

Residential All-In-One Energy Storage System

GW3K-EMA-G10

GW2K-EMA-G10

GW3.0-BAT-LVD-G10

User Manual

GOODWE

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Copyright Statement

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NOTICE

Due to product version upgrades or other reasons, the document content will be updated periodically. Unless otherwise agreed, the content of this document cannot replace the safety precautions on the product label. All descriptions in the document are for guidance only.

About This Manual

Overview

This document primarily introduces the product information, installation wiring, configuration and commissioning, troubleshooting, and maintenance content for the energy storage system composed of inverters, expansion batteries, and smart meters. Please read this manual carefully before installing and using the product to understand the product safety information and familiarize yourself with the product's functions and features. The document may be updated periodically; please obtain the latest version and more product information from the official website.

Applicable Model

The energy storage system includes the following products:

Product Type	Product Information	Description
Inverter	GW3K-EMA-G10* GW3K-EMA-UK-G10*	Rated Power: 3kW
Battery system	GW3.0-BAT-LVD-G10	Rated Energy: 3kWh

*This product is only an inverter and can be used as part of a plug-and-play solar equipment system. Whether it meets the system requirements in the VDE 0126-95 standard must be ensured by the end user or system integrator.

Symbol Definition

 DANGER
Indicates a high potential hazard which, if not avoided, will result in death or serious injury.
 WARNING
Indicates a moderate potential hazard which, if not avoided, could result in death or serious injury.
 CAUTION
Indicates a low potential hazard which, if not avoided, could result in moderate or minor injury.
NOTICE
Emphasizes and supplements the content, may also provide tips or tricks for optimal product

use, which can help you solve a problem or save your time.

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1 Safety Precautions

The Safety Precautions information contained in this document must always be followed when operating the equipment.

WARNING

The equipment has been strictly designed and tested in compliance with safety regulations. However, as electrical equipment, relevant safety instructions must be followed before performing any operations. Improper handling may lead to serious injury or property damage.

1.1 General Safety

NOTICE

- Due to product version upgrades or other reasons, the document content may be updated periodically. Unless otherwise specified, the document content cannot supersede the safety precautions on the product label. All descriptions in the document are for guidance only.
- Please read this document carefully before installing the device to understand the product and its precautions.
- When operating the device, use insulated tools and wear personal protective equipment to ensure personal safety. Wear anti-static gloves, anti-static wrist straps, anti-static clothing, etc., when handling electronic components to protect the device from electrostatic damage.
- Unauthorized disassembly or modification may cause equipment damage, which is not covered by the warranty.
- Equipment damage or personal injury caused by failure to install, use, or configure the device in accordance with the requirements of this document or the corresponding user manual is beyond the manufacturer's liability. For more product warranty information, please visit the official website:
<https://www.goodwe.com/warrantyrelated.html>.

1.2 personnel requirements

NOTICE

- Personnel responsible for equipment maintenance must first undergo strict training to understand various safety precautions and master the correct operating procedures.
- Maintenance, replacement of equipment or components is only permitted to be performed by qualified professionals or trained personnel.

1.3 System Safety

 DANGER

- Before performing electrical connections, ensure the device is powered off. Live work is strictly prohibited, as it may lead to hazards such as electric shock.
- For devices supporting PV string connection, the PV input terminals have a weak surge current withstand capability. It is strictly forbidden to power on the device directly from a DC voltage source via the PV ports. If it is necessary to power on from the PV port, please follow the steps below. Damage caused by improper operation is considered user-inflicted and is not covered under the product warranty.
 1. First, limit the output current of the DC voltage source to within the maximum allowable input current range of the PV port.
 2. Then, close the DC switch of the inverter.
 3. Finally, gradually increase the output voltage of the DC source from zero to the target value at a rate $\leq 50\text{V/s}$.
- All operations including transportation, storage, Installation, operation, use, and maintenance must comply with applicable laws, regulations, standards, and specifications.
- The specifications of cables and components used for electrical connections must comply with local laws, regulations, standards, and specifications.
- Please use the cable connectors provided in the package to connect the device cables. If other models of connectors are used, any resulting device damage is not within the manufacturer's responsibility.
- Ensure all device cable connections are correct, secure, and not loose. Improper wiring may cause poor contact or damage the device.
- To protect the device and its components from damage during transportation, ensure the transport personnel are professionally trained. Record the operation steps during transportation and keep the device balanced to avoid dropping.
- The device is heavy. Please assign personnel corresponding to the device's weight to prevent the device from exceeding the safe lifting capacity and causing injury.
- Ensure the device is placed stably and not tilted. Toppling of the device may cause equipment damage and personal injury.

WARNING

- During device installation, avoid letting the wiring terminals bear weight, otherwise it may cause terminal damage.
- If the cable is subjected to excessive tension, it may lead to poor connections. When wiring, leave a certain length of cable before connecting it to the device's wiring port.
- Cables of the same type should be bundled together. Cables of different types should be laid at least 30mm apart, and it is prohibited to intertwine or cross-lay them.
- Using cables in high-temperature environments may cause insulation aging and damage. The distance between the cable and the periphery of heating devices or heat source areas should be at least 30mm.

1.3.1 PV String Safety

WARNING

- Ensure the component frame and mounting system are properly grounded.
- After connecting the DC cables, ensure the cable connections are secure and not loose. Improper wiring may cause poor contact or high impedance, and damage the inverter.
- Ensure the cable positive and negative polarities are connected correctly and are not reversed; the voltage should be lower than the Max. Input Voltage. Damage caused by reverse connection and overvoltage is not covered by the equipment manufacturer's warranty.
- The PV string output does not support grounding. Before connecting the PV string to the inverter, ensure the minimum insulation resistance to ground of the PV string meets the minimum insulation resistance requirement ($R = \text{Max. Input Voltage (V)} / 30\text{mA}$).
- Do not connect the same PV string to multiple inverters, as this may cause damage to the inverter.
- The photovoltaic modules used must comply with IEC 61730 Class A standards.

1.3.2 Inverter Safety

WARNING

- Ensure the voltage and frequency of the grid connection point comply with the inverter's grid-connection specifications.
- It is recommended to add protective devices such as circuit breakers or fuses on the AC side of the inverter. The rating of the protective device must be greater than 1.25 times the inverter's maximum AC output current.
-

1.3.3 Battery Safety

DANGER

- Before operating any device in the system, ensure the device is powered off to avoid the risk of electric shock. Strictly adhere to all safety precautions in this manual and the safety labels on the device during operation.
- Do not disassemble, modify, or repair the device without official authorization from the manufacturer, as this may pose an electric shock hazard or cause device damage. Any resulting losses are beyond the manufacturer's liability.
- Do not impact, pull, drag, squeeze, or step on the device. Do not place the battery in fire, as this may cause an explosion risk.
- Do not place the battery in high-temperature environments. Ensure there are no heat sources nearby and that the battery is not exposed to direct sunlight. A fire may occur if the ambient temperature exceeds 60°C.
- Do not use the battery if it has obvious defects, cracks, damage, or other abnormalities. Battery damage may lead to electrolyte leakage.
- Do not move the battery system while it is operating.
- Battery short circuit may cause personal injury. The instantaneous high current from a short circuit can release a large amount of energy, which may lead to a fire.

WARNING

- Battery current may be affected by factors such as temperature, humidity, weather conditions, etc., which may lead to current limiting and affect load capacity.
- If the battery fails to start, please contact the after-sales service center as soon as possible. Otherwise, the battery may be permanently damaged.
- Please perform regular inspection and maintenance on the battery according to its maintenance requirements.

Emergency Response Measures

- Battery electrolyte leakage

If the battery module leaks electrolyte, avoid contact with the leaked liquid or gas. Electrolyte is corrosive, and contact may cause skin irritation and chemical burns. If accidentally exposed to the leaked substance, please perform the following actions accordingly:

 - Inhalation: Evacuate from the contaminated area and seek medical help immediately.
 - Eye contact: Rinse with clean water for at least 15 minutes and seek medical help immediately.
 - Skin contact: Thoroughly wash the affected area with soap and water, and seek medical help immediately.
 - Ingestion: Induce vomiting and seek medical assistance immediately.
- Fire
 - When the battery temperature exceeds 150°C, there is a risk of fire, and the battery may release toxic and harmful gases after catching fire.
 - To prevent fire, ensure that there are carbon dioxide, Novec1230, or FM-200 fire extinguishers near the equipment.
 - When extinguishing fire, do not use ABC dry powder fire extinguishers. Firefighters must wear protective clothing and self-contained breathing apparatus.

1.4 Safety Symbols and Certification Marks

⚠ DANGER

- After device installation, the labels and warning signs on the cabinet must be clearly visible. It is prohibited to obstruct, alter, or damage them.
- The following cabinet warning label descriptions are for reference only. Please refer to the actual labels used on the device.

No.	Symbol	Meaning
1		Potential hazards exist during equipment operation. Take precautions when operating the equipment.
2		High voltage hazard. High voltage is present during equipment operation. Ensure the equipment is powered off before performing any operations.
3		The inverter surface is at high temperature. Do not touch during operation to avoid burns.
4		Use the equipment properly. There is a risk of explosion under extreme conditions.
5		The battery contains flammable materials. Beware of fire.
6		The equipment contains corrosive electrolyte. Avoid contact with leaked electrolyte or vapor.
7		Delayed discharge. After powering off the equipment, please wait 5 minutes for it to fully discharge.
8		Keep the equipment away from open flames or ignition sources.
9		Keep the equipment out of reach of children.
10		Do not extinguish with water.
11		Please read the product manual carefully before operating the equipment.
12		Personal protective equipment must be worn during installation, operation, and maintenance.

No.	Symbol	Meaning
13		Do not dispose of the equipment as household waste. Dispose of it according to local laws and regulations, or return it to the equipment manufacturer.
14		Grounding point.
15		CE certification mark.
16		Double insulation or reinforced insulation

1.5 EU Declaration of Conformity

1.5.1 Equipment with Wireless Communication Modules

Equipment with Wireless Communication Modules sold in the European market must comply with the following directives:

- Radio Equipment Directive 2014/53/EU (RED)
- Restrictions of Hazardous Substances Directive 2011/65/EU and (EU) 2015/863 (RoHS)
- Waste Electrical and Electronic Equipment 2012/19/EU
- Registration, Evaluation, Authorization and Restriction of Chemicals (EC) No 1907/2006 (REACH)

1.5.2 Battery

Battery that can be sold in the European market meets the following directive requirements:

- Electromagnetic compatibility Directive 2014/30/EU (EMC)
- Battery Directive 2006/66/EC and Amending Directive 2013/56/EU
- Restrictions of Hazardous Substances Directive 2011/65/EU and (EU) 2015/863 (RoHS)*1
- Regulation (EU) 2023/1542 Article 12 - Safety of stationary battery energy storage systems
- Regulation (EU) 2023/1542 Article 10 - Performance and durability requirements

for rechargeable industrial batteries, LMT batteries and electric vehicle batteries

- Regulation (EU) 2023/1542 Article 14 - Information on the state of health and expected lifetime of batteries
- Waste Electrical and Electronic Equipment 2012/19/EU
- Registration, Evaluation, Authorization and Restriction of Chemicals (EC) No 1907/2006 (REACH)

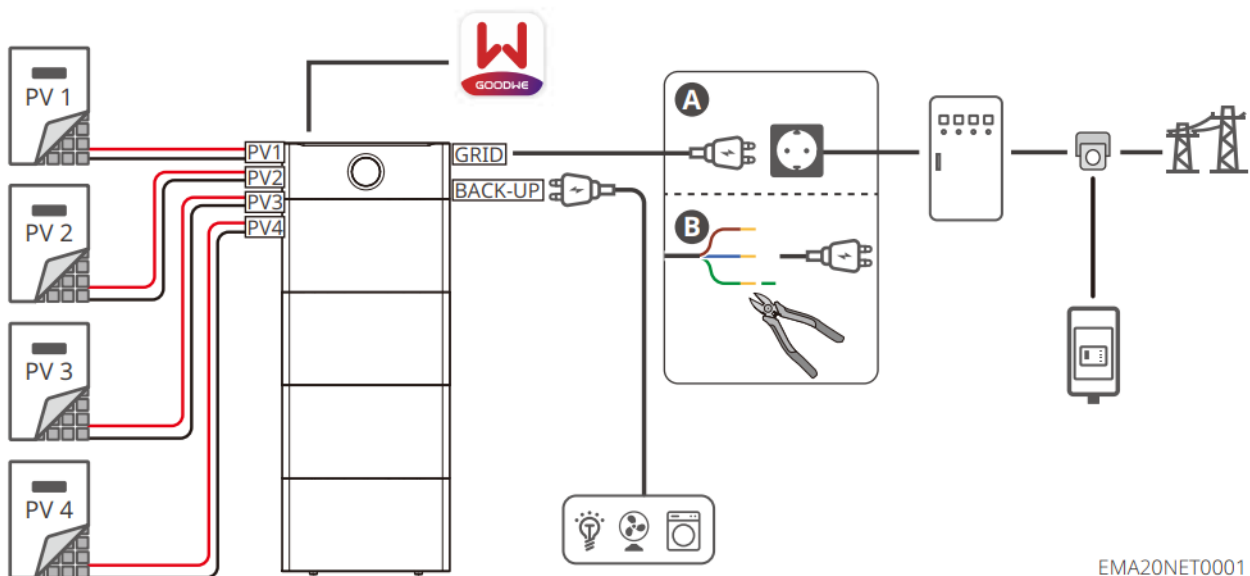
*1: Our battery products meet the hazardous substance limit requirements specified in this regulation.

For more EU declarations of conformity, please visit the [official website](#).

2 System Introduction

2.1 System Overview

The integrated home energy storage system solution combines an inverter and battery, converting solar energy into electricity within the photovoltaic system to directly power household loads or store energy in the battery.



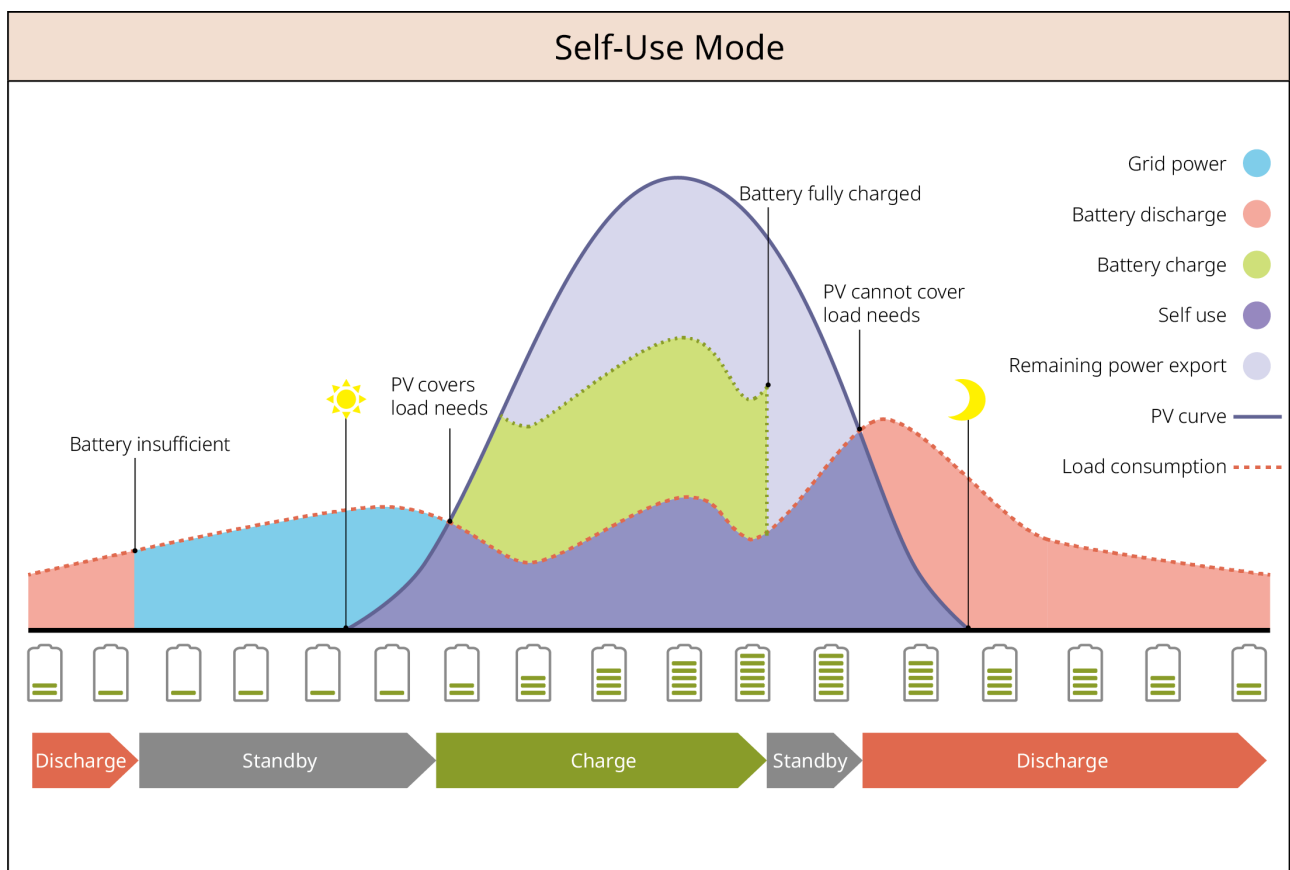
- Supports Plug-and-Play mode scenarios or Professional mode scenarios.
 - Plug-and-Play scenario: The grid-tie power is 800W. The system is ready for use once the wiring is completed.
 - Professional mode scenario: The maximum grid-tie power is 3000W. Wiring must be completed by a professional and the system must be configured via the App.
- Supports battery installation based on actual needs, with a maximum of 5 batteries connectable.
- Please prepare your own smart meter. Connect to a wireless meter via WiFi or to a wired meter via the RS485 port to enable functions such as self-consumption and power limiting. For the installation method and precautions of the meter, please refer to the corresponding meter manual.
- Supports connection to the SEMS+ App for local device configuration or remote monitoring of power station information.
- When connecting via Bluetooth, ensure the line-of-sight distance between the device and the App is less than 5 meters. When connecting via WiFi, ensure the line-of-sight distance between the device and the router is less than 10 meters.

- Before grid connection, please confirm you have obtained permission from the local grid.
- Ensure the DC input current for each PV string does not exceed 36A, and the open-circuit voltage does not exceed 60V.

2.2 System Working Mode

Self-Use Mode

- The basic mode of system operation.
- PV generation first supplies power to the load, excess power charges the battery, and the remaining power is sold to the grid. When PV generation cannot meet the load demand, the battery supplies power to the load; when the battery power is also insufficient, the grid supplies power to the load.

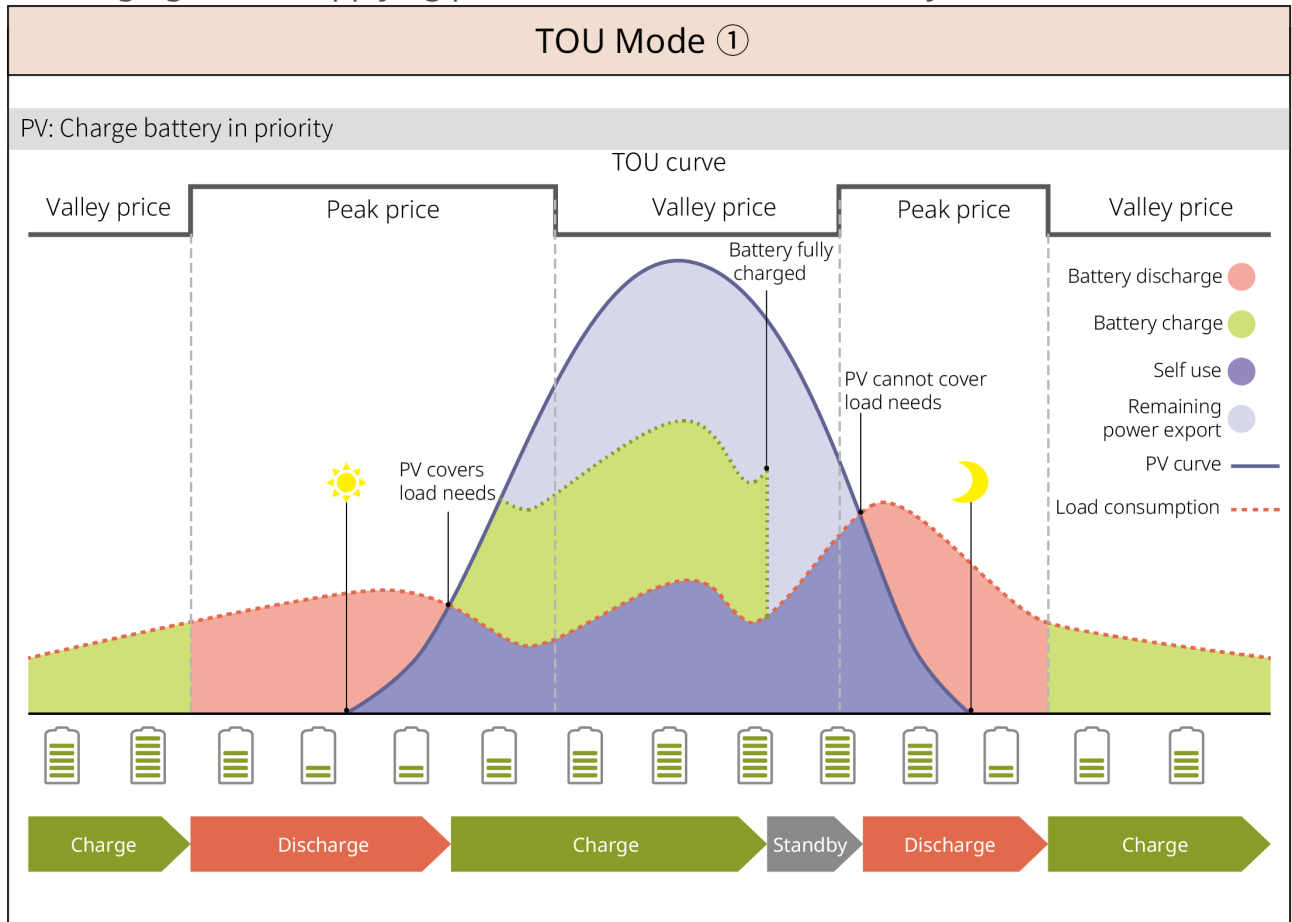


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Time-of-Use Mode

Under compliance with local laws and regulations, based on the difference between peak and valley electricity prices, set different time periods for buying and selling electricity.

For example: during valley price periods, set the battery to charging mode, buying electricity from the grid to charge; during peak price periods, set the battery to discharging mode, supplying power to the load via the battery.



AI Mode

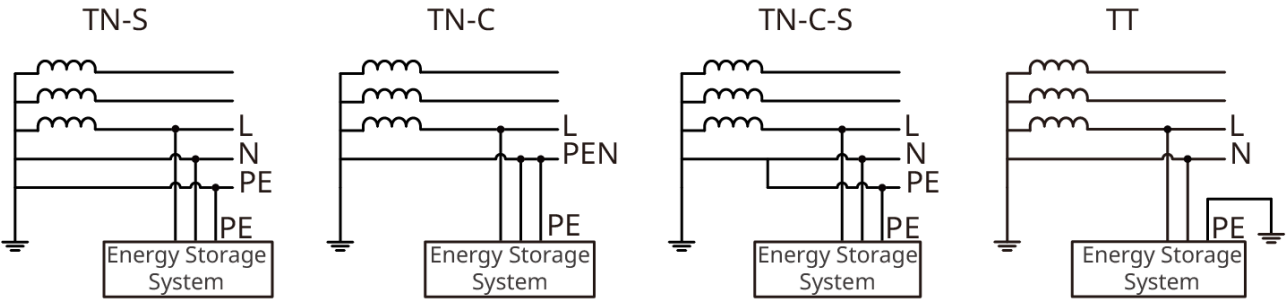
When a Home Energy Management System (HEMS) is used in the system, AI Mode is supported.

Set electricity prices based on user needs, combined with AI calculations for optimized scheduling, to maximize energy and economic efficiency. When using AI Mode, during the initial stage of collecting station information, there may be deviations between predicted curves and actual data. Before enabling AI Mode, please set the electricity price plan first. When the electricity price plan is a fixed tariff, AI Mode is not supported. Choose Time-of-Use Tariff or Dynamic Tariff, supporting:

- **Dynamic Tariff:** Obtain dynamic tariffs from the power company, and combined with user-set tariff surcharges, dynamically adjust the actual buying and selling electricity prices.

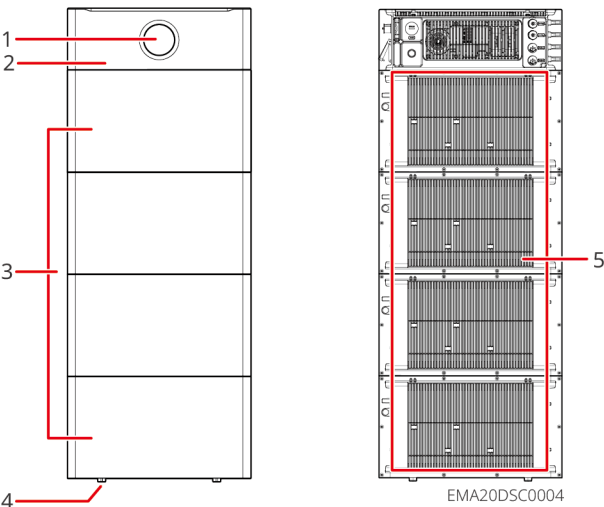
- Time-of-Use Tariff: Users set electricity price information for different time periods based on actual tariffs. Supports setting multiple groups of tariffs.

2.3 Supported Grid Types



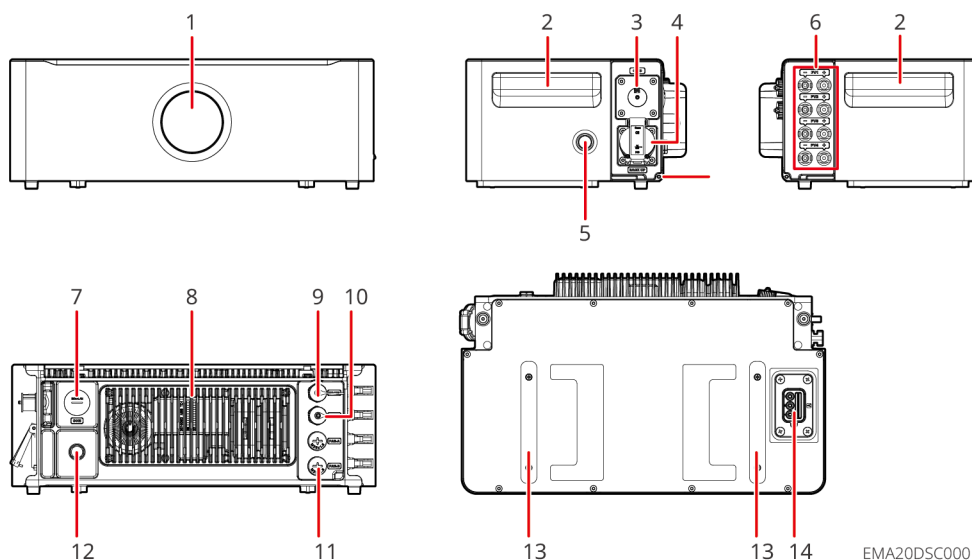
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2.4 Appearance Description



No.	Part	No.	Part
1	System Indicator Light	2	hybrid inverter
3	Battery	4	Foot Pad
5	heat sink	-	-

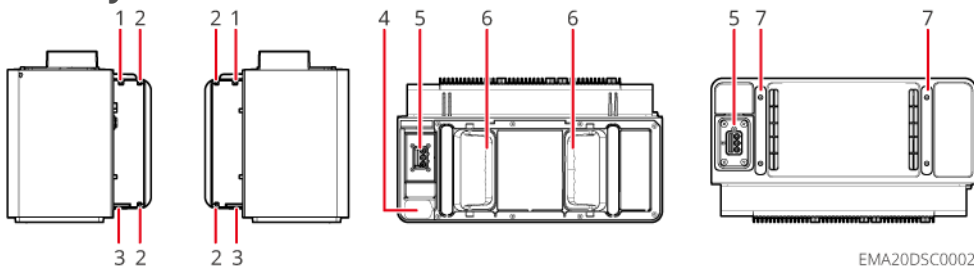
hybrid inverter



No.	Part/Silkscreen	Description
1	System indicator light	Indicates the system operating status.
2	Carrying handle	Used for carrying the device.
3	Grid port	Connect AC cable to link the device to the grid.
4	BACK-UP port	Connect AC cable to supply power to critical loads.
5	ON/OFF switch	Controls device power on/off.
6	PV input terminal	Connect DC input cables from PV modules.
7	Communication Port	Reserved port.
8	heat sink	-
9	RS485 communication port	Connect communication cable to link the device to meters, EnWG 14A devices, etc.
10	LAN communication port	Connect HEMS devices.

No.	Part/Silkscreen	Description
11	Parallel communication port	Reserved port.
12	Ventilation valve	-
13	Foot pad	-
14	Battery connection blind-mate port	Connects the inverter to the expansion battery.

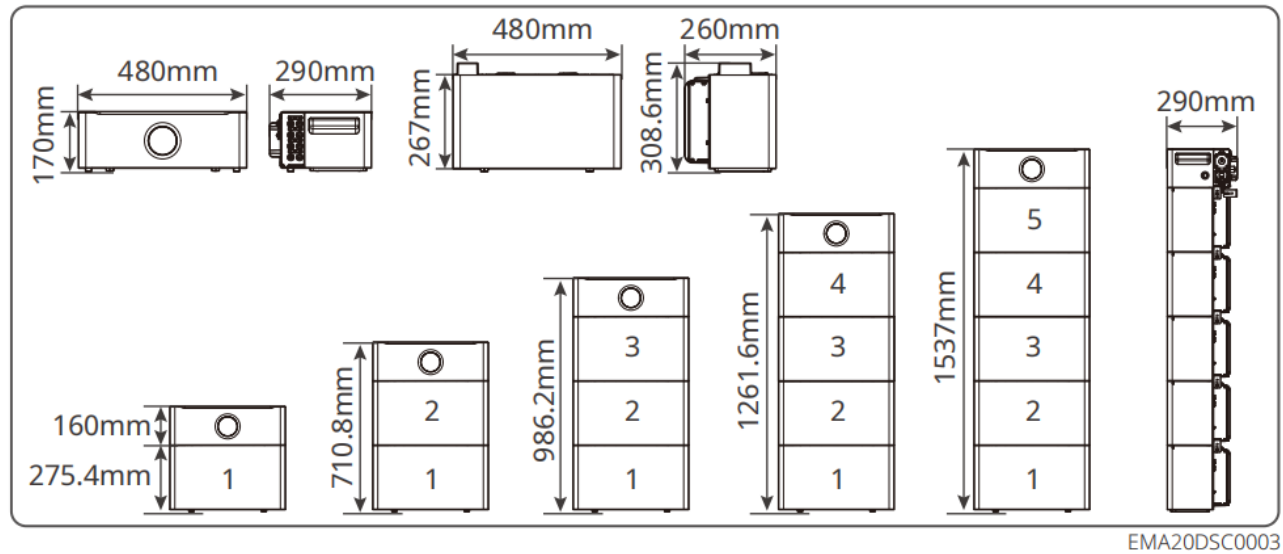
Battery



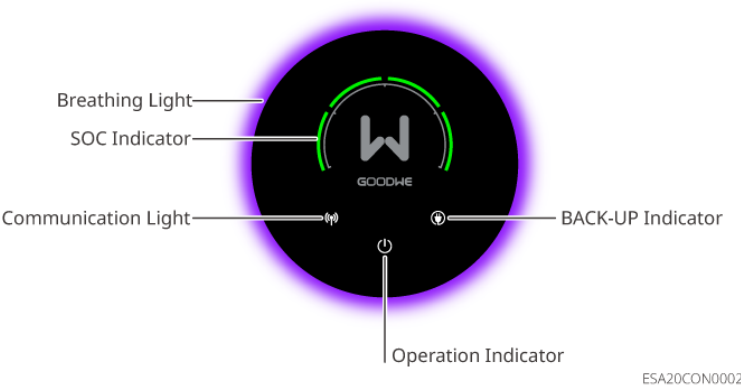
No.	Component/Silkscreen	Description
1	Series Bracket Mounting Hole	For mounting the series bracket, used to secure the inverter to the battery or to secure battery to battery.
2	Anti-tip Bracket Mounting Hole	For securing the anti-tip bracket.
3	Series Bracket Mounting Hole	For mounting the series bracket, used for inverter to battery or for securing battery to battery.
4	Battery Connection Port Protector	When the battery is not in use, it is used to install on the blind-mating port of the battery connection.
5	Battery Connection Blind-mating Port	Connection port between the inverter and battery, or between batteries.

No.	Component/Silkscreen	Description
6	Carrying Handle	Used for carrying the device.
7	Foot Pad	-

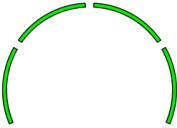
2.5 Size Guide



2.6 Indicator Light Description



indicator	Indicator Status	Dynamic Indicator Status	Description
	Yellow light steady	Blue-purple chasing light	Inverter powered on, in standby mode.
	Green blinking	Blue-purple chasing light	Inverter starting up, in self-test mode.
	Green steady	Blue-purple breathing light	Inverter operating normally in grid-tied generation or off-grid mode.
	Off	Red light blinking	System operation fault.
	Off	Off	Inverter powered off.
	Yellow light blinking	/	Inverter monitoring module resetting.
	Yellow light steady		Inverter and communication terminal not connected.
	Green light blinking		Communication terminal and cloud server communication fault.
	Green light steady		Inverter monitoring normal.
	Off		Inverter monitoring module not started.
	Yellow light steady		Grid abnormal, inverter BACK-UP port power supply normal.
	Green light steady		Grid normal, inverter BACK-UP port power supply normal.
	Off		BACK-UP port no power supply.

indicator	Indicator Status	Dynamic Indicator Status	Description
	Green light steady		- Battery charging. - Segmented lighting, each segment = 25% SOC:
	Green light blinking		- Battery discharging. - Segmented lighting, each segment = 25% SOC:
	Off		Battery has no charge or system not powered on.

3 Check and Storage

3.1 Check Before Receiving

Before signing for the product, please carefully check the following:

1. Check the outer packaging for any damage, such as deformation, holes, cracks, or any other signs that could indicate damage to the equipment inside the box. If damaged, do not open the packaging and contact your dealer.
2. Check whether the device model is correct. If it does not match, do not open the packaging and contact your dealer.

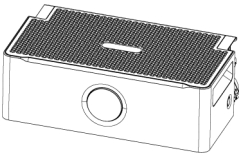
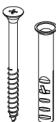
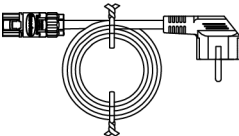
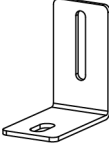
3.2 deliverables



WARNING

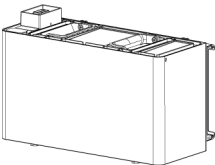
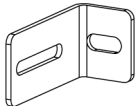
Check if the types and quantities of deliverables are correct, and if there is any damage to the appearance. If damaged, please contact your dealer.

Energy Storage Inverter Deliverables

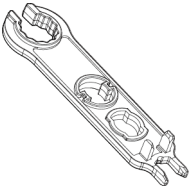
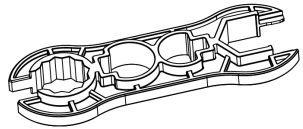
Part	Description	Part	Description
	hybrid inverter x1		Expansion screw x2
	AC connection cable x1 The style of AC plug varies by region. Please refer to the actual product.		locking bracket x2

Part	Description	Part	Description
	M4*10 screw x2		PV anti-tamper cover x8 Only applicable to MC4 PV connector in some regions.
	Product documentation x1	-	-

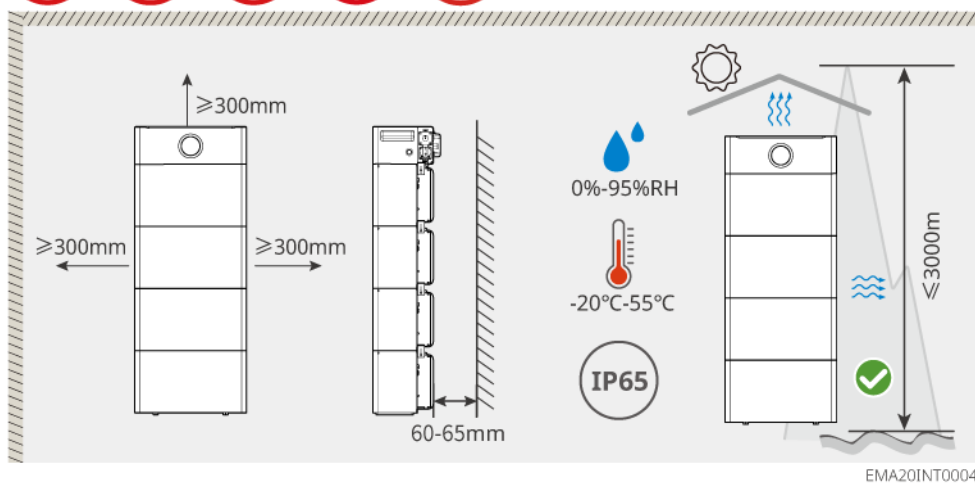
Batteries Deliverables

Part	Description	Part	Description
	Battery x1		Series Bracket x2
	M4*10 screw x2	-	-

Optional Deliverables

Component	Description
	PV Connector Release Tool
	AC Connector Release Tool

3.3 Storage



- If the inverter has been stored for more than two years or has not been operated for more than six months after installation, it is recommended to have it inspected and tested by professionals before putting it into use.
- To ensure the good electrical performance of the internal electronic components of the inverter, it is recommended to power it on every six months during storage; if it has not been powered on for more than six months, it is recommended to have it inspected and tested by professionals before putting it into use.
- To protect battery performance and service life, it is recommended to avoid long-term idle storage. Prolonged storage may cause deep discharge of the battery, leading to irreversible chemical degradation, resulting in capacity decay or even complete failure. It is advised to use it promptly. If the battery needs long-term storage, please refer to the following conditions for maintenance:

NOTICE

[1] The storage time is calculated from the first maintenance date indicated on the battery's outer packaging label, with charge/discharge maintenance performed according to the maintenance cycle. After the charge/discharge maintenance is completed satisfactorily, please update the maintenance information on the outer box's maintenance label to facilitate the preservation of maintenance records.

Product Model	Initial SOC Range for Battery Storage	Recommended Storage Temperature	Charge/Discharge Maintenance Cycle[1]	Battery Maintenance Method
GW3.0-BAT-LVD-G10	35~45%	0~35°C	-20~35°C, 12 months 35~45°C, 6 months	Charge the battery according to the SOC range requirements.

Packaging Requirements:

Ensure that the outer packaging box is not removed and the desiccant inside the box is not lost.

Environmental Requirements:

1. Ensure that the device is stored in a cool place, avoiding direct sunlight.
2. Ensure that the storage environment is clean, with appropriate temperature and humidity ranges, and no condensation. If there is condensation on the device ports, do not install the device.
3. Ensure that the device is stored away from flammable, explosive, corrosive, and other hazardous materials.

Stacking Requirements:

1. Ensure that the stacking height and direction of the device are arranged according to the instructions on the packaging box label.
2. Ensure that there is no risk of tipping after the devices are stacked.

4 Installation



When performing device installation and electrical connection, please use the components included in the shipment. Otherwise, any resulting device damage will not be covered under warranty.

4.1 Installation Requirements

Installation Environment Requirements

1. The equipment must not be installed in flammable, explosive, corrosive, or similar environments.
2. The temperature and humidity of the installation environment must be within a suitable range.
3. The installation location must be out of reach of children.
4. When installing equipment within a system, sufficient space should be reserved around the equipment to ensure adequate room for installation and heat dissipation.
5. The inverter enclosure temperature is high during operation. Do not touch the enclosure before it cools down to prevent burns.
6. The equipment should be installed away from direct sunlight, rain, snow accumulation, and similar conditions. It is recommended to install it in a sheltered location.
7. The installation space must meet the equipment's ventilation, heat dissipation, and operational space requirements.
8. The equipment installation height should facilitate operation and maintenance, ensuring the indicator lights, all labels are easily visible, and the terminal blocks are easily accessible.
9. The installation altitude of the equipment must be lower than the maximum operating altitude.

NOTICE

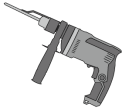
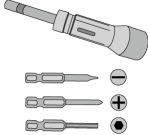
Charging temperature range: $-20 < T < 55^{\circ}\text{C}$; Discharging temperature range: $-20 < T < 55^{\circ}\text{C}$.

If installed in an environment below -20°C , the battery will be unable to recharge and restore energy after being fully discharged, resulting in battery undervoltage protection.

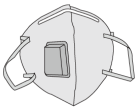
Tool Requirements

NOTICE

During installation, it is recommended to use the following installation tools. If necessary, other auxiliary tools can be used on-site.

Tool Type	Description	Tool Type	Description
	diagonal plier		Level bar
	hammer drill (Bit $\Phi 8\text{mm}$)		torque wrench M5
	rubber hammer		Marker pen
	cable tie		Vacuum cleaner

personal protective equipment

Tool Type	Description	Tool Type	Description
	Insulated gloves, protective gloves		Dust mask
	goggle		Safety shoes

4.2 Equipment Handling



- During operations such as transportation, handling, and installation, the relevant national/regional laws, regulations, and applicable standards must be complied with.
- Before installation, the device needs to be moved to the installation site. To prevent personal injury or equipment damage during the moving process, please note the following:
 - Ensure an adequate number of personnel is assigned according to the device's weight to prevent it from exceeding the safe manual handling limit and causing injury.
 - Wear safety gloves to avoid injury.
 - Ensure the device remains balanced during movement to prevent it from falling.

4.3 Installation Equipment



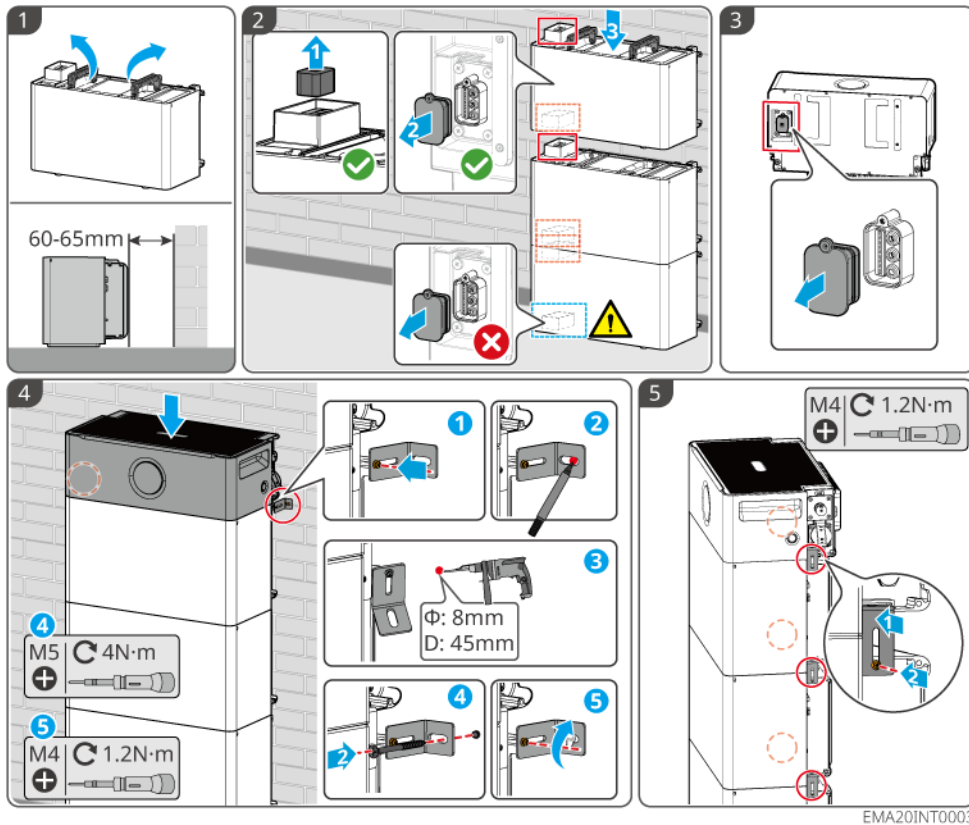
CAUTION

- When drilling holes, ensure the drilling location avoids water pipes, cables, etc., inside the wall to prevent hazards.
- When drilling, please wear safety goggles and a dust mask to prevent dust from being inhaled into the respiratory tract or falling into the eyes.
- Please install the inverter above the battery; do not install the battery above the inverter.
- During equipment installation, ensure it is installed level and securely. When placing the inverter and battery, confirm that the holes on the upper and lower layers are aligned; the anti-tip bracket should be vertical and tightly attached to the wall or battery surface.
- When using an impact drill to make holes, use cardboard or other shielding materials to cover the equipment to prevent foreign objects from entering the device interior, which could cause damage.
- Please ensure the system installation location is within WiFi signal coverage.
- When stacking batteries for installation, do not remove the protective cover of the blind-mate port on the bottommost battery, otherwise the system will not operate normally.

Installation Steps:

1. Place the bottom-most battery 60mm-65mm away from the wall, keeping it parallel to the wall surface.
2. Except for the battery at the very bottom of the stack, which should retain its blind port protective cover, the protective covers on the blind ports of all other batteries must be removed. After removing the covers, stack and install the batteries.
3. Remove the blind port protective cover from the inverter.
4. Stack and install the inverter. During installation, align it with the battery blind ports to ensure a secure fit.
 - a. Attach one side of the anti-tip bracket to the first battery beneath the inverter and pre-tighten with screws.
 - b. Identify and mark the positions on the wall where holes need to be drilled to secure the anti-tip bracket.
 - c. Drill holes using an impact drill: hole diameter 8mm, depth 45mm.
 - d. Secure the anti-tip bracket to the wall using expansion screws.
 - e. Tighten the screws on the battery side.

5. Insert the series connection brackets into the bracket mounting holes of the inverter and batteries in sequence, and secure them with screws to complete the fixation between the inverter and the batteries, and between the batteries themselves.



5 System Wirings



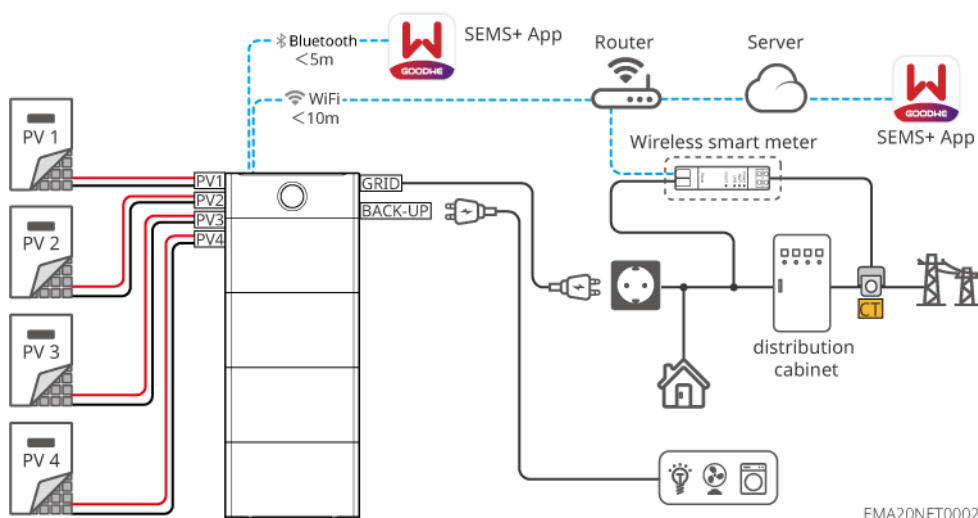
- The installation, routing, and connection of cables must comply with local laws, regulations, and standard requirements.
- All operations during electrical connections, as well as the specifications of cables and components used, must meet local legal and regulatory requirements.
- Before performing electrical connections, ensure that the equipment is powered off. Live operation is strictly prohibited, otherwise it may lead to DANGERS such as electric shock.
- Cables of the same type should be bundled together and separated from cables of different types. It is prohibited to intertwine or cross-arrange them.
- If the cable is subjected to excessive tension, it may lead to poor connections. When connecting, please leave a certain length of cable before connecting it to the inverter terminal port.

NOTICE

- When performing electrical connections, wear personal protective equipment such as safety shoes, protective gloves, and insulated gloves as required.
- The cable colors in the graphics in this document are for reference only. Specific cable specifications must comply with local regulatory requirements.

5.1 Plug-and-Play Mode System Wiring

System Networking Diagram



- Please prepare your own smart meter. Connect the wireless meter via WiFi to achieve self-consumption, power limiting, and other functions. For the installation method and precautions of the meter, please refer to the corresponding meter manual.
- Supported wireless meter models: shelly PRO 3EM, Donghong meter SEM3-WL-2, Donghong P1 reading head, everhome infrared reading head, everhome P1 reading head.

Connecting PV DC Cables



Before connecting the PV string to the device, confirm the following information. Otherwise, it may cause permanent damage to the device, and in severe cases, may lead to fire causing personal injury and property damage.

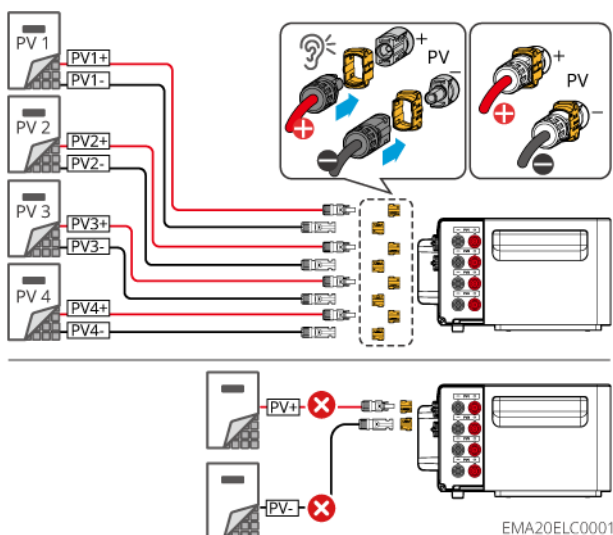
1. Ensure the maximum short-circuit current and maximum input voltage of each MPPT circuit are within the inverter's allowable range.
2. Ensure the positive terminal of the PV string is connected to the inverter's PV+, and the negative terminal of the PV string is connected to the inverter's PV-.

WARNING

- The PV string output does not support grounding. Before connecting the PV string to the inverter, ensure the minimum insulation resistance to ground of the PV string meets the minimum insulation resistance requirement ($R = \text{Max. Input Voltage} / 30\text{mA}$).
- After completing the DC cable connection, ensure the cable connections are secure and not loose.
- Ensure the DC cable polarity is correct (positive and negative are not reversed) and the voltage is within the allowable range.
- Do not connect two or more PV strings in series, as this may cause the input voltage to exceed 60V, leading to equipment damage.
- To prevent the PV cable from falling off, please install the anti-tamper cover. The anti-tamper cover is only applicable to MC4 PV connectors in some regions.

Operation Steps:

1. (Optional) If a PV anti-tamper cover is included in the shipment, please install it onto the PV connector on the inverter side.
2. Connect the PV cable from the module side to the PV connector on the inverter side.



Connecting AC Cables

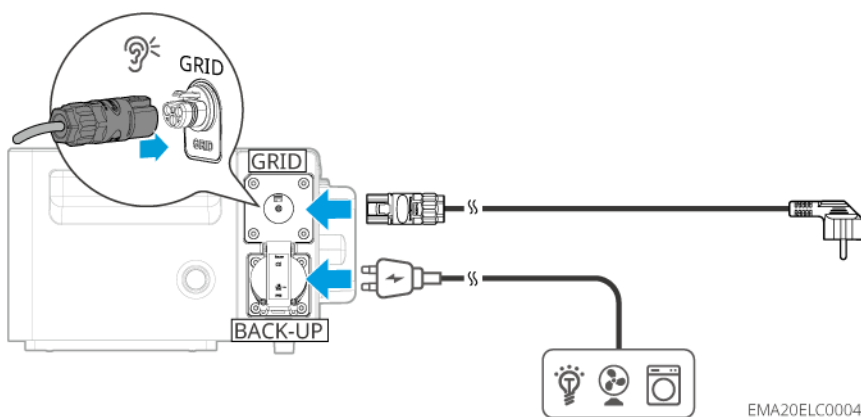


DANGER

Please confirm that the AC cable plug and socket specifications match.

Operation Steps:

1. Take out the AC cable included in the shipment and connect it to the GRID AC connection port on the all-in-one unit side.
2. If you need to connect a BACK UP load, you can plug the load plug into the BACK UP port on the all-in-one unit side.
3. Plug the other end of the AC cable into a household power socket.

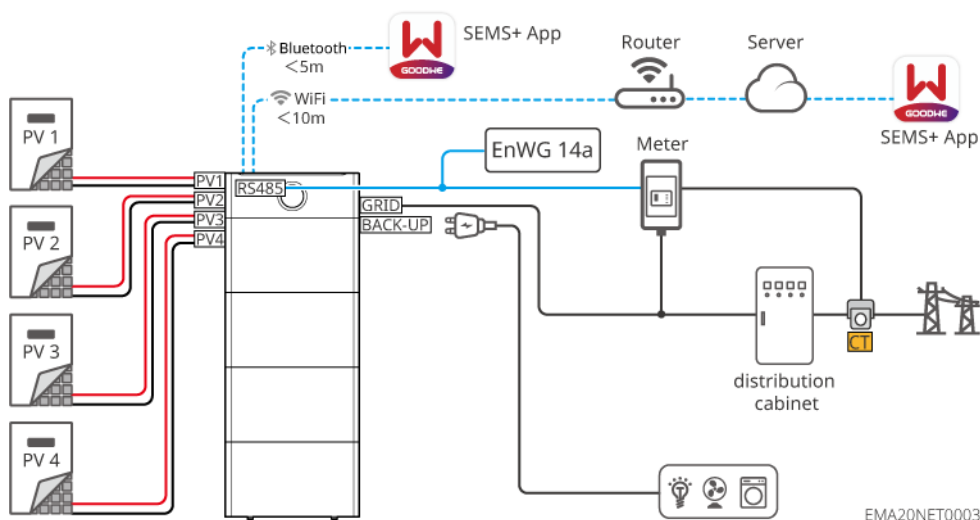


5.2 Professional Mode System Wiring



DANGER

- System installation and wiring in Professional Mode must only be performed by professional technicians.
- After completing system installation and wiring, the grid-connected power can be modified via the SEMS+ App.



- Supports connection to the Home Energy Management System (abbreviated as HEMS), where HEMS uniformly schedules and manages the system. For the installation methods and precautions of HEMS, please refer to the [HEMS User Manual](#).
- Please prepare your own smart meter, connect to a wireless meter via WiFi or a wired meter via RS485 port, to achieve functions such as self-consumption and power limitation. For the installation methods and precautions of the meter, please refer to the corresponding meter manual.
 - Supported wireless meter models: shelly PRO 3EM; Donghong meter SEM3-WL-2; Donghong P1 meter head; everhome infrared meter head; everhome P1 meter head.
 - Supported wired meter models: Goodwe GMK110; Goodwe GMK330; Donghong meter SEM3-WL-2.

Connecting PV DC Cables

DANGER

Before connecting the PV string to the device, confirm the following information. Failure to do so may cause permanent damage to the device and, in severe cases, may lead to fire, resulting in personal injury or property damage.

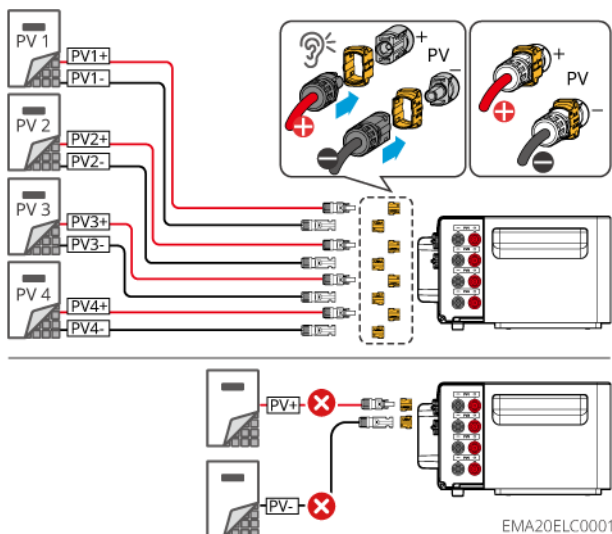
1. Ensure the maximum short-circuit current and maximum input voltage of each MPPT are within the allowable range of the all-in-one unit.
2. Ensure the positive terminal of the PV string is connected to the PV+ terminal of the all-in-one unit, and the negative terminal of the PV string is connected to the PV- terminal of the all-in-one unit.

WARNING

- PV string output does not support grounding. Before connecting the PV string to the all-in-one machine, ensure that the minimum insulation resistance to ground of the PV string meets the minimum insulation impedance requirement ($R = \text{Max. Input Voltage} / 30\text{mA}$).
- After completing the DC cable connection, ensure that the cable connections are tight and not loose.
- Ensure that the DC cable positive and negative poles are correct, with no reverse connection; and the voltage is within the allowable range.
- Do not connect two or more PV strings in series, otherwise it may cause the input voltage to exceed 60V, leading to equipment damage.
- To prevent PV cable detachment, install an anti-tamper cover. The anti-tamper cover is only applicable to MC4 PV connectors.

Operation Steps:

1. Take out the PV anti-tamper cover included in the shipment, and install it to the PV connector on the all-in-one machine side and the PV connector on the component side.
2. Take out the PV extension cable included in the shipment, and connect it to the all-in-one machine and the component respectively.

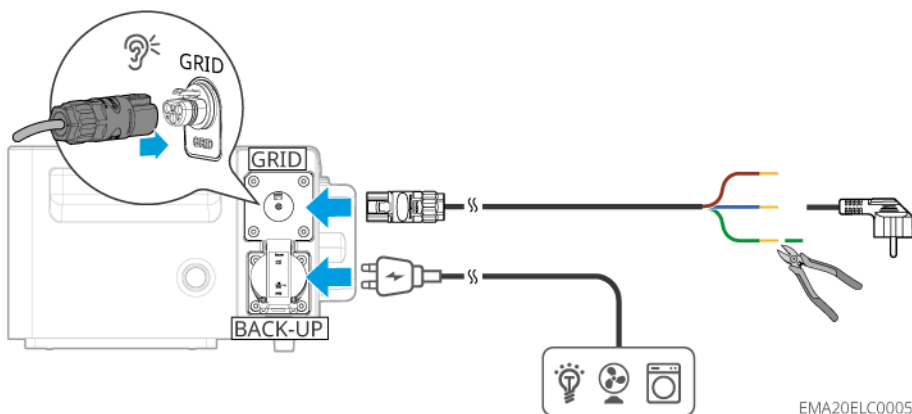


Connecting AC Cables

- Choose whether to install an RCD device according to local laws and regulations. The inverter can be externally connected to a compliant RCD (Residual Current Device), which provides protection when the leakage current exceeds the limit.
- If you need to extend the AC cable, please prepare your own. Recommended specification: 2.5mm² outdoor copper core cable.

Operation Steps:

1. Prepare the AC cable and connect it to the home distribution cabinet.
2. If you need to connect BACK UP loads, you can plug the load into the BACK UP port on the inverter side.



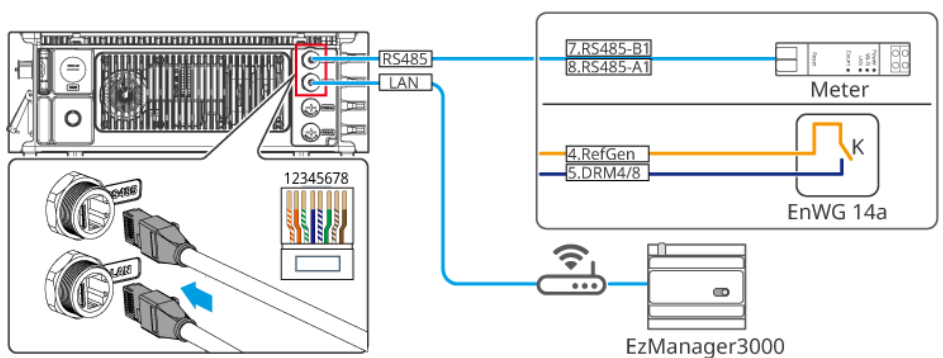
Connecting Communication Cables

- When using the RS485 communication port for wiring, please prepare your own standard network cable of CAT5 or higher specification and RJ45 connector. Based

on the port definitions below and actual needs, crimp the RJ45 connector network cable yourself or contact the manufacturer to purchase connectors and 2PIN/8PIN terminal adapter cables.

PIN	Port Definition	Description
1	RS485_A2	Reserved port.
2	RS485_B2	
3	NC	
4	RefGen	Connect to a 14a device when support for emergency grid dimming is required per regulations such as EnWG 14a in regions like Germany.
5	DRM4/8	
6	NC	Reserved port
7	RS485_B1	Used for connecting devices such as smart meters.
8	RS485_A1	

- When using the LAN communication port for wiring, please prepare your own standard network cable of CAT5 or higher specification and RJ45 connector. It can be connected to a router and ultimately to the Home Energy Management System (HEMS) device.



EMA20ELC0003

6 System Commissioning

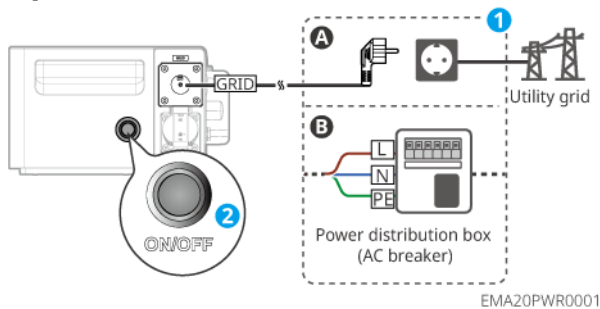
6.1 Check Before Power ON

No.	Inspection Item
1	The equipment is installed securely. The installation location facilitates operation and maintenance. The installation space allows for ventilation and heat dissipation. The installation environment is clean and tidy.
2	DC cables and AC cables are connected correctly and securely.
3	Cable bundling meets routing requirements, is reasonably distributed, and shows no damage.
4	The voltage and frequency at the inverter grid connection point meet the grid connection requirements.

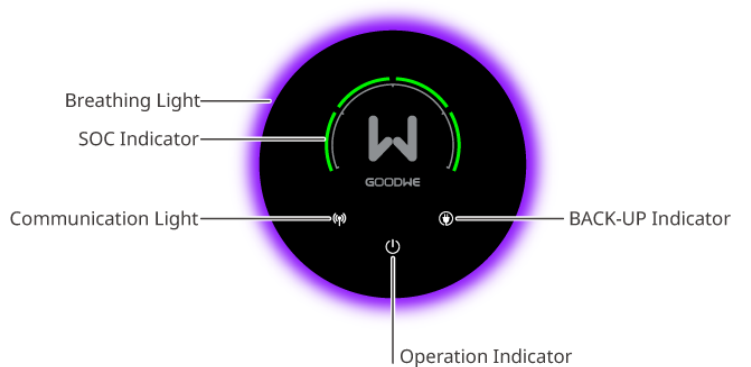
6.2 Power ON

Step 1: Connecting the AC Cable.

Step 2: Press the device ON/OFF switch to start the device.

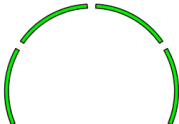


6.3 Indicator Light Description



ESA20CON0002

indicator	Indicator Status	Dynamic Indicator Status	Description
⏻	Yellow light steady	Blue-purple chasing light	Inverter powered on, in standby mode.
	Green blinking	Blue-purple chasing light	Inverter starting up, in self-test mode.
	Green steady	Blue-purple breathing light	Inverter operating normally in grid-tied generation or off-grid mode.
	Off	Red light blinking	System operation fault.
	Off	Off	Inverter powered off.
📶	Yellow light blinking	/	Inverter monitoring module resetting.
	Yellow light steady		Inverter and communication terminal not connected.
	Green light blinking		Communication terminal and cloud server communication fault.
	Green light steady		Inverter monitoring normal.
	Off		Inverter monitoring module not started.

indicator	Indicator Status	Dynamic Indicator Status	Description
	Yellow light steady		Grid abnormal, inverter BACK-UP port power supply normal.
	Green light steady		Grid normal, inverter BACK-UP port power supply normal.
	Off		BACK-UP port no power supply.
	Green light steady		- Battery charging. - Segmented lighting, each segment = 25% SOC:
	Green light blinking		- Battery discharging. - Segmented lighting, each segment = 25% SOC:
	Off		Battery has no charge or system not powered on.

7 System Debugging and Power Station Monitoring

7.1 Device Debugging and Power Station Monitoring via SEMS+ App

SEMS+ App is a software for remote power station monitoring or local device debugging. It supports installers or owners:

- Remotely monitor the operation of the power station and set the operating parameters of the station and devices.
- Locally connect to devices to view their operation status and set device parameters.

Download and Install SEMS+ App

Mobile Phone Requirements:

- Operating System Requirements: Android 7.0 and above, iOS 15.1 and above.
- The phone must support a web browser and connect to the Internet.
- The phone must support WLAN/Bluetooth functionality.

Download Methods:

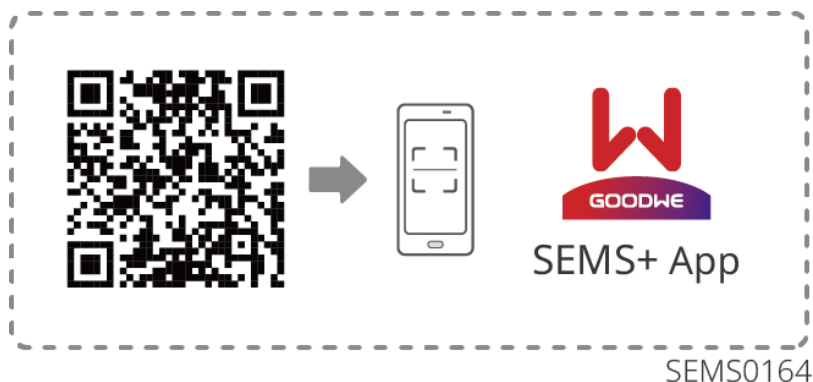
Method 1:

Search for SEMS+ in Google Play, App Store, Huawei, Honor, Xiaomi, OPPO, and vivo app stores to download and install.



Method 2:

Scan the QR code below to download and install.



For detailed functions, please refer to the "[SEMS+ App User Manual](#)". The user manual can be obtained from the official website or by scanning the QR code below.



7.2 Device Debugging and Power Plant Monitoring via SEMS+ WEB

SEMS+ WEB is a monitoring platform that can communicate via WiFi or LAN. The following are the common functions of SEMS+ WEB:

1. Manage organization or user information, etc.
2. Add, monitor power plant information, etc.
3. Maintain equipment.

For detailed functions, please refer to the "[SEMS+ WEB User Manual](#)".



SEMS+ WEB User Manual

8 Maintenance

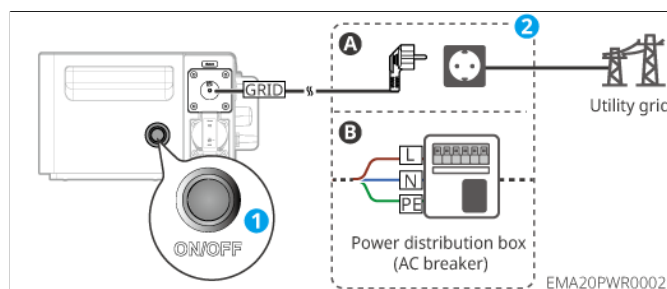
8.1 Power OFF the System

DANGER

- When performing operation and maintenance on devices within the system, please power down the system. Operating devices while powered on may cause device damage or risk of electric shock.
- After the device is powered off, internal components require a certain amount of time to discharge. Please wait according to the time specified on the label until the device is completely discharged.

Step 1: Press the device ON/OFF switch to turn off the device.

Step 2: Unplug the AC cable.



8.2 Removing the Equipment

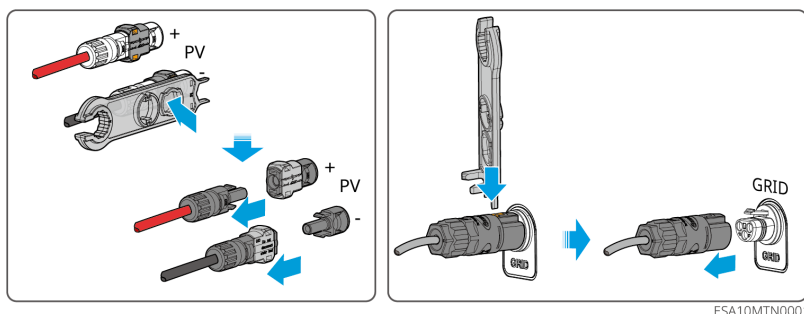


DANGER

- Ensure the device is powered off.
- When operating the device, please wear personal protective equipment.
- When removing wiring terminals, use standard disassembly tools to avoid damaging the terminals or the device.
- Unless otherwise specified, the device disassembly method is the reverse order of the installation method, and this document will not elaborate further.

Operation Steps:

1. Power down the system.
2. Use labels to mark the cable types for the cables connected in the system.
3. Disconnect all electrical connections of the equipment. Use tools to remove the PV anti-tamper cover and AC connector, as shown in the figure below.
4. Remove the inverter and battery.
5. Store the equipment properly. If it will be put into use later, ensure that the storage conditions meet the requirements.



8.3 Disposing of the Equipment

When the equipment can no longer be used and needs to be disposed of, please dispose of it in accordance with the electrical waste disposal requirements of the regulations in the country/region where the equipment is located. The equipment must not be disposed of as general household waste.

8.4 Routine Maintenance



DANGER

- Before performing equipment maintenance, ensure you wear the necessary personal protective equipment to prevent electric shock.
- During maintenance, ensure all upstream and downstream power switches for the equipment are turned off.
- During maintenance, strictly adhere to the correct operating procedures.



WARNING

- If any issue is found that may affect the battery or energy storage inverter system, please contact after-sales personnel. Disassembly by unauthorized personnel is prohibited.
- If exposed copper wires are found inside the conductive cables, do not touch them. High voltage hazard. Please contact after-sales personnel. Disassembly by unauthorized personnel is prohibited.
- In the event of any other emergencies, please contact after-sales personnel immediately. Operate only under the guidance of after-sales personnel or wait for them to perform on-site operations.

Maintenance Item	Maintenance Method	Maintenance Cycle	Maintenance Purpose
System Cleaning	Check if the installation space meets requirements and if there is any debris accumulation around the equipment.	Once every six months	Prevent overheating failures.
System Installation	• Check if the equipment installation is secure and if fastening screws are loose. • Check if there is any damage or deformation on the equipment exterior.	Once every six months to once a year	Verify equipment installation stability.

Maintenance Item	Maintenance Method	Maintenance Cycle	Maintenance Purpose
Electrical Connections	Check if electrical connections are loose, if cable exteriors are damaged, or if copper exposure occurs.	Once every six months to once a year	Ensure electrical connection reliability.
Battery Maintenance	If the battery has not been used or fully charged for an extended period, regular charging is recommended.	Once every 15 days	Protect battery service life.

8.5 Troubleshooting

Please follow the methods below for troubleshooting. If the troubleshooting methods do not help you, please contact the after-sales service center.

When contacting the after-sales service center, please collect the following information to facilitate a quick resolution.

1. Product information, such as: serial number, software version, device installation time, time of failure occurrence, frequency of failure occurrence, etc.
2. Device installation environment, such as: weather conditions, whether components are obstructed, shaded, etc. It is recommended to provide photos, videos, and other files of the installation environment to assist in problem analysis.
3. Grid conditions.

If the system experiences a problem not listed, or if following the instructions still does not prevent the problem or abnormality, immediately stop system operation and contact your dealer at once.

No.	Fault Name	Fault Cause	Troubleshooting Suggestions
1	Grid Overvoltage Protection	Grid voltage is higher than the allowable range, or the duration of high voltage exceeds the high voltage ride-through (HVRT) set value.	1. If it occurs occasionally, it may be a temporary grid anomaly. The inverter will resume normal operation after detecting a normal grid, requiring no manual intervention. 2. If it occurs frequently, check if the grid voltage is within the allowable range. • If the grid voltage is outside the allowable range, contact the local power operator. • If the grid voltage is within the allowable range, after obtaining consent from the local power operator, modify the inverter's grid overvoltage protection point, HVRT settings, or disable the grid overvoltage protection function. 3. If it cannot be restored for a long time, check if the AC side circuit breaker and output cables are properly connected.
2	Grid Undervoltage Protection	Grid voltage is lower than the allowable range, or the duration of low voltage exceeds the low voltage ride-through (LVRT) set value.	1. If it occurs occasionally, it may be a temporary grid anomaly. The inverter will resume normal operation after detecting a normal grid, requiring no manual intervention. 2. If it occurs frequently, check if the grid voltage is within the allowable range. • If the grid voltage is outside the allowable range, contact the local power operator. • If the grid voltage is within the allowable range, after obtaining consent from the local power operator, modify the inverter's grid undervoltage protection point, LVRT settings, or disable the grid undervoltage protection function. 3. If it cannot be restored for a long time, check if the AC side circuit breaker and output cables are properly connected.

No.	Fault Name	Fault Cause	Troubleshooting Suggestions
3	Grid Rapid Overvoltage Protection	Abnormal grid voltage detection or extremely high voltage triggers the fault.	1. If it occurs occasionally, it may be a temporary grid anomaly. The inverter will resume normal operation after detecting a normal grid, requiring no manual intervention. 2. If it occurs frequently, check if the grid voltage is within the allowable range. • If the grid voltage is outside the allowable range, contact the local power operator. • If the grid voltage is within the allowable range, after obtaining consent from the local power operator, modify the inverter's grid overvoltage protection point, HVRT settings, or disable the grid overvoltage protection function. 3. If it cannot be restored for a long time, check if the AC side circuit breaker and output cables are properly connected.
4	Grid 10min Overvoltage	The sliding average of grid voltage within 10 minutes exceeds the range specified by safety regulations.	1. If it occurs occasionally, it may be a temporary grid anomaly. The inverter will resume normal operation after detecting a normal grid, requiring no manual intervention. 2. Check if the grid voltage is operating at a high level for an extended period. If it occurs frequently, check if the grid voltage is within the allowable range. • If the grid voltage is outside the allowable range, contact the local power operator. • If the grid voltage is within the allowable range, after obtaining consent from the local power operator, modify the grid 10-minute overvoltage protection point.

No.	Fault Name	Fault Cause	Troubleshooting Suggestions
5	Grid Overfrequency	Grid anomaly: The actual grid frequency is higher than the local grid standard requirements.	1. If it occurs occasionally, it may be a temporary grid anomaly. The inverter will resume normal operation after detecting a normal grid, requiring no manual intervention. 2. If it occurs frequently, check if the grid frequency is within the allowable range. • If the grid frequency is outside the allowable range, contact the local power operator. • If the grid frequency is within the allowable range, after obtaining consent from the local power operator, modify the grid overfrequency protection point.
6	Grid Underfrequency	Grid anomaly: The actual grid frequency is lower than the local grid standard requirements.	1. If it occurs occasionally, it may be a temporary grid anomaly. The inverter will resume normal operation after detecting a normal grid, requiring no manual intervention. 2. If it occurs frequently, check if the grid frequency is within the allowable range. • If the grid frequency is outside the allowable range, contact the local power operator. • If the grid frequency is within the allowable range, after obtaining consent from the local power operator, modify the grid underfrequency protection point.

No.	Fault Name	Fault Cause	Troubleshooting Suggestions
7	Grid Frequency Instability	Grid anomaly: The rate of change of the actual grid frequency does not comply with local grid standards.	1. If it occurs occasionally, it may be a temporary grid anomaly. The inverter will resume normal operation after detecting a normal grid, requiring no manual intervention. 2. If it occurs frequently, check if the grid frequency is within the allowable range. • If the grid frequency is outside the allowable range, contact the local power operator. • If the grid frequency is within the allowable range, contact your dealer or after-sales service center.
8	LVRT Undervoltage	Grid anomaly: The duration of abnormal grid voltage exceeds the time specified for LVRT/HVRT.	1. If it occurs occasionally, it may be a temporary grid anomaly. The inverter will resume normal operation after detecting a normal grid, requiring no manual intervention. 2. If it occurs frequently, check if the grid voltage and frequency are within the allowable range and stable. If not, contact the local power operator; if yes, contact your dealer or after-sales service center.
9	HVRT Overvoltage	Grid anomaly: The duration of abnormal grid voltage exceeds the time specified for LVRT/HVRT.	
10	DCI Protection Level1	The DC component of the inverter output current is higher than the range allowed by safety regulations or the machine's default settings.	1. If it is caused by an external fault, the inverter will automatically resume normal operation after the fault disappears, requiring no manual intervention. 2. If this alarm occurs frequently, affecting normal power plant generation, contact the dealer or GoodWe after-sales service center.
11	DCI Protection Level2	The DC component of the inverter output current is higher than the range allowed by safety regulations or the machine's default settings.	

No.	Fault Name	Fault Cause	Troubleshooting Suggestions
12	Low Insulation Resistance	1. The PV string is short-circuited to the protective earth. 2. The PV string is installed in a long-term humid environment with poor line-to-ground insulation.	1. Check the impedance between the PV string and the protective earth. If a short circuit is found, rectify the short circuit point. 2. Check if the inverter's protective earth wire is correctly connected. 3. If it is confirmed that the impedance is indeed lower than the default value in rainy/overcast environments, reconfigure the "Insulation Resistance Protection Point".
13	Grounding Abnormal	The inverter's protective earth wire is not connected.	Please confirm if the inverter's protective earth wire is not properly connected.
14	Internal Comm Loss	Refer to the specific subcode for the cause.	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.
15	Back-up Output Overload	Prevents the inverter from continuously outputting overload.	Turn off some off-grid loads to reduce the inverter's off-grid output power.
16	Back-up Output Overvoltage	Prevents damage to loads caused by inverter output overvoltage.	1. If it occurs occasionally, it may be caused by load switching, requiring no manual intervention. 2. If it occurs frequently, contact the dealer or GoodWe after-sales service center.
17	AC HCT check Abnormal	Abnormal sampling exists in the AC sensor.	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.

No.	Fault Name	Fault Cause	Troubleshooting Suggestions
18	Relay Check Abnormal	Relay abnormality, causes: 1. Relay abnormality (relay short circuit) 2. Relay sampling circuit abnormality. 3. AC side wiring abnormality (may have loose connections or short circuits)	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.
19	Cabinet Overtemperature	Cabinet temperature is too high, possible causes: 1. Inverter installation location is not ventilated. 2. Ambient temperature is too high. 3. Internal fan operation is abnormal.	1. Check if the ventilation at the inverter installation location is good and if the ambient temperature exceeds the maximum allowable range. 2. If ventilation is poor or ambient temperature is too high, improve the ventilation and heat dissipation conditions. 3. If both ventilation and ambient temperature are normal, contact the dealer or GoodWe after-sales service center.
20	INV Module Overtemperature	Inverter module temperature is too high, possible causes: 1. Inverter installation location is not ventilated. 2. Ambient temperature is too high. 3. Internal fan operation is abnormal.	

No.	Fault Name	Fault Cause	Troubleshooting Suggestions
21	Boost Module Overtemperature	Boost module temperature is too high, possible causes: 1. Inverter installation location is not ventilated. 2. Ambient temperature is too high. 3. Internal fan operation is abnormal.	
22	1.5V Ref Abnormal	Reference circuit fault	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.
23	Model Identification Fault	Fault related to model identification error.	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.
24	Bus Overvoltage	BUS overvoltage, possible causes: 1. PV voltage is too high; 2. Inverter BUS voltage sampling is abnormal;	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.
25	N-Bus Overvoltage		

No.	Fault Name	Fault Cause	Troubleshooting Suggestions
26	PV Input Overvoltage	PV input voltage is too high, possible cause: PV array configuration error: too many PV panels are connected in series in the string, causing the string's open-circuit voltage to be higher than the inverter's maximum operating voltage.	Check the series configuration of the corresponding PV array string to ensure the string's open-circuit voltage does not exceed the inverter's maximum operating voltage. After correcting the PV array configuration, the inverter alarm will automatically disappear.
27	PV Continuous Hardware Overcurrent	1. Unreasonable component configuration 2. Hardware damage	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.
28	FlyCap Software Overvoltage	Flying capacitor overvoltage, possible causes: 1. PV voltage is too high; 2. Inverter BUS voltage sampling is abnormal;	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.
29	PV String Reversed (String1~16)	PV string is reversed.	Check if the string is reversed.
30	Internal Fan Abnormal	Internal fan abnormality 1. Fan power supply abnormality; 2. Mechanical fault (stall); 3. Fan aging damage.	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.

No.	Fault Name	Fault Cause	Troubleshooting Suggestions
31	Flash R/W Error	Flash content changed; flash lifespan exhausted;	1. Upgrade to the latest firmware. 2. Contact the dealer or GoodWe after-sales service center.
32	PV IGBT Short Circuit Fault	1. PV Boost circuit Mos short circuit 2. Inverter sampling circuit abnormal	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.
33	PV String Mismatch	1. String power exceeds 600W 2. Inverter sampling circuit abnormal	Turn off the AC output side switch, disconnect the PV strings, set the device switch to OFF, wait for 5 minutes, then close the AC output side switch, connect the PV strings, and press the device switch to ON. If the fault persists, contact the dealer or GoodWe after-sales service center.

9 technical parameter

9.1 Inverter Parameters

technical parameter	GW3K-EMA-G10	GW3K-EMA-UK-G10
Battery Side		
Battery Type	Li-ion	Li-ion
Nominal Voltage (V)	54	54
Voltage Range (V)	52-56	52-56
Start-up Voltage (V)	9	9
Number of Battery Inputs	1	1
Max. Continuous Charging Current (A)	63	63
Max. Continuous Discharging Current (A)	64	64
Max. Charging Power (kW)	3.4	3.4
Max. Discharging Power (kW)	3.2	3.2
PV Side		
Max. Input Power (kW)	4.8	4.8

technical parameter	GW3K-EMA-G10	GW3K-EMA-UK-G10
Max. Input Voltage (V)	60	60
MPPT Operating Voltage Range (V)* ¹	13-48	13-48
MPPT Operating Voltage Range at Nominal Power (V)	33.3-48	33.3-48
Start-up Voltage (V)	15	15
Nominal Input Voltage (V)	40	40
Max. MPPT Current (A)	36/36/36/36	36/36/36/36
Max. MPPT Short Circuit Current (A)	40/40/40/40	40/40/40/40
Max. Backfeed Current to the Array (A)	0	0
Number of MPPTs	4	4
Number of Strings per MPPT	1	1
AC Side (Grid Port)		
Rated Power (kW)	0.8(default) /3 * ²	0.8(default) /3 * ²
Maximum Power (kW)	0.8(default) /3 * ²	0.8(default) /3 * ²

technical parameter	GW3K-EMA-G10	GW3K-EMA-UK-G10
Rated Apparent Power from Grid (kVA)	3.6	3.6
Rated Apparent Power to Grid (kVA)	0.8(default) /3 ^{*2}	0.8(default) /3 ^{*2}
Max. Apparent Power to Grid (kVA)	0.8(default) /3 ^{*2}	0.8(default) /3 ^{*2}
Max. Apparent Power from Grid (kVA)	3.6	3.6
Nominal Voltage (V)	220/230/240, L/N/PE	220/230/240, L/N/PE
Voltage Range (V)	170-280	170-280
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	45-55 / 55-65	45-55 / 55-65
Rated Current from Grid (A)	16@220V 15.7@230V 15@240V	16@220V 15.7@230V 15@240V
Rated Current to Grid (A)	3.5@220V/3.5@230V/3.3@240V(default) 13.7@220V/13@230V/12.5@240V ^{*2}	3.5@220V/3.5@230V/3.3@240V(default) 13.7@220V/13@230V/12.5@240V ^{*2}
Max. Current from Grid (A)	16	16

technical parameter	GW3K-EMA-G10	GW3K-EMA-UK-G10
Max. Current to Grid (A)	3.5(default)/15.2*2	3.5(default)/15.2*2
THDi	3%	3%
Type of Voltage	a.c.	a.c.
AC Side (Back-up Port)		
Rated Apparent Power (kVA)	3	3
Max. Apparent Power (kVA)	off-grid: 3 on-grid: 3.6	off-grid: 3 on-grid: 3.6
Nominal Voltage (V)	220/230/240, L/N/PE	220/230/240, L/N/PE
Nominal Frequency (Hz)	50/60	50/60
Frequency Range (Hz)	45-55 / 55-65	45-55 / 55-65
Rated Current (A)	13.7@220V 13.1@230V 12.5@240V	13
Max. Current (A)	off-grid: 13.7 on-grid: 16	off-grid: 13 on-grid: 13
Total Voltage Distortion Rate (@linear load)	<3%	<3%
On/Off-grid Switching Time (ms)	10	10
Efficiency		

technical parameter	GW3K-EMA-G10	GW3K-EMA-UK-G10
Max. Efficiency	92.0%	92.0%
Max. Battery to AC Efficiency	92.0%	92.0%
MPPT Efficiency	99.80%	99.80%
Protection		
PV String Current Monitoring	standard-equipped	standard-equipped
PV Insulation Resistance Detection	standard-equipped	standard-equipped
Anti-islanding Protection	standard-equipped	standard-equipped
AC Overcurrent Protection	standard-equipped	standard-equipped
AC Short Circuit Protection	standard-equipped	standard-equipped
AC Overvoltage Protection	standard-equipped	standard-equipped
DC Surge Protection	Level 3	Level 3
AC Surge Protection	Level 2	Level 2
General Data		
Operating Temperature Range (°C)	-20-55	-20-55

technical parameter	GW3K-EMA-G10	GW3K-EMA-UK-G10
Operating Environment	Indoor/Outdoor	Indoor/Outdoor
Storage Temperature (°C)	-20~+35°C ≤ 12 months +35~+45°C < 6 months	-20~+35°C ≤ 12 months +35~+45°C < 6 months
Relative Humidity	0-100%	0-100%
Max. Operating Altitude (m)	3000	3000
Cooling Method	Natural cooling	Natural cooling
User Interface	LED, APP	LED, APP
Communication (BMS)	CAN	CAN
Communication	RS485, LAN, WiFi, Bluetooth	RS485, LAN, WiFi, Bluetooth
Communication Protocols	Modbus-RTU	Modbus-RTU
Weight (kg)	≤ 15	≤ 15
Dimensions (W×H×D mm)	480x170x290	480x170x290
Noise Emission (dB)	≤20	≤20
Topology	Isolated	Isolated
Power Self-consumption at Night (W)	<10	<10
Ingress Protection Rating	IP65	IP65

technical parameter	GW3K-EMA-G10	GW3K-EMA-UK-G10
Anti-corrosion Class	C4M	C4M
DC Connector	Jinko (6mm ²)	Stäubli MC4 (6mm ²)
AC Connector	Plug and play terminal	Plug and play terminal
Environmental Category	3K5	3K5
Pollution Degree	PD3 (External) PD2 (Internal)	PD3 (External) PD2 (Internal)
Overvoltage Category	DC II / AC III	DC II / AC III
Protective Class	I	I
Decisive Voltage Classification (DVC)	battery: B PV: B AC: C Com: A	battery: B PV: B AC: C Com: A
Mounting Method	Ground stacking	Ground stacking
Type of Electrical Supply System	TT, TN	TT, TN
Power Factor	Adjustable 0.8 leading ~ 0.8 lagging	Adjustable 0.8 leading ~ 0.8 lagging
Safe Service Life (years)	≤15	≤15
Certification		
Grid Standard	Refer to official website.	
Safety Regulation		
EMC		

*1: Please refer to the user manual to understand the MPPT voltage range under nominal power.

*2: Default 0.8kW, can be adjusted from 0.8kW to 3kW by a professional electrician.

9.2 Battery Technical Data

technical parameter	GW3.0-BAT-LVD-G10
Battery Type	LFP (LiFePO ₄)
Rated Capacity (Ah)	314
Rated Energy (kWh)	3
Usable Energy (kWh)*1	2.75
Nominal Voltage (V) (Battery)	9.6
Voltage Range (V) (Battery)	8.61-10.83
Operating Voltage range (V) (Single-phase System)	52-56
Max. Current from Grid (System) (A)	32
Max. Current to Grid (System) (A)	33
Max. Input Power (System) (kW) *2	1.7
Max. Output Power (System) (kW) *2	1.7
Charging Temperature Range (°C)	-20~+55 (with heating film)
Discharging Temperature Range (°C)	-20~+55
Relative Humidity	4-100%
Max. Operating Altitude (m)	3000

technical parameter	GW3.0-BAT-LVD-G10
Noise Level (dB)	≤20
Communication	CAN
Weight (kg)	≤29
Applicable Fire Extinguishing Agents	CO ₂ , H ₂ O
Key Materials	LiFePO ₄ , C, Cu, LiPF ₆ , Al, (C ₃ H ₆) _n
Ingress Protection Rating	IP65
Protective Class	II
Dimensions (W×H×D mm)	480×308.6×260
Storage Temperature (°C)	-20~+45
Maximum Storage Time	-20~+35°C ≤12 months +35~+45°C ≤6 months
Expandability	≤5P
Mounting Method	Ground Stacking
Cycle Life ^{*3}	≥10000
Country of Manufacture	China
Standards & Certifications	
Safety	IEC 60673, IEC62619/IEC63056 REGULATION (EU) 2023/1542 article 12 REGULATION (EU) 2023/1542 article 10
EMC	IEC 61000-6-1/-2/-3/-4(EN IEC 61000-6-1/-2/-3/-4), CISPR11
Transportation	UN38.3

*1: Test conditions are 100% DOD (battery voltage range 2.87~3.61V), the battery system is charged and discharged at 850W at 25±2°C at the beginning of life. The available energy is defined by its initial design value. Actual available energy may

vary due to charge/discharge rates, environmental conditions (such as temperature), transportation, and storage factors.

*2: Max. Input Power / Max. Output Power / Peak Output Power are related to temperature and SOC.

*3: Based on test data under specific laboratory conditions.

10 Appendix

10.1 Explanation of Terms

- **Overvoltage Category Explanation**

- **Overvoltage Category I:** Equipment connected to circuits with measures to limit transient overvoltages to a relatively low level.
- **Overvoltage Category II:** Energy-consuming equipment supplied by fixed distribution installations. This category includes appliances, portable tools, and other household and similar loads. If there are special requirements for the reliability and suitability of such equipment, Overvoltage Category III is adopted.
- **Overvoltage Category III:** Equipment in fixed distribution installations, where the reliability and suitability of the equipment must meet special requirements. This includes switching devices in fixed distribution installations and industrial equipment permanently connected to fixed distribution installations.
- **Overvoltage Category IV:** Equipment used in the power supply of distribution installations, including measuring instruments and preceding overcurrent protection devices, etc.

- **Damp Location Category Explanation**

Environmental Parameters	Level		
	3K3	4K2	4K4H
Temperature Range	0~+40°C	-33~+40°C	-33~+40°C
Humidity Range	5% to 85%	15% to 100%	4% to 100%

- **Environmental Category Explanation:**

- **Outdoor Type Inverter:** Ambient air temperature range is -25 to +60°C, suitable for pollution degree 3 environment;
- **Indoor Type II Inverter:** Ambient air temperature range is -25 to +40°C, suitable for pollution degree 3 environment;
- **Indoor Type I Inverter:** Ambient air temperature range is 0 to +40°C, suitable for pollution degree 2 environment;

- **Pollution Degree Category Explanation**

- **Pollution Degree 1:** No pollution or only dry non-conductive pollution;
- **Pollution Degree 2:** Generally, only non-conductive pollution, but occasional

temporary conductive pollution due to condensation must be considered;

- **Pollution Degree 3:** There is conductive pollution, or non-conductive pollution becomes conductive due to condensation;
- **Pollution Degree 4:** Persistent conductive pollution, such as pollution caused by conductive dust or rain/snow.

10.2 Meaning of Battery SN Code

*****2388*****
└───┘
11-14位

The 11th to 14th digits of the product SN code represent the production time code.
The production date in the above image is 2023-08-08

- The 11th and 12th digits are the last two digits of the production year, e.g., the year 2023 is represented as 23;
- The 13th digit is the production month, e.g., 8th month (August) is represented as 8;

Details are as follows:

Production Month	Jan-Sep	Oct	Nov	Dec
Month Code	1~9	A	B	C

- The 14th digit is the production day, e.g., the 8th day is represented as 8;
Numbers are preferred for representation, e.g., 1~9 represent the 1~9 th days, A represents the 10 th day, and so on. Among them, the letters I and O are not used to avoid confusion. Details are as follows:

Production Date	1Day	2Day	3Day	4Day	5Day	6Day	7Day	8Day	9Day
						y	y	y	y

Code	1	2	3	4	5	6	7	8	9
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Production Date	10th	11th	12th	13th	14th	15th	16t h	17t h	18t h	19t h	20t h
Code	A	B	C	D	E	F	G	H	J	K	L

Production Date	21st	22nd	23rd	24th	25th	26t h	27t h	28t h	29t h	30t h	31st
Code	M	N	P	Q	R	S	T	U	V	W	X

11 Contact Information

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