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1. Symbols Explanation

To reduce the risk of electrical shock, and to ensure safe installation & operation of the inverter, the following safety symbols are used to indicate dangerous conditions and important safety instructions.



WARNING: This indicates a fact or feature very important for the safety of the user and/or which can cause serious hardware damage if not applied appropriately.

Use extreme caution when performing this task.



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

2. Introduction

Thanks for your usage of WBI-2KW, which includes our experiences in the field of grid-connected controller. We hope it will be helpful to operation of wind generator. If any questions, please contact us, we will solve your problems in time.

2.1. Basic information

You can see the whole system in Fig 1. The rectifier will convert AC into DC, and then the inverter will convert DC into sustained AC to charge the grid. Our unloader holds the function to rectify and unloading. All the designs will protect the grid-connected inverter to avoid the damage of overcharging.

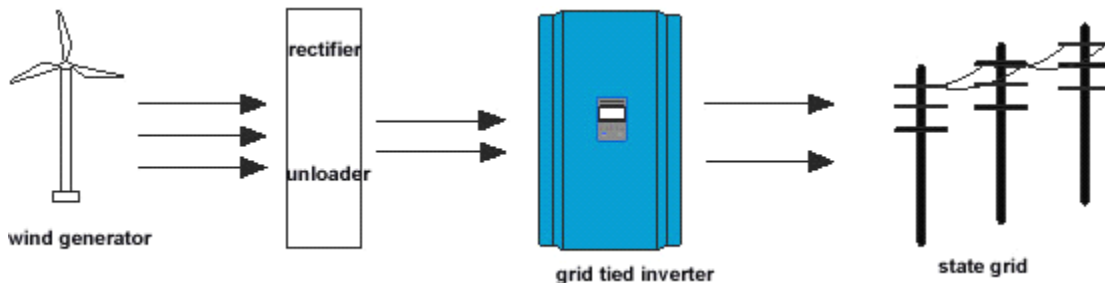


Fig 1 the method to connect WBI-2KW with On-grid system

2.2. How to use this manual

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

3. Safety Instructions

- Please read this manual carefully before installing WBI-2KW.
- Disconnect the inverter from the grid before you do any operation.
- All the connections shall be done by professionals.
- All electrical installations shall follow the local and national electrical codes.
- The renewal parts are not included in WBI-2KW. If you want to repair your WBI-2KW, please contact the local professionals.
- Connection of WBI-2KW to grid must be done after receiving prior approval from

Power Company and can only perform by professionals.

● Completely disconnect the output of wind generator before wiring them or use other methods to ensure safety from shock hazard. Because when there is wind the wind turbine may rotate, and the wind generator may begin to generating.



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

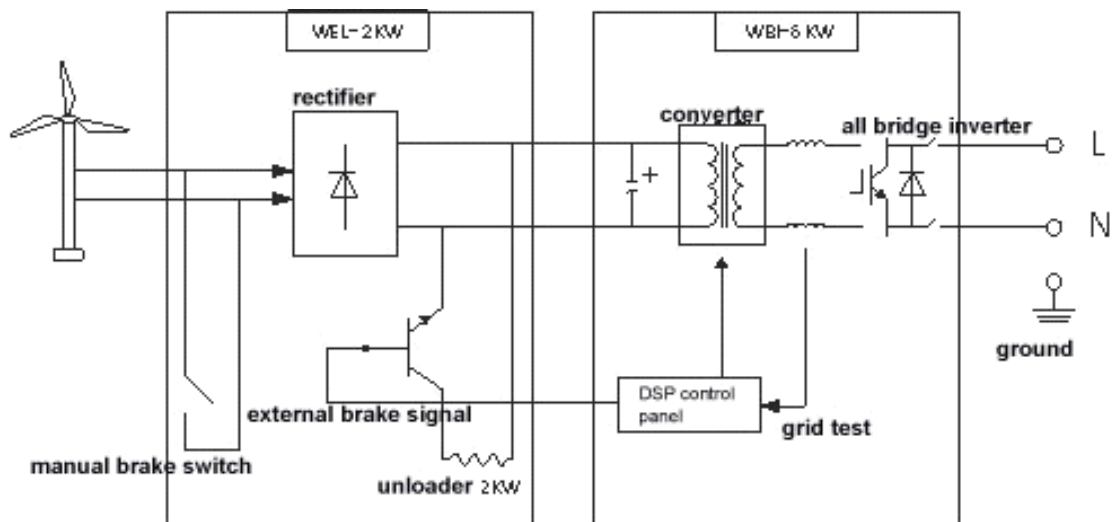


Warning: please protect our intellectual property, all the repairs of users are not allowed or we will not responsible for the breakdowns.

4. Products introduction

4.1 Topology Description

Fig 2 shows the whole system WBI-2KW, unloader and the windpower turbine system. The wind generator will convert the wind power into AC, and then the unloader will convert AC into DC, at last WBI-2KW will convert DC into sustained AC to charge the grid. WBI-2KW can work with higher power and charging voltage because of using the advanced IGBT and controller system.



(Fig2)

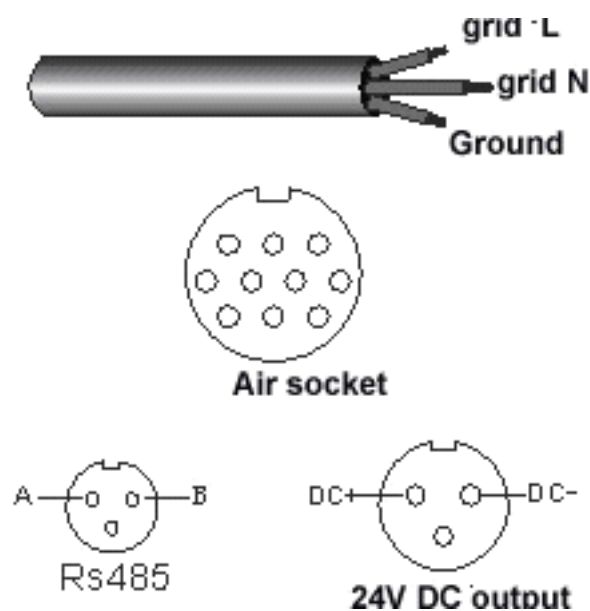
4.2 Technical characteristics

Characteristics of WBI-2KW:

- The power efficiency has been highly improved because of using IGBT.
- Highly improve the generation capacity by using MPPT.
- LCD shows several information simultaneously.
- You can see the real-time work curve from the PC.
- Several communication interface includes power line carrier, RS485, wireless data transmission.
- Comprehensive protection function with highly reliability
- Wind AC voltage range
- Freely set working curve
- Simple, reliable and special plug connection

4.3 The cabling interface

Fig 3 shows the details of wire connection, and the explanations exist in table one.



(Fig3)

Table one terminals explanation

| Terminals | Introduction |
|-----------|---|
| RS485 | connect to PC, A represents R+, B represents R- |
| DC+ | DC+ terminal |
| DC- | DC- terminal |
| Grid | connect to grid red wire connects to L black wire connects to N Yellowish green wire connect to ground |

5. Operation description

5.1 Operation

● Standby mode

In standby mode the inverter is ready to switch into Grid mode. If the power generated by the wind turbine is insufficient for grid operation, the inverter remains in standby mode until the wind turbine has generated sufficient power to switch into grid-connecting mode.

● connecting model

After all system checks have been performed, the inverter switches from standby mode to connecting mode. In this mode the inverter is connected to the grid and delivers power to the grid. The inverter will leave this model only if disconnection or without enough wind. Inverter will work with MMPT simultaneously that is the normal operation model.

● Breakdowns and stop

The inverter will turn off the AC connection if breakdowns happened to protect the windpower generator system. When there is a fault happen, the inverter will switching off and go into fault or stop mode to protect the wind power system. The inverter will wait for 10 seconds to check the conditions, if condition allowed, the inverter will start to work or it will stay in the mode of breakdowns.

- unloading operation

The generator will rotate fast with strong wind, at this time the output voltage will reach to a dangerous level. And the unloader will begin to work under this situation to consume redundant power.

5.2 Connecting to the Grid

Inverter will automatically check whether it is possible to connect the grid. The inverter will work as following when it connection to grid:

- The generator begins to work with possible wind to generate.
- The inverter will prepare to connect grid when the DC voltage reach start-up voltage.
- Inverter checks the condition of grid.
- After 10 seconds monitoring the inverter will connect to grid.



Note: The start voltage of DC is set before delivery, please don't change it.

5.3 Supplying Power to the Grid

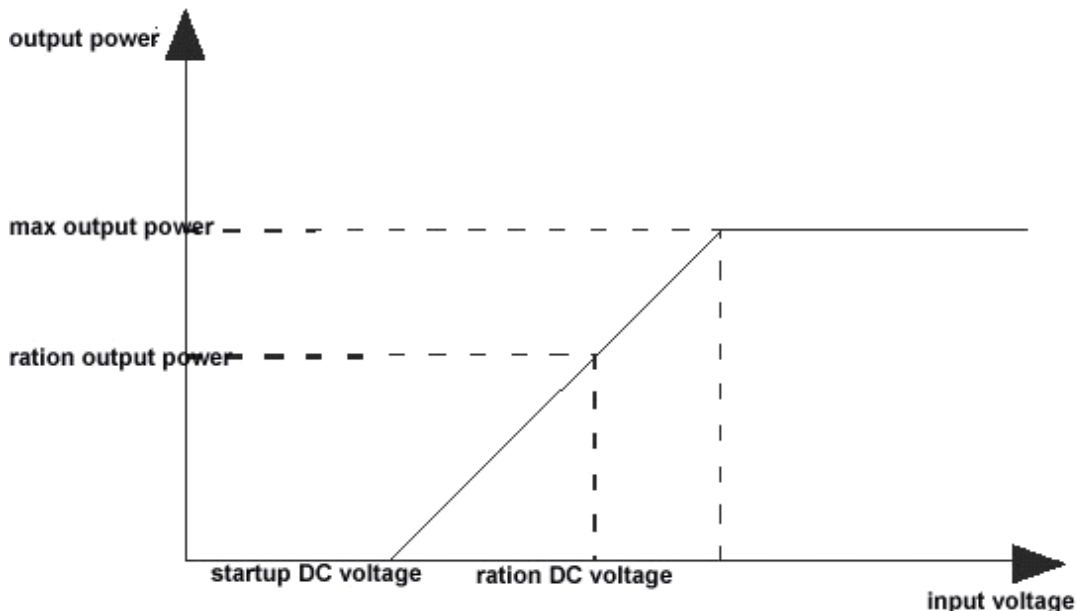


Fig 4

All the parameters of inverter and grid will be monitored when connecting to grid.

Fig 4 shows the relationship between outputting voltage and outputting power:

- The grid-connected inverter begins to charging the grid when the DC voltage reaches the start voltage.
- The max rated output power can reach 5KW when the voltage reach the DC rated voltage.
- WBI-2KW can reach the max power efficiency when the VDC is higher than rated one.
- The output power may equal to or less than the output of wind generator when the inverter reach to the max output power.

5.4 Disconnecting from the Grid

If wind power is insufficient to generate power for the grid the inverter disconnects from the grid and goes into standby mode. Additionally, the connecting mode will start-up quickly with possible wind.

Reasons for WBI-2KW disconnects from the grid

- Grid resistance

WBI-2KW will stop working with grid resistance more than 1.0 ohm.

- Grid voltage

The grid voltage shall in the range 180V to 250V. WBI-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. WBI-2KW will disconnect from grid within 0.2s if the grid frequency don't match the set one.

6. Monitor methods

6.1 Comprehensive information

Inverter can work automatically without user's operation and maintenance. The inverter will turn off if the grid can't work. We will provide a monitor system to users for easily understand the windpower generator system. Users can see the condition of inverter and also the curve.

- Intelligent part

WBI-2KW manages the windpower system through RS485 by using intelligent part.

- PC

PC manages the windpower system through RS485 by using intelligent part.

- Intelligent part and PC

PC and Intelligent part manage the windpower system through RS485

6.2 LCD

The inverter operates automatically without the need for user interaction or maintenance. There is a LED and two key-presses at the panel of the inverter. We can see the working condition of WBI-2KW from LCD.



LED key-presses and LCD

Users can see the basic information from LCD

- keying

Key 1 up \triangle

Key 2 down ∇

You can use the two keys to turn up or down to see the information. We will provide the soft for both the power parameters and other operation; please tend to professionals for help.

- LED indicator

Grid power indicator (POWER)

Wind generator output voltage indicator
 grid-connected relay (ON)
 Grid-connected indicator (ON-GRID)
 Abnormal indicator (MALFUNCTION)

Table2-3: Electrical Specifications

Table 2

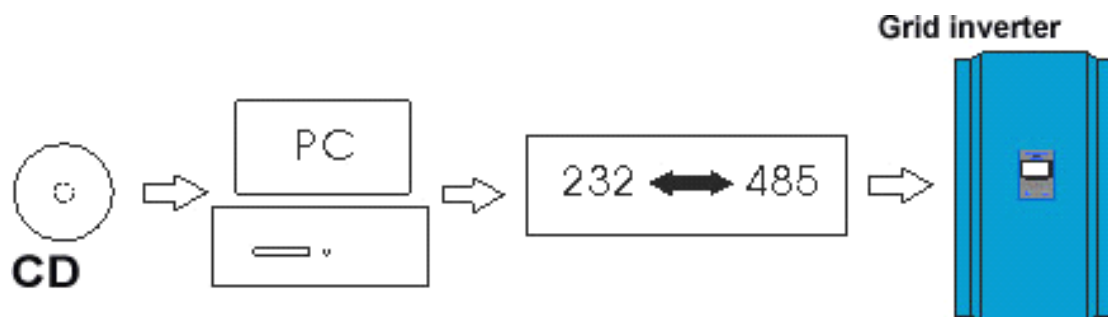
| data | explanation | unit |
|-----------------------|--|------|
| input voltage | wind generator real-time output voltage (DC) | V |
| generatrix voltage | the min required voltage for grid | V |
| output voltage | grid voltage | V |
| output current | grid-connected current | A |
| output power | grid-connected power | W |
| equipment temperature | real-time temperature of grid-connected inverter | °C |
| cumulative output | grid-connected output | D |

Table 3 breakdowns

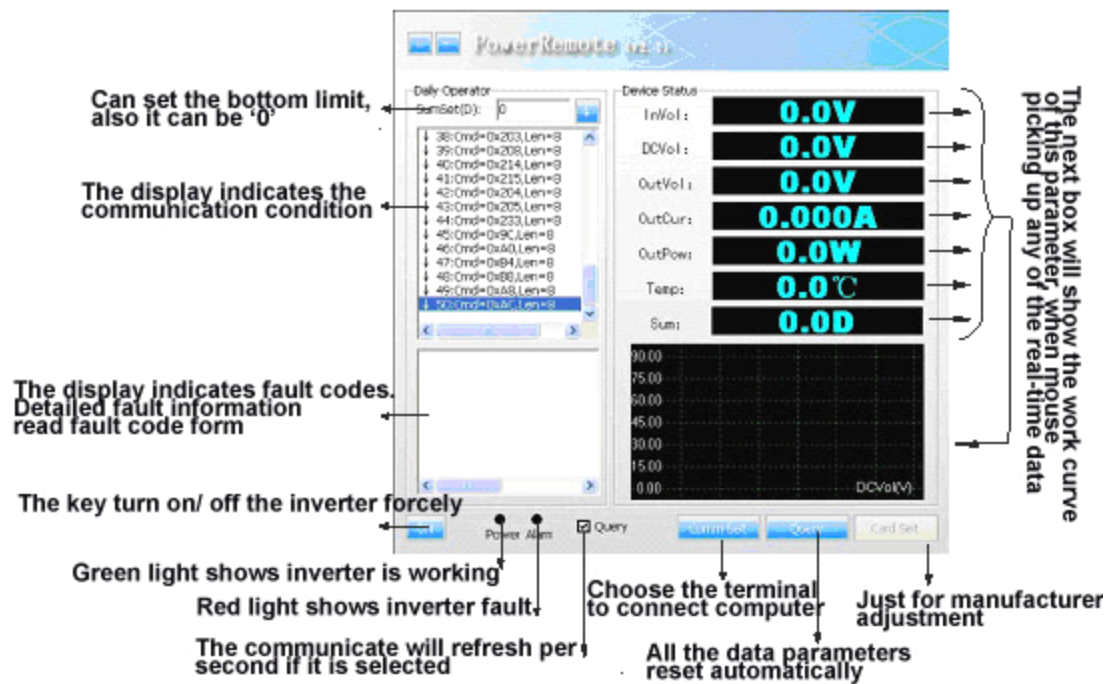
| breakdown code | code specification | |
|----------------|--|--|
| ○XB4 | grid voltage is higher than upper limit | |
| ○XB8 | grid voltage is lower than lower limit | |
| ○X215 | the temperature of inverter is higher than upper limit | |
| ○X501 | breakdowns of inverter | |
| ○X601 | grid frequency is too high | |
| ○X602 | grid frequency is too low | |

7 .The installation and usage of remote software

- Installation



- Operation of the remote software of windpower generator system



8. Installation guidance

8.1 Summary

The following gives installation instructions for electricians. It helps to swiftly and correctly install a WBI-2KW inverter.

●Checking for Shipping Damage

The WBI-2KW inverters are thoroughly checked and tested rigorously before they are shipped. Even though they are delivered in a rugged, heavy cardboard box, the inverters can be damaged in shipping which typically is the shipping company's fault. So you should check the inverter before installation.

Please inspect the inverter thoroughly after it is delivered. If any damage is seen please immediately notify the shipping company. A photo of the damage may be helpful to you.

Do not accept unit if visibly damaged or note visible damage when signing shipping company receipt. Please Report damages immediately to shipping company. Do not remove the unit from packaging.

●Basic Installation requirements

A list of requirements is shown as following:



WBI-2KW shall be installed on the wall vertically.

Do not install WBI-2KW outdoors for lacking of the function of waterproof.

It is advised not to install 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°C to 40°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 a

sufficient space for heat dissipation!

The inverter shall be mounted in a well-ventilated area.

8.2 Peripheral size

WBI-2KW472* 575*160 mm

8.3 Mechanical installation

8.3.1 Erecting instructions

Don't touch the inverter to avoid electric shock.



Notice: disconnect the inverter from wind generator and the grid before you open the inverter. There still exist current in a short time, and please take care.



Warning: completely disconnect AC DC by professionals, 10s later you can open the inverter panel.

8.3.2 Mechanical requirements

Mounting Place

The WBI-2KW has a net weight of 26 kg. Please keep this in mind when selecting the location and then fix it on the wall with bulgy screw.

Remarks: the temperature shall between -20°C and 40°C .



WARNING: Some parts of WBI-2KW can reach temperature over 90°C and the unloader reach temperature over 180°C when it works. So keep a suitable distance to flammable materials!

Remarks: the distance between wind generator and WBI-2KW shall be as short as possible to reduce the length of connecting wire.

8.3.3 Mechanical installation program

Do as following:

- The inverter can't be mounted outdoors.
- Mounts it in a clean and dry location for efficient cooling
- Try to shorten the cables length between grid and wind generator with permit to gain an optimal electrical efficiency
- Don't install it near people or animals, because of producing noise.
- Install the inverter follow the local codes.
- Installation at eye-height allows easy reading of the indicator LED and LCD.
- Do not mount the inverter in hot climates higher than 40°C
- The temperature of crate can reach 70°C , so the inverter shall not be mounted where people are likely to touch the case or heat sink.

8.4 Electrical connection

8.4.1 Electrical connection requirements

- Grid 220V AC

The WBI-2KW is designed for 220V grid (single phase).The voltage should be within the range of 180V and 250V and the frequency should be within 47~51.5HZ/57~61.5HZ.

The relevant technical regulations as well as specific requirements shall meet the

requirements of local public grid. The wire for supplying AC and DC shall bear the max current.

- Locate on the ground

If you want to locate your inverter on the ground please add proper protector.

Basic tool for connecting

8.4.2 Electrical safety explanation



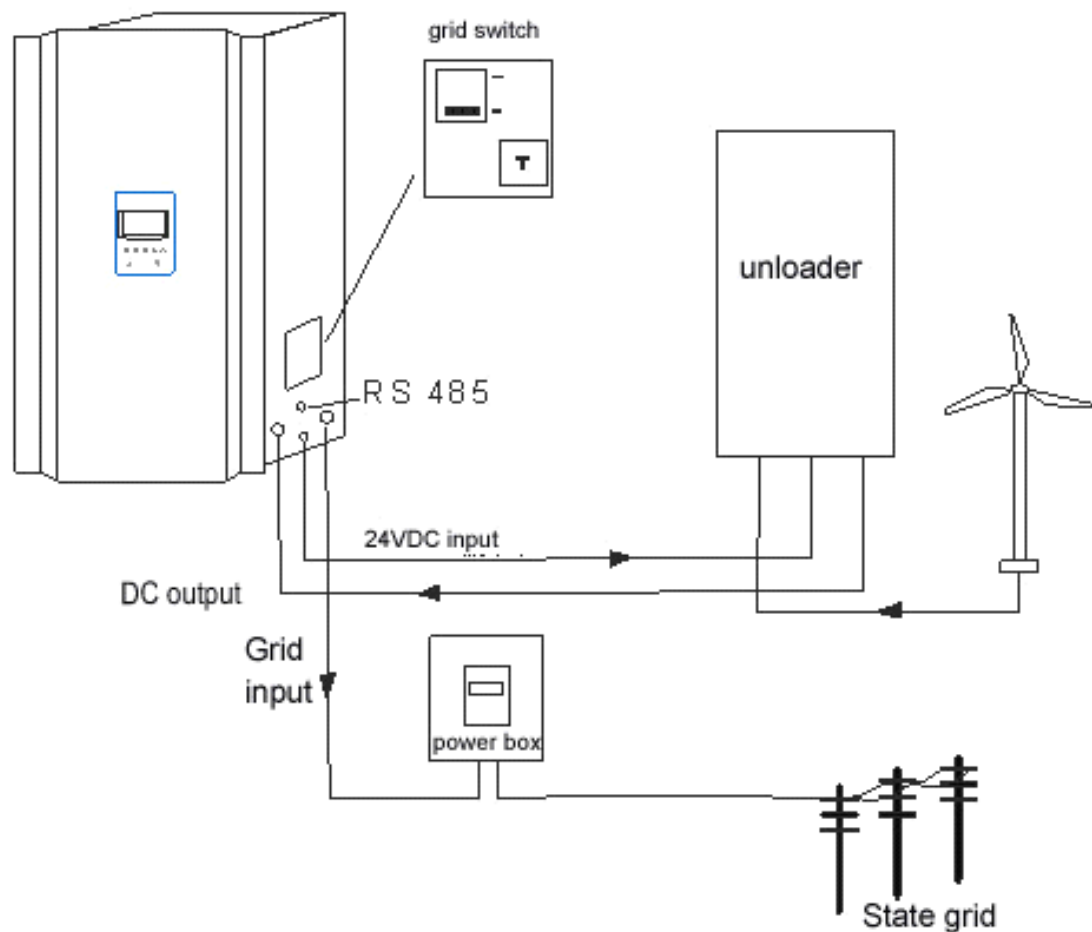
Attention: All the electric installation shall fulfill local and international requirements.



Warning: the input voltage shall not over 280v or it will damage WBI-2KW.

8.4.3 Wire connection

Do as following



Note: the cable plugs labeled L, N and the ground has been set, and provided to WBI-2KW.

- “inverter” wire
- “wind generator input” wire
- connect “grid” wire



Attention: The wires are marked with L, N and grounding.



Note: All plugs are direct insert type

- Commercial connecting cable

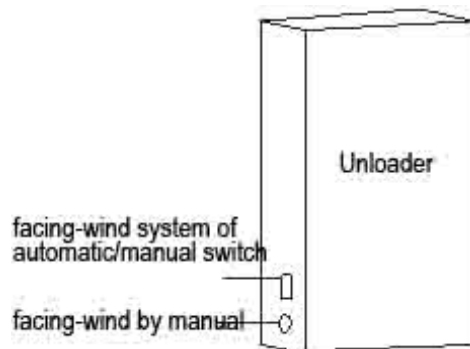
L is red wire

N is black wire

The grounding line is yellowish green

Make sure all the wires are fixed.

- Auto –facing wind system, and manual –facing wind system



Our unloader has two systems, one is auto –facing wind system, and the other is manual –facing wind system. We suggest you select the auto –facing wind system at normal condition. Please turn on the manual –facing wind system switch on condition of strong wind or stop the wind turbine.

9. Technical parameters

9.1 Electric specifications

INPUT VALUE of the WBI-2KW (DC side)

| | |
|----------------------------------|----------|
| AC Input voltage range | 80V-135V |
| Consecutive overloading capacity | 110% |
| Rated DC output Power | 2KW |
| Personnel Protection | ground |

OUTPUT VALUE of the WBI-2KW (DC side)

| | |
|---|---|
| rated power | 2KW |
| AC Voltage Range(Nominal) | 180-260V AC |
| AC Frequency | 47-51.5HZ/57-61.5HZ |
| Power Factor | > 0.99 |
| MAX efficiency | 90% |
| European Efficiency | 88% |
| Internal consumption during operation | 20W |
| Protection | Short circuit protection 、 Over Heat protection 、 Over Load Protection, Safety Protection |
| Total Current Harmonic Distortion (THD) | THD < 3% |
| Phase Shift | 0 |

| | |
|--------------------|---------------------|
| Utility Monitoring | According to UL1741 |
|--------------------|---------------------|

9.2 Mechanical specifications

| | |
|-------------------|----------------|
| size (W*H*D) size | 472*575*160 mm |
| net weight | 26kg |
| temperature | -20℃-40℃ |

9.3 Characteristics

| | |
|--------------------|--------------------------------|
| Utility Disconnect | Complies with NEC |
| Cooling | Wind cooling |
| Display | LED and LCD |
| Communication | RS485 |
| EMC | EN50081,part1 EN50082,part2 |
| Safety | EN 50178 |
| Grid interference | EN61000-3-2 |

10. Contact us & Non-responsibility

10.1 Non-responsibility

The file contents are not fixed. If you need the newest information, please contact our company or our distributor.

Excluded are any warranty claims and liabilities for direct or consequential damages due to:

Inappropriate use or operation

Use in the inappropriate environment

Ignore the safety rules when operate the wind generator

Ignore the warnings and note

Change the product or use pirate software.

Unexpected factors

Breakdown of wrong operation

10.2 Contact us

If you have any questions about WBI-2KW, please contact us.

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Fax: +86 551 3442991

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Mailbox: hummer@chinahummer.cn

