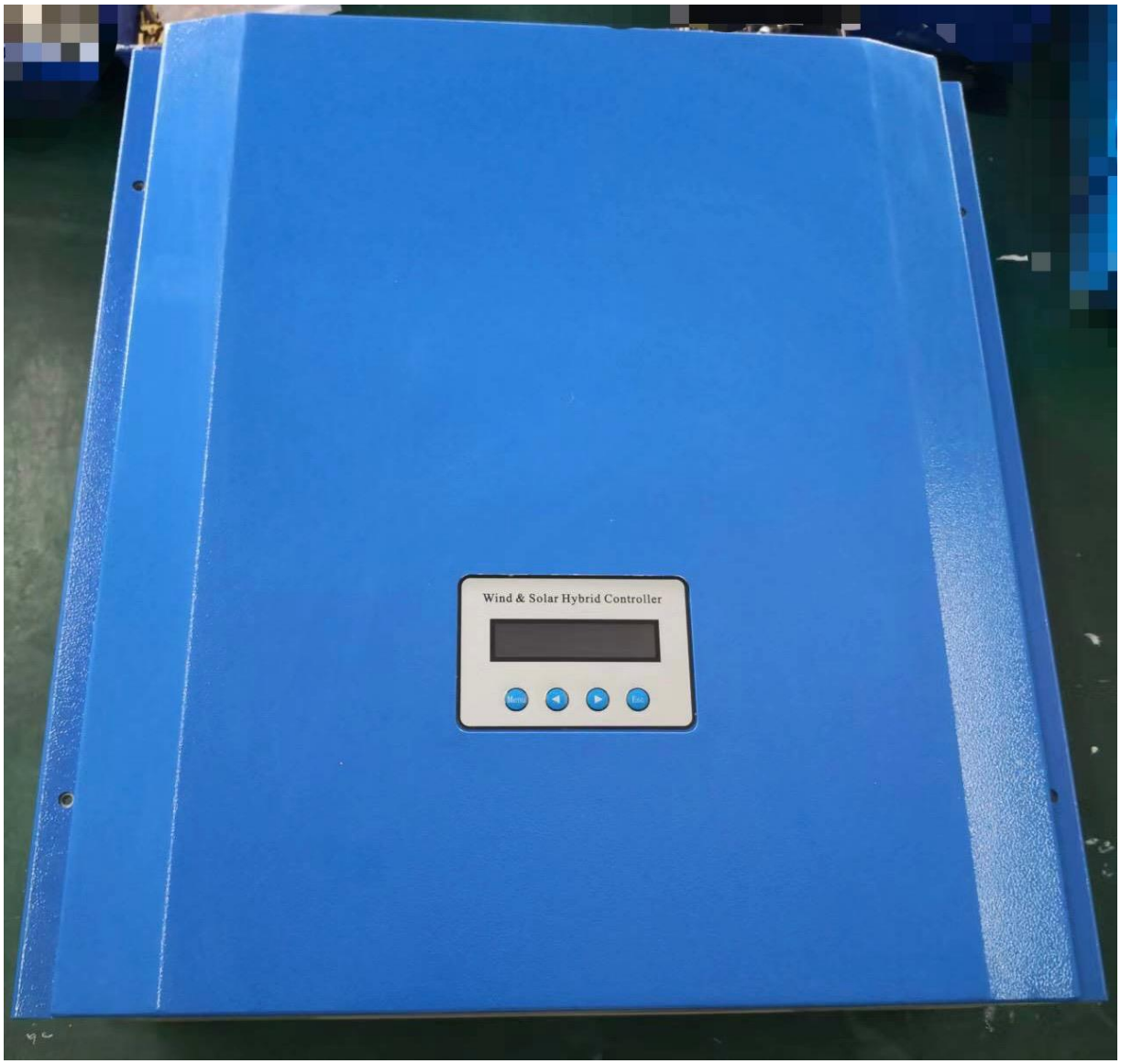
Wind & Solar Hybrid Controller

User's Manual



Ver.2.0-202208

Thank you for purchasing our product(s). The manual is provided to people who need to install and operate the controller. Read this manual before any work with controller and keep it carefully. The contents of this manual will be periodically updated or revised if necessary. However discrepancies cannot be excluded. Please refer to the actual product(s).

Symbols

The following symbols are used throughout this manual to indicate potentially dangerous conditions or mark important safety instructions.

△ **WARNING:** Indicates a potentially dangerous condition. Use extreme caution when performing this task.

INDICATION: Indicates a procedure or function that is important.

NOTE: Indicates a specific description for content.

General Safety Information

- When receiving the product, please check whether the goods have been damaged during transportation. If you find any problems, please contact our company or transportation company immediately..
- All installation and electrical work must be performed by professional personnel.
- Without any professional guidance, do not disassemble or attempt to repair the controller.
- Do not use the controller without batteries.
- Do not cut off the connection of controller and batteries when controller is working normally.
- Keep children away from controller.
- Do not allow water enter into the controller.
- Confirm that power connections are tightened to avoid excessive heating from a loose connection. Make sure cables are suitable for system.

1 Product Introduction

This kind of wind and solar hybrid controller is special design for off-grid wind solar hybrid generation system. Appearance is elegant, operations are easy. It also makes the wind generator and solar panels charge to batteries safely and efficiently.

1.1 Functions and Features

1.1.1 Basic Functions

- **Wind Turbine and Load Adaptive Impedance Matching, maximize energy utilization.**
  There is internal resistance in Wind generators, batteries and loads. According to impedance matching principle, only when input impedance equals to output impedance, power utilization is maximal, get the maximum power.
- **Protect wind generator from over-revolution speed, over-voltage and over-current**
  Max revolution speed, max voltage and max current of wind generator could be set. Once the actual revolution speed, voltage or current over the set ones, PWM intelligent unloading will start automatically. That protect wind generator.
- **Intelligent limiting of batteries max current**
  Batteries maximum capacity could be set through this controller. According to the set maximum capacity, controller could calculate the maximum charging current. Then batteries will be protected.
- **Function of manual brake**
- **Wind charging manual switch**
  On the controller you can manually set whether using wind charge to battery or not.
- **Solar charging manual switch**
  On the controller you can manually set whether using solar charge to battery or not.
- **BOOST and BUCK function in one**
  (If do not buy Boost & Buck Wind Solar Controller, there is no this function)
  Once wind generator voltage is lower than battery voltage, controller starts boost module automatically. Wind generator voltage is increased to the charging voltage, and it is boost charging. When wind generator voltage is higher than battery voltage, in order to acquire max power, buck module of controller will be started, the generator is buck charging.
  Loads lower the revolution speed of wind generator when it is breeze. That decreases the output power of wind generator. Through max current tracking (MCT) and max power point tracking (MPPT), output of wind generator is stabilized at the max balance of wind energy utilization. Combine with boost and buck function, wind energy utilization is increased.
- **BOOST function**
  (If do not buy Boost Wind Solar Controller, there is no this function)
  Once wind generator voltage is lower than battery voltage, controller starts boost module automatically to charge to battery.

- **BUCK function**
  (If do not buy Buck Wind Solar Controller, there is no this function)

- Once wind generator voltage is higher than battery voltage, controller starts buck module automatically to charge to battery.

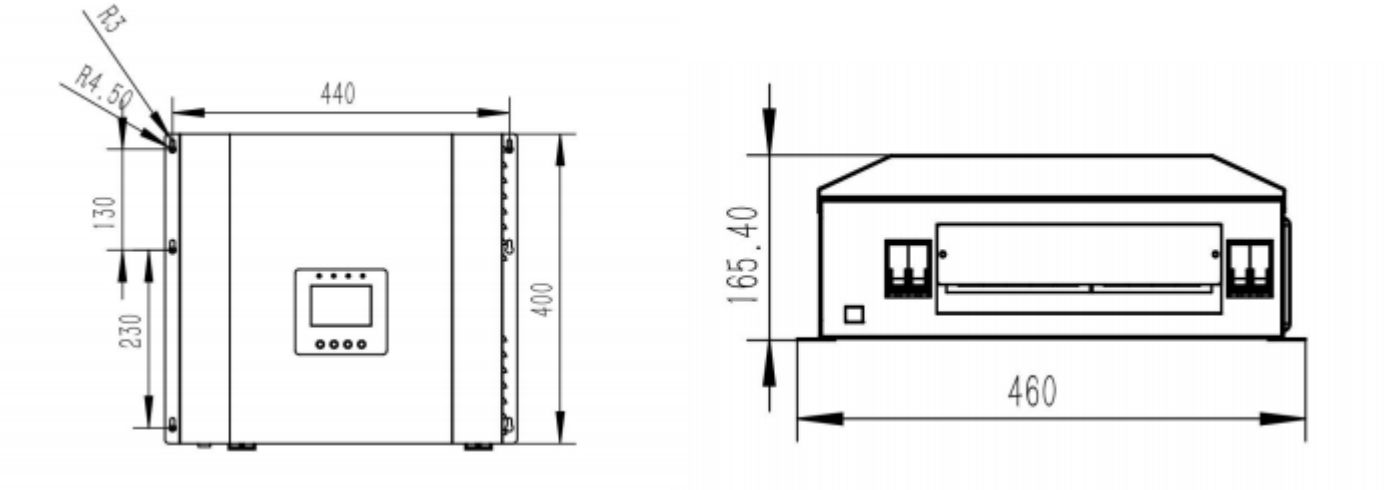
1.1.2 Optional Function

The following functions are available for purchase.

- **USB function**
  Record controller's working data by USB stick. Users can analyze the data on PC.
- **RS232 interface**
  By serial interface communication, you could monitor the whole system, storage and analyze data.
  Program could be upgraded by serial interface.
  Connect PC and controller by serial interface. You could set the parameters on PC and controller simultaneously.
  Software is free, easy to operate and no need to be installed.
- **RS485 interface**
- **GPRS**
- **Anemometer function**
  Wind speed could be displayed on LCD, easy to observe.

1.2 Dimension

1.2.1 PWM/MPPT(1KW-3KW)



2 Installation and Electrical Connection

2.1 Installation

2.1.1 Mounting Notes

△ Please carefully read this user manual before installation.
△ All mounting work must be performed by professional personnel.
△ Disconnect all sources of power to the controller before installing or adjusting.
△ Do not allow water and snows enter into the controller.
△ Install the controller where is dustless, airy and avoid direct sunlight.
△ If install controller in a cabinet, make sure there is enough space for controller heat-dissipating.
△ Keep controller away from corrosive gas and intense electromagnetic interference.
△ Locate the product where easy to install, electrical connection and maintenance.

2.1.2 Mounting Steps

1. Choose mounting location.(Please refer to installation notes)
2. Check and clean the surrounding of the installation site; make sure there is enough space for connecting cables.
3. Prepare tools for installation.
4. Fix the controller at the installation site.
5. Check that the controller is firmly installed.

3 Electrical Connection

3.1 Wiring Notes

⚠ Any incorrect operation during wiring can cause hazards, So wiring operations must be carried out by professional personnel.

⚠ Please select cables with appropriate specifications and good insulation for electrical connection.

⚠ When connecting, please ensure that the connectors are tightened and there is no loose connection.

⚠ Avoid loose connectors caused by wire shaking during mobile use.

3.2 Wiring Steps （Follow the bellow suggestions and steps to connect)

3.2.1 Battery Wiring

Battery wiring(the positive and negative cannot be reversed)

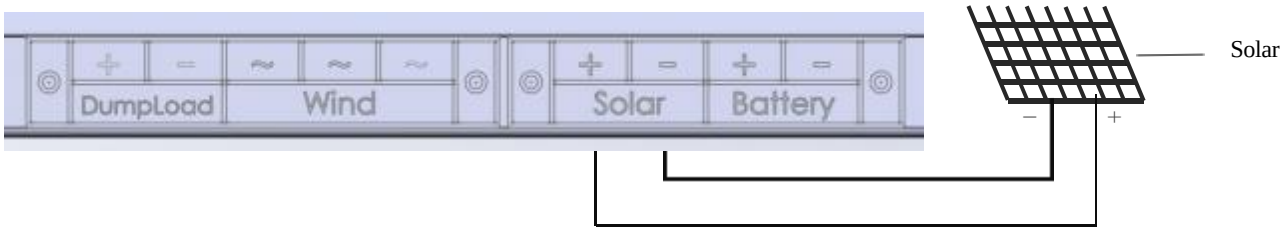
Connect battery positive(+) and negative(-) wires to controller as show.

△ Be careful when connecting the battery to avoid short circuits

△ Before connecting the battery, keep the battery switch of controller (BATTERY) OFF, Do not switch it to ON until you confirm the connection is correct and safe.

☞ Although this product has a protective function to prevent reverse connection of the battery, it avoids reverse connection of the positive and negative of the battery.

3.2.2 Solar Wiring



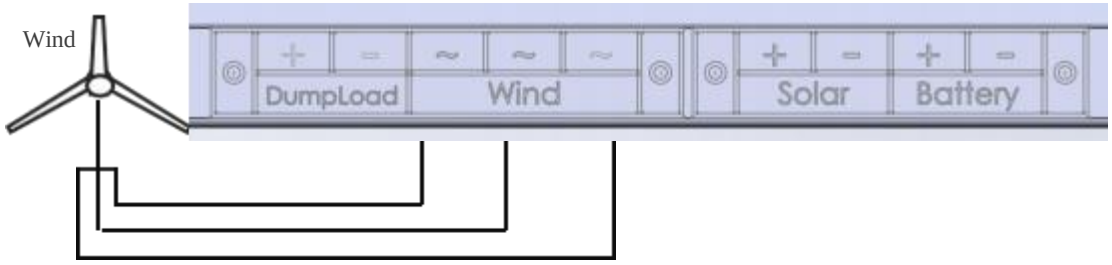
Solar wiring(the positive and negative cannot be reversed)

Connect solar positive(+) and negative(-) wires to controller as shown.

△ The solar PV array may produce high voltages in sunlight. Be careful of electric shock when wiring.

☞ Although controller has the protection of solar anti-reverse, but anti-connecting of positive (+) and negative(-) is forbidden.

3.2.3 Wind Generator Wiring



Wind generator wiring(regardless of positive and negative)

Connect wind generator wires to controller as shown.

△ The wind generator could produce high voltage. Be careful of electric shock.

△ It is recommended to connect the wind turbine under wind or no breeze conditions. The high-speed rotating wind turbine must not be connected until the controller is started.

3.2.4 Confirm Wiring

Double-check the wiring. Make sure each connection is correct. Secure no loose and resistive connections.

4 Operation

4.1 Description of Buttons

Buttons	Description
Menu	Enter into sub-screen or confirm the command.
◁	Switch between sibling menu or decrease the setting value.(Press more than two seconds change the setting value quickly)
▷	Switch between sibling menu or increase the setting value.(Press more than two seconds change the setting value quickly)
Esc	Return to parent screen or cancel the command.

LCD display screen interface， Press▶to switch the interface information and browse the parameter information.

4.2 Description of the LCD display

1. BAT： Normal
51.7V 0.0A 0.0W

2. Solar： NIGHT
1.4V 0.0A 0.0W

1.Battery: the battery status is normal
**V battery charging voltage ； **A battery charging current；
**W: battery charging power
2.Solar： Day/Night
V photovoltaic charging voltage；A photovoltaic charging current；**W photovoltaic charging power

3. Wind: 0RPM
2.5V 0.4A 1.0W

4:Battery _Temp:
Normal T:25.0℃

3.Wind：Current wind speed
**V charging voltage of wind ； **Wind charging current ；
**Wind charging power

4.T Battery temperature： Normal

5:Solar_Temp
Normal T: 25℃

6:Wind_Temp
Normal T: 26.2℃

5.T Solar charging temperature：Normal

6.T Wind charging temperature：Normal

8. Dump Load Temp：
Normal T: 25.7℃

9. Address：

2

7. T Dump Load_Temp：Normal

8. Address: Address of this controller in standard MODBUS protocol.

9. Solar_ Total:
0.0KWH

A. Wind_ Total:
0.0KWH

7. Total Solar power generation: Accumulated total Solar power generation.

A. Total power generation of wind：Cumulative total power generation of wind turbine

B:Current system status: Normal

C**： 0 0:0

B. Fault condition code ：

0/0 —Fault No. / total number of faults

Press the menu key to enter the browse fault code status, and press the◀ and ▶ key to browse all the current fault codes

When no errors is displayed on the second line, press menu to enter the system information interface.

1.No battery - no battery detected or battery voltage too low

2.Load short circuit - load short circuit or load current is too large .

3.Solar over-voltage - Solar voltage is too high

4.Load over-voltage - the load voltage is too high.

5.High Temperature error - temperature sensor 6.error Data error

6.Data error- data memory error

7.No error-no any error

B.State: Normal
C: 0 0: 0

C:Errors: (0/0)
No Errors

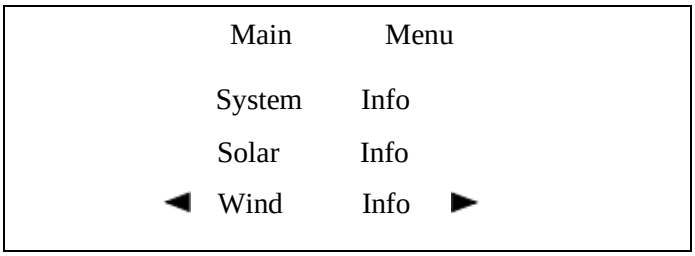
Press OK to enter the system parameter setting interface and press ◄ ► to switch options. Press the OK key again to enter the parameter browsing and view the data up and down by ► . Press OK again. When the parameter flashes, press the ◄ ► adjust the parameter. Press OK again to save the data. Press ESC to return.

Main Menu ◄ System Info ► Solar Info Wind Info	System parameter information
◄ System Info ► Sysvol: 48v Batt: 200AH Ener: ADD	Lock * * V: current system voltage value Capacity * * ah: current battery capacity Electricity * *:accumulation and clearing of system power
◄ System Info ► Low: 40.8v Rlow: 46.5v Float: 54.0v	Under voltage: under voltage protection voltage Under recovery: under voltage return voltage Floating charge: floating charge voltage
◄ System Info ► Full: 58.8v Rfull: 52.8v Out: 65.0v	Over-voltage: over-voltage protection voltage Over recovery: over-voltage return voltage Over load: overload protection voltage

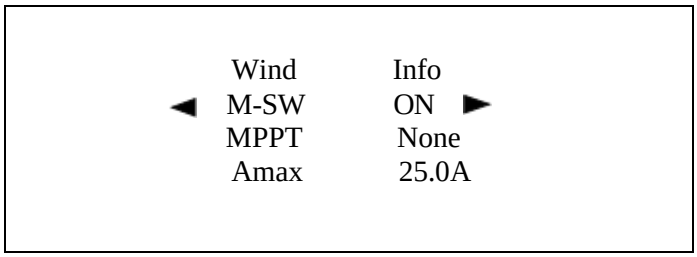
Press ► to enter the "solar parameter setting" option, and press OK to enter the solar parameter setting interface.

Solar Info System Info: Solar Info: Wind Info:	PV parameter information
Solar Info ◄ M-SW ON: ► LON 6.0V LOFF 6.0V	Charging: photovoltaic charging on / off Light on: light controlled on voltage Light off: light controlled off voltage

Press ESC to return to the "system parameter setting" interface, switch to the "fan parameter setting" option, and press OK to enter parameter browsing



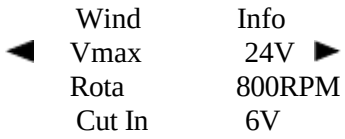
Wind parameter information



Charging * *: wind turbine charging on / off

MPPT * *: Wind MPPT function on / off

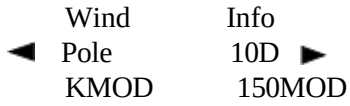
Current limit * * A: Max current of wind turbine



Voltage limit** V: Max voltage of wind turbine

Speed limit * * RPM: Max speed of wind turbine

Cut in * * V: initial charging voltage of wind turbine



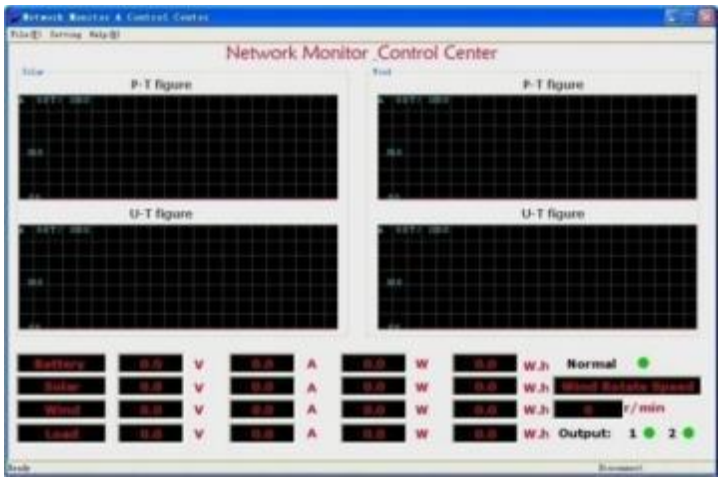
Magnetic pole * *: number of fan magnetic poles

Coefficient * *: MPPT disturbance value

5 Software

The software is easy to operate need not to be installed. You can browse and set parameters on PC through the software. Users could ask for the software from sellers.

①Browsing interface on PC:



②Contents displayed on browsing interface:

Battery: voltage; charging current; power; power obtained; generated energy obtained.

Solar: voltage; charging current; charging power; generated energy.

Wind turbine: voltage; charging current; charging power; generated energy.

Output load: voltage; current; power; output energy.

③Software using method could reference to the instruction of software compressed file.

6 Warranty

The product is warranted for two years from the date of shipment to the original end user. During warranty period, if failure occurs when the product normal using, our company will repair or replace the failure product.

Out of warranty period, we supply repair service, but for charges.

This warranty is only provided to buyers who have bought the product and signed the CI with us, and the warranty is nontransferable.

Our company reserves the right to change products and without notice when products update.

This warranty does not apply under the following conditions:

- Damage by not operating in accordance with user manual.
- Damage by accident, negligence, abuse or improper use.
- Unauthorized product modification or attempted repair.
- Damage occurring during shipment.

7 Battery parameter

Battery voltage	**24V**	**48V**	**72V**	**96V**	**120V**	Customize other parameters (to be discussed separately)
Under voltage (Low) (adjustable)	20.4V	40.8V	61.0V	80.0V	102.0V	
Under voltage recovery voltage(Rlow) (adjustable)	23.0V	46.5V	68.0V	92.0V	115.0V	
Over voltage(Full) (adjustable)	29.4V	58.8V	86.0V	117.0V	144.0V	
Over voltage recovery voltage(RFull) (adjustable)	26.4V	52.8V	78.0V	105.0V	130.0V	
Float voltage(Flot) (adjustable)	27.0V	54.0V	81.0V	108.0V	135.0V	

8 Parameter information

Rated voltage of battery	24V、48V、72V、96V、 120V、(one out of five) (customizable)
Rated power for wind turbine	1KW-3KW
Rated power for solar panels	1KW-3KW
Maximum photovoltaic access voltage	180V below 96V, 350V above 96V (except for special parameters)
Maximum connection voltage of wind	180V below 96V, 350V above 96V (except for special parameters)
Start speed of unloading(Rota)	500R (adjustable)
Wind pole pair (Pole)	10D（adjustable）
Wind unloading way	Internal resistance unloading and external resistance unloading (different power corresponds to different unloading methods, subject to the actual situation)
Dump load control mode	Over rotate speed limiting, Over voltage limiting, Over Current limiting, PWM.
Wind charging mode	MPPT(boost)、MPPT(buck)、MPPT （boost&buck）、PWM(optional)
Photovoltaic charging mode	PWM
Display mode	LCD
Load	NO
Display content	**Battery:** voltage;charging current; Percentage of battery power. **Wind:** voltage; charging current; rotate speed; output current; output power. **System:** state; generated energy; error code.
Operating temperature and humidity range	- 20~ + 55℃/35~85%RH(Non-condensing)
Static power consumption	≤3W
Protection type	**Battery:**over-discharge protection; over-charge protection; anti-reverse connection. **Wind:** Over rotate speed protection, over voltage protection, over current protection.
Controller /Outer package size NW./GW	460*400* 165.4mm/530*480*285mm 14kg/ 16.5kg
Additional function	RS232、RS485、GPRS 、Anemometer (one out of four, need to purchase)

Picture for reference

RS232

RS485

GPRS

Anemometer