

# Content

1. Symbol Explanation.....	2
2. Introduction.....	2
2.1. Basic Information.....	2
2.2. How to Use the Manual.....	3
3. Safety Instruction.....	3
4. Products Introduction.....	4
4.1 Topology Description.....	4
4.2 Technical Characteristics.....	4
5. Operation Description.....	5
5.1 Operation Pattern.....	5
5.2 Connect to Grid.....	6
5.3 Supply Power to the Grid.....	6
5.4 Disconnect from Grid.....	6
6. Monitor Methods.....	7
6.1 Comprehensive Information.....	7
6.2. LCD and Operation on the Display.....	7
6.2.1. LCD.....	7
6.2.2 Key.....	8
6.2.3 LED Indicator Light.....	8
6.2.4 Data shown on LCD (Table2-3).....	8
6.2.5 Operation on the Display.....	9
7. Installation and Operation of Remote Control Software.....	10
7.1. Assembling.....	10
7.2. Operation on Display.....	11
8. Installation Guidance.....	11
8.1 Summary.....	11
8.2 External Dimension.....	12
8.3 Mechanical Installation.....	12
8.3.1 Safety Instructions.....	12
8.3.2 Mechanical Requirements.....	13
8.3.3 Installation Guidance.....	13
8.3.4 Installation Instruction.....	13
9. Technical Parameters.....	19
9.1 Electronic Specification.....	19
9.2 Mechanical Specification.....	20
9.3 Characteristics.....	20
10. Inverter Cleaning.....	21
11. Contact Us & Non-responsibility.....	21

# 1. Symbol Explanation

Please pay attention to the meaning of the following symbols in this manual.



**Warning: This indicates a feature that is very important for the safety of user and/or which can cause serious hardware damage if not applied appropriately. Use extreme caution when performing this task.**



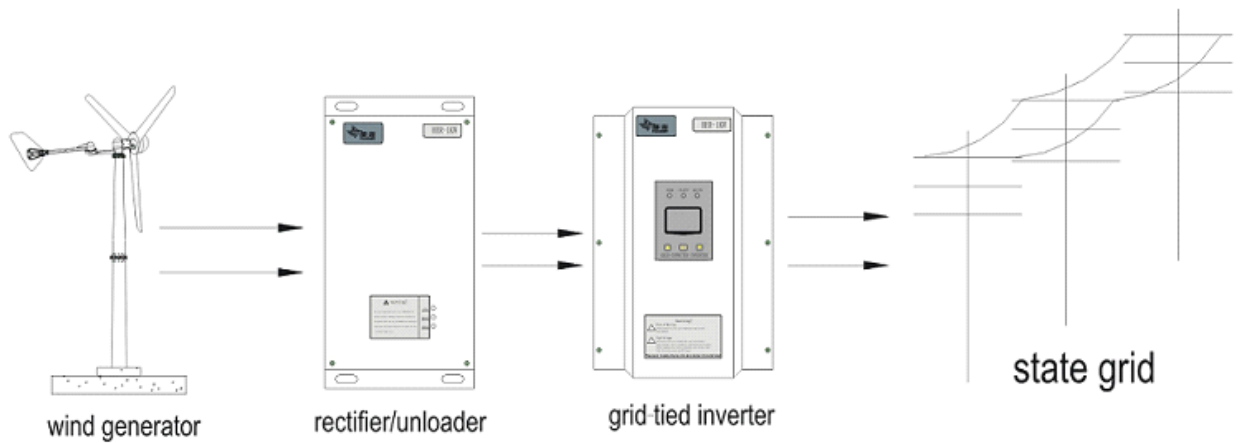
**Attention: This indicates a feature that is important either for optimal and efficient use or optimal system operation.**

## 2. Introduction

Thanks for your usage of HUMMER-2KW, which is developed with our rich experiences in the field of grid-tied controller. We hope it will be helpful to the operation of wind generator. If any questions, please contact us and we will solve your problems in time.

### 2.1. Basic Information

The whole system is shown in PIC1. The rectifier will convert the unstable AC from the generator into DC, and then the grid-tied inverter will convert DC into sustained AC to supply power to the grid. The unloader integrates the function of rectification and division load. All the designs will protect the grid-tied controller to avoid the damage of overcharging.



(PIC1) How to connect HUMMER-2KW to grid-tied system

## 2.2. How to Use the Manual

The purpose of this manual is to provide users with detailed product information for easily use HUMMER-2KW. Please read the manual in detail before going any further.

## 3. Safety Instruction

- Please read this manual carefully before installing HUMMER-2KW.
- Disconnect the inverter from the grid before doing any operation.
- All the connections shall be performed by professionals.
- All electrical installations shall comply with the local and national electrical codes.
- Replaceable units are not included in HUMMER-2KW. Any repair is needed; please contact the local authorized installer.
- HUMMER-2KW can not be connected to the grid until you got the approval from utility company, furthermore, all the connection operation shall be performed by professionals.
- Disconnect the wind generator output before connecting it to HUMMER-2KW or use other methods to prevent shock hazard. These operations are very important, because hazardous voltage will be produced if the generator runs during the course of connection.



**Warning: Make sure the AC Voltage is less than 280V. higher voltage will damage HUMMER-2KW, and also will make the Warranty out of effect.**



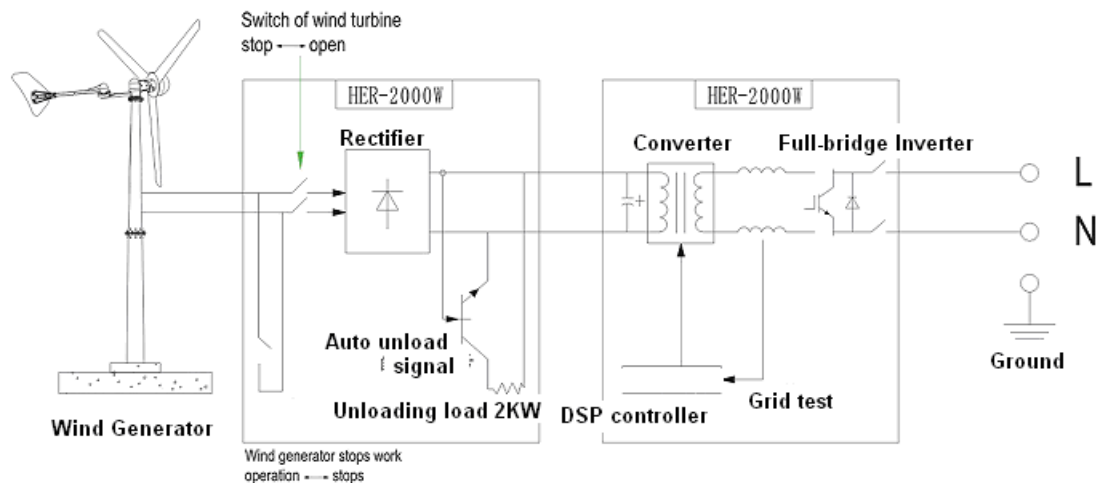
**Warning: Please protect our intellectual property, all the repairs of owners' are not allowed or we will not be responsible for the**

**breakdowns. At the same time, it will not work normally if you open the inverter.**

## 4. Products Introduction

### 4.1 Topology Description

PIC2 shows the whole system HUMMER-2KW, unloader wind generator and grid-tied inverter. The wind generator will convert wind power into AC, which will be converted into DC by the unloader; HUMMER-2KW will convert DC into sustained AC and at last the converter will charge the grid with AC. With the advanced technology of IGBT and control processor HUMMER-2KW can work with higher power and charge voltage.



(PIC 2)

### 4.2 Technical Characteristics

Characteristics of HUMMER-2KW:

- The power efficiency has been highly improved by using IGBT.
- The generator capacity is highly improved with MPPT auto-optimization technology.
- LCD indicates kinds of information simultaneously.
- Real-time work curve can be seen from the PC interface.
- Several optional communication interface includes power line carrier, RS485, wireless data transmission.
- Reliability is very high because of comprehensive protection function.
- Wide AC voltage range
- Freely set working curve chart
- Special plug features simple and reliable.

### 4.3 Cable Interface

PIC3 shows the details of cable connection and the explanations exist in table 1.

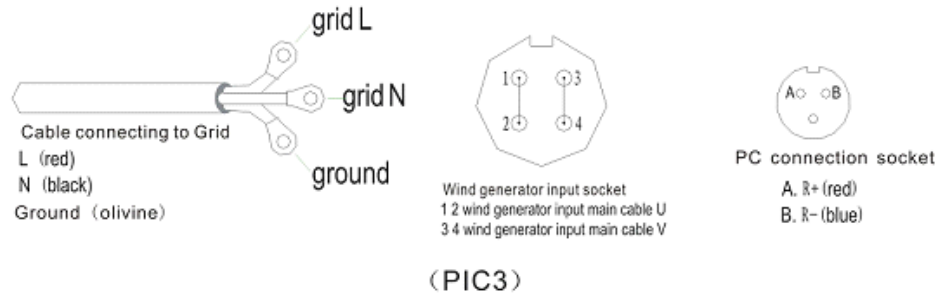


Table 1 Terminals Explanation

Terminal	Instruction
Cable connecting to Grid	Red line connect to L, black line connect to N, olive line connect to ground
Wind generator input socket	1 and 2 connect to U, 3 and 4 connect to V
PC connection socket	Connect to PC, A indicates R+, B indicates R-

## 5. Operation Description

### 5.1 Operation Pattern

#### ● Standby Pattern

Inverter is ready to switch into Grid pattern when it is standby. If the power generated by the wind turbine is insufficient for grid operation, the inverter remains in standby pattern till all the requirements are matched.

#### ● Connecting Pattern

After all system checks have been performed, the inverter switches into connecting pattern. The inverter is connected to the grid and delivers power to the grid under this pattern. The inverter will not leave this pattern unless disconnection or without enough wind. Inverter will work with enabled MPPT simultaneously under connecting pattern, which is called normal operation pattern.

#### ● Breakdowns and Stop Pattern

To protect wind generator system the inverter will turn off AC connection and goes into breakdowns and stop pattern if breakdowns happen. It takes 10 seconds for inverter to check the conditions after the breakdowns are solved. If condition allowed, the inverter will start to work, otherwise it will still standby or in breakdowns and stop pattern.

#### ● Unloading Operation

The wind generator will rotate fast with strong wind; as a result the output voltage will reach up to a dangerous level. Unloader will begin to work to consume redundant power as the AV voltage up to a certain degree.

## 5.2 Connect to Grid

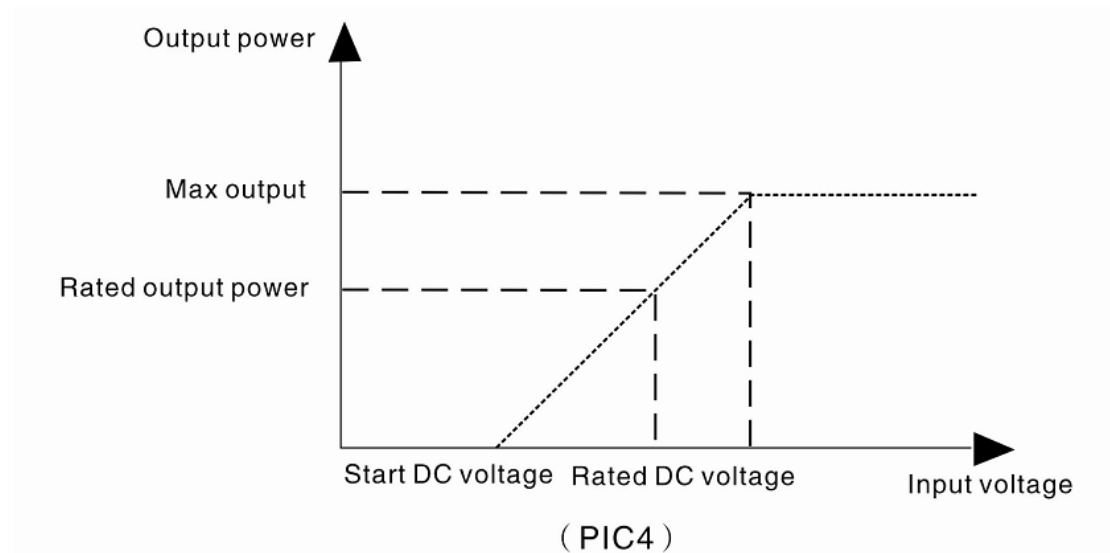
Inverter will automatically check whether it is possible to connect to grid. The inverter will work as follows when it connects to grid:

- Wind generator begins to supply power with available wind energy.
- The inverter will prepare to connect to grid, once the DC Voltage exceeds the start-up value.
- The inverter checks if the situation of grid is good.
- The inverter will access the grid after 10 seconds monitoring.



**Attention: The start up DC voltage Value has been set before delivery, please don't change it casually.**

## 5.3 Supply Power to the Grid



After connecting to the grid, inverter will run according to MPPT in order to achieve max high-power conversion. Upon connecting to grid, all the parameters of inverter and grid will be monitored continuously.

PIC4 shows the relationship between output power and input voltage as follows

- The grid-tied inverter begins to feed the grid when the DC voltage reaches the start-up value.
- The rated output power can reach 2KW when the voltage reach the rated DC voltage.
- HUMMER-2KW will output max power when the VDC is higher than rated one.
- The max output power of inverter may equal to or less than the output power of wind generator.

## 5.4 Disconnect from Grid

If wind power is insufficient to generate power for the grid, the inverter will disconnect

from the grid and goes into standby pattern and monitor available wind power continuously. Additionally, the connecting pattern will start-up quickly with available wind. Reasons for HUMMER-2KW disconnects from grid.

- Cable Resistance

HUMMER-2KW will stop working when the cable resistance is more than 1.5ohm.

- Grid Voltage

The grid voltage shall in the range of 180V to 250V (Depend on local electric frequency). HUMMER-2KW will disconnect from grid within 0.2s if the grid voltage is not in this range.

- Grid Frequency

The grid frequency may be 47-51.5Hz or 57-61.5Hz. HUMMER-2KW will disconnect from grid within 0.2s if the grid frequency doesn't match the set one (Default value 50/60±1HZ).

## **6. Monitor Methods**

### **6.1 Comprehensive Information**

Inverter can work automatically without owner's operation and maintenance. The inverter will automatically turn off if the grid can't work. In order to learn the wind generator system, we will provide a data collection system for monitoring. Owners can see the working condition of inverter and also the curve chart.

- Intelligent Group

HUMMER-2KW adopting intelligent group, manages the wind system with RS485 data bus.

- PC

PC adopting intelligent group, manages the wind system with RS485 data bus.

- Intelligent Group and PC

PC and Intelligent group manage the wind system with RS485 data bus.

### **6.2. LCD and Operation on the Display**

#### **6.2.1. LCD**

The inverter operates automatically without owner's interaction or maintenance. There is a LCD and three keys at the front panel of the inverter. We can see the working condition of HUMMER-2KW from LCD.



### (PIC 5) LED, KEY and LCD

Users can see the basic information from LCD on the display board.

#### 6.2.2 Key

Key 1:  $\Delta$  up

Key 2: Set, enter language choosing interface after choosing this key.

Key 3:  $\nabla$  Down

Use key 1 and 3 to turn up or down to see the information. We will provide the software for both the power parameters and other operation; please turn to professionals for help to avoid damaging the system. (There is no setting interface for user)

#### 6.2.3 LED Indicator Light

Grid power indicator (POWER)

Wind generator input voltage indicator (INPUT VOLTAGE)

Grid-tied relay (ON)

Grid-tied indicator (GRID-TIED)

Abnormal indicator (MALFUNCTION)

#### 6.2.4 Data shown on LCD (Table2-3)

Table 2 Electrical Real-time Data

Data	Explanation	Unit
Input voltage	Wind generator real-time output voltage (DC)	V
Generatrix voltage	Min required voltage for grid	V
Output voltage	Grid-tied voltage	V
Output current	Grid-tied current	A
Output power	Grid-tied power	W



Equipment temperature 1	Real-time temperature of the inverter	°C
Cumulative output capacity	Grid-tied output capacity	D

Table 3 Breakdowns

Breakdowns	
Grid voltage is higher than max limit	Grid frequency is too high
Grid voltage is lower than min limit	Grid frequency is too low
Inverter temperature is higher than max limit	Inverter breakdowns

### 6.2.5 Operation on the Display

#### (1) Display 1



Note:

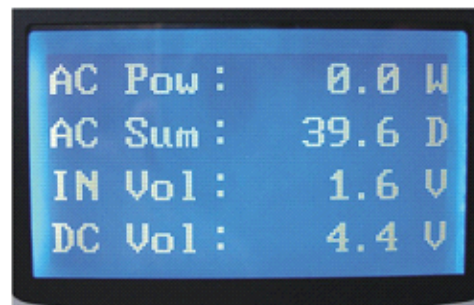
Device(Inverter): Show "ON" after turned on, show "OFF" after turned off.

Fault: Faults will be shown line by line. If over two faults happen, they will be displayed one by one.

AC Current: Inverter output current (A)

AC Voltage: Inverter grid-tied voltage (V)

#### (2) Display 2



Note:

AC Power: Actual output power from inverter.

AC Summation: The accumulative AC output quantity (kwh)

IN Voltage: Wind generator input voltage

DC Voltage: Generatrix voltage (V)

#### (3) Display 3



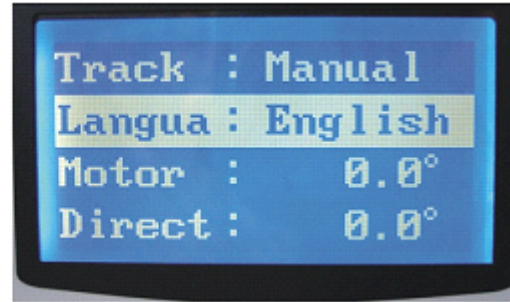
Note:

Temperature 1: Inverter actual temperature (°C)

**Press ▲、▼ on the right side of display panel to switch from display 1 to display 3.**

(有问题，好像是下侧 **underside**)

(4)Display 4



Note:

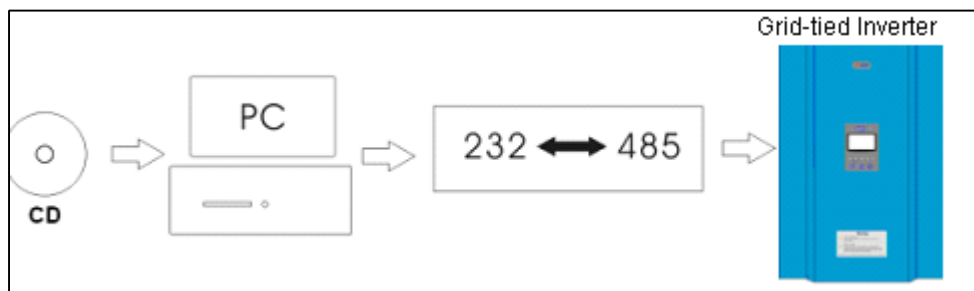
Language: Indicate the used language, there are two language options: English and Chinese. Press “SET” to choose “language”, and then press “SET” again to choose the right side of “language”, press ▲、▼ to choose “Chinese” or “English” and press “SET” for confirmation.

**Switch method between display1, 2, 3 and display 4**

Press “SET” to switch to display4, when the showing one is any one of display1 to 3. When display 4 is showing, press “SET” for 3 seconds to switch to display1.

## 7 . Installation and Operation of Remote Control Software

### 7.1. Assembling



## 7.2. Operation on Display

The screenshot shows the PowerRemote (v2.1) software interface. It is divided into several sections:

- Daily Operator:** Contains a list of commands (0-13) and an AC Sum(B) field set to 0. An annotation states: "Can freely set the bottom limit of wind generator, and also it can be set as '0'".
- Device Status:** Displays real-time data for InVol (0.0V), BusVol (0.0V), OutVol (0.0V), OutCur (0.000A), OutPow (0.0W), Temp (0.0°C), and ACSum (0.0D). An annotation points to this section: "The next box will show the work curve of this parameter when mouse picking up any of the real-time data".
- Wind Status:** Displays Speed (0M/S), Rotate (0R/S), Direct (0°), Position (0°), and Temp (0°C).
- Control Panel:** Includes an ON button, Power and Alarm indicator lights, a Refresh checkbox, and buttons for CommSet, Query, and CardSet.
  - An annotation for the ON button: "The key turn on/off the inverter forcibly".
  - An annotation for the Power light: "Green light shows inverter is working".
  - An annotation for the Alarm light: "Red light shows inverter fault".
  - An annotation for the Refresh checkbox: "The communicate will refresh per second if it is selected".
  - An annotation for the CommSet button: "Choose the terminal To connect computer".
  - An annotation for the Query button: "Just for manufacturer adjustment".
  - An annotation for the CardSet button: "All the data parameters reset automatically".

## 8. Installation Guidance

### 8.1 Summary

The following are instructions for electrician installation. It is helpful to swiftly and correctly install HUMMER-2KW inverter.

#### ●Checking for Shipping Damage

The HUMMER-2KW inverters are thoroughly inspected and tested before transportation. Check the inverter once you receive it, if any damage is found please immediately notify the shipping company and report damage immediately, meanwhile send a photo of the damage to our company.

#### ●Basic Installation Requirements

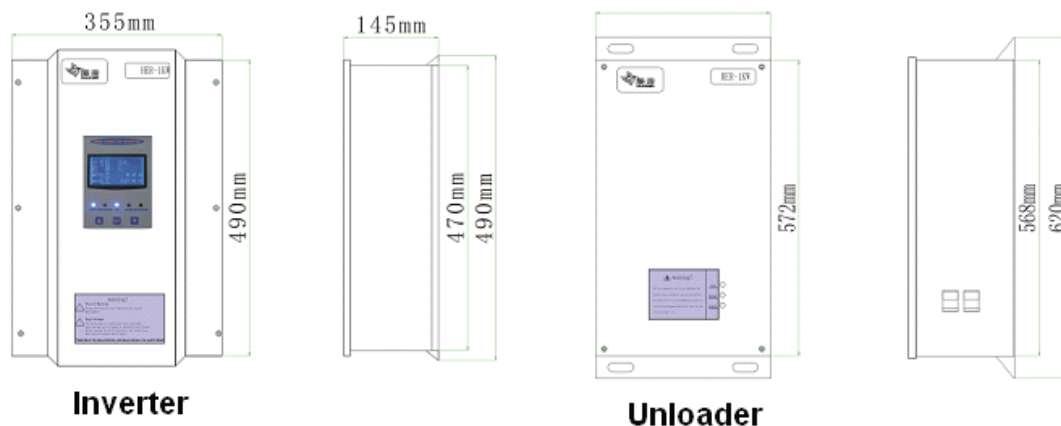
The inverter is sensitive to humidity; please pay attention to the following points.



- ※ HUMMER-2KW shall be installed on the wall vertically.
- ※ Do not install HUMMER-2KW outdoors without shelter because it lacks of the function of waterproof.
- ※ Suggest not installing the inverter in living rooms, since the inverter may produce some operating noise (< 40 DB).
- ※ Avoid installing the inverter in a location subject to vibrations.
- ※ The LED and display shall always be legible.
- ※ The ambient temperature should remain within the specified temperature range ( $-20^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ).
- ※ It is important to have air freely circulating around the inverter; Therefore keep the area within 30 centimeters of the inverter free from obstacles. Please make sure there is sufficient space for heat dissipation.
- ※ The inverter shall be mounted in a well-ventilated area.

## 8.2 External Dimension

HUMMER-2KW inverter with dimension 490\*355\*145mm, unloader with dimension 620\*320\*158mm (PIC8)



(PIC 8)

## 8.3 Mechanical Installation

### 8.3.1 Safety Instructions

Don't touch the inverter to avoid electric shock. The equipment can output DC400V and grid-tied AC260V.



**Attention: When the inverter is repaired by professionals, disconnect the inverter from wind generator and the grid before open the inverter. There will exist current in inverter in a short**

**time, please take care.**



**Warning: Completely disconnect AC and DC power, disconnect from state grid, wait for 10s for releasing power, and then open the inverter panel to check the inverter, all the above mentioned action shall be performed by professionals.**

### **8.3.2 Mechanical Requirements**

Mounting Place

The HUMMER-2KW has a net weight of 15.5kg, which shall be taken concern when choosing the location and then fix it on the wall with bulgy screw.

**Remarks:** the temperature shall between  $-20^{\circ}\text{C}$  and  $+40^{\circ}\text{C}$



**Warning: Some parts of HUMMER-2KW can up to temperature  $90^{\circ}\text{c}$  and the unloader can up to  $180^{\circ}\text{c}$  when it works. So keep it away from flammable materials.**

**Remarks:** The distance between wind generator and HUMMER-2KW shall be as short as possible to reduce the length of connecting cable.

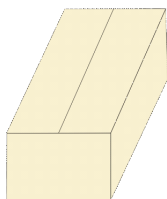
### **8.3.3 Installation Guidance**

Do as follow:

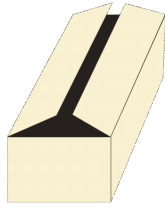
- The inverter can't be mounted outdoors without shelter.
- Mount it in a clean and dry location for efficient cooling.
- Try to shorten the cables length between grid and wind generator if available to gain an optimal electrical efficiency.
- Don't install it near people or animals, because of noise.
- Install the inverter follow the local codes
- Installation at eye-height allowed space, so LED and LCD can be read easily.
- Do not mount the inverter in hot climates higher than  $40^{\circ}\text{C}$
- The case temperature can reach  $70^{\circ}\text{C}$ , please keep away for safety.

### **8.3.4 Installation Instruction**

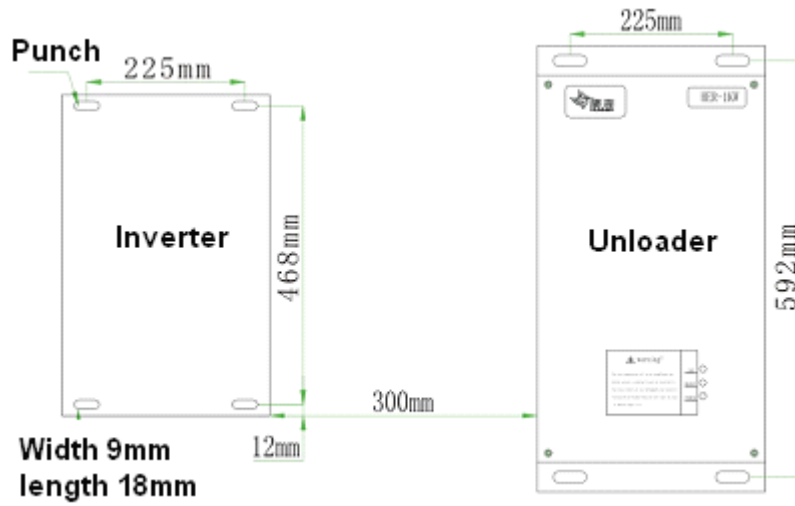
Step 1: Inspect the outer package to make sure there is no damage (PIC9)



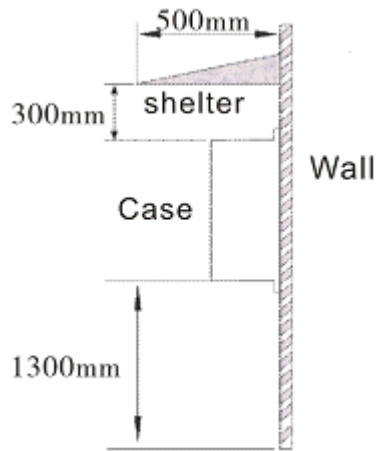
Step 2: Open the package (PIC10)



Step 3: Choosing a site  
Step 4: Punching (PIC11)

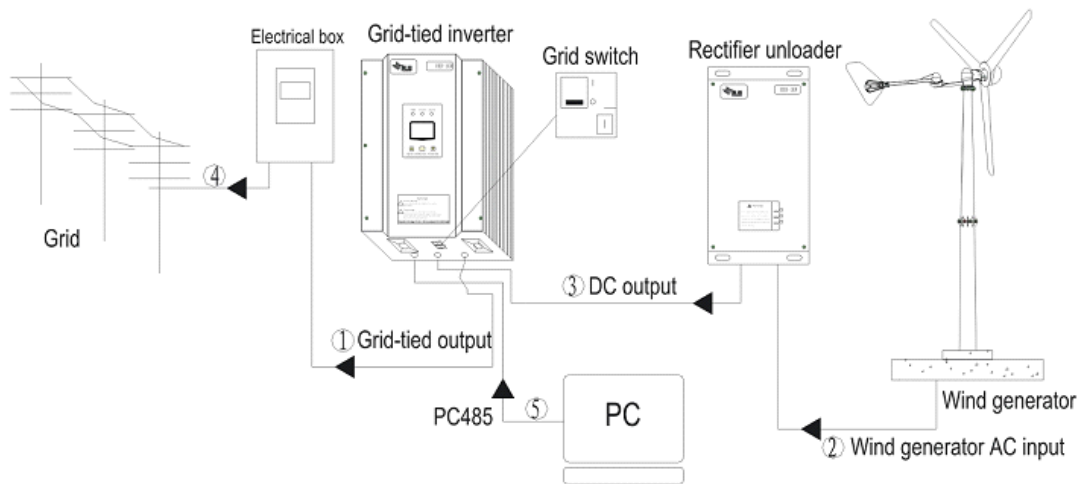


Step 5: Assembling (PIC12)



Or follow local requirements to install.

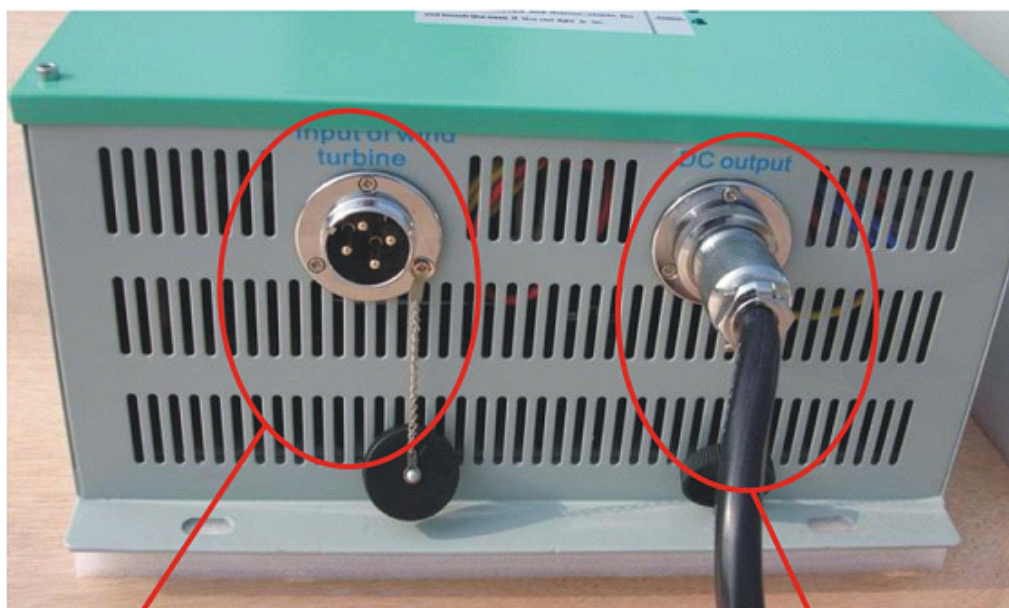
Step 6: Connection (PIC13)



Explanation for PIC13

- ① Grid-tied output (grid-tied output & supply power for inverter stayby)
- ② Wind generator input (connect to rectifier unloader, wind generator AC input)
- ③ DC output (change wind generator AC into DC output)
- ④ Wind generator connect to state grid (L, N, GND)
- ⑤ PC 485 connect to PC

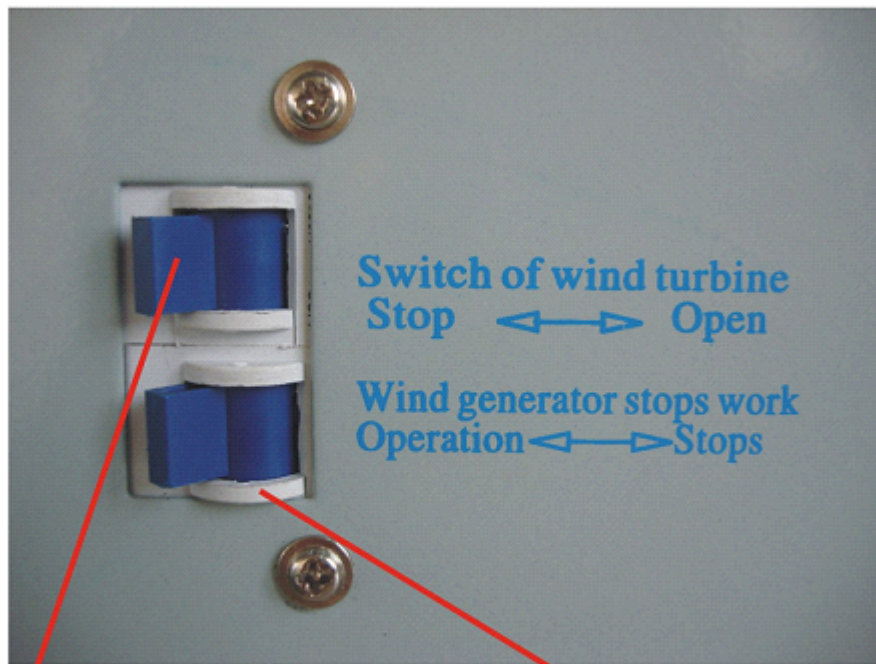
**(1) Rectifier unloader under panel**



Wind generator input

DC output

**(2) Rectifier Unloader Right Panel**



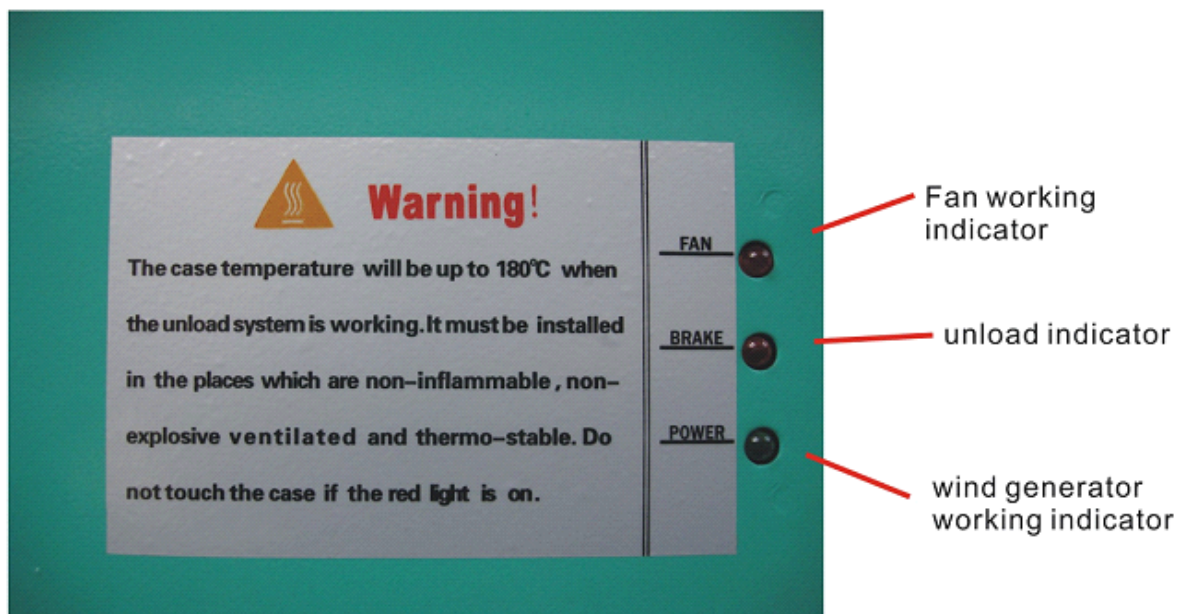
Switch of wind turbine

Wind generator stops work

Note: ① Wind generator will disconnect with unloader if the “Switch of wind turbine” is on “stop” position, wind generator will connect to unloader if the switch on “open” position.

② Wind generator stops work switch: When the switch is on “stops” position, the two wind generator output cables will short-circuit; when it is on “operation” position the wind generator will work normally.

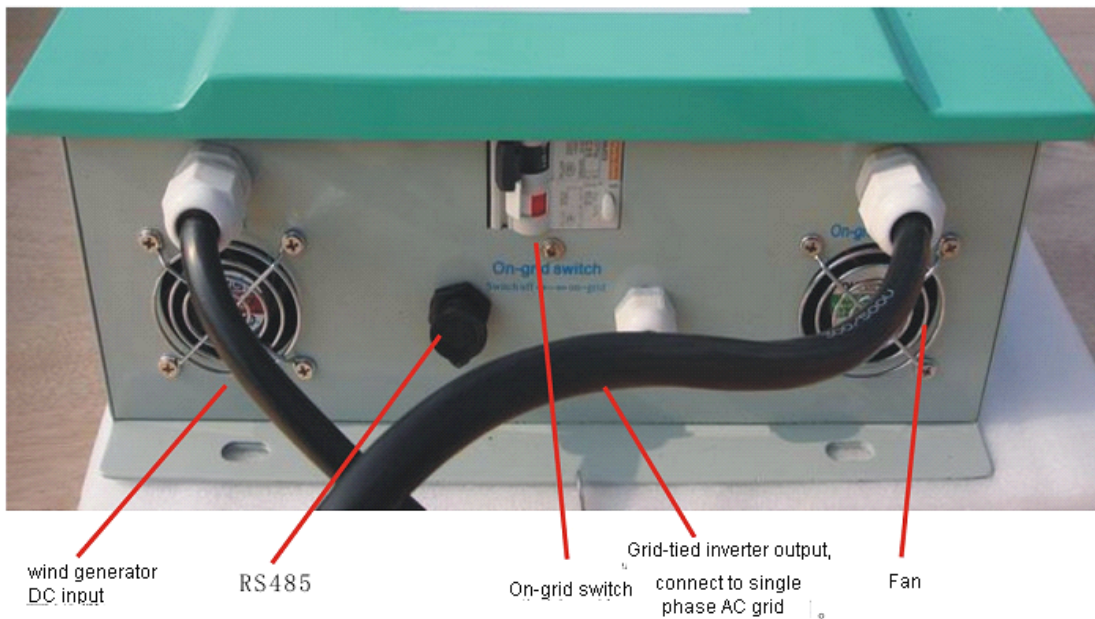
### (3) Rectifier Unloader Upper Panel



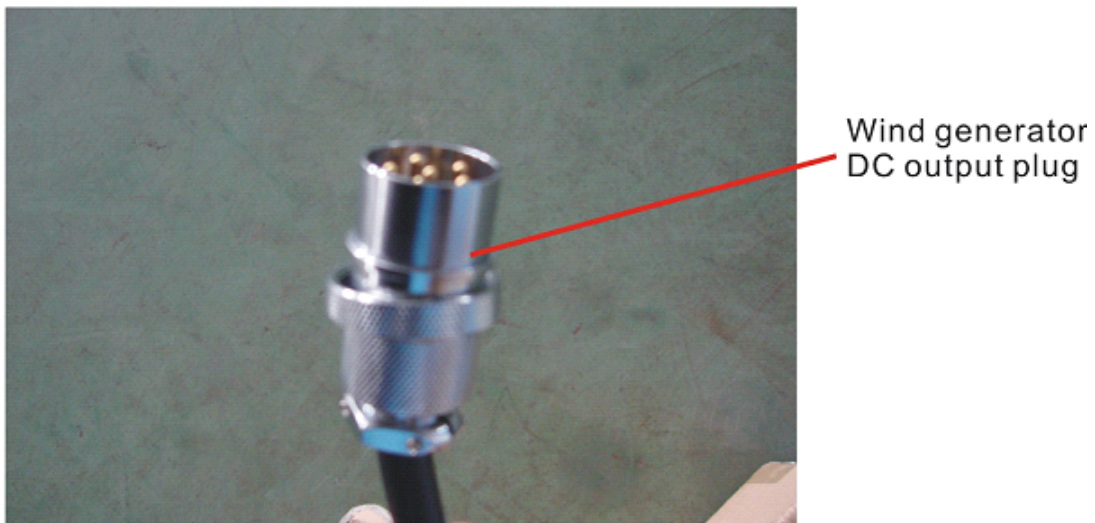
Note: The shining unload indicator shows that unloader resistance works discontinuously, the light unload indicator shows that unloader resistance works continuously.

### (4) Grid-tied Inverter Side Panel





**(5) Wind Generator DC Output Plug**



**(6) Connection of Wind Generator and Grid**

Electrical connection requirements

- 220V AC Grid

The HUMMER-2KW is designed for 220V grid (single phase). The voltage should be within the range from 180v to 250v and the frequency should be within 47~51.5HZ/57~61.5HZ (Default value 50±1HZ/60±1HZ).

The relevant technical regulations as well as specific requirements should meet the requirements of local state grid. Choosing the connection cable should obey the rule that the cable can offer maximum current.

- Fixed on the Ground

Please apply local safety requirements and add proper protection if inverter is located on the ground.

- Electrical Safety Description



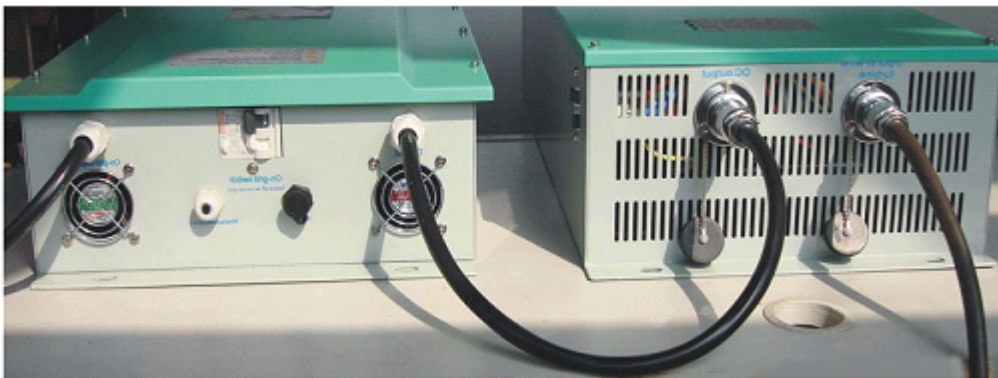
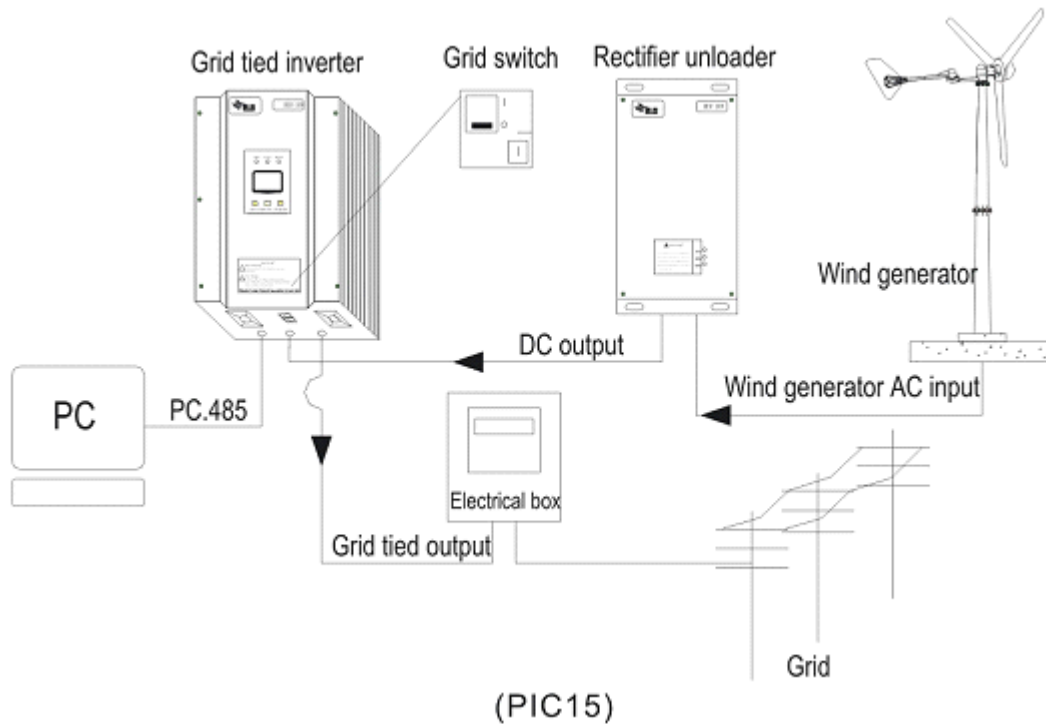
**Attention: All the electric installation should accord with local and international standard.**



**Warning: Make sure that the input voltage is not more than 260V. HUMMER-2KW will be damaged by exorbitant voltage.**

Wire Connection

All the circuit connections are shown as following. Connection: (PIC15)



Connection Step:

- ① Keep the “on-grid switch” on the under panel of inverter on “Switch off” position, and then separately connect inverter output line “L”, “N” and “GND” to single-phase grid.
- ② Keep the “switch of wind turbine” on the right panel of rectifier unloader at “stop” position, and also put the “wind generator stops work” at “stop” position, in this way the two output cables of wind generator can be short-circuit to avoid blades’ rotation during tower erection process.
- ③ Insert the plugs into the corresponding sockets, and fasten them.

④ put “on-grid switch” at “on-grid” position, put “switch of wind turbine” at “open” position, and then put “wind generator stops work” at “operation” position after tower erection, and then wind generator will begin to work with wind.



**Attention: Avoid the fast rotation of blades when connecting the wind generator to grid-tied system or the high voltage will be easy to damage the grid-tied system.**

### (7) Connection of PC and Inverter



Explanation for PIC14

- 1: RS485 output
- 2: Change 485 into 232
- 3: Change 232 into USB



**Attention: plug can't insert it into a wrong socket.**



**Attention: Cable plugs labeled with L, N and Ground are already pre-set for HUMMER-2KW.**



**Attention: All plugs are direct insert plugs.**

- Cable connecting to Grid
- Cable L is red
- Cable N is black
- Cable Ground is olivine
- Make sure all the cables are fixed.

## 9. Technical Parameters

Following are technical parameters of HUMMER-2KW

### 9.1 Electronic Specification

INPUT VALUE of HUMMER-2KW (DC side)

DC input voltage range	120V-160V
------------------------	-----------

Consecutive overloading capacity	110%
Rated DC output Power	2KW
Personal Protection	ground

#### OUTPUT VALUE of HUMMER-2KW (DC side)

Rated Power	2KW
AC Voltage Range	180-250V AC
AC Frequency	47-51.5HZ/57-61.5HZ
Power Factor	> 0.99
MAX Efficiency	95%
European Efficiency	92%
Internal Consumption	< 10W standby
Protection	Short circuit protection, over heat protection, over load protection, safety protection
Total Current Harmonic Distortion (THD)	THD < 3%
Phase Shift	0
Utility Monitor	According to UL1741

## 9.2 Mechanical Specification

Size (W*H*L)	490*355*145mm
Net weight	15.5kg
Temperature	-20°C-40°C

## 9.3 Characteristics

Utility Disconnect	Connect to NEC
Cooling	Wind cooling
Display	LED and LCD
Communication	RS485
EMC (Electromagnetic compatibility)	EN50081, part1 EN50082, part2
Safety	EN 50178
Grid-tied interference	EN61000-3-2

## 10. Inverter Cleaning



- ① Protection cover    ② Dust screen



**Attention: Clean the inverter every three months.**

## 11.Contact Us & Non-responsibility

The content of these files are constantly checked and modified, please call us or login our homepage [www.chinahummer.cn/eng](http://www.chinahummer.cn/eng) for the latest information. But the information may be more or less different to the original. So please contact our company or local dealer for latest version.

We will not be responsible for the following damage:

- ◆ Inappropriate use or operation
- ◆ Use in the inappropriate environment
- ◆ Ignore the related safety rules when operating the wind generator
- ◆ Ignore the warnings and Attention
- ◆ Change the product or use pirate software.
- ◆ Breakdowns due to the above operation or related operation
- ◆ Unexpected factors

**Any question about HUMMER-2KW, please contact us**

Add: Room 2904, Building No.5, Jindi international city, No. 88 South of Ma'anshan road,  
Hefei, Anhui province, China

TEL for sale: +86-551-3441230

FAX for sale: +86-551-3442991

TEL for customer service: +86-551-3441231

E-mail: [sales@chinahummer.cn](mailto:sales@chinahummer.cn)

Website: [Http://www.chinahummer.cn/eng](http://www.chinahummer.cn/eng)