

3KW MPPT Wind Charge Controller

User Manual



Keep it safe after reading

- Please read it carefully and pay attention to safety matters before operation.
- Conserve the manual at hand, you can refer to it anytime you like.

QINGDAO GREEF NEW ENERGY EQUIPMENT CO.,LTD

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

Symbols

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



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



INDICATION: Indicates a procedure or function that is important.



NOTE: Indicates a specific description for content.

General Safety Information

- 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.

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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

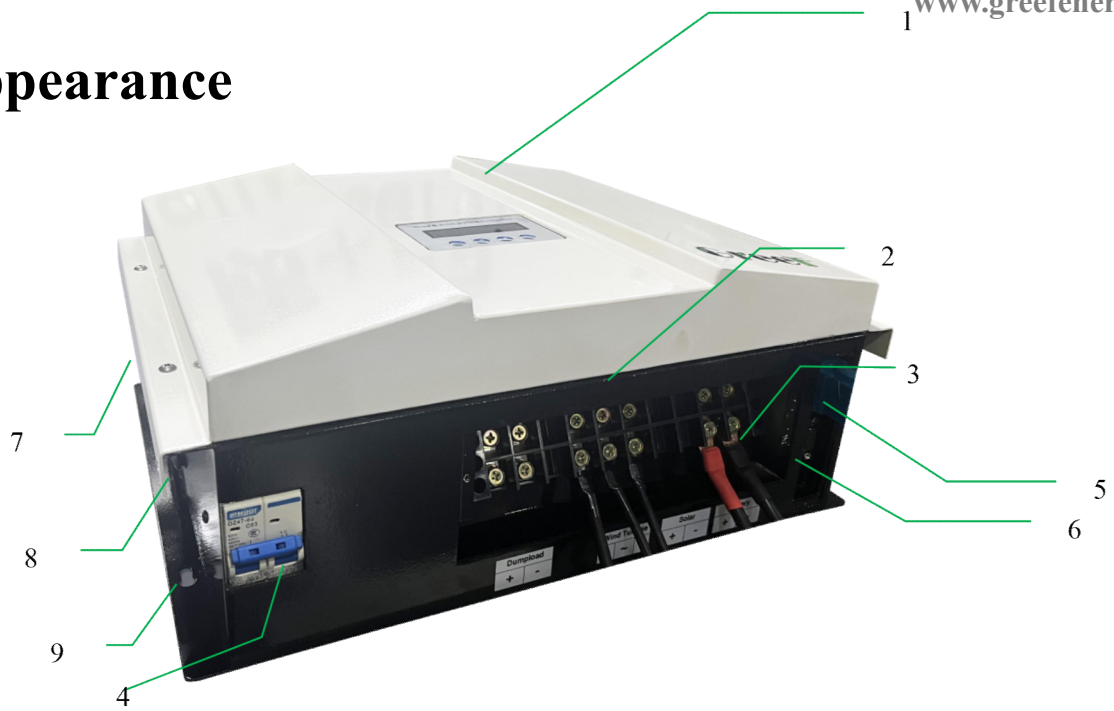


Figure1-1 Appearance description

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, battery
3	Battery	Connect battery
4	Brake switch	Turn on (ON) or turn off (OFF) wind braking
5	RS485 interface	Communication interface (If don't purchase, no this interface)
6	RS232 interface	Communication interface (If don't purchase, no this interface)
7	Resistance cooling fan	This fan rotates when wind generator braking ,cooling the resistances
8	System cooling fan	This fan rotates when charging current is too high, cooling the system
9	Mounting holes	Install controller



1.3 Dimensions

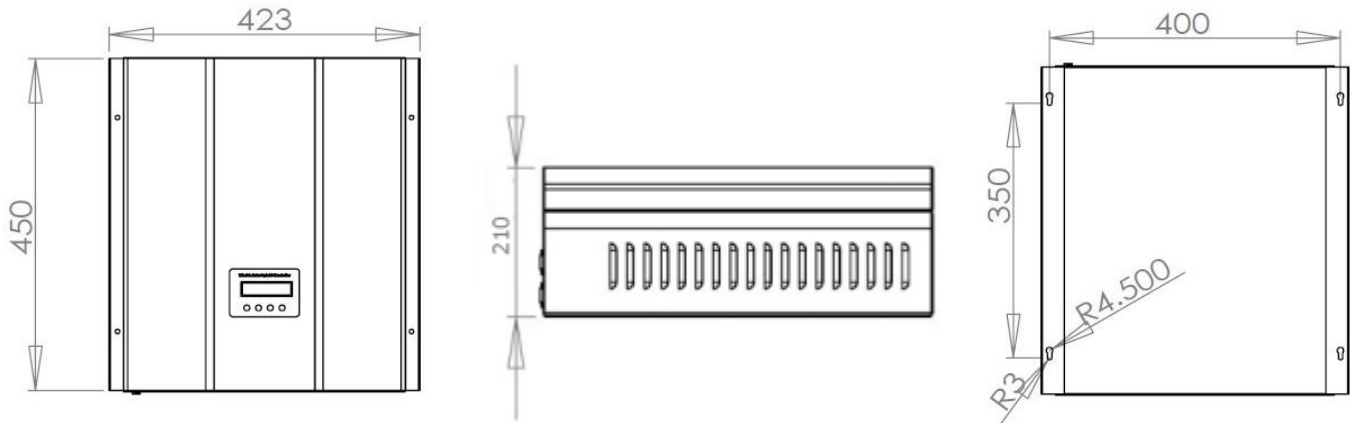


Figure1-2 Dimensions of controller

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

■ Solar and Wind SYSTEM

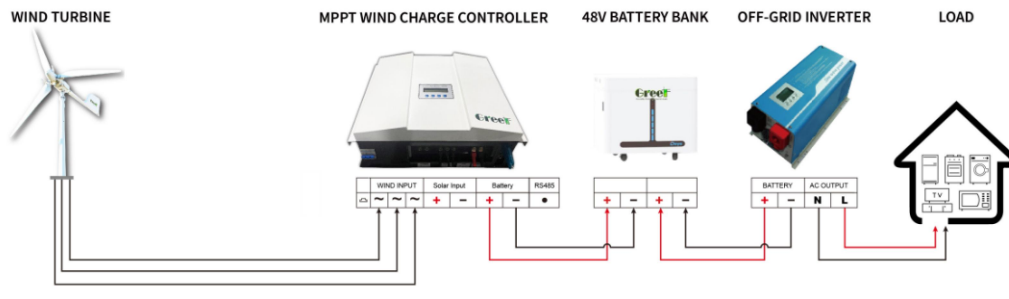


Figure2-1 Overview of electrical connection

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.

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

2.3.1 Battery Wiring

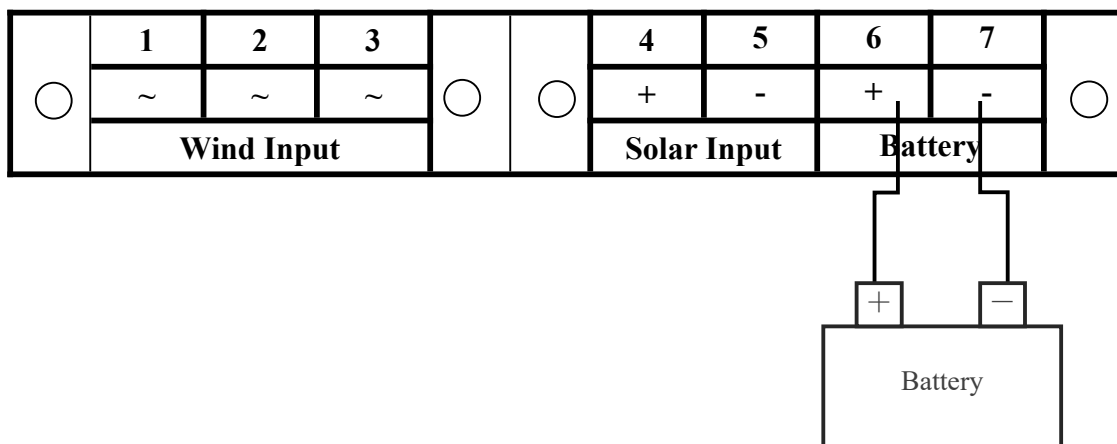


Figure2-2 Battery wiring

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 until 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..3.2 Solar Wiring

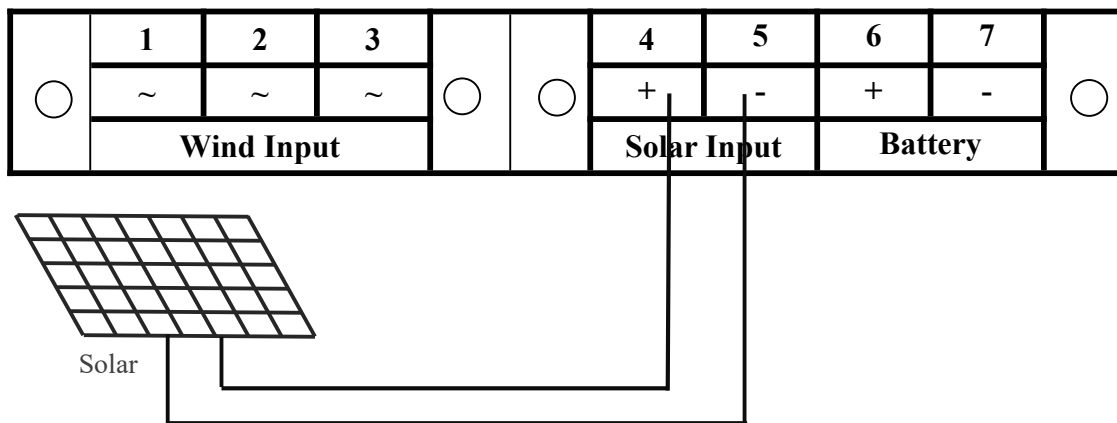


Figure2-3 Solar wiring

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..3.3 Wind Generator Wiring

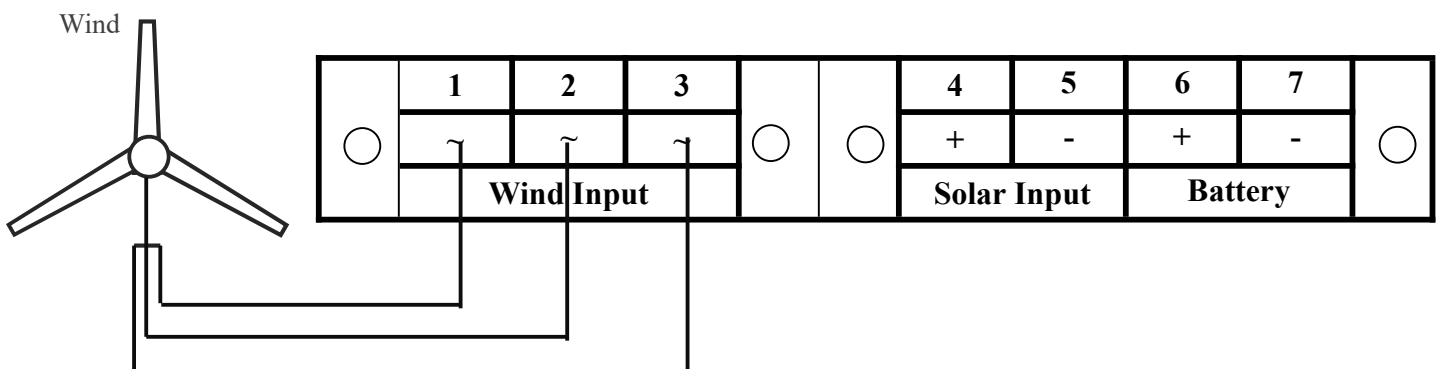




Figure2-4 Wind generator wiring

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.

2.3.4 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

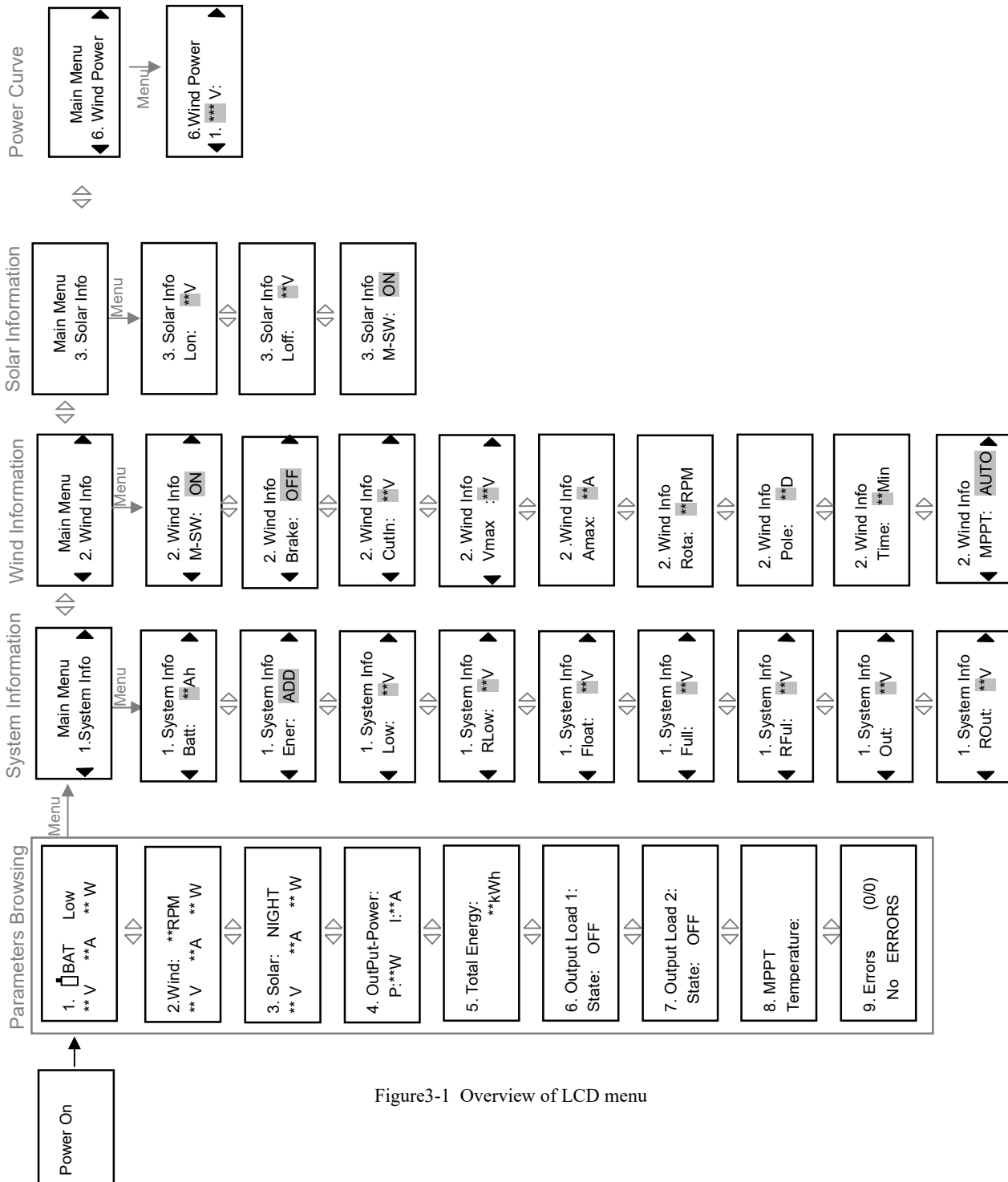


Figure3-1 Overview of LCD menu


Some 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. The number would be set one by one from left to right. After one number is set, press “Menu”, the flash number will be the next. When the last number (unit) is finished press “Menu” to save the setting, press “Esc” to back out.

3.3 Parameters Browsing

3.3.1 Battery

1.  : BAT Low
 ** V ** A ** W



Right corner have below displays:

Low—Battery power is low **Normal**—Battery power is normal **Full**—Battery power is full

Break—Manual break or Over voltage and current and rotate break

**V—Battery voltage

**A—Battery charging current

**W—Battery charging power

3.3.2 Wind

2. Wind: **RPM
 ** V ** A ** W



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

Other displays:

**V—Wind input voltage

**A—Wind input current

**W—Wind input power

3.3.3 Solar

3. Solar : NIGHT
 ** V ** A ** W



Right corner have below displays:

DAY— When solar voltage is higher than “Lon” voltage, right corner display “DAY”. It delays 1 minute. When controller is power on, it displays “DAY”, analysis present circumstance, 1 minute later it displays normally.

NIGHT—When solar voltage is lower than “Loff” voltage, right corner display “NIGHT”. It delays 1 minute.

**V—Solar charging voltage **A—Solar charging current **W—Solar charging power

3.3.4 Total Generated Energy

4. Total Energy
 **kWh



Total-Energy—total generated energy

This value is cumulative. If you want to start from 0, set ”Ener” in 3.4

3.3.5 Temperature Protection

9. Temperature:
 NORMAL T: **C



TEMPERATURE—Temperature protection.

NORMAL: MOS fet temperature is normal. **HIGH**: MOS fet temperature is high.

OTP: MOS fet temperature is over the protect temperature. **ERROR**: Temperature detection is error.

**C: ** Celsius degree.

3.3.6 Error Code

A. Errors: (0/0)
 No Errors.



0/0 — For example: If it is 2/4. 2 indicate the error display on next line is the second error of the 4 errors. 4 indicate there are 4 errors in all now.

Press “Menu” key to browsing what error code display on next line, press and to switch over.

When the second line display “No Errors”, press “Menu” key to into parameters browsing.

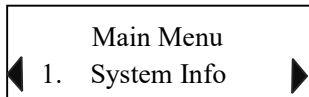
NO BATTERY—battery is not detected or battery voltage is too low

SHORT LOAD—load short-circuit or load current is large **SOLAR OVER V**—solar voltage is too high

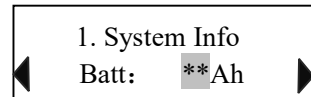
LOAD OVER V—load voltage is too high **TEMP ERROR**—temperature sensor error

EEPROM ERROR.—data storage error **No Errors**—normal

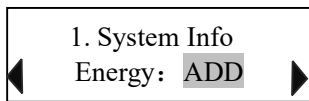
3.4 System Information



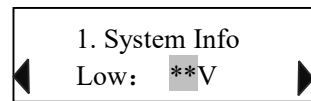
System Info—system information



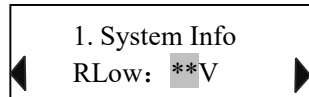
Batt—battery capacity



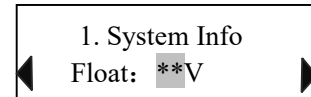
Energy—ADD: Energy cumulates
CLEAR: Energy clears to 0



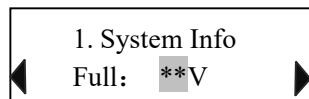
Low—under voltage



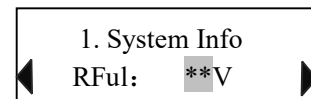
RLow—under voltage recovery voltage



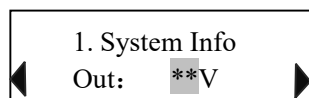
Flot—floating voltage



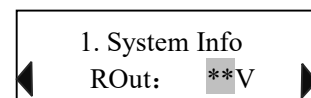
Full—over voltage



RFull—over voltage recovery voltage

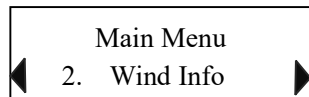


Out—over load protection voltage

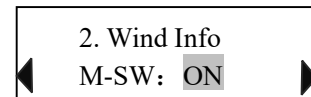


ROut—over-load recovery voltage

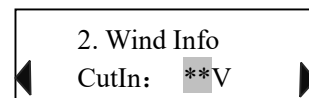
3.5 Wind Information



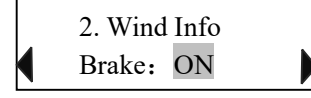
Wind Info—wind information



M-SW—wind charging manual switch
ON: turn on OFF: turn off



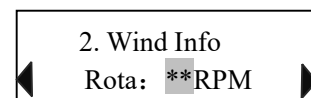
CutIn—wind start charging voltage
If do not purchase the function of Boost or Boost & Buck, it would display “NONE”



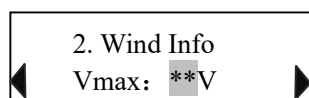
Brake—manual braking switch
ON: turn on OFF: turn off



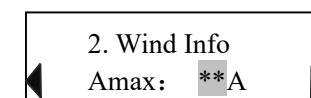
Pole—wind generator pole logarithm



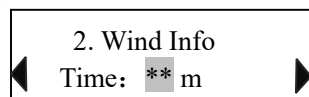
Rota—maximum rotate speed of wind generator.



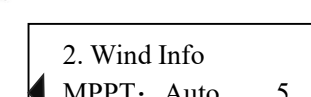
Vmax—Maximum voltage of wind generator



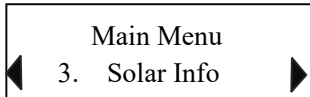
Amax—Maximum current of wind generator



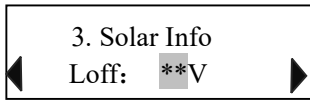
Time—braking time



3.6 Solar Information



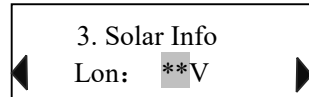
Solar Info—solar information



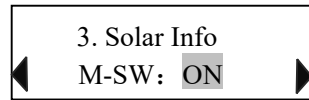
Loff—light control off voltage



MPPT—MPPT mode Auto or P-V

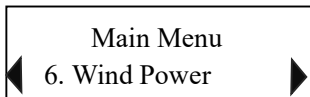


Lon—light control on voltage

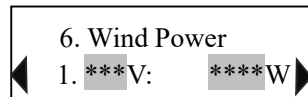


M-SW—wind charging manual switch
ON: turn on OFF: turn off

3.7 Wind Power Curve Setting



Wind Power Curve Setting

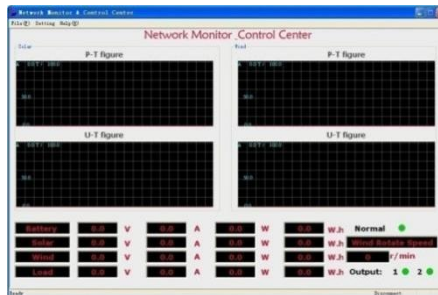


Can Setting 15 voltage-power point.

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. (Baud Rate: 19200)

- 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 Parameters

Model	GBBC1K/48	GBBC2K/48	GBBC3K/48	GBBC5K/48	GBBC10K/240
Rated wind power	1KW	2KW	3KW	5KW	10KW
Nominal system voltage	48V	48V	48V	48V	240V
Under voltage (Low) * adjustable	20.8V	40.8V		81V	210V
Under voltage recovery voltage(Rlow) * adjustable	23.5V	46.5V		93V	230V
Over voltage(Full) * adjustable	28.8V	57.6V		115V	284V
Over voltage recovery voltage(RFull) * adjustable	26.5V	52.8V		105V	265V
Float voltage(Flot) * adjustable	27.6V	54.0V		108V	272V
Wind dump load rotate speed(Rota) * adjustable	800R	800R	800R	400R	800R
Wind charging range * adjustable	DC (20-350)V	DC (20-350)V	DC (20-350)V	DC (20-350)V	DC (120-400)V
Wind start charging voltage(Cut In) * adjustable	24V	20V	20V	20V	120V
Wind dump load voltage(Vmax) * adjustable	80V	180V	150V	380V	400V
Dump load control mode	Over rotate speed limiting, Over voltage limiting, Over Current limiting, PWM				
Wind charging mode	MPPT(Boost & Buck) & PWM				
MPPT Mode	Auto & P-V Curve				
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. Loads: Current; power; working mode.				
Operating temperature & Relative humidity	- 20~ + 55°C /35~85%RH(Non-condensing)				
Power Loss	≤3W				
Protection type	Battery: Over-discharge protection; over-charge protection; anti-reverse connection. Wind: Over rotate speed protection, over voltage protection, over current protection. Loads: Over-load protection				
Controller size	450*425*210(mm)	450*425*210(mm)	450*425*210(mm)	450*330*210(mm)	450*330*210(mm)
Package size (Controller)	500*500*250(mm)	500*500*250(mm)	500*500*250(mm)	470*390*240(mm)	500*400*250(mm)
Package size (Dump Load)	Dump Load Inside			750*450*260mm	750*450*260mm
Net weight	16KG	16KG	16KG	12KG	11KG
Gross weight (Controller)	17KG	17KG	17KG	16KG	12KG
Gross weight (Dump Load)	Dump Load Inside			19KG	19KG
Communication function	RS232/RS485/USB/GPRS/WIFI/Ethernet				

6 After-sales Service

Thank you for choosing "GREEF" new energy products. We always provide a comprehensive range of services before, during and after sales. "GREEF NEW ENERGY guarantee as follows:

★ I. Warranty period:

OFF-GRID CONTROLLER is ONE year warranty.

- (1) The warranty period is start from the date of on the guarantee card .
- (2) Free maintenance services during the warranty period the cost involved be borne by the company, do not charge a fee to customers, free warranty if any damage outside the warranty period, the company will charge a fee for labor costs and materials.
- (3) The warranty period, company's quality problems caused by the maintenance of the freight borne by the company. if not under warranty or not quality problem, all the freight &charges by the customer. Tax is should be paid by customer in their own country all the time.

★ II. Warranty:

We will provide the approved products for all customers to provide maintenance services. But in order to enable the two sides can enjoy fair

Treatment, for the following reasons for failure or damage, we will not provide free warranty.

- (1) When beyond the warranty period;
- (2) Disasters, leaving damage to the product caused by accident;
- (3) The user-transport, carrying, falling, collision and damage caused by the failure;
- (4) The product as user-modification, and other failures caused by improper use and damage;
- (5) The users' unmorally operation, like test with other equipment, and caused by the failure;
- (6) Customer open and repair device without our guide and cause damage.

★ III. Maintenance services implementation:

- (1) If your machine meet any problem, please take photos and video to send to our service department and explain the details of the problems. or send to the sales which you contact before.
- (2) Our engineers will check the problem, and give you suggestion to solve the problem. Most of the small problem can be solved after engineer guide.
- (3) If we find that any parts need to be replacement, we will send the parts to customers. Quality problem we afford products cost &freight for replacement within warranty period.
- (4) If a major problem in our products, we will send engineers to provide appropriate support.

★ IV. Fees:

For the warranty, we will charge a fee (fee = fee + replacement parts technical service fees), we will provide timely material Price (cost) .

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