

Thank you for purchasing this Esco Ductless Fume Hoods. Please read this manual thoroughly to familiarize yourself with the many unique features and exciting innovations we have built into your new equipment. Esco provides many other resources at our website, www.escoglobal.com, to complement this manual and help you enjoy many years of productive and safe use of your Esco products.



User Manual

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Ascent•MAX®

Ductless Fume Hood

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Warranty Terms and Conditions

Esco products come with a limited warranty. The warranty period will vary depending on the product purchased, beginning on the date of shipment from any Esco international warehousing location. To determine which warranty applies to your product, refer to the appendix below.

Esco's limited warranty covers defects in materials and workmanship. Esco's liability under this limited warranty shall be, at our option, to repair or replace any defective parts of the equipment, provided if proven to the satisfaction of Esco that these parts were defective at the time of being sold, and that all defective parts shall be returned, properly identified with a Return Authorization.

This limited warranty covers parts only, and not transportation/insurance charges.

This limited warranty does not cover:

- Freight or installation (inside delivery handling) damage. If your product was damaged in transit, you must file a claim directly with the freight carrier.
- Products with missing or defaced serial numbers.
- Products for which Esco has not received payment.
- Problems that result from:
 - External causes such as accident, abuse, misuse, problems with electrical power, improper operating environmental conditions.
 - Servicing not authorized by Esco.
 - Usage that is not in accordance with product instructions.
 - Failure to follow the product instructions.
 - Failure to perform preventive maintenance.
 - Problems caused by using accessories, parts, or components not supplied by Esco.
 - Damage by fire, floods, or acts of God.
 - Customer modifications to the product
- Consumables such as filters (HEPA, ULPA, carbon, pre-filters) and fluorescent / UV bulbs.
- Esco is not liable for any damage incurred on the objects used on or stored in Esco equipment. If the objects are highly valuable, user is advised to have in place independent external preventive measures such as connection to a centralized alarm system.

Factory installed, customer specified equipment or accessories are warranted only to the extent guaranteed by the original manufacturer. The customer agrees that in relation to these products purchased through Esco, our limited warranty shall not apply and the original manufacturer's warranty shall be the sole warranty in respect of these products. The customer shall utilize that warranty for the support of such products and in any event not look to Esco for such warranty support.

Esco encourages all users to register their equipment online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.

ALL EXPRESS AND IMPLIED WARRANTIES FOR THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN TIME TO THE TERM OF THIS LIMITED WARRANTY. NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER THE LIMITED WARRANTY PERIOD HAS EXPIRED. ESCO DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES PROVIDED FOR IN THIS LIMITED WARRANTY OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, ANY LIABILITY FOR THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES, FOR PRODUCTS NOT BEING AVAILABLE FOR USE, OR FOR LOST WORK. ESCO'S LIABILITY WILL BE NO MORE THAN THE AMOUNT YOU PAID FOR THE PRODUCT THAT IS THE SUBJECT OF A CLAIM. THIS IS THE MAXIMUM AMOUNT FOR WHICH ESCO IS RESPONSIBLE.

These Terms and Conditions shall be governed by and construed in accordance with the laws of Singapore and shall be subject to the exclusive jurisdiction of the courts of Singapore.

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Global Email Helpdesk: support@escoglobal.com

Visit <http://www.escoglobal.com/> to talk to a Live Support Representative

Distributors are encouraged to visit the Distributor Intranet for self-help materials.

Product Appendix, Warranty Listings

Biological Safety Cabinets, Laminar Flow Cabinets, HEPA-Filtered Cabinets (except Streamline brand)	The warranty periods for BSC may vary by country. Contact your local distributor for specific warranty details.
Laboratory Fume Hoods	1 year limited.
Ductless Fume Hoods	3 years limited for Ascent Opti's, 5 years for Ascent Max's.
Cleanroom Equipment	1 year limited.
Laboratory Ovens and Incubators	1 year limited.
CO ₂ Incubators	2 years limited.
Containment/Pharma Products	2 years limited.
Ultralow Temperature Freezer	3 years limited. 60 months on Compressor.

The warranty period starts two months from the date your equipment is shipped from Esco facility for international distributors. This allows shipping time so the warranty will go into effect at approximately the same time the equipment is delivered to the user. The warranty protection extends to any subsequent owner during the warranty period. Distributors who stock Esco equipment are allowed an additional four months for delivery and installation, providing the product is registered with Esco. User can register product online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.


Policy updated on 12th Apr 2011 (This limited warranty policy does not apply to products purchased before 12th Apr 2011)

Introduction

1. Products Covered

Esco Ductless Fume Hood – Ascent Max (ADC Series)					
Electrical Rating	0.6 meters 2 feet	0.9 meters 3 feet	1.2 meters 4 feet	1.5 meters 5 feet	1.8 meters 6 feet
220-240 V AC, 50Hz, 1Φ	ADC-2B1	ADC-3B1 ADC-3C1 ADC-3D1 ADC-3E1	ADC-4B1 ADC-4C1 ADC-4D1 ADC-4E1	ADC-5B1 ADC-5C1 ADC-5D1 ADC-5E1	ADC-6B1 ADC-6C1 ADC-6D1
110-120 V AC, 50Hz, 1Φ	ADC-2B2	ADC-3B2 ADC-3C2 ADC-3D2 ADC-3E2	ADC-4B2 ADC-4C2 ADC-4D2 ADC-4E2	ADC-5B2 ADC-5C2 ADC-5D2 ADC-5E2	ADC-6B2 ADC-6C2 ADC-6D2
220-240 V AC, 60Hz, 1Φ	ADC-2B3	ADC-3B3 ADC-3C3 ADC-3D3 ADC-3E3	ADC-4B3 ADC-4C3 ADC-4D3 ADC-4E3	ADC-5B3 ADC-5C3 ADC-5D3 ADC-5E3	ADC-6B3 ADC-6C3 ADC-6D3

2. Safety Warning

- Anyone working with, on or around this equipment should read this manual. Failure to read, understand and follow the instructions given in this documentation may result in damage to the unit, injury to operating personnel, and / or poor equipment performance.
- Any internal adjustment, modification or maintenance to this equipment must be undertaken by qualified service personnel.
- The use of any hazardous materials in this equipment must be monitored by an industrial hygienist, safety officer or some other suitably qualified individual.
- Before you process, you should thoroughly understand the installation procedures and take note of the environmental / electrical requirements.
- In this manual, important safety related points will be marked with the symbol. 
- If the equipment is used in a manner not specified by this manual, the protection provided by this equipment may be impaired.

3. Limitation of Liability

The disposal and / or emission of substances used in connection with this equipment may be governed by various local regulations. Familiarization and compliance with any such regulations are the sole responsibility of the users. Esco's liability is limited with respect to user compliance with such regulations.

4. European Union Directive on WEEE and RoHS

The European Union has issued two directives:

- **Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE)**

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:



Esco sells products through distributors throughout Europe. Contact your local Esco distributor for recycling/disposal.

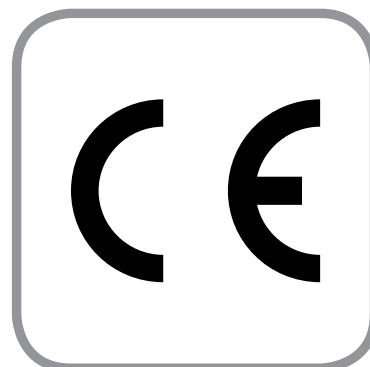
- **Directive 2002/95/EC on Restriction on the use of Hazardous Substances (RoHS)**

With respect to the directive on RoHS, please note that this hood falls under category 8 (medical devices) and category 9 (monitoring and control instruments) and is therefore exempted from requirement to comply with the provisions of this directive.

Declaration of Conformation

In accordance to EN ISO/IEC 17050-1:2010

We, Esco Micro Pte. Ltd.
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Singapore, 486777
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declare on our sole responsibility that the product:

Category	: Ductless Fume Hoods
Brand	: Ascent Max
Model	: ADC-2B1, ADC-3B1, ADC-4B1, ADC-5B1, ADC-6B1 ADC-3C1, ADC-4C1, ADC-5C1, ADC-6C1 ADC-3D1, ADC-4D1, ADC-5D1, ADC-6D1 ADC-3E1, ADC-4E1, ADC-5E1

in accordance with the following directives:

2006/95/EEC	: The Low Voltage Directive and its amending directives
92/31/EEC	: The Electromagnetic Compatibility Directive and its amending directives

has been designed to comply with the requirement of the following Harmonized Standard:

Low Voltage	: EN 61010-1:2010
EMC	: EN 61326-1:2006 Class B

More information may be obtained from Esco's authorized distributors located within the European Union. A list of these parties and their contact information is available on request from Esco.

A handwritten signature in black ink, appearing to read 'XQ Lin', is positioned above a horizontal line.

XQ Lin
Group CEO, Esco

This Declaration of Conformity is only applicable for 230V AC 50Hz units

Chapter 1 - Product Information

1.1 Quick View



1.2 FiltraCheck

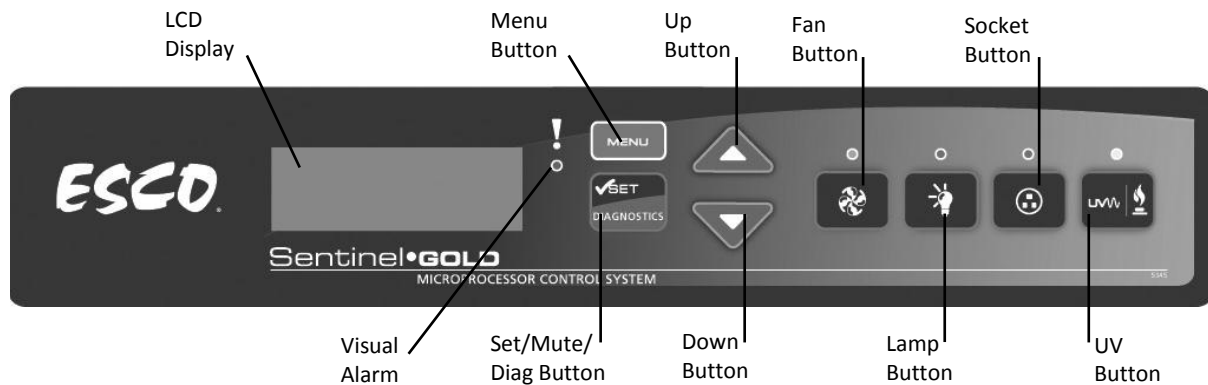
FiltraCheck is a trademark service provided by Esco's fume filtration division. Customers who intend to purchase a ductless fume hood but are unsure whether the cabinet is suitable for their application, can forward a list of chemicals that they will be handling and their pattern of usage to Esco's FiltraCheck service team.

A PDF Questionnaire form is available at <http://ductless.escoglobal.com/>. This questionnaire can be downloaded and either forwarded by email or by fax to Esco. After careful analysis of the provided chemicals list and pattern of usage, a proper advice document will be generated and provided to the customer in 3 days period.

This document will recommend the appropriate laboratory equipment; ducted fume hood or ductless fume hood or neither based on the investigation done by the FiltraCheck team. Depending on the type of chemicals used, the document may also contain a list of procedures, warnings, etc. that will help in ensuring a safer laboratory working environment. In the case of a recommendation of a ductless cabinet, appropriate grade and type of activated carbon also becomes a factor that has to be taken into consideration.

Chapter 2 - Control System

2.1 Sentinel Control System

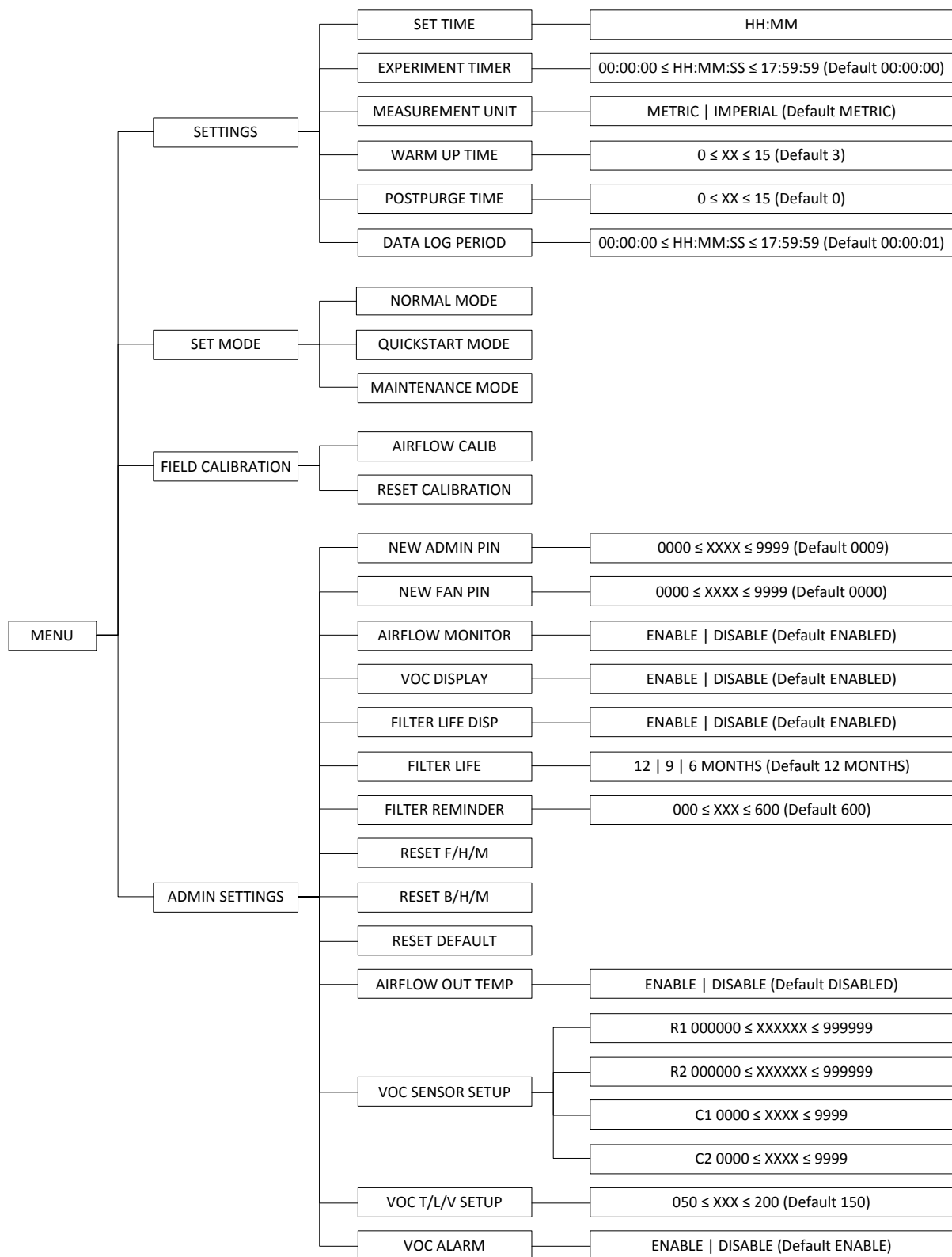


1. Fan Button
 - Turns on and turn off the fan.
2. Lamp Button
 - Turns on and turn off the lamp.
3. Socket Button
 - Turns on and turn off the electrical socket (retrofit kit).
 - The maximum rating of all the outlets in the cabinet is 5 A. if overloaded, the fuse will blow.
4. UV Button
 - Although present, this feature is not applicable.
5. Up (▲) and Down (▼) Arrow Button
 - Move upwards and downwards the menu options.
 - Increase and decrease corresponding value inside one of the menu options.
 - Move the sash window upward and downward (for motorized sash hood).
6. Set or Mute Button
 - Choose the menu or sub-menu currently displayed on the LCD screen.
 - Proceed to the next step or sequence inside one of the menu options.
 - Sash alarm can be muted by pressing Set button.
7. Menu Button

Alarm is disabled when you enter menu options

- To enter and exit from the menu options.
- To go back to the previous level of the menu options.
- To access maintenance mode from "AIRFAIL!" error condition.

2.2 Menu Options



2.2.1 Settings

Users may use the settings menu function to customize the operation of the hood to meet specific application requirements. The settings menu can be entered using both FAN PIN and ADMIN PIN.

2.2.1.1 Set Clock (Time)

Users can set the time by increasing/decreasing the hour and minute values. The correct time will be maintained even after the unit is turned off.



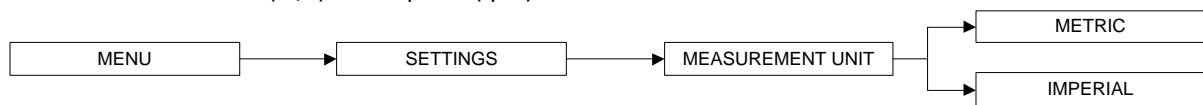
2.2.1.2 Experiment Timer (not applicable to motorized sash fume hood)

Experiment timer is a countdown timer that can be used for critical experiment. Experiment timer can be set between “00:00:00” and “17:59:59”.



2.2.1.3 Measurement Unit

Using this option, the user can select the unit in which air velocity is measured and displayed. The user can choose between metric (m/s) and imperial (fpm).



2.2.1.4 Warm Up Time

There will be a period of warm-up, before the fan is fully functioning. This is to ensure that the sensors, the blower, and the control system are stabilized, as well as purging the work zone of contaminants. The default setting is 3 minutes and the user can set it between 3 to 15 minutes.

During the warm up period, the user can use the FAN button to turn off the blower, LIGHT button to turn on and off the fluorescent lamp and MENU button. However, to be able to access the menu, the user need to input ADMIN PIN and even then, some portions of the menu (WARM UP and all FIELD CALIBRATION) is still not accessible for the user. Entering the menu during this time will pause the warm up period.



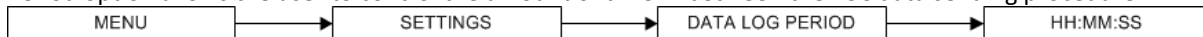
2.2.1.5 PostPurge Time

After the user switches off the blower, there will be a post-purge period, to ensure that all contaminants are purged from the work zone. The default setting is zero minute (disable) and user can set it between 0 to 15 minutes. However, it is recommended to purge the hood for around 3 minutes after the work is complete.



2.2.1.6 Data Log Period

Using RS232 communication port, the fume hood can send data on the condition of the BSC to a PC. Data Log Period option allows the user to control the amount of time in between the BSC data sending procedure.



2.2.2 Setting Mode

The hood has three working mode; two of which, normal mode and quickstart mode, can be used in daily activity. Both of these modes can be seen and accessed when you enter the FAN PIN.



2.2.2.1 Normal Mode

The normal mode is activated by factory default. In this mode, all alarms and interlocks are enabled.

2.2.2.2 Quickstart Mode

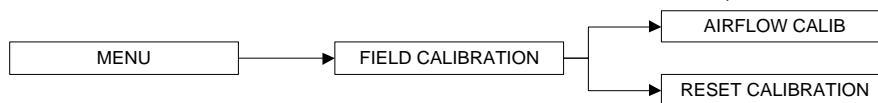
Quickstart mode allows the user to activate the blower and the light simply by opening the sash window to the operating position. In this mode, all alarms and interlocks are enabled.

2.2.2.3 Maintenance Mode

Maintenance mode should only be accessed by qualified personnel during maintenance. In this mode, all alarms are disabled and all interlocks are defeated.

2.2.3 Field Calibration

The purpose of calibration is to ensure the accuracy of the airflow display and alarm (if present). This involves measuring airflow with reference instrumentation and establishing reference between airflow sensor(s) on the BSC to the standard reference. Calibration should only be carried out by trained personnel. This section presents a brief overview of the calibration menu function. For more information, refer to test report.



2.2.3.1 Airflow Calibration

This option allows proper calibration and operation of the airflow sensor alarm. There will be three points to be calibrated, namely inflow fail point, inflow nominal point, and downflow nominal point.

2.2.3.2 Reset Calibration

This option allows the user to reset all value calibrated in the field and return it to the values gathered in factory calibration.

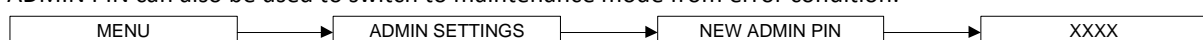
2.2.4 Admin Settings

The admin menu allows you to change both FAN and ADMIN PIN. The reset blower, filter and UV hour meter functions are usually used after you change the blower, filter or UV lamp as they can easily give you the indication on when to do BSC maintenance. While the reset default function will return the options in the settings menu to their factory settings.

2.2.4.1 New ADMIN PIN (default 0009)

ADMIN PIN restricts access to some of the more delicate menu functions, namely admin and field calibration, which should only be accessed by a qualified personnel. User must enter four digits ADMIN PIN before accessing these menus.

ADMIN PIN can also be used to switch to maintenance mode from error condition.



2.2.4.2 New FAN PIN (default 0000 - DISABLED)

FAN PIN restricts access to fan control and some parts of the menu, settings and set mode. User must enter four-digit PIN before switching fan on or off. As such, it can restrict access to operating the hood by unauthorized personnel. It will also prevent unauthorized shutdown of the hood when continuous operation is required. Fan PIN is also needed to disable the alarm when the sash is fully raised and cleaning needs to be performed.

Setting the PIN to 0000 will disable this feature. The FAN PIN is disabled by default. When the FAN PIN is disabled, the hood can be turned on and off without requiring PIN, however to access the menu, the user is still required to enter the FAN PIN (0000).

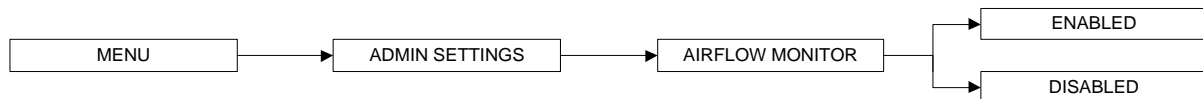


2.2.4.3 Airflow Monitor

Whenever the air velocity falls below the fail point, the air fail alarm will be triggered. This option is used to enable/disable alarm. The alarm is enabled by default.

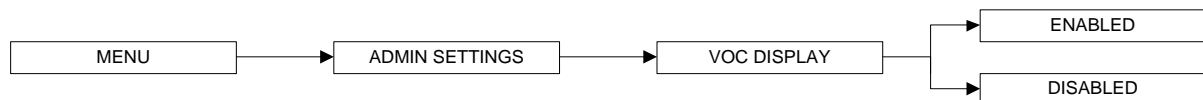
When the Airflow Monitor is disabled, the warm up period is removed. But the airflow will not be displayed for the first three minutes.

If the ambient temperature is outside of 18-30°C (which is the cabinet working temperature), the Airflow Monitor is automatically disabled



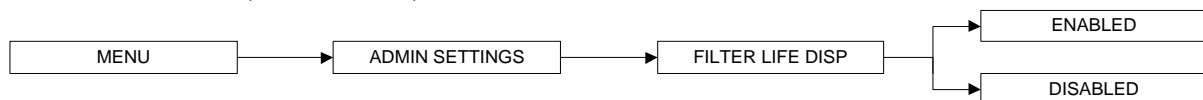
2.2.4.4 VOC Display

This option is to determine whether the VOC sensor status ("VOC:NO", "VOC:YES", or "VOC:RDY") is displayed on the LCD.



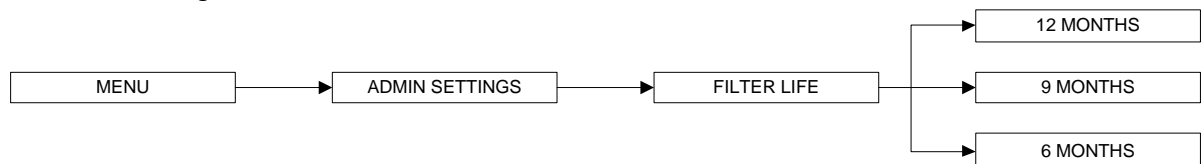
2.2.4.5 Filter Life Display

Using this option, the user can select the whether the filter life is displayed or not. Filter life is calculated based on the filter life value (section 2.2.4.6).



2.2.4.6 Filter Life

To set the filter life value. The time can be chosen between 12, 9 or 6 months. It is recommended to set the filter life according to the FiltraCheck recommendation. The default value is 12 months.



2.2.4.6 Filter Reminder

To set the time between reminder to check for carbon filter saturation.



2.2.4.7 Reset F/H/M

This option is used to reset the filter hour meter. The filter hour meter indicates how long the filter has been in operation. The counter value can be checked while in the diagnostic mode. Please reset the filter hour meter after each filter replacement.



2.2.4.8 Reset B/H/M

This option is used to reset the blower hour meter. The blower hour meter indicates how long the blower has been in operation. The counter value can be checked while in the diagnostic mode. The value can also provide some help in setting up maintenance schedule.



2.2.4.9 Reset Default

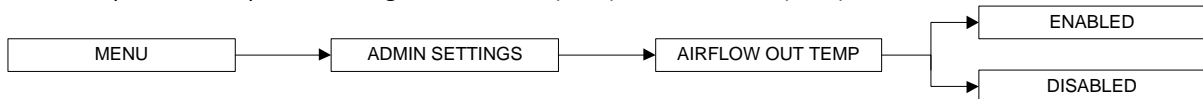
User can reset the default setting by choosing this option. The features being reset are warm-up period (3 minutes), post-purge period (0 minute), measurement unit (Metric), airflow monitor (enabled), ADMIN PIN (0009), Filter Life Display (enabled) and FAN PIN (0000).

Note that the calibration settings cannot be reset as it may cause the hood to operate in an unsafe manner. The hour meters cannot be reset either.



2.2.4.9 Airflow Out Temp

Using this option, the user can select the whether or not to display the airflow when the ambient temperature is out of optimum temperature range, below 18°C (65°F) or above 30°C (86°F).



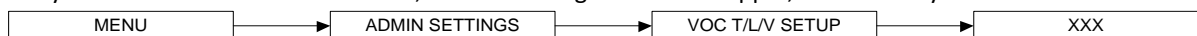
2.2.4.10 VOC Sensor Setup

This setting is intended to enter the VOC sensor parameters based on the sensor label/test report. The value must be set correctly to ensure sensor reading accuracy. When selected, a warning message will occur to remind the user.



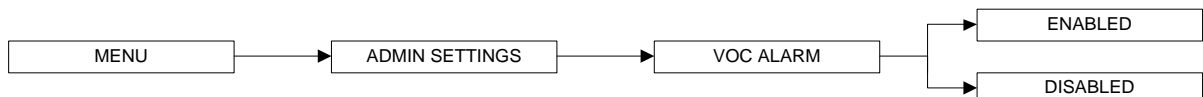
2.2.4.11 VOC Threshold Level Value Setup

User might set the VOC alarm threshold level value. This value might be different for particular chemical. Or the user might need to lower the alarm threshold to have them warned earlier. When selected, will display entry field to set VOC alarm threshold; allowable range is 50 to 200 ppm, set to 150 by default.



2.2.4.12 VOC Alarm

This option is to determine whether VOC concentration is monitored and an alarm is raised if it is over the threshold.



2.3 Stopwatch and Experiment Timer (Only for non-motorized sash hood)

- The stopwatch function can be started by pressing the UP button while the sash is in the safe/ready position. Pressing UP button again while the stopwatch function will stop and resume the timer. Pressing DOWN button will leave the stopwatch function and reset the timer. The timer in the stopwatch function is counting up and shown using the HH:MM:SS format.
- The experiment timer can be started by pressing the DOWN button while the sash is in the safe/ready position. Pressing DOWN button while the experiment timer function is working will stop and resume the timer. Pressing the UP button will leave the experiment timer function and reset the timer. The timer in the experiment timer function is counting down and shown using the HH:MM:SS format. Operator can use the SETTINGS | EXPERIMENT TIMER menu (refer to section 2.2.1.2) to set the experiment timer.

2.4 Alarm and Warnings

The warning AIR FAIL! indicates that there is airflow failure. The operator should check if there is any obstruction to the airflow, and correct it if possible. However, if the problem continues, the operator should stop working as the hood's protection may have been compromised. Call service or Esco's local distributor.

Other alarms that indicate a failure or an error in the BSC system:

- ERR.AIRFAIL will be displayed if the blower is turned off while there is an airflow failure.
- ERR.CALIB will be displayed if the airflow velocity sensor is not yet calibrated.

2.5 VOC Sensor

VOC Status

- Displays "VOC:NO" if the VOC sensor is not installed or the connection is failed.
- Displays "VOC:YES" if the VOC sensor is installed, but not setup yet.
- Displays "VOC:RDY" if the VOC sensor is installed, setup, and ready to use.

The display might unintentionally change from "VOC:RDY" to "VOC:YES" if the wiring connection has ever been disrupted for a while. User should have qualified personnel to check whether the VOC sensor is good and correct.

VOC Alarm

- Displayed as "VOC ALARM!" message on the fourth row whenever the detected VOC concentration is higher than the TLV (Threshold Level Value). The message will disappear if the detected value is slightly lower than the TLV. The TLV is in ppm units.
- User should immediately stop the experiment activity and let the unit running to flush the air. Any chemical source under the hood should be closed whenever possible. If the unit has no backup filter, it might be necessary for the user to leave the room until the alarm stops.
- Current estimated VOC concentration can be checked in the diagnostic, at parameter "EST. VOC".
- The alarm can be muted for 30 seconds by pressing MUTE button (crossed speaker symbol).

Note on VOC Sensor:

- VOC sensor is meant to detect particular organic vapour (mainly alcohol derivatives) only. It is less or insensitive to other type of vapour. Do not attempt to use the sensor for improper materials such as ammonia or hydrocarbon vapour.
- The detected VOC value is an estimate only. Use with cautions and provide standard instruments to measure the actual value.
- The sensor might degrade and affects its accuracy if some conditions encountered. Such as exposure to silicon vapour, under extremely low or high humidity, or extremely low O2 concentration.
- If the sensor is suspected to degrade, contact technical service for replacement.

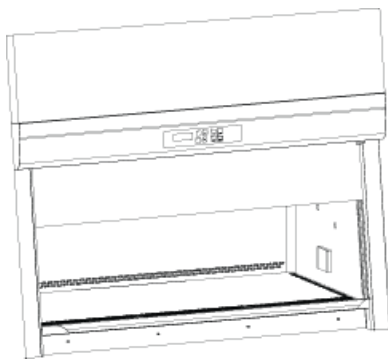
2.6 Diagnostic Mode

On Screen	Explanation
MODE	Shows which mode is active: NORMAL MODE, QUICKSTART MODE or MAINTENANCE MODE.
VERSION	Shows the version of the software; eg: CP107 V 1.0.
TEMPERATURE	Shows the temperature inside the cabinet.
B/H/M	Blower Hour Meter – increase by the hour.
F/H/M	Filter Hour Meter – increase by the hour.
FLTR REMIND	Time between reminder to check the filter.
FILTER LIFE	Shows percentage of filter life (based on Filter Hour Meter) and expected filter life of 10000 hours.
FILTER DISP	Filter life display status.
AF OUT TEMP	Airflow velocity display status when temperature is out of range
VOC DISPLAY	Voc sensor result display status.
ADC IFF	ADC for Fail Point Inflow – calculated using offset based on Inflow Nominal Point.
ADC IFN	ADC for Nominal Point Inflow – based on field calibration.
ADC IFA	ADC for Actual Inflow – showing real time sensor reading.
ADC IF0	ADC for factory calibrated Zero Point Inflow (no inflow).
ADC IF1	ADC for factory calibrated Fail Point Inflow.
ADC IF2	ADC for factory calibrated Nominal Point Inflow.
ADC A2 R0	ADC value for zero resistance calibration of VOC sensor.
ADC A2 R1	ADC value during span resistance calibration of VOC sensor.
R1 VALUE	Measured span resistor value
VOC R1	VOC sensor R1 parameter
VOC R2	VOC sensor R2 parameter
VOC C1	VOC sensor C1 parameter
VOC C2	VOC sensor C2 parameter
VOC SENSOR	VOC sensor presence and calibration status
ADC VOC	ADC value of the VOC sensor result
EST. VOC	Estimated VOC density
VOC LIMIT	VOC alarm threshold density (in ppm)
CONSTANT	airflow sensor constant. This value is needed when ordering a new sensor.
CALIB TEMP	Temperature when the factory calibration was performed.
ADC TEMP	ADC value for temperature.
M_SWITCH1	Shows the condition of magnetic switch 1 – safe position.
M_SWITCH2	Shows the condition of magnetic switch 2 – fully closed position.

Chapter 3 – Basic Hood Operation

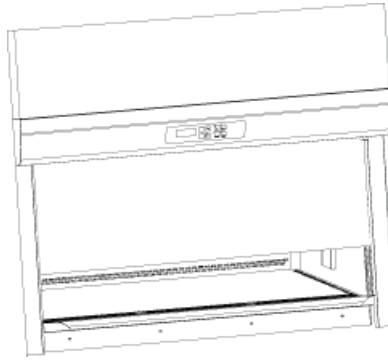
3.1 Sash Window Operation

3.1.1 Sash Window State



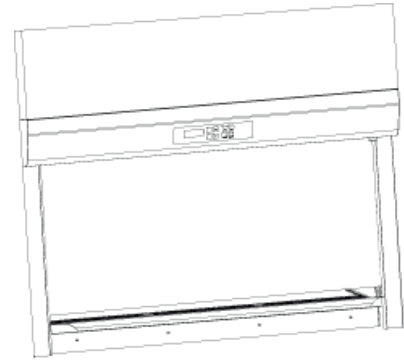
Sash is fully open

- ✓ Blower can be active
- ✓ Fluorescent lights can be used
- ✗ Unsafe working condition



Sash is in safe position

- ✓ Blower can be activated
- ✓ Fluorescent lights can be used
- ✓ Safe working condition



Sash is fully closed

- ✗ Blower can't be activated
- ✗ Fluorescent lights can't be used

3.1.2 Operating Motorized Sash Window (Only for hoods with motorized sash window)

The motorized sash uses a “push and hold” mechanism, so if you remove your finger from the button the sash will stop immediately – this is a safety feature to control the closure and prevent anything getting trapped in the aperture as the sash descends.

Lower Sash from Fully Open Position

When the sash is fully open, pressing the down button and holding it will cause the sash to move to the Safe Height setting and stop. If the fluorescent lights are on as the sash descends, they will stay on as long as the sash stops in the Safe Position. If you release the button before the sash has reached Safe Position the lights will switch off automatically.

Lower Sash from Safe Height Position

When the sash is at safe operating height pressing the down button and holding it will cause the sash to move down to the fully closed position and stop. If the fluorescent lights are on as the sash descends, they will switch off automatically as soon as the sash reaches fully closed. If you release the button before the sash has reached the fully closed position the lights will switch off automatically.

Raise Sash from Fully Closed Position

When the sash is fully closed, pressing the up button and holding it will prompt the user to input the password to turn on the fan. If the password is correct, if it was on fan will turn on and the sash will move up to the Safe Height setting and stop.

Raise Sash from Safe Height Position

When the sash is safe operation position, pressing the up button and holding it will cause the sash to move up to the fully open position and stop. If the fluorescent lights are on as the sash rises, they will stay on as long as the sash is allowed to fully open. Stopping the sash midway will cause the lights to switch off automatically.

3.1.3 Using Sash Window

- The sash window should be fully closed when the hood is not in use. This helps keep the work zone interior clean.
- The sash window should always be in the normal operating height at all times when the hood is in use. Even if the cabinet is left unattended, but the blower is on, the sash window should never be moved from the normal operating height, unless during loading or unloading of materials/apparatus into the hood.
- The alarm will be activated whenever the sash window is moved from the normal operating height.
- Whenever the sash window is moved to the correct height from a higher or lower position, the light will automatically be turned on as a signal to the user.
- The sash window may be opened to its maximum position for the purpose of loading/unloading of materials/apparatus into the hood. When the sash window is fully opened, the alarm sound may be muted by pressing MUTE button but, will be automatically sounded again after 5 minutes to remind the user that it is not safe to work in the cabinet and the light will be turned on to facilitate cleaning.

3.2 Starting and Shutting Down the Ductless Fume Hood

3.2.1 Turning on the Hood

1. Raise the sash to the indicated normal operational height (READY state). The lamp will turn on when this height is reached.
2. Turn on the fan by pressing the FAN button. Input the Fan PIN if asked (default: 0001). This will start the warm up procedure (default: 3 minutes). All buttons are disabled during warm up period.
3. The hood is ready for work.

3.2.2 Turning off the Hood

1. Turn off the fan by pressing the FAN button. Input the Fan PIN if asked (default: 0001). This will start the post purge procedure (default: 0 minute). All buttons are disabled during post purge period.
2. Lower the sash to the fully closed position. The sash can be lowered immediately after turning off the fan as it will not interrupt the post purge procedure.

3.3 Operating the Ductless Fume Hood

3.3.1 Working in the Hood

- Check the label on the ductless fume hood to see what chemicals the hood is intended for – and only use the hood for any procedure involving such chemicals.
- Ensure the exhaust is operating before commencing work.
- After all the apparatuses/items have been arranged, allow the blower to run for another 3 minutes in order to purge work zone of contaminants.
- Minimize room activity since these external airflow disturbances may adversely affect the hood's internal airflow, impairing the containment capabilities of the fume hood.
- Keep your head outside of the hood.
- Work as far into the hood as possible and with slow, deliberate movements, to minimize airflow disturbances.
- Work with the sash as fully lowered as possible, utilizing the sash as a natural barrier.
- Do not use this hood as a storage area. Items can block airflow and interfere with containment.
- If performance is suspected, or an airflow alarm is triggered (*if installed*), terminate usage, close the sash completely, and cease work.
- Do not let organic chemicals evaporate in the hood – use a proper waste bottle. Do not leave uncapped bottles of chemicals or waste in a hood.
- Certify this hood annually to verify airflow velocity, smoke patterns and containment.
- Perform routine maintenance in accordance with the manufacturer's instructions.

3.3.2 Working Ergonomics

On most occasions, you would most likely be operating the fume hood in sitting rather than standing posture.

There are some obvious advantages of the sitting posture:

- The physiological energy cost and fatigue involved in sitting are relatively less
- Sitting posture provides the body with a stable support

However, sitting position has some drawbacks too:

- The working area available is fairly limited
- There is a potential risk of being constrained in the same posture for a long time
- Sitting posture is one of the most stressful postures for one's back

Therefore you should pay careful attention to the following guidelines in order to achieve comfortable and healthy working conditions:

1. Always ensure that your legs have enough legroom.
2. Keep your lower back comfortably supported by your chair. Adjust the chair or use a pillow behind your back whenever necessary.
3. You should place your feet flat on the floor or on a footrest. Don't dangle your feet and compress your thighs.
4. You should keep varying your sitting position throughout the day at regular intervals so that you are never in the same posture for too long.
5. Observe the following precautions with respect to your eyes:
 - Give your eyes frequent breaks. Periodically look away from the work area and focus at a distant point.
 - Keep your glasses clean.
6. Arrange the items/apparatus frequently used in your work in such a way that you can minimize the physical strain involved in handling them.
7. Exercise regularly

Ergonomics accessories available with Esco include:

- a. Armrest padding
- b. Lab chair
- c. Footrest

Please contact your local distributor or Esco for more information.

Chapter 4 – Maintenance

4.1 Scheduled Maintenance

Proper and timely maintenance is crucial for trouble free functioning of any device and your Esco ductless fume hood is no exception to this rule. We strongly recommend that you follow the maintenance schedule suggested hereunder in order to obtain optimal performance from your Esco ductless fume hood.

No.	Description of Task to Perform	Maintenance to be carried out every				
		Week	Month	Quarter	1 Year	2 Years
1	Check the alarm and measure the basic airflow	√				
2	Clean the interior work surface and walls with soap water	√				
3	Wipe down sash with appropriate glass cleaner	√				
4	Clean the exterior surfaces of the ductless fume hood		√			
5	Measure the ductless fume hood face velocity		√			
6	Check fans, motors, drives and bearings for proper operation			√		
7	Check fluorescent tubes for proper operation			√		
8	Test the operation of airflow alarm			√		
9	Repair defect and lubricate as necessary			√		
10	Clean the stainless steel surface using MEK			√		
11	Re-certification				√	
12	Change the fluorescent lamps					√
13	Check filter saturation	(check according to Filtracheck recommendation)				

Cleaning the Hood

- Clean the work surface and walls with soap water
- Clean the sash window using an appropriate glass cleaner
- Use a damp cloth to clean the exterior surface of the fume hood, particularly on the front and top in order to remove dust that accumulated there
- Use clean water to finish the cleaning and wash away any residue from the soap water and glass cleaner
- For removing stubborn stains or spots on the stainless steel surface, make use of MEK (Methyl-Ethyl-Ketone). In such cases, make sure that you wash the steel surface immediately afterwards with clean water and some liquid detergent. Use a polyurethane cloth or sponge for washing. Regularly cleaning the stainless steel surface can help you retain the attractive factory finish.

Test the audible and visual alarm

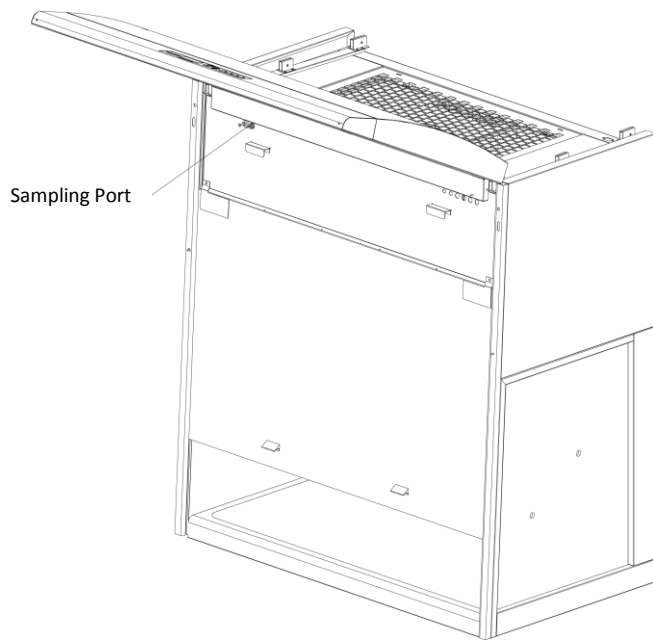
If possible, cover the airflow sensor; otherwise cover the perforations on the back wall – this should disrupt the airflow of the hood enough to activate the alarm

Check the hoods functionality

- Check the hood's mechanical functionality; ex: sash window – lubricate if necessary
- Check the hood's electrical functionality; ex: fluorescent lamp – replace if necessary
- Check the hood for any defect, repair immediately

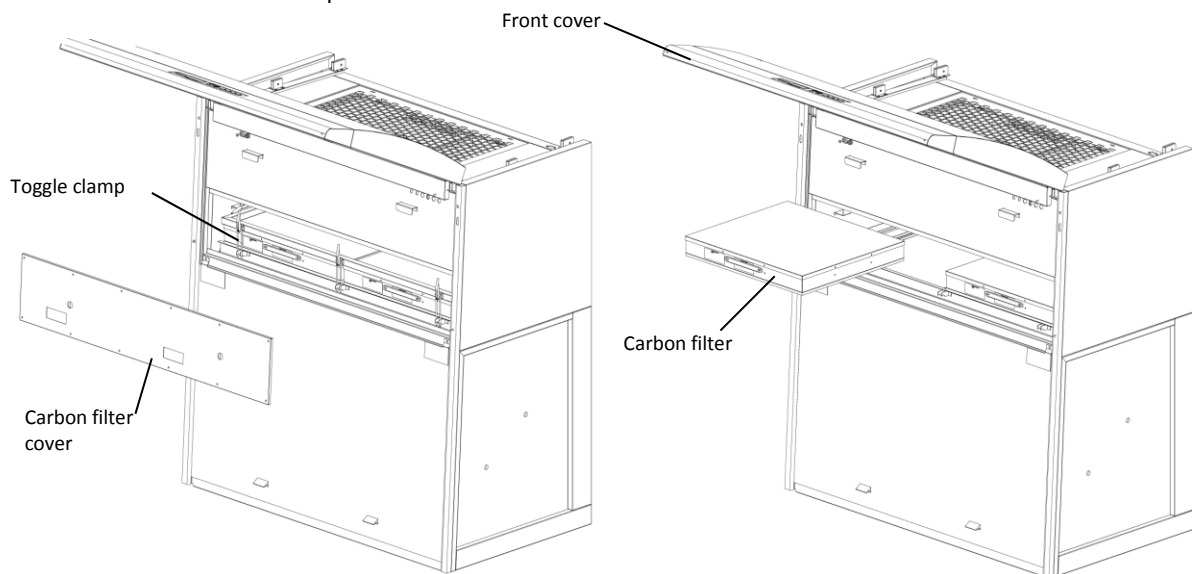
Check filter saturation

Check for filter saturation often. The saturation level of a filter is directly affected by the amount of chemical fume generated by the experiment conducted inside the fume hood. Use particle counter below and above the main (and backup) filter and compare the results to check the saturation level of the carbon filter. (See Appendix for a simple carbon filter saturation check using the hood's sampling port)



Replacing the Carbon Filter

- 1 Lower the sash glass and open the front cover
- 2 Open the carbon filter cover
- 3 Open the toggle clamp
- 4 Replace the filter
- 5 Reverse the above steps



Re-certification

All ductless fume hoods must be re-certified annually by a certified engineer.

4.2 Maintenance/Service Log

It is good practice (and in some cases regulatory requirement) to maintain a log of all maintenance work carried out on your freezer.

APPENDIX

FILTER SATURATION TEST

INTRODUCTION

Electronic detectors for monitoring filter saturation (efficiency) have not been shown to be sufficiently reliable for the range of gases used in school/lab and over a reasonable time scale; therefore chemical tests are needed.

As there are strict limits to the concentrations of hazardous gases in air which can be breathed, it is necessary to test the efficiency of the filter regularly. Further, it is prudent to conduct an initial test to ensure that the filter is seated properly and that its contents have not been displaced in transit. It is advisable to test for this every time the filter is replaced.

There are 3 methods according to the COSHH regulation to test for filter saturation by chemical (acid gases).

- Propan-2-ol challenge test (BS 7989:2001 Standard)
- Method using a canister (cease to be practicable)
- Method using the burning sulphur (BS 7989:2001 Standard)
- Test for saturation by organic gases (limited usage)

For our purpose, Esco will be using the propan-2-ol challenge and burning sulphur test method.

PROPAN-2-OL CHALLENGE TEST

The rate of release of propan-2-ol vapor is calculated by evaporating a weighted quantity of propan-2-ol for a measured time. The filter challenge concentration and filter efficiency are then calculated as shown.

APPARATUS

- Gas detection kit
- Propan-2-ol
- Anti-bumping granules
- Balance, weighting to 0.1 gram or less
- Stop clock
- 250 ml conical flask, with a stopper.
- Hotplate

PROCEDURE

1. Determine the air volume flow rate through the fume cupboard and record the value as F_a in m^3/min .
2. Pour about 100 ml of propan-2-ol into a preweighted, stoppered, conical flask containing a few anti-bump granules. Record the weight of solvent added as M_1 in gram.
3. Set up the hotplate in the fume cupboard. Switch on the fume cupboard, remove the stopper from the flask and place the flask in on the hotplate.
4. As the propan-2-ol begins to boils, the vapour condenses on the cooler parts of the flask forming a boundary line. When the boundary reaches the top of the flask, start the stop clock.
5. After 60s, take a reading of the concentration of propan-2-ol in the exhaust gas emitted by the fume cupboard using a gas detection kit with a suitable tube. Repeat the measurement at 5 min. record the highest concentration in ppm. Convert the concentration from ppm to mg/m^3 using the formula below and record as C_e in mg/m^3 .
6. When the last of the propan-2-ol has evaporated, stop the clock, noting the time of the run as t in second.

CALCULATION

- Calculate the total volume V_a in m^3 of air passed through the fume cupboard during test: $V_a = F_a t / 60$
- Calculate the challenge concentration in mg/m^3 : $C_o = 1000 M_1 / V_a$
- Calculate the filter efficiency (%): Filter efficiency = $100 (C_o - C_e) / C_o$
- Conversion from ppm to mg/m^3 : Concentration in $\text{mg}/\text{m}^3 = \text{Concentration in ppm} \times 60.1 / 24$

METHODS USING BURNING SULPHUR

The rate of release of sulphur dioxide is calculated by weighing the vessel containing the sulphur dioxide before and after it has burning for a measured time. It is satisfactory provided

- a) the Bunsen burner is turned off once the burning of sulphur starts and
- b) the apparatus is sited as far forward in the fume cabinet as possible to obtain complete combustion.

The item required are powdered roll sulphur (150-200 g), a flat-bottom porcelain evaporating basin, a gas detection kit, a balance weighting to 0.1g or less, a stop clock, Bunsen burner, two gauze squares both with ceramic circular centres, a tripod, a heat-proof mat and a ruler. Wear eye protection. Sulphur dioxide is a toxic gas, so do not breathe it in.

1. Powder the roll sulphur in a mortar with a pestle.
2. Fill a flat-bottom porcelain evaporating basin with the sulphur so that it is level with the rim.
3. Weigh the porcelain basin, the sulphur and one of the gauzes (M_1 grams).
4. Set up the Bunsen burner, tripod, the other gauze and the evaporating basin on a heat-proof mat so that the centre of the basin is 5cm inside the upper rim of the aperture (This places the sulphur in the maximum incoming draught and encourages complete combustion).
5. Switch on the fume cabinet.
6. Light the Bunsen burner with the gas tap half-open and the collar open enough so that the flame is non-luminous.
7. The sulphur melts slowly to a pale amber liquid. Remove the Bunsen burner from under the gauze and adjust the collar so that it is half-open. Place it back under the gauze very carefully (The liquid will quickly darken. Changes in the appearance of the liquid surface indicate that burning is about to start. Sulphur catches light with a blue flame).
8. Start the stop-clock when half of the surface of sulphur has caught alight. Immediately turn off the Bunsen burner at the gas tap.
9. After 60 seconds, take reading of the concentration of the sulphur dioxide being emitted through the exhaust with a gas detection kit. A slight smell of sulphur dioxide should be ignored but, if the exhaust gas causes breathing difficulties, stop the test.
10. Place the other gauze (which was used in the weighing) on top of the basin and stop the clock, noting the time (t seconds)
11. When the sulphur has cooled down for about 20 minutes and solidified, reweigh the basin, the remaining sulphur and the gauze (M_2 grams).

The sulphur and dish may be kept and used the next time the test is carried out. A little more powdered roll sulphur may need to be added to make up for any lost in the previous burning.

CALCULATION

$$\text{Rate of release of sulphur dioxide} = (M_1 - M_2) \times 750 / t \text{ cm}^3 \text{ s}^{-1}$$

Now check your result with the table below.

Rate of sulphur dioxide released ($\text{cm}^3 \text{ s}^{-1}$)	Maximum permitted concentration of sulphur dioxide in the exhaust gas (ppm)
05	1
10	2
15	3
20	4
25	5
30	6

LOG RECORD

Fume Hood : _____
 Serial Number : _____
 Person in Charge : _____

1. This log record should be used by the operator to record any new chemicals that has been introduced to the fume hood during its operation, problems encountered, etc.
2. Please also record any major maintenance procedure performed by the service technician, for example: parts replacement, recertification, etc.

[illegible]

In case of emergencies, please call:

Name : _____

Cell Phone Number : _____

E-mail : _____

