BGD 856

UV Light
Accelerated Aging Test Chamber

BUV

OPERATION
MANUAL

Biuged

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About Us

Biuged Precise Instruments （Guangzhou） Co. Ltd. has been focusing on developing and innovating high-quality and high-precision instruments for 50 years. We are the biggest and most professional manufacturer of testing instruments for paint, coating, ink and printing field in China. All our products are in according to ISO, ASTM, EN standards etc and get CE Certification.

Originally founded in 1963, Biuged have grown to an internationally recognized company with many worldwide customers base which includes the worlds leading paint and coatings manufactures.

At the same time, Biuged has a young, motivate and vibrant team. Our R&D department continually investigates new product design ideas, in conjunction with the major standards committees. In order to supply up to date instrumentation for the Quality Control of coatings, we always apply the advanced contemporary techniques and experience to our new products. Our manufacturing department ensures that all our products are built to the highest quality, every instrument undergoing rigourous calibration and testing before it leaves our premises.

Moreover, Biuged has own independent Calibrate laboratory and more than 40 agents and offices all over the world. We are also the major member of Chinese Standardization Technology Committee of Paint and Pigment.

Produce the highest cost-effective products and offer the most professional service are Biuged mission. Satisfying our customers' needs are our ultimate wishes.

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Dear User

Thank you for purchasing this BGD 856 UV Light Accelerated Aging Test Chamber from Biuged Precise Instruments (Guangzhou)CO.,LTD. Just as in the past, our staff will adhere to our principle of "customer first" to provide you with the most enthusiastic and professional service. In order to operate this machine correctly and expertly, you are advised to read this manual carefully, and pay attention to all warnings and alerts to ensure safe operation. After reading this manual, please keep it well for reference at any time.

If you have any questions in the course of using, please feel free to call our technical engineers to get professional guidance.

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The Biuged Company has the final right to interpret this operation manual. If there is any inevitable irregularity in the operation manual, sincerely seek your kind understanding. All the relevant images are just for reference; please confirm the shape with the installed product.

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1.0 Introduction

Many polymer materials are often damaged by natural environmental factors which from Earth's surface and atmosphere when they are used outdoor, thus affect their useful life. In order to properly assess their useful life in the outdoors, using the environmental testing equipment to simulate of each kinds of natural climatic condition, and study weather resistance of each kind of product in the laboratory has become a wide and effective method.

1.1 Professional Terms

1. 1.1 Test of Fluorescent UV-Condensation type

Using fluorescent UV lamp as light source to simulate and strengthen the UV spectrum effect on polymer materials which bring the most significant degradation. Proper control of temperature and humidity can produce the periodic condensation on the sample test.

1.1.2 Ultraviolet regions

Ultraviolet regions are divided into UV-A ultraviolet with wavelength range of 315 ~ 400nm, UV-B with wavelength range of 280 ~ 315nm and UV-C<280nm to fully obtain the sunlight effect, moisture effect and temperature effect on the polymer damaging results.

1.1.3 Fluorescent UV Lamp

Fluorescent UV lamp is a low-pressure mercury lamp generating the light of 254nm wavelength. Since added the phosphoric coexistence, its wavelengths converts to be longer, for the energy distribution of fluorescent UV light depends on the emission spectrum produced by phosphoric coexistence and the glass tube's transmission & expansion.

1.1.4 Irradiance

The total incident irradiance of all light waves is represented with W/m^2, because irradiance distribution is based on different spectrums.Different spectrums generate very different effect on materials, so the results caused by the different light sources should not be compared.

1.1.5 Black Panel Temperature/Blackboard Temperature （BPT）

Temperature measured by a thermometer fixed on a black panel which exposed to UV lamps.

1.2 Test Principle

BGD 856 UV Light Accelerated Aging Test Chamber (hereinafter referred as BUV) adopts fluorescent UV lamp as the light source. Its inner temperature and humidity can be properly controlled to obtain the periodic condensation on the sample for fully evaluating the damaged factor caused by sunlight, moisture and temperature (materials aging phenomenon includes fading, disluster, intensity reduction, cracking, flaking, chalking, and oxidation).

Fluorescent UV light can emulate the effect of sunshine, while condensation and water spray system can emulate the effects of rain and dew. During the test, radiation energy and temperature are controllable. A typical test cycle generally carries out under strong irradiation of UV light or in the dark and wet condensation period with 100% relative humidity. These tests generally applied in the fields of paint and coatings, automotive industry, plastic, wood, glue, etc…

1.2.1 Simulated sunlight

The ultraviolet rays from the sun are the main factor which cause damage to the durability of most materials. UV lamps are used to simulate the short-wave ultraviolet part of sunlight. It produces little visible light or infrared spectrum energy. We can choose different wavelengths of UV ultraviolet light

according to different test requirements to obtain different total energy and wavelength of UV radiation. Usually, UV lamps can be divided into two types, which are UVA and UVB respectively.

UVA-340 Lamp: UVA-340 Lamp can highly simulate short-wave ultraviolet light of sunlight, the wavelength range is from 365 nm to 295 nm.

UVB 313 Lamp: UVB-313 lamp emits stronger shortwave ultraviolet light compared with the ultraviolet rays on Earth, thus can accelerate material aging process. However, this lamp may cause some unrealistic material damage. It is mainly used in quality control, research and development, and the test of the materials with strong weather resistance.

UVA 351 Lamp: Simulates UV sunlight which has passed through the window. It is excellent for testing materials aging process indoor.

The superiority of **BUV** is that it can be controlled and adjusted automatically during testing process. As it is well known, the energy in testing process is the main factor in polymer materials aging. In order to ensure reproducibility and comparability of testing results, the UV energy is a very important technical indicator. We adopt the principles which similar with Sun- eye to automatically monitor the testing process throughout the energy value. When the lamp energy is less than the expected value, the system can automatically monitor the difference and replenish energy immediately.

1.2.2 Simulated moisture condensing

In many outdoor environments, materials are placed in wet condition for over 12 hours each day. Studies have shown that the main factor of the outdoor wet condition is caused by dew, not rain. BUV simulates the outdoor moisture erosion through the unique condensation capabilities. In the condensation cycle during the test, water on the bottom of the chamber is heated to become superheated steam filling the test chamber. Hot steam makes the chamber maintain 100% relative humidity, and maintain a relatively high temperature. Sample was fixed on the wall of test chamber. Thus the sample surface is exposed to the ambient air of test chamber. The other side of the sample is exposed to the natural environment which has a cooling effect, bringing internal and external surfaces of the sample with temperature difference, and the temperature difference leads to the test surfaces always have drips caused by condensation process.

The outdoor materials should be under insolation and humid condition over ten hours in a day, so the typical condensation cycle usually lasts several hours. BUV offers two humid simulations. Condensation method is most widely used. It is the best simulation for testing outdoor moisture erosion. Meanwhile BUV also provides water spray. All the BUV can run the water spray process as well as Condensation process.

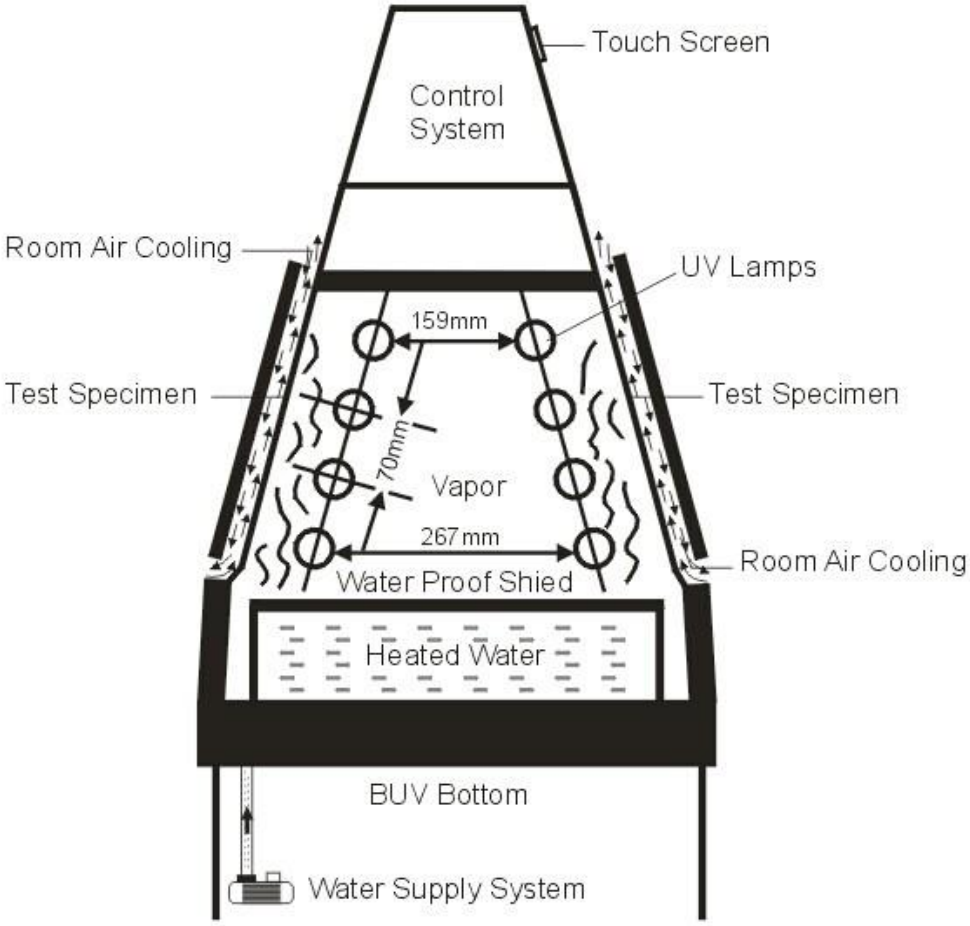
Water spray system

For some applications, the water spray can simulate end-use environmental conditions better. Water spray can effectively simulate heat shock or mechanical erosion caused by dramatic temperature changes or rain. In some practical application conditions, such as a sudden brash in a sunshine day, can bring heat shock because the temperature of the material changes drastically. This heat shock severely tests the properties of many materials. BUV water spray can simulate this heat shock and / or stress corrosion.

BUV spray system design with 12 nozzles, each side has 6 pieces in the test chamber. Spray system can run a few minutes and then shut down. This transitory water spray can cool the samples quickly, creating heat shock conditions.

1.2.3 Temperature Control

In each cycle, the temperature can be controlled at a set value. At the same time, the black panel thermometer can monitor the temperature. Temperature increase can accelerate the aging process, and the temperature control for reproducibility of the test is also very important.



Picture 1：BUV Test principle

2.0 BUV Parameters and Features

2.1 Main Features

◆ Original UVA or UVB lamps from Q-Lab, ensure the comparability of testing results.

◆Irradiance can be controlled automatically (with the closed-loop system, the value of irradiance is more precise and steady) and can be calibrated.Comparable to the international highest level of the same industry.

◆ With spray and condensation function.

◆ According with many testing standards. The operator can set any testing program

◆ Real-time collect and store data, and testing data can be converted into EXCEL format automatically and be saved. And all these data can be educed by U disk. Achieve the real unattended running

◆ TCP/IP Ethernet interface, the user can tele-control the machine through TCP/IP internet.

◆ Control the machine with touch screen menu. Because of the friendly and convenient interface, the user can check any parameters at any time during the test

◆ Control the temperature automatically with the high precise Pt 100 temperature sensor of black panel.

◆ Alarm and protection: water-breaking protection，overloading protection，over-temperature protection switch

2.2 Main Technical Parameters：

■ **Light Source:** UV-A (wave length 340 nm) or UV-B (wave length 313 nm) ;
40W×8 pcs (The normal use-life is 6,000 hours)

■ **The range of Irradiance**：0.30 W/m^2 ～1.55 W/m^2

■ **Temperature Range**：Black Panel Temperature（BPT）：RT+10℃～80℃

■ **Temperature Stability**：±3℃

■ **Interior of cabinet**：Stainless steel -SUS 304 material

■ **Exterior of cabinet**：Powder coating on SUD 304

■ **Insolating Area**：5175cm^2/828in^2

■ **Sample Capacity**：24 pieces of standard specimen（48 pieces can be put in at one time，150mm×70 standard samples）

■ **Size**：1360×560×1290mm（L×W×H）

■ **Weight**：161 kg

■ **Total Max. Power**：2KW

■ **Power**：220VAC±10%　　50 Hz or 60Hz；10A (Max Electric Current)

■ **Adjustable range for water supply**：0-4LPM

2.3 Test Methods & Material Standards

◆ ISO 16474-1《Paints and varnishes -- Methods of exposure to laboratory light sources -- Part 1: General guidance》

◆ ISO 16474-3《Paints and varnishes — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps》

◆ ISO 4892-1《 Plastics-Methods of exposure to laboratory light sources-Part 1: General Guidance》

◆ ISO 4892-3《 Methods of exposure to laboratory light sources-Part 3: Fluorescent UV lamps》

◆ ASTM D 4587《Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings》

◆ ASTM D 4329《Standard Practice S for Fluorescent UV Exposure of Plastic》

◆ ASTM G-151《Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that use laboratory light sources》

◆ ASTM G-154《Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Non-Metallic Materials》

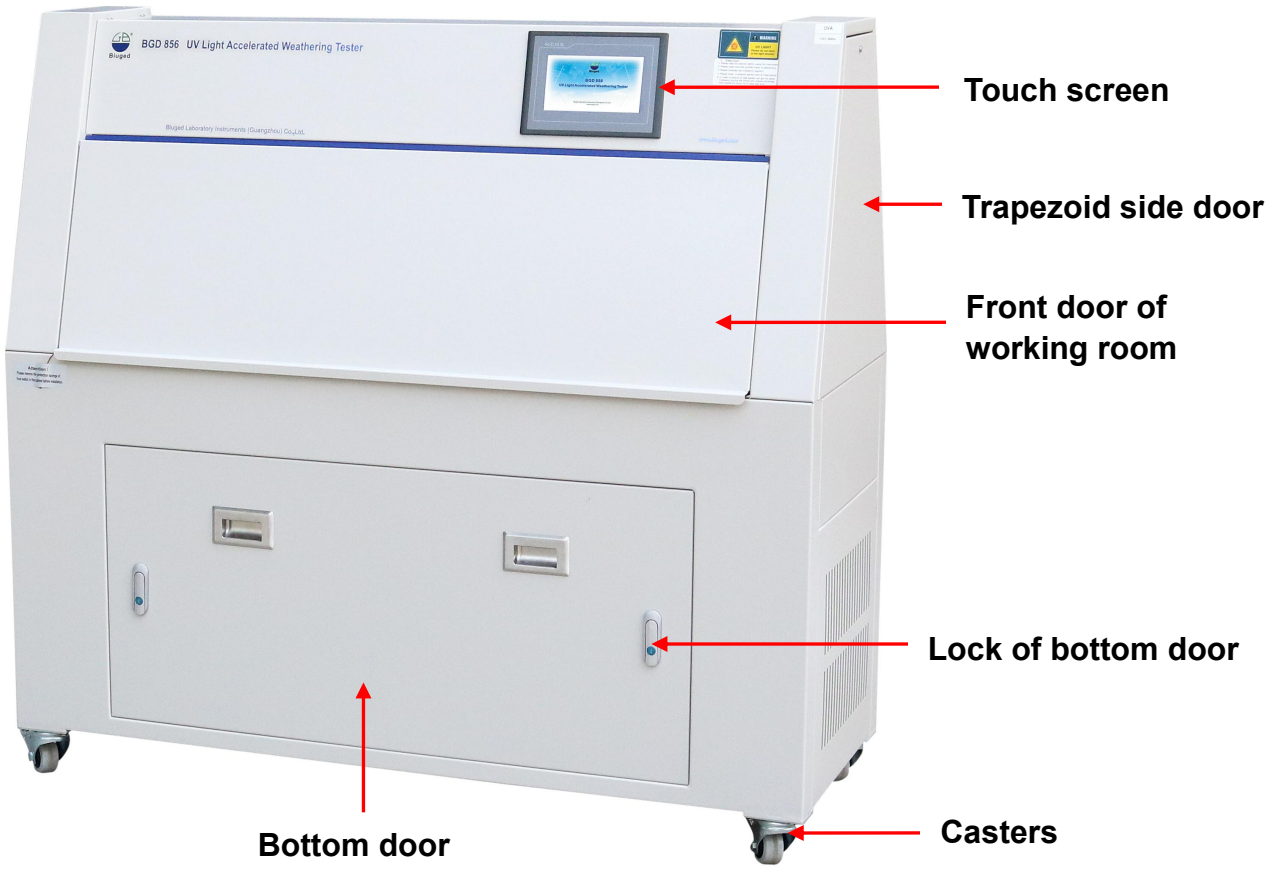
◆ BS 2782:Part5, 《Method 540B (Methods of Exposure to Lab Light Sources) 》

◆ SAE J2020《Accelerated Exposure of Automotive Exterior Malts Using a Fluorescent UV/Condensation Apparatus》

◆ JIS D 0205《Test Method of Weather-ability for Automotive Parts》

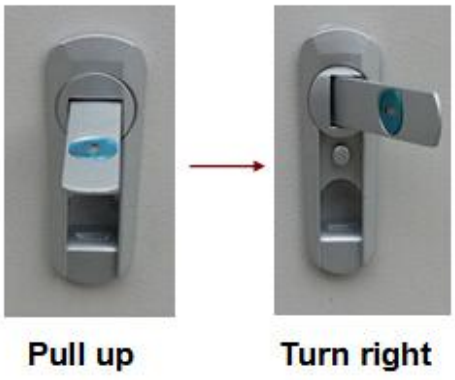
3.0 BUV structure and main parts introduction

3.1 BUV front view

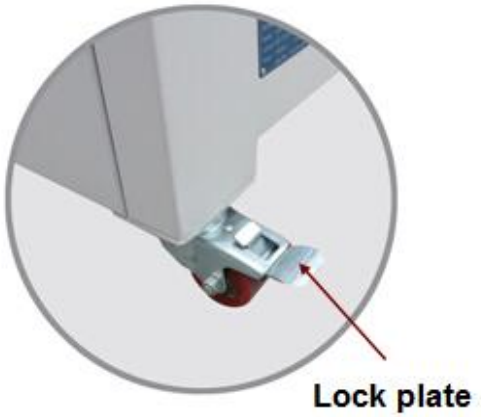


Picture 2：BUV front view

Touch screen—Used to set all test parameters and test program, and monitor BUV running status
Trapezoid side door—Need to be opened when replacing lamps
Front door of working room—When putting or checking test samples, open toward directly.
Bottom door—Need to be opened when replacing filter or checking water route （see picture 3）
Casters—When moving BUV, please pull up lock plates, and when fixing BUV, please pull down lock plates.

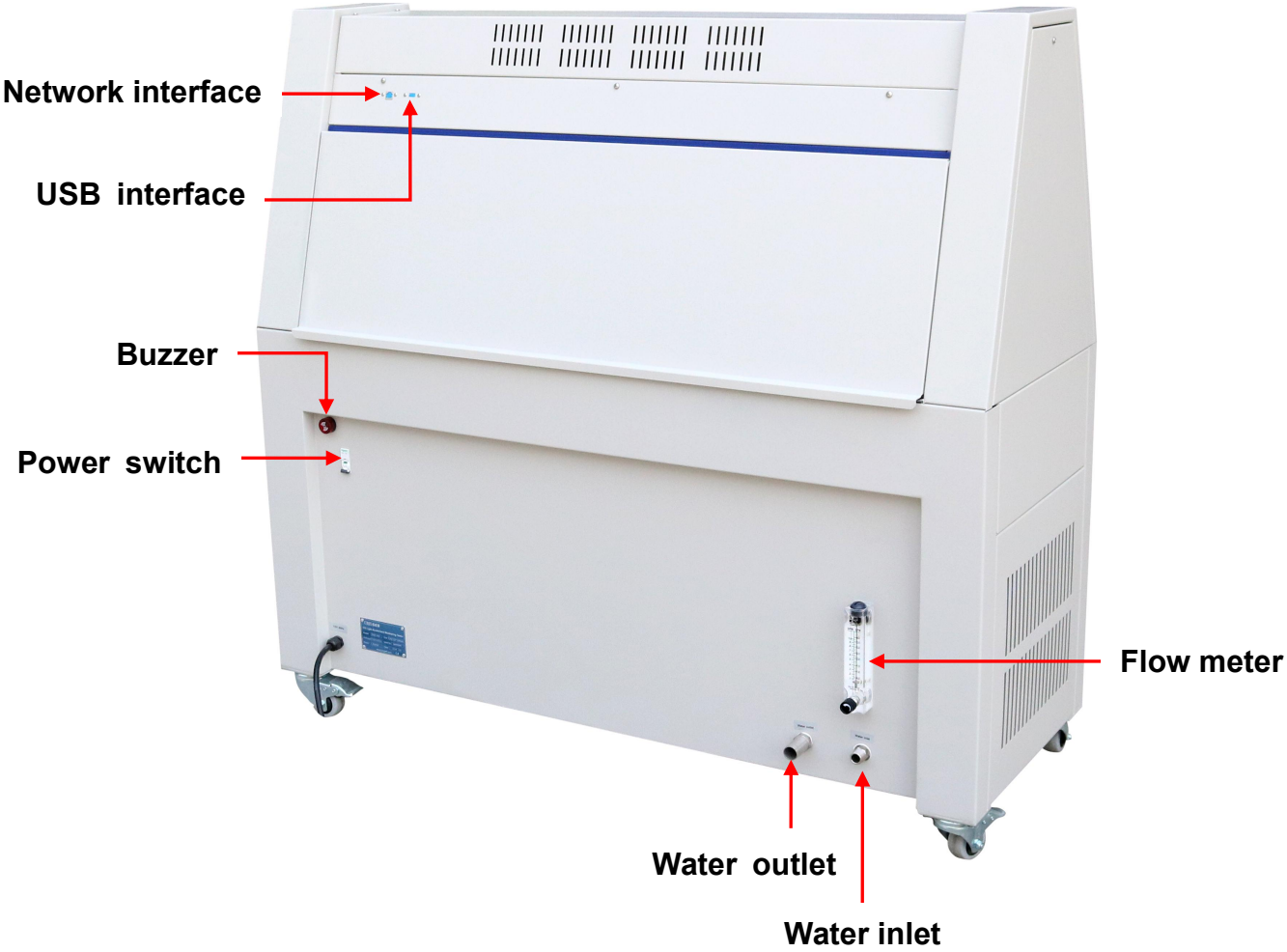


Picture 3：Open bottom door



Picture 4： Move BUV

3.2 BUV back view



Picture 5：BUV back view

USB interface—Connect U disk or other external disks prepared by user and exports data of BUV running status.（**See 5.7.2**）.

Network interface—TCP/IP Ethernet interface, is accordance with IEEE802.3、IEEE802.3U standards. Under this interface, Biuged can maintenance or monitor BUV remotely. User need insert his network cable into this interface, then Biuged can visit this BUV by internet, observe BUV running status, update software and teach users to use , maintenance or repair BUV.

Note：Please consult Biuged engineers to get special instructions when doing this step or meeting any problems !

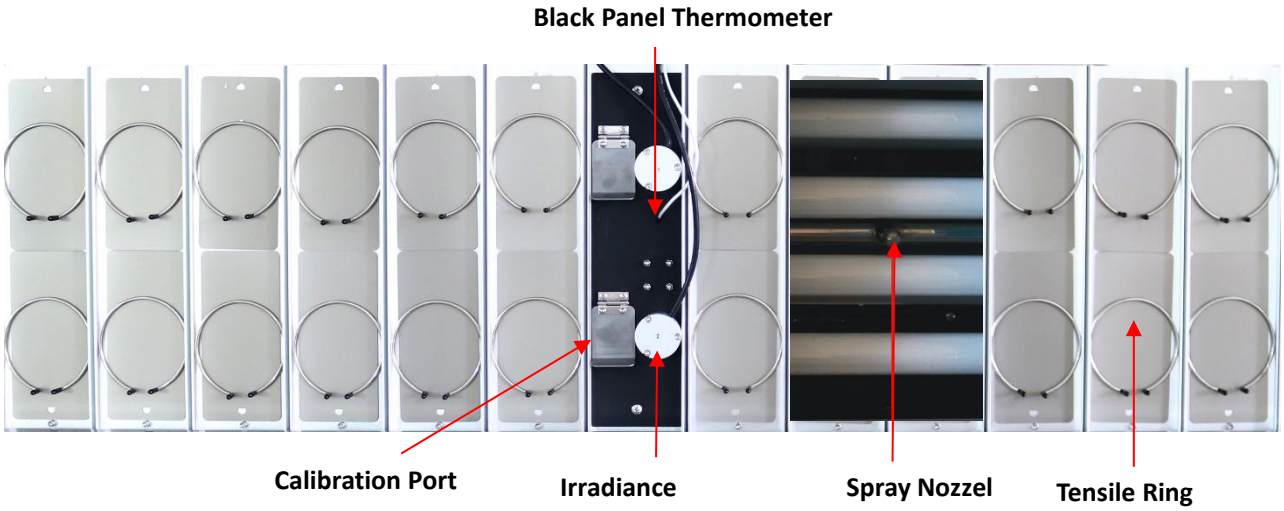
Buzzer—It will work and alarm when the BUV irradiance is abnormal.

Flow meter—Used to adjust the spray water amount.

Water inlet—Connect to external water required by BUV.

Water outlet—Drain the redundant water in the working room.

3.3 BUV working room



Picture 6：BUV working room

Black panel thermometer：Consists of a PT100 sensor and a metal panel painted by black coating, and be exposed to the same condition as test panels. It's used to monitor black panel temperature, and is installed in the middle of working room and near No.1 irradiance sensor and No.2 irradiance sensor.

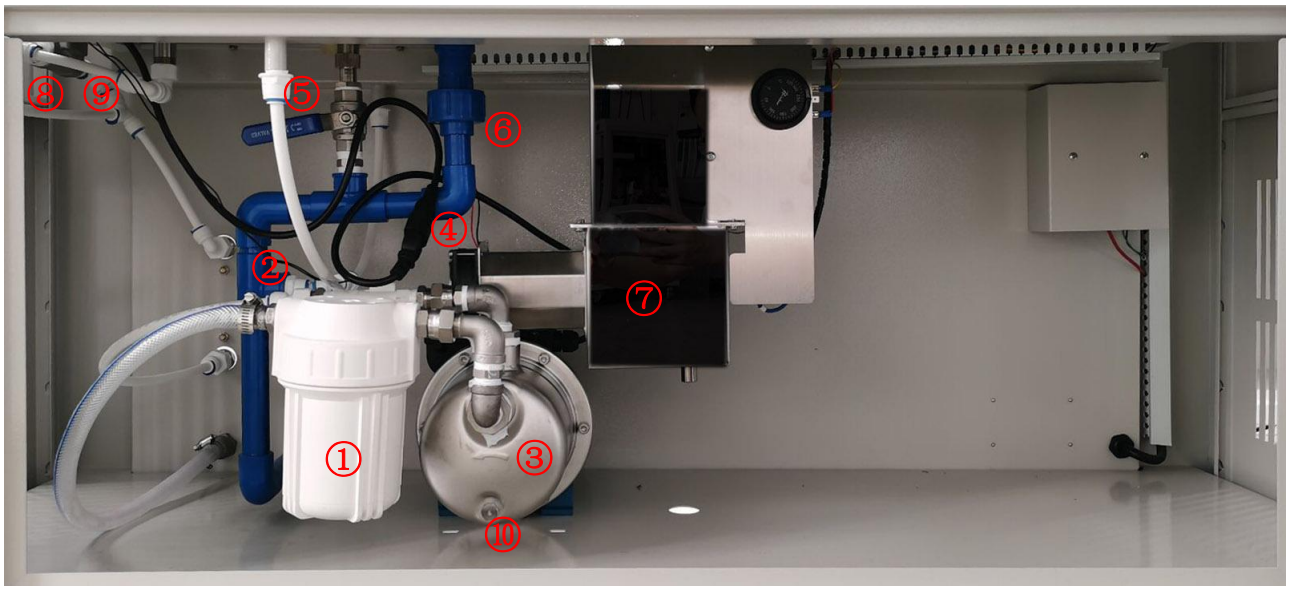
Irradiance sensors：8 lamps in the chamber are divided into 4 groups. Group 1 and Group 2 are in the front side and Group 3 and group 4 are at the other side.
4 Irradiance sensors are faced to the relevant group of lamps. Every sensor is marked a number（from 1# to 4#）to correspond relative lamp group. These sensors measure real-time UV energy and give feed back to the control system. BUV control system calculates and adjusts automatically lamp irradiance according to the difference between set value and actual value. Irradiance sensors should be cleaned periodically by a soft cloth.

Calibration Port：4 Calibration Ports locates next to the 4 irradiance sensors. Each port is covered by a piece of metal. When the irradiance sensor is about to be calibrated, open the covered piece and then put the sensor of radiometer into the ports.

Spray nozzles：There are 12 spray nozzles（six in the front and six in the back） which are installed uniformly in the middle of lamps, they are used to spray water to the test panels surface.

Tension rings：Together with test panel holder to fix test panels.

3.4 BUV bottom view



Picture 7：BUV bottom view.

①**Fliter**：Used to filter water before entering BUV.

②**Water flow sensor**：used to monitor external main water is shortage or not, and protect water pump.

③&④**Water pump and power socket**： When the pressure of external water is too low or not, connecting the power socket can increase pressure to spray water. If the external water has enough pressure, please unplug it.

⑤**Drain valve**：Drain waste water when cleaning working room.

⑥**Overflow pipe**：Drain redundant water when spraying.

⑦**Air heater inlet**：Absorb outdoor air to working room by fan.

⑧**Condensation water inlet** ：Close or open the water for producing condensation by a magnetic valve.

⑨**Spray water inlet**：Close or open the water for spraying by a magnetic valve.

⑩**Drain hole of the pump**：When the temperature is lower than 0℃, please drain all the water inside the pump, otherwise the pump might be broken by the frozen water.

4.0 Preparation before installation

4.1 Safety

Biuged won't be responsible for any action and damage if the user operate the BUV without the guidance of manual. Biuged promise to replace all parts which are damaged during the transporting. Users are required to use Biuged's original parts for repairation and replacement, otherwise we won't be responsible for any potential troubles and problems of machine.

4.1.1 Electric Shock dangerous

The startup voltage of UV Lamps is 400V. The plastic lamp socket supply the voltage to lamps when machine is UV cycling. The voltage of bare lamp is 400V when just one side of lamp is connected with socket.

Please note as below:

1. **Turn off the power before maintenance.**
2. **Don’t touch the plug of lamps when the machine is on UV cycle.**
3. **Don’t put anything into the socket of lamps when the machine is on UV cycle.**

4.1.2 UV Dangerous

⚠ UV lamps would cause serious sunburns or eye inflammation.
⚠ Know all safety cautions before operating BUV.
⚠ Should be operated by technician.
⚠ Open the BUV for repairing only turning off the power.
⚠ Turn off the UV lamps before opening the BUV for taking out the samples.
⚠ Don’t gaze forward the UV lamps when no wearing goggle against UV lamps.

4.2 BUV Installation

4. 2.1 Installation site

Install BUV in the clean environment with relative humidity range is between 0 and 85%. According to the requirements of ASTM (G53) , BUV should be placed in the environment whose temperature is between 20℃ and 30℃. In order to reduce the air pollution and dirt, the site should be ventilated. Don't install BUV in the easy-to-corrode or poisonous environment or near the corrosion resistance tester.

If BUV was installed near the wall or other sundries, it can affect BUV to control the temperature. It would be much better if BUV can be installed in an air-conditioned room, so the room's temperature can be kept between 21 ℃ ~ 27 ℃.Beyond this temperature, it will effect the BUV to control the temperature. At the same time, too high temperature will weaken the condensation of samples. In fact, because of some special design, BUV also can work normally even if the environment temperature is between 5℃～35℃

4.2.2 Power supply

Ensure the voltage supplied to BUV is within the range ±10% of rated voltage. BUV's Instantaneous power is 2KW. If current is 20 A then BUV needs special line. BUV with 220 V voltage uses 16 A circuit breaker (circuit breaker is the part of main power supply switch). If a few units BUV are connected with the same circuit, then every BUV should have enough over-current protection ability.

BUV voltage and frequency is marked on the nameplate of the machine, BUV should connect with 10 A current, don’t need any extended wire, and have three feet grounding plug, terminal as below:

Live wire-red
Null wire-blue
Ground wire-green/yellow (double colors)

4.2.3 Water supply

The water consumption of cabinet is for spraying and producing condensation. Water should be accordance with 3 grades requirements of laboratory used water（we recommend use distilled water or deionized water or other suitable purification apparatus to produce water）. Water pH value should be between 6.0 and 8.0, and its conductivity should be less than 5μS/cm, solid content be less than 1ppm. Even a little silicon of spray water would bring some deposit on the sample surface, so the silicon content should be less than 0.1ppm.

Low purity water would bring dirt on the test panel surface or lamp surface or jam nozzle, therefore, all the pipes, valves or any joints from purification apparatus to the cabinet should be stainless or plastic material.

5.0 Test

5.1 Install BUV

5.1.1 Unpacking

Cut off the metal strips on the package and remove all nails, and then move BUV out from the package to the position complied with Rule 4.2.1. Then tear up all packing materials on BUV, and check whether the surface of the instrument is damaged or whether all the parts are included.

If the temperature is around zero degree during delivery, the BUV should be preheated for 24 hours before being examined.

5.1.2 Removing the protection sponge of float switch

Open one of the front doors, uninstall the 2 lower lamps, and remove the water proof shield, thus the float switch would occur. Remove the protection sponge of float switch (as shown in the pictures below), and then re-install all the lamps and shield. (please check **6.1 UV lamps** and **8.1.2- Picture** 34 for the details of removal and installation of the lamps and shield).

5.1.3 Connect BUV to power supply

The power switch provides the all power to BUV, it could be acted as safety brake if the electric current is too large （when some parts are short circuit）.

Power switch ON：Start up BUV and touch screen would be light.

Power switch OFF：Turn off it when checking or replacing test panels or replacing lamps.

Power switch is out of control or trip： Indicate there are some problems in the electric circuit. Pull out the power line and ask the professional technician for checking.

5.1.4 Connect water pipes and check water route

5.1.4.1 Install BUV water inlet and water outlet

Water inlet：connect external water by a 1/2 in. quick coupling , the pressure of external water should be not more than 90psi.

Water outlet： Connect suitable soft water pipes (inner diameter is 1 inch.) to outdoor.

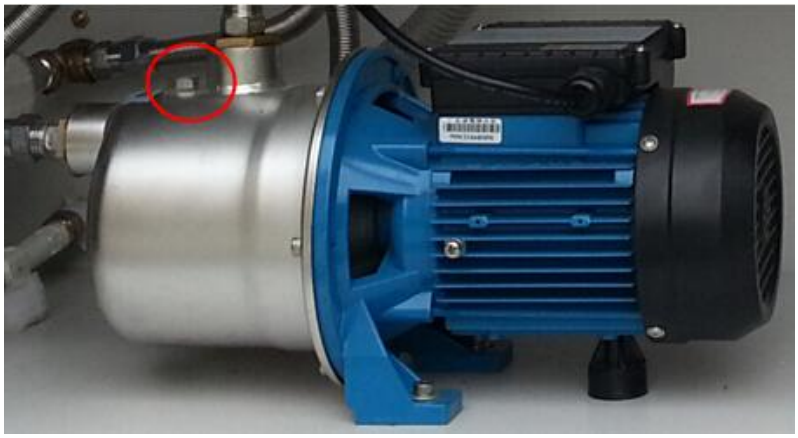
Note: In order to drain off the water successfully, please ensure the height of outfall should be lower than the cabinet outlet.

5.1.4.2 BUV water supply

BUV will consume near 4 L water per minute when spraying, so it’s necessary to have enough external water till finish spraying.

Moreover, only when water pressure in working room is more than 40psi（2.8bars /276kPa）, can BUV spray normally and all spraying water can be spread to all test panels surface uniformly. So, BUV comes with a pump to increase water pressure （see picture 8）. Only when external water pressure is too low or zero, must operator turn on this pump（connect power source of pump）.Kindly note please pull out the pump plug when external water have enough pressure.

Furthermore, please empty all air in the pump before pumping water（dismantle the screw marked with red color as below picture and fill it up with water）. Empty pumping is forbidden!



Picture 8：Water Pump

5.1.4.3 Adjust spray water flow rate

Spray water rate can be adjusted by flow meter（flow meter reads water amount per minute）; Kindly note this flow meter just adjust water amount, can't increase pressure to water.

The adjustable range of flow meter is 0～4LPM （anticlockwise rotation is increase, clockwise rotation is decrease）. Rotate knob of flow meter to adjust spray water amount. 0 LPM position means no water , if exceed 4LPM position, flow meter will not work any longer.

Note：

① **Set value of water flow rate is recommended as 2.5 LPM, then BUV have enough water to spread all test panels.**

② **Please let water flow when adjust flow meter, otherwise, can't judge water flow rate.**

5.1.4.4 Check the whole water route

After finishing all above steps, operator should check the whole water route again, ensure water supply and drainage can work normally and no leakage.

Check all spray nozzles in working room to ensure they can spray normally. Furthermore, keeping a consistent spray range for every nozzle is also important, it have been adjusted well before BUV leaving factory, but operator also should check it again before testing.

5.2 Choose UV lamps

BUV has been installed 8 UVA or UVB lamps and also set corresponding lamp type in system before leaving factory. If operator wants to use different UV lamps instead, please enter "**Parameter**" menu of main window to change UV lamp type.

There are four types UV lamps which can be suitable for BUV：Two types UV-B lamp and two types UV-A Lamp. All these UV lamps produce UV light or visible light, and its power consumption is equal to the common 40W fluorescent lamp. The main difference between these lamps is total energy produced by lamps and spectrum of wave length. These difference would cause a big different test result.

Don't use the different type lamps at the same time for one BUV, it will cause a big unaccordant light irradiating to the samples which are produced by these different lamps, and it also make the calibration procedure become more complicate. Some users put the UV-A lamps on one side, and do the UV-B on other side. This way is also unrecommendable , because some light produced from one side would come to other side after coming across clappanel. In this way, the user will get all sorts aging test results with different degree.

5.3 Prepare test panels

5.3.1 Substrate

The substrate used for the preparation of the test panels shall be that usually used in practice（e.g. plaster, wood, metal or plastics material）.

Unless otherwise agreed or specified, standard test panels prepared in accordance with ISO 1514 shall be used. The test panels shall be flat and their dimension should be 150mm×（70～75）mm×（0.8～1.5）mm.

When using condensation to wet the test panels, the maximum test-panel thickness shall be such that condensation occurs on the front of the panel.

5.3.2 Preparation and coating

Unless otherwise specified, prepare each test panel in accordance with ISO 1514 and then coat it by the specified method with the product or system under test.

Unless otherwise agreed, coat only the front of each test panel with the coating material or coating system to be tested, if necessary, coat the backs and edges of the test panels with a protective paint.

5.3.3 Drying and conditioning

Dry （or stove）and age （if applicable）each coated test panel for the specified time and under the specified conditions.

Mark all the test panels indelibly.

5.3.4 Thickness of coating

Determine the thickness, in micrometers, of the dried coating by one of the non-destructive procedures specified in ISO 2808.

5.3.5 Number of test panels

Generally, for each coating material, an appropriate number of test panels is tested in one apparatus. In the case of graduated testing, the number of test panels for each coating material will have to be increased.

If required, at least on additional test panel for each coating material shall be prepared as a reference specimen. It shall be stored at room temperature, avoiding humidity and direct radiation.

Note: The properties of some reference coatings can change during storage.

5.4 Fixation of test panels and inspection before running BUV

5.4.1 Put test panels

A standard sample tray can contain two panels in 150 *70mm or one panel in 300*70mm.

There are 24 trays coming with BUV, each tray has two base panels（Aluminum）. Please take out base panels firstly and put test panels on the tray with coated surface facing to lamps, then fix test panels by tension rings.

Don’t take out base panels if no test panels on the sample tray.

On the other hand, a nature characteristic of BUV condensation system is that the panel forms the side wall of the test room and supply the clappanel to keep the hot steam in the cabinet. The air in the room behind the panel makes the temperature of panel lower than the steam. At this temperature, the water will condense on the panel.

The thick insulation sample, for example, wood or rubber, will make the condensation inadequate because of poor heat transmission. In order to increase the condensation or heat transmission, the BUV device is advised to be put in the room with an air conditioner or increase the temperature of condensation process.

⚠ Notes when put the sample

The test panel is the side-wall of the working room in fact. The tray is very important for closing the steam. The steam

will lapse, the condensation effect will weaken and the temperature will be out of control without the panels. In addition, the panel will make the tray block the hole and close the gap whose diameter is longer than 1mm. Some BUV come with rubber racks which are used to seal on the edge.

5.4.2 Check all lamps and irradiance sensors

Inspect all lamps surface and the glass of irradiance sensors, if there are any dirt or water stains, please clean it with a soft cloth.

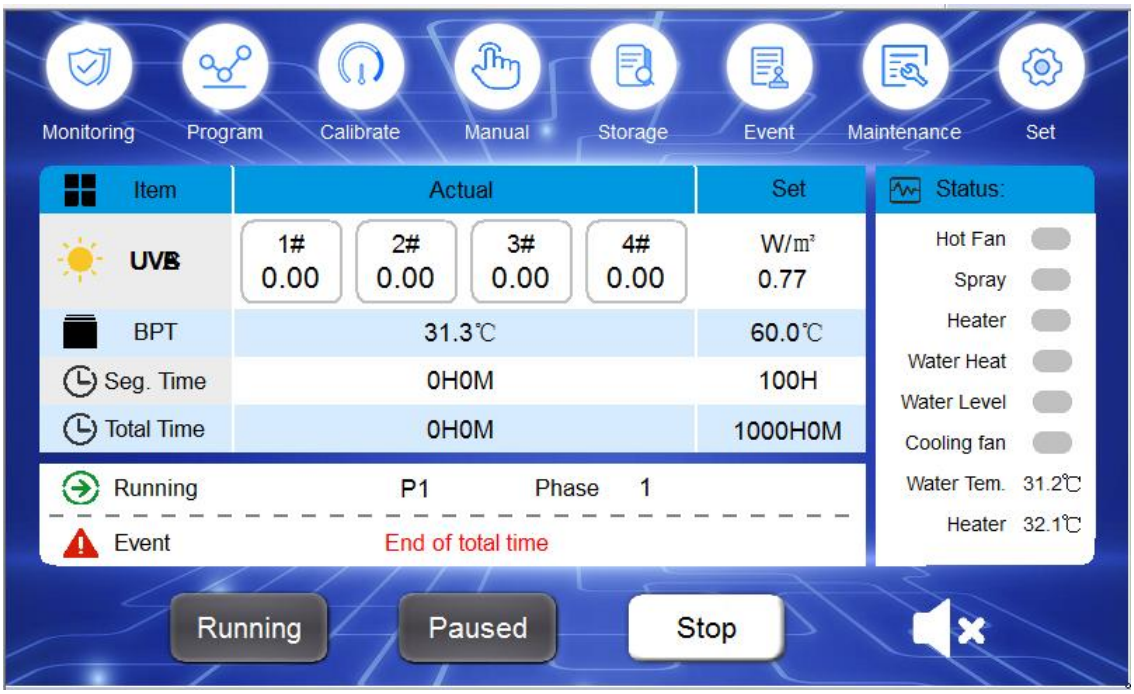
5.5 Set test parameters

5.5.1 Turn on BUV

Turn on the power switch at the back of BUV, the touch screen will light and show this window as below:

Picture 9：BUV boot window

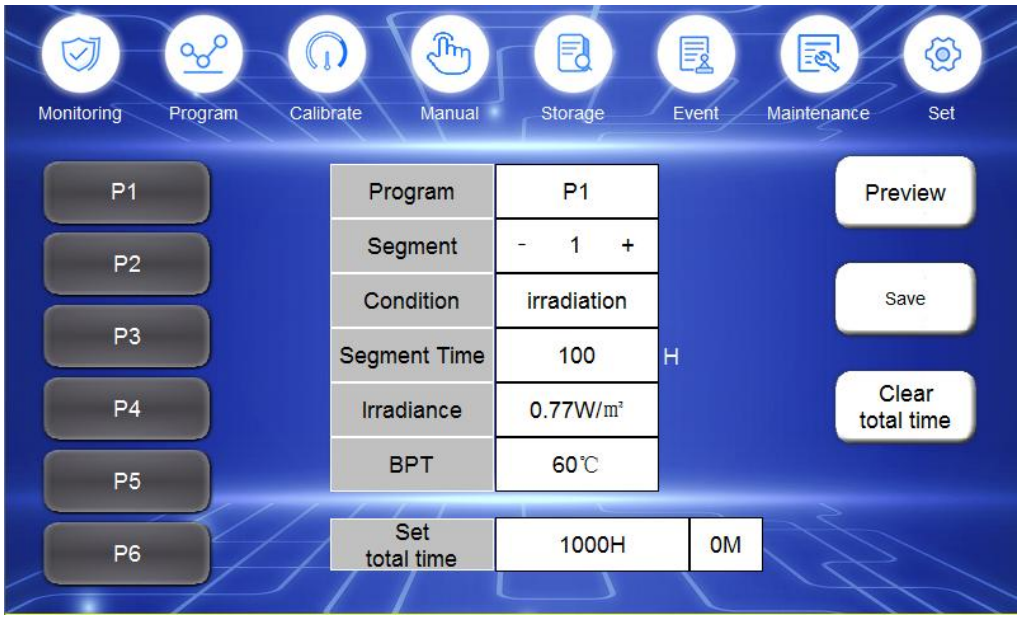
Click boot window at any position and BUV enter the main window as below：



Picture 10：BUV main window

5.5.2 Edit a test program

Click “**Program**” on the left menu of main window , BUV will enter test program window as below:



Picture 11：Test program window

According to different standards or test methods, operator can edit different test programs. For each program, it can be set as 10 segments, and each segment can be set different work conditions（four types： Irradiation, water spray, condensation and finish）as well as relevant test parameters.

BUV permit operator to edit six test programs at most and save it permanently. Generally speaking, if the operator has set and saved one program in the BUV, for next test, if he still use this same program, just choose this program and run BUV directly, no need to set again.

Now, we will take **Table 1** as a sample to show how to set a new program, the total test time is 500 hours.

Table 1: A typical test program

Working Condition	Time	Irradiance	Temperature
Irradiation	8h	0.76±0.02 W/m^2	60±3℃
Water spray	0.25h	0.00	No control
Condensation	4h	0.00	50±3℃

From this table, we can know BUV shall run irradiation, water spray and condensation recurrently for 500 hours.

Now, we choose “**Program 1**” to name and edit this test.

Click “**Program 1**” and it will become green, and the right “**Program No.**” will show “**1**”

① **Set the first segment**

Now, the “**Segment**” show “**1**” and means this is the first segment. Choose “Work condition” as “**Irradiation**”（If it is not irradiation, just click the current working condition to change）.

Set “**Segment time** ”as “**8**”（Click the right green frame of the time, then will appear a keyboard, click“**8**” and press “**Confirm**”, then the keyboard will be disappeared. Do the same job as below steps of editing numbers）.

Set “**Irradiance**” as “**0.76**”

Recommended set point of irradiance

Intensity of illumination can be set from light to dark , as reference, we suggest using the standard or the biggest setting value, as shown below table. Of course, user also can use higher intensity of

illumination value than the maximum, but we don't suggest doing so.

Table 2：Recommended set point of irradiance

The type of light	smallest irradiance	normal irradiance	biggest irradiance
UVA-340	0.30 W/m²@ 340 nm	0.89 W/m² @ 340 nm	1.55 W/m² @ 340 nm
UVA-340+	0.70 W/m²@ 340 nm	0.89 W/m²@ 340 nm	1.70 W/m²@ 340 nm
UVA-351	0.30 W/m² @ 351 nm	0.76 W/m² @ 351 nm	1.25 W/m² @ 351 nm
UVB-313	0.30 W/m² @ 313 nm	0.71 W/m² @ 313 nm	1.23 W/m² @ 313 nm
UVB-313+	0.30 W/m² @ 313 nm	0.71 W/m² @ 313 nm	1.70 W/m² @ 313 nm

Test specification: if the user does the special test, please refer to the test specification parts.

Accelerate test: the setting value of irradiance is the main influence factor of aging degree for most materials. If you want to get the fastest aging effect, the maximum intensity of illumination could be selected. And it is very useful for inspecting the quality and durability of material when can not do an long-term experiments.

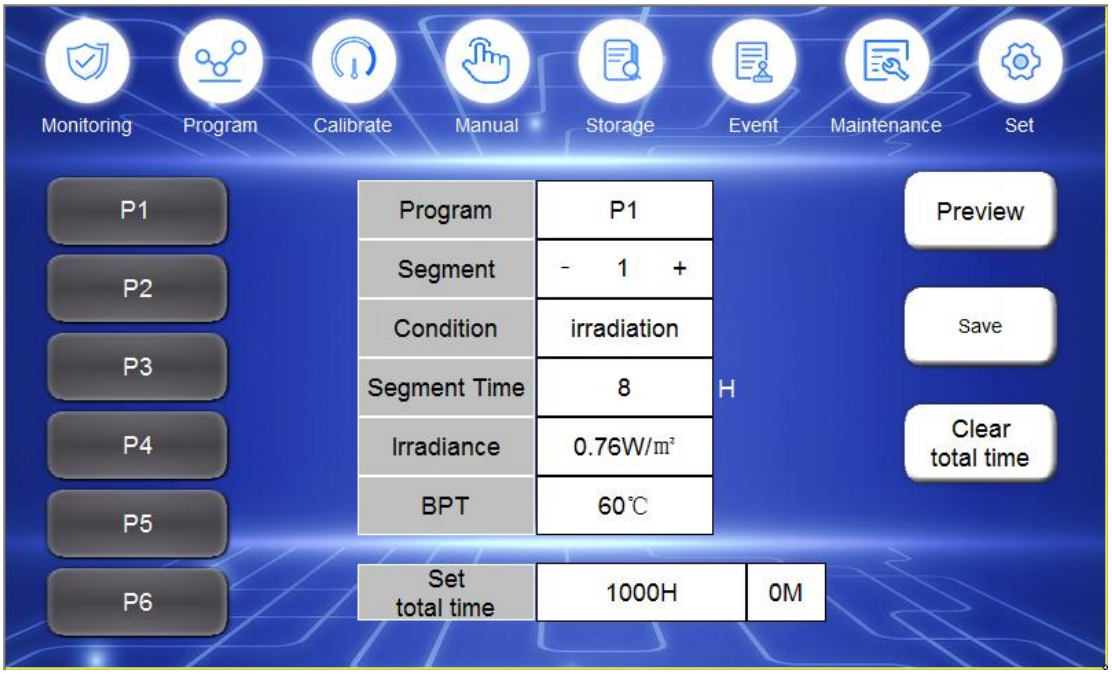
Lamp life: the setting value of the irradiance would decide the lamps life. The higher the set point is, the shorter the lamp life would be. The lamps life is over 6,000 hours under the normal setting, and once be worked with max. set point, the lamp life would be less than 2,000 hours.

Relevance: Relevant impacts of setting Irradiance. In theory, for some tests with normal irradiance value, the relativity between testing result with natural exposure is greater than with maximum irradiance as set point. That is because the set max. irradiance is much greater than the value of natural sunlight.

Set this segment “**Black panel Tem.**” as “**60**”

Black panel temperature: although air heater can control temperature, but set irradiance point maybe also have affect on maximum and minimum available temperature of BUV. This is because the lamp may have a fever, the higher the irradiance is, the more heat would be produced. Therefore, if you want to get 75 ℃ temperature of the black panel, you should set higher irradiance value. To get the black panel with 55 ℃ , the lower irradiance should be selected.

After setting these four values, please press “**Save**” . This button will stop blinking if it has been saved successfully.



Picture 12：Set the first segment

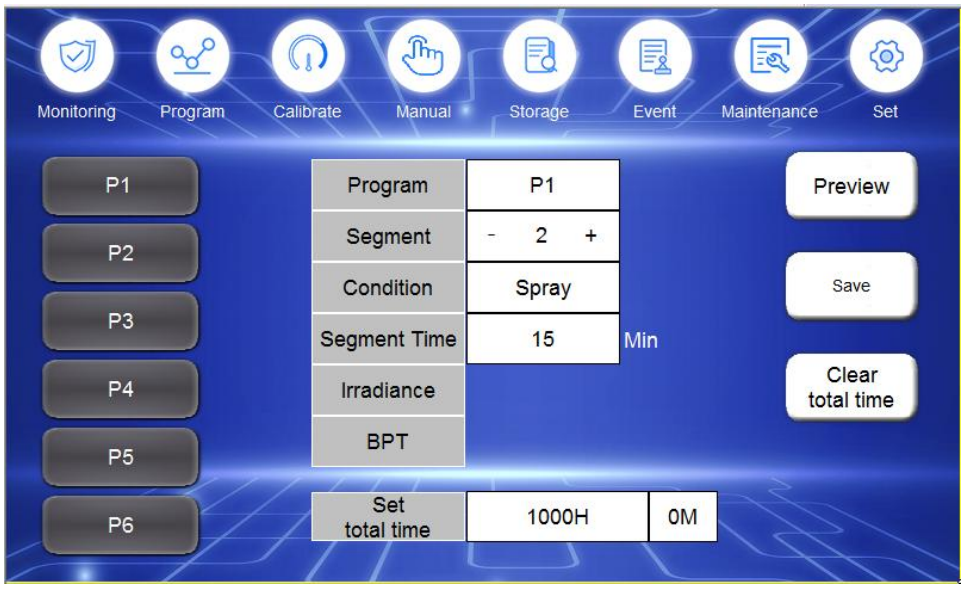
② **Set the second segment**

Revise the segment No. to“**2**”（click the number at the back of segment, there a keypanel will appear, click “**2**”）

Choose the “**Condition**” as“ **Spray**”

Set “**Segment Time**” as “**15**”minutes（0.25 hour）

After setting these two values, please press “**Save**”



Picture 13：Set the second segment

③ **Set the third segment**

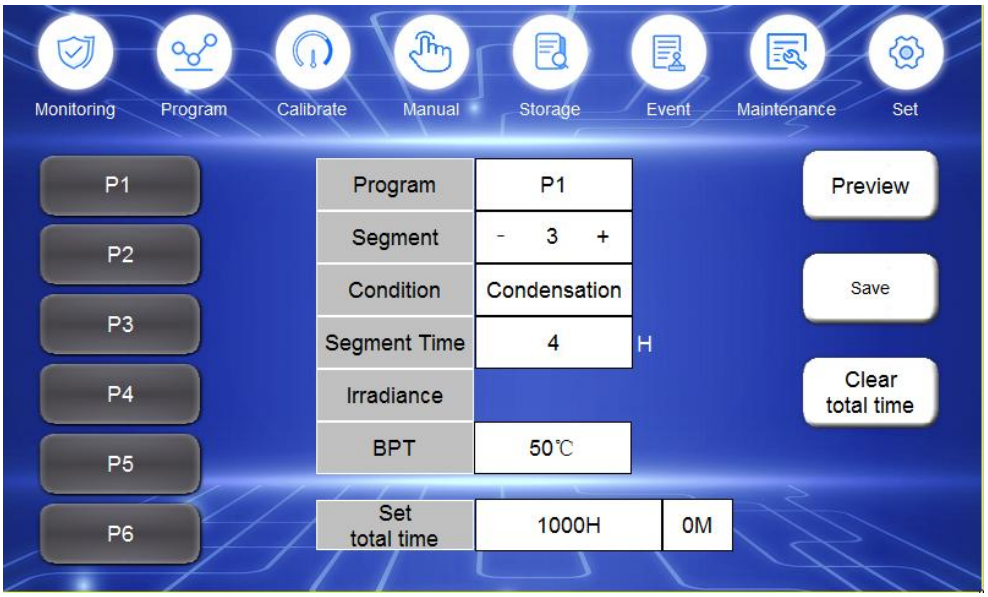
Revise the segment to “**3**”

Choose the “**Condition**” as “**Condensation**”

Set “**Segment Time**” as “**4**” hours

Set **“BPT”** as **“50℃”**

After setting these three values, please press “**Save**”

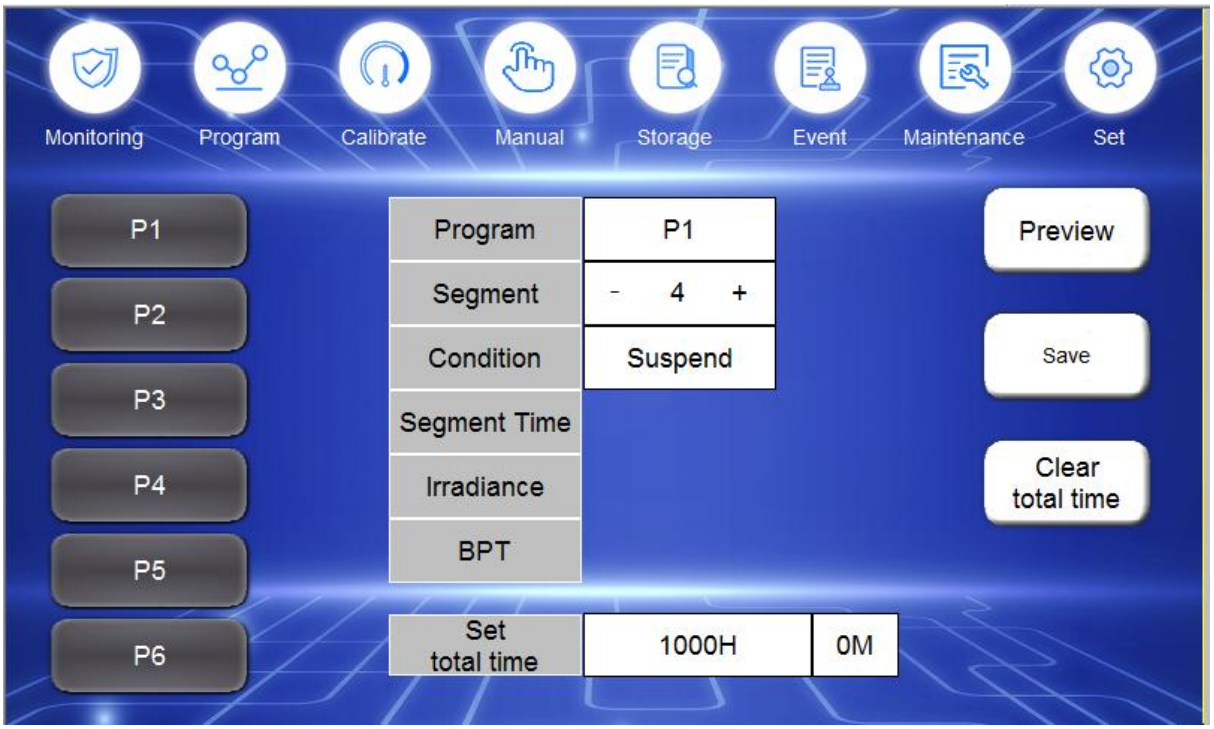


Picture 14：Set the third segment

④ **Set the fourth segment**

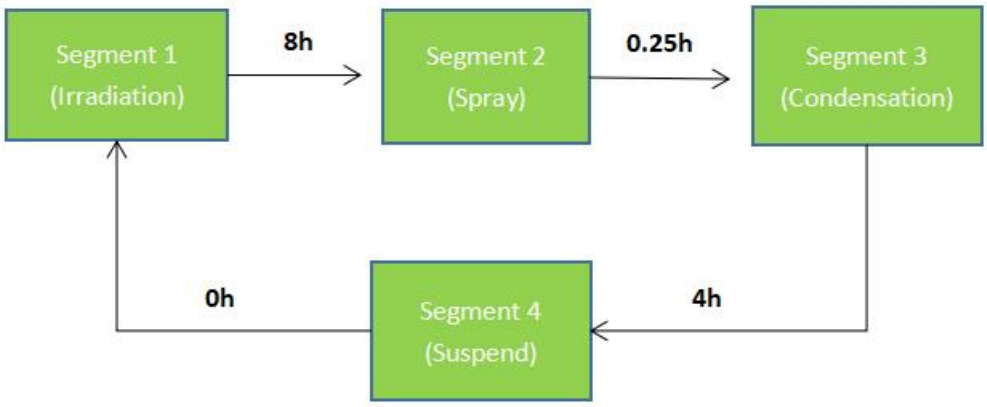
Revise the segment No. to “**4**”

Choose the “**Condition**” as “**Suspend**”, then press “**Save**”；Now set the “**Set total time**” of program 1 as “**1000**” hours , and also click “**Clear total time**” to zero the run time which BUV have run（If have）.



Picture 15：Set the fourth segment

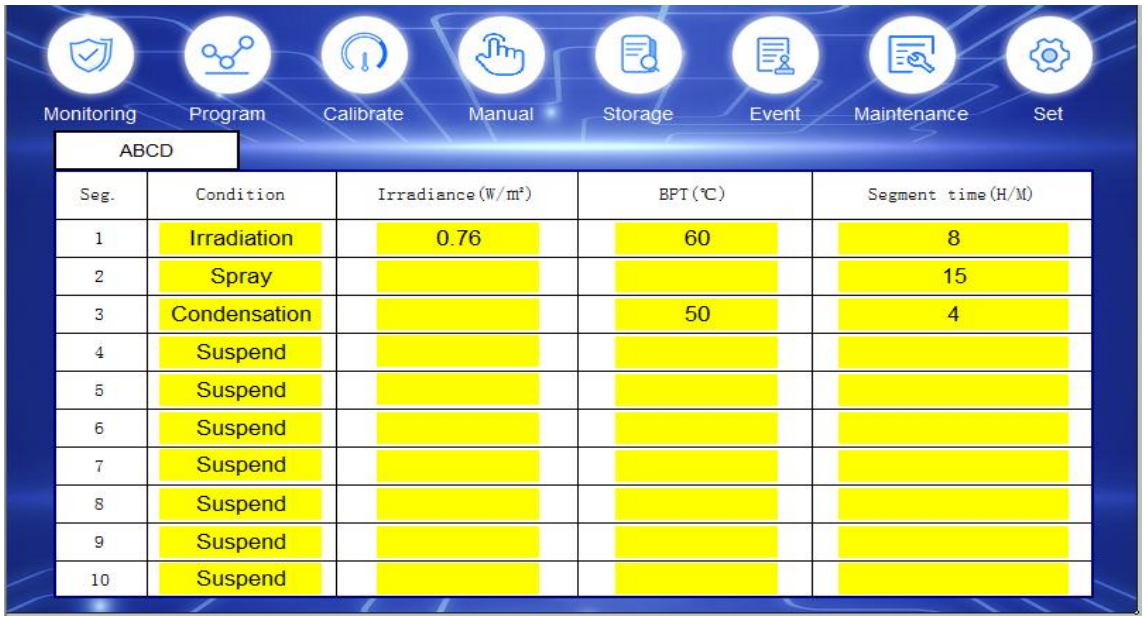
Now, it means program 1 will run segment 1, segment 2 and segment 3 step by step and then finish one cycle, and run segment 1 again for a new cycle. The cycle of program is as below picture：



Picture 16：The cycle of program 1

⑤ **Preview**

After setting these four segments, then press “**Preview**” to check again if all set testing parameters are accordance with requirements （See **Picture 17**）



Seg.	Condition	Irradiance(W/m²)	BPT(℃)	Segment time(H/M)
1	Irradiation	0.76	60	8
2	Spray			15
3	Condensation		50	4
4	Suspend			
5	Suspend			
6	Suspend			
7	Suspend			
8	Suspend			
9	Suspend			
10	Suspend			

Picture 17：The total preview of program 1

a. If the operator still need to set other segments, just do the same jobs as above （10 segments are the max.）. If some segment work condition of this program is set as “End”, then program would jump to the first segment again and begin a new cycle. BUV runs this cycle repeatedly till the total run time reach the set value.

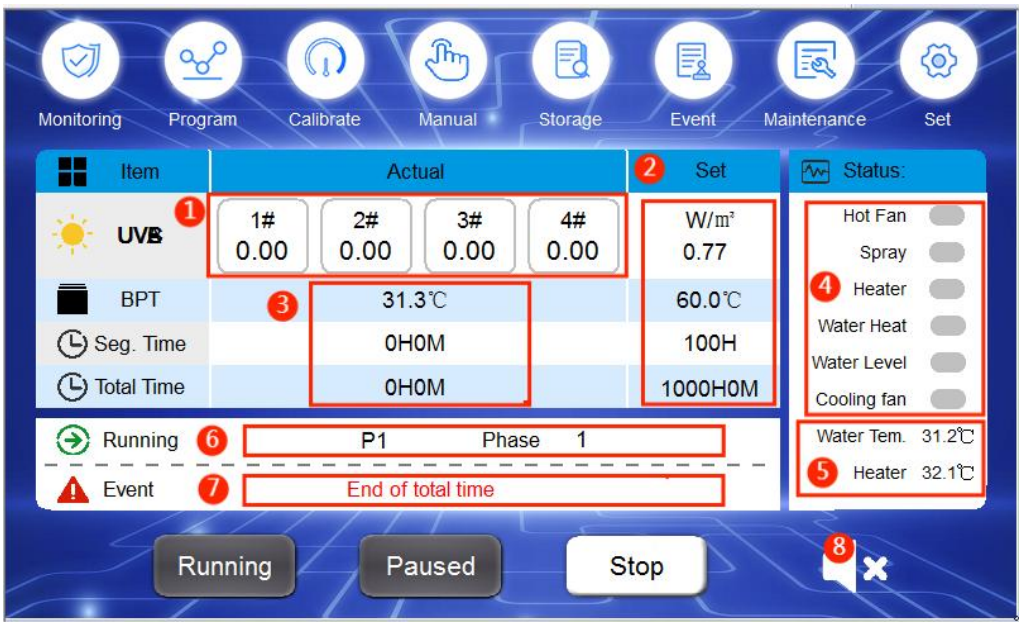
b. For “irradiation or condensation” working condition, the time unit is hour; while for “spray ”working condition, it is minute.

c. For “Condensation”working condition, no need to set irradiance, and for “Spray”, no need to set irradiance and black panel temperature.

d. The operator should press “Save” button after setting every segment. It’s also recommended to preview this segment again to ensure every parameter is set correctly.

5.6 Run BUV

5.6.1 Press “**Return**” till return to main window, press “**Start**，then BUV begin to work. Now the main window will show as below picture：



Picture 18：Fact running window of program 1

①—The current irradiance of four different positions of BUV. Normally, these values will reach the set values and become stable after UV lamps have light for 10 minutes（small fluctuation is normal）; If the difference between irradiance with set value has been exceeding 0.1 W/m^2 for one hour, then BUV will alarm and be stopped automatically.

②—Current set test parameters, include set irradiance, set temperature and running time.

③—Actual segment time, total time and black panel temperature of P1.

④—Main parts working status： Gray means the parts is off now, and yellow means the parts working now.

⑤—Current water temperature of working room and current heater temperature.

⑥—Current working condition which BUV is doing and the past time which this working condition has been running.Press and hold the segment number (digit 1 position in the picture) for 1 second to enter the next segment.

⑦—All alarm events during BUV working.

⑧—Buzzer off button.

5.7 Other Operation Window

5.7.1 Manual Window

Picture 19：Manual Window

Manual operation: when the user needs to check whether a certain function of BUV can work normally, it can be checked separately by manually opening this function.

In this part, you can manually control the four main functions of BUV (Manual Spray, Manual Hot Fan, Manual UV and Manual Water Heat). Directly press the function button to be manually controlled, and the change button will turn black, indicating that the user has started manual operation.

Others are status indicators. Yellow represents on and gray represents off.

Notes:

1. If Manual UV is selected, the irradiance value (0.30-1.55w/m^2) must also be entered.
2. As long as any manual operation function is enabled, BUV will not run automatically according to the program settings.

5.7.2 Set Window

Picture 20：Set Window

Lamp select: when different types of lamps are replaced, click the corresponding lamp type here.
Irradiance check: check the irradiation error of the corresponding channel.
ON: the alarm status is on ; OFF: the alarm status is off.

5.7.3 Maintenance Window

Picture 21：Maintenance Window

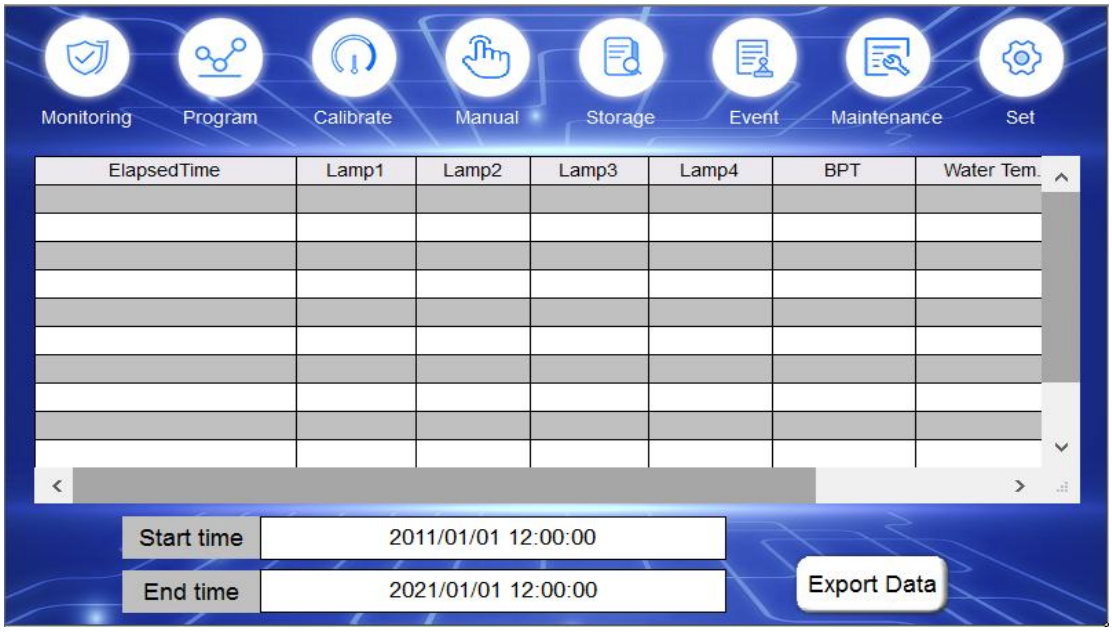
Elapsed Time: users can view the elapsed time of each group of lamps (the upper two lamps on the front door of the working room are the Lamp 1, the lower two lamps are the Lamp 2, the upper two lamps on the back door of the working room are the Lamp 3, and the lower two lamps are the Lamp 4). It is recommended that the user should reset the accumulated time after each replacement of a new lamp, and then the user can view the elapsed time of the current lamp at any time.

BUV Run Time: this value records the total time of BUV operation, which cannot be reset by the user.

5.7.4 Storage Window

The operator can check or download some main test parameters of BUV working status.

Click the fifth button "**Storage**" on the left side of main window, then system enter the below window:



Picture 22: Storage Window

Just input **"Start Time"** and **"End Time"** then can download all data in this time range.

As above **Picture 22**: The start time is "**2011/01/01 12: 00: 00**" and end time is "**2021/01/01 12: 00: 00**", so all data from 12:00 on January 1, 2011 to 12:00 on January 1, 2021 would be downloaded.

Note: Please connect movable disk to the USB interface of BUV, wait for 5 seconds then can download data.

The "**Count**" can show all items which have been downloaded. It has been increasing when downloading. If this number don't increase any more, then means data storage is finished.

The original name of the file downloaded from U disk is "**data . csv**", open this file, and the display format is as below:

数据.CSV

	A	B	C	D	E	F	G
1	MCGS-Time	Sensor 1	Sensor 2	Sensor 3	Sensor 4	Water Tem.	BPT Tem.
2	2015/4/10 12:04	0.764051	0.765232	0.764558	0.767781	48.0502	62.5523
3	2015/4/10 12:05	0.766955	0.765554	0.763889	0.769856	47.9558	62.7789
4	2015/4/10 12:06	0.768352	0.766323	0.766322	0.766325	47.8556	62.5441
5	2015/4/10 12:07	0.764321	0.76232	0.76232	0.764526	47.8445	62.5551
6	2015/4/10 12:08	0.763566	0.76555	0.763252	0.763369	47.7757	62.4332
7	2015/4/10 12:09	0.763226	0.767278	0.764323	0.762598	47.7952	62.3385
8	2015/4/10 12:10	0.768756	0.76343	0.76212	0.76388	47.6995	62.5221
9	2015/4/10 12:11	0.767889	0.762124	0.763639	0.764563	47.5663	62.322
10	2015/4/10 12:12	0.76922	0.764556	0.762526	0.762556	47.622	62.2252
11	2015/4/10 12:13	0.763321	0.763758	0.764755	0.761331	47.4552	62.2278

Picture 23: Display format of "data. CSV"

From this above EXCEL, user can see every data clearly at any year, any month and any date. It is very convenient for user to monitor and check the BUV working status, thus achieving the real "**Guard**

free”.

Note：Please contact Biuged if need to adjust BUV system time.

5.7.5 Calibrate Window

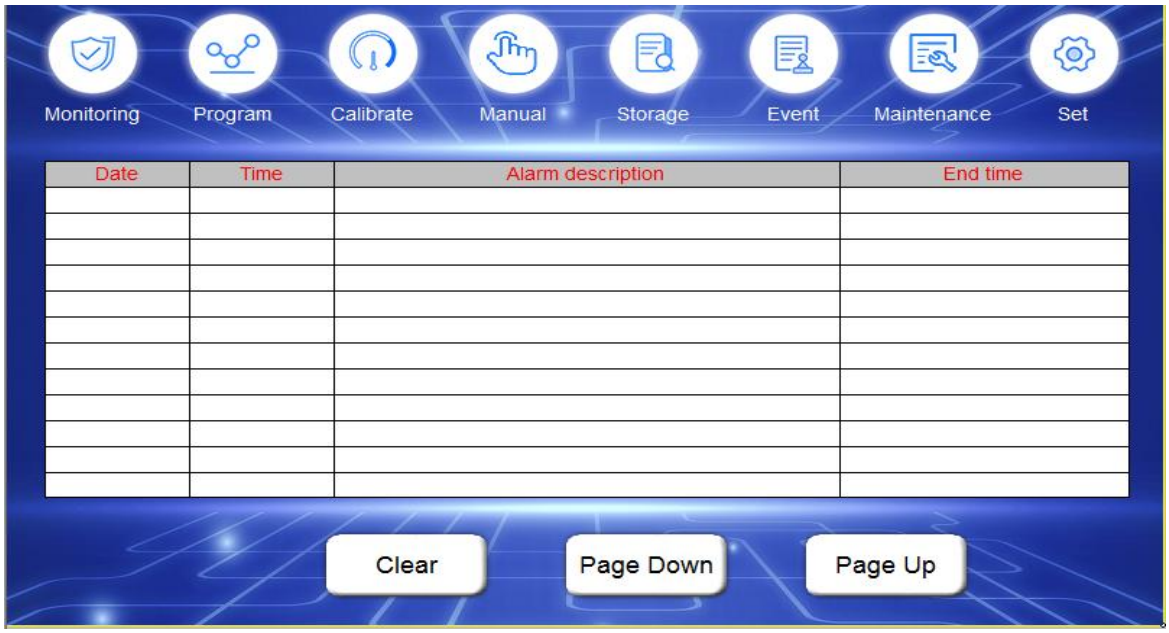
If the user want to calibrate BUV, please click the third button “**Calibrate**” on the left side of main window, then system enter the below window：

Picture 24：Calibrate Window

For more detailed information, please see **7.0**

5.7.6 Alarm Events Window

If the user want to check BUV alarm events, please click the sixth button “**Event**”, then BUV enter this picture as below:



Picture 25：BUV Alarm Events Window

5.8 Finish test

When BUV run time reach the set value, it will stop automatically.

If the operator want to check test panels temporarily , just click “**Pause**”, if want to continue this test, click“**Pause**”again. If want to finish test, click “**Stop**”directly.

6.0 Installation and replacement for the common accessories of BUV

6.1 UV lamps

BUV has been installed a set of lamps （8 pcs）according to the customer’s requirement before leaving factory.

The actual working life of the lamp vary from the lamp types and the working irradiance. The high irradiance will reduce the expected life of lamp significantly. If the fact irradiance can’t reach set value, and still can’t overcome it even after calibration, then the lamps should be replaced. Generally speaking, no need to replace all lamps at the same time, just replace that group （2 pcs）whose irradiance can’t reach the set value even after calibration.

NOTE：

① **The power must be cut off before replacing the lamp.**

② **It is important to replace a group of lamps at one time. If only one lamp is replaced, the irradiance level will be different significantly from top to bottom.**

③ **The BUV irradiance must be calibrated again after replacing the lamps.**

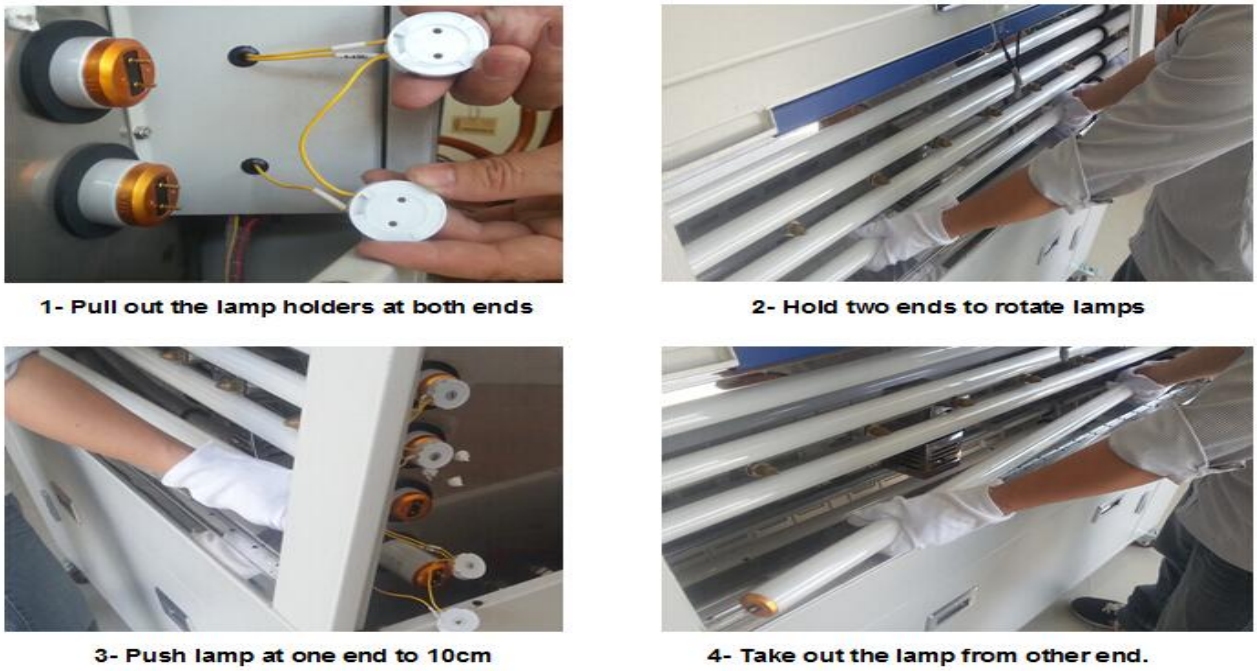
Please follow up these steps when replacing lamps.

① Put the power switch at the back of BUV to “**OFF**”position, and take out the plug from power socket.

② Open the left and right trapezoid side doors, pull out the lamp holders of the lamps which need to be replaced at both ends.

③ Stand at the front of BUV, open the front working room door and remove all sample trays.

④ Wet the lamps surface with a clean and wet cotton cloth, push the lamp to either end with uniform power to 10 cm, then take out lamps from another direction.



Picture 26：Replace BUV lamps

⑤ Insert the new lamp 10 cm into the small hole on the left, and insert another end of lamp to the right hole of working room.

⑥ Stand on the corner of machine and rotate the lamp until the lamp ends are fit with lamp holder, then insert the two pins of lamp ends to corresponding jacks of lamp holders.

Note: Make sure the lamp ends have been inserted into the jacks fully; otherwise the lamp can not be run or lighted normally.

⚠ ***High pressure dangerous!*** When the daylight lamps are being installed or removed, make sure that the power switch behind the BUV has been cut off.

⚠ ***Warning!*** Do not touch the lamp by hand directly because the oil of the skin will inhibit the transmission of the lamp. Please wear the cotton or rubber gloves when you have to touch the lamps. In case you touched the lamps by hand, please clean it with fiber glass cleaner or clean soft cotton cloth.

⚠ ***Danger!*** Do not install or remove the lamp when it is working, otherwise you will get an electric shock. Check whether the switch is in the "**off**" position for every installation or dismantlement.

⚠ ***Warning of the UV!*** The eyes and skin will be hurt badly when they are exposed in UV. Cut off the power switch when replace the fluorescent tubes.

6.2 Irradiance sensors

There are four irradiance sensors which monitor the corresponding four groups lamps separately. Due to long exposure to ultraviolet rays, these sensors also will be aged, therefore can't give a correct irradiance reading. When the calibration coefficient of some group lamps is more than "10", it means the irradiance sensor corresponded with this group lamps should be replaced.

Please follow up these steps when replacing lamps.

① **Turn the switch at the back of the instrument to OFF, and disconnect the external main power supply.**

② **Open the door of the studio, take out the fixing frame, unscrew the connecting screw of the irradiance sensor and the fixing frame, and take out the irradiance sensor.**

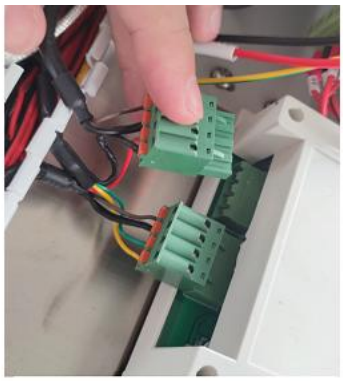
③ **Pull out the plug on the control device, press the orange button on the plug, and take out the brown wire and black wire.**

④ **Open the wire duct cover and take out the sensor wire.**

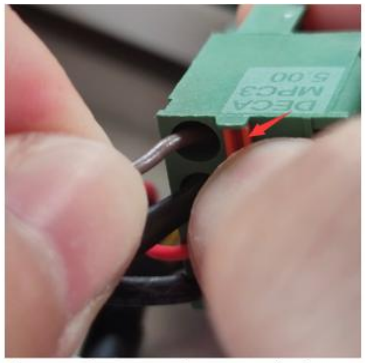
⑤ **Take out the sensor from the studio.**

⑥ **Install the new sensor, connect the connector, and put the fixing frame back to the original position.**

① Loosen the sensor fixing screw and take out the sensor



② Take out the plug



③ Press the orange button and take out the brown wire and black wire

④ Open the wire slot cover and take out the sensor wire

⑤ Take out the sensor in the studio

Picture 27：Replace irradiance sensor

Note：Each sensor has its own number and corresponding installation position. Don't connect the wrong number fast joint and put it in the wrong position.

6.3 Black Panel

The black panel is a resist-corrosion metal panel whose size is 300mm×75mm×1mm. Its surface is coated black paint which has a perfect resist-aging performance. During the test, the black paint would be aged and fade because the black panel has been exposed under ultraviolet. This black panel should be replaced when its color difference with the back unexposed paint （△E）is more than 3.0 .

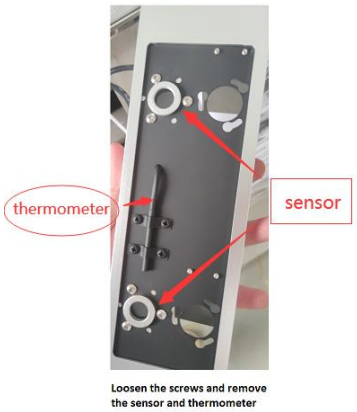
Please follow up these steps when replacing the black panel.

① Turn the switch at the back of the instrument to OFF, and disconnect the external main power supply.

② Open the front door of the studio and take out the fixing frame.

③ Unscrew the screws on the fixing frame, remove the sensor and thermometer, and replace it with a new blackboard.

④ Install the sensor and thermometer, and put the holder back to its original position.



Picture 28：Replace BUV black panel

6.4 Filter element

The BUV filter is used to filter the external water. As the using time become longer and longer, the filter element of filter will change color gradually. The lifetime of filter element depends on the external water quality. It should be replaced when its color become dark brown.

Picture 29：Replace BUV filter element

Please follow up these steps when replacing the filter element.

① Turn off external water supply.

② Screw off the filter cover anticlockwise by plastic wrench which come with BUV, take out the filter element and replace a new one.

Note：Please put the black seal ring in the correct position, otherwise filter will leak. If any water drop on the cabinet body, please dry it in case of rust.

7.0 Calibration

BUV calibration includes irradiance calibration and black panel temperature calibration.

UV lamps can be used for a long time till its irradiance energy can't reach the set value. Because the control system prolong the life of lamps with maximum degree during the whole test, BUV should be calibrated timely（Recommended calibration period is 500 hours, otherwise irradiance difference will occur because of irradiance sensor self aging）.

As any other lamps, UV lamps energy of BUV also decrease as time increase. The control system would compensate it automatically through strengthening the voltage of lamps. But as the using time become longer and longer, the energy of lamps decrease continuously. For some high set point of irradiance, BUV couldn't keep this irradiance any longer, and now the system of BUV would reminder failure "the error of irradiance is too large" and shut off the machine. Now, the operator should calibrate the BUV by standard calibration radiometer. If machine still can't get the set point after calibration, the user should replace the two pcs lamps corresponding to the sensor and calibrate again.

On the other side, after a long use, the temperature value read by BUV will drift a little because of the temperature sensor self performance. So it's necessary to calibrate temperature periodically（Recommended calibration period is 6 months）.

7.1 Calibrate irradiance

To calibrate irradiance, a radiometer which has been calibrated is necessary. Now, we recommend BGD 8118 radiometer produced by Biuged.

Picture 30：BGD 8118 Radiometer

Radiometer is used for calibrating the BUV specially and just for fluorescent UV lamps. It is not only used to calibrate the UVA lamps , but also UVB lamps. For UVB lamps, it has been calibrated well at the wave length 313 nm with $W/m^2/nm$ unit before delivery. For UVA lamps, it has been calibrated well at the wave length 340 nm with $W/m^2/nm$ unit.

On the other side, because radiometer is a precise meter, the operator should keep the sensor glass clean when use it. And it should be kept in a dry and ventilated environment and far away from high temperature, cool and moisture.

For every calibration, four channels （consist of relative lamps and irradiance sensor, for example, channel 1 corresponds to 1# sensor and the first group lamp）of BUV should be calibrated step by step.

Strong light Warning!

- ⚠ UV lamps might cause serious sunburns or eye inflammation !
- ⚠ Know all safety cautions before calibration !
- ⚠ Should be operated by technician !
- ⚠ Operators should wear necessary goggles, protection cloths and gloves !
- ⚠ During calibration, sample holders with panel should be used to cover the rest space of working

room to avoid light leakage as much as possible !

Please follow up these steps to calibrate irradiance.

① Check the four irradiance sensors of BUV , and ensure there is no any water drop or dirt on the glass surface.

② Prepare the irradiance calibrating holder：fix the BGD 8118 radiometer sensor on the calibrating holder, put this holder beside the irradiance sensor which need to be calibrated.

Fox example, if calibrate 1# channel, then put the radiometer sensor near the 1# irradiance sensor, now the value shown on the radiometer screen is the fact value of 1# irradiance sensor.

Put the radiometer sensor near that sensor needed to be calibrated

Close BUV front door, compare the value read from radiometer and BUV showing value.

Picture 31：Calibrate BUV irradiance

③ Turn on the BUV, set irradiance as any value between 0.5～0.8W/m^2, set the black panel temperature as 60℃.

④ Connect BUV to radiometer with the USB line which come with BUV, choose the corresponding calibration point （UVA or UVB）in the radiometer.

⑤ After the black panel temperature become stable（need 30 minutes）, read the value shown on the radiometer.

⑥ Enter BUV calibration windows （as **Picture 32**） and login.

Picture 32：Calibrate BUV irradiance

⑦ Click the blue button at the back of relative channel, then a key panel will appear, input the value read from radiometer and click the back “Confirm” button, now, the showing value will be the same as Calibrate value.

⑧ Calibrate other channels with the same steps in turn.

⑨ Check again all channels which have been calibrated, make sure the difference between showing value of BUV with reading value from radiometer is within 0.01 W/m^2, If not, recalibrate this channel .

7.2 Calibrate black panel temperature

Please follow up these steps to calibrate temperature.

① Turn on the BUV and enter the main windows, now the BUV is on standby.

② Take out the black panel temperature holder, loosen the back screws and take out the thermometer.

③ Prepare a precise mercury thermometer（0.1℃ accuracy）which has been calibrated. Put the mercury thermometer and the blackboard thermometer into an insulated cup containing hot water（the recommended temperature is 60 ± 10 ℃, and the water level is higher than the probe of the blackboard thermometer）at the same time. Compare the mercury thermometer value with BUV showing value. If the difference is more than 0.5℃，then calibrate BUV temperature.

④ Enter the calibration windows, input the value read from mercury thermometer into the blue “Calibrate Value” and press “Confirm”.

Picture 33：Calibrate BUV Black Panel Temperature

8.0 Maintenance of BUV

The maintenance of BGD 856 should be undertaken by the special technician who has received the professional training. Daily maintenance can ensure a correct test results and extend BUV lifetime.

8.1 The recommended maintenance schedule

We recommend the operator to clean, check and replace parts BUV periodically according to **Table.3**. This time is BUV work time, not lamps work time.

Table. 3：Recommended Maintenance Schedule

Operation	Time
Clean lamps	Check once before each test
Clean working room	Per 1,000 hours or as needed
Check spray	Per 3 months
Calibrate irradiance	After the lamps have worked 500 hours
Calibrate black panel temperature	6 months
Check water filter	6 months

8.1.1 Clean lamps

The impurities from spray water and air dust can make lamps become dirty, thereby effect the lamps working. So it's necessary to clean lamps after every test.

8.1.2 Clean the working room

Even the working room is made up of stainless steel, it's still also become corrosion because of pollution come from test specimen or bad water. Operator should be clean its surface periodically with detergent specially used for stainless steel, keep its surface be clean and smooth.

Please follow up these steps to clean BUV working room：

① Turn off all power supply of BUV.
② Turn off external water supply.
③ Turn on the ball valve and discharge all water on the working room bottom.
④ Open the BUV front door and take out all sample trays.
⑤ Remove left and right trapezoid side door, and take out the second and forth group lamps.
⑥ Take out the water proof shield of working room.
⑦ Clean the working room, then install these parts according to the above steps reversely.

Note：

1. Be careful when cleaning working room, don't let water enter the air heater located in the middle of room.

2. Don't use steel wire to clean the working room, otherwise will damage its surface and lead to rust. Cotton yarn is suitable. Also don't use any slovent disinfected by chlorine. Special cleaning agent for stainless steel or any other similar agent is suitable.

3. After cleaning the working room and sample trays, use a wet cotton to clean its surface residue. And use deionized water to clean working room.

Turn on the drain valve, and discharge all water of working room.

Take out all sample trays and remove the second and fourth group lamps.

Remove all screws of water proof shield

Take out the water proof shield and clean the room

Picture 34：Clean BUV working room

9.0 Warranty

9.1 The machine is warranted in respect of materials and workmanship for 12 months from the date of purchase. Any defective parts within the machine arising during the warranty period, shall be replaced free of charge subject to our inspection.

9.2 Any defective parts within the machine arising out of the warranty period: shall be replaced at client's expense.

9.3 Under the following conditions, we will not be responsible for the replacement during the warranty period:

- Without invoice or receipt.
- Damaged by wrong assembling or disassembling.
- Damaged by wrong or careless operation.
- Damaged by wrong operating under improper condition.
- Damaged by broken packing during transportation.

10.0 Troubleshooting

Problems	Reasons	Treatments
Big difference between fact irradiance with set value	1. Irradiance hasn't been calibrated for a long time 2.Irradiance sensor is wrong 3. Lamps has aged 4.Bad contact between lamp holders or no connection	1. Calibrate irradiance, if can't solve, continue the next step. 2. Exchange the fault channel sensor with other normal channel sensor, if the irradiance can recover, then means this sensor is wrong, replace a new irradiance sensor. 3. If can't solve problem even exchanging the other channel sensor, maybe the lamps has aged, contact Biuged. 4. Check lamp holders and replace a new one.

Showing irradiance value has a big swings	1. Irradiance sensor is wrong 2. channel amplifier is wrong 3. Ballast is wrong 4. Bad contact between lamp holders or no connection	1. Exchange the fault channel sensor with other normal channel sensor, if the irradiance can recover , then means this sensor is wrong, replace a new irradiance sensor. If can't solve problem, enter the next step. 2. Open the top cover of BUV can find a white box, there are five joints in the circuit panel, namely power source and four channels amplifies. Exchange the fault channel amplifier with the normal amplifier, if can solve problem, it means the amplifier is wrong. If not, enter the next step. 3.Check the ballast：from up to down is #1、#2、#3、#4；For example, if 1 # sensor is unstable, then exchange #1 ballast with #2 ballast. If can solve it, it means this ballast is wrong ,replace a new one. 4. Check lamp holders and replace a new one.
No spray	1. Check the pressure of external water 2.Spray nozzle is blocked 3. Electromagnetic valve of spraying failure	1. If the external water don't have pressure, open the BUV bottom, check if the power socket of water pump has been connected. If pump is drawing water but still don't spray, check if has added water to the pump watering inlet.（vacant draw can't work） 2. Check all spray nozzles by manual operation（see 5.7.1）. 3. Set spray as manual operation and hear if there is any noise occurred from valve, or use a multi-meter to measure the two ends voltage of valve , if the voltage is 220V, then means electromagnetic is wrong. If no any voltage, then check the low-voltage electric relay of circuit panel work or not.
Can't condensate or bad condensation	1. Sample trays can't be sealed well 2.Set wrong system parameters 3. Heating elements are wrong 4.Low-voltage electric relay is wrong	1. Seal the working room by enough sample trays. 2. Check the system parameters window "max. water Tem." And "min. water. Tem." （see 5.7.1） 3. Run BUV for half-hour, check the water temperature shown in main window. If it's ambiente temperature, then check if there is voltage at the both end of heating elements, If yes, means heating elements are wrong. If no, contact Biuged. 4. Replace low-voltage electric relay.
Black panel temperature can't reach the set value	1. Set a too high value or environment temperature is too low. 2.Solid state relay is wrong 3. Thermometer is wrong	1. Revise the program setting parameters or change room temperature . 2. Open the top cover to check the solid state relay. 3. Replace the black panel thermometer.
Black panel temperature overheating	1. Solid state relay is wrong 2. Thermometer is wrong	1. Open the top cover to check the solid state relay. 2. Replace the black panel thermometer.
The machine alarm water shortage even connect the water	1. The protection sponge of float switch hasn't been removed 2. Float switch is wrong 3. The water pump hasn't been started 4. The solenoid valve of water supply is wrong	1. Removing the protection sponge of float switch according to 5.1.2 in the manual. 2.Replace the float switch. 3.Connect the power supply of water pump. 4. Replace the solenoid valve.

11.0 Other Accessories Ordering Information

BGD 8110--UVB lamps (40W/313nm)
BGD 8111--UVA lamps (40W/340nm)
BGD 8118--Calibration Radiometer (310nm&340nm)
BGD 8120--0℃ Standard Resistor
BGD 8121--100℃ Standard Resistor
BGD 8130--Standard sample tray
BGD 8170-- Pure water equipment

12.0 Packing List

Accessory Name	Quantity
UV Light Accelerated Weathering Cabinet	1 pc
Sample trays	24 pcs（Installed at the BUV）
Tension rings	48 pcs（Installed at the BUV）
Black panel temperature sensor holder	1 pc（Installed at the BUV）
Irradiance sensor holder （include four irradiance sensors）	2 pcs（Installed at the BUV）
Water pipe	1 for in & 1 for out
UVB（ or UVA）lamps	8 pcs（Installed at the BUV）
Rubber racks	Come with BUV if needed
Base panels（Aluminum）	48 pcs（Installed at the BUV）
Plastic Wrench	1 pc
Instruction manual	1 pc
Certificate Verification	1 pc

13.0 Others

For further information, please contact Biuged, your local supplier, or visit our website at www.biuged.com. When there are differences between the actual products and the pictures of the instruments, the actual products shall prevail.Please download the latest instructions on the official website.