



Monmouth
Scientific

Operating & Maintenance Manual



THE MARKET LEADER IN *CLEAN AIR SOLUTIONS*
www.monmouthscientific.co.uk

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For permission requests, please write to:-
Monmouth Scientific Limited, Units 5 & 5 Kilnside, East Quay, Bridgwater, Somerset, TA6 4DB.
Email: info@monmouthscientific.co.uk
Tel: +44(0)1278 458090

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For permission requests, please write to:-
Monmouth Scientific Limited,
Monmouth House, Peninsula Business Park, Bridgwater, Somerset, TA6 4QB.
Email: info@monmouthscientific.co.uk
Tel: +44(0)1278 458090

Warning

This cabinet must be used in compliance with these instructions and any repairs or maintenance carried out by qualified personnel.

For parts or service information please contact Monmouth Scientific.

SECTION 1

DESCRIPTION OF THE CABINET

The Circulaire range of filtration fume cabinets are designed to provide operator and environmental protection. The cabinet provides an inflow of air $>0.5\text{m/sec}$ through the working aperture to provide operator protection. The contaminated air is then passed through electrostatically charged pre-filters to remove particulate and then through Activated Carbon main filters to remove chemical contaminants before exhausting the air back to the laboratory. An additional carbon or HEPA exhaust safety filter may be fitted if required.

When installed correctly the cabinet complies fully with international standards including BS7989:2001 for filtration fume cupboards.

Model	Circulaire TP800	Circulaire TP1100	Circulaire TP1400	Circulaire TP1800
Dimensions				
External	800mm wide 700mm deep 1300mm high	1100mm wide 600mm deep 1300mm high	1400mm wide 700mm deep 1300mm high	1800mm wide 700mm deep 1300mm high
Internal	785mm wide 680mm deep 840mm high	1085mm wide 680mm deep 840mm high	1385mm wide 680mm deep 840mm high	1785mm Wide 680mm Deep 840mm High
Aperture	670mm wide 280mm high	970mm wide 280mm high	1270mm wide 280mm high	1670mm wide 280mm high
Weight				
	120 kg	141 kg	167kg	200kg
Airflow				
Aperture Face velocity (Nominal)	0.55m/sec			
Nominal Airflow volume	370m ³ / hr	538m ³ / hr	705m ³ / hr	926m ³ / hr
Electrical				
Voltage Input	110V, 50-60 Hz or 230V, 50-60 Hz (Factory configured ONLY)			
Power (Max)	360 Watt			460 Watt
Lighting	> 800 Lux (600mm LED X2)	> 800 Lux (900mm LED X2)	> 800 Lux (1200mm LED X 2)	
Fan	Centrifugal digital			
Controls	HMI control			
Monitoring systems				
Airflow	Visual and audible low airflow alarm			
Filter condition (option)	Visual and audible Filter condition alarm – (Suitable for Organic compounds)			
Sound level (SPL)				
	Typically < 60 dB (A) @1m from aperture			
Filters (Full details of available filters, refer to Section 3)				
Pre-filter	Electrostatic - G4 grade			
Main filter	1 x Carbon or HEPA	2 x Carbon or HEPA	2 x Carbon or HEPA	3 x Carbon or HEPA
Exhaust Filter (Optional)	1 x Carbon or HEPA			
Construction				
Filtration Head	Zinc coated steel, Polyester powder coated			
Enclosure	Clear acrylic Zinc coated steel, Polyester powder coated			
Optional Spillage tray	GRP/Polypropylene/Stainless Steel Issue B			

SECTION 2

INSTALLATION

- The cabinet should be sited in a draught free position
- The cabinet is recirculating and requires no connection to ductwork
- Lift up the front cover and remove the inner filter access cover using the key provided and check that the main Carbon Filter/s are in place and the identification tags are connected. If filters are not fitted see section 4 for instructions.
- Check the pre-filters are in place by rotating the small plastic catch located inside the enclosure, which will allow the pre-filter retaining frame to be lowered.
- Connect the cabinet to a 13A outlet socket

TESTING / COMMISSIONING

A test certificate will be supplied for conformity to CE marking, and electrical test.

The airflow should be checked using a vane anemometer and the results recorded.

The operation of the filter condition alarm should also be checked, see section 5.

THE CABINET MUST BE TESTED EVERY 14 MONTHS TO COMPLY WITH C.O.S.H.H REGULATIONS.

SECTION 3

GENERAL OPERATION

The main on/off switch is located on the right hand side near the top of the cabinet. When first turned on, the LCD control panel will be displayed providing operator instructions for cabinet use.

After starting, the sash may be raised to the maximum working height as indicated by the arrows located to the right-hand side of the cabinet aperture. Should the sash be raised above this point, the safety systems will detect this and a warning will be displayed on the screen.

The sash may be raised for short periods of time (for apparatus access etc) but it should be noted that the face velocity and containment will be reduced.

The cabinet can be put into standby mode by pressing the  key.

When in standby mode the fan, lights and control system are turned off. Normal operation can be resumed by touching the screen. An ECO mode can be activated which turns off the lights and reduces the fan speed if no activity is seen inside the cabinet for a time period set in the supervisor settings (see page 11). Normal operation is resumed by touching the screen.

If the cabinet is not to be used for several days the cabinet can be turned off at the main on/off switch if preferred.

CONTROL SYSTEM

The cabinet is controlled and monitored by a microprocessor with an LCD touch screen. The touch screen provides the operator with general information about the cabinet and displays the current face velocity and filter condition. Control of light level, fan speed and other operating settings are all accessed via a menu system.

The control system is factory set to maintain the following parameters:

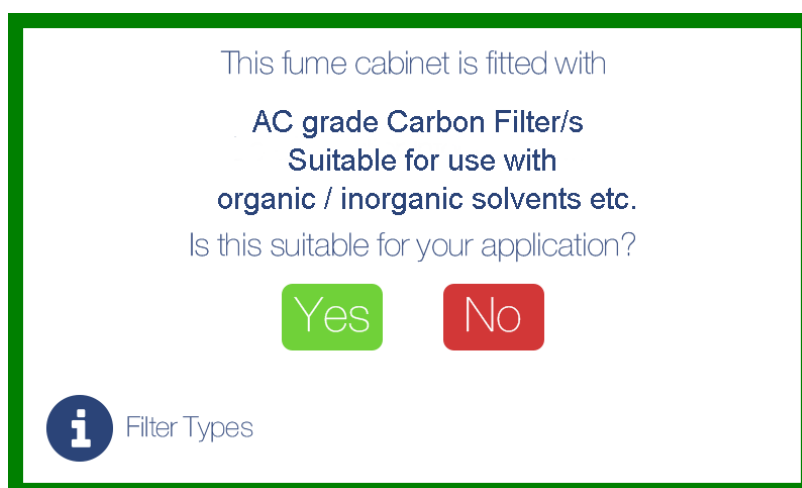
Normal face velocity:	0.55m/sec.
Low fan speed:	0.35m/sec.
Low airflow alarm:	0.30m/sec.

These settings can be changed by a Monmouth engineer. Please contact Monmouth Scientific for further advice.

START-UP

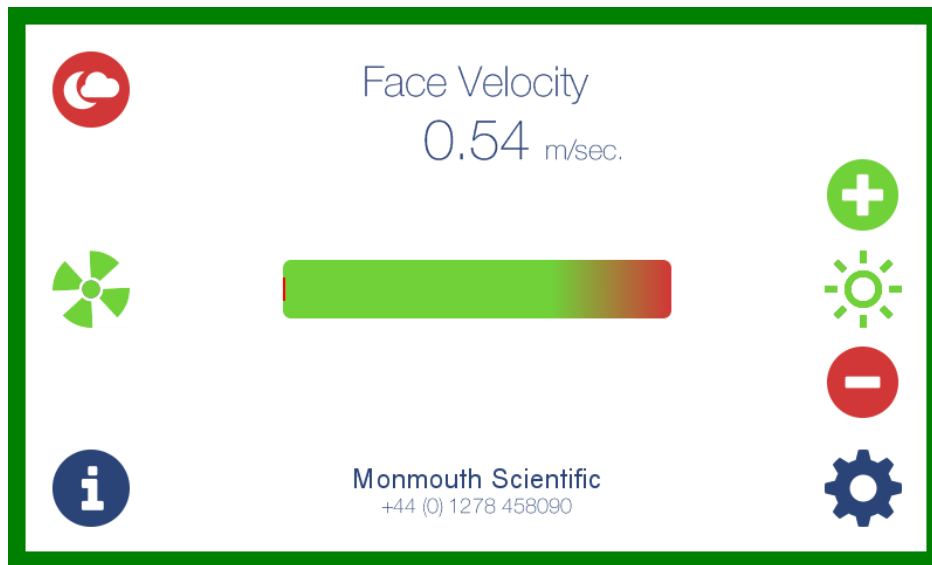
When first turned on the screen below is displayed providing information about the filters fitted to the cabinet. **It is vitally important that the correct filters are fitted to suit the work being carried out.** Basic filter information can be displayed by

pressing the  key. Please contact Monmouth Scientific for further advice on filter types.



If the procedures carried out inside the cabinet are always the same this screen can be bypassed in the Supervisor Settings (see page11)

When the filter type has been accepted the normal running screen below is displayed.



FACE VELOCITY

The face velocity is continuously monitored and displayed in M/sec – alternatively, this can be changed to display ft/min in the Supervisor Settings (see page 11).

The microprocessor controls the fan speed to compensate for filter blockage and other changes in airflow.

The value will fluctuate slightly during normal operation, this is normal and is an indication that the fan is under microprocessor control. When the sash is fully closed, the reading may also

CARBON FILTER CONDITION

The cabinet is fitted with a hydrocarbon sensor which monitors the airflow after it has passed through the main carbon filter/s. The filter condition is displayed on the bar graph indicator in the middle of the display. If filter breakthrough is detected the green line will progress to the right and warning messages will be displayed. If the main filter fitted to the cabinet is a HEPA filter the bar graph will not be displayed.

CONTROL BUTTONS



Light On / Off



Lighting - Reduce Brightness



Lighting - Increase Brightness



Fan On



Fan Off



Low Fan Speed - Reduces fan speed to 0.35m/sec. (for use when weighing etc.)



Settings - access to settings menu




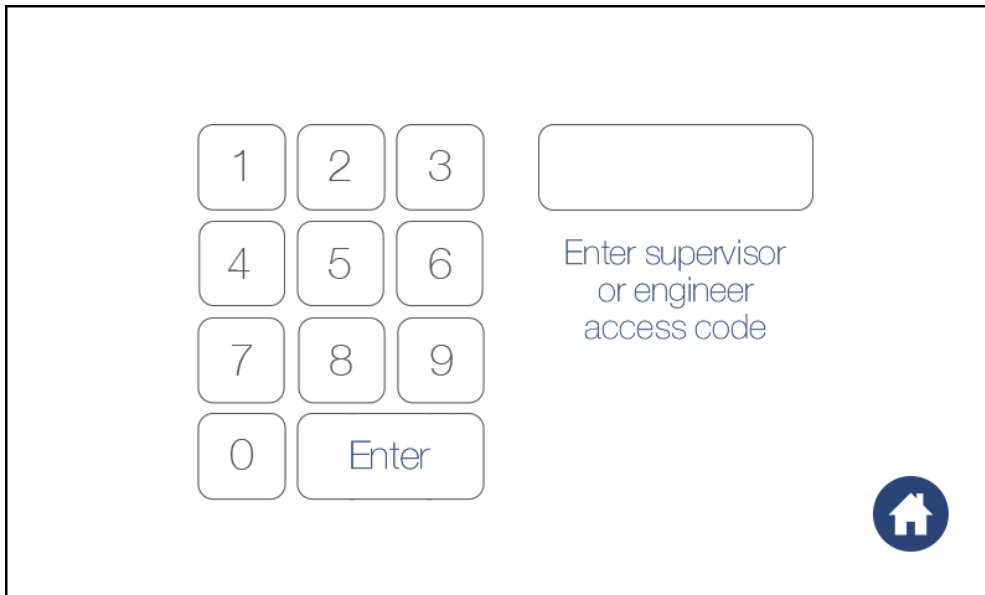
Information - Cabinet and filter information



Standby - Puts cabinet into standby


SETTINGS

Pressing the  key on the main screen enters the Set-Up menu access screen.



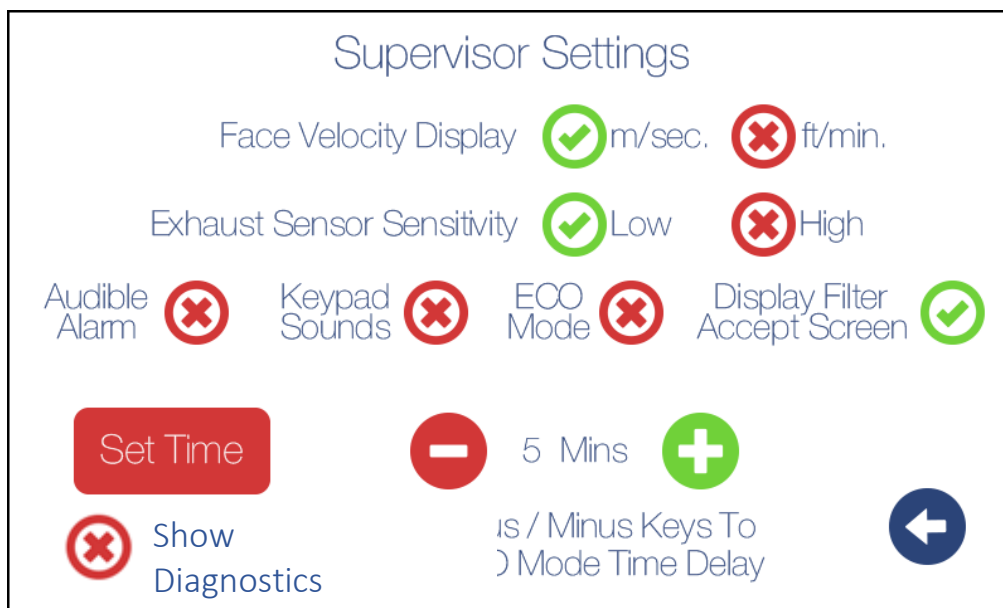
The supervisor access code is supplied with the cabinet and allows access to change operating preferences.

The engineer access code is reserved for service engineers to carry out maintenance procedures.

The  key returns to the normal display screen.

SUPERVISOR SETTINGS

When the correct Supervisor code is entered the screen below is displayed.



Face Velocity Display - select preferred velocity units.

Exhaust Sensor Sensitivity - Changes the sensitivity of the carbon filter sensor to enable detection of less volatile chemicals.

Audible Alarm - Turns off the audible low airflow alarm.

Keypad Sounds - Turns off the audible key beeps.

ECO Mode - turns off the lights and reduces the fan speed if no activity is seen inside the cabinet for a time period set by using the arrow keys at the bottom of the screen. Normal operation will be resumed when operator touches the screen.

Display Acceptance Screen - Turns on / off the Filter type acceptance screen at start up.


Set Time - displays a time / date setup screen

Show diagnostics – Enable to display diagnostics information on home page (use only if directed by Monmouth service personnel)





Pressing the  key returns to the previous screen.

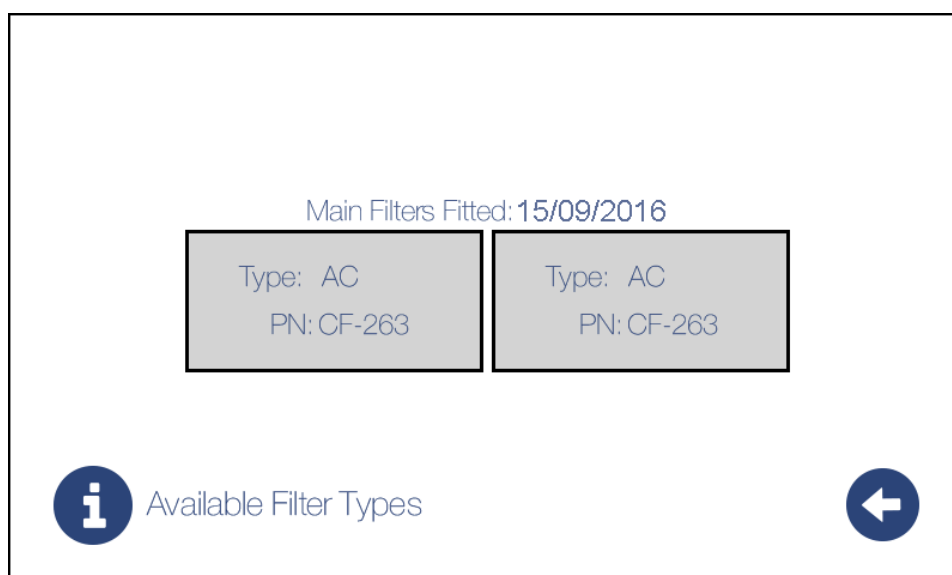
INFORMATION SCREEN


Pressing the  key on the main screen will display the information screen below.



Service information is reset by a Monmouth engineer during a service visit. When a service becomes due a warning screen will be displayed momentarily on start-up during the proceeding month.

Pressing the  key will display the screen below providing information on the type of filters fitted. The  key will return to the previous screen.



Pressing the  key again will display information on the types of filter available.

Available Filter Types.

AC:	General organic / inorganic solvents etc.
ACID:	Acidic compounds and general organics.
ACR:	Alkali compounds and general organics
AMM:	Ammonia & Amine containing compounds and general organics
CYN:	Cyanide compounds and general organics
ETHER:	Ether compounds and general organics
FORM:	Aldehydes and general organics
SUL:	Sulphur compounds and general organics
MCH:	A blend of up to 4 of the above carbon types
ED:	Tri-Layered for use in schools (organic, acid & alkali)
HEPA:	Removal of particulate



SECTION 4

FILTERS

Genuine Monmouth Filters are fitted with an electronic tag which transmits filter type, part number etc. to the control system automatically on start-up. Filters from alternative suppliers may be used but the efficiency and capacity cannot be guaranteed. The control system will detect non genuine filters and display a warning on start-up.

IMPORTANT: Filters concentrate dust, pollutants etc. and care must be taken when changing them. Personal Protective Equipment must be worn including gloves and particulate face mask.

PRE-FILTERS - CHANGING

This may be carried out with the cabinet running to provide additional protection to the operator.

- Rotate the small plastic catch inside the enclosure which will allow the pre-filter retaining frame to be lowered and the filter replaced.

MAIN CARBON FILTERS - CHANGING

Check filters to be fitted are the correct grade for intended use. Contact Monmouth Scientific for information if required.

- The cabinet should be turned off whilst changing the main Carbon Filters.
- Move the sash to its lowest position.
- Lift up the front panel and remove the inner filter access cover with the key provided.
- Disconnect the wire from the electronic filter tag(s).
- Rotate each filter clamp handle 180° to raise filters.
- Slide filters out and seal in a marked bag for disposal.
- Fit new filters ensuring they are pushed fully in before rotating filter clamp handles to clamp the filter in place.
- Re-connect the wire to the electronic filter tag(s).
- Re fit the inner filter access cover.
- Close the front panel.
- The cabinet is now ready for use and the updated filter information will be displayed on the general information screen.

MAIN HEPA FILTERS - CHANGING

- Carry out safety hazard assessment for safe changing
- Follow the procedure for changing Carbon Filters taking extra care with operator protection. (A dropped filter can release particulate).
- Dispose of filter as hazardous waste.

OPTIONAL EXHAUST FILTER – CHANGING (IF FITTED)

- The exhaust filter/s are mounted on top of the cabinet.
- Remove the top fixing frame by unscrewing the fixing bolts.
- Disconnect the wire from the electronic filter tag(s) and remove the filter(s)
- Place used filters in a polythene bag and seal. Label bag with disposal instructions.
- Apply silicone grease to new filter seals and place in position.
- Re-connect the wire to the electronic filter tag(s).
- Replace frame and bolt down evenly.
- If the cabinet is used with toxic particulates and a HEPA exhaust filter fitted the filter should be checked using DOP equipment.

FILTER SELECTION

It is most important that filters fitted are correct for the particular application. A guide to filter selection is as follows:

Gaseous fumes – Activated Carbon filters. Different grades are available to improve efficiency and extend filter life.

Particulates – HEPA filters. Circulaire HEPA filters are 99.997% efficient for particulates greater than 0.3 microns. For maximum protection against penetration the safety exhaust HEPA filter should be selected. The exhaust filter has seals under negative pressure to eliminate possible filter bypass. The main filter can either be HEPA or activated carbon.

Activated Carbon Filters

Standard activated carbon is suitable for a wide range of pollutants including hydrocarbons. Activated carbon can be impregnated with chemicals to neutralise types of chemicals and there is a list on the following page to indicate the types available.

The given weight is approximate to standard activated carbon. Impregnated carbons have higher densities and will increase filter weight.

Filter Type	Application	Typical Chemicals
HEPA	Particulates	Asbestos / powders
ACTIVATED CARBON – A/C	Hydrocarbons	Alcohols, Hydrocarbons, General use
ACID	Acid gasses	SO ₂ , HCL, H ₂ SO ₄
FORM	Aldehydes	Formalin Glutaraldehyde
SUL	Sulphur compounds	H ₂ S, mercaptans
AMM	Ammonia	NH ₃ , NH ₄
ETHER	Ethers	
SCHOOLS	Educational, Animal odours	SO ₂ , H ₂ SO ₄ , BR ₂ , H ₂ S, NH ₃ , CCL ₄ , hydrocarbons

- All grades of activated carbon have general use capability for hydrocarbons.
- Other grades are available for applications not listed above.
- Filters can be manufactured in layers suitable for more than one application.

To determine correct filter type please contact Monmouth Scientific with details of application, volumes, concentrations, temperatures etc.

Exhaust Filters

The cabinet may be fitted with a safety exhaust filter if required to provide an additional level of safety / capacity if required.

Cabinets used for toxic particulates must be fitted with a HEPA exhaust filter. (The main filter may be Carbon or HEPA.)

MAXIMISING FILTER LIFE

- Handle minimum volumes of chemicals
- Minimise surface area of exposed chemicals to reduce evaporation rates
- Cover containers as far as practical
- Do not boil off large volumes of chemicals
- Minimise use of heat
- Acids should be at room temperature and covered as far as practical

CARBON FILTER EFFICIENCIES

Typical filter efficiencies are >99% and this efficiency is maintained for most of the filter life. Filters should be changed when efficiency has reduced to below 90%.

ABSORPTION CAPACITIES

Circulaire cabinets have very large filter capacities, with a typical value of >30% for hydrocarbons. The cabinets have the following nominal absorption capacities:

Model	Carbon Weight	Typical Hydrocarbon capacity at 30% absorption
Circulaire CTP800	1 X 16Kg	4.8Kg
Circulaire CTP1100	2 X 14Kg	8.4Kg
Circulaire CTP1400	2 X 16Kg	9.6Kg
Circulaire CTP1800	2 X 16Kg + 1 X 14Kg	18Kg

Impregnated filters have different densities and filter capacities. Contact Monmouth Scientific for absorption capacities for different applications.

SECTION 5

MAINTENANCE

The cabinet should be isolated from the electricity supply before carrying out any maintenance procedures.

FUSES

The main fuses are located in the mains inlet socket on the top of the cabinet. Remove the mains lead and withdraw the fuses using a small screwdriver. **Always replace fuses with the correct type and rating.**

LIGHTING

The high efficiency, low voltage LED light tubes are fitted to the inside of the front cover. They should provide many years of service without requiring replacement. Spare tubes are available from Monmouth Scientific and have the following part numbers:

Circulaire CTP800 - GS-01514

Circulaire CTP1100 - GS-01539

Circulaire CTP1400 - GS-01540

Circulaire CTP1800 - GS-01540

Care should be taken to ensure the tubes are fitted in the correct orientation with the red+ marking on the tube aligning with red mark on the fitting.

CHECKING THE LOW AIRFLOW ALARM

The low airflow alarm will be activated if the face velocity drops below 0.30m/sec. To check the function of the alarm follow the procedure below:

- 1) With the cabinet running measure the face velocity using a rotating vane anemometer. The average reading should be $0.55\text{m/s} \pm 0.02$
- 2) Using paper or similar material progressively block the air inlet grille/s as evenly as possible inside the cabinet to simulate a blocked filter.
- 3) The fan will automatically speed up to try and compensate for the loss in airflow, however as the filters are increasingly blocked a point will be reached where the fan has no more capacity and the airflow will begin to drop.
- 4) Monitor the face velocity to check that the alarm is activated at around 0.3m/sec.
- 5) Remove paper to allow the cabinet to return to a normal running condition.

CHECKING THE CARBON FILTER CONDITION ALARM

- 1) Turn the cabinet off, open the front cover and release the filter clamp to provide a filter bypass.
- 2) Close the cover and turn the cabinet on.
- 3) The filter condition alarm is inhibited for 5 minutes during start up to allow the sensor to stabilise. After 5 minutes proceed to step 4.
- 4) Pour a small amount of Isopropyl Alcohol onto a piece of tissue paper inside the cabinet.
- 5) The hydrocarbon sensor should sense the presence of the fumes, the bar graph indicator will indicate an alarm condition and activate the audible alarm.
- 6) Turn the cabinet off, re-clamp the filter and run the cabinet to contain any fumes still being released.
- 7) The bar graph indicator will drop to indicate a safe condition and the cabinet is safe to use.
- 8) If no response is observed from the challenge test, or the cabinet does not recover to a safe condition after the test the main carbon filters may need to be replaced or the system may need to be re-calibrated. Contact Monmouth Scientific for further advice.

For parts or service information please contact Monmouth Scientific.

Monmouth+ Scientific

Monmouth Scientific Limited

UK Headquarters

Monmouth House,
Peninsula Business Park,
Bridgwater,
Somerset,
TA6 4QB.

+44(0)1278 458090

www.monmouthscientific.co.uk

info@monmouthscientific.co.uk

