FISON

CLASS II A2 BIOLOGICAL SAFETY CABINET FM-BSC-A400

Index

1. Introduction

Class II A2 Biological Safety Cabinet FM-BSC-A400 is a floor standing unit which meets the requirement specified by NSF for Class II type A2 BSC. Features tough glass front window, water tap and gas tap, universal caster, waterproof socket, LCD display, I.V. bar with hooks etc. to carry out the experiments in a contaminant free environment along with operator protection. Approximately 35% of air is exhausted, 65% is recycled and inflow of air is 462 m3/h. It is used in microbiology labs, biotech labs, universities etc.

2. Features

- ✓ NSF certified product
- ✓ Motorized front window
- ✓ LCD Display
- ✓ Automatically adjusted air speed
- ✓ Stores pre-set details even in-case of power failure
- ✓ Single piece of stainless steel used to make side and back wall
- ✓ 10° slanted front door to have better access in working area
- ✓ Universal caster with brakes and levelling feet
- ✓ Two-layered laminated toughened anti-UV glass
- ✓ Stainless steel water tap and gas tap
- ✓ Spacious enough for two person
- ✓ Waterproof socket to avoid short-circuits
- ✓ Efficient decontamination through UV lamp
- ✓ Exhaust thimble can be attached
- ✓ Stainless steel I.V. bar with 10 hooks
- ✓ High efficiency and lower power consuming ECM motor with adjustable speed
- ✓ Drain valve for easier cleaning
- ✓ Two HEPA filter and filter life indicated on display screen
- ✓ Many other optional accessories can be provided

3. Security system

- Interlock function between UV lamp and front window
- Interlock function between UV lamp and blower
- Interlock function between UV lamp and fluorescent lamp
- Interlock function between blower and front window
- Alarm system for abnormal air flow velocity, filter replacement, front window placed at unsafe height

4. Specifications

Model No.	FM-BSC-A400
External Dimension (W×D×H)	1383×775×2295 mm
Internal Dimension (W×D×H)	1210×600×660 mm
Work Surface Height	750 mm
Max Opening	550 mm (22 inch)
Tested Opening	Safety height 200 mm (8 inch)
Air flow Volume	In flow: 462 m^3/h (272 cfm) Down flow: 65%: 863 m^3/h (507 cfm) Exhaust: 35%: 462 m^3/h (272 cfm)
Front Window Thickness	≥ 5 mm
HEPA Filter	Two, 99.999% efficiency at 0.3 um
Filter Guard Type	Aluminium alloy frame
Noise	NSF 49 ≤ 61 dB/EN 12469 ≤ 58 dB
Illumination	≥ 1000 Lux
Display	LCD Display
Waterproof Socket	Two Total consumption: ≤ 500 W
Tap	Water tap × 1, Gas tap × 1
Ground Resistance	≤ 0.10 Ω
Power Supply	AC 220 V ± 10%, 50/60 Hz; 110 V ± 10%, 60 Hz, Full load Amps: 9A, BTU/Hr: 1689
Consumption	400 W
DC Motor	One ECM motor, 110V & 220V acceptable, Speed adjustable
Material	Working area: 304 stainless steel Frame and Decorative Plate: cold-rolled steel with anti-bacteria power coating.
UV Lamp	30 W Emission of 253.7 nanometers
Illumination Lamp	18 W ×2
Packaging Dimension (W×D×H)	1540×1080×1900 mm
Weight	334 kg

5. Applications

It used to carry out various experiments in microbiology, biotechnology, pharmacy, clinical research etc. in a ventilated and de-contaminated environment.

6. Instrument introduction

6.1 Structural composition

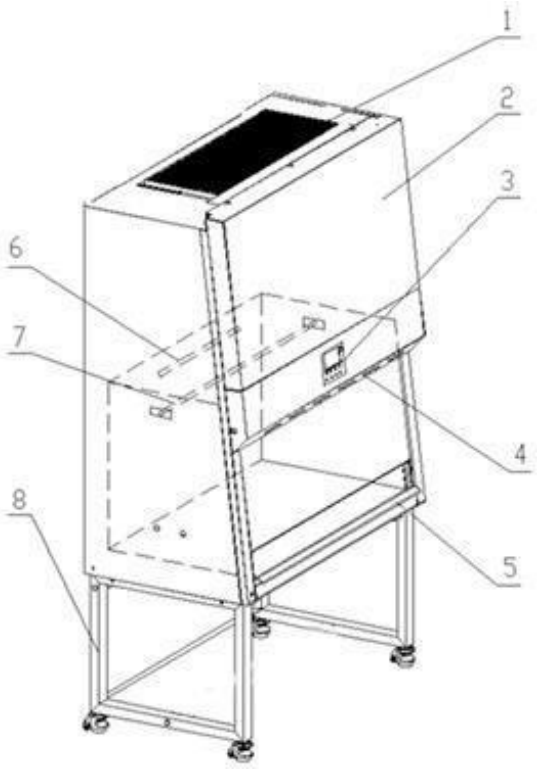


Figure-1

1. Air outlet safety guard
2. Control panel
3. LCD display
4. Fluorescent lamp
5. Alarm rest plate
6. UV lamp
7. IV bar
8. Base stand

6.2 Control panel

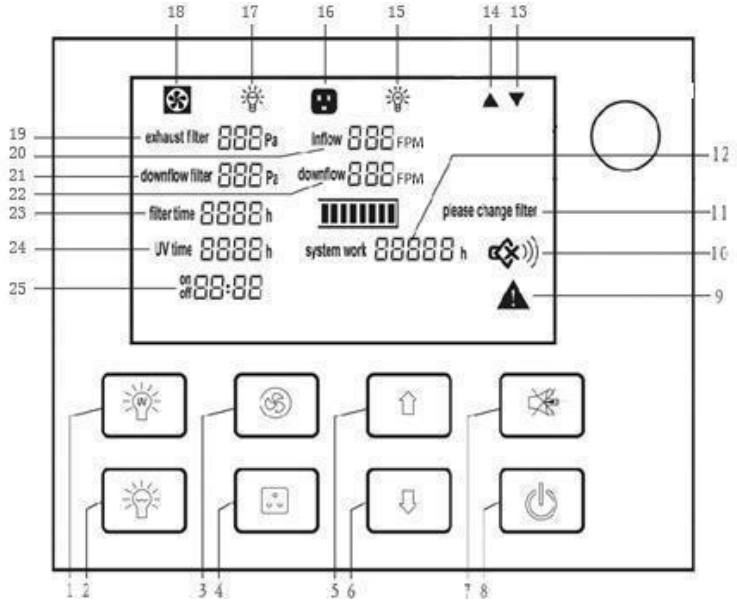


Figure-2

1. UV lamp	14. Glass window up status
2. Fluorescent lamp	15. UV status
3. Blower	16. Socket status
4. Socket	17. Fluorescent lamp status
5. Glass window up	18. Blower status
6. Glass window down	19. Exhaust filter differential pressure
7. Mute	20. Inflow velocity
8. Power	21. Supply filter differential pressure
9. Alarm status	22. Downflow velocity
10. Mute status	23. Filter working time
11. Filter changing status	24. UV lamp working time
12. System working time	25. Reservation timing
13. Glass window down status	

a. LCD screen: The working status and operation of the instrument can be seen on the LCD screen.

b. Soft touch buttons:

1)  **: The power button**: Master switch to control other function keys.
2)  : **Control fluorescent lamp**: When you press each time, the status of the fluorescent lamp and the corresponding status counter on the LCD change at a time from bright to extinguished or the opposite.
3)  : **Control UV lamp**: When you press each time, the status of the UV lamp and the corresponding status counter on the LCD change at a time from bright to extinguished or the opposite. (It works only after the front window, fluorescent lamp, and blower are fully closed).
4)  : **Control blower working status**: When you press each time, the status of the blower and the corresponding status counter on the LCD change at a time from bright to extinguished or the opposite. (It will not work when the front window is fully closed).
5)  : To control the socket power status.
6)  : Press the MUTE button to stop the voice prompt
7)  : Press the UP button, glass window will rise. Stopping at 10-inch distance units' panel. Continue to press the UP button until it reaches its lowest point, glass window will stop moving when lose the button.
8)  : Press the DOWN button, glass window will fall. Stopping at a 10-inch distance unit panel and continuing to press the DOWN button until it reaches its lowest point, the glass window will stop moving when loses the button.
9) There are a total of 8 common buttons on the control panel.

7. Installation

7.1 Unpacking

1) Choose the proper unpacking method according to the actual situation.
2) Necessary tools for unpacking: Electric drill with hexagon dead M8.

Figure-3

3) Use the M8 Wrench to unpack.

Figure-4

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

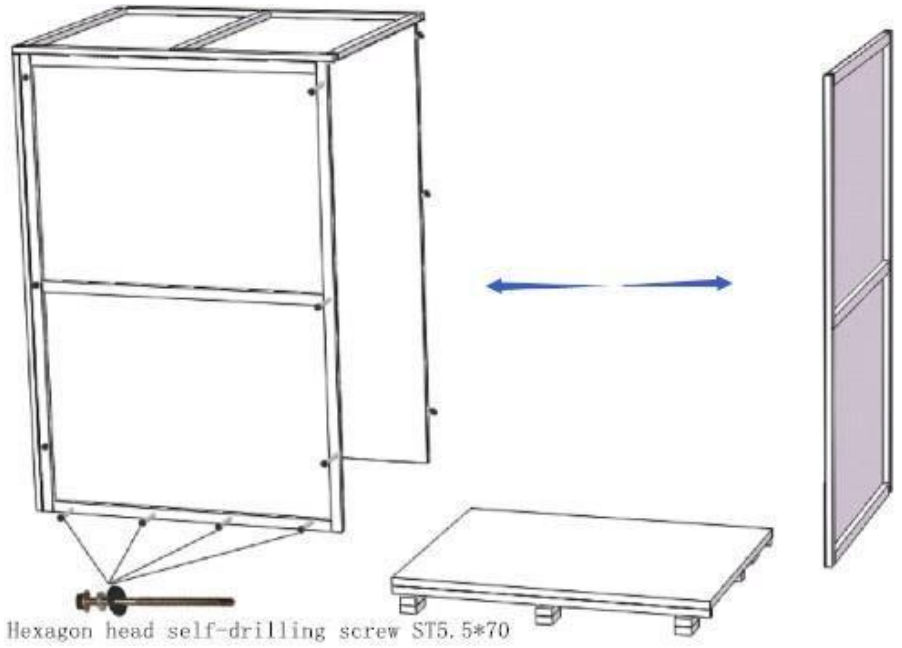


Figure-5

7.2 Installation conditions and environment

1) To avoid disturbances to the safety cabinet and its operator, follow the following guidelines while determining a suitable location for the cabinet.
2) The distance from the plane of the aperture to any circulation space should be at least 1000 mm, to preserve a zone undisturbed by anyone other than the operator.
3) The Biosafety Cabinet should be placed in a position where there should be no opposing wall (or other obstruction likely to affect the airflow) within 2000mm of the front aperture.
4) Safety cabinets should not be installed in positions where they are likely to be affected by other items or equipment. In particular, the distance to the aperture of an opposing safety cabinet, fume cupboard, or the edge of a local exhaust ventilation outlet should not be less than 3000 mm.
5) Any room air supply diffuser should not be within 1500 mm of the front aperture.
6) Doorways should not be within 1500 mm of the aperture or 1000 mm of the side of the safety cabinet.
7) The position of a safety cabinet should satisfy the spatial requirements (e.g. vision, lighting and convenience of access) of the operator and personnel working nearby. When a cabinet is installed on a benchtop, the leading edges should be flush with or slightly overhanging the edge of the benchtop.

Working environment

1) Only is suitable for indoor
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 Biosafety Cabinet
6) The power supply needs to be grounded, (Judging method: testing the firewire and the zero line of the power supply with the 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).
7) Test the voltage stability before using, if the voltage is unstable, use the voltage regulator, otherwise the control panel and transformer may be easily damaged

7.3 Installation

1) Install the base stand.
2) Put the upper body on the base stand and fix it with bolts that are packed in the bag in the work area. Connect the base stand with the cabinet.
3) Adjust the foot caster and work surface, make sure the maximum stability on the uneven ground, clockwise the red part of the foot, lower the corresponding supporting feet, lower the height of the cabinet, and lower four feet at the same time can move the cabinet; rotate the red part of the foot, higher the corresponding base supporting feet, higher the height of the cabinet, higher four legs at the same time can make the cabinet at horizontal steady state.
4) Remove the internal packaging materials, empty all the pieces, etc.
5) Check whether the accessories are according to the product packing list.
6) Check if there is any damage in the process of transportation and check the situation of all components. If necessary, test the filter and the fixed bolt on the front panel, these bolts should not be too tight. If you need to check the surface of the air filter, you can loosen the bolt's fixed well wind network and take it out carefully from the front.
7) Check if the workplace place stable.
8) If the safety cabinet is equipped with a water tap and gas tap, on the side wall isa1/2-inch threaded pipe joint; Connected to the building or other connection should fit this size.
9) Install HEPA exhaust protective device on the exhaust HEPA filters: put the protective device on the opening place of the filter and fix it with a nut.
   Fix the drain valve on the bottom floor, connect the drain valve, and check the drain valve in the closed position - in parallel with the ground position.
10) The top of the device is equipped with a HEPA exhaust protective device, if equipment is required there is an external exhaust system (applied to the poisonous and harmful gas or steam).
11) Install UV lamp
12) Installation of the main components

a. Installation of the base stand

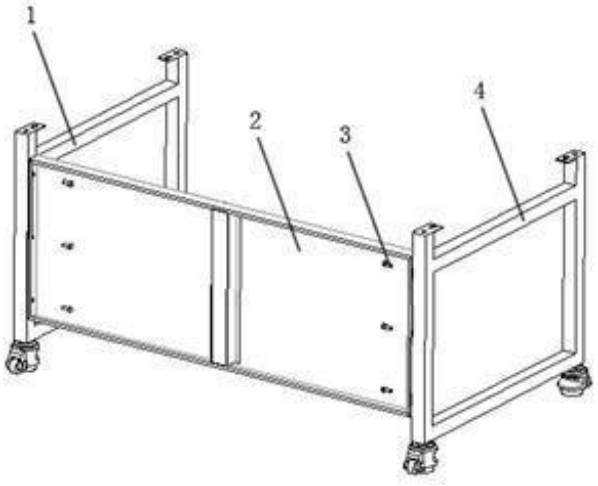


Figure-6

1. Right bracket
2. Back connection plate
3. Inside hex bolts M10 x 20, six pcs
4. Left bracket
5. Connect main body and base

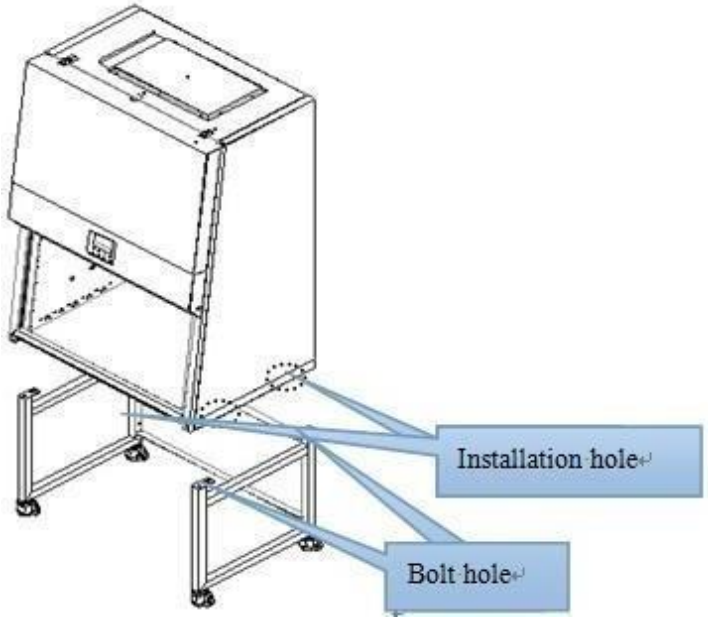


Figure-7

1) Align the mounting holes on the bottom of the cabinet side with the locating bolts and slow down the cabinet on the mounting base.

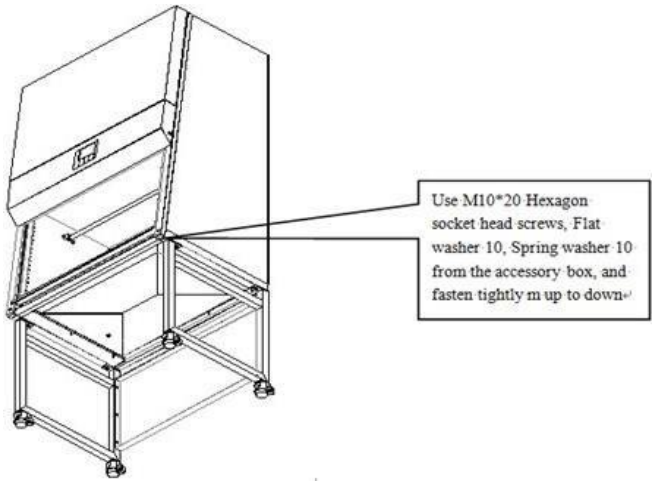


Figure-8

2) Take out the M10×20 Hexagon socket head screws, Flat washer 10, and Spring washer 10 from the accessory box, and fasten tightly.

b. Installation of drain valve

Figure-9

1. Drain valve connector
2. Shim
3. Safety cabinet bottom installation holes
4. Ball coupling fastening nut
5. Rubber gasket
6. Drain valve
7. Copper joints

c. Adjustment of foot master caster

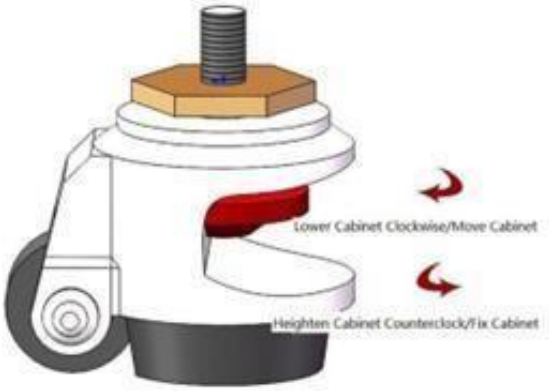


Figure-10

1) Clockwise rotate the caster's red part to lower down the base feet and the height of the cabinet.
2) Low down all four casters can move to the cabinet position.
3) The counterclockwise rotation caster's red part can raise the base leg and height of the cabinet. Raising all four casters at the same time can fix the cabinet.
4) Adjust the four Foot -masters to make the cabinet stable.

d. Installation of water tap

Figure-11

1. Tighten nut
2. Tap/ gas tap

Pick up the water tap, gas tap and tightening nut as shown.

7.4 Checking after installation

Checking Items	Normal situation
Wind speed display	Inflow (100-110) FPM, downflow (60-70) FPM
Pressure display	Exhaust filter80-120Pa, downflow filter 80-120Pa
Fan operation	The fan running
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

1) Connect the Biosafety Cabinet dedicated power line to the power outlet on the ground, The electric current is 9A, and the Biosafety Cabinet must be the only equipment on the circuit to ensure that does not exist in any other equipment, see the electrical equipment requirements data in the cover.
2) Open the Fan key on the Control Panel, fans will take some delay to achieve the required speed. To prevent too much current, the fans need a delay of about 10-15S to achieve full speed before the motor runs. Similarly, the fans also need the 10-15S delay stopping. Stable voltage is provided by a built-in voltage regulator circuit for the motor/blower, thus eliminating air fluctuations.
3) Press the LIGHT button on the control panel and turn **ON** the lights. If the lamp is not bright, kindly check the lamp tube or socket, it may course loose between the lamp and lamp holder in the carrying process.
4) Press the UV button on the control panel; turn on the UV lamp to check whether the UV light is working properly.
5) Press the key SOCKET button on the Control Panel; check the safety cabinet's internal power socket. If the safety cabinet is equipped with two sockets, the button controls both.
6) Press the mute button on the control panel to start the sound attenuation function and press it again to restore the alarm.
7) Continue to press the door up buttons on the control panel, and the glass door will continue rising, automatic stops when up to 10 inches, press this button again and the glass door will continue rising.
8) Continue to press the door down buttons on the control panel, glass door will continue dropping, automatic stops when down to 10 inches, press this button again and the glass door will continue dropping.

7.5 Installation of filter to an external system

1) Regarding the installation of a Biosafety Cabinet exhaust HEPA filter connected to an external exhaust system, we supply the following Suggestions.
2) When the Biosafety Cabinet is connected to the efflux system, it must be a 100% efflux system.

Top pipe connection

1) Whether the safety cabinet is working, the exhaust hood can always provide continuous stable gas flow exhaust outdoors. The total exhaust air rate of the exhaust hood is no less than 100m3/h of the safety cabinet's gas displacement, and the gas displacement of safety cabinet BSC-4FA2 are separately 460m3/h.
2) When the safety cabinet vents to a public exhaust system, this connection method is also available.
3) To make sure the disordered airflow inner side does not leak into the air outside; an air curtain should be used to check the unclosed roof.
4) Ensure that there is no air exhaust fan working in the distance when the cabinet is working. Air exhaust fans in the building should be locked to the cabinet's supplier, or they should install a switch or similar device on the laboratory exhaust system.
5) To set the suction on the top correctly, there needs to be an air throttle on the gas exhaust pipeline.
6) Adjust the air flow balance by a qualified person.

8. Operations

8.1 Remote control

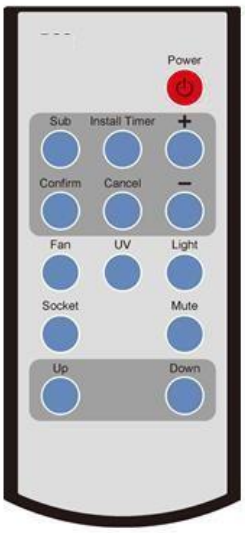


Figure-12

1. Power
2. Sub
3. Install timer
4. Confirm
5. Cancel
6. Turn Up (+)
7. Turn Down (-)
8. Bower stats (FAN)
9. UV lamp (UV)
10. Fluorescent lamp (LIGHT)
11. Socket status (SOCKET)
12. Mute status (MUTE)
13. Glass window up status (UP)

8.2 Reservation time (SUB)

1) Connect the power, open the power lock, and press the reservation timing button (SUB).
2) Adjust the time (minutes) by the "+" or "-" button. Press the confirmation button (CONFIRM) to confirm, and then adjust other minutes and hours position data in the same way.
3) After the time is confirmed, the corresponding display lamp lights by selecting the function buttons (such as UV).
4) Press the POWER button again, the reservation function starts. Reserved time starts count down. The corresponding setting function starts when the time counts down to zero.

8.3 Timer (Install timer)

1) Connect the power, open the power lock, and press the button (POWER), and the corresponding display lamp lights by selecting the function buttons (such as UV).
2) Press the button (INSTALL TIMER) and adjust the time (minutes) by the "+" or "-" button. Press the button (CONFIRM) to confirm, and then adjust other minutes and hours position data in the same way.
3) After the time is confirmed, the Timer function starts. When the time counts down to zero, all the functions will be off, the cabinet will be in standby mode.

8.4 Air filtration system:

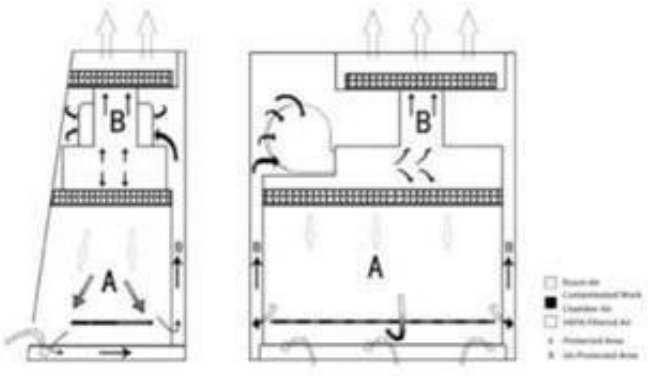


Figure-13

a. Circuit of digital control

1) The Cabinet uses the latest microprocessor control technology to monitor your safety cabinet's function, easy to operate, with a friendly interface and automatic diagnostic function.
2) Connect the safety cabinet to the recommended power interface.
3) After powering **ON** the LCD will display the cabinet's working time, and filter's working time and lifetime. When push the power button, the LCD background lights up, and the system will be in standby mode.
4) After powering **ON** the equipment will check itself automatically. When the front window is too high, it will alarm the buzzer, and the LCD will show "!" and flicker, now you can adjust the height of the front window. If the differential pressure of the supply filter and exhaust filter is too big, there will be audio and visual alarms, then we need to replace the filter, to ensure the safety of the operator.
5) After self-examination, the equipment will be in standby state.
6) The fan runs by activating the switch on the control panel, the Fan sign on the LCD will light, meanwhile, the motor will start, and it will reach the normal speed after 10-15 seconds.
7) When the fan switches again, the motor and the sign of the fan will close, and the motor will shut down after 10-15 seconds.

8) The three-pin socket is controlled by the relevant key on the control panel, the max current is 5A. If there are two three-pin sockets, they will be controlled at the same time.
9) The digital controller can adjust all the velocities of the fan, and it can provide linear compensation for voltage fluctuation.
10) The airflow volume will be displayed and monitored through the pressure and will be sampled by the microprocessor. When the airflow volume exceeds the normal value, the buzzer will alarm continuously.
11) Before seeking maintenance service help, pull the plug off the wall, then plug in to restart the motor after about 2 minutes, the safety cabinet will restart and run well.

b. Airflow velocity indication

Airflow velocity indication is inflow velocity and downflow velocity.

c. Differential pressure indication

1) Differential pressure indication is the differential pressure between the upper and lower filter, and it will increase when the filter loading increases.
2) The value after the Exhaust filter is the exhaust filter differential pressure, and the value after the downflow filter is the supply filter differential pressure.

d. Use of UV lamp

Use a UV lamp to sterilize the equipment for at least half an hour before and after use. When sterilizing, the operator had better leave the room to protect eyes and skin.

e. Use of socket

1) The switch of the socket is on the control panel, on the circuit board there is a 6.3A fuse for overload protection.
2) The power supply provided by the socket is 110V, 60Hz or 220V, 50Hz/60Hz, and the maximum current is 5A.

9. Maintenance

9.1 Structural material maintenance

Material	Recommended clean method
Stainless steel	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. Clean the extra soap lather with a dry cloth or towel. For the contaminated or dirty work surface or sump, use a mild abrasive compound like SPIC or SPAN then wipe the following above.
Surface coating	Use a soft cotton cloth or towel (not lint) to wipe the surface with a non-abrasive household cleanser like FANTASTIC or BON AMI, but not an abrasive compound like AJAX or COMET.

9.2 Cleaning process

1) Raise the front glass window to make it easier to clean the whole inner workplace.
2) The cleaning process is decided by the agent and follows suggestions from the safety office and safety committee.

9.3 Vent tank

The sudden leaking of any liquid in the workplace may stay on the workplace or flow into Vent tank which is around the workplace. A stainless Vent tank can use a draining valve to dredge. Under normal conditions, the draining valve should be kept closed.

10. Troubleshooting

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 will twinkle with the exclamation mark. Then just adjust the height of the front window. (Front window height setting value is 10inch)

2) HEPA filter pressure difference alarm

a. 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.
b. Remind 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 below 83FPM, and downflow velocity below 51FPM, at the same time LCD will twinkle an exclamation mark to remind the operator to pay attention.

Faults	Measures
The equipment doesn't work	(a) Check whether the power socket is inserted tightly. (b) Check whether these three insurance tubes of the circuit board burned out: Zero-line insurance tube F3 12.5A, fire line insurance tube F2 12.5A, and transformer insurance tube F1 125 mA. (c) Transformer fault or cable poor contact can lead to circuit board working voltage abnormal.
The blower doesn't work	(a) Check whether the motor is broken. (b) If components or the circuit of the control panel is broken. (c) Check whether the circuit is well-connected. (d) Check whether the blower circuit board fuse F4 6.3 A is burned out.
Motor with buzzing	(a) Replace motor (b) Low fan speed settings
The fluorescent/UV lamp doesn't work	(a) The corresponding lamp broken (b) Components or the circuit of the control panel is broken (c) The corresponding ballast broken (d) Check whether the circuit board fuse is burned out. Fluorescent F6 2.5A, UV F5 2.5A
The motor or fan set has a scratch or friction	(a) Check the fan cage for debris, pieces of paper, packaging., and remove them. (b) The wind impeller may slide on the motor shaft, replace the fan.

Airspeed too low	(a) The speed of the fan is set incorrectly (b) Check whether the HEPA filter is blockage, check pressure readings (c) Air flow needs a balance between input and output.
The front window doesn't work	(a) Check whether the circuit board fuses F8 6.3A is burned out. (b) The motor is damaged, replace the motor.
No electricity socket	(a) Didn't turn on the socket (b) Components or the circuit of the control panel is broken (c) Check whether the circuit board fuse F7 6.3A is burned out.

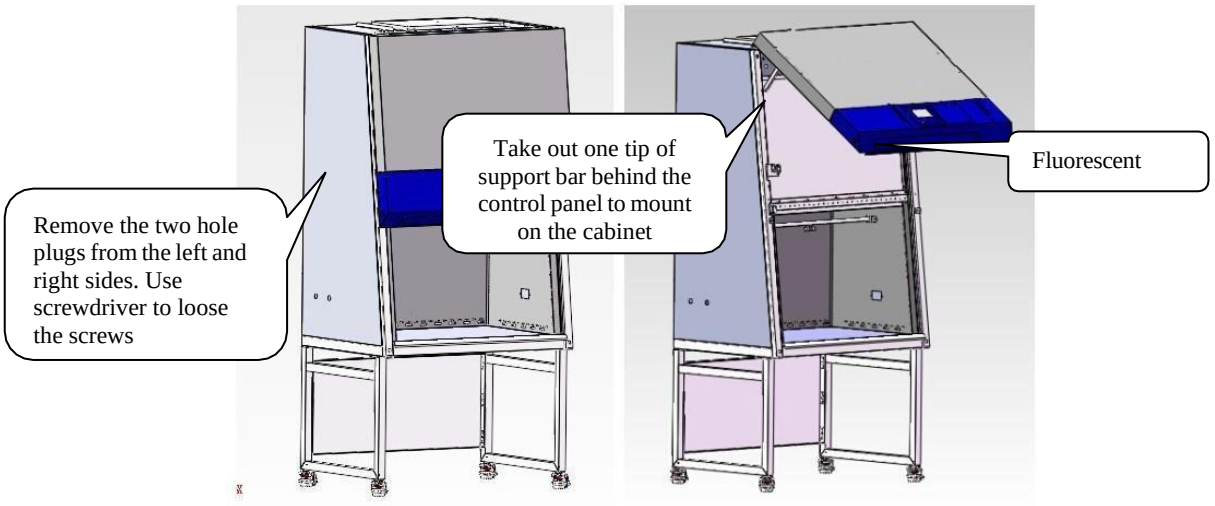
11. Accessories

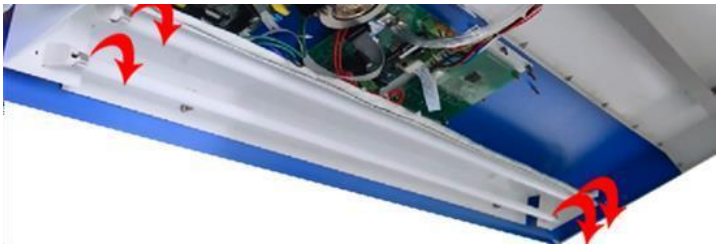
Sr. No	Name of accessory	Quantity
1	Armrest	1pc
2	Formalin fumigation sterilizer	1pc
3	Infrared sterilizer	1pc
4	Airflow tester	1pc
5	Remote control	1pc
6	Electric height adjustable base stand	1pc

12. Replacement

1) Replace fluorescent lamp

When replacing lights, make sure that the power is **OFF** open the operation panel as shown in the figure use the control panel support frame (fixed in the inside position of the control panel as shown), then as shown rotary screw off the tubes, take the correspondence type of lamp, put it to the lamp holder and rotary screw to the right position in the opposite direction.

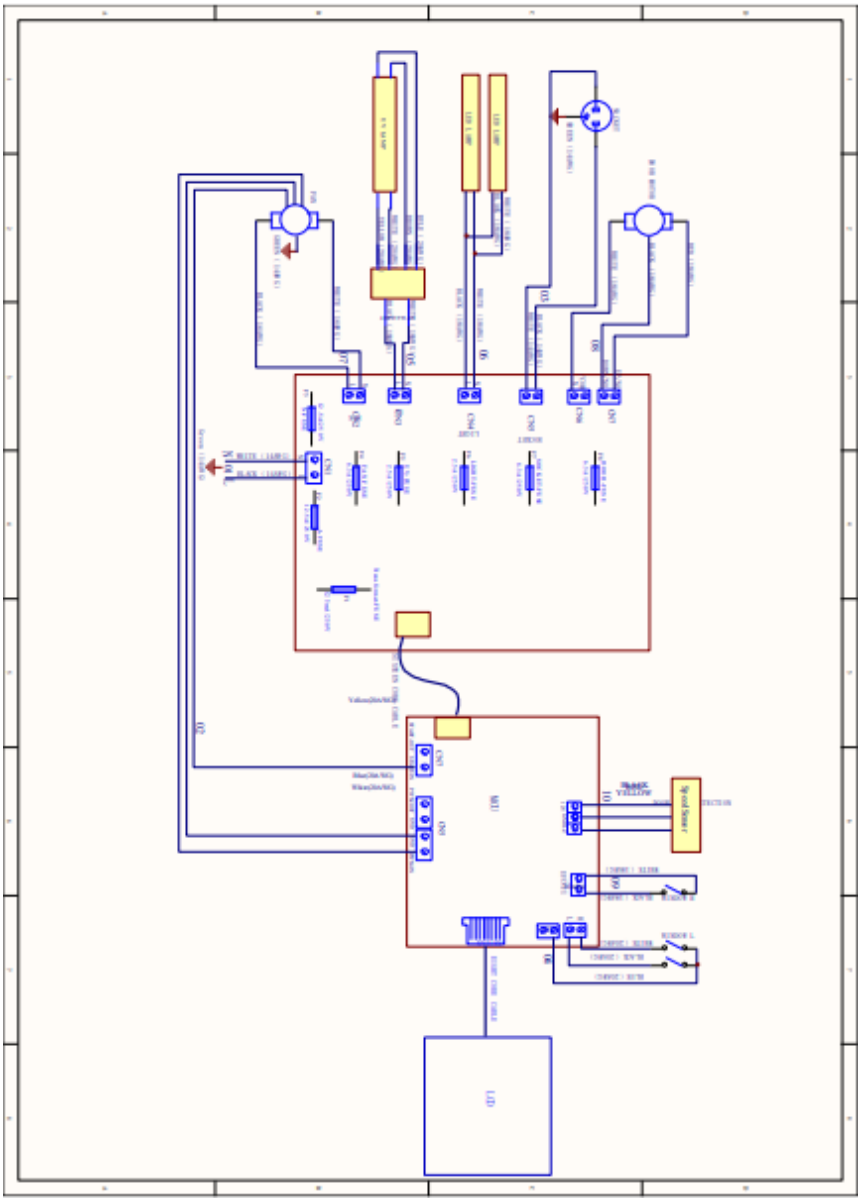




2) Replace the UV lamp

a. UV lamps should be replaced regularly according to the frequency of use. When using a UV lamp reaches a time of 600 hours, we recommend replacing the lamp.
b. UV lamps should be replaced regularly according to the frequency of use, when using UV lamps reach the time of 600 hours, we recommend replacing the lamp.
c. After replacing the UV lamp, it needs to keep pressing the button of UV for about five seconds when the machine stays on standby, when hears an alarm voice, the UV lamp use time is zero.

13. Circuit diagram



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