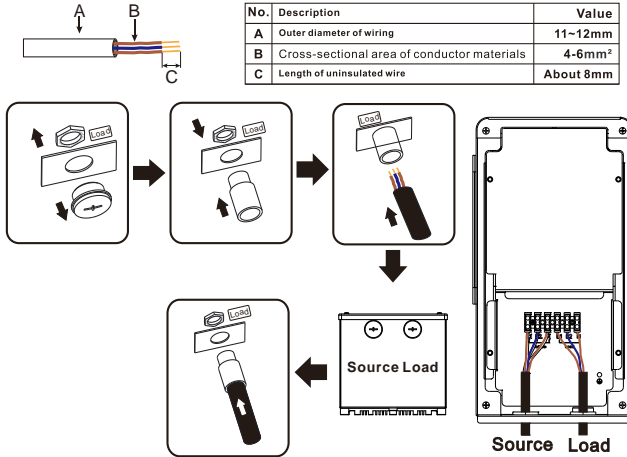


Fig.6-8 Auto-transformer wiring

WARNING



- TO REDUCE THE RISK OF FIRE, DO NOT CONNECT TO AN AC LOAD CENTER (CIRCUIT BREAKER PANEL) HAVING MULTI-WIRE BRANCH CIRCUITS CONNECTED.
- PLEASE NOTE THE POWER RATING OF BACKUP LOADS CONNECTED TO THE LOAD PORT CAN NOT EXCEED THE LOAD POWER RATING.

6.6 PV cable wiring

DANGER



- The output wiring terminals of the PV modules or connected optimizer may have hazardous voltages. Touching the terminals may cause electric shock.
- Before connecting the PV input power cables, ensure that the DC SWITCH on the inverter is OFF and that the DC input terminals of the inverter have no voltage.

DANGER



Ensure that both the positive and negative leads are strictly isolated from protective ground potential (PE).

DANGER



Please disconnect all PV panels before wiring the PV terminals, or you may suffer a high voltage shock.

Install the PV cable wiring following the steps as below.

Step 1: Install the pipe fittings. For details, see 6.3 Installing Conduits and wires.

Step 2: Route the PV input power cable through the conduit and then the pipe fitting .

Step 3: Connect the PV input power cable to the terminal block.

Step 4: Secure the fitting to the conduit.

Step 5: Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fittings are secured reliably before sealing the cable holes.

Step 6: Keep the maintenance compartment clean.

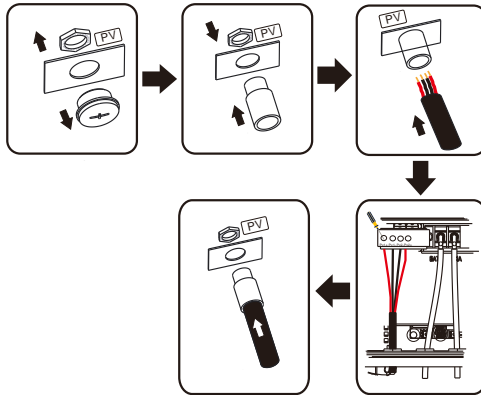


Fig.6-9 PV cable wiring

6.7 Battery cables wiring

DANGER



- A reverse polarity connection may damage the inverter. Please pay attention to the connection. Damage caused by a reverse polarity connection is not covered under the warranty.
- Risk of electric shock and chemical contamination. If the DC circuit breaker between the inverter and battery is not installed, an electric arc might be generated. It is recommended to install a DC circuit breaker between the inverter and the battery to ensure that the inverter can be safely disconnected from the battery.

For safe operation of the system, it is advisable to use the wire in line with the following specifications.

Install the battery cable wiring following the steps shown below:

Step 1: Check if the voltage of batteries complies with the product specifications.

Step 2: Disconnect the DC circuit breaker between the inverter and batteries.

Step 3: Install the pipe fittings. For details, see 6.3 Installing Conduits and wires.

Step 4: Route the battery cable through the conduit and then the pipe fitting.

Step 5: Connect the battery cable to the terminal block.

Step 6: Secure the fitting to the conduit.

Step 7: Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fittings are secured reliably before sealing the cable holes.

Step 8: Keep the maintenance compartment clean.

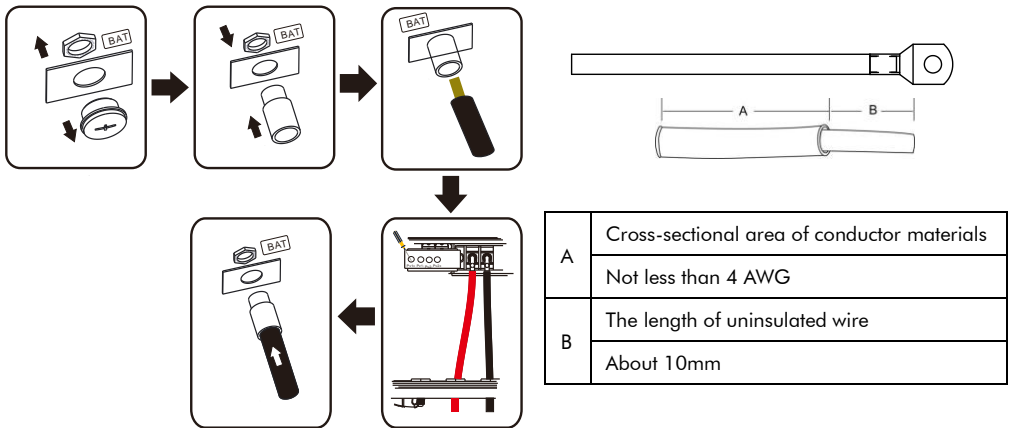


Fig.6-10 battery cable wiring

6.8 Signal cables wiring

Signal cables, including BMS RS485/CAN and RS485 for the meter. Both ports are RJ45.

6.8.1 BMS Communication cable wiring

Both CAN and RS485 use the same communication port. The communication protocol must match between the inverter and battery pack otherwise the battery pack will not work.

Procedure:

Step1: Install the pipe fittings. For details, see 6.3 Installing Conduits and wires.

Step2: Route the signal cable through the conduit and then the pipe fitting.

Step3: Connect the signal cable to the corresponding terminal block and clamp the shield layer of the cable into the ground point.

Step4: Secure the fitting to the conduit.

Step5: Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fittings are secured reliably before sealing the cable holes.

Step6: Keep the maintenance compartment clean.

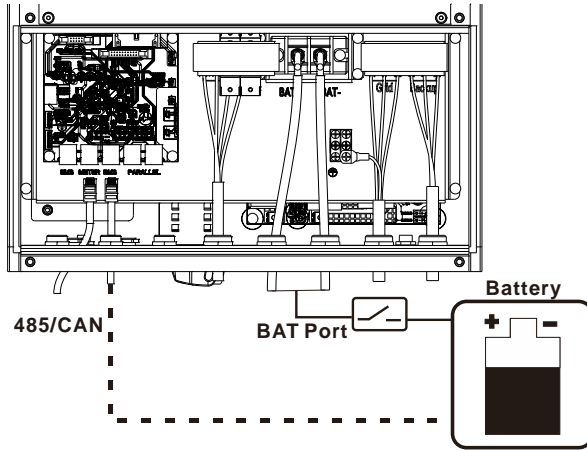
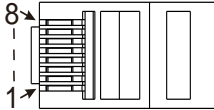


Fig.6-11 BMS cable wiring

BMS RJ45 definition:



1	2	3	4	5	6	7	8
GND	X	X	CAN_H	CAN_L	RS485-B	RS485-B	RS485-A

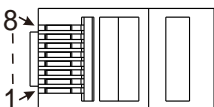
6.8.2 Meter Communication cable wiring

The supplied Meter must be installed for proper operation of the inverter.

Procedure:

- Step 1:** Install the pipe fittings. For details, see 6.3 Installing Conduits and wires.
- Step 2:** Route the signal cable through the conduit and then the pipe fitting.
- Step 3:** Connect the signal cable to the corresponding terminal block and clamp the shield layer of the cable into the ground point.
- Step 4:** Secure the fitting to the conduit.
- Step 5:** Check that the cables are connected correctly and securely. Then take appropriate measures to ensure that the pipe conduit and fittings are secured reliably before sealing the cable holes.
- Step 6:** Keep the maintenance compartment clean.

Meter RJ45 definition:



1	2	3	4	5	6	7	8
X	X	RS485-B	X	X	RS485-A	X	X

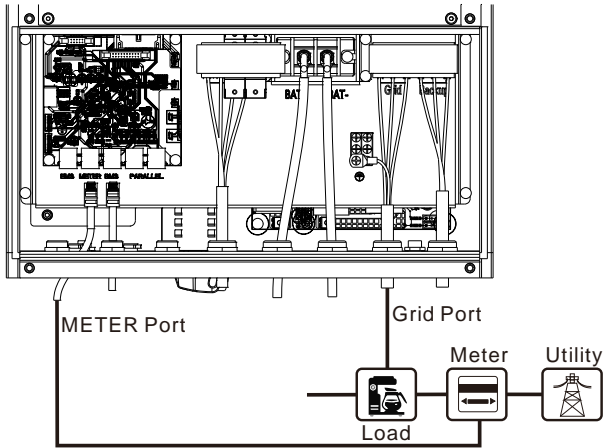


Fig.6-12 Meter cable wiring

7. System Operation

7.1 Before Power-On

Check all the cases on the table below to make sure it is safe before powering the inverter on.

NO.	Items	Criteria
1	Mounting position	The inverter is installed properly on the wall
2	Mounting space	An appropriate installation space has been chosen for ventilation
3	Switches OFF	Make sure the PV side DC switch and battery switch is in the “OFF” position
4	Grounding	The ground cable is connected correctly, securely, and reliably
5	Cable	Cables are all installed and insulated properly.
6	DC cable Connection	Make sure the PV and battery cable are connected properly.
7	AC cable Connection	Make sure the grid and load cable are connected properly.
8	Unused terminals and ports	Unused terminals and ports are fitted with watertight caps.
9	Breakers	Make sure the grid and load breaker are properly selected and used. All breakers are OFF

7.2 Start the Inverter



NOTICE

Connecting only the AC grid will not be able to power on the inverter. Make sure the PV power or battery power is enough to power on the inverter.

Step 1: Turn on the DC switch at the bottom of the inverter to power on the screen.

Step 2: Set the date and time after powering up the inverter for the first time, as shown in fig.7-1.

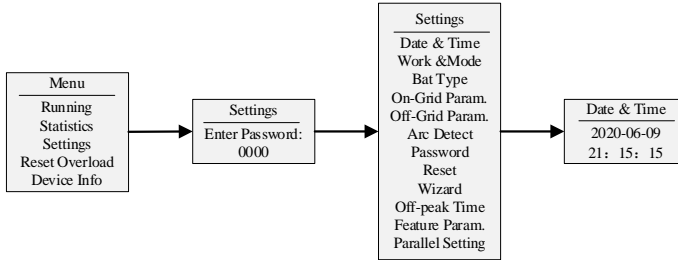


Fig.7-1 Setting data and time

Step 3: Choose the grid tied standard. Factory default is IEEE1547.

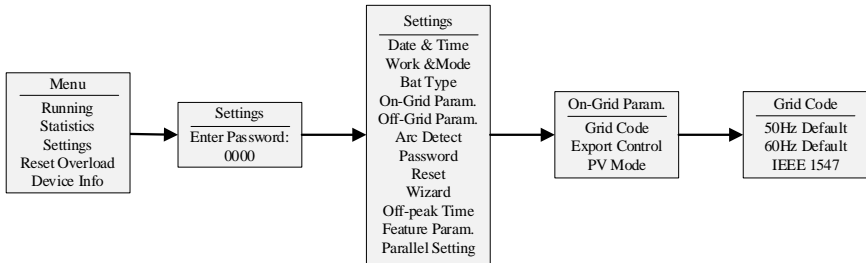


Fig.7-2 Choose the grid tied standard

Step 4: Select the input mode according to the PV array configuration, Factory default is "Independent".

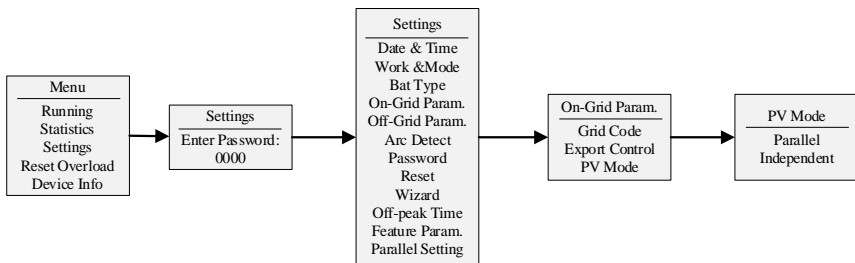


Fig.7-3 Select the input mode

Choose Parallel or Independent mode in the PV mode setting.

In Parallel mode, the two PV inputs are combined as one input and one MPPT is performed in the inverter. This mode should be used if there is only one PV input and the total power is more than 2800W to utilize the maximum power of the PV array.

In Independent mode, the two PV inputs are independent and each input has one MPPT performed individually in the inverter. The two PV strings can have different voltage and current.

Step 5: Select the work mode of the battery, Factory default is “Backup”. Please refer to section 7.4 for the details of the work mode.

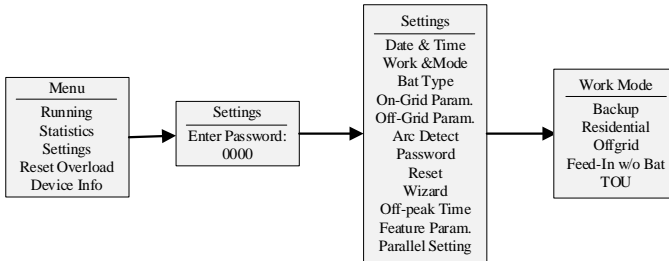


Fig.7-4 Select the work mode of battery

Step 6: Select the battery type for the right BMS communication protocol, Factory default is “PionPower”.

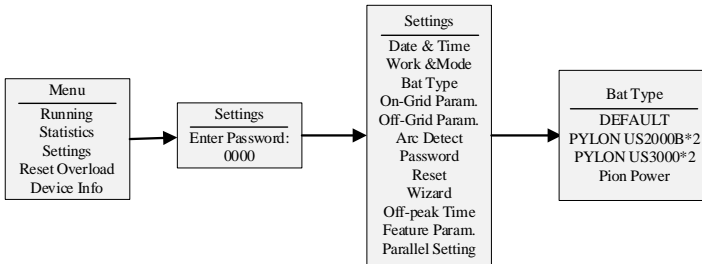


Fig.7-5 Select the battery type

The “DEFAULT” mode of the Bat. Type is for internal company testing only, not for user use.

Customized communication protocol could be modified. Please contact the manufacturer for further details.

Step 7: Set the charge and discharge time for the battery. The months and time are the default values in Fig. 7-6.

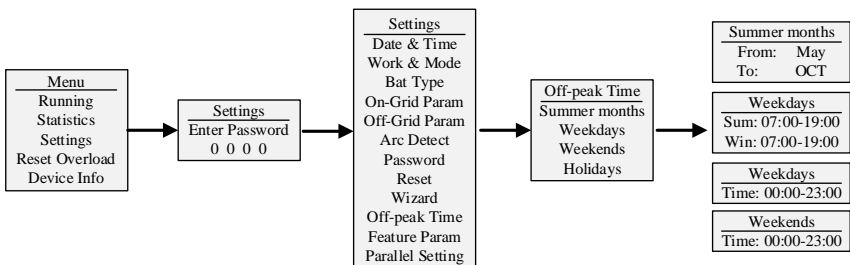


Fig.7-6 Setting the charge and discharge time

Step 8: Turn on the grid breaker and load breaker.

Step 9: Turn on the battery switch.

Step 10: The inverter will start up automatically to operate after 60 seconds.

7.3 Shut down the Inverter



NOTICE

After the inverter powers off, the remaining electricity and heat may still cause electric shock and scald. After powering off, make sure to wait for at least 5 minutes before servicing the inverter.

Step 1: Turn off the breaker between the inverter and the Grid.

Step 2: Turn off the battery breaker.

Step 3: Turn the DC switch at the bottom of the inverter to the "OFF" position.

7.4 Working Mode

The inverter has five main working modes: residential mode, backup mode, time of use (TOU), off-grid mode and feed-in without battery (Feed-In W/O BAT).

7.4.1 Residential Mode

When solar energy is sufficient, power converted by the inverter (from solar energy) will first be used to supply the load. If solar power is inadequate, power stored in the batteries and solar energy will both support the load. At night, the batteries and main grid supply will provide power for the load.

When selecting residential mode, the power meter must be installed correctly on the right directional mark on the CT. The blue LED on the inverter panel indicates that the meter is communicating properly with the inverter. With the power meter installed, when the SOC of the battery is low, the battery will be charged until the SOC of the battery reaches the discharge level. The battery will supply the power to the load as needed.

In this mode, when detecting that the grid is powering the home load, the inverter will discharge the battery and use PV energy to power the home load instead. This can reduce the meter power to around zero. On the contrary, when the inverter detects that PV energy is feeding the grid, the inverter will charge the battery and reduce the meter power to zero. If the meter loses communication with the inverter, the battery will not be discharged or charged by the inverter. Unless the SOC of the battery is less than 20%, the inverter will not start charging the battery.

7.4.2 Backup Mode

Power converted by the inverter from solar energy will be used first to charge the battery, with any residual power used for the load and then the grid. The battery can be charged during the charging period set by the peak and off-peak time. During the non-charging period, the battery will not be charged or discharged.

7.4.3 Time of Use (TOU)

In TOU mode, the energy from the PV or grid can be stored in the battery pack based on user settings, refer to 7.2 step 7.

Users can set the inverter to store energy when electricity price is low. The stored energy can then be used when prices are high. The charging and discharging time may also be carried out based on the actual usage.

During the charging period set by the off-peak time, the battery shall be charged if the power of the load is less than the minimum power. The charging shall be stopped when the power of the load reaches the minimum power.

During the discharging period and with the power meter installed, the maximum discharging power of the battery should not exceed the maximum rated power of the inverter. When the SOC of the battery is very low, the battery should not be discharged. The battery pack will be charged when it sends the charging request to the inverter.

When the SOC of the battery is very low and a power meter is not installed, the inverter only stops discharging the battery and can not charge the battery even if the battery sends the charging request.

7.4.4 Off Grid Mode

In off-grid mode, the inverter should not be connected to the grid. The load will be powered only by the PV and battery. The battery must be installed and off grid output must be enabled. The inverter will be on standby mode when the grid is on but will start to power the load when the grid is off.

In this mode:

- When the grid is on, the inverter will show waiting status.
- If BMS communication is lost, the inverter will be in standby mode
- Off-grid output must be enabled as shown below. Otherwise the inverter will show waiting status.

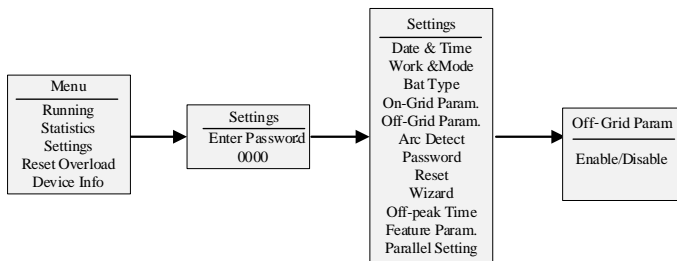


Fig.7-7 Setting Off Grid Mode

7.4.5 Feed-in without battery (Feed-In w/o Bat)

If the battery is not installed when selecting this mode, the inverter will work as a grid-tied inverter. But when the battery is installed, the inverter will not work and show waiting status.

7.5 Grid fault protecting

When the grid voltage or frequency is out of range as shown below, the inverter will trip as required by IEEE 1547-2003. The inverter will reconnect to the grid if the grid voltage or frequency is recovered to the normal range. After the fault is disconnected, the inverter will reconnect after 300s.

Utility Interconnection Voltage and Frequency Trip Limits and Trip Times:			
Voltage and frequency limits for utility interaction according to Table 1 and Table 2 per IEEE 1547-2003 (R2008).			
Region	Voltage rang (%Vnom)	Frequency rang (Hz)	Clearing time (s)
A	$V < 50\%$	Rated (60Hz)	0.16
B	$50\% \leq V < 88\%$	Rated (60Hz)	2.0
C	$110\% < V < 120\%$	Rated (60Hz)	1.0
D	$120\% \leq V$	Rated (60Hz)	0.16
E	Rated (Vnom)	$F > 60.5$	0.16
F	Rated (Vnom)	$F < 59.3$	0.16

8. Display and Setting

8.1 Parameter display

PV input display interface:

	DC1	DC2	
U	150	160	V
I	10.5	10.6	A
P	2500	2500	W

Grid parameters display interface:

```

Inv Pwr : 4000 W
Inv Cur: 5.2  A
Grid Volt: 240 V
Freq: 60.00  Hz
    
```

Emergency power output parameters display interface:

```

EPS Pwr : 4000 W
Eps Volt : 240 V
EPS Cur: 5.2  A
Freq: 60.00  Hz
    
```

Battery parameters display interface:

```

BAT SOC : 50 %
BAT Pwr: 3000W
BAT Volt: 54.3 V
BAT Cur: 2.5A
    
```

8.2 Device Info

<p>Firmware information:</p> <div data-bbox="101 208 346 330" style="border: 1px solid black; padding: 5px;"><p>Firmware Ver.</p><hr/><p>Master: 1.00.0x3D3F Slave: 1.00.0xD98C Comm: 1.00.0xACA7</p></div>	<p>Serial NO.:</p> <div data-bbox="460 208 694 330" style="border: 1px solid black; padding: 5px;"><p>Serial No.</p><hr/><p>123456789AZWSEDC</p></div>	<p>Inverter Model.:</p> <div data-bbox="798 208 982 330" style="border: 1px solid black; padding: 5px;"><p>Model</p><hr/><p>G5000</p></div>
---	--	---

8.3 Setting

Password setting:

Enter Password:

X X X X

After entering the setup interface, the system will prompt you to input your password.
The default password is "0000", which can be changed in the Password setting menu.
Press the UP/DOWN key to increase or decrease the input number.
Press the ENTER key to move the cursor right or to confirm the setting.
Press the ESC key to move the cursor left.

Setting date and time:

Date & Time

2020-06-09
21: 15: 15

Press the UP/DOWN key to increase or decrease the input number.
Press the ENTER key to move the cursor right or to confirm the setting.
Press the ESC key to move the cursor left.

Setting working mode:

Work Mode

Backup
Residential
Offgrid
Feed-In w/o Bat
TOU

Press the UP/DOWN key to select.
Press the ENTER key to confirm the setting.
Press the ESC key to return.

Setting battery type:

Bat Type

DEFAULT
PYLON US2000B*2
PYLON US3000*2
Pion Power

Press the UP/DOWN key to increase or decrease input figures.
Press the ENTER key to move the cursor backwards or confirm the setting.
Press the ESC key to return.

Setting system parameters:

On-Grid Param.

Grid Code
Export Control
PV Mode

Press the UP/DOWN key to increase or decrease input figures.
Press the ENTER key to move the cursor backwards or confirm the setting.
Press the ESC key to return.

Grid code setting:

Grid Code

50Hz Default
60Hz Default
IEEE 1547

North America select IEEE1547

Export power limit setting:

Export Control

export ctrl : En/Dis
Power Limit :100 %

To enable this mode, the meter must be installed so that the power feeding to the grid can be controlled to a limited value which is set by the power limit.

PV mode setting:

PV Mode

Parallel
Independent

Parallel: two PV strings work as one MPP tracker
Independent: Two PV strings work as two separated MPP trackers.

Off grid function select:

Off-grid output:

Off-grid mode
Recover SOC

Off-grid mode: Enable or disable the off-grid function.
Recover SOC: Set the off-grid charging recovery SOC value. When there is no output during off-grid charging and the battery charge exceeds the set value after charging, it will exit the current state and start the inverter output.

Arc detection:

AFCI En/Dis
Arc fault reset
Self test

Enable or disable the Arc fault detection.
If arc fault occurs, manually resetting this interface is required.
Select self-test to test the arc detecting device. This will be done automatically each time when the inverter powers up.

Setting a new password:

Enter a new
PWD:

X X X X

Four digital numbers

Feature parameters:

ISO En/Dis
IMI En/Dis
Modbus Address

Enable or disable the Insulation detection function.

Enable or disable ground fault current detection.

RS485 Modbus address setting.

Time of use parameters setting:

Off-peak Time
Summer months
Weekdays
Weekends
Holidays

In TOU/Backup mode, this parameter must be set to let the inverter work normally.

Reset interface:

Reset
Energy reset
Event reset
Restore default

Reset energy measurement of the day/week/month/year.

Clear historical event record.

Factor setting reset.

Parallel Setting:

Parallel Setting
Enable/Disable
ID: Master

Parallel function enables switch and parallel ID setting.

On-grid inverter setting as follows:

- a. Can only support up to 3 devices on-grid and parallel but not off-grid and parallel. The load of each inverter cannot be connected together.
- b. The ID of each machine must be set to either: Master, SlaverI, SlaverII;
- c. The grid-connection settings of each device in parallel must be the same, such as working mode, etc.
- d. Only one meter (Meter) can be connected when paralleling, and the meter communication line is connected to the host's meter communication interface.

8.4 Statistics

History events:

Event Log <hr/> 1: FAN Fault 20-06-28 16:00:25
--

Record the latest 10 inverter events.

History events:

Energy Log <hr/> Day Month Year

Displays how much energy the inverter produces every day, month and year.

An example is shown below.

PV: 10.0 kWh Sell: 22.3 kWh
 Buy: 35.4 kWh Chg: 86.3 kWh
 Dchg: 45.9kWh

8.5 Reset Overload

Reset Overload:

Menu <hr/> Statistics Settings Reset Overload

When an overload fault occurs, the Reset Overload command can be selected to manually clear the fault.

9. Fault diagnosis and solutions

The inverter is easy to maintain. When you encounter the following problems, please refer to the solutions below and contact the local distributor if the problem remains unsolved. The following table lists some of the basic problems that may occur during the actual operation, as well as their corresponding basic solutions.

Alarm code	Description	Diagnosis and solutions
Grid Lost Fault	Inverter cannot detect grid voltage and frequency	<ul style="list-style-type: none"> ● check if the grid cable is connected tightly ● check if the grid breaker is on
Grid Volt Fault	Grid voltage is out of operating range	<ul style="list-style-type: none"> ● check if the grid cable is connected correctly ● the inverter will reconnect when the grid voltage is back to normal
Grid Freq Fault	Grid frequency is out of operating range	<ul style="list-style-type: none"> ● check if the grid cable is connected correctly ● the inverter will reconnect when the grid frequency is back to normal
PV Volt Fault	PV voltage of string1 or string2 is over voltage	<ul style="list-style-type: none"> ● check if the PV input cable is connected correctly ● inspect the PV input voltage. If over voltage, please reduce the quantity of the PV panels

BAT Volt Fault	Battery voltage is out of operating range	<ul style="list-style-type: none"> ● check if the battery input cable is connected correctly ● inspect the battery input voltage, if over or under voltage, please set it within the normal range
BAT NTC Fault	Battery power converter's temperature is out of operating range or temperature detection component has failed	<ul style="list-style-type: none"> ● check if working temperature is within -25~60°C ● contact distributor for help
Inv NTC Fault	Inverter bridge's temperature is out of operating range or temperature detection component has failed	<ul style="list-style-type: none"> ● check if working temperature is within -25~60°C ● contact distributor for help
PV Iso Fault	PV array insulation is under the lowest requirement	<ul style="list-style-type: none"> ● check if PV cable is connected correctly ● check if the insulation of electric cables is damaged ● check if earth cable is connected correctly ● contact distributor for help
DCI Fault	Inverter output DC current is over range	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
GFCI Fault	Isolation Monitor Interrupter Fault Current is out of range	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
FAN Fault	Fan cannot work within the right speed specified	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
EPS Volt Fault	Emergency power voltage (load side) is out of range	<ul style="list-style-type: none"> ● check if EPS is over loaded ● restart the inverter ● if error still occurs, please contact the distributor
EPS Load Fault	Grid-tied mode: EPS over load Off Grid mode: inverter cannot supply enough power to the backup load	<ul style="list-style-type: none"> ● if EPS is overloaded, please reduce the load in half ● Select "reset overload" or restart the inverter ● if error still occurs, please contact the distributor
EPS Relay Fault	At least one relay between the grid and load has failed	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
Grid Relay Fault	At least one relay between the grid and inverter has failed	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
GFCI HW Fault	Circuit for Isolation Monitor Interrupter Fault Current detecting failure	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
AFCI Fault	Arc fault current detected	<ul style="list-style-type: none"> ● check if the PV cable is connected correctly and tightly ● check if the insulation of the electric cables is damaged ● Select "Arc fault reset" or restart the inverter ● if error still occurs, please contact the distributor
SCI Fault	Communication between the slave MCU and display MCU has failed	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor

SPI Fault	Communication between the main MCU and slave MCU has failed	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
EEPROM Fault	Storage device which connects to the slave MCU has failed	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
Sample Fault	Redundant sample of slave MCU is not consistent with the main MCU	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
ARM EEPROM Fault	Storage device which connects to the display MCU has failed	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
AFCI HW Fault	Arc fault current detection device self-test failed	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
Input Cur Fault	PV input over current	<ul style="list-style-type: none"> ● check if the PV input current is out of the specified range ● restart the inverter ● if error still occurs, please contact the distributor
Output Cur Fault	Inverter output over current	<ul style="list-style-type: none"> ● check the grid cable or breaker for any short circuit situations ● restart the inverter ● if error still occurs, please contact the distributor
BB Cur Fault	Buck boost converter over current	<ul style="list-style-type: none"> ● check for any short circuit at the battery input ● restart the inverter ● if error still occurs, please contact the distributor
BUS Volt Fault	BUS voltage is out of range	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
MID Volt Fault	DC\DC converter output voltage is out in range	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
BAT Cur Fault	Charge and discharge DC/DC converter over current	<ul style="list-style-type: none"> ● restart the inverter ● if error still occurs, please contact the distributor
Parallel Comm Fault	Communication between parallel inverters failure	<ul style="list-style-type: none"> ● check if parallel communication cables are connected correctly ● restart the inverter ● if error still occurs, please contact the distributor
Parallel Setting Fault	The settings of parallel inverters are incorrect or inconsistent	<ul style="list-style-type: none"> ● check the settings of parallel inverters. For example, work mode must be consistent.

10. Inverter Parameters

Model	G5000
PV input	
Max input voltage (Vdc)	535V

Min. input voltage	100V
Initial feeding voltage	150V
Range of PV input operating voltage (Vdc)	100-535V
MPPT range (Vdc)	100-535V
Range of PV voltage@ full output (Vdc)	255-500V
Max PV input current (Adc)	11A
Max input short circuit current (A)	13.5A
No. of MPPT/Strings per MPPT	2/1
Max input power per MPPT (W)	2800W
Max. PV input power(W)	5600W
Grid terminal parameters	
Nominal AC output voltage (Vac)	240 Vac
Nominal AC output frequency (Hz)	60 Hz
Operating frequency range (Hz)	59.3 Hz - 60.5 Hz
Operating AC output voltage range (Vac)	211.2 - 264.0 V @ 240 V
Nominal AC output current (Aac)	20.8A
Max. Continuous AC output current (Aac)	22A
Max AC output overcurrent protection (A)	45A
Nominal AC output power (VA)	5000VA
Max. Continuous AC output power (VA)	5000VA
Output power factor rating	>0.99
AC load terminal parameters	
Nominal AC output voltage (Vac)	240 Vac
Nominal AC output frequency (Hz)	60 Hz
Max. Continuous AC output current (Aac)	20.8A
Max. Continuous AC output power (VA)	5000VA
Max. AC output power (VA)	7000VA
Battery terminal parameters	
Battery Type	Li-ion
Nominal voltage (Vdc)	48V
Range of DC charging voltage (Vdc)	42-58V

Range of DC discharging voltage (Vdc)	42-58V
Charge voltage range (@full power) (Vdc)	52.5-58V
Discharge voltage range (@full power) (Vdc)	50-58V
Max. charging current (A _{dc})	80A
Max. charging power (W)	4200W
Max. discharging current (A _{dc})	100A
Max. discharging power (W)	5000W
General parameter	
Storage temperature range	- 30°C to +60°C
operation temperature range	- 20°C to +60°C with derating above 40°C
Enclosure Type	NEMA 3R
BMS communication port BMS	CAN/RS485

11. Auto-transformer Parameters

Model	AT5000
Input parameters (from converter load terminal)	
Nominal AC input voltage (V _{ac})	240 Vac (L-L)
Nominal AC input frequency (Hz)	60 Hz
Nominal AC input current (A _{ac})	20.8A
Max. Continuous AC input power (VA)	5000VA
Output parameters (to load panel board terminal)	
Nominal AC output voltage (Vac)	120/240 Vac split phase
Max. Continuous AC output current(L-N) (A _{ac})	20.8A
Max. Continuous AC output current (L-L) (A _{ac})	20.8A
Max. Continuous AC output power (VA)	5000VA
General parameter	
operation temperature range	- 20° C to +60° C
Enclosure Type	NEMA 3R

Appendix I Suggested System Diagram

Whole home backup system

User can choose the whole home load to connect to the backup load port of the inverter. When the grid is off, the inverter can automatically trip the AC contactor to isolate the grid from the home load distributor. The home load will then be supplied by the inverter.

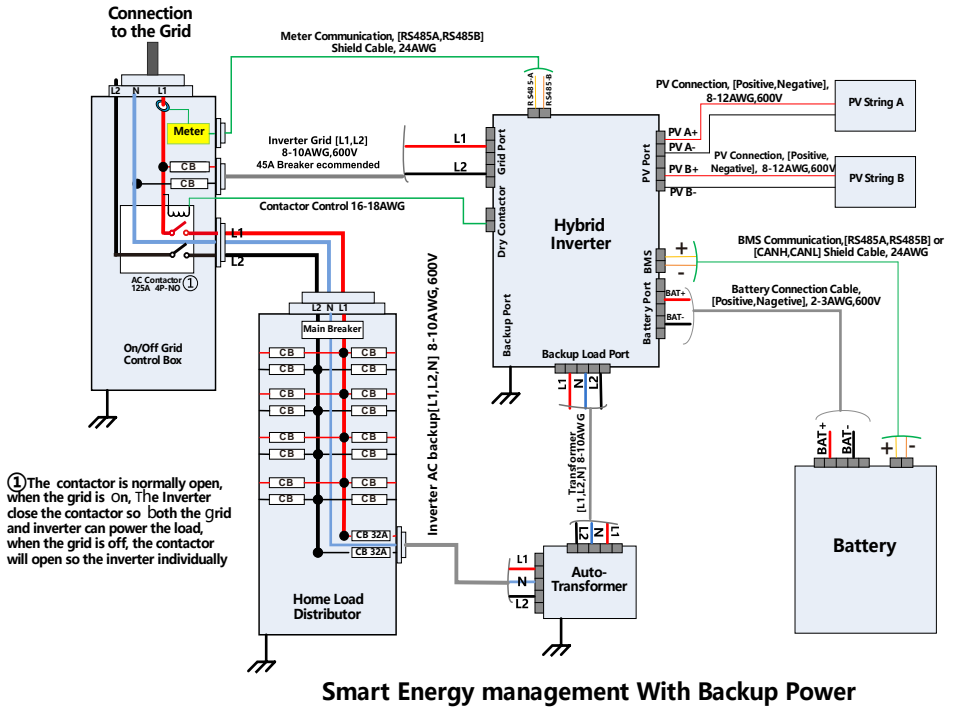
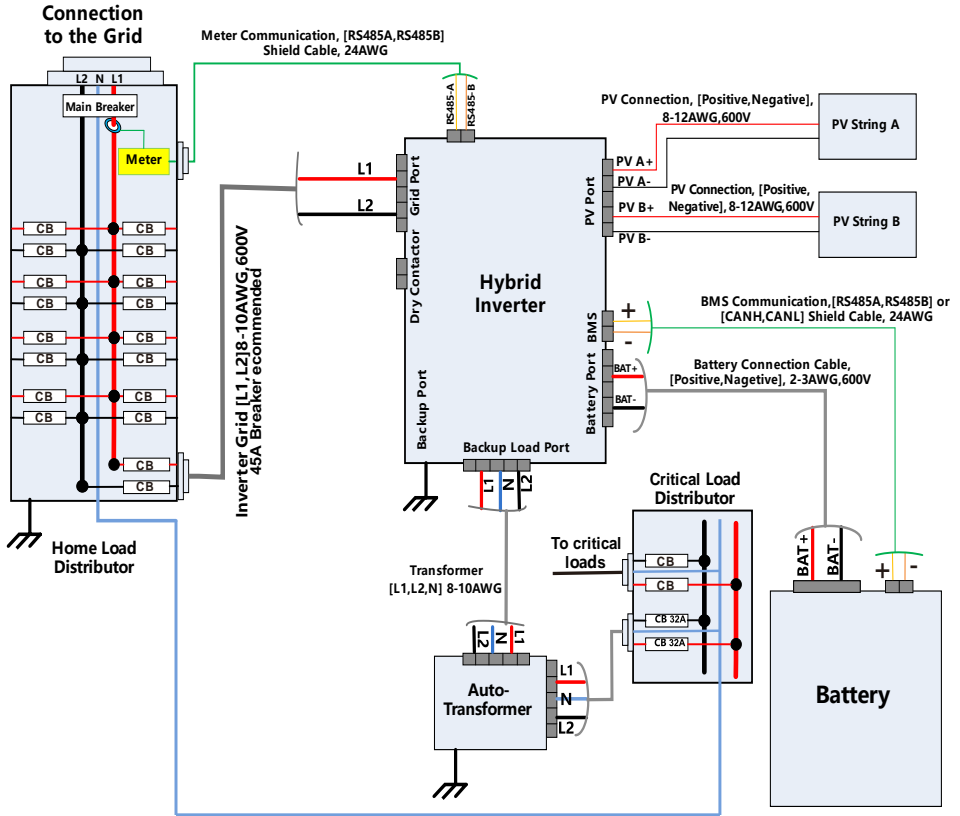


Fig. I-1 Whole home backup system

Partial home backup system

User can also use an additional distribution panel for critical load. This will save the cost of an AC connector.

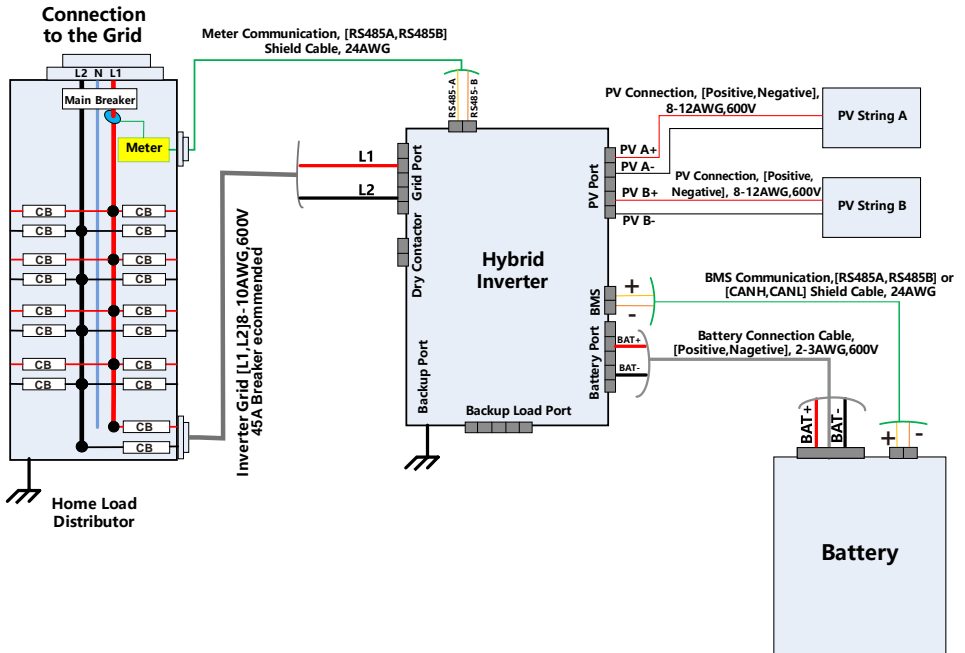


Smart Energy management With additional Backup Power for critical loads

Fig. I-2 Partial home backup system

Use without backup power

If the grid is not off frequently, users can configure a smart energy management system without a backup function to save the cost of an auto-transformer. The inverter will intelligently control the home energy power from the PV, battery or grid.



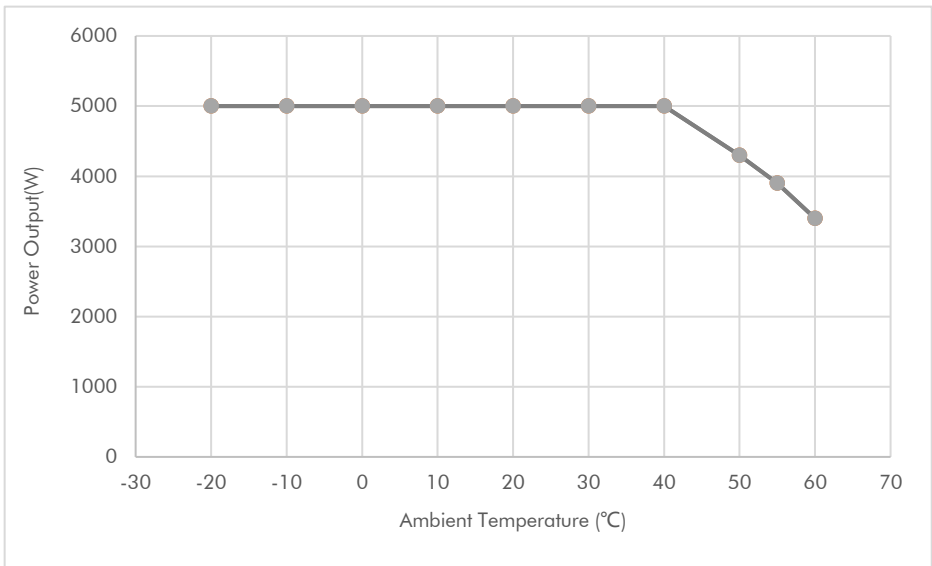
Smart Energy management Without Backup Power

Fig. I-3 Without backup load system

Appendix II Power Derating Strategy

The inverter can operate in ambient temperatures ranging from -20°C to 60°C but for the consideration of the heat dissipation design, the inverter will derate when the ambient temperature is higher than 40°C . The derating curve is shown below. The output power is limited depending on the temperature.

In this derating curve, the inverter will derate the power to 3400W when ambient reaches 60°C , and the inverter will cease to export power at about 65°C .



When the inverter is working on off-grid mode, the auto-transformer will derate simultaneous with the inverter. When the inverter is working on grid-tied mode, it will only detect the over load situation of the auto-transformer and will perform the protection.

Warranty Card

Customer Information

Full Name: _____ Phone/Mobile Number: _____

Return Address: _____

Email: _____

Product Information

Model: _____ Purchase Date (YYYY/MM/DD) : _____

Serial Number: _____

To be Completed by Repair Center:

Repair Date	Repair Center Name	Fault Description & Repair Status	Completion Date	Repair Center Stamp



