

**Gsolar Power Co., Ltd.**



**XJCM-9A Sun Simulator**

**Installation operation and maintenance manual**

2010 Version

2010-April, English.

## Brief introduction

**Gsolar sun simulator** is a steady state system based on a Xenon lamp light source. The Xenon lamp with appropriate filters to acquire the IEC 60904-9 class A or AM1.5 spectral distribution.

The system comprises a solar simulator, PC, software, printer, infrared sensor and rail guide

### Features:

Measures and displays the following module parameters:

- Complete I-V curve, P-V curve
- Open-circuit voltage, Voc
- Short-circuit current, Isc
- Pm, Vm, Im
- Efficiency .Eff
- Fill factor. FF, Rs, Rsh
- Room temperature(EnvTemp), Module temperature(SurTemp),
- Double flash testing

### Class A solar simulator according to IEC 60904-9

- Xenon flash tube with AM1.5G filter
- +/- 2 % irradiance uniformity
- irradiance and temperature corrections A class

### Proprietary electronic load and data sampling

- measurement reliability surpasses IEC 60904-9
- irradiance level adjustable from 200 to 1200 W/m<sup>2</sup>

Gsolar sun simulator is a high quality, robust and reliable system.

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## 1. Introduction

This manual represents the installation , operation ,maintain and repair work of XJCM-9A solar simulator.

**Please read this manual seriously before installation and operation.**

### 1.1 Abstract

XJCM-9A Sun simulator (Picture 1-1) is used for testing solar module at AM1.5 condition. This system is unique; module faced down and light irradiates the module below it. The xenon lamps simulate the sun light to effect testing.

The simulated sunlight whose spectrum is match to real sun spectrum. After filtration, the spectrum conforms to ASTM E-927 and IEC 60904-9 AAA class standard.



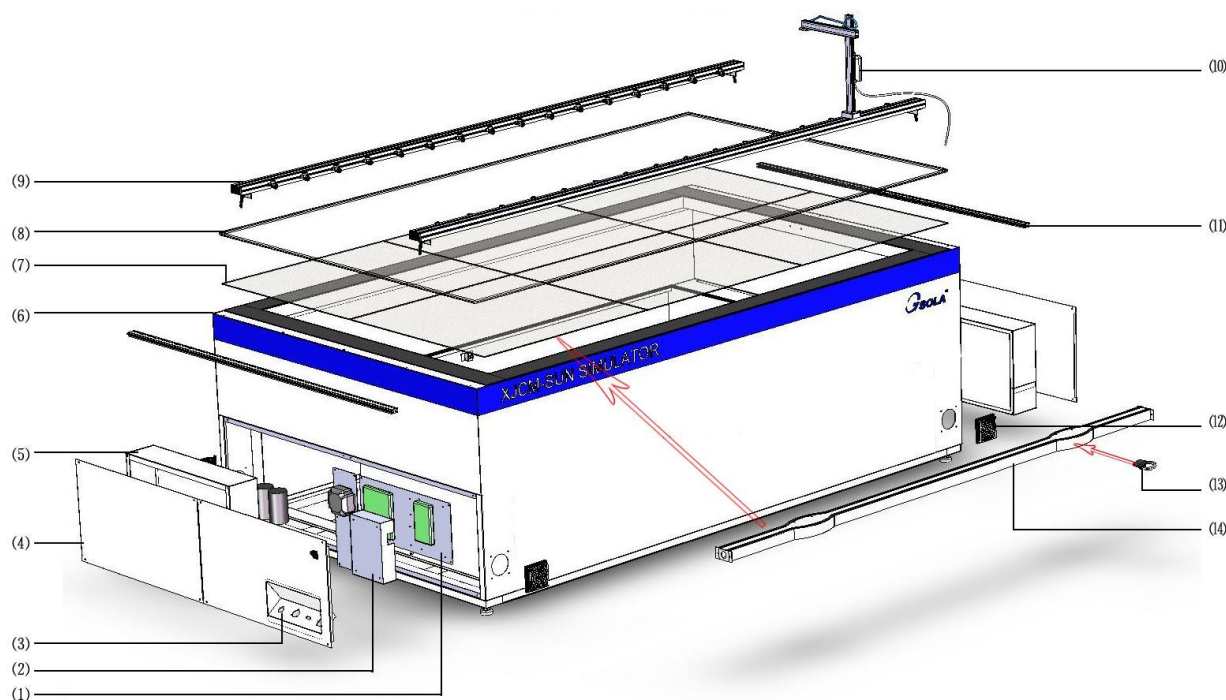
Pic 1-1 XJCM-9A Sun Simulator

Main technical features:

Feature Description	Specification
<b>LIGHT SOURCE UNIT</b>	
Type of lamp	Xenon long Arc

Lamp Power	3,000 W
Max. Illuminated area	2000mm x1100mm
Light Source	flash
Spectrum	AM1.5
Lamp lifetime	>300,000 flash times
Adjustment Range of light intensity	200-1200 W/m <sup>2</sup>
Simulator class as per ASTM E927 / IEC60904-9	<b>A</b>
Spectral Match as per ASTM E927 / IEC60904-9	+/-25% or better
Temporal stability as per ASTM E927 / IEC60904-9	+/-0.3% or better
Non-uniformity of irradiance as per ASTM E927/ IEC60904-9	+/-2% or better
Dimensions (Height x Width x Depth)	2,500mm x 1,500mm x 900mm
Weight	700 Kg
<b>POWER SUPPLY UNIT</b>	
Phase/Voltage/Current/Frequency	Single Phase/220 Volts/10A/50-60Hz
Max. Power Consumption	3 KW

## XJCM-9A SUN Simulator



- ① mounting panel of circuit element    ② shield cove    ③ control panel    ④ side panel    ⑤ inside door    ⑥ metal shell of machine    ⑦ filter glass    ⑧ top glass    ⑨ guide rail    ⑩ IR temperature    ⑪ aluminum bar    ⑫ fan    ⑬ light    ⑭ girder

## 1.2 Solar simulator, model XJCM-9A technical sheet

<b>Model</b>	XJCM-9A
market introduction of model	2006
<b>Simulator dimensions</b>	
total system size (length × width × height)	2,500 × 1500 × 900 mm
total system weight	~700 kg
<b>Light generator</b>	
max. illuminated area	2,000 × 1,100 mm
type of lamp	Xenon
type of measurement	two flash
spectrum	AM 1.5
lamp lifetime (average no. of flashes)	300,000
range of light intensity	200 - 1,200 W/m <sup>2</sup>
load time	10 s
light pulse duration	2x10ms
spectral irradiance distribution (IEC 60904-9)	A
temporal stability (IEC 60904-9)	A
STI	0.2%
LTI	0.5%
non-uniformity of irradiance (IEC 60904-9)	2% (A class 2mx1m)
module faces	down
<b>Light generator - power supply</b>	
phase, voltage, frequency	1Ph, 220-240 V, 50/60 Hz
max. power	3 kW
average power consumption	1 kWh/h
<b>Electronic load</b>	
voltage ranges	1/10/50/100/200V(opt.)
current ranges	0.25/1/2.5/10/20A(opt.)
current / voltage resolution	0.025%

reference cell range	50 mV
accuracy	$< \pm 0.3\%$
max. module output power under flash	1 KW
duration of IV measurement	10ms/20ms
D/A and A/D resolution	12 bit
max. no of measuring points per curve	400
max. data acquis. speed per measurement	20 $\mu$ s
max. module measurements per hour	>20S each time
<b>System control + software</b>	
guide rail	Yes
infrared sensor	Yes
temperature sensor	Yes
computer hardware	Yes
software includes database	Yes
read / print facility for barcode labels	opt.
Components Supplier info	
Electronic load	Gsolar
Computer system	HP
Software	Gsolar
Infrared sensor	Raytek

### 1.3 Work condition

Item	Specification
Work temperature	0~55℃
Storage temperature	-25~75℃
Work Humidity	5~95%RH,
Storage Humidity	5~95%RH,
Work environment	No corrupt gas



## 2. Terminology

Name	definition	unit
$V_{oc}$	Voltage at zero current output	V
$I_{sc}$	Current at zero voltage	A
$P_m$	Maximum output	W
$V_m$	Voltage at maximum power	V
$I_m$	Current at maximum power	A
$V_{dot}$	Voltage of a random appointed point on I-V curve	V
$I_{dot}$	Current of this appointed point	A
$R_s$	Series resistance of module	ohm
$R_{sh}$	Shunt resistance of module	ohm
Eff	Eff = $P_{max} / (\text{Module size} \times \text{Input Light Power})$	%
FF	$FF = \frac{P_{max}}{(V_{oc} \times I_{sc})} \times 100$	%
Temp	Calibrated temp.	°C
SurTemp	real temp. of surface of module	°C
EnvTemp	Real temp of environment	°C

## 3. Facility requirement

- The sun simulator needs the following facilities:

### Public facility requirement

Public facility requirement	
Power	220-240 VAC、10A、50/60 Hz、single phase

- The sun simulator must be grounded independently.**

## 4. Simulator system

The below section is the introduction of the main parts of simulator and their functions in testing.

### 4.1 Computer system

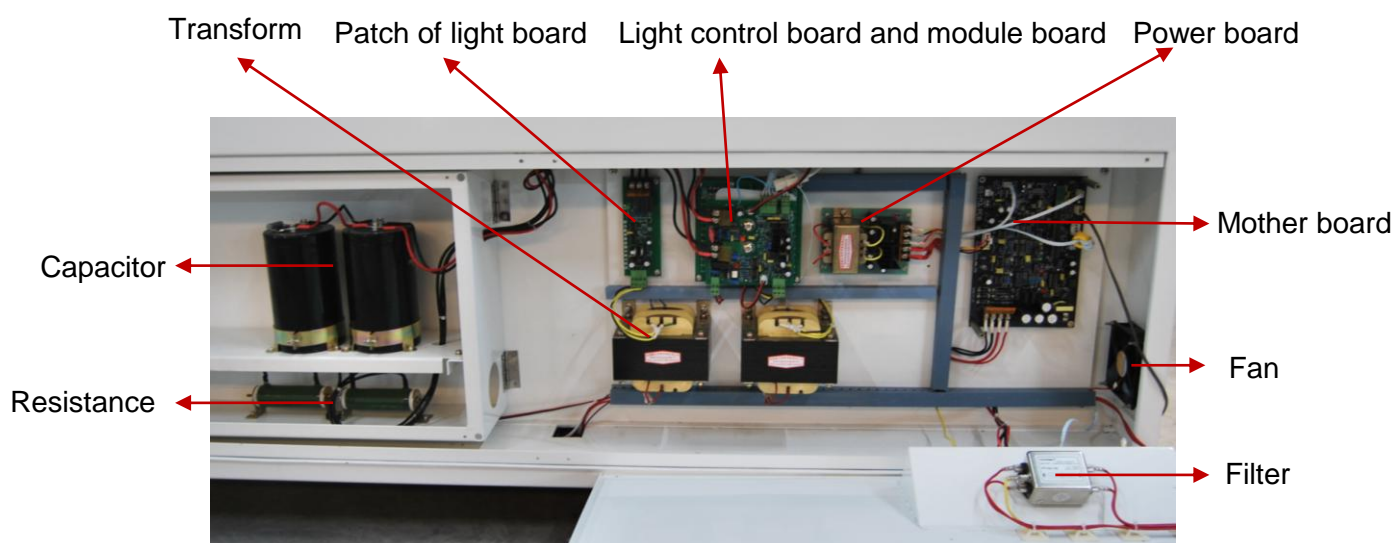
Computer system controls the operation of sun simulator and deals with data. This computer system contains one PC, liquid crystal screen, keyboard, disc drive and testing software.

Control function contains: trigger xenon light, set light intensity, set electric load and data processing which contains output I-V curve, display all the module parameter---operator, ID, time, date, illumination and temperature etc.

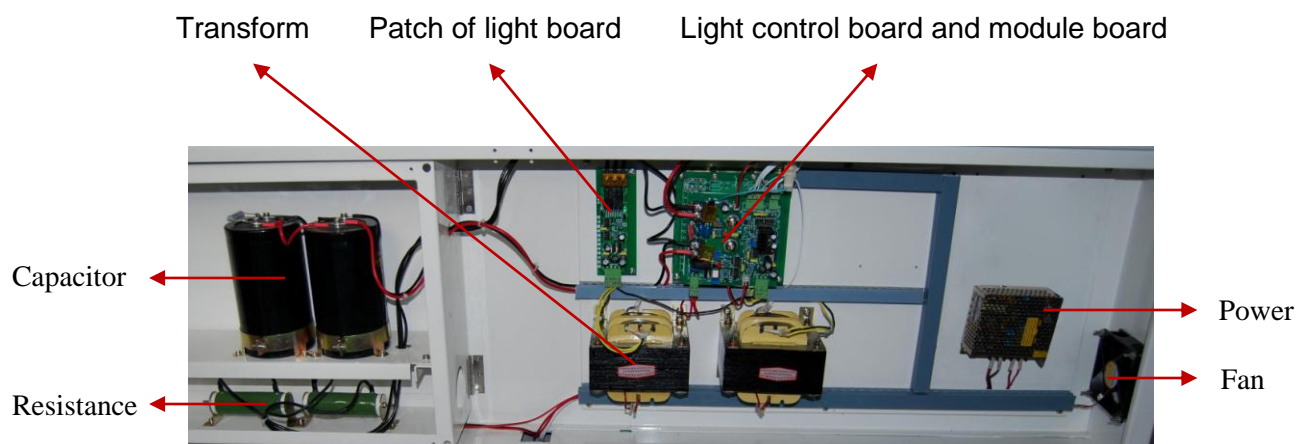
### 4.2 Light board and motherboard

XJCM-9A sun simulator uses two xenon lamps which are controlled by two lightboards to simulate sun light. Lightboard adjusts intensity and was controlled by motherboard to trigger the lamp. The motherboard is controlled by PC system to transfer signal.

A apply two xenon lamps which controlled by two light control boards which were installed at two sides of the simulator. The two light control boards receive the control signal from the mother board. As shown in pic. 4-1 and pic.4-2.



Pic 4-1 Mother board and light control board



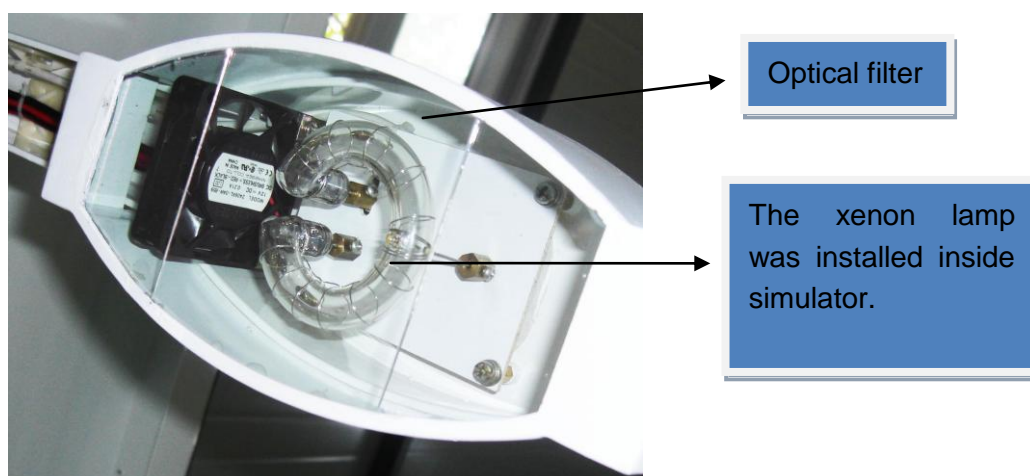
Pic 4-2 Light control board

### 4.3 Xenon lamp and Spectrum filter

Xenon lamps were used to simulate the sun light and could produce light whose wavelength from 400-1100nm that can meet ASTM E-927 standard. XJCM-9A apply 6 pieces of filter to adjust the uniformity of illumination making it up to  $< \pm 2\%$ .

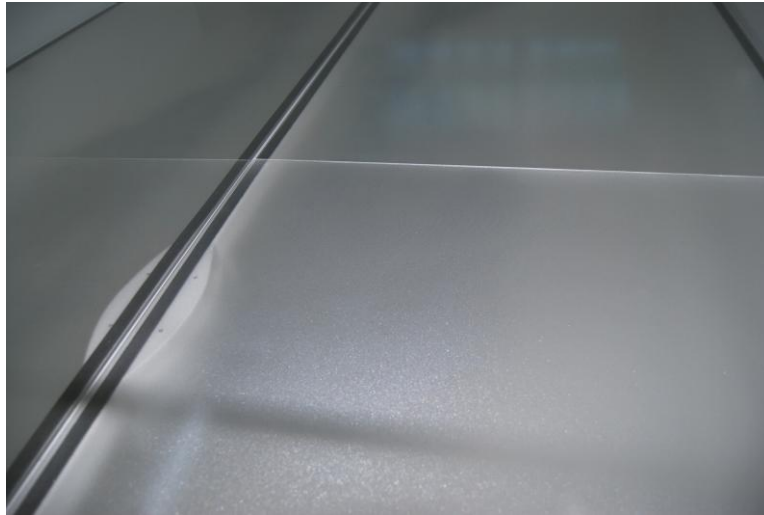


**Never change the lamps' position, the non-uniformity of illumination is affected by lamp position.**



Pic.4-3 Xenon lamps

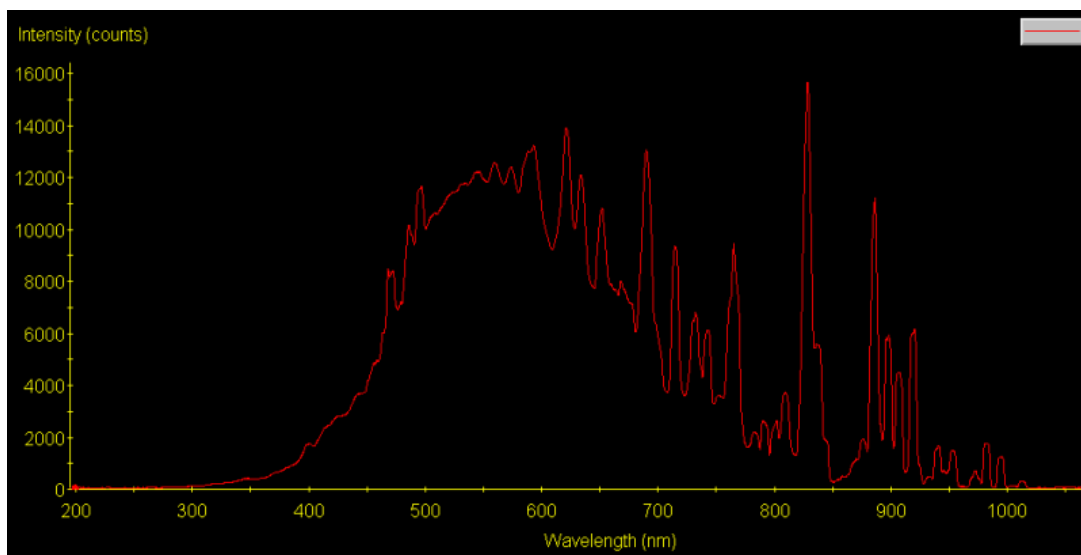
Spectrum filter is made of six glasses with coated on one side, it were used to absorb extra energy of xenon in order to make the spectrum up to AM1.5 spectrum distribution from 400-1100nm.



Pic.4-4 Spectrum Filter

#### 4.3.1 ASTM E-927

The following picture is the spectrum of XJCM-9A sun simulator, from 300 to 1100nm.



Pic. Spectrum of XJCM-9A sun simulator

#### 4.4 Reference cell

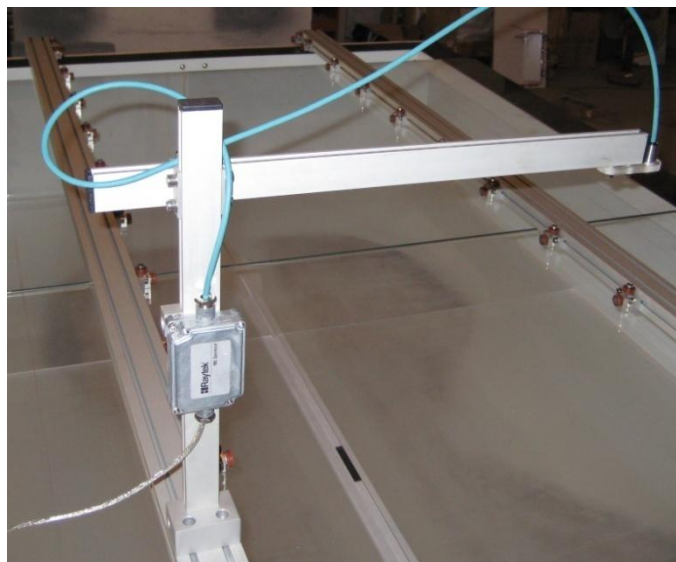
Reference cells were used to adjust the intensity. XJCM-9A has two reference cells installed inside simulator on the two short edges side.



Pic.4-5 Reference cells

#### 4.5 Infrared temperature sensor

Infrared temperature sensor can directly get the temperature of module. It was connected to computer and could provide temp. data to the software in order to make temperature correction.



Pic.4-6 Infrared temperature sensor

## 5. Transport , Unpacking and Installation

Please be careful when moving the sun simulator. Forklift is strongly recommended. There are glasses on the simulator and were packed inside. Therefore, please be careful when unpacking the wooden package and moving the tester.

The following item should be prepared before installing the **XJCM-9A solar simulator**:

### 1 Installation

Unpacking (wooden case): Crowbar, hammer

Deliver: forklift (equipment's weight is 700Kg)

Workers: 4-5

### 2 Operations

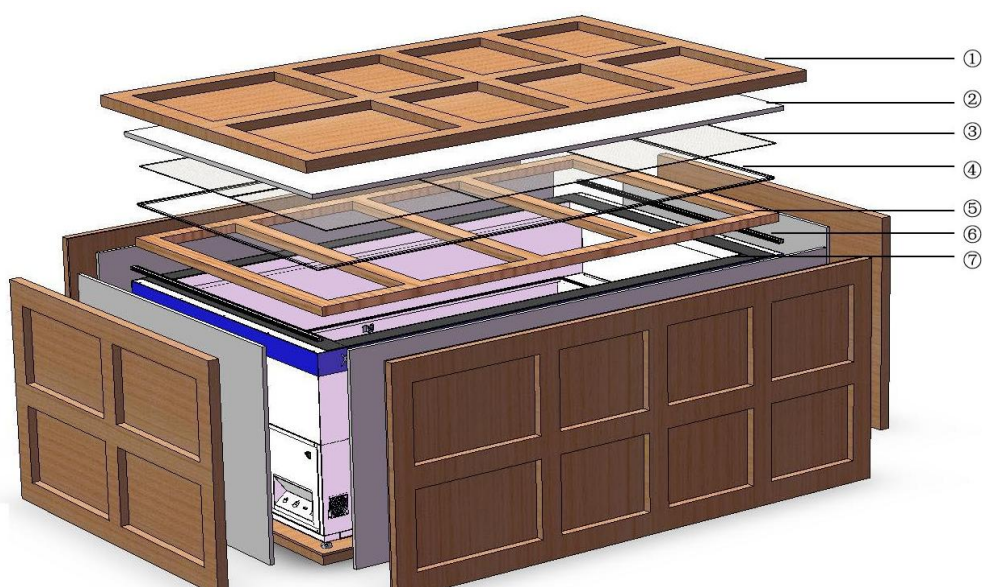
Computer desk: one (or common desk for computer)

Connected to ground: Socket must be connected to ground very well. And connect simulator shell to ground additionally.

### 3 Training

Please dispatch one executive officer and 1-2 operators come to our company to be trained.

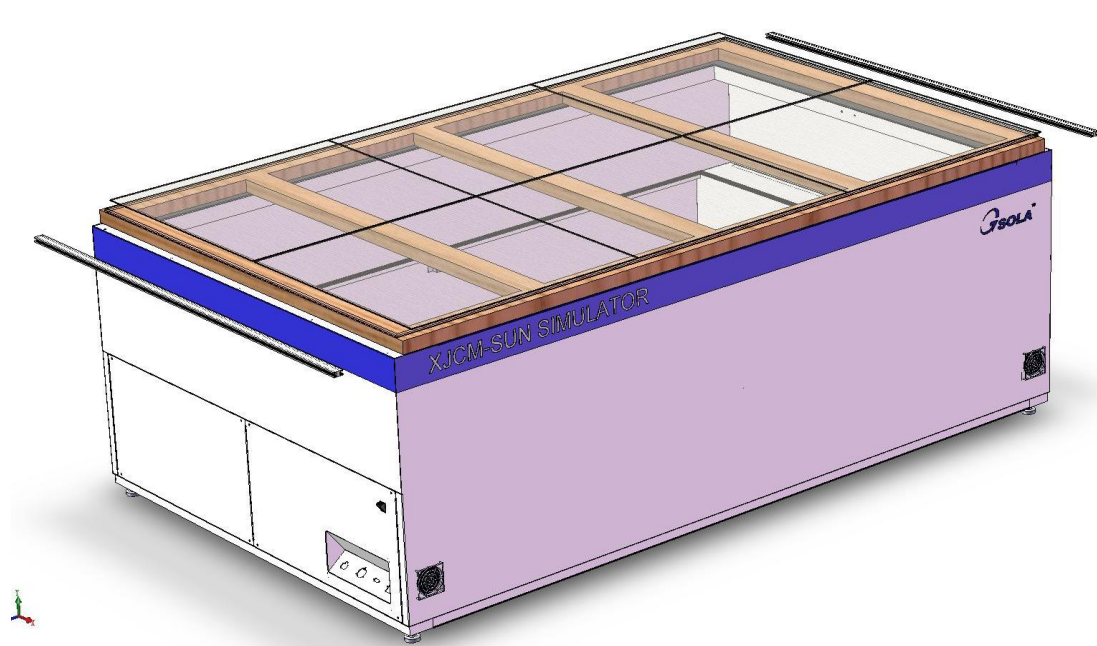
## 5.1 Unpacked process



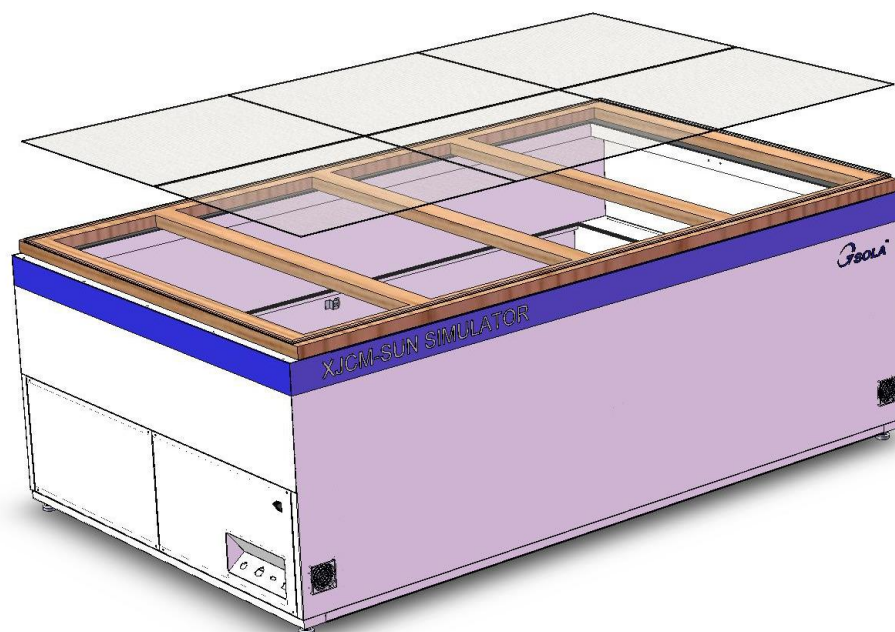
- ① Wooden cover    ② Packing material    ③ Coated glasses    ④ Top big glass  
⑤ Wooden frame    ⑥ Aluminum bar    ⑦ Metal shell of machine



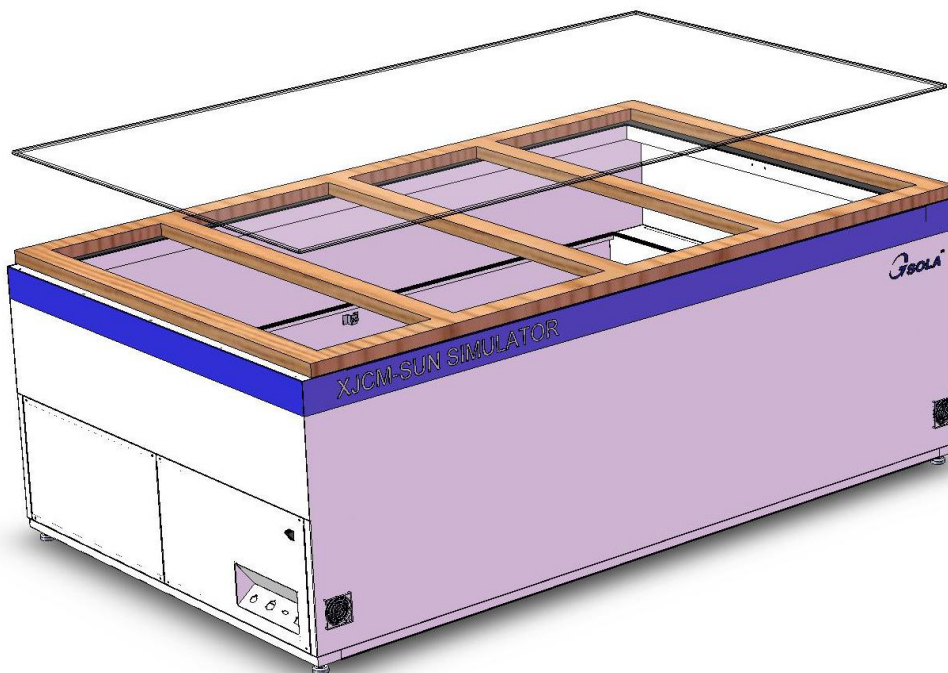
## 1. Remove the aluminum bar



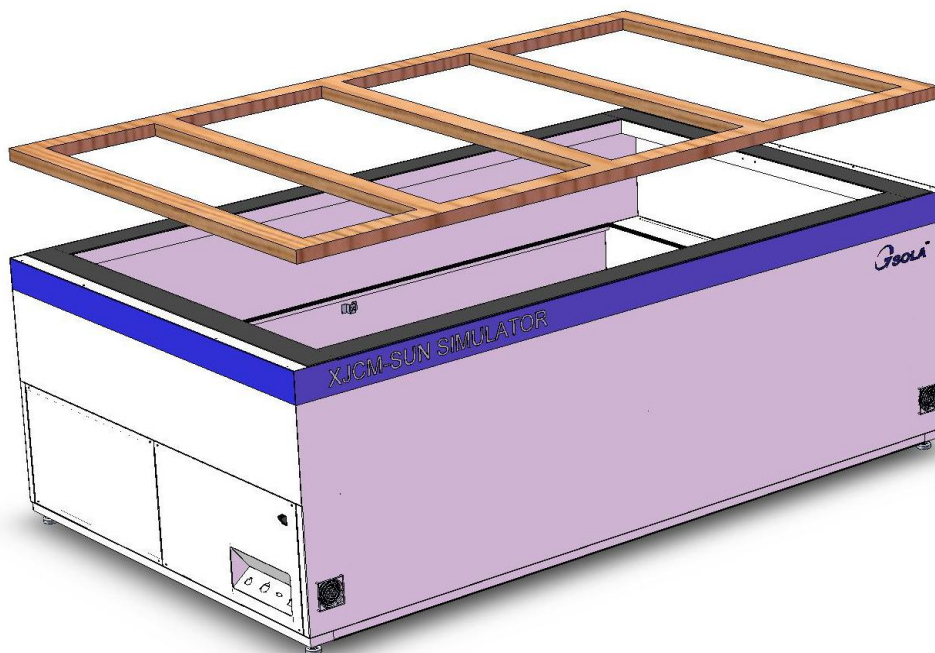
## 2. Remove the coated glasses



### 3. Remove the top big glass



### 4. Remove the wooden frame



**After taking the packing materials down,** you should check it by visual inspection whether there is any damage caused by shipping. If you found any damage, please inform Gsolar and Transportation company.



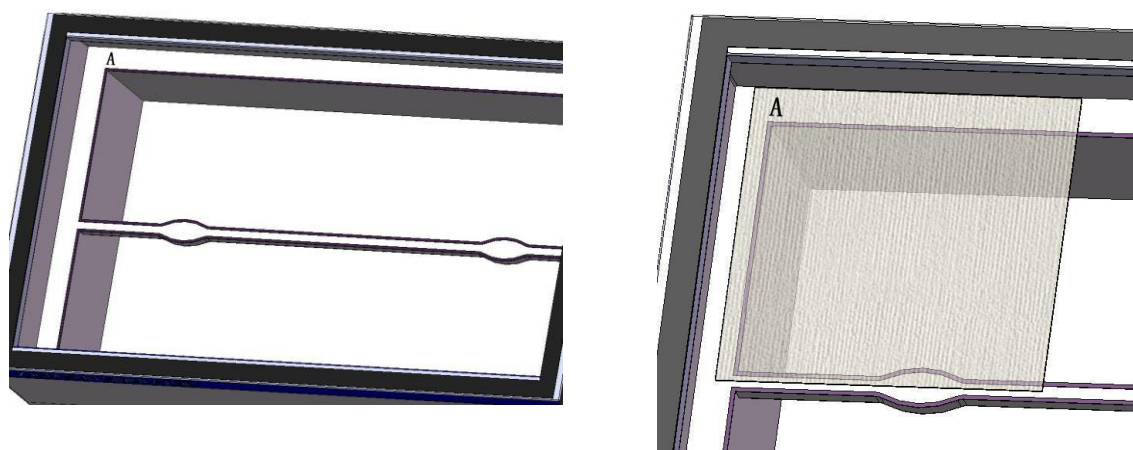
## 5.2 Installation process

### 1. First, install the footing to put the equipment

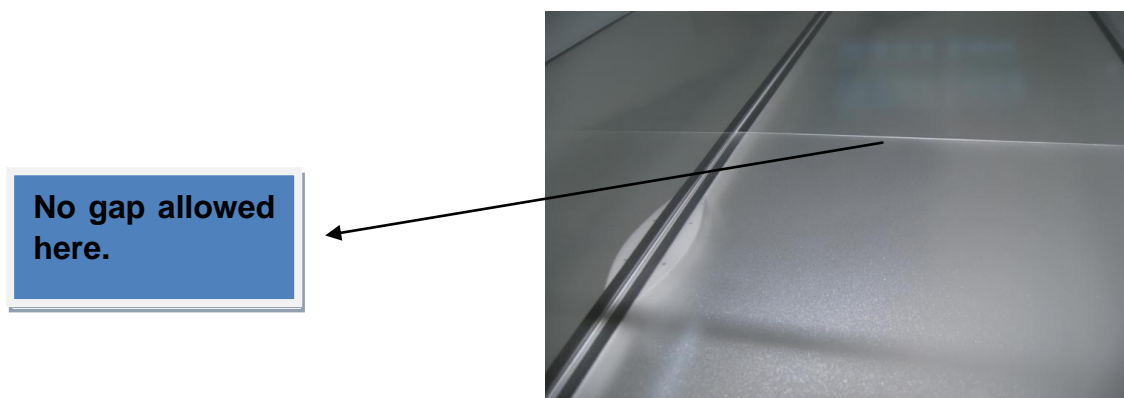
### 2. Put the six coated glasses on the right position

Each glass has one English letter which corresponding to the same letter marked inside the machine. Please make sure the same letter on both glasses and machine installed together. The face with coated of glasses downwards to the bottom.

**Remember never clean the face with coated.**

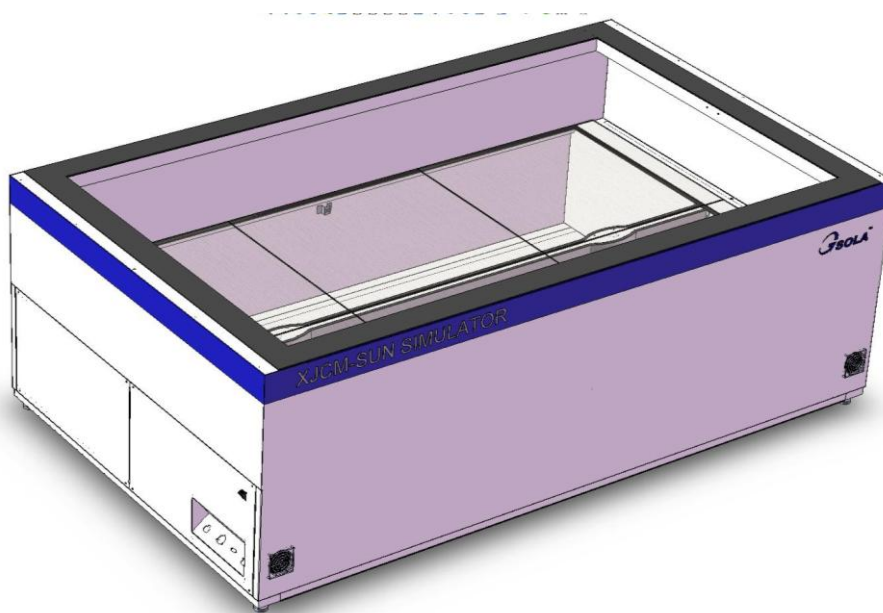
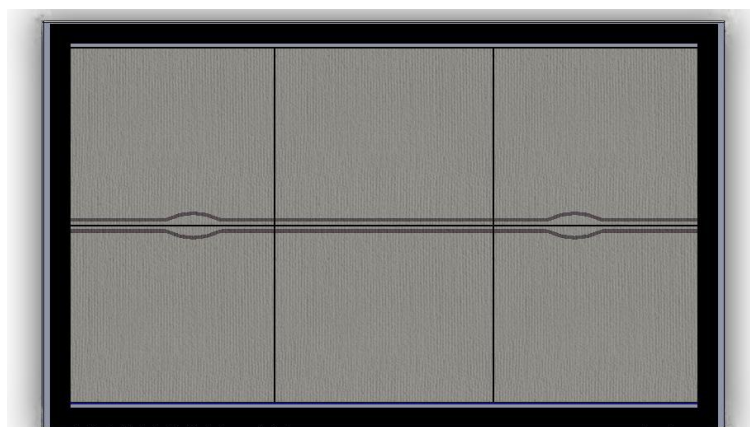


Ensure all the glasses are in position with **no gap** between them.

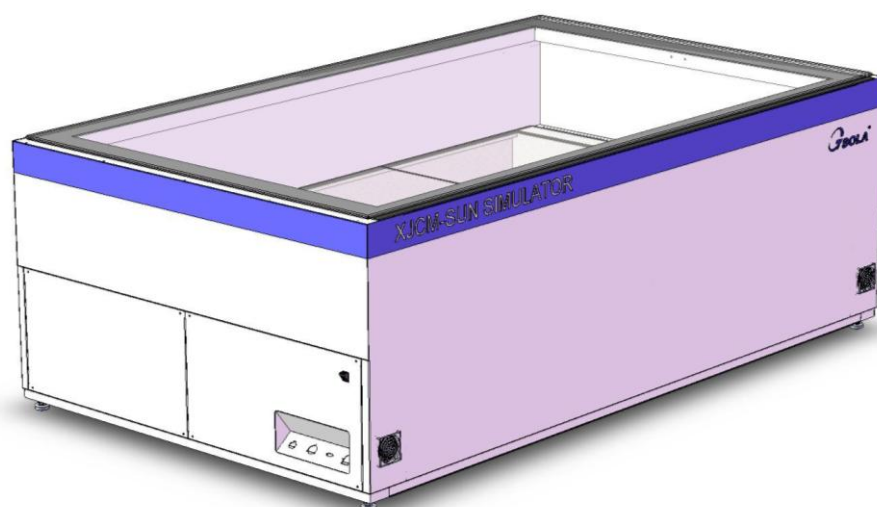


**Attention:** Don't clean non-smooth face with coated.

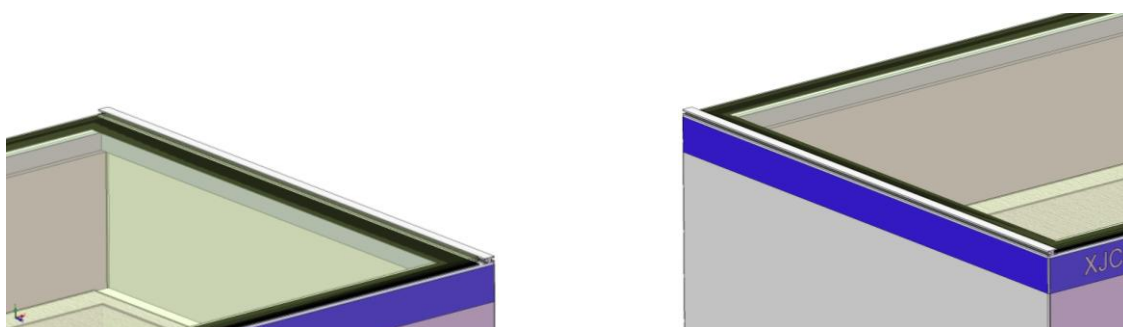
Coated glasses are completely installed.



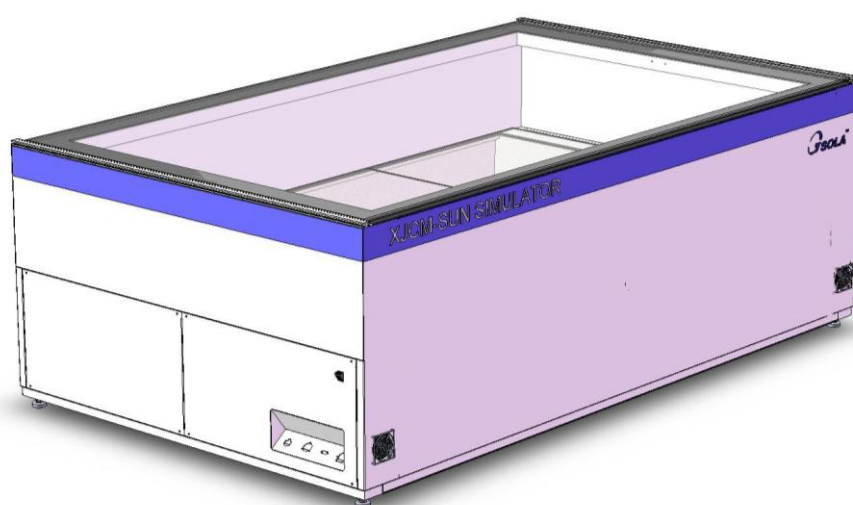
### 3. Install top big glass



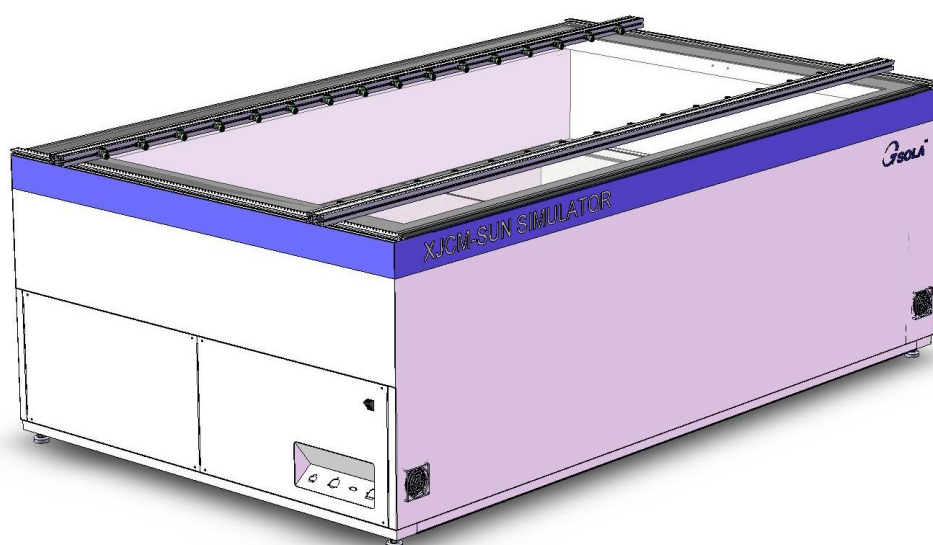
#### 4. Install two aluminum bars



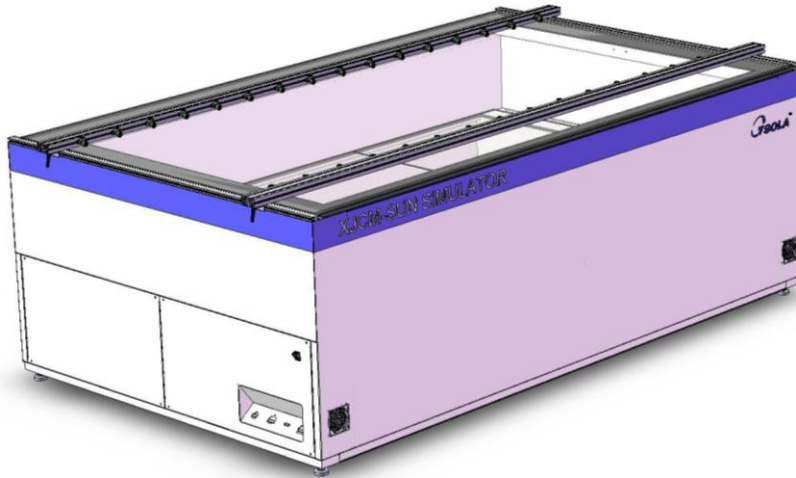
The aluminum bars are installed completely:



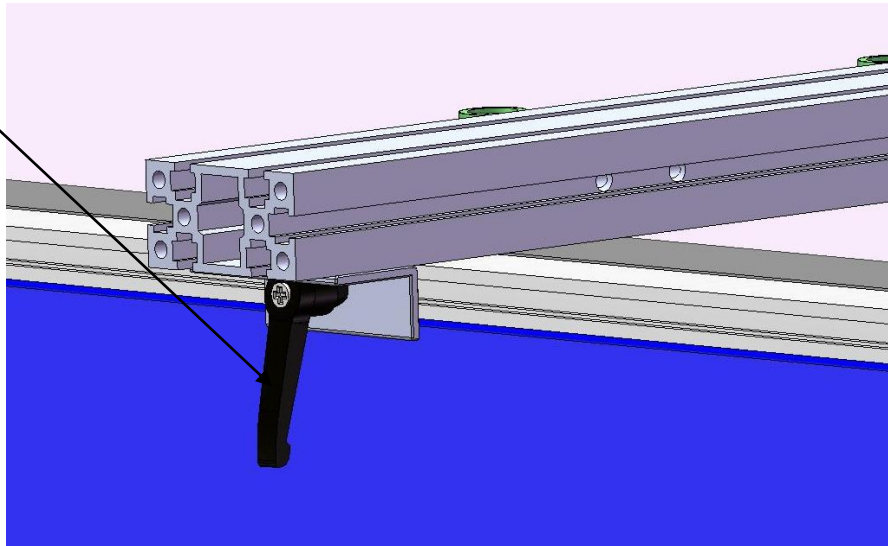
#### 5. Install guide rail



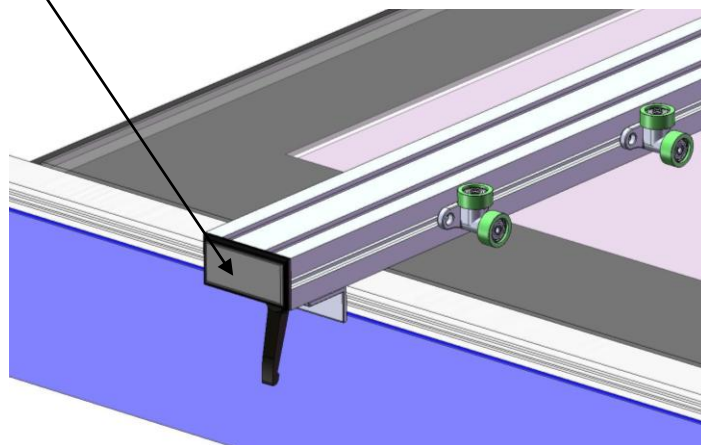
**6. Install fixing screw to fixed the guide rail**



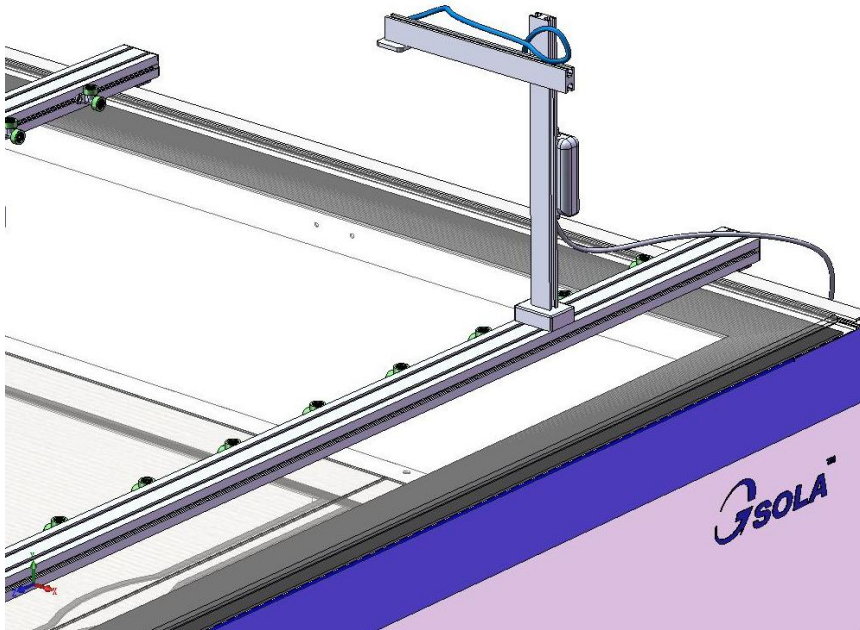
**Fixing  
screw**



**7. Install black cover on head of aluminum bar**



## 8. Install IR temperature sensor



## 5.3 Transport

For any reason customer need to move or transport sun simulator, make sure to remove all the glasses to a safe place, including Top glass and six Spectrum glasses. Please move the machine stable, do not impact!

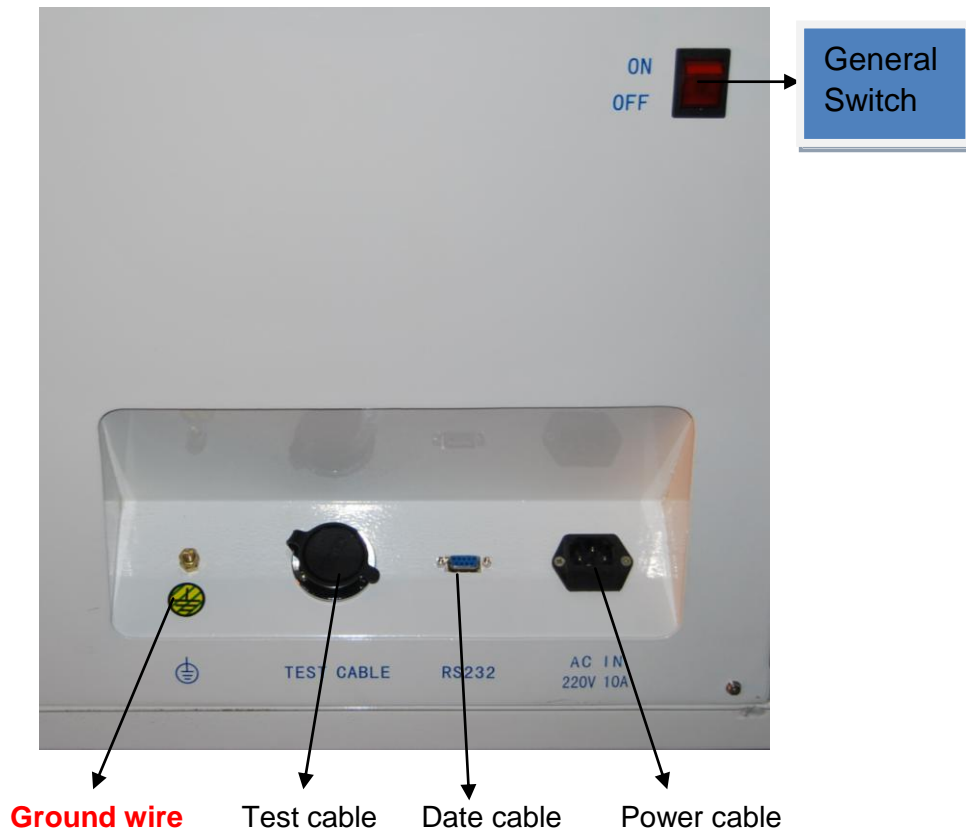
Forklift is strongly recommended to lift the simulator. Please pay attention to the following points when you lift.

- (1) When lifting, be careful drop from folk lifter.
- (2) Lift the simulator slowly.
- (3) Lift machine at 50cm height not too high.

## 5.4 Connect cable

1. Take out the all accessories, including PC, printer and cables.
2. Connect following wires.





3. Install computer and run software then test.

After hardware fixed, the sun simulator is ready for operation. Before effect testing, calibration work has to be done; more details about calibration please refer to the software instruction Chapter-6.

## 6. Software Instruction Manual

This manual should be use as operation instruction to Gsolar Sun simulator software part only, please read carefully before testing.

This software is used to obtain the electrical features and I-V curve of solar cell and module, store and print testing results.

Some requirements to the hardware and software are shown below:

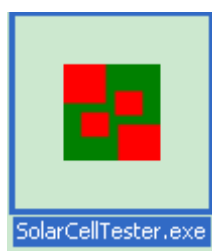
**Hardware:** computer, XJCM-9A tester, link cable.

**Software:** XJCM-9A solar cell professional testing software, Windows XP.

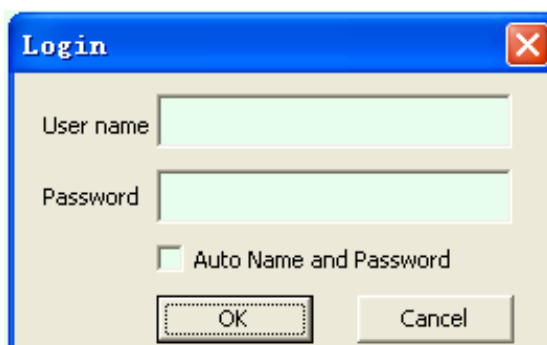
Before testing, please make sure all the devices are connected properly.

### 6.1 Interface Instruction

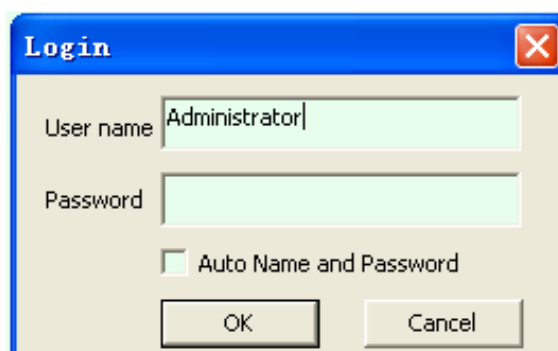
Software could be executed by clicking **SolarCellTester** icon.



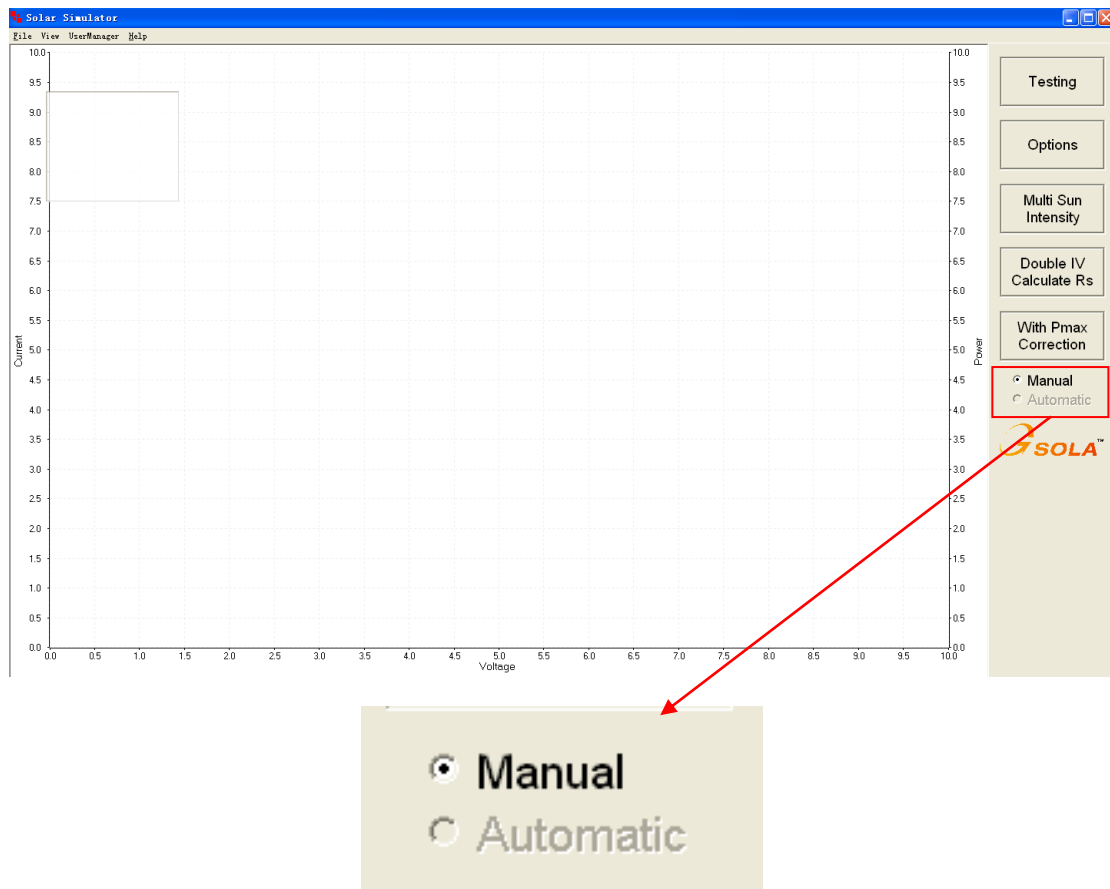
The below pictures are the interface of testing software.



Please input **Administrator** to **both** User name and Password then press OK button.



After that, you will see below interface



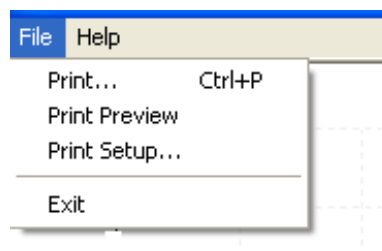
There is two running status in the right panel of the software, 'Manual' and 'Automatic', which means operate manually or controlled by the PLC, and 'Manual' is the default option. If there is no profibus card, the 'Automatic' status can not be used.

## 6.2 Menu bar Instruction

Before we effect testing, it's useful to know some instruction of menu bar.

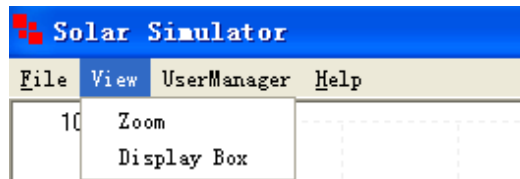
### 6.2.1 File menu

The file menu includes the printing of testing data or results.



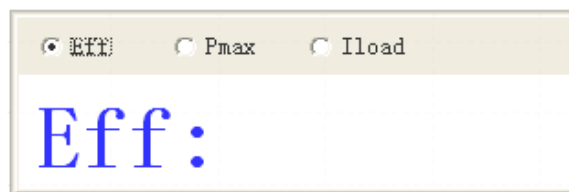
### 6.2.2 View



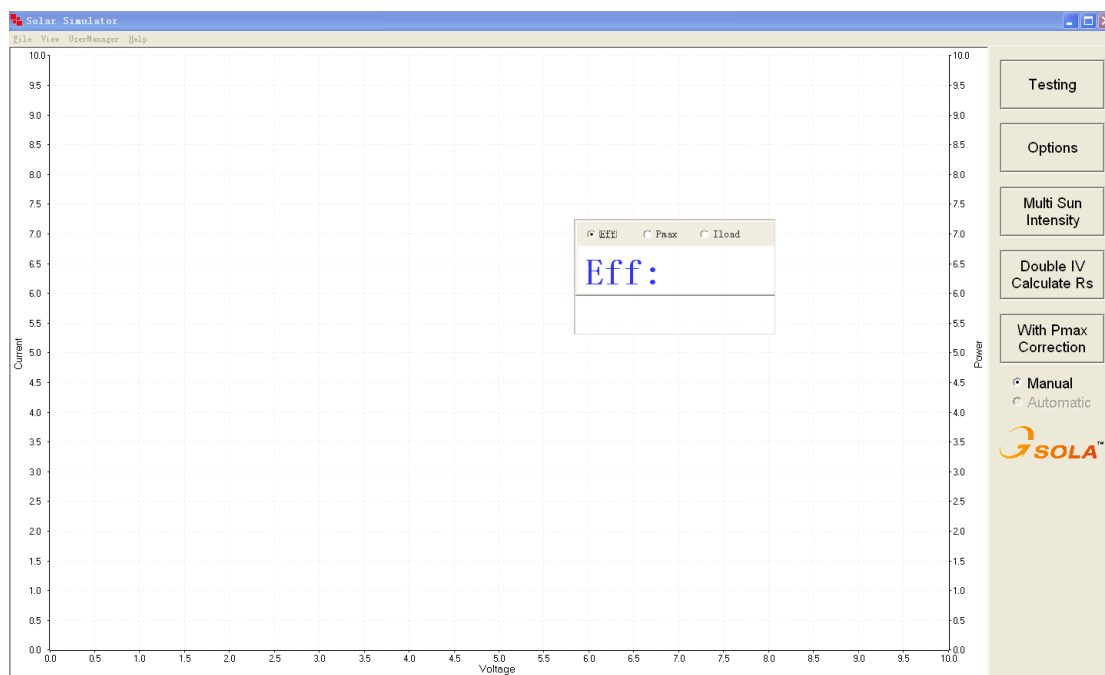


## 1. Zoom

Pressing the Zoom of submenu, then you can see below interface. You can amplification the display of one parameter. The software apply three parameters to choose: Eff,  $P_{max}$ ,  $I_{load}$ .



You could move and scale this floating window, as following pic.



## 2. Display box

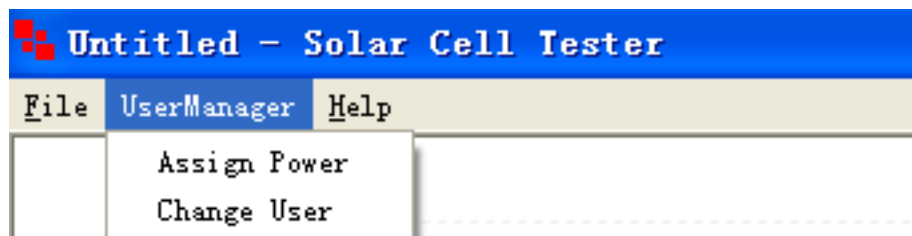
The floating window will return to initial position and size after you choose the **Display box** submenu.

If you want to cancel the amplification, you could choose the **Display box** again.

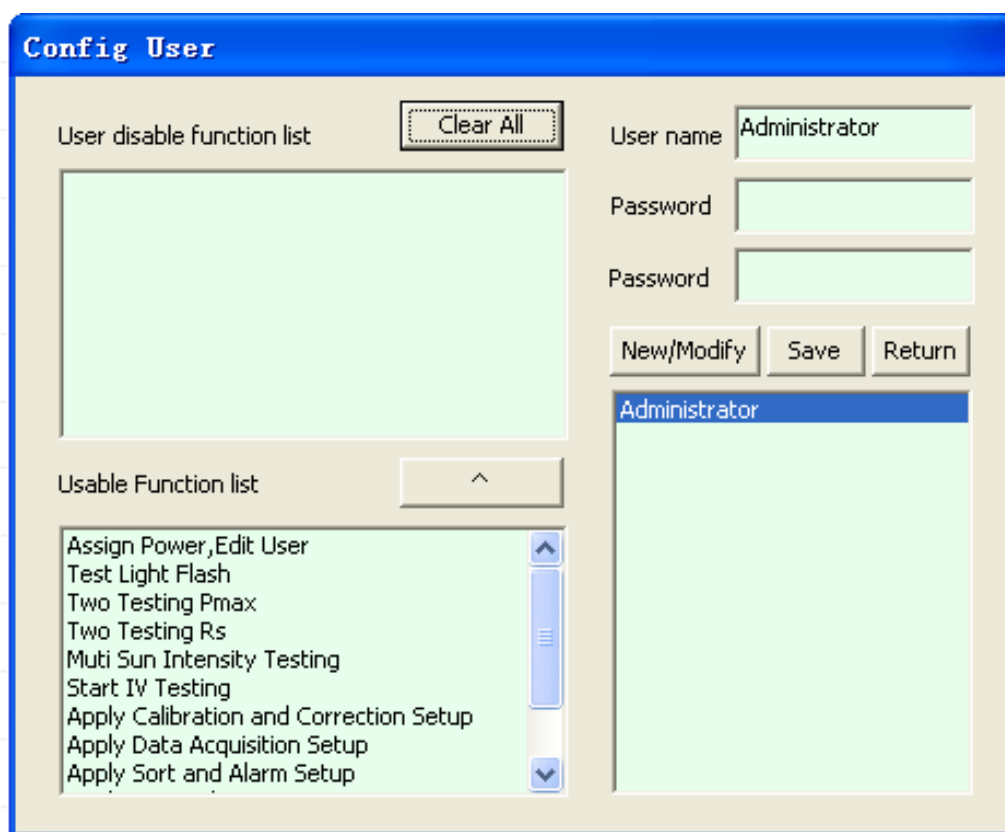
### 6.2.3 User Manager

#### 1. Assign Power

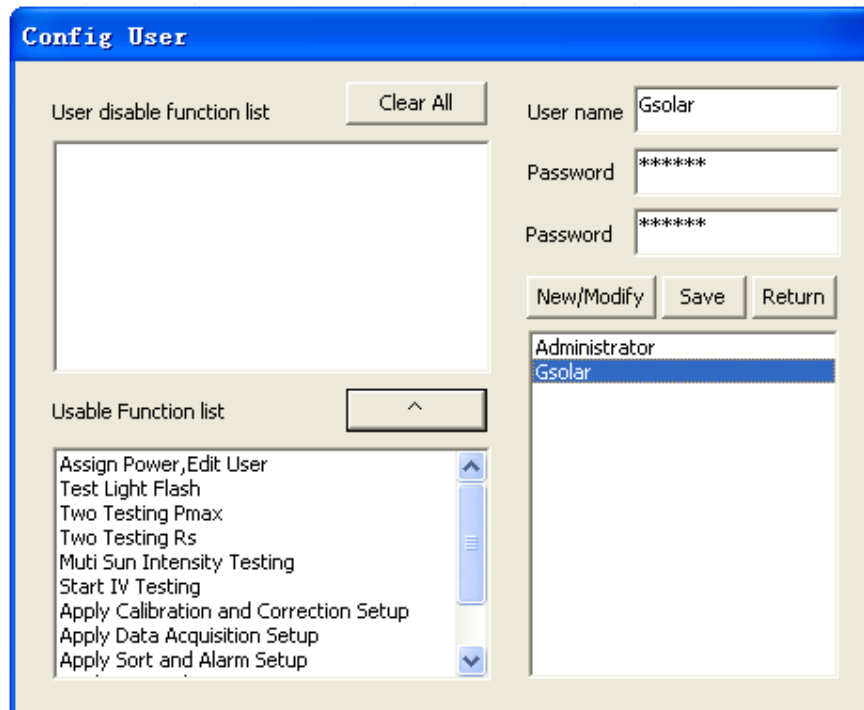
Choosing Assign Power under UserManager on Tool bar of software



After that, you can see below interface

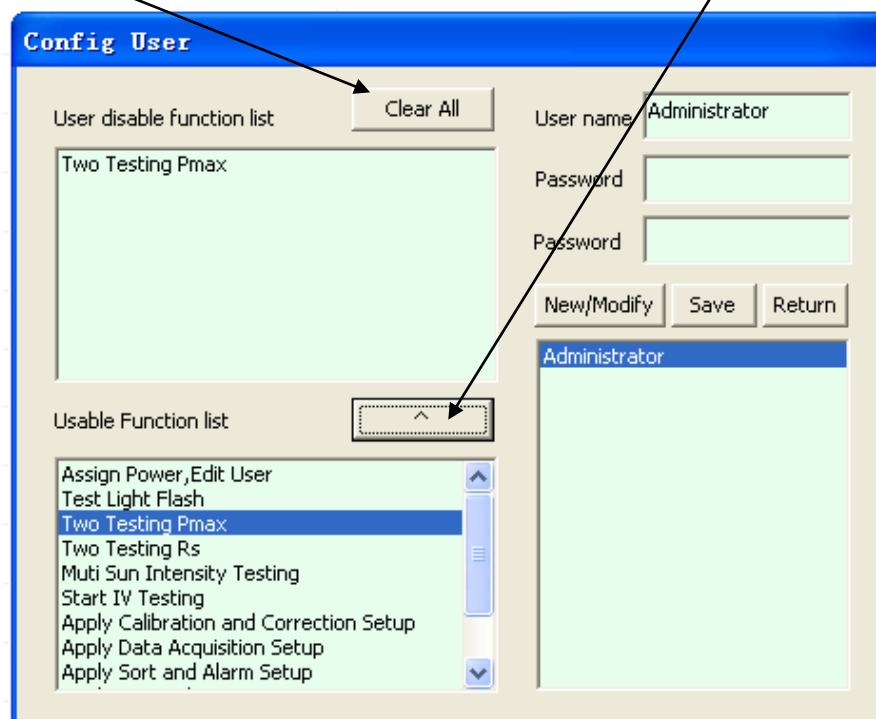


You can add a new custom: after inputting the new **User name** and **Password**, you should press **New/Modify** and **Save** button, then a new custom was added in the user list. If you want delete former user (double click the mouse) and press **New/Modify** and **Save** button.



If you want to hide some functions, please choose current user, then choosing the function in **Usable Function list**, finally press button with up arrow and **New/Modify** button.

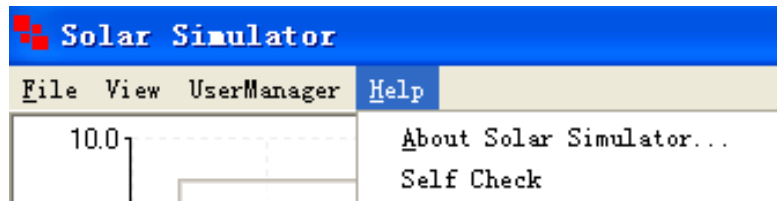
If you want to use the hided functions again, please double click this function in **User disable function list**. Then press the **New/Modify** and **Save** buttons. If you press the “**Clear All**” button, all functions in **User disable function list** will be cleared.



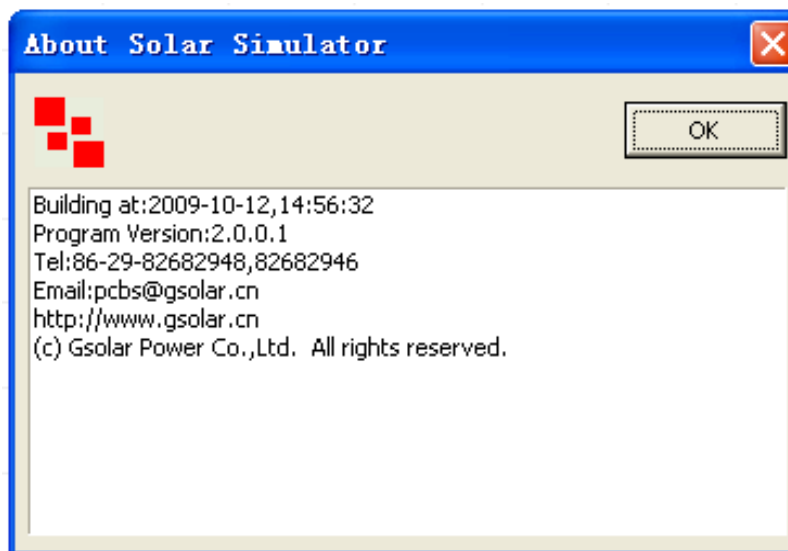
## 2. Change User

If choosing this menu, you will exit the current user and need to login again.

### 6.2.4 Help



#### 1. About Solar Simulator

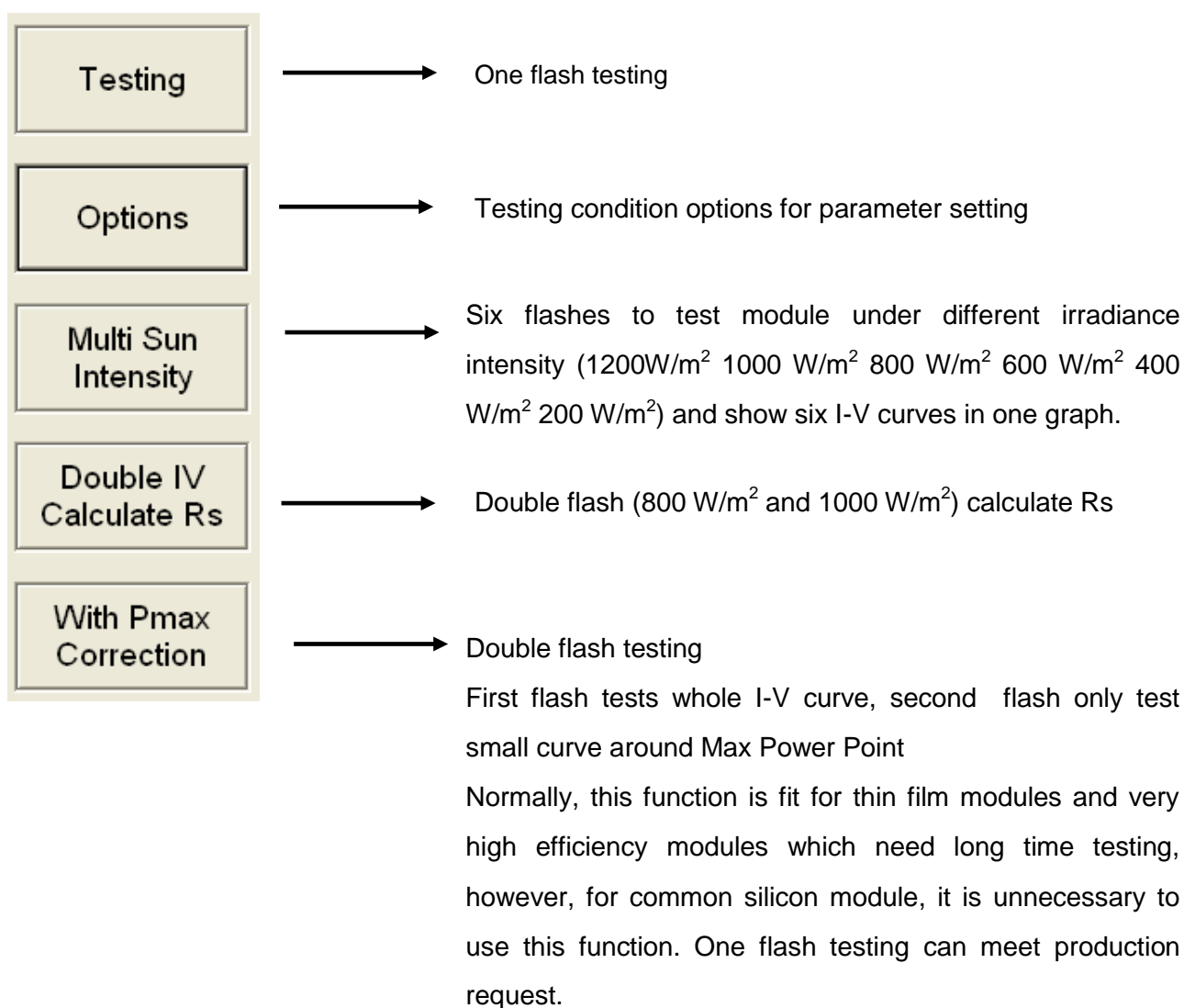


#### 2. Self Check

Self Check—A reference to test the xenon lamp. After you choose this menu, the system test one time, and the sun intensity's attenuation curve will be shown on the screen. If the first half of this curve is straight approximately, the xenon lamp could normal operation. If not the lamp is aging or faulty.

### 6.3 Testing Button

Before we start to present the soft functions, some button declarations will be helpful in operating this software.



### 6.3.1 Testing Button

After you press the Testing button, the software will test according the user's setting. Please refer to the chapter of 6.3.2 for details.

### 6.3.2 Options Button

Under the Option Button, some labels are listed as below.

#### 6.3.2.1 Calibration

**Solar Cell Testing Setting**

Calibration | Acquisition | Data Filter | Chart Axis | Save Data | Print Label

**Current And Voltage Adjust**

Calc

Isc Object: 0 A

Isc Present: 0 A

Isc Factor: 1

Voc Object: 0 V

Voc Present: 0 V

Voc Factor: 1

**Sun Intensity Adjust**

STD. CELL Isc: 0 A

☐ To Sun Intensity: 1000 W/m<sup>2</sup>

**IV Temperature Adjust**

Current Temp. Factor: 0.0002 /Degree

Voltage Temp. Factor: -0.0037 /Degree

Solar Cell Area: 156.25 cm<sup>2</sup>

☐ Using EnvTemp ☒ Using SurfTemp

Object Temp.: 25 ☒ To this Temp.

**Calibration Temp. Sensor**

Calc

Object: 0 C

Present: 0 C

Factor: 1

Area(To Eff): 0 cm<sup>2</sup>

Set Vdot: 0 V

☐ No Calibration And Adjust

Apply Exit

Input each solar cell area not the whole module area

Input the whole module area to calculate the efficiency of module

Before we effect testing, some calibration works have to be done. There are 5 parts under this task.

In the calibration list including the below works.

- Current And Voltage Adjust
- Calibration Temp. Sensor
- Sun Intensity Adjust
- (don't use it here that is for outdoor machine)
- IV Temperature Adjust
- Set Vdot
- No Calibration And Adjust

## 1. Current And Voltage Adjust

In order to make sure the testing result match to the real data, user has to use **Standard reference Cell / Module** to calibrate the tester by adjusting **Current** and **Voltage** according to the Standard Figures of the cell or Module before testing. Firstly, Input the Isc and Voc of Reference Cell / Module then press Calc button and apply button and test ref. Cell/module, we got the result like Pm, Isc, Voc, etc. Compare the test result to the Standard Parameter; if it's different then

**only** adjust the input (**Isc**) to make sure testing result is same with Standard Figure.

There're two **Factories**, one **Isc factor** and the other is **Voc factor**. These two factories will be calculated out after your input of Isc and Voc were adjusted.

The value of the two factories should be in **0.9~ 1.1**.

- **Standard Cell / Module** here refer to the solar cell / module which were tested by some authentic organization and were gave exact figure like Isc, Voc and Power of it.
- **Standard Figure** here refer to the figures given by some authentic organization through a standard way.

## 2. Calibration Temp.Sensor

XJCM-9A tester engages **Temp.Sensor** to acquire temperature of the environment and module. It varies to XJCM-9A modules. Latest XJCM-9A use infrared temperature sensor to obtain the surface temperature of the Cell / Module more precisely and other sensor to get temperature of environment.

This function and IV Temperature Adjust is interaction:

In IV Temperature Adjust, if you choose “using EnvTemp”, the software will calibrate the EnvTemp in “Calibration Temp.Sensor”. If you choose “using SurTemp”, the software will calibrate the infrared temperature which is the surface temperature of module.

**Noctice: NO matter choose “using EnvTemp” or “using SurTemp”, you must input each solar cell, so the “Calibration Temp.Sensor” will take effect.**

**Notice: Customer don't need to calibrated temp. sensor now.**

## 3. Sun Intensity Adjust(this functional is for other machine not simulator)

Sometimes, user wants to know test solar cell or module outside. Gsolar outdoor testing machine XJCM-8W (with a standard cell) can test real sunlight intensity by Input standard cell Isc. Then test each parameter of solar module.

## 4. IV Temperature Adjust

This section is used to make adjustment to the testing result when we want to know the cell or module's electrical property under different temperature. Since the effect of cell's temperature on current and voltage varies according to different kinds of cells. User could input corresponding **Voltage temp. Factor(minus**

**value)** and **Current temp. Factor(plus value)** according to various solar cells. With the cell area value, and environmental temperature or cell surface temperature; we can get the Isc and Voc under certain temperature by calculating. Remember **To This Temp.** have to be clicked in order to effect this function.

**Object Temp**—25 degree. After you choose this radiobutton, even the room is not 25 degree, software will calculate the result automatically then show the correct result at 25 degree.

## 5. No Calibration And Adjust

User could disable all the calibration and adjustment by click this button.

## 6. Set Vdot

When we want to know the value of current under certain voltage, just input the value of voltage value and click **Apply** button. The result will show on the screen.

**Notice:** Customer should use reference standard module to calibrate the machine every 2-4 hours

### 6.3.2.2 Acquisition



XJCM-9A testing equipment can test different size of modules accurately with 4 degrees of current and voltage.

**Customer should choose right range so that the result can be accurate.**

Details show below:

**Current: 0 - 0.25 / 1 / 2.5 / 10 A**

**Voltage: 0 - 1 / 10 / 50 / 100 V or 0 - 1 / 10 / 50 / 200 V according to different motherboard.**

Customer should choose right voltage range which must match the hardware.

If you choose 200V with 100V motherboard, the voltage value will be twice than correct value.

**Light pulse duration**—the customer should also choose right value according to motherboard. Normally, 10ms should be chosen.

**Check External Key** ---- This functional is for other machine not simulator. XJCM-8 and XJCM-9 testing equipment provides external pedal key to trigger testing.

**Enable Test Irev**----This function is adequate for XCJM-9. If you click it, the machine will test reverse current of cell.

**Disable Counter Alarm**---The machine has counter function which can know some wear parts' frequency like lamp, probes of cell tester and other parts.

We supply three counters that customer can name the counter inputting any letter by themselves.

Customer can also set up Alarm value, for example, customer named lamp counter and input 300,000 to Alarm value. In that case, if lamp flashed to 300,000, the machine will alarm to show a warning window

After replacing the wear parts, the customer can press R button to make counter to zero..

**Total Testing Counter**—this counter is recording the testing times that can't be changed by customers.

**Notice:** Remember to click **Apply** button after each setting, otherwise the setting will not be effective

### 6.3.2.3 Data Filter

**Solar Cell Testing Setting**

Calibration | Acquisition | **Data Filter** | Chart Axis | Save Data | Print Label

**Sort**

Update Min 0  
Append Max 0  
Insert Grade Name  
Delete

**Alarm**

	Min	Max		Min	Max		Min	Max
Isc	0	0	Eff	0	0	Idot	0	0
Voc	0	0	Im	0	0	Rsh	0	0
Pm	0	0	Vm	0	0			
FF	0	0	Rs	0	0			

Grade Type

☒ Idot at Vdot  
☐ Max. Power  
☐ Efficiency  
☐ Imax

Alarm System

☐ Disable This Alarm  
☐ Disable Display  
☐ Disable Ringing  
☐ No Save Error

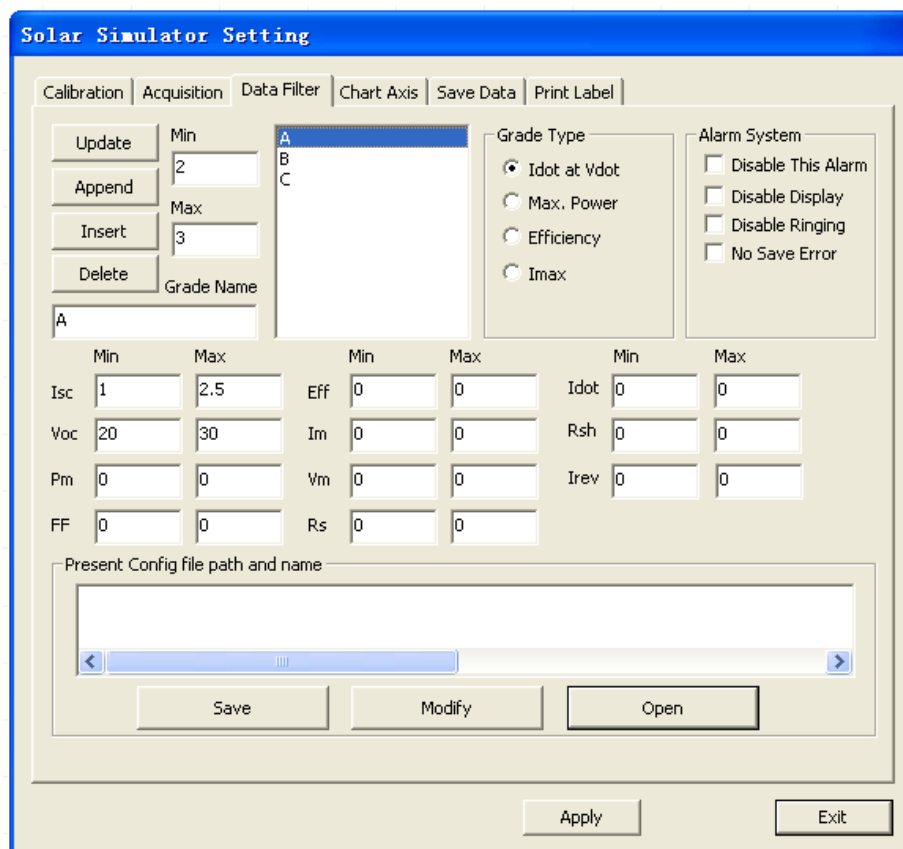
Present Config file path and name

Save Modify Open

Apply Exit

This part includes two sections, one is sort setting, another is alarm setting. The two parts is interaction.

For example, the custom choose the “Idot at Vdot” in “Grade Type”. In the sort setting , input 2 in “Min” , 3 in “Max” and A in “Grade Name”. This suggests that we set a “A” sort which Idot range is 2A-3A. And then set B sort:3A-4A, C sort: 4A-5A.

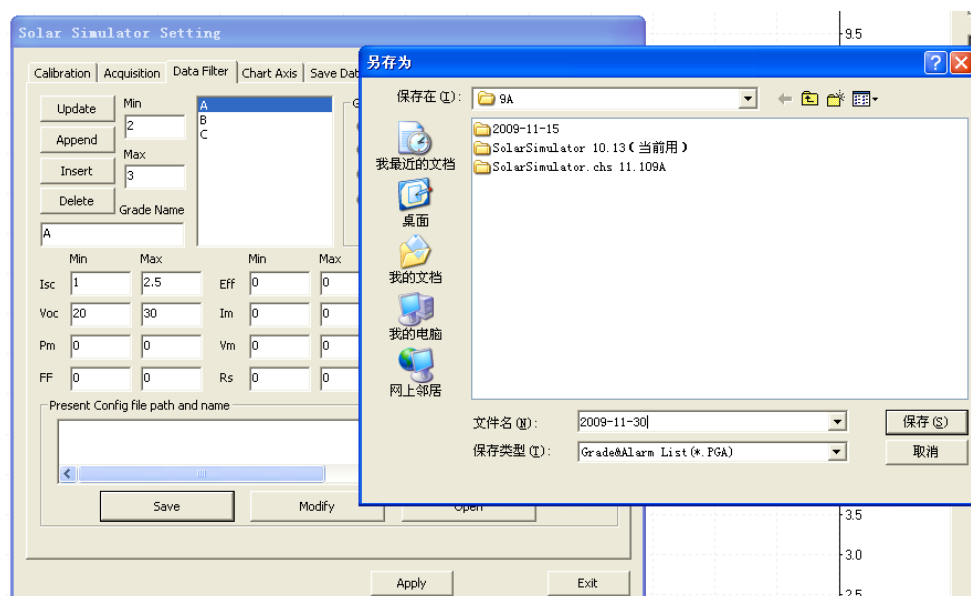


If you want to modify the parameters of one sort, you could press the **Update** button after you modify it. If you want to Insert D sort in A and B, after you setting the parameters of D sort, then choosing the B sort and pressing the **Insert** button.

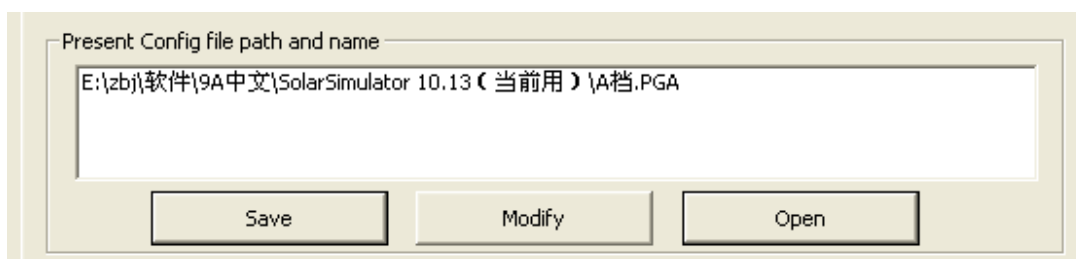
In alarm setting, the custom could input the value of Isc, Voc, Pm and so on. Before that, you should choose the sort you want to set, A sort is for example. Then input the value: Isc (1-2.5A) ,Voc(20-30V).

Setting B sort and C sort according to the above steps.

After setting, press the Save button, and then you will see the below interface. You could name it for yourself.



After saving , you will see a save path in Present Config file path and name.



You could double click the file if you want to remove it in this list. And you could press the **Open** button to open the file which is saved before. If you want to modify it, press the **Modify** button, the parameters will be shown in the editing area, then press the **Update** button after you modify it.

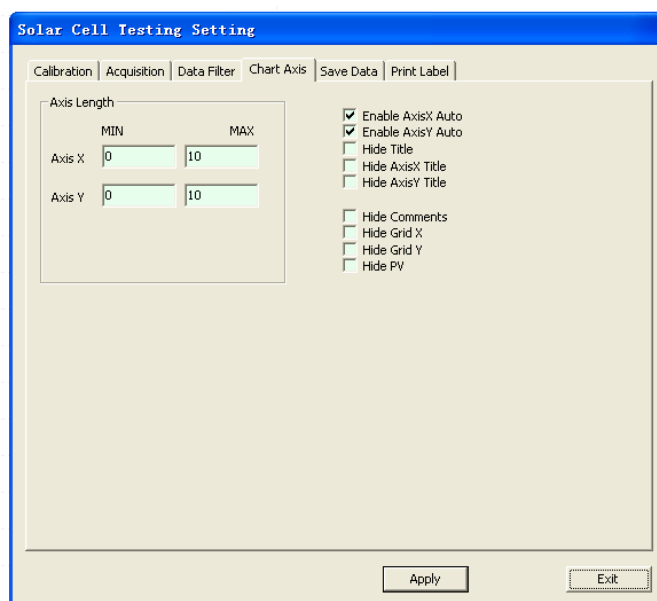
**Notice:** You must press **Save** button after setting, or all the setting will not work.

After the testing is completion, if the testing result of Isc is 2.3A, Voc is 32V, it's A sort according the Idot. The Isc's alarm value of A sort is 1-2.5A, so the software will not alarm. The Voc's alarm value of A sort is 20-30V, the measured value exceed it, so the software will alarm according the Voc.

The software provides four alarm status to customs:

- **Disable This Alarm** — No alarming.
- **Disable Display** — Alarming but not display the dialog.
- **Disable Ringing** — Alarming but not ring a bell.
- **No Save Error** — The error datas will not be saved.

### 6.3.2.4 Chart Axis



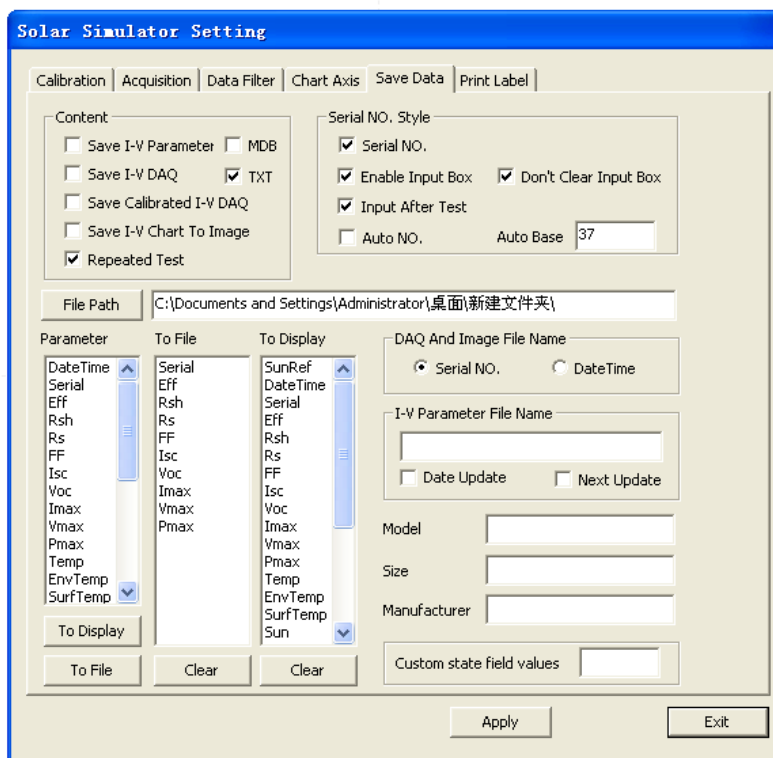
Axis length could be set down according to the chart requirement. There're 9 boxes for clicking in order to enable or hide some testing data.

Remember to click **Apply** button to make settings effective.

**Commonly, only click Enable AxisX Auto and Enable AxisY Auto.**

In that case, the I-V curve will be always in best position no matter people testing big or small size of modules.

### 6.3.2.5 Save Data



## Data saving

- Solar cell tester software provides several saving functions for user in order to save the testing result. In the Content box, there're three items for saving I-V parameter / DAQ / chart separately. The file path is the place where the data is saved.

**Save I-V Parameter** means save parameter to database (.csv format file).

**Save I-V DAQ** means save 400 points raw data of I-V curve

**Save Calibrated I-V DAQ** means save the calibrated datas.

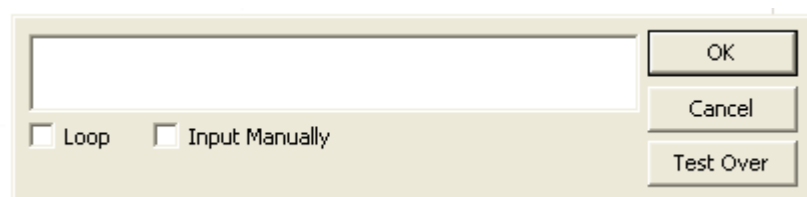
**Save I-V Chart to JPG** means save I-V curve and result as .jpg format picture.

**MDB** means save parameter to database (Access format file).

**TXT** means save the I-V parameters in a notepad.

**Repeated Test** In the automatic mode, it allow the operator to change some options and flash many times until he get the satisfied result and send the data to the plc.

- There're two ways to make a Serial No, to the test result. One is manual, the other is automatic. Serial No. will automatic add up if Serial no is only numeric and Auto Base value was given. Otherwise User has to click **Enable Serial No. Input Box** and **Serial No.** to input the Serial No. by keyboard or barcode reader. If you choose the manual style, the dialog will be shown after you press the Testing button. Then if you use the barcode reader to read-in the serial NO., and choosing the Loop option, the software will automatic to the next loop testing.



There is a check box 'Input manually' in the serial number dialog, you can input the serial number manually by making it checked, or the dialog will display after 2 seconds. The check box is always checked and can not be changed in 'Manual' status.

Input manually: Allow the operator to input the serial number manually if he check the option in 2 seconds. It is always checked and can not be changed in 'Manual' mode.

- **At test complete**— Usually, after pressing test button, a small window will show firstly, customer should input serial No. then lamp flashes.

If customer clicked this box, the lamp will flash firstly then small window show after test complete.

**Notice: Please ensure input the Serial.No, or software will not save the test results.**

**Description:** In the manual input Serial.No mode, if user not input Serial.No, the software will not control the equipment to flash. At automatic mode, if user not input Serial.No, the software will not save the test results. At this mode, please choose time as the file name to ensure the DAQ and BMP file's synchronization saving.

- **Date update**—click this means the I-V parameter can only be saved one day.

**Next day**, the new I-V parameter csv file will replace the former one.

**Next update**---click this means the software can only save present testing parameter. The csv file will change every flash testing.

- User can choose the parameters listed in the Parameter Column and listed these items in the **TO FILE / TO DISPLAY** column, after effect the settings by clicking **Apply** button, then the corresponding figure will be saved in database or only displayed on the screen.
- The test result of I-V curve will be stored as JPG format and could be named as **Serial No.** or test **Date time**
- The test result of all parameters' value will be stored in csv format file and the file could be renamed.
- XJCM-9A tester allows user input the Module name, size and the manufacturer in order to make a record.
- **Customer state field values**—means customer can write some notes (only number) to module.

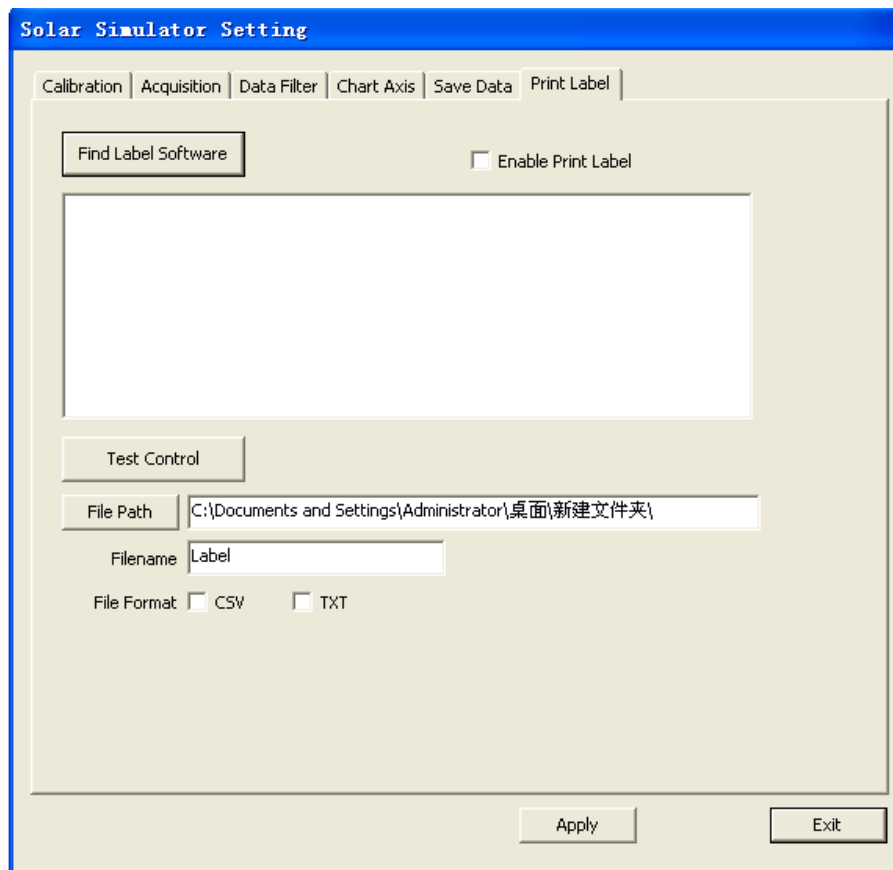
Software can also save these notes in csv. File.

**Remember to click Apply button to affect settings.**

#### 6.3.2.6 Print label

**This function allows customer to print label after each testing.**

**However, our software can only match Postek G3106 label Printer.**



### Enable Print Label:

If clicking this, customer can only save all parameters of latest one flash testing in csv file separately.

There are two check boxes in 'Print Label', which are 'CSV' and 'TXT', you can select the file format to save the label. Select 'TXT' to save the label file in a notepad.



## 7. Maintain and repair



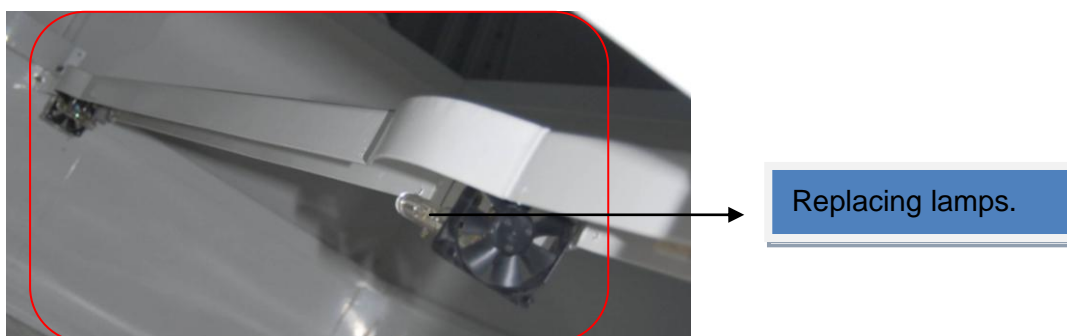
**Please cut off the power before any repair and maintain work!**

### 7.1 Change lamp

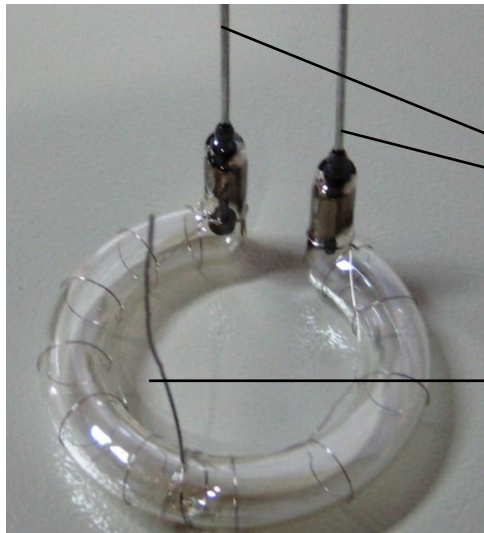
When the lamp got problem like life terminate, it should be replaced. For safe operation and repairmen, first cut off the power and rest the simulator for 30 minutes. When replace the lamp please don't change the height of lamps.

Replace lamp process including: loose screw, take out the lamp, fix new lamp, tight the screw

1. Repair the machine after switch off 30 minute later.
2. Open the door on side of machine, remove the filter mask. Go through in and change the lamp.



**Attention: Xenon lamp will be hot after use and contain compressed air - Danger of explosion. Don't touch lamp with finger directly. please wear protection glasses when change the lamp.**



**Electrode wire!**

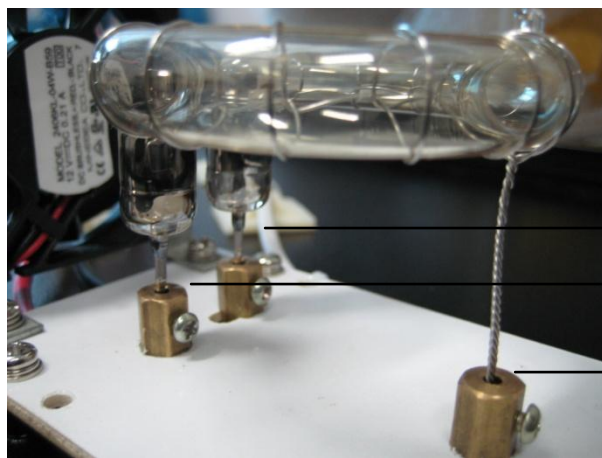
**Never touch the lamp when power connected!**

**high voltage wire**

## 7.2 Remove lamp

XJCM-9A has two xenon lamps which were installed on the lamp board.  
As shown the follow picture.

1. Loose three screws(two fix the electrode and one fixes the trigger wire)



**Trigger high voltage wires were fixed on the lamp board**

2. Take out the lamp slightly and slowly.



**Keep the trigger wires away from electrode avoid spark**

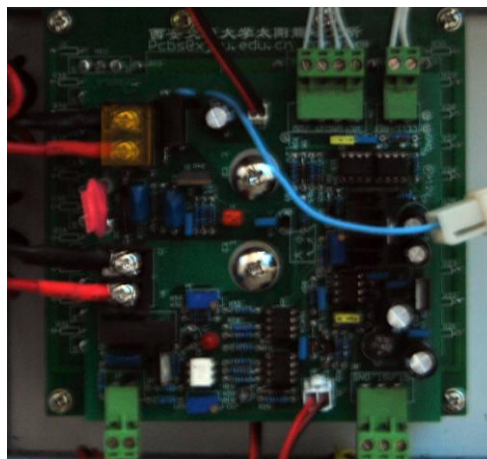
Input the electrodes and trigger wire of the lamp to copper pillar simultaneously until the wire can't be input any more. Fasten the screws, then the xenon lamp will be replaced okay.

**Attention: Don't tight the screws hardly avoid the screw cutting the wire.**

### 7.3 Replace mother board and lamp control board



Mother Board



Lamp Board

**When replace the mother board or lamp control board, make sure the power was shut down and rest the sun simulator for half an hour.**

Gsolar sun simulator connects the mother board and lamp control board by screws and wires. Before replacing, please notice the position where all the wires were connected.

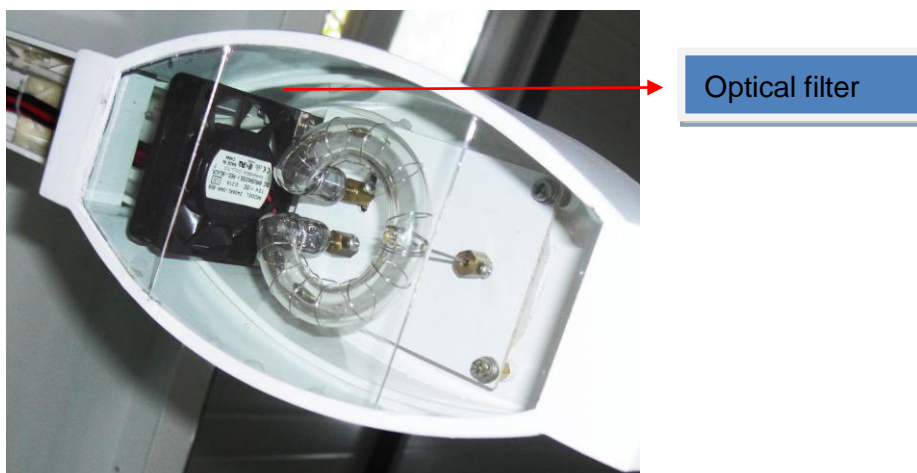
- Loosen the screws and wires
- Replace the board and connect the wires and screws.

**Note: Never confused the positions of the board where the wires were connected. Wires vary in color, diameter and size.**

## 7.4 Maintain

### 7.4.1 Daily

- Use some clean cloth to clean the top glasses, keep the top glass clean and no nick.
- Use standard module to adjust the equipment eachday or every work shift.
- Use some clean cloth to clean the optical filter, keep it clean.



### 7.4.2 Month


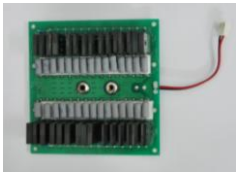





- If the dust is too much, the light intensity and spectrum will be influenced.
- You can clean the inside shell of simulator if there is too much dust.









### 7.4.3 Yearly

- Check the lamp according to usage frequency. If it is not stable, Please change it.


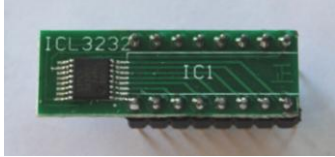
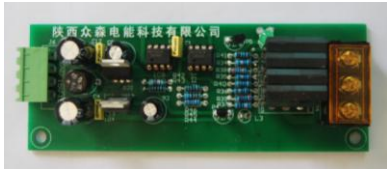

## 8 Appendix

### 8.1 Supplier Documentation

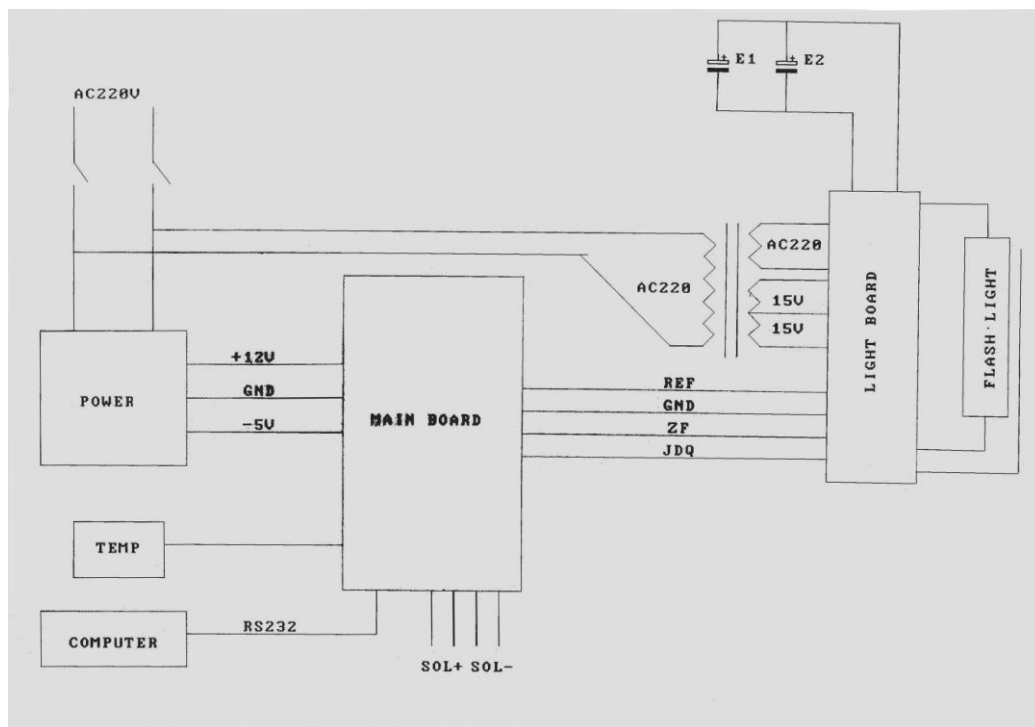
Items	model	picture	supplier
Motherboard	GS-M3		Gsolar
Module board	GS-MK30		Gsolar
Light board	GS-LB20		Gsolar
Lamp 3000W	GS-L3000		Perkin Elmer
Reference cell	GS-C60		Gsolar
Data wire	GS-RS-3		Gsolar
clip of data wire	GS-JZ		Gsolar

Testing cable	GS-CS25		Gsolar
Electro Capacitor(10000 MFD 450VDC)	GS-CAP100		Gsolar
resistance R-50	GS-R50-2		Gsolar
Fan	GS-F60		Gsolar
Temp.Sensor	GS-B20		Gsolar
Power board	GS-DC12		Gsolar
Transformer	GS-E2012		Gsolar
rolls	GS-RO-696		Gsolar



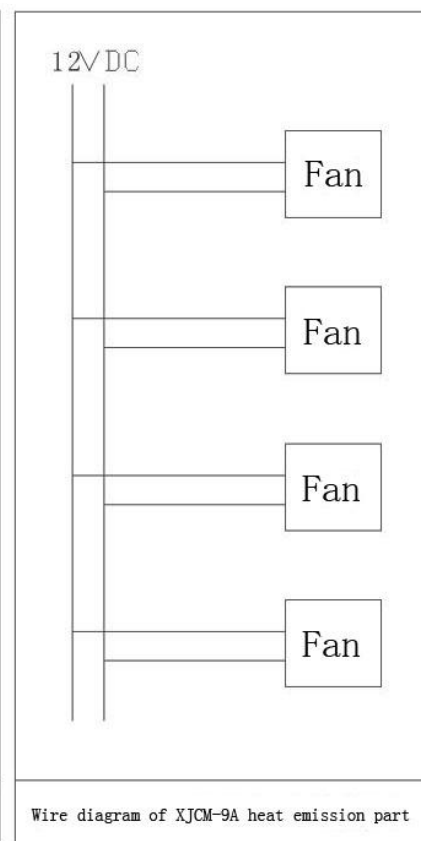
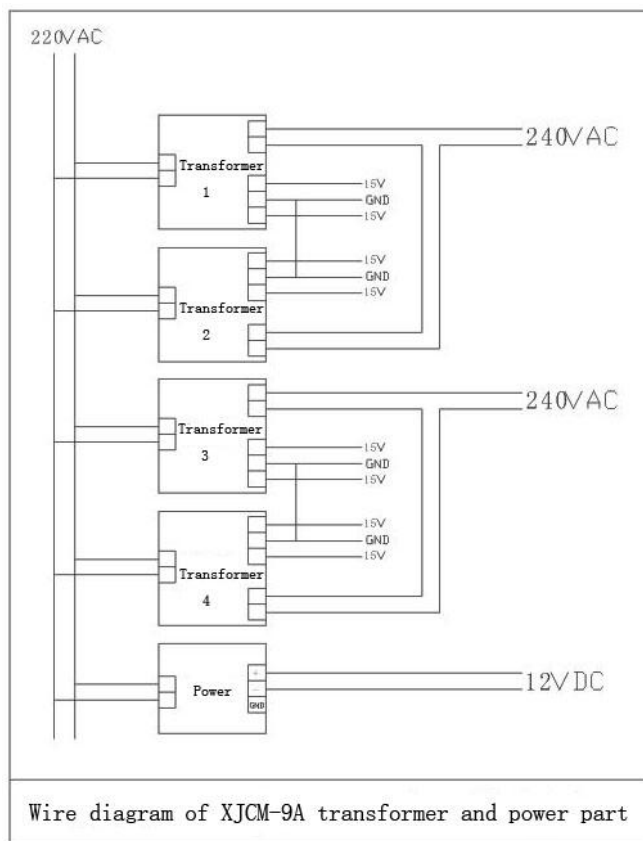
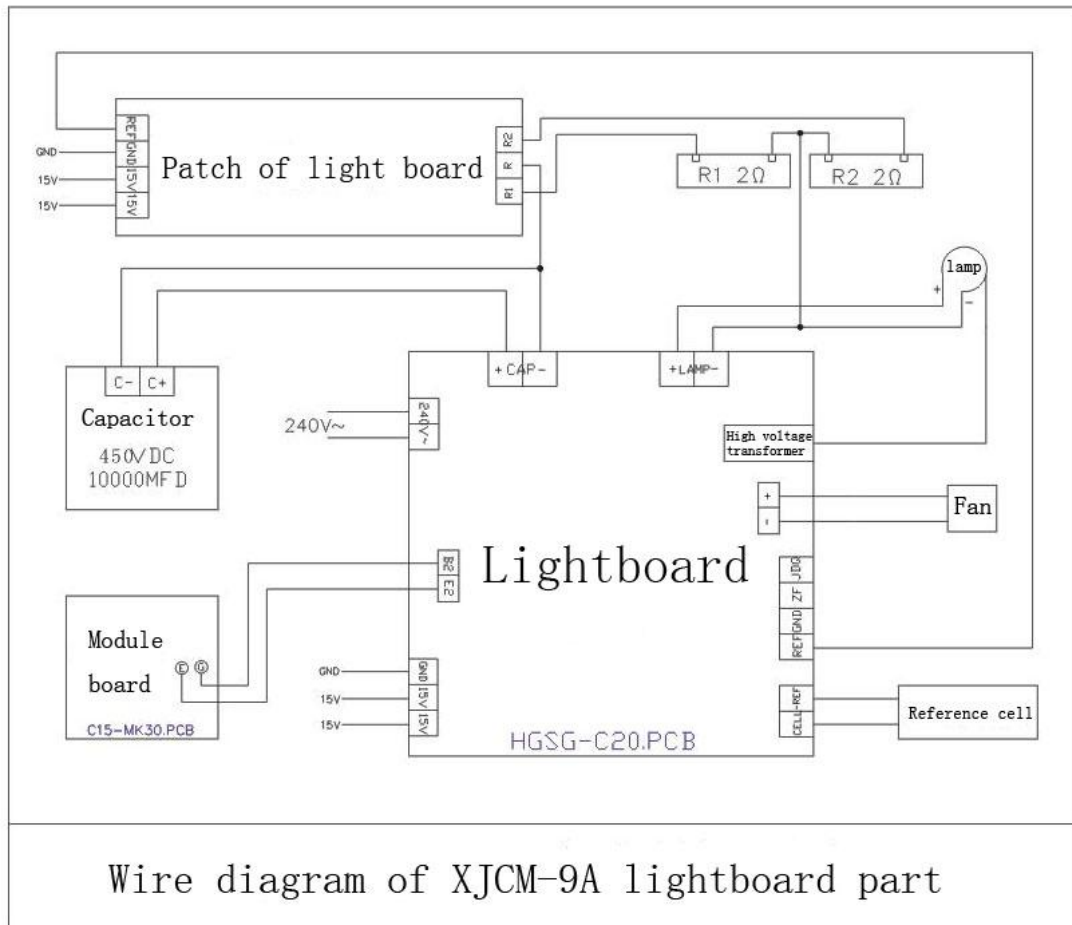
IR sensor	GS-IR10		Raytek
RS 3232 clip	MAX3232		Gsolar
Patch of light board	GS-PLB20		Gsolar
Filter	GS-LBX		Filtemc

## 8.2 Principle Circuit Diagram









## **9 Environmental friendly statement.**

Gsolar Sun Simulator applies environmental friendly accessories. Spare-parts could be recycled which including glasses equipped to the sun simulator, electronic circuit of Lamp Control Board and Mother Board and the cabinet itself.

All the accessories could post to Gsolar. We provide repair services or disposal.

### **Note:**

When dispose the accessories please make sure all the action is according to relative local regulation or legislations.

## **10 If you have more questions, please contact us.**

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