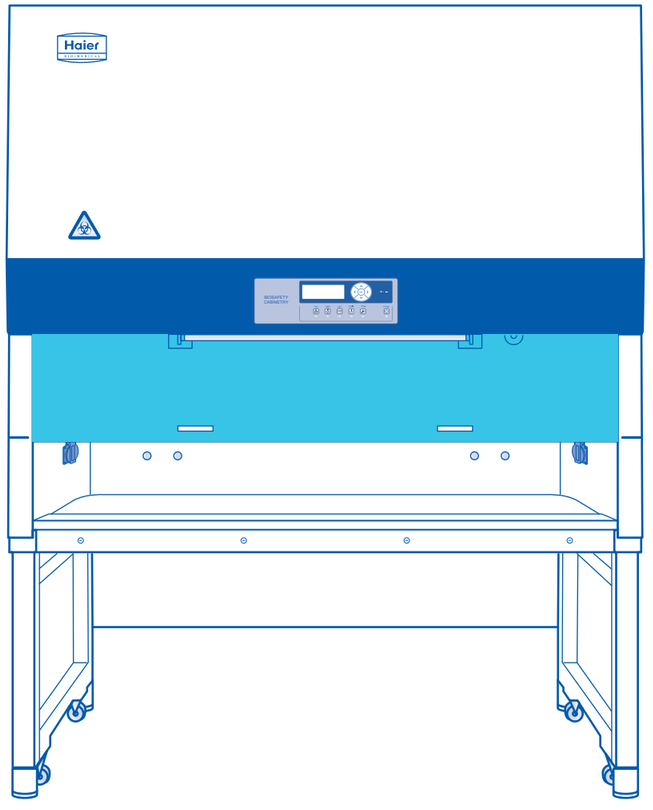
Haier

Biological safety cabinet

Operation Manual



Model:
HR1200-IIA2-D
HR1200-IIA2-S

Certicate of Quality

checker:

Manufacturer: Qingdao Haier Biomedical Co., Ltd.
Address: Haier Industry Park, Economic Technology Development Zone. Qingdao 266510.P.R.China
Web:www.haiermedical.com
Version:1st,2019
V13026

- Read the Operation Manual carefully before using your appliance.
- Keep the Operation Manual in a safe place.
- Appearance , color and layout of the door may vary.

Catalog

Packing List

S/N	Category	Name	Unit	Quantity	Remarks
1	Subject	Host	Set	1	
2	Document	Manual	Copy	1	
3	Document	Delivery inspection report	Copy	1	
4	Parts	Manual package	Piece	1	
5	Parts	Accessory package	Piece	1	
6	Parts	Drain valve	Piece	1	Only for HR1200-IIA2-D
7	Parts	Handrest	Piece	1	
8	Parts	Handrest fastening screws	Piece	4	On the host
9	Parts	Drawbench cloth	Piece	1	
10	Parts	Water cock	Piece	1	Optional parts
11	Parts	Air cock	Piece	1	Optional parts
12	Parts	Vacuum cock	Piece	1	Optional parts
13	Parts	Gas cock	Piece	1	Optional parts
14	Parts	Exhaust hood	Piece	1	Optional parts
15	Parts	Exhaust pipe∅200	Piece	1	Optional parts
16	Parts	Exhaust pipe hoop∅200	Piece	1	Optional parts
17	Packing	Chassis and packing accessories	Set	1	Optional parts 17.1~17.9 for D
17.1	Parts	Upper left support of chassis	Piece	1	
17.2	Parts	Under left support of chassis	Piece	1	Including two casters and two steel foots
17.3	Parts	Upper right support of chassis	Piece	1	
17.4	Parts	Under right support of chassis	Piece	1	Including two casters and two steel foots
17.5	Parts	Rear support of chassis	Piece	1	
17.6	Parts	Hexagon socket screw M12X20	Piece	12	
17.7	Parts	Six angle bolts M12X20	Set	4	Including flat and spring cushion
17.8	Parts	Inner hexagon spanner	Piece	1	
17.9	Document	Chassis assembly manual	Copy	1	
18	Parts	Glass door motor	Piece	1	Optional parts

Technical Data

Product model	HR1200-ⅡA2-D	HR1200-ⅡA2-S
Level and type	Level-Ⅱ, Type-A2	Level-Ⅱ, Type-A2
Boundary dimensions (L x W x H) mm	1380×845×2160	1380×845×2160
Work area dimensions (L x W x H) mm	1310×620×650	1310×620×650
Exhaust air filter Specification/quantity	HEPA FILTER×2 Filtration efficiency ≥99.995%@0.3μm	HEPA FILTER×1 Filtration efficiency ≥99.995%@0.3μm
Downflow air filter Specification/quantity	ULPA FILTER×1 Filtration efficiency ≥99.9995%@0.12μm	HEPA FILTER×1 Filtration efficiency ≥99.995%@0.3μm
Inflow velocity (m/s)	0.45m/s	0.45m/s
Downflow velocity (m/s)	0.30m/s	0.30m/s
Power Connection Type	X	X
Power supply	220-240V~ 50/60Hz	220-240V~ 50/60Hz
Rate Current	7.5A	7.5A
Power input	1600VA	1600VA
Exhaust Fan power	170W	112W
Exhaust Fan speed	2860r/min	1250r/min
Downflow Fan power	190W	120W
Downflow Fan speed	2000r/min	1800r/min
Net weight	320kg	320kg
Pollution degree	Class 2	Class 2
Altitude up	2000m	2000m

Product Introduction

The Haier biological safety cabinet uses an imported high efficiency particulate air (HEPA) filter with the filtration efficiency and working area cleanliness higher than 99.99% and Class 10 respectively. We hope our product can bring considerate help to your work.

The biological safety cabinet is mainly used for microorganism handling and experimental operation to protect the safety of the personnel, operation objects and environment involved. The negative pressure air curtain at the opening of the biological safety cabinet is used to prevent spillover of polluted aerosol and thus protect the working staff. The vertical unidirectional flow through the efficient filter can provide clean air higher than Class 10 to the experimental operation, so that the operation objects could be reliably protected. The gas discharged through the efficient filter has had microorganisms and dust fully filtered and thus the environment can be well protected.

The design, production and inspection of the Haier biological safety cabinet has completely followed the NSF International Standard/American National Standard, as well as the industrial standard YY0569 Biological safety cabinet, the European standard EN12469 Biotechnology - Performance Requirements for Biological safety cabinets and the Australian standard AS 2252.2 Class II Biological safety cabinets - Design.

As the most fundamental safety protective equipment of laboratory biosafety, biological safety cabinets are widely used for scientific research, teaching, clinical test and production in such fields as microbiology, biomedicine, genetic recombination and biological products, currently able to provide a sterile dust-free mobile working environment for medical and health care, pharmaceutical industry and scientific research.

As a negative pressure ventilation cabinet made up of a super-efficient filter and a negative pressure enclosure structure, this product can be used for protection of operators, as well as experimental environment and materials, to avoid infection and injuries from the aerosol produced by dangerous biological factors.

Scope of application

The Class-Ⅱ biological safety cabinet is such a safety cabinet with a front operation window, through which the operator can complete operations in the cabinet, so that the personnel, product and environment could be protected during working.

Product Features

I. Safety system

Various fault alarms (such as wind speed abnormality, filter service life, glass door position abnormality)
Two modes for alarms (sound buzzer and lamp flickering)
Unique anticreep protection design

II. Air duct system

The working area adopts an integrated structure and high-quality stainless steel, featuring strong resistance to corrosion.
The double-layer side panel structure can effectively reduce the internal structural resistance of the biological safety cabinet, so that the operating space could be surrounded by negative pressure and subject to double-layer isolation from the ambient environment, which can effectively prevent the polluted aerosol from overflowing.

III. Control system

The high-performance forward-directed centrifugal fan can have its excellent performance and low energy consumption optimally matched by virtue of its professional structure design and efficient performance area.
The dual-channel digital differential pressure sensor and high-precision wind speed sensor can monitor the running status of the safety cabinet and the service life of the filter.
The intelligent regulation of the fan speed can ensure that the working area could have its downflow and inflow velocities in line with the standard requirements.

IV. Humanization design

The floodlight is installed inside the front cover to protect your eyes against direct exposure.
The function of early warning when the filter has less than 10% service life left can remind users of filter replacement, so as not to avoid work delay.
The concave disk countertop can facilitate effluent collection, cleaning and disinfection.

Troubleshooting

Note

Study the circuit diagram carefully before inspection and maintenance of the device; moreover, only trained and qualified maintenance personnel can inspect and maintain the circuits.

Such problems as follows occur due to abnormal use, but are not classified as faults:

Symptoms	Troubleshooting
The safety cabinet doesn't work	Check whether the socket power supply is normal.
	Check whether any plug is loose.
The UV lamp can’t be started	Only when the door is shut and the fans and fluorescent lamps all have stopped working can you start the UV lamp. Please check whether the conditions are satisfied to enable the UV lamp.
	The start time delay has not yet terminated.
Airflow abnormality alarm	The power supply is abnormal.
	The lab air feeding and discharging has not satisfied the requirements for device operation.
	The vents are blocked.
	The air intake is blocked.
	The wind velocity probe is obscured or disturbed by other airflow.
Filter service life expiration alarm	It is a normal phenomenon reminding users to contact its supplier for replacement, but it still can be used in a short time.
Door height abnormality alarm	It is a normal phenomenon and you only need to adjust the door opening height to that as regulated.
Ambient temperature and humidity alarm	Improve the lab environment or change the alarm setting value.

Service and Maintenance

1. Replacement of electrical parts
1) Only qualified electricians can operate all electrical components of the device in safe conditions (namely, turn off the power supply).
2) Fluorescent lamps and ballasts can only be replaced by such operators qualified through electrical training.
3) The control panel can be opened during maintenance of electrical components.
4) The device power lines have the function of leakage protection (The total current flow of the power cord is 10A and if greater than 10A, the power line plug will cut off automatically), so never replace or use any other type of power lines without permission.
2. Replacement of air filter
1) To avoid possible pollution, take care to replace the filter with special tools. In addition, you should fully know about corresponding laws, standards and regulations. It is critical for you to understand the detailed characteristics of this product!
2) This job can only be undertaken by the professionals specially trained by Haier Group, so that the risk of pollution could be minimized!
3) Only such filters approved by Haier Group can be used other than any other one; otherwise, unknown risks may occur.

Safety Labels and Safety Precautions

Dear Haier customers,
Thank you for buying this Haier biological safety cabinet. Please carefully read this manual and pay attention to the following symbols.

Safety labels


Note


Bio-safety


Don't touch
the wind speed sensor


Grounding
Mark

Safety precautions

Note	Ignoring this warning may result in death or serious injury.
Caution	Ignoring this warning may result in death or serious injury, and/or damage to the freezer and property.

Actions or operations which are prohibited

Actions or operations which must be followed

Note

- Only professional technicians or Haier service personnel can install the unit. Failure to do so may cause electricity or fire.
- The cabinet must be securely installed on a firm floor. Tilted installation may result in the product tipping over thereby causing injury and damage.
- Please use a dedicated power supply of proper rating to operate the unit. The supply power needs to match the requirement of the product indicated on the product label to avoid fire and electric shock.
- If the supply voltage is constantly 10% higher than the rated voltage of the unit, an external regulator with a capacity of 4000W or higher must be installed.

Safety Labels and Safety Precautions

If the power cord needs to be extended , the cross-section of the extended cable must be no less than 2 $mm^2$and no longer than 3 m for products of 220V-240V~ 50/60Hz.

Your safety cabinet is equipped with a standard three-prong power plug(grounded) complying with the standard three-prong socket (grounded) rated 10A 220V-240V~ 50/60Hz).(Pluggable power line)

Removal of the ground prong is strictly prohibited for safety reasons under any circumstances .The electrical power plug should be securely plugged into the socket. A loose plug in the socket may cause fire.

The power socket intended for your safety cabinet must be grounded to avoid electric shock. If the socket does not meet this requirement, the condition must be corrected by a qualified technician before using the cabinet ·

Never install your cabinet in an unprotected area. If the cabinet is rained on , there is a danger of electric shock.

Your cabinet must not be installed in a damp area or an area subjected to waer spray. Otherwise this may reduce the degree of insulation and thereby cause electrical leakage or electrical shock.

Never directly pour water into the cabinet,the water may cause electric shock or short circuit.

Do not place any water container or heavy object on top of the cabinet. A falling object may injure an operator. If the water spills into the cabinet, it may damage the Insulation thereby causing electric shock.

Only service personnel can remove the cabinet. Failure to do so may cause tipping or Injury and damage .

No modification of this eguipment is allowed

To avoid the risk of electric shock, this equipment must only be connected to a supply mains with protective earth .

Never use gas lines, water mains, telephone lines or lightening rods as the grounding device for your safety cabinet. This type of improper groundingmay cause electric shock or other dange

Do not touch any electrical components, switches or power cord with wet hands. Such action may lead to electric shock.

When unplugging the power cord from the socket, please grip the plug itself and pull it out. Do not pull the power cord as this may stri p the wires out of the plug thereby causing electric shock and fire.

Should there be any malfunction in the equipment, power off the cabinet and unplug the power cord from the power supply. Continuous operation in an abnormal condition may result in electric shock and fire.

Users must not dismantle, repair or modify the equipment. Such improper operations may result in fire or personal injury.

Service and Maintenance

Period of comprehensive maintenance

Maintenance should be carried out every year or every 1,000 working hours and once the equipment is restarted. The statistics of the operation time will directly affect judgment on necessary maintenance, so we recommend that a detailed record of the operation time should be prepared when this equipment is used for later reference and query.

The magnetically controlled switch is used to control the linkage protection and the magnet is the key component to determine the action of the switch, so replacement once every five years is suggested to ensure its effectiveness.

Recommended service and maintenance methods

1. Cleaning

Under normal conditions, you can only use a small amount of domestic or commercial dish detergent soluble in water to directly wipe away the dirt on the surface of the equipment.

2. Daily or weekly cleaning during operation

1) After used, the safety cabinet should be kept working for 5-10 minutes, so that the flying aerosol can fully adhere to the filter through the gas circulation in the cabinet.
2) Use medical alcohol to disinfect and clean the workshop.
3) Use medical alcohol to disinfect and clean the operation panel.
4) Use flexible detergent or special glass detergent to clean the cabinet surface and glass.
5) Check the device functions according to its user's manual.

3. Monthly cleaning

1) Use detergent to remove the dust on all surfaces.
2) Disinfect the device inside.
3) Test the device functions and check its safety in its normal operation conditions.

4. Yearly maintenance

Make comprehensive inspection on the device safety during maintenance.

1) Check the tightness of the front glass door actuator.
2) Test the product performance.
3) Record the current maintenance results.

Maintenance work

Note

1. The device maintenance can only be completed by the personnel trained and approved by Haier Group!
2. When the device fails while the operator can't troubleshoot it immediately, please notify the maintenance department immediately but for your safety, never repair it by yourself!
3.Please disinfect the cabinet inside thoroughly before any panel is opened! (See the warnings on the panel)

Disinfection Instructions

n) After 25% of the formaldehyde is depolymerized, have the safety cabinet fan working for 10-15 seconds. After 50%, 75% and 100% of the paraformaldehyde is depolymerized, repeat the steps above. In case the safety cabinet fan is working, use an auxiliary draught fan or air fan to accelerate circulation of the air in the safety cabinet or extend the time for sterilization beyond the time as proposed in Item p) below;
o) Disconnect the power supply of the heating plate and heater for paraformaldehyde;
p) Keep the safety cabinet at least 6 hours, favorably overnight (2h);
q) Prepare a neutralizer according to Step g) and electrify the heater containing ammonium bicarbonate and the safety cabinet fan until the ammonium bicarbonate has been completely dissipated. Same as operation on paraformaldehyde, after 25% of the ammonium bicarbonate has been decomposed, have the safety cabinet fan working for 10-15s; if the safety cabinet fan doesn't work, use an auxiliary draught fan or air fan to accelerate circulation of the air in the safety cabinet or extend the neutralization time for at least for 6h;
r) Keep the safety cabinet for at least 1 hour and then open the sealing film;
s) If a hose is used to drain the neutralized formaldehyde, tear open the plastic covering on the safety cabinet vent and connect the hose to the vent and seal it; if the hose can work properly, the plastic covering on the safety cabinet front window will be absorbed; cut one or two small holes (about 15×15cm) on such covering, so that fresh air can enter the safety cabinet, while the neutralized formaldehyde can be discharged from the vent hose of the safety cabinet;
Note: Other methods can be used to eliminate formaldehyde, only if such methods can remove formaldehyde safely and effectively.

Safety Labels and Safety Precautions

- When repairing and maintaimng your cabinet, take precautions not to inhale any chemicals or aerosols floating inside and outside the cabinet. They might be harmful to your health.
- If poisonous, radioactive or other harmful materials need to be used in the cabinet, the equipment should be located in a safe zone. Improper usage of the equipment with such materials may harm the environment or operators health .
- If the cabinet is not in use for a long period of time, make sure the power cord is unplugged. Deteriorated insulation of the power cord may lead to electric shock or fire .
- If the cabinet is not in use in an area without any supervision, please make sure children will not approach the cabinet and the glass door should be closed.
- If the glass is damaged, please do not use this caibinet to avoid UV light leakage .
- The replacement of any spare parts shall be conduct by technicians approved by manufacturer.
- The wastes of the cabinet need to be disposed by specialized personnel ,no arbitrary movement of it is allowed;or otherwise,events of kisd being shut in it may occur.
- Do not use any non manufacturer-approved electrical components in the cabinet.
- The appliance must be positioned so that the plug is accessible.
- The appliance must be placed on a solid and flat surface, or excessive vibration and noise may be produced when the appliance in operation.
- Do not climb on top of the cabinet or place any object on it .
- Do not use any hard objects such as nails and wires to explore any openings or gaps such as air ventilation ports.Accidental contact between a hard object and a moving part may result in electric shock or injury.
- Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.
- Do not use centrifuge、alcohol lamp in the working area .
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard .
- Ignoring this note may result in death or serious injury, and damage to the unit and property.

Safety Labels and Safety Precautions

Caution

- After restarting your cabinet from a power outage or shutdown ensure that all settings are correct.
- Before any repair and maintenance of the cabine please disconnect the power to avoid electric shock or injury to personnel.
- During any repair operations, gloves should be worn to prevent getting injured by sharp edges or corners.
- Hold firmly onto the handle to close the door to avoid pinching your hands.
- Do not tilt the cabinet more than 10 degree when moving the cabinet.
- When moving the cabinet, please be careful not to stumble with the cabinet which could cause injury to personnel and damage to the cabinet

Meaning of crossed out wheeled dustbin:
Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities.Contact you local government for information regarding the collectionsystems available.If electrical appliances are disposed of in landfills or dumps, hazardoussubstances can leak into the groundwater and get into the food chain, damaging yourhealth and well-being.When replacing old appliances with new ones, the retailer is legallyobligated to take back your old appliance for disposals at least free of charge.

Disinfection Instructions

d) If the safety cabinet has its waste gas exhausted indoors, you can seal its vent with a plastic tape;
e) To urgently eliminate, purify and neutralize the formaldehyde, you can put a hose near the safety cabinet in advance and connect it with a chemical smoke hood or other exhaust device suitable for discharging poisonous gas;
f) Put a heater (such as electric heating pan or remote control formaldehyde generator/neutralizer available in the market) on the workbench, set the temperature at 232-246℃ and spray paraformaldehyde evenly on the heating surface of the heater;

Note The autoignition temperature of polyformaldehyde is 300℃.

g) Put the neutralizer heater on the workbench and isolate the neutralizer (ammonium bicarbonate or its equivalent substitute) from the air in the safety cabinet before use. The following two examples illustrate how to achieve isolation from the air:
- Example 1: Spray ammonium bicarbonate or its equivalent substitute evenly on the heating surface of the heater and cover it with an aluminum foil to prevent the ammonium bicarbonate or its equivalent substitute from reacting with the formaldehyde during disinfection. Place the aluminum foil correctly so that there is no ammonia escaping during heating or prepare to remove the aluminum foil in a remote manner at the beginning of the neutralization stage. The technology for removal of aluminum foils should be so reliable that there is no risk for formaldehyde leaking out of the safety cabinet.
- Example 2: The safety cabinet should be sealed with glove-integrated plastic film. Put ammonium bicarbonate or its equivalent substitute in the container of the safety cabinet and then seal it well; during the neutralization stage, the purification operator can complete operations in the safety cabinet with no damage to the sealing system, take out the ammonium bicarbonate or its equivalent substitute from the sealed container and then spray it evenly on the heating surface of the heater and electrify the heater, so that ammonium bicarbonate or its equivalent substitute will be heated to give off ammonia;
h) Put a heating plate, a beaker with water and a hygrothermograph on the workbench of the safety cabinet, but never connect any electric wire to the power source in the safety cabinet;
i) Use thick plastic film and tapes to seal the front operation window of the safety cabinet. Seal all areas possible to suffer from leakage, such as around wire outlets and operation window as well as at the joint between the plastic film and the safety cabinet;
j) Measure the temperature and humidity in the safety cabinet;
k) The temperature should be above 21℃, with the humidity of 60-85%; use a heating plate to heat the water in the beaker so that it could reach the required temperature and humidity;
l) Before formaldehyde depolymerization, any entry into the area or room around the safety cabinet shall be strictly prohibited according to relevant regulations and safety measures. The principles for occupational exposure to formaldehyde in occupational safety and sanitary regulations require that the area in which the concentration of the formaldehyde spreading in the air exceeds the permissible exposure limit should be stipulated as a control area and should be indicated with signs and symbols, only with appropriate trainers' access. The current rules should be reviewed and followed;
m) Insert the electric wire of the heater into the socket outside the safety cabinet;

Disinfection Instructions

Purification treatment shall be made when daily maintenance, filter replacement and performance test is necessary for any contaminated part of the safety cabinet.

Before certification test and gas purification, all internal working faces and exposed outer surfaces should be disinfected with appropriate disinfectant. In addition, prior to certification test, a level-2 gaseous biosafety agent as designated should be used to disinfect the whole safety cabinet. If a safety cabinet has ever been working, a level-3 biosafety agent is recommended for disinfection. Such safety cabinets should be disinfected in advance before moved if potential biological factors may cause pollution and risks. In addition, the surface contaminated by overflowing and spattering reagents should be appropriately disinfected. In most cases in need of gas disinfection, depolymerized paraformaldehyde should be used as a disinfectant in the following procedures. Before any other alternative method is used for disinfection, we should follow the cyclic parameters of the safety cabinet and the effectiveness of such parameters. The material compatibility is related to degradation and absorption of an alternative detergent, as well as the key factor to maintain the integrity and necessary disinfection time of the safety cabinet. In some cases, these alternative methods are needed, for example: mitigation of disease viruses. The purification method can be determined by users and certification authorities. When paraformaldehyde is used for gas purification, clarify the regulated area, selected gas mask, protective facilities, corresponding testing, medical monitoring, harm communication and training, record storage and relevant contents, and then follow the steps below for further operations (Automatic formaldehyde gas purification/neutralization can replace such steps as follows):

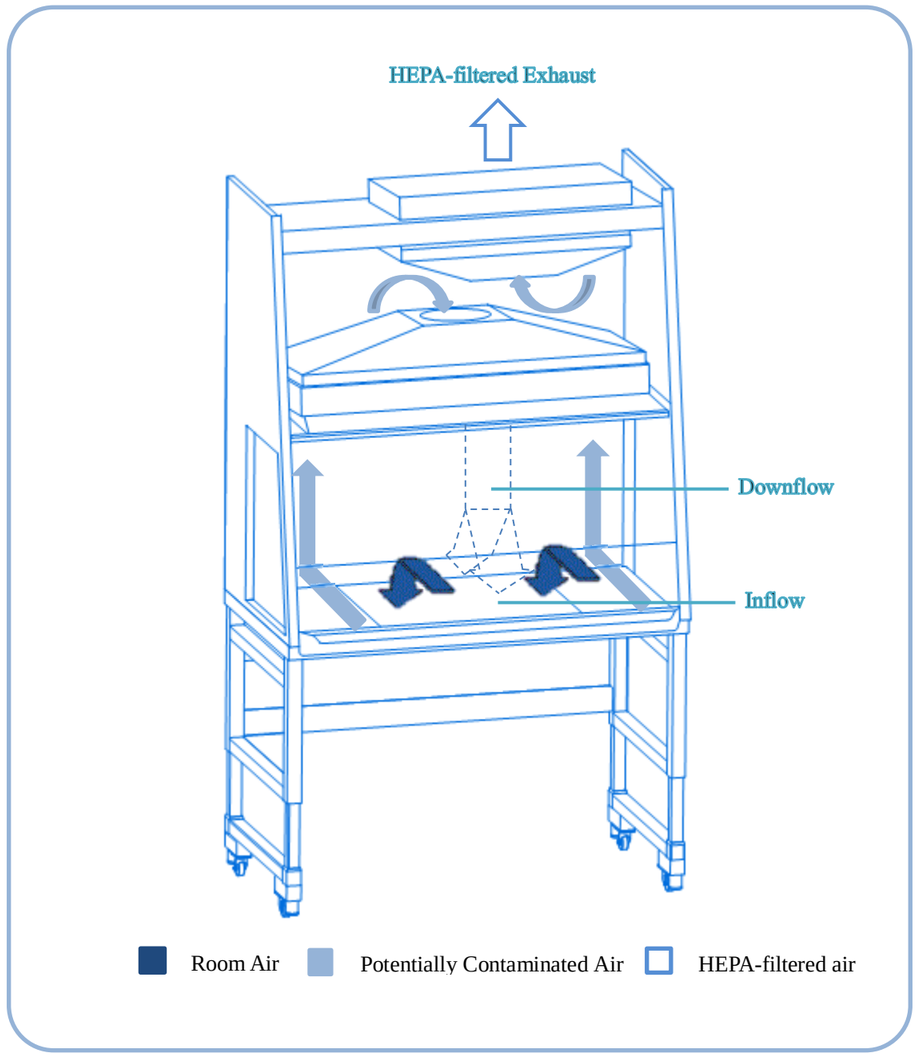
⚠ Note

Before disinfection, remove all hydrogen chloride from the safety cabinet, because it will produce a carcinogen - bis-chloromethyl ether (BCME) in the ambient air environment when there is formaldehyde in existence.

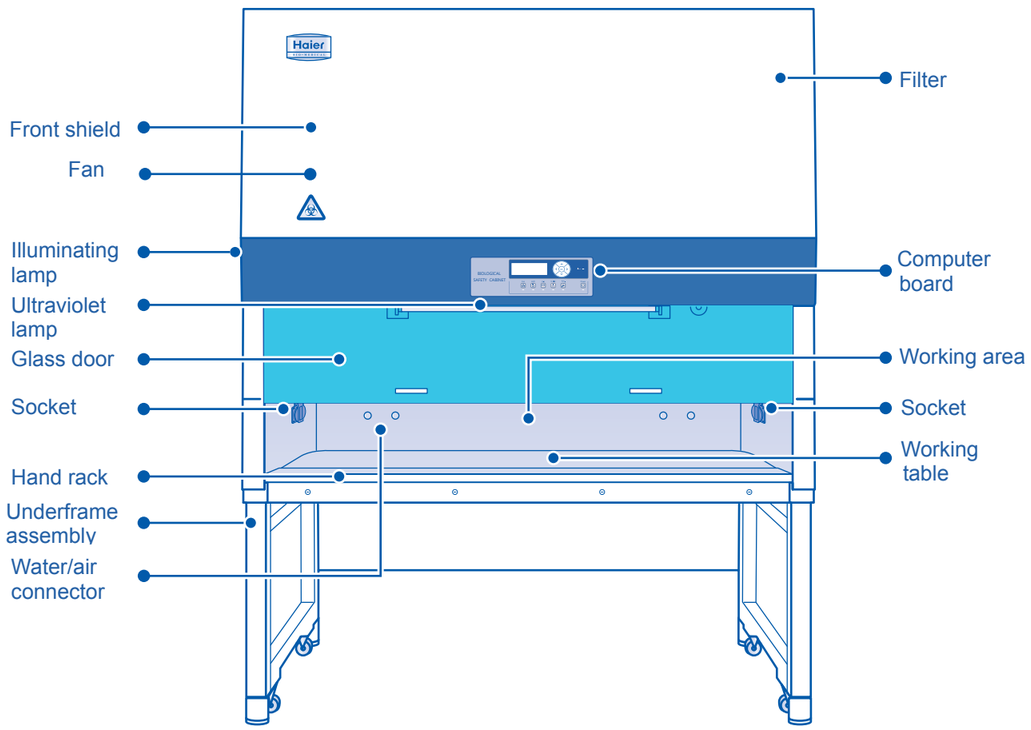
a) Multiply the height, width and depth of the safety cabinet to work out its total volume (about 1.8m³);
b) Multiply the total volume of the safety cabinet by 11g/m³ to determine the weight of paraformaldehyde as required. Determine the amount of ammonium bicarbonate or its substitute via chemometry and provide ammonia gas and formaldehyde for neutralization reaction. Prepare more ammonium bicarbonate (10% more) to ensure complete reaction;
Such agents as follows will be used for one-time disinfection of this safety cabinet:
Paraformaldehyde dosage: The concentration should be 40% as required, with 20ml used for per cubic meter of the volume.
Ammonia water dosage: The concentration should be 25% as required, with 14ml used for per cubic meter of the volume.
c) The safety cabinet must use airtight exhaust pipes. Its airtightness can be realized at the end of the pipe. If the exhaust pipe is longer than 3m, more paraformaldehyde should be used to match the increased volume. If the exhaust of the safety cabinet recirculates into the exhaust system of a building, disconnect the safety cabinet from the building system for sealing (plastic film and tapes can be used);

Product working principle

Working principle of The biological safety cabinet:



Product main structure



Static pressure cabinet body

The static pressure cabinet body, as an air filtration system, is the most important system to ensure the equipment performance. This part is mainly made up of a fan, a circular duct, a gas filter, and exhaust filter and a dust cover. See the schematic diagram for its ventilation mode.

The air filtration system mainly undertakes to supply continuous clean air (namely, vertical downward laminar flow) into the working chamber to ensure that the cleanliness is higher than Class 10 in the chamber body and secondly purify the effluent gas to prevent environmental pollution.

Working chamber

This part is mainly composed of stainless steel liner coaming, a removable tray and a dynamically balanced front glass window. The airflow through the front air inlet on the front window enters the internal circular duct to have the cleanliness higher than Class 10 in the working chamber, so that a clean environment could be provided for experiment operations.

Testing

6.4 Airflow fluctuation alarm

The safety cabinet must be competent for real-time display of the downflow and inflow velocities, which should be kept at ±0.025m/s of the measured downflow and inflow velocities and calibrated to the measured values, with the display resolution of at least 0.01m/s. When the downflow and inflow velocity fluctuates beyond ±20% of the nominal values, a sound and light alarm will be used to prompt the fluctuation of such velocity.

Testing

4.3.3 The measuring points should be kept at about 100mm from each other, close to but no less than 100mm away from the side of the front operation window, with the average of all measured values used to indicate the inflow velocity;
4.4 Results: The measurement results should comply with the requirements in 4.1.

5. Airflow mode

5.1 Requirements:
5.1.1 The airflow should be kept downward in the working area of the safety cabinet, free of air vortex, upward airflow or dead points.
5.1.2 There should be no air escape from the safety cabinet.
5.1.3 The airflow should be kept inward around the front operation window of the safety cabinet, with no air escape outside. The inflow air from the front operation window should not enter the working area.
5.2 Instrument: smoke generator and smoke agent, able to provide visual smoke
5.3 Method and results:
5.3.1 Downflow testing:
The smoke goes through the centerline of the countertop at 100mm above the top of the front operation window from one end to the other, with the results in line with the requirements of 5.1.1.
5.3.2 Test of inspection window airflow:
Have the smoke kept at 25mm behind the viewing screen and 150mm above the top of the front operation window from one end to the other, with the results in line with the requirements of 5.1.1 and 5.1.2.
5.3.3 Test of the airflow at the edge of the front operation window:
Let the smoke kept at about 38mm outside the safety cabinet and through around the whole front operation window, with special attention paid to corners and vertical edges. Moreover, the results should be in line with the requirements of 5.1.3.
5.3.4 Test of the sliding window airtightness:
Let the smoke through the sliding window from where it is 50mm away from the side walls and the working area of the safety cabinet, with the results in line with the requirements of 5.1.2.

6. Alarm and linkage system

6.1 Front operation window alarms:
When the safety cabinet front window has its opening height higher or lower than the nominal height of the front operation window, the sound alarm should be triggered, with the linkage system enabled. When the opening height has come back to the nominal height, the alarm sound and the linkage system should be able to stop automatically.
6.2 Linkage alarm of internal supply/exhaust fan:
When the safety cabinet has an internal draught fan and an exhaust fan at the same time, an interlock function should be provided. Once the exhaust fan stops working, the downflow supply fan will stop with the sound and light alarm enabled; once the downflow supply fan stops working, the exhaust fan will continue to work with the sound and light alarm enabled.
6.3 Exhaust alarm of Type-A2 safety cabinets
When a safety cabinet (Type A2) is connected with an exhaust hood and exhausting via its outdoor fan, then a sound and light alarm is used to prompt the exhaust air loss.

Product main structure

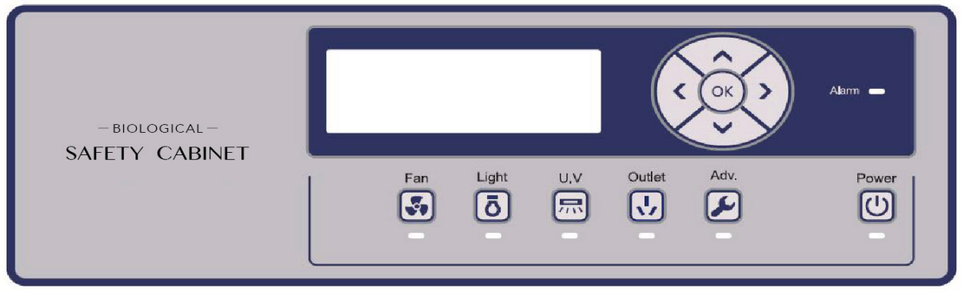
Negative pressure channel

The negative pressure channel is also a major system to ensure the performance of this equipment and Type A2 biological safety cabinet can exhaust indoors or outdoors. In time of outdoor exhaust, a dedicated exhaust hood should be used for connection.

The negative pressure channel mainly undertakes to protect the air curtain at the access opening on the front window and the airflow into the working chamber can sufficiently protect the safety of the operator and purify the effluent gas to prevent environmental pollution.

Product Functions

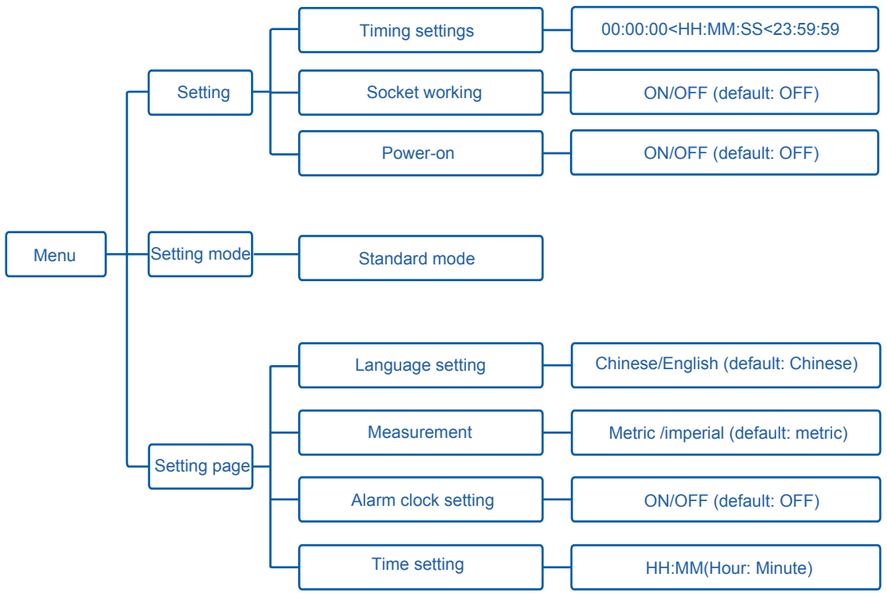
Control panel



(1) “Fan” button: Start/Stop the fan; enter/exit the safety and energy-saving function;
(2) “Light” button: Start/Stop the floodlight;
(3) “UV Lamp” button: Start/Stop the UV lamp;
(4) “Outlet” button: Control the cabinet socket ON-OFF;
(5) “Adv.” button: Start the function of setting;
(6) ↑button: Add 1, “>” shift up;Lift the glass door;
(7) ↓ button: Subtract 1, “>” shift down;;Descend the glass door;
(8) → button: Move the current option right and turn pages rightwards;
(9) ← button: Move the current option left and turn pages leftwards;
(10) “Power” button: Cabinet switch – Press and hold it for 2s to start/stop;
(11) “OK” button: Confirm settings, return to the original page and mute the alarm sound.

Menu options

Please refer to the operation flow chart for all menu options in the table below.

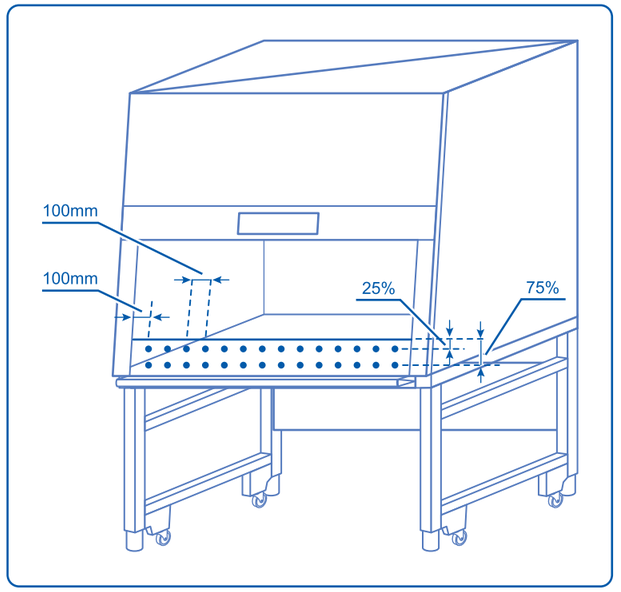


Testing

a) Have the measuring points distributed equidistantly at least in two rows (in each of which there should be 4 measuring points at least) to form square lattices ;
b) The distance should be 150mm from the test area boundary to the inner walls and front operation window of the safety cabinet.
Use a clamp to accurately position the anemometer probe at each measuring point for testing.
Record the measured values of all measuring points and work out the average according to such measured values.
3.4 Results: The measurement results should comply with the requirements in 3.1.

4. Inflow velocity

4.1 Requirement: The mean velocity of the airflow into the safety cabinet should be kept at ±0.025m/s of the nominal value. The flow should be no less than 0.1m3/s within one-meter width in the working area.
4.2 Instrument:
a) Thermal anemometer - Its accuracy should be ±0.015m/s or ±3% of the indicating value (whichever larger);
b) Anemometer probe clamp - It can accurately position the anemometer probe at each measuring point but have no impact on the airflow mode (for example, cyclic clips and clamps can be used).
4.3 Testing method:
4.3.1 Open the front window to the standard height;
4.3.2 Use a thermal anemometer to measure the airflow velocity at two rows of points on the front operation window plane and the first row is located at about 25% of the opening height below the upper edge of the front operation window while the second row is located at about 75% of the opening height below the upper edge of the front operation window;



Testing

d) Keep the photometer probe no more than 25mm away from the filter surface in the downstream of the filter, move it at the scanning rate slower than 50mm/s and have the probe scanning the whole downstream side of the filter and the edge of each combination filter (The scanning routes should be slightly overlapped). Check carefully around the filter periphery, along the joints between the filter and the frame as well as around the seals between the filter and other parts.

2.5 Results: The scanning results should comply with the requirements of 2.1.

3. Downflow velocity

3.1 Requirements: The safety cabinet downflow should have its average velocity kept at ±0.025m/s of the nominal value and the difference shall be no more than ±20% or ±0.08m/s (whichever larger) between the measured value and the average velocity of each measuring point.

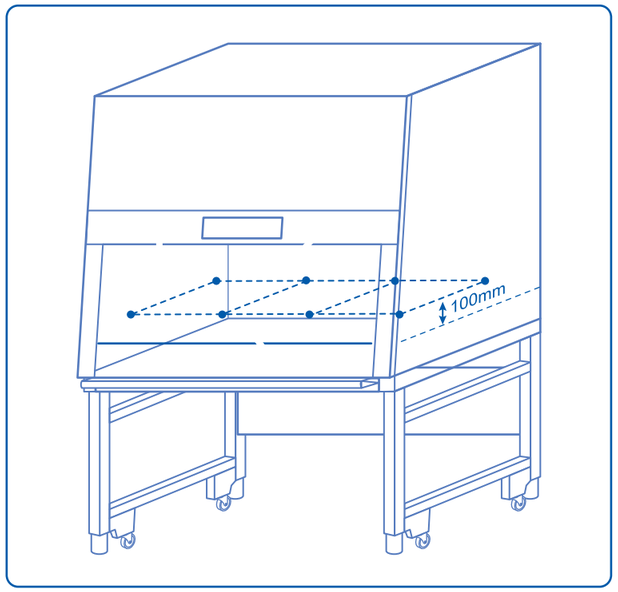
3.2 Instrument

a) Thermal anemometer - Its accuracy should be ±0.015m/s or ±3% of the indicating value (whichever larger) and it should be calibrated according to the manufacturer's instructions. When the air pressure and temperature at the measuring point deviates from the standard conditions listed on the thermal anemometer, correct it according to the correction factors as provided in the user manual of the thermal anemometer;

b) Anemometer probe clamp - It can accurately position the anemometer probe but have no impact on the airflow mode (for example, cyclic clips and clamps can be used).

3.3 Testing method:

Determine the position of the measuring point as follows on the horizontal plane 100mm higher than the upper edge of the front operation window above the working area and measure the velocity of the downflow across such plane at several points.



Product Functions

1. Setting

Users can use the setting menu functions for operation of the safety cabinet to meet specific application requirements and use the "→" button to control the setting menu.

1.1 UV lamp appointment time setting

UV lamp appointment:
＞1：00:00—00:00 ON/OFF
2：00:00—00:00 ON/OFF

On the standby page, users can use the "→" button to select the "UV Lamp Appointment" settings page for specific time operation settings; after the time setting is completed, select "ON", press "OK" to confirm it, and then the UV lamp appointment time settings are successful; moreover, such settings can be memorized and even if the equipment is started again after power failure, the appointment time will be the last setting.

1.2 UV lamp one-click appointment

Touch the "Setting" button and the "UV Lamp" button indicator starts to flash slowly, which indicates that the product appointment is successful. Touch the "Setting" button again and the "UV Lamp" button indicator goes out, which indicates that the product appointment has been cancelled. In case of successful appointment with the glass door fully closed, the UV lamp will light up automatically when the appointment time approaches but it will go out automatically at the end of the appointment time.

⚠ Note

If the appointment function has been enabled and the computer board detects that some other button functions have been enabled besides the "Power" button (which indicates that it is being used), then just when the appointment time approaches, the current appointment function will be invalid and the UV lamp will not light up, but the appointment instructions in time of standby will not disappear, the appointment function will still be valid in time of setting next day (namely, a 24-hour delay); later on, only if the appointment function is not cancelled, regular testing will be repeated every day when the appointment time approaches, and the UV lamp will light up if conditions are satisfied.

1.3 Timing settings

Timing settings
＞ Countdown: 00:00:00
Stopwatch: 00:00:00

Use the "→" button to turn pages, select "Timing Setting" and you can set the countdown and stopwatch, with the timing unit as follows: "Hours: Minutes: Seconds".

When the arrow is in the first line, directly the press the "OK" button to start countdown, press the "OK" button again to stop countdown and then press the "OK" button again to start countdown from the stop time last time.

Product Functions

When the arrow is in the second line, directly the press the “OK” button to start countdown, press the “OK” button again to stop countdown and then press the “OK” button again to start countdown from the stop time last time.

The zero clearing operation is to reset the time as 00:00:00.

When the countdown has terminated, it will be buzzing for 2s.

1.4 Setting of socket working time

Setting of socket working time
＞Socket SPC operation: ON/OFF
Socket working hours: 00:00:00
Remaining time: 00:00:00

Use the “→” button to turn pages, select “Socket Working Time Settings” and you can set the working hours of the socket in “Socket Working Time Settings”; when the socket SPC option is enabled, the display screen will be kept normally on within the last 30 seconds of the socket working hours.

1.5 Power-on password setting

＞Password protection: ON/OFF
Enter the original password: XXXX
Enter a new password: XXXX
Enter the new password again: XXXX
Back

On the “User Settings” page, click the “OK” button to enter the menu options and press the “↓” button to select the “Power-on Password Setting” option.

The factory default password is “0006”; please modify or cancel it as needed.

1.6. Automatic door (optional)

xxxx-xx-xx MON. 00:00
Downflown: XXXX m/s
Inflown: XXXX m/s
Filter life: XXXX%

Click the "∧" “∨”key to control the lifting of the glass door. When the door is closed, press the "∧" key briefly, and the glass door will automatically rise to the marked height. When the glass door is in the marked height position: ① press the "∧" key for a short time, the glass door will automatically rise to the highest position; ② When the glass door is in the highest position, press and hold the "∨",the glass door will decend(If you release the "∨" key during the descent, the glass door will stop descending; when you descend to the marked height, the glass door will also stop descending.). If equipped with foot switch, left and right pedals have the same function as “∧∨”key.

Testing

When the safety cabinet is newly installed, moved and checked annually, it is necessary to test the performance, airflow and interlocking alarm of the safety cabinet.

1. Visual testing

1.1 Requirements:

1.1.1 The cabinet surface should be smooth and regularly shaped, free of obvious scratches, rusty spots and indentation.

1.1.2 The explanatory texts and graphic symbols should be correct, clear, straight and solid enough.

1.1.3 The weld joints should be solid with smooth surfaces.

1.2 Testing method: Test by means of your eyesight and hand feeling; the results should comply with the above-mentioned requirements.

1.3 Results: The test results should comply with the requirements in 1.1.

2. Integrity of HEPA filter:

2.1 Requirement: The leakage rate should be less than 0.01% at any point of the filter able to be scanned for test. The leakage rate should be less than 0.005% at any point of the filter unable to be scanned for test.

2.2 Reagents:

Dioctyl-phthalate (DOP) or any equivalent liquid can produce aerosol particle liquid identical to DOP aerosol particles in size distribution, such as: poly alpha olefins (PAO), sebacate (2 - ethyl caproic ester), polyethylene glycol and drug-level light mineral oil.

2.3 Instrument:

The instrument as mentioned below is used to test HEPA filter integrity:

Aerosol photometer with linear or logarithmic scales – It can have the polydispersion aerosol particles with the concentration of 10μg/L DOP (or equivalent liquid) in the filter upstream airflow marked as 100%, able to detect 0.001% particles of the same aerosol; moreover, the photometer should be calibrated according to the instructions of its manufacturer; adjust the aerosol generator pressure to the minimum of 140 kPa and use DOP or equivalent liquid to generate aerosol. The generator nozzle should be immersed into the liquid no deeper than 25mm. The aerosol generator has its maximum range of 0-550kPa, with the resolution and accuracy of 7kPa. The generator pressure gauge has been calibrated by its manufacturer or can be calibrated in accordance with its manufacturer's instructions.

2.4 Method:

Follow the steps below to scan and detect the filter:

a) Enable the fan and lamp of the safety cabinet, remove the diffuser device and protection cover (if any) of the filter, lay the aerosol generator in place, lead the aerosol into the safety cabinet and generate equally-distributed HEPA filter upstream airflow according to the manufacturer's instructions. When the manufacturer has not provided the concrete inlet of the aerosol, the aerosols should be led in so that it could be equally distributed in the airflow of the safety cabinet;

b) Open the aerosol photometer and adjust according to the manufacturer's instructions;

c) Test the HEPA filter upstream airflow containing aerosol to confirm that the light scattering intensity of thus-concentrated aerosol should at least be equal to that produced by 10μg/L DOP;

- For a linear scale photometer (0-100 scale divisions), adjust its reading to 100;
- For a logarithmic scale photometer, adjust the reading of the upstream airflow concentration above 1×10^4 of the concentration corresponding to a scale division (use the instrument calibration curve);

Use

Precautions for use:

Note

Read this Manual carefully before using this equipment; any unauthorized use may result in damages to its protection.

Any large object placed in the working area of the biosafety cabinetry will hinder tits airflow and thus reduce its efficiency. For example, centrifuges, mixers and other electric devices are usually provided with cooling fans, which will cause damages to the airflow in the biosafety cabinetry. You'd better use a sealed safety cup in the centrifuge to facilitate sample feeding and discharging in the biosafety cabinetry.

Never use any alcohol lamp in the biosafety cabinetry, because its heat will damage its airflow and filter device, thus to cause leakage due to damages of the HEPA filter paper.

The UV light source can only be used to disinfect the countertop and internal environment, before which the countertop should be cleaned to remove the dust and dirt that may harm the disinfection effect. Ultraviolet (UV) is harmful to human body, so no test operation is permitted in the cabinet when the ultraviolet light is turned on (see the warning beside the UV lamp) to protect your skin and eyes against direct exposure to ultraviolet light.

Note

1.The total current provided by a socket shall be no more than 2A!
2.The waterproof socket can act only when its front cover is closed and it cannot be regarded as a waterproof socket when its front cover is open!

At the bottom of the working area is provided with a drain valve, which should be timely cleaned when cleaning the waste water or other waste liquid flowing into the countertop bottom; moreover, such waste should be subject to innocent treatment.

Product Functions

2. Mode settings

This safety cabinet has two modes: standard mode and energy-saving mode

2.1 Standard mode

The factory default setting is the standard mode, in which all alarm and linkage functions are enabled.

2.2 Intelligent mode

After entering the user settings page, you can select the intelligent mode in the mode options. In this mode, all alarms and interlock functions are enabled, and the declining air speed can be in a constant condition to realize the automatic adjustment.

3. Settings page

Press the "→" button to select the user settings; press the "OK" button and you can set some conventional options.

3.1 Language settings

This safety cabinet provides two languages: Chinese/English.

3.2 Measurement units

This safety cabinet provides metric and imperial display modes. The imperial units include: fpm (foot per minute) - wind speed, cfm (cubic foot per minute) - air volume and ° F (Fahrenheit) – temperature.

3.3 Alarm clock settings

Select "Alarm settings" in the menu and you can press "↑" and "↓" select the alarm time; except for the alarm page, when the alarm clock countdown ends, the buzzer will be buzzing for30s with the sound effect as follows: "Beep-beep……Beep-beep……" displaying 30s for "The alarm clock countdown ends" and you can press "OK" to restore the original page and cancel the buzzer within 30s.

3.4 Time settings

Use "↑" or "↓" to set hours and minutes. Properly set time will still be valid after the equipment is shut down.

3.5 UV lamp delay settings

Press "↑" or "↓" to adjust the time for "UV Lamp Delay Start" and you can set the delay start time of the UV lamp (3s by default); when the conditions are satisfied for operation of the UV lamp, press the "UV Lamp" button and the UV lamp will light up at the end of the set delay-time, during which the indicator will flash quickly.

3.6 UV lamp run time settings

Press the "↑" or "↓" button and select the "UV Lamp Run" time to set the UV lamp run time (30 minutes by default), when the glass door is completely closed, press the "UV Lamp" button to light up the ultraviolet lamp and after the run time ends, the UV lamp will go out automatically.

3.7 Settings of UV lamp service life

After a new UV lamp is used, you can reset the UV lamp service life in this option.

Note

The UV lamp run time setting refers to the run-time duration of the UV lamp after the "UV Lamp" button is pressed, and in the appointment mode of the UV lamp, such duration is determined by the time interval between its appointment ON and OFF time.

Product Functions

Alarm status	PieceAlarm conditions	Alarm page display
Alarm when the door is open with the fan disabled.	When the door is open ,disable the fan.	Please close the door.
Alarm when the inflow velocity is abnormal	When the inflow velocity exceeds the range as prescribed after the self-cleaning operation ends.	The inflow velocity is too high/low.
Alarm when the downflow velocity is abnormal	When the downflow velocity exceeds the range as prescribed after the self-cleaning operation ends.	The downflow velocity is too high/low.
Alarm when the filter is abnormal	The filter has its differential pressure greater than the setting on both sides.	Please check the filter for abnormality.
Alarm of filter service life	The differential pressure is within the setting on both sides of the filter.	The filter has its residual service life less than 10% and please contact for replacement.
Alarm of UV lamp service life	The UV lamp has its residual service life less than 10%.	The UV lamp has its residual service life less than 10% and please contact for replacement.
Alarm when the door height is abnormal	The door is not reliably closed in time of shutdown or the opening height of the door is not in conformity with provisions in time of startup.	The door height is abnormal and please adjust it.
Ambient temperature alarm	The ambient temperature exceeds the range as prescribed.	The ambient temperature is too low/high, so please adjust it.
Ambient humidity alarm	The ambient humidity exceeds the range as prescribed.	The ambient humidity is too low/high, so please adjust it.

Use

Booting steps

1. Switch on the power supply and then press the power button 2S for booting.
2. Raise the door and window glass to align the lower edge of the glass door to the door height marker line.
3. The safety cabinet will be running for self-cleaning until the prompt “In self-cleaning, wait a moment” has disappeared.
4. Clean the countertop and its inner walls of the safety cabinet.
5. Start experiment.

Shutdown steps

1. Take out all test items.
2. The safety cabinet will automatically run for 3 minutes.
3. Clean the countertop and its inner walls of the safety cabinet.
4. Close the front window glass and pull the door body to the bottom.
5. Press and hold the power supply button for 2S and then press the “OK” button to complete shutdown.
6. Cut off the power supply.

Steps for UV lamp settings

On the “UV lamp Appointment Settings” page, you can set the appointment function of the UV lamp. Press “↑” and “↓” for options between two groups of time periods respectively, press “→” or “←” to set the time in turn, and then press “OK” to complete the setting; press “OK” but the corresponding line is invalid after the appointment function is enabled and then the corresponding line will still be invalid if “Cancel” is selected; in the standby mode after the door is closed, if the UV lamp appointment time has been set, press the “Setting” button and the appointment function will start; the “UV lamp” indicator will flash slowly and press “Setting” again to cancel the appointment. If the setting time approaches, the UV lamp will light up automatically if conditions are satisfied to enable the UV lamp.

Note

1. Conditions to enable theUV lamp: The floodlight, front window glass and sockets are all closed but the power indicator is on.
2. If the appointment function has been enabled and some other and some other button functions have been enabled besides the Power button just when the appointment time approaches, then the current appointment function will be invalid, but the appointment indicator will remain in its original state and the appointment function will still be valid in time of setting next day (namely, a 24-hour delay).

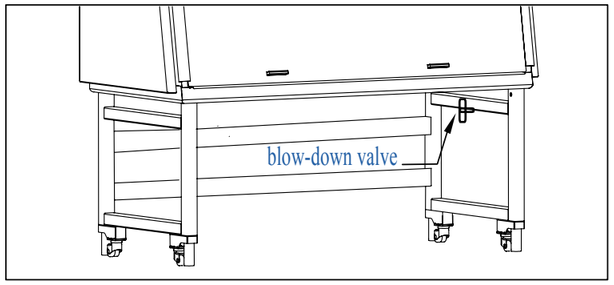
Installation blow-down valve of Bio-safety Cabinet

(HR1200-IIA2-S is not equipped)

1 After the base plate installation, the blow-down valve(screwed end) need to be winded with PTFE THREAD SEAL ;

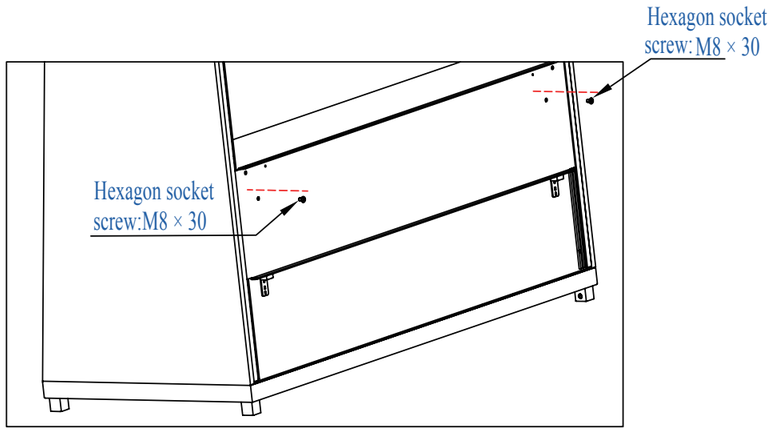
2 Aligning the drain outlet at the bottom left under the cabinet ,tighten the blow-down valve;

3 Keep the blow-down valve handle Parallel to the table to close the the blow-down valve .



Disassembly of counterweight bolt on Smart products

After installation, remove the hexagon screws, so that the glass door can be used normally.



Note

The equipment itself is rather heavy, so at least four people are needed for joint handling, during which you can contact its manufacturer without delay if any question. Moreover, different people are quite different in bearing strength, so try once before formal lifting to avoid risks.

1. Installation environment:

Environmental temperature: 5℃～40℃

Relative humidity: The maximum relative humidity is 80% when the temperature is lower than 31℃; the relative humidity will have a linear drop of 50% when the temperature is 40℃;

Atmospheric pressure: 70~106 kPa

Power supply: 220-240V~, 50/60Hz

2. Installation site:

●For indoor use;

●The safety cabinet should be located far away from channels as well as room airflow that may damage the isolation layer produced by the air barrier at the operation window. The laboratory windows (if any) should be closed at all times and the safety cabinet should not be placed at any airflow inlet, in order to prevent air blowing through the front operation window or towards the exhaust gas filter.

●If permitted, a 30cm clearance should be reserved at the back of and around the safety cabinet for cleaning; if not permitted, a minimum clearance of 8cm and 20 cm should be reserved at each side and the back respectively for cleaning of the safety cabinet. Relevant power sockets can be kept as close as possible to facilitate maintenance but not necessarily move the safety cabinet for testing of electrical safety.

●Never put the equipment beyond easy disconnection of its breaker.

3. Installation suggestion:

The Type-A2 products are designed with airflow forced back to the laboratory but usually not discharged outside. It is critical that there should at least be a clearance of 8cm reserved between the top vent and the ceiling. Moreover, there should at least be a space of 30cm reserved between the top vent of the safety cabinet and the ceiling.

The Type-B2 products are designed with airflow discharged outside but not forced back to the laboratory. The laboratory design should ensure adequate supply air and the discharge pipelines should not be kept too long. It is suggested that the safety cabinet should use its own dedicated exhaust system, free of connection to any public exhaust channel before manufacturer’s approval.

When necessary, 100% exhaust gas before discharged into the atmosphere should first go through the exhaust system connected by means of a dedicated exhaust hood. Moreover, hard connection is not permitted between any Type-A2 safety cabinet and the exhaust system.

The anchor ground for a biosafety cabinetry should be free of obvious subsidence, bending and other forms of deformation when subject to a 400kg pressure.

Any socket for the safety cabinet should have its current no less than 10A and must be well grounded but not shared with any other electrical appliance.

If any water or gas pipeline is needed, relevant connectors should be reserved indoors; the pressure should meet the use requirements of the safety cabinet (no higher than 0.2MPa and 0.1MPa for water and gas pipelines respectively) subject to permissions of Haier after-sales service departments.

Installation

Installation steps:

Note Please read this manual carefully before installing the equipment.

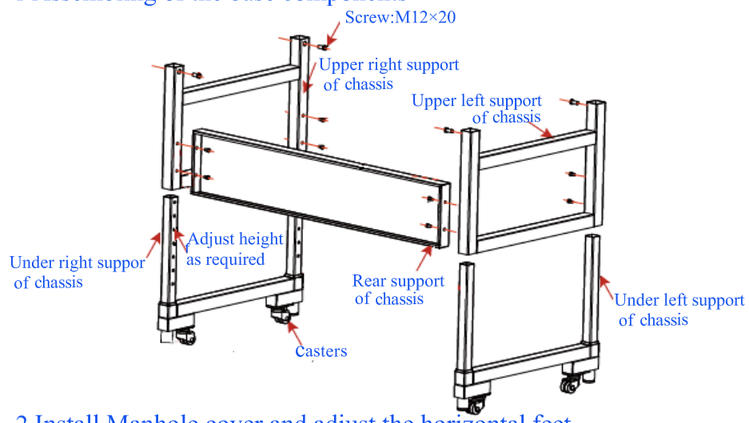
1. Open the packing and check the hardware equipment according to the packing list to ensure that there is no loss or damage during transportation.
2. Place the safety cabinet appropriately in the laboratory and remove the outer packing of the product.
3. Open the chassis packing for assembly according to the instructions for chassis installation and horizontal debugging as shown in the figure:
4. Before lifting the cabinet body, you must adjust the four chassis anchors against the ground in order to have the chassis kept stable during installation; never move it at will so that possible security hazards could be avoided; while lifting the cabinet body, never put your hand between the chassis and the cabinet body, in order to prevent injuries.
5. Finally install the cabinet body in place on the chassis.
6. Assemble the drain valve in place according to the instruction requirements.
7. Remove the screws on the back (see Instructions for Chassis Installation).

Installation

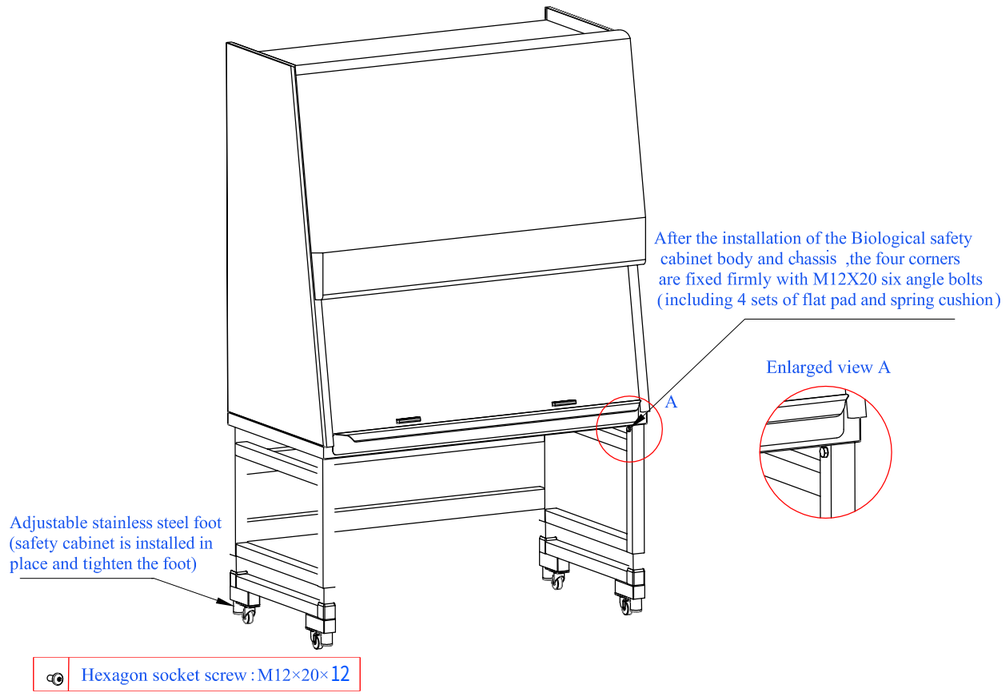
If the safety cabinet is equipped with a underframe, follow these steps to assemble.

Biological safety cabinet underframe component installation horizontal feet debugging

1 Assembling of the base components



2 Install Manhole cover and adjust the horizontal feet



Note

In order to ensure the safety of biological safety cabinet ,all screws must be tightened.