Operation Manual

iMars

Grid-tied Solar Inverter

INVT Solar Technology (Shenzhen) Co., Ltd.

Preface

The manual is intended to provide detailed information of product information, installation, application, trouble shooting, precautions and maintenance of iMars series grid-tied solar inverters. The manual does not contain all the information of the photovoltaic system. Please read this manual carefully and follow all safety precautions seriously before any moving, installation, operation and maintenance to ensure correct use and high performance of operation on the inverter.

The use of the iMars series grid-tied solar inverters must comply with local laws and regulations on grid-tied power generation.

The manual needs to be kept well and be available at all times.

There may be data deviation because of product improving. Detailed information is in accordant with the final product.

Contents

1 Safety precautions

iMars series grid-tied solar inverters are designed and tested strictly in accordance with relevant international safety standards. As an electrical and electronic device, all relevant safety regulations must be strictly complied during installation, operation, and maintenance. Incorrect use or misuse may result in：

- Injury to the life and personal safety of the operator or other people.
- Damage to the inverter or other property belonging to the operator or other people.

In order to avoid personal injury, damage to the inverter or other devices, please strictly observe the following safety precautions.

This chapter mainly describes various warning symbols in operation manual and provides safety instructions for the installation, operation, maintenance and use of the iMars series grid-tied solar inverters.

1.1 Icons

This manual provides relevant information with icons to highlight the physical and property safety of the user to avoid device damage and physical injury.

The icons used in this manual are listed below:

Icons	Name	Instruction	Abbreviation
 Danger	Danger	Serious physical injury or even death may occur if not follow the relative requirements	
 Warning	Warning	Physical injury or damage to the devices may occur if not follow the relative requirements	
 Do not	Do not	Damage may occur if not follow the relative requirements	
 Hot sides	Hot sides	Sides of the device may become hot. Do not touch.	
Note	Note	Physical hurt may occur if not follow the relative requirements	Note

1.2 Safety guidelines

	● The first thing after receiving is to check for any visible damage to the package or to the inverter. If there is something suspected, contact the shipping company and local dealer before installing. ● The installation and operation of PV inverter must be carried out by professional technicians who have received professional trainings and thoroughly familiar with all the contents in this manual and the safety requirements of the electrical system. ● Do not carry out any wiring and inspection or changing components when the power supply is applied.
	● Ensure that there is no electromagnetic interference from other electrical and electronic equipment on the installation site. ● Do not refit the inverter unauthorized. ● All the electric installation needs to be compliance with the national or local laws and standards.

	● The temperature of individual parts or the enclosure of the inverter–especially the heat sink may become hot in normal operation. There is a danger of burning. Do not touch.
	● The inverter must be reliably grounded before operation.
	● Do not open the cover of inverters unauthorized. The electrical parts and components inside the inverter are electrostatic. Take measurements to avoid electrostatic discharge during relevant operation.
	● The inverter must be reliably grounded.
	● Ensure that DC and AC side circuit breakers have been disconnected and wait at least 5 minutes before wiring and checking.
Note: Technical personnel who can perform installation, wiring, commissioning, maintenance, troubleshooting and replacement of the iMars series grid-tied solar inverters must meet the following requirements:	
● Operators need professional training. ● Operators must read this manual completely and master the related safety precautions. ● Operators need to be familiar with the relevant safety regulations for electrical systems. ● Operators need to be fully familiar with the composition and operating principle of the entire grid-tied photovoltaic power generation system and related standards of the countries/regions in which the project is located. ● Operators must wear personal protective equipment.	

1.2.1 Delivery and installation

	● Keep the package and unit complete, dry and clean during storage and delivery. ● Please remove and install the inverter with two or more people, because of the inverter is heavy. ● Remove and install the inverter with appropriate tools to ensure safe and normal operation and avoid physical injury or death. The people also need mechanical protective measures, such as protective shoes and work clothes. ● Only qualified electricians are allowed to install the inverter. ● Do not put and install the inverter on or close to combustible materials.

	● Keep the installation site away from children and other public places. ● Remove the metal jewelry such as ring and bracelet before installation and electrical connection to avoid electric shock. ● Do cover solar modules with light-tight materials. Exposed to sunlight, solar modules will output dangerous voltage. ● The inverter input voltage does not exceed the maximum input voltage; otherwise inverter damage may occur. ● The positive and negative pole of solar modules can not be grounded, otherwise irrecoverable damage may occur. ● Ensure the proper grounding of the inverter, otherwise, improper connection or no grounding may cause stop of the inverter. ● Ensure reliable installation and electrical connection.

Note: iMars grid-tied solar inverters are only for crystalline silicon solar modules.

1.2.2 Grid-tied operation

	● Only qualified electricians are allowed to operate the inverter under the permission of local power departments. ● All electrical connections must meet the electrical standards of the countries/regions in which the project is located. ● Ensure reliable installation and electrical connection before operation. ● Do not open the cover of inverter during operation or voltage is present.

1.2.3 Maintenance and inspection

	● Only qualified electricians are allowed to perform the maintenance, inspection, and components replacement of the inverter. ● Contact with the local dealer or supplier for maintenance. ● In order to avoid irrelevant personnel from entering the maintenance area during maintenance, temporary warning labels must be placed to warn non-professionals to enter or use fence for isolation. ● Firstly disconnect all power supplies of the grid to the inverter before any maintenance, and then disconnect the breakers and wait for at least 5 minutes until the inverter is discharged before maintenance.

	● Please follow electrostatic protection norms and take correct protective measures because of the electrostatic sensitive circuits and devices in the inverter. ● Do not use parts and components not provided by our company during maintenance. ● Restart the inverter after settling the fault and problem which may affect the safety and performance of the inverter. ● Do not get close to or touch any metal conductive part of the grid or inverter, otherwise electric shock, physical injury or death and fire may occur. Please do not ignore the warning icons and instructions with “electric shock”.

1.2.4 What to do after scrapping

	● Do not dispose of the inverter together with household waste. The user has the responsibility and obligation to send it to the designated organization for recycling and disposal.

2 Product overview

This chapter mainly describes the appearance, packaging accessories, name plate, technical parameters and other information of iMars grid-tied solar inverters.

2.1 Solar grid-tied power generation system

2.1.1 Application

The photovoltaic grid-tied power generation system consists of solar modules, grid-tied inverter, metering devices and public grid.

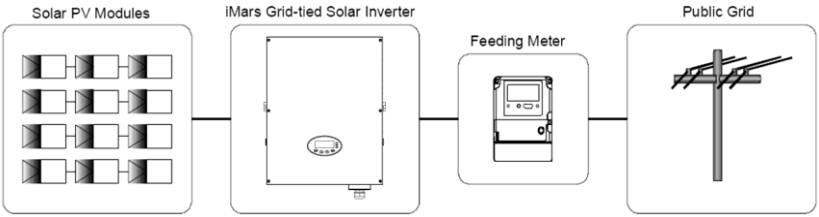


Figure 2.1 Application of iMars grid-tied solar inverters

Grid-tied solar inverter is the core of photovoltaic power generation system. The solar energy can be converted into DC electric energy through solar modules and then be changed into sinusoidal AC energy which has the same frequency and phase with the public grid by grid-tied solar inverters, and then be fed to the grid.

iMars grid-tied solar inverters are only applied in solar grid-tied power generation system and its DC input are only composed of crystalline silicon solar modules whose negative and positive poles are not grounded.

⚠	● The recommended solar modules need to comply with IEC61730 Class A rating.

2.1.2 Supported grid connection structure

iMars series grid-tied solar inverters support TN-S, TN-C, TN-C-S , TT and IT grid connection.

When applied to the TT connection, the N-to-PE voltage should be less than 30V.

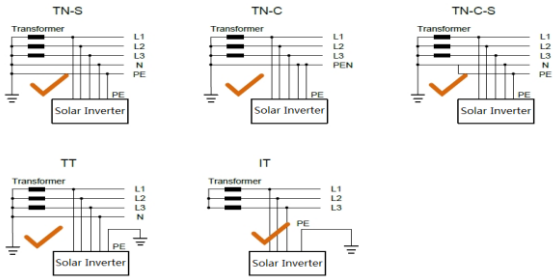


Figure 2.2 Type of grid

2.2 Products appearance

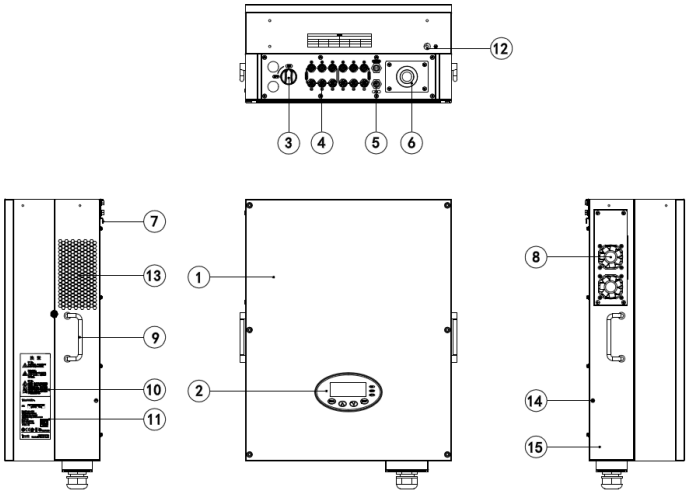


Figure 2.3 Products appearance of 12~17kW

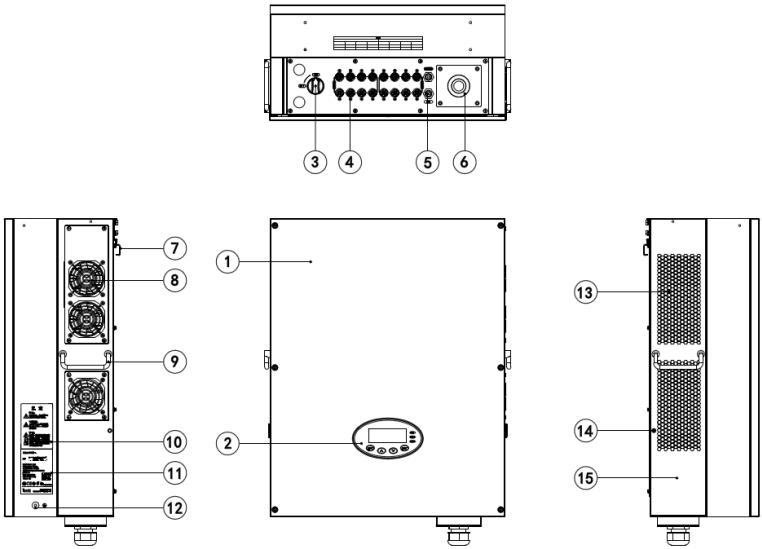


Figure 2.4 Products appearance of 20~40kW

Table 2-1 Parts instruction of three-phase grid-tied solar inverter

No.	Name	Instruction
1	Cover	
2	Operational panel	LED indicators, LCD screen and buttons
3	DC switch	On –off of the DC input
4	DC input port	For the connection of solar modules
5	Communication port	RS485 and EXT communication port
6	AC terminal	For the connection of AC output
7	Installation hanger	For the connection of inverter and installation bracket
8	Fan mounting plate	Air inlet, and for fans fixing
9	Concave handle	For removing and carrying
10	Safety precautions	
11	Name plate	For rated parameters of the inverter
12	External grounding	
13	Air duct	For ventilation
14	Screw holes	To fasten the inverter on the installation bracket
15	Cooling chamber	Protect the radiator and fan

2.3 Name plate

Figure 2.5 shows the inverter nameplate.

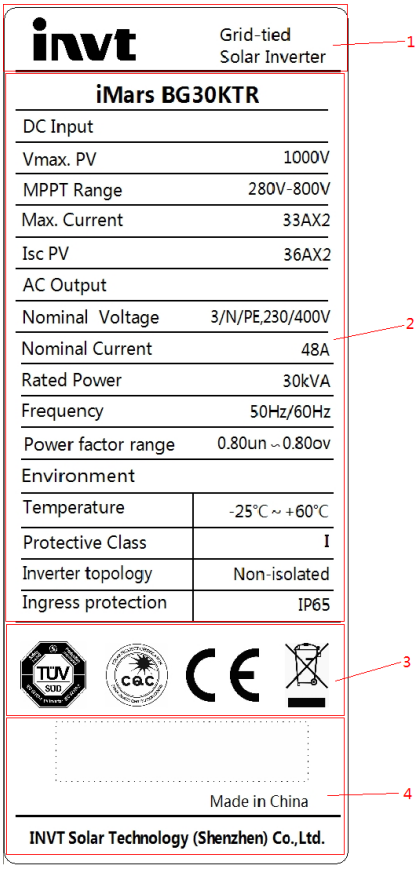


Figure 2.5 Name plate

（1）Trademark and product type

（2）Model and important technical parameters

（3）Certification system of the inverter confirming

（4）Serial number, company name and country of origin

Icons	Instruction
	● TUV certification mark. The inverter is certified by TUV.
	● CE certification mark. The inverter complies with the CE directive.
	● CQC certification mark. The inverter is certified by CQC.
	● EU WEEE mark. Cannot dispose of the inverter as household waste.

2.4 Models

Table 2-2 Models of iMars grid-tied solar inverter

Product name	Model	Rated output power (W)
Three-phase (L1, L2, L3, N, PE)		
Three-phase grid-tied solar inverter	12kW	12000
Three-phase grid-tied solar inverter	15kW	15000
Three-phase grid-tied solar inverter	17kW	17000
Three-phase grid-tied solar inverter	20kW	20000
Three-phase grid-tied solar inverter	20kW-M	20000
Three-phase grid-tied solar inverter	25kW	25000
Three-phase grid-tied solar inverter	30kW	30000
Three-phase grid-tied solar inverter	33kW	33000
Three-phase grid-tied solar inverter	35kW	35000
Three-phase grid-tied solar inverter	40kW	40000

Note: Refer to the product specifications in chapter 10.

2.5 Dimensions and weight

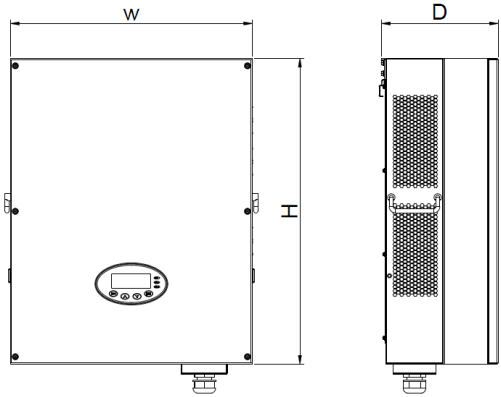


Figure 2.6 Inverter dimensions

Table 2-4 Inverter dimension and net weight

Model	H (mm)	W (mm)	D (mm)	Net weight (kg)
12kW / 15kW/ 17kW / 20kW-M	610	480	230	36
20kW / 25kW / 30kW / 33kW / 35kW / 40kW	660	520	250	53

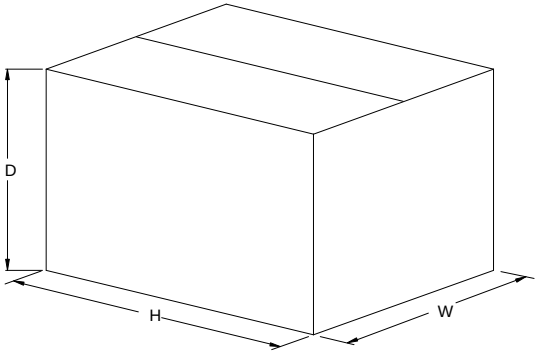


Figure 2.7 Paper packages dimension

Table 2-5 Packages dimension and gross weight

Model	H (mm)	W (mm)	D (mm)	Weight (kg)	Packaging Material
12kW / 15kW / 17kW / 20kW-M	788	622	396	43	Paper
20kW / 25kW / 30kW / 33kW / 35kW / 40kW	850	665	410	62	Paper

3 Storage

If the inverter is not put into use immediately, the storage of inverter should meet the following requirements:

- Do not remove the outer packing.
- The inverter needs to be stored in a clean and dry place, and prevent the erosion of dust and water vapor.
- The storage temperature should be kept at -40°C~+70°C, and the relative humidity should be kept at 5%RH~95%RH.
- The stacking of inverters is recommended to be placed according to the number of stacking layers in the original shipment. Place the inverter carefully during stacking to avoid personal injury or equipment damage caused by the falling of equipment.
- Keep away from chemically corrosive substances that may corrode the inverter.
- Periodic inspections are required. If damages are found by worms and rats, or packaging are found to be damaged, the packaging materials must be replaced in time.

After long-term storage, inverters need to be inspected and tested by qualified personnel before put into use.

4 Installation

This chapter describes how to install the inverter and connect it to the grid-tied solar system (including the connection between solar modules, public grid and inverter).

Read this chapter carefully and ensure all installation requirements are met before installation.

Only qualified electricians are allowed to install the inverter.

4.1 Unpacking inspection

The inverter has been thoroughly tested and rigorously checked before delivery, but damage may still occur during transportation. Before unpacking, check carefully whether the product information in the order is consistent with that on the nameplate of the package box and whether the product package is intact. If any damage is detected, please contact the shipping company or the supplier directly. Please also provide photos of the damage to get our fastest and best service.

Put the inverter into the package if not used and protect it from humidity and dust.

Check as following after unpacking:

(1) Ensure no damage to the inverter unit.

(2) Ensure the operation manual, port and installation accessories in the package.

(3) Ensure no damage or loss to the items in the package.

(4) Ensure the information of the order is the same as that of the name plate.

Below are the detailed lists:

Packing list of 12kW / 15kW / 17kW / 20kW-M inverter:

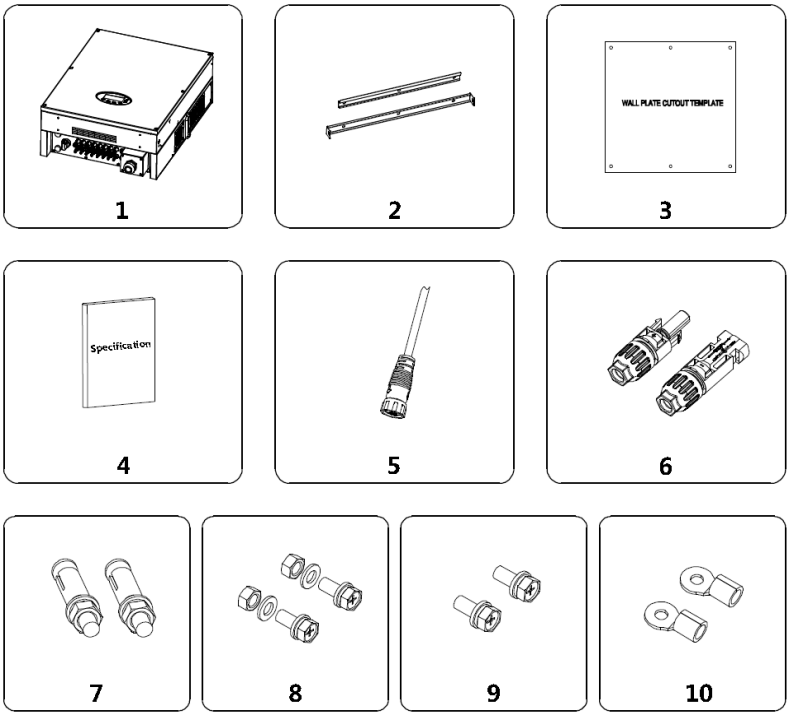


Figure 4.1 Packing list of12kW / 15kW / 17kW / 20kW-M inverter

Table 4-1 Detailed delivery list of 12kW / 15kW / 17kW / 20kW-M inverter

No.	Name	Quantity
1	6kW / 8kW / 10kW / 12kW / 15kW / 17kW / 20kW-M inverter	1
2	Installation bracket	1
3	Location hole template	1
4	operation manual	1
5	Communication connector	1
6	DC connector	4 pairs
7	Expansion bolts M8*60	6
8	Hex combination bolt M8*20	6
9	Hex combination bolt M6*16	2
10	AC ring terminal	5

Packing list of 20kW / 25kW / 30kW / 33kW / 35kW / 40kW inverter:

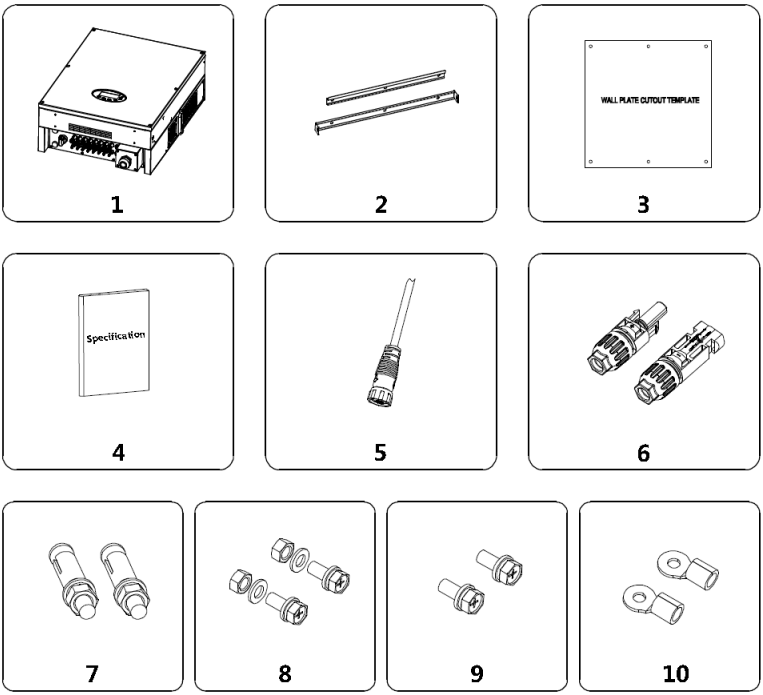


Figure 4.2 Packing list of 20kW / 25kW / 30kW / 33kW / 35kW / 40kW inverter

Table 4-2 Detailed delivery list of 20kW / 25kW / 30kW / 33kW / 35kW / 40kW inverter

No.	Name	Quantity
1	20kW / 25kW / 30kW / 33kW / 35kW / 40kW inverter	1
2	Installation bracket	1
3	Location hole template	1
4	operation manual	1
5	Communication connector	1
6	DC connector	6pairs /8 pairs （35kW/40kW）
7	Expansion bolts M8*60	6
8	Hex combination bolt M8*20	6
9	Hex combination bolt M6*16	2
10	AC ring terminal	5

4.2 Before installation

4.2.1 Installation tools

Table 4-3 Tools list

No.	Installation tools	Instruction
1	Marking pen	Mark the installation hole
2	Electrodrill	Drill in the bracket or wall
3	Hammer	Hammer on the expansion bolts
4	Monkey wrench	Fix the installation bracket
5	Allen driver	Fasten the screws, remove and install AC wiring box
6	Straight screwdriver	For AC wiring
7	Megger	Measuring insulation performance and impedance
8	Multimeter	Check the circuit and AC and DC voltage
9	Electric iron	Weld communications cable
10	Wire crimper	Crimp DC terminals
11	Hydraulic clamp	Crimp ring terminal for AC wiring

4.2.2 Installation place

Select installation site according to below requirements:

(1) The height of the installation position should ensure that the line of sight is at the same level as the LCD for viewing the parameters inverter conveniently.

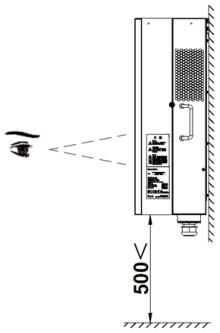


Figure 4.3 Optimal mounting height

(2) The installation site must be well ventilated and away from raindrops or direct sunlight.

(3) There must be enough pre-reserved space around the installation site for convenient installation and disassembly of the inverter and air convection, as shown in Fig 4.4.

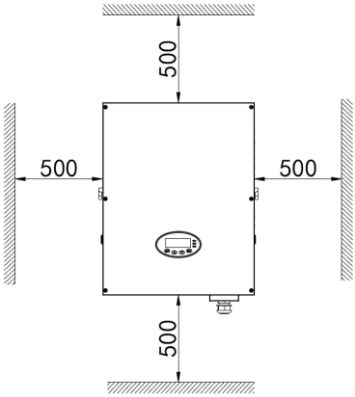


Fig 4.4 Installation spacing

When install more than one inverter, it is necessary to reserve a certain space between the inverters. The left and right spacing is shown as Figure 4.5, and the upper and lower sides of the inverter should have sufficient space to ensure good heat dissipation.

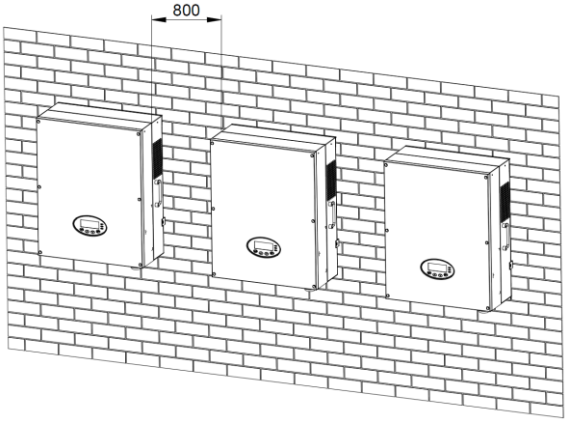


Figure 4.5 Side-by-side installation space requirements

(4) The ambient temperature of installation should be -25°C~60°C

(5) The installation site should be away from electronic devices which can generate strong electromagnetic interference

(6) The inverter should be installed on firm and solid surface eg wall surface and metal bracket

(7) The installation surface should be vertical to the horizontal line, as shown in Figure 4.6

Install the inverter vertically or backward ≤ 15° to facilitate heat dissipation.

Do not tilt the inverter forward, horizontal, upside down, over- backward, and roll when install the inverter.

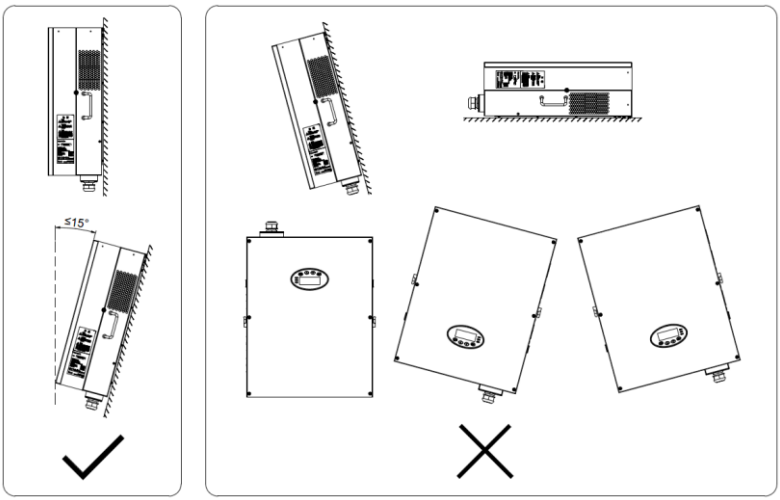


Fig 4.6 Installation position of the inverter

(8) The installation should ensure that the inverter is reliably grounded, and the material of grounded metal conductor should be consistent with the metal material reserved for the grounding of the inverter.

- Do not remove any part and component of the inverter unintended; otherwise damage to the device and physical injury may occur.

4.2.3 Connection cables

In order to regulate and compatible with the inverter AC/DC connector or terminal block specifications, below requirements on the AC/DC leads connected to corresponding inverter models should be fulfilled:

Table 4-4 Cable specifications

Model	DC side		AC side	
	Min cross-section area mm²(length≤50m)	Min cross section area mm² (Length>50m)	Min cross section area mm² (Length≤50m)	
			L	N/PE
12kW / 15kW / 17kW / 20kW-M	4	6	6	4
20kW / 25kW	4	6	8	4
30kW / 33kW / 35kW / 40kW	4	6	10	6

4.2.4 Miniature circuit breakers

In order to ensure safe operation of the inverter and circuits, it is recommended to configure corresponding micro breaker or fuse on the DC input end and AC output end of the inverter. Table 4-5 is the requirements recommended for micro breaker:

Table 4-5 Breakers specifications

Model	DC input	AC output
	Recommended DC breakers	Recommended AC breakers
12kW	DC1000V, C32A, 2P	AC400V, C25A, 4P
15kW	DC1000V, C32A, 2P	AC400V, C32A, 4P
17kW	DC1000V, C32A, 2P	AC400V, C35A, 4P
20kW-M	DC1000V, C40A, 2P	AC400V, C50A, 4P
20kW	DC1000V, C40A, 2P	AC400V, C50A, 4P
25kW	DC1000V, C40A, 2P	AC400V, C63A, 4P
30kW	DC1000V, C50A, 2P	AC400V, C63A, 4P
33kW	DC1000V, C50A, 2P	AC400V, C63A, 4P
35kW	DC1000V, C50A, 2P	AC400V, C63A, 4P
40kW	DC1000V, C50A, 2P	AC690V, C63A, 4P

4.3 Mechanical installation

The material for fixing the inverter and the installation mode vary with the different installation sites. It is recommended to install the inverter vertically to the firm wall or metal bracket. Here we take wall installation as an example to introduce the installation matters of the inverter.

As shown in Fig 4.7, the overall installation of the inverter should be vertical to the horizontal surface.

4.3.1 Installation of three-phase inverter

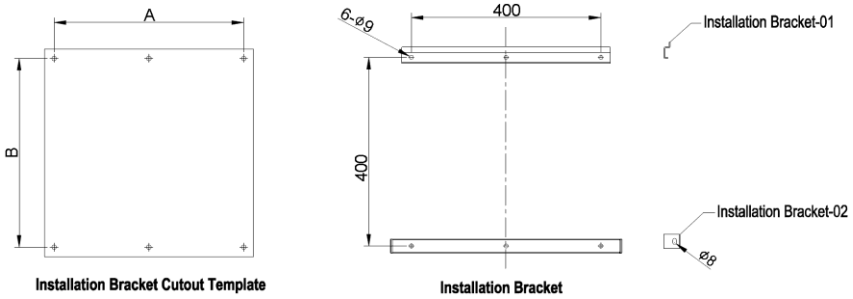


Figure 4.7 Installation bracket

Table 4-6 Instruction of installation bracket

Model	Installation hole	
	A(mm)	B(mm)
12kW / 15kW / 17kW / 20kW-M / 20kW / 25kW / 30kW / 33kW / 35kW / 40kW	400	400

Installation steps of three-phase inverter:

(1) Use the punch positioning plate in the packaging box to determine the punch position. As shown in Figure 4.8. Level the holes with a level ruler and mark it with a marking pen.

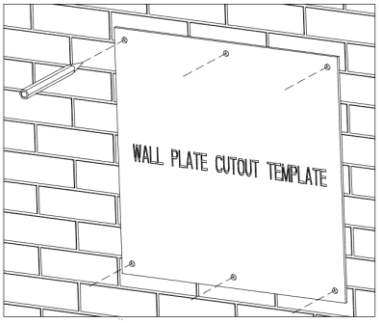


Figure 4.8 Mark the punch position

(2) Drill 6 installation holes on the wall with electric drill. As shown in Figure 4.9.

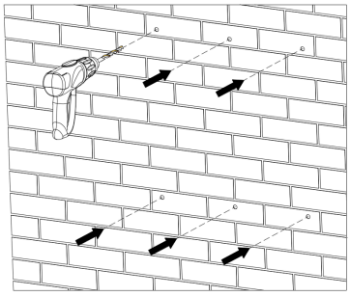


Figure 4.9 Drilling

(3) Fix the expansion bolts to the 6 installation holes with hammer, as shown in Figure 4.10.

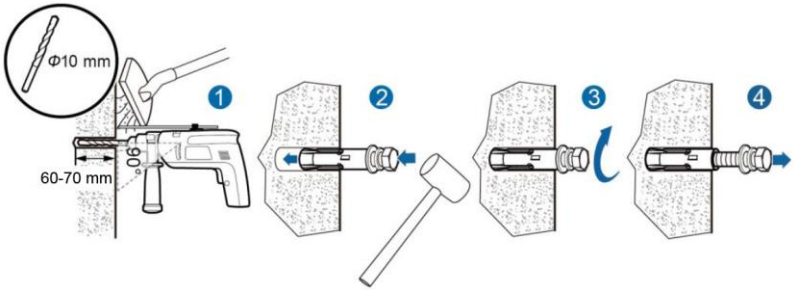


Figure 4.10 Install expansion bolts

(4) Fix the installation bracket onto the expansion bolts and ensure the installation is firm enough(tightening torque is 13N•m) . As shown in Figure 4.11.

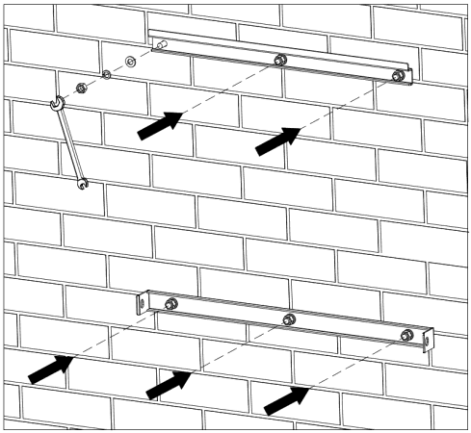


Figure 4.11 Fix the installation bracket

(5) Hang the inverter onto the installation bracket and ensure the installation is firm enough. As shown in Figure 4.12.

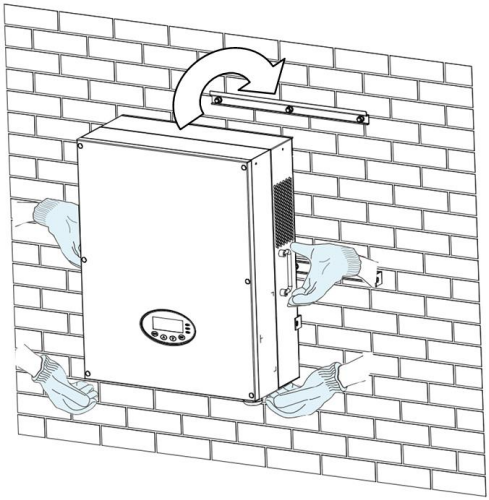


Figure 4.12 Installation of inverter

(6) Ensure the inverter is installed properly and tighten the M6X16 bolts into the screw holes on the left and right side of inverter(tightening torque is 4N•m). As shown in Figure 4.13.

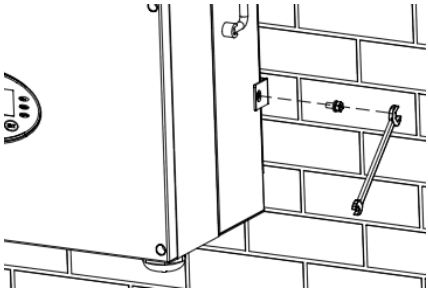


Figure4.13 Installation of M6X16 bolts

4.4 Electrical installation

This section presents the detailed contents and safety precautions related to electrical connection.

Fig 4.14 is the connection diagram for PV grid-connected system.

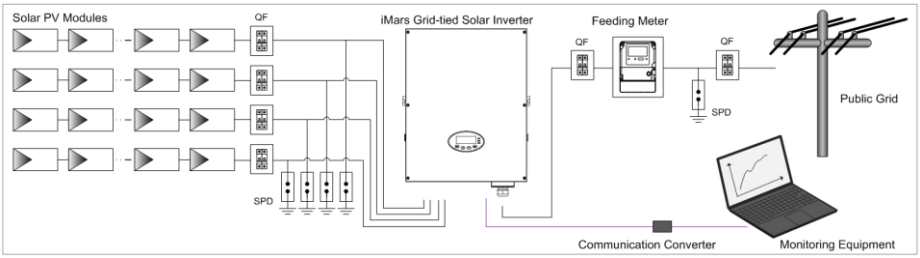


Figure 4.14 Block diagram of the grid-tied solar system

⚠	● Improper operation during the wiring process can cause fatal injury to operator or unrecoverable damage to the inverter. Only qualified personnel can perform the wiring work. ● All electrical installations must be in accordance with local and national electrical codes. ● All cables must be firmly attached, undamaged, properly insulated and adequately dimensioned. ● It is not allowed to close the AC and DC breakers before the inverter is electrically connected.
Note	● Read and follow the instructions provided in this section while observing all safety warnings. ● Always note the rated voltage and current defined in this manual. Never exceed the limits.

4.4.1 Connection of solar modules

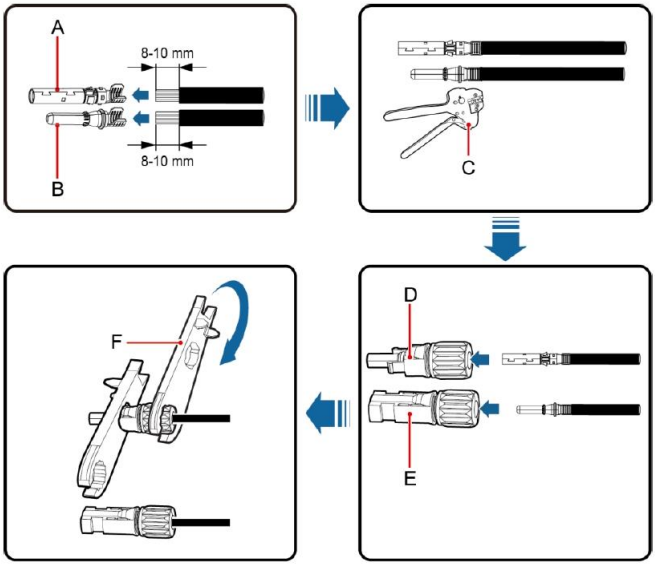


Figure 4.15 Connection between DC connector and solar modules

Connection steps:

(1) Lighting, short-circuit and other protection measures which meet the local electrical safety laws and regulations are needed before the AC connection;

⚠	● PV strings can be connected to inverter only after protection measures which conform to local electrical regulations are taken and the technical parameters in this manual are fulfilled.

(2) Connect the output cables of solar modules to the DC connector of inverter as Figure 4.15 shows. Remove the isolation layer of the DC cable for about 8-10mm. Insert the conductor part into the appropriate position of the connector, crimp the MC4 DC terminal and tighten the nut with a torque of 2.5-3Nm. Ensure the poles of solar modules are correctly and well connected with the connectors.

(3) After the DC connector is connected, use a multimeter to measure the voltage of the DC input string, verify the polarity of the DC input cable, and ensure that the voltage of each string is within the allowable range of the inverter, as shown in Figure 4.16.

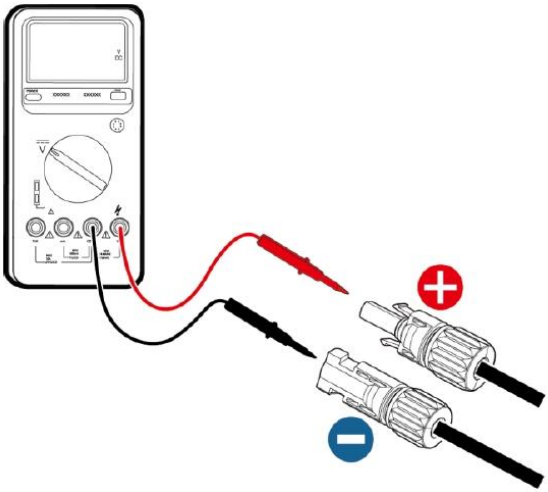


Figure 4.16 DC input voltage measuring

⚠	● The PV string connected to iMars series inverter must adopt the DC connector configured especially for the inverter, do not use other connection devices without authorization from our company, otherwise damage to the device, unstable operation or fire may occur and our company will not undertake quality assurance or assume any direct or joint liability thereof.

(4) Connect the DC connector with the inverter and ensure tightly-fastened;

(5) When removing the DC connector from the inverter, insert the head of the straight screwdriver into the raised hole in the middle of the connector, and force the movable end of the connector to exit.

4.4.2 AC connection of inverter

Table4-7 Port instruction of AC connector

AC connector	Three-phase	Remark
L1	L1 (A)	
L2	L2 (B)	
L3	L3 (C)	
N	N neutral wire	
⏚	PE grounding wire	Must be connected

The steps to access the grid are as follows:

(1)Lighting, short-circuit and other protection measures which meet the local electrical safety laws and regulations are needed before the AC connection.

⚠	● Only qualified cables under the local electrical safety laws and regulations and comply with the technical parameters of this manual are allowed to connect to the inverter. ● Only with the permission of the local electric power company can the inverter be connected to the utility grid.

(2) Disassemble the waterproof cover of the three-phase inverter AC junction box, as shown in Figure 4.17.

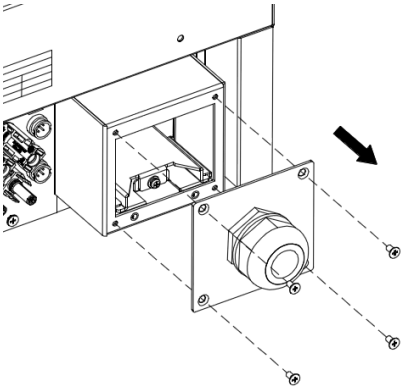


Figure 4.17 Unpacking the waterproof cover

(3) Remove the fixing screws of AC terminal rail, as shown in Figure 4.18.

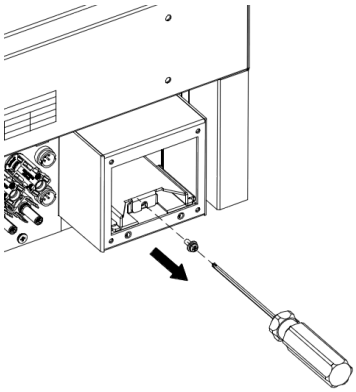


Figure 4.18 Remove fixing screws of the rail

(4) Pull out the AC terminal rail as shown in Figure 4.19.

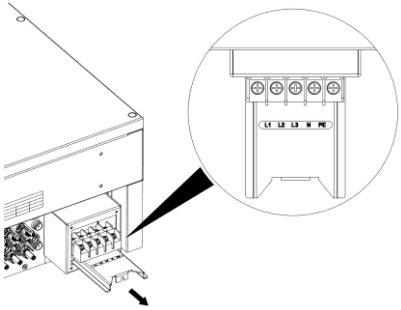


Figure 4.19 Pull out the rail

(5) Crimp the five wires(L1、L2、L3、N、PE) of the three-phase utility grid and the OT terminals firmly to ensure that the conductor of the wire is not exposed, as shown in Figure 4.20;

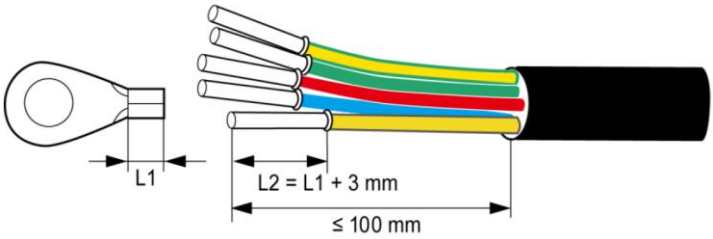


Figure 4.20 Wire crimp terminal

(6) The connection of AC cable and the connector should be correct and the screws are tightened. The tightening torque is 2N•m, as shown in Figure 4.21.

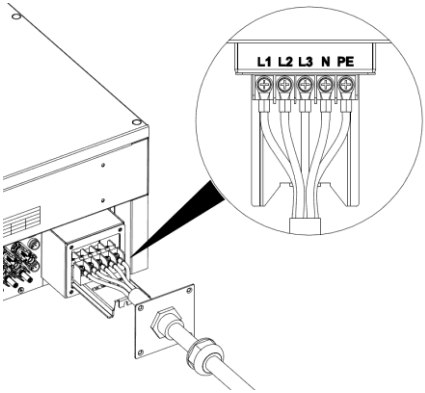


Figure 4.21 Connection of wire and connector

(7) Push the AC terminal rail into the inside of the case and fix the rail with screws. Then lock the waterproof cover of the junction box with the fixing screws. The tightening torque is 1.5 N•m. Finally, tighten the waterproof connector to complete the waterproofing of the cable, as shown in Figure 4.22.

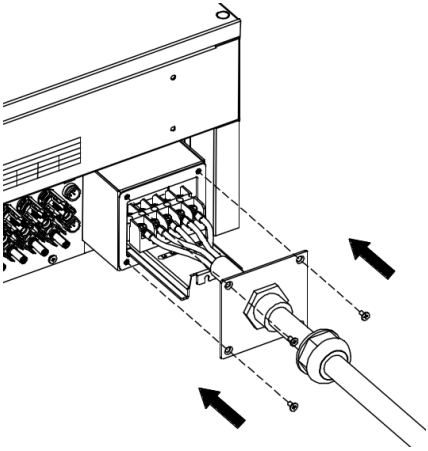


Figure 4.22 Fix the waterproof cover of junction box

5 Operation

This chapter describes detailed operation of the inverter which involves the inspection before operation, grid-tied operation, stopping and daily maintenance of the inverter.

5.1 Inspection before operation

Check as follows before operation (including but not limited to):

(1) Ensure the installation site meet the requirement mentioned in section 4.2.2 for easy installation, removing, operation and maintenance;

(2) Ensure the mechanical installation meet the requirement mentioned in section 4.3;

(3) Ensure the electrical installation meet the requirement mentioned in section 4.4;

(4) Ensure all switches are “off”;

(5) Ensure the voltage meet the requirement mentioned in technical parameters;

(6) Ensure all electrical safety precautions are clearly-identified on the installation site.

	● In order to ensure a safe, normal and stable operation of the PV power generation system, all the newly installed, renovated and repaired PV grid-connected power generation system and its grid-connected inverter must undergo inspection before running.

5.2 Grid-tied operation

Start the inverter according to below steps to achieve grid-connected operation of the inverter:

Note	● ***It is a must to select the country to set grid-connected standard during the initial operation of the inverter, see details at section 6.5.*** ● Keep the power-on state of the inverter for at least 30 minutes, and complete the charging of built-in clock battery of the inverter to ensure the clock can run normally!

Please start the inverter as follows:

(1) Ensure the requirements mentioned in section 5.1 are met;

(2) Switch on the breakers at the AC side;

(3) Switch on the integrated DC switch;

(4) Switch on the switch on the DC side;

(5) Observe the LED indicators and information displayed on the screen. Refer to chapter 6 for detailed information.

Run Green indicator blinks, others off: the inverter is power on and in self-inspection;
Run Green indicator on, others off: the inverter is in power generation after self-inspection----successful commissioning.
“Warn” or “Fault” indicators are on or blinking: the inverter is power on, but fault occurs. Please refer to section 6.3 for detailed information, and then stop as the section 5.3 mentioned, finally settle the problems as chapter 7. If all faults are solved, do as chapter 5 mentioned.

(6) Refer to section 6.4.4 to set the inverter time according to local time.

(7) The default DC input mode of inverter is “independent” mode; refer to section 6.4.4 to

check and set DC input mode.

5.3 Stopping

Stop the inverter as follows it needs maintenance, inspection and troubleshooting:

(1) Switch off the breakers at the AC side;

(2) Switch off the integrated DC switch;

(3) Switch off the switch on the DC side;

(4) Wait at least 5 minutes until the internal parts and components are discharged. And then stop the inverter.

5.4 Daily maintenance

In solar PV grid-connected power generation system, iMars series grid-connected inverter can realize grid-connected power generation and stop/start operations automatically day and light in whatever seasons. In order to safeguard and prolong the service life of the inverter, it is necessary to carry out daily maintenance and inspection on the inverter besides using the inverter strictly according to this manual.

5.4.1 Regular maintenance

Maintenance contents	Maintenance methods	Maintenance cycle
Store the operation data	Use real-time monitoring software to read inverter running data, regularly back up all inverter running data and stats. Check the monitoring software and inverter LCD screen to make sure the parameters are set correctly.	Once each quarter
Check inverter operation status	Check to make sure the inverter installation is solid, no damage or deformation. When inverter running, check to make sure the sound and variables are normal. When inverter running, use thermal imager to check whether the case cooling is normal.	Every six months
Clean the surface	Check the ambient humidity and dust around inverter, clean the inverter when necessary. See Section 4.4.2.	Every six months
Check electrical connection	Check the cable connection and inverter terminals, make sure they are connected reliably, not loose, and no damage, insulation reliable.	Every six months

Maintenance contents	Maintenance methods	Maintenance cycle
Maintenance and replace fan	Check the fans of three-phase inverter to make sure out of wind is normal, the sound is normal, the fan blades are no cracks, power lines and control signal lines are not damaged. If necessary, clean the air inlet and outlet; If not running properly, the fan must be replaced, see Section 4.4.2.	Every six months
Check the security features	Check the off-on feature of inverter: use monitoring software or LCD and keyboard on the inverter, do "off" and "on" operation, to confirm its off-on feature intact. At the same time, make sure monitoring software can normally communicate with the inverter. Check the warning label on or around the inverter, if necessary replaced.	Every six months

5.4.2 Maintenance guide

Clean the inverter

Cleaning procedure is as follows:

(1) Disconnect the input and output switches.

(2) Wait ten minutes.

(3) Use a soft brush or a vacuum cleaner to clean the surface and the inlet and outlet of the inverter.

(4) Repeat Section 5.1 operating content.

(5) Restart the inverter.

Clean the fans

Cleaning procedure is as follows:

(1) Disconnect the input and output switches.

(2) Wait ten minutes.

(3) Remove the inverter as the reverse steps of Section 4 content.

(4) Remove the cooling chamber or fan mounting plate, as shown in Figure 5.1 and Figure 5.2.

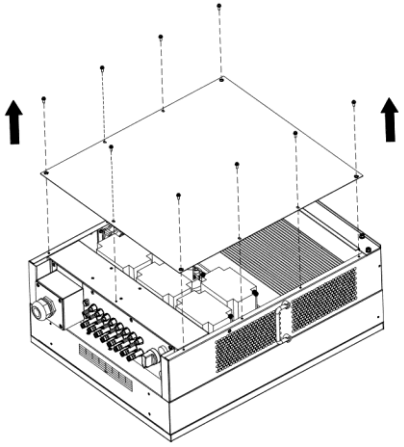


Figure 5.1 Remove the cooling chamber

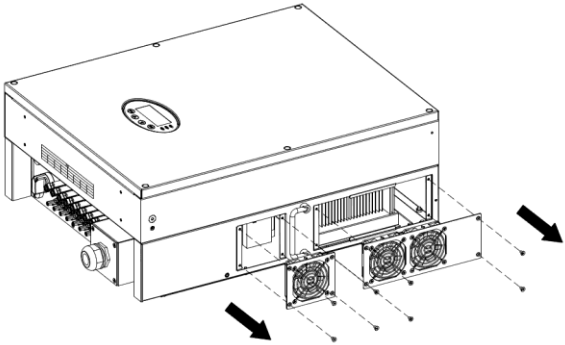


Figure 5.2 Remove the fan mounting plate

(5) Use soft brush or vacuum cleaner to clean the cooling chamber and the fans.

(6) Assembly the cooling chamber or fan mounting plate into inverter.

(7) Re-install the inverter to its original position as Section 4 of the content.

(8) Repeat Section 5.1 operating content.

(9) Restart the inverter.

Fan Replacement

If the inverter reports over-temperature fault, or non-normal fan operation noise, please replace the fan. This operation must be carried out by professionals.

	● Inverter should be shut down before maintenance work begins, and disconnect all power inputs. ● Wait at least 10 minutes, until the inverter internal capacitors discharge before maintenance work. ● Fan replacement must be carried out by professionals.

Fan replacement procedure is as follows:

(1) Disconnect AC breaker.

(2) Turn the DC switch to “OFF” position.

(3) Wait for at least 10 minutes.

(4) Disconnect all the electrical wirings at the bottom of the inverter.

(5) Lift up the inverter with the help of others and take the inverter off the wall.

(6) Place the inverter on the operation platform.

(7) Disassemble the fan box as shown in fig 5.2.

(8) Disassemble the damaged inverter fan as shown in Fig 5.3, then install the new fan back to its original position, and connect the fan power and control cable.

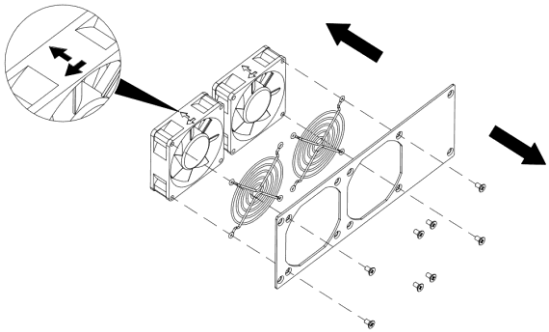


Figure 5.3 Replace fans

(9) Install the screws and covers of cooling bin or fan box to their original position.

(10) Install the inverter to its original position again according to section 4.

(11) Repeat the operations in section 5.1.

(12) Restart the inverter.

Note	● Once the inverter alarms and stop, do not be restarted before all the fault has been ruled out. Checks should be strictly in accordance with Section 5.1 steps.

6 Display panel

This chapter describes the panel displaying and how to operate on the panel, which involves the LCD display, LED indicators and operation panel.

The operation state and parameters can be attained from the LED indicators and LCD display. The displayed content and parameters can also be set or modified by the operation panel.

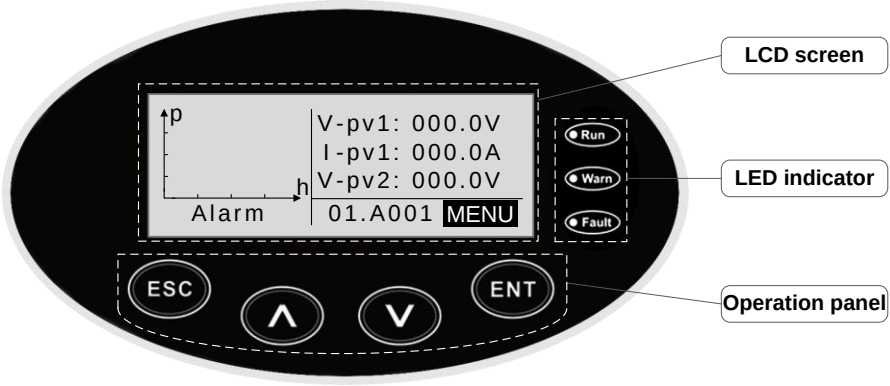


Figure 6.1 Operation panel

6.1 LED indicators

There are three LED indicators on the panel:

(1) “Run”, operation indicator, green;

(2) “Warn” recoverable fault indicator, yellow;

(3) “Fault”, unrecoverable fault indicator, red.

The inverter state includes 6 states of stand-by, self-inspection, power generation, recoverable fault and unrecoverable fault; LED indicators are on, off and blinking. Please refer to table 6-1 for detailed state of inverter and LED indicators state.

“○”: LED indicator is off;
“◐” (green), “◐” (yellow), “◐” (red): LED indicator is blinking at every 0.25S or 0.5S;
“●(Green), “●” (yellow), “●” (red): LED indicator is on.

Table 6-1 Inverter state and LED indicators

Inverter state	LED indicators	Description
Stand-by	○ Run ○ Warn ○ Fault	No power on. All indicators off.
Self-inspection	◐ Run ○ Warn ○ Fault	Green indicator blinks in every 0.25s, others off. Power on and ready for self-inspection
Power generation	● Run ○ Warn ○ Fault	Green indicator keeps on, others off. Grid-tied power generation.

Inverter state	LED indicators	Description
	Run Warn Fault	(1) Grid-tied power generation, but clock fault (A007); (2) Grid-tied power generation, but DC input fault (A001 or E001); (3) Grid-tied power generation，but fan fault(E006 or E012); Green and yellow indicator keeps on, others off.
Recoverable fault	Run Warn Fault	Inverter stand-by. The public grid fault(A001, A003, A004, A005or A006); Yellow indicator blinks in every 0.5s, others off
	Run Warn Fault	(1) Inverter stand-by. Temperature abnormal(E006); (2) Inverter stand-by. DC input fault (E001); Yellow indicator keeps on, others off
Unrecoverable fault	Run Warn Fault	Hardware or software fault (E003, E004, E005, E008, E009, E011, E013 or E015). De-couple the inverter from the system before maintenance. Red indicator blinks in every 0.5s, others off
	Run Warn Fault	Current-leakage or unqualified output power energy of the inverter (E007, E010, E014, E017, E018 or E020). De-couple the inverter from the system before maintenance. Red indicator keeps on, others off
Artificial turned off	Run Warn Fault	Stop after the communication or panel command. All indicators are on.
Note	Please refer to chapter 6 and 8 for detailed fault information and troubleshooting.	

6.2 Operation panel

There are 4 buttons on the panel:

(1) “ESC”, exit and return ;

(2) “∧”, back to the front page and data increasing;

(3) “∨”， to the next page and data decreasing;

(4) “ENT”, enter.

6.3 LCD screen

All information is displayed on the LCD screen. The background illumination of LCD screen will go out to save power if there is not button operation in 15 seconds. But it can be activated by pressing any button. Press “ENT” to enter into the main interface if the background illumination is on. All parameters can be viewed and set on the interface.

There are main interface and menu interfaces on the LCD screen, of which the main interface is the default one after power on, while the menu interfaces are used to watch and set parameters or other manual operation, such as viewing the monitoring parameters, history record, system information, statistics and fault information and setting the displayed language, time,

communication address, password and factory defaults.

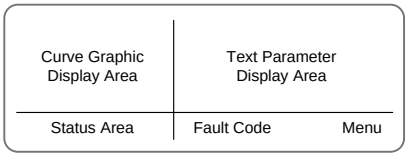


Figure 6.2 Main interface

The main interface of the LCD screen is shown as the figure above:

(1) The curve displays the power changing at the current day;

(2) The words on the screen display the current key parameters of the inverter. Three lines of words are displayed at a time, but if the inverter is in operation or stand-by state, the words are rolling forward at every 3s. And the user can press "∧" or "∨" to look up the information freely;

(3) 5 states of the inverter are displayed on the screen;

(4) If the inverter is in fault or warning state, up to 8 corresponding fault codes can be displaying on the screen.

6.4 Functions operation

Most of the parameters can be viewed and set through the LCD screen and operation panel.

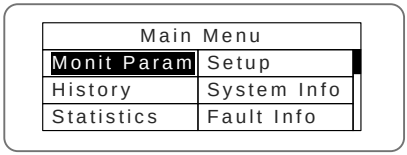


Figure 6.3 Main interface

6.4.1 Monitoring parameters

Press "∧" and "∨" in the main interface to select "Monit Param", and then press "ENT" to view the parameters which is shown in figure 6.4. Go the front or next page through "∧" and "∨" and return through "ESC".

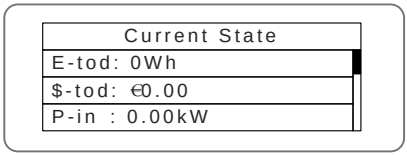


Figure 6.4 Monitoring parameters

Different inverter has different parameters. "●" in table 6-2 means the monitoring parameters of the inverter can be displayed on the LCD screen.

Table 6-2 Monitoring parameters

Monitoring content	12kW / 15kW / 17kW /20kW-M	20kW/ 25kW / 30kW / 33kW / 35kW / 40kW
Total power produced this day(E-tod)	●	●
Total power saved this day($-tod)	●	●
Input power(P-in)	●	●
Output power(P-out)	●	●
Peak power(PpDay)	●	●
Grid voltage U(VoutU)	●	●
Grid voltage V (VoutV)	●	●
Grid voltage W (VoutW)	●	●
Grid current U (IoutU)	●	●
Grid current V(IoutV)	●	●
Grid current W(IoutW)	●	●
Grid frequency(Fgrid)	●	●
Power factor(pf)	●	●
Input V 1(V-pv1)	●	●
Input I1 (I-pv1)	●	●
Input V2(V-pv2)	●	●
Input I2(I-pv2)	●	●
Grounding resistor(Riso)	●	●
Leakage current(Ileak)	●	●
Temperature 1(Tinv1)	●	●
Temperature 2(Tinv2)	●	●
Total power consumption(E-tot)	●	●
Total time(h-tot)	●	●
Current date(Data)	●	●
Current time(Time)	●	●
First power-on time of today (Power ON)	●	●
First running time of today (Run Time)	●	●
Peak power time of today (Ppk Time)	●	●
Stop running time of today(Today OFF)	●	●
Stop running time of yesterday (Last OFF)	●	●

6.4.2 History

Press "∧" and "∨" in the main interface to select "History", and then press "ENT" to view the parameters which is shown in figure 6.5.

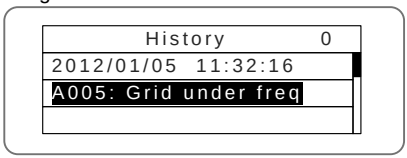


Figure 6.5 History parameters

There are 32 history records in total. Press "∧" and "∨" to review the history record and press "ESC" to exit. The numbers on the top right is the serial No. of the record and the numbers in the second line display date when faults occur and settled. If the color of the third line illuminates, the fault occurs, if not, the fault is solved.

6.4.3 Statistics

Press "∧" and "∨" in the main interface to select "Statistics", and then press "ENT" to view the parameters which is shown in figure 6.6.

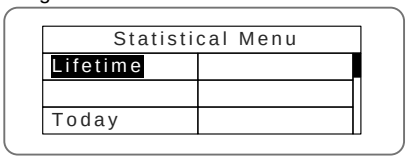


Figure 6.6 Statistic information

The information in table 6-3 can be viewed in the statistical menu.

Table 6-3 Statistic information

Content	Detailed
Lifetime	Total operation time, total power produced, total power saved, total CO_2 reduction in lifetime
Day statistics	Total power produced, total power saved, peak power and total CO_2 reduction in current day

6.4.4 Parameter settings

Press "∧" and "∨" in the main interface to select "Setup Menu", and then press "ENT" to view the parameters which is shown in figure 6.7.

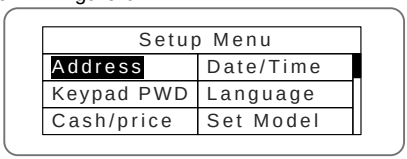
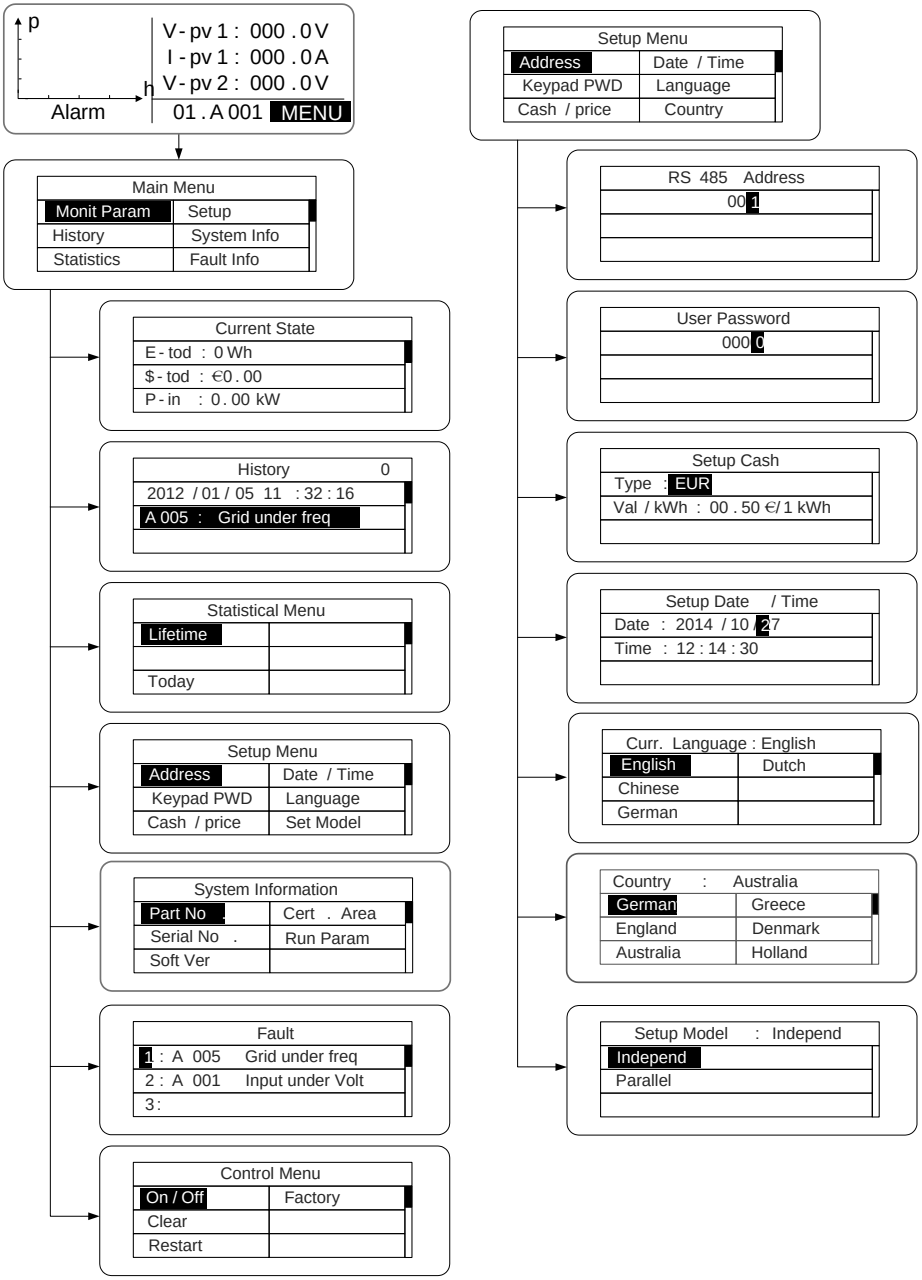


Figure 6.7 Setting information

Parameters can be set in this interface.

LCD menus:


p
h
Alarm
V-pv 1: 000.0V
I-pv 1: 000.0A
V-pv 2: 000.0V
01.A001 MENU
Main Menu
Monit Param
Setup
History
System Info
Statistics
Fault Info
Current State
E-tod : 0Wh
$-tod : €0.00
P-in : 0.00 kW
History 0
2012 /01/ 05 11 :32:16
A 005 : Grid under freq
Statistical Menu
Lifetime
Today
Setup Menu
Address
Date / Time
Keypad PWD
Language
Cash / price
Set Model
System Information
Part No
Cert . Area
Serial No .
Run Param
Soft Ver
Fault
1: A 005 Grid under freq
2: A 001 Input under Volt
3:
Control Menu
On / Off
Factory
Clear
Restart
Setup Menu
Address
Date / Time
Keypad PWD
Language
Cash / price
Country
RS 485 Address
001
User Password
0000
Setup Cash
Type : EUR
Val / kWh : 00.50 €/1 kWh
Setup Date / Time
Date : 2014 /10 /27
Time : 12:14:30
Curr. Language : English
English
Dutch
Chinese
German
Country : Australia
German
Greece
England
Denmark
Australia
Holland
Setup Model : Independ
Independ
Parallel

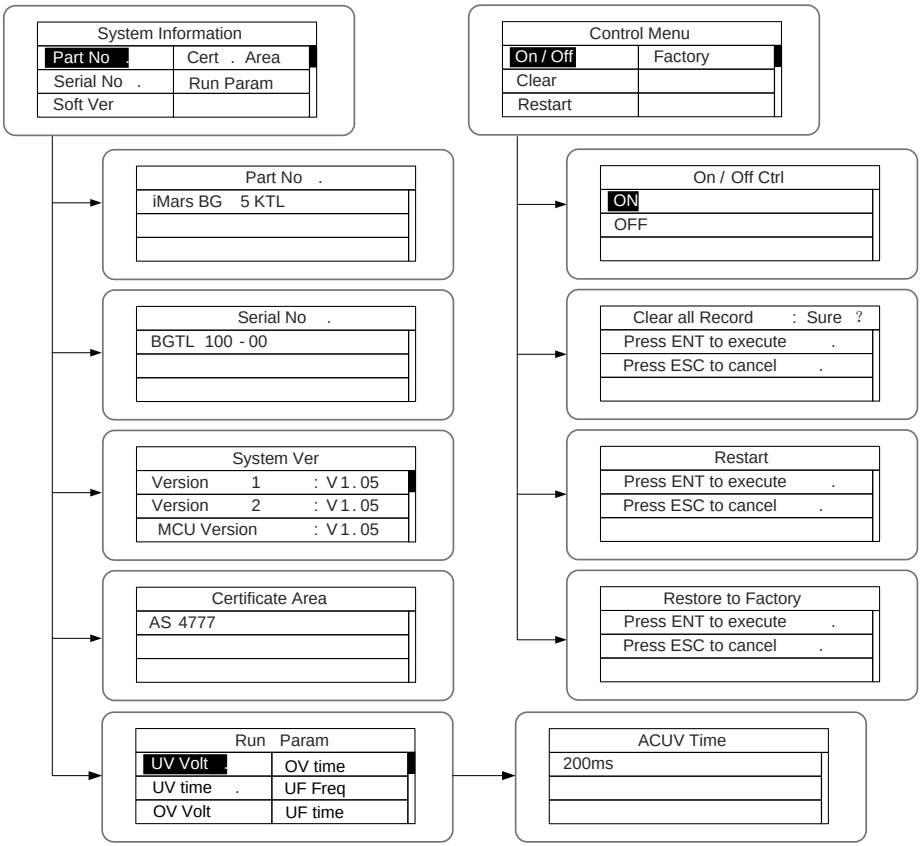
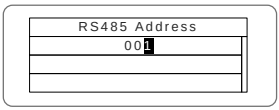
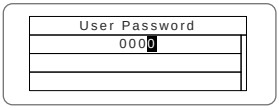
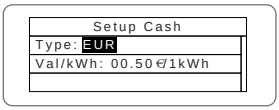
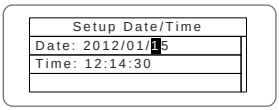
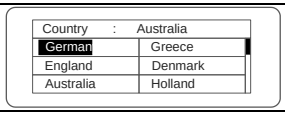
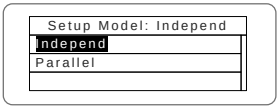
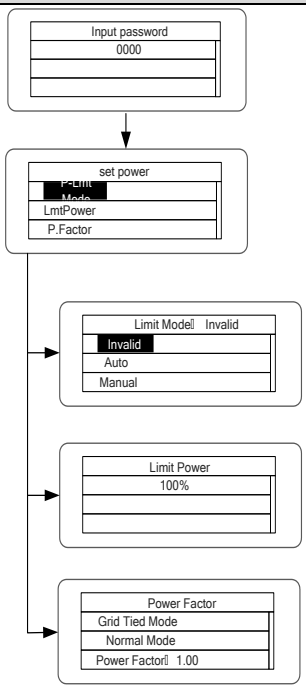
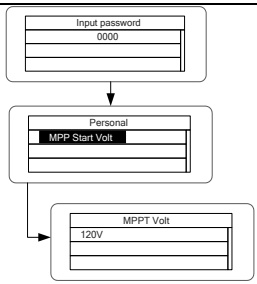
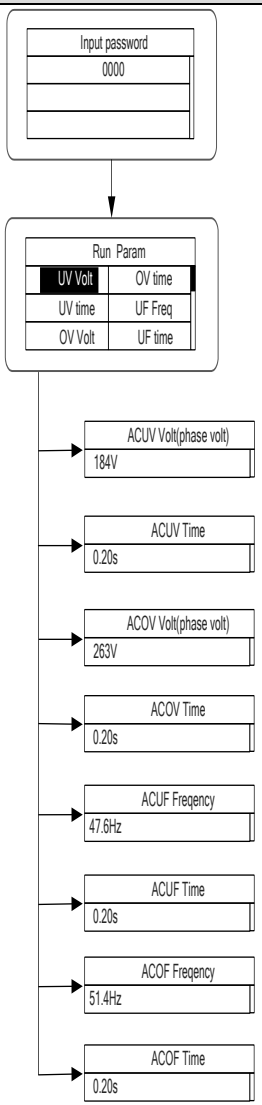


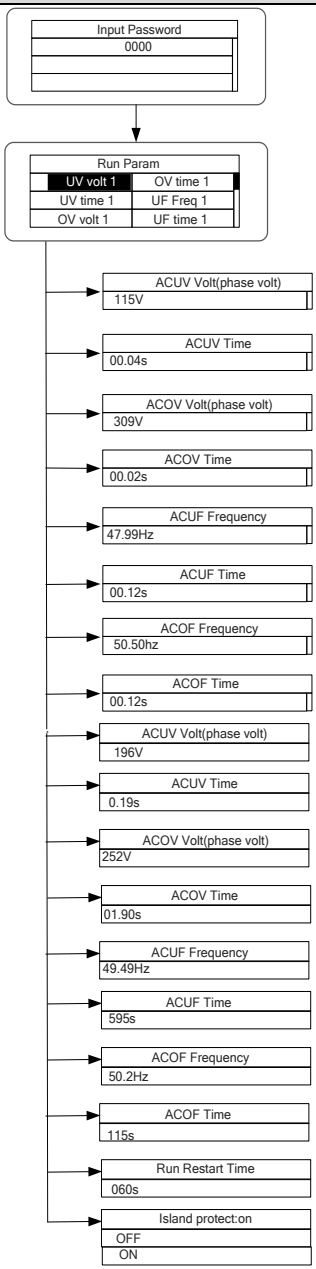
Table 6-4 Parameters setting

Setting item	LCD display	Instruction
RS485 Address		Enter into the interface and edit the data through "∧" or "∨". And then press "ENT" again to the next bit. After editing the three bits, press "ENT" to save the edition and press "ESC" to exit.
User password		Enter into the interface and edit the data through "∧" or "∨". And then press "ENT" again to the next bit. After editing the four bits, press "ENT" to save the edition and press "ESC" to exit. The default password is "0000"; the user can enter into the setting interface without password. If the password is not "0000", the user can enter into the setting interface with password.

Setting item	LCD display	Instruction
Setup Cash		Enter into the interface and edit the currency type and cash through "∧" or "∨". And then press "ENT" again to the next line. After editing the four bits, press "ENT" to save the edition and press "ESC" to exit. The currency types include EUR, POD, CNY and USD.
Setup Date/Time		Enter into the interface and edit the date and time through "∧" or "∨". And then press "ENT" again to the next line. After editing the four bits, press "ENT" to save the edition and press "ESC" to exit.，
Language		Enter into the interface and edit the language through "∧" or "∨". And then press "ENT" again to save the edition and press "ESC" to exit. The default language is English.
Select Country		Enter into the interface and select country through "∧" or "∨". And then press "ENT" again to save the edition and press "ESC" to exit.
Setup mode		The DC input mode includes "independent" and "parallel": "independent mode" is the independent MPPT of Track A and Track B; "parallel mode" is the parallel MPPT of Track A and Track B. The default mode is "independent". The input mode setting is invisible if the inverter is in power generation. It is only available during DC power on and AC power off. Press "∧" or "∨" to select the setting mode and press "ENT" to save the setting or "ESC" to return. If the situation of section 5.4.8 occurs, it is necessary to switch the DC input to "parallel" mode.

Setting item	LCD display	Instruction
Set power		The password is needed when enter into the interface of “Set power”. Get the password from the supplier if necessary. There are 3 submenus: ①P-Lmt Mode: invalid (limited power function is invalid),auto (special for single phase) ,manual (set the limit of output value manually); ② LmtPower: this function is only valid when the P-Lmt Mode is manual, the percentage is that of the rated power and the setting range is from 10% to 100%; ③p.Factor: includes normal model (default value “1”), current advanced mode and current hysteresis mode and the setting rage is -0.9-0.99. (the machine of three phase only has the function of ③)
Personal		This function is only valid for single phase inverters. The password is needed when enter into the personal interface. Get the password from the supplier if necessary. It can set MPPT starting voltage from 120V to 160V under the submenu of ”MPPT start volt”.

Setting item	LCD display	Instruction
Run Param		Password is required when enter into the interface of “Run Param”. Get the password from the supplier if necessary. Set ACUV Volt, ACUV time and others under the related submenus, and then press “ ∧ ” and “ ∨ ” to modify, and finally press “ENT” to confirm.

Setting item	LCD display	Instruction
Run Param		There are 2 protections under G83/G59(UK) and PEA(Thailand) standards, and there is only one protection under other grid tied standard. Set ACUV Volt, ACUV time and others under the related submenus, and then press “ ∧ ” and “ ∨ ” to modify, and finally press “ENT” to confirm. Generally, it is only necessary to set ACUV and ACUF value for ACUV and ACUF protection. And it is necessary to set ACOF1 and ACOF2 together for ACOF protection.

6.4.5 System Information

Press "∧" and "∨" in the main interface to select "System Information", and then press "ENT" to view the parameters which is shown in figure 6.8.

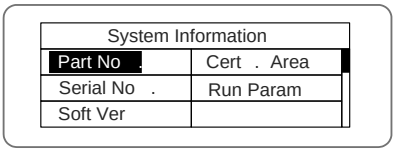


Figure 6.8 System information

The system information include "product model", "serial No.", "software version" and "certificate version".

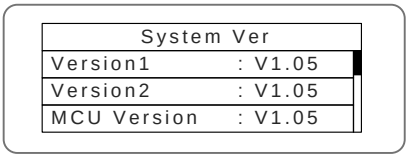


Figure 6.9 System version

6.4.6 Faults

Press "∧" and "∨" in the main interface to review the fault history, and then press "ENT" to view the sub-menu which is shown in figure 6.10.

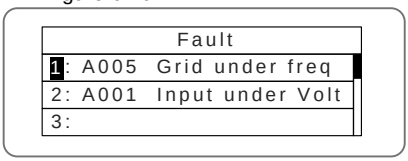


Figure 6.10 Fault information

There are 8 pieces of fault information in the record which is shown in figure 5.10; otherwise it will display "No Fault!" Refer to section 6.4.2 for more detailed information.

6.4.7 Inverter control

Press "∧" and "∨" in the control interface, and then press "ENT" to view the sub-menu which is shown in figure 6.11.

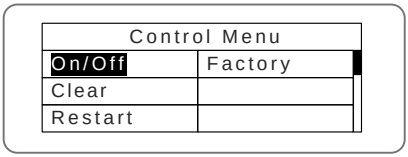


Figure 6.11 Control interface

Refer to the table below for detailed information.

Table 6-5 Inverter control

Control item	LCD display	Instruction
On/Off control	On/Off Ctrl ON OFF	Control the “On/Off” through the panel. Press “ ^ ” and “ v ” in the control interface to select the operation. Press “ENT” to ensure the operation and press “ESC” to return.
Restart	Restart Press ENT to execute. Press ESC to cancel.	Restart the inverter through the panel. And save the all settings and operation record. Press “ENT” to ensure restarting and the inverter will begin to self-inspect or press “ESC” to return.
Record clear	Clear all Record: Sure? Press ENT to execute. Press ESC to cancel.	Press “ENT” to ensure clear all records or press “ESC” to return. “Record clear” is to clear all setting parameters through the panel, restore to the factory setting and save all history operation records.
Restore to factory	Restore to Factory Press ENT to execute. Press ESC to cancel.	“Restore to factory” is to clear all setting parameters and history operation records through the panel, restore to the factory setting. Press “ENT” to ensure clear or press “ESC” to return.

6.4.8 Mode settings

The default mode of series grid-tied solar inverter is “independent”. But if the current of solar modules are joined into the inverter as figure 6.12 shows, it is necessary to switch the mode into “parallel”.

The mode 12kW / 15kW /17kW / 20kW / 25kW / 30kW / 33kW / 35kW / 40kW Please refer to section 6.4.4 for detailed setting.

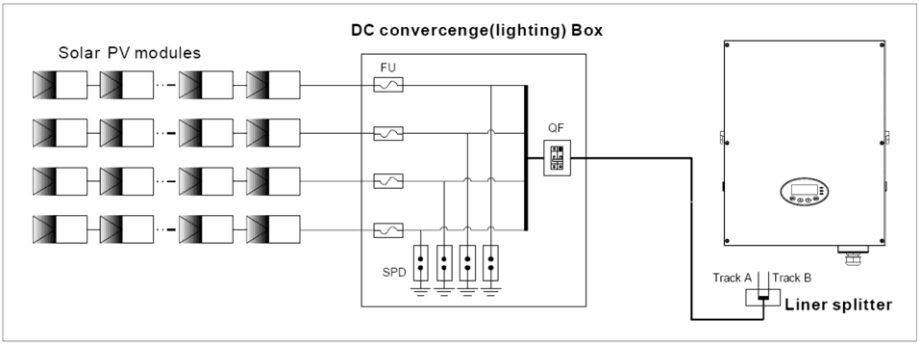
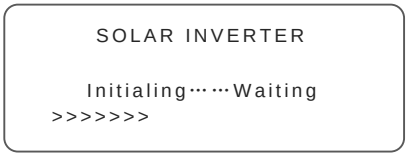


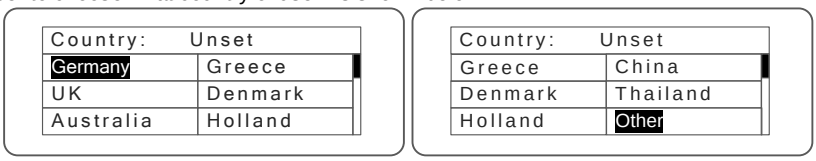
Figure 6.12 “Parallel” input mode

6.5 Grid Certification Choice

Power on the inverter by DC input for the first time or after Restore factory settings, it will appear on the LCD screen prompts as follows:



Waiting a few seconds later, in the LCD screen will appear a list of countries as follows, requiring the user to choose what country of use. As shown below:



Press the "^" or "v" button to navigate the country, press the ENT button to complete the setting.

After determine the location, please follow the user manual required with the proper use of inverter.

Comparison Table: Available Countries and their grid certification

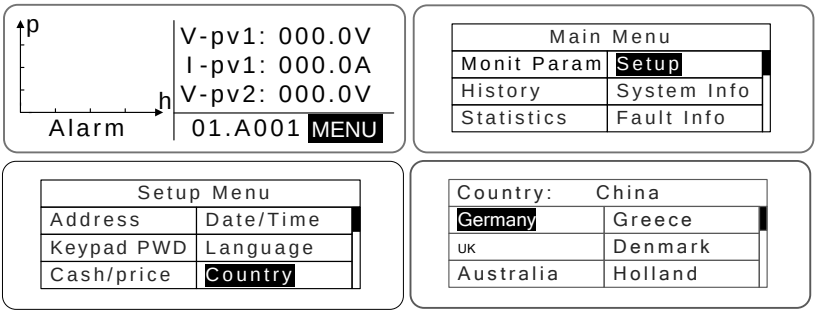
No.	Country	Certification	Remark
1	Germany	VDE0126& AR-N4105	
2	UK	G83/G59	
3	Australia	AS4777	
4	Greece	VDE0126	
5	Denmark	TF3.2.1	
6	Holland	C10/C11	
7	China	CQC	
8	Thailand	PEA	
9	Other	VDE0126	

Reference Table: Grid Certification and Grid Voltage and Frequency of Some Countries

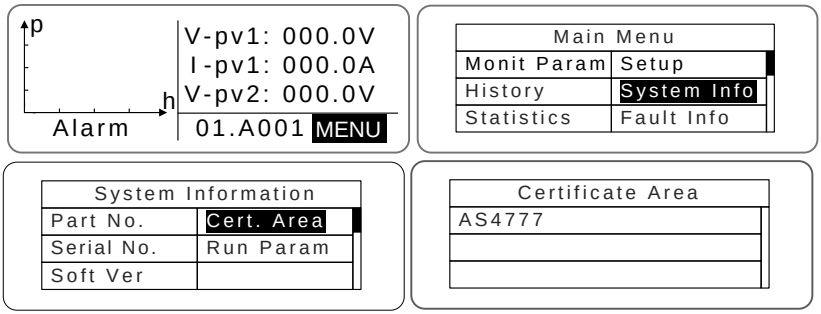
No.	Country	Certification	Three-phase voltage	Grid frequency
1	Germany	VDE0126& AR-N4105	380~400V	50Hz
2	France			
3	Greece			
4	Turkey			
5	Romania			
6	Slovakia			
7	Portugal			
8	Poland			
9	Hungary			
10	Switzerland			
11	Austria			

No.	Country	Certification	Three-phase voltage	Grid frequency
12	UK	G83-2/G59-3	415V	50Hz
13	Australia	AS4777.2&AS4777.3 AS/NZS3100	400~415V	50Hz
14	Singapore			
15	New Zealand			
16	Belgium	C10/C11	380~400V	50Hz
17	Luxembourg			
18	Holland			
19	Denmark	TF3.2.1	380~400V	50Hz
20	Thailand	PEA	380V	50Hz
21	China	CGC/CF001	380V	50Hz
22	Italy	ENEL	400V	50Hz

The user can change the location through the following ways:
LCD Screen：MENU→Main Menu: Setup→Setup Menu: Country→Country:



The user can query the grid certification which has been set through the following ways:
LCD Screen：MENU→Main Menu: System Info→System Information: Cert. Area→Certificate Area



7 Monitoring communication

This chapter describes the communication connection of inverter and monitoring system (Industrial master, private computers, smart phones and so on).

7.1 Standard communication

The standard communication mode of iMars grid-tied solar inverter is RS485 which includes “RS485” and “EXT” ports. The two ports can both communicate with private computers, smart phones and so on. The system monitoring solution are shown as figure 7.1.

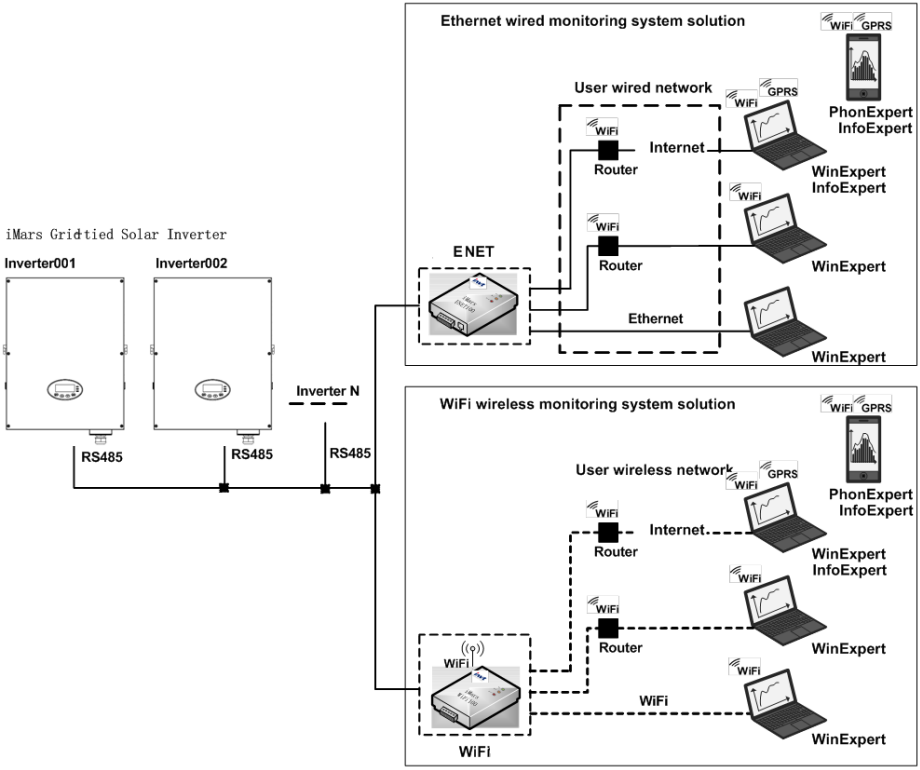


Figure 7.1 Monitoring system of inverter

Table 7-1 Pins on inverter instruction

Pin on inverter	Definition
1	+5VDC
2	A (RS485+)
3	B (RS485-)
4	GND

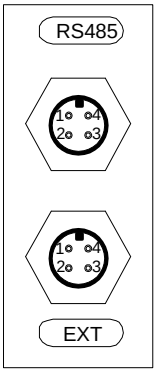


Figure 7.2 RS485 pin on inverter

Figure 7.3 Communication connector

Connection steps:

(1) Connect the communication connector configured for the inverter to the RS485 terminal of the inverter, as shown in Fig 7.4;

(2) According to Table 7-1, connect the communication connector pinout and the user's device, make sure the connection is correct.

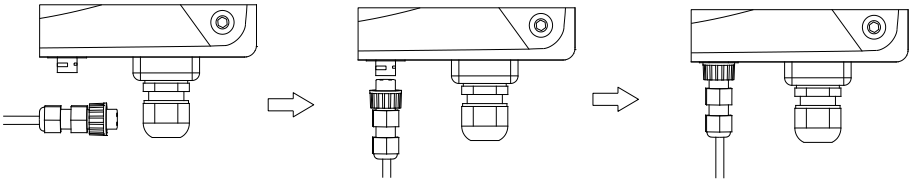


Figure 7.4 Communication cable connection

(3) Please download the monitoring software “iMars WinExpert” and its operation instruction on website.

7.2 Optional communication

The optional communication modes include Ethernet, WiFi, GPRS and ENET，which also need corresponding communication parts and components as shown in Table 7-2.All operation parameters of the inverter are output from port “RS485-M” to the communication devices, finally transmitted to the monitoring system as standard Ethernet and WIFI signal. See Figure 7.1.

Table 7-2 Optional communication accessories

Optional accessories	Inverter port	Port of upper PC
Ethernet convert	RS485-M	RJ45 pin
WiFi converter	RS485-M	WiFi signal
GPRS converter	RS485-M	GPRS signal
ENET converter	RS485-M	Ethernet port

Please download the connection instruction, operation manual and commissioning tools on website.

Note: the optional accessories are not standard-configured, need to buy separately.

8 Troubleshooting

This chapter describes the fault alarm and fault code for quick troubleshooting.

Table 8-1 Fault code

Fault code	Message	Instruction	Fault analysis
A			
A001	Input UV	Input undervoltage	PV1 undervoltage PV2 undervoltage
A002	Bus UV	Bus undervoltage	DC input
A003	Grid UV	AC undervoltage	Low voltage of the public grid
A004	Grid OV	AC overvoltage	High voltage of the public grid
A005	Grid UF	AC underfrequency	Low frequency of the public grid
A006	Grid OF	AC overfrequency	High frequency of the public grid
A007	Clock Fail	Clock alarm	Wrong setting
A009	Cmd Shut	Manual stutdown	Stop by the operation panel or upper PC
A011	Grid Loss	The public grid disconnects.	Check if inverter AC connection is well
E			
E001	Input OV	Input overvoltage	DC input overvoltage
E003	Bus OV	Bus overvoltage	Internal bus voltage
E004	Boost Fail	Voltage-boost fault	Voltage-boost fault of the inverter
E005	Grid OC	AC overcurrent	Internal AC overcurrent
E006	OTP	Overtemperature	Internal overtemperature
E007	Riso Low	Low isolation impedance	Low isolation impedance of the external port system
E008	IGBT drv	IGBT drive protection	IGBT drive protection of the inverter
E009	Int Comm	Internal communication fault	Master-slave DSP communication disabled Error of master-slave DSP check bit
E010	ILeek Fail	Huge leakage current	Huge leakage current of the system or inverter
E011	Relay Fault	Relay fault	Internal relay fault
E012	Fan Fail	Fan fault	Internal fan fault
E013	Eeprom	Memory error	Internal memory error
E014	Dc inject	High DC injection	High DC injection during AC output

Fault code	Message	Instruction	Fault analysis
E015	OutputShort	Output short-circuit	Output short-circuit
E018	Input OC	Input overcurrent	DC input overcurrent
E019	Incnst	Data consistency fault	Inconsistent grid voltage, frequency, leakage current or AC/DC injection
E020	PowerReversed	DC power reversed	DC power reversed

If any problem, please contact with the supplier and provide following information:

- Model of the inverter:_____;
- Serial No. of the inverter:_____;
- System version:——version 1: _____;
  ——version 2: _____;
  ——MCU software version: _____;
- Fault code:_____;
- Fault description_____.

9 Contact us

Shenzhen·China

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E-mail: solar-service@invt.com.cn

INVT group website: www.invt.com

INVT solar website:: www.invt-solar.com

10 Technical parameters

Table 10-1Technical parameters

Model		Three-phase				
		BG12KTR	BG15KTR	BG17KTR	BG20KTR-M	BG20KTR
Input(DC)	Max. DC voltage (V)	1000	1000	1000	1000	1000
	Starting voltage (V)	200	200	200	300	300
	MPPT voltage range(V)	180 - 800	180 - 800	180 - 800	280-800	280-800
	Rated DC input voltage range(V)	350 - 800	400 - 800	400 - 800	450-800	450-800
	Number of MPPT/string per MPPT	2/2				2/3
	Max. DC input power (W)	12500	15600	17500	20800	20800
	Max. DC current (A) X Number of MPPT	19x2	21x2	23×2	25X 2	25X 2
	Isc PV（A）	21x2	23.5x2	25.5×2	27X 2	27X 2
	Maximum backflow current (inverter backflow to PV array)	0A	0A	0A	0A	0A
	DC switch	Optional				
Output(AC)	Max output power(W)	12000	15000	17000	20000	20000
	Voltage(V)/ frequency(Hz) range	320~460Vac、50Hz(47~51.5Hz)				
	Maximum output current(A)	19.3	24.1	27.3	32	
	Maximum output fault current	250A @41.6ms			472A @11.04ms	
	AC inrush current	Less than 10 A			Less than 20 A	
	Maximum output overcurrent protection(A)	38.2	47.7	54	63.3	
	Power factor	-0.80~+0.80(adjustable)				
	Harmonic distortion	< 3% (rated power）				
Output(AC)	Cooling method	Air cooling				
	Maximum efficiency	98.20%	98.30%	98.30%	98.4%	98.4%
	European efficiency	97.60%	97.80%	97.80%	98.0%	98.0%
	MPPT efficiency	99.9%				
	Protection degree	IP65				
	Power consumption at night	< 1W				
	Isolation mode	Transformerless				
	Safety class	I				
	Overvoltage protection class	AC:III,PV:II				
	Inverter topology	Non-isolated				
	Pollution degree	3				
	Operation temperature	-25℃~+60℃,（Derate after 45℃）				
	Relative humidity	4~100%, Condensation				
	Max. altitude(m)	≤2000， (Derate if the altitude＞2000)				
	Display	3.5 inches' LCD, support backlight display				
	System language	English, Chinese, German, Dutch				
	Communication	RS485 (standard),Ethernet, WiFi (optional)				
	DC terminal	BC03A/ BC03B				
	Noise dB(A)	≤55				
	Installation mode	Wall installation				
Others	Grid standard	DIN VDE 0126-1-1：2013，VDE-AR-N 4105：2011，DIN VDE V 0124-100：2012，IEC 61727（IEC62116），AS/NZS 4777.2：2015，NB/T32004-2013，IEC 60068-2-1：2007，IEC 60068-2-2：2007，IEC 60068-2-14：2009，IEC 60068-2-30：2005，IEC 61683：1999，C10/11：2012				
	Safe certificate / EMC category	IEC 62109-1 ：2010，IEC 62109-2 ：2011，EN 61000-6-2: 2005 / EN 61000-6-3:2007/A1:2011				
Protection	Input overvoltage protection, input overcurrent protection, DC isolation monitoring, DC monitoring, grounding fault current monitoring, grid monitoring, island protection, short circuit protection, overheating protection etc.					

Model		Three-phase				
		BG25KTR	BG30KTR	BG33KTR	BG35KTR	BG40KTR
Input(DC)	Max. DC voltage (V)	1000	1000	1000	1000	1000
	Starting voltage (V)	300	300	300	300	300
	MPPT voltage range(V)	280-800	280-800	280-800	280-800	280-800
	Rated DC input voltage range(V)	480-800	480-800	520-800	550-800	560~800
	Number of MPPT/string per MPPT	2/3			2/4	
	Max. DC input power (W)	26000	31200	36000	38000	42800
	Max. DC current (A) X Number of MPPT	30 X 2	33X 2	33X 2	33X 2	33X 2
	Isc PV（A）	33 X 2	36X 2	33X 2	33X 2	36X 2
	Maximum backflow current (inverter backflow to PV array)	0A	0A	0A	0A	0A
	DC switch	Optional				
Output(AC)	Max output power(W)	25000	30000	33000	35000	40000
	Voltage(V)/ frequency(Hz) range	320~460Vac、50Hz(47~51.5Hz)			375~483Vac, 50Hz(47~51.5 Hz)	384~552Vac, 50Hz(47~51.5Hz)
	Maximum output current(A)	40	48			
	Maximum output fault current	472A ,11.04ms				
	AC inrush current	Less than 20 A				
	Maximum output overcurrent protection(A)	79.1	95			
	Power factor	-0.80~+0.80(adjustable)				
	Harmonic distortion	< 3% (rated power）				
Output(AC)	Cooling method	Air cooling				
	Maximum efficiency	98.4%	98.5%	98.5%	98.5%	98.60%
	European efficiency	98.0%	98.0%	98.1%	98.1%	98.2%
	MPPT efficiency	99.9%				
	Protection degree	IP65				
	Power consumption at night	< 1W				
	Isolation mode	Transformerless				
	Safety class	I				
	Overvoltage protection class	AC:III,PV:II				
	Inverter topology	Non-isolated				
	Pollution degree	3				
	Operation temperature	-25℃~+60℃,（Derate after 45℃）				
	Relative humidity	4~100%, Condensation				
	Max. altitude(m)	≤2000， (Derate if the altitude＞2000)				
	Display	3.5 inches' LCD, support backlight display				
	System language	English, Chinese, German, Dutch				
	Communication	RS485 (standard),Ethernet, WiFi (optional)				
	DC terminal	BC03A/ BC03B				
	Noise dB(A)	≤55				
	Installation mode	Wall installation				
Others	Grid standard	DIN VDE 0126-1-1：2013，VDE-AR-N 4105：2011，DIN VDE V 0124-100：2012，IEC 61727（IEC62116），AS/NZS 4777.2：2015，NB/T32004-2013，IEC 60068-2-1：2007，IEC 60068-2-2：2007，IEC 60068-2-14：2009，IEC 60068-2-30：2005，IEC 61683：1999，C10/11：2012				
	Safe certificate / EMC category	IEC 62109-1 ：2010，IEC 62109-2 ：2011，EN 61000-6-2: 2005 / EN 61000-6-3:2007/A1:2011				
Protection	Input overvoltage protection, input overcurrent protection, DC isolation monitoring, DC monitoring, grounding fault current monitoring, grid monitoring, island protection, short circuit protection, overheating protection etc.					