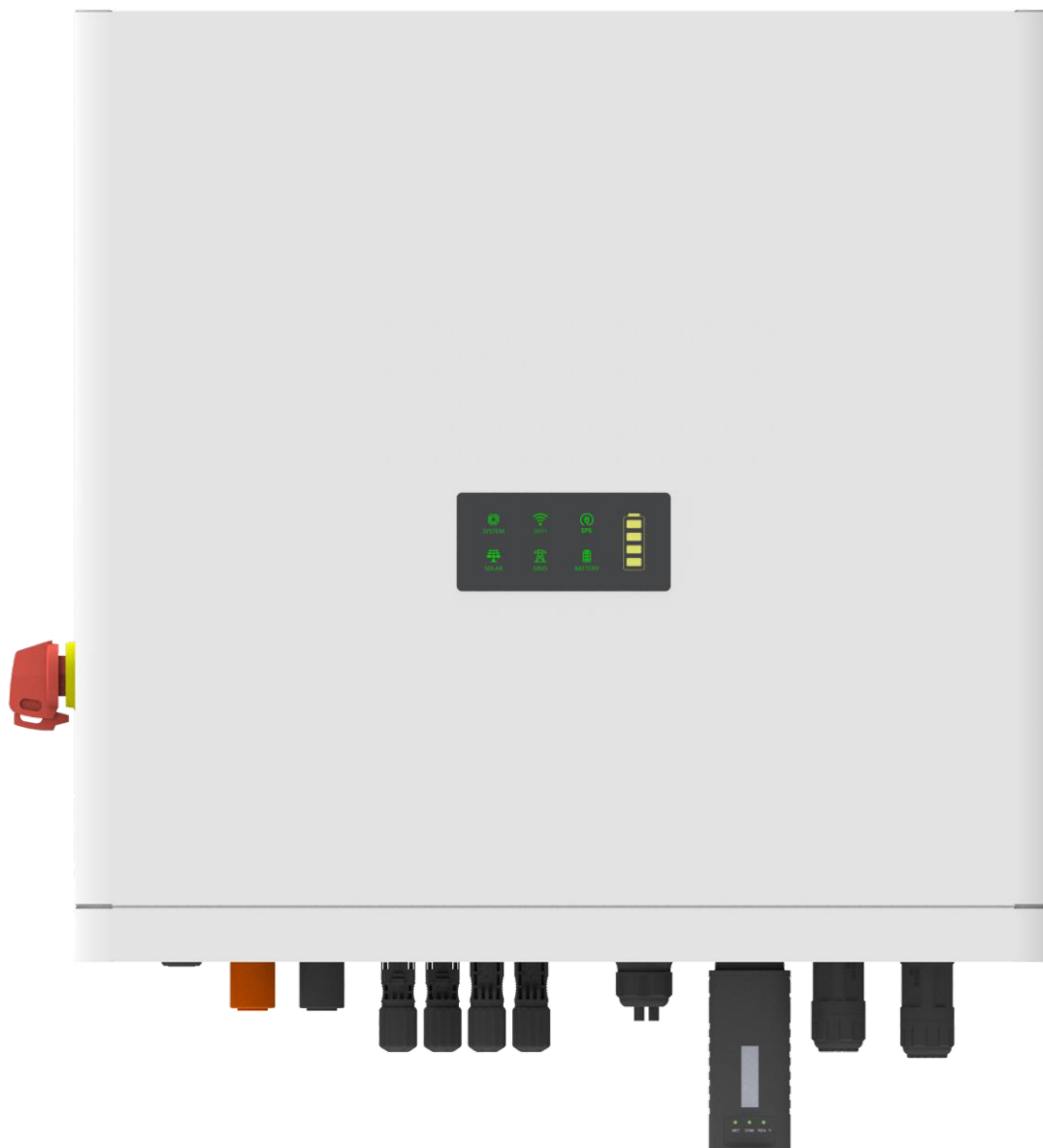




User Manual

Single Phase Hybrid Inverter

V1.4

Note:

This document is subject to irregular updates due to product upgrades or other reasons. Unless otherwise specified, this document should not be used instead of the safety precautions described in the product labels or User Manual. All instructions in this document are for reference only.

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1 Preface

This Manual is considered as one part of the AE Hybrid product series. It introduces the assembly, installation, commissioning, maintenance and troubleshooting of the products. Before operation, please read this Manual carefully to learn the product safety information and grasp the product functions and characteristics. The document is subject to irregular updates. The latest information and more product information can be obtained from the official website.

1.1 Applicable products

This document is applicable to the following inverter models:

Hybrid inverter

- AE3K6-L1-S
- AE4K-L1-S
- AE4K6-L1-S
- AE5K-L1-S

1.2 Applicability

This document is intended for professionals. Only trained personnel are allowed to carry out those activities described in this document.

1.3 Sign definition

This Manual contains the following types of safety instructions and general information as described below:

 Danger
Indicating a potential high danger that, if not avoided, can result in death or serious injuries to personnel.
 Warning
Indicating a potential medium danger that, if not avoided, can result in death or serious injuries to personnel.
 Caution
Indicating a potential low danger that, if not avoided, may result in moderate or mild injuries to personnel.
Note
An emphasis and supplement to the content, which may also provide tips or tricks for optimizing the application of products for the sake of solving a problem or save your time.

1.4 Important safety instructions

 Danger
• The voltage inside the inverters is too high, which is life-threatening! All work must be carried out by qualified electricians. • Unless otherwise supervised or guided by a dedicated person, children or individuals with physical, sensory, intellectual impairments, or lack of experience and knowledge are not allowed to operate the devices. Children should be supervised and prevented from operating the devices. • Burns may be caused due to overtemperature of case components! During operation, the upper cover and case may be hot. Only the lower cover of the cases can be touched during operation.
 Warning
• Be sure that the input DC voltage is $\leq$ the maximum DC voltage. Too high voltage may cause a permanent damage to the inverters or other losses, which are not covered by the warranty!

• Authorized maintainers must disconnect the AC and DC power sources of the inverters before trying any maintenance, cleaning or working on any circuit connected to the inverters.
Note
• The grounding of PV modules and hybrid inverters should meet local requirements. In order to achieve an optimal protection for the system and personnel, it is recommended to connect the generator frame and other conductive surfaces through ensuring continuous conduction and grounding. • Radiation may be harmful to your health!

- It is recommended to use only the accessories included in the inverter packages. Otherwise, fires, electric shock, or personal injuries may be caused.
- Ensure that the existing wires are intact and undamaged, and too short sizes are not allowed.
- DO NOT remove any components of the inverters that are not mentioned in the Installation Guide. The provided inverters do not contain user repairable components. For instructions on obtaining services, see the Warranty. Electric shocks or fires may be caused by unauthorized repair of the inverters, which are excluded in the Warranty.
- Stay away from flammable and explosive materials for fear of fires.
- The installation positions should be kept away from damp or corrosive substances.
- Authorized maintenance personnel must use insulating tools when installing or operating the devices. The PV modules should meet the requirements of IEC 61730 Class A.
- DO NOT touch the positive or negative pole of the PV connection device. Touching both positive and negative poles at the same time is strictly prohibited.
- The devices include capacitors, which can still be charged to a potentially lethal voltage after disconnecting the main power, batteries and PV power supply.
- After disconnecting the power supply, the dangerous voltage will last for up to 5 minutes.
- Be aware that electric shocks may be caused by the energy stored in the capacitors. When powered on, DO NOT touch the inverter couplers, main power cables, battery cables, PV cables or PV generator. After disconnecting the PV power supply, batteries and main power. Wait for 5 minutes for the intermediate circuit capacitors to discharge, and then unplug the DC, battery plugs and main power couplers.
- When accessing the internal circuit of the inverters, be sure to wait for 5 minutes before operating the power circuit or removing the electrolyte capacitors inside the devices. DO NOT switch on the devices in advance, because the capacitors will take time to fully discharge!

1.5 Version records

The latest version in the modification records contains the updated content from all previous version documents.

V1.0 2024-03-15

- First issue

V1.1 2024-10-14

- 5.2.2 Installation of Inverter (split unit): Optimization installation diagram.

V1.2 2025-02-14

- 6.6 Parallel wiring scheme: Add parallel function description;
- 8.1 Description of panel indicators: Modify the color of the WIFI indicator panel.

V1.3 2025-03-14

- 7.2 Device powering on: Optimize the power on sequence.
- 9.1 Inverter power-off: Optimize the power-off sequence.
- 9.4 Fault handling: Optimize fault handling description.

V1.4 2025-08-01

- 3.3.1 System operating mode: Add Power Dispatch Mode

2 Safety Precautions

Please always follow the safety precautions mentioned in this document when operating the devices.

Note

The inverters have been strictly designed in accordance with safety regulations and passed the related test, however, as electrical devices, relevant safety instructions must be followed before any operation of the devices. Improper operation may cause serious injuries or property damages.

2.1 General safety

Note

- This document is subject to irregular updates due to product upgrades or other reasons. Unless otherwise agreed, the content of the document should not be used instead of the safety precautions described in the product labels or User Manual. All descriptions in the document are for guidance only.
- Before installing the devices, read this document carefully to understand the products and precautions.
- All device operations must be carried out by professional and qualified electrical technicians who have a full understanding of the relevant standards and safety regulations of the project location.
- When operating the inverters, it is necessary to use insulating tools and wear personal protective equipment for the sake of personal safety. Before touching any electronic devices, wear antistatic gloves, antistatic wristbands and antistatic clothing to protect the inverters from being damaged by static.
- Damages or personal injuries caused by failing to install, use or configure the inverters according to the document are excluded in the responsibility of the manufacturer.

2.2 Safety of serial PV modules



Danger

Please use the DC terminals provided with the packages to connect the DC cables of the inverters. Other DC terminal models may be liable to cause serious consequences, and the device damages caused accordingly are not covered in the responsibility of the manufacturer.



Warning

- Ensure that the module frame and bracket system are well grounded.
- Make sure that the completed DC cable connection is firm without loose parts.
- Use a multimeter to measure the positive and negative poles of the DC cables for correct arrangement without reverse connection; The voltage should be kept within the allowable range.
- DO NOT connect the same serial PV modules to multiple inverters for fear of damages to them.
- The PV modules used together with the inverters must meet the requirements of IEC61730 Class A.

2.3 Inverter safety



Warning

- Be sure that the voltage and frequency of the grid connection point meet the inverter grid connection specifications.
- It is recommended to add protective devices such as circuit breakers or fuses at the AC side of the inverters. The rated output current of the protective devices should be higher than 1.25 times that at the AC side of the inverters.
- Protective grounding wires of the inverters must be firmly connected. When multiple inverters are used, be sure that the protective grounding points of all inverter casings are equipotentially connected.
- If the inverter triggers a fault fewer than 5 times, it can automatically clear the fault and resume operation. After the 5th fault trigger, the inverter will shut down for protection and will require a manual shutdown-startup command to function normally.



Danger

- After the inverters are installed, the labels and warning signs on the packages must be clear and visible, and covering on and alteration of or damage to them are not allowed.
- The signs on the inverter cases are as follows:

Symbol	Explanation
	CE sign. The inverters meet the applicable CE guidelines.
	TUV certified.
	RCM sign.
	High-temperature surface. The inverters will become hot during operation. DO NOT touch them during operation.
	Danger! High voltage.
	The high voltage in the inverters is life-threatening! Electrical shock hazard!
	Read the attached document before operation.
	The inverters shall not be disposed of together with domestic garbage. The disposal shall be carried out according to the local laws and regulations. They can be sent back to the manufacturer for disposal. For the disposal information, see the attached document.
	DO NOT operate the inverters before isolating them from any battery, main power and on-site PV panel.
	Connection points of protective grounding wires.
	Life-threatening high voltage. After the power supply is turned on, there is a residual voltage in the hybrid inverter, which takes 5 minutes to discharge to a safe voltage.

2.4 Battery safety

 Warning
• Batteries to be used together with the inverters must be approved by the inverter manufacturer, and the approved battery list can be obtained through the official website. • Before installing the devices, read the User Manual of the batteries carefully to understand the products and precautions. The operation must be subject to the User Manual of the batteries. • The batteries, if having been completely discharged, must be charged in strict accordance with the model related User Manual. • The battery current may be affected by some factors such as temperature, humidity and weather conditions, etc., which may cause battery current limiting and affect the loading capacity. • If failing to activate the batteries, contact the After-Sales Service Center as soon as possible. Otherwise, the batteries may be permanently damaged. • Use a multimeter to measure the positive and negative poles of the DC cables for correct arrangement without reverse connection; The voltage should be kept within the allowable range. • DO NOT connect the same battery pack to multiple inverters for fear of damages to them.

2.5 Personnel requirements

Note
• Personnel for installing and maintaining the devices must be trained strictly to understand various safety precautions and master correct operating methods. • The installation, operation, maintenance and replacement of devices or components are only allowed to be carried out by qualified professionals or trained personnel.

2.6 EU declaration of conformity

Equipment with wireless communication capabilities that can be sold in the European market should meet the following directive requirements:

- 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)

Equipment without wireless communication capabilities that can be sold in the European market should meet the following directive requirements:

- 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)

3 Product Introduction

3.1 Product description

Function overview

The hybrid energy storage inverter controls and optimizes the energy flow of PV and batteries through an integrated energy management system. During the day, PV power generation first supplies the load, then charges the battery, and finally the excess electricity can be connected to the grid; At night, the battery discharge supplies the load, and the insufficient part is supplemented by the grid; When the grid is outage, PV power generation and batteries are only supplied to the off-grid load, and the grid-connected load cannot be used. In addition, the system also supports users to set their own charging and discharging time to meet the needs of users.

Model description

This document is applicable to the following inverter models:

Hybrid inverter

- AE3K6-L1-S
- AE4K-L1-S
- AE4K6-L1-S
- AE5K-L1-S

Symbolic meanings

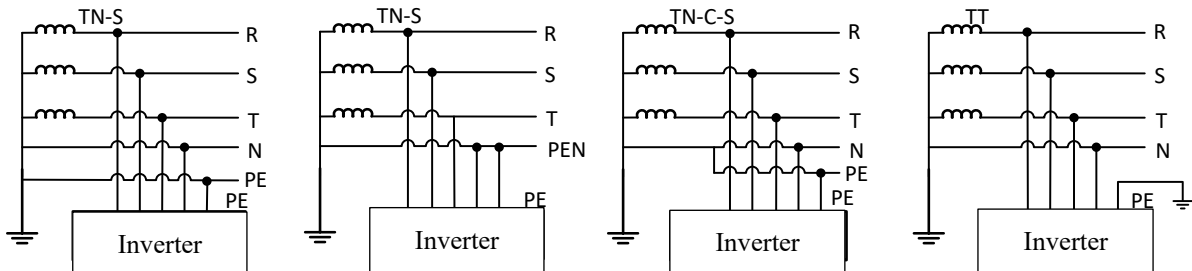
AE5K-L1-S

1 2 3 4

Symbol	Meaning	Description
1	Brand code	
2	Rated capacity	5K: Rated capacity of 5kVA
3	Battery voltage	H: High battery voltage; L: Low battery voltage; 1: Derived series number
4	Wiring method	T: Three-phase output; S: Single-phase output

Supported grid forms

For grid forms with an N line, the N-to-ground voltage should be less than 10V.



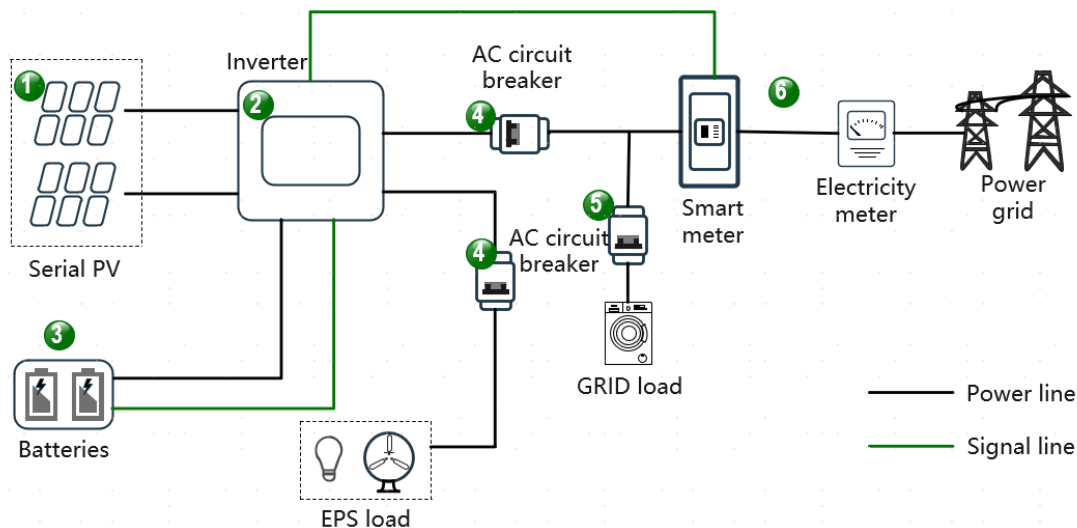
3.2 Application scenario



Warning

- PV systems are not suitable for devices that rely on a stable power supply, such as life-sustaining medical equipment. Please ensure that system power outages will not cause personal injury.
- If the PV system is provided without batteries, the off-grid function will not be activated.
- The battery current may be affected by some factors such as temperature, humidity and weather conditions, etc., which may cause battery current limiting and affect the loading capacity.
- When the inverter experiences overload protection for the first time, it can automatically restart. If it happens multiple times, the restart time of the inverter will be extended. To Power off for 3 minutes and then restart with power on as soon as possible, you can shut down and then Power off for 3 minutes and then restart with power on through the App.
- When the grid power is off, if the load capacity exceeds the inverter's rated power, the inverter's off-grid function will automatically shut down. To restart, ensure that the load power < inverter's rated power by turning off heavy loads.
- The EPS output port of the inverter is provided with an overload capacity and UPS function, which can be used normally for ordinary household loads in case of a grid power outage. In order to ensure the stability of UPS switching and load power supply, loads with higher starting currents such as high-power water pumps should be avoided of possible. Supportable loads are as follows:
 - Power of resistive loads < PCS rated power
 - Power of non-linear loads < 60% of PCS apparent power. When non-linear loads are present, please contact the manufacturer to confirm PCS capacity configuration.
 - For motor loads with inverters, load power < 60% of PCS unit's apparent power.
 - For motor loads without frequency converters, please contact the manufacturer to confirm the PCS capacity configuration.

The specific power of motor-type loads that can be supported depends on the actual load conditions on site and requires communication with our technical staff.



No.	Component	Description
1	Serial PV modules	The serial PV modules are composed of PV modules connected in series.
2	Inverter	Hybrid inverter.
3	Batteries	The selection should be made based on the matching list of inverters and batteries.
4	AC circuit breaker	• The specification of the EPS load and GRID load circuit breakers for the same model should be consistent with each other. Customers' own AC switches are recommended. • AC circuit breaker specification requirements: AE3K6-L1-S, AE4K-L1-S, AE4K6-L1-S and AE5K-L1-S: Rated current $\geq 32A$, AC rated voltage $\geq 250V$.

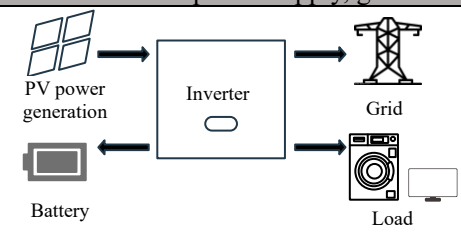
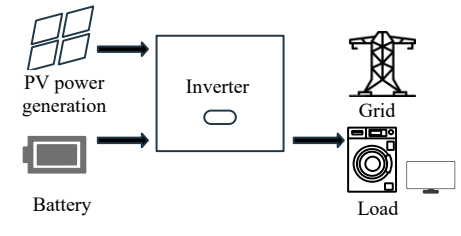
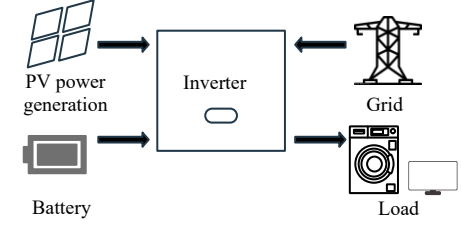
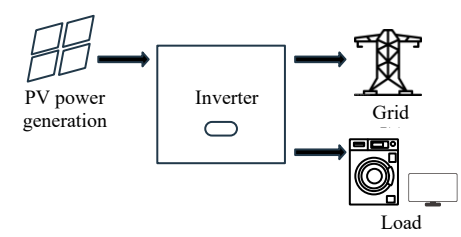
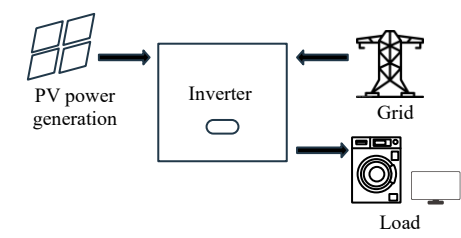
5	AC circuit breaker	The specifications should be dependent on the actual load.
6	Smart meter	Provided with the inverters or purchase from the inverter manufacturer.

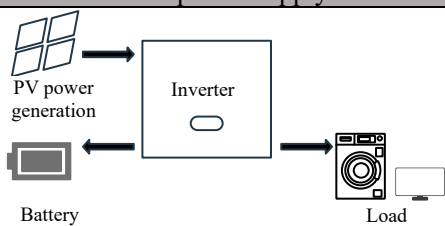
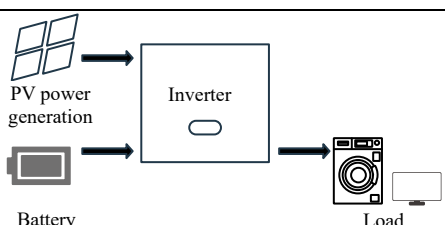
3.3 Operating mode

The hybrid inverters have multiple operating modes depending on different requirements.

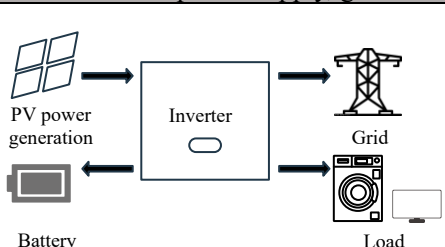
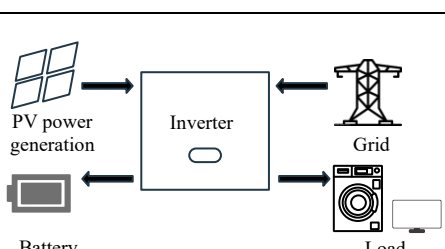
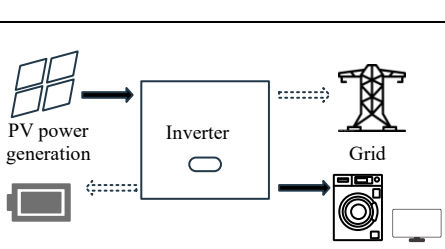
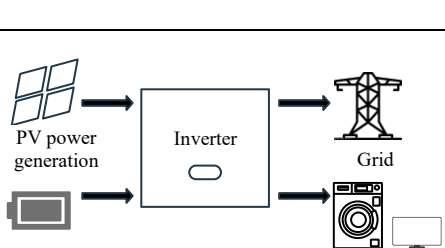
3.3.1 System operating mode

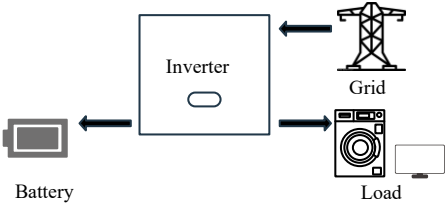
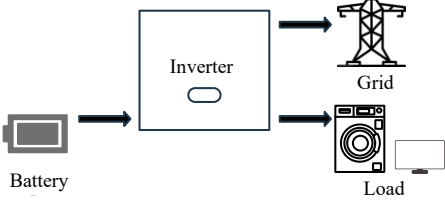
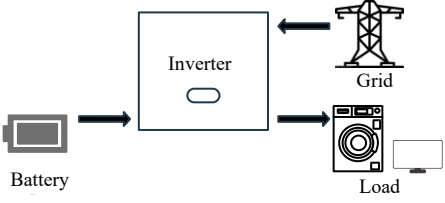
Operating mode 1: Self-Consumption

1. When the PV power supply, grid and batteries are available:	
 PV power generation feeds into the Inverter. The Inverter feeds into the Grid and the Load. The Battery is connected to the Inverter but has no power flow arrows.	A. The solar energy power supply to loads is preferred. If the solar energy is sufficient to supply power to all connected loads, the excess electricity quantity from the solar energy will charge the batteries and then be fed into the grid.
 PV power generation feeds into the Inverter. The Inverter feeds into the Load. The Battery feeds into the Inverter. The Grid is connected to the Inverter but has no power flow arrows.	B. The solar energy power supply to loads is preferred. If the solar energy is insufficient to supply power to all connected loads, the batteries will supply power to the loads at the same time.
 PV power generation feeds into the Inverter. The Inverter feeds into the Load. The Battery feeds into the Inverter. The Grid feeds into the Inverter.	C. The solar energy power supply to loads is preferred. If the solar energy and batteries are insufficient to supply power to all connected loads, the grid will supply power to the loads at the same time.
2. When the PV power supply and grid are available (without batteries):	
 PV power generation feeds into the Inverter. The Inverter feeds into the Grid and the Load.	A. The solar energy power supply to loads is preferred. If the solar energy is sufficient, the excess electricity quantity will be fed into the grid.
 PV power generation feeds into the Inverter. The Inverter feeds into the Load. The Grid feeds into the Inverter.	B. The solar energy power supply to loads is preferred. If the solar energy is insufficient to supply power to all connected loads, the grid will supply power to the loads at the same time.

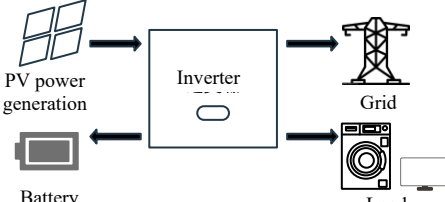
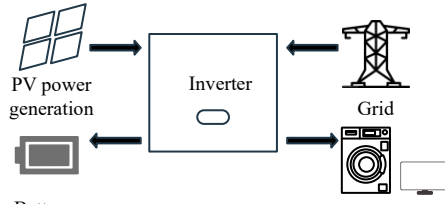
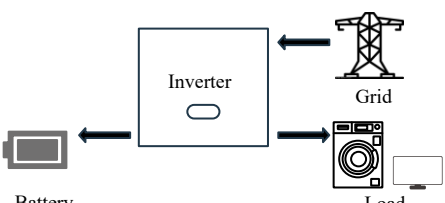
3. When the PV power supply and batteries are available (grid disconnected):	
 PV power generation Battery Inverter Load	A. The solar energy power supply to loads is preferred. If the solar energy is sufficient to supply power to all connected loads, it will charge the batteries.
 PV power generation Battery Inverter Load	B. The solar energy power supply to loads is preferred. If the solar energy is insufficient to supply power to all connected loads, the batteries and solar energy will supply power to the loads at the same time.

Operating mode 2: Force time use custom

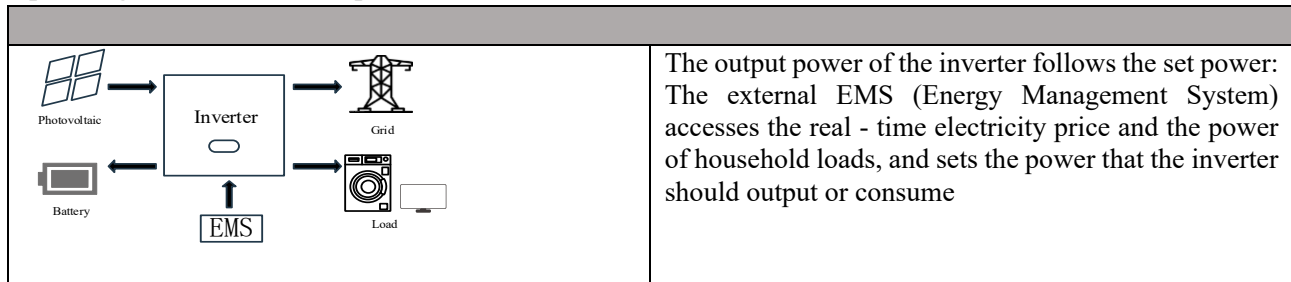
1. When the PV power supply, grid and batteries are available:	
 PV power generation Battery Inverter Grid Load	A. When charging, the solar energy charging to the batteries will be preferred. The excess electricity quantity from the solar energy will be supplied to the loads. If the solar energy is sufficient to supply power to the loads and charge the batteries, the excess electric energy, if any, will be fed into the grid.
 PV power generation Battery Inverter Grid Load	B. During charging, solar power will prioritize charging the battery pack. Any excess solar power will then supply the load. If solar power is insufficient for both charging the battery pack and powering the load, the grid will supply power to all connected loads.
 PV power generation Battery Inverter Grid Load	C. When discharging, the solar energy power supply to the loads will be preferred. If the solar energy is sufficient to supply power to the loads and excess energy can still be reserved, the selection can be made depending on user preferences.
 PV power generation Battery Inverter Grid Load	D. During noncharging and discharging periods, the solar energy power supply to loads is preferred, while the excess energy will supply power to the grid.
2. When the grid and batteries are available (PV power generation disconnected):	

	A. When charging, the grid will charge the batteries while supplying power to the connected loads.
	B. When discharging, if the electricity quantity of the loads is less than that of the batteries, the battery power supply to the loads will be preferred, and the excess electricity quantity will be fed into the grid.
	C. When discharging, if the electricity quantity of the loads is higher than that of the batteries, the batteries and grid will supply power to the loads at the same time.

Operating mode 3: Back-up

1. When the PV power supply, grid and batteries are available:	
	A. The solar energy charging to the batteries is preferred. If excess solar energy is reserved, the excess electric energy will be supplied to the loads, and the excess electricity quantity, if still reserved, will be fed into the grid.
	B. The solar energy charging to the batteries is preferred. If excess solar energy is reserved, the excess electric energy will be supplied to the loads. If the solar energy is insufficient to charge the batteries and supply power to the loads, the grid will supply power to the loads.
2. When the grid and batteries are available (PV power supply disconnected):	
	The grid will supply power to the loads and charge the batteries at the same time.

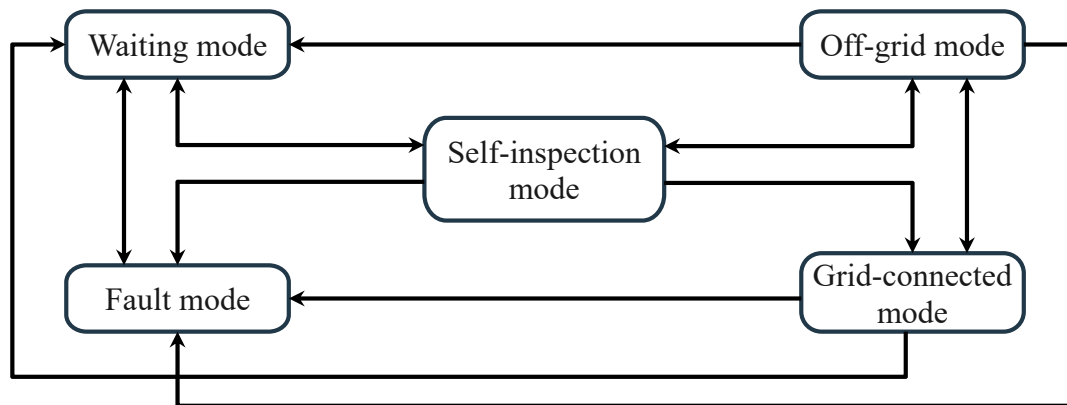
Operating mode 4: Power Dispatch



Note

If the anti-reverse current function is enabled, the system will not feed power to the grid.

3.3.2 Inverter operating mode



No.	Component	Description
1	Waiting mode	Waiting after powering on the machines - The fault mode of the inverters will be enabled in case of a fault. - When meeting the conditions, the self-inspection mode will be enabled.
2	Self-inspection mode	Before starting the inverters, self-inspection and initialization will be continued. - When the self-inspection fails, the fault mode will be enabled. - When the self-inspection result is accepted and the grid is normal, the grid-connected mode will be enabled. - When the self-inspection result is accepted, however, no grid connection / a grid anomaly is found: - If batteries with sufficient power are used, the normal off-grid mode (the EPS port outputs an AC voltage) will be enabled; - If the used batteries are provided with low battery and PV power generation is allowed, the power reservation off-grid mode (the EPS port has no outputs, the PV system charges the batteries) will be enabled; - If the used batteries are provided with low battery and no power from PV system is generated, the waiting mode will be enabled; - When no batteries are used, the waiting mode will be enabled.
3	Grid-connected mode	The inverters are used with the grid connected. The fault mode of the inverters will be enabled in case of a fault. When no grid connection / a grid anomaly is found, see the above steps ①~④ for operation without grid connection / a grid anomaly under the self-inspection mode.
4	Off-grid mode	The inverters are working under the off-grid mode, and the EPS port continues to supply power to the loads. - The fault mode of the inverters will be enabled in case of a fault. - If the power grid restores, the grid-connected mode will be enabled. - If the used batteries are provided with low battery: - When the solar power generation is allowed, the power reservation off-grid mode (the EPS port has no outputs, the PV system charges the batteries) will be

		enabled; ② When no solar power generation is allowed, the waiting mode will be enabled.
5	Fault mode	If a fault is detected, the fault mode of the inverters will be enabled. After the fault is cleared, the waiting mode will be enabled.

3.4 Functional characteristics

Power derating

In order to ensure the safe operation of the inverter, when the operating conditions are unsatisfactory, the inverters will automatically derate its output power.

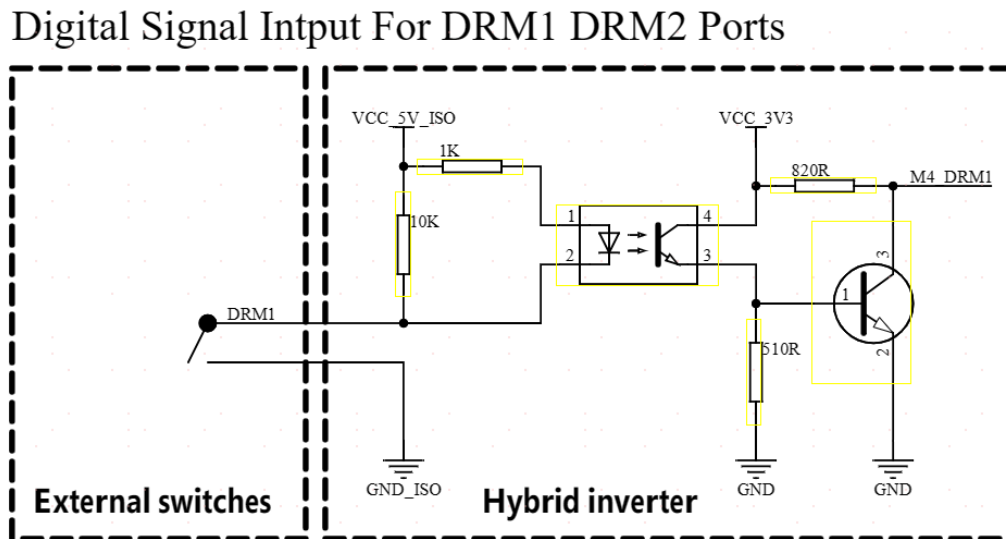
The following are factors that may cause power derating, which should be avoided during operation if possible.

- Adverse ambient conditions, such as direct sunlight and high temperatures, etc.
- The output power percentage of the inverters has been set.
- Overfrequency and load reduction.
- High input voltage value.

DRM input control

The inverter reserves DRM input control ports for controlling the running status of PCS.

If you need to use this function, configure the external wiring as recommended in the following diagram:



The DRM interface is defined in the following table:

Port	Definition
J7-1	DRM ports, for DRM0
J7-4, J7-5	Common ports

The inverter should detect and initiate a response to all supported demand response commands, with the demand response mode described as follows:

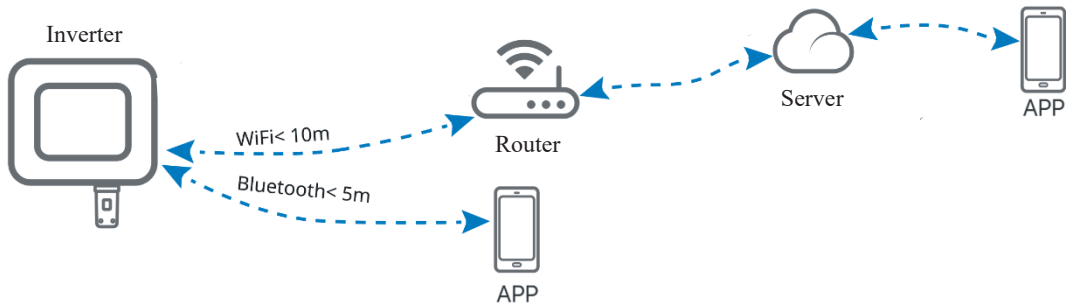
Mode	Demand response
DRM0	Operate to disconnect devices when status is ON
DRM1	Function not open, do not wire
DRM2	Function not open, do not wire
DRM3	Function not open, do not wire

Communication

The inverters can be set through WiFi or Bluetooth near-end; They supports connecting to the cloud through WiFi or LAN for monitoring the inverter operation and power station operation, etc.

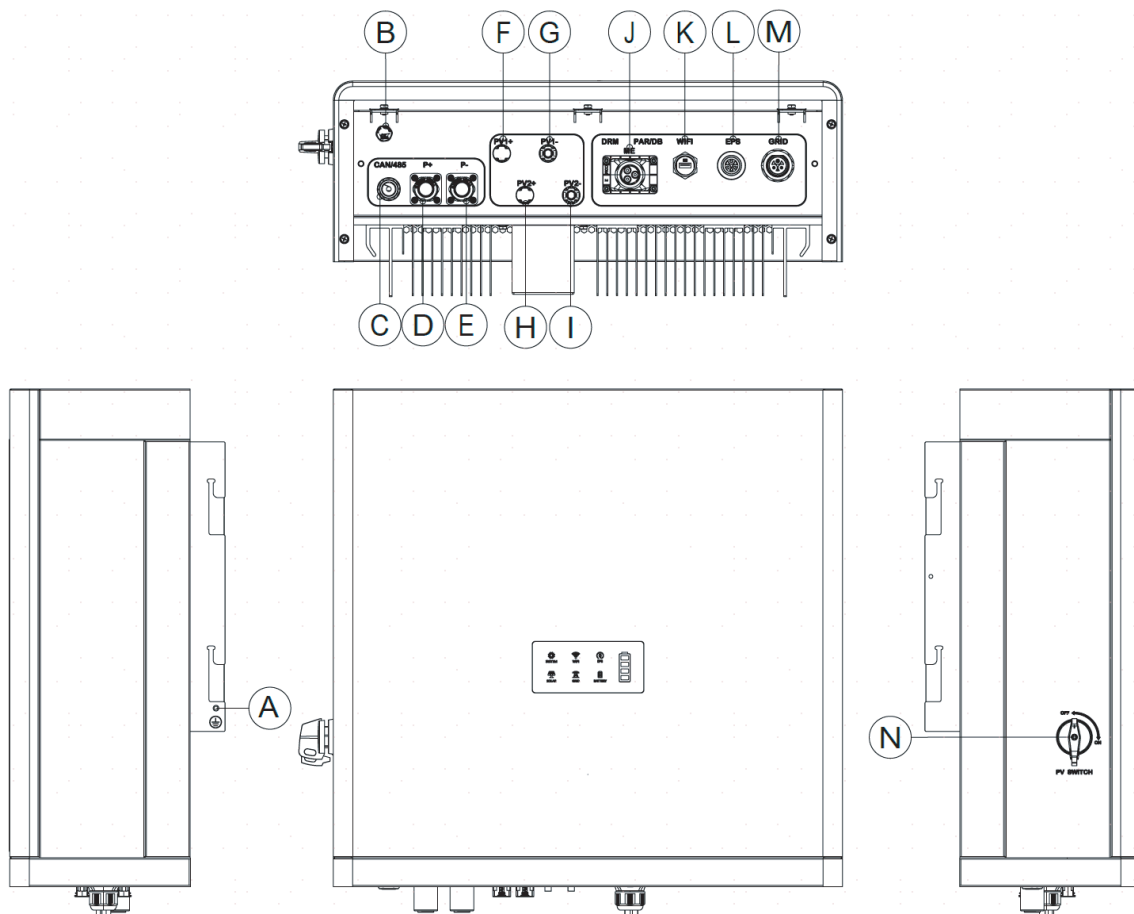
- Bluetooth: Meeting the Bluetooth 5.1 standard.
- WiFi: Supporting the 2.4G frequency band. The router should be set to the 2.4G or 2.4G/5G concurrent mode.
- The input wireless signal name of the router can contain up to 40 bytes.

- The WiFi signal strength can be viewed through the App. When the signal strength is less than -60, it is recommended to move the router closer to the devices or remove those signal barriers to improve the signal strength.
- LAN (optional): Supporting connecting to the router through LAN communication before connecting to the cloud.



3.5 Appearance description

3.5.1 Appearance introduction

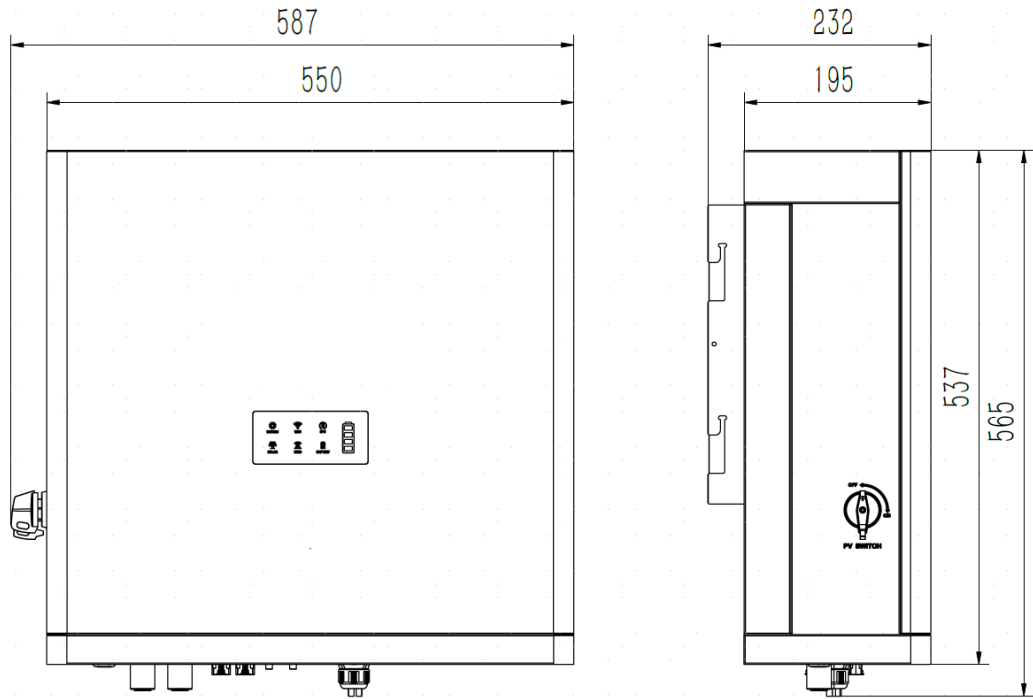


Mark	Description
A	Ground
B	Waterproof breather Valve
C	BMS port (CAN/485)
D/E	Input ports of battery system (P+/P-)
F/G	PV DC input ports (PV1+/PV1-)
H/I	PV DC input ports (PV2+/PV2-)
J	Communication ports (DRM, PAR/DB, ME)
K	WiFi interface for external WiFi
L	EPS output
M	Grid output

N	PV switch
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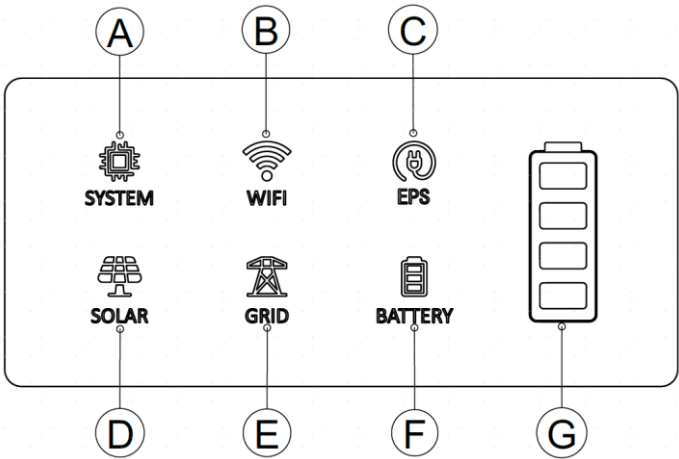
Note
1. BMS port: For BMS communication of lithium batteries.
2. DRM port: The demand response mode is selected based on specific requirement.
3. CAN port: Parallel port.

3.5.2 Size description



Unit: mm

3.5.3 Panel description



Object	Name	Description
A	SYSTEM	System operation status
B	WIFI	Network connection status
C	EPS	Load connection status
D	SOLAR	PV connection status
E	GRID	Grid connection status
F	BATTERY	Battery connection status
G	Battery level	Displayed battery level

3.5.4 Technical data

Model	AE3K6-L1-S	AE4K-L1-S	AE4K6-L1-S	AE5K-L1-S
	PV input			
Recommended max. DC power [W]	7000	7000	7000	7000
Max. DC voltage [V]	550	550	550	550
Max. input current [A]	14/14	14/14	14/14	14/14
Max. short-circuit current [A]	18/18	18/18	18/18	18/18
Number of MPPT trackers	2	2	2	2
Max. feedback current of inverter to PV array	0	0	0	0
DC circuit breaker	Yes	Yes	Yes	Yes
	AC output			
Rated AC power [W]	3600	4000	4600	5000
Max. apparent AC power [VA]	3600	4000	4600	5000
Rated grid voltage (range) [V]	220/230(198-253)	220/230(198-253)	220/230(198-253)	220/230(198-253)
Rated grid freq. [Hz]	50/60	50/60	50/60	50/60
Rated AC current [A]	16.4/15.7	18.2/17.4	20.9/20	22.7/21.7
Max. AC current [A]	16.4	18.2	20.9	22.7
Displacement power factor	0.9 leading...0.9 lagging	0.9 leading...0.9 lagging	0.9 leading...0.9 lagging	0.9 leading...0.9 lagging
Total harmonic distortion (THDi)	< 2%	< 2%	< 2%	< 2%
Load control	Optional	Optional	Optional	Optional
	AC input			
Rated AC power [W]	3600	4000	4600	5000
Rated grid voltage (range) [V]	220/230 (198-253)	220/230 (198-253)	220/230 (198-253)	230/220(198-253)
Rated grid freq. [Hz]	50/60	50/60	50/60	50/60
Rated AC current [A]	16.4/15.7	18.2/17.4	20.9/20	22.7/21.7
Max. AC current [A]	25	25	25	25
Power factor	0.9 leading...0.9 lagging	0.9 leading...0.9 lagging	0.9 leading...0.9 lagging	0.9 leading...0.9 lagging
	EPS output			
Rated power of load [W]	3600	4000	4600	5000
Max. load power [VA]	3600	4000	4600	5000
Rated grid voltage [V]	220/230	220/230	220/230	220/230
Output frequency	50/60	50/60	50/60	50/60
Rated current of load [A]	16.4/15.7	18.2/17.4	20.9/20	22.7/21.7
Max. load current [A]	25	25	25	25
Switching time [ms]	<20	<20	<20	<20
Total harmonic distortion (THDv)	<2%	<2%	<2%	<2%
Parallel operation	Yes	Yes	Yes	Yes
	Battery parameter			
Battery type	Lithium battery / lead-acid batteries			
Battery voltage range [V]	45-58			
Suggested battery voltage [V]	51.2			
Cutoff voltage [V]	45			
Max. charging voltage [V]	58			
Max. protection voltage [V]	58			
Max. charging/discharging current [A]	70/70	80/80	90/90	100/100
Peak charging/discharging current [A]	100/100	100/100	100/100	100/100
Communications Interface	CAN/RS485/WIFI/DRM			

Reverse connection protection	Yes
	Efficiency
MPPT efficiency	99.9%
European efficiency	97%
Max. efficiency	97.6%
Max. battery charging efficiency	95%
Max. battery discharging efficiency	95%

3.5.5 Basic data

Model	AE3K6-L1-S	AE4K-L1-S	AE4K6-L1-S	AE5K-L1-S
Size [W/H/D] (mm)	550*565*232±5			
Packaging size [W/D/H] (mm)	670*650*300±5			
Net weight [kg]	28±1			
Gross weight [kg]	34±2			
Installing	Modular			
Operating temperature range [°C]	-25~+60 (derating at 45)			
Storage temp. [°C]	-25~+60			
Relative humidity for storage/operation	4%~95% (Condensing)			
Altitude [m]	<2000			
Intrusion protection	IP65(for outdoor use)			
IP grade	I			
Nighttime consumption	<3W			
Overvoltage cat.	III(MAINS), II(PV, Battery)			
Contamination level	II(inside);III(outside)			
Cooling	Natural			
Noise level	<30dB			
Inverter topology	Non-isolated			
Active anti-islanding mode	Power variation			
Communications Interface	CAN/RS485/WIFI/LAN/DRM			

3.5.6 Safety and protection

Safety and protection	AE3K6-L1-S	AE4K-L1-S	AE4K6-L1-S	AE5K-L1-S
Overvoltage/undervoltage protection	YES	YES	YES	YES
DC isolation protection	YES	YES	YES	YES
Monitoring ground fault protection	YES	YES	YES	YES
Grid protection	YES	YES	YES	YES
DC injection monitoring	YES	YES	YES	YES
Feedback current monitoring	YES	YES	YES	YES
Residual current detection	YES	YES	YES	YES
Anti-islanding protection	YES	YES	YES	YES
Overload protection	YES	YES	YES	YES
Overheat protection	YES	YES	YES	YES

4 Device Inspection and Storage

4.1 Inspection before signing for acceptance

Before signing for product acceptance, Check the following carefully:

1. Check for any damage to the outer packages, such as deformation, holes, cracks, or other defects that may cause damage to the devices inside the packages. DO NOT open the packages if any damage is found. Contact your dealer.
2. Check the inverters for correct model. DO NOT open the packages if any discrepancy is found. Contact your dealer.
3. Check the types and quantity of deliverables for being correct, and the appearances for any damage. Contact your dealer if any damage is found.

4.2 Deliverables

 Warning
• When making electrical connections, use the wiring terminals shipped with the packages. Damages caused by using incompatible connectors are not covered in the Warranty. • The number of accessories distributed with the packages is dependent on the product configuration.

Please confirm the materials according to the packing list inside the packaging box.

4.3 Device storage

If the inverters are not intended for use at present, just store them according to the following requirements:

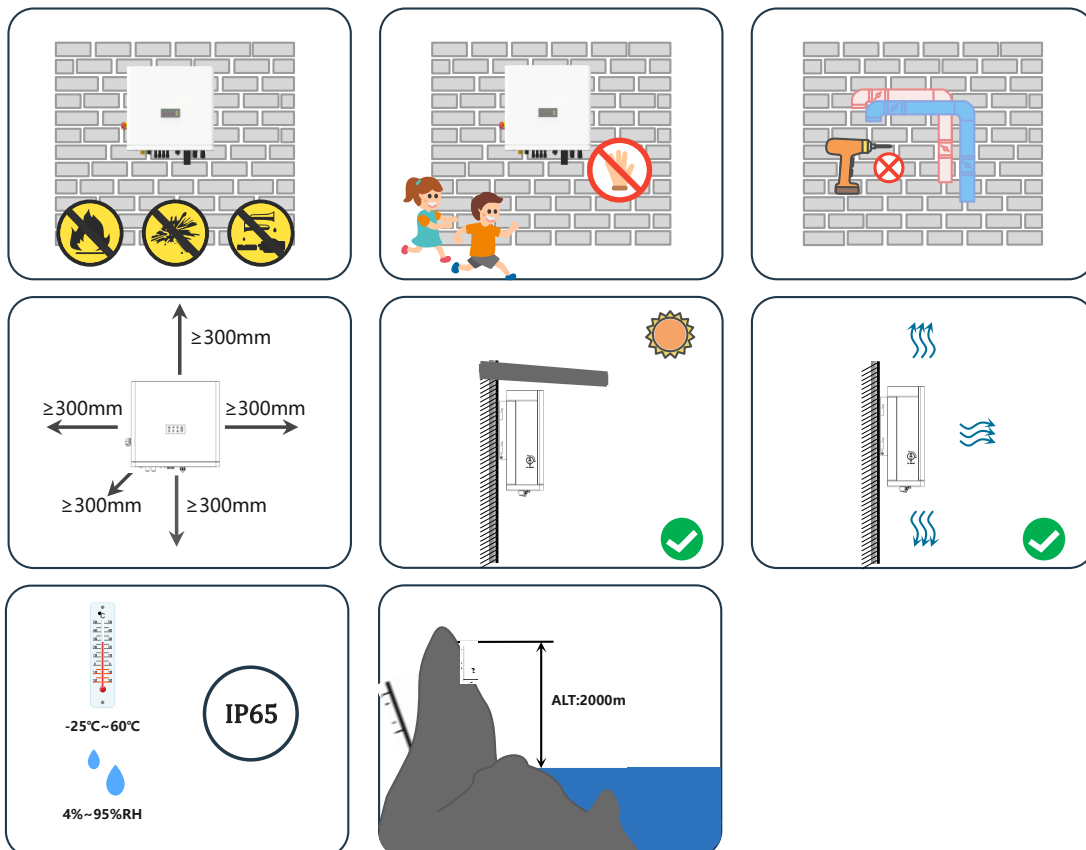
1. Make sure that the outer packages are not removed and the desiccant inside the packages exists.
2. Make sure that the storage environment is clean with appropriate temperature and humidity conditions and without condensation.
3. Make sure that the inverter stacking height and direction meet the instructions on the package labels.
4. Make sure that the inverters are not liable to tipping over after stacking.
5. After a long-term storage, the inverters must be inspected and confirmed by professional personnel before continuing to be used.

5 Installation

5.1 Installation requirements

Installation environment requirements

1. The devices should not be installed at places with flammable, explosive, or corrosive materials, etc.
2. The installation positions should be away from the reach of children and sufficient spaces should be left. There may be a high temperature on the surface of the devices during operation, DO NOT touch them for fear of burns.
3. The installation positions should be prevented from water pipes and cables in walls for fear of causing accidents during drilling.
4. The inverters should be installed at places that are away from sunlight, rain and snow, etc. It is recommended to install them at covered places. Sunshades can be set up if necessary.
5. The installation spaces must meet the device ventilation and heat dissipation and operating space requirements.
6. The IP grade of the devices should meet the requirements for indoor and outdoor installation, and the installation ambient temperature and humidity should be kept within a suitable range.
7. The installation height of the devices should be suitable for operation and maintenance. Make sure that the indicators and all labels of the devices are clear, and the wiring terminals are always ready.
8. The installation altitude of the inverters should be lower than the maximum operating altitude of 2000m.
9. Stay away from strong magnetic field places and avoid electromagnetic interference.



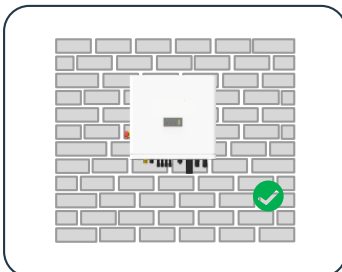
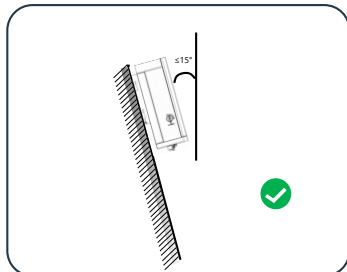
Installing carrier requirements

- The installing carriers must be made of nonflammable and fire-proof materials.
- Make sure that the installing carriers are sturdy, reliable and capable of carrying inverters. Load-bearing capacity not less than 35kg.
- When a device is in operation, vibration is unavoidable, and therefore, DO NOT install it on a carrier with poor

sound insulation in order to prevent the noise from the device from causing inconvenience to residents in the living area during operation.

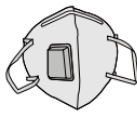
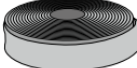
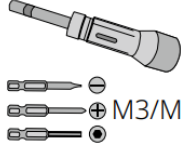
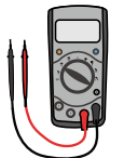
Installing angle requirements

- Recommended inverter installation angle: vertical installation, tilt forward or backward $\leq 15^\circ$.
- DO NOT install the inverters upside down, forward / backward tilt beyond the angle, or horizontally.



Installing tool requirements

It is recommended to use the following tools during installation. Other auxiliary tools can be used on site if necessary.

 Goggles	 Safety shoes	 Safety gloves	 Dust mask	 Modular plug cable crimping pliers
 Diagonal pliers	 Wire stripper	 churn drill	 Hot air gun	 Vacuum cleaners
 Marking pen	 Level bar	 Heat-shrinkable sleeve	 Rubber hammer	 Torque wrench
 Multimeter	 Cable tie	 Adjustable wrench	 PV crimping pliers	 Short handle screwdriver

5.2 Installation of Inverter

5.2.1 Inverter transportation

 Caution
• The transportation, carrying, installation and other operations should meet the laws, regulations and relevant standards of the country and region where the products are located. • Before installation, the inverters should be carried to the installation positions. Pay attention to the following

for fear of personal injuries or device damages during handling:

1. The weight of the devices should be considered before assigning workers for handling in order to prevent them from failing to handling the devices and causing injuries.
2. Wear safety gloves for fear of injuries.
3. Make sure that the devices are balanced during handling to avoid dropping.

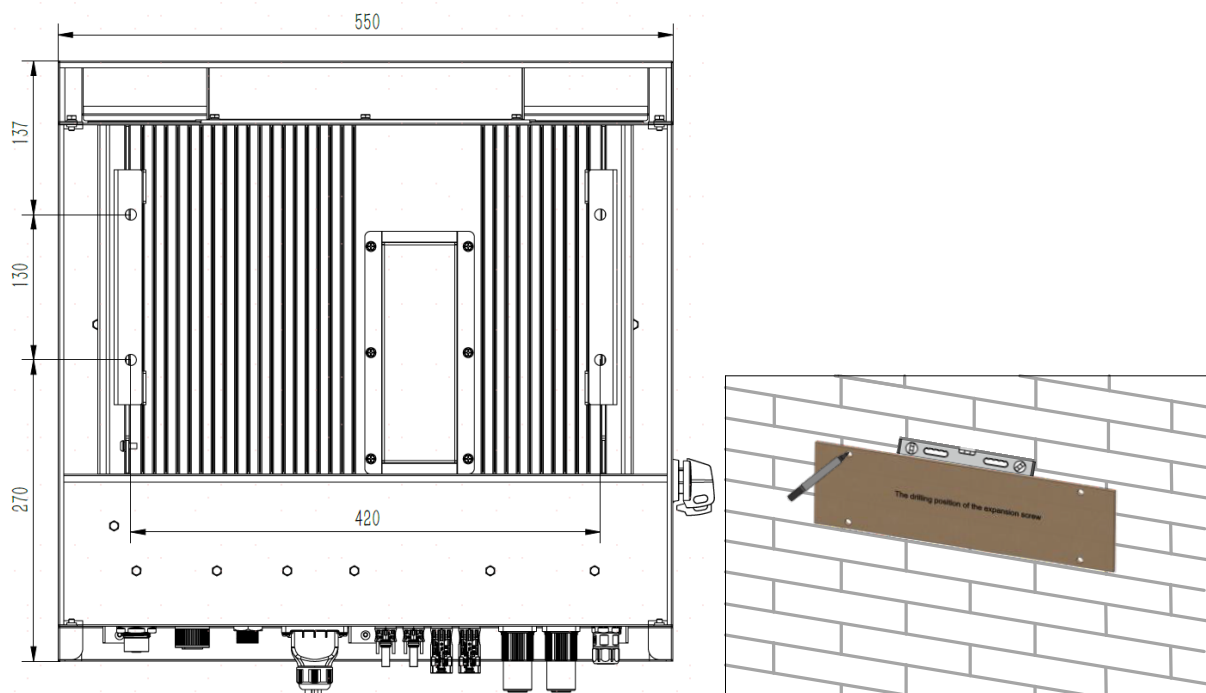
5.2.2 Installation of Inverter (split unit)

Note

- During drilling, the holes should be away from water pipes and cables in walls for fear of accidents.
- During drilling, wear protective goggles and dust masks to prevent dust from entering your respiratory tract or eyes.
- Be sure that the inverters are securely installed to prevent dropping and injuries.

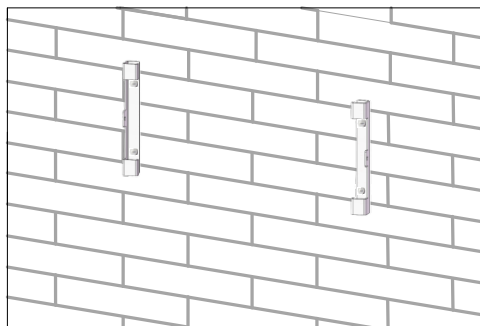
Step 1: Make sure that an inverter is at the rough installation position on the wall;

Step 2: Take out a piece of drilling positioning cardboard from a package and place it horizontally on a wall, and mark a drilling position with a marker;



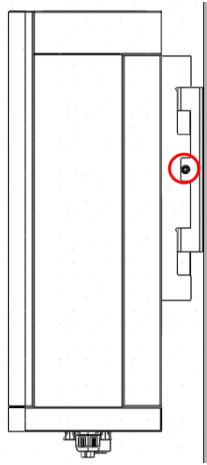
Step 3: Drill with a churn drill with the bit diameter being $\phi 12$. Make sure that the hole depth is about 80-85mm.

Step 4: Use M8X80 expansion screws to install a bracket on the wall;



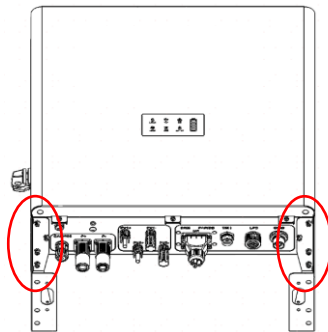
Step 5: Hang the inverter on the wall-mount bracket;

Step 6: Fix the wall-mount bracket and inverter with screws to prevent the inverter from unhooking and ensure a stable installation.

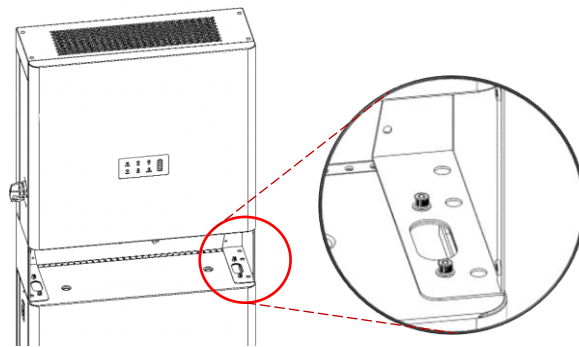


5.2.3 Installation of Inverter (all-in-one unit)

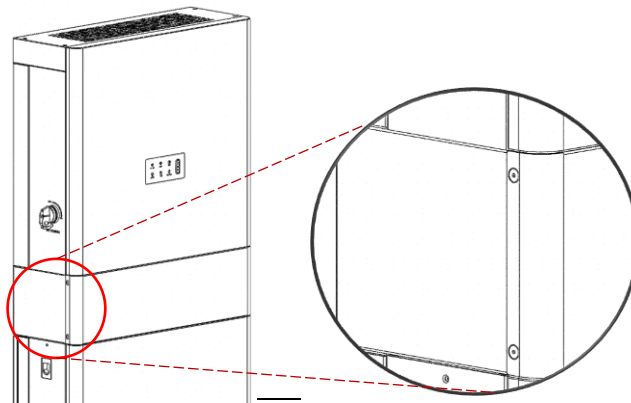
Step 1: Install the left / right base supports on an inverter case;



Step 2: Move the inverter onto an installed battery system and connect it to the PACK body through the base bolt holes;



Step 3: After wiring, fix the front decorative cover to the base using M5 countersunk screws;

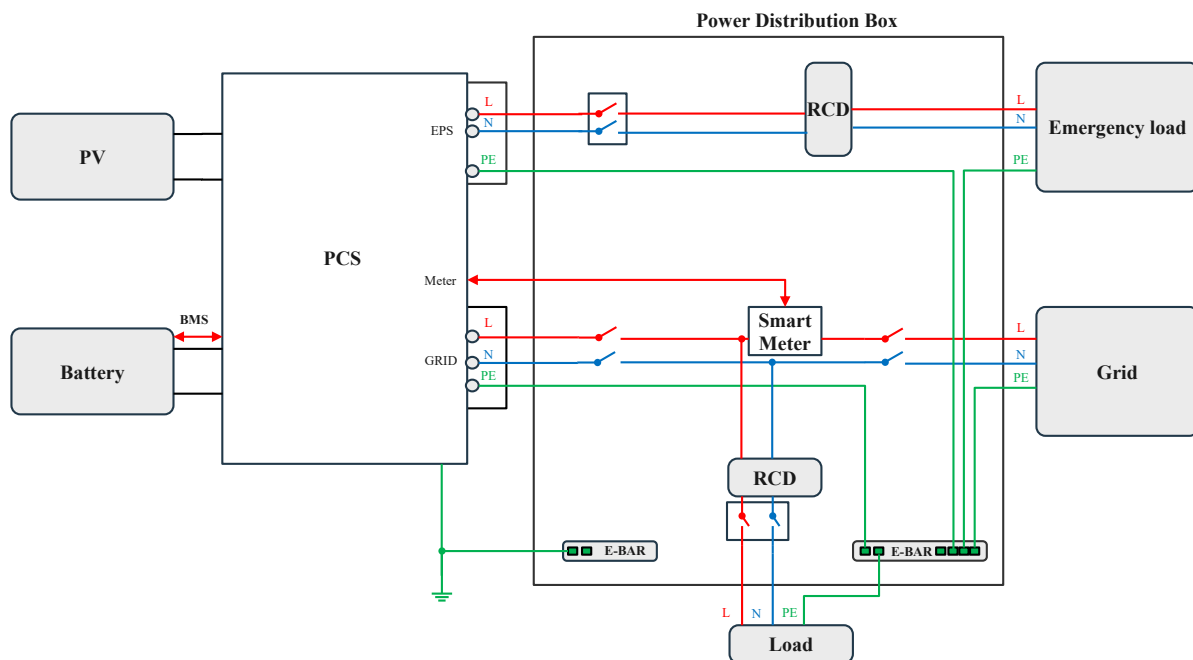


6 Electrical connection

6.1 System wiring block diagram

Note
• According to the regulatory requirements in different regions, the wiring methods for the N and PE wires of the GRID and EPS ports of inverters are different, which is dependent on the local regulations. • The GRID and EPS AC ports of inverters are provided with built-in relays. When the grid meets the local regulations, the built-in GRID relays are switched on; Otherwise, they are switched off. • When an inverter is powered on, the EPS AC port is energized. If maintenance of the EPS load is required, power off the inverter, otherwise an electric shock may be caused.

System Diagram 1 (suitable for most countries)



Safety precautions

 Danger
• All operations and used cable and component specifications during electrical connection must meet local laws and regulations. • Before making an electrical connection, disconnect the DC switch and AC output switch of the inverters to ensure that the devices are powered off. Live operation is strictly prohibited, otherwise dangers such as electric shock may be caused. • Similar cables should be tied together and arranged separately from different types of cables. Intertwining or cross arrangement are prohibited. • If the cables bear too much tension, a poor wiring may be caused. When wiring, reserve a certain length of the cables before connecting them to the inverter wiring ports. • When crimping a wiring terminal, make sure that the cable conductor part is in full contact with the wiring terminal. DO NOT crimp the insulation sheath of the cable together with the wiring terminal, otherwise operation of device will fail, or the inverter terminal block may be damaged due to poor connection and high temperature after operation.

Note

- When making electrical connections, wear personal protective equipment such as safety shoes, protective gloves and insulating gloves as required.
- Only professionals are allowed to make electrical connection related operations.
- The cable colors in the diagrams of this Manual are for reference only, and the cable specifications must meet local regulatory requirements.

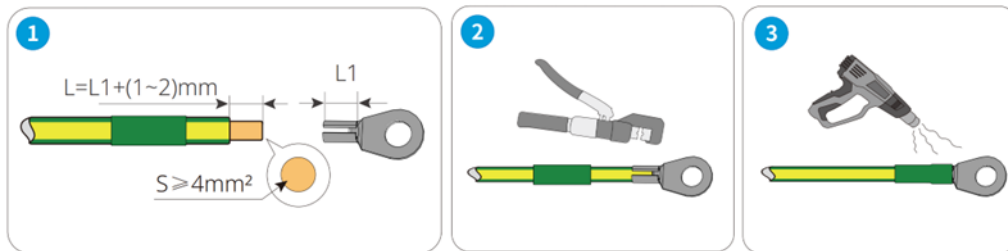
6.2 Grid and load connection

Connect the grounding points of each module in sequence and then tighten the grounding wires with grounding screws.



Warning

- The protective grounding wire of the casings should not be used instead of that of the AC output ports. When wiring, make sure that the two protective grounding wires are reliably connected.
- When multiple inverters are used, be sure that the protective grounding points of all inverter casings are equipotentially connected.
- In order to improve the corrosion resistance of terminals, it is recommended to apply silica gel or coat on the grounding terminals for protection after protective grounding wire connection.
- The protective grounding wires should be provided by the user, recommended specifications:
 - Type: Outdoor copper wire
 - Conductor cross-sectional area: 4-6 mm²



The hybrid inverters are designed specifically for single-phase grids. The voltage and frequency are 220/230V and 50/60Hz, respectively. Other technical requirements should be subject to the requirements of local public grids.

Recommended cable and miniature circuit breaker	
Cable	10AWG
Miniature circuit breaker	32A



Warning

- A miniature circuit breaker should be installed between an inverter and the grid, and no direct connection of a load to an inverter is allowed.
- During final installation, the circuit breakers meeting the IEC 60947 and IEC 60947-2 standards should be installed on the devices.

Step 1. Check the grid voltage.

1.1 Check the grid voltage and compare it with the allowable voltage range (see the technical data).

Step 2. Remove the waterproof cover from the inverter grid port.

Step 3. Make GRID cables for the AC power grid.

3.1 Select the appropriate wire (cable size: see the table above).

3.2 Reserve about 20 mm cross-sectional area of conductor material and remove 10 mm insulation layer at the end of conductor.

3.3 Remove the AC terminal using the crimping pliers.

3.4 Connect cables to the components and insert them into the terminal holes according to the cable sequence.

3.5 Tighten the screws with a hex wrench, and the torque is 1.2±0.1N·m.

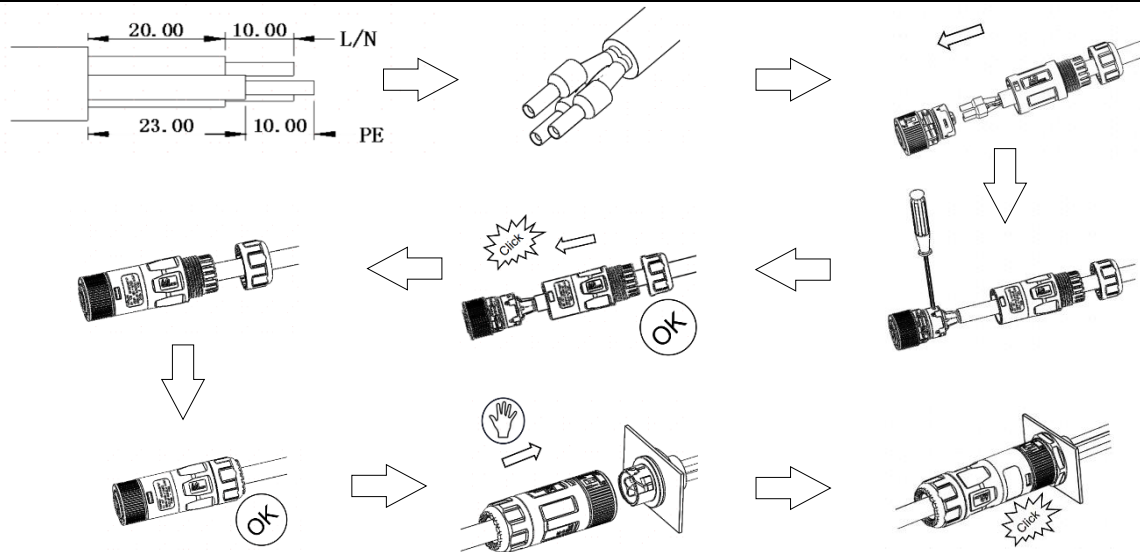
3.6 Insert the main body into the buckle and hear "Click"

3.7 Use an open end wrench to tighten the nut (torque 2.5±0.5N·m).

3.8 The assembly is complete.

3.9 Installation arrow Indicates the female end of the cable.

3.10 Complete the installation.



Step 4. Make an AC load EPS conductor.

4.1 Select the appropriate wire (cable size: see table above).

4.2 Reserve about 20 mm cross-sectional area of conductor material and remove 10 mm insulation layer at the end of conductor.

4.3 Remove the AC terminal using the crimping pliers.

4.4 Connect cables to the components and insert them into the terminal holes according to the cable sequence.

4.5 Tighten the screws with a hex wrench, and the torque is $1.2 \pm 0.1 \text{ N} \cdot \text{m}$.

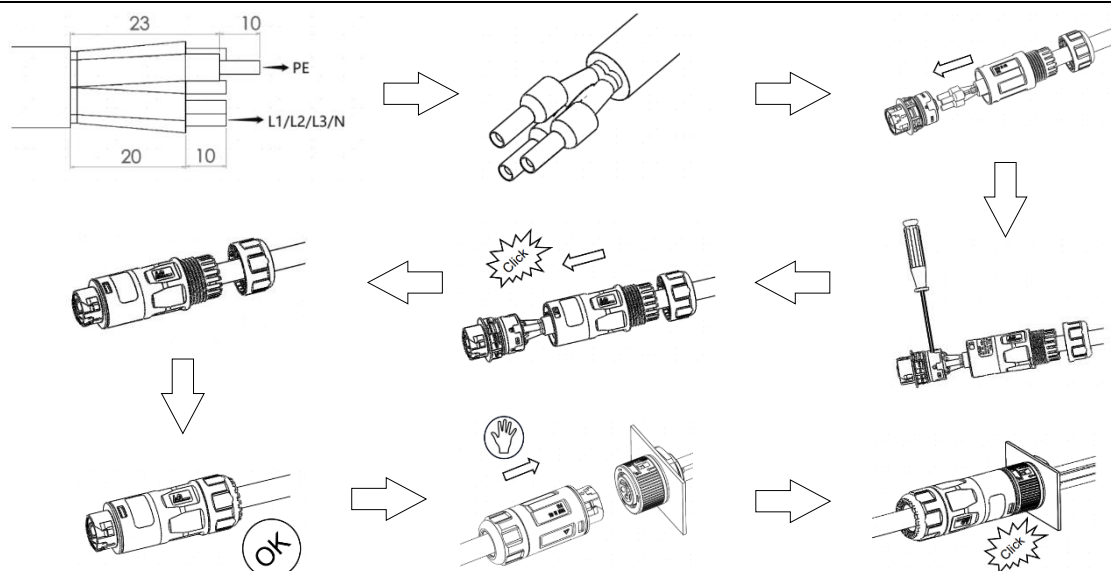
4.6 Insert the main body into the buckle and hear a click.

4.7 Use an open end wrench to tighten the nut (torque $2.5 \pm 0.5 \text{ N} \cdot \text{m}$).

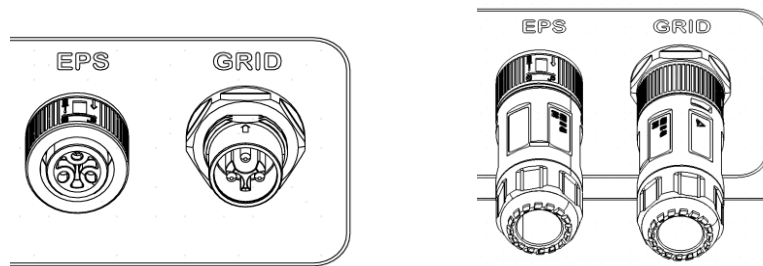
4.8 Complete the assembly.

4.9 Installing the arrow indicates the female end of the cable.

4.10 Completing the Installation.

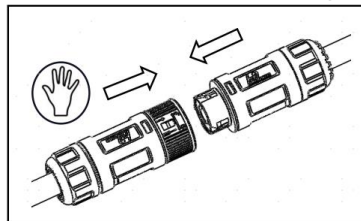


Step 5. GIRD and EPS cables have been installed.



Note

- Connect the AC connectors to the GRID and EPS interfaces respectively.
- During the maintenance of the inverter, the GRID port can be directly plugged into the EPS port, and the power grid supplies power to the EPS load, without additional wiring through the distribution box;



6.3 PV connection



Danger

- The voltage of the PV modules is very high and has reached the dangerous range. The connection should meet the electrical safety rules.
- DO NOT connect the same serial PV modules to multiple inverters for fear of damages to them.
- Before connecting the serial PV modules to an inverter, the following information should be confirmed, otherwise it may cause a permanent damage to the inverter, and in severe cases, fires and major personnel / property losses may be caused.
 1. Be sure that the maximum short-circuit current and maximum input voltage of each MPPT are kept within the allowable range of the inverter.
 2. Be sure that the positive pole of the serial PV modules is connected to PV+ of the inverter, and the negative pole of the serial PV modules is connected to PV- of the inverter.



Warning

The output of the serial PV modules does not support grounding. Before connecting the serial PV modules to an inverter, make sure that the minimum ground insulation resistance of the serial PV modules meets the minimum insulation impedance requirement ($R = \text{maximum input voltage} / 30\text{mA}$). If the insulation impedance is less than this requirement, an insulation impedance alarm from the inverter will be triggered.

Note

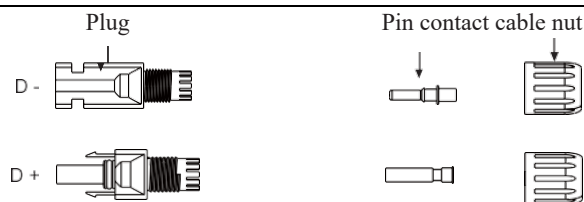
- A hybrid inverter can be connected in series with two serial PV modules for operation under 3.6kW, 4kW, 4.6kW and 5kW.
- The PV modules used for connecting the inverter should meet the requirements of IEC 61730 Class A.
- Choose PV modules with excellent performances and reliable quality.
- The open circuit voltage of the serial module array should be less than the maximum DC input voltage.
- The DC input operating voltage should be kept within the MPPT voltage range.

Maximum DC voltage limit				
Model	AE3K6-L1-S	AE4K-L1-S	AE4K6-L1-S	AE5K-L1-S
Max. DC voltage (V)	550			
MPPT voltage range (V)	150-500			

Connecting PV:

Step 1. Check the PV modules to ensure that they are in an open circuit state and that the PV+ and PV- ports of the PV modules are correct.

Step 2. Separate the DC connector.



Step 3. Wiring

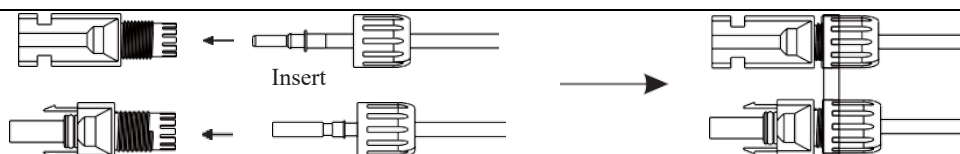
3.1 Choose a piece of 12 AWG wire and connect it to a cold-pressed terminal.

3.2 Remove 10mm of insulation sheath from the end of the wire.

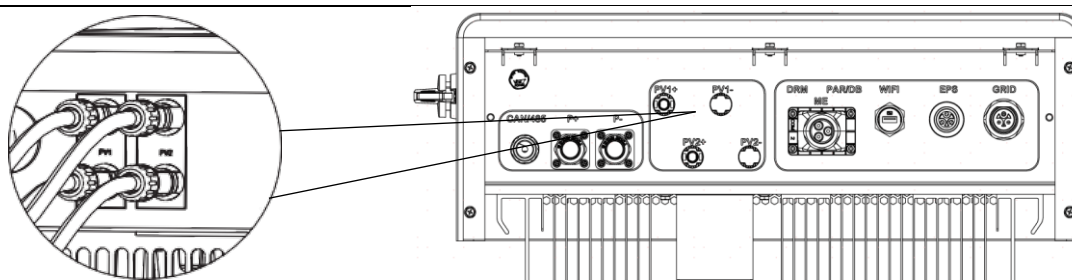
3.3 Insert the stripped end to a pin contact and clamp them with crimping pliers.



Step 4. Insert the pin contact into the back of the male or female plug through a cable nut. When you feel or hear a "click" sound, it indicates that the pin contact module has been correctly locked.



Step 5. Insert the PV connector into the corresponding PV connector on an inverter.



6.4 Battery connection



Danger

- Batteries to be used together with an inverter must be approved by the inverter manufacturer, and the approved battery list can be obtained through the official website.
- Short circuit of the batteries may cause personal injuries, and the instantaneous high current caused by short circuit can release a large amount of energy, which may cause a fire.
- Before connecting the battery cable, make sure that the inverter and batteries have been powered off, and that the front and rear switches of the device have been disconnected.
- During the operation of the inverter, no connection or disconnection of the battery cable is allowed. Failing to operate according to the requirements may lead to electric shocks.

- DO NOT connect the same battery pack to multiple inverters for fear of damages to them.
- Connecting loads between the inverter and batteries is not allowed.
- When connecting the battery cable, use insulating tools to prevent unexpected electric shocks or short circuit of the batteries.
- Make sure that the open circuit voltage of the batteries is kept within the allowable range of the inverter.
- A DC switch should be used between the inverter and batteries.



Warning

- When wiring, the battery cable should perfectly match with the "P+", "P -", and grounding port of the battery terminal. If the cable connection is incorrect, damage to the device will be caused.
- Make sure that the wire core is fully accessed into the terminal wiring hole and not exposed.
- Make sure that the cable connection is tight, otherwise the operation of the device may cause overheating of the wiring terminals, and accordingly, result in damage to the device.

Note

- Before selecting batteries, it should be noted that the maximum voltage of the batteries should not exceed 58V, the minimum voltage should not be lower than 45V, and the communication for the batteries should be compatible with the inverter.
- The connecting cable between the batteries and inverter should be at least 25 square CSA products.
- The battery communication can only function properly when the battery BMS is compatible with the inverter.
- When replacing the batteries, all switches should be Off and the system communication cable should be unplugged.
- All the above connections and operations must be carried out by professionals after the entire device is powered off.

Step 1. Select two 25-level cables and strip the front end of the cables by 12 to 13mm.

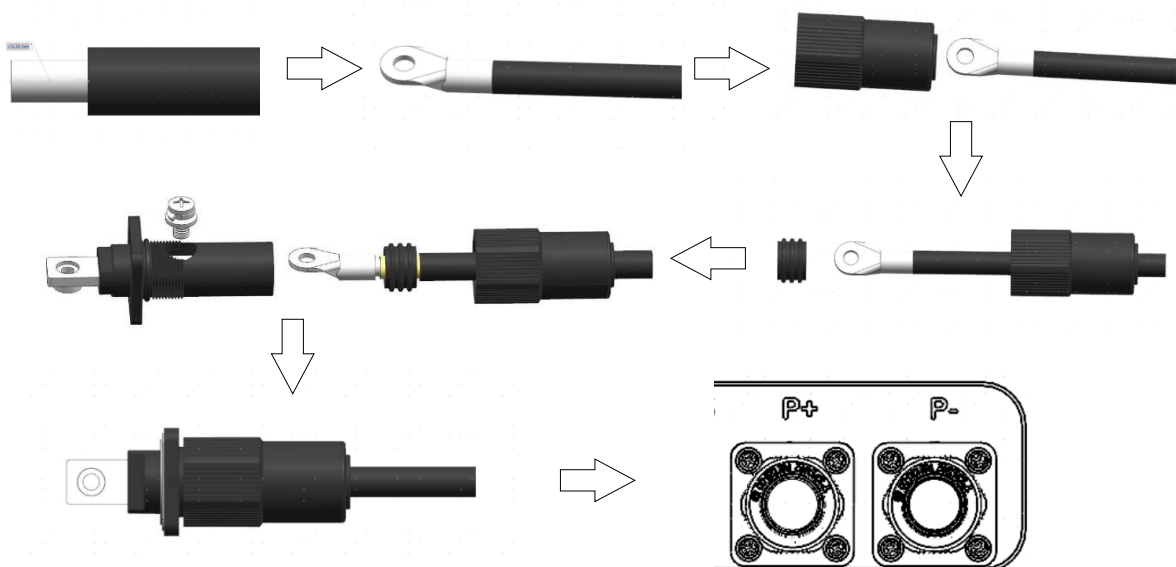
Step 2. Select the SC25-6 terminal from the accessories, insert the stripped cable into the terminal, and press the cable tightly using the crimping die.

Step 3. Route the cable connected to the ear through the end of the cover.

Step 4. Insert the lugs through the tail clip.

Step 5. Insert the lugs into the main body.

Step 6. Tighten the cover.



Note

- Reverse connection of the positive and negative poles is not allowed.

6.5 Communication connection

6.5.1 Definition of communication interface

➤ Definition of BMS PIN interface

The communication interface between an inverter and the battery system is RS485 or CAN, and RJ45 connectors are provided. The wiring sequence of modular plugs should meet the 568B standard: orange-white / orange / green-white / blue / blue-white / green / brown-white /brown.

	PIN	1	2	3	4	5	6	7	8
CAN	Definition	X	X	BMS_CANH		BMS_CANL		X	X



➤ DI connection

DI supports certain demand response modes by sending the following control signals.

1	2	3	4	5	6	7	8
DRM3	DRM1	CANL	DRM2	CANH	COM	GND_ISO	DRM0



➤ Definition of METER PIN interface

The communication interface between an inverter and the electricity meter is RS485, and RJ45 connectors are provided. The wiring sequence of modular plugs should meet the 568B standard: orange-white / orange / green-white / blue / blue-white / green / brown-white /brown.

	PIN	1	2	3	4	5	6	7	8
RS485	Definition	X	X	X	RS_485A	RS_485B	X	X	X



6.5.2 WiFi connection

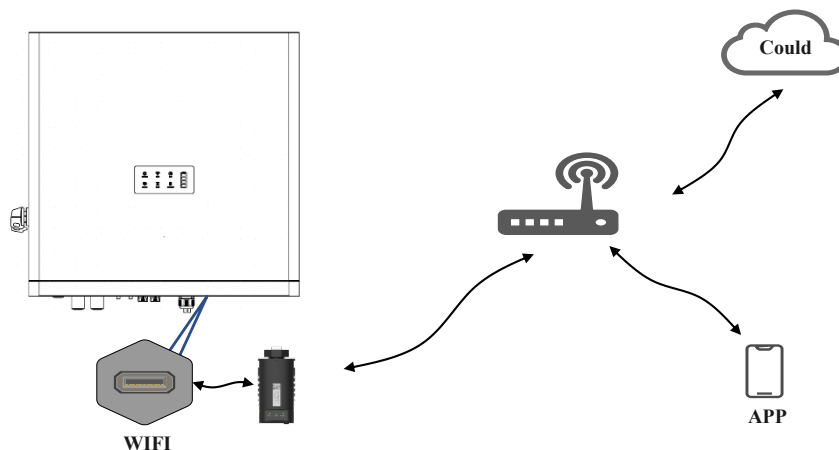
The inverters are provided with a WiFi port for collecting data from inverters and transmit it to a monitoring website through WiFi.

Step 1. Insert the WiFi plug into the "WIFI" port at the bottom of an inverter.

Step 2. Connect the inverter with a router.

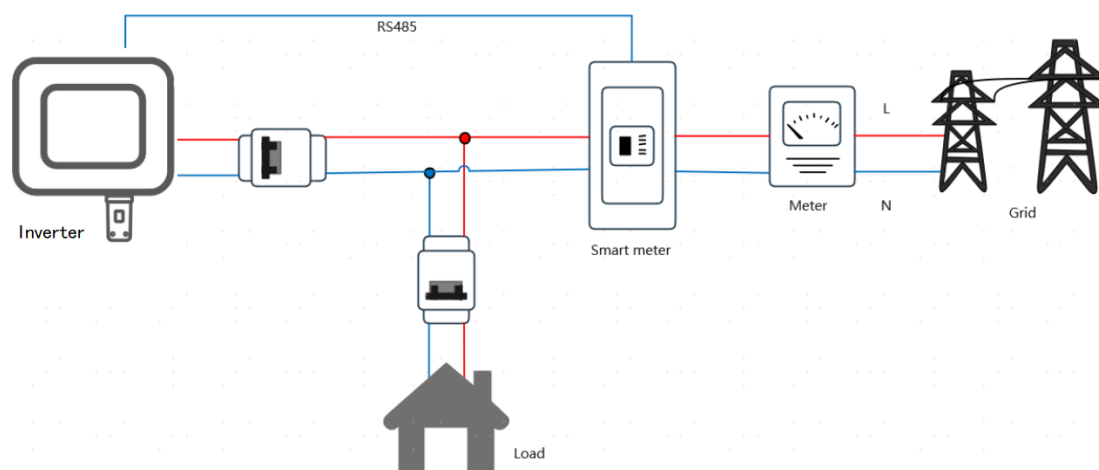
Step 3. Create a user account online. (See the WiFi configuration for details).

Schematic



6.5.3 Anti-reverse current networking scheme

The hybrid inverters can be used with a smart meter to achieve the anti-reverse current function.



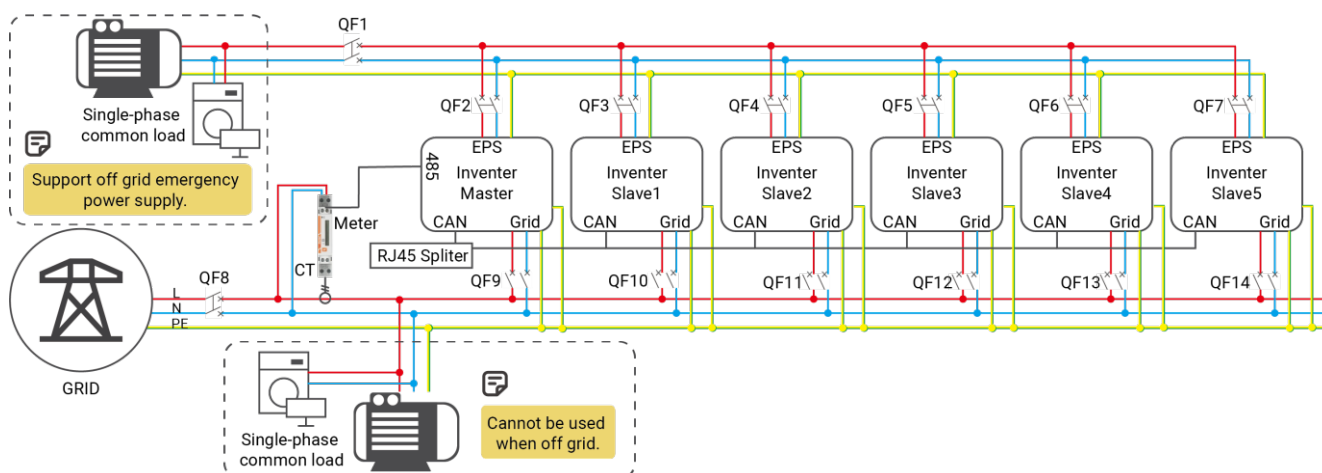
6.6 Parallel wiring scheme

This product consists of four power products, 3.6kW, 4kW, 4.6kW and 5kW, which can be installed independently of multiple inverters under the power grid without interference or communication between inverters.

When EPS ports or GRID ports are required to be used in parallel, capacity expansion can be achieved by using no more than 6 inverters in a parallel system. All inverters in parallel must have the same software version.

6.6.1 Parallel wiring diagrams

When the system needs to use EPS or GRID port parallel function, the master-slave wiring must be carried out according to the following diagram. EPS port supports offline operation, while GRID port does not support offline operation.



markings	descriptions
QF1	EPS parallel circuit breaker, rated current $\geq 25A \times N$ (number of inverters), rated voltage $\geq 400V$.
QF2-7	EPS stand-alone circuit breaker, rated current = 25A, rated voltage $\geq 400V$.
QF8	For entry circuit breakers, the current-carrying capacity shall take into account the total electrical current.
QF9-14	GRID stand-alone circuit breaker, rated current= 32A, rated voltage $\geq 400V$.
METER	Direct meters are rated at 80A. Calculate the current value when the inverter is charging and there is a load on the GRID port. If it exceeds 80A, a mutual inductance meter should be used.
485	Inverter communication interface (MET)

CAN	Inverter communication interface (PAR/DB), interconnected with RJ45 shunt, first and last device need to close CAN communication termination resistor switch.
RJ45 Splitter	Inverter communication interface (PAR/DB) parallel box.

6.6.2 Parallel power-up procedure

The inverter is divided into a master and several slaves, connected via a CAN communication interface (PAR/DB). Before powering up, make sure that the power line and parallel communication line have been connected according to the parallel wiring diagram, and the circuit breakers QF1~7 are all disconnected.

The parallel power on sequence for EPS or GRID ports is as follows:

Step 1: Close the GRID side circuit breakers QF8-QF14 of the inverter.

Step 2: The device that communicates with the electricity meter is first powered on and automatically set as the host when there is no host.

Step 3: The remaining inverters are powered on sequentially, with the default setting being the slave in the master state.

Step 4: Close all EPS single circuit breakers QF2-QF7 of the inverters.

Step 5: Close the EPS parallel circuit breaker QF1 to supply power to the EPS load.

If you want to replace the host device, you need to power off all the slave devices, reset the host (automatically set as the host when there is no host after reset), and power on the slave devices in sequence;

If you want to add a slave device, you need to install a slave according to the wiring diagram, and power it on while the host is running; When the number of slave devices exceeds 5, newly added slave devices will report communication failures;

If you want to replace the slave device, you need to replace it according to the wiring diagram, and reset the host before powering on.

6.7 Installation inspection

After the products are installed, make sure to check according to the following table!

Item	No.	Content
Installation	1	Check the products for being installed vertically and stably.
	2	Check all screws for being tightened (especially the electrical connection). Check the flat washers and spring washers for being complete and not placed upside down.
	3	Check the reserved distance below the products for meeting the requirements.
	4	Check the accessories for being complete and the cables for being intact without damage.
Electrical connection	1	Check the positive / negative poles of the cables at the PV side for being correct.
	2	Check the knob switch at the PV side for being "OFF".
	3	Check the connector positions at the load side and grid side for being correct.
	4	Check the casing grounding for being reliable.
	5	Check all connectors for being connected reliably.
	6	Check the cable models and specifications for being correct.
	7	Check all cables for being connected reliably.
	8	Check the colors of the AC cables for meeting the requirements and the safety signs for being complete.
	9	Check the cables for being neat and the tying for meeting the process specifications.

7 Test Operation of Device

7.1 Check before power on

No.	Item
1	The inverters are firmly installed, the installation positions are convenient for operation and maintenance, the installation space is convenient for ventilation and heat dissipation, and the installation place is clean and tidy.
2	The protective grounding wires, DC input wires, AC output wires, and communication cables are connected correctly and firmly.
3	The tied cables meet the wiring requirements, are reasonably distributed and have no damages.
4	Waterproof covers are installed for unused wire holes.
5	The used wire holes have been sealed.
6	The voltage and frequency of the inverter-grid connection point meet the grid connection requirements.

7.2 Device powering on

Step 1: Switch on the GRID AC circuit breaker of the inverters.

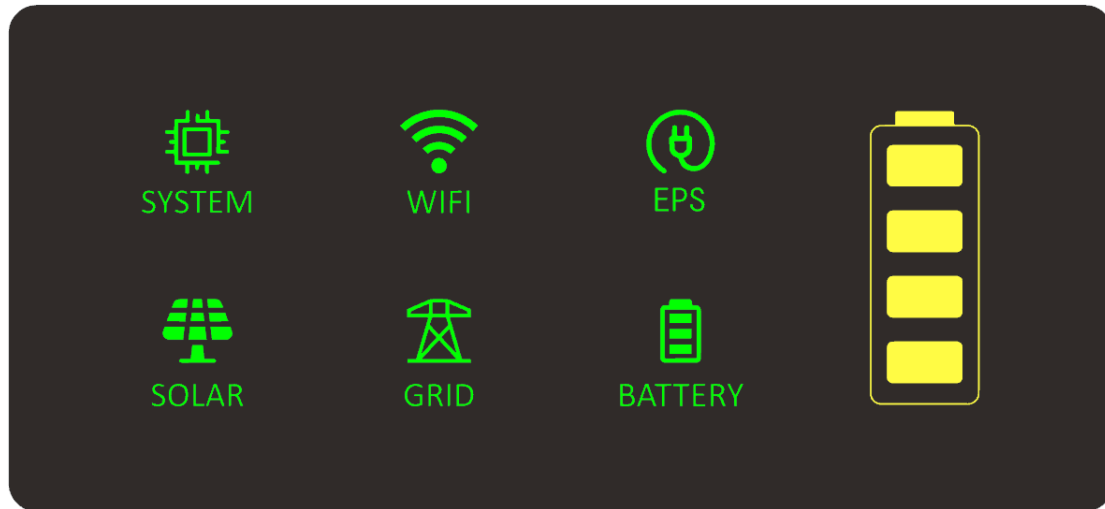
Step 2: Switch on the EPS AC circuit breaker of the inverters.

Step 3: Switch the inverter PV switch on.

Step 4: Starting battery power.

8 LED Interface and Settings

8.1 Description of panel indicators

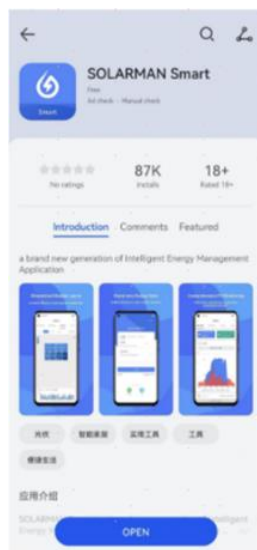


Name	Description
SYSTEM	(1) Off: System power down (2) Yellow: Standby (3) Red: Fault (4) Green-flashing: Starting (5) Green: Running
WIFI	(1) Off: Without WiFi communication (2) Green: With WiFi communication
EPS	(1) Off: EPS port not powered (2) Yellow: EPS port powered (device not running, power supply from the grid) (3) Red: Fault (4) Green: Running
SOLAR	(1) Off: PV port not powered (2) Yellow - flashing: PV port powered, however, too low voltage - below startup threshold (3) Yellow: PV port powered, however, PV modules not running (4) Red: PV fault (5) Green: PV modules running
GRID	(1) Off: Grid port not powered (2) Yellow - flashing: Grid port powered, normal voltage and frequency, however, reconnection to the grid according to regulations expected (currently not connected to the grid) (3) Yellow: Grid port powered, normal voltage and frequency (4) Red: Fault (5) Green: Grid port powered and grid-connected running
BATTERY	(1) Off: Bat port not powered (2) Yellow - flashing: Bat port powered, however, too low voltage - below startup threshold (3) Yellow: Bat port powered, but Bat modules not running (4) Red: Bat fault (5) Green: Battery module running
Battery level	(1) Battery level displayed (2) Flashing: Charging (3) Not flashing: Discharging/stationary

8.2 WiFi configuration

App download:

For the Android system, you can search for and download "SOLARMAN Smart" from the App market/store, while for the IOS system, you can download "SOLARMAN Smart" app from the App Store.



QR code download: The SOLARMAN Smart app can also be downloaded by scanning the QR codes on your phone. Scan the QR codes on your phone.



- 1) Open the APP, click Login to register a new user account;
- 2) Operate according to all instructions in the APP;

8.3 EMS configuration

The Energy Management System (EMS) can be configured through the App or online website.

Three operating modes can be set:

1. Self-powered model:

The APP will be used to manage your household electricity usage and reduce the cost of electricity from the grid.

2. Economic model:

The battery level will be charged and discharged according to your settings.

3. Backup model:

Unless the grid is blacked out, the batteries will not discharge. At this time, the batteries can support household electricity by discharging.

9 System Maintenance

9.1 Inverter power-off



Danger

- When operating and maintaining an inverter, power it off. Live operation of the device may cause damage to the inverter or an electric shock.
- After the inverter is powered off, it takes a certain period of time for internal components to discharge. Wait until the device is fully discharged according to the label time requirements.

Step 1: Switch off the EPS AC circuit breaker of the inverter.

Step 2: Switch off the GRID AC circuit breaker of the inverter.

Step 3: Switch the inverter DC switch off.

Step 4: Switch off the energy storage circuit breaker between the inverter and batteries.

9.2 Inverter removal



Warning

- Make sure that the inverters are powered off.
- When operating the inverters, wear personal protective equipment.

9.2.1 Split unit removal

Step 1: Disconnect all electrical connections of an inverter, including DC cable, AC cable, communication cable, communication modules and protective grounding wire.

Step 2: Remove the fixing screws between the radiator and wall-mounted bracket, and then remove the inverter from the wall-mounted bracket.

Step 3: Remove the wall-mounted bracket.

Step 4: Properly store the inverter. If it will be used in the future, be sure that the storage conditions meet the requirements.

9.2.2 All-in-one unit removal

Step 1: Disconnect all electrical connections of an inverter, including DC cable, AC cable, communication cable, communication modules and protective grounding wire.

Step 2: Remove the front decorative cover.

Step 3: Remove the screws connecting the base and battery system, and then remove the inverter from the wall-mounted bracket.

Step 4: Properly store the inverter. If it will be used in the future, be sure that the storage conditions meet the requirements.

9.3 Scrapping of inverters

When an inverter will go out of use and needs to be scrapped, dispose of it according to the electrical waste disposal requirements of the country/region where the inverter is located. DO NOT treat the inverter as household waste.

9.4 Fault handling

Inverter is easy to maintain. When encountering the following issues, see the following solutions. If the problems

remain unresolved, contact your local dealer. When contacting the After-Sales Service Center, please collect the following information for a quick resolution.

1. Inverter information, such as serial number, software version, Indicator status information, device installation time, fault time and fault frequency, etc.
2. Device installation environment, such as weather conditions, covered modules and shadows, etc. It is recommended to provide photos, videos and other files to assist in analyzing the installation environment.
3. Grid conditions.

The following table shows some basic issues that may occur during actual operation as well as the corresponding basic solutions.

No.	Fault name	Reason	Solution
00	Relay detection failure	The relay may be damaged.	(1) Power off for 3 minutes and then restart with power on. (2) If the error warning persists, contact customer service.
01	Self-test failure	The inverter may be damaged.	(1) Power off for 3 minutes and then restart with power on. (2) If the error warning persists, contact customer service.
02	DC bus voltage too high	DC bus voltage exceeds maximum value.	(1) Power off for 3 minutes and then restart with power on.
03	AC side current sensor failure	AC side current sensor may be damaged.	(1) Power off for 3 minutes and then restart with power on. (2) If the error warning persists, contact customer service.
04	Residual current detection device failure	The residual current detection device may be damaged.	(1) Power off for 3 minutes and then restart with power on. (2) If the error warning persists, contact Customer Service.
05	Device failure	The inverter device may be damaged.	(1) Power off for 3 minutes and then restart with power on. (2) If the error warning persists, contact Customer Service.
06	Frequency change rate abnormality	The frequency change rate of the power grid exceeds the standard.	(1) Check the power grid for abnormalities.
07	AC side frequency out of range	Grid frequency is abnormal.	(1) Check whether the power grid is abnormal.
08	AC side voltage out of range	The grid voltage is abnormal.	(1) Check the grid for abnormalities.
09	Grid loss	Grid is abnormal.	(1) Check if the grid is abnormal.
10	Residual current detection failure	Residual current detection exceeds the standard.	(1) Check that the device is reliably grounded.
11	Overvoltage on PV side	The voltage on the PV side is too high.	(1) Check that the connected PV is within the range specified for the inverter.
12	Insulation impedance detection failure	Insulation impedance detection is abnormal.	(1) Check that the PE wire is connected to the inverter and grounded. (2) Power off for 3 minutes and then restart with power on. (3) If the error warning persists, contact customer service.
13	Inverter over-temperature	The inverter temperature is higher than the permissible value.	(1) Turn off the inverter and wait one hour before starting the inverter again.
14	Consistency fault: Inconsistent voltage sampling on AC side of main and sub CPUs	Inconsistent voltage sampling on AC side of main and sub CPUs.	(1) Power off for 3 minutes and then restart with power on. (2) If the error warning persists, contact customer service.

15	Consistency fault: Inconsistent sampling of frequency and voltage values on the AC side of the main and secondary CPUs	Inconsistent sampling of frequency and voltage values on the AC side of the main and secondary CPUs	(1) Power off for 3 minutes and then restart with power on. (2) If the error warning persists, contact customer service.
16	Ten-minute voltage average overvoltage	The ten-minute voltage average is abnormal.	(1) Check the power grid for abnormalities.
17	Residual current protection fault:30mA level	Residual current detection exceeds the standard.	(1) Check that the equipment is reliably grounded.
18	Residual current protection fault: 60mA level	Residual current detection exceeds the standard.	(1) Check that the device is securely earthed.
19	Residual current protection fault: 150mA level	Residual current test exceeds the standard.	(1) Check that the device is reliably earthed.
20	Internal Fan Failure Alarm	Internal fan failure.	(1) Power off for 3 minutes and then restart with power on. (2) If the error warning persists, contact customer service.
21	External Fan Fault Warning	External fan failure	(1) Power off for 3 minutes and then restart with power on. (2) If the error warning persists, contact Customer Service.
22	CPU Self-Test-Register Exception	Device CPU register failure	(1) If the error warning persists, contact Customer Service.
23	CPU self-test-RAM abnormality	Device CPU RAM fault	(1) If the error warning persists, contact Customer Service.
24	CPU self-test-ROM abnormality	Device CPU ROM failure	(1) If the error warning persists, contact customer service.
25	Low temperature warning	Battery temperature is below the permissible value.	(1) Check that the ambient temperature near the battery is as specified.
26	Battery SOC low	Battery SOC is lower than the set value.	(1) Battery capacity is low This is a normal warning (SOC<100%-DOD).
27	Battery malfunction	Alarm or malfunction in the battery system	(1) Check if the battery is alarming. (2) If the error warning persists, contact Customer Service.
28	Battery Communication Disconnect	Communication between the battery and the inverter is abnormal or not possible.	(1) Check that the battery is connected and that the communication cable is normal. (2) Check if the battery has failed.
29	EPS output overload	The EPS power is greater than the power specified by the equipment.	(1) Check that the load complies with the maximum power of the inverter. (2) If the error warning persists, contact Customer Service.
30	Combox disconnected from Cloud.	Combox is disconnected from Cloud.	(1) Check whether the network connection is normal.

9.5 Regular maintenance

 Warning
• Make sure that the inverters are powered off. • When operating the inverters, wear personal protective equipment.

Maintenance item	Maintenance method	Maintenance cycle
System cleaning	Check for foreign objects and dust in the radiator.	Once/half year~ once/year
DC switch	Turn the DC switch on and off continuously for 3	Once / year

	times to ensure that it functions properly.	
Electrical connection	Check for loose electrical connections, damaged cable appearance and copper exposure.	Once/half year~ once/year
Sealability	Check the sealability of the device lead-in holes for meeting the requirements. Gaps should be resealed if being oversized or not sealed.	Once / year

Precautions

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The information in this document (including software, etc.) is subject to change without prior notice. During preparing this Manual, we have made every effort to ensure the accuracy of its content, however, all statements, information and suggestions in this Manual do not mean any form of express or implied warranty.

In addition to the product warranty described alone, the state and local laws and regulations provide financial compensation for the product's power connection (including violation of implied terms and warranties). The company hereby declares that the terms and conditions of the product and the policy can and can only legally exclude all liability within a limited scope.

Under the guidance of our company, customers return our products so that our company can provide service of maintenance or replacement of products of the same value. Customers need to pay the necessary freight and other related costs. Any replacement or repair of the product will cover the remaining warranty period of the product. If any part of the product or product is replaced by the company itself during the warranty period, all rights and interests of the replacement product or component belong to the company. Factory warranty does not include damage due to the following reasons:

Damage during transportation of equipment;

Damage caused by incorrect installation or commissioning;

Damage caused by failure to comply with operation instructions, installation instructions or maintenance instructions;

Damage caused by attempts to modify, alter or repair products;

Damage caused by incorrect use or operation;

Damage caused by insufficient ventilation of equipment;

Damage caused by failure to comply with applicable safety standards or regulations;

Damage caused by natural disasters or force majeure (e.g. floods, lightning, over voltage, storms, fires, etc.).

In addition, normal wear or any other failure will not affect the basic operation of the product. Any external scratches, stains or natural mechanical wear does not represent a defect in the product.