

**User Manual >>**

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# 1 About this Manual



This chapter explains symbols, signal words and abbreviations possibly used in this manual.

## 1.1 Illustration of General Notices


Beside warnings general notices are used in this manual to emphasize information.

These notices are labeled by the following symbols.

### Symbols for General Notices

Symbol	Description
	General hint
	Tip for background information

## 1.2 Abbreviations

BDEW	German Association of Water and Energy Industries (German: <b>B</b> undesverband <b>d</b> er <b>E</b> nergie- und <b>W</b> asserwirtschaft)
BGV	Regulations of the German professional association concerning the prevention of accidents (German: <b>B</b> erufs <b>g</b> enossen - <b>s</b> chaftliche <b>V</b> erordnung)
	Labeling of the <b>C</b> ommunauté <b>E</b> uropéenne = European Community; confirms the conformity of products with the relevant EU standards and guidelines
DIN	German Institute for Standards (German: <b>D</b> eutsches <b>I</b> nstitut für <b>N</b> ormung)
DNO	<b>D</b> istribution <b>N</b> etwork <b>O</b> perator
EMC	<b>E</b> lectro magnetic compatibility
EN	European standard (German: <b>E</b> uropäische <b>N</b> orm)
IEC	<b>I</b> nternational <b>E</b> lectrotechnical <b>C</b> ommission
VDE	Association of German Electricians (German: <b>V</b> erband <b>D</b> eutscher <b>E</b> lektrotechniker)
WT	<b>W</b> ind <b>T</b> urbine

## 2 General Information



Read this manual carefully and pay attention to the safety instructions embodied.

This manual describes the feed-in inverter HYGCI-15CL (V1.0/V1.5) developed by HYE. This device is used for grid-connected operation of small wind turbines (WT), HYGCI-15CL-V1.0 is suitable for HY-1000 wind turbine, while HYGCI-15CL-V1.5 is suitable for HY-1500 wind turbine, which means the energy generated by the WT is supplied to the connected grid. Therefore the HYGCI-15CL (V1.0/V1.5) converts the speed dependent AC/DC voltage of the WT into a grid-compatible AC voltage. For this process grid voltage is necessary. In the event of a mains power failure or when the WT generates more energy than the HYGCI-15CL (V1.0/V1.5) can feed to the grid, the integrated intelligent electronic break system will automatically trigger, inverter will auto rest after a while when gust wind passes, and system will start to generate electricity again.



Fig. 1: Principle block diagram of HYGCI-15CL (V1.0/V1.5) between small wind turbine and grid

The HYGCI-15CL (V1.0/V1.5) accommodates the components rectifier and inverter in a compact housing.

The HYGCI-15CL (V1.0/V1.5) display integrated in the front panel of the device displays the different measured variables. Thus you can check the performance of the small wind turbine. The data logger stores the values for later use. The operating mode of the device is indicated by the LED status display.

The HYGCI-15CL (V1.0/V1.5) meets the applying European regulations and standards.

Among others the device complies with the BDEW guideline for the connection and parallel operation of generators in the public low-voltage grid of the distribution network operators (DNO). This includes the regulations for mains monitoring according to DIN V VDE V 0126-1-1 (automatic disconnection device between a generator and the public low-voltage grid). You can look up other country configurations and standards in the Internet.

Country-specific and plant-specific settings are secured by password and must be set by the plant manufacturer of the WT.

### 2.1 Scope of Supply and Additional Equipment

The following articles are included in the scope of supply when you purchase the HYGCI-15CL (V1.0/V1.5):

- < HYGCI-15CL (V1.0/V1.5)
- < Wall mount with suitable bolts and fixings
- < User Manual

## 3 Safety Instructions



These safety instructions must be kept.

### 3.1 General Safety Instructions

- Before installation, please read all instructions in this manual.
- It is performed only by qualified personnel.
- All electrical installation shall be done in accordance with local and national electrical codes.
- Connecting to the grid must be done after receiving prior approval from the utility company.
- Before connecting, please shut down the generator output in order not to get electric shock, for the generator will generate electricity in the wind.

All Information and advice attached to the device, such as safety instructions or danger warnings and technical data (type plate) are:

- not to be removed
- not to be damaged
- to be kept readably (no covers, no paint over or the like)

### 3.2 Appropriate Use

The appropriate use involves:

- completely reading and following the content of the documentation and attend to the safety instructions and danger warnings comprised therein
- mounting and connecting the device according to the installation instructions by trained staff

Moreover we refer to the following guidelines:

- regulations of the utility concerning the grid feed-in
- instructions of the small wind turbine manufacturer

HYE is not liable for damage resulting from unintended use of the device.

### 3.3 Galvanic Isolation

The HYGCI-15CL (V1.0/V1.5) is constructed and designed to assure maximum safety during the installation and operation. The maximum possible degree of safety is being assured by the galvanic isolation of the input and the output. In addition the galvanic isolation allows parallel connection of several feed-in converters of the type HYGCI-15CL (V1.0/V1.5) on the generator end.


### 3.4 Mains Monitoring

The device interrupts operation in case of line interferences, e.g. in the event of an AC power failure. The grid feed-in is stopped according to the country-specific standard (e.g. DIN V VDE V 0126-1-1). This way dangerous voltage in the AC conductors is avoided, when a mains failure occurs.

### 3.5 Storage, Transport and Setup

	<b>NOTICE</b>
	<p><b>Storage and transport without original packaging</b></p> <p>When the device is stored or transported without the original packaging, this is to be considered as extraordinary burden and may cause property damage.</p> <p>Store the device in a dry, well ventilated room!</p> <p>Store and transport the device only in original packaging in compliance with class 2M1, according to DIN EN 60721-3-x: 1998-03.</p>

The HYGCI-15CL (V1.0/V1.5) is tested for mechanical shock, mechanical oscillation and its fatigue strength under oscillation stresses according to DIN VDE 50178: 1997 class 3M1.

	<b>NOTICE</b>
	<p><b>Property damage due to loose setup</b></p> <p>Oscillation beyond the limiting value or application onto non-stationary equipment is to be considered extraordinary burden and can cause property damage.</p> <p>Mount the device shock-proof and free of oscillation to a wall according to the regulations for stationary appliances.</p>

#### Environmental Conditions

Pay attention to the following notes to provide for a long service life and trouble-free operation:

- < Protect the device against mechanical damage!
- < Protect the device against dirt and humidity!
- < Protect the device against direct sunlight! Excessive solar radiation will impair the service ability of the device! The optimum ambient temperature is in the range of 10 - 20°C.
- < Take care that a sufficient amount of space is provided around the device.

When the operation/mounting place is outside the denoted area, this is to be considered not intended.

Precise information on the permissible ambient conditions are given in the technical data.

### 3.6 Maintenance

The HYGCI-15CL (V1.0/V1.5) is designed for a minimum amount of maintenance.

We recommend checking the following functions at regular intervals in order to ensure a proper operation of the device:

- < Check on a regular basis, preferably weekly, whether the device operates properly. This should be done at different wind conditions. You can recognize the proper operation by means of the displayed operating modes. Serious errors are displayed by the red LED.
- < Pollution of the heat sink can restrict the heat dissipation. Check the heat sink for dirt on a regular basis and clean it with a paintbrush, a soft brush or compressed air.
- < Clean the display and the LED display with a moist cloth when it is dirty. Do not use harsh cleaning agents (e.g. abrasive), solvent or acid substances!

## 3.7 Disposal

The HYGCI-15CL (V1.0/V1.5) fulfills the requirements covered in the Directive 2002/95/EC on the restriction of the use of hazardous substances in electrical and electronic equipment (RoHS Directive).



The HYGCI-15CL (V1.0/V1.5) must not be disposed as part of domestic waste. According to the European Directive 2002/96/EC about old electrical and electronic equipment and the implementation into national law, exhausted electric equipment must be collected separately and recycled in an environmentally acceptable way. Make sure that you can return the used device to the merchant. It may have potential effect on the environment and on your health, if you disregard the EC Directive!

## 3.8 Guarantee and Liability

The guarantee period is two years from the date of delivery (implied warranty).

Guarantee claims are excluded:

- < when the device has been employed beyond its intended use in terms of section 3.2 "Appropriate Use", P.5
- < when the device has been mounted non-standard or improperly, especially by electricians without license
- < when the device has been employed although the protection equipment was defective
- < when the maximum permissible input voltage has been exceeded
- < through improper operation
- < when the device or its equipment have been modified
- < when the device was affected by foreign material or force majeure

In addition to the implied warranty HYE offers a fee-based manufacturer's guarantee of five years from the date of purchase.



### Exclusion of liability

The country-specific parameters of the grid must be set by the plant manufacturer of the WT according to the local grid parameters.

HYE is therefore not liable for damage due to wrong parameters on the grid end.



## 4 Description of the Device

### 4.1 Technical Data

Important technical data are also to find on the type plate attached to the device.

Model	HYGCI-15CL-V1.0	HYGCI-15CL-V1.5
Matching wind turbine	HY-1000L	HY-1500L
Manual Brake		
Rated Current	32A	32A
Rated Voltage	400VAC	400VAC
Brake Unit		
DC output voltage range	0-280V	0-350V
AC input voltage	0-200V	0-230V
AC max. current	30A	
Power		
Rated output	1000W	1500W
Peak output	1100W (adjusted)	1600W(adjusted)
DC voltage input		
Working voltage	40Vdc~450Vdc	
On-grid voltage	70Vdc~350Vdc	
Max. input current(dc)	8A	
AC output		
AC output voltage	220V/230V/240V(1ψ2W)	
Output frequency	50 Hz / 60Hz	
Output standard option	CE-EMC, CE-LVD, VDE0126-1-1	
Power factor	>0.99 @ full load	
Max. conversion efficiency	>95%	
Environment requirement		
Protection grade	IP20	
Ambient temperature	-20℃~60℃	
Humidity	≤90%	

Physical features	
Packing dimension	670*540*250 mm
Gross weight	33kg

### 4.1.1 Output of a HYGCI-15CL (V1.0/V1.5)

The following figure indicates the relation between the generated DC voltage and the maximum output power.

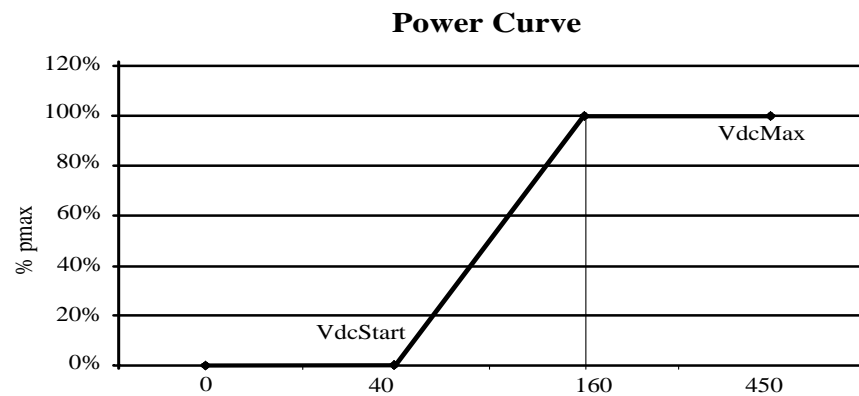


Fig. 2: Output curve

## 4.2 Device View and Type Plate

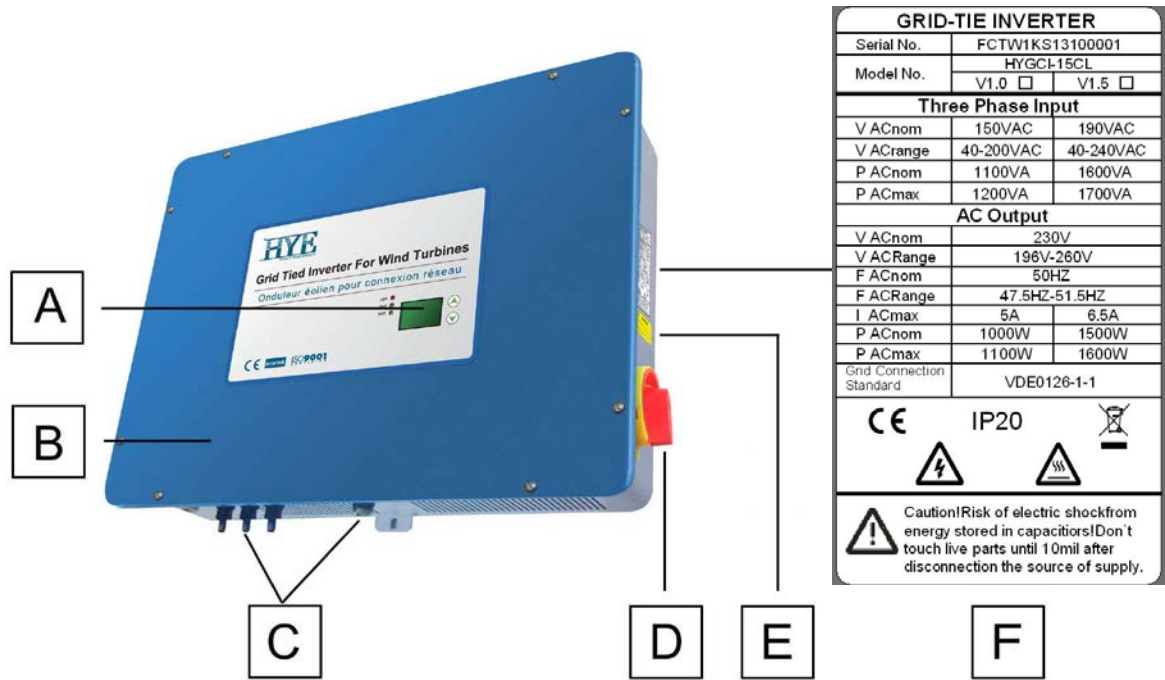


Fig. 3: HYGCI-15CL (V1.0/V1.5) (steel sheet housing) with type plate

- [A] Operating unit with graphic display, LEDs and push buttons
- [B] Steel sheet housing (IP Code: IP20)
- [C] Screwed cable glands
- [D] Manual brake
- [E] Manual brake caution mark
- [F] Type plate

### 4.3 Dimensions

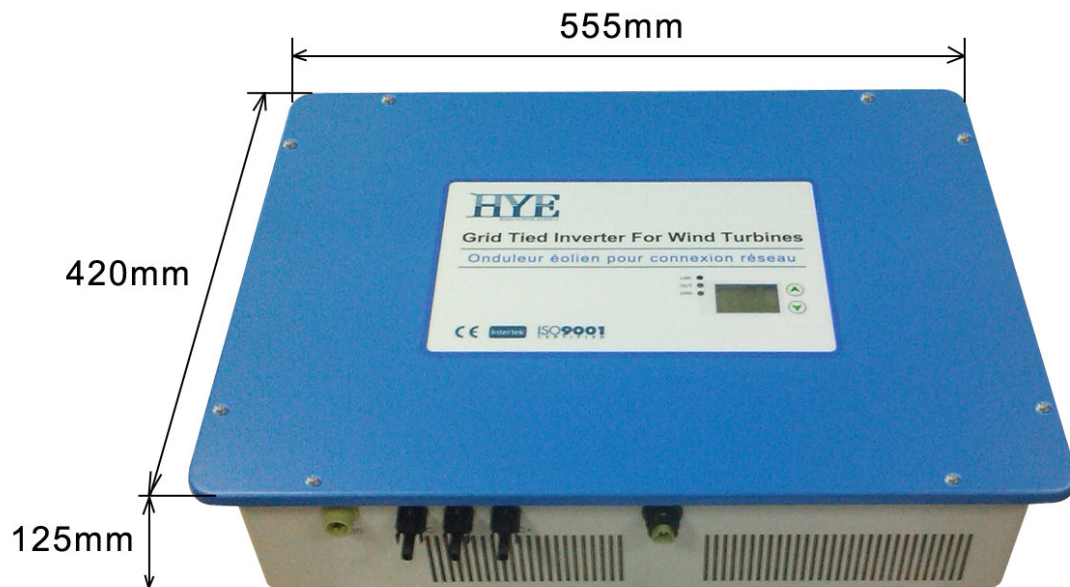


Fig. 4: Dimensions HYGCI-15CL (V1.0/V1.5) (steel sheet housing) in mm

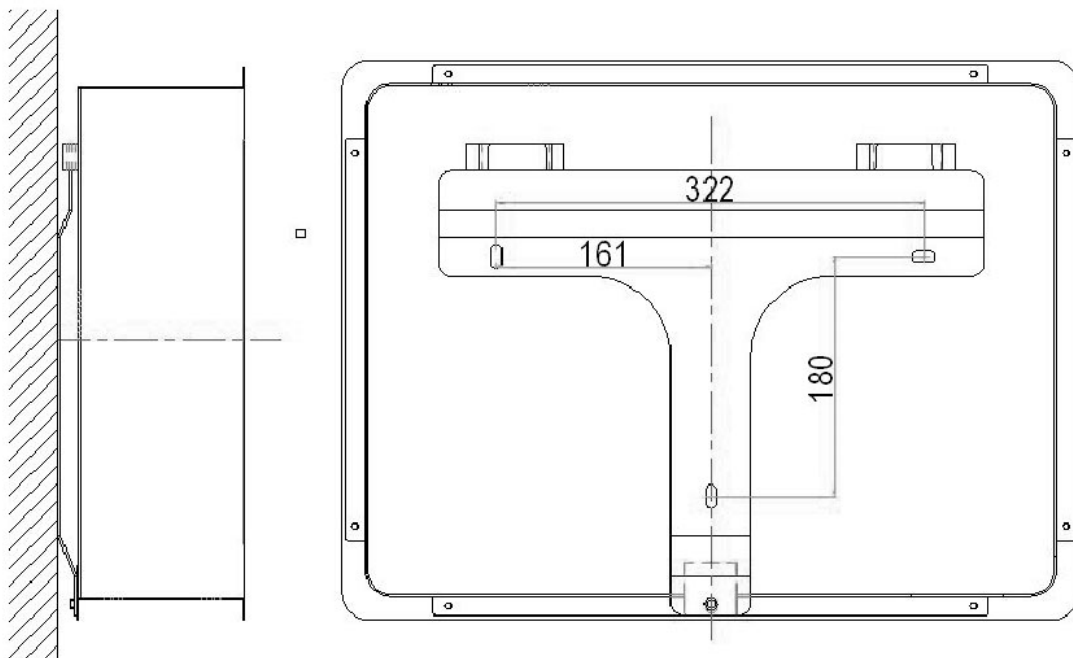


Fig. 5: Dimensions wall mount in mm

## 5 Installation

This chapter first describes the mounting of the HYGCI-15CL (V1.0/V1.5) to the wall, followed by the electrical connection.

### 5.1 Mounting the HYGCI-15CL (V1.0/V1.5)

The HYGCI-15CL (V1.0/V1.5) is mounted vertically to a weight-bearing wall using the wall mount provided. Please, consider the safety instructions and application advice and the technical data, when mounting the device.

A dry, dust-free room provides for ideal environmental conditions.



#### **Risk of fire due to hot surfaces**

During operation individual device parts can reach a temperature of 60°C and may cause a fire. A fire can cause serious personal injury and property damage.

Make sure that there are no combustible materials near by the device.

#### 5.1.1 Ventilation and Free Space

The HYGCI-15CL (V1.0/V1.5) isn't convection ventilated, an internal fan is necessary. A greater amount of space must be provided above the device, so it can be moved into the wall mount. Keep the spacing to other devices.

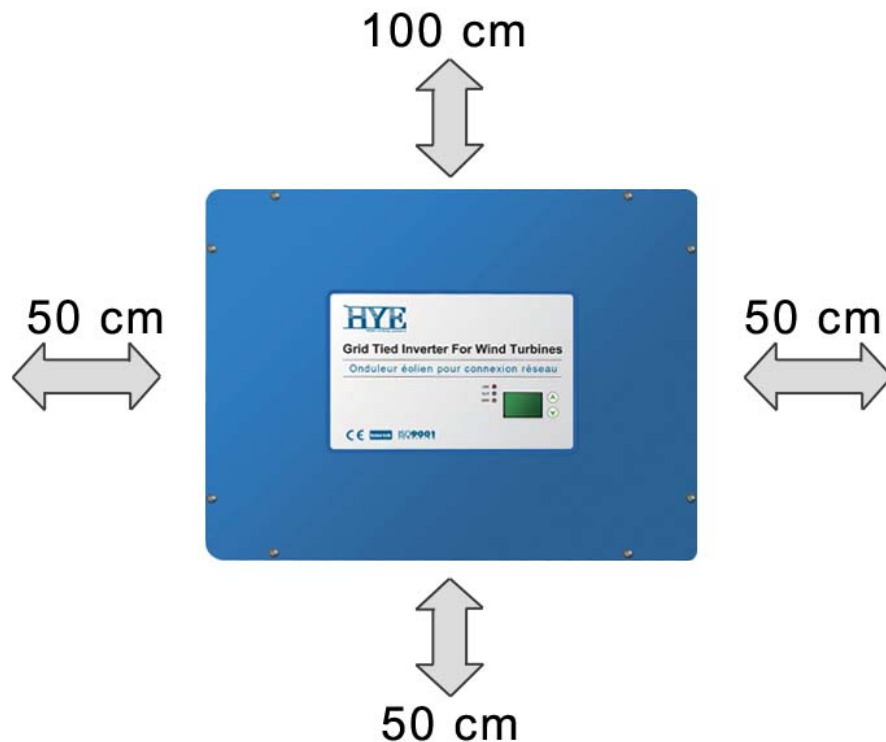


Fig. 6: Required space to other devices

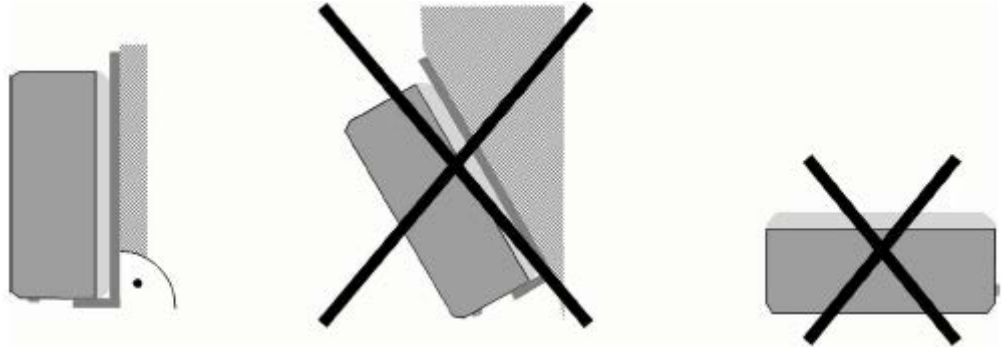


When the circulation of air is restricted, the HYGCI-15CL (V1.0/V1.5) may overheat and switches off. Do not put anything onto the device and clean the fan.

## 5.1.2 Mounting Instructions

HYENERGY recommends mounting the device to the wall vertically.

Pay attention that the device is not tilted to the front. The mounting angle should be 90°.



*Fig. 7: Type of mounting and tilt angle*

Use the wall mount provided with the devices to mount the HYGCI-15CL (V1.0/V1.5) simply and safely.

Mount the device as follows:

- ◆ Select a mounting location for simple operation. The display should be at eye level of the operator.
- ◆ Fasten the wall mount to a vertical wall using the fixings and the hexagon head bolts supplied with the device.
- ◆ Make sure that the wall mount is tightened firmly.
- ◆ Place the HYGCI-15CL (V1.0/V1.5) on the edges of the angular mounting rails so that it is tilted to the front. Position the device so that the slide-in rails of the wall mount fit into the grooves of the HYGCI-15CL (V1.0/V1.5) on both sides.
- ◆ Tilt the HYGCI-15CL (V1.0/V1.5) to the rear then and move it vertically into the wall mount. The angular mounting rails interlock with the bent outer fins of the device to ensure secure hold.

## 5.2 Electrical Connection

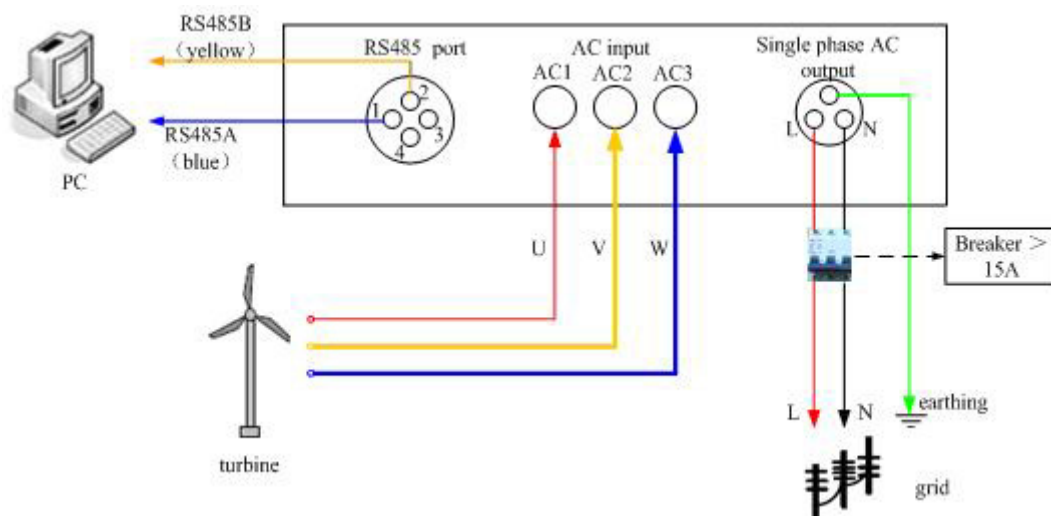


Fig. 8: Connection of HYGCI-15CL (V1.0/V1.5) to small wind turbine and public grid

### ➤ Connection to The Grid

A HYGCI-15CL (V1.0/V1.5) is designed for the 230V single phase utility grid, whose voltage is between 196V~264V and frequency is between 47.5Hz~51.5Hz (Rating according to VDE 0126-1-1/A1 :2011 above 50.2Hz).

B Make sure that connecting wires can support over current.

C For safe installation and operation, the breaker is necessary, which should support over current and over voltage.

D Technical specification and standard should be in accordance with local power company code.

### ➤ Input three phase AC connection

A Please make sure the wind turbine is stop during installation. To ensure the safety while installing the system, please switch the manual brake to ON status. Since the manual brake switch is ON, wind turbine can keep stop during your installation. During the operation in the future, when storm is coming, you can stop the turbine by turning on manual brake located right side down of the inverter. Please refer to following cable connection:



- B Three phase AC output wires from turbines connect to three phase input ports.
- C Please ensure connecting wires to be stable.

## ➤ Output AC connection

- A Disconnect the breaker so as to ensure output AC ports without electricity.
- B AC output “L” connects to “L” of the single phase grid.
- C AC output “N” connects to “N” of the single phase grid.
- D The earthing wire connects to the earth.
- E Please ensure connecting wires to be stable.

## ➤ Communication connection

When a PC is used to monitor one inverter or several inverters, RS485 bus is applied as communication method. There is a RS485/RS232 converter (optional) between PC and RS485 bus. Communication system diagrams are as below.

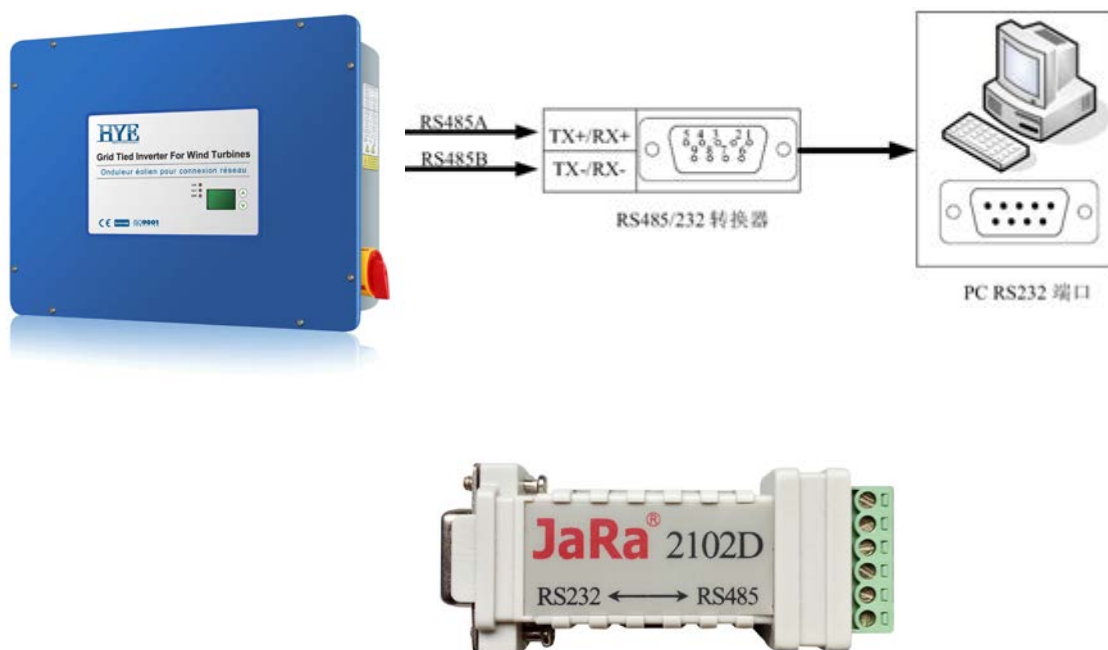


Fig. 9: Communication Connection of HYGCI-15CL (V1.0/V1.5) and RS485/RS232 converter (optional)



The HYGCI-15CL (V1.0/V1.5) is to be connected according to the figure. By means of the disconnecting points (2 breakers) the device is de-energized to ensure that you can work safely at the device and personal injuries are avoided in the event of an error.

## 5.2.1 Opening the Device



Opening the device will result in the loss of warranty.




## 6 Initial Operation

Take the following steps to put the HYGCI-15CL (V1.0/V1.5) into operation:

- A According to installing process, connect the turbine, controller, inverter and grid.
- B Before starting, ensure AC voltage to meet the start conditions.
- C Switch-on the circuit breaker to connect the grid.
- D Switch-off the manual brake.
- E When all start conditions are met, the inverter will automatically start to generate power to the grid.
- F In normal operation of inverter, it needs no people to control, as well as it will automatically restart after an error stop.

# 7      Operation at the Device

This chapter describes the different displays and settings you can attain via the operating unit of the device. You find a clearly arranged operating structure attached. 

## 7.1 Introduction on the inverter panel

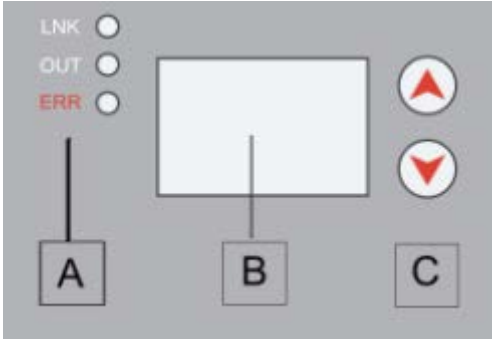










Fig. 11: Operating unit of HYGCI-15CL

- [A] LEDs
- [B] LCD Display
- [C] Buttons

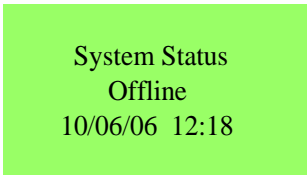
			State
On	On	On	Processing of Initialization
Off	Off	Off	Standby state
Flash	Off	Off	Connecting to The Grid
On	Off	Off	Connected to The Grid
On	On	Off	Generating Power to The Grid
Off	Off	On	An Error Occurred
Off	Flash	On	Manual Stop State

Buttons	Using method	Function
	UP	①Up to another screen ②To increase the value
	Down	①Down to another screen ②Shift to the next edit position
	Both press for 0.5~1s Enter	Applying the current input or switch to the next screen
	Both press for 1~2s Esc	Cancel the current input; screen is set back to the previous one
	Both long press Esc	Switch to the main menu

- 1) Checking the wiring of controller and inverter correct or not, Please refer to 5.2 wiring diagram.
- 2) Open inverter AC grid switch;
- 3) After inverter starting, inverter goes into “Initializing” status and starts to check if grid voltage and frequency meet setting standard of inverter. In the initializing process, All of the LEDs are on. If the grid is abnormal, the ERR light will be on.
- 4) Grid voltage and frequency is normal by inverter initial check, after 30 seconds, inverter starts to work, then all LEDs are off, and LCD screen displays turbine status, for example “system status: offline”.

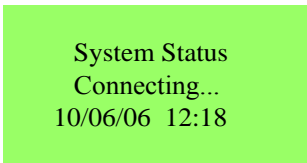
## 7.2 System State Screen

After initializing, it shows Offline (standby status).



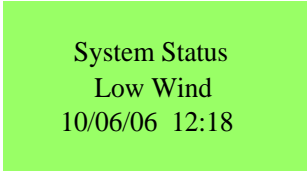
System Status  
Offline  
10/06/06 12:18

When all connecting conditions are fulfilled, it shows Connecting.



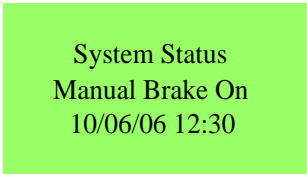
System Status  
Connecting...  
10/06/06 12:18

When the turbine output power is low, it shows Low Wind.



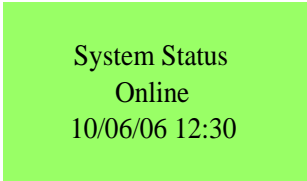
System Status  
Low Wind  
10/06/06 12:18

When manual brake is on, it shows Manual Brake On



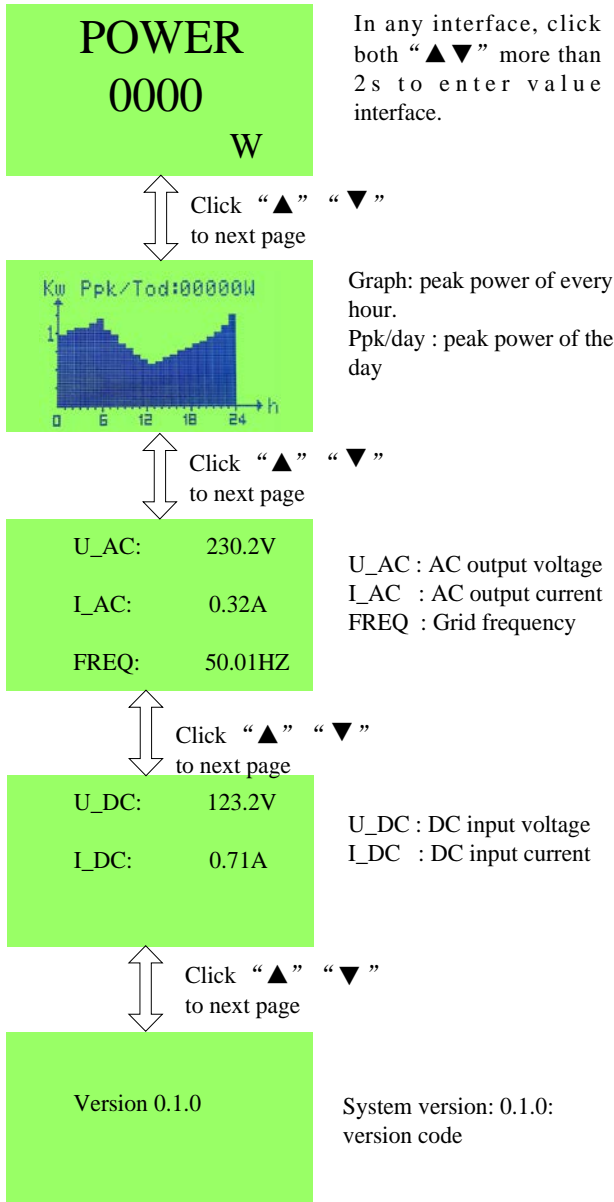
System Status  
Manual Brake On  
10/06/06 12:30

After the inverter connected to the grid, it shows Online (connected status).



System Status  
Online  
10/06/06 12:30

7.3 Device Status



The user settings as follows:

1. STOP

2. START

3. Time Setting

4. Error Record

- 1.STOP: manual stop
- 2.START: manual start
- 3.Time Setting: set time
- 4.Error Record: retrieve error record
- 5.Sys.Settings: system advanced setting

Page 2

5. Sys. Settings

1. Manual stop:

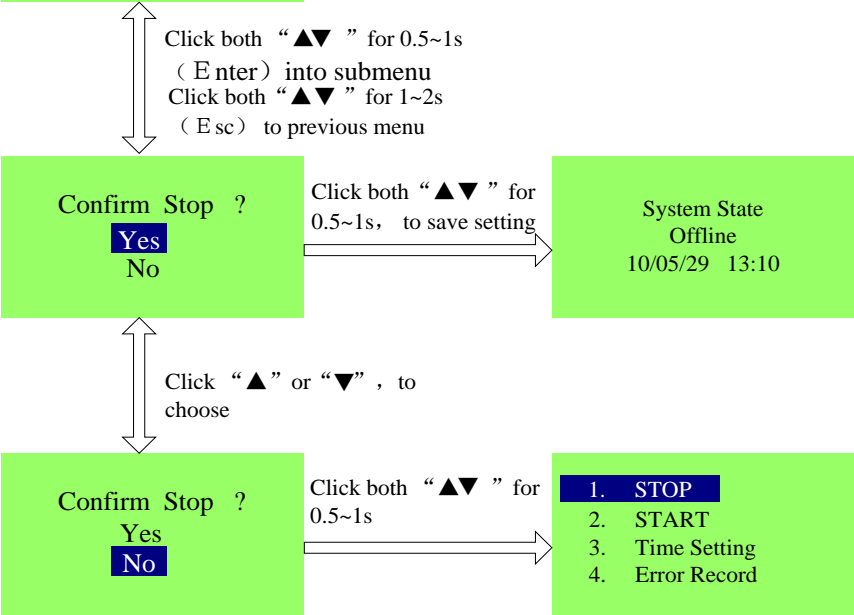
1. STOP

2. START

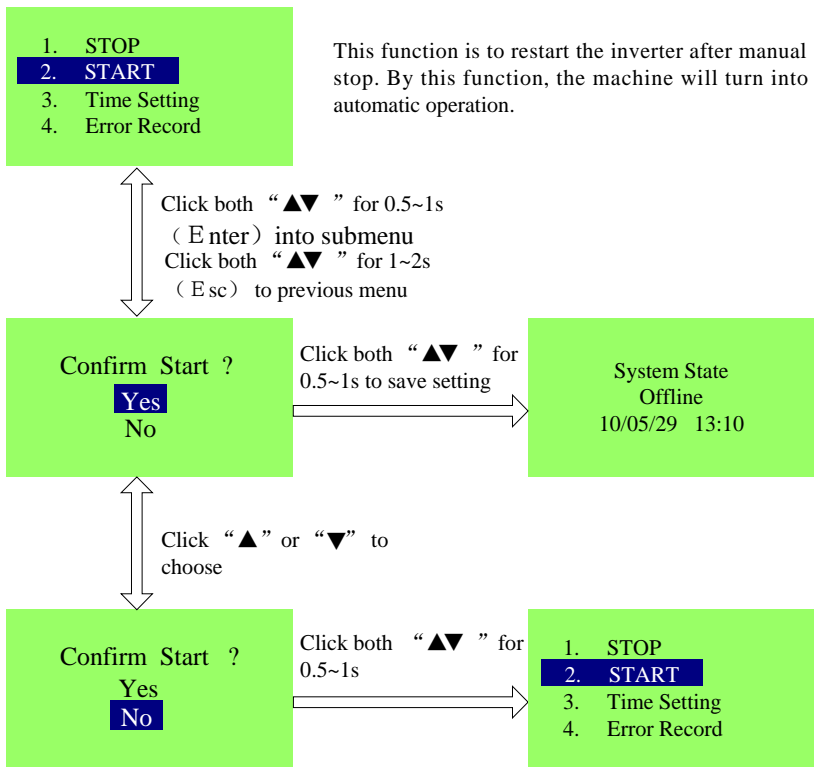
3. Time Setting

4. Error Record

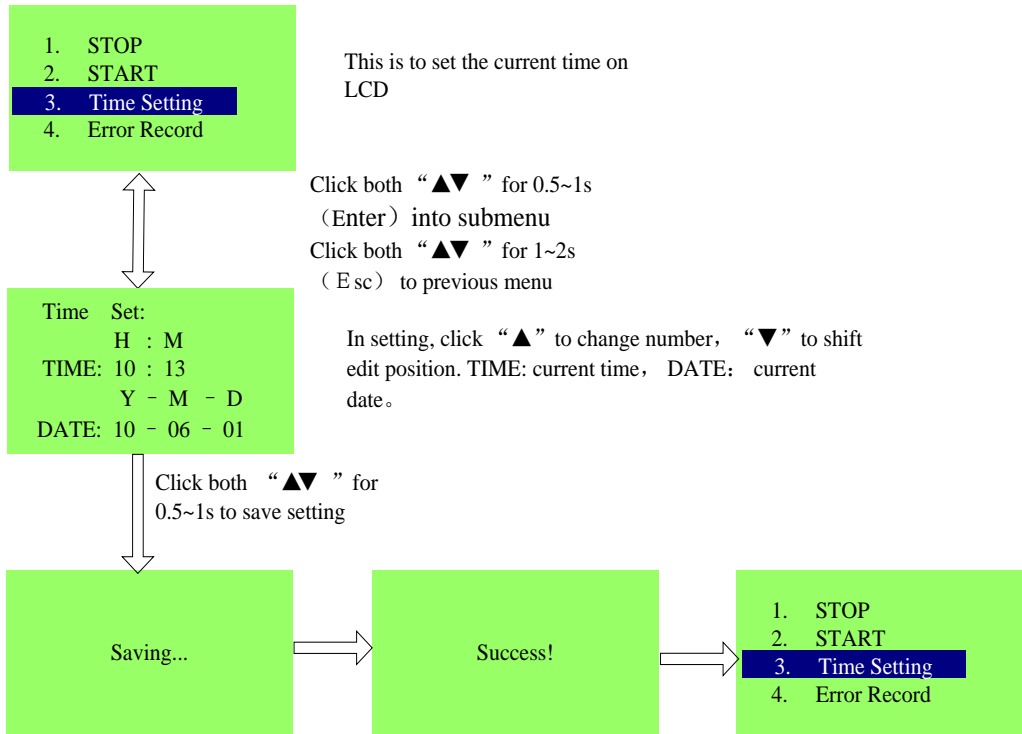
- 1.STOP: manual stop. Under special circumstance, this function can disconnect the inverter from turbines and the grid.



2. Manual start:



3. Time setting:



4. Error record:

1. STOP

2. START

3. Time Setting

4. Error Record

To look over error records at most of 10 pics.

Err. Record 01

Code : 07

10/05/27 20:42

The first line is error No.  
The second line is error code.  
The third line is error time.

Click both “▲▼” for 0.5~1s  
(Enter) into submenu.  
Click both “▲▼” for 1~2s  
(Esc) to previous menu.

5. System advanced setting:

5. Sys. Settings

System advanced setting, this needs a password.

1. Volt. Start

2. Volt. Stop

3. Time Start

4. Time Stop

Click both “▲▼” for 0.5~1s  
(Enter) into submenu  
Click both “▲▼” for 1~2s  
(Esc) to previous menu

The advanced system settings as follows:

- 1. Volt. Start
- 2. Volt. Stop
- 3. Time Start
- 4. Time Stop

- 5. SeNo. Setting
- 6. Comm. Setting
- 7. Rs485 Setting
- 8. Curve Setting

- 9. Select Power
- 10. Power Factor

- 1. Volt. Start: start voltage
- 2. Volt. Stop: stop voltage
- 3. Time Start: start time
- 4. Time Stop: stop time
- 5. SeNo. Setting: serial No
- 6. Comm. Setting: set communication
- 7. RS485 Setting: set RS485
- 8. Curve. Setting: set power curve points
- 9. Select Power : choose the mode : 1000 W or 1500W.
- 10. Power Factor : set power factor

1. Start Voltage:

- 1. Volt. Start
- 2. Volt. Stop
- 3. Time Start
- 4. Time Stop

Click both “▲▼” for 0.5~1s  
(Enter) into submenu  
Click both “▲▼” for 1~2s  
(Esc) to previous menu

Volt. Startup:  
040V

“▲” to add or subtract, “▼” to shift. The set range: 40~250V

Click both “▲▼” for 0.5~1s to save setting.

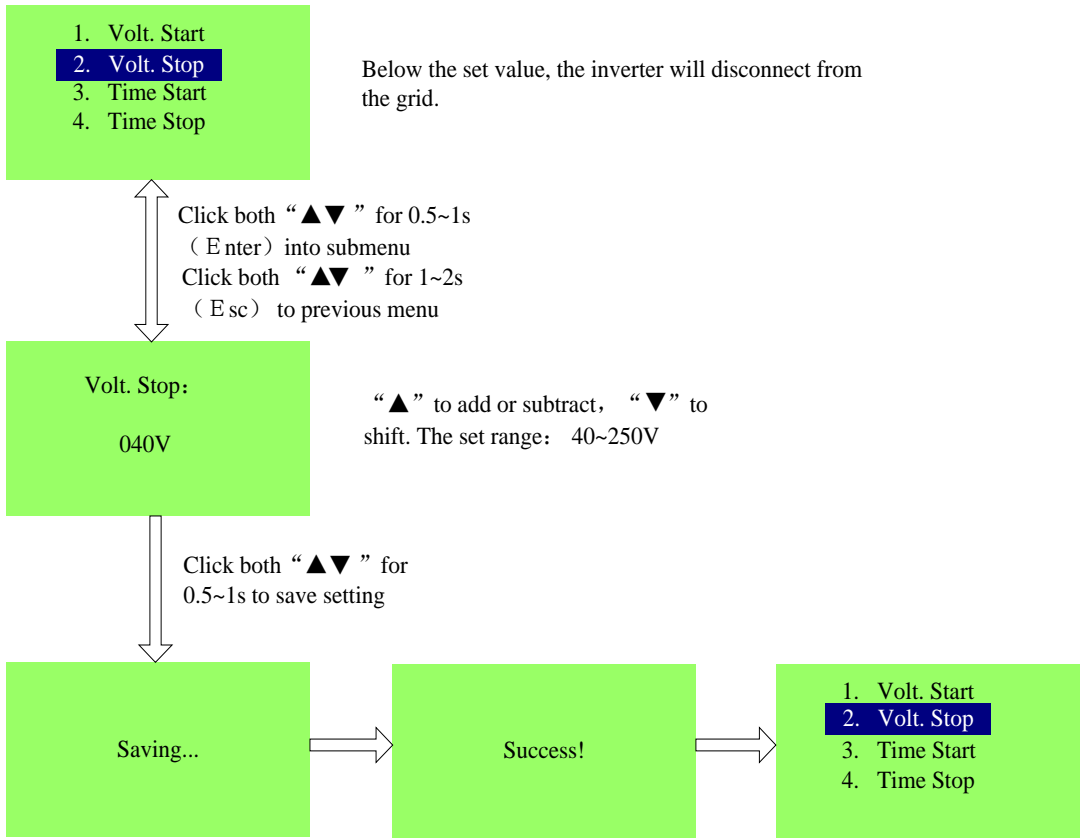
- 1. Volt. Start
- 2. Volt. Stop
- 3. Time Start
- 4. Time Stop

Saving...

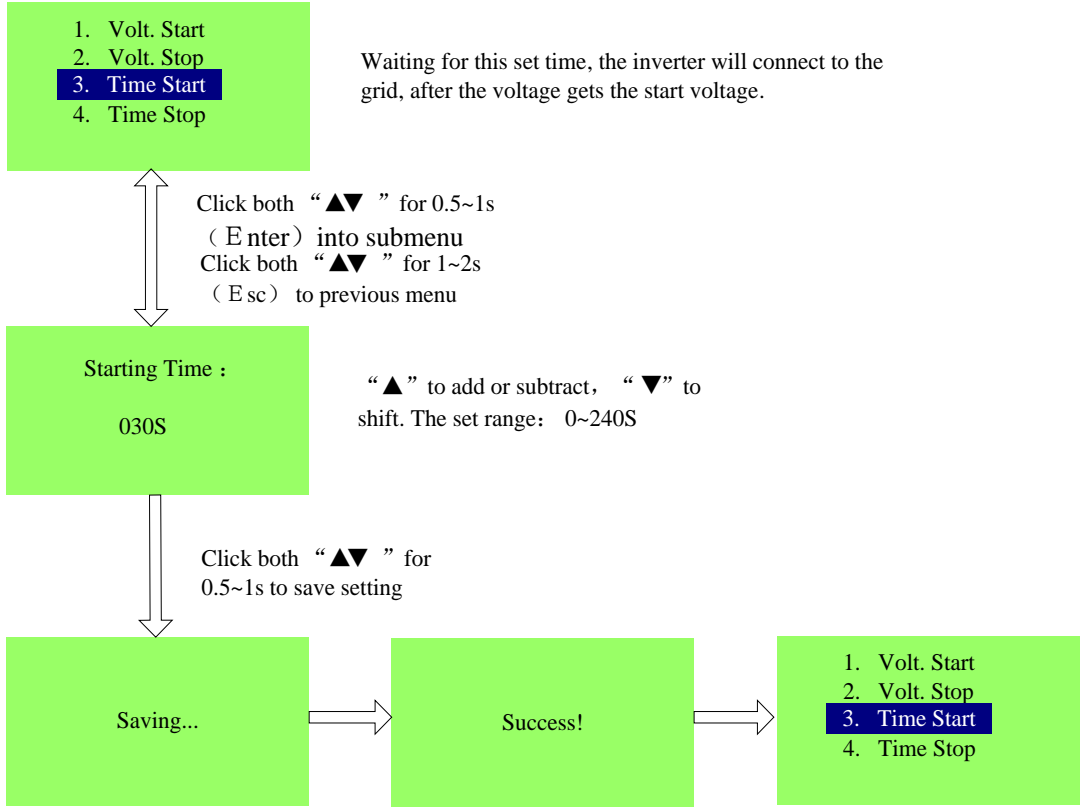
Success!



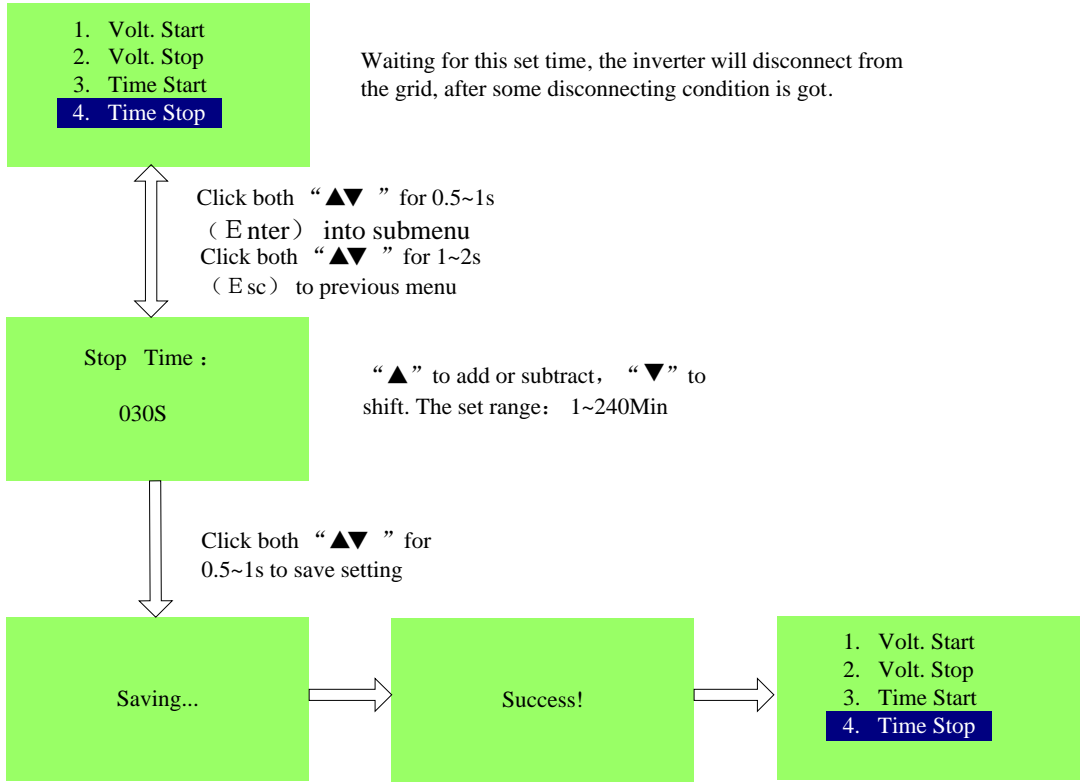
2. Stop Voltage:



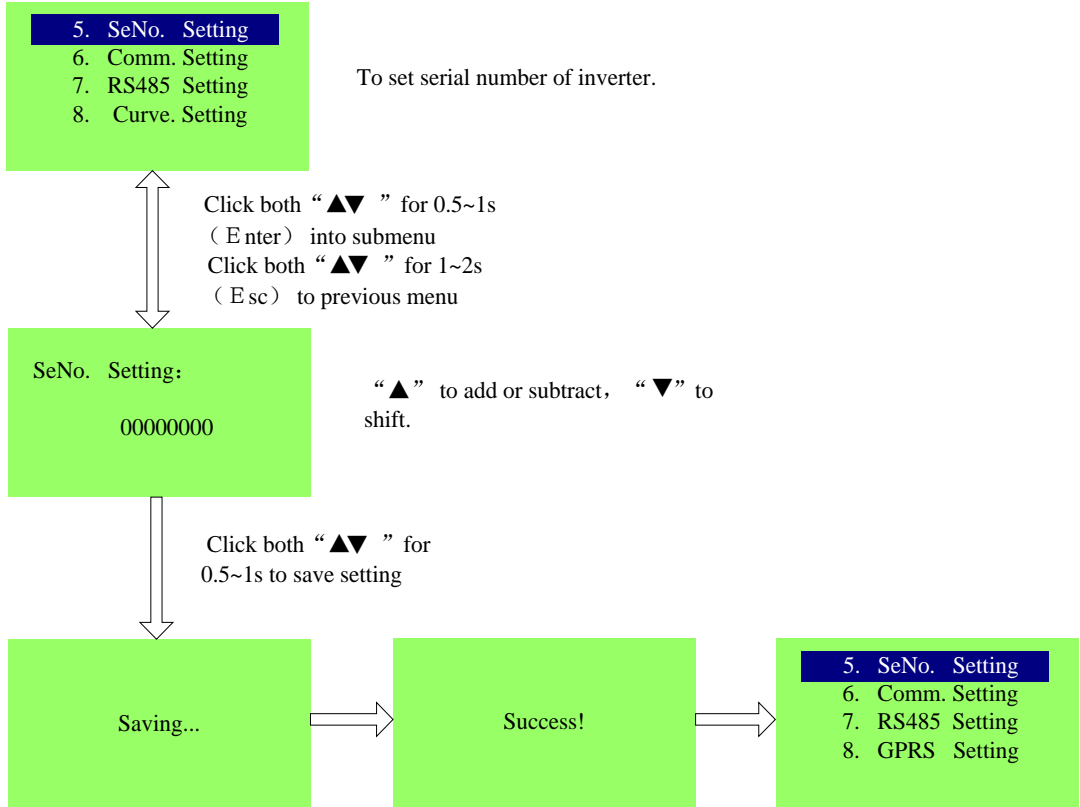
3. Start Time:



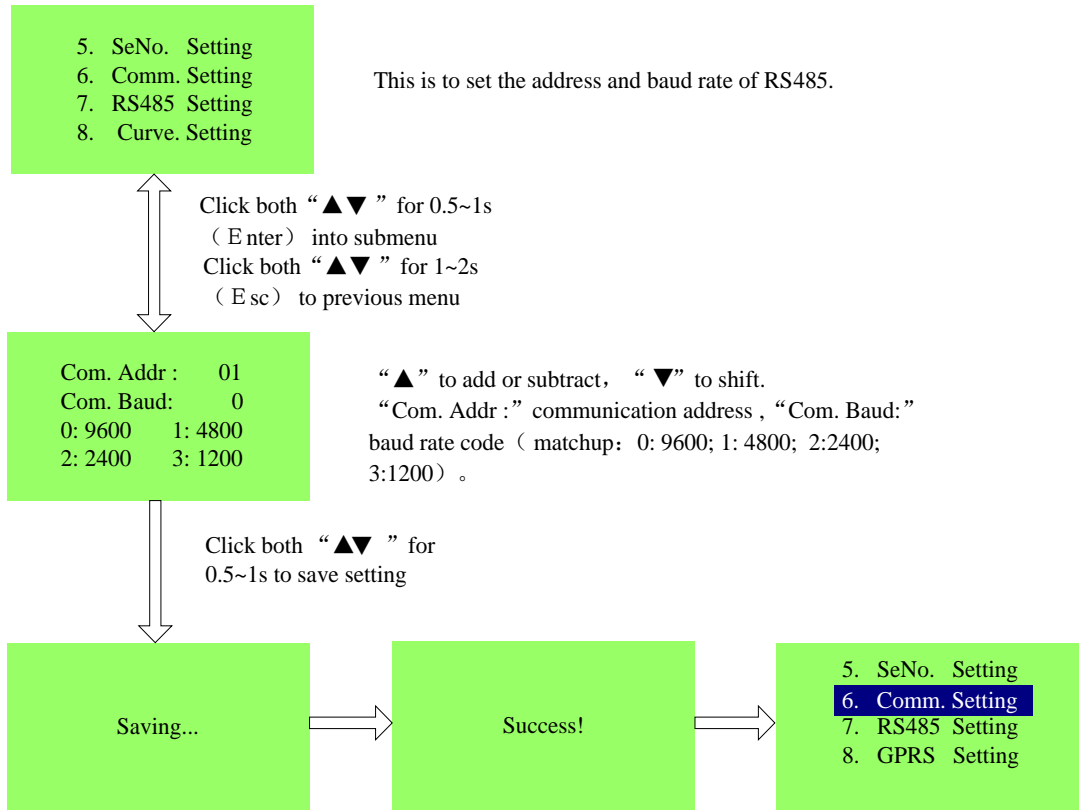
4. Stop Time:



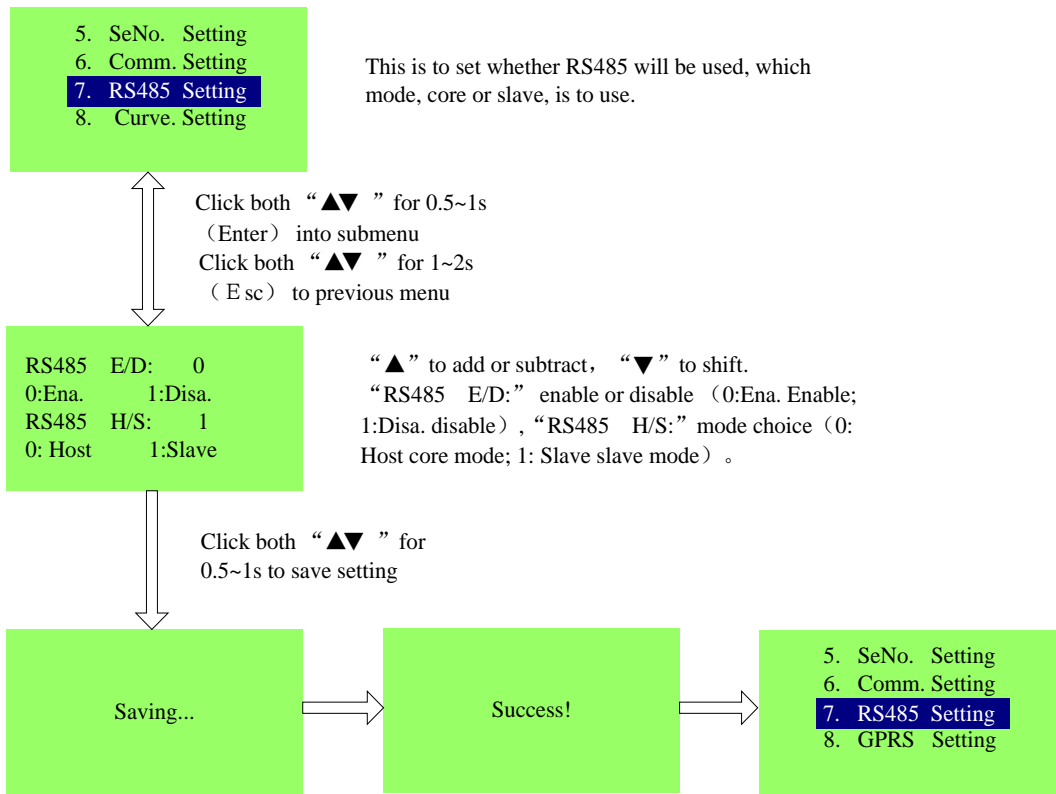
5. Serial No.:



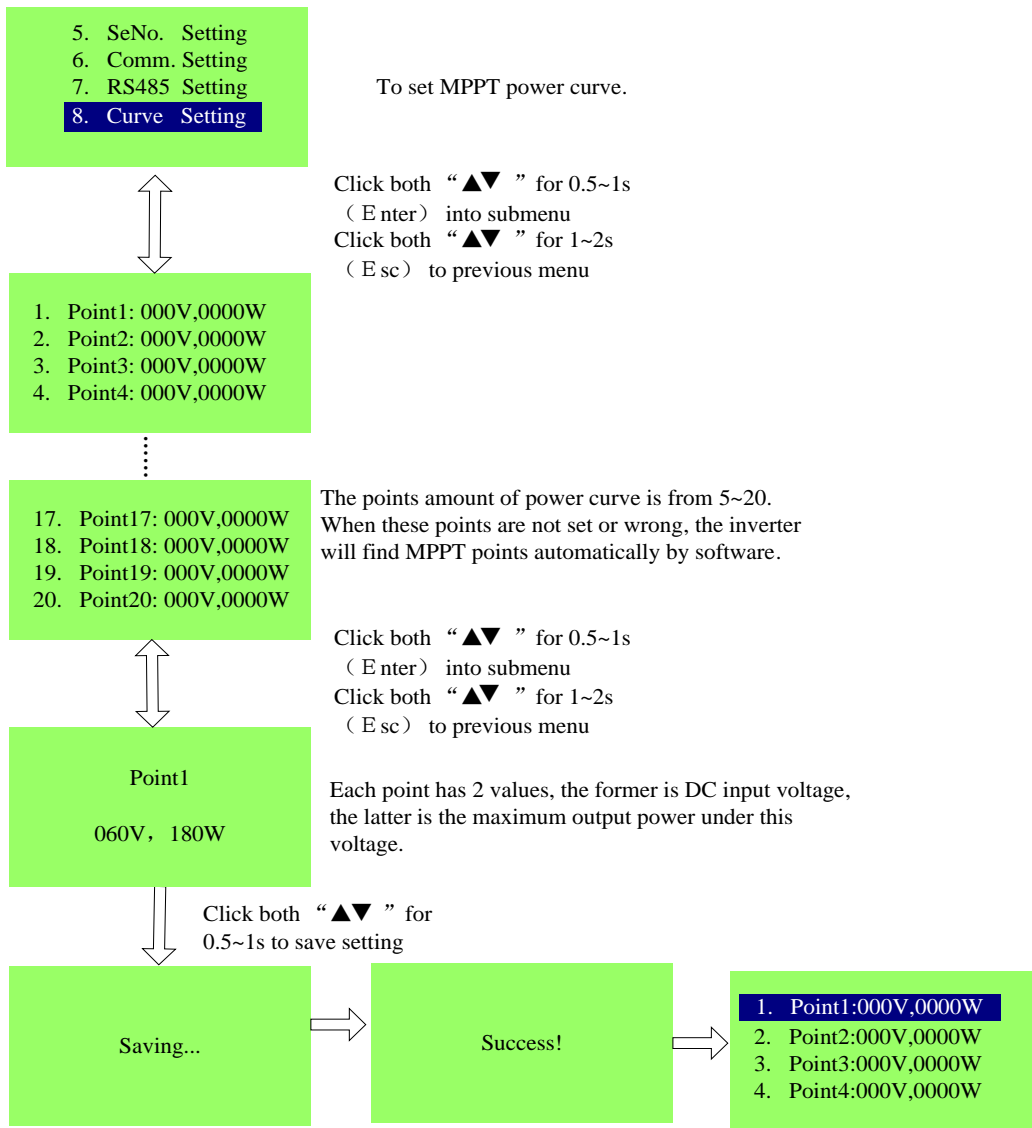
6. Communication Setting:



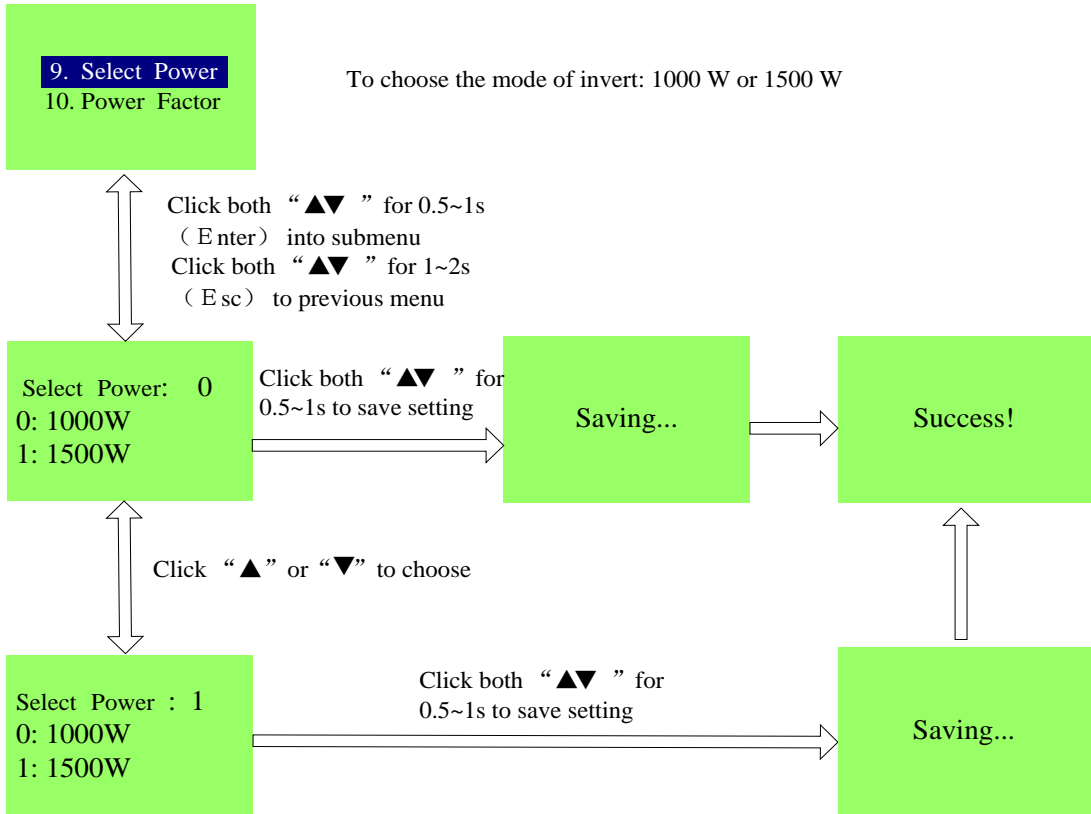
7. RS485 Setting:



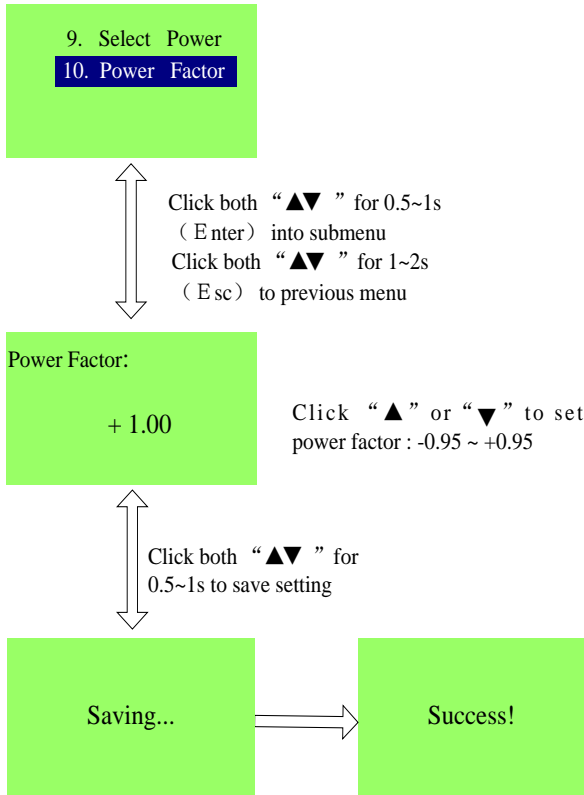
8. Curve Setting:



9. Power Selection:



10. Power Factor



## Appendix

## Trouble Shooting

Error Code: Phenomenon	<b>Note: Inverter will automatically restart when random failure occur. If malfunction continually occur in a short period of time, OR same error code occur frequently, please check your system under instructions below.</b>
ErrorCode01: Over Input Voltage	Severe malfunction. Please turn off wind turbine system immediately and contact dealer or manufacturer.
ErrorCode02: Over Inverter Bus Voltage	Normal failure, please disconnect both input and output of the inverter for at least 1 minute. Re-connect. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode03: Over Instantaneous Input Current	Normal failure, please disconnect both input and output of the inverter for at least 1 minute. Re-connect. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode04: Over Mean Input Current	Severe malfunction. Please turn on manual break immediately to stop the turbine and contact dealer or manufacturer.
ErrorCode05: Over Instantaneous Output Current	Normal failure, please disconnect both input and output of the inverter for at least 1 minute. Re-connect. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode06: Over Mean Output Current	Severe malfunction. Please turn on manual break immediately to stop the turbine and contact dealer or manufacturer.
ErrorCode07: Over Grid Frequency	Normal failure. Please check if the grid is stable.
ErrorCode08: Under Grid Frequency	Normal failure. Please check if the grid is stable.
ErrorCode09: Under Grid Voltage	Normal failure. Please check if the grid is stable.
ErrorCode10: Over Grid Voltage	Normal failure. Please check if the grid is stable. Also check the diameter of AC cable - small diameter or longer length of the AC cable will cause this failure.
ErrorCode11: IPM Error	Normal failure, please disconnect both input and output of the inverter for at least 1 minute. Re-connect. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode12: Over Temperature	Normal failure, please disconnect both input and output of the inverter for at least 1 minute. Re-connect. Make sure the inverter is running in a cool dry place. If malfunction is still there, please contact dealer or manufacturer.

Error Code: Phenomenon	<b>Note: Inverter will automatically restart when random failure occur. If malfunction continually occur in a short period of time, OR same error code occur frequently, please check your system under instructions below.</b>
ErrorCode13: DSP Error	Normal failure, please disconnect both input and output of the inverter for at least 1 minute. Re-connect. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode14: Communication Error	Normal failure, please check the communication cable is connected in correct manner. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode15: Boost Error	Normal failure, please disconnect both input and output of the inverter for at least 1 minute. Re-connect. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode16: Grid Connection Over Time Error	Normal failure, please disconnect both input and output of the inverter for at least 1 minute. Re-connect. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode19: Inverter Overload	Normal failure, please shut down the inverter for 10 minutes. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode20: Dual CPU Check Error	Normal failure, please disconnect both input and output of the inverter for at least 1 minute. Re-connect. If malfunction is still there, please contact dealer or manufacturer.
ErrorCode21: Turbine Output Over Voltage	Normal failure, normally this situation will occur under severe weather conditions. After 1st severe weather condition strike Inverter & Turbine (system), it will automatically restart in 10 minutes; if second strike comes within one hour, system will automatically restart in 30 minutes; if third strike comes within one hour, system will assume a big storm is coming and will trigger safety mode - stop for 12 hours, then after restart.