Thank you for purchasing this Esco Laminar Flow Cabinet. Please read this manual thoroughly to familiarize yourself with the many unique features and exciting innovations we have built into your new equipment.

Esco Lifesciences provides many other resources at www.escolifesciences.com and www.esco-medical.com, to complement this manual and help you enjoy many years of productive and safe use of Esco Products.

User Manual

MIRI® Laminar Flow Cabinet

Laminar Flow Cabinet

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Esco MIRI® Laminar Flow Cabinet
User Manual | Version A.1 – Released August 2023

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"Material in this manual is provided for informational purposes only. The contents and the product described in this manual (including any appendix, addendum, attachment or inclusion), are subject to change without notice. Esco makes no representations or warranties as to the accuracy of the information contained in this manual. In no event shall Esco be held liable for any damages, direct or consequential, arising out of or related to the use of this manual."

Table of Contents

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 the mentioned parts:

- 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
- 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 does not look to Esco for such warranty support.

Esco encourages all users to register their equipment online at www.escolifesciences.com/services/warranty-registration 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.

Technical Support, Warranty Service Contacts USA: 1 215-441-9661

Singapore: +65 6542 0833

Global Email Helpdesk: support@escolifesciences.com
For more information, visit www.escolifesciences.com & www.esco-medical.com

Product Appendix, Warranty Listings

MIRI® Laminar Flow Cabinet, HEPA/ULPA-Filtered Cabinets	The warranty periods for MLF may vary by country. Contact your local distributor for specific warranty details.

Note: The warranty periods for MLF may vary by country. Contact your local distributor for specific warranty details.

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.escolifesciences.com/services/warranty or complete the warranty registration form included with each product.

Policy updated on 1st January 2015 (This limited warranty policy applies to products purchased on and after 1st January 2015)

Introduction

Safety Warning

- Anyone working with, on or around this equipment should read this manual. Failure to read, understand and comply with the instructions given in this manual 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 is prohibited. Laminar flow cabinets are intended for product protection ONLY.
- Explosive or inflammable substances should never be used in the cabinet unless adequate risk assessment has been carried out.
- 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.

Document Management

We recommend that you keep this manual, along with the factory test report close to the cabinet for easy reference by the cabinet operator and qualified maintenance personnel.

If you require replacements for any of the provided documentation (including factory test reports) you can request copies from Esco Customer Services*. Please provide the following information when making requests for replacement documents:

- Company (Organization) Name
- Product Brand and Model
- Product Serial Number
- Documents requested

** There may be a nominal charge for this service.*

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.

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.

Recommended method of disposal is according to The Federal, State, and Local Government regulations.

- 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.

Symbols

Information in this manual may be prefaced with the following symbols. They are provided to help you identify important operational, safety, maintenance or conformance issues.

Safety First: Important safety reminders

Note: Important reminders and helpful tips

Electrical Hazard: Danger of electric shock

Declaration of Conformity

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

We, Esco Micro Pte. Ltd.
of 21 Changi South Street 1
Singapore, 486777
Tel: +65 6542 0833

declare on our sole responsibility that the product:

Category : Vertical Laminar Flow Cabinet
Brand : MIRI® Laminar Flow Cabinet
Model : MLF-3D_, MLF-4D_, MLF-5D_, MLF-6D_, MLF-3D8_-MON, MLF-4D_-MON, MLF-5D_-MON, MLF-6D_-MON

in accordance with the following directives:

2014/35/EU : The Low Voltage Directive and its amending directives
2014/30/EU : The Electromagnetic Compatibility Directive and its amending directives
2012/19/EU : Waste Electrical and Electronic Equipment (WEEE)

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

Low Voltage : IEC 61010-1:2010 + AMD 1:2016 (3.1 edition)
EMC : EN 60601-1-2:2015 + A1:2021

Applied Standards: EN ISO 13485:2016; ISO 9001:2015; ISO 14001:2015; EN IEC 6100-3-2:2019 + A1: 2021; EN 6100-3-3:2013 + A1: 2019; EN 55011:2016 + A1: 2017 + A11: 2020; EN 6100-4-2:2009; EN 6100-4-3: 2006 + A1: 2008 + A2: 2010; EN 6100-4-4: 2012; EN 6100-4-5:2014 + A1: 2017; EN 6100-4-6: 2014; EN 6100-4-8: 2010; EN 6100-4-11: 2004 + A1: 2017; IEC 61010-1: 2010/AMD 1:2016

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

Place of Issue: Singapore
Date of Issue: June 2023

Indra Setiawan

Indra Setiawan

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

We, Esco Micro Pte. Ltd.
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Category	**: Vertical Laminar Flow Cabinet**
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in accordance with the following directives:

Electrical Equipment (Safety) Regulations 2016
Electromagnetic Compatibility Regulations 2016
The Waste Electrical and Electronic Equipment Regulations 2013

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

Low Voltage	**: IEC 61010-1:2010 + AMD 1:2016 (3.1 edition)**
EMC	**: EN 60601-1-2:2015 + A1:2021**

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

Place of Issue: Singapore
Date of Issue: June 2023

Indra Setiawan

Indra Setiawan
Plant Manager, Esco Lifesciences

MIRI® Laminar Flow Cabinet

About the Product

The MIRI® Laminar Flow cabinet provides a controlled and clean environment inside a laboratory. It employs a vertically unidirectional clean air pattern which supplies the working zone with higher quality of air therefore, preventing the sample from being risked to contamination.

MIRI® Laminar Flow cabinet is a vertical laminar flow workstation where ambient air is drawn in from the top of the cabinet, indicating the inflow of air, and descends into the working surface zone, indicating the downflow. The air will be filtered first by the prefilter made of polyester fibers with 85% arrestance and further filtered by the HEPA/ULPA filter.

The MIRI® Laminar Flow is a laminar flow cabinet which can be used for handling samples where work-zone cleanliness is required to prevent the sample from being contaminated by the means of clean filtered air through superior air filtration system. The workstation utilizes the vertical airflow pattern to provide clean air onto the working zone.

An integral part of the MIRI® Laminar Flow is the possibility of integrating a touchscreen monitor equipped with a mini-PC. The monitor can be used for microscope camera imaging by connecting it via the USB socket located below the monitor, next to the monitor's On/Off button. The user will be able to have a better observation of the object through the big screen of the monitor display. The MIRI® Laminar Flow cabinet is also equipped with the provision of microscope pole, meaning if needed by the user, they will be able to have an easy installation of the microscope unit.

The MIRI® Laminar Flow Cabinet are stationary devices. The term refers to equipment that, once installed and placed into service, is not intended to be moved from one place to another. The unit is meant to remain in the same location of initial installation within the laboratory.

About the Laminar Flow

MIRI® Laminar Flow cabinet is classified as a laminar flow cabinet which provides a controlled and clean environment inside the laboratory. The specific type of laminar flow pattern applied in the MIRI Laminar Flow is the unidirectionally vertical pattern. The vertical airflow pattern provides clean air towards the working surface of the workstation; therefore, the sample being handled will be protected from possible contaminations. Considering that the MIRI Laminar Flow provides vertical airflow pattern where only the sample being handled is protected, the workstation, therefore, should NEVER be used when handling hazardous samples.

There are 2 types of unidirectional airflow patterns, the first being horizontal and the second type is vertical. Horizontal Flow-type cabinet will have the main filtration system located at the back of the cabinet, meanwhile, Vertical flow-type cabinet will have the filtration system located at the top of the cabinet. In a more detailed manner, the vertical airflow system in the MIRI® Laminar Flow is displayed as seen in the figure below.

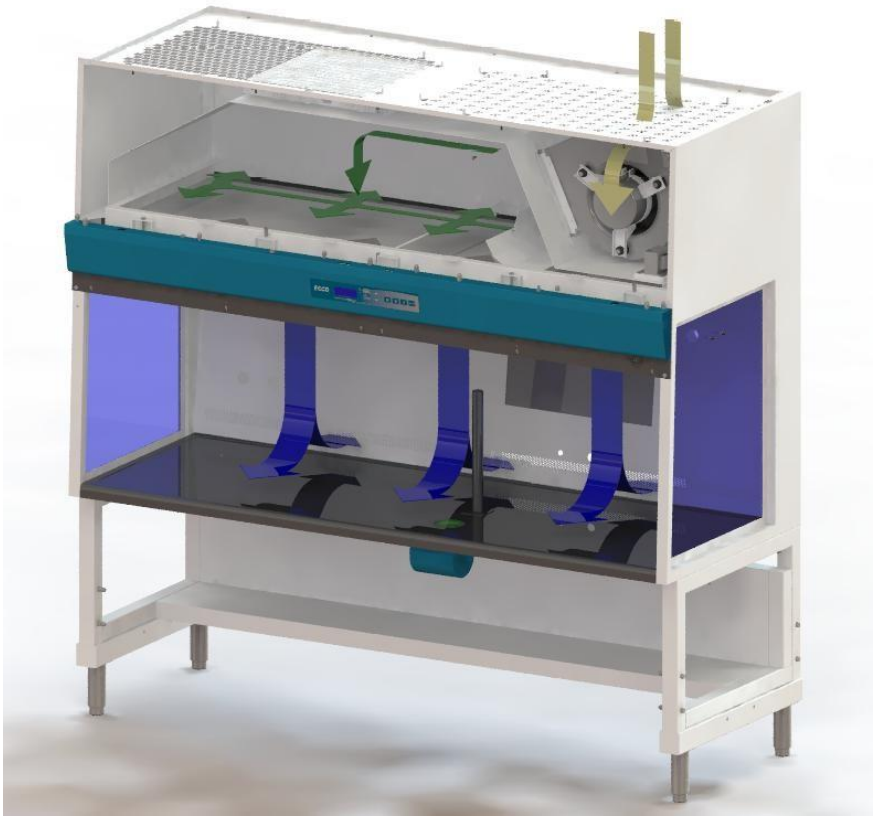


Figure 1. The laminar airflow pattern employed in the MIRI Laminar Flow Cabinet

Ambient air enters through the top of the cabinet where it will pass by the pre-filtration system to filter out dust particles. Afterwards, air will go through the DC ECM blower and get pushed towards the ULPA filter, where particulates of <0.3 um will be filtered out with efficiency of 99.9995%. Clean filtered air will then flow down to the working zone where the sample will be handled.

Quick View of the MIRI® Laminar Flow Cabinet

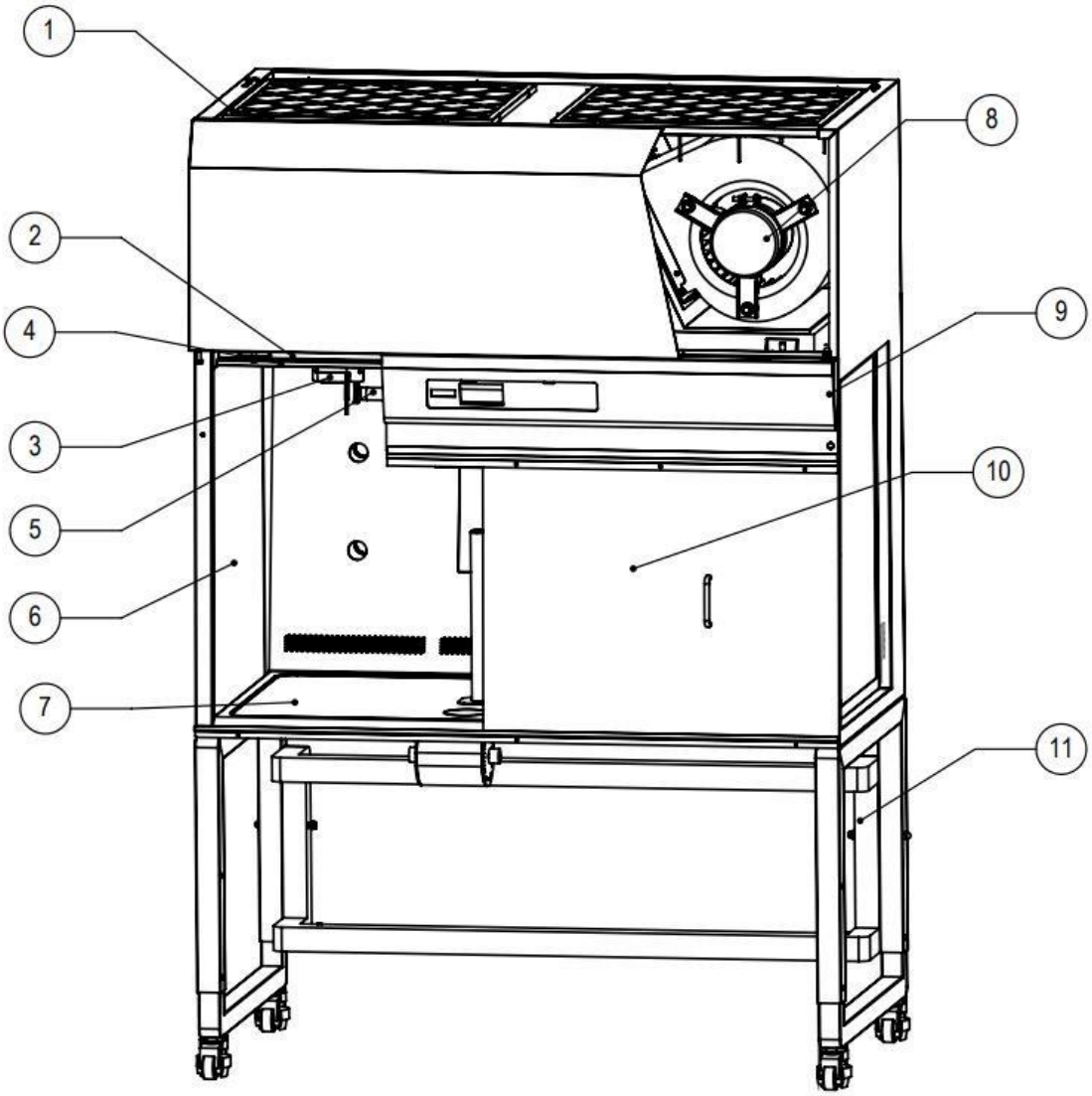


Figure 2. Simple mechanical drawing of the MLF

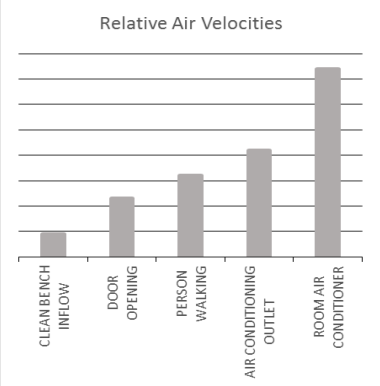
1. Pre-filter
2. Main ULPA filter
3. Donut-shaped airflow sensor
4. LED light
5. UV light
6. Transparent tempered glass side panels
7. Spill-retaining stainless-steel worktop
8. ECM blower
9. Sentinel™ Gold Microprocessor Control System
10. (Optional) Front cover for fixed sash (UV kit)
11. Support stand (STA type)

Installation

Location Requirements

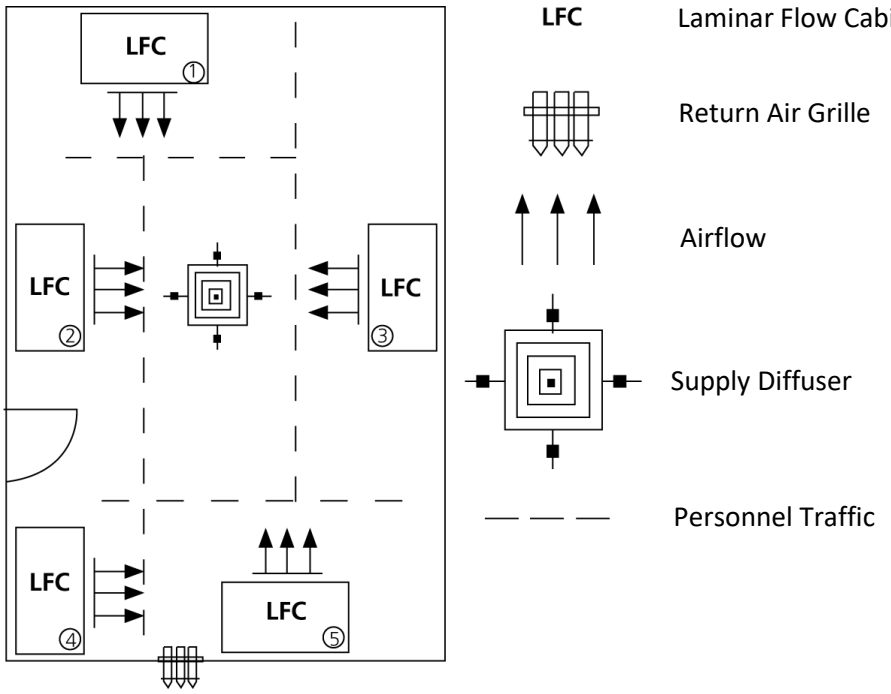
MIRI® Laminar Flow Cabinet is a stationary device, meaning that the equipment, once installed and placed into service, is not intended to be moved from one place to another place. The unit is meant to remain in the same location within a laboratory/institution. The operating environment requirement for the MLF cabinet is mentioned in this user manual, in below section. It is highly recommended that the user follows the operating environment for the use of the cabinet to avoid any damages from occurring on the unit.

The cabinet is required to be located that does not compromise the performance of the unit.



As seen in the chart, your cabinet's internal airflow velocity is relatively low compared to the airflow disturbance which can potentially be caused by the opening of the door, a person walking across the cabinet, or through direct exposure to an air-conditioning outlet. These external airflow disturbances can affect the containment inside the cabinet. Therefore, the cabinet should be located as far as possible from sources that can cause airflow disturbance towards the cabinet and in an orientation, which optimally shields the cabinet's airflow from all external airflow disturbances. There should be adequate SOP within the laboratory that target to minimize events which can affect the performance of the cabinet.

The diagram below illustrates various possible influences that can be induced by the room's design and ventilation system on the laminar flow cabinet's airflow. Bear in mind that the diagram below does not depict any typical installation. In fact, it is NOT recommended that such many cabinets are placed in the small room together, or in a close proximity to each other.



1. LFC 1 is quite appropriately located in a site that is optimum to avoid excessive air movements from the surrounding areas.
2. LFC 2 is placed too close to the doorway and its airflow could be influenced by the supply diffuser.
3. The airflow of LFC 3 could also be influenced by the supply diffuser.
4. LFC 4 is placed too close to the doorway.
5. LFC 5 is placed in an suitable location in the room given that the adjacent return air grille does not influence the cabinet's airflow.

Operating Environment Requirements

The device may only be used under the following conditions:

- Operating humidity: 5-95% RH (Non-condensing)
- Operating altitude – up to 2000 meters (6560 feet or 80kPa – 106kPa)
- Non-operating altitude – more than 2000 meters (more than 6560 feet or more than 80kPa – 106kPa)
- Temperature between 18°C – 30°C (65°F – 86°F)
- Keep away from direct sunlight
- Keep dry
- For indoor use only
- Main supply voltage fluctuations up to ±10% of the nominal voltage
- Pollution degree of 2.0
- *Pollution degree describes the amount of conductive pollutants present in an operating environment. In pollution degree 2.0, it is assumed that only non-conductive pollutants such as dust are present, except when occasional conductivity caused by condensation.*

Preparing for Installation

Support Stand Options

Esco provides a number of support stand options, these are summarized below, and further details can be found in the table at the end of this section.

- o Telescoping height with Castor Wheel
- o Telescoping height with Levelling Feet

Esco support stands with levelling feet is recommended for safety. It is recommended that the installation of the support stand be carried out by qualified personnel (contact your Esco Distributor for assistance). After the cabinet is installed on the support stand, use a level placed in the center of the work tray to adjust the legs to achieve a level work surface; first level from left to right and then level from front to back. The NSF approved leg levelers provide a maximum 50 mm (2") adjustment.

When installing the cabinet onto an existing work surface, ensure that the structure can safely support the combined weight of the cabinet and any related equipment. Some modifications to the work surface may be necessary. The work surface should be smooth, non-porous and resistant to those disinfectants and chemicals to which the cabinet is regularly exposed to.

Electrical Requirements

- The MIRI® Laminar Flow Cabinet should always be connected to its own dedicated power outlet.
- The power rating for all MLF models is shown in the table below. Ensure that the outlet is rated accordingly.

Table 1. Different model of MLF and their respective electrical characteristic

Cabinet Model Code	Electrical rating	Cabinet Full Load Amps (FLA) (A)	Power (W)	Max. Rating for EO
MLF-3D8 MLF-3D8-MON	220-240 VAC, 50/60 Hz	6A	950 W	N/A
MLF-3D9 MLF-3D9-MON	115-130 VAC, 50/60 Hz	10A	950 W	N/A
MLF-4D8 MLF-4D8-MON	220-240 VAC, 50/60 Hz	6A	1000 W	N/A
MLF-4D9 MLF-4D9-MON	115-130 VAC, 50/60 Hz	10A	1000 W	N/A
MLF-5D8 MLF-5D8-MON	220-240 VAC, 50/60 Hz	6A	1100 W	N/A
MLF-5D9 MLF-5D9-MON	115-130 VAC, 50/60 Hz	10A	1100 W	N/A
MLF-6D8 MLF-6D8-MON	220-240 VAC, 50/60 Hz	6A	1100 W	N/A
MLF-6D9 MLF-6D9-MON	115-130 VAC, 50/60 Hz	10A	1100 W	N/A

- The power inlet in the MLF cabinet is located in the top right side and the cord is 2 m and 2.5 m long for 4 feet and 6 feet cabinet, respectively. The power cord is plugged into the laboratory's wall outlet.
- The cabinet maximum voltage fluctuation is +10% of the nominal voltage. The DC-ECM motor of the MLF will maintain the airflow by increasing the filter loading when the voltage fluctuations become higher.
- The MLF cabinet should not be plugged in to GFCI outlet, if so, may initiate outlet trip. Hence, the cabinet must be plugged in to a regular, non-GFCI outlet.
- For better operation and safe usage of the cabinet, a reliable protective earth connection is highly recommended.

Do not defeat the safety purpose of the grounding-type plug! A grounding-type plug has two blades and a prong, which is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician to replace the outlet.

Connecting the Electrical Supply

- Please refer to the serial label on the MLF cabinet for the proper electrical rating to ensure that the cabinet is connected to the correct electrical supply.
- Connect the supplied power cord provided in the input on the top of the MLF. Make sure that the cable connector is seated firmly in the socket.
- Ensure that the mains electricity supply is switched off prior to plugging the unit into the wall socket. Do not start the unit up until all the connections have been made and the post installation steps have been completed.

Safety Guidelines for Disconnection of Power

- A standard MIRI Laminar Flow Cabinet includes one (1) appliance inlet, located at the top right corner side from the front view of the workstation. The appliance inlet (at the right side) shall supply the main MLF cabinet. Before connecting the unit to the power source, the cable and the plug need to be free from any physical damage.
- Once the MLF cabinet has been properly turned off, unplug the cable attached to the appliance inlet to disconnect the unit from the power supply system.

Installation at the Site

Follow the guidelines explained below to properly install the MLF unit.

1. Lift the cabinet using a stacker or forklift.

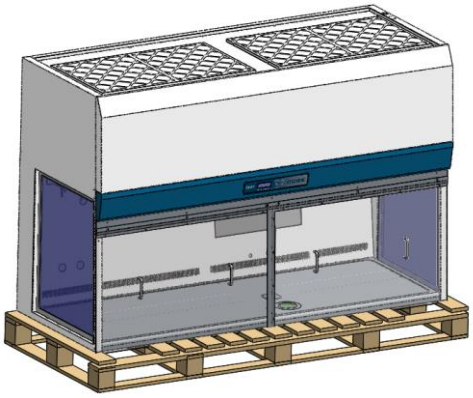


Figure 3. MIRI Laminar Flow Cabinet, the cabinet

2. Position the pre-assembled support stand below the cabinet.

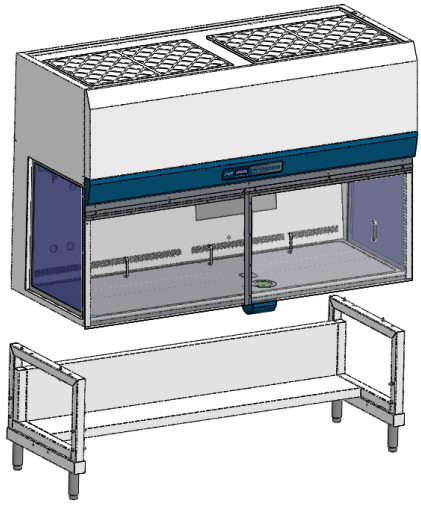


Figure 4. MIRI Laminar Flow Cabinet, the cabinet and the support stand

3. Remove the 4 bolts as shown in the below image.

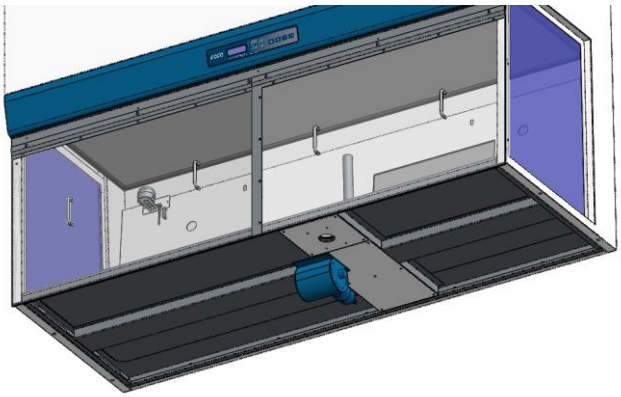


Figure 5. 4 bolts in the MIRI Laminar Flow Cabinet

4. Lower the cabinet slowly and carefully onto the support stand. Ensure the support stand is aligned correctly with the cabinet.

5. Secure the support stand to the cabinet using the 4 long bolts.

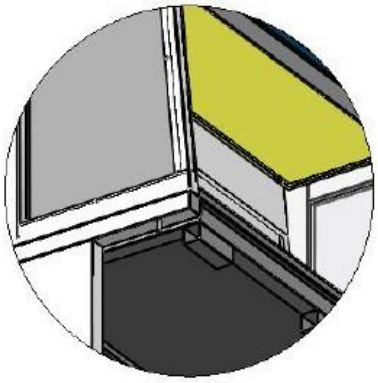


Figure 6. 4 long bolts in the MIRI Laminar Flow Cabinet

6. Unscrew the 4 bolts as shown below and remove the 4 pieces of angle brackets.

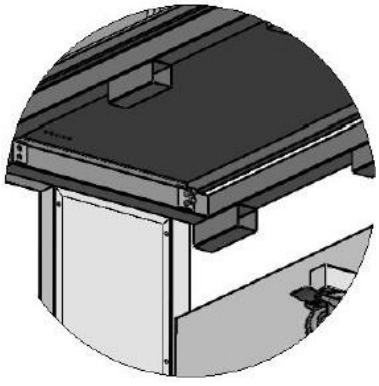


Figure 7. 4 pieces of angle brackets removal

7. Pull out the metal pallet. The installation has been completed.

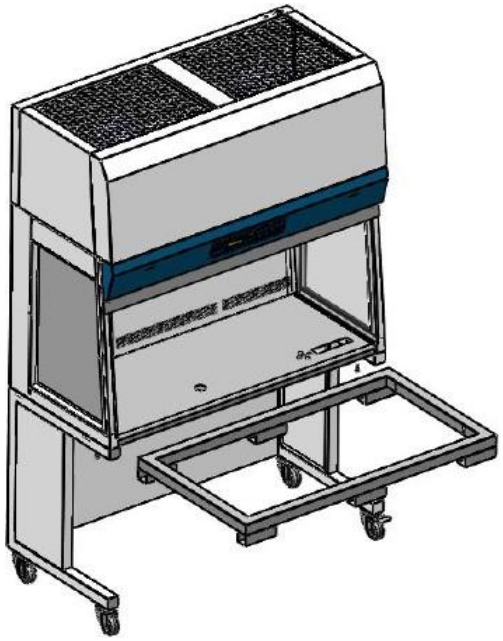


Figure 8. Metal pallet in the MIRI Laminar Flow Cabinet

Transport and Disposal

Transport

The devices are packed in a carton box, and it is wrapped in a polyethylene. The box is affixed to a pallet with special straps. A visual inspection should be done to see if there is any damage. If there is no damage found, the MIRI Laminar Flow is prepared to be transported.

These labels should be glued on the box:

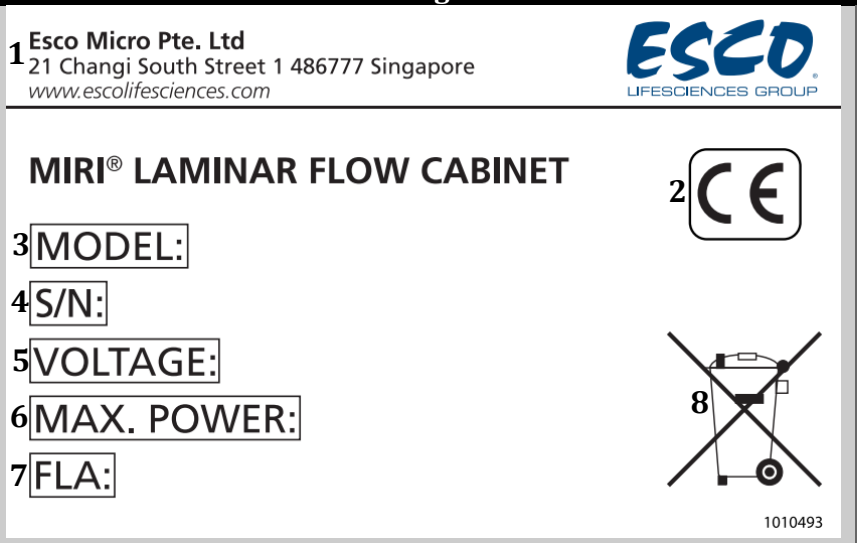
Label with handling symbols and the marked packing date

Safety and Warning Labels on the Cabinet

Anyone using the cabinet should familiarize themselves with the various labels displayed in and on the cabinet. It is very important that users are familiar with the meanings of the labels before attempting to use the unit.

Table 2 Labels on the Miri Laminar Flow Cabinet

Description	Image
PC On/Off Button	ON / OFF
USB Port	USB PORT

Description	Image
1. Manufacturer's address and country of origin 2. CE Mark 3. Model 4. Serial Number 5. Voltage rating 6. Maximum power 7. Full-Load-Amps Value 8. Observe WEEE	

Disposal

It is highly recommended that prior to proper disposal, all surfaces of the cabinet to be disinfected or decontaminated.

The unit contains reusable materials. All components (except for the ULPA filters) can be discarded as electrical waste after cleaning and disinfection.

Please note that the ULPA filters must be discarded according to the applicable national regulations for special solid waste.

Basic Cabinet Instructions

Cleaning Instructions

MIRI® Laminar Flow Cabinet is not a sterile device. It is not delivered sterile state and it is not possible to keep them sterile while in use. However, their design was created with great care to make it easy for the user to keep the device sufficiently clean and not contaminate the key components. These cleaning instructions are for general-purpose use and have not been validated for sufficiency to cover all possible usage aspects and all imaginable use scenarios.

The design features intended to provide cleanliness are:

- A HEPA/ULPA filtered laminar airflow.
- A flush stainless-steel work surface.
- Use of parts that withstand cleaning well.

☞ **Always validate the cleaning procedures locally; for more guidance, consult your manufacturer or the distributor.**

Wearing gloves and good handling techniques are essential to successful cleaning.

1. Power off the MIRI® Laminar Flow Cabinet
2. It is recommended that the unit is cleaned with aqueous 70% isopropyl alcohol (IPA): moisten a sterile wipe and clean all internal and external surfaces of the device by rubbing the wipe on the surfaces.
3. Following cleaning, it is recommended to not use the workstation straight away to ensure that all alcohol fumes dissipate first.
4. Finally, purified or sterile water is used to wipe the device surfaces to remove any residue from the disinfectant agent.
5. Inspect the device: if visually clean, the device is ready for use.
6. Turn on the MIRI® Laminar Flow Cabinet
7. Stubborn stains on the stainless-steel surface can be removed using MEK (Methyl-Ethyl-Ketone). Make sure to wash the surface cleaned with MEK immediately with clean water and appropriate liquid detergent.

If the device is not visually clean, repeat the process from step 2.

Working Ergonomics

On most occasions, you would most likely be operating the cabinet in a sitting rather than a standing position. There are some obvious advantages of the sitting position:

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

However, the 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:

- Always ensure that your legs have enough legroom.
- Keep your lower back comfortably supported by your chair. Adjust the chair or use a pillow behind your back whenever necessary.
- You should place your feet flat on the floor or on a footrest. Don't dangle your feet and compress your thighs.
- 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.
- 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.
- Arrange the items/apparatus frequently used in your work in such a way that you can minimize the physical strain involved in handling them.
- Exercise regularly

The cabinet's noise emission has been tested and found to be in compliance with EN 12469, ISO 4871 and NSF/ANSI 49 which is important to ensure health and comfort for the operator.

UV Lamps for Working Zone Decontamination (Optional)

Shortwave UV (UVC) with wavelength at 253.7 nm is considered as germicidal and virucidal. Even at the minimum acceptable irradiance in a cabinet – 40 μW/cm² (US Department of Health and Human Services et. al., 2000), it would only take 12.5 minutes to reach 30,000 μW/cm2 (1 W = 1 J/sec), which has been listed as germicidal for spore forming organism. Unlike many other types of decontamination agent, UV light doesn't leave any residue. The decontamination action stops upon de-energizing of the lamp.
However, due to the short wavelength, the UV light does not penetrate well. Thus, UV light can only be used to effectively disinfect the work area of an empty cabinet. For any container stored inside the cabinet's work area, the UV radiation will only disinfect the outer surface of the material, leaving the inner surface and the content inside the material untouched.

UV light decontamination method may be used before and after working with vegetative organisms and viruses. However, it should not be the sole decontamination agent; the use of chemical decontamination agent is still encouraged.

Make sure that front cover is placed and the interlock is working properly before activating the UV lamp. Avoid direct contact with skin and eyes as UV light can cause direct eye damage and erythema of skin.

To activate the UV lamp

1. UV lamp feature can only be activated once the polycarbonate front cover has been properly installed.
2. Insert the stainless-steel part of front cover into the sash of the laminar flow cabinet.
3. Make sure that the magnet in the front cover is detected by the magnetic switch on the worktable, otherwise UV lamp cannot be turned on.
4. The UV lamp should be activated for around 60 minutes to work effectively. Use the UV

timer feature to easily control the period of decontamination (UV timer is disabled by default). Leaving the UV lamp on for over 60 minutes or even overnight is not recommended because it shortens the lifespan of the lamp. The UV lamps used in Esco cabinet have a lifespan of 2,000 hours.

5. The UV lamp should be cleaned of any dust and dirt weekly and changed annually to ensure its effectiveness.
6. Minimize the material inside the cabinet's work area during the process of UV light decontamination. A direct interaction with UV light can degenerate plastic or rubber-based material and can cause another hazard.

Touchscreen Monitor and Mini PC (Optional)

The MIRI® Laminar Flow Cabinet is equipped with one powerful touch enabled AIO PC. Switch "ON/OFF" the PC by pressing the button below the screen.

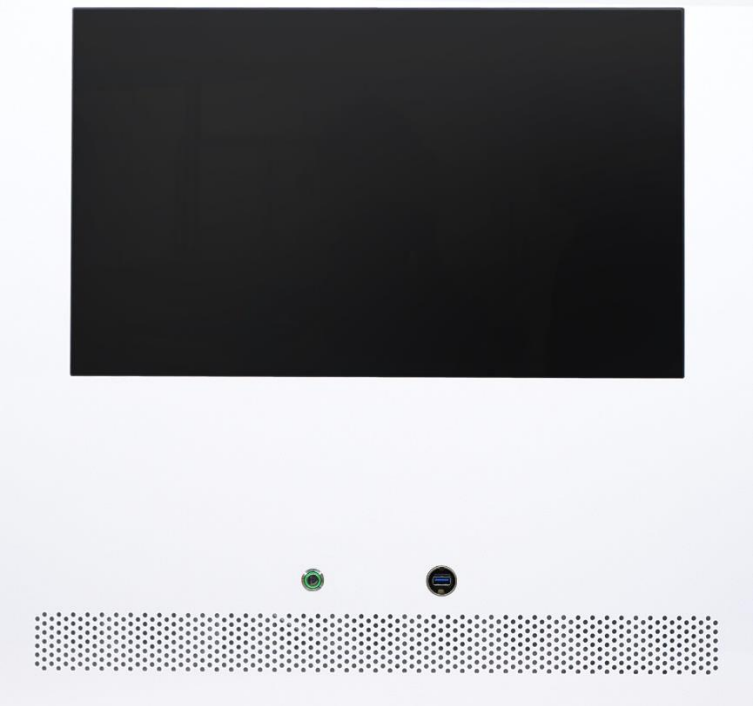


Figure 9 The AIO PC screen in MIRI® Laminar Flow Cabinet

First, the PC will start and load the Windows operating system. The AIO PC can easily be used to display an image from any USB-type microscope camera. A standard USB socket is located below the AIO PC. It can be used to load the microscope camera drivers or other software onto the AIO PC. When the software is set up, the microscope camera can be connected to the USB socket and the image will be displayed on the monitor. The AIO PC can easily be used to display an image from any USB-type microscope camera. A standard USB socket is located under the PC next to the On/Off button. The USB socket can be used to load the microscope camera drivers or other software into the AIO PC. When the software has been set up, the microscope camera can be connected to the USB socket and the image shown on the screen.

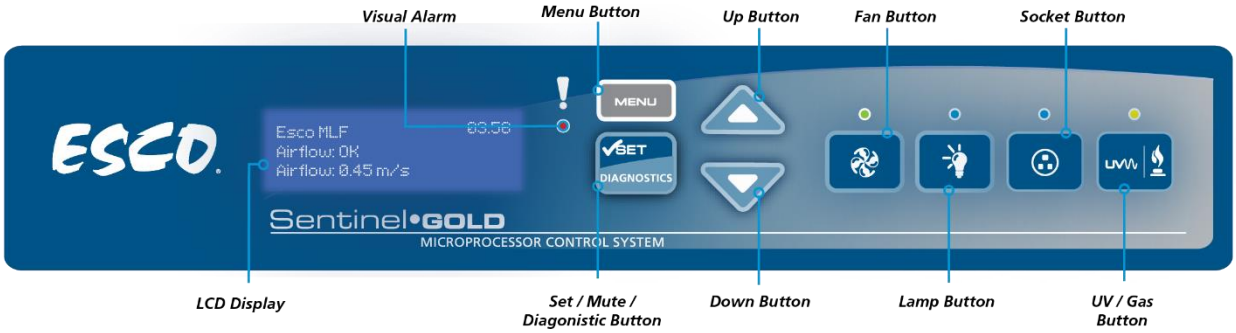
To turn on the Monitor

1. Ensure that the power plug has been connected to the cabinet and the power socket (indicated when the Sentinel™ Gold is turned on).
2. After the first step has been completed, proceed to press the On/Off button located below the monitor to turn it on.

To connect the microscope with the AIO PC

1. Properly mount the camera on the microscope.
2. Connect the cable into the camera.
3. Connect the other end of the cable into the USB port located on the backwall of the cabinet (below the AIO PC).
4. If the USB port is occupied, you may use an external adapter which would allow you to have multiple USB ports.

Sentinel™ Gold Microprocessor Controller System



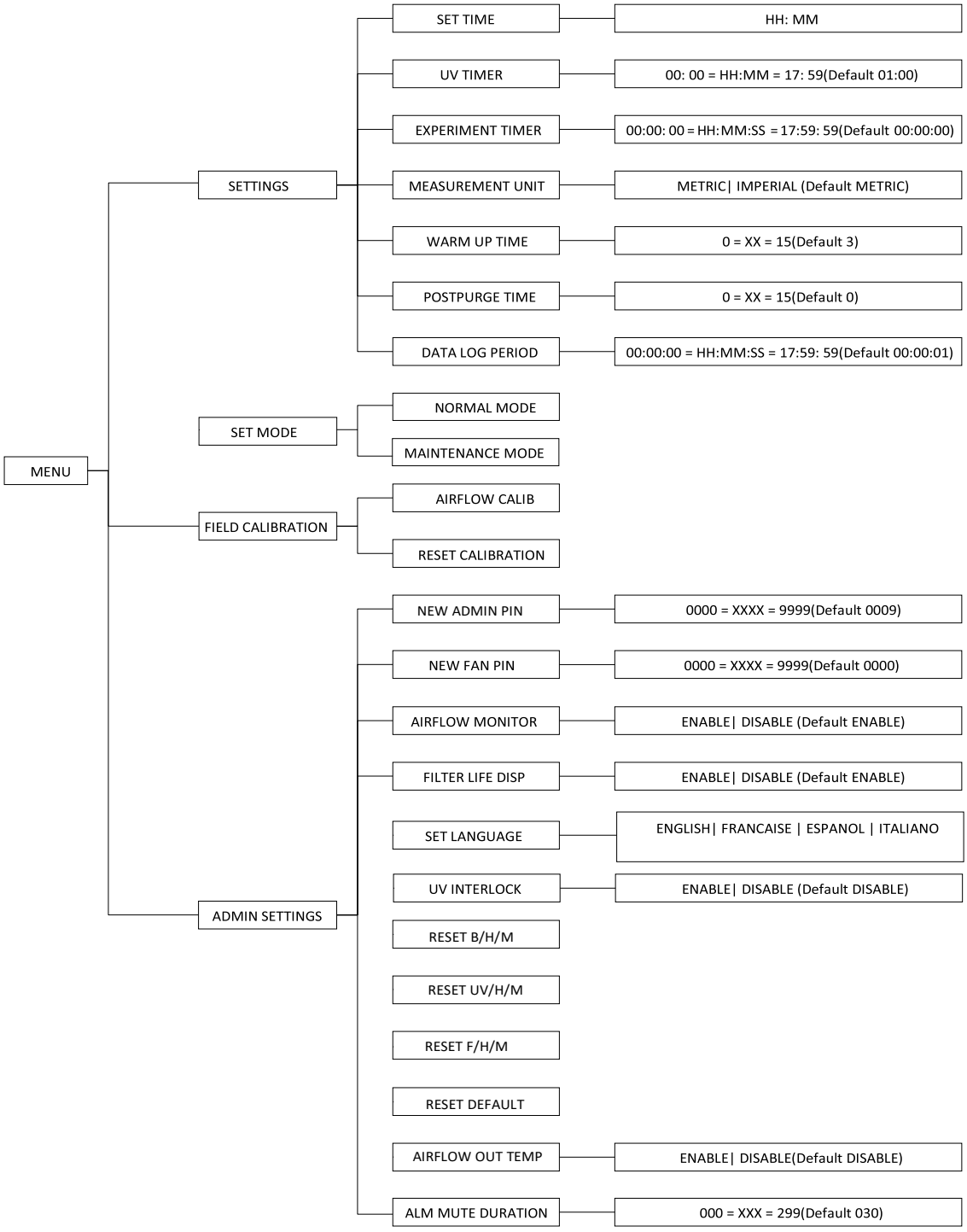
1. Fan Button
   - Turns the fan on or off.
   - To activate standby mode.
2. Lamp Button
   - Turns the LED lamp on or off.
3. Socket Button
   - Turns on or off the electrical socket (*if present*).
   - The maximum rating of all the outlets in the cabinet is 5 A. If there is an overload, the fuse will blow.
4. UV/Gas Button
   - Turns on or off the UV lamp (*optional retrofit kit*).
   - Please install front cover *(retrofit kit)* if you want to use this feature. Since the front cover is capable of filtering UV rays, users are protected from the harmful UV rays.
5. Up (▲) and Down (▼) Arrow Button
   - Moves the menu options upwards and downwards.
   - Increases and decreases corresponding value inside one of the menu options.
   - For accessing the stopwatch and experiment timer function.
6. Set/Mute/Diagnostic Button
   - To proceed to the next step, level or sequence inside the menu options.
   - Mutes the air fail alarm sound (during normal mode).
   - Enters diagnostic mode.
7. Menu Button

When you are entering menu options, the alarm will sound to indicate that the microprocessor is not monitoring the operation of the cabinet. No further warnings will be given.

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

Menu Options

Please refer to the following diagram for complete reference to all menu options available.



Settings

Users may use the settings menu to customize the operation of the cabinet to meet specific application requirements. The settings menu can be entered either FAN PIN or ADMIN PIN.

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.

To set the time:

1. Press MENU button to enter the menu display – if the LFC is secured by a FAN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose SET TIME. Press SET button to confirm.
6. The time is set in HH:MM format. Use UP/DOWN buttons to choose the hour (HH). Press SET button to confirm. Do the same for the minute
7. The display will show TIME SET for a few second and then return to SETTINGS.
8. Press MENU button twice to return to the main display.

UV Timer (If UV is present)

UV timer can be used to switch off the UV lamp automatically after a fixed period. The UV timer can be set up to 24 hours. By default, the timer is set to 60 minutes. Esco does not recommend leaving the UV lamp on for more than 60 minutes per decontamination cycle as it shortens the lifespan of the UV lamp. Unless the UV timer is activated, the lamp has to be switched off manually.

To set the UV timer:

1. Press MENU button to enter the menu display – if the LFC is secured by a FAN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose UV TIMER. Press SET button to confirm.
6. The time is set in HH:MM format. Use UP/DOWN buttons to choose the hour (HH). Press SET button to confirm. Do the same for the minute.
7. The display will show UV TIMER SET for a few second and then return to SETTINGS.
8. Press MENU button twice to return to the main display.

Experiment Timer

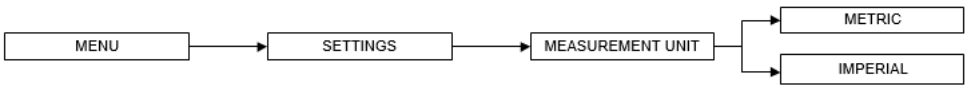
Experiment timer is a countdown timer that can be used for critical experiment. Experiment timer can be set between “00:00:00” and “17:59:59”.

To set the Experiment Timer:

1. Press the MENU button to enter menu display – if the cabinet is secured by a FAN PIN, then it will ask for the PIN, otherwise go to step 3
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm
3. The alarm buzzer will go off
4. Use UP/DOWN buttons to choose SETTINGS. Press SET button to confirm
5. Use UP/DOWN buttons to choose EXPERIMENT TIMER. Press SET button to confirm
6. The time is set in HH:MM:SS format. Use UP/DOWN buttons to choose the hour (HH). Pres SET button to confirm. Do the same for minute and second
7. The display will show EXPERIMENT TIMER SET for a few second and then return to SETTINGS
8. Press MENU button twice to return to the main display

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) units.



To Set Measurement Unit

1. Press MENU button to enter the menu display – if the LFC is secured by a FAN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose MEASUREMENT UNIT. Press SET button to confirm.
6. Use UP/DOWN buttons to choose between METRIC and IMPERIAL. Press SET button to confirm.
7. The display will return to SETTINGS.
8. Press MENU button twice to return to the main display.

Warm Up Time

There will be a warmup period before the LFC is fully functioning upon activation of the unit. This is to ensure that the sensors, the blower, and the control system are stabilized, as well as to ensure the work zone is purged of contaminants. The default setting is 3 minutes, and the user can set it between 3 to 15 minutes.

During the warmup 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 needs to input ADMIN PIN and even then, some sections of the menu (WARM UP and all FIELD CALIBRATION) are still not accessible for the user. Entering the menu during this time will put the warmup period on pause.

To Set Warm Up Time

1. Press MENU button to enter the menu display – if the LFC is secured by a FAN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose WARM UP TIME. Press SET button to confirm.
6. The time is set in MM format. Use UP/DOWN buttons to set the warm-up period.
7. Press SET button to confirm.
8. The display will show WARM UP SET for a few second and then return to SETTINGS.
9. Press MENU button twice to return to the main display.

Post Purge Time

After the user switches off the LFC 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 (disabled) and user can set from 0 up to 15 minutes. It is recommended that LFC is purged for a minimum of 3 minutes after the work is complete.

To Set Post Purge Time

1. Press MENU button to enter the menu display – if the LFC is secured by a FAN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose POSTPURGE TIME. Press SET button to confirm.
6. The time is set in MM format. Use UP/DOWN buttons to set the post purge period.
7. Press SET button to confirm.
8. The display will show POST PURGE SET for a few second and then return to SETTINGS.
9. Press MENU button twice to return to the main display.

Data Log Period

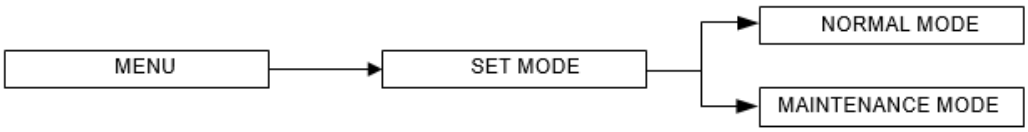
Using RS232 communication port, the LFC can send data on the condition of the LFC to a PC. Data Log Period option allows the user to control the amount of time within the LFC data sending procedure.

To Set Data Log Period

1. Press MENU button to enter the menu display – if the LFC is secured by a FAN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose DATA LOG PERIOD. Press SET button to confirm.
6. The time is set in HH:MM:SS format. Use UP/DOWN buttons to choose the hour (HH). Press SET button to confirm. Do the same for the minute and second.
7. The display will show DATA LOG PERIOD SET for a few second and then return to SETTINGS.
8. Press MENU button twice to return to the main display.

Setting Mode

The LFC has normal mode that can be used in daily activity, and maintenance mode is for the use of qualified personnel during maintenance.



To Set the Mode

1. Press MENU button to enter the menu display – if the LFC is secured by a FAN and ADMIN PIN, then it will ask for the appropriate PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm will go off
4. Use UP/DOWN buttons to choose SET MODE. Press SET button to confirm.
5. Use UP/DOWN buttons to choose between NORMAL MODE, QUICKSTART MODE and MAINTENANCE MODE. Press SET button to confirm.
6. The display will return to SET MODE.
7. Press MENU button twice to return to the main display.

Normal Mode

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

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.

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 LFC to the standard reference. Calibration should only be carried out by qualified personnel. This section presents a brief overview of the calibration menu function. For more information, refer to the test report.

Airflow Calibration

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

Reset Calibration

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

Admin Settings

The admin menu allows you to change both FAN and ADMIN PIN. The reset blower, filter and UV hour meter (if present) functions are usually used after the blower, filter or UV lamp is changed as they can easily serve as an indication to the user on when the LFC needs maintenance. The reset default function will return the options in the settings menu to their factory settings.

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 qualified personnel. User must enter a four-digit ADMIN PIN before accessing these menus.

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

To Set New ADMIN PIN:

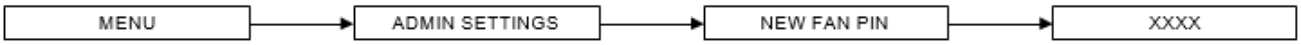
1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose NEW ADMIN PIN. Press SET button to confirm.
6. The FAN PIN consists of 4 numerical digits (XXXX) that the user must enter one by one.
7. Use UP/DOWN buttons to choose the first digit (X). Press SET button to confirm. Do the same for the following three digits
8. The display will show CONFIRM PIN? Press SET button to confirm.
9. The display will return to ADMIN SETTINGS.
10. Press MENU button twice to return to the main display.

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 the four-digit PIN before switching the fan on or off. This feature prevents unauthorized personnel from accessing critical control sections. It will also prevent unauthorized shutdown of the LFC when continuous operation is required.

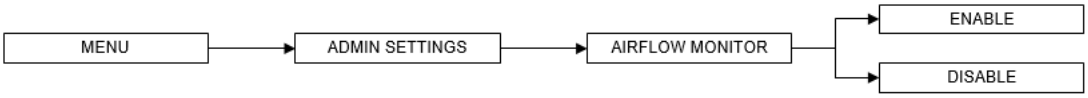
It is recommended that the FAN PIN be issued only to personnel authorized to use the LFC. With FAN PIN, the user can access admin and set mode parts of the menu.

Setting the PIN to 0000 will disable this feature. The FAN PIN is disabled by default. When the FAN PIN is disabled, the LFC 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).



To Set New FAN PIN:

1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose NEW FAN PIN. Press SET button to confirm.
6. The FAN PIN consists of 4 numerical digits (XXXX) that the user must enter one by one. Use UP/DOWN buttons to choose the first digit (X). Press SET button to confirm. Do the same for the following three digits
7. The display will show CONFIRM PIN? Press SET button to confirm.
8. The display will return to ADMIN SETTINGS.
9. Press MENU button twice to return to the main display.

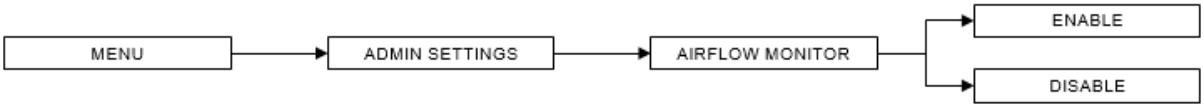


Airflow Monitor

Whenever the air velocity falls below the failure 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 warmup period is removed but the airflow will not be displayed for the first three minutes.

If the ambient temperature is outside of 18-30^{o}C (cabinet working temperature), the Airflow Monitor is automatically disabled.

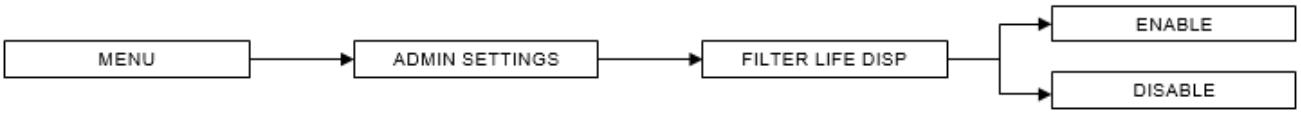


To Set A/F Monitor:

1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose AIRFLOW MONITOR. Press SET button to confirm.
6. Use UP/DOWN buttons to choose between ENABLE and DISABLE. Press SET button to confirm.
7. The display will return to ADMIN SETTINGS.
8. Press MENU button twice to return to the main display.

Filter Life Display

Using this option, the user can select whether the filter life is displayed or not.
Filter life is calculated based on the filter hour meter (F/H/M). The filter life display will count down according to the amount of hours left in the filter hour meter with respect to filter life expectancy of 10,000 hours. When the filter is changed, the F/H/M must be reset *(please see section 4.2.4.9 to reset the F/H/M).* Please note that the life of the filter is dependent on multiple factors which include environmental air cleanliness. A dirty / dusty environment will load the filter fast.

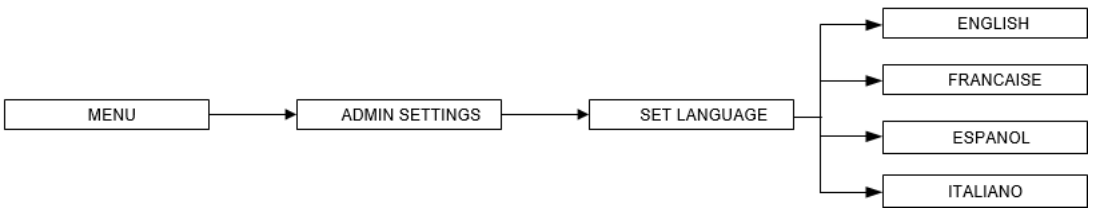


To Set Filter Life Display:

1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose FILTER LIFE DISP. Press SET button to confirm.
6. Use UP/DOWN buttons to choose between ENABLE and DISABLE. Press SET button to confirm.
7. The display will return to ADMIN SETTINGS.
8. Press MENU button twice to return to the main display.

Set Language

Using this option, the user can select the language of messages displayed on the LCD.



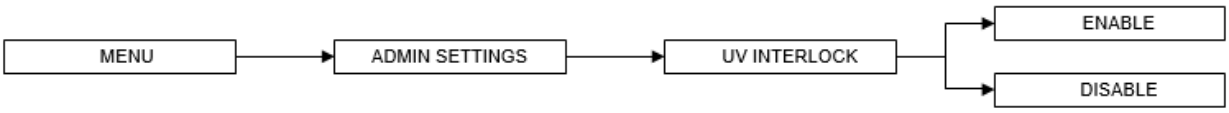
MIRI Laminar Flow Cabinet comes with English as the default language; however, other languages are also available for a more diverse option for our customer, the languages available include Italian, Spanish, and French.

To Set Language:

1. Press MENU button to enter the menu display – if the LFC is secured by a FAN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose SET LANGUAGE. Press SET button to confirm.
6. Use UP/DOWN buttons to choose between ENGLISH, FRANÇAISE or ESPAÑOL (depending on the option the user has requested). Press SET button to confirm.
7. The display will return to ADMIN SETTINGS.
8. Press MENU button twice to return to the main display.

UV Interlock

When the UV Interlock is enabled, this means that the UV can't be switched on when the front cover is not installed. When it is disabled, the UV can be switched on without the front cover *(only if the fan and light are switched off)*. After the UV is switched on, the fan and light can't be switched on. By default, this option is disabled.



To Set UV Interlock:

1. Press MENU button to enter the menu display – if the LFC is secured by a FAN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the FAN PIN or ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose UV INTERLOCK. Press SET button to confirm.
6. Use UP/DOWN buttons to ENABLE or DISABLE. Press SET button to confirm.
7. The display will return to ADMIN SETTINGS.
8. Press MENU button twice to return to the main display.

It is recommended that the UV Interlock be enabled.

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. There is no maximum value in blower hour meter. The counter value can be checked in the diagnostic mode. The value can also provide some help in setting up maintenance schedule.

To Reset B/H/M:

1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm
5. Use UP/DOWN buttons to choose RESET B/H/M. Press SET button to confirm
6. The display will show READ MANUAL and PRESS SET. Press SET button to confirm
7. The display will display ”CONFIRM?”. Press SET button to confirm
8. The display will return to ADMIN SETTINGS
9. Press MENU button twice to return to the main display

Reset UV/H/M (If UV is present)

This option is used to reset the UV lamp hour meter. The UV lamp hour meter indicates how long the UV lamp has been in operation. The maximum counter is set at 2,000 hours (100%). The counter value can be checked while in the diagnostic mode.

Please reset the UV lamp hour meter after each UV lamp replacement.

To Reset UV/H/M:

1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose RESET UV/H/M. Press SET button to confirm.
6. The display will show READ MANUAL and PRESS SET. Press SET button to confirm.
7. The display will show CONFIRM?. Press SET button to confirm.
8. The display will return to ADMIN SETTINGS.
9. Press MENU button twice to return to the main display.

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 maximum counter is set at 10,000 hours (100%). The counter value can be checked while in the diagnostic mode.

Please reset the filter hour meter after each filter replacement.

To Reset F/H/M:

1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose RESET F/H/M. Press SET button to confirm.
6. The display will show READ MANUAL and PRESS SET. Press SET button to confirm.
7. The display will show CONFIRM?. Press SET button to confirm.
8. The display will return to ADMIN SETTINGS.
9. Press MENU button twice to return to the main display.

Reset Default

Users can reset default settings by choosing this option. The features being reset are warm up period (3 minutes), post-purge period (0 minute), UV timer (60 minutes) if present, measurement unit (metric), airflow monitor (enabled), ADMIN PIN (0009), filter life display (disabled) and FAN PIN (0000).

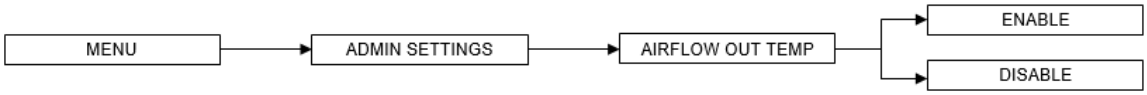
Note that the calibration settings cannot be reset as it may cause the LFC to operate in an unsafe manner. The hour meters cannot be reset using this function either.

To Reset Default:

1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose RESET DEFAULT. Press SET button to confirm.
6. The display will show READ MANUAL and PRESS SET. Press SET button to confirm.
7. The display will show CONFIRM?. Press SET button to confirm.
8. The display will return to ADMIN SETTINGS.
9. Press MENU button twice to return to the main display.

Airflow out Temp

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

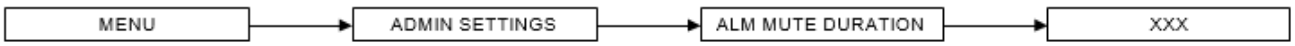


To Set Airflow Out Temp:

1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose AIRFLOW OUT TEMP. Press SET button to confirm.
6. Use UP/DOWN buttons to choose between ENABLE and DISABLE. Press SET button to confirm.
7. The display will return to ADMIN SETTINGS.
8. Press MENU button twice to return to the main display.

Alarm Mute Duration

To mute *Airfail* alarm for a certain period. The mute period can be set from 0 up to 299 seconds; the default value is 30 seconds. Alarm will be activated when the airflow velocity is below the value prescribed by the standard the cabinet is designed or certified to.



To Set Alarm Mute Duration

1. Press MENU button to enter the menu display – if the LFC is secured by an ADMIN PIN, then it will ask for the PIN, otherwise go to step 3.
2. Use UP/DOWN button to enter the ADMIN PIN digit by digit. Press SET button to confirm.
3. The alarm buzzer will sound.
4. Use UP/DOWN buttons to choose ADMIN SETTINGS. Press SET button to confirm.
5. Use UP/DOWN buttons to choose ALM MUTE DURATION. Press SET button to confirm.
6. Use UP/DOWN buttons to choose the mute period. Press SET button to confirm.
7. The display will show MUTE DURATION SET for 2 seconds and return to ADMIN SETTINGS.
8. Press MENU button twice to return to the main display.

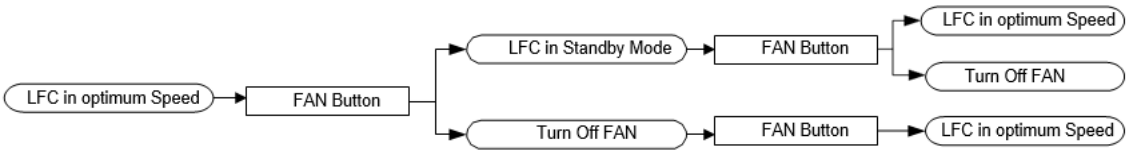
Stopwatch and Experiment Timer

- The stopwatch function can be started by pressing the UP button while the cabinet is in operation. Pressing UP button again while the stopwatch function is activated will stop or resume the timer. Use the DOWN button to exit the stopwatch function and reset the timer. The timer in the stopwatch function is counting up and is shown using the HH:MM:SS format.
- The experiment timer can be started by pressing the DOWN button while the cabinet is in operation. Pressing the DOWN button while the experiment timer function is activated will stop or resume the timer. Use the UP button to exit the experiment timer function and reset the timer. The timer in the experiment timer function is counting down and is shown using the HH:MM:SS format. Operator can use the SETTINGS EXPERIMENT TIMER menu *(refer to section 4.2.1.3)* to set the experiment timer.

Standby Mode

The LFC supports standby mode, where the blower speed is greatly reduced resulting in less power consumption. This mode is typically used during the night to maintain basic level of containment where the cabinet is not used by the operator.

The mode can be accessed by pressing the FAN button when the cabinet is in operation. In standby mode, the airflow monitor is disabled and only the FAN button is operational, while other buttons are interlocked.



Alarms and Warnings

The MLF uses alarms to indicate that the condition inside the LFC is not safe for the products, so check the LCD display to understand the cause of these alarms.

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

- **AIRFLOW: NO!** Will be displayed if there is an airflow failure.
- **SENSOR UNCALIBRATED** will be displayed if the airflow velocity sensor is not yet calibrated.
- **WARNING: LOW AIRFLOW!** when the velocity is below fail point airflow.

If the message "Call Service for re-certification" is displayed, it means that the LFC certification has expired. Call service or Esco's local distributor for re-certification.

Diagnostic Mode

Diagnostic mode can be accessed by pressing the SET button. The diagnostic mode allows the user to know the condition of the LFC or help the service engineer during maintenance and troubleshooting.

Table 3 Short explanation on the features of Sentinel Gold

On Screen	Explanation
MODE	Shows which mode is active: NORMAL MODE or MAINTENANCE MODE
VERSION	Shows the version of the software; *e.g.* CP104D V 1.0
TEMPERATURE	Shows the temperature inside the cabinet.
B/H/M	Blower Hour Meter – increase by the hour.
FILTER LIFE	Shows percentage of filter life (based on Filter Hour Meter) and expected filter life of 10000 hours.
AF OUT TEMP	Velocity display status when optimum temperature is out of range
UV INTERLOCK	UV interlock status enabled or disabled.
UV LIFE	Shows percentage of UV lamp life (based on UV Lamp Hour Meter).
UV TIMER	Shows the UV timer value – default is 60 minutes. Maximum value is 00 minutes (infinite on).
MUTE TIMER	Shows the mute timer value – default is 30 seconds. Maximum value is 299

	seconds.
ADC AFF	ADC for Fail Point Airflow – calculated using offset based on Airflow Nominal Point.
ADC AFN	ADC for Nominal Point Airflow – based on field calibration.
ADC AFA	ADC for Actual Airflow – showing real time sensor reading.
ADC AF0	ADC for factory calibrated Zero Point Airflow (no airflow).
ADC AF1	ADC for factory calibrated Fail Point Airflow.
ADC AF2	ADC for factory calibrated Nominal Point Airflow.
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 – front cover

Maintenance

The MIRI® Laminar Flow Cabinet is designed to be easy to use, but the reliable and safe operation of this equipment is based on the following conditions:

- In-line ULPA filters must be replaced yearly during annual maintenance.
- According to the clinical practice intervals, suitable cleaning should be done in the laboratory where MIRI Laminar Flow Cabinet is used. The manufacturer does not recommend periods longer than 14 days between cleaning.

⚠ **It is essential to perform the inspection and service at the intervals indicated in the MAINTENANCE section below. Failure to do so can have serious adverse outcomes, causing the unit to stop performing as expected and cause damage to samples, patients or users.**

⚠ **Warranty is considered to be void if service and maintenance are not followed.**

⚠ **Warranty is considered void if service and maintenance procedures are done not by trained and authorized personnel.**

Scheduled Maintenance

Proper and timely maintenance is crucial for a trouble-free operation of any device and your Esco cabinet is no exception to this rule. We strongly recommend that you follow the maintenance schedule suggested hereunder to obtain optimal performance from your Esco cabinet.

Table 4 Maintenance plan for MIRI® Laminar Flow Cabinet

No.	Description of Task to Perform	Maintenance to be carried out every					
		Day	Month	Quarter	1 Year	2 Years	4 Years
1	Surface decontaminate the work zone	√					
2	Clean the exterior surfaces of the laminar hood		√				
3	Check all service fixtures (if present) for proper operation		√				
4	Pre-filter replacement			√			
5	Cabinet inspection for any abnormalities or malfunctions			√			
6	Clean up stainless steel surfaces with MEK			√			
7	Re-certification				√		
8	UV-lamp replacement (if present)				√		
9	LED lamp functionality inspection				√		
10	Flow Sensor replacement					√	
11	Main Filter Replacement						√

Product Specification

Table 5 MIRI® Laminar Flow Cabinet general specifications

Technical Specification		MLF-3D_	MLF-4D_	MLF-5D_	MLF-6D_
Work Area Dimension (W X D X H)		965 x 635 x 680 mm	1268 x 635 x 680 mm	1570 x 635 x 680 mm	1878 x 635 x 680 mm
External Dimension w/o support stand (W X D X H)		1035 x 760 x 1270 mm	1340 x 760 x 1270 mm	1640 x 760 x 1270 mm	1965 x 760 x 1270 mm
External Dimension w/ "STA" type support stand (W X D X H)		1035 x 770 x 1980 mm	1340 x 770 x 1980 mm	1640 x 770 x 1980 mm	1965 x 770 x 1980 mm
Cabinet Construction	Main Body	1.2 mm (0.05") 18-gauge electro-galvanized steel with white oven baked epoxy-polyester powder coated finish			
	Work Zone	1.2 mm (0.05") 18-gauge stainless steel, grade 304, with 4B finish			
	Side Walls	UV-absorbing tempered glass 5mm (0.2"), colourless and transparent			
	Sash				
Power Supply	MLF-_D**8**	220-240V, 50/60Hz			
	MLF-_D**9**	115-130V, 50/60Hz			
Motor Type		ECM Motor			
Pre-Filter		Disposable and non-washable 100% polyester fibre with 85% arrestance, EU-3 rated			
Filter Efficiency		HEPA/ULPA filtration with 99.9995% efficiency			
ISO Classification		ISO Class 3			
Noise Level Reading*		≤48 dB(A)			
Control System		Esco Sentinel™ Gold Microprocessor Controller			
Microscope Pole Provision		Position for 1 microscope			
Transmitted Light Source		1 set			
Advanced Option		21" Touchscreen Monitor**			
Net Weight		162 kg	182 kg	212 kg	254 kg
Cabinet Weight w/ Support Stand		185.5 kg	207 kg	238.5 kg	282 kg

Specifications are subject to change without notice.

**Noise reading in open field condition/ anechoic chamber. Noise reading in normal room varies by room size, layout, and background noise, but may reach roughly 3 dBA above these values.*

***Monitoring screen system comes as accessory*

Electromagnetic Compatibility

Table 6 Electromagnetic emissions

Emission Test	Compliance	Electromagnetic Environment Guidance
RF Emissions CISPR 11	Group 1	The MIRI® Laminar Flow Cabinet does not use RF energy. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment
RF Emissions CISPR 11	Class A	The MIRI® Laminar Flow Cabinet is suitable for use in a hospital environment. It is not for domestic establishments.
Harmonic Emissions IEC 6100-3-2	Class A	
Voltage Fluctuations/Flicker Emission	Class A	

Table 7 Electromagnetic immunity

Guidance and Manufacturer's declaration – Electromagnetic Immunity			
The MIRI® Laminar Flow Cabinet is intended for use in the electromagnetic environment specified below. The customer or the MIRI® Laminar Flow Cabinet user should ensure that it is used in such environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic environment-guidance**
Electrostatic Discharge (ESD) IEC 61000-4-2	±8 kV contact ± 15 kV air	±8 kV contact ± 15 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%
Electrical Fast Transient/Burst IEC 61000-4-4	± 2 kV 100 kHz repetition frequency	± 2 kV 100 kHz repetition frequency	
Voltage Surge Immunity IEC 61000-4-5	± 0.5 kV, ± 1 kV, ± 2 kV 9 (L-N and L-PE)	± 0.5 kV, ± 1 kV, ± 2 kV 9 (L-N and L-PE)	
Conducted Disturbance IEC 61000-4-6	0.15 MHz – 80 MHz; 3V, 80% AM kHz ISM Bands & Radio Amateur Bands; 6V, 80% AM 1 kHz	0.15 MHz – 80 MHz; 3V, 80% AM kHz ISM Bands & Radio Amateur Bands; 6V, 80% AM 1 kHz	

Power Frequency Magnetic Field Immunity IEC 61000-4-8	Side/Axis X, Y, Z Test level at 30 A/m 50 Hz and 60 Hz	Side/Axis X, Y, Z Test level at 30 A/m 50 Hz and 60 Hz	Power frequency magnetic fields should be at levels characteristic of a specific location in a typical commercial or hospital environment.
Voltage Dips & Interruptions IEC 61000-4-11	100% dip, 0.5 cycle (50 & 60 Hz) 100% dip, 1 cycle (50 & 60 Hz) 30% dip, 25 cycle (50 Hz) 30% dip, 30 cycle (60 Hz)	100% dip, 0.5 cycle (50 & 60 Hz) 100% dip, 1 cycle (50 & 60 Hz) 30% dip, 25 cycle (50 Hz) 30% dip, 30 cycle (60 Hz)	

Table 8 Recommended separation distances

Recommended separation distance between portable and mobile RF communication equipment and the MIRI® Laminar Flow Cabinet			
The MIRI® Laminar Flow Cabinet is intended for use in the electromagnetic environment in which radiated RF disturbances are controlled. The customer or the MIRI® Laminar Flow Cabinet user can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the MIRI® Laminar Flow Cabinet as recommended below according to the maximum output power of the communications equipment.			
The rated maximum output power of the transmitter (W)	**Separation distance according to the frequency of the transmitter (m)**		
	150 kHz to 80 MHz d=1.2√P	**80 MHz to 800 MHz d=1.2√P**	**800 MHz to 2.5 GHz d=2.3√P**
0.01	0.1 m	0.1 m	0.2 m
0.1	0.4 m	0.4 m	0.7 m
1	1.2 m	1.2 m	2.3 m
10	3.7 m	3.7 m	7.4 m
100	11.7 m	11.7 m	23.3 m
For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meter (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. **Note 1**: At 8- MHz and 800 MHz, the higher frequency range's separation distance applies. **Note 2**: These guidelines may not apply in all situations.			

The device may be affected by cellular telephones and other personal or household devices not intended for the facilities. It is recommended that all equipment used near the MIRI® Laminar Flow cabinet product comply with the electromagnetic compatibility standard and check before use that no interference is evident or possible. If interference is suspected or possible, switching off the offending device is the usual solution required in aircraft and medical facilities.

According to the EMC information, electrical equipment needs special precautions regarding EMC and needs to be installed and put into service. Portable and mobile RF communications equipment can affect electrical equipment.

MIRI Laminar Flow Certification Procedures

To begin the certification process, make sure that the fan and the lamps are turned on and the cabinet is required to be set on the "Maintenance Mode". In the maintenance mode, all alarm functions are defeated.

How to set the Cabinet to Maintenance Mode

1. On the Sentinel Gold LCD, at normal mode will display

ESCO MLFC XX: XX Airflow: 0.45 m/s	**OR**	ESCO MLFC XX: XX Airflow: 90 fpm

2. Press the MENU button to access the microprocessor menu. The LCD will display:

ESCO MLFC XX: XX PASSWORD: 0 Press ↑ / ↓ to change, then press set…

3. Keep pressing the ▼ button until the cursor of the LCD is at "ENTER MENU". Press the SET button. The display will show "PASSWORD" with flashing "0". Continue by entering the ADMIN PIN (0009). Follow the procedure below to enter the pin:
   a. Press SET button, flashing "00" will appear
   b. Press SET button, flashing "000" will appear
   c. Press SET button, flashing "0000" will appear
   d. Press ▼ button to key in "9"
   e. Press SET button

4. Alarm will now go off, wait until the alarm stops. The display should now show:

MENU OPTION XX: XX →SETTINGS SET MODE FIELD CALIB

5. Keep pressing the ▼ button until the cursor of the LCD is at "SET MODE". Press SET button.

MENU OPTION XX: XX NORMAL MODE →MAINTENANCE MODE

6. Keep pressing the ▼ button until the cursor of the LCD is at "MAINTENANCE MODE". Press SET button. Press the MENU button twice (2x) to exit from the MENU MODE.

7. The word "MAINTENANCE" is now displayed on the LCD as shown:

MAINTENANCE XX: XX Airflow: 0.45 m/s	**OR**	MAINTENANCE XX: XX Airflow: 90 fpm

Locating the Speed Controller

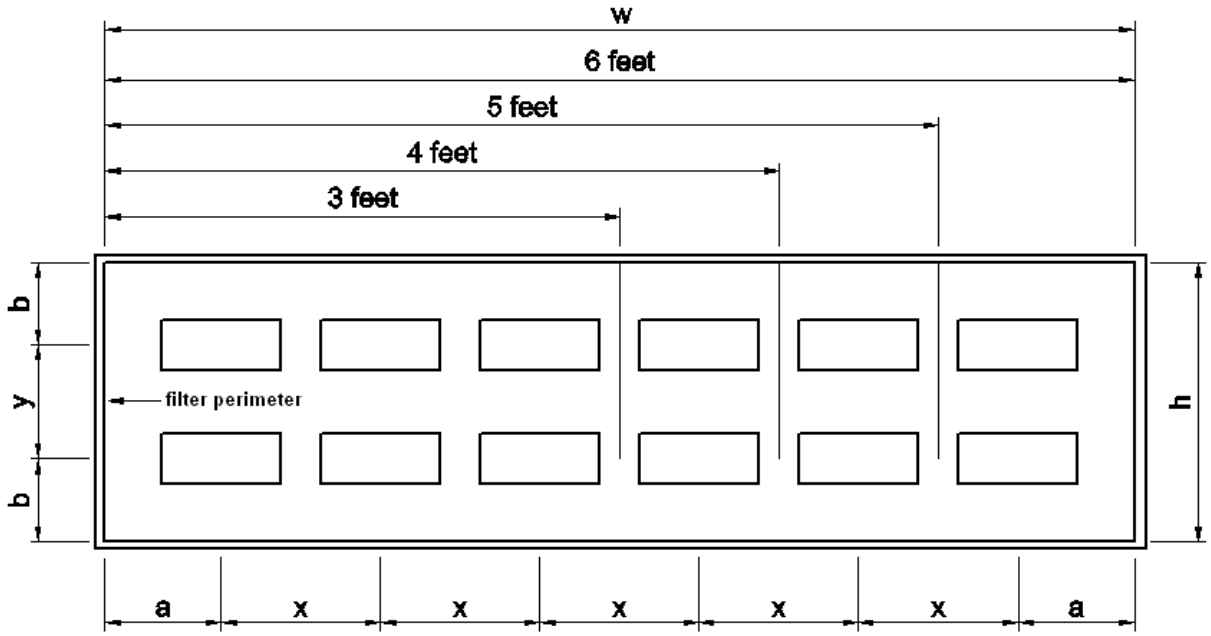
Prior to certification, the user would need to be able to locate the speed controller in order to change the blower motor speed.

1. Remove the pre-filter on top of the cabinet
2. The speed control is located on electrical panel below the mesh guard
3. Use screwdriver to alter the speed controller
4. Put the pre-filter back to its original placement after the speed controller has been successfully adjusted

Nominal Airflow Velocity and Uniformity Test

Prior to conducting the airflow velocity and uniformity test, the blower should be turned ON for at least 10 minutes.

Place the Thermo anemometer on a plane that is 150mm from the filter face, and measure the airflow according to the grid instruction below:



The airflow Grid Plane is 150mm in front of the filter:

Cabinet Models MLF-A		*3 feet*	*4 feet*	*5 feet*	*6 feet*
Width = w (mm) (in)		914 (36)	1219 (48)	1524 (60)	1829 (72)
Height/Depth = (mm) (in)		610 (24)	610 (24)	610 (24)	610 (24)
Left to Right	*Distance from filter perimeter = **a** (mm) (in)*	150 (6)	150 (6)	150 (6)	150 (6)
	*Distance apart = **x** (mm) (in)*	307 (12.1)	306 (12)	306 (12)	306 (12)
Front to Back	*Distance from filter perimeter/table = **b** (mm) (in)*	150 (6)	150 (6)	150 (6)	150 (6)
	*Distance apart = **y** (mm) (in)*	310 (12.2)	310 (12.2)	310 (12.2)	310 (12.2)

Average Velocity	_____ m/s	Acceptance: 0.45 ± 0.025 m/s (90 ± 5 fpm)
Maximum Deviation	_____ %	Acceptance: 20%
Result (circle one)	***Pass / Fail***	
Motor Duty Cycle	_____ %	

Fail Airflow Velocity Measurement

Using the same grid instructions above, measure the fail airflow velocity and fill in the table according to the measurement taken:

Average Airflow Velocity	_____ m/s	Acceptance: 0.30 ± 0.025 m/s (60 ± 5 fpm)
Motor Duty Cycle	_____ %	

Calibrating the Airflow Set Point

To calibrate the airflow set point of the workstation, follow the instruction below:

No	Action	LCD Display
1	Press the MENU button. No PIN is asked if cabinet is in maintenance mode. If cabinet is in Normal mode, enter PIN = 0009. Press the ▼ button to select FIELD CALIB, and then press SET.	MENU OPTIONS 17:23 SETTINGS SET MODE -> FIELD CALIB ⬇
2	The pointer will be at AirFlow Calib Press SET.	MENU OPTIONS 17:23 -> AirFlow Calib Reset Calibration
3	The “Read Manual” message is to discourage unauthorized person. Press SET to continue.	CALIBRATION 17:23 Field Calibration Read Manual!!! And Press SET Button
4	Ensure that you have setting the airflow velocity at nominal: **0.45 ± 0.025 m/s (90 ± 5 fpm)** The Airflow volume is blinking indicating that it can be changed. Select your obtained Airflow using ▲ or ▼ buttons. Then press SET.	CALIBRATION 17:23 Set Airflow: 0.45 Use ↑ / ↓ to change **OR** CALIBRATION 17:23 Set Airflow 90 fpm Use ↑ / ↓ to change

No	Action	LCD Display
5	Wait for 3 minutes for the software to record this sensor ADC point. Do not change Motor Duty Cycle or disrupt airflow / sensor during this time.	CALIBRATION 17:23 Wait 03Min Time Left: 02:59
6	Calibration Done message will be displayed, and the screen will go back to MENU OPTIONS shown in Step 2. If Calibration Error message is displayed, please ensure that airflow are within ± 0.025 m/s (5 fpm) from nominal, and re-do the calibration.	CALIBRATION 17:26 Wait 03Min Time Left: 00:01 CALIBRATION DONE MENU OPTIONS 17:23 -> AirFlow Calib Reset Calibration
7	Return the cabinet from Maintenance Mode to Normal Mode.	**See Page 1, Top**
MICROPROCESSOR CALIBRATION IS FINISHED		

How to set the Standby Mode Airflow

1. Set the cabinet to Standby Mode. Press the black bottom on the ECMS controller for a few seconds until the display shows "0"
2. Adjust the Standby Mode duty cycle to set the Standby Mode Airflow, 0.32 m/s (63 fpm). Duty Cycle: _____ %
3. Press the black bottom on the ECMS controller for a few seconds until the reading says "dn".
4. Set the Duty Cycle back to Normal Speed Mode

HEPA/ULPA Filter PAO Leak Test

To conduct HEPA/ULPA Filter, follow the instruction explained below:

1. Access the PAO sampling port. It's not contaminated, so there is no need for decontamination. Place the aerosol generator on top of cabinet to spray the aerosol into the blower.
2. Connect the aerosol generator to compressed air or compressed nitrogen supply. Open the aerosol generator valve(s). Set the supply pressure valve to 23 psi for PAO.
3. Turn on the aerosol photometer. Check the upstream aerosol concentration. See chart below: Record the concentration below:

Actual PAO concentration: _____ µg/liter

If calculated method is used, along with the ATI TDA-4Blite aerosol generator, then the upstream aerosol concentration can be calculated according to the following equation:

Aerosol concentration = $\frac{13{,}500 \times N}{TotalAirflowCfm}$, where N = Number of Laskin nozzle(s) opened

Refer to the chart for the Total Airflow:

Cabinet Model MLF-A	3 feet	4 feet	5 feet	6 feet
Total Airflow (cfm)	532	709	886	1064

4. With traverse speed of 2 inches/second, scan the airflow filter media for leakage and record the results,

Airflow Filter	
Leaks detected in media	Yes / No
Leaks detected in gasket	Yes / No
Particle penetration	_____%

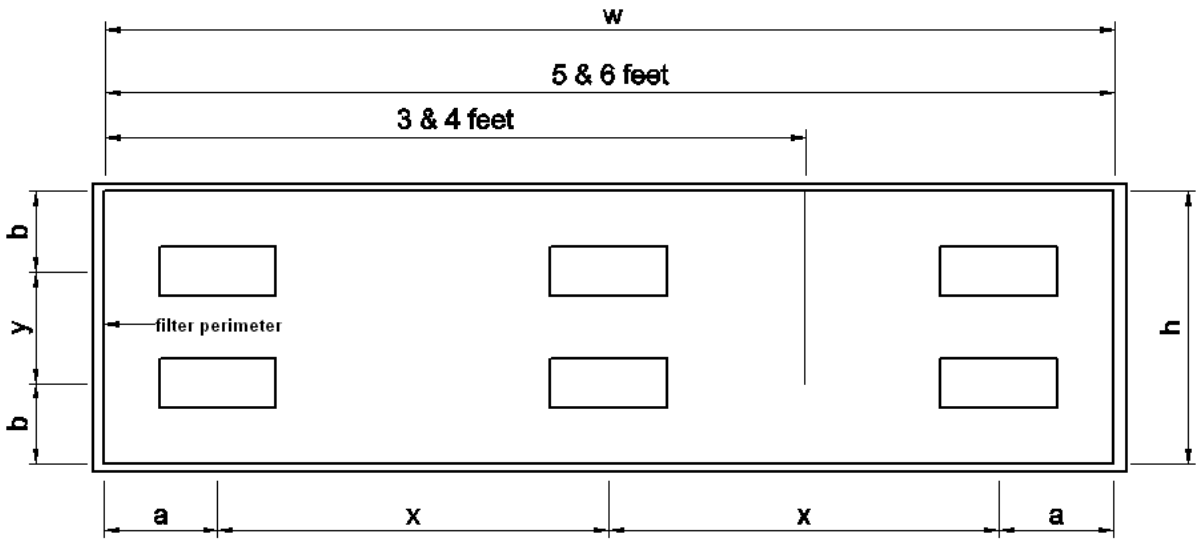
Acceptance: Max. particle penetration of filter(s) 0.01% or no filter(s) leak present

Result: **Pass / Fail**

Particle Count Test

It is advised for the user to use a particle counter with sampling rate of 0.028 m^3 (1 ft^3).

Place the particle counter sampling cone inside the working zone according to the grid instruction below: Plane is 300mm in front of the diffuser.



Plane is 300 mm in front of the filter/diffuser.

Cabinet Models MLF-A		*3 feet*	*4 feet*	*5 feet*	*6 feet*
Width = w (mm) (in)		914 (36)	1219 (48)	1524 (60)	1829 (72)
Height/Depth = h (mm) (in)		610 (24)	610 (24)	610 (24)	610 (24)
Left to Right	*Distance from diffuser perimeter = **a** (mm) (in)*	300 (11.8)	300 (11.8)	300 (11.8)	300 (11.8)
	*Distance apart = **x** (mm) (in)*	314 (12.4)	619 (24.4)	462 (18.2)	615 (24.2)
Front to Back	*Distance from diffuser perimeter = **b** (mm) (in)*	150 (6)	150 (6)	150 (6)	150 (6)
	*Distance apart = **y** (mm) (in)*	310 (12.2)	310 (12.2)	310 (12.2)	310 (12.2)

Average Count of air : _____for particle size of **0.5 micron and larger** sampled in 0.028 m^3 (1 ft^3)

Note : The particle count done in the factory is "as-built" condition.

If 0.5 micron counter is used on the field, there shall be no more than

1 particles of 0.5 µm sampled in 0.028 m^3 (1 ft^3) of air to reach ISO Class 3.

Cleanliness rating : ISO Class 3 per ISO 14644.1 (≤ 35 count for particles equal to and larger than
0.5 µm per 1 m^3 or 35.3 ft^3 of air).

Results : ***Pass / Fail***

Noise Level Test (Optional for field testing)

Noise level test is conducted with the cabinet running under regular parameters. A calibrated noise level meter will be used to obtain the noise level of the cabinet during normal operation, at 300mm (12 in) in front of the work surface area lower edge and 380 mm (15 in) above the recessed work surface area.

Cabinet noise level (dBA)	Ambient noise - fan off (dBA)	Corrected noise level (dBA)

Acceptance : Maximum corrected noise level of 67 dBA.

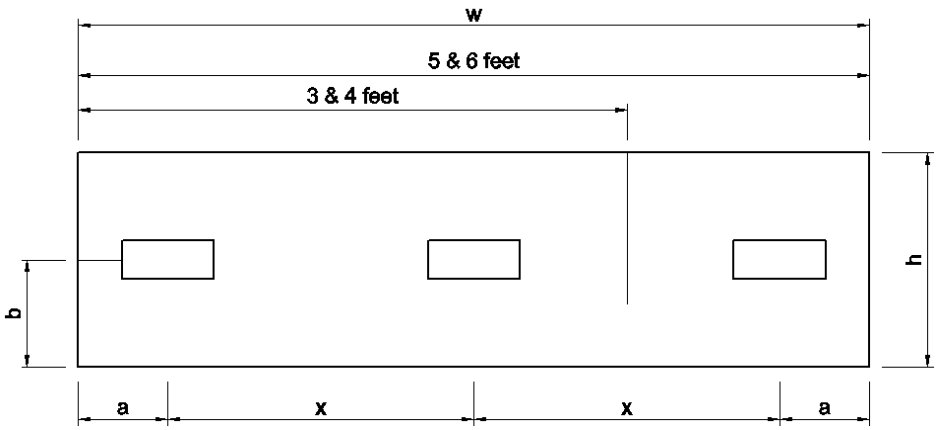
Result : ***Pass / Fail***

Disclaimer : 1. This noise test was done in the factory that is susceptible to reflective, reverberant, and background noise effect. This noise figure may be different than the brochure value that is obtained from anechoic chamber.
2. If the difference between cabinet and ambient noise was less than 10 dBA, correction chart was used, which combined with transient ambient noise, may vary the corrected noise level by ± 1.5 dBA.

Testing was performed in accordance with the following IEST (Institute of Environmental Sciences and Technology) contamination control document: IEST-RP-CC002.2 "Recommended Practice for Uni-directional Flow Clean Air Devices" Section 6.11

Light Intensity Test (Optional for field testing)

A light intensity meter will be used to measure the light intensity from front to back at the centre line of the working surface of the cabinet. See the grid instruction below:



Cabinet Model MLF-A		3 feet	4 feet	5 feet	6 feet
Width = **w** (mm) (in)		914 (36)	1219 (48)	1524 (60)	1829 (72)
Depth = **h** (mm) (in)		610 (24)	610 (24)	610 (24)	610 (24)
Left to Right	Distance from diffuser perimeter = **a** (mm) (in)	300 (11.8)	300 (11.8)	300 (11.8)	300 (11.8)
	Distance apart = **x** (mm) (in)	314 (12.4)	619 (24.4)	462 (18.2)	615 (24.2)
Front to Back	Distance from diffuser perimeter = **b** (mm) (in)	305 (12)	305 (12)	305 (12)	305 (12)

Average light reading : _____ lux (ft-candles)

Acceptance Criteria : Average light reading should be at least 800 lux (74 ft-candles)

Result : ***Pass / Fail***

APPENDIX

APPENDIX A: LOG RECORD

Cabinet Model : _____
Serial Number : _____
Person in-charge : _____

1. This log record should be used by the operator to record any new agent/virus/bacteria/protist that has been introduced to the unit during its operation, problems encountered, etc.
2. Any decontamination procedure performed by either the user or the technician should be recorded down as well.
3. Please also record any major maintenance procedure performed by the service technician, for example: parts replacement, recertification, etc.

Date	Event	User Signature	Supervisor Signature