



- ✓ *SN15HT*
- ✓ *SN12HT*
- ✓ *SN10HT*
- ✓ *SN10HT-X*
- ✓ *SN8.0HT*
- ✓ *SN6.0HT*
- ✓ *SN5.0HT*

User Manual

SN5.0-15HT

Sineng Electric Co., Ltd.

Version: V1.0

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Remark

For product upgrading or other reasons, the manual content may be updated from time to time. The manual content cannot replace the safety precautions on product labels unless otherwise stated. All descriptions in the manual are for guidance only.

Introduction

This manual mainly provides information on the inverter product, installation wiring, configuration testing, troubleshooting, and maintenance. Please carefully read this manual before installation and use it to obtain the product's information on its safety, function and performance. This manual will be revised due to updating of the products. Please obtain the latest product information on the manufacturer's website.

Applicable products

This manual is applicable to the following PV inverters made by Sineng Electric Co., Ltd.:

Model	Rated power
SN15HT	15kW
SN12HT	12kW
SN10HT	10kW
SN10HT-X	10kW
SN8.0HT	8kW
SN6.0HT	6kW
SN5.0HT	5kW

Applicable users

This manual is intended for use by professionals who are familiar with local regulations and electrical system operation, and properly trained to have a full picture of this product.

Symbol definition

For correct use, this manual adopts the following symbols highlighting related important information, which shall be carefully read and understood.

Symbol	Description
	This symbol indicates a warning sign that needs to be noticed.
	This symbol indicates that there is a danger of electric shock, which may cause personal injury.
	This symbol indicates that special attention must be paid due to high hazard risks.

Revision history

The latest version in the change record contains all changes made in previous versions.

V1.0 2024-10-14

- First Edition.

Safety precaution

Ensure to carefully read all safety precautions in this manual when operating.

Remark: The inverter has been engineered and tested in accordance with the appropriate safety regulations. Ensure to observe related safety requirements before operating this electrical device, which otherwise may lead to serious injury or property loss.

General safety

Remark:

For product upgrading or other reasons, the manual may be updated in the future. The manual content cannot replace the safety precautions on product labels unless otherwise stated. All descriptions in the manual are for guidance only.

- Carefully read this manual before installation to have a full picture of the product and related precautions.
- All operations must be conducted by professional and qualified electrical staff, who are familiar with local standards and safety regulations.
- Use insulation tools for work with the inverter, plus the appropriate PPEs in place to ensure work safety. Before working with electronic devices, wear static gloves, wrist straps, anti-static clothing, etc. to protect the inverter from electrostatic impact.

Property loss or personal injury, arising from failure to carry out inverter installation, operation, and setup in the way mentioned in this manual, will not be covered by the warranty. For more details on product warranty, please go to www.si-neng.com.

PV string safety



- *Use the DC wiring terminal delivered with the case to connect the DC cables of the inverter. Using other DC wiring terminals may lead to serious consequences, and the resulting property loss is not covered by the warranty.*



Make sure that the module frame and support system are properly grounded.

- *Ensure the connected DC cables are properly secured in place.*
- *Check the positive and negative terminals of the DC cable with multimeter and ensure that they are correctly wired, with the voltage reading within the allowable range.*

- *It is prohibited to connect a PV string to more than one inverter, which may otherwise lead to inverter breakdown.*
- *The PV module selected to match the inverter must conform to the requirements of Class A, IEC61730.*

Inverter safety



Warning

Make sure the grid-connected access point meets the requirements of the voltage and frequency for the grid connection of the inverter.

- *It is recommended to add protective devices such as circuit breakers or fuses on the AC side of the inverter. The protective device shall be specified at 1.25 times the maximum AC output current of the inverter.*
- *The protective grounding wire of the inverter must be connected firmly. For multiple inverters, ensure that all inverters share the same protective grounding points.*
- *If the inverter trips for less than 5 times within 24h, the alarm can be automatically cleared. After the 5th arc fault, the inverter shuts down for protection, and the inverter can work normally only after the fault is cleared.*
- *The BACK-UP function is not recommended if no battery is configured in the PV system. Otherwise, the resulting system operation risks will not be covered by the warranty.*



Danger

- *After installation, the labels and warning signs on the case must be clearly visible. And it is prohibited to cover, alter or damage them.*
- *The inverter case shall have the symbols below:*

	HV hazard. There is a high voltage when the inverter is running. Make sure that the inverter gets powered off before operating.		Delayed discharge. When the device is powered off, please wait for 10 minutes until the device is fully discharged.
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	Please read the product manual carefully before operating the device.		There is a potential hazard after the equipment is in operation. Ensure proper protection when operating.
	High temperature on the surface of the inverter. Do not touch the device when it is running, otherwise it may cause burns.		Protective grounding wire connection point.
	CE certificate.		The device cannot be treated as household waste. Please dispose of it in accordance with local laws and regulations, or send it back to the manufacturer.

Battery safety



Warning

- The battery used with the inverter must be approved by the inverter manufacturer. The list of approved batteries can be obtained from the official website.
- Before installation, please carefully read the battery's user manual to understand the product and precautions, and operate in strict accordance with the requirements of the battery user manual.
- If the battery has been fully discharged, recharge the battery in accordance with its user manual.
- The battery current may be affected by some factors, such as temperature, humidity, weather conditions, etc., which may cause the battery current to be limited and affect the load capacity.
- If the battery fails to work, please contact the after-sale service center as quickly as possible. Otherwise, the battery may be permanently damaged.
- Check the positive and negative terminals of the DC cable with a multimeter and ensure that they are correctly wired, with the voltage reading within the allowable range.
- It is prohibited to connect a battery pack to multiple inverters, otherwise the inverter may be damaged.

Personnel Requirements

Remark:

- The personnel responsible for the installation and maintenance of the device must get strict training to understand all safety precautions and master correct operation methods.
- Only qualified professionals or trained personnel are allowed to install, operate, maintain, and replace equipment or components.

EU Declaration of Conformity

Devices with wireless communication functions that can be sold on the European market shall meet 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)

Devices without wireless communication functions that can be sold in the European market shall meet the following directives:

- Electromagnetic Compatibility Directive 2014/30/EU (EMC)
- Electrical Apparatus Low Voltage Directive 2014/35/EU (LVD)
- 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)

For more details on the EU declaration of conformity, please go to the official website: www.sineng.com.

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Overview of Manual

Before unpacking and installing the product, please read this manual thoroughly, which contains the following chapters:

Symbol Conventions: This chapter summarizes various symbols that appear in the manual and explains the symbols for better reading.

Safety Precautions: This chapter describes precautions that require attention before operation.

Chapter 1 Product Overview: This chapter briefly introduces the PV inverter and PV power generation system.

Chapter 2 Inverter Installation: This chapter introduces the storage conditions, handling instructions, and installation instructions required for the reliable running of the inverter.

Chapter 3 Electrical connections: This chapter describes the external power cable and communication cable used to connect the inverter to external equipment.

Chapter 4 Features and settings: This chapter introduces the human-machine interface, power-on/off operation, and disconnection operations.

Chapter 5 Fault treatment: This chapter provides a list of events and alarms of the inverter.

Chapter 6 Technical parameter: This chapter describes the product specifications of SN series PV inverters.

Chapter 7 Product Maintenance: This chapter introduces inverter maintenance, including periodic maintenance and daily maintenance.

After-sales Service Information: This chapter provides the contact information for the after-sales service of the product.

Chapter 1 Product Profile

1.1 Product overview

1.1.1 Function overview

The inverter may control and optimize energy flow in the PV system through an integrated energy management system. The electricity generated in the PV system can be used by the load, stored in the battery, and transferred to the power grid.

1.1.2 Model description

The following types of inverters are applicable:

SN15HT
SN12HT
SN10HT
SN10HT-X*
SN8.0HT
SN6.0HT
SN5.0HT

Note*: The SN10HT-X has three PV input channels, differing from the SN10HT's two channels.

1.1.3 Model implication

SN 15 HT
1 2 3

S/N	Implication	Description
1	Brand code	SN: Sineng Electric
2	Rated output power	15: Rated output power at 15kW
3	System classification	HT: Hybrid system (Three phase)

Table 1-1 Model implication

1.1.4 Applicable grid type

The power grids supported by SN15HT/SN12HT/SN10HT/SN10HT-X/SN8.0HT/SN6.0HT/SN5.0HT are TN-S, TN-C, TN-C-S, TT and IT, as shown in Figure 1-1.

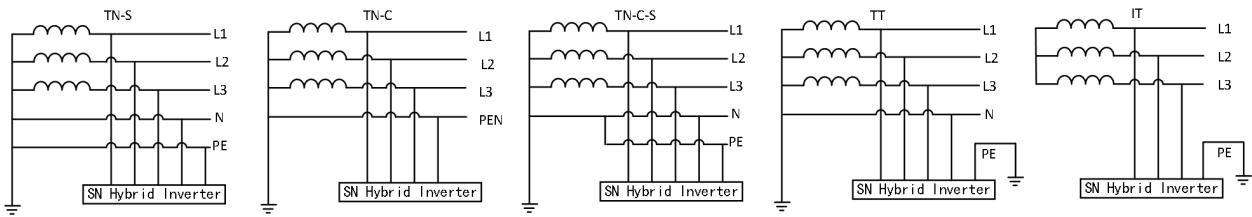


Figure 1-1 Power Grid supported by SN Series Hybrid Inverter

1.2 Scenario



Warning

- *PV systems are not suitable for connection to devices that rely on a stable power supply, such as life-sustaining medical equipment. Please ensure that there is no risk of personal injury despite the system being shut down.*
- *Please try to avoid using loads with high starting current in the PV systems, such as high-power water pumps, as this may result in off-grid output failure due to excessive instantaneous power.*
- *No BACK-UP function is not recommended if no battery is used in the PV system. Otherwise, the resulting system operation risks are not covered by the warranty.*
- *The battery current may be limited by some factors, such as temperature, humidity, weather conditions, etc., thus affecting the load capacity.*
- *If rapid shutdown module is in the PV system, please ensure that the rapid shutdown module used in the PV string has the same model as the inverter's built-in transmitter. If not, the run-off function may fail.*
- *When the inverter trips on the overload protection at a time, the inverter can automatically restart. If it occurs repeatedly, it may take more time to restart. The inverter may be shortly restarted by the App whenever required.*
- *In case of excessive load capacity beyond the rated power of the inverter during grid outage, the inverter's off-grid function will automatically turn off. To restart, turn off the high-power load to ensure that the load power is less than the rated power of the inverter.*
- *The inverter at the off-grid mode can be used for household loads, such as:*

Inductive load \ Capacitive load: total power $\leq 0.5 \times$ rated output power of the inverter.

1.2.1 System scheme

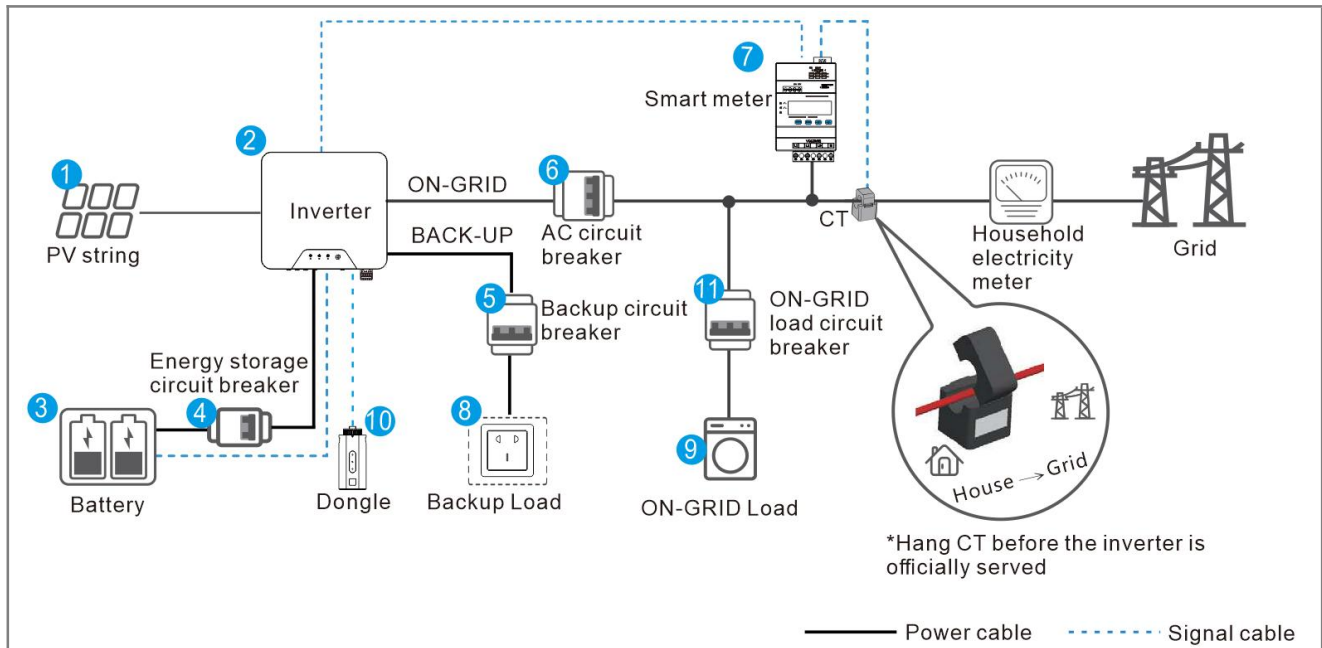


Figure 1-2 System scheme

S/N	Parts	Description
1	PV string	PV string consists of PV modules
2	Inverter	Applicable inverters: SN15HT/SN12HT/SN10HT/SN10HT-X/SN8.0HT/SN6.0HT/SN5.0HT series.
3	Battery	Select the appropriate models based on the matching table of the inverter and battery. The approved list of batteries may be obtained on the website or via the APP.
4	Energy storage circuit breaker	Recommended capacity: rated current $\geq$ 40A, rated voltage $>$ 600V.
5	Backup circuit breaker	To be specified in conjunction with the actual load.
6	AC circuit breaker	Recommended specification: SN15HT/SN12HT: rated current $\geq$ 50A SN10HT/ SN10HT-X/SN8.0HT: rated current $\geq$ 32A SN6.0HT/SN5.0HT: rated current $\geq$ 25A
7	Smart meter	To be purchased from the inverter manufacturer, recommended model: AC smart meter-DTSU666.
8	Backup load	Support connection of standby loads, such as other important loads.
9	ON-GRID load	Household appliances
10	Dongle	WLAN/4G communication stick
11	ON-GRID load circuit breaker	To be specified in conjunction with the actual load.

Table 1-2 System scheme

1.3 Operating mode

1.3.1 System Operating mode

1.3.1.1 Self-consumption mode

Overview:

The Self-consumption function can adjust the power of PV, battery, and power grid based on the meter power. Given the enabled power meter and normal communication, energy flow will be adjusted based on the power of the meter. The inverter, when the grid is cut off, will automatically switch to the off-grid mode.

The inverter defaults to self-use mode.

The electricity generated by PVs, if sufficient, is supplied to the load in priority while the surplus is used to charge the battery. And any remaining electricity, if any, will be sent to the grid.

When the electricity generated by PVs is insufficient to supply the load, but the PV and battery can support the loads, the PV and battery will supply the loads.

When the PV and battery are not sufficient to supply the loads, PV and battery together with the grid will supply the loads.

Charging plan under self-use mode

To prevent excessive energy use and prevent battery abnormalities, as well as retain more energy for emergencies, a forced-charge option is designed. There are two time periods. If the winter option is selected, the inverter will forced-charge the battery according to the set charging power within the set time until the set SOC value is reached.

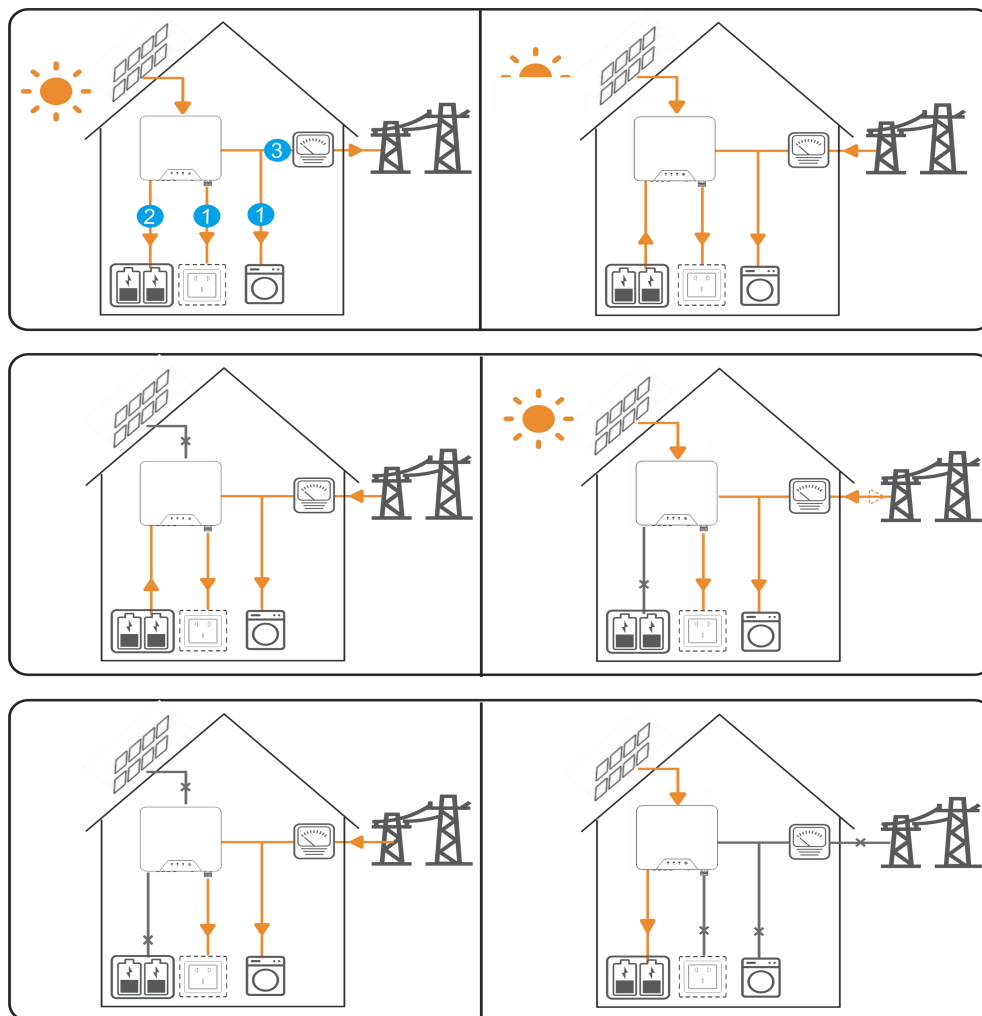


Figure 1-3 Self-use mode

1.3.1.2 Timing charging and discharging mode

It is configured to sell batteries at peak electricity prices and buy batteries at off-peak electricity prices, which can improve economic benefits. The inverter may switch to the off-grid mode when the grid is under power failure.

We can set certain days of the week or certain times of the day to charge or discharge the battery.

When the current SOC is greater than the minimum SOC for grid connection, the battery will be charged and discharged as usual.

Discharging will stop when the current SOC is less than or equal to the minimum SOC for grid connection. Furthermore, forced-charging is also controlled by the battery command (forced-charging is prioritized when required by the battery).

When the battery is under abnormal condition, charging or discharging will be stopped. The inverter, when the grid is cut off, will automatically switch to the off-grid mode.

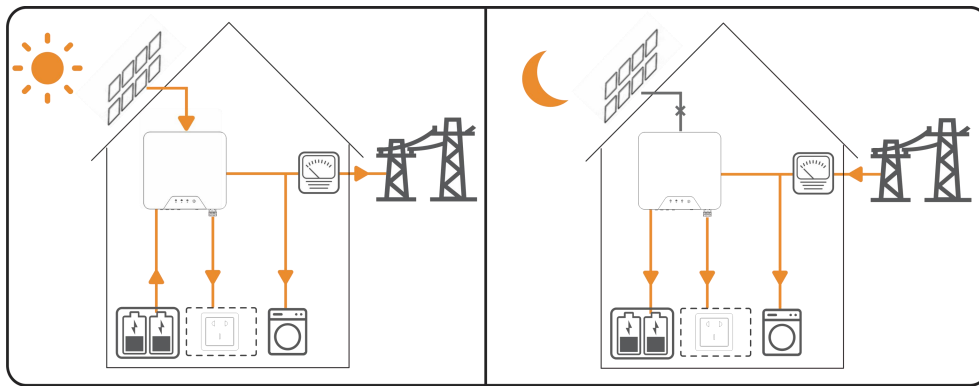


Figure 1-4 Timed charging and discharging mode

1.3.1.3 Standby mode

The battery can only be discharged when the main power is abnormal and can be used as an emergency power source.

The inverter, when the power grid is cut off, may automatically switch to the off-grid mode. Maintain the battery's current SOC above the minimum grid-connected SOC.

When the current SOC is less than the minimum grid-connected SOC, it will be charged to the hysteresis point of the minimum grid-connected (minimum SOC+2%).

Given the current SOC at 95% - 100%, in order to reduce the waste of electricity caused by taking power from the power grid, priority will be given to ensuring the EPS power supply, and excess energy will be fed to charge to the battery.

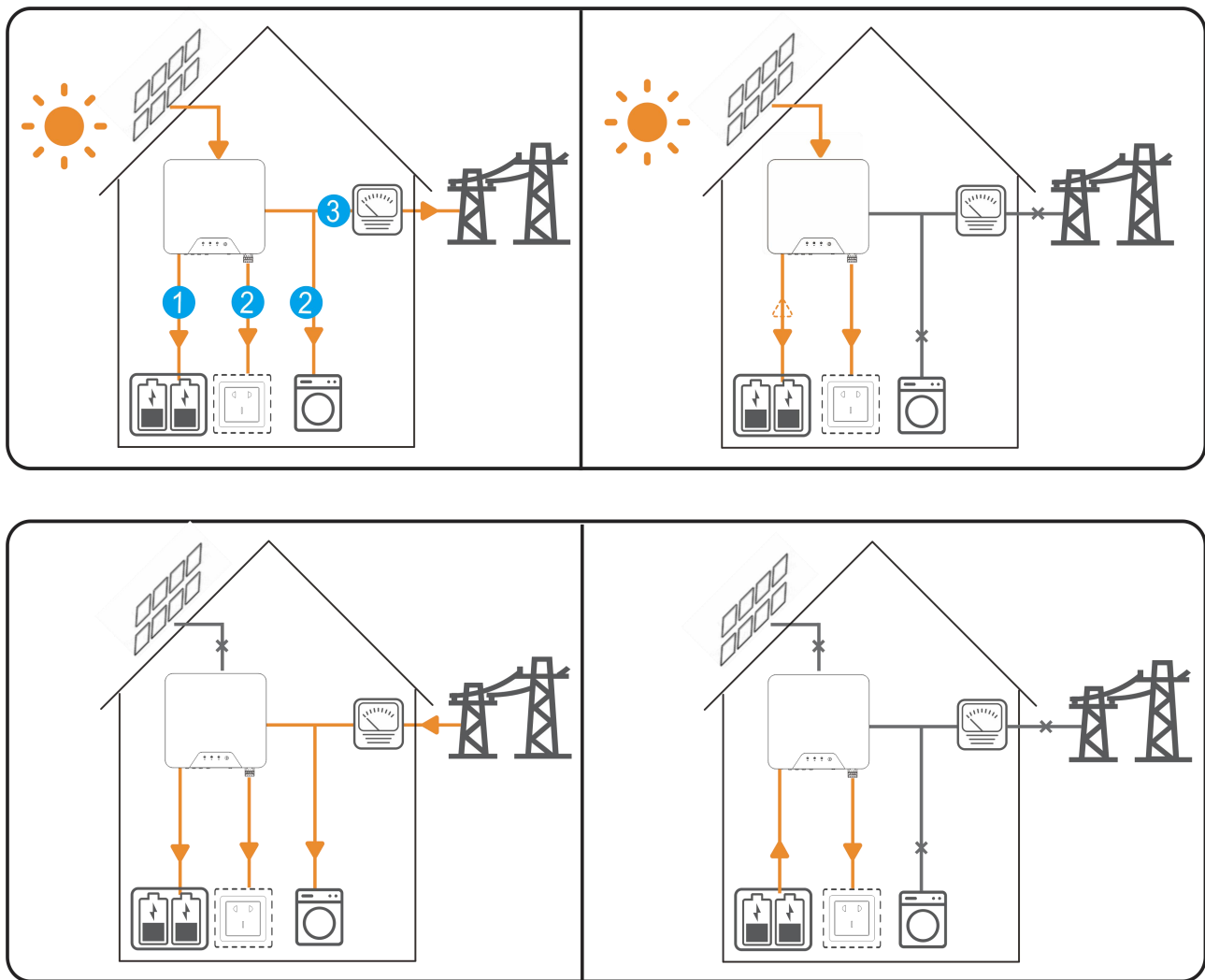


Figure 1-5 Backup mode

1.3.1.4 Forced off-grid mode

A pure off-grid system consisting of PV, batteries, and loads is suitable for areas without grids.

In this mode, the inverter can be forced to disconnect from the grid and runs in the off-grid mode. Under such circumstances, the inverter can neither send power to the grid or take power from the grid.

Battery charging and discharging are not controlled by this in off-grid mode (including no mains supply).

The Compatibility for Backup under Off-grid Scenario

The information below is about the compatibility for backup of SN15HT/ SN12HT/ SN10HT-X /SN10HT / SN8.0HT /SN6.0HT /SN5.0HT inverter under off-grid scenario. Please refer to this information before you use the back-up model of the four inverters under off-grid situation. When the PV voltage exceeding 900V, the back-up side will operate at the reduced rate.

Main electrical panel

The data of the compatibility for backup of SN15HT/ SN12HT/ SN10HT/ SN10HT-X/ SN8.0HT/ SN6.0HT/ SN5.0HT are based on the test with batteries (SOC、 Temperature). For the actual application, please refer to the maximum output capacity of the battery.

1.3.2 Inverter Run Mode

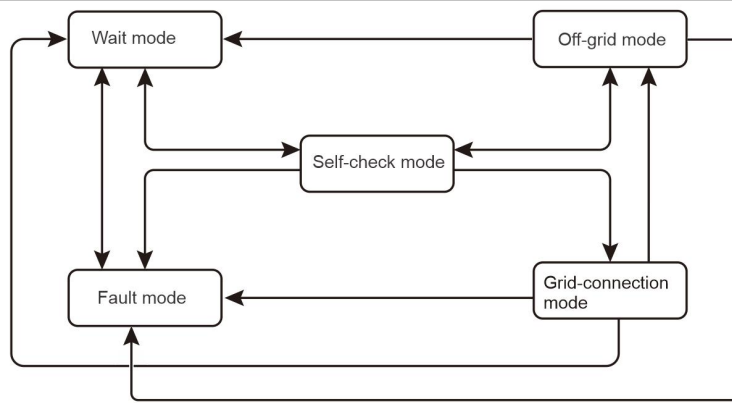


Figure 1-6 Inverter run mode

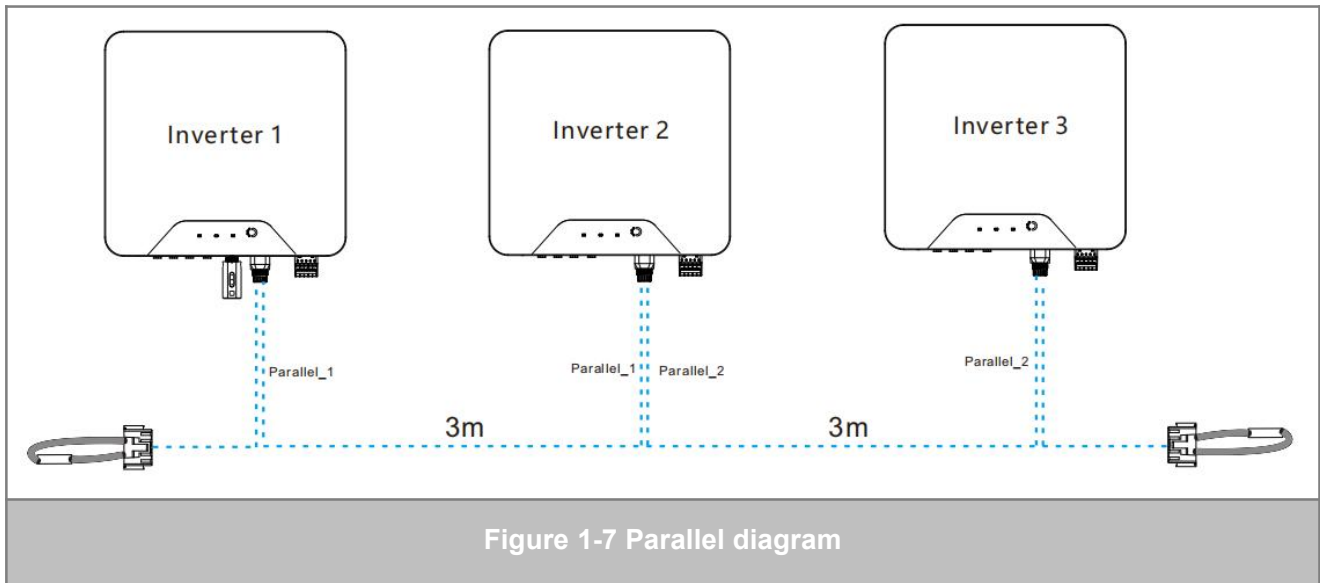
S/N	Parts	Description
1	Wait mode	Wait stage when the machine is powered on - Enter the self-check mode when conditions are met. - In case of fault, the inverter is switched to the fault mode.
2	Self-check mode	The inverter, before startup, shall continuously perform self-check, initialization, etc. - When conditions are met, enter the grid-connection mode so that the inverter starts grid-connected operation. - If no grid is detected, enter the off-grid mode so that the inverter starts off-grid operation. Given the inverter is lack of off-grid function, enter the wait mode. - If self-check fails, enter the fault mode.
3	Grid-connection mode	The inverter performs the grid-connection operation as usual. - If detection shows grid absence, enter the off-grid working mode. - If fault is detected, enter the fault mode. - If it is detected that the grid condition does not meet the grid-connection requirements, and no off-grid output function is activated, enter the wait mode.
4	Off-grid mode	In case of power failure, the inverter is switched to the off-grid mode from the working mode so as to continuously supply power to the loads. - If fault is detected, enter the fault mode. - If it is detected that the grid condition does not meet the grid-connection requirements, and no off-grid output function is activated, enter the wait mode. - If it is detected that the grid conditions meet the grid-connection requirements, and off-grid output function is activated, enter the self-check mode.
5	Fault mode	If fault is detected, the inverter enters the fault mode, and enters the wait mode after fault clearance.

Table 1-3 Inverter run mode

Note: When the inverter is powered on for the first time, there must be a normal AC voltage on the grid side; otherwise, the inverter's relay will not be able to perform self-inspection, resulting in the inverter's inability to start up properly. If you want the inverter to operate, you can choose to enter off-grid mode, which allows the inverter to function independently of the grid. After the inverter has completed its initial power-up self-inspection, you can proceed with mode switching as indicated in the above diagram.

1.3.3 Parallel Mode

The parallel mode can ensure the continuous power supply of the system when a single machine fails or needs maintenance, and can centrally manage and monitor multiple inverters, which helps to discover and solve problems in time, and improve the maintenance efficiency and operation effect of the system. The communication module is used to manage the inverter for expansion, allocate the battery power reasonably, and maintain the stable operation of the energy storage system after expansion, avoiding the phenomenon of high-frequency and power frequency circulation, and ensuring the continuous and reliable operation of the user's load terminal.



Note:

Before operation, recommend that the inverter meets the following four conditions,

1. The software version of all inverters is the same;
2. The power range of all inverter models is the same;
3. The parameters of batteries connected to all inverters are the same, including brand, model, capacity, BMS;
4. The machine needs to purchase the corresponding machine attachment package;

Otherwise, this function cannot be used.

1.4 Function characteristics

Power derating

For safe operation, the inverter will automatically reduce the output power under the non-optimum condition. The following factors may cause power derating, please try to avoid them during use.

- Unfavorable environmental condition, such as direct exposure to sunshine, high temperature, etc.
- Inverter's output power percentage has been set.
- Load shedding due to over frequency.
- The input voltage is too high or too low.
- The input current is high.

AFCI (By default, this function is closed)

Causes of electric arc:

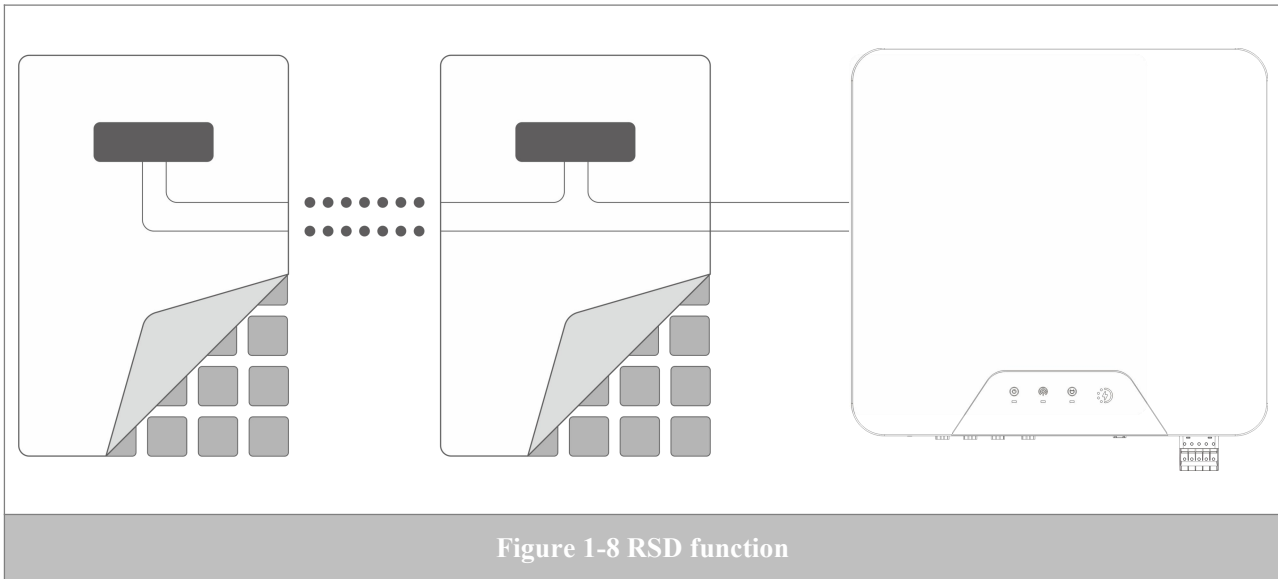
- Inadequate connector connection in the PV system or battery system.
- Cable connection is incorrect or damaged.
- Connector, cable are aging.

Electric arc detection method

- Inverter integrated AFCI function.
- When the inverter detects an electric arc, an indication of the time and phenomenon of the fault can be displayed through the App.
- If the inverter trips less than 5 times within 24h, the alarm can be automatically cleared. The inverter will be shut down for protection on the 5th arc fault trip. The inverter may not resume operation until the fault is cleared.

RSD (Optional)

The inverter is equipped with a built-in signal transmitter that can communicate with an external unit module-level disconnecter. In case of the emergency, the transmitter can be disabled by enabling the external emergency switch to shut down the module.



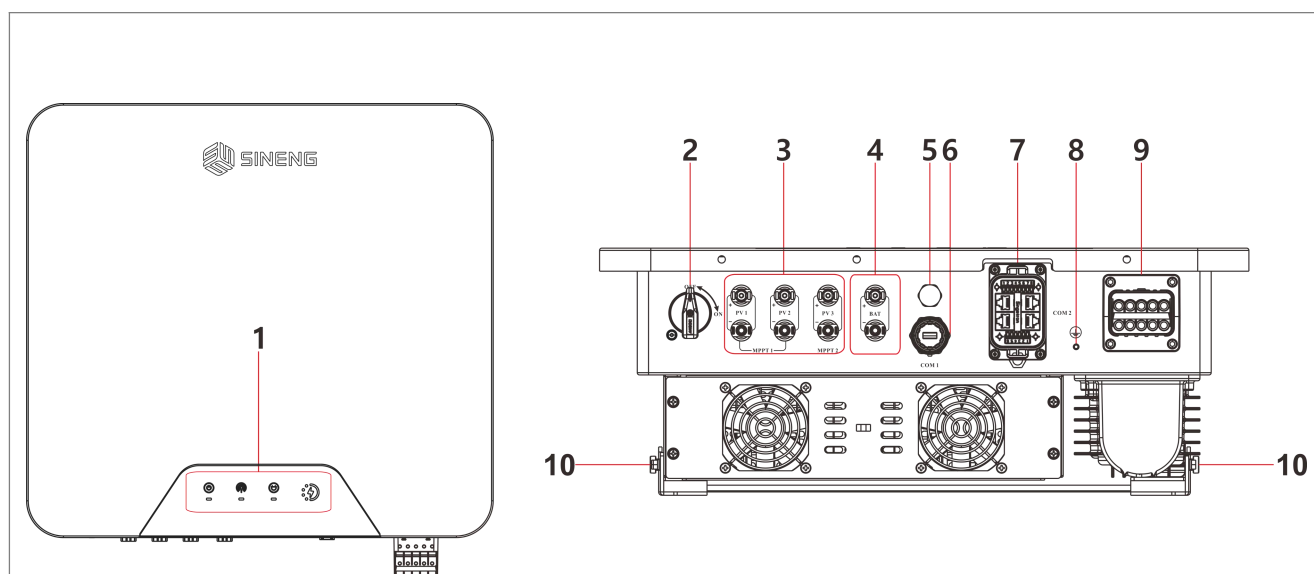
Earth Fault Alarm

The inverter is equipped with the reserved port used for earth fault alarm.

In case of earth fault, the LED fault light of the inverter will be ON.

1.5 Inverter Appearance

1.5.1 Introduction of Appearance



Taking the SN15HT as an example.

Figure 1-9 Appearance and dimensions

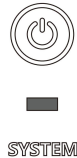
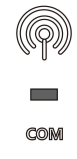
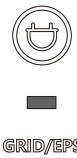
* DC switch is used optionally. Please refer to the actual product version received.

S/N	Content	Description
1	Indicator light	Indicate the inverter's operation state.
2	DC switch*	Control DC input On /Off
3	PV input port	To connect PV module DC input cable
4	Energy storage DC input port (BAT)	To connect battery DC input cable
5	SRV	Safety relief valve
6	Communication module interface (WIFI/4G/Bluetooth)	To connect external APP and cloud platform
7	Communication port	To connect external communication and monitoring
8	Protective ground terminal	Connect protective ground wire
9	Grid-connected/ Off-grid terminal	To connect AC grid cables/ To connect the AC critical load cable
10	Hangers	To hang up the inverter

Table 1-4 appearance of the inverter

* DC switch ratings: U_i : 1200V; U_{imp} : 8kV; -40°C to $+85^{\circ}\text{C}$; 4 polarity; DC-PV2, U_e/I_e : 1200V/25A; 1000V/32A; $I_{(make)}/I_{(break)}$: $4xI_e$; I_{cw} : 1.5KA, 1s; I_{cm} : 2.0kA; Suitability for isolation.

1.5.2 Description of Panel Indicators

Category	Symbol	Status	Definition
Status light		Red light - On	Fault, shutdown, or ARM-to-DSP communication fault
		Yellow light - On	Alarm, no shutdown
		Blue light - On	Normal operation
		Blue light - flash	Wait Status
Communication light		Blue light - flash	Data interaction with RS485 or USB port
		Blue light - Off	No data interaction with RS485 or USB port
EPS light		Blue light - On	Grid connection, Bypass relay closes
		Blue light - flash	Off-grid mode, EPS working
		Blue light - Off	EPS not working
Battery light - charging/discharging		Blue light 4 - flash	Charging SOC>75%
		Blue light 4 - On	Discharge/Idle SOC >75%
		Blue light 3 - flash	Charging SOC>50%
		Blue light 3 - On	Discharge/Idle SOC >50%
		Blue light 2 - flash	Charging SOC>25%
		Blue light 2 - On	Discharge/Idle SOC >25%
		Blue light 1 - flash	Charging SOC>10%
		Blue light 1 - On	Discharge/Idle SOC >10%
		Blue light - all off	SOC<10% or communication failure
Table 1-5 Description of indicators			

Remarks:

1. When upgrading the program version, the status blue light flashes rapidly.
2. The battery light indicators from bottom to top, blue light indicators 1--4 (SOC 25%-100%).

The nameplate is for reference only, please refer to the actual product.



Figure1-10 Nameplate and Label

Table 1-6 Description of nameplate

Icon	Item	Description
	Danger warning	Inverters are power electronic products with potential risks, especially after power-on, therefore, they must be operated by professionals under safety protection.
	Warning mark	The inverters have high voltage during operation. All operations on the inverter must be performed by well-trained professional electrical technicians.
	Anti-scald warning	When the inverter is running, the surface (especially the radiator) is under high temperature, please do not touch it directly to avoid burns.
	Delayed discharge mark	The inverter can discharge to a safe voltage 10 minutes after it is powered off, only then can the professionals operate it.
	User manual mark	Professionals should refer to the user manual when installing or maintaining the inverter.
	EU WEEE mark	If the user intends to discard this product, it must be sent to an appropriate place for recovery and recycling, which cannot be disposed of as domestic waste.
	CE mark	This product complies with CE certification.
	TÜV mark	This product complies with TÜV certification.
	RCM mark	This product complies with RCM certification.
	DRM mark	This product complies with DRM certification.

Table 1-7 Description of marks

Chapter 2 Inverter installation

This chapter introduces the on-site environmental conditions required for storage and reliable running of the inverters, installation steps, and other related instructions.

2.1 Storage Before Installation



Warning

- *The inverters must be stored indoors, and the package of the inverters must be intact. It is strictly prohibited to store the inverters without packaging. Otherwise, Sineng shall not assume any liability for the damage to the inverters, the shortening in service life or other losses caused by such storage conditions.*
 - *No more than 7 inverters should be stacked together! It is strictly prohibited to store the inverter horizontally or upside down!*
 - *The inverter should be stored in a temperature range of -40~70°C, with the relative humidity of 0~100%(non-condensation).*
 - *Inverters that have been stored for more than one year need to be inspected and tested by professionals before being put into use.*
-

2.2 Inspection of inverter before installation

2.2.1 Check the outer packaging

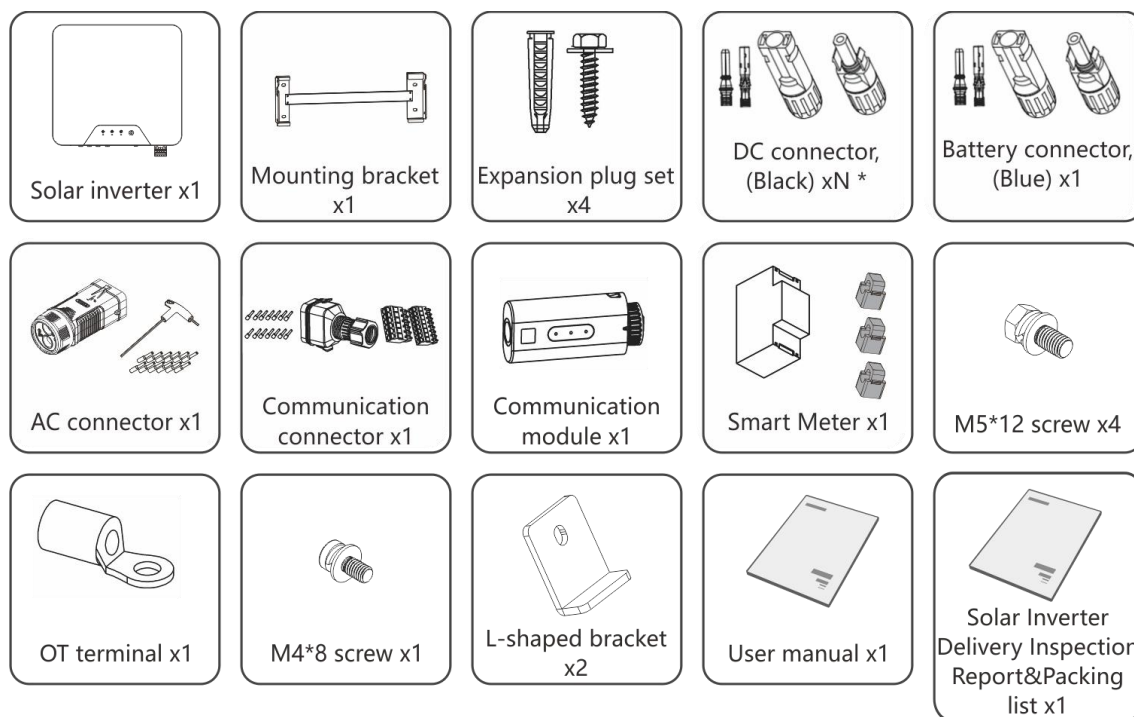
Before unpacking the inverter, check the outer packaging for visible damage, such as holes, cracks, or other signs of possible internal damage, and check the inverter model. If there is any deformation of the packaging or the inverter model does not match, please do not disassemble it and contact your dealer as soon as possible

2.2.2 Check the deliverable

IMPORTANT: Once the equipment arrives, keep the equipment balance when unpacking and unpack it carefully to avoid scratching.

After unpacking the inverter, check that the items are intact and free of any visible external damage. If there are any items missing or damaged, please contact your dealer.

The delivered items with the box and their quantity are as follows:



* The number of the DC connectors of SN10HT-X/SN12HT/SN15HT is 3.

* The number of the DC connectors of SN5HT/SN6HT/SN8HT/SN10HT is 2.

Figure 2-1 Items list

2.3 Requirements for inverter installation

2.3.1 Requirements for installation tool

For installation, the following installation tools are recommended. Other auxiliary tools can be used on site if necessary.

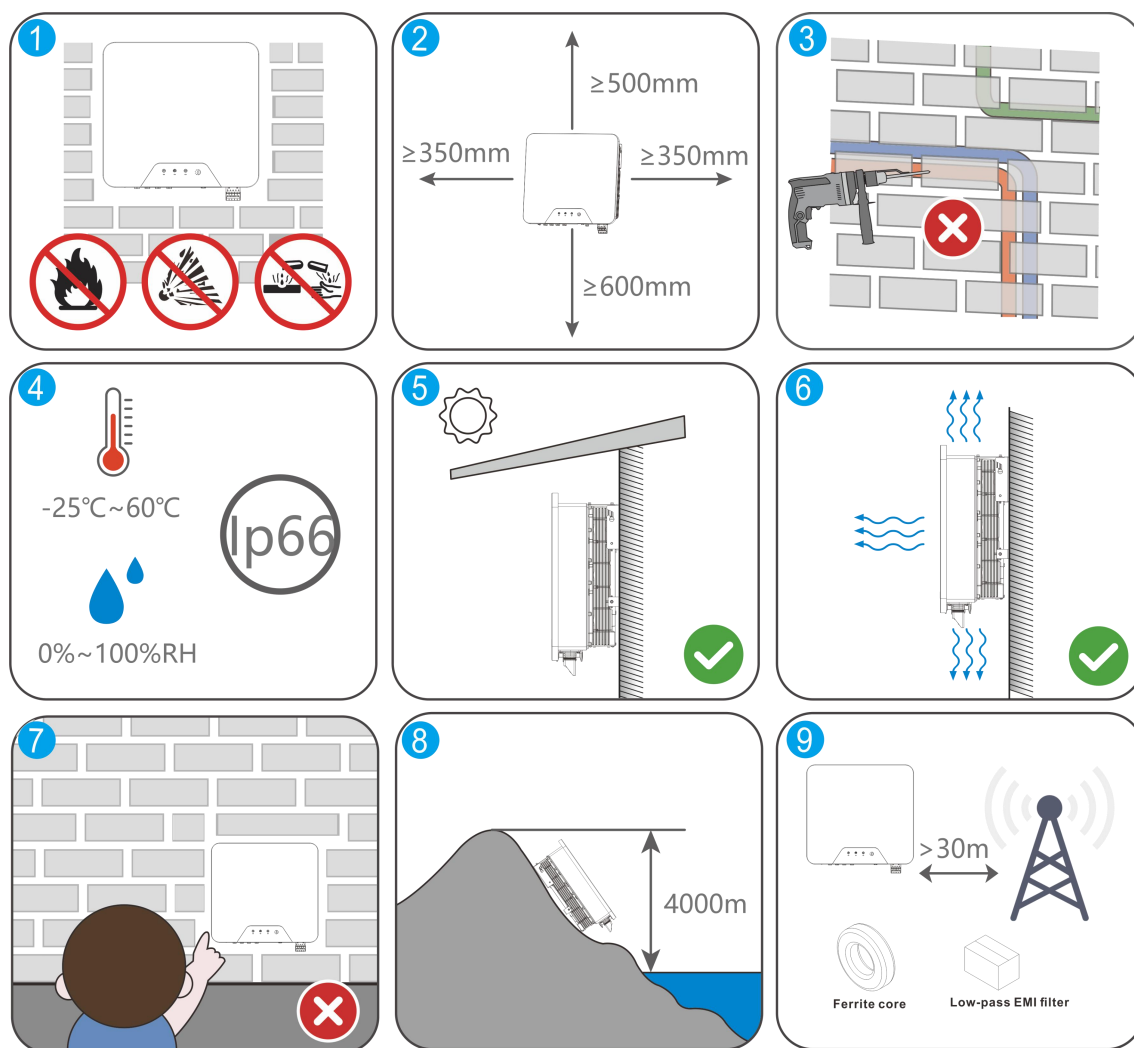


2.3.2 Requirements for installation environment

1. The equipment cannot be installed in flammable, explosive, corrosive or other alike environments.
2. The installation height of the equipment should be convenient for operation and maintenance. Ensure that the indicators and all labels of the equipment are easy to check, and the terminal blocks are easy to operate.
3. Please avoid the water pipes and cables in the wall to avoid danger when drilling holes for installation.
4. The equipment protection level meets the requirements for indoor and outdoor installation, and the temperature and humidity of the installation environment must be within the appropriate range.
5. The inverter needs to be installed away from sunshine, rain, snow, and other alike environments. It is recommended to install it in a sheltered location. If necessary, a sunshade can be built.

6. The installation space must meet the requirements for ventilation, heat dissipation and operation.
7. The installed equipment should be out of reach for children, and should not be in places that are easy to touch. The surface of the equipment may be hot when it is in operation, take caution to avoid burns.
8. The inverter installation altitude should be less than 4000m (the maximum working altitude).
9. Keep away from strong magnetic field to avoid electromagnetic interference. If there are radio stations or wireless communication equipment below 30MHz nearby, please install the equipment according to the following requirements:
Add a ferrite core with multi-turn windings at the DC input line or AC output line of the inverter, or add a low-pass EMI filter.

The distance between the inverter and the wireless electromagnetic interference equipment exceeds 30m.



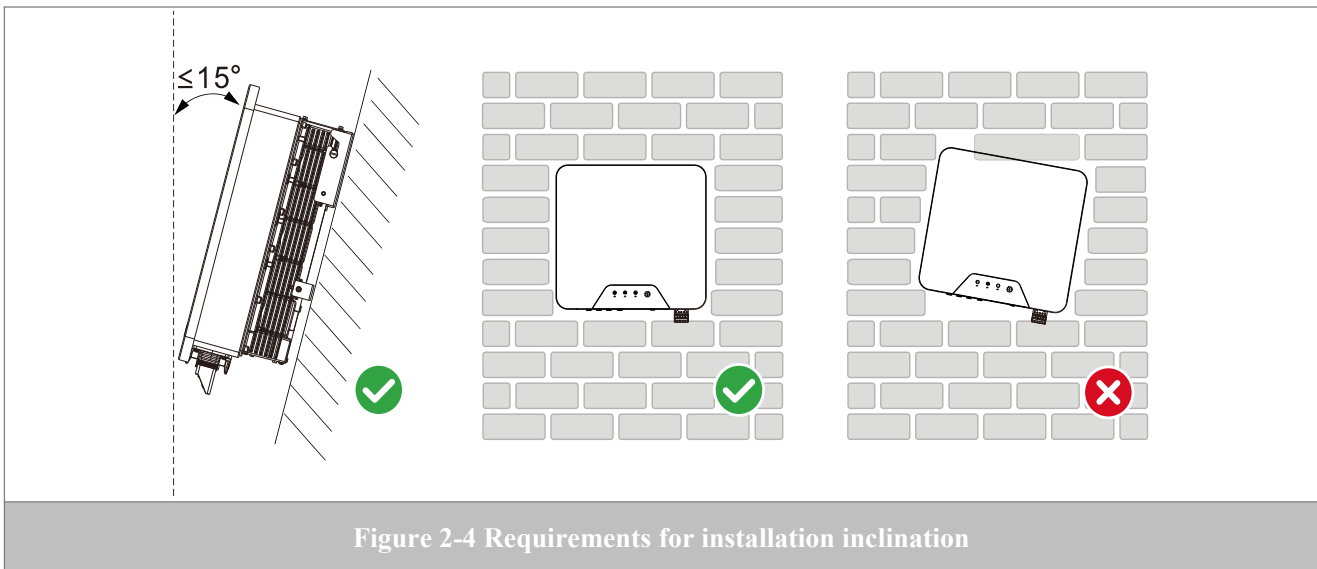
2.3.3 Requirements for installation carrier

- The installation carrier must be fire-resistant.
- Please ensure that the installation surface is firm, and the carrier meets the load-bearing requirements of the equipment.
- When the equipment is running, it will vibrate. Please do not install it on a carrier with poor sound insulation, to ensure that the noise generated by the equipment will not trouble other residents in the living area.

2.3.4 Requirements for installation inclination

Recommended inverter installation inclination: vertical or leaning backward $\leq 15^\circ$.

Do not install the inverter upside down, leave it tilting forward or backward beyond the angle, or install it horizontally.



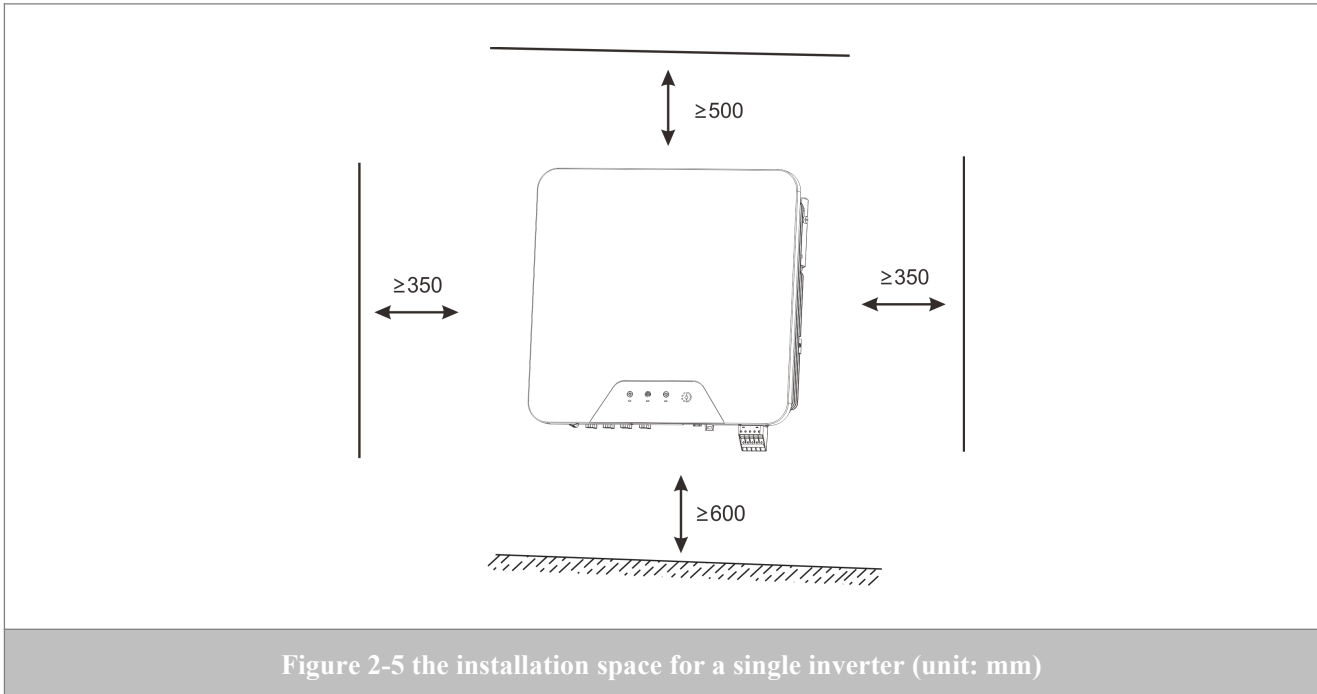
Note:

1. It is recommended to install the equipment vertically or within a caster angle of 15° . Damages of the inverter due to non-conforming installation will not be covered by the product warranty.
2. When installing, make sure that the radiator is free from obstructions to ensure unobstructed air ducts.

2.3.5 Requirements for installation space

2.3.5.1 Installation of single inverter

When installing a single inverter, reserve enough space around it for the installation, maintenance and heat dissipation. The distance between the bottom of the inverter and the ground is recommended to be greater than or equal to 600mm. The installation space of a single inverter is shown in the figure below.

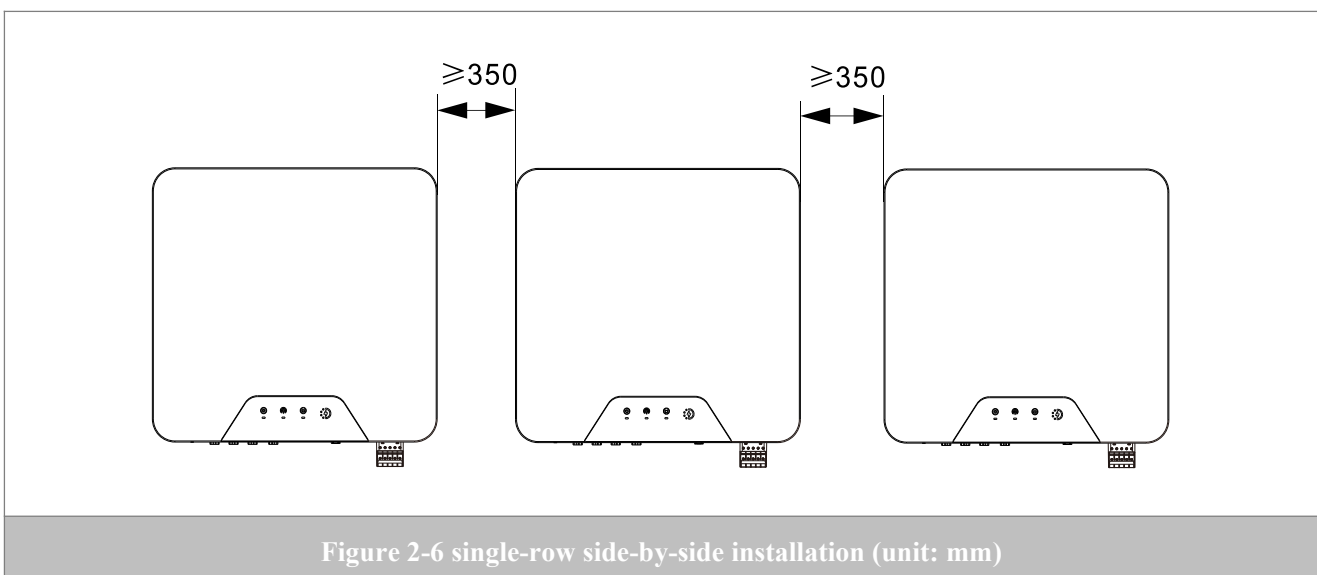


2.3.5.2 Installation of multiple inverters

To ensure good heat dissipation of the inverter and easy maintenance, when multiple inverters installed, leave an appropriate distance between them. Generally, the recommended installation forms include single-row side-by-side installation and multi-row staggered installation. The specific installation requirements are as follows.

- Single-row side-by-side installation

When the inverters are installed side by side in a single row, the distance between the inverters is not less than 350mm. And the distance between the inverters and the upper, lower, left, and right solid objects (such as walls) should meet the spatial requirements for the installation of a single inverter, please refer to the following diagram.



- Multi-row staggered installation

To facilitate heat dissipation when installing multi-row inverters, there must be no intersection between two adjacent rows of inverters in the upper and lower spaces. The horizontal distance between two staggered inverters is not less than 350mm, and the vertical distance between the inverters is not less than 500mm. The distance between the inverters and the upper, lower, left, and right solid objects (e.g. walls) should correspond to the space required for the installation of a single inverter, as shown in the following diagram.

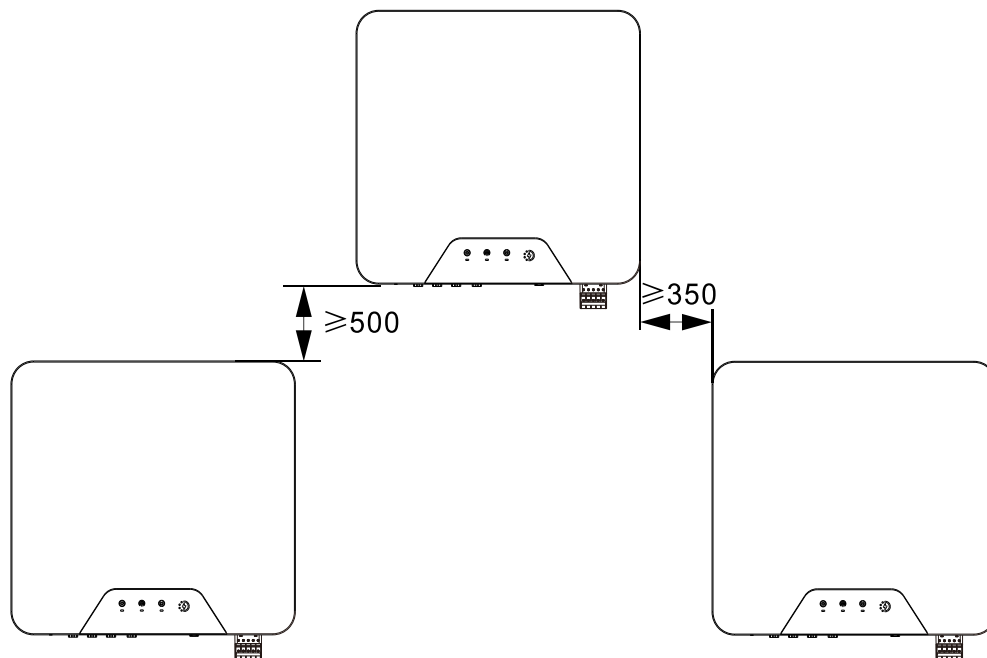


Figure 2-7 multi-row staggered installation (unit: mm)

2.4 Installation of inverter

2.4.1 Handling of inverter



Warning

- Before installation, the inverter needs to be transported to the installation site. To avoid personal injury or equipment damage during the transportation, please pay attention to the following:
- Please arrange personnel according to the weight of the equipment to prevent the equipment from exceeding the weight that the human body can carry and even hurting people.
- Wear safety gloves to avoid injury.
- Please ensure that the equipment is balanced during transportation to avoid falling.

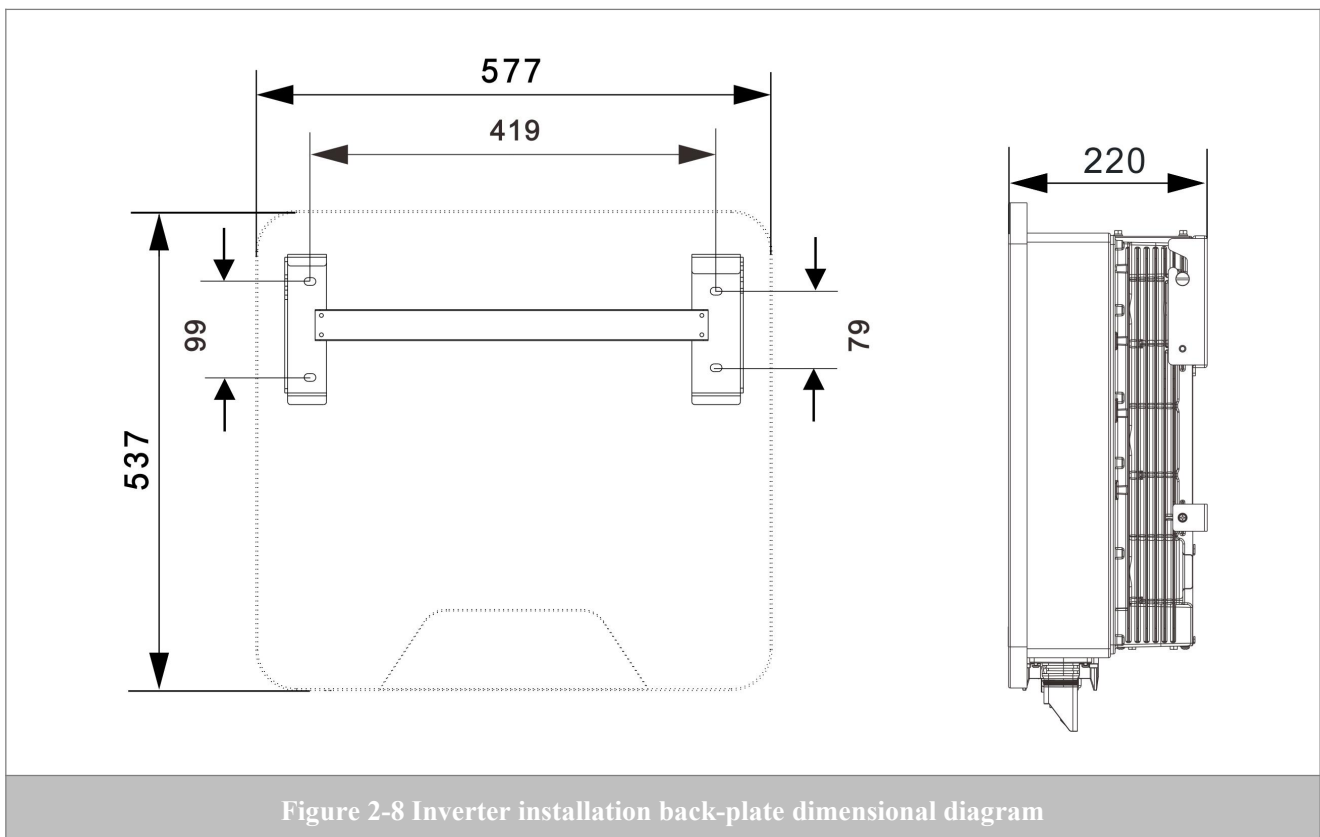
2.4.2 Installation of inverter

Remark:

- Please avoid the water pipes, cables, etc. in the wall to prevent danger when drilling holes.
- When drilling holes, please wear goggles and a dust mask to prevent dust from being inhaled or falling into your eyes.
- Please prepare your own DC switch lock.

2.4.2.1 Inverter installation dimensional diagram

Back-plate dimensional diagram of the inverter is as follows:



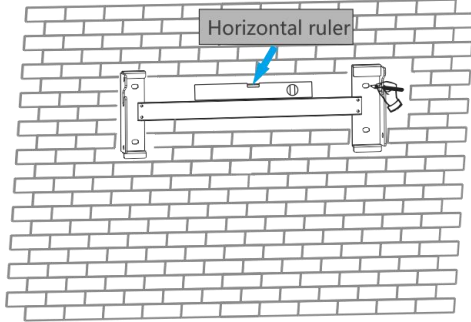
2.4.2.2 Wall installation

The installation steps of the inverter wall-mounted back-plate are as follows:

Step 1: Take out the back-plate from the accessories, use a level to ensure that the back-plate is placed horizontally on the wall, and mark the drilling positions with a marking pen.

Step 2: Use a percussion drill with the drill bit diameter of 10mm to drill holes and ensure that the depth of the hole is about 70mm.

1 Determine the drilling position.



2 Drilling.

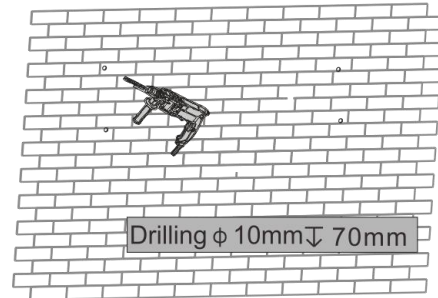
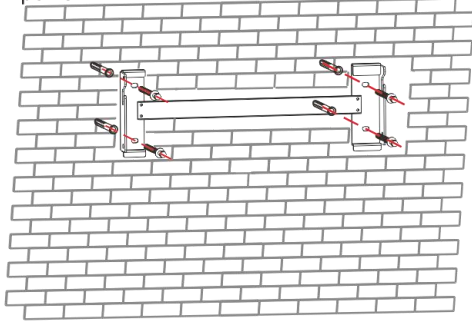


Figure 2-9

Step 3: Install expansion tubes and fix the back-plate to the wall with self-tapping screws.

Step 4: Install the DC switch locking screw.

3 Install the expansion tube and fix the back panel.



4 Install the DC switch lock screw.

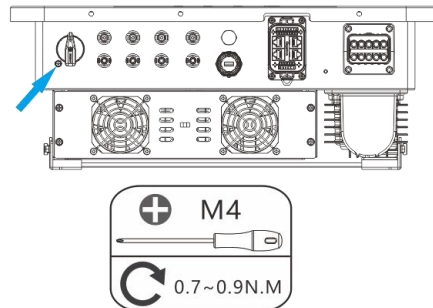


Figure 2-10

Step 5: Put out the inverter from the box.

Step 6: Hang the inverter on the back-plate.

Step 7: Install the screws of the back panel and L-shaped brackets.

Step 8: Place gaskets and tighten the expansion screws on the back-plate at the bottom. Install anti-theft locks (if it is needed)

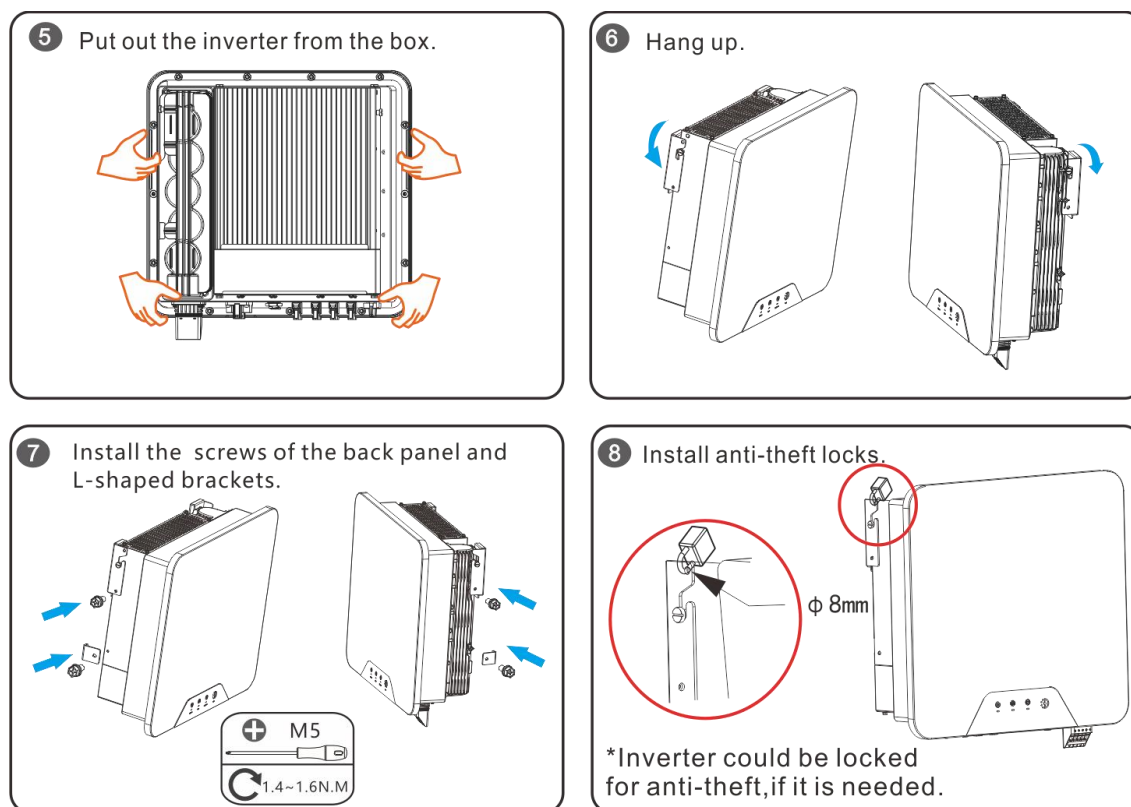


Figure 2-11

Note:

1. Pay attention to personal safety when handling.
2. The product accessory package contains expansion tubes and self-tapping screws.
3. The wall must have enough carried capacity.
4. The DC switch locking screw is delivered with the inverter. According to the requirements of Australian standards, it is used to fix the DC switch (DCSWITCH) to prevent accidental startup (this step needs to be performed for the models used in Australia according to local standards).

Chapter 3 Electrical connections



Danger

- *When PV modules are exposed to light, DC high voltage exists at the battery panel port, which endangers the personal safety of the operator!*
- *The insulation layer of the power cable must remain intact and free from damage and scratches. Otherwise, it may cause the short circuit and fire!*
- *Before wiring for the inverter, you must check and confirm that all the connecting cables of the equipment are free from dangerous voltage, and you must set up obvious warning signs at the external power distribution switch of the equipment to prevent others from misoperating the external switches of the equipment and threatening the personal safety of operators!*
- *Before wiring the inverter, make sure the AC wiring port is disconnected from the grid, and the AC port is under zero voltage!*



Warning

- *Strictly follow the label inside the inverter to connect the cables, otherwise the equipment will be damaged.*
 - *The inverter cable connection must be safe and reliable. The cable selection and tightening torque must comply with the requirements in this manual, otherwise it may cause fire and damage to the inverter.*
 - *Operators are not allowed to open the upper cover of the main compartment without permission. If the tamper-evident label is torn off and the inverter is damaged, the damage will not be covered by our warranty.*
 - *Power off completely before opening the cover. (Ensure that the PV port is powered off and the EMI board on the DC side is powered off.)*
 - *When opening the upper cover of the wiring compartment, be careful not to scratch or damage the protective foam on the upper cover, as this may cause water to enter the inverter.*
 - *Please try not to open the inverter wiring compartment in rainy or snowy weather to avoid the risk of water ingress.*
-

3.1 Electrical system wiring diagram

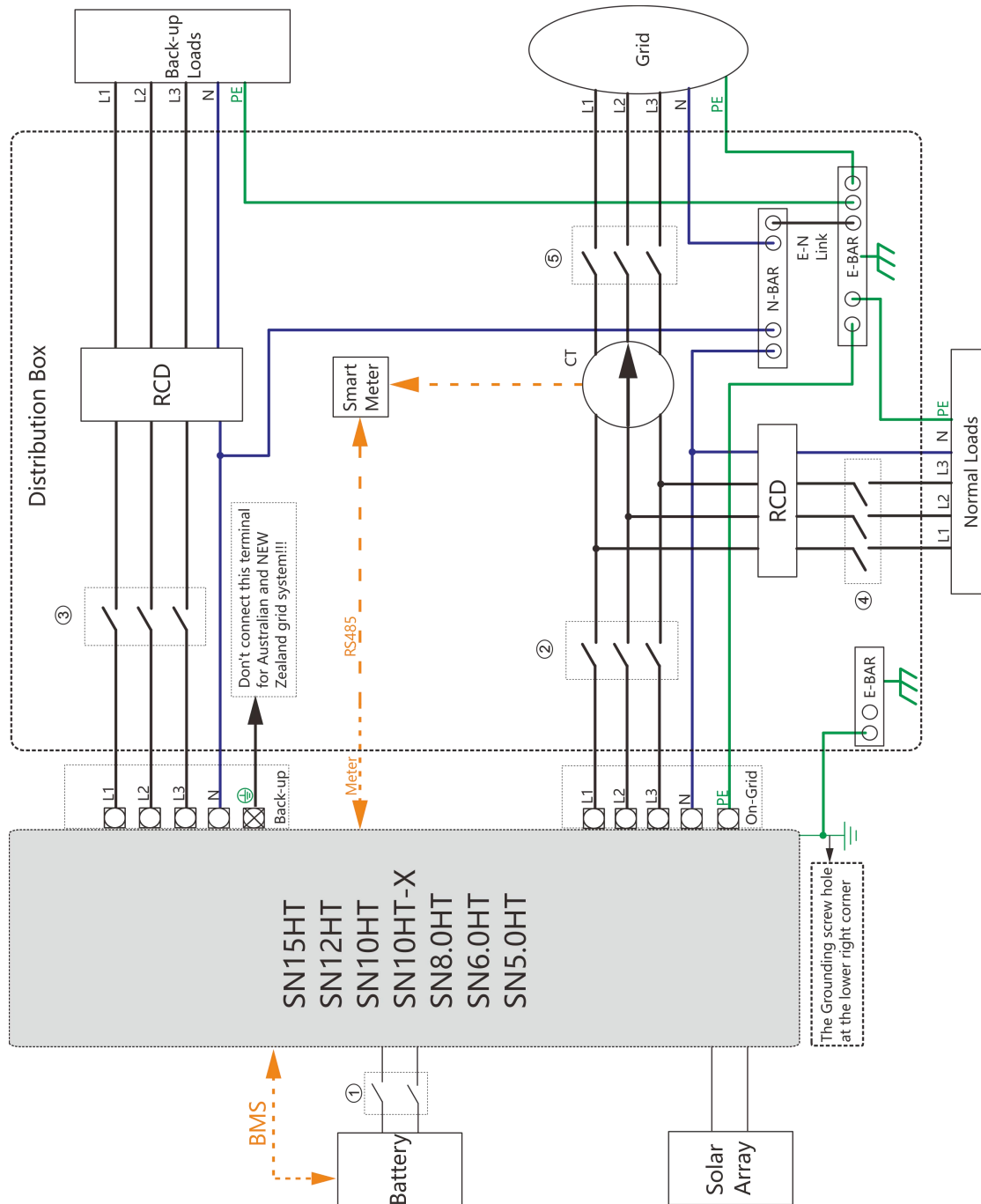


Figure 3-1 Electrical system wiring diagram

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!

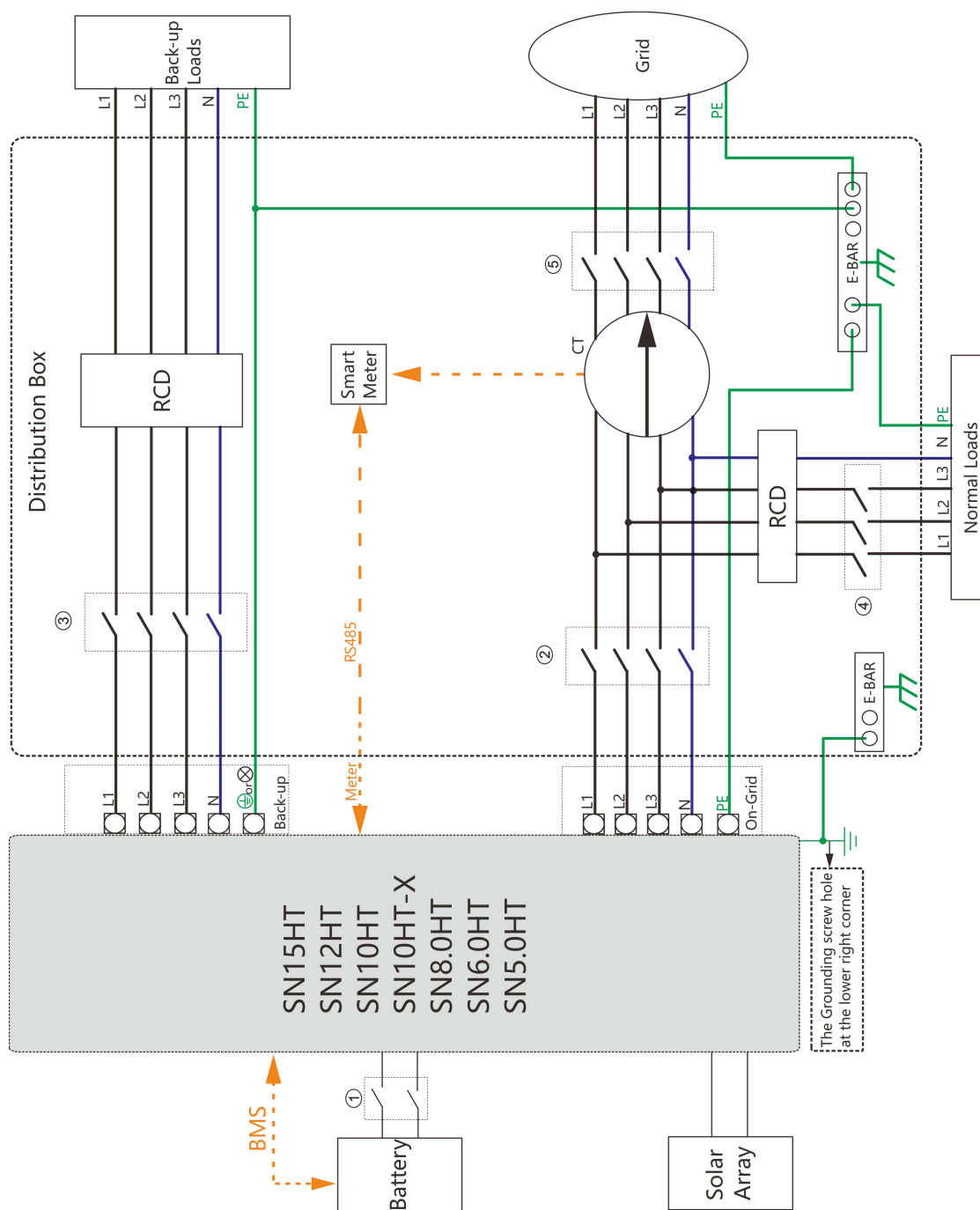


Figure 3-2

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!

To ensure that the SN series hybrid inverter is normally disconnected from the grid under abnormal conditions, please select a suitable AC circuit breaker. The recommended specifications are as follows:

NO. SN15HT/ SN12HT/ SN10HT/ SN10HT-X/ SN8.0HT/ SN6.0HT/ SN5.0HT	
①	$\geq 40\text{A}/600\text{V}$ DC breaker
②	SN15HT/SN12HT: Rated current $\geq 50\text{A}$ SN10HT/ SN10HT-X/SN8.0HT: Rated current $\geq 32\text{A}$ SN6.0HT/SN5.0HT: Rated current $\geq 25\text{A}$
③	SN15HT/SN12HT: Rated current $\geq 32\text{A}$ SN10HT/ SN10HT-X/SN8.0HT/ SN6.0HT/SN5.0HT: Rated current $\geq 25\text{A}$
④	Depends on loads
⑤	Depends on household loads and inverter capacity (Optional)
Table 3-1	

The SN series hybrid inverter integrates a leakage protection circuit. If the leakage current is greater than the protection threshold value required by safety regulations, the inverter will automatically disconnect from the power grid.

If the AC circuit breaker is furnished with leakage current detection function, please select the appropriate device according to the table below.

Inverter model	Leakage current trigger value
SN15HT	300mA
SN12HT	
SN10HT	
SN10HT-X	
SN8.0HT	
SN6.0HT	
SN5.0HT	
Table 3-2	

3.2 Recommended cable specifications

SN series hybrid inverter external cables include grounding cables, AC cables(on-grid), AC cables(off-grid), DC input cables, battery input cables, and communication cables. Recommended cable specifications are as follows:

Content	Type	Cable sectional area	Wiring terminal	Tightening torque
Grounding cable	Outdoor copper core cable	6mm ²	M5(OT terminal)	1.4~1.6 N.m
AC cable (On-grid)	Outdoor copper core cable (5-core)	6mm ²	\	1.9~2.0N.m
AC cable (Off-grid)	Outdoor aluminum core cable (5-core)	6mm ²	\	1.9~2.0N.m
DC input cable	Meet the standard for 1000V	4~6 mm ²	\	\
Battery input cable	Meet the standard for 1000V	6~10mm ²	\	\

Table 3-3

3.3 Connect grounding cable



Warning

- The inverter must be reliably grounded, otherwise it will cause personal injury or abnormal operation of the inverter!

The inverter needs to be grounded nearby, and the steps to connect the protective grounding cable are as follows:

- (1) Use a wire stripper to strip a piece of bare copper core from the grounding cable of the corresponding specification, and the length of the bare copper core should be 3mm longer than the wiring end of the OT terminal.
- (2) Use crimping pliers to crimp the OT terminal to the bare copper core.
- (3) Put a heat-shrinkable sleeve of suitable size on the wiring end of the OT terminal, and the length of the heat-shrinkable sleeve (withstanding voltage $\geq 1000\text{V}$) is generally recommended to be 1.5--2 times longer than that of the wiring end.
- (4) Use a heat gun to blow the heat-shrinkable sleeve, making the sleeve wrap the terminal and cable tightly to complete the preparation of cable (the process is shown in the steps in the figure below①).
- (5) Fasten the OT terminal of the grounding cable to the grounding port with an M5 screw, and the tightening torque is 1.4~1.6N.m (refer to the steps in the figure below for details).

Remarks: After the grounding terminal is fastened, it is recommended to apply silicone or paint the outside of the terminal to improve the anti-corrosion performance of the terminal.

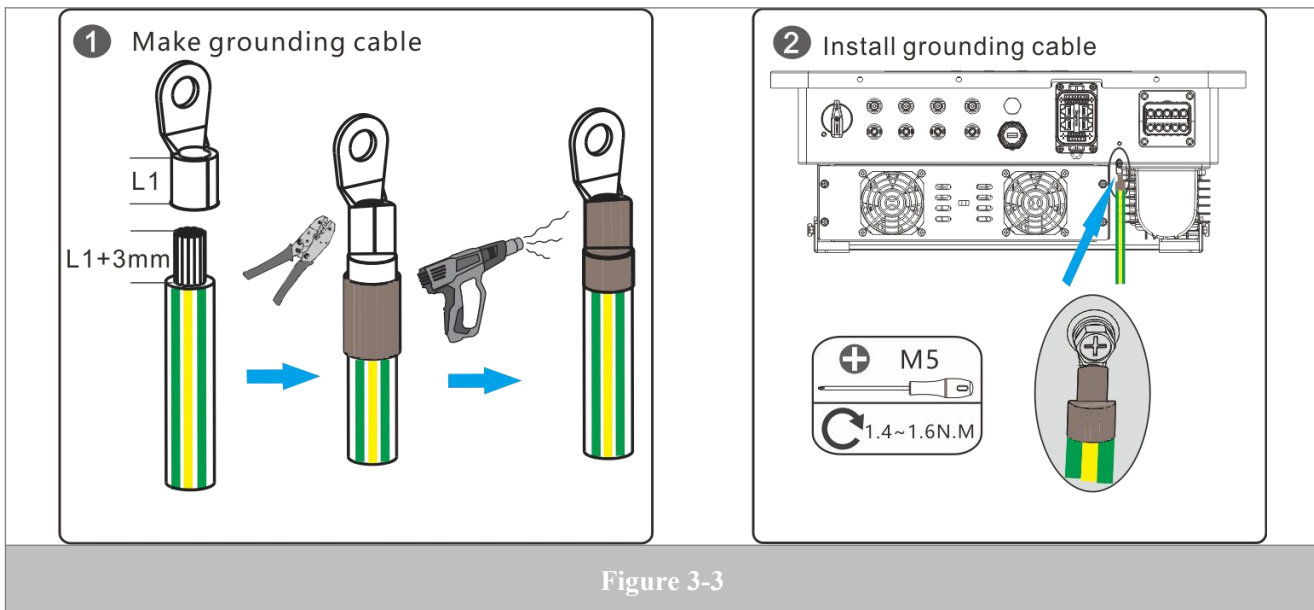


Figure 3-3

Note:

- 1.Users need to prepare cables and heat shrinkable sleeves for the protective grounding cables by themselves.
- 2.The tools users need to use include - diagonal pliers, wire strippers, crimping pliers, a heat gun, and a M5 Phillips screwdriver.

3.4 Connect AC cable(On-grid) and AC cable(Back-up)



Warning

- An AC circuit breaker matching the power of the inverter must be connected between the inverter output and the grid, and each inverter corresponds to an independent circuit breaker!
- The on-grid and back-up cable locks and fixing screws must be tightened, otherwise there is a risk of inverter damage or fire!
- When connecting on-grid and back-up cables, make sure that the AC circuit breaker is disconnected!
- Inverters and AC circuit breakers are prohibited from connecting to loads!

The specific steps for connecting the AC cables are as follows:

- (1) Prepare on-grid and back-up cables, and strip the cables as shown in the following figure①.
- (2) Disassemble the AC connector, then insert the on-grid cables into the on-grid output terminal, and insert the back-up cables into the back-up output terminal.
- (3) Use a hex wrench to fix the AC cables. Connect the AC output terminal and the inverter.

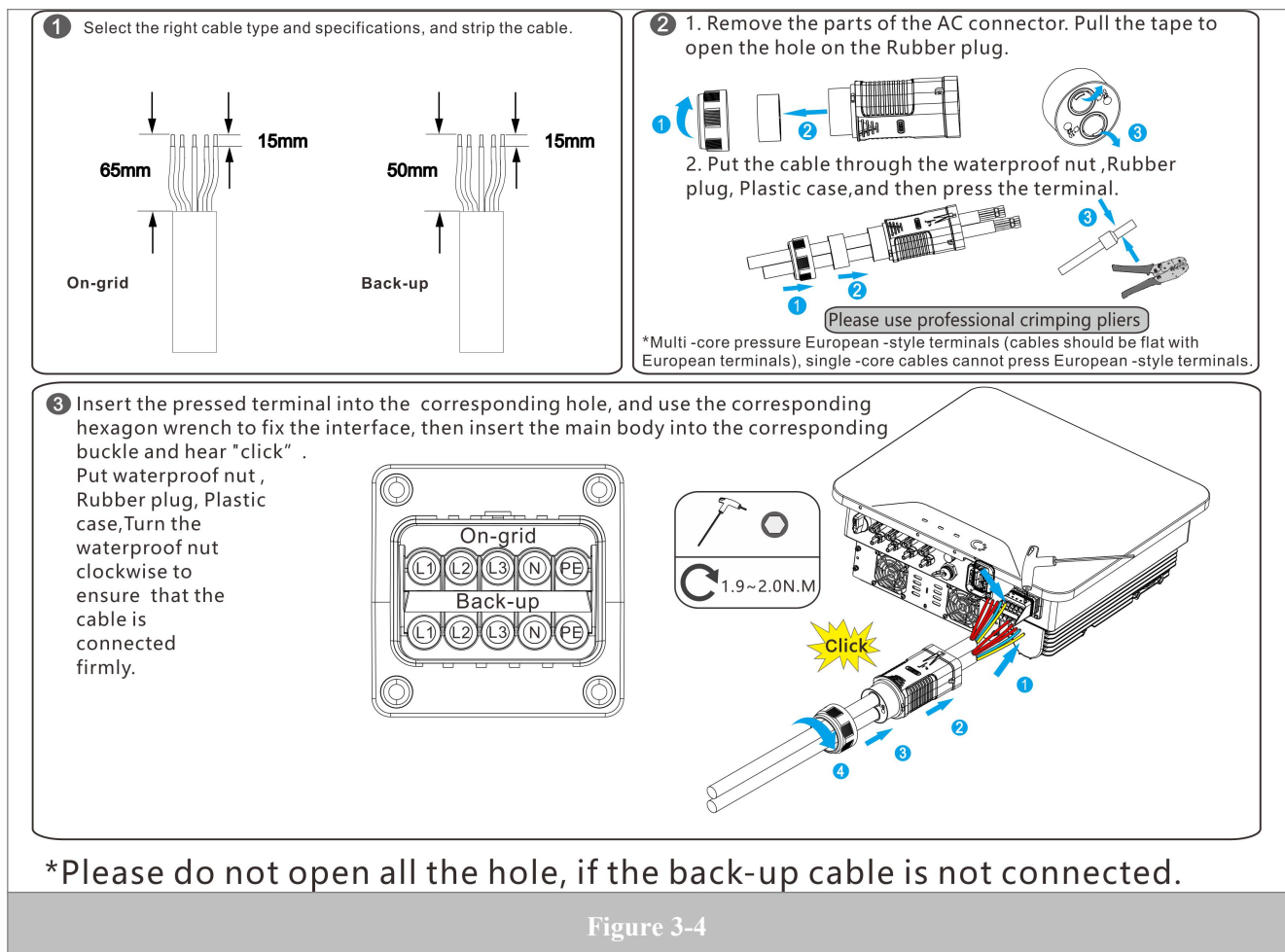


Figure 3-4

Note:

1. Before connecting the cables, disconnect the circuit breaker between the power grid and the inverter.
2. Make sure that the protective layer of the cable is inside the connector, otherwise it will lower the sealing level at the terminal.
3. When fixing the cables, ensure that the cores are fully inserted into the wiring holes without exposure.

3.5 Connect the DC input cable



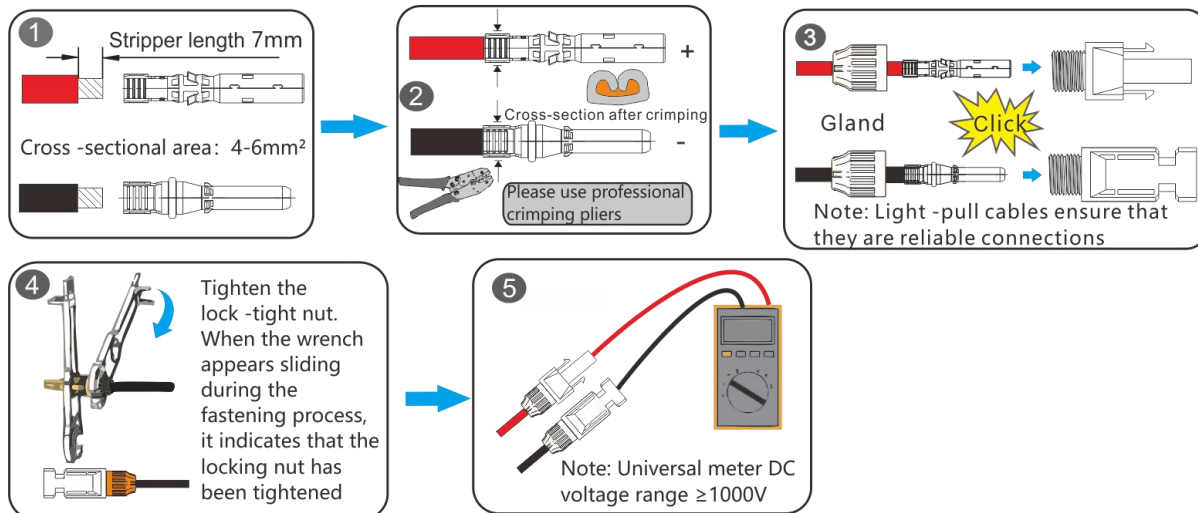
Warning

- *If PV modules are exposed to light, the photovoltaic panel may endanger the life of the operator with high voltage output!*
 - *Before wiring, make sure that the side of the photovoltaic panel is completely covered with an opaque cloth before the operation.*
 - *The DC switch of the inverter must be in the "OFF" position!*
 - *The parameter configuration of the battery string should match the DC input parameters of the inverter.*
 - *If the inverter is directly connected to the grid, the positive and negative poles of the photovoltaic panel cannot be directly grounded.*
 - *If multiple inverters are connected in parallel to the grid through a transformer, the positive and negative poles of the photovoltaic panel cannot be directly grounded.*
 - *It is forbidden to use DC terminals with specifications, models, and brands other than those provided by us!*
 - *Before connecting the photovoltaic strings to the inverter, ensure that the photovoltaic strings are well insulated from the ground!*
 - *To increase the power generation capacity of the system, it is recommended that each string be connected with the photovoltaic strings with the same number, specifications, and direction!*
-

The steps for the connection of the DC input cable are as follows:

- (1) Use wire strippers to strip the insulation layer of the positive and negative cables to an appropriate length.
- (2) Put the insulation layer of the positive and negative cables into the corresponding metal terminals, and crimp them tightly with crimping pliers.
- (3) Insert the crimped positive and negative cables into the corresponding insulating shells until a "click" sound is heard, indicating that they are in place.
- (4) Tighten the plastic nuts at the end of the insulating shell of the positive and negative connectors.
- (5) Use a multimeter to measure the voltage of the positive and negative DC terminals to ensure that the polarity of the battery panel is correct, and the voltage is less than the maximum input voltage that the system can withstand.
- (6) Remove the protection plugs of the positive and negative poles of the DC input terminal of the inverter.
- (7) Insert the positive and negative connectors into the positive and negative poles of the DC input terminal of the inverter until a "click" sound is heard, indicating that they have been installed in place.

1、Assemble DC connector



2、Connect the PV input cable

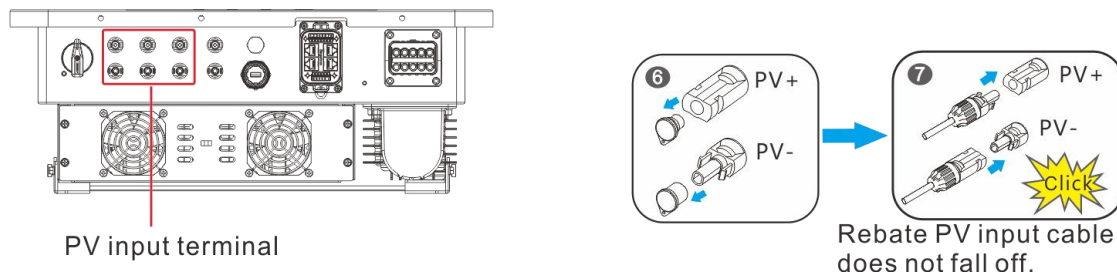


Figure 3-6

Note:

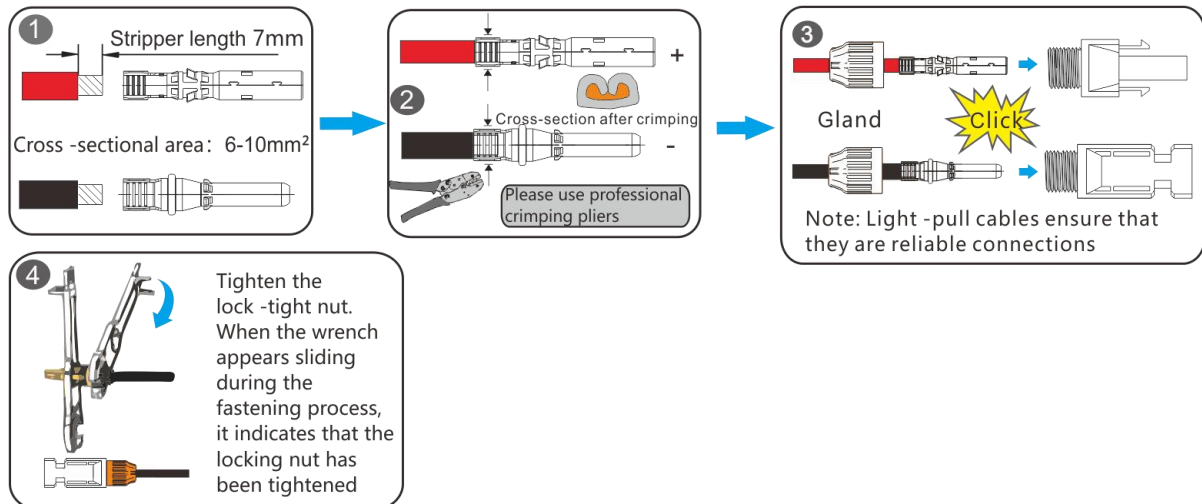
- 1.The DC switch must be in the "OFF" position before wiring!
- 2.Before connecting the photovoltaic strings to the inverter, ensure that the photovoltaic strings are well insulated from the ground.
- 3.The photovoltaic strings connected to the same channel of MPPT must adopt the photovoltaic panels of the same type and number.
- 4.For the positive and negative pole connectors that have been connected, when measuring the voltage with a multimeter, ensure the value is positive to ensure that the polarity is correct; and its value is less than the maximum input voltage of the system (1000V), to ensure that the number of photovoltaic modules is properly configured.

3.6 Connect battery input cable

The wiring method for the battery connection and DC connections is similar, except for the different colors of the terminals: the battery connector is blue, while the DC connector is black. When the terminal is inserted into the machine, please make sure the insertion is correct.

The steps for the connection of the battery input cable are as follows:

1、Assemble Battery connector



2、Connect the Battery input cable

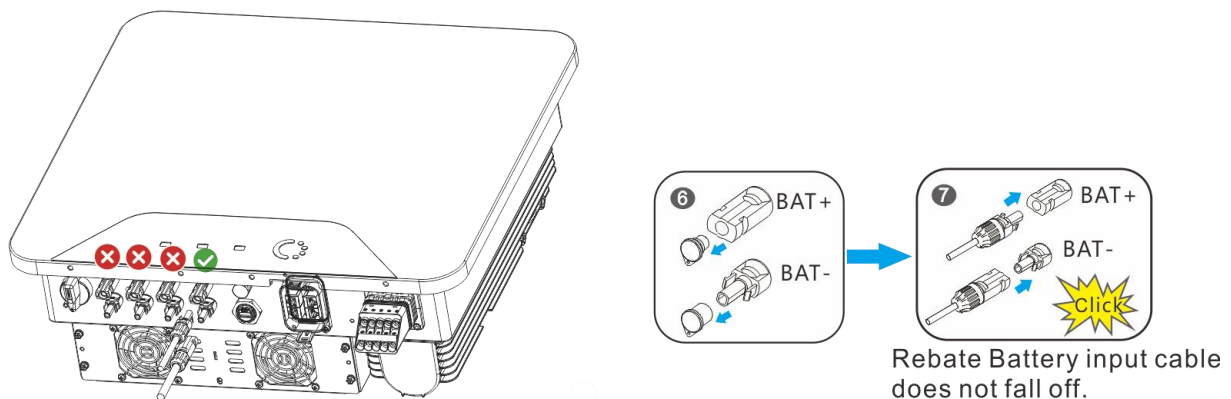


Figure 3-7

Note:

When wiring, make sure that the polarity of the battery cable is correct, and do not reverse it. If the positive and negative poles of the battery get reversed, there is a risk of damaging the inverter.

3.7 Install the Communication module



Warning

- Please install the communication module in strict accordance with the user manual!

The installation steps of the communication module are as follows:

- (1) Before installation, please read the manual of the communication module carefully.
- (2) Unscrew the dust-proof cover of the aviation plug, insert the communication module into the data acquisition stick terminal, and tighten the plastic nut clockwise.

Install the Communication module

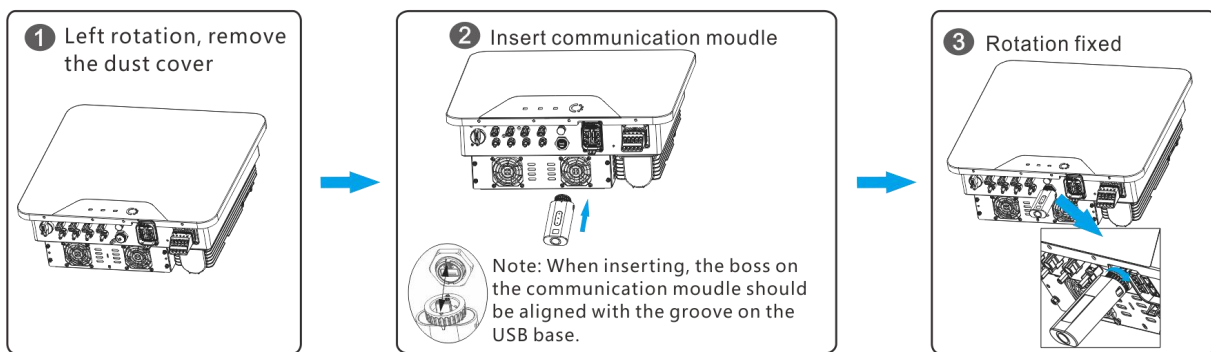


Figure 3-8

Note:

- 1.The installation method of the communication module is illustrated in the above diagram.
- 2.When installing the communication module, the three indicator lights should face outward.
- 3.When installing the communication module, it is forbidden to rotate the WIFI module, which may result in loose terminals on the panel end and cause water to enter the inverter.
- 4.To install the communication module, please tighten the plastic nut clockwise, otherwise there will be a risk of abnormal communication or water ingress.

3.8 Install communication cable



Warning

- Please connect the inverter communication cable in strict accordance with the inverter communication port label!

The communication signal is defined as follows:

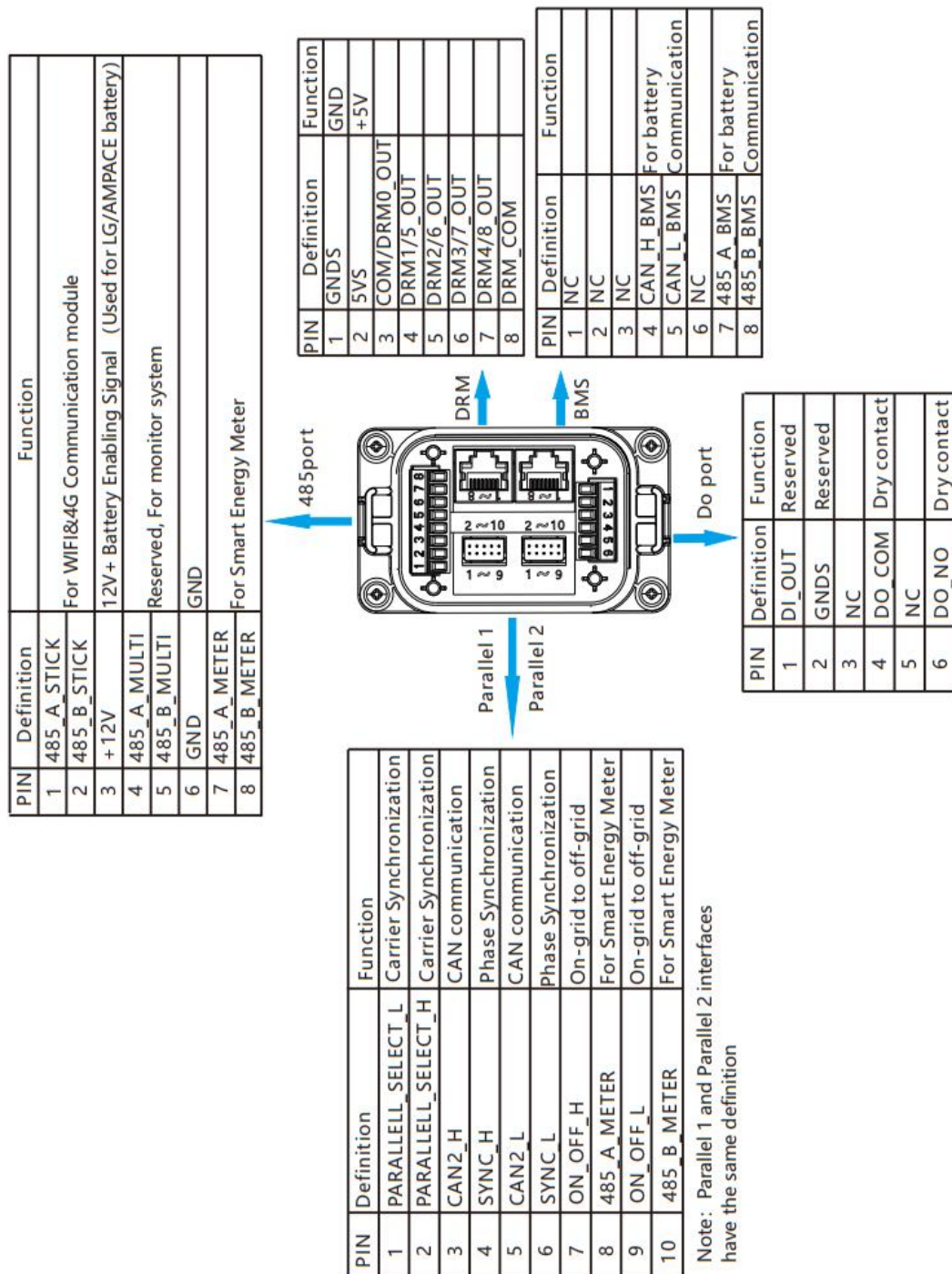
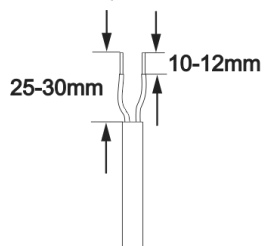


Figure 3-9

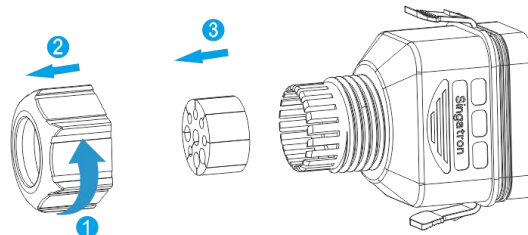
The steps to connect the communication cable are as follows:

Connect the communication cable (connector terminal connection)

- 1** Strip the signal cable/Battery Enabling Signal cable (20AWG two-core cable is recommended)



- 2** Disassemble connector



- 3** Route the cables through the lock nut, the main body, and then crimp the signal cable

If you use the network cable, the 22AWG two-core cable or 24AWG two-core cable, you need to fold the copper wire after stripping the wire, and then insert the pipe terminal to use the tool for pressing (If the copper wire is not folded, the tubular terminal may not be firmly crimped)

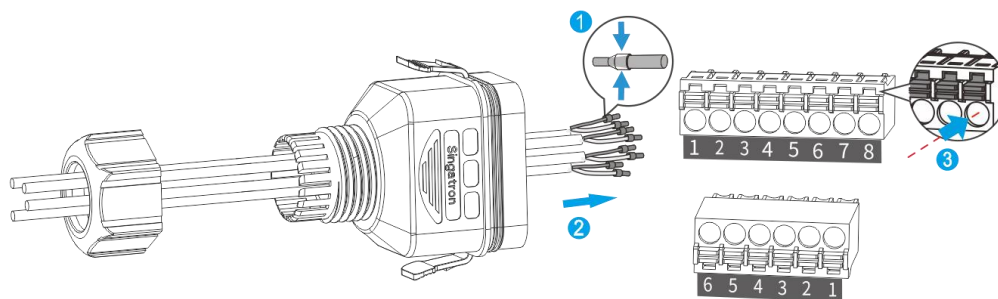


Figure 3-10

4

485port

PIN	Definition
1	485_A_STICK
2	485_B_STICK
3	+12V
4	485_A_MULTI
5	485_B_MULTI
6	GND
7	485_A_METER
8	485_B_METER

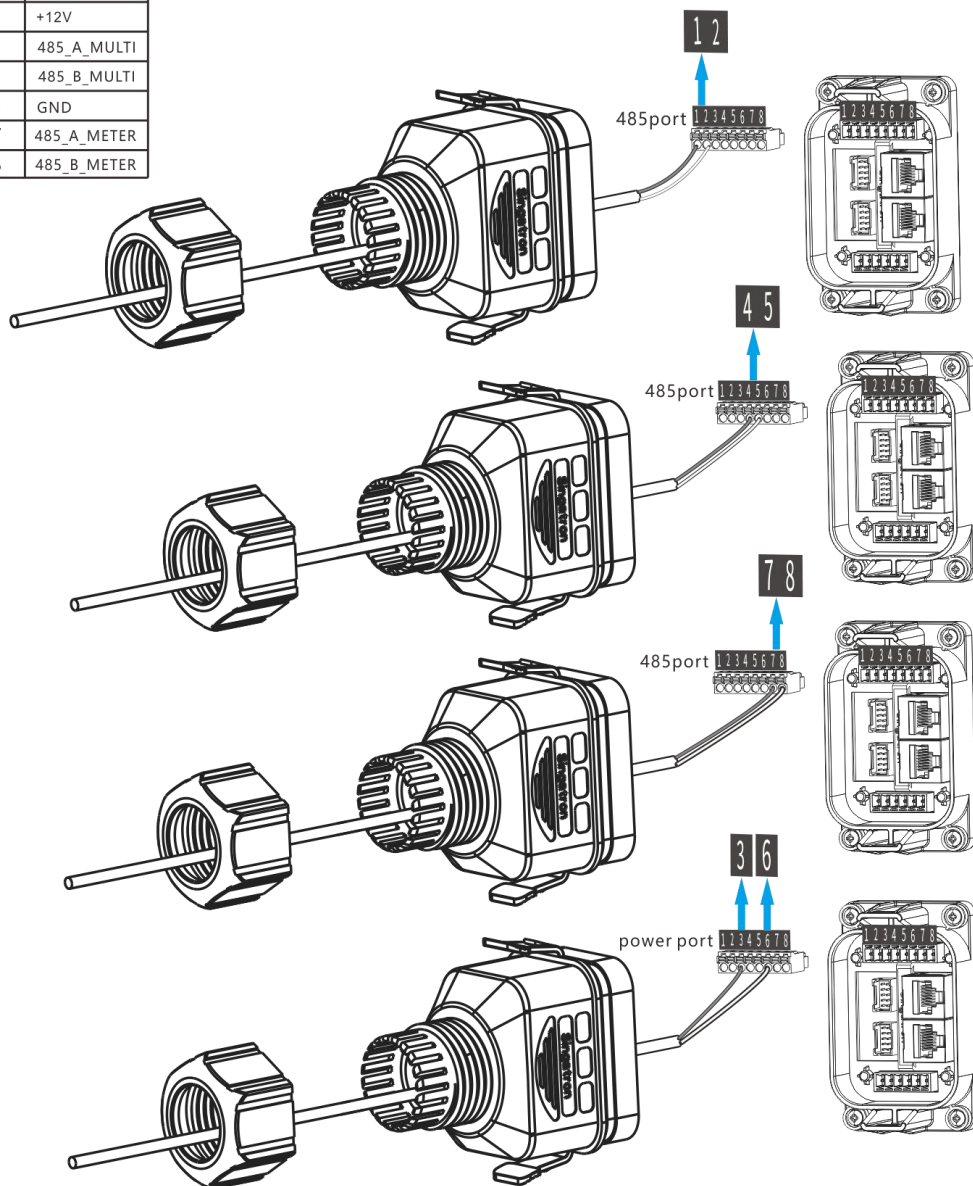


Figure 3-11

Label	Description
RS_485_STICK	For WIFI&4G Communication module
RS_485_MULTI	Reserved, For monitor system
RS_485_Meter	For Smart Energy Meter
+12V/GND	Battery Enabling Signal (Used for LG/AMPACE battery)

5

Do port

PIN	Definition
1	DI_OUT
2	GNDS
3	NC
4	DO_COM
5	NC
6	DO_NO

Do communication cable: need to use non -network cables, use 4 cores 0.5mm² communication cable.

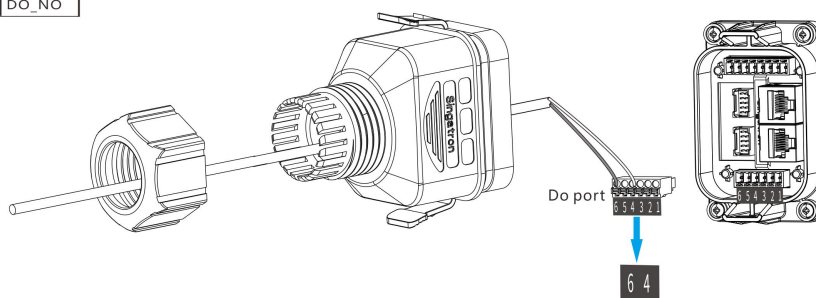


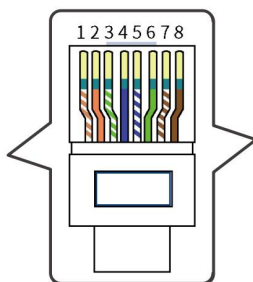
Figure 3-12

Label	Description
DI	Reserved

Connect the communication cable (DRM, BMS terminal connection)

DRM

PIN	Colour	Definition
1	White and Orange	GNDS
2	Orange	5VS
3	White and Green	COM/DRM0_OUT
4	Blue	DRM1/5_OUT
5	White and Blue	DRM2/6_OUT
6	Green	DRM3/7_OUT
7	White and Brown	DRM4/8_OUT
8	Brown	DRM_COM



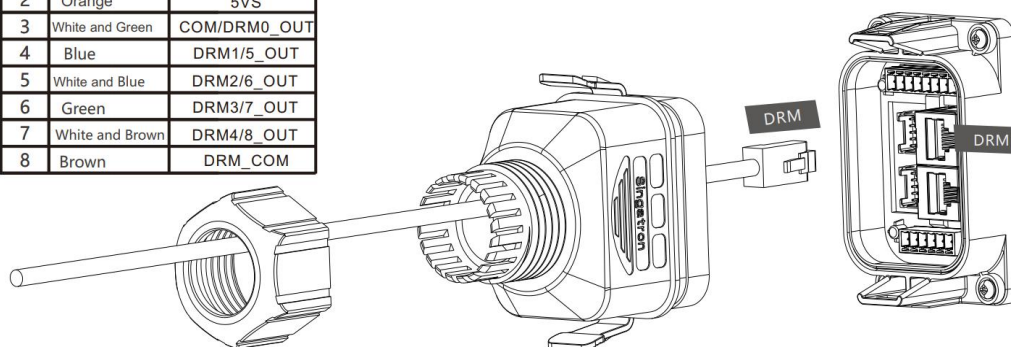
BMS

PIN	Colour	Definition
1	White and Orange	NC
2	Orange	NC
3	White and Green	NC
4	Blue	CAN_H_BMS
5	White and Blue	CAN_L_BMS
6	Green	NC
7	White and Brown	485_A_BMS
8	Brown	485_B_BMS

Figure 3-13

1 DRM

PIN	Colour	Definition
1	White and Orange	GNDS
2	Orange	5VS
3	White and Green	COM/DRM0_OUT
4	Blue	DRM1/5_OUT
5	White and Blue	DRM2/6_OUT
6	Green	DRM3/7_OUT
7	White and Brown	DRM4/8_OUT
8	Brown	DRM_COM



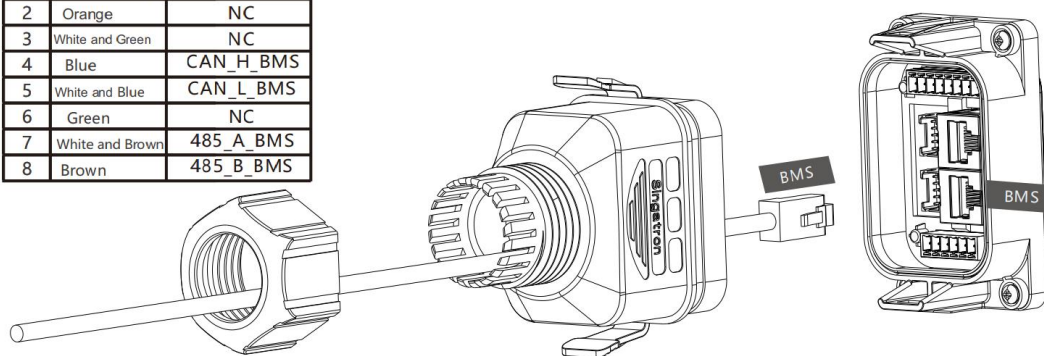
DRM network cable is a standard part, no need to process separately.

Figure 3-14

Label	Description
DI/DRM	"AU"/"NZ": Demand response enabling device (DRED)

2 BMS

PIN	Colour	Definition
1	White and Orange	NC
2	Orange	NC
3	White and Green	NC
4	Blue	CAN_H_BMS
5	White and Blue	CAN_L_BMS
6	Green	NC
7	White and Brown	485_A_BMS
8	Brown	485_B_BMS



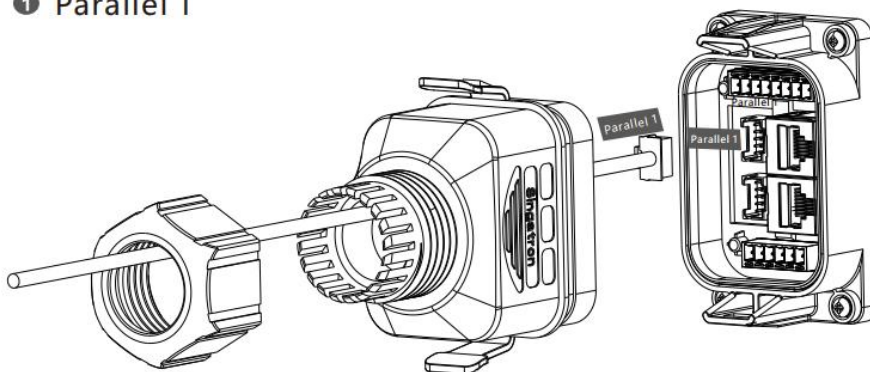
BMS network cable is a standard part, no need to process separately.

Figure 3-15

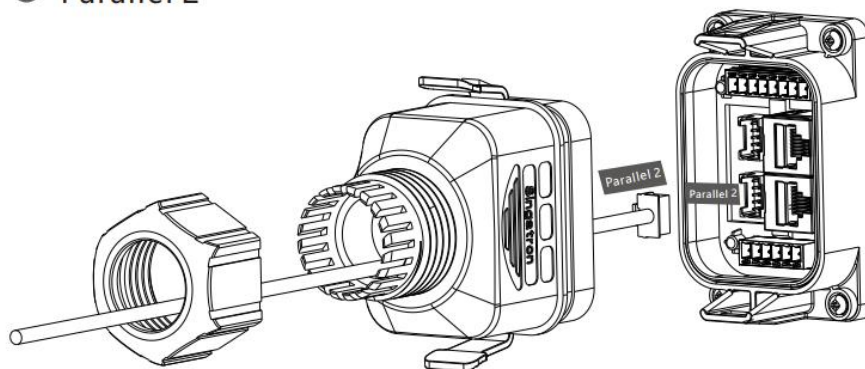
Label	Description
BMS/RS485	For battery communication
BMS/CAN	For battery communication

Note: LG/AMSPACE batteries require the use of a battery enable signal (+12V/GND).

① Parallel 1



② Parallel 2



Parallel 1 port and Parallel 2 port are reserved.

Figure 3-16

Label	Description
PARALLELL_SELECT_L	Carrier Synchronization
PARALLELL_SELECT_H	Carrier Synchronization
CAN2_H	CAN communication
SYNC_H	Phase synchronization
CAN2_L	CAN communication
SYNC_L	Phase synchronization
ON_OFF_H	On-grid to off-grid
485 A METER	For Smart Energy Meter
ON_OFF_L	On-grid to off-grid
485 B METER	For Smart Energy Meter

Press the cable into the rubber plug (reserved the incision around the rubber plug, and press the cable in the bundle directly when installing)

① Press 485 interface signal cable

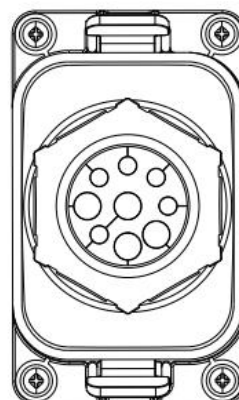


*Cable cannot be entangled

② Press RJ45, parallel cable



*Cable cannot be entangled



③ Press DO interface signal cable

Figure 3-17

Please use the blocked rubber to plug the wiring holes and tighten the tight nut.

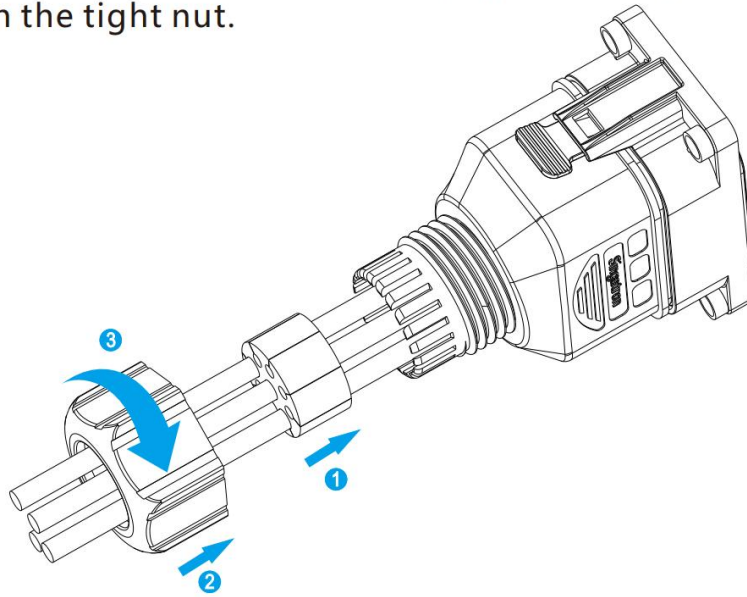


Figure 3-18

Note:

1. Make sure that the protective layer of the communication cable is inside the connector, otherwise it will lower the sealing level at the communication terminal.
2. When fixing the communication cables, ensure that the cores are fully inserted into the communication wiring holes without exposure, and fasten with the specified torque.

3.9 Smart Meter and CT Connection



Warning

- Make sure AC cable is totally isolated from AC power before connecting Smart Meter & CT.

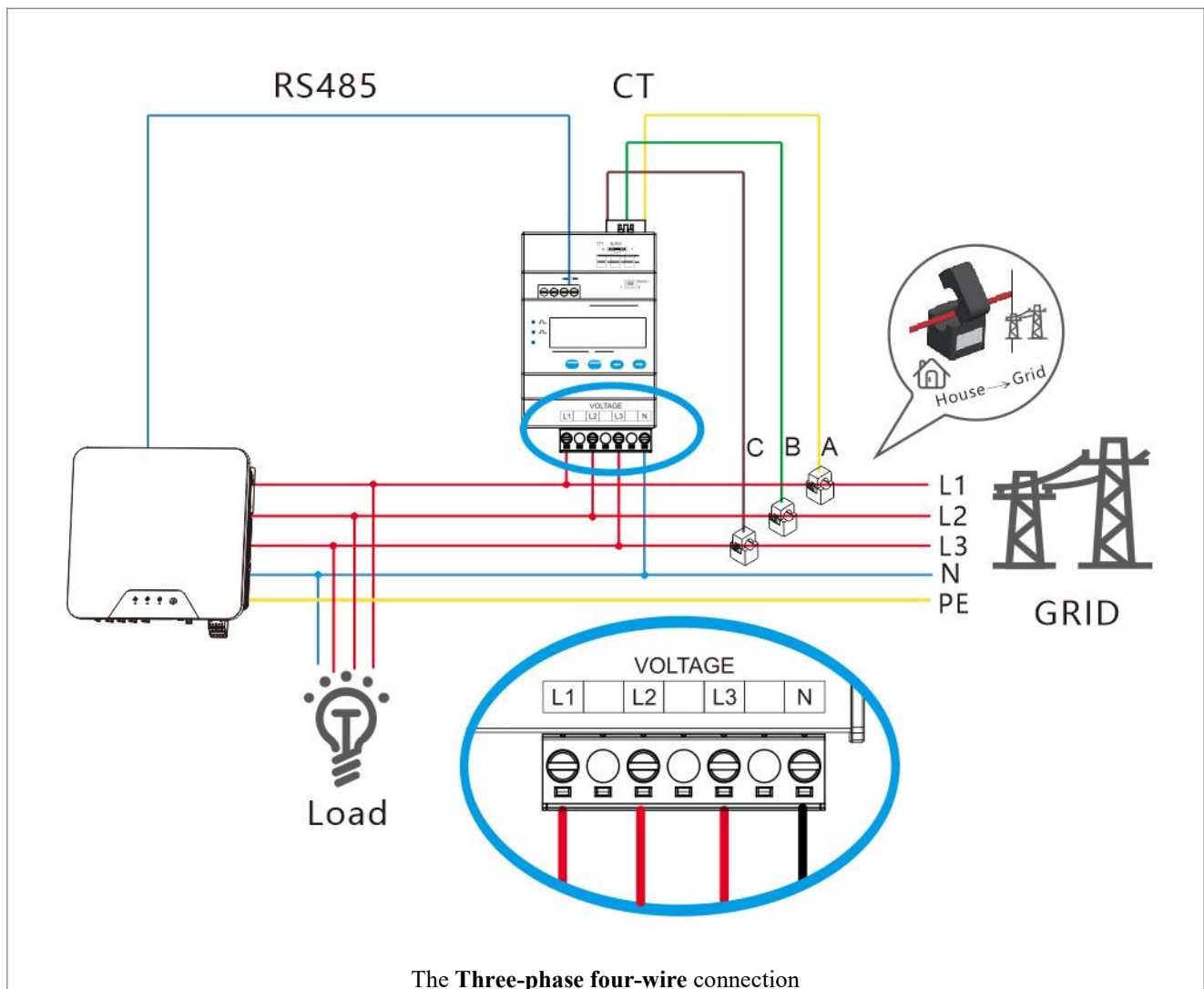
The Smart Meter with CT in the SN product box is compulsory for the system installation and it is used to detect grid voltage, current direction, and magnitude, as well as to instruct the operation condition of inverter via RS485 communication.

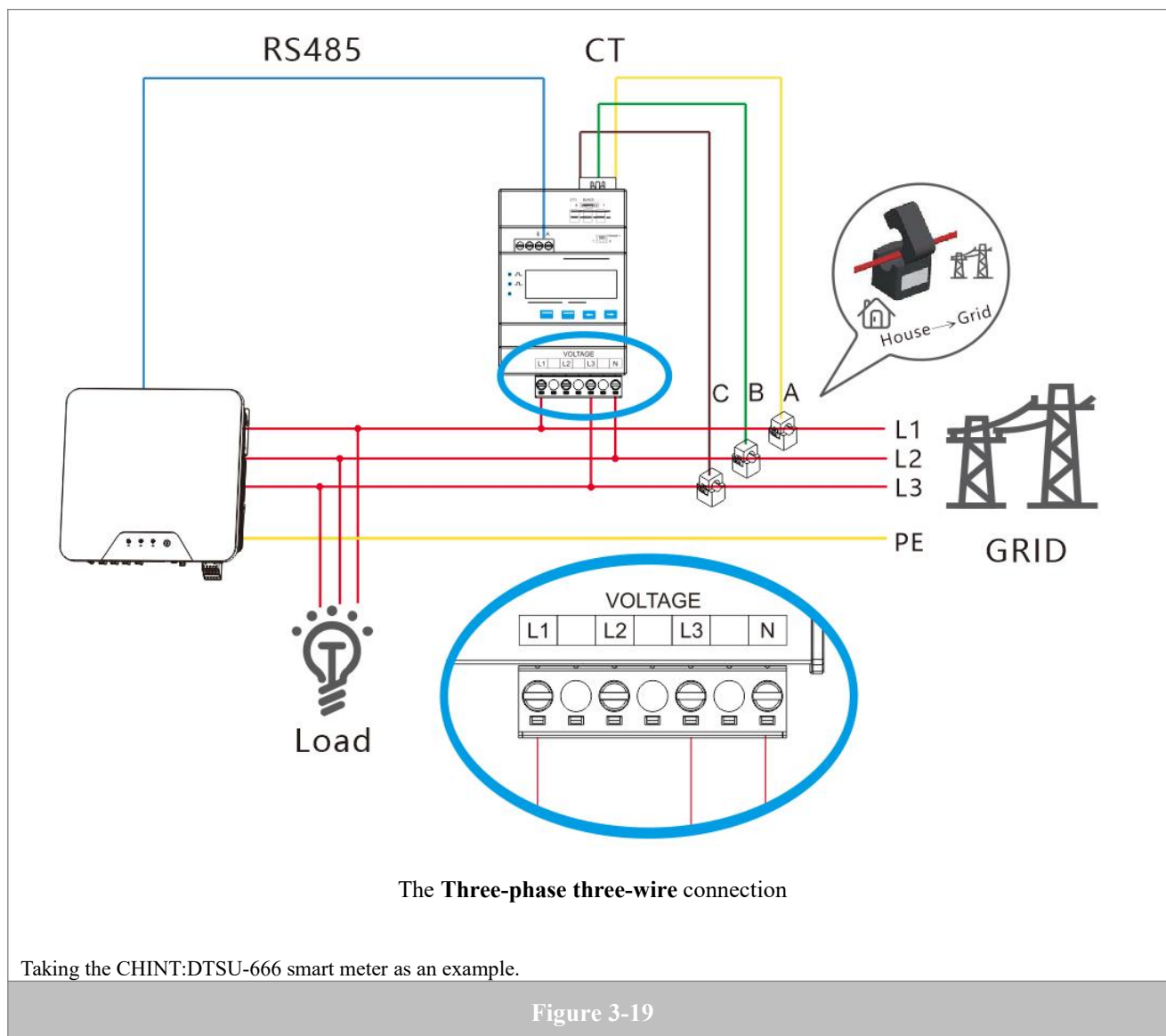
Note:

The Smart Meter and CT is well configured, please do not change any setting on Smart Meter.

For more detailed instructions, please refer to the user manual included with the smart meter.

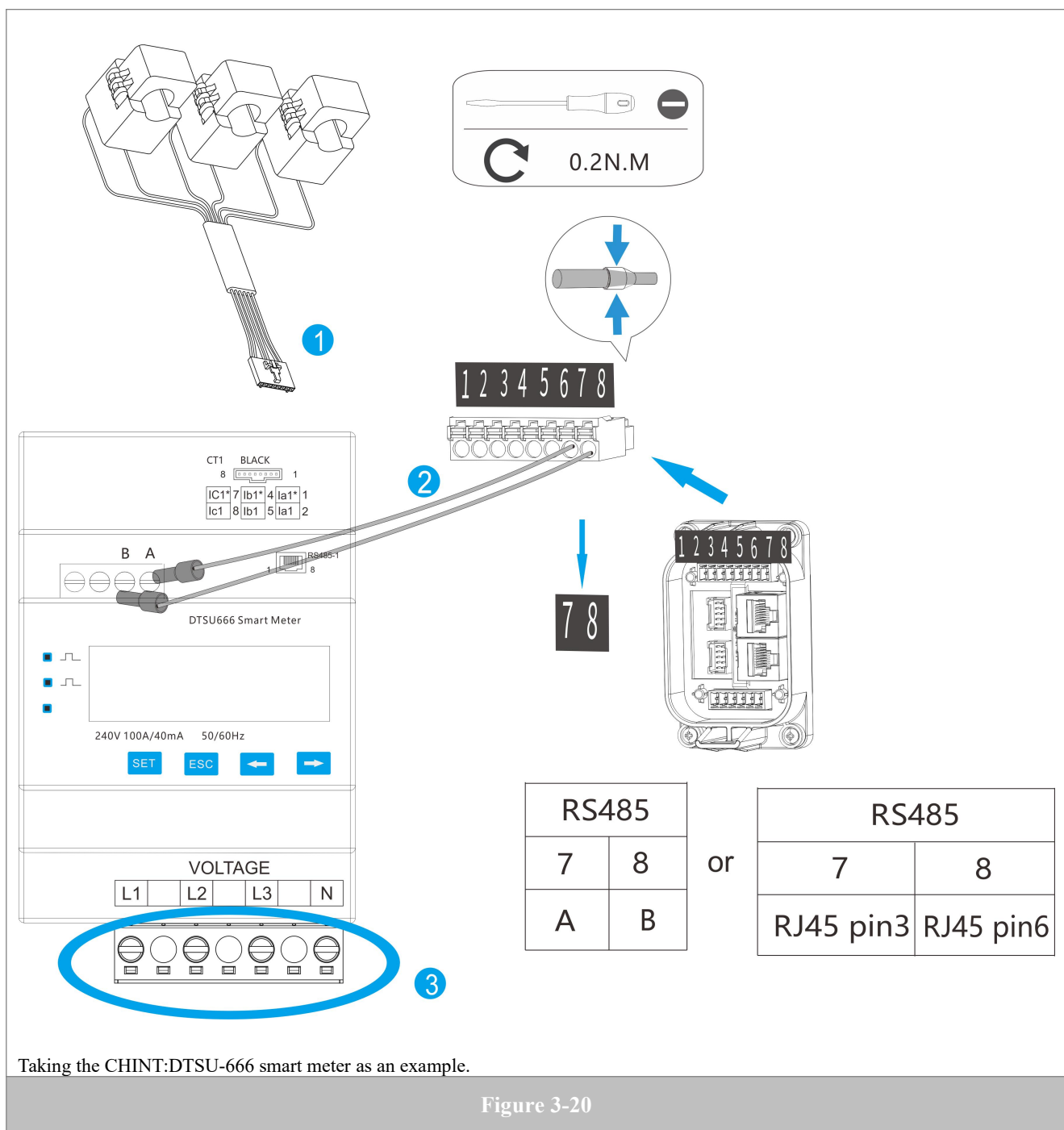
Smart Meter & CT Connection Diagram:





Note:

1. Please use the Smart Meter with CT in the SN product box;
2. CT cable is 3m as default, which could be extended to 5m at maximum;



Label	Description
L1/L2/L3/N	Connected Gird L1/L2/L3/N
RS485_A/B or RJ45 pin 3/6	Connected Inverter RS_485_Meter
CT_1	Connected Gird L1/L2/L3/N(as shown in the figure)

3.10 Parallel connection

Follow the Parallel System user manual in detail.

3.11 Inspection after installation

S/N	Inspection item	Inspection result: (Yes √/No ×)
1	Check whether the DC switch of the inverter is in the "OFF" position.	☐
2	Check whether the inverter installation is firm and reliable.	☐
3	Check whether the connection of the external grounding cable is correct, whether the terminal is tight, whether the grounding is reliable, and ensure that there is no open circuit or short circuit.	☐
4	Check whether the AC output cables are connected correctly, whether the terminals are fastened, and ensure that there is no open circuit or short circuit.	☐
5	Check whether the polarity of the DC input cable is correct, whether the connector insertion is firm, and ensure that there is no open circuit or short circuit.	☐
6	Check whether the connection of the communication cable is correct, whether the terminal is tight, and ensure that there is no open circuit or short circuit.	☐
7	Check whether the plastic nut on AC side and those at the end of the communication cable lock are tightened.	☐
8	Check whether the unused ports are fitted with dust plugs.	☐
9	Check whether the data acquisition stick module is installed correctly (only for products with optional data acquisition stick).	☐
Special reminder: It is recommended that after one week of operation, in an environment with sufficient light, the on-site operation and maintenance personnel use an infrared detector to measure the temperature of the direct connection terminal. If everything is normal, it means that the connection of the DC terminal is reliable. If everything is normal for the temperature of the direct connection terminal, it means that the connection of the DC terminal is reliable.		



Warning

- *Multi-point grounding in the matrix is prohibited!*

Chapter 4 Features and settings

4.1 Power-on sequence

Step 1: Check whether the electrical connection is correct.

Step 2: Open the DC switch.

Step 3: Power on the grid side.

Step 4: Power on the PV side.

Step 5: Power on the battery side.

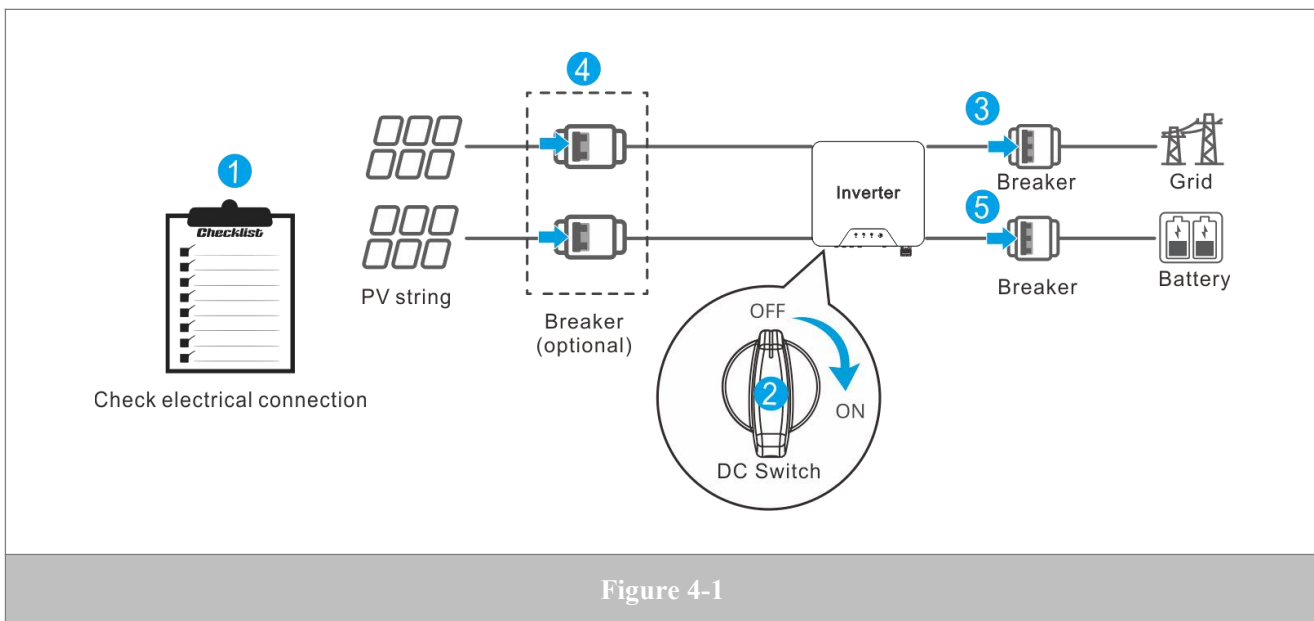


Figure 4-1

4.2 Smart meter connection and testing

4.2.1 Overview

To keep the inverter in normal operating condition, there are specific requirements for the connection method of the smart meter, and the smart meter certified or supplied by us should be used.

4.2.2 Connection direction

Pay attention to the direction of the power flow when connecting the smart meter. The power is negative when drawing power from the grid, and positive when sending power to the grid.*

**For the phase-adaptive version of the meter, please refer to section 4.4.3.2 for detailed information.*

4.2.3 Software installation QR code

To better manage and monitor your energy system, please visit your mobile app store (Apple App Store or Google Play). To download and search for the following two applications:

- **PowerInsight** (Local configuration)
- **EnjoySolar** (Online monitoring).

Or scan following QR codes:



PowerInsight
(Local Configuration)



EnjoySolar
(Online Monitoring)

4.3 Running mode

Taking the APP of PowerInsight2 as an example.

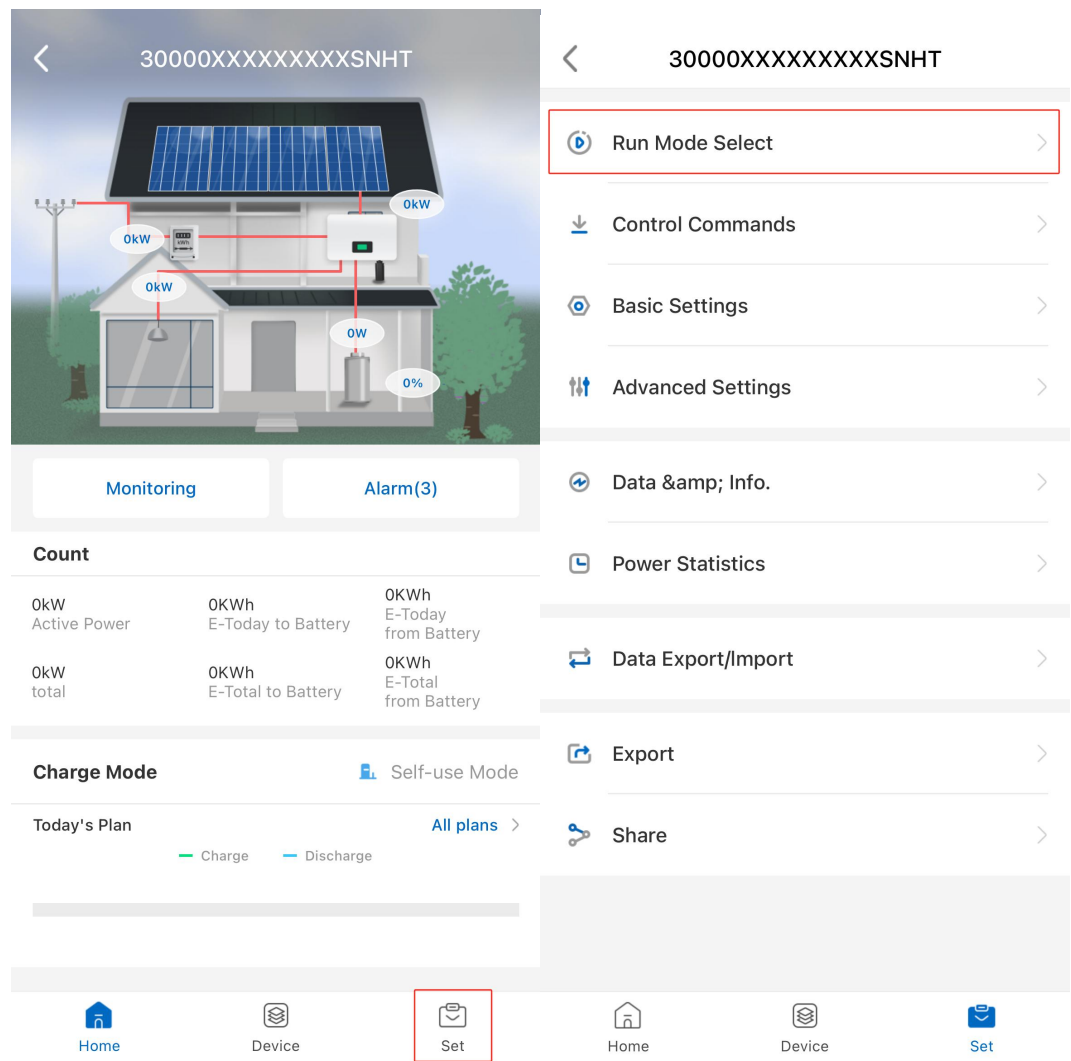


Figure 4-2

4.3.1 Self-use mode

4.3.1.1 Overview

Self-use mode can be used to adjust the power of PV, battery, and grid according to the power of the energy meter or EPS load power. If the energy meter turns on when communication is normal, the energy flow will adjust according to the power of the energy meter. If the energy meter is off or the energy meter is on with communication being abnormal, the energy flow will adjust according to the EPS load power.

The grid can switch to off-grid mode automatically in the event of a power failure.

4.3.1.2 Prioritized order of energy self-use

PV priority: The PV-generated electricity is supplied to the load first while the surplus is supplied to charge the battery, and any remaining electricity, if any, is sent selectively to the grid.

The PV-generated electricity, if sufficient, is supplied to the load as a priority while the surplus is supplied to charge the battery, and any remaining electricity, if any, is supplied to the grid.

If the PV-generated electricity is insufficient enough to sustain the load power, but the PV+ battery can sustain the loads, the PV+ battery will electrically supply the loads.

If the PV+battery is insufficient to support the loads, PV+battery+grid electrically will support the loads.

When the battery is discharging:

Grid-connected min. SOC setting range: 10-100%.

Normal charging and discharging is allowed at $SOC_{cur} > SOC_{min}$. The battery stops discharging until $SOC_{cur} \leq SOC_{min}$.

Force charge the battery when the SOC_{cur} is below 9% until the SOC rises to 14%.

Note*: Current SOC

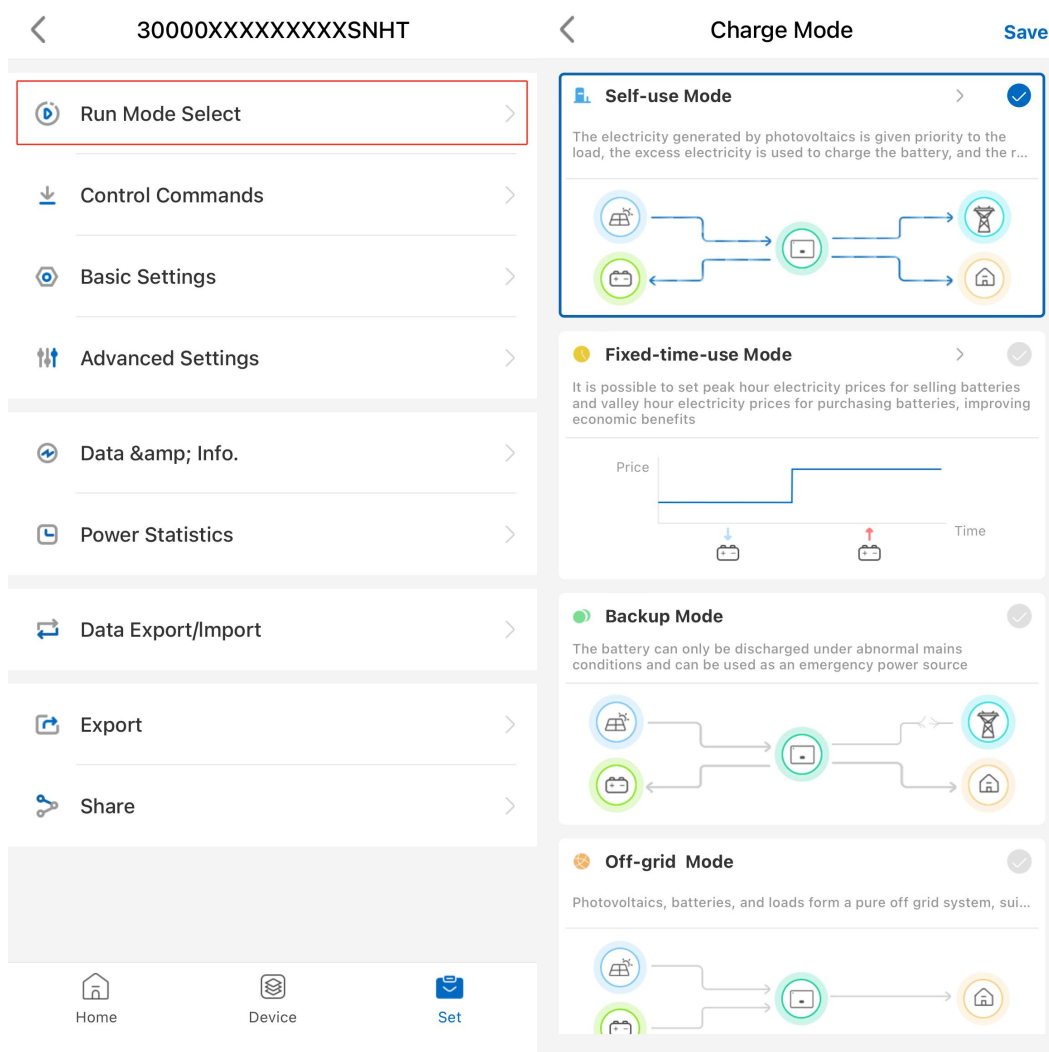


Figure 4-3

4.3.1.3 Charging plan under self-use mode

In order to avoid excessive energy consumption and battery abnormalities and to reserve more power for emergency use, a special design is made for the high power charging option. There are two time periods. When the option is selected, the battery is forced to charge according to the set charge power within the set time period, until the set SOC value is reached.

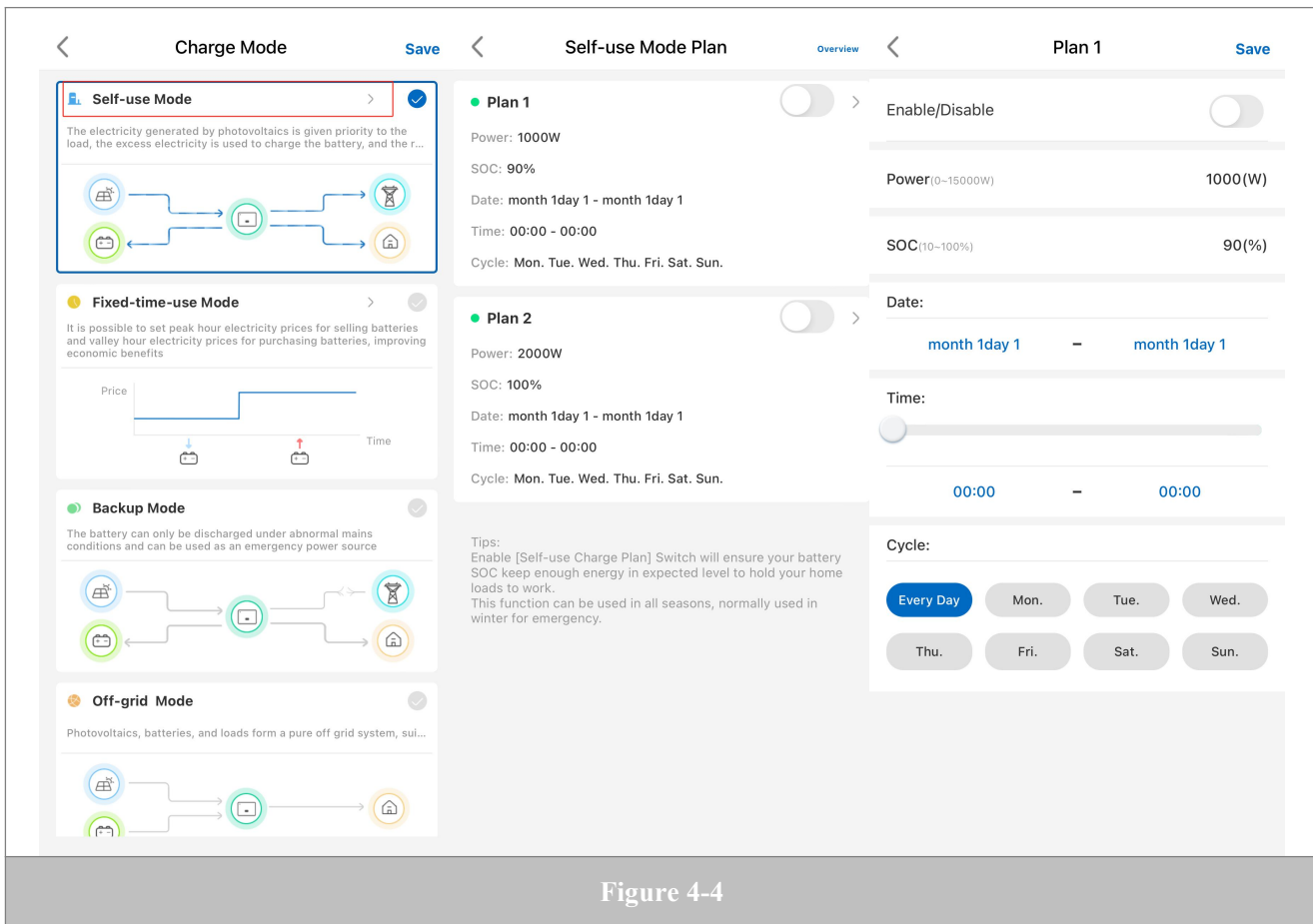


Figure 4-4

Parameter:

Forced charging function enabled: **Enabled:** Enable this function. **Disabled:** disable this function.

Start date and time: The date and time when the forced charging function starts.

End date and time: The date and time when the forced charge ends.

If the end date is later than the start date, they are considered to be in the same year. If the end date is earlier than the start date, the date is considered to span the year, counting first from the start date to 31 December, then from 1 January to the end date.

Time: It must not span days, and the end time must be later than the start time. Otherwise, the setting will fail.

Power: The power for forced charging of the battery*1.

SOC: Charge to a value where SOC stops charging.

Week function: Set the day of the week on which the battery is to be intensively charged. *1

*1Note: The actual charging power is affected by the PV, the rated power based on the model, the battery charging limit value and whether the battery can be charged from the mains.

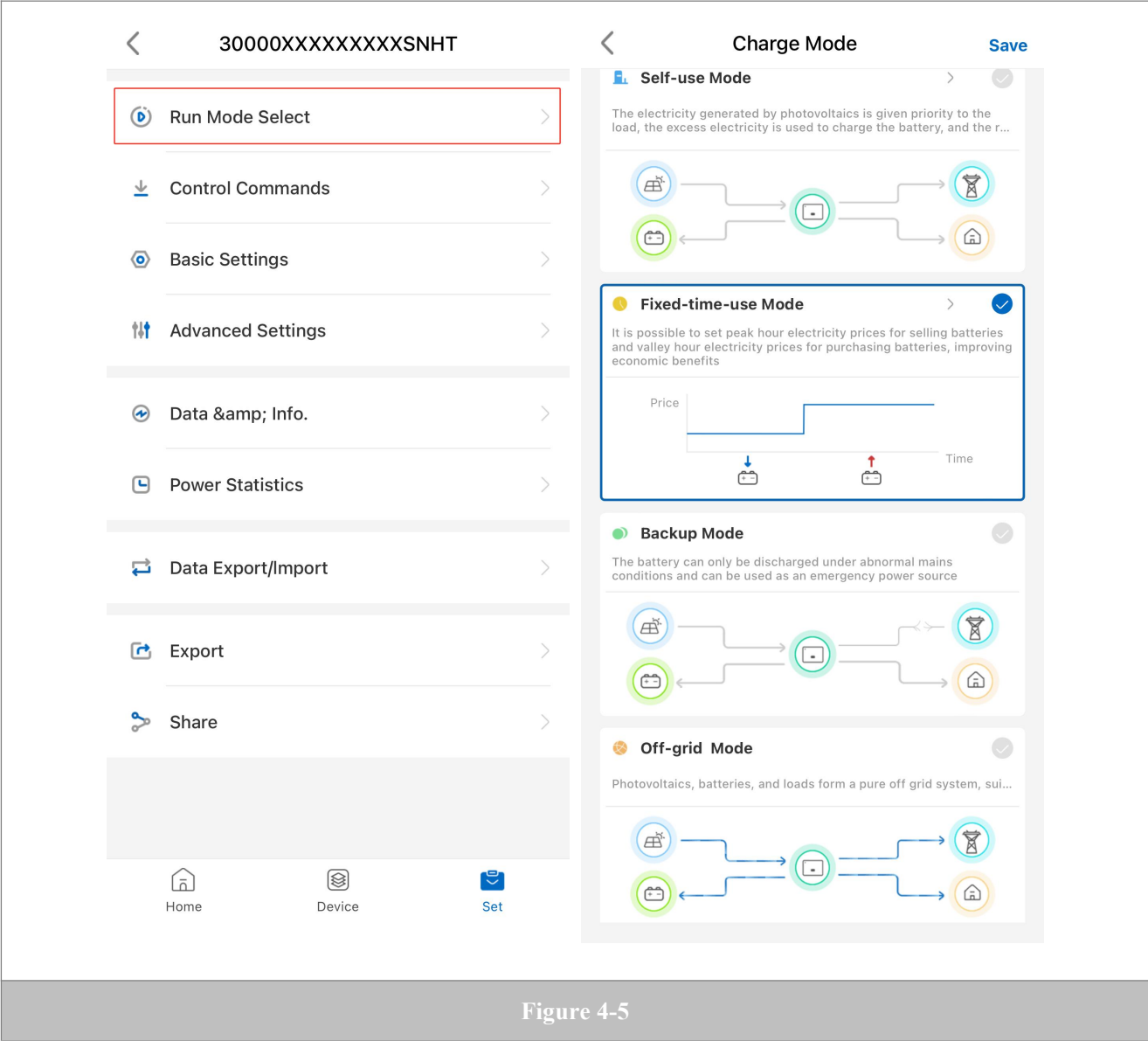
The power is the minimum value of the PV, the rated power and the battery charge limit.

4.3.2 Fixed-time-use Mode

4.3.2.1 Overview

We can set a peak power price to sell power from batteries and buy power for batteries at an off-peak power price, which can improve the economic benefits.

The equipment can automatically switch to off-grid mode, when the power grid fails.



4.3.2.2 Date/time setting

There are three settings of timed charging and timed discharging.

Time: If the regular charging and discharging is not used, all periods should be set to 00:00 with the start time and end times controlled between 00:00 and 23:59, where the end time must be later than the start time, and the time cannot cover a day. When setting, all time periods must not overlap, otherwise the setting will not be successful.

Power: The power for forced charging of the battery^{*2}.

^{*2} **Note:** The actual charge power is affected by the PV, the rated power based on the model, the battery charge, and discharge limit value and whether the battery is allowed to be charged the battery from the grid.

Among them, the charging and discharging power of the battery changes with the change of SOC, and the charging power is the minimum value among the PV, the rated power of the model, and the charging and discharging limit of the battery.

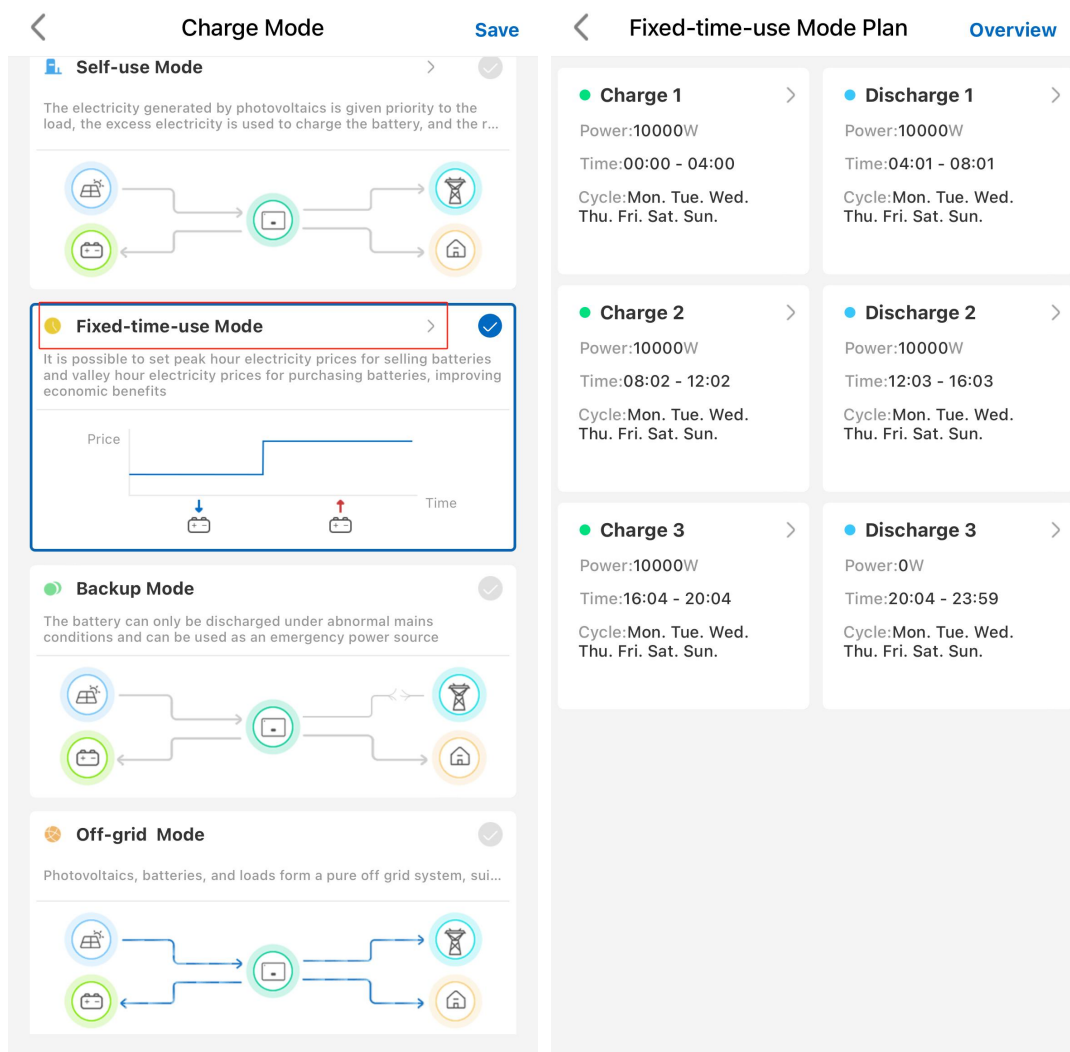


Figure 4-6

4.3.2.3 Week setting

Week function: Set which day of the week the battery is charged or discharged.

If the current SOC is greater than the minimum on-grid SOC, it can be charged and discharged normally; the battery will stop discharging until the current SOC is less than or equal to the minimum on-grid SOC.

If the current SOC is less than 9%, the battery is forced to charge until the SOC reaches 14%. Whether or not forced charging will be applied to the battery during actual use is also controlled by the command of the battery (if the battery requests forced charging, it will give priority to the forced charging of the battery).

In the event of a battery fault, stop battery charging or discharging.

In the event of a grid power failure, the equipment can be automatically switched to the off-grid mode.

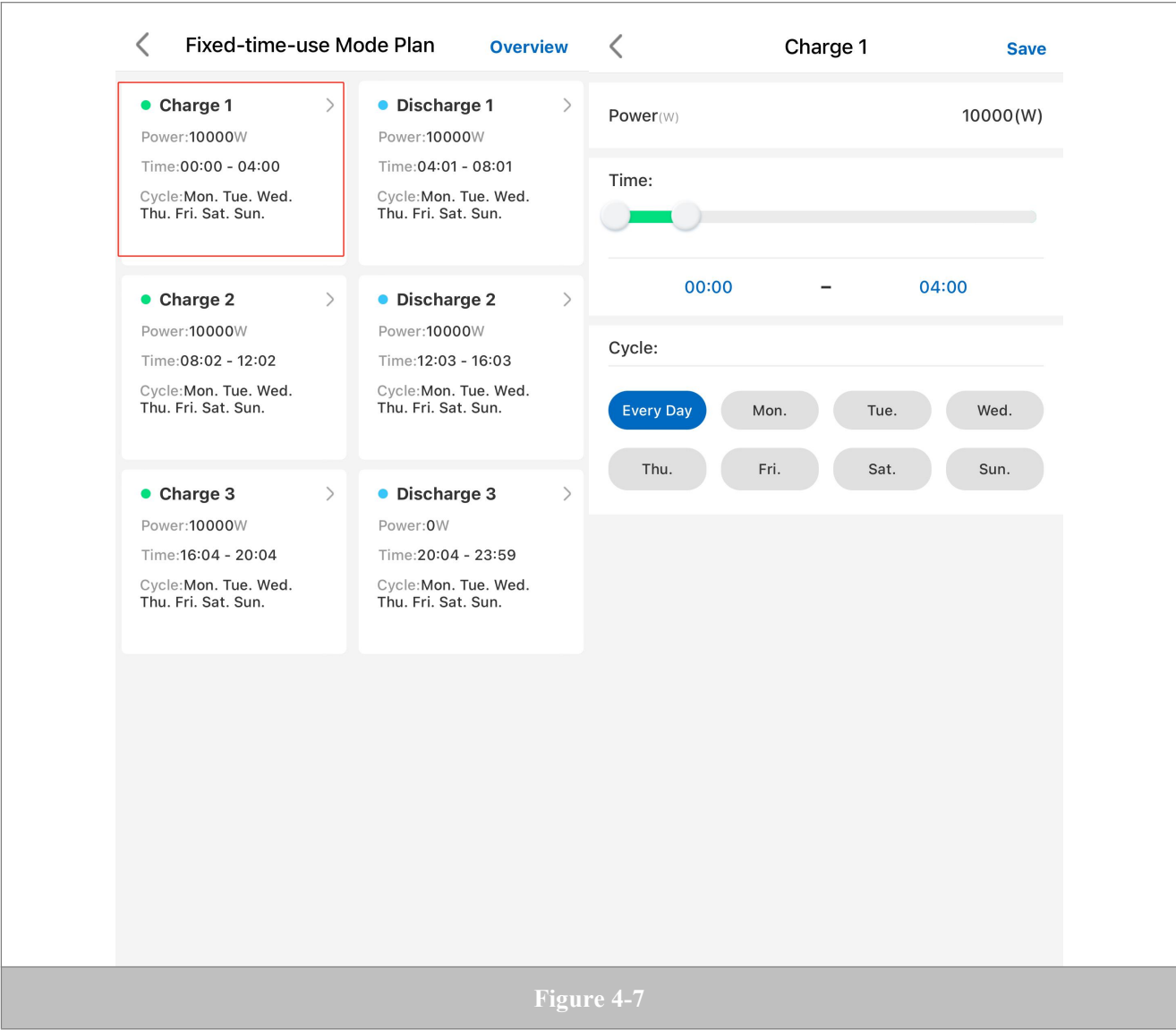


Figure 4-7

4.3.3 Backup mode

4.3.3.1 Overview

The battery can only be discharged under abnormal mains supply conditions and can be used as an emergency power source.

If the mains supply is lost, the unit will automatically enter the off-grid mode.

The current SOC of the battery must be maintained above the minimum SOC (set in On-grid minimum SOC).

If the current SOC is less than the minimum SOC set in On-grid, the battery will be charged to the SOC+2% hysteresis points of minimum SOC (On-grid).

When the current SOC is between 95% and 100%, in order to reduce the energy wasted by drawing power from the grid, at this time, the power supply to the EPS is guaranteed at this time according to the priority and the excess energy will be used to recharge the battery.

In this mode, we should pay more attention to the problem of phase unbalanced. Ac output power will be divided according to the loads connected with each phase. At the same time, the power of each phase cannot exceed the maximum power of the single phase, such as the rated power of the inverter is 12kW, and the single-phase load power cannot exceed 4kW.

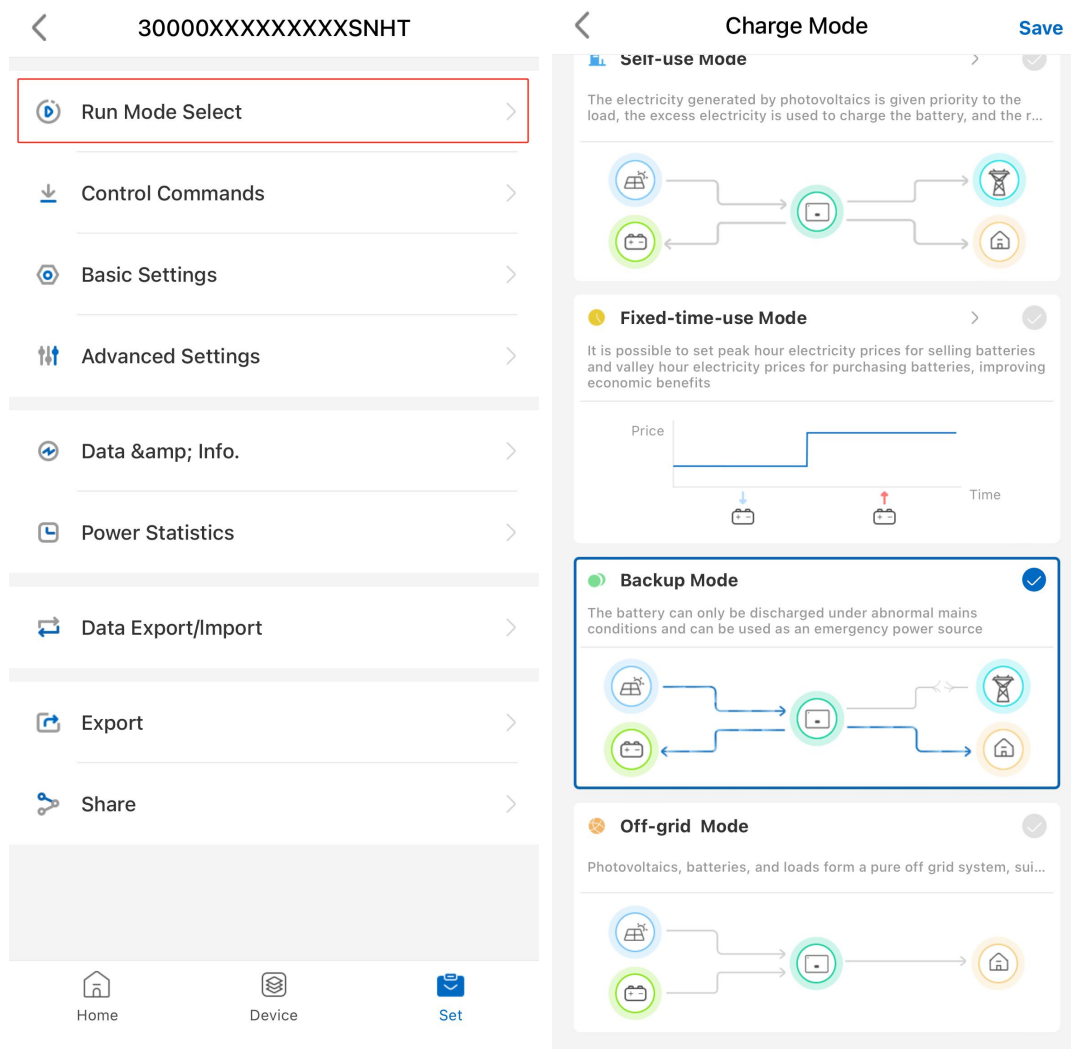


Figure 4-8

4.3.4 Off-grid mode (Active setting)

A pure off-grid system consisting of PV, Batteries, and Loads suitable for off-grid areas.

In this mode, you can force the inverter to disconnect from the grid to allow off-grid operation. Under this condition, it is impossible to send power to the grid or receive power from Grid.

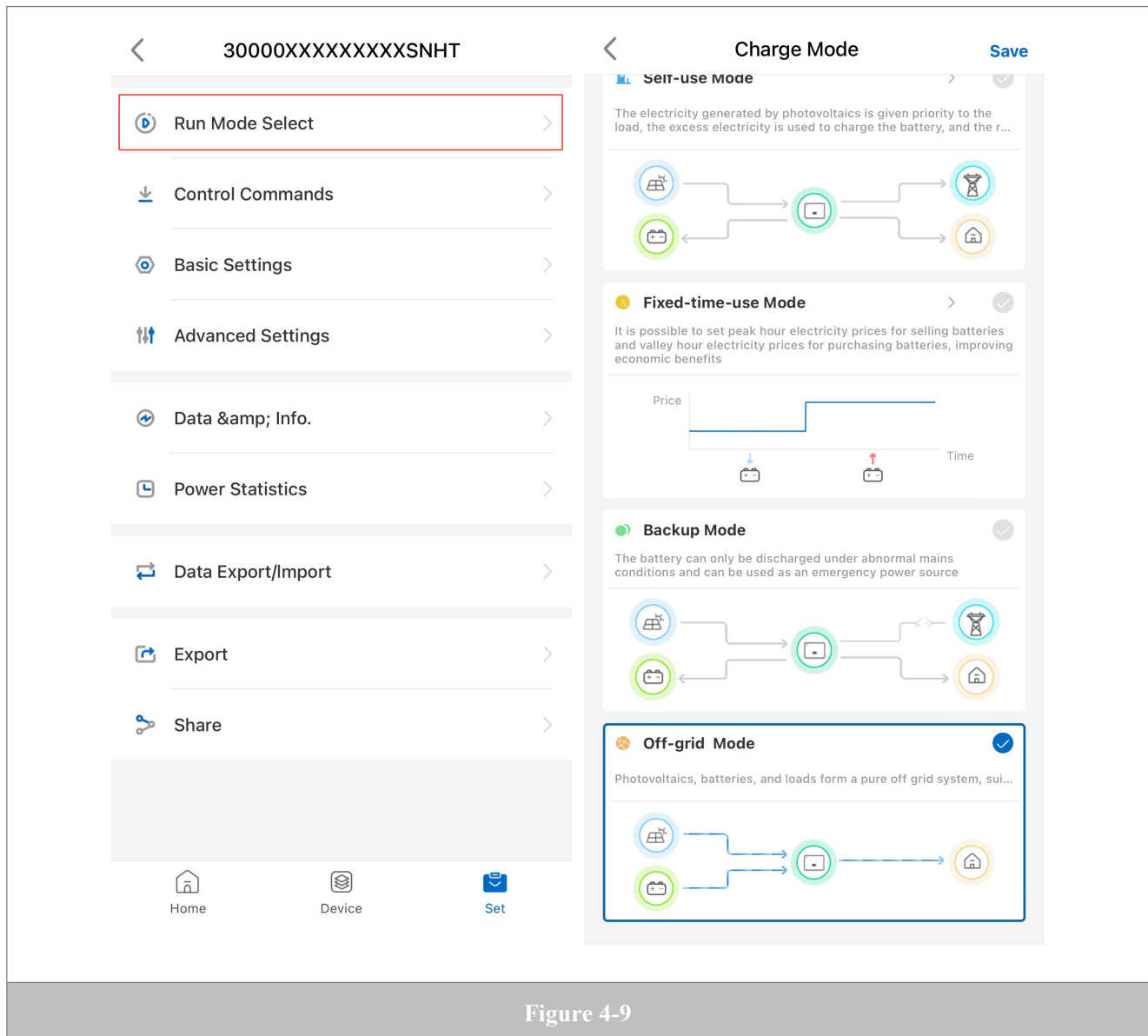


Figure 4-9

No grid power condition:

When the inverter detects that there is no grid power, it enters the same operating mode as the forced off-grid mode, and system will use Off-grid minimum SOC as the battery protect limitation. The inverter will not automatically enter off-grid mode upon the first power-up.

4.4 Function and parameter settings

4.4.1 Remote control

When the remote control (advanced authority) (also called **Passive Mode**) is enabled, the inverter's own operating mode (Self-containment with the power generated, regular charge and discharge and back-up mode) will be deactivated. The negative is for charging, while the positive is for discharging. The data of remote-control enabling function and the remote-control power in the inverter are not stored, i.e., which means the inverter is deactivated after restarting. If you wish to continue using it, you must enable and set the power again.

This mode can only work in grid connected mode, and battery charging and does not control battery charging and discharging in off-grid mode (including no mains supply).

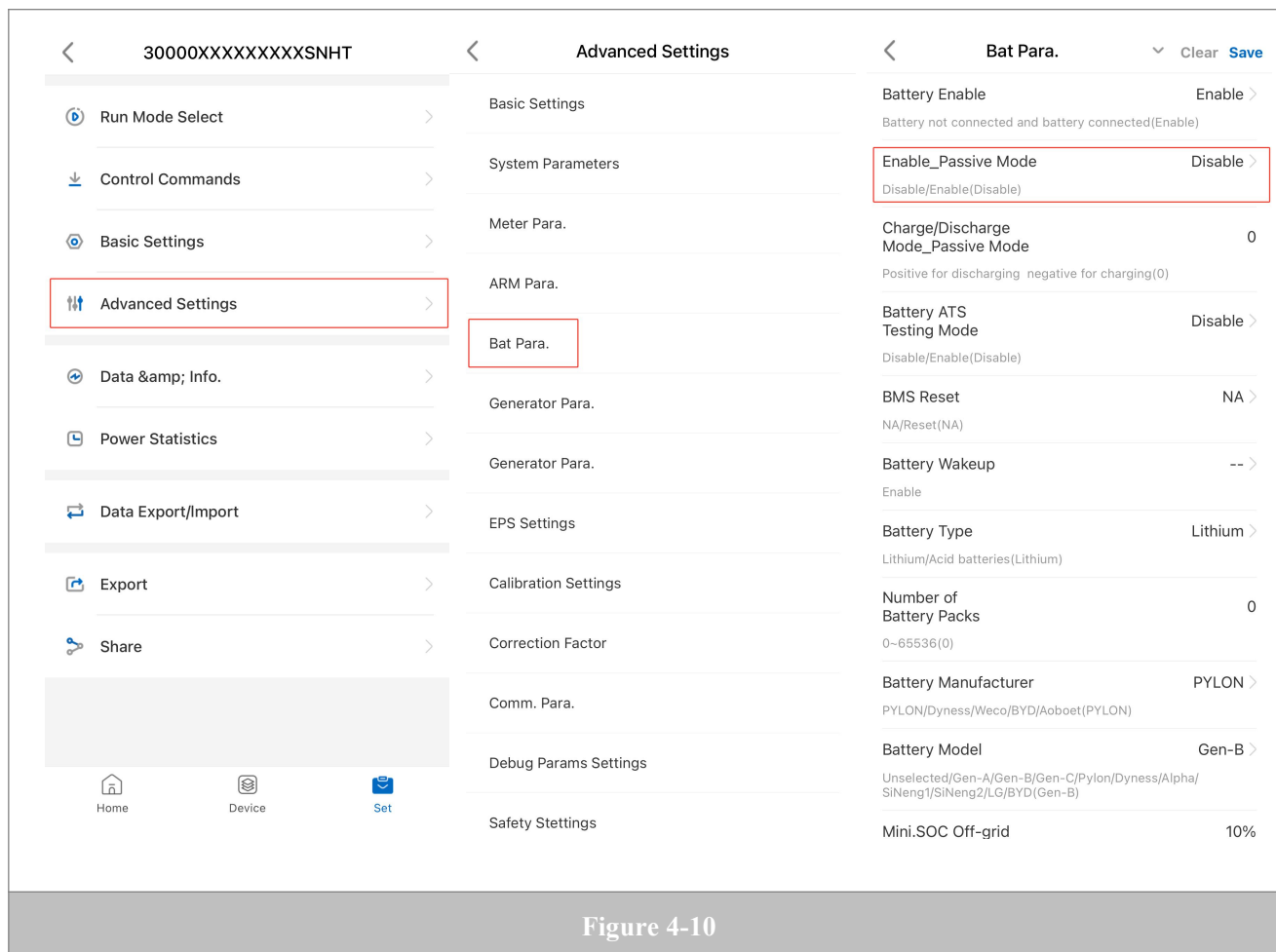


Figure 4-10

4.4.2 Battery Settings

Function: energy store and power supply.

Battery Enable: The battery must be enabled during normal operation. If the battery communication is abnormal or the battery fails and stops after being enabled, the inverter will stop.

If you need to use the battery function, please enable the battery enable flag first.

Battery Disable: If the battery fails, if the inverter is still required to operate normally as a grid-connected device, or if it is only required to be used as a grid-connected inverter without a battery, the battery can be disabled, so that the energy storage inverter can be used as a grid-connected inverter to supply power to the grid.

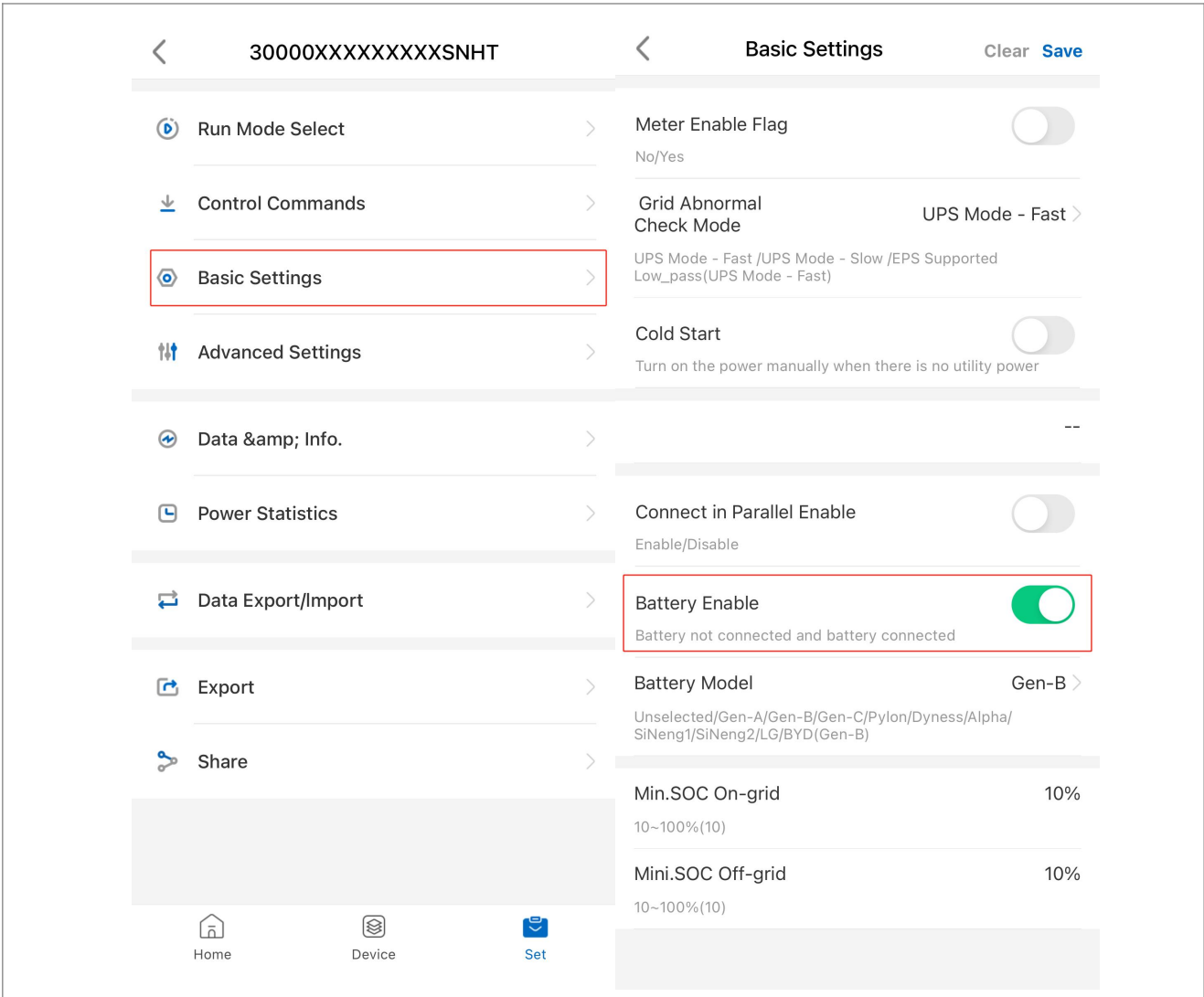


Figure 4-11

Battery model: If the battery function is enabled, the battery model must be selected correctly, otherwise abnormal battery communication may occur and the inverter may not operate.

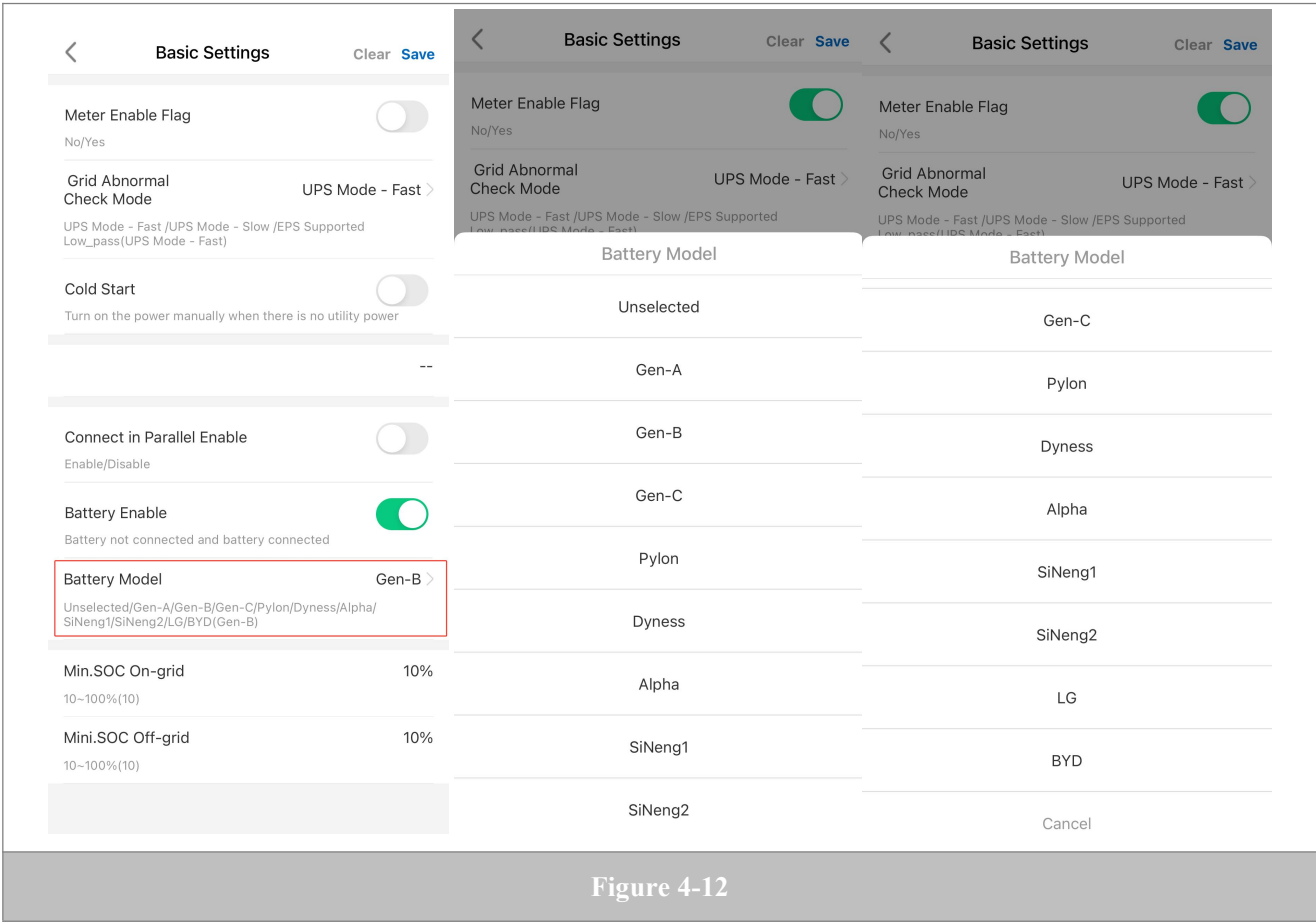


Figure 4-12

4.4.3 Smart meter

4.4.3.1 Overview

Function: 1. Used for export limit. 2. Adjust the inverter power according to the power of the energy meter under the self-use mode with the power generated and in the back-up mode.

Smart meter enabling: It can achieve the export limit function, adjust the inverter output power according to the power of the energy meter under the self-use mode with the power generated and back-up mode, and read real-time grid power, voltage, current and other parameters.

Smart meter disabling: Can not achieve export limit function, adjust the inverter output power according to the power of the ESP load under self-use mode with the power generated and back-up mode.

Smart meter model: Factory default setting.

Smart meter installation position: By default, the energy meter is installed on the grid side.

The factory default parameters of the energy meter communication are correct, please do not change them to avoid abnormal communication between the energy meter and the inverter.

Caution: If the energy meter and the inverter are connected to the three-phase grid, please ensure that the output of the energy meter and the inverter are in the same phase, otherwise the energy meter function will be disabled.

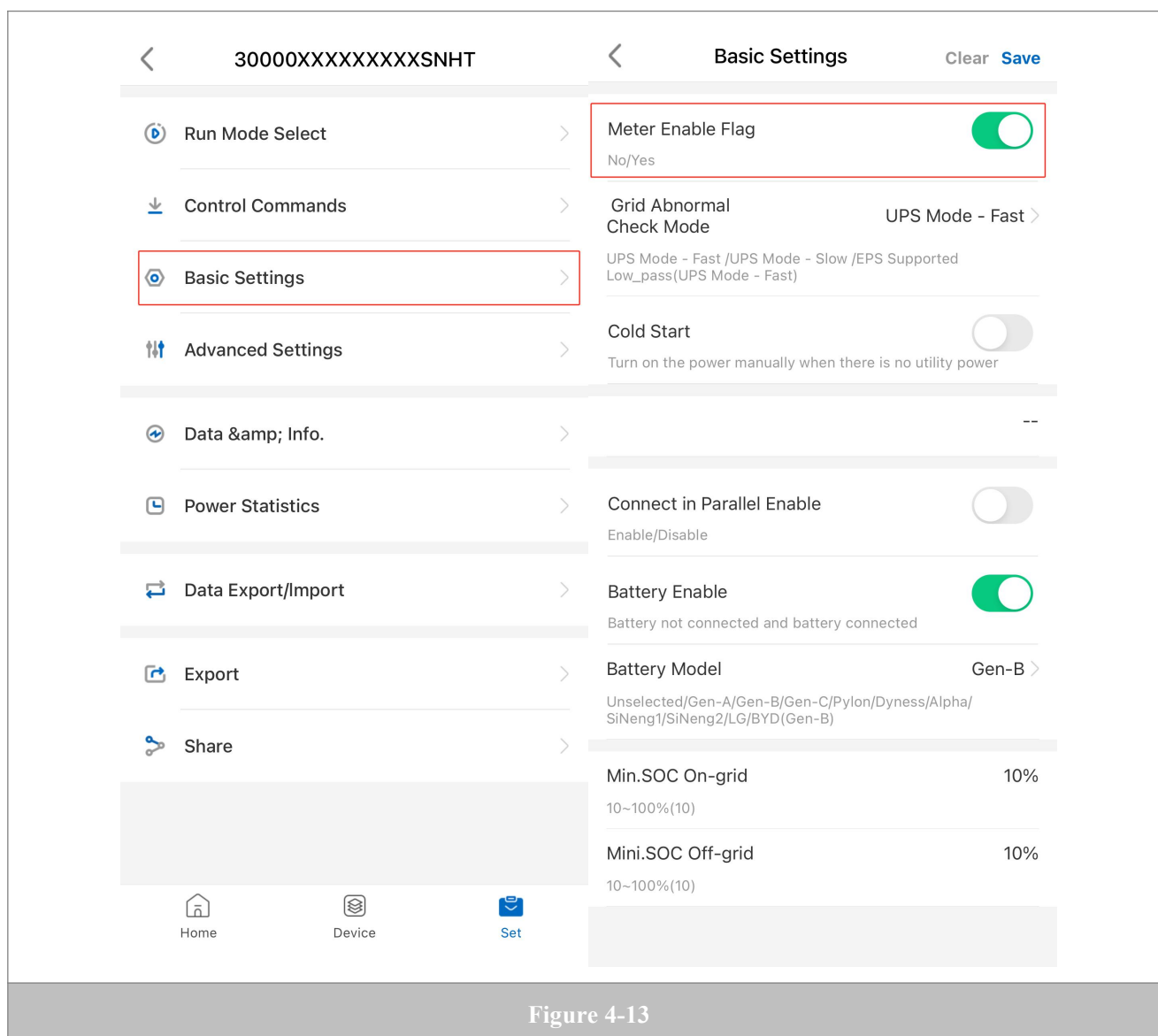


Figure 4-13

4.4.3.2 Three-Phase Adaptive Smart Meter Instructions

Function: When the inverter voltage phase sequence is consistent with the grid phase sequence, this feature can automatically adjust the phase sequence and polarity of the meter when the meter phase sequence and polarity are incorrectly connected.

**If the battery cannot work, or the grid side does not support the three-phase four-wire connection method, the automatic phase adjustment function cannot be used. Please connect the wiring according to the correct method as shown in the meter wiring diagram.*

**In the event of a three-phase three-wire grid configuration, it is necessary to connect the B-phase of the grid to the N-phase of the meter. Under this condition, the automatic phase adjustment function cannot be used.*

Scenario Description:

The meter requires a three-phase four-wire connection, and the neutral wire must be correctly connected. When performing self-check of the meter, the inverter needs to ensure that it is connected to the battery and that the battery is functioning properly, and that it is connected to the meter and that the meter is working normally.

Operation Instructions:

- Ensure Battery Enablement: Make sure the battery is enabled, the correct battery model is selected, and the battery connections are accurate to guarantee the battery functions properly.
- Ensure Meter Enablement: Ensure that the electricity meter is enabled, the correct meter model (DTSU666) is selected, and the meter connections are accurate to ensure the meter operates normally.

- The meter self-check needs to be carried out in the three-phase unbalanced mode. If the three-phase unbalanced mode is not enabled, the inverter will automatically enable the three-phase unbalanced mode (which will be automatically turned off after the test ends).

**When the three-phase unbalance is enabled and the meter scheduling is enabled, the entire process of the meter self-check takes about 3 minutes.*

When the three-phase unbalance is prohibited or the meter scheduling is prohibited, the entire process of the meter self-check takes about 5 minutes.

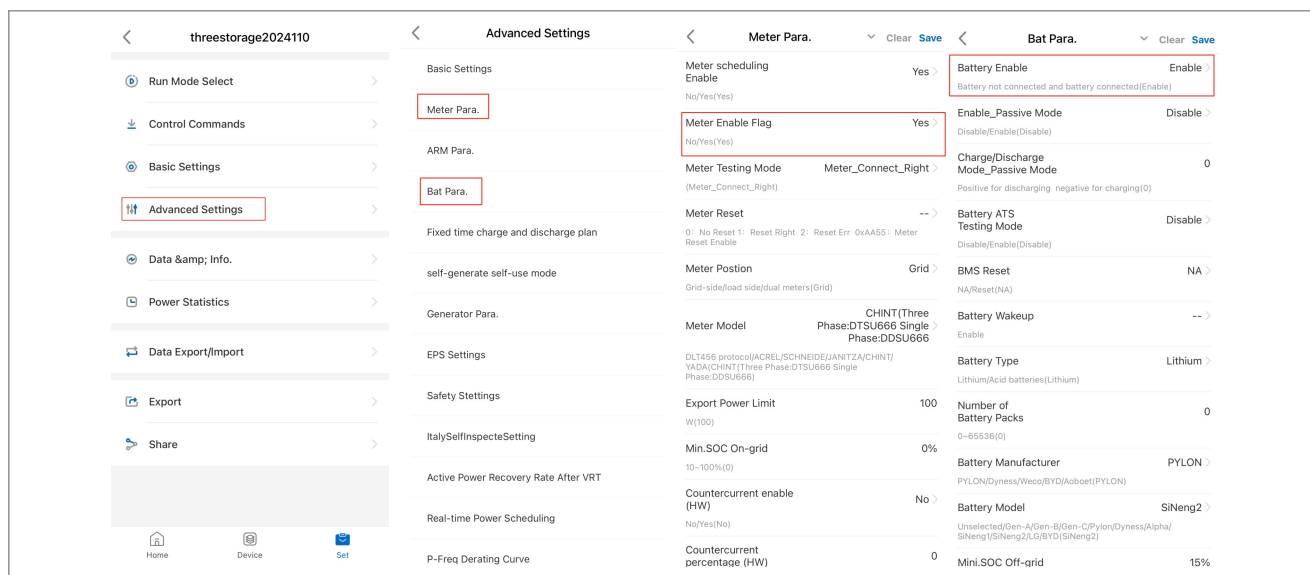


Figure 4-14

- Meter Self-Check: Click on "Meter Self-Check Start" in the meter's test mode menu.

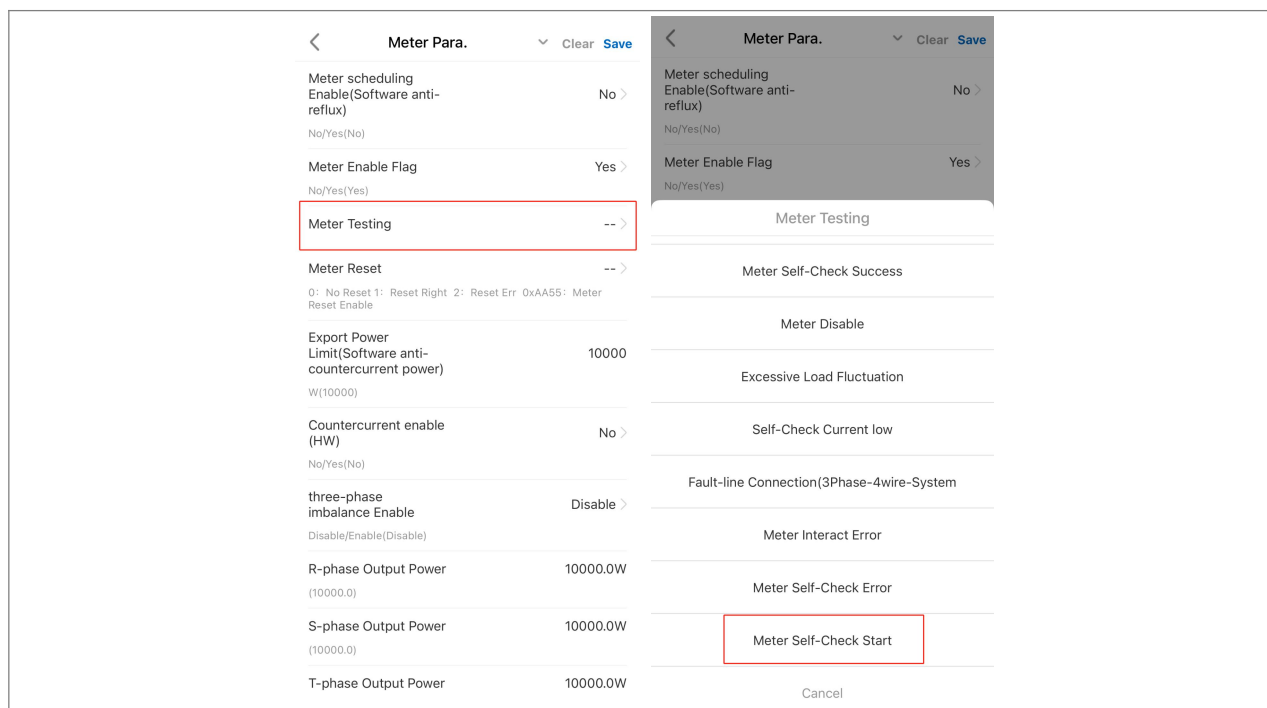


Figure 4-15

- Self-Check Success Notification: If the self-check process is successful, the meter's test mode menu will display "Meter Self-Check Success".

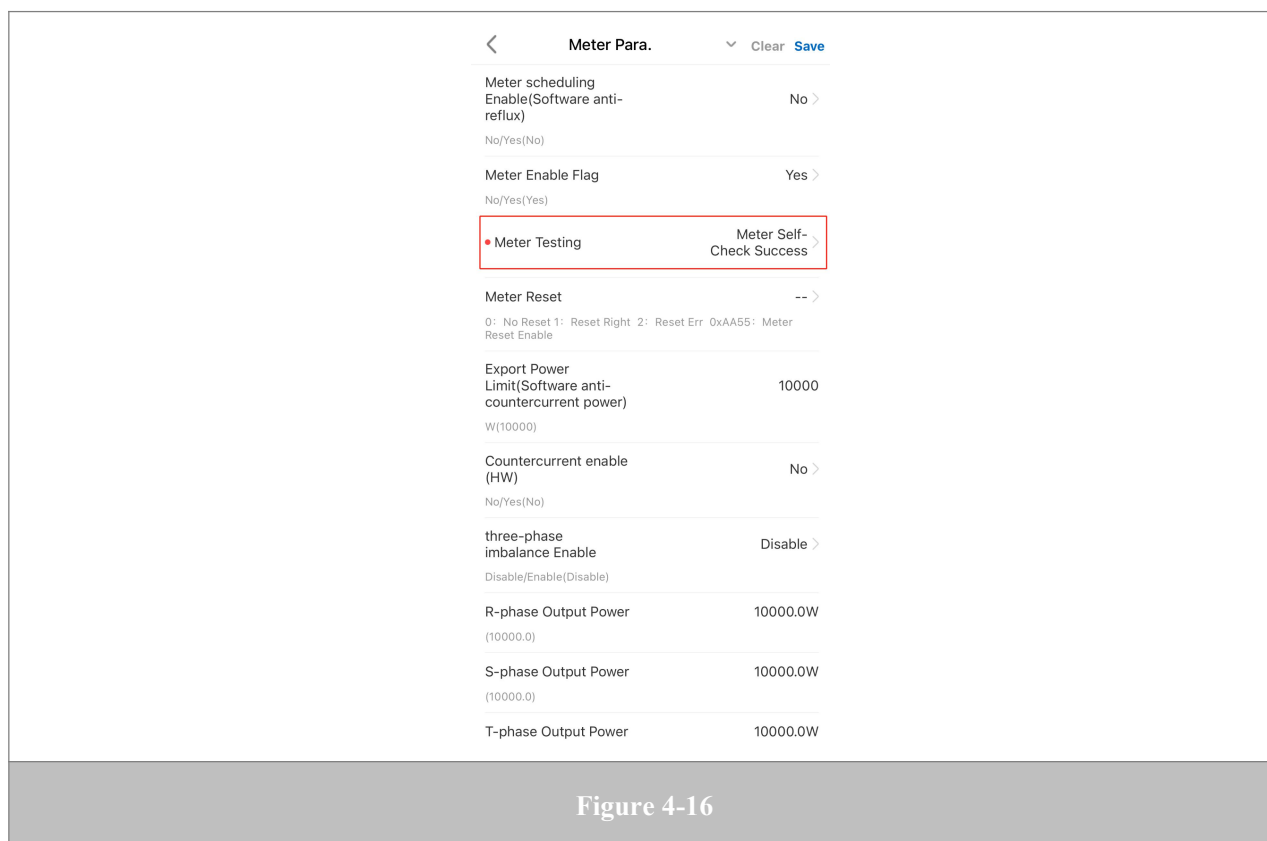
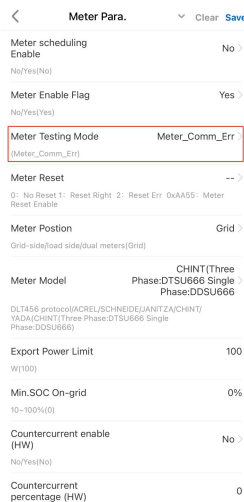
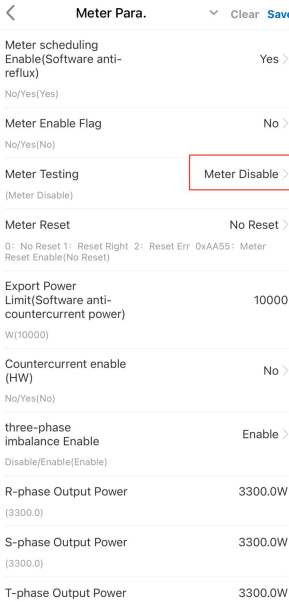
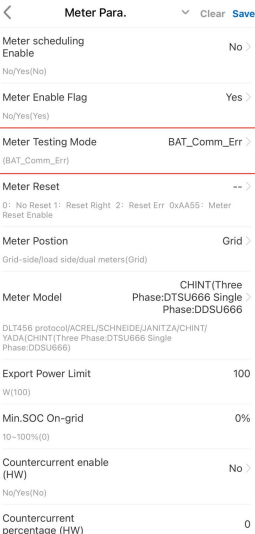
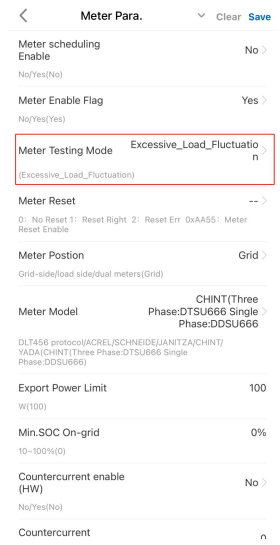
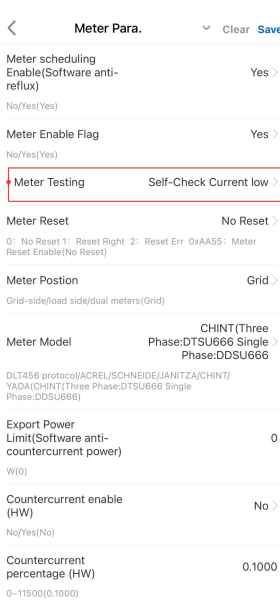
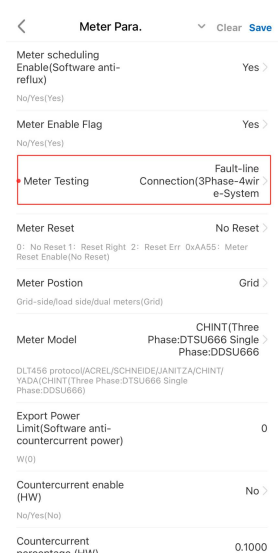
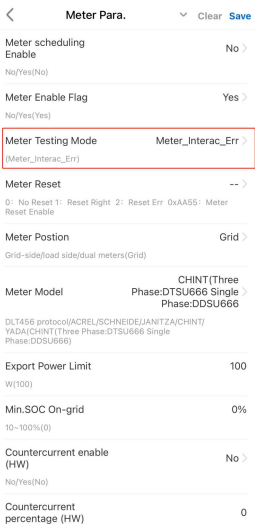
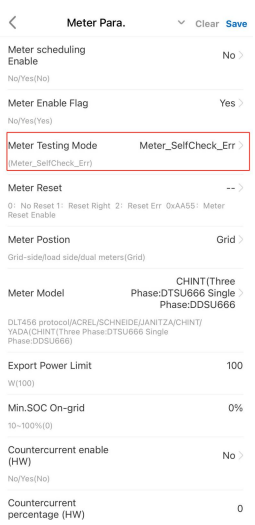


Figure 4-16

- Self-Check Failure Notification: If the self-check of the meter is unsuccessful, the meter's test mode menu will display the specific cause of the failure. For the causes of failure and their respective troubleshooting measures, please refer to table.

Error description	APP display interface	Cause of failure	Error Handling
Meter Communication Error		● Poor Communication Connection ● Mismatched Communication Address	● Check Meter Wiring Connections. ● Check Communication Address[112].
Meter Disable		● Meter Not Enabled	● Check meter Enablement.
BAT Communication Error		● Battery Model Mismatch ● Battery Not Enabled ● Poor Communication Connection	● Check Battery Model. ● Check Battery Enablement. ● Check Battery Wiring Connections.

Excessive Load Fluctuation		Home load fluctuations occurred during the self-check process of the electricity meter.	It is necessary to check for home load fluctuations during the self-check process, preferably with each phase load not exceeding 800W.
Self-Check Current low		When the power load on the grid side approaches 1KW every phase, it may result in the meter detecting a current lower than the required value.	It is suggested to increase or decrease the load. (The dynamic load range of every phase should be 0-0.63KW, and the static load range of every phase should be less than 0.63KW or greater than 1.17KW.)
Fault-line Connection (3Phase-4wire-System)		The self-check function of the meter is only applicable to three-phase four-wire meters.	Check the wiring of the meter and inverter to ensure it is a three-phase four-wire connection. Make sure the meter settings are configured for a three-phase four-wire system.

Meter Interact Error		● The meter failed to exchange data with the inverter during the self-check process.	● Check if the meter model has a self-check function. ● Check the connection of the meter's communication lines. ● Check if there is a significant difference between the meter's current, voltage, and the AC side data before the self-check starts.
Meter Self-Check Error		● If the meter self-check fails, it will report a meter self-check error.	● If the meter self-check fails, an error will be reported. For repeated failures, reset the meter to its original phase sequence and manually rewire according to the meter wiring diagram.

4.4.3.3 Smart Meter Reset

Function: This feature allows the restoration of the meter's phase sequence, CT (Current Transformer) phase sequence, and CT polarity to the unadjusted states.

Scenario Description: If the meter self-check fails to correct the phase and polarity, a reset to the default phase sequence is advised. Subsequently, align the Current Transformer (CT) sequence with the grid (L1, L2, L3, N), ensure the CT direction points towards the grid, and verify the correct voltage phase sequence as per the meter's wiring diagram.

Operation Instructions:

1. Select the "Meter Reset" option in the electricity meter parameter list.
2. Choose to enable the reset completed.

This process will revert the meter to its default settings, allowing you to start the wiring and configuration process a new, ensuring that all connections are made correctly according to the specifications.

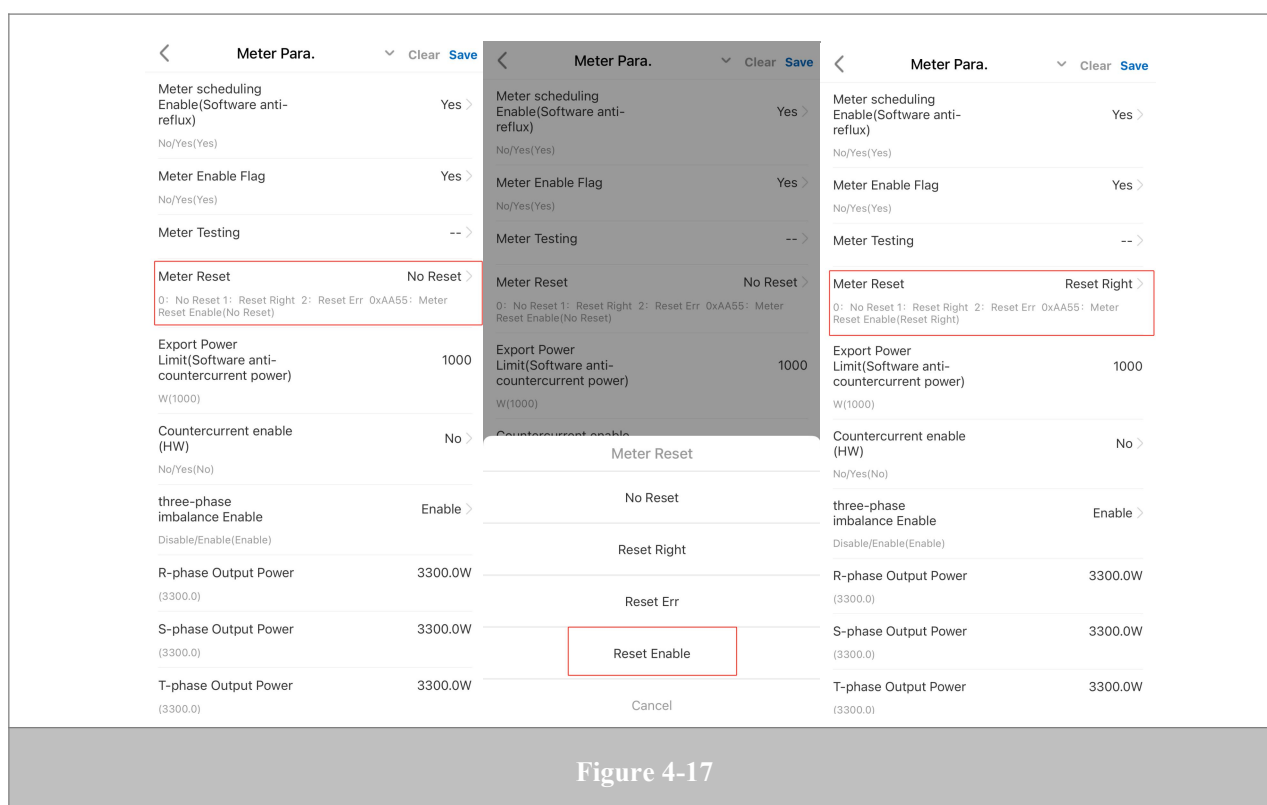


Figure 4-17

4.4.4 On-grid minimum SOC

Function: In on-grid mode, the lowest SOC of the battery will all use this SOC.

In self-use mode with respect to the power generated, the battery will no longer be discharged when its real-time state of charge is less than this value.

In regular charge/discharge mode, when the real-time SOC of the battery is less than this value, it will no longer be discharged.

In standby mode, the battery is charged when the real-time charge state of the battery is less than this value, and the battery is not discharged when it is greater than this value.

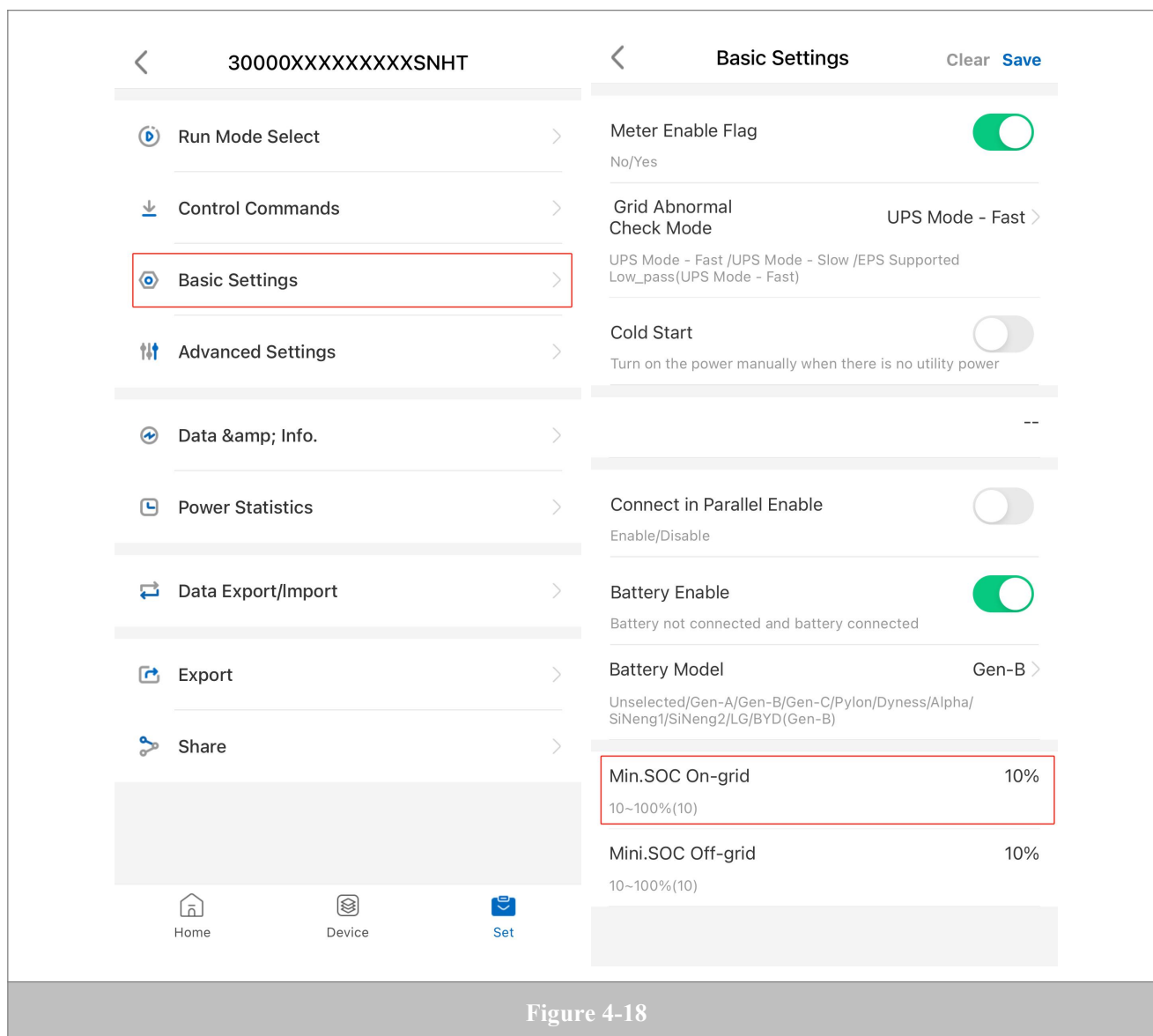


Figure 4-18

4.4.5 Off-grid minimum SOC

Function: The minimum SOC of the battery set in the off-grid mode or other mode without grid-connected-in conditions, system will all use this SOC limitation parameters, with the range set as 10%~100%.

In both cases, when the battery SOC is greater than this value, it can be discharged, and when it is lower than this value, the battery can be charged according to the PV situation.

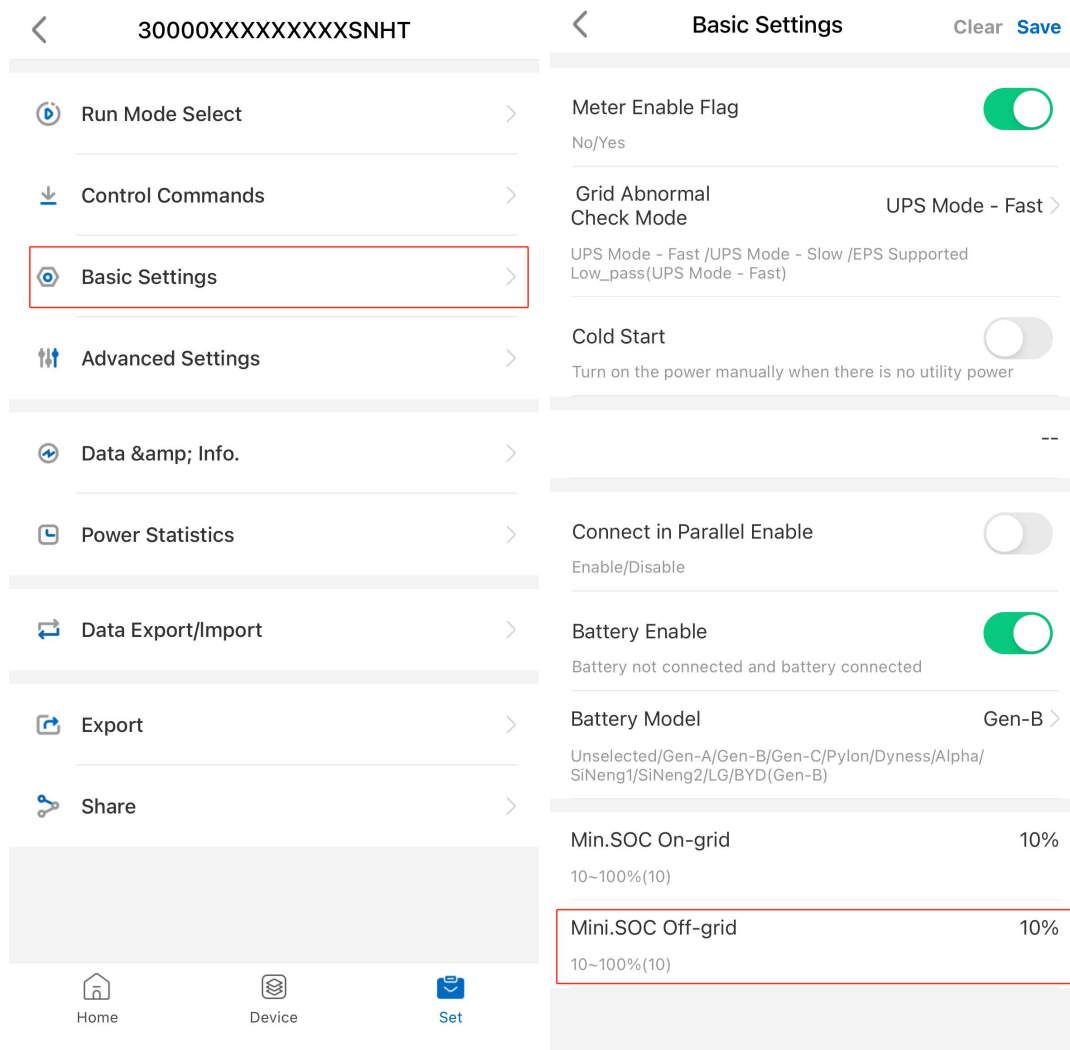


Figure 4-19

4.4.6 Low Battery SOC Protection

During the actual operation of the system, the battery may discharge to a state of low SOC. Prolonged or repeated charging and discharging of the battery will affect its BMS system, cause resource waste, and even endanger system safety. Our device is equipped with this function to protect the battery and ensure the safe and stable

operation of the system.

When the battery is in a continuous discharge state, the system will protect the battery for the first time according to the "minimum SOC for On-grid " set by the user, and stop continuing to discharge;

When the battery is worn down for a long time, the SOC will further decrease. When the battery BMS "forced charging" command is triggered, the system will charge the battery under conditional charging situations until the "forced charging" command of the battery BMS disappears (there may be differences in the SOC values of different battery BMS in forced-charging and stopping-forced-charging. The system will automatically recognize them without any user action);

When the battery BMS "forced charging" command is triggered, in order to prevent the battery from still discharging at low battery level and repeatedly charging / discharging in a short period of time, the system will protect the battery from discharging for a certain period of time. The more times the BMS "forced charging" command is triggered, the longer the time delay will be;

When battery BMS "forced charging" command triggered 3 or more times, the system will no longer allow the battery to discharge until the battery meets the charging conditions. After the battery BMS triggers the "forced charging" command and disappears, when charging reaches the SOC+3% hysteresis point, the battery charging or discharging will no longer be restricted by this function protection.

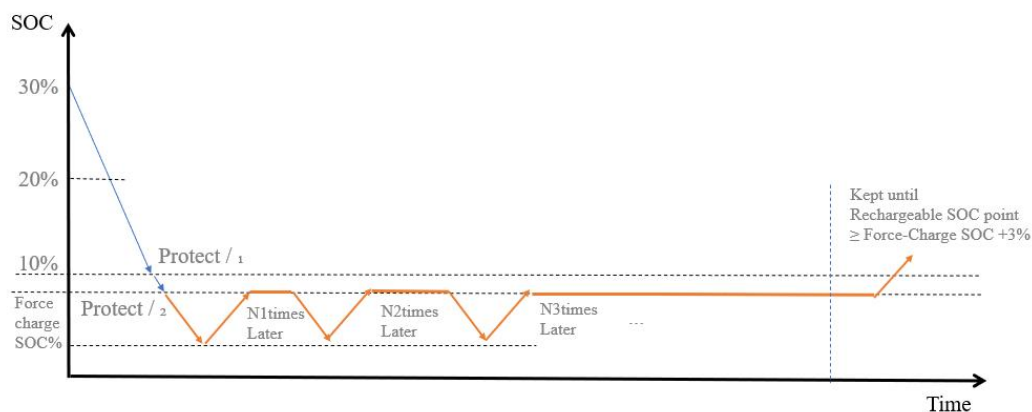


Figure 4-20

4.4.7 Forced charging

This occurs mainly when the battery power is low. To prevent the battery from being damaged due to the lack of battery power, there are two main situations:

1. When the battery SOC is below 5%, it is charged to 9% by the forced charging.
2. The battery will request a forced charge until the sign for forced charge request symbol disappears. The duration of the forced charge is different for each battery, if it is still less than 9%, it will continue to be charged to

14%.

4.4.8 Automatic forced SOC calibration

During prolonged operation, the battery may not consistently meet the SOC calibration conditions, which can lead to inaccuracies in SOC readings. To assist with SOC calibration for the battery, the inverter system will, after running for a certain period (which may vary depending on the battery type), charge the battery to 100% capacity at full power when the system has charging conditions and the battery is in a charging state. This process helps the Battery Management System (BMS) to complete a calibration of the battery's charge levels.

4.4.9 Three-phase Imbalance

Function: This function can separately control the power of each phase of the inverter sent to the grid .

The three-phase imbalance function will be activated when the inverter is connected to the battery, communicates normally with the electricity meter, and both the smart meter dispatch and three-phase imbalance are enabled.

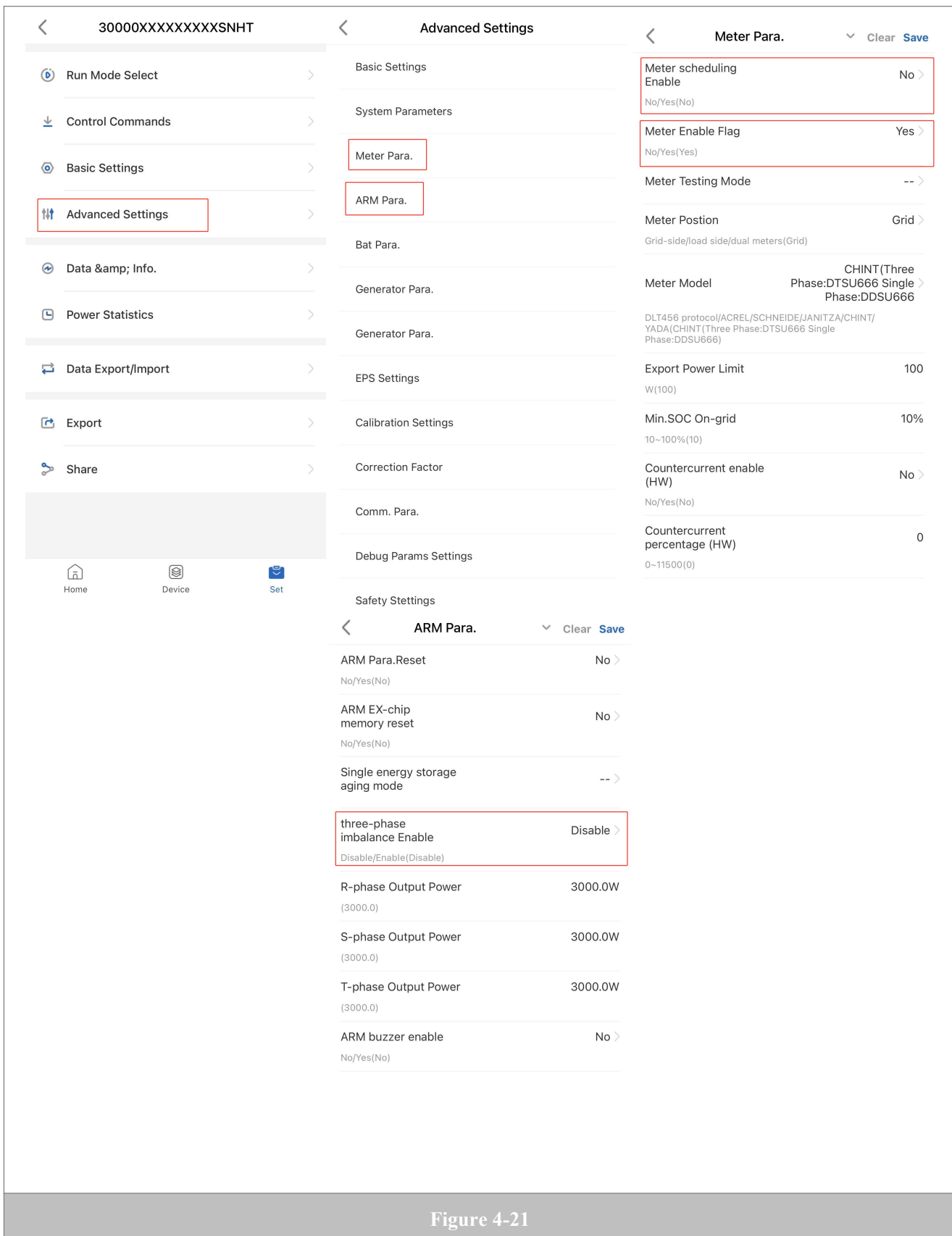
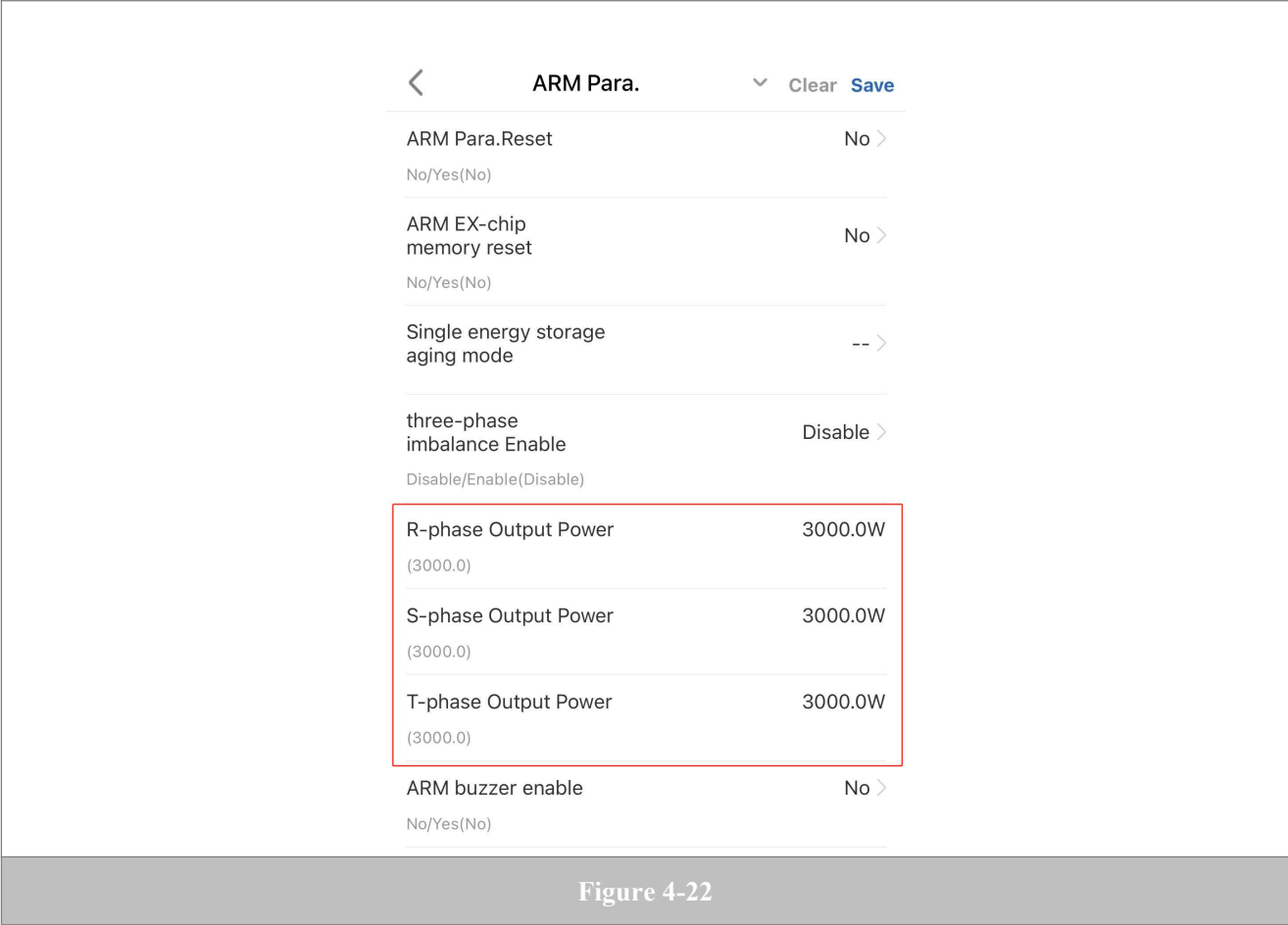


Figure 4-21

In the three-phase imbalance export limit function, the power limits according to the meter and the power output

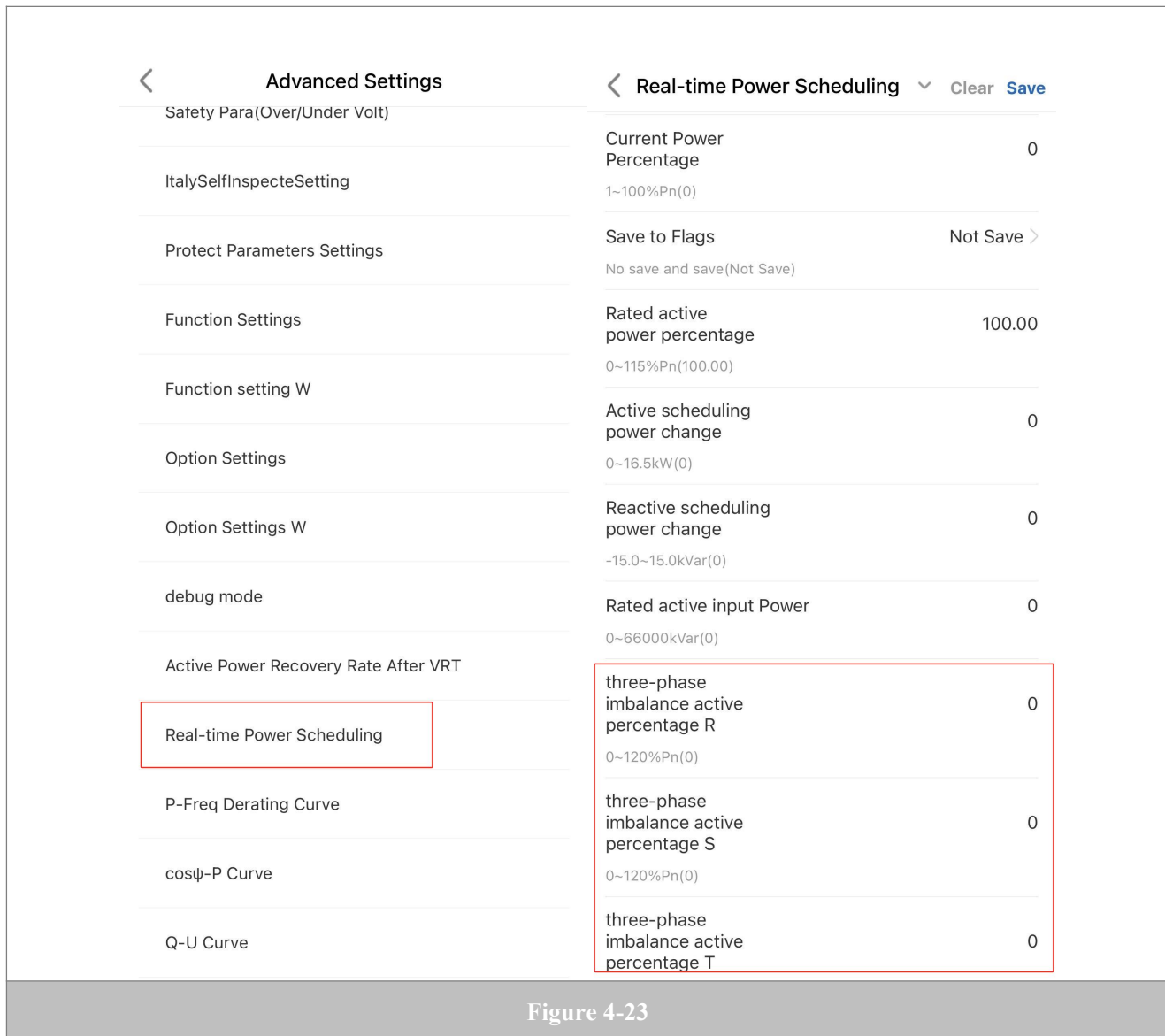
percentage limits for the inverter are introduced respectively.

- The power sent to the grid by any individual phase of the inverter can be limited by configuring the output power values for the R/S/T phases.



- R/S/T Phase Active Power Percentage Limitation.

By setting the active power percentages for the R/S/T phases, the power output of any individual phase of the inverter can be restricted (note that the active power percentages for the R/S/T phases are not saved in real-time; they will revert to the initial value of 115% upon re-energization).



Note: When setting both the R/S/T phase output power values and the R/S/T phase active power percentages, the inverter will limit the power output based on the lower of the two values.

4.4.10 Export limit

Function: This function can control the power sent by the inverter to the grid.

The export limit function will be activated when the inverter is connected to the battery and the communication with the energy meter is correct.

In this introduction to the export limit function, software export limit function and hardware export limit function will be introduced separately. The settings also need to be set separately as export limit (software) / Export limit (hardware). When the safety regulations and standards in different countries are inconsistent, the system will automatically execute software, hardware, or software/hardware export limit functions that comply local safety regulations with user settings.

- Soft Limit, export limit (software)

It is necessary to activate the export limit function (also called Soft limit) and set the power sales limit, which controls the value of the power output to the grid.

- Hard Limit, export limit (hardware)

- Soft & Hard Limit, export limit (software and hardware)

When both export limit (software) and export limit (hardware) functions are turned on, the system will first use software export limit scheduling. If the software export limit adjustment still cannot achieve the purpose of preventing backflow, hardware export limit will be enabled.

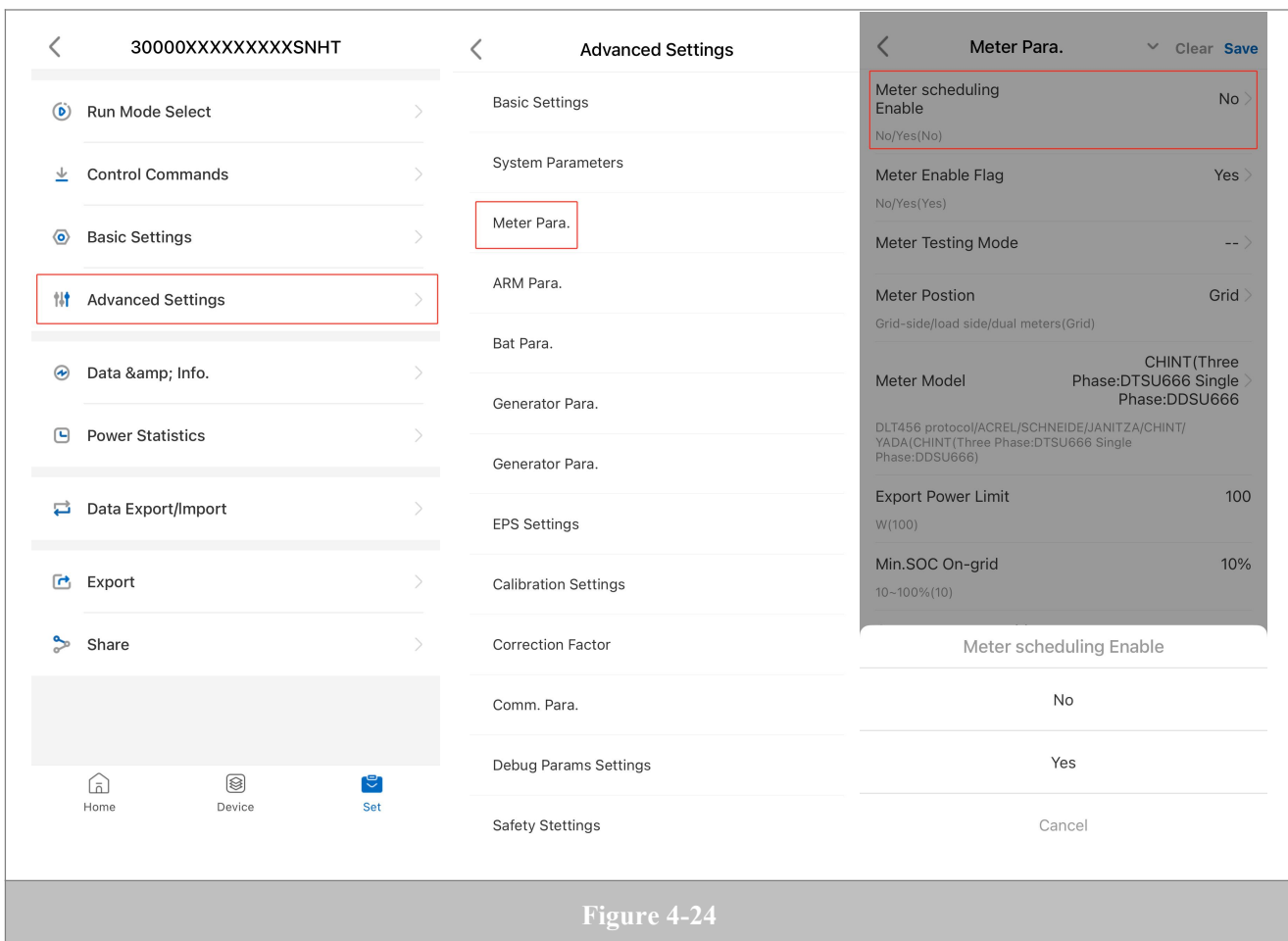


Figure 4-24

4.4.11 DRM function

Function: This function can control the power taken from the grid and the power sent to the grid in real time.

DRM activation: Once enabled, the DRM function specified in the Australian safety regulations can be realized, and must work in conjunction with the DRM device to work. If DRM is enabled, but the inverter does not detect the DRM device, the inverter will consider that the DRM function to be abnormal, and the power harvesting and power generation are no longer be controlled by the DRM device.

It can send 100% power to the grid, and also take power with 100% power from the grid to charge the battery.

If this function is enabled, and the DRMs tool is also connected, but the detected state is invalid (multiple states exist at the same time), it can also send power to the mains at 100% power and take power from the grid with 100% power to charge the battery. For other states, see the description of DRMs.

DRM deactivation: Power consumption and power generation power are no longer controlled by DRM devices.

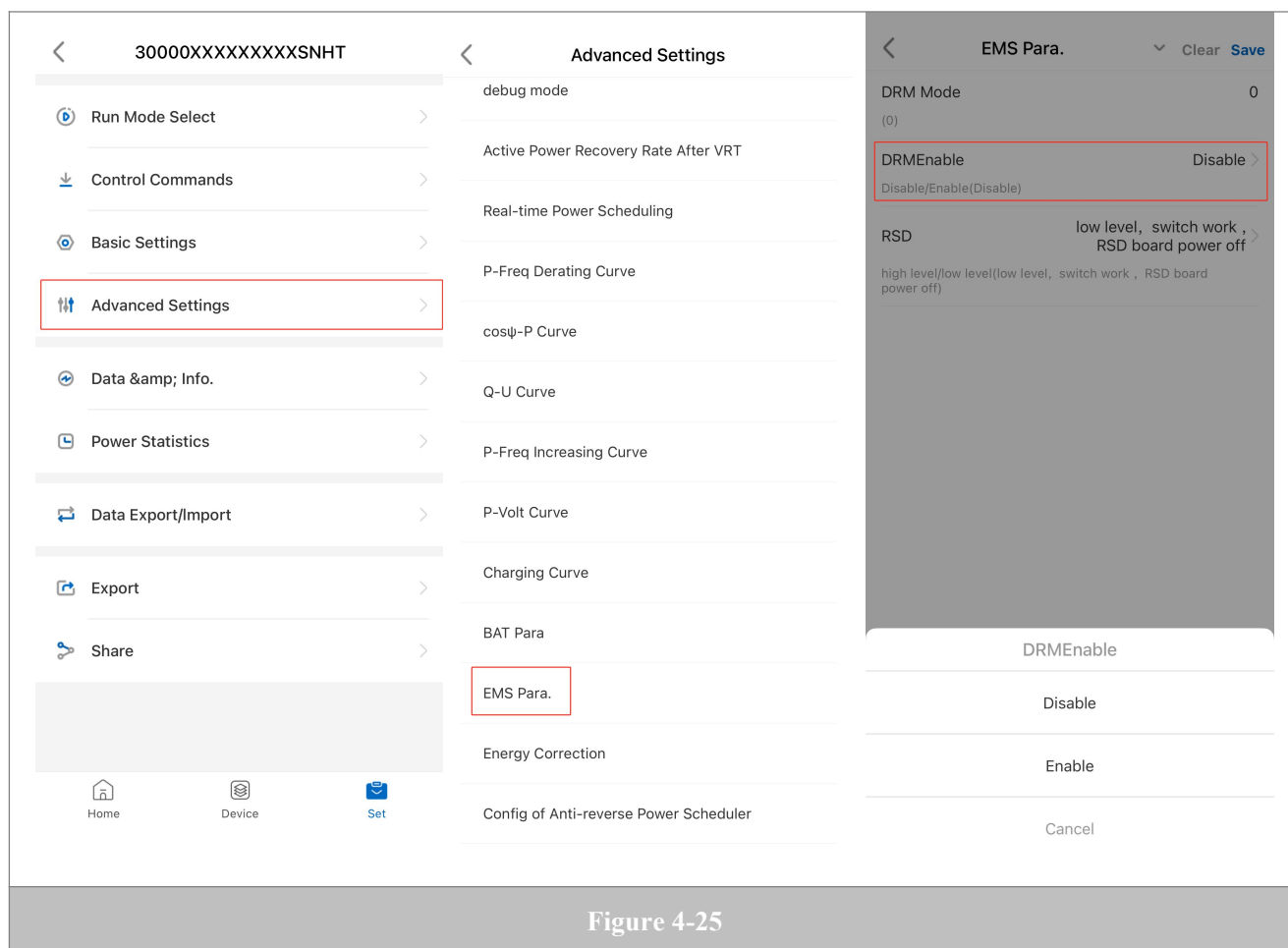


Figure 4-25

4.4.12 IPS Self Inspect (for Italy CEI0-21 Grid Only)

Function: The Italy CEI0-21 grid code requires an IPS check for the SN5.0/6.0/8.0/10/10-X/12/15HT. During the self-inspect, the inverter checks the protection threshold and protection time of the maximum voltage over 10 min (59.S1), maximum overvoltage (59.S2), minimum undervoltage (27.S1), minimum undervoltage (27.S2), maximum over frequency (81.S1), maximum over frequency (81.S2), minimum underfrequency (81.S), and minimum underfrequency (81.S2).

Procedure : On the home screen, Advanced Settings >ITA > IPS Self Inspect > Italy IPS setting > Start >Tap Start to start an IPS test.

After the IPS test is complete, IPS State is displayed as Check completed.

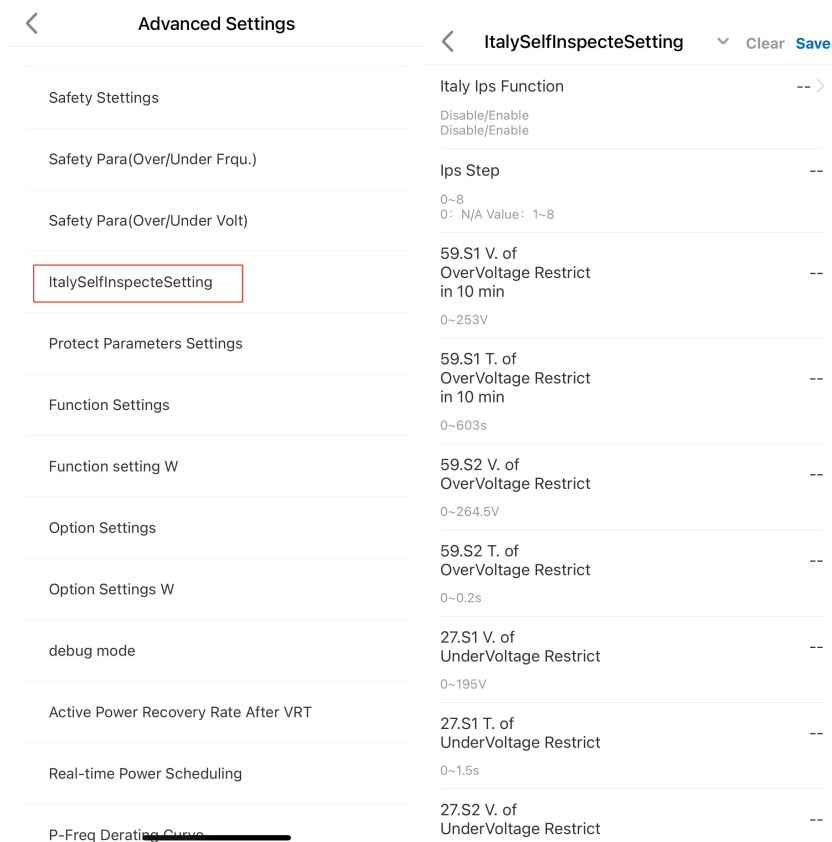


Figure 4-26

IPS Test Type	Description
Maximum voltage over 10 min (59.S1)	The default maximum voltage over 10 min protection threshold is 253 V (1.10 Vn), and the default protection time threshold is 3s.
Maximum overvoltage (59.S2)	The default overvoltage protection threshold is 264.5 V (1.15 Vn), and the default protection time threshold is 0.2s.
Minimum undervoltage (27.S1)	The default undervoltage protection threshold is 195.5 V (0.85 Vn), and the default protection time threshold is 1.5s.
Minimum undervoltage	The default undervoltage protection threshold is 34.5 V (0.15 Vn), and the default protection time threshold is 0.2s.

(27.S2)	
Maximum overfrequency (81.S1)	The default overfrequency protection threshold is 50.2 Hz, and the default protection time threshold is 0.1 s.
Maximum overfrequency (81.S2)	The default overfrequency protection threshold is 51.5 Hz, and the default protection time threshold is 0.1 s.
Minimum underfrequency (81.S1)	The default underfrequency protection threshold is 49.8 Hz, and the default protection time threshold is 0.1 s.
Minimum underfrequency (81.S2)	The default underfrequency protection threshold is 47.5 Hz, and the default protection time threshold is 0.1 s.

4.4.13 Parallel mode settings

Follow the Parallel System user manual in detail.

Chapter 5 Fault treatment



Warning

- *Non-professionals cannot deal with inverter alarms or faults!*
- *When dealing with inverter events, strictly follow the relevant instructions in this manual!*

5.1 Alarm information

When the inverter is running, if it encounters an abnormal state of the power grid, PV panel, or inverter, it will make an intelligent judgment and display the fault on the display or mobile APP. The following table lists the fault alarms, interpretations, and recommended handling procedures.

Alarm ID	Alarm description	Event handling
1	Grid Volt Abnormal	1. Check that the AC output side voltage of the inverter meets the grid requirements. 2. Check that the phase sequence of the AC line is connected correctly and that the wiring sequence of the N line and PE is correct and fixed. If not fixed, please connect the Sineng customer service center.
4	Grid Freq abnormal	1. Check that the AC output frequency of the inverter meets the grid standards. 2. Check that the phase sequence of the AC is connected correctly and that the wiring sequence of the N line and PE is correct and fixed. 3. Check the frequency of the fault. If it occurs occasionally, it may be caused by the instantaneous change in the mains frequency and no action is required. If not fixed, please connect the Sineng customer service center.
5	No Grid Volt	The inverter will resume operation when the grid returns to normal. Otherwise: 1. Check whether the AC switch of the inverter is on. 2. Confirm that the phase sequence of the AC line is connected correctly and that the wiring sequence of the N line and PE is correct.
6	Grid Sequence Reverse	1. Check that the phase sequence of the AC line is correctly connected. 2. If phase sequence detection is not required, enable the phase sequence

		adaptive function. If not fixed, please connect the Sineng customer service center.
7	GFCI Fault	Wait for the inverter until it returns to normal. Otherwise: 1. A humid environment or poor lighting will cause this fault, and the inverter will return to operation when the environment improves; 2. If the environment is normal, check whether the insulation of the DC and AC cables is normal; 3. Confirm that the cause is not one of the above and if the fault still exists, please contact the Sineng customer service center.
8	ISO Fault	Wait for the inverter to return to normal. Otherwise: 1. Check the impedance of the strings and the DC cables to the earth. If there is a short circuit or if the cable insulation is damaged, please take corrective action; 2. If the cable is normal and the fault occurs on a rainy day (or in the morning with dew), check when the weather improves; 3. If it is confirmed that the cause is not one of the above, but the fault still exists, please contact the Sineng customer service center.
9	DCI Fault	Check that the phase sequence of the AC line is correct, and the that the wiring sequence of the N line and PE is correct. If not fixed, please connect the Sineng customer service center.
10	NPE Volt Fault	Measure if the voltage of the grid N-line to earth is high. If not fixed, please connect the Sineng customer service center.
12	EPS Overload	The output load power is too high. Check whether the power of the output load is greater than the rated power of the inverter. If so, it must be disconnected. Use a load that is less than or equal to the rated power of the inverter and restart the inverter. If the fault information remains, contact the Sineng customer service center.
13	AC Port Reversed	Reverse the wiring of the EPS terminal and the mains terminal. Reverse the wiring terminal of EPS and that of the utility power, then restart the inverter, if the fault information remains, please contact the Sineng customer

		service center.
14	Load NPE Fault	Measure if the voltage of the Load N-line to earth is high. If not fixed, please connect the Sineng customer service center.
16	Neutral Disconnected (EPS_Grid)	Eps_N is not connected to grid N Disconnect the AC side switch, the DC side switch, and the battery switch. Check whether the Eps_N is connected to the N wire of the mains. If not, connect the Eps_N to the N wire of the mains, and the machine will operate normally. If the fault information remains, please contact the Sineng customer service center.
21	Device Fault	1. Wait for the inverter returns to normal. 2. Turn off the AC & DC switch, wait for 15 minutes and then restart the inverter. If not fixed, please connect the Sineng customer service center.
23	Temp High	1. Ensure that the installation environment and space of the inverter meet the heat dissipation requirements. 2. Check that the fan is not blocked by foreign objects and confirm that the fan can operate normally. 3. Check that the ambient temperature of the inverter is not too high. If not fixed, please connect the Sineng customer service center.
24	M-DSP Version Fault	DSP version issue, please contact the Sineng customer service center.
25	Communication Error (DSP-ARM)	1. Wait for the inverter to return to normal. 2. If faults occur frequently please contact the Sineng customer service center.
26	Communication Error (Master-Slave)	1. Wait for the inverter to return to normal. 2. If failures occur frequently please get in touch with the after-sales service center.
28	Logical Interface Enabled	1. Under this mode, the inverter can be shut down by the logical interface. 2. If failures occur frequently without logical interface being enabled, please get in touch with the after-sales service center.
29	Device Model Mismatch	Please connect the Sineng customer service center.
33	BUS Volt High	1. Restart the inverter and check that it is operating normally. 2. Check that the PV string voltage meets the maximum input voltage requirements

		of the inverter. If not fixed, please connect the Sineng customer service center.
39	AFCI Fault	1. Check the DC side for damaged cables, loose terminals, poor contact, and scorch marks on components; if so, replace any abnormal cables, terminals, or other components. 2. Clear the error message. If not fixed, please connect the Sineng customer service center.
40	PV Volt High	1. Check that the PV string input voltage matches the inverter display. 2. Check that the PV string voltage meets the maximum input voltage requirements of the inverter. If not fixed, please connect the Sineng customer service center.
41	PV reverse	1. Check whether the string corresponding to the alarm is reserved. If so, it is recommended to turn off the DC switch and reserve the string polarity when the solar irradiance decreases and the string current drops below 0.5A; 2. Confirm that the cause is not one of the above and the fault still exists, please contact the Sineng customer service center.
42	PV More Panels	1. Check that the PV string input voltage matches the inverter display. 2. Check that the PV string voltage meets the maximum input voltage requirements of the inverter. If not fixed, please connect the Sineng customer service center.
44	Series Temperature High	1. Confirm that the installation environment and the space around the inverter meet the heat dissipation requirements. 2. Check that the fan is not blocked by other objects and confirm that the fan can operate normally. 3. Check that the ambient temperature of the inverter is not too high. 4. Once the fault has been cleared manually, restart the inverter; if the fault occurs frequently, please contact the Sineng customer service center.
48	Battery Volt Out Range	Check the battery voltage. If the battery voltage exceeds the allowable range, the inverter will operate normally when the voltage returns to normal. If the battery voltage is within the allowed range, and the fault information remains, please contact the Sineng customer service center.

50	EPS Volt Out Range	Restart the inverter, if the fault information is still present, please contact the Sineng customer service center.
55	EPS over current	The output load current is too high. Check whether the power of the output load is greater than the rated power of the inverter. If so, it must be disconnected. Use a load that is less than or equal to the rated power of the inverter and restart the inverter. If the fault information remains, contact the Sineng customer service center.
65	Relay Fault	1. Restart the inverter and check that it is operating normally. 2. Check that the wiring of the inverter is correct (Neutral & PE). If this happens frequently, please contact the Sineng customer service center.
79	Internal Fan Fault	If this happens frequently, please contact the Sineng customer service center.
80	External Fan Fault	If this happens frequently, please contact the Sineng customer service center.
201	AC Curr High	The inverter monitors the external operating conditions in real time, and the inverter will resume normal operation after the fault disappears, no manual intervention is required. If this alarm occurs frequently, check that there is no short circuit in the external output circuit; if the problem cannot be solved, please contact the Sineng customer service center.
202	AC Curr Hardware Protect	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently, check that there is no short circuit in the external output circuit; if the problem cannot be solved, please contact the Sineng customer service center.
203	HVRT	If it occurs accidentally, it may be caused by a short-term abnormality of the grid The inverter will resume normal operation when it detects that the grid has recovered, no manual intervention is required. If it occurs frequently, please check that the grid voltage is within the allowable range, If not fixed, please connect the Sineng customer service center.
204	LVRT	If it occurs accidentally, it may be caused by a short-term abnormality of the grid The inverter will resume normal operation

		when it detects that the grid has recovered, no manual intervention is required. If it occurs frequently, please check that the grid voltage is within the allowable range, If not fixed, please connect the Sineng customer service center.
205	PV-PE Volt High	Wait for the inverter to recover; If the inverter cannot be restored for a long time, disconnect the switch on the AC side switch and DC side switch, wait for 5 minutes, and then close the AC and DC switches in turn. Restart the inverter, if the fault information still exists, contact Sineng customer service center.
206	Island	If it occurs accidentally, it may be caused by a short-term abnormality of the grid. The inverter will resume normal operation when it detects that the grid has recovered, no manual intervention is required. If it occurs frequently, please check that the grid frequency is within the acceptable range, If not fixed, please connect the Sineng customer service center.
207	DSP EEPROM fault	1. Restart the inverter and check that it is operating normally. 2. If this happens frequently, please contact the Sineng customer service center.
208	RTC Fault	1. Restart the inverter and check that it is operating normally. 2. If this happens frequently, please contact the Sineng customer service center.
209	MCU_Register Fault	1. Restart the inverter and check that it is operating normally. 2. If this happens frequently, please contact the Sineng customer service center.
210	MCU_RAM Fault	1. Restart the inverter and check that it is operating normally. 2. If this happens frequently, please contact the Sineng customer service center.
214	Temp Low	Wait for the ambient temperature to return to the specified range, and then the inverter will start up automatically. If not fixed, please connect the Sineng customer service center.
219	MPPT overcurrent	Wait for the inverter to recover; If the inverter cannot be restored for a long time, disconnect the switch on the

		AC side switch and DC side switch, wait for 5 minutes and close the AC and DC switches in turn. Restart the inverter, if the fault information still exists, contact the Sineng customer service center.
220	MPPT overcurrent (hardware)	Restart the inverter, if the fault information is still present, please contact the Sineng customer service center.
221	MPPT Start Volt Out Range	Check the series configuration of the photovoltaic panels to ensure that the open-circuit voltage of each string is lower than the maximum operating voltage of the inverter. After the configuration is correct, the inverter will automatically start. If not fixed, please connect the Sineng customer service center.
223	Boost1 current limiting	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently and the problem cannot be solved, please contact the Sineng customer service center.
224	Boost2 current limiting	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently and the problem cannot be solved, please contact the Sineng customer service center.
229	AC current limiting	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently and the problem cannot be solved, please contact the Sineng customer service center.
230	Inverter PWM abnormality	The inverter monitors the internal operating conditions in real time, and resumes normal operation when the fault is cleared, without the need for manual intervention. If this alarm occurs frequently and the problem cannot be solved, please contact the Sineng customer service center.
241	BuckBoost Overcurrent (Hardware)	Restart the inverter and if the fault information is still present, please contact the Sineng customer service center.
245	BuckBoost overcurrent	Restart the inverter, if the fault information is still present, please contact the Sineng customer service center.

247	Balance Bridge Overcurrent(Hardware)	The output half wave load power is too high. Check whether the half wave load power of the output load is greater than the sixth rated power of the inverter. If so, it must be disconnected. Use a load that is less than or equal to the sixth rated power of the inverter of the inverter and restart the inverter. If the fault information remains, contact the Sineng customer service center.
Table 5-1		

Chapter 6 Technical parameter

6.1 Regular parameters

Item	Specification						
Equipment model	SN5.0HT	SN6.0HT	SN8.0HT	SN10HT	SN10HT-X	SN12HT	SN15HT
Dimensions (mm)	577*537*206						
Net weight (kg)	26kg				29kg		
Operating temperature	-25～60℃						
Storage temperature	-40～70℃						
Relative humidity	0～100%, no condensation						
Altitude	4000m (more than 3000m derating)						
Pollution level	Level III						
Environmental category	Outdoor						
Table 6-1							

6.2 Electrical characteristics (DC Input)

Item	Specification						
Model	SN5.0HT	SN6.0HT	SN8.0HT	SN10HT	SN10HT-X	SN12HT	SN15HT
Maximum DC input power (W)	7500	9000	12000	15000	15000	18000	22500
Maximum DC input voltage (Vdc)	1000						
Star-up voltage (Vdc)	180V						
MPPT voltage range (Vdc)	160-950V						
Full load MPPT voltage range (Vdc)	200-850	200-850	230-850	290-850	220-850	260-850	320-850
MPPT Qty.	2						
The maximum number of strings per MPPT	1/1				2/1		
The maximum input current per channel of MPPT (Adc)	18/18				32/18		
Maximum short-circuit current (Adc)	25/25				40/25		
Max. inverter backfeed current to the array (Adc)	0						
Table 6-2							

6.3 Battery characteristics (input and output)

Item	Specification						
Equipment model	SN5.0HT	SN6.0HT	SN8.0HT	SN10HT	SN10HT-X	SN12HT	SN15HT
Battery type	Lithium battery						
Battery voltage range	160--600V						
Maximum charging and discharging current	25A/25A				30A/30A		
Communication mode	CAN/485						
Table 6-3							

6.4 Electrical characteristics (AC output/input)

Item	Specification						
Equipment model	SN5.0HT	SN6.0HT	SN8.0HT	SN10HT	SN10HT-X	SN12HT	SN15HT
Grid system	3/N/PE						
Output rated power (W)	5000	6000	8000	10000	10000	12000	15000
Maximum output apparent power (VA)	5500	6600	8800	11000	11000	13200	16500
The maximum power taken from the grid (W)	7500W	9000W	12000W	15000W	15000W	18000	22500
Output rated voltage (Vac)	380/220;400/230						
Output working voltage range (Vac)	195--276						
Rated output current (Aac)	7.6 /7.3	9.1 /8.7	12.2 /11.6	15.2 /14.5	15.2 /14.5	18.2 /17.4	22.8 /21.8
Maximum output current (Aac)	8.4 /8.0	10 /9.6	13.4 /12.8	16.7 /16	16.7 /16	20 /19.2	25 /24
The maximum current taken from the grid (Aac)	11.4 /10.9	13.7 /13.1	18.2 /17.4	22.8 /21.8	22.8 /21.8	27.3 /26.1	34.1 /32.7
Rated frequency (Hz)	50Hz /60Hz						
Output current waveform distortion	Total distortion rate<3%						
Output power factor	Adjustable range: -0.8 lagging ~+0.8 leading						
Component of output DC	<0.5% *In (rated current)						
Inrush Current（peak and duration）	3.9A@55ms						
Table 6-4							

Back-up:

Item	Specification						
Equipment model	SN5.0HT	SN6.0HT	SN8.0HT	SN10HT	SN10HT-X	SN12HT	SN15HT
Rated output power (W)	5000	6000	8000	10000	10000	12000	15000
Short-period transient output (VA)	7500 60S	9000 60S	12000 60S	15000 60S	15000 60S	18000 60S	18000 60S
Switching time	10ms						
Rated output voltage (Vac)	220/380; 230/400						
Rated grid frequency (Hz)	50/60						
Output THDv (@linear load)	≤2%						
Table 6-5							

6.5 Electrical characteristics (Protection characteristics)

Item	Specification						
Equipment model	SN5.0HT	SN6.0HT	SN8.0HT	SN10HT	SN10HT-X	SN12HT	SN15HT
DC reverse polarity protection	YES						
Leakage current protection	YES						
Islanding protection	YES						
Output current protection	YES						
DC switch	YES						
Insulation resistance detection	YES						
AFCI	YES						
AC and DC surge protection	II						
Over voltage category	II (DC), III (MAINS)						
RSD	Optional						
Table 6-6							

6.6 Electrical characteristics (System characteristics)

Item	Specification						
Equipment model	SN5.0HT	SN6.0HT	SN8.0HT	SN10HT	SN10HT-X	SN12HT	SN15HT
Maximum inverter efficiency (%)	97.80%	97.80%	98.20%	98.20%	98.20%	98.20%	98.20%
European efficiency	97.20%	97.20%	97.30%	97.50%	97.50%	97.50%	97.50%
Battery maximum charging efficiency By PV	98.3%						
Battery maximum charging /discharging efficiency from/to AC Max.Efficiency	97.5%						
Power self-consumption at night (W)	< 25 (No backup output)						
HMI	LED						
Protection level	IP66						
Cooling method	Natural cooling				Smart Cooling		
Noise (dB)	< 35				<55		
User interface	LED&APP						
Communication with meter	RS485						
Monitoring	WIFI/Ethernet/4G&Bluetooth						
Protection	IP66						
Mounting	Wall Bracket						
Topology	Non-isolation						
Table 6-7							

6.7 Certification and standards

Item	Specification
Safety regulation certification	IEC/EN62109-1/2
EMC certification	IEC/EN61000-2/3/6
Table 6-8	

Chapter 7 Product maintenance

This chapter covers shutting down, removing, scrapping, and maintaining of the inverter (including the inverter maintenance cycle and inverter maintenance methods). When servicing the inverter, be sure to read the instructions in this chapter carefully.



Danger

- *The inverter may only be serviced by qualified personnel and must not be operated by unauthorised persons!*
 - *To ensure the safety of maintenance personnel, do not touch any live parts of the inverter when it is running, and it is necessary to always check that the product's earth point is securely connected.*
 - *When the inverter is completely disconnected, dangerous voltages are still present inside the inverter! Please wait for 30 minutes before servicing the inverter!*
 - *Do not connect or disconnect the DC connector while the inverter is operating!*
 - *Please be sure to use qualified spare parts provided by Sineng. If the equipment is damaged due to the use of spare parts not provided by us, we take no responsibility.*
 - *Unauthorized or improper disassembly of the inverter may result in damage to the equipment. Sineng is not responsible for such damage!*
-

7.1 Power-off of inverter



Danger

- *Always turn off the inverter before operating or servicing it. Operating equipment with the power on may cause damage to the inverter or electric shock.*
 - *When the inverter is switched off, it takes some time for the internal components to discharge. Please wait until the equipment has fully discharged in accordance with the time specified on the label.*
-

Step 1: (Optional) Issue a trip command to the inverter.

Step 2: Disconnect the AC switch between the inverter and the grid.

Step 3: Disconnect the DC and battery switches of the inverter.

7.2 Disassemble inverter



Warning

- *Make sure the inverter is switched off.*
- *Wear professional protective equipment when operating the inverter.*

Step 1: Disconnect all electrical connections to the inverter, including the DC cable, AC cable, communication wire, communication module, and protective earth cable.

Step 2: The person carrying out the disassembly should hold the handle during the operation, or the disassembly should be carried out by lifting and then removing the inverter from the back plate.

Step 3: Remove the back plate.

Step 4: Store the inverter properly. If the inverter is to be used at a later date, ensure that the storage conditions meet the requirements.

7.3 Scrapping the inverter

If the inverter can no longer be usable and must be scrapped, please dispose of it in accordance with the electrical waste disposal regulations of the country/region in which the inverter is located.

It cannot be treated as household waste.

7.4 Periodic maintenance

The periodic inspection and maintenance of the inverter can be used to confirm the status of the inverter in time and improve the reliability of the inverter. The periodic inspection list is shown in the table below.

Inspection content	Method	Inspection cycle
System cleaning	Check that there are no foreign objects on the heat sink	Once a year or when an anomaly is detected
Visual inspection	Check to see if the inverter is damaged or deformed in any way.	Once a year
Cable connection	Check that the AC and DC cables are securely connected and that there is no damage Check that the earth cable is securely connected	Half a year after first use, and every six months thereafter
Tightness	Check that all terminals and connections are well sealed	Once a year

Table 7-1

Appendix

Safety Standard Code	List of safety regulations	
0	China-1	CHN-A
1	General-1	General-A
2	China-2	CHN-B
3	General-3	General-C
4	General-4	General-D
5	Germany-1	DEU-A
6	General Europe-1	EU-General-A
7	Belgium	BEL
8	Holland	NLD
9	Portuguesa	PRT
10	Sweden	CHE
11	Brazil-1	BRA-A
12	France	FRA
13	Italy	ITA
14	Spain	ESP
15	Greece-1	GRC-A
16	General-2	General-B
17	Korea	KOR
18	UK-1	GBR-A
19	UK-2	GBR-B
20	India	IND
21	Poland	POL
22	General Europe-2	EU-General-B
23	Czech	CZE
24	Denmark-1	DNK-A
25	Greece-2	GRC-B
26	Ireland	IRL
27	Lithuania	LUX
28	Norway	NOR
29	Slovenia	SVN
30	Switzerland	SWE
31	Turkey	TUR
32	Finland	FIN
33	Cyprus	CYP
34	Slovakia-1	SVK-A
35	Iceland	ISL
36	Latvia	LVA
37	Romania	ROM
38	Australia-1	AUS-A
39	Australia-2	AUS-B
40	Australia-3	AUS-C
41	Austria	AUT
42	New Zealand	NZL
43	Denmark-2	DNK-B

44	Brazil-2	BRA-B
45	South Africa	ZAF
46	Invalid safety	Undefined
47	Thailand-PEA	THA-P
48	Thailand-MEA	THA-M
49	Germany-2	DEU-B
50	Saudi Arabia	SAU
51	IEC General-50HZ	IEC General-50HZ
52	Pakistan	PAK
53	Sri Lanka	LKA
54	Hungary	HUN
55	Singapore	SGP
56	Dubai	Dubai
57	IEC General-60HZ	IEC General-60HZ
58	Morocco	MAR
59	Serbia	SRB

After-sales Service Information

Sineng Electric Co., Ltd. provides a full range of technical support services for customers. Customers can contact the nearest Sineng local office or customer service center, or directly contact the HQ.

Sineng Electric Co., Ltd.

Address: No.6, Hehui Road, Huishan Economic Development Zone, Wuxi, China

Postal code: 214174

Customer service hotline: 0510-88888118

Fax: 0510-85161899

Warranty card

Thank you for choosing Sineng PV inverter.

Product model: _____

Delivery No.: _____

Please refer to the instructions in the *User Manual* for specifications, implementation standards, and technical conditions of this product.

This product is guaranteed for ____ year(s). During the warranty period, Sineng will provide free component repair or replacement services for failures caused by non-human reasons and force majeure (including but not limited to earthquakes, mudslides, floods, typhoons, and wars).

User name: _____

User address: _____

Contact person: _____

Phone number of user: _____

Email: _____

Sineng Electric Co., Ltd.

Address: No.6, Hehui Road, Huishan Economic Development Zone, Wuxi, China

Postal code: 214174