

Advanced Wind/Solar Hybrid (Street Light) Controller

Model: WWS03A-12-R-L-E

(Three Phase) Version 1.0



Hefei Win Power Co.,Ltd



- 1-Really appreciate purchasing controller produced by HeFei Win Power Co.,LTD. Pls read manual with care before installation and keep it properly
- 2-Installation should be strictly in accordance with manual and done by experienced technician
- 3-The equipment should avoid long-term exposure to corrosive gas and moisture environment.
- 4-Keep away from moist ,rain , insolation , severe dust,,shaking. corrosion and intensive electromagnetic interface
- 5- Do not open enclosure and maintain personally

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1. General Description

The advanced wind/solar hybrid controller is specially designed for high-end small-scale wind/solar hybrid system and especially suitable for wind/solar hybrid street light system and wind/solar hybrid monitoring system.

The controller adopts PWM to control wind turbine and solar panels and charges battery with current limiting and voltage limiting as follows :

Charge with Current Limiting : Controller will charge battery with current limiting when battery power is low .

Controller will fully charge battery with the whole power produced by wind turbine and solar panels when total charge current of wind turbine and solar panels is lower than current limiting point. Controller will charge battery with the current limiting point and the over power will be unloaded by PWM when total charge current of wind turbine and solar panels exceeds current limiting point,

Charge With Voltage Limiting :Controller will charge battery with voltage limiting when battery power is high.

Controller will fully charge battery with the whole power produced by wind turbine and solar panels when battery voltage is lower than voltage limiting point. Controller will charge battery with voltage limiting point and over power will be unloaded by PWM when battery voltage exceeds voltage limiting point.

The controller has two DC output specially designed for street light system. Each DC output has seven different output control modes including: (1)constant on, (2)constant off , (3)constant half-power, (4)light-control on ,light-control off, (5)light-control on and time-control off, (6)light-control on, time-control & half-power , light-control off, (7) light-control on, time-control & half-power , time control off. The seven modes can be optionally setted by serial port communication. Three modes can be setted by LCD key-press, including, (1)constant on, (2)light-control on , light-control off, (3)light-control on , time-control off. Light-control on and light-control off are achieved by detecting solar panel voltage which can be setted from LCD key-press and serial port communication. In addition, the time of time-control off can also be setted from LCD key-press and serial port communication.

The controller adopts LCD module especially designed for wind/solar hybrid system. The LCD can display battery voltage, wind turbine voltage, solar panel voltage, wind power, solar panel power, wind

turbine current, solar panel current, output control mode of the first load, the output off time of the first load , output control mode of the second load , the output off time of second load , voltage point of light-control on, voltage point of light-control off, indicating lamp stands for day or night, battery power status, load status, as well as over-voltage, under-voltage, over-load, short circuit, etc. Users can browse and set parameters from the LCD key-press.

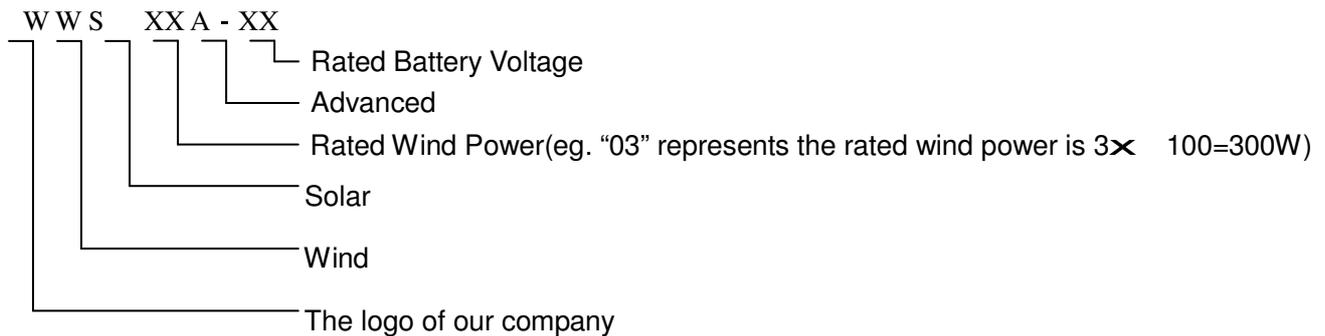
The controller with dedicated monitoring software. The software can demonstrate monitoring control system status in real-time, such as battery voltage, wind turbine voltage, solar panel voltage, battery charging current, wind turbine charging current, battery charging current, battery charging power, solar panel charging power, wind turbine charging power, Wind Turbine RPM etc. User can adjust parameters from software. Meanwhile the software can control running status of wind turbine and load.

In addition, the controller has series perfect protection functions, including: solar panel reverse-charging, solar panel reverse-connection, battery over-charge, battery over-discharge, battery reverse-connection, load short-circuit, over-load, lightning, wind turbine current limiting, wind turbine automatic brake and manual brake.

The low-voltage charge function is optional . This function enables wind turbine to charge battery under low power. Because the wind turbine produces low power at low RPM, The charging current should not be too high at low RPM . The low-voltage charging module enables the wind turbine to charge battery with constant input impedance under low-voltage charging status (the charging current is proportional to charging voltage). The input impedance can be modified through serial port communication depending on the different characteristics of wind turbine .In addition, users can set wind turbine starting charge voltage point through serial port communication. The wind turbine will start charging battery Only when the wind turbine voltage is higher than the wind turbine starting charging voltage point . The wind turbine start charging voltage point can be modified through the serial port communication.

The controller has intelligentized ,modularized, simple structure design with powerful function. All components are high quality industrial range and each controller is produced under excellent production activity. Ensure the controller can be used in relatively poor working environment and has reliable performance and long useful life.

2. Model Description



eg. WWS 03A-12-R-L-E (300W Advanced Wind/Solar Hybrid Controller, Runs in 12V battery voltage)

3. Performance Features

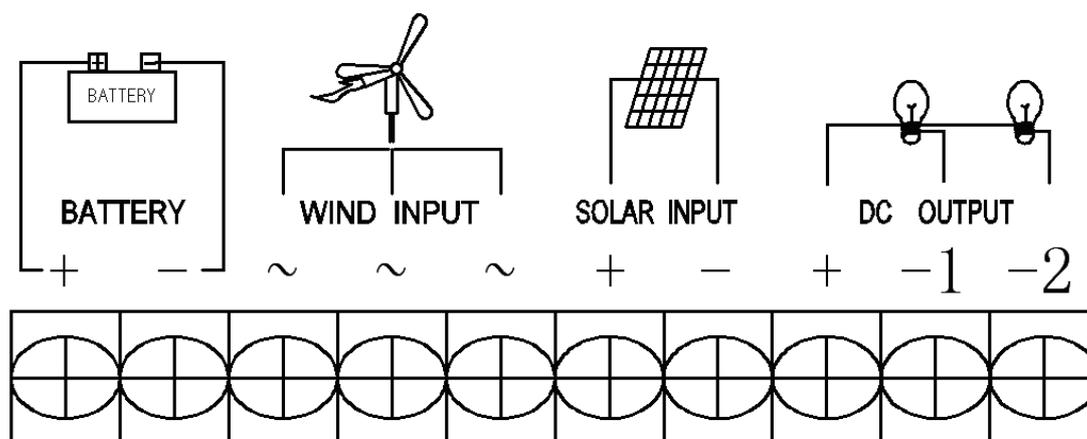
- > Intelligentized ,modularized, simple structure design with powerful function and stable performance.
- > PWM charging with voltage limiting and current limiting, Users can set precise stop rotation speed for different wind turbine .
- > Optional Low voltage charging module, the module's input impedance and the starting charge voltage is adjustable for adapting to the fixed feature of different wind turbines.
- > Two DC output, Each DC output has seven selective modes of controlling output : (1)constant on, (2)constant off , (3)constant half-power, (4)light-control on ,light-control off, (5)light-control on and time-control off, (6)light-control on, time-control & half-power , light-control off, (7) light-control on, time-control & half-power , time control off.
- > Optional RS232, RS485 serial port communication for remote monitoring
- > TVS lightning protection
- > Protection for over-charging, over-discharging, short circuit, over-load and a unique anti-reverse protection
- > Adopt the special LCD designed for wind/solar hybrid street light .The LCD can displays all system status and system parameters

4. Operation Process

The wiring diagram of wind&solar hybrid system and Terminal connection of wind/solar hybrid controller as following picture 1 and picture 2 :



Picture 1, wind&solar hybrid system wiring diagram



Picture 2, terminal connection

After installing wind wind/solar hybrid system, please connect the controller accurately as the sequential operation

Open the package and check whether the equipment is damaged due to transportation or not.

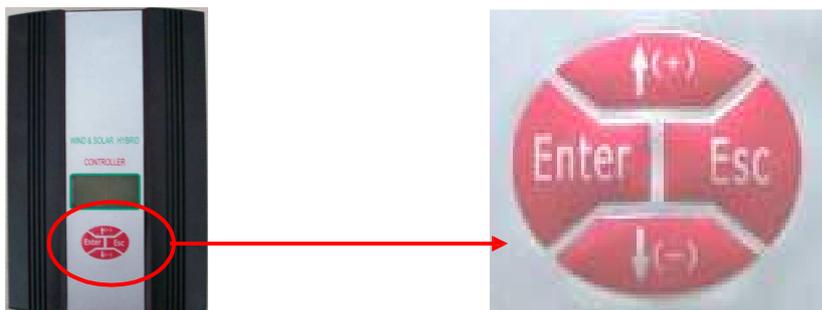
- > Connect DC load to “DC OUTPUT” terminal : The first load should be connected to "+" and "-1" of the “DC OUTPUT” terminals , The second load should be connected to "+" and "-2" of the “DC OUTPUT” terminals. The modes of load output can be setted according to the requirements of system .(The half-power output is only applicable to LED load).

- > Connect battery positive pole to the positive (+) "BATTERY" terminal, Connect battery negative pole to the negative(-) "BATTERY" terminal with copper core cable(section surface $\geq 6\text{mm}^2$).

Although the controller has anti-reverse protection, but reversing battery is still forbidden!

- > Ensure wind turbine in brake status and then connect the wind turbine output lines to the "WIND INPUT" terminals in back panel .
- > Cover solar panel with a shelter and then connect solar panels to the "SOLAR INPUT" terminals in back panel.
- > Remove the shelter of solar panle and release the brake switch of wind turbine.
- > Install matched software into computer (XP system). then connect controller with computer through RS232 or 485 serial port communication and data cable.The software will display the system parameters.
- > Users can set parameters and load output modes through the software and the LCD key-press

5. LCD operation and Display Instructions



Picture 3, the key-press of LCD

5.1 Description of Key-Press:

LCD backlight is on after pressing any key. The backlight will auto-off 10 seconds later while stop pressing any key

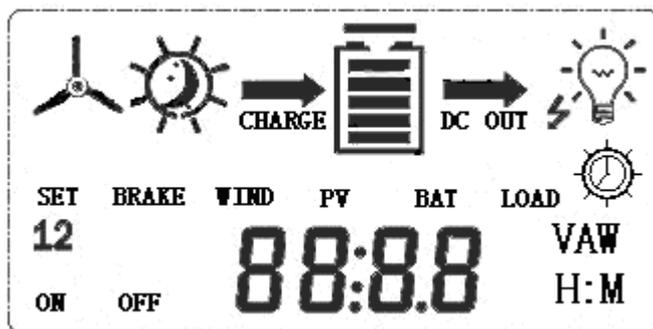
" $\uparrow(+)$ " key symbolizes increase or next one. In browsing window, press this key to check next parameter. In setting window, press this key to check next adjustable parameter or increase the value of the current parameter.

- > " $\downarrow(-)$ " key symbolizes decrease or previous one. In browsing window, press this key to check the previous parameter. In setting window, press this key to check the previous adjustable parameter or decrease the value of the current parameter.

- > "Enter" key symbolizes set or confirm . In browsing window, press this key to access setting window.
 In setting window, press this key to save parameter and return to browsing window.
- > "Esc" key symbolizes cancel or manual switch. In setting window, press this key to return to browsing window and do not save the modified parameters. In browsing window, the key is as a manual reset key for load short-circuit or overload

5.2 Displayed Content Description

LCD screen displays the following picture.

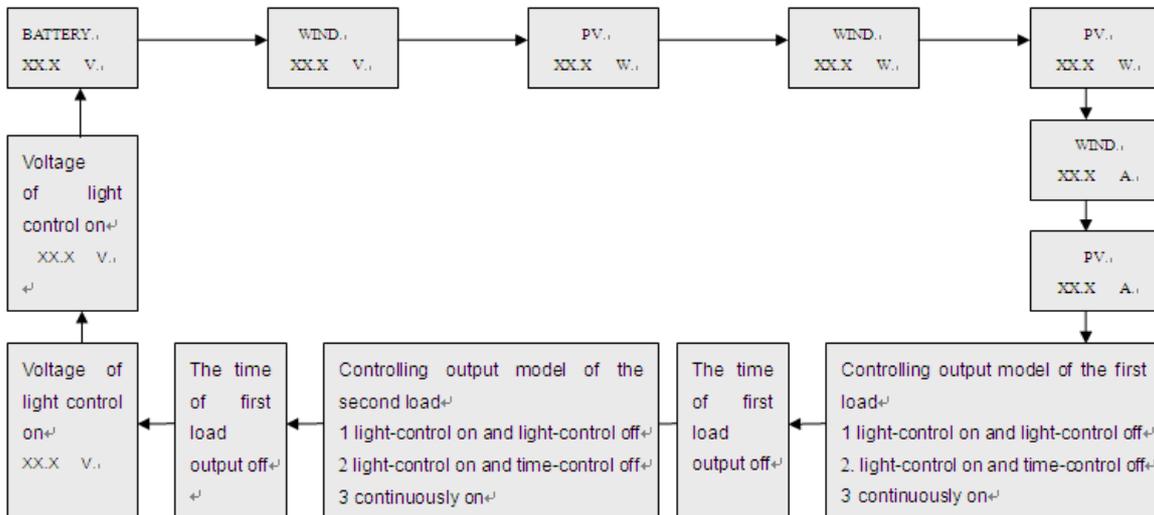


- 1) symbolizes the wind turbine.
- 2) symbolizes the day, symbolizes the night.
- 3) symbolizes the battery , internal strip graph represents the status of battery power., The symbol is flashing when the battery is over-discharge, this flashing will not stop until over-discharging recover ;The symbol is flashing when the battery is over-voltage,The flashing will not stop until over-voltage receivever.
- 4) symbolizes the status of load and error
 - > stands for normal load without output , stands for normal load with output .
 - > The symbol flashing stands for over-load, users must remove the extra load, click "Esc" key to recover the over-load
 - > The symbol of short-circuit flashing stands for short-circuit protection status, users should check load wiring, confirm the line wiring is normal and press " Esc " key to recover the short-circuit
- 5) symbolizes light-control and time-control. symbolizes light-control on and light-control off.
 symbolizes light control on and time control off.

- 6) The character "SET" symbolizes the setting status.
- 7) The character "12" symbolizes the first output and the second output.
- 8) **88:88** is parameters showing. The LCD displays all system status value and system parameters with intuitive digital and graph.

5.3 Browsing Parameters and Output Modes Description

- 1) Turn on the power, the LCD is under browsing window and displays battery voltage: XX.X V;
- 2) In browsing window, LCD will circularly display the following parameters by pressing "↑(+)" key, battery voltage, wind turbine voltage, solar panel voltage, wind power, solar panel power, wind turbine current, solar panel current, controlling output modes of the first load, the time of first load output off, controlling output modes of the second load, the time of second load output off, voltage point of light-control on, voltage point of light-control off. LCD will display parameters in reverse order by pressing "↓(-)" key.



LCD can display three controlling modes of load output, including light-control on and light-control off, light-control on and time-control off, constant on.

Three controlling modes of the first output which are shown on the LCD as follows :

- 1) The below picture shows interface of light-control on and light-control off. (Note: In order to show particularly the necessary content, we delete the other contents of the LCD) .

Lower-left corner of LCD displays "1" which symbolizes the first load output. The right side displays "load" and a sun symbol which suggest that the load is under light-control (light-control on and light-control off. In this mode), the controller will detect the light intensity from solar panel voltage, Initiate the corresponding load output automatically when it is dark and stop output automatically at dawn. The voltage point of light-control on and light-control off can be setted by LCD key and serial port communication.



Interface of light-control on and light-control off

2) The below picture shows interface of light-control on and time-control off.

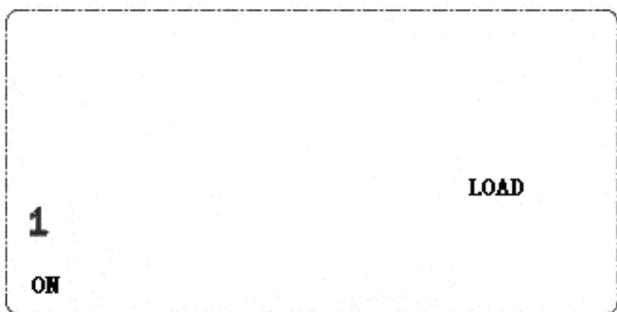
Lower-left corner of LCD displays "1" which symbolizes the first load output. The right side displays "load" and a sun symbol which has a clock symbol inside. All suggest that the load is under light-control on and time-control off. In this mode, the controller will detect the light intensity from solar panel voltage, Initiate the corresponding load output automatically when it is dark and stop load output automatically when the load is up to the time of time-control off . Or stop load output eventhough the load isn't up to the time-control off but it is at dawn .



Interface of light control on and time control off

3) The below picture shows interface of constant on .

Lower-left corner of LCD displays "1" which symbolizes the first load output and displays character "on" symbolize the load is constant on which means that the corresponding load has output within 24 hours except for low voltage protection status or fault condition.,The right side displays character "load" This mode is applicable to outdoor monitoring system.



Interface of constant on

5.4 Setting Parameters and Output Modes Description

User can set following parameters from LCD press-key : output modes of first load .output modes of second load, the time of first load off, the time of second load off, the voltage point of light-control on and

the voltage point of light-control off. And three output modes for each load :Light-control on,light-control off,light-control on,time-control off, constant on .

When users need to modify any given parameter, enter into setting window by pressing “↑(+)” or “↓(-)” key and “Enter” Key, and then user can view and modify parameters by pressing “↑(+)” or “↓(-)” key .Save the modified parameters and return to browsing window by pressing "Enter" key after setting parameters, not save the modified parameter and return to browsing window by pressing “Esc” key.

5.5 Manual Brake Setting:

Press the "Enter" key and "Esc" key at the same time, LCD displays the symbol **BRAKE** that suggests wind turbine is in brake status. Press the "Enter" key and "Esc" key at the same time in brake status, the symbol **BRAKE** will disappear and the brake status is released. In normal situation, the wind turbine can not be setted in brake status.

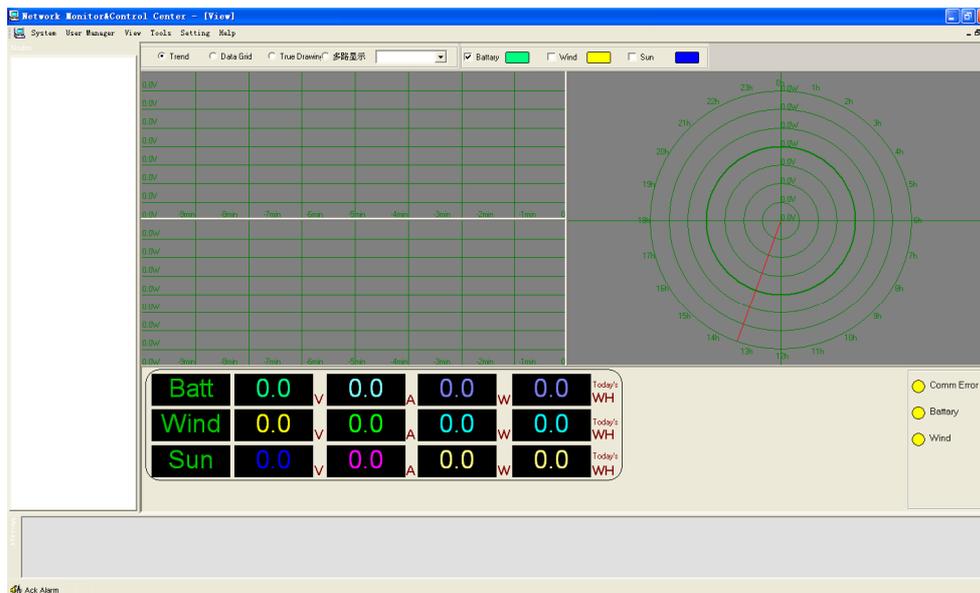
6. Monitoring Software

6.1 Software Installation

Double-click "WinController.exe" software→ click "Install" → read the agreement of license, click **I agree** if users agree to the terms and conditions → **Next** ...

→ **Success** . (Software installation process is same as general software installation process)

6.2 The instruction of the software interface



Parameters Displaying

- The first column displays battery's parameters : current, voltage, power, electric quantity
- The second column displays the wind turbine's parameters : current, voltage, power, electric quantity

- The third column displays solar panel's parameters :current, voltage, power, electric quantity
- The bottom- right corner is system simulation, including communication signal, battery

status, wind turbine status, first load output and second output status. The indicator is yellow when no signal and green when the software is working normally.

Menu



System

Different users have different rights to operate each function of software .Three types of users setted in this software . They are operators .system manager and user manager . Users logo and switch different user privileged to operate the software .

- User

Manage

To perfect the safety and Operating traceability, the system sets user manager module. Users divided into operators, system manager, and user manager . includes: name, age,sex ,headship ,password, Privilege etc .

View

(1) View trend shows the trend of the system so that users can view the curve of the operating system.

(2) Data grid shows all sorts of data recorded in the process of system operation.

(3) True drawing shows simulation of system.



Tools

(1) Query history date → Enter "begin time" and "end time", click " query" button, then the data list will show whole historical data within queried time period . Then click " Save to Excel" .Historical data will be stocked into excel files .

(2) Query log → enter "begin time" and "end time", uses can check all operation records in the

process of system operation. Meanwhile, the dates can be stocked into excel files.

(3) Query power → enter "begin time" and "end time", users can check the power recorded.

Meanwhile, the dates can be stocked into excel files.

(4) Query alarm → enter"begin time" and "end time", users can check the error alarms in the process of system operation. Meanwhile, the dates can be stocked into excel files



Setting

(1) General→ users select language into Chinese Version or English Version

(2) Running parameters → User can set series voltage, current and output modes via Running Parameters

(3) Switch wind's state → set the status of wind turbine in brake or working .

(4) Area-node

(5) Option setting can set status detection of AC output signals and imitation signals.

7. Performance Parameters

Model	WWS03A-12-R-L
Rated Battery Voltage	12V
Rated Wind Turbine Maximum Power	300W
Input Impedance Range	1~10/15S
Rated Wind Turbine Maximum Input Current;	40A
Wind Turbine Maximum Input Power	500W
Wind Turbine Starting Charge Voltage(factory default)	Continuous Adjustable (2V)
Starting Unload Voltage (factory default)	adjustable (14V)
Starting Unload Current (factory default)	0-25A (adjustable)
PV maximum charge Current	10A
Battery over-discharge protection Voltage	adjustable (11V)
Battery Over-discharge Recovery Voltage	adjustable (12V)
Output Protection Voltage	16V
PV voltage of Light Control on	adjustable (1V)
PV Voltage of Light Control off	adjustable (1.5V)
Line 1 Rated Output Current	10A
Line 2 Rated output Current	10A
Line 1 Output Mode(Factory Default)	Seven Modes selection(Light Control on and light control off)
Line 2 Output Mode (Factory Default)	Seven Modes (Light Control on and time control 5 hours)
Display Mode	LCD
Display Parameters	Battery Voltage, Wind Turbine Voltage, PV Voltage, Wind Turbine Current, PV Current, Wind Turbine Power, PV Power.Ove-Voltage, Under-Voltage, Over-load, short circuit.Etc
Communication Interface Module	RS - 232C (RS485 is selection)
Range of working Temperature &Humidity	-20~+55°C/35~85%RH (Without Condensation)
Quiescent Current	20±2mA(100mA if the interface is RS485)

8. Abnormal phenomenon and treatment

Phenomenon	Description
The symbol  flashing, without charge or discharge	Battery is over-voltage, check battery voltage, and the cable is well connected or not, re-connect all components;
The symbol  flashing and no output	Battery is over-discharging and battery is empty. Please continue to use the battery after battery is fully charged. Remove the battery and recover it with battery-charging device if the battery is over discharging for a long time.
The symbol  flashing and no output	Over loading occurs. Please check the load and ensure that the load power consumption is not exceed the rated current of product, remove the extral or abnormal load, press "Esc" key to recover
The symbol  flashing and no output	Short-circuit protection occurs. Please check load and wiring, remove the short-circuit risks or damaged load, press "Esc" key to recover .

If the phenomenon do not meet the description or can not be returned to normal please contact our service department or salesman to repair or replace.

9. Warranty and after Sales Service

We provide 1 year warranty for our product from the date of delivery

If the product is exceed warranty or damaged by transportation, improper operation , human element, force majeure, it is not under warranty.

Declare: The product has applied for patent protection, counterfeiting will be subject to legal sanctions. Our Company reserves the right to change products and without notice when products update.