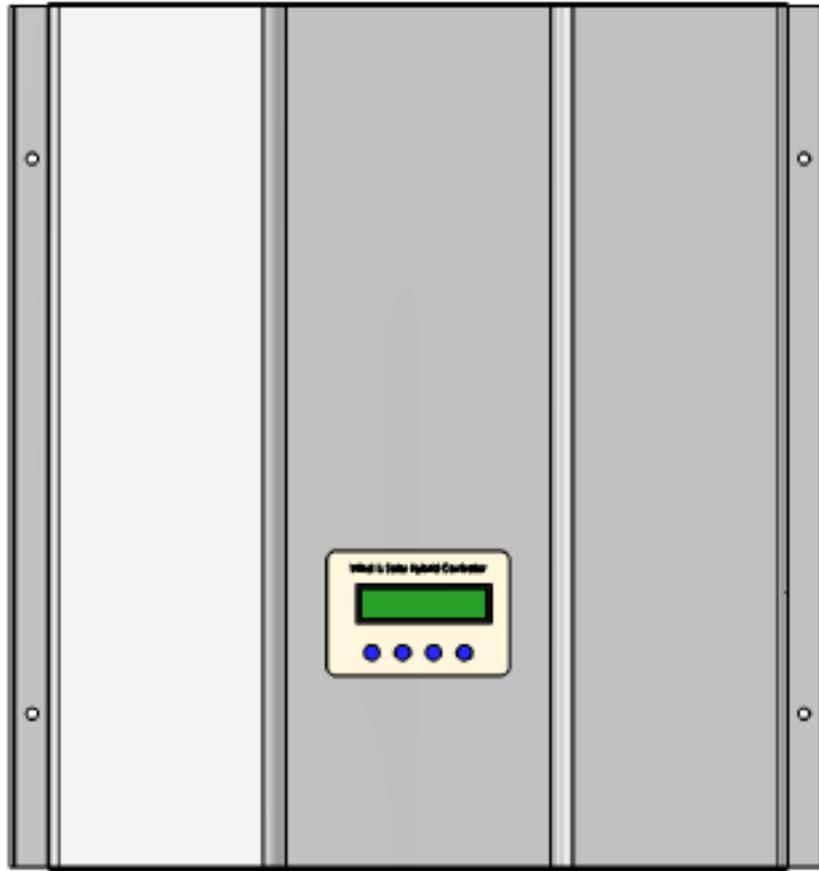# Wind & Solar Hybrid Controller

Hybrid Charge Controller All Round 3000_48 Boost

User Manuel

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.

📖

General Safety Information

- Before receive the product, check it carefully. Make sure whether the product is damaged during transport. If it is damaged, contact the shipping company or our company immediately.

- All installation and electrical work must only 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 to enter 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 course 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.

> **Solar charging manual switch**

On the controller you can manually set whether using solar charge to battery.

> **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**

> **Anemometer function**

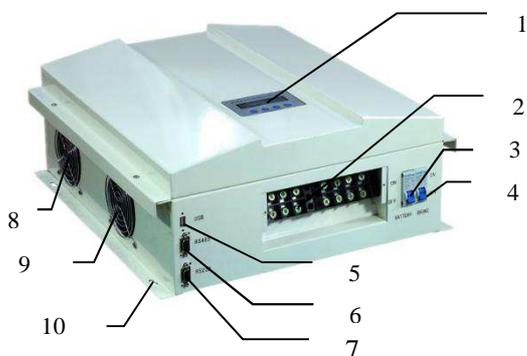Wind speed could be displayed on LCD, easy to observe.

1.2 Appearance

Figure1-1 Appearance description

| Item	Name	Description
1	LCD display panel	A friendly human-computer interaction interface. Running data and configuration parameters are displayed in the LCD screen. Parameters could be set by keys on the panel.
2	Terminal block	Connect wind generator, pv panel, battery and load.
3	Battery switch	Disconnect battery current safely
4	Wind brake switch	Turn on (ON) or turn off (OFF) wind braking
5	USB	Storage data（If don't purchase, no USB interface）
6	RS485 interface	Communication interface （If don't purchase, no this interface）
7	RS232 interface	Communication interface （If don't purchase, no this interface）
8	Resistance cooling fan	This fan rotates when wind generator braking ,cooling the resistances
9	System cooling fan	This fan rotates when charging current is too high, cooling the system
10	Mounting holes	Install controller

1.3 Dimensions
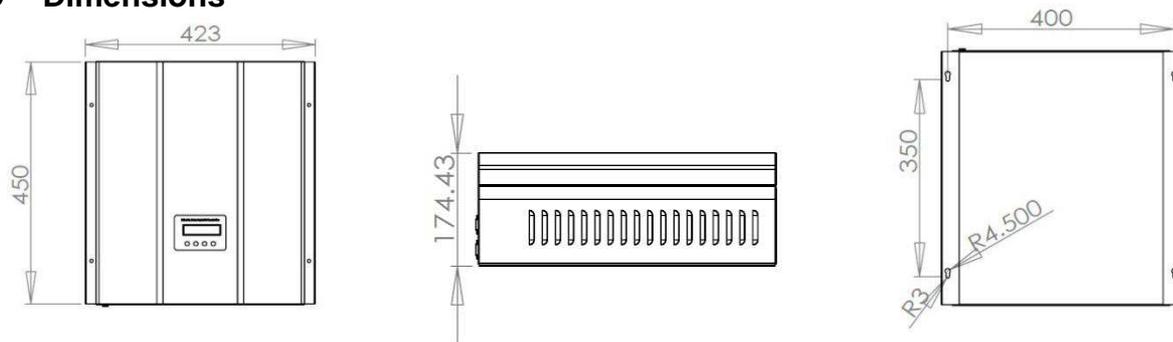
Figure1-2 Dimensions of controller

2   Installation and Electrical Connection

2.1   Installation

2.1.1   Mounting Notes

⚠ Read through this entire section first before beginning installation.

⚠ All mounting work must only be performed by professional personnel.

⚠ Disconnect all sources of power to the controller before installing or adjusting.

Do not allow water and snows enter the controller.

⚠ Install in locations 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 in where easy to install, electrical connection and service.

2.1.2   Mounting Steps

1. Choose mounting location.(Please refer to installation notes)

2. Check for clearance around the location; make sure there is enough space for connecting cables.

3. Prepare tools for installation.

4. Place the controller to the mounting location.

5. Check that the controller is securely mounted.

2.2 Electrical Connection
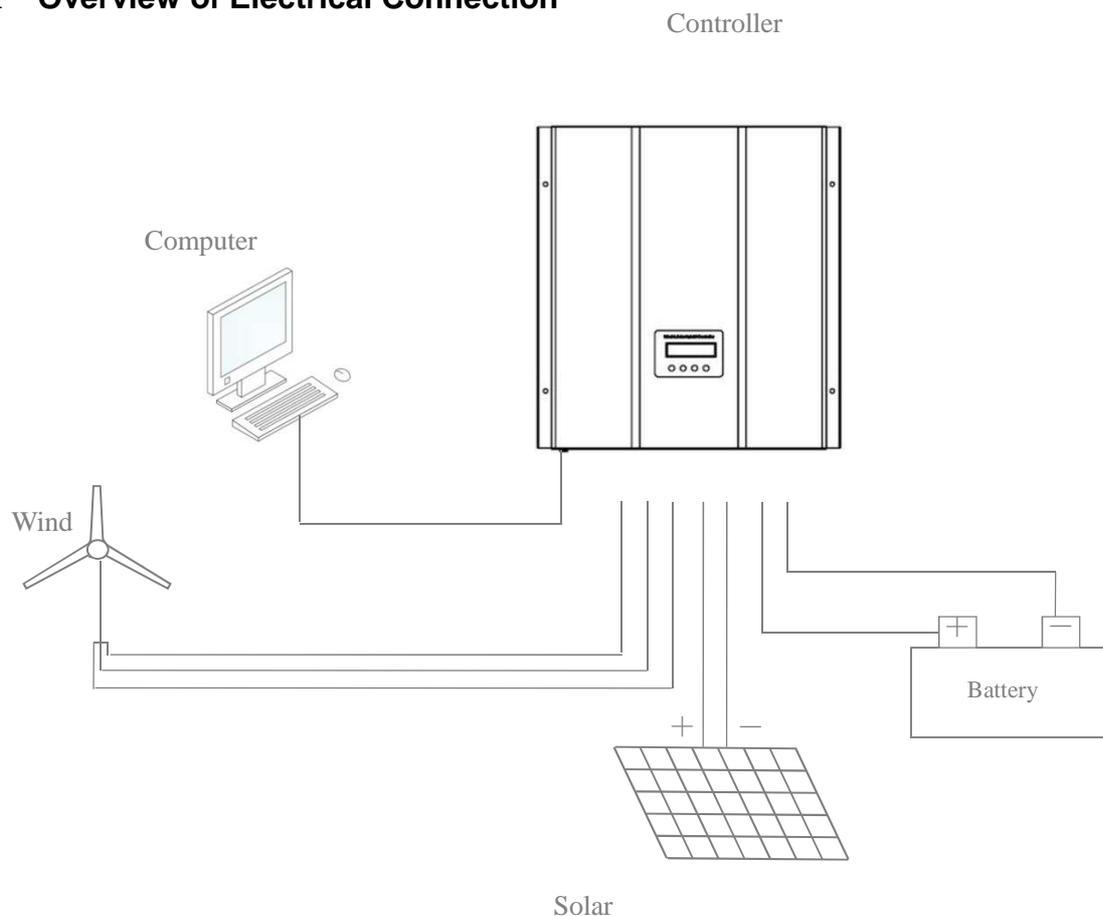
2.2.1 Overview of Electrical Connection

Figure2-1 Overview of electrical connection

2.2.2 Wiring Notes

⚠ Improper operation during the wiring process can cause fatal injury to the operator or unrecoverable
⚠ controller damage.

⚠ Only qualified personnel can perform the wiring work.
⚠

All cables must be undamaged, properly insulated and adequately dimensioned.

Make sure that all cables are firmly attached. Unsecured cables create loose and resistive connections
which may lead to excessive heating and /or fire.

⚠ For mobile applications, be sure to secure all wiring, avoid loose connections.

2.2.3 Wiring Steps （Follow the bellow suggestions and steps to connect）
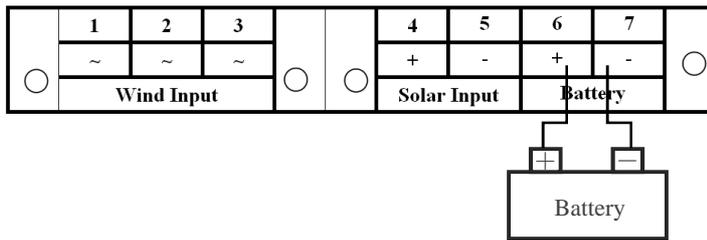
2.2.3.1 Battery Wiring

Figure2-2 Battery wiring

Connect battery positive(+) and negative(-) wires to controller as shown in figure2-2.

⚠ Be careful of avoiding short circuit when wiring the battery.

⚠ Before wiring the battery, keep the battery switch of controller (BATTERY) on OFF, Do not switch it to ON untill you confirm the wiring is correct and safe.

☞ Although controller has the protection of battery anti-reverse, but anti-connecting of positive (+) and negative(-)

is forbidden.

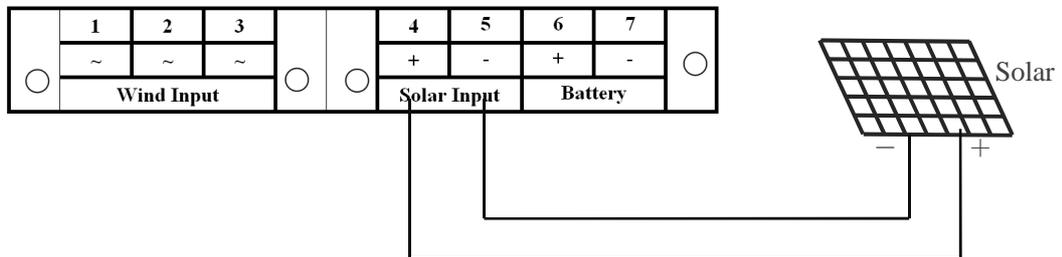### 2.2.3.2 Solar Wiring

Figure2-3 Solar wiring

Connect solar positive(+) and negative(-) wires to controller as shown in figure2-3.

⚠ 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
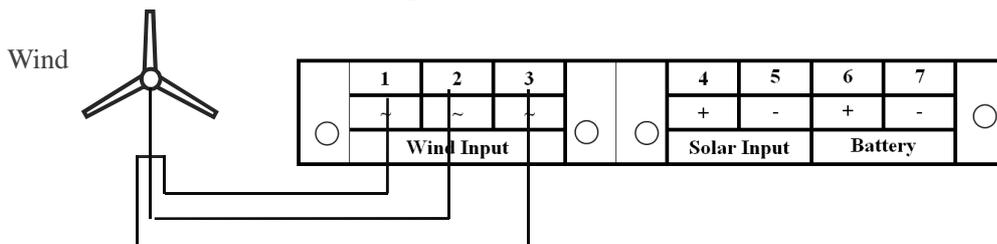
forbidden.

2.2.3.3 Wind Generator Wiring

Figure2-4 Wind generator wiring

Connect wind generator wires to controller as shown in figure2-4.

⚠ The wind generator could produce high voltages. Be careful of electric shock.

⚠ When it is breeze or windless, connection of wind generator and controller would be safer and better. Only when

controller is in the state of start-up, high-speed rotate wind generator could be connected.

2.2.4 Confirm Wiring

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

3 Operation

3.1 Description of Buttons

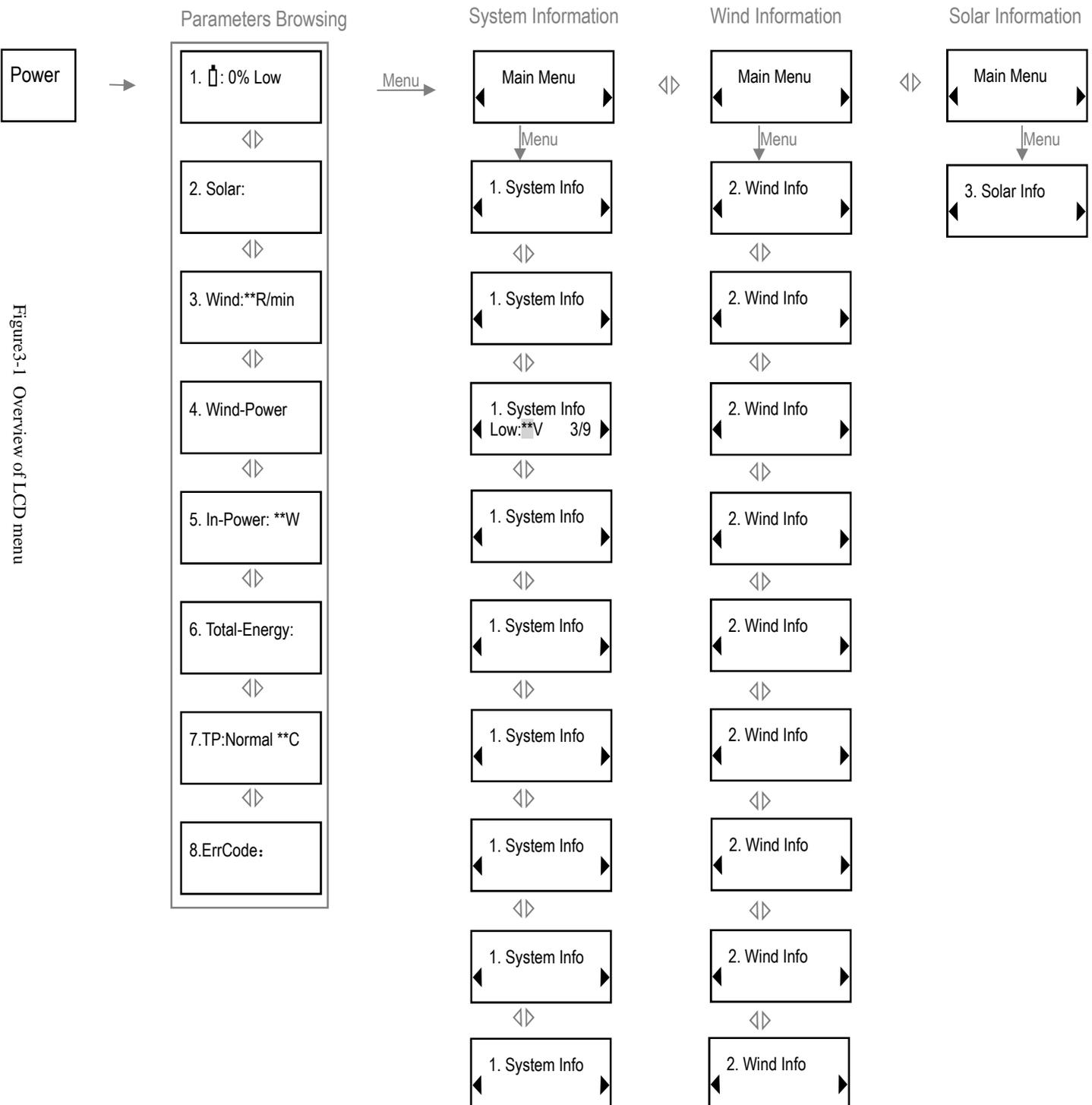| Buttons	Description
Menu	Enter into sub-screen or confirm the command.
◁	Switch between sibling menu or decrease the setting value.(Press more than two seconds change the setting value quickly)
▷	Switch between sibling menu or increase the setting value.(Press more than two seconds change the setting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

3.2 Overview of LCD Menu

The gray shaded parameters could be set manually by users.

Parameter setting steps:

1. Press "Menu" to enter the setting state, setting value would flash.

2. Press "◁" to decrease the setting value. Press "▷" to increase the setting value.

3. After step 2, press "Menu" to save the setting, press "Esc" to back out.

Figure3-1 Overview of LCD menu

Parameters Browsing

| Power | → | 1. ▯ : 0% Low |

◁▷

2. Solar:

◁▷

3. Wind:**R/min

◁▷

4. Wind-Power

◁▷

5. In-Power: **W

◁▷

6. Total-Energy:

◁▷

7.TP:Normal **C

◁▷

8.ErrCode：

System Information — Menu

Main Menu
◁▷

1. System Info

1. System Info

1. System Info
Low:**V   3/9

1. System Info

1. System Info

1. System Info

1. System Info

1. System Info

Wind Information

Main Menu

2. Wind Info

2. Wind Info

2. Wind Info

2. Wind Info

2. Wind Info

2. Wind Info

2. Wind Info

2. Wind Info

Solar Information

Main Menu

3. Solar Info

Phaesun

3.3 Parameters Browsing

3.3.1 Battery

```
1. ▯：**%        Low

    V：**V      I：**A
```

**%— Percentage of battery power

Right corner have below displays:

Low—Battery over-discharge protecting   **Normal**—Battery is normal

Full—Battery over-charge protecting;   **Float**—Floating

Ft：**s —Countdown of exiting float（countdown start from 30s）

V—Battery voltage

3.3.2 Solar

```
2.   Solar ：

     V：**V       I：**A
```

V—Solar voltage

I—Solar charging current

3.3.3 Wind

```
3.   Wind：   **R/min

     V：**V       I：**A
```

**R/min— rotating speed of wind generator. （Normal working state is this display）

Other displays:

W1：Brake—wind generator is manually braked

W2：**S—when battery voltage is greater than "Full", generator is braking. Exit braking "Time" countdown.

W3：**S—when rotate speed of wind generator is greater than "Rota", generator is braking. Exit braking "Time" countdown.

W4：**S—when wind generator voltage is greater than "Vmax", generator is braking. Exit braking "Time" countdown.

☞ **W5：**S**—when wind generator current is greater than "Amax", generator is braking. Exit braking "Time" countdown.

W*：Stay—Exit braking "Time" countdown finish, wind generator still stay brake.

"**Full**" could be set in 5/9 of 3.4.

"**Rota**" could be set in 2/9 of 3.5.

"**Vmax**" could be set in 6/9 of 3.5.

V—wind output voltage

I—wind charging current

```
4.  Wind-Power

    P：**W      I：**A
```

V—wind output power

I—wind output current

3.3.4 Input

```
5.  In-Power：   **W

    S：**W     W：**W
```

In-Power—total input power

S—solar input power

W—wind input power

3.3.5 Total Generated Energy

```
6.Total-Energy：

        **W • h
```

Total-Energy—total generated energy

This value is cumulative. If want to start from 0, set in 2/9 of 3.4.

3.3.6 Temperature Protection

```
7. TP: Normal     **C

   TM:Normal      **C
```

TP—controller device working temperature

TL—MOS fet temperature

Normal：temperature is normal.   Error：temperature detection module is error.

OTP：over-temperature protection   **C：**Celsius degree

3.3.7 Error Code

```
8.ErrCode：

  B*   S*   W*   T*
```

B1—battery over-discharge

B2—battery over-charge

S1—solar input voltage is high

S2—solar charging module short-circuit fault

S3—solar charging module open-circuit fault

W1—wind generator is manually braked

W2—battery voltage is greater than "Full", wind generator brakes

W3—wind generator rotate speed is greater than "Rota", generator brakes

W4—wind generator voltage is higher than "Vmax", generator brakes

W5—wind generator current is greater than "Amax", generator brakes

W6—brake module short-circuit fault

W7—wind charging module short-circuit fault

W8—wind charging module open-circuit fault

W9—wind input voltage is high

T1—MOS fet detection module fault

T2—MOS fet over-temperature protection

T5—controller device detection module fault

T6—controller device over-temperature protection

* 0—normal state

3.3.8 USB （This is optional function, if not purchase, there is no the following display）

```
A1.          ****-**-**

USB**        **:**:**
```

****-**-**—Year-Month-Day。 Values could be set in 3.7

USB**—USB state

USB interface has the following states:

USBOK—USB well connected

USBNC—USB not connected

USBdErr—USB conversion module damaged or not connected

USBFULL—USB stick is full

::**—Hour**:** Minute**:** Second. Values could be set in 3.7

RS485 （This is optional function, if not purchase, there is no the following display）

```
A2. Device-Addr:

                  1
```

Device-Addr— Device address, for Modbus communication

3.3.9 Anemometer （This is optional function, if not purchase, there is no the following display）

```
A3. Wind-Speed:

        ***m/s
```

Wind-Speed—Wind speed

3.4 System Information

```
     Main Menu
◄  1.   System Info  ►
```

System Info—system information

```
1. System Info

◄  Batt：  **Ah    1/9  ►
```
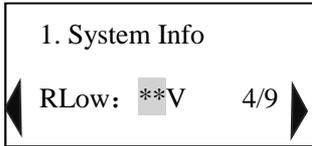
Batt—battery capacity

```
1. System Info

◄  Energy：  ADD   2/9  ►
```
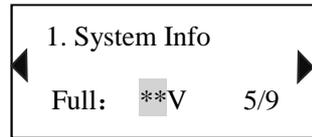
Energy— ADD：Energy cumulates

　　　　　CLEAR：Energy clears to 0

```
1. System Info

◄  Low：  **V    3/9  ►
```
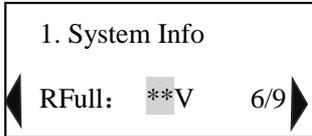
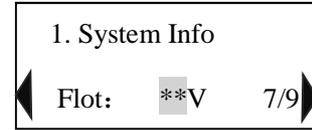**Low**—battery over-discharge limit voltage

```
┌─────────────────────────┐
│  1. System Info         │
│ ◀ RLow：**V      4/9 ▶  │
└─────────────────────────┘
```

RLow—battery over-discharge limit recovery voltage

```
┌─────────────────────────┐
│  1. System Info         │
│ ◀ Full：  **V     5/9 ▶ │
└─────────────────────────┘
```

Full—battery over-charge limit voltage

```
┌─────────────────────────┐
│  1. System Info         │
│ ◀ RFull：  **V    6/9 ▶ │
└─────────────────────────┘
```

RFull—battery over-charge limit recovery voltage

```
┌─────────────────────────┐
│  1. System Info         │
│ ◀ Flot：   **V    7/9 ▶ │
└─────────────────────────┘
```

Flot—floating voltage

```
┌─────────────────────────┐
│  1. System Info         │
│ ◀ Out：   **V     8/9 ▶ │
└─────────────────────────┘
```
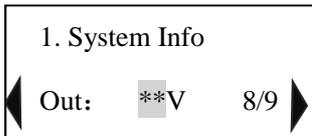
Out—over load limit voltage

This controller has no output.

```
┌─────────────────────────┐
│  1. System Info         │
│ ◀ ROut：   **V    9/9 ▶ │
└─────────────────────────┘
```
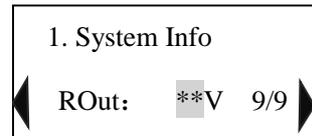
ROut—over-load limit recovery voltage

This controller has no output.

3.5 Wind Information
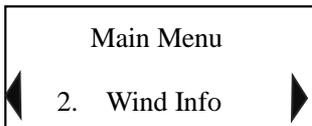
```
┌─────────────────────────┐
│     Main Menu           │
│ ◀   2.   Wind Info    ▶ │
└─────────────────────────┘
```
Wind Info—wind information
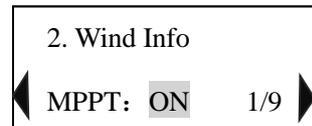
```
┌─────────────────────────┐
│  2. Wind Info           │
│ ◀ MPPT： ON      1/9 ▶  │
└─────────────────────────┘
```
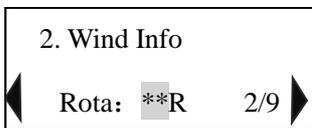**MPPT**—wind MPPT function switch.

ON: turn on   OFF: turn off

If do not purchase the function of Boost/Buck/Boost & Buck, it would display "NONE".

```
┌─────────────────────────┐
│  2. Wind Info           │
│ ◀  Rota： **R     2/9 ▶ │
└─────────────────────────┘
```
Rota—maximum rotate speed of wind generator.

```
┌─────────────────────────┐
│  2. Wind Info           │
│ ◀ Pole：    **D   3/9 ▶ │
└─────────────────────────┘
```
Pole—wind generator pole logarithm

```
┌─────────────────────────┐
│  2. Wind Info           │
│ ◀ Brake： ON      4/9 ▶ │
└─────────────────────────┘
```
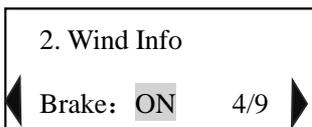
Brake—manual braking switch

ON: turn on   OFF: turn off

```
┌─────────────────────────┐
│  2. Wind Info           │
│ ◀ M-SW： ON       5/9 ▶ │
└─────────────────────────┘
```

M-SW—wind charging manual switch

ON: turn on   OFF: turn off

```
┌─────────────────────────┐
│   2. Wind Info          │
│                         │
│◀  Vmax：**V    6/9  ▶  │
└─────────────────────────┘
```
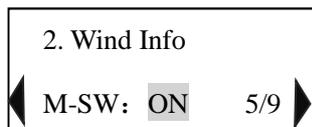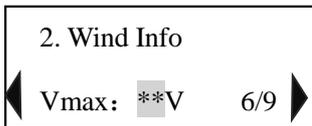
Vmax—Maximum voltage of wind generator

```
┌─────────────────────────┐
│   2. Wind Info          │
│                         │
│◀  Time：**min   8/9  ▶ │
└─────────────────────────┘
```
Time—braking time

```
┌─────────────────────────┐
│   2. Wind Info          │
│                         │
│◀  Amax：**A    7/9  ▶  │
└─────────────────────────┘
```
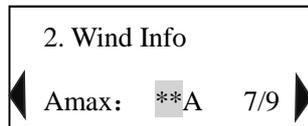
Amax—Maximum current of wind generator
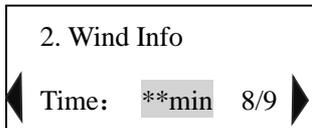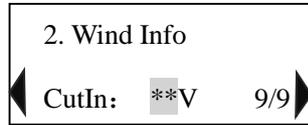
```
┌─────────────────────────┐
│   2. Wind Info          │
│                         │
│◀  CutIn：**V    9/9  ▶ │
└─────────────────────────┘
```
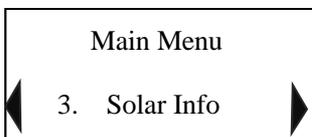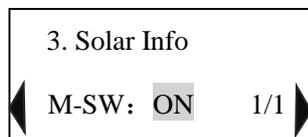**CutIn**—wind start charging voltage

If do not purchase the function of Boost or Boost & Buck, it would display "NONE"
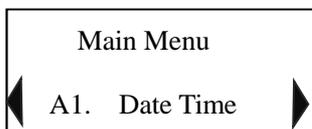
3.6 Solar Information

```
┌─────────────────────────┐
│    Main Menu            │
│                         │
│◀  3.  Solar Info    ▶  │
└─────────────────────────┘
```

Solar Info—solar information

```
┌─────────────────────────┐
│   3. Solar Info         │
│                         │
│◀  M-SW：ON     1/1  ▶  │
└─────────────────────────┘
```
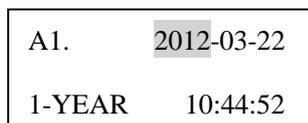
M-SW—wind charging manual switch

ON: turn on   OFF: turn off

3.7 Date and Time Setting（If don't purchase the USB function, there is no the following display）
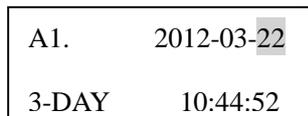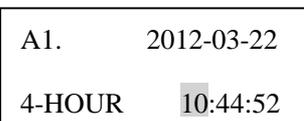
```
┌─────────────────────────┐
│    Main Menu            │
│                         │
│◀  A1.  Date Time    ▶  │
└─────────────────────────┘
```
Date Time—date and time
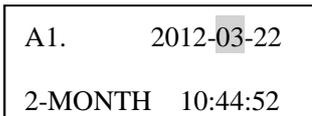
```
┌─────────────────────────┐
│   A1.     2012-03-22    │
│                         │
│   2-MONTH   10:44:52    │
└─────────────────────────┘
```
2-MONTH—"month" setting

```
┌─────────────────────────┐
│   A1.     2012-03-22    │
│                         │
│   4-HOUR    10:44:52    │
└─────────────────────────┘
```
4-HOUR—"hour" setting

```
┌─────────────────────────┐
│   A1.     2012-03-22    │
│                         │
│   6-SEC     10:44:52    │
└─────────────────────────┘
```
6-SEC—"second" setting

```
┌─────────────────────────┐
│   A1.     2012-03-22    │
│                         │
│   1-YEAR    10:44:52    │
└─────────────────────────┘
```
1-YEAR—"year" setting

```
┌─────────────────────────┐
│   A1.     2012-03-22    │
│                         │
│   3-DAY     10:44:52    │
└─────────────────────────┘
```
3-DAY—"day" setting
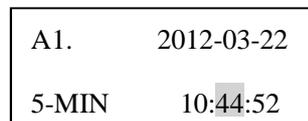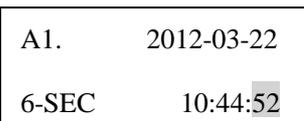
```
┌─────────────────────────┐
│   A1.     2012-03-22    │
│                         │
│   5-MIN     10:44:52    │
└─────────────────────────┘
```
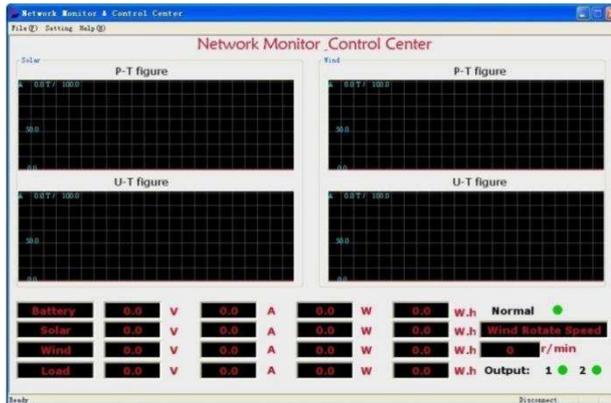**5-MIN**—"minute" setting

4 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 the software from sellers.

- Browsing interface on PC:

- Contents 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.

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

5 Warranty

The product is warranted for one year 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

Parameters

Wind Solar Hybrid Controller (Boost & Buck)

Model	Hybrid Charge Controller All Round 3000_48 Boost
Rated wind power	3KW
Rated solar power	900W
External dump load device	NO
Nominal system voltage	48V
Battery over-discharge limit voltage(Low)	40.8V(adjustable)
Battery over-discharge limit recovery voltage(Rlow)	46.5V(adjustable)
Battery over-charge limit voltage(Full)	58.8V(adjustable)
Battery over-charge limit recovery voltage(RFull)	52.8V(adjustable)
Float voltage(Flot)	54.0V(adjustable)
Wind dumpload rotate speed(Rota)	800R(adjustable)
Wind pole logarithm(Pole)	4D(adjustable)
Wind charging range	DC (20-100)V
Wind start charging Rota(CutIn)	300R(adjustable)
Wind dumpload voltage(Vmax)	100V(adjustable)
Dump load control mode	Over rotate speed limiting, Over voltage limiting, Over Current limiting, PWM
Wind charging mode	MPPT(Boost & Buck) & PWM
Solar charging mode	PWM
Display mode	LCD
Display content	**Battery**: voltage;charging current; Percentage of battery power. **Wind**: voltage; charging current; rotate speed; output current; output power **Solar**: voltage; charging current. **System**: state; generated energy; error code
Operating temperature & Relative humidity	−20~＋55℃/35~85%RH(Non-condensing)
Quiescent power drain	≤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 size	450mm*423mm*174.43mm
Package size	510mm*250mm*545mm
Net weight	15.5Kg
Gross weight	17.0Kg
Optional function	□　RS232 □　RS485 □　USB □　Anemometer function