EA30-35KTLSI
PV Grid-connected Inverter

User Manual

GUANGDONG EAST POWER CO.LTD

Dear customer, thanks for selecting EA3KLPV II and EA5KLPV II photovoltaic (PV) grid-connected inverter products developed by Guangdong East Power Co., Ltd., we sincerely hope our products can meet your needs, and look forward to more advice on product performance and function. We will continue to improve the product quality.

Read through the manual before use the product. The manual should be stored together with other materials regarding product module and kept accessible to relevant personnel.

The manual will be constantly updated and revised, and there may be inconsistency or wrong description, the user shall refer to the purchased product in kind, may download from www.eastups.com or seek for the manual of latest version from marketing channels.

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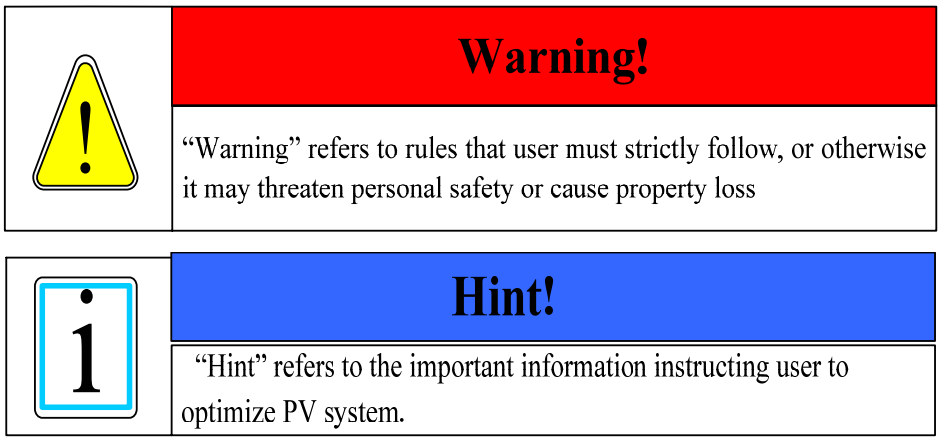
1 Manual description

1.1 Symbols in the manual

For safety use of EA30-35KTLSI grid-connected inverter, please know the following two symbols in the manual.



1.2 Reader

EA30-35KTLS grid-connected inverter installation and operation personnel should read carefully the manual, since it provides detailed description of the transport, installation, operation, maintenance and fault removal of the inverter developed by our company.

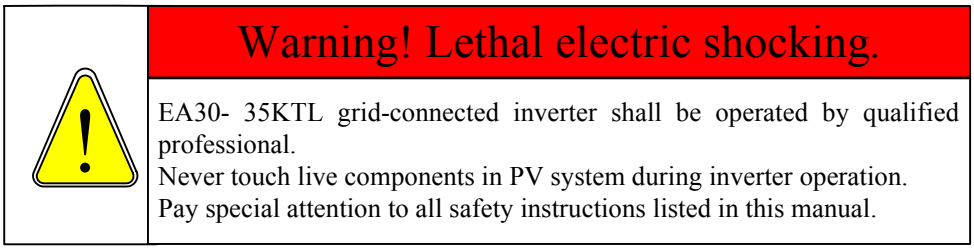
1.3 Effectiveness

The manual applies to EA30-35KTLS grid-connected inverter.

2 Safety instruction and precautions

Read carefully the manual before installation and operation, and the equipment damage caused by installation and operation in violation of instructions in the manual shall not fall within the quality warranty provided by our company.

2.1 Safety instructions



	**Warning! Damage to EA30- 35KTL inverter**
	Input DC voltage shall not exceed 1,000V as excessive high voltage would cause device damage.

	**Danger! High Voltage.**
	Make sure power off before repairing.

	**Danger! High Voltage.**
	This symbol indicates that you should wait at least 60 seconds after disconnecting the inverter from the utility grid and from the PV input before touch any inner live parts.

	**Caution!**
	Look over the user manual before any operate on the inverter.

	**Caution! Hot Surface.**
	Do not touch the surface of the inverter when the inverter is running!

2.2 Precautions

- ✧ Inverter should be correctly handled, stored, assembled, installed, operated and maintained.
- ✧ All operations and wiring should be performed by professional electric or mechanical engineer so as to ensure all electrical installations compliant with relevant standard. To ensure safe operation, it is required to provide correct earthing and necessary short-circuit protection.

- ✧ Before inspection or maintenance, ensure no electricity at DC and AC side.
- ✧ Solar energy cell arrays should be covered with lightproof material if photovoltaic array is installed in daylight, or otherwise the array will result in high voltage under sunlight.
- ✧ After installation or maintenance, shut down AC breaker before switch on DC. Pay special attention to the operation sequence of switching on DC, or otherwise inverter would be damaged: switch on DC breaker of inverter, DC breaker of DC power distribution cabinet, and then the DC breaker of combiner box.
- ✧ Follow the operation and installation instruction in the manual, completely comply with all danger, warning and safety information.

3 Description of EA30-35KTLSI grid-connected inverter

3.1 Application of grid-connected inverter

EA30-35KTLSI grid-connected inverter, as a solar energy grid-connected inverter, applies to PV grid-connected power generation system. In the system, it con constantly maintain maximum output power of solar cell panel and deliver the converted energy from solar cell panel to power grid. PV grid-connected power generation system is composed of PV module, PV combiner box, PV grid-connected inverter, metering device and power distribution system, as shown in Figure 1.

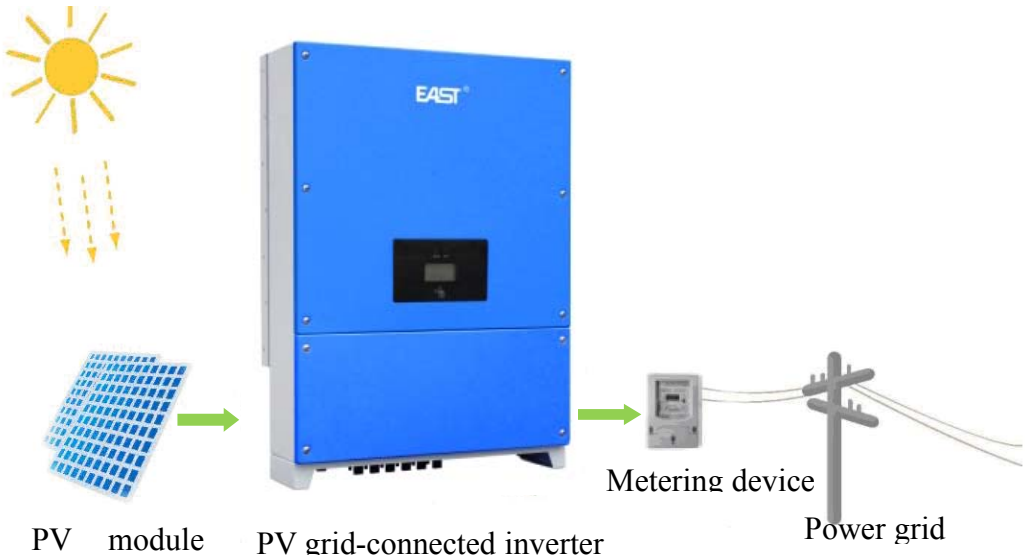


Figure 1 PV grid-connected power generation system

	Hint
	PV grid-connected power generation shall be approved by local power supply sector and operated by professional.

3.2 Features of EA30-35KTLSI grid-connected inverter

- Non-isolated transformer provides conversion efficiency up to 98.7% and European efficiency 98.4%;
- Three-route MPPT, acquiring generated energy from battery pack in shadow as much as possible;
- Wide MPPT voltage range (320~900V) and longer daily power generation time;
- Intelligent MPPT algorithm, maximum power point tracing free from influence of illumination change;
- Precision recognition technology for power change guarantees accurate and stable static MPPT;
- Wide working temperature range -25 ℃ —60 ℃ , support continuous power generation under full-load in high temperature environment.

High reliability

- Membrane capacitor is designed with long service life, and the equipment is designed with 25-year service life;
- Natural radiation, water-roof, and high resistance to dust and salt-spray corrosion;
- Active+ passive island protection, grid-connected relay redundancy disconnection protection, safe and reliable;
- Multi-layer overcurrent, overvoltage, over temperature and short-circuit protection for software and hardware;
- Up to 6-route serial fault detection and rapid serial fault location.

Advanced control technology

- Three-level SPWM and SVPWM dual modulation and natural smooth switchover;
- Self-adaption control, adaptive to severe week power grid environment;
- Current harmonic compensation, grid-connection current harmonic〈1%;
- Support active and reactive power gird regulation and night SVG function;
- Low-voltage (no-voltage) fault ride-through function.

User-friendly and flexible

- Multi-language LCD display screen allows for flexible setting of operation parameters;

- It is internally provided with DC lightning arrester and fuse, no need for DC combiner box, helps reduce user system cost;
- DC on-off air switch, safe and convenient maintenance;
- Outdoor use protection grade IP 65;
- Wall-mounted design, one-step molded aluminum shell, convenient for installation and maintenance.

3.3EA30-35KTLSI circuit structure

Figure 2 provides the schematic diagram for EA30-35KTLSI inverter. Electric energy generated by PV module passes through lightning arrester which would absorb surge voltage at DC side, and capacitive energy storage device would maintain DC voltage stable. With the application of three-level SPWM and SVPWM dual modulation three-phase full-bridge inversion, DC is converted into AC with the same frequency and phase with power grid and, then through filter, sine wave AC is generated and, after subject to high-frequency signal conducted interference by AC filter, electric energy is transmitted to power grid.

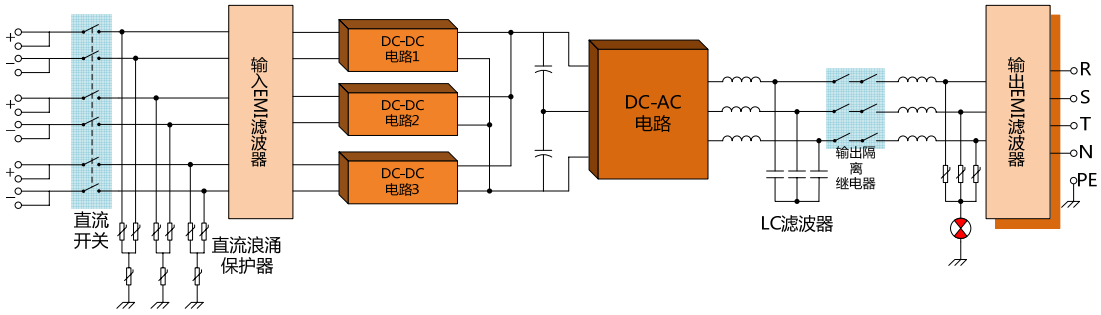
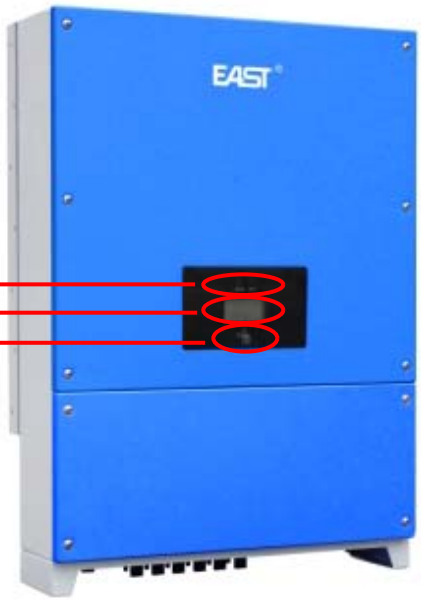


Figure 2 Schematic diagram for EA30-35KTLSI inverter

3.4 Description of inverter structure

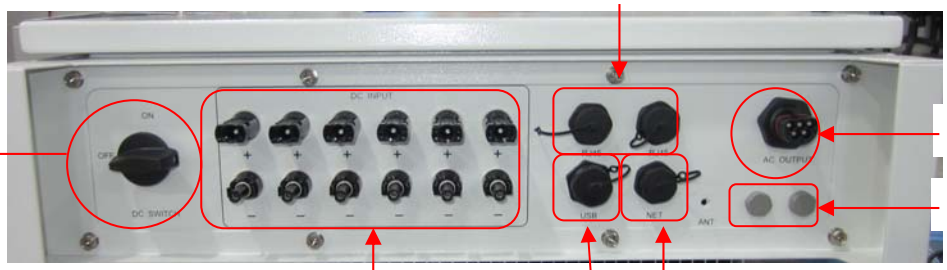
Figure 3 External structure of EA30-35KTLSI

Front



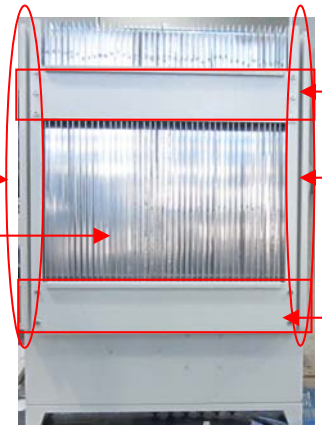
1. Indicator
2. Display screen
3. Knock etection

Bottom



6、RS485
4、DC switch
9、AC terminal
10、Waterproof valve
7、USB terminal
5、PV terminal
8、Network port

Back



13、Wall-hanging backing plate
11、Handrail for handling
11、Handrail for handling
12、Radiator
13、Wall-hanging backing plate

Figure 3 External structure diagram (Front, bottom and back)

	No.	Name	Description
Front	1	Display screen	Display inverter parameters
	2	Knock detection	Set and view inverter parameters
	3	Indicator	Indicate inverter state
Bottom	4	DC switch	Control PV input
	5	PV terminal	Connect with PV battery
	6	RS485 terminal	RS485 port
	7	USB terminal	USB port
	8	Network cable terminal	Network interface
	9	AC terminal	Connect with three-phase AC
	10	Water-proof valve	Waterproof and breathable
Back	11	Handrail for handling	Convenient for handling and installation
	12	Radiator	Reduce temperature of inverter power device
	13	Wall-hanging backing plate	Hang inverter onto wall

Figure 1 Appearance description

Figure 4 shows the maintainable interior parts.

You may see maintainable interior parts after opening the bottom cover plate of inverter.

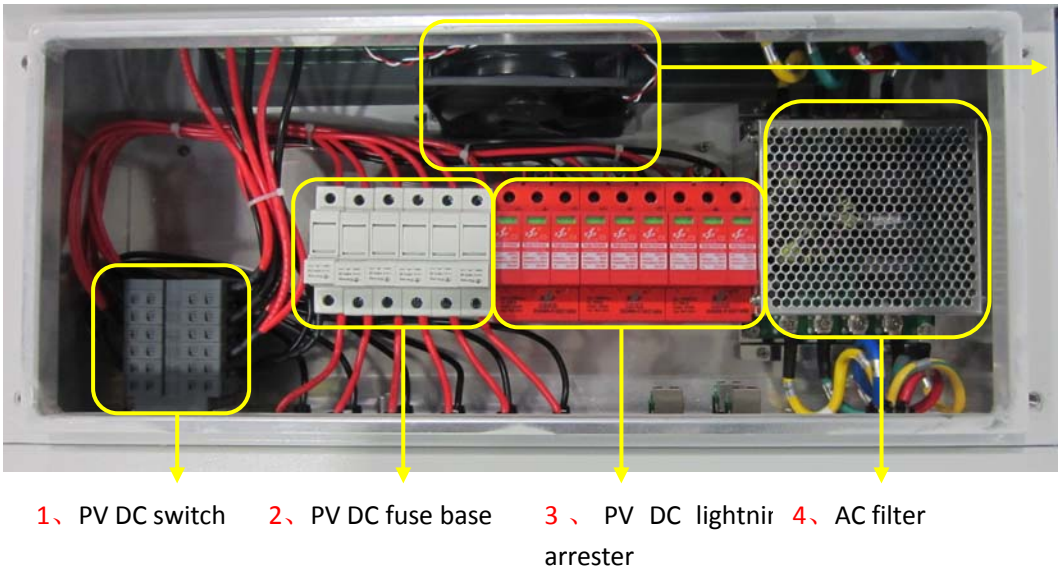


Figure 4 Maintainable interior parts

No.	Name	Description
1	PV DC switch	Control on/off of PV input
2	PV DC fuse base	Contain breaker, protect battery plate
3	PV DC lightning arrester	Anti-surge
4	AC filter	AC output filtering
5	DC Fan	Enhance radiating capacity of radiator

Table 2 Description of maintainable parts

4 Installation

4.1 Inspection before installation

EA30-35KTLSI grid-connected inverter has been subject to careful testing and detection before delivery, while it may be damaged in transit. In case of any damage, contact with the transport company or directly contact with East and provide photo of the damaged part, we'll sincerely provide you the best service as soon as possible.

4.2 Overall dimensions

See Figure 5 for the mechanical dimensions of EA30-35KTLSI: 580mmx820mmx255mm (WxHxD), about 65kg.

Figure Dimensional diagram for EA30-35KTLSI

4.3 Installation requirement

	**Warning!** Wall or frame to which inverter is hung shall have sufficient carrying capacity, or otherwise inverter would fall down, endanger personal and property safety.

	**Warning!** Carefully align with the position and gently hang inverter onto wall plate, or otherwise inverter would slide, endanger personal and property safety.

(1) EA30-35KTLSI inverter is an outdoor inverter, IP65, applicable in both indoor and outdoor environment.

(2) Be sure inverter is securely and stably mounted on wall. See Figure 5 for the mechanical dimensions of EA30-35KTLSI, 580mmx820mmx255mm (WxHxD), about 65kg, therefore the wall should be capable of sustaining the

inverter and provided with sufficient space for installation.

(3) The space between inverter and surrounding objects shall comply with the following conditions: horizontal space≥200mm; upper space ≥500mm; lower space ≥300mm and front space ≥1000mm (as shown in Figure 6), so as to ensure sufficient installation and radiation space.

(4) According to the EMC and noise level, inverter is applicable to industrial environment and should be installed away from living area as far as possible.

(5) Vertical installation, or at most backward inclination 15°is recommended. It Should be installed in positive direction, with terminals facing downward.

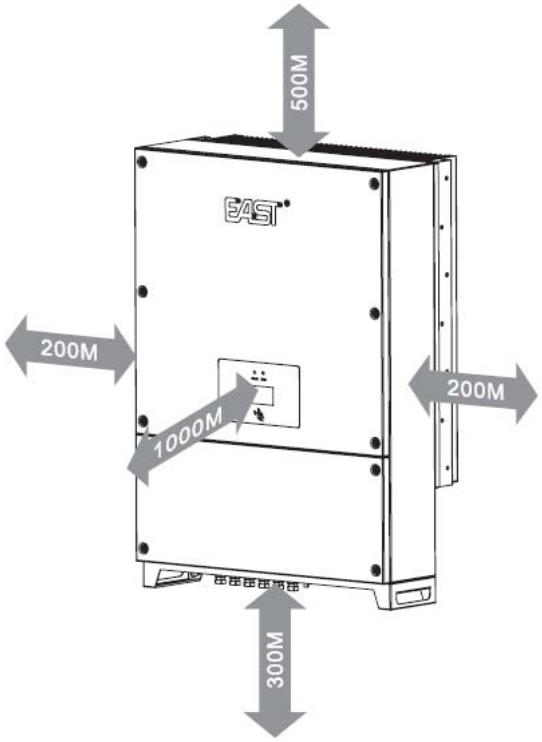


Figure 6 Minimum installation space

(6) Securely fix wall plate onto wall with explosion screw, keep inverter upward, align the groove of hanging backing plate with the convex edge of wall plate and then slightly lower it. See the structural diagram for wall plate in Figure 7.

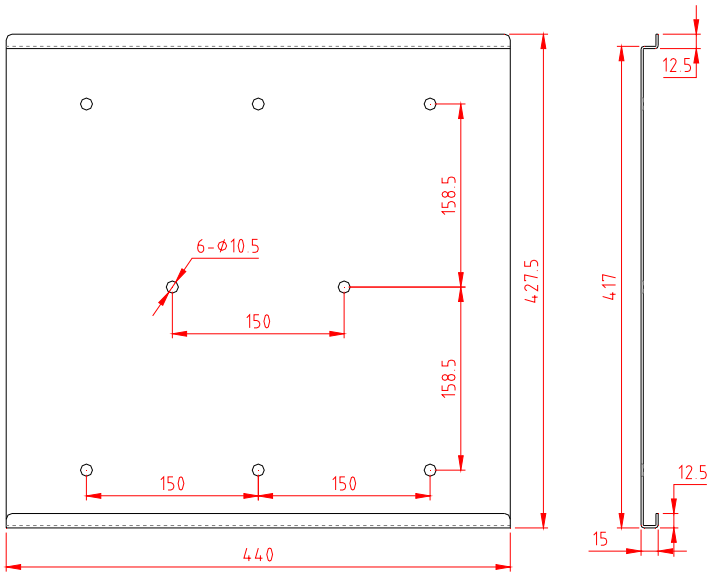


Figure 7 Structural diagram for wall plate

4.4 Inverter handling method

Please comply with the handling method in the manual to handle with EA30-35KTLSI grid-connected inverter, since wrong handling method may cause inverter falling down, inverter damage and even personal injury.

Warning!

Pay attention to the weight and dimension of inverter. Watch out for sliding and collision during handling.

Two operators should keep hands at handle groove on both sides of inverter, grasp handlers, as shown in Figure 8, take out inverter from packing case and carry to the designated installation position.

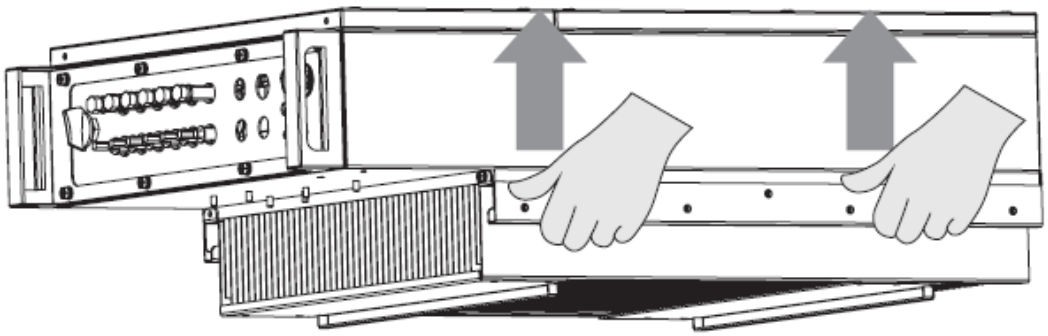


Figure 8 Handling method

5 System wiring

This chapter would describe the electrical connection between EA30-35KTLSI grid-connected inverter and solar cell array as well as the power grid and its trial operation. Please read carefully the following instructions, warnings and precautions before connection.

Warning!

Ensure no electricity at AC and DC side during electrical connection!

Configured PV array should have the open-circuit voltage no more than 900V!

Hint!

Grid-connected power generation shall be approved by local power supply sector and installed by professional electrician.

Attention!

Make sure you select right protective equipment at AC and DC side before operating the inverter . For details about what parameters you can use, refer to the technical specification.

5.1 Requirement for connection cables

Cable name	Cable unit (mm^2)
PV array DC＋	Provide 6-route input, wire diameter no less than 4-6mm^2
PV array DC-	Provide 6-route input, wire diameter no less than 4-6mm^2
Power grid L1 phase	Provide single-route input, wire diameter no less than 8-10mm^2
Power grid L2 phase	Provide single-route input, wire diameter no less than 8-10mm^2
Power grid L3 phase	Provide single-route input, wire diameter no less than 8-10mm^2
Power grid N	Wire diameter no less than 8-10mm^2

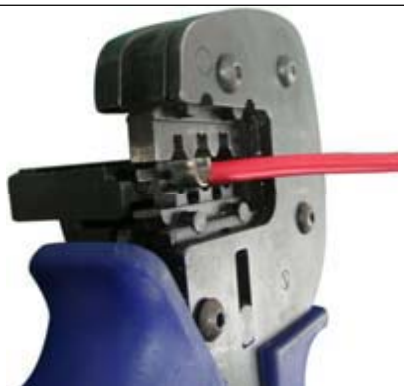
Ground wire	Wire diameter no less than 8-10mm^2

Table 3 Requirement for cables

5.2 Cable and wiring method

5.2.1。PV input wire manufacturing and connector assembly

Step 1: Strip about 6mm insulation layer from DC cable to expose copper wire, insert copper wire into metal tube core of connector and clamp it with wire crimper.

<table>
<tr><td>-pole input terminal and tube core</td><td>+ pole input terminal and tube core</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Strip cable, insert it into tube core and clamp it with wire crimper.</td></tr>
<tr><td rowspan="2">  </td><td>  </td></tr>
<tr><td>  </td></tr>
</table>

Step 2: 2. Loosen terminal cap and lead cable through the cap. Insert tube core into wire slot until the connection is completed.

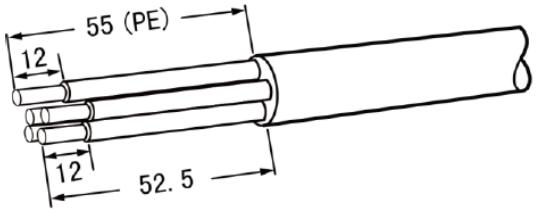
Step 3: Tighten terminal cap.

Step 4: Insert terminals with connected lines into corresponding + and – terminal at the bottom of inverter.

5.2.2 AC output line and ground wire manufacturing and AC output connector assembly, AC output line connection

Step 1: Disassemble AC output connector and check accessory for completeness.
From left to right: 1. Mating socket; 3. Shell; 3. Seal ring; 4. Sealing cap

Step 2: Strip the sheath and insulation layer of appropriate length from AC output cable with wire stripper.



Step 3: Lead AC output cable (L1, L2, L3, N, PE) through cable sealing cartridge and sleeve.

Step 4: Loosen screws in the jack of matting socket with straight screwdriver, insert cable core into corresponding jack and tighten screws.

L1 connecting to 1# jack;
L2 connecting to 2# jack;
L3 connecting to 3# jack;
N line connecting to N jack.

PE line connecting to ⏚ jack.

Step 5: Install mating socket on the shell and it is in place when you hear “click”. Tighten sealing cap on the shell.

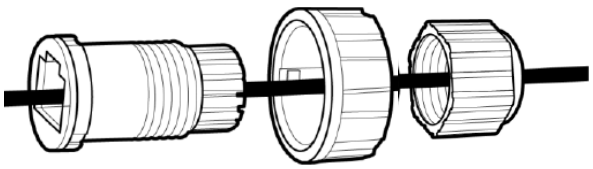
Step 6: Connect AC output connector to bayonet joint at inverter AC output terminal, push it until hear “click”.

5.2.3 Prepare RS484 communication line and Assemble RJ45 terminal

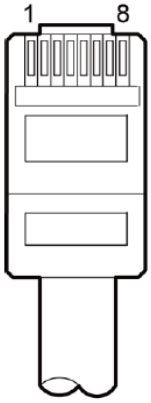
Recommended RS485 communication cables: 24AWG outdoor shielded network cable (standard cable, internal resistance less or equivalent to 1.5Ω /10m), shielded twisted pair network cable, outer diameter of 4.5mm～7.5mm (8 cable cores, wire diameter of each 1.00mm～1.07mm).
As shown in the structural diagram for waterproof RJ45 terminal, parts from left to right are: 1. Plastic seat; 2. Mating nut; 3. Cable sealing nut (No crystal head and network cable would be provided).

Step 1: Strip the insulation layer of appropriate length from shielded network cable with wire stripper.

Step 2: Lead shielded network cable through cable sealing nut, mating nut and plastic seat in succession.



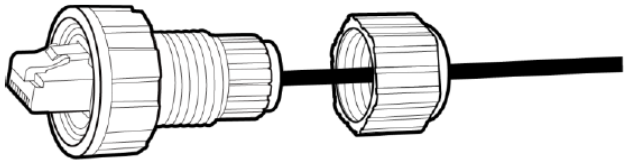
Step 3: Arrange in sequence shielded network cables with insulating layer stripped and insert into crystal head.



No.	Color	Function
1	White orange	RS485A, RS485 differential signal +
2	Orange	RS485B, RS485 differential signal-
3	White green	PGND
4	Blue	RS485A, RS485 differential signal +
5	White blue	RS485B, RS485 differential signal-
6	Green	PGND
7	White brown	PGND
8	Brown	PGND

Table 4 Definition of network cable connection

Step 4: Clamp crystal head with wire crimper, put plastic base on the crystal head with shielded network cable, tighten cable sealing nut.



Step 5: Insert crystal head into inverter RS485 port and tighten mating nut.

5.2.4 USB terminal wire connection

Our company would not provide USB connection wire that is the general wire.

6 Display screen operation and system setting

	Hint
i	HCI rules: Turn page or Downward if knock once in 1s; Enter or Confirm if knock twice consecutively in 1s; Return or Cancel if knock thrice consecutively in 1s; Lock screen or Unlock if knock four times Consecutively in 1s;

	Hint
i	**Data input rules:** It is required to input data when maintain inverter; correct data input method should be: "Downward" means switching to the data to be set, "Confirm" means entering setting state; "Downward" is to change setting value, "Confirm" is to complete setting.

6.1 Description of main interface

After power-on, display screen would present initialization interface and display our LOGO, as shown below:

Enter the startup interface 2s later;

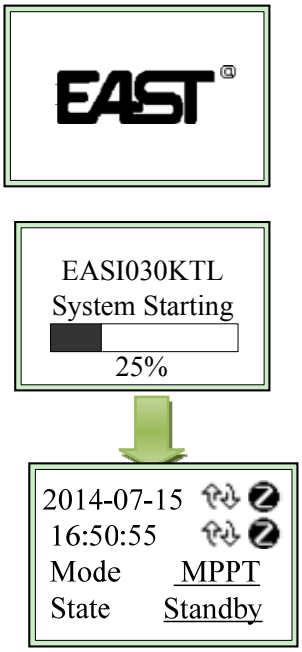


Figure 9 Startup diagram

It would enter main interface after startup. Main interface includes 10 pages, displaying respectively the operation state, generated energy, earning, power factor, efficiency, input and output power, active power, reactive power, apparent power, plus or minus the DC voltage, power grid voltage, PV input information such as current, voltage, temperature, as shown below:

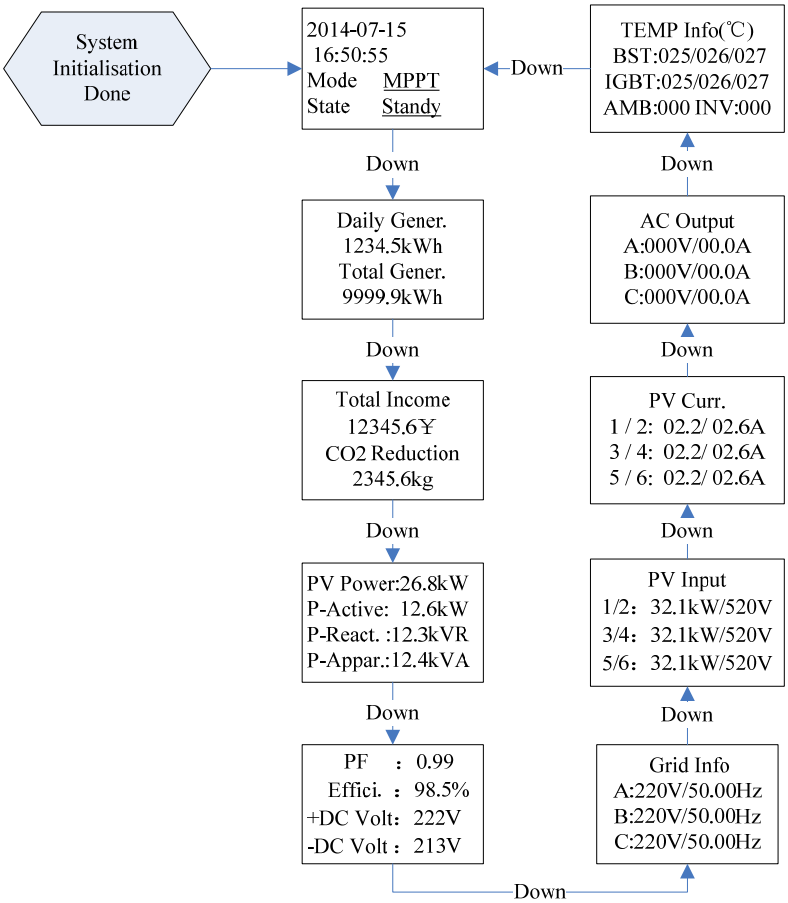


Figure 10 Description of main interface

6.2 Menu

The following figure is the menu operation flow chart. The manual provides only the setting and maintenance for user part.

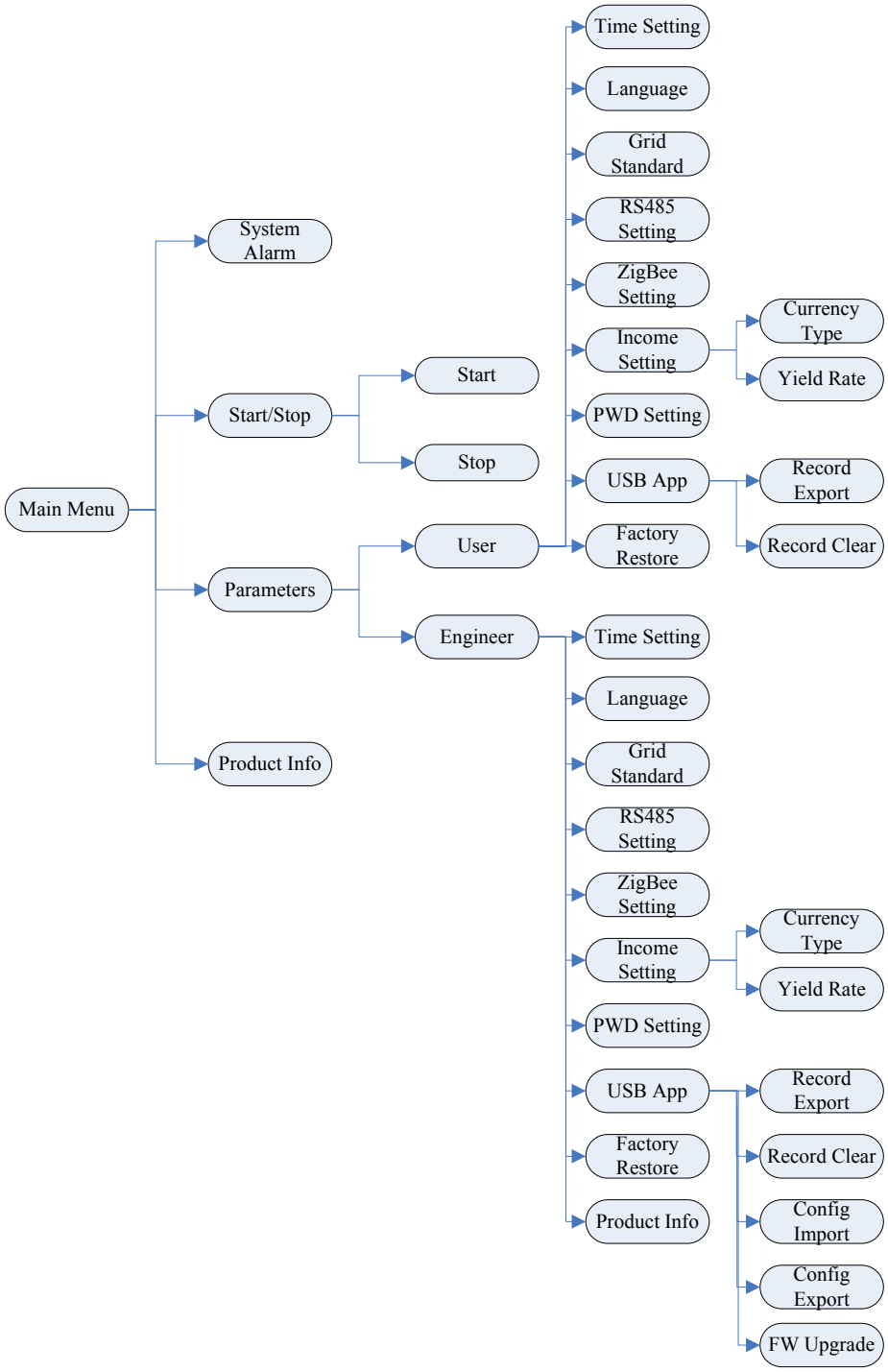
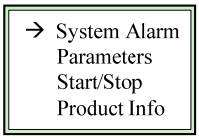


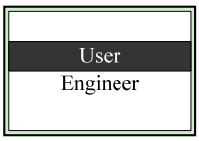
Figure 11 Menu process chart

6.3 Setting and maintenance

1. Enter main menu and select Setting Maintenance;



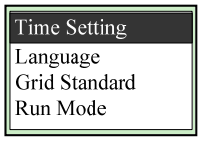
2. Select ordinary User;



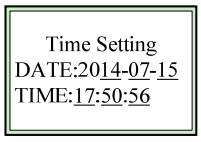
3. Input password when access to Setting and Maintenance in the first time and, after inputting correct password, you may complete system setting.

6.3.1 Time setting

1. Select “Setting and Maintenance” in main menu and find “System Time” after Page Turning;



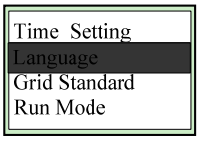
2. Select “System Time” and access to setting interface;



3. You may revise and save time setting by clicking once, twice and thrice.

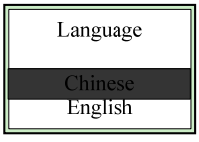
6.3.2 Language setting

1. Select “Setting and Maintenance” in main menu and find “System Language” after Page Turning;



2、

2. Select “System Language” and access to setting interface;

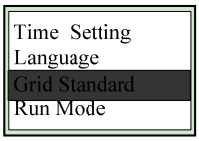


3. You may select and confirm language by clicking once, twice and thrice; three

languages are available: Chinese and English .

6.3.3 Power grid standard setting

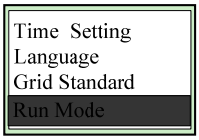
1. Select “Setting and Maintenance” in main menu and find “Power Grid Standard” after Page Turning;



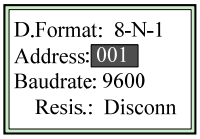
2. Select “Power Grid Standard” and access to setting interface;

6.3.4 RS485 communication setting

1. Select “Setting and Maintenance” in main menu and find “RS485” after Page Turning;



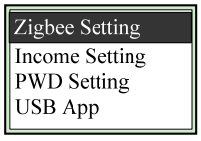
2. Select “RS485” and access to setting interface;



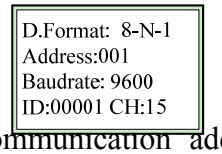
3. You may set and save communication address, Baud rate matched resistance by clicking once, twice and thrice;

6.3.5 ZigBee setting

1. Select “Setting and Maintenance” in main menu and find “ZigBee” after Page Turning;



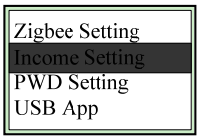
2. Select “ZigBee” and access to setting interface;



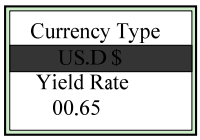
3. You may set and save communication address, Baud rate, ZigBeeID and Zeigbee channel by clicking once, twice and thrice;

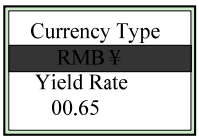
6.3.6 Earning setting

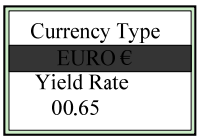
1. Select “Setting and Maintenance” in main menu and find “Earning Setting” after Page Turning;



2. Select “Earning Setting” and access to setting interface, you may select different currencies by turning page;



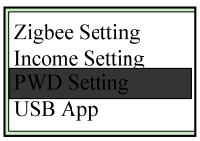




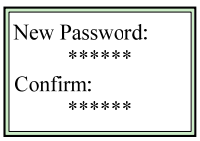
3. Save setting by double click and you may cancel setting by clicking thrice.

6.3.7 Password change

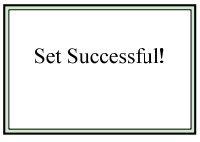
1. Select “Setting and Maintenance” in main menu and find “Change Password” after Page Turning;



2. Select “Change Password” and access to Change interface;

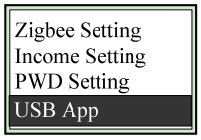


3. Input new password and confirm it, then the revision is finished.



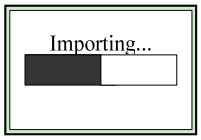
6.3.8 USB function

1. Select “Setting and Maintenance” in main menu and find “USB Function” after Page Turning;



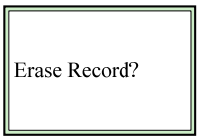
2. Select “USB Function”, access to “Record Export” interface and select “Export”;

3. If U disk is inserted, record would be exported to the disk;



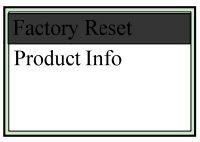
4. If U disk is not inserted, system will prompt user inserting U disk.

5. Select “Delete Record” and confirm it, then the historic record saved in inverter will be deleted.

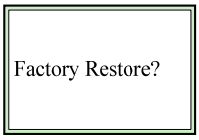


6.3.9 Restore factory default

1. Select “Setting and Maintenance” in main menu and find “Restore Factory Default” after Page Turning;

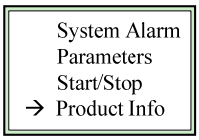


2. Select “Restore Factory Default” and confirm it, all configuration and historic data will be cleared;

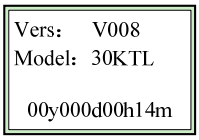


6.3.10 View product information

1. Select “About” in main menu interface;

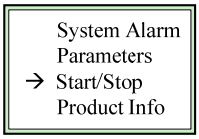


2. It will display firmware version of the current system and Vxxx product model, as well as the cumulative operation time since system power-on.



6.4 Startup & Shutdown

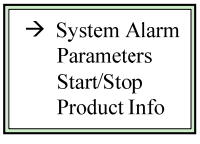
1. Enter main menu by double click on any page in main interface, and select “Startup & Shutdown” by single click;



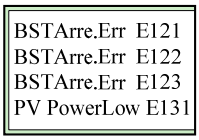
2. You may select “Startup” or “Shutdown” with double click as required.

6.5 View warning information

1. Enter main menu by double click on any page in main interface, and select “Warning Information” by single click;



2. You may check current inverter fault information by double click, and view more information by clicking on “Page Turning”;



In case of system fault warning, red LED will flash, or otherwise would not be lighted.

7 System operation

7.1 Startup procedure

Warning!

Confirm again the voltage at both DC and AC side complies with allowable range of inverter. Switch on inverter DC switch first, following by DC breaker of combiner box, or otherwise equipment would be damaged

After electrical connection, start up EA30-35KTLSI inverter as follows:

1. Ensure correct connection between inverter and power grid;
2. Ensure PV array polarity is correct;
3. Ensure AC and DC terminals are securely fixed;
4. Close AC output switch;
5. Turn DC switch to “ON” position.

7.2 Description of the working mode of EA30-35KTLSI grid-connected inverter

EA30-35KTLSI supports unmanned monitoring and automatic operation and, based on the output power of solar battery array, judges if grid-connection power generation is required. System operation process includes five working states: startup, grid-connection operation, standby, sleep state, shutdown and fault handling. Figure 14 presents the working mode conversion process for EA30-35KTLSI grid-connected inverter (Where Vpv means the DC output voltage of PV array). .

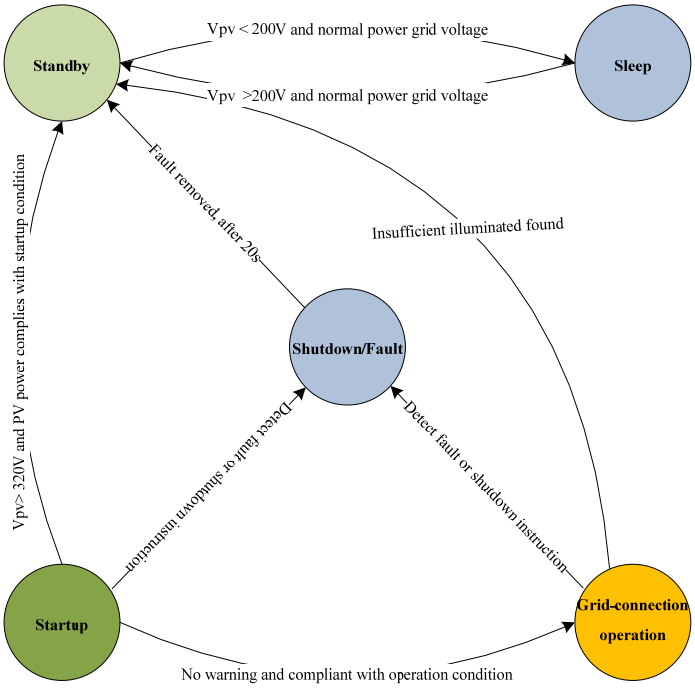


Figure 12 Working mode conversion process for inverter

◆ **Startup**

Startup refers to the preparatory stage from standby mode to grid-connection operation mode and, under which state, grid-connected inverter would constantly detect if PV module has sufficient energy to generate electricity, namely when PV module has open-circuit voltage up to 320V and solar panel has output power up to 200W, PV grid-connected inverter will convert from startup state to grid-connection operation state.

◆ **Grid-connection operation**

Grid-connection operation mode means the mode under which grid-connected inverter will convert DC of PV array into AC to power grid. To optimize the utilization of PV array energy, the system is designed with maximum power point tracking (MPPT) control, namely the system will, regardless of sunshine and temperature, constantly maintain solar cell array output under maximum power state.

◆ **Standby**

Standby state means that when PV array output voltage is up to a certain value but fails to comply with startup condition, while parameters such as grid voltage and frequency are within allowable range. Under the mode, inverter will constantly detect

open-circuit voltage of PV array and, when larger than 320V, enter startup state.

◆ **Sleep**

Sleep state means the state under which PV array has the output voltage less than 200V, fails to support auxiliary power supply but power grid functions normally. When system detects the output voltage of PV array less than 200V and no demand for SVG in night, it will automatically enter sleep state to reduce system energy consumption.

◆ **Normal shutdown or fault**

Normal shutdown or fault means the specific state under which the system would protect itself when PV array has low output power or suffers shutdown failure.

When PV array has quite low output power less than 100W in consecutive 5 minutes, and no demand for SVG in night, the system will enter shutdown mode.

To manually shut down the equipment on display screen, you have to connect with power grid again via display screen.

When the system failure is detected, the system will, under no circumstances, disconnect the inverter from power grid. In this state, the warning lights flashes, liquid crystal display shows the current failure, the user may handle it accordingly based on the current fault and the fault treatment table. After failure occurs and failure is automatically remove, the system will automatically detect within 20s if grid-connected power generation conditions are meet and, if so, start normal power generation, otherwise keep fault status until the system is restored to normal condition.

7.4 Monitoring mode

Inverter WIFI Communication System

It is designed with WIFI communication function, built with WIFI communication module and externally provided with wireless antenna. It needs no RS485 communication wire, can realize real-time monitoring of inverter data with the application of upper host monitoring software or mobile phone APP.

Wireless monitoring may be classified into the mobile phone and computer monitoring. User needs to install PV inverter monitoring software on computer or mobile phone (Android) application program.

WIFI module built in PV inverter is designed with AP and STA connection mode. The former is a wireless access point, by which mobile phone, computer or other device can connect to WIFI module; the latter is a terminal. WIFI module is connected to router, and user may connect to router via mobile phone or computer and, by monitoring software on phone or computer, view the real-time inverter data. The following diagrams are related to the four connection methods.

I. Monitoring at mobile phone terminal
Access method 1:

Figure 13 Mobile phone- Router- Inverter

The access method is one of most common methods and by which, user may log on network by phone and also monitor inverter data.
Access method 2:

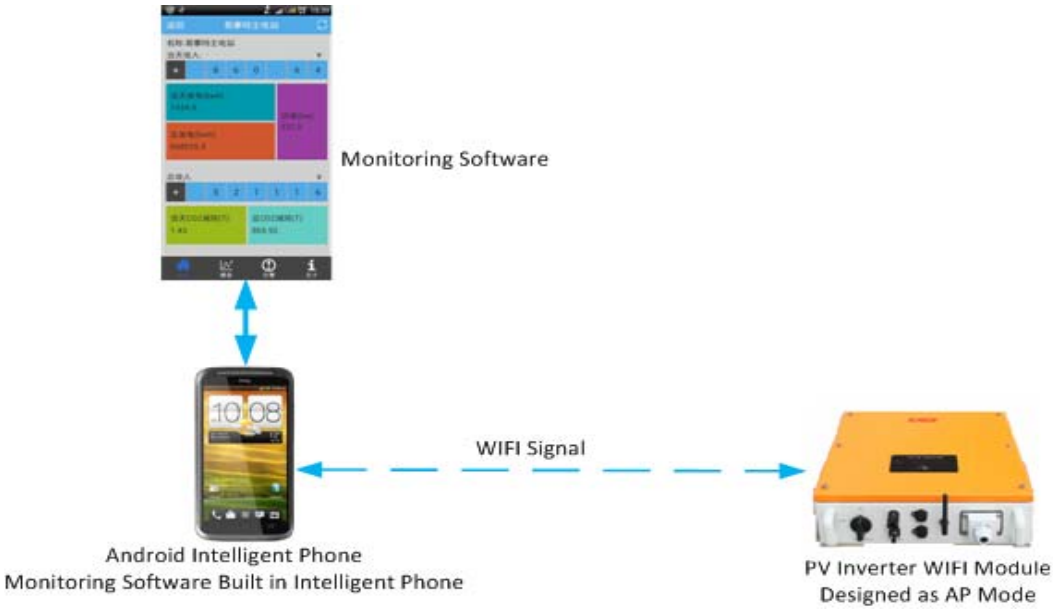


Figure 14 Mobile Phone- Inverter

By this access method, user may directly view inverter data via WIFI in case of no wireless router.

II. Monitoring via computer

Access method 1:

User may connect to wireless router via computer, to router via WIFI or network cable, and view inverter data by PV inverter monitoring software.

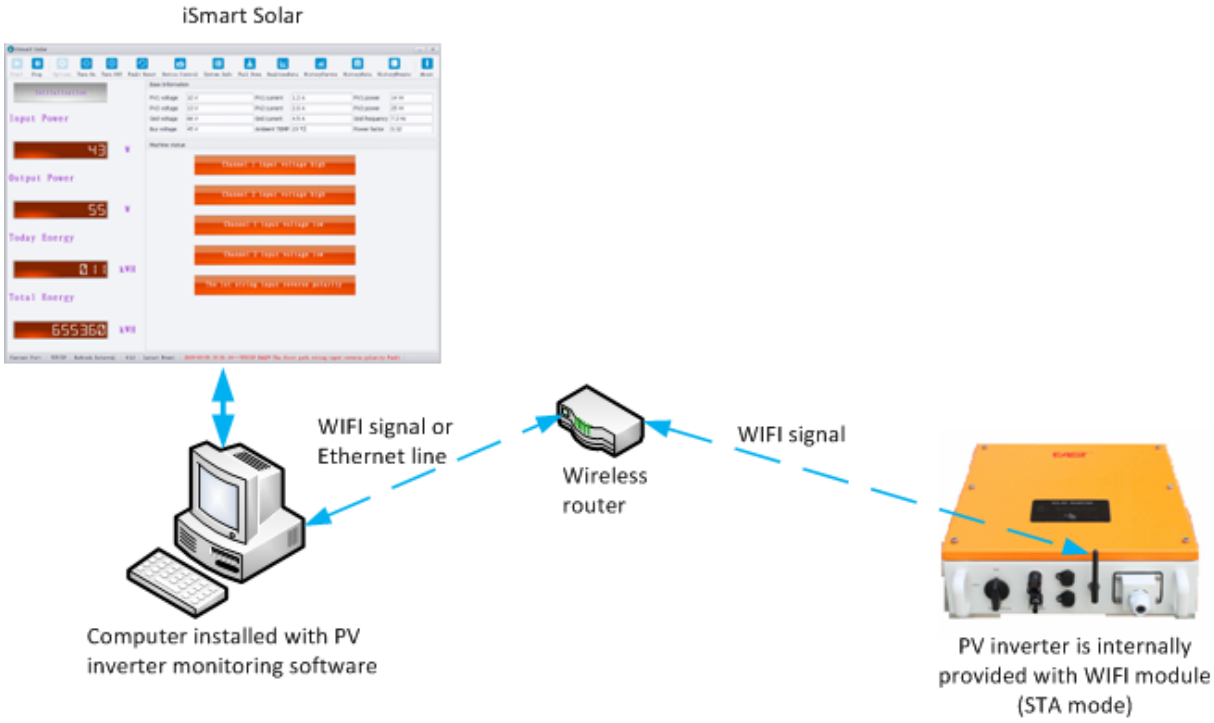


Figure 15 Computer- Router- Inverter

Access method 2:

User computer is directly connected with PV inverter. The computer must be provided

with wireless WIFI function and, with the application of PV monitoring software, can monitor real-time inverter data.

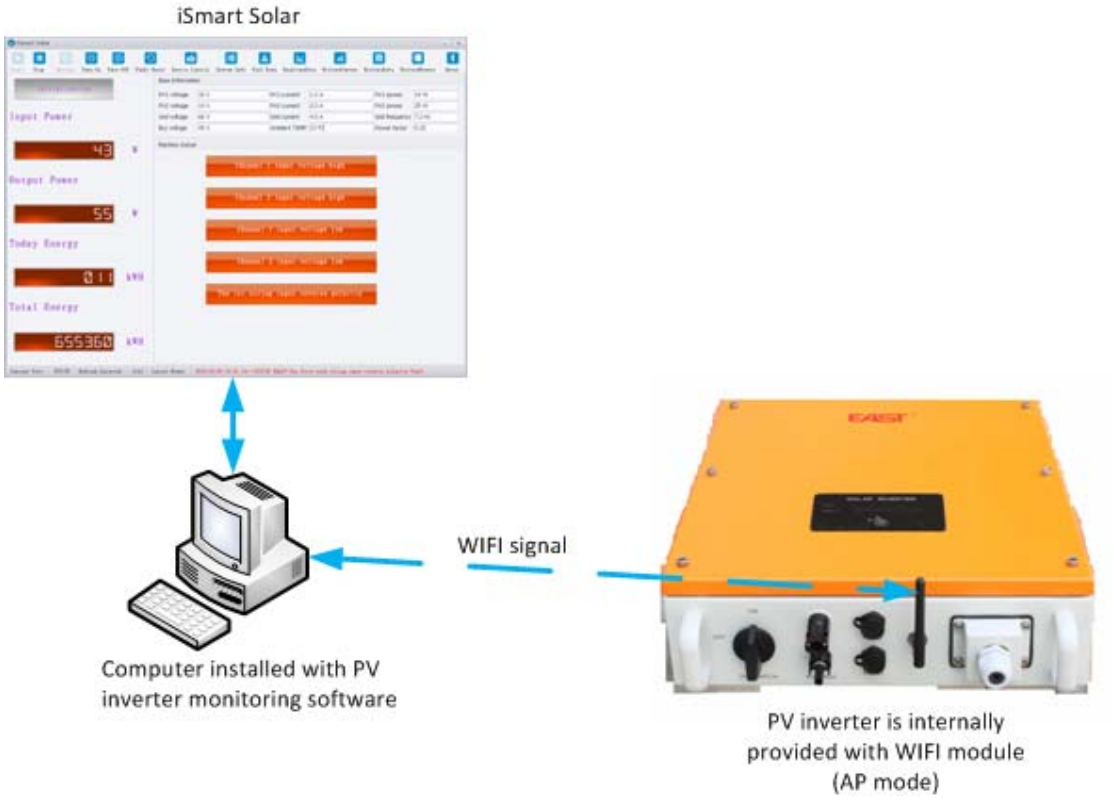


Figure 16 Computer- Inverter

Configuration method for WIFI module built in inverter:

Built-in WIFI module is designed with two working modes: AP mode and STA mode. User may switch working mode by software in mobile phone or computer. User should download and install software smartlink3.6.3 in mobile phone and configure the mode according to specific procedure; as to the computer, user may configure WIFI module parameter via debugging software SecureCRT and default inverter as AP mode before delivery.

Centralized monitoring software

Centralized monitoring software in PV inverter is used to conduct centralized monitoring of all inverters in an area. Monitoring means can be classified into webpage monitoring on computer or monitoring via phone client. User may monitor data at any time by monitoring software in phone client, and customer may access to wireless data (GPRS) in the phone or connect with router via WIFI, and view inverter data by enabling monitoring software. Users need not to install monitoring software on computer, may log on corresponding IP address through browser, and view relevant data after inputting account name.

Application diagram for centralized monitoring software

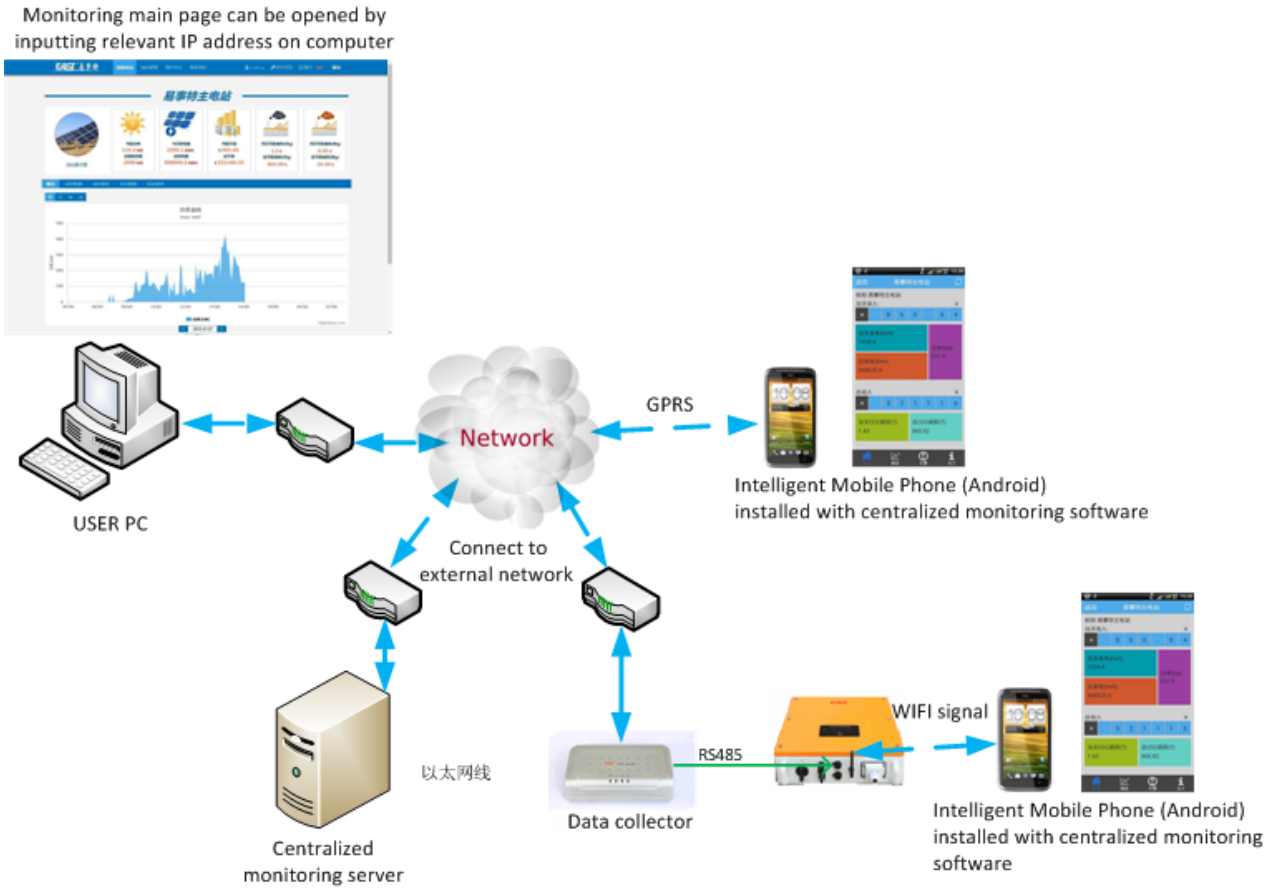


Figure 17 Application diagram for centralized monitoring software

ZigBee wireless communication system

PV inverter ZigBee wireless communication means to transmit inverter data to collector via wireless equipment, applicable to the centralized monitoring of multiple inverters in an area. If ZigBee wireless communication is to be used, a ZigBee wireless coordinator should be installed at the side of data collector. Since PV inverter is built with ZigBee wireless module, user may only need to set wireless parameters in interface, connect inverter with wireless coordinator and form a wireless network for data transmission.

Block diagram for ZigBee wireless data transmission is provided as below:

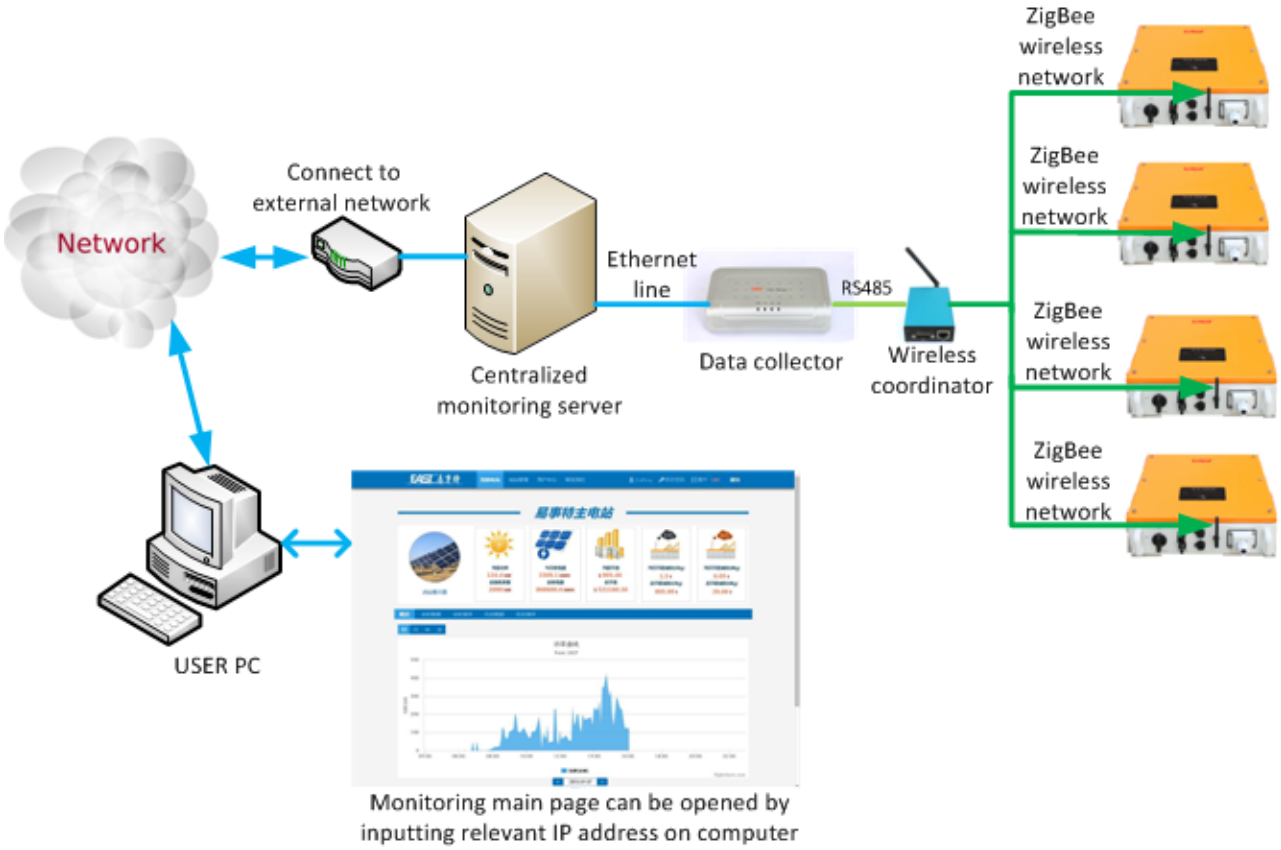


Figure 18 ZigBee wireless data transmission is provided as below:

8 Fault handling

In case of fault, fault light will be lighted, monitoring panel displays current fault and fault ID, and inverter will determine if to shut down according to warning level. Table 5 provides common fault warnings and handling suggestions.

Definition of warning level:

Important warning: Inverter will, in case of fault, enter shutdown mode and stop grid-connection power generation.

Warning hint: Inverter will still support grid-connection power generation when some parts are out of order.

Warning ID	Name	Warning Level	Causes	Handling Suggestions
101~103	High serial voltage	Important	Excessive number of battery panels in serial	Check if open-circuit voltage higher than maximum input voltage of

			results in high output, finally causing higher maximum input voltage of inverter than open-circuit voltage of PV serial.	inverter is caused by excessive number of series configurations of PV and if so, regulate configured serials number to drop output voltage within specification range. After correct adjustment, inverter will restore normal operation.
111~113	Serial polarity reversed	Important	Serial polarity is reversely connected during installation.	Check if corresponding positive and negative pole on inverter serial is reversely connected and, if so, please adjust the polarity.
121~123	BOOST lightning protection fault	Hint	BOOST lightening arrester is not connected or damaged.	Check if BOOST lightening arrester is connected and if not, connect it.
131	Low input power	Hint	PV serial is subject to long-term fixation and aging.	Check if the route of serial is covered, if the surface is clean and not covered, check battery panel for damage.
141	ISO insulation impedance abnormality	Important		
201	Power-off	Important	No power supply for power grid.	Check power grid for power supply.
211~216	Overvotlage	Important	Power grid voltage is too high, beyond allowable range.	Occasional occurrence may be caused by short-term power grid abnormality. After detecting normal power grid, inverter will restore normal operation, no need for artificial interference. If the problem occurs frequently, please check if power grid voltage is within allowable range and if not, contact with local power operator and, if so,

				revise the protection point, subject to approval by local power operator.
221~226	Undervoltage	Important	Power grid voltage is too low, beyond allowable range.	Same with the suggestions for handling power grid overvoltage.
231~236	Overfrequency	Important	Power grid frequency is too high, beyond allowable range.	Same with the suggestions for handling power grid overvoltage.
241~246	Underfrequency	Important	Power grid frequency is too low, beyond allowable range.	Same with the suggestions for handling power grid overvoltage.
251~243	Abnormal power grid frequency	Important	Before inverter grid-connection, detect power grid frequency beyond allowable range.	Same with the suggestions for handling power grid overvoltage.
261	Island	Important	Abnormally fluctuated power grid frequency	Check if power grid is under islanding state.
262	Power grid unbalance	Important	Power grid unbalance beyond allowable range	Occasional occurrence may be caused by short-term power grid abnormality. After detecting normal power grid, inverter will restore normal operation, no need for artificial interference.
263	FRT occurrence	Hint	Power grid voltage is subject to falling-down	Prompt warning for falling down voltage, no need for special treatment.
264	Power grid phase sequence reversely connected	Hint	Power grid ABC phase sequence reversely connected	Adjust AB or BC or CA two-phase wire connection
301~331	BOOST circuit fault	Important	If abnormal external condition results in BOOST circuit protection	Inverter monitors external working condition at real time and, after fault removal, restore normal work, no

			inside inverter, the possible causes may include: ID：301~309 Significant change in external condition results in excessive high input current. ID：311~316 Significant change in external condition results in excessive high input voltage. ID：321~323 Inverter detects BOOST temperature beyond allowable range. ID：331 Inverter BOOST is failed to perform soft startup.	need for artificial interference; ID：321~323 Check if inverter's BOOST temperature sensor wires are connected.
401~491	Inversion circuit fault	Important	If abnormal external condition results in internal inversion circuit protection, the possible causes may include: ID：401~416 Significant change in external condition results in excessive high output current. ID：421~427 Inverter output short circuit.	Inverter would monitor external working condition and, after fault removal, restore to normal condition, no need for artificial interference; ID：421~427 Check if the output cable of inverter is subject to short circuit. ID：451~455 Check if the wires of inverter temperature sensor is connected ID：471~474 Check if inverter relay works

			ID：431~433 Inverter's inversion current ABC three-phase DC component exceeds allowable range. ID：441~444 If residual current of inverter exceeds allowable range. ID：451~455 Inverter temperature detects temperature beyond allowable range. ID：461~466 Inverter results in positive and negative busbar voltage beyond allowable range due to severe change in external condition. ID：471~474 Inverter relay detects fault. ID：481 Abnormal inverter phase lock. ID：482 Failed inverter soft startup. ID：483 Abnormal lightning arrester output ID：485~486 Normal inverter fan	normally and has any bonding. ID：483 Please check if the output lightning arrester of inverter is normally connected and protected against damage. ID：485~486 Please check if wires of inverter fan are connected and fans free from damage.

			ID：491 Derated output power	
501~503	Communication fault	Important	Abnormal communication between inverter chips	501~502: EEPROM device has problems; 503: Abnormal main and auxiliary chip
601	Abnormal version detection	Important	Mismatching software version	Please update software.

Table 5 List of common fault warning

Remark: Please contact with East customer service center if the recommended handling method in Table 5 “Suggestions for Handling” fails to help you.

Appendix A

Technical Specification for String Inverter (EA30KTLSI)

Item / Product Model	EA30KTLSI	EA35KTLSI
输入 Input		
Maximum DC input power	31kWp	36kWp
Maximum DC input voltage	1000V	
Starting voltage	200V	
Maximum DC input current	3×21A	
MPP voltage range	320~900V	
Scope of full-load MPP voltage	480~800V	580~800V
MPPT Quantity	3	
DC terminal	2×6	
MPPT efficiency (static)	＞99.9%	
Insulation voltage resistance between DC input terminal and chassis	Basic insulation 3000Vdc/1min	
Output		
Rated output power	30kW	35KW
Rated output voltage	3×380Vac/400Vac/415Vac+N+PE	3x480Vac+PE
Rated output current	3×45.5A/43.5/41.7A	3x43.5A
Maximum allowable output current	3×50A	
Rated frequency	50Hz/60Hz	

DC component	＜0.5% (rated current)	
THD%	<3% (rated power)	
Power factor	0.8 lead ~0.8 slag	
Insulation voltage resistance between AC input terminal and chassis	Basic insulation 3000Vdc/1min	
Efficiency		
Maximum inversion efficiency	98.7%	98.8%
European efficiency	98.4%	98.5%
General Parameters		
Standby consumption	15W	
Topology type	No transformer	
MTBF	40,000h	
Protection	5-years (standard), 10/15/20/25 years optional	
保护 Protection		
Input reverse connection protection	Yes	
DC overvoltage and overload protection	Yes	
Output AC short-circuit protection	Yes	
AC overload, overcurrent restriction and protection	Yes	
Overvoltage, undervoltage and unbalance protection for power grid	Yes	
Overfrequency and underfrequency protection	Yes	
Electric leakage protection	Yes	
Lightning protection	Yes	
Islanding protection	Active and passive method	
Insulation impedance detection protection	Yes	
Standard		
Certification	VDE/TUV/CE/CQC	
Grid-connection safety and anti-islanding	VDE126-1-1/A1/TUV/VDE-AR-N-4105/BDEW/CEIO-21	
EMC/Safety rules	EN61000-6-2,EN61000-6-3, EN61000-3-2,EN61000-3-3, EN61000-3-11,EN61000-3-12, EN/IEC62109-1,EN/IEC62109-2	
Other parameters		
Mechanical dimensions (L×H×W)	580mm×800mm×260mm	
Working temperature	-25℃-60℃	
Heat dissipation method	Natural heat dissipation	
Maximum working altitude	3000m	
Relative humidity (no condensation)	0-100%	
Weight	<65kg	
Protection grade	IP65	

Appendix B

1 Quality warranty

■ Warranty period

Warranty period: two-year warranty period is provided for the product, subject to contractual stipulation, if any.

■ Evidence

During warranty period, East may request customer represent product purchase invoice and date, and the product trade mark shall be distinctive, or otherwise East has the right to reject quality warranty.

■ Conditions

- ✧ East will provide free maintenance or replacement with new products for products failed in warranty period.
- ✧ Nonconforming products should be returned to East
- ✧ Customer should ensure that East has rational time to repair faulty equipment.

The company will not provide quality warranty in any of the following circumstances:

- ✧ Damage in transit;
- ✧ Incorrect installation;
- ✧ Incorrect refitting;
- ✧ Incorrect use;
- ✧ The equipment runs in a severe environment specified in the manual;
- ✧ Damage caused by abnormal natural environment.

Pictures or diagrams mentioned in the manual are for reference only, finally subject to the actual product.

Product dimension and parameter change shall be subject to the latest material issued by our company without any prior notice.

2 Contact us

Should you have any problem regarding EA series three-phase PV grid-connection inverter, please contact us and we'd like to provide solution. Please keep the following contact ways in mind:

Address: Industrial North Road 6, Songshan Lake High-tech Development Zone, Dongguan, Guangdong

TEL: 0769-22897777

FAX: 0769 -22898866

Website: http://www.eastups.com