PV Master App

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ET SERIES USER MANUAL

HYBRID INVERTER

V 1.0
2021-06-15

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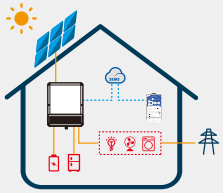
01 INTRODUCTION

The ET series, also called hybrid or bidirectional solar inverters, can be applied to solar systems using PV, batteries, loads and grid systems for energy management. The energy produced by PV systems can be used to optimize household loads, the excess energy charges the battery, and once the battery is fully charged any excess energy at that point is exported to the grid.

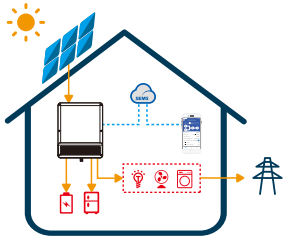
The battery discharges to support loads when the available PV power is insufficient to meet self-consumption requirements. If the battery power is insufficient, the system draws power from the grid to support any loads.



Note:
The introduction describes the general operation conditions of an ET system. The operating mode can be adjusted in the PV Master App including the system layout. The general operating modes for the ET system are shown below:

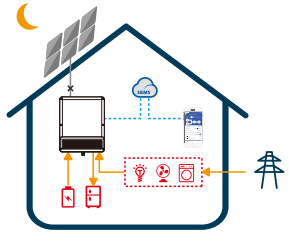
1.1 Introduction to Operating Modes

The ET system typically has the following operating modes based on your configuration and layout conditions. Note: Backup function is optional for German market



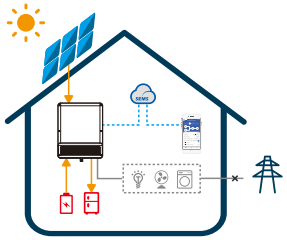
Mode I

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.



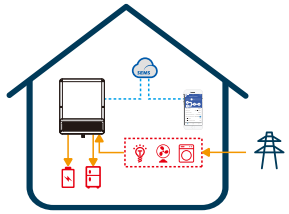
Mode II

If the PV system is currently not generating any electricity and the battery is charged, loads are supplied with electricity from the battery and the grid.



Mode III

(If backup function is included) When the grid fails, the system automatically switches to backup mode. In this case, the backup loads can be supplied by both PV and battery energy.



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 & Warnings

The ET series of inverters from Jiangsu GoodWe Power Supply Technology Co., Ltd. (also called GoodWe) strictly complies with related safety rules for product design and testing. Please read and follow all of the instructions and cautions appearing on the inverter or in the User Manual during installation, operation and maintenance, as any improper operation might cause personal injury or property damage.

Explanation of Symbols

	Caution! Failure to observe any warnings contained in this manual may result in injury.
	Danger - high voltage and electric shock!
	Danger - hot surface!
	The components of the product can be recycled.
	This side up! This package must always be transported, handled and stored in such a way that the arrows always point upwards.
	No more than six (6) identical packages are to be stacked on top of each other.
	The product shall not be disposed of as household waste.
	Fragile - The package/product must be handled carefully and should 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.
	This symbol indicates that you should wait at least 5 minutes after disconnecting the inverter from the utility grid and from the PV panel before touching any inner live parts.
	CE mark

Safety warnings

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

Never insert or remove the AC or DC connections when the inverter is running.

Before making any wiring connections or performing electrical operations on the inverter, all DC and AC power must be disconnected from the inverter for at least 5 minutes to make sure that the inverter is totally isolated to avoid electric shock.

The temperature of the inverter surface can exceed 60°C during operation. Make sure it has cooled down before touching it and make sure the inverter is out of reach of children.

Do not open the inverter cover or change any components without manufacturer's authorization. Otherwise, the warranty for the inverter will be invalid.

The usage and operation of the inverter must follow the instructions in this User Manual. Otherwise, the protection design might be impaired and the warranty for the inverter will be invalid.

Appropriate methods must be adopted to protect the inverter from static electricity damage. Any damage caused by static electricity is not warranted by the manufacturer.

PV negative (PV-) and battery negative (BAT-) on inverter side are not grounded as the default design. Connecting either PV- or BAT- to EARTH is strictly forbidden.

Any PV modules used with the inverter must have an IEC61730 class A rating, and the total open-circuit voltage of the PV string/array must be lower than the maximum rated DC input voltage of the inverter. Any damage caused by PV overvoltage is not covered by the warranty.

When exposed to sunlight, the PV array generates dangerous high DC voltages.
Please operate the inverter according to these instructions, or danger to life may result.

The inverter, with a built-in RCMU, will prevent the possibility of DC residual currents up to 6mA. Thus, in the system, an external RCD (type A) can be used (⩾30mA).

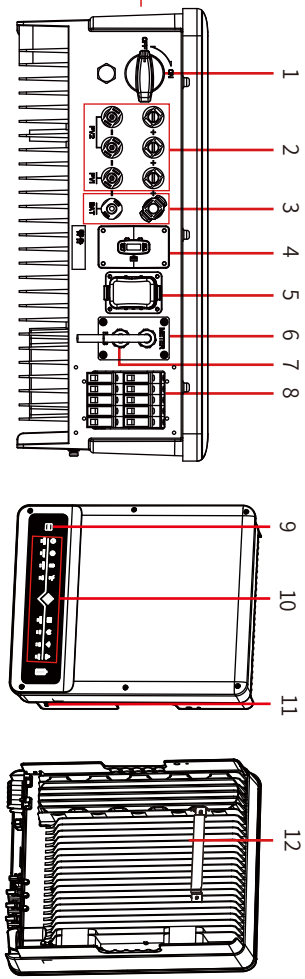
In Australia, the output of the backup side in the switchbox should be labelled "Main Switch UPS Supply". The output on the normal load side in the switch box should be labelled "Main Switch Inverter Supply".

PV Input Terminal [1]

1.3 Product Overview

HYBIRD LED INDICATORS

	SYSTEM	BACKUP	BATTERY	GRID	ENERGY	COM	Wi-Fi	FAULT	STATUS	EXPLANATION
SYSTEM	■								■	ON = System is ready
									▮▮▮▮▮	BLINK = System is starting up
									———	OFF = System is not operating
BACKUP		■							■	ON = Backup is ready/power available
									———	OFF = Backup is off/no power available
BATTERY			■						■	ON = Battery is charging
			▮▮▮▮▮						▮▮▮▮▮	BLINK 1 = Battery is discharging
			▮▮ ▮▮						▮▮ ▮▮	BLINK 2 = Battery is low/soc is low
			———						———	OFF = Battery is disconnected/not active
GRID				■					■	ON = The grid is active and connected
				▮▮▮▮▮					▮▮▮▮▮	BLINK = The grid is active but is not connected
				———					———	OFF = The grid is not active
ENERGY					■				■	ON = Consuming energy from the grid/ purchasing
					▮▮▮▮▮				▮▮▮▮▮	BLINK 1 = Supplying energy to the grid/ zeroing
					▮▮ ▮▮				▮▮ ▮▮	BLINK 2 = Supplying energy to the grid/ selling
					———				———	OFF = The grid is not connected or the system is not operating
COM						■			■	ON = BMS and meter communications are OK
						▮▮▮▮▮			▮▮▮▮▮	BLINK 1 = Meter communications are OK, BMS communications have failed
						▮▮ ▮▮			▮▮ ▮▮	BLINK 2 = BMS communications are OK, meter communications have failed
						———			———	OFF = BMS and meter communications have both failed
Wi-Fi							■		■	ON = Wi-Fi is connected/active
							▮▮▮▮▮		▮▮▮▮▮	BLINK 1 = Wi-Fi is resetting
							▮▮ ▮▮		▮▮ ▮▮	BLINK 2 = Wi-Fi is not connected to the router
							▮▮▮ ▮▮▮		▮▮▮ ▮▮▮	BLINK 4 = Wi-Fi server problem
							———		———	OFF = Wi-Fi is not active
FAULT								■	■	ON = A fault has occurred
								▮▮▮▮▮	▮▮▮▮▮	BLINK1 = Overload of backup output/ reduce load
								▮▮▮ ▮▮▮	▮▮▮ ▮▮▮	BLINK4 = CT wiring fault
								———	———	OFF = No fault

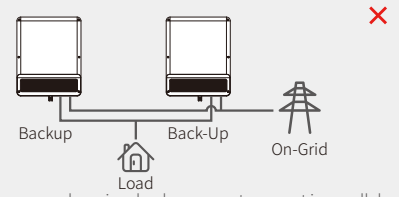


1. DC Switch
2. (PV+/PV-)[2]
3. Battery Terminal(BAT+/BAT-)
4. Communication Module Port (WiFi or Bluetooth)
5. COM Terminal
6. METER Communication Port
7. BMS Communication Port
8. AC Terminal (ON-GRID and BACKUP)
9. WiFi Reset
10. Indicator
11. PE Terminal
12. Mounting Plate

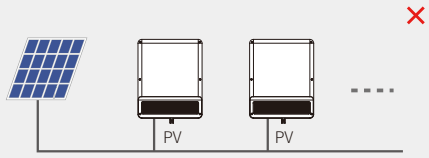
[1] GW5KL-ET, GW6KL-ET, GW8KL-ET,GW10KL-ET: optional.
[2] GW8KL-ET and GW10KL-ET: 2 x PV+/PV-.

2.1 Unacceptable Installations

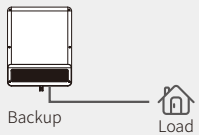
Please avoid the following installations types, which will damage the system or the inverter.



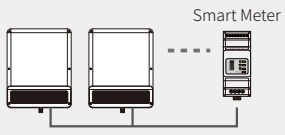
For the general version, backup cannot connect in parallel. For advanced applications, please contact our after-sales department.



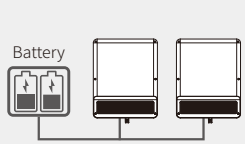
Single PV string cannot connect to multiple inverters



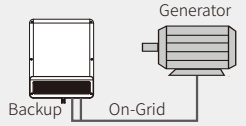
The Inverter does not support off-grid functions in gridless areas.



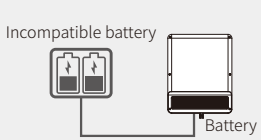
One meter cannot be connected to multiple inverters. Different CTs cannot connect to the same line cable.



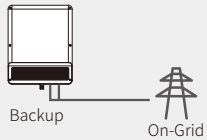
One battery bank cannot be connected to multiple inverters.



The on-Grid or backup side cannot be connected to any AC generator directly.



The inverter battery input must not be connected to incompatible batteries.



The backup side cannot be connected to the grid.

2.2 Packing List

Upon receiving the hybrid inverter, please check if any of the components listed below are missing or broken.

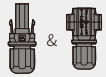
Inverter

Wall-Mounting Bracket

Smart Meter with 3CT

Positive PV Connector

Negative PV Connector



BAT Connectors

AC Cover

PIN Terminal

Spare Screw

PE Terminal

Expansion Bolts

Bluetooth (Optional)

COM Module

COM Connector

Documents

2.3 Mounting

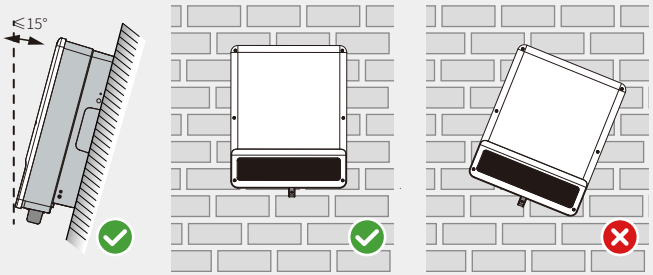
2.3.1 Select Mounting Location

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

No part of the system should not block the switch or breaker from disconnecting the inverter from DC and AC power.

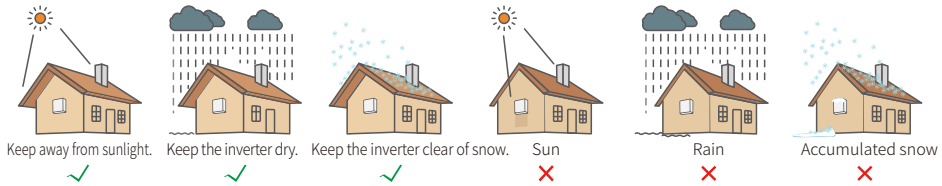
Rule 1. The inverter should be installed on a solid surface which is suitable for inverter's dimensions and weight.

Rule 2. The inverter should be installed vertically or be on a slope with a maximum value of 15°.

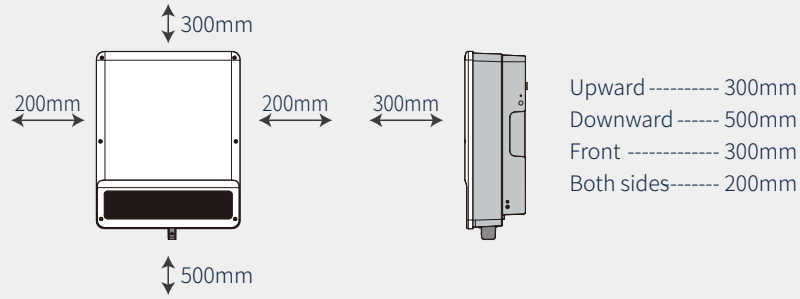


Rule 3. The ambient temperature should be lower than 45°C.
(High ambient temperatures will cause power derating of the inverter.)

Rule 4. The inverter installation should be protected by shelter from direct sunlight or bad weather such as snow, rain, lightning etc.



Rule 5. The inverter should be installed at eye level for convenient maintenance.
Rule 6. The product label on the inverter should be clearly visible after installation.
Rule 7. Leave enough space around the inverter according to the figure below.



2.3.2 Mounting

The inverter must not be installed near flammable or explosive materials or near equipment with strong electromagnetism.

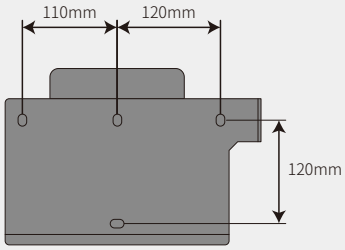
The inverter is suitable for mounting on concrete or other non-combustible surfaces only.

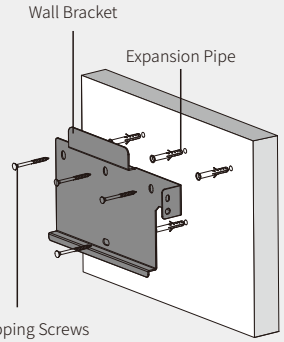
Step 1

Please use the mounting bracket as a template to drill 4 holes in the correct positions (e.g. 10mm in diameter and 80mm in depth).

Use the expansion bolts in the accessory box and tightly attach the mounting bracket to the wall.

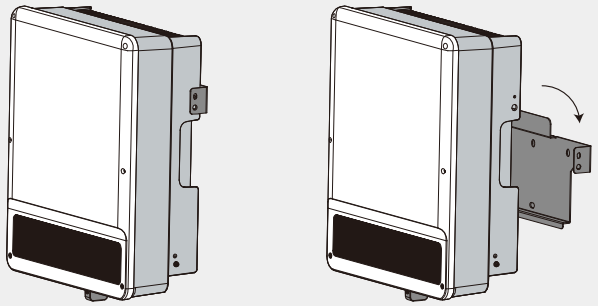
Note: The bearing capacity of the wall must be greater than 25kg. Otherwise, the wall may not be able to prevent the inverter from dropping.





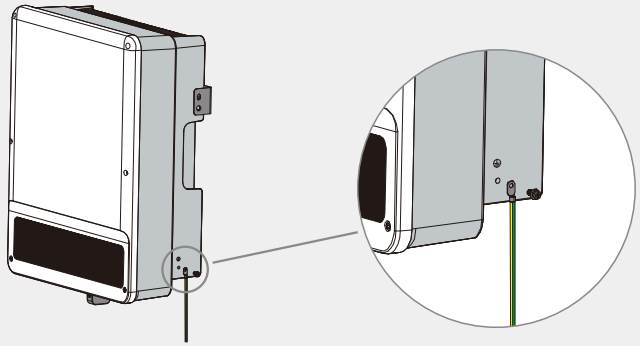
Step 2

Carry the inverter by holding the heat sink on two sides and place the inverter on the mounting bracket.



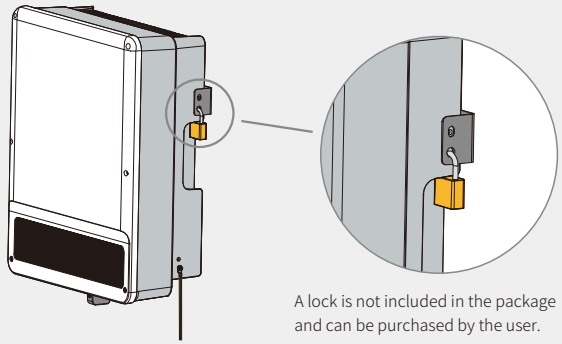
Step 3

The ground cable shall be connected to the ground plate on the grid side.



Step 4

The inverters can be locked for anti-theft purposes if this is necessary for individual requirements.



A lock is not included in the package and can be purchased by the user.

2.4 Electrical Wiring Connection

2.4.1 PV Wiring Connection

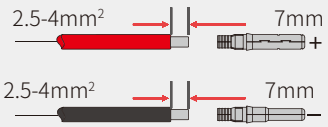
Before connecting PV panels/strings to the inverter, please make sure all requirements listed below are followed:

- The total short-circuit current of a PV string must not exceed the inverter's max DC current. (For models GW8KL-ET and GW10KL-ET, PV2 has 2 pairs of PV connectors which can accept 2PV strings with a total short-circuit current of no more than 22A)
- The minimum isolation resistance to ground of the PV string must exceed 19.33kΩ in case of any shock hazard.
- The PV string must not be connected to the earth/grounding conductor.
- Use the right PV plugs in the accessory box. (BAT plugs are similar to PV plugs. Please check before using them.)

Note: There are MC4, QC4.10, or Amphenol plugs in the accessory box. The connection details are shown below.

Step 1

Prepare the PV cables and PV plugs.

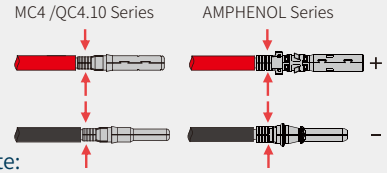


Note:

1. Please use the PV plugs and connectors from the accessory box.
2. The PV cable should be a standard 2.5–4mm².

Step 2

Connect the PV cable to the PV connectors.



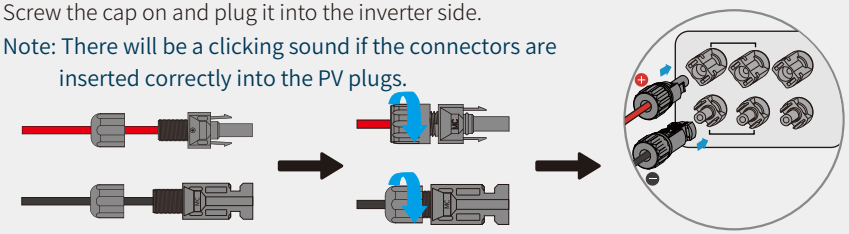
Note:

1. The PV cable must be tightly crimped onto the connectors.
2. For Amphenol connectors, the limit buckle cannot be pressed.
3. There will be a clicking sound if the connectors are inserted correctly into the PV plugs.

Step 3

Screw the cap on and plug it into the inverter side.

Note: There will be a clicking sound if the connectors are inserted correctly into the PV plugs.



The polarity of the PV strings must not be connected in a reverse manner. Otherwise, the inverter could be damaged.

For the GW8KL-ET and GW10KL-ET models, use two separate PV plugs if the short-circuit current of the PV array connected to inverter's PV2 input is greater than 15A.

2.4.2 Battery Wiring Connections

Please be careful of any electric shock or chemical hazards. For batteries without a built-in DC breaker, make sure that an external DC breaker (⩾40A) connected.

Make sure the battery is under normal working condition (such as battery voltage and BMS setting etc.) when the inverter and battery is to be used. If you need to use the hybrid inverter as a Grid-tied inverter, please contact GoodWe after-sales.

Make sure that the battery switch is off and that the nominal battery voltage meets ET series specifications before connecting the battery to the inverter. Make sure the inverter is totally isolated from both PV and AC power. Please strictly follow the requirements and steps listed below. Using inappropriate wires may cause bad contacts and high impedances, which are dangerous for the system.

Use the correct BAT plugs from the accessory box.

The maximum battery current is 25A. Please use the tin-plated cables for which the cross section ranges from 4 to 6mm² (AWG 10). The battery cable requirements are shown in Figure 2.4.2-1.

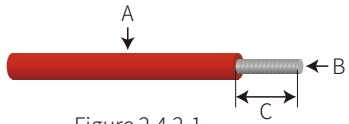


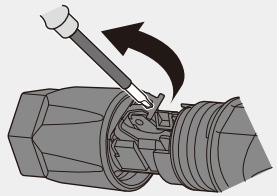
Figure 2.4.2-1

Grade	Description	Value
A	Outside diameter of insulation	5.5-8.0 mm
B	Conductor core section	4-6 mm²
C	Conductor core length	15 mm

Connection process for battery wiring

Step 1

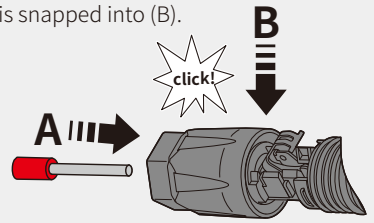
Open the spring using a screwdriver.



Step 2

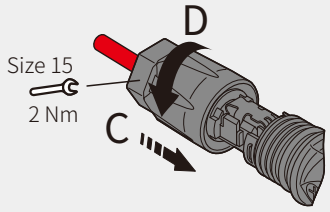
Carefully insert the stripped wire with twisted litz wires all the way into (A). The litz wire ends must be visible in the spring.

Close the spring. Make sure that the spring is snapped into (B).



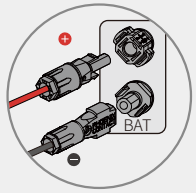
Step 3

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



Step 4

Insert two BAT connectors into the inverter BAT input. There will be a clicking sound if the connectors are inserted correctly.



2.4.3 On-Grid & Backup Connection

An external AC breaker is needed for the on-grid connection for isolation from the grid when necessary.

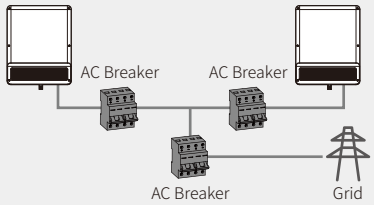
Note: Backup function is optional for only German market, even though the hardware connector is always there.

The requirements for the on-grid AC breaker are shown below.

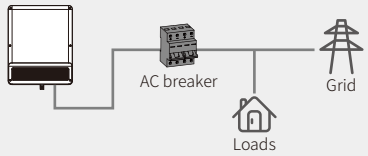
Inverter model	AC breaker specifications
GW5K/GW5KL-ET	25A/400V (e.g. DZ47-60 C25)
GW6.5K/GW6KL-ET	25A/400V (e.g. DZ47-60 C25)
GW8K/GW8KL-ET	32A/400V (e.g. DZ47-60 C32)
GW10K/GW10KL-ET	32A/400V (e.g. DZ47-60 C32)

Note: The absence of an AC breaker on the backup side will lead to inverter damage if an electrical short circuit occurs on the backup side.

1. Use separate AC breakers for individual inverters.



2. On the AC side, an individual breaker should be connected between the inverter and grid but before any loads.



Requirement of AC cable connected to On-Grid and Back-Up side.

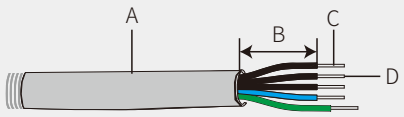
Make sure the inverter is totally isolated from any DC or AC power before connecting the AC cable.

Note:

1. The neutral cable shall be blue, the line cable shall be black or brown (preferred), and the protective earth cable shall be yellow-green.
2. For AC cables, the PE cable shall be longer than the N&L cables. This provides protection in case the AC cable slips or is removed, the ensuring that the earth conductor will be the last cable to take the strain.

Step 1

Prepare the terminals and AC cables according to the correct table.

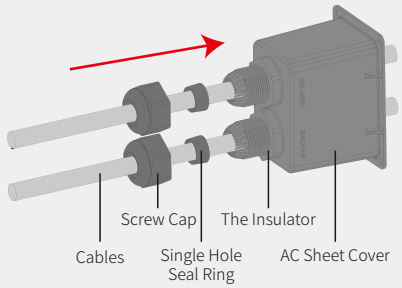


Grade	Description	Value
A	Outside diameter	13-18 mm
B	Separated wire length	20-25 mm
C	Conductor wire length	7-9 mm
D	Conductor core section	4-6 mm²

Step 2

Place the AC cable through the terminal cover as shown in the figure.

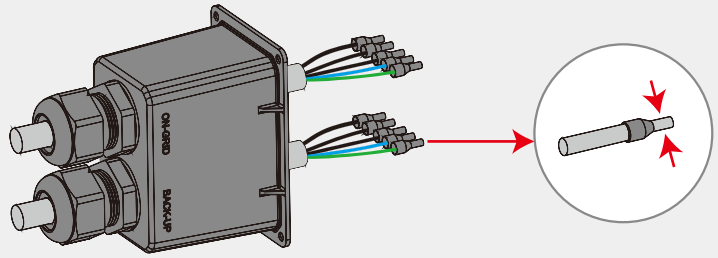
Note: Please use the terminals in the accessory box.



Step 3

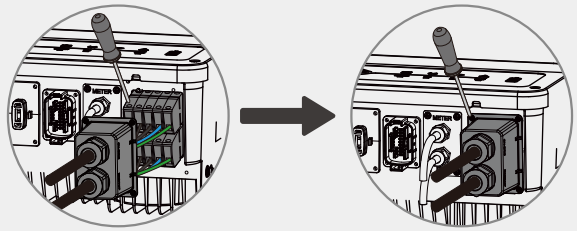
Press the connectors tightly on the cable conductor core.

Note: Make sure the cable jacket is not locked within the connector.



Step 4

Use a screwing torque of 2.0–2.5Nm



1. Connect the assembled AC cables to AC terminals with a fastening torque of approximately 2.0-2.5 Nm.

Note: (If the inverter has backup function) Connect the backup terminals before connecting the on-grid terminals. Make sure they are not connected to the wrong side.

2. Lock the cover and screw on the cap.

Special adjustable settings

The inverter has a field where the user can set functions, such as trip points, trip time, time of reconnection, active and invalid of QU curve, and PU curve. These functions can be adjusted by using special software. If interested, please contact the after-sales department.

Declarations for the backup function

The backup outputs of the ET hybrid inverters have overload capability.

For details please refer to the technical parameters in the ET series inverter section (Page 35).

The inverter has self-protection derating at high ambient temperatures.

The statement below lays out the general policies governing the series EH, EM, ES, ET, BH, BT and SBP energy storage inverters.

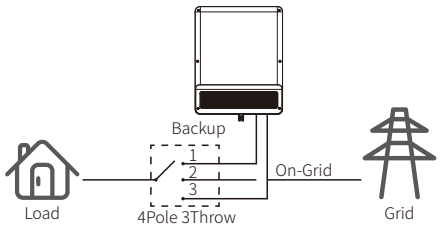
1. For hybrid inverters (e.g. Series EH, EM, ES, and ET), a standard PV installation typically consists connecting the inverter to both panels and batteries. When the system is not connected to the batteries, the manufacturer strongly advises that the backup function not be used. The manufacturer will not honour the standard warranty and will not be liable for any consequences arising from users not following this instruction.
2. Under normal circumstances, the backup switching time is less than 10ms (e.g. the minimal condition to be considered as a UPS-level switching). However, some external factors may cause the system to fail in backup mode. Due to this, we recommend that users to be aware of these conditions and follow the instructions as described below:
   - Do not connect loads which are dependent on a stable energy supply for reliable operation.
   - Do not connect the loads which may, in total, exceed the maximum backup capacity.
   - Try to avoid those loads which may create very high start-up current surges such as inverters, air conditioners, high-power pumps etc.
   - Due to the battery condition itself, the battery current might be limited by factors including but not limited to temperature and weather etc.

Acceptable loads are shown below:

- Inductive Loads: 1.5 P non-frequency conversion air conditioners can be connected to the backup side. Two or more non-frequency conversion air conditioners connected to backup side may cause the back-up mode to be unstable.
- Capacitive Loads: A total power ⩽ 0.6 × nominal power of the model. (Any load with high startup current is not acceptable.)
- For complicated applications, please contact the GoodWe Solar Academy.

Note:

For convenient maintenance, please install a SP 3T switch on both the backup and on-grid sides. Then it is adjustable to support load by backup or by grid or default settings.



1. The backup load is supplied from backup side.
2. The backup load is isolated.
3. The backup load is supplied from grid side.

Declarations for backup overload protection

The inverter will restart itself if overload protection is triggered. The preparation time for restarting will be increasingly long (one hour at most) if an overload recurs. Take the following steps to immediately restart the inverter.

Decrease the backup load power to within the maximum limitation.

On The PV Master App → Advanced Settings → Click "Reset Backup Overload History".

2.5 Communication Connections

2.5.1 Smart Meter & CT Connections

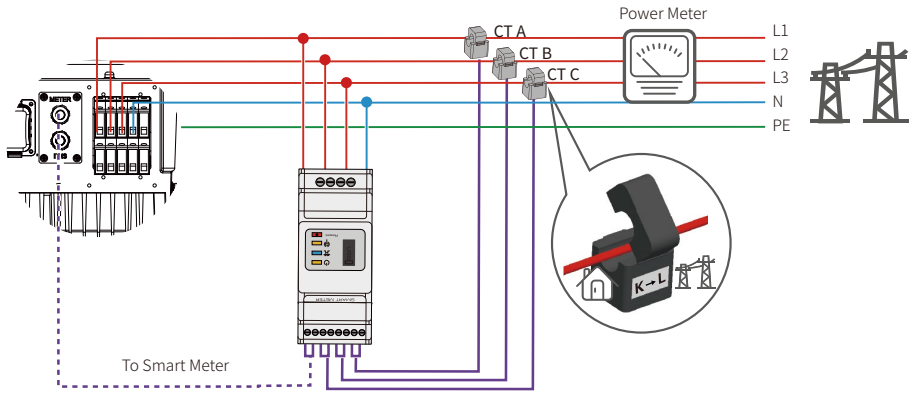
Make sure the AC cable is totally isolated from AC power before connecting the Smart Meter and CT.

A Smart Meter with the CT in product box is compulsory for ET system installation and is used to detect the grid voltages and current directions and also is used to provide the operating condition of the ET inverter via RS485 communications.

Note:

1. The Smart Meter with CT is already configured ; please do not change any settings on the Smart Meter.
2. One Smart Meter can be used with only one ET inverter.
3. Three CTs must be used for one Smart Meter and must be connected on the same phase with the Smart Meter power cable.

Smart Meter & CT connection diagram



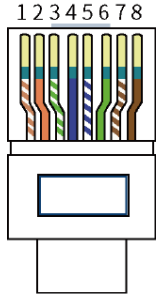
Note:

1. Please use the Smart Meter with the 3 CTs contained in the product box.
2. The CT cable is 3m long as a default and can be extended to maximum of 5m.
3. The Smart Meter communication cable (RJ45) is attached on the inverter ("To Smart Meter" cable), and be extended to a maximum length of 100m, and must use a standard RJ45 cable and plug, as shown below:

Detailed pin functions of each port on the ET

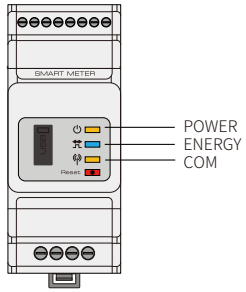
BMS：CAN communication is configured by default. If 485 communication is used, please contact the after-sales service to replace this with the correct communication cable.

Position	Colour	BMS Function	Smart Meter Function	EMS
1	Orange & white	485_A2	NC	485_A
2	Orange	NC	NC	485_B
3	Green & white	485_B2	485_B1	485_A
4	Blue	CAN_H	NC	NC
5	Blue & white	CAN_L	NC	NC
6	Green	NC	485_A1	485_B
7	Brown & white	NC	485_B1	NC
8	Brown	NC	485_A1	NC



Smart Meter LED indications

STATUS	OFF	ON	Blinking
POWER	Not working	Working	/
ENERGY	/	Importing	Exporting
COM	Blinks one time when data are transferred to the inverter		



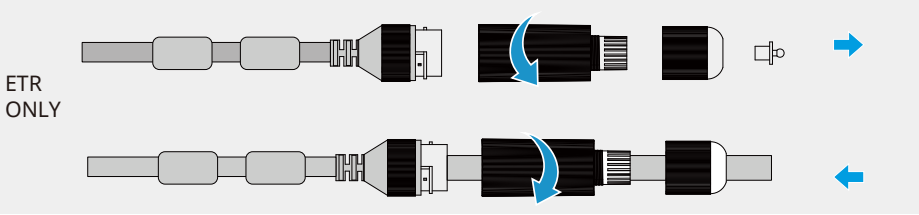
2.5.2 BMS Connection

BMS is used to communicate with the connected compatible lithium battery.

There is a 3m communication cable marked "To Battery" on the inverter except ETR models. For ETR models, the net cable should be prepared by the customer and should be no longer than 5m.

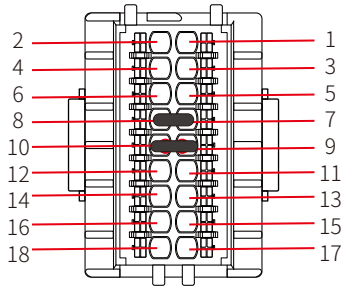
Connection steps

1. Confirm that the battery and inverter power cables are connected (refer to 2.4.2 Battery Wiring Connections)
2. Connect the BMS communication cable of the inverter to the communication interface of the lithium battery
3. Select the corresponding battery via the APP (please refer to the user manual of the PV master app)



2.5.3 COM Terminal Connection

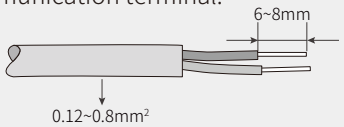
Follow the pin definition below to connect the communication cables. Do not remove the resistor or short circuit wire unless you are going to use the corresponding PINs.

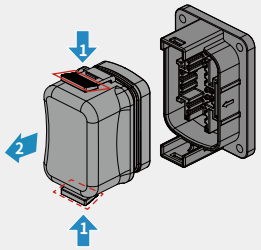


PIN	Definition	Function	PIN	Definition	Function
1	485_A1	RS485	9	Remote Shutdown	Remote Shutdown
2	485_B1		10	GND-S	
3	DRM 1/5 or DI_1	DRED or RCR	11	LG_EN+	LG Battery Enabling Signal
4	DRM 2/6 or DI_2		12	LG_EN-	
5	DRM 3/7 or DI_3		13/14	N/A	N/A
6	DRM 4/8 or DI_4		15/16		
7	COM/DRM0 or REF_1		17	DO-	Dry Contact of Load Control
8	REFGEN or REF_2		18	DO+	

Step 1

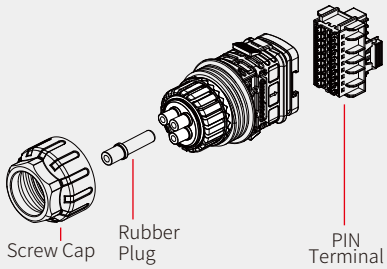
Prepare the communication cable and remove the plug of the communication terminal.





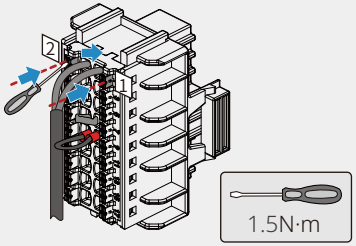
Step 2

Dismantle the communication module and take out the pin terminal. To avoid water and dust, keep the rubber plug to seal the unused holes.



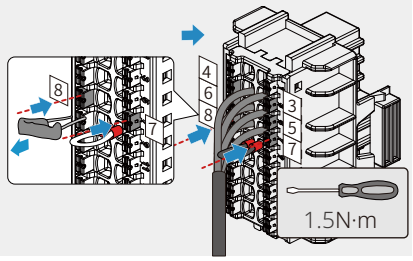
Step 3-1 For RS485 Communication

Insert the communication cable into pin 1 and pin 2 of the pin terminal to realize the RS485 communication function.



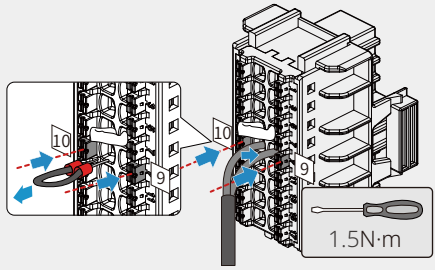
Step 3-2 For DRED or RCR

Remove the resistor, then insert the communication cable into pin 3, 4, 5, 6, 7, and 8 to realize the DRED or RCR function. Keep the resistor by default if DRED or RCR function is not to be used.



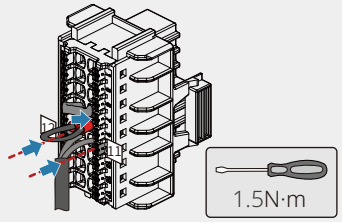
Step 3-3 For Remote Shutdown

Remove the short circuit wire. Connect pin 9 and pin 10 with an external switch using a communication cable. Keep the short circuit wire by default if remote shutdown function is not to be used.



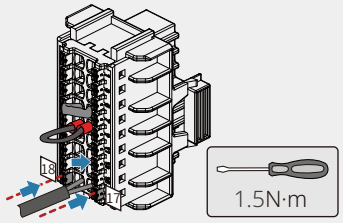
Step 3-4 For Battery Enabling Signal

Insert the communication cable into pin 11 and pin 12 to realize the battery enabling signal function. Designed for LG battery only.



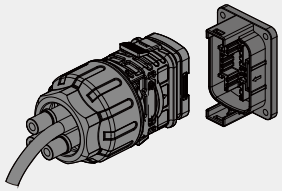
Step 3-5 For Dry Contact of Load Control

Insert the communication cable into pin 17 and pin 18 to realize the dry contact relay function.



Step 4

Assemble the communication module and plug it into the communication terminal.

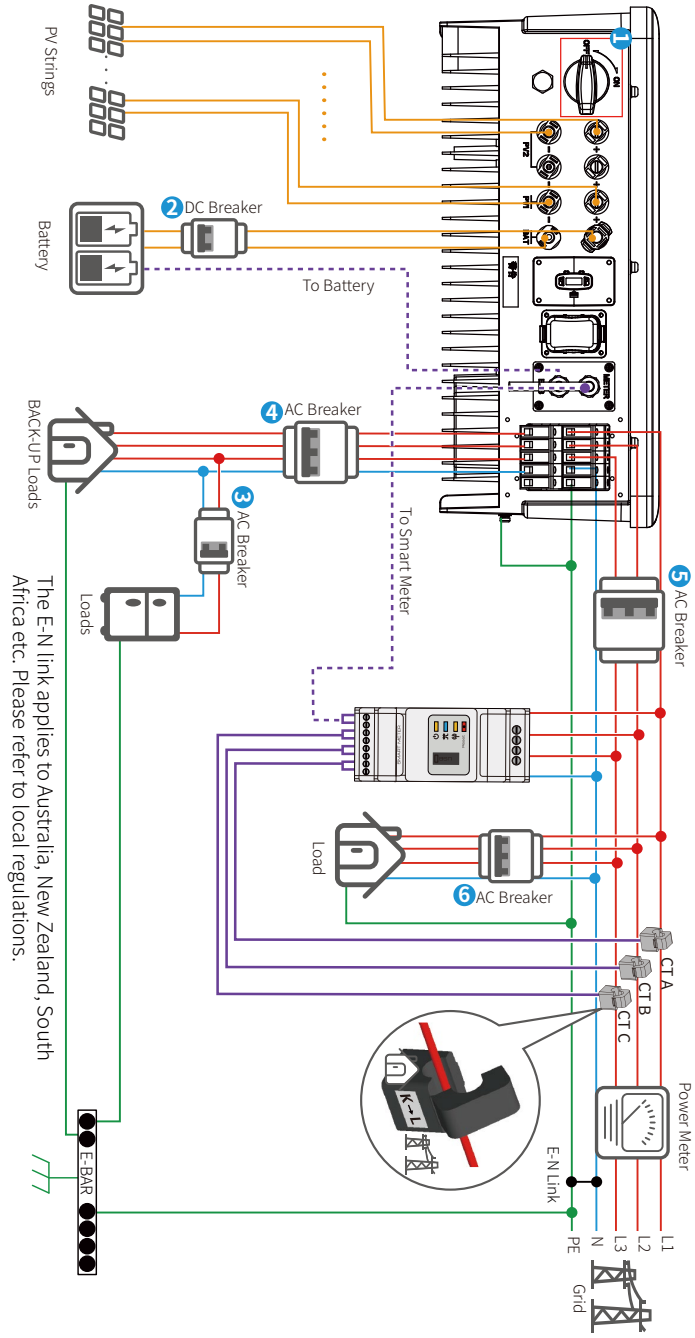


2.6 Earth Fault Alarm Connection

ET series inverters comply with IEC 62109-2 13.9. The fault indicator LED on the inverter cover will light up and the system will email the fault information to customer.

Wiring system for the ET series hybrid inverter

Note: This diagram indicates the wiring structure of the ET series hybrid inverter, not the electric wiring standard.



Please select the breaker according to the specifications below:

Inverter	①	②	③	④	⑤
GW5KL/6KL-ET	40 A/600 V DC breaker	25 A/400 V AC breaker			Depends on household loads
GW8KL/10KL-ET		32 A/400 V AC breaker			
GW5K/6.5K-ET		25 A/400 V AC breaker			
GW8K/10K-ET		32 A/400 V AC breaker			

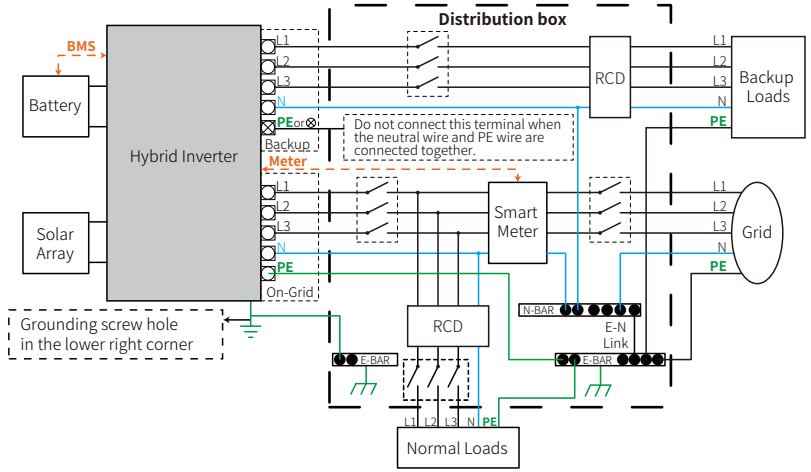
1. For batteries with attached breakers, the external DC breaker may be omitted.
2. Please use CT A for L1, CT B for L2, and CT C for L3. Also, follow the "House (K)→Grid(L)" direction to complete the connection. Otherwise, there will be an error reminder from the PV Master App.

System connection diagrams

Note: According to Australian safety requirements, the neutral cables of the on-grid side and backup side must be connected together. Otherwise, the backup function will not work.

This diagram is an example for an application that neutral connects with the PE in a distribution box.

For countries such as Australia, New Zealand, South Africa, etc., please follow local wiring regulations!

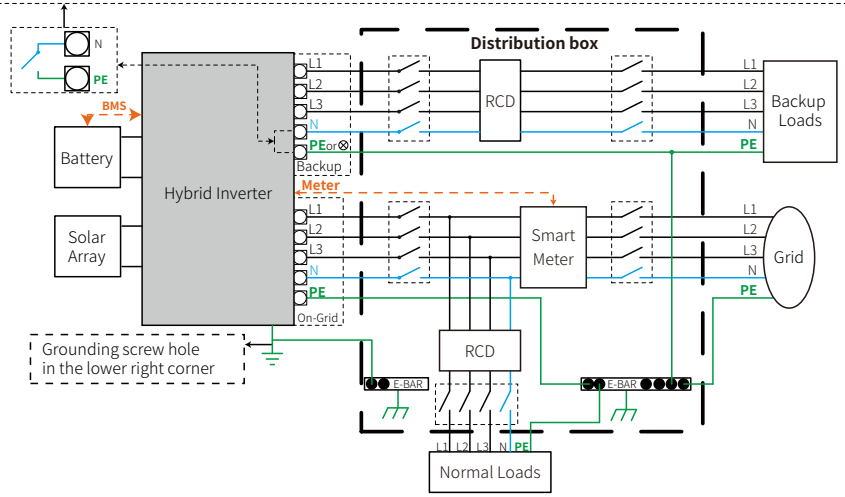


This diagram is an example for an application in which neutral is separated from the PE in the distribution box.

For countries such as China, Germany, the Czech Republic, Italy, etc., please follow local wiring regulations!

Note: Backup function is optional in German market. Please leave backup side empty if backup function is not available in the inverter.

When the inverter is working in backup mode, neutral and PE on the backup side are connected via the internal relay. Also, this internal relay will be open when the inverter is working in grid-tied mode.



03 MANUAL OPERATION

3.1 Wi-Fi Configuration

This part shows the configuration using a web page.

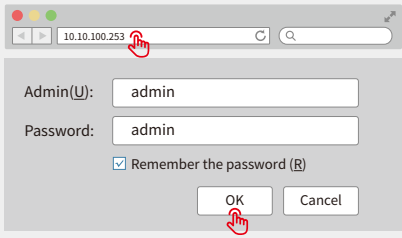
Wi-Fi configuration is absolutely necessary for online monitoring and maintenance.

Preparation:

1. The inverter must be powered up with battery or grid power.
2. A router with internet access to the website www.semsportal.com is required.

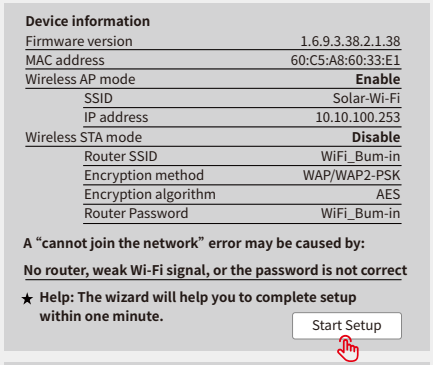
Step 1

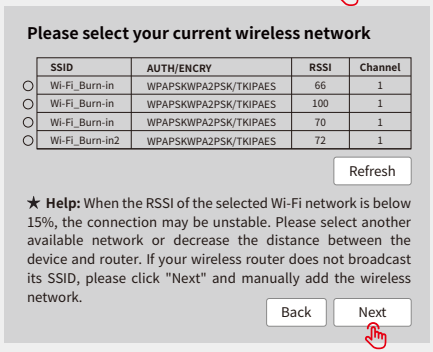
1. Connect Solar-Wi-Fi* to your PC or smart phone (* its name is the last 8 characters of the inverter's serial number); Password：12345678.
2. Open your browser and logon to 10.10.100.253 Admin (User): admin; Password: admin.
3. Then click "OK".



Step 2

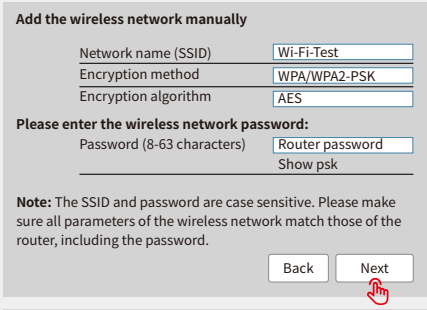
1. Click "Start Setup" to choose your router.
2. Then click "Next".

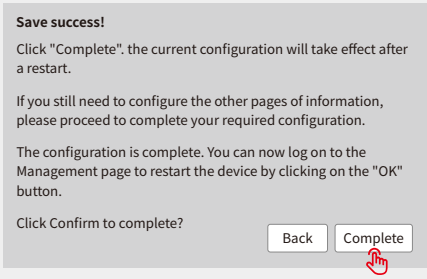




Step 3

1. Fill in the password of the router, then click "Next".
2. Click "Complete".

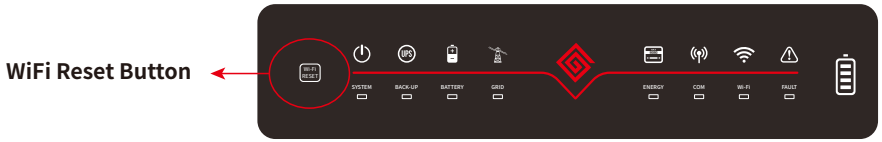




Note:
1. Please make sure the password and encryption method/algorithm are the same as those of the router.
2. If everything went well, the WiFi indicator on the inverter will change from a double blink to 4 blink and then to a steady status, which means that the WiFi has successfully connected to the server.
3. WiFi configuration can also be done via the PV Master App. For details, please check 3.2 PV Master App.

WiFi Reset & Reload

WiFi reset means restarting the WiFi module. The WiFi settings will automatically be reprocessed and saved. WiFi Reload means setting the WiFi module to the default factory settings.



WiFi reset
Short press the reset button.
The WiFi LED will blink for a few seconds.

WiFi reload
Long press the reset button more than 3s.
The WiFi indicator will double blink until the WiFi is configured again.

Note:
The WiFi reset and reload function can be used only when:
1. WiFi disconnects with the internet or cannot connect successfully to the PV Master App.
2. "Solar-WiFi signal" cannot be found or other WiFi configuration problems exist.
Do not press the button if WiFi monitoring is working correctly.
Replace the module using the unlock tool.

PV Master is an external monitoring and configuration application for hybrid inverters and is used on smart phones or tablets for both Andriod 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. WiFi configuration.

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 opertaion instructions, please refer to PV Master user manual in www.goodwe.com.

PV Master APP

3.2 PV Master

3.2.1 Commissioning via PV Master

Log in using the initial password for the first time and change the password as soon as possible. To ensure account security, you are advised to change the password periodically and keep the new password in mind.

Steps to connect the WiFi:
Step 1:**PV Master →Connect Device→Inverter with WiFi**
Step 2:**Phone Settings→WLAN→Solar-WiFi********
Step 3:**PV Master→Solar-WiFi********

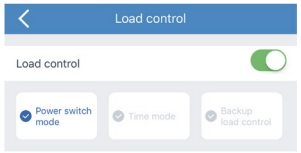
Follow the steps below to set basic settings.
PV Master→Settings→Basic Setting→Installer Password(goodwe2010)→Select Safety→ Select Work Mode→CT Detection

3.2.2 Load Control

The inverter is equipped with a dry contact relay, which helps turn the loads on or off when an extra contactor is connected.

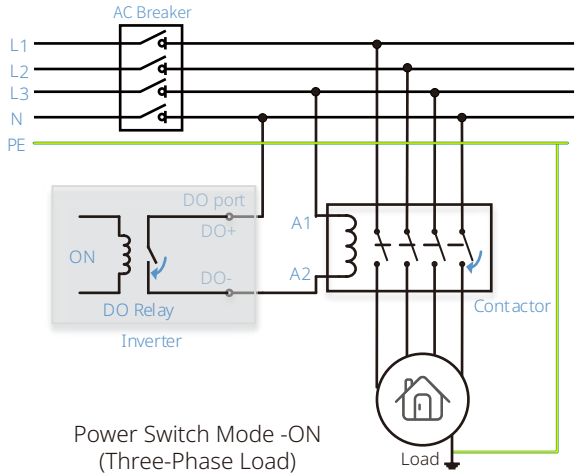
Note:
- The AC contactor should be placed between the inverter and the loads. Do not connect the load to DO port directly.
- The contactor is not supplied by the manufacturer. Connect the the load to the DO port of the inverter directly if the load is designed with a DI port.
- Maximum voltage and current at DO dry contact port: 250VAC 3A/30VDC 3A.
- When the controlled load is connected to ONGRID, the contactor coil must also be connected to ONGRID. When the controlled load is connected to BACKUP, the contactor coil must also be connected to BACKUP.

Tap **Settings→Load Control** to enter load control page and select the working mode.
Working mode: Power Switch Mode, Time Mode and Backup Load Control Mode.

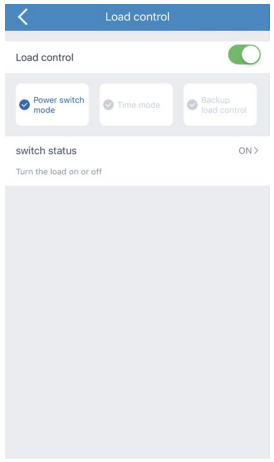


Power Switch Mode

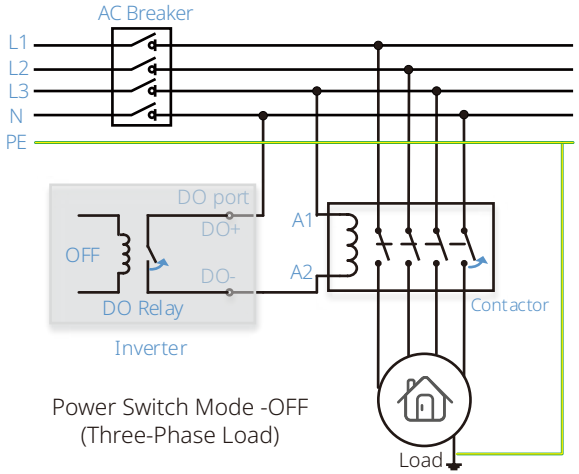
Turn on or off the loads via PV Master app directly.
- Select **Power Switch Mode** and tap **ON.** Once the inverter receives **ON** command, the contactor will be connected and loads be powered on.



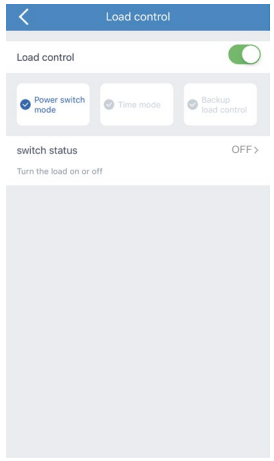
Power Switch Mode -ON
(Three-Phase Load)



- Select **Power Switch Mode** and tap **OFF.** Once the inverter receives **OFF** command, the contactor will be disconnected and loads be powered off.

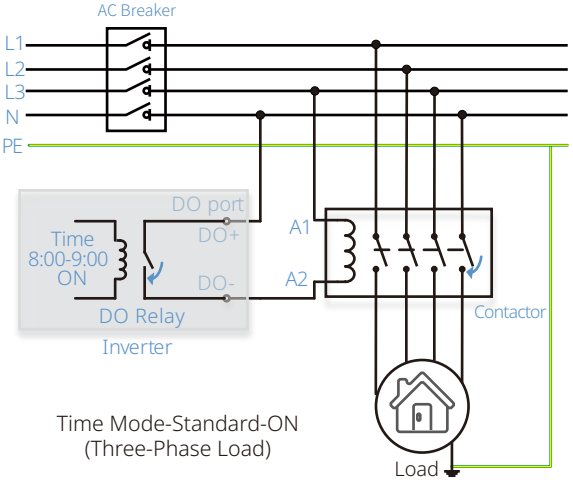


Power Switch Mode -OFF
(Three-Phase Load)

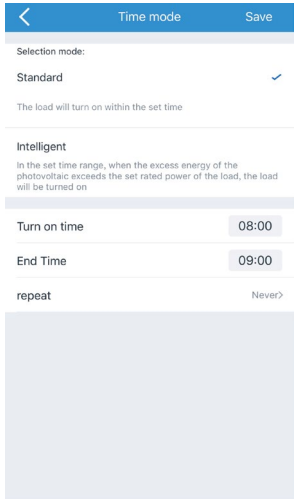


Time Mode

Standard Time Mode: Set the starting time and end time to turn on the loads at the preset time only. The loads will not work except the preset period.
Select **Time Mode→Add→Standard→Turn on time&End time&Repeat→Save** to set the turn on time, end time and repeat day.
The following figures show the example to turn on the load from 8:00 a.m. to 9:00 a.m.



Time Mode-Standard-ON
(Three-Phase Load)



Intelligent Time Mode: set time range, load consumption time, and nominal power of load via PV Master. Once the excess energy of the photovoltaic exceeds the preset load nominal power, the loads will be turned on.

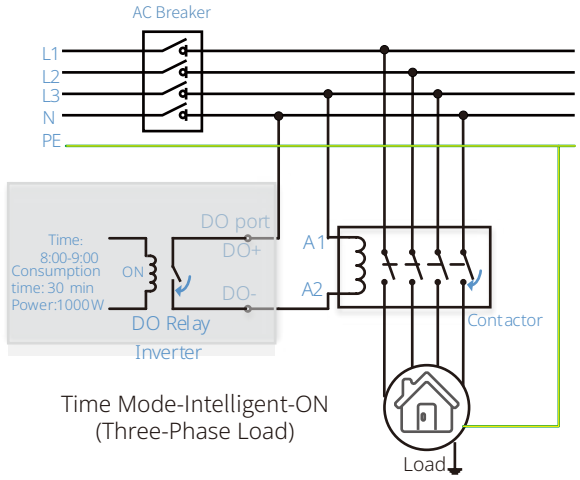
Note:

• The intelligent mode cannot be set when the inverter is working in off-grid mode.

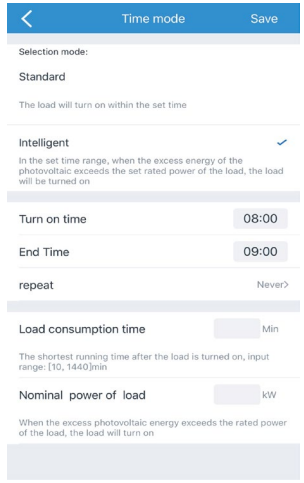
• Switch off Export Power Limit before setting intelligent mode.

• Load consumption time means the shortest load working time after the loads been turned on. The time is set to prevent the loads be turned on and off frequently when the PV power fluctuates greatly.

Set load consumption time to 30 minutes means the loads will work for at least 30 minutes even when the excess PV power is lower than 1000W.
Select **Time Mode→Add→Intelligent→Turn on time&End time&Repeat&Load consumption time&Nominal power of load→Save** to set the turn on time, end time, repeat day, shortest working time and nominal power.
The following figures show the example to power on the loads from 8:00 a.m. to 9:00 a.m., when the excess PV power exceeds 1000W.

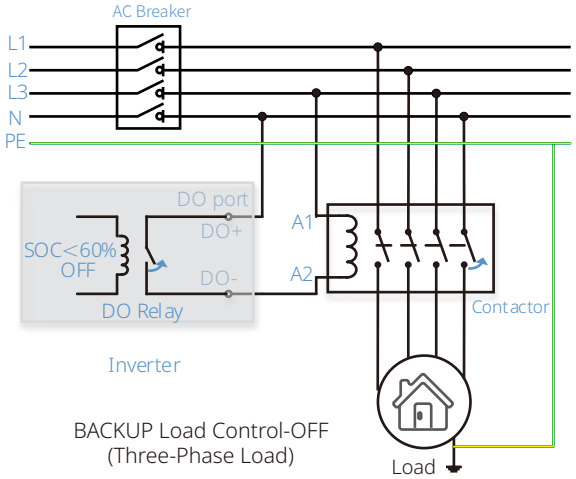


Time Mode-Intelligent-ON
(Three-Phase Load)

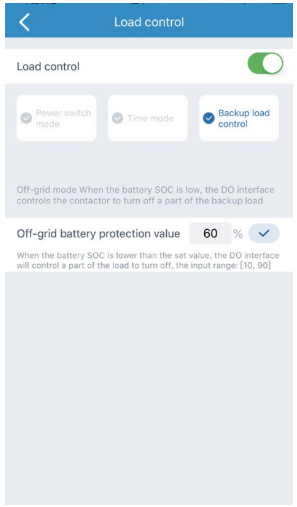


BACKUP Load Control

Some unimportant loads connected to the BACKUP terminal do not need to be powered all the time. If the PV system is not generating any electricity and the grid is not working, the unimportant loads can be disconnected, so that the battery energy can be supplied to other important loads in priority.
Set the SOC value via PV Master. When the battery SOC is lower than the target SOC value, the inverter can disconnect the loads through the DO port. The SOC threshold for the load to turn on again is 10%.
For example, set the SOC value to 60%. The loads will be disconncted when the SOC of the battery is below 60%. To turn on the loads again, the SOC of the battery should be restored to 70%.



BACKUP Load Control-OFF
(Three-Phase Load)

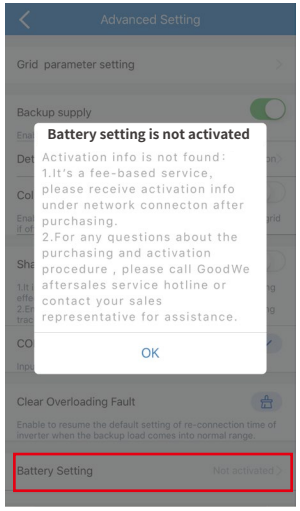


3.2.3 Battery Ready and Force Charge to Battery

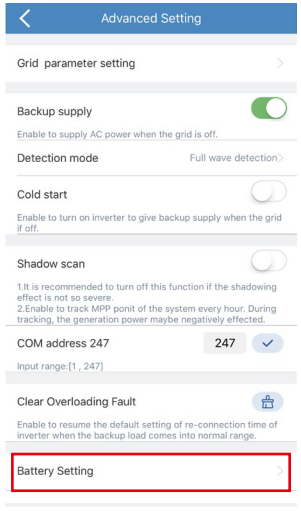
Battery Ready(ETR)

Battery Ready function is a fee-based function, which is off by default. Contact the after-sales service to pay for the function and obtain the series number. The after-sales service staff will activate the battery-ready function. Connect the inverter to PV Master again after receiving an activation notification from the after-sales service staff.

Tap **Advanced Setting→Battery Setting** to check the battery status.



Battery ready not activated



Battery ready activated

Force Charge to Battery

Tap **Advanced Setting→Battery Setting →Force Charge to Battery→SOC(discontinue)→ Save** to set the SOC and start force charge to battery function.

After starting the force battery to charge function, the power of the system gives priority to charging the battery until the preset SOC is reached.

3.3 CEI Auto-Test Function

The PV auto-test function of CEI is integrated into the PV Master App to satisfy Italian safety requirements. For detailed instructions regarding this function, please refer to "PV Master Operation Instructions".

3.4 Startup/shutdown Procedure

DC switch is used to cut off PV input power while the breaker equipped on the battery is used to cut off battery power.

When you want to shut down the inverter during an event, you should turn off the inverter DC switch and the battery DC breaker.

When you want to start-up the inverter after rectification, you should turn on the inverter DC switch and the battery DC breaker.

04 OTHER

4.1 Error Messages

The error messages shown below will be displayed on the PV Master App or reported by e-mail if an error occurs.

ERROR MESSAGE	EXPLANATION	REASON	SOLUTIONS
Utility Phase Failure	The sequence of the on-grid wire is incorrect	The inverter has detected that the phase angles of L2 and L3 are reversed	The L2 and L3 cables are connected in reverse order.
Utility Loss	Public grid power is not available (e.g. power has been lost or the on-grid connection has failed)	The inverter cannot detect a connection to the grid	1. Check (use a multimeter) to see if the AC side has any voltage present. Make sure that grid power is available. 2. Make sure that the AC cables are connected tightly. 3. If all appears to be working well, please turn off the AC breaker and turn it on again in 5 mins.
VAC Failure	The grid voltage is not within the permissible range	The inverter has detected that the AC voltage is beyond the normal range required for safety in the country of use.	1. Make sure the safety country of the inverter is set correctly. 2. Check (use a multimeter) if the AC voltage (between L and N) is within the normal range (also on the AC breaker side) a. If the AC voltage is high, make sure that the AC cable complies with the requirements stated in the User Manual and that the AC cable is not too long. b. If the voltage is low, make sure the AC cable is connected well and that the jacket of the AC cable is not compressed into the AC terminal. 3. Make sure that the grid voltage in your area is stable and is within the normal range.
FAC Failure	The grid frequency is not within the permissible range	The inverter has detected that the grid frequency is beyond the normal range required for safety in the country	1. Make sure the safety country of the inverter is set correctly. 2. If the safety country setting is correct, please check the inverter display to see if the AC frequency (Fac) is within the normal range. 3. If an FAC failure only occurs a few times and is resolved quickly, this condition could be caused by occasional grid-frequency instability.
PV/BAT Overvoltage	The PV or BAT voltage is too high	The total voltage (open-circuit voltage) of each PV string is higher than the maximum DC input voltage of the inverter or the battery voltage is higher than the maximum BAT input voltage of the inverter	1. Check if the PV string Voc is lower than the Max PV input voltage of the inverter. If the Voc of the PV string is high, please decrease the number of PV panels to make sure that Voc is within the maximum DC input voltage range of the inverter. 2. Check if the battery voltage is lower than the maximum battery input voltage of the inverter. If the battery voltage is high, please decrease the number of battery packs to make sure the voltage is within the maximum battery input voltage range of the inverter.
Over Temperature	The temperature inside the inverter is too high	The inverter's working environment has led to a high-temperature condition	1. Attempt to decrease the ambient temperature. 2. Make sure that the installation complies with the instructions in the inverter User Manual. 3. Attempt to shut down the inverter for 15 mins and then start it up again.
Isolation Failure	The ground insulation impedance of the PV string is too low	Isolation failure could be due to multiple causes such as the PV panels are not grounded well, the DC cable is broken, the PV panels are old, or the ambient humidity is relatively high, etc.	1. Use a multimeter to determine if the resistance between the earth and the inverter frame is close to zero. If not, please ensure that the connection is good. 2. If the humidity is too high, an isolation failure may occur. 3. Check the resistance between PV1+/PV2+/BAT+/PV- to earth. If the resistance is less than 33.3 kΩ, check the system wiring connections. 4. Attempt to restart the inverter. Check to see if the fault still occurs. If not, it means that the fault was caused by an occasional event. Alternatively, contact the after-sales department.
Ground Failure	The ground leakage current is too high	A ground failure can be due to multiple causes such as the neutral cable on the AC side is not connected well or the ambient humidity is relatively high, etc.	Check (use a multimeter) if there is a measurable voltage (it should normally be close to 0 V) between the earth and the inverter frame. If there is a measurable voltage, this means the neutral and ground cables are not connected well on the AC side. If this happens only in the early morning, at dawn, or on rainy days with higher humidity and recovers quickly, this may be a normal situation.
Relay Check Failure	Self checking of the relay has failed	The neutral and ground cables are not connected well on the AC side or this may be an occasional failure	Check (use a multimeter) if there is high voltage (which should normally be less than 10 V) between the N and PE cables on the AC side. If the voltage is greater than 10 V, this means the neutral and ground cables are not connected well on the AC side or it may be necessary to restart the inverter.
DC Injection High	/	The inverter has detected a high DC component in the AC output	Try to restart the inverter. Check if the problem recurs. If not, this was an occasional occurrence. Otherwise, contact the after-sales department immediately.
EEPROM R/W Failure	/	This is caused by a strong external magnetic field, etc.	Try to restart the inverter. Check if the problem recurs. If not, this was an occasional occurrence. Otherwise, contact the after-sales department immediately.
SPI Failure	Internal communication has failed	This is caused by a strong external magnetic field, etc.	Try to restart the inverter. Check if the problem recurs. If not, this was an occasional occurrence. Otherwise, contact the after-sales department immediately.
DC Bus High	The BUS voltage is too high	/	Try to restart the inverter. Check if the problem recurs. If not, this was an occasional occurrence. Otherwise, contact the after-sales department immediately.
Backup Overload	The backup side is overloaded	The total backup load power is greater than the nominal backup output power	Decrease the backup loads to make sure the total load power is lower than nominal backup output power (please refer to page 11).

4.2 Troubleshooting

Checks Before Turning On AC Power

- **Battery connections:** Confirm that the connections between the ET and battery and that the polarities (+/-) are not reversed. Refer to figure 4.2-1
- **PV input connection:** Confirm the connections between the ET and PV panels and that the polarities (+/-) are not reversed. Refer to figure 4.2-2.
- **On-grid & backup connections:** Confirm that the on-grid is connected to the power grid and that the backup is connected to the loads and that the polarities (e.g. L1/L2/L3/N are in sequence) are not reversed. Refer to figure 4.2-3.
- **Smart Meter & CT connections:** Make sure that the Smart Meter and CT are connected between the house loads and the grid and follow the Smart Meter direction sign on the CT. Refer to figure 4.2-4.

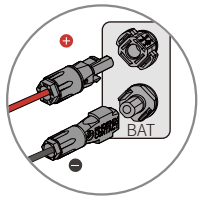


Figure 4.2-1

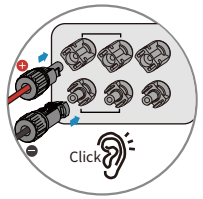


Figure 4.2-2

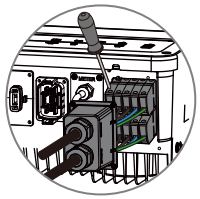


Figure 4.2-3

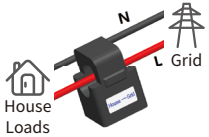
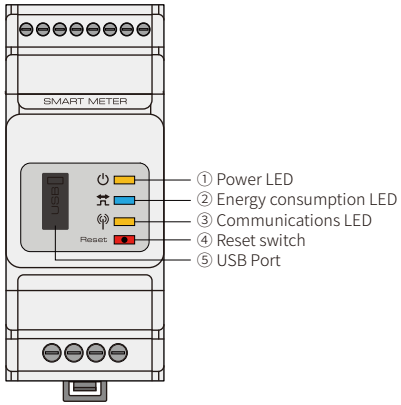


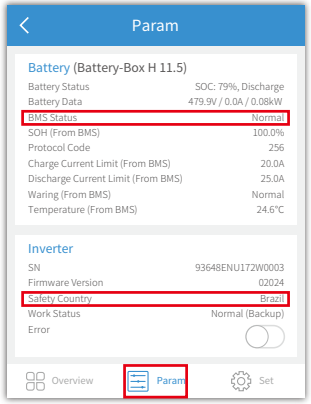
Figure 4.2-4

Checks At Startup And Turning On AC Power

Battery settings, BMS communication and safety country setting:

After connecting the Solar-Wi-Fi* (*The Wi-Fi signal is named as the last 8 characters of the inverter's serial number.). Check the PV Master App "Param" to make sure that the battery type is the same as was installed. Also check that the "Safety Country" setting is correct. If it is not correct, please set is correctly in “Set”.





Note: For compatible lithium batteries, the BMS status will display "Normal" after selecting the correct battery company.

Problems During Operation

ET does not start up with battery only

Solution:

Make sure that the battery voltage is greater than 180V. Otherwise, the battery cannot start the ET.

ET did not start up with PV only

Solution:

1. Make sure the PV voltage is greater than 180 (230 V is needed to enter on-grid mode).
2. Make sure that, for the connection between the ET and PV panels, the polarities are (+/-) not reversed.

The ET hybrid inverter does not discharge or output without the PV or when the PV power is less than the load power

Solution:

1. Check whether the communications between the ET and Smart Meter are OK.
2. Make sure the load power is greater than 150W.
   a. The battery will not discharge continuously unless the load power is greater than 150W.
   b. If the battery does not discharge when the Meter power is greater than 150W, please check the Smart Meter & CT connections and directions.
3. Make sure the SOC (State of discharge) is greater than 1-DOD (Depth of discharge). Or, if the battery is discharged to below 1-DOD, the battery will only discharge again when SOC is charged to (20%+1-DOD/2 (if battery discharge is needed immediately, the user should restart the battery).
4. Check on the APP whether the charge time has already been set because during the charge time, the battery will not discharge (battery will charge in priority during times of concurrent charge/-discharge).

The battery does not charge when the PV power is greater than the load power

Solution:

1. Check the discharge time setting on the APP.
2. Check if the battery is fully charged and also if the battery voltage reaches the "charge voltage".

High power fluctuations during battery charge or discharge

Solution:

1.Check if there are fluctuations in load power.

2.Check if there are fluctuations in PV power.

Battery does not charge

Solution:

1. Make sure that BMS communications are OK on the PV Master App.
2. Check if the CT is connected at the right position and is connected in the right direction per the User Manual.
3. Check if the total load power is significantly higher than the PV power.

Questions & Answers (Q & A)

About the Wi-Fi Configuration

Q: Why can't I find the Solar-Wi-Fi* signal on mobile devices?

A: Normally the Solar-Wi-Fi* signal can be seen immediately after inverter has powered up. However, the Solar-Wi-Fi signal will disappear when the ET connects to the internet. If changes to the settings are required to connect to the router for changes. If you cannot find the Wi-Fi signal or connect to the router, please try to reload the Wi-Fi (please refer to the ET User Manual page 21).

Q: Why can't I connect to the Solar-Wi-Fi* signal on my phone?

A: The Wi-Fi module can only connect to one device at a time. If the signal is already connected to another device at the same time, you will not be able to connect to the signal.

About Battery Operation

Q: Why does the battery not discharge when the grid is not available but it discharges normally when the grid is available?

A: On the APP, the off-grid output and backup function should be turned on to force the battery to discharge under off-grid mode.

Q: Why is there no output on the backup side?

A: For backup supply, "Backup Supply" on the PV Master App must be turned on. In off-grid mode or when the grid power is disconnected, the "Off-Grid Output Switch" function must be turned on as well.

Note: When turning the "Off-Grid Output Switch" on, do not restart the inverter or battery. Otherwise, the function will be switched off automatically.

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

A: This normally happens when BMS communications fail when using lithium batteries. If the batteries enter float charge mode, the SOC is automatically reset to 95%.

Q: The battery cannot be fully charged to 100%?

A: The battery will stop charging when the battery voltage reaches the charge voltage set in the PV Master App.

Q: Why does the battery switch always trip when it starts up (lithium battery)?

A: The switch of the lithium battery trips because of following reasons:

1. BMS communication fails.
2. The battery SOC is too low and the battery trips to protect itself.
3. An electrical short-circuit has occurred on the battery connection side. Alternatively, for other reasons, Please contact the after-sales department.

Q: Which battery should I use for the ET?

A: For the ET series inverter, it can connect to lithium batteries which have compatibility with ET-series inverters with nominal voltages from 180 V to 600 V. For compatible lithium batteries, please refer to the battery list in the PV Master App.

About PV Master Operation And Monitoring

Q: Why can't I save settings on the PV Master App?

A: This could be caused by losing the connection to Solar-Wi-Fi *.

1. Make sure you have already connected to Solar-Wi-Fi* (make sure that no other devices are connected) or to the router (if Solar-Wi-Fi* is connected to the router). The APP homepage shows the connections.
2. Make sure you restart the inverter 10 mins after you have changed any settings because the inverter will save the settings every 10 mins while operating in normal mode. We recommend that parameter settings be changed when the inverter is in wait mode.

Q: Why are the data displayed on the homepage different from the param page, like charge/discharge, PV value, load value, or grid value?

A: The data refresh frequency is different, so there will be data discrepancies between different pages on the APP as well as between these shown on the portal and APP.

Q: Some columns show NA, like battery SOH, etc. Why does that happen?

A: NA means that the App has not received data from the inverter or server because of communication problems, such as battery communications and the communications between inverter and the App.

About the Smart Meter And Power Limit Function

Q: How to activate the output power limit function?

A: For the ET system, this function can be activated by following these steps:

1. Make sure the Smart Meter connections and communications are functioning correctly.
2. Turn on the export power limit function and set the maximum output power to the grid on the APP.

Note: Even if the output power limit is set to 0W, there might still be a deviation of a maximum of 100 W when exporting to the grid.

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

A: The export limit could theoretically be 0W but there will be a deviation of around 50–100 W for the ET system.

Q: Can I use other meter brands to take over from the Smart Meter in the ET system or to change settings in Smart Meter?

A: No, because the communication protocol is integrated into the inverter and Smart Meter, other meter brands cannot communicate. Also, any change to the manual settings could cause a meter communication failure.

Q: What is the maximum current allowed to pass through the CT on the Smart Meter?

A: The maximum current for the CT is 120A.

Other Questions

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

A: For the shortest resolution, please refer to "ET Quick Installation Instructions" and to the "PV Master App Instructions".

Q: What kind of load can I use to connect to the backup side?

A: Please refer to User Manual on page 12.

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

A: Normally we still provide technical support for problems caused by not following the instructions in the User Manual. However we cannot guarantee any replacements or returns. So, if there are any special conditions for which you cannot follow the instructions 100%, please contact the after-sales department for suggestions.

4.3 Disclaimer

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

- The inverter is damaged during transfer.
- The inverter is out of the warranty year and an extended warranty is not purchased.
- The inverter is installed, refitted, or operated in improper ways without authorization from the manufacturer.
- The inverter is installed or used under improper environmental or technical conditions (as mentioned in this User Manual) and without authorization from manufacturer.
- The installation or configuration of the inverter does not follow the requirements mentioned in this User Manual.
- The inverter is installed or operated contrary to the requirements or warnings mentioned in this User Manual.
- The inverter is broken or damaged by any force majeure, such as lightening, earthquake, fire hazard, storm and volcanic eruption etc.
- The inverter is disassembled, changed or updated on software or hardware without authorization from the manufacturer.
- The Inverter is installed, used, or operated against any related provisions contained in international or local policies or regulations.
- Any incompatible batteries, loads or other devices are connected to the ET system.
- Specifications are subject to change without notice. Every effort has been made to make this document complete, accurate and up-to-date. However, GoodWe may need to make some improvements under certain circumstances without advance notice. GoodWe shall not be responsible for any loss caused by this document including, but not limited omissions errors,typographical errors, arithmetical errors or listing errors in this document.

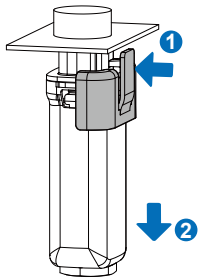
If you have any questions or suggestions, please contact GoodWe after-sale.

Note: The manufacturer retains the right to explain all of the contents in this User Manual. To insure IP66, the inverter must be sealed well; please install the inverters within one day of unpacking; otherwise, please seal all unused terminals /holes; unused terminals/holes are not allowed to remain open; and confirm that there is no risk of water or dust entering any terminals/holes.

Maintenance

The inverter requires periodic maintenance; the details are shown below:

- In any case, cut off the voltage supply of PV, battery and AC Grid, and then carry out maintenance. Make sure the inverter is totally isolated from all DC and AC power for at least 5 mins before maintenance.
- Heat sink: Please use a clean towel to clean the heat sink once a year.
- Torque: Please use a torque wrench to tighten the AC and DC wiring connections once a year.
- DC breaker: Check DC breaker regularly and activate the DC breaker 10 times in a row once per year.
- Activating the DC breaker will clean the contacts and extend the lifespan of the DC breaker.
- Waterproof covers: Check to see that the waterproof covers of RS485 and other parts are replaced once per year.
- WiFi module: Replace or remove the WiFi module using the WiFi module remover, which is delivered in the package. Remove the communication terminal next to the WiFi module first. Place the remover horizontally on the WiFi module, then turn the remover to 90° to fasten it and the module together. Press the remover and pull the module to remove it as the following figure shows.



4.4 Technical Parameters

Technical Data	GW5KL-ET	GW6KL-ET	GW8KL-ET	GW10KL-ET
Battery Input Data				
Battery Type	Li-Ion			
Battery Voltage Range (V)	180~600			
Max. Charging Current (A)	25			
Max. Discharging Current (A)	25			
Charging Strategy for Li-Ion Battery	Self-adaption to BMS			
PV String Input Data				
Max. DC Input Power (W)	6650	7980	10640	13300
Max. DC Input Voltage (V)[*1]	1000			
MPPT Range (V)[*2]	200~850			
Start-up Voltage (V)	180			
Min. Feed-in Voltage (V) [*8]	210			
MPPT Range for Full Load (V)[*3]	240~850	285~850	260~850	320~850
Nominal DC Input Voltage (V)[*4]	620			
Max. Input Current (A)	12.5/12.5		12.5/22	
Max. Short Current (A)	15.2/15.2		15.2/27.6	
No. of MPP Trackers	2			
No. of Strings per MPP Tracker	1/1		1/2	
AC Output Data (On-grid)				
Nominal Apparent Power Output to Utility Grid (VA)	5000	6000	8000	10000
Max. Apparent Power Output to Utility Grid (VA)[*2*7]	5500	6600	8800	11000
Nominal Apparent Power from Utility Grid (VA)	10000	12000	15000	
Max. Apparent Power from Utility Grid (VA)	10000	12000	15000	
Nominal Output Voltage (V)	400/380, 3L/N/PE			
Nominal Output Freqency (Hz)	50/60			
Max. AC Current Output to Utility Grid (A)	8.5	10.5	13.5	16.5
Max. AC Current From Utility Grid (A)	15.2	18.2	22.7	22.7
Output Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)			
Output THDi (@Nominal Output)	<3%			
AC Output Data (Back-up)				
Back-up Nominal apparent power (VA)	5000	6000	8000	10000
Max. Output Apparent Power (VA)	5000	6000	8000	10000
Peak Output Apparent Power (VA)[*3]	10000, 60sec	12000, 60sec	16000, 60sec	16500, 60sec
Max. Output Current (A)	8.5	10.5	13.5	16.5
Nominal Output Voltage (V)	400/380			
Nominal Output Frequency (Hz)	50/60			
Output THDv (@Linear Load)	<3%			
Efficiency				
Max. Efficiency	97.60%			
Max. Battery to Load Efficiency	97.50%			
Europe Efficiency	96.80%			
MPPT Efficiency	99.90%			

Technical Data	GW5KL-ET	GW6KL-ET	GW8KL-ET	GW10KL-ET
Protection				
Anti-islanding Protection	Integrated			
PV String Input Reverse Polarity Protection	Integrated			
Insulation Resistor Detection	Integrated			
Residual Current Monitoring Unit	Integrated			
Output Over Current Protection	Integrated			
Output Short Protection	Integrated			
Battery Input Reverse Polarity Protection	Integrated			
Output Over Voltage Protection	Integrated			
General Data				
Operating Temperature Range (°C)	-35~60			
Relative Humidity	0~95%			
Operating Altitude (m)	⩽4000			
Cooling	Nature Convection			
Noise (dB)	<30			
User Interface	LED & APP			
Communication with BMS*4	RS485; CAN			
Communication with Meter	RS485			
Communication with EMS	RS485 (Insulated)			
Communication with Portal	Wi-Fi			
Weight (kg)	24		25	
Size (Width*Height*Depth mm)	516*415*180			
Mounting	Wall Bracket			
Protection Degree	IP66			
Standby Self Consumption (W)*5	<15			
Topology	Battery Non-Isolation			
Certifications & Standards*6				
Grid Regulation	AS/NZS 4777.2:2015			
Safety Regulation	IEC62109-1&2			
EMC	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4,			
	EN61000-4-16, EN61000-4-18, EN61000-4-29			

*1: For 1000V system, Maximum operating voltage is 950V.
*2: According to the local grid regulation.
*3: Can be reached only if PV and battery power is enough.
*4: CAN communication is configured by default. If 485 communication is used, please replace the corresponding communication line.
*5: No Back-up Output.
*6: Not all certifications & standards listed, check the official website for details.
*7: For Belgium Max. Output Apparent Power (VA)：GW5K-ET is 5000; GW6.5K-ET is 6500; GW8K-ET is 8000; GW10K-ET is 10000.
*8: When there is no battery connected, inverter starts feeding in only if string voltage is higher than 400V.

Technical Data	GW5K-ET	GW6.5K-ET	GW8K-ET	GW10K-ET
Battery Input Data				
Battery Type	Li-Ion			
Battery Voltage Range (V)	180~600			
Max. Charging Current (A)	25			
Max. Discharging Current (A)	25			
Charging Strategy for Li-Ion Battery	Self-adaption to BMS			
PV String Input Data				
Max. DC Input Power (W)	6500	8450	9600	13000
Max. DC Input Voltage (V)*1	1000			
MPPT Range (V)*2	200~850			
Start-up Voltage (V)	180			
Min. Feed-in Voltage (V) *8	210			
MPPT Range for Full Load (V)*3	240~850	310-850	380~850	460~850
Nominal DC Input Voltage (V)*4	620			
Max. Input Current (A)	12.5/12.5	12.5/12.5	12.5/12.5	12.5/12.5
Max. Short Current (A)	15.2/15.2			
No. of MPP Trackers	2			
No. of Strings per MPP Tracker	1/1			
AC Output Data (On-grid)				
Nominal Apparent Power Output to Utility Grid (VA)	5000	6500	8000	10000
Max. Apparent Power Output to Utility Grid (VA)*2*7	5500	7150	8800	11000
Nominal Apparent Power from Utility Grid (VA)	10000	13000	15000	
Max. Apparent Power from Utility Grid (VA)	10000	13000	15000	
Nominal Output Voltage (V)	400/380, 3L/N/PE			
Nominal Output Freqency (Hz)	50/60			
Max. AC Current Output to Utility Grid (A)	8.5	10.8	13.5	16.5
Max. AC Current From Utility Grid (A)	15.2	19.7	22.7	22.7
Output Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)			
Output THDi (@Nominal Output)	<3%			
AC Output Data (Back-up)				
Back-up Nominal apparent power (VA)	5000	6500	8000	10000
Max. Output Apparent Power (VA)	5000	6500	8000	10000
Peak Output Apparent Power (VA)*3	10000, 60sec	13000, 60sec	16000, 60sec	16500, 60sec
Max. Output Current (A)	8.5	10.8	13.5	16.5
Nominal Output Voltage (V)	400/380			
Nominal Output Frequency (Hz)	50/60			
Output THDv (@Linear Load)	<3%			
Efficiency				
Max. Efficiency	98.00%		98.20%	
Max. Battery to Load Efficiency	97.50%		97.50%	
Europe Efficiency	97.20%		97.50%	
MPPT Efficiency	99.90%		99.90%	

Technical Data	GW5K-ET	GW6.5K-ET	GW8K-ET	GW10K-ET
Protection				
Anti-islanding Protection	Integrated			
PV String Input Reverse Polarity Protection	Integrated			
Insulation Resistor Detection	Integrated			
Residual Current Monitoring Unit	Integrated			
Output Over Current Protection	Integrated			
Output Short Protection	Integrated			
Battery Input Reverse Polarity Protection	Integrated			
Output Over Voltage Protection	Integrated			
General Data				
Operating Temperature Range (°C)	-35~60			
Relative Humidity	0~95%			
Operating Altitude (m)	≤4000			
Cooling	Nature Convection			
Noise (dB)	<30			
User Interface	LED & APP			
Communication with BMS*4	RS485; CAN			
Communication with Meter	RS485			
Communication with EMS	RS485 (Insulated)			
Communication with Portal	Wi-Fi			
Weight (kg)	24			
Size (Width*Height*Depth mm)	516*415*180			
Mounting	Wall Bracket			
Protection Degree	IP66			
Standby Self Consumption (W)*5	<15			
Topology	Battery Non-Isolation			
Certifications & Standards*6				
Grid Regulation	VDE-AR-N 4105; VDE 0126-1-1			
	EN 50549-1; G98, G99, G100; CEI 0-21			
Safety Regulation	IEC62109-1&2			
EMC	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4,			
	EN61000-4-16, EN61000-4-18, EN61000-4-29			

*1: For 1000V system, Maximum operating voltage is 950V.
*2: According to the local grid regulation.
*3: Can be reached only if PV and battery power is enough.
*4: CAN communication is configured by default. If 485 communication is used, please replace the corresponding communication line.
*5: No Back-up Output.
*6: Not all certifications & standards listed, check the official website for details.
*7: For Belgium Max. Output Apparent Power (VA)：GW5K-ET is 5000; GW6.5K-ET is 6500; GW8K-ET is 8000; GW10K-ET is 10000.
*8: When there is no battery connected, inverter starts feeding in only if string voltage is higher than 400V.

4.5 Other Tests

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

RA, XA for the line conductor

RN, XN for the neutral conductor

Zref:

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

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

4.6 Quick Checklist To Avoid Dangerous Conditions

1. The inverter must not be installed near flammable or explosive materials or near equipment with strong electromagnetic fields. Please refer to page 6.
2. Remember that this inverter is heavy! Please be careful when lifting from the package. Please refer to page 7.
3. Make sure that the battery breaker is off and that the nominal battery voltage meets ET specifications before connecting the battery to the inverter; make sure that the inverter is totally isolated from both PV and AC power. Please refer to page 9.
4. Make sure that the inverter is totally isolated from all DC or AC power before connecting the AC cable. Please refer to page 11.
5. Make sure the AC cable is totally isolated from AC power before connecting the Smart Meter and CT. Please refer to page 14.

Appendix protection category definition

Overvoltage category definition

Category I	Applies to equipment connected to circuits where measures have been taken to reduce transient overvoltages to a low level.
Category II	Applies to equipment which is not permanently connected to the installation. Examples are appliances, portable tools, and other plug-connected equipment.
Category III	Applies to downstream fixed equipment and includes 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 (i.e. upstream of the main distribution board). Examples are electricity meters, primary overcurrent 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, temporary conductivity caused by condensation is expected.
Pollution Degree III	Conductive pollution occurs, or dry, non-conductive pollution occurs, which becomes conductive due to condensation, which is an expected condition.
Pollution Degree IV	Persistent conductive pollution occurs; for example, pollution caused by conductive dust, rain, or snow.