Phase Converter
User Manual

Please strictly abide by the warning and operating instructions in the manual and machine, properly keep this manual well.

Before not read all safety and operation instructions, please don't operate the machine, otherwise it will damage to the equipment and cause personal safety accident.

Content

Perface

Manual Instruction

This manual includes the description regarding the troubleshooting in process of transportation, installation, maintenance and operation of the following converters:

- In order to describe convenient later, power phase converter will be short for converter. When introduce the information about each converter type in detail, pointed out the converter type alone.

Target Reader

This manual apples to the converter installation person and professional engineering technology person of operation and LCD interface operation person.

Use the Manual

Please read this manual carefully before starting installation and operation. Please keep this manual for operation and maintenance in future.
The manual content will continue to update, amend, but unavoidably exist slightly discrepancy or error with material object. Users to purchase products, please kind prevail.

Symbol Used

The following safety symbols may be used in this manual, they represent the meaning of below.

Safety Symbol	Meaning
 **Danger!**	If ignore the security warning, it may lead to serious accidents of injuries.
 **Warning!**	If ignore the security warning, it may cause serious injury accident, equipment damage or major business interruption risk.
 **Notice!**	If ignore the security warning, it may cause moderate injury accident, moderate damage to the equipment or part of the risk of business interruption.
 **Note!**	The content is the body of the additional information.

Symbols on the converter:

Symbol	Meaning
	Ground Protection
	Refer to related instructions
	Cannot discard the converter together with waste of life.
	Beware of dangerous electrical voltage. The converter operates at high voltages!
	CE mark The converter complies with the requirements of the applicable EC guidelines.
	ISO mark The inverter complies with the requirements of the applicable CQC, CNAS guidelines.

1. Safety Instructions

For electrical and electronics equipment, security is concerned with the whole process of installation, commissioning, operation and maintenance. Therefore, incorrect or wrong operation will damage the operator or third party's life or safety, or the converter equipment. In order to reduce the casualties, converter and other equipment damage, operation and maintenance process must strictly abide by all of the following danger, warning, and pay attention to the safety information such as tips.

Warning!

All the installation and operation of series converter must be finished by professional technical person.

- Receive special training.
- Complete to read this manual and master related safety attentions of operation.

Any damage to the equipment caused due to failure to comply with the descriptions in this manual in installation or operation will be beyond the scope of the company's quality guarantee.

Before installation

Notice!

When received products, need to check the converter if there is any damage during transportation, and if found the problem please immediately contact Supplier or contact transportation company.

Installing

Before installing converter, make sure the converter not have electrical connections and electricity.

Danger!

The solar cell arrays should be covered with opaque materials when installing the photovoltaic arrays during the day, otherwise the solar cell arrays will generate high voltage, causing person casualties.

Warning!

If converter installation environment improper selection, it will affect the machine performance and may cause machine damage.

Don't install the converter in inflammable, explosive place or inflammable, explosive materials storage.

Don't install the converter in explosive dangerous place.

Don't install the converter in place where vulnerable to lightning strike.

Don't install the converter in place where have more salt fog.

Danger !

Before electrical connections, ensure that the solar cell arrays are covered with opaque materials, otherwise the solar cell arrays will generate high voltage, causing person casualties.

Electrical connections

Warning !

All the operating and wiring work should be operated by professional electrical or mechanical engineer.

Warning !

When running converter, need ensure well-ventilated.

converter should be upright installed and ensure heat sink, fan etc. without shelter.

Warning !

Please don't open any breakers before all equipments are not completely connected well.

Notice !

All the electrical installation must meet the electrical installation standard of local and country.

Warning !

Please don't open any breakers before all equipments are not completely connected well.

Notice !

In order to make sure safe running, ask for proper grounding, using appropriate conductor size and providing short circuit protection.

Notice !

Connection cable must selection suitable specification, firm connection and good insulation.

Running

Danger !

Under AC side of converter take with loads, can't directly break AC connection, need cut off the converter start switch firstly and break AC output breaker, ensure that it has no voltage in AC side, then can break AC connection.

Danger !

Please don't connected any terminal connectors under converter charged state!
Please don't open the cover plate under converter charged state!

Notice !

When the converter is running, only LCD display screen and front panel AC switches, AC switches, start switch can be touched, can't touch the heating devices (such as radiator, etc.) to avoid scald.

Maintenance

Danger !

Maintenance work must be done by professional maintenance technical person.

Danger !

Before checking and maintaining, please must break Start switch, AC side breaker, then break AC side breaker, after waiting 5 minutes, measured AC side and AC side voltage with a multimeter, ensure that have no voltage between AC side and AC side to operate.

2. Product Introduction

2.1 Summarize

Our power phase converter is one of the most advanced AC-DC -AC conversion products in the world, the world which can convert ordinary single-phase power to industrial three-phase power.

It can solve production inconvenience because of some areas with the three-phase electric power restrictions, also solved some user requirements that can't apply for the three-phase electric because of space limitation.

It has the main advantages of high quality sine wave AC output, microcomputer control, humanness design, high efficiency, low no-load loss and no pollution.

The converter can supply AC power to all kinds of electric equipment, electric motors, pump, compressor, and other industrial power supply. Applicable to all types of load.

2.2 Production Introduction

2.2.1 Production Appearance

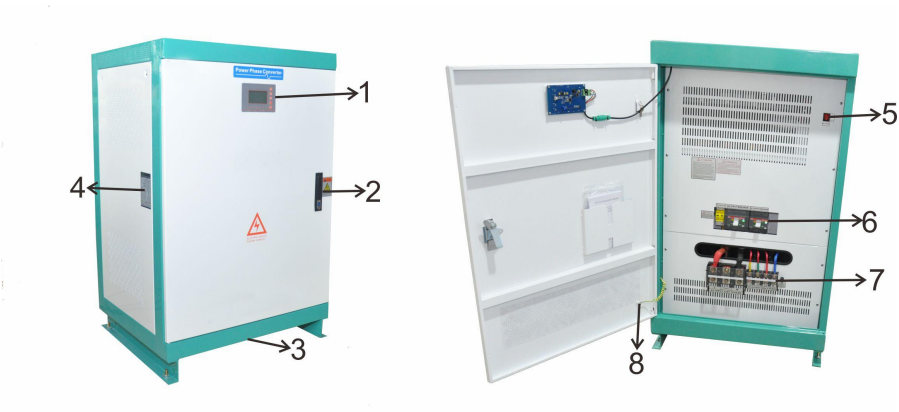


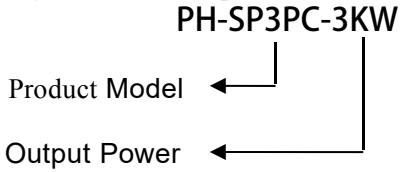
Figure2-1 Appearance of SDT power phase converter

Table2-1 converter appearance information table

No.	Name	Introductions
1	LCD display screen	Man-machine interface, you can check the converter operating information through LCD display screen, also can set some function and parameters of converter.
2	Lock	The lock of converter used to open and lock
3	PG Cable Glands	The input wire and output wire through this cable glands
4	Name plate	converter basic parameters listed on the nameplate for basic information about converter
5	Start switch	Used to Starting and break the converter
6	Breakers, SPD	AC input breaker and AC output breaker, SPD
7	Connection terminals	Including AC input terminal; AC output terminal;
8	PE (grounding)	Earth wire of cabinet

2.2.2 Product Name

The way of product naming, take for example:



2.3 Technical Description

2.3.1 Working Principle

The principles of power phase converter please refer to the schematic below.

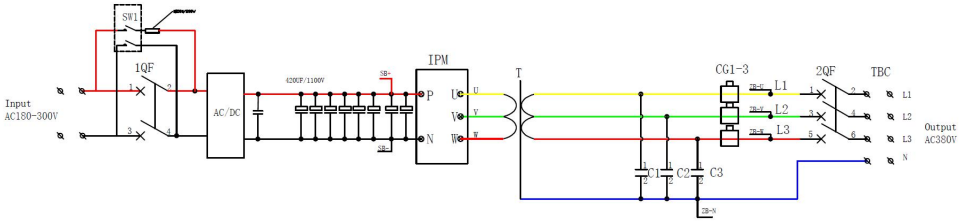


Figure2-2 Internal circuit structure diagram of power phase converter

2.3.2 Derating

Reduce the output power is a way to prevent converter overload or some potential problems. When the operating environment temperature and altitude are too high, both can cause converter derate operation.

Environment temperature too high

converter temperature derating curves in below

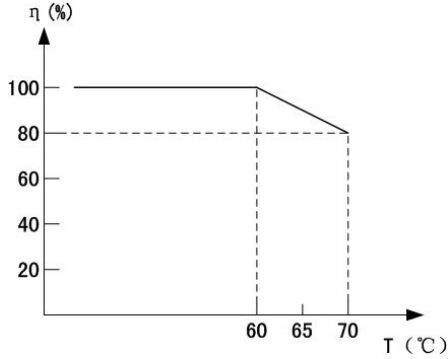


Figure2-3 converter temperature derating curve

η=（Pout/Pnom）x100

T is environment temperature

Pout is the power phase converter actual max. output power

Pnom is the power phase converter allowed max. output power

2.3.3 Product Feature

- Two kinds of start mode: Step Down Voltage Start and Variable Frequency Start. VFD is especially used for taking 3 phase inductive load more easily.

This function is very convenient for users and also reduce frequency converter's usage, which reduced the cost of equipment investment, easy to connect wires and control.

- Output AC Power is suitable for all types of home appliances, electric tools, electric motors etc.
- Using the sixth generation efficient IPM intelligent module from Japanese Mitsubishi, high efficiency and stable performance. It with powerful protection function for short circuit, over load, over temperature. Service life can reach to 15 years.
- Pure sine wave output. with good transient response, little harmonic distortion and stable output voltage features.
- Adopted low frequency isolated transformer, safe and reliable, single phase input power is completely isolated from three phase output power, high instantaneous power, stable performance and low load loss.
- Adopts new magnetism material, largely reduce machine consumption, making efficiency maximum up to 90%.
- Adopts America DSP chip, safe and reliable.
- Adopts black pure aluminum radiator, which confirms the best radiating performance
- Converter has the function of filtering the grid disturbance and interference at the same time, which is a good performance of stabilized voltage and frequency power, to provide a more stable and pure power supply environment for the back end devices.

3. Converter Unpacking

3.1 Unpacking Check

The product has been tested and checked carefully before transportation, but damage may be caused during transportation, therefore, the product should also be checked carefully before installation.

- Please check whether converter outer packing is in good condition;
- After unpacking, please check whether the equipment is in good condition;
- According to the packing list to check whether all the parts is correct and in good condition.

If any damage is found, please contact supplier or the transportation company. Please keep well the photos taken at the damaged parts and we'll provide you with best and fastest services.

4. Installation Procedure

4.1 Prepare Installation Tools

Before installation, need to prepare first.

converter installation and wire installation will need the following tools.

You also can choose the right tools according to your own experience

Sketch map	Name	Recommend specification	Function
	Wire crimpers	6~50mm^2	Used for crimping input and output terminals connected to the wires
	Cross screwdriver	Φ8	Used for the input and AC output wires installation

Table4-1 Installation tools list

4.2 Installation Steps

Tools ready, follow these steps to install

Installation steps	Installation instruction	Reference chapters
1	Before installation, check whether the converter is in good condition;	
	Whether the product fittings are complete	
	Whether the installation tools and spare parts are complete	4.1
2	Whether the installation environment meets the requirements	1
	Read the manual, especially the "safety instructions"	1
3	Choose the best installation location	5.1
	Installation	5.2
4	Electrical Connection	
	AC side wire connection	6.1
	AC side wire connection	6.2
5	Configuration parameter	10
6	Troubleshooting	9

Table4-2 Installation process table

5 Installation

5.1 Installation Site Required

converter installation site environment has very important influence to the safe operation, the performance and life of the converter. Install the converter before, need to choose the right installation site.

- All installation must comply with local standards.
- Do not install the converter at a flammable or explosive place or a place where the flammable or explosive materials are stored.
- Do not install the converter in a place where there is a risk of explosion.
- Do not install the converter in places where the converter is vulnerable to lightning strike.
- Do not install the converter in a higher salt spray environment
- Converter installation site must be in good ventilation, do not install the converter in the case closed, otherwise the converter will not work properly.

- Converter protection level is IP20, can be installed indoor, when the converter is installed indoor, should be installed as far as possible in the eaves or other have the shadow place, avoiding direct sunlight, rain and snow.
- Converter is installed indoor, keep away from Windows, avoiding lightning
- The installation place selected should be solid enough to support the converter weight for a long period.
- The site for converter installation must be clean and the ambient temperature must be maintained within -20 to +50°C.
- Converter installation site relative humidity should not be more than 95%, water vapor may corrode converter, and damage the internal components
- The converter must be installed in a place convenient for observation and maintenance
- Don't install the converter in living area, the converter will produce some noise when running, influence daily living.

5.2 Installation Direction

- The converter should be installed vertically.
- Do not install converter tilted forwards.
- Never install the converter horizontally.
- The installation place of converter should be convenient for operation and reading out of the LCD displayed information
- Do not install the converter in a place where children can touch.
- The converter uses fan cooling mode and the installation site selected should ensure the minimum installation spacing between the converter and the fixed object and the nearby converters to ensure an good ventilation. And in front of the converter need to keep enough space, is convenient to check the LCD display information.

5.3 Installation of converter

5.3.1 Check the front panel breakers are in "OFF" state, check whether there is a short circuit on load.

5.3.2 Absolutely prohibit AC input power supply connect to the converter output terminal.

5.3.3 The connection cable between the grid and converter should be as short as possible, otherwise the harmonic leakage current from cables will be harmful to converter and the system equipment.

5.3.4 System grounding terminal must be grounded, and make the ground wire's length as short as possible. Do not allow welding machine, motor and other high current device in this system common ground. Ensure all system's ground wires are separately layout from high current electrical equipment.

5.3.5 Please don't turn off AC input breaker under the converter with load, otherwise it will cause AC input breaker or IPM module damaged.

5.3.6 When the converter happen MOD, OVER LOAD fault alarm, please turn off the AC input breaker until the LCD screen completely extinguished and restart the converter.

5.3.7 Put the inverter on ventilated and away from sunlight, confirmed the machine and wall distance is greater than 50cm. Don't block the vents, if found the vents blocked, please clean up in time.

5.3.8 When the converter is running normally and temperature is rising. If the fan stop working, please replace the fan in time. (The starting temperature of the fan is 45°C).

5.3.9 Recommend to turn on AC input breaker firstly, then turn on AC output breaker, then turn on Start switch, make the converter starting load, can effectively avoid the damage of large inrush current to the converter.

5.3.14 Don't connect ground wire (PE) of cabinet and neutral wire (N) together.

 **Note!**

Please don't break the AC Input Breaker often, otherwise it will cause will cause AC input breaker damaged. If you want to shut down the converter, just need turn off the AC output breaker or Start switch. If you have to turn off the AC input breaker, please turn off the start switch, then AC Output Breaker to make converter stop working, then turn off the AC Input breaker.

Notice !

Never connect several converters in parallel output!

Danger !

Ensure that all cables are not charged before electric operation!

5.4 Notice

5.4.1 All operations of equipment must be done by professionals, please remove metal jewelry on hands before the operation in case of electric shock !

5.4.2 The inside cooling fan of the machine is controlled by temperature, it's a normal phenomenon that the fan is not running when converter just start soon or taking little load, the fan only will run when cabinet internal temperature exceeds 45 ℃.

5.4.3 When the machine is working, in case of accidents and to avoid electric shock, please don't open the cover of cabinet.

5.4.4 Please don't make change to the circuit line privately when regular checking, in case of damage.

5.4.5 It's a normal phenomenon that the converter has a certain degree of fever during the use process, but should keep the environment of installation ventilated, cooling and clean, especially can't block air ventilator.

5.4.6 The inside all CMOS components of the machine can't touch, when the circuit is powered on don't connect or disconnect the wires and terminals.

5.4.7 After connect all wires, please must be carefully check (voltage value, positive and negative pole are consistency, grounding is well).

5.4.8 Even if the all switch on the panel is OFF, but converter's part of capacitor still electric, please don't touch.

5.4.9 When take with motor and pump or other inductive loads, the converter had best leave 30% of the power margin, should be considered the impact current to the machine, to ensure reliable power supply to converter

6 Electrical Connection

The electrical connection should be carried out immediately when the installation is completed. When making electrical connection, special attention should be payed to the following operating specification:

Warning !

- All the electrical connection must meet local electrical connection standard.
- Only qualified electrical personnel can perform the wiring installation work.
- Incorrect wiring operation may cause operating casualties or equipment damage permanently.
- Before electrical connection, please make sure that the AC side and AC side are uncharged!
- Ask for correct grounding, using appropriate conductor and providing necessary short-circuit protection to ensure safe operation.
- Please don't turn on any breakers before all the equipment unfinished connection.

6.1 Connecting Terminals of converter

The input and output terminals are installed in the bottom of the converter and include AC side input terminals and AC side output terminals.

Figure6-1 Connection terminals on converter

Table 6-1 Terminals Description

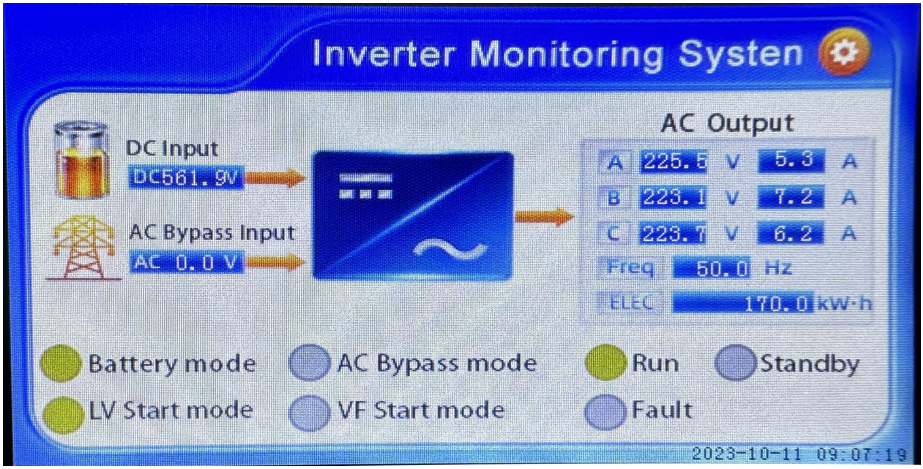
Terminals	Description
L， N	AC Input terminals 110V
L1, L2, L3, N	AC Output terminals, L1, L2, L3 live wire "N" is Neutral wire
PE	Earth Wire

Warning !

Make sure the input and output cables are firmly connected.

7. LCD Display Interface Overview

Inverter power on, the first interface display parameter as following



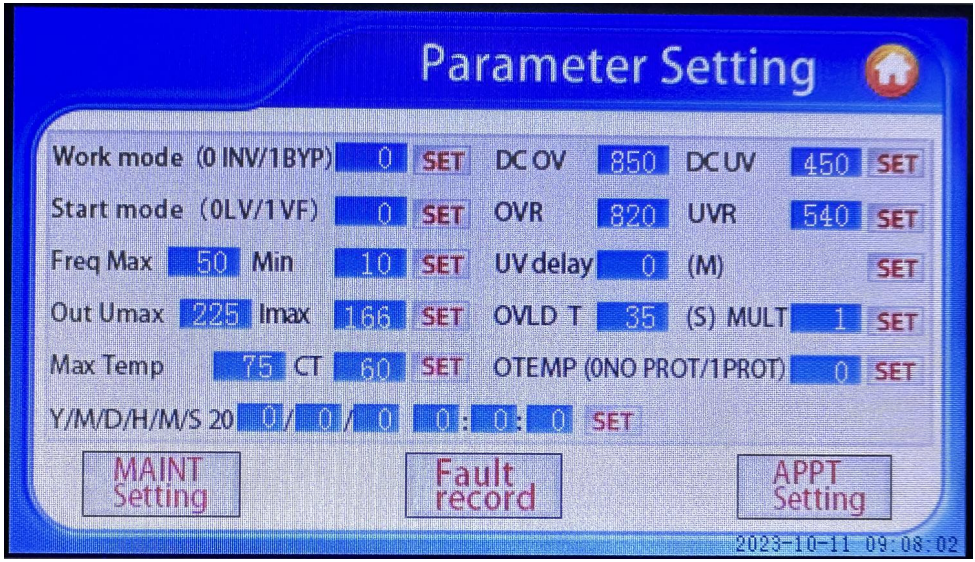
Press  **enter into the "Password Login" interface as following.**

Notice! If you want to adjust the parameter setting, please contact the manufacturer ask for password

Notice! When inverter is working, please don't adjust parameters setting.

If you want to adjust parameter setting, please turn off start switch, then operation.

The following settings only for professional operation, the non-professionals can't change parameters, otherwise, incorrect settings may cause equipment damage.



8 Malfunction and Troubleshooting

8.1 Troubleshooting

Once malfunction or stop condition arise, the current fault code will be displayed on the LCD screen, please refer form below for classical malfunction and troubleshooting.

Condition code	Name	Phenomena	Cause value	Troubleshooting
State 01	DC input voltage low	Inverter stop working, malfunction disappear, system restart automatic		Check DC input voltage to ensure the input voltage within working range of inverter
State 02	DC input Over voltage	Inverter stop working, malfunction disappear, system restart automatic	DC input voltage higher than maximum input voltage of inverter	Check DC input voltage to ensure the input voltage within working range of inverter
State 03	Output overload	Inverter shut down, malfunction disappear, restart again.	Load higher than rated output power of inverter.	Please insure correct system design. This fault is usually caused by larger power of load. Please reduce the power of load.
State 04	IPM fault	Inverter shut down, malfunction disappear, restart again.		Please check if short circuit on AC output. If this fault appear frequently, please contact manufacturer.

Table 8-1 Stop condition and trouble shooting

8.2 Maintenance

To ensure series converter continuously and normally running, it is required regular maintenance, usually every six months for regular inspections.

Before opening the cover of cabinet maintenance, should completely cut off the power and shut down converter 10 minutes or longer, after capacitors end discharging, then can proceed maintenance (the machine inside has many capacitors and discharge need some time), be careful not to damage any parts and components, pay attention to the order of wiring.

Every half to one year, check the items below:

Warning !

This operation must be done with whole system is not charged with electricity.

- Check humidity and dust of converter surrounding environment, if have too much dust, clean the converter.

- Check the converter cable connection is loose, if loose, tightening again according to the connection method of wire.
- Check whether the cable is damaged, especially the metal surface Contact surface is cut marks or not.

Parts	Check the contents	Solutions
Input and output terminals	loose	Tightening
Input and output cable	The cable whether is aging	Replace cable
Control board	Accumulation of dust and dirt	Using 392kPa-588kPa pressure dry compressed air to blow off
Bus capacitor	Discoloration or smell	Replace capacitor
Radiator Fan	Not work	Replace fan
Inside of cabinet	Accumulation of dust and dirt	Using 392kPa-588kPa pressure dry compressed air to blow off
Button cell	LCD doesn't display Time	Replace the CR1220 Button Cell on the motherboard

9. Warranty Conditions

Sales staff cooperate with Engineering department, delivery the products that meet the needs of users and be in good condition to the user. Terms are stipulated as following:

We usually adopt entrust transport way to delivered the goods, when the user sign for the goods by delegating transport, should carefully check whether the structure and appearance of product is damaged, if with doubt, the user shall not sign for it, if you sign for it then means you agree the goods without any fault or damage during transportation.

1. Our company seriously promised: for all sold out converter, we provide one year warranty from the date of delivery and supply maintenance services all the time.

2. Within warranty time, when converter meets all the installation environment and using conditions, also operation correctly, if the converter have damage or accident happens, please inform our company after-sales service

department, when contact us, please provide the equipment model, serial number and complete problem explanation. We will provide free components for replacement firstly, if the problems still can't be solved, please contact the manufacturer as soon as possible, prohibit remove the parts by yourself !

The factory warranty does not cover damages that occur due to the following reasons:

- Transport damage
- Incorrect installation or commissioning
- Failure to observe the user manual, the installation guide, and the maintenance regulations
- Modifications, changes, or attempted repairs
- Incorrect use or inappropriate operation
- Insufficient ventilation of the device
- have been modified, altered or operated with other components not approved by Supplier;
- Force majeure (e.g., lightning, overvoltage, storm, fire)
- Have been treated improperly, negligently in any other inappropriate way (including use outside of the recommended ambient conditions).
- Are not operated in accordance with the operating manuals for their intended purpose;

Neither does it cover cosmetic defects which do not influence the energy production.

Claims that go beyond the rights cited in the warranty conditions, in particular claims for compensation for direct or indirect damages arising from the defective device, for compensation for costs arising from disassembly and installation, or loss of profits are not covered by the factory warranty, insofar Supplier is not subject to statutory liability. In such cases, please contact the company that sold you the device. Possible claims in accordance with the law on product liability remain unaffected.

10. Main Parameters

Isolation mode		Low Frequency Transformer
AC Input	Rated voltage (VAC)	Optional: 110VAC-480VAC 1-phase/2-phase
	Voltage range (VDC)	120-350VDC
AC Output	Rated output power	3~150KW
	Output waveform	Pure Sine Wave
	Rated Voltage	Optional: 220V~ 480VAC±3%
	Phases	three-phase + N wires
	Frequency	50Hz/60Hz
	Power Factor (PF)	>0.99
	converter Efficiency	>86%
	Display	LCD+LED
	Voltage Accuracy	Load Balancing ≤1%, Unbalance Load ≤5%
	Waveform distortion rate	≤2% (Linear load), ≤3% (Nonlinear load)
	Dynamic Response	5%, ≤50ms (load 0~100%)
	Running mode	Working continuously
	Electrical insulation	2000Vac, 1 Minute
Protection Function	Overload Ability	120%, 20 seconds
	Protection	Input under voltage, overvoltage, output over-current, short circuit, overheating etc.
	Cooling method	Fan-cooled
	Short-circuit protection	No automatic recovery, need to restart the machine
Working Environment	Noise (1 meter)	≤60dB
	Degree of protection	IP20(indoor)
	Working Altitude (m)	≤3000m
	Working temperature	-20~+50℃
	relative humidity	0~90%, non-condensing
Mechanical Dimension	Depth* Width * Height	600x700x1080mm
	Weight (Kg)	260Kg