

SPECIFICATION OF PV CHARGE CONTROLLER

PV CHARGE CONTROLLER



XANTRA ADVANCED 96V - 120V/60A PWM SOLAR CHARGE CONTROLLER

Installation and operating instructions

Version: 5.0 (2016.12)

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Users:

Thank you very much for selecting our PV CHARGE CONTROLLER!

This manual contains important information and suggestion about installation, operation and trouble shooting. Please read them carefully before you use it

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1. Safety Instructions

1.1 Safety instructions are identified as follows



WARNING: This symbol indicates potentially dangerous condition. Users should pay extreme caution when performing this task.



CAUTION: This symbol indicates critical procedure for safe and proper operation of the controller



NOTE: This symbol indicates the procedure or function that is important for safe and proper operation of the controller.

1.2 Safety Precautions

1.2.1 Read all the instructions and cautions in the manual before installation.

1.2.2 There are no serviceable parts inside the controller, so do not disassemble or attempt to repair it without authority from manufacturer.

1.2.3 Please avoid direct sunlight if you install it outdoor.

1.2.4 Install external fuses/breakers as required.

1.2.5 Install the controller in well ventilated places, the controller heatsink may become very hot during operation.

1.2.6 Keep the controller away from water, electrical heater and avoid the controller from direct sunlight.

1.2.7 Disconnect PV arrays and battery before install or adjust the controller.

1.2.8 Power connections must remain tight to avoid excessive heating from loose connection.

1.2.9 Be sure to always keep children away from the system.

1.2.10 Do not use measurement equipment you know to be damaged or defective.

1.2.11 Avoid the generation of sparks and wear eye protection during installation.

1.2.12 The manual must also be available to third parties for all

work performed on the system.

1.3 After-sale service

The controller has two years of warranty since the manufacture date. Please operate the controller following the manual strictly. If there are some problems happen, please contact us directly for professional suggestions, if the problems still can't be solved, then send it back to us with freight prepaid, and provide related information about the controller, such as invoice, S/N code and details description of the faults. The information will help us to make a fast repair. We also need to know the information of solar panels, batteries and loads which are important to us finding the reasons and solve the problems.

1.4 Exclusion of Liability

The manufacturer cannot monitor the compliance to this manual, nor the conditions and methods of installation, operation, usage and maintenance of the system controller. Improper installation of the system may result in damage to property and, as a result, to bodily injury. Therefore, we assume no responsibility or liability for loss, damage or costs which result from, or are in any way related to, incorrect installation, improper operation, or incorrect use and maintenance. Similarly, we assume no responsibility for patent right or other right infringements of third parties caused by usage of this system controller. The manufacturer reserves the right to make changes to the product, technical data or assembly and operating instructions without prior notice.



NOTE: Opening, manipulating or attempting to repair the device or operating the device in an improper manner will invalidate all legal guarantee claims.

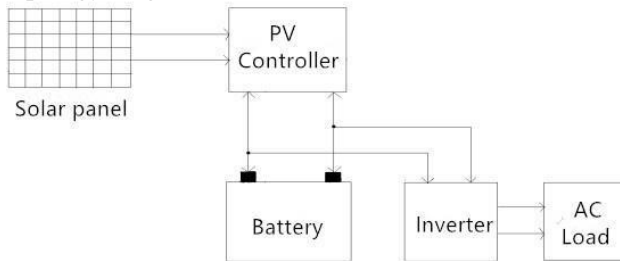
2. Product Information

The **YO POWER** PV charge controller adopts advanced digital control technology, 3'' LCD display, touching keys and

automatically operation. With the features of PWM (Pulse Width Modulation) battery charging and unique control technology, the PV charge controller improves battery life efficiently. The PV charge controller is only suitable for controlling solar modules. Never connect any other types of charging source to the controller. This can destroy the controller and/or the charging source permanently.

! CAUTION: The controller is only suitable for indoor use or well waterproof. It must be installed in a manner providing protection from weathering influences such as rain and direct sunlight. Ventilation openings must not be covered. The controller may only be used for the specified intended purpose. Please also ensure that the permissible model-specific rated currents and voltages are not exceeded. No liability is accepted when the device is used in a manner other than for the intended purpose. Handle the product with care.

2.1 Topology diagram



Picture 1: Off grid solar system wiring diagram

2.2 Performance feature

2.2.1 Industrial-grade chips ensure stable performance.

2.2.2 Excellent EMC design




2.2.3 PWM technology has three charging stages (buck charging, equalize charging and float charging) which improves the charging efficiency and battery storage capability.

2.2.4 Advanced battery activation technology which increases battery lifetime 30% at least and improves the system


- performance
- 2.2.5 It adopts imported IGBT power module or MOSFET as electronic switch which can improve the stable performance of controller.
- 2.2.6 3'' LCD displays the system status and working parameters
- 2.2.7 Parameters setting flexibly by touching keys
- 2.2.8 Users can parallel connect lots of t controllers in a system
- 2.2.9 Fully enclosed duct design and high-speed fan for cooling makes the controller working under harsh environments
- 2.2.10 DC output function (optional function)
- 2.2.11 Standard Modbus protocol for RS-485 or GPRS communication to extend the communication distance (optional function)
- 2.2.12 New SOC method indicates the power generation information of daily, monthly and total.
- 2.2.13 The temperature compensation function compensates the voltage based on different temperature.
- 2.2.14 It adopts graphical dot-matrix 3'' LCD and 4 touching buttons as HMI for full menu and easy operation
- 2.2.15 RTC function indicates the real time and temperature.
- 2.2.16 The deep protection to avoid destroying battery when the power switch (IGBT) is down (optional function).


3. Installation Instruction


3.1 Precautions


-  Warning: do not install it with open type lead-acid battery in a confined space, also do not install it in a sealed place where battery gas may be assembled. These will cause explosion.
-  Warning: If the positive and negative of battery is short circuit, there will be explosion or fire, so be careful about it.
-  Warning: The PV arrays may produce a high voltage which will shock to people, it's very dangerous, so be careful about it when


you wire the system.


 **Caution:** When you install the controller, please ensure there is enough air through the heat sink of controller, we suggest 200mm space at each left and right.

 **Caution:** Please ensure all battery and PV arrays are turn off when you install controller in the system. We suggest users to install a break between PV arrays and controller, also same between battery and controller.

 **Caution:** our PV charge controller is equipped with corresponding cold pressing terminal for different current. Please tightly press it with wire. Loose connection will gather heat which is very dangerous. Please also ensure there is no any fur between the wire and cold pressing terminal.

 **Caution:** Please use insulated tools and avoid placing metal objects near the battery.

 **Note:** By default, the controller works with Lead-acid battery, GEL battery, AMG battery, etc. If you use Lithium battery, please let me know before you buy it. We have special program for lithium battery. We will do not take any responsibility for problems when you use the controller with lithium battery.

 **Note:** We suggest 10mm^2 wire for current small than 50A, 16mm^2 wire for current between 50A~100A, 25mm^2 wire for current more than 100A. ($5\text{A}/\text{mm}^2$ current density)

3.2 Wiring instruction

By default, the PV charge controller only has 1 group of solar panel input and 1 group of battery output, there is no DC output, so we choose 4P TC series barrier terminal. The wiring terminal as following:

Solar Panel		Battery	
S+	S-	B+	B-

Type 1: 1 group of PV input and 1 group of battery output

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But we also offer another two types of wiring as following:

Solar Panel 1		Solar Panel 2		Battery	
S1+	S1-	S2+	S2-	B+	B-

Type 2: 2 groups of PV input and 1 group of battery output

Solar Panel		Battery		Load	
S+	S-	B+	B-	L+	L1

Type 3: 1 group of PV input, 1 group of battery output, 1 group of DC output

3.3 Mounting

3.3.1 Choose mounting location

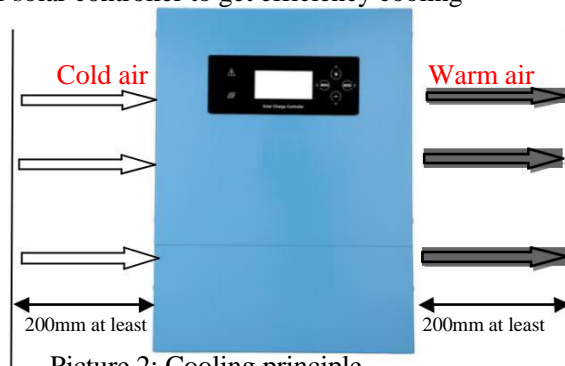
Mount the controller near to battery and on a safe surface protected from direct sunlight, high temperature and water, a best surface should with following properties

*** Stable * Ventilation * Non-flammable * Dry**

Do no install the controller outside. The controller must be mounted protected from moisture, dripping water, spray, rainwater and direct or indirect heating, e.g. from direct sunlight.

3.3.2 Check for clearance

Please ensure there is enough space at the right and left of solar controller to get efficiency cooling



3.3.3 Mark holes

Mark the four mounting hole locations on the mounting surface.

3.3.4 Drill holes

Remove the controller and drill 4mm² holes in the marked locations.

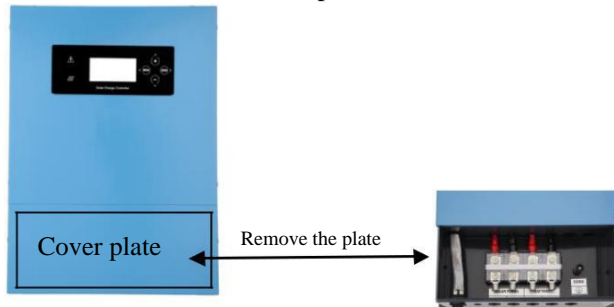
3.3.5 Fix controller

Place the controller and align the mounting holes with the drilled holes in step 3.3.3. Secure the controller in place using the mounting screws.

3.4 Wiring the controller to the system

3.4.1 Crimp the cold pressing terminal with your wires. Please tightly crimp them.

3.4.2 Remove the connection cover plate



3.4.3 Connect battery to the controller



Note: Right connect the positive and negative.



Caution: before you connect battery to the controller, please ensure the power switch is on “OFF” side.



Warning: Risk of explosion or fire! Never short circuit battery positive (+) and negative (-) or cables.

3.4.4 Connect solar panel to the controller



Note: Right connect the positive and negative



Caution: If there is no combiner in the system, we require user to add a breaker between the controller and PV arrays. And before you connect them, please ensure

that the breaker is off.



Warning: Risk of electric shock! The solar module's high voltage output can cause severe shock or injury. Be careful operation when installing solar wiring.

3.4.5 Connect loads to the controller (if controller has this function)



NOTE: Right connect the positive and negative 3.4.6 Confirm the wiring

Double check the all the wiring steps above. Confirm all connections are right and tightened. Then do the next step.

3.4.7 Power the controller

First turn on the breaker between controller and battery, then turn on the controller's power switch.



NOTE: After you done this, the controller will start to work, the LCD will display "WELCOME TO USE PV CHARGE CONTROLLER PLEASE WAIT A MOMENT!----" and enter into monitoring interface after 3 seconds.

3.4.8 Start charging

Turn on the combiner or the breaker between PV arrays and controller to process system operation, please pay attention on the voltage of PV arrays, charging current, battery(s) voltage if they are normal as well.

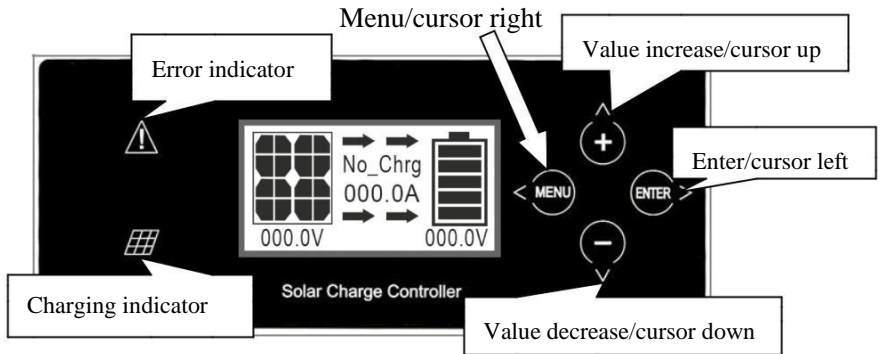


Caution: If you want to remove the system, please follow the following steps strictly:

- A. Turn off the combiner or breaker between solar module(s) and controller, then remove the solar module(s) from controller first!
- B. Turn off the switch on the controller.
- C. Turn off the breaker between battery and controller, then remove battery from controller at last!

4. Operation

4.1 Instruction of HMI interface



4.2 Operating interface

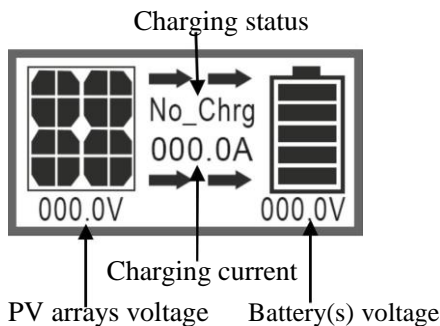


NOTE: It will enter to monitoring interface automatically if there is no operation within 3 minutes.

The controller will enter to initial interface after you power the controller (step 3.4.7) as follow:



The initial interface will last 3 seconds, then enter to monitoring interface as follow:



Note: Charging status instruction

No-Chrg: No charging

Qu-Chrg: Bulk charging

Eq-Chrg: Equalize charging

FL-Chrg: Float charging



Note: Error instruction

OV-Volt: Over voltage

OV-Curr: Over current

UV-Volt: Under voltage

OV-Temp: Over temperature

NC-IGBT: module error (if it comes up with this error, please shut down the battery and PV arrays in time and contact us immediately.

After it enter to monitoring interface, you can browse the system parameters through pressing + and - key. The system parameters as follow:

TEMP:25.6°C Run_T:0000day Time:12:24:56 Date:11-05-2016	Charge Energy Day: 00000.0KWh Mon: 00000.0KWh Tot: 0000000KWh
--	--

TEMP: Temperature

Charge Energy: Generate power

Run-T: Running time

Day: Daily generate power

Time: Real time

Mon: Monthly generate power

Date: Date

Tot: Total generate power

4.2.1 Main menu interface

When it at monitoring interface, Press “Menu” key to main menu 1 interface which displays the following contents

1.Monitoring 2.Device Set 3.Parameter Set 4.Rated Value

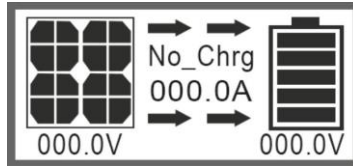
Cursor showing the contents which can be operated

Keep pressing “-“ key to enter to main menu 2

5.Password Set 6.Reboot Device 7.Factory Reset

4.2.2 Monitoring

At main menu interface, press + or - key, the inverse cursor moves between main menu 1 and main menu 2, when the inverse cursor points at **1. Monitoring**, then press “Enter” to enter to monitoring interface as following:



This interface shows the charging information 4.2.3 Device Set

At main menu 1 interface, let the inverse cursor point to **2. Device Set** and press “Enter” to enter to device setting interface which displays contents as follow:

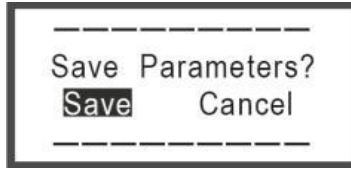


Press “Menu” or “Enter”, the inverse cursor moves among each parameter. When inverse cursor points at the parameter, the contents of the parameter can be modified through pressing + to increase the value or pressing - to decrease the value. After you done the setting, keep pressing “Enter” until you enter to password setting interface as follow:



NOTE: The equipment ID can be set from 1 to 247.
Enter the correct password you will get the next

interface.



If you choose “Save”, the interface will enter to the following interface and return to main menu 1 interface after 5 seconds. The settings will be saved.



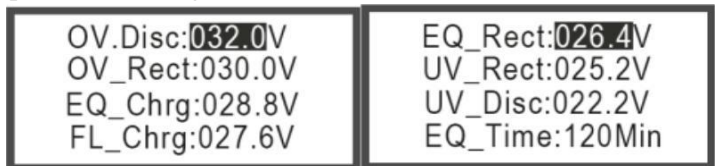
If you choose “Cancel”, it also returns to monitoring interface without saving the settings.

If the password is wrong, the interface will show the following information and return to main menu 1 interface after 5 seconds without saving the settings.



4.2.4 Parameter Set

At main menu 1 interface, let the inverse cursor point at **3. Parameter Set**, press “Enter” key to enter to working parameter setting interface as follow:



After you complete the setting, keep pressing “Enter” until you get the password setting interface. The next setting is same to 4.2.1



Note: Instruction of each parameter

OV_Disc: Over voltage disconnect

OV_Rect: Over voltage reconnect

EQ_Chrg: Equalize voltage

FL_Chrg: Float voltage

EQ_Rect: Equalize recovery voltage

UV_Rect: Low voltage reconnect

UV_Disc: Low voltage disconnect

EQ_Time: Equalize time



Note: the adjustable arrange of Equalize time is 10~180 minutes



Note: The working parameters will affect the battery life directly, the default parameters are the best, so if there is special requirement, please do not change them.



Note: In order to promise a safe performance of solar system, there is a special logic in the controller's program, it is the adjustable arrange of the seven parameters (except the equalize time) is 0.75~1.42 times of battery rated voltage, and they also follow the logic: Over voltage disconnect > Over voltage reconnect > equalize voltage > float voltage > equalize recovery voltage > low voltage reconnect > rated system voltage > low voltage disconnect.

4.2.5 Rated Value

At main menu 1, let the inverse cursor point at **4. Rated Value**, press “Enter” key and enter to rated value interface as follow:

Rated Value BV: 024V PV: 120A



Note:

BV: Rated voltage of battery system

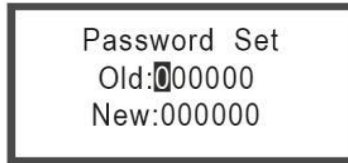
PV: Rated charging current

It's a factory default model for reference, users can't modify them.

4.2.6 Password Set

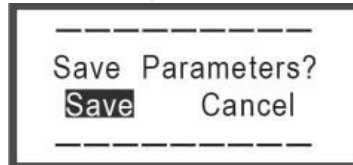
At main menu 2, let the inverse cursor point at

5. Password, press "Enter" key and enter to password setting interface as follow:



Password Set
Old:000000
New:000000

Modify the password through pressing + or - key, after you done the setting, press "Enter" and enter to the following interface



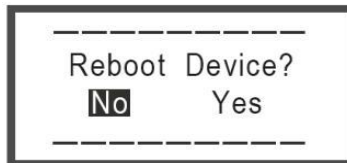
Save Parameters?
Save Cancel

The next setting is same to 4.2.3

4.2.7 Reboot Device

At main menu 2, let the inverse cursor point at

6. Reboot Device, press "Enter" and enter to reboot device interface as following



Reboot Device?
No Yes

If you choose "No", it will return to main menu 1 immediately, if you choose "Yes", the interface will show following information and the controller would be rebooted

REBOOT DEVICE
PLEASE WAIT A MOMENT!



Note: There is no step of putting password for this step, so care about it!

4.2.8 Factory Reset

At main menu 2, let the inverse cursor point at

7. **Factory Reset**, press “Enter” and enter to password interface as follow:

User Password
[000000]

If you put a wrong password, the interface will show the following information and return to main menu 1 after 5 seconds

USER PASSWORD WRONG!

If you put right password, the interface will show the following information

Factory Reset?
No Yes

If you choose “No”, it will return to main menu 1 immediately, if you choose “Yes”, the interface will show the following information and all parameters recovery to factory setting

DEVICE SET RESET.....
PARAMETER SET RESET..
CHARGE ENERGY.....



Note: the buzzer will alarm simultaneously if there is any error, if you both about it, you can cancel the alarm function by yourself, the setting step please refer to 4.2.3

5. Instruction of PWM technology

5.1 What is PWM charging model

Pulse Width Modulation (PWM) is the most effective means to achieve constant voltage battery charging by switching the solar system controller's power devices. When in PWM regulation, the current from the solar array tapers according to the battery's condition and recharging needs. The battery can be fully charged safely and rapidly with pulse current. Pulse current charging model makes battery having more time to react which reduces the gassing volume and makes battery improving the acceptance rate of charging current.

5.2 Bulk charging stage

In this stage, 100% of available solar power is used to charge battery(s). Every time after the controller is rebooted, if it detects the system voltage low than equalize charging point, it will enter to bulk charging stage automatically.

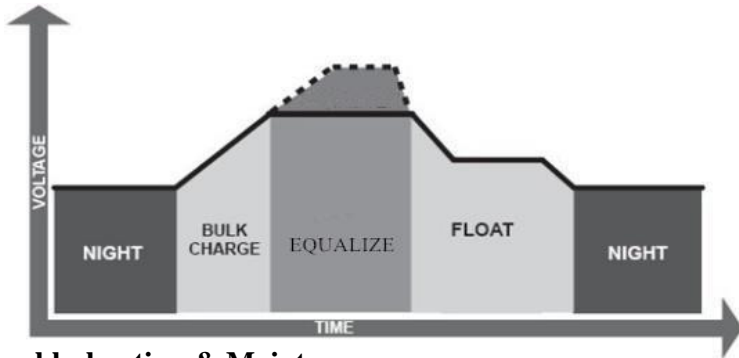
5.3 Equalize charging stage

The controller will enter to equalize charging stage and keep a constant-current charging battery(s) since the system voltage reach to equalize charging point. Constant-current regulation is used to prevent heating and excessive battery gassing. As to factory default setting, the equalize charging stage will remain 120 minutes and then enter to Float charging stage.

5.4 Float charging stage

It will enter to float charging stage after the Equalize charging stage is done. In this stage, it will use a smaller voltage and current charging battery slightly. The purpose of Float charging stage is to offset the power consumption caused by itself and

other equipment in the system, while maintaining full battery storage capacity. Load(s) can continue draw power from battery in float charging stage, even that the system load(s) exceed charging current, the controller will no longer be able to maintain the battery at the Float charging stage, it will return to Bulk charging stage once battery bank system voltage below than equalize charging point. The battery charging information as follow:



6. Troubleshooting & Maintenance

6.1 Troubleshooting

The trouble phenomenon and solutions please refer to the table-1 and table-2 in the last.

6.2 Maintenance

The following inspections and maintenance tasks are recommended at least two times per year for best performance.

- Check the air flow and ventilation around the controller is not blocked. Clear all dirt or fragments around the exit fan.
- Check all the naked wires to make sure insulation is not damaged for serious sunshine, frictional wear, dryness, insects or rats etc. Maintain or replace the wires if necessary.
- Check if LCD display. Pay attention to any troubleshooting or error indication. Take corrective action if necessary.
- Tighten all the terminals. Inspect for loose, broken, or

burnt wire connections. Confirm that all the terminals have no corrosion, insulation damaged, high temperature or burnt/discolored sign.

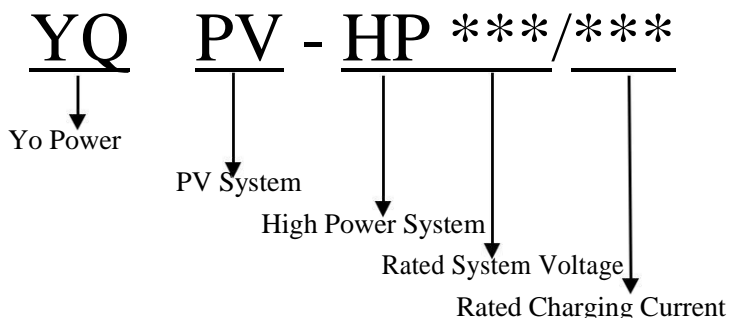


Check and confirm that lightning arrester is in good condition. Replace a new one in time if necessary.



WARNING: Risk of electric shock! Please turn off the power when you do these.

7. Model Instruction



8. Technical Specification

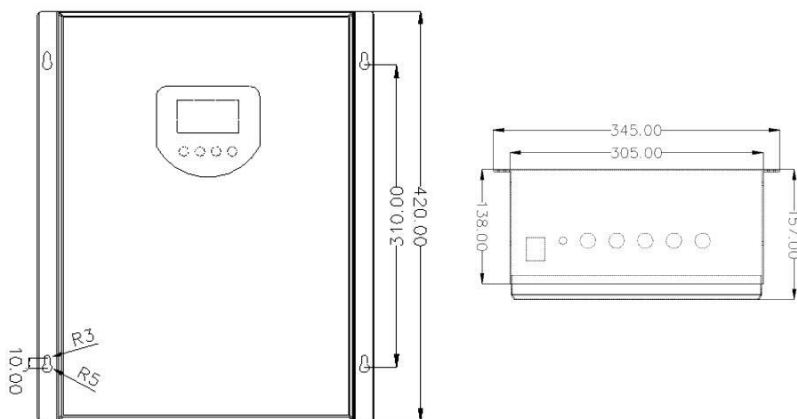
Model	YQPV-HP96V/60A	
Electrical Parameter		
Rated system voltage	96V	
Max. input voltage	192V	
Rated charging current	60A	
No. of input	1 group	
No-load loss	<0.5W	
Equalize voltage	115.2V	Adjustable
Equalize recovery voltage	105.6V	
Equalize charging time	120 Minutes	
Float voltage	110.4V	
Over voltage disconnect	128V	
Over voltage reconnect	120V	

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Environment Parameter	
Display	3'' LCD (White backlight)
Display language	English
Indicator light	Error indicator/Charging indicator
Terminal type	TC Series barrier terminal
Humidity	0~98%, non-condensing
Environment temperature	-25°C +55°C
Elevation	≤4000M, should reduce power if the elevation high than 4000M
Protection level	IP32
Noise	<30dBA
Dimension	420*345*157mm
Weight	11KG
Package size	540*470*280mm
Package weight	12KG
Package information	Hard box with pearl sponge

9. Dimension

9.1 Product dimension



Unit: mm

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Indicator	Fault	Possible reason	Troubleshooting
OV-Volt	Battery over charge	There are other equipment charging battery and make the system voltage unstable	Turn off the PV module(s) and check the real battery voltage
UV-Volt	Battery over discharge	The consumption power is high than charging power	Shut down loads or check if the under voltage of inverter is too low
OV-Curr	Charging current is too large	The real charging current is more than 1.1 times than rated system voltage	Check if the solar power is high than the Max. solar power which controller demands
OV-Temp	High temperature	The heat sink's temperature is very high	The controller will stop charging since the heat sink's temperature high than 75 ⁰ C automatically and recovery since the temperature below than 65 ⁰ C
NC-IGBT	Power module error	IGBT is down	This error couldn't be repaired, please turn off battery and PV arrays, and contact us immediately.

TABLE-1

Fault	Possible reason	Troubleshooting
It doesn't work when you first install it	1. Battery voltage is too low 2. Battery reverse connection	1. Change battery or charging battery by other equipment 2. Please adjust the connection
The controller doesn't charging when sun light on PV modules	1. The PV modules short circle.	1. Check if the connections of PV modules is right and tightened.
Small charging current	1. The sunshine is not good 2. Battery is close to full charge	1. Wait for good sunshine 2. It's normal

TABLE-2

Any Changes without prior notice!