BioMAT 2-S2

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General Description – 1.1

The BioMAT 2 Microbiological Safety Cabinet has been designed to provide optimum performance for both operator and product protection. Using the latest developments in microprocessor and fan technology, it is designed to exceed the performance requirements of the European Microbiological Safety Cabinet Standard EN12469:2000. The safety cabinet carcass and all seals are maintained under negative pressure ensuring air cannot leak out during normal operation.

Class 2 Safety Cabinets offer both operator and product protection; they ensure that any aerosols generated within the cabinet are filtered via high efficiency filtration (HEPA) prior to being dispersed back into the laboratory or discharged to atmosphere. Operator protection is provided by an air curtain across the working aperture in the front screen. Protection of the products from external contamination is provided by a unidirectional downflow of sterile air into the working area.

The Class 2 Microbiological Safety Cabinet can be supplied as standard in any of the following three configurations:

- **Re-circulating Type** – Air from the safety cabinet passes through **two** high efficiency filters (HEPA) before being released back into the laboratory. The exhaust air is made up of approximately 40% of the total air volume handled by the safety cabinet. Approximately 60% of the air is re-circulated within the safety cabinet and passes through a high efficiency (HEPA) filter to ensure sterility within the work area.

- **Exhaust Type** – Exhaust air from the safety cabinet is passed through a single high efficiency filter (HEPA) before being dispersed to atmosphere via a fan assisted extract system. The exhaust air is made up of approximately 40% of the total air volume handled by the safety cabinet. Approximately 60% of the air is re-circulated within the safety cabinet and passes through a high efficiency (HEPA) filter to ensure sterility within the work area.

- **Thimble Type** – Air from the safety cabinet passes through **two** high efficiency filters (HEPA) before being discharged into an open duct, usually a specific building extract system used to ensure laboratory extract & pressures are maintained. This extract system is monitored via the safety cabinet controls, in the event of an extract system failure the operator will be notified by an audible and visual alarm on the cabinet. The exhaust air is made up of approximately 40% of the total air volume handled by the safety cabinet plus an amount of air from the laboratory. Approximately 60% of the air is re-circulated within the safety cabinet and passes through a high efficiency (HEPA) filter to ensure sterility within the work area.

Quality Assurance – 1.2

Although fully tested before leaving our factory as part of the ISO 9001:2008 Quality Assurance Programme, the specified performance will only be maintained if your cabinet is sited correctly and regularly serviced. CAS can only accept responsibility for correct functioning of your cabinet if: -

- The safety cabinet is correctly sited in the laboratory to avoid any adverse conditions within the room that may affect the level of operator protection i.e. close to air supply grilles, laboratory doors or thoroughfares.

- It has been installed and commissioned by CAS trained personnel or approved CAS agents.

- Extension, modification, relocation, repairs or other maintenance is carried out by CAS personnel or persons authorised by CAS or, in the case of electrical work, by qualified electricians.

- In the case of repair or maintenance, it is important OEM replacement parts supplied by CAS are used.

- The electrical installation surrounding the unit and to which it is connected comply with the latest IEC regulations.

- The unit is used and maintained in compliance with the instructions contained in this manual.

CE Declaration of Conformity

CAS declares that the equipment supplied conforms to the following CE directives—

72/23/EC	**Low Voltage Directive and its amending directives**
89/336/EC	**Electromagnetic Compatibility Directive and its amending directives**
98/37/EC	**Machinery Directive and its amending directives**

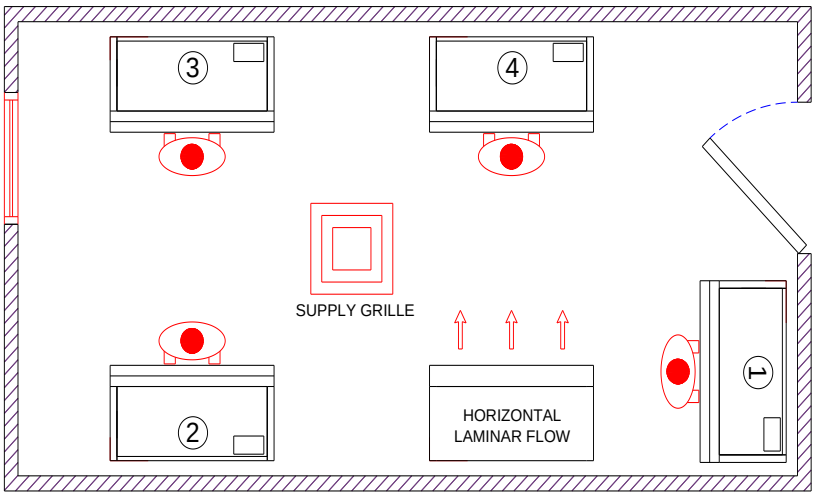
Cabinet Siting – 1.3

The siting of your Safety Cabinet is extremely important. Air currents and the movement of people in the laboratory can adversely affect the performance.

Safety Cabinets should be sited away from;

- Doors and windows which open
- Draughts caused by ventilation and air conditioning units
- Pedestrian traffic routes
- Other safety cabinets or fume cupboards
- Adjacent fridge & Incubator doors

These points are of particular relevance to class 2 safety cabinets. The diagram shown below indicates some suggested locations for the correct siting of safety cabinets and highlights some situations which should be avoided.



Position 1 - An acceptable site not affected by disruptive air currents

Position 2 - Well sited, supply grille must be low velocity discharge.

Position 3 - Poorly sited if windows open – If not it should be a safe distance from the cabinet opposite.

Position 4 - Poorly sited – can be affected by air currents from the opening door, through traffic and the horizontal laminar flow workstation sited directly opposite.

Installation – 1.4

Safety Cabinets are sophisticated items of equipment containing delicate filters which require expertise in their safe handling and installation into laboratories.

For exhaust type safety cabinets, the exhaust ductwork route should ideally be surveyed and ductwork installation be carried out by qualified engineers as it forms an integral part of the system relating to the overall performance of the cabinet and is required to conform to various safety standards.

A poorly installed cabinet may compromise the protection provided by the cabinet to both personnel and work being handled, it may also present a hazard to other occupants of the building and the general public.

- Make-up Air

It is important that any make-up air compensating for the air exhausted from the safety cabinet does not cause draughts to the discomfort of the laboratory staff or be detrimental to the cabinet performance.

Air supply diffusers should be positioned more than 1500mm away from the front of the safety cabinet and have a maximum velocity of no more than 0.30m/sec.

- Commissioning

When any safety cabinet is installed, it is necessary to carry out a number of commissioning checks in order to ensure it is fully operational and that the performance on site satisfies the current standard BS EN 12469:2000. This includes measuring airflows, testing the HEPA filters with a suitable challenge aerosol and a KI Discus Test (operator protection test) at the open aperture which is used to assess the containment of the cabinet.

CAS employ a team of fully trained installation and commission engineers to carry out all work necessary. This ensures all new safety cabinets operate to the desired performance.

- Site Surveys

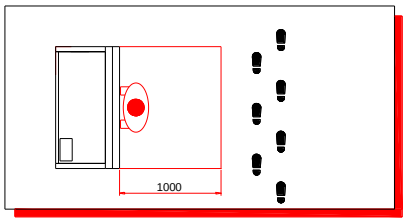
If you have any queries regarding the siting of your safety cabinets we will be only too pleased to arrange a site survey by one of our regionally based technical support staff.

- Periodic Maintenance & Servicing

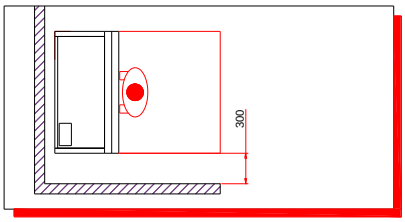
To maintain safety cabinets at their optimum level of performance and to ensure lifetime operation, regular servicing is essential. CAS provide a full service and maintenance scheme tailored to suit your individual needs. For more information on this please contact our service department on **0161-655-8860**.

Avoiding Disturbances – 1.5

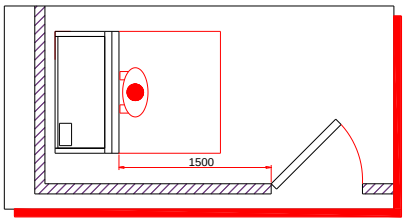
The sketches below show recommendations to help avoid disturbances for the cabinet operator and safety cabinet performance.



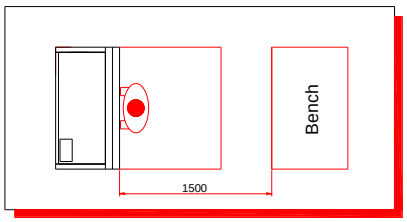
Keep pedestrians away from the front of your safety cabinet



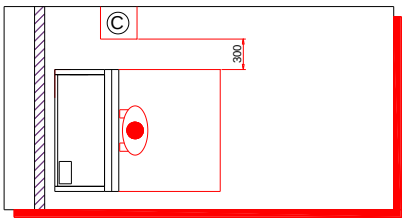
Keep clear of adjacent wall



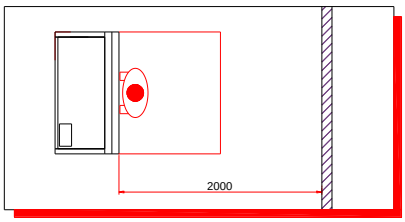
Position well away from the door openings



Position clear of bench opposite



Keep clear of structural columns



Keep well away from opposite wall

Technical Data – 1.6

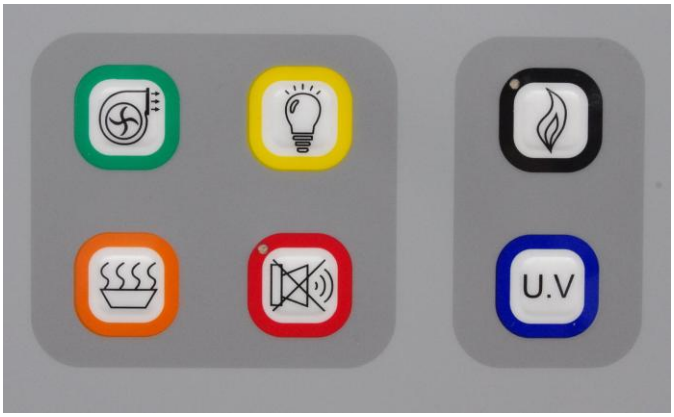
Cabinet Size		900mm	1200mm	1500mm	1800mm
Dimensions					
External Dimensions	(w/d/h)	900/705/1420	1200/705/1420	1500/705/1540	1800/7051540
Internal Dimensions	(w/d/h)	810/560/700	1110/560/700	1410/560/700	1710/560/700
Work Tray	(w/d)	770/400	1070/400	1370/400	1670/400
Opening to Work Area	(w/h)	770/200	1070/200	1370/200	1670/200
Weight Typical	Kg	210	220	315	350
Loading Capacity					
Work Surface	Kg	25	25	25	25
Air Volumes Typical					
Exhaust Air Volume	m^3/sec	0.09	0.130	0.160	0.190
Re-circ Air Volume	m^3/sec	0.130	0.190	0.240	0.290
Pressure Drop Typical					
Exhaust Clean Filters	Pa	300	300	300	300
Exhaust Dirty Filters	Pa	500	500	500	500
HEPA Filter Data					
HEPA Type		H14 (EN1822)	H14 (EN1822)	H14 (EN1822)	H14 (EN1822)
Efficiency	@ 0.3µ	99.999%	99.999%	99.999%	99.999%
Heat Gains Typical					
Recirc	Watts	190	190	270	350
Exhaust	Watts	100	100	135	175
Noise Typical					
Noise Level	dB (A)	<52	<52	<55	<55
Light Typical					
White interior	Lux	>1000	>1000	>1000	>1000
St/St Interior	Lux	>800	>800	>800	>800
Duct Connection (Exh)	Mm	160	160	200	200
Electrical Data Typical					
Voltage	Volts AC	230	230	230	230
Frequency	Hz	50	50	50	50
Phase	N/A	Single	Single	Single	Single
Power Consumption	kW	0.19	0.19	0.27	0.35
Current	A	3	3	5	7
Internal Socket(s)		230v /13 Amp	230v /13 Amp	230v /13 Amp	230v /13 Amp

This Manual – 1.7

This user manual has been prepared to provide a basic operating and maintenance instruction. It is intended to supplement existing in-house procedures and codes of practice, and not to replace them. If further advice is required on the use or maintenance of this equipment, the staff of Contained Air Solutions Ltd. will be pleased to assist wherever possible.

Switches & Indicators – 2.1

The diagram below shows a typical control panel membrane layout for the BioMAT 2 safety cabinet.



DESCRIPTION	LEGEND	COLOUR	FUNCTION
A – Cabinet Operation		Green	Starts / Stops power supply to fans and control circuits.
B – Lights		Yellow	Controls power to work area lighting.
C – Gas Valve (Optional Feature)		Black	Used to activate a solenoid Gas Valve (if fitted). Will only function when cabinet airflows are in a safe working condition.
D – Alarm Mute		Red	To mute the audible alarm. Fault indication on display will remain lit until fault is rectified, red alarm strip bar mounted in the bottom of the control panel door works in conjunction with the visual alarm.
E – Fumigate		Orange	To activate decontamination cycle. Will only operate when cabinet is switched OFF and visor is closed. (can be configured to formaldehyde or VHP).

F – UV Lights (Optional Feature)		Blue	Used to activate power to UV Lights. Will only operate when cabinet is switched OFF, interlocked with cabinet lights.
G – Lock Function		On TFT Display (Touch screen) Shown locked	Lock facility for supervisor & maintenance engineer control, used to prevent cabinet operation during decontamination or otherwise. When pressed it will request a lock number, this is **8860**.

DESCRIPTION	LEGEND	COLOUR	FUNCTION
UP Arrow		Red Border	Used to drive the front sash open
DOWN Arrow		Red Border	Used to drive the front sash closed

Start Up Procedure – 2.2

The following notes are for guidance where local laboratory instructions do not exist or are inappropriate. They should complement, not replace, existing codes of practice issued by your Laboratory Safety Officers.

- Ensure mains power supply to the cabinet is switched on as evidenced by the main TFT display illumination, the CAS logo will be displayed (home screen). The lock function must be set to `un-locked` icon. This is a padlock symbol on the main display.

- Press the green switch 'A' on the control panel membrane – The display will change to show a cabinet complete with an animated airflow diagram, the front glass sash will automatically rise to provide a 200mm working height and the fans will start. The exhaust fan will be energised initially to ensure a sufficient inflow of air is achieved, once the required inflow velocity is achieved the downflow fans will start. The main display will show `AIRFLOW STABILISING` and a countdown timer of 30 seconds will be displayed, once the airflows are settled and the timer has elapsed the display will show `INFLOW SAFE` & `DOWNFLOW SAFE`, adjacent the animated airflow diagram should display green filters. On start up an audible alarm will sound until the airflows achieve a safe condition; this may be muted using the Alarm Mute button `D'.

  NOTE: Should the airflows change significantly and fall out of the specifications laid down in EN12469:2000 then the cabinet alarms will be automatically activated.

- Switch on the interior lighting using button 'B'.
  The lighting can be configured as interlocked or non-interlocked. If the lighting is interlocked, it will only operate once the cabinet has achieved a safe working condition.
  Should the lighting configuration be set to non-interlocked then the lighting can be operated regardless of cabinet operation, i.e. lights can be witched ON or OFF for use when loading or unloading equipment prior to operation.

  NOTE: A lighting configuration of either interlocked or non-interlocked are generally factory set, however this can be amended on site by a CAS engineer if required during commissioning.

- Should the sash need opening further than the 200mm point to load or unload equipment then the UP arrow on the control panel membrane should be used. Once the equipment is loaded the DOWN arrow button should be de-pressed once and the sash will return to the 200mm position.

  NOTE: In the event an object is trapped when the sash is travelling down an anti-trap feature will drive the door back upwards by approx 50mm. To drive the visor closed from 200mm to fully closed the DOWN arrow must be pressed and held.

Shut Down Procedure – 2.3

- The work area should be cleared of any apparatus and equipment; it should be fully cleaned in accordance with laboratory codes of practice. The cabinet should be left running for a few minutes to ensure any residual aerosols are removed.

- Switch off the interior light using button `B` on the control membrane.

- Switch off the cabinet using button `A` on the membrane.

- Drive the sash closed by pressing and holding the DOWN arrow on the control membrane. In the event something gets trapped the visor will rise back up approx 50mm. If the sash DOWN button is pressed whilst the cabinet is operating the fans will automatically switch off once it reaches the 50mm position, this ensures the fans are off when the sash is closed.

Cleaning Procedure – 2.4

Regular cleaning is very important to prevent the build-up of dirt and hence potentially infectious material. Routine swabbing of work surfaces with 70% v/v IMS (ethanol) or IPA (Isopropyl Alcohol) is recommended.

For cleaning the work surfaces swabbing with a mild detergent in warm water is very effective. Phenolic or Cresolic disinfectants should be avoided as they may stain the white surfaces with a brownish colour. If they are used, any spillage should be quickly rinsed with clean water and mopped up with an absorbent tissue. Most of the quaternary ammonium compounds and the Glutaraldehyde based surface disinfectants are suitable.

To facilitate cleaning of the work zone and the interior, the whole front screen / visor may be opened and lowered from the top, supported by the hinges at the lower edge. It is good practice to clean the inside of the viewing screen to ensure adequate visibility of the working zone. ***Always consult the Laboratory Safety Officer before carrying out this procedure.***

Warning

If Hypochlorites are used to clean the stainless steel interior of the safety cabinet, they will initially cause rust spots and over time may lead to further damage.

Disinfectants containing acids, alkalis, electrolytes and hypochlorite's can adversely affect metal parts and cause corrosion.
Disinfectants containing organic solvents can damage plastics.

Fumigation & Formalin Quantities – 2.5

When handling hazardous materials, the air space inside the cabinet should be decontaminated regularly and always before servicing and following any spillages. Fumigation by formaldehyde gas is the recommended decontamination procedure for biological hazards although there are alternative methods available including VHP and Ozone decontamination.

To facilitate the fumigation a sequence has been incorporated in the cabinet controls, this is detailed under fumigation procedure.

A convenient way of generating sufficient formaldehyde is to boil off Formalin (40% formaldehyde BP or equivalent) in a suitable vessel such as a formalin vaporiser. These are available from CAS.

Always consult your Laboratory Safety Officer prior to fumigation of a safety cabinet.
***** If in doubt ask *****

Formalin Quantities

The recommended quantity stated in BS EN12469:2000 on Page 40 Annex J, Part 2 is 60ml formaldehyde solution mixed with 60ml distilled water per cubic meter of cabinet volume.
However, this quantity is now considered in excess of that required to achieve a satisfactory kill throughout the cabinet.
We have therefore produced the following table based on quantities employed by users of large numbers of Safety Cabinets.

If you still consider that the quantities recommended in the British Standard are to be used, you may find on completion of the fumigation cycle that high quantities of fluids containing formaldehyde are present in the cabinet and across the work surface.

Cabinet Size	900mm	1200mm	1500mm	1800mm
Formalin	15ml @40%	20ml @ 40%	25ml @ 40%	30ml @ 40%
Distilled Water	15ml	20ml	25ml	25ml

Fumigation Procedure – 2.6

- Switch off the cabinet fans by pressing the green button 'A' on the control panel.

- For re-circulating type safety cabinets, a fumigation extract kit (Optional Kit) should be fitted to the cabinet discharge. Ensure the manual damper or blanking plate is fitted and fully closed, this prevents any fumigant leakage from the cabinet discharge during fumigation. For cabinets connected to a duct system proceed as follows:

    - Fill the formalin vaporiser with the correct amount of Formalin (see section 2.5 for quantities) and screw on the aluminium cap – finger tight, having checked the gasket in the cap is undamaged. If the vaporiser is free standing, place on the cabinet work tray, plug into the cabinet internal socket and switch on. Press the DOWN button on the control panel and drive the sash to the fully closed position. Fumigation wedges are provided with each cabinet, these are used to help provide additional pressure from the glass to the seal during fumigation. The image shown below shows the fitting positions for the fumigations wedges.

    - Now press the fumigation button `E' and the display will show `FUMIGATION IN PROGRESS'. A countdown timer will be shown directly below in minutes e.g. `285 MINS`. During the first hour of the fumigation cycle the internal fans (downflow fans) will cycle for 20 seconds at 20 minute intervals, this ensures formaldehyde is well dispersed within the cabinet and through the HEPA filters.

Warning

Ensure all laboratory personnel are aware that the fumigation is taking place; appropriate warning notices should be put on all doors entering the laboratory and on the cabinet being fumigated.

- The cabinet should be left for a minimum of 6 hours, preferably overnight.

  Note: Once the 'fumigate' button has been activated DO NOT SWITCH CABINET ON until the cycle has been completed.

- On completion the cabinet will display `FUMIGATION COMPLETE` and `READY TO VENT`. When ready, press the fumigation button to exit the fumigation cycle and then press the green button `A` to purge the cabinet of formaldehyde gas.

For re-circulating type safety cabinets press the 'fumigate' button to complete the cycle and open the manual shut-off damper on the fumigation adaptor kit (Optional kit) having first fitted the extract tubing and placed the discharge point in a location approved by the Laboratory Safety Officer.

***** When fumigating a re-circulating type safety cabinet where venting is unobtainable, CAS can offer a ForMAT sterilisation kit, this is a semi-automated process which uses ammonia to neutralise the formaldehyde following the decontamination cycle. Any residual ammonia is then removed via a carbon filter module which attaches to the cabinet discharge, contacts CAS for more info on the ForMAT sterilisation kit *****

- Switch on the cabinet and then remove the sealing tape. To avoid formaldehyde being drawn out of the cabinet remove the rubber bung when using a 100% sealing closure panel. If using a lightweight closure panel carefully remove.

- Within the first few minutes of purging, the majority of the formaldehyde gas within the safety cabinet will be removed. However due to the fact that formaldehyde adheres to the surfaces of the cabinet and within the media of HEPA filters, we recommend that the cabinet is continuously run for at least 6 hours before it is serviced or work re-commences.

- Swab down the inside surfaces and thoroughly clean any residual poly-formaldehyde residue.

- Remove the fumigation kit (optional) from the cabinet discharge before commencing to use the cabinet.

** Any poly-formaldehyde residue in the vaporiser may be removed by heating with water containing a little mild detergent at neutral pH.

General Note

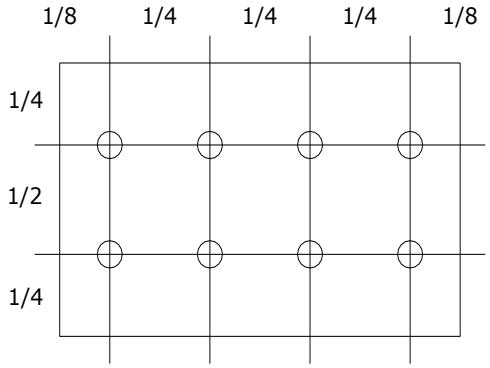
Other methods of generating formaldehyde and other methods of cabinet decontamination can be employed; prior to using alternative methods your Laboratory Safety Officer should be consulted. Contained Air Solutions will be pleased to advise if they are able, but a detailed knowledge of every technique cannot be guaranteed.

A VHP sterilisation cycle is available on the BioMAT 2, this would either be factory set or set by a CAS engineer at the time of commissioning. The VHP cycle when selected runs the down flow fans continuously at 50% of the normal speed, this ensures the air is cycled throughout the cabinet work area and fan & filter plenums. Various sizes of inlet and outlet VHP connection ports can be fitted by CAS either in our factory or later on site.

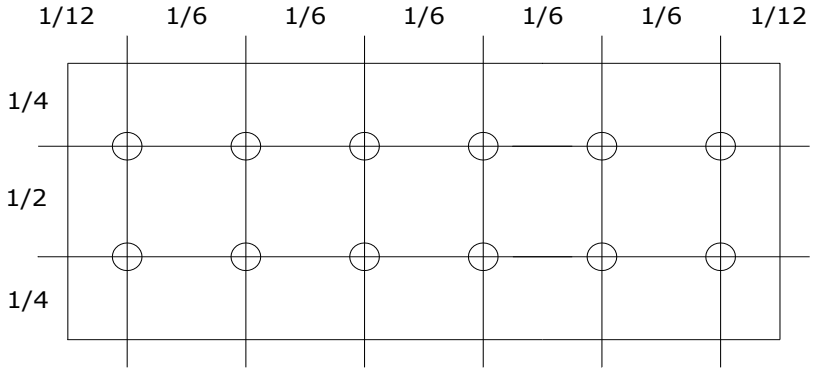
If your cabinet is fitted with ports to allow fumigation using Vaporised Hydrogen Peroxide (VHP) please refer to the VHP equipment manufacturer's manual for the correct application of this technique.

Airflow Measurements – 2.7

It is recommended that the downward airflow within the work zone is checked regularly, i.e. weekly or monthly according to cabinet usage. A calibrated rotating vane type anemometer with a head diameter of approximately 100mm is considered satisfactory. On 1200mm wide cabinets, take 8 readings, namely four along a line one quarter of the depth of the working space forward of the rear wall, and four along a line the same distance behind the front window on a horizontal plane 100mm above the top edge of the working aperture. Typical anemometer positions for the 1200mm & 1800mm sizes of cabinet are illustrated below. The results should be recorded to monitor cabinet performance over time.



1200mm wide



1800mm wide

Unidirectional Downflow Air

NOTE: - *The unidirectional Downflow air within the cabinet is set up during factory testing and checked again during on site commissioning to give an average velocity of 0.3 to 0.35m/sec measured at a horizontal plane 100mm above the top edge of the working aperture. The limitations laid down in the BS EN standard are a minimum 0.25m/sec and a maximum of 0.50m/sec with no one reading being greater than +/- 20% of the mean velocity.*

This preset velocity can only vary if (a) the soiling of the downflow filter occurred, or (b) there is a fan failure.

NOTE: - *We recommend that the downflow velocity be checked on a regular basis and the results recorded to monitor cabinet performance over time.*

Ultraviolet Radiation (Optional Feature) – 2.8

Ultraviolet Radiation (UV) lamps may be fitted as an optional feature; these are usually fitted as new in our factory but could be retrofitted at a later date on site if required. If installed the cabinet will have 2 short wavelength Ultraviolet (UV) tubes emitting 254 nano metres fitted at high level to the inside work area of the safety cabinet.

Once operated using the UV button on the control membrane a timer will be displayed on the TFT display. The required time for the UV can be factory set or alternatively adjusted to suit your requirements on site by the CAS commissioning engineer. Once the cycle as started and the pre-set time period is shown, +/-5 mins buttons will appear, these allow the UV cycle time to be increased or decreased to suit user requirements.

As a safety feature the UV tubes are interlocked with the cabinet lights and visor position to prevent them being used when the cabinet is in normal use or the visor is open.

NOTE: - *Over time, the effective life of UV tubes is known to deteriorate; therefore, we recommend that tubes are replaced on an annual basis to ensure maximum efficiency is maintained.*

Applications

Many bacteria are quite resistant to UV Radiation, and may require prolonged exposure for sterilisation. Dry and/or protein covered organisms may be protected against UV and may be only slightly affected if at all. However, moist, vegetative cells without too much protein covering are killed with reasonable effectiveness after 3-4 hours exposure.

Warning

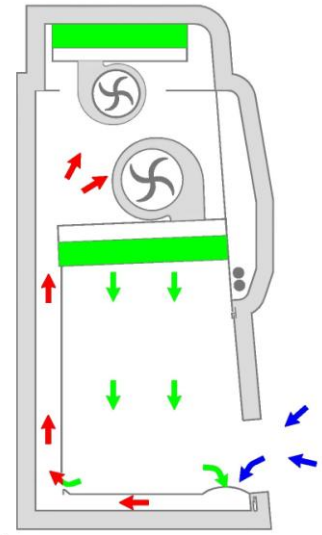
Extreme care must be exercised when using UV radiation. Consult your Laboratory Safety Officer prior to use.

UV Radiation can cause burns to unprotected skin and it is very important not to look directly at the illuminated tubes with the naked eye.

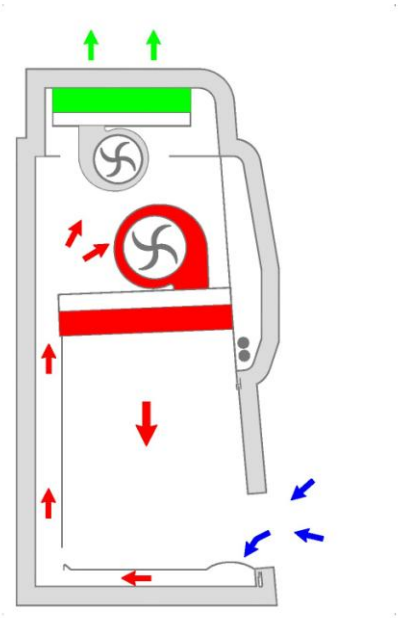
Display - 3.1

The cabinet display is located in the centre of the control membrane, this is a full colour touch sensitive TFT display; it incorporates airflow animations as well as written text to ensure the cabinet condition can be clearly seen from the operating position.

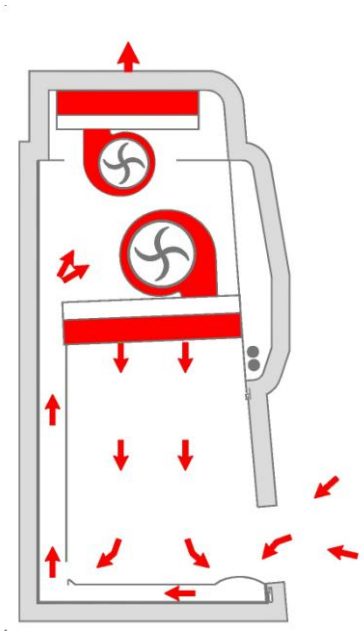
Typical animation is displayed during normal safe operation, shown below:



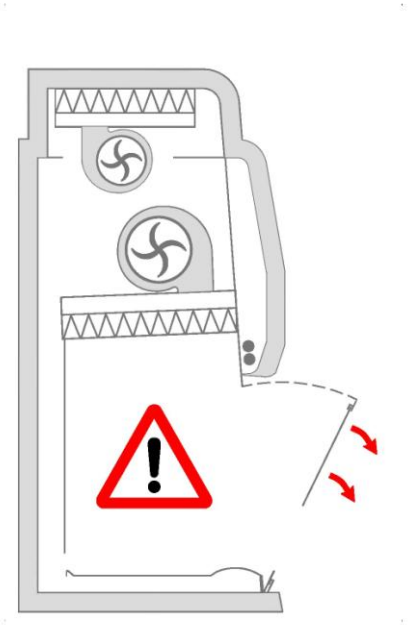
In the event of a low down flow alarm condition the display will clearly indicate the fault; the animation shown below will remain displayed until the fault is rectified.



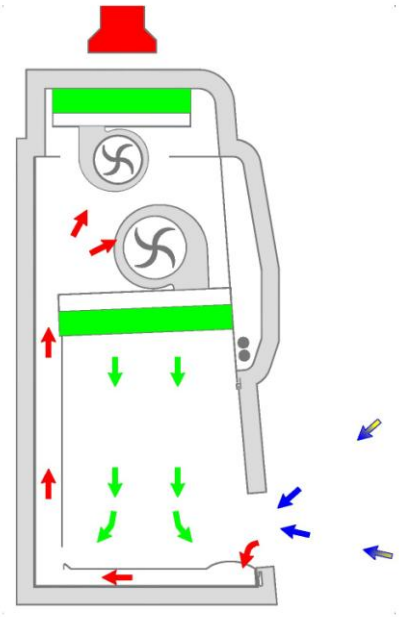
In the event of a low inflow alarm condition the display will clearly indicate the fault; the animation shown below will remain displayed until the fault is rectified. A low inflow alarm condition will automatically switch the down flow fans off, this helps to prevent any air escaping through the open front aperture.



Should the front visor be opened then an alarm condition will clearly indicate the fault; the animation shown below will remain displayed until the fault is rectified.



If the safety cabinet is configured as a Thimble type unit then additional sensing is incorporated. This monitors the main extract system to ensure all discharge air from cabinet is removed, in the event the main extract system fails an alarm will sounds and the animation shown below will be displayed.



Note – In the event the cabinet is configured as a thimble type cabinet (cabinet discharge air feeds into a main building extract system) should the main extract system fail when the cabinet is switched off then the cabinet operation will inhibited until the fault is rectified. If the cabinet is in use an alarm will sound advising the operator, the cabinet will continue to operate in a safe manner allowing the samples to be safely bagged up before shutting down the cabinet.

Should the cabinet produce an alarm condition it may be necessary to arrange for a CAS Service Engineer to attend site, in such cases please contact our Service Department on **0161-655-6183.**

Alarm Circuits – 3.2

There are four standard alarm circuits on the BioMAT 2 Re-circulating, Exhaust and thimble Safety Cabinets.

1. INFLOW

Sensed by an accurate airflow sensor mounted in the exhaust module and connected via a control cable to the main PCB, this will sense low airflow caused by a fan failure or the accumulation of filter soiling, this information is then processed by the main PCB and an alarm condition is displayed on the TFT display. In the event the alarm is triggered `LOW AIRFLOW` text will be displayed along with an animated airflow diagram, the audible alarm will sound and a red alarm strip will illuminate under the bottom edge of the control panel door. The audible alarm may be muted using the alarm mute button on the front membrane.

1. DOWNFLOW

Sensed by an accurate airflow sensor mounted beneath the down flow filter and connected via a control cable to the main PCB, this will sense low airflow caused by a fan failure or the accumulation of filter soiling, this information is then processed by the main PCB and an alarm condition is displayed on the TFT display. In the event the alarm is triggered `LOW DOWNFLOW ` text will be displayed along with an animated airflow diagram, the audible alarm will sound and a red alarm strip will illuminate under the bottom edge of the control panel door. The audible alarm may be muted using the alarm mute button on the front membrane.

2. FRONT VISOR

The Front visor position is monitored by a micro-switch hidden in the front screen assembly. When opened the display will show `VISOR OPEN' text along with an animated diagram, the audible alarm will sound and a red alarm strip will illuminate under the bottom edge of the control panel door. The audible alarm may be muted using the alarm mute button on the front membrane.

1. THIMBLE

Sensed by an accurate pressure sensor mounted on the main printed circuit board and connected via tubing to a sensing point in the dedicated building extract system, this will sense low airflow caused by fan failure and transmit the signal to the main PCB. In the event this alarm is triggered the display will show `LOW AIRFLOW` along with an animated airflow diagram, the audible alarm will sound and a red alarm strip will illuminate under the bottom edge of the control panel door. The audible alarm may be muted using the alarm mute button on the front membrane. It is important to ensure that the pressure tubing is not damaged or split where it is connected to the pressure sensor.

** The alarm circuit is activated automatically on start-up, this may be muted using the alarm mute button on the control membrane.

Electrical Protection – 3.3

Ensure the Safety Cabinet is isolated from the mains supply prior to opening access panels.

Warning

Fuses

There are 10 fuses mounted on the printed circuit board, these are used to protect the various electrical circuits of the cabinet. The cabinet controls are housed behind the front control panel which is secured with two screws located across the bottom edge. Once the screws are removed the control panel will hinge upwards to facilitate access to the main printed circuit board, this can be held open using two stainless steel stays located at either side.

For full details on control circuits on the cabinet please see the wiring diagram attached to this manual.

FUSE IDENTIFICATION

F1	MAINS SUPPLY	10A
F2	EXHAUST FAN	6.3A
F3	VAPORISER	2A
F4	DOWNFLOW FAN	6.3A
F5	LIGHTS	2A
F6	MIANS 1 OUTPUT	3A
F7	U.V. LIGHTING OUTPUT	2A
F8	MAINS 2 OUTPUT	3A
F9	GAS SOLENOID OUTPUT	2A
F10	SASH MOTOR DRIVE (N/A)	3A

Note; The output for the sash drive motor is not used on the hinged visor safety cabinet.

Fan Speed Control – 3.4

Both the inflow and downflow fans can be adjusted via the engineer's menu please see section 3.5 for more information.

To maintain optimum performance during routine planned maintenance it may be necessary to increase cabinet fan speeds to overcome filter soiling or to ensure adequate operator protection levels are provided. Changes can be made via the front TFT touch display through an integrated Engineer's Menu.

Warning

It is important that any changes to fan speeds must be made by a CAS service engineer or approved service provider, failure to do this may result in the warranty being invalidated.

Engineer's Menu – 3.5

Warning

It is important that any changes within the Engineer's Menu are conducted by a CAS service engineer or approved service provider; failure to do so may result in the warranty being invalidated.

To access the engineers' menu the cabinet should have power connected and the cabinet switched off, the CAS home screen should be visible. The letter `A` of CAS should be pressed and held for more than 5 seconds, once the 5 seconds as elapsed the engineers menu will be displayed.

The following can be adjusted via the engineers menu ;

- Cabinet configuration & type
- Fan speeds
- Airflow alarm parameters
- UV Output and time configuration
- Gas solenoid output
- Time setting
- Service due timer activated
- Software revision information
- Lighting configuration
- Energy save mode activation
- PCB Input confirmation
- PCB output confirmation

Downflow HEPA Filter – 4.1 (Note: 2 person operation on larger cabinets)

The downflow filter is a single HEPA filter mounted immediately above the working area. Access is gained by opening the control panel door.

IMPORTANT

Cabinet must be decontaminated prior to changing any HEPA filters and a safe permit to work issued, see section 2.6

Only replace or examine filters if authorised to do so by the Safety Officer or the person in charge of the laboratory. To remove any filters wear disposable gloves, an apron, overalls and appropriate face covering, especially eye protection.

Warning

Ensure the Safety Cabinet is isolated from the mains supply prior to opening access panels.

The front control panel is hinged at the top and retained by fixing screws in the lower edge, when opened it can be supported by two stainless steel stays located at either side. Behind the front control panel is the main access panel held in place by several screws. The front sash must firstly be propped before disconnecting the two straps across the top edge. Once removed the upper slide tracks can be removed and the down flow access panel removed. Care should be taken to ensure the panel is supported prior to releasing the last screw and removed carefully to prevent damage to the gasket.

Behind the access panel is the downflow fan cassette and the downflow HEPA filter. Turning the jacking screws clockwise at each side a little at a time will raise the module from the filter. The downflow filter may then be drawn forward and out of the cabinet body, this can then be disposed of as recommended by site regulations.

To replace, first ensure that all surfaces have been cleaned and are free from loose matter.

Carefully remove the new filter from its protective packing.

Inspect both exposed surfaces for signs of damage. Any damage should be reported to the supplier immediately.

The filter should be slid carefully into the cabinet taking care not to damage the gaskets, if necessary by carefully supporting the filter from within the work area. The fan module is then lowered by turning the jacking screws anti-clockwise a little at a time so as to compress the filter gasket to approximately half its original thickness. The panels may then be replaced, and

the filter and its gasket tested for leaks by challenging with an aerosol and scanning the surface with the probe of a forward light scattering photometer.

Re-circ HEPA Filter – 4.2 (Note: 2 person operation on larger cabinets)

The dual HEPA filtration is located on the top of the main body of the cabinet held in place by either two compression fasteners or jacking screws dependant on cabinet configuration.

IMPORTANT

Cabinet must be decontaminated prior to changing any HEPA filters and a safe permit to work issued, see section 2.6

Only replace or examine filters if authorised to do so by the Safety Officer or the person in charge of the laboratory. To remove any filters wear disposable gloves, an apron, overalls and appropriate face covering, especially eye protection.

Warning

Ensure the Safety Cabinet is isolated from the mains supply prior to opening access panels.

To remove filter, firstly remove the top vanity panel, this simply lifts upwards and then forwards away from the cabinet. Release fasteners or jacking screws (dependant on configuration), lift module until top HEPA filter can be removed. Slide filter forward and out and dispose of as recommended by site regulations, remove filter spacer and set to one side ready for replacement. Raise second HEPA filter and slide forward and dispose of as recommended by site regulations.

To replace, first ensure that all surfaces have been cleaned and are free from loose matter.

Remove both filters from their protective packing.

Inspect exposed surfaces for signs of damage. Any damage should be reported to the supplier immediately.

Slide first filter carefully into position taking care not to damage the filter gaskets, replace filter spacer ensuring test holes are visible from the front. Slide second filter carefully into position taking care not to damage the filter gaskets. Lock fasteners or jacking screws, ensuring filters are correctly positioned and gaskets are compressed to about half their original thickness. Replace vanity panel opposite of removal.

The filters and their gaskets should be tested for leaks by challenging with an aerosol and scanning the surface with the probe of a forward light scattering photometer.

Exhaust HEPA Filter – 4.3 (Note: 2 person operation on larger cabinets)

The single HEPA filter is located on the top of the main body of the cabinet held in place by either two compression fasteners or jacking screws.

IMPORTANT

Cabinet must be decontaminated prior to changing any HEPA filters and a safe permit to work issued, see section 2.6

Only replace or examine filters if authorised to do so by the Safety Officer or the person in charge of the laboratory. To remove any filters wear disposable gloves, an apron, overalls and appropriate face covering, especially eye protection.

Warning

Ensure the Safety Cabinet is isolated from the mains supply prior to opening access panels.

To remove filter, firstly remove the top vanity panel, this simply lifts upwards and then forwards away from the cabinet. Release fasteners or jacking screws (dependant on configuration), lift module until top HEPA filter can be removed. Slide filter forward and out and dispose of as recommended by site regulations, remove filter spacer and set to one side ready for replacement.

To replace, first ensure that all surfaces have been cleaned and are free from loose matter.

Remove new filters from its protective packing.

Inspect exposed surfaces for signs of damage. Any damage should be reported to the supplier immediately.

Slide filter carefully into position taking care not to damage the filter gaskets, replace filter spacer ensuring test holes are visible from the front. Lock fasteners or jacking screws, ensuring filters are correctly positioned and gaskets are compressed to about half their original thickness. Replace vanity panel opposite of removal.

The filters and their gaskets should be tested for leaks by challenging with an aerosol and scanning the surface with the probe of a forward light scattering photometer.

General Notes – 4.4

- Do not store equipment inside the Microbiological Safety Cabinet. The amount of equipment should be kept to a minimum to reduce any disruption to the airflow patterns within the cabinet work area.

- A Bunsen burner must not be used inside the cabinet.

- Great care should be taken to prevent litter such as disposable gloves or tissues from being sucked through the airways at the rear of the work area. These can lodge and reduce the airflow through the cabinet. It is good practice to clean underneath the work tray regularly. ***Always consult the Laboratory Safety Officer before carrying out this procedure.***

- The failsafe solenoid operated gas valve (If fitted) will only allow gas to flow when the cabinet is switched on and there is a satisfactory airflow. Any interruption in the power supply or failure of air supply necessitates manual resetting of the valve by depressing the button on the control panel marked 'gas valve'.

- As a safety feature the UV tubes (If fitted) are interlinked with the cabinet lights to prevent them being used when the cabinet is in use.

We recommend cabinet users consult their own laboratory safety information. Other publications available include:

Science Reviews Ltd, Occupational Hygiene Monograph No.9
British Standard BS EN 12469:2000 & 5726-2000 Part 5
Australian Standard AS2567
American National Sanitation Foundation Standard No. 49

We would also recommend the latest guidelines issued by the UK Advisory Committee on Dangerous Pathogens (ACDP). These documents contain much useful information on the performance, installation, testing, use and limitations of Microbiological Safety Cabinets.

Service Schedule 5.1

SERVICE SCHEDULE 5.1
Class II Microbiological Safety Cabinets

Schedule of work included in service agreement

1	Filter Integrity Test (D.O.P) on all HEPA filter(s) and seals
2	Airflow Profiling ensuring compliance to latest British & European Standards
3	Operator Protection Testing (K.I. Discus) 1 x Per Annum
4	Check and adjust alarm parameters & control functions as required
5	Check and adjust electrical and electronic controls as related to the airflow system
6	Check and adjust operation of exhaust system as required
7	Mechanically inspect cabinet components and duct connections (if fitted)
8	Change main filters as necessary (Supply and fitting subject to additional charge)
9	Prepare computer generated Service Report

Above work to be carried out twice each service year

(Operator Protection Test K.I. Discus carried out once per year unless instructed otherwise

Service schedules can be tailored to suit individual needs

For a competitive Quotation please contact our service Department on

0161-655-8860

Spares List 5.2

Shown below are ordering codes for the most common parts used on the BioMAT 2 Safety Cabinets. In addition to these items we stock a vast range of Spares, consumables and optional extras. If you cannot see what you require please give us a call on the telephone number shown below.

*** Please note cabinet serial number must be quoted when ordering ***

UK:

Tel: 0161-655-8860

Fax: 0161-655-8865

Overseas:

Tel: +44-161-655-8860

Fax: +44-161-655-8865

ORDERING CODES			
Item	**BioMAT 2 1200mm**	**BioMAT 2 1500mm**	**BioMAT 2 1800mm**
Downflow HEPA Filter	FIL	FIL	FIL
Exhaust HEPA Filter	FIL	FIL	FIL
Recirc HEPA Filter	FIL	FIL	FIL
Downflow Fan	FAN	FAN	FAN
Exhaust Fan	FAN	FAN	FAN
Main PCB	ELC	ELC	ELC
Control Membrane	LAB	LAB	LAB
Work Area Light	ELC	ELC	ELC
Work Area Light Driver	ELC	ELC	ELC
UV Light Tube	ELC 061	ELC 061	ELC 061
Standard Closure Panel	CCM 725	CCM 800	CCM 772
100% Sealing Closure Panel	CCM 726	CCM 801	CCM 773
Formalin Vaporiser	CCP 083	CCP 083	CCP 083
Fumigation Adaptor Box (Recirc)	CCM 111	CCM 802	CCM 112

Wiring Diagram 5.3