

Solar Inverter

User Manual

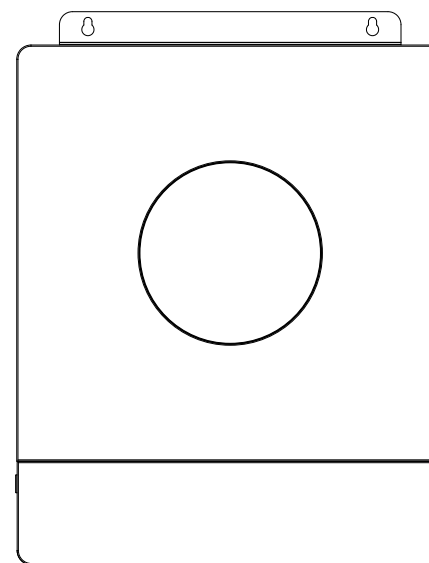


Table Of Contents

1. Information on this Manual	01
1.1 Validity	01
1.2 Scope	01
1.3 Target Group	01
1.4 Label Description	01
1.5 Safety Instructions	02
2. Introduction	03
2.1 Features	04
2.2 Product Overview	04
3. Installation	05
3.1 Unpacking and Inspection	05
3.1.1 Open-box Inspection	05
3.1.2 Installation Tools	05
3.1.3 Packing List	06
3.2 Mounting Unit	07
3.3 PV Connection	08
3.4 Battery Connection	10
3.5 AC Input/Output Connection	12
3.6 CT Connection	15
3.7 Dry Contact Signal	15
3.8 Lithium Battery Connection	16
3.9 Smart Communication Stick Connection(Optional)	19
3.10 Earth Connection(mandatory)	19
4. Operation	20
4.1 Power ON/OFF	20
4.2 Parallel mode Connection	20
4.3 Display Panel	27
4.4 LCD Display	28
4.4.1 Main Screen	28
4.4.2 System information	29
4.4.3 System Settings	30
4.4.4 Fault Record	33
4.4.5 Device Information	33
5. Specifications	34
6. Warning Code Table	37
7. Fault Code Table	38

1. Information on this Manual

1.1 Validity

This manual is valid for the following devices:

12000W Solar Hybrid Inverter

14000W Solar Hybrid Inverter

16800W Solar Hybrid Inverter

1.2 Scope

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

Contents may be periodically updated or revised due to product development. The information in this manual is subject to change without notice. The latest manual can be acquired via www.vami-tek.com

1.3 Target Group

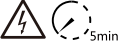
This document is intended for qualified persons and end users. Tasks that do not require any particular qualification can also be performed by end users, Qualified persons must have the following skills.

- Knowledge of how an solar inverter works and is operated.
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of the applicable standards and directives
- Knowledge of the compliance with this document and all safety information

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

1.4 Label Description

Labels on solar inverter:

	CAUTION Do not disconnect under load!
	Danger: High Voltage! Danger: Electrical Hazard!
	Start maintaining the solar inverter at least 5 minutes after the solar inverter disconnected from all external power supplies.
	Read instructions carefully before performing any operation on the solar inverter.

	Grounding: The system must be firmly grounded for operator safety.
	Do Not put it in the waste bin! Recycle it by licensed professional!

Labels in the documentation:

 WARNING!	A high level of potential danger, which, if not avoided, could result in death or serious injury to personnel.
 CAUTION!	A moderate or low level of potential danger, which, if not avoided, could result in moderate or minor injuries to personnel. In some bad situation, it could result in death or serious injury to personnel.

1.5 Safety Instructions



WARNING!

This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

1. Please be clear which kind of battery system you want, lithium battery system or lead-acid battery system, if you choose the wrong system, energy storage system can't work normally.
2. Before using the unit, read all instructions and cautionary marking on the unit, the batteries and all appropriate sections of this manual. The company has the right not to quality assurance, if not according to the instructions of this manual for installation and cause equipment damage.
3. All the operation and connection please professional electrical or mechanical engineer.
4. All the electrical installation must comply with the local electrical safety standards.
5. When install PV modules in the daytime, installer should cover the PV modules by opaque materials, otherwise it will be dangerous as high terminal voltage of modules in the sunshine.
6. **CAUTION** - To reduce risk of injury, charge only deep-cycle lead-acid type rechargeable batteries and lithium batteries. Other types of batteries may burst, causing personal injury and damage.
7. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
8. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.

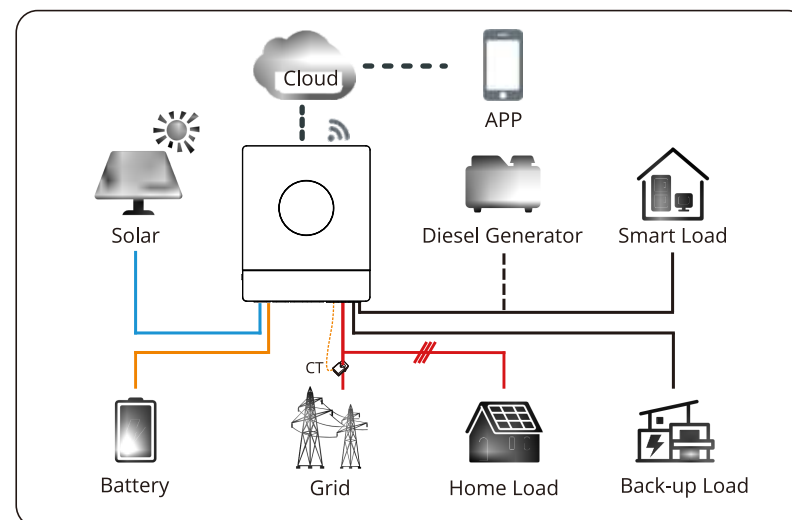
9. Never charge a frozen battery.
10. For optimum operation of this solar inverter, please follow required spec to select appropriate cable size. It's very important to correctly operate this solar inverter.
11. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
12. Please strictly follow installation procedure when you want to disconnect DC terminals. Please refer to INSTALLATION section of this manual for the details.
13. **GROUNDING INSTRUCTIONS** - This solar inverter should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this solar inverter.
14. **NEVER** - Cause DC input and output short circuited. Do not connect to the mains when DC input short circuits.
15. Make sure the solar inverter is completely assembled, before the operation.

2. Introduction

The following illustration shows basic application of this solar inverter. It also includes following devices to have a Complete running system.

- PV modules
- Battery modules (This solar inverter can work with or without battery).

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



This is a multifunctional solar inverter, combining functions of battery charger, solar charger and inverter to offer reliable power support with portable size.

Its comprehensive LCD display offers user configurable such as battery charging and acceptable input voltage based on different applications.

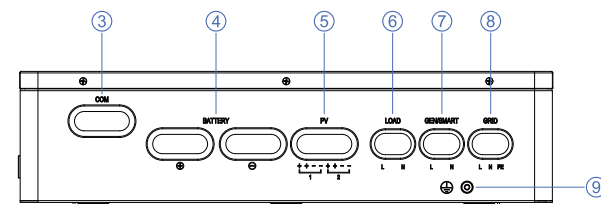
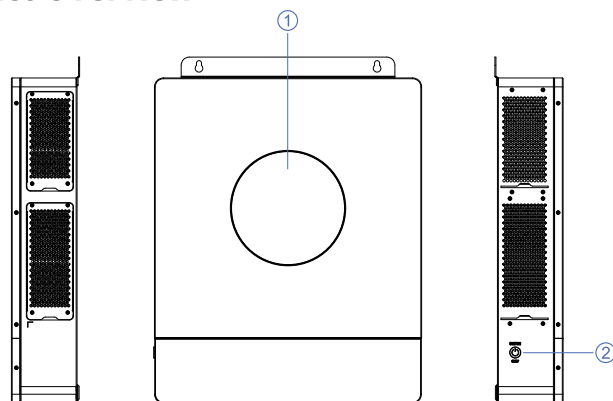
The WiFi module is a plug-and-play monitoring device to be installed on the solar inverter, With this device, users can monitor the status of the system from the mobile phone or from the website anytime anywhere.

2.1 Features

Rated power 12KW/12KVA, 14KW/14KVA and 16.8KW/16.8KVA, power factor 1

- Pure sine wave inverter
- Built-in MPPT solar charge controller
- With CAN/RS485 for BMS communication
- With the ability to work without battery
- WIFI remote monitoring
- With limit function, prevent excess power overflow to the grid
- Lithium battery activation function
- Cold start function
- Solar and Battery can power loads at the same time
- Compatible to mains voltage or generator power
- Parallel connection quantity up to 6 units (Battery must be connected)
- Intelligent cooling fan control greatly reduces fan noise
- Overload/over temperature/short circuit protection
- Small size and light weight

2.2 Product Overview



- | | | |
|-----------------|-----------------------|-------------------------------|
| ① LCD Display | ② Power On/Off Button | ③ Communication/parallel port |
| ④ Battery input | ⑤ PV input | ⑥ Load input port |
| ⑦ GEN/SMART | ⑧ Grid input | ⑨ PE connet |

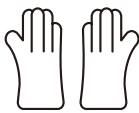
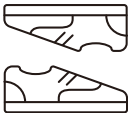
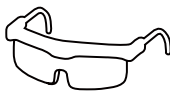
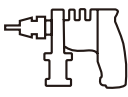
3. Installation

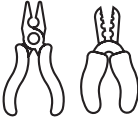
3.1 Unpacking and Inspection

3.1.1 Open-box Inspection

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

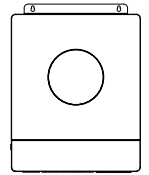
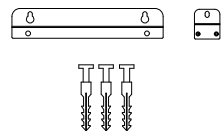
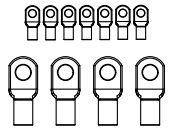
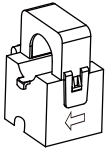
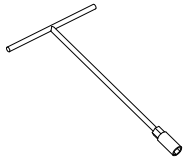
3.1.2 Installation Tools

Installation Tools	Multi-meter 	Protective gloves 	Insulated anti-smashing shoes 
	Safety glasses 	ESD wrist strap 	Hammer drill 

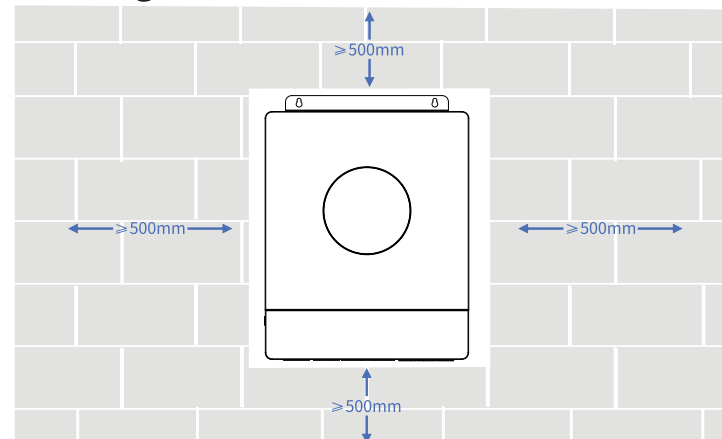
Electric screwdriver	Cross screwdriver	Rubber mallet
		
Spirit level	Wire cutter/stripper	Terminal crimping tool
		

3.1.3 Packing List

You should have received the items in the following package:

 Inverter x1	 Stainless steel anti-collision bolt (M6x40) x3 Wall mounting bracket x2	 User manual x1
 O-shaped terminal (M5) x7 and (M8) x4	 Parallel communication cable x1	 CT (optional) x1
 PV unlock wrench x1		

3.2 Mounting Unit



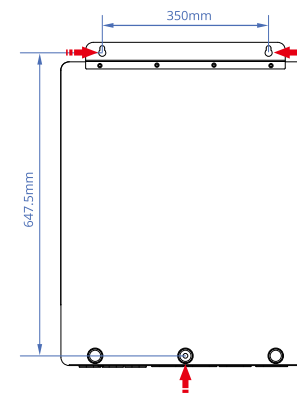
Consider the following points before selecting where to install:

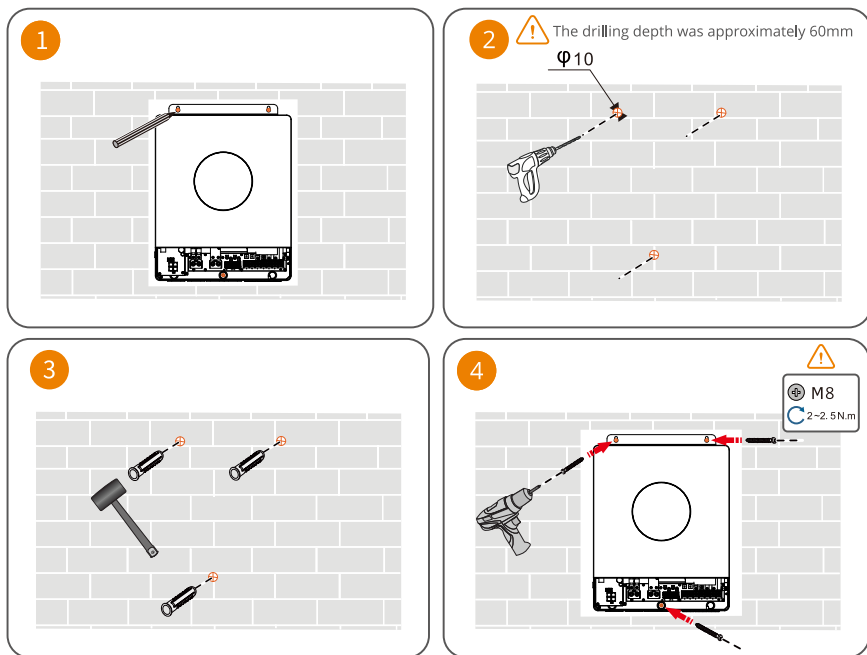
- Do not mount the solar inverter on flammable construction materials.
- Mount on a solid surface.
- Install this solar inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature should be between -10°C and 55°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure to keep other objects and surfaces as shown in the diagram above to guarantee sufficient heat dissipation and to have enough space for removing wires.

Follow the installation steps:

Choose the recommend drill head (as shown in below pic) to drill 3 holes on the wall, 60mm deep.

1. Use a proper hammer to fit the expansion bolt into the holes
2. Carry the solar inverter and holding it, make sure the hanger aim at the expansion bolt, fix the solar inverter on the wall.
3. Fasten the screw head of the expansion bolt to finish the mounting.





WARNING!

Inverter is suitable for mounting on concrete or other non-combustible surface only.

3.3 PV Connection



CAUTION!

Before connecting to PV modules, please install a separate DC circuit breaker between solar inverter and PV modules.



WARNING!

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



WARNING!

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



WARNING!

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



WARNING!

All wiring must be performed by a qualified personnel.



WARNING!

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

Model	Wire Size/Circuit breaker	Cable(mm ²)
12KW/14KW/16.8KW	10AWG/4P-36A	6

PV Module Selection:

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

1. Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of solar inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than start-up voltage.

Model	12KW/14KW/16.8KW
Max. PV Array Open Circuit Voltage	500Vdc
Start-up Voltage	85Vdc
PV Array MPPT Voltage Range	85Vdc~450Vdc

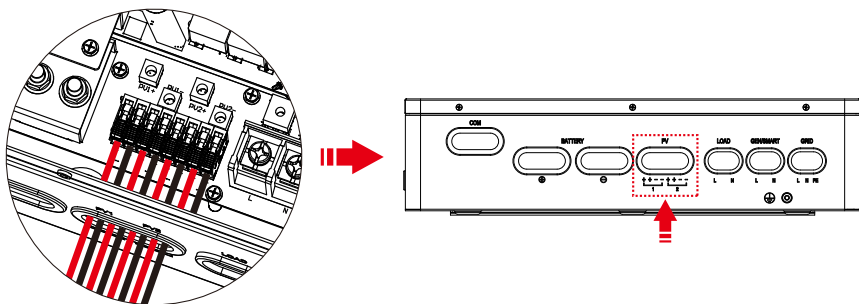


WARNING!

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

Please follow below steps to implement PV module connection

1. Before making PV port connection, be sure to turn off DC breaker or disconnect first.
2. Use multi-meter check to ensure the polarities are correct.
3. Insert PV cables according to polarities indicated on terminal block, shown as picture below.



4. Make sure the wires are securely connected.



To avoid any malfunction, do not connect any PV modules with possible current leakage to the Inverter. For example, grounded PV modules will cause current leakage to the Inverter. When using PV modules, please ensure the PV+ & PV- of solar panel is not connected to the system ground bar.



It is requested to use PV junction box with surge protection. Otherwise, it will cause damage on Inverter when lightning occurs on PV modules.

3.4 Battery Connection

CAUTION!



For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and solar inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection installed. The recommended size of protector or disconnect as shown below.



WARNING!

All wiring must be performed by a qualified person.



WARNING!

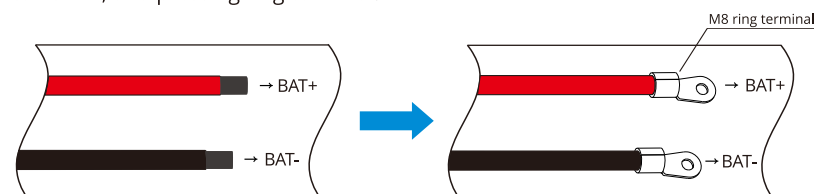
It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and DC circuit breaker as below. The cable color mentioned below is for typical reference.

Model	Wire Size/Circuit breaker	Cable(mm ²)	Torque value(max)
12KW	2AWG/4P-400A	35*2	24.5Nm
14KW	1AWG/4P-500A	50*2	24.5Nm
16.8KW(48V)	1AWG/4P-500A	50*2	24.5Nm

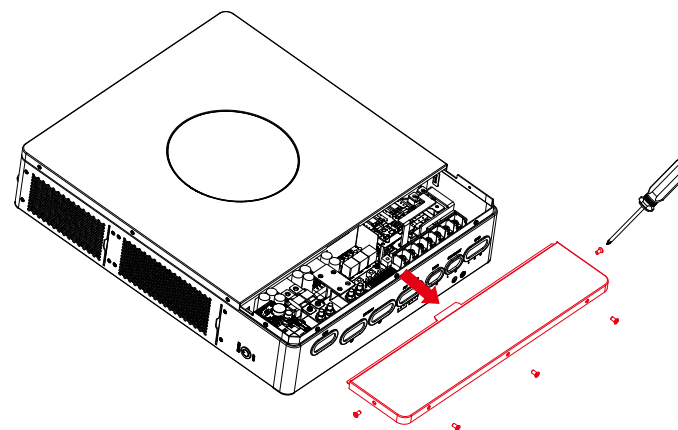
Note: For lead acid battery, the recommended charge current is 0.3C (Csbattery capacity)

Please follow below steps to implement Battery connection

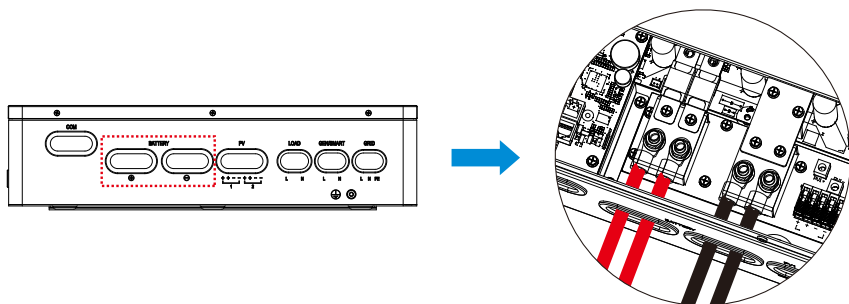
1. Please choose a suitable battery cable with correct connector which can well fit into the battery terminals.
2. Remove insulation sleeve 12mm from the head of cables, shorten the conductor part to 10mm, and pressing ring terminal.



3. Use a suitable screwdriver to unscrew the bolts and fit the battery connectors in, then fasten the bolt by the screwdriver, make sure the bolts are tightened with torque of 24.5 Nm in clockwise direction.
4. Before connecting all wires, please remove the corresponding wiring bin as shown below.



5. Make sure polarity at both the battery and solar inverter is correctly connected.



6. Connect all battery packs as units requires. It's suggested to connect at least 300Ah capacity battery.



WARNING! Shock Hazard

Installation must be performed with care due to high battery voltage.



CAUTION!

Do not place anything between the flat part of the solar inverter terminal and the DT terminal. Otherwise, overheating may occur.



CAUTION!

Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.



CAUTION!

Before making the final DC connection or closing DC breaker or disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

3.5 AC Input/Output Connection



CAUTION!!

Before connecting to Grid input power source, please install a separate AC breaker between inverter and Grid input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of Grid input. The recommended spec of AC breaker as shown below.



CAUTION!!

There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.



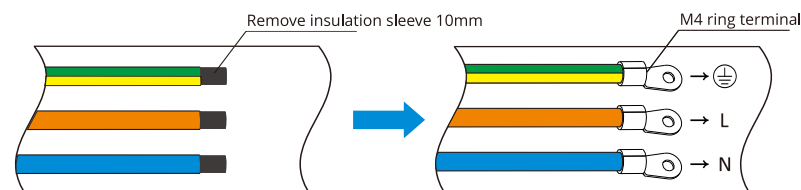
WARNING!!

All wiring must be performed by qualified personnel. It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size and AC circuit breaker as below.

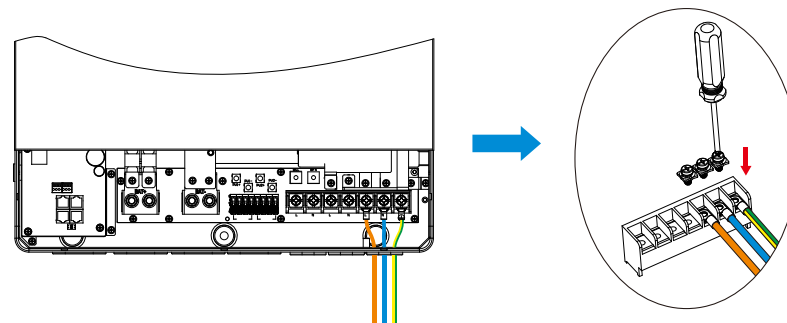
Model	Wire Size/Circuit breaker	Cable(mm ²)	Torque value(max)
12KW	4AWG/2P-100A	25	5Nm
14KW	4AWG/2P-120A	25	5Nm
16.8KW	4AWG/2P-120A	25	5Nm

Please follow below steps to implement AC input/output connection:

1. Before making Grid input/Load connection, be sure to turn off AC breaker or DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And pressing ring terminal.

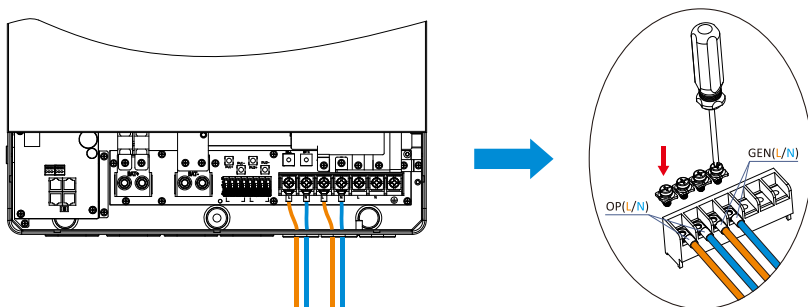


3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⊕) first.





4. Then, insert Load and Generator/OPS(Smart load) input wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⊥) first.



CAUTION!!

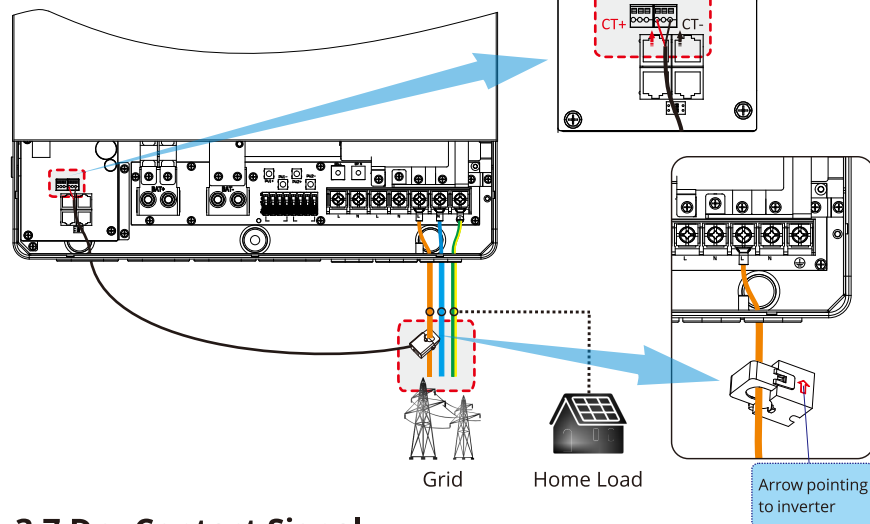


CAUTION!!

Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits.

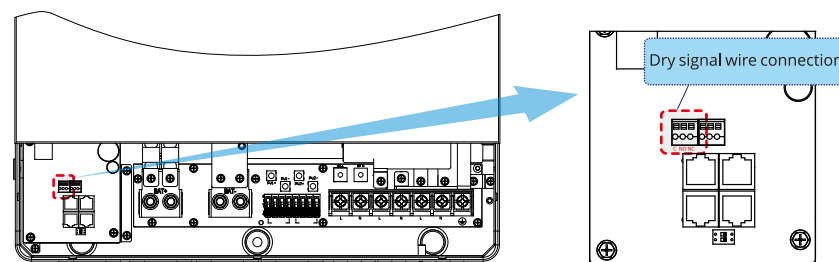
If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it's equipped with time-delay function before installation.

Otherwise, this inverter/charger will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.



3.7 Dry Contact Signal

There is one dry contact (3A/250VAC) available on the inverter.

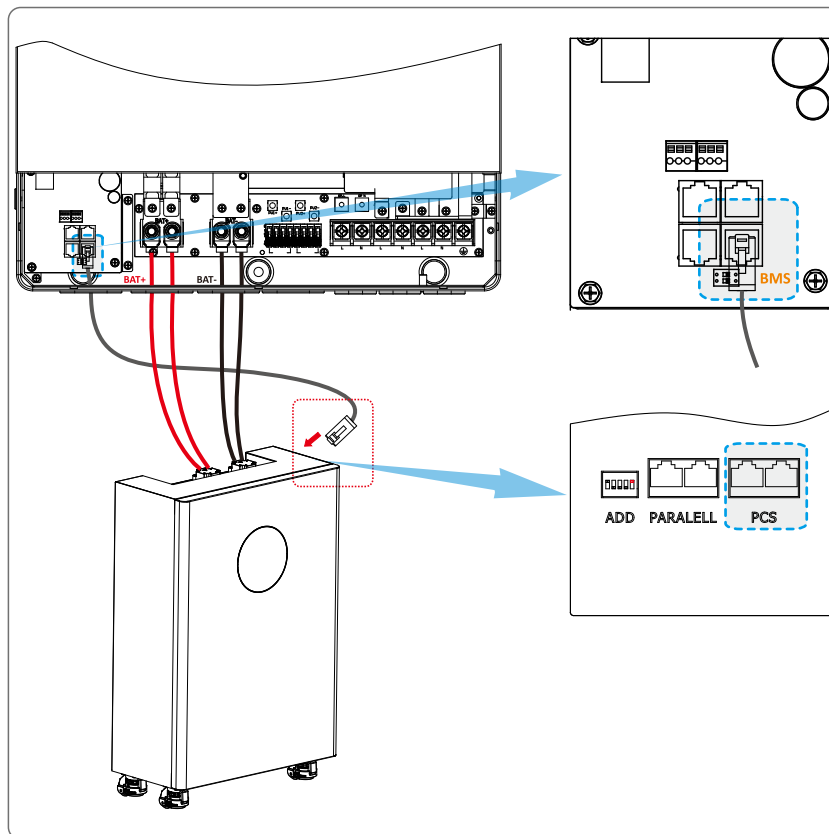


Unit Status	Condition	Dry contact port: 	
		NO & C	NC & C
Power Off	Unit is off and no output is powered.	Close	Open
Power On	Battery voltage < Cut-off voltage setting value	Open	Close
	Battery voltage > Cut-off back voltage setting value or battery charging reaches floating stage	Close	Open

3.8 Lithium Battery Connection

It is allowed to connect lithium battery and build communication only which it has been configured. Please follow bellow steps to configure communication between lithium battery and inverter.

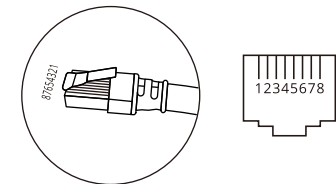
1. Connect power cable between lithium battery and inverter, Please pay attention to the terminals of positive and negative. Make sure the positive terminal of battery is connected to the positive terminal of inverter, and the negative terminal of battery is connected to the negative terminal of inverter.
2. The communication cable is bundled with lithium battery. Both sides are RJ45 port. One port is connected to the BMS port of inverter and another one is connected to the PCS port of lithium battery



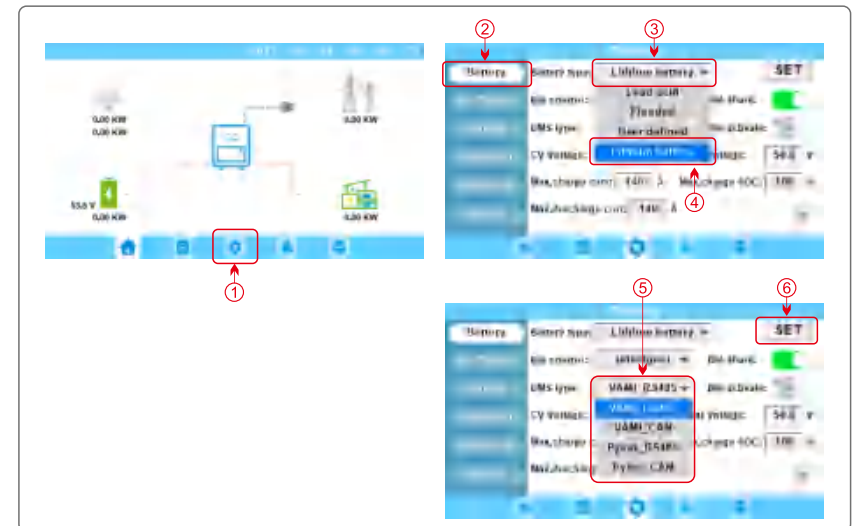
Note: Before connect the communication cable, check the BMS communication port(RJ45) definitions of lithium battery, ensure it is the same as the inverter as follows, otherwise, you need to replace it with a matching cable.

No.	BMS Port Pin
1	RS485-B
2	RS485-A
3	---
4	CAN-H
5	CAN-L
6	COM_GND
7	RS485-A
8	RS485-B

BMS Port(RJ45): CAN/RS485



4. Power up lithium battery and inverter, configure battery type to "Lithium battery", and BMS type to "RS485" or "CAN" in LCD as below:



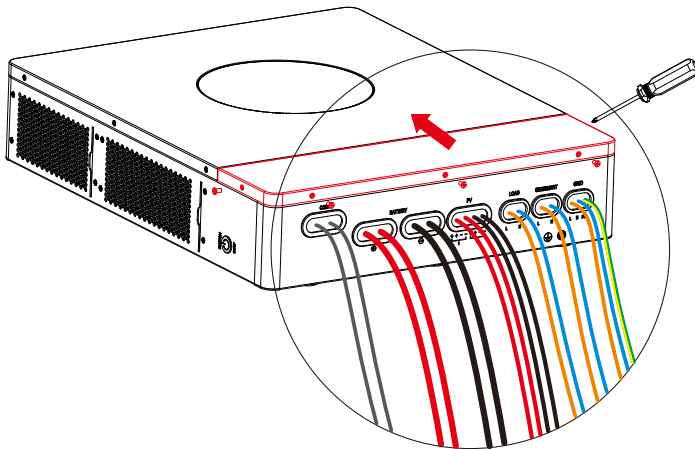
And then LCD will show you lithium battery "SOC%" icon as below, it means lithium battery communication successful.



5. Finally, you can see the Lithium battery datas in the communication system in LCD as below:

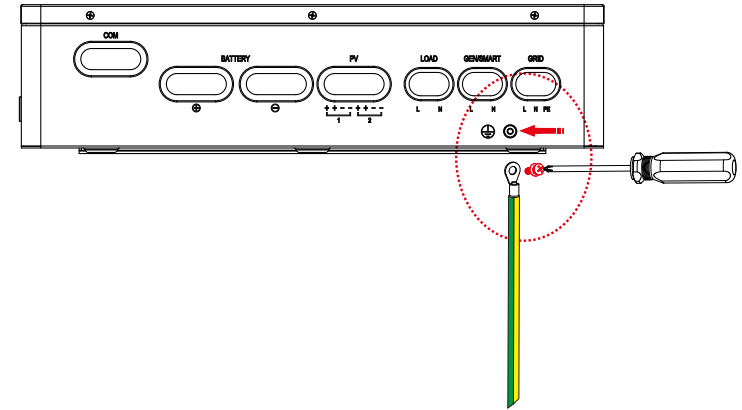


6. After connecting all wires, please cover the corresponding wiring bin as shown below.



3.10 Earth Connection(mandatory)

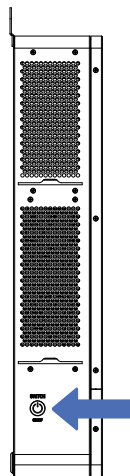
Ground cable shall be connected to ground plate on grid side this prevents electric shock if the original protective conductor fails.



4. Operation

4.1 Power ON/OFF

Once the unit has been properly installed and the batteries are connected well, simply press ON/OFF switch (located on the button of the case) to turn on the unit.



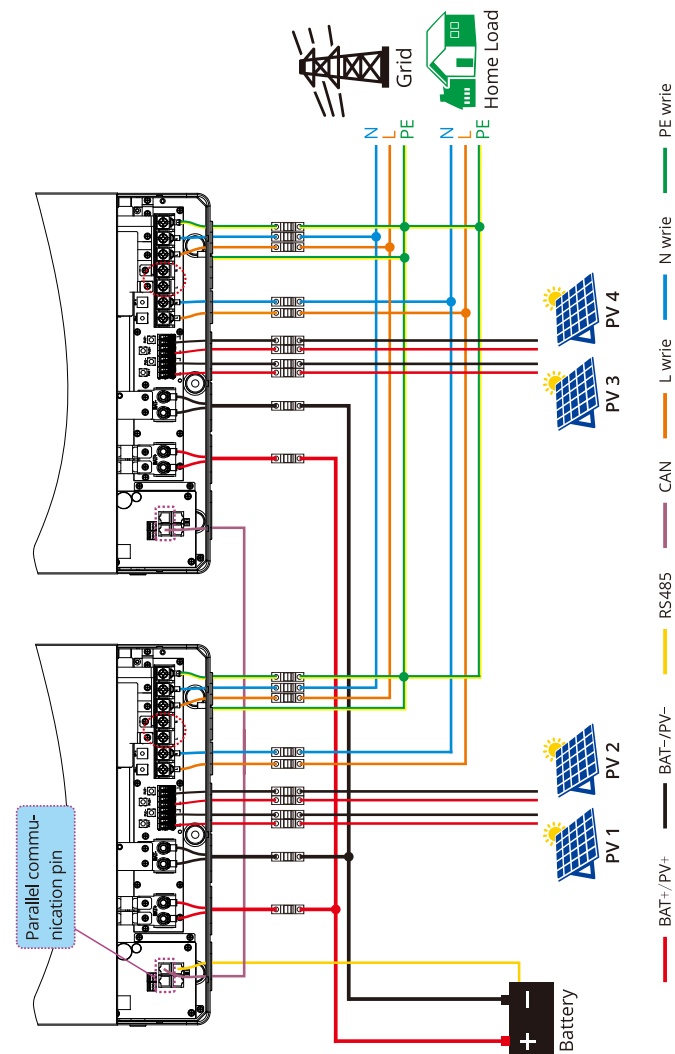
4.2 Parallel Function Connection

Support up to 6 units to composed single phase parallel system or three phase parallel system, for parallel system setup.

Step 1. Cable connection:

1. Connect all power wires according to "Chapter 3. Installation" for every inverter.
2. Connect all inverter to single phase parallel system or three phase parallel system as below:

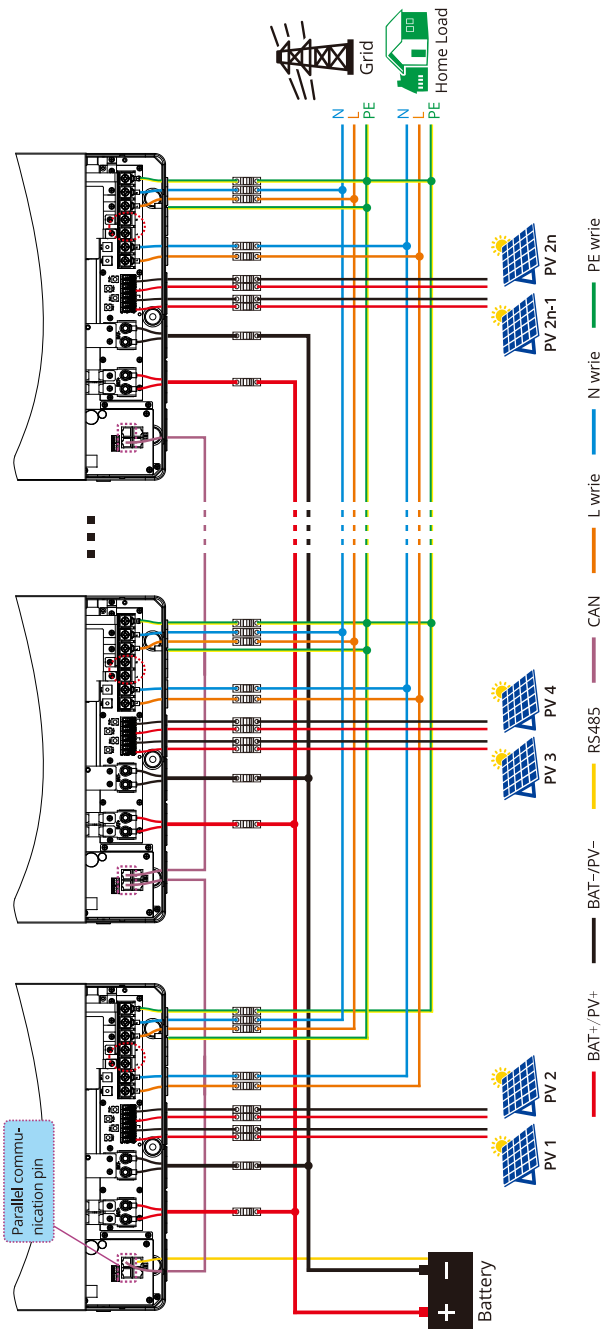
Single Phase Parallel connection diagram for two inverters in parallel.



WARNING!! Strictly maintain insulation between PV ports in parallel systems. A single PV module's positive (+) and negative (-) lines **MUST NOT** be connected to PV ports of two or more inverters in the parallel configuration.

Note: Before starting up inverters, please connect all positive (+) and negative (-) wires of battery together.

Single Phase Parallel connection diagram for three to six inverters in parallel.

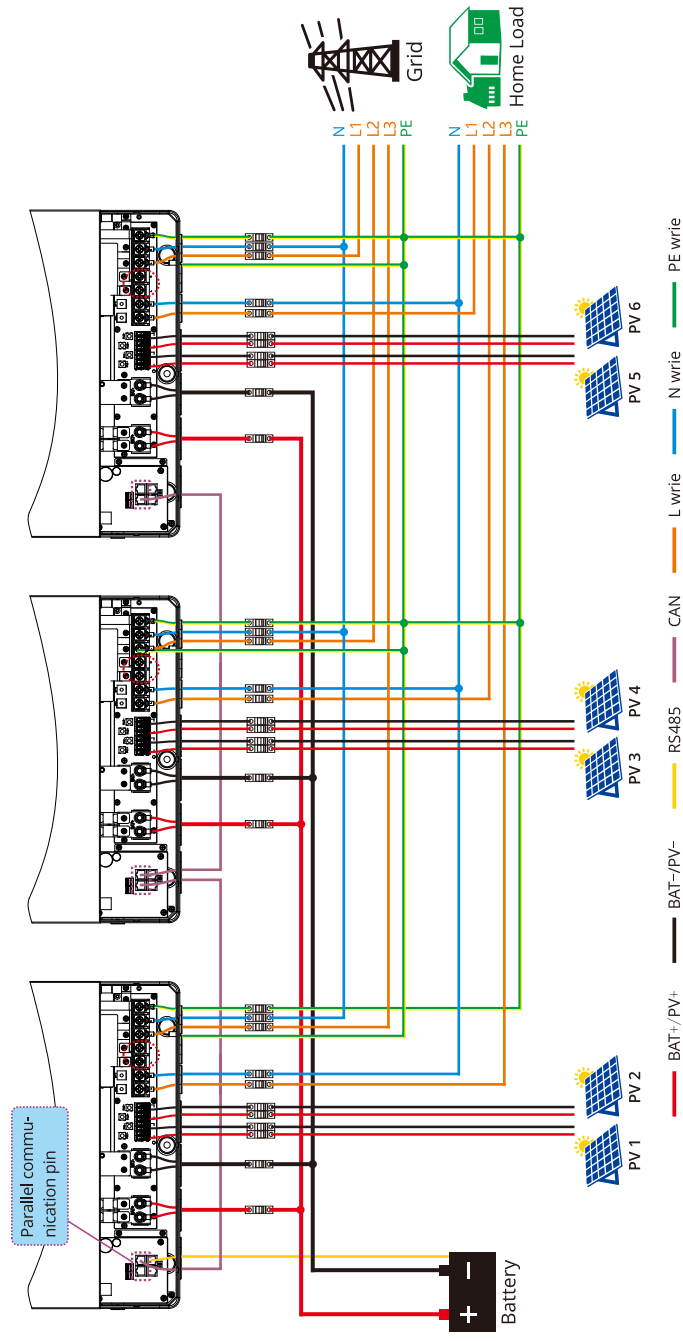


WARNING!! Strictly maintain insulation between PV ports in parallel systems. A single PV module's positive (+) and negative (-) lines MUST NOT be connected to PV ports of two or more inverters in the parallel configuration.

Note:

1. "n" is the number of parallel connections of the inverters.
2. Before starting up inverters, please connect all positive (+) and negative (-) wires of battery together.

Three Phase Parallel connection diagram for three inverters in parallel.



WARNING!! Strictly maintain insulation between PV ports in parallel systems. A single PV module's positive (+) and negative (-) lines MUST NOT be connected to PV ports of two or more inverters in the parallel configuration.

Note: Before starting up inverters, please connect all positive (+) and negative (-) wires of battery together.



1. "n1"/"n2""n3" is the number of parallel units for P1/P2/P3 phase.

1. The number of parallel units for 1 MW ZN is 300.
2. Before starting up inverters, please connect all positive (+) and negative (-) wires of battery together.
3. 6KVA each inverter must be connected to a separate photovoltaic; 12KVA/16.8KVA each inverter must be connected to two separate photovoltaics.
4. Each phase is connected with at least one, a maximum of 4 parallel units for same phase; and a maximum of 6 parallel units for three phases.

Parallel communication cable x1

Solar Inverter || 25

4. And then LCD will show you "M" or "S" icon, it will also show you "L1", "L2" or "L3" icon only in three phase parallel system, it means Parallel system seting successfull, as below:



Master of single phase parallel system



Slave of single phase parallel system



Master and L1 phase of three phase parallel system



Slave and L1 phase of three phase parallel system



Slave and L2 phase of three phase parallel system



Slave and L3 phase of three phase parallel system

Step 4. Start-up parallel system :

1. Check the all power wires connection, ensure the all connection is correct.



WARNING!

Strictly maintain insulation between PV ports in parallel systems. A single PV module's positive (+) and negative (-) lines **MUST NOT** be connected to PV ports of two or more inverters in the parallel configuration.

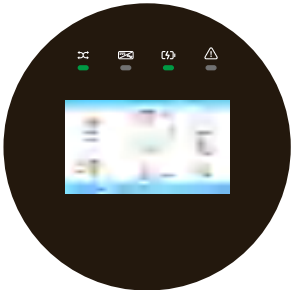


WARNING!
Please connect all positive (+) and negative (-) wires of battery together.

2. Turn on the AC output circuit breaker, PV input circuit breaker and AC input circuit breaker in sequence.
3. Check whether each inverter output normally (such as: input/output voltage, Load, charging and discharging current, etc).

4.3 Display Panel

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



LED Indicator		State	Description
	Green led	solid	Inverter is running in utility mode.
		flash	Inverter is running in generator mode.
	Green led	solid	Inverter is running in off-grid mode.
		flash	Inverter is running in stand-by mode.
	Green led	solid	Battery is fully charged.
		flash	Battery is in charging.
	Red led	solid	Fault happened.
		flash	Warning happened.

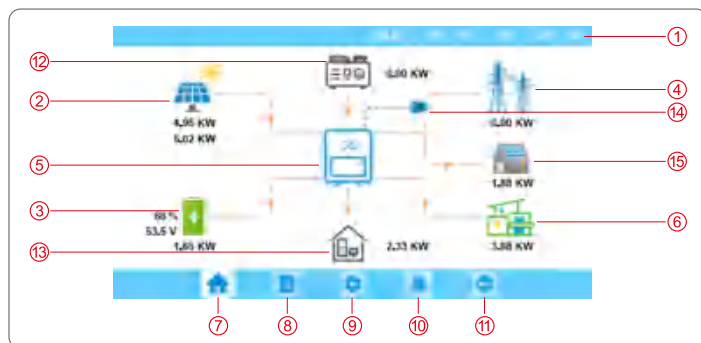
4.4 LCD Display

4.4.1 Main Screen

The main screen showing the info including Solar, Battery, Grid and Load. It's also displaying the energy flow direction by arrow.

1. PV power and Load power always keep positive.
2. Battery power positive means charge, negative means discharge.
3. Grid power negative means sell to grid, positive means get from grid.

The LCD is touchscreen, below screen shows the overall information of the inverter.

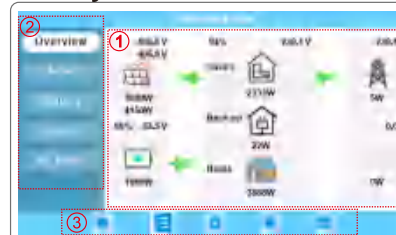


- | | | | | |
|-------------|--------------|-------------------|-------------|------------------|
| ① Time | ② Solar Icon | ③ Battery Icon | ④ Grid Icon | ⑤ Inverter Icon |
| ⑥ Load Icon | ⑦ Home | ⑧ Information | ⑨ Settings | ⑩ Fault Record |
| ⑪ Other | ⑫ Gen Icon | ⑬ Smart Load Icon | ⑭ CT Icon | ⑮ Home Load Icon |

1. At the top of the screen is the time.
 2. Solar Icon: Press this Icon, you can enter into the PV Information Page.
 3. Battery Icon: Press this Icon, you can enter into the Battery Information Page.
 4. Grid Icon: Press this Icon, you can enter into the AC Input Information Page.
 5. Inverter Icon: Press this Icon, you can see the overall operation information of the inverter.
 6. Load Icon: Press this Icon, you can enter into the Output Information Page.
- Note:** The ICONS for PV, Grid, Battery, and Load will always be displayed on the Home page, and gray indicates no connection.
7. Home: Click to enter the home page.
 8. Information: Click to enter the system real-time information page.
 9. Settings: Click to enter the system Settings page, you can set parameters related to the battery, output, and electricity meter, as well as other configuration parameters.
 10. Fault Record: Click to view the latest ten fault records.
 11. Other: Click to view device information.
 12. Gen Icon: Press this Icon, you can enter into the AC Input Information Page.
 13. Smart Load Icon: Press this Icon, you can enter into the Output Information Page.
 14. CT Icon: When set to "CT", the CT icon will appear on the Home page. The CT icon will turn blue when the grid is connected, otherwise it will turn gray.
 15. Home Load Icon: Press this Icon, you can enter into the Output Information Page.

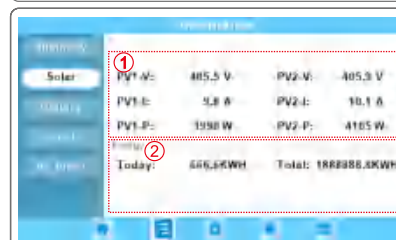
Note: All fault information and warning information except "W04 BatUnder" will be displayed in the blank area to the left of the inverter icon.

4.4.2 System information



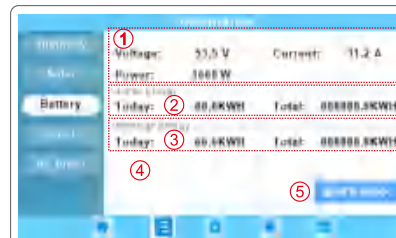
This is Inverter Panel detail page.

- ① Summarized real-time operating data of the inverter.
- ② Click to access the corresponding data details page.
- ③ Click to access the corresponding function display page.



This is Solar Panel detail page.

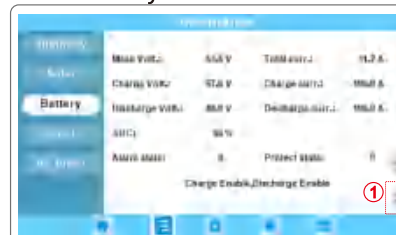
- ① Voltage, Current, Power for each MPPT.
- ② Solar Panel energy for Day and Total.



This is Battery Panel detail page.

- ① Voltage, Current, Power for Battery.
- ② Battery charge energy for Day and Total.
- ③ Battery discharge energy for Day and Total.
- ④ The alarm "W04 BatUnder" will be displayed here.
- ⑤ After successful BMS communication, you can enter the BMS information page.

BMS Summary Data:

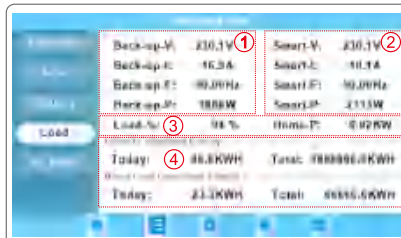


Note:

- ① The "⏏" button will only appear when the RS485 protocol is selected. You can access the BMS Details Page only by clicking this "⏏" button.

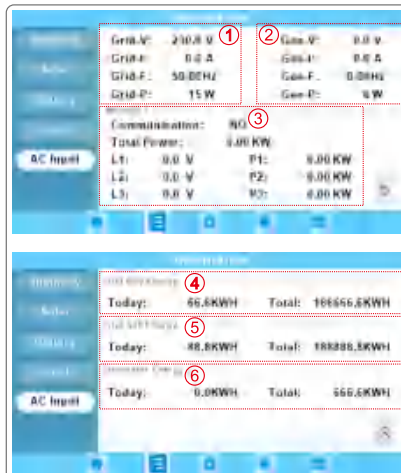
BMS Details Data:





This is Output Panel detail page.

- ① Voltage, Current, frequency, Power for Load.
- ② Voltage, Current, frequency, Power for Smart Load.
- ③ Total Output Percentage and Home Load Power.
- ④ Output/Home Load Panel energy for Day and Total.



This is AC Input Panel detail page.

- ① Voltage, Current, frequency, Power for Grid.
- ② Voltage, Current, frequency, Power for Generator.
- ③ Meter Communication Status, as well as Voltage and Power of the Meter/CT.
- ④ Energy from Grid to Inverter.
- ⑤ Energy from Inverter to grid.
- ⑥ Generator Panel energy for Day and Total.

4.4.3 System Settings

After setting the parameters for all configuration items, you must click the "SET" button to ensure the settings are successfully applied.



Battery type: Optional include Lead acid, Flooded, User defined and Lithium battery (default).

Bat control: You can choose Intelligent(default), Battery Voltage or Battery SOC%.

Note: All settings (Volt/SOC) will control the charging/discharging status based on this selected value. When "Intelligent" is selected, control will be based on SOC if BMS communication is successful; other-wise, it will be controlled by voltage.

Bat share: Click Enable(default)/Disable.

Note: In a parallel system, this function must be enabled when batteries are operated in parallel packs; conversely, it should be disabled when the batteries are used independently.

BMS type: Optional include VAMI RS485, VAMI CAN(default) and Pylon RS485 and Pylon CAN.

Bat activate: This feature will help recover a battery that is over discharged by slowly charging from the solar array or grid.

Charge limit: The Max. charge current from battery.

Max. Charge SOC: The Max. charge SOC from battery.

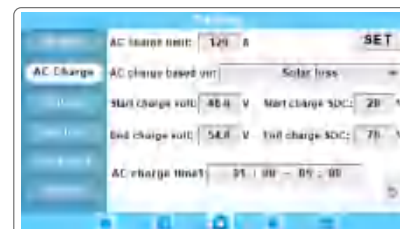
Cut-off volt/SOC: End of discharge Cut off voltage/SOC in on-grid and off-grid condition respectively.

Cut-off back volt/SOC: Restore the voltage/SOC values for discharge in on-grid condition.

Recommended battery settings

(The following voltage can only be set under user-defined and lithium battery conditions)

Battery Type	C.V. Voltage	Float Voltage	Cut-Off Voltage
Lead acid	28.2V/56.4V	27.0V/54.0V	21.0V/42.0V
Flooded	29.2V/58.4V	27.0V/54.0V	21.0V/42.0V
Lithium	Follow its BMS voltage parameters		



AC Charge limit: The Max. AC charge current from battery.

AC charge based on:

Disable: The system will not use AC to charge the battery(except BMS set force charge flag);

Always: Grid always allows battery charging;

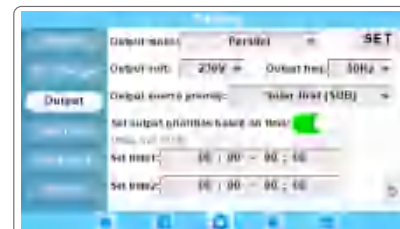
Solar loss: Grid is only allowed to charge the battery after the PV power supply is lost;

According to Battery Voltage/SOC: During the setting voltage/SOC, system will use AC to charge the battery if battery voltage/SOC is lower than AC Charge Start Battery Voltage/SOC and will stop when Voltage/SOC is higher than AC Charge End Battery Voltage/SOC;

According to Time: During the setting time, system will use AC to charge the battery until battery full;

According to Battery Voltage/SOC and Time: During the setting time, system will use AC to charge the battery if battery Voltage/SOC is lower than AC Charge Start Battery Voltage/SOC and will stop when Voltage/SOC is higher than AC Charge End Battery Voltage/SOC.

Note: When operating in Solar-Battery-Utility Mode, the battery will prioritize powering the load rather than charging.



Output mode: Optional include Single, Parallel, L1 of three phase L2 of three phase and L3 of three phase.

Output voltage: Optional include 220V, 230V and 240V.

Output frequency: Optional include 50Hz and 60Hz.

Output source priority:

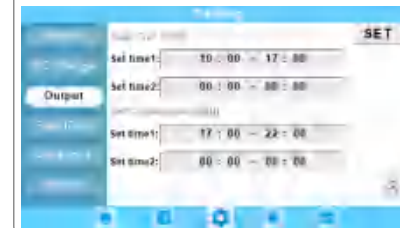
Utility first: Utility provides power to the loads first. PV and battery will provide power to loads only when utility is not available;

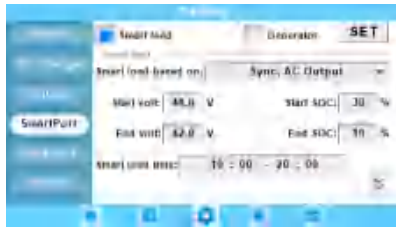
Solar first: PV provides power to the loads first. If PV is not sufficient, utility will supply power to the loads at the same time. Battery will provide power to loads only when utility is not available;

Solar-Battery-Utility: PV provides power to the loads first. If PV is not sufficient, battery will supply power to the loads at the same time. Utility provides power to the loads only when battery voltage/SOC drops to the Cut-off voltage/SOC in on-grid.

Set output priorities based on Time: After being enabled, the load will be carried according to the corresponding output priority within the specified time period.

NOTE: 1. When the start time and the end time are the same, the setting will not take effect; 2. When the time settings of different output priorities overlap, the "Utility first" will be given precedence, followed by the "Solar first".





NOTE: The Smart Load terminal is multiplexed as the second-output and the generator input, and only one of the two functions can be used.

For the smart load function:

Disable: The system will not use the smart load function;

Synchronization AC Output: The smart load will switch on and off following the main load;

According to Battery Voltage/SOC: During the setting voltage/SOC, system will activate the smart load function if battery voltage/SOC is higher than Start Battery Voltage/SOC and will turn off the smart load output when Voltage/SOC is lower than End Battery Voltage/SOC;

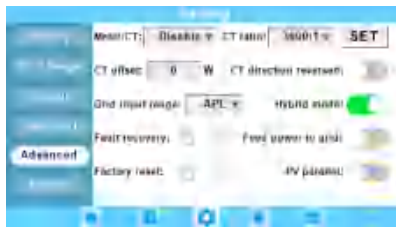
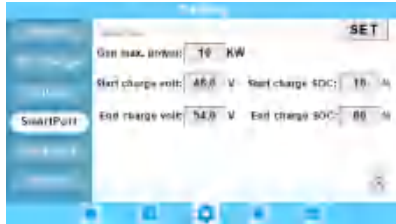
According to Time: During the setting time, system will use AC to charge the battery until battery full;

According to Battery Voltage/SOC and Time: During the setting time, system will activate the smart load function if battery voltage/SOC is higher than Start Battery Voltage/SOC and will turn off the smart load output when Voltage/SOC is lower than End Battery Voltage/SOC.

For the Generator function:

Gen Max. Power: The Max. input power from generator.

Start/End charge Voltage/SOC: System will use Generator to charge the battery if battery voltage/SOC is lower than Start Battery Voltage/SOC and will stop when Voltage/SOC is higher than End Battery Voltage/SOC.



Meter or CT: Optional include Disable, Meter and CT.

CT ratio: Optional include 1000:1, 2000:1 and 3000:1.

CT offset: Compensate for the deviation of CT sampling.

CT direction reversed: When the CT is installed on the wrong direction, installer can modify it by selecting it, no need reconnect.

Grid input range: Optional include APL and UPS. APL should be selected, when the utility is not well.

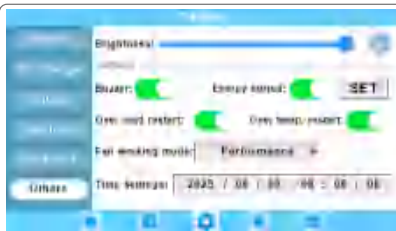
Hybrid mode: When enabled, the system will operate on grid mode.

Feed power to grid: When enabled, inverter is allowed to feed exceeding solar power to grid.

PV parallel: When enabled, the two MPPT will be used in parallel.

Fault recovery: Settings require unlocking, and the unlock password is 666666. If selected, the inverter will exit the fault state and start up again.

Factory reset: Settings require unlocking, and the unlock password is 888888.



Brightness: Swipe to set screen brightness.

Fan working mode: Optional include Performance, Balance and Silence.

Buzzer: Click Enable/Disable.

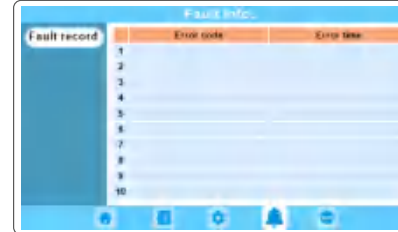
Over load restart: Click Enable/Disable.

Over temperature restart: Click Enable/Disable.

Energy stored function: Click Enable/Disable.

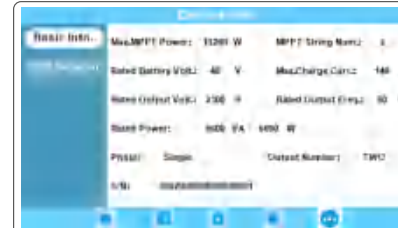
Time settings: Click to set the time in the pop-up window.

4.4.4 Fault Record

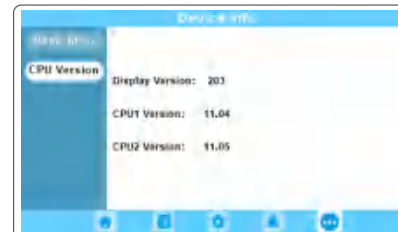


Current and historical faults can be viewed on this page.

4.4.5 Device Information



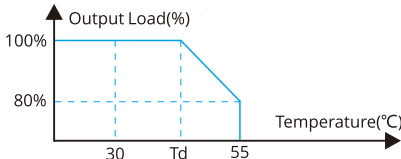
This is Basic Information page.

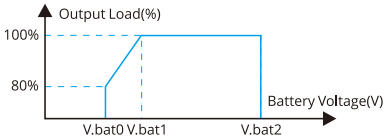
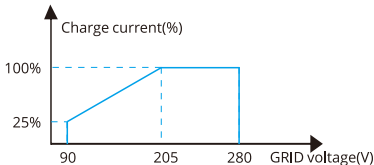


This is CPU Version page.

5. SPECIFICATIONS

Model	12KW	14KW	16.8KW
Rated battery voltage	48V		
Line Specifications			
Max. Input power[VA/W]	27600		
Input voltage range[Vac]	90-280		
Nominal input voltage[Vac]	230		
Input voltage waveform	Sinusoidal (utility or generator)		
Low line voltage disconnect[Vac]	Home Appliances(APL): 90±3; Computers(UPS):170±3		
Low loss voltage re-connect[Vac]	Home Appliances(APL): 100±3; Computers(UPS):180±3		
High line voltage disconnect[Vac]	280±3		
High line voltage re-connect[Vac]	270±3		
Max AC input voltage[Vac]	280±3		
Max. Bypass overload current[A]	120		
Max. Bypass input current[A]	120		
Max. Inverter/rectifier current[A]	100		
Efficiency (line mode)	>95%(Rated R load, battery full charged)		
Transfer time (single unit)[ms]	10 typical (UPS); 20 typical (Appliances)		
Transfer time (parallel)[ms]	50 (typical)		
Pass through without battery	Yes		
Nominal input frequency[Hz]	50/60(Auto detection)		
Low line frequency disconnect[Hz]	40±1		
Low line frequency re-connect[Hz]	42±1		
High line frequency disconnect[Hz]	65±1		
High line frequency re-connect[Hz]	63±1		
PV String Input Specifications			
Max. Input power[W]	12000+12000	12600+12600	
Max. PV open circuit voltage[VDC]	500		
PV rated voltage [VDC]	350		
Min. Startup voltage[VDC]	75		
MPPT range[VDC]	85~450		
Max.PV input current[A]	36+36		
Max.PV isc(A)	54+54		
No. of strings per MPPT tracker	2+2		
No. of MPPT trackers	2		
Max. MPPT efficiency	>99%		

Smart Port(GEN) Specifications			
Rated output power[VA/W]	12000	14000	16800
Input voltage range[Vac]	90-280		
Nominal input voltage[Vac]	230		
Input voltage waveform	Sinusoidal (utility or generator)		
Low line voltage disconnect[Vac]	Home Appliances(APL): 90±3; Computers(UPS):170±3		
Low loss voltage re-connect[Vac]	Home Appliances(APL): 100±3; Computers(UPS):180±3		
High line voltage disconnect[Vac]	280±3		
High line voltage re-connect[Vac]	270±3		
Max AC input voltage[Vac]	280±3		
Max. Input current[A]	120		
Pass through without battery	Need battery on		
Nominal Input frequency[Hz]	50/60(Auto detection)		
Low line frequency disconnect[Hz]	40±1		
Low line frequency re-connect[Hz]	42±1		
High line frequency disconnect[Hz]	65±1		
High line frequency re-connect[Hz]	63±1		
AC Output/Smart Port(Sec.Output) Specifications			
Rated output power[VA/W]	12000	14000	16800
Nominal output voltage[Vac]	220/230/240(±5%)		
Rated output current(A)	52.2	60.9	73
Max. Output current(A)	100		
Nominal output frequency(Hz)	50±0.3/60±0.3(Adjustable)		
Parallel capability	Yes, up to 6 units		
Over-Load protection(SMPS load)	5s@≥150%load; 10s@105%~150%load		
Surge rating	2* rated power for 5s		
Capable of starting electric	Yes		
Output short circuit protection	Line mode: Circuit Breaker; Battery mode: Electronic Circuits		
Output voltage waveform	Pure sine wave		
Output load limitation(@Temp.) When ambient temperature is higher than "Td(45°C)", output power will be derated. The minimum Ac output voltage is 180V.			

Output load limitation(@Bat. Voltage) When battery voltage is lower than "V.bat1", output power will be derated. The minimum AC output voltage is 180V. V.bat0: 21V/42V V.bat1: 25V/50V V.bat2: 31V/62V			
Battery Input Specifications			
Max. Input power[VA/W]	12000	14000	16800
Input voltage range[VDC]	40~60		
Nominal input voltage[VDC]	48		
Max. Discharging current[A]	240	280	300
Max. Solar charging current[A]	240	280	300
Max. Grid charging current[A]	240	280	300
Max. Charging current(PV+Grid)[A]	240	280	300
Cold start voltage[VDC]	23	46	
Low DC input shut-down voltage[VDC] (Load < 50%/@Load ≥ 50%)	43/42		
High DC input alarm & fault voltage[VDC]	62±0.4		
High DC input recovery voltage[VDC]	60±0.4		
Max.Charging/Discharging efficiency	93.5%		
Grid charging current Limitation(@Battery voltage) Relationship between battery charging current and grid voltage.			
Algorithm			
Three stage: Boost CC (Constant current stage)-> Boost CV(Constant voltage stage)-> Float FV(Constant voltage stage)			
Charging curve 			

Battery type setting	Battery Type	Boost CC/CV	Float
	AGM	56.4V	54V
	Flooded	58.4V	54V
	Self-defined	Adjustable, up to 60V	
	Lithium		
General Specifications			
Operating temperature range(°C)	-40~60, >45 Derating		
Operating humidity range(%)	0~100		
Max.Operating altitude(m)	2000		
Standby self-consumption(W)	<20		
Cooling	Smart cooling		
Noise(dB)	≤55 dB(A)		
Communication	RS485/CAN; WIFI; Dry port		
Surge Protection	DC Type III / AC Type III		
Protection degree	Ip54		
Installation style	Wall-mounted		
Warranty	3 years		
Net/Gross weight(kg)	32/36		
Product size(D*W*H)(mm)	639x524x129		
Package dimension(D*W*H)(mm)	778x629x213		

6. Warning Code Table

Warning Code	Warning Information	Audible Alarm	Trouble shooting
W01	Overload	No buzzer alarm	Reduce the loads.
W02	Grid over voltage warning	No buzzer alarm	Check whether the grid voltage exceeds the allowable range of the inverter.
W03	Remote shutdown warning	No buzzer alarm	Check if remote shutdown is enabled via WIFI. Disable the enable or restart the inverter.
W04	Battery Low Voltage	No buzzer alarm	Check if the battery voltage is below the cut-off voltage/SOC.
W05	Fan is locked (down)	No buzzer alarm	Check if the Fans wiring connected well. Replace the fan.
W06	Fan is locked (up)	No buzzer alarm	Check if the Fans wiring connected well. Replace the fan.

W07	Output not connected together in parallel mode	No buzzer alarm	Check whether the output load of the inverter is normal, and check whether the inverters are connected together in the same phase.
W08	Second output overload	No buzzer alarm	Reduce the connected load by switching off some equipment, and restart the unit, if the error happens again, please return to repair center.
W09	BMS connect fail	No buzzer alarm	Check whether the communication protocol and communication port are correct, and whether the communication line connection is normal.
W10	Parallel grid lost	No buzzer alarm	Check whether the mains input cable of the inverter is abnormal, and restart the unit, if the error happens again, please return to repair center.
W11	Meter not connected	No buzzer alarm	Check whether the communication line connection is normal.

7. Fault Code Table

Fault Code	Fault information	Trouble shooting
E01	Bus voltage is too high by software	AC Surge or internal components failed. Restart the unit, if the error happens again, please return to repair center.
E02	Bus voltage is too low	Restart the unit, if the error happens again, please return to repair center.
E03	Bus soft start fail	Internal components failed. Restart the unit, if the error happens again, please return to repair center.
E04	Bus over voltage by hardware	Internal components failed. Restart the unit, if the error happens again, please return to repair center.
E10	Inverter soft start fail	Internal components failed. Restart the unit, if the error happens again, please return to repair center.
E11	Inverter over current or surge detected by software	Restart the unit, if the error happens again, please return to repair center.
E12	Inverter over current or surge detected by hardware	Restart the unit, if the error happens again, please return to repair center.
E13	Inverter voltage is too low	Reduce the connected load. Restart the unit, if the error happens again, please return to repair center.
E14	Inverter voltage is too high	Restart the unit, if the error happens again, please return to repair center.
E15	Output short circuited	Check if wiring is connected well and remove abnormal load.

E16	Inverter current sensor failed	Restart the unit, if the error happens again, please return to repair center.
E17	Inverter negative power	Restart the unit, if the error happens again, please return to repair center.
E20	Overload time out	Reduce the connected load by switching off some equipment.
E21	OP current sensor failed	Restart the unit, if the error happens again, please return to repair center.
E23	The AC input and output wires are inversely connected	1. Please check AC input and output wires are connected correctly. 2. If this error happens during parallel installation, please check wires connection. If they are connected correctly, please finish parallel installation first, and then restart inverters. 3. If the problem remains, please contact your installer.
E24	The output relay exception	Restart the unit, if the error happens again, please return to repair center.
E30	Battery voltage is too high	Check if spec and quantity of batteries are meet requirements.
E31	Battery over current by software	Restart the unit, if the error happens again, please return to repair center.
E32	Battery over current by hardware	Restart the unit, if the error happens again, please return to repair center.
E33	Battery current sensor failed	Restart the unit, if the error happens again, please return to repair center.
E34	LLC current sensor failed	Restart the unit, if the error happens again, please return to repair center.
E35	DC/DC soft start fail	Restart the unit, if the error happens again, please return to repair center.
E36	DC/DC over current by hardware	Restart the unit, if the error happens again, please return to repair center.
E37	LLC over current by software	Restart the unit, if the error happens again, please return to repair center.
E38	LLC over current by hardware	Restart the unit, if the error happens again, please return to repair center.
E39	Battery short circuited	Reduce the number of PV modules in series.
E40	BMS data loss	Check if wiring is connected well.
E41	LLC TX wrong	Restart the unit, if the error happens again, please return to repair center.

E50	PV1 voltage is too high	Reduce the number of PV modules in series.
E51	PV2 voltage is too high	Reduce the number of PV modules in series.
E52	PV1 port short circuited	Check if wiring is connected well.
E53	PV2 port short circuited	Check if wiring is connected well.
E54	PV1 over current by software	Check if wiring is connected well.
E55	PV2 over current by software	Check if wiring is connected well.
E56	PV1 current sensor failed	Restart the unit, if the error happens again, please return to repair center.
E57	PV2 current sensor failed	Restart the unit, if the error happens again, please return to repair center.
E58	PV1 over current by hardware	Restart the unit, if the error happens again, please return to repair center.
E59	PV2 over current by hardware	Restart the unit, if the error happens again, please return to repair center.
E60	PV1 input over power	Reduce the connected load. Restart the unit, if the error happens again, please return to repair center.
E61	PV2 input over power	Reduce the connected load. Restart the unit, if the error happens again, please return to repair center.
E62	PV parallel fail	1. Check if PV parallel setting are right and restart the inverter. 2. If the problem remains, please contact your installer.
E70	Fan is locked	Check if FAN wiring is connected well. Replace the fan.
E71	Over temperature happen at PV circuit	The temperature of internal PV component is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
E72	Over temperature happen at INV circuit	The temperature of internal INV component is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
E73	Over temperature happen at Convert L circuit	The temperature of Convert L battery converter component is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
E74	Over temperature happen at Convert H circuit	The temperature of internal Convert H component is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.

E75	Over temperature happen at LLC TX	The temperature of internal DC/DC TX is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
E76	Over temperature happen at grid relay	The temperature of internal grid relay is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
E77	Over temperature happen at internal ambient temperature	The temperature of internal ambient is over the limitation. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
E80	CAN data loss	1. Check if communication cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
E81	Host data loss	
E82	Synchronization data loss	
E83	The firmware version of each inverter is not the same	1. Update all inverter firmware to the same version. 2. Check the version of each inverter via LCD setting and make sure the CPU versions are same. If not, please contact your installer to provide the firmware to update. 3. After updating, if the problem still remains, please contact your installer.
E84	The output current of each inverter is different	1. Check if sharing cables are connected well and restart the inverter. 2. If the problem remains, please contact your installer.
E85	AC output mode setting is different	1. Switch off the inverter and check LCD setting program 20. 2. For parallel system in single phase, make sure no 3P1, 3P2 or 3P3 is set on program 20. For supporting three-phase system, make sure no "PAL" is set on program 20. 3. If the problem remains, please contact your installer.
E86	AC output parallel mode setting wrong	1. Switch off the inverter and check LCD setting program 20. 2. For parallel system in single phase, make sure no 3P1, 3P2 or 3P3 is set on program 20. For supporting three-phase system, make sure no "PAL" is set on program 20. 3. If the problem remains, please contact your installer.