User Manual

I1000-RH1 Series

3kW / 3.68kW / 5kW / 6kW

Single Phase, 2 MPPTs High Voltage Hybrid Inverter

- 150% DC input oversizing
- Charging / discharging efficiency >97%
- Support VPP / FFR function
- Up to 6000W charging / discharging rate
- Remote firmware upgrade & work mode setting
- EU standard certified by TÜV Rheinland

Content

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storage system

Notice

This manual contains important safety instructions that must be followed during installation and maintenance of the equipment.

Save the manual!

IMPORTANT TO READ CAREFULLY AND KEEP FOR POSSIBLE CONSULTATIONS

Copyright Declaration

1. About This Manual

1.1 Applicability

Please read the product manual carefully before installation,operation or maintenance.This manual contains important safety instructions and installation instructions that must be followed during installation and maintenance of the equipment.

I1000-RH1-3K-M1 I1000-RH1-3.68K-M1 I1000-RH1-5K-M1 I1000-RH1-6K-M1

1.2 Target group

This manual is intended for qualified electrical technical personnel who are responsible for hybrid inverte installation and commissioning in the eneray storage system.

1.3 Symbols used

The following types of safety instructions and general information appear in this document as described below:

⚠	**DANGER!** 'Danger' indicates a hazard with a high level of risk that, if not avoided, will result in death or serious in jury.
⚠	**WARNING!** 'Warning' indicates a hazard with a medium level of risk that, if not avoided, will result in death or serious injury.
⚠	**CAUTION!** 'Caution' indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.
NOTICE	**NOTICE!** 'Notice' indicates a situation that, if not avoided, could result in equipment or property damage.
☞	**NOTE!** 'Note' provides tips that are valuable for the optimal operation of your product.

2. Safety

2.1 General Safety

The hybrid inverter has been designed and tested strictly according to international safety regulations. Read all safety instructions carefully prior to any work and observe them at all times when working on or with the hybrid inverter. Incorrect operation or work may cause:

- injury or death to the operator or a third party;
- damage to the inverter or other properties.

2.2 Important safety instructions

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⚠️	**DANGER!** PV strings will produce electrical power when exposed to sunlight and can cause a lethal voltage and an electric shock. Only qualified personnel can perform the wiring of the PV panels. Do not open the enclosure when the inverter is running. Unauthorized opening will void warranty and warranty claims and in most cases terminate the operating license. When the enclosure lid is removed, live components can be touched which can result in death or serious injury due to electric shock. Operating a damaged inverter can lead to hazardous situations that can result in death or serious injuries due to electric shock. Batteries deliver electric power, resulting in burns or a fire hazard when they are short circuited, or wrongly installed. Lethal voltages are present at the battery terminals and cables connecting to the inverter. Severe injuries or death may occur if the cables and terminals in the inverter are touched. PV negative (PV-) and battery negative (BAT-) on inverter side is not grounded as default design. Connecting PV- or BAT- to EARTH are strictly forbidden.
⚠️	**WARNING!** Do not disconnect PV connectors, AC connector or battery connectors while the inverter is running. De-energize from all multiple power sources. Wait 5 minutes for the internal capacitors to discharge. Verify that there is no voltage or current before disconnecting any connectors. Use personal protective equipment, including rubber gloves and protetive boots during the installation or maintenance.
⚠️	**CAUTION!** Do not touch any hot parts (such as the heat sink) during operation, The temperature of inverter surface might exceed 60℃ during working.
NOTICE	**NOTICE!** Electrical installation and maintenance must be carried out by competent electricians according to local regulations. Do not open inverter cover or change any components without GS ESS Power's authorization, otherwise the warranty commitment for the inverter will be invalid. Usage and operation of the inverter must follow instructions in this user manual, otherwise the protection design might be useless and warranty for the inverter will be invalid.
👉	**NOTE!** Electrical installation and maintenance must be carried out by competent electricians according to local regulations.The inverter built-in RCMU will exclude possibility of DC residual current to 6mA, thus in the system an external RCD (type A) can be used(≥30mA).

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. I1000-RH1 series inverter provide Active Frequency Drift(AFD) to prevent islanding effect.

2.3 Explanation of symbols

This section gives an explanation of all the symbols shown on the type label.
Symbols on the Type Label

DANGER!	DANGER!
TÜVRheinland ZERTIFIZIERT	TUV mark.
CE	CE mark. The inverter complies with the requirements of the applicable CE guidelines.
(hot surface symbol)	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
(high voltage symbol)	Danger of high voltages. Danger to life due to high voltages in the inverter!
(warning symbol)	Danger. Risk of electric shock!
(waste disposal symbol)	The inverter cannot be disposed of together with the household waste. Disposal information can be found in the enclosed documentation.
(no work symbol)	Don't work on this inverter until it is isolated from battery, mains and on-site PV generation suppliers.
(high voltage / 5 min symbol) 5 min	Danger to life due to high voltage. There is residual voltage in the inverter which needs 5 min to discharge. Wait 5 min before you open the upper lid or the DC lid.
(read manual symbol)	Please read this manual before installation.
(RCM symbol)	RCM (Regulatory Compliance Mark) The product meets the requirements of the applicable Australian standards.

3. Introduction

3.1 Basic features

The I1000-RH1 series hybrid inverters apply to PV energy storage system with PV modules, battery, loads and grid. The energy produced by PV system shall be used to optimize self-consumption, excess power charge battery and the rest power could be fed into the grid. Battery shall be discharged to support loads when PV power is insufficient to meet self-consumption. If both PV power and battery power is insufficient, the system will take power from grid to support loads.
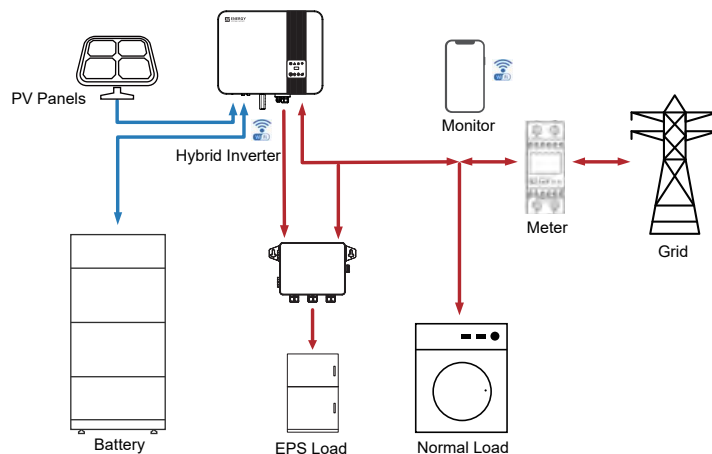
Figure 3-1 PV Energy Storage System

3.2 Work modes

The I1000-RH1 series hybrid inverter has the following work modes based on your configuration and layout conditions.

Work mode: Self-use

Priority: load>battery>grid

❶ Generated solar energy
❷ Load consumption
❸ Storage in battery
❹ Feed the excess solar energy into the grid
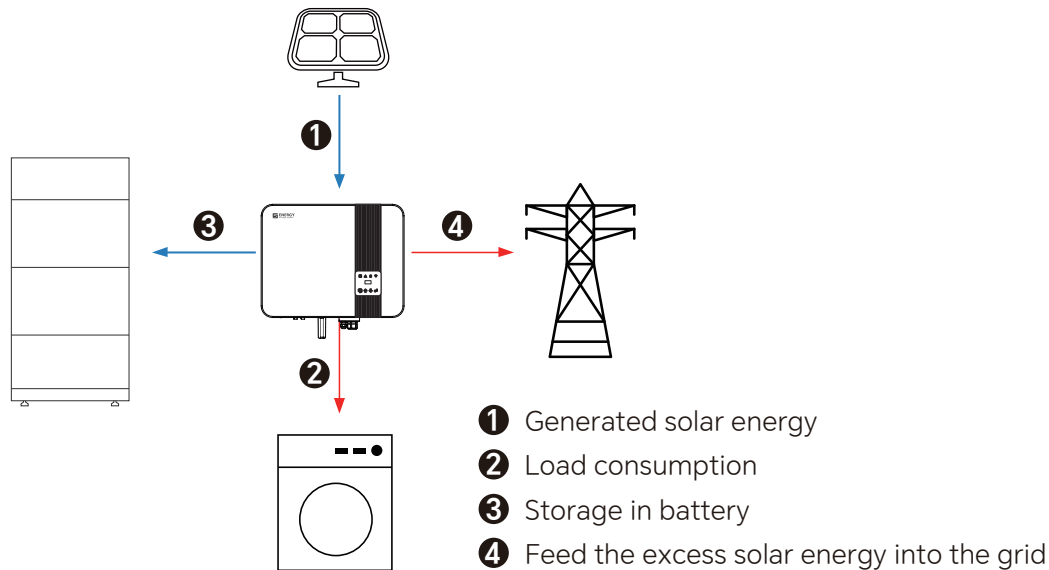
Self-consumption of PV renewable energy is the highest priority. The PV excess is used to charge the batteries, then fed back into the grid.

Work mode: Feed in Pirority

Priority: load>battery>grid

This mode applies the area that has high feed-in tariff and export control.
The PV generated power will be used to supply the loads firstly, then feed into the grid.
The excess power will charge the battery.

❶ Generated solar energy
❷ Load consumption
❸ Feed into grid
❹ Charge the battery
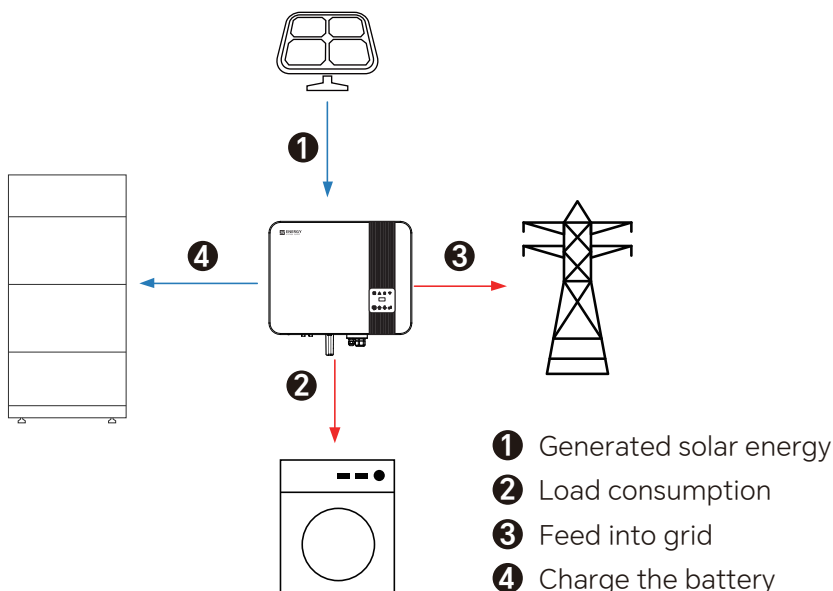
Work mode: Force time use

Priority: battery>load>grid (when charging)

① Generated solar energy
② Storage in battery
③ Load consumption
④ Grid supply power when the
   battery capacity is not enough
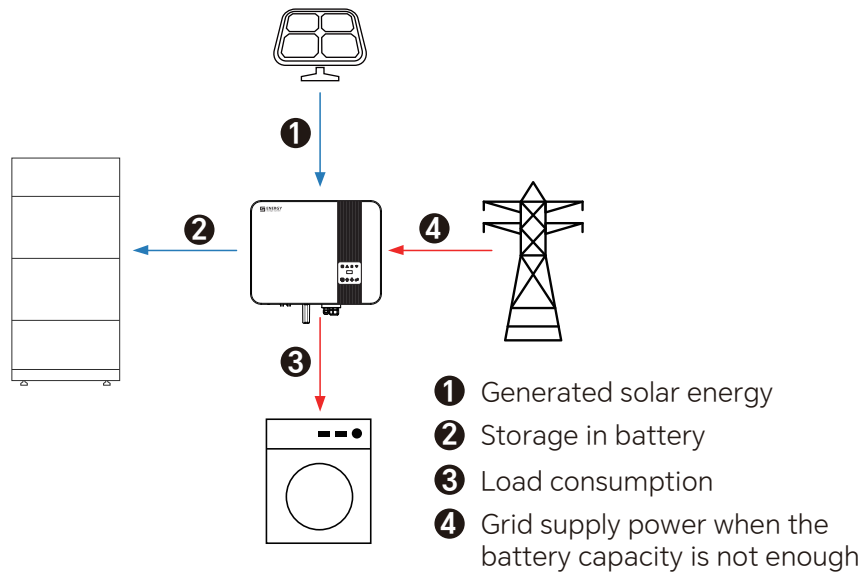
Priority: load>battery>grid (when discharging)
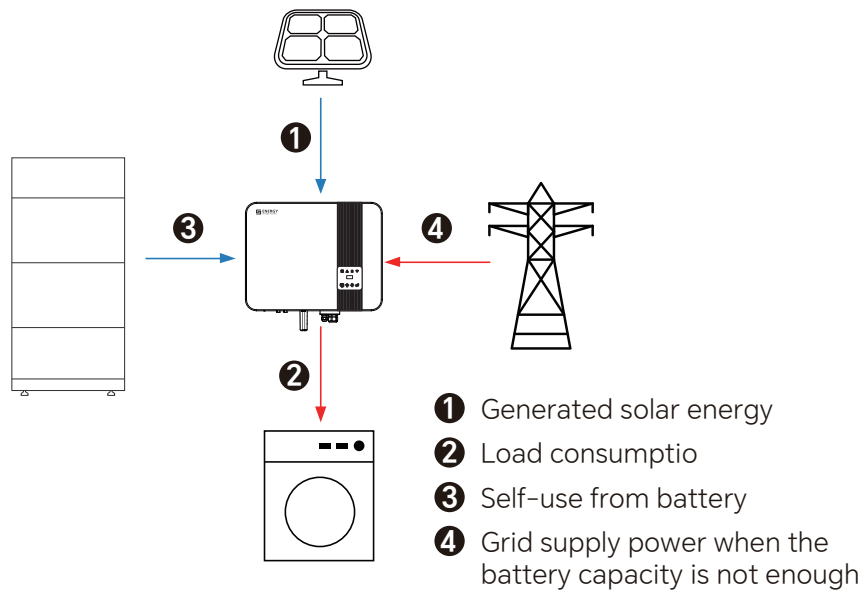
① Generated solar energy
② Load consumptio
③ Self-use from battery
④ Grid supply power when the
   battery capacity is not enough

This mode applies the area that has electricity price between peak and valley. User can use off-peak electricity to charge the battery. Charging may be set flexibly, and the rest of time is in self-use mode.

Work mode: Back up mode

Priority: battery>load>grid
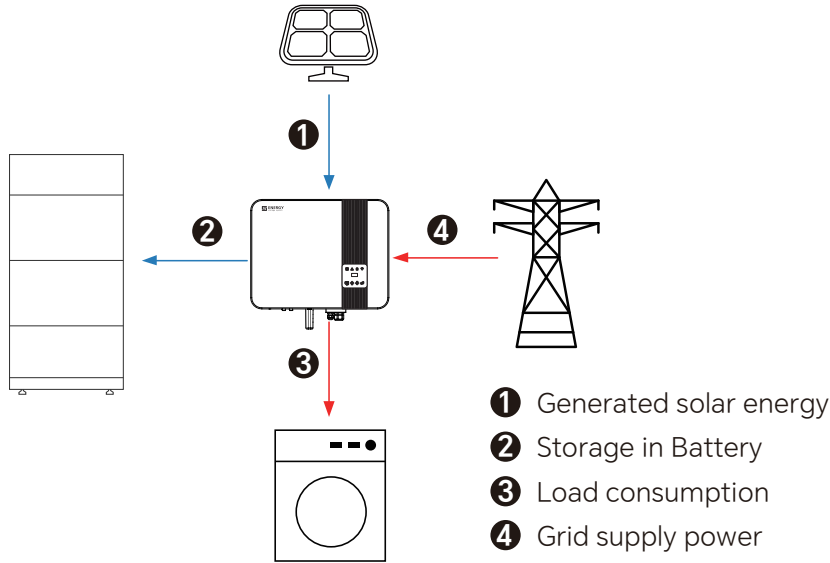
1 Generated solar energy
2 Storage in Battery
3 Load consumption
4 Grid supply power

This mode applies the area that has electricity price between peak and valley. User can use off-peak electricity to charge the battery. The charging and discharging time can be set flexibly, and it also allows choosing whether charge from the grid or not.

⚠️

WARNING!
Make sure the load powering rating in within the EPS's output rating. Or the inverter will shut down with an 'over load' warning.
When an 'over load' is appeared, adjust the load power make sure it is with the range of the EPS output, and turn the inverter on.
For the nonlinear load, please pay attention to the inrush power make sure it is within the range of the EPS output.

3.3 Terminals

The I1000-RH1 series hybrid inverters apply to PV energy storage system with PV module, battery, loads and grid. The energy produced by PV system shall be used to optimize self-consumption, excesspowercharge battery and the rest power could be fed into the grid. Battery shall be discharged to support loads when PV power is insu cient tomeet self-consumption. If both PV power and battery poweris insu cient,the system willtake powerfrom grid to supportloads.

A   B C D E   F   G H
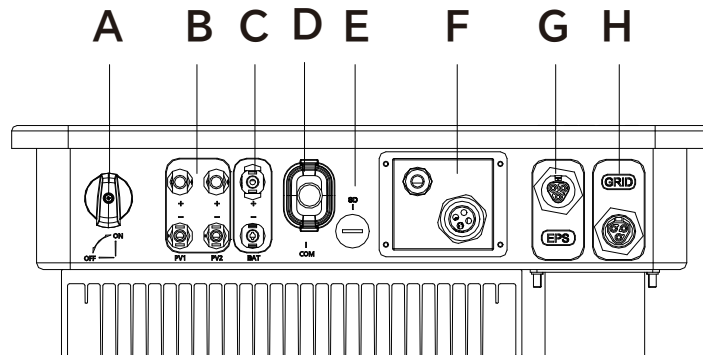
Figure 3-2 Terminals

Object	Description	Object	Description
A	DC switch	E	SD port
B	PV connector	F	Communication port
C	Battery connector	G	EPS port
D	WiFi or 4G or Ethernet port	H	AC port

Note: The DC switch is used to isolate PV strings.

3.4 Dimension

520mm

172mm

412mm
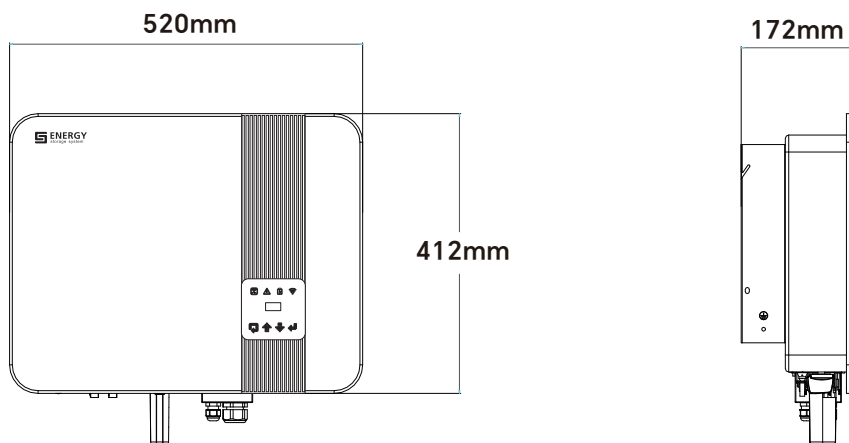
Figure 3-3 Dimension

4. Technical data

Model	I1000-RH1-3K-M1	I1000-RH1-3.68K-M1	I1000-RH1-5K-M1	I1000-RH1-6K-M1
PV Input Data				
Recommended Max. PV Power [Wp]	4500	5000	7500	9000
Max. PV Input Voltage [V]	600			
MPPT Voltage Range [V]	120 ~ 550			
Rated PV Input Voltage [V]	360			
Start-up Voltage [V]	150			
No. of MPP Trackers	2			
No. of Input Strings per Tracker	1			
Max. Input Current per MPPT [A]	13.5 / 13.5			
Max. Short-circuit Current per MPPT [A]	17 / 17			
Backfeed Current to array [A]	0			
DC Switch	Integrated			
AC Output Data(on-grid)				
Rate AC Power [W]	3000	3680	5000	6000
Rated Apparent Power [VA]	3000	3680	5000	6000
Rated AC Current [A]	13	16	21.7	26.1
Max. AC Current [A]	13	16	21.7	26.1
Rated AC Voltage / Range [V]	220 / 230; 160 ~ 290			
Grid Frequency / Range [Hz]	50 / 60; ±5			
Adjustable Power Factor [cosφ]	0.8 leading ~ 0.8 lagging			
Output THDi (@Rated Output)	< 2%			
AC Inrush Current [A]	35			
AC Max. Output Fault Current [A]	80			

Model	I1000-RH1-3K-M1	I1000-RH1-3.68K-M1	I1000-RH1-5K-M1	I1000-RH1-6K-M1
Output DC (Battery)				
Battery Type	Lithium			
Battery Voltage Range [V]	80 ~ 450			
Max. Charging / Discharging Current [A]	25			
Max. Charging / Discharging Power [W]	4500 / 3000	5000 / 3680	6000 / 5000	6000 / 6000
Communication Interface	CAN			
EPS Output Data (With Battery)				
EPS Rated Power [W]	3000	3680	5000	6000
EPS Rated Voltage [V]	220 / 230			
EPS Rated Frequancy [Hz]	50 / 60			
EPS Rated Current [A]	13	16	21.7	26.1
Output THDi (@Rated Output)	< 2%			
Automatic Switch Time [s]	< 0.5			
Peak Apparent Power, Duration [VA, s]	3600, 600	4416, 600	6000, 600	7200, 600
Efficiency				
Max. Efficiency	97.42%	97.45%	97.50%	97.50%
Euro Efficiency	97.15%	97.17%	97.20%	97.20%
MPPT Efficiency	99.90%	99.90%	99.90%	99.90%
Battery Charge / Discharge Efficiency	97.15%	97.17%	97.20%	97.20%
Protection				
DC Insulation Monitoring	Integrated			
Input Reverse Polarity Protection	Integrated			
Anti-island Protection	Integrated			
Residual Current Monitoring	Integrated			
Over-heat Protection	Integrated			
AC Overcurrent Protection	Integrated			
AC Short-circuit Protection	Integrated			
AC Overvoltage Protection	Integrated			
DC Surge Protection	Integrated (Type III)			
AC Surge Protection	Integrated (Type III)			
General Data				
Size (Width * Height * Depth) [mm]	520 * 412 * 172			
Weight [kg]	20			
User Interface	LED + OLED			
Communication	RS485 and USB (Standard), Wifi or 4G or Ethernet (Optional)			
Ambient Temperature Range [℃]	–30 ~ +60			
Relative Humidity	0 ~ 95%			
Operating Altitude [m]	≤ 2000			
Standby Self Consumption [W]	< 15			
Topology	Non-isolation			
Cooling	Natural Convection			
Enclosure	IP65			
Protective Class	I			
Overvoltage Category	III (Mains) II (DC)			
Noise [dB]	<35			
Warranty [years]	5 / 7 / 10			
General Data				
Grid Regulation	EN50549, VDE0126, CEI 0-21, UNE217002, EN50549-PL, EN50549-GR, EN50549-IE, IEC61727, IEC62116, G98, G99, AS4777, C10/C11			
Safety Regulation	EN62109-1, EN62109-2			
EMC	EN61000-6-1/3			

5 Installation

5.1 Unpacking

Check the delivery for completeness. Contact your dealer at once if anything is missing.

Object	Quantity	Description
A	1	I1000-RH1 series inverter
B	1	Bracket
C	2	Battery Connectors (1* positive, 1*negative)
D	4	PV Connectors (2* positive, 2*negative)
E	4	AC Terminal
F	1	EPS Terminal
G	1	8P Pluggable Terminal Block
H	1	EPS-100-G2(Optional)
I	1	Wifi or 4G or Ethernet Module(Optional)
J	3	Ethernet RJ45 Connector
K	1	M5 screws
L	1	Earth Terminal
M	4	Expansion tubes & Expansion screws
N	1	Meter
O	1	User Manual
P	1	Quality Certificate

Open the package and pick the product, check that if there is any distortion or impaired during the transportation. Meanwhile, check that if the relating accessories and the materials are here, you can see the accessories list in the table.

The instruction manual is an integral part of the unit and should therefore be read and kept carefully.

It is recommended that the packaging should not be removed until the unit is located in the installation site.

5.2 Check for transport damage

Check if the I1000-RH1 series inverter has some visible external damage, such as cracks in the housing or display please contact with your dealer if you find any damage.

5.3 Installation precaution

The I1000-RH1 series inverter is designed for outdoor installation (IP65)
Make sure the installation site does not fall into one of the following conditions:
·Do not install the inverter in direct sunlight.
·Do not install the inverter on flammable construction material.
·Do not install the inverter in areas where highly flammable materials are stored.
·Do not install the inverter in potentially explosive areas.
·Do not install the inverter during periods of precipitation or high humidity (>95%); Moisture trapped within the location may cause corrosion and damage to the electric components.
·Provide adequate ventilation when using batteries, and also read the warning label on the bottom of the inverter.
·Install the inverter in a location that maintains an ambient air temperature that is less than 40°C;That is to maintain a safe internal component temperature; the inverter would reduce power if the ambient air temperature exceeds 40°C.
·The inverter should be installed in a location that is not accessible for children.
·The inverter emits a slight vibrating noise when operating, which is normal and no effect on performance.
·The slope of the wall should be within ±5°.
·The inverter is heavy, ensure the mounting place is strong enough to hold the weight of the inverter.
·If you install the inverter in a cabinet, closet or other small enclosed area, sufficient air circulation must be provided in order to dissipate the heat generated by the unit.

5.4 Available space
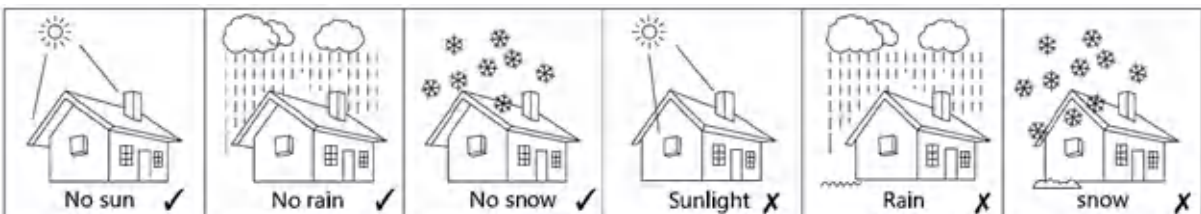
Figure 5-1 inverter space size
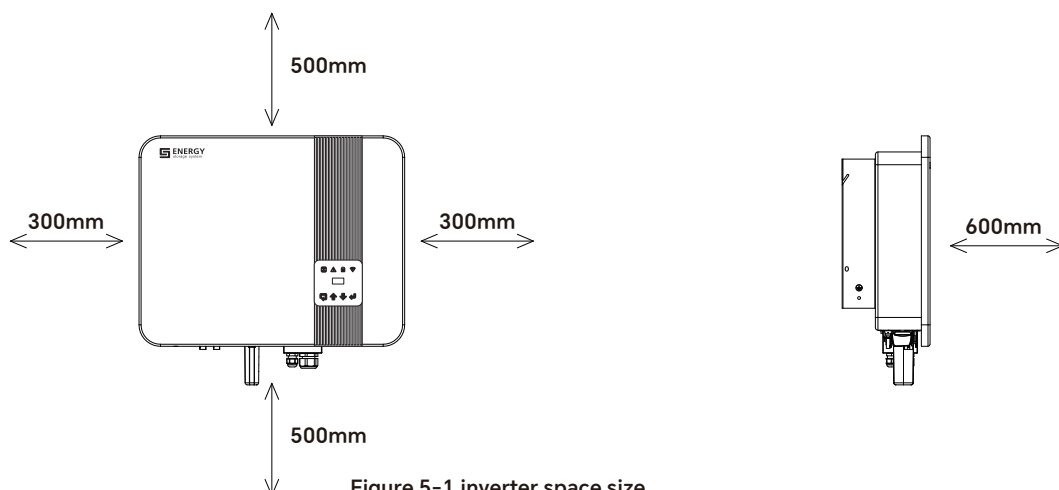
5.5 Preparation

No.	Tool	Model	Function
1		Level	Make sure the bracket is properly installed
2		BOSCH HD18-2 Two-Speed Hammer Dril	Drill holes on the wall
3		Hammer	Hanging the bracket
4		KIM0 20V 1/2 Cordless Brushless Impact Wrench Set	Hanging the bracket
5		PV-AZM-410	Stripping plier for PV cable
6		PV-CAM-22100	Crimping plier for PV cable
7		Screwdriver	Wiring
8		RJ45 Crimping Tool	Crimping tool for RJ45 terminal
9		Crimping plier	Crimping Tool For Insulated Electrical Connectors

Lifting and Handling

The unit is heavy. Do not lift it alone.
·During lifting procedures ensure that the unit is firmly secured to avoid the risk of accidental tipping or dropping.
·Parts serving for support or immobilization of unit shall be designed and manufactured so as to minimize the risk of physical injuries and of accidental loosening of fixing.
·Ensure that the method of lifting will not allow the unit to slip from chains and slings or turn-over or slide from lifting devices.

· Transportation must be carried by specialized person (truck operators. Hook-up personal), equipped with the necessary protection equipment (overalls, safe shoes, protective gloves, helmets, goggles)
· Do not walk or stand beneath or in the proximity of the load.
· Avoid sudden movements and jolts when unloading and positioning the unit. Internal handling procedures must be conducted with care. Do not exert leverage on the components of the machine.
· If the unit is not balanced apply ballast. Any protruding parts should not be supported by hand.
· The inverter should be installed so that the operating panel shall be easily accessible- easy access to the electrical power connection point.
· Accessible for maintenance and repair work.
· Parts serving for support or immobilization of unit shall be designed and manufactured so as to minimize the risk of physical injuries and accidental loosening of fixings.
· Loading capacity and hardness of the supporting surface, load rating of mounting bracket should be at least four times the weight of the devices according to IEC62109-1. And supporting characteristics will be impaired by wear, corrosion, material fatigue or ageing, This should be calculated by inspection of the design data of supporting material and consulting construction engineer.

5.6 Installation steps

Step 1: Screw the wall bracket on the wall
· Use the wall bracket as a template to mark the position of the 4 holes.

320mm

110mm
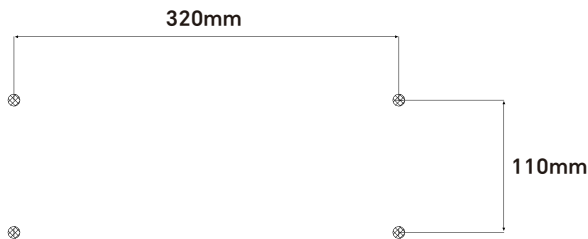
· Drill holes with φ10 driller carefully, make sure the holes are deep enough (at least 45mm) for install and tight the expansion tubes.
· Install the expansion tubes in the holes, and tight them. Install the wall bracket using the expansion screws in the screw package.

Step2: Hang the I1000-RH1 series inverter on the wall bracket.
· Transportation of the inverter needs at least 2 people, each one needs to use the handles at the sides of the inverter.
· Hang the inverter over the bracket, move the inverter close to it, slightly laydown the inverter make sure the 4 mounting bars on the back of the inverter is fixed well with 4 grooves on the bracket.
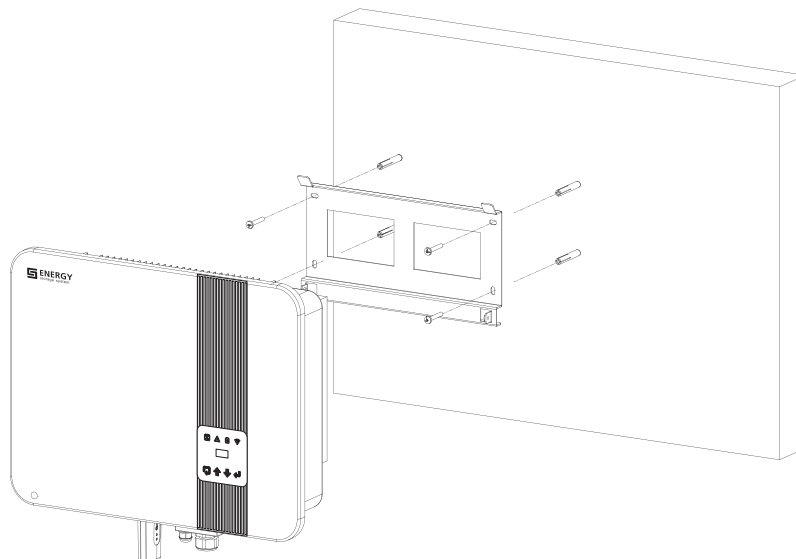
5.7 Electrical WiringConnection

The overview of the connection terminals of inverter please refer to Figure 3-2, and the wiring connections please refer to Figure 3-1 the PV energy storage system wiring diagram in chapter 3.1.

System Connection Diagrams

Note: This diagram is an example for Australian, South Africa and New Zealand grid system where neutral line can't be switched.
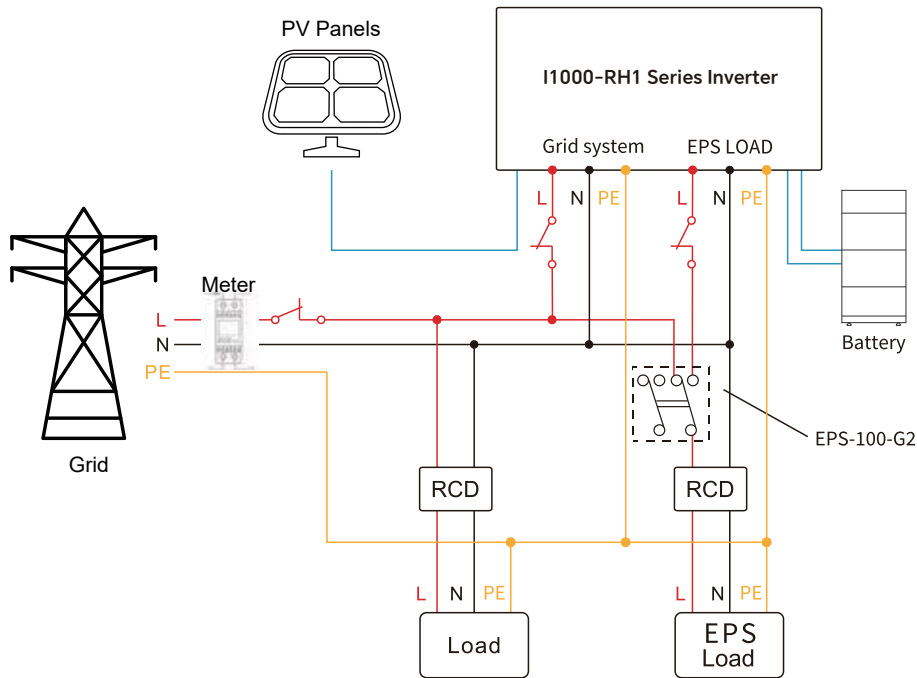
Note: This diagram is an example for grid system without special requirement on electrical wiring connection.

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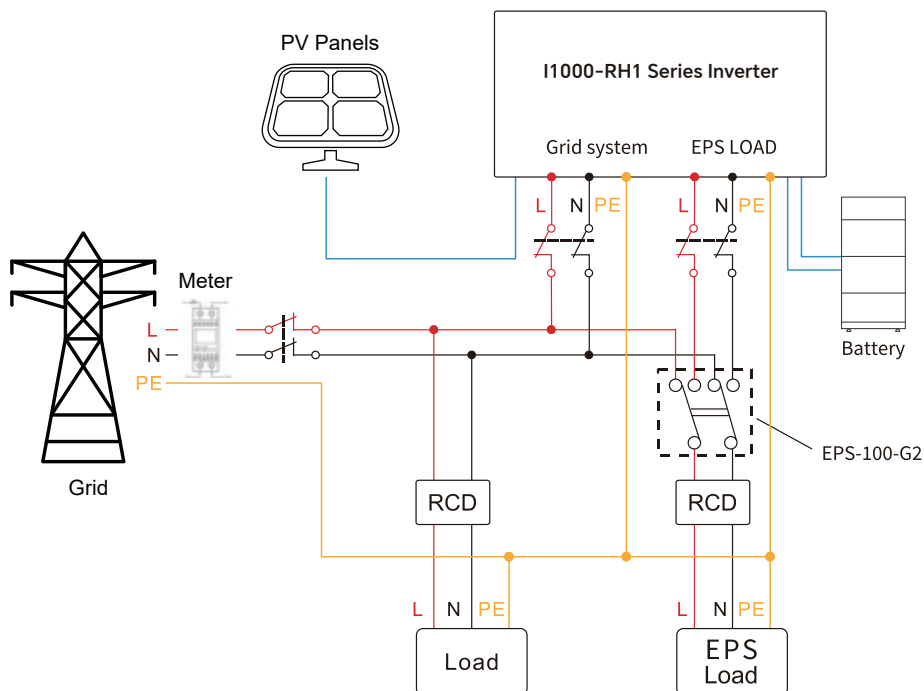
NOTICE	NOTICE! · The EPS Box is not included as part of the inverter. · Inverters have not been tested to AS/NZS 4777.2:2020 for multiple phase combinations. · For the high voltage battery,Turbo H1 Series is the only battery the inverter is compatible with.

The main steps to connect the I1000-RH1 series system

· PV string connection
· AC output connection
· Battery connection
· Battery power connection
· Battery communication connection
· EPS connection
· Earth connection
· Communication connection

5.7.1 PV WiringConnection

Before connecting PV strings to I1000-RH1 series hybrid inverter, please make sure requirements are followed as below :
· The total short– circuit current of PV string must not exceed inverter's max DC current .
· Make sure open circuit voltage of PV string is less than 1000V.
· PV strings could not connect to earth/grounding conductor.
· Use the right PV plugs in the accessory box, BAT plugs are similar with PV plugs, please confirm before use it.

Connection Steps:

1.Turn off the DC switch.
2.Prepare 2.5–4mm^2 PV cable and PV plugs as below.
3.Strip 7mm of the conductor with stripping plier. Use a suitable stripping tool for this
(e.g. "PV-AZM-410 ")
4.Insert striped cable into pin contact and ensure all conductor strands are captured in the pin contact.
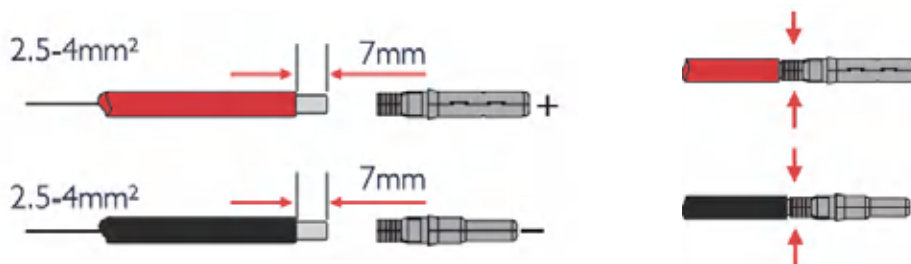
5.Crimp pin contact by using a crimping pliers(PV-CZM-22100). Put the pin contact with striped cable into the corresponding crimping pliers and crimp the contact.
6.Insert pin contact through the cable nut to assemble into back of the male or female plug. When you feel or heard a 'click' the pin contact assembly is seated correctly.
7.Tight the DC connector.
a.Slide the cable nut towards the back shell.
b.Rotate the cable nut to secure the cable.
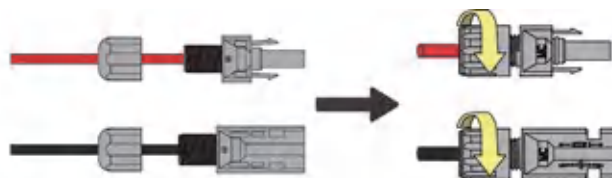
8.After securing the cable tightly, align the 2 half connectors and mate them. together by hand until a 'click' is felt or heard.

9.Separate the DC connector

a.Use the specified wrench tool.

b.When separate the DC+ connector, push the tool down from upside.

c.When separate the DC− connector, push tool down from the bottom side.

d.Separate the connectors by hands.

5.7.2 Battery Connection

When you want to build a self-use storage system, the high voltage battery is a necessary part. The I1000-RH1 series inverter provides the necessary part of the interfaces to connect the battery.

> ⚠️ **WARNING!**
> Make sure you select the correct specification cables fo installation. Otherwise the power will make the cable hot or burnt; it could result in death or serious injury.

1.Battery Power Cable Connection

1) Prepare the tin-plated cables with a conductor cross section of 4 to 6 mm² (AWG 10).

2) Strip 15mm off the conductor. Use a suitable stripping tool for this (e.g. "Knipex Solar 121211").

3) Open the spring using a screwdriver ①.
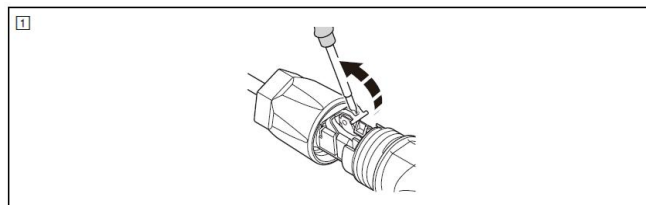
4) Carefully insert the stripped wire with twisted litz wires all the way in (②, A). The litz wire ends have to be visible in the spring.

5) Close the spring. Make sure that the spring is snapped in (②, B).
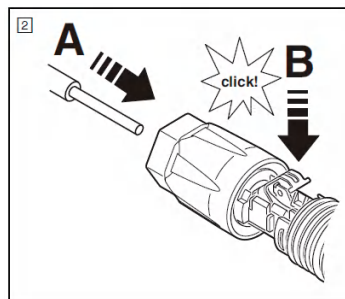
6.Push the insert into the sleeve (③, C).

7.Tighten the cable gland to 2 Nm (③, D).Use a suitable and calibrated torque wrench,size 15. Use an open-jaw wrench, size 16, to hold the connector in place.

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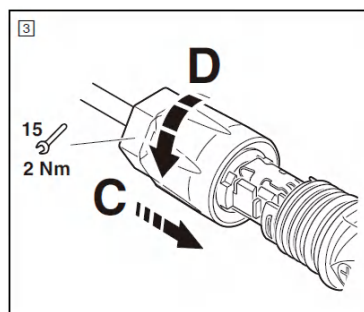
8.Fit the two connectors together until the connection audibly locks into place.
9. Check to make sure the connection is securely locked
10.Separating connectors
1). Insert the screwdriver into one of the four openings(④, A).
2). Leave the screwdriver in the opening. Pull the two connectors apart(④, B).
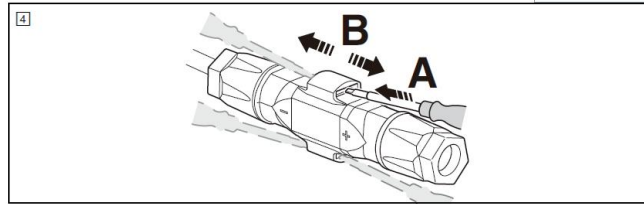
NOTE:

If the resistance to earth of each conductor of the PV array and battery system lower than the detection,the inverter will report Earth Fault Alarm.

This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring. If an Earth Fault Alarm occurs, the red light will be on and the ISO Check fault will be displayed on the LCD screen,and the fault can be found in the history of the fault. For the machine installed with WiFi/GPRS, the alarm information can be seen on the corresponding monitoring website, and can also be received by the APP on the mobile phone.

===Error Logs===

01: ISO Check Fault

2. Battery Communication Connection

The communication interface between battery and inverter is CAN with a RJ45 connector.
The Pins definition is as below.
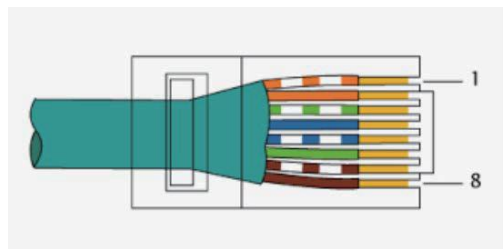
Pin	1	2	3	4	5	6	7	8
Function	NC	NC	NC	CANH	CANL	NC	NC	NC

Overview for all battery connections

BAT+

BAT−   BMS
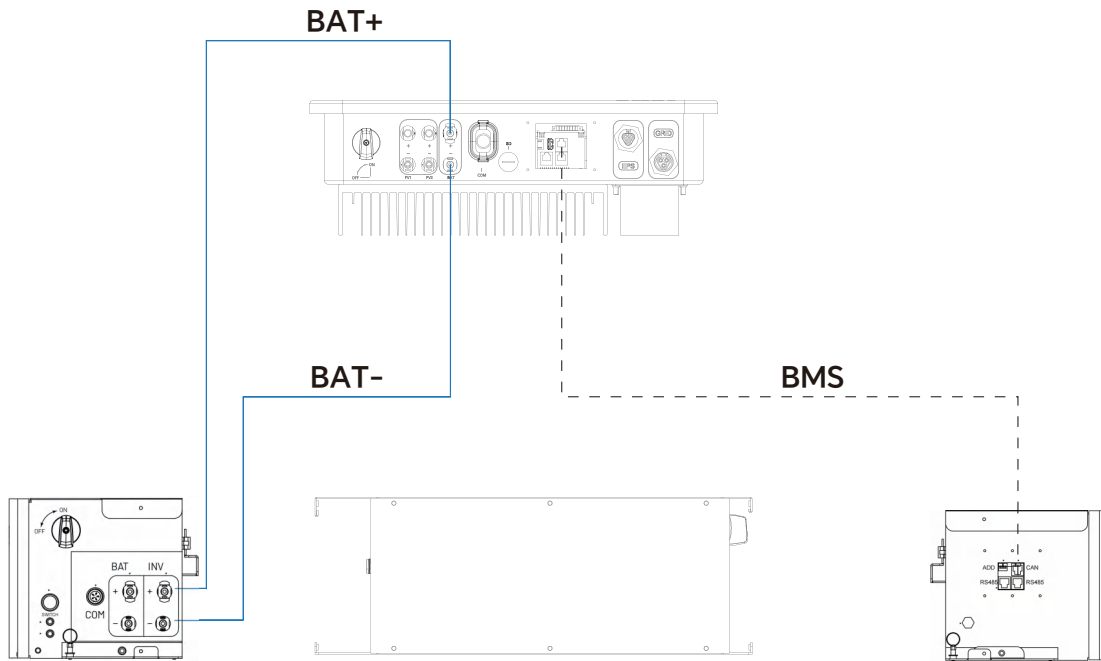
5.7.3 AC OutputConnection

I1000-RH1 series inverters have already integrated RCMU (residual current monitoring unit) inside, however if an external RCD is and the groove on the housing engage perfectly until a 'Click' is heard or felt. required, a type A RCD with rated residual current of 30mA or higher is recommended. There are two AC terminals and the assembly steps for both are the same, just need to check one for 'Grid' another for 'EPS'.The AC cable and micro-breaker specification for AC side of N3 HV series inverter as below.

Model	I1000-RH1-3K-M1	I1000-RH1-3.68K-M1	I1000-RH1-5K-M1	I1000-RH1-6K-M1
Cable(Cu)	4mm²	4mm²	6mm²	6mm²
Micro-Breaker	25A	25A	32A	32A

⚠️

WARNING!
Make sure you select the correct specification cables for installation. Otherwise the power will make the cable hot or burnt; it could result in death or serious injury.
Don't connect the phase to 'PE' terminal, otherwise the hybrid inverter will not function properly.

Connection Step:

1. Lead the AC cable through the cable gland and the housing.
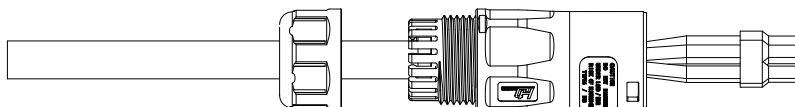
2. Remove the cable jacket by 40 mm, and strip the wire insulation by 8 mm–15 mm.
3.Fully insert the conductors to the corresponding terminal and tighten the screws with the torque 0.8 Nm. Pull cables outward to check whether they are firmly installed.
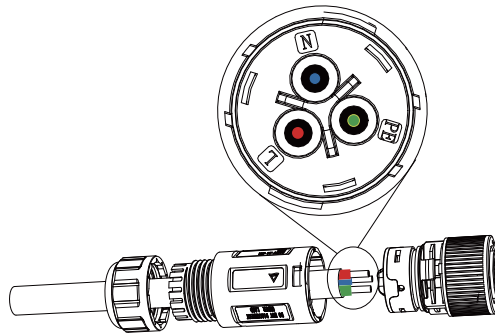
4.Assemble the housing, the terminal block and cable gland (torque 4 Nm–5 Nm). Make sure that the rib of the terminal block and the groove on the housing engage perfectly until a 'Click' is heard or felt.
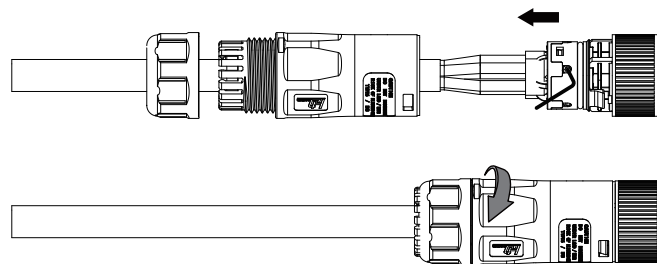
5.7.4 Earth Connection

You can additionally earth the inverter enclosure of a second earthling or equipotential bonding is required locally. This prevents touch current if the original protective conductor fails.
Cable size: 12AWG

Connection step:

·Strip the earthing cable insulation.
·Insert the stripped cable into the ring terminal.
·Clamp the end of the ring terminal.
·Unscrew the screw of the earthing connector.
·Suit the ring terminal on the earthing connector.
Suit the gasket on the earthing connector.
·Screw the screw of the earthing connector.
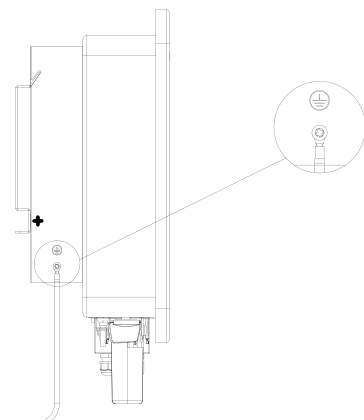
5.7.5 Communication connection

Communication interface

This product has a series communication interfaces besides WIFI or 4G or Ethernet (optional), Dry contact and extend port and for human and machine communication, etc., can be delivered to PC or other monitoring equipment via these interfaces.
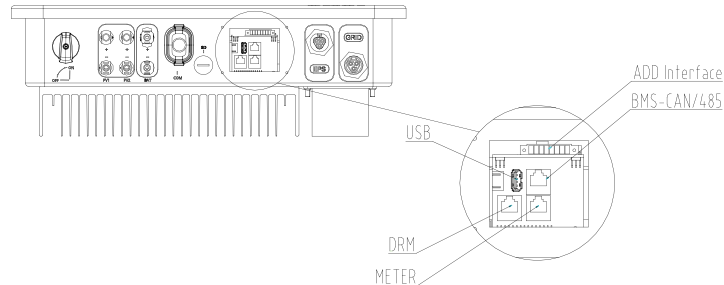
1. WIFI or 4G or Ethernet

The details please refer to the WIFI or 4G or Ethernet module user manual.

2. ADD Interface

ADD interface PINS definition:

Pin	1	2	3	4	5	6	7	8
Function	METER-485A	METER-485B	GENA	GENB	+5V	SHUTOWN	Temp	GND

Meter communication: METER_485A & METER_485B----pin1 & pin2
Relay contact output for generator: GENA & GENB----pin3 & pin4
Shut down the hybrid inverter: +5V & SHUTDOWN----pin5 & pin6
Temperature of Lead-acid battery Temp & GND—PIN7 and pin8

3. METER port

Meter port PINS definition:
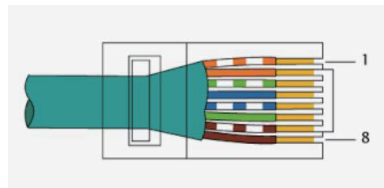
Pin	1	2	3	4	5	6	7	8
Function	METER-485A	METER-485B	NC	NC	NC	NC	NC	NC

The function of meter port same as pin1 & pin2 of ADD interface.

Meter wiring diagram for Typical Energy Storage System
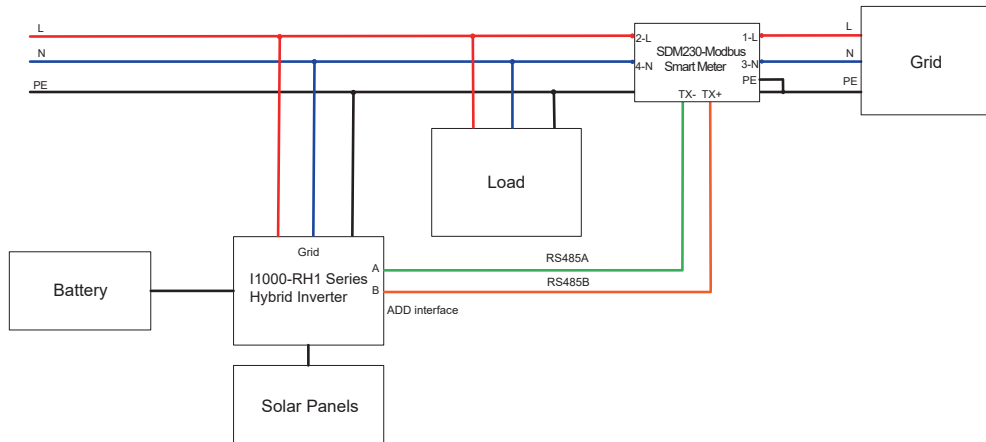
The I1000-RH1 series energy storage inverter adopts EASTRON SDM230-Modbus smart meter. The connect steps are as follows:
· Before connecting the smart meter to the system, please read the signs on the meter carefully. Please connect the PIN1 and PIN3 of the meter to the grid, and connect the PIN2 and PIN4 of the meter to the inverter and load.
· Connect the smart meter PIN5, PIN6 to the ADD interface of inverter (meter PIN5 to inverter RS485 A, meter PIN6 to inverter RS485 B).
· Connect PIN7 of the meter to the ground.

Note:
The local address and the meter address need to be set as "001" on the inverter screen. The address of the smart meter itself needs to be set to "001".

WARNING!
If one chooses a flexible wire, ensure the cord section is pressed on the crimping terminal before connecting it to the meter as below.

Meter wiring diagram for AC Retrofit System

Renac Hybrid inverters can be used in the following situations also. If the site already has a grid tied PV system and want to increase module capacity or provide back-up power. Additional meter between the grid-connected inverters and I1000-RH1 series hybrid inverter is required. One I1000-RH1 series hybrid inverter can be connected maximum two On-Grid single-phase inverters, and in the system, the smart meter must be the EASTRON SDM230-Modbus.
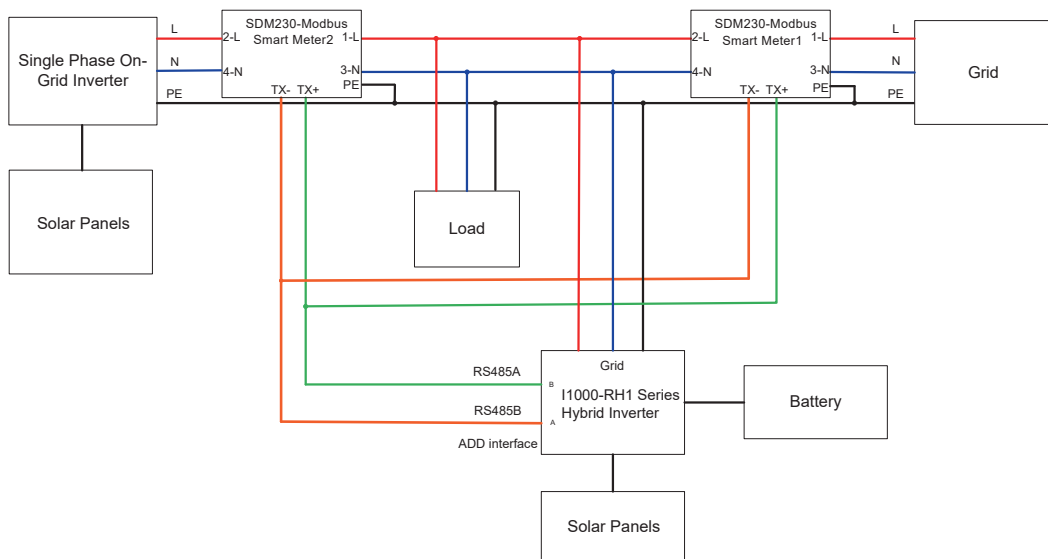
Note:
The local address needs to be set as "001" on the inverter screen, and meter1 address set as "001", meter2 address set as "004". The address of the smart meter1 itself needs to be set to "001", and the smart meter2 needs to be set as "004".

4. DRED

This application meets the requirements of local Australian grid code (AS/NZS 4777.2) which, among specific requirements for connection, calls for compatibility with Demand Response Enabling Devices (DRED). The DRED is under control of a local network operator and allows to put the inverter in one of the Demand Response Modes (DRMs) defined by the standard:

· DRM 0 Operate the disconnection device.
· DRM 1 Do not consume power.
· DRM 2 Do not consume at more than 50% of rated power.
· DRM 3 Do not consume at more than 75% of rated power and source reactive power if capable.
· DRM 4 Increase power consumption (subject to constraints from other active DRMs).
· DRM 5 Do not generate power.
· DRM 6 Do not generate at more than 50% of rated power.
· DRM 7 Do not generate at more than 75% of rated power and sink reactive power if capable.
· DRM 8 Increase power generation (subject to constraints from other active DRMs).

Currently, it is mandatory to respond to DRM0, which allows the network manager to remotely decouple the installation from the distribution network.

DRM PINS definition:
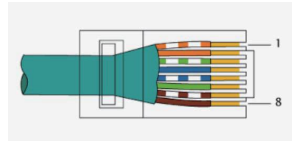
Pin	1	2	3	4	5	6	7	8
Function	DRM1/5	DRM2/6	DRM3/7	DRM4/8	+3.3V	COM/DRM0	GND	GND

5.8 Inverter manipulation

Start inverter after checking all below steps:
· Check that the device is fixed well on the wall.
· Make sure all the PV wiring and the AC wiring are completed.
· Make sure the meter are connected well.
· Make sure the battery is connected correctly.
· Turn on the external AC, DC switch.
· Turn on the DC switch to the 'ON' position.
· Set sysswitch on the screen of the inverter to 'Turn on'

Startup inverter:

· Inverter will start automatically when the PV panel generate enough energy or the battery is charged.
· Check the status of LED and LCD screen, first LED should be green and the LCD screen should display the main interface.
· If first LED is not green please check the below:
– All the connections are right.
– All the external disconnect switches are closed.
– The DC switch of the inverter is in the ' ON ' positon.
· Enter the setting interface.
· Set the safety standard as page 28; Set the system time as page 27; PV connection mode as page 28; Set the work mode as page 27; Set the communication address as page 28; Set the EPS as page 26; Set WIFI according to the wifi manual;

> 👉 **NOTE!**
> Please set the inverter if it is the first time to start up.
> Above steps is for the regular start-up of the inverter. If it is the first time to start up the inverter, you need to start up the inverter.

Shutdown inverter:

> ⚠ **CAUTION!**
> Danger of burns!
> Even if the inverter is shut down, it may still be hot and cause burns. Wear protective gloves before operating the inverter after it cools down.

For maintenance or other service work, the inverter must be switched off.
Proceed as follows to disconnect the inverter from the AC and DC power sources.Lethal voltages or damage to the inverter will follow if otherwise.

· Disconnect the external AC circuit breaker and secure it against reconnection.
· Rotate the DC switch to the "OFF" position for disconnecting all of the PV string inputs.
· Wait about 10 minutes until the capacitors inside the inverter completely discharge.
· Ensure that the DC cable is current–free via a current clamp.

6. Operation method

6.1 Control panel
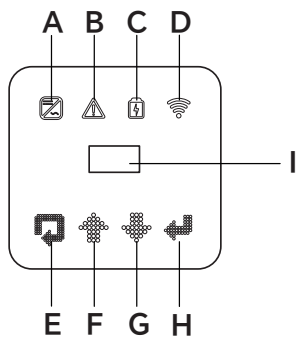
Object	Name	Description
A	Indicator LED	Green: Normal working Status.
B		Red: Fault.
C		Blue: Battery communication status.
D		Yellow: RS485 communication status.
E	Function Button	ESC button: Leave from current interface or function
F		Up button: Move cursor to upside or increase value.
G		Down button: Move cursor to downside or decrease value.
H		OK button: Confirm the selection.
I	LCD Screen	Display the information of the inverter.

6.2 LCD function
Menu structure:

```
=====Settings=====        ==User Verify==         ====Advanced*====
PV Config                  0 0 0 0               >On-Grid
Comm Addr                                         Battery
>Advanced*                OK                      Feature

                                                  ====On-Grid====         ====Safety====         ====On-Grid====
                                                 >Safety                 >Australia A            >Safety
                                                  Grid                                            Grid
                                                  Export Control          OK                      Export Control

                                                  ====On-Grid====         =====Grid=====          ==Volt Protect==       ==Volt Protect==
                                                  Safety                 >Volt Protect           >Vac Upper Slow         >Vac Lower Slow
                                                 >Grid                    Freq Protect            260.0V                 180.0V
                                                  Export Control                                  OK                     OK

                                                                                                  ==Volt Protect==       ==Volt Protect==
                                                                                                 >Vac Upper Fast         >Vac Lower Fast
                                                                                                  265.0V                 000.0V
                                                                                                  OK                     OK

                                                                                                  ==Volt Protect==
                                                                                                 >Vac 10M Avg
                                                                                                  255.0V
                                                                                                  OK

                                                                          =====Grid=====          ==Freq Protect==       ==Freq Protect==
                                                                          Volt Protect           >Fac Lower Slow         >Fac Upper Slow
                                                                         >Freq Protect            47.00Hz                52.00Hz
                                                                                                  OK                     OK

                                                                                                  ==Freq Protect==       ==Freq Protect==
                                                                                                 >Fac Lower Fast         >Fac Upper Fast
                                                                                                  47.00Hz                52.00Hz
                                                                                                  OK                     OK

                                                  ====On-Grid====         =Export Control=
                                                  Safety                 >User Value
                                                  Grid                    10000W
                                                 >Export Control          OK

                          ===Advanced*===         ====Battery====         ====Battery====         ====Battery====        ====Battery====
                          On-Grid                >Min Capacity            Min On-Grid SOC        >Chr Max Curr          >Dischr Max Curr
                         >Battery                 010%                    000%                    25.0A                  25.0A
                          Feature                 OK                      OK                      OK                     OK

                                                  ====Battery====         ====Battery====         ====Battery====
                                                 >Battery Awaken         >Eps BT Low Rec         >Eps OL Rec SOC
                                                  No                      Disable                 100%
                                                  OK                      OK                      OK

                          ===Advanced*===         ====Feature=====        =Remote Control=        ====Feature====        ====DRM0 =====       ===Feature====        =Meter Setting=
                          On-Grid                >Remote Control         >Disable                 Remote Control         >Disable             Remote Control       >Disable
                          Battery                 DRM0                                           >DRM0                                        DRM0
                         >Feature                 Meter Setting           OK                      Meter Setting          OK                  >Meter Setting        OK

                          ===Advanced*===         ==New Password==
                          Battery                 Enter Password
                          Feature                 0 0 0 0
                         >New Password            OK

                          ===Advanced*===         =====Reset=====         ==Reset Energy==        =====Reset=====        =Reset Errlogs=      =====Reset=====       =Factory Reset=
                          Feature                >Reset Energy                                     Reset Energy                                Reset Energy        >ESC<   ENT
                          New Password            Reset Errlogs          >ESC<   ENT             >Reset Errlogs          >ESC<   ENT          Reset Errlogs
                         >Reset                   Factory Reset                                   Factory Reset                              >Factory Reset

                          ===Advanced*===         =====USB=====           ====Upgrade====         ==DSPM Upgrade==        ====Upgrade=====     ==DSPS Upgrade==
                          New Password           >Upgrade                >DSPM Upgrade           >No<     Yes             DSPM Upgrade        >No<     Yes
                         >Reset                                           DSPS  Upgrade                                  >DSPS  Upgrade
                         >USB                                             ARMC Upgrade                                    ARMC Upgrade

                                                                          ====Upgrade=====        ==ARMC Upgrade==        ====Upgrade=====     ==BATM Upgrade==
                                                                          DSPM Upgrade           >No<     Yes             DSPS Upgrade        >No<     Yes
                                                                          DSPS  Upgrade                                   ARMC Upgrade
                                                                         >ARMC Upgrade                                   >BATM Upgrade

                                                                          ====Upgrade=====        ==BATS Upgrade==
                                                                          ARMC Upgrade           >No<     Yes
                                                                          BATM Upgrade
                                                                         >BATS Upgrade
```

6.3 LCD operation
6.3.1. Main screen

The main screen as below. Press up or down for more information.

```
     Normal              Normal              Normal              Normal              Normal
Power:        W     Ppv:         W     Pac:         W     WorkMode:           Battery Status:
Battery:      %     Pbat:        W     Pfeed:       W
  XX-XX XX:XX:XX                        Pload:       W               Self Use              XXX
```

6.3.2. Status

Press 'OK' to enter the menu, check grid , solar, battery, EPS and temperature of the inverter.
Press up and down to select, press 'ESC' to return to the Menu.

```
                        =====Solar=====         =====Solar=====         =====Solar=====         =====Grid=====
                        Vpv1:        V          Ipv1:        A          Ppv1:        W          Vac:         V
                        Vpv2:        V          Ipv2:        A          Ppv2:        W          Iac:         A
                                                                        PV Conf: Multi          Pac:         W
  =====Menu=====
 >Status
  History               =====Grid=====          =====Charger=====       =====BMS=====           =====BMS=====
  Setting               Fac:        Hz          Vbat:        V          Vbat:        V          Vdis:        V
                                                Ibat:        A          Ibat:        A          Ichr:        A
                                                Pbat:        W          Vchr:        V          Idis:        A

                        =====EPS=====           =====EPS=====           =====TEMP=====          =====TEMP=====
                        Veps:        V          Feps:       Hz          Inner:       C          Boost:       C
                        Ieps:        A                                  Charger:     C
                        Peps:        W                                  Inverter:    C
```

A) Solar

This status shows the real time PV parameters of the system. The input voltage, current and power of each PV input. Press up and down button to review the parameter. Press 'ESC' to return to status.

```
=====Solar=====        =====Solar=====        =====Solar=====
Vpv1:        V          Ipv1:        A          Ppv1:        W
Vpv2:        V          Ipv2:        A          Ppv2:        W
                                                PV Conf: Multi
```

B) Grid

This status shows the real time grid parameters such as voltage, current, output power and frequency. Pac measures the output of the inverter.
Press up and down button to review the parameter. Press 'ESC' to return to status.

```
=====Grid=====        =====Grid=====
Vac:        V          Fac:        Hz
Iac:        A
Pac:        W
```

C) Charger

This status shows the charger situation of the system. Include the charger voltage and current, charge and discharge voltage, charge and discharge current. '+' means in charging; '-' means in discharging. Press up and down button to review the parameter. Press 'ESC' to return to Status.

```
=====Charger=====
Vbat:        V
Ibat:        A
Pbat:        W
```

D) BMS

This status shows the battery situation of the system. Include the battery voltage and current, charge and discharge voltage, charge and discharge current. '+' means in charging; '–' means in discharging. Press up and down button to review the parameter. Press 'ESC' to return to Status.

```
=====BMS=====        =====BMS=====
Vbat:        V        Vdis:        V
Ibat:        A        Ichr:        A
Vchr:        V        Idis:        A
```

E) EPS

EPS will only have data when the inverter is working in EPS mode, it will show the real time data of the EPS output. As voltage, current , power, frequency. Press up and down button to review the parameter. Press 'ESC' to return to Status.

```
=====EPS=====        =====EPS=====
Veps:        V        Feps:        Hz
Ieps:        A
Peps:        W
```

6.3.3. History

The history function contains three aspects of the information: inverter yield, battery yield and error log. Press up and down to select, and review the data of system , press 'ESC' to return to the Menu.
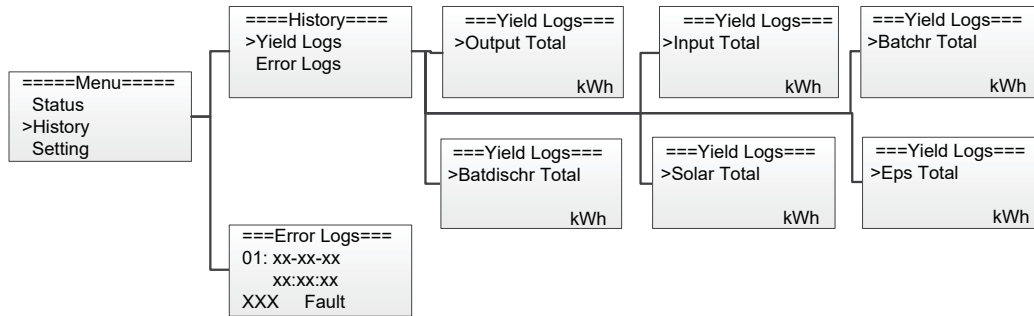
6.3.4. Settings

Setting function is used for set the inverter for language, date and time, work mode, communication address, advanced and so on.

A) Language

Press up or down button to change language. Press 'OK' to confirm.

B) Date Time

Press up or down button to change language. Press 'OK' to confirm.
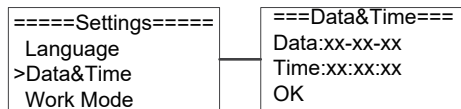
C) Work Mode

Press up or down button to select different work modes. Press 'OK' to confirm.
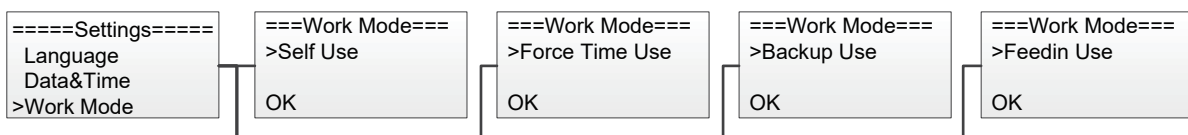
D) PV Connection

This function can set the mode of PV input. There are two modes for selection; Comm and Multi. The 'Comm' mode means single MPP tracking, 2 MPPT working together; 'Multi' means multi-MPP tracking, 2 MPPT work independently. Press up or down button to select and press 'OK' to confirm.

```
=====Settings=====        =PV Connection=        =PV Connection=
   Data&Time              >Multi                 >Comm
   Work Mode
>PV Config                OK                     OK
```
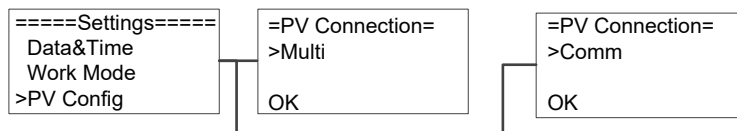
E) Communication Address

Press up or down button to change address of local and meter. Press'OK'to confirm.

```
                          ===Comm Addr===        ===Local Addr===
                          >Local Addr            >001
                            Meter Addr
=====Settings=====                               OK
  Work Mode
   PV Config
>Comm Addr                ===Comm Addr===        ===Meter Addr===
                            Local Addr           >001
                          >Meter Addr
                                                 OK
```
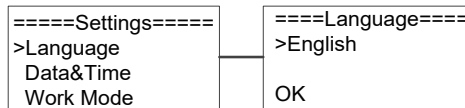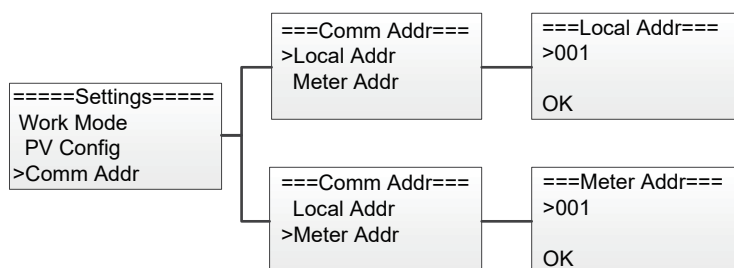
Advanced settings require the original password '0000', Press'OK'to confirm.

```
=====Settings=====        ==User Verify==
  PV Config
   Comm Addr                    0  0  0  0
>Advanced*                OK
```
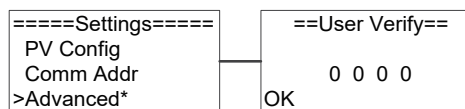
F) Safety

User can set safety standard according to different countries and local stanndards.
Press up or down button to change the grid code. Press'OK'to confirm.

```
====On-Grid====          ====Safety====
>Safety                  >Australia A
  Grid
  Export Control            OK
```
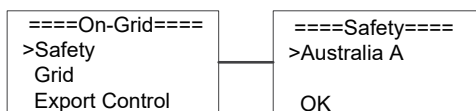
Note:

For compliance with AS/NZS 4777.2:2020, please select from Australia A/B/C/ or New Zealand. Please contact your local grid operator to select the region according to the grid code list.

Grid codes

No.	National/Regional Grid Code	Description
0	VDE4105-DE	Germany power Grid, meet Grid standards "VDE-AR-N-4105".
1	CEI0-21	Italy power Grid.
2	Australia A	For large interconnected power systems. e.g. all Australian networks other than Australia B/C and New Zealand.
3	RD1699	Spain power Grid.
4	EN50549	Default EN50549 Grid setting.
5	EN50549-DK-W	West Denmark power Grid.
6	Greece	Greece power Grid.
7	EN50549-NL	Netherland power Grid, meet Grid standards "EN50438".
8	C10/11	Belgium power Grid.
9	G99	UK power Grid.
10	China	China power Grid, meet Grid standards "CN-NBT".
11	VDE0126-FR	France power Grid, meet Grid standards "VDE 0126".
12	EN50549-PL	Poland power Grid.
13	Brazil-180s	Brazil power Grid ,connect/reconnect time 180s
14	VDE0126-DE	Germany power Grid, meet Grid standards "VDE 0126".
15	CEI0-16	Italy power Grid, meet Grid standards "CEI 0-16".
16	G98	UK power Grid.
17	Greece Island	Greece Island power Grid.
18	EN50549-CZ	Czech Republic power Grid, meet Grid standards "EN50438Y2007-CZ".
19	IEC61727-IN	India power Grid.
20	Korea	Korea power Grid.
21	EN50549-SW	Sweden power Grid.
22	China-W	China power Grid, Grid voltage range: 160-290V.
23	China-H	Grid frequency range: 47-53HZ.
24	IEC61727-IN-W	China power Grid, meet standards"CQC".
25	Brazil	India power Grid, meet Grid standards "IEC61727".

No.	National/Regional Grid Code	Description
26	IEC61727-SL	Sri Lanka power Grid, meet Grid standards "IEC61727".
27	Mexico	Mexico power Grid, meet Grid standards "IEC61727 60HZ".
28	New Zealand	All systems in New Zealand.
29	Philippines	Philippines power Grid, meet Grid standards "IEC61727 60HZ" spec
30	IEC61727-SL-W	Sri Lanka power Grid, Grid voltage range: 160-280V, Grid frequency range: 47-52HZ.
31	PEA	Thailand power Grid.
32	PEA-W	Thailand power Grid, Grid voltage range: 160-280V, Grid frequency range: 47-52HZ.
33	IEC61627-VN	Vietnam power Grid.
34	IEC61627-VN-W	Vietnam power Grid, Grid voltage range: 160-280V, Grid frequency range: 47-52HZ.
35	Tunisia	Tunisia
36	MEA	Thailand power Grid.
37	MEA-W	Thailand power Grid, Grid voltage range: 160-280V, Grid frequency range: 47-52HZ.
38	Brazil-LV	120V 60Hz voltage of grid L to N(R3-10-15K-LV only,others reserved.
39	EN50549-DK-E	East Denmark power Grid
40	Tunisia-W	Tunisia wide range
41	Chile	Chile Power Grid
42	Brazil-W	Brazil power Grid , meet Grid standards "NBT 16150".
43	EN50549-PL-W	Poland power Grid.
44	Brazil-180s-W	Brazil power Grid , meet Grid standards "NBT 16150".
45	UNE217002-ES	Spain power Grid.
46	G98-NI	G98 for Northern Ireland
47	G99-NI	G99 for Northern Ireland
48	EN50549-NW	Norway-400VLine
49	EN50549-NW-LV	Norway-230VLine-R3-10-15K-LV only,others reserved
50	IEC61727-LV	133V 50Hz, low voltage power grid
53	Australia B	For small interconnected power systems. e.g. Western Power
54	Australia C	For isolated or remote power systems. e.g. Horizon Power and TasNetworks

G) Grid

Normally, the end user do not need to set the grid parameters, all default value has set on factory according to safety standards of different countries.
If need to reset, please refer to the requirement of local grid to do changes.

Press up or down button to change the value of grid voltage and grid frequency protect . Press 'Ok' to confirm.

```
====On-Grid====          =====Grid=====        ==Volt Protect==       ==Volt Protect==
  Safety                   >Volt Protect        >Vac Upper Slow        >Vac Lower Slow
>Grid                       Freq Protect         260.0V                 180.0V
  Export Control                                  OK                     OK

                                                ==Volt Protect==       ==Volt Protect==
                                                 >Vac Upper Fast        >Vac Lower Fast
                                                  265.0V                 000.0V
                                                  OK                     OK

                                                ==Volt Protect==
                                                 >Vac 10M Avg
                                                  255.0V
                                                  OK

                          =====Grid=====        ==Freq Protect==       ==Freq Protect==
                            Volt Protect         >Fac Lower Slow        >Fac Upper Slow
                           >Freq Protect          47.00Hz                52.00Hz
                                                  OK                     OK

                                                ==Freq Protect==       ==Freq Protect==
                                                 >Fac Lower Fast        >Fac Upper Fast
                                                  47.00Hz                52.00Hz
                                                  OK                     OK
```
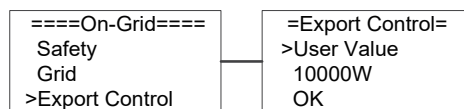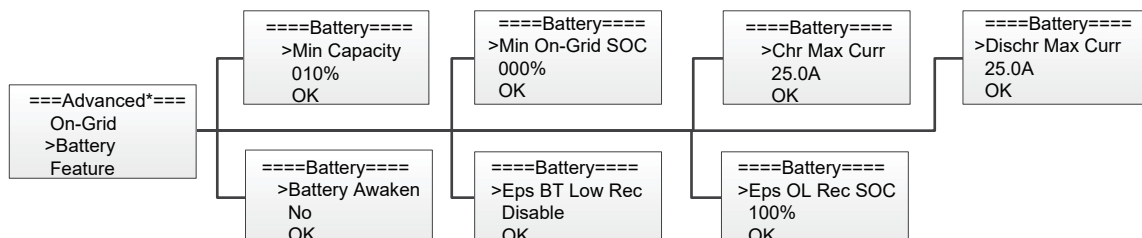
H) Export controla

With this function the inverter can control the energy export to the grid. Press up or down button to change the export power. Press 'Ok' to confirm.

```
====On-Grid====          =Export Control=
  Safety                  >User Value
  Grid                     10000W
>Export Control            OK
```
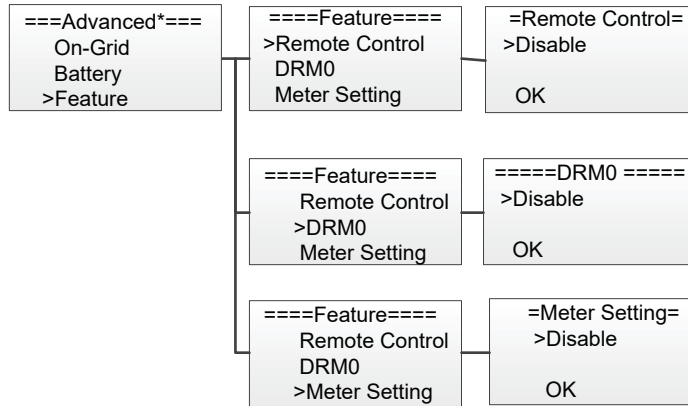
I) Battery

Press up or down button to set the parameters of battery. 'Eps BT Low Rec' means recovery enable switch when battery low capacity in EPS mode, 'Eps OL Rec SOC' means EPS overload due to low capacity for battery, if recovered, min soc. Press 'OK' to confirm.

```
                         ====Battery====       ====Battery====       ====Battery====       ====Battery====
                          >Min Capacity         >Min On-Grid SOC      >Chr Max Curr         >Dischr Max Curr
                           010%                  000%                  25.0A                 25.0A
                           OK                    OK                    OK                    OK
===Advanced*===
  On-Grid
 >Battery
  Feature
                         ====Battery====       ====Battery====       ====Battery====
                          >Battery Awaken       >Eps BT Low Rec       >Eps OL Rec SOC
                           No                    Disable               100%
                           OK                    OK                    OK
```

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J) Feature

Press up or down button to enable or disable remote control, DRM0, and Meter. Press 'OK' to confirm.

```
===Advanced*===         ====Feature====         =Remote Control=
   On-Grid              >Remote Control          >Disable
   Battery                DRM0
  >Feature                Meter Setting             OK
```
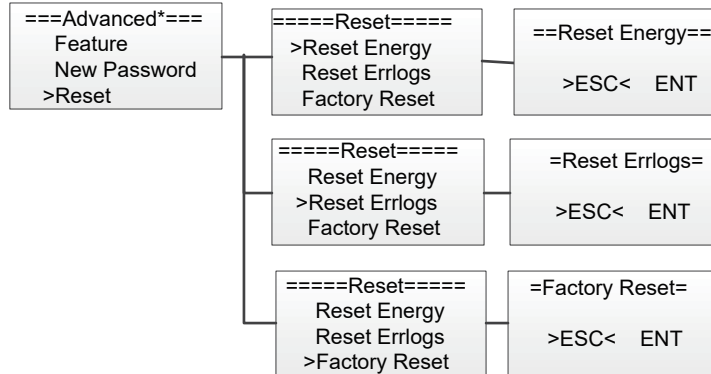
```
                        ====Feature====         =====DRM0 =====
                          Remote Control         >Disable
                          >DRM0
                          Meter Setting             OK
```

```
                        ====Feature====         =Meter Setting=
                          Remote Control          >Disable
                          DRM0
                          >Meter Setting            OK
```

K) New Password

Press up or down button to set new password. Press 'OK' for more than 3 seconds to confirm.
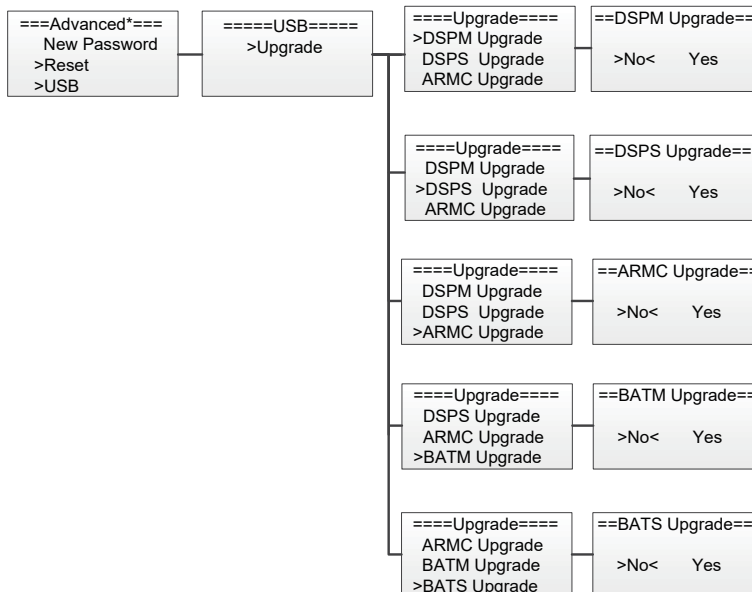
```
===Advanced*===         ==New Password==
   Battery              Enter Password
   Feature                 0  0  0  0
  >New Password         OK
```

L) Reset

Press up or down button to reset energy, reset errors or factory reset. Press 'OK' to confirm.

```
===Advanced*===         =====Reset=====         ==Reset Energy==
   Feature              >Reset Energy
   New Password           Reset Errlogs          >ESC<    ENT
  >Reset                  Factory Reset
```

```
                        =====Reset=====         =Reset Errlogs=
                          Reset Energy
                          >Reset Errlogs         >ESC<    ENT
                          Factory Reset
```

```
                        =====Reset=====         =Factory Reset=
                          Reset Energy
                          Reset Errlogs          >ESC<    ENT
                          >Factory Reset
```

M) USB

Press up or down button to upgrade DSPM, DSPS, ARMC, BATM or BATS. Press 'OK' to confirm.
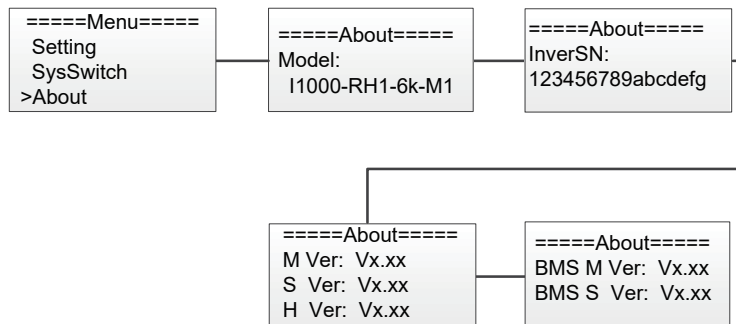
```
===Advanced*===    =====USB=====    ====Upgrade====    ==DSPM Upgrade==
   New Password     >Upgrade        >DSPM Upgrade
  >Reset                             DSPS  Upgrade      >No<    Yes
  >USB                               ARMC Upgrade
```

```
                                    ====Upgrade====    ==DSPS Upgrade==
                                      DSPM Upgrade
                                      >DSPS  Upgrade    >No<    Yes
                                      ARMC Upgrade
```

```
                                    ====Upgrade====    ==ARMC Upgrade==
                                      DSPM Upgrade
                                      DSPS  Upgrade     >No<    Yes
                                      >ARMC Upgrade
```

```
                                    ====Upgrade====    ==BATM Upgrade==
                                      DSPS Upgrade
                                      ARMC Upgrade      >No<    Yes
                                      >BATM Upgrade
```

```
                                    ====Upgrade====    ==BATS Upgrade==
                                      ARMC Upgrade
                                      BATM Upgrade      >No<    Yes
                                      >BATS Upgrade
```

6.3.5.System Switch

Press up or down button to turn on or turn off the inverter. Press 'OK' to confirm.

```
=====Menu=====            ====SysSwitch====
  History                  >Turn On
  Setting
 >SysSwitch                 OK
```
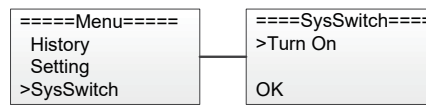
6.3.6. About

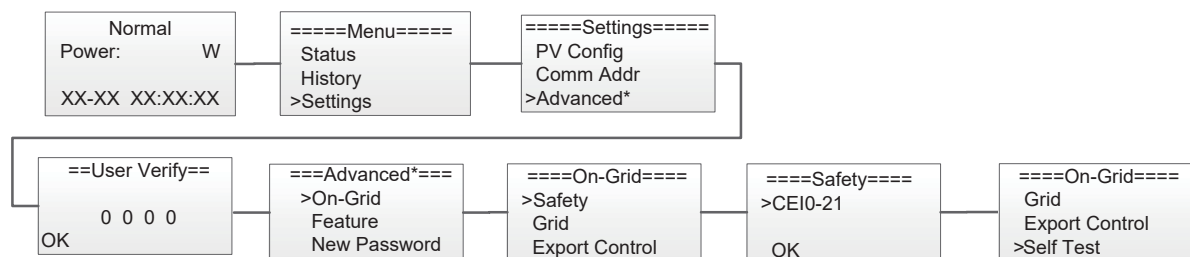This interface shows the information of the inverter, such as series number and software version.

```
=====Menu=====        =====About=====        =====About=====
  Setting             Model:                 InverSN:
  SysSwitch             I1000-RH1-6k-M1       123456789abcdefg
 >About


                      =====About=====        =====About=====
                      M Ver:  Vx.xx          BMS M Ver:  Vx.xx
                      S  Ver:  Vx.xx         BMS S  Ver:  Vx.xx
                      H  Ver:  Vx.xx
```

6.3.7. Self-Test in accordance with CEI 0-21 (Applies to Italy only)

The self-test is only required for inverters, which are commissioned in Italy. The Italian standard requires that all inverters feeding into the utility grid are equipped with a self-test function in accordance with CEI 0-21. During the self-test, the inverter wil consecutively check the protection reaction times and values for overvoltage, under voltage, over frequency and under frequency.

Self-test function is available at any time. It also allows end user get test reports shown on LCD display.

Note: Users need to set the inverter country to CEI 0-21 before testing.

Auto-Test from screen:

```
   Normal           =====Menu=====        =====Settings=====
Power:        W       Status               PV Config
                      History              Comm Addr
XX-XX  XX:XX:XX      >Settings            >Advanced*


==User Verify==      ===Advanced*===      ====On-Grid====      ====Safety====       ====On-Grid====
                     >On-Grid             >Safety              >CEI0-21               Grid
   0  0  0  0         Feature              Grid                                       Export Control
OK                    New Password         Export Control       OK                   >Self Test
```

6.4 APP remote operation

For some functions setting, the end user can achieve them through APP remotely.Such as power factor,reactive power, DRM0 and so on.
Please refer to the user manual of WIFI module for more details about configuration and power plant creating.

6.4.1.Reactive Power
(For specific country if required by the local grid.)

There are 5 modes for selecting: None, Fixed PF, Fixed Q, CosphiP, and Q(U), end user can select the corresponding mode according to local standards.
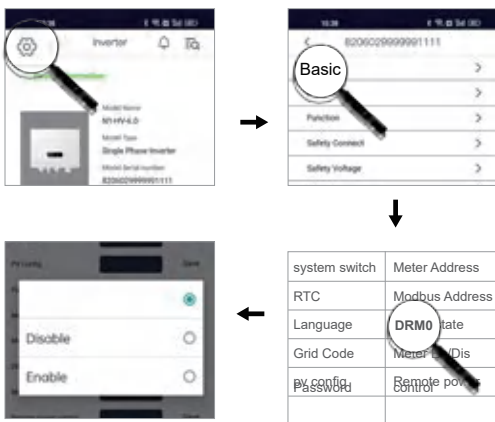

Fixed PF		
Fixed Q		
CosphiP	CosphiPLockinV CosphiPLockOutV CosphiPPF1 CosphiPP1 CosphiPPF2	CosphiPP2 CosphiPPF3 CosphiPP3 CosphiPPF4 CosphiPP4
Q(U)	Q(U) enter delay Q(U) LockinP Q(U) LockoutP QuV1 QuQ1 QuV2	QuQ2 QuV3 QuQ3 QuV4 QuQ4
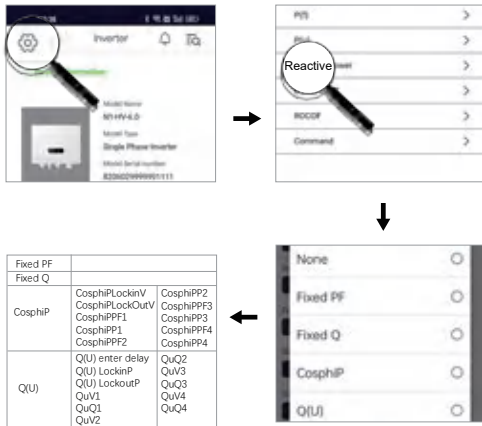
6.4.2. P(U) function

P(U) function is Volt-watt response mode which is required by standard NZS4777.2 and applies to NZS4777.2 only. The default value of the function is "enable", choose "disable" means the funciton is turn off.

P(U)able	P1
V1	P4
V2	P(U)delay
V3	power decline gradient
V4	
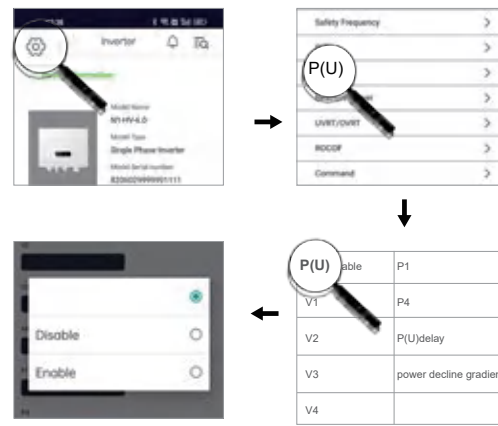
6.4.3. DRM function

DRM function is Demand Response Mode which is required by standard NZS4777.2.and applies to NZS4777.2 only. The default value is "enable" Choose "disable" means the funciton is turn off.

system switch	Meter Address
RTC	Modbus Address
Language	DRM0 tate
Grid Code	Meter En/Dis
pv config. Password	Remote power control

6.4.4. Power rate limit function

Power rate limit function is required by standard NZS4777.2 and applies to NZS4777. 2 only. This function is defined as a percentage of rated power per minute.
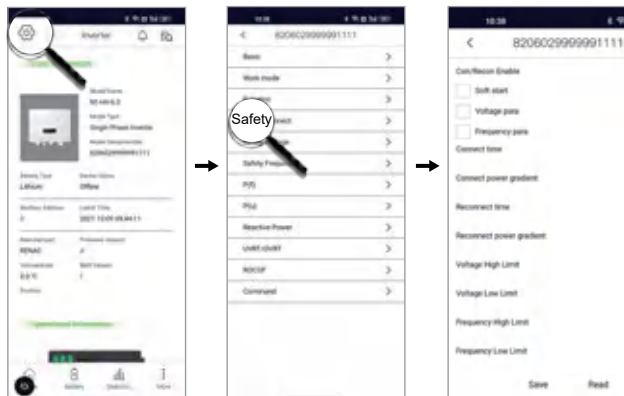
7 Troubleshooting

7.1 Troubleshooting

This section contains information and procedures for solving possible problems with the I1000-RH1 series inverters, and provides you with trouble shooting tips to identify and solve most problems that could occur with the I1000-RH1 series inverters. This section will help you narrow down the source of any problems you may encounter. Please read the following trouble-shooting steps.

HW Protect Fault	Inverter over current or battery over current or PV over current detected by hardware. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
Grid Lost Fault	Grid is lost. · System will reconnect if the utility is back to normal. · Or seek help from us, if not go back to normal state.
Grid Volt Fault	Grid voltage out of range. · System will reconnect if the utility is back to normal. · Or seek help from us, if not go back to normal state.
Grid Freq Fault	Grid frequency out of range. · System will reconnect if the utility is back to normal. · Or seek help from us, if not go back to normal state.
PV Volt Fault	PV voltage out of range. · Please check the output voltage of PV panels. · Or seek for help from us.
Bus Volt Fault	Bus voltage out of range detected by hardware. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
Bat Volt Fault	Battery voltage fault. · Check if the battery input voltage is within the normal range. · Or seek help from us.
Vgrid 10M Fault	The grid voltage is out of range for the last 10 Minutes. · System will reconnect if the utility is back to normal. · Or seek help from us, if not go back to normal state.
DCI OCP Fault	DC component is out of limit in output current. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
DCI OVP Fault	DC component is out of limit in output voltage. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
SW OCP Fault	Output current high detected by software. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
RC OCP Fault	The residual current is high. · Please check if the insulation of electric wires is damaged. · Wait for a while to check if back to normal. · Or seek for help from us.
ISO Check Fault	The isolation is failed. · Please check if the insulation of electric wires is damaged. · Wait for a while to check if back to normal. · Or seek for help from us.
Temp Over Fault	The inverter temperature is high. · Please check if the environment temperature. · Wait for a while to check if back to normal. · Or seek for help from us.
BatConDir Fault	The battery connection is reversed. · Check if the positive pole and negative pole of battery are correctly connected. · Or seek help from us.

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AD Sample Fault	The sample value between master and slave is not consistent. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
EPS Over Load	Over load in off grid mode. · Please check if the eps load power exceeds the limit. · Or seek for help from us.
Over Load Fault	Over load in on grid mode. · Please check if the load power exceeds the limit. · Or seek for help from us.
PV Cnf Fault	PV Connection Setting Fault · Resetting the PV connection. · Or seek help from us, if cannot go back to normal state.
Bat Low Fault	The battery power is low. · Wait the battery to be recharged. · Or seek for help from us.
ByPassRelay Fault	By pass relay fault · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
SPI Comm Fault	The communication between master and slave fault ·Disconnect solar power PV+ , PV- and battery, reconnect them. ·Or seek help from us, if cannot go back to normal state.
BMS_Lost	The communication between BMS and Inverter is interrupted. · Check if the communication cable between BMS and Inverter is correctly and well connected.
Inter Fan Fault	Fan Device Fault · Disconnect solar power PV+ , PV- and battery, reconnect them. · Check if the fan is stopped by dust or other foreign. · Or seek help from us, if cannot go back to normal state.
AC HCT Fault	AC Current Sensor Fault · Disconnect solar power PV+ , PV- and battery, reconnect them. · Or seek help from us, if cannot go back to normal state.
Inv EEPROM Fault	The master eeprom is fault. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
GFCI HW Fault	The residual current circuit is fault. · Please check if the insulation of electric wires is damaged. · Wait for a while to check if back to normal. · Or seek for help from us.
EPS Relay Fault	The EPS relay always keep open. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
Grid Relay Fault	The grid relay always keep close. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
Other Dev Fault	Other device fault. · Turn off the PV, battery and grid , reconnect them. · Or seek for help from us if cannot back to normal.

Mgr EEPROM Fault	The manager eeprom is fault. · Disconnect PV, grid and battery, then reconnect. · Or seek help from us, if not go back to normal state.
Meter Lost Fault	The communication between meter and Inverter is interrupted. · Check if the communication cable between meter and Inverter is correctly and well connected.
Dsp Lost Fault	SCI communication fault ·Disconnect solar power PV+ , PV- and battery, reconnect them. ·Or seek help from us, if cannot go back to normal state.
BMS Volt Fault	Battery voltage sensor error · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS Tepr Fault	Battery temperature sensor error · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS IN_COM Fault	BMS internal communication fault. · Disconnect battery, check wiring between inverter and battery, battery internal wiring then reconnect. · Or seek help from us, if not go back to normal state.
BMS Dcov Fault	Battery input over voltage error · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS RV Fault	Battery input transposition error · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS Relay Fault	The battery relay is fault. · Disconnect battery, then reconnect. · Or seek help from us, if not go back to normal state.
BMS Cell Fault	Battery cell error · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS Other Fault	Battery other error · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS Protect OV	Battery over voltage protect · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS Protect LV	Battery under voltage protect · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS Protect ChrOC	Battery over current charging protect · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS Protect DishargeOC	Battery over current discharging protect · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.

BMS Protect TemHigh	Battery temperature is high · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state.
BMS Protect TemLow	Battery temperature is low · Wait for 5 minutes, check again. · Or seek help from us, if not go back to normal state

Remark

If your inverter's information panel is not displaying a Fault light, check the following list to make sure that the present state of the
installation allows proper operation of the unit.
· Is the inverter located in a clean, dry, and adequately ventilated place?
· Have the DC input breakers been opened?
· Are the cables adequately sized and short enough?
· Are the input and output connections and wiring in good condition?
· Are the configurations settings correct for your particular installation?
· Are the display panel and the communications cable properly connected and undamaged?
Contact GS ESS Power Customer Service for further assistance. Please be prepared to describe details of your system installation and provide the model and serial number of the unit.

7.2 Maintenance

Inverters generally do not need any daily or routine maintenance. Heat sink should not be blocked by dust, dirt or any other items. Before the cleaning, make sure that the DC SWITCH is turned OFF and the circuit breaker between inverter and electrical grid is turned OFF. Wait at least for 5 minutes before the Cleaning.

During the process of using the inverter,the manage person shall examine and maintain the machine regularly.The concrete operations are follow.
1: Check that if the cooling fins on the rear of house are covered by dirts, and the machine should be cleaned and absorbed dust when necessary.This work shall be check time to time.
2: Check that if the indicators of the inverter are in normal state,check if the keys of the inverter are in normal state,check if the display of the inverter is normal.This check should be performed at least every 6 months.
3: Check that if the input and output wires are damaged or aged.This check should be performed at least every 6 months.
4: You should keep the inverter panels clean and their security checked at least every 6 months.

· Inverter cleaning
Please clean the inverter with an air blower, a dry & soft cloth or a soft bristlebrush. Do NOT clean the inverter with water,corrosive chemicals, detergent, etc.

· Heat sink cleaning
For the long-term proper operation of inverters, ensure there is enough space around the heat sink for ventilation, check the heat sink for blockage (dust, snow, etc.) and clean them ifthey exist. Please clean the heat sink with an air blower, a dry & softcloth or a soft bristle brush. DoNOT clean the heat sink with water, corrosive chemicals, detergent, etc.

8 Decommissioning

8.1 Dementling the inverter

· Disconnect the inverter from DC input and AC output.
· Disconnect battery wiring.
· Wait for 5 minutes for de-energizing.
· Disconnect communication and optional connection wiring.
· Remove the inverter from the bracket.

8.2 Packaging

If possible, please pack the inverter with the original packaging.
If it is no longer available, you can also use an equivalent carton that meets the following requirements.
· Suitable for loads more than 25kg.
· With handle.
· Can be fully closed.

8.3 Storage

Store the inverter in dry place where ambient temperatures are always between
-20 °C – +60 °C.

8.4 Disposal

When the inverter or other related components need to be disposed. Have it carried out according to local waste handling regulations.Please be sure to deliver wasted inverters and packing materials to certain site, where can assist relevant department to dispose and recycle.

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