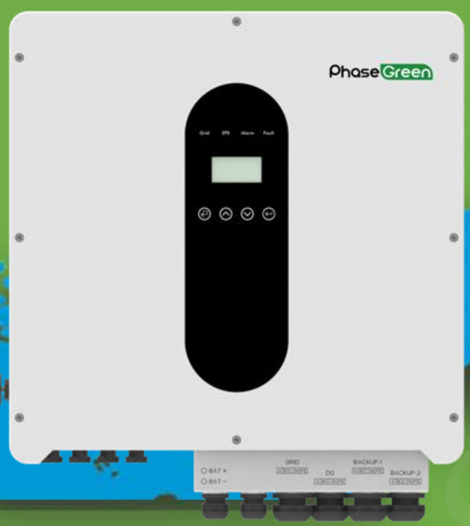

User Manual

PhG-P6~15K0HT-M
Smart Three-phase Hybrid Inverter

Issue Date: 2022

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Version History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Version 1.1

- Update and add some technical parameters.

Version 1.0

- This issue is used for first office application (FOA).

About This manual

Overview

This document describes the product of PhG-P6K0HT-M, PhG-P8K0HT-M, PhG-P10K0HT-M ,PhG-P12K0HT-M and PhG-P15K0HT-M (PhG-P for short) in terms of their installation, electrical connections, commissioning and troubleshooting. Before installing and operating the PhG-P, ensure that you are familiar with the features, functions, and safety precautions provided in this document.

Intended Audience

This document is applicable to:

- Installers
- Users
- Sales

Symbol Conventions

The symbols that may be found in this document are defined as follows:

Symbol	Description
⚠ DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. Notice is used to address practices not related to personal injury
🕮 NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Contents

1 Safety Precautions

Read the manual carefully and operate in accordance with the safety precautions. Refer to local safety regulations on items not covered in this manual. Electrical installation, maintenance must be performed by professional / qualified personnel.

1.1 General Safety

Declaration

Before installing, operating, and maintaining the equipment, read this document and observe all the safety instructions on the equipment and in this document.

The "NOTICE", "WARNING", and "DANGER" statements in this document do not cover all the safety instructions. They are only supplements to the safety instructions. PhaseGreen will not be liable for any consequence caused by the violation of general safety requirements or design, production, and usage safety standards.

Ensure that the equipment is used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and the resulting the equipment malfunction, component damage, personal injuries, or property damage are not covered under the warranty.

Follow local laws and regulations when installing, operating, or maintaining the equipment. The safety instructions in this document are only supplements to local laws and regulations.

PhaseGreen will not be liable for any consequences of the following circumstances:

- Equipment damage due to force majeure, such as storms, earthquakes, ire, floods, and debris flows
- Damage caused during transportation by the customer
- Damage caused by storage conditions that do not meet the requirements specified in related documents
- Operation beyond the conditions specified in this document
- Installation or use in environments that cannot meet relevant international, national, or local standards
- Unauthorized modifications to the product or software code or removal of the product
- Failure to follow the operation instructions and safety precautions on the product and in this document
- Damage to the hardware or data of the equipment due to customer's negligence, improper operation, or intentional damage

- System damage caused by improper operations of a third party or customer, including those in transportation, installation, and adjustment, alteration, or removal of identification marks

General Requirements

DANGER

Do not work with power on during installation.

- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, and performing outdoor installation) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- After installing the equipment, remove idle packing materials such as cartons, foam, plastics, and cable ties from the equipment area.
- In the case of a fire, immediately leave the building or the equipment area, and turn on the fire alarm bell or make an emergency call. Do not enter the building on fire in any case.
- Do not scrawl, damage, or block any warning label on the equipment.
- Tighten the screws to the specified torque using tools when installing the equipment.
- Understand the components and functioning of a grid-tied PV power system and relevant local standards.
- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches cannot be exposed to an outdoor environment for a long period of time.
- Do not open the host panel of the equipment.
- You shall not reverse engineer, decompile, disassemble, adapt, add code to the device software or alter the device software in any other way, research the internal implementation of the device, obtain the device software source code, infringe on PhaseGreen's intellectual property, or disclose any device software performance test results.

Personal Safety

- If there is a probability of personal injury or equipment damage during operations on the equipment, immediately stop the operations, report the case to the supervisor, and take feasible protective measures.

- Use tools correctly to avoid hurting people or damaging the equipment.
- Do not touch the energized equipment, as the enclosure is hot.

1.2 Personnel Requirements

- Personnel who plan to install or maintain PhaseGreen equipment must receive thorough training, understand all necessary safety precautions, and be able to correctly perform all operations.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment.
- Personnel who will operate the equipment, including operators, trained personnel, and professionals, should possess the local national required qualifications in special operations such as high-voltage operations, working at heights, and operations of special equipment.
- Only professionals or authorized personnel are allowed to replace the equipment or components (including software).

NOTE

- Professionals: personnel who are trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, and maintenance
- Trained personnel: personnel who are technically trained, have required experience, are aware of possible hazards on themselves in certain operations, and are able to take protective measures to minimize the hazards on themselves and other people
- Operators: operation personnel who may come in contact with the equipment, except trained personnel and professionals

1.3 Electrical Safety

Grounding

- For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.
- Do not damage the ground conductor.
- Do not operate the equipment in the absence of a properly installed ground conductor.

- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is securely grounded.

General Requirements

DANGER

Before connecting cables, ensure that the equipment is intact. Otherwise, electric shocks or fire may occur.

- Ensure that all electrical connections comply with local electrical standards.
- Obtain approval from the local electric utility company before using the equipment in grid-tied mode.
- Ensure that the cables you prepared meet local regulations.
- Use dedicated insulated tools when performing high-voltage operations.

AC and DC Power

DANGER

Do not connect or disconnect power cables with power on. Transient contact between the core of the power cable and the conductor will generate electric arcs or sparks, which may cause fire or personal injury.

- Before making electrical connections, switch off the disconnector on the upstream device to cut off the power supply if people may contact energized components.
- All DC cables should be installed to provide as short a run as possible, and positive and negative cables of the string or main DC supply should be bundled together. Avoiding the creation of loops in the system.
- Before connecting a power cable, check that the label on the power cable is correct.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- The unit contains capacitors that remain charged to a potentially lethal voltage after the MAINS, battery and PV supply has been disconnected. Hazardous voltage will present for up to 5 minutes after disconnection from power supply. When accessing the internal circuit of inverter, it is very important to wait 5 minutes before operating the power circuit or demounting the electrolyte capacitors inside the device. Do not open the device beforehand since the capacitors require time sufficiently discharge!

- Measure the voltage between terminals Vdc+ and Vdc- with a multi-meter (impedance at least 1Mohm) to ensure that the device is discharged before beginning work (35Vdc) inside the device.

Surge Suppression Devices (SPD)

Thunder will cause a damage either from a direct strike or from surges due to a nearby strike Induced surges are the most probable cause of thunder damage in majority or installations, especially in rural areas where electricity is usually provided by long overhead lines. Surge may be included on both the PV array conduction and the AC cables leading to the building.

- To protect the AC system, surge suppression devices (SPD type2) should be fitted at the main incoming point of AC supply (at the consumer's cutout), located between the inverter and the meter/distribution system; SPD (test impulse D1) for signal in according to EN 61632-1.
- To protect the DC system, surge suppression device (SPD type2) should be fitted at the inverter end of the DC cabling and at the array located between the inverter and the PV generator, if the voltage protection level (VP) of the surge arresters is greater than 1100V, an additional SPD type 3 required for surge protection for electrical devices.

Battery Safety Instructions

PhG-P hybrid inverter series should be worked with high voltage battery, for the specific parameters such as battery type, nominal voltage and nominal capacity etc., please refer to parameters of the products.

As accumulator batteries may contain potential electric shock and short-circuit current danger, to avoid accidents that might be thus resulted, the following warnings should be observed during battery maintain or replacement:

- Do not wear watches, rings or similar metallic items.
- Use insulated tools.
- Put on rubber shoes and gloves.
- Do not place metallic tools and similar metallic parts on the batteries.
- Switch off load connected to the batteries before dismantling battery connection terminals.
- Only personal with proper expertise can carry out the maintenance of accumulator batteries.

Anti-Islanding Effect

Islanding effect is a special phenomenon that grid-connected PV system still supply power to the nearby grid when the voltage loss is happened in the power system. It is dangerous for maintenance personnel and the public. PhG-P Hybrid series inverter provide Active Frequency Drift (AFD) to prevent islanding effect.

Cabling

- When routing cables, ensure that a distance of at least 30 mm exists between the cables and heat-generating components or areas. This prevents damage to the insulation layer of the cables.
- Bind cables of the same type together. When routing cables of different types, ensure that they are at least 30 mm away from each other.
- Ensure that the cables used in a grid-tied PV power system are properly connected and insulated and meet specifications.

CE Directives

This section mentions the requirements of the European low voltage directives, which contains the safety instructions and conditions of acceptability for the endues system, which you must follow when installing, operating, and servicing the products. If ignored, physical injury or death may follow, or damage may occur to the products. Read this before you work on the products. If you are unable to understand the dangers, warnings, cautions or instructions please contact an authorized service dealer before installing, operating, and servicing the products.

The Grid connected inverter meets the requirement stipulated in Low Voltage Directive (LVD) 2014/35/EU and Electromagnetic Compatibility (EMC) Directive 2014/30/EU. The unit is based on: EN 62109-1:2010; EN 62109-2:2011; IEC 62109-1(ed.1); IEC62109-2(ed.1); EN 61000-6-3:2007+A: 2011; EN 61000-6-1:2007; EN 61000-6-2:2005;

In case of installation in PV system, startup of the unit (i.e. start of designated operation) is prohibited until it is determined that the full system meets the requirements stipulated in EC Directive (2014/35/EU, 2014/30/EU, etc.). Before the shipment from the factory, the grid connected inverter is completely connecting device and ready for connection to the mains and PV supply, the unit shall be installed according to the national wiring regulations. Compliance with safety regulations depends upon installing and configuring system correctly, including using the specified wires.

The system must be installed only by professional assemblers who are familiar with requirements for safety and EMC. The assembler is responsible for ensuring that the end system complies with all the relevant laws in the country where it is to be used.

The individual subassembly of the system shall be interconnected by means of the wiring methods outlined in national/international such as the national electric code (NFPA) No.70 or VDE regulation 0107.

1.4 Installation Environment Requirements

- Ensure that the equipment is installed in a well-ventilated environment.
- To prevent fire due to high temperature, ensure that the ventilation vents or heat dissipation system are not blocked when the equipment is running.
- Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.

1.5 Mechanical Safety

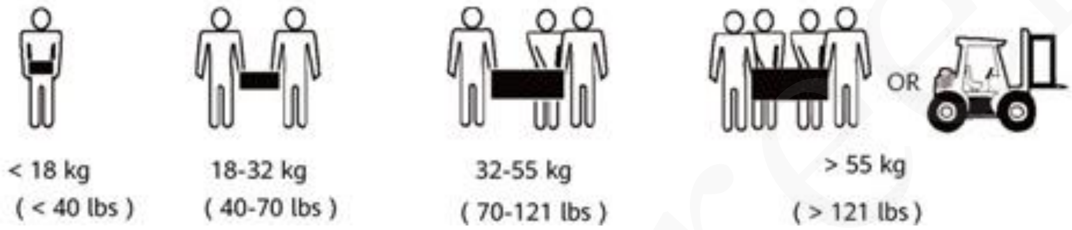
Drilling Holes

When drilling holes into a wall or floor, observe the following safety precautions:

- Wear goggles and protective gloves when drilling holes.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings that have accumulated inside or outside the equipment.

Moving Heavy Objects

- Be cautious to avoid injury when moving heavy objects.



- When moving the equipment by hand, wear protective gloves to prevent injuries.

1.6 Commissioning

When the equipment is powered on for the first time, ensure that professional personnel set parameters correctly. Incorrect settings may result in inconsistency with local certification and affect the normal operation of the equipment.

1.7 Maintenance and Replacement

DANGER

High voltage generated by the equipment during operation may cause an electric shock, which could result in death, serious injury, or serious property damage.

Prior to maintenance, power off the equipment and strictly comply with the safety precautions in this document and relevant documents.

- Maintain the equipment with sufficient knowledge of this document and using proper tools and testing equipment.
- Before maintaining the equipment, power it off and follow the instructions on the delayed discharge label to ensure that the equipment is powered off.

- Turn off the AC and DC switches of the PhG-P when maintaining the electric equipment or power distribution equipment connected the PhG-P.
- Place temporary warning signs or erect fences to prevent unauthorized access to the maintenance site.
- If the equipment is faulty, contact your dealer.
- The equipment can be powered on only after all faults are rectified. Failing to do so may escalate faults or damage the equipment.

1.8 Storage

The following requirements should be met if the PhG-P is not put into use directly:

- Do not unpack the PhG-P.
- Keep the storage temperature at –40°C to +70°C and the humidity at 0%– 95% RH.
- The PhG-P should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- If the PhG-P has been long-term stored, inspections and tests should be conducted by qualified personnel before it is put into use.

2 Product Introduction

2.1 Product overview

Functions

Smart Three-phase Hybrid Inverter PhG-P6~15K0HT-M Series is a high-quality inverter which can convert the DC power generated by PV strings into AC power and store energy into battery or feeds the power into the Power Grid. The inverter can be used to optimize self-consumption, store in the battery for future use or feed the power into Public Grid. Work mode depends on PV energy and user's preference. It can provide power for emergency use during the grid lost by using the energy from battery and inverter (generated from PV)

Model

This manual document covers the following PhG-P Series product models:

- PhG-P6K0HT-M
- PhG-P8K0HT-M
- PhG-P10K0HT-M
- PhG-P12K0HT-M
- PhG-P15K0HT-M

Figure 2-1 Model description (using PhG-P10K0HT-M as an example)

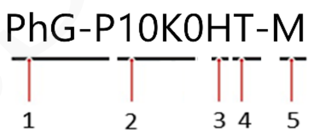


Table 2-1 Model description

Identifier	Description	Value
1	Product family name	PhG-P: PhaseGreen smart hybrid inverter
2	Power class	6K0: rated power of 6.0 kW 8K0: rated power of 8.0 kW 10K0: rated power of 10.0 kW 12K0: rated power of 12.0 kW 15K0: rated power of 15.0 kW

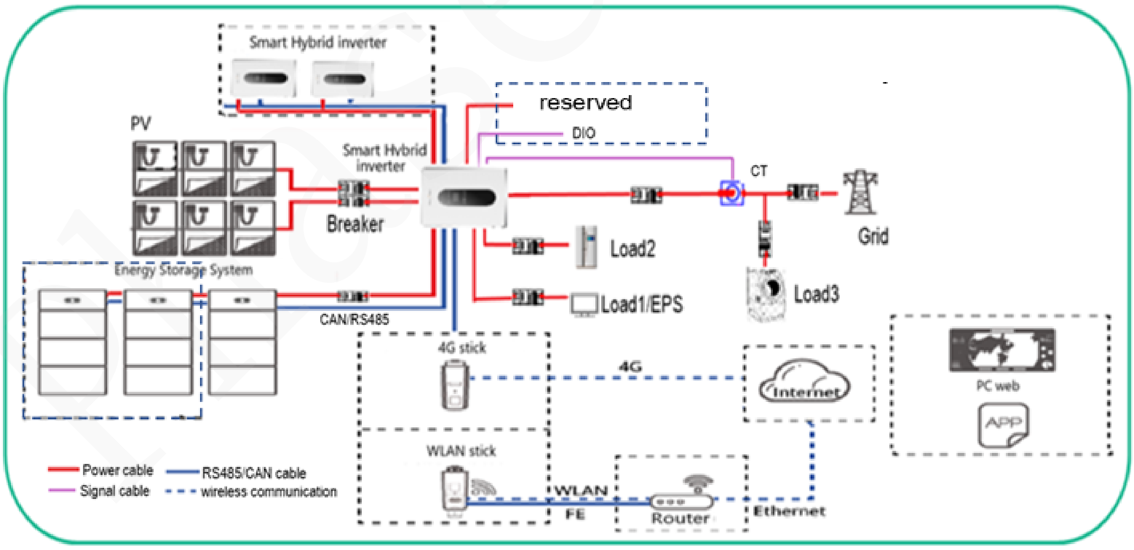
3	Support Low or High voltage battery	"L" or "H" means the inverter supported the input battery voltage range level is "Low" (40~60V) or "High" (125~600V)
4	T	T: "Three", means AC output/connection is three- phase
5	Series	M: means "M" series

Production Application

The PhG-P applies to residential PV energy storage system. Typically, a grid-tied system consists of PV strings, hybrid inverters, AC/DC breakers, and power distribution units. The smart hybrid inverter PhG-P Series are designed with 2 PV strings inputs and the input of the battery energy storage system and the generator. The smart hybrid inverter PhG-P Series provide two BACK-UP outputs (Load1/EPS (emergency power supply), Load2) for customer to choose based on the local rules. The inverter integrates the On/Off grid controller. It provides the convenience in installation and maintenance.

The smart hybrid inverter PhG-P Series Support multi-machine parallel connection. It is flexible for the user to configure larger capacity.

Figure 2-2 Production application (dashed boxes indicate optional components)



NOTE

For detailed operations of energy storage system in the application, please refer to the guides: **PhG-ESS-XX User Manual**

2.2 Appearance and connect terminal

2.2.1 Appearance and connect terminals

Figure 2-3 Appearance and connect terminals

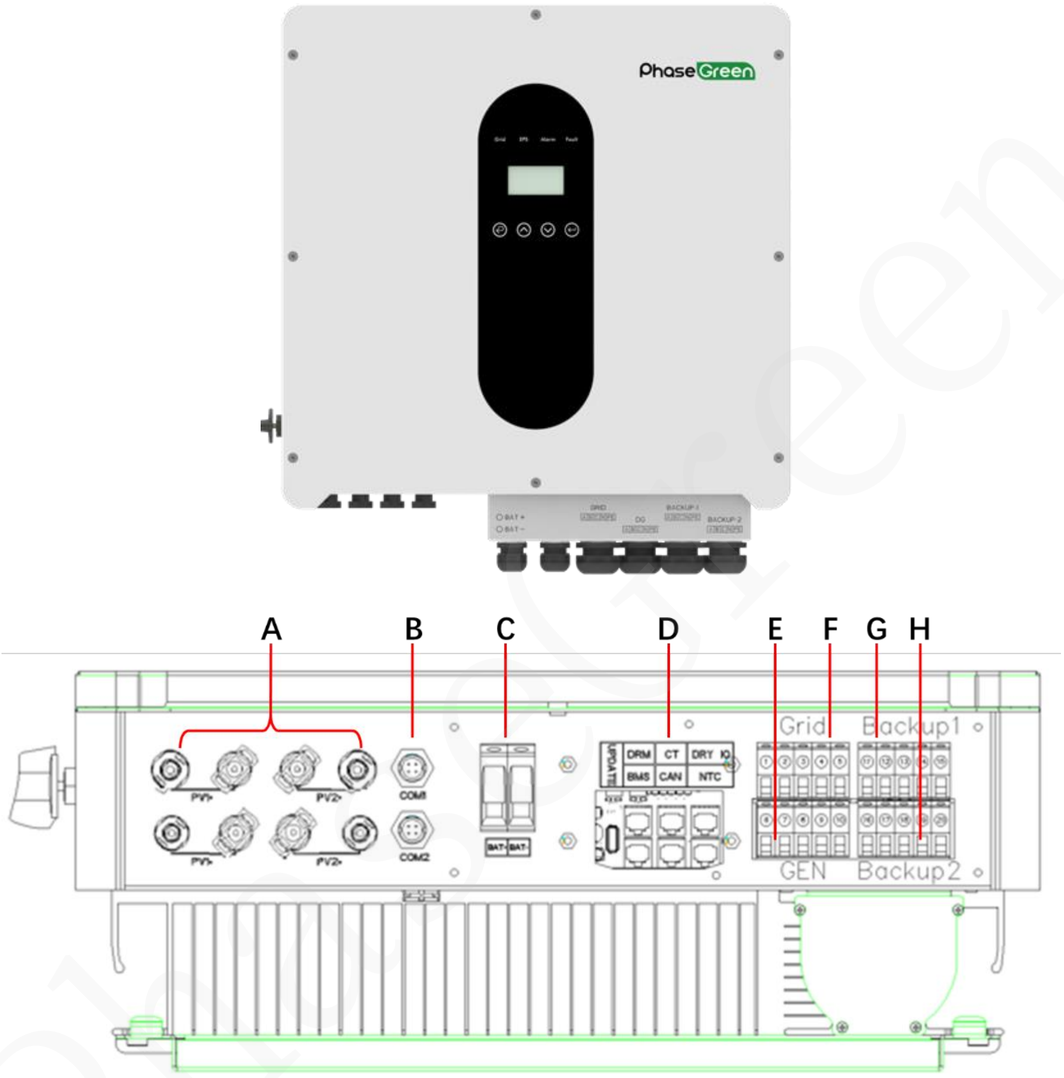


Table 2-2 Product interface description

Object	Function	Label	Description
A	PV string 1 Input port	PV1+	PV string 1 positive input （Spare a terminal on the left）
		PV1-	PV string 1 negative input （Spare a terminal on the left）
	PV string 2 Input port	PV2+	PV string 2 positive input (Spare a terminal on the left）

Object	Function	Label	Description
		PV2-	PV string 2 negative input (Spare a terminal on the left)
B	Communication interface	COM1	GPRS port(optional)
C	BAT Port	BAT+	Battery Positive input
		BAT-	Battery negative input
D	signal line interface	UPDATE	Upgrading software Ports
		DRM	Function temporarily retained
		CT	Connect to CT (current transformer)
		DRY IO	dry contact
		BMS	BMS communication to Battery
		CAN	CAN communication
		NTC	NTC detection
E	GRID	①	Grid line A phase
		②	Grid line B phase
		③	Grid line C phase
		④	Grid line neutral line
		⑤	Grid line ground electrode
F	GEN (Diesel generator function is unreleased currently, reserved)	⑥	A phase
		⑦	B phase
		⑧	C phase
		⑨	neutral line
		⑩	ground electrode
G	Backup1	⑪	Backup1 line A phase
		⑫	Backup1 line B phase
		⑬	Backup1 line C phase
		⑭	Backup1 line null line,
		⑮	Backup1 line ground electrode
H	Backup2	⑯	Backup2 line A phase
		⑰	Backup2 line B phase
		⑱	Backup2 line C phase
		⑲	Backup2 line neutral line,
		⑳	Backup2 line ground electrode

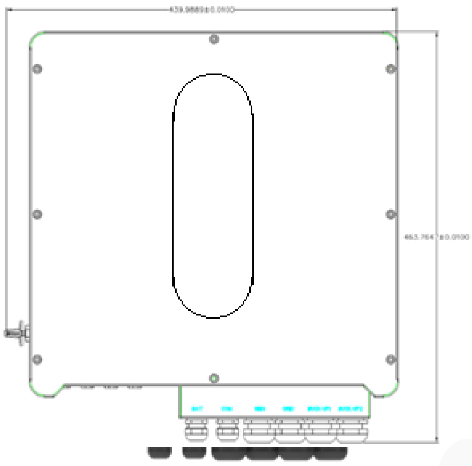
NOTICE

Qualified electrician will be required for the installation.

Before installation, ensure the Battery input, PV input, AC output/Grid and BACK-UP output worked in the rated range. if the equipment works is not in the rated range, it could result in equipment damage or that the equipment is not working.

2.2.2 Dimension

Figure 2-4 Dimension of PhG-P



Front View

Left Side View

2.3 Label Description

2.3.1 Enclosure Labels

Table 2-3 Enclosure label description

Symbol	Description
	Warning. Hot face -Hot surfaces. -To reduce the risk of burns. -Do not touch.
	Waring. Danger of high voltage and electric shock! -Both AC and DC voltage sources are terminated inside this equipment. -Each circuit must be individually dis-connected before servicing. -When the Photovoltaic array is exposed to light, it supplies a DC voltage to this equipment. -Disconnect all sources of supply before servicing. -When a ground fault is indicated. Normally grounded conductors may be ungrounded and energized or normally ungrounded conductors may be grounded.
	Warning. This symbol indicates that you should wait at least 5mins after disconnecting the inverter from the utility grid and from the PV panel before touching any inner parts. -Risk of electric shock from energy stored in capacitor.
	Caution! Failure to observe a warning indicated in this manual may result in injury. -Risk of electric shock, do not remove upper front cover. -No user serviceable parts inside.

	-Refer servicing to qualified service personnel.

2.3.2 Product Nameplate

Figure 2-5 Nameplate (Using PhG-P8K0HT-M as an example)

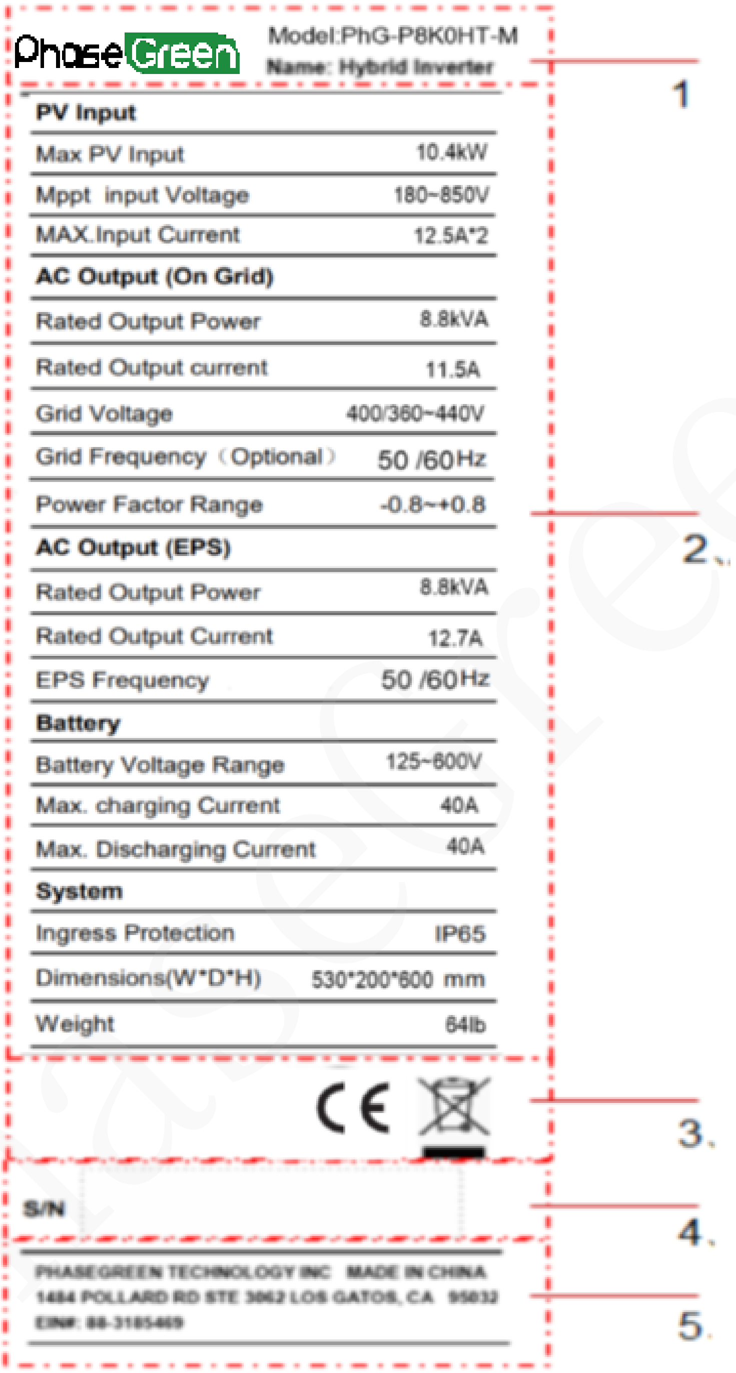


Table 2-4 Nameplate description

No.	Description	No.	Description
1	Trademark and product model	2	Key technical parameters
3	Certification marks	4	Serial Number
5	Company name and country of origin		

NOTE

High voltage generated by the equipment during operation may cause an electric shock, which could result in death, serious injury, or serious property damage.

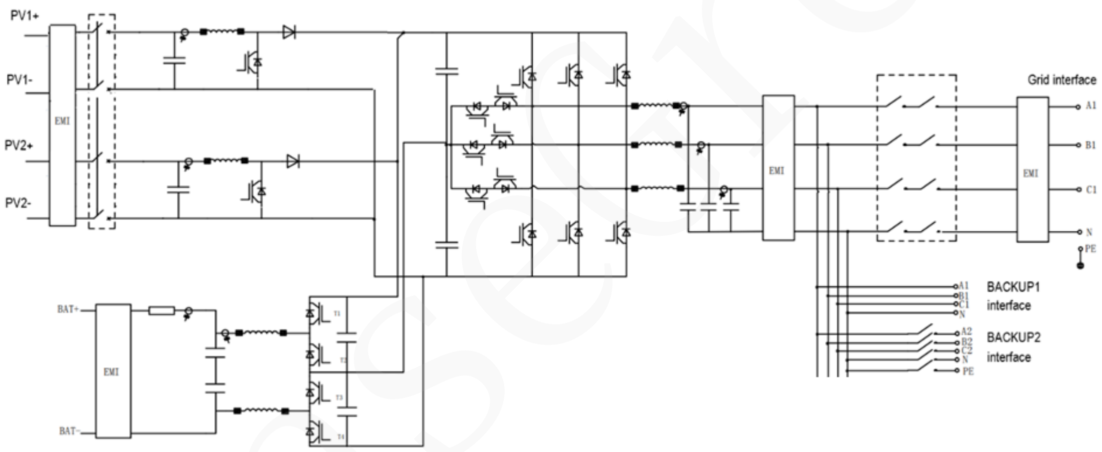
Prior to maintenance, power off the equipment and strictly comply with the safety precautions in this document and relevant documents.

2.4 Working Principles

2.4.1 Circuit Diagram

Hybrid Series is designed with two EPS(BACKUP) versions for customer to choose based on the local rules.

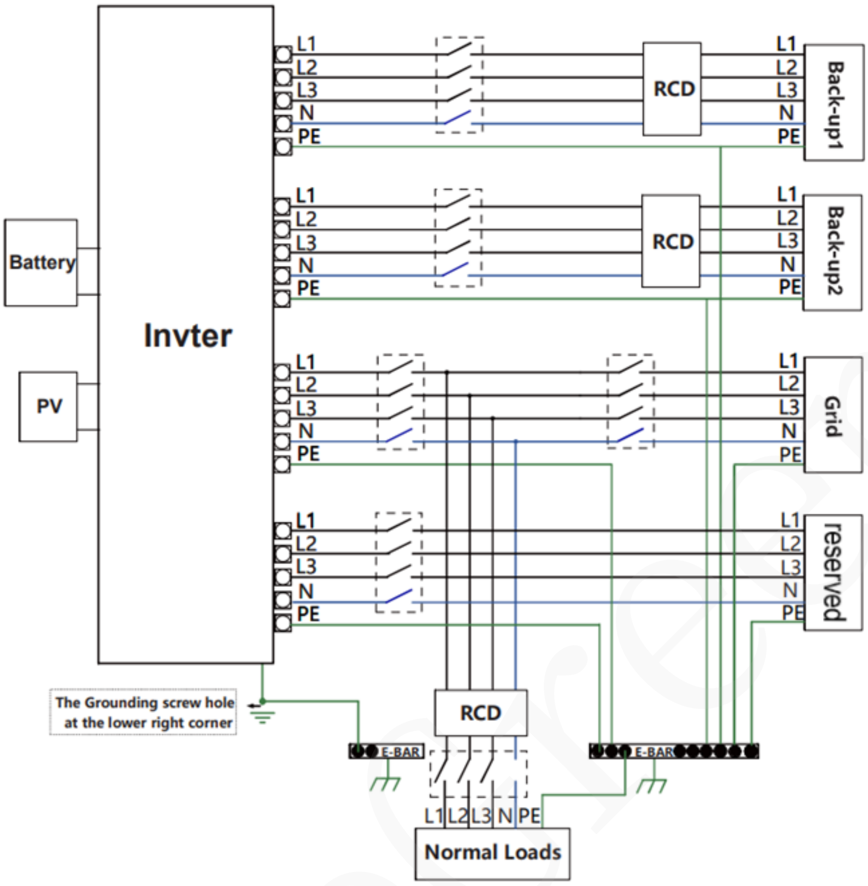
Figure 2-6 PhG-P inner conceptual diagram



2.4.2 System Diagram

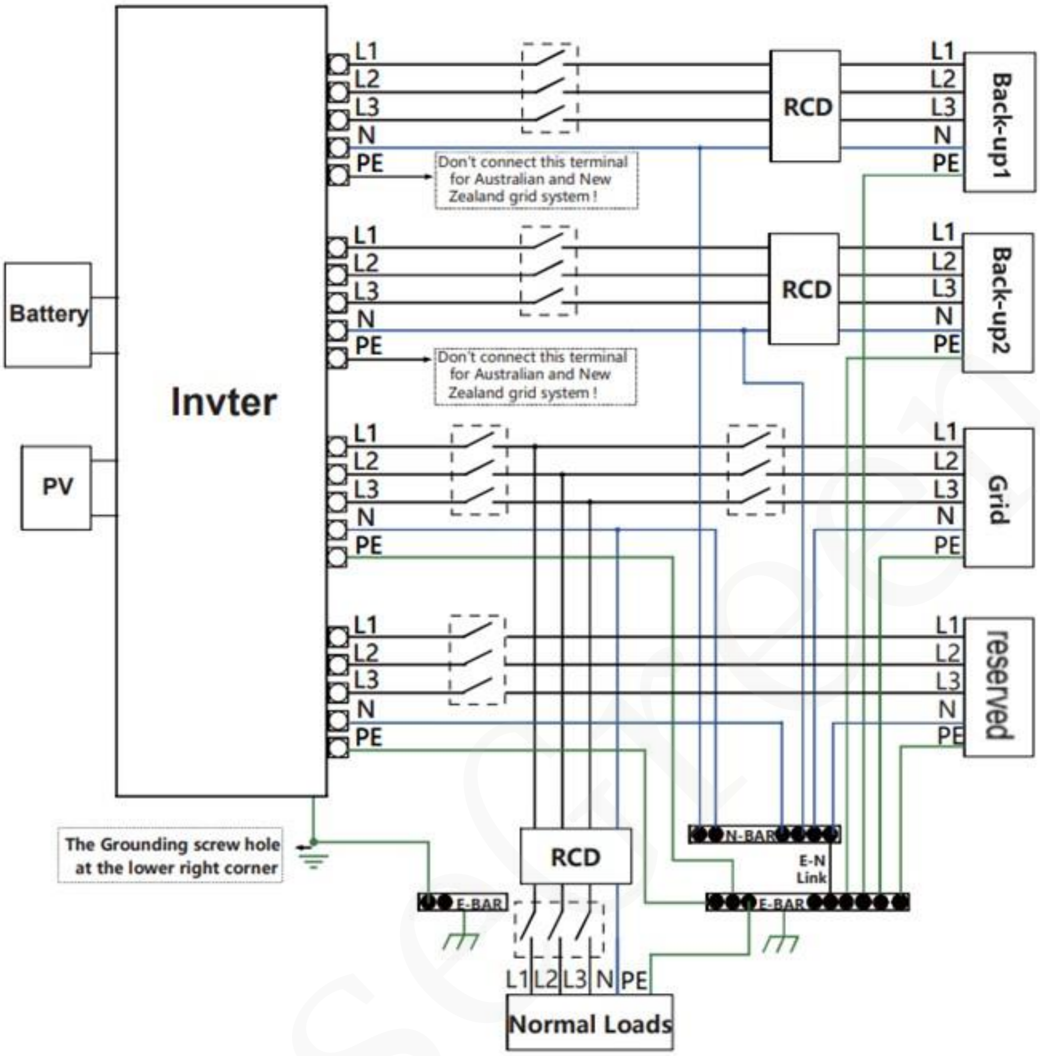
E Version applies to the wiring rules that requires the Live line and N (Neutral) line of EPS must be disconnected with the Live line and N (Neutral) line of grid (applies to most countries).

Figure 2-7-1 PhG-P E Version System Diagram



I Version applies to the wiring rules that requires N (Neutral) line of alternative supply must NOT be isolated or switched (applies to wiring rules AS/NZS_3000:2012 for Australia and New Zealand).

Figure 2-7-2 PhG-P I Version system Diagram



NOTE

- Please make the home loads within the "BACK-UP output rating" under BACK-UP mode, otherwise the inverter will shut down with an "overload fault" warning.
- Please confirm with the mains grid operator whether there are any special regulations for grid connection.
- The wiring diagram is for reference only, and the complete electrical connection shall meet the requirements of local regulations.
- Do not misconnect the phase sequence. Otherwise, the inverter cannot run normally.

2.5 Work Modes

Based on different requirements, the hybrid inverter provides multiple work modes such as Self-Use, Peak Shift(TOU) and Battery Priority.

Self-Use

- This mode applies to areas where the electricity price is high, or areas where the FIT(Feed-in-Tariff) subsidy is low or unavailable, or areas where the grid blackouts are frequent.
- In this mode, **Self-Use** is selected. Solar energy provides power to the loads as first priority, if solar energy is sufficient lo power all connected loads, solar energy excess power will be provided to charge battery, and then redundant power will be fed to grid. When PV power is insufficient or no PV power is generated at night, batteries discharge to supply power to the loads. If solar energy and battery are not sufficient to power all connected loads, utility energy (Main Grid) will supply power to the loads with solar energy at the same time. Self-Use improving the self-consumption rate of the PV system and the self-sufficiency rate of residential energy and reducing electricity costs.

Peak-Shift (TOU, Time-Of-Use)

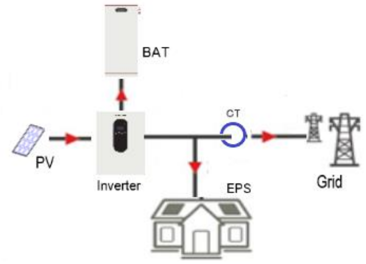
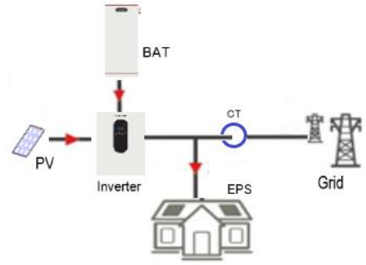
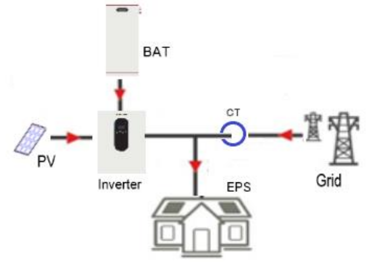
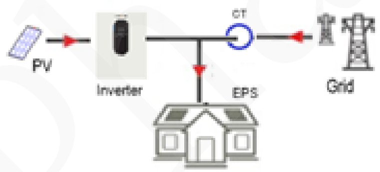
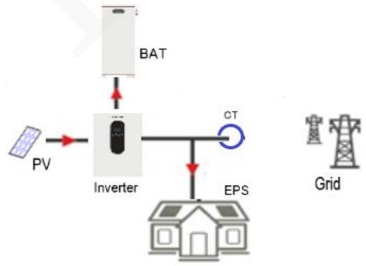
- This mode applies to scenarios where the price difference between peak and off-peak hours is large.
- In this mode, **Peak-Shift** is selected. You can manually set the charge and discharge time segments. For example, you can allow the grid to charge batteries in low electricity price periods at night and discharge batteries during high electricity price periods, saving electricity fee. The charge from grid function must be enabled.

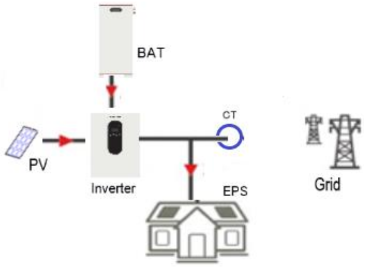
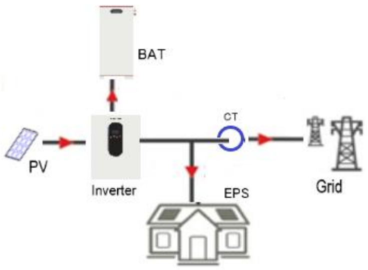
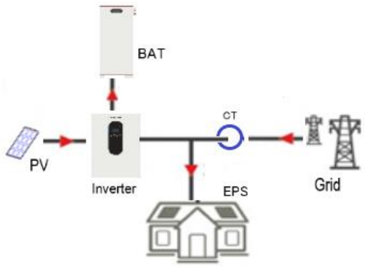
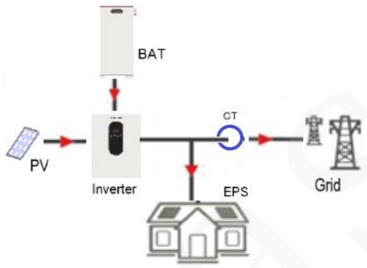
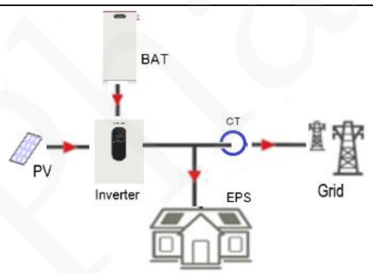
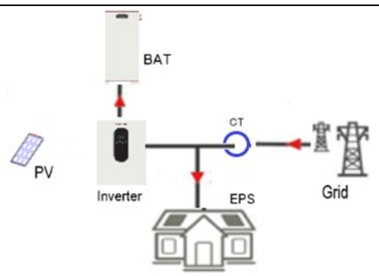
Battery Priority

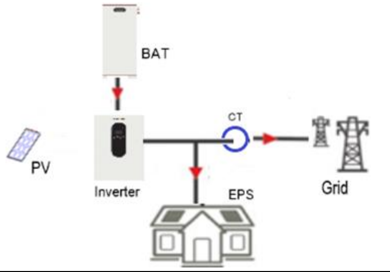
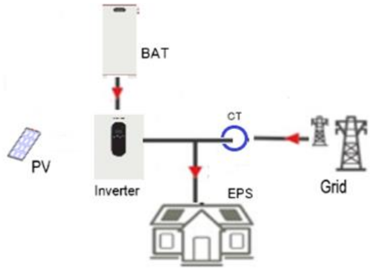
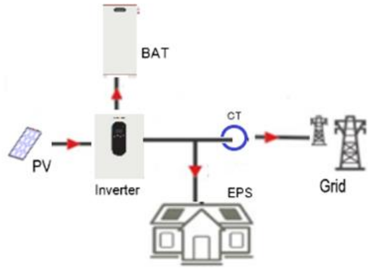
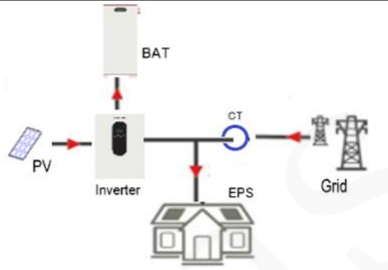
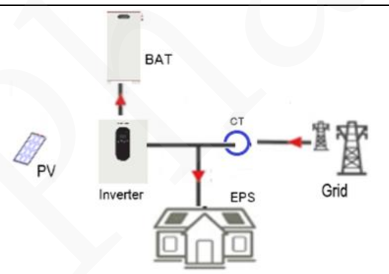
- This mode applies to scenarios where the grid blackouts are frequent and maintain high capacity of battery.
- In this mode, **Batter Priority** is selected. Solar energy will charge battery as first priority, if solar energy is excess, the excess power will supply load. If there's still some extra energy, then the excess power will be fed to grid.

Table 2-5 Work modes of PhG-P

1.Work modes: Self-Use
1. When PV, Grid, Battery is available

<table>
<tr><td>
</td><td>A. Solar energy provides power to the loads as first priority, if solar energy is Sufficient lo power all connected loads , solar energy excess power will provide to charge battery , and then redundant power will be fed to grid.</td></tr>
<tr><td>
</td><td>B. Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time .</td></tr>
<tr><td>
</td><td>C. Solar energy provides power to the loads as first priority, if solar energy and battery are not sufficient to power all connected loads, utility energy (Main Grid) will supply power to the loads with solar energy at the same time.</td></tr>
<tr><td colspan="2">2.When PV, Grid is available (without battery)</td></tr>
<tr><td>
</td><td>A. Solar energy provides power to the loads as first priority, if solar energy is sufficient, the excess power will be feed to grid.</td></tr>
<tr><td>
</td><td>B. Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, Grid energy will supply power to the loads at the same time.</td></tr>
<tr><td colspan="2">3.When PV. Battery is available (Grid is disconnected):</td></tr>
<tr><td>
</td><td>A. Solar energy provides power to the loads as first priority, if solar energy is sufficient to power all connected loads, solar energy will be provided to charge the Battery.</td></tr>
</table>

<table>
<tr><td>
</td><td>B. Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, battery energy and solar energy will supply power to the loads at the same time.</td></tr>
<tr><td colspan="2">2.Work modes: Peak Shift</td></tr>
<tr><td colspan="2">1.When PV, Grid, Battery is available:</td></tr>
<tr><td>
</td><td>A. On charge time, solar energy will charge battery as first priority. The excess energy will supply power to the loads. If solar energy is sufficient to supply loads and charge battery, and if there's still some extra energy, then the excess power will be fed to grid.</td></tr>
<tr><td>
</td><td>B. On charge time, solar energy will charge battery as first priority, then the excess solar energy will supply power to loads. If solar energy is not sufficient to charge battery and supply loads, grid will supply all the connected loads with solar energy together.</td></tr>
<tr><td>
</td><td>C. On discharge time, solar energy provides power to the loads as first priority, if solar energy is sufficient to supply loads, and if there's still some extra energy from solar energy, then the excess power and battery will deliver the power to the grid at the same time.</td></tr>
<tr><td>
</td><td>D. In the period of no charge or discharge, the solar power supply loads at first priority, excess energy to the grid.</td></tr>
<tr><td colspan="2">2.When Grid, Battery is available (PV is disconnected):</td></tr>
<tr><td>
</td><td>A. On charge time, grid will charge battery and supply power to the connected loads at the same time.</td></tr>
</table>

<table>
<tr><td>
</td><td>B. On discharge time, if load power is less than battery power, battery will supply power to loads as first priority, the excess power will be fed to grid.</td></tr>
<tr><td>
</td><td>C. On discharge time, if load power is more than battery power, battery and grid will supply power to the loads at the same time.</td></tr>
<tr><td colspan="2">3.Work modes: Battery Priority</td></tr>
<tr><td colspan="2">1.When PV, Grid, Battery is available:</td></tr>
<tr><td>
</td><td>A. Solar energy will charge battery as first priority, if solar energy is excess, the excess power will supply load. If there's still some extra energy, then the excess power will be fed to grid</td></tr>
<tr><td>
</td><td>B. Solar energy will charge battery as first priority, if solar energy is excess. the excess power will supply load. If solar energy is not sufficient to charge battery and supply loads, grid will supply power to loads.</td></tr>
<tr><td colspan="2">2.When Grid, Battery is available (PV is disconnected):</td></tr>
<tr><td>
</td><td>Grid will supply power to load and charge battery at the same time.</td></tr>
</table>

NOTICE

If set anti-Reverse function allowable, once on the work mode of Self-use, Peak shift, battery priority, the system will not feed power to grid.

2.6 Technical Parameters

Table 2-6 Technical Parameters of PhG-P

Technical specifications	**PhG-P6K0HT-M**	**PhG-P8K0HT-M**	**PhG-P10K0HT-M**	**PhG-P12K0HT-M**	**PhG-P12K0HT-M**
Input (PV)					
Max. power(W)	9000	12000	15000	18000	22500
Max. DC System Voltage(V)	1000				
MPPT operating voltage range(V)	180-850				
Min. input voltage / start voltage	125V/180V				
MPPT tracker/strings	2(1/1)				2(2/2)
Max. input current per MPPT(A)	13				20
Max. short-circuit current per MPPT(A)	16				30
Battery Input/Output					
Battery voltage range(V)	125~600				
Max. charge Voltage(V)	600				
Rated charge/discharge current(A)	40	40	40	40	40
Max. charge/discharge current(A)	50	50	50	50	50
Battery type	Lithium iron phosphate(LFP) and Lead Acid Battery				
Communication interface	CAN/RS485				
AC output(On-Grid/Backup)					
Nominal AC voltage	3W+N+PE; 220 / 380 V, 230 / 400 V, 240 / 415 V				
AC frequency rated & range	50 ±5Hz / 60 ±5Hz				
Rated output power(VA)	6000	8000	10000	12000	15000
Max. output power(VA)	6600	8800	11000	13200	16500
Rated output current(A) @400V	8.7	11.5	14.4	17.3	21.7
Max. output current(A)	9.5	12.7	15.9	19.1	23.8
Power factor	0.99, 0.8 leading~0.8 lagging				
Harmonics THDi @ Nominal power	<3%				
Max. switch time(Backup)	≤20 ms				
Output THDv @ Linear load(Backup)	<2%				
Overload capability	110%,30s/120%,10s/150%,0.02s				

AC Input(On-Grid)					
Rated grid voltage	3W+N+PE, 220 / 380 V; 230 / 400 V; 240 / 415 V				
AC voltage range	360 V ~ 440 V				
AC grid frequency rated & range	50 ±5Hz / 60 ±5Hz				
Rated power(W)	12000	16000	20000	24000	30000
Max. input power from grid(VA)	13200	17600	22000	26400	33300
Rated input current from grid(A)	17.3	23.1	28.9	34.7	43.4
Max. input current from grid(A)	19	25.5	31.	38.2	47.6
General					
MPPT efficiency	99.5%				
Max efficiency	97.9%	97.9%	98.2%	98.2%	98.5%
Euro efficiency	97.2%	97.2%	97.5%	97.5%	97.6%
Max. battery to load efficiency	97.5%	97.5%	97.5%	97.6%	97.8%
Ingress Protection	IP65				
Noise(dB)	<35				
Dimensions W * D * H (mm)	530*200*600				
Device weight(kg)	30	31	31	31	34
Installation	Wall-mounted				
Operating temperature range	-25 ~ + 60 °C (-13 °F ~ 140 °F)				
Relative operating humidity	0 %RH ~ 95 %RH				
Cooling	Natural convention				
Standby consumption	< 3W				
Max. operating altitude	4000m(Derating above 2000 m)				
Inverter topology (Solar/Battery)	Transformer less / Transformer less				
User interface	LCD & APP				
Communication with meter	RS485				
Communication with portal	WiFi Stick				
Communication RS485/WiFi/4G/CAN	Yes/Yes/Optional/Yes				
Integrated power control / Zero export control	Yes / Yes				
Safety Protection					

DC-side disconnection device	Yes
PV string reverse polarity protection	Yes
All-pole sensitive residual current monitoring unit	Yes
Anti-islanding protection	Yes
AC output over current protection	Yes
AC output short circuit current protection	Yes
AC over voltage protection	Yes
Protection class (as per IEC 62109-1)	I
overvoltage category (as per IEC 62109-1)	AC: III; DC: II
Standard Compliance	
Safety	IEC/EN62109-1,IEC/EN62109-2
EMC	IEC61000-6-1,IEC61000-6-3
Grid connection standard	IEC61727,IEC62116,IEC61683,Europe:EN50549-1;Germany:VDE4105/2104,NTS 2.1;Spain:UNE 217001,UNE 217002,UNE 206007,UNE 206006

3 Installation

3.1 Checking before Installation

Before unpacking the inverter, check the outer packing materials for damage, such as holes and cracks, and check the inverter model. If any damage is found or the inverter model is not what you requested, do not unpack the package and contact your supplier as soon as possible.

3.2 Packing List

Open the package and take out the product, please check the accessories first. The packing list shown as below. If any damage is found or any component is missing, contact your supplier.

Figure 3-1 Packing list

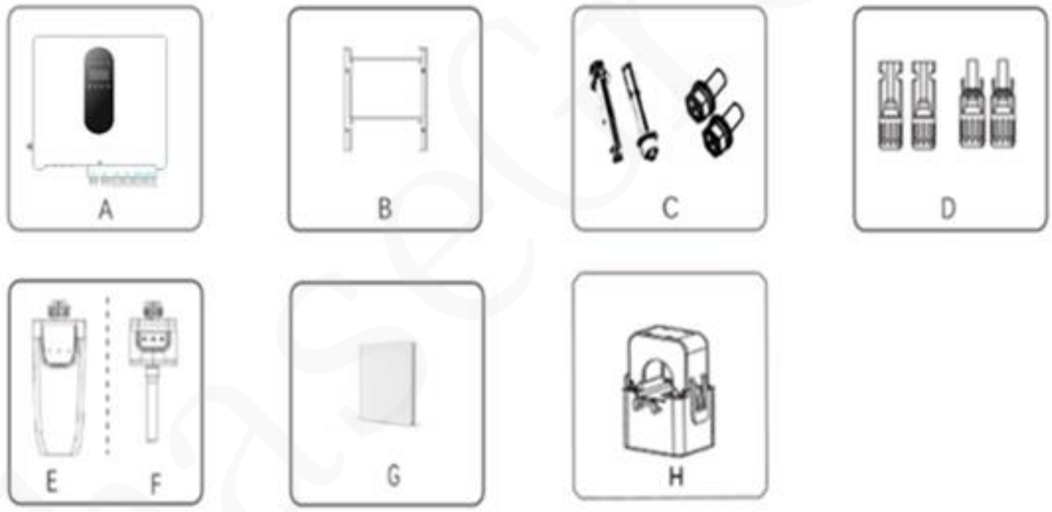


Table 3-1 Packing list description

Object	Description
A	Inverter
B	Bracket
C	Expansion screws and pan-head screws
D	PV connectors (2*positive, 2*negative)
E	Wi-Fi module (Optional)
F	GPRS module (Optional)
G	User manual (Optional) . or Soft-Paper
H	Current Transformer (CT)

3.3 Mounting

3.3.1 Environment Requirements

PhG-P hybrid inverter Series inverter is designed for outdoor installation (IP65). Make sure the installation site meets the following conditions:

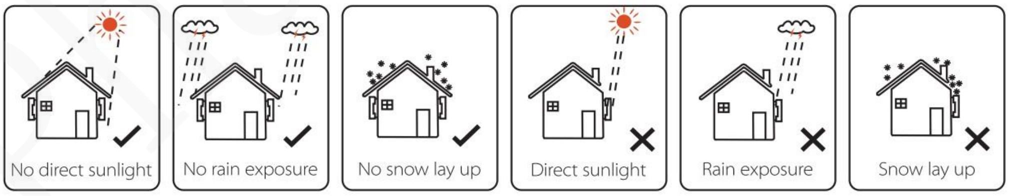
- The PhG-P is protected to IP65 and can be installed indoors or outdoors.
- Not in direct sunlight.
- Not in areas where highly Flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television antenna or antenna cable.
- Not higher than altitude of about 2000m.
- Not in environment of precipitation or humidity (> 95%).
- Under good ventilation condition.
- The ambient temperature in the range of -25℃ to +60℃.
- The slope of the wall should be within ± 5°.
- The wall hanging the inverter should meet conditions below:

  1. Solid brick/concrete, or strength equivalent mounting surface.

  2. Inverter must be supported or strengthened if the wall's strength isn't enough (such as wooden wall, the wall covered by thick layer of decoration)

  Please **AVOIDE** direct sunlight, rain exposure, snow laying up during installation and operation.

Figure 3-2 PhG-P installation Environment Requirements



3.3.2 Space Requirement

Reserve enough space around the PhG-P to ensure sufficient space for installation and heat dissipation.

Figure 3-3 PhG-P Installation Space Requirement

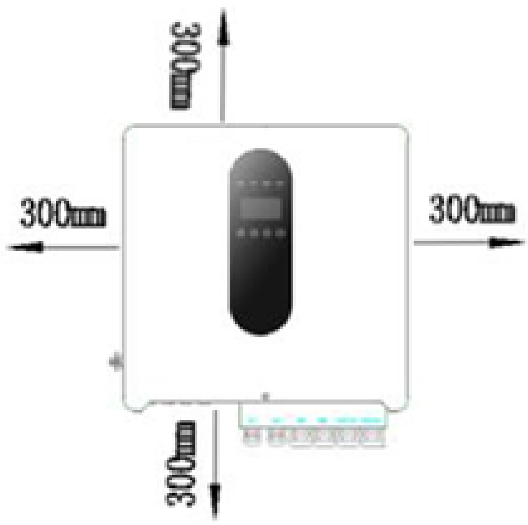


Table 3-2 Installation Space Requirement

Position	Min. size
Left	300mm
Right	300mm
Top	300mm
Bottom	300mm
Front	300mm

When installing multiple PhG-P, install them in horizontal mode if sufficient space is available and install them in triangle mode if no sufficient space is available.

Figure 3-4 Horizontal installation (recommended)

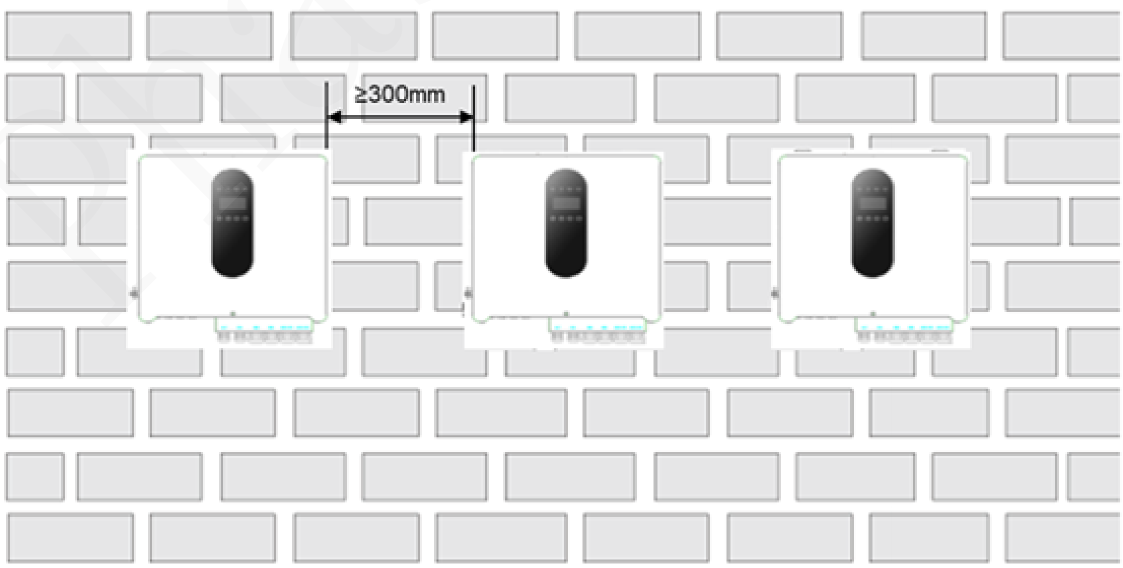
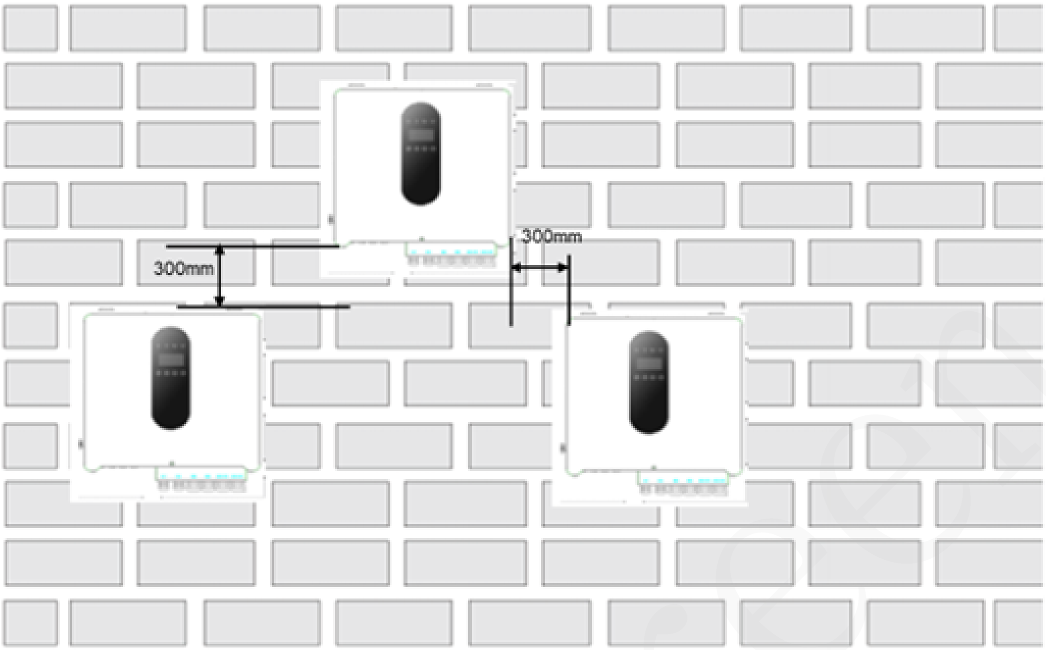


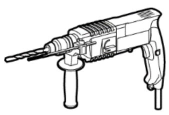
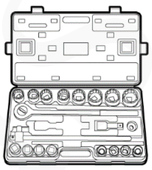
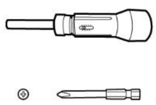
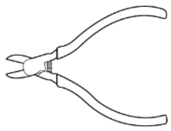
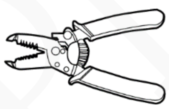
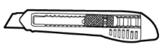
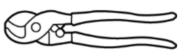
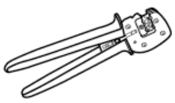
Figure 3-5 Staggered installation (recommended)

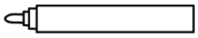
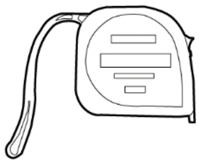
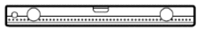
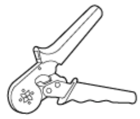
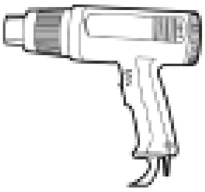
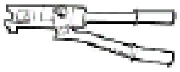
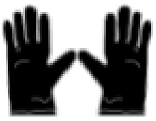
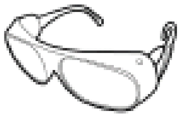
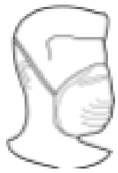


3.3.3 Tools for installation

Tools required for installation, please refer to the following table.

Table 3-3 Tools required for installation

 Hammer drill	 Socket wrench set	 Torque screwdriver	 Diagonal pliers
 Wire stripper	 Removal wrench	 Rubber Hammer	 Utility knife
 Cable cutter	 Crimping tool	 Multimeter	 Vacuum cleaner

 Marker	 Measuring tape	 Bubble or digital level	 Cord end terminal crimper
 Heat shrink tubing	 Heat gun	 Hydraulic	
 Safety gloves	 Safety goggles	 Dust mask	 Safety shoes

3.3.4 Mount the Inverter

Structure Requirements

- The mounting structure where the PhG-P is installed must be fireproof.
- Do not install the PhG-P on flammable building materials.
- The PhG-P is heavy. Ensure that the installation surface is solid enough to bear the weight load.
- In residential areas, do not install the PhG-P on drywalls or walls made of similar materials which have a weak sound insulation performance because the noise generated by the PhG-P is noticeable.

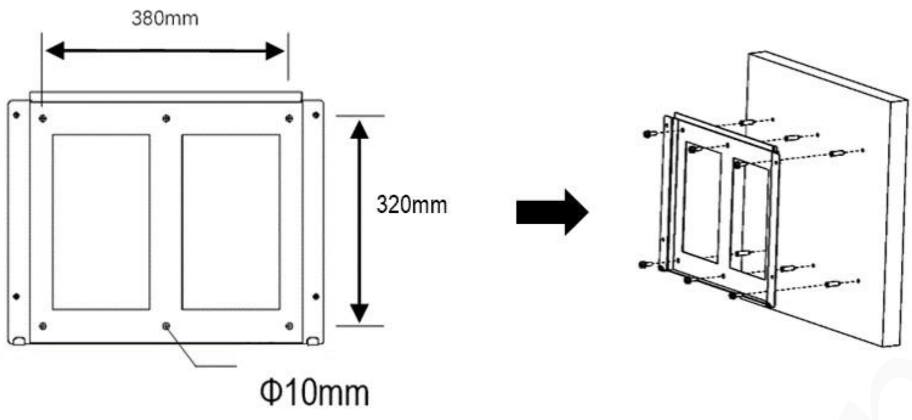
Step 1: Screw the wall bracket on the wall

1.1 Place the bracket on the wall and mark down the position of the 4 holes.

1.2 Drill holes with driller, make sure the holes are deep enough (at least 60mm) to support the inverter.

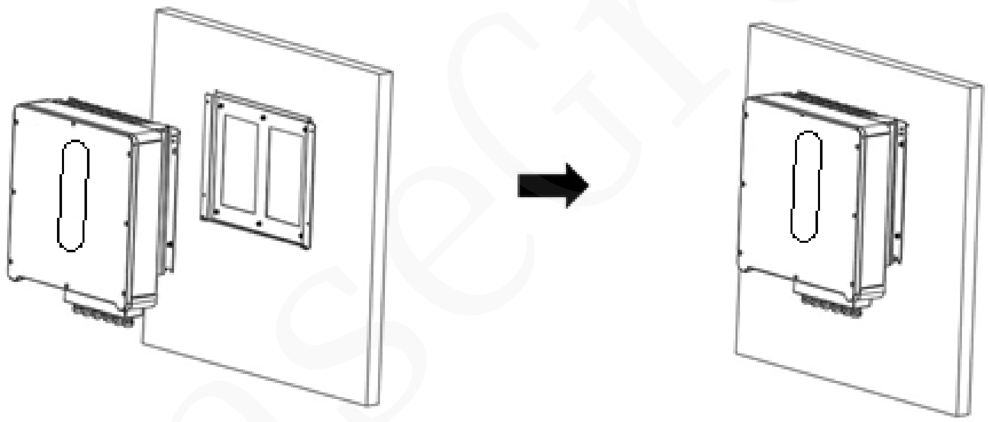
1.3 Install the expansion tubes in the holes, and tighten them. Then install the wall bracket with the expansion screws.

Figure 3-6 Drill holes



Step 2: Place the inverter on the wall mounted bracket by holding the handle on the side.

Figure 3-7 Fix inverter on the wall



Step 3: Tighten the fixing screws on both sides of the inverter.

Step 4: If necessary, customer can install an anti-theft lock on the left-bottom of the inverter.

NOTICE

Prepare an anti-theft lock suitable for the lock hole diameter (Φ6 mm) by yourself. Ensure that the lock can be installed successfully.

Outdoor waterproof lock is recommended.

Keep the key to the anti-theft lock properly.

4 Electrical Connections

4.1 Connection Preparation

Figure 4-1 Ph-P Cable Connections Diagram

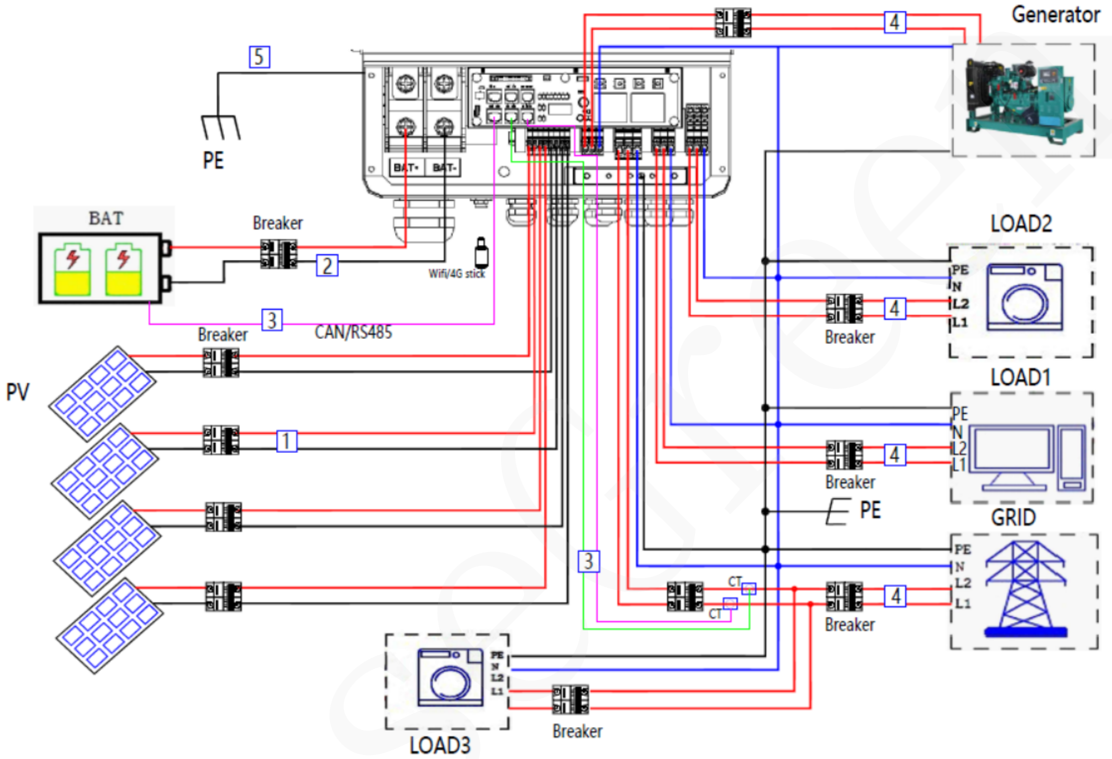


Table 4-1 Cable description

No.	Name	Type
1	DC input power cable	Common outdoor PV cable in the industry
2	Battery cable	
3	Signal cable	Outdoor shielded twisted pair
4	AC output power cable	Outdoor copper cable
5	PE cable	outdoor copper-core PE cable

4.2 Connecting the PE cable

Important Notes

DANGER

Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.

Do not connect the N wire to the enclosure as a PE cable. Otherwise, electric shocks may occur.

Procedure

Step 1 Crimp OT terminals.

Choose the 8 AWG or 10AWG wire to connect with the OT terminal.

NOTICE

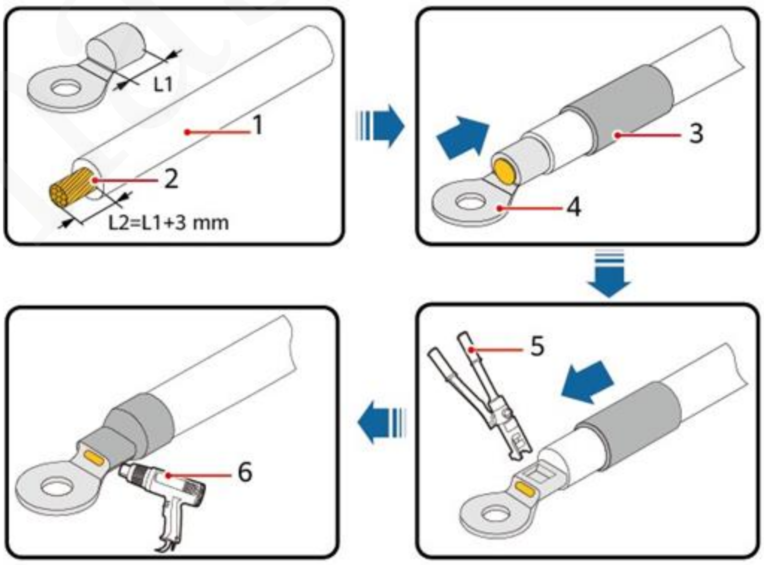
Avoid scratching the core wire when stripping a cable.

The cavity formed after the conductor crimp strip of the OT terminal is crimped must wrap the core wires completely. The core wires must contact the OT terminal closely.

Wrap the wire crimping area with heat shrink tubing or PVC insulation tape. The heat shrink tubing is used as an example.

When using a heat gun, protect devices from being scorched.

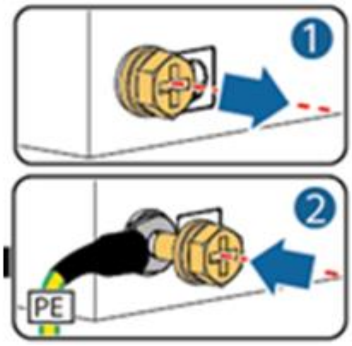
Figure 4-2 Crimping an OT terminal



(1) Cable	(2) Core	(3) Heat shrink tubing
(4) OT terminal	(5) Crimping tool	(6) Heat gun

Step 2 Connect the PE cable.

Figure 4-3 Connecting the PE cable



4.3 PV connection

Hybrid inverter PhG-P can be connected in series with 2-strings PV modules for 6kW, 8kW, 10KW, 12KW, 15KW. Please select PV modules with excellent function and reliable quality. Open- circuit voltage of module arrays connected in series should be Less than Max. DC input voltage; operating voltage should be conformed to MPPT voltage range.

Table4-2 DC input of PV connected to PhG-P

Model	PhG-P6K0 HT-M	PhG-P8K0 HT-M	PhG-P10K0 HT-M	PhG-P12K0 HT-M	PhG-P15K0 HT-M
Max. DC Voltage	1000V				
MPPT Voltage Range	180~850V				

⚠ WARNING

PV module voltage is very high, which already achieve dangerous voltage range, please comply with electric safety rules when connecting.

Please do not make PV positive pole or negative pole ground!

Please ensure that the DC switch is set to OFF.

NOTE

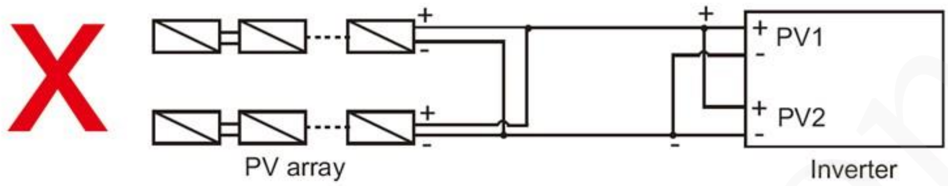
The following requirements of PV modules need to be applied for each input range.

Please do not make PV positive pole or negative pole ground!

In order to save cable and reduce the DC loss, we suggest installing the inverter near PV modules.

NOTE

PV connection mode is **NOT** allowed! Please connect the PV string separately to the inverter to ensure the MTTP function.



Connection Steps:

Step1. Checking PV module.

1.1 Use Multimeter to measure module array voltage.

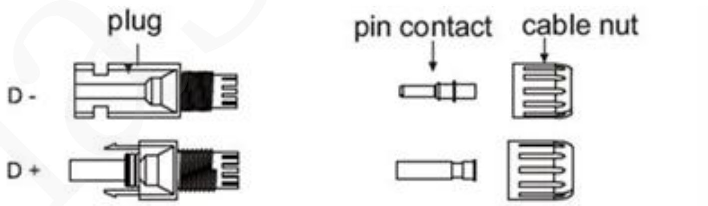
1.2 Check the PV+ and PV- from the PV string combiner box correctly.

1.3 Please make sure the impedance between the positive pole and negative pole of PV to earth should be MΩ level.

Step2. Separating the DC connector.

Choose the 12 AWG or 10AWG wire to connect with the cold-pressed terminal.

Remove 18mm of insulation from the end of wire.

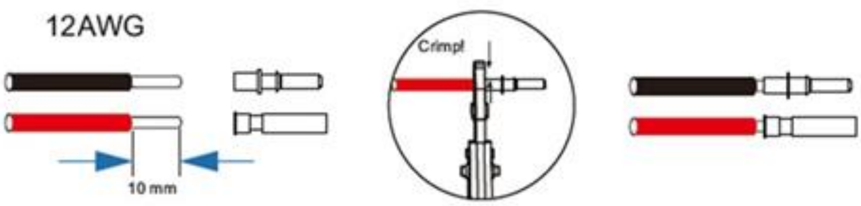


Step3. Wiring.

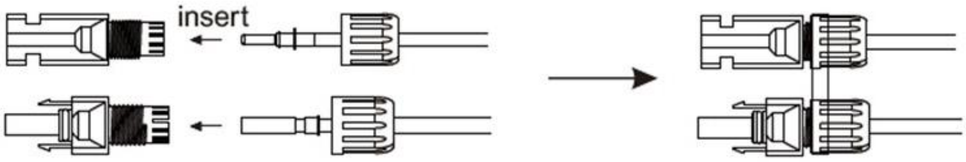
3.1 Choose the 12 AWG wire to connect with the cold-pressed terminal.

3.2 Remove 10mm of insulation from the end of wire.

3.3 Insert the insulation into pin contact and use crimping plier to clamp it.



Step4. Insert pin contact through the cable nut to assemble into back of the male or female plug. When you feel or heard a “click” sound the pin contact assembly is seated correctly.



Step5. Plug the PV connector into the corresponding PV connector on inverter

4.4 Grid Connection

PhG-P Hybrid series inverter are designed for single phase grid. Voltage is 220/230/240V, frequency is 50/60Hz. Other technical requests should comply with the requirement of the local public grid.

Table4-3 DC input of PV connected to PhG-P

Model	PhG-P6K0 HT-M	PhG-P8K0 HT-M	PhG-P10K0 HT-M	PhG-P12K0 HT-M	PhG-P15K0 HT-M
Cable	4-5mm²				
Micro-Breaker	20A				

Micro-breaker should be installed between inverter and grid, any load should not be connected with inverter directly.

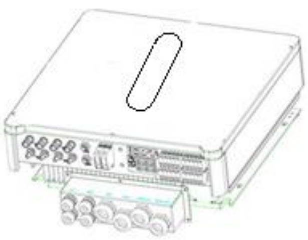
Connection Steps:

Step1. Check the grid voltage.

1.1 Check the grid voltage and compare with the permissive voltage range (Please refer to technical data).

1.2 Disconnect the hybrid inverter PhG-P from all the phases and secure against re-connection.

Step2. Remove the waterproof lid from the grid port on the inverter.



Step3. Make AC wires.

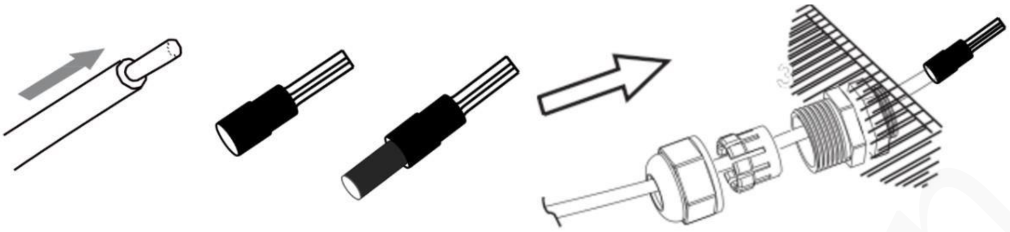
3.1 Choose the appropriate wire (Cable size: refer to Table 4-2).

3.2 Reserve about 60mm of conductor material sectional area.

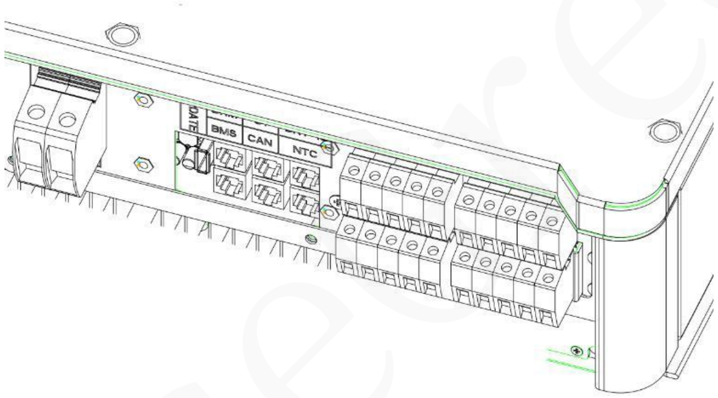
3.3 Remove 10mm of insulation from the end of wire.

3.4 Clamp down the terminals with crimping pliers

3.5 Disassembly of waterproof connectors and waterproof covers and pass the cable through the waterproof connector.



Step 5. Cross this end of Grid Cables through the grid port(Grid) and CT Signal Cables through the COM port.



4.5 EPS Connection

(apply to I Version and E Version only)

PhG hybrid inverter series inverter has on and off grid function, the inverter will deliver output power through AC port when the grid is on, and it will deliver output power through EPS port when the grid is off.

4.5.1 I Version & E Version

PhG series inverter provides two versions for customer to choose based on the local rules.

“I Version” means inverter has a build-in changeover switch. This version applies to the wiring rules which requires N (Neutral) line of alternative supply must not be isolated or switched. (Applies to wiring rules AS/NZS3000:2014 of Australia and New Zealand.)

“E Version” means inverter needs to install an external changeover device for EPS function. This version applies to the wiring rules which allows N (Neutral) line of alternative supply can be isolated or switched. (Applies to most of the countries).

4.5.2 Auto & Manual

EPS function can be achieved automatically or manually according to user's wishes. For "I Version" inverter, EPS function can only be triggered automatically.

For "E Version" inverter, EPS function can be triggered either automatically or manually according to user's preference.

If user wants to use this function manually, it will need to be installed an external switch. Please refer to specific wiring diagram below.

For solution, please contact our sales.

Figure 4-5 E Version Auto, required for Changeover Switch

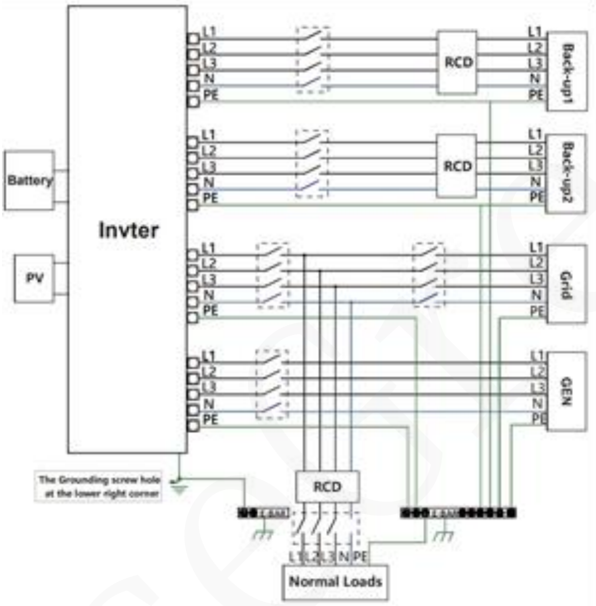
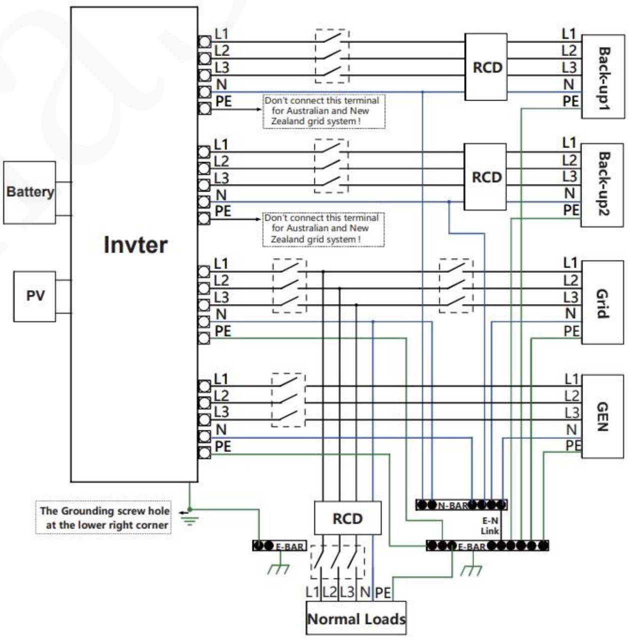


Figure 4-6 I Version Auto, not required for Changeover Switch



Please contact our sales for any compatible contactor purchase requirement.

📖 NOTE

In case of discrepancies between wiring mode of local policy and the operation guide above, especially for the wiring of n (neutral) line, grounding, and RCD, please contact us before any operation! The wiring diagram is for reference only, and the complete electrical connection shall meet the requirements of local regulations..

PhG-P Series hybrid inverter has On and Off grid function, the inverter will deliver output power through AC port when the grid is on, and it will deliver output power through BACKUP port when the grid is off.

BACKUP1 for very important load, BACKUP2 for important or normal load.

When there is a power outage or when there is no power grid:

- If the battery does not report low voltage or under voltage alarm, the inverter will supply power to both BACKUP1 and BACKUP2
- If the battery generates a low voltage or under voltage alarm, the inverter only supplies power to BACKUP1

Table 4-4 Cable and Micro-breaker recommended

Model	PhG-P6K0 HT-M	PhG-P8K0 HT-M	PhG-P10K0 HT-M	PhG-P12K0 HT-M	PhG-P15K0 HT-M
Cable	4-5mm²				
Micro-Breaker	20A				

Connection Steps:

Step1. Make EPS wires

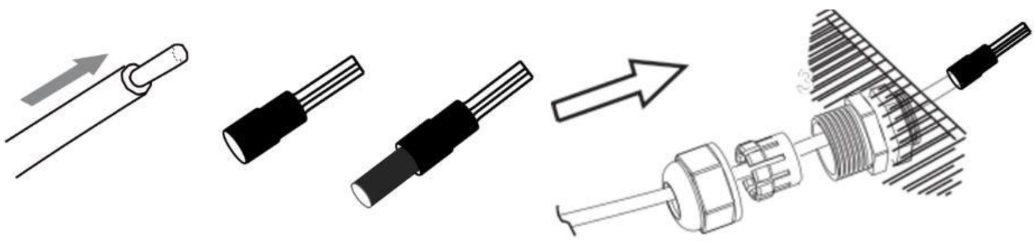
1.1 Choose the appropriate wire (cable size: refer table 4-3).

1.2 Reserve about 60mm of conductor material sectional area.

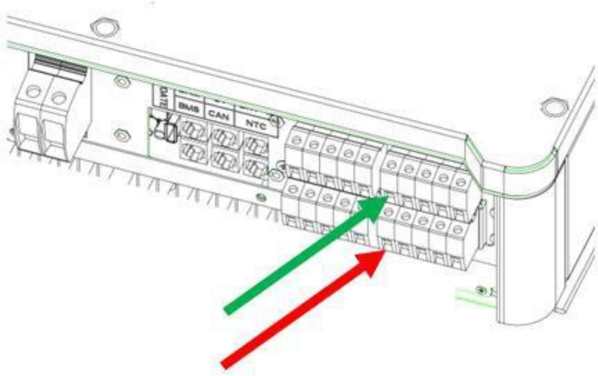
1.3 Remove 10mm of insulation from the end of wire.

1.4 Clamp down the terminals with crimping pliers.

1.5 Disassembly of waterproof connectors and waterproof covers and pass the cable through the waterproof connector.



Step2. Connect the AC connector to the EPS port of the inverter with a slotted screwdriver. The arrow (top) is backup1, the arrow (bottom) is backup2.



Requirements for BACK-UP load

⚠ WARNING

Make sure the BACK-UP load power rating is within BACK-UP output rating range, otherwise the inverter will shut down with an “over load” warning.

When an “over load” is appeared, adjust the load power to make sure it is within the BACK-UP output power range, then turn the inverter turn on again.

For the nonlinear load, please make sure the inrush power should be within the BACK-UP output power range.

Below table shows some common feasible loads for you reference.

Table 4-5 Reference of common feasible loads

Type	Power		Common equipment	Example		
	Start	Rated		Equipment	Start	Rated
Resistive load	R 1	R 1	Incandescent lamp, TV	100W Incandescent lamp	100VA (W)	100VA (W)
Capacitive load	R 2	R 1.5	Fluorescent lamp	40W Fluorescent lamp	80VA (W)	60VA (W)
Inductive load	R 3~5	R 2	Fan, Fridge	150W Fridge	450-750VA (W)	300VA (W)

4.5 Battery Connection

Charging & discharging system of PhG-P Hybrid series inverter is designed for high-voltage lithium battery. Before choosing battery, please note the battery communication should be compatible with PhG-P Hybrid inverter

Battery breaker

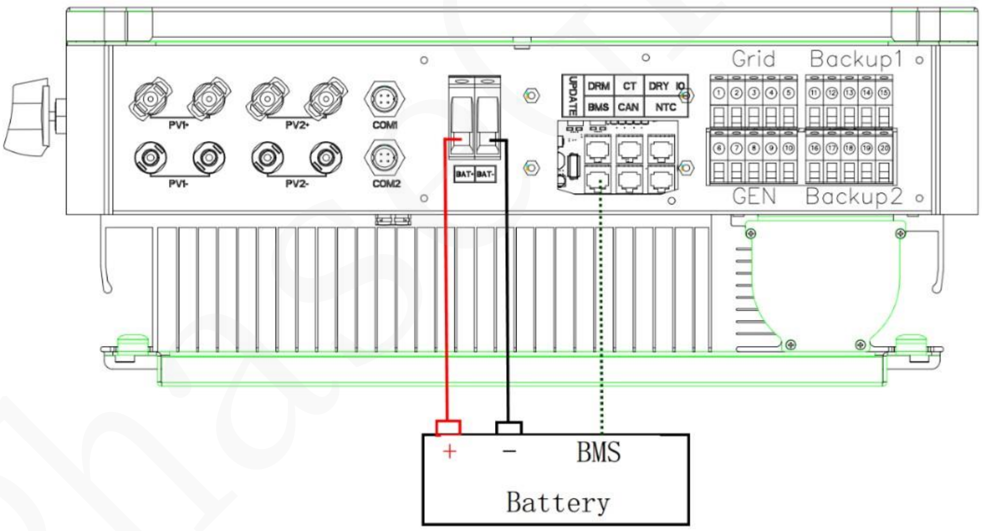
Before connecting to battery, please install a nonpolar DC breaker to make sure inverter can be securely disconnected during maintenance

Table 4-6 DC Breaker to connect between battery and Inverter

Model	PhG-P6K0 HT-M	PhG-P8K0 HT-M	PhG-P10K0 HT-M	PhG-P12K0 HT-M	PhG-P15K0 HT-M
Voltage	Nominal voltage of DC breaker should be larger than maximum voltage of battery				
Current(A)	63A				

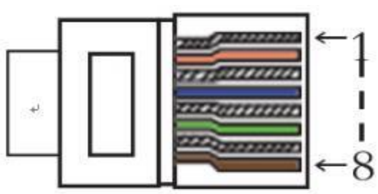
Battery connection diagram

Figure 4-7 Battery connection diagram



BMS PIN Definition

Communication interface between inverter and battery is RS485 or CAN with a RJ45 connector



Item	PIN	1	2	3	4	5	6	7	8
CAN	Definition	X	X	X	BMS_CANH	BMS_CANL	X	X	X
RS485	Definition	X	X	X	X	X	GND	BMS_485A	BMS_485B

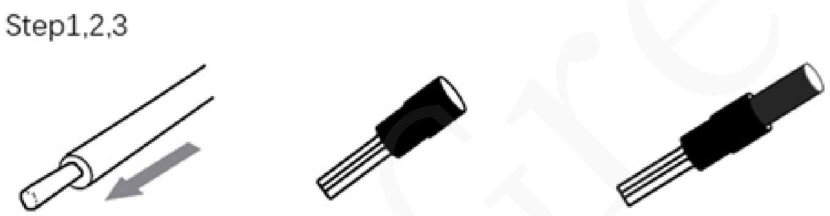
When using RS485 protocol, please note that PIN2 must be disconnected.

NOTE

The battery communication can only work when the battery BMS is compatible with the inverter.

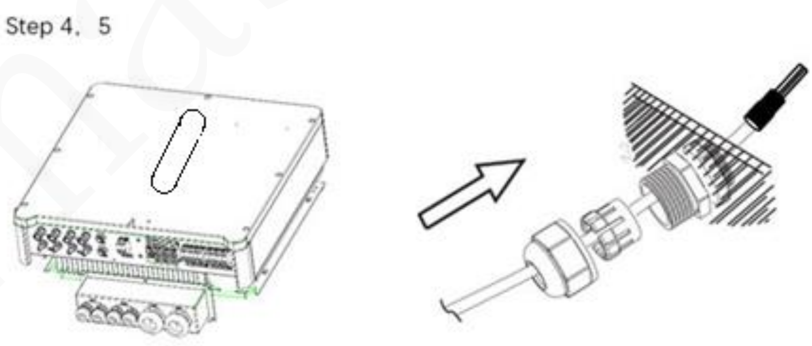
Power Connection Steps:

Step1,2,3. Choose the 10mm2 wire and strip the cable to 15mm. Insert the stripping line into the terminal and clamp it with a crimping clamp.

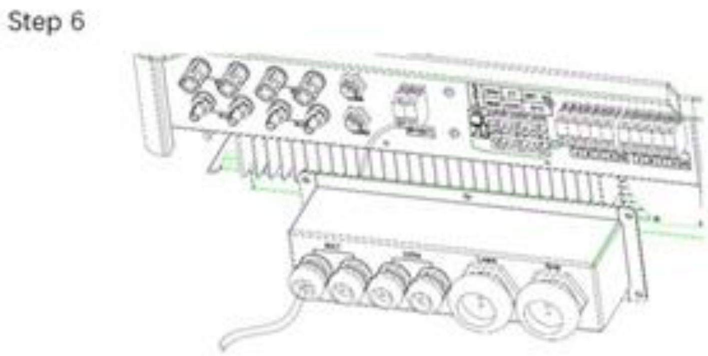


Step4. Remove waterproof cover plate.

Step5. Disassemble the waterproof connector and pass the cable through the waterproof connector.



Step6. Connect the cable to the terminal of the inverter.

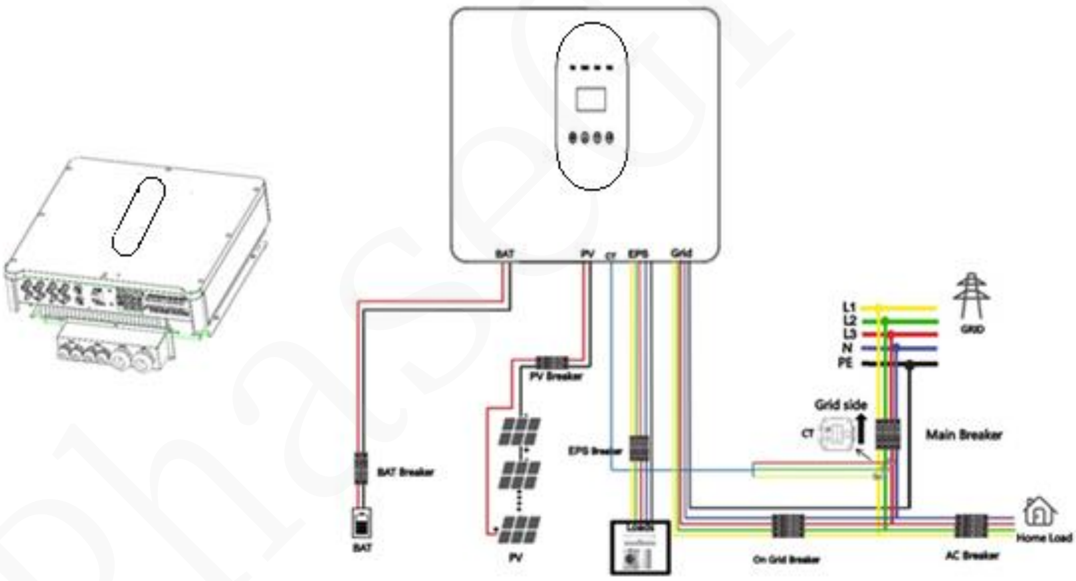


Step7. Assemble waterproof connectors and waterproof covers plate.

4.6 CT Connection and Phase instruction

CT is used for monitoring the power usage for entire house, at the meantime, inverter will also need the data from CT to achieve the Export Control Function.

Fig 4-8 CT connection and phase wiring diagram



NOTE

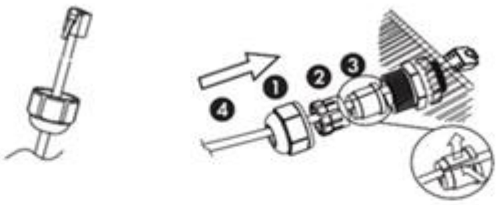
The CT arrow points to the grid side, otherwise the inverter display data will be wrong, or the machine can't be used normally.

Do not misconnect the phase sequence. Otherwise, the inverter cannot run normally.

CT Connection Steps:

Step1. Disassembly of waterproof connectors and waterproof covers.

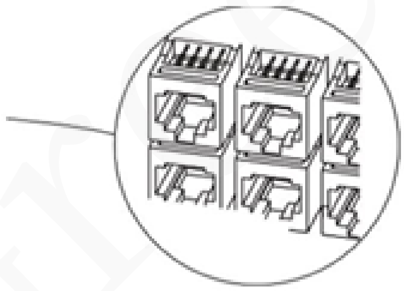
Step2. Prepare a communication cable (without sheath) and pass the cable through the waterproof connector.



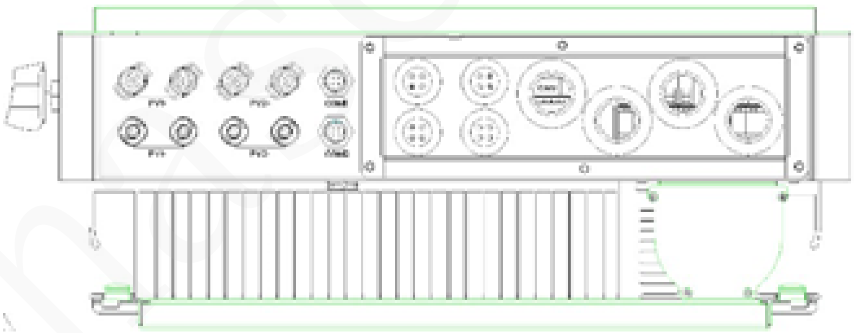
The seal is used for waterproof.Please make sure it has been kept back.

Step3. Insert CT line side of the cable into CT port inside of inverter

DRM	CT	Dry contact
BMS-485 BMS-CAN	Parallel	NTC



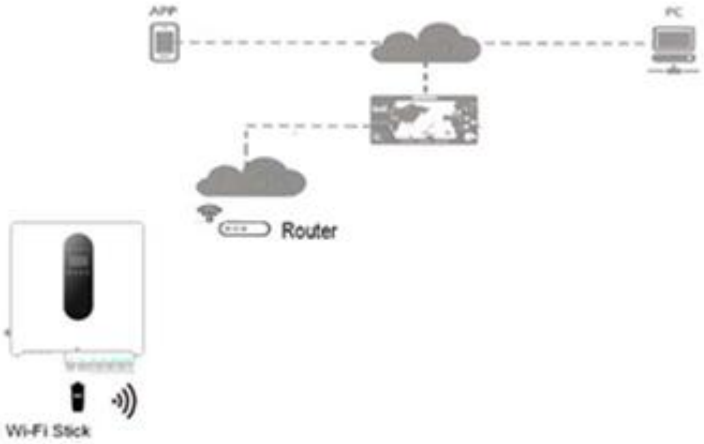
Step4. Assemble waterproof connectors and waterproof covers plate.



4.7 Wi-Fi Stick Connection (optional)

Hybrid inverter provides a Wi-Fi port which can collect data from inverter and finish the transmission the data through the router to the cloud server. If you use the Wi-Fi communication, please ensure the router support Wi-Fi nearby. (Purchase the Wi-Fi stick product from supplier if needed)

4.7.1 Wi-Fi communication Diagram



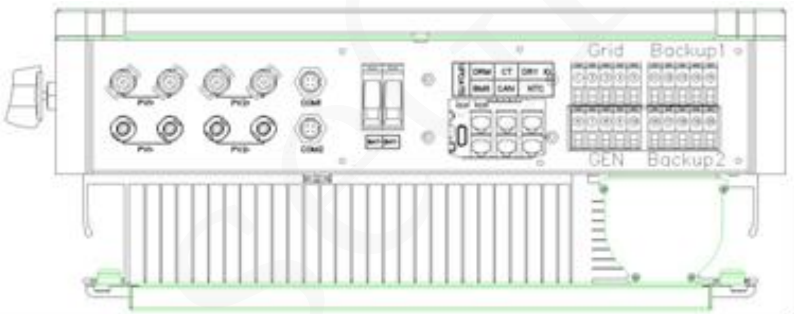
4.7.2 Wi-Fi Connection

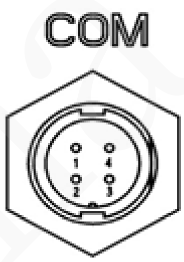
WiFi Connection Steps:

Step1. Plug WiFi into COM2(WiFi) port at the bottom of the inverter.

Step2. Build the connection between the inverter and router.

Step3. Create a user account online. (Please check the WIFI user manual for more details).



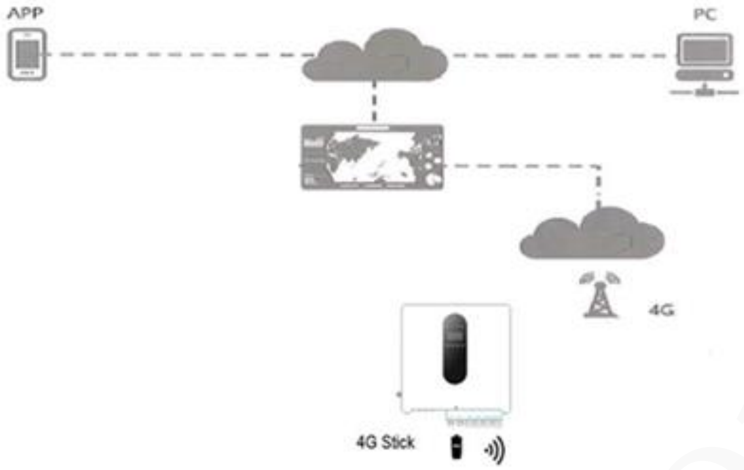


1	2	3	4
+5V	RS485_A	RS485_B	GND

4.8 4G Stick Connection (optional)

Hybrid inverter support 4G communication which can collect data from inverter and finish the transmission the data through the GPRS mobile network to the cloud server. If you use the 4G communication, please prepare a standard SIM card. When installing the SIM card, determine its installation direction based on the silk screen and arrow on the card slot.

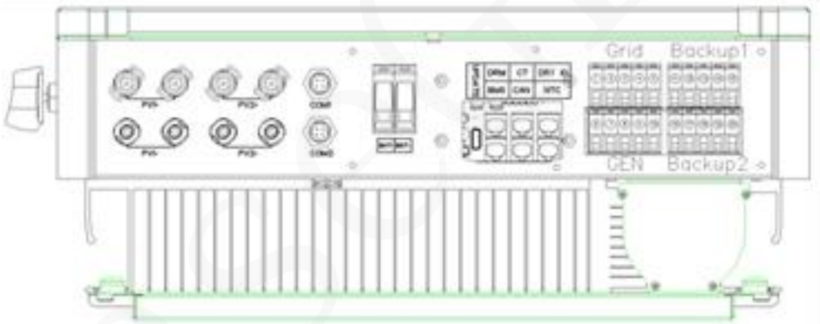
4.8.1 4G connection Diagram



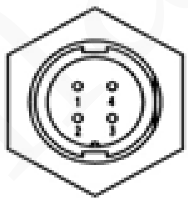
4.8.2 4G stick Connection

Step1. Plug 4G stick into “COM1“ port at the bottom of the inverter.

Step2. Create a user account online. (Please refer the 4G Stick user manual for more details).



COM



1	2	3	4
+5V	RS485_A	RS485_B	GND

5 Commissioning

5.1 Checking Before Power-On

Table 5-1 Checklist

No.	Item	Acceptance Criterion
1	PhG-P inverter installation	The PhG is installed correctly and securely.
2	Wi-Fi stick or 4G stick	The Wi-Fi stick or 4G stick is installed correctly and securely.
3	Cable routing	The cables are routed properly as required by the customer.
4	Reliable grounding	The PE cable is connected correctly and securely.
5	Switch	DC switches and all the switches connecting to the PhG-P are OFF.
6	Cable connection	The AC output power cable, DC input power cables, battery cable, and signal cable are connected correctly and securely
7	Unused terminals and ports	Unused terminals and ports are locked by watertight caps.
8	Installation environment	The installation space is proper, and the installation environment is clean and tidy.

5.2 PhG-P hybrid inverter power-on

Important Notes

NOTICE

Before turning on the AC switch between the PhG-P and the power grid, check that the AC voltage is within the specified range using a multimeter.

Procedure

Step1. If a battery is connected, turn on the battery switch.

Step2. Turn on the AC switch between the PhG-P and the power grid.

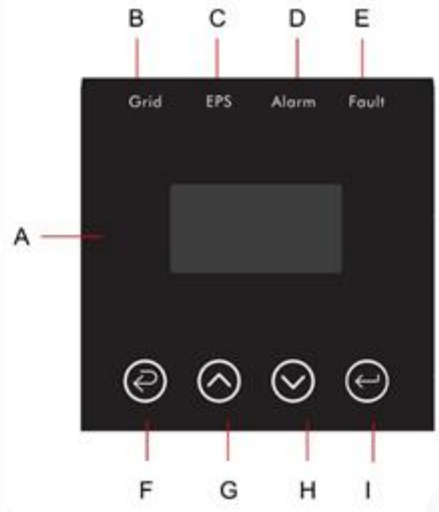
Step3. Turn on the DC switch (if any) between the PV string and the PhG-P.

Step4. Turn on the DC switch at the left side of the PhG-P.

Step5. Wait for about 1 minute and observe the LED indicators and LCD display to check its running status.

5.3 Display and instructions of system

5.3.1 Control Panel

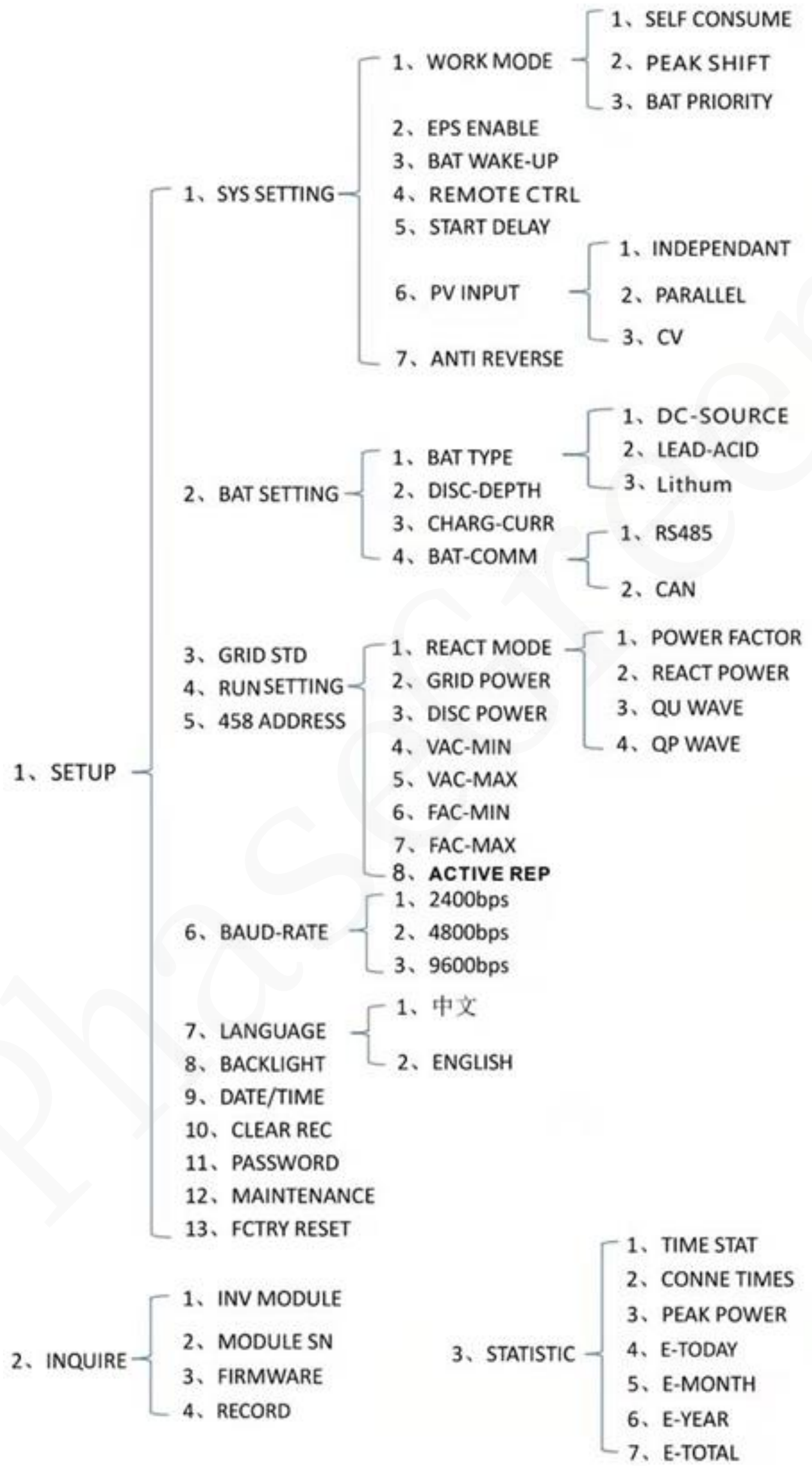


Object	Name	Description
A	LCD	Display the information of the inverter.
B	Indicator LED	"Grid", lit in green: The inverter is in grid mode. Off: The inverter is in not in grid mode.
C		"EPS", lit in green: The inverter is in off-grid mode. Off: The inverter is in not in off-grid mode.
D		"Alarm", lit in Yellow: The inverter is in Warning. Off: The inverter has no Inverter Warning
E		"Fault", lit in red: The inverter is in fault status. Off: The inverter has no errors.
F	Function Button	Esc: Return from current interface or function.
G		Up: Move cursor to upside or increase value.
H		Down: Move cursor to downside or decrease value.
I		Enter: Confirm the selection.

5.3.2 Instructions for LED Indicator

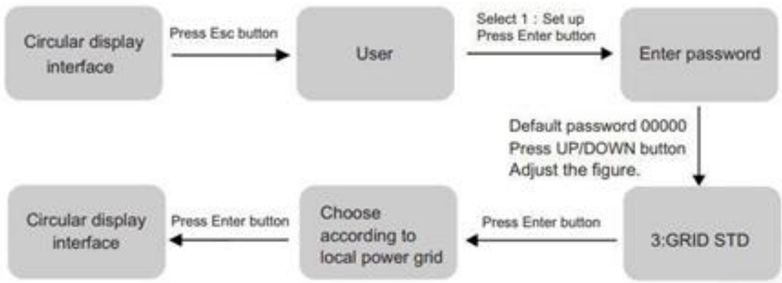
Item	Grid (Green)	EPS (Green)	Alarm (Yellow)	Fault (Red)
Initialization	off	off	off	off
Stand-by	off	off	off	off
Grid mode	on	off	off	off
Off-Grid	off	on	off	off
Bypass of Mains	off	on	on	off
Fault	off	off	off	on

5.3.3 Instructions for the LCD

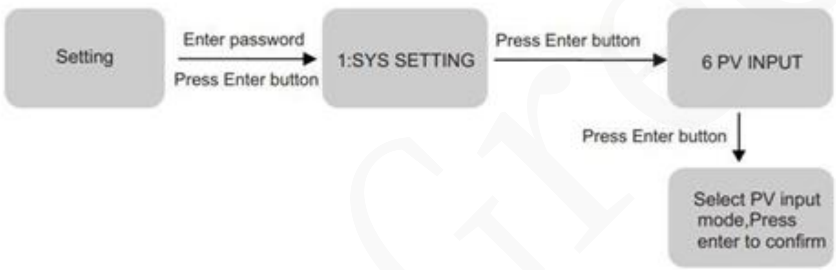


For example,Before selecting the mode, you can set it up ac cording to the local power grid, PV input mode and battery type.

Power grid :



PVinput mode :



Battery parameters :

6 LCD Operation

6.1 LCD Interface

6.1.1 Error information

Interface	Description
ERROR NO. 🔒 **02:** Bat Disconnect **27:** BMS Comm. fail	Numbers represent error codes and text is error information. Refer to Chapter 9 for contents. **NOTE:** When there is a lock mark 🔒 in the upper right corner of the screen, you cannot turn the page, you need to press Enter to unlock it first.

6.1.2 System setting 1

Interface	Description
SYSTEM1 **STATE:** SELF CSM **GRID:** US-CA **PV I/P:** PARALL	**State:** Setting of the whole inverter working mode. Including: SELF CONSUME, PEAK SHIFT and BAT PRIORITY. Refer to Chapter 2.5 for specific contents. **Grid standard:** Displays the grid standard actually set. **PV input mode:** The display value is the setting value of PV input type, including: INDEPENDANT, PARALLEL, CV. Settings and explanations are provided in section 6.2.4.6.

6.1.3 System setting 2

Interface	Description
SYSTEM2 **BMS Com:** CAN **Anti-Reve:** DISA **DOD:** 80%	**BMS Com:** Battery Management System communication mode Including CAN or RS485. **Anti-Reverse:** Displays Whether Inverter isn't allowed to generate electricity to the Grid. Including: DISABLE, ENABLE The Settings are described in section 6.2.6. **DOD:** Depth of battery discharge. When the battery discharge exceeds the DOD parameter, the inverter generates a low voltage or under voltage alarm, and the battery stops discharging.

6.1.4 System setting 3

Interface	Description
SYSTEM3 **EPS ENABLE:** ENAB	**EPS ENABLE:** When the Grid and PV are powered off, Enable the battery to supply power to the load, default option is enable.

6.1.5 PV1 Input display interface

Interface	Description
PV1 **INPUT VOLT:** 0.0V **CURR:** 0.00A **POWER:** 0W	PV1 input real-time voltage PV1 input real-time current PV1 input real-time power.

6.1.6 PV2 Input display interface

Interface	Description
PV2 **INPUT VOLT:** 0.0V **CURR:** 0.00A **POWER:** 0W	PV2 input real-time voltage PV2 input real-time current PV2 input real-time power.

6.1.7 PV3 Input display interface

Interface	Description
PV2 **INPUT VOLT:** 0.0V **CURR:** 0.00A **POWER:** 0W	PV3 input real-time voltage PV3 input real-time current PV3 input real-time power.

6.1.8 PV4 Input display interface

Interface	Description
PV2 **INPUT VOLT:** 0.0V **CURR:** 0.00A **POWER:** 0W	PV4 input real-time voltage PV4 input real-time current PV4 input real-time power.

6.1.9 DC Voltage interface

Interface	Description
DC VOLTAGE **VpBUS+:** 235.0V **VnBUS -:** 235.0V **LeakCur:** 0mA	**VpBUS+:** Real-time voltage of bus capacitor of the inverter. **VnBUS-:** Real-time voltage of bus capacitor of the inverter. **LeakCurr:** Real-time leak current of the inverter.

6.1.10 Battery interface

Interface	Description
BATTERY **VOLT:** 0.0V **CURR:** 0.0A **STA:** C, D, F	Battery real-time voltage Battery real-time current **STA:** Battery status **C :** Indicates that the battery is rechargeable (From the BMS) **D :** Indicates that the battery can discharge (From the BMS) **F :** The battery requests a forcible charge (From the BMS)

6.1.11 Battery Type interface

Interface	Description
BATTERY INFO **TYPE:** Lithium **TEMP:** 26℃ **SOC:** 30%	**TYPE:** Battery type:(lead-acid, lithium battery) **TEMP:** Battery temperature. **SOC:** Percentage of battery capacity from the BMS

6.1.12 Battery Current interface

Interface	Description
BMS PRMETER **CHAR VOL:** 0.0V **CHARGE:** 50A **DISCHA:** 50A	**CHAR VOL:** Battery charging or discharging voltage. **CHARGE:** Battery charging current. **DISCHA:** Battery discharging current.

6.1.13 Grid-Connected

Interface	Description
GRID **GRID FREQ:** 0.00Hz **L1:** 0.0V 0.0A **L2:** 0.0V 0.0A	**GRID FREQ:** Grid real-time frequency. **L1:** Gird-phase L1 real-time voltage. CT real-time current **L2:** Gird-phase L2 real-time voltage. CT real-time current **CT:** Current sensor accessories

6.1.14 INV(INVERTER Output information)

Interface	Description
INV **INV FREQ:** 0.00Hz **L1:** 0.0V 0.0A **L2:** 0.0V 0.0A	**INV FREQ:** Grid real-time frequency. **L1:** INV - L1 real-time voltage. INV -L1 real-time current. **L2:** INV - L2 real-time voltage. INV -L2 real-time current.

6.1.15 LOAD

Interface	Description
LOAD **L1:** 0.0V 0.0A **L2:** 0.0V 0.0A	**L1:** Load -L1 real-time voltage. Load -L1 real-time current. **L2:** Load -L2 real-time voltage. Load -L2 real-time current.

6.1.16 ON GRID POWER

Interface	Description
POWER **GRID L1:** 0.0W **GRID L2:** 0.0W	**GRID L1:** Grid -L1 power. **GRID L2:** Grid -L2 power.

6.1.17 INV POWER

Interface	Description
POWER **INV L1:** 0.0W **INV L2:** 0.0W	**INV L1:** INV- L1 power. **INV L2:** INV- L2 power.

6.1.18 LOAD POWER PER

Interface	Description
LOAD POWER PER **L1:** 0W 0% **L2:** 0W 0%	**L1:** Load-phase L1 power percentage. **L2:** Load-phase L2 power percentage.

6.1.19 POWER

Interface	Description
POWER **PV :** 0W **BAT:** 0W	**PV :** PV power. **BAT:** Battery power.

6.1.20 Temperature

Interface	Description
TEMPERATURE **INVER:** 0℃ **DCDC:** 0℃ **INSIDE:** 0℃	**INVER:** DC/AC temperature. **DCDC:** DC/DC temperature. **INSIDE:** Internal ambient temperature.

6.1.21 State

Interface	Description
STATE SYS: **STANDBY** **INV:** STANDBY **DCDC:** STANDBY	**System information:** Display complete inverter status information, including: **Initialization, Standby, PV** grid connection, **Grid** connection of battery, Hybrid power supply, Fault, Service, Self -check, Off-gird, grid, INV to PFC , Charging enables, Discharge enables, Force charge enable, etc. **INV:** Displays the inverter status information. **DCDC:** Displays charging and discharging status information

6.2 Setting

6.2.1 State

Interface	Description
USER **1: SETUP** **2: INQUIRE** **3: STATISTIC**	**SETUP:** Press Enter to user settings interface. **INQUIRE:** Query inverter model, serial number, software version. **STATISTIC:** View inverter run statistics.

6.2.2 SET Password

Interface	Description
PASSWORD **INPUT:** XXXXX	Enter the password required for setting. The default password is "**00000**". Press the Up or Down keys to adjust the number, press the Enter key to move the cursor forward, and press the ESC key move the cursor backward.

6.2.3 Setup

Interface	Description
SETUP **1: SYS SETTING** **2: BAT SETTING** **3: GRID STD** **4: GRID SET** **5: RUN SETTING** **6: 485 ADDRESS** **7: BAUD RATE** **8: LANGUAGE** **9: BACKLIGHT** **10: DATE/TIME** **11: CLEAR REC** **12: PASSWORD** **13: MAINTENANCE** **14: FCTRY RESET**	This interface is used for various information inquiry options. Press the Up/Down button to make the corresponding selection. Press Enter button to enter the selected menu. Press ESC button return to the user interface. (Refer to 6.2.1). There are 14 options in total.

6.2.4 System setting

6.2.4.0 System setting

Interface	Description
SYS SETTING **1: WORK MODE** **2: EPS ENABLE** **3: BAT WAKE-UP** **4: GRID SET** **5: REMOTE CTRL** **6: START DELAY** **7: PV INPUT** **8: Anti Reverse**	This interface is used to access system information. Press Up/Down button to move corresponding options. Press Enter to enter the selected menu. Press ESC button to return to the setting interface. There are 8 options in total.

6.2.4.1 Work mode

Interface	Description
WORK MODE **1: SELF CONSUME** **2: PEAK SHIFT** **3: BAT PRIORITY**	This interface is used to select the working mode. Press ESC button return to setting interface. (Refer to 2.5)

6.2.4.1.1 Peak shift work time

Interface	Description
WORK MODE 1: SELF CONSUME **2: PEAK SHIFT** 3: BAT PRIORITY	**WORK MODE** This interface is used to select the working mode. Press ESC button return to setting interface. (Refer to 2.2). Select the peak shift mode, you also need to set the charge and discharge time It's allowed to set Three charging and discharging periods. When setting the time, ensure that the time of the inverter is the local time. Press Enter to enter the next menu.
WORKTIME 1: TIME 1 2: TIME 2 3: TIME 3 CHAG START1 00:00 CHARGE END1 00:02 DISC START1 00:03 DISCHA END1 23:59	**WORK TIME** This parameter is set for one day. If the specified time conflicts, the first time is used as the main time perform. If the three time ranges do not conflict, the three time ranges are executed in sequence. **TIME X** This interface is used to adjust the time of peak load shifting. Press Up/Down button to move the corresponding options. Press Enter to enter the selected menu. Press Esc button to return to the working mode interface.

6.2.4.2 EPS enable

Interface	Description
EPS ENABLE 1: DISABLE **2: ENABLE**	When the Grid and PV are powered off, Enable the battery to supply power to the load, default option is "ENABLE".

6.2.4.3 Battery wake-up

Interface	Description
WAKE-UP EN **1: DISABLE** 2: ENABLE	When the battery is low and the battery relay has been disconnected, the inverter will send instructions to the battery forcibly sucking relay by BMS, and the inverter will charge. The default option is disabled. (Partial lithium battery support) If you want to use this feature, please consult the battery brand supported by the dealer. Use it only when the battery is too low.

6.2.4.4 REMOTE CTRL

Interface	Description
REMOTE CTRL **1: DISABLE** **2: ENABLE**	Reserved

6.2.4.5 START DELAY

Interface	Description
START-UP DELAY **INPUT:** 60 **UNIT:** SEC	Reserved

6.2.4.6 PV INPUT MODE

Interface	Description
INPUT MODE **1. INDEPENDENT** **2. PARALLEL** **3. CV**	Setup of PV Input mode. **INDEPENDENT:** The default Settings **PARALLEL:** This feature is for test use only, not customer use. **CV:** This feature is for test use only, not customer use. The factory setting by default is Independent. When parallel input is set to be independent mode, PV power will be imbalanced.

6.2.4.7 Anti-Reverse

Interface	Description
Anti-Reverse **<u>1. DISABLE</u>** 2. ENABLE	**Anti-Reverse:** Whether Inverter isn't allowed to generate electricity to the Grid. The default option is Disable.

6.2.4.8 ARC ENABLE

Interface	Description
-ARC- **<u>1.DISABLE</u>** 2.ENABLE	Enable or disable arc pull function detection. The default option is Disable.

6.2.4.9 BUTT ENABLE

Interface	Description
Anti-Reverse **<u>1. DISABLE</u>** 2. ENABLE	When the button is enabled, the button will take effect. After powering on, press the button to run the inverter. If the button is not pressed, the button will not take effect when the machine is disabled in standby.

6.2.5 BAT SETTING

6.2.5.0 BAT SETTING

Interface	Description
BAT SETTING **<u>1. BAT TYPE</u>** **2. DISC-DEPTH** **3. CHARG-CURR** **4. BAT-COMM**	This interface is used to select battery parameters. Press Up/Down button to move corresponding options; Press Enter button to enter the selected menu; Press ESC button to return to setting interface.

6.2.5.1 BAT TYPE

Interface	Description
BAT TYPE **1. DC-SOURCE** **<u>2. LEAD-ACID</u>** **3. Lithium**	This interface is used to select battery type. Press Up/Down button to move corresponding options. Press Enter button to enter the selected menu. Select the LEAD-ACID, enter button to enter LEAD-ACID interface; Set 1 to test and disable the setting.

6.2.5.1.1 Lead-acid battery parameter

Interface	Description
LEAD-ACID **<u>1. CHARG-VOLT</u>** **2. BAT END VOLT** **3. BAT OVP** **4. BAT CAP**	**LEAD-ACID** This interface is used to select LEAD-ACID battery parameter. Press Up/Down button to move corresponding options. Press Enter button to enter the selected menu; 1. Charge voltage 2. BAT end voltage 3. BAT over voltage 4. BAT Capacity
CHARGE-VOLT **INPUT:** 55.0 **UNIT:** V	**CHARGE VOLT** This interface is used to set the lead acid battery charging voltage. （The input value ranges as recommended by the battery manufacturer）
Interface	**Description**
BAT END VOLT **INPUT:** 043.0 **UNIT:** V **BAT OVP** **INPUT:** 058.0 **UNIT:** V **BAT CAP** **INPUT:** 0100 **UNIT:** AH	**BAT END VOLT** This interface is used to set the lead-acid battery discharging voltage. Discharge cut-off voltage, as recommended by the battery manufacturer. **BAT OVP** This interface is used to set the lead acid battery Charge protection voltage. Charge protection voltage, as recommended by the battery manufacturer. **BAT CAP** This interface is used to set the lead acid Battery capacity. It is related to the input power. The battery capacity setting will affect the maximum charging current, for example, set 100Ah, the maximum charging current is 100A*0.2=20A

6.2.5.2 DISC-DEPTH

Interface	Description
DISC DEPTH **Grid DOD:** 080% **OFF Grid DOD:** 080 **Return:** 020%	Grid DOD/ OFF Grid DOD: When the battery discharge is higher than the set parameter, the inverter generates a battery low voltage alarm. Return: When a low-voltage alarm is generated, the alarm is cleared if the battery charge is higher than the specified amount.

6.2.5.3 BAT-COMM

Interface	Description
BAT-COMM 1. RS485 **2. CAN**	This interface is used to select battery communication BMS type. Press Up/Down button to move corresponding options; Press Enter button to enter the selected menu. The default option is CAN.

6.2.6 Grid STD(Standard)

6.2.6.1 Grid STD(Standard)

Interface	Description
GRID STD **1. AU** **2. AU-W** **3. NZ** **4. UK** **5. PK** **6. KR** **7. PHI** **8. CN** **9. US-CA** **10. THAIL** **11. ZA** **12. CUSTOM** **13. POL** **14. EN** **15. VDE4105**	This interface is used to select Grid standard. Press Up/Down button to move corresponding options; Press Enter button to enter the selected menu. **1: AU-(Australia):** 240V/415V/50Hz **2: AU-W(Western Australia):** 240V/415V/50Hz **3: NZ-(New Zealand):** 240V/415V /50Hz **4: UK-(United Kingdom):** 230V/50HZ **5: PK-(Pakistan):** 230V/50HZ **6: KR-(Korea):** 220V/380V/60Hz **7: PHI-(Philippines):** 110V/220V/60HZ **8: CN-(China):** 220V/380V/50HZ **9: US-CA-(America):** 120V/240V, 208V, 240V, 60Hz **10: THAIL-(Thailand):** 220/380V/50HZ **11: ZA-(South Africa):** 230/50HZ **12: CUSTOM:** User defined **13: POL-(Poland):** 230V/380V/50HZ **14: EN50549-(Europe):** 217V/220V/240V 380V/400V 50HZ/60HZ **15: VDE4105-(Germany):** 230V/380V/50Hz If the country used is not one of the above options, consult the distributor.

6.2.6.2 Grid Set

Interface	Description
GRID SET **1.220V single** **2:120/240V** **3:120/208V** **4:120V single**	220V single： 220V Single-phase electric. 120/240V： 120/240V Bipolar electric. 120/208V： 120/208V Bipolar electric. 120V single： 120V Single-phase electric.

6.2.7 RUN SETTING

6.2.7.0 RUN SETTING

Interface	Description
RUN SETTING **1. REACT MODE** **2. GRID POWER** **3. DISC POWER** **4. CHAG POWER** **5. PV POWER** **6. VAC-MIN** **7. VAC-MAX** **8. FAC-MIN** **9. FAC-MAX** **10. ACTIVE REP.**	This interface is used to select run setting. Press Up/Down button to move corresponding options. Press Enter button to enter the selected menu. Factory default Settings. Please consult the distributor for modification

6.2.7.1 REACT MODE

Interface	Description
RUN SETTING **1. REACT MODE** **2. GRID POWER** **3. DISC POWER**	This interface is used to select react mode. Press Up/Down button to move corresponding options; Press Enter button to enter the selected menu.
REACT MODE 1. POWER FACTOR 2. REACT POWER 3. QU WAVE 4. QP WAVE	 POWER FACTOR REACT POWER QU WAVE (Reserved) QP WAVE (Reserved)
POWER FACTOR INPUT: C1.00	**POWER FACTOR** The input value should range between L0.80 and L0.99 or C0.8 and C1.00.
REACT POWER INPUT: +00%	**REACT POWER** Active power adjustment.

6.2.7.2 GRID POWER

Interface	Description
GRID PERCENT INPUT: 100%	The input value is power percent of grid.

6.2.7.3 DISC POWER

Interface	Description
DISC PERCENT INPUT: 100%	The input value is power percent of battery discharge.

6.2.7.4 CHAG POWER

Interface	Description
CHAG PERCENT INPUT: 100%	The input value is power percent of battery charge.

6.2.7.5 PV POWER

Interface	Description
PV PERCENT INPUT: 100%	The input value is power percent of PV.

6.2.7.6 VAC-MIN

Interface	Description
GRID VOLT LOW **INPUT:** 176 **UNIT:** V	The input value of Grid low voltage. (This is valid only if the grid standard is "custom")

6.2.7.7 VAC-MAX

Interface	Description
GRID VOLT HIGH **INPUT:** 270 **UNIT:** V	The input value of Grid high voltage. (This is valid only if the grid standard is "custom)

6.2.7.8 FAC-MIN

Interface	Description
GRID FREQ LOW **INPUT:** 42.0 **UNIT:** Hz	The input value of Grid low frequency. (This is valid only if the grid standard is "custom”)

6.2.7.9 FAC-MAX

Interface	Description
GRID FREQ HIGH **INPUT:** 58.0 **UNIT:** Hz	The input value of Grid high frequency. (This is valid only if the grid standard is "custom”)

6.2.7.10 ACTIVE REF.

Interface	Description
ACTIVE Type **1.PWR-VOLT RES** **2.PWR-FREQ RES** **3.PFC-VOLT RES** **4.PFC-FREQ RES** **5.ACTIVEISLAND** **6.Leack Current** **7.Insulation Detection**	This interface is used to select active reference. Press Up/Down button to move corresponding options; Press Enter button to enter the selected menu. Each menu has enabled or disabled, set it when you need. All defaults are enabled. When the insulation detection is set to enable, there will be about 1 minute power outage, you can change the setting to enable to avoid this phenomenon.

6.2.8 485 Address

6.2.8.0 485 Address

Interface	Description
485 ADDRESS **INPUT: 1**	This interface is used to select 485 Address.

6.2.9 RS485 BAUD RATE

6.2.9.0 BAUD RATE

Interface	Description
SELECT **1. 2400 bps** **2. 4800 bps** **3. 9600 bps**	This interface is used to select baud rate. The default BAUD Rate is set to 9600 bps

6.2.10 LANGUAGE

6.2.10.0 LANGUAGE

Interface	Description
LANGUAGE **1.Chinese** **2.English**	This interface is used to select language. The default language is set to English

6.2.11 BACKLIGHT

6.2.11.0 BACKLIGHT

Interface	Description
LIGHT TIME **INPUT:** 20 **UNIT:** SEC	This screen is used to set the screen light time.

6.2.12 DATE/TIME

6.2.12.0 DATE/TIME

Interface	Description
DATE/TIME **DATE:** 2021-12-25 **TIME:** 22:30:00 **WEEK:** Saturday	This interface is used to set date and time.

6.2.13 CLEAR REC

6.2.13.0 Clear history

Interface	**Description**
DEL REC **1. CANCEL** **2. CONFIRM**	This interface is used to clear operation history.

6.2.14 PASSWORD

6.2.14.0 PASSWORD

Interface	**Description**
PASSWORD **OLD:** XXXXX **NEW:** XXXXX **CONFIRM:** XXXXX	This interface is used to set password. The Default Password is **00000**

6.2.15 MAINTENANCE

6.2.15.0 MAINTENANCE

Interface	**Description**
PASSWORD **INPUT:** XXXXX	Reserved

6.2.16 FCTRY RESET

6.2.16.0 FACTORY RESET

Interface	**Description**
FACTORY RESET **1. CANCEL** **2. CONFIRM**	This interface is used to reset the inverter.

6.3 INQUIRE

Interface	Description
INQUIRE **1. INV MODULE** **2. MODULE SN** **3. FIRMWARE** **4. RECORD** **5. DIAGNOSE**	Press Up/Down button to move corresponding options. Press Enter button to jump to the selected menu. Press ESC button to return to other interface.

6.3.1 INV MODULE

Interface	Description
MODEL **MODEL:** 8K	This interface shows inverter model.

6.3.2 MODULE SN

Interface	Description
S / N **GUID: XXXXXXXXXXXX** **SN: FXXXXXXXXXXX**	This interface shows module SN.

6.3.3 FIRMWARE

Interface	Description
FIRMWARE **ARM:** V1.XX.XX **DSP:** V1.XX.XX	This interface shows Software version.

6.3.4 RUNNING RECORDS

Interface	Description
REC(01) **02:** Bat Disconnect **UP:** 12-25 20:00 **DOWN:** 12-26 23:00	This interface show running recorders.

6.3.5 DIAGNOSE

Interface	Description
DIAGNOSE 000000 000000 000000 000000 000000 000000	Factory internal us

6.4 STATISTIC

Interface	Description
STAT.	This interface shows inverter operation statistic.
1. TIME STAT.	1. Inverter operation and Grid-connection time statistic.
2. CONNE.TIMES	2. Inverter Grid-connection times statistic.
3. PEAK POWER	3. Displays power peak in history and for the day.
4. E-TODAY	4. Displays statistic for the day (kWh).
5. E-MONTH	5. Displays statistic for the month (kWh).
6. E-YEAR	6. Displays statistic for the year (kWh).
7. E-TOTAL	7. Displays statistic of the inverter (kWh).

Note:

1. E-TODAY/MONTH/YEAR/TOTAL→INPUT→PV/GRID(Consume)/BATD(Battery discharge) →OUTPUT→BatC(Battery charge)/GRID(Generation)/CNSUM(Load consume)

2. If the inverter shut down before 24:00 on that day, and the day statistic will not be stored.

7 Fault diagnosis and solutions

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

Table 7-1 Fault diagnosis and solutions table

Content	Codes	Solutions
Dischg Over Cur	00	Battery discharge over current. When the battery is loaded, the load is too large. (1) Nothing needs to do, wait one minute for the inverter to restart. (2) Check whether the load is within the specification. (3) Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines, then check
Over Load	01	The load power is greater than other power(PV,BAT). (1) Check whether the load is within the maximum power of the machine. (2) Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines, then check whether the load is short circuited if the fault has been eliminated. (3)Contact customer service if error warning continues.
Bat Disconnect	02	Battery Disconnect. (Battery voltage not identified) (1)Check whether the battery not connected. (2)Check whether the battery wiring port is open circuit. (3)Contact customer service if error warning continues.
Bat Under Vol	03	Battery voltage low that normal range. (1) Check if the battery is in line with the presetting, If so, power off and restart. (2) Check if the grid is powered down. If the power is off, if so, waiting for the grid to powered up, the grid will automatically charge the battery. (3) Contact customer service if error warning continues.
Bat Low Capacity	04	(1) Battery Low that setting capacity.(SOC<100% - DOD)
Bat Over Vol	05	The battery voltage is greater than the Inverter maximum voltage. (1) Check if the battery is in line with the presetting, If so, power off and restart. (2) Contact customer service if error warning continues.
Gird low vol	06	Grid voltage is abnormal(lower than normal) (1) Check if the grid is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Grid over vol	07	Grid voltage is abnormal(over than normal) (1) Check if the grid is abnormal.

Content	Codes	Solutions
		(2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Grid low Freq	08	Grid Frequency is abnormal(lower than normal). (1) Check if the grid is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Grid over Freq	09	Grid Frequency is abnormal(over than normal). (1) Check if the grid is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
GFCI over	10	Inverter GFCI exceeds standard. (1) Check PV string for direct or indirect grounding phenomenon. 2) Check peripherals of machine for current leakage. (3) Contact the local inverter customer service if fault remains
Solar Unconnected	11	Solar is abnormal. (1) PV is not connected. (2) PV switch is not closed. (3) Check PV availability.
Grid CT Reverse	12	CT connects abnormal. (1) Check whether the CT is connected in the correct direction. (2) Contact customer service if error warning continues.
Bus under vol	13	BUS voltage is lower than normal. (1) Check the input mode setting is correct. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Bus over vol	14	BUS voltage is over than maximum value. (1) Check the input mode setting is correct. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Inv over cur	15	The inverter current exceeds the normal value. (1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Chg over cur	16	Battery charge current over than the Inverter maximum voltage. (1)Restart the inverter and wait until it functions normally.
Bus vol osc	17	Bus voltage instability. (1) Check the input and output mode setting is correct. (2) Restart the inverter and wait until it functions normally.
Inv under vol	18	INV voltage is abnormal (1) Check if the INV voltage is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Inv over vol	19	INV voltage is abnormal (1) Check if the INV voltage is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Inv Freq Abnor	20	INV frequency is abnormal (1) Check if the INV frequency is abnormal.

Content	Codes	Solutions
		(2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Env/IGBT temp high	21	The inverter temperature is higher than the allowed value. (1) Cut off all the power of the machine and wait one hour, then turn on the power of the machine. (2) Contact customer service if error warning continues.
Bat Over Temp	23	Battery temperature is higher than the allowed value. (1) Disconnect the battery and reconnect it after an hour. (2) Contact customer service if error warning continues.
Bat Under Temp	24	Battery temperature is low than the allowed value. (1) Check the ambient temperature near the battery to see if it meets the specifications. (2) Contact customer service if error warning continues.
BMS Comm Fail	27	Communication between lithium battery and inverter is abnormal. (1) Check the cable, crystal, Line sequence. (2) Checking the Battery switch.
Fan Fail	28	Fan Fail (1) Check whether the Inverter temperature is abnormal. (2) Check whether the fan runs properly.
Grid Phase err	30	The grid fault phase. (1) Check power grid wiring if connected reverse or not.
Arc Fault	31	PV Arc Fault (1) Check Photovoltaic panels, PV wire. (2) Contact customer service if error warning continues.
Bus Soft Fail	32	The inverter may be damaged (1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Inv Soft Fail	33	
Bus Short	34	
Inv Short	35	
Fan Fault	36	Fan Fault (1) Check whether the Inverter temperature is abnormal. (2) Check whether the fan runs properly.
PV iso Low	37	PV iso low (1) Check if the PE line is connected to the inverter and is connected to the ground. (2) Contact customer service if error warning continues.
Bus Relay Fault	38	The inverter may be damaged (1)Restart the inverter and wait until it functions normally. (2)Contact customer service if error warning continues.
Grid Relay Fault	39	
EPS rly fault	40	
GFCI fault	41	
Bat Reverse	42	(1) Check if the inverter battery positive and negative connection is correct. (2) Contact customer service if error warning continues.
PV Short	43	(1) Restart the inverter and wait until it functions normally. (2) Disconnect the PV input, restart the inverter and wait until it functions normally.
Self Test Fail	44	The inverter may be damaged

Content	Codes	Solutions
System Fault	45	(1)Restart the inverter and wait until it functions normally. (2)Contact customer service if error warning continues.
Current DC over	46	
Voltage DC over	47	

Note: If an error occurs that is not listed in the table, Please Contact customer service.