

**GOODWE**



# **User Manual**

**Hybrid Inverter**  
**ETC Series**

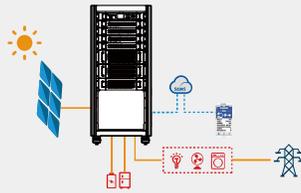
V1.0-2022-04-29

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## 01 INTRODUCTION

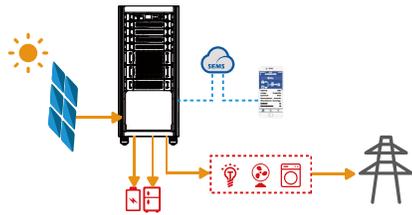
ETC series bidirectional inverter is designed for indoor use, which could be used with or without existing PV system to store energy using batteries. Energy produced from the PV system will be used to optimize self-consumption, excess will be used to charge the battery, anymore could be exported to the grid. Loads will be supported in priority by PV system, then battery power, if more power is needed, energy will be imported from the grid.



Note:  
The introduction describes a general behavior of ETC system. The operation mode can be adjusted on depending on the system layout. Below are the general operation modes for ETC system.

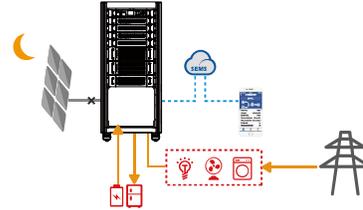
### 1.1 Operation Modes Introduction

ETC system normally has the following operation modes based on your configuration and layout conditions.



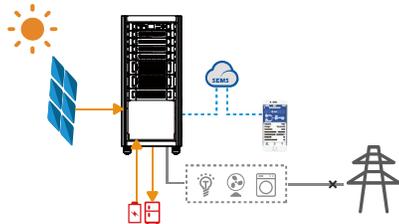
#### Mode I

Energy produced by the PV system is used to optimize self-consumption needs. Excess energy is used to recharge the batteries and any additional excess energy is then exported to the grid.



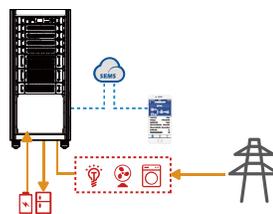
#### Mode II

When there is no PV power, and the battery is sufficient, loads will be supplied with electricity from the battery and the grid.



#### Mode III

When grid power fails, the system automatically switches to Back-Up mode. The Back-Up load can be supported by PV and battery.



#### Mode IV

The battery can be charged from the grid and the charging time/power can be set to various options in the PV Master App.

## 1.2 Safety & Warning

The ETC series inverter strictly complies with related safety rules for product design and testing. Please read and follow all the instructions and cautions on the inverter or user manual during installation, operation or maintenance, as any improper operation might cause personal or property damage.

### Symbols explanation



Caution!  
Failure to observe a warning indicated in this manual may result in injury.



Danger of high voltage and electric shock!



Danger of hot surface!



Components of the product can be recycled.



This side up! The package must always be transported, handled and stored in such a way as the arrows always point upwards.



Products should not be disposed as household waste.



Fragile - The package/product should be handled carefully and never be tipped over or slung.



Refer to the operating instructions.



Keep dry! The package/product must be protected from excessive humidity and must be stored under cover.



Signals danger due to electric shock and indicates the time to wait (5 minutes) before it is safe to touch the internal parts of the inverter after it has been disconnected from its power source.



CE Mark



C-Tick mark in Australia

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### **Safety warning**

Any installation and operation on inverter must be performed by qualified electricians, in compliance with standards, wiring rules or requirements of local grid authorities or companies (like AS 4777 and AS/NZS 3000 in Australia).

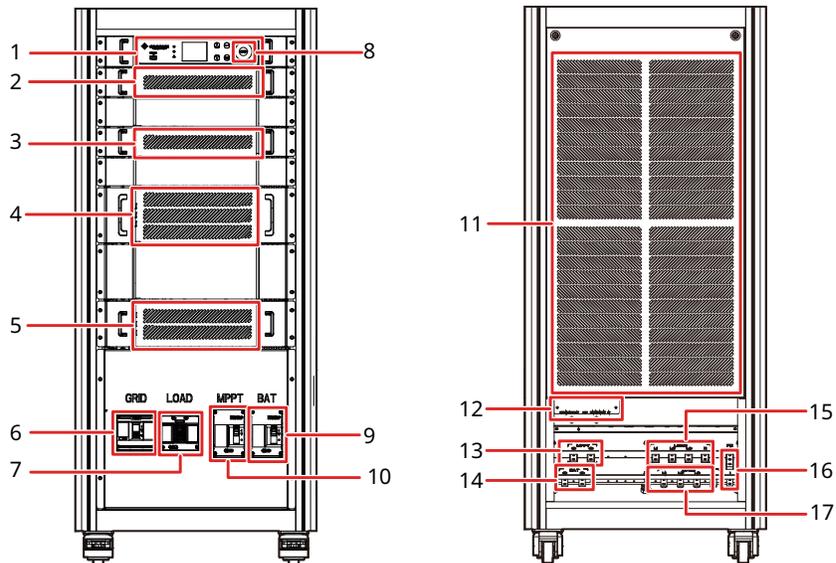
1. Prohibit inserting and pulling the AC and DC terminals when the inverter is running.
2. Before any wiring connection or electrical operation on inverter, all DC and AC power must be disconnected from inverter for at least 5 minutes to make sure inverter is totally isolated to avoid electric shock.
3. The temperature of inverter surface might exceed 60°C during operation, so please make sure it has cooled down before touching it, and make sure the inverter is out of reach of children.
4. Do not open the inverter's cover or change any components without manufacturer's authorization, otherwise the warranty commitment for the inverter will be invalid.
5. Usage and operation of the inverter must follow instructions in this user manual, otherwise the protection design might be impaired and warranty commitment for the inverter will be invalid.
6. Appropriate methods must be adopted to protect inverter from static damage. Any damage caused by static is not warranted by manufacturer.
7. PV negative (PV-) and battery negative(BAT-) on inveter side is not grounded as default design. Connecting PV- or BAT- to EARTH are strictly forbidden.
8. The inverter, with built-in RCMU, will exclude possibility of DC residual current to 6mA, thus in the system an external RCD (type A) can be used( $\geq 30\text{mA}$ ).
9. In Australia, the inverter internal switching does not maintain neutral integrity, which must be addressed by external connection arrangements like in the Off-Grid System Connection Diagram.
10. In Australia, output of back-up side in switch box should be labeled "Main Switch UPS Supply", the output of normal load side in switch box should be labeled "Main Switch Inverter Supply".
11. The PV modules used to connected to this inverter shall be Class A rating certified according to IEC 61730, and the total open-circuit voltage of PV string/array is lower than the maximum rated DC input coltage of the inverter. Any damage caused by the PV over-voltage is beyond warranty.
12. When exposed to sunlight, the PV array generates dangerous high DC voltage, please operate according to the user manual, or it will result in danger to life.
13. The product is not suitable for household use.

### 1.3 Product Overview

ETC series energy storage inverters can be applied in a grid-tied system, an emergency power supply system, or a hybrid system.

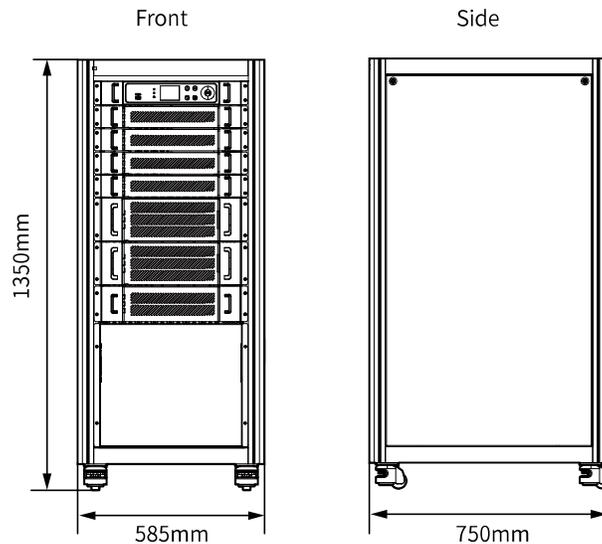
GW50K-ETC	Model
GW	Brand
50K	Power Class
ET	Three-phase Hybrid Inverter
C	Cabinet Style Product

GW50K-ETC



- (1) Monitoring Unit (EMS1000)
- (2) MPPT Module (GW50K-PVM)
- (3) DC-DC Conversion Module (GW50K-DCM)
- (4) Power Conversion System Module (GW50K-BTM)
- (5) ON/OFF Grid Switching Module (GW100K-ST5)
- (6) AC Output Circuit Breaker (GRID)
- (7) Load Circuit Breaker (LOAD)
- (8) Emergency Stop Button
- (9) Battery Circuit Breaker (BAT)
- (10) MPPT DC Input Circuit Breaker (MPPT)
- (11) Heat Dissipation Hole
- (12) Communication Cable Port
- (13) PV DC Input Terminal (MPPT)
- (14) Battery DC Terminal (BAT)
- (15) Load Terminal (LOAD)
- (16) PE Terminal
- (17) AC Output Terminal (GRID)

## Dimensions



## 02 INSTALLATION INSTRUCTIONS

### 2.1 Select Mounting Location

For inverter's protection and convenient maintenance, mounting location for inverter should be selected carefully based on the following rules:

Any part of this system shouldn't block the switch and breaker from disconnecting the inverter from DC and AC power.

**Rule 1.** Inverter should be installed on a solid surface, where is suitable for inverter's dimensions and weight.

**Rule 2.** Inverter should be installed horizontally.

**Rule 3.** Ambient temperature should be lower than 45°C. (High ambient temperature will cause power derating of inverter.)

**Rule 4.** The inverter should be installed indoors.

**Rule 5.** Bearing capacity of the floor must be higher than 300kg/m<sup>2</sup>.

**Rule 6.** Inverter should be installed at eye level for convenient maintenance.

**Rule 7.** Product label on inverter should be clearly visible after installation.

**Rule 8.** Leave enough space around the inverter according to the below figure.

**Rule 9.** Suitable for mounting on concrete or other non-combustible surfaces only



Move the inverter to the site before installation. Follow the instructions below to avoid personal injury or equipment damage.

1. Consider the weight of the equipment before moving it. Assign enough personnel to move the equipment to avoid personal injury.
2. Wear safety gloves to avoid personal injury.
3. Keep balance when moving the equipment.

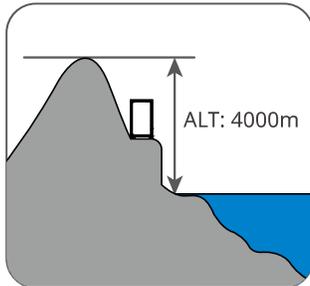
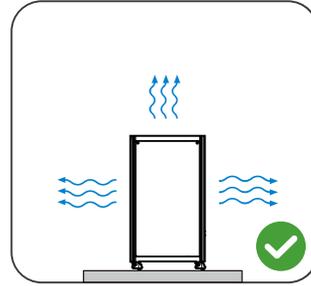
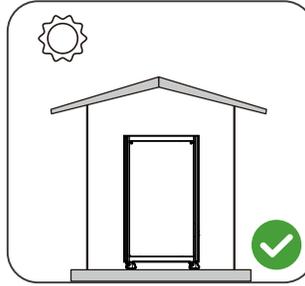
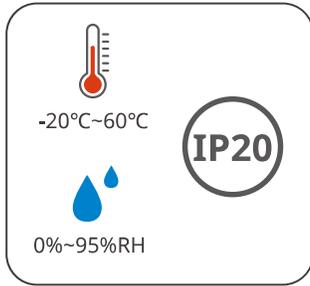
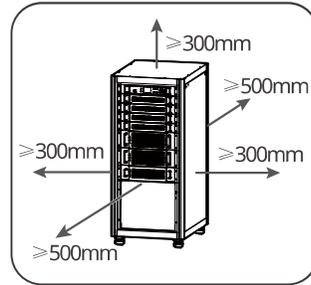
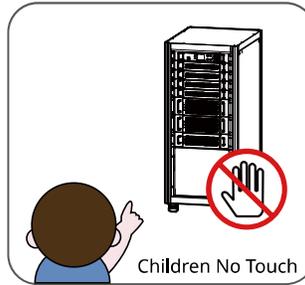
## 2.2 Mounting



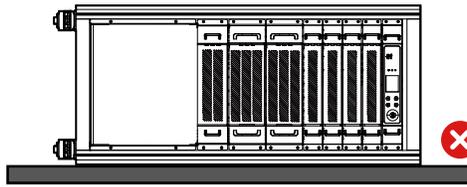
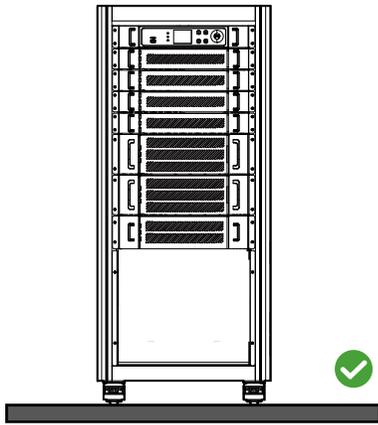
Inverter cannot be installed near flammable, explosive or strong electro-magnetic equipment.

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

### Space Requirements

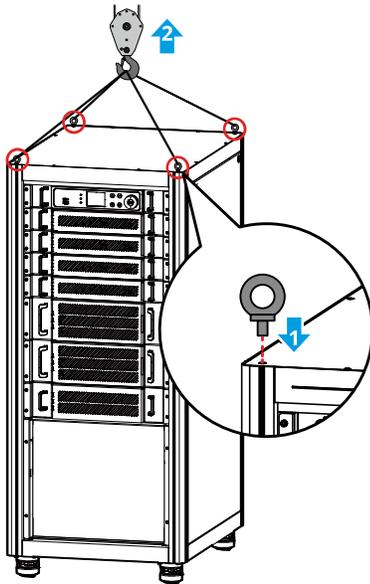


### Angle Requirements

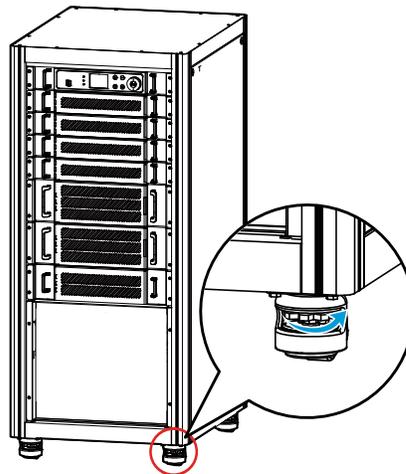


### Installing the Inverter

Lifting the Cabinet



Fixing the Cabinet

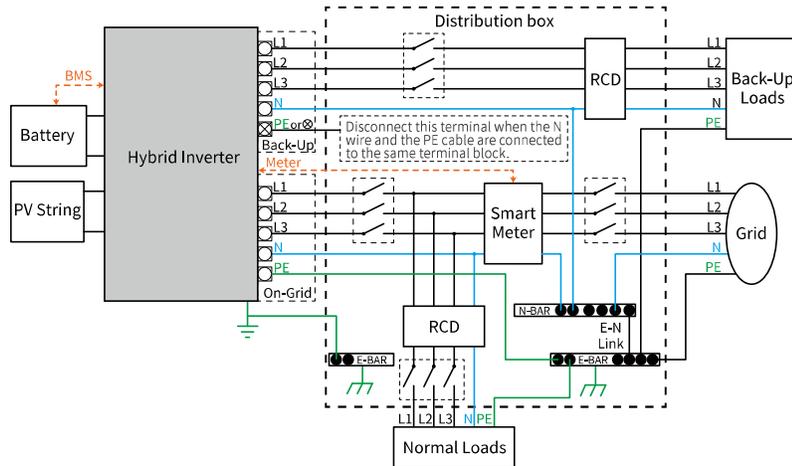


## 2.3 Electrical Wiring Connection

### 2.3.1 System connection diagrams

According to Australian regulations, the N wires on the GRID side and BACK-UP side should be connected to one terminal block. Otherwise, the BACK-UP function may fail.

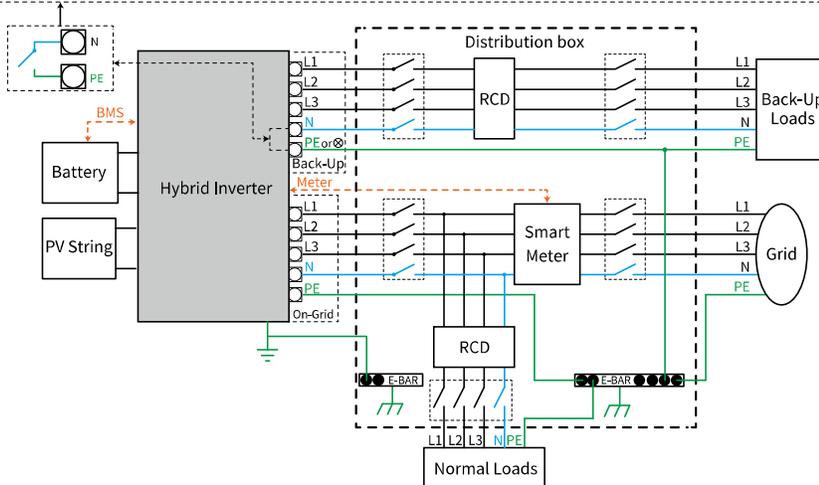
The following diagram shows the wiring connection when the N wire and the PE Cable are connected to the same terminal block. Equipment installed in Australia, New Zealand, South Africa, and so on should follow this diagram. All installations and wiring connections should meet local laws and regulations.



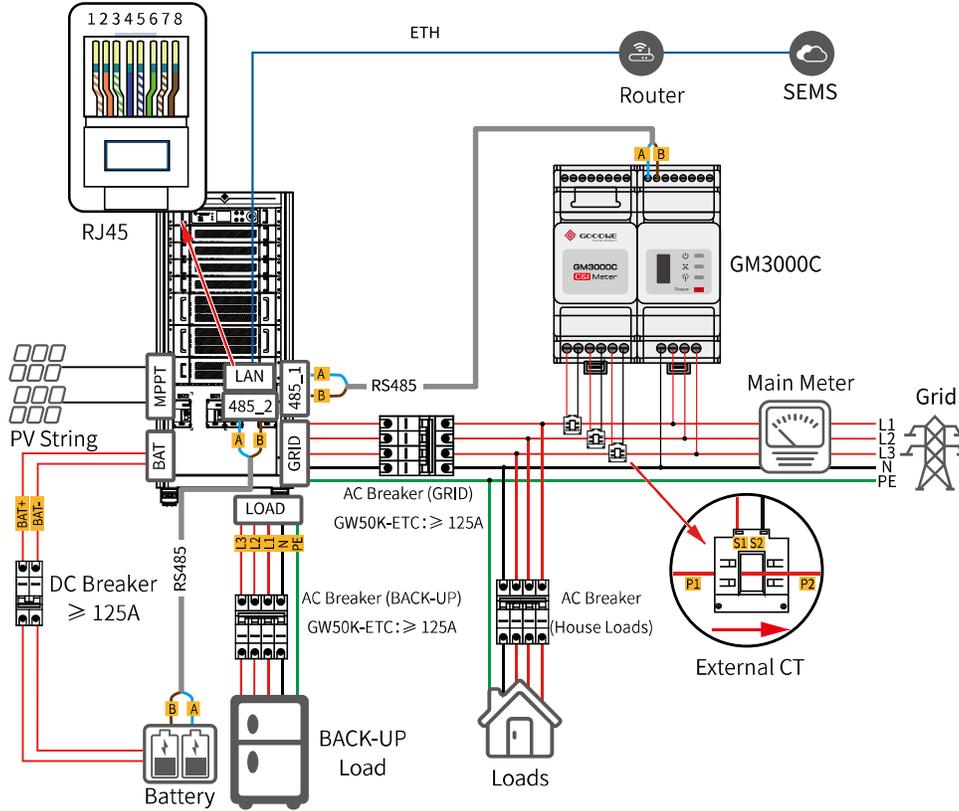
The following diagram shows the wiring connection when the N wire and the PE Cable are connected separately.

Equipment installed in China, Germany, Czech Republic, Italy, and so on should follow this diagram. All installations and wiring connections should meet local laws and regulations.

When the inverter is working in BACK-UP mode, the N wire and PE cable will be connected in one internal relay. This relay will be disconnected when the inverter is working in grid-tied mode.



### 2.3.2 System Application

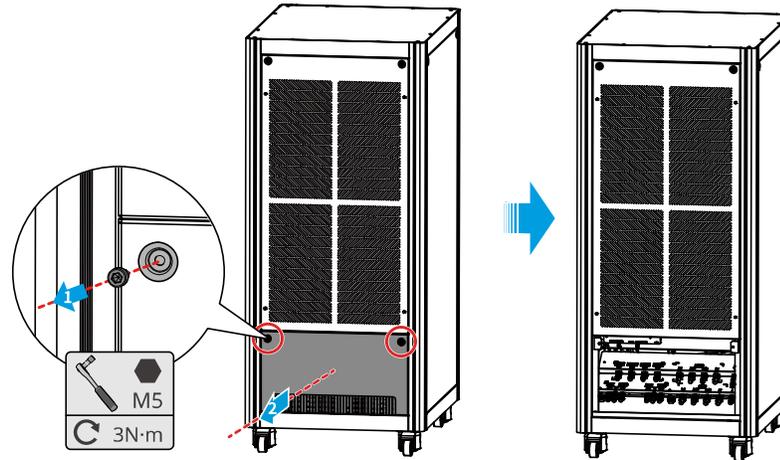


#### Cable

No.	Type	Specification
1	DC Input Cable (MPPT) DC Power Cable (BATTERY)	Two single-core outdoor copper-core cables or aluminum cables are needed per MPPT; (PV+ and PV-: M8 OT Terminals) Copper Cable Conductor Cross Sectional Area: 25mm <sup>2</sup> - 50mm <sup>2</sup> Aluminum Cable Conductor Cross Sectional Area: 70mm <sup>2</sup>
2	PE Cable	Single-core Outdoor Copper-core Cable M8 OT Terminal Conductor Cross Sectional Area: 16 mm <sup>2</sup> - 25 mm <sup>2</sup>
3	AC Output Cable (GRID)/Load Output Cable (LOAD)	Single-core or Multi-core Outdoor Copper-core Cable or Aluminum Cable: (L1, L2, L3, N, and PE: M8 OT Terminals) GW50K-ETC <ul style="list-style-type: none"> <li>Copper Cable Conductor Cross Sectional Area(S): 25 mm<sup>2</sup> - 50 mm<sup>2</sup>;</li> <li>Aluminum Cable Conductor Cross Sectional Area ≥ 70mm<sup>2</sup></li> </ul>
4	RS485 Communication Cable (RS485)	Outdoor Shielded Twisted Pair; Conductor Cross Sectional Area: 0.25 mm <sup>2</sup> - 1 mm <sup>2</sup>

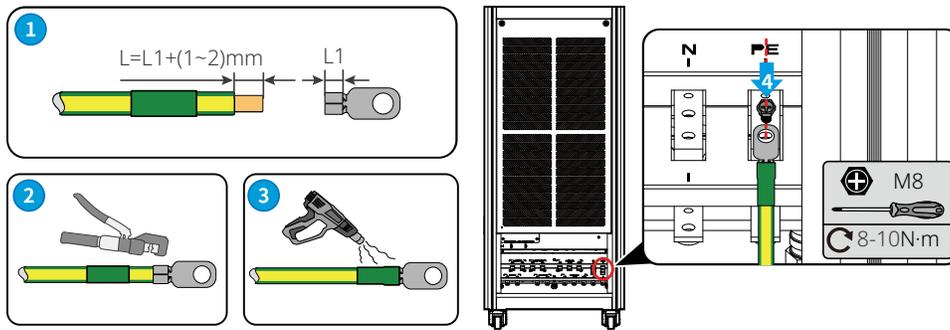
### 2.3.3 Electrical Wiring Connection

#### Opening the Wiring Chamber Door



- Before connecting AC, DC and communication cables, connect the ground terminals to the protective ground point to ensure reliable grounding of the inverter.
- Please be careful about any electric shock or chemical hazard.
- Before connecting PV Panels/Strings, please make sure requirements are followed as below:
  1. The total short-circuit of PV string must not exceed inverter's max DC current.
  2. The minimum isolation resistance to ground of the PV string must exceed 100KΩ in case of any shock hazard.
  3. PV string could not connect to earth/grounding conductor.
- Before connecting battery, please make sure battery switch is off and battery nominal voltage meet ETC series's specification before connecting battery to inverter and make sure inverter is isolated from PV and AC power.
- The polarity of PV Strings/battery or on the inverter cannot be connected reversedly, otherwise inverter could be damaged.
- Before connecting AC cable, please make sure inverter is totally isolation from any DC/PV or AC power.
- For battery without build-in DC breaker, make sure there is an external DC breaker connected.
- Neutral cable shall be blue, line cable shall be black or brown (preferred) and protective earth cable shall be yellow-green.
- For AC cables, PE cable shall be longer than N&L cables, so in case that the AC cable slips or is taken out, the protecting earth conductor will be the last to take the strain.
- Make sure that the battery switch is off and battery nominal voltage meets the inverter's specification before connecting battery to inverter. Make sure inverter is totally isolated from AC power.
- Please follow the requirements and steps below strictly. Using improper wire may cause bad contact and high impedance, which is dangerous to the system.

### Connecting the PE Cable



### Connecting the AC Output Cable, Load Output Cable, Battery Cable, and PV Input Cable

No.	Connection Port	Cable Type	Requirements
1.	GRID	Connecting the AC Output Cable	L1/L2/L3/N/PE: M8 Screws, tightening torque: 8 - 10 N · m
2.	LOAD	Connecting the LOAD Output Cable	
3.	BATTERY	Connecting the DC Battery Cable	BAT+/BAT-: M8 Screws, tightening torque: 8 - 10 N · m
4.	MPPT	Connecting the PV Input Cable	PV+/PV-: M8 Screws, tightening torque: 8 - 10 N · m



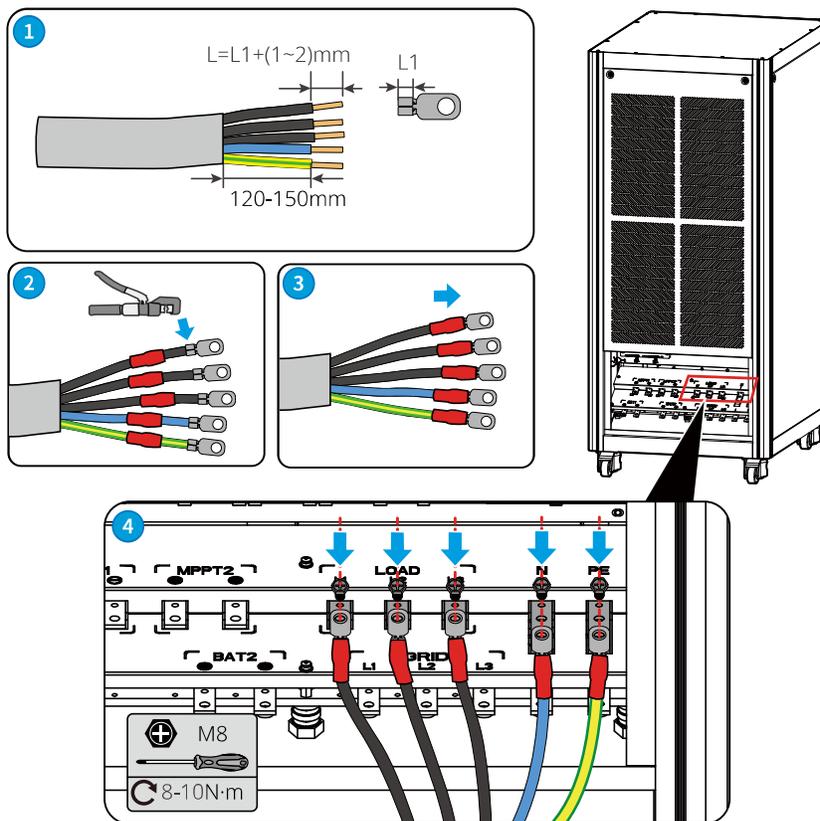
**WARNING!**

- The PV strings have a DC high voltage in the sun, and the following operations must be performed by the engineers with electrical installation qualifications and wearing certain safety protection tools.
- Disconnect all DC and AC circuit breakers before electrical connections. Take some actions to avoid the circuit breakers from reconnecting.
- Ensure that all cables are free of voltage before electrical connection.
- Check the impedance between the positive/negative of the battery and the ground before connecting the battery and the inverter. The impedance should be higher than 1MΩ.
- Check the impedance between the positive/negative terminals of the PV string and the ground before connecting the PV string and the inverter. The impedance should be higher than 1MΩ.



NOTE

- The AC output cable, load output cable, DC input cable, and battery cable are connected to the equipment in the same way. Take the AC output cable connection as an example to explain the connection steps below.
- Make sure the following cables are connected correctly to avoid equipment damage.
  1. Positive and negative terminals of the battery are connected correctly.
  2. Positive and negative terminals of the PV string are connected correctly.
  3. AC cable L1, L2, L3 are connected in the correct sequence.
  4. Do not mix PE cable and N wire.

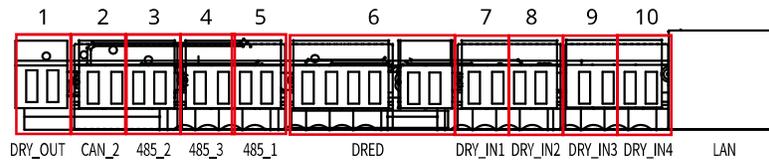


## Communication Line Connections



### NOTE

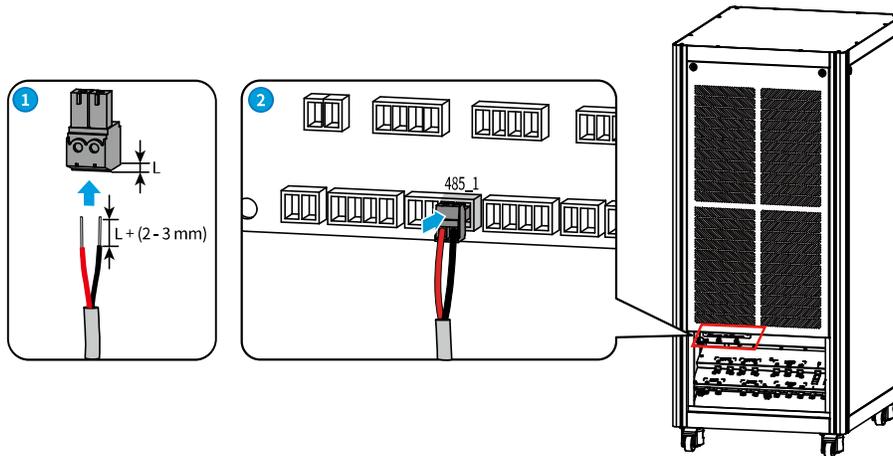
- The wiring methods for connecting communication lines through the terminal block are the same, and this document uses the RS485\_1 port connection as an example to illustrate the procedures.
- The DRY\_OUT, CAN\_2, RS485\_3, DRY\_IN1, DRY\_IN2, DRY\_IN3 and DRY\_IN4 ports are reserved.



No.	1	2	3	4	5
Definition	DRY_OUT	CAN_2	485_2	485_3	485_1
Function	Reserved	Reserved	BMS	Reserved	Meter

No.	6	7	8	9	10
Definition	DRED	DRY_IN1	DRY_IN2	DRY_IN3	DRY_IN4
Function	DRED	Reserved	Remote Shutdown	Reserved	Reserved

## Connecting to the Terminal Block



## DRED

DRED is used for installations in Australia and New Zealand (also used as remote shutdown function in European countries), in compliance with Australia and New Zealand safety requirements (Or European countries). The inverter integrates the DRED control logic and provides the DRED interface. DRED is not provided by the manufacturer.

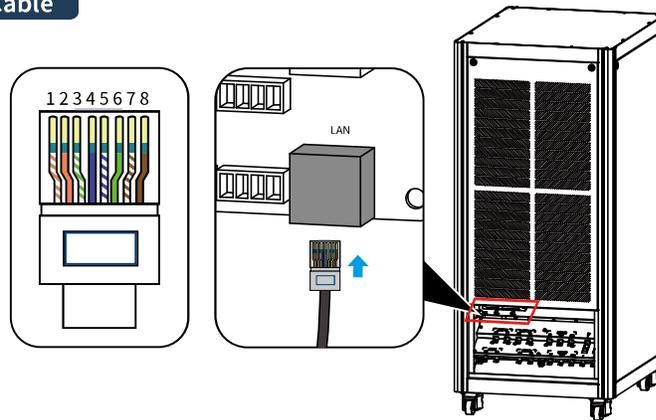
Detailed connection of DRED / Remote shutdown is shown below:

1. Put DRED cable through the plate.
2. Connect DRED cable on the 6-pin terminal. The function of each connection position is shown as below.

No.	1	2	3	4	5	6
Function	DRM1/5	DRM2/6	DRM3/7	DRM4/8	REFGEN	COM / DRMO

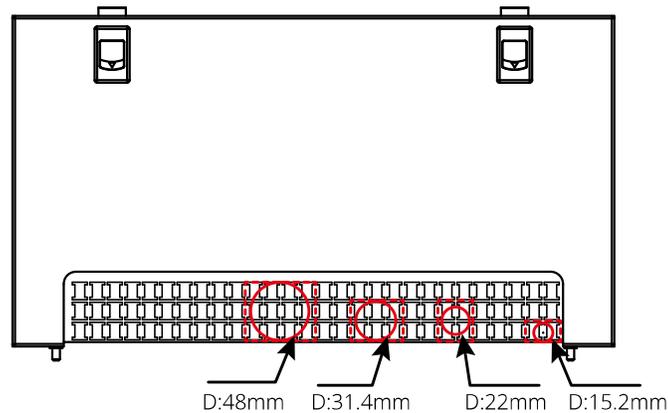
## LAN Communication Cable

PIN	Color
1.	Orange&White
2.	Orange
3.	Green&White
4.	Blue
5.	Blue&White
6.	Green
7.	Brown&White
8.	Brown



## Compartment Door

Install the compartment door after the cable connection is completed. Cut a hole using a utility knife, as the cable inlet hole is not reserved. The hole size should be decided according to the cable diameter to avoid insects or rats that may damage the equipment.



### Special adjustable setting

The inverter has a field where the user could set functions, such as trip points, trip time, time of reconnection, active and invalid of QU curve and PU curve. Functions can be adjusted through special software. If interested, please contact with our department of server.

### Declaration for back-up function

The back-up output of ETC hybrid inverters have over load ability.

And the inverter has self-protection derating at high ambient temperature.

Under normal circumstances, the back-up switching time is less than 10 ms (the minimal condition to be considered as the UPS level). However, some external factors may cause the system to fail on Back-Up mode. As such, we recommend the users to be aware of conditions and follow the instructions as below:

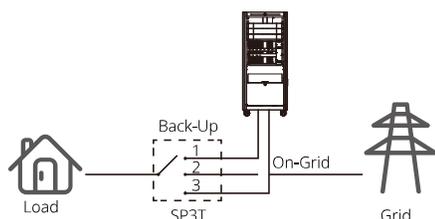
- Do not connect loads if they are dependent on a stable energy supply for a reliable operation
- Do not connect the loads which may in total exceed the maximum back-up capacity
- Try to avoid those loads which may create very high start-up current surges such as inverter air-conditioner, high-power pump etc.
- Due to the condition of the battery itself, battery current might be limited by some factors including but not limited to the temperature, weather etc.

### Accepted loads as below:

- Inductive load: The maximum starting power of the load should be less than the inverter power.
- Capacitive load: Total power  $\leq 0.6 \times$  nominal power of model. (Any load with high startup current at start-up is not accepted.)
- For complicated application, please contact after-sales.

### Note:

For convenient maintenance, please install a "4Pole3Throw" on back-up and on-grid side. Then it is adjustable to support load by back-up or by grid or default settings.



1. Back-up load is supplied from back-up side.
2. Back-up load is isolated.
3. Back-up load is supplied from grid side.

### Declaration for back-up overload protection

Inverter will restart itself if overload protection triggers. The preparation time for restarting will be longer and longer (max one hour) if overload protection repeats. Take following steps to restart inverter immediately.

- Decrease back-up load power within max limitation

### Smart Meter & CT Connection



#### NOTE

- Make sure AC cable is totally isolated from AC power before connecting Smart Meter & CT.
- For the detailed operation steps of connecting CT, please refer to the Smart Meter user manual in [https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW\\_Smart%20Meter\(GM3000C\)\\_Quick%20Installation%20Guid-EN.pdf](https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW_Smart%20Meter(GM3000C)_Quick%20Installation%20Guid-EN.pdf)

### Anti-reverse function connection

If ETC system (connected with grid-tied inverters) requires anti-reverse function, it is operable but please note:

1. This diagram is only for installation where there is exporting power limit function requirement.
2. For anti-reverse function, it can be set on Screen→Settings→Operation Mode→Self-Use→Power limit.
3. This diagram will only applies if grid-tied inverter has anti-reverse function build-in. And the power limitation value can be set on grid-tied inverter.
4. When using anti-reverse function, it would buy about 500W from the grid.

## 2.4 Earth Fault Alarm Connection

ETC series inverter complies with IEC 62109-2 13.9. Fault indicator LED on the inverter cover will light up and the system will email the fault information to customer. It must be installed in a high traffic area where the LED would be noticed.

### 03 Check Items Before Powering On

No.	Check Item
1.	The inverter is firmly installed.
2.	The PE cable, power cable, and communication cable are connected correctly and securely.
3.	Cable ties are routed properly and evenly, tied tightly and no burrs.
4.	Switches of the upstream and downstream should be all off.
5.	The inverter is installed in a proper place where is clean and tidy.
6.	The compartment door is installed.

### 04 System Power-on

1. Measure the DC input cable and battery cable using the multimeter to avoid reverse polarity connection. Also, the DC voltage of the battery and the DC voltage of the PV string should be under the permissible range.
2. Turn on the AC switch between the inverter and the utility grid.
3. Turn on the DC switch between the inverter and the battery.
4. Turn on the AC switch between the inverter and the loads.
5. Turn on the MPPT switch between the inverter and the PV string.
6. Observe the indicator and LCD to check the inverter's working status.

Indicator Status	Description
 Power Supply	 ON=INVERTER POWER-ON
	 OFF=INVERTER POWER-OFF
 Operation	 ON=SYSTEM IS READY
	 BLINK=SYSTEM IS STARTING UP
	 OFF=SYSTEM IS NOT OPEATING
 Warning	 FAULT HAS OCCUREED
	 BLINK=OVERLOAD OF BACK-UP OUTPUT/REDUCE LOAD
	 OFF=NO FAULT

## 05 Parameter Setup

### 5.1 Commissioning via LCD Screen



#### NOTE

- After the inverter is powered on, the LCD screen of the monitoring unit automatically turns on and enters the home page.
- Access to the settings page requires a password, please contact GOODWE Service Center to obtain the password.



Up and Down Arrows



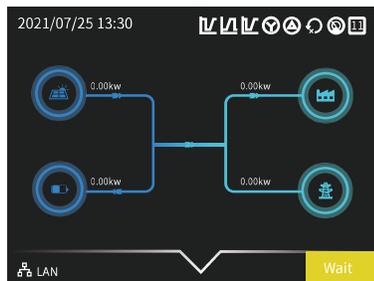
Enter Key



Esc Key

1. Press Enter on the homepage to access the main menu page.
2. Select "Settings" and press Enter to enter the password, then press and hold Enter to access the settings page.
3. Select "Safety Code" and press and hold Enter to complete the parameter settings according to the local safety code settings.
4. Select "Battery" and press and hold Enter to complete the parameter settings according to the battery type connected to the inverter.
5. Select "Operation Param" and press Enter to access the operating parameters page, then select "CT Ratio", set the CT ratio according to the actual connected CT specifications, and press and hold Enter to complete the parameter settings.
6. Exit to the main menu page and select "Communicate Info" to check if the electric meter, BMS and network communication status are normal.

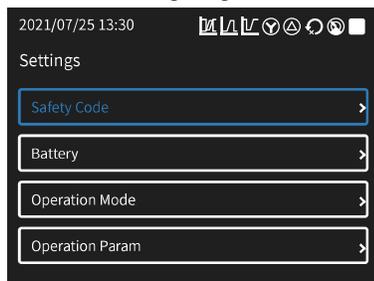
Homepage



Main Menu



Settings Page



Display operation logic: Refer to appendix for details.

## 5.2 PV Master

PV Master is an external monitoring and configuration application for hybrid inverters and is used on smart phones or tablets for both Android and iOS systems. The main functions are listed as below:

1. Configure the system to customize functions by the user.
2. Monitor and check the performance of the hybrid system.
3. Access and change the regional settings.
4. Check the inverter firmware version.
5. Set export power limit.

Search PV Master in Google Play or Apple App Store, or scan the QR code to download the app. Operation steps are the same for Android system and iOS system although the two interfaces are slightly different.

For more detailed operation instructions, please refer to PV Master user manual in [https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW\\_PV%20Master\\_User%20Manual-EN.pdf](https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW_PV%20Master_User%20Manual-EN.pdf).



PV Master App



PV Master  
User Manual

*Note:*

*For Australian customers please select from Australia Region A/B/C to comply with AS/NZS 4777.2:2020. Contact local grid operator to see which Region to select. After setting the safety region, some parameters in the inverter system will take effect according to the corresponding safety regulations, such as PU curve, QU curve, trip protection, etc. For Australian and European users, if you need to change the configuration parameters, please refer to the PV Master user manual.*

## 5.3 SEMS Portal

SEMS Portal is an monitoring platform used to manage organizations/users, add plants, and monitor plant status.

For more details, refer to the SEMS Portal User Manual. Scan the QR code or visit [https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW\\_SEMS%20Portal-User%20Manual-EN.pdf](https://en.goodwe.com/Ftp/EN/Downloads/User%20Manual/GW_SEMS%20Portal-User%20Manual-EN.pdf) to get the user manual.



SEMS Portal



SEMS Portal  
User Manual

## 06 System Power-off

To power off the inverter, follow the steps below:

1. Turn off the AC switch between the inverter and the grid.
2. Turn off the AC switch between the inverter and the load.
3. Turn off the DC switch between the inverter and the battery.
4. Turn off the MPPT switch between the inverter and the PV Strings.

## 07 Others

### 7.1 Error Messages

ERROR MESSAGE	EXPLANATION	REASON	SOLUTIONS
Utility Phase Failure	The sequence of on-grid wire is wrong	Inverter detects that phase angle of L2 and L3 are reversed	Reverse connection order of L2 and L3 cable.
Utility Loss	Public grid power is not available (Power lost or on-grid connection fails)	Inverter does not detect the connection of grid	<ol style="list-style-type: none"> <li>1. Check (use multi-meter) if AC side has voltage . Make sure grid power is available.</li> <li>2. Make sure AC cables are connected tightly and well.</li> <li>3. If all is well, please try to turn off AC breaker and turn on again in 5 mins.</li> </ol>
VAC Failure	Grid voltage is not within permissible range	Inverter detects that AC voltage is beyond the normal range required by the safety country	<ol style="list-style-type: none"> <li>1. Make sure safety country of the inverter is set right.</li> <li>2. Check (use multi-meter) if the AC voltage (Between L &amp; N) is within a normal range (also on AC breaker side)               <ol style="list-style-type: none"> <li>a. If the AC voltage is high, then make sure the AC cable complies with that required on user manual and the AC cable is not too long.</li> <li>b. If the voltage is low, make sure the AC cable is connected well and the jacket of the AC cable is not compressed into the AC terminal.</li> </ol> </li> <li>3. Make sure the grid voltage of your area is stable and within normal range.</li> </ol>
FAC Failure	Grid frequency is not within permissible range	Inverter detects that the grid frequency is beyond the normal range required by the safety country	<ol style="list-style-type: none"> <li>1. Make sure the safety country of the inverter is set right.</li> <li>2. If safety country is right, then please check on the inverter display if AC frequency (Fac) is within a normal range.</li> <li>3. If FAC failure only appears a few times and is resolved soon, it should be caused by occasional grid frequency instability.</li> </ol>
BAT Over Voltage	BAT voltage is too high	The battery voltage is higher than the max BAT input voltage of the inverter.	Check battery voltage is lower than Max Battery Input Voltage of the inverter. If voltage of Battery is high, please reduce battery module.
Over Temperature	Temperature inside of the inverter is too high	The inverter's working environment leads to a high temperature condition	<ol style="list-style-type: none"> <li>1. Try to decrease surrounding temperature.</li> <li>2. Make sure the installation complies with the instruction on inverter user manual.</li> <li>3. Try to close the inverter for 15 mins, then start up again.</li> </ol>

ERROR MESSAGE	EXPLANATION	REASON	SOLUTIONS
Isolation Failure	Ground insulation impedance of Battery is too low	Isolation failure could be caused by multiple reasons like battery not being grounded well, DC cable is broken, battery are aged or surrounding humidity is comparatively heavy, etc.	<ol style="list-style-type: none"> <li>1. Use multi meter to check if the resistance between earth &amp; inverter frame is about zero. If it's not, please ensure that the connection is well.</li> <li>2. If the humidity is too high, isolation failure may occur.</li> <li>3. Check the resistance between BAT to earth and PV to earth, if the resistance is lower than 100k, check the system wiring connection.</li> <li>4. Try to restart the inverter, check if the fault is still occurs, if not, means it is just an occasional situation, or contact after-sales.</li> </ol>
Ground Failure	Ground leakage current is too high	Ground failure could be caused by multiple reasons like that the neutral cable on the AC side is not connected well or the surrounding humidity is comparatively heavy, etc.	Check (use multi-meter) if there is voltage (normally should be close to 0V) between earth & inverter frame. If there is a voltage, it means the neutral & ground cables are not connected well on the AC side. If it happens only in the early morning/dawn /rainy days with higher air humidity and is recovered soon, it should be normal.
Relay Check Failure	Self checking of relay failure	Neutral & ground cables are not connected well on AC side or just an occasional failure	Check (use multi-meter) if there is high voltage (normally should be lower than 10V) between N & PE cable on the AC side. If the voltage is higher than 10V, it means the neutral & ground cable are not connected well on AC side or restart inverter.
DC Injection High	/	Inverter detects a higher DC component in AC output	Try to restart the inverter, check if it still occurs. If not, it is just an occasional situation. Otherwise, contact after-sales immediately.
EEPROM R/W Failure	/	Caused by a strong external magnetic field etc.	Try to restart the inverter, check if it still occurs. If not, it is just an occasional situation. Otherwise, contact after-sales immediately.
SPI Failure	Internal communication fails	Caused by a strong external magnetic field etc.	Try to restart the inverter, check if it still occurs. If not, it is just an occasional situation. Otherwise, contact after-sales immediately.
DC Bus High	BUS voltage is too high	/	Try to restart the inverter, check if it still occurs. If not, it is just an occasional situation. Otherwise, contact after-sales immediately.
Back-Up Over Load	Back-up side is over loaded	Total back-up load power is higher than the back-up nominal output power	Decrease back-up loads to make sure the total load power is lower than back-up nominal output power.

## Problems During Operation

### ETC does not start up with only battery

#### Solution:

Make sure the voltage of battery is higher than 200V, otherwise battery cannot start ETC up.

### High power fluctuation on battery charge or discharge:

#### Solution:

Check if there is a fluctuation on load power.

### Battery does not charge:

#### Solution:

1. Make sure BMS communication is OK on the LCD screen.
2. Make sure the CT is connected in the right position and to right direction.
3. Make sure the total load power is much higher than PV power.

## Questions & Answers (Q & A)

### About Battery Operation

#### Q: Why does the battery SOC suddenly jump to 95% on the Portal?

A: This normally happens on when BMS communication fail on lithium. If battery enter float charge, SOC will be reset to 95% automatically.

#### Q: Why battery switch always trip when it starts up (Lithium battery)?

A: The switch of lithium battery normally trips for following reasons:

1. BMS communication fails.
2. Battery SOC is too low, battery trips to protect itself.
3. An electrical short-cut happened on battery connection side. Or other reasons please contact with our department of server for details.

### About Smart Meter and Power Limit Function

#### Q: How to activate Output Power Limit function?

A: For ETC system, the function could be realized by:

1. Make sure Smart Meter connection and communication are well.
2. Turn on Export Power Limit function and set the max output power to grid on App.

**Note:** Even if output power limit is set to 0W, there might still be a deviation of a max of 500W exporting to grid.

#### Q: Why is there still power exporting to grid after I set power limit as 0W?

A: Export limit could theoretically be 0W, but there will be a deviation of around 0-500W for ETC system.

**Q: Can I use other brand Meter to take over Smart Meter in ETC system or change some settings on Smart Meter?**

A: No, because the communication protocol is inset between inverter and Smart Meter, other brand Meter cannot communicate. Also any manual setting change could cause Meter communication failure.

**Other Questions**

**Q: Is there a quick way to make the system work?**

A: The shortest way, please refer to "ETC Quick Installation Instructions".

**Q: Will the warranty of the inverter still be valid if for some special conditions we cannot 100% follow the installation or operation instructions of the user manual?**

A: Normally we can still provide technical support to problems caused b disobeying the instruction on the user manual, but we cannot guarantee a replacement or returns. So if there is any special conditions where you cannot 100% follow the instructions, please contact after-sales.

**Disclaimer**

The ETC series inverters are transported, used and operated under environmental and electrical conditions. Manufacturer has the right not to provide after-sales services or assistance under following conditions:

- Inverter is damaged during transfer.
- Inverter's warranty has expired and extended warranty is not bought.
- Inverter is installed, refitted or operated in improper ways without authorisation from manufacturer.
- Inverter is installed or used under improper environment or technical condition mentioned in this user manual, without authorisation from manufacturer.
- Installation or configuration of the inverter does not follow requirements mentioned in this user manual.
- The inverter is installed or operated against the requirements or warnings that are mentioned in this user manual.
- Inverter is broken or damaged by any force majeure like lightning, earthquake, fire hazard, storm and volcanic eruption etc.
- Inverter is disassembled, changed or updated on software or hardware without authorisation from manufacturer.
- Inverter is installed, used or operated against any related items in international or local policies or regulations.
- Any non-compatible batteries, loads or other devices connected to ETC system.

**Note: Manufacturer will keep the right to explain all the contents in this user manual.**

**Maintenance**

The inverter requires periodical maintenance, details as shown below:

- Make sure inverter is totally isolated from all DC and AC power for at least 5 mins before maintenance.
- Torque: Please use torque wrench to tighten AC and DC wiring connection once a year.
- Clean: Clean the dust of the fan inlet once a year
- DC breaker: Check DC breaker regularly, active the DC breaker 10 times in a row once a year.

## 7.2 Technical Parameters

Technical Data	GW50K-ETC
<b>Battery Input Data</b>	
Battery Type	Li-Ion
Nominal battery voltage (V)	620
Battery voltage range (V)	200~865
No. of Battery Input	1
Max. continuous Charging Current (A)	100
Max. continuous Discharging Current (A)	100
Max charge power (W)	50K
Max discharge power (W)	50K
<b>PV String Input Data</b>	
Max.Input Power (W)	65K
Max.Input Voltage (V)	1000
MPPT Operating Voltage Range (V)	250~850
MPPT Voltage Range at Nominal Power (V)	510-850
Start-up Voltage (V)	180
Nominal Input Voltage (V)	600
Max. Input Current per MPPT (A)	100
Max. Short Circuit Current per MPPT (A)	125
Max.Backfeed Current to The Array (A)	0
Number of MPPT	1
Number of Strings per MPPT	8
<b>AC Output Data (On-grid)</b>	
Nominal Apparent Power Output to Utility Grid (VA)	50K
Output Rated Active Power (W)	50K
Max. Apparent Power Output to Utility Grid (VA)	52.5K
Nominal Apparent Power from Grid(VA)	50K
Max. Apparent Power from Utility Grid (VA)	55K
Nominal Output Voltage (V)	400,3L/N/PE
Output Voltage Range (V)	312~460(AS),318~497(Germany)

Nominal AC Grid Frequency (Hz)	50/60
AC Grid Frequency Range (Hz)	47~52(AS);47.5~51.5(Germany)
Max. AC Current Output to Utility Grid (A)	76
Max. AC Current From Utility Grid (A)	100
Max. Output Fault Current(peak and duration) (A)	156A@150us
Inrush Current(peak and duration) (A)	160
Nominal Output Current (A)	72.5
Output Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)
Max. Total Harmonic Distortion	<3%
<b>AC Output Data (Back-up)</b>	
Back-up Nominal apparent power (VA)	50K
Output Rated Active Power (W)	50K
Max. Output Apparent Power (VA)	55K
Peak Output Apparent Power (VA)	55K
Max. Output Current (A)	76
Nominal Output Voltage (V)	400Vac,3L/N/PE
Nominal Output Frequency (Hz)	50/60
Output THDv (@Linear Load)	<3%
<b>Efficiency</b>	
Max. Efficiency	97.60%
European Efficiency	97.30%
Max. Battery to Load Efficiency	97.20%
<b>Protection</b>	
DC Insulation Resistance Detection	Integrated
Residual Current Monitoring Unit	Integrated
Anti-islanding Protection	Integrated
DC Reverse Polarity Protection	Integrated
AC Overcurrent Protection	Integrated
AC Short Circuit Protection	Integrated
AC Overvoltage Protection	Integrated
DC Surge Arrester	Type II(Type I Optional)
AC Surge Arrester	Type II(Type I Optional)
DC Switch	Integrated
AC Switch	Integrated
PV String Current Monitoring	Optional
DC Arc Fault Circuit Interrupter	Optional

Emergency Power Off	Integrated
Rapid Shutdown	Optional
Remote Shutdown	Integrated
PID Recovery	Optional
I-V Curve Scan	Optional
I-V Curve Diagnosis	Optional
<b>General Data</b>	
Operating Temperature Range (°C)	-20~+60°C(>45°C derating)
Relative Humidity	0~95% (Non-condensing)
Max. Operating Altitude (m)	4000
Cooling Method	Fan Cooling
User Interface	LCD & LED & APP
Communication with BMS	RS485
Communication with Meter	RS485
Communication with Portal	RS485,LAN/Bluetooth
Weight (Kg)	142
Dimension W×H×D (mm)	585*1360*750
Noise Emission (dB)	<68
Topology	Transformerless
Ingress Protection Rating	IP20
Protective class	I
Environmental Category	4K4H
Storage environments(°C)	-30~+60°C
Pollution Degree	II
Overvoltage Category	DCII / AC III
The Decisive Voltage Class (DVC)	C
Mounting method	Tower
Grid Standards	AS-NZS 4777.2: 2020, VDE-AR-N 4105: 2018
Safety Regulation	IEC62109-1&2
EMC	EN61000-6-4:2007+A1:2011(IEC 61000-6-4:2006+A1:2010) EN 6100-6-2:2005(IEC 6100-6-2:2016)

### 7.3 Other Test

For Australian requirements, in the THDi test, Zref should be added between inverter and mains.

RA, XA for Line conductor

RN, XN for Neutral conductor

Zref:

RA=0, 24; XA=j0,15 at 50Hz;

RN=0, 16; XN=j0,10 at 50Hz

### 7.4 Quick Check List to Avoid Danger

1. Inverter cannot be installed near flammable, explosive or strong electro-magnetic equipment.
2. Remember that this inverter is heavy! Please be careful when lifting out from the package.
3. Make sure battery breaker is off and battery nominal voltage meets ETC specification before connecting battery to inverter and make sure inverter is totally isolated from AC power.
4. Make sure inverter is totally isolated from any DC or AC power before connecting AC cable.
5. Make sure AC cable is totally isolated from AC power before connecting Smart Meter & CT.

#### Appendix protection category definition

Overvoltage category definition

Category I	Applies to equipment connected to a circuit where measures have been taken to reduce transient overvoltage to a low level.
Category II	Applies to equipment not permanently connected to the installation. Examples are appliances, portables tools and other plug-connected equipment.
Category III	Applies to a fixed equipment downstream, including the main distribution board. Examples are switchgear and other equipment in an industrial installation.
Category IV	Applies to equipment permanently connected at the origin of an installation (upstream of the main distribution board). Examples are electricity meters, primary over-current protection equipment and other equipment connected directly to outdoor open lines.

Moisture location category definition

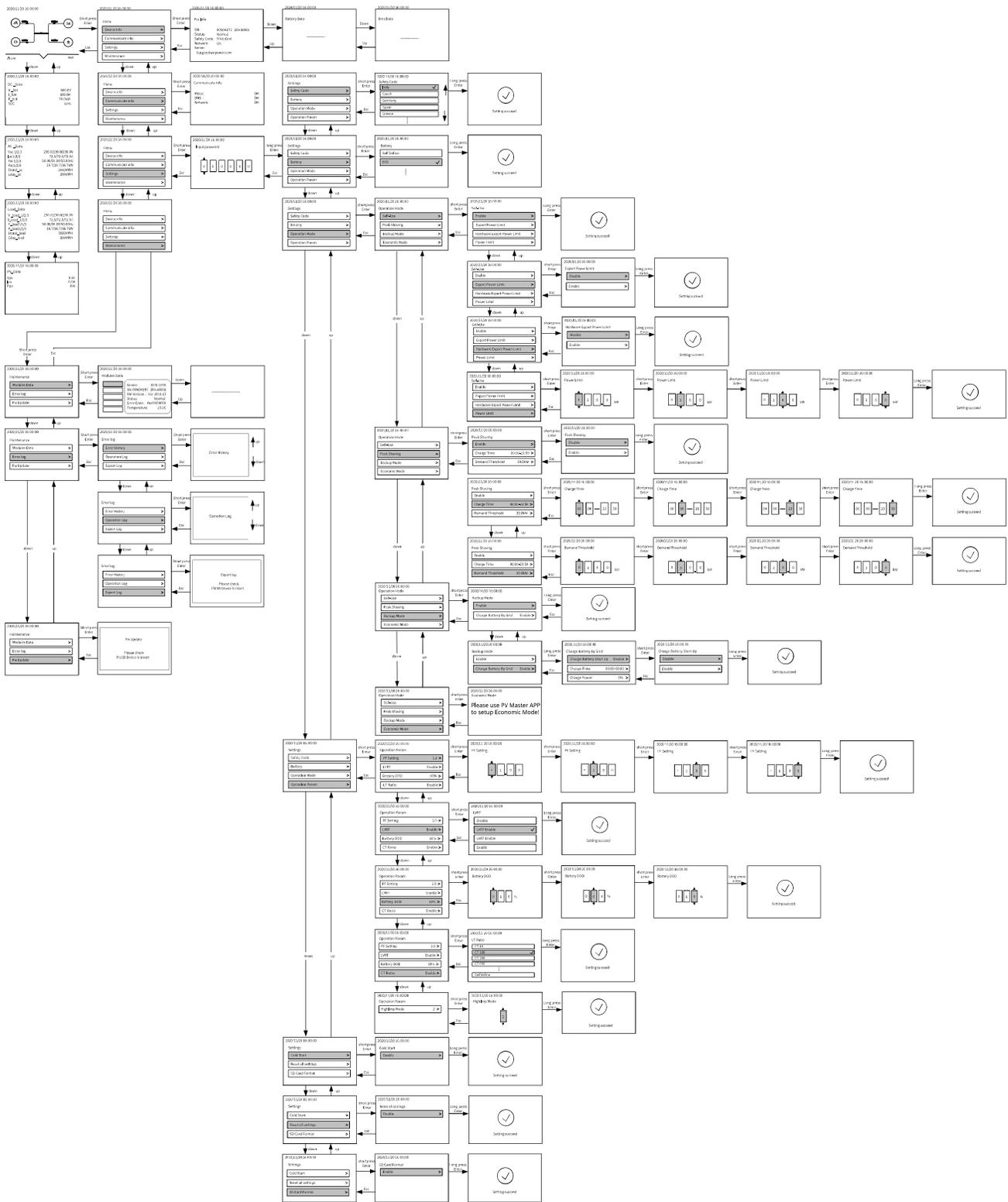
Moisture Parameters	Level		
	3K3	4K3	4K4H
Temperature Range	0~+40°C	-33~+40°C	~20~+55°C
Moisture Parameters	5%~85%	15%~100%	4%~100%

Environment category definition

Environment Condition	Ambient Temperature	Relative Humidity	Applied to
Outdoor	-20~50°C	4%~100%	PD3
Indoor Unconditioned	-20~50°C	5%~95%	PD3
Indoor conditioned	0~40°C	5%~85%	PD2

Pollution degree definition

Pollution Degree I	No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.
Pollution Degree II	Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.
Pollution Degree III	Conductive pollution occurs, or dry, non-conductive pollution occurs, which becomes conductive due to condensation, which is expected.
Pollution Degree IV	Persistent conductive pollution occurs, for example, the pollution caused by conductive dust, rain or snow.





GoodWe Website

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Local Contacts