



User Manual

Freedom Won Single Phase Inverters

Encore 8K and Encore 10K

Distributed By Freedom Won (Pty) Ltd

*Kimbult Industrial Park, Unit C3 & C4
9 Zeiss Road
Laser Park, Honeydew
2040
South Africa*

www.freedomwon.co.za

Technical and Installation Assistance – Contact:

Please contact your Freedom Won Distributor/Reseller or Installer for technical and installation support. A directory of Distributors and Reseller Installers is available at www.freedomwon.co.za.

For advanced support please contact support@freedomwon.co.za.

Update Record:

Revision Number	Update Summary	Updated By	Date of Issue
1	Generator Settings Included	Tshepho Chego	17 August 2023

Table of Contents

1.	Notes on this Manual.....	3
1.1.	Scope of Validity.....	3
1.2.	Target Group.....	3
2.	Introduction.....	3
2.1.	Important Safety Instructions.....	3
1.2	Explanation of Symbols.....	7
1.3	Basic features.....	8
1.4	Work Modes.....	10
1.5	Dimensions.....	13
2.	Interface definition and Technical Data.....	13
2.1	Interface definition.....	13
2.2	Technical Data.....	14
2.3.	Safety and Protection.....	15
3.	Installation.....	15
3.1	Check for Physical Damage.....	15
3.2	Packing List.....	15
3.3	Tools required for installation.....	16
3.4	Mounting.....	16
4.	Electrical Connection.....	18
4.1.	PV connection.....	18
4.2.	Grid Connection (GEN connection).....	19
4.3.	Back-up: Load1 and Load2 Connection.....	19
4.4.	Battery Connection.....	21
4.5.	Meter Connection.....	24
4.6.	WIFI Connection.....	25
4.7.	CT Installation instructions.....	25
4.8.	Inverter Parallel Configuration Guide.....	26
5.	Generator Settings.....	31
6.	LCD Interface and Setting.....	31
7.	Fault diagnosis and solutions.....	51

1. Notes on this Manual

1.1. Scope of Validity

This manual must be referenced together with the Encore Single Phase Inverter installation and operation. It provides detail important for the assembly, installation, commissioning, and maintenance of the product. A troubleshooting guide is included to assist with assessing the types of failures and related remedies.

Please read this manual carefully before operating the product.

The Encore single phase inverter range covers models 8K and 10K.




1.2. Target Group



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

2. Introduction

2.1. Important Safety Instructions

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

<p>Danger!</p> 	<ul style="list-style-type: none"> • Poses a danger to life due to high voltage. • All work must be done by a qualified electrician. • The appliance is not to be used by children, or persons with reduced physical, sensory, or mental capabilities, or that lack the required experience and knowledge. • The appliance must be installed out of reach of children.
<p>Caution!</p>	<ul style="list-style-type: none"> • Danger of burn injuries due to hot enclosure parts. • During operation, the enclosure's upper lid and body may become hot. Only touch the lower lid during operation.
<p>Caution!</p> 	<ul style="list-style-type: none"> • Possible damage to health because of the effects of radiation! • Do not stay closer than 20cm to the inverter for extended periods.
<p>Note!</p> 	<ul style="list-style-type: none"> • Grounding the PV generator: • Comply with the local requirements for grounding the PV modules and the PV generator. The generator frame and other electrically conductive surfaces should be connected in a manner that ensures continuous conductivity and grounding of these items to ensure optimal protection of the system and persons.
<p>Warning!</p>	<ul style="list-style-type: none"> • Ensure input DC voltage \leq Max. allowed DC voltage.

	<ul style="list-style-type: none">• Overvoltage may cause permanent damage to the inverter or other losses, which will not be included in the warranty!
Warning! 	<ul style="list-style-type: none">• Authorized service personnel must disconnect both AC and DC power from the inverter before attempting any maintenance or cleaning or Risk of electric shock working on any circuits connected to the inverter.• Risk of electric shock!

- Adhere to the instructions and requirements of this manual.
- Prior to the application, please read this section carefully to ensure correct and safe application. Please keep the user manual for continuous reference.
- When operating equipment, in addition to following the precautions in this document, follow the accepted safety requirements associated with the work being performed. Freedom Won will not be liable for any consequences of violation of the safety regulations relating to proper installation and operation of the product.
- Only accessories supplied with the inverter are recommended. Use of other unverified parts may result in a risk of fire, electric shock, or injury to persons.
- Make sure that existing wiring is in good condition and that wires are not undersized.
- Do not disassemble any parts of the inverter which are not mentioned in the installation guide. It contains no user-serviceable parts. See the warranty document for instructions on obtaining service from the manufacturer. Attempting to service the inverter yourself may result in a risk of electric shock or fire and will void your warranty.
- Do not expose the inverter to flammable or explosive materials.
- The installation location should be free of corrosive substances and humid condensing air.
- Authorized service personnel must use insulated tools when installing or working with this equipment.
- PV modules shall have an IEC 61730 class A rating.
- Do not touch either the positive or negative pole of the PV connecting device. Never touch both at the same time.
- The unit contains capacitors that remain charged to a potentially lethal voltage after the mains, battery, and PV supply have been disconnected.
- A hazardous voltage will be present for up to 5 minutes after disconnection from the power supply.
- CAUTION - RISK of electric shock from energy stored in a capacitor, never operate on the inverter couplers (plugs), 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 5 minutes to let the intermediate circuit capacitors discharge before unplugging the PV DC, battery connectors, and mains couplers.
- When accessing the internal circuits of the inverter, it is very important to wait 5 minutes before operating the power circuit or removing the electrolyte capacitors inside the device. Do not open the device beforehand since the capacitors require time to sufficiently discharge!

- Surge protection devices (SPDs) for PV installation:



WARNING!

Over-voltage protection with surge arresters should be provided the PV power system is installed. When The grid connected inverter is not fitted with SPDs in both PV input and mains input

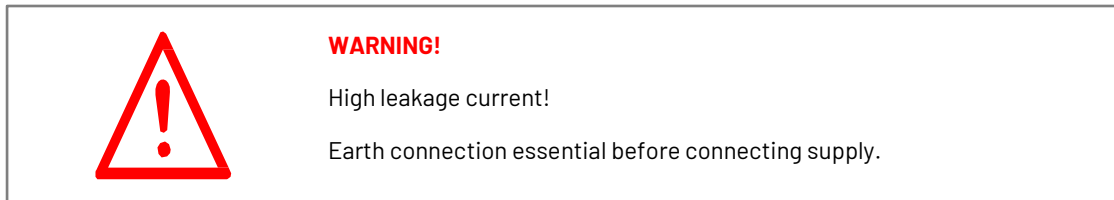
- Lightning will cause damage either from a direct strike or from surges due to a nearby strike.
 - Induced surges are the most likely cause of lightning damage in majority of installations, especially in rural areas where electricity is usually provided by long overhead lines. Surges may originate on both the PV array conductors 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, and the lightning current surge can be discharged into the ground.
 - Installation of Surge Protection Devices (SPDs) is recommended to protect the inverter against mechanical damage and excessive stress. Including a surge arrester in case of a building with external lightning protection system (LPS) when separation distance is kept.
 - To protect the DC system, SPD type2 should be fitted at the inverter end of the DC cabling, if the voltage protection level (VP) of the surge arresters is greater than 1100V, an additional SPD type 3 is required for surge protection for electrical devices.
 - To protect the AC system, SPD type2 should be fitted at the main incoming point of AC supply (at the consumers breaker), located between the inverter and the meter/distribution system.
 - All DC cables should be installed to provide as short a run as possible. 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 impedance voltage across their terminals is typically more than 30 volts.
-
- Anti-Islanding Effect

Islanding effect is a phenomenon where a grid-connected PV system can still supply power to the nearby grid when the local grid is off. It is dangerous for maintenance personnel and the public.

The Encore Single Phase series inverters provide Active Frequency Drift (AFD) to prevent the occurrence of islanding.

- PE Connection and Leakage Current

The end-use application shall monitor the protective conductor using the Residual Current Operated Protective Device (RCD) with rated fault current $I_{fn} \leq 240\text{mA}$ 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 about 700nf.



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

- Make sure that the grounding conductor is adequately sized as required by safety regulations.
- Do not connect the ground terminals of the unit in series in case of a multiple installation.
- This product can cause current with a DC component, where a residual current operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of type B is allowed on the supply side of this product.
- Do not connect the ground terminals of the unit in series in case of multiple installations. This product can cause current with a DC component, where a residual current operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of type B is allowed on the supply side of this product.

Battery Safety Instructions

The Encore 8K and 10K inverter operate on a "low voltage" battery, for the specific parameters such as battery type, nominal voltage, and nominal capacity etc., please refer to section 4.

As batteries may contain potential electric shock and short-circuit current danger, to avoid accidents 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 off load connected to the batteries before dismantling battery connection terminals.
6. Only personal with proper expertise can carry out the maintenance of batteries.

1.2 Explanation of Symbols

This section explains all the symbols shown on the inverter's type label.

Symbols on the Type Label

Symbol		Explanation
CE mark.		The inverter complies with the requirements of the applicable CE guidelines.
TUV certified.		The product is compliant with applicable safety and operating standards.
RCM remark		Regulatory Compliance Mark The product adheres to all safety regulations and is certified for sales
SAA certification.		Certified approval for declared and non-declared electrical equipment that has proven to comply with the safety requirements of the applicable Australian Standard.
Beware of the hot surface.		The inverter can become hot during operation.
The danger of high voltages		Dangerous due to high voltages in the inverter!
Danger		Risk of electric shock!
Disposal		The inverter cannot be disposed of with household waste. Disposal information can be found in the enclosed documentation.
Documentation		Observe enclosed documentation
Do not operate		Do not operate on this inverter until it is isolated from the battery, mains, and on-site PV generation supply.
Dangerous due to high voltage.		There is residual voltage existing in the inverter after power off, which needs 5 min to discharge. • Wait 5 min before you open the upper lid or the DC lid.

1.3 Basic features

The Encore 8K and Encore 10K series inverters is a high-quality inverter range that can:

- Convert solar energy to AC energy,
- Store solar energy in batteries,
- Use battery stored energy to supply the AC output without the grid being available,
- Export excess solar energy to the grid,
- Use the grid to charge batteries if needed,
- Use the grid to support loads directly if needed,
- a fuel generator interface for backup power if needed.

The Encore 8K and 10K series inverters supply single-phase 230V AC output and are designed to operate optimally on all Freedom Won 52V LiFePO4 batteries using CAN Bus for communication between the batteries and the inverters.

The Freedom Won battery ranges presently available to operate with these inverters are as follows:

- Freedom Won LiTE Home 52V
- Freedom Won LiTE Marine 52V
- Freedom Won LiTE Business 52V
- Freedom Won eTower e5000

The inverter can be used to optimize the self-consumption of solar energy by storing energy in the battery for future use. The battery can alternatively be kept fully charged from the grid with PV used to supply loads and/or to export to the grid.

The operating mode depends on the amount of PV energy installed, the size of the battery system, or the user's preference. The inverter can provide power for emergency use during grid outages by using the energy from both the battery and/or the inverter (using power generated from PV).

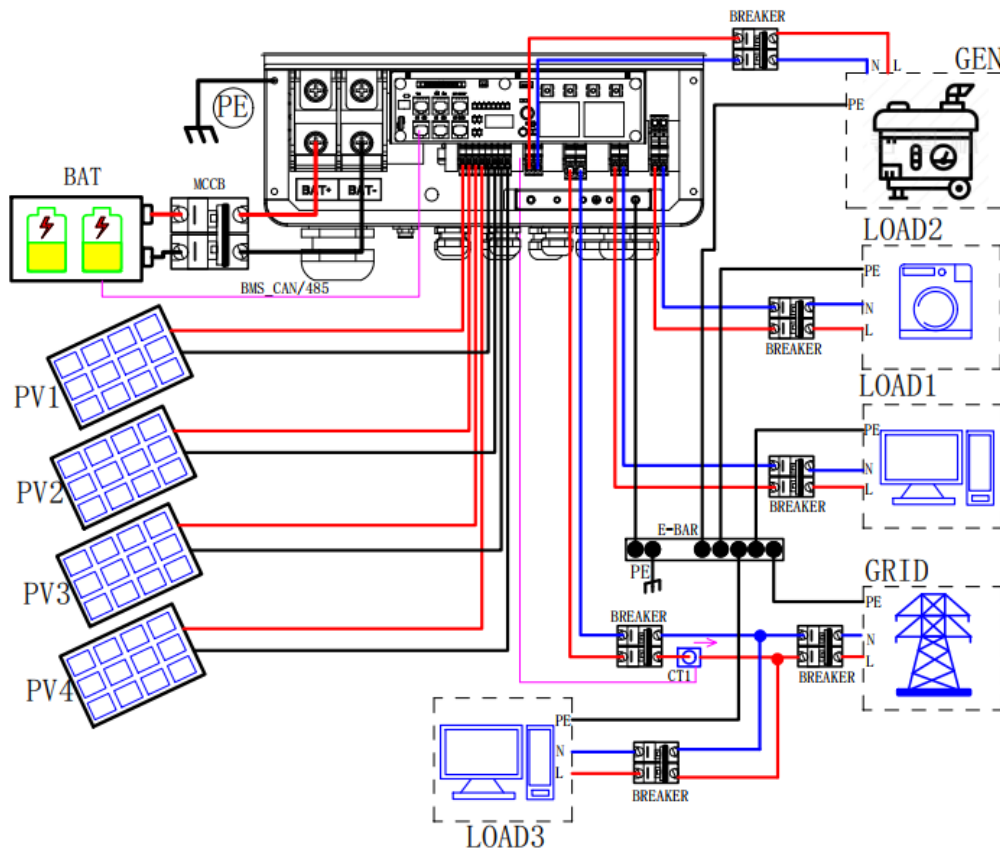
The inverter can be configured as per Figure 1.1 with a dedicated Essential Power Supply (EPS) as well as a grid parallel connection. The EPS provides seamless power to essential loads when the grid fails by supplying this power from a combination of battery and PV energy sources. The loads connected to this EPS must not exceed the power rating of the inverter. Larger and less important loads can be connected to the AC input side of the inverter without being concerned about the inverter's maximum output power rating. Although these loads will not receive power when the grid is off, the advantage of this configuration is that any excess PV power can be directed to these loads

when the grid is on, which reduces the demand from the grid. A Current Transformer (CT) (included with inverter) is used to measure the current at the grid metering point, which allows the inverter to prevent feeding any excess energy to the grid if grid export is not desired, or not allowed.

An optional changeover switch is shown in Figure 1.1 to allow diverting the essential loads to the grid directly, should the inverter need to be taken offline for maintenance.

If the users load exceeds the inverter load rating, then the user must select a larger inverter with adequate power rating.

Figure 1.1 Typical System Connection Diagram



Note!

- The peak load power must not exceed the rated output power on the Load 1 and Load 2 connections. The load profile at the premises must be assessed before selecting the inverter size, or larger loads must be connected on the Load 3 connection point (non-backup). The inverter will shut down with an “overload fault” if the loads exceed the rated power.
- Comply with the local power utility regulations for grid connected systems.

1.4 Work Modes

The Encore hybrid inverters provide multiple operating modes based on different requirements.

	<p>Operating Mode: Self-consumption or battery cycling</p> <p>1. When PV, Grid, and Battery are available:</p> <ul style="list-style-type: none"> A. Solar provides power to the loads as first priority, if solar power is sufficient to power all connected loads, solar power excess will be used to charge the battery, or – if the battery is fully charged – will feed to non-essential loads or the grid. B. Solar provides power to the loads as first priority, if solar power is not sufficient to support all connected loads, battery energy will supplement the solar power supplied to the loads. C. Solar provides power to the loads as first priority, if solar energy and battery are not sufficient to power all connected loads, utility energy (grid) will supply power to the loads supplemented by the available solar energy. <p>2. When PV, Battery is available (the grid is disconnected):</p> <ul style="list-style-type: none"> A. Solar energy provides power to the loads as first priority, if solar energy is sufficient to power all connected loads, solar energy will provide power to charge the 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.
	<p>Operating Mode: Time of Use Scheduling (Peak shift)</p> <p>1. When PV, Grid, and Battery are available:</p> <ul style="list-style-type: none"> A. During battery charge time, solar power will charge the battery as first priority. The excess power will supply the loads. If solar power is sufficient to supply loads and charge the battery, and if there's still some extra energy, then the excess power will feed the power to non-essential loads and the grid. B. During battery charge time, solar energy will charge the battery as first priority, then the excess solar energy will supply power to loads. If solar energy is not sufficient to charge the battery and supply loads, the grid will supply the connected loads while available solar power charges the battery.

<p>OPERATING MODE:1C PV and BAT feed into INVERTER. INVERTER outputs to GRID and EPS.</p> <p>OPERATING MODE:1D PV feeds into INVERTER. INVERTER outputs to GRID and EPS.</p> <p>OPERATING MODE:2A GRID and EPS feed into INVERTER. INVERTER outputs to BAT.</p> <p>OPERATING MODE:2B BAT feeds into INVERTER. INVERTER outputs to GRID and EPS.</p> <p>OPERATING MODE:2C BAT and GRID feed into INVERTER. INVERTER outputs to EPS.</p>	<p>C. During battery discharge time, solar provides power to the loads as first priority, if solar power is sufficient to supply loads, and if there's still some extra power from solar, then the excess solar power and the battery will deliver the power to the non-essential loads or grid at the same time.</p> <p>D. In the period of no charge or discharge, the solar power supplies load as first priority, and excess energy is fed to non-essential loads and the grid.</p> <p>2. When Grid and Battery are available (PV is unavailable):</p> <p>A. During battery charge time, the grid will charge the battery and supply power to the connected loads at the same time.</p> <p>B. During battery discharge time, if load power is less than battery power, the battery will supply power to loads as first priority, the excess battery power will feed to non-essential loads and the grid.</p> <p>C. During battery discharge time, if load power is more than battery power, the battery and grid will supply power to the loads at the same time.</p>
<p>OPERATING MODE:1A PV and BAT feed into INVERTER. INVERTER outputs to GRID and EPS.</p> <p>OPERATING MODE:1B PV and BAT feed into INVERTER. GRID and EPS feed into INVERTER.</p> <p>OPERATING MODE:1C PV and BAT feed into INVERTER. INVERTER outputs to GRID and EPS.</p> <p>OPERATING MODE:1D PV feeds into INVERTER. INVERTER outputs to GRID and EPS.</p>	<p>Operating Mode: Time of Use Scheduling (load shift)</p> <p>1. When PV, Grid, and Battery are available:</p> <p>A. During battery charge time, solar power will charge the battery as first priority. The excess power will supply the loads. If solar power is sufficient to supply loads and charge the battery, and if there is still some extra energy, then the excess power will feed the power to non-essential loads and the grid.</p> <p>B. During battery charge time, solar energy will charge the battery as first priority, then the excess solar energy will supply power to loads. If solar energy is not sufficient to charge the battery and supply loads, the grid will supply the connected loads while available solar power charges the battery.</p> <p>C. During battery discharge time, solar provides power to the loads as first priority, if solar power is sufficient to supply loads, and if there is still some extra power from solar, then the excess solar power and the battery will deliver the power to the non-essential loads or grid at the same time.</p> <p>D. In the period of no charge or discharge, the solar power supplies load as first priority, and excess energy is fed to non-essential loads and the grid.</p>

<p>OPERATING MODE:2A</p> <p>OPERATING MODE:2B</p> <p>OPERATING MODE:2C</p>	<p>2. When Grid, Battery is available (PV is unavailable):</p> <ol style="list-style-type: none"> During battery charge time, the grid will charge the battery and supply power to the connected loads at the same time. During battery discharge time, if load power is less than battery power, the battery will supply power to loads as first priority, the excess battery power will feed to non-essential loads and the grid. During battery discharge time, if load power is more than battery power, the battery and grid will supply power to the loads at the same time.
<p>OPERATING MODE:1A</p> <p>OPERATING MODE:1B</p> <p>OPERATING MODE:2A</p>	<p>Operating Mode: Bat priority</p> <ol style="list-style-type: none"> When PV, Grid, and Battery are available: <ol style="list-style-type: none"> Solar energy will charge the 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 the grid. Solar energy will charge the battery as first priority. If solar energy is insufficient to charge the battery and supply loads, the grid will supply power to loads. When only the Grid and Battery are available (PV not available): <ol style="list-style-type: none"> The grid will supply power to the load and charge the battery at the same time.



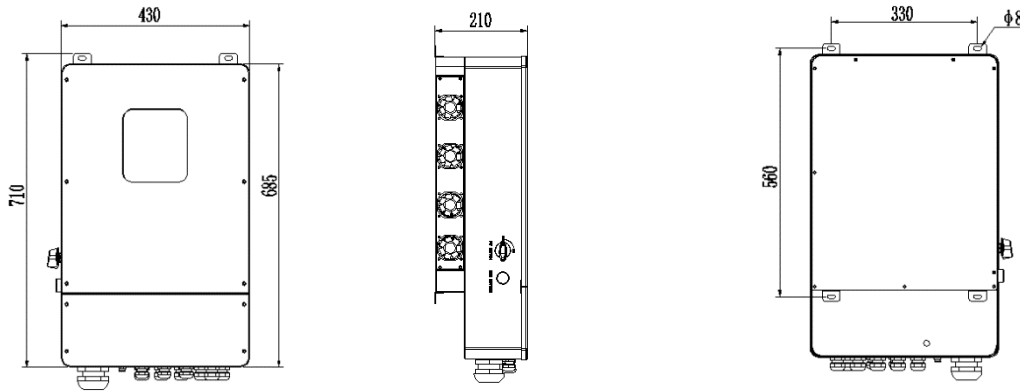
Note!

If the "anti-Reflux" (zero-export) function is set on the inverter, in all operating modes the system will not feed power to the grid, only to non-essential loads.

1.5 Dimensions

Principle dimensions are provided in Figure 1.3. The Encore 8K and Encore 10K have the same casing size.

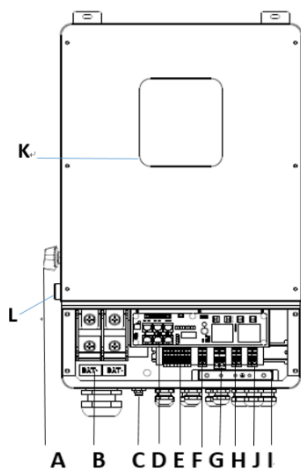
Figure 1.3 Principal Inverter Dimensions



2. Interface Definition and Technical Data

2.1 Interface definition

Figure 2.1 Labelled View of Terminals of PV Inverter



OBJECT	DESCRIPTION
A	DC switch
B	BAT input
C	Wi-Fi
D	DRM/BMS/CT/DRY IO/CAN/USB upgrading
E	PV1~PV4 input
F	Generator
G	Grid
H	BACK-UP1 output
J	BACK-UP2 output
I	PE
K	LCD
L	Rapid Shutdown (RSD) button (ON/OFF)



Note!

Installation to be completed only by qualified electrician

2.2 Technical Data

Note: If the South African national grid standard is selected, the grid power is only 4.6KW!

Encore Single Phase Inverter Range

Technical Specification	Encore 8K	Encore 10K
Input (PV)		
Max. power(kW)	12	13
Max. DC voltage(V)		500
MPPT voltage range(V)		120-500
Max.input current of single MPPT(A)		12/12
MPPT tracker/strings		4/1
AC output		
Rated output power(kVA)	8	10
Max. output current(A)	38.3	47.8
Grid voltage/range(V)		230/176-270
Frequency (Hz)		50/60
Displacement Power Factor		0.8lagging-0.8leading
THDi		<3%
Battery		
Battery voltage range(V)		40-60
Max. charging voltage(V)		58
Max. charge/discharge current(A)	190/190	210/210
Battery type		Lithium / Lead-acid
Communication interface		CAN/RS485/WIFI/LAN/DRM
EPS output		
Rated power (kVA)	8	10
Rated output voltage(V)		230
Rated output current(A)	38.3	47.8
Rated frequency (Hz)		50/60
Automatic switching time (ms)		<20
THDv		<2%
General data		
Battery chage/discharge efficiency	95%	95%
DC Max. efficiency	97.2%	97.2%
Europe efficiency	97.8%	97.8%
MPPT efficiency		99.9%
Ingress protection		IP65
Noise level (dB)		<40
Operation temperature(C)		-25-60(derating at 45)
Cooling		Natural
Storage/Operation Relative humidity		4-100%(non-condensing)
Altitude(m)		<2,000
Dimensions W * D * H(mm)		430*220*710
Weight (kg)		41
Night-time consumption(W)		<3
Safety Compliance		
Safety Standard	IEC/EN62109-1/-2, IEC/EN62477-1, EN 62109-2	
EMC	IEC 61000-6-1/-2/-3/-4, IEC 61000-3-11, IEC61000-3-12	
Certificates	South Africa NRS, IEC 62109-1/-2, IEC 61000-6-1, IEC 61000-6-3	

2.3. Safety and Protection

Safety & Protection	
Over/under voltage protection	YES
DC isolation protection	YES
Monitoring ground fault protection	YES
Grid protection	YES
DC injection monitoring	YES
Back feed current monitoring	YES
Residual current detection	YES
Anti-islanding protection	YES
Overload protection	YES
Over temperature protection	YES
Max. output fault current	55A
Max. output over current	28.7A

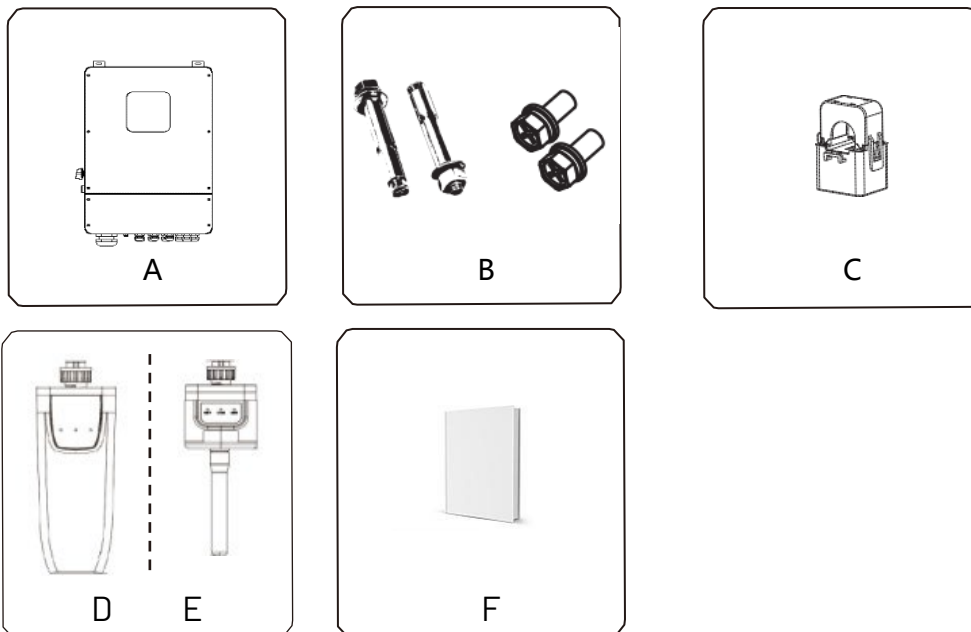
3. Installation

3.1 Check for Physical Damage

Ensure that the inverter was not damaged during transportation. If there is any visible damage, please contact your supplier/installer immediately.

3.2 Packing List

Open the package and take out the product, please check the accessories first. The packing list is shown below.



Object	Description
A	Inverter
B	Expansion screws and pan-head screws
C	CT (Grid current)
D	Wi-Fi module (standard)
E	GPRS module (optional)
F	User manual

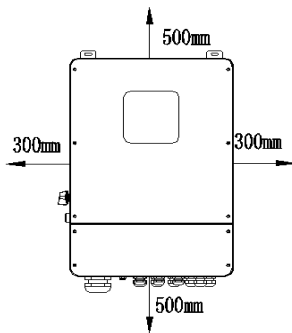
3.3 Tools required for installation.

Installation tools: Crimping pliers for PV pin connectors, RJ45 crimping tool, screwdrivers, masonry drill, spanners, sockets, etc.



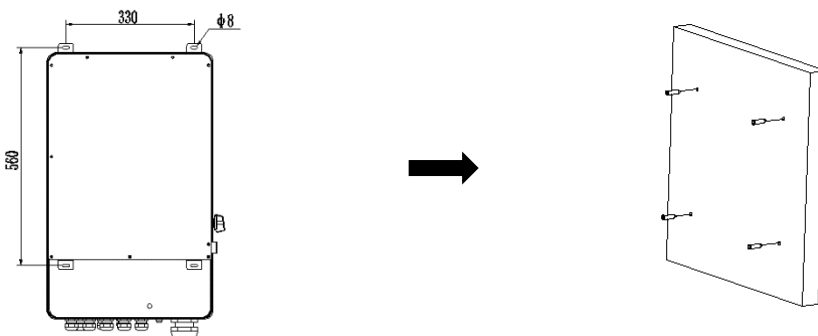
3.4 Mounting

Space Requirement



Position	Min.size
Left	300mm
Right	300mm
Top	500mm
Bottom	500mm
Front	1000mm

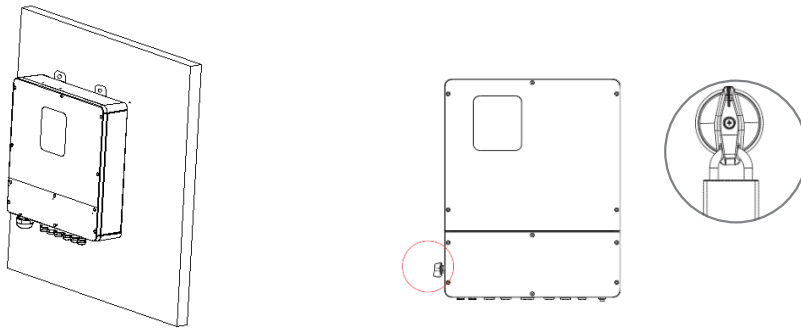
Step 1: Screw the wall bracket on the wall.



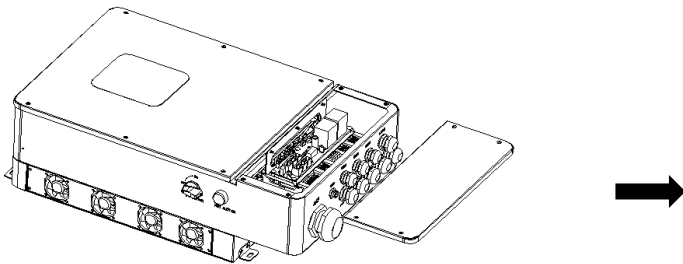
- 1.1 Place the bracket on the wall and mark down the position of the 4 holes.
- 1.2 Drill holes with the masonry drill, make sure the holes are deep enough (at least 60mm) to support the inverter.
- 1.3 Install the wall plugs in the holes and tighten them. Then install the wall bracket with the wall plug screws.

Step 2: Place the inverter on the wall-mounted bracket by holding the handles on the sides.

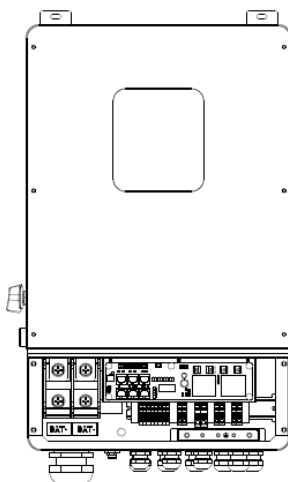
Step 3: Tighten the fixing screws on both sides of the inverter.



Step 4: Remove the cover screws by Allen Key and remove the cover.





Step 5: insert the respective cables into the glands and once terminated tighten the gland nuts



4. Electrical Connection

4.1. PV connection

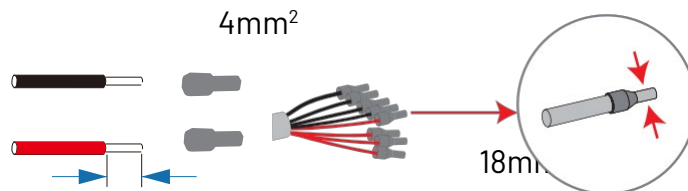
The Encore 8k and Encore 10k models can be connected with 4-strings of PV modules. Open-circuit voltage of module strings should be <Max. DC input voltage; operating voltage ($V_{maxpower}$) should be within the specified MPPT voltage range.

	<p>WARNING!</p> <ul style="list-style-type: none">• PV module voltage can be dangerous. Comply with safe procedures and practices when connecting.• Do not connect either positive or negative PV to ground.
	<p>Note!</p> <p>In order to save cable and reduce DC power loss, the inverter should be installed as near as possible to the PV modules.</p>

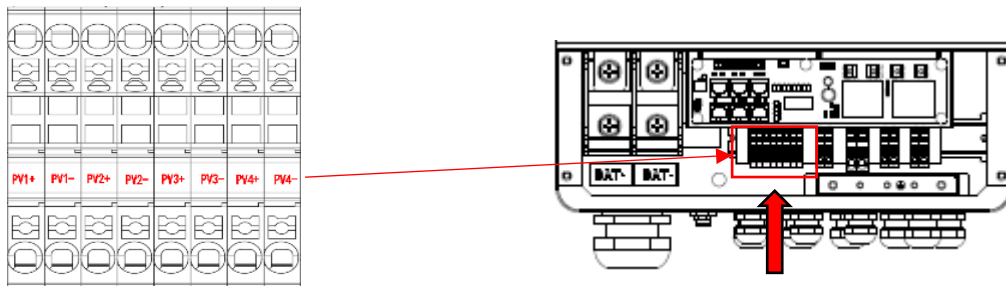
Step 1: Wiring.

1.1 Use 4mm² wire to connect the panel strings and crimp bootlace ferules on each cable end.

1.2 Remove 18mm of insulation from end of wire.



Step 2: Insert the PV cables through the PV cable glands, connect PV cables to PV terminals.



4.2. Grid Connection (GEN connection)

Step 1: Check the grid voltage.

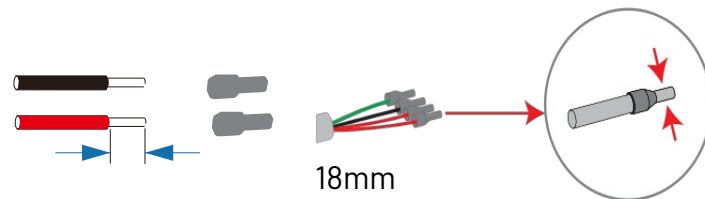
- 1.1 Check the grid voltage and compare with the permissive voltage range (Please refer to technical data).
- 1.2 Disconnect the circuit board from all the incoming phases and secure against re-connection.

Step 2: Grid cables selection

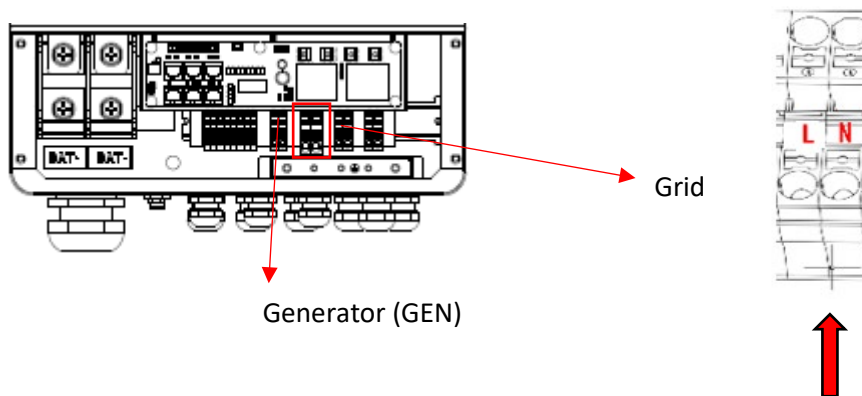
Select the cable sizes as per below table

Model	Encore 8K	Encore 10K
Cable	6mm ²	10mm ²

Step 3: Remove 18mm of insulation from the end of each wire and crimp on a bootlace ferrule.



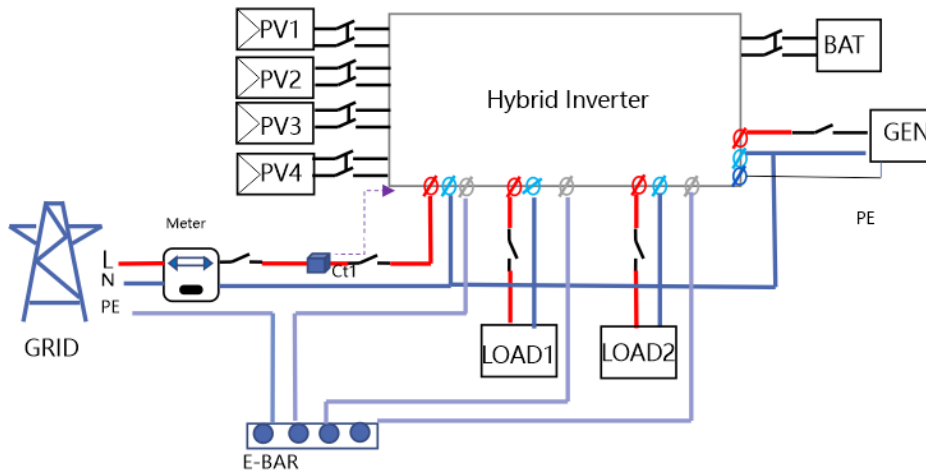
Step 4: Insert the Grid cables through the grid cable glands and connect grid cables to grid terminals.




4.3. Back-up: Load1 and Load2 Connection

The Encore inverters have an On and Off grid function, the inverter can deliver output power to the grid input when the grid is on as well as to the back-up outputs, and it will deliver output power to the back-up outputs when the grid is off.

- Load1 port: use this output for the important loads that should never lose power.
- Load2 port: use this output for loads that can be switched off if the battery drops below the preset SoC.





Note!
Ensure the installation complies with local regulations where they differ from especially for the wiring of neutral line, grounding, and RCD.

- Back-Up: Load1 and Load2 Connection:

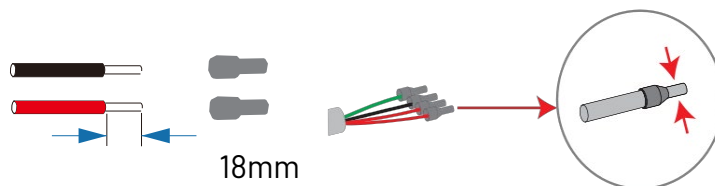
The load outputs must be connected to circuit breakers as below:

Model	Encore 8K	Encore 10K
Circuit Breaker	40A	50A

Note: The absence of AC breakers on the load outputs lead to inverter damage if an electrical short circuit occurs on the output wiring circuits.

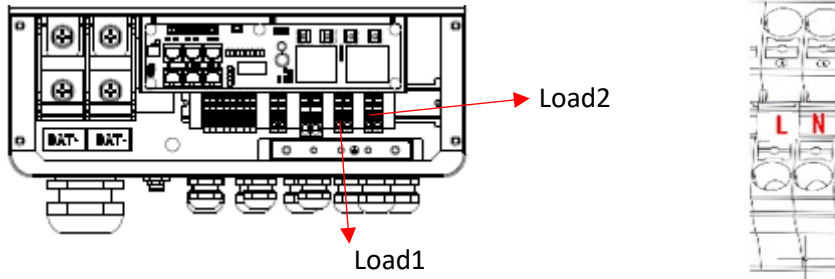
Step 1: Prepare the load output cables.

Model	Encore 8K	Encore 10K
Cable	6mm ²	10mm ²



Step 2: Connect the cables to the load output terminals on the inverter: Load1 and Load2 port of the inverter.

(Load1≤Rated power, Load2≤Rated power, (Load1+Load2)≤Rated power)



- Requirements for BACK-UP load (Load1 and Load2 outputs)



WARNING!

- Make sure the BACK-UP load power rating is less than the BACK-UP max output power rating, otherwise the inverter will shut down with an "overload" warning.
- When an "overload" occurs, adjust the load power to make sure it is below the BACK-UP output power limit, then turn the inverter back on.
- For the inductive loads, please make sure the start-up inrush current is below the BACK-UP output current limit.

4.4. Battery Connection

The Encore 8k and Encore 10k inverters are designed to operate on a lithium battery with nominal voltage between 48V and 52V.

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

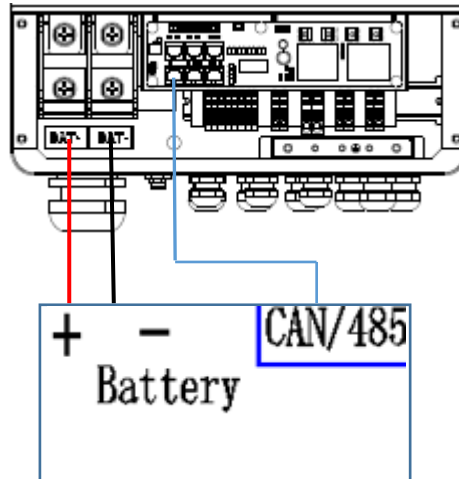
- Battery breaker

The connection of the battery to the breaker should include either a DC breaker or isolator, or a set of fuses that can be pulled out to isolate the battery from the inverter for maintenance. Note that when installing a Freedom Won LiTE battery, the external isolation device is not needed because the LiTE battery includes an integral DC breaker that can be used for isolating the battery from the inverter during maintenance.

The isolating device must be rated as follows:

Model	Encore 8K	Encore 10K
Current[A]	250A	300A

- Battery connection diagram




- BMS PIN Configuration

The communication interface between the inverter and battery is RS485 or CAN and uses an RJ45 connector.

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

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

Note!



The battery communication must be compatible with the inverter to work. If a battery brand besides a Freedom Won battery is to be used with these inverters, please contact Freedom Won for confirmation of compatibility.

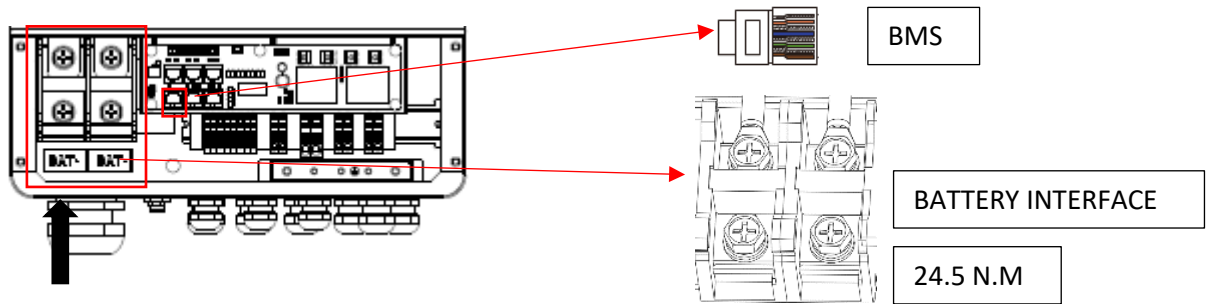
- Power Connection to the Battery:

Step 1:

Strip the battery cables back 15mm from the end and fit a crimp ring terminal with M8 ring size. The battery cable size to the inverter must be 35mm² minimum for the Encore 8k and minimum 50mm² for the Encore 10k. Apply heat shrink to the crimped area as shown in black fill below.



Step 2: Insert the cables through the battery connection glands and connect battery cables to battery terminals




Note!

Positive and negative connections must not be reversed!

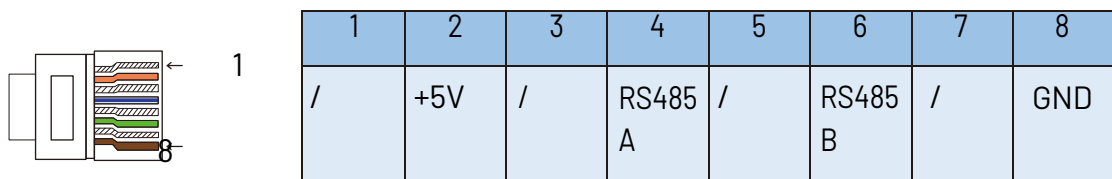
4.5. Meter Connection

A meter may be installed for monitoring the power consumption of the premises.

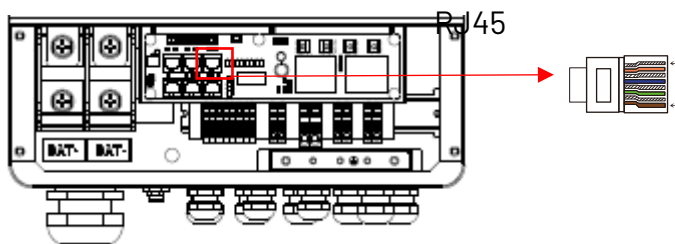
	<p>Note! The meter selected must be compatible with the inverter. If you wish to install a meter please contact Freedom Won for help with selecting the correct meter.!</p>
---	--

- Meter PIN Definition

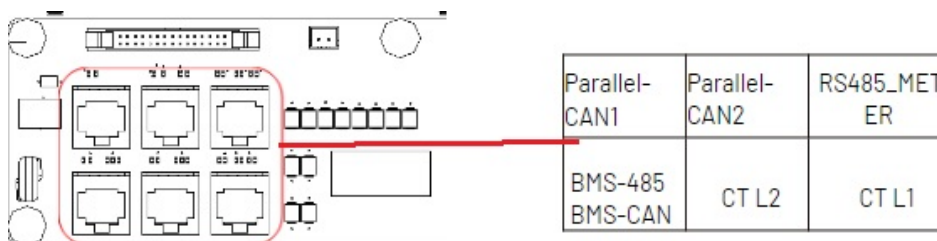
The communication interface between the inverter and meter is RS485 with an RJ45 connector.



Step 1: Make RJ45 wire, insert the Meter wire through the com port gland.



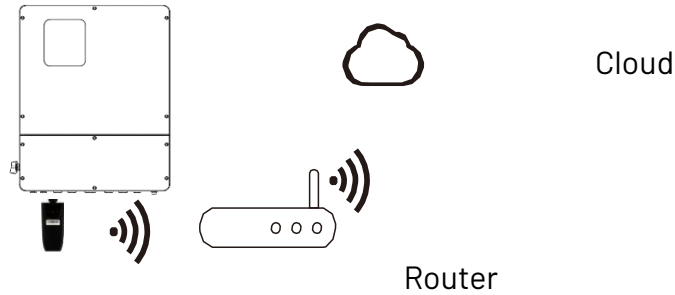
Step 2: Insert one RJ45 side of the cable into the Meter port inside of inverter and the other side into BMS-485 port of the meter.



4.6. WIFI Connection

Inverter provides a WIFI port which can collect data from inverter and transmit it to monitoring-website by WIFI. The WiFi dongle is provided with the inverter as standard.

- Diagram



- WIFI Connection:


Step1. Plug Wi-Fi into “WIFI” port at the bottom of the inverter.

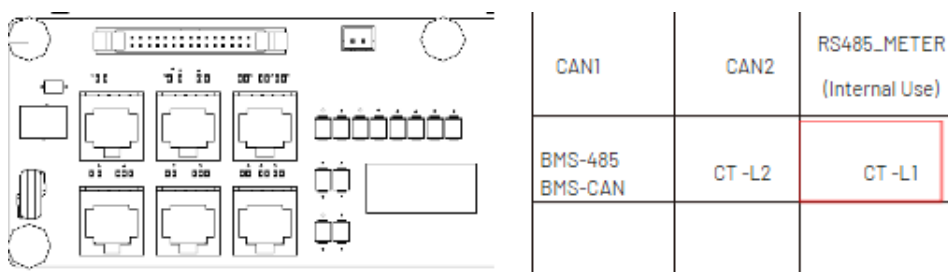
Step2. Establish the connection between the inverter and router.

Step3. Create a user account online (please check the WiFi user manual for more details).

4.7. CT Installation Instructions

A Current Transformer (CT) is used to measure the Grid current.

	<p>Note!</p> <p>If CT is not installed or installed reversely, the functions of "Zero Export", "Self-Consumption"- Consumption of Use Scheduling" will not operate.</p> <p>The direction of the arrow on the CT points from this inverter to the GRID</p>
---	--



The RJ45 connector of the CT is connected to “CT-L1”, and the CT is fitted over Live (L) cable. The connection CT-L2 is not used.

4.8. Inverter Parallel Configuration Guide

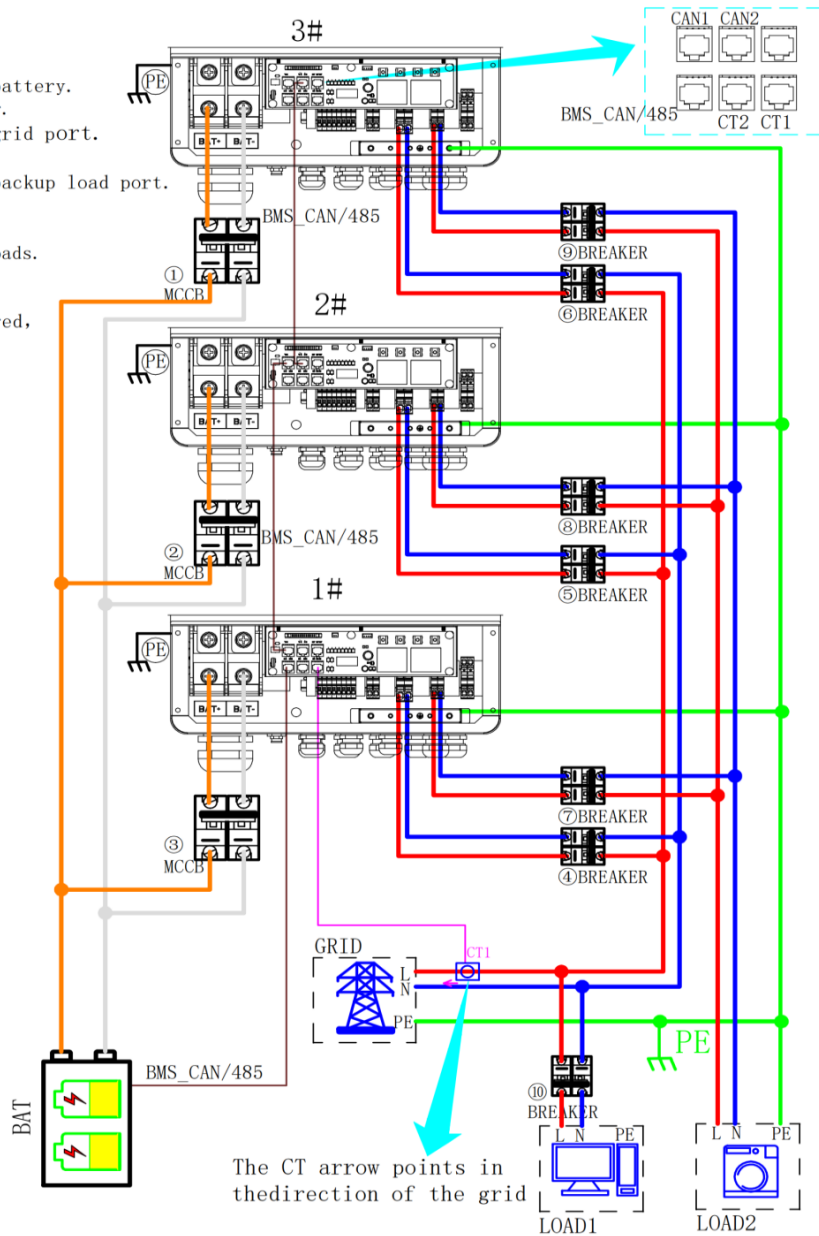
4.8.1 Parallel System Diagram

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

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

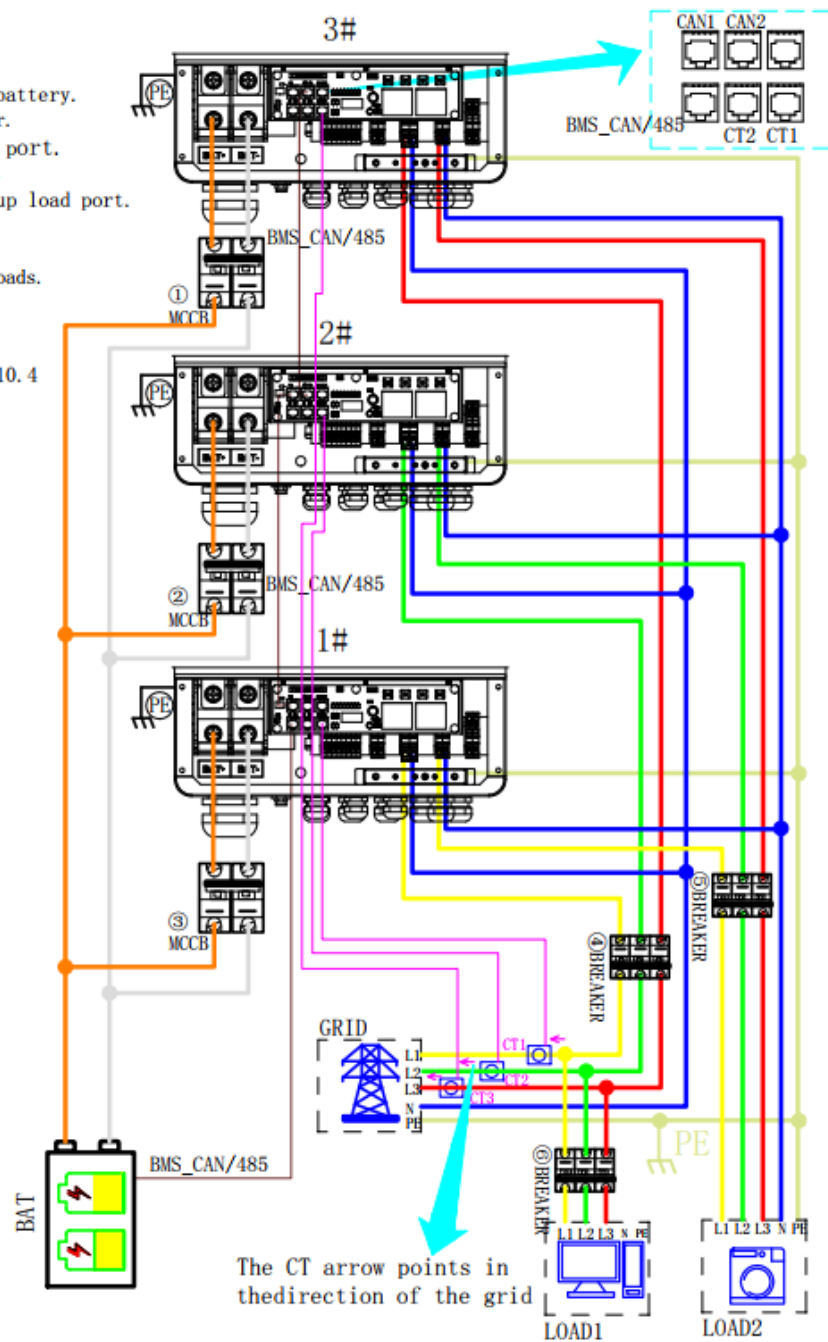
Default settings:
CT shared, battery shared,
Set Parallel Enable.



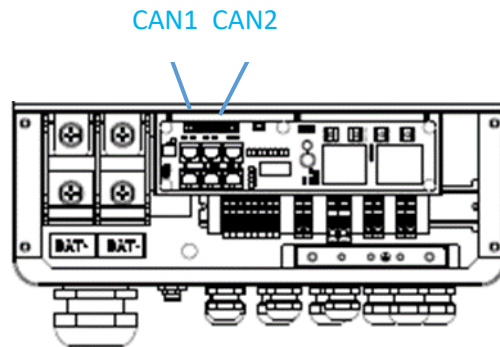
10.1.2 Parallel connection for 230/400 three phase

- ①②③DC Breaker for battery.
R8KLN: 250A DC breaker.
- ④AC Breaker for grid port.
R8KLN: 40A AC breaker.
- ⑤AC Breaker for backup load port.
R8KLN: 40A AC breaker.
- ⑥AC Breaker.
Depends on household loads.

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



4.9 Parallel 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.

4.10 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 the same length.

Make sure the CT Limiter sensor is installed properly. If the load is connected outside the inverter, the user needs to choose a 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 cat only needs to be connected to the master inverter. Please install CT on every unit's incoming electrical service wire on L1 and L2 when choosing independent CT.

Please check the master and slavers setting by screen and make sure all the settings are same.

4.11 Parallel System Setting


The parallel setting page can be visited in the following steps in the screen:


USER->1. SETUP->PASSORD CHECK->15.parallel

4.11.0 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 settings. Total numbers of the inverters. In a parallel system, the master unit broadcasts the BMS and other information to the slavers. Make sure only one unit is configured as master. Local unit address (1-8). Common CT Enable Local phase of unit for three-phase installation. (reserved function) Enable or disable group 3 phase enable. DISCHARGE CURR, Total battery discharge current command, only be settable in master unit in parallel mode. CHARGE CURR, Total battery charge current command, only be settable in master unit in parallel mode. PARALLEL EN, Enable/Disable the parallel function

4.11.1 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.

	<p>Note!</p> <p>If you need to assemble a three-phase (230/24) using a single phase, please make the following settings. 1. 3Phase; 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)</p>
---	---

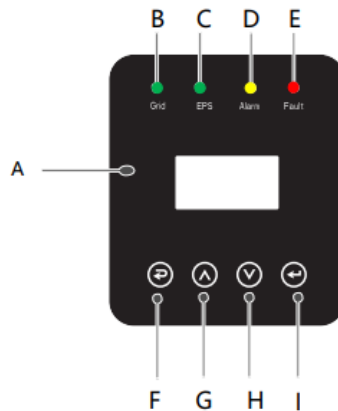
5. Generator Settings

Generator Settings	
Start SoC	User Define (Auto-Start charging Command SoC)
Stop Soc	User Define (Auto-Stop Charging Command SoC)
Charge Current To Battery	User Define (Battery Charge Current),
Max Run Time	User Define (Generator Run Time)
Cooldown	User Define (Generator Cooldown Period)

Control	
Generator Enable	Enable/Disable (Enabling/Disabling the Generator)
Charge Enable	Enable/Disable (Enabling/Disabling the Gen charging option)
Manual Enable	Enable/Disable (Enabling\Disabling Manual Generator Option)
Manual Cmd Enable	Enable/Disable (Enabling Manual Generator Start)
Grid Connect Port	Enable/Disable (Configuring Grid Port as a Gen port)
Inverter Power	Inverter Rated Capacity

6. LCD Interface and Setting

6.1 Control Panel

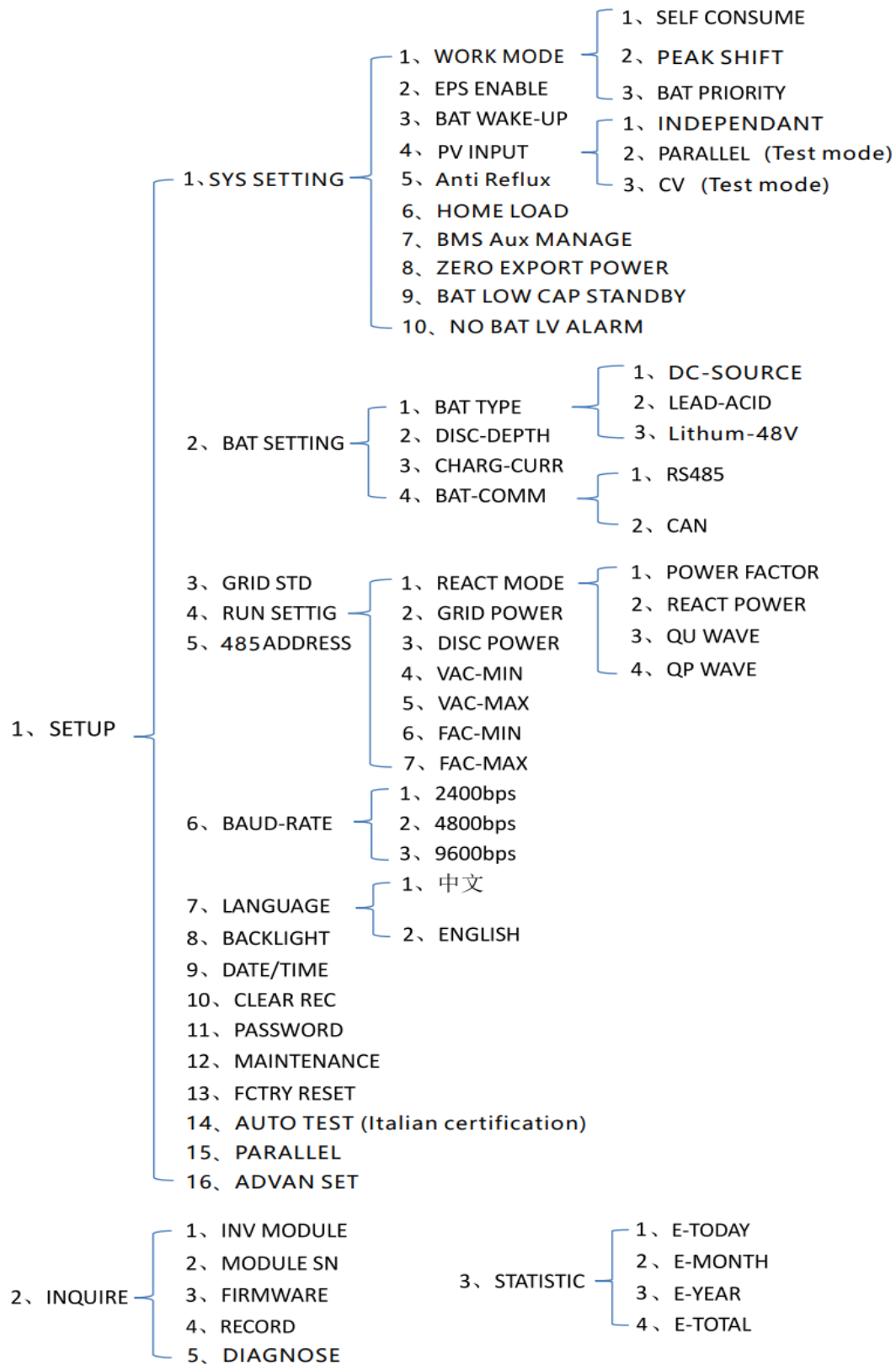


Object	Name	Description
A	LCD Screen	Displays the information of the inverter.
B	Indicator LED	lit in green: The inverter is in grid connected mode. Off: The inverter is not in grid mode.
C		lit in green: The inverter is in off-grid mode. Off: The inverter is not in off-grid mode.
D		lit in Yellow: The inverter is in warning state. 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 upwards or increase value.
H		Down: Move cursor downwards or decrease value.
I		Enter: Confirm the selection.

6.2 Instructions for LED Indication

	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

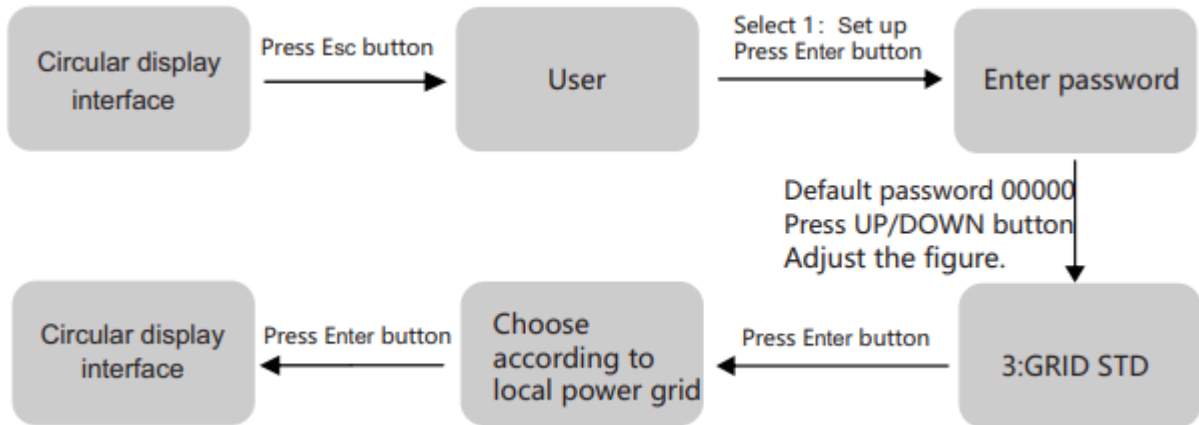
6.3 Instructions for the use of three modes



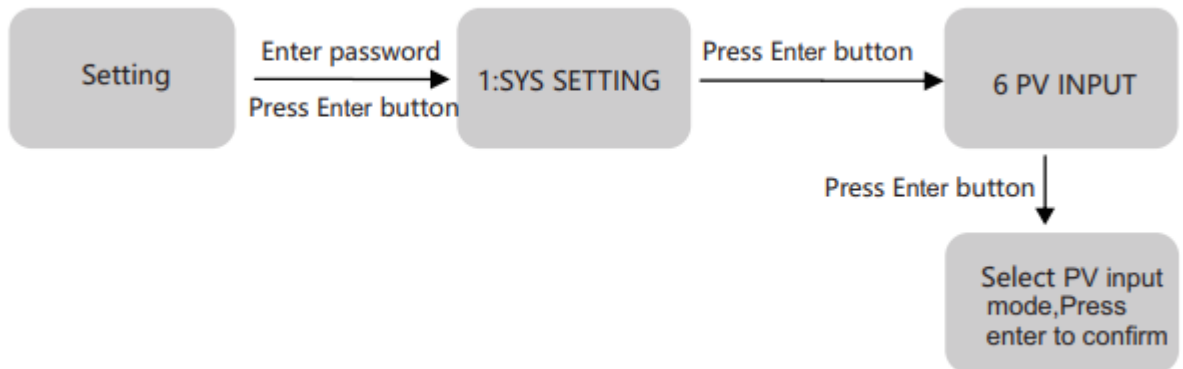
For example, before selecting the mode, you can set it up according to the local power grid,

PV input mode and battery type.

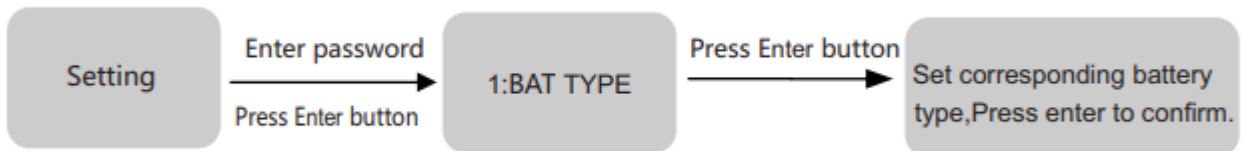
Power grid:



PV input mode:




Battery parameters:



6.4 LCD Interface

6.4.1 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 move to another page, you need to press Enter to unlock it first.

6.4.2 System setting1

Interface	Description
SYSTEM1 STATE: SELF CSM GRID: US-CA 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 set. PV input mode: The display value is the setting value of the PV input type. Including INDEPENDENT, PARALLEL, and CV. Settings. Explanations are provided in section 5.5.4.4

6.4.3 System setting2

Interface	Description
SYSTEM2 BMS Com: CAN Anti-Reflux: DISA DOD: 80%	BMS Com: Battery Management System communication mode. Including CAN, and RS485. Anti-Reflux: Displays Whether Inverter is not allowed to generate electricity to the Grid. Including DISABLE and ENABLE. DOD: Depth of battery discharge. When the battery discharge exceeds the DOD parameter, the inverter generates a low voltage or under voltage alarm, and the battery stops discharging.

6.4.4 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, the default option is enable.

6.4.5 PV1 Input display interface

Interface	Description
PV1 INPUT VOLT: 300V CURR: 10.00A POWER: 3000W	PV1 inputs real-time voltage, current, and power.

6.4.6 PV2 Input display interface

Interface	Description
PV2 INPUT VOLT:300V CURR: 10.00A POWER: 3000W	PV2 inputs real-time voltage, current, and power.

6.4.7 DC Voltage interface

Interface	Description
DC VOLTAGE BUS: 384V	BUS: Real-time voltage of the bus capacitor of the machine.

6.4.8 Battery interface

Interface	Description
BATTERY VOLT: 50V CURR: 10.00A STA: C D F	Battery real-time voltage. Battery real-time current. STA: Battery status (received from the BMS). C: Indicates that the battery will accept charge D: Indicates that the battery will accept discharge F: The battery requests a forced charge

6.4.9 Battery current interface

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

6.4.10 Battery current interface

Interface	Description
BMS PRMETER CHAR VOL: 0.0V CHARGE: 50A DISCHA: 50A	CHAR VOL: Battery charging voltage. CHARGE: Battery charging current. If the inverter is in a parallel state and uses a common battery setting, the charging current on the master is equal to the value uploaded by the BMS divided by the number of parallel machines. The charging current on the slave is equal to the value uploaded by the BMS and is compared with the value set on the master, the minimum value is taken and divided by the number of parallel machines. DISCHA: Battery discharging current. (The parallel state is the same as the charging value algorithm)

6.4.11 Grid output

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

6.4.12 INV output

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

6.4.13 EPS LOAD

Interface	Description
EPS LOAD VOLT: 0.0V CURR: 0.00A PERCENT: 0%	VOLT: LOAD real-time voltage. CURR: LOAD real-time current. PERCENT: LOAD real-time percentage.

6.4.14 POWER

Interface	Description
POWER INV: 0.0W GRID: 0.0W HOMELOAD: 0.0W	INV: INV power. GRID: Grid power. HOMELOAD: Power of grid-side load.

6.4.15 POWER

Interface	Description
POWER PV I/P: 0W EPSLOAD: 0W BAT: 0W	PV I/P: PV power. LOAD: LOAD power. BAT: BAT power.

6.4.16 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.

6.4.17 State

Interface	Description
STATE SYS: STANDBY INV: STANDBY DCDC: STANDBY	<p>System information: Display complete machine status information, including: INIT, STANDBY, PV GRID, BAT GRID, BYP, AC BAT CHG, HYBRID POW, etc.</p> <p>INIT: Initialization</p> <p>PV GRID: PV generates electricity for the grid.</p> <p>BAT GRID: Battery discharges to the power grid.</p> <p>BYP: By-pass band load.</p> <p>AC BAT CHG: The grid charges the battery.</p> <p>HYBRID POW: Hybrid power supply (Multiple Power Supply).</p> <p>INV: Displays the inverter status information, including STANDBY, OFF GRID, GRID, OFF GRID PL, INV TO PFC.</p> <p>GRID: Grid-connected state.</p> <p>OFF GRID PL: Working state of off-grid conversion to grid connection.</p> <p>INV TO PFC: Status of power by public grid turns into on-grid working mode.</p> <p>DCDC: Displays charging and discharging status information, including STANDBY, CHARGE, and DISCHARGE.</p>

6.5 Settings

6.5.1 SETTINGS

Interface	Description
USER 1. SETUP 2. INQUIRE 3. STATISTIC	<p>SETUP: Press Enter on the user settings interface.</p> <p>INQUIRE: Query machine model, serial number, and software version.</p> <p>STATISTIC: View machine-run statistics.</p>

6.5.2 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 to move the cursor backward.

6.5.3 Setup

Interface	Description
SETUP 1. SYS SETTING 2. BAT SETTING 3. GRID STD 4. RUN SETTING 5. 485 ADDRESS 6. BAUD RATE 7. LANGUAGE 8. BACKLIGHT 9. DATE/TIME 10. CLEAR REC 11. PASSWORD 12. MAINTENANCE 13. FCTRY RESET 14. AUTO TEST 15. PARALLEL 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 the ESC button to return to the user interface.

6.5.4 System setting

6.5.4.1 Interface

Interface	Description
SYS SETTING 1. WORK MODE 2. EPS ENABLE 3. BAT WAKE-UP 4. REMOTE CTRL 5. START DELAY 6. PV INPUT 7. Anti Reverse 8. HOME LOAD 9. BMS Aux MANAGE 10. Zero Export Power 11. BAT LOW CAP STANDBY	This interface is used to access system information. Press the Up/Down button to move the corresponding options. Press Enter to enter the selected menu. Press the ESC button to return to the setting interface.

6.5.4.1.1 Work mode

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

6.5.4.1.2 Peak shift work time

Interface	Description
WORK MODE 1. SELFCONSUME 2. PEAK SHIFT 3. BAT PRIORITY WORKTIME 1. TIME 1 2. TIME 2 3. TIME 3 CHAG START1 00:00 CHARGE END1 00:02 DISC START1 00:03 DISCHA END1 23:59	This interface is used to select the working mode. Press the ESC button to return to the setting interface. (Refer to 3.3). Select the peak clipping and valley filling mode, you also need to set the charge and discharge time. Three charging and discharging periods can be set. When setting the time, ensure that the time of the inverter is the local time. Press Enter to enter the next menu. This parameter is set for one day. If a specific period conflicts with another time, the earliest time is used as the effective setting. If the three-time ranges do not conflict, the three-time range settings are executed in sequence. This interface is used to adjust the time of peak load shifting. Press the Up/Down button to move the corresponding options. Press Enter to enter the selected menu. Press the Esc button to return to the working mode interface.

6.5.4.2 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, and the default option is enable.

6.5.4.3 Battery wake-up

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

	the battery wakes up successfully, please turn off the function, otherwise, it will affect the normal operation of the machine
--	--

6.5.4.4 PV INPUT MODE

Interface	Description
INPUT MODE 1. INDEPENDENT 2. PARALLEL 3. CV	Setup of PV Input mode. INDEPENDENT: The default Settings PARALLEL: This feature is for test use only, not customer use. CV: This feature is for test use only, no customer use. The factory setting by default is Independent. When parallel input is set to stand-alone mode, PV power will be imbalanced.

6.5.4.5 Anti Reflux

Interface	Description
Anti Reverse 1. DISABLE 2. ENABLE	Anti-Reflux: Whether Inverter isn't allowed to generate electricity to the Grid. The default option is disabled. It means the inverter is allowed to generate electricity for the Grid.

6.5.4.6 HOME LOAD

Interface	Description
HOME LOAD 1. DISABLE 2. ENABLE	ENABLE: Statistics on the power consumption of grid-side loads. The default option is enable.

6.5.4.7 BMS Aux MANAGE

Interface	Description
BMS Aux MANAGE 1. DISABLE 2. ENABLE	ENABLE: When the BMS of the battery does not have a disable charge or discharge function, the inverter will automatically reduce the power to avoid overcharging or over-discharging the battery. The default option is disabled.

6.5.4.8 Zero Export Power

Interface	Description
Zero Export Power INPUT: +000W	Grid demand setpoint - used to ensure a positive draw always to ensure the hybrid inverter won't feed power to the grid, set it as +20w~100w. (-20W means to generate electricity into the grid; +20W means to draw electricity from the grid)

6.5.4.9 BAT LOW CAP STANDBY

Interface	Description
BAT LOW CAP STANDBY 1. DISABLE 2. ENABLE	ENABLE: When there is no photovoltaic power supply at night, and the battery reports low voltage or low capacity, the machine will enter the standby state only the mains power to supply power to the load. The default option is enable.

6.5.4.10 NO BAT LV ALARM

Interface	Description
NO BAT LV ALARM 1. DISABLE 2. ENABLE	ENABLE: When the battery voltage or SOC falls below the set value, the inverter will not display an alarm. The default option is disable.

6.5.5 BAT SETTING

6.5.5.1 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 the Up/Down button to move corresponding options; Press Enter button to enter the selected menu. Press the ESC button to return to the setting interface.

6.5.5.1.1 BAT TYPE

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

6.5.5.1.1.1 Lead-acid battery parameter

Interface	Description
LEAD-ACID 1. CHARG-VOLT 2. BAT END VOLT 3. BAT OVP 4. BAT CAP	This interface is used to select LEAD-ACID battery parameter. Press the Up/Down button to move corresponding options; Press Enter button to enter the selected menu. 1. Charge voltage 2. BAT end voltage 3. BAT over voltage

CHARGE VOLT INPUT: 55.0 UNIT: V	This interface is used to set the lead acid battery charging voltage. (The input value ranges from 40 to 58)
BAT END VOLT INPUT: 45.0 UNIT: V	This interface is used to set the lead acid battery discharging voltage. (The input value ranges from 40 to 51V) Discharge cut-off voltage, as recommended by the battery manufacturer.
BAT OVP INPUT: 55.0 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 $100A \times 0.2 = 20A$

6.5.5.2 BAT-COMM

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

6.5.6 Grid standard

Interface	Description
GRID STD 1.AU 2. AU-W 3. NZ 4. UK 5. VDE 6. KR 7. PHI 8. CN 9. US-CA 10. JP 11. CUSTOM 12. ~~~~	This interface is used to select the Grid standard. Press the 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:PK — PAKISTAN 6:KR— Korea 7: PHI— Philippines 8:CN— China 9:US-CA— America 10: TSAIL— THAILAND 11:ZA— South Africa 12: CUSTOM— User defined 13: POL— Poland 14: EN50549 15: VDE4105 16: JPN— Japan 17: ITA— Italy

6.5.6 RUN SETTING

6.5.7.1 RUN SETTING

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

6.5.7.2 REACT MODE

Interface	Description
RUN SETTING	REACT MODE: Reactive mode, including POWER FACTOR, REACT POWER, QU WAVE, and QP WAVE. (For specific countries, if required by the local grid.)
1. REACT MODE	
2. GRID POWER	
3. DISC POWER	
REACT MODE	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.)
1. POWER FACTOR	
2. REACT POWER	
3. QU WAVE	
4. QP WAVE	
POWER FACTOR INPUT: C1.00	Power Factor: The input value should range between L0.80 and L0.99 or C0.8 and C1.00.
REACT POWER INPUT: +00%	REACT POWER: Reactive power control. The input value should range between -60% and +60%, which varies with the standard.

6.5.7.3 GRID POWER

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

6.5.7.4 DISCHARGE POWER

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

6.5.7.5 PV POWER

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

6.5.7.6 VAC-MIN

Interface	Description
GRID VOLT LOW INPUT: 150 UNIT: V	The input value of the Grid is low voltage. It is valid when custom grid mode is selected.

6.5.7.7 VAC-MAX

Interface	Description
GRID VOLT HIGH INPUT: 280 UNIT: V	The input value of the Grid is high voltage. It is valid when custom grid mode is selected.

6.5.7.8 FAC-MIN

Interface	Description
GRID FREQ LOW INPUT: 57.0 UNIT: Hz	The input value of the Grid is low frequency. It is valid when custom grid mode is selected.

6.5.7.9 FAC-MAX

Interface	Description
GRID FREQ HIGH INPUT: 63.0 UNIT: Hz	The input value of the Grid is high frequency. It is valid when custom grid mode is selected.

6.5.7.10 ACTIVE REF.

Interface	Description
ACTIVE Type 1. PWR-VOLT RES 2. PWR-FREQ RES 3. PFC-VOLT RES 4. PFC-FREQ RES 5. Anti-Island 6. Leak Current 7. Insul Detect	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. 2. PWR-FREQ RES: The 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.

	<p>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.</p> <p>4. PFC-FREQ RES: The 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.</p> <p>5. Anti-Island: Anti-Islanding (The default option is enable) When the grid goes down, the 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.</p> <p>6. Leak Current: Leak current detection (The default option is enable).</p> <p>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 detection and the load will stop working.</p>
--	---

6.5.8 485 Address

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

6.5.9 485 BAUD RATE

Interface	Description
SELECT 1.2400 bps 2.4800 bps 3.9600 bps	This interface is used to select a 485 baud rate.

6.5.11 BACKLIGHT

Interface	Description
LIGHT TIME INPUT: 20 UNIT: SEC	This interface is used to set the backlight on time after a button is pressed.

6.5.12 DATE/TIME

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

6.5.13 CLEAR REC

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

6.5.14 PASSWORD

Interface	Description
PASSWORD OLD: XXXXX NEW: XXXXX CONFIRM: XXXXX	This interface is used to set a password.

6.5.15 MAINTENANCE

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

6.5.16 FCTRY RESET

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

6.5.17 ADVAN SET

Interface	Description
ADVAN SET 1. Mode Set 2. Advan Ctrl 3. TOU Set	The hybrid inverter can be programmed to control how and when to use grid power. The advanced mode allows management of flexible loads and time-of-use billing. ADVAN SET: Advanced settings include mode setting, advanced controls, TOU setting (time-of-use setting)

6.5.17.1 Mode Set

Interface	Description
Mode Set 1. Disable 2. Sell first 3. SFC. Sell EN 4. SFC. Sell Dis	<p>There are three advanced modes available: Sell First, and SFC. Sell EN, SFC. Sell Dis.</p> <p>Sell First: First, consider selling electricity to the grid. In this mode, the anti-reflux setting is automatically disabled.</p> <p>The users can use this mode to sell back surplus solar power to the grid. If the time of use is enabled, the battery power can also be sold to the grid.</p> <p>SFC. Sell EN: Self-consume mode, electricity selling enable. In this mode, 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 be used to charge the battery, and then redundant power will feed to the grid (. See 1.4 Work Modes for details)</p> <p>SFC. Sell Dis: Self-consume mode electricity selling disabled. 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 the grid. Users can use this feature to ensure that the inverter does not feed power back to the grid.</p>

6.5.17.2 Advan Ctrl

Interface	Description
Advanced Control 1. Grid Chg En 2. TOU En 3. Only PV Chg TOU Set Start: 00:00 End: 00:00 Power: 00:00 Soc: 00:00	<p>There are also some attributes of these modes: Global Grid Charge Enable, Time-of-use Enable, and PV Charge Only.</p> <p>Global Grid Charge Enable: It is a high-level control attribute of grid charge enable. If the time of use function is disabled, this attribute is used to judge whether to charge the battery by the grid. If the time of use function is enabled, the battery can be charged by the grid only when the time slot grid charge attribute is enabled.</p> <p>Time-of-use Enable: 6 slots can be programmed. If grid charge is enabled, the grid is used to power the load and charge the battery to target SOC at specific bat power attribute value. If selling electricity to the grid is enabled, the battery will discharge to target SOC at specific battery power attribute value.</p> <p>PV Charge Only: If the user does not want to use the grid to charge the battery at any time, please enable this attribute. The photovoltaic energy will be used first for the load, and then the excess energy will be used to charge the battery. If the photovoltaic energy is insufficient, the battery will power the load.</p>

6.1 INQUIRE

6.1.1 INQUIRE

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

6.6.1.1 INV MODULE

Interface	Description
MODEL 8K	This interface shows an inverter model.

6.6.2 MODULE SN

Interface	Description
S / N GUID: XXXXXXXX XXXXXXXXXXXXXXXX SN:XXXXXXXXXXXX	This interface shows the module SN.

6.6.3 FIRMWARE

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

6.6.4 RUNNING RECORDS

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

6.6.5 DIAGNOSE

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

6.7 Statistic

6.7.1 Statistic

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

If the inverter shuts down before 24:00 on that day, the day's statistics will not be stored

6.8 Autotest Fast

1. SETUP	Press the enter button and
↓	default password 00000
14. AUTO TEST	Press the Enter button to start
Testing 59. S1...	
↓	Wait
Test 59. S1 OK!	
↓	Wait
Testing 59. S2...	
↓	Wait
Test 59. S2 OK!	
↓	Wait
Testing 27. S1...	
↓	Wait
Test 27. S1 OK!	
↓	Wait
Testing 27. S2...	
↓	Wait
Test 27. S2 OK!	
↓	Wait
Testing 81>S1	
↓	Wait
Test 81>S1 OK!	
↓	Wait
Testing 81>S2...	
↓	Wait
Test 81>S2 OK!	
↓	Wait
Testing 81<S1...	

↓	Wait
Test 81<S1 OK!	
↓	Wait
Testing 81<S2...	
↓	Wait
Test 81<S2 OK!	
↓	Wait
AutoTest OK!	
↓	
59.S1 :228V 902ms	
↑↓	Press the up/down button to page through the test page
59. S2 :229V 204ms	
↑↓	Press the up/down button to page through the test page
27. S1 :228jV 408ms	
↑↓	Press the up/down button to page through the test page
27. S2 :227V 205ms	
↑↓	Press the up/down button to page through the test page
81>. S1 49. 9Hz 103ms	
↑↓	Press the up/down button to page through the test page
81>. S2 49. 9Hz 107ms	
↑↓	Press the up/down button to page through the test page
81<. S1 50. 0Hz 105ms	
↑↓	Press the up/down button to page through the test page
81<. S2 50. 1Hz 107ms	

7. Fault diagnosis and solutions

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

Fault diagnosis table

Content	Codes	Explanation	Solutions
Dischg Over Cur	00 29	Battery discharge over current. When the battery is loaded, the load is too large.	(1) No intervention is required to restart, wait one minute for the inverter to restart. (2) Check whether the load complies with the specification. (3) Remove some loads to prevent a recurrence. (4) Contact customer service if error warning continues.
Overload	01	The load power is greater than the combined power available from PV and BAT	(1) Check whether the load complies with the maximum power of the inverter. (2) Remove some loads and wait for the inverter to restart. (3) Contact customer service if the error warning continues.
Bat Disconnect	02	BatteryDisconnect.(Battery voltage not identified)	(1) Check whether the battery is connected. (2) Check if the battery wiring port is open-circuited. (3) Contact customer service if the error warning continues.
Bat Under Vol/ Bat Under Capacity	03	Battery voltage/SOC is lower than the set value. Both off grid and on-grid discharge are forbidden.	(1) Verify the battery voltage is within operating range. (2) If the battery voltage is too low, charge using the PV or grid. (3) Battery under capacity, it is a normal warning. When the battery capacity is not sufficient. (SOC<100%-OFFGRID DOD)
Bat Low Volt/ Bat Low capacity	04	Battery voltage/SOC is lower than the set value. On-grid discharge is forbidden.	(1) Battery Low that setting capacity. (SOC<100%-DOD) (2) Check the battery capacity or voltage
Bat Over Vol	05	The battery voltage is over the Inverter's maximum voltage.	(1) Verify the battery voltage is within operating range. (2) Restart the inverter and wait until it functions.

Grid over vol	06	The grid voltage is abnormal	(1) Check if the grid is abnormal.
Grid over vol	07		(2) Restart the inverter and wait until it functions normally. (3) Contact customer service if the error warning continues.
Gfci low freq	08	Grid Frequency is abnormal.	(1) Check if the grid is abnormal.
	09		(2) Restart the inverter and wait until it functions normally. (3) Contact customer service if the error warning continues.
Gfci over	10	Inverter GFCI exceeds the standard.	(1) Check the PV string for direct or indirect grounding phenomena. (2) Check the peripherals of the inverter for current leakage. (3) Contact the local inverter customer service if the 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 the 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.
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 the 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 the error warning continues.
lgbt temp high	21	The inverter temperature is higher than the allowed value	(1) Cut off all the power of the inverter and wait one hour, then turn on the power of the inverter.
BMS sys error	22	The communication between batteries is faulty	(1) Please check whether the communication between the batteries is normal. (2) Contact customer service if error warning continues.

Bat over temp	23	Battery temperature is higher than the allowed value.	Disconnect the battery and reconnect it after an hour.
Bat UnderTemp	24	Battery temperature is lower 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 the lithium battery and inverter is abnormal or not in communication.	(1) Check the cable, crystal, and Line sequence. (2) Checking the Battery switch.
Bat Fault	28	An alarm or fault occurs in the battery system.	(1) Check whether the battery generates alarms. (2) Contact customer service if the error warning continues.
Grid Phase error	30	The power grid phase sequence is incorrectly connected.	(1) Check power grid wiring
Arc Fault	31	PV Arc Fault	(1) Check Photovoltaic panels and PV wire. (2) Contact customer service if the 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 the 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 Low insulation impedance.	(1) Check if the PE line is connected to the inverter and is connected to the ground. (2) Contact customer service if the error warning continues.
Bus Relay Fault	38	The inverter may be damaged.	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if the error warning continues.
Grid Relay Fault	39	The inverter may be damaged.	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if the error warning continues.
EPS rly fault	40		
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 your installer.

NOTICE:

The copyright of this manual belongs to Freedom Won (Pty) Ltd. Any corporation or individual should not copy, use any part for other purposes, or distribute this manual in any form or by any means. All rights reserved.

The information in this document (including software, etc.) is subject to change without notice. Every effort has been made to ensure the accuracy of the contents during the preparation of this document, but all statements, information and suggestions in this document do not constitute any express or implied warranty in any form. Freedom Won (Pty) Ltd reserves the right of final interpretation.