Hybrid Inverter User Manual

CONTENTS

1 Notes on this Manual

1.1 Scope of Validity

This manual is an integral part of Hybrid, it describes the assembly, installation, commissioning, maintenance, and failure type of the product. Please read it carefully before operating.

Model Number: FB8KL1

Store this manual where it will be accessible at all times.

1.2 Target Group

This manual is for qualified electricians. The tasks described in this manual only can be performed by qualified electricians.

1.3 Symbols Used

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

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

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

> **Caution!**
> "Caution" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

> **Note!**
> "Note" provides tips that are valuable for the optimal operation of ours.

2 Safety

2.1 Important Safety Instructions

Danger!
- Danger to life due to high voltages in the inverter!
- All work must be carried out by qualified electrician.
- The appliance is not to be used by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Children should be supervised to ensure that they do not play with the appliance.

Caution!
- Danger of burn injuries due to hot enclosure parts!
- During operation, the upper lid of the enclosure and the enclosure body may become hot.
- Only touch the lower enclosure lid during operation.

Caution!
- Possible damage to health as a result of the effects of radiation!
- Do not stay closer than 20 cm to inverter for any length of time.

Note!
- Grounding the PV generator.
- Comply with the local requirements for grounding the PV modules and the PV generator. It is recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction and ground these in order to have optimal protection of system and persons.

Warning!
- Ensure input DC voltage ≤Max. DC voltage. Over voltage may cause damage.
- Permanent damage to inverter or other losses, which will not be included in warranty!

- Please keep the user manual properly. When operating equipment, in addition to following the general precautions in this document, follow the specific safety instructions. We will not be liable for any consequence caused by the violation of the safety operation regulations and design, production, and usage standards.
- Accessories only together with the inverter shipment are recommended here. Other- wise may result in a risk of fire, electric shock, or injury to person.
- Make sure that existing wiring is in good condition and that wire is not undersized. Do not disassemble any parts of inverter which are not mentioned in installation guide. It contains no user-serviceable parts. See Warranty for instructions on obtaining service. Attempting to service the inverter yourself may result in a risk of electric shock or fire and will void your warranty.
- Keep away from flammable, explosive materials to avoid fire disaster.
- The installation place should be away from humid or corrosive substance.
- Authorized service personnel must use insulated tools when installing or working with this equipment.
- Never touch either the positive or negative pole of PV connecting device. Strictly prohibit touching both at the same time.
- 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.
- CAUTION-RISK of electric shock from energy stored in capacitor, never operate on the inverter couplers, the MAINS cables, Battery cables, PV cables or the PV generator when power is applied. After switching off the PV, battery, and Mains, always wait for 5minutes to let the intermediate circuit capacitors discharge before unplugging DC, battery in plug and MAINS couplers.

- 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!
- Surge protection devices (SPDs) for PV installation

> ⚠ **WARNING !**
> - Over-voltage protection with surge arresters should be provided when the PV power system is installed.
> - The grid connected inverter is not fitted with SPDs in both PV input side and MAINS side.

- Lightning will cause a damage either from a direct strike or from surges due to a nearby strike.

- Induced surges are the most likely cause of lightning 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.

- Specialists in lightning protection should be consulted during the end use application. Using appropriate external lightning protection, the effect of a direct lightning strike into a building can be mitigated in a controlled way, and the lightning current can be discharged into the ground.

- Installation of SPDs to protect the inverter against mechanical damage and excessive stress include a surge arrester in case of a building with external lightning protection system (LPS) when separation distance is kept.

- 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.

- To protect the AC system, surge suppression devices (SPD type2) should be fitted at the main incoming point of AC supply (at the consumers cutout), located between the inverter and the meter/distribution system;

- 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.

- Spark gap devices are not suitable to be used in DC circuits once conducting, they won't stop conducting until the voltage across their terminals is

6

typically more than 30 volts.

➢ 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.

Hybrid series inverter provide Active Frequency Drift (AFD) to prevent islanding effect.

➢ PE Connection and Leakage Current

•The end-use application shall monitor the protective conductor by residual current operated protective device (RCD) with rated fault current Ifn≤240mA which automatically disconnects the device in case of a fault.
The device is intended to connect to a PV generator with a capacitance limit of approx. 700nf.

⚠ **WARNING !**
● High leakage current!
● Earth connection essential before connecting supply.

Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic.

➢ Battery Safety Instructions

Hybrid Series inverter should be worked with low voltage battery, for the specific parameters such as battery type, nominal voltage and nominal capacity etc., please refer to section 4.3.

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 replacement:

 1: Do not wear watches, rings or similar metallic items.

 2: Use insulated tools.

 3: Put on rubber shoes and gloves.

 4: Do not place metallic tools and similar metallic parts on the batteries.

 5: Switch offload connected to the batteries before dismantling battery connection

  terminals.

 6: Only personal with proper expertise can carry out the maintenance of
  accumulator batteries.

2.2 Explanation of Symbol

This section gives an explanation of all the symbols shown on the inverter and on the type label.

Symbols on the Type Label

	UL certified
	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 live parts.
	eep dry! The package/product must be protected from excessive humidity and must be stored under cover.
	Refer to the operating instructions.
	ragile - The package/product should be handled carefully and never be tipped over or slung.
	Products should not be disposed as household waste.
	No more than six(6) identical packages being stacked on each other
	Components of the product can be recycled.
	Danger of hot surface!
	Danger of high voltage and electric shock!
	Caution! Failure to observe a warning indicated in this manual may result in injury

3. Introduction

3.1 Basic features

Hybrid Series is a high-quality inverter which can convert solar energy to AC energy and store energy into battery.

The inverter can be used to optimize self-consumption, store in the battery for future use or feed in to 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).

3.2 System Diagram

Hybrid Series is designed with two BACK-UP versions for customer to choose based on the local rules. The applies to the wiring rules that requires Neutral line of alternative supply must NOT be isolated or switched.
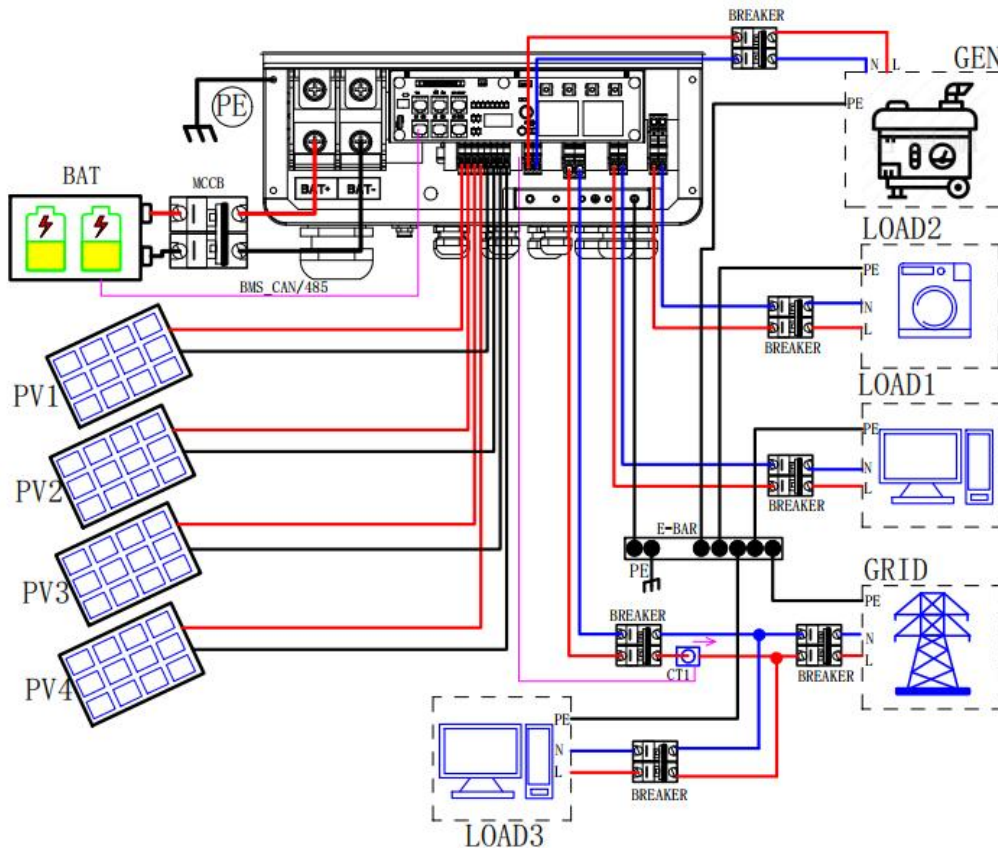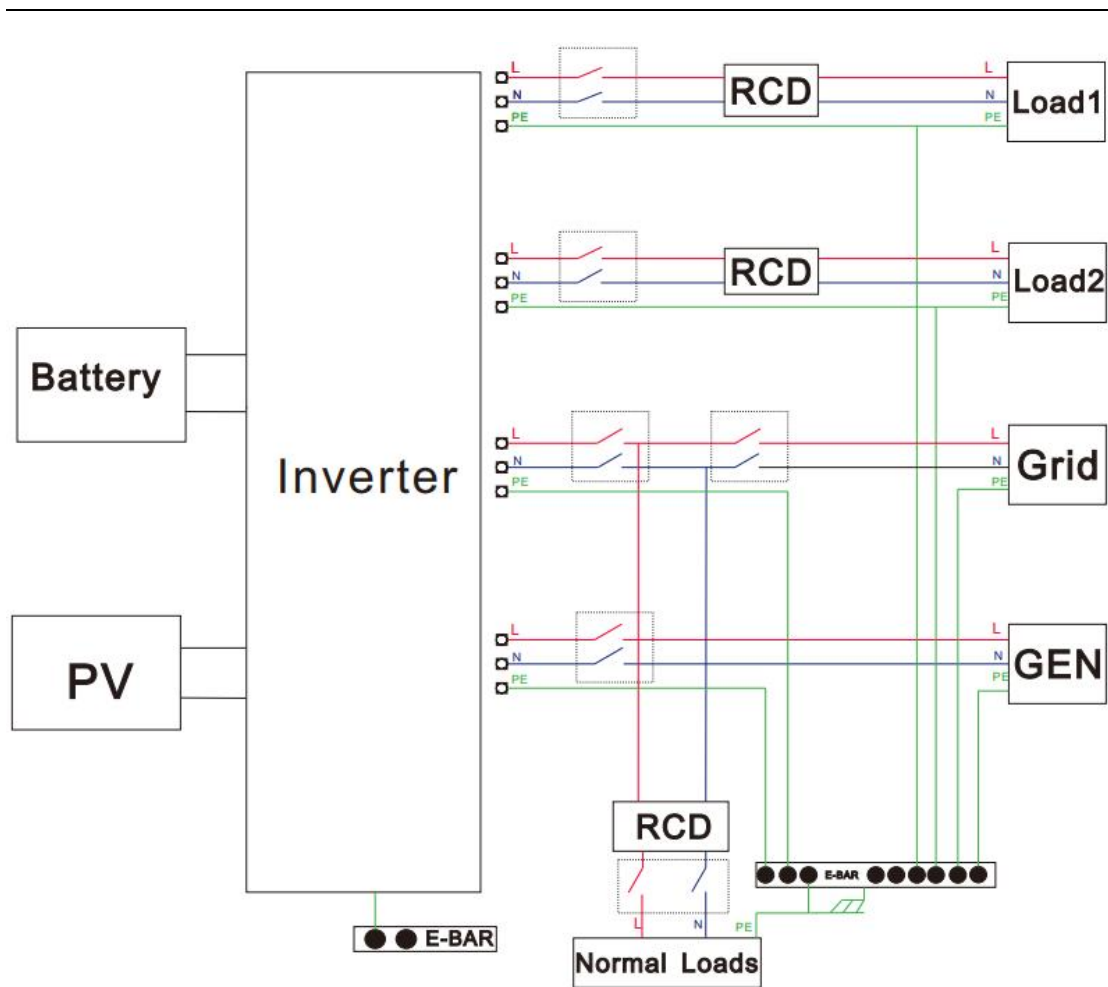
All switches and RCD devices in the figure are for reference only, and the specific installation shall be subject to local regulations.

> **Note!**
> ● Please control the home loads, and make sure it's 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 is any special regulations for grid connection.

| | BAT PV GEN CT GRID LOAD1 LOAD2 |

BMS

BAT Breaker

BMS

BAT1

PV Breaker   PV Breaker

GEN Breaker

PV1 •••••• PV4
(PV MAX:500V)

GEN

CT
Grid side
CT
On Grid Breaker

Meter

Main Breaker

AC Breaker

EPS Breaker

EPS Breaker

L
N
PE

GRID   Home Load   Load1   Load2
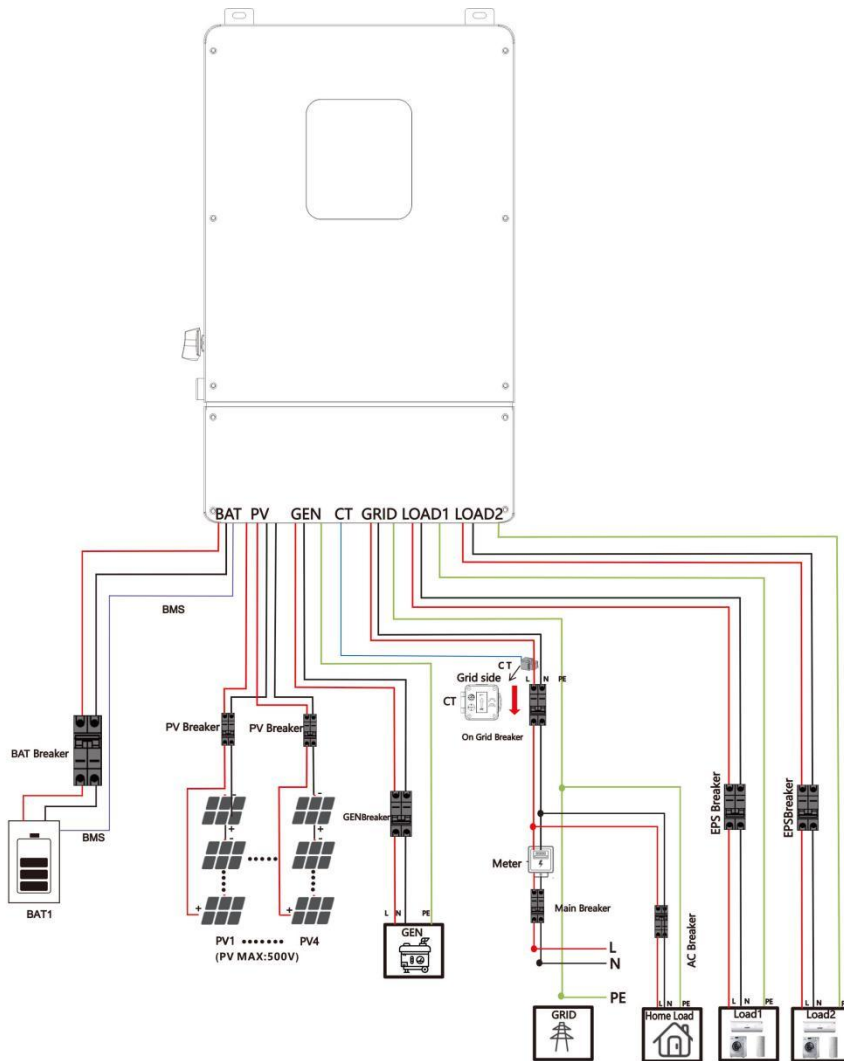
Note!
- The arrow on the CT points to the power grid, as shown.
- If the CT connector is improperly connected, the inverter cannot read the data correctly, so that the relevant working conditions cannot be realized normally.

3.3 Work Modes

Inverter provides multiple work modes based on different requirements.

Work modes: Self-use

1. When PV, Grid, Battery is available:

A. Solar energy provides power to the loads as first priority, if solar energy is sufficient to power all connected loads, solar energy excess power will provides to charge battery, and then reduntant power will feed to grid.

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.

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.

2. When PV, Grid is available（without battery):

A. Solar energy provides power to the loads as first priority ,if solar energy is sufficient, the excess power will feed to grid.

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.

3. When PV, Battery is available（Grid is disconnected):

A. Solar energy provides power to the loads as first priority ,if solar energy is sufficient to power all connected loads, solar energy will provides to charge battery.

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.

Work modes: Peak shift

1. When PV, Grid, Battery is available:

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 feed the power to grid

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.

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.

D. In the period of no charge or discharge, the solar power supply loads at first priority , excess energy to the grid.

2. When Grid, Battery is available(PV is disconnected):

A. On charge time, grid will charge battery and supply power to the connected loads at the same time.

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 feed to grid.

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.

Work modes: Bat priority

1. When PV, Grid, Battery is available:
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 feed the power to grid .

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.

2. When Grid,Battery is available (PV is disconnected):
Grid will supply power to load and charge battery at the same time.

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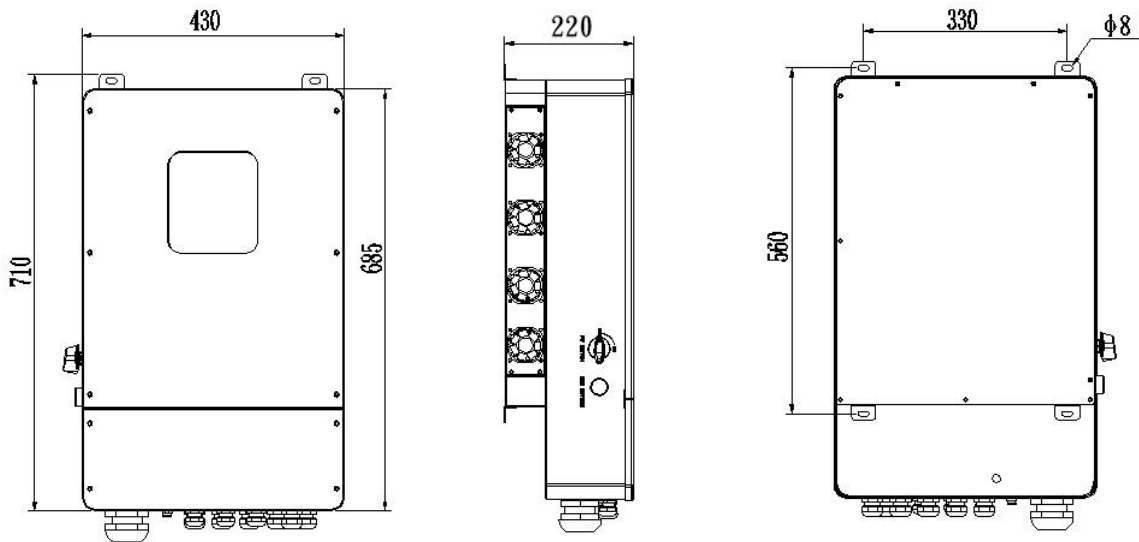If set anti-Reverse function allowable, Once on the work mode of Self-use, Peak shift, battery priority, the system will not feed power to grid.

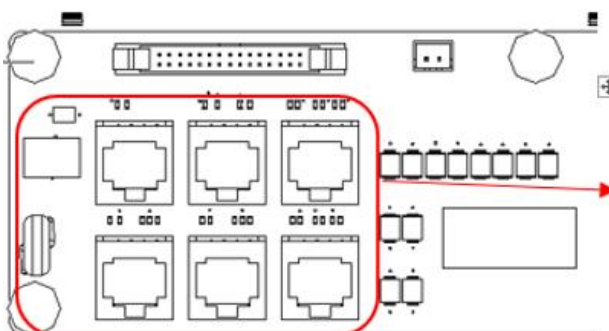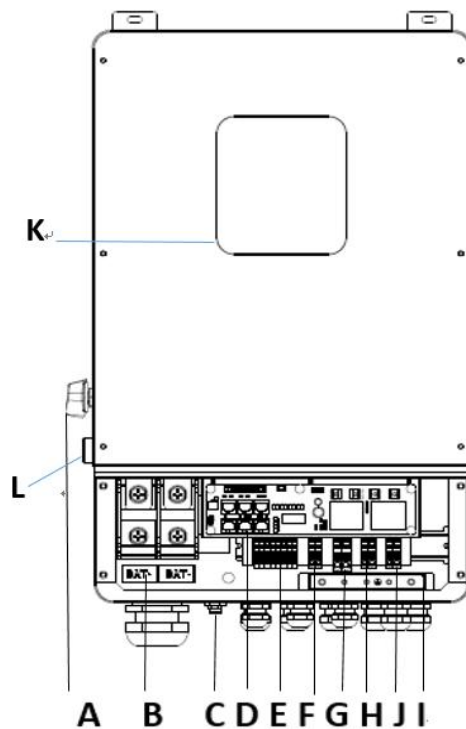In addition to the above three basic modes, there is also an "Advanced Mode". Please refer to Chapter 11 for details.

3.4 Dimension

Object	Description
A	DC switch
B	BAT input
C	Wi-Fi
D	CAN1/CAN2/RS485/BMS485,BMSCAN/CTL1/CTL2/Type-c upgrade
E	PV1~PV4 input
F	Generator

3.5 Terminals of PV inverter

TYPE-C	CAN1	CAN2	RS485
UPDATE	BMS-485		
	BMS-CAN	CT L2	CT L1

CAN1/CAN2: Communication interface for connecting inverters.

RS485: Read the internal data of inverter.

BMS-485/ BMS-CAN: BMS communication for lithium batteries.

CT L1/CT L2: For external grid side CT to detect current size.

TYPE-C UPDATE: Update machine software locally on PC via USB-A port.

G	Grid
H	BACK-UP1 output
I	PE
J	BACK-UP2 output
K	LCD
L	RSD button

> ⚠ **WARNING !**
> Qualified electrician will be required for the installation.

4. Technical Parameters

4.1 Inverter specication

Technical Data	FB8KL1
PV Input Data	
MAX.DC Input Power	12KW
NO.MPPT Tracker	4
MPPT Range	120 – 500V
MAX.DC Input Voltage	500V
MAX.Input Current	14A

MAX.Short Circuit Current	20A
Battery Input Data	
Nominal voltage (Vdc)	48V
MAX.Charging/Discharging Current	190A/190A
Battery Voltage Range	40–60V
Battery Type	Lithium and Lead Acid Battery
Charging Strategy for Li–Ion Battery	Self–adaption to BMS
AC Output Data(On–Grid)	
Nominal output power Output to Grid	8kVA
MAX. Apparent Power Output to Grid	8.8kVA
Max Grid–Connected Power In **South Africa**	4.6 kVA
Output Voltage Range	220，230V，240V
Output Frequency	50/60Hz（45 to 54.9Hz / 55 to 65Hz）
Nominal AC Current Output to Grid	34.8A
Max.AC Current Output to Grid	38.3A
Max.AC Current From Grid	50A
Output Power Factor	0.8leading···0.8lagging
OutPut THDI	< 2%
AC Output Data(Back–Up)	
Nominal. Apparent Power Output	8kVA
MAX. Apparent Power Output	8.8kVA
Nominal Output Voltage L–N	220，230V，240V
Nominal Output Frequency	50Hz/60Hz
Output THDU	< 2%
Efficiency	
Europe Efficiency	>=97.8%
MAX. Battery to Load Efficiency	>=97.2%
Protection	
Grounding detection	YES
Arc Fault Protection	optional
Island Protection	YES
Battery reverse Polarity	YES
Insulation Resistor Detection	YES
Residual Current Monitoring Unit	YES
Output Over Current Protection	YES
Back–up Output Short Protection	YES
Terminal temperature detection	YES
Output Over Voltage Protection	YES
Output Under Voltage Protection	YES

| General Data	
Operating Temperature Range	−25 ~ +60°C(> 45°C derating)
Relative Humidity	0–95%
Operating Altitude	0~4000m(Derating above 2000m altitude)
Ingress Protection	IP65
Weight	41kg
Size (Width*Height*Depth)	460mm x 760mm x 225mm
Cooling	FAN Cooling
Noise emission	<38dB
Display	LCD，Touch panel（optinal）
Communication With BMS/Meter/EMS	RS485，CAN
Supported communication interface	RS485, WLAN, 4G (optional)
Self–consumption at night	< 20 W
Support diesel generator	YES

5. Installation

5.1 Check for Physical Damage

Make sure the inverter is intact during transportation. If there is any visible damage, such as cracks, please contact your dealer immediately.

5.2 Packing List

Open the package and take out the product, please check the accessories first.The packing list shown as below.
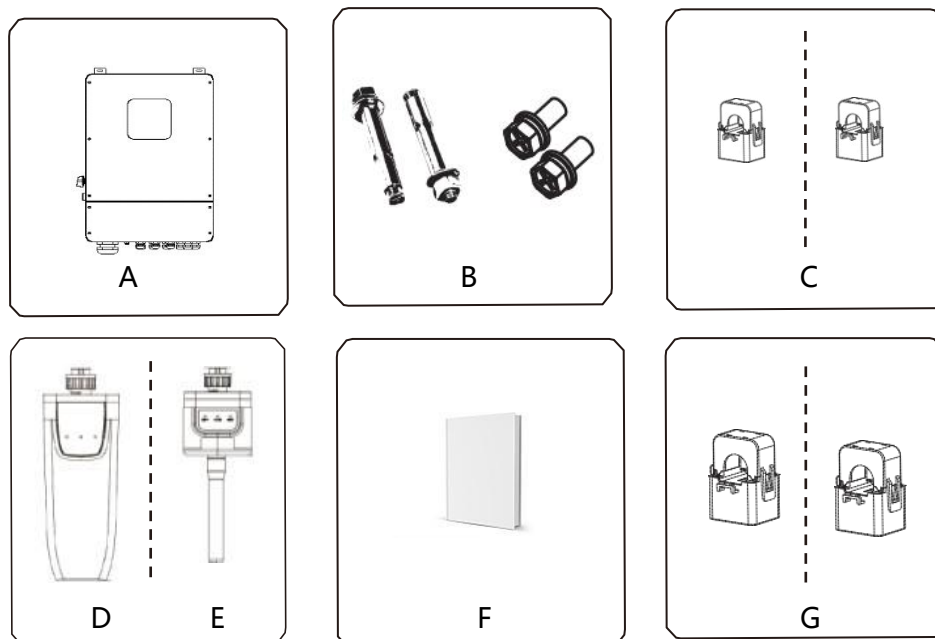
Object	Description
A	Inverter
B	Expansion screws and pan-head screws
C	CT(inner radius 16mm)
D	GPRS module (optional)
E	WiFi module (optional)
F	User manual
G	CT (inner radius 35mm/optional)

5.3 Mounting

➢ Installation Precaution

Inverter is designed for outdoor installation (IP 65).Make sure the installation site meets the following conditions:

◆ 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 above sea level.

◆ Not in environment of precipitation or humidity (> 95%).

◆ Under good ventilation condition.

◆ The ambient temperature in the range of -20℃ 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.
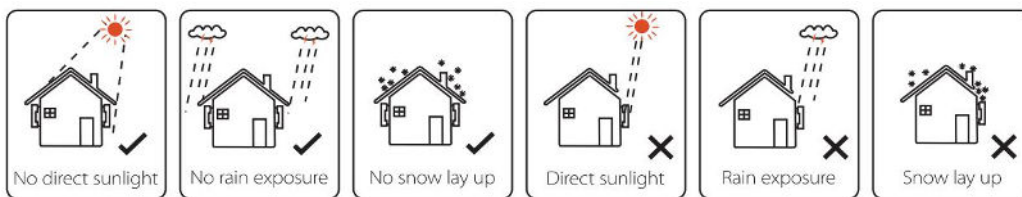
➢ **Space Requirement**
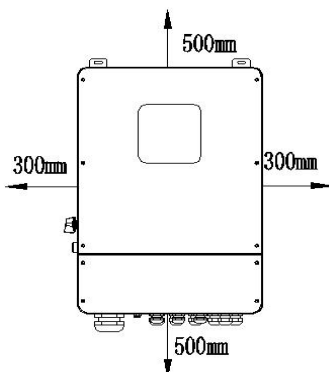
| Position	Min. size
Left	300mm
Right	300mm
Top	500mm
Bottom	500mm
Front	1000mm

➢ **Mounting**

Tools required for installation.

Installation tools : crimping pliers for binding post and RJ45, screwdriver, manual wrench etc

Step 1: Drill 4 holes in the wall according to the following distance dimensions, 50~60mm depth. Then use a proper hammer to fit the expansion bolt into the holes.
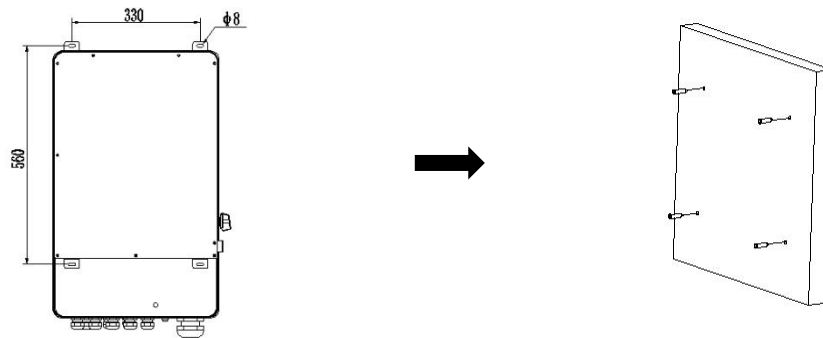
Step 2: Lift up the inverter and align the hole of the inverter with the expansion bolt, Fix the inverter on the wall.

Step 3: Tighten the nut of expansion bolt，and install an anti-theft lock on DC switch of the inverter
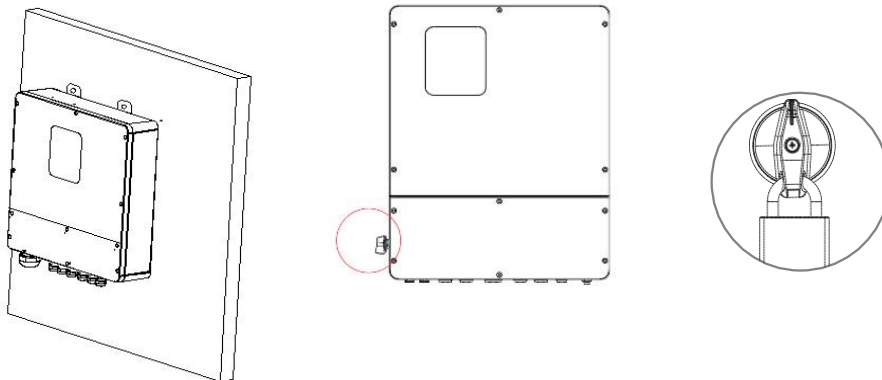
Step 4: Remove the cover screws by Allen Wrench and remove the cover. Remove the waterproof cover by a flat blade screwdriver. Wiring box conduit plugs, Conduit plugs are provided for 1 inch conduit fittings. If used conduit fitting is not 1 inch, an appropriate conduit adaptor should be used.

20
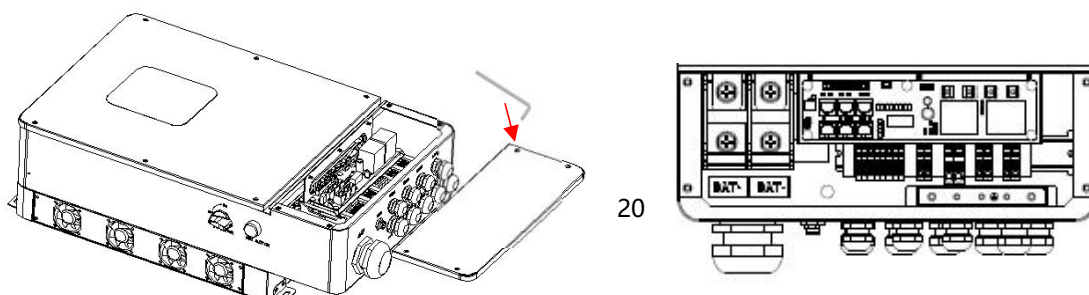
Step 5: Pass the corresponding conduit and fasten the joint.
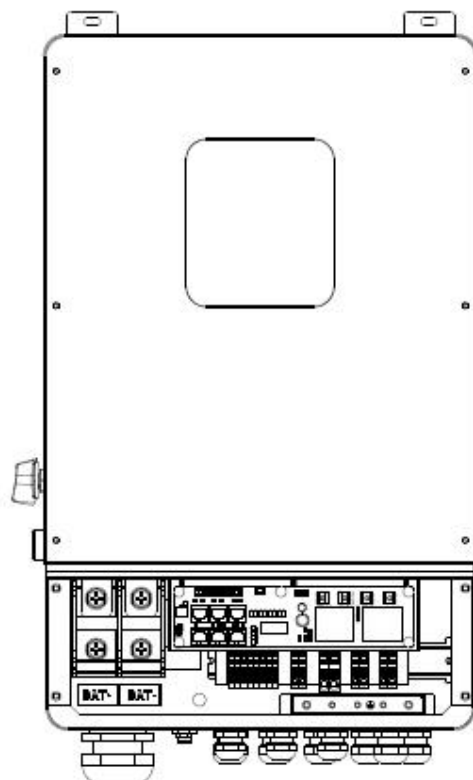
6. Electrical Connection

6.1 PV connection

Hybrid can be connected in series with 4-strings PV modules for 5kW, 6kW, 7.6kW, 8kW , 10kW.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.

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 or negative ground **!**

Note!

- The following requirements of PV modules need to be applied for each   input area;

- Please do not make PV positive or negative ground!

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

Step1. Wiring.

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

1.2 Remove 18mm of insulation from the end of wire.

12AWG

18mm
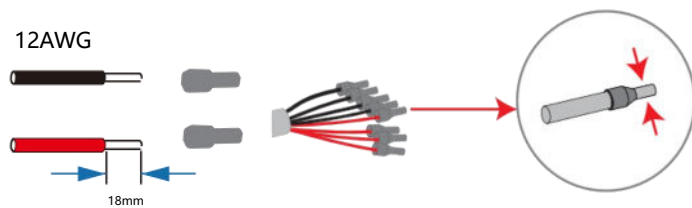
Step2. Cross the PV cables athrough the PV port, Connect PV cables to PV terminals.

Connect PV cables to PV terminals.

PV1+ PV2+ PV3+ PV4+ PV1- PV2- PV3- PV4-

6.2 Grid Connection (GEN connection)

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 circuit board from all the phases and secure against re-connection.

Step2. Grid cables choose

Use the right pin terminal from the accessory box. Press the connectors on cable conductor core tightly.

Model	FB8KL1
Cable	10AWG

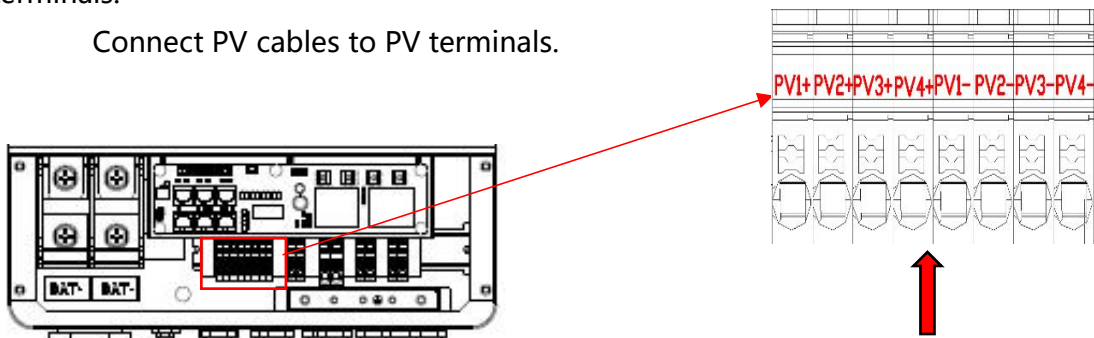**Step3.** Choose the wire to connect with the cold-pressed terminal.
(Remove 18mm of insulation from the end of wire.)

18mm
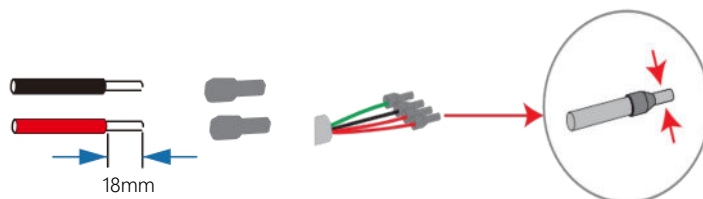
Step4. Cross the Grid cables although the grid port, Connect Grid cables to Grid terminals.

Generator (GEN)
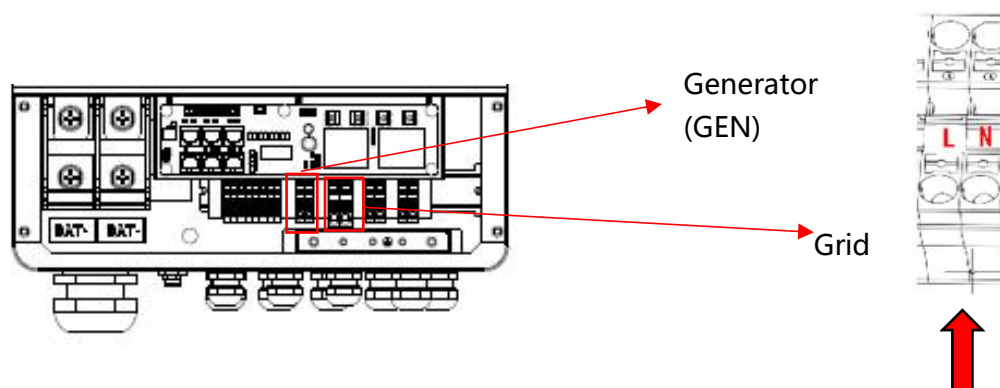
Grid

6.3 Back-up:Load1 and Load2 Connection

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 back-up port when the the grid is off.

➢ Auto & Manual
BACK-UP function can be achieved automatically or manually according to user's wishes. BACK-UP function can only be triggered automatically.

➢ Load1 port: important load.
Load2 port: When the battery is not sufficient, the load on this interface will

power down

1). For inverter, the standard PV installation typically consists of the connection of the inverter with both panels and batteries. In case of systems not connected to the batteries, the Back-Up function is strongly not advised to use. It shall not cover the standard warranty and be liable for any consequences arising from users not following this instruction.

2). Hybrid inverters are able to supply over load output at its "Back-Up". For details, please refer to the technical parameters of inverter. And the inverter has self-protection dreading at high ambient temperature.

3). For complicated application, or Special load，please contact after-sales team.
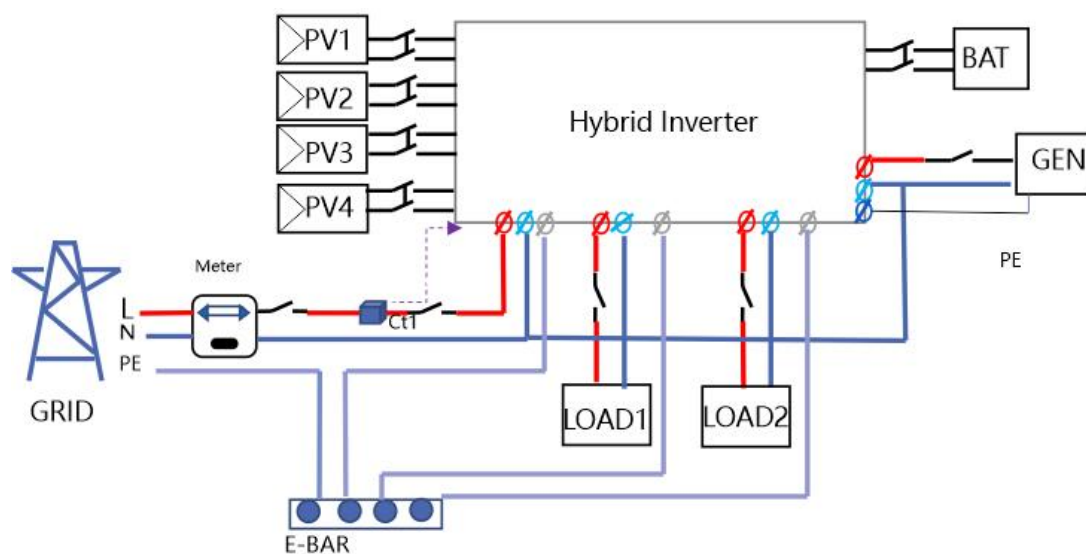
Note!

In case of discrepancies between wiring mode of local policy and the operation guide above, especially for the wiring of neutral line, grounding and RCD, please contact us before any operation!

➢ **Back-Up: Load1 and Load2 Connection:**

When using the off-grid function, please add off grid AC breaker in off grid output cable to ensure safety.

Model	FB8KL1
Micro-breaker	40A

Note: The absence of AC breaker on back-up side will lead to inverter damage if an electrical short circuit happens on back-up side.

Step1.Make BACK-UP wires.

Model	FB8KL1
Cable	10AWG

18mm
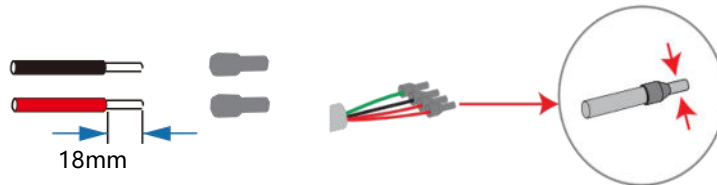
Step2.　Connect the cables to the BACK-UP: Load1 and Load2 port of the inverter.
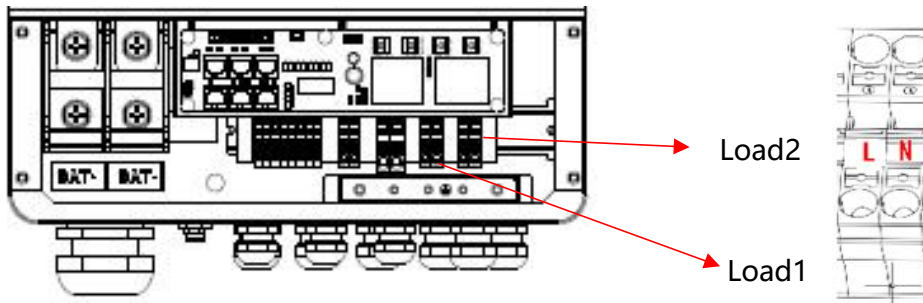
Load2

Load1

Inside the inverter, load2 is connected to load1 through a relay, and the relay disconnect when the SOC of battery is lower than set value. At this time,the load2 is powered off and load1 is still powered on.(The total power of Load1 plus Load2 should not more than the rated BACK-UP power when GRID is off)

➢ **Requirements for BACK-UP load**

	Waring!
⚠	● Make sure the BACK-UP load power rating is within BACK-UP output rating, 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 back on. ● For the nonlinear load, please make sure the inrush power should be within the BACK- UP output power range.

6.4 Battery Connection

Charging & discharging system of Hybrid series inverter is designed for 48V lithium battery.

Before choosing battery, please note the maximum voltage of battery cannot exceed 60V and the battery communication should be compatible with Hybrid inverter.

➢ **Battery breaker**

Before connecting to battery, please install a no-polarized DC breaker to make sure inverter can be securely disconnected during maintenance.
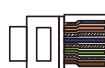
Model	FB8KL1
Current[A]	250A

➢ **Battery connection diagram**
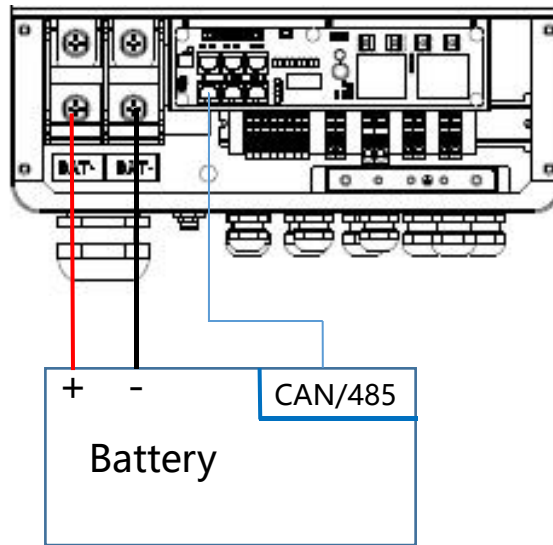
➢ **BMS PIN Definition**

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

	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！

➢ Power Connection Battery:

Step1
Choose the 1 AWG wire and strip the cable to 15mm. Select two O-terminals with an aperture of M10. Insert the stripping line into the O-terminal and clamp it with a crimping clamp.

Step2. Cross the battery cable although the battery port. Connect battery cable to battery terminal
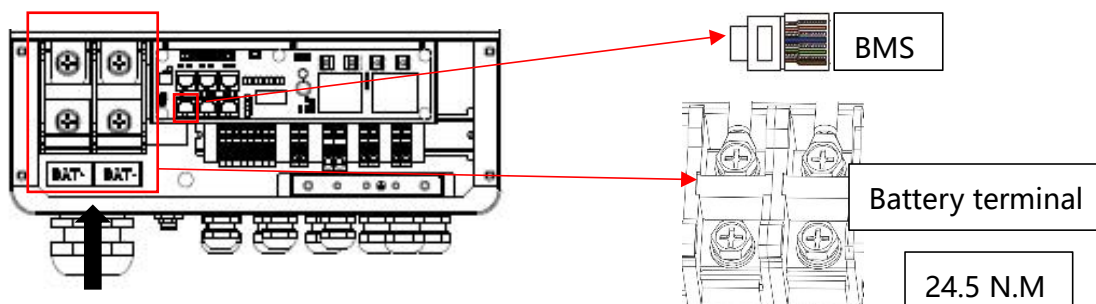
Note!
Positive and negative wires are not allowed to reverse.

6.5 WIFI Connection (optional)

Inverter provides a WIFI port which can collect data from inverter and transmit it to monitoring-website by WIFI. (Purchase the product from supplier if needed)
1) Diagram

27
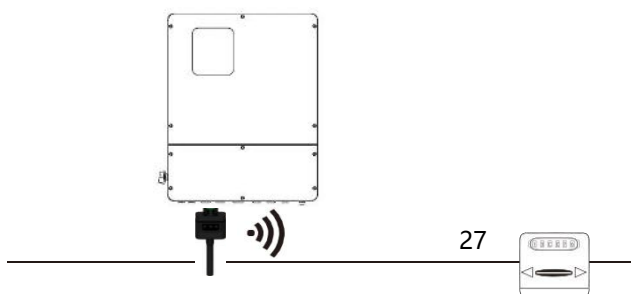
AC

Meter

2)Wi-Fi Connection:
Step1. Plug Wi-Fi into "Wi-Fi" 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 Wi-Fi user manual for more details).

6.6 GPRS Connection (optional)

Hybrid inverter provides a GPRS (radio frequency) interface which control the switch time of a designated load via an external Smart Plug (purchase the product from supplier if needed.) so that the load mostly consumes PV energy and incurs the lowest-possible energy costs during operation.
1)Diagram
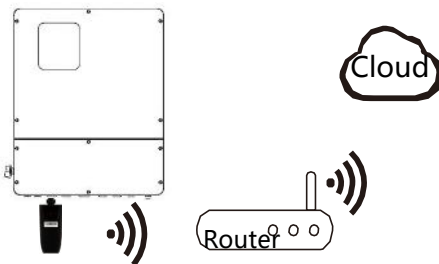
2)GPRS Connection :
Please refer to the Smart Plug user manual for detailed connection

WI-FI or GPRS
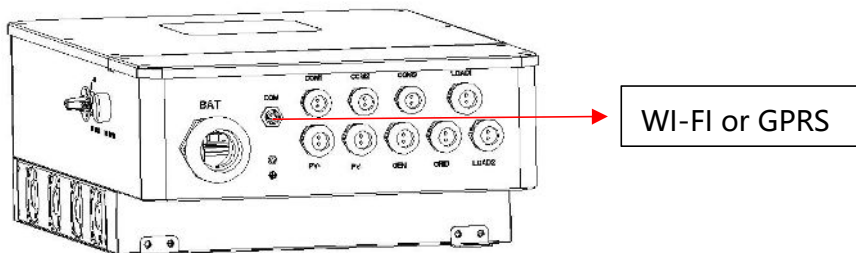
6.7 CT Installation instructions

CT is short for "current transform" ,is used to detect Grid current .

Note!
- If CT is not installed or installed reversely, the functions of "Anti-reflux", "Self-use", "Peak-shift "… will not be realized.
- The direction of the arrow on the CT points from this inverter to the GRID!

When connected to single-phase power grid (South Africa, Europe, Africa, Asia, Australia). Only one CT is provided in the accessories. The RJ45 connector of CT is connected to"CT-L1", and the CT is connected to L phase.

CAN1	CAN2	RS485_METER (Internal Use)
BMS-485 BMS-CAN	CT -L2	CT -L1
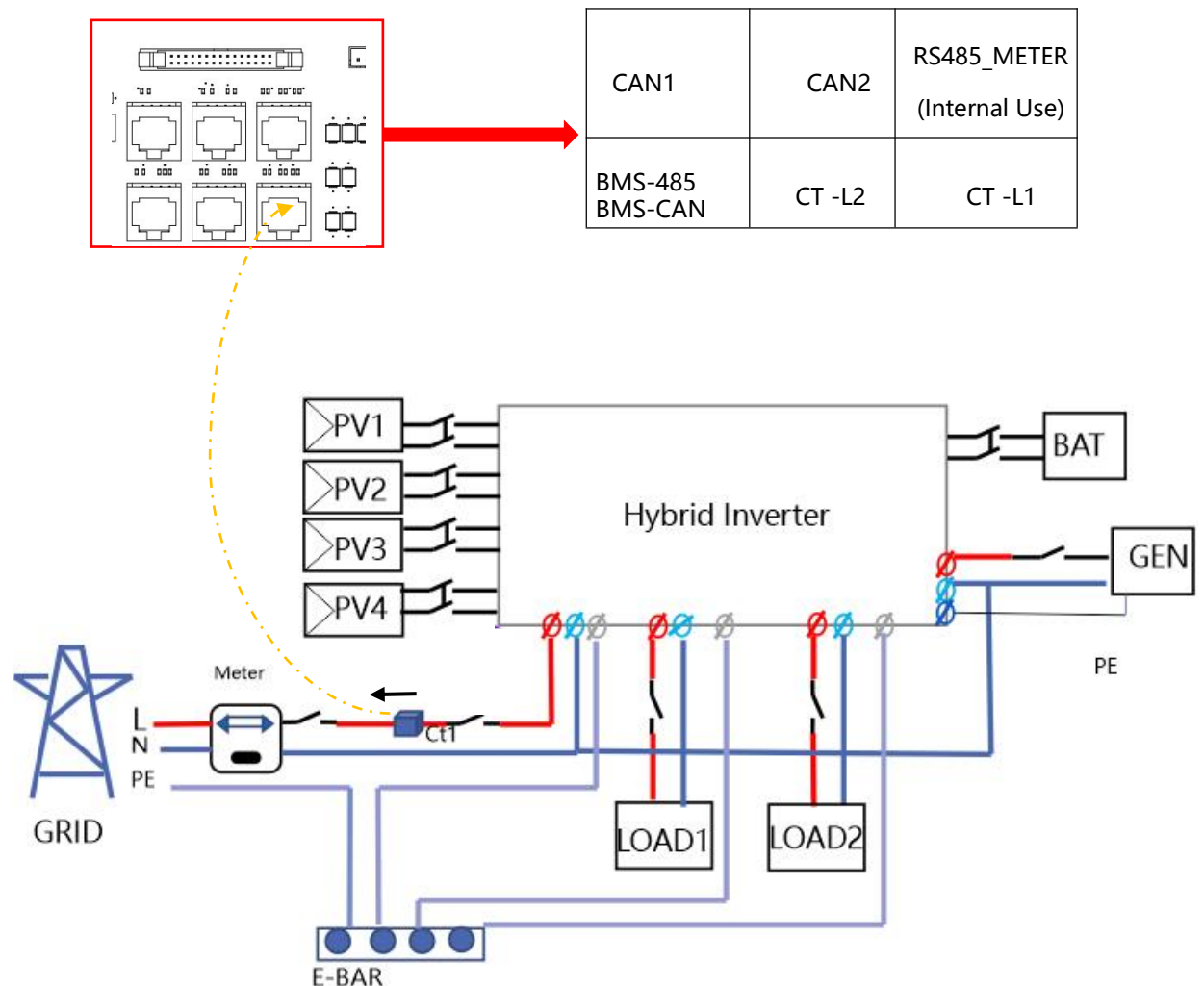
6.8 E-Stop Installation

The emergency stop (E-stop) button (D) included with this inv
the PV modules from passing voltage on the string conducto
safe voltage for first responders to perform work in or on the
The e-stop button is a normally closed (NC) contact. When th
the state of the e-stop is open.
Two 18-22AWG wires are used for connection between e-stop and inverter. At the inverter, these conductors are terminated at the 10 pin connector in the middle of the communication board, and the two conductors are respectively connected to

DRY1_1B and DRY1_1。 At e-stop, the conductor is connected to the back of the contactor.

RSD RUTTON

+12V GND

Press down to power on 12V

RSD device
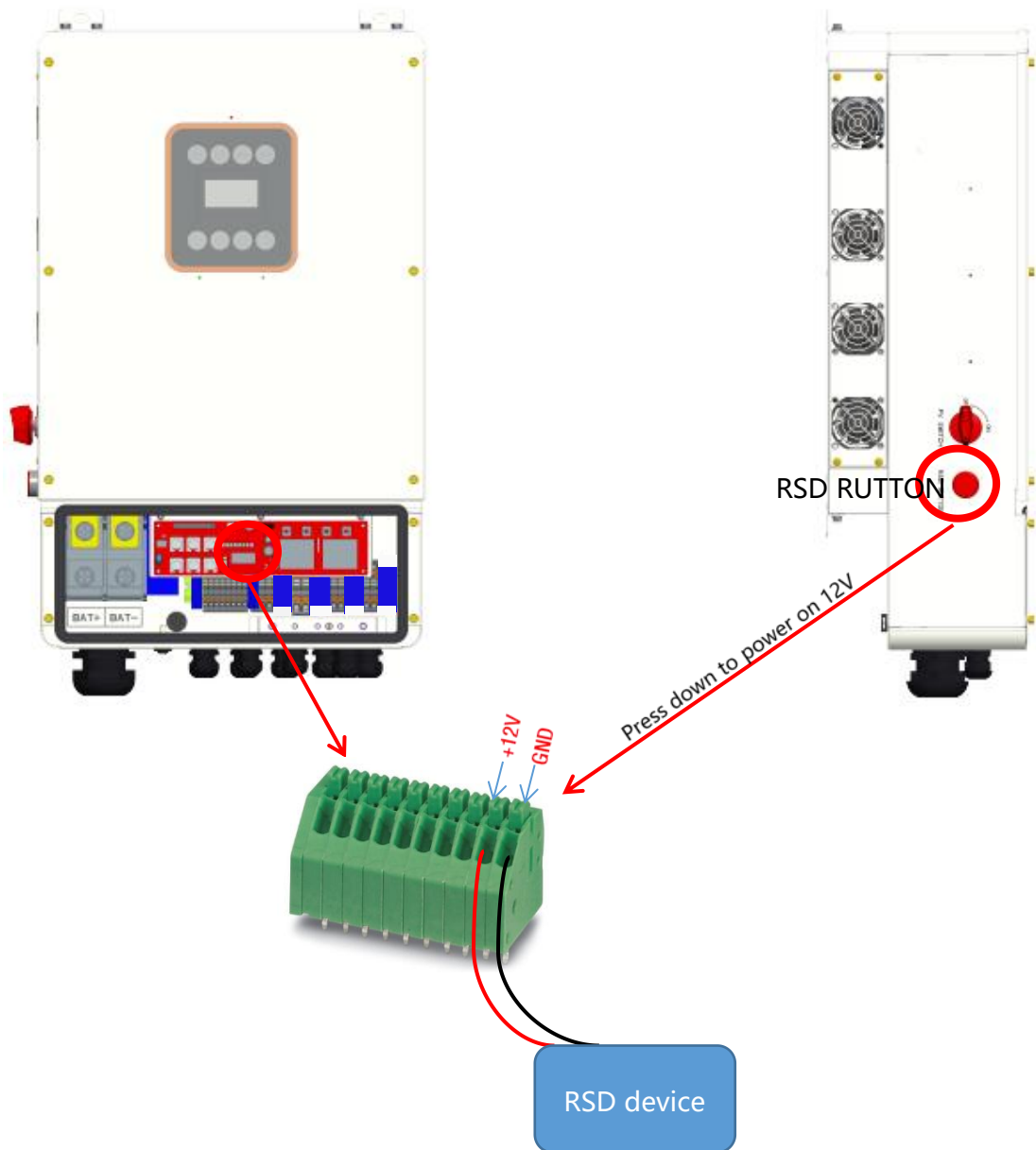
7. LCD Operation

7.1 Control Panel
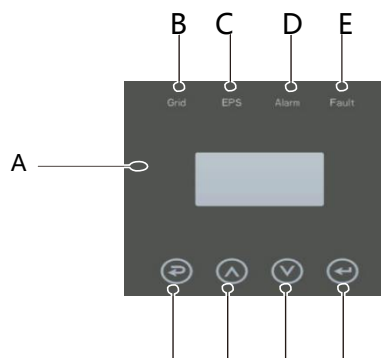
F   G   H   I

Object	Name	Description
A	LCD	Display the information of the inverter.
B	Indicator LED	lit in green: The inverter is in grid mode. Off: The inverter is in not in grid mode.
C		lit in green: The inverter is in off-grid mode. Off: The inverter is in not in off-grid mode.
D		lit in Yellow: The inverter is in Warning . Off: The inverter has no Inverter Warning
E		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.

7.2 Instructions for LED Indicator

	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

7.3 Instruct

1. SYS SETTING
  1. WORK MODE
    1. SELF CONSUME
    2. PEAK SHIFT
    3. BAT PRIORITY
  2. EPS ENABLE
  3. BAT WAKE-UP
  4. PV INPUT
    1. INDEPENDANT
    2. PARALLEL
    3. CV
  5. Grid Sell
  6. HOME LOAD
  7. ARC ENABLE
  8. RSD Switch
  9. CT Ratio

2. BAT SETTING

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1.SETUP

1. BAT TYPE
2. DISC-DEPTH
3. CHARG-CURR
4. BAT COMM

1. DC-SOURCE
2. LEAD-ACID
3. Lithium

1. RS485
2. CAN

1. Float V
2. Absorption V
3. BAT END VOLT
4. BAT OVP
5. BAT CAP

1. REACT MODE
2. GRID POWER
3. DISC POWER
4. VAC-MIN
5. VAC-MAX
6. FAC-MIN
7. FAC-MAX
8. ACTIVE REP
9. GRID RECONNE

1. POWER FACTOR
2. REACTPOWER
3. QU WAVE
4. QP WAVE

1. PWR-VOLT RES
2. PWR-FREQ RES
3. PFC-VOLT RES
4. PFC-FREQ RES
5. Anti-Islandi
6. Leak Current
7. Insul Detect

1. 9600bps

2. 19200bps

1. 中文

2. ENGLISH

1. CANCEL

2. CONFIRM

```
                              1. NUM                    1. Master
                              2. MASTEP/SLAVE
                              3. ADDRESS               2. Slave
                              4. COMMON CT
                              5. PHASE A/B/C
              14. PARALLEL    6. 3PHASE EN
                              7. CHARGE CURR
                              8. DISCHG CURR
                              9. PARALLEL EN

                              1. START SOC
                              2. STOP SOC
                              3. ChgCurrToBAT          1. Generator En
                              4. MAX RUN TIME          2. Charge En
              15. GENERATOR   5. COOLDOWN              3. Manual En
                              6. CONTROL               4. ManualCmd En
                              7. POWER                 5. Connect Grid
1.SETUP
                              1. Mode Set              1. Disable
                                                       2. Sell First
                                                       3. SFC. BuySell
              16. ADVAD SET                            4. SFC. SellDis

                              2. Advan Ctrl            1. Grid Chg En
                              3. TOU Set               2. TOU En
                              4. AuxLoad SOC           3. only PV Chg


                              1. INV MODULE
                              2. MODULE SN
2.INQUIRE                     3. FIRMWARE
                              4. RECORD
                              5. DIAGNOSE


                              1. E-TODAY
                              2. E-MONTH
3.STATISTIC                   3. E-YEAR
                              4. E-TOTAL
```

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

Power grid:

```
┌──────────────────┐   Press Esc button   ┌──────────────────┐   Select 1: Set up
│ Circular display │  ──────────────────> │       User       │   Press Enter button
│    interface     │                      │                  │  ──────────────┐
└──────────────────┘                      └──────────────────┘                │
                                                                               │
          Default    password    00000    Press                               ▼
          UP/DOWN button Adjust the figure.                         ┌──────────────────┐
┌──────────────────┐  <──────────────────────────────────────────  │  Enter password  │
│    3:GRID STD    │                                                └──────────────────┘
└──────────────────┘
          │  Press Enter button
          ▼
┌──────────────────┐   Press Enter button   ┌──────────────────┐
│ Choose according │  ──────────────────>   │ Circular display │
│ to local power grid │                     │    interface     │
└──────────────────┘                        └──────────────────┘
```
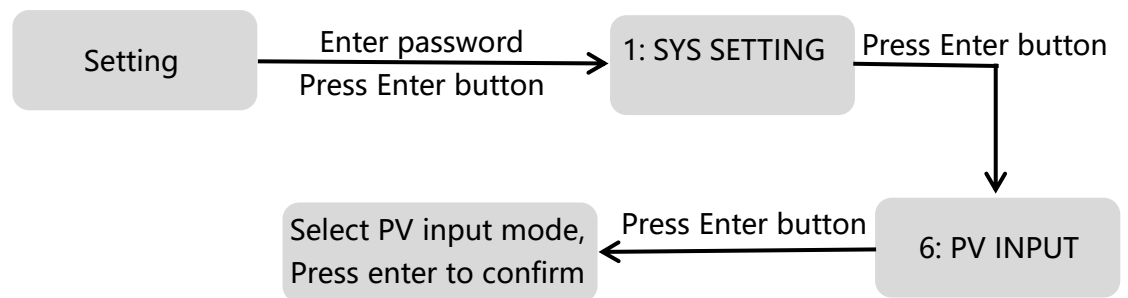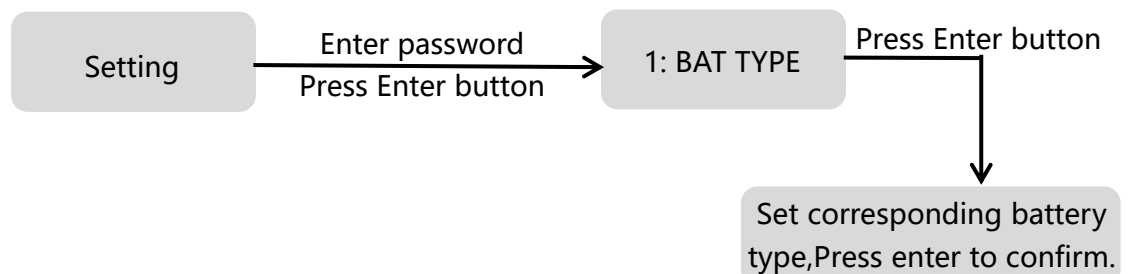
PV input mode:

```
┌──────────────┐   Enter password        ┌──────────────────┐   Press Enter button
│   Setting    │   Press Enter button    │  1: SYS SETTING  │  ──────────────┐
│              │  ──────────────────>    │                  │                │
└──────────────┘                         └──────────────────┘                │
                                                                             ▼
┌────────────────────┐   Press Enter button   ┌──────────────────┐
│ Select PV input mode, │  <──────────────────  │   6: PV INPUT    │
│ Press enter to confirm │                      └──────────────────┘
└────────────────────┘
```

Battery parameters：

```
┌──────────────┐   Enter password        ┌──────────────────┐   Press Enter button
│   Setting    │   Press Enter button    │   1: BAT TYPE    │  ──────────────┐
│              │  ──────────────────>    │                  │                │
└──────────────┘                         └──────────────────┘                │
                                                                             ▼
                                         ┌──────────────────────────┐
                                         │ Set corresponding battery │
                                         │ type,Press enter to confirm. │
                                         └──────────────────────────┘
```

8. LCD Operation

8.1 LCD Interface

8.1.1 Error information

Interface	Description
ERROR NO. 🔒 02:BatDisconnect 27:BMS Comm.fail	Numbers represent error codes and text is error information. Refer to Chapter 9 for specific 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.

8.1.2 System setting1

Interface	Description
SYSTEM1 STATE：SELF CSM GRID ＳＴＤ： UK ＰＶ I/P： PARALL	State: Setting of the whole machine working mode. Including: SELF CONSUME, PEAK SHIFT and BAT PRIORITY. Refer to Chapter 3.3 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.

8.1.3 System setting2

Interface	Description
SYSTEM2 BMS Com： CAN Grid Sell： Yes DOD： 80%	BMS Com: Battery Management System communication mode. Including: CAN, RS485. Grid Sell：Shows whether the inverter is allowed to generate power to the grid. Including: Yes, no DOD: Depth of battery discharge.

8.1.4 System setting3

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.

8.1.5 PV1 Input display interface

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

8.1.6 PV2 Input display interface

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

8.1.7 PV3 Input display interface

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

8.1.8 PV4 Input display interface

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

8.1.9 DC Voltage interface

Interface	Description
DC VOLTAGE VpBUS: 235.0V VnBUS: 235.0V LearkCur: 0mA	VpBUS: Real-time voltage of bus capacitor of the machine. VnBUS: Real-time voltage of bus capacitor of the machine. LeakCurr: Real-time leak current of the machine.

8.1.10 Battery interface

Interface	Description
BATTERY VOLT: 0.0V CURR: 0.0 A	Battery real-time voltage, 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)

8.1.11 Battery current interface

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

8.1.12 Battery current interface

Interface	Description
LEAD BAT 1000AH CHARG-V: 55.00V BAT END-V: 43.0V BAT OVP: 58.0V	CHAR VOL: Battery charging or discharging voltage. CHARGE: Battery charging current. DISCHA: Battery discharging current.

8.1.13 Grid-connected

Interface	Description
GRID OUTPUT VOLT: 0.0V CURR: 0.00A FERQ: 0.00HZ	GRID real-time voltage. GRID real-time current. GRID FREQ: Grid real-time frequency.

8.1.14 INV(not for customer)

Interface	Description
INV OUTPUT VOLT: 0.0V CURR: 0.00A FERQ: 0.00HZ	INV real-time voltage. INV real-time current. INV FREQ: Grid real-time frequency.

8.1.15 EPS LOAD

Interface	Description
EPS LOAD: VOLT: 0.0V CURR: 0.00A	EPS LOAD real-time voltage. EPS LOAD real-time current.

8.1.16 GRID/INV POWER

Interface	Description
POWER INV: 0W GRID: 0W	INV real-time power. GRID real-time power.

8.1.17 POWER PER

Interface	Description
POWER PV: 0W EPSLOAD: 0W BAT: 0W	PV: Photovoltaic input power. EPSLOAD: Load side real-time power. BAT:Real-time battery power.

8.1.18 Temperature

Interface	Description
TEMPERATURE INVER: 0°C DCDC: 0°C INSIDE: 0°C	INVER: INV Temperature. DCDC: DCDC Temperature. INSIDE: Internal ambient temperature of the machine.

8.1.19 State

Interface	Description
STATE SYS: STANDBY INV: STANDBY DCDC: STANDBY	System information: Display complete machine status information, including: INIT, STANDBY, PV GRID, BAT GRID, BYP, AC BAT CHG, HYBRID POW etc. INIT: Initialization PV GRID: PV generates electricity for the grid. BAT GRID: Battery discharges to the power grid. BYP: By-pass band load. AC BAT CHG: The grid charges the battery

	HYBRID POW: Hybrid power supply(Multiple Power Supply). INV: Displays the inverter status information,including: STANDBY, OFF GRID, GRID, OFF GRID PL, INV TO PFC. GRID: Grid connected state. OFF GRID PL: Working state of o ff -grid conversion to grid connection. INV TO PFC: Status of power by public grid turn into on grid working mode. DCDC: Displays charging and discharging status information, including: STANDBY, CHARGE, DISCHARGE.

8.2 SETTING

8.2.1 State

Interface	Description

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

8.2.2 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.

8.2.3 Setup

Interface	Description

SETUP
→1:SYS SETTING
  2:BAT SETTING
  3:GRID STD
  4:GRID SETTING
  5:RUN SETTING
  6:485 ADDRESS
  7:BAUD RATE
  8:LANGUAGE
  9:BACKLIGHT
  10:DATE/TIME
  11:CLEAR REC
  12:MAINTENANCE
  13:FCTRY RESET
  14:PARALLEL
  15:GENE RATOR
  16:ADVAN SET
	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 8.2.1).
	There are 16 options in total.

8.2.4 System setting

8.2.4.0 System setting

Interface	Description

SYS SETTING
→1: WORK MODE
  2: EPS ENABLE
  3: BAT WAKE-UP
  4: PV INPUT
  5: Grid Sell
  6: HOME LOAD
  7: ARC Enable
  8: RSD Switch
  9: CT Ratio
	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.

8.2.4.1 Work mode

Interface	Description

WORK MODE
→1:SELFCONSUME
  2:PEAK SHIFT
  3:BAT PRIORITY
	This interface is used to select the working mode.
	Press ESC button return to setting interface. (Refer to 3.3)

8.2.4.1.1 Peak shift

Interface	Description

WORK MODE
  1:SELFCONSUME
→2:PEAK SHIFT
  3:BAT PRIORITY
	This interface is used to select the working mode.
	Press ESC button return to setting interface. (Refer to 3.3).
	
	Select the peak shift mode, you also need to set the charge and discharge time

WORKTIME*
→1:TIME 1
  2:TIME 2
  3:TIME 3
	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.

CHR START1 00:00 CHRG END1 00:02 DIS START1 00:03 DISC END1 23:59	This interface is used to adjust the time of peak load shifting. There are three time periods you can set. 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.

WORKTIME*

1)The maximum allowable setting time is 24h(one day), It is allowed to set six different charging and discharging states within 24h.(time1 twice,time2 twice,time3 twice), The inverter runs repeatedly every day according to the set time.

Set time range
00:00   23:59
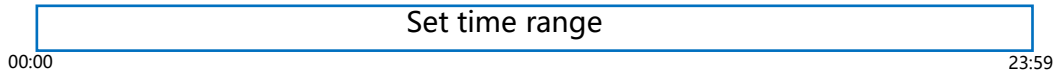
2) The inverter executes according to the settings of time1, time2 and time3 in the order of time. The following figure is an example。 Different time periods do not overlap.

Time1
charge	
00:00   05:00   23:59

Time2
	discharge		charge	
00:00   07:00   10:00 11:00   13:59   23:59

Time3
	discharge		charge
00:00   14:00   19:00 21:00   23:59

RUN
charge		discharge		charge	discharge		charge
00:00   05:00 07:00   10:00 11:00   13:59   19:00 21:00   23:59
                                                    14:00
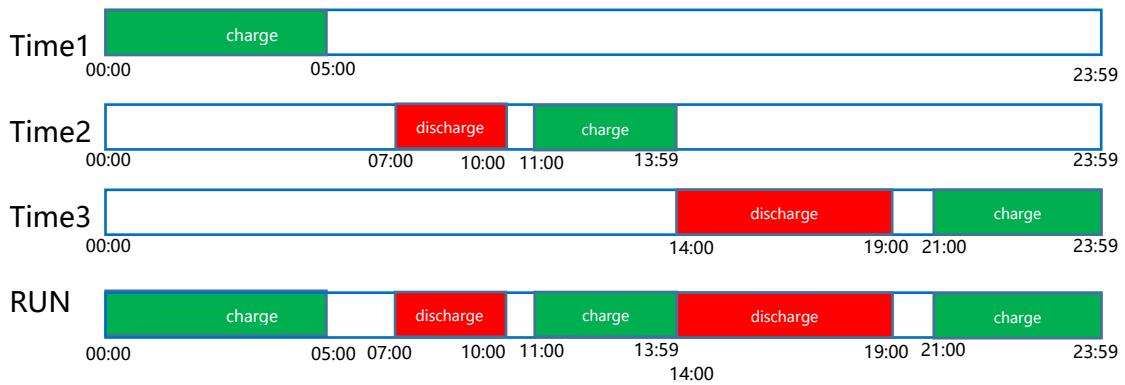
3) If you want to set a continuous charging time from the first night to the next morning. For example, you want charge battery form first day 21:00pm to next day 5:00am, divide this time period into two time periods (21:00~23:59, 00:00~05:00), and select two charging time periods from Time1, Time2 and Time3 and set them.

8.2.4.2 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.

8.2.4.3 Battery wake-up

Interface	Description

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 battery support)

8.2.4.4 PV INPUT MODE

Interface	Description
INPUT MODE →1.INDEPENDENT 　2.PARALLEL 　3.CV	Setup of PV Input mode. Default factory setting is Independent, When parallel input is set to be stand-alone mode, PV power will be imbalanced. PARALLEL：In parallel mode is commonly used in test, two or four road PV in parallel. CV:(Constant voltage test model)not for customer

8.2.4.5 Grid Sell

Interface	Description
Grid Sell →1.YES 　2.NO	Grid Sell: Whether the inverter is allowed to sell electricity to the grid. The default option is Allow, which means that the inverter can generate electricity to the grid.

8.2.4.6 HOME LOAD

Interface	Description
HOME LOAD →1. DISABLE 　2. ENABLE	When set to "ENABLE", if you have a load connected to the mains port, you can see its load power.

8.2.4.7 ARC ENABLE

Interface	Description
-ARC- →1.DISABLE 　2.ENABLE	Enable or disable ARC detection function.

8.2.4.8 BUTT ENABLE

Interface	Description

	When it is set to "ENABLE", you can power on or power off the inverter through the button at the left side.
BUTTON ENABLE →1.DISABLE 2.ENABLE	When is set to"DISABLE", When it is set to disable, the machine will start automatically regardless of the status of the button.

8.2.5 BATTERY SETTING

8.2.5.0 BAT SETTING

Interface	Description

BAT SETTING
→1.BAT TYPE
  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.

8.2.5.1 BAT TYPE

Interface	Description

BAT TYPE
  1.DC-SOURCE
→2.LEAD-ACID
  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 testing mode （not for customer）

8.2.5.1.1 Lead-acid battery parameter

Interface	Description

LEAD-ACID → 1.Float V 　2.Absorption V 　2.BAT END VOLT 　3:BAT OVP 　4:BAT CAP	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. Battery float voltage: Charge the battery with constant voltage and small current. 2. Battery constant voltage charging: Charge the battery with constant current. 3. Discharge protection voltage. 4. Charging protection voltage. 5. Battery capacity
Float V INPUT:　55.0 V UNIT:　　V	This interface is used to set the lead acid battery charging voltage. (The inpt value ranges from 40 to 59.5)，Set the floating charge voltage to be less than the constant charge voltage.
Absorption　V INPUT:　56.0 V UNIT:　　V	

Interface	Description
BAT END VOLT INPUT:　　045.0 UNIT:　　　V	This interface is used to set the lead acid battery discharging voltage.　(The input value ranges from 40 to 51) Discharge cut-off voltage, as recommended by the battery manufacturer.
BAT OVP INPUT:　　055.0 UNIT:　　　V	This interface is used to set the lead acid battery Charge protection voltage. (The input value ranges from 50 to 59.5) Charge protection voltage, as recommended by the battery manufacturer.
BAT CAP INPUT:　　0450 UNIT:　　　AH	This interface is used to set the lead acid Battery capacity. It is related to the input power. (The input value ranges from 50 to) 1000) The battery capacity setting will affect the maximum charging current, for example, set 100Ah, the maximum charging current is 100A*0.2=20A

8.2.5.2 DISC-DEPTH

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.

8.2.5.3 BAT-COMM

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

8.2.6 Grid standard

8.2.6.0 Grid std

Interface	Description
GRID STD 1.AU 2.AU-W 3.NZ 4.UK 5.PE 6.KP 7.PHI → 8.CN 9.US-CA 10.THAIL 11.ZA 12.CUSTOM 13.POL 14.EN50549 15.VDE4105 16.JPN 17.ITA 18.STO 19.CZE 20.SWE 21.HU 22.SK 23.AT 24.BE 25.JM	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 2:AU-W—Western Australia 3:NZ-- New Zealand 4: UK--United Kingdom 5:PE—Pakistan 6:KR—Korea 7:PHI—Philippines 8:CN—China 9:US-CA—America 10:THAIL—Thailand 11:ZA--South Africa 12:CUSTOM--User defined 13:POL--Poland 14:EN50549 15:VDE4105 16:JPN--Japan 17:ITA--Italy 18:STO—Slovenia 19:CZE--Chech 20:SWE—Sweden 21:HU--Hungary 22:SK--Slovakia 23:AT--Austria 24:BE—Belgium 25:JM--Jamaica

8.2.6.1 Grid set

	Description

GRID SET → 1:Single Phase 2:Split Phase 3:US 208V 4:JP 120V	Single Phase：220V Single-phase. Split Phase：120/240V Split-phase. US 208V：120/208V Split-phase. JP 120V：120V Single-phase.

8.2.7 RUN SETTING

8.2.7.0 RUN SETTING

Interface	Description
RUN SETTING 1.REACT MODE → 2.GRID POWER 3.DISC POWER 4.VAC-MIN 5.VAC-MAX 6.FAC-MIN 7.FAC-MAX 8.ACTIVEREP 9.GRID RECONN	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. 1. REACT MODE: Used to select reactive power control mode. 2. GRID POWER：When the inverter is connected to the grid, it can be used to set the maximum discharge current provided by the whole inverter to the grid. 3. DISC POWER: When the inverter is connected to the grid, it can be used to set the maximum discharge current provided by the battery to the grid.

8.2.7.1 REACT MODE

Interface	Description
RUN SETTING → 1.REACT MODE 2.GRID POWER 3.DISC POWER REACT MODE → 1.POWER FACTOR 2.REACT POWER 3.QU WAVE 4.QP WAVE POWER FACTOR INPUT: C1.00	This interface is used to select react mode. Press Up/Down button to move corresponding options; Press Enter button to enter the selected menu. (For specific country if required by the local grid.) POWER FACTOR: Active Power/ Apparent Power a ratio of, used to control reactive power. REACT POWER: Direct reactive power control. QU WAVE: Voltage-reactive curve. QP WAVE: Active power-reactive power curve. (These two functions are not available on the screen, please contact the distributor if you need to use them.) The input value should range between L0.80 and L0.99 or C0.8 and C1.00.

Interface	Description
REACT POWER INPUT: +00%	The input value should range between -60% and +60%, which varies with the standard.

8.2.7.2 GRID POWER

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

8.2.7.3 DISCHARGE POWER

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

8.2.7.4 CHAG POWER

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

8.2.7.5 PV POWER

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

8.2.7.6 VAC-MIN

Interface	Description

Interface	Description
GRID VOLT LOW INPUT: 176 UNIT: V	The input value of Grid low voltage. It effects when grid mode choose custom.

8.2.7.7 VAC-MAX

Interface	Description
GRID VOLT HIGH INPUT: 270 UNIT: V	The input value of Grid high voltage. It effects when grid mode chooses "custom".

8.2.7.8 FAC-MIN

Interface	Description
GRID FREQ LOW INPUT: 42.0 UNIT: Hz	The input value of Grid low frequency. It effects when grid mode choose "custom".

8.2.7.9 FAC-MAX

Interface	Description
GRID FREQ HIGH INPUT: 58.0 UNIT: Hz	The input value of Grid high frequency. It effects when grid mode choose "custom".

8.2.7.10 ACTIVE REF.

Interface	Description

ACTIVE Type	1.PWR-VOLT RES: Generation voltage response. When the grid voltage is abnormal, the active power is limited, and the function is enabled when required by the national grid standard.
1.PWR-VOLT RES 2.PWR-FREQ RES 3.PFC-VOLT RES 4.PFC-FREQ RES 5. Anti-Islandi 6.Leak Current 7.Insul detect	2.PWR-FREQ RES: Generation frequency response. When the power grid frequency is abnormal, the active power will be limited, and the function will be enabled if required by the national power grid standard.
	3.PFC-VOLT RES: Charge voltage response. When the grid voltage is abnormal, the charging power will be limited, and the function will be enabled if required by the national grid standards.
	4.PFC-FREQ RES: Charge frequency response. When the power grid frequency is abnormal, the charging power will be limited, and the function will be enabled if required by the national power grid standard.
	5.Anti-Island: Anti-Islanding(The default option is enable) When the grid goes down, inverter will detect the loss of power and disconnect from the grid within milliseconds. It prevents your solar panels from feeding electricity into a downed power line.
	6.Leak Current: Leak current detect (The default option is enable).
	7.Insul detect: Insulation detect (The default option is enable). When the insulation detection function is enabled in the grid-connected state, the insulation detection is performed once a day when the photovoltaic energy comes in, and the inverter switches to the By-pass band load. If the inverter is off-grid, the output will be disconnected during insulation detect andthe load will stop working.

8.2.8 485 Address

8.2.8.0 485 Address

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

8.2.9 485 BAUD RATE

8.2.9.0 BAUD RATE

Interface	Description

Interface	Description
SELECT →1.9600 bps 　2.19200 bps	This interface is used to select 485 baud rate.

8.2.10 LANGUAGE SETTING

8.2.10.0 LANGUAGE

Interface	Description
LANGUAGE 1.中文 →2.English	This interface is used to select language.

8.2.11 BACKLIGHT

8.2.11.0 BACKLIGHT

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

8.2.12 DATE/TIME　SETTING

8.2.12.0 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.

8.2.13 CLEAR REC

8.2.13.0 Clear history

Interface	Description

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

8.2.14 MAINTENANCE

8.2.14.0 MAINTENANCE

Interface	Description
PASSWORD INPUT: XXXXX	This interface is used to enter maintenance.

8.2.15 FCTRY RESET

8.2.15.0 FACTORY RESET

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

8.2.16 PARALLEL

8.2.16.0 PARALLEL

*Please read Chapter 10 for more details.

Interface	Description

Interface	Description
RUN SETTING 1.NUM →2.MASTEP/SLAVE 3.ADDRESS 4.COMMON CT 5.PHASE A/B/C 6.3PHASE EN 7.CHARGE CURR 8.DISCHG CURR 9.PARALLEL EN	This interface is used to select run setting. Press Up/Down button to move corresponding options; Press Enter button to enter the selected menu.

8.2.16.1 NUM

Interface	Description
PARALLEL NUM INPUT: 2	This operation is used to select the number of parallel machines.

8.2.16.2 MASTEP/SLAVE

Interface	Description
Master/Slave →1.Master 2.Slave	This interface is used for paralleling, and the inverter is selected as the master or slave.

8.2.16.3 ADDRESS

Interface	Description
Parallel Addr INPUT: 1	This interface is used to select the parallel address, the host address is set to 1 by default, there is a slave, and the slave is set to 2; If there are two slaves, the slaves are set to 2 and 3 respectively; the address settings of each inverter cannot be the same.

8.2.16.4 COMMON CT

Interface	Description

Interface	Description
COMMONM CT →1.DISABLE 2.ENABLE	Enable or disable CT sharing.

8.2.16.5 PHASE A/B/C

Interface	Description

Phase A/B/C
→1.A
   2.8
   3.C
	This interface is used to select the output phase of the device when three phases are used. (Reserved function).

8.2.16.6 3PHASE EN

Interface	Description
3PHASE EN →1.DISABLE 2.ENABLE	Enable or disable group 3 phase enable.

8.2.16.7 CHARGE CURR

Interface	Description
Charge Curr INPUT: 0100 UNIT: A	This interface is used to select the parallel charging current.

8.2.16.8 DISCHG CURR

Interface	Description
Discharge Curr INPUT: 0100 UNIT: A	This interface is used to select the parallel discharge current.

8.2.16.9 PARALLEL EN

Interface	Description

Parallel EN →1.DISABLE 2.ENABLE	Start or disable the parallel function.

8.2.17 GENEATOR

8.2.17.0 GENEATOR

*Please read Chapter 9 for more details.

Interface	Description
GENEATOR 1.START SOC →2.STOP SOC 3.ChgCurrToBAT 4.MAX RUN TIME 5.COOLDOWN 6.CONTROL 7.POWER	1. This interface is used to select run setting. 2. Press Up/Down button to move corresponding options; 3. Press Enter button to enter the selected menu.

8.2.17.1 START SOC

Interface	Description
STRART SOC INPUT: 020%	This interface is used to set the minimum battery capacity when starting the generator.

8.2.17.2 STOP SOC

Interface	Description
STOP SOC INPUT: 020%	This interface is used to set the maximum battery capacity when the generator is turned off.

8.2.17.3 ChgCurrToBAT

Interface	Description
Chg Curr to BAT INPUT: 030 UNIT: A	This interface is used to set the battery charging current when the generator is used.

8.2.17.4 MAX RUN TIME

Interface	Description
MAX RUN TIME INPUT: 10.0 UNIT: hours	This interface is used to set the maximum running time of the generator.

8.2.17.5 COOLDOWN

Interface	Description
COOL DOWN TIME INPUT: 02.0 UNIT: hours	This interface is used to set the cooling time.

8.2.17.6 CONTROL

Interface	Description
GEN CONTROL 1.Generator En →2.Charge En 3.Manual En 4.ManualCmd En 5.Connect Grid	Tis interface shows Generator CONTROL 1. 1.Enable control of the Generator function. 2. Generator Charge Enable control 3. If the user wants the Generator to be controlled manually, Enable it. If the user wants the Generator to be automatically controlled to start and stop through the dry contact, Please ban dragons(The default is AutoCtrl En). Manual En should be opposed to AutoCtrl En。 4. The on/off command in manual control mode , 5. Connect the diesel Generator to the grid input port.

8.2.17.7 POWER

Interface	Description
POWER INPUT:　　　08.0 UNIT:　　　KW	This interface is used to set the diesel generator power.

8.2.18.0 ADVAN SET

8.2.18.0 ADVAN SET

Interface	Description
ADVANH SET → 1.Mode Set 　2.Advance Ctrl 　3.TOU Set 　4.Auxload Soc	This interface displays advanced mode settings. 1.->Inverter working mode setting. 2.->Inverter related function control. See 12.2.3 Advan Ctrl for details. 3.->Time of use setting. See 12.2.4 Time of use for details. 4.-> Used to set the SOC of the switch LOAD 2 (only if the battery is present).

8.2.18.1 Mode Set

Interface	Description
Mode Set → 1.Disable 　2.Sell First 　3.SFC.BuySell 　4.SFC.SellDis	On this page, select the advanced mode you need to enable. If selected, the mode will be enabled.

8.2.18.2 Advance Ctrl

Interface	Description
ADVAN CONTROL → 1.Grid Chg En 　2.TOU En 　3.Only PVChg	1.->Global control, whether the power grid can charge the battery. 2.->Whether TIME OF USE is enabled 3.->The battery is charged only by PV, and cannot be charged by the grid.

8.2.18.3 TOU Set

Interface	Description

SLOT → 1.Slot 1 2.GridChg 1 Star: 00:00 End: 00:00 Power: 00.0KW SOC: 0%	1.->From the start time to the end time, charge the battery with the written Power to the written SOC. If GridChg is enabled, allow the grid to charge. 2.->In the slot section, control the grid to charge the battery.

8.2.18.4 Auxload SOC

Interface	Description
Auxload SOC SOC on: 0% SOC off: 0%	SOC on:The SOC value of the battery enabled by load 2 . SOC off:The SOC value of the battery disabled by load 2 .

8.3 INQUIRE

8.3.0 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.

8.3.1 INV MODULE

Interface	Description
MODEL 8K	This interface shows inverter model.

8.3.2 MODULE SN

Interface	Description
S / N GUID: XXXXXXXX XXXXXXXXXXXXXX SN:FXXXXXXXXXXX	This interface shows module SN.

8.3.3 FIRMWARE

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

8.3.4 RUNNING RECORDS

Interface	Description
REC(01) 02:Batdisconnect UP: 12-25 23:00 DOWN:	This interface shows running recodes.

8.3.5 DIAGNOSE

Interface	Description
DIAGNOSE 000000 000000 000000 000000 000000 000000	Factory internal use.

8.4 STATISTIC

8.4.0 STATISTIC

Interface	Description

STAT. → 1.E-TODAY 2.E-MONTH 3.E-YEAR 4.E-TOTAL	This interface shows inverter operation statistic. 1. Displays statistic for the day (KWH). 2. Displays statistic for the month (KWH). 3. Displays statistic for the year (KWH). 4. 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.

9. Generator Use Operation Guide

9.1 Generator Use Diagram

1) The Generator is connected to the grid port of the inverter. The connecting cable shall be covered with CT. It is used in some off gird situations. The system diagram is as follows.
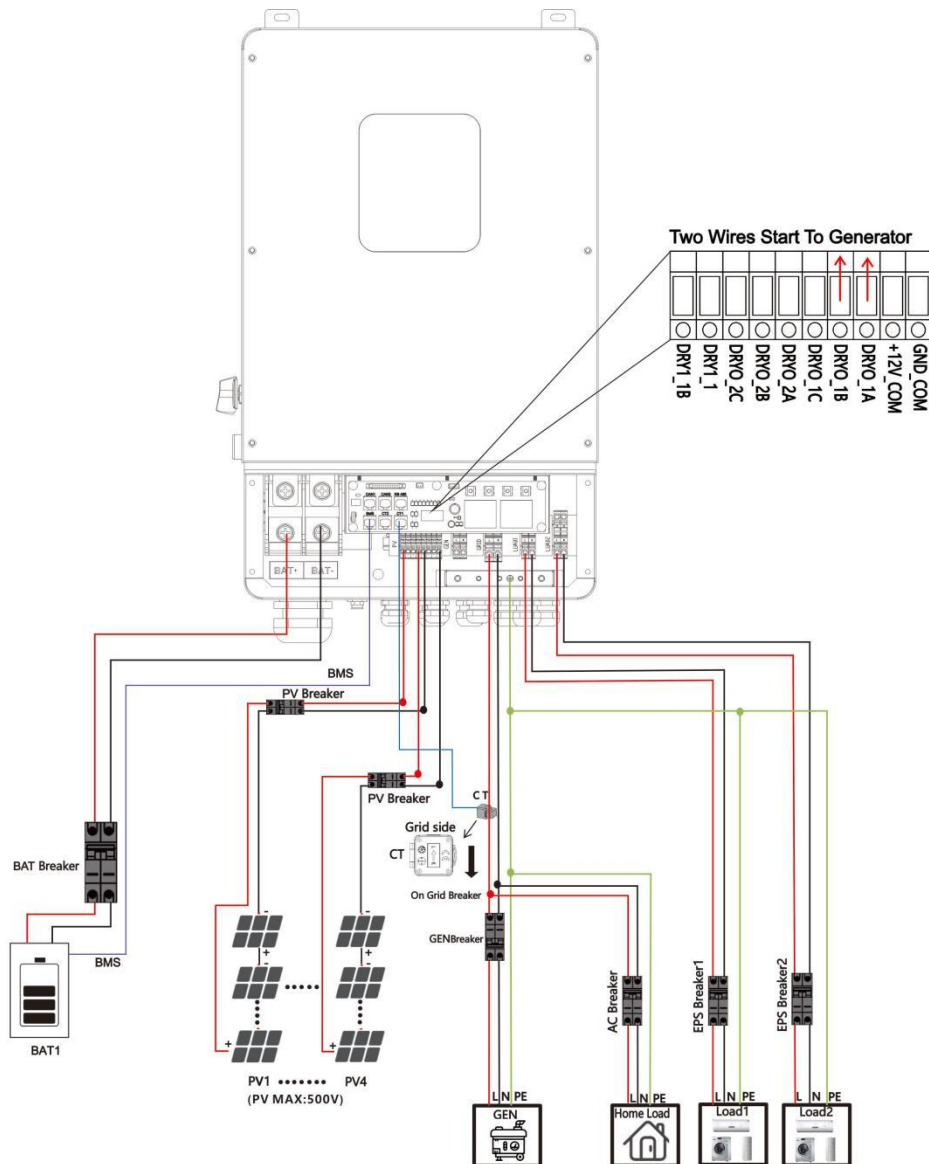
2) The Generator is normally connected to the Generator port. The connecting cable between the Generator and the inverter does not need to be covered with CT. The connection line of the power grid port should be connected

with CT. The system diagram is as follows.
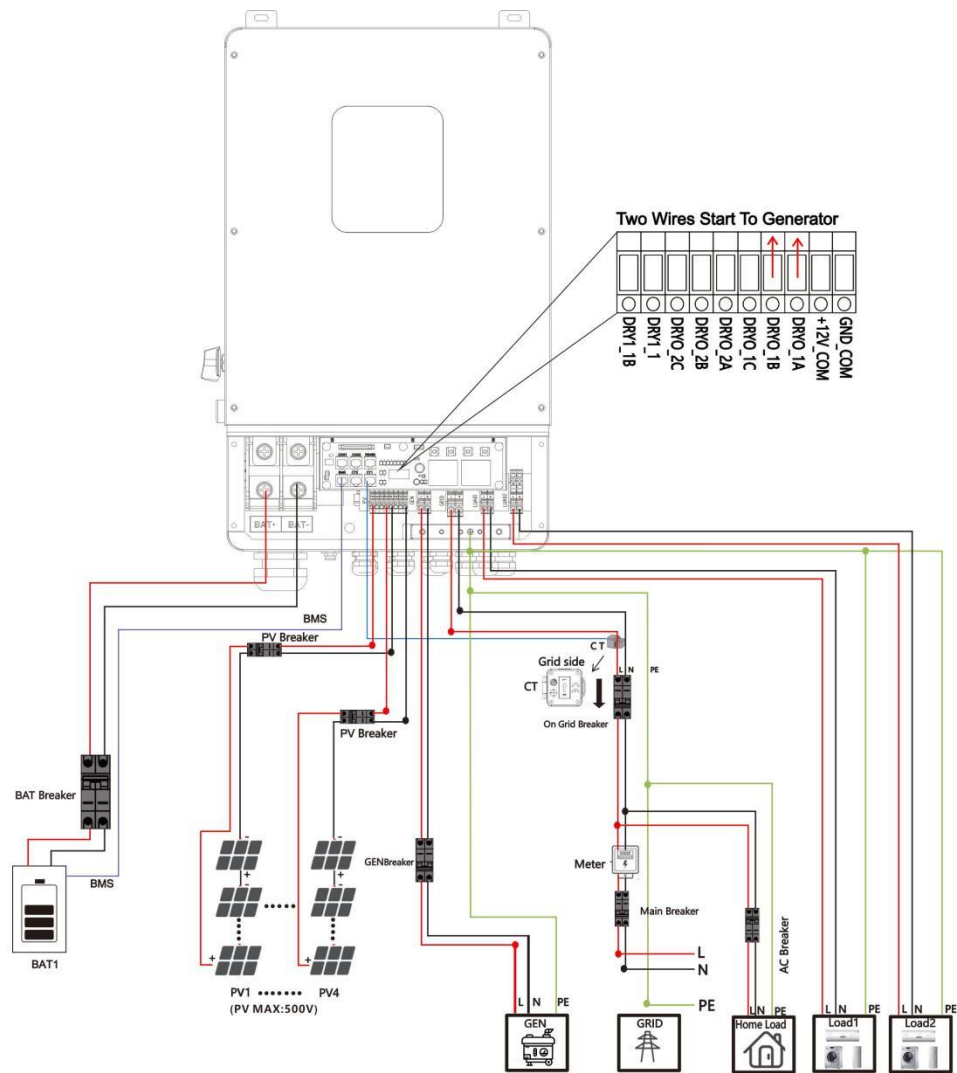
9.2 Generator Operation Notes

1) The two wires start signal **DRYO_1A** and **DRYO_1B** of the Generator is used to automatically control the start and stop of the Generator.

2)Make sure the inverter units software version support Generator function.
USER->INQUIRE->FIRMWARE

```
FIRMWARE
ARM:    V1.XX.XX
DSP:    V1.XX.XX
```

3) When the generator is used in inverter parallel situation, the two wires start signal is only needed to be connected to the master unit. The wiring and the setting of the Generator should be exactly same.

4)Please check the diagram above.

9.3 Generator Setting

The Generator setting page can be visited in the following steps in the screen:
    USER->1. SETUP->PASSORD CHECK->16.Generator

9.3.1 Setting

Interface	Description
Generator. → 1.START SOC. 2.STOP SOC 3.ChgCurrToBAT 4.MAX RUN TIME 5.COOLDOWN 6.CONTRL 7.POWER	This interface shows Generator setting. 1. When the SOC of battery is lower than the setpoint，the Generator drycontact is enabled and Generator Manual operation is disabled, the connected Generator will be started. 2. When the SOC of battery is higher than the setpoint，the Generator drycontact is enabled and Generator Manual operation is disabled, the connected Generator will be stopped. 3. It indicates the maximum current that the inverter charges the battery from Generator. 4. It indicates the longest time Generator can run in one day, when time is up, the Generator will be turned off. The value 240 means 24hours in which state the Generator will not be shut down all the time. The unit is 0.1 hour. 5. It indicates the waiting time of the Generator to restart after it has reached the running time.The unit is 0.1 hour. 6. Refer to 11.3.2 **CONTRL.** 7. Rated power of Generator.

9.3.2 CONTRL

Interface	Description
GEN CONTROL 1.Generator En 2.Charge En 3.Manual En 4.ManualCmd En 5.Connect Grid	This interface shows Generator CONTRL. 1. Enable control of the Generator function. 2. Generator Charge Enable control 3. If the user wants the Generator to be controlled manually, Enable it. If the user wants the Generator to be automatically controlled to start and stop through the dry contact, Please ban dragons(The default is AutoCtrl En). Manual En should be opposed to AutoCtrl En。 4. The on/off command in manual control mode , 5. Connect the diesel Generator to the grid input port.

10. Inverter Parallel Guide

10.1 Parallel System Diagram

Multiple inverters can be installed together to deliver more power. When AC loads are present, all units effectively share the load. The system diagram is as follows.

10.1.1 Single phase (230Vac)parallel connection diagram

①②③DC Breaker for battery.
R8KLNA: 250A DC breaker.
④⑤⑥AC Breaker for grid port.
R8KLNA: 40A AC breaker.
⑦⑧⑨AC Breaker for backup load port.
R8KLNA:40A AC breaker.
⑩AC Breake.
Depends on household loads.

Default settings:
CT shared,battery shared,
Set Parallel Enable.

3#

CAN1 CAN2

BMS_CAN/485   CT2 CT1

BMS_CAN/485

①
MCCB

⑨BREAKER

⑥BREAKER

2#

②
MCCB   BMS_CAN/485

⑧BREAKER

⑤BREAKER

1#

③
MCCB

⑦BREAKER

④BREAKER

GRID   CT1
L
N
PE

PE

BAT   BMS_CAN/485

⑩
BREAKER

L N PE

L N PE

The CT arrow points in
thedirection of the grid

LOAD1

LOAD2
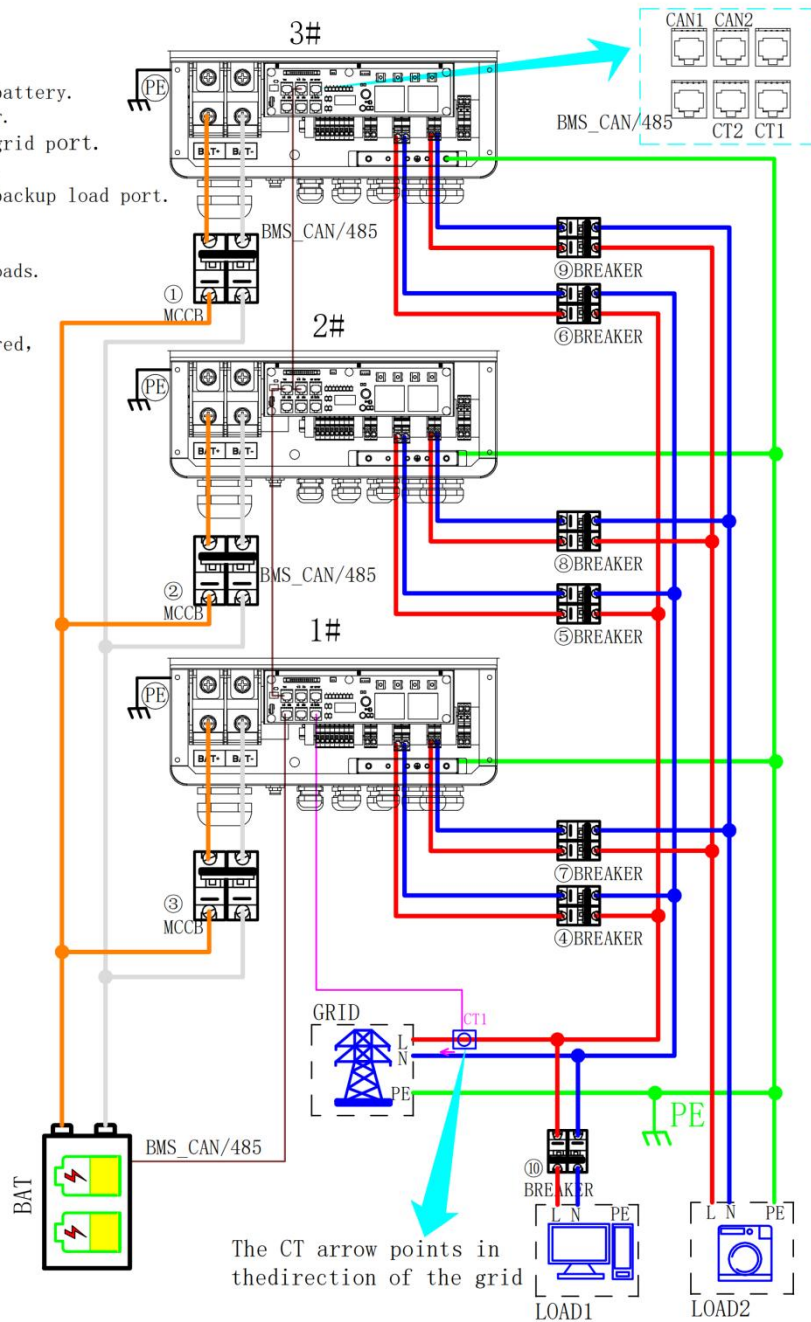
10.1.2 Parallel connection for 230/400 three phase

①②③DC Breaker for battery.
R8KLNA: 250A DC breaker.
④AC Breaker for grid port.
R8KLNA: 40A AC breaker.
⑤AC Breaker for backup load port.
R8KLNA:40A AC breaker.
⑥AC Breake.
Depends on household loads.

Default settings:
battery shared,
System settings, see 10.4
"Note".

3#

CAN1 CAN2

BMS_CAN/485

CT2 CT1

BMS_CAN/485

① MCCB

2#

② MCCB

BMS_CAN/485

1#

③ MCCB

④BREAKER

⑤BREAKER

GRID

L1
L2
L3
N
PE

CT1
CT2
CT3

⑥BREAKER

BMS_CAN/485

BAT

The CT arrow points in
thedirection of the grid

PE

⑥BREAKER

L1 L2 L3 N PE

LOAD1

L1 L2 L3 N PE

LOAD2
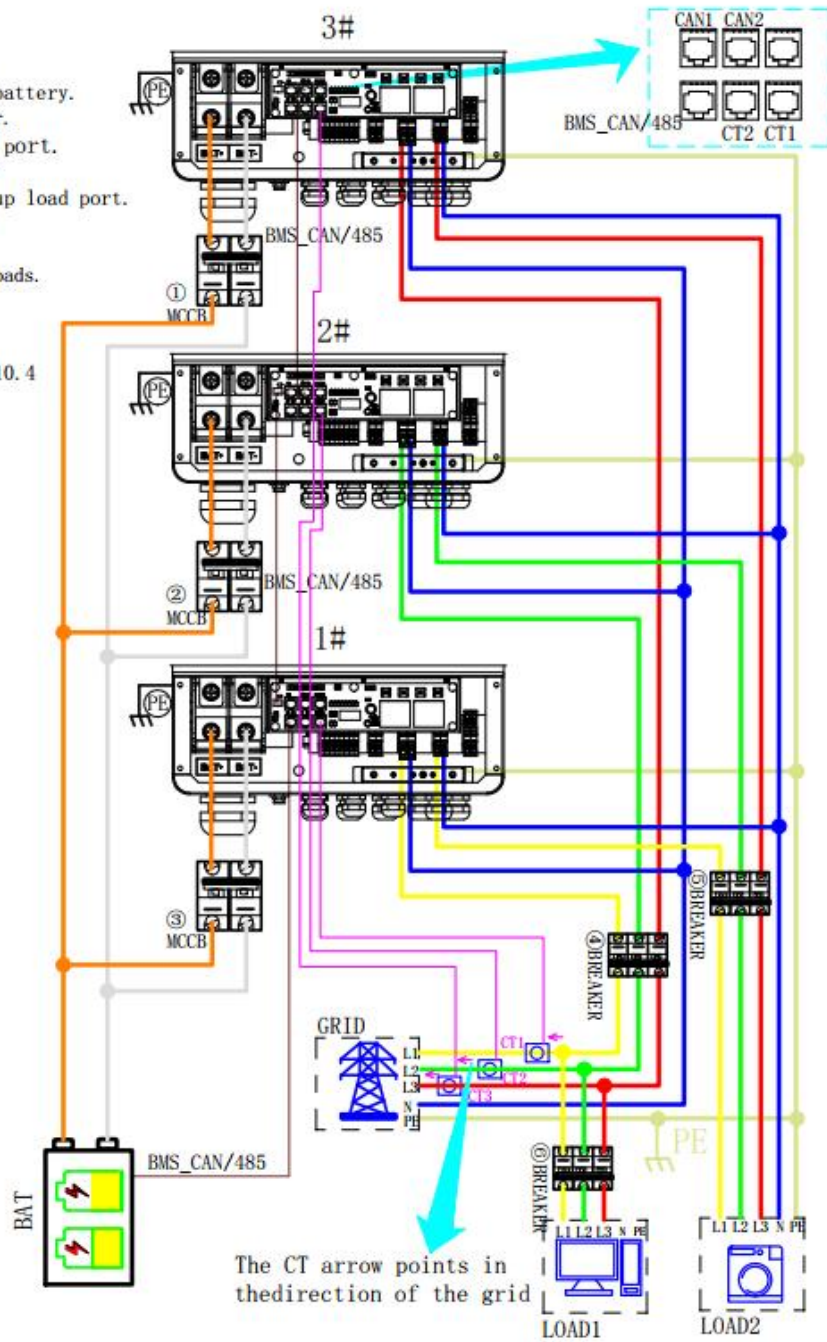
10.2   Parallel CAN1   CAN2   Communication Cable Connection
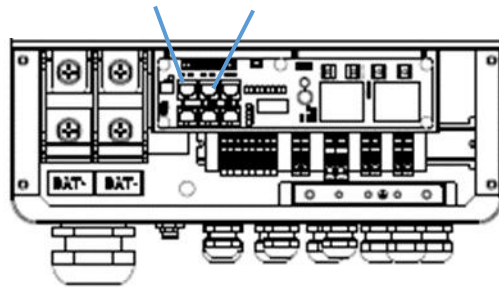
For parallel communication ,CAT 5 cables are needed. The units should be connected hand by hand.

When using common batteries, BMS cable needs to be connected to the master unit. The inverter shares the BMS information by inter-unit parallel communication cable.

10.3 Parallel Operation Notes

1) Make sure all the units in parallel are with the same software version.
USER->INQUIRE->FIRMWARE

```
        FIRMWARE
ARM:      V1.XX.XX
DSP:      V1.XX.XX
```

2) Please check the diagram above .The common batteries use is supported on default for maximizing the system efficiency. The BMS cable should be connected to the master inverter.

3) Connect the loads of the two inverters together first. It should be noted that **the grid power line and the load line of the two inverters should be roughly the same length.**

4) Make sure the CT Limiter sensor is installed properly. If the load is connected outside the inverter, user need to choose common ct and make sure the CT ratio is right(the default 90A ct ratio is 1:1000, no need to change). The common ct is only needed to be connected to the master inverter. Please install CT on every unit's incoming electrical service wires on L1 and L2 when choosing independent ct .
5) Please check the master and slaver's setting by screen and make sure all the setting are

same.

10.4 Parallel System Setting

The parallel setting page can be visited in the following steps in the screen:
    USER->**1. SETUP**->**PASSORD CHECK**->**15.parallel**

10.4.0 Setting

Interface	Description

Parallel.
→1.NUM.
  2.MASTER/SLAVER
  3.ADDRESS
  4.COMMON CT
  5.PHASE A/B/C
  6.3PHASE EN
  7.DISCHARGE CURR
  8.CHARGE CURR
  9.PARALLEL EN
	This interface shows parallel setting.
	1. Total numbers of the inverters.
	2. In a parallel system,the master unit broadcasts the bms and other information to the slavers. Make sure only one unit is configued as master.
	3. Local unit address(1-8).
	4. Common CT Enable
	5. Local phase of unit for three-phase installation. (reserved function)
	6. Enable or disable group 3 phase enable.
	7. DISCHARGE CURR, **Total battery discharge current command, only be settable in master unit in parallel mode.**
	8. CHARGE CURR, **Total battery charge current command, only be settable in master unit in parallel mode.**
	9. PARALLEL EN,Enable/Disable the parallel function

10.4.1 Parallel Error information

Interface	Description
ERROR NO. 🔒 11:parallel fail	A parallell warning may occur because of the following reasons: 1. Wrong setup of the parallel num. 2. Wrong inter-unit parallel communication cable. 3. Wrong setup of the unit address.

Note!

● I If you need to assemble a three-phase (230V/240) using a single phase, please make the following settings:

1. 3PHASE EN; 2. PHASE Selection; 3. Grid Standard(South Africa); 4. Power Grid Settings(Split Phase); 5. Master/slave selection; 6. Number of parallel machines; 7. ADDRESS. (Do not PARALLEL Enable and COMMON CT Enable)

11. Advanced Mode Operation Guide

11.1 Advanced Mode Introduction

The hybrid inverter can be programmed to control how and when to use grid power.The Advcanced mode allow management of flexible loads and time-of-use billing.

There are three advanced mode available: **Sell First Mode,Self-consumption buy and sell Mode** and **Self-consumption dis sell Mode.**

Sell First Mode (Sell First) :   In this mode the anti-reflux setting is automatically disabled.
The users can use this mode to sell back surplus solar power to grid. If time of use is enabled, the battery power can also be sold to grid.

Self-consumption buy and sell Mode (SFC.BuySell) : In this mode, the ct limiters are used to sense the grid power flow direction. The hybrid inverter can be choosed to sell power or not sell power to grid. There is a **CT Limit Power** parameter available in this mode.When the battery is needed to discharge to reduced the load consumption,the grid will cover the parameter set part consumption firstly and the battery discharges energy to makes up the rest part.Other conditions are similar to SELF CONSUME working mode.

Self-consumption dis sell Mode (SFC.SellDis) : In this mode, the ct limiters should be installed in the input of the inverter's grid port. The hybrid inverter will not sell power to grid. The user can use **Zero export power** parameter to ensure the inverter won't feed back power to grid.

There are also some attributes of these mode: **Global Grid Charge Enable**, **Pv Charge Only**,   **Time-of-use Enable** and **6 Time-of-use Slots.** The time slots parameters are shown in as below:

	Grid Charge	Gen Charge	Start Time		End Time		Bat Power	Bat SOC
Time Slot1	√		1 h	0 m	8 h	0 m	8000 W	50 %
Time Slot2			8 h	0 m	9 h	0 m	8000 W	100 %
Time Slot3	√		9 h	0 m	13 h	0 m	8000 W	100 %
Time Slot4			13 h	0 m	19 h	0 m	8000 W	15 %
Time Slot5	√		19 h	0 m	20 h	0 m	8000 W	100 %
Time Slot6	√		20 h	0 m	1 h	0 m	8000 W	100 %

Global Grid Charge Enable: It is a high level control attribute of grid charge enable. If

time of use function is disabled, this attribute is used to judge whether or not to charge the battery by grid. If time of use function is enabled ,the battery can be charged by grid only when the time slot grid charge attribute is enabled.

Pv Charge Only : If user don't want to use grid to charge the battery in any time ,please enable this attribute.

6 Time-of-use Slots : There are 6 slots which can be programmed. If grid charge/generator charge is enable, the grid is used to power the load and charge the battery to target SOC at specific bat power attribute value.

Auxload SOC : This function is used to control the on-off of load 2. When the battery is discharged to a certain capacity, the port on load 2 is disconnected and no longer provides power to load 2. When the battery is charged to a certain capacity, the port on load 2 is closed, allowing load 2 to provide power.

11.2 Advanced Mode Setting

The Advanced Mode Settings page can be accessed through the following steps on the screen:

USER->**1. SETUP**->**PASSORD CHECK**->**16.ADVAN SET**

11.2.1 Setting

Interface	Description
--ADVAN SET-- -- >1.Mode Set 　2.Advan Ctrl 　3.TOU Set 　4.Auxload Soc	This interface displays advanced mode settings. 1.　->Inverter working mode setting. 2.　->Inverter related function control. See 12.2.3 **Advan Ctrl** for details. 3.->Time of use setting. See 12.2.4 **Time of use** for details. 4.-> Used to set the SOC of the switch LOAD 2 (only if the battery is present).

11.2.2 Work Mode

Interface	Description
--MODE SET-- -- > 1.Disable 　2.Sell First 　3.SFC.BuySell 　4.SFC.SellDis	On this page, select the advanced mode you need to enable. If selected, the mode will be enabled.

11.2.3 Advan Ctrl

Interface	Description

--ADVAN CONTROL--
-- > 1. Grid Chg En
    2. TOU En
    3. Only PVChg
	1.->Global control, whether the power grid can charge the battery.
	2.->Whether TIME OF USE is enabled
	3.->The battery is charged only by PV, and cannot be charged by the grid.

11.2.4 Time Of Use

| Interface	Description
--SLOT-- -- > 1. Slot1 2. GridChg1 Start: 00:00 End: 00:00 Power: 00.0KW SOC: 0%	1.->From the start time to the end time, charge the battery with the written Power to the written SOC. If GridChg is enabled, allow the grid to charge. 2.->In the slot section, control the grid to charge the battery.

11.2.5 Auxload SOC

Interface	Description
--Auxload SOC-- SOC on: 0% SOC off: 0%	SOC on:The SOC value of the battery enabled by load 2 . SOC off:The SOC value of the battery disabled by load 2 .

12. APP grid compliance parameters interface settings

12.1 grid compliance parameters setting interface of mobile APP

12.1.1 Step of entering interface parameter settings

Interface setting: Enter solarman APP using WIFI dongle > My > Local mode > Scan the QR code of the data stick > Enter the local mode interface > Parameters > Enter the password (00000) > UL parameters.
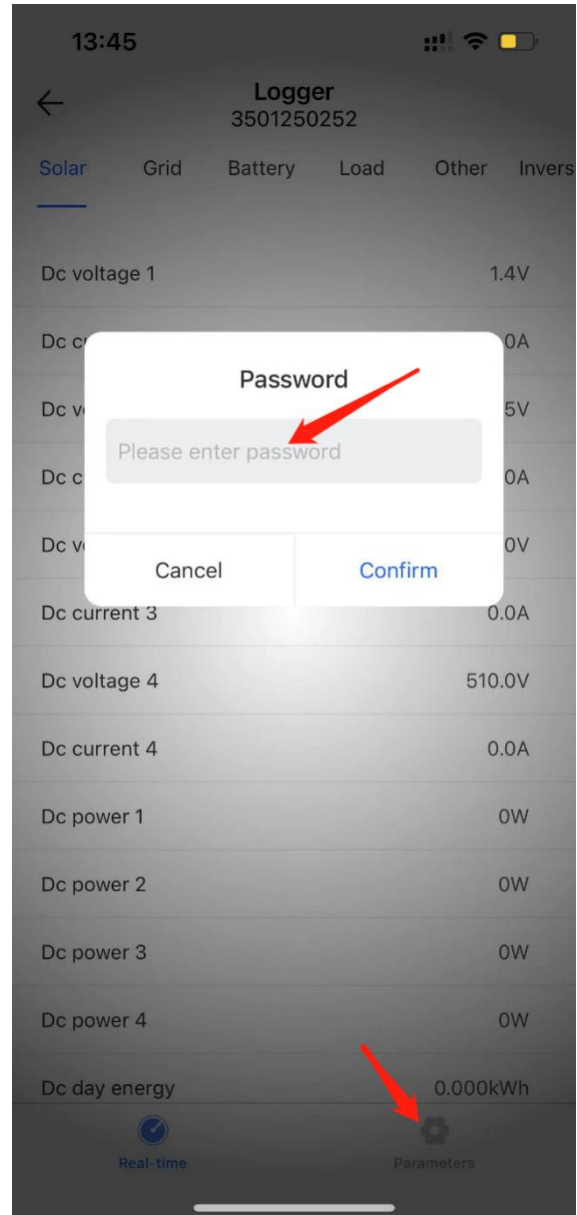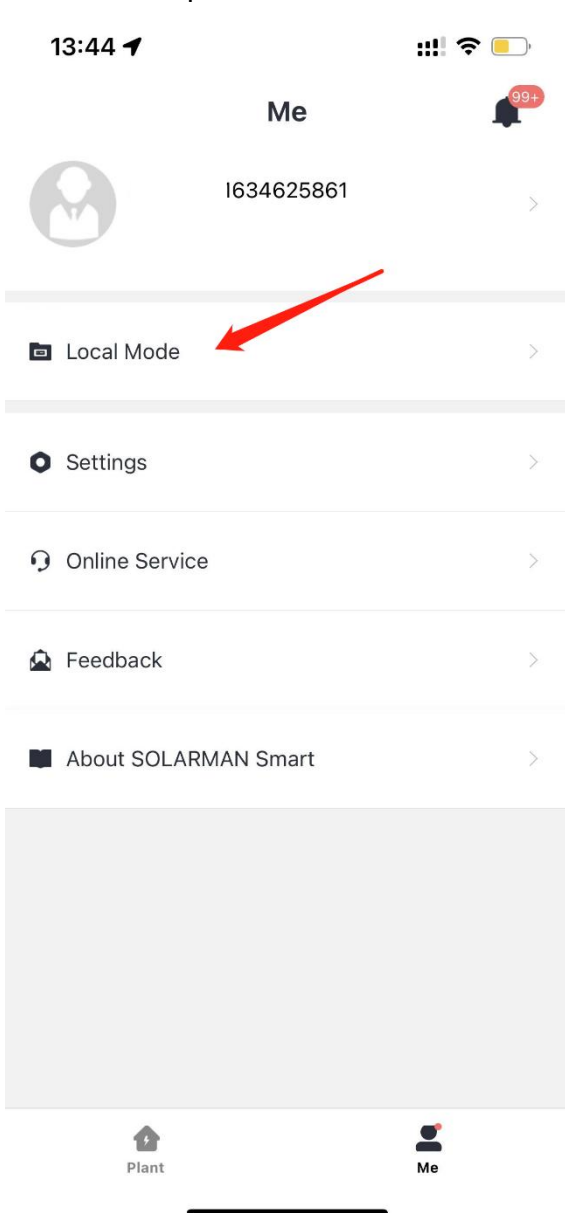
12.1.2 Display interface

UL Set

Vac HV1 Trip	110.0 %/Vn >
Vac HV2 Trip	120.0 %/Vn >
Vac HV3 Trip	120.0 %/Vn >
Vac HV1 ClrTime	1.0 S >
Vac HV2 ClrTime	0.16 S >
Vac HV3 ClrTime	0.16 S >
Vac LV1 Trip	88.0 %/Vn >
Vac LV2 Trip	60.0 %/Vn >
Vac LV3 Trip	45.0 %/Vn >
Vac LV1 ClrTime	2.0 S >
Vac LV2 ClrTime	1.0 S >
Vac LV3 ClrTime	0.16 S >
Fac HF1 Trip	60.50 Hz >

UL Set

Vac LV3 ClrTime	0.16 S >
Fac HF1 Trip	0.50 Hz >
Fac HF2 Trip	61.50 Hz >
Fac HF3 Trip	61.50 Hz >
Fac HF1 ClrTime	300.0 S >
Fac HF2 ClrTime	10.0 S >
Fac HF3 ClrTime	10.0 S >
Fac LF1 Trip	59.20 Hz >
Fac LF2 Trip	57.50 Hz >
Fac LF3 Trip	57.50 Hz >
Fac LF1 ClrTime	300.0 S >
Fac LF2 ClrTime	10.0 S >
Fac LF3 ClrTime	10.0 S >

Var Var RspTime	10.00 S >
Inv NorRampRate	1.60 %Pn/S >
Inv SoftRampRate	1.60 %Pn/S >
Vac Pwr Start	106 %/Vn >
Vac Pwr Stop	110 %/Vn >
Vac Pwr RspTime	10.00 S >
Grid Reconnection Time	100.0 S >
Fac Pwr HFDb	0.500 Hz >
Fac Pwr HFK	50 %Pn/Hz >
Fac Pwr HFRspTime	0.50 S >
Fac Pwr LFDb	0.036 Hz >
Fac Pwr LFK	50 %Pn/Hz >
Fac Pwr LFRspTime	0.50 S >

12.2 Parameters description

12.2.1 Over/under-voltage protection point/time

Interface	Description
L/HVRT Vac HV3 Trip 130%/Vn　　Vac HV3 ClrTime 0.1S Vac HV2 Trip 120%/Vn　　Vac HV2 ClrTime 0.1S Vac HV1 Trip 120%/Vn　　Vac HV1 ClrTime 13.0S Vac LV1 Trip 80%/Vn　　Vac LV1 ClrTime 20S Vac LV2 Trip 50%/Vn　　Vac LV2 ClrTime 2.0S Vac LV3 Trip 50%/Vn　　Vac LV3 ClrTime 0.1S	HV means high voltage trip protection. LV means low voltage trip protection. Vn stands for the rated voltage of the local grid. In US, Vn stands for 120V for split phse. If the user needs to use over-voltage and under-voltage protection, he can find the corresponding parameters in the above mobile APP interface according to the table on the left and set them by himself.

Puerto Rico Grid Compliance Settings:

Interface	Description
L/HVRT Vac HV3 Trip 120%/Vn　　Vac HV3 ClrTime 0.16S Vac HV2 Trip 120%/Vn　　Vac HV2 ClrTime 0.16S Vac HV1 Trip 110%/Vn　　Vac HV1 ClrTime 1.0S Vac LV1 Trip 88%/Vn　　Vac LV1 ClrTime 2.0S Vac LV2 Trip 60%/Vn　　Vac LV2 ClrTime 1.0S Vac LV3 Trip 40%/Vn　　Vac LV3 ClrTime 0.16S	If the user needs to use over-voltage and under-voltage protection, he can find the corresponding parameters in the above mobile APP interface according to the table on the left and set them by himself. Vn stands for the rated voltage of the local grid. In US, Vn stands for 120V for split phse.

12.2.2 Over/under-frequency protection point/time

Interface	Description
L/HFRT Fac HF3 Trip 67.00Hz　　Fac HF3 ClrTime 4.0S Fac HF2 Trip 62.00Hz　　Fac HF2 ClrTime 0.1S Fac HF1 Trip 61.20Hz　　Fac HF1 ClrTime 4.0S Fac LF1 Trip 47.05Hz　　Fac LF1 ClrTime 1.0S Fac LF2 Trip 46.50Hz　　Fac LF2 ClrTime 300S Fac LF3 Trip 45.00Hz　　Fac LF3 ClrTime 3.0S	HF means over-frequency trip protection. LF means under-frequency trip protection. If the user needs to use over-frequency and under-frequency protection, he can find the corresponding parameters in the above mobile phone APP interface according to the table on the left and set them by himself.

Puerto Rico Grid Compliance Settings:

Interface	Description
L/HFRT Fac HF3 Trip <u>61.50Hz</u> Fac HF3 ClrTime <u>10.0S</u> Fac HF2 Trip <u>61.50Hz</u> Fac HF2 ClrTime <u>10.0S</u> Fac HF1 Trip <u>60.50Hz</u> Fac HF1 ClrTime <u>300.0S</u> Fac LF1 Trip <u>59.20Hz</u> Fac LF1 ClrTime <u>300.0S</u> Fac LF2 Trip <u>57.50Hz</u> Fac LF2 ClrTime <u>10.0S</u> Fac LF3 Trip <u>57.50Hz</u> Fac LF3 ClrTime <u>10.0S</u>	If the user needs to use over-frequency and under-frequency protection, he can find the corresponding parameters in the above mobile phone APP interface according to the table on the left and set them by himself.

12.2.3 frequency-active power (freq-watt) mode parameters

Interface	Description
L/HVRT Fac Pwr HFDb <u>0.5Hz</u> Fac Pwr HFK <u>50%Pn/Hz</u> Fac Pwr HFRspTime <u>0.50S</u> Fac Pwr LFDb <u>0.036Hz</u> Fac Pwr LFK <u>50%Pn/Hz</u> Fac Pwr LFRspTime <u>0.50S</u>	HFDb:Over frequency dead band. HFK:Over frequency PF curve. HFRspTime:Over frequency response time. LFDb:Under frequency dead band. LFK:Under frequency PF curve. LFRspTime:Under frequency response time. When the user needs to set the over-frequency and under-frequency dead zone, he can find the corresponding parameters in the above mobile phone APP interface according to the table on the left and set them by himself. Pn:Active power output in percent of nameplate.

13. 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.

Fault diagnosis table

Content	Codes	Explaination	Solutions
DischgOverCur	00	Battery discharge over current. When the battery is loaded, the load is too large.	(1) Nothing need to do, Wait one minute for the inverter to restart. (2) Check whether the load is in compliance with 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 in compliance with 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.
BatDisconnect	02	Battery Disconnect. (Battery voltage not identified)	(1) Check whether the battery is connected. (2) Check if battery wiring port is open circuited. (3) Contact customer service if error warning continues.
Bat Under Vol	03	Battery voltage low that normal range.	(1) Checking System Settings, If so, power off and restart. (2) Check if the grid power down. If so, waitting for the grid power up, the inverter will automatically charge. (3) Contact customer service if error warning continues.
Bat Low capacity	04	Bat Low capacity	(1) Battery Low that setting capacity.(SOC<100%-DOD)
Bat Over Vol	05	The battery voltage is greater than the Inverter maximum voltage.	(1) Checking System Settings, If so, power off and restart. (2) Contact customer service if error warning continues.
Gird low vol	06	Grid voltage is	(1) Check if the grid is abnormal.

Grid over vol	07	abnormal	(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.	(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 overFreq	09		
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 unremoved.
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 maximum value..	(1) Check the input mode setting is correct. (2) Restart the inverter and wait until it functions normally.
Inv over cur	15	The inverter current exceeds the normal value.	(1) Restart the inverter and wait until it functions normally.
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		
InvFreqAbnor	20	INV frequency is abnormal	(1) Check if the INV frequency is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.

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.
bat over temp	23	Battery temperature is higher than the allowed value.	(1) Disconnect the battery and reconnect it after an hour.
bat UnderTemp	24	Battery temperature is low than the allowed value.	(1) Check the ambient temperature near the battery to see if it meets the specifications.
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.(If you can see it)
Grid Phase err	30	The grid fault phase.	(1) Check power grid wiring
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.(If you can see it)
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.
Grid Relay Fault	39		
EPS rly fault	40		(2) Contact customer service if error warning continues.
Gfci fault	41		
Selftest fail	44		
System fault	45		
Current DCover	46		
Voltage DCover	47		

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