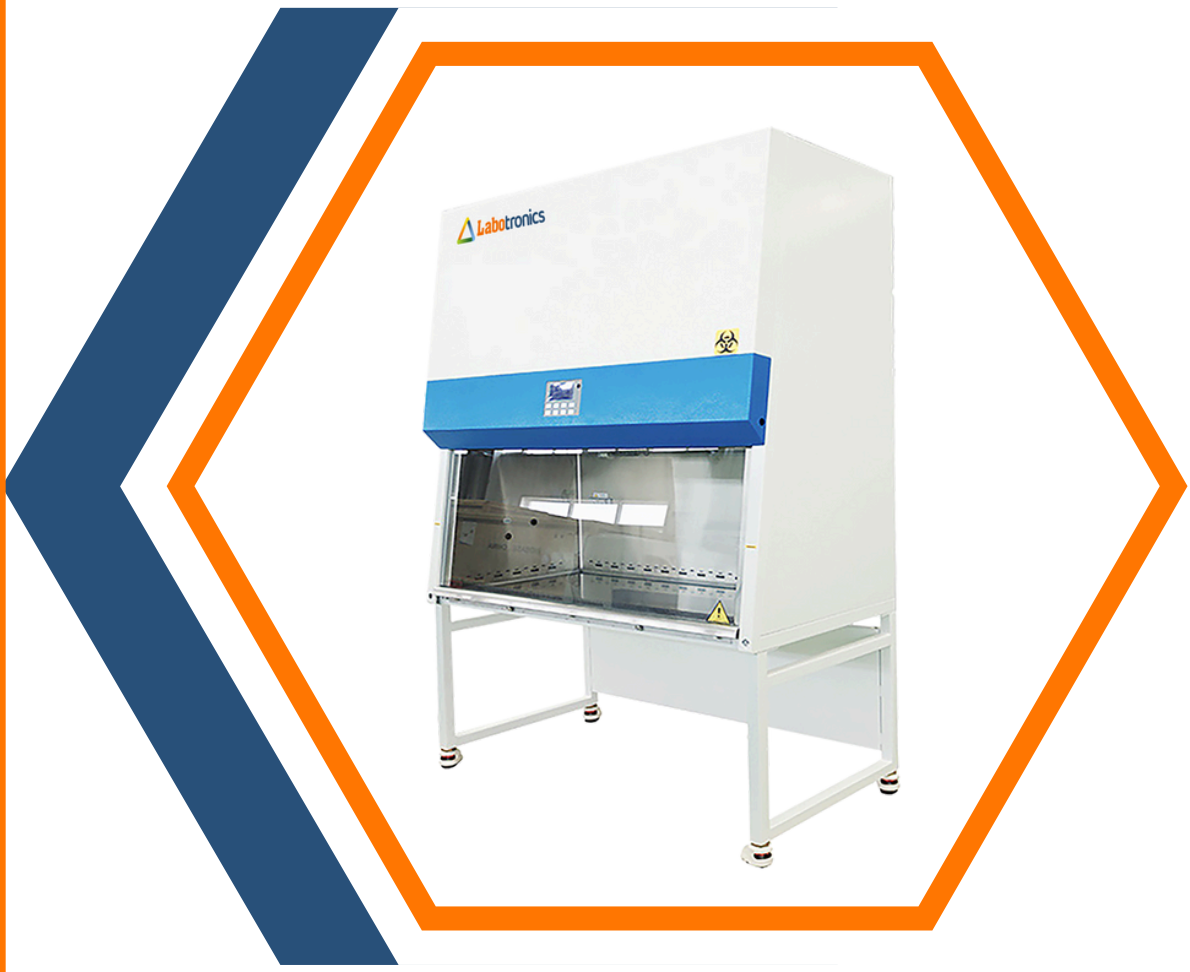
Labotronics




# Class II Biosafety Cabinet Type A2

# LB-2OBSC

www.labotronics.com | info@labotronics.com

# Index


| Sr. No | Title | Page no |
|---|---|---|
| 1. | Introduction | 2 |
| 2. | Features | 2 |
| 3. | Specifications | 3 |
| 4. | Applications | 4 |
| 5. | Instrument Introduction | 5 |
| 6. | Installation | 11 |
| 7. | Operations | 17 |
| 8. | Maintenance | 20 |
| 9. | Troubleshooting | 25 |
| 10. | Replacement | 28 |
| 11. | Accessories | 31 |
| 12. | Circuit Diagram | 32 |

## 1. Introduction

**Class II Biosafety Cabinet Type A2 LB-20BSC** offers a maximum opening of 470 mm and a tested opening safety height of 200 mm. The motorized front window is made of two-layer laminated toughened glass with anti-UV properties. It is constructed from cold-rolled steel with an anti-bacterial powder coating. Our cabinet features a 7-inch color touch display that allows users to monitor and adjust settings.

## 2. Features

1. Password-protected power-on
2. Automatic wind speed EC fan
3. Power-off memory function
4. Scheduled operation timer
5. Comfortable one-piece handrest

## 3. Specifications

| | |
|---|---|
| **Model No** | **LB-20BSC** |
| **Maximum Opening** | 470 mm |
| **Tested Opening** | Safety height 200 mm |
| **Work Surface Height** | 750 mm |
| **Air inflow volume** | 427 $m^3$/h (252 cfm) |
| **Air Downflow volume** | 65%: 823 $m^3$/h (507 cfm) |
| **ULPA Filter** | Two |
| **ULPA Filter Efficiency** | 99.9995% efficiency at 0.12 μm, filter life indicator |
| **Front Window** | Motorized, two-layer laminated toughened glass, anti-UV |
| **Noise Level** | ≤ 62 dB(A) |
| **UV Lamp** | 30 W, emission of 253.7 nm |
| **Illuminating Lamp** | 12 W, LED lamp |
| **Illumination** | ≥ 1000 lux |
| **Display** | Color Touch Screen |
| **Waterproof Socket** | Two, Total Consumption ≤ 500 W |
| **Tap** | 1 Water tap and 1 gas tap |
| **Ground Resistance** | ≤ 0.10 Ω |
| **Filter Guard Type** | Main filter - Aluminum frame, glass fiber filter paper |
| **Alarm** | Abnormal Airflow<br>Filter Replacement<br>Front Window at Unsafe Height<br>High Filter Pressure Alarm |
| **DC Motor** | One ECM motor |
| **Work Zone Material** | 304 stainless steels |
| **Main Body Material** | Cold-rolled steel with anti-bacteria powder coating |
| **Compliance** | NSF 49/ANSI 49 |
| **Power Consumption** | 500 W |
| **Power Supply** | AC115-230V, 50Hz/60Hz |
| **Internal Dimensions (W × D × H)** | 1200 × 600 × 660 mm |
| **External Dimensions (W × D × H)** | 1337 × 775 × 2220 mm |
| **Packaging Dimensions (W × D × H)** | 1540 × 890 × 1900 mm |
| **Weight** | 330 kg |

## 4. Applications

Class II Biosafety Cabinet Type A2 LB-20BSC provides containment and protection in biological research, preventing contamination. Ideal for laboratories, hospitals, and pharmaceutical facilities.

## 5. Instrument Introduction

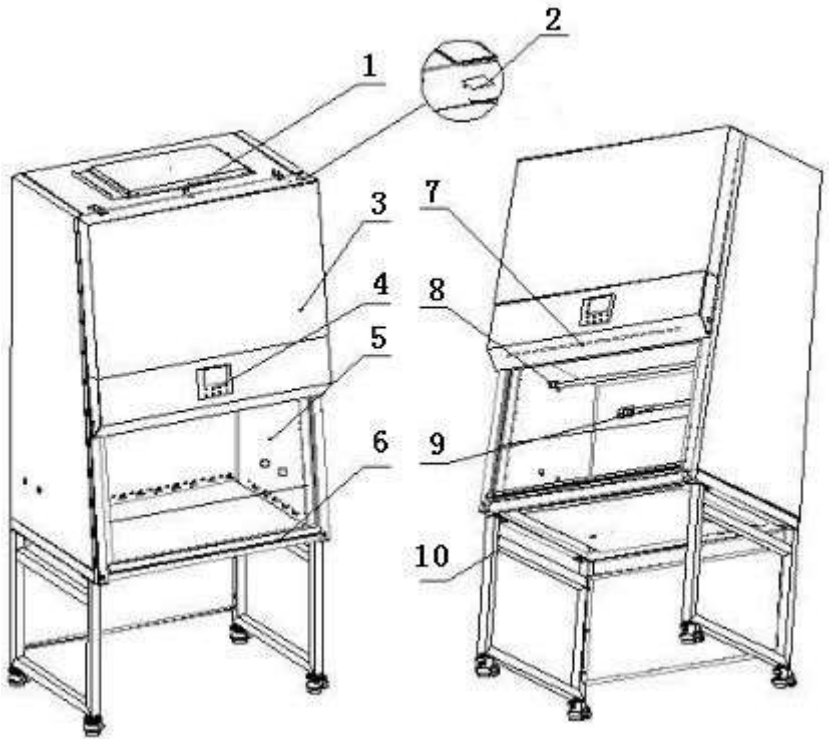



**Figure-1**

1) Air Outlet Safety guard window
2) Power Socket
3) Control Panel
4) LCD Display
5) Front Window
6) Alarm rest plate
7) Fluorescent lamp
8) IV Bar
9) UV Lamp
10) Base Strand

### 5.1 Structure Introduction

1) **Driving System of Front Window**
   The driving system includes a front window, hauling sash, and position switch.
2) **Air Filtration System**
   The Air Filtration System is BSC's most important system. It consists of a blower, supply filter, and exhaust filter. The system's function is to transfer filtered air to the work area, ensure the downflow velocity, and keep the work area clean to Class 100 standards.

**3) UV Light**

The UV lamp is inside the work area. So, UV lamps can well sterilize all space in the work area. An emission of 253.7 nanometres can ensure the most efficient decontamination.

**4) Fluorescent Light**

The BSC is equipped with a straight tube type energy-saving fluorescent lamp. It can ensure the average illumination inside the work area meets standard requirements.

**5) Air pipe**

The air pipe is the vintage of the differential pressure sensor.

**⚠ The air pipe should not be blocked and kindly do not hang anything on the pipes, otherwise it will affect wind speed and pressure.**

**6) Waterproof Socket**

Waterproof Sockets are located on the right side of the work area and can be controlled by the SOCKET button.

⚠ (1) Kindly Ensure the total load of sockets should be ≤ 230V*1.5A.

(2) Fuse protector：（See Circuit ）

The equipment is equipped with a main power fuse, waterproof socket fuse, and fan fuse. They are located near the power cord's outlet. The fuse label corresponds to the relevant specifications.

**7) LCD Display**

LCD (Liquid Crystal Display): Place liquid crystals between two paralleled glasses. Between the two pieces of glass, there are many vertical and horizontal small wires, through which we can change the direction of the crystal molecule. The light refraction creates the image, low power consumption without electromagnetic radiation




**Figure-2**

Large LCD indicates detailed key parameters, it is a real-time display to reflect the equipment's working condition, such as the effective working state of the filter, which is more intuitive.

**8) Structure**

- Class II Biosafety Cabinet's both sides and back area are negative pressure air channels. And the negative pressure keeps the work area away from contamination.
- The Cabinet body is built of 1.2mm cold-rolled steel with anti-powder coating. Strong and steady.
- The work area is fully made of 304 stainless steel which looks beautiful and with corrosion resistance performance.
- The base stand is made of cold-rolled steel with an anti-powder coating.
- Soft touch type control panel, easy to handle, and beautiful appearance.

## 5.2 Control Panel

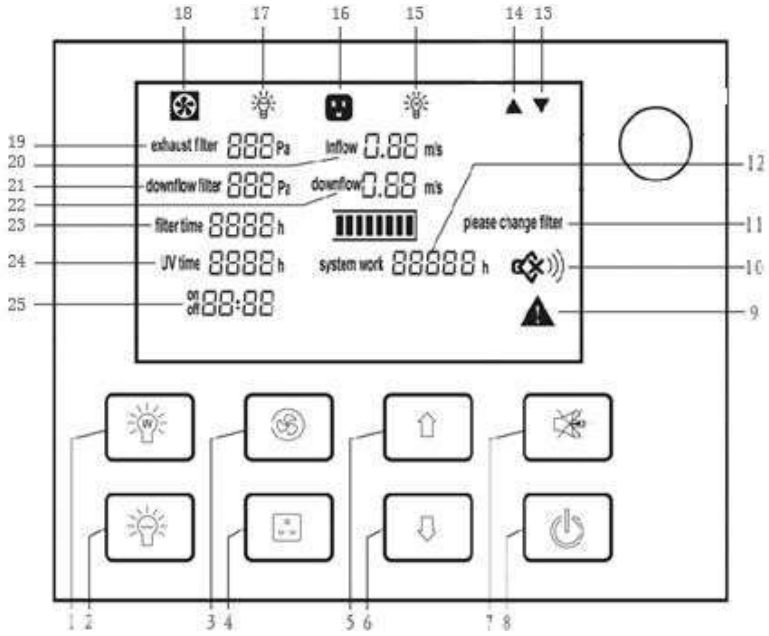



**Figure-3**

1) UV Lamp
2) Fluorescent Lamp
3) Blower
4) Socket
5) Glass Window Up
6) Glass Window Down
7) Mute
8) Power
9) Alarm status
10) Mute Status
11) Filter Changing Status
12) System Working time
13) Glass Window Down Status
14) Glass Window up status
15) UV Status
16) Socket Status
17) Fluorescent Lamp Status
18) Blower Status
19) Exhaust Filter Differential Pressure
20) Inflow velocity
21) Supply Filter Differential Pressure
22) Down-flow velocity
23) Filter Working Time
24) UV Lamp Working Time
25) Reservation Timing

**LCD Screen**
The working status of the equipment and operation can be seen on the LCD screen.
**Soft touch button.**
BSC's main functions could be executed by touch buttons. Users can operate the BSC either by pressing the buttons on the control panel or using the remote control. There are a total of 7 common buttons on the control panel.

| Buttons | Description |
|---|---|
|  | The power button. |
|  | To control fluorescent lamps. |
|  | To control UV lamps. (It works only after the front window is fully closed). |
|  | To control the blower's working status. (It will not work when the front window is fully closed). |
|  | To control socket power status. |
|  | Press the MUTE button to stop the voice prompt. |
|  | Press the UP button, glass window will raise. |
|  | Press the Down button, glass window will fall. |

## 5.3 Remote Control

To solve the problem of inconvenience for users in close-range operation, the biological safety cabinet is equipped with a special remote control. The remote control is small and light in weight and can flexibly control all functions of the biological safety cabinet within a range of 6m and 30° in front of the biological safety cabinet, and the user can carry it with him for operation. The remote control adopts an imported special chip for remote control, which has the characteristics of good anti-interference performance, long remote-control distance, and high control precision.




**Figure-4**

**Buttons of Remote Control:**

1) Power (POWER)
2) Reservation Time (SUB)
3) Timer (INSTALL TIMER)
4) Confirm (CONFIRM)
5) Cancel (CANCEL)
6) Turn up (+)
7) Turn down (-)
8) Fan (FAN)
9) UV (UV)
10) Illumination (LIGHT)
11) Socket (SOCKET)
12) Mute (MUTE)
13) Front window up (UP)
14) Front window down (DOWN)

**1) Electric glass door control**

The front glass door is electrically controlled, and the remote control, foot switch, and panel light touch buttons can be completely controlled at will, without direct contact between the user and the glass door. The glass door control motor is a special reversible speed-adjustable motor, which has the characteristics of large starting torque and stable rotation.

**2) Application of reservation time**

The biological safety cabinet is equipped with a dedicated UV lamp. When turning on or off, the UV lamp needs to be irradiated for at least 30 minutes to achieve the sterilization effect. To solve the process of waiting to turn on or off, the safety cabinet has added a unique appointment timing function: It can be automatically turned on or off after the sterilization is completed. The set time range is 0~99 hours and 59 minutes. Greatly improve the work efficiency of the staff.

**3) Remote control reception window**

This window receives commands from the remote control. There are 8 commonly used buttons on the operation panel. The reservation time function needs to be controlled by the remote control. The buttons with the same mark on the panel and the remote control have the same function and perform the same function.

**4) Remote control**

**Timed shutdown**

- When the equipment is running, press the SUB key (sub) to set the timing shutdown time, and the LCDs off.
- Adjust the time through the +, and - keys, press Install **Timer** to switch the tenth, hour, and 10-hour bits of the time, and press confirm to save the settings and start the timed shutdown.
- Press the SUB key twice in a row to exit the timed shutdown function.

**Reservation time**

- **Start Reservation**: Plug in the power supply, open the power lock, enter the standby mode, select the function keys (UV, FAN, SOCKET), and start the corresponding function reservation timing.
- **Modify the reservation time:** After starting the reservation, press the **SUB** key to set the reservation opening time (on), switch the tenth bit, hour bit, and 10-hour bit of the time through the Install **Timer** key, and press the +, - keys to adjust the time; Press the **CONFIRM** key again to set the end time (off) of the reservation function. The steps are the same as above; Finally, press the **CONFIRM** key to start the reservation timing.
- End Reservation: when the reservation function is in progress, press the corresponding keys (UV, FAN, SOCKET) to end the reservation function immediately.

**Note:**

- The glass door shall be closed when the UV reservation is opened; When the fan is opened, the glass door shall be operated to a safe height.
- On -- the reservation function starts after this time, off -- the operation time of the reservation function.
- If the start time (on) is 00:00, after modifying the reservation time, you need to press the corresponding keys (UV, FAN, SOCKET) to exit, and then press the reservation function key to start the reservation function.

# 6. Installation

## 6.1 Unpacking

1) **Method 1**: Use M8 Wrench to unpack




**Figure-5**

2) **Method 2:** Use M8 Wrench to unpack




**Figure-6**

Rapid unpacking diagram (**Figure 7**). Disassemble the screws shown in the below Picture, then move the wooden pieces to the right and left.

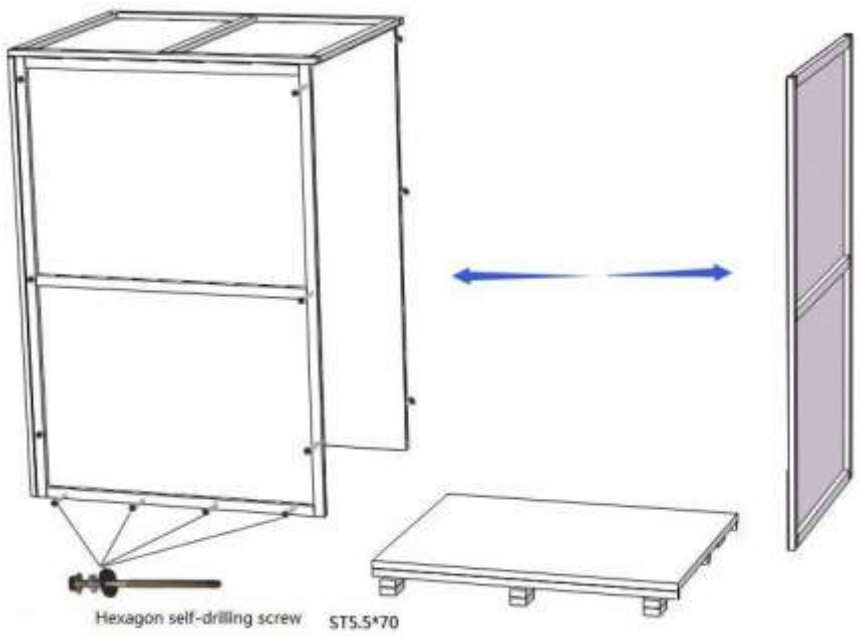



**Figure-7**

## 6.2 Installation conditions and environment

To avoid disturbances to the safety cabinet and its operator, follow the following guidelines, while determining a suitable location for the cabinet:

- The Class II Biosafety Cabinet should be placed in an air-free protected area. Front window operation door shouldn't be against over door or window, but far away from Ventilation and air conditioning vents.
- To against various high-speed currents of air from interfering with operation areas, such as doors, windows, fans, draughts of sending air, compressed air, etc.
- The test shows that if another interference airflow exceeds the intake airflow rate of the safety cabinet, the indoor air will enter the working area of the cabinet. So, it is very necessary to place the cabinet in the correct position.
- It should also pay attention to the relationship between the safety cabinet exhaust air and indoor ventilation airflow or exhaust duct. Exhaust air discharged from the top, when placing the cabinet, it should avoid restricting its exhaust. Biological safety cabinets should be in the direction of the airflow downstream and on the side of the security cabinet with at least 300mm of space to help check.

## 6.3 Working Environment

1) Only it is suitable for indoors.
2) Ambient temperature: 15℃～35℃.
3) Relative Humidity: ≤75%.
4) Atmospheric pressure range: 70 kPa～106 kPa.

5) **Electrical parameters:** Consistent with the rated voltage of the Class II Biosafety Cabinet.
6) The power supply needs to be grounded; (**Judging method:** Testing the firewire and the zero line of the power supply with a multimeter, the firewire to ground voltage should be grid voltage and the zero line to ground voltage should be 0, otherwise the power supply ground is bad).

## 6.4 Installation

- Remove all the package materials.
- Inspect the surface of the main body to Ensure whether there are scratches, deformation, or uncorrelated things.
- Chor forklift; Eck the attachment and information according to the packaging list in the instructions.
- Move the whole device to the final installation location, where is convenient to install.
- This equipment shouldn't be hosted. Wooden packaging should be used as tap support in the transport process, carried by hydraulic truck or forklift.
- The whole power line is 3 * 1.0mm$^2$ * 3000mm; the whole ground line is yellow green 14AWG.

  ⚠The base stand will be packed at the back of the main body, kindly take it out before installation. do not invert, disassemble, or title the cabinet during transportation.
- The base stand assembly
  Referring **to Figure 8** assembling the base stand.

⚠ Note: The base mounting bolts are fixed to the base stand. When installing the base stand, except for the 4 bolts marked with a red circle in **Figure 9,** Kindly remove the other bolts and install them.

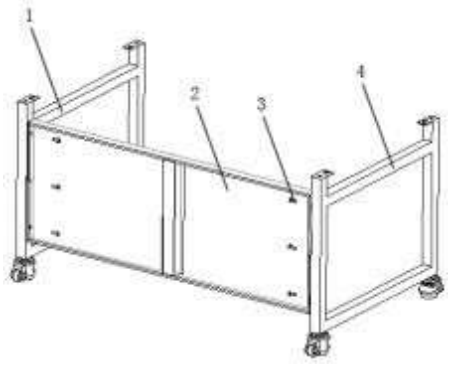



**Figure-8**

Remove the M10×20 Hexagon socket head screws, buckle plug, M10 Stainless steel flat washer, M10 Stainless steel spring washer, and M10 Stainless steel cap nuts, referring to **Figure 9** assembled base, firmly fastening requirements.
Connect the base stand and main body.
Refer to **Figure 9** to connect the base stand and main body

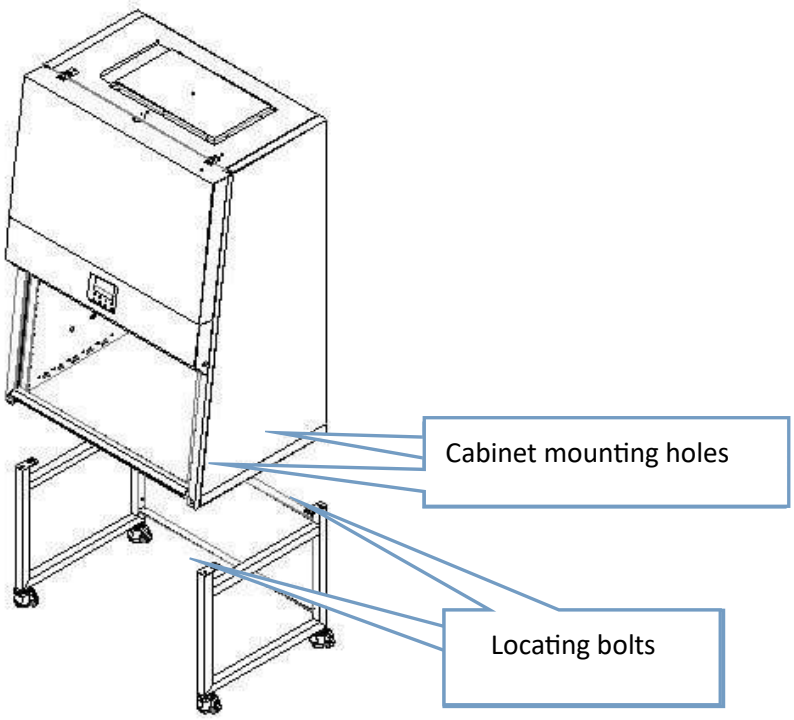



**Figure-9**

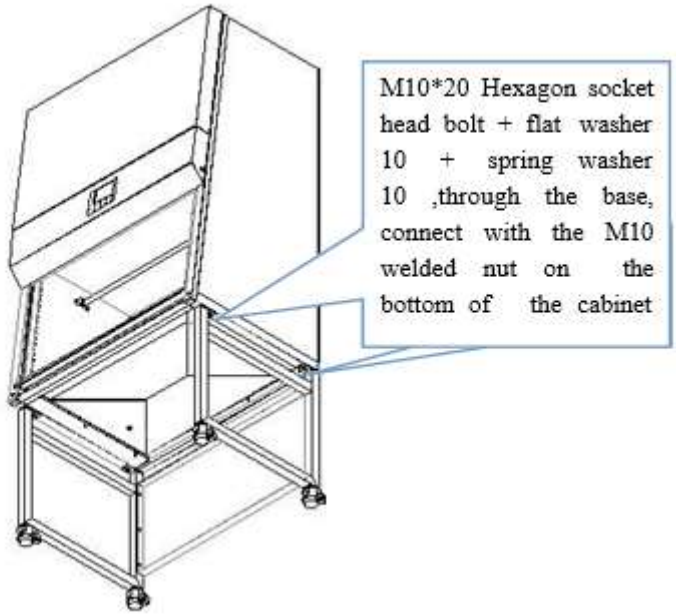



**Figure-10**

- Adjustment of Foot master Caster

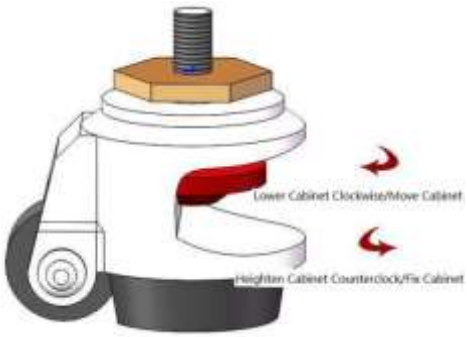



**Figure-11**

Clockwise rotate the caster's red part to lower the base feet and the height of the cabinet. Low down all four casters can move the cabinet position. Counterclockwise rotate casters' red part can raise the base leg and height of the cabinet. Adjusting all four casters at the same time can make the cabinet stable.

- Installation of Drain valve.




**Figure-12**

1. Drain valve connecter
2. Shim (Inner diameter*outer diameter*thicknessΦ20*Φ28*2mm)
3. Safety cabinet bottom installation holes
4. Ball coupling fastening nut
5. Rubber gasket (Inner diameter*outer diameter*thicknessΦ13*Φ19*2mm)
6. Drain valve

Take Out drain valve coupling, shim (Inner diameter *Outer Diameter thicknessΦ20*Φ28*2mm) Ball nut, Rubber gasket (Inner diameter*Outer diameter *thickness Φ13*Φ19*2mm) t, drain valve, assembling from up to down as **Figure 12** illustrates.
Don't place equipment where difficult to operate and disconnect the device**.**

## 6.5 Checking after installation

| Checking Items | Normal Situation |
|---|---|
| Wind speed display | Inflow 0.53±0.025m/s, downflow 0.33±0.025m/s |
| Blower | Blower runs normal |
| Fluorescent lamp | Lamp lights after pressing the button |
| UV Lamp | Lamp lights after pressing the button |
| Display screen buttons | All buttons can be used |
| Socket | Press the socket key, multimeter testing output supply voltage |

## 7. Operations

### Note:

1) Ensure the input voltage is correct and stable. The rated load of the main power socket should be higher than the cabinet consumption. The plug must be well grounded.
2) To avoid air turbulence, the operator should slightly move his arms during the experiment. Hands should stay inside the working area for at least 1 minute before operating. To decrease the time of arms moving into and out of the working area, prepare all the necessary items inside the cabinet before starting the experiment.
3) Moving principles of different samples inside the cabinet: When two or more samples need to be moved, be sure that low-polluting samples move to high-polluting samples. The movement of items should also follow the principles of slow-moving.
4) **Samples placed in parallel:** Samples should be placed in the cabinet parallel to avoid cross-contamination between samples and blocking the back air grille.
5) To avoid samples being sucked into the negative passage or the blower, do not place soft and slight samples (for example soft tissue) on the surface during the experiment.
6) The weight of items placed in the cabinet should be no more than 23 kg/25×25cm$^2$.
7) **Avoid vibration:** Avoid using vibration equipment (eg centrifuges, vortex oscillators, etc). inside the cabinet. Vibration would cause lower cleanliness of the operating area and affect operator protection.
8) **No flame:** No flame is allowed inside the cabinet. Using fire will lead to airflow disorder and filter damage. If sterilization is required during the experiment, an infrared sterilizer is highly recommended.
9) **HEPA filter life:** With the usage time increasing, dust and bacteria accumulate inside the HEPA filter. Filter Resistance is getting bigger, when it reaches the maximum point, there will be audible and visual alarms. Kindly replace the new HEPA filter, otherwise it will affect the safety performance of the equipment. The used filter should be processed 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.
11) Front Grille is used for air intake and drain. Do not block it, otherwise it will affect airflow. An armrest is recommended to solve this problem and reduce the operator's wrist fatigue.
12) Long-term use of Class II Biosafety Cabinets will inevitably cause pollution (e.g. HEPA filters, corner cabinets, etc.). To sterilize thoroughly every 500 hours, a formalin (formaldehyde) fumigation sterilizer is recommended. After sterilization, neutralize formaldehyde gas with ammonium hydrogen carbonate. Ensure no sterilization gas escapes during the whole process.
13) The maximum storage period is one year. If the period is more than one year, a performance test should be done.
14) In the transportation process should take appropriate protective measures according to the diagram on the surface of the package.
15) The ground bearing requirements: ground bearing capacity ≥450KPa.

16)Total weight: 220 kg.
17)Allowable pressure of water socket: ≤0.8MPa. (Optional)
18)For experiments that produce waste liquid, Kindly timely drain wastewater in the sump through the drain valve. If the liquid waste is harmful to the human body, according to the grade of pollution add the corresponding grade container, or connect to the corresponding grade drainpipes, and drain the waste into the experimental equipment immediately.
19)A person can operate a Class II Biosafety Cabinet only if he is qualified after training, during using a Class II Biosafety Cabinet if it is a harmful experiment, the operator must wear appropriate protective gloves, masks lab coats, etc., and avoid touching his mouth, eyes, and face.
20)There is a risk of moving the parts. Relevant personnel can use this equipment after training. while the front window must be raised to 200mm and in this case person can operate in the cabinet. In this way, we can reduce harm out of front window trouble.
21)When the equipment is repaired or scrapped. The internal parts can't be thrown about because of biological hazards Kindly deal with them according to local regulations.

## 7.1 Operation Process

1)Connect the same power reply, as required for equipment
2)Open the power lock, the **LCD** display lights up and the alarm rings at the same time, and then the machine enters standby status. Waiting for the operator to input the button to use it.
3)Press the **POWER** button, then the following functions are available: fluorescent lamp. UV lamp, Fan, Mute, Sockets, Front window up and down, Reservation timing

⚠When the front window is Closed and the Fluorescent light is off, then press the UV button to select the sterilization function.
4)Kindly move the front window at 200mm height from the worktable, turn on the fan, and ensure the experiment is started after the fan working for at least half an hour.

⚠For operating safety, kindly put testing materials inside the cabinet in advance, and keep the front window at 200mm height from the worktable during operation.

UV lamp intensity should be tested regularly. If there are no test conditions, it should be replaced when the UV timer is on the display indicating the working time reaches 1000 hours.
5)Kindly move the front window at 200mm height from the worktable, turn on the fan, and ensure the experiment is started after the fan working for at least half an hour.

⚠For operating safety, kindly put testing materials inside the cabinet in advance, and keep the front window at 200mm height from the worktable during operation.

After finishing the experiment, kindly move the front window down to the bottom, and ensure to sterilize the cabinet with a UV lamp for 30 minutes before turning off the cabinet.

## 7.2 Performance Index

1) **Biological safety functions**
   Personnel protection, microbial colony count ≤5CFU.
   Sample protection, microbial colony count ≤5CFU.
   Cross-contamination protection, microbial colony counts 2CFU.
2) **Leak-proof Cabinet**
   If the cabinet pressurized to 250Pa, Paint 25 g/L of soap solution with a paint brush, without any leakage of soap bubbles.
3) **Integrity of HEPA Filter**
   Scan and detect the HEPA filter, the leakage rate at any point should not be ＞0.01%.
4) Vibration amplitude
   The net vibration amplitude between frequencies 20Hz and 2000KHz is no more than 5μm(rms).
5) **Illumination**
   The average illumination is no less than 750 lux, **Mechanical performance**
   **Electrical properties**
   - **Basic insulation:** Between live parts and the metal shell in the AC voltage 1500V, continuous 1min without breakdown.
   - Reinforced insulation: between live parts and non-metallic shell in the AC voltage 3000V, continuous 1min without breakdown.
   - Leakage current ≤10mA.
   - Grounding resistance ≤0.1Ω

## 7.3 Working Theory /Airflow pattern and protected area

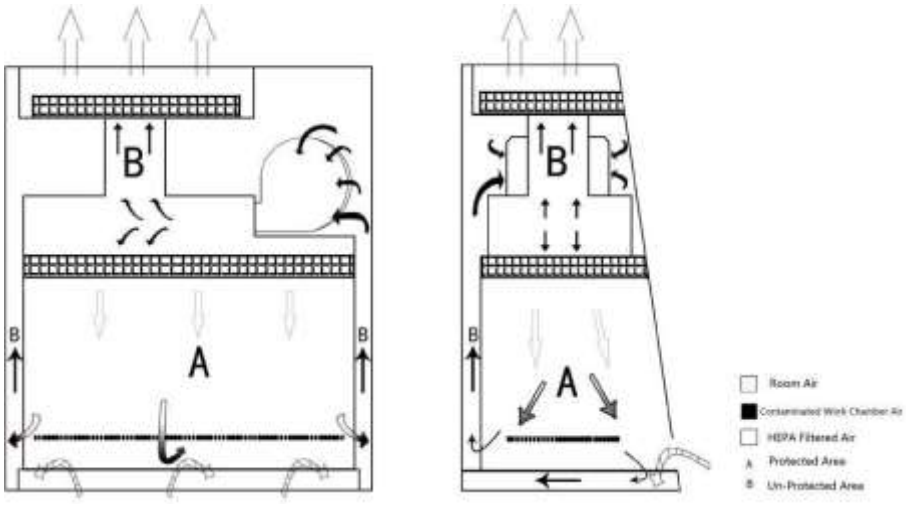



**Figure-13**

# 8. Maintenance

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.

⚠ When doing maintenance, kindly pay attention to cutting off the power, to avoid electric shock.

## 8.1 Preparation before maintenance

Soap, hot water or warm water, a soft cotton cloth, dry cloth or towel, medical alcohol or other disinfectants, 100 dilutions of household bleach, abrasive household cleaners, and sterile water.

⚠ Before fumigation shouldn't open the cabinet, enclosure and prohibit removing any parts from the Class II Biological Safety Cabinet!

## 8.2 Clean the cabinet surface

1) **Cleaning 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.'
   - **Cleaning method:** When the test substance is accidentally spilled on the work surface, first with a paper towel to it up, then wash and clean it with water or other materials (**Note**: Cleaning material used does not set off a chemical reaction with the test substance), waste liquid discharges from the bottom drain valve in the front left. After wiping twice, use the solution of the test lytic substance (**Note**: The solution can be used doesn't set off a chemical reaction with the test substance) to wash the work surface, while using a hairbrush to clean twice, then wipe and wash with water or other materials, waste liquid discharges from the sump drain valve in the left front, then clean the sump.

⚠ Before fumigation do not open the cabinet enclosure, prohibit removing any parts from the Class II Biosafety Cabinet.

**Fumigation method:** The safety cabinet should be sealed before fumigation to ensure that no formaldehyde leaks into the laboratory or another room. Fumigation for safety cabinet and filter should ensure that export of HEPA filter and piping systems are exposed for more than 14 hours to ensure that microorganisms that pierce the filter is inactivate. When half of the formaldehyde has evaporated, turn on the cabinet fan running for 10s ~ 15s, making the whole area filled with formaldehyde; After complete evaporation, and then turn on the cabinet fan once more running for 10 ~ 15. After the fumigation, the Class II Biosafety Cabinet sealing device should be removed, and the exhaust fan on for not less than 8 hours, so before using or servicing the cabinet to remove residual formaldehyde vapor.

There are signs of contamination, work surface, sump, etc, we can use medical alcohol or other disinfectant to wipe.

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

⚠**Disinfectants used for wiping should not damage 304 stainless steels.**

2) **Clean the external surface and front window.**
Use a soft cotton cloth or towel to wipe the surface with a non-abrasive household cleanser.

## 8.3 Overall Maintenance period

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

## 8.4 Maintenance Methods

**Daily or weekly maintenance**

- Disinfect and clean the operating area.
- Clean the external surface and front window around the operating area.
- Check the various functions of equipment.
- Record this maintenance result

**Monthly Maintenance**

- Clean the external surface and front window.
- Wipe the working table, the inner wall surface of the operating area (excluding the wind-distributing grid of the operating area) and the inner surface of the glass door with 70％ medical alcohol or household bleach diluted 1:100 (i.e., 0.05% sodium hypochlorite). Then wipe again with sterile water to eliminate the rest of the chlorine.
- Check the various functions of equipment.
- Record this maintenance result.

**Annual Maintenance**

- Check the two conveyor belts of the front window drive unit and ensure that their tightness coincides.
- Check the Fluorescent lamps.
- Apply to test the overall performance of the cabinet on an annual basis to ensure performance safety. The user is responsible for testing costs.

**Storage Conditions**

Safety cabinet should be stored in a relative humidity of no more than 75%, a temperature below 40°C, in a warehouse with good ventilation performance, no acid, no alkali, and no other corrosive gases, the storage period shall not exceed one year, safety cabinet for more than a year needs to unpack and checked. Only the tested and qualified safety cabinet can be sold.

## 8.5 Methods and procedures for disinfection

Disinfection is necessary when any contaminated part of the Class II biosafety cabinet is needed for routine maintenance, replacement filters, performance testing, etc. Before doing the certification test and gas sterilization, all internal working surfaces and the exposed outer surface should be disinfected with a suitable disinfectant.

Besides, before doing the certificate test, kindly use the biological safety level 2 designated agents, in the form of gaseous state to the entire safety cabinet to ensure the disinfection is in line with the requirements. When the safety cabinet has been used, it is recommended to use the biological safety level 3 designated agents. It should be disinfected first while the cabinet with the potential hazard of contamination moves the place. In addition, if the reagents are overflowed and spilled after the experiment, the contaminated surface should be properly disinfected. Kindly use the depolymerization of paraformaldehyde as a disinfectant on the occasion stated below, while most of the time using gas. Before disinfection by other methods, the cycle parameters and the validity of these parameters must be given for each model and size. The compatibility of materials and the degradation and absorption of alternatives are the key factors in maintaining the integrity of the safety cabinet and the time required for disinfection. Some cases need to use these alternative methods, e.g. slow virus disease. The disinfection methods should be negotiated by the users and the authentication institution. When using paraformaldehyde for air disinfection, it is necessary to point out the area of regulation, the gas masks, protective facilities, the corresponding testing, medical monitoring, hazards training, record keeping, and according to the following steps:

Before disinfection, all the hydrogen chloride should be moved away from the cabinet. Hydrogen chloride in the presence of formaldehyde in the air, will form a carcinogen two chloromethyl ether (BCME) with the environmental condition.

- Multiply the height, width, and depth to calculate the total volume of the safety cabinet.
- Safety cabinet total volume multiplied by 11g / m3, to determine the required quality of paraformaldehyde. To confirm the quantity of ammonium hydrogen carbonate or its substitute according to the stoichiometric method and provide ammonia and formaldehyde with neutralization reaction. Ammonium hydrogen carbonate needs to be more than 10% to ensure the complete reaction.
- If there is an exhaust pipe in the safety cabinet, the pipeline must be airtight. The terminal air tightness in the pipe can be realized, or if there is a valve regulating valve closed in the safe cabinet nearby. If the exhaust pipe is longer than 3m, kindly increase the amount of paraformaldehyde to compensate for the increased volume. If the safety cabinet exhaust gas recirculation into the building exhaust system, kindly disconnect the safety cabinets and building system connection and make it closed (can use plastic film and plastic strip).
- If the security cabinet is released exhaust indoors, Kindly seal the exhaust port with plastic straps.
- For emergency exhaust, sterilize and neutralize formaldehyde, Kindly pre-place a hosepipe near the safety cabinet. This hosepipe should relate to chemicals through the hood or other suitable discharge of poisonous gas exhaust devices.
- Place the heating device such as a commercially available electric heating frying pan, or formaldehyde generator/neutralizer on the workbench and set the Temperature to 232℃ ~246℃, poly formaldehyde is evenly sprayed on the heating surface of the heating device.

 The autoignition temperature is paraformaldehyde at 300℃.

- Put the heating device used for the neutralizer on the work surface. The neutralizer (ammonium bicarbonate or equivalent substitute) should be isolated from the air in the cabinet before we use it. The following two examples us how to separate from air:

  **Example.1**

  1) Ammonium bicarbonate or substitute uniformly sprayed on the heating surface of the heating device, cover it with aluminum foil to prevent ammonium bicarbonate or disinfection alternatives from reacting with formaldehyde. The place where we put aluminum foil should enable the heating ammonia escape, or to prepare to remove the aluminum foil at the start in the neutralization stage. Removing the aluminum foil does not allow leaking out formaldehyde from the Class II Biosafety Cabinet.

  **Example.2**

  2) The safety cabinet with the gloves is sealed with plastic film. An ammonium bicarbonate or equivalent substitute was placed in sealed containers in the Class II Biosafety Cabinet, in the neutralization stage personnel disinfection through the glove disinfected the cabinet without breaking the seal system. The ammonium bicarbonate or equivalent substitute is removed from the sealed container and uniformly sprayed on the heating surface of the heating device, the heating device is energized, and ammonium bicarbonate or equivalent substitute will be heated to release ammonia.
- The heating plate, water beaker, and hygrometer should be put on the workbench for the Class II Biosafety Cabinet, do not connect the wires in the cabinet.
- Seal the front window working hole with a thick plastic film and plastic tape. Seal all possible leak areas. Such as wire export, around the front window working hole and the point where the plastic film connects with the Class II Biosafety Cabinet.
- Measured the temperature and humidity inside the cabinet.
- Temperature should be above 21 ℃, humidity should be 60% to 85%. Heat water in the beaker with a heating plate to achieve the desired temperature and humidity.
- Before depolymerization formaldehyde by relevant provisions of the regulations and strict security measures should limit access to the area around the cabinet or room. Occupational Safety and Health Administration guidelines on occupational exposure to formaldehyde in claim airborne formaldehyde concentrations exceed permissible exposure limits should be prescribed as a control area, marked out with signs and symbols of the region, and only appropriately trained personnel. We must review and observe current regulations.
- Connect the wire of the heating device with an outside socket for the Class II Biosafety Cabinet.
- After 25% of the formaldehyde is depolymerized, turn on the cabinet blower 10 s ~ l 5 s. Paraformaldehyde depolymerization 50%, repeat the above steps after the 75% and 100%. In case the Class II Biosafety Cabinet blower does not work, use the auxiliary blower or fan to promote air circulation inside the cabinet, or to extend the disinfection time, exceed the following step p recommended time.
- Disconnected the power of the heating plate and the heating device for paraformaldehyde.
- Class II Biosafety Cabinet keep for at least 6h, preferably overnight.

- Prepare according to step g, power the heating device containing ammonium bicarbonate and Class II Biosafety Cabinet to make ammonium bicarbonate vanish. Like operating with paraformaldehyde, after 25% ammonium bicarbonate vanishes, turn on the Class II Biosafety Cabinet blower for 10 s ~ l 5 s, if the fan does not work auxiliary fan or a fan to promote air circulation in a cabinet, or neutralization time extends to at least 6 h.
- Class II Biosafety Cabinet for at least 1 hour after unfolding sealing films.
- The hose exhausts neutral formaldehyde out, tear the plastic covers of the biological safety cabinet vent , connect the hose with the vent, and seal, if the hose works, before the cabinet-through plastic window cover, is inhaled, the plastic cover of the front window working hole is cut out one or two small openings (about 15cm×15cm), make fresh air go into the cabinet, but neutral formaldehyde, from the Class II Biosafety Cabinet exhaust via hose.

Users can use other methods to eliminate formaldehyde. if the method is safe and effective to eliminate formaldehyde gas.

# 9. Troubleshooting

## 9.1 Common Faults and Solution

**Warning and reminder**

Digital display of pressure difference, digital velocity display, audible and visual alarm system.

1) **Over safety height alarm for the front window**
   There will be audio and visual alarms when the front window is lifting over safety height. At the same time, the LCD display will twinkle exclamation mark. Then just adjust the height of the front window. (Front window height setting value is 200mm).
2) **ULPA filter pressure difference alarm**
   There will be audio and visual alarms if the pressure of the air supply filter or exhaust filter can't meet the present value, at the same time LCD will twinkle an exclamation mark. Remember the operator to replace the filter immediately to protect the operator's safety.
3) **Velocity fluctuation alarm**
   There will be audio and visual alarms if the inflow velocity and downflow velocity are below 20% of the standard value, namely, inflow velocity is below 0.42m/s and, the downflow velocity is below 0.26m/s, at the same time LCD display will twinkle and exclamation mark to remind the operator to pay attention.

## 9.2 Troubleshooting

Kindly confirm whether the power is connected or not, whether the power cord is obviously damaged or not, whether the fuse is good or not, and whether the power locks are in an open state or not before the fault diagnosis.

| Faults | Check parts | Measures |
|---|---|---|
| The fluorescent lamp doesn't work | Lamp holder | The tube and lamp holder are connected securely. |
| | Tube | Change the tube. |
| | Ballast | Change the ballast. |
| | Circuit | Check circuit. |
| | Control panel | Change the control panel. |
| UV lamp doesn't work | First check the troubles according to the inspection of the fluorescent lamp, if the UV lamp still doesn't work, then make the following analysis. | |
| | Micro Switch | Check if the Micro Switch is broken. |
| | Front window, fluorescent lamp and blower | Check whether the front window, fluorescent lamp, and blower are open or not. |
| | Control panel | Change the control panel. |

| | | |
|---|---|---|
| The button doesn't work | Control panel | Ensure the power connects well, and the fuse is well. |
| | | Check if the button is broken. |
| | | Ensure the connecting wire is connected well. |
| | | Change control panel. |
| The Blower doesn't work | Micro Switch | Check if the switch is broken or works Fine. |
| | Front window | Whether the front window is open or not, the blower works only when the front window is open. |
| | Blower | If the blower is broken, change it. |
| | Circuit | Check circuit. |
| | Control panel | Change the Control Panel. |
| No electricity in the socket | Socket | Check if the socket is broken. |
| | Socket fuse | Check if the socket fuse is broken. |
| | Circuit | Check circuit. |
| | Control panel | Change the control panel. |
| Pressure or air speed displayed incorrectly | Gas circuit | Check whether the gas circuit has dropped, is broken, or jammed. |
| | Control panel | Change the control panel. |
| The front window doesn't work | Transmission part | Check transmission connection and lead rail. |
| | The motor of the front window | Check the front window motor |
| | Circuit | Check circuit. |
| | Control panel | Change control panel. |
| Remote control doesn't work | Remote control | Check if the Remote control is broken or not, and if there's electricity in the battery. |
| | Connection cable | Check whether the main control paneland. The display board is connected well. |
| | Control panel | Change the control panel. |
| No electricity in the equipment | Power supply | Check power supply connects well |
| | Power wire | Check whether the power wire has obvious damage |
| | Fuse | Check if the fuse is good |
| | Power key | Check if the power key is open, broken, or not. |
| | Transformer | Check whether the transformer works normally. |
| | Control panel | Change the control panel. |
| The display | Connection winding | Check whether the winding displacement |

| | | |
|---|---|---|
| doesn't work | displacement | connects well. |
| | Display screen | Check whether the display screen is good |
| | The motor of the front window | Check the front window motor. |

**Notes**

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

## 10. Replacement

### 1) Replacement of Fluorescent light

When replacing lights, Ensure that the power is off, open the operation panel, use the control panel support frame (fixed in the inside position of the control panel as shown), then like in **Figure 15** shown screw the tube 90°, take the correspondence type of lamp, put it to the lamp holder and screw 90 °to the right position.

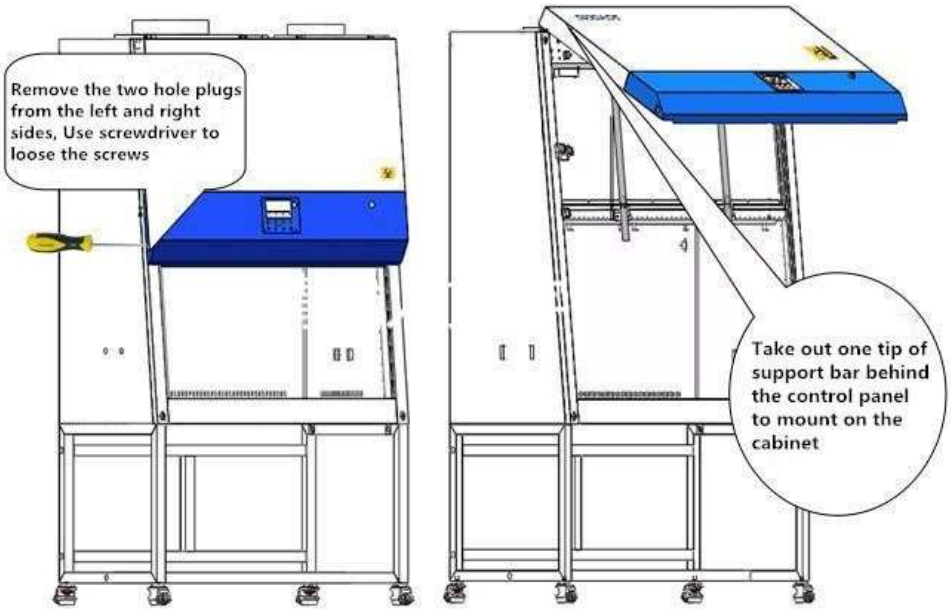



**Figure-14**




**Figure-15**

**2) Replacement of UV Lamp**

UV lamps should be replaced regularly according to the frequency of use, when using UV lamps reaches a time of 600 hours, we recommend replacing the lamp. When replacing, first Ensure the power is off, and then screw the bulb 90 °and take it off, then take the correspondence type of lamp, put it to the lamp holder, and screw 90 °in the reverse direction. After replacing the UV lamp, one needs to keep pressing the button of UV for about five seconds when the machine stays on standby.




**Figure-16**

**3) Replace the fuse**

The power plug fuse is in the top operation panel, when replacing it, turn off the power disconnect the plug, and take out of the fuse holder using a slotted screwdriver replace it with a new fuse, and then press it back.




**Figure-17**

**Label Description**

1) **Biological hazard label**



**Figure-21**

2) **Fuse label**

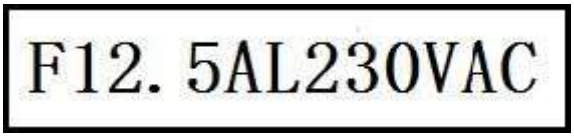



**Figure-22**

3) **Ground Label**



**Figure-23**

4) **Glass door superelevation warning label**



**Figure-24**

## 11. Accessories

### Standard Accessories

| Accessories | Quantity |
|---|---|
| LED Lamp | 2 pcs |
| UV lamp | 2 pcs |
| Base stand | 1 pc |
| SS water tap | 1 pc |
| SS gas tap | 1 pc |
| Drain valve | 1 pc |
| Waterproof sockets | 2 pcs |
| Remote Control | 1 pc |
| Stainless Steel IV Bar with 10 hooks | |

### Optional Accessories

Armrest
Airflow Tester
Formalin Fumigation Sterilizer
Ammonium Hydrogen Carbonate Neutralizer
Electric Height Adjustable Base Stand

## 12. Circuit Diagram

