

Biosafety Cabinet

Class II A2

BSC-1500IIA2-S

USER MANUAL

Thank you very much for purchasing our class II A2 Biosafety Cabinet.

Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the “Warranty” at a hand place for future reference.



Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.

Version 2023.07

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Preface

Dear respected users:

Welcome to buy OUR Biological Safety Cabinet, here please accept our sincere thanks!

The biological safety cabinet is used to protect the operator, laboratory environment and experimental materials. When the operator is carrying out an experiment with the original culture, bacterial strain or using infectious experimental materials, it can avoid him from contacting with infectious aerosol or spills. The biological safety cabinet is a necessary equipment in the labs of microbiology, biomedicine, gene recombination, animal experiment and biological products, especially in a place where the operator needs to take protective measures, such as in the fields of medical and health, pharmaceutical, scientific research, etc. It can provide a sterile, dust-free and safe working environment for the operator who are carrying out bacterial culture.

We sincerely hope that our products will bring the greatest help for your work.

In order to make you have a better understanding of our cabinet, please be sure to carefully read the manual before use. The content of this manual is very important for you to use this device safely and correctly!

After you have read the manual carefully, please keep it in a convenient place for easy reference.

1. Applicable Scope

Class II A2 biological safety cabinet is a safety cabinet with a front window operation port, through which the operator can operate in the cabinet. In addition, the biosafety cabinet can protect personnel, products and the environment during operation.

Working environment: (1) For indoor use only;

(2) Ambient temperature: 15°C~35°C;

(3) Relative humidity: ≤ 75%;

(4) Atmospheric pressure range: 70 kPa to 106 kPa.

(5) Power supply: 220V 50Hz

2. Technical Parameters

This product belongs to Class II A2 biological safety cabinet, which fully meets the requirements of the YY 0569-2011 Class II Biological Safety Cabinets, the pharmaceutical industry standard of the People's Republic of China. Its basic technical parameters are as follows:

Parameters Model	BSC-1500IIA2-S
Power supply	220V~50Hz
Outer size	1500×785×2220(mm)
Operating area size	1220×700×660(mm)
Rated power	1800W
Total exhaust air amount	840m ³ /h
UV lamp power	15W*2
LED lamp power	16W*2
Downflow velocity	0.33m/s
Inflow velocity	0.48m/s
Filter efficiency	99.9995% (for particles with the diameter of 0.12μm)
Noise	≤67dB (A)

Note: (1) The power consumption of the power supply includes the power of the operating area load (the load cannot exceed 500W);

(2) The company reserves the right to change the design of the product. The product is subject to change without prior notice.

3. Performance Index

3.1 ULPA integrity

The leakage rate of the scannable detection filter at any point shall not exceed 0.01%.

3.2 Vibration amplitude

The net amplitude of vibration between 10 Hz and 10 kHz shall not exceed 5 μ m (rms).

3.3 Illuminance

The average illumination is not less than 650 lx, and the measured value of each illuminance point is not less than 430 lx.

3.4 Mechanical properties

The design and structure of safety cabinet can resist overturning or deformation caused by external force, downward bending caused by worktable load and overturning caused by working load. When the center of worktable is loaded with 23kg pressure, the worktable will not produce permanent deformation.

3.5 Electrical performance

Permissible limits for accessible components	Value under normal conditions	The effective value of voltage shall not exceed the limit value of 33V.
		When the effective value of voltage exceeds the limit value, the effective value of the sine wave current shall not exceed the limit value of 0.5mA.
	Limits under single fault conditions	The effective voltage value shall not exceed the limit value of 55V.
		When the effective value of the voltage exceeds the limit, the effective value of the sine wave current shall not exceed the limit of 3.5mA.
Protective connection impedance of plug connection	The impedance between the protective conductor terminal and each accessible component that requires protective connection shall not exceed 0.1 Ω .	

equipment		
Dielectric strength test	After the Dielectric strength test, there shall be no breakdown or repeated flashover.	Basic insulation: 1390 V, 50 Hz AC voltage, test for 5s.

4. Product Features

4.1 Electrically controlled front window

The front window is controlled electrically, as a result, users don't have to directly contact with the front window. The motor used for the front window is a specialized reversible speed control motor, which has the characteristics of high starting torque and smooth rotation.

4.2 Structure

- 1) The left and right and rear cavities of the biological safety cabinet are filled with negative pressure air ducts, making a air curtain between the working area and the external environment . At the same time, the working area is surrounded by negative pressure to ensure that the product does not leak.
- 2) The cabinet part is made of 1.2mm-thick cold-rolled steel plate with electrostatic spraying on the surface, which enhances the structural strength and makes the whole device more stable.
- 3) The working area table and the inner side of the device are made of stainless steel to ensure that the safety cabinet is beautiful and corrosion-resistant.
- 4) Base is made of cold-rolled steel with electrostatic spraying on the surface
Soft touch type control panel, easy to handle and beautiful appearance.
- 5) Touch switch is used in the control panel to ensure that the cabinet is beautiful and easy to operate.

4.3 Warnings and reminders

4.3.1 Front window operation port alarm

When the opening height of the front window of the safety cabinet exceeds or falls below the specified height of the front window operation port, an audible alarm will sound, and the interlocking system will activate. When the opening height is adjusted to the specified opening height, the alarm sound and interlocking system will automatically release (the height of the front window operation port is set to be 200mm).

4.3.2 Filter pressure loss

Ensure the safety cabinet can be used normally, and the pressure difference of the filter in the safety cabinet

should not exceed 170Pa. If it exceeds 170Pa, an audible and visual alarm will be triggered.

5. Structure Composition

5.1 Structure composition of BSC-1500IIA2-S

The product is a Class II A2 Biosafety cabinet, which is composed of cabinet body, front window operation port, support feet and casters, fan, liquid collecting tank, filter, control panel, UV lamp and LED lamp.

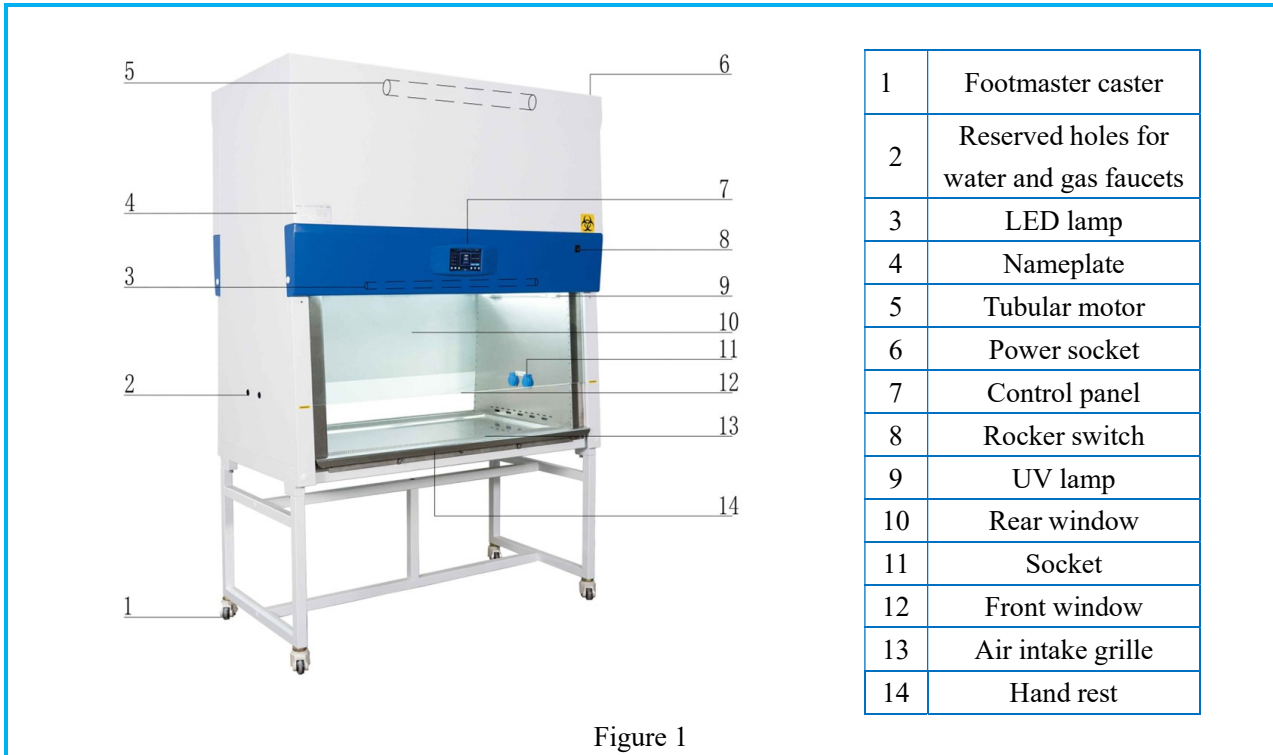


Figure 1

5.2 Front window drive system

The front window drive system consists of a tubular motor, front window, traction mechanism, limit switch, etc.

5.3 Air filtration system

Air filtration system is the most important system to ensure the performance of the cabinet. It consists of fan, supply filter and exhaust filter. The main function of air filtration system is to continuously let filtered air enter work area, ensuring the down flow velocity, the cleanness of work area and exhaust air are up to standards.

5.4 UV lamp

The UV lamp tube is located inside the operation area to ensure that the UV light can fully irradiate all the space in the operation area to thoroughly disinfect the cabinet.

5.5 LED lamp

LED lamps are used for lighting to ensure that the average illumination in the operation area meets the standard requirements.

5.6 Control panel

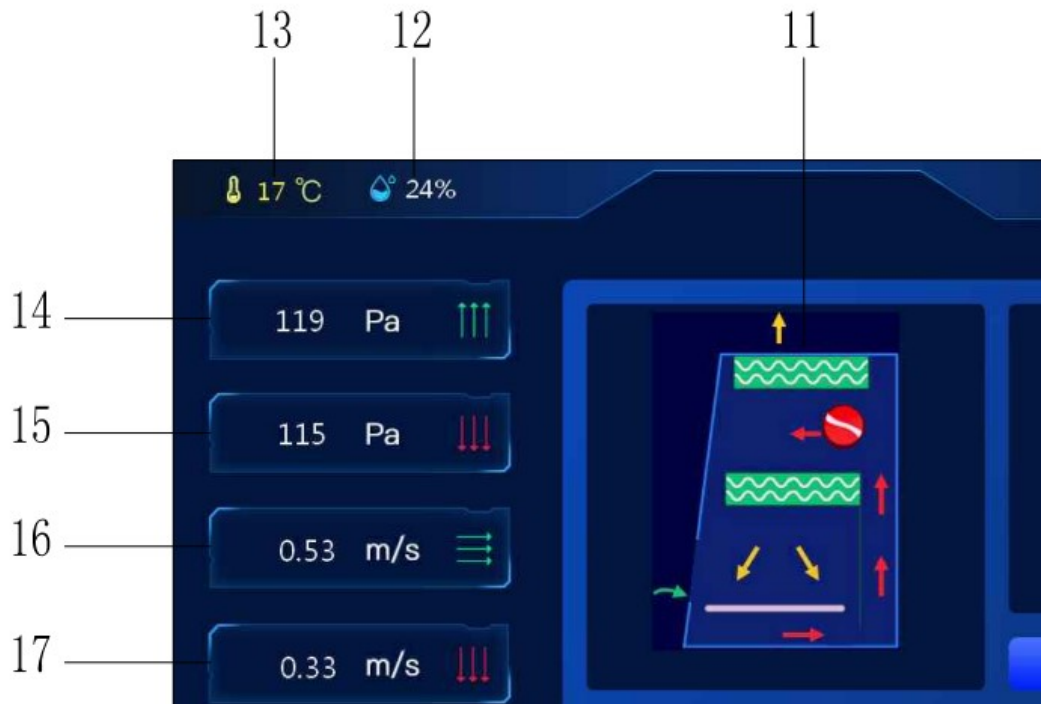


图 3

1	Fan	2	UV	3	LED
4	Setting	5	Socket	6	Mute
7	Lock screen	8	Front window up/ down	9	Alarm display window
10	Clock	11	Dynamic diagram of airflow pattern	12	Humidity in the operating area
13	Temperature in the operating area	14	Exhaust filter pressure difference display	15	Supply air filter pressure difference display
16	Inflow velocity display	17	Downflow velocity display		

5.6.1 Touch screen display window

Through the touch screen display window, you can view the working status and performance of the device.

5.6.2 Buttons

The operation of the device is conducted through touching the buttons;

Password interface: after power on, the password interface will pop up. The initial password is 2222, and the

password can be modified. The modification method is shown below.

Button function: After pressing the corresponding function button, there will be icon display on the display screen and the corresponding function will be started;

After the fan button is pressed and the fan is running, there will be animation demonstration, which will stop automatically when the button is pressed again.

After both the front window and rear window are closed, press the UV button to set the disinfection time.

After it is confirmed that the UV lamp is turned on, press the button again to turn off the UV lamp.

When the lighting button is pressed, the LED lamp is turned on, and when pressed again, the LED lamp is turned off.

When the socket button is pressed, the socket is powered on, and if pressed again, the socket is powered off.

Mute button: When the device is in an alarm state, pressing this button will cancel the alarm, and when pressed again, the alarm function will activate.

Interlock: UV lamp and fan are interlocked with each other. That's to say, UV lamp cannot be turned on when the lighting button is pressed; when the UV lamp is turned on, the LED lamp can be turned on and UV lamp is turned off; Note: when the fan is in normal operation, if the glass door is closed, the fan will stop working, but there is an icon. After the glass door is lifted, the fan will resume operation, and the UV function is the same as above.

Alarm window: when an alarm is triggered, the alarm information will be displayed in the corresponding alarm window. When multiple alarms appear at the same time, it will be broadcast circularly.

Button memory function: fan, LED lamp and lighting are provided with power-off memory function. If the power is turned on after power failure, the corresponding function button will be opened, where there is no need to re-input the password but enter the main interface.

User setting button: setting interface (click setting button in the main interface to enter the settings interface).

Date and time adjustment: click the time in the upper right corner of this interface to enter the time adjustment interface. To adjust the corresponding date and time in this interface, press the OK button to save and exit.

Date and time adjustment: in this interface, click the time in the upper right corner to enter the time adjustment interface, to adjust the corresponding date and time in this interface, then press the OK button to save and exit.

Timing on / off function: click Timing Mode button in the user setting interface to enter the setting interface.

Under this interface, the timing on/off function of fan, UV lamp and socket and timing shutdown function can be set. For specific operation, input the time for timing on/off operation in the corresponding function bar, and

press the corresponding ON button after input to turn on the function. At the same time, in the main interface, there will be an icon prompt in front of the corresponding operation button, and the corresponding function will automatically be on/off according to the set time. To turn off this function, click OFF button. Note: fan and UV lamp functions are interlocked with glass doors.

View the working time of filter, UV lamp: click the Device Life button in the user setting interface to enter the view interface to view the service life.

User password modification: in the setting interface, click the Change Password button to enter the password modification interface. Enter the original password to enter the modification interface to modify the user password, and click "OK" button to exit.

Front window up button: press the up button continuously, the front window will continue to rise, and stop when it is 200 mm away from the worktable, continue to press the up button until the lowest point of travel is reached, and release the button, the front window will stop moving.

Front window down button: press the down button continuously, the front window will continue to drop, and stop when it is 200 mm away from the worktable, continue to press the down button until the lowest point of travel is reached, and release the button, the front window will stop moving.

Rear window up/down: Manually control the height of the rear window by pressing the self-restoring rocker switch on the rear panel.

5.7 Sampling port

The sampling port for upstream aerosol concentration test of ULPA filter reserved in the safety cabinet is located at the lower part of the panel of the work area. The transparent pipe labeled "filter upstream" is the sampling port for upstream aerosol concentration test of supply air filter and exhaust air filter, as shown in Figure 4.



Figure 4

5.8 Power switch

After the power cord is connected to the power supply, turn on the rocker switch to power on the device .

5.9 Waterproof socket

Waterproof sockets are located on the right side of the work area, to supply power to the devices in the work area. The waterproof sockets can be controlled by SOCKET button.



- (1) Please make sure the total load of sockets should be $\leq 500\text{W}$;**
- (2) Waterproof socket can be waterproof only when front cover is put down, when the front cover is opened, the socket can not be regarded as a waterproof socket.**

5.10 Fuse

The equipment is equipped with main power fuse, waterproof socket fuse and fan fuse, which are located next to the power cord outlet above the cabinet and the operation panel. For the specifications corresponded to the fuse label, please see Chapter 10.

6. Installation & Instructions for Operations

6.1 Installation



The safety cabinet needs to be installed by qualified engineers trained by our company.

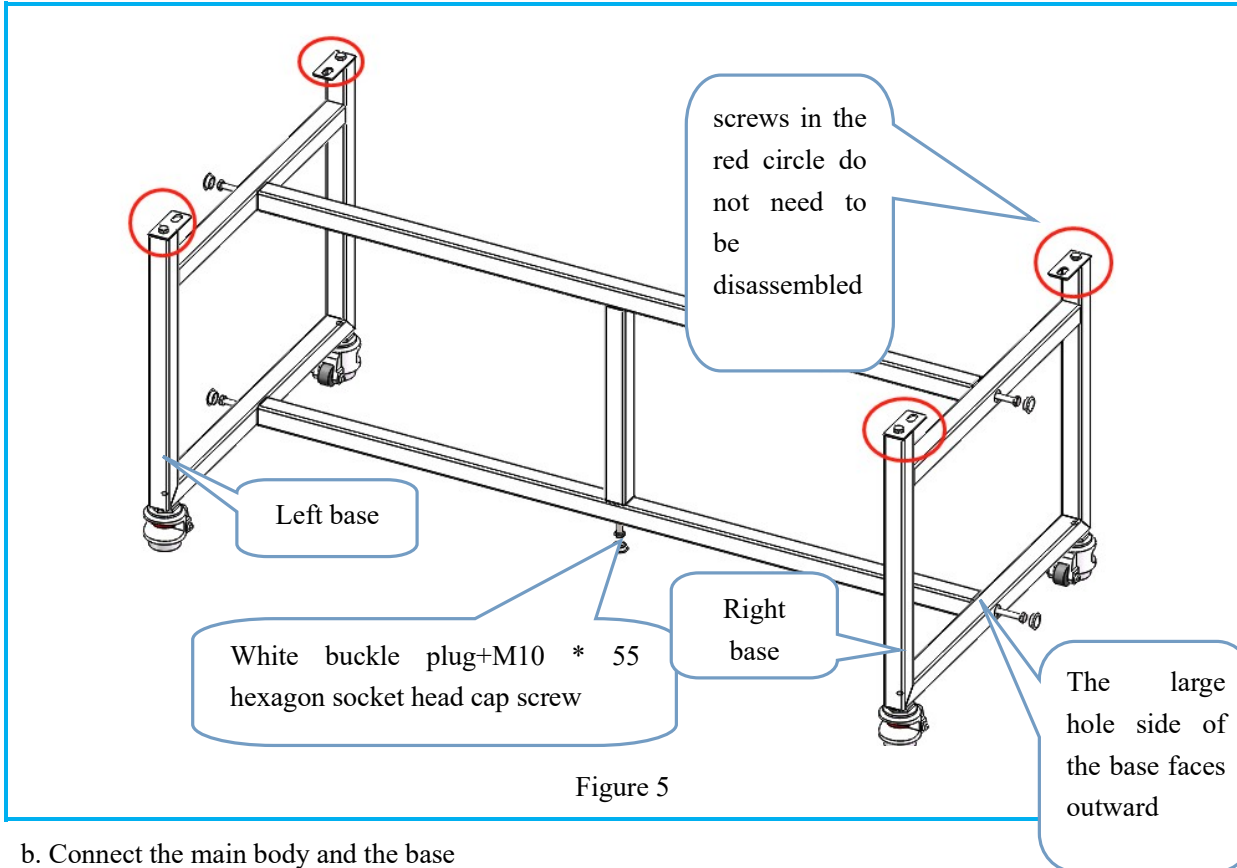
1. Remove all the package materials;
2. Inspect the surface of main body to make sure whether there is scratch, deformation or uncorrelated things;
3. Check the accessories and data carefully according to the packing list in the user manual;
4. Move the whole device to the final installation location



The base will be packed at back of main body, please take it out before installation. DO NOT INVERT, DISASSEMBLE OR TITILE THE CABINET during transportation.

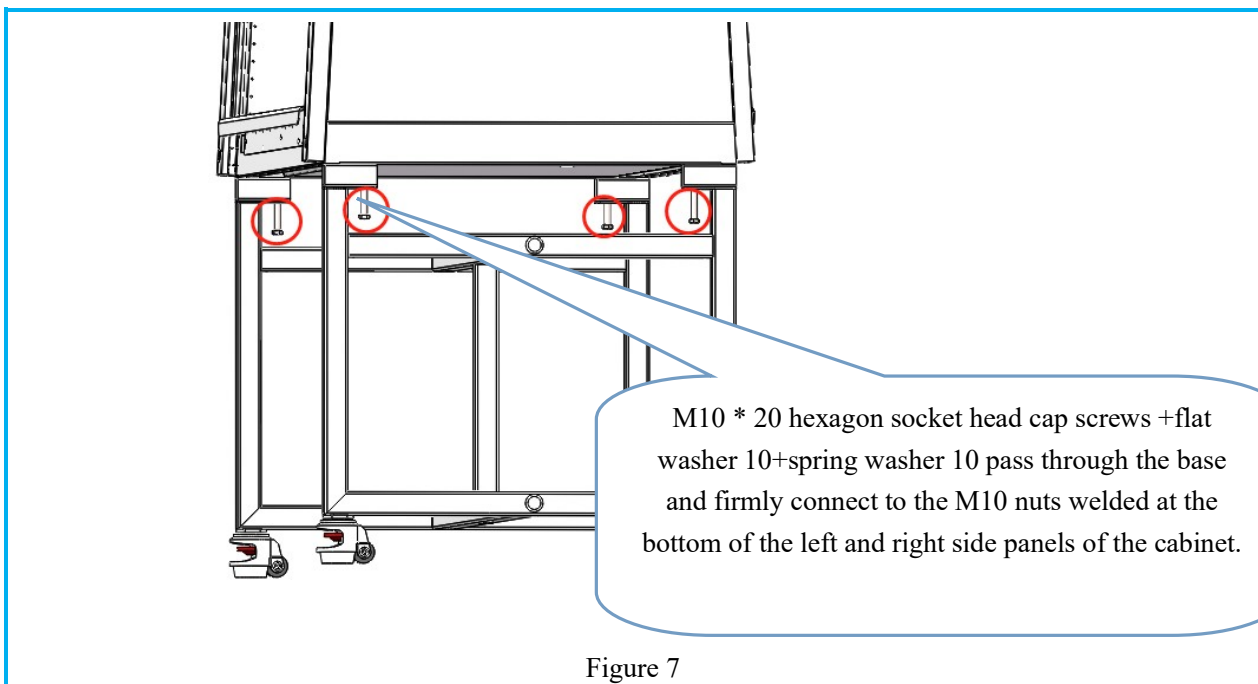
a. Connect the base

Remove the 5pcs of M10 * 55 hexagon socket head cap screw from the base assembly (4 screws in the red circle do not need to be disassembled) as shown in the figure below, and plug the installation holes with the 5 white buckle plugs in the accessory box, as shown in Figure 5



b. Connect the main body and the base

Take 4 sets of M10 * 20 hexagon socket head cap screw, flat washers 10, and spring washers 10, to connect the main body and the base, as shown in Figure 7.



c. Assembly of drainage ball valve

Take out the accessories of the drainage ball valve, as shown in the table below, install them from top to bottom according to the picture on the left, and tighten them firmly, as shown in Figure 9.

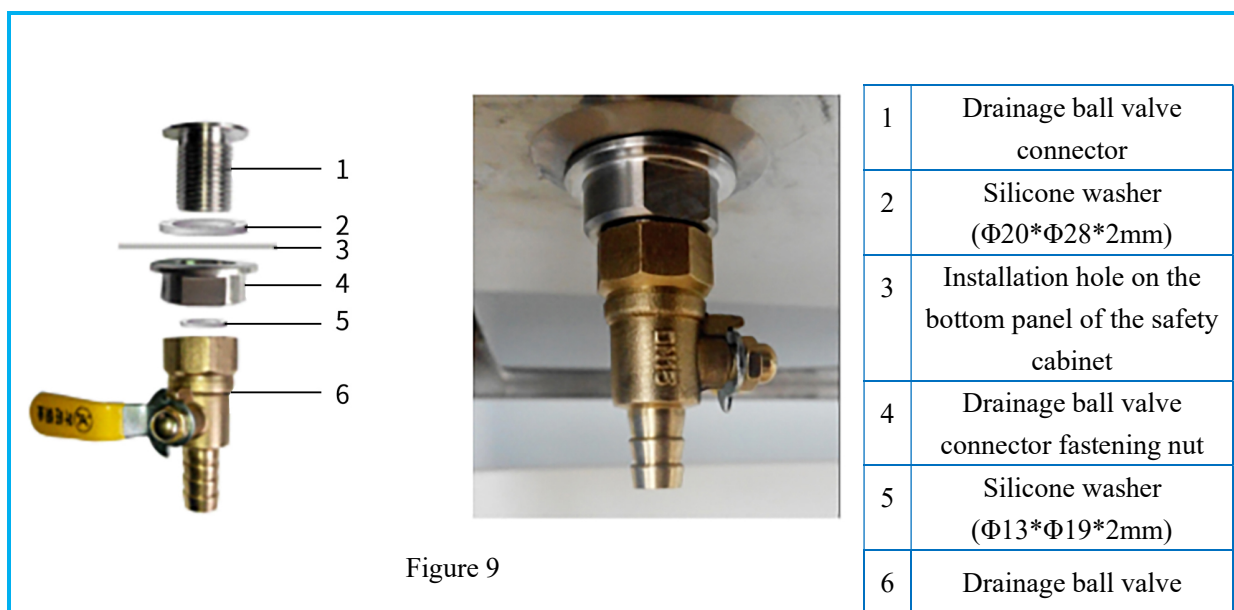


Figure 9

d. Placement of the biosafety cabinet

The biosafety cabinet should be placed in an air flow protection area to prevent the influence of airflow from ventilation system, air conditioning, doors, windows and personnel movement on the safety cabinet. The test shows that if the other interference airflow exceeds the inflow velocity of the safety cabinet's inlet, the indoor infectious gas will enter the working area of the safety cabinet. Therefore, it is necessary to place the biosafety cabinet in the correct position. Attention should also be paid to the relationship between biosafety cabinet exhaust air and indoor ventilation airflow or exhaust duct. The exhaust air of the biosafety cabinet is discharged from the top of the cabinet body, and the exhaust air of the biosafety cabinet should not be blocked when placing the biosafety cabinet. The biosafety cabinet should be located downstream of the air flow direction, and at least 300 mm space must be reserved on each side of the cabinet for inspection in the future.

e. Adjustment of footmaster caster

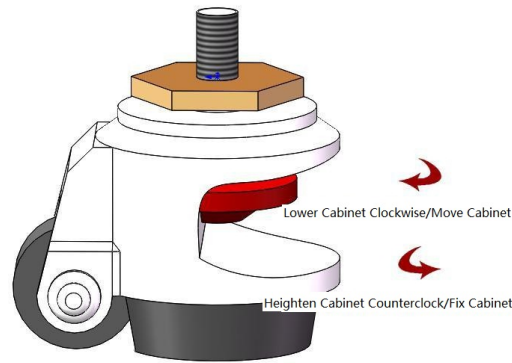



Figure 10

Clockwise rotate caster's red part to low down the base feet and the cabinet height. Low down all four casters at the same time to move the cabinet. Counterclockwise rotate casters' red part to raise the base feet and cabinet height. Raise all four casters at same time to fix the cabinet. In addition, adjust the four casters at the same to to keep the cabinet in a horizontal and stable state.


 **Do not place the device in a position where it is difficult to operate the device.**

6.2 Test Basis


The biosafety cabinet must be tested in accordance with the requirements of YY 0569-2011 Class II Biosafety Cabinet, the pharmaceutical industry standard of the China.

6.3 Instructions for Operation

- a、 Connect to the AC power supply, and it is recommended that users use a UPS;
- b、 Open the power lock, to power on the device, then it will be in the standby mode, after which, wait for the operator to input through the buttons and execute ;
- c、 After pressing the power button, press each function button to realize the following functions, including lighting, disinfection, fan, mute, socket, electric door lifting;

 **When front window is open or other button is pressed, the disinfection function can not be activated.**

- d、 Before using the device, lower the bottom edge of the glass door to the bottom, turn on the UV lamp, and disinfect for more than 10 minutes;

 (1) **During disinfection, people should leave the room to protect their eyes and skin and avoid injury caused by accidental exposure;**

(2) **The intensity of UV lamp shall be tested regularly according to the manufacturer's recommendations, and it is recommended to inspect it once a quarter. If it is unqualified, it shall be**

replaced;

e、Lift up/down the bottom edge of the electric door to the height of 200 mm from the work table, then turn on the fan, and operate for half an hour before the normal operation in the cabinet;



In order to ensure the safety of operation, please place the experimental articles in the safety cabinet in advance, and keep the bottom edge of the electric door 200 mm higher than the worktable during the experimental operation.

f、After use, lower the bottom edge of the electric door to the bottom, turn on the UV lamp to disinfect for more than half an hour, after which, turn off the equipment .

6.3 Product Contraindication

There are currently no known contraindications to this product.

6.3 Potential Safety Hazards and Usage Restrictions

Hazard Type	Potential Hazard	Hazardous Effect	Cause Analysis	Usage Restriction
Performance hazards	Product contamination	Harm to product users	<ol style="list-style-type: none"> 1.The downflow velocity is too low 2.The inflow velocity is too high 3.The ULPA for air supply fails 4. The disinfection/cleaning is not good 5.The operation is improper 	Used by professionals with experience in biological hazard protection
	Environmental pollution	Biohazard accident	<ol style="list-style-type: none"> 1.The ULPA for air exhaust fails 2.The operation is improper 	Used by professionals with experience in biological hazard protection
	Operator infection	Personal safety accident	<ol style="list-style-type: none"> 1.The ULPA for air exhaust fails 2.The inflow velocity is too low 3.The downflow velocity is too high 4.The operation is improper 	Used by professionals with experience in biological hazard protection. In addition, they must wear protective clothing
	Mechanical hazards to the operator	Personal safety accident	<ol style="list-style-type: none"> 1.The front window falls off 2. The cabinet body topples over 	Used by personnel with knowledge of mechanical operation safety
Electrical	Electric shock hazard	Personal safety accident	<ol style="list-style-type: none"> 1.The wire is damaged 2.Poor grounding 3.Caused by moisture and moisture 	Used by personnel with experience in electricity safety

hazard	Fire hazard	Personal safety accident	<ol style="list-style-type: none">1. The load of the socket in the operating area is too large2. Short circuit occurs to the wire because of aging3. The operation is improper	Used by personnel with experience in electricity safety. In addition, they must equip with a certain level of firefighting knowledge
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6.4 Accidents during Use and Countermeasures

Analysis of unexpected situations	Possible hazards	Countermeasures
Sudden power outage during use	Products, the lab, and operators may be contaminated	Immediately terminate the experiment, and personnel should leave the lab to reduce the likelihood of personnel being infected. After the power supply is restored, the operators are required to wear protective clothing. After entering the lab, they must disinfect the lab and equipment.
Supply air fan has failure during use	Products, the lab, and operators may be contaminated	Immediately terminate the experiment, completely close the front window operation port, turn on the UV lamp for disinfection. Besides, personnel should leave the lab to reduce the likelihood of personnel being infected. After disinfecting the room, the operators must wear protective clothing for subsequent inspections and sample processing.
Glass falls off or is damaged during use	Products, the lab, and operators may be contaminated	Quickly seal the samples that can emit hazardous gases to prevent the spread of pollution. Turn off the equipment and disinfect the room.
Emergency situations in the work environment, such as fires, earthquakes, etc	Operators may be injured, and the equipment may be damaged	Immediately terminate the experiment, completely close the front window operation port. Besides, personnel should leave the lab. If time permits, cut off the power supply.

7.Maintenance & Common Fault Analysis

Because the operating time will directly affect the judgment of maintenance needs, we recommend the user keep a detailed record of operating time for reference.

7.1 Clean the Cabinet Surface

7.1.1 Clean the operating area surface

Wipe the entire surface with a soft cotton cloth or towel soaked with concentrated liquid soap, then wipe up the soap with another cotton cloth or towel soaked with clean hot or warm water, and then wipe the surface with a dry cotton cloth or towel rapidly.

For the contaminated or dirty work table or sump, use 70% medical alcohol or other disinfectant to wipe.



Disinfectants used for wiping should not damage 304 stainless steel.

7.1.2 Clean the external surface and front window

Use soft cotton cloth or towel to wipe the surface with non-abrasive household cleanser.

7.2 Overall Maintenance Period

We suggest comprehensive maintenance period is one year or 1000 working hours.

7.3 Maintenance methods

1) Daily or weekly maintenance

- a) Disinfect and clean operating area (refer to the instructions listed in 7.1.1);
- b) Clean the external surface and front window around the operating area (refer to the instructions listed in 7.1.2);
- c) Check the various functions of equipment;
- d) Record this maintenance result

2) Monthly maintenance

- a) Clean the external surface and front window (refer to the instructions listed in 7.1.2); .
- b) Wipe the working table, inner wall surface of operating area and the inner surface of glass door with 70 % medical alcohol.
- c) Check the various functions of equipment;
- d) Record this maintenance result;

3) Annual maintenance

- a) Check the two conveyor belts of front window drive unit, and ensure that their tightness is coincident.
- b) Check the UV lamp and LED lamp.
- c) Apply for testing the overall performance of cabinet on an annual basis to ensure the performance safety.
User is responsible for testing costs.
- d) Record this maintenance result.

7.4 Common Faults Analysis

Please confirm whether the device is connected to the power supply, whether the power cord has obvious damage, whether the fuse is good, and whether the power lock is in the open state before carrying out the fault diagnosis.

Faults	Causes	Measures
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LED lamp doesn't work	Lamp tube	Replace with a new lamp tube
	Circuit	Check the circuit
	Control panel	Replace with a new control panel
UV lamp doesn't work		Firstly, follow the LED lamp fault diagnosis method for inspection, and then make the following judgments
	Ballast	Replace with a new ballast
	Micro switch	Check whether the micro switch is damaged
	Front window, LED lamp and fan	Check whether the front window, LED lamp and the fan are closed
	Control panel	Replace with a new control panel
Fan doesn't work	Micro switch	Check whether the micro switch is good and whether it can work normally
	Front window	Check whether the front window is opened, and fan can work only when the front window is opened
	Fan	Check whether the fan is damaged, if so, replace with a new one
	Circuit	Check the circuit
	Control panel	Replace with a new control panel
No electricity in socket	Socket	Check whether the socket is damaged
	Socket fuse	Check whether the socket fuse is damaged
	Circuit	Check the circuit
	Control panel	Control panel
Pressure or velocity display is not correct	Air pipe	Check whether air pipe has been dropped, damaged, or jammed
	Control panel	Replace with a new control panel
Front window doesn't work	Drive unit	Check the drive connection and rail
	Motor of front window	Check the motor of front window
	Circuit	Check the circuit
	Control panel	Replace with a new control panel
No electricity in the equipment	Power supply	The equipment has not been connected to the power supply
	Power cord	Check whether power cord has obvious damage
	Fuse	Check whether the fuse is in good condition
	Power lock	Whether the power lock has been opened or whether it has been damaged
	Transformer	Check whether the transformer works normally
	Control panel	Replace with a new control panel
Display cannot be lightened	Connecting cable	Check if the connecting cable is in good contact
	Display screen	Check whether the display screen is in good condition
	Control panel	Replace with a new control panel

It cannot alarm	Micro switch	Check whether the micro switch is good and whether it can work normally
	Circuit	Check if the micro switch wiring is in good condition
	Control panel	Replace with a new control panel



1) The above electrical parts must be operated by a qualified electrician in safety conditions (cutting off power supply). The other parts are not allowed to remove; otherwise the user should take responsibility by themselves;

2)If failures cannot be solved by the operator, please notify our maintenance department immediately.

For your safety, please do not maintain equipment by yourself;

3)The maintenance of this equipment can be undertaken by trained and recognized technicians;

4)If you need to order parts, please contact our technical service department, and tell us the model and serial number of the cabinet you purchased.

Consumables: LED lamp, UV lamp, fuse, filter. For the LED lamp, UV lamp and fuse, you can select to buy from the manufacturer or buy locally. When customers select to replace them by themselves, please contact our company or apply for the manufacturer to replace them. The filter must be provided by the manufacturer and replaced by professional training personnel. For the service provided by the manufacturer, a certain service fee and consumables fees will be charged.

7.5 Replacement of Simple Parts

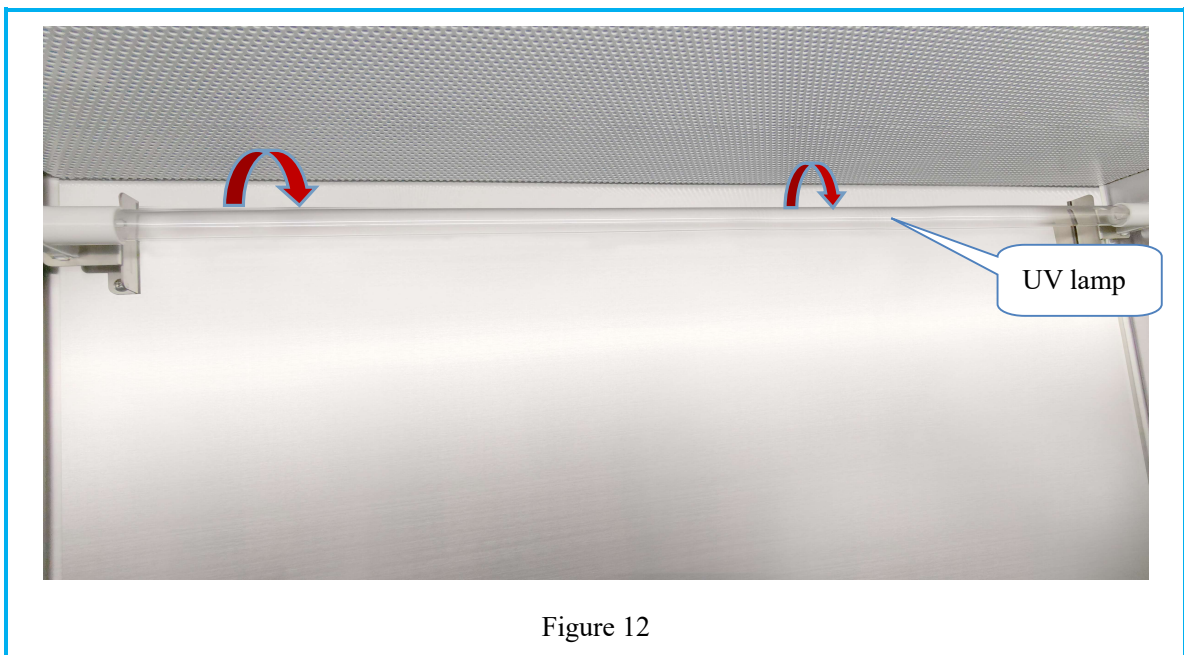
1) Replace the fuse

The power tail plug's fuse is located at the top of the safety cabinet's operation panel. When replacing, turn off the power and unplug the plug first. The live wire fuse is also located inside the power tail plug at the top of the safety cabinet's operation panel. Use a flat screwdriver to lift out the fuse holder and replace it with a new fuse, then press it back.



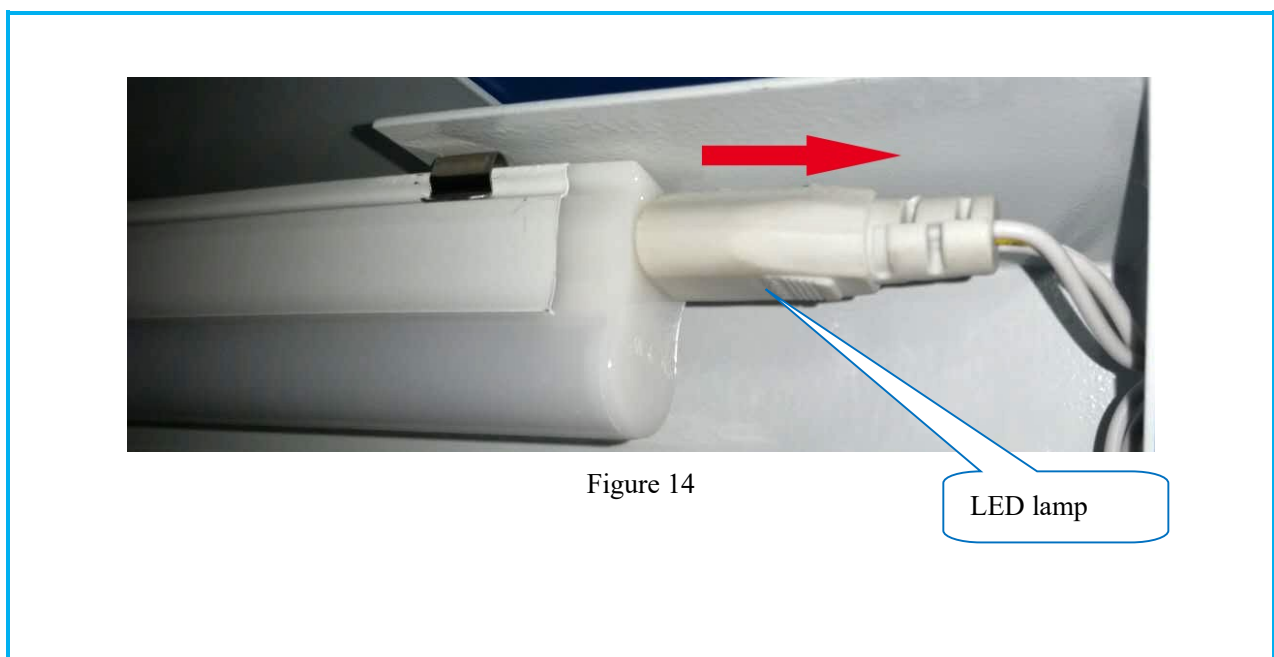
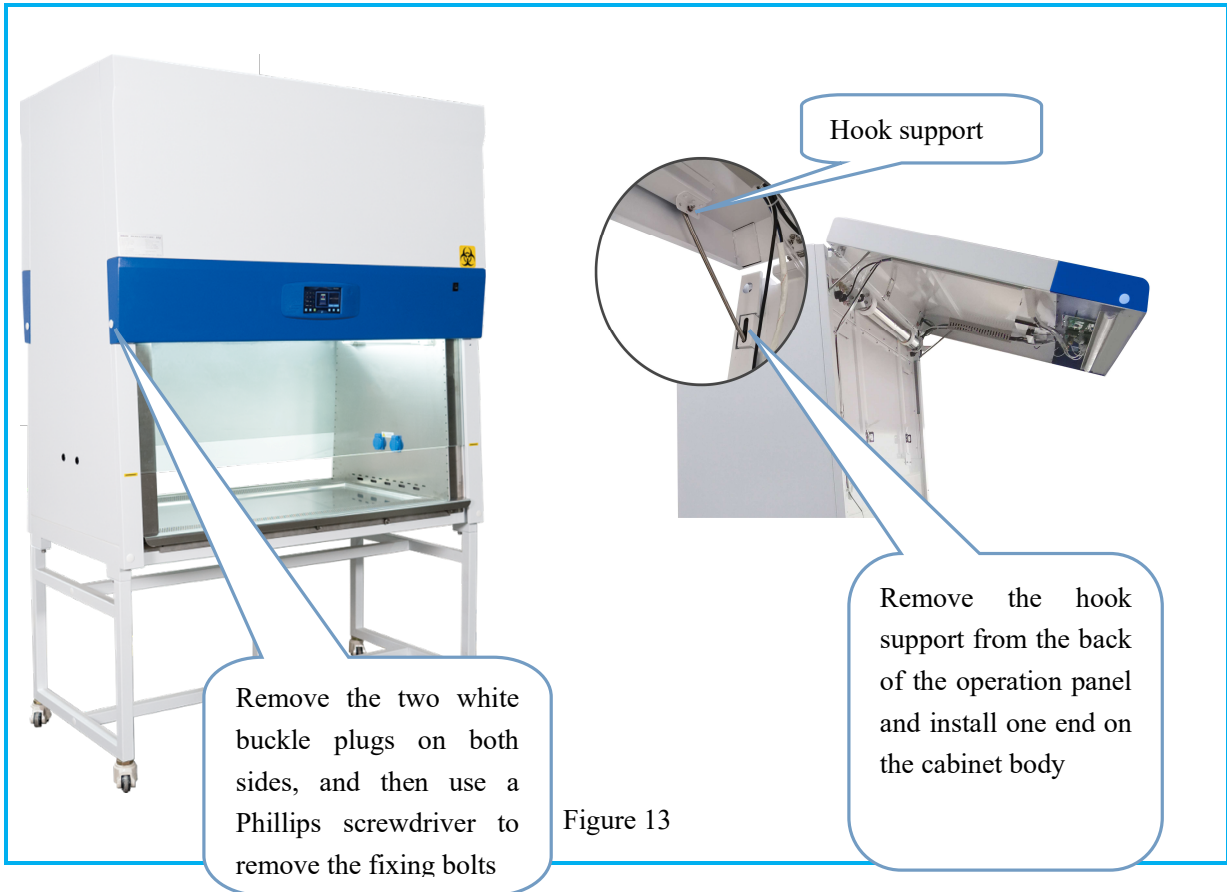
2) Replace the UV lamp

When replacing, first disconnect the power supply, then turn the lamp tube by 90 ° to remove it. Take a UV lamp of the same specification, and place it on the lamp holder by turning it 90 ° in the opposite direction.



3) Replace the LED lamp

When replacing, disconnect the power supply and open the operation panel as shown in Figure 13. Use the hook support (fixed on the inside of the operation panel at the position shown in the figure). Then, as shown in Figure 14, unplug the lead of the lamp in the direction shown by the arrow, remove the lamp, and install the lamp of the corresponding model.



7.6 Storage Conditions

The biosafety cabinet should be stored in a warehouse with a relative humidity of no more than 80%, a temperature below 40 °C, good ventilation performance, and without corrosive gases such as acid and alkali.

The storage period of the biosafety cabinet shall not exceed one year. The biosafety cabinets that have been stored for more than one year shall undergo unpacking inspection. Those that pass the unpacking inspection can enter the circulation field.

7.7 Transportation Conditions

During the transportation of the biosafety cabinet, corresponding measures should be taken in accordance with the requirements shown on the outer surface of the packaging box. The buyers should carefully check whether the packaging box is in good condition after they receive the biosafety cabinets with packaging boxes transported by the logistics company. If there is any damage, compression or other phenomenon in the packaging box, please refuse to accept the goods and contact our company in a timely manner.

Please contact our company promptly when relocating or moving the biosafety cabinet that has been installed and used.

8. Disinfection Methods & Procedures

In case daily maintenance, filter replacement, and performance testing are required on any contaminated part of the safety cabinet, disinfection must be carried out. Before carrying out certification testing and gas disinfection, all internal working surfaces and exposed external surfaces should be disinfected with appropriate disinfectants. In addition, it is necessary to disinfect the entire safety cabinet in a gaseous form with a designated agent of biosafety level 2. When the safety cabinet has been used, it is recommended to use reagents designated for biosafety level 3 for disinfection. When moving the safety cabinet with potential risk of being contaminated by biotic component, it should be disinfected first. In addition, after spillage and splashing of experimental reagents, the contaminated surface should be disinfected appropriately. In most cases where gas disinfection is required, the following procedure uses depolymerized Paraformaldehyde as disinfectant. Before using other alternative methods for disinfection, it is necessary to provide the cycle parameters of each model and size of the safety cabinet and the effectiveness of these parameters; The compatibility of materials is related to the degradation and absorption of alternative detergents, and is a key factor in maintaining the integrity of safety cabinets and the time required for disinfection. Some situations require these alternative methods, such as slowing down disease viruses. The disinfection method is determined through consultation between the user and the certification body. When Paraformaldehyde is used for gas disinfection, the specified area, selected gas mask, protective facilities, corresponding tests, medical

surveillance, hazard transmission and training must be indicated, then the record must be kept well and the following steps shall be followed:



Before disinfection, all the hydrogen chloride should be moved away from the cabinet. For the hydrogen chloride, in the presence of formaldehyde, under the ambient air, the BCME will generate.

1. Figure out the total volume of the cabinet by multiplying the height, width and depth.
2. Multiply the total volume of the safety cabinet by 11g/m³ to determine the mass of Paraformaldehyde required. Determine the amount of Ammonium bicarbonate or its substitute according to stoichiometry, and provide ammonia for neutralization reaction with formaldehyde. Weigh more than 10% of Ammonium bicarbonate to ensure complete reaction;
3. If the safety cabinet has an exhaust pipe, this pipe must be airtight. Its airtightness can be achieved at the end of the pipeline, or if there is a regulating valve near the safety cabinet, it can be closed at the regulating valve. If the exhaust pipe is longer than 3m, the amount of Paraformaldehyde shall be increased to compensate for the increased volume. If the exhaust air of the safety cabinet shall recirculate and enter the exhaust system of the building, disconnect the safety cabinet from the building system and seal it (plastic film and plastic strip can be used);
4. If the exhaust from the safety cabinet is released into the room, seal the exhaust port with plastic tape;
5. In order to urgently eliminate formaldehyde, disinfect and remove neutralized formaldehyde after neutralization, a hose can be placed near the safety cabinet in advance. This hose must be connected to a chemical smoke hood or other suitable exhaust device that emits toxic gases;
6. Place the heating device, such as the commercially available electric heating frying pan or formaldehyde generator/neutralizer, on the work table. The temperature is set at 232 °C~246 °C, and Paraformaldehyde is evenly sprayed on the heating surface of the heating device;



The autoignition temperature of formaldehyde oligomer is 300 °C.

7. Place the heating device used for the neutralizing agent on the work table as well. Neutralizing agents (ammonia bicarbonate or equivalent substitutes) should be isolated from the air in the safety cabinet before use. The following two examples illustrate how to achieve air isolation:

Example 1: Ammonia bicarbonate or its substitute is evenly sprayed on the heating surface of the heating device, covered with aluminum foil to prevent it from reacting with formaldehyde during disinfection. The placement of aluminum foil should be able to allow ammonia gas to escape during heating, or be prepared to

remove the aluminum foil at the beginning of the neutralization stage. Do not allow formaldehyde to leak out of the safety cabinet when removing aluminum foil;

Example 2: The safety cabinet is sealed with a plastic film integrated with the gloves. Ammonium bicarbonate or its equivalent substitute is sealed in a container inside the safety cabinet. During the neutralization stage, personnel performing disinfection enter the safety cabinet through gloves without breaking the sealing system. Take out ammonia bicarbonate or its equivalent substitute from a sealed container and evenly sprinkle it on the heating surface of the heating device. The heating device is powered on, and ammonia bicarbonate or its substitute is heated to release ammonia gas;

8. The heating plate, water beaker and hygromograph are placed on the workbench of the safety cabinet. Do not connect wires to the power supply inside the safety cabinet;

9. Close the front window operation port of the safety cabinet with thick plastic film and plastic tape. Seal all areas that may leak, such as around wire exits, front window operation port, and connections between plastic film and safety cabinet;

10. Measure the temperature and humidity inside the safety cabinet;

11. The temperature should be above 21 °C and the humidity should be between 60% and 85%. Heat the water in the beaker with a heating plate to reach the expected temperature and humidity;

12. Before carrying out formaldehyde depolymerization, access to the area or room around the safety cabinet shall be strictly restricted according to relevant regulations and safety measures. The guidelines for occupational exposure to formaldehyde in the Occupational Safety and Health Regulations require that areas where the concentration of formaldehyde in the air exceeds the allowable exposure limit should be designated as control areas, marked with symbols and markings, and restricted to appropriately trained personnel. Review must be done and current regulations must be observed;

13. Insert the wires of the heating device into the socket outside the safety cabinet;

14. After 25% of formaldehyde is depolymerized, turn on the safety cabinet fan for 10s to 15s. Repeat the above steps after depolymerizing 50%, 75% and 100% of paraformaldehyde. In case the safety cabinet fan does not work, use an auxiliary fan or blower to promote the circulation of air inside the safety cabinet, or extend the disinfection time beyond the recommended time in step 16 below;

15. Disconnect the power supply of heating plate and heating device used for paraformaldehyde;

16. Keep the safety cabinet for at least 6 hours, preferably overnight;

17. Prepare the neutralizer according to step 7, and power on the heating device containing ammonia bicarbonate and the safety cabinet fan until the ammonia bicarbonate has dissipated. As with the operation of

paraformaldehyde, after 25% of hydrogen carbonate ammonia decomposes, turn on the safety cabinet fan for 10s~15s. In case the safety cabinet fan does not work, use an auxiliary fan or blower to promote the air circulation in the safety cabinet, or extend the neutralization time to at least 6h;

18. Open the sealing film after maintaining the safety cabinet for at least 1 hour;

19. If a hose is used to drain the neutralized formaldehyde, tear the plastic cover at the exhaust port of the safety cabinet, connect the hose to the exhaust port, and seal it. If the hose is working properly, the plastic cover at the operating port of the front window of the safety cabinet will be sucked in, and one or two small openings (approximately 15cm × 15cm) will be cut in the plastic cover at the operating port of the front window of the safety cabinet, allowing fresh air to enter the safety cabinet, while the neutralized formaldehyde is discharged from the hose at the exhaust port of the safety cabinet.



Other methods can be used to eliminate formaldehyde, as long as the method used can safely and effectively eliminate formaldehyde gas.

9. Precautions

1. Before connecting to the AC power supply, it is necessary to ensure that the voltage of the power supply is consistent with the input voltage of the safety cabinet and stable. The power supply voltage must be reliably grounded and ensure that the rated load of the power socket is not less than this requirement; This safety cabinet uses a grounding plug, which has a third pin and can only be used for a grounded power outlet. If the plug cannot be inserted into the socket, an electrician should be asked to install a grounded power socket;

2. Slow movement: In order to avoid affecting the normal airflow state, the operator needs to carefully maintain the integrity of the airflow at the front opening when moving their arms in and out of the safety cabinet. The arms should slowly enter and exit the front opening vertically. Put your hands and arms into the biosafety cabinet and wait for about one minute, so that after the adjustment of the cabinet is completed and the inside air "sweeps" the surface of your hands and arms, you can start to process the articles. Before starting the experiment, all necessary items should be placed in a safety cabinet to minimize the number of times the arms enter and exit the front opening;

3. Principle of movement for different samples in the cabinet: When two or more items in the cabinet need to be moved, the principle of moving low polluting items to high polluting items must be followed to avoid large areas of pollution inside the cabinet caused by high polluting items during the movement process. When moving items, follow the principle of slow movement at the same time;

4. Parallel placement of items: In order to avoid cross contamination between items, items placed in the cabinet should be arranged horizontally as much as possible to avoid cross contamination during the return air

process, and to avoid blocking the return air grille at the rear part, which may affect the normal air path;

5. During the use of the equipment, do not place soft or delicate items (such as soft tissue) on the work table to prevent them from being sucked into the negative pressure air duct and fan by the suction port, which may affect the operation of the equipment;

6. The weight of items placed in the cabinet should be no more than $23\text{Kg}/25\times 25\text{cm}^2$;

7. Avoid vibration: Try to avoid the use of vibrating instruments (such as centrifuges, vortex oscillators, etc.) inside the cabinet, as vibration can shake off particulate matter accumulated on the filter membrane, resulting in a decrease in the cleanliness of the operating area. At the same time, if the balance on the front operating surface fails, it will also cause contamination to the operator;

8. No flame: No flame is allowed inside the cabinet. Using of fire will lead to airflow disorder, and filter damage. If sterilization is required during the experiment, infrared sterilizer is highly recommended.

9. ULPA filter has its lifespan. With the extension of using time, the accumulation of dust and bacteria in the filter can lead to an increase in pressure loss of the filter. When an alarm sound is sent, it is necessary to contact our company's service department in a timely manner to replace the filter, otherwise it will affect the safety performance of the equipment. In addition, the replaced filter must be treated as medical waste;

10. There is a negative passage surrounding the work area, which is sealed strictly in the factory. The operator is not allowed to remove or loose screws of those parts. If necessary, please contact service personal of our company.

11. Front grille is used for air intake and drain. Do not block it, otherwise it will affect airflow. Armrest is recommended to solve this problem and reducing the operator's wrist fatigue.

12. Long-term use of biological safety cabinets will inevitably cause pollution (e.g. ULPA filter, corner cabinets, etc.). In order to better remove the pollution of the biosafety cabinet, it is recommended to use the formaldehyde fumigation sterilizer for sterilization every 500 hours, and then use the ammonium bicarbonate neutralizer to remove the formaldehyde gas in the cabinet. During disinfection, ensure that no disinfection gas will spill out of the biosafety cabinet;

13. The maximum storage period is one year. If the period is more than one year, it must be unpacked and inspected by our company's technical personnel once. Those that pass the inspection can be used;

14. Ground bearing requirements for the use of safety cabinets: Ground bearing capacity $\geq 450\text{KPa}$.

15. The allowable pressure of the safety cabinet's faucet: $\leq 0.8\text{MPa}$.

16. For experiments that may produce waste liquid, please use a drain valve in a timely manner to discharge the waste liquid from the collection tank after the experiment. If the liquid waste caused by the experiment

can cause harm to human health, according to the pollution level of the waste, it is recommended to add a waste collection container of the corresponding level at the outlet of the drain valve or connect a sewage pipeline of the corresponding level, and discharge the waste into an experimental equipment that can be treated directly.

17. The experimenters must be trained and qualified before they can operate the safety cabinet. When using the safety cabinet for experiments that are harmful to the human body, the experimenters must wear corresponding protective gloves, masks and lab coat, and avoid touching the mouth, eyes and face.






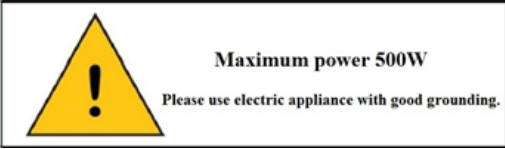
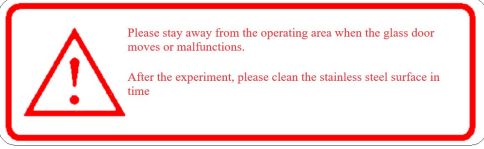


18. The moving parts of the instrument pose risks, and relevant personnel must undergo training before accessing or using this equipment. At the same time, the front window glass must be raised to a designated height of 200mm before the laboratory personnel can operate the experimental objects inside the safety cabinet to reduce the harm caused by the front window glass failure to the laboratory personnel.

19. If the equipment must be repaired or scrapped, while it cannot be disposed of arbitrarily due to the presence of biological hazards in the internal components of the instrument. Please handle it in accordance with local regulations.



Serious declaration: we will take no responsibility for risks caused by improper operation and man-made damages!

10. Labels

	<p>Biological hazard mark</p>
	<p>UV lamp warning label</p>
	<p>Warning label for the glass door is too high</p>
	<p>Grounding label</p>
	<p>Drainage valve label Biological hazard label for the drainage valve and warning label</p>
	<p>Load requirement label</p>
	<p>Front window warning label</p>
	<p>10A power supply fuse lable</p>
	<p>Filter scan label</p>

11. Equipment Used for Test



Air volume hood



Thermal anemometer



Sound level meter



Vibrometer



Lumeter



UV meter



Differential manometer



Air curtain detector



Aerosol photometer



Aerosol generator



Electrical safety performance
comprehensive tester

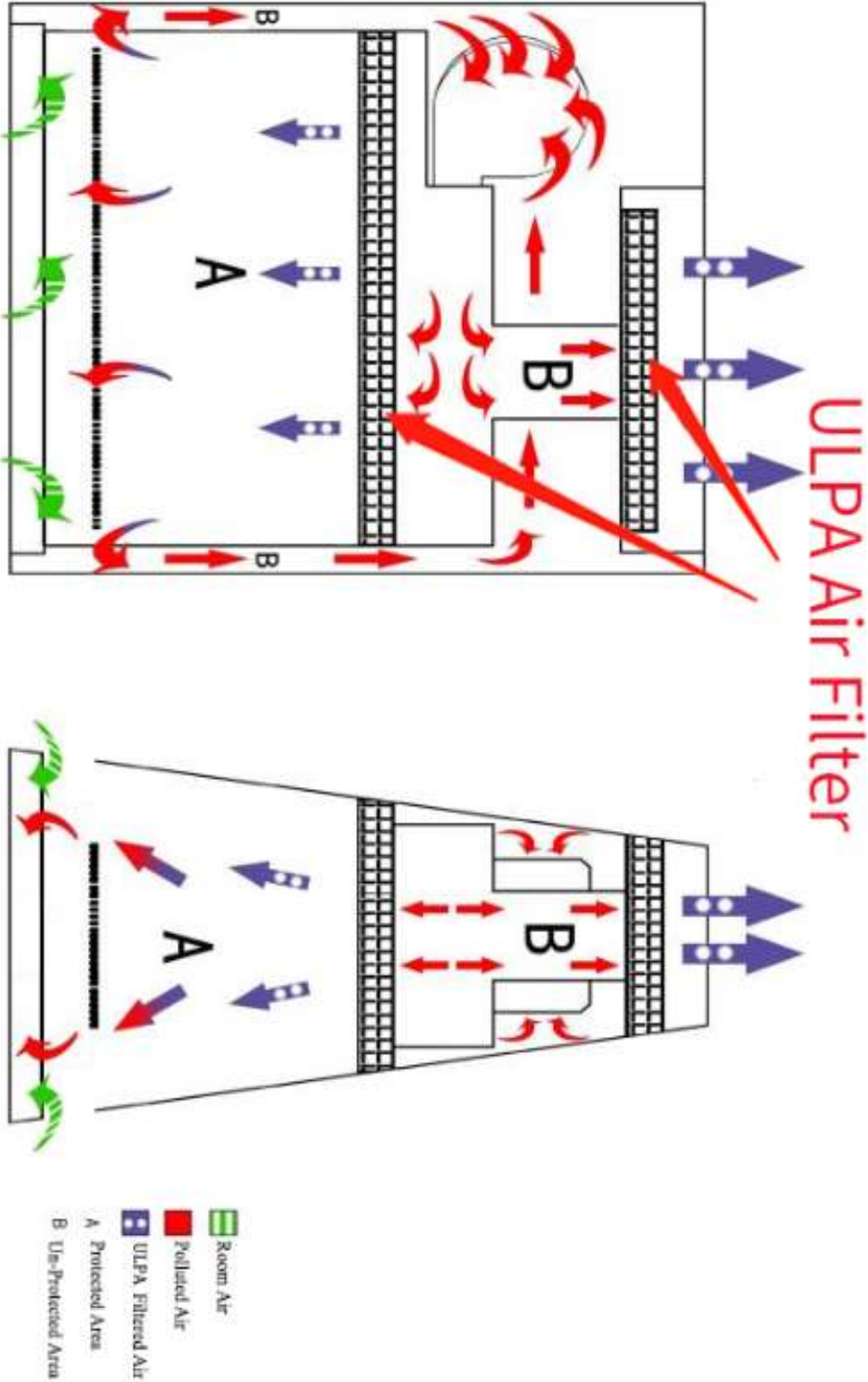


Ground continuity resistance
measuring instrument

12. Warranty

1. Warranty is 12 months from EX-factory date (excluding UV and LED lamps, fuse).
2. We will take no responsibility for risks caused by improper operation and man-made damages.
3. After the expiration of warranty, our company is also responsible for repairs, but the corresponding maintenance cost should be charged.
4. Life time of the laminar flow cabinet is 8 years from production date on the label.
5. We can provide equipment drawings and necessary technical data for maintenance companies or personnel trained by our company.

Appendix B Airflow Pattern Diagram



Appendix C Packing List

No.	Item	Quantity
1	BSC-1500IIA2-S main body	1 set
2	BSC-1500IIA2-S base	1set
3	UV lamp (T6 15W)	1pc
4	RVV power cord	1pc
5	Fuse (10A)	2pcs
6	Stainless steel hexagon socket head cap screw M10*55	5pcs
7	Stainless steel hexagon socket head cap screw M10*20	4pcs
8	Stainless steel flat washer φ10	4pcs
9	Stainless steel spring washer φ10	4pc
10	Button plug (white)	6pc
11	Allen wrench	1pc
12	Drainage ball valve connector fastening nut	1pc
13	Drainage ball valve connector	1pc
14	Drainage ball valve	1pc
15	Silicone gasket (inner diameter * outer diameter * thickness: Φ20*Φ28*2mm)	1pc
16	Silicone gasket (inner diameter * outer diameter * thickness: Φ13*Φ19*2mm)	1pc
17	Motor regulating rod	1pc
18	BSC-1500IIA2-S User Manual	1 copy
19	Certificate Card	1 sheet
20	Warranty Card	1 sheet
21	Test Report	1 sheet