# KEHUA TECH

PV Grid-tied Inverter

SPI-B Series (30K-60K)

# User Manual

**Trademarks and Permissions**

and other Kehua trademarks are trademarks of Kehua Data Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

**Notice**

The purchased products, services and features are stipulated by the contract made between Kehua and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specification in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

# KEHUA DATA CO.,LTD.

| | |
|---|---|
| Address: | No.457,MalongRoad,TorchHigh-TechIndustrialZone,Xiamen,Fujian,China |
| Website: | www.kehua.com |
| E-mail: | service@kehua.com |
| Customer Service Telephone: | 400-808-9986 |
| Tel: | 0592-5160516 |
| Fax: | 0592-5162166 |

# Foreword

## Summaries

Thank you for choosing the PV grid-tied inverter(Hereinafter referred to as "inverter")!

This document gives a description of inverter, including the appearance, features, working principles, installation, electrical connection, operation, maintenance and storage, etc.

Please save the manual after reading, in order to consult in the future.

📖 **NOTE**
The figures in this manual are just for reference, for details please see the actual product.

## Applicable Model

- SPI30K-B
- SPI33K-B
- SPI36K-B
- SPI40K-B
- SPI50K-B
- SPI60K-B

📖 **NOTE**
SPI30K-B, SPI33K-B and SPI36K-B have six routes of DC input, SPI40K-B has nine routes of DC input,SPI50K-B andSPI60K-Bhas twelve routes of DC input, the SPI-B series (30K-60K) string PV grid-tied inverter is similar. The figures in this manual takes SPI60K-B for an example.

## Symbol Conventions

The manual quotes the safety symbols, these symbols used to prompt users to comply with safety matters during installation, operation and maintenance. Safety symbol meaningas follows.

| Symbol | Description |
|--------|-------------|
| ⚠ DANGER | Alerts you to a high risk hazard that could, if not avoided, result in serious injury or death. |
| ⚠ WARNING | Alerts you to a medium or low risk hazard that could, if not avoided, result in moderate or minor injury. |
| ⚠ CAUTION | Alerts you to a potentially hazardous situation that could, if not avoided, result in equipment damage, data loss, performance deterioration, or unanticipated results. |
| ⚠ | Anti-static prompting. |
| ⚡ | Be care electric shock prompting. |
| ⚘ TIP | Provides a tip that may help you solve a problem or save time. |
| 📖 NOTE | Provides additional information to emphasize or supplement important points in the main text. |

Product standard: Q/XMHS 003

# Contents

# 1 Safety Description

This chapter mainly describes the safety announcements.Prior to performing any work on the device, please read the user manual carefully, follow the operation and installation instructions and observe all danger, warning and safety information, which is to avoid human injury and device damage by irregular operations.

## 1.1 Safety Announcements

This section mainly describes the safety announcements when operation and maintenance. For details, please refer to safety description in the relevant chapters.

⚠️ **CAUTION**

Before operation, please read the announcements and operation instructions in this section carefully to avoid accident.

The promptings in the user manual, such as "Danger", "Warning", "Caution", etc. don't include all safety announcements. They are just only the supplement of safety announcements when operation.

📖 **NOTE**

Any device damage caused by violating the general safety operation requirements or safety standards of design, production, and usage will be out of Kehua's warranty range.

## 1.1.1 Use Announcements

⚠️ **DANGER**

Don't touch terminals or conductors that is connected with grid to avoid lethal risk！

 **DANGER**

There is no operational part inside device. Please do not open the crust of device by yourself, or it may cause electric shock. The device damage caused by illegal operation is out of the guarantee range.

 **DANGER**

Damaged device or device fault may cause electric shock or fire!

●    Before performing any work on the device, please check whether there is no damage or danger in the device visually.

●    Check whether the connection for other external devices or circuits is safe.

 **DANGER**

After disconnect the input and output of the inverter, there still has residual energy in the storage capacitor, which may cause electric shock. It can't do the maintenance until all power supply sources are switched off for 30 minutes.

 **WARNING**

Please do not put finger or tool into the rotating fans to avoid human injury or device damage.

**Danger of High Temperature**

The surface temperature of inverter may reach to 75°C. During running, please don't touch the surface to avoid scald.

⚠️ **CAUTION**

No liquid or other objects are allowed to enter the cabinet.

⚠️ **WARNING**

In case of fire, please use dry power fire extinguisher. If using liquid fire extinguisher, it may cause electric shock.

## 1.1.2 PV Array Protection

When install PV array in daytime, it necessary to cover PV array by light-proof material, or the PV array will generate high voltage under sunshine. If touching PV array accidently, it may cause electric shock or human injury!

⚠️ **DANGER**

There exists dangerous voltage between the positive and negative of PV array!

When install device, it must disconnect inverter with PV array completely. Set warning mark here to avoid reconnecting.

## 1.1.3 ESD Protection

⚠️ **CAUTION**

To prevent human electrostatic damaging sensitive components(such as circuit board), make sure that you wear a anti-static wrist strap before touching sensitive components, and the other end is well grounded.

## 1.1.4 Grounding Requirements

⚠ **WARNING**

High leakage risk! Device must be grounded before performing electrical connection. The grounding terminal must be connected to ground.

- When install device, it must be grounded first. When dismantle device, the grounding wire must be removed at last;

- Don't damage the grounding conductor;

- Device should be connected to the protection earth permanently. Before operation, it should check the electrical connection to ensure the device is grounded reliably.

## 1.1.5 Moistureproof Protection

⚠ **CAUTION**

Moisture invasion may cause inverter damage!

Observe the following items to ensure that inverter works normally.

- When the air humidity is more than 95%, don't open the door of inverter;

- In the wet or damp weather, don't open the door of inverter to perform maintenance or repair.

## 1.1.6 Warning Mark Setting

In order to avoid accident for unwanted person gets close to inverter or makes improper operation, it should observe the following requirements when perform installation, daily maintenance or repair.

- Set warning marks where the switches are to avoid switching them on improperly.

- Set warning signs or safety warning belt in the operation area, which is to avoid human injury or device damage.

## 1.1.7 Electrical Connection

Electrical connection must be performed according to the description in the user manual and the electrical circuit schematic.

**WARNING**

The configuration of PV array, grid level, grid frequency, etc. must meet the technical requirements of inverter.

Grid-tied generation should be allowed by the local power supply department and the related operation should be performed by professionals.

All electrical connection must meet the related country and district standard.

## 1.1.8 Measurement Under Operation



**CAUTION**

There exists high voltage in the device. If touching device accidently, it may cause electric shock. So, when perform measurement under operation, it must take protection measure(such as wear insulated gloves, etc.)

The measuring device must meet the following requirements:

- The range and operation requirements of measuring device meets the site requirements;

- The connections for measuring device should be correct and standard to avoid arcing.

## 1.2 Operator Requirements



**CAUTION**

The operation and wiring for inverter should be performed by qualified person, which is to ensure that the electrical connection meets the related standards.

Before install, operate and maintain device, the operator must understand the safety announcements, know correct operations and be trained strictly.

- Operator should know the structure and working principle of PV grid-tied generation system well.

- Operator must be familiar with the related country and district standard.

# 1.3 Operation Environment Requirements

The operation environment may influence the life span and reliability of device. So, please avoid to use device in following environment:

- The place where temperature and humidity beyond the technical specifications (temperature: -25℃～60℃; relative humidity:0%-95%).

- The place with direct sunshine or rain.

- The place with vibration or impact.

- The place with dust, corrosive material, salt or burnable gas.

- The place with poor ventilation or closed situation.

- The place where close to resident living quarter.

# 2 Overview

This chapter mainly describes product introduction, components and working principle, etc.

## 2.1 Product Intro

The inverter converts the DC energy from PV array into AC energy and then feedbacks to power grid, which is suitable for the commercial roof grid-tied system and large power station grid-tied system. The PV grid-tiedgeneration system consists of PV array, PV grid-tied inverter, transformer(According to practical application) and power distribution system, as shownFigure2-1.

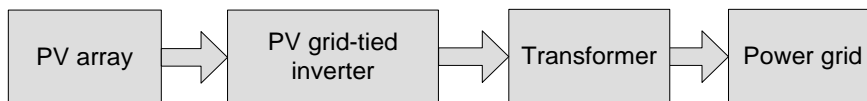| PV array | | PV grid-tied inverter | | Transformer | | Power grid |
|---|---|---|---|---|---|---|

Figure2-1 PV grid-tiedgeneration system

### 2.1.1 Apperance

The appearance of SPI-B series (30K-60K) string PV grid-tied inverter is as shown in Figure2-2.
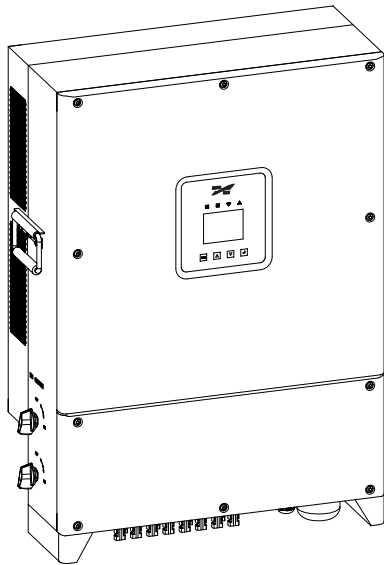


Figure2-2 Appearance

## 2.1.2 Model Meaning

The model meaning of SPI-B series (30K-60K) string PV grid-tied inverter is as shown in Figure2-3.

SPI □K-B
— Non-isolated type
— Output power
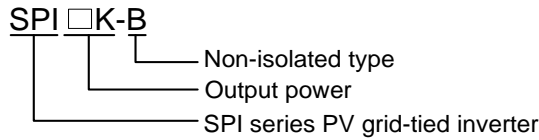— SPI series PV grid-tied inverter

Figure2-3 Model meaning

As shown in Figure2-3, "SPI" means that the product is Kehua SPI series PV gird-tied inverter; "□ K " means output power, when"□ K" is 60K, it means that the output power is 60kVA; "B" means that the product is the non-insolated type inverter.

## 2.1.3 Features

- Adopts the efficient type-T three level high frequency conversion technology and advanced full digital control technology.

- Adopts the advanced disturbance detection technology to realize the anti-island running protection.

- Equipped with perfect protection function and the nighttime loss is low.

- The reactive power is adjustable, the range of power factor is -0.8(lag)～+0.8(ahead).

- The active power can be adjusted form 5% to 100% continuously.

## 2.1.4 Grid Mode

The inverter supports five kinds of grid modes: TN-S, TN-C, TN-C-S, TT and IT, as shown in Figure2-4.
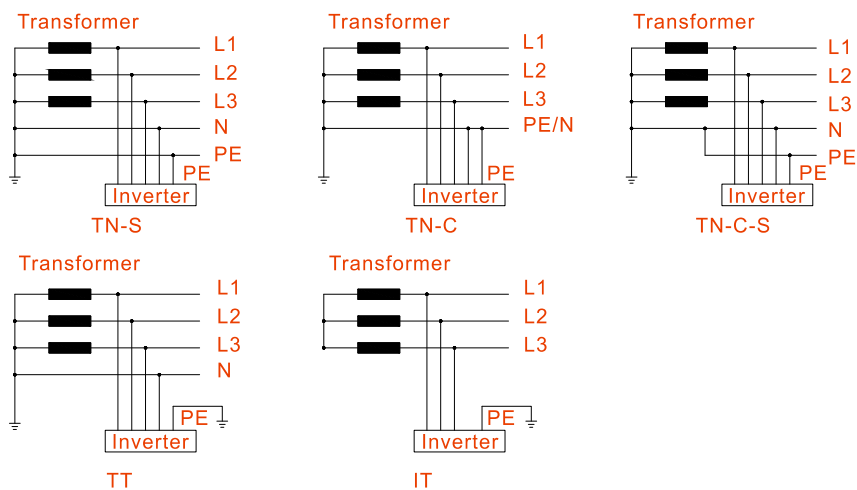


Figure2-4 Grid mode

⚠️  **CAUTION**

In the TT grid mode, the rms voltage between the neutral wire and grounding wire must be less than 20V.

If the inverter is equipped with anti-PID module SPID-S, it only can select IT grid mode. Besides, it need to configure transformer.

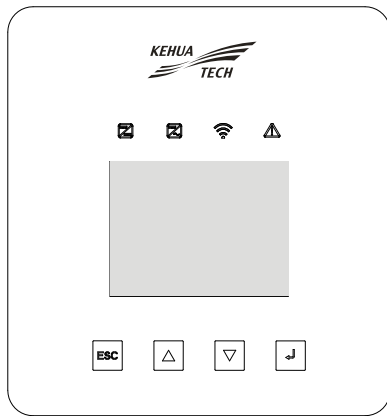## 2.2 Compoments

## 2.2.1 Operation Panel



Figure2-5 Operation panel

### Status indicator

There are four status indicators on the front panel of inverter, the indicator status illustration is as shown in Table2-1.

Table2-1 Indicator status illustration

| Type | Mark | Color | Meaning | Status | Illustration |
|------|------|-------|---------|--------|--------------|
| LED | ▨ | Green | PV connection indicator | ON | At least a group of PV has been connected. |
| | | | | OFF | All PV are disconnected. |
| | ▨ | Green | Grid connection indicator | ON | Grid-tied status |
| | | | | OFF | No grid-tied status |

| Type | Mark | Color | Meaning | Status | Illustration |
|------|------|-------|---------|--------|--------------|
|  | 📶 | Green | WIFI/GPRS indicator | ON | WIFI/ GPRS has been connected |
|  |  |  |  | OFF | WIFI/ GPRS has been disconnected |
|  | ⚠ | Red | Fault indicator | ON | The inverter has protection action. |

Button

There are four buttons on the front panel of inverter, the button function is as shown in Table2-2.

Table2-2 Button function

| Button | Function |
|--------|----------|
| ESC | Return/ quit |
| ▲ | Page up/ number "+"/ select option |
| ▼ | Page down/ number "-"/ select option |
| ↵ | Enter/ confirm/ save/ select number bit |

LCD touch screen

The inverter adopts 3.5 inch color touch screen, the display information includes：

● The running status and information of inverter.

● Service and operation information.

● Alarm and fault information.

## 2.2.2 DC Switch

DC switch connects the inverter with PV array.When the inverter works normally, the DC switch must be in the "ON" position. When wiring, set the DC switch in the "OFF" position. When maintenance, set the DC switch in the "OFF" position and wait for 30 minutes, then check whether the DC busbar voltage inside the device is less than 10V or not by multimeter. If yes, the maintenance can be done. The position of DC switch is as shown in Figure2-6.
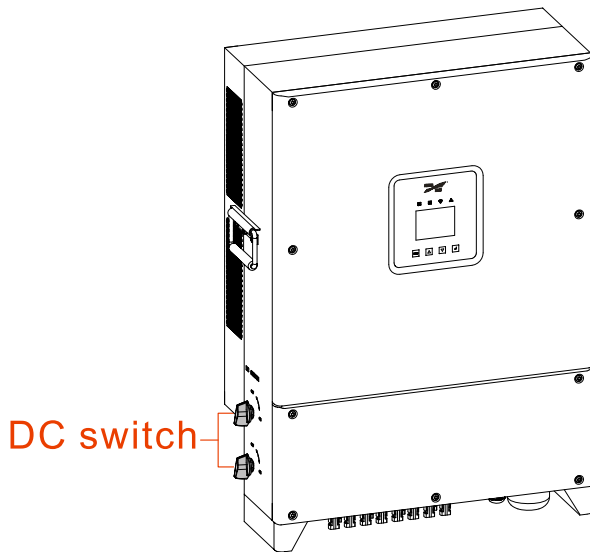
Figure2-6 DC switch

---

## ⚠ CAUTION

When maintenance or wiring, it should switch off DC switch.

---

## 2.3 Working Principle

PV array input connected with inverter, which will combine into n routes of MPPT circuits inside the inverter to do the max. power point tracking. Then convert the DC power into three-phase AC power through inverting circuit and support the surge protection in the DC side and AC side, the details refer toFigure2-7.
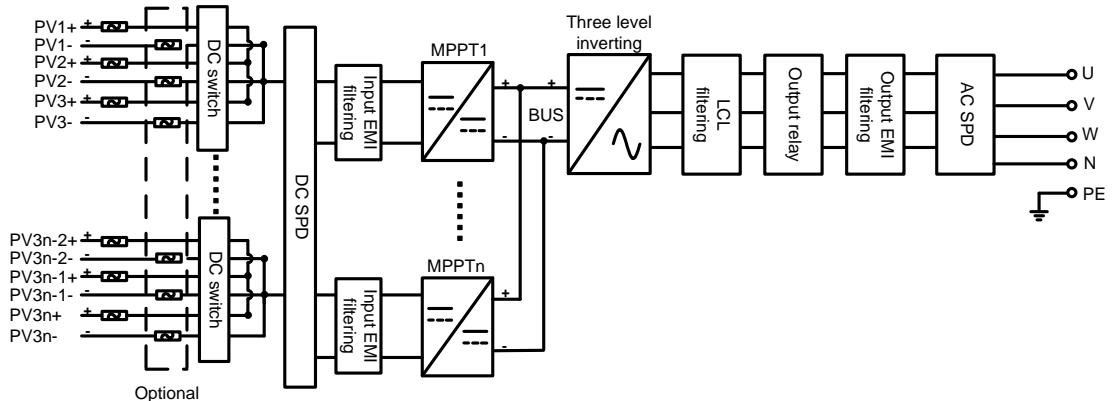


Figure2-7 Working principle diagram

# 3 Installation

This chapter mainly introduces the inverter's installation, including installation process, installation preparation, handling, unpacking and checking, installation procedures, electrical connection. check the installation ,etc.

## 3.1 Installation Process

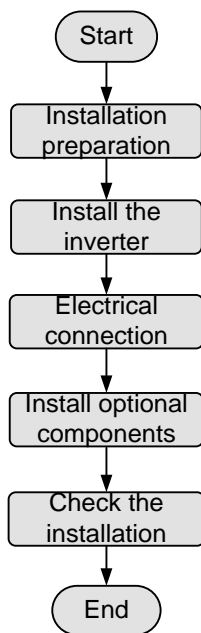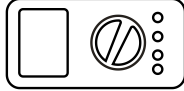The installation process of inverter is as shown in Figure3-1.

```
        ┌─────────┐
        │  Start  │
        └────┬────┘
             ↓
     ┌───────────────┐
     │ Installation  │
     │ preparation   │
     └───────┬───────┘
             ↓
     ┌───────────────┐
     │  Install the  │
     │   inverter    │
     └───────┬───────┘
             ↓
     ┌───────────────┐
     │  Electrical   │
     │  connection   │
     └───────┬───────┘
             ↓
     ┌───────────────┐
     │Install optional│
     │  components   │
     └───────┬───────┘
             ↓
     ┌───────────────┐
     │  Check the    │
     │ installation  │
     └───────┬───────┘
             ↓
        ┌─────────┐
        │   End   │
        └─────────┘
```
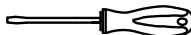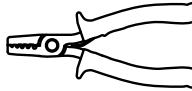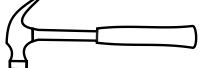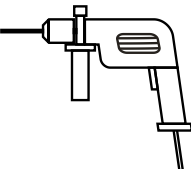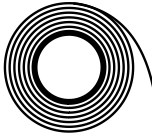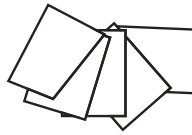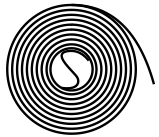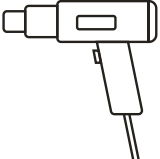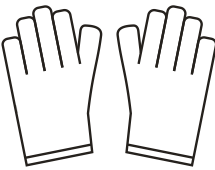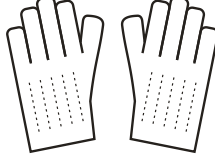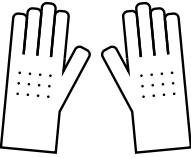
Figure3-1 Installation process

## 3.2 Installation Preparation

### 3.2.1 Installation Tools

| Tools | | | |
|---|---|---|---|
| Clamp meter | Multi-meter | Label paper | Phillips screwdriver |
| Flat-headscrewdriver | Socket wrench | Adjustable wrench | Torque wrench |
| COAX crimping tool | Diagonal pliers | Wire stripper | Claw hammer |
| Hammer drill | Insulation tape | Cotton cloth | Brush |
| Heat shrink tubing | Heat gun | Electrician's knife | Protective gloves |
| ESD gloves | Insulated gloves | Hydraulic pliers | Cable tie |

## 3.2.2 Installation Environment

The installation environment of inverter should meet the following items:

- Do not install the inverter in the place with poor ventilation.

- There has sufficient fresh-air supply around the inverter.

- The installation place has no direct sunlight and rain.

- Place select the wall or bracket with enough bearing capacity.

- Consider the visibility of operation panel.

## 3.2.3 Installation Clearance

Keep a clearance of at least 1000mm from the left side and right side of inverter to other objects, at least 500mm from the top of inverter to ceiling and at least 500mm from the bottom of inverter to ground, which is good for heat dissipation or maintenance, as shown in Figure3-2.
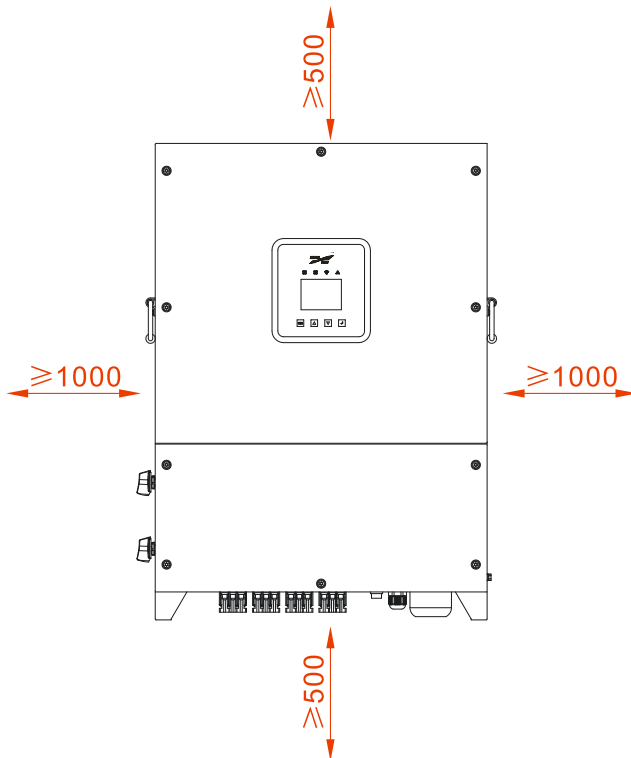


Figure3-2 Installation clearance

# 3.3 Handling, Unpacking and Checking

## 3.3.1 Handling

The inverter should be handled to the installation site by trained professionals(at least two person).

⚠️ **CAUTION**

When handling device, move it carefully to avoid impact or fall.

When handling device, keep it vertical. Don't put it down or put it up suddenly.

## 3.3.2 Unpacking and Checking

📖 **NOTE**

Determine the unpacking site in advance. Normally, it's better that the unpacking site is close to installation position.

Step 1   Check the appearance of package for shipping damage. If any shipping damage is found, report it to the carrier immediately.

Step 2   Handle device to the installation site.

Step 3   Remove the package and take out the optional components and user manual.

Step 4   Check the device completeness.

- Inspect the device's appearance for shipping damage, if any shipping damage is found, report it to the carrier immediately.

- Check if the types of the accessories are complete and correct. If there is any discrepancy, take notes and contact the distributor immediately.

⚠️ **CAUTION**

After unpacking, if the device should be stored for a long time, it's recommended to pack device with the original package.

----**End**

## 3.4 Inverter Installation

The inverter can be installed on the wall or metal holder through equipped installation holder, the dimensions of installation holes of the installation holder is as shown in Figure3-3.
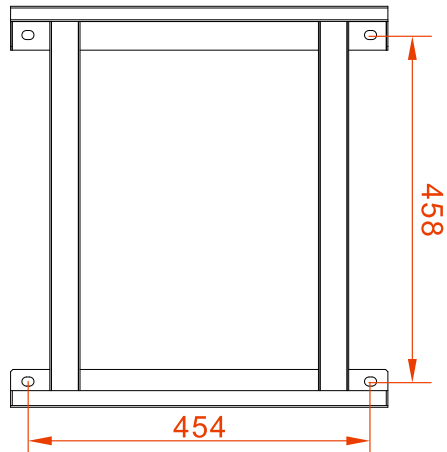
Figure3-3 The dimensions of installation holes of installation holder(Unit: mm)

⚠️ **WARNING**

Vertical installation is perfect. If it should be tilt, the vertical gradient should not exceed ±15°.

The installation procedures are as follows:

Step 1　Determine the installation site according to the dimensions of inverter(as shown in Figure3-4) and installation clearance requirements(as shown in Figure3-2).
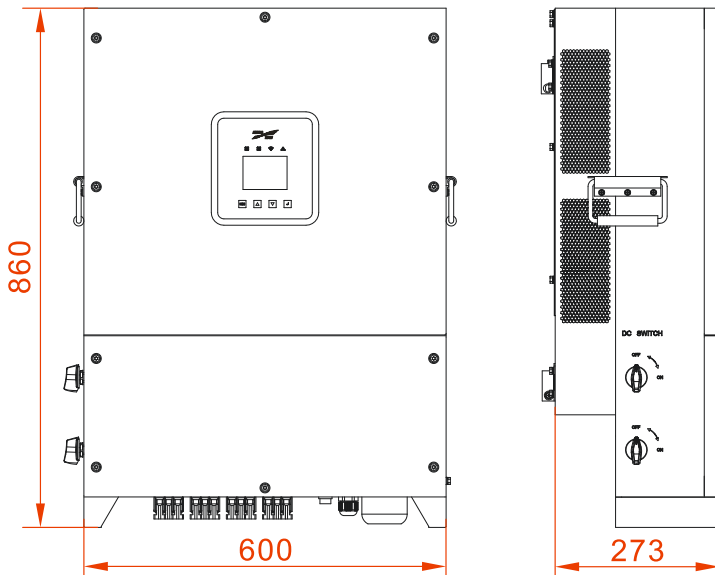


Figure3-4 The dimensions of inverter(Unit: mm)

Step 2    According to the dimensions of installation holes of installation holder(as shown in Figure3-3), mark the position of installation holes on the wall. Drill holes on the wall vertically by hammer drilling according to the marked position.

 **CAUTION**

Keep the installation holder horizontal to ensure that the installation holes on the wall are aligned.

 **NOTE**

Drill four holes on the wall with Φ14.5mm in diameter and 55~60mm in depth. Clear the dust and measure the net depth. Ensure that the depth of four holes are the same.

Step 3    As shown in Figure3-5, install the equipped four expansion bolts M10*80 into the installation holes on the wall.
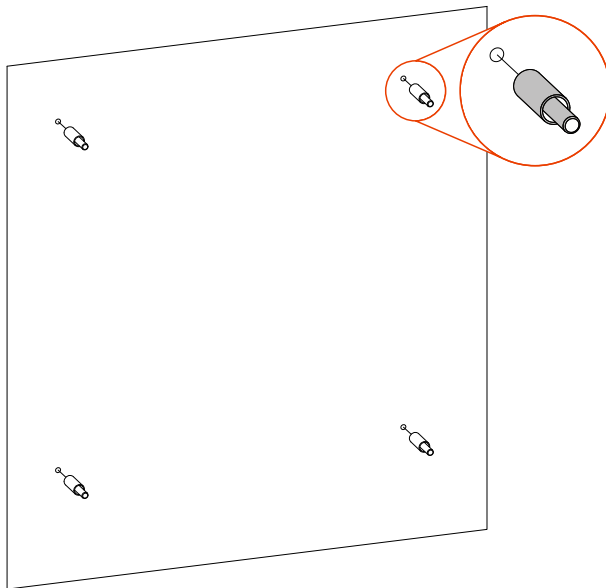


Figure3-5 Install the expansion bolts

Step 4    As shown in Figure3-6, put the installation holder in the prepared expansion bolts with the flat washer, spring washer and nut and fasten nuts clockwise by wrench to fix the installation holder on the wall.
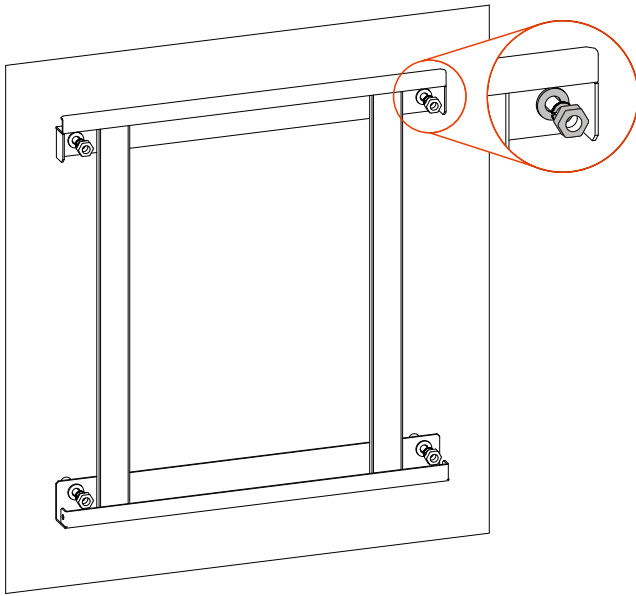
Figure3-6 Fix the installation holder on the wall

Step 5    As shown in Figure3-7, uplift the inverter and insert the holes in the back of the inverter into the bulge of installation holder(total two positions) slowly. It can't release the inverter until it has been fastened firmly.
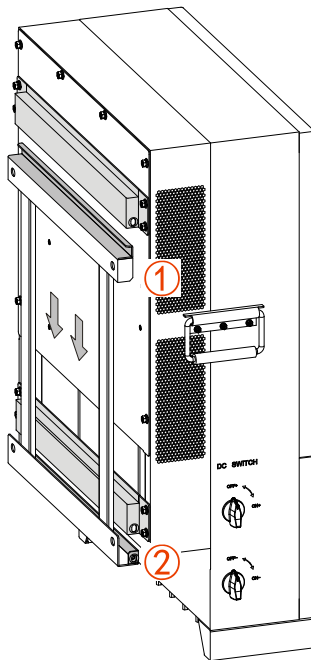


Figure3-7 Fasten the inverter to the installation holder

Step 6    As shown in Figure3-8, fasten the inverter to the installation holder in the two sides of the inverter by equipped bolts M6*16.
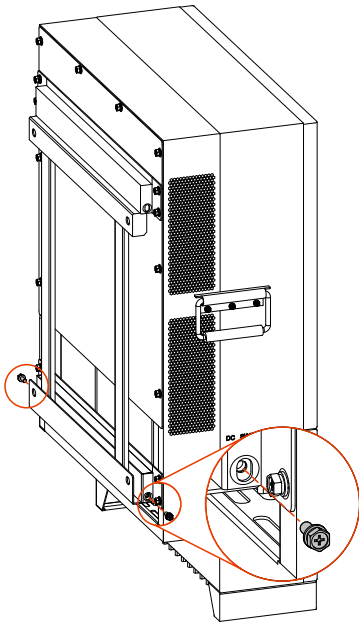
Figure3-8 Fasten the inverter

**----End**

# 3.5 Electrical Connection

The wiring for inverter be performed in the bottom of inverter. The mark is as shown in Figure3-9, and the mark meaning is as shown in Table3-1 The recommended wire requirements is as shown in Table3-2.
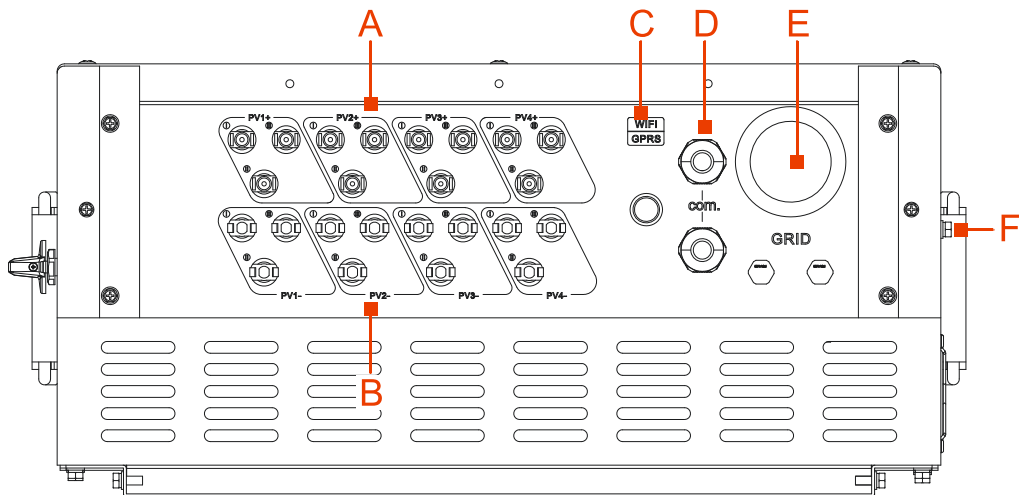


Figure3-9 Connection mark

📖 **NOTE**

1.  As the SPI30K-B、SPI33K-B and SPI36K-Bhave six routes of DC input,the three routes of DC input in the markPV3+, PV3-, PV4+ and PV4- of Figure3-9 don't connect with PV connector. Use plugs to block them.
2.  As the SPI40K-B has nine routes of DC input,the three routes of DC input in the mark PV4+ and PV4- of Figure3-9 don't connect with PV connector. Use plugs to block them.
3.  As the SPI50K-B and SPI60K-B havetwelve routes of DC input.

Table3-1 Mark illustration

| No. | Mark | Illustration |
|-----|------|-------------|
| A | PV+ input 1~4 | Draw the positive input wires through the PV connectors. |
| B | PV- input 1~4 | Draw the negative input wires through the PV connectors. |
| C | WIFI/GPRS | WIFI/GPRS power supply output port |
| D | com. | Draw Ethernet communication wire/RS485 communication wire /DRM communication wire through the nylon cable gland. |
| E | GRID | Draw AC output wire through the nylon cable gland. |
| F | ⏚ | Ground the chassis. |

Table3-2 Wire requirements

| Wire type | Specification | Recommend |
|-----------|---------------|-----------|
| Input wire | 4 mm$^2$ | - |
| Output wire | 5*35mm$^2$ （allow the maximum wire diameter: 5*70mm$^2$） | RNBS38-8 |
| Ethernet communication wire | Network wire with eight cores | RJ45 plug |
| RS485communication wire | 2*0.3 mm$^2$ | - |
| DRM communication wire | Network wire with eight cores | RJ45 plug |
| Grounding wire | 25 mm$^2$ | RNBS22-6 |

**NOTE**

1. The cables in this table are based on UL copper wire. If other wires are used, please replace them according to the standard. The wire materials selected by our company have passed the national standard certification or UL certification. Refer to Table3-2for the recommended cross-sectional area of the wire when the user purchases the wire by himself (the wire is about 5 meters long).If the wire length exceeds5meters, the cross-sectional area of the wire should be increased accordingly.
2. If the recommended terminal model is not adopted,please confirm with our company.
3. If using the aluminum wire, it should adopt copper-aluminum transition terminal.

## 3.5.1 Electrical Connection Announcements

When perform the electrical connection for inverter, it should follow the below procedures:

Step 1　Before perform the electrical connection, ensure the grounding terminalof inverter has been connected with the ground, as shown in Figure3-10.
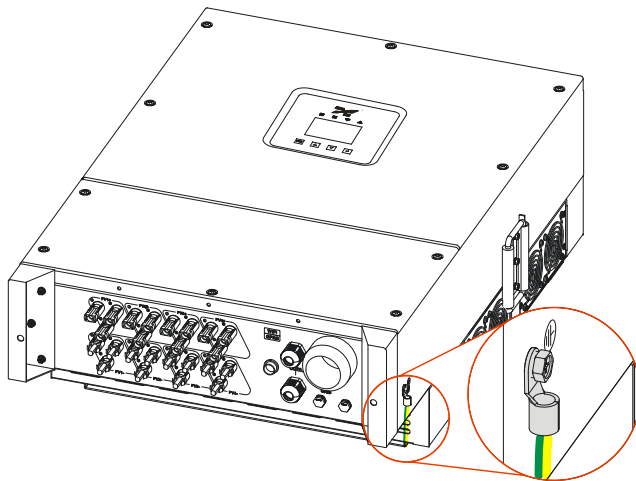


Figure3-10 Grounding

⚠ **CAUTION**

As shown in Figure3-11, the grounding of inverter mustn't connect with the grounding of the lighting rod of the building where the inverter installed. It should separate them. The grounding of inverter should connect with the grounding system directly and the impedance should be less than 20mΩ.
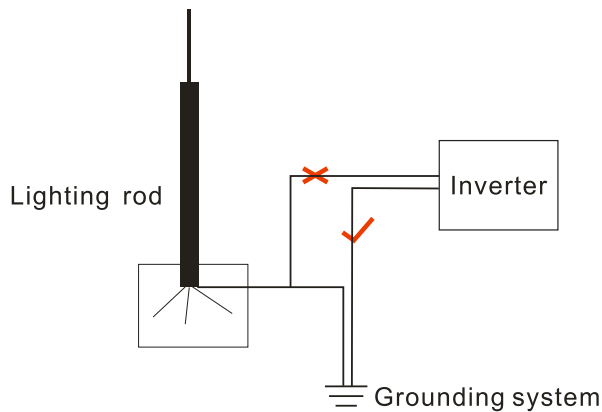
Figure3-11 The grounding of inverter

Step 2    Switch off the DC switch connected with PV array and DC switch in the inverter.

Step 3    Connect the DC input in the inverter with the PV array.

Step 4    Connect the AC output in the inverter with the grid.

Step 5    After finish electrical connection, block GRID port, COM port by fireproofing mud.

**----End**

## 3.5.2 DC Connection

⚠ **CAUTION**

When installation, it must use the equipped DC terminals and PV connectors to avoid inverter damage.

Switch off the DC switch before connected with PV array.

Connect the positive pole and negative pole correctly when doing the electrical connection between PV array and inverter.

The DC input voltage should be less than the max. input voltage of inverter.

It's forbidden to connect the grounding wire in the positive pole and negative pole of PV array, or it will lead to inverter damage.

Use the equipped PV connector and terminals to perform DC connection. PV connector includes positive connector and negative connector. The corresponding matching is positive metal terminal and negative metal terminal respectively, as shown in Figure3-12 and Figure3-13.
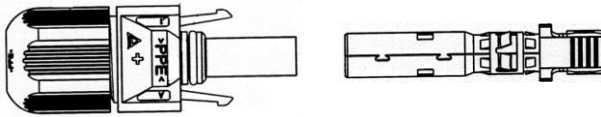
Figure3-12 Positive connector and positive metal terminal
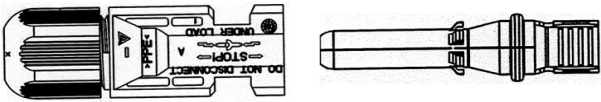


Figure3-13 Negative connector and negative metal terminal

Step 1    Dismantle the sealing nuts of positive connector and negative connector respectively.

Step 2    Strip the insulation layer of positive wire and negative wire for about 7mm by wire stripper, as shown in Figure3-14 and Figure3-15.
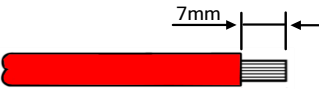


Figure3-14 Positive wire
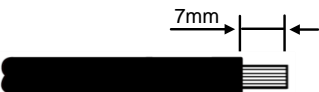


Figure3-15 Negative wire

Step 3    Draw the positive wire and negative wire through the corresponding sealing nuts respectively.

Step 4    Insert the positive wire and negative wire into the positive metal terminal and negative metal terminal respectively. Crimp the metal terminals firmly by crimping pliers, as shown in Figure3-16 and Figure3-17.
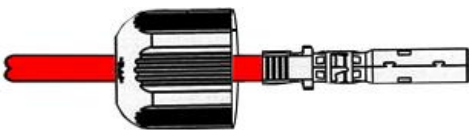


Figure3-16 Crimp the positive metal terminal



Figure3-17 Crimp the negative metal terminal

23

Step 5   Insert the positive wire and negative wire into the corresponding insulation crust respectively. If there has a click sound, it means it have been inserted properly.

Step 6   Tighten the sealing nuts of positive connector and negative connector to the corresponding insulation crusts respectively.

Step 7   Insert the positive connector and negative connector into the ports marked with "+" and "-" in the inverter respectively. If there has a click sound, it means it have been inserted properly, as shown in Figure3-18 and Figure3-19.
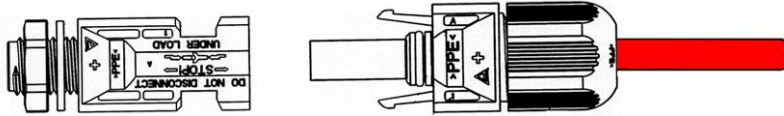


Figure3-18 Connect with the positive pole of DC input



Figure3-19 Connect with the negative pole of DC input.

**----End**

## 3.5.3 AC Connection

 **CAUTION**

When wiring, pay attention to distinguish the AC live wire, neutral wire and grounding wire.

Step 1   Dismantle cover, as shown in Figure3-20.
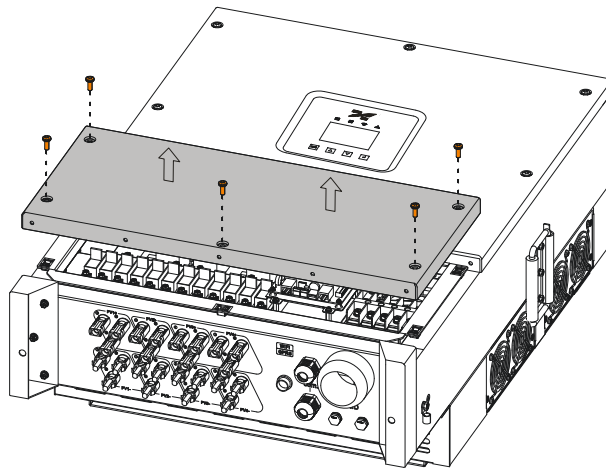
Figure3-20 Dismantle cover

Step 2   Strip the outer insulation jacket of AC wire for about 90mm and the insulation jacket of wire for about 15mm, as show in Figure3-21.
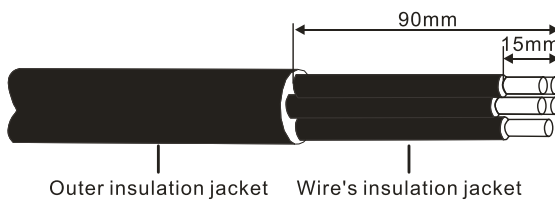


Figure3-21 Strip wire

📖 **NOTE**

If using the hard wires, the stripped length of wire V,W,N can be shorter than wire U, PE for about 5mm to make the wire U, PE connect to connector easily. (The color of AC wire is determined by the local standard.)

Step 3   Loosen the nylon cable gland in the " GRID " and draw the AC wires through it. Connect the wires to round terminals respectively, insert the wires into the corresponding wiring terminals respectively and tighten the screws on the wiring terminals by Phillips screwdriver(or socket wrench), as shown in Figure3-22.
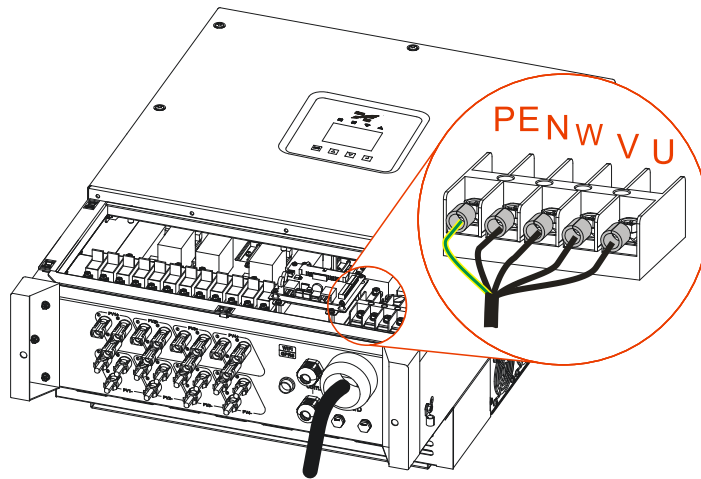
Figure3-22 Wiring diagram for AC wire

Step 4    After wiring, tighten the nylon cable gland and install the cover.

⚠️ **CAUTION**

When multiple inverters are in parallel, it's necessary to add breaker with impact tripping function in the AC output backend.

**----End**

## 3.5.4 com. Communication Connection

com. communication includes Ethernet communication, RS485 communication and DRM communication(optional).

Step 1    Dismantle cover, as shown in Figure3-23.
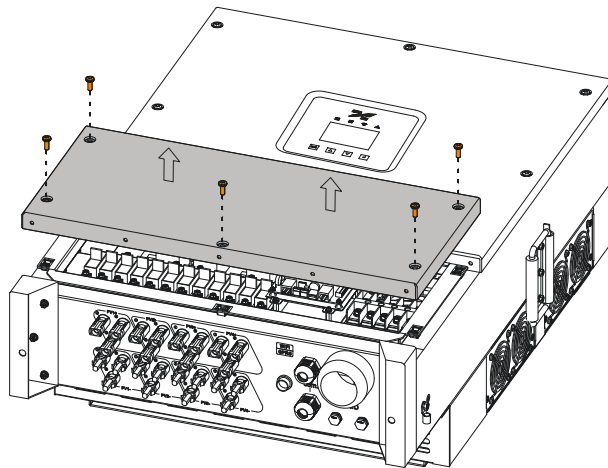
Figure3-23 Dismantle cover

Step 2　Loosen the nylon cable gland in the "com."(two pieces) and then draw the communication wires through it.

Step 3　Connect communication wire.

● Ethernet communication connection

Crimp Ethernet communication wire according to Figure3-24, and then insert it into Ethernet communication port in the communication board, as shown in Figure3-25. Connect the other end of Ethernet communication wire with computer or logger.
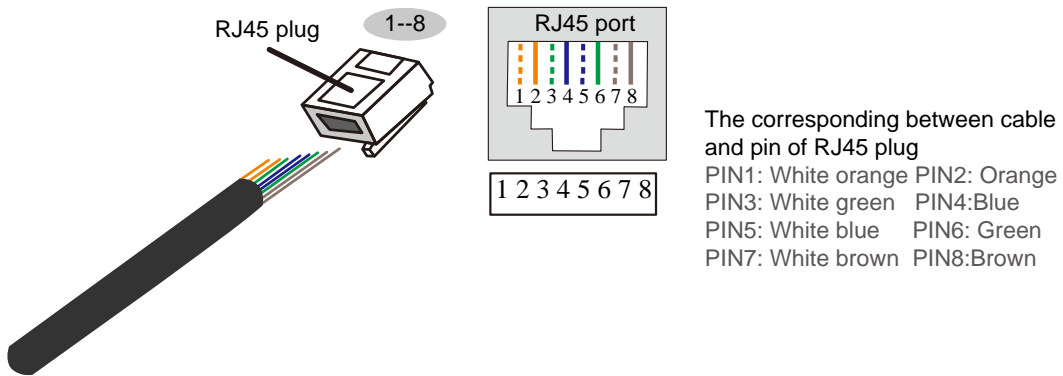


Figure3-24 Crimping diagram of Ethernetcommunication wire
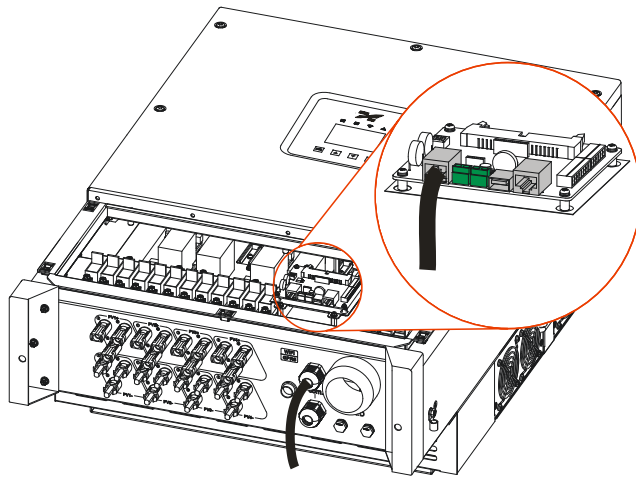
Figure3-25 Ethernet communication connection

● RS485 communication connection

Connect RS485 communication wires with RS485 ports in the communication board respectively, as shown in Figure3-26. Connect the other end of RS485 communication wire with computer or logger.
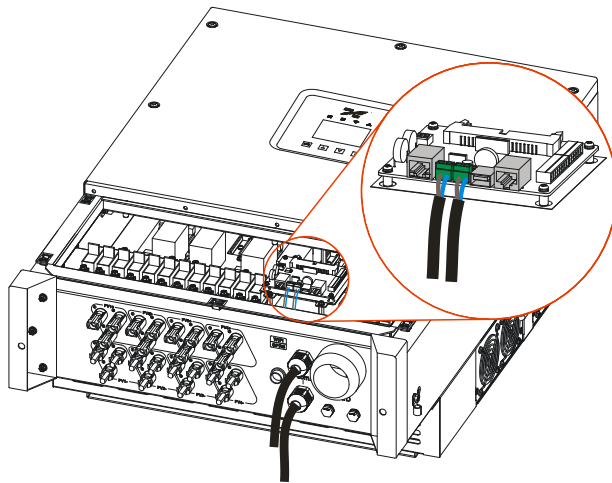


Figure3-26 RS485 communication connection

**⚠ WARNING**

When connect with wiring terminals, don't press the insulation layer of communication wires, or it may cause poor connection.

RS485communication wires should be wired separately from input and output cables to avoid interfering with communication.

📖 **NOTE**

    The communication address and baud rate of inverter can be set by Kehua monitor software. The default baud rate is 9600. If any doubt, contact manufacturer.

If there has multiple inverters, all inverters can realize the communication connection by communication wires in chrysanthemum chain, as shown in Figure3-27.



Figure3-27 Multiple inverters communication system

📖 **NOTE**

    If the inverter has to connect with the terminal resistance, set the dial switches SW1 in the communication board to the "ON" position.

● DRM communication connection(optional)

Crimp DRM communication wire according to Figure3-28, and then insert it into DRM communication port in the communication board, as shown in Figure3-29.Connect the other end of DRM communication wire with DRM control device
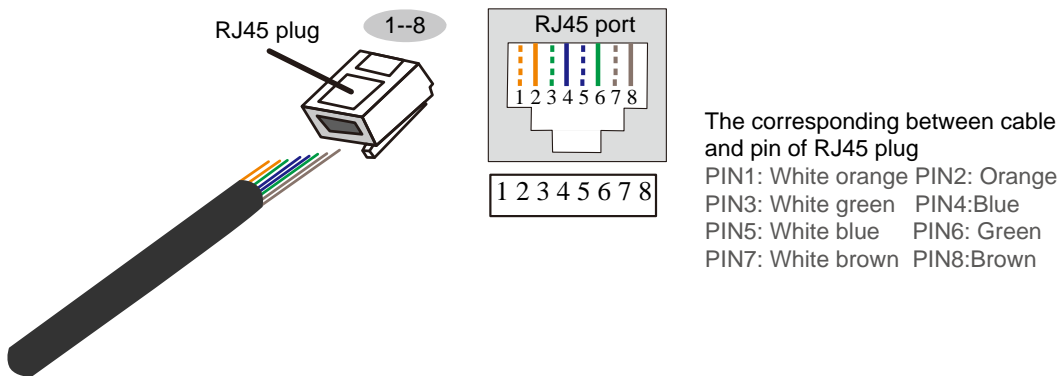


Figure3-28 Crimping diagram of DRMcommunication wire
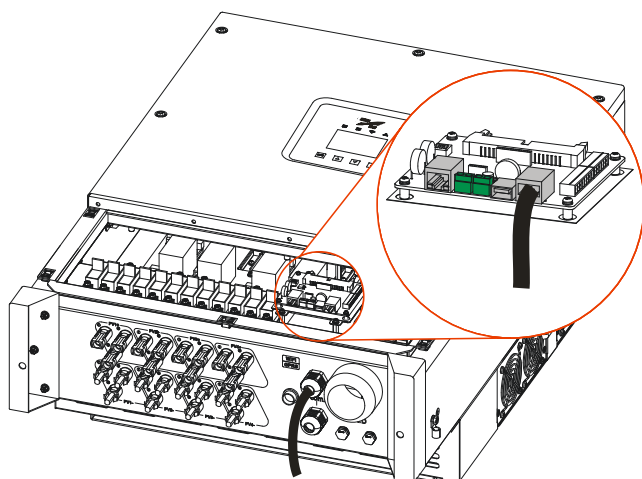
Figure3-29 DRM communication connection

Step 4    After wiring, tighten the nylon cable gland and install cover.

**----End**

## 3.5.5 WIFI/GPRS Communication Connection(Optional)

If there has optional component WIFI/GPRS stick, insert the equipped WIFI/GPRS stick into the WIFI/GPRS port to do the internet monitoring, as shown in Figure3-30.
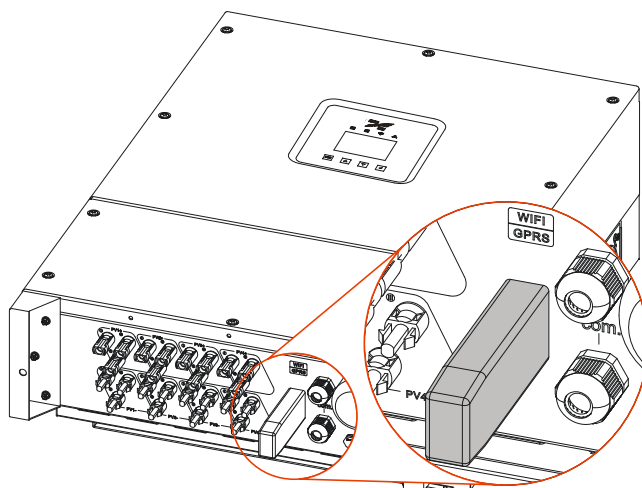


Figure3-30 WIFI/GPRS communication connection

&#x1F4D6; **NOTE**
1.    The GPRS do not need to set.
2.    For the use of WIFI and GPRS, please see the built-in user manual in the packaging of WIFI/GPRS.
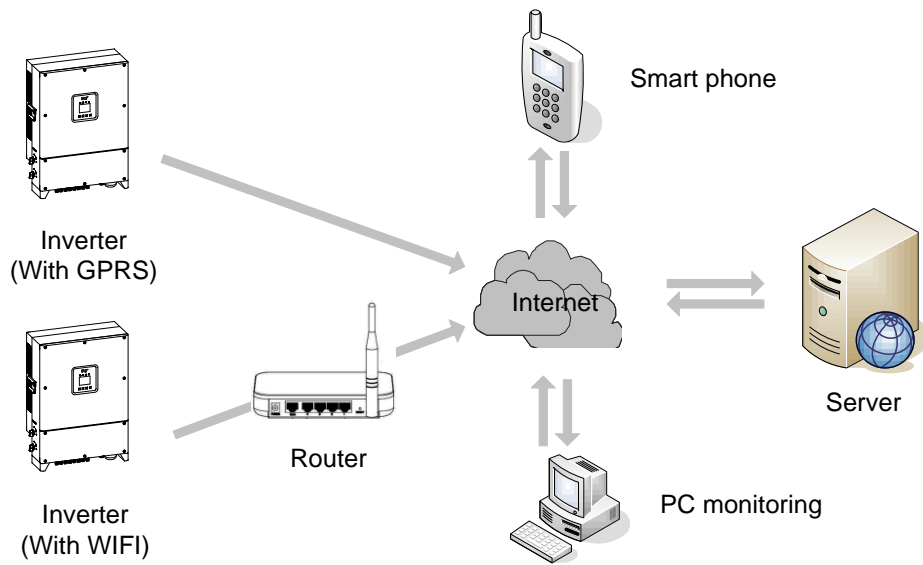
Figure3-31 WIIF/GPRS monitoring plan

## 3.6 Check the Installation

After installation, check the following items:

1.   Check if the connection in the DC input, AC output and communication wire are right.

2.   Check if the inverter is installed firmly.

3.   Check if all the screws in the crust of inverter are tightened.

# 4 Operation Interface

This chapter mainly introduces the operation interface of inverter.

## 4.1 Initial Wizard

If it's the first time to power on LCD, it will enter the initial wizard. It can set the language, date & time, screen, as shown in Figure4-1 to Figure4-4, the relevant button function is as shown inTable4-1. If it has to set the above parameters later, set them in the setting interface(refers to **4.3.4 Setting)**.



Figure4-1 Initial wizard interface



Figure4-2 Language setting interface

Figure4-3 Date & time setting interface



Figure4-4 Screen setting interface

Table4-1 Button function in the initial wizard interface

| Button | Function |
|---|---|
| ESC | ● Return to the previous level<br>● Cancel<br>● Quit the selection box |
| ▲ | ● Choose upward<br>● Number "+" |
| ▼ | ● Choose downward<br>● Number "-" |
| ↵ | ● Enter the next level<br>● Confirm<br>● Enter the selection box<br>● Select number bit in the selection box |

## 4.2 Main Interface

The main interface shows the current status of the inverter, MPPT voltage/ current, grid voltage/ current, output power, daily power generation, CO2 reduction, total power generation and time, etc. Besides, user can query the power generation per hour in histogram, as shown in Figure4-5, the relevant button function is as shown in Table4-2.
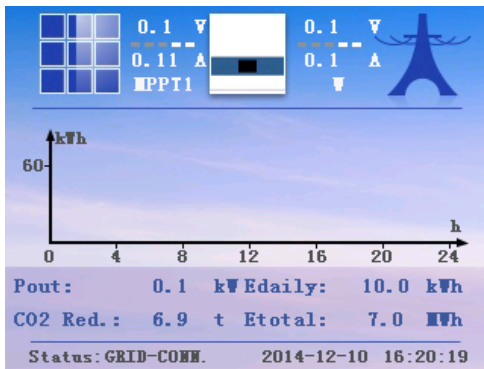


Figure4-5 Main interface

Table4-2 Button function in the main interface

| Button | Function |
| --- | --- |
| ESC | ● Quick view alarm |
| ▲ | ● Transfer MPPT voltage/ current <br> ● Transfer grid voltage/ current |
| ▼ | ● Transfer MPPT voltage/ current <br> ● Transfer grid voltage/ current |
| ↵ | ● Enter the main menu |

## 4.3 Main Menu

In the main interface, press "↵" button to enter the main menu. There has six submenus: running info., power query, record query, setting, ON/ OFF and about in the main menu, as shown inFigure4-6, the relevant button function is as shown in Table4-3.

Figure4-6 Main menu

Table4-3 Button function in the main menu

| Button | Function |
|--------|----------|
| ESC | ● Quit the main menu |
| ▲ | ● Choose left |
| ▼ | ● Choose right |
| ↵ | ● Enter the next level |

## 4.3.1 Running Information

In the main interface, press "↵" button to enter the main menu. In the main menu, press "↵" button to enter the running information interface, and press "▲" or "▼" button to view the running information, as shown in Figure4-7 to Figure4-11, the relevant button function is as shown in Table4-4.
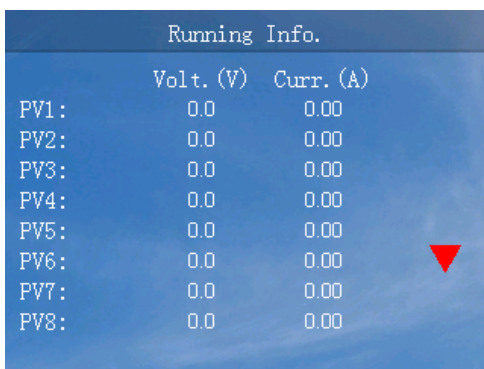


Figure4-7 Running information interface(1)
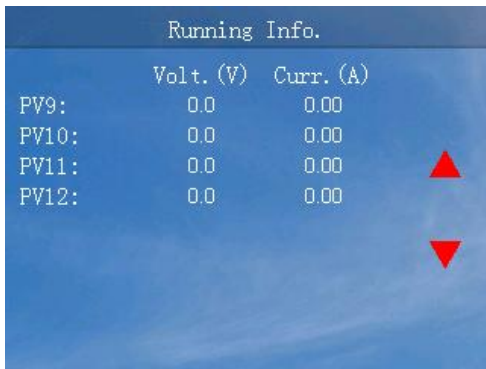
Figure4-8 Running information interface (2)
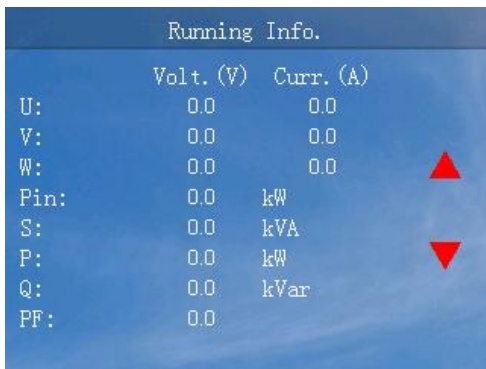


Figure4-9 Running information interface(3)
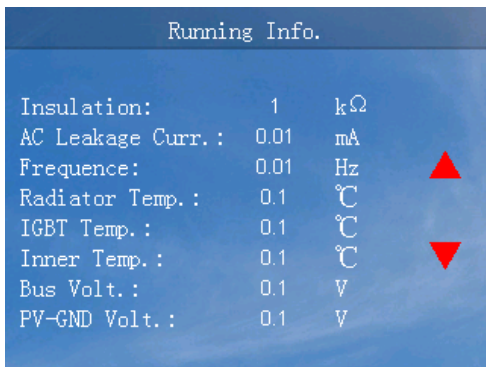


Figure4-10 Running information interface(4)
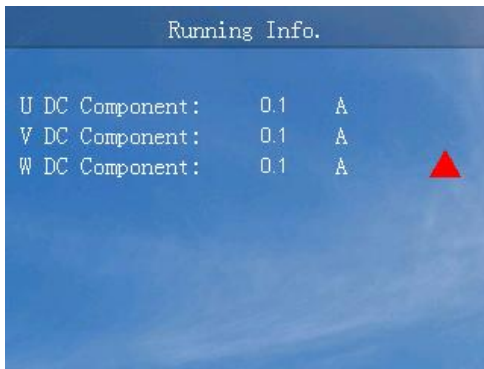
Figure4-11 Running information interface(5)

Table4-4 Button function in the running information interface

| Button | Function |
|--------|----------|
| ESC | Return to the previous level |
| ▲ | Page up |
| ▼ | Page down |

## 4.3.2 Power Query

In the main interface, press "⏎" button to enter the main menu. In the main menu, press "▼" button and then press "⏎" button to enter the power query interface, and press "▲" or "▼" button to view the power information. In the power query interface, you can query daily power generation, monthly power generation, total power generation, etc. The query ways of daily power generation and monthly power generation are figure and chart, as shown in Figure4-12 to Figure4-17,the relevant button function is as shown in Table4-5.



Figure4-12 Power generation query interface

Figure4-13 Daily power generation query interface(chart)
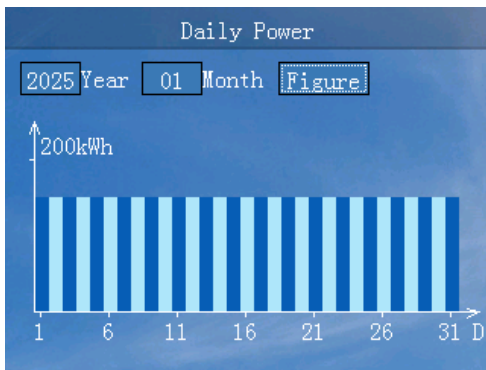


Figure4-14 Daily power generation query interface(figure)



Figure4-15 Monthly power generation query interface(chart)
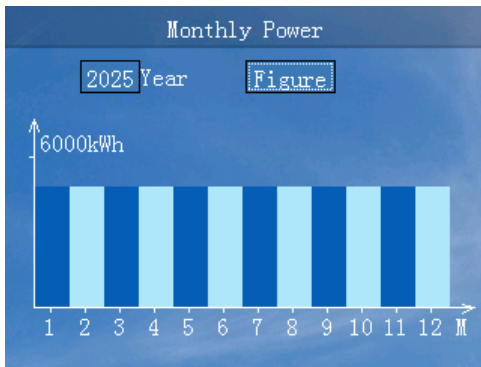
Figure4-16 Monthly power generation query interface(figure)
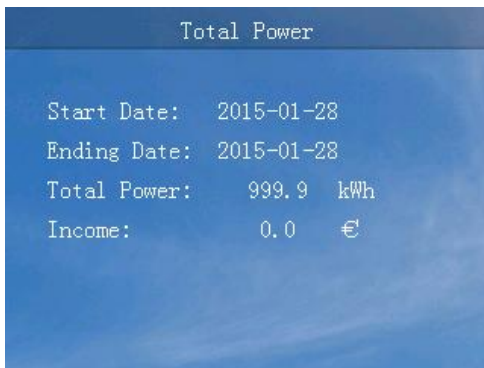


Figure4-17 Total power generation query interface

Table4-5 Button function in the power generation query interface

| Button | Function |
|---|---|
| ESC | ●     Return to the previous level<br>●     Quit the selection box |
| ▲ | ●     Number "+" in the year and month selection box<br>●     Transfer the figure/ table in the figure/table selection box |
| ▼ | ●     Number "-" in the year and month selection box<br>●     Transfer the figure/ table in the figure/table selection box |
| ↵ | ●     Enter the selection box<br>●     Enter the next level |

## 4.3.3 Record Query

In the main interface, press "↵" button to enter the main menu. In the main menu, press "▼" button twice and then press "↵" button to enter the record query interface, and press "▲" or "▼" button to

view the record information.In the record query interface, you can query the current alarm, history alarm, user log, grid-connected/ off-grid log, power dispatch log and fault wave, as shown in Figure4-18 to Figure4-24, the relevant button function is as shown in Table4-6.



Figure4-18 Record query interface
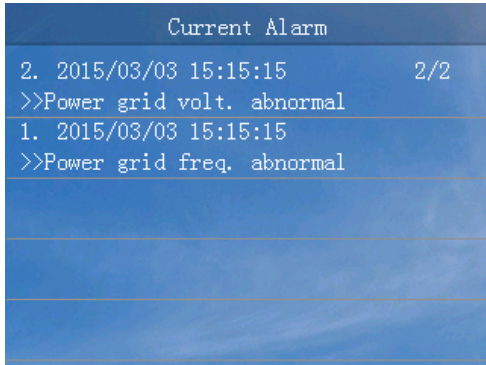


Figure4-19 Current alarm interface
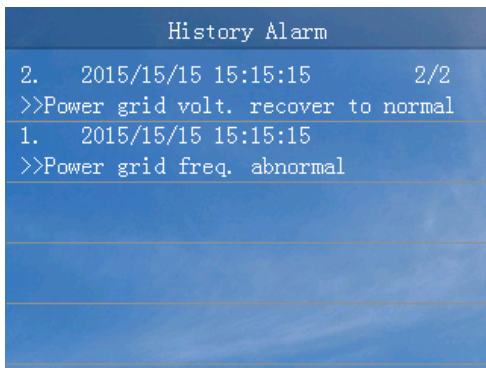


Figure4-20 History alarm interface
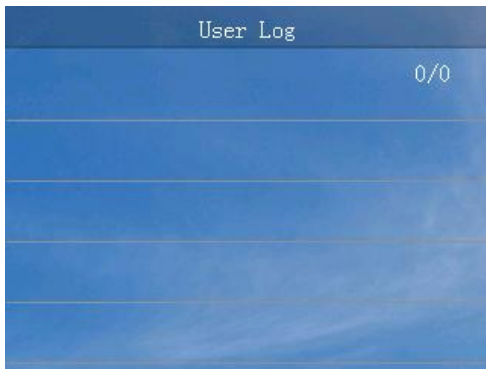
Figure4-21 User log interface
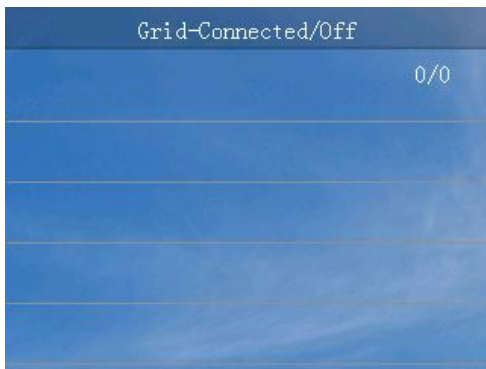


Figure4-22 Gird-connected/off-grid log interface
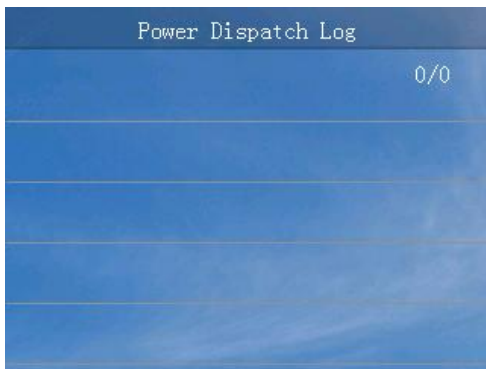


Figure4-23 Power dispatch log interface
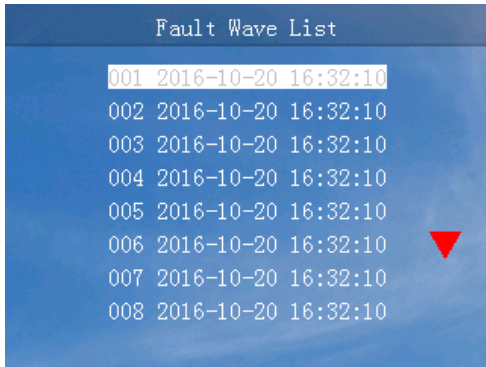
Figure4-24 Fault wave list interface

Table4-6 Button function in the record query interface

| Button | Function |
|--------|----------|
| ESC | ● Return to the previous level |
| ▲ | ● Choose upward <br> ● Page up |
| ▼ | ● Choose downward <br> ● Page down |
| ↵ | ● Enter the next level |

## 4.3.4 Setting

In the main interface, press "↵" button to enter the main menu. In the main menu, press "▼" button three times and then press "↵" button to enter the login interface. Select user name and enter the password, it will enter the corresponding setting interface.

There has two users: user and administrator.

### User setting interface

The password of user is 100000, as shown in Figure4-25, the relevant button function is as shown in Table4-7.

Figure4-25 Login interface


Table4-7 Button function in the login interface

| Button | Function |
| --- | --- |
| ESC | ● Return to the previous level<br>● Quit the selection box |
| ▲ | ● Choose upward<br>● Number "+" |
| ▼ | ● Choose downward<br>● Number "-" |
| ↵ | ● Enter the next level<br>● Confirm the selection<br>● Select number bit in the selection box<br>● Long press to enter the user setting interface |

User can perform the language setting, screen setting, price setting and password setting, as shown in Figure4-26 to Figure4-30, the relevant button function is as shown in Table4-8.

Figure4-26 User setting interface
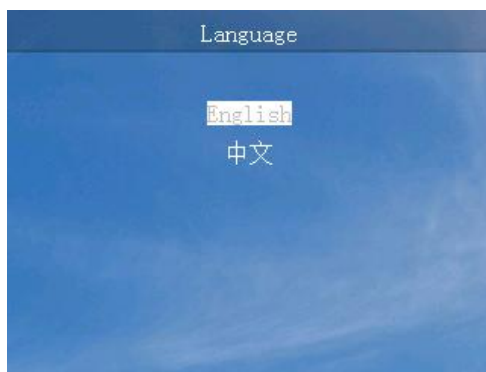


Figure4-27 Language setting interface



Figure4-28 Screen setting interface

Figure4-29 Price setting interface



Figure4-30 Password setting interface

Table4-8 Button function in the user setting interface

| Button | Function |
|--------|----------|
| ESC | ● Return to the previous level <br> ● Quit the selection box |
| ▲ | ● Choose upward <br> ● Number "+" |
| ▼ | ● Choose downward <br> ● Number "-" |
| ↵ | ● Enter the next level <br> ● Enter the selection box <br> ● Select number bit in the selection box |

## Administrator setting interface

The password of administrator is 200000, as shown in Figure4-31, the relevant button function is as shown in Table4-9
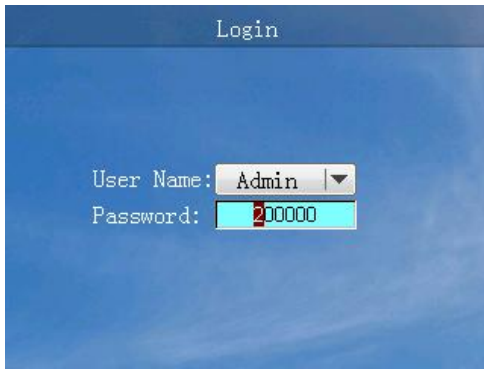


Figure4-31 Login interface

Table4-9 Button function in the login interface

| Button | Function |
|--------|----------|
| ESC | ● Return to the previous level<br>● Quit the selection box |
| ▲ | ● Choose upward<br>● Number "+" |
| ▼ | ● Choose downward<br>● Number "-" |
| ↵ | ● Enter the next level<br>● Confirm the selection<br>● Select number bit in the selection box<br>● Long press to enter the administrator setting interface |

The administrator can perform the general setting, communication setting, total power revise, reset password, record management, restore default setting, engineer setup, advanced setting, as shown in Figure4-32 toFigure4-52, the relevant button function is as shown in Table4-10.

Set the communication parameter RS485 according to the communication plan in the project site. When setting, it should match with address and baud rate. The details about the communication connection plan in the project site refer to**3.5.4 com. Communication Connection.**

Set the engineer setup according to the practical application and the grid-tied standard, in order to use the default setting.



Figure4-32 General setting interface



Figure4-33 Communication setting interface
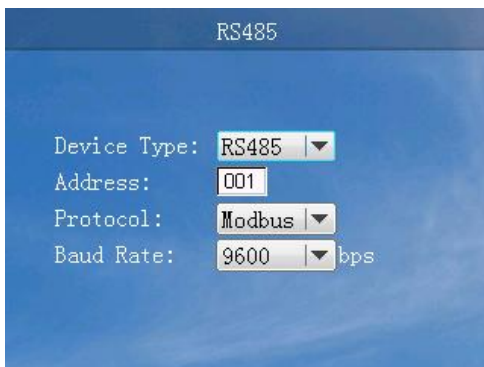


Figure4-34 RS485 setting interface
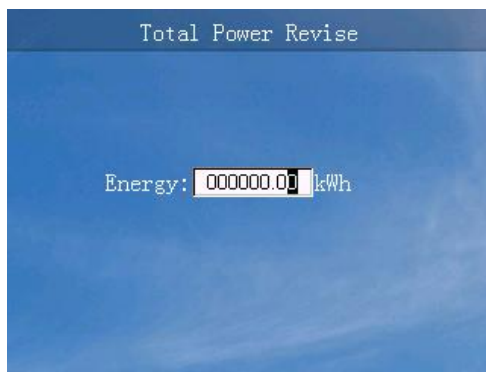
Figure4-35 Total power revise interface



Figure4-36 Reset password interface



Figure4-37 Records management interface

Figure4-38 Restore default setting interface
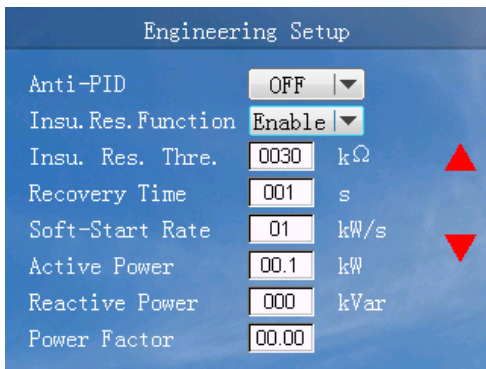


Figure4-39 Engineering setup interface(1)



Figure4-40 Engineering setup interface(2)

PV Grid-tied Inverter SPI-B Series (30K-60K)

4 Operation Interface                                                                                    User Manual

Figure4-41 Advanced setting interface(1)



Figure4-42 Advanced setting interface(2)



Figure4-43 PV branch warning mask interface

50

All rights reserved ©Kehua Data Co., Ltd.
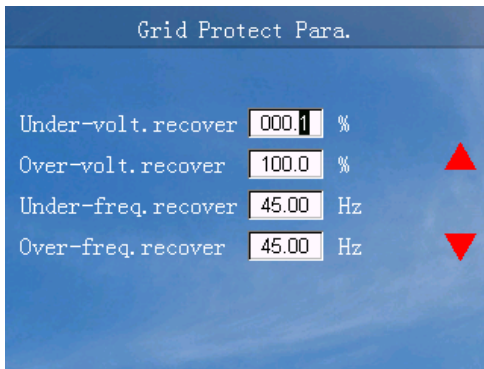
Figure4-44 Grid protect parameter interface(1)
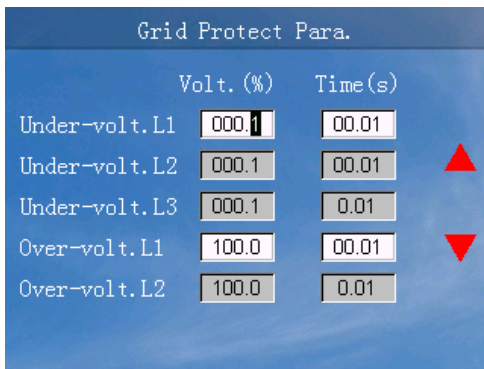


Figure4-45 Grid protect parameter interface(2)
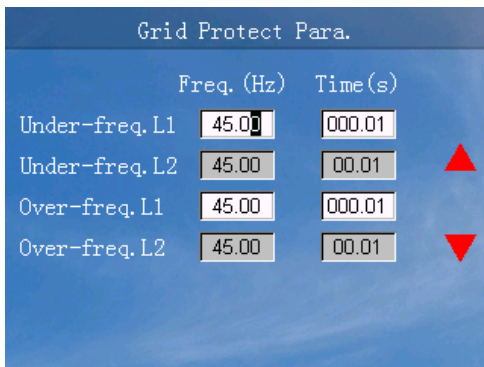


Figure4-46 Grid protect parameter interface(3)

51
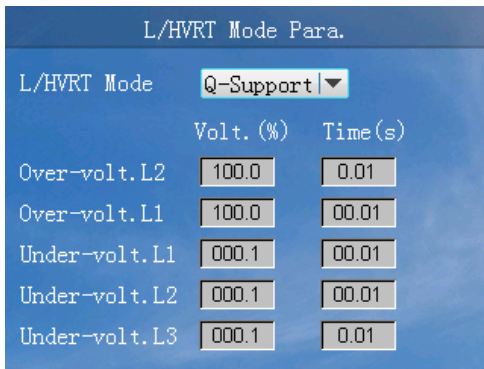
Figure4-47 L/HVRT mode parameter interface
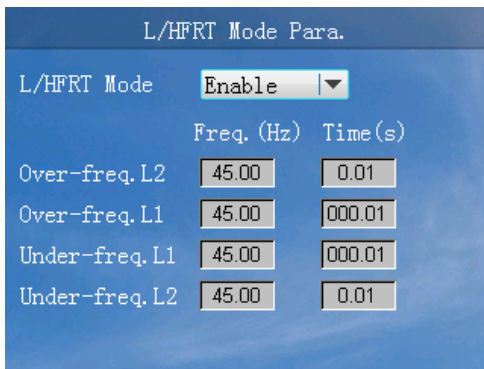


Figure4-48 L/HFRT mode parameter interface
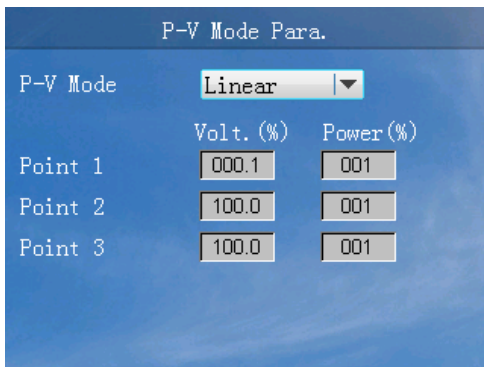


Figure4-49 P-V mode parameter interface
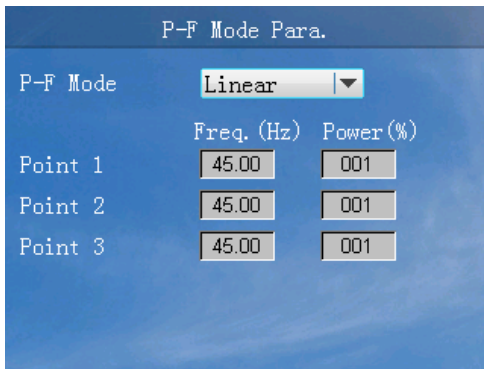
Figure4-50 P-F mode parameter interface
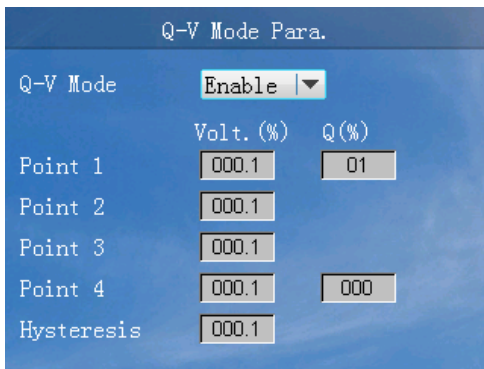


Figure4-51 Q-V mode parameter interface
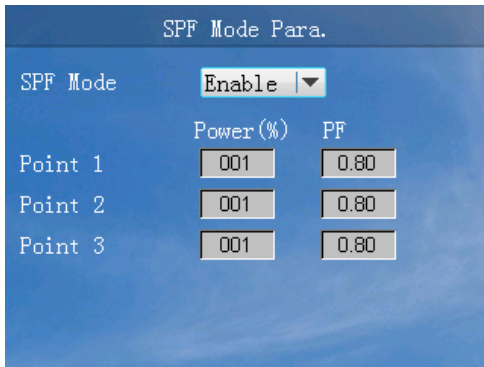


Figure4-52 SPF mode parameter interface

Table4-10 Button function in the administrator setting interface

| Button | Function |
|--------|----------|
| ESC | ● Return to the previous level<br>● Quit the selection box |
| ▲ | ● Choose upward<br>● Number "+" |

| Button | Function |
|--------|----------|
| ▼ | ● Choose downward<br><br>● Number "-" |
| ↵ | ● Enter the next level<br><br>● Confirm the selection<br><br>● Select number bit in the selection box<br><br>● Long press to save |

## 4.3.5 ON/ OFF

In the main interface, press "↵" button to enter the main menu. In the main menu, press "▼" button four times and then press "↵" button to enter the ON/OFF interface. When the inverter is off, it will enter the power on confirmation interface. While the inverter is on, it will enter the power off confirmation interface, as shown Figure4-53 to Figure4-54, the relevant button function is as shown in Table4-11.



Figure4-53 Power on confirmation interface



Figure4-54 Power off confirmation interface

Table4-11 Button function in the ON/ OFF interface

| Button | Function |
|--------|----------|
| ESC | ● Return to the previous level<br><br>● Cancel |
| ↵ | ● Enter the confirmation interface<br><br>● Confirm |

## 4.3.6 About

In the main interface, press "↵" button to enter the main menu. In the main menu, press "▼" button five times and then press "↵" button to enter the about interface. and press "▲" or "▼" button to view the about information, as shown in Figure4-55, the relevant button function is as shown in Table4-12.
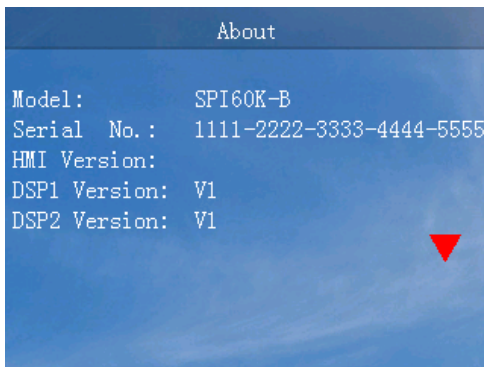


Figure4-55 About interface

Table4-12 Button function in the about interface

| Button | Function |
|--------|----------|
| ESC | ● Return to the previous level |
| ▲ | ● Page up |
| ▼ | ● Page down |

# 5 Startup and Shutdown

This chapter mainly introduces how to start and shut down the inverter.

## 5.1 Start Inverter

Step 1    Switch on the DC switch in the inverter and the DC switch in the project site. When the PV array provides enough startup voltage, PV connection indicator will be on.

Step 2    Switch on the AC switch between inverter and grid, the fault indicator is off.

Step 3    If the DC and AC supply power normally, the inverter will prepare to start. At first, the inverter will check the inner parameters and AC grid parameters, if they are in the normal range, a moment later, the inverter will check the insulation impedance.

Step 4    A moment later, the inverter will generate power normally. The grid connection indictor will be on.

**----End**

## 5.2 Shut Down Inverter

Step 1    Switch off the DC switch in the inverter and the DC switch in the project site. A moment later, PV connection indicator will be off.

Step 2    Disconnect the connection between inverter and grid.

**----End**

# 6 Maintenance and Troubleshooting

This chapter mainly describes the maintenance and troubleshooting.

## 6.1 Maintenance

The inverter needn't to be maintained regularly, but the sundries or dust may influence the heat dissipation performance, so, use soft brush to clean the inverter. If the surface of LCD and LED indicator are too dirty to read, use a wet cloth to clean them.

⚠ Danger of High Temperature

During running, please don't touch the surface to avoid scald. Shut down inverter and wait until it cooling down, then do the maintenance.

⚠ **CAUTION**

Do not clean the device with any solvent, abrasive material or corrosive material.

## 6.2 Troubleshooting

The inverter is designed on the basis of the grid-tied operation standards and meets the requirements of safety and EMC. Before provided to client, the inverter has been experienced for several rigorous tests to ensure reliable and optimizing operation.

If some faults occur, the touch screen will show the corresponding alarm information. Under the circumstances, the inverter may stop power generation. The fault situation is as shown in Table6-1.

Table6-1 Fault situation

| No. | Items | | Protection | Off-grid | Restorability | Alarm requirement |
|---|---|---|---|---|---|---|
| 1 | PV input protection | PV input over-voltage protection | Yes | Yes | Yes | Protection |
| 2 | | Input (PV plate) reversed connection protection | Yes | Yes | Yes | Protection |
| 3 | | Insulation fault | Yes | Yes | Yes | Protection |
| 4 | | DC input over-current protection | Yes | No | Yes | — |
| 5 | Grid-tied output protection | Grid phase-lacking protection | Yes | Yes | Yes | Protection |
| 6 | | Grid frequency too high | Yes | Yes | Yes | Protection |
| 7 | | Grid frequency too low | Yes | Yes | Yes | Protection |
| 8 | | Grid voltage too high | Yes | Yes | Yes | Protection |
| 9 | | Grid voltage too low | Yes | Yes | Yes | Protection |
| 10 | | Initiative island protection | Yes | Yes | Yes | Protection |
| 11 | | Inverting current DC component abnormal | Yes | Yes | Yes | Protection |
| 12 | | Inverting over-current | Yes | Yes | Yes | Protection |
| 13 | | Inverting current unbalance | Yes | Yes | Yes | Protection |
| 14 | | Short-circuit protection in the inverter | Yes | Yes | No | Protection |
| 15 | | Residual current protection | Yes | Yes | Yes | Protection |

| No. | Items | | Protection | Off-grid | Restorability | Alarm requirement |
|---|---|---|---|---|---|---|
| 16 | Busbar voltage | Busbar over-voltage protection | Yes | Yes | Yes | Protection |
| 17 | | Busbar unbalance protection | Yes | Yes | Yes | Protection |
| 18 | Temperature protection | Radiator over-temperature | Yes | Yes | Yes | Protection |
| 19 | | Inner over-temperature | Yes | Yes | Yes | Protection |
| 20 | | Power module over-temperature | Yes | Yes | Yes | Protection |
| 21 | Other protections | Inner fan fault alarm | Yes | No | Yes | Alarm/ decrease load |
| 22 | | Outer fan fault alarm | Yes | No | Yes | Alarm/ decrease load |
| 23 | | Drive fault | Yes | Yes | No | Protection |
| 24 | | DC SPD | Yes | No | Yes | Alarm |
| 25 | | AC SPD | Yes | No | Yes | Alarm |
| 26 | | Display communication fault | Yes | No | Yes | Alarm |
| 27 | | Inner communication abnormal | Yes | Yes | Yes | Protection |
| 28 | | Leakage current hall fault | Yes | Yes | Yes | Protection |

---

⚠️ **CAUTION**

If the inverter has an alarm mentioned in Table6-1, please shut down inverter(refer to **5.2 Shut Down Inverter**), 5 minutes later, restart the inverter (refer to **5.1 Start Inverter**). If the alarm status is not removed, please contact our local dealer or service center. Before contacting us, please prepare the following information.

1. Inverter S/N.

2. Distributor/ dealer of the inverter(if has).

3. The date of grid-tied power generation.

4. Problem description.

5. Your detail contact information.

---

# 7 Package,Transportation,Storage

This chapter mainly describes the package, transportation and storage.

## 7.1 Package

The package of product is carton. When packing, pay attention to the placing direction requirements. One side of carton, it should print warning icons, including keep dry, handle with care, up, stacking layer limit, etc. The other side of carton, it should print the device model, etc. Print the logo of Kehua company and device name on the front of carton.

## 7.2 Transportation

Pay attention to the warnings on the carton. Don't impact severely when transportation. In case of damaging device, it should follow the placing direction that shows on the carton. Don't carry device with the objects that inflammable, explosive, or corrosive. Don't put device in the open-air warehouse when transshipment. Leaching and mechanical damage by rain, snow or liquid objects is prohibited.

## 7.3 Storage

When storing device, it should follow the placing direction that shows on the carton. The gap is 20cm between the carton and ground and the clearance is at least 50cm from carton to wall, heat source, cold source, windows or air inlet.

The storage environment temperature is -40℃～70℃. If storing or transporting device beyond the working temperature, before startup, set it alone and wait for the temperature reaches to the range of the working temperature and keep the status more than four hours. In warehouse, It's prohibited that there has poisonous gas, objects that inflammable and explosive, corrosive chemical objects. Besides, it shouldn't have too strong mechanical shaking, impact and strong magnetic field. Under the storage conditions above, the storage period is six months. If it is beyond six months, it has to recheck.

# A Technical Specifications

## A.1 SPI30K-B

| Items | Min. | Typical | Max. | Illustration |
|-------|------|---------|------|--------------|
| Max. PV input voltage(Vdc) | 300 | - | 1100 | - |
| MPPT working voltage with full load(Vdc) | 540 | - | 850 | - |
| PV connected/ MPPT tracking | 6/2 | | | |
| Isc PV[a] (absolute maximum)（A） | 2*37.5A | | | |
| DC current of each route(A) | 0 | 25 | 30 | - |
| PV input power(kW) | 0 | 30 | 33 | - |
| Startup voltage(V) | - | 350 | - | |
| **Grid features** | | | | |
| Output power(kW) | - | - | 30 | - |
| Power（maximum continuous）(VA) | - | - | 30 | |
| Current(maximum continuous)a.c.A(A) | - | 47.6 | | |
| Current (inrush) peak and duration | | 53.1 | | |
| Maximum output overcurent | | 56.3 | | |

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| protection (A) | | | | |
| Maximum output fault current(A) | | 85.9 | | |
| Rated grid voltage(Vac) | 400V(3P4W) | | | |
| Grid voltage range(Vac) | 340 | 400 | 440 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Frequency range(Hz) | 48.5<br>58.5 | 50<br>60 | 50.5<br>60.5 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Grid-connected inverting efficiency | - | - | 98.5% | - |
| Grid-connected current harmonic | 0% | - | 3% | Under full-load |
| Power factor range | 0.8 (ahead) | 1 | 0.8 (lag) | - |
| Current DC component | <215mA | | | - |
| Self power consumption at night | <1W | | | - |
| Protection grade(IP) | IP65 | | | - |
| Isolation type | No isolation | | | With no transformer, the input cannot be connected with ground, or the grounding output must be with isolation transformer. |
| Heat dissipation way | Smart wind-cooling | | | - |
| Noise | ≤65dB | | | - |

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| Display way | LED indicator | | - | |
| Communication port | RS485/ Ethernet/ DRM(optional)/ WIFI(optional)/ GPRS(optional)/ PLC(optional) | | | |
| Operation temperature(℃) | -25 | 25 | 60 | If the operation temperature exceeds 50℃, it is necessary to decrease rated power to use. |
| Storage temperature(℃) | -40 | 25 | 70 | - |
| Relative humidity | 0 | - | 95% | With no condensation |
| Atmosphere(KPa) | 70 | 106 | - | - |
| Altitude(m) | 0 | - | 5000 | When the altitude exceeds 3000m, it is necessary to decrease rated power to use. |

# A.2 SPI33K-B

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| Max. PV input voltage(Vdc) | 300 | - | 1100 | - |
| MPPT working voltage with full load(Vdc) | 540 | - | 850 | - |
| PV connected/ MPPT tracking | 6/2 | | | |
| Isc PV[a] (absolute maximum)（A） | 2*37.5A | | | |
| DC current of each route(A) | 0 | 28 | 30 | - |
| PV input power(kW) | 0 | 33 | 36 | - |
| Startup voltage(V) | - | 350 | - | |
| **Grid features** | | | | |

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| Output power(kW) | - | 33 | 36 | - |
| Power（maximum continuous）(VA) | | | 36 | |
| Current(maximum continuous)a.c.A(A) | | 52 | | |
| Current (inrush) peak and duration | | 57.9 | | |
| Maximum output overcurent protection (A) | | 61.5 | | |
| Maximum output fault current(A) | | 93.7 | | |
| Rated grid voltage(Vac) | 400V(3P4W) | | | |
| Grid voltage range(Vac) | 340 | 400 | 440 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Frequency range(Hz) | 48.5<br>58.5 | 50<br>60 | 50.5<br>60.5 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Grid-connected inverting efficiency | - | - | 98.5% | - |
| Grid-connected current harmonic | 0% | - | 3% | Under full-load |
| Power factor range | 0.8 (ahead) | 1 | 0.8 (lag) | - |
| Current DC component | <235mA | | | - |
| Self power consumption at night | <1W | | | - |

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| Protection grade(IP) | IP65 | | | - |
| Isolation type | No isolation | | | With no transformer, the input cannot be connected with ground, or the grounding output must be with isolation transformer. |
| Heat dissipation way | Smart wind-cooling | | | - |
| Noise | ≤65dB | | | - |
| Display way | LED indicator | | | - |
| Communication port | RS485/ Ethernet/ DRM(optional)/ WIFI(optional)/ GPRS(optional)/ PLC(optional) | | | |
| Operation temperature(℃) | -25 | 25 | 60 | If the operation temperature exceeds 50℃, it is necessary to decrease rated power to use. |
| Storage temperature(℃) | -40 | 25 | 70 | - |
| Relative humidity | 0 | - | 95% | With no condensation |
| Atmosphere(KPa) | 70 | 106 | - | - |
| Altitude(m) | 0 | - | 5000 | When the altitude exceeds 3000m, it is necessary to decrease rated power to use. |

## A.3 SPI36K-B

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| Max. PV input voltage(Vdc) | 300 | - | 1100 | - |
| MPPT working voltage with full load(Vdc) | 540 | - | 850 | - |

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| PV connected/ MPPT tracking | 6/2 | | | |
| Isc PV[a] (absolute maximum) (A) | 2*37.5A | | | |
| DC current of each route(A) | 0 | 28 | 30 | - |
| PV input power(kW) | 0 | 36 | 40 | - |
| Startup voltage(V) | - | 250 | - | |
| **Grid features** | | | | |
| Output power(kW) | - | 36 | 39.6 | - |
| Power（maximum continuous）(VA) | | | 39.6 | |
| Current(maximum continuous)a.c.A(A) | | 57.7 | | |
| Current (inrush) peak and duration | | 64.2 | | |
| Maximum output overcurent protection (A) | | 68.2 | | |
| Maximum output fault current(A) | | 103.3 | | |
| Rated grid voltage(Vac) | 400V(3P4W) | | | |
| Grid voltage range(Vac) | 340 | 400 | 440 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Frequency range(Hz) | 48.5 58.5 | 50 60 | 50.5 60.5 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Grid-connected inverting | - | - | 98.7% | - |

| Items | Min. | Typical | Max. | Illustration |
|-------|------|---------|------|--------------|
| efficiency | | | | |
| Grid-connected current harmonic | 0% | - | 3% | Under full-load |
| Power factor range | 0.8 (ahead) | 1 | 0.8 (lag) | - |
| Current DC component | <260mA | | | - |
| Self power consumption at night | <1W | | | - |
| Protection grade(IP) | IP65 | | | - |
| Isolation type | No isolation | | | With no transformer, the input cannot be connected with ground, or the grounding output must be with isolation transformer. |
| Heat dissipation way | Smart wind-cooling | | | - |
| Noise | ≤65dB | | | - |
| Display way | LED indicator | | | - |
| Communication port | RS485/ Ethernet/ DRM(optional)/ WIFI(optional)/ GPRS(optional)/ PLC(optional) | | | |
| Operation temperature(℃) | -25 | 25 | 60 | If the operation temperature exceeds 50℃, it is necessary to decrease rated power to use. |
| Storage temperature(℃) | -40 | 25 | 70 | - |
| Relative humidity | 0 | - | 95% | With no condensation |
| Atmosphere(KPa) | 70 | 106 | - | - |

| Items | Min. | Typical | Max. | Illustration |
|-------|------|---------|------|--------------|
| Altitude(m) | 0 | - | 5000 | When the altitude exceeds 3000m, it is necessary to decrease rated power to use. |

# A.4 SPI40K-B

| Items | Min. | Typical | Max. | Illustration |
|-------|------|---------|------|--------------|
| MPPT input voltage(Vdc) | 300 | - | 1100 | - |
| MPPT working voltage with full load(Vdc) | 540 | - | 850 | - |
| PV connected/ MPPT tracking | 9/3 | | | |
| DC current of each route(A) | 0 | 25 | 30 | - |
| PV input power(kW) | 0 | 40 | 45 | - |
| Startup voltage(V) | - | 250 | - | |
| **Grid features** | | | | |
| Output active power(kW) | - | 40 | 44 | - |
| Output apparent power(kVA) | - | - | 44 | - |
| Rated grid voltage(Vac) | 400V(3P4W) | | | |
| Grid voltage range(Vac) | 340 | 400 | 460 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Frequency range(Hz) | 48.5 | 50 | 50.5 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Grid-tied inverting efficiency | - | - | 98.8% | - |
| Grid-tied China efficiency | - | - | 98.3% | - |

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| Grid-tied current harmonic | 0% | - | 3% | Under full-load |
| Power factor range | 0.8 (leading) | 1 | 0.8 (lagging) | - |
| Current DC component | <288mA | | | - |
| Self power consumption at night | <1W | | | - |
| Protection grade(IP) | IP65 | | | - |
| Isolation type | No isolation | | | With no transformer, the input cannot be connected with ground, or the grounding output must be with isolation transformer. |
| Heat dissipation way | Smart wind-cooling | | | - |
| Noise | ≤65dB | | | - |
| Display way | LCD+LED indicator | | | - |
| Communication port | RS485/ Ethernet/ DRM(optional)/ WIFI(optional)/ GPRS(optional) | | | |
| Operation temperature(℃) | -25 | 25 | 60 | If the operation temperature exceeds 50℃, it is necessary to decrease rated power to use. |
| Storage temperature(℃) | -40 | 25 | 70 | - |
| Relative humidity | 0 | - | 95% | With no condensation |
| Atmosphere(KPa) | 70 | 106 | - | - |
| Altitude(m) | 0 | - | 5000 | When the altitude exceeds 3000m, it is necessary to decrease rated power to use. |

● Specifications are subject to change without prior notice.

# A.5 SPI50K-B

| Items | Min. | Typical | Max | Illustration |
|---|---|---|---|---|
| MPPT input voltage(Vdc) | 300 | - | 1100 | - |
| MPPT working voltage with full load(Vdc) | 540 | - | 850 | - |
| PV connected/ MPPT tracking | 12/4 | | | |
| DC current of each route(A) | 0 | 19 | 30 | - |
| PV input power(kW) | 0 | 50 | 55 | - |
| Startup voltage(V) | - | 250 | - | |
| **Grid features** | | | | |
| Output active power(kW) | - | 50 | 55 | - |
| Output apparent power(kVA) | - | - | 55 | - |
| Rated grid voltage(Vac) | 400V（3P4W） | | | |
| Grid voltage range(Vac) | 340 | 400 | 460 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Frequency range(Hz) | 48.5 | 50 | 50.5 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Grid-tied inverting efficiency | - | - | 99.0% | - |
| Grid-tied China efficiency | - | - | 98.4% | - |
| Grid-tied current harmonic | 0% | - | 3% | Under full-load |
| Power factor range | 0.8 (leading) | 1 | 0.8 (lagging) | - |

| Items | Min. | Typical | Max | Illustration |
|-------|------|---------|-----|--------------|
| Current DC component | <362mA | | | - |
| Self power consumption at night | <1W | | | - |
| Protection grade(IP) | IP65 | | | - |
| Isolation type | No isolation | | | With no transformer, the input cannot be connected with ground, or the grounding output must be with isolation transformer. |
| Heat dissipation way | Smart wind-cooling | | | - |
| Noise | ≤65dB | | | - |
| Display way | LCD+LED indicator | | | - |
| Communication port | RS485/ Ethernet/ DRM(optional)/ WIFI(optional)/ GPRS(optional) | | | |
| Operation temperature(℃) | -25 | 25 | 60 | If the operation temperature exceeds 50℃, it is necessary to decrease rated power to use. |
| Storage temperature(℃) | -40 | 25 | 70 | - |
| Relative humidity | 0 | - | 95% | With no condensation |
| Atmosphere(KPa) | 70 | 106 | - | - |
| Altitude(m) | 0 | - | 5000 | When the altitude exceeds 3000m, it is necessary to decrease rated power to use. |

● Specifications are subject to change without prior notice.

## A.6 SPI60K-B

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| MPPT input voltage(Vdc) | 300 | - | 1100 | - |
| MPPT working voltage with full load(Vdc) | 540 | - | 850 | - |
| PV connected/ MPPT tracking | 12/4 | | | |
| DC current of each route(A) | 0 | 23 | 30 | - |
| PV input power(kW) | 0 | 60 | 72 | - |
| Startup voltage(V) | - | 250 | - | |
| **Grid features** | | | | |
| Output active power(kW) | - | 60 | 66 | - |
| Output apparent power(kVA) | - | - | 66 | - |
| Rated grid voltage(Vac) | 400V（3P4W） | | | |
| Grid voltage range(Vac) | 340 | 400 | 460 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Frequency range(Hz) | 48.5 | 50 | 50.5 | Settable(If it is necessary to set the parameter, please contact the manufacturer.) |
| Grid-tied inverting efficiency | - | - | 99.0% | - |
| Grid-tied China efficiency | - | - | 98.45% | - |
| Grid-tied current harmonic | 0% | - | 3% | Under full-load |
| Power factor range | 0.8 (leading) | 1 | 0.8 (lagging) | - |

| Items | Min. | Typical | Max. | Illustration |
|---|---|---|---|---|
| Current DC component | <433mA | | | - |
| Self power consumption at night | <1W | | | - |
| Protection grade(IP) | IP65 | | | - |
| Isolation type | No isolation | | | With no transformer, the input cannot be connected with ground, or the grounding output must be with isolation transformer. |
| Heat dissipation way | Smart wind-cooling | | | - |
| Noise | ≤65dB | | | - |
| Display way | LCD+LED indicator | | | - |
| Communication port | RS485/ Ethernet/ DRM(optional)/ WIFI(optional)/ GPRS(optional) | | | |
| Operation temperature(℃) | -25 | 25 | 60 | If the operation temperature exceeds 50℃, it is necessary to decrease rated power to use. |
| Storage temperature(℃) | -40 | 25 | 70 | - |
| Relative humidity | 0 | - | 95% | With no condensation |
| Atmosphere(KPa) | 70 | 106 | - | - |
| Altitude(m) | 0 | - | 5000 | When the altitude exceeds 3000m, it is necessary to decrease rated power to use. |

● Specifications are subject to change without prior notice.

# B Acronyms and Abbreviations

**A**

**AC**                Alternating Current

**D**

**DC**                Direct Current

**L**

**LCD**               Liquid Crystal Display

**LED**               Light-emitting Diode

**M**

**MPPT**              Maximum Power Point Tracking

**P**

**PE**                Protective Earthing

**PV**                Photovoltaic

**R**

**RS485**                  Recommend Standard485

KEHUA TECH

**KEHUA DATA CO., LTD.**

Technical Support

4402-02795 006