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 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.

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

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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 waring 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	Electrostatic sensitive	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	The procedures taken for ensuring proper operation.	Note

1.2 Safety guidelines

	● After receiving this product, first make sure that the product is well packaged. If you have any questions, please contact the shipping company or local distributor immediately. ● Installation of PV inverters must be performed by professional technician who has been specially trained, thoroughly read and familiar with all the contents of this manual and familiar with 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.
	● It 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 before electrical connection. Exposed to sunlight, solar modules will output dangerous voltage. ● The inverter input voltage can 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 series 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 DC 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 series 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.
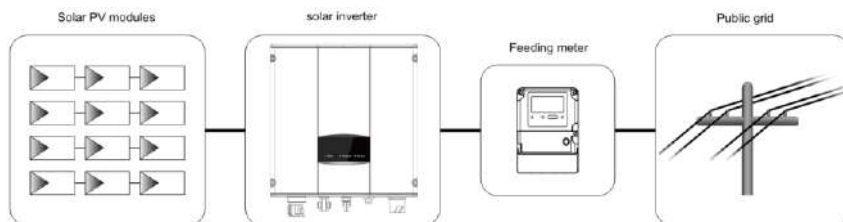
Figure 2.1 Application of iMars series grid-tied solar inverters

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 series 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 standard.

2.1.2 Supported grid connection structure

iMars series grid-tied solar inverters support TN-S, TN-C, TN-C-S and TT grid connection. When applied to the TT connection, the N-to-PE voltage should be less than 30V.
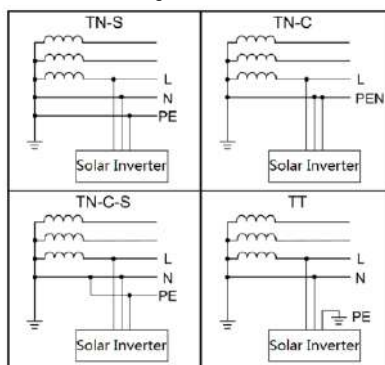
Figure 2.2 Type of grid

2.2 Products appearance
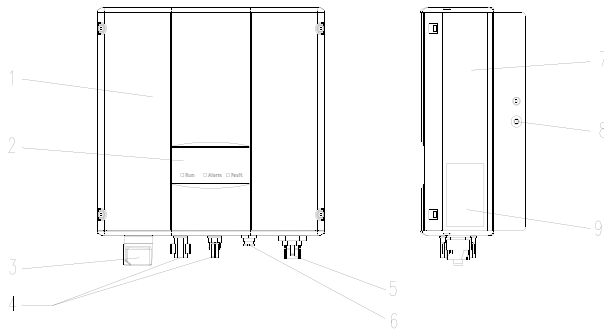
Figure 2.3 Products appearance

Table 2-1 Parts instruction

No.	Name	Instruction
1	Cover	
2	LED display panel	LED indicators
3	DC switch	On –off of the DC input (optional)
4	DC input port	For the connection of solar modules
5	AC terminal	For the connection of AC output
6	Communication port	RS485 and EXT communication port
7	Cooling chamber	
8	Radiator	
9	Name plate	For rated parameters and safety precautions of the inverter

2.3 Nameplate

Inverter nameplate as shown in Figure 2.4
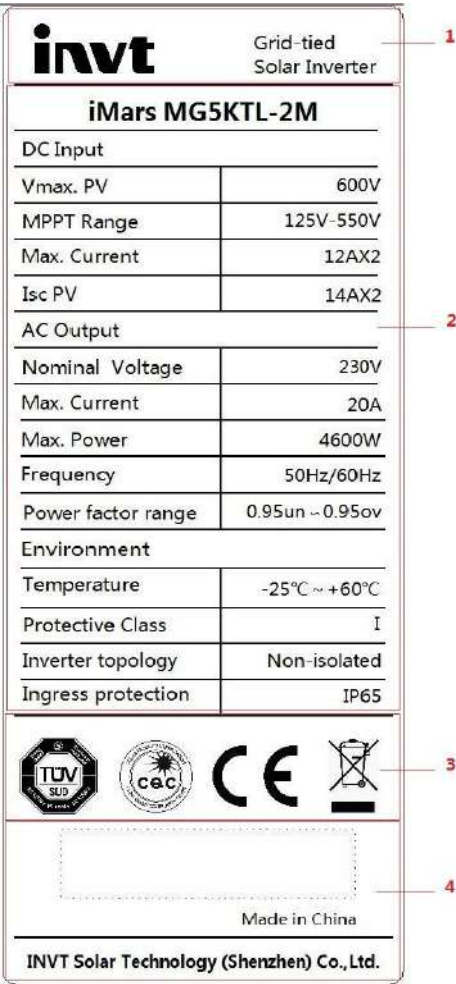
Figure 2.4 Inverter nameplate

（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 Products modules

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

Product name	Model	Rated output power
Single-phase (L, N, PE)		
Single-phase grid-tied solar inverter	iMars MG750TL	750
Single-phase grid-tied solar inverter	iMars MG1KTL	1000
Single-phase grid-tied solar inverter	iMars MG1K5TL	1500
Single-phase grid-tied solar inverter	IMars MG2KTL	2000
Single-phase grid-tied solar inverter	iMars MG3KTL	3000
Single-phase grid-tied solar inverter	iMars MG4KTL	3680
Single-phase grid-tied solar inverter	iMars MG4K6TL	4200
Single-phase grid-tied solar inverter	iMars MG5KTL	4600
Single-phase grid-tied solar inverter	iMars MG5K5TL	5000
Single-phase grid-tied solar inverter	iMars MG3KTL-2M	3000
Single-phase grid-tied solar inverter	iMars MG4KTL-2M	3680
Single-phase grid-tied solar inverter	iMars MG4K6TL-2M	4200
Single-phase grid-tied solar inverter	iMars MG5KTL-2M	4600
Single-phase grid-tied solar inverter	iMars MG5K5TL-2M	5000

Note: The technical parameters of grid-tied solar inverter refer to the appendix.

2.5 Dimensions and weight
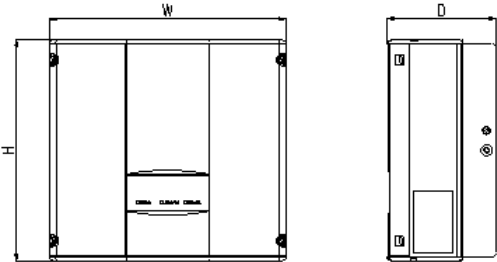
Figure 2.5 Inverter dimensions

Table 2-3 Inverter dimension and net weight

Model	H (mm)	W (mm)	D (mm)	Net weight (kg)
MG750TL / MG1KTL / MG1K5TL / MG2KTL / MG3KTL	280	300	138	9.5
MG4KTL / MG4K6TL / MG5KTL/ MG5K5TL	365	360	150	15
MG3KTL-2M / MG4KTL-2M / MG4K6TL-2M / MG5KTL-2M/ MG5K5TL-2M /	420	360	150	17
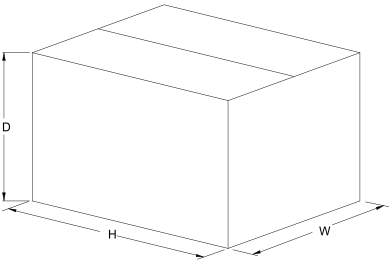
Figure 2.6 Paper packages dimension

Table 2-4 Packages dimension and gross weight

Model	H (mm)	W (mm)	D (mm)	Gross weight (kg)	Packaging Material
MG750TL / MG1KTL / MG1K5TL / MG2KTL / MG3KTL	411	418	251	11	Paper
MG4KTL / MG4K6TL / MG5KTL/ MG5K5TL	518	480	284	17	Paper
MG3KTL-2M / MG4KTL-2M / MG4K6TL-2M /MG5KTL-2M / MG5K5TL-2M /	573	480	284	19	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℃~+70℃, 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 packages 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.

(5) The standard delivery list is shown as below.

Single-phase inverter packing list:
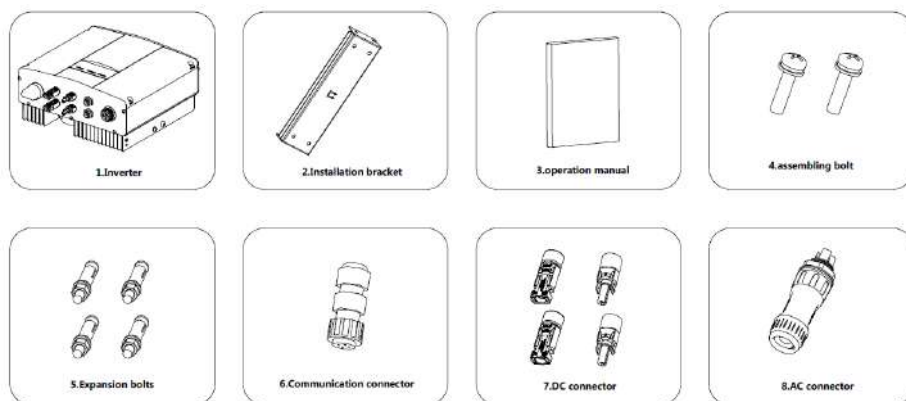
Figure 4.1 Single-phase inverter packing list

Table 4-1 Detailed delivery list of single-phase inverter

No.	Name	Quantity
1	MG750TL / MG1KTL / MG1K5TL / MG2KTL / MG3KTL / MG4KTL / MG4K6TL / MG5KTL / MG5K5TL /MG3KTL-2M / MG4KTL-2M / MG4K6TL-2M / MG5KTL-2M / MG5K5TL-2M inverter	1
2	Installation bracket	1
3	Operation manual	1
4	Bolt M5*20	2
5	Expansion bolts M6*60	MG750TL / MG1KTL / MG1K5TL / MG2KTL / MG3KTL:3MG4KTL / MG4K6TL/MG5KTL / MG5K5TL / MG3KTL-2M / MG4KTL-2M / MG4K6TL-2M / MG5KTL-2M / MG5K5TL-2M /: 4
6	Communication connector	1
7	DC connector	MG750TL / MG1KTL / MG1K5TL / MG2KTL / MG3KTL:1 pair MG4KTL / MG4K6TL / MG5KTL / MG5K5TL / MG3KTL-2M / MG4KTL-2M /MG4K6TL-2M / MG5KTL-2M / MG5K5TL-2M /:2 pairs
8	AC connector	1

4.2 Before installation

4.2.1 Installation tools

Table 4-2 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

4.2.2 Installation place

Select installation place based on the following considerations:

(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 of inverter conveniently.

(2) Select a well ventilated place sheltered from direct sun radiation and rain.

(3) Allow sufficient space around the inverter to enable easy installation and removal from the mounting surface and air convection. Refer to Figure 4.2.

(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 needs to be installed on a firm and sturdy surface, such as wall and metal bracket and so on.

(7) The installation surface should be perpendicular to the horizontal line. Refer to Figure 4.3.

(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.
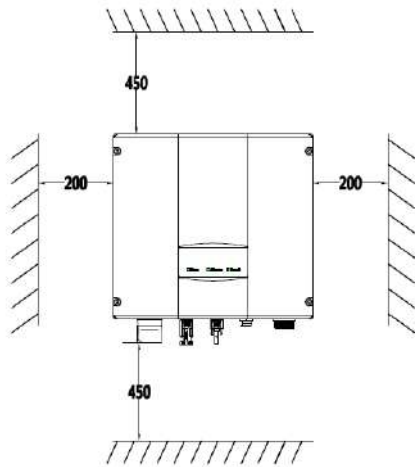
Figure 4.2 Installation space

Ensure there is sufficient space for heat-releasing. In generally, below space requirement should be met:

Table 4-3 Detailed installation space

	Minimum clearance
Lateral	200mm
Top	450mm
Bottom	450mm
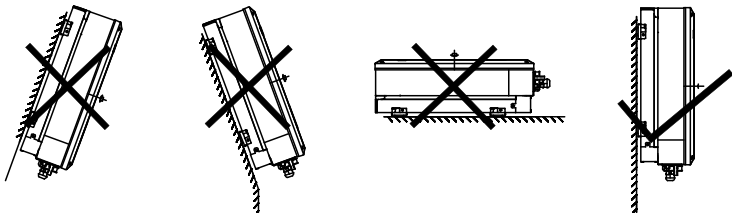
Figure 4.3 Installation position

	● Do not open the cover of the inverter or replace any part as incomplete inverter may cause electric shock and damage the device during operation.

4.2.3 Cable specification

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

Table 4-4 Cable specifications

Model	DC side		AC side	
	Min cross-sectional area mm²(length≤50m)	Min cross sectional area mm² (Length>50m)	Mini cross-sectional area mm²	
			L	N/PE
MG750TL / MG1KTL / MG1K5TL / MG2KTL / MG3KTL	4	4	4	
MG4KTL / MG4K6TL / MG5KTL / MG5K5TL / MG3KTL-2M / MG4KTL-2M / MG4K6TL-2M / MG5KTL-2M/ MG5K5TL-2M /	4	4	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 side and AC output side of the inverter. Table 4-5 is the requirements for recommended micro breaker:

Table 4-5 Specifications of micro breaker:

Model	DC input	AC output
	Recommended DC breakers	Recommended AC breakers
MG750TL/MG1KTL/ MG1K5TL	DC500V, C10A, 2P	AC240V, C10A, 2P
MG2KTL	DC500V, C16A, 2P	AC240V, C16A, 2P
MG3KTL/ MG3KTL-2M	DC500V, C16A, 2P	AC240V, C20A, 2P
MG4KTL/ MG4KTL-2M	DC600V, C20A, 2P	AC240V, C25A, 2P
MG4K6TL-2M/ MG5KTL-2M/ MG5K5TL-2M	DC500V, C20A, 2P	AC240V, C32A, 2P
MG4K6TL / MG5KTL/ MG5K5TL /	DC600V, C25A, 2P	AC240V, C32A, 2P

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 the Fig 4.4, the overall installation of the inverter should be vertical to the horizontal surface.

4.3.1 Installation of single-phase inverter
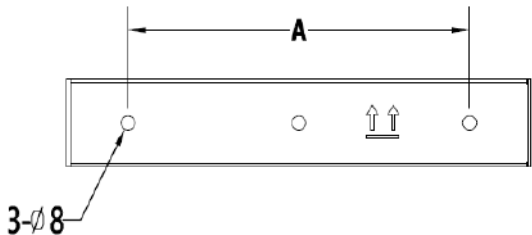
Figure 4.4 Installation bracket of 0.75~3KW inverter
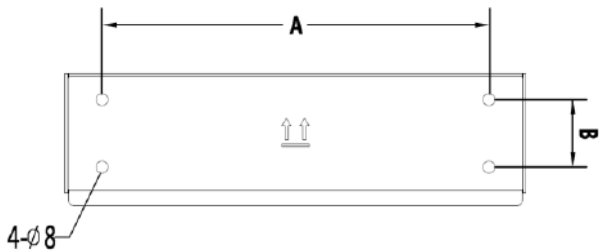
Figure 4.5 Installation bracket of 4~6KW inverter

Table 4-6 Size of installation bracket

Model	Installation hole
	A(mm)*B(mm)
MG750TL / MG1KTL / MG1K5TL / MG2KTL / MG3KTL	195
MG4KTL / MG4K6TL/ MG5KTL/ MG5K5TL / MG3KTL-2M / MG4KTL-2M / MG4K6TL-2M MG5KTL-2M / MG5K5TL-2M /	260*45

Table 4-7 Instruction of installation bracket

No.	Structure instruction
1	Installation holeΦ8
2	Assembling bolt hole M5

Installation steps:

(1) Firstly, take down the installation bracket from the package.

(2) Place the bracket at the appropriate height and position on the wall. Mark the punching position according to the fixing hole. Drill holes of 70mm deep and install the expansion screw. Fix the bracket on the expansion bolt according to the arrow instruction. Ensure the installation is firm enough, the tightening torque is 8Nm.

(3) Lift the inverter to suspend it on the installation bracket through M8 hex socket cap screws.

(4) Finally, fasten the inverter and the bracket with M5 screws and tighten the screws to 2 Nm. For firm installation, the operators cannot release the device until the inverter is installed on the bracket firmly.
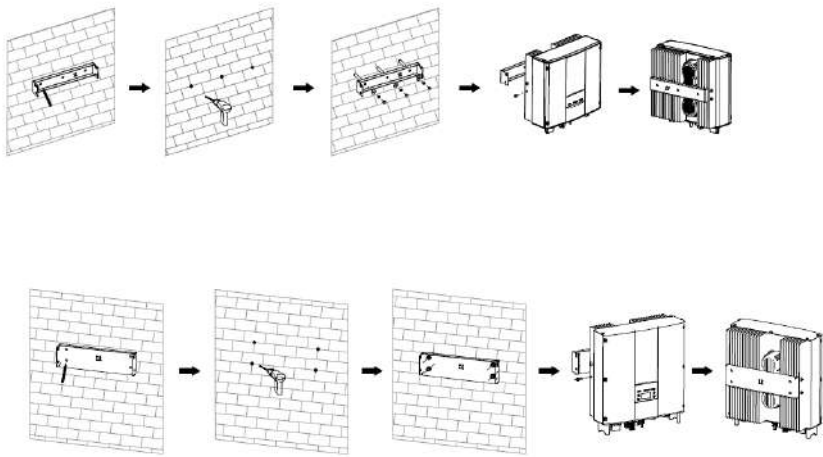
Figure 4.6 Installation of inverter

4.4 Electrical installation

This section describes the electrical connection related content and related safety precautions.

Figure 4.7 is the schematic diagram of the photovoltaic grid-connected system.
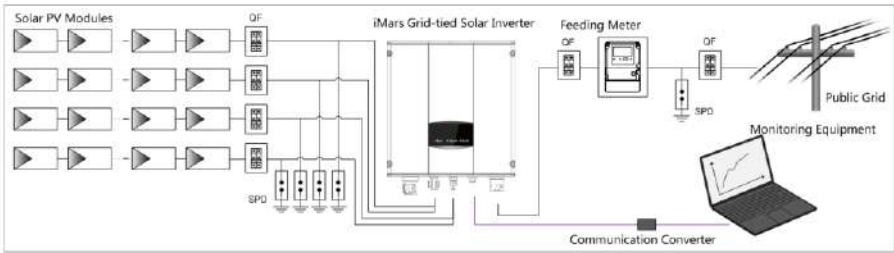
Figure 4.7 PV grid-connected system diagram

⚠️	● Electrical connection must be carried out by professional technicians as wrong operation may cause damage to the device, physical injuries or even death during system operation. ● All the electrical installation must conform to the national and local electrical safety regulations. ● Ensure all the cables are installed firmly according to the specified safety requirements and free from any damage. ● 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. Strictly follow the requirements when operating. ● Always note the rated voltage and current defined in this manual. Never exceed the limits.

4.4.1 Connection of solar modules
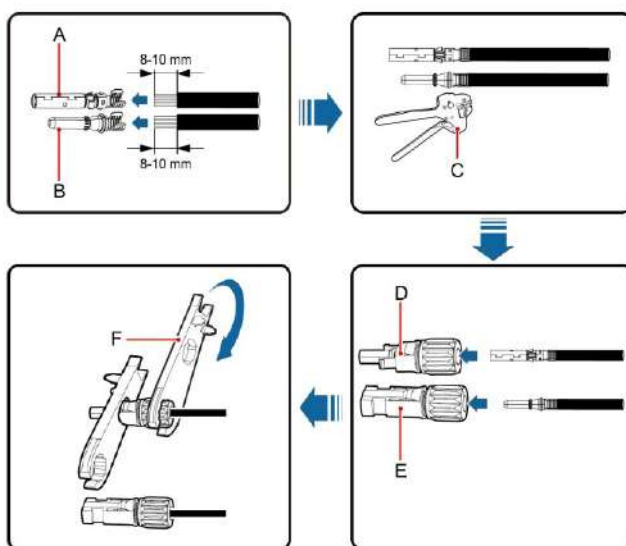
Figure 4.8 Connection between DC connector and solar modules

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 4.8 shows. Loose the nut of connector and 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 of the inverter and tighten the nut with a torque of 2.5-3Nm. The wiring of negative pole is the same as that of the positive pole. Ensure the poles of solar modules are well connected with the connectors;

⚠	● 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.

(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 4.9.
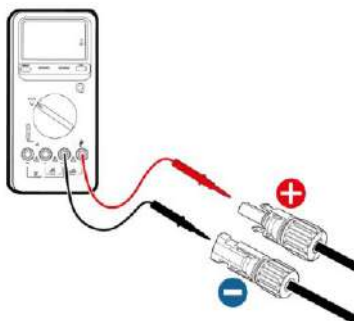
Figure 4.9 DC input voltage measuring

(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
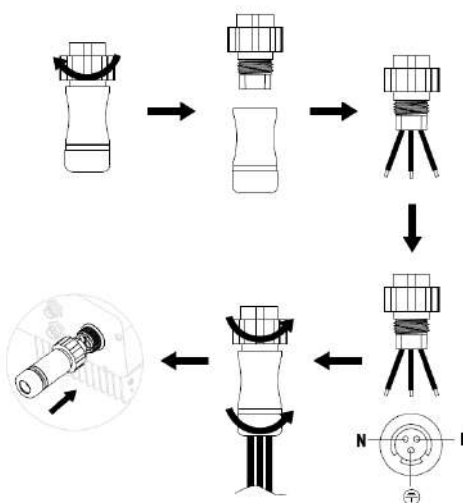
Figure 4.10 AC connection of single-phase inverter

AC connection steps of single-phase inverter:

(1) Before connecting the single-phase AC grid cable to the inverter, take lightning and short circuit protection measures in accordance with the local electrical safety codes;

(2) As shown in Figure 4.10, connect and fasten L, N and PE conductors of the single-phase AC grid to AC terminal and tighten to 0.5 Nm. Assemble the AC terminal and tighten to 2.5-3 Nm, then connect the terminal to the AC port of the inverter.

(3) Connect the DC output cable of the PV module to the DC connector which provided by our company, and then connect the DC connector to the DC terminal of the inverter.

⚠	● 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.

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

The following items must be checked strictly before running the PV grid-connected inverter
(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 section4.3;

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

(4) Ensure all switches are "off";

(5) Ensure the open circuit voltage of the PV module complies with the DC side parameter
    requirements(in the appendix) of inverter;

(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	● 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 indicator state of the inverter and the information displayed by LCD. Refer to
    chapter 6 for LED state indicator and LCD display information.

◐ Run	Green indicator flickers, other indicators are off: Inverter is powered on and under self-inspection, wait for enough light to fulfill grid-connected condition;
● Run	Green indicator on, others off: The inverter is in power generation after self-inspection----successful commissioning.

"Warn" or "Fault" indicator is on or flickers: inverter is powered on but system fault occur. Refer
to section 6.3 to check the fault code in LCD display, stop the inverter as per section 5.3, and
rule out faults according to chapter 8. After all the faults are removed, repeat the operations in
chapter 5.

5.3 Stopping

When it is necessary to carry out power-off maintenance, inspection and fault elimination on the inverter, stop the inverter according to the following steps:

(1) Disconnect the breaker on inverter public grid AC side;

(2) Disconnect the integrated DC switch of the inverter;

(3) Disconnect the circuit switch on PV string DC input side;

(4) Wait for at least 5 minutes until the internal parts of the inverter are fully discharged, and complete the stop operation.

5.4 Daily maintenance

In solar PV grid-connected power generation system, iMars series grid-connected solar 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 inverter	Check the ambient humidity and dust around inverter, clean the inverter when necessary. See Section 5.4.2.	Every six months
Check electrical connection	Check whether system cable connection and inverter terminal block are loosened, if yes, secure them again in the manner specified in section 4. Check whether the cable is	Every six months

Maintenance contents	Maintenance methods	Maintenance cycle
	damaged, and whether the cable skin touched by the metal surface is cut.	
Check the security features	Check the inverter LCD and stop function of the system. Simulate stop operation and check the stop signal communication. Check the warning marks and replace them if necessary.	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.

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.

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.
Power generation	● 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
Recoverable fault	◯ 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

Inverter state	LED indicators	Description
	⚪ 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.

The machine can be turned on and off by pressing the buttons: press "ESC" and "ENT"(about 3 seconds) at the same time, and then the quick start-up and stop is available.

6.3 LCD screen
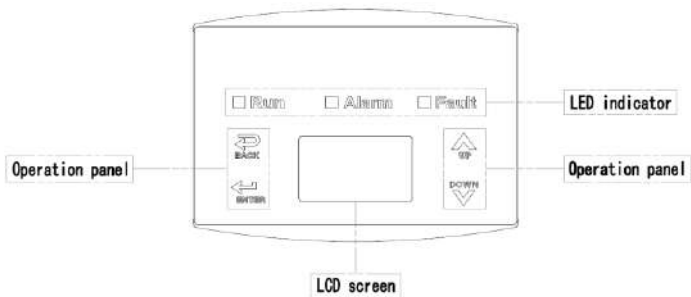
Figure 6.1 Operation panel

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, as shown in Figure 6.3. 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.
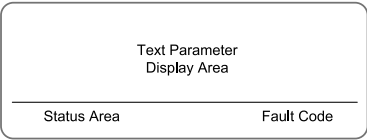
Figure 6.2 Main interface

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

(1) The curve graph display area displays the power change curve of current day;

(2) Text parameter display area displays the key running parameters of current inverter operation, which displays three rows of parameters every time. Under running or sleep state of the inverter, the displayed content rolls up per screen at 3s interval; press "∧" or "∨" to look through the displayed content;

(3) State display area displays current running state of the inverter, which can display "self-inspection", "grid-connected power generation", "alarm", "fault", "OFF" state;

(4) Dynamic fault code and menu entrance. When the state display area displays "alarm" or "fault", the dynamic fault code area will display corresponding fault code (display up to 8 fault codes).

6.4 Functions operation

Most of the parameters can be viewed and set through the LCD screen and operation panel.
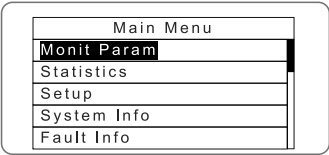
Figure 6.3 Main interface

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".
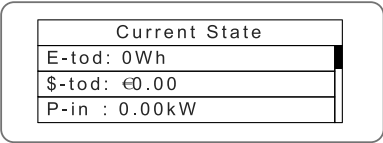
Figure 6.4 Monitoring parameters

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.

```
       History          0
 2012/01/05   11:32:16
 A005: Grid under freq
```
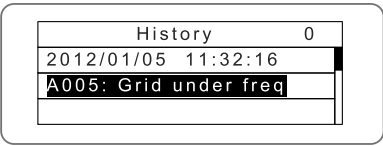
Figure 6.5 History parameters

"Historical record" can display 32 pieces of historical information, press "∧" or "∨" key to look through the historical information, press "ESC" to return. The number on the upper right corner of the first row is the number of historical record, the 2nd row (as shown in Fig 6.5) displays the date and time when fault occurred or restored, and the 3rd row displays detailed information of fault code. When the 3rd row displays in inverse color, it indicates fault occurred, otherwise it is fault restored.

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.

```
     Statistical Menu
 Lifetime
 Today
```
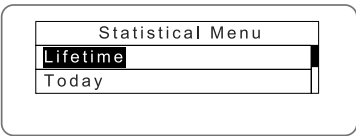
Figure 6.6 Statistic information

The information in table 6-2 can be viewed in the statistical menu.

Table 6-2 Statistic information

Content	Detailed
Lifetime	Total operation time, total power produced, total power saved, total CO_2 reduction in lifetime
Time statistics	Total power produced, total power saved, peak power and total CO_2 reduction in statistical time
Day statistics	Total power produced, total power saved, peak power and total CO_2 reduction in current day
Latest 7 days	Total power produced, total power saved and total CO_2 reduction in latest 7 days
Latest 1 month	Total power produced, total power saved and total CO_2 reduction in latest 1 month
Latest 30 days	Total power produced, total power saved and total CO_2 reduction in latest 30 days

Content	Detailed
Latest 1 year	Total power produced, total power saved and total CO_2 reduction in latest 1 year

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.

```
            Setup Menu
   Address
   Cash/price
   Date/Time
   Language
```
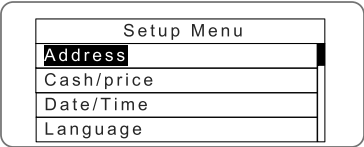
Figure 6.7 Setting information

"Set up menu" can realize parameter setup shown in Table 6-3.

LCD menus:
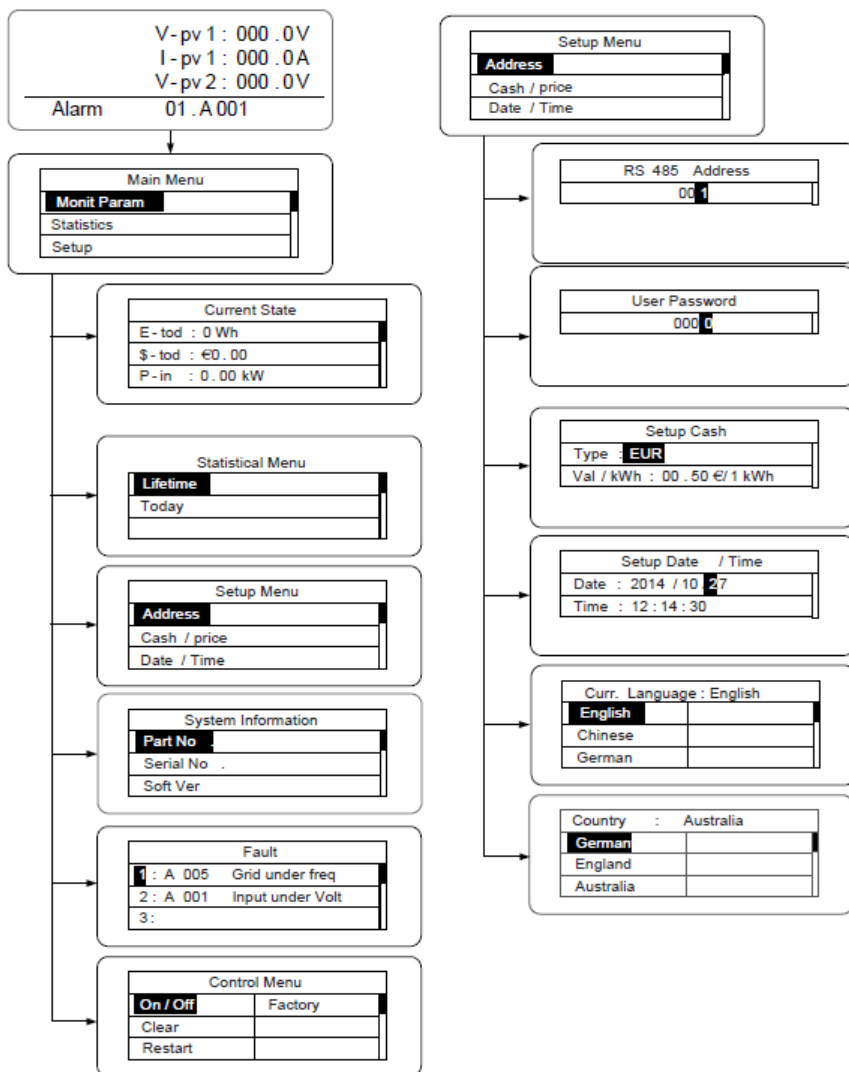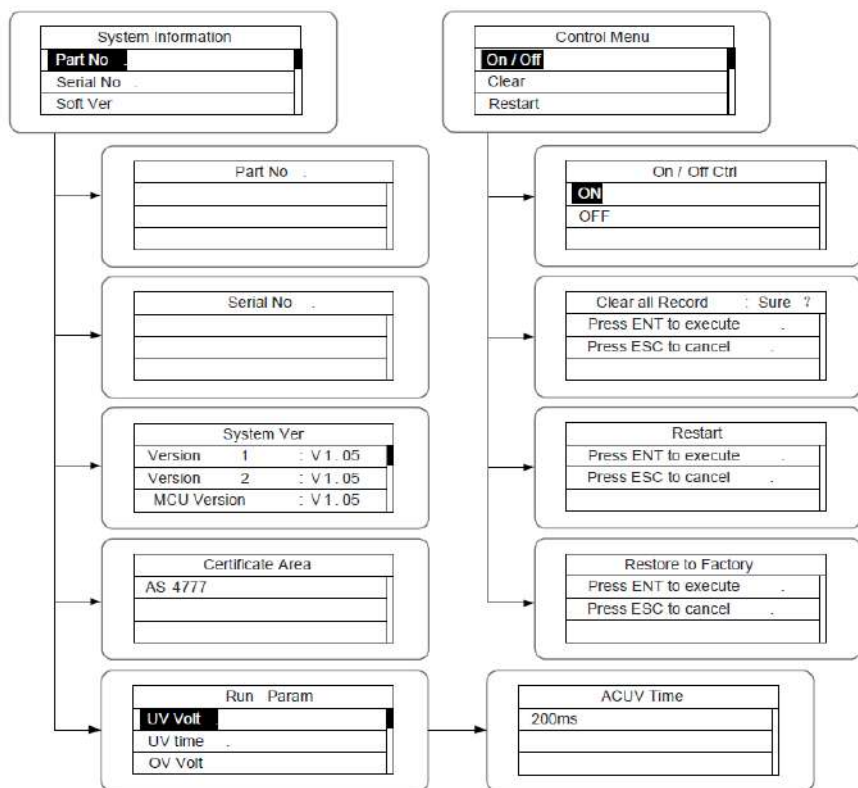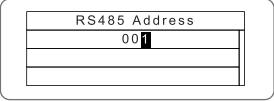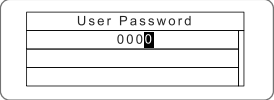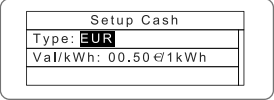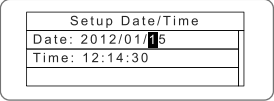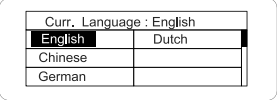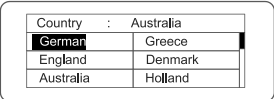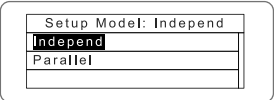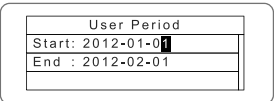
Table 6-3 Parameters setting

Setting item	LCD display	Instruction
RS485 Address	RS485 Address 001	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	User Password 0000	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.
Setup Cash	Setup Cash Type: EUR Val/kWh: 00.50 €/1kWh	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	Setup Date/Time Date: 2012/01/15 Time: 12:14:30	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.，

Setting item	LCD display	Instruction
Language	Curr. Language : English English Dutch Chinese German	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	Country : Australia German Greece England Denmark Australia Holland	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	Setup Model: Independ Independ Parallel	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 6.4.8 occurs, it is necessary to switch the DC input to "parallel" mode.
User period	User Period Start: 2012-01-01 End : 2012-02-01	Enter into the interface and edit the user period through "∧" or "∨". And then press "ENT" again to the next bit. After editing, press "ENT" to save the edition and press "ESC" to exit. Of which, the setting time and date needs to be later than the system setting, and the start time needs to be earlier than the end time.

Setting item	LCD display	Instruction
		The setting date and time is used for the statistical information.
Set power	**Input password** 0000 **set power** P-Lmt Mode / LmtPower / P.Factor **Limit Mode Invalid** / Invalid / Auto / Manual **Limit Power** 100% **Power Factor** / Grid Tied Mode / Normal Mode / Power Factor 1.00	The password is needed when enter into the interface of "Set power". Get the password from the supplier if necessary. There are 3 submenus: ① P-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%; ③ Power factor: includes normal model (default value "1"), current advanced mode and current hysteresis mode and the setting rage is -0.9-0.99.
Personal	**Input password** 0000 **Personal** MPP Start Volt **MPPT Volt** 120V	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	Input password 0000 Run Param UV Volt OV time UV time UF Freq OV Volt UF time ACUV Volt(phase volt) 184V ACUV Time 0.20s ACOV Volt(phase volt) 263V ACOV Time 0.20s ACUF Freqency 47.6Hz ACUF Time 0.20s ACOF Freqency 51.4Hz ACOF Time 0.20s	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	Input Password 0000 Run Param UV volt 1 / OV time 1 UV time 1 / UF Freq 1 OV volt 1 / UF time 1 ACUV Volt(phase volt) 115V ACUV Time 00.04s ACOV Volt(phase volt) 309V ACOV Time 00.02s ACUF Frequency 47.99Hz ACUF Time 00.12s ACOF Frequency 50.50hz ACOF Time 00.12s ACUV Volt(phase volt) 196V ACUV Time 0.19s ACOV Volt(phase volt) 252V ACOV Time 01.90s ACUF Frequency 49.49Hz ACUF Time 595s ACOF Frequency 50.2Hz ACOF Time 115s Run Restart Time 060s Island protect:on OFF ON	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 ACUV2, ACOV2 and ACUF2 value for ACUV, ACOV and ACUF protection. And it is necessary to set ACOF1 and ACOF2 together for ACOF protection.

6.4.5 System Information

Press "Ʌ" and "V" in the main interface to select "System Information", and then press "ENT" to view the parameters which is shown in Figure 6.8.

```
        System Information
   Part No   .
   Serial No   .
   Soft Ver
```

Figure 6.8 System information

The system information include "product model", "serial No.", "software version" and "certificate version". If select "Software Version" in the "System Version", can view the inverter Version 1, Version2, MCU Software Version, RS485 protocol and other information, as shown in Figure 6.9.

```
          System Ver
   Version 1        : V1.05
   Version 2        : V1.05
   MCU Version      : V1.05
```

Figure 6.9 System version

6.4.6 Faults

Press "Ʌ" and "V" 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.

```
             Fault
   1: A005  Grid under freq
   2: A001  Input under Volt
   3:
```

Figure 6.10 Fault information

There are 8 pieces of fault information in the record which is shown in Figure 6.10. Otherwise it will display "No Fault!" Refer to section 6.4.2 for more detailed information.

6.4.7 Inverter control
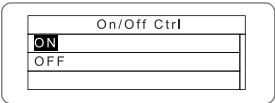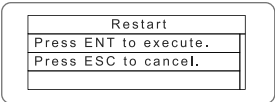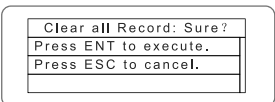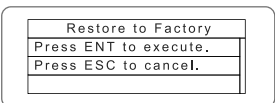
Press "Ʌ" and "V" in the control interface, and then press "ENT" to view the sub-menu which is shown in Figure 6.11.

```
          Control Menu
   On/Off         Factory
   Clear
   Restart
```

Figure 6.11 Control interface

Refer to the table below for detailed information.

Table 6-4 Inverter control

Control item	LCD display	Instruction
On/Off control	On/Off Ctrl ON OFF	Control the "On/Off" through the panel. Press "∧" and "∨" 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.

6.5 Grid certification choice

Power on the inverter by DC input for the first time or after restore factory settings, the LCD screen will appear a list of countries, requiring the user to choose what country of use. As shown below:

Country:	Unset
Germany	Greece
UK	Denmark
Australia	Holland

Country:	Unset
Greece	China
Denmark	Thailand
Holland	Other
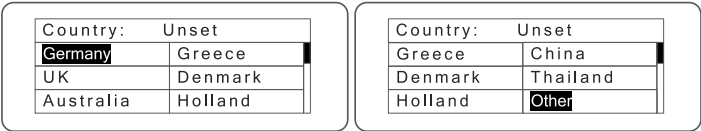
Press the "∧" or "∨" button to select the country (refer to the below table), press the ENT button to complete the setting.

After finish the country setting, 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	

The user can change the country setting through the following ways:

LCD screen：MENU→Main Menu: Setup→Setup Menu: Country→Country:

```
  p              V-pv1: 000.0V           Main Menu
                 I-pv1: 000.0A     Monit Param  Setup
               h V-pv2: 000.0V     History      System Info
    Alarm    │ 01.A001 MENU        Statistics   Fault Info
```

```
        Setup Menu                   Country:     China
  Address      Date/Time       Germany        Greece
  Keypad PWD   Language        UK             Denmark
  Cash/price   Country         Australia      Holland
```

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

```
  p              V-pv1: 000.0V           Main Menu
                 I-pv1: 000.0A     Monit Param  Setup
               h V-pv2: 000.0V     History      System Info
    Alarm    │ 01.A001 MENU        Statistics   Fault Info
```

```
     System Information              Certificate Area
  Part No.     Cert. Area       AS4777
  Serial No.   Run Param
  Soft Ver
```

7 Monitoring communication

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

The standard communication mode of iMars grid-tied solar inverter is RS485 which includes "RS485-M" and "RS485-S" ports. The RS485-M ports can communicate with private computers, smart phones and so on. The system monitoring solution is shown as Figure 7.1.
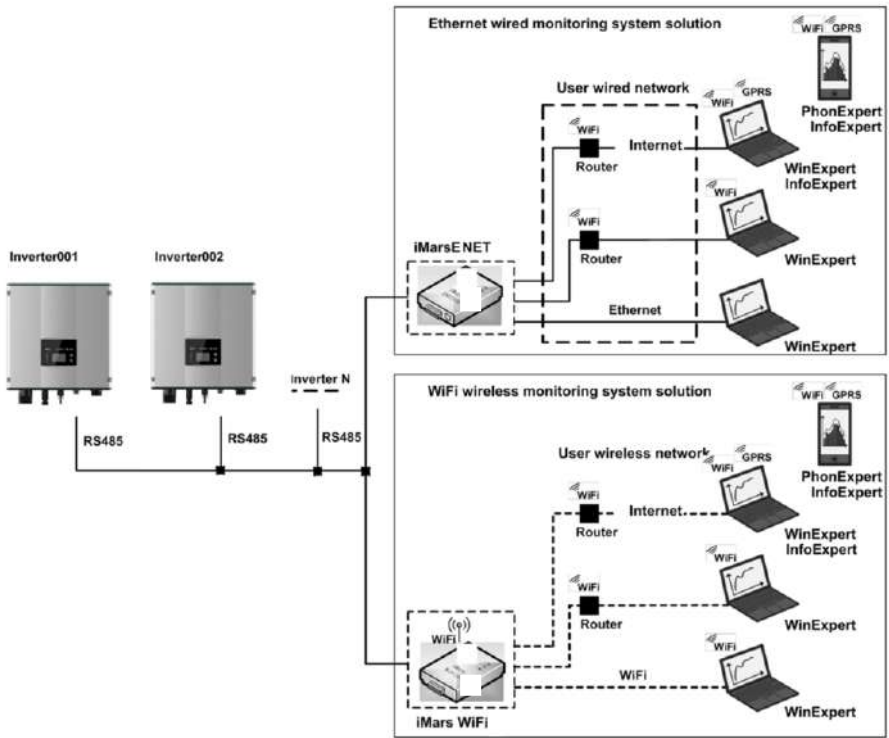
Figure 7.1 Monitoring system of inverter

7.1 Standard communication

Table 7-1 Pins on inverter instruction

Pin on inverter	Definition
1(Red)	+5VDC
2(Orange)	A (RS485+)
3(Brown)	B (RS485-)
4(Black)	GND
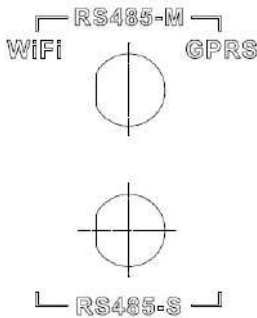
Figure 7.2 RS485 pin on inverter   Figure 7.3 Communication connector

Connection steps:

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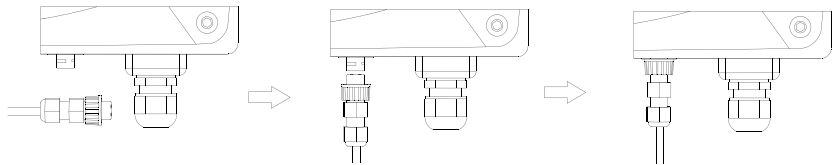
Figure 7.4 Detailed connection

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

(3) Please download the monitoring software "iMars WinExpert" and its operation instruction from our website.

7.2 Optional communication

The optional communication modes include the 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, WiFi, GPRS and ENET 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	Over temperature	Internal over temperature
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

Fault code	Message	Instruction	Fault analysis
E014	Dc inject	High DC injection	High DC injection during AC output
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
E021	Meter commErr	Power meter communication is faulty	The communication between smart meter and inverter is faulty (when anti-feedback function is enable)
E022	FreqChg	Frequency is changed	Fluctuation of grid voltage is over inverter normal sustainable range
E023	PE Loss	PE wire not connected	The PE wire is unconnected (this error code only available under AS4777 safety)
E024	MeterLoss	The smart meter not connected	The smart meter not connected
E025	Locking	The inverter is locked	The inverter is locked
E026	Run Limit	Light load	Light load (when anti-feedback function is enable)
E028	DRM0 Loss	The DEM0 box not connected	The DRM0 box is unconnected (this error code only available under AS4777 safety)

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

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10 Technical parameters

Table 10-1 Technical parameters

Model		Single-phase								
		MG750TL	MG1KTL	MG1K5TL	MG2KTL	MG3KTL	MG4KTL	MG4K6TL	MG5KTL	MG5K5TL
Input (DC)	Max. DC voltage (V)	400	450	450	450	500	600	600	600	600
	Starting voltage (V)	60	80	80	120	120	120	120	120	120
	MPPT voltage(V)	50-400	60-400	80-410	100-410	120-450	125-550	125-550	125-550	125-550
	Operation voltage (V)	100-320	121-360	165-360	180-360	210-400	240-500	240-500	250-500	250-500
	MPPT/strings per MPPT	1/1	1/1	1/1	1/1	1/2	1/2	1/2	1/2	1/2
	Max. DC power (W)	900	1200	1700	2200	3300	4000	4600	5000	5500
	Max. input current (A)	8x1	9x1	10x1	12×1	15×1	16×1	18×1	20×1	23×1
	Isc PV	8.8	9.9	11	13.2	16.5	18	20	22	25
	Max inverter backfeed current to the array(A)	0	0	0	0	0	0	0	0	0
	DC switch	Optional								
Output (AC)	Max output power	750	1000	1500	2000	3000	3680	4200	4600	5000
	Voltage(V)/ frequency(Hz)	180~270Vac、50Hz(47~51.5Hz) / 60Hz(57~61.5Hz) VDE0126& AR-N4105、AS4777.2/AS4777.3、CQC、G83-2、G59-3、C10/11、TF3.2.1、PEA								
	Max. AC current (A)	3.6	4.5	6.5	9	13	16	18.3	20	24
	Maximum output overcurrent protection	6.1	7.6	11.0	15.3	22.0	33.5	37.9	40.2	40.2
	Maximum output fault current	40A ,19.5ms					104A,37.2ms			
	AC inrush current	Less than 10 A					Less than 2 A			
	Power factor	-0.9~+0.9 (adjustable)								
	Harmonic distortion	< 3% (rated power）								
System	Cooling	Natural cooling								
	Maximum efficiency	96.90%	97.20%	97.30%	97.40%	97.60%	97.60%	97.40%	97.50%	97.50%
	European efficiency	96.00%	96.10%	96.30%	96.50%	96.50%	96.50%	96.50%	96.50%	96.50%
	MPPT efficiency	99.9%								
	Protection degree	IP65								
	Power consumption	< 1W								
	Isolation mode	Transformerless								
	Protective class	VI								
	Overvoltage category	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)								
	Displaying	LED/ LCD, backlit display								
	Systerm language	English, Chinese, German, Dutch								
	Communication	RS485 (standard); handheld keypad; WiFi (optional)								
	DC terminal	BC03A/ BC03B								
	Noise dB(A)	≤25								
	Installation mode	Wall installation								
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								

Model		Single-phase				
		MG3KTL-2M	MG4KTL-2M	MG4K6TL-2M	MG5KTL-2M	MG5K5TL-2M
Input(DC)	Max. DC voltage (V)	600	600	600	600	600
	Starting voltage (V)	120	120	120	120	120
	MPPT voltage(V)	125-550	125-550	125-550	125-550	125-550
	Operation voltage (V)	180-500	220-500	220-500	250-500	250-500
	MPPT/strings per MPPT	2/1	2/1	2/1	2/1	2/1
	Max. DC power (W)	3000	3680	4200	4600	5000
	Max. input current (A)	8×2	10×2	11×2	12×2	15×2
	Isc PV	9×2	11×2	12×2	14×2	16.5×2
	Max inverter backfeed current to the array	0	0	0	0	0
	DC switch	Optional				
Output(AC)	Max output power	3000	3680	4200	4600	5000
	Voltage(V)/ frequency(Hz)	180~270Vac、50Hz(47~51.5Hz) / 60Hz(57~61.5Hz)				
		VDE0126& AR-N4105、AS4777.2/AS4777.3、CQC、G83-2、G59-3、C10/11、TF3.2.1、PEA				
	Max. AC current (A)	14	16	18.3	20	24
	Maximum output overcurrent protection	27.0	33.5	37.9	40.2	40.2
	Maximum output fault current	104A,37.2ms				
	AC inrush current	Less than 2 A				
	Power factor	-0.9~+0.9 (adjustable)				
	Harmonic distortion	< 3% (rated power）				
System	Cooling	Natural cooling				
	Maximum efficiency	97.60%	97.30%	97.40%	97.40%	97.40%
	European efficiency	96.50%	96.40%	96.50%	96.50%	96.50%
	MPPT efficiency	99.9%				
	Protection degree	IP65				
	Power consumption	< 1W				
	Isolation mode	Transformerless				
	Protective class	I				
	Overvoltage category	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)				
	Displaying	LED/ LCD, backlit display				
	Systerm language	English, Chinese, German, Dutch				
	Communication	RS485 (standard); handheld keypad; WiFi (optional)				
	DC terminal	BC03A/ BC03B				
	Noise dB(A)	≤25				
	Installation mode	Wall installation				
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				