Haier

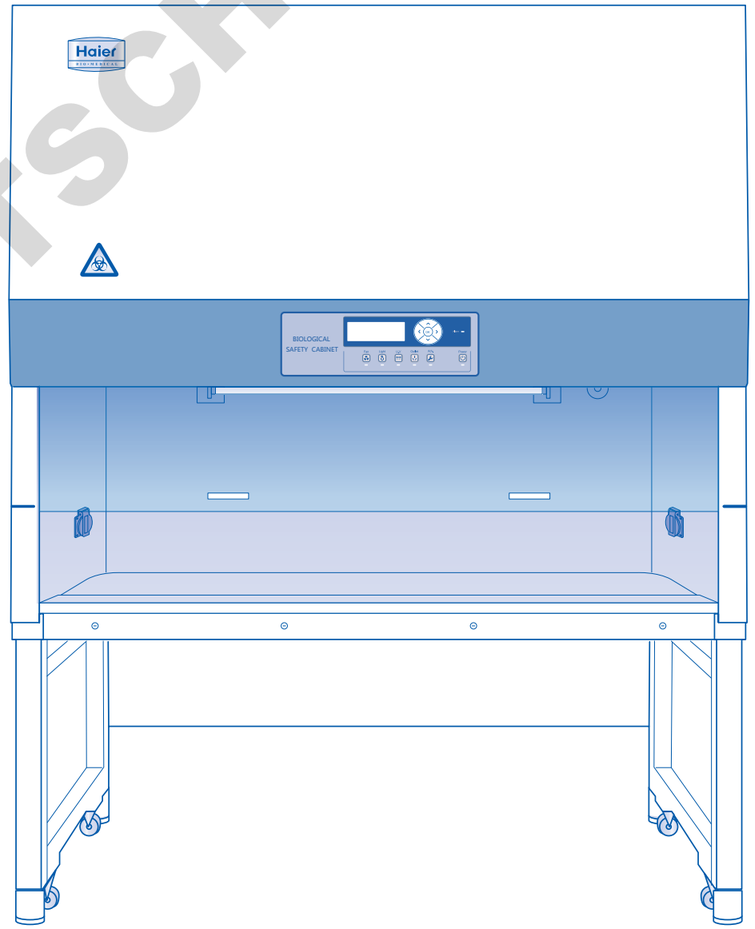
Biological Safety Cabinet

Operation Manual

Certicate of Quality

Checker:

Qingdao Haier Biomedical Co.,Ltd.
Address: Haier Industrial Park, Economic Technology Development Zone, Qingdao P.R. China
Web:www.haiermedical.com
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Model:
HR900-ⅡA2
HR900-ⅡB2
HR1200-ⅡA2
HR1200-ⅡB2
HR1500-ⅡA2
HR1500-ⅡB2

- 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.

DOMINIQUE DUTSCHER SAS

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Technical Data-Packing List

Packing list

Due to continuous improvements, we may change the design without issuing a notice. Thank you for your understanding.

S/N	Category	Description	Unit	Quantity	Remarks
1	Document	Instruction Manual	Copy	1	A2, B2
2	Document	Confirmation Book for Installation and Commissioning	Copy	1	A2, B2
3	Document	Delivery Inspection Report	Copy	1	A2, B2
4	Document	Instruction Manual for Underframe Assembly	Copy	1	A2, B2
5	Accessory	Packaging bag for Instruction Manual	Nr.	1	A2, B2
6	Accessory	Hand rack	Nr.	1	A2, B2
7	Accessory	Hand rack fastening screw	Nr.	4	A2, B2
8	Accessory	Metal scouring pad	Piece	1	A2、B2 (Used for stainless steel polishing and rust removal)
9	Accessory	Wrench	Piece	1	A2, B2
10	Accessory	External exhaust fan	Set	1	Optional for B2
11	Accessory	External exhaust fan rack	Set	1	Optional for B2
12	Accessory	Expansion bolt	Nr.	4	Optional for B2
13	Accessory	External exhaust pipe	Nr.	1	Optional for B2
14	Accessory	Faucet assembly	Set	2	Optional for A2, B2
15	Accessory	External exhaust hood	Set	1	Optional for A2
16	Accessory	External exhaust pipe	Nr.	1	Optional for A2
17	Accessory	Fastening screw (M6 × 15)	Nr.	8	Optional for A2

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Technical Data-Packing List

Technical Data

Product model		HR900-IIA2	HR1200-IIA2	HR1500-IIA2
Level and type		Level II Type A2	Level II Type A2	Level II Type A2
Dimension (L×W×H)		1080×780×2160	1380×780×2160	1680×780×2160
Dimension of working area (L×W×H)		920×620×650	1220×620×650	1520×620×650
Air exhaust filter Specification /Quantity		360×486×69 /one	360×786×69 /one	360×1086×69 /one
Air supply filter Specification /Quantity		448×897×69/one	448×1197×69/one	448×1497×69/one
Downflow rate	Standard mode	0.33m/s	0.34m/s	0.31m/s
	Energy-saving mode	0.30m/s	0.31m/s	0.28m/s
Inflow rate	Standard mode	0.55m/s	0.55m/s	0.55m/s
	Energy-saving mode	0.52m/s	0.52m/s	0.52m/s
Power supply		AC220V/50Hz	AC220V/50Hz	AC220V/50Hz
Overall power		1400VA	1500VA	1300VA
Fan power		335W	475W	650W
Rotating speed of fan		480 r/min	560 r/min	1150r/min
Net weight		290kg	320kg	350kg
Product model		HR900-IIB2	HR1200-IIB2	HR1500-IIB2
Level and type		Level II Type B2	Level II Type B2	Level II Type B2
Dimension (L×W×H)		1080×780×2215	1380×780×2215	1680×780×2215
Dimension of working area (L×W×H)		920×620×650	1220×620×650	1520×620×650
Air exhaust filter Specification /Quantity		360×486×117 /one	360×786×117/one	360×1086×117/one
Air supply filter Specification /Quantity		448×897×69/one	448×1197×69/one	448×1497×69/one
Downflow rate	Standard mode	0.31m/s	0.31m/s	0.31m/s
	Energy-saving mode	0.28m/s	0.28m/s	0.28m/s
Inflow rate	Standard mode	0.55m/s	0.55m/s	0.55m/s
	Energy-saving mode	0.52m/s	0.52m/s	0.52m/s
power supply		AC220V/50Hz	AC220V/50Hz	AC220V/50Hz
Overall power		1950VA	1950VA	1700VA
Fan power		335W	335W	490W
Rotating speed of fan		480r/min	480 r/min	1100r/min
Net weight		280kg	310kg	340kg

Product Characteristics

1. Safety system

Various failure alarms (air speed anomaly alarm, filter life alarm, glass door misplacement alarm and ultraviolet lamplife alarm).
Two alarm modes (buzzing alarm and flashing lamp alarm).
Unique electric leakage protection design.

2. Air duct system

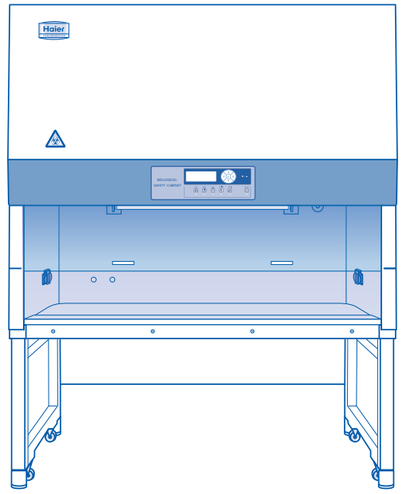
The working area is in molded structure made of high-quality stainless steel and is highly resistant to corrosion.
The side plate and liner panel form a negative pressure passage. This design structure substantially reduces the internal flow resistance inside the cabinet; therefore the operating area is subject to a negative pressure to prevent any contaminated aerosol from leaking out.

3. Control system

The high-performance forward centrifugal fan with specialized structure design operates at a high efficiency to achieve an optimal balance between the performance and energy consumption.
The two-channel digital differential pressure transducer and high-precision air speed sensor monitor the operating status of the safety cabinet and the life of the filter in real time. The intelligent adjustment of the fan rotating speed guarantees the downflow rate and inflow rate within the working area are as specified.

4. User-friendly design

The ultraviolet lamp reservation function helps users improving work efficiency.
The illuminating lamp is installed inside the front shield to protect human eyes from exposure to direct light.
If the filter life is less than 10%, an alarm will be triggered to remind the user to replace the filter.
The concave working table can trap the waste liquid and facilitate the cleaning and disinfection operation.



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Product Presentation

Dear Haier Customers,

The Haier biological safety cabinet is designed with a ultra-low penetration air filter (ULPA). The filtration efficiency is higher than 99.999% at 0.12 ym. The work space cleanliness is higher than Class 10. We hope our product will provide a reliable safe environment for you.

The biological safety cabinet is to create an experimental environment that involves microbiological operation. The unit performs with high efficiency to provide safety for personnel, experimental objects and work environment. The negative pressure air curtain at the opening of the biological safety cabinet prevents contaminated aerosol from leaking out and harming personnel. The vertical one-way airflow filtered by the ULPA supplies the experimentation with clean airflow betterthan Class 10, so as to protect the experiment objects. The exhaust gas from the ULPA already has the microorganisms and dust adequately filtered, so as to protect the environment.

The design, manufacture and testing of the biological safety cabinet of Haier completely comply with the industrial standard Biological Safety Cabinet (YY0569-2011) and also take into account the USA standard Class II (Laminar Flow) Biological Safety Cabinet (NSF/ANSI49-2009), the European standard Performance Criteria for Biological Safety Cabinet (EN12469-2000) and Australian standard Class II Biological Safety Cabinet –Design(AS 2252.2-2009).

Biological safety cabinet is extensively applied in research, education, clinical examination and production concerning microbiology, biomedical science, genetic recombination and biological products. It is the most basic protection equipment in the primary protection system for biological safety in a laboratory. It provides a sterile, dustless and mobile work environment for health care, pharmacy and scientific research.

This product is based on a negative pressure ventilation cabinet consisting of a ULPA and a negative pressure chamber and it is intended to protect the experiment operator, experiment environment and experiment materials and to prevent the infection and attack by the aerosol generated by the hazardous biological factors.

Thank you.

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Solution to FAQ

Note

Please carefully study the circuit diagram before equipment circuit inspection and maintenance which can only be done by personnel with professional training and maintenance qualification.

The following problems belong to normal phenomena instead of failures:

Q1: Why my safety cabinet doesn't work?

Phenomena	The safety cabinet doesn' t work.
Solution	• Check whether the power supply socket is working normally. • Check whether the plug is loosened

Q2: Why the ultraviolet lamp doesn't start up?

Phenomena	The ultraviolet lamp doesn' t start up.
Solution	• The illuminating lamp can start up only if the door is closed and the fan, florescent lamp stop working, so please check whether it meets all the premises. • The delay start has not timed up.

Q3: Why the filter alerts for insufficient lifespan.

Phenomena	The filter alerts for insufficient lifespan.
Solution	It' s a normal phenomenon, and you can contact the supplier for replacement or still use it within short time.

Q4: Why does the door alert for abnormal height?

Phenomena	The door alerts for abnormal height.
Solution	It' s a normal phenomenon, and you can relieve the alarm by adjusting the door to a specified height.

Q5: Why the equipment alerts for abnormal airflow?

Phenomena	The equipment alerts for abnormal airflow.
Solution	• The power supply is in abnormal condition. • The air volume exhausted by the laboratory is not enough to run the equipment. • The air outlet is blocked. • The air inlet is blocked. • The air speed sensor is blocked or interfered by other airflow.

Q6: Why the equipment alerts for ambient temperature and humidity?

Phenomena	The equipment alerts for ambient temperature and humidity.
Solution	Improve environment in the laboratory or modify alert settings.

Maintenance

Repair work

Note

1. The repair work for this equipment can only be taken by technicians trained and authorized by Haier.
2. If a failure cannot be immediately resolved by an operator, please report the problem to the Maintenance Department. For your safety, do not attempt to repair the unit by yourselves.
3. Do not replace any component in the equipment without Haier's approval. Consult with Haier technical service department should there be a need to replace components. Please have the model number and serial number ready when you contact Haier's technical service.

Note Special attention:

please disinfect the cabinet interior thoroughly before you open any panel!(see Warnings on the panel)

1. Replacement of electrical component

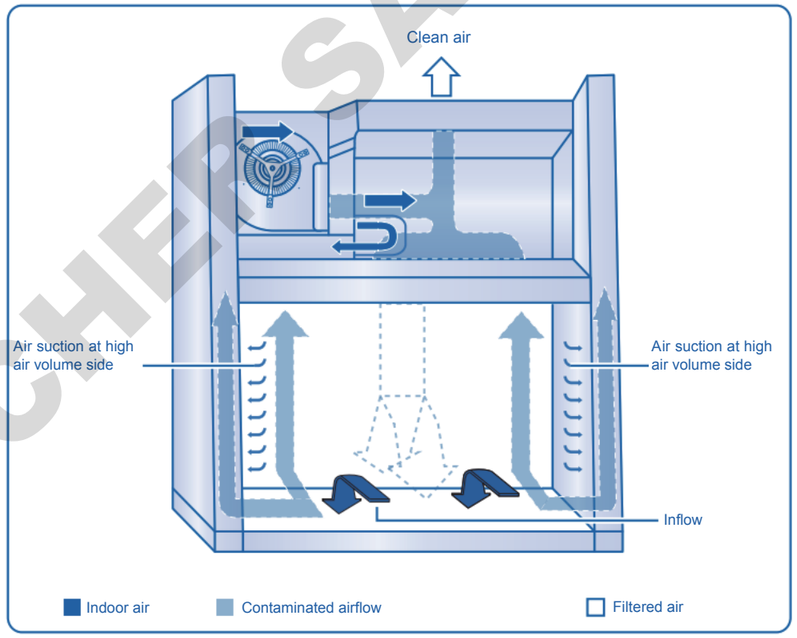
(a) Power off the unit before any service operation is performed.
(b) Replacement of illuminating lamp and ballast should be performed by a qualified electrician.
(c) You can open the control panel when repairing electrical components.
(d) As the power line provided with the product has function in electric leakage protection (the total amperage of the power line is 10A, and the power line plug will automatically outage if the amperage is over 10A), please don't use or replace it with power line of other types.

2. Replacement of air filter

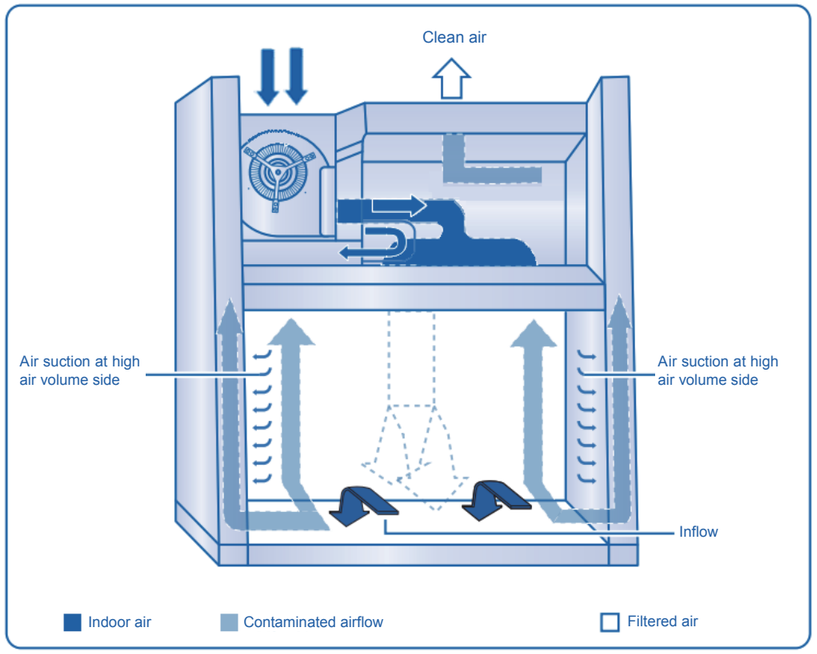
a) Replacement of air filter requires serious attention. Careless work can lead to pollution. Applicable laws, regulations, standards and rules must be followed. It is extremely important to understand features of the unit before any repair work is performed.
b) Replacement of air filter must be performed by a Haier trained technician.
C) Please only use air filters approved by Haier to avoid unknown risks.

Working Principle of the Product

The working principle scheme of the safety cabinet is shown below:
Working principle scheme of A2 biological safety cabinet:

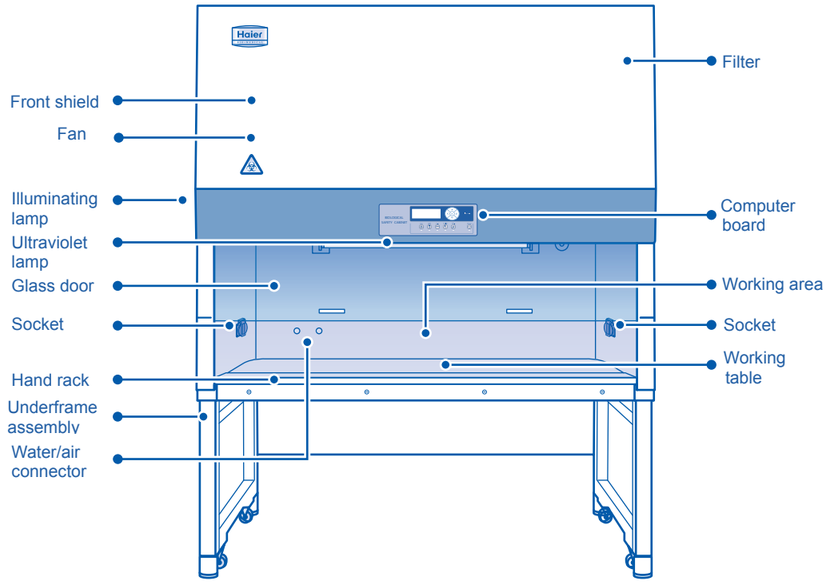


Working principle scheme of B2 biological safety cabinet:



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Primary Structure of the Product



Static pressure chamber

• The static pressure chamber, i.e. the air filtration system, is the most important system that enables the function of this equipment. This system consists of the fan, circulating air duct, air supply filter and exhaust filter. Its air circulation process is shown in the working principle scheme.

• The primary function of the air filtration system is to constantly supply clean air in the form of vertical downward laminar flow to the work room, where the cleanness of the air in the working chamber is better than Class 10; in addition, this system also cleans the exhaust gas to prevent environmental pollution.

Working chamber

• This system consists of the stainless steel liner panel, movable tray and dynamic-balance front glass window. Airflow enters via the air inlet at the front window into the internal circulating air duct; the cleanness of the working chamber is better than Class 10, which provides a clean experiment environment.

Negative pressure passage

• The negative pressure passage is also an important system to fulfill the function of this equipment. The A2 biological safety cabinet can deliver air to both inside and outside of the room. A special exhaust hood must beused for air delivery to outside.

• The negative pressure passage of B2 biological safety cabinet consists of the exhaust filter, exhaust pipeline and air exhauster. Its air circulation process is shown in the working principle scheme.

• The function of the negative pressure passage is to provide an air curtain at the front window operation port so that the airflow delivered into the work room is safe enough for the personnel; besides, it also cleans the exhaust gas to prevent environmental pollution.

Maintenance

Note

The operating condition of this equipment can only be guaranteed when proper inspection and maintenance are performed.

Comprehensive maintenance period

- Maintenance work should be done annually (or every 1000 working hours) and after each time of restart. Because the maintenance schedule is heavily dependent on usage, please keep a record of the actual operating time of the equipment for the purpose of maintenance schedule.
- The magnetically controlled switch is used to control linkage protection, in which the magnet, serving as a key component to determine the switch motion, shall be replaced with new ones every 5 years to guarantee its effect.

Recommended maintenance method

1. Cleaning

Generally speaking, you only need to use light detergent water for cleaning. Use a cloth to wipe the equipment.

2. Daily or weekly cleaning when using the equipment

(a) After an operation, keep cabinet working for 5 to 10 minutes. This operation will allow the remnant aerosol to be captured by the air filter.

(b) Use medical alcohol for disinfection and clean the workshop.

(c) Use medical alcohol for disinfection and cleaning of the operation panel.

(d) Use flexible detergent or glass-dedicated detergent to clean the external surface and the glass of the cabinet.

(e) Inspect each function of the equipment as per the Instruction Manual.

3. Monthly cleaning

(a) Use detergent to clean up all dust on the external surface.

(b) Disinfect the interior of the equipment.

(c) Take inspection for equipment functions and its security in general operations.

4. Annual maintenance

Take comprehensive inspections for equipment security and do corresponding maintenance work.

(a) Inspect for tightness of the front glass door drive device.

(b) Check and replace the ultraviolet lamp tube.

(c) Test product performance.

(d) Record this maintenance.

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Disinfection Instruction

(l) Before depolymerizing the formaldehyde, strictly restrict the access to the areas or rooms around the safety cabinet according to the relevant regulations and provisions of security measures. Areas with the formaldehyde concentration in the air exceeding the permissible exposure limits shall be regarded as the control areas as required in the guidelines for occupational exposure to formaldehyde of the occupational safety and health regulations. Mark the areas with signs and symbols, and only properly trained personnel canget in these areas. Reexamination must be conducted, and all operations must follow the existing provisions.

(m) Plug the electric wire of the heating device in the socket out of the safety cabinet.

(n) After depolymerizing the formaldehyde with the concentration of 25%, turn on the safety cabinet fan, and keep it running for 10-15s. After depolymerizing the paraformaldehyde with concentration of 50%, 75% and 100%,repeat the preceding steps. In case of the safety cabinet fan not working, use auxiliary fan or fan to promote air circulation in the safety cabinet, or extend the disinfection time to exceed the time recommended in item p) below.

(o) Cut off the power supply of the heating plate and heating device used for the paraformaldehyde.

(p) Maintain the safety cabinet in state for at least 6 hours, and preferably overnight (2h).

(q) Prepare the neutralizer following step g), and energize the heating device containing ammonium bicarbonateand safety cabinet fan, until the ammonium bicarbonate is dissipated up by heating. The operation is the same as that for paraformaldehyde, after decomposing the 25% ammonium bicarbonate, turn on the safety cabinet fan,and keep it running for 10-15s. In case of the safety cabinet fan not working, use auxiliary fan or fan to promoteair circulation in the safety cabinet, or extend the neutralization time for at least 6h.

(r) Maintain the safety cabinet for at least 1 hour to open the sealing film.

(s) For the formaldehyde drained and neutralized by using the hose, pull apart the plastic mulch on the safety cabinet vent, connect the hose to the vent and seal it. If the hose works normally, the plastic mulch on the safety cabinet front opening will be sucked in. Make one or two small opening (about 15× 15cm) on the plastic mulch on the safety cabinet front opening to let the fresh air enter the safety cabinet, and the neutralized formaldehyde is discharged through the hose of the safety cabinet vent.

Hint: Other formaldehyde elimination measures can be adopted, only if these measures can help to eliminate theformaldehyde safely and efficiently.

Product Installation

Installation environment:

Ambient temperature: 5°C~40°C

Relative humidity: 80% relative humidity if temperature is lower than 31°C
relative humidity reduces linearly by 50% if temperature is 40°C

Atmospheric pressure: 70~106kPa

Power supply: 220V, 50Hz±1Hz

Installation place:

- Indoors
- The safety cabinet shall not be installed in any passage way and must be far away from any indoor airflow that may damage the isolated layer generated by the air barrier at the operation port. The window (if any) of the laboratory must be constantly closed; the safety cabinet shall be far away from the airflow inlet so as to prevent airflow passing through the front operation port or flowing to the exhaust filter.
- If there is enough space, the perimeter of the safety cabinet shall maintain 30cm clearance for cleaning purpose; if not, each side shall maintain at least 8cm clearance and the rear 20cm clearance for cleaning purpose. The power socket can be close to the safety cabinet to make it easy for maintenance and to perform electrical safety test without moving the safety cabinet.
- Do not install the equipment in a place where it is hard to access the disconnecting device.

Suggestions for installation:

- The A2 model is designed to circulate airflow back to the laboratory and airflow is usually not going outdoors. It is imperative that spacing between the top vent and ceiling must be at least 8cm. The spacing between the top ventand ceiling must be at least 30cm.
- The B2 model is designed to deliver air to outdoors and not to the laboratory. The laboratory must be designed to have adequate supplementary and the exhaust pipeline should not be excessively long. It is recommended that the safety cabinet is integrated with a dedicated exhaust system. A public exhaust system can not be connected to this equipment unless such connection is approved by the manufacturer.
- In case of air delivery to the atmosphere, the airflow must 100% pass through the exhaust system which is connected with a special-purpose exhaust hood. The A2 safety cabinet can not have hard connection with the exhaust system.
- The ground to accommodate the biological safety cabinet must be able to sustain 400kg pressure without noticeable subsidence, bending and any other deformation.
- The power socket for the safety cabinet is able to carry at least 10A electric current and the cabinet shall not share the socket with any other electric appliance
- To connect any water or gas pipeline, the room must reserve a connection which can sustain the pressure required for the safety cabinet: for water pipeline, ≤ 0.2MPa and for gas pipeline, ≤ 0.1MPa. Such connection must be informed to the After-sale Service Department of Haier.

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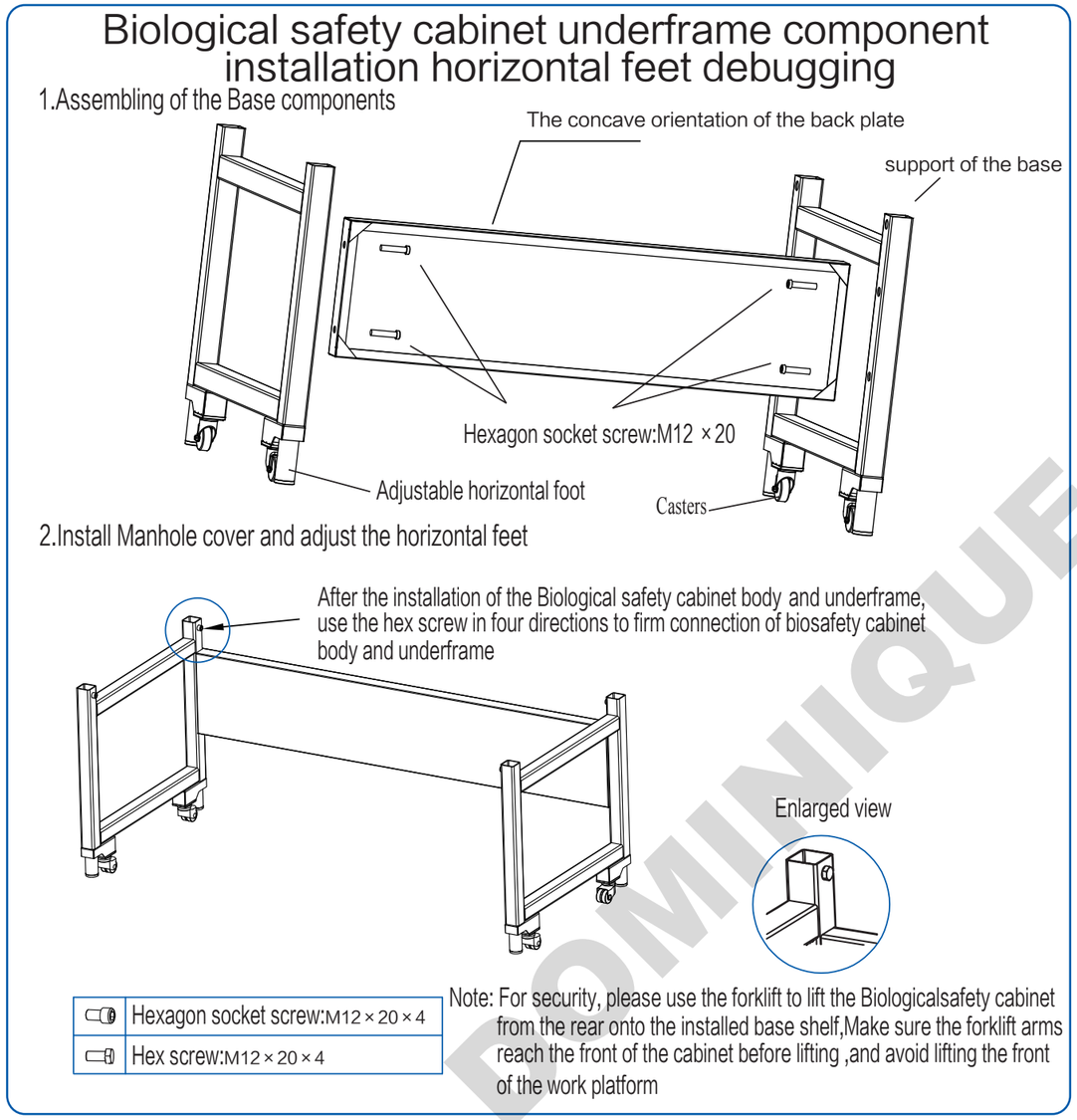
Product Installation

Installation steps:

Note Please read this manual carefully before installing the equipment.

1. Open the package, check the hardware against the packing list and make sure no part has been lost or damaged during transportation.
2. Place the safety cabinet at a proper position in the laboratory and remove its external package.
3. Open the under frame package and assemble the equipment as per the base installation and levelness calibration manual.

See the picture:



Disinfection Instruction

(d) If the exhaust of the safety cabinet is released into the room, seal the vent by using the plastic tape.

(e) In order to exclude the formaldehyde in emergency, eliminate the neutralized formaldehyde after purification and neutralization. A hose can be placed near the safety cabinet in advance, which shall be connected to the chemicalsmoke hood or other exhaust device which is applicable for exhausting toxic gases.

(f) Place the heating device such as the purchasable electric heating frying pan, or remote control formaldehyde generator/neutralizer on the working table, set the temperature to 232-246° C, and spray the paraformaldehyde evenly on the heating surface of the heating device.

Hint:The auto-ignition temperature of the paraformaldehyde is 300° C.

(g) Place the heating device used for the neutralizer on the working table as well. Isolate the neutralizer (ammoniumbicarbonate or the equivalent) from the air in the safety cabinet before using it. The following two examples show how to implement air isolation.

Example 1: Spray the ammonium bicarbonate or its alternative evenly on the heating surface of the heating device, and cover it with the aluminum foil to prevent the ammonium bicarbonate or its alternative from reacting with the formaldehyde during the disinfection. Place the aluminum foil in a way allowing the ammonia to escape when heating the device, or prepare to remove it through the remote control at the beginning of the neutralization stage. The hazardous situation of leaking the formaldehyde out of the safety cabinet is not allowed when using the aluminum foil removing technique.

Example 2: Seal the safety cabinet and gloves by using a whole plastic film. Put the ammonium bicarbonate or the equivalent in a container, and seal it. In the neutralization stage, when the purification personnel put hishands into the safety cabinet with the gloves on, the sealing system shall not be destroyed. Take out the ammonium bicarbonate or the equivalent from the sealed container, spray it evenly on the heating surface of the heating device, energize the heating device, and the ammonium bicarbonate or the equivalent will give off ammonia when heated.

(h) Place the heating plate, beaker with water and hygrothermograph on the working table of the safety cabinet, and avoid connecting electric wires to the internal power supply of the safety cabinet.

(i) Place the heating plate, beaker with water and hygrothermograph on the working table of the safety cabinet, and seal the front window operation port of the safety cabinet by using the thick plastic film and plastic tape. Seal all areas with possible leakage, such as the wire outlet, areas around the operation port and junctions of the plastic film and the safety cabinet.

(j) Determine the temperature and humidity in the safety cabinet.

(k) The temperature shall be above 21° C, and the humidity shall be 60-85%. Heat the water in the beaker by using the heating plate to make it reach the desired temperature and humidity.

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Disinfection Instruction

When any contaminated part of the safety cabinet needs routine maintenance, filter replacement and performance test, etc., purification must be performed.

Before the certification test and gas purification, all internal working faces and exposed outer surfaces shall be disinfected by using the proper disinfectant. In addition, before the certification test, use the gaseous form of the Biosafety Class 2 designated reagent to disinfect the overall safety cabinet, until it meets the requirement. If the safety cabinet has been used, we recommend using the Biosafety Class 3 designated reagent to perform the disinfection. When moving the safety cabinet under the potential biological factors contamination, disinfection shall be performed in advance.

Besides, if the experimental reagent spills or splashes out, the contaminated surface shall be disinfected properly. In most cases, when gas disinfection is required, depolymerized paraformaldehyde is used as the disinfectant in the programdescribed later. Before using any other alternative methods for disinfection, cycle parameters and their effectiveness of the safety cabinet must be taken into consideration. Degradation and absorption of the alternative detergent dependon the material compatibility which is the key factor for maintaining the integrity and required disinfection time of the safety cabinet. In certain cases, these alternative methods are required, such as slowing disease virus. The user consults with the certification authority to determine the purification method. When using the paraformaldehyde to perform gas purification, designate the specified area, selected respirators, protection facilities, corresponding tests,medical surveillance, hazard communication and training, and record keeping, etc., and perform the gas purification according to the following steps (automatic formaldehyde gas purification/neutralization can replace the following steps):

⚠ Note

Before disinfection, all hydrogen chloride must be removed from the safety cabinet. In the ambient air,the hydrogen chloride may turn to the carcinogenic bichloromethylether (BCME) with the existence of the formaldehyde.

(a) Multiply the height, width and depth to calculate the total volume of the safety cabinet: about 1.8m³.

(b) Multiply the total volume of the safety cabinet by 11g/mm³ to determine the required weight of paraformaldehyde.Determine the amount of ammonium bicarbonate or its alternative, and provide the ammonia and formaldehyde for the neutralization reaction. Take 10% more of the ammonium bicarbonate than it is needed to ensure the complete reaction.

Reagents used for the one-time disinfection of this safety cabinet are as follows:

Paraformaldehyde dosage: concentration shall be 40% as required, and 20ml per cubic meter.

Ammonia dosage: concentration shall be 25% as required, and 14ml per cubic meter.

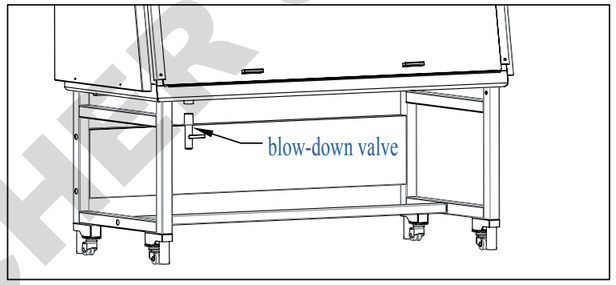
(c) The exhaust pipe of the safety cabinet must be with good air tightness. Its air tightness can be realized by the terminal of the exhaust pipe. If the exhaust pipe is longer than 3m, increase the paraformaldehyde amount to make up for the increased volume. If the exhaust of the safety cabinet enters the exhaust system of the building through the recirculation, cut off the connection between the safety cabinet and the building system, and close the safety cabinet (the plastic filmand plastic strips can be adopted).

Product Installation

Installation blow-down valve of Bio-safety Cabinet

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 .

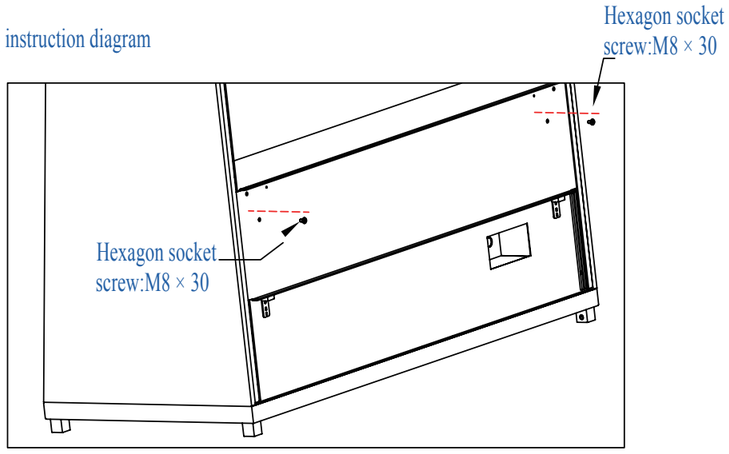
Installation instruction



Disassembly of counterweight bolt on Smart products

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

Dismounting instruction diagram



4. Before moving the cabinet body, make sure the four adjustable legs of the underframe are all on the ground to keep the underframe stable during installation, for any movement may cause safety issues. When moving the cabinet body, never put your hand at the joint between the underframe and cabinet body, so as to protect yourhand from squeezing.

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Product Installation

Note

The equipmentis rather heavy. If there is a need to move it, make sure sufficient moving equipment is available. Contact the manufacturer if there are problems of handling the equipment. The weight-carrying capacity of one person differs from that of another, so please carry the cabinet body in a trial manner to make sure everybody is able to bear the weight, so as to avoid any safety problem during carrying.

5. Install the cabinet body onto the base. Now installation is complete.
6. Fix the drainage valve at the position specified by the manual (see the underframe installation manual).
7. Remove the rear screws (see the underframe installation manual).

Operation Instruction

Application precautions

Note

Read this manual carefully before using the equipment, protection provided by the equipment may be damaged, if the equipment is not used in the way specified by the manufacturer.

- Large objects placed in the working area of the biological safety cabinet may hinder the airflow, thus to reduce the efficiency of the biological safety cabinet. For example, electric appliances such as the centrifuge and agitator are commonly equipped with the cooling fan, which will disturb the airflow in the biological safety cabinet. The centrifuge is better to adopt the sealed safety cups which can be used to load and unload samples in the biological safety cabinet.
- Alcohol lamp must not be used in the biological safety cabinet. For the heat generated by it will disturb the airflow and damage the filtration device, and lead to filter paper breakage of the ULPA, thus to cause leakage.
- Ultraviolet source is only applicable for the disinfection of the working table and internal environment. Before performing the disinfection, clean the working table to remove the dust and dirt which may have impact on the disinfection effect. The ultraviolet ray may hurt people, please do not perform any test operations in the cabinet with the ultraviolet lamp on (see the warning at the ultraviolet lamp) to prevent the skin and eyes from the direct contact with the ultraviolet lamp.

Note

The current supplied by the socket in total must not exceed 2A!
Waterproof socket plays waterproof function only when its front cover is closed, and with the front cover open, this socket cannot be regarded as a waterproof socket!

- Base of the working area is installed with the drain valve, and if the wastewater generated from the working table cleaning or from other sources flows into the working table base, please clean it up timely, and perform the harmless treatment on the discharged wastewater.

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Operation Instruction

Operation steps for starting up

1. Connect the power supply, press the power button 2s to start up the machine.
2. Raise the glass of doors and windows to make the lower edge of the glass door in alignment with the door heighmarker line.
3. The safety cabinet is set in self-cleaning operation, until the “in the self-cleaning, please wait” disappears.
4. Clean the working table and inner wall of the safety cabinet.
5. Experimental operation.

Operation steps for shutdown

1. Take out all experimental items.
2. The safety cabinet is in self-operation state for 3 minutes.
3. Clean the working table and inner wall of the safety cabinet.
4. Close the front window glass, and pull the door to the bottom.
5. Always press the power button 2s to shut down the machine.
6. Cut off power supply.

Setting steps for ultraviolet lamp

1. Page down to display the ultraviolet lamp reservation setting page, and you can perform the reservation function setting for the ultraviolet lamp in the page. Select two time periods respectively by pressing the “**<** ” and “ **>** ”button, press the “ **∧** ” or “ **∨** ” button after pressing the "set” button to set time successively, and press the "OK” button to complete the setting. Selecting "OK” will have an effect on the operation after starting the reservation, and selecting "Cancel” will not have an effect on the operation after starting the reservation.
2. On the standby page after closing the door, if the reservation time of the ultraviolet lamp is already set, press the "Set” button to make reservation for the start; and the indicator of the"ultraviolet lamp” flashes slowly, and then press the “Set” button again to cancel the reservation. When reaching the set time, if the condition for turning on the ultraviolet lamp is met, the ultraviolet lamp will be turned on automatically.

⚠ Note

1. Condition for turning on the ultraviolet lamp: the illuminating lamp is turned off, the front window glass and socket are both closed, and the power indicator is on.
2. If the reservation function is already started, at the moment of reaching the reservation time, functions of all other buttons are enabled except the “Power” button, then this reservation function is in vain,but as the reservation indicator remains in the original state, the reservation function is still valid when setting time on the next day (24-hour delay).

Product Testing

1. Appearance

1.1 Requirements

1.1.1 The surface is free of noticeable scratch, rust, indentation; the appearance is clean and smooth.
1.1.2 The texts and graphic symbol indicating the functions are correct, clear, straight and firm.
1.1.3 The welds are firm and welded surfaces smooth.

1.2 Test method

The results of tests by your eyes and hands must be in line with the aforementioned requirements.

1.3 Results

The test results shall comply with the requirements of 1.1.

2. Integrity of ULPA

2.1 Requirements

The filtration failure rate of a scannable filter detected at any spot shall not exceed 0.01%.
The filtration failure rate of an unscannable filter detected at any spot shall not exceed 0.005%.

2.2 Reagent

Dioctyl phthalate (DOP) or equally effective liquid that is good enough to generate an aerosol liquid of the same particle size and distribution patter as the DOP aerosol, e.g. alpha polyolefin (PAO), diethyl sebacate (2-ethylhexyl), polyethylene glycol and pharmaceutical-grade light material oil.

2.3 Instruments

The instrument used for testing the integrity of the ULPA:
The aerosol photometer with linear scale or logarithmic scale can mark the polydisperse aerosol particles of 10μg/L DOP (or an equivalent liquid) concentration in upstream of the filter as 100% and it can detect 0.001% of the same aerosol particles. The photometer must be calibrated as per the instruction manual of the manufacturer.

Reduce the pressure of the aerosol generator to the minimum of 140kPa and use DOP or an equivalent liquid to generate aerosol. Immerse the generator nozzle in liquid by no more than 25mm. The maximum measuring range of the aerosol generator is 0-550kPa and its resolution and accuracy 7kPa. The pressure meter of the generatoris to be calibrated by the manufacturer or calibrated as per the instruction manual of the manufacturer.

2.4 Method

Scanning test of the filter is to proceed in the following steps.
(a) Start the fan and lamp of the safety cabinet, remove the air diffuser and protective cover (if any) of the filter, fix the aerosol generator and infuse the aerosol into the safety cabinet and generate evenly dispersed airflow in upstream of the ULPA as per the instruction of the manufacturer. If the manufacturer has not specified the position to infuse aerosol, infuse aerosol in a manner that enables it to be evenly dispersed in the airflow in the safety cabinet.

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Product Testing

(b) b) Start the aerosol photometer and cabinet per the instruction of the manufacturer.

(c) Test the airflow containing aerosol in upstream of the ULPA and make sure the light scattering intensity of the aerosolis at least equal to that of the 10μg/L DOP.

-For a photometer with linear scale (0-100), calibrate it to 100.

-For a photometer with logarithmic scale, calibrate concentration reading of the upstream airflow to more than1× 104 of the concentration reading represented by each scale mark (use the calibration curve of the instrument)

(d) The photometer probe is in the downstream of the filter and is no more than 25mm from the filter surface. Move the photometer at a speed slightly less than 50mm/s to let the probe scan the entire downstream section of the filter and the edge of each combined filtering piece. The scanning routes must be slightly overlapped. Carefully scan the entire perimeter of the filter, the joints between the combined filtering piece and frame and the sealed joints between the filter and other parts.

(e) To measure the aerosol concentration of the airflow in the downstream of the exhaust filter of the B2 safety cabinet,reserve a tubeline under the working table and insert the probe of a photometer carrying rigid tube in to the tubeline.

2.5 Results

The scanning results shall comply with the requirements of 2.1.

3. Downflow rate:

3.1 Requirements

The average downflow rate in the safety cabinet shall be within the nominal range of ± 0.025m/s and the difference between the measured value at each measurement point and the average flow rate shall be within± 20% or ± 0.08m/s (whichever is the greater)

3.2 Instruments

(a) The thermal-type air meter with accuracy of ± 0.015m/s or ± 3% of the indicated value (whichever is the greater)must be calibrated as per the instruction of the manufacturer. If the air pressure and temperature at the test pointdeviate from the nominal readings on the thermal-type air meter, correct the air meter using the correction factors provided in the instruction manual of the thermal-type air meter manufacturer.

(b) The air meter probe clamp can accurately locate the probe without affecting the airflow mode (either circularclamp or pincer-type clamp is acceptable).

3.3 Test method

Identify a number of measurement point at the horizontal plane that is 100mm above the top edge of the frontwindow operation port in the working area and measure the downflow rate at these points in the following steps.(See the picture below)

Introduction to Product Functions

3.8 Life time setting for ultraviolet lamp

After replacing the ultraviolet lamp tube, the ultraviolet lamp life can be cleared in this setting option.

3.9 Self-cleaning setting

Press the " ∧ " or " ∨ " button to select the "Self-cleaning countdown" time and set the self-cleaning time duration.The time duration is determined depending on environmental cleanliness. The self-cleaning time can be shortened in a clean room and may be extended in a non-clean room. The time duration for an ordinary non-clean room is 3minutes by default.

3.10 Internal fan setting

By this option, the internal fan can be turned on and off.

3.11 Voice volume setting

Press the " ∧ " or " ∨ " button to select the voice volume with the volume range of Levels 0-10.

3.12 Factory setting restoration

When you select this option, the display page will jump to "Restoring factory settings" for 5s. after the factory settings are completed, it will display "Restoration completed" for 2s.

4. Description of alarm page display

Alarm state	Alarm condition	Alarm page display
Alarm for door opened and fan closed	When the door is opened, the fan is closed	Please close the door
Alarm for inflow air speed anomaly	When the self-cleaning is finished, the inflow air speed exceeds the specified range.	The inflow air speed is too large/too small
Alarm for declining air speed anomaly	When the self-cleaning is finished, the declining air speed exceeds the specified range.	The declining air speed is too large/too small
Alarm for filter anomaly	Differential pressure across the filter is greater than the set value	For the filer anomaly, please check
Alarm for filter life	Differential pressure across the filter if within the alarm value range set	For the filter life is less than 10%, please contact to replace
Alarm for ultraviolet lamp life	The rest of ultraviolet lamp life is less than 10%	For the rest of ultraviolet lamp life is less than 10%, please contact to replace
Alarm for door height anomaly	The door is not closed properly at shutdown or the door opening height is inconsistent with the provisions at startup	For door height anomaly, please adjust
Alarm for ambient temperature	The ambient temperature exceeds the range specified	For the ambient temperature is too low/too high, please adjust
Alarm for ambient humidity	The ambient humidity exceeds the range specified	For the ambient humidity is too low/too high, please adjust

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Introduction to Product Functions

2.3 Energy saving mode

After entering the user settings page, you can select whether to enable the energy-saving mode under the premise that you select the intelligent mode. In this mode, all alarms and interlock functions are enabled.

3 Setting Page

Select the user settings by pressing the " > " button; press the " OK " button to set some general options.

3.1 Language setting

The safety cabinet is available in two languages: Chinese/English.

3.2 Unit of measurement

The safety cabinet can display the data in metric and imperial units. Imperial units for the air speed: fpm (feet per minute); air volume: cfm (cubic feet per minute); temperature: Fahrenheit (° F).

3.3 Alarm clock setting

The user can select the "Alarm clock setting" in the menu, press the " ∧ " and " ∨ " buttons to select the alarm time.Except the alarm page, the buzzer sounds for 30s like "drop drop…drop drop" at the alarm clock setting time and the "alarm time has come to 30 s" will be displayed. Press the "OK" to restore the original page and cancel thebuzzing within 30 s.

3.4 Data setting

Users can use the " ∧ " or " ∨ " button to set the date. The date that is set correctly will remain valid after closing the equipment.

3.5 Time setting:

Users can use the " ∧ " or " ∨ " button to set the hour and minute values. The date that is set correctly will remainvalid after closing the equipment.

3.6 Ultraviolet lamp delay setting

Press the " ∧ " or " ∨ " button to adjust the "Ultraviolet lamp delay start" time and set the ultraviolet lamp delay startstart time (default: 3s). When the ultraviolet lamp operating conditions are satisfied, press the "Ultraviolet lamp" button and it will be enabled after the delay time set where the indicator flashes rapidly during the delay time.

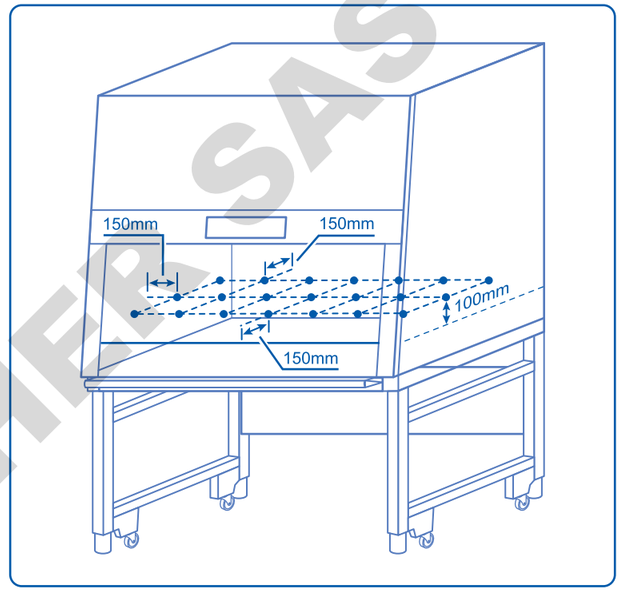
3.7 Operation time setting for ultraviolet lamp

Press the " ∧ " or " ∨ " button to select the "Ultraviolet lamp operation" time and set the ultraviolet lamp operation time (default: 30 minutes). After the glass door is completely closed, press the "Ultraviolet lamp" button so that the ultraviolet lamp turns on and operates continuously based on the operation time set. After the operation time, the ultraviolet lamp will turn off automatically.

⚠ Note

The operation time set for ultraviolet lamp refers to the continuous operation time of the ultraviolet l amp after pressing the Ultraviolet lamp button. Under the ultraviolet lamp reservation mode, the continuous operation time of ultraviolet lamp is determined by the interval between the reservation t urn-on time and reservation turn-off time.

Product Testing



(a) The measurement points are equally spaced and form into the square grids no bigger than 150mm×150mm. There should be at least 3 rows of measurement points and 7 points in each row.
(b) The perimeter of the test area shall be 150mm distant from the inner wall and front window operation port of Use the clamp to fix the air meter probe at each measurement point for measurement. Make calculation using the safety cabinet.the measured values recorded from all measurement points.

3.4 Results

The measured results shall comply with the requirements of 3.1.

4. Inflow rate

4.1 Requirements

The average inflow rate of the safety cabinet shall be the nominal value ± 0.025 m/s. The flow of 1 meter-wide working area shall be not less than 0.1 m³/s.

4.2 Instruments

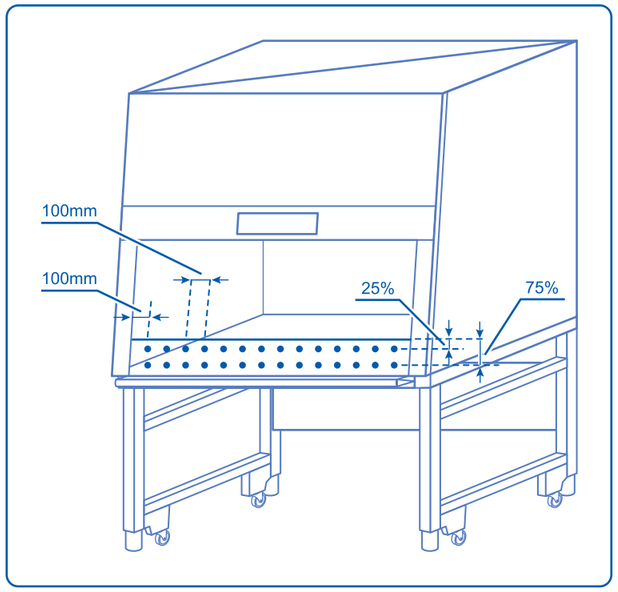
(a) The accuracy of a thermal anemograph is ±0.015 m/s or ±3% of the indicating value (whichever is the greater).
(b) With the anemograph probe jig, the anemograph probe can be positioned precisely to a measurement point without impacting the airflow mode (the ring clip and forceps clip can be used.).

4.3 Test method

4.3.1
Open the front window to the standard height.
4.3.2
Measure the airflow rate at two rows of points on the plane of the front window operation port with a thermal anemometer where the first row is at about 25% of the opening height below the upper edge of the front window operation port and the second row is at about 75% of the opening height below the upper edge of the front window operation port. (See the picture below)

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Product Testing



4.3.3
The interval between two points is about 100mm and the distance from the side edge of the front window operation port is small, but not less than 100mm. The average value of all measured values indicates the inflow rate.

4.4 Results

Measured results shall comply with the requirements of Section 4.1.

5. Airflow mode

5.1 Requirements

5.1.1
The airflow in the working area of safety cabinet shall be downward without vortex, upward airflow and dead points.
5.1.2
The airflow shall not escape from the safety cabinet.
5.1.3
The airflow around the overall front window operation port of safety cabinet shall flow inwards without the airflow escaped outwards. The inflow at the front window operation port shall not go into the working area.

5.2 Instruments

The smoke generator and smoke agent will produce the visual smoke.

5.3 Method and result

5.3.1
Downflow test:
The smoke flows from one end of the safety cabinet to the other end along the center line of the working table about 100mm above the top of the front window operation port. The results shall meet the requirements of Section 5.1.1.

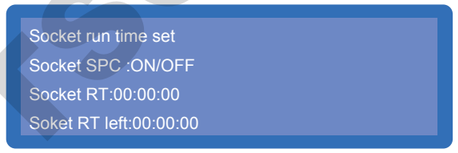
Introduction to Product Functions

1.3 Timing setting



Use the ">" direction button to turn the page to enter the "Timing setting" page on which you can set the countdown and stopwatch in "hour: minute: second". When the arrow is in the first row, directly press the OK button to start the countdown, press it again to stop the countdown, and then press it to continue the countdown from the last stopping time.
When the arrow is in the second row, directly press the OK button to start the timing, press it again to stop the timing, and then press it to continue the timing from the last stopping time.
The resetting time after the zero clearing is 00: 00: 00.
The buzzing at the countdown finish is for 2s.

1.4 Socket working time setting



Use the ">" direction button to turn the page to enter the "socket working time setting" page where the user can set the socket working duration at the "socket working time setting". When the program-controlled option of socket is enabled, the display screen will remain under the on state within the last 30s of socket working duration.

1.5 Power-on password setting



In the user setting page, press " OK " button to access the menu options and press the " v " button to select the "Power-on password setting" option.
The factory default password is "0006" which can be modified or canceled as needed.

2 Setting Mode

The safety cabinet has three modes: Standard mode, intelligent mode, energy saving mode.

2.1 Standard mode

The standard mode is taken as the factory default setting by which all alarms and interlock functions are enabled under this mode.

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.

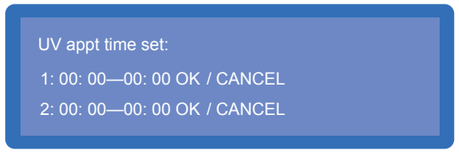
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Introduction to Product Functions

1. Setup

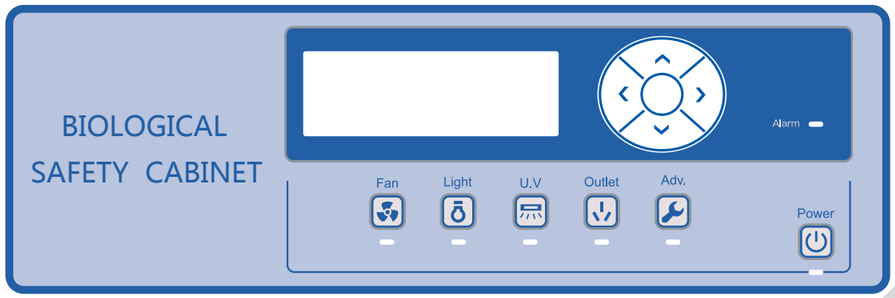
Users can use the setup menu function for the operation of the safety cabinet to meet specific application needs and use the ">" direction button to enter the setup menu.

1.1 Ultraviolet lamp reservation time setting



Users can use the ">" direction button in the standby page to enter the "Ultraviolet lamp reservation" time setting pageby selecting for specific time operation settings. After the time setting is completed, select "On" and press "OK" button to confirm to complete the ultraviolet lamp reservation time setting. This operation will be remembered, even when you turn the equipment closed on again with the last time set as the reservation time.

1.2 One-button ultraviolet lamp reservation





Users touch the "Setup" button gently and then the "ultraviolet lamp" button indicator blinks slowly,indicating the product is reserved successfully.

Users touch the "Setup" button again and then the "ultraviolet lamp" button indicator will turn off,indicating the reservation function of the product is canceled.

After the reservation is completed and the glass door is completely closed, the ultraviolet lamp will automatically turn on at the reservation time and it will automatically turn off at the end of reservation time.

Note

If the user has enabled reservation function, but the computer board detects in addition to the"Power" button, other button functions are enabled (indicating the user is using), this reservation will not be executed and the ultra violet lamp will not be on (but the reservation description will not disappear at the stand-by time and the reservation function (delayed for 24 hours) is still valid at the set time of the following day). Hereafter, as long as the reservation function is not canceled,the detection will be carried out at the reservation time of each day and the ultraviolet lamp will be on if the illuminating conditions of ultraviolet lamp are met.

Product Testing

5.3.2

Observation window airflow test:

The smoke flows from one end of the safety cabinet to the other end about 25mm behind the observation screen and about 150mm above the top of the front window operation port. The results shall meet the requirements of Sections 5.1.1 and 5.1.2.

5.3.3

Test of airflow at the edge of front window operation port:

The smoke passes around the front window operation port about 38mm away from the safety cabinet, so special attention shall be paid to the corners and vertical edges. The results shall meet the requirements of Section 5.1.3.

5.3.4

Tightness test of the sliding window:

The smoke passes in the sliding window about 50mm away from the side wall of safety cabinet and the top of working area. The results shall meet the requirements of Section 5.1.2.

6. Alarm and interlocking system

6.1 Front window operation port alarm

When the front window opening height of safety cabinet is higher or lower than the nominal height of front window operation port, the audible alarm shall give an alarm and the interlocking system will be started. When the opening height returns to the nominal height, the alarm sound and interlocking system shall be relieved automatically.

6.2 Interlocking alarm of the internal air supply fan/exhauster

When the internal downflow fan and air exhauster are in the safety cabinet, the interlocking function shall be set. Once the air exhauster stops working, the downflow supply fan will be closed and the audible andvisual alarm will give an alarm. Once the downflow supply fan stops working, the air exhauster will continueto operate and the audible and visual alarm will give an alarm.

6.3 Air exhausting alarm of the B2 safety cabinet

The B2 safety cabinet of Level II is provided with the outdoor air exhauster. Once the safety cabinet is set with the allowable airflow range, when the loss of the exhaust volume is 20% within 15s, the audible andvisual alarm will give an alarm and the interlocking internal fan of safety cabinet will also be closed.

6.4 Air exhausting alarm of the A2 safety cabinet

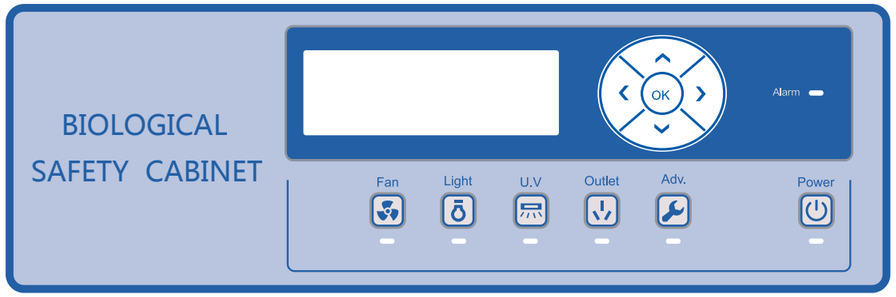
If the A2 safety cabinet is connected with an exhaust hood and uses the outdoor fan for air exhausting,the audible and visual alarm will be used to prompt the airflow loss due to air exhausting.

6.5 Airflow fluctuation alarm

The safety cabinet must display the downflow rate and inflow rate of the working area in real time while the deviation from the measured values shall not exceed ±0.025 m/s and shall be calibrated to the measured values with the display resolution of at least 0.01 m/s. The downflow rate and inflow rate is fluctuated by more than ±20% of the nominal value, the audible and visual alarm will be used to prompt the fluctuation of the downflow rate and inflow rate.

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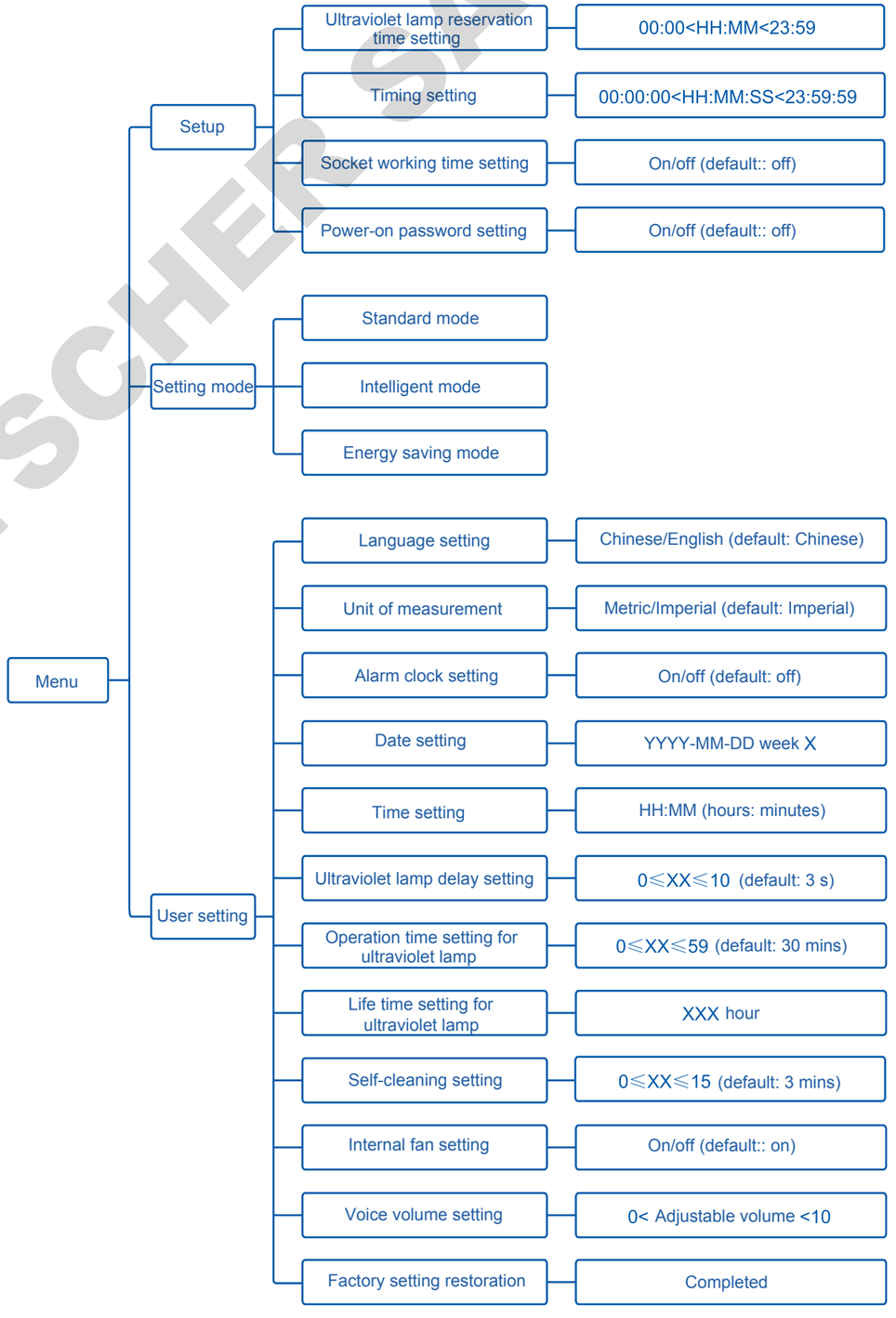
Control panel



(1) Fan button:	Start/stop the fan; enter/exist from the safety and energy saving function
(2) Illuminating lamp button:	Control the on/off of the illuminating lamp
(3) Ultraviolet lamp button:	Control the on/off of the ultraviolet lamp
(4) Socket button:	Control the on/off of the socket in the cabinet
(5) Setup button:	Start to set
(6) ^ button:	+1, move up
(7) v button:	-1, move down
(8) > button:	Move the current selection towards the right and turn the page towards the right
(9) < button:	Move the current selection towards the left and turn the page towards the left
(10) Power button:	Hold the button for 2 s to start and close the machine
(11) OK button:	Confirm the setting, go back to the original page and mute the alarm sound

Menu options

See the diagram below for the operation flow diagram of all menu options



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