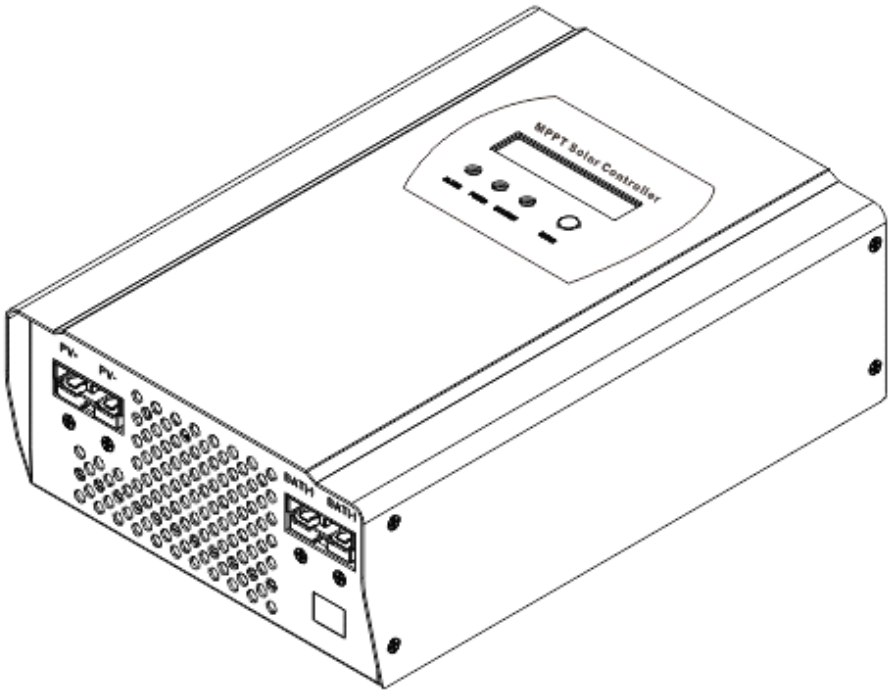
MPPT Solar Charge Controller

12V/24V/48V Automatic Recognition

40A 50A 60A Series

Manual



Contents

1. Notes on this Manual

This manual describes how to install and service MPPT solar charge controller.

1.1 Validity

This manual applies to the whole MPPT solar charge controller models produce by our company:

1.2 Target Group

This manual is intended for the installer and the operator.

1.3 All manuals for the device and installed components must be stored in the immediate vicinity of the charge controller and must be accessible at all times.

1.4 Symbols Used

The following types of safety messages and general information appear in this document:

Warning!

WARNING indicates a hazardous situation which, if not avoided, could result in machine stoppage or serious injury.

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Note!

In order to operate this device well, please read the operation instruction carefully.

2. Safety Instructions

2.1 General Safety Instructions

Warning!

Due to high input working voltage, please be cautious, otherwise it is danger to life.

- All work on the charge controller must only be carried out by an electrically skilled person.
- The appliance is not to be used by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Children should be supervised to ensure that they do not play with the appliance.

Caution!

Be careful for high temperature enclosure parts.

- Do not touch the enclosure of the charge controller during operation. Please settle it on the cooling ventilation environment.

Caution!

Radiation is harmful for health.

- Do not stay closer less than 20 cm around the solar charge controller for a long time.

2.2 Explanation of Symbols

Below is the explanation for all the symbols shown on the device and label.

Symbol	Explanation
	Risk of electric shock Energy stored in capacitors will remain alive for 5 minutes; don't touch within the period after disconnection Both the sides have circuit lines, disconnect both and don't operate within 5 minutes after disconnection
	No self-serviceable parts inside the enclosure, don't attempt to remove the cover. Only qualified persons are permitted to operate and maintain the equipment. Only insulated tools are permitted to use to reduce risks of hazard to individuals.
	Beware of hot surface. The solar charge controller can become hot during operation. Avoid contact during operation. And never put any goods onto the equipment under load.

● Symbols on the Type Label

Symbol	Explanation
	CE FCC CB ROHS mark； The device complies with the requirements of the applicable CE FCC CB ROHS guidelines.

●Important Safety Instructions

When using the product, please do remember the below information to avoid the fire, lightning or other personal injury:

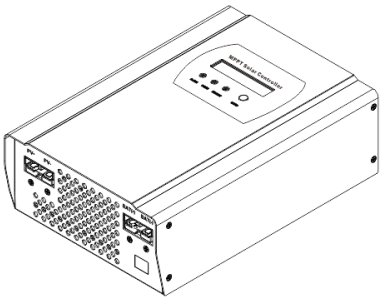
	Warning! Ensure input DC voltage no more than Max. DC voltage .Over voltage may cause permanent damage to solar charge controller or other losses, which will not be included in warranty! This chapter contains important safety and operating instructions. Read and keep this operation guide for future reference.
	Warning! Authorized service personnel must disconnect both DC and battery bank power from the solar charge controller before attempting any maintenance or cleaning or working on any circuits connected to the solar charge controller.

- Before using the solar charge controller, please read all instructions and cautionary markings on the solar charge controller, and all corresponding sections of this guide.
- Please use components and parts recommended or sold by us.
  Otherwise may result in a risk of fire, electric shock, or injury to person.
- To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and that wire is not undersized. Do not operate the solar charge controller with damaged or substandard wiring.
- Do not disassemble the solar charge controller. It contains no user-serviceable parts. See Warranty for instructions on obtaining service. Attempting to repair the solar charge controller by yourself may result in a risk of electric shock or fire and will make your warranty invalid.
- To reduce the risk of electric shock, authorized service personnel must use insulating tool to operate the device.
- Keep away from flammable, explosive materials to avoid fire disaster.
- The installation place should be away from humid or corrosive substance.
- To reduce the chance of short-circuits, authorized service personnel must use insulated tools when installing or working with this equipment.

3. Unpacking

3.1 Device parts checking：

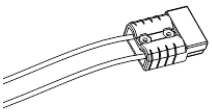
A



B

C

D



Object	Quantity	Description
A	1 unit	Charge controller
B	2 pc	Gallow pulley
C	4 set	screw
D	2 pc	joint

If there is any part missing, please contact your dealer.

3.2 Check for Transport Damage

Check the charge controller for visible external damage, such as cracks in the enclosure. Contact your dealer if you find any damage.

3.3 Identifying the Charge Controller

You can identify the charge controller by the type label. The type label is in the enclosure.

4. Assembly

4.1 Operator：technical personnel;

4.2 Selecting the Mounting Location

Danger:

Danger to life due to fire or explosion.

The charge controller enclosure can become hot during operation.

- Do not mount the charge controller on flammable construction material.
- Do not mount the charge controller near highly flammable materials.
- Do not mount the charge controller in potentially explosive areas.
- Do not expose the charge controller to direct sunlight to avoid power loss due to overheating.

Caution:

Danger of burn injuries due to hot enclosure parts.

- Mount the charge controller in such a way that it cannot be touched inadvertently during operation.

4.2.1 Dimensions

L * W * H：270mm*150mm*88mm

4.2.2 Net Weight

Weight：3kg

4.2.3 Ambient Conditions

- The mounting location and method must be suitable for the weight and dimensions.
- Mount on a solid surface.
- The mounting location must be accessible at all times.
- The charge controller must be easy to remove from the mounting location at any time.
- The ambient temperature should be between -20 °C and +60 °C to guarantee optimal operation.
- Do not expose the charge controller to direct sunlight to avoid power losses due to overheating.

4.2.4 Safety Clearance

Observe the following safety clearance to wall, other devices or objects to ensure sufficient heat dissipation.

Direction	Safety clearance
Sides	20cm
Top	30cm
Bottom	20cm

5. MPPT controller Connection

5.1 Safety

Danger!

Danger to life due to high voltage in the solar charge controller.

- Disconnect the PV array using a disconnection unit and secure it against accidental reactivation.
- Disconnect the circuit breaker and ensure that it cannot be reconnected.
- Ensure that no voltage is present in the system.

Warning:

Risk of injury due to electric shock。

If all cables with different voltages are routed in parallel, damaged cable insulations may lead to a short circuit.

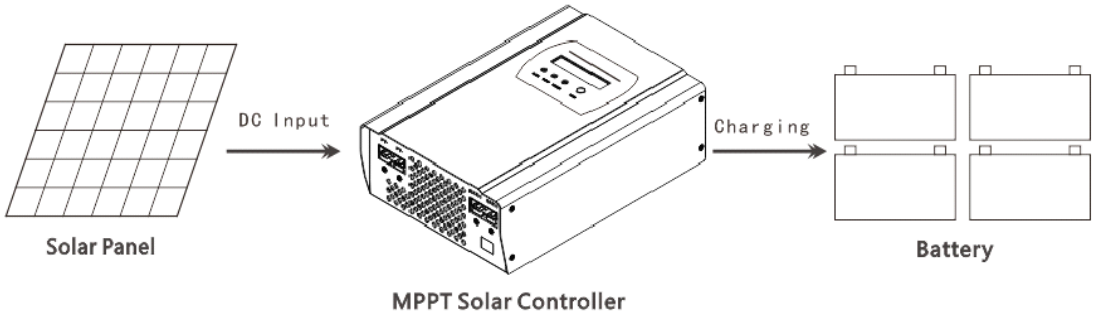
- Route all cables separately.

Warning:

Over voltage can destroy the system.

- Use an external over voltage protector in areas with an increased risk of thunderstorm and lightning.

5.2 Connections of the PV power system



●PV String

Solar charge controller device can be connected in series into 1-strings PV modules. Please select PV modules with excellent function and reliable quality. Open-circuit voltage of module arrays connected in series should be less than Max. DC input Voltage (150V); operating voltage should be conformed to MPPT voltage range.

Please use PV cable to connect modules to device. From junction box to device, voltage drop is about 1-2%. So we suggest the solar charge controller install near PV module, in order to save wire and reduce DC loss.

Note:

Please don’t connect the PV panel positive or negative to ground.

Warning:
PV module voltage is very high which belongs to dangerous voltage range, please comply with electric safety rules.

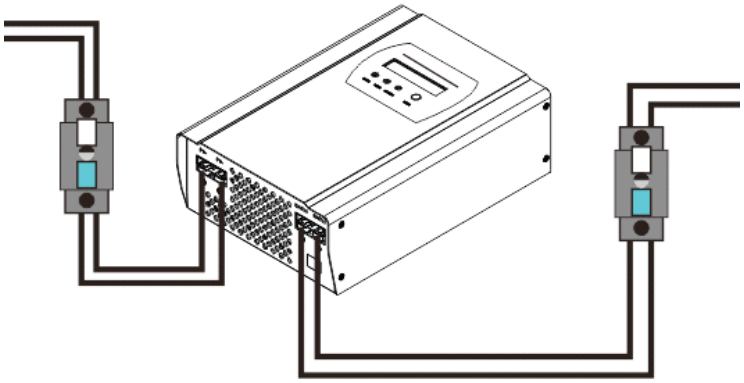
● DC Output
Solar charge controller is designed for battery charging.
Table 4 Cable and Micro-breaker Requirement

Model	40A	50A	60A
Cable (Cu)	≥4mm	≥4mm	≥4mm
Micro-Breaker	63 A	63 A	63A

Micro-breaker should be installed between DC output and battery. Moreover, micro-breaker should be installed between PV and device.

Connections of break

5.3 Correct connections between joint and solar charge controller

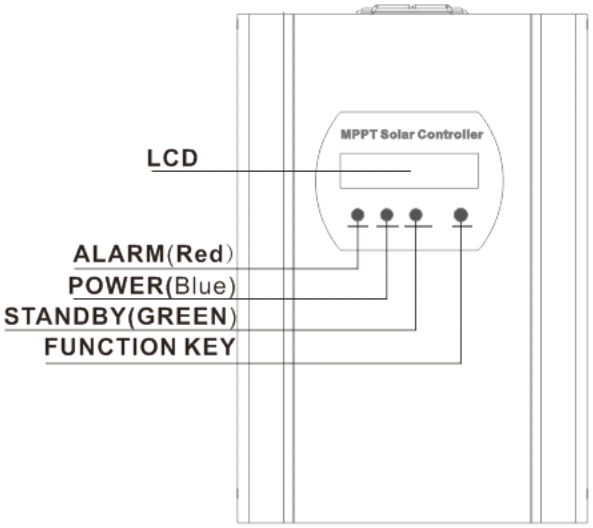


6. Commissioning

6.1 Check the following requirements before commissioning:
All DC cables completely connected (PV strings and batteries)
6.2 Commissioning Procedure
1. Check the polarity of the battery and the PV array.
2. Close the solar charge controller. Fasten the lid to the enclosure using eight screws.
3. Connect the cables leading from the solar charge controller to the battery.
4. Switch on the circuit breaker and the disconnection unit.
5.Then turn on the controller and solar panel circuit breaker ;
6.Then controller began to enter the self-test mode ; system conditions are correct , the controller automatically enter the working mode ; otherwise into the error mode ;
7.The battery type can be selected in any mode, please take the following information for reference (Reference 7 LED and LCD indicator Description).

7. Meaning of the LED (Light Emitting Diodes) and LCD function

7.1 Panel Description



7.2 **LED information**

ALARM (Red）------ Fault light (red)
POWER(Blue) ------ Charging lamp (blue)
STANDBY(Green)---- Power light (green)
FUNCTION KEY----- function key

LED information

Condition	Alarm（Red）	Power(Blue)	Standby(Green)
Power on	off	off	on
Charge	off	on	on
Fault	on	off	on
Bat Chose Type	off	off	off

In voltage constant working mode, power led will turn blue once per second
In current constant working mode, power led will blink blue per 3 second.
In float constant working mode, power led will always turn blue.

7.3 LCD explanation

7.3.1 The controller has the three -state normal mode:

Operating State	Information Display	Description
1	Checking	Check the system parameters , and compliance ;
2	Fault Mode	Charge cut down
3	Normal state	charging

7.3.2 Information of LCD in different mode

MPPT Information of LCD in different mode	
Model 1 / **Display**	**Boot Mode**
1	mode
2	BAT checking
3	PV volt checking
4	In volsen checking
5	Out volsen checking
Remarks：Shown above automatically next page , according to system conditions, and then enter the normal operating mode or failure mode ;	
Model 2 / **Display**	**Normal Mode**
1	Display Model
2	Firmware Ver
3	Machine ID
4	BAT Type
5	Chg Cur
6	BAT volt
7	Opt Power
8	PV volt
9	In Temp
10	Buck 1 Temp
11	CC Mode charging
Remarks：On this mode, shown the next page after each pressing of function key; when error occurred, enter the failure mode automatically.	
Model 3 / **Display**	**Fault Mode**
1	BAT CHG SYS
2	Firmware Ver
3	Machine ID
4	BAT Type

5	**Fault Mode**（See the fault type table）
6	Chg Cur
7	Bat volt
8	Opt Power
9	PV volt
10	Buck 1 Temp
Remarks: On this mode, shown the next page after each pressing of function key; when error removed, enter the other mode ;	

Error mode

Error code	Description
PV Volt High	over voltage at DC input voltage
PV Volt Low	DC input voltage low (also at night and during periods with low solar irradiation)
In Relay Fault	Input relay interrupted
Out Volt Low	battery voltage is lower than 9 V
Out Volt High	short circuit, overload or over current at battery or PV array (also before first commissioning)
Out Cur Over	Over current at Output current
Out Relay Fault	Output relay interrupted
Output Short	short circuit in the sensor cable
BAT Polar Error	Battery polar connect error
BAT Volt Error	Battery is not standard
Buck1 Fault	Buck1 circuit interrupted
Buck2 Fault	Buck2 circuit interrupted
Bat Temp High	Battery temperature too high
Enir Temp High	Environment temperature too high
Buck Temp High	charge controller temperature is higher than 90 °C
Pv Vol Sensor Fail	PV voltage sensor interrupted
Bus Sensor Fail	Bus voltage senor interrupted
Buck Sensor Fail	Buck voltage sensor fault
Out Vol Sensor Fail	Output voltage sensor fault
Out Cur Sensor Fail	Output current senor interrupted
Battery Off	Battery cable interrupted

7.4 Chosen for battery

When battery unselected, the default one is Gel battery for charging.

7.4.1 Function key

Types of battery can be set by function key.

Step 1:

Press the function key for 3 seconds, then LCD will display types of battery.

Step 2:

Press the key to choose the type of the battery which you need. When you press the function key once, LCD will display one type of battery.

Step 3:

After choosing the matched battery, you need press the function key for 3 seconds to set types of battery.

7.5 Types of batteries charging parameter.

The charging voltage of battery type						
Battery Type	**Bulk Voltage**			**Floating Voltage**		
	12V	24V	48V	12V	24V	48V
Vented	14.2V	28.6V	57.2V	13.2V	26.4V	52.80V
Sealed	14.2V	28.6V	57.2V	13.4V	26.8V	53.60V
Gel	**14.2V**	**28.6V**	**57.2V**	**13.7V**	**27.40V**	**54.80V**
NiCd	14.2V	28.6V	57.2V	14.0V	28.0V	56.0V
In the case battery type is not set , use the default battery type (Gel gel battery).						

8. Technical Parameter

DC12V/24V/48V-series		40A	50A	60A
Charge Mode	Maximum Power Point Tracking			
Method	3 stages: fast charge(MPPT),constant voltage, floating charge			
System Type	DC12V/24V/48V	Automatic recognition		
System Voltage	12V system	DC9V~DC15V		
	24V system	DC18V~DC30V		
	48Vsystem	DC36V~DC60V		
Soft Start Time	12V/24V/48Vsystem	≤10S		
Dynamic Response Recovery Time	12V/24V/48Vsystem	500us		
Conversion Efficiency	12V/24V/48Vsystem	≥96.5%,≤99%		
PV Modules Utilization Rate	12V/24V/48Vsystem	≥99%		
Input Characteristics				
MPPT Working Voltage and Range	12V system	DC18V~DC150V		
	24V system	DC34~DC150V		
	48V system	DC65~DC150V		
Low Voltage Input Protection Point	12V system	DC16V		
	24V system	DC30V		
	48V system	DC60V		
Low Voltage Input Recovery Point	12V system	DC22V		
	24V system	DC34V		
	48V system	DC65V		
Max DC Voltage	12V/24V/48V system	DC160V		
Input Overvoltage Protection Point	12V/24V/48V system	DC150		
Input Overvoltage Recovery Point	12V/24V/48V system	DC145V		
Max. PV Power	12V system	570W	700W	900W
	24V system	1130W	1400W	1700W
	48V system	2270W	2800W	3400W
Output Characteristics				
Selectable Battery Types (Default type is GEL battery)	12V/24V/48Vsystem	Sealed lead acid, vented, Gel, NiCd battery		
Constant Voltage	12V/24V/48V system	Please check the charge voltage according to the battery type form.		
Floating Charge	12V/24V/48V			

Voltage	system			
Over Charge Protection Voltage	12V system	14.6V		
	24V system	29.2V		
	48V system	58.4V		
Rated Output Current	12V/24V/48V system	40A	50A	60A
Current-limiting Protection	12V/24V/48V system	44A	55A	66A
Temperature Factor	12V/24V/48V system	±0.02%/℃		
Temperature Compensation	12V/24V/48V system	14.2V-(The highest temperature-25℃)*0.3		
Output Ripples(peak)	12V/24V/48V system	200mV		
Output Voltage Stability Precision	12V/24V/48V system	≤±1.5%		
Display				
LCD display		Input, output parameter and output power etc (check the LCD display instruction)		
LED display		3 LEDs indicates: Fault indicate light, charge indicate light, power source indicate light(check the LED instruction)		
Protection				
Input Low Voltage Protection		Check the input characteristics		
Input Overvoltage Protection		Check the input characteristics		
Input Polarity Reversal Protection		yes		
Output Overvoltage Protection		Check the output characteristics		
Output Polarity Reversal Protection		yes		
Short-circuit Protection		Recover after eliminating the Short-circuit fault, no problem for long term Short-circuit		
Temperature Protection		95℃		
Temperature protection		Above 85℃,decrease the output power, decrease 3A per degree.		
Other Parameters				
Noise		≤40dB		
Thermal methods		Forced air cooling, fan speed rate regulated by temperature, when inner temperature is too low, fan ran slowly or stop; when controller stop working, fan also stop ran.		
Components		World brand raw materials. Compliance with EU standards. All rated temperature of electrolytic		

	capacitors not less than 105℃
Smell	No peculiar smell and toxic substances.
Environment Protection	Meet the 2002/95/EC,no cadmium hydride and fluoride
Physical	
Measurement DxWxH (mm)	270*185*90
N.G(kg)	3
G.N(kg)	3.6
Color	Blue/Green (optional)
Safety	CE, RoHS, PSE,FCC
EMC	EN61000
Type of Mechanical Protection	IP21
Environment	
Humidity	0~90%RH (no condense)
Altitude	0~3000m
Operating Temperature	-20℃ ~ +40℃
Storage Temperature	-40℃ ~ +75℃
Atmospheric Pressure	70~106kPa

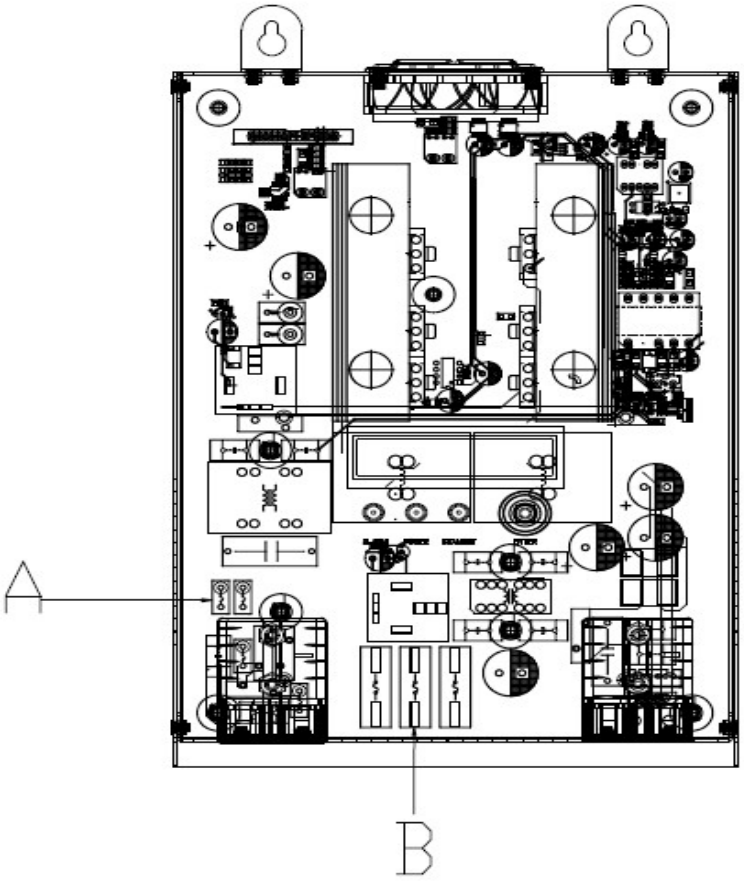
9. Maintenance and Cleaning

9.1 Replacing the Thermal Fuses

Using incorrect thermal fuses may irreparably damage the solar charge controller.

• Only use the thermal fuses included in the scope of delivery

1. Open the solar charge controller as described in section "Opening the solar charge controller"
2. Remove the broken thermal fuses from the sockets (A and B).
3. Insert new thermal fuses (included in the scope of delivery).
4. Close the solar charge controller as described in section "Closing the solar charge controller".



Location of Thermal Fuses

9.2 Cleaning the Cooling Fin

Clean the Fan air vents and internal cooling fin regularly by using the dry or small wet cloth to wipe.
Attention:
• Liquid detergent or corrosive solvent cleaning are forbidden.
• Liquid is not allowed to down in the device.
• Make the air vent open.
•Carefully remove dirt with a suitable soft brush.

10. Storage and waste disposal.

10.1 Store the charge controller in a dry place with ambient temperatures between -40 °C and +75 °C.
10.2 Disposal
Dispose of the solar charge controller at the end of its service life in accordance with the disposal regulations for electronic waste which apply at the installation site at that time.

11. Recovery Processing and Warranty

11.1 Recovery Processing

When the controller abnormal, please check the following question and contact the customer service representative.
11.1.1 Controller failure mode：
Please check the fault tips in the failure mode, and then proceed to the appropriate troubleshooting;
11.1.2 When the controller does not start properly:
1. Check the controller external solar panels with the correct polarity.
2. Check Battery Connection;
3. Check Battery;
4. Check circuit breaker;
5. Check internal fuse;
If the problem persists , please contact the customer service；
Please offer the following information： Equipment information: Model, Order No., serial-number(Stickers on the rear plate); Detailed description of the problem
(Type of system, occasionally/frequent problems, indicator light, data display, and so on).

11.2 Warranty

Within the warranty period, it is free to repair for the non-human fault. Otherwise, should charge the cost of repairs.

11.3 Guarantee Card

User name:_____ Country:_____
Address: _____
Telephone Number:_____ Pose Code:_____
Email:_____
Date of Purchase:_____ Vendor:_____
Date of Installation:_____ Installer:_____
Installer Contact Information:_____
Solar Charge Controller Serial Number:_____
Battery Voltage: _____ PV Voltage:_____
PV Module Type and Manufacturer:_____
Array Wattage:_____ Notes:_____