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***Wind/Solar Hybrid Controller***  
***(Boost/Buck)***  
***User Manual***




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# 1 Safety Instructions


Thank you for purchasing our product(s). It is important that you read this entire user manual thoroughly prior to installation to assure proper performance and safety. Please keep the manual in a safe place.


 Please inspect the controller thoroughly after it is delivered. If any damage is seen, please notify the shipping company or our company immediately. A photo of the damage may be helpful.


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


 Only experienced technicians can work on this equipment. In order to ensure the equipment work normally, the installation should be strictly in accordance with this user manual.◦


 It is important to have air freely circulating around the controller. Please avoid mounting the controller in a dusty, humid area.

 Keep the controller away from rain, insolation, severe dust, vibrations, corrosive gas and intense electromagnetic interference.

 Flammable, explosive materials placed around the controller is strictly prohibited.

 Keep children away from the equipment.

 Do not use the controller without batteries.

 Do not maintain the equipment personally.

# 2 Product Introduction

## 2.1 General Description

This wind/solar hybrid controller is specially designed for off-grid wind/solar generation system. The equipment could control the wind generator and solar cells charging to battery safely and efficiently.

## 2.2 Functions & Features

### 2.2.1 Wind Generator Boost and Buck Intelligently

- When wind voltage is lower than battery voltage, the controller will start boost module automatically, make wind voltage rise to charge voltage.
- When wind voltage is higher than battery voltage, the controller will start buck module for getting the max power.

### 2.2.2 Wind Turbine Max Current Tracking (MCT) & Max Power Point Tracking (MPPT)

- When it is breeze, load drops wind turbine rotate speed, output power from wind turbine lowers. By MCT and MPPT, keep wind turbine output on the max balance point of wind power utilization. Combine with boost-buck circuit, improve the utilization coefficient for wind energy.

### 2.2.3 Adaptive Impedance Matching of Wind Turbine & Load

- Wind generators, batteries and load all have internal resistance. According to impedance matching principle, only when input impedance equals to output impedance, power utilization would be maximal. The energy utilization will be improved to the utmost extent by adaptive impedance matching of controller.

### 2.2.4 Control mode of Wind Turbine Open Circuit & Dump-loading; Over Rotate Speed limiting, Over Voltage & Over Current limiting

- Traditional wind/solar hybrid controller: When total current of wind & solar is greater than limiting current, battery power is large, the excess energy will be dumped by PWM. Wind turbine rotate speed lowers, and the excess energy is consumed in MOSFET and wind turbine. This causes wind turbine heat, shortens generator and controller's working life.
- This professional wind/solar hybrid controller: When total current of wind & solar is greater than limiting current, battery power is large, PWM duty cycle of charging circuit is decreasing until charging is finished. When charging finished, current circuit disconnected, wind generator has no load. In order to prevent wind generator from a very quick rotate speed, this professional controller provide the function of over rotate speed limiting and over voltage limiting. Once the rotate speed or voltage exceed what you set on the controller, the controller will start PWM smart dump-loading automatically. Prevent wind turbine from working in unloading state for long time. This is good for both wind turbine and controller.

### **2.2.5 Battery Maximum Charging Current Smart Limiting**

- Traditional wind/solar hybrid controller: Different wind/solar hybrid systems need different capacity batteries; different capacity batteries have different max currents. Traditional wind/solar controllers have no settings for batteries max charging currents, or have wrong settings. Leads over current, shortens batteries using life.
- This professional wind/solar hybrid controller: Users can set the capacity of battery. This professional controller can calculate the max charging current intelligently according to users' settings. Protect batteries.

### **2.2.6 Wind/Solar Charge to Battery Independently; Complement Intelligently**

- Traditional wind/solar hybrid controller: Wind/solar charge to battery by rectifying two currents to one. PV takes short circuit protection as wind take dump-loading. Working in short circuit state for long time, PV cells will burn out easily.
- This professional wind/solar hybrid controller: Wind/solar charge to battery independently, complement intelligently. When charging finishes, PV cells take open circuit protection, wind generator takes open circuit, over voltage, over rotate and over current protections.

### **2.2.7 Manual Brake**

### **2.2.8 Using or Not Using Wind to Charge to Battery Could be Set Manually**

- User can choose whether use wind to charge to battery. Set wind "M-SW: ON", wind charging is normal; Set wind "M-SW: OFF", wind charging is prohibited. Before connecting to wind turbine, users could first set wind "M-SW: OFF" manually to prevent sparks.

### **2.2.9 Using or Not Using Solar to Charge to Battery Could be Set Manually**

- User can choose whether use solar to charge to battery. Set solar "M-SW: ON", solar charging is normal; Set solar "M-SW: OFF", solar charging is prohibited. Before connecting to PV panels, users could first set solar "M-SW: OFF" manually to prevent sparks.

### **2.2.10 RS232/RS485 Real-time Communication**

- Through serial communication, computer could monitor the whole system and analyze the data.

### **2.2.11 Procedure Could be Upgraded by RS232**

- Some customization functions could be altered through upgrade procedure by serial ports.

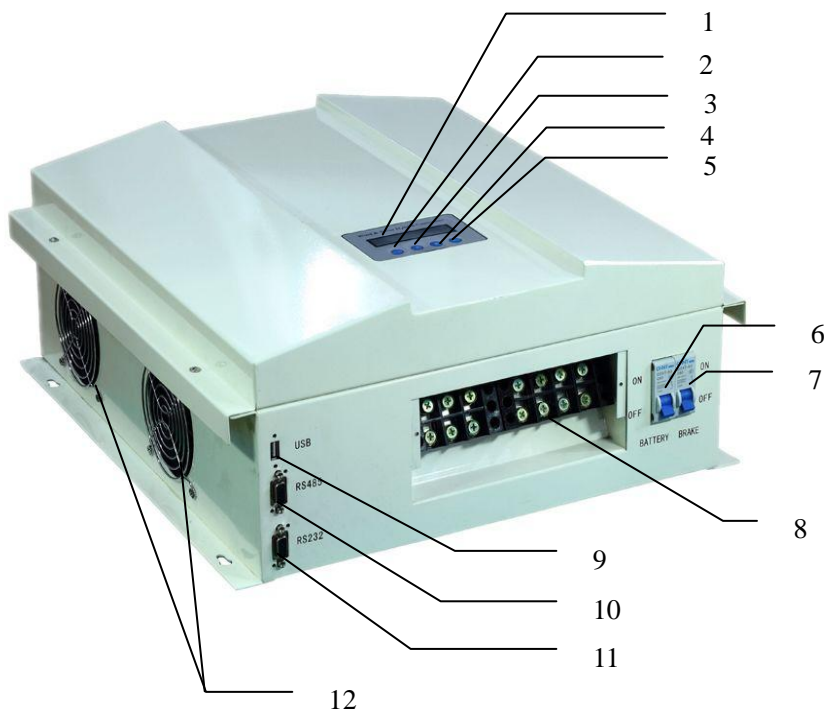
### **2.2.12 PC and Controller Both Could Set Parameters**





### **2.2.13 LCD Display Multi-level Menu; Intelligent Button Settings**

- The controller with LCD screen supports multi-level menu viewing. Users could set lot parameters through buttons. What more is there go with touch-tone when you press the buttons. All designs of this controller are humanized.

## 2.3 Design & Dimensions

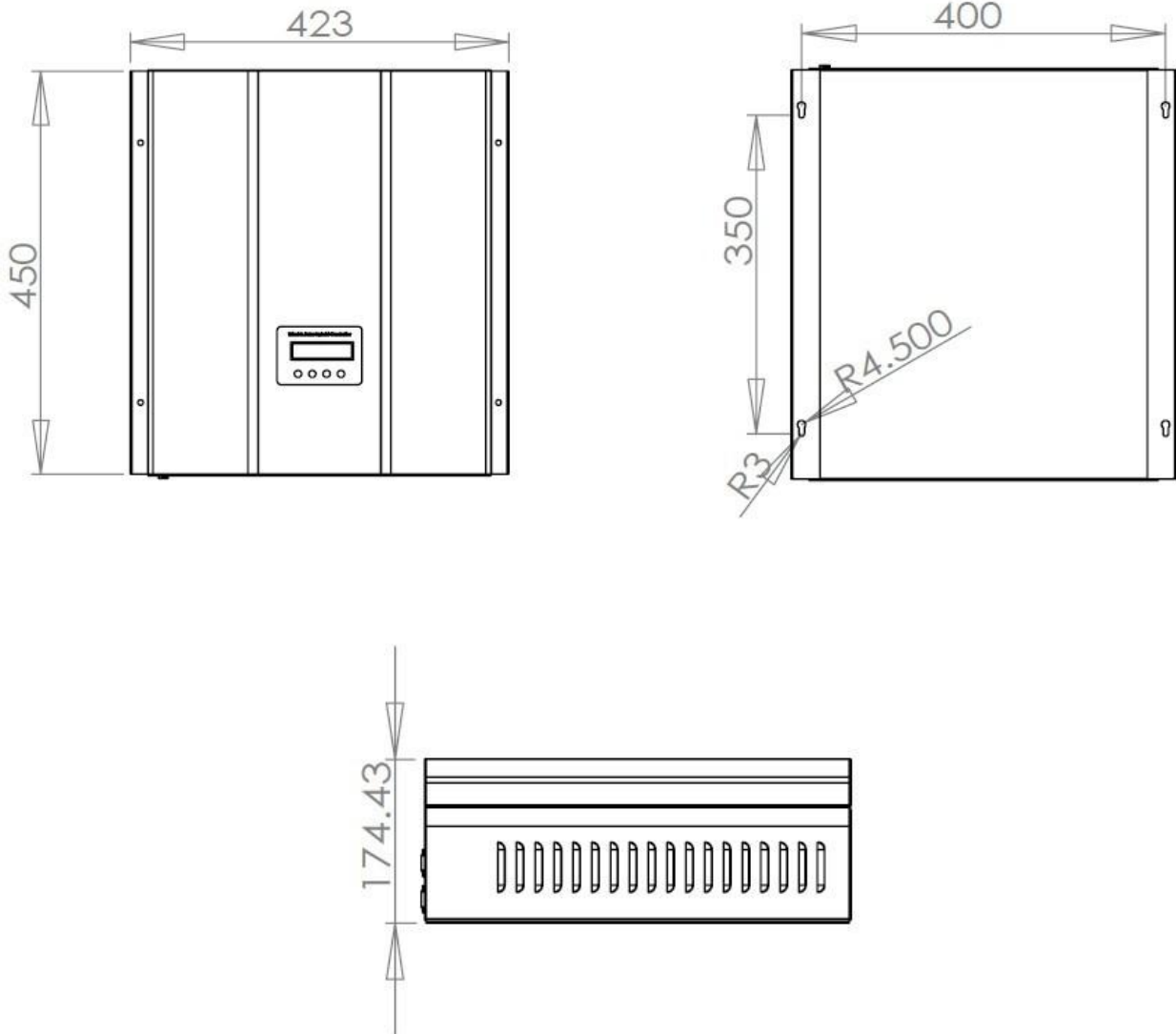
### 2.3.1 Design



No.	1	2	3	4	5	6
Name	LCD Screen					Battery Switch

No.	7	8	9	10	11	12
Name	Brake Switch	Terminal Blocks	USB (optional)	RS485 (optional)	RS232 (optional)	Fans

### 2.3.2 Dimension



# 3 Installation and Electrical Connection

## 3.1 Installation

### 3.1.1 Warning

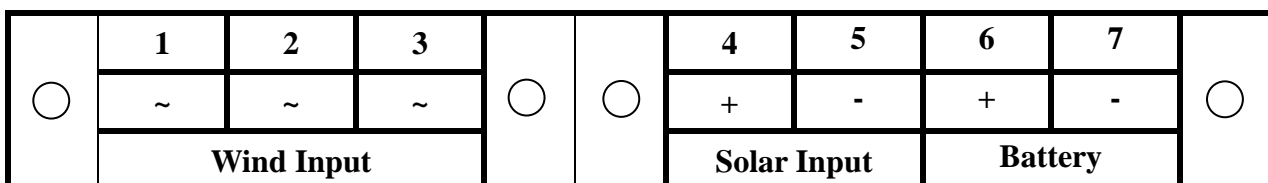
- Please read this chapter carefully before installation to make sure the whole process is safe.
- It is important to choose where to install the controller. Keep the controller away from rain, insolation. Put the controller in a dry, ventilated place.
- Metal materials placed around the controller are prohibited. If not may cause battery short circuit.
- There should be enough space around the controller for cooling.
- This controller could only charge to the lead-acid batteries which are in the control range of this controller.
- Not fully connection and corrosive wire will produce lot of heat. Then wire insulation layer may be melted, lead surrounding material combustion, even fire. So please ensure every connection is secure, to avoid connector loose when moving.

### 3.1.2 Installation Steps

- |                         |   |
|-------------------------|---|
| Step 1: Select location | Do not install the controller in a place where insolate, high temperature and rainy. Please keep enough free air around the controller. |
| Step 2: Inspect         | Put the controller on the place where it will be installed. Inspect if there is enough space for connections.                           |
| Step 3: Mark            | Mark with 4 dots on install surface through controller's 4 open holes.  |
| Step 4: Drill holes     | Drill 4 holes in the 4 dots which were marked in step 3.  |
| Step 5: Fix controller  | Aim controller's 4 open holes toward the 4 holes which were drilled in step 4. Then fix controller with screw nails.                    |
| Step 6: Check           | Make sure the controller is firmly installed.   |

## 3.2 Electrical Connection

### 3.2.1 Terminal Connection









### 3.2.2 Connections Steps ( Please do the connections safely and strictly according to the steps below.)

- Step1: Before connecting, please put “**BATTERY**” Switch to “OFF”. Then, Connect battery to controller’s “**Battery**” terminals with cuprum cable which more than 6 mm<sup>2</sup> and less than 1m. Although there is reverse connection protection, but connecting battery reversely is forbidden! Connection is finished, put “**BATTERY**” Switch to “ON”
- Step2: To prevent producing sparks while connecting, you are supposed to set wind, solar “M-SW: OFF”.( Specific operations refer to **4.6 / 4.7** )
- Step3: Connect wind turbine to controller’s “**Wind Input**” terminals. Make sure positive to positive, negative to negative.
- Step4: Connect solar panels to controller’s “**Solar Input**” terminals. Make sure positive to positive, negative to negative.
- Step5: After connecting you can do what you do in step 2 to set the wind, solar and output “M-SW: ON”. Or you can do the operations on PC through RS232.

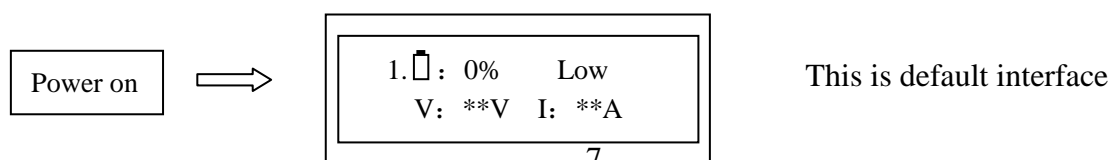
**When you finish the connection, pulling cables to make sure they are connected firmly.**

## 4 Menu Operation

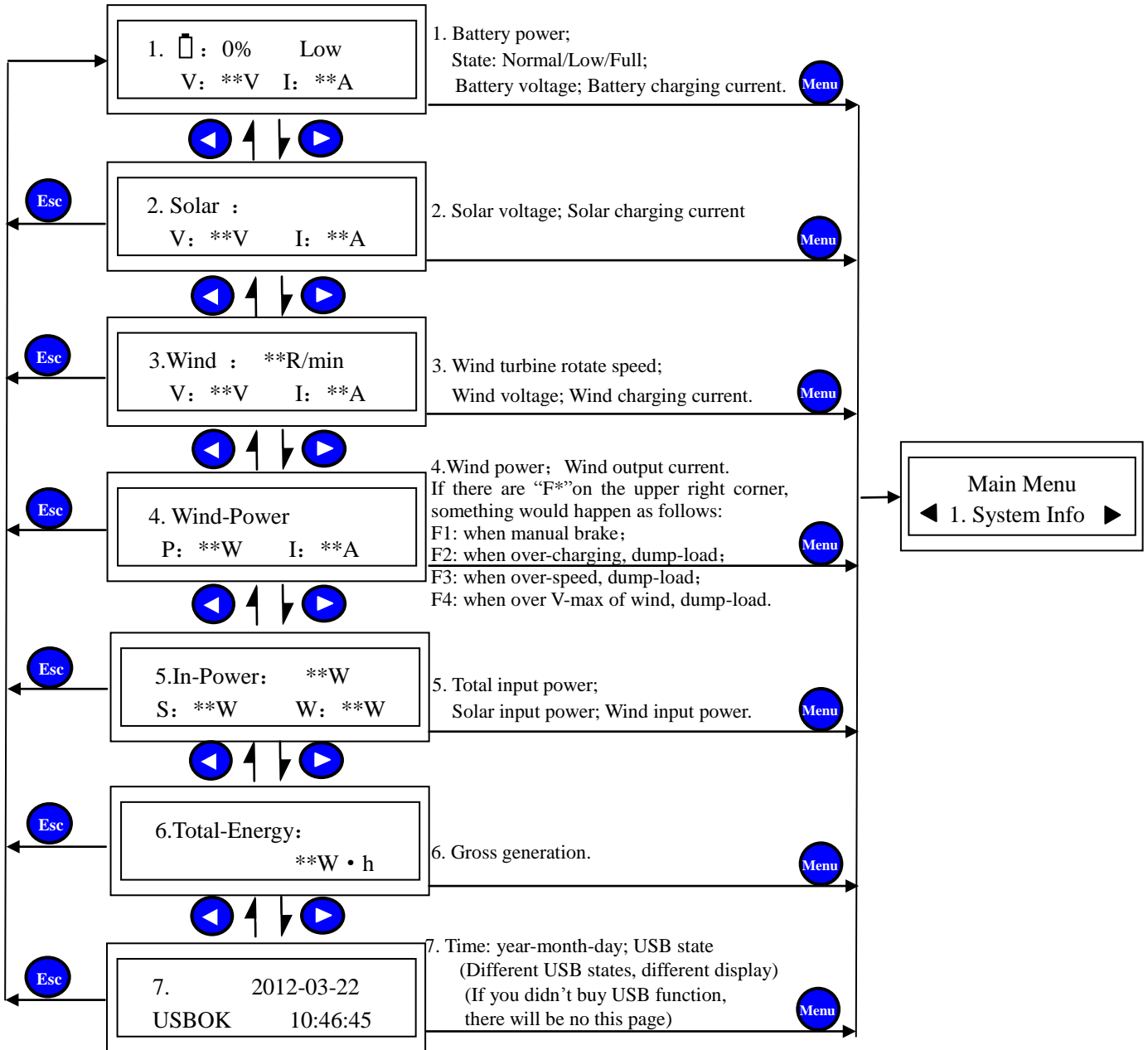
### 4.1 Buttons

Buttons	Description
	It is used to select menu item and confirm changes.
	It is used for left and right page turning in the screen or increase/decrease number.
	It is used for left and right page turning in the screen or increase/decrease number.
	It is used as return/finish function.

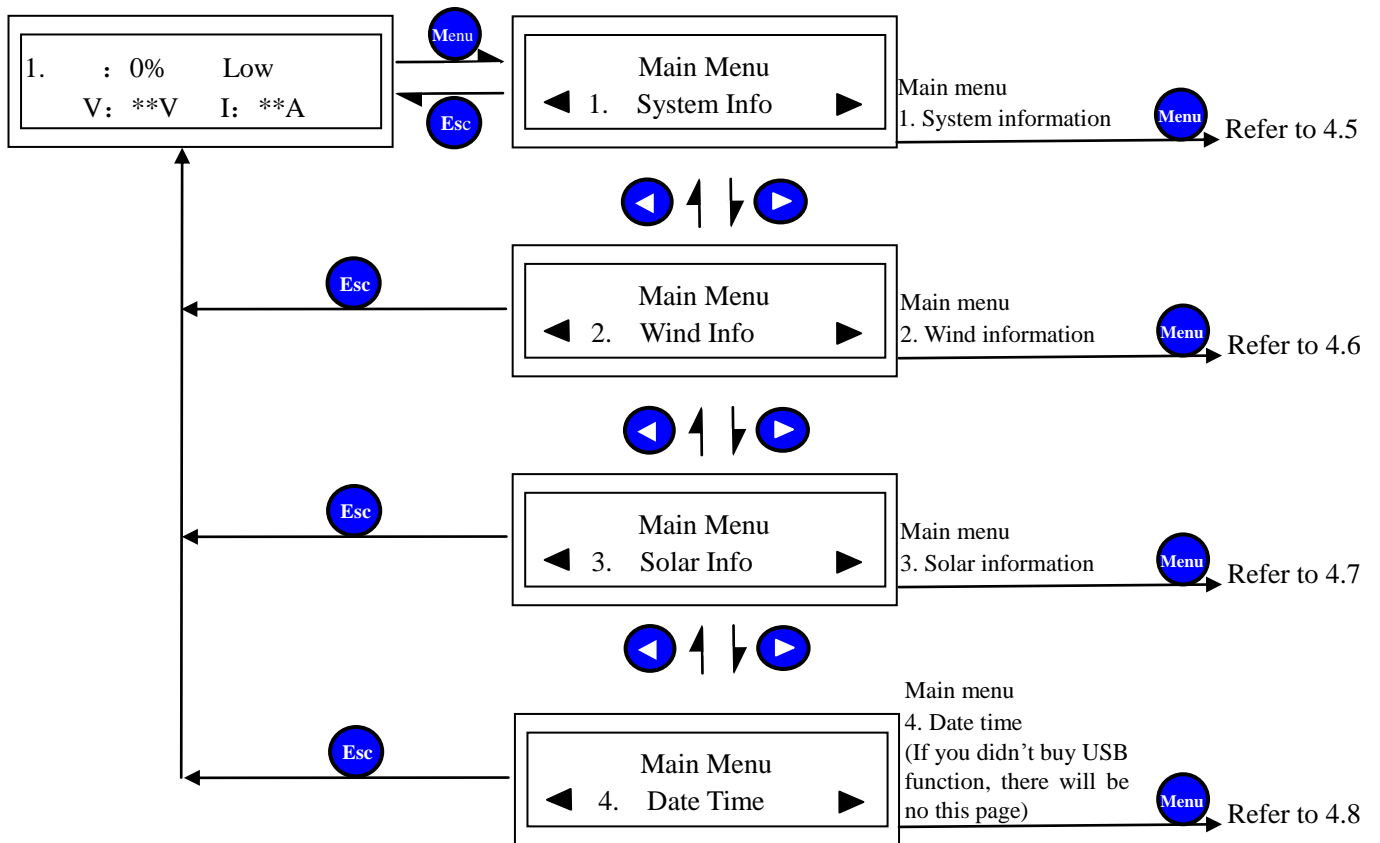
### 4.2 Display on LCD Screen——Default Interface



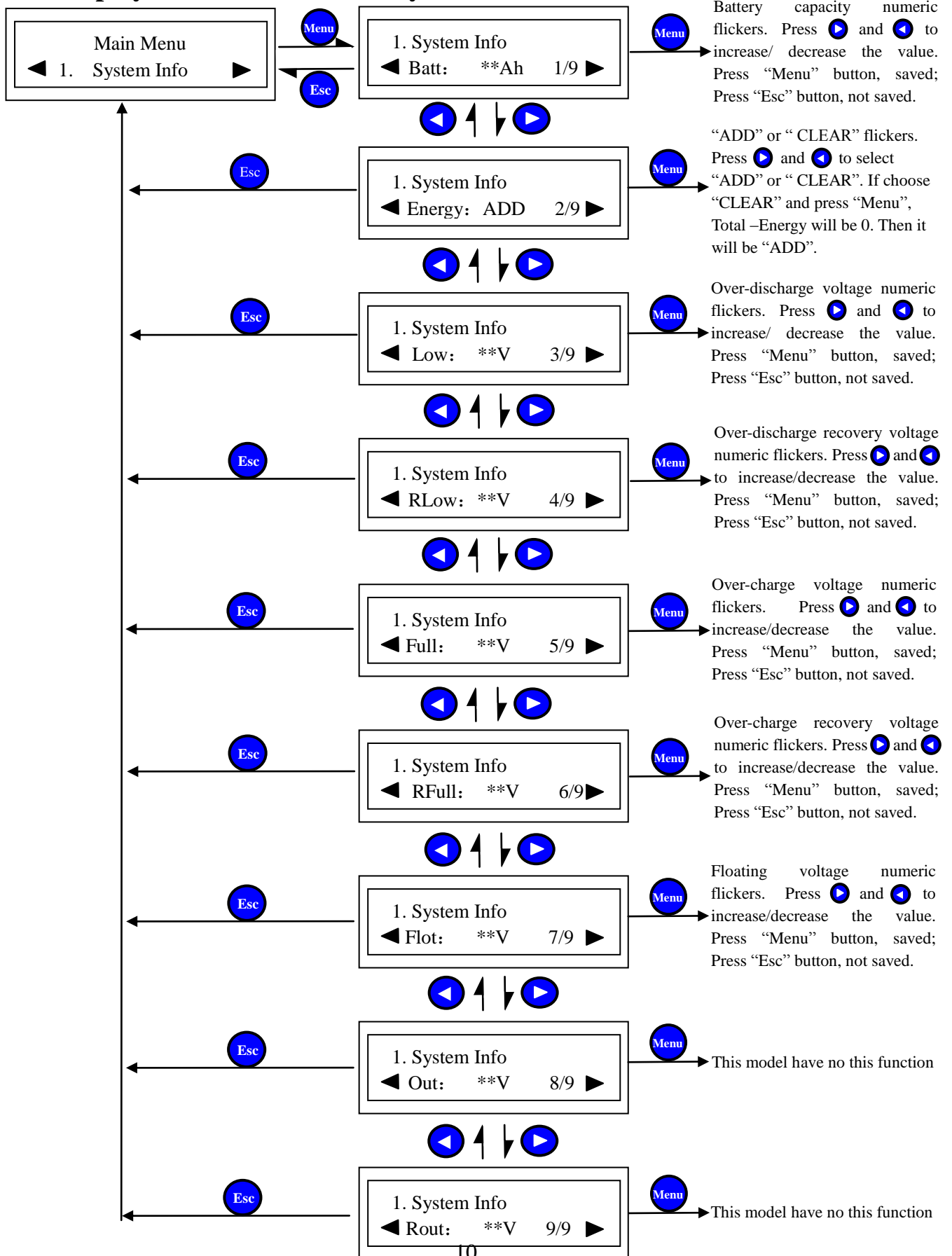
### 4.3 Display on LCD Screen——Browsing Parameter Interface



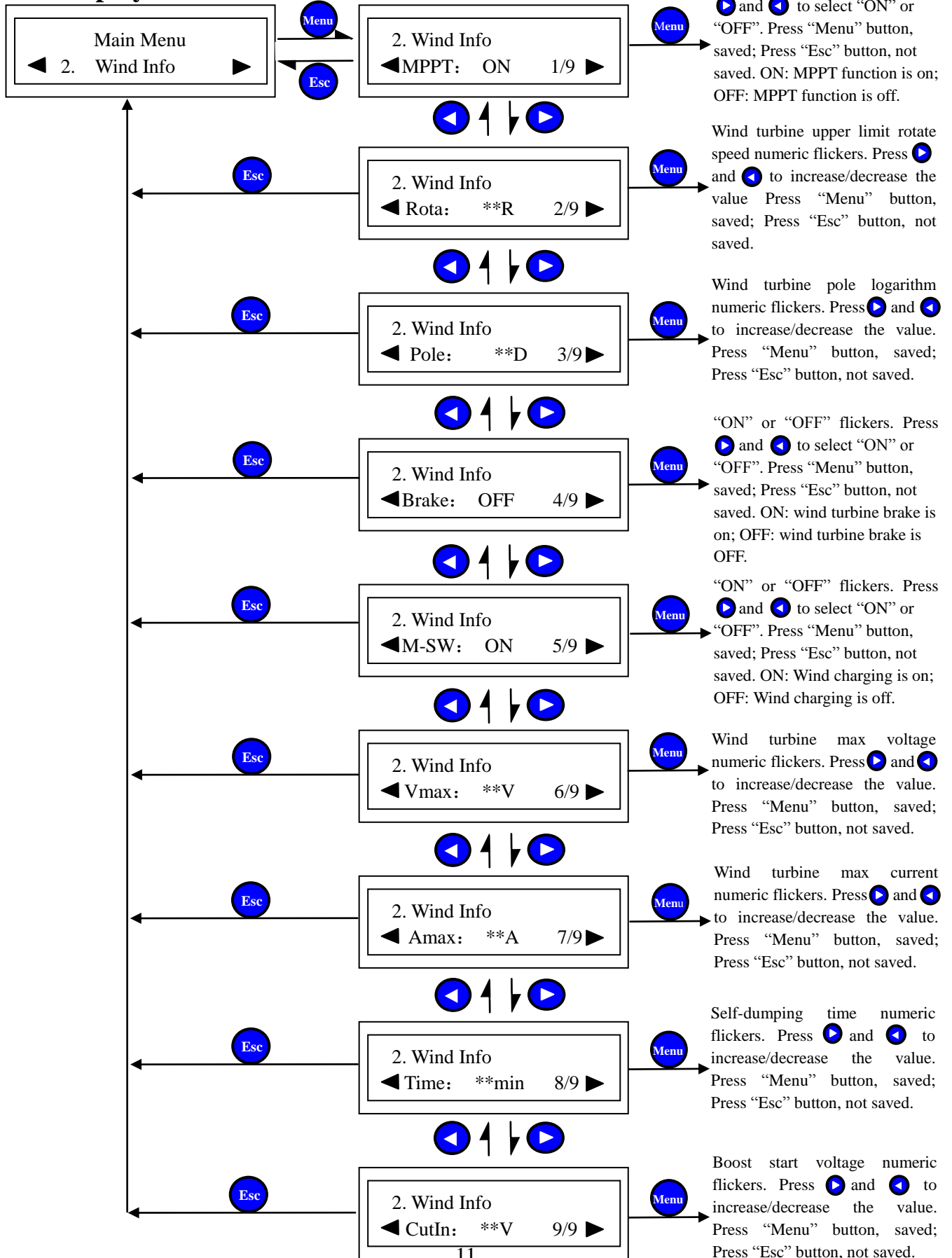
## 4.4 Display on LCD Screen——Main Menu Interface



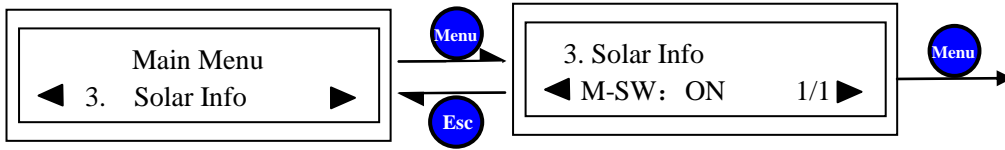
### 4.5 Display on LCD Screen — System Information



## 4.6 Display on LCD Screen—Wind Information



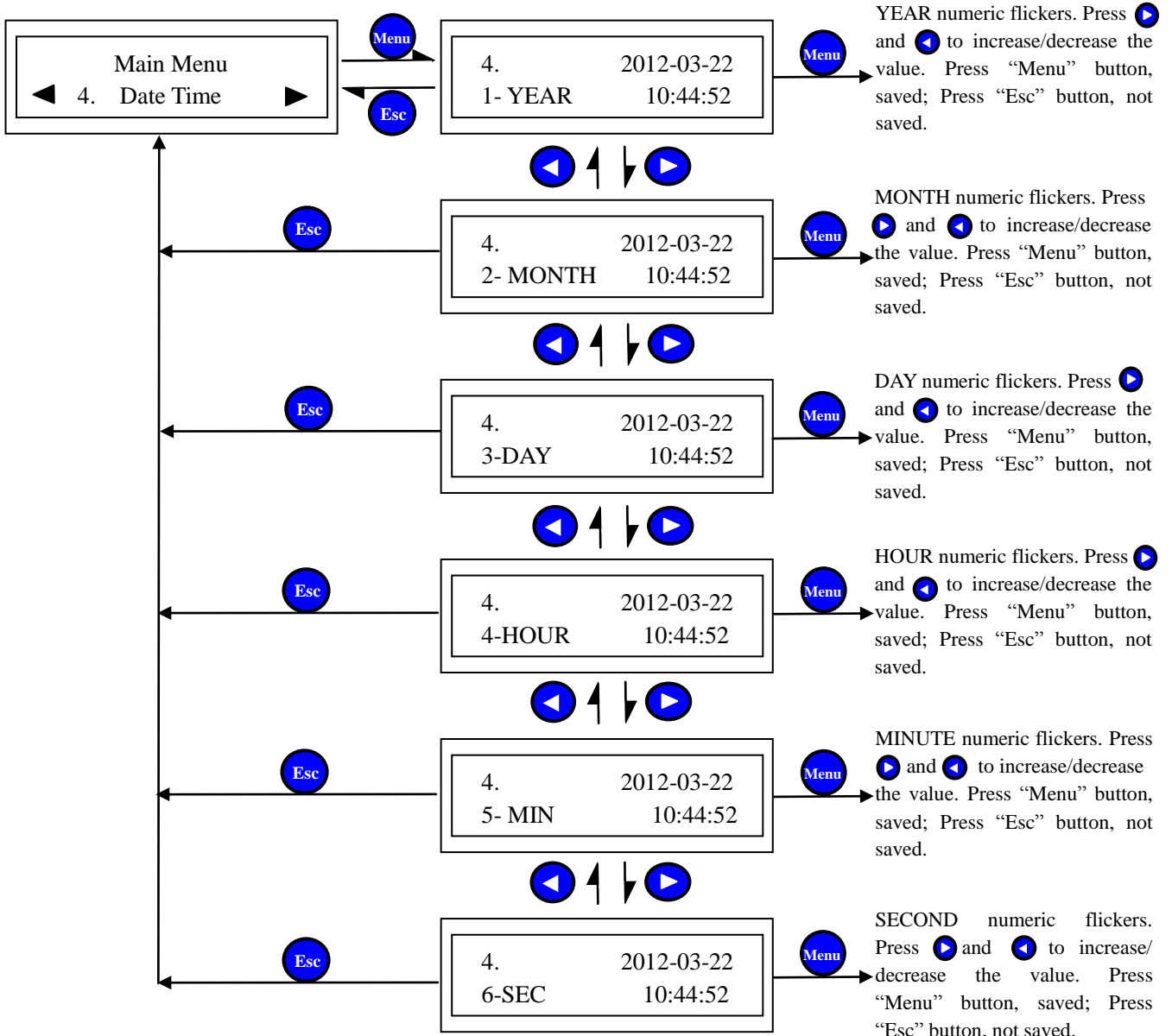
### 4.7 Display on LCD Screen——Solar Information



“ON” or “OFF” flickers. Press and to select “ON” or “OFF”. Press “Menu” button, saved; Press “Esc” button, not saved. ON: Solar charging is on; OFF: Solar charging is off.

### 4.8 Display on LCD Screen——Date Time

(If you do not buy USB function, following operations cannot be done.)



YEAR numeric flickers. Press and to increase/decrease the value. Press “Menu” button, saved; Press “Esc” button, not saved.

MONTH numeric flickers. Press and to increase/decrease the value. Press “Menu” button, saved; Press “Esc” button, not saved.

DAY numeric flickers. Press and to increase/decrease the value. Press “Menu” button, saved; Press “Esc” button, not saved.

HOUR numeric flickers. Press and to increase/decrease the value. Press “Menu” button, saved; Press “Esc” button, not saved.

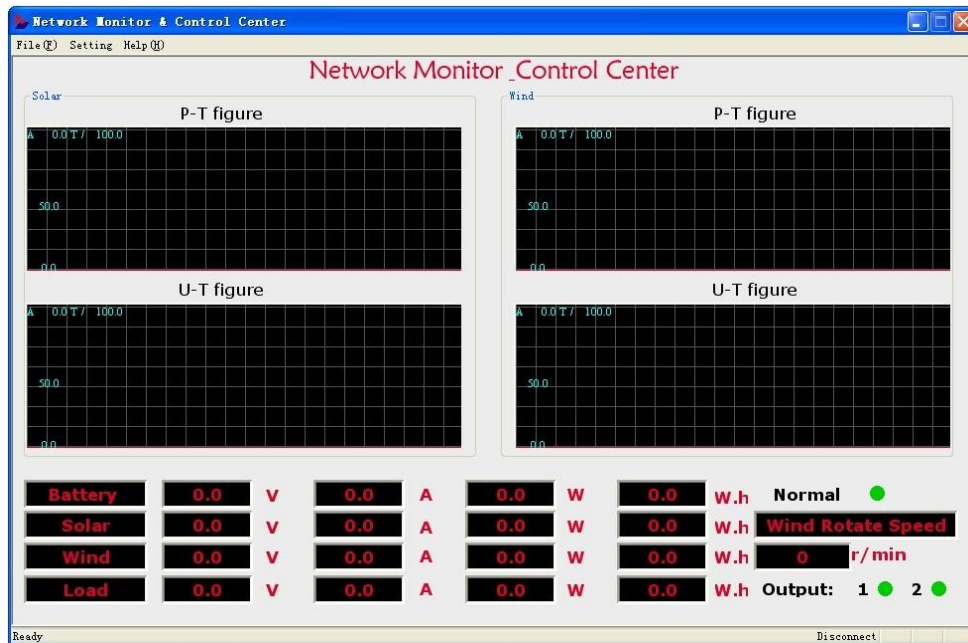
MINUTE numeric flickers. Press and to increase/decrease the value. Press “Menu” button, saved; Press “Esc” button, not saved.

SECOND numeric flickers. Press and to increase/decrease the value. Press “Menu” button, saved; Press “Esc” button, not saved.

## 5 PC Software

The software easy to operate need not to be installed. You can browse and set parameters on PC through the software.

- Browsing interface on PC



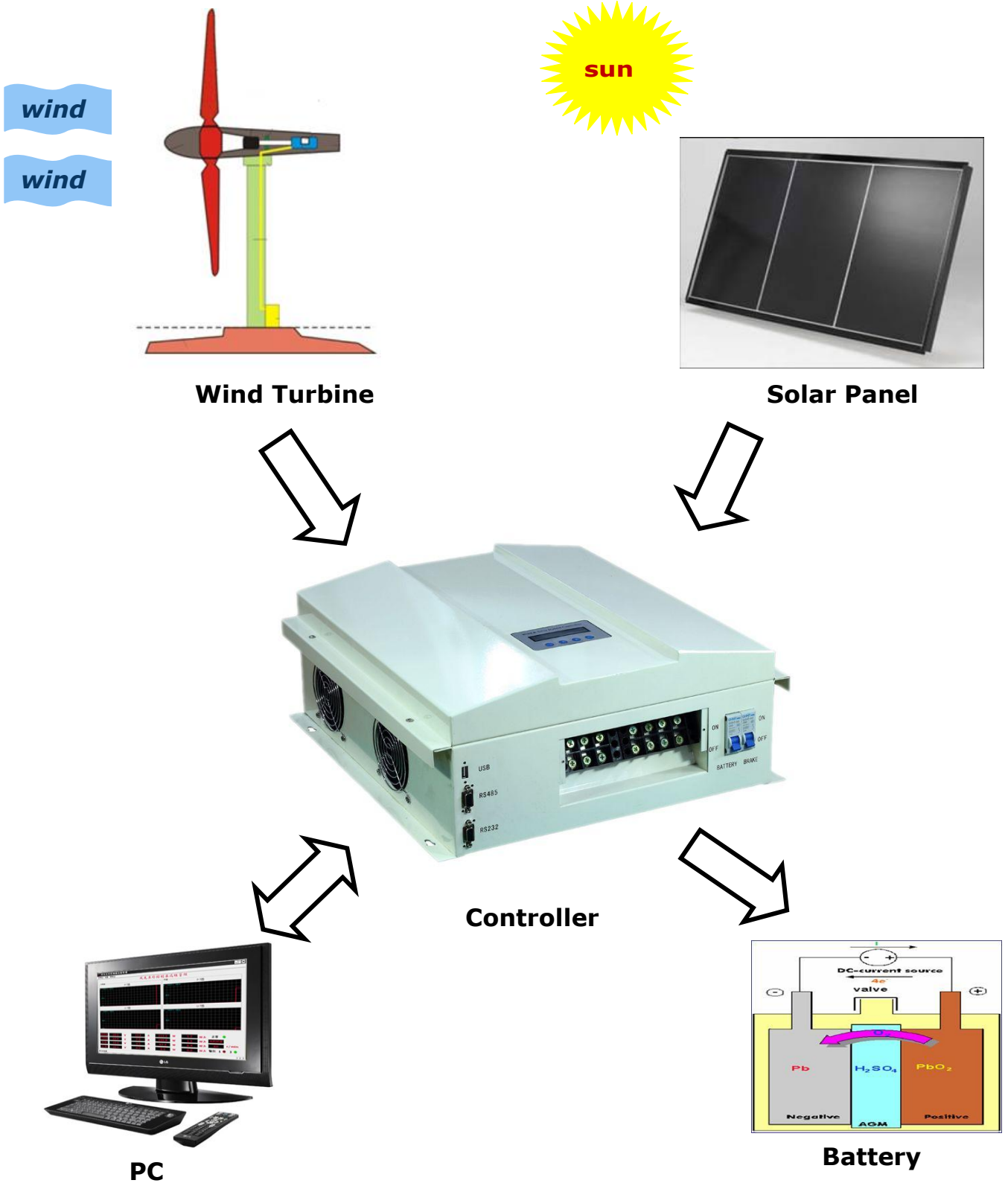
- Contents displayed on browsing interface
  - Battery: voltage; charging current; power; power obtained; generated energy obtained.
  - Solar: voltage; charging current; charging power; generated energy.
  - Wind turbine: voltage; charging current; charging power; generated energy.
  - Output load: voltage; current; power; output energy.
- Setting parameters on PC please refer to management software

## 6 Warranty & After-sales Service

- 1 year major parts and components warrantee for product purchased for international use, electrical components are sold as-is for international use.
- If it is guarantee period later, or device is damaged by transportation, misoperations, human element or force majeure, the product is not under warranty.
- 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.

# Appendix

## Wind/Solar Hybrid System





## Technical Data

Model	HY-C10-24BSLS	HY-C10-48BSLS	HY-C10-96BSLS
Rated Wind Turbine Power	1KW		
Max. Wind Input Power	1.5KW		
Rated Solar Power	300W		
Rated Battery Voltage	24V	48V	96V
Over-discharge Voltage	20.4V(adjustable)	40.8V(adjustable)	80.0V(adjustable)
Over-discharge Recovery Voltage	23.0V(adjustable)	46.5V(adjustable)	92.0V(adjustable)
Over-charge Voltage	28.8V(adjustable)	58.8V(adjustable)	115.0V(adjustable)
Over-charge Recovery Voltage	26.0V(adjustable)	56.0V(adjustable)	105.0V(adjustable)
Floating Voltage	27.0V(adjustable)	57.0V(adjustable)	110.0V(adjustable)
Dump-load start Voltage	100V(adjustable)	100V(adjustable)	200V(adjustable)
Dump-load start Rotate Speed	500RPM(adjustable)		
Wind start Charging Voltage	10V	15V	40V
Wind Turbine Charging Mode	MPPT and PWM		
Solar Charging Mode	PWM		
Controlling Dump-load Mode	Over rotate speed limiting, Over voltage limiting, Over Current limiting, PWM		
Display Mode	LCD		
Display content	Voltage of battery, solar and wind. Current of battery, solar and wind; Power of wind, solar and battery; System state, and so on.		
Operating Temperature & Relative Humidity	-20~+55°C/35~85%RH(Non-condensing)		
Quiescent Power Drain	≤3W		
Protection Type	Solar cells and battery anti-reverse connection; Battery over-charge, over-discharge, over-charge recovery, over-discharge recovery, etc.; Load over-charge and over-discharge; Wind turbine brake automatically and manually		
Package Size(L*W*H)	510mm*250mm*545mm		
Gross Weight	16.0Kg		
Communication Mode (optional)	RS232、RS485		
Storage (optional)	USB		