Biosafety cabinet

A2-1000 D/G 1300D/G (LCD display)

Instruction Manual

Thanks for your purchasing. Please read this manual carefully before using it.

Make sure put this manual in convenient place for later use.

version: 2018-03

Products

Product introduction

A2 type bio-safety cabinet is the safety equipment for research,teach and clinical examination in fields of microbiology,biomedicine,genic recombination,animal experiments and biologicals.
It adopt special design and structure to offer safe protection to environment,operators and test items.

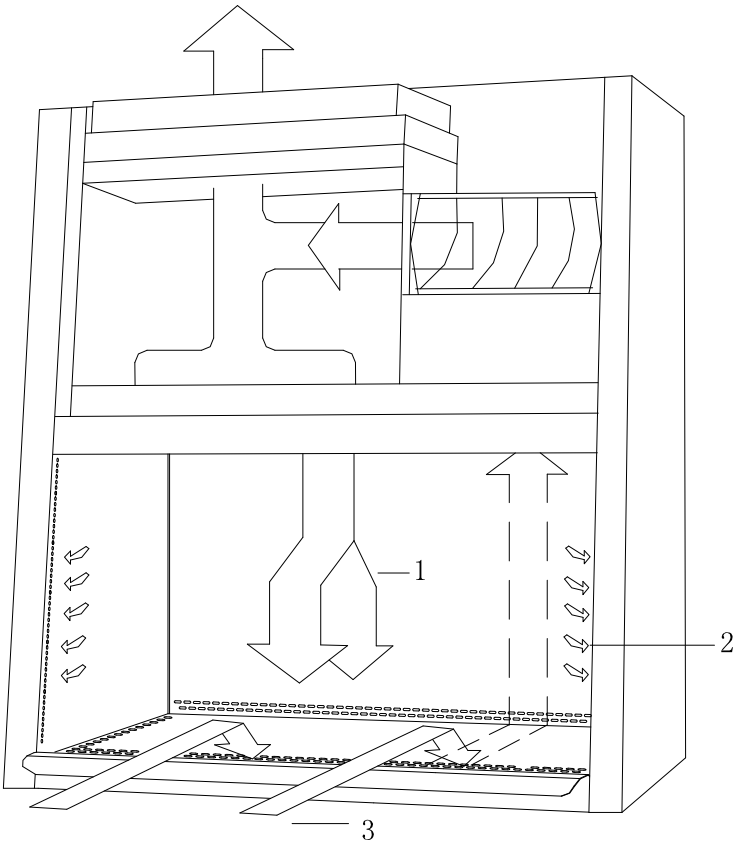
Features

It is consist of cabinet,glass window,SUS304 S.S working table,front compartment,universal wheels,water proof socket,fan,down flow filter, exhaust flow filter,fluorescent lamp,UV lamp and LCD controller and alarm system.the cabinet is made of cold-rolled steel,electrostatic spray in surface,10 degree titling design for front panel.

Parameter

		A2-1000D	A2-1300D	A2-1000G	A2-1300G
External （H*W*D）		2060*1040*760	2060*1340*760	2060*1040*760	2060*1340*760
Internal（H *W*D）		660*960*535	660*1260*535	660*960*535	660*1260*535
Average flow speed	In flow	0.50m/s			
	Down flow	0.35m/s			
Flow capacity	In flow	270m^3/h	356m^3/h	270m^3/h	356m^3/h
	Down flow, 70%	563m^3/h	741m^3/h	563m^3/h	741m^3/h
	Exhaust, 30%	270m^3/h	356m^3/h	270m^3/h	356m^3/h
High efficiency filter		G style: ULPA filter, 99.999%; D style HEPA filter, 99.995%.			
Noise		≤65dB			
Light		≥650Lux			
Cabinet		Outer:1.2mm cold steel,white epoxy resin paint, inner: 1.0mm304 S.S			
Power supply voltage		220-240VAC,50Hz,1Ph			
power(W)		500	550	500	550

Flow mode



1. the ULPA filtered air.
2. not filtered/might polluted air.
3. incoming air

The fan suck the coming air from surrounds into grating in the front of working table to avoid to pollute table and samples, the incoming air won't be mixed with cleaning air in the chamber. The coming air will go through the path and flow to the pressure chamber in the top.

30% air in the pressure chamber will be exhausted out through filter. The left 70% air will be down to filter then form cleaning air to flow to working area.

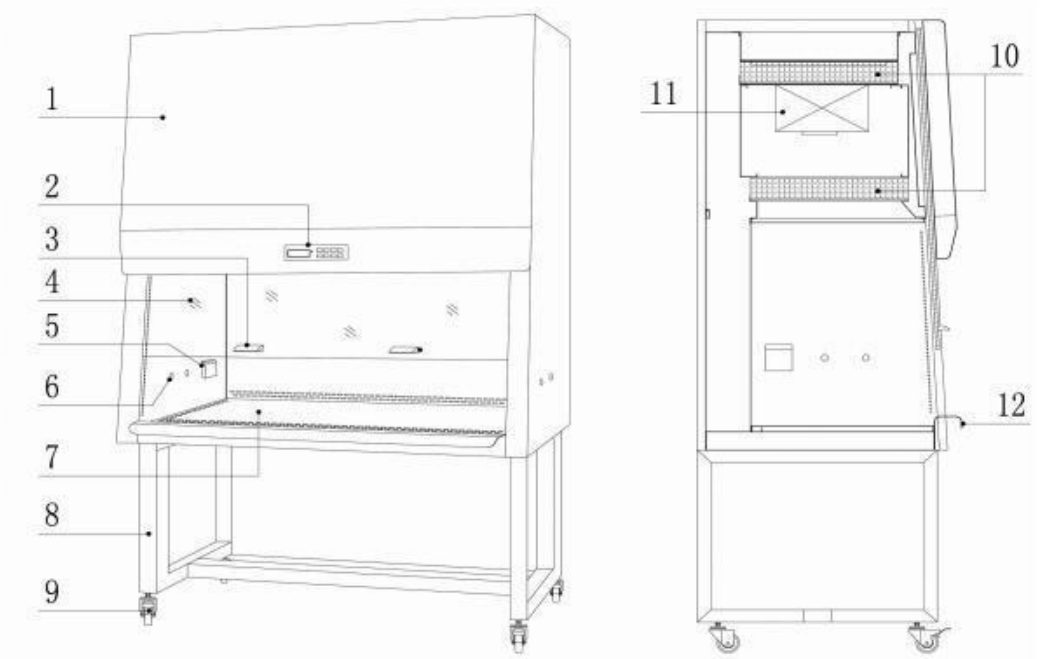
The stable and uniformity air flow will protect samples, to avoid cross infection in the chamber.

When the air approach to working table, the down flow will be parted two parts, one partial will flow forwarding to grating, the other partial will flow backward.a little part of down flows after filtered will be sucked speedily to the holes of side area.

The inflow and down flow are mixed to form gas curtain to prevent the polluted gas to working area, and also avoid overfall of chamber airs.

Product view

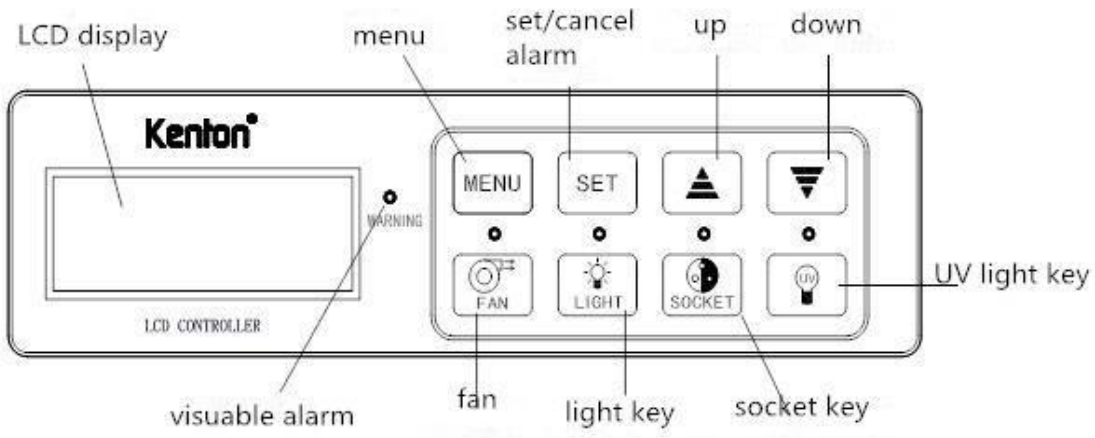
Components



1.cabinet body
2.LCD controller
3.handle for glass window
4.glass window
5.water proof socket
6.holes for taps
7. working table
8.supporting
9.universal wheels
10.filters
11.fan
12.hands rack

Control system

Buttons instruction



1. Fan button: open or close fan.
2. Fluorescent light button: open or close light.
3. Socket button: open or close socket, the current is 5A,fuse will be burnt if over the 5A.

UV button: open or close light,the UV light will be on only if the front door is shut. the front door have the protection from UV light.

4. Up and down button: up or down to choose the menu, increase or decrease the value in the menu. Access to timer and counter-counting function.
5. set/cancel alarm button: choose menu or secondary menu, access to next step of the menu, muse function.

7. Menu button: access or exist from menu options, return to last step of menu options, return to management mode from error condition.

Remark: when input menu options, the alarm beeps, that means the processor can’t manage the operation.

Menu options

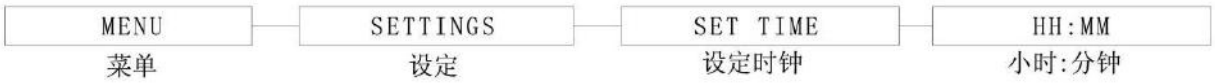
Pls refer to the diagram below,

1.1 setting

In order to the safe operation, it will be required to input Fan Pin and Admin pin.

1.1.1 Time setting

Press UP and DOWN buttons to increase and decrease the Hour and Minute value, the correct time will be reserved,Even if the equipment is shut, the time will be keeping.



1. Press MENU button to access, if there is FAN PIN required, pls input pin code.if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose SET TIME, then press SET to confirm.
6. Time setting HH:MM, Press UP and Down buttons to choose hour(HH),press SET to confirm. The same for minute MM.
7. The screen will display time is done, it will go back to SETTINGS after some seconds.
8. Press twice of MENU button, it will return to main menu.

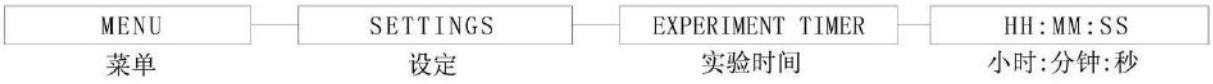
1.1.2 UV timer

UV timer can set the time period for shut off the UV light, the longest period is 18 hours, default time is 60 minutes, because it is considered the most effective UV sterilization time.Do notsuggest starting the UV light over 60mins,otherwise it will shorten the life of the lamp. When no setting the UV timer, you need to close it manually.

1. Press MENU button to access, if there is FAN PIN required, pls input pin code.if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose UV TIMER, then press SET to confirm.
6. Time setting HH:MM, Press UP and DOWN buttons to choose hour(HH),press SET to confirm. The same for minute MM.
7. The screen will display UV time is done, it will go back to SETTINGS after some seconds.
8. Press twice of MENU button, it will return to main menu.

1.1.3 Experiment timer

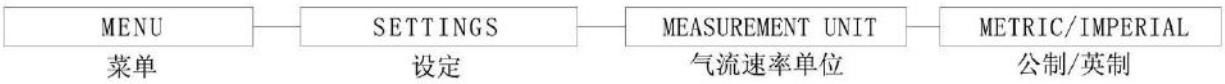
Experiment timer is counter-counting. the time can be set between “00:00:00” and “17:59:59”.



1. Press MENU button to access, if there is FAN PIN required, pls input pin code.if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose EXPERIMENT TIMER, then press SET to confirm.
6. Time setting HH:MM:SS, Press UP and DOWN buttons to choose hour(HH),press SET to confirm. The same for minute MM and second SS.
7. The screen will display Experiment time is done, it will go back to SETTINGS after some seconds.
8. Press twice of MENU button, it will return to main menu.

1.1.4 Measurement unit

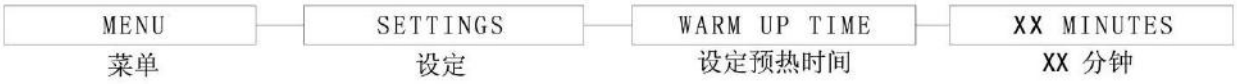
Users can choose the unit for flow speed rate of measurement and display（m/s）or（fpm）.



1. Press MENU button to access, if there is FAN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose MEASUREMENT UNIT, then press SET to confirm.
6. Press UP and DOWN buttons to choose METRIC or IMPERIAL, then press SET to confirm.
7. The screen will go back to SETTINGS after some seconds.
8. Press twice of MENU button, it will return to main menu.

1.1.5 Set to warm up time:

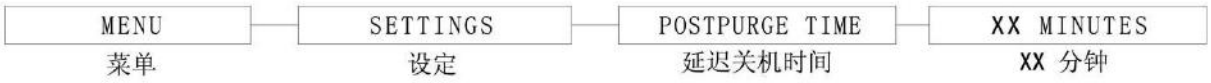
Before the fan running, there will be warm up period, it will assure the stability for sensor,fan and control system.the default setting is 3 minutes, it can be set from 3 to 15 minutes.
During the warm up period, user can press FAN button to close the fan, press LIGHT button to open or close fluorescent lamp. However, when come into menu, it need to input ADMIN PIN, even if, the menu function(WARM UP and ALL FIEND) can't work, the warm up will be discontinuous when come to MENU.



1. Press MENU button to access, if there is FAN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose WARM UP TIME, then press SET to confirm.
6. Setting time is of MM, Press UP and DOWN buttons to choose the time, then press SET to confirm.
7. The screen will display warm up time is done,it will go back to SETTINGS after some seconds.
8. Press twice of MENU button, it will return to main menu.

1.1.6 set to postpurge time

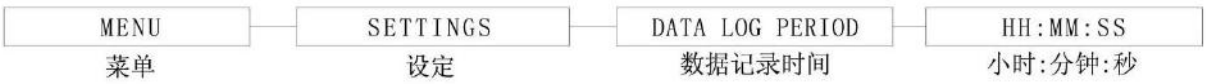
After closing the fan, there will be period of late exhaust, to make sure the remaining contamination exhaust from the working area.default time is 0, it can be set from 0 to 15mins. No this function when set to 0, the proposed set is 3mins.



1. Press MENU button to access, if there is FAN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose POSTPURGE UP TIME, then press SET to confirm.
6. Setting time is of MM, Press UP and DOWN buttons to choose the time, then press SET to confirm.
7. The screen will display auto exhaust timer is done,it will go back to SETTINGS after some seconds.
8. Press twice of MENU button, it will return to main menu.

1.1.7 Set to Data logo period

Use RS232 port, users can transfer the record to PC which connect to the port, data logo period will help users to control the data logo time.



1. Press MENU button to access, if there is FAN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose DATA LOG PERIOD, then press SET to confirm.
6. Setting time is of HH:MM:SS, Press UP and DOWN buttons to choose HH, then press SET to confirm. The same operation for the MM and SS.
7. The screen will display data log period is done,it will go back to SETTINGS after some seconds.
8. Press twice of MENU button, it will return to main menu.

1.2 Setting mode

Bio-safety cabinet have three modes, the Home interface and Quickstart mode can be used in daily operation. After input FAN PIN, user can see the both modes and operate it.

1. Press Menu button to access, if there is FAN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose SETTINGS, then press SET to confirm.
5.Press UP and DOWN buttons to choose HOME INTERFACE, QUICKSTART MODE and MAINTENANCE MODE,then press SET to confirm.
6. Press twice of MENU button, it will return to main menu.

1.2.1 HOME INTERFACE
The default is home interface, under this mode, the all buttons and alarms are working.

1.2.2 QUICKSTART MODE
Under this mode, slide the front window to operation position, fan and lamp will start.
the all buttons and alarms are working as well.

1.2.3 MAINTENANCE MODE
Under this mode, the all buttons and alarms are unworkable. Only the authorized people can log in during maintenance.

1.3 Field calibration

The purpose of calibration is to make the flow display and alarm to be accurate,it need professional instrument to test airflow, to make sure airflow sensor in the chamber is the same with instrument.the calibration is required professional person to operate.

1.3.1 Airflow Calibration

This option allow the proper calibration and operation to alarm of airflow speed sensor.this three points can be calibrated: inflow alarm, standard inflow value and standard down flow value.

1.3.2 Reset Calibration

Users can reset the calibrated data through this option,it will return to factory default data.

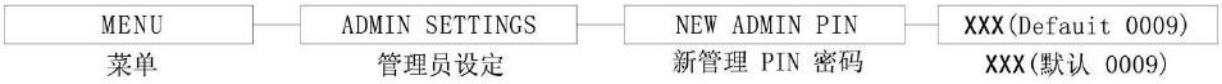
1.4 Admin Calibration

Admin menu can change FAN and ADMIN PIN. When the chamber is in repair,replacing fan,filter or UV meter, system will remind to reset those. Choose the original setting reset,it will return to default setting.

1.4.1 New Admin PIN（default 0009）

ADMIN PIN: limit user to access complicated menu function - Admin and Field Calibration.only professional person can access them to operate. Before log into the menu, need to input Admin Pin (4 numbers).

ADMIN PIN could shift ERR.MSWITHCH to AIR FAIL!Error .



Set to new Admin Pin:

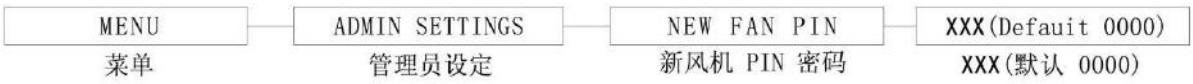
1. Press MENU button to access, if there is ADMIN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose ADMIN SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose NEW ADMIN PIN, then press SET to confirm.
6. FAN PIN is of 4 numbers, use UP and DOWN button to choose the first number,then press SET to confirm. The same operation for the other 3 numbers.
7. The screen will display “confirm PIN”,then press SET button to confirm.it will return to ADMIN SETTINGS.
8. Press twice of MENU button, it will return to main menu.

1.4.2 New Fan Pin（default is 0000-DISABLED）

ADMIN PIN is to limit user to access to fan control and other menus,setting and mode. User need to input 4 numbers pin to open or close fan. So, it will limit the non-professional person to operate the machine, and avoid error operation of shut off the fan at continuous running of the safety cabinet.

Note: suggest continuous working on the safety cabinet to avoid the pollution. When fully lift the front window and clean the chamber, FAN PIN can stop the alarm.

When PIN code is 0000, the function is disable. In this condition, the screen won’t display input pin code,safety cabinet can start and shut off. If go to menu, it need to input FAN PIN 0000.



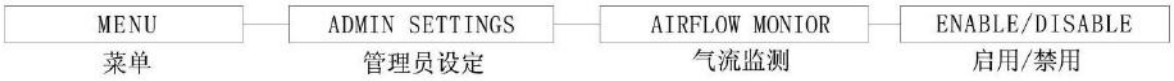
Set to new Fan Pin:

1. Press MENU button to access, if there is ADMIN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose ADMIN SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose NEW FAN PIN, then press SET to confirm.
6. FAN PIN is of 4 numbers, use UP and DOWN button to choose the first number,then press SET to confirm. The same operation for the other 3 numbers.
7. The screen will display “confirm PIN”,then press SET button to confirm.it will return to ADMIN SETTINGS.

8. Press twice of MENU button, it will return to main menu.

1.4.3 Airflow Monitor

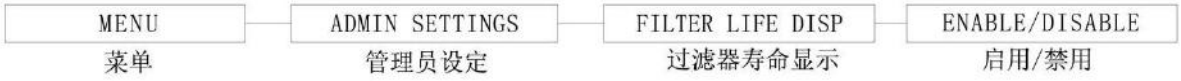
When airflow is below to failpoint,the alarm will start up, this option can start alarm or prohibit the alarm starting, in default setting, alarm is in open status.
When airflow monitor is disable, there will be no preheating time,but, during 3 minutes before the cabinet start , there won't display airflow.
If the room temperature is not between 18-30℃(this is the working temperature),the airflow monitor will be disable automatically.



Set to F/A Monitor:
1. Press MENU button to access, if there is ADMIN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose ADMIN SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose AIRFLOW MONITOR, then press SET to confirm.
6. Press UP and DOWN buttons to choose ENABLED and DISABLED, then press SET to confirm.
7. The screen will return to ADMIN SETTINGS.
8. Press twice of MENU button, it will return to main menu.

1.4.4 Filter Life Display

With this option, user can choose whether display filter life.
Filter life is reckoned by filter meter.filter life is counter counting,(total time 10000 hours, minus the consumed time), if replaced the filter, it must reset F/H/M,pls refer to 1.4.8 to set.



Set to filter life display:
1. Press MENU button to access, if there is ADMIN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose ADMIN SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose FILTER LIFE DISP, then press SET to confirm.
6. Press UP and DOWN buttons to choose ENABLED and DISABLED, then press SET to confirm.
7. The screen will return to ADMIN SETTINGS.

8. Press twice of MENU button, it will return to main menu.

1.4.5 Reset to B/H/M

With this option, user can reset fan game watch, the game watch display fan running time, no max value on the watch. The value can be check at diagnostic model.

1. Press MENU button to access, if there is ADMIN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose ADMIN SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose RESET B/H/M, then press SET to confirm.
6. Screen will display READ MANUAL, press SET to confirm.
7.Screen will display CONFIRM?,press SET to confirm.
8. The screen will return to ADMIN SETTINGS.
9. Press twice of MENU button, it will return to main menu.

1.4.6 Reset to UV/H/M

This setting can reset timer of UV light,UV timer display the running time, the max setting is 2000 hours.The value can be check at diagnostic model.after replace the UV light, pls reset UV timer.

1. Press MENU button to access, if there is ADMIN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose ADMIN SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose RESET UV/H/M, then press SET to confirm.
6. Screen will display READ MANUAL, press SET to confirm.
7.Screen will display CONFIRM?,press SET to confirm.
8. The screen will return to ADMIN SETTINGS.
9. Press twice of MENU button, it will return to main menu.

1.4.7 Reset to F/H/M

This option can reset filter timer. Filter timer display the running time, the max is 10000 hours.The value can be check at diagnostic model.after replace filter, pls reset filter timer.

1. Press MENU button to access, if there is ADMIN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose ADMIN SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose RESET F/H/M, then press SET to confirm.
6. Screen will display READ MANUAL and PRESS SET, press SET to confirm.
7.Screen will display CONFIRM?,press SET to confirm.
8. The screen will return to ADMIN SETTINGS.
9. Press twice of MENU button, it will return to main menu.

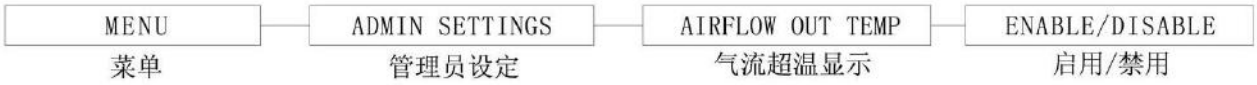
1.4.8 Reset to default value

User can use this option to reset original setting. The available reset options are preheating time (3 minutes),clean exhaust time(0 minute),UV timer(60 minutes),measurement unit(metric),A/F monitor(start-up),ADMIN PIN(0009), filter life display(disable) and FAN PIN(0000).
Note: calibration setting and timer can't be reset.

1. Press MENU button to access, if there is ADMIN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose ADMIN SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose RESET DEFAULT, then press SET to confirm.
6. Screen will display READ MANUAL and PRESS SET, press SET to confirm.
7.Screen will display CONFIRM?,press SET to confirm.
8. The screen will return to ADMIN SETTINGS.
9. Press twice of MENU button, it will return to main menu.

1.4.9 Airflow Out Temp

When room temperature exceeds optimum temperature range(lower than 18 ℃ or higher than 30 ℃) user can choose if display the airflow.



1. Press MENU button to access, if there is ADMIN PIN required, pls input pin code. if no, it will go to next step 3.
2. Use UP and DOWN buttons to input numbers, then press SET.
3. Alarm beeps.
4. Press UP and DOWN buttons to choose ADMIN SETTINGS, then press SET to confirm.
5. Press UP and DOWN buttons to choose AIRFLOW OUT TEMP, then press SET to confirm.
6. Press UP and DOWN buttons to choose ENABLED and DISABLED, then press SET to confirm.
7. The screen will return to ADMIN SETTINGS.
8. Press twice of MENU button, it will return to main menu.

Stopwatch function and experimental timer

• Stopwatch can start by press UP button at front window in safe/ready condition, press UP button again to stop or re-start, press DOWN button to keep stopwatch function or reset timer, the timer way is clockwise counting,display way is HH:MM:SS.
• Stopwatch can start by press DOWN button at front window in safe/ready condition, in using experimental timer, press DOWN button to stop timer or re-start,press UP button to keep experimental timer function and re-start timing,the timing way is counter down counting,display:HH:MM:SS（user can use SETTINGS/EXPERIMENT TIMER to have setting.（refer to **1.1.3**）

Alarm and warning

The alarm is to hint the unsafe operation to operator, check the LCD screen to find the reasons of the alarm,the normal alarm is SASH ALARM, it means the front window is in improper height or closing position(UV mode),it can be solved by adjusting the position of the window.
The other alarm is the wind speed alarm! It display airflow speed failure, operator should check if airflow have been baffled, and correct it in time.while if the alarm is continue, operator should stop operating,because the cabinet is in unsafe condition. Pls ask to our after service.

Other reports about system failure and error:
• when airflow failure, it will display AIRFAIL：NO!
• if controller detects more than one switch is activated at the same time, the screen will display. SASH:ERROR POSITION,as front window only exist a safe position at a time.it indicates that

front window monitor system errors.

• When fan speed sensor is not calibrated, it will display SENSOR UNCALIBRATED.

Diagnostics mode

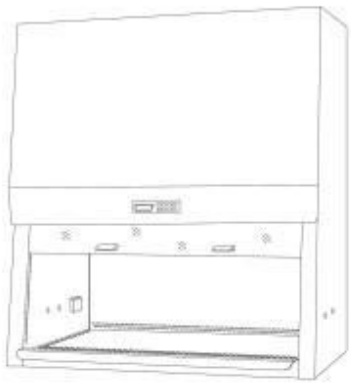
Press SET button to access diagnostics mode.user can learn of the working condition of the cabinet,or it can help engineer to take judgement at repairing and debugging.

Screen display	explanation
MODE	Display the present mode：home interface，quickstart mode,maintenance mode
VERSION	Display the software version
TEMPERATURE	Display the chamber temperature
B/H/M	Fan timer-increased as hour
FILTER LIFE	Display the filter life's percentage
AF OUT TEMP	Display speed rage status,when temp. Exceeds the specified tolerance
UV LIFE	Display the UV light life's percentage
UV TIMER	Display the value of UV timer-default setting is 60mins, the max is 00mins.
ADC IFF	Display the ADC value, when Inflow is insufficient.
ADC IFN	Display the ADC value, when Inflow is specified.(it is set at sensor calibration)
ADC IFA	ADC value for actual inflow
ADC IF0	ADC value for actual inflow at zero calibration setting(no inflow)
ADC IF1	The ADC value of the factory calib when the air flow is not enough.
ADC IF2	Factory calibration of the ADC value of the fixed point into the air flow
DFN	Rated value of the down flow speed-input at filed calibration
CONSTANT	Constant value of gas sensor
CALIB TEMP	Temperature value at calibration
ADC TEMP	Temperature value of ADC
M_SWITCH1	Display M switch1 state-fully open state
M_SWITCH2	Display M switch2 state-safe state
M_SWITCH3	Display M switch3 state-fully close state

Basic operation

Operation for sliding front window

1.1 the condition of sliding window



Sliding up the window fully
√ the fan can be turned on
√ fluorescent lamp can be used
× unsafe working condition

Sliding up the window in safe position
√ it can turn on the fan
√ it can use fluorescent lamp
√ safe working condition

Sliding down the window fully
× the fan can't be turned on
× fluorescent lamp can't be used

1.2 operation to front window

• When Do notuse the cabinet, the window should be shut off, it will help to keep chamber clean.

•When cabinet is in using, sliding window to keep proper height for operating. Even if the cabinet is no use, once the fan is running, the window should in normal operating height.unless putting in, or transferring materials or instrument.

• When sliding window to abnormal height, alarm will beep.

• When sliding window to correct position from higher or lower position, light will be on to remind operator.

• When put in or transfer materials and instruments to chamber, the window will be located in maximum.when window is open totally,alarm will beep, just press MUTE button to mute. But 5s later, it will alarm again to remind operator.lamp will be on automatically for offering convenience to take cleaning work.

Start-up and shutdown

1.1 Start-up bio-safety cabinet

1. Sliding up the window to the specified operation height(ready condition), when reach to the height, the lamp will be on automatically.

Note：if choose quickstart mode, fan will start even Do notpress the FAN button.

2. Press FAN button to start up the fan, if screen required, just input FAN PIN(if PIN≠0000). Preheating is starting (default value: 3 minutes). During preheating period, the other buttons are unworkable.
3. Cabinet is ready to work.

1.2 Shutdown bio-safety cabinet

1. Press FAN button to shutdown fan.if screen required, just input FAN PIN. (if PIN≠0000).then self clean exhaust program set up(default value: 0 minute).in self clean exhaust working, the all buttons can't be used.
2. Sliding down the window to close completely（screen will display UV MODE）.the self clean exhaust program won't be terminated, it will shutdown fan firstly,then slow down.
3. Open UV light(press UV button),sterilize to the whole working area. Pls keep the UV lamp on, be sure to sterilize thoroughly. only after self clean exhaust program is over，UV light can open.

attention when working at chamber

- Before using the cabinet and after using it, it need to clean the working surface(working table, back, sides,lights,power fitting, service equipment and internal surface of the window)
- Before using the cabinet and after using it, open the fan 3 minutes at least, in order to clean up the contamination in the chamber.
- Use cleaner to clean all articles entering or leaving the working area(include the users' arms).
- Put dustbin in the working area(article bad or discarded sucker)
- Put all materials and instruments to the safe working area.

Attention to use of UV light

UV light is a kind of effective disinfectant and virucide. The acceptable lowest irradiation degree -40 μ W/cm^2
(HHS,et.al.,2000)only need 12.5mins to reach 30，000 μ W/cm^2（1W=1/sec），can inhibit the growth of spores.
UV light sterilizing won't leave any residues.on the condition that the UV lamp has been cut off, the sterilizing will stop. However, as result of the waves of the UV light which can't pass through the articles. So UV light is only used at empty chamber. For the containers in the chamber, UV light only works on their surface.

- UV sterilization is only for plant organisms an viruses,keep open before or after operation. But this shouldn't be the only method of disinfection, the chemical disinfection is also suggested.
- During the UV sterilization, reduce the articles in the chamber at most.UV radiation will age the plastic or rubber material and cause to other harm.
- Before startup the UV lamp, pls be sure the front window is in closing condition and associated locks can work properly. Avoid to expose skin and eyes from UV light.because UV will cause carcinogens.
- The effective working time of UV lamp is about 60 minutes.the UV timer can control sterilization time.(the default setting for UV timer is in closing), Do notsuggest that UV light open over 60 minutes, otherwise it will shorten the lift of the lamp. Its life time is 2000 hours.
- UV lamp should be cleaned every week,it should be replaced every year to ensure the efficiency.

Disinfection

Disinfection always use formaldehyde suffocating or other disinfector. eg.Clo2 or catalase, disinfection is only allowed to operate by professional person.
Below these conditions, user must ensure the thorough disinfection for the chamber, remember the characteristics of bacteria:

- Move or relocate the cabinet.
- Change the working type of the cabinet.
- Go into polluted area in repairing. eg. Replace filters.

Note: before chamber in whole disinfection,the filters can't be replaced. After replacing the filters, the cabinet should be re-calibrated.

Installation

1.1 Position demands

1.1.1 placement demand

1）There should be 1 meter（ 3’）between cabinet and aisles.
2）There should be 30CM（ 1’）far away from two sides of cabinet.
3）The distance from vent to each aisles should be over 1.5 meter（ 5’）.
4）The distance from side panels to each aisles should be over 1.0 meter（ 3’）.
5）Two facing safety cabinets, the distance from vent to the other cabinet on the next side should be 3 meter（ 10’）at least.
6）Every obstacles before the vent should be more than 30cm（ 1’） away from cabinet sides.
7）If any obstacles in front of cabinet affect airflow, the distance should be more than 2 meters.
8）The distance from vent to the opposite lab tables should be more than（ 5’）.
9）Avoid placing the lab table on the right corner of the cabinet,the operators beside the desk will interfere the airflow.
10）The distance from the front edge of lab desk to side of cabinet shouldn’t be less than 1 meter（ 3’）,it will help to reduce the airflow from front of cabinet.

1.1.2 movement demand

Mostly the safety was seldom moved,once put in a realistic position.however,if moving or repacking it, you have to consider of these points:

· Before moving the cabinet,remember to disinfect it.
· Remember to protect the all accessories,eg, The sliding front window.
· The cabinet is so heavy, normally it need 6 people or more to move it.

If to repack:

· Place the cabinet to pallet.
· Fasten the body to the pallet by strips.
· If possible,use the original pack to repack it.
· Use moving equipment to lift up the pallet.

1.2 environment demand

· Environment temperature：-20℃～42℃
· Relative humidity：≤90%
· Pressure range：70KPa～106KPa
· Pollution degree:2.0

The degree of pollution refers to the number of conductive contaminants in the operating environment.

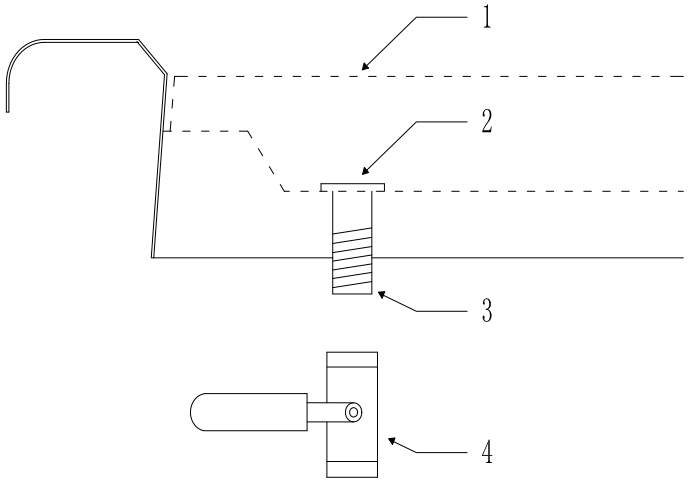
1.3 Exhaust demand

Exhaust filter area is especially vulnerable to be interfered by turbulence and convulsion.so the distance from top of cabinet to roof should be more than 30cm（ 1’）, if the distance less than 30cm,air flow alarm system need to be re-calibrated.

1.4 Drain valve installation

Use PTFE band to connect drain valve,ensure drain valve is in closing status.

1、Take away working table.
2、Open the black cap in the hole.
3、Clean the thread below the hole and seal with sealing tape.
4、Install drain valve,rotate the body until it is fixed.



1.5 safety and warning sign for the safety cabinet

The person use the bio safety cabinet should be familiar with the signs in the cabinet,it is very important to learn of their meanings.

1.6 Features certification

Before using it, the features of the cabinet should be check and certificated to in accordance with the factory standard.

1.7 Disclaimer

Bio safety cabinet’s performance and safety have been estimated strictly at manufacturer, field calibration is the important partial to meet factory standard.

Repair and maintenance

Maintenance routine

Reasonable and regular maintenance is essential to maintain the normal operation of any equipment,This is not an exception to the biological safety cabinets. Following the maintenance schedule to maintenance the products,in order to keep best performance.

No.	Maintenance task description	Maintenance record					
		Daily	weekly	monthly	quarterly	yearly	Two years
1	Working area surface disinfection	√					
2	Alarm confirmation after power on	√					
3	Disinfection to slot surface		√				
4	Grab paper test		√				
5	Clean the outer of cabinet			√			
6	Clean the sliding window			√			
7	Check all fixtures			√			
8	Check if there is any abnormal or failures				√		
9	Use MEK to clean S.S surface				√		
10	Re-calibration					√	
11	Replace UV lamp（if have）					√	
12	Replace fluorescent lamp						√

1.1 Cleaning bio-safety cabinet

• Clean the work table and walls with appropriate disinfectant and then clean it with soap water.

• Clean the front window with appropriate disinfectant,then clean it with glass cleaner.

• Use a damp cloth to clean the outer surface,especially on the front and top to remove dust.

•Use clean water to do the final cleaning,in order to remove the residual disinfectant,soap water and glass cleaner.

•Use MEK（Methyl-Ethyl-Ketone）to remove stubborn stains and spots on the stainless steel surface. After use it, ensure to use clean water on S.S surface, or other liquid cleaner.

1.2 Test on sound and light alarm

• The simplest way is to move front window to test it. Locate it neither on safe position, nor on uv mode position.

1.3 Examine the function of safety cabinet

• Check the mechanical performance,eg:if the front window glass slide smoothly.

• Check the electrical function of safety cabinet,eg:if the fluorescent lamp need to be replaced.

• Check if there is any defects in the bio safety cabinet.

1.4 Grab paper test

The purpose of the grab paper test is to remove any objects that may cause a drag.because the area is polluted, so it need to take care of it.

Before opening the grab paper:

·In the air flow running state,wipe the working surface and the walls of the chamber.

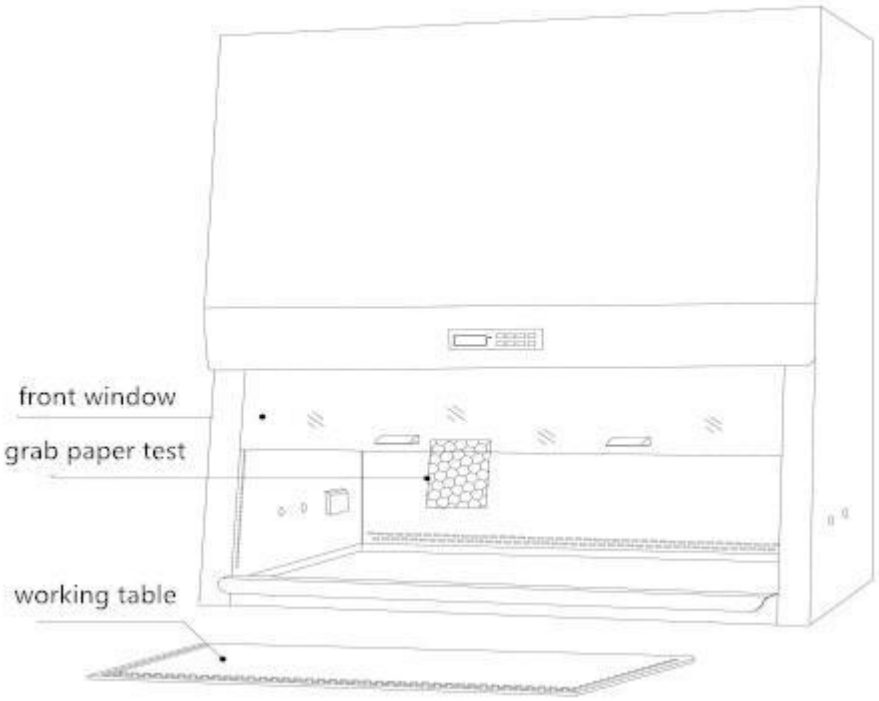
·If the internal can’t be wiped, it should disinfect the cabinet.

Grab paper test：

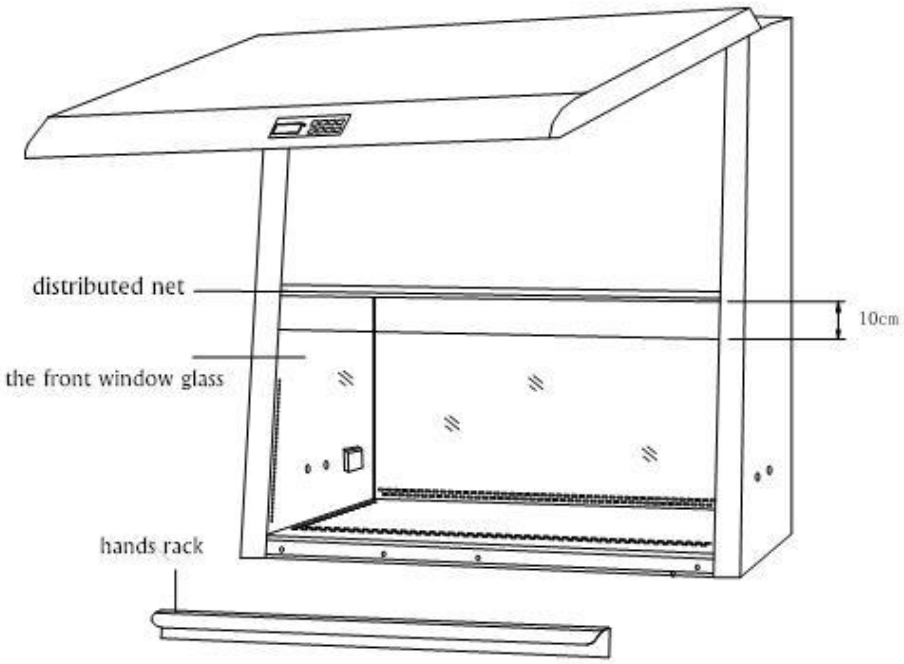
1．Shut off the fan,the front window lift up the highest position.

2．Remove the table to proceed grab paper test.

3．Grab paper position as shown below,



1.5 Cleaing process for front window of safety cabinet



1. Remove hands rack.
2.Descend the window to lowest position, keep 10cm gap between window and air distributor of filter.
3. Open front board.
4. Use of 70% different alcohol to wipe the front window glass by hands stretch into it through the gap.
5. After cleaning, push the front window to safe position.
6. Shut off the front board.
7. Install the hands rack.

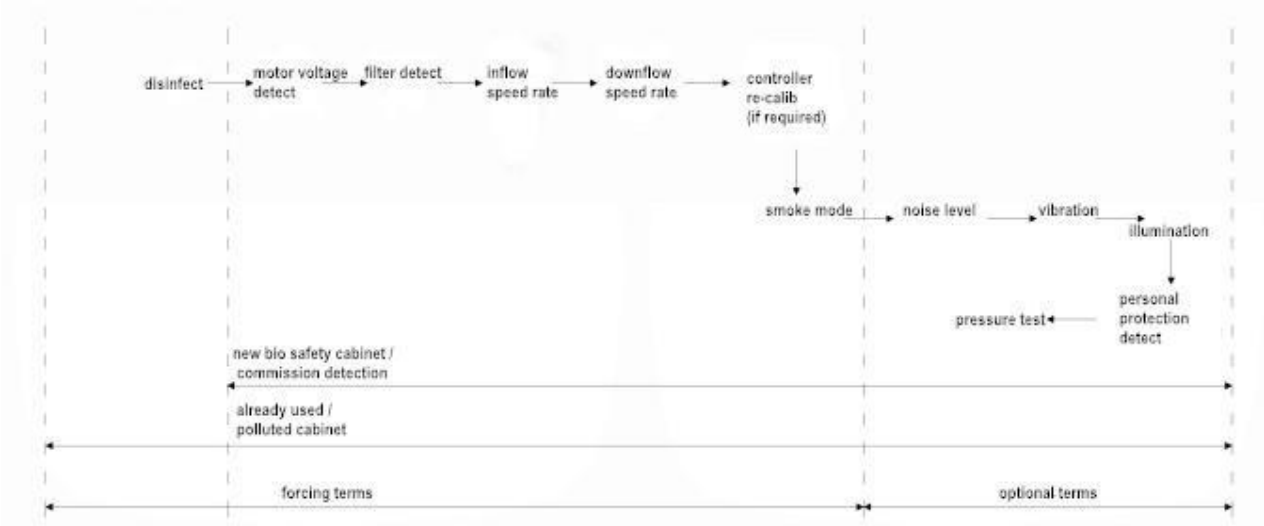
Re certification and calibration

Bio safety cabinet needs to be calibrated, when in those conditions:
·Move the cabinet and replace it.
·Be doubt with the performance of the safety cabinet.
·Replace the filter and fan.
·Annual inspection.safety cabinets need to be test and re-calibrated by qualified engineers.

Re certification needs to do the following content:
·Airflow speed and airflow mode of the safety cabinet should be accordance with manufacturer specified specifications and relative international standard.

·Filters require scan detection to ensure no leakage.
·Operator’s comfort detect.
·If the airflow speed deviate largely from setting value, it need to be calibrated, then record the final data.
Airflow alarm need to be calibrated, when in those conditions:
·The reason of airflow alarm can’t be confirmed.·it shows the airflow speed is deviated more than 0.02m/s from the actual measured speed, the re-calibration is required.

1.1 Certification flowchart

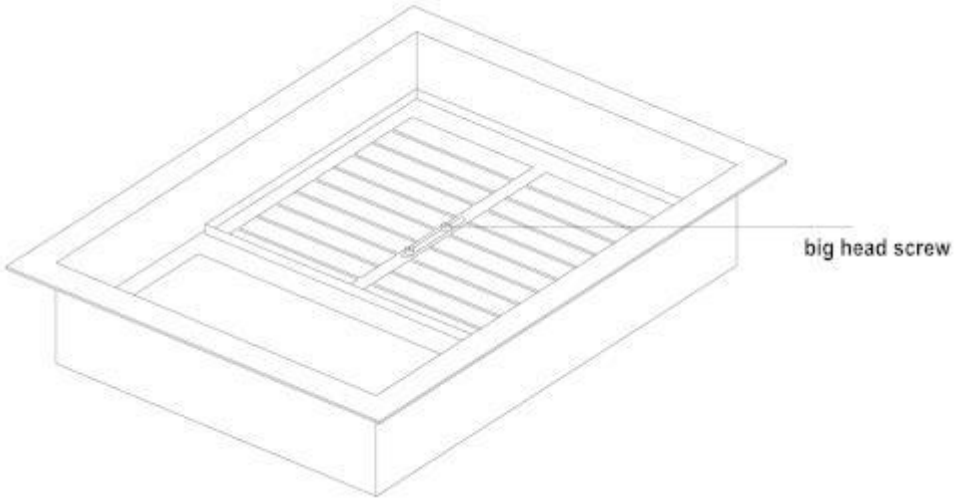


1.2 Certification and calibration

The certification and calibration procedures are reported in the test report.

1.3 Air break adjustment

Air break is used to balance the down flow speed and exhaust speed,when down flow speed can’t meet the standard. If the down flow speed is too fast,open the air break switch, If the down flow speed is too slow,close the air break switch.



Loose the big head screw on the top, slide the air break toward left or right, it can increase or reduce the airflow speed.

Disinfection

Bio safety cabinet needs to be disinfected, when in those conditions:

- Before replacing exhaust filter and down flow filter or fan.
- Before entering the polluted positive pressure or negative pressure cavity
- When leakage happens, pollution is covered to the surface which is not easy to touch.
- Before performance confirmation or re-certification,especially to class III or IV.
- Before re-placing of the safety cabinet.

When in disinfection, the qualified person is allowed to do it with personal protective articles.

1.1 Disinfection solvent

1.1.1 Formalin/poly formaldehyde disinfection

Usually use formalin gas to disinfect,by 37% formalin solution evaporation

Although formalin's permissible exposure dose is 0.75ppm, but many scientists reckon that there is no safe level carcinogen to human body. Therefore, it need to evacuate staff when in disinfection.

There are other drawbacks of using formalin:

- The operation process is very time consuming.
- The engineer need to cover the exhaust filter by plastic bag and let formalin steam cycle by opening the fan discontinuously
- As a result of disinfection will produce a large number of residues, it need to thoroughly eliminate before or after use of disinfection .

The following is an overview of the provisions of delaying time in formalin disinfection process: According to OSHA provision,formaldehyde short-term exposure level is 15 minutes of exposure capacity 2ppm. Four times per day,each exposure interval time is 60 minutes at least.

No.	Operating process	time
1	Covering plastic cover,sealing safety cabinet	1 hour
2	formalin steam generator	*1/2* hour
3	formalin contact time	8-10 hours
4	Neutralize formalin by ammonia generator	*1/2* hour
5	Ammonia contact time,neutralize formalin	2 hours
6	Exhaust ammonia residue	1 hour
7	Peel off plastic over,cleaning residue.	1 hour
The total time without ammonia neutralization		10 *1/2*-12 *1/2* hours
The total time with ammonia neutralization		14-17 hours

Ammonia is used to neutralize formalin. OSHA stipulate that ammonia short-term exposure level is 15 minutes of exposure capacity 35ppm. Four times per day,each exposure interval time is 60 minutes at least.

Because of the adverse effects of Faure Marin on health,Germany, Australia and Switzerland have banned the use of Faure Marin,other countries have followed it.these countries use CLO2 gas and H2O2 vapor to replace Faure Marin.

1.1.2 CLO2 disinfection

CLO2 disinfection is to infect the chlorine gas to the tank filled with sodium hypochlorite, then produce yellow green clo2 gas to carry out disinfection, CLO2 disinfection is faster than formalin,residue is relatively few.Chlorine dioxide as a gas, diffusion is very fast, do not need to open the fan of biological safety cabinets. It only need 1 hour contact to kill creatures quickly and efficiently.the process of CLO2 disinfection is as follows:

No.	Operating process	time
1	Covering plastic cover,sealing safety cabinet	1 hour
2	CLO2 gas discharge	*1/2* hour
3	CLO2 contact time	1 hour
4	CLO2 washing	*1/2 hour*
5	Peel off plastic over,cleaning residue.	*1/2 hour*
Total time		3 *1/2 hours*

1.1.3 H2O2 disinfection

H2O2 disinfection is to produce the steam by the rapid evaporation of water soluble hydrogen peroxide mixture, and spread to internal of the entire safety cabinet.

There are mainly two kinds of hydrogen peroxide generator with obvious difference in operation and theory:

- A principle is to avoid surface condensation, reduce corrosion, optimization of steam

Distribution.The relative humidity inside the cabinet must be less than 30%, in order to ensure that the remaining 70% space is filled with hydrogen peroxide.

• Another principle is to produce micro condensation, to achieve the purpose of sterilization.The generator will release some high speed micro droplets in the biological safety cabinet.

Hydrogen peroxide vapor is not carcinogenic, but it is very efficient for microorganisms.

The time for the whole process as follows:

No.	**Operating process**		**time**	
1	Covering plastic cover,sealing safety cabinet		1/2 hour	
2	Adjustment and disinfection cycle		1/2-1 1/2 hour	
3	Exhausting H2O2 from pipe	H2O2 generator inflation	1/2 hour	8 hours
4	Peel off plastic over		1/2 hour	
TOTAL			2-3hours	9 1/2-10 1/2 hours

Using H2O2 disinfection method, safety cabinet need to assemble two ports:

1．A port is located in front of the opening or the side wall, through the working area.

2．Another port is located at the top of exhaust filter.

Common fault treatment method

This section describes the most common maintenance problems. For more troubleshooting or maintenance information, please contact with the KENTON local agency.

Tools：

• DVM(digital voltmeter). Note: analog voltmeter can be used for troubleshooting, but can not be used for motor voltage measurement.

• Cross screwdriver

• Insulated jumper wire

Problem 1：the cabinet can’t set up（LCD、buttons、fan and outlet is useless）

reason	Proper operation
Power failure	• check the power outlet whether there is electricity
The power cord is not connected or damaged	·ensure the power cord is connecting to the power outlet. ·cut off the power cord of cabinet,Measurement of the AC voltage between the wire and the terminal. ·if the voltage is not ±2% of outlet voltage,need to replace the power cord,otherwise go to next step.
Circuit breaker short circuit	• check the circuit breaker in the circuit board. Note：if the circuit breaker has been short, before check the all circuit components and connection line, do not start circuit breaker. • if it is able to operate normally after restarting the circuit breaker. If not,pls go to next step.
Incorrect connection	• measuring AC voltage of wire and terminal in electric box. • Voltage must be within 10% of the rated voltage.

	• If the voltage is out of range or there is no voltage, check the wire connections at the ends of the connector. • If the connector has a voltage, but the line of fire and the terminal is not, the problem between the terminal board • If the connector Do nothave voltage, but the female cable connector of the top wire inserted in the power cord is provided with a voltage, so the problem is that the pin on the female connector and the connector.
Connection problem from the motherboard to the display	• Measuring the introduction voltage of the terminal on the main board(notice to the polarity) • voltage should be in 6.75-8.25VDC. • If the voltage is out of range or no voltage, check the connection line between the SMPS and the motherboard. • Check the flat ribbon cable connector on the motherboard to the LCD/ buttonboard film. note： From the motherboard to the display and buttonboard there are two ribbon cables, one for the show, and the other for the LED/ buttonboard film • If the LCD is open, the buttonboard is not LED,so check the connector of the ribbon cable.
Defective motherboard	• If the main board is the introduction of voltage in 6.75-8.25VDC,and appear the conditions below, then the motherboard is defective. 1． All LED on the control panel are not on 2． LCD is blank. 3． Buzzer doesn't ring • if these conditions are not exist, then replace the motherboard, otherwise go to the next step. Note：when replacing motherboard, it need to re connect the all lines,the connection error may damage the board.

Problem 2: blank display of LCD

reason	Proper operation
Connection problem	•Check the LCD large flat ribbon cable that connects the motherboard and the end of the motherboard. • Check that the cable is properly plugged into a socket on the motherboard;this is a button connector with a lock arm; the lock arm must be in the same direction as the cable. • If the LCD display can not be powered, please follow the problem 1 to describe the check board power supply.
Contrast problem	•rotating the top metal part by flat screwdriver to adjust the potentiometer to achieve the best LCD contrast.Increase contrast in counter clockwise direction • if LCD is still bank, replace LCD.
LCD defect	• Connect a new LCD to the LCD port on the motherboard • If the new LCD works normally, it means the old one is defective. • If the new LCD is still not working, replace the large flat ribbon cable. • If LCD is infected and can not work, replace the motherboard

Problem 3：Buttons are useless

reason	Proper operation
Connection problem	• LCD display normal or not? If it is not normal, pls refer to the problem 1, ensure the motherboard have power. • Make sure the flat ribbon cable is connected to the main board. • The interface board and the membrane / press are located behind the panel. • cut off the power,take off lamps and clips from lamp and supporting(pull out lamp connector). • Check the connection between the cable and the interface board on the motherboard • Check plastic cable from the interface board to the display panel.
Cable and / or interface board and / or buttons defect	• replace them one by one,check which one have defects. • replace the defective parts.

Problem 4：fan can’t work

reason	Proper operation
Fan can’t work	• press FAN button on the panel to start the fan. • if need to input Fan PIN(default:0001) • LED for fan should be on, then fan will start • if fan won’t work, then go to next step. • if the LED light is not on, refer to problem 1.
DC voltage problem of relay board	• Measuring the terminal introduced voltage on relay board(notice to the polarity) • voltage should be in 6.75-8.25 VDC • • If the voltage is out of range or no voltage, check the connection line between the SMPS and the motherboard. • if the voltage is correct, pls go to next step.
fuse or circuit	• check the AC voltage in the relay panel. • Ensure that the fan button and LED is in power • measuring the AC voltage from terminal board or from the end of the three terminal boards. • if the end(terminal with a cable) have voltage, check the central end and terminal board. • check the fuse on the relay board. • if fuse is broken,it have to be replaced with new one. • if fuse is no problem,check voltage of the terminal block and circuit of relay board. • There is voltage on the terminal end with the cable that the fuse is good.Circuit is without power.
Motor speed controller is defective	• shut off the fan switch。 • Join route cables between two speed controlled cables. •jumper cable draw away speed controller from the circuit, fan should start to run at full speed. • open the fan switch • if fan run at full speed, then speed controller is defective and need to replace. • if fan Do notrun, there is no problem on the speed controller, go to next steps.
Capacitor defective	• shut off power of cabinet. • Find the capacitor, unplug the two cables of capacitor. • use capacitance meter or DVM to measure capacitance,record the data between two capacitance cables. • If the value is beyond the range specified in Table 1, replace the capacitor • If the capacitance value is within a given range, continue to the next step.

Auto heating cut	• check fan when over heating-Motor has built-in heat circuit breaker • shut off fan and then restart it after 60 minutes. • If the fan can be restarted, it shows that there is a high temperature inside the safety cabinet. • If the fan can't be restarted,continue to the next step.
Motor fault	warning： The safety cabinet must be disinfected before opening the panel to enter the fan. • Check mechanical damage. • the motor can rotate or not. • check cables. • check the fan.

Problem 5：Airfail

reason	proper operation
The external air disturbance	• airflow sensor is located at the top of the cabinet and the upper of the exhaust filter •ensure that the air source in the vicinity of the sensor without external interference,such as ventilation holes, lights, near to the ceiling. • If there is no external disturbance, please go to the next step.
The grid blocking of the safety cabinet	• ensures that the air inlet grille in the safety cabinet is not blocked, and the safety cabinet is not overloaded. • If the intake grille is not blocked, please go to the next step.
The air sensor is loose or is not in the correct position	• find out the airflow sensor at the top of the safety cabinet. 1． ensure that the surface of the sensor is not blocked,the penetrating hole is vertical to the filter surface. 2． Exhaust air sensors are not close to the box 3． sensor box and filter surface without gap. 4． sensor box tightly affixed to the safety cabinet.
Low building supply voltage(if it is a new safety cabinet, check this)	·open the power box, to find out test point of motor voltage. Note: the professionals need to adjust all voltages. For a new safety cabinet, if the motor voltage is less than the rated voltage recorded in the factory inspection report, it is required to adjust the speed controller, according to the test report, to change the output voltage of the wind turbine. ·For the a year used of safety cabinets, with reference to the last test report of the motor rated voltage. If there is no test report, measuring the actual flow of the safety cabinet, correspondingly increase the motor voltage, to achieve the rated air flow rate ·If the power supply voltage is correct, please go to the next step.
The power supply of the gas flow sensor is defective (SMPS)	·it need to power the cabinet when implement the test. ·Find the location of the 5 pin connector. ·On the back of the 5 plug connector, the DC voltage between the green (pin5) and the black (pin4) is measured; and the voltage at the other end of the switching power supply is measured. ·Voltage should be in the range of +12VDC + 10%. ·Do notneed to measure the voltage at the other end of the 5 plug connector. ·If out of range, check the power of the SMPS molded wire. - check wire connection terminals. The input voltage of SMPS should be 10% of the introduced voltage of the safe cabinet. ·If there is an input voltage, there is no output voltage, please replace the SMPS.
Safety cabinet need to set up the airflow	·referring to the test report to set up the airflow.
calibration	·re-calibration of the microprocessor, follow the calibration procedures in the test report.Warning: it can only be performed by professional personnel. <u>Check calibration data</u> ·After the calibration is completed, press the MENU button two times, enter the main display interface.

	·press SET/Diagnostic button， LCD will show the current security cabinet using the model and software version number. ·Press the DOWN button to find the information below: 1, TEMPERATURE: shows the actual ambient temperature. 2, IFF: ADC intake flow is not enough when the ADC value - based on the amount of the air flow is calculated using the compensation calculation. 3, IFN: ADC intake flow of the fixed-point ADC value - the sensor calibration set on time. 4, IF0: ADC factory calibration zero point into the air flow of the ADC value (no air flow) - zero school on time setting. 5, IF1: ADC factory calibration into the ADC value when the air flow is not enough. 6, IF2: ADC factory calibration of the ADC value of the fixed point into the air flow 7, DFN: the rating of the sinking air velocity - field calibration time input. 8, CONSTANT: air flow sensor constant value - sensor calibration input. 9, TEMP: CALIB factory calibration temperature. 10, TENP: ADC temperature ADC value. Note: according to the pre-set instrument unit in SETTINGS>MEASUREMENT UNIT> (metric or Imperial), temperature and speed of the unit will be changed accordingly. As a metric - C, m/s and imperial - "F, fpm. Factory setting is metric. ·After calibration is completed, in order to avoid the shortage of air flow alarm or LCD display unstable airflow speed, please operate the following: 1、 CONSTANT value is correct. Use this value to check the list of records that are written on the surface of the device, or the list of internal components that can be replaced in the test report. 2、 TEMPERATURE display indoor temperature. If not, refer to the section B of the problem. 3、 IF0 ADC < IF1 ADC < IF2 ADC. If not, please re calibrate it in the correct order. CONSTANT SET, ZERO CALIB, SET. If there is ERROR CALIBRATION, please refer to the possible problems of the section A . 4、 IF0 ADC < IFN ADC, if not, please follow the correct order, re calibration. CONSTANT SET, ZERO CALIB, SET. If there is ERROR CALIBRATION, please refer to the section A of the problem. 5、 the calibrated IFA ADC value should be close to the IFN ADC value. If not, adjust the speed controller, by means of at least±20 units.
sensor failure	A． sensor failure / misalignment • Find the main board location. • Using DVM, check the output voltage of the J1 (- +) sensor on the channel AIN1 (+) and on the motherboard • If the voltage of the motor is increased, then the sensor voltage should be increased. If the voltage of the motor is reduced, the voltage of the sensor should be reduced. • if it is different by observation,check the connectors which is from sensor to cabinet body and the connectors on circuit board are loose or not. • If the connection is no problem, but the sensor is still not working, please replace the sensor. • If the air current transmission feels to work properly, please go to the next step. B． temperature sensor failure • check output voltage of the temperature sensor in the channel AIN4 (-) and the motherboard J4 (+) e by DCM • 0.01VDC should be on behalf of 1. For example, if the output voltage is 0.25VDC, the temperature is 25 degrees Celsius. Tolerance + 1 C is acceptable. • If the reading error, please change the temperature sensor. • If the temperature senor is correct,pls go to next step.

Problem 6：internal noise is too big

reason	Proper operation
resonance	• Find the position of the motor speed controller. • Measurement of motor voltage degree records. • increase the motor speed 5-10VAC, does the noise change or disappear? • If the noise is gone, please professionals, measure the actual flow rate. 1.if the speed is still in the acceptable range, the need for maintenance. 2.If the speed is beyond the acceptable range, or the noise is still there, please go to the next step.
Motor loose or impeller loose	• Refer to the problem 2- capacitor defective parts, check the capacitor if required. Note: before entering the fan, disinfect to cabinet. • Open the fan cover plate, view the fan assembly bolt is tightened. • There is no noise when the fan rotates. • If the wind turbine mechanical damage, please replace.

Problem 7: fluorescent lights are always off

reason	proper operation
the sliding window in the alarm condition.	The LED light on the front panel is on? Whether to press the LIGHT button, to ensure that the sliding window in the normal operating position (normal operating height). Note: the sliding window must be in the normal operating position. Is there a pre heating? Note: if the security cabinet is in the warm-up phase, the fluorescent light is not on, unless in the quick start mode. Move the sliding front window to the ready position (normal operation height). Press the LIGHT button on the film to turn on the light. If the LED light is on, the buttonboard and the main board can work normally. If in the right place, the fluorescent lamp still cannot be lit, continue to enter the next step. If the LED LIGHT lamp is still not light, please jump to the part of the prepared magnetic switch.
The fluorescent lamp burned out	replace broken. The fluorescent tube is located within the blue panel.
Fluorescent lamp ballast problems or problems of the relay board	To check the voltage of the relay board. Find the AC circuit, which measures the LS7 voltage of the terminal board and the line terminal on the three terminals (J13 on the board). if the end terminal (terminal cable) voltage, check the central terminal (normally open circuit) to the terminal board (neutral) voltage. The central terminal has no voltage to explain the fuse or circuit without power. Check the fuse on the relay board. If the fuse F7 fuse, temporarily use F5 (alternate) instead of F7. If the fuse F7 is good, check the voltage of the terminal board (center line) and the LS7 circuit on the line terminal (J13 on the relay board). There is no line at the end of the wire with a voltage description F7 fuse is good, the circuit does not have power. Make sure that the LED LIGHT light is on. If the ballast has power, the lamp is new, the problem may be the connection line or ballast. Check the connection of the connector C. If the terminal is not loose, replace the ballast.

Reserve magnetic switch problem	The LED of the fluorescent lamp is bright, and the sliding window is in the normal operating position (ready for the state). The display screen displays SASH:OK or SASH:NO? SASH:NO note that the sliding window is not in the correct position, and the fluorescent lamp LED should be not bright, which indicates that the motherboard has a problem or a magnetic switch has a problem. When facing the security cabinet, remove the side cover of the right sliding window, you can find the magnetic switch to control the position of the sliding window. On the right side, there are 3 magnetic switches. The middle one is the ready position. In the middle of the switch, there is a magnet attached to the glass. In the switch or the magnet position, so that the distance between them in the 10-13mm (to 1/2 3/8), if the distance is too far, the switch may not be controlled by the magnet. If LCD still displays "SASH:NO?", the switch may have a problem or the line is connected to the problem, check the connection line and go to the next step.
Connection line problem	Find the C connector and D, check the connector and the female side. If the LED of the fluorescent lamp is bright, but the light still can not be lit, return to the problem 7, repeat the process of troubleshooting.

Problem 8: the UV lamp is always closed

reason	proper operation
The sliding window is not in the ultraviolet state	Reduce the sliding window to the UV mode position. If FULLY CLOSED SASH is not displayed on the LCD, please refer to the magnetic switch for troubleshooting the part. Press the purple button and turn on the UV light. If FULLY CLOSED SASH is displayed on the LCD, but by the UV button, the UV lamp is not turned on, please refer to the magnetic switch to exclude the part.
There is a problem with the UV lamp	Replace the Problematic UV lamp.
There is a problem with the ballast of the ultraviolet lamp.	Check the voltage of the relay board. Find the position of the LS8 (J15 terminal) circuit, measure the AC voltage of the large terminal board (center line) and the 3 wiring board (J15 on the relay board). If the end of the line terminal (terminal with a wire) without electricity, please refer to the next step in the ultraviolet relay circuit LS8 without electricity. If the line terminal (with the terminal) has a voltage, check the voltage of the central terminal (normal disconnect circuit) to the blue terminal board (neutral line). The central terminal has no voltage to indicate that the fuse or circuit does not have electricity. Check the fuse on the relay board F8. If the fuse F8 fuse, temporarily replace the F5 with F8. (backup) If the fuse F8 is good, check (the center line) terminal board and LS8 circuit (on the J15 terminal on the relay board) terminal voltage. There is no line at the end of the wire there is a voltage that the F8 fuse is good, the circuit does not have electricity. Make sure the UV LED is open. If the ballast is a bit, the UV lamp is new, the problem may be connected to the electric wire or the UV lamp ballast. Check the connector E (115V) or B (230V) wire connection. If the terminal is not loose, replace the UV lamp ballast.
UV relay circuit LS8 and K2 relay without electricity	LS8 does not have the power to indicate that the K2 relay is open. Check the magnetic UV interlock switch on the left side of the sliding window. Check K2 relay AC Check the AC voltage to and from the K2 relay There is no voltage to say the connection between the line of fire and the K2 relay. If the K2 relay is provided with a voltage, but the K2 relay has no voltage, which

	indicates the connection line between the relay D-6 and D-3. In the D connector, jumper switch to simulate a closed connector D-6 and D-3. If the relay does not have power, check the K2 coil to the connector D connection and the neutral line from the K2 to the DC power supply. If there is no problem with the connection of the electric wire with the naked eye, there is no trace of burning or blinking in the K2 relay. If there are traces of burning or blinking, replace the relay. If there is no burning or flashing traces, cut off the power supply of the safety cabinet. Cut off the relay cable, check the continuity of the K2 relay terminal.NC to Com continuity, and Com to NO is not continuous. If you find that the end of the continuity of the wrong, and replace the relay.
UV magnetic switch has problems or not aligned	Moving the sliding window to the fully closed position SASH:FULLY should display CLOSED..LCD If the LCD display shows "SASH:NO!" the sliding window is not completely closed. Check the magnetic switch. There are 3 magnetic switches on the right side of the safety cabinet. The bottom one is the UV mode. A magnet is attached to the top of the glass on the edge of the switch. Changing the position of the switch or the magnet, the distance between the two is 10-13mm (to "1/2 3/8"). If the distance is too far, the switch may not be able to detect the magnet. If LCD is still displayed "SASH:NO check the connection of the D-4 and D-5 pins on the connector D. U/V simulation of a closed - jumper switch in D-4 and D-5 pin connector D between. If this UV can not be opened, return to the beginning of this process, and then check it again.

Problem 9: power supply socket is always blocked

reason	Proper operation
Connection problem	• The LED lamp of the socket can not be lit? 115VAC security cabinet, check the GFCI socket, if the LED on the GFCI is lit, press the middle of the RESET button to reset the GFCI, if the LED with the GFCI socket input, that the socket has electricity, but the short circuit. Check the voltage of the relay board. Find the position of the LS4 (J6 terminal) circuit, measuring the AC voltage between the terminal board and the 3 terminal board (J6). If the end of the line terminal (with the cable terminal) has a voltage, check the central terminal (normal disconnect circuit) to the (middle line) terminal board. There is no voltage on the central terminal to indicate that the fuse or circuit does not have electricity. Check the fuse on the relay board. If the fuse F4 fuse, temporarily use F5 (alternate) instead of F4. If the fuse F4 is good, check the voltage between the end of the (middle line) end plate and the end of the line on the LS4 circuit (J6 on the relay board). There is no line terminal with a wire which has a voltage indicating that the F4 fuse is good and that the circuit does not have electricity. Make sure that the socket LED is on. If the relay is electrically powered, the E (115V) or B (230V) 1 and 4 pins to the connector E (115V) or () or B (230V) 2 and 5 pins can be checked. If there is electricity through the connector E, remove the plug from the wall. Check the power supply to the safe, and then to the power outlet. There is no problem with the circuit. Return to check the voltage of the connector E (115V) or B (230V). If there is no voltage to the relay, check the auxiliary power cord (if it is provided with two power supplies). Make sure that the connection to the socket is the correct voltage.

	If the socket and wire are connected, check the external power of the connector C-3 C pin and the C-6 center line. Use the red and blue wiring board, confirm the electricity, the middle line is very good. There is no electricity to show that there is a problem between the wires and the connectors. Check the power cord, IEC entrance and connector C between the connection is a problem, whether it is loose.

Problem 10: contaminated samples / laboratory

reason	Proper operation
Grille blocked / safety cabinet put too many items	Note: the sample is contaminated under normal circumstances is the following several led: - the user's use of technology is not good or lack of training. - samples have been contaminated in the incubator or elsewhere and not in the biological safety cabinet. Use a biological safety cabinet to check the following items: - ensure the grille in the front and rear are not blocked. Get all the equipment and other items from the safe and clean the area under the working table. Wipe clean all the items in the biological safety cabinet. If the pollution problem remains, check whether the safety cabinet has been certified, including air flow and filter leakage tests.

Software trouble shooting

error code	proper operation
Sliding window: position error	The magnet switch is located on the right side of the side cover.

magnetic switch 1	magnetic switch 2	magnetic switch 3	magnetic switch 4	describe
off	on	on	on	The sliding window is completely opened, the alarm is alarm, and the alarm can eliminate the sound.
on	off	on	off	Sliding windows completely closed, you can operate the UV lamp
on	on	off	on	Safety cabinet sliding window in standard height, ready to use
on	on	on	on	Sliding windows in the unsafe condition, alarm alarm, alarm can not eliminate the sound.
Reset condition				Sliding window: detect the error location

Sensor not calibrated	Calibration controller. Calibration of reference test report.			
Sliding window position	function	Normal or quick start mode, airflow alarm is turned on	Normal or quick start mode, airflow alarm off	maintenance mode
ready	Sliding window position detection	yes	yes	yes
	Fan control	Yes, the requirements of preheating and exhaust time, PIN FAN password	Yes, the requirements of preheating and exhaust time, PIN FAN password	Yes, do not need to preheat and exhaust time, do not PIN password
	Lighting control	yes	yes	yes
	Socket control	yes	yes	yes

	UV control	Interlocking	Interlocking	Interlocking
	Entry menu	Yes, need ADMIN or PIN USER password	Yes, need ADMIN or PIN USER password	Yes, do not need PIN password
	Press SET button	Complete diagnostic information	Complete diagnostic information	Complete diagnostic information
	timer	yes	yes	yes
	Current time display	yes	yes	yes
	Air velocity display	yes	yes	yes
	If there is no calibration, the sensor is not calibrated			
	Air velocity display	yes	yes	no
	Air flow recession check	yes, if the air flow is weakened, the alarm and the display alarm	yes, if the air flow is weakened, the alarm and the display alarm	no
Sliding window alarm	Sliding window position detection	yes	yes	yes
	Current time display	yes	yes	yes
	Sliding window alarm	yes，Not variable	yes，Not variable	Not variable
	Fan control	yes，Do not need preheating and exhaust time, do not PIN password	Yes, do not need to preheat and exhaust time, do not PIN password	Yes, do not need to preheat and exhaust time, do not PIN password
	Lighting control	no	no	yes
	Socket control	yes	yes	yes
	UV control	Interlocking	Interlocking	Interlocking
	Air velocity display	yes	yes	yes
	Air velocity display	yes	yes	yes
	Air flow recession check	yes，If the air flow is weakened, the alarm should alarm.	yes，If the air flow is weakened, the alarm	no

			should alarm.	
Fully open	Sliding window position detection	yes	yes	yes
	Current time display	yes	yes	yes
	alertor	Yes,Can be changed for 5 minutes	Yes,Can be changed for 5 minutes	not applicable
	Fan control	Yes,Require preheating and exhaust time, PIN FAN password	Yes,Require preheating and exhaust time, PIN FAN password	not applicable
	Lighting control	yes	yes	yes
	Socket control	yes	yes	yes
	UV control	Interlocking	Interlocking	Interlocking
Complete closure	Sliding window position detection	yes	yes	yes
	Require closing fan	yes	yes	no
	Fan control	Interlocking	Interlocking	yes
	Lighting control	Interlocking	Interlocking	yes
	Socket control	yes	yes	yes
	UV control	yes	yes	Interlocking

Connection description

Terminal code	Meaning
1、2、3	T1；PT100 Temperature sensor
4、、5、6	V1、G1、12V；V1 for wind speed output signal, G1 for GND, 12VDC for 12V power supply
7、8、9	no
10、11	no
12、13	IN2；Front window on / off signal access
14、115	IN3；Front window super high signal access
16、17	no
18、19	LZ-17 Transformer ~ 17V access terminal
20、21	LZ-17 Transformer ~ 15V access terminal
22、23	LZ-17 Transformer ~ 11V access terminal
24、25	OT1；Lighting access terminal
26、27	OT2；UV access terminal
28、29	OT3；Socket power supply access terminal
30～37	no
38、39	L、N；AC220V electric access terminal
40、41	OT8；Fan access terminal, of which 40 for the N phase

Alarm list

1 temperature sensor fault E1　2 wind speed is high E2

3 send wind speed low E3　4 exhaust wind speed is high E4

5 exhaust wind speed low E5　6 filter failure E6

7 front window position offset E7　8 connection fault E8

Packing list

	name	quantity	remark
1	equipment	1 set	
2	support	1 set	4 pieces
3	6mm hexagon wrench	1 pcs	Meet to M8 hexagon screws
4	manual	1 pcs	

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