Off Grid Solar Inverter

User Manual

OG-1P5K-PDT

Version 1.0

About This Manual

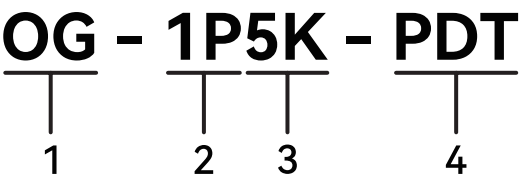
Scope of Validity

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

This manual is valid for the following inverter models:

- OG-1P5K-PDT

Model Description



1	**Product Type**	"OG" refers to Off Grid Solar Inverter.
2	**Grid Type**	"1P" refers to Single Phase.
3	**Rated Power**	"5K" refers to the rated output power of 5 kW.
4	**Type**	"P" is a Parallel Version, "D" is a Dual Output, "T" has a Built-in Power Booster.

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 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

Symbol Description

Different levels of warning messages in this manual are defined as follows:

DANGER!

Indicates a high-level hazard that, if not avoided, will result in death or serious injury.

WARNING!

Indicates a medium-level hazard that, if not avoided, could result in death or serious injury.

CAUTION!

Indicates a low-level hazard that, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates a low-level hazard that, if not avoided, could result in minor or moderate injury.

NOTE

Indicates a low-level hazard that, if not avoided, could result in minor or moderate injury.

Change History

Version 1.0 (01/12/2024)

Initial release

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Acceptable Loads Are as Below:

OG series inverter is able to supply a continuous rated output or maintain a double rated output for less than 10 seconds on back-up side to support loads. The inverter also has self-protection against derating at high ambient temperature.

*** Inductive loads and capacitive loads** can be briefly referred to as **shock loads**.

*** Shock loads** may experience shock currents or surges during startup, which can cause voltage fluctuations, current inrushes, motor vibrations, and voltage surges. These anomalies may exceed the load-bearing capacity of the inverter, resulting in damage or even failure. Therefore, it is necessary to control the total amount of inductive and capacitive loads connected to the inverter to ensure safe and stable operation.

- When selecting an inverter, the loading capacity should be taken into consideration to ensure that the total amount of connected inductive and capacitive loads fall within its rated capacity.
- When connecting **Shock loads** to the off-grid inverter, it is necessary to limit the total load capacity according to the following table to ensure safe and reliable operation of the inverter. Please refer to the table for the allowed load capacities for each load type.

Model	Continuous Output	Max. output (< 10 s)	Maximum individual Shock load power, Maximum total load power
5K 48V	5000 W	15000 VA	≤ 1.6 KVA (**Individual Shock load**) (**1Hp AC x2 or 1.5Hp x1 or 2Hp x1**) ≤ 3 KVA (Total Loads include Shockload) (**1Hp AC x2 or 1.5Hp x1**) ≤ 3.5 KVA (Total Load **without** Shock load)

WARNING!

Earth connection essential before connecting supply.
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.
Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.

NOTICE

It is important to make sure that the combined power required for all devices connected to this EPS output does not exceed the power rating of the inverter.
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 is equipped with time - delay function before installation. Otherwise, this inverter will trig overload fault and cutoff output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

1 Safety

1.1 Symbols on the Label and Inverter

Table 1-1 Symbols

Symbol	Description
	CAUTION Do not disconnect under load!
	Danger: High Voltage! Danger: Electrical Hazard!
	Delayed discharge. Wait 5 minutes after power off until the components are completely discharged.
	Read instructions carefully before performing any operation on the INVERTER.
	Grounding: The system must be firmly grounded for operator safety.

1.2 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 leadacid 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 inverter, please follow required spec to select appropriate cable size. It's very important to correctly operate this 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 AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.

13 GROUNDING INSTRUCTIONS -This inverter should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.

14 NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.

15 Make sure the inverter is completely assembled, before the operation.

2 Introduction

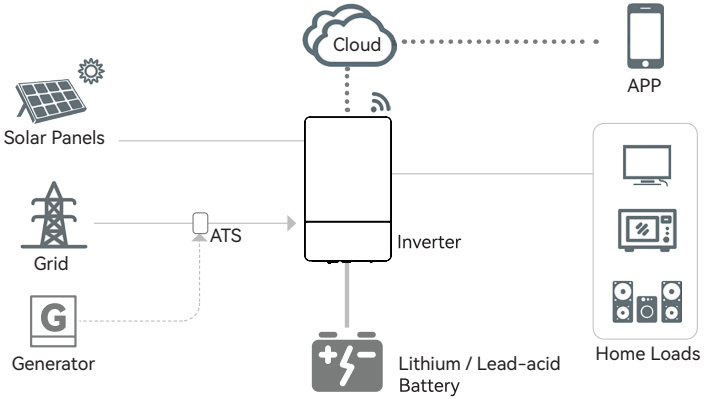


Figure 2-1 Off Grid Solar Energy Storage System

This is a multifunctional solar inverter, integrated with a MPPT solar charge controller, a high frequency pure sine wave inverter and a UPS function module in one machine, which is perfect for off grid backup power and self-consumption applications. This inverter can work with or without batteries.

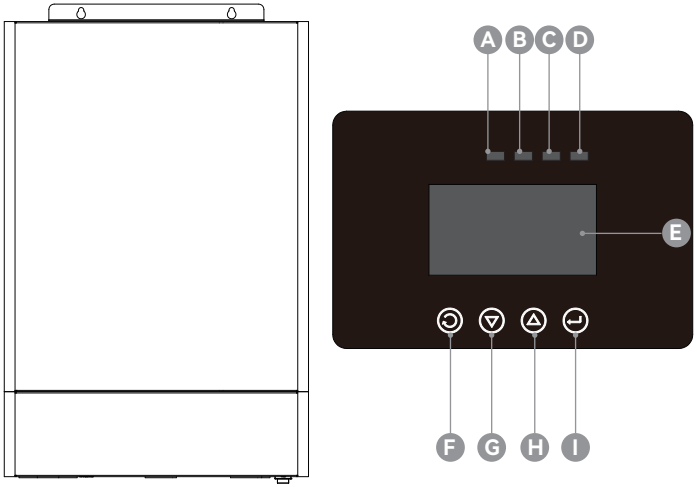
The whole system also need other devices to achieve complete running such as PV modules, generator, or utility grid. Please consult with your system integrator for other possible system architectures depending on your requirements. The WiFi / GPRS module is a plug-and-play monitoring device to be installed on the inverter. With this device, users can monitor the status of the PV system from the mobile phone or from the website anytime anywhere.

2.1 Features

- Pure sine wave AC output
- High frequency inverter with small size and light weight.
- Solar and utility grid can power loads at the same time
- Dual AC output
- Feed-in to grid
- Parallel operation up to 9 units (only with battery connected)
- With CAN/RS485 for BMS communication
- With the ability to work without battery
- WIFI/GPRS remote monitoring (optional)

2.2 Product Overview

2.2.1 Panel

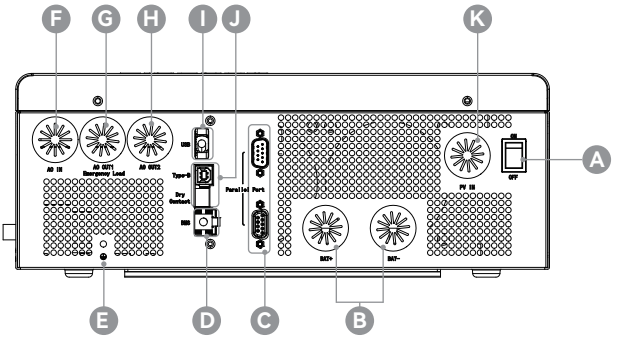


A	AC Indicator	D	Fault Indicator	G	Up Button
B	Invert Indicator	E	LCD Display	H	Down Button
C	Charging Indicator	F	ESC Button	I	Enter Button

Figure 2-2 LED Panel

2.2.2 Terminals Description

OG-1P5K-PDT



A	Power On/Off Switch	E	PE	I	WiFi
B	Battery Input	F	AC Input	J	Type B and Dry Contact
C	Parallel Communication Ports	G	AC Output 1 / Emergency Load	K	PV Input
D	BMS Communication Port	H	AC Output 2		

Figure 2-3 Terminals

3 Installation

3.1 Unpacking and Inspection

3.1.1 Open-box Inspection

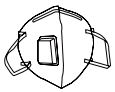
Products have been strictly tested before leaving the factory. Please sign for them after inspection. If the product is damaged, please contact the local distributor. Please open the box to check whether the outer packaging is intact or damaged, whether the internal equipment is damaged.

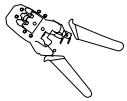
3.1.2 Installation Tools


Goggles

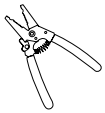

Safety shoes

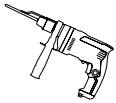

Safety gloves

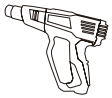

Dust mask


RJ45 crimping tool


Diagonal pliers


Wire stripper

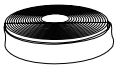

Hammer drill


Heat gun

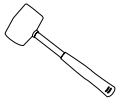

Vacuum cleaner

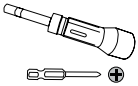

Marker

Level

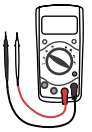

Heat shrink tube


Cable tie

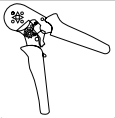

Rubber hammer

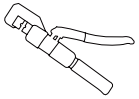

M2 M3 M4 M5

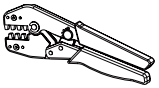
Torque wrench

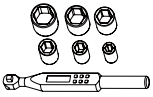

Multimeter

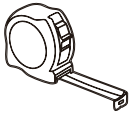

PV crimping tool


Tube type terminal crimping tool


YQK-70 hydraulic pliers


Crimping tool 4-6 m^2

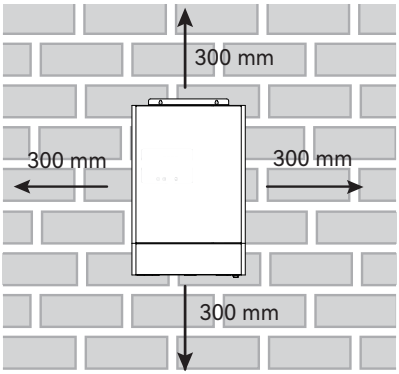

Hex socket


Measuring tape

3.1.3 Packing List

Description	Quantity
Inverter	1 pc
User Manual	1 pc
M6*50, SUS304 Expansion Screw	2 pcs
Parallel Line	1 pc
E6010 Tubular Terminal, for AC input/output, PV, Generator Input	9 pcs

3.2 Mounting Unit



Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface.
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature should be between -15℃ and 50℃ 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.

WARNING!

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

Follow the installation steps:

Step 1: Use Ø8 drilling bit drill holes on the mounting surface. The distance between 2 holes is 140 mm. Then insert the expansion screw (M6). The expansion screw*2 are in packing.

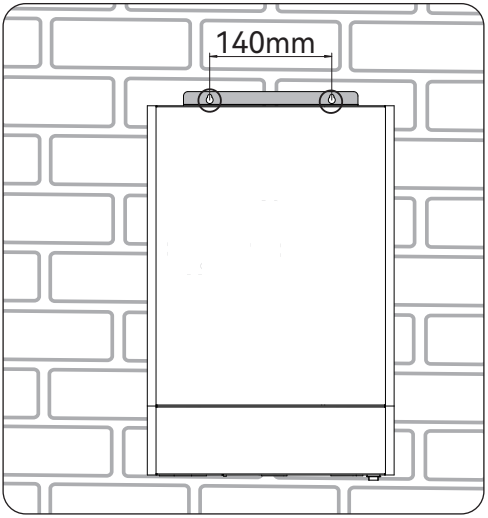


Figure 3-4 Drilling Holes

Step 2: Lock bracket on the mounting surface by screw nut.

Step 3: Lift the inverter vertically and place it on the rack through the hook on the back.

Step 4: Lock the M4 screws on the side of the inverter and rack. The screws are in pack.

Before connecting all wiring, please take off bottom cover by removing four screws as shown below:

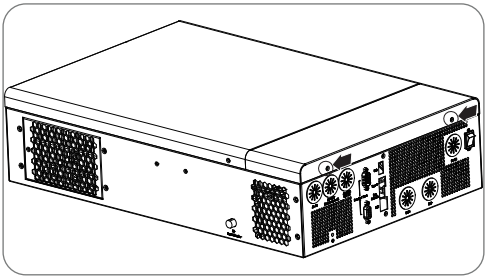


Figure 3-5 Removing Screws

3.3 AC Input / Output Connection

CAUTION!

Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 40 A for 5 kW inverter.

CAUTION!

There are three terminal blocks with 'AC IN', 'GEN /AC OUT 2', 'AC OUT 1' markings. Please do NOT mis-connect input and output connectors.

CAUTION!

Be sure to connect AC cables with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.

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 AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggestion for AC input wires

Model	Gauge	Cross Section
5 kW Inverter	10 AWG	5.26 mm^2

WARNING!

It's very important for system safety and efficient operation to use appropriate cable for AC output 1 connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggestion for AC output wires

Model	Gauge	Cross Section
5 kW Inverter	12 AWG	4 mm^2

WARNING!

Make sure AC power is disconnected before attempting to connect AC power to the unit.

All operations during the electrical connection process, as well as the specifications of cables and components used, must comply with local laws and regulations. The cable color mentioned below is for typical reference.

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

Step 1: Before making AC connection, be sure to open AC circuit breaker first.

Step 2: Remove insulation sleeve 12 mm from the head of cables, shorten the conductor part to 10 mm. Insert the cable into the tubular terminal. Then use terminal crimping tool make the terminal and cable connected tightly.

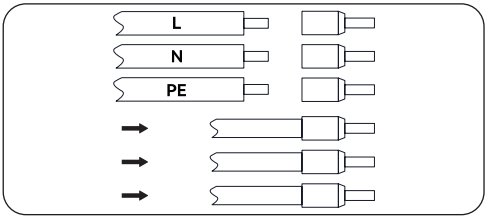


Figure 3-6 Removing Sleeve

Step 3: Insert AC input/output cables according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective cable first.

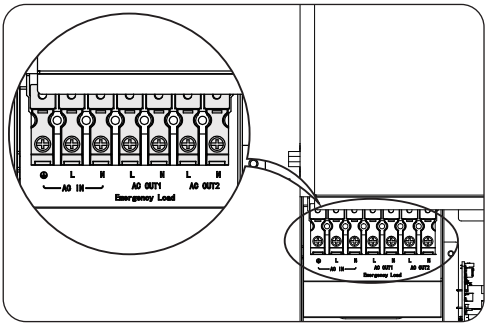


Figure 3-7 Drilling Holes

Step 4: Make sure the cables are securely connected.

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 with manufacturer of air conditioner that if it's equipped with time-delay function before installation. Otherwise, this off grid solar inverter will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air condition.

3.4 Generator Input Connection/Dry Contact Connection

CAUTION!

Install a separate AC circuit breaker between the inverter and the generator before connecting the generator.

CAUTION!

There are three terminal blocks with “AC IN”, “GEN /AC OUT 2” “AC OUT 1” markings. Please do NOT mis-connect input and output connectors.

CAUTION!

Be sure to connect cables with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.

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 GEN input connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggestion for Generator Input wires

Model	Gauge	Cross Section
5 kW Inverter	10 AWG	5.26 mm^2

WARNING!

Make sure GEN power is disconnected before attempting to connect GEN power to the unit.

All operations during the electrical connection process, as well as the specifications of cables and components used, must comply with local laws and regulations. The cable color mentioned below is for typical reference.

Please follow below steps to implement generator connection:

Step 1: Before making GEN connection, be sure to open AC circuit breaker first.

Step 2: Remove insulation sleeve 12mm from the head of cables, shorten the conductor part to 10 mm. Insert the cable into the tubular terminal. Then use terminal crimping tool make the terminal and cable connected tightly.

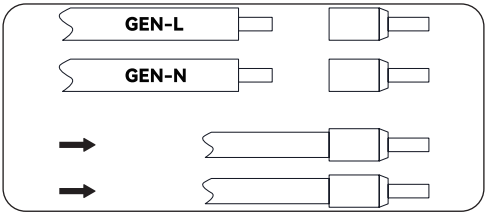


Figure 3-8 Removing Sleeve

Step 3: Insert GEN cables according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective cable first.

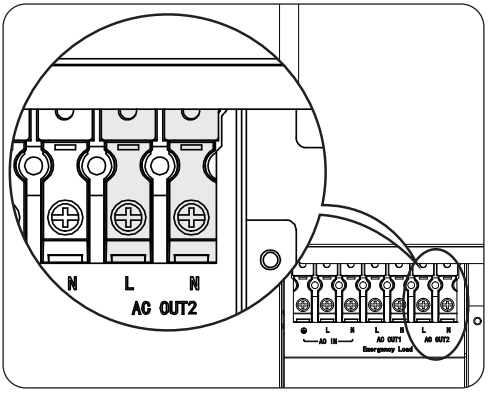


Figure 3-9 Generator Connection

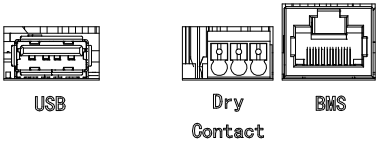
Step 4: Make sure the cables are securely connected.

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 with manufacturer of air conditioner that if it's equipped with timedelay function before installation. Otherwise, this off grid solar inverter will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air condition.

Dry contact connection:

In communication port area of inverter bottom, there is a dry contact port for generator control.



3.5 PV Connection

CAUTION!

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

WARNING!

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

WARNING!

All wiring must be performed by a qualified personnel.

WARNING!

It' 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 as below. The cable color mentioned below is for typical reference.

Model	Gauge	Cross Section
5 kW Inverter	12 AWG	4 mm^2

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 inverter.

2 Open circuit Voltage (Voc) of PV modules should be higher than start-up voltage.

Inverter Model	5 kW Inverter
Max. PV Array Open Circuit Voltage [Vdc]	500
Start-up Voltage [Vdc]	150
PV Array MPPT Voltage Range	120 ~ 450

WARNING!

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

Please follow below steps to implement PV module connection:

Step 1: Before making PV connection, be sure to open DC circuit breaker first.

Step 2: Remove insulation sleeve 12mm from the head of cables, shorten the conductor part to 10 mm. Insert the cable into the tubular terminal. Then use terminal crimping tool make the terminal and cable connected tightly.

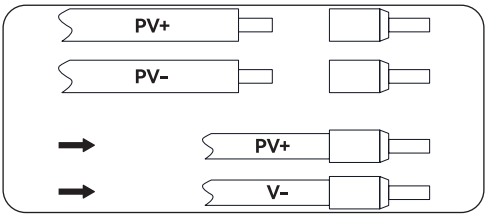


Figure 3-10 Removing Sleeve

Step 3: Use multi-meter check to ensure the polarities are correct.

Step 4: Insert PV cables according to polarities indicated on terminal block and tighten the terminal screws.

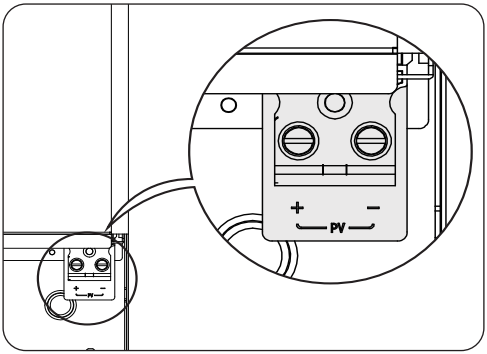


Figure 3-11 PV Connection

Step 5: Make sure the cables are securely connected.

3.6 Battery Connection

3.6.1 Lead-acid Battery Connection

User can choose proper capacity lead acid battery with a nominal voltage at 48V. Also, you need to choose battery type as 'AGM or FLD(flooded)'.

CAUTION!

For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and 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 is 150A.

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 terminal size as below. The cable color mentioned below is for typical reference.

WARNING!

Make sure AC power is disconnected before attempting to connect AC power to the unit.

All operations during the electrical connection process, as well as the specifications of cables and components used, must comply with local laws and regulations.The cable color mentioned below is for typical reference.

Recommended battery cable and terminal size:

Model	Gauge	Cross Section
5 kW Inverter	2 AWG	25 mm^2

NOTICE

For lead acid battery, the recommended charge current is 0.3C (C>battery capacity).

Please follow below steps to implement battery connection:

Step 1: Unscrew the pre-fixed screws on battery poles. Prepare 2 DT terminals (It should fit for AWG2 cables).

Step 2: Remove insulation sleeve 12mm from the head of cables, shorten the conductor part to 10 mm. Insert the cable into the DT terminal. Then use terminal crimping tool make the terminal and cable connected tightly.

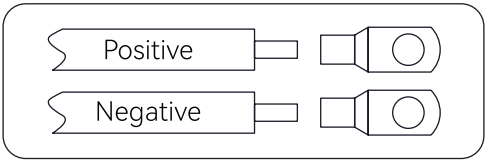


Figure 3-12 Removing Sleeve

Step 3: Pass the battery cable through the battery installation hole on bottom shell, and

tighten the terminal screws. Make sure polarity at both the battery and the inverter/ charge is correctly connected and DT terminals are tightly screwed to the battery terminals..

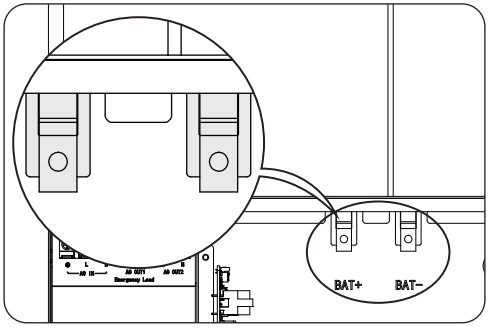


Figure 3-13 Battery Connection

Step 4: Connect all battery packs as units requires. It's suggested to connect at least 200Ah capacity battery.

DANGER!

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

CAUTION!

Do not place anything between the flat part of the 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/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

3.6.2 Lithium Battery Connection

If choosing lithium battery for inverter, Please check the compatibility of the protocol first. There're two connectors on the lithium battery, RJ45 port of BMS and power cable.

Please follow below steps to implement lithium battery connection:

Step 1: Follow section 3.6.1 to implement the power cable connection.

Step 2: Connect RJ45 terminal of battery communication cable to BMS communication port of inverter. The communication protocol should be RS485 or CAN.

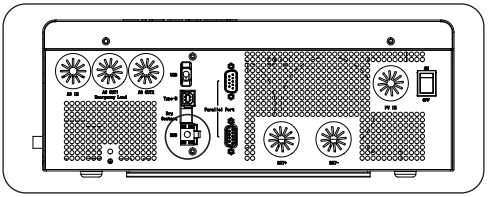


Figure 3-14 Lithium Battery Connection

Step 3: Insert the other end of RJ45 (battery communication cable) to battery communication port of lithium battery.

> **NOTICE**
>
> If choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. You need to choose battery type as "lithium battery" during inverter setting.

Lithium battery communication and setting:

In order to communicate with battery BMS, you should set the battery type to "LIb" in Section 4.2.2 Program 17.

Make sure the lithium battery BMS port connects to the inverter is Pin to Pin, the inverter BMS port pin assignment shown as below:

Pin Number	BMS Port
1	RS485B
2	RS485A
3	-
4	CANH
5	CANL
6	-
7	-
8	-

Communicating with battery BMS in parallel system

If need to use communicate with BMS in a parallel system, you should make sure to connect the BMS communication cable between the battery and one inverter of the parallel system.

3.7 Final Assembly

After connecting all wiring, please put bottom cover back by screwing four screws mentioned

in Section 3.2.

3.8 Smart Communication Stick Connection (Optional)

The smart communication stick is used to connect to the cloud platform. Please insert the stick into COM port directly.

3.9 Meter/CT connection (Optional)

Insert the RJ45 connector(communication cable) from meter or mains CT.

Make sure that the meter/mains CT port connected to the inverter is Pin to Pin, and the inverter meter /CT port pin assignment is as shown below:

Pin Number	Meter/CT Port
1	Meter RS485B
2	Meter RS485A
3	Grid.Isense+
4	-
5	-
6	Grid.Isense-
7	-
8	-

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:

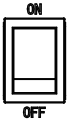


Figure 4-1 Power ON/OFF

4.2 Operation and Display Panel

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

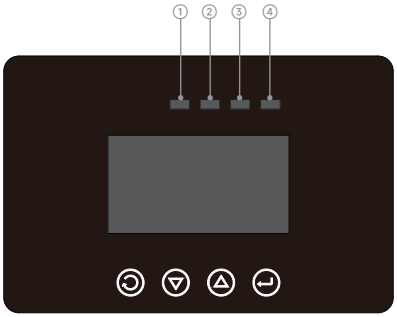


Figure 4-2 LED Indicators

Table 4-1 LED Description

LED Indicator			Description
① AC	Status indicator (Green)	Solid On	The mains power is normal and enters the mains power operation.
		Flashing	The mains power is normal, but it has not entered mains power operation.
		Off	The mains power is abnormal.
② Inverter	Invert indicator (Yellow)	Solid On	Output is powered by battery or PV in battery mode.
		Off	Other states.

LED Indicator			Description
③ Charging	Charging indicator (Yellow)	Solid On	The battery is in float charging.
		Flashing	The battery is in constant voltage charging.
		Off	Other states.
④ Fault	Fault indicator (Red)	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.
		Off	The inverter is working properly

Figure 4-3 Function Buttons

Table 4-2 Function Buttons

Button	Description
ESC	To exit setting mode
DOWN	To go to next selection
UP	To go to previous selection
ENTER	To confirm the selection in setting mode or enter setting mode

4.2.1 LCD Display Icons

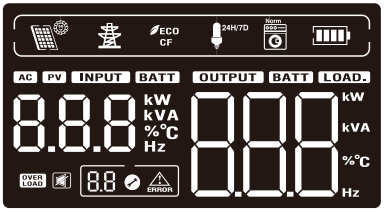


Figure 4-4 LCD Icons A

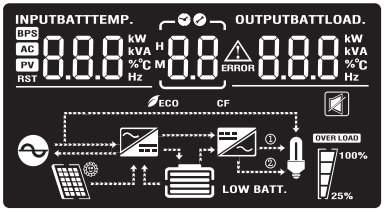


Figure 4-5 LCD Icons B

Table 4-3 LCD Icons

Icon	Description
AC Input Information	
	AC input icon.
	Indicate AC input power, AC input voltage, AC input frequency, AC input current.
PV Input Information	
	PV input icon.
	Indicate PV power, PV voltage, PV current, etc.
Load Information	
	Load icon.
	Indicate power of load, power percentage of load.
	Indicate overload happened.
Battery Information	
	Indicate battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.
	Indicate battery voltage, battery percentage, battery current.
Other Information	
	Indicate alarm code or fault code.
	Indicate a fault is happening.

Icon	Description
	Indicate the alarm is disabled.
	Indicate power saving mode.

For Lead-acid battery, detailed description of battery icon as following:

In battery mode, battery icon will present Battery Capacity

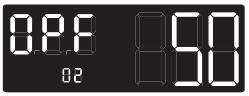
Table 4-4 Function Buttons

Load Percentage	Battery Voltage	Display
Load > 50%	< 11.146 V	
	11.146 V ~ 11.685 V	
	11.685 V ~ 12.224 V	
	> 12.224 V	
50% > Load > 20%	< 11.795 V	
	11.795 V ~ 12.334 V	
	12.334 V ~ 12.873 V	
	> 12.873 V	
Load < 20%	< 12.12 V	
	12.12 V~ 12.659 V	
	12.659 V ~ 13.198 V	
	> 13.198V	

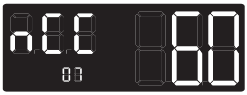
4.2.2 LCD Setting

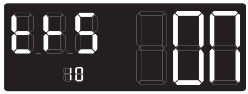
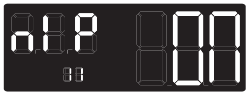
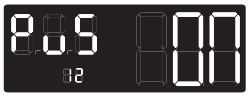
After pressing and holding ENTER button for 2 seconds, the unit will enter setting mode. Press “UP” or “DOWN” button to select setting programs. Then press “ENTER” button to confirm the selection or ESC button to exit.

Table 4-5 LCD Setting

Program	Description	Setting Option
01	Output voltage	 230 V (default) Adjustable/settable value: 208 V, 220 V, 230 V, 240 V
02	Output frequency	 50 Hz (default) Adjustable/settable frequency: 50 Hz, 60 Hz
03	Output source priority	Solar first  Solar energy provides power to the loads as first priority. If solar energy is sufficient, battery will be charged with solar energy. If solar energy is not sufficient to power all connected loads, Grid will supply power to the loads at the same time. The extra power will charge the battery. If solar energy and grid are not sufficient, battery will supply power to the loads at same time. If solar, grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.
		Grid first (default) 

Program	Description	Setting Option
03	Output source priority	Grid provides power to the loads as first priority. Solar power will charge the battery. If solar is not sufficient to charge battery, grid will charge the battery at the same time. If grid is not sufficient to power all connected loads, solar energy will supply power to the loads at the same time. If solar energy and grid are not sufficient, battery will supply power to the loads at same time. If solar, grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.
		PBG priority 
		Solar energy provides power to the loads as first priority. If solar energy is sufficient, battery will be charged with solar energy. If solar energy is not sufficient to power all connected loads, battery will supply power to the loads at the same time. If solar energy and battery are not sufficient, grid will supply power to the loads at same time. If solar, grid and battery power is not sufficient to power loads, inverter will go to standby and charge battery.
04	Output mode	APP: Appliance (default) 
		Applied to household appliances
		UPS 
		Applied to computer and other devices. Typical switching time is 10 ms.

Program	Description	Setting Option
05	Charger source priority	PNG: PV and Grid (default) 
		OPV: Only PV 
		GRD: Grid first 
		PV: PV first 
		There are four options for charging priority. The default is PNG (PV and Grid). PV and Grid are charged at the same time;. The second is OPV (Only PV). Only PV charge. The third is GRD (Grid). Grid charging takes priority. The fourth is PV. PV gives priority to charging.
06	Grid charging current	
		30 A (default) Setting range is [2, 80 A]
07	Maximum charging current	
		Set total charging current for solar and grid chargers. The default is 60 A.
		Available options: 2/10/20/30/40/50/60/70/80 A
08	Menu Default	
		During setting:
		Set to ON. If the current page is not on the first page and no operation with 1 minute, the system will return to display the first page.
		Set to OFF. If the current page is not on the first page and no operation with 1 minute, the system will stay on the current page.

Program	Description	Setting Option
09	Auto restart when overload occurs	The default is ON. 
10	Auto restart when over temperature occurs	The default is ON. 
11	Main input cut warning	 Enable/Disable Mains or PV loss alarm. The default setting is ON. If the main input detected lost, the buzzer will sound for 3 seconds. when set to OFF, after the main input is lost, the buzzer will not sound.
12	Energy-saving mode	 The default setting is OFF. When set to ON, in battery mode, if the load is lower than 50 W, the system will stop output for a period then resume. If the load is still lower than 50 W, the system will do the loop stop then resume. If the load is higher than 100 W, the system will resume continuous normal output.
13	Overload transfer to bypass	 The default setting is OFF. When set to ON, in the case of PV priority output, if there is an overload, the system will immediately transfer to bypass mode (utility power output, also known as bypass mode).
14	Silent mode setting	 Enable/disable buzzer sound. The default setting is OFF. When set to ON, in any situation such as alarms or faults, the buzzer will not sound. This setting can be applied to all modes .

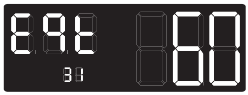
Program	Description	Setting Option
15	Battery return to mains voltage point	
		When the battery is set to the CUS (Customer Setting Type) mode. The adjustable range is [44, 52 V]. .
		When the battery is set to the AGM (Lead Acid Battery Type) or FLD (Flooded Battery Type) mode. The default setting is 46 V, and it can be adjusted within a range of [44, 52 V].
		When the battery is set to the LIB (Lithium Battery Type) mode. The default is 47.6 V, and it can be adjusted within a range of [40, 50 V].
16	Switching back to battery mode voltage points	
		When the battery is set to CUS (Customer Set Type) mode, The default setting is 52 V, The voltage range is [48, 58 V].
		When the battery is set to AGM (Absorbent Glass Mat) or FLD (Flooded) mode,The default is 52 V. It can be adjusted within a range of [48, 58 V].
		When the battery is set to LIB (Lithium Battery) mode, The default setting is 54.4 V. It can be adjusted within a range of [46, 58 V].
17	Battery type	AGM 
		Flooded 
		Lithium (default) 
		User-Defined 

Program	Description	Setting Option
18	Battery low voltage point	
		It is not possible to set the battery definition mode to AGM or FLD mode. The initial default setting is 44 V. When the battery type is set to CUS, the adjustable range for the battery voltage is [42, 54 V].
		Battery low voltage alarm setting. When the battery type is set to LIB, the default setting is 47.6 V. The adjustable range for the voltage is [41.2, 50 V].
19	Battery shutdown voltage point	
		The battery low voltage shutdown point setting function cannot be adjusted when the battery is defined as AGM or FLD mode. The default setting is 42 V. When the battery type is set to CUS, the default setting is 21 V. The adjustable range for the voltage is [40, 48 V].
		When the battery type is set to LIB , the battery shutdown point can be modified. The default setting is 46 V, and the adjustable range is [40, 48 V].
20	Constant voltage mode voltage point setting	
		When the battery is defined in AGM or FLD mode, the voltage set point cannot be configured. The default setting for AGM mode is 56.4 V, for FLD mode is 58 V. When the battery type is CUS, It can be set within the range of [48, 60 V] for the constant voltage charging set point. It is important to note that the constant voltage set point voltage needs to be higher than the float charge set point voltage.
		When the battery type is set to LIB, the default constant voltage charging set point is 56.4 V, and it can be adjusted within the range of [48, 60 V]. It is important to ensure that the constant voltage set point voltage is higher than the float charge set point voltage.

Program	Description	Setting Option
21	Floating charge mode voltage point setting	
		When the battery is defined in AGM or FLD mode, the voltage set point cannot be configured. The default setting for AGM/FLD mode is 54 V. When the battery type is CUS, It can be set within the range of [48, 60 V] for the floating charging voltage set point. If the battery type is LIB, the default setting for the floating charging point is 55.2 V. The setting range is between 50 V and 58 V. It is important to note that the constant voltage point voltage should always be set higher than the floating charge point voltage.
22	Grid low voltage point setting	
		If output mode is APP, Grid low voltage point can be set within a range of 90 V to 154 V. The default setting is 154 V.
		If output mode is UPS, Grid low voltage point can be set within a range of 170 V to 200 V. The default setting is 185 V.
23	Grid high voltage point setting	
		If output mode is APP, Grid high voltage point can be set within a range of 264 V to 280 V. The default setting is 264 V.
		If output mode is UPS, Grid high voltage point is set as 264 V.

Program	Description	Setting Option
24	Lower power discharge time setting	 When in battery mode and operating under a low load, unrestricted discharge for an extended period can deplete the battery, affecting its lifespan. When the inverter reaches the set low power discharge time, the low voltage shutdown point will be raised to 44 V. The default low power discharge time is 8 (8 hours), adjustable range [1, 8]. In inverter mode,the low power discharge time setting,the default is 8 (8 hours), the setting range is [1, 8]. In battery mode, after the continuous discharge time exceeds 8 hours and the battery shutdown point has not been reached, the battery voltage shutdown point will be modified to 44 V, and the system will alarm for 1 minute when the battery continues to discharge to 44 V. Then shut down again. When the battery voltage exceeds 52.8 V exceeds 30 s, the battery discharge time will bereset.
25	Inverter soft start setting	 Default setting is OFF. If it set to ON, the inverter output gradually increases from 0 to the target voltage value. If OFF, the inverter output directly increases from 0 to the target voltage value. Setting Condition: It can be set in single-machine operation mode.
26	Reset factory setting	 Restore all settings to factory default values. Before the setting, this interface is displayed as OFF. When set to ON, the system will restore to default settings. After the setting is completed, this interface will display OFF again. The setting can be applied immediately in mains and standby modes, but cannot be set in battery mode.

Program	Description	Setting Option
27	Parallel mode setting	 Set the parallel operation mode. It can be set in mains mode and standby mode (StandBy: no output but screen is on), but cannot be set in battery mode. Other models cannot be set. The default setting is SIG (single mode), which can be set to PAR (parallel mode) single-phase parallel operation mode, 3P1 (R phase mode), 3P2 (S phase mode), 3P3 (T phase mode). When using the parallel operation function, first connect the parallel system correctly, and then set the parallel operation mode of each machine correctly. If there is a machine set to SIG in the parallel system, it will report a fault 24. If there are machines set to 3P1, 3P2, and 3P3 in the parallel system, all machines must be set to one of these three modes, and at least one machine must be set for each mode. Otherwise, all machines set to these three modes will report a fault 24.
28	Battery Disconnection Alarm	 Enable/Disable battery disconnection alarm. Default setting is OFF. When set to OFF, there will be no battery disconnection, low battery voltage, or battery under voltage alarms when the battery is disconnected.
29	Battery Equalization Mode	 Enable/Disable Battery equalization. Default setting is OFF. If it is set to ON, the controller will start to enter the equalization phase when the set equalization interval (battery equalization period) is reached during the float charging stage, or the equalization is activated immediately.
30	Equalization Voltage Point Setting	 The default setting is 58.4, with a configurable range of [48, 60 V].

Program	Description	Setting Option
31	Equalization Charging Time Setting	 During the equalization stage, the controller will charge the battery as much as possible until the battery voltage rises to the battery equalization voltage. Then, it will adopt constant voltage regulation to maintain the battery voltage. The battery will remain in the equalization stage until the set battery equalization time is reached. The default setting is 60 minutes, with a configurable range of [5, 900], and an increment of 5 minutes for each setting.
32	Equalization Delay Time Setting	 During the equalization stage, if the battery equalization time expires and the battery voltage has not risen to the battery equalization voltage point, the charging controller will extend the battery equalization time until the battery voltage reaches the battery equalization voltage. When the battery equalization delay setting is completed and the battery voltage is still below the battery equalization voltage, the charging controller will stop equalization and return to the floating stage. The default setting is 120 minutes, with a configurable range of [5, 900], and an increment of 5 minutes for each setting.
33	Equalization Interval Time Setting	 When the battery connection is detected during the float phase with the equalization mode turned on, the controller will start to enter the equalization phase when the set equalization interval (cell equalization period)is reached. The default setting is 30 days, the settable range is [1,90], and the increment of each setting is 1 day.
34	Enable Equalization Immediately	 The default setting is OFF, the function is not turned on; when it is set to ON, in the float charging stage when the equalization mode is turned on and the battery connection is detected. The balance charging is activated immediately, and the controller will start to enter the equalization stage.

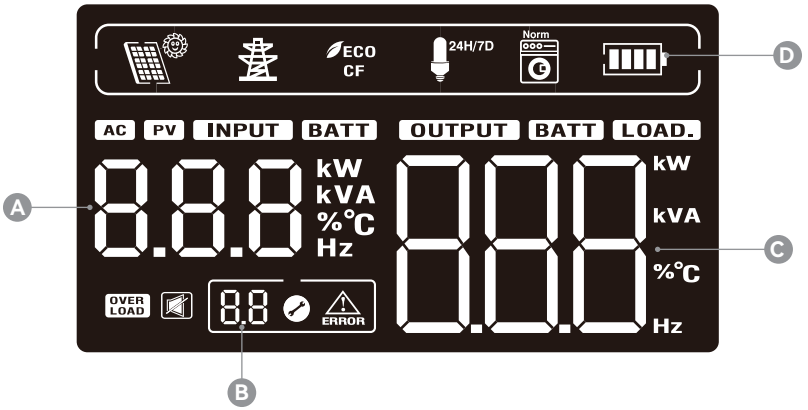
Program	Description	Setting Option
35	Grid-tie inverter function	 Set whether the inverter should feed power to the grid in PV priority grid mode or PBG grid mode. The default setting is OFF, and the function is not enabled. When set to ON, the inverter tracks the maximum power point, and the excess energy is fed into the mains. After the function is turned on, if a communication ab normality occurs, an alarm 56 is generated, and the inverter no longer determines the operation logic according to the BMS information.
36	Battery dual output low voltage shutdown point	 When enabled, the secondary output of the inverter is enabled by default. In battery mode, when the battery voltage drops below the set point, the secondary output is turned off. When the battery voltage rises above the set value plus 1 V per additional battery cell, the secondary output is turned on. The default setting of 48 V, with a configurable range of [44, 60 V]. When the set point is higher than the constant voltage charging (CV) point – 1 V per cell, the recovery voltage is set to the constant voltage charging point.
37	Battery dual output duration	 When enabled, the secondary output of the inverter is enabled by default. In battery mode, when the battery discharge time reaches the set point, the secondary output is turned off. Default setting is OFF, the function is not enabled. The configurable range is [5,890] in minutes. When set to FUL, the secondary output has unlimited output time.

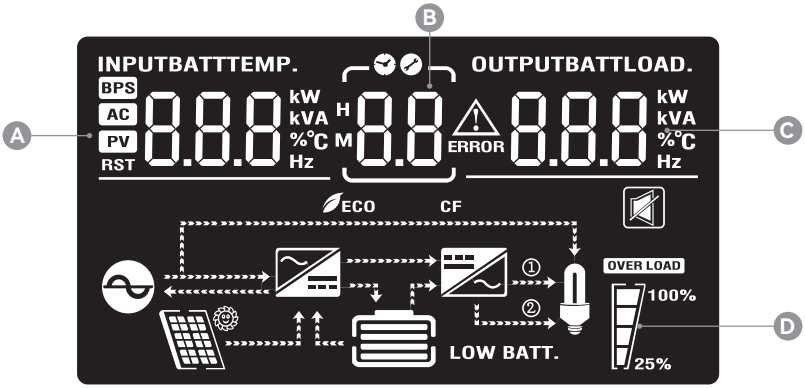
Program	Description	Setting Option
38	BMS Communication Function	 Enable/Disable lithium battery communicates with inverter. Default setting is OFF, if a communication abnormality occurs, alarm 56 is generated and the inverter no longer operates based on the BMS information.
39	Low SOC Shutdown	 Set the inverter to shut down when the State of Charge (SOC) of the battery is low. Default setting is 20, with a configurable range of [5, 50]. When the lithium battery SOC reaches the set value in battery mode, the inverter shuts down and generates alarm 68. The alarm 68 is cleared when the SOC returns to the set value + 5%. In standby mode, the inverter can switch to battery mode only when the SOC reaches the set value + 10%. If it does not reach this threshold, alarm 69 is generated. Once the function is enabled, alarm 69 is triggered when the lithium battery SOC reaches the set value + 5%, and it is cleared when it returns to the set value + 10%. It can be set to OFF, in which case the inverter no longer performs shutdown, startup, or alarm operations based on the SOC condition. Once the function is enabled, if a communication abnormality occurs, the inverter no longer operates based on the SOC information and clears the related alarms.
40	High SOC to Battery	 Set the SOC value for the inverter to switch to battery mode. Default setting is 95, with a configurable range of [10, 100]. In PBG priority mode, when the lithium battery SOC reaches the set value in normal grid mode, the inverter switches to battery mode. Once enabled, the inverter will only switch to battery mode when the SOC is above the set point and the battery voltage is higher than the voltage point to switch back to battery mode. It can be set to OFF, in which case the inverter no longer switches from grid mode to battery mode based on the SOC condition. Once the function is enabled, if a communication abnormality occurs, the inverter no longer operates based on the SOC information and clears the related alarms.

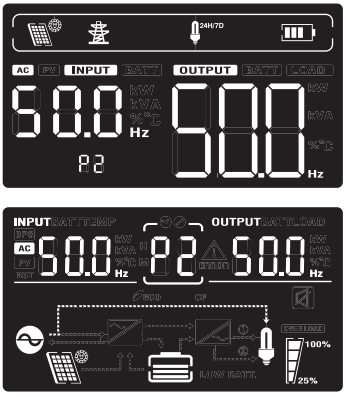
Program	Description	Setting Option
		
41	Low SOC to Grid	Set the SOC value for the inverter to switch to grid mode. The default setting is 50, with a configurable range of [10, 90]. In PBG priority mode, when the lithium battery SOC reaches the set value in battery mode, the inverter switches to grid mode. Once enabled, the inverter will switch to grid mode when the SOC is below the set point or the battery voltage is lower than the voltage point to switch back to grid mode It can be set to OFF, in which case the inverter no longer switches from battery mode to grid mode based on the SOC condition. Once the function is enabled, if a communication abnormality occurs, the inverter no longer operates based on the SOC information and clears the related alarms. When this setting is higher than the STB point, STB and STG will no longer take effect after the next activation.

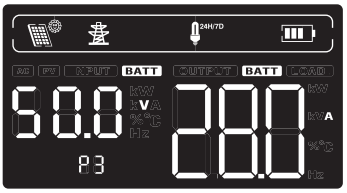
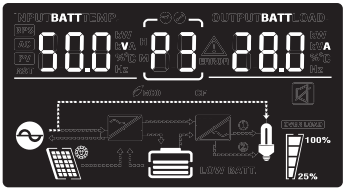
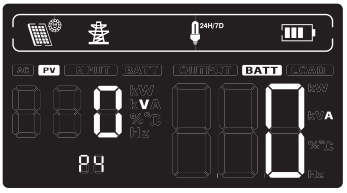
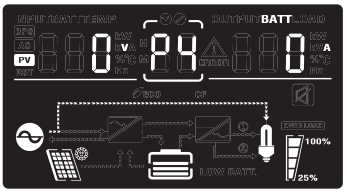
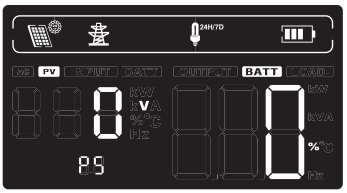
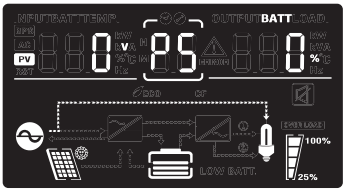
4.3 Display Information

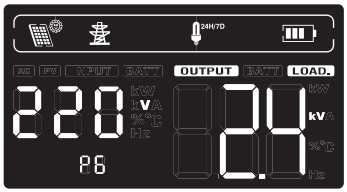
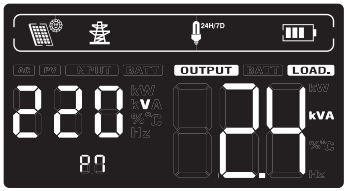
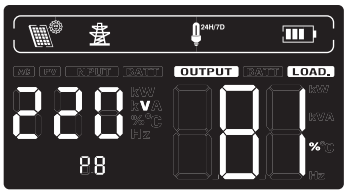
The LCD display information will be switched in turns by pressing “UP” or “DOWN” key. The selectable information is switched as below order: voltage, frequency, current, power, firmware version.

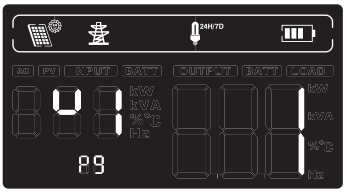
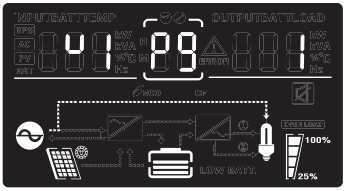
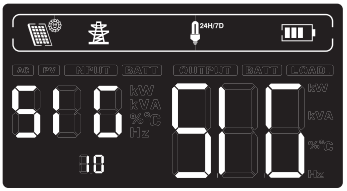
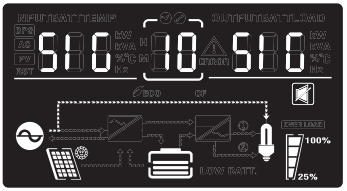
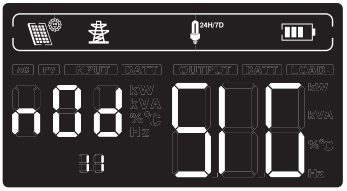
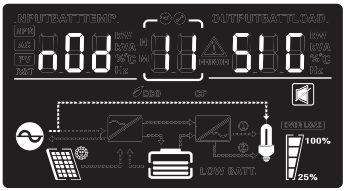


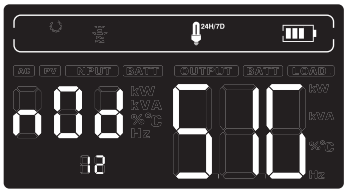
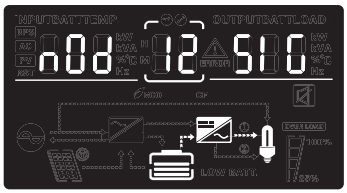
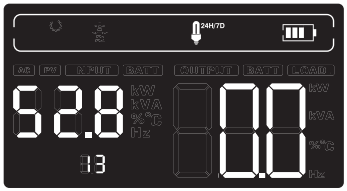
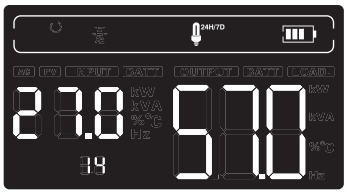
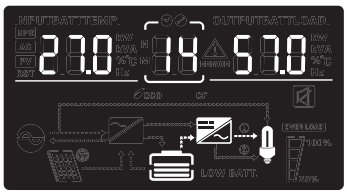


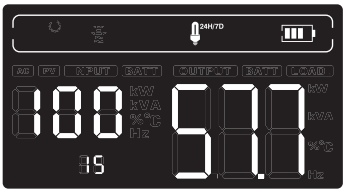
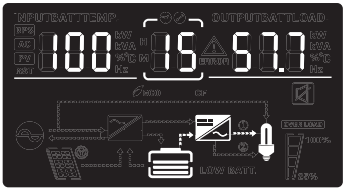
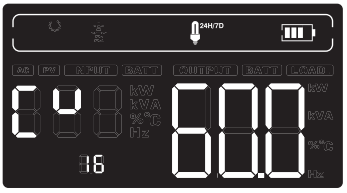
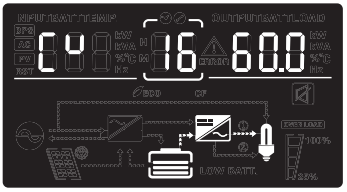
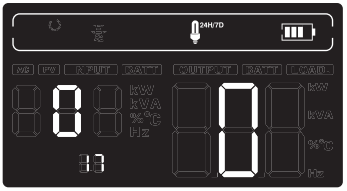
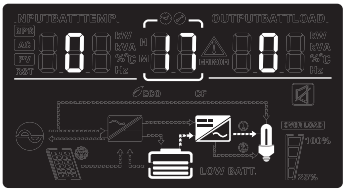
Information	LCD display
A AC Input voltage B Alarm or Fault code (Default Display Screen) C Output voltage D Battery capacity	
A AC Input frequency B Alarm or Fault code C Output voltage D Battery capacity	

Information	LCD display
A Battery voltage B Alarm or Fault code C Output current D Battery capacity	 
A PV voltage B Alarm or Fault code C PV charging current D Battery capacity	 
A PV voltage B Alarm or Fault code C PV power D Battery capacity	 

Information	LCD display
A Output voltage B Alarm or Fault code C active power output D Battery capacity	
A Output voltage B Alarm or Fault code C complex power output D Battery capacity	
A Output voltage B Alarm or Fault code C load percentage D Battery capacity	

Information	LCD display
Display software version	 
Display photovoltaic power generation	 
Parallel operation status display photovoltaic power generation	 
After enabling BMS, the following pages are available	

Information	LCD display
Network status of lithium battery When the upper right display shows SIG constant, the battery pack is operating as a single group; When it shows PAR constant, the battery pack is operating in multiple groups in series and parallel; When it flashes PAR, the battery pack is establishing a state of multiple groups in series and parallel	 
Lithium battery voltage and current information; The upper left displays BMS battery voltage information; The upper right displays BMS battery current information. When BMS communication fails, both the upper left and upper right displays will flash ERR	 
Lithium battery temperature and SOC; The upper left displays BMS temperature information; The upper right displays BMS SOC information. When BMS communication fails, both the upper left and upper right displays will flash ERR	 

Information	LCD display
Lithium battery capacity; The upper left displays rated capacity; The upper right displays current capacity. When BMS communication fails, both the upper left and upper right displays will flash ERR	 
Lithium battery constant voltage point; The upper left displays the fixed letter CV; The upper right displays the BMS constant voltage charging point. When BMS communication fails, the upper right display will flash ERR	 
Lithium battery fault alarm information; The upper left displays BMS alarm information; The upper right displays BMS fault information. When BMS communication fails, both the upper left and upper right displays will flash ERR	 

5 Parallel Installation Guide

The inverter can be used in parallel with two different operation modes.

1. Parallel operation in single phase with up to 9 units.

2. Maximum 9 units work together to support 3-phase equipment.

Check the installation instructions from above sections. Be sure to save enough clearance between every 2 inverters. For AC/DC breaker/disconnector, please check the recommended size from corresponding section and how many units of inverter mounted, then selected proper model of breaker/disconnector.

WARNING!

All inverters must be connected to the same batteries and ensure each group of cables from the inverters to the batteries in the same length.

WARNING!

Do not connect the same PV string to multiple inverters, as this may cause damage to the inverters. Each inverter is separately connected to PV.

CAUTION!

To avoid overload, it is best to run the whole system properly before closing the circuit breaker on the load side.

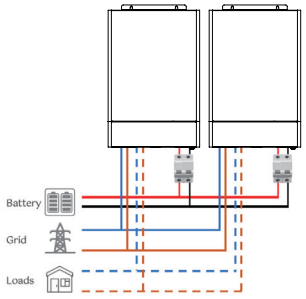
CAUTION!

Conversion time exists in the power supply system. Power supply interruption may occur for key equipment with high power supply requirements.

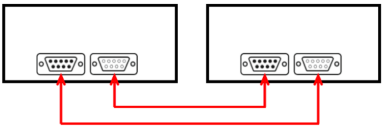
5.1 Parallel Cable Connection in Single Phase

Two inverters in parallel

System connection:

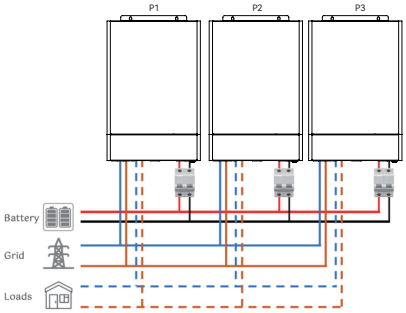


Communication connection:

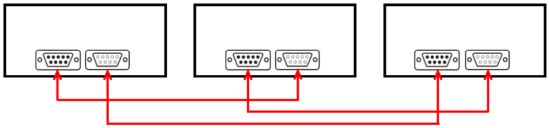


Three inverters in parallel

System connection:



Communication connection:

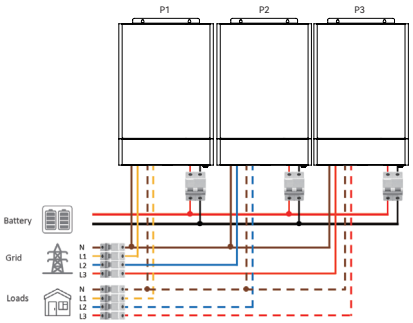


Multiple single-phase parallel connected systems can follow an extended wiring method from two single-phase parallel machines to three single-phase parallel motors.

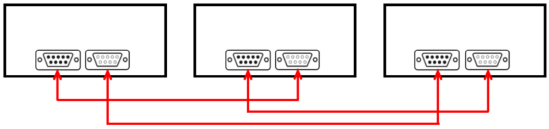
5.2 Parallel Cable Connection in Three Phase

One inverter per phase

System connection:



Communication connection:

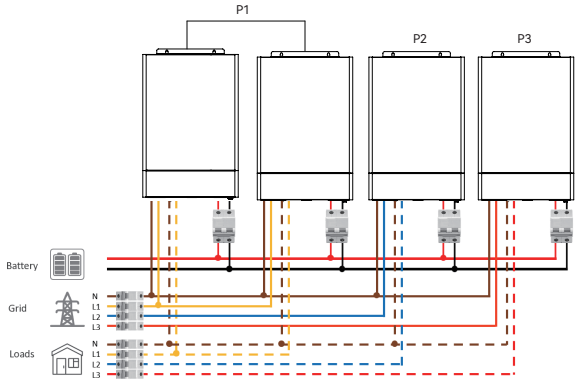


There is no difference in the connection method between single-phase and three-phase communication cables. Just connect the parallel interface of the inverters in series.

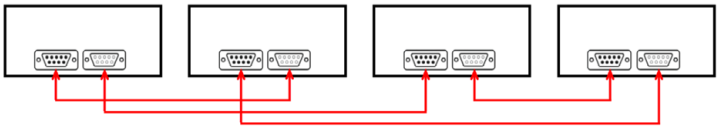
Considering the length of the cable connection, we adopt the principle of connecting in series nearby.

Two inverters in first phase and only one inverter in the other phase

System connection:

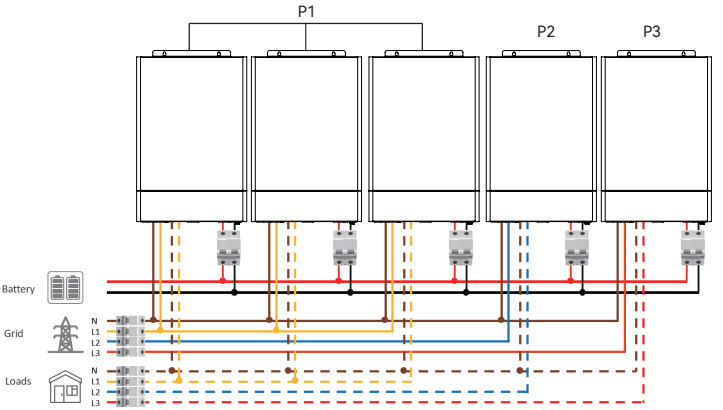


Communication connection:

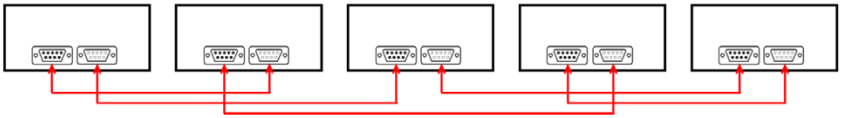


Three inverters in first phase and only one inverter in the other phase

System connection:

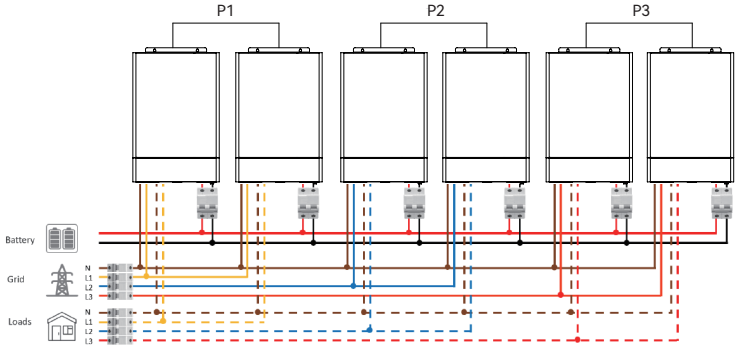


Communication connection:

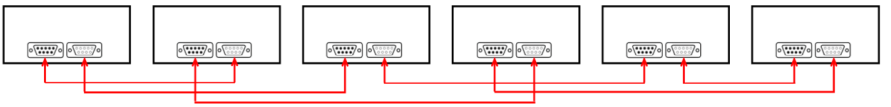


Two inverters in each phase

System connection:

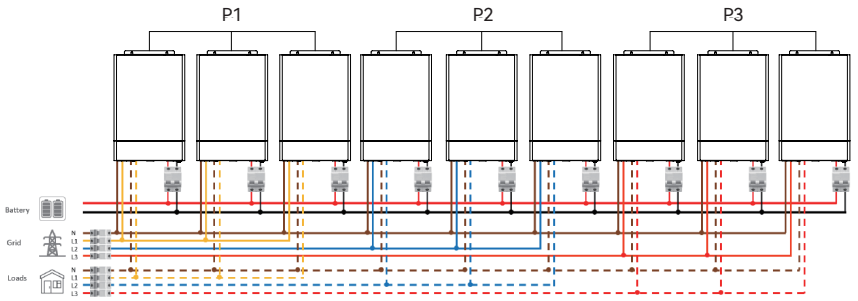


Communication connection:

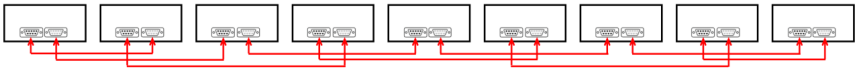


Three inverters in each phase

System connection:



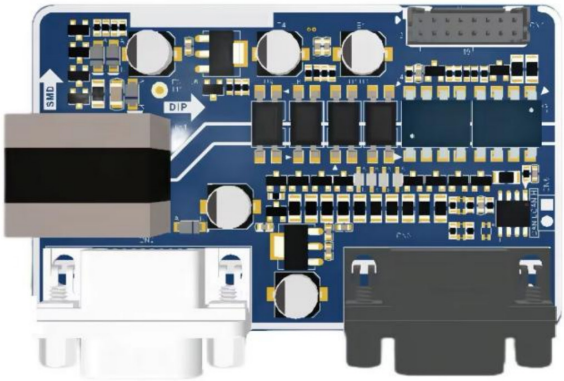
Communication connection:



5.3 System Setting for Parallel

CAUTION!

In each parallel system, the left side ADD DIP switch(channel 1) of two machines which are farthest apart should switch to upper position.



Single phase setting

Step 1: Before setting, please check if the wiring is correct. Ensure that all circuit breakers (PV, AC input, AC output battery breaker) are disconnected and that each neutral line of the inverter is connected together.

Step 2: Switch 'ON/OFF' switch to OFF on the bottom of the inverter. Make sure all inverters switched to OFF.

Step 3: Set DIP switch channel 1 of the first and last inverters to ON.

Step 4: Connect battery breaker to power the inverters.

Step 5: Switch ‘ON/OFF’ switch to ON on inverter, wait unitl the LCD diaplay is on. Thenswitch ‘ON/OFF’ switch to OFF.

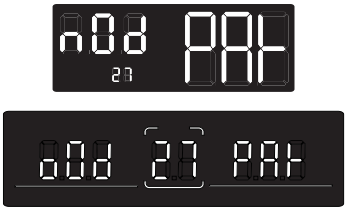
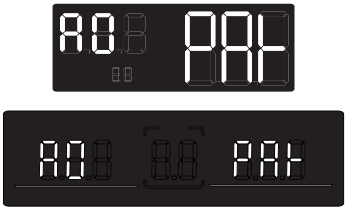
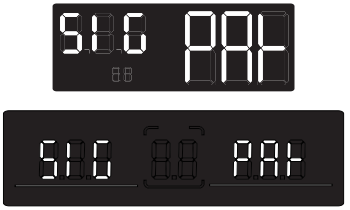
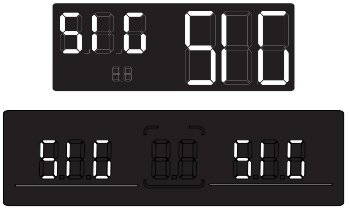
Step 6: Set "PAR" in program 27 on the LCD.

Step 7: Follow step 4&5 to set all the parallel inverter.

Step 8: Switch ‘ON/OFF’ switch to ON on inverter. then connect all the breakers.

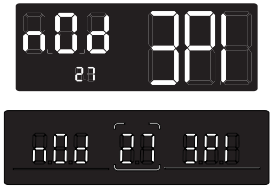
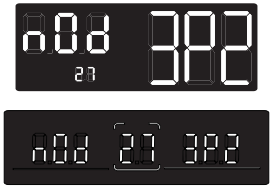
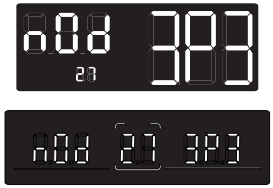
NOTICE

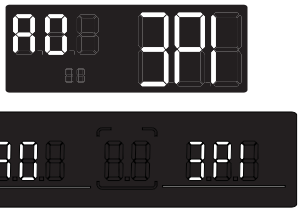
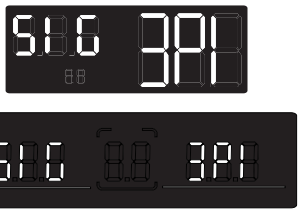
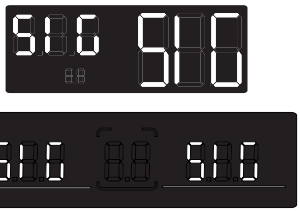
- When setting the LCD program, the ON/OFF switch must be OFF. Otherwise, it cannot be set up.
- The primary and slave devices are generated by competition within the system. Typically, A0 stands for primary device. S1 to S8 stands for the slave device.

Information	LCD display
	LCD setting interface single-phase parallel machine interface display
	Left part: A0 or S1-S8 means parallel communication is success. Right part: PAR means parallel setting for single phase is success.
	Left part: SIG means parallel communication is failed. Right part: PAR means parallel setting for single phase is success.
	Left part: SIG means parallel communication is failed. Right part: SIG means parallel setting for single phase is failed.

Three phase setting

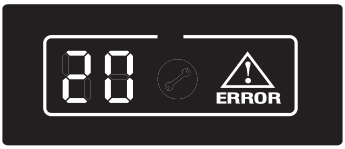
Follow the steps of Single phase setting. The only difference is when set in Program 27, it should be 3P1 for first phase, 3P2 for second phase and 3P3 for third phase.

First-phase LCD is shown	Second-phase LCD is shown	Third-phase LCD is shown
		

Information	LCD display
	Left part: A0 or S1-S8 means parallel communication is success. Right part: 3P1/3P2/3P3 means parallel setting for three phase is success.
	Left part: SIG means parallel communication is failed. Right part: 3P1/3P2/3P3 means parallel setting for three phase is success.
	Left part: SIG means parallel communication is failed. Right part: SIG means parallel setting for three phase is failed.

6 Fault Reference Code

Fault display:



Function description

If alarm occurs, Fault indicator flashes and buzzer sounds every one second for 1 minute, then stop. If fault occurs, the fault indicator is always on, the buzzer sounds 10 seconds then stops. System will try restart aromatically. If the machine does not work after six times' restart, the machine and LCD display will always in the fault status. You need to completely power off (off the screen) or wait for 30 minutes to restart the machine. The fault LCD display is shown in the figure above. In fault mode fault icon is bright, in alarm state alarm icon is flashing, and contact the manufacturer to troubleshoot the abnormal situation according to the fault information.

Fault

The inverter enters fault mode, with a constant red LED light and LCD displaying a fault code.

Fault code sheet

No.	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
1	Bus soft boost start failed	Turn fault mode	Bus voltage does not reach set value for more than 30 seconds.	Cannot restore.	Fault
2	Bus voltage high	Turn fault mode	The bus voltage is higher than protection point.	Cannot restore.	Fault
3	Bus voltage low	Turn fault mode	Bus voltage is below the under voltage protection point.	Cannot restore.	Fault
4	Battery over current	Turn fault mode	TZ interrupt triggered more than 2 times within 2ms.	Cannot restore.	Fault
5	Over temperature	Turn fault mode	The PFC temperature exceeds the protection threshold. Fan stuck for more than 5 minutes.	Tried to restart six times, if failed, cannot restore.	Fault

No.	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
7	Bus soft start fault	Turn fault mode	Turn fault mode. The soft start process has exceeded but the bus voltage has not reached set value.	Cannot restore.	Fault
8	Bus short circuit	Turn fault mode	Inverter on or PFC on, bus voltage below threshold.	Cannot restore.	Fault
9	Inverter soft start fault	Turn fault mode	The bus voltage is higher than protection point, or the DC component is greater than 20V. or the inverter is not completed within 5 minutes.	Cannot restore.	Fault
10	INV over voltage	Turn fault mode	The inverter voltage is higher than the set value [276 V].	Cannot restore.	Fault
11	INV under voltage	Turn fault mode	Battery mode and there is no short circuit in the inverter, the inverter voltage is lower than 160 V.	Cannot restore.	Fault
12	INV short circuit	Turn fault mode	In battery mode or Standby mode, if the inverter voltage is lower, current is greater than set value.	Tried to restart six times, if failed, cannot restore.	Fault
13	Negative power protection	Turn fault mode	In battery mode, the load power is lower than set value(negative power, such as -1200 W).	Cannot restore.	Fault
14	Over load	Turn fault mode	Overload exceeds limit (list in specification).	Tried to restart six times, if failed, cannot restore.	Fault
15	Model fault	Turn fault mode	Cannot match any model in model number detection.	Cannot restore. Check whether the control board is assembled incorrectly or whether the program is burned incorrectly.	Fault
16	No boot loader	Turn fault mode	No boot loader	Cannot restore. Try to send command TIDA1911000000000000.	Fault
17	Program updating	Turn fault mode	Inverter receive updating task.	Restore after updating.	Fault
19	Same SN	Turn fault mode	Same series number in parallel.	Cannot restore.	Fault
20	CAN communication fault	Turn fault mode	Wrong number of slave machine.	Cannot restore.	Fault
21	Large voltage difference of the parallel battery	Turn fault mode	The voltage difference of the parallel battery is too large.	Cannot restore.	Fault
22	Voltage difference of the parallel inverter	Turn fault mode	The difference in mains voltage exceeds set value between parallel inverter.	Cannot restore.	Fault

No.	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
23	Direct current injection (DCI) Protection	Turn fault mode	The difference in mains frequency exceeds set value between parallel inverter.	Cannot restore.	Fault
24	Parallel configuration difference	Turn fault mode	The local inverter is single mode, but there is a parallel machine on the bus.	Restore after set to single machine operation and disconnect parallel communication, or parallel operation condition recover.	Fault
25	Parallel disconnection	Turn fault mode	Synchronization signal lost.	Cannot restore.	Fault
26	BMS fault	Turn fault mode	Error code in BMS message.	Turn off BMS communication function or BMS fault recovery.	Fault
29	Inverter over current	Turn fault mode	Instantaneous current of inverter is higher than set value.	Tried to restart six times, if failed, cannot restore.	Fault

7 Alarm Reference Code

Alarm: the inverter does not enter the fault mode, LED red light flashing, LCD displays the Alarm code.

Alarm code sheet

No.	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
50	Battery open	Alarm, battery does not charge.	Battery voltage is below set point.	Restore after battery voltage recover.	Alarm
51	Battery low voltage shutdown	Alarm, battery low voltage shutdown or cannot power on.	Battery voltage is below set point.	Restore after battery voltage recover.	Alarm
52	Battery low voltage	Alarm	Battery voltage is below set point.	Restore after battery voltage recover.	Alarm
53	Charger short circuit	Warning, battery does not charge.	The battery voltage is less than 5 V and the charging current is greater than 4 A.	Cannot restore.	Alarm
54	Low power discharge	Alarm	The battery voltage is greater than 52.8 V and the discharge time exceeds the set low-power discharge time.	Restore after battery voltage recover.	Alarm
55	Battery over charge	Alarm, battery does not charge	Battery voltage is higher than the set value.	Can restore.	Alarm
56	BMS disconnect	Alarm, lock standby mode.	No correct BMS communication response within 10 seconds.	Restore after communication recover.	Alarm
57	Over temperature	Alarm, battery does not charge.	The temperature of PFC or INV is above the set value.	Restore after temperature is under set value	Alarm
58	Fan error	Alarm, if one fan fails and the other fan is running at full speed.	Fan speed is less than the set value.	Restore after fan recover.	Alarm
59	EEPROM error	Alarm	Numerical calibration error.	Restore after calibration right.	Alarm

No.	Meaning	Relevant action	Trigger conditions	Resume conditions	Fault / Alarm
60	Overload	Alarm, battery does not charge	When not in mainsmode or the PV is normal and the output priority is not mains priority, the load exceeds 102% and the duration is 200~220 ms.	Restore after load back to normal	Alarm
61	Abnormal generator waveform	Alarm, continuously operating in battery mode.	Generator waveform detection result is abnormal.	Can restore.	Alarm
62	PV Energy Weak	Alarm, turn off PV output and charging.	When the battery is not connected, the bus voltage is lower than the set value.	Restore after 10 mins.	Alarm
63	Synchronization signal fail	Alarm, turn fault mode.	Host or slave with host present, no synchronization signal restored within set value	Restore after signal recover.	Alarm
64	Parallel configuration incompatible	Alarm, turn standby mode.	When parallels with 3 phases, there is one phase loss setting.	Restore when threephase setting is correct.	Alarm
65	Parallel version incompatible	Alarm, turn standby mode.	There is an incompatible version number in the parallel system.	Restore when all machine versions in the parallel system are compatible with each other.	Alarm
66	Parallel Communication Fault	Alarm, turn standby mode.	The slave machine cannot be detected in a parallel system.	Restore after detecting slave machine access or set to stand-alone mode to restore.	Alarm
67	Line difference of the parallel inverter	Alarm	The host determines that the difference between the local mains voltage and any slave mains voltage exceeds set value.	Cannot restore.	Alarm
68	SOC Under	Alarm, turn standby mode.	Lithium battery SOC is lower than the set value.	Restore after turning off the low SOC shutdown function, or turning off the BMS communication function, or when the SOC returns to the set value + 5%.	Alarm
69	SOC Low	Alarm, if it is in standby mode, it will remain in standby mode and not power on.	Lithium battery SOC is lower than the set value + 5% (mains mode or battery mode), lower than the set value + 10% (standby mode).	Restore after turning off the low SOC shutdown function, or turning off the BMS communication function, or when the SOC returns to the set value + 10%.	Alarm

8 Battery Equalization

Equalization function is added into charge controller. It reverses the buildup of negative chemical effects like stratification, a condition where acid concentration is greater at the bottom of the battery than at the top. Equalization also helps to remove sulfate crystals that might have built up on the plates. If left unchecked, this condition, called sulfation, will reduce the overall capacity of the battery. Therefore, it's recommended to equalize battery periodically.

NOTICE

Don't activate this mode when using lithium batteries.

How to Apply Equalization Function

You must enable battery equalization function in monitoring LCD setting Program 29 first. Then, you may apply this function in device by either one of following methods:

1.Set balance mode on Program 29.

2.Set balance voltage point on Program 30.

3.Set balance charging time on Program 31.

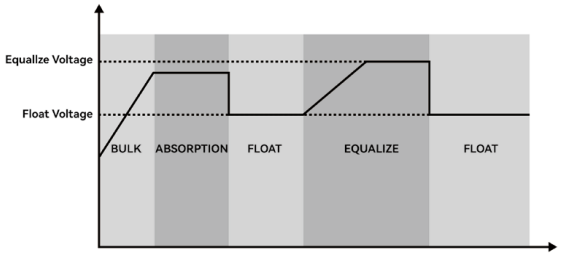
4.Set balance delay time on Program 32.

5.Set balance interval time on Program 33.

6.Set immediate balance mode activation on Program 34.

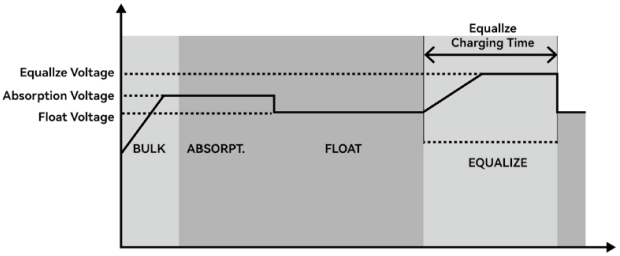
When to Equalize

In float stage, when the setting equalization interval (battery equalization cycle) is arrived, or equalization is active immediately, the controller will start to enter Equalize stage.

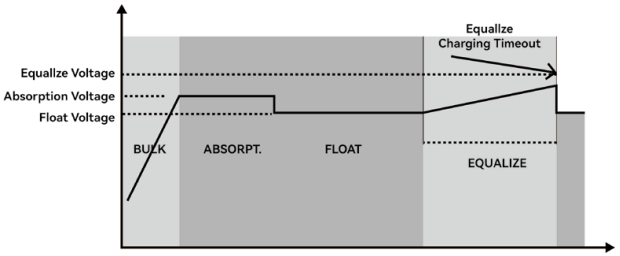


Equalize charging time and timeout

In Equalize stage, the controller will supply power to charge battery as much as possible until battery voltage raises to battery equalization voltage. Then, constant-voltage regulation is applied to maintain battery voltage at the battery equalization voltage. The battery will remain in the Equalize stage until setting battery equalized time is arrived.



However, in Equalize stage, when battery equalized time is expired and battery voltage doesn't rise to battery equalization voltage point, the charge controller will extend the battery equalized time until battery voltage achieves battery equalization voltage. If battery voltage is still lower than battery equalization voltage when battery equalized timeout setting is over, the charge controller will stop equalization and return to float stage.



9 Specifications

9.1 Line Specifications

- Input Voltage

Model	OG-1P5K-PDT
Main topology	L + N + PE
Nominal voltage [Vac]	208 / 220 / 230 240
Input Voltage Range [Vac]	90 ~ 280
Input Low Loss [Vac]	154 (default) Settable: 90 ~ 154 (APP mode)
	185 (default) Settable: 170 ~ 200 (UPS mode)
Input Low Comeback [V]	Low Loss voltage + 9
Input High Loss [Vac]	264 (default) Settable: 264 ~ 280
	264
Input High Comeback [V]	Low Loss voltage - 9

- Input Frequency

Model	OG-1P5K-PDT
Nominal Frequency [Hz]	50 / 60
Frequency Range [Hz]	40 / 70
Freq. Low loss / Comeback [Hz]	40 / 43.5 @ 50 Hz (UPS mode) 40 / 40.5 @ 50 Hz (APP mode)
	50 / 53.5 @ 60 Hz (UPS mode) 50 / 50.5 @ 60 Hz (APP mode)
Freq. High loss / Comeback [Hz]	60 / 56.5 @ 50 Hz (UPS mode) 70 / 69.5 @ 50 Hz (APP mode)
	70 / 66.5 @ 60 Hz (UPS mode) 70 / 69.5 @ 60 Hz (APP mode)

- Input Current

Model	OG-1P5K-PDT
Max. Current (RMS) [A]	40

9.2 Battery Specifications

- Battery Information

Model	OG-1P5K-PDT
Battery Pieces [pcs]	4
Auto Restart Function	Yes
Battery test function	No
Battery type	VRLA / LI
Nominal Battery voltage [V]	N * 12
Battery management	Yes

- Battery Protection

Model	OG-1P5K-PDT
Battery over Voltage [V]	61
Battery under voltage [V]	10.5 * N
Battery low voltage alarm [V]	10.8 * N

Model	OG-1P5K-PDT
Over current protection	Fuse

9.3 Charger Specifications

- Charger (line mode)

Model	OG-1P5K-PDT
Charging voltage [V]	FV MODE: 54 Settable: 53.2 ~ 55.6 CV MODE: 56.4 Settable: 56 ~ 58
Temperature Compensation	Yes
Charging Current [A]	2 ~ 80
Default Charging Current	30
Charging mode	Two / Three / Auto Settable
Charge Voltage Accuracy	± 5%

- Charger (PV)

Model	OG-1P5K-PDT
PV Charging method	MPPT
PV Maximum Input Power [W]	6500
PV Maximum Input Current [A]	18
Efficiency	99.5% max
Battery Voltage Accuracy	± 0.3%
PV Voltage Accuracy [V]	± 2
MPPT [Vdc]	120 ~ 450
Max. PV voltage [Vdc]	500
Max. PV charge current [A]	80
Max. Charging Current [A]	80

9.4 Output Specifications

- Output Power Rating

Model	OG-1P5K-PDT
Output topology	L1 + N1 + L2 + N2 + PE
Output power [W]	5000

- Output Voltage

Model	OG-1P5K-PDT
Nominal Voltage [Vac]	208 / 220 / 230 / 240
Waveform	Pure Sine Wave
Voltage Regulation	± 5%
DC offset [mV]	± 100

- Output Frequency

Model	OG-1P5K-PDT
Nominal Frequency [Hz]	50 / 60
Line Mode	50 Hz: (43.5 ~ 56.5) Hz (UPS mode) (40 ~ 70) Hz (APP mode) 60 Hz: (53.5 ~ 66.5) Hz (UPS mode) (40 ~ 70) Hz (APP mode)
Battery Mode	50 / 60
Frequency regulation	0.1%

- Charger (PV)

Model	OG-1P5K-PDT
Overload Protection	1min@102%< Load ≤120% 10s@110%<Load ≤130% 3s@130%<Load ≤150% 200ms@Load>150%

- Output Short Circuit Protection

Model	OG-1P5K-PDT
Battery mode	Current limitation
Line mode	Breaker (40 A)

9.5 Switch Time Specifications

- Switch Time

Model	OG-1P5K-PDT
Line Mode To Battery Mode [ms]	10

9.6 Efficiency Specifications

- Efficiency

Model	OG-1P5K-PDT
Line Mode	> 99.5% @3 Kva > 99.5% @5 Kva
Battery Mode	> 93.5% @1 Kva > 93.5% @3 Kva > 91.5% @5 Kva
Standby power [W]	< 50

10 Troubleshooting

Problem	Fault Event	Trigger conditions	What to do
LED screen display fault code 5	Overtemperature	1. PFC temperature exceeds the protection threshold [85℃ when not locked rotor, 65℃ when locked rotor] for more than 20 seconds. 2. Fan lock exceeds 5 minutes.	Please check if the fan is not connected or if there are loose wiring issues. If the fan is not connected for more than 5 minutes, the machine will report fault code 5.
LED screen display fault code 12	Inverter short circuit	In battery mode or standby mode, if the inverter voltage is lower than 100V and the inverter current is greater than 40 A, it should respond within 80–100 ms.	1. Check if there is a short circuit at the output terminals (such as a screw piercing through the locking terminal causing a LN short circuit). 2. Verify if the inverter voltage and inverter current meet the triggering conditions.
LED screen display fault code 15	Model malfunction	The model number detection does not match any model number.	Check if the control board is assembled incorrectly or if the program is burned incorrectly.
LED screen display fault code 16	No boot program	The third digit of the communication is not 1.	Send command: TIDA1911000000000000
LED screen display fault code 20	CAN communication error	In battery mode, if the battery mode is set to mains power mode and the parallel mode is set to mains power mode, the number of responses from the slave devices does not match the previously defined number of slave devices. Receiving communication from two or more devices with a slave number of 0 consecutively.	1. Check if the parallel mode is set but the machine is turned on in single machine mode. 2. Check if the parallel connection cable and the parallel board are connected according to the parallel SOP (Standard Operating Procedure).
LED screen display fault code 58	Fan malfunction	Any of the fans rotating less than 8 times within 2 seconds.	1. Check if the fan is not connected properly or if there are any loose connections. 2. If the fan is properly connected: a) Check if there is any issue with the fan detection circuit, usually caused by excessive soldering underneath the control board socket. b) Check if the fan itself is damaged.

Problem	Fault Event	Trigger conditions	What to do
Unable to start	Battery	Due to the need for a voltage of ≥ 11.5 V/N to start the machine in battery mode, common reasons for failure to start include improper calibration or insufficient battery voltage.	1. Check if the battery voltage sampling is functioning properly and if the battery voltage has been calibrated. 2. Use a multimeter to measure the voltage at the battery terminals (using a DC power supply or a real battery) to see if it reaches the minimum voltage of 11.5 V per cell for startup. Note: It is crucial to configure the battery voltage according to the machine model. Connecting the wrong battery voltage can cause capacitor explosion.
	Utility power	The bus voltage is higher than protection point, or the DC component is greater than 20V. or the inverter is not completed within 5 minutes.	1. Check for any short circuits at the mains terminal (such as a screw piercing through and causing a short circuit between the live and neutral terminals). 2. Check if there are any wiring errors, such as mistakenly connecting the mains input to the output terminals.
	PV		1. Check if the PV input voltage is too close to the critical threshold. 2. For low voltage versions of the machine, check if the software version numbers of the main control is compatible. If the software versions differ significantly, the machine may not be activated.
PV not charging			1. For low voltage versions of the machine, check if the software version numbers of the main control is compatible. If the software versions differ significantly, the machine may not be activated. 2. Connecting the wrong battery voltage can result in damage to the auxiliary power supply on the PV side, causing a loss of power and inability to communicate with the main control.