TBEA

String Photovoltaic Grid-connected Inverters User Manual



TS300/330/360KTL-HV-C1

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1 About this manual

1.1 Symbol interpretation

In order to use this Manual better, please read the following interpretation of symbols carefully:

Symbols	Name of Symbols	Symbols' meaning
	Operate Warning!	This warning indicates a hazardous situation which, if not avoided, could results in minor or moderate injury.
\wedge	Notice!	Improper operation or presence of contents marked with such symbol may damage the equipment, reduce its performance or lead to other unpredictable results.
4	Shock hazard mark	Electric shock hazard indicates parts with the electric shock hazard may threaten the safety of the users, do not touch!
	High temperature hazard label	All the places marked by this symbol are places with high temperature danger, which may cause danger to the safety of users. Please do not touch them at will.
	Grounding!	This symbol is a protective grounding label.
A (*)	Capacity Discharge	There is a high voltage when the inverter is powered up. All operation for the inverter must be performed by trained professional electrical technicians.
		In order to prevent electric shock, do not touch any live parts within 30 min after all power sources are disconnected.
**********	Inverter serial number	Serial number information.

^{*}There is information of product type and parameters on the nameplate which is sticked on the side of the device.

1.2 Application Scope

This manual provides detailed product information, installation and operation instructions for 1500V serialized two-stage inverter TS300/330/360KTL-HV-C1 series manufactured by TBEA Xi'an Electric Technology Co., Ltd.

This manual is prepared for the installation and operation of inverter. Personnel for installation and operation shall have corresponding professional knowledge to identify the electronic part and component and electrical schematic diagram symbols as well as experience in standard electrical power distribution.

This manual content will be continuously updated and revised, which may be a little different from the physical product. The user shall refer to the physical product purchased and may obtain the latest version manual from sales channel.



1.3 PV grid-connected power generation system

The PV grid-connected generation system is shown in Figure 1-1, which consists of the photovoltaic array, grid-connected inverter, step-up transformer, grid and other auxiliary equipment. The solar energy is converted into direct current energy through photovoltaic modules, and then converted into sinusoidal energy with the same frequency as the power grid by grid-connected inverters. And finally fed into the power grid by booster transformer.

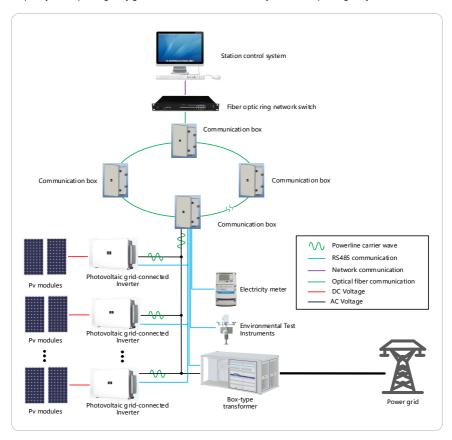


Figure 1-1 Schematic diagram of PV grid-connected generation system



1.4 Safety Instructions

Relevant safety regulations must be followed during product installation, trial operation, operation, and maintenance. Unreasonable use or misoperation may result in:

- > Harm the life and personal safety of the operator or third parties.
- Damaged products or other property belonging to operators or third parties.

To avoid the above hazards, please strictly follow the safety precautions in the manual.



When using and operating the inverter, please read the safety instructions carefully.



- 1.It is strictly prohibited to operate the product (including but not limited to handling, installation, electrical connection, power on, maintenance, high-altitude operations, etc.) in adverse weather conditions such as lightning, rain, snow, and winds above level six. Our company shall not be liable for any equipment damage caused by earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, or force majeure.
- 2.If a fire occurs, evacuate the building or product area and call the fire alarm number. Under no circumstances should one re-enter the burning area.
- 3.When using tools to tighten products or terminals, please tighten them according to the specified torque, otherwise it may cause product damage, which will not be covered by the warranty.
- 4.Before using tools, please master the correct usage of tools to avoid injury and damage to equipment.

1.4.1 Handling Safety

- When moving heavy objects, be prepared to carry them to avoid injury or sprain.
- If many people are moving heavy objects at the same time, ensure that the weight is balanced by considering the height and other conditions.
- When two or more persons are involved in moving heavy objects, ensure that one person is responsible for lifting or lowering the equipment at the same time.
- Wear protective equipment, such as protective gloves and shoes, when moving equipment by hand to avoid injury.
- When carrying equipment by hand, squat close to the object and lift the object slowly and steadily with your legs extended instead of your back. Do not suddenly lift or twist your torso.
- > Do not quickly lift heavy objects above the waist. Place heavy objects on a workbench half waist high or at an appropriate position and adjust the position of your palms before lifting them.
- Heavy objects must be carried with balanced and steady force. The moving speed should be uniform and low. Install the device smoothly and slowly to avoid scratches on the device surface or damage to the components and cables of the device.
- When carrying heavy objects, pay special attention to workbench, slopes, stairs, and places that may slip easily. When carrying heavy objects, ensure that the door is wide enough for the equipment to pass through. otherwise, fingers may be bruised or bruised.
- Move your feet instead of twisting your waist when carrying heavy objects. When you need to lift and transfer heavy objects at the same time, you should first point your feet in the direction you want to move, and then move.
- When moving a forklift truck, place it in the middle to prevent it from tipping over. Before moving, please fasten the equipment to the forklift with a rope. When moving, you need special care.



> The inverter weighs about 110kg and requires four persons to carry it or use a forklift.

1.4.2 Install Security

- Check all safety signs and warning labels on the product.
- > Before installation, please ensure that the product has no electrical connections.
- Cables and heating devices should not come into direct contact to prevent insulation layer aging and damage caused by high temperatures.
- When installing on a wall, if drilling is required, please make sure to avoid the water and electricity wiring inside the wall
- If the product supports lifting and handling methods and needs to be lifted by lifting tools, personnel are prohibited from passing or staying below the product.
- When handling products, please consider the weight of the product, pay attention to maintaining balance, and prevent the product from tipping or falling.
- > Before operating the product, please ensure that the tools used have completed regular maintenance.
- The installation location of this device should avoid fire sources and should not be installed in flammable or explosive environments.

1.4.3 Electrical connection safety

- Before making electrical connections, please ensure that the inverter is not damaged, otherwise it may cause danger!
- Before making electrical connections, please ensure that the inverter and all switches connected to it are in the "OFF" state, otherwise it may cause electric shock danger!
- When performing electrical connection operations, operators must wear personal protective equipment and remove rings, watches, and other metal objects.
- Before touching the DC cable, please make sure to use measuring equipment to ensure that the cable is not electrified
- > Comply with the safety operating procedures of relevant electrical equipment.
- > Inverters cannot be connected to photovoltaic panels that require positive or negative grounding.
- Due to the high current of the inverter during operation, it is necessary to ensure that all terminals and bolts are securely fastened during wiring to ensure good contact.
- When performing wiring operations, be sure to use specialized insulation tools and do not place tools or other metal objects on the equipment.
- Pay attention to the warning signs on the product and follow their safety instructions when operating.
- > Comply with the safety precautions listed in this manual and other relevant documents of this product.
- > Electrical connections and equipment operations must be completed by professionals.
- > The cables used in photovoltaic power generation systems must have appropriate specifications, firm connections, and good insulation.
- Before connecting the DC connector to the inverter, please check the positive and negative polarity of the photovoltaic string, confirm that it is correct, and then insert the DC connector into the corresponding DC terminal. It is strictly prohibited to reverse the positive (+) and negative (-) polarity of the DC input side of the inverter
- During the installation and operation of the inverter, please ensure that the positive or negative pole of the photovoltaic string does not short circuit to ground. Otherwise, it may cause AC/DC short circuits in the inverter, resulting in product damage, which will not be covered by the warranty.



- Load cannot be connected between the inverter and its directly connected AC circuit breaker to avoid accidental tripping of the switch.
- Even though there is no external power source input, there may be high voltage in the equipment. Do not touch it!
- Do not put any object in the cavity or open device of the inverter.
- Even if all switches and circuit breakers are turned off, there are still dangerous voltages in the inverter. Any operation that needs to be opened or moved can only be carried out by professional technicians.
- Please strictly follow local laws and regulations, safety standards, or our company's recommended values when selecting AC circuit breakers of appropriate specifications. Otherwise, in abnormal situations, it may not be possible to disconnect in a timely manner, leading to safety accidents.
- The wiring process must follow the relevant rules of the local power grid and the safety instructions of the photovoltaic string.

1.4.4 Safe operation

When the product is running, please pay attention to the following:

- Do not touch the product casing.
- It is strictly prohibited to plug or unplug all connectors on the inverter.
- Do not touch any wiring terminals of the inverter, as there may be a risk of electric shock.
- > Do not disassemble any components of the inverter, as there may be a risk of electric shock.
- It is strictly prohibited to touch the hot parts of the inverter (such as the radiator), otherwise there may be a risk of burns.
- It is strictly prohibited to access or exit a certain string or component in a string, otherwise it may cause electric shock danger.
- It is strictly prohibited to operate any switch on the inverter.
- > The equipment should be operated by professional technicians.

1.4.5 Maintain safety

(1) Safety requirements before maintenance operation

- Before maintenance operations, use the mobile app to remotely shut down the inverter. After the inverter grid relay is disconnected, first turn off the "DC SWITCH A/DC SWITCH B/DC SWITCH C" on the DC side, and then disconnect the AC circuit breaker between the inverter and the grid. Please wait for at least 5 minutes before performing maintenance operations! (If it is necessary to remove the DC side panel of the inverter, wait for 30 minutes before processing.)
- If it is necessary to open the DC side panel of the inverter, the inverter should be powered off for 30 minutes, and a detection device should be used to ensure that there is no voltage or current. Protective equipment should be worn to operate and maintain the inverter.
- After the product is shut down, there is still a risk of burns. After the product cools down, it is necessary to wear protective gloves before operating the product.
- If there is paint peeling or rust on the inverter casing, please repair it in a timely manner, otherwise it may affect the use of the inverter.
- The internal components of the inverter do not include any parts that require maintenance. Do not open the inverter chassis (excluding the junction box) or replace the internal components of the inverter without authorization. Otherwise, any losses caused by this will not be covered by the warranty.
- > To prevent unrelated personnel from approaching the product for misoperation or accidents, please place prominent warning signs or set up safety warning tapes around the product.



- Do not open the maintenance chamber door in rainy or snowy weather. If unavoidable, please take protective measures to prevent rain and snow from entering the maintenance chamber and affecting product operation.
- To prevent the risk of electric shock, non professionals are strictly prohibited from opening the inverter without authorization.

(2) Safety requirements during maintenance operations

- > Touching the contacts, terminals, etc. connected to the power grid or internal components of the product poses a risk of electric shock.
- Voltage may be generated on the grid side, and a standard voltmeter should be used to confirm that there is no voltage before touching.
- When cleaning the inverter, please avoid using cleaning agents, otherwise it may cause damage to the inverter, and the resulting losses will not be covered by the warranty.
- To reduce the risk of electric shock, do not perform maintenance operations beyond this manual. If necessary, please contact our company for repair, otherwise any losses caused will not be covered by the warranty.
- If the inverter malfunctions and shuts down, professional tools should be used to measure whether there is no current in the PV cable on the DC side. If the current persists, no operation should be performed on the DC power side before sunset (DC switch opening and closing, DC terminal plugging and unplugging, etc.).

(3) Safety requirements after maintenance operations

- Before closing the maintenance chamber door, please check if there are any objects left in the maintenance chamber, such as screws, tools, etc.
- It is recommended that users use cable sheaths to protect AC lines. If users use cable sheaths, please ensure that they are located inside the maintenance chamber.

1.4.6 Scrap safety

Please dispose of the product in accordance with local regulations and standards to avoid causing property damage or personal injury.



2 Product Introduction

2.1 Brief Introduction of Product

2.1.1 Function Introduction

TS300/330/360KTL-HV-C1 series photovoltaic grid-connected Inverter is a 1500V three-phase series photovoltaic grid-connected Inverter. The main function is to convert DC power generated by photovoltaic arrays into AC power and feed it into the grid.

2.1.2 Type Introduction

The type description of the inverter is shown in Figure 2-1:

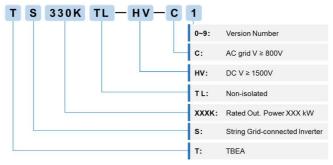


Figure 2-1 Inverter Model Description

2.1.3 Grid Form

The connection type of the grid supported by TS300/330/360KTL-HV-C1 series inverter is the IT grid, as shown in Figure 2-2:

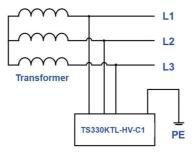


Figure 2-2 PV Grid-connected Generation System



2.2 Appearance Introduction

Table 2-1 Instruction for Inverter Appearance

Item	Instruction
1	Inverter Box
2	Door Panel
3	Maintenance door panel
4	Display Board
5	Maintenance warehouse
6	Protection cover
7	Hook
8	Earthing Position
9	Inverter Inductance
10	Radiator
11	External cooling fan assembly
12	Boost Inductance
13	Handle

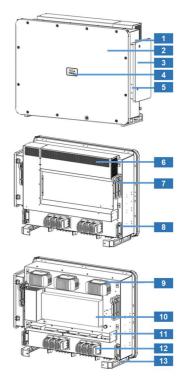


Figure2-3 Inverter Appearance

*Explanation: This image is for reference only. Please refer to the actual product received!

2.3 Introduction of External Connection Terminal of Inverter

The external connection terminal of inverter is shown as Fig.2-4.

Table 2-2 Description of Terminal

Item	Description
1	PV+(1~30)
2	PV- (1~30)
3	Communication interface
4	DC switch (A\B\C)
5	Auxiliary switch
6	Ventilation valve

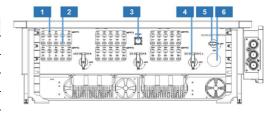


Figure2-4 External Connection Terminal of Inverter

^{*}Explanation: This image is for reference only. Please refer to the actual product received!



2.4 Display Panel



Figure2-5 LED Display Panel

• PWR	СОМ	ERR
Continuous Light up	Twinkle for 100ms	Continuous Light up
Inverter on-grid	Mobile APP interacts with communication board.	Inverter failure
Twinkle for 200ms	It lasts for 5s every 1 minute	Continuous go out
Inverter self-test	The link between Wifi module and Comm. board is interrupted	Operate normally
Twinkle for 1s	Twinkle during communication	Twinkle for 1s
Inverter off-grid	Twinkle when receiving correct message from correct inverter	Other failures or warnings like communication failure



2.5 Circuit diagram

TS300/330/360KTL-HV-C1 is connected to 30 PV channels and internally combined into 6 MPPTs for maximum power point tracking of the string. The conversion from DC to three-phase AC is achieved through an inverter circuit, and surge protection function is supported on the DC and AC sides.

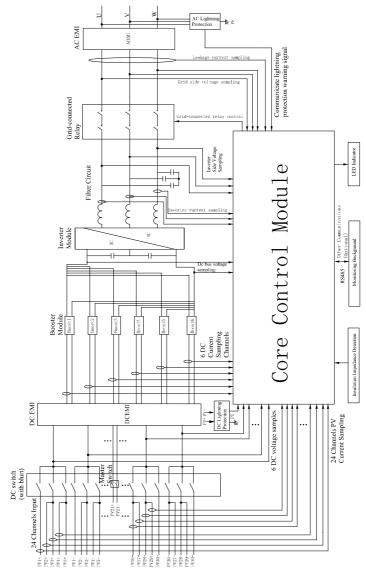


Figure2-6 Circuit diagram



3 Inverter unpacking and storage

3.1 Unpacking and Inspection

The equipment has undergone complete testing and strict inspection before leaving the factory, but damage may still occur during transportation. Please conduct a detailed inspection before signing for the product. The inspection contents are as follows:

- (1) Check if the packaging box is damaged.
- (2) Check goods completeness and order match per packing list.
- (3) Unpack and check if all internal equipment is intact and undamaged.

If there is any damage or incomplete goods, please contact the transportation company or our company directly, and provide photos of the damaged area or the names and quantities of missing accessories for the convenience of providing services.

Please do not dispose of the original packaging of the equipment. It is best to store the equipment in its original packaging box after it is shut down and dismantled. If using tools to unpack, pay attention to the use of tools and do not damage the product.

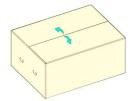
After receiving the product, check the appearance and structural components for damage, and verify that the packing list matches the actual ordered product. If there are any issues with the above inspection items, do not install and contact our company promptly.

3.2 Unpacking steps

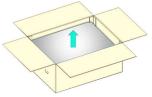
(1) Cut the packing tape with an art knife. Remove the horizontal and vertical paper corner protectors.



Packing case Packing tape



Open the packing case Figure 3-1 Unpacking



Taking out the inverter

- (2) Open the packaging box.
- (3) Remove the shipping accessories from the packaging box and keep them properly.
- (4) Take out the inverter and place it on the flat ground with sponge pad or foam and other protective materials.

*Explanation: This image is for reference only. Please refer to the actual product received!



3.3 Inverter storage

If the inverter is not immediately put into use, the storage of the inverter needs to be met these requirements:

- Do not remove the outer packaging of the inverter.
- Storage temperature shall be kept at -40 °C ~ +70 °C. Relative humidity should be maintained at 5% RH~95% RH.
- Store in a clean and dry place with a rain shelter, not outdoors to prevent erosion from dust and moisture. Please place according to storage requirements, otherwise it may cause the product to be corroded, and the damage caused by this will not be covered by the warranty.
- A single pallet can stack up to 2 inverters, and a maximum of 2 layers of pallets (up to 4 inverters) can be stacked, as shown in the following figure:

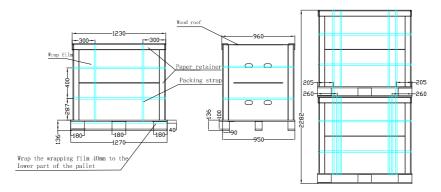


Figure 3-4 Inverter packaging diagram

- During storage, it is necessary to check regularly every three months. If abnormal situations such as packaging damage, tilting, or deformation are found, the packaging materials need to be replaced in a timely manner.
- > The long-term storage time of the inverter should not exceed one year. When the storage time is one year or more, the inverter needs to be inspected and tested by our company's technical personnel before it can be put into use. Contact the manufacturer for specific installation and grid connection matters.



4 Installation

4.1 Mechanical Installation

4.1.1 Basic installation requirements

- > The installation site shall be strong and stable enough to support the weight of the inverter for a long time.
- > The inverter shall be installed perpendicular to the ground and the connecting terminals shall be located below.
- The local temperature (such as radiator) of the inverter will be high during operation. Do not install the inverters in places that children can touch to avoid scalding or electric shock.
- The installation location of the inverter should be kept away from direct sunlight. If the installation location is in the area exposed to direct sunlight, it is recommended to add a sunshade or other facilities that can effectively block sunlight.
- The inverter has the protection class of IP66 and thus it can be installed outdoors.
- If the on-site environment does not meet the above installation requirements, please contact our company for consultation

4.1.2 Installation Environment Requirements

➤ Installation site environment temperature should be between -40°C ~ 60°C, and the environment should be clean.



Figure 4-1 Temperature Diagram of the Inverter Installation Environment

Avoiding the direct sunshine of the inverters can prolong the service life of the inverters. The shielded installation location is a better choice, as shown in Figure 4-2:



Figure 4-2 Installation Position of the Inverter

When installing the inverters, it is necessary to reserve a certain space distance around the inverters, as shown in Figure 4-3, to ensure the smooth heat dissipation.



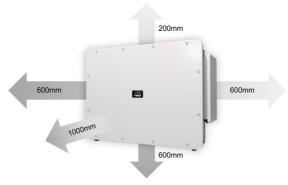


Figure 4-3 Surrounding Dimension for Inverter Installation



The distance between a single inverter and the surrounding objects should meet the following conditions: the left distance is ≥600mm. Right side distance ≥600mm. The upper distance is ≥200mm (to ensure the installation space and heat dissipation is smooth, and this size is the minimum installation space size requirement, in order to prevent the accident expansion after the fire, it is recommended that the top installation space of the inverter is ≥600mm). Lower distance ≥600mm (this distance mainly considers rain splashing into the inverter or weeds into the inverter, if the site can ensure that there is no such risk, you can appropriately reduce the distance to 400mm). Front distance ≥1000mm. To ensure sufficient installation and cooling space.

> When installing inverters back-to-back, the distance between the two inverters should be at least 600mm.

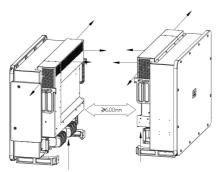


Figure 4-4 Distance between the two inverters

When installing multiple inverters back-to-back, it is necessary to reserve a certain distance between the inverters.



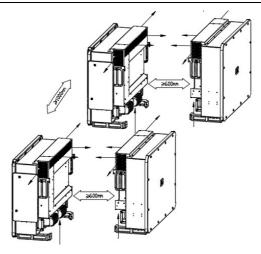


Figure 4-5 Spacing between inverters

Maintenance space of external fan requires is shown in Figure 4-6: the maintenance of the external fan requires at least 600mm. Please note that there is no column, wall, etc. in this section, otherwise the fan cannot be pulled out during maintenance.



The maintenance space of the external fan requires at least 600mm, which must be paid attention to during the preliminary design and construction of the power station.

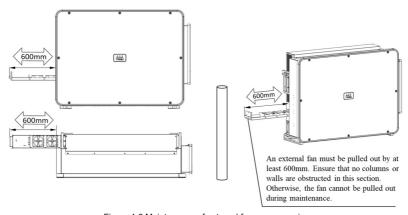


Figure 4-6 Maintenance of external fan space requires



4.1.3 Safety Instructions

As an electronic product, touching the live part is dangerous. The maximum voltage of the product is 1500V on the DC side, 800V on the AC side and 920V(1.15Un) on the AC side.



Before installation and maintenance, ensure that AC and DC sides are not live.



This device must be installed by a professional electrician. Do not remove unconnected DC test protective caps.

4.1.4 Installation Requirements

(1) Installation Process Description

The installation process of the inverter is shown in Figure 4-7.



Figure 4-7 Installation Process

Table 4-1 Installation Process Installation Process Description

Steps	Operation	Description
1	Installation exam	Before opening the case, it is necessary to check whether the outer packing is damaged or not. after opening the case, it is necessary to check whether the deliverables are ready and whether there is any obvious external damage.
2	Prepare installation tools	Prior to installation of the inverter, prepare the corresponding tools for successful installation and wiring.
3	Select the installation position	Inverters need to be installed at appropriate locations to ensure that the inverters can work normally and reliably.
4	Install the backboard	Prior to installation of the inverter, the backboard provided along with the equipment shall be installed first, so that the inverter may be firmly installed on the wall.
5	Install inverter	Install the inverter on the backboard and secure it with bolts.



(2) Pre-installation Exam

Check if the installation accessories are complete before installation, shown in figure 4-8:



Figure 4-8 Check Items prior to Installation
Table 4-2 Check Items prior to Installation

No.	Name	Description
Α	Inverter	TS300/330/360KTL-HV-C1 Series
В	Cold pressed terminal	2, Used for grounding wire connection
С	Install backboards	1, for supporting and fastening the inverter
D	Expansion bolts(Customer- provided)	4 sets for fastening the mounting plate onto the concrete wall
Е	DC terminals	30 pairs for connecting the DC input
	Fasteners	4 sets of M10 assembling bolts and nuts for fastening the mounting plate onto the metal framework.
F		2 sets of M8 assembling bolts for fastening the installation pendants and inverter
G	Metal terminals	30 pairs for fastening the DC input cable
Н	Documents Other documents	



If the above-mentioned relevant items are lost, please timely contact the supplier or manufacturer.



(3) Prepare Installation Tools

Tools required for installation are shown in Table 4-3:

Table 4-3 List of Installation Tools

No.	Tools	Туре	Application
1	Percussion drilling(Wall installation)	Drill Ø10	Wall punching
2	Monkey wrench(Wall installation)	Opening≥32mm	Fastening the expansion bolt
3	Inner box spanner	M6	Open the door sheet in case of AC and communication wiring.
4	Cross screwdriver	M10	Fasten the grounding wire
5	Sleeve	M10	Fasten the AC cable
6	Torque wrench	-	Tighten the screws/nuts to a given torque
7	Straight screwdriver	M2.5	Fasten the communication cable
8	Removal wrench	-	Install and remove terminals
9	Diagonal pliers	-	Cut the cable tie
10	Stripper	-	Peel off the cable epidermis
11	Rubber Hammer(Wall installation)	-	Strike the expansion bolt into the hole
12	Utility Knife	-	Unpacking etc
13	Wire Cutter	-	Cut the power supply cable
14	Crimping Pliers	-	Press the cable
15	Vacuum Cleaner	-	Clean the on-site dust after punching on the wall
16	Multimeter(Measureable voltage greater than 1500V)	-	Testing the correctness of grounding connection, etc.
17	Mark Pen	Diameter≤10mm	Label a mark
18	Steel Tape	-	Measuring distance
19	Level	-	Guarantee Horizontal Installation of Hanging Plate
20	Anti-static gloves	-	Operator wears when installing equipment
21	Safety goggles	-	Operator wears when punching
22	Dust Mask	-	Operator wears when punching

(4) Requirements for Installation Position



- 1.The surface temperature of inverter can reach 80°C, please don't put it with flammable material!
- 2.Please don't install this product in the space where contains the flammable gas (for example Battery Room, Fuel Storage Room, etc.)





Installation position shall not prevent disconnection of equipment power supply.

The following should be considered when choosing installation location:

- The protection level of the inverter is IP66, and it can be installed indoor and outdoor.
- Please ensure the strength of installation wall or support can comply with load-bearing requirement of the inverter.
- > The installation location of the inverter should be convenient for electrical connection and maintenance.
- The inverter should be installed vertically with an inclination of no more than 15° to facilitate heat dissipation, shown in Figure 4-10. Do not tilt the inverter forward, backward, horizontally, or tilt it too much.



Figure 4-9 Vertical installation diagram of inverter

- > The inverter should be installed in a ventilated environment to facilitate good heat dissipation.
- Space should be left when installing multiple inverters in horizontal lining, and the suggested space value is showed as Figure 4-10.
- > There should be enough space in front of the inverter to facilitate data observation and maintenance.
- If the inverter is installed on the support, please ignore the expansion bolts and tools which are used for fixing expansion bolt.



Figure 4-10 Inverter Installation Position Clearance Figure (unit: mm)



(5) Installation Backboard

According to different materials of the installation wall selected and actual wall hanging requirements, how to use the installation accessories provided to install the inverter will be elaborated in detail below. Backplane installation method owners can choose wall installation or bracket installation according to their actual situation.

1) Wall Installation Mode

a) Installation Carrier Requirement:

- > Inverter installation carrier must have fire resistance property
- Please don't install the inverter on the flammable construction materials.
- > The weight of the inverters is 110kg. Please ensure that the installation surface is strong enough to meet the requirements of the installation of the inverters
- In residential areas, do not install the inverters on gypsum board walls or walls with similar poor sound insulation, so as to avoid the noise generated by the inverters when they work disturbing the residents in the living areas.
- The inverter will generate some noise during operation, and it is not recommended to install the inverter in living areas. If unavoidable, it is recommended to install the inverter at a distance of more than 25 meters away from residential areas or adopt noise reduction measures.
- If the inverter is installed in a place with lush vegetation, please regularly weed it. In addition, it is necessary to modify the ground below the inverter, such as laying cement, stones, etc. (the recommended area is 3m × 2.5m).
- > Do not install the inverter in environments that are flammable, explosive, or have smoke.
- It is strictly prohibited to install inverters under air conditioning vents, ventilation openings, computer room outlet windows, and other locations that are prone to water leakage, in order to prevent liquids from entering the equipment and causing equipment failure or short circuits.
- Inverters are strictly prohibited from being installed in areas containing perishable substances, such as corrosive gases, organic solvents, etc.
- During the operation of the inverter, there may be high temperature and high voltage on the surface. It is strictly prohibited to touch it to prevent burns or electric shock.
- > Inverters should not be installed in places that are easily accessible to people.
- > It is very important to ensure good ventilation and heat dissipation of the inverter. Please install the inverter in a well ventilated environment.
- If the inverter is installed in a closed environment, a heat dissipation device or ventilation device needs to be installed, and the indoor ambient temperature during operation should not be higher than the external ambient temperature.
- > The inverter should be installed in a location with shading or a sunshade should be built.
- Before installing the inverter outdoors in salt damaged areas, please consult our company. Salt damaged areas mainly refer to coastal areas within 500m of the coast. The settling amount of salt spray is related to the characteristics of seawater, sea breeze, precipitation, air humidity, terrain, and forest coverage in the adjacent sea area, and there are significant differences.
- Inverters are strictly prohibited from being installed in environments contaminated by chemicals, such as halogen elements, sulfides, etc.
- In dusty environments, such as areas with high levels of dust, smoke, flocs, etc., particulate matter in the environment may accumulate at the equipment's air vents or radiators, affecting machine heat dissipation and, in severe cases, potentially causing machine damage. Therefore, it is strictly prohibited to install the inverter in a dusty environment. If unavoidable, please clean the fan and radiator regularly to ensure a good heat dissipation environment.



b) Installation Step:

- Step 1: Confirm the bearing requirement of the wall, Take out the mounting plate and place it on the wall horizontally, and its height shall ensure that the display panel position of the inverter is aligned with the hole.
- Step 2: According to the trepanning of the mounting bracket, mark the position of drilling hole as shown in Figure 4-11, and use a percussion drill to drill holes in the marked position. The recommended drill holes on the wall is 10.0mm in diameter and 80mm in depth. The wall thickness needs to be ensured to be at least 120mm.

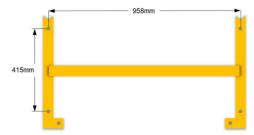


Figure 4-11 Installation Hole Location (unit: mm)

Step 3: Mount the mounting plate to the wall with the expansion bolts (if it is mounted onto a metal bracket, use 4 sets of M10 assembling bolts and spring flat gasket nuts) and lock the nuts, with the tightening torque of 12N·m, as shown in Figure 4-12:

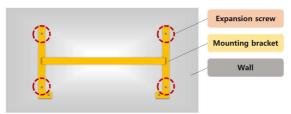


Figure 4-12 Installation Diagram of Inverter Mounting Plate

2) Bracket installation method

- Step 1: Take out the mounting plate and place it on the designated metal framework horizontally, and its height shall ensure that the display panel position of the inverter is aligned with the hole.
- Step 2: According to the trepanning of the mounting bracket, mark the drilling position on the metal bracket as shown in Figure 4-11, and use a percussion drill to drill holes in the marked drilling position, with the recommended drilling diameter of 12mm. (if the shape and position of the metal frame do not match the mounting plate, re-drill the hole in the appropriate position according to the frame mounting bracket which is selected.)
- Step 3: Use 4 sets of M10x70 combination bolts (if the length cannot meet the installation requirements, please prepare the M10 combination bolts) and spring flat washer nut to fix the mounting plate on the metal support, and tighten the nut with torque 12N•m, as shown in Figure 4-13:



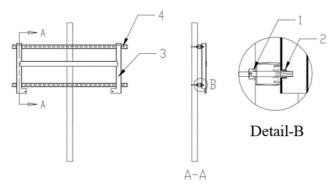


Figure 4-13 Installation Diagram of Inverter Mounting Plate
Table 4-5 Instruction of Installation View Number

Number	Description
1	M10 bolt
2	Nut
3	Mounting bracket
4	Metal bracket(Customer-provided)

(6)Transfer inverter



Notice

- Once the equipment is located, remove the packaging carefully to avoid scratching the equipment. Keep the
 device stable during unpacking.
- 2. Need four operators to move the inverter together, or use the appropriate moving tools.
- The bottom interface and terminal of the inverter should not be load-bearing. Do not contact the interface and terminal directly with the ground or other supports.
- 4. When the inverter is placed on the ground, it is necessary to pad foam or paper under it to avoid damage to the shell.

Remove the inverter from the packaging box and move it to the selected installation location. The following Figure 4-14 shows the transfer of the inverter:

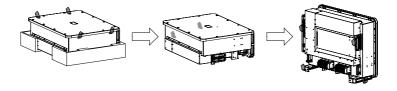


Figure 4-14 Moving an inverter



(7) Install the Inverter

Hang the inverter on the mounting bracket and fasten it with a combination of two M8 bolts with a tightening torque of $10 \text{ N} \cdot \text{m}$, as shown in Figure 4-15.



Figure 4-15 Inverter Installation Instruction

(8) The installation is completed.



4.2 Electrical Connection

4.2.1 In-put & Out-put Requirements

All inputs and outputs are connected by inverters with or with standard waterproof terminals. If other terminals are used to connect with inverters, all consequences will be undertaken by customers themselves.

4.2.2 Power Distribution Introduction

Open the door sheet of the inverter to see its power distribution part, as shown in Figure 4-16:



Figure 4-16 Inverter Distribution Part

4.2.3 DC Side Connecting



DC voltage must be measured with a multimeter above 1500V, otherwise it will cause personal injury or damage to the equipment.





Array open-circuit voltage can't exceed 1500V, or the facility will be damaged. please measure the open-circuit voltage of the Photovoltaic Array with multimeter before connecting.

The maximum allowable working current of the array is 25A.



The voltage positive and negative electrode of the PV array shall not be connected reversely, otherwise the equipment will be damaged. A multimeter must be used for measurement and confirmation.

- Before crimping the DC terminal, it is necessary to ensure that the DC side cable is not energized.
- Measuring the open-circuit voltage of the photovoltaic array with multimeter to ensure the open-circuit voltage is no more than DC 1500V.
- The positive and negative electrodes of the photovoltaic module cannot be short-circuited to the ground, and must be measured with a DC 1500V multimeter before connecting.
- > The positive anode connector of the photovoltaic array insert to the connection terminal "PV+" of inverter bottom through the connection wire.
- The negative anode connector of the photovoltaic array insert to the connection terminal "PV-" of inverter bottom through the connection wire.
- Please confirm all connection wire is firm.



The input wiring of the inverter should leave a certain margin at the input port in order to avoid the influence of the tension of the lead on the reliability of the PV wiring terminal.



- 1. The inverter does not support the use of "Y" connectors.
- 2.The PV21 DC terminal must be connected.
- 3.Make sure that the connected DC input terminals are evenly distributed on each MPPT.



Cable Requirements and Connection Wire Manufacturing:

Table 4-5 Cable Diameter Specification Table

Cable Type	Recommended cable outer diameter(mm)	Recommended cross-sectional area(mm²)
1500V PV cable(Must be copper)	4.7~6.4	4&6

^{*}Note: The multi-core cable shall be selected for the external cable as much as possible to ensure that the inverter is connected reliably. compatible with AWG10 cables. If there are other specifications and models of cables, please contact our technical staff for confirmation before installation.

After select a red (positive) and black (negative) cable respectively according to the cable requirements (the length shall be selected according to the wiring requirements), produce the connecting wire according to the steps in Table 4-6.

Table4-6 Detailed Description of Cable Connection Line Production Steps

Steps	Operation instructions	Specific Operation View
1	Strip 8mm of one end of the cable	Positive Solid 8mm Red Negative
2	Connect the red and black wires to the tubular terminals according to the corresponding relationship in the figure and press them. The terminals and cables shall not be loosened or dropped under the tension above 390N	Red Black
3	Install the tubular terminal and plug together and tighten the fastening sheath	Red
4	The selection of DC input terminals should meet the following principles: Ensure that the PV string is evenly distributed across each MPPT. When the number of input strings is 24-29, ensure that the PV strings are connected according to the following table.	



Table 4-8 PV string connection requirements when the number of strings is 24-29

Input string count	Terminal selection	Input string count	Terminal selection
	PV1~PV4,	25	PV1~PV5,
	PV6~PV9,		PV6~PV9,
24	PV11~PV14,		PV11~PV14,
24	PV16~PV19,		PV16~PV19,
	PV21~PV24,		PV21~PV24,
	PV26~PV29.		PV26~PV29.
	PV1~PV,	27	PV1~PV5,
	PV6~PV10,		PV6~PV10,
26	PV11~PV14,		PV11~PV15,
20	PV16~PV19,		PV16~PV19,
	PV21~PV24,		PV21~PV24,
	PV26~PV29.		PV26~PV29.
	PV1~PV5,	29	PV1~PV5,
	PV6~PV10,		PV11~PV15,
28	PV11~PV15,		PV16~PV15, PV16~PV20,
20	PV16~PV20,		PV21~PV25.
	PV21~PV24,		PV21~PV25, PV26~PV29.
	PV26~PV29.		F V ZUF V Z 3.



Positive and negative metal terminals are packaged together with positive connectors and negative connectors respectively. Please open them when unpacking so as not to confuse polarity and cause inconvenience to wiring.

4.2.4 AC side wiring



When connecting to the AC grid, disconnect the AC side distribution protection device to ensure that the terminals on the AC side are not energized. Otherwise there is a danger of electric shock.

- Disconnect the AC side and DC side protection devices, and use a multimeter to confirm that the terminals on the AC side are not energized.
- Make cables and crimp the appropriate terminals.
- Pass the cable through the AC wiring waterproof connector at the bottom of the inverter.
- Tighten the AC output cable and protective ground wire.
- Lock the maintenance chamber door panel and tighten the two screws on the door panel with hex wrench.
- > If the incoming line seal on the AC side is damaged during installation, there will be a gap between the cable and the seal. To ensure the protection level of the equipment, the cable and the seal must be sealed with



fireproof mud or expanded foam suitable for power. If the inverter is damaged due to failure to follow this action, it will not be covered by the warranty.

Cable requirements and cable production:

Table 4-9 Wire Diameter Specification Table

Cable specification		Copper core cable	CCA/CCAA Cable
Cross sectional area of the wire(mm²)	Range	70-150	150-400
	Recommended value	120	185

^{*}Note: The multi-core cables shall be selected for the external cable as much aspossible to ensure that the inverter is connected reliably. When using aluminum wire, copper-aluminum transition terminals are required.

1) Peel off the armor layer of the cable by 300mm, and use wire stripping pliers to remove 20mm of the insulation layer from the cable with the armor layer removed (taking the OT terminal as an example), as shown in Figure 4-17. Loosen the screws of the AC output wiring seal, thread the cable through the AC output interface, and ensure that the reserved length of the AC cable in the junction box is appropriate, as shown in Figures 4-18 and 4-19. Then tighten the incoming wire seal with 4 screws, with a torque of 1.6 N·m.

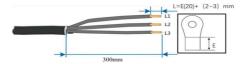


Figure 4-17 Communication cable stripping diagram



Figure 4-18 Threading diagram of the AC cable(Single core cable)

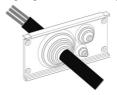


Figure. 4-19 AC cable threading diagram (three-core cable)

2) Insert the core stripped with the insulation layer into the OT/DT terminal crimping area, press it with the crimping pliers, and protect the OT/DT terminal crimping area with insulating tape or heat shrinkable sleeve, as shown in Figure 4-20; Dimensional requirements for OT/DT terminals after crimping and forming, as shown in Figure 4-21.



Figure 4-20 Cable connection diagram



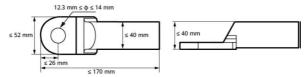


Figure 4-21 Dimensional requirements for OT/DT terminals after crimping and forming

*Note: i) If the terminal aperture purchased by the customer is >14mm, the gasket needs to be added to meet the assembly, and the customer shall bear the cost.

- ii) The customer has not communicated with the equipment manufacturer in advance, and the selected terminal aperture is not within the range marked on the drawing, so gaskets need to be added to meet the assembly, and the customer shall bear the cost.
- Material:304 stainless steel passivation, thickness 3mm-5mm, internal and external diametersprovided by reference to the national standard
- 3) Fix the L1, L2, and L3 cables to the internal AC output terminals of the chassis, and tighten the screws. The nut used is M12 and the tightening torque is 30-45N·m, as shown in Figure 4-22.

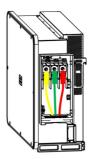


Figure4-22 Cable fastening diagram

4) Lock the maintenance chamber door panel and tighten the two screws on the door panel with hex wrench, as shown in the figure4-23, with a fixed torque of 6 N·m



Figure4-23 Maintain the fixing screws of the warehouse door panel



■ Medium voltage transformers:

- > The medium voltage transformer used in conjunction with it shall meet the following requirements.
- The transformer can choose the distribution transformer (dry-type/oil-immersed type), which can meet the needs of photovoltaic systems with periodic loads.
- The voltage of the low-voltage side of the transformer shall conform to the output line voltage of the AC side, and the system voltage of the low-voltage winding, AC cable and secondary equipment of the step-up transformer shall withstand the voltage to the ground ≥ 1000V when connected to the IT power grid.
- The line voltage output on the high side of the transformer is consistent with the grid voltage level at the installation site.
- The apparent power of the inverter must be less than the power of the transformer. The maximum AC current after all inverters are connected in parallel needs to be considered. If the total number of grid-connected inverters is more than 15 units, please contact our technical staff to confirm the feasibility of the scheme.

■ The overall technical requirements of the box transformer low-voltage cabinet are as follows:

- The breaking capacity of the molded case circuit breaker and frame circuit breaker of the low-voltage cabinet branch of the box transformer is greater than the short-circuit current on the low-voltage side of the transformer. For example, if the rated capacity is 3300kVA, the short-circuit impedance is 7% of the step-up transformer, the short-circuit current on the low voltage side can be calculated: I=3300/0.8/1.732/0.07=34.02kA, the MCCB ICU zis required to be 34.02kA under the condition of 800Vac.
- The circuit breaker needs to consider the temperature and altitude derating, and the temperature rise test report of the low-voltage cabinet is required.

4.2.5 Connection of Grounding Wire



The protective earth line must be properly connected, otherwise the equipment may be damaged.

In photovoltaic power generation systems, all non-current-carrying metal components and equipment casings shall be connected to the ground (PE), such as photovoltaic array supports, inverter casings, etc. Recommended earth line (yellow-green, copper) diameters are shown in Table 4-10:

Table 4-10 Earth Line Diameter Specification Table

Cable specification		Copper core cable/ mm ²	CCA/CCAA/mm2
	Range	35-75	75-200
Cross sectional area of the PE wire(mm²)	Recommended value	Sp≥S/2	
		Sp: Cross sectional area of the PGND cable conductor	
		S: Cross sectional area of the AC output conductor	

^{*}Note: The multi-core cables shall be selected for the external cable as much as possible to ensure that the inverter is connected reliably.

The Sp value in this table is only valid when the conductor materials of the protective ground wire and the AC output line are the same. Otherwise, the appropriate cross-sectional area of the cable conductor should be selected to ensure that the conductivity of the protective earth wire is equivalent to that specified in this table. The specifications of the protective grounding wire are determined by this table or calculated according to IEC60364-5-54.



Our inverter supports IT system protection grounding, which can be done inside the chassis (when using four core wires) or outside the chassis. Users can choose the grounding method according to their on-site needs. The connection method of the ground wire is as follows:

There is a grounding point inside the communication maintenance chamber, as shown in Figure 4-24. When using multi-core wires on site, use M8x20 combination screws to tighten the grounding point, with a torque of 15 N m. This grounding screw is not included in the entire machine and needs to be prepared by the customer themselves.

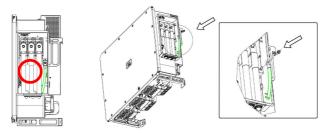


Figure 4-24 Grounding point inside the maintenance chamber on the AC side

The chassis casing has two grounding points as shown in Figure 4-25, one of which is a backup grounding point. Tighten the OT terminal directly to the grounding point with an M12 combination bolt, with a torque of $20N \cdot m$. This grounding screw is already installed in the grounding position, and customers can directly wire it.

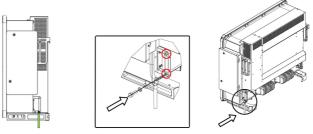


Figure 4-25 Grounding Point outside the Casing

In order to improve the anti-corrosion performance of the grounding terminal, it is recommended to apply silicone or paint on the outside of the grounding terminal for protection after the installation of the grounding cable.

4.2.6 RS485 Communication

(1) Interface descriptions

The communication terminal of the string inverter is located at the bottom of the inverter. Please refer to Chapter 2.3 for the introduction of external wiring terminals of the inverter. The RS485 communication plug is not provided in our standard supply interface. If the customer needs to use 485 communication on site, they must contact our company to purchase the RS485 communication plug.RS485 communication terminal, as shown in Figure 4-26. The RS485 communication terminal is set for details, see Table 4-11.



Figure 4-26 RS485 communication terminal



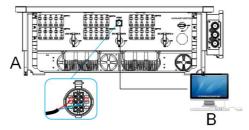
Table 4-11 Definitions of RS485 communication terminals

Port	Pin	Definition	Note
RS485-1	1	RS485-1A-IN, RS485 differential signal +	Used to cascade series
	2 RS485-1B-IN, RS485 differential signal -		inverters or connect devices such as data collectors inside
	3	RS485-1A-OUT, RS485 differential signal +	the communication box.
	4	RS485-1B-OUT, RS485 differential signal -	
RS485-2	5	1	
	6	1	
Reserve	7	1	
		1	

(2) RS485 Communications System

1) Connection of A Single Machine

An inverter communicates with the host through the RS485 port. Connect the pin 3 (RS485-1A-out) and the pin 4 (RS485-1B-out) of the RS485-1 port to the host through the RS485 communication cable, as shown in figure 4-27.

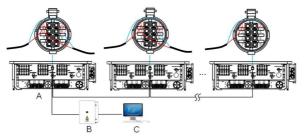


(A) Inverter (B) Upper computer

Figure 4-27 RS485 Single Machine Communication Connection Figure

2) Wiring Mode of Several Inverters

Multiple inverters communicate with the host over the RS485 port. The RS485 port on each inverter is connected to the host through a daisy chain, as shown in figure 4-28.



(A) Inverter (B) Communication box (C) Upper computer Figure 4-28 Communication Wiring Diagram of Several Inverters



(3) RS485 Connection Method

Step1: Unscrew the communication terminal locking nut and remove the sealing ring.



Figure 4-29 Taking out the sealing ring

Step2: Press the buckles on both sides of the connector to remove the wire component.



Figure 4-30 Taking out the cable component

Step3: Select the sealing ring based on the outer diameter D of the cable. Thread the cables into the locking nut, sealing ring, and make wire components in sequence.



Figure 4-31 Routing cables

Step4: Strip off the appropriate length of protective and insulation layers from the cable, and ensure that the insulation sheath of the core wire is no more than 3mm away from the end face of the crimping tube.

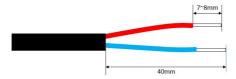


Figure 4-32 Peeling off the protective and insulation layers of the cables

Step5: Secure the cable to the terminal block and tighten the crimping screw with a 2mm flathead screwdriver to a torque of 0.5N·m.









Figure 4-34 Tightening the lock nut clockwise

- Step6: Gently pull the cable backwards and tighten the locking nut clockwise.
- Step7: Remove the waterproof cover of the communication terminal on the chassis.



Figure 4-35 Removing the waterproof cover



Figure 4-36 Installing the connector into the communication terminal

- Step8: Install the connector onto the communication terminal.
- Step9: Use waterproof plugs to seal vacant connector sealing rings



Figure 4-37 Waterproof plug Plug the vacant connector sealing ring



- 1.The RS485 communication cables must be shielded twisted pair cables. Twisted pair cables with a shielded layer are recommended. The cross-sectional area of the cables ranges from 0.75mm² to 1.5mm².
- 2. The number of devices on a single RS485 daisy chain cannot exceed 32 units.
- 3. RS485 daisy chain length can not exceed 1000 meters, recommended within 500m.



4.2.7 Power Line Carrier (PLC) Communication Method

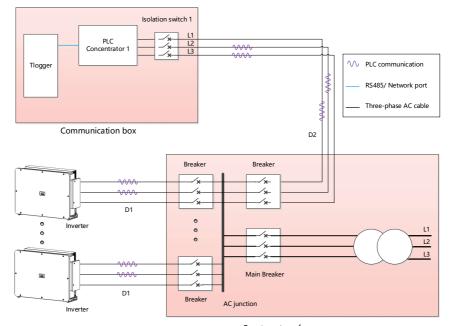
The inverter built-in PLC communication module needs to be adapted to the PLC concentrator inside the communication box provided by TBEA Xi 'an Electric Technology Co., Ltd. for data communication.



- 1. The communication box should be ordered from TBEA Xi 'an Electric Technology Co., Ltd.
- 2.The PLC concentrator directly uses the inverter AC output cable for data communication, saving the trouble of laying and maintaining special communication cables. The RS485 port of the data collector supports transparent transmission of the MODBUS-RTU protocol, and is fully compatible with the monitoring equipment and software based on the original RS-485 communication mode.

(1) Application scenarios

The inverter can be used in two scenarios: double-winding transformer and double-split transformer. The PLC communication connection diagram in the double-winding transformer scenario, as shown in figure 4-38, the PLC communication connection diagram in the double-split transformer scenario, as shown in figure 4-39.



Box-type transformer

Figure 4-38 PLC communication connection in the dual-winding transformer scenario



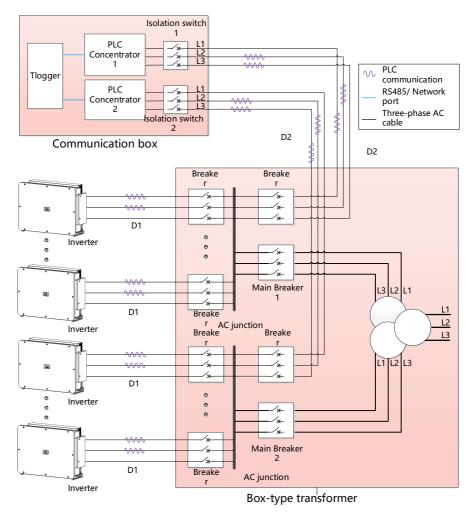


Figure 4-39 PLC communication connection in the dual-split transformer scenario



The parameters are described in Figure 4-38 and Figure 4-39, as shown in Table 4-12.

Table 4-12 Parameter description

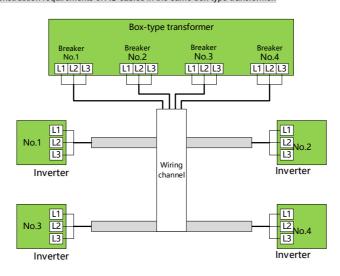
Label	Description	Cable specification
D1	Length of the AC cable between the box-type transformer and the inverter	1.For multi-core AC cables, the value must be smaller than or equal to 1000 m.
	transformer and the inverter	2.If a single-core AC cable is used, the cable must be smaller than or equal to 700 m. Bind the cable at an interval of 1m.
		1m
		*Notes:AC cables
D2	Length of PLC cable between communication box	1.lt is recommended to use outdoor UV-proof multi-core copper AC cable, core diameter range of 2.5mm²~16mm², recommended 4mm².
	and the box-type transformer	2.Cable voltage requirements: Isolation voltage ≥1000Vac.
		3.If the communication box is installed outside the communication box, the three-phase AC cable between the box-type transformer and the communication box is less than 10m. If the communication box is installed inside the box-type transformer, the three-phase AC cable between the suggestion box and the communication box is less than 3m. The shorter the length, the better the communication.

(2) AC cable routing rules

1) AC cable routing rules from the box-type transformer to the inverter

The AC cables between the box-type transformer and the inverter can be laid in the cable trench, cable trough, or pipeline. However, the AC cables must comply with the following requirements: the construction requirements for AC cables in the same container and the construction requirements for AC cables in different containers.

a) The construction requirements of AC cables in the same box-type transformer.





Only AC cables routed from the same box-type transformer can be deployed in the cable slots, as shown in figure 4-40.

Figure 4-40 Ac cable routing diagram in the same box-type transformer

Cables can be laid parallel in the online slots and cannot be tied or twisted. The spacing between AC cables and the same slots is optional. Tie a cable, as shown in Figure 4-41, wrap a cable, as shown in Figure 4-42.





Figure 4-41 Cable knotting diagram

Figure 4-42 Cable winding diagram

- When single-core cables are used, the AC cables of inverters are bound with cable straps every 1 m. The cables between inverters are arranged in parallel, and cannot be twisted or tied.
- The following lists the spacing between low-voltage AC cables and medium-voltage AC cables in the same box-type transformer:
 - (i) If low-voltage AC cables and medium-voltage AC cables are parallel in the same box type transformer, the horizontal distance between them must be greater than 3m, as shown in Figure 4-43.

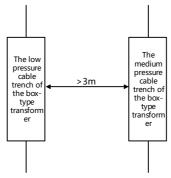


Figure 4-43 Horizontal distance between PLC cables

(ii) If low-voltage AC cables and medium-voltage AC cables are crossed in the same box type transformer, the Angle between the two cables ranges from 60° to 120°, and the vertical distance between the two cables is greater than 1m, as shown in figure 4-44.

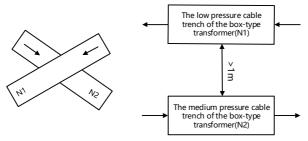


Figure 4-44 Vertical distance between PLC cables



- b) The construction requirements of AC cables in the different box-type transformers.
- The AC cables on the low voltage side of the different box-type transformers must be arranged in their respective cable slots, as shown in figure 4-45.

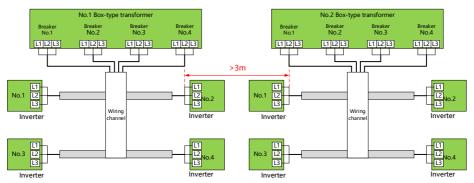


Figure 4-45 Ac cables change between the different box-type transformers

- Routing requirements for medium voltage AC cables and low voltage AC cables vary according to the different box-type transformers.
 - If the two cables are arranged in parallel, the horizontal distance between them must be greater than 3m.

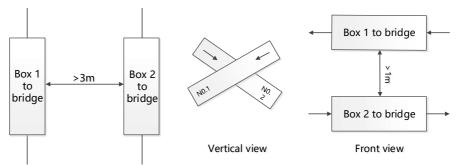


Figure 4-46 Horizontal spacing between AC cables

Figure 4-47 Crossover spacing of AC cables

 If two cables are crossed, the Angle between the two cables ranges from 60° to 120°, and the vertical distance between the two cables is greater than 1m.

2) Ac cable routing rules from the box-type transformer to the communication

- The AC cables between the communications box and the box-type transformer are arranged in parallel(PLC1 and PLC2), and are not wrapped in the cable trough.
- The circuit breaker corresponding to the middle of the bus is recommended for the coupling point of the AC cable connection the box-type transformer bus. For example, if a bus bar has eight branches, select the coupling point corresponding to the fourth or fifth branch row in the middle of the bus bar. A bus bar has nine branches. You are advised to select the coupling point corresponding to the fifth branch row in the middle of the bus bar.



- Use multi-core copper AC cables with the diameter ranging from 2.5mm² to 16mm².
- The rated power frequency voltage of the three-phase AC cable to the ground should be greater than or equal to 1000V. The cable length is less than 10m. The shorter the cable length is, the better the communication effect is.
- Ensure that the cable phase sequence is the same. The phase sequence for connecting the slave node to the inverter side must be the same as that for connecting the primary node to the box-type transformer copper bar and connecting the AC cable to the communication box.

4.2.8 Confirm and Clean

- (1) Confirm that the AC output cable, grounding wire and communication cable are connected correctly and installed firmly
- (2) Confirm that no tools and others are left inside the inverter.
- (3) Close the front door panel and install the screws on the door panel. The tightening torque is $6N \cdot m$.
- (4) Clean up the site.



4.3 TBEA Solar App

4.3.1 App Introduction

TBEA Solar App Communicat ion connection can be established with the inverter through WIFI to achieve near end maintenance of the inverter. Users can view real-time operation data of inverters, query power data, query power generation data, query event records, and set parameters through the App.

*Note: The screenshots in this manual are from Android version V2.1.0.1, please refer to the actual page for accuracy.

4.3.2 Download and Install

IOS: Search for TBEA Solar on the App Store and download it.

Android: Scan the QR code and follow the prompts on the interface to download and install the App.



Figure 4-48 QR code

After installation, the desktop displays the following App icon



Figure 4-49 APP icon

4.3.3 Sign in

(1) Prerequisite

To log in to the App, the following conditions must be met Inverter AC/DC side power on status:

- > The distance between the mobile phone and the inverter is within 5m and unobstructed
- > The mobile phone needs to disconnect from the carrier's data network connection
- Only one upper device is allowed to connect and operate the same inverter at the same time

(2) Login steps



Step1: Open the mobile WIFI and search for the WIFI name of the inverter. The initial WIFI name of the inverter is usually the MAC address of the inverter (the separate barcode below the inverter nameplate is the MAC address)



Figure 4-50 Searching for WIFI

Step2: Double click the inverter WIFI name, enter the password: tbea1234, and click the "Connect" button.

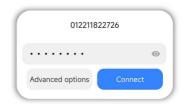


Figure 4-51 Entering a password

Step3:After the inverter WIFI connection is successful, click on the TBEA Solar App icon on the mobile
desktop to enter the app homepage



4.3.4 Functional Overview

Overview of App Functions, as shown in the following Figure 4-52.

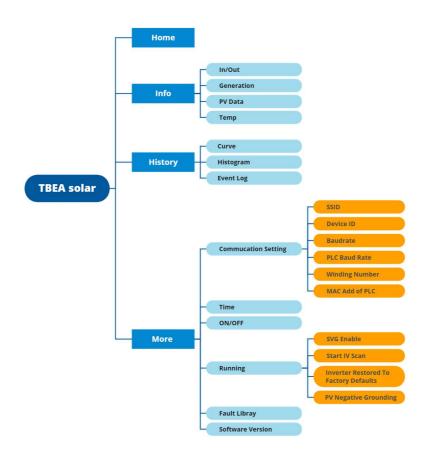


Figure 4-52 Overview of APP functions



4.3.5 Home



Figure 4-53 Homepage

Table 4-13 Introduction to various functions on the homepage

NO	Name	Description
1	Device Type	Display inverter type
2	Physical Image	Display the actual appearance of the inverter
3	Serial Number	Display the serial number of the inverter
4	Туре	Display the actual model of the inverter
5	Inverter Status	Display the current active power/active power setting value and reactive power/reactive power setting value of the inverter
6	Power	Display the daily power generation and cumulative total power generation of the inverter
7	Electric Energy	Display the power curve changes between 3pm and 23:00 every day
8	Power Curve	Display the power curve changes between 3pm and 23:00 every day
9	Navigation Bar	Includes menus for "Home", "Info", "History", and "More"



4.3.6 Info

Click on "Info" in the navigation bar to enter the Info page. The Info includes In/Out, Generation, PV Data, Temp., etc. You can switch pages by swiping left or right to view detailed information of different categories.

Table 4-14 Introduction to the functions of the Info column

In/Out	Generation	PV Data	Temp.
DC Bus Voltage	Daily Time	PV(n)(V)/(A)	Device Temperature
DC Bus Current	Total Time	MPPT(n)(A)	IGBT-A Temperature
DC Input Power	Daily Energy		IGBT-B Temperature
Line-AB Voltage	Monthly Energy		IGBT-C Temperature
Line-BC Voltage	Yearly Energy		Boost(n) Temperature
Line-CA Voltage	Total Energy		
Phase A Current	CO ₂ Emissions		
Phase B Current	LastMonth's Energy		
Phase C Current	LastYear's Energy		
Frequence			
PF_Set			
Power Factor			
P_Set			
Active Power			
Q_Set			
Reactive Power			
Apparent Power			
Insulation Resistance			



4.3.7 History

Click on History in the navigation bar to enter the Curve page. Swipe left or right to switch to the Histogram and Event Log page, as Figure 4-54 shown below. The function introduction of the history page is as follows as shown in Table 4-15.

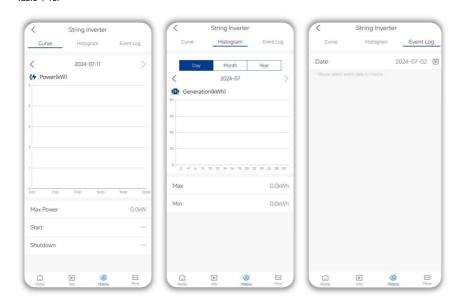


Figure 4-54 Display of various functions on the history page
Table 4-15 Introduction to History Function

Category	Description	
Curve	Can view the power curve changes of the inverter between 3pm and 23:00 daily since its operation until now.	
	Day:Display the daily power generation bar chart for the current month.	
Histogram	Month:Display the monthly power generation bar chart for the current year.	
	Year:Display the annual power generation bar chart of the inverter since its operation.	
Event Log	By selecting a date, you can query the event records for that day.	



4.3.8 More

Click "More" on the navigation bar to enter the "More" interface, as shown below Figure 4-55.



Figure 4-55 More

(1) Commucation Setting



Figure 4-56 Commucation Setting



Table 4-16 Introduction to Commucation Setting Function

Category	Description
SSID	Click on "SSID" and enter the WIFI name to be set in the pop-up text box (note: WIFI name settings cannot contain Chinese characters) to modify the WIFI name of the inverter. After changing the WIFI name, communication will be interrupted. Please wait for about 5 seconds before reconnecting to the changed WIFI login App.
Device ID	Click on "Device ID" and enter the device address to be set in the pop-up text box to modify the communication address of the inverter (address range: 1-247).
Baudrate	Click on "Baudrate" and set the 485 baud rate of the inverter through the pop-up radio button.
PLC Baud Rate	Click on "PLC Baud Rate" and set the inverter PLC baud rate through the pop-up radio button.
Winding Number	Click on "Winding Number" and use the pop-up text box to set the winding number to which the inverter belongs.
MAC Addr of PLC	Click on "MAC Addr of PLC" and set the MAC address of the inverter through the pop-up text box.

(2) Time

On the "More" interface, click "Time" to complete the inverter timing operation.

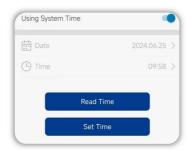


Figure 4-57 Time

The App supports two time synchronization methods: system time synchronization and custom time synchronization

- System time:"Using System Time"In the enabled state, click the "Set Time" button to complete the system timing
- 2) Custom time:"Using System Time"In the prohibited state, select the time to be set through the time control and click the "Set Time" button to complete the custom time synchronization
- 3) Read Time:Click the "Read Time" button to display the actual system time of the inverter

(3) ON/OFF

Click "ON/OFF" on the "More" interface to perform shutdown and startup operations on the device.





Figure 4-58 ON/OFF



(4) Running

Click on "Running" on the "More" interface to enter the corresponding interface, as shown below.



Figure 4-59 Running

Table 4-17 Function Introduction of Running Parameter Setting Page

Name	Range
SVG Enable	Enable/Disable
Start IV Scan	Start/Stop
Inverter Restored To Factory Defaults	Done/Cancel
PV Negative Grounding	Not Ground/Ground

(5) Fault Library

When the inverter malfunctions, you can search for the actual fault information corresponding to the fault code through the fault library on the mobile App.



Figure 4-60 Fault library



(6) Software Version



Figure 4-61 Software Version

Click on "Software Version" on the "More" interface to view the inverter version information.

Table 4-18 Software Version Page Function Introduction

Name	Description
CIB	Version of communication board
CIB-BL	BOOT version of communication board
DSP-Master	Version of DSP 1
DSP-Slaver	Version of DSP 2
DSP-Master-BL	BOOT version of DSP 1
DSP-Slaver-BL	BOOT version of DSP 2
CPLD/FPGA	Version of CPLD/FPGA



5 Function description and operation procedures

5.1 Function description

5.1.1 Operating Mode

Outage status

State of the system which stops the grid-connection work after the system receives the stop instruction or the unrecoverable fault occurs.

Standby Status

This state represents that the system stops working and waits for meeting the start conditions.

Waiting Status

According to different cause of shutdown and grid-connection standards, the inverter will be on the waiting state and confirm the condition before on-grid.

Self-inspection Status

This state indicates that the inverter is testing its hardware before the inverter starts grid-connected operation, key factors need to be tested under this state, including PV insulation resistance, DC voltage sampling and AC voltage sampling.

Running status

Under this state, the inverter is in a grid-connected operation state, and converts the DC electric energy of the PV array into the AC electric energy injected into the grid in the maximum power tracking mode.



5.1.2 Mode Conversion

The operating mode switch of the system is shown in Figure 5-1.

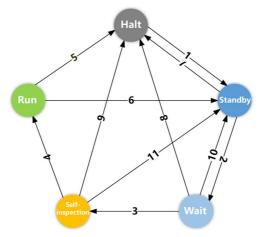


Figure 5-1 System State Switching Figure

Table 5-1 System State Switching Description

SN	Switching description
1	Stop command eliminating or man-made troubleshooting
2	Receive a start command
3	Start delay time
4	Detection circuit such as the PV voltage, PV earth impedance, grid voltage, grid frequency etc. are normal.
5	Stop command or unrecoverable fault occurs.
6	The shutdown command issues or the grid-connection conditions is not satisfied
7	Stop command
8	Stop command or unrecoverable fault
9	Stop command
10	The shutdown command issues or the waiting conditions is not satisfied
11	The shutdown command issues or the start conditions is not satisfied



5.2 Operation Instructions of Inverter

Various operation instructions of the inverter during installation, operation and maintenance are shown in Table 5-2:

Table 5-2 Process Instructions

Operation	Operation instructions	
Grid-connection preparation operation	1.Connect the input and output lines according to the wiring instructions. 2.Turn on the DC switch. 3.Turn on the AC breaker between the inverter and grid.	
Grid-connection operation	When the input voltage of the grid-connected inverter reaches its start voltage range, the system will automatically start the grid-connection and the inverter is in a grid-connected generation state. otherwise the inverter will give out a fault warning.	
Stop operation	If the system needs to be shut down in normal operation, it can be shut down in the following two ways: 1.Stop may be controlled from a remote place. 2.Under emergency cases, disconnect the DC switch (not recommended).	
Fault removal operation	1.In case of fault during operation of the system, the inverter immediately stops. 2.During fault of the system, the fault light of the indication panel will light up to give an alarm and the corresponding fault information may be read via an upper computer. 3.Prior to troubleshooting, the DC switch shall be turned off and the breaker between the inverter and grid shall be disconnected. Troubleshooting shall be performed according to the method in Section 7.3.	



6 Test Run

6.1 Check before trial operation

Before starting the inverter for the first time, the following checks need to be done.

- Check and confirm that all equipment has been reliably installed in place.
- Check if the DC switch and AC circuit breaker are in the "OFF" state.
- Check if the grounding wire is correctly and reliably connected.
- Check if the communication cables are correctly and reliably connected.
- Check if the DC cable is correctly and reliably connected.
- Check if the AC cables are correctly and reliably connected.
- Check if the vacant terminals have been sealed.
- > Ensure that no construction tools are left on the top of the machine or in the maintenance compartment
- All safety signs and warning labels are firmly and clearly affixed.

6.2 Trial operation steps

If all the above items meet the requirements, please perform the following steps to start the inverter for the first time.

- Step1: Please ensure that PV21 is connected to the string.
- Step2: Turn the auxiliary switch at the bottom of the inverter to "ON". Observe the inverter indicator light.

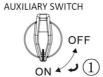


Figure 6-1 Schematic diagram of enabling the auxiliary switch

Step3: If the inverter indicator lights are not flashing at the same time, turn the remaining DC switches to "ON"



Figure 6-2 The DC switch is turned to ON

Step4: If the DC switch does not trip, proceed to step 5. If the switch trips, please contact our company for assistance.



Step5: Turn the auxiliary switch on the inverter to "OFF".

AUXILIARY SWITCH



Figure 6-3 Turning the auxiliary switch to OFF

- Step6: Close the AC circuit breaker between the inverter and the power grid.
- Step7: Install TBEA Solar App, see 4.3.2 for details on downloading and installing.
- Step8: When the inverter is connected to the grid for the first time, it is necessary to use the TBEA Solar App to initialize the protection parameter settings. Under normal lighting and grid conditions that meet the grid connection requirements, the inverter will operate normally.

Step9: After initialization is complete, the app automatically enters the homepage. The inverter indicator light is green and constantly on, indicating that the machine is in grid connected operation.



7 System maintenance

7.1 Daily maintenance

In order to ensure long-term good operation of the inverter, it is recommended to carry out routine maintenance according to the description in this section.



- 1.Please use the mobile app for remote shutdown during system cleaning, electrical connection, grounding reliability maintenance, etc. After the inverter grid relay is disconnected, first turn off the "DC SWITCH" on the DC side, and then disconnect the AC circuit breaker between the inverter and the grid. Please wait for at least 5 minutes before performing maintenance operations. (If it is necessary to remove the DC side panel of the inverter, wait for 30 minutes before processing)
- 2.If it is necessary to open the cabinet door in the rainy and snowy weather, please make sure the safeguard procedures and prevent the rain and snow coming into the machine. If you can't make it, please don't open the cabinet door.

Table 7-1 Maintenance list

Check list Check's method		Maintenance period	
System clearance	If there are flying flocs in the surrounding environment of the project site, it is necessary to regularly wash the radiator to ensure good heat dissipation.	Once every six months to one year	
System operation	Whether the outline of machine have damage and deformation.	Once time per half of one year	
Status	2.Hear the exceptional noise when the machine is running.		
	Check the machine's parameters and make sure they're right.		
Electrical	1.Whether the cable is fallen off or loosen.	First time is in the half of one year	
connection	Whether the cables have damages, the key point is the connection between the cables and metal terminals.	after first working, then once time per half of one year or one year	
	 Check whether the waterproof covers of COM, wireless communication ports and ACOUTPUT are locked tightly. 		
Reliability of ground connection	Check the reliability of ground connection.	First time is in the half of one year after first working, then once time per half of one year or one year	



7.2 External Fan Replacement

When the external fan is damaged or the service life expires, it should be replaced immediately. The steps are as follow (reference to Figure 7-1):

- Step1: Loosen the one M4 combined screw of the fan fixed bracket in left side.
- Step2: Pull the bracket out for about 15cm slowly, then, you can see 6pairs sockets, please separate them in turn.
- Step3: Pull the fan bracket until it is fully pulled out.
- Step4: Loosen the screw on the fan bracket and replace the damaged fan, please pay attention to fan direction when replacing.
- Step5: Refer to the above steps and follow the opposite steps to install it back, then the replacement is complete.

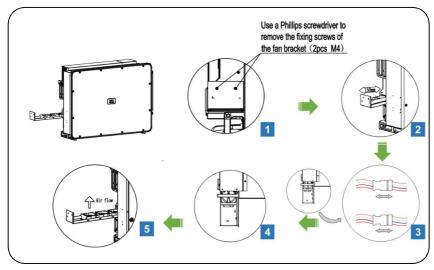


Figure 7-1 Fan replacement steps



7.3 Fault causes

System fault causes are listed as follows:

- Connection fault of external grid (such as poor connection of cable A, B or C or incorrect phase sequence connection).
- PV array exceeds the working voltage range.
- Grid undervoltage (U_{AC} < U_{AC,min}).
- Grid overvoltage (U_{AC}>U_{AC.max}).
- Grid frequency is too low (f_{AC}<f_{AC,min.}).
- Grid frequency is too high (f_{AC}>f_{AC,max.}).
- Output short circuit.
- Inverter over temperature fault.

Conform whether the ordinary power outage occurs or not, and whether the inverter output cables are disconnected or not when fault occurs .Please contact the professional technician if the fault cannot be eliminated.

7.4 Fault diagnosis

The following is defined for the level of failure that occurs during the operation of the system:

- Alarm fault: The inverter fails to generate electricity due to a fault or an abnormal external environment.
- Shutdown alarm: The inverter stops being connected to the grid due to a fault or an abnormality in the external environment.

The general way to diagnose a fault is as follows Table 7-2:



Table 7-2 Comparison table for system faults

Fault Coding	Fault Name	Fault Level	Fault Causes	Solutions
100	Insulation impedance fault	Shutdown fault	The DC input impedance (insulation impedance between PV and ground) is lower than the set value.	1.Check whether the photovoltaic array is short-circuited to the ground. 2.If the fault occurs when the ambient air is humid, such as in the early morning or after rain, check whether the insulation of the PV cable to the ground is poor.
110	PV reverse connection	Shutdown fault	The polarity of the series is reversed.	Check whether the corresponding positive and negative terminals of the string on the device are reversed. If yes, wait until the string current is lower than 0.5A, set the "DCSWITCH" to the "OFF" position, and then adjust the polarity of the string.
111	String mismatches	Alarm fault	The opening voltage of the series is lower than that of other series in parallel with the same MPPT.	1.Check whether the number of panels in series corresponding to the input string is less than the other strings in parallel. If so, wait until the photovoltaic string current is reduced to less than 0.5A, set the "DC SWITCH" to the "OFF" position, and adjust the number of string panels.
				2. Check whether the corresponding group string is blocked.
				Check whether the open circuit voltage of the corresponding string is abnormal.
206	Relatively short circuit fault	Shutdown fault	The impedance of the phase line to PE is low or short circuit.	1.If it occurs occasionally, the power grid may be abnormal for a short time, and the device will return to normal work after detecting that the power grid is normal, without manual intervention.
				2.If the fault persists for a long time, check whether the AC switch is properly connected to the cable, and measure whether the AC voltage is normal.
208	The inverter output three-phase current is unbalanced	Shutdown fault	The power grid phase voltage difference is too large.	1.If it occurs occasionally, the power grid may be abnormal for a short time, and the device will return to normal work after detecting that the power grid is normal, without manual intervention.
				If it occurs frequently, check whether the power grid voltage is within the normal range.
				3.The control parameters are incorrectly set.



Fault Coding	Fault Name	Fault Level	Fault Causes	Solutions
300	The RMS of the power grid voltage is high	Alarm fault	The power grid voltage is higher than the allowable range.	1.If it occurs occasionally, the power grid may be abnormal for a short time, and the device will return to normal work after detecting that the power grid is normal, without manual intervention.
				If the fault occurs frequently, check whether the power grid voltage is within the allowable range.
				If the fault persists for a long time, check whether the AC switch is properly connected to the cable.
301	The RMS of power grid voltage is low	Alarm fault	The grid voltage is below the allowable range.	I.If it occurs occasionally, the power grid may be abnormal for a short time, and the device will return to normal work after detecting that the power grid is normal, without manual intervention.
				If the fault occurs frequently, check whether the power grid voltage is within the allowable range.
				3.If the fault persists for a long time, check whether the AC switch is properly connected to the cable.
302	High frequency of grid	Alarm fault	The grid frequency is higher than the permitted range.	1.If it occurs occasionally, the power grid may be abnormal for a short time, and the device will return to normal work after detecting that the power grid is normal, without manual intervention.
				2.If the frequency occurs frequently, check whether the power grid frequency is within the allowable range.
303	Low network frequency	Alarm fault	Grid frequency below allowable range.	1.If it occurs occasionally, the power grid may be abnormal for a short time, and the device will return to normal work after detecting that the power grid is normal, without manual intervention.
				2.If the frequency occurs frequently, check whether the power grid frequency is within the allowable range.
306	PV overvoltage	Alarm fault	The PV open circuit voltage is higher than the maximum operating voltage of the device.	Measure the string voltage, check the configuration of the photovoltaic array, and avoid excessive number of series. After the PV array is correctly configured, the device alarm is automatically cleared.



Fault Coding	Fault Name	Fault Level	Fault Causes	Solutions	
307	PV undervoltage	Alarm fault	The PV open circuit voltage is lower than the device starting voltage.	Measure the voltage of the series, check the configuration of the photovoltaic array, and avoid too few series in series. After the PV array is correctly configured, the device alarm is automatically cleared.	
309	Continuous leakage current protection	Shutdown fault	The leakage current (residual current of the square) is higher than the set value.	Check whether the impedance of the AC and DC cables to the ground is too low and whether the insulation layer is damaged.	
400	Ambient temperature is too high	Shutdown fault	The temperature in the chassis is too high.	Check whether the installation location of the device is properly ventilated and whether the ambient temperature exceeds the upper limit.	
				If there is no ventilation or the ambient temperature is too high, improve the ventilation and heat dissipation.	
				3.If the ventilation and ambient temperature are normal, check whether the heat sink is blocked or the internal fan is abnormal.	
402 403	The inverter A phase, B phase, or C phase IGBT temperature is too high	Shutdown fault	The temperature of the A /B /C phase IGBT module on the inverter side exceeds the upper limit.	1.Check whether the installation location of the device is properly ventilated and whether the ambient temperature exceeds the upper limit.	
404				If there is no ventilation or the ambient temperature is too high, improve the ventilation and heat dissipation.	
				3.If the ventilation and ambient temperature are normal, check whether the heat sink is blocked or whether the internal and external fans are abnormal.	
411	The temperature of the inverter IGBT is unbalanced	Shutdown fault	The temperature difference of the three-phase inverter module exceeds the upper limit.	1.Check whether the installation location of the device is properly ventilated and whether the ambient temperature exceeds the upper limit.	
				If there is no ventilation or the ambient temperature is too high, improve the ventilation and heat dissipation.	
				3.If the ventilation and ambient temperature are normal, check whether the heat sink is blocked or whether the internal and external fans are abnormal.	



Fault Coding	Fault Name	Fault Level	Fault Causes	Solutions
412	The BOOST IGBT temperature is too high. Procedure	Shutdown fault	BOOST IGBT module temperature exceeds the upper limit.	Check whether the installation location of the device is properly ventilated and whether the ambient temperature exceeds the upper limit.
				If there is no ventilation or the ambient temperature is too high, improve the ventilation and heat dissipation.
				3.If the ventilation and ambient temperature are normal, check whether the heat sink is blocked or whether the internal and external fans are abnormal.
505 506 507	Phase A overflow/phase B overflow/phase C	Shutdown fault	A sharp decrease in the power grid voltage or short circuit triggers overcurrent protection.	The device monitors the external working conditions in real time. After the fault disappears, the device will return to normal operation without manual intervention.
307	overflow			2.If the alarm is generated frequently and affects the normal operation of the power station, check whether the AC side voltage is normal.
				3.The control parameters are incorrectly set.
901	The grid voltage is not suitable for operation	Shutdown fault	The grid voltage is above or below the allowable range, or the low voltage duration exceeds the low voltage crossing set value, or the high voltage duration exceeds the high voltage crossing set value.	1.If it occurs occasionally, the power grid may be abnormal for a short time, and the device will return to normal work after detecting that the power grid is normal, without manual intervention.
				If the fault occurs frequently, check whether the power grid voltage is within the allowable range.
				3.If the fault persists for a long time, check whether the AC switch is properly connected to the cable.
902	The grid frequency is not suitable for operation	Shutdown fault	The grid frequency is higher or lower than the permitted range.	If it occurs occasionally, the power grid may be abnormal for a short time, and the device will return to normal work after detecting that the power grid is normal, without manual intervention.
				If the frequency occurs frequently, check whether the power grid frequency is within the allowable range.
				3. The Power Grid Standard parameter is incorrectly set.
907	Five inspection failures	Shutdown fault	During the self-test, a test failed five times.	1.If it occurs accidentally, it may be that a self-test fails, and the device will return to normal work after passing the self-test without manual intervention.
				2.If an external or internal fault occurs frequently, determine the cause based on other fault information.



Fault Coding	Fault Name	Fault Level	Fault Causes	Solutions
/	An internal fan is faulty	Alarm fault	The internal fan is faulty and the power derates.	Please contact the regional after-sales service engineers.
1	An external fan is faulty	Alarm fault	External fans are faulty, and the power derates.	Please contact the regional after-sales service engineers.
/	Internal communication failure	Shutdown fault	Device exception.	Please contact the regional after-sales service engineers.

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8 Technical Parameter

8.1 Technical Characteristics

- Intelligent air-cooled heat dissipation, prolong the life of device, more reliable work status.
- High power density.
- > Input branch current monitoring.
- There are anti-thunder functions on the AC and DC sides.
- High capacity ratio, low LCOE.
- Several communication interfaces are optional, which support RS485, the power line communication.
- Have the low voltage rid through (LVRT) function.
- > Have the high voltage rid through (HVRT) function.
- > The protection level is IP66, applicable to the harsh outdoor environment with more rain and dust.
- Anticorrosion level C5, adapted to high humidity, strong corrosive industrial areas and high salinity coastal areas.

8.2 Technical parameters

Туре	TS300KTL-HV-C1	TS330KTL-HV-C1	TS360KTL-HV-C1
DC side parameters			
Starting voltage(V)		500	
Max. DC input voltage (V)		1500	
PV input operating voltage range(V)		500~ 1500	
No. of Ind. MPPT Track. Lines		6	
Max. number if inputs		24(210) / 30(182)	
AC side parameters			
Rated output power (kW)	300	330	363
Rated grid voltage (Vac)		3/PE /800	
Rated grid frequency (Hz)		50	



Туре	TS300KTL-HV-C1	TS330KTL-HV-C1	TS360KTL-HV-C1			
System parameters						
Operating Temp. Range	-40°C ~ 60°C					
Operating Humidity Range	0% ~ 100% without condensation					
Operating Alt. Range		5000m (derat > 4000m)				
Protection Class		I				
Protection Rating		IP66				
Corrosion Resistance		C5				
Pollution Degree		Outside PD3, Inside PD3	2			
Overvoltage Category (OVC)		II (PV), III (Grid)				
Isolation Type		Non-isolation				
Cooling System		Intelligent Fan Cooling				
Protection functions						
LVRT		Yes				
HVRT		Yes				
Switch		Yes				
DC Fuse		No				
PV Insulation Impedance Protection	Yes					
AC Side Short Circuit Protection	Yes					
Overcurrent Protection	Yes					
Grid Voltage & Frequency Protection	Yes					
Branch Current Inspection	Yes					
SPD Failure Detection	Yes					
String Intelligent Breaking	Yes					
Mechanical parameters						
Dimensions (W / H / D)	1120×820×365 mm					
Weight	110kg (Excluding installation bracket)					
DC Inputs Type	4~6 mm², optional 10 mm²					
Installation mode	Pole installation / Wall hanging					
Communication and display						
Communication Interface	RS485 / PLC					
Display	LED indicator light, WiFi+ APP					
Communication Protocol	Modbus_RTU					



9 Appendix

9.1 Quality assurance

This product can enjoy the free maintenance within the warranty period. When the following situations occur, the company has the right not to undertake quality assurance:

- Incorrect installation.
- Incorrect modification.
- Incorrect use.
- Any installation and range of application exceeding the relevant international standard specifications.
- Damages caused by the non-normal natural environment.

9.2 Contact us

If you have any questions on this product, please contact us, the contact details are as follows:

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