

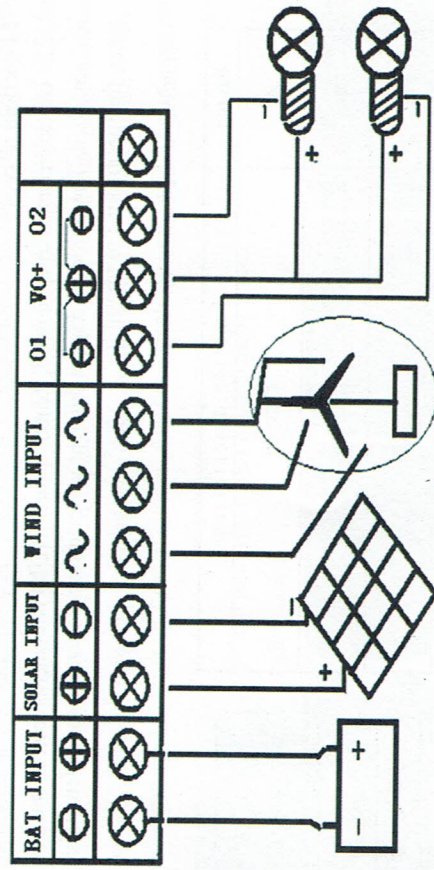
One、Basic Information

Super-intelligent wind/solar hybrid controller is a new type of intelligent and high performance controller for solar and wind application. It contains many years of application experience (such as waterproof, dustproof, salt spray, wiring error, wind resistance limit control of wind turbines, energy management etc.), it has done to ultimate no matter it applied to the charging control or street light control. In order to meet variety of applications, the controller adopts a hierarchical and modular structure, all functions can be achieved with different functional plates according to actual application, and it is convenient for rapid customization and application.

Two、Characteristics

- ◆ **Waterproof and safety wire connecting:** Three defenses for circuit board, hierarchical design, even if small amount water enters, it will not damage the device. Terminals are treated with injection molding process, wiring short circuit and cross will not occur.
- ◆ **RS232 communication:** Standard configuration RS232 communication, using a USB to RS232 members, more convenient to do monitoring cooperating with a computer (RS485, short-range wireless is optional).
- ◆ **Automatically alarming, good protection:** Battery and PV panel input terminals will not be damaged with continuous reverse, and it has buzzer alarm. Output terminal has continuous short-circuit protection, and over current protection. It is recovered after the abnormal excluded. Controller terminals up alarm function, to avoid the possibility of damage caused by water inside the controller when use in the open air or bad weather.
- ◆ **Patented wind turbines steady speed generation, current limit control technology:** which makes the wind turbines not run with super speed and over current, the wind turbines can keep generation with a limited set speed and current even in the high winds, avoid direct stop of wind turbines with over speed caused by strong wind. Greatly improve the wind turbines generation energy and keep the safe running of the wind turbines.
- ◆ **Wind turbines input MPPT generation technology (boost):** Controller can provide automatically wind turbines input maximum power tracking mode, or the 5 segments match curve input configuration mode (input rev to input current; or output voltage to input current curve), which makes the high efficient generation of the wind turbines, but with low speed.
- ◆ **Support multiple output mode selection:** This controller provides optional multiple output modes (light control, time control, light on in the morning, PWM dimming, reverse direction), which can satisfy a variety of applications.
- ◆ **Statistic the cumulative generating capacity, remaining power, speed, current, temperature and other data:** The controller screen displays not only the current, voltage, power of conventional wind turbines, PV, battery, and the output terminal; but also the cumulative generating capacity of wind turbines and PV, the remaining battery power, wind turbines speed, unloading current, and the temperature of controller.

Three、Installation process



Connection of controller terminals

Connect below components with below orders after finishing the installation of wind generator and solar battery panel, and external electric circuit.

- 1) Open the package, and do installation upon the confirmation of no damage of parts.
- 2) Connect the DC load with [VO+ 01 or VO+ 02] of the controller
- 3) Connect the battery and [BAT INPUT] on the controller with 6mm² or bigger copper core cable
(Please pay attention to the reverse connection of battery although there is reverse protection)
- 4) Connect the positive & negative of PV panel with [SOLAR INPUT] [+] [-] of controller
- 5) Connect the output of wind generator with [WIND INPUT] of controller when the wind turbines is not running or running with low speed; if the wind generator with single DC input, connect positive or negative output with [WIND INPUT].

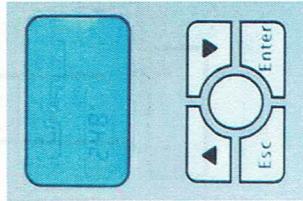
Four、Parameters setting instructions

1.Functions of keys

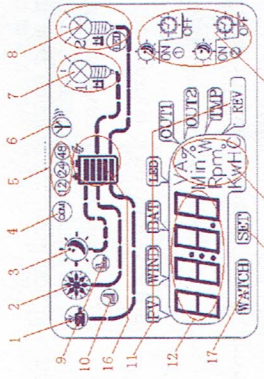
The controller enters into the work standby status ([RUN] flashing) as soon as it is powered and initialized. The controller displays different information according to the different function types, the specific kind to prevail.

Definitions of the buttons on the panel

But ton	Function description
▲	Page up
▼	Page down
ESC	Escape
ENTER	Confirm / Enter



2.Information displayed on LCD screen

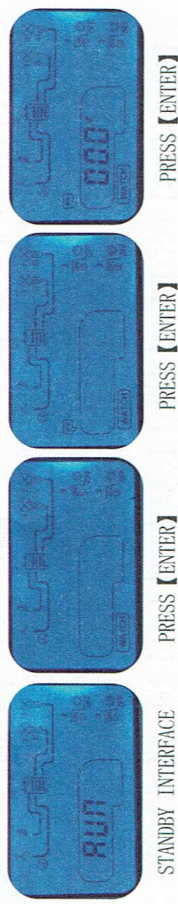


1. Mains electricity supply, displayed when mains electricity exists
2. Wind turbines graph, the graph rotates when the rotate; when brakes, displays brakes box
3. Daytime, night indication symbol. In the daytime displays sun, at night displays moon.
4. Communication display symbol, temporarily retained
5. Battery voltage level symbol, 12V displays 12, 24V displays 24, 48V displays 48
6. Wireless communication display, displays the symbol when has wireless module, displays dynamic symbol during communication
7. The No.1 output status display, when close the output, the symbol not light, otherwise, the symbol light. When short circuit, short circuit symbol displays; when has morning lighting function, and in the state of waiting for morning lighting, light symbol flashing indicates waiting.
8. The No.2 output status display, when close the output, the symbol not light, otherwise, the symbol light. When short circuit, short circuit or over loading and such abnormalities, abnormal symbol displays; when has morning lighting function, and in the state of waiting for morning lighting, light symbol flashing indicates waiting(for normal output). If used LED driver module output, then LED symbol displays
9. Solar MPPT symbol, displays when has solar MPPT components, the symbol flashing when the MPPT works
10. Wind turbines MPPT symbol, displays when has wind turbines MPPT components, the symbol flashing when the MPPT works
11. PV parameter symbol
12. Wind turbines parameter symbol
13. Battery parameter symbol
14. LED drive output parameter symbol
15. No.1 output parameter symbol
16. No.2 output parameter symbol
17. Temperature symbol
18. Rev symbol
19. Digital display parameter / status symbol
20. Parameter setting symbol
21. Parameter unit
22. No. 1/2 output/ close status display symbol, displays when has output module, ON corresponding to output open status, OFF to the close status
23. Battery status symbol, displays the rest battery power, after over voltage, displays the over voltage symbol
24. Data checking symbol

3.Dynamic parameters browse (read only)

Press the [ENTER] again, first displays the[PV], which means can check the solar panel input parameters, in this state, press the page up or down buttons, can switch to other dynamic parameters, corresponding to [PV], [WIND], [BAT], [OUT1], [OUT2], [TMP], [REV]. After selecting the information need to be displayed, press [ENTER], you can enter the parameters class to be displayed currently, each parameter class following several subproject parameters, they can be displayed through up / down buttons. Any time after shows subprojects parameter class, press the [ENTER] can skip to the next parameter class. Any time press [ESC] can exit the parameter display step by step until you return to the standby screen.

For example (in the standby screen)



Below shows all the dynamic parameters can be checked

- [Pu]: parameters of solar panel; [S-U] solar input voltage; [S-I] solar input current; [S-P] solar input power; [S-d] solar input generated energy; [E-U] Analog voltage of external photosensitive resistor; (Use external photosensitive resistor to do day/night checking instead of solar panel)
- [WIND] parameters of wind generator: [n-U] Wind turbines input voltage (DC voltage after rectification); [n-I] Wind turbines input current (DC current after rectification); [n-P] Wind turbines input power (DC power after rectification); [n-d] Wind turbines input generated energy (DC generated energy after rectification); [n-F] Wind turbines input unloading current (DC equivalent current); [n-C] Current of wind turbines charging to battery
- [BAT] battery parameters:
- [b-U] battery voltage; [b-I] total charging current to battery; [b-P] total charging power to battery; [b-d] total charging capacity to battery
 - [OUT1] the 1st output parameters: [01I] the 1st output current; [01P] the 1st output power; [01t] the 1st output time
 - [OUT2] the 2nd output parameters:
 - [02I] the 2nd output current; [02P] the 2nd output power; [02t] the 2nd output time
 - [TMP] internal air temperature of controller:
 - [TNP] controller internal temperature
 - [REV] wind turbines rev parameter:
 - [NSP] wind turbines rev display

4. Parameters setting

Operating Instructions of Keys:

The controller can set part of the key parameters through LCD screen. However, some advanced parameters can be set by the USB monitoring communication data cable cooperates with software. In standby state (displays Run), press [ENTER], then select [SET] through the up/down buttons, press [ENTER] again, the controller requests a password, enter the correct password and press [ENTER], then you can enter into the menu. The default password is: 0000. Enter the menu password input interface, current bit flashes, and every time press Page Down, flashing skip to the next operation bit; every time press Page Up, current operating-bit data is changed (+1). After you entering the correct password, displays [YES] and then enter into the menu parameter selection area. If wrong, displays [ERR]. Through page up and down to select the current menu. In the current menu, press [ENTER] to enter into the corresponding parameter setting interface immediately, displays the actual setting of parameters. Modify the parameters as above description, after modifying, press the [OK] to save the parameter setting immediately, prompt [ERR] if there is an error, no error prompts [YES]. Any time, pressing [ESC] to exit current interface, return to the previous level. The controller can set below parameters:

[OEY] [SYS] [t10] [t1F] [t2O] [t2F] [nDS] [nUt] [bEn] [nbt] [CLU]
[SrU] [nm] [mS] [Add]

[OEY] Parameter password setting: default value [000]

[SYS] 24V /12V /48V system or automatic recognition settings: 24V system [000], 12V system [001], 48V system [002], automatic system [003], default value: [000]

[T10] [T1F] These two parameters are combined for controlling the 1st output:

[T10] =0 [T1F] =0 range 0-16 hours

Output in the night: (light control -- through LCD screen can only set this mode)

The 1st output is light control output mode: that means output after dark; closed after dawn.

Output in the day: (through USB data wire and software to set this mode)

The 1st output is light control output mode: that means output after dawn; closed after dark. In this mode, the output in the day and night are opposite, below are the same, no longer tired.

[T10] >0 [T1F] =0 range 0-16 hours

Output in the night: (time control -- through LCD screen can only set this mode)

The 1st output is time control output mode: output in night, closed when the set time arrived. If the setting time has not arrived, but already in the daytime, output will be closed.

Output in the day: (through USB data wire and software to set this mode)

Output is opposite with that in the night under time control.

[T10] =0 [T1F] >0 range 0-16 hours

Output in the night and output in the day are all valid

The 1st output maintains continuous output mode: that means maintain a continuous output for 24 hours unless there is abnormality occurs (under voltage, over current, short circuit, etc.)

[T10] >0 [T1F] >0 range 0-16 hours

Output in the night: (light open in the morning -- through LCD screen can only set this mode)

The 1st output is light open in the morning mode output: that means, after dark, output opens; close output when last time reaches to [T10] setting time, and transfer to a waiting state, waiting till to the [T1F] setting time, continue to open the output, until to the morning

Output in the day: (through USB data wire and software to set this mode)

Output is opposite with that in the night under light open in the morning mode.

[T20] and [T2F] are combined for controlling the 2nd output.

Please refer to [T10] and [T1F] combined for controlling the 1st output (meaning of the parameters are the same).

That is: [T10] equals to [T20], [T1F] equals to [T2F]

In addition, the 2nd output can output PWM signal, which is not rely on the [T20] [T2F] parameters, this function can be achieved through the mode set by software through USB data wire.

When set to PWM output mode, it will output PWM signal.

PWM signal frequency: 250HZ ± 5HZ

PWM signal amplitude: Battery voltage

PWM output current: 12A (low level is valid)

PWM output ratio: 0%-100% (100% corresponds to output battery voltage, 0% corresponds to output closed)

This output mode is mainly used for the LED lamp dimming, cooperate with our energy management algorithm (need to use the monitoring software Settings) to realize the output energy management, achieve more bright Light time.

[nDS] Pole pair number set of the wind generator, used for measuring the wind turbines speed:

Generally, wind generators are permanent magnet synchronous generator, how many magnets inside; half is the number of pole pairs. Range: 2-100 default: 4 pairs

[nUt] Sustained braking time parameter set after wind turbines braking: After the wind turbines brakes, wind turbines can be released after the brake time set by this parameter, and continue to generate electricity (except: after wind turbines brakes, if the brake current is too large, and do not reduce even last for some time, the controller will release the braking action, and recheck brake conditions after a period of time, if OK, re-brake, again and again, to avoid burn generator or controller due to large current, limited current set by [nm] parameters). Range: 1-59 default: 20 minutes

[bEn] The buzzer sound settings: [000] close prompt; [001] open prompt.

[nbt] Wind turbines MPPT charging components maximum input current limit setting

1. In the automatic power tracking mode (only can be set by USB data wire)

This parameter is used to control the matching of input current through the MPPT parts and wind turbines input impedance. If the value is set too small, the MPPT algorithm is inefficient, but does not pin down the wind turbines; If it is set too large, the MPPT algorithm is high efficient, but may be drag wind turbines in low wind speed. So they need a reasonable set according to wind turbines power curve. For example, in the low wind speed (such as 4.5 m/s), the wind turbines can output the maximum power under 2A current, and will not cause the stall running of wind turbines (pin down the wind turbines, speed can not be improved), then this parameter should be set to 2A, that is: [nbl] = 20, that is: 2.0A, Range 0-250 that is 0-25A current. Specific refers to the maximum power configuration of MPPT module.

2. In the 5 segments matching mode (only can be set by USB data wire, default is this mode)

Through USB data wire to set the 5 points wind turbines curve of rev-current, or voltage-current, the set current will be limited by the [nbl] parameter. As the controller includes the main charging passage of the wind turbines, MPPT low voltage charging passage, so this parameter restricts the maximum input current of MPPT low voltage boost charging, can avoid over current running of MPPT low voltage boost charging passage. After set running in the curve matching, the controller will extract the input current from the wind turbines to charge the battery according to this charging curve. Generally, recommend the experienced customers use this mode to match with the wind turbines, to have the best generating effect.

[SrU] Starting wind turbines MPPT charging voltage setting: When the input voltage of wind turbines is over this setting parameter, MPPT start charging, the controller (or 5 segments curve matching) does the maximum power tracking to wind turbines input automatically. Range: 2-255, default: 85 corresponds to 8.5V

[CLU] closing wind turbines MPPT charging voltage setting: When the input voltage of wind turbines reaches to or lower than this setting parameter, close the MPPT charging, which can avoid stopping of wind turbines under a very low speed. Range: 2-255, default: 120 corresponds to 12.0V

[nml] Wind turbines maximum input current setting: when wind turbines input current for generating exceeds this setting current, will cause a controlled braking action, combining [NUT] parameter, to finish the brake control. Range 0-500, which is 0-50.0A, default 18.0A

[mns] Wind turbines maximum rev limit setting: When the wind turbines speed reaches this setting speed, the controller controls the speed within this parameter setting value through automatically unloading, stable the maximum speed, if the wind turbines speed is too large, exceeds the automatic steady speed range, continue for some time, will start braking, braking time decided by [nUt]. Range 0-3000 rev / min, default 500

[Add] Communication code of the controller: Give a code to different devices during the multiple communications; every controller code must be different with others, to avoid crosstalk. Range 2 - 250, default 6

Five. Special operations of controller

1. Manually unloading operation: In standby mode, long press the [ESC] button for 3 seconds, the wind turbines will enter into manual brake status immediately, the wind turbines graphic symbol shows as a frame, and the wind turbines is framed by it, which means it's braking now. If now you press [ESC] for 3 seconds, the braking action will be released slowly, and the wind turbines generates again.

2. Controller warm reset starts: Press page up and down buttons simultaneously for 3 seconds, LCD digital part displays [RST], the controller is reset immediately, reinitialize working. Recommend to perform this operation to reset controller after setting all the parameters, or encounter problems.

3. Manual testing of PV input reverse (for wiring in the night): When connect the solar panel in the night, this function is used to detecting whether there is a reverse (when wiring in the daytime, this function is failure). In standby mode, long press the page up button for 3 seconds, the controller displays [-C-], continuously check if the solar panel is reversed within 5 seconds, if reverse is exists, displays 'Err', recheck after correcting, if OK, no error information will appear.

4. Meanings of Buzzer prompting: below conditions will cause buzzer prompting: 1) controller is powered on; 2) key input; 3) battery reversed; 4) solar panels reversed; 5) the 1st output is short circuit, over current; 6) the 2nd output is short circuit, over current; 7) the controller terminal is upward; 8) temperature is too high.

Define the meanings of different prompting from outside: one "Drip" sound includes 1) and 2); intermittent "Drip" sound includes 5), 6) and 8); Long "Drip" sound includes 3), 4) and 7), define the problem quickly, and remove the fault.

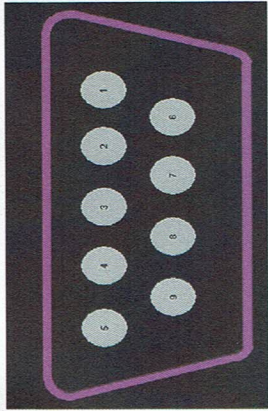
5. Removing of abnormal information: when the failure occurs, enter the menu, then exit directly, the failure is clear.

SIX Product Parameters

Product model (circled number is the code)	T1-WS11-02-NNHN-1 ① T1-WS11-03-NNHN-1 ② T1-WS11-04-NNHN-1 ③	T2-WS11-03-NNHN-1 ④ T2-WS11-04-NNHN-1 ⑤ T2-WS11-06-NNHN-1 ⑥
Battery parameters	12V 24V	
Applied battery voltage	Reverse connection protection (do not burn any components, with voice prompt); over voltage protection	
Battery protect method	14.5V±0.2V 29.0V±0.2V	
Voltage at the over voltage protection point	13.75V±0.2V 27.5V±0.2V	
Voltage at the over voltage recovery point	11.50V±0.2V 23.0V±0.2V	
Voltage at the under voltage recovery point	10.50V±0.2V 21.0V±0.2V	
Battery temperature compensation	5mV/°C/2V (settable) (optional component)	
Wind turbines input parameters	200W/①; 300W/②; 400W/③; 300W/④; 400W/⑤; 600W/⑥	
Rated power of applied wind turbines	20A/①; 30A/②; 35A/③; 20A/④; 25A/⑤; 30A/⑥	
Rated input current (DC after rectification)	25A/①; 40A/②; 45A/③; 30A/④; 30A/⑤; 40A/⑥	
Maximum input current (DC after rectification)	500 Rpm (settable)	
The default speed of the wind turbines generation with limited speed	25A (settable)	
The default current of the wind turbines generation with limited current	over rev protection, over current protection, induction lightning protection	
Wind turbines protection method	PWM stepless high-frequency soft unloading (built-in)	
Unloading method	Boost MPPT mode (automatic tracking or 5 segments curve tracking)	
MPPT function	5A (standard configuration); 12A / 18A / 25A (optional)	
Input current of MPPT passage	250W/12V (standard configuration) 550W/24V (standard configuration)	
PV input parameters	500W/12V (optional) 1100W/24V (optional)	
Rated power of applied PV	15A (standard configuration) 30A (optional)	
Rated input current of terminal	Reverse connection protection (voice prompt)	
PV protection methods	Open circuit unloading	
Unloading method	2 outputs	
Discharge output port parameters	12A	
Rated current of each output	Over current protection; short-circuit protection	
Output protection methods	light control, time control, reverse output, lights on in the morning, PWM output (only the 2 nd output has it)	
Others	Monitor the air temperature inside controller, temperature of unloading parts and wind turbines MPPT components, and also monitor the control terminals installed on the inversion (with voice prompt)	
Auxiliary function	Liquid crystal (LCD) display	
Display mode	RS232(5V electrical level) (standard), RS485/Short-range wireless (optional)	
Communication mode	Wind turbines input voltage/current/power/generated energy/rev/unloading current	
Displayed parameters	PV input voltage/current/power/generated energy	
	Battery voltage/charging current/power/total charging capacity/battery status information	
	output current /power/abnormal information of 2 outputs	
Power consumption in standby mode (screen backlight closed)	About 20ma /24V system About 30ma / 12V system	
Operating mode	3M foil key operation (4 keys)	
Working temperature / humidity range (environment)	-40°~+80°C/20°~85%RH (non condensing)	
Protection grade	IP41	
Controller size (L*W*H)	175mm*148mm *84mm	
Net weight	1.8KG	

Seven. Appendix: Definition of communication port

The controller is configured with a standard 9-pins connector port of DB9 for communication and multi-function selection interfaces, which are defined as follows:



- Definition of the pins:
- 1--- RXD pin (control the RXD pin) of 232 communication TTL level
 - 2--- TXD pin (control the TXD pin) of 232 communication TTL level
 - 3--- GND pin of 232 communications
 - 4--- TB pin of 485 communications
 - 5--- TA pin of 485 communications
 - 6--- External output power supply VCC, Voltage: 5Vdc, the maximum current: 50mA
 - 7--- External output power supply V+, Voltage: battery voltage
 - 8--- External photosensitive probe (photosensitive resistor) terminal 1 (do not rely on PV panel to detect the lighting)
 - 9--- External photosensitive probe (photosensitive resistor) terminal 2 (do not rely on PV panel to detect the lighting)
- Above function definitions relies on corresponding hardware, in the normal communication, only pin1, 2, 3, 6 are available.

Eight. Using environment

Avoid using in the environment which with direct sunlight, exposure, rain, wet, acid fog and so on.

It is not allowed to using in the environment which with flammable, explosive gas or other items, must be ware of flame or spark.

Nine. Quality assurance and after-sales service

One year warranty from the date of the products sold. Within the warranty period, the product failures caused by normal use, our company will provide free repair or replacement. If the warranty period has expired, our company still provides maintenance services, but requires a fee. The product warranty is only available to the original purchaser, it is not transferable. Our company reserves the right to change products, product updates without notice. Anyone of the following conditions occurs within the warranty period, our company will not provide free services:

- Do not use in accordance with the user manual, and caused damages.
- Equipment damage caused irresistible natural disasters.
- Customers reshape and modify the equipment.
- Customer has signed for receiving, equipment damage caused by transportation

Note: this is a brief manual, for detailed instruction please contact with our company.