ESCO

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Esco Controlled Environment Laboratory and Cleanroom Equipment Solutions

NSF / ANSI 49 Biological Safety Cabinets • Animal Containment Workstations • Fume Hoods • Clean Benches

Labculture®

Class II, Type A2 Biological Safety Cabinets

User and Service Manual

Thank you for purchasing this Esco Biological Safety 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 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 And Service Manual

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Labculture®

Class II, Type A2 Biological Safety Cabinets

US $ 50.00
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Additional manuals can be purchased through your Esco Distributor

Esco LA2 User & Service Manual (Version 4)
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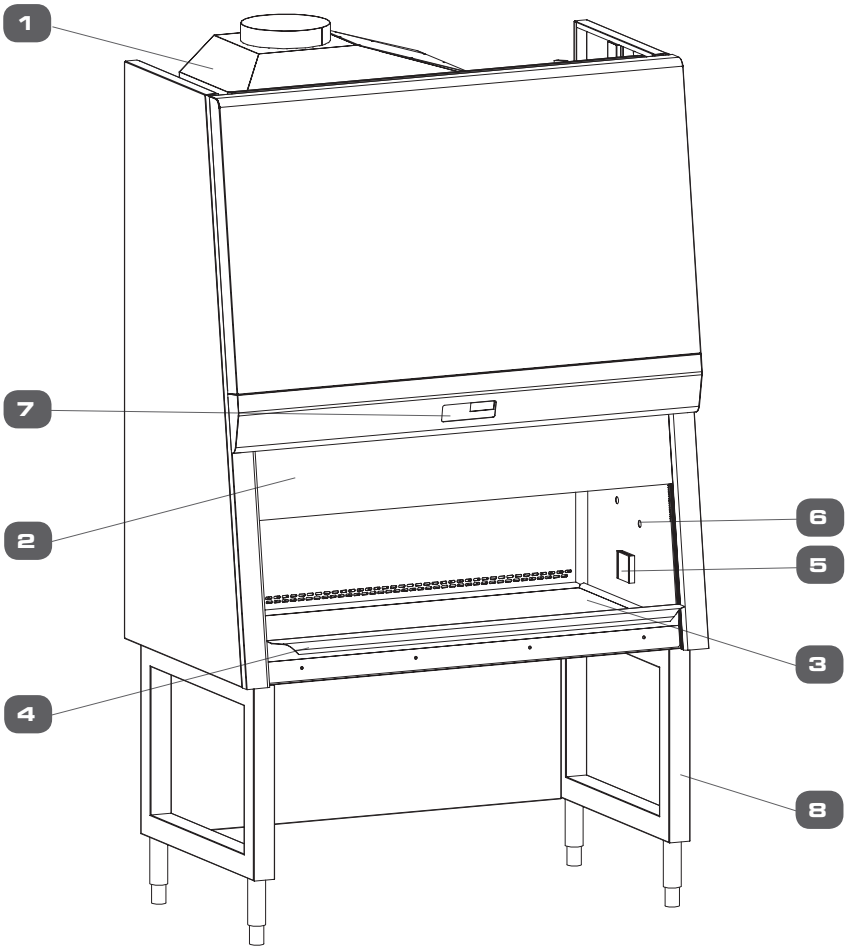
USER SECTION

CHAPTER 1
BASIC PRODUCT INFORMATION

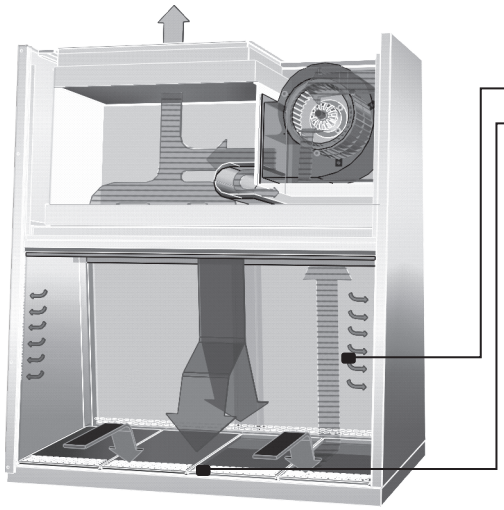
1.1 QUICK VIEW



1. Optional Exhaust Collar for Thimble-ducting
2. Frameless, shatterproof sash is easier to clean, offers larger, unobstructed viewing area.
3. Interior work area formed from a single piece of stainless steel with large radius corners to simplify cleaning.
4. Raised armrest maintains safety by preventing blockage
5. Universal electrical outlet
6. Service fixtures (offset for easier reach)
7. Esco Sentinel microprocessor supervises all cabinet functions. The control panel is located on the center of the cabinet, and angled down for easy access by the operator.
8. Optional support stand (with leveling feet shown, other types and options are available).

Class II cabinets provide product, operator and environmental protection. They are suitable for general microbiological work with agents classified under biological safety levels 1, 2 or 3.
(For more details please refer to www.escoglobal.com).

1.2. AIRFLOW PATTERN



- ULPA - filtered air
- Unfiltered / potentially contaminated air
- Room air / inflow air

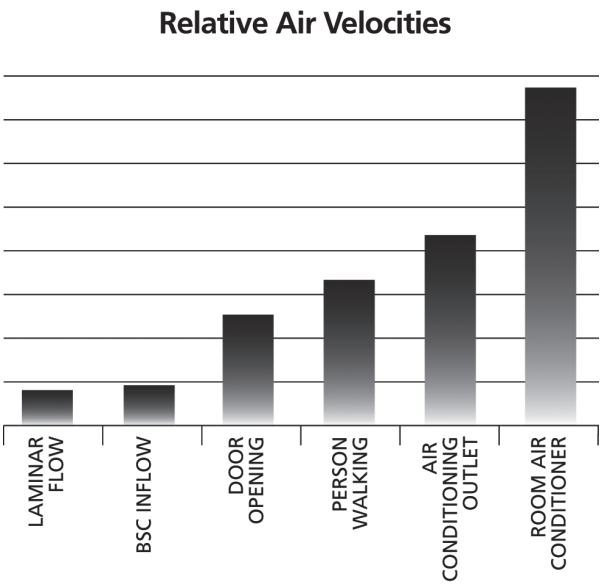
- Ambient air is pulled through the perforations located towards the work zone front to prevent contamination of the work surface and work product. The inflow does not mix with the clean air within the cabinet work zone. Inflow air travels through a return path toward the common air plenum (blower plenum) at the top of the cabinet.
- Approximately 37% for **LA2-_A_/ LA2-_A_-M** (30% for **LA2-_L_/ LA2-_L_-M**) of the air in the common plenum is exhausted through the ULPA filter to the room. The remaining 63% for **LA2-_A_/ LA2-_A_-M** (70% for **LA2-_L_/ LA2-_L_-M**) of the air is passed through the downflow ULPA filter and into the work area as a vertical laminar flow air stream bathing the work surface in clean air.
- The uniform, non-turbulent air stream protects against cross contamination within and throughout the work area.
- Near the work surface, the downflow air stream splits with a portion moving toward the front air grille, and the remainder moving to the rear air grille. A small portion of the ULPA filtered downflow enters the intake perforations at the side capture zones at a higher velocity.
- A combination of inflow and downflow air streams forms an air barrier that prevents contaminated room air from entering the work zone, and prevents work surface emissions from escaping the work zone.
- Air returns to the common air plenum where the 37% exhaust for **LA2-_A_/ LA2-_A_-M** (30% for **LA2-_L_/ LA2-_L_-M**) and 63% recirculation process for **LA2-_A_/ LA2-_A_-M** (70% for **LA2-_L_/ LA2-_L_-M**) is continued.

CHAPTER 2
INSTALLATION

2.1 PRE-REQUISITES

2.1.1 Selecting the Installation Location

Location impacts the nature and extent of external airflow disturbances, which may affect performance of the cabinet.



As can be seen in the graph, your cabinet's internal airflow velocity is relatively small compared to the airflow disturbances potentially caused by the opening of a door, a person walking by or for that matter being exposed to an air-conditioning outlet. All these things can therefore affect the proper functioning of a biological safety cabinet, thereby impairing the protection offered by the cabinet to both the operator and the samples placed inside it.

When installing the cabinet, it should be located as far away as possible from the above-mentioned sources of airflow disturbance and in an orientation which optimally shields the cabinet's internal airflow from all external airflow disturbances. Please note that the cabinet should not be placed close to another cabinet.

Fig. 1 *Relative air velocities of airflow disturbances*

2.1.1.1 The following requirements should be taken into account:

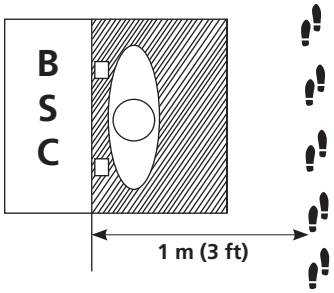
a. Poor siting of a cabinet can adversely affect performance. A specialist engineer should be consulted on correct positioning of the cabinet prior to installation.

b. Cabinets should never be sited in line with a doorway, an openable window, or adjacent to a thoroughfare. Care should be taken to ensure that possible disturbances to airflow such as room air diffusers, fans, extractors, vents, etc. are taken into account and any risk of disturbance noted and mitigated before installation.

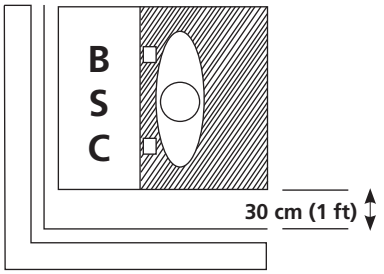
c. Room air supply diffusers should not be within 1.5 metres (5′) of the front aperture. If there are large numbers of cabinets in a laboratory this recommendation may be difficult to comply with, but where diffusers have to be placed in close proximity to a safety cabinet, their discharge velocities and the force air handling rates will need to be low.

d. The position of a safety cabinet should satisfy the spatial requirements (e.g. vision, lighting and convenience of access) of the operator and people working nearby. If the cabinet is installed on a bench top, the leading edge should slightly overhang or be flush with the edge of the bench top.

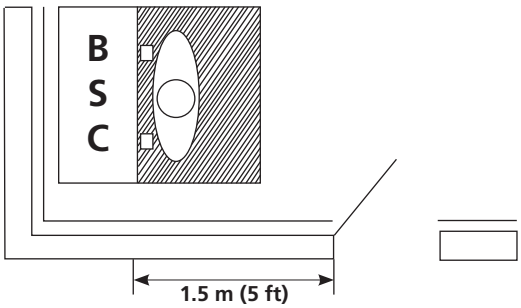
e. There should not be an open space between the leading edge of the cabinet and the front of the bench as this may create turbulence in front of the aperture. It also provides an obstacle which could adversely affect airflow across the cabinet face.



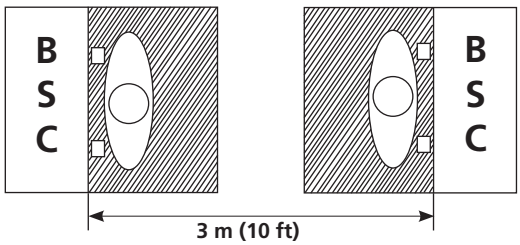
Any pedestrian traffic routes, thoroughfares or walkways should be at least 1.0 metre (3') from the front of the cabinet, so as to preserve a zone undisturbed by anyone other than the operator.



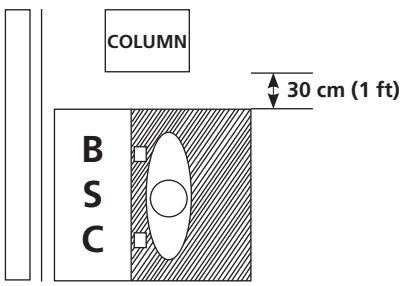
You should not position the cabinet with either side closer than 30cm (1') to adjacent walls or other similar obstructions. Allow at least 30cm (1') clearance on both sides of the cabinet. There should be adequate space left for cleaning the sides of the cabinet and for carrying out decontamination procedures. There should be unobstructed access to the main power supply point(s).



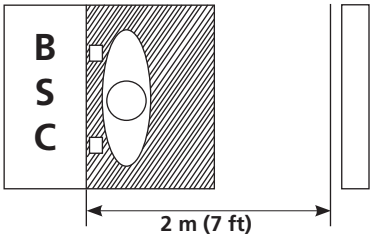
You should not position the cabinet where the distance between the aperture and any doorway is less than 1.5 metres (5') or the distance between the side panel and any doorway is less than 1.0 metre (3'). Door openings cause substantial air turbulence. If the door is fitted with air transfer grills, operator protection factor testing may be carried out to determine suitable reduced clearance.



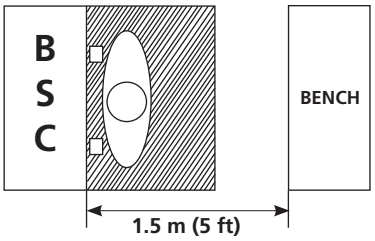
Safety cabinets should not be installed in positions where there is a likelihood of interference from other laboratory equipment. The distance from the aperture to the aperture of an opposing cabinet, fume cupboard, etc. should be in excess of 3 metres (10') for safe operation.



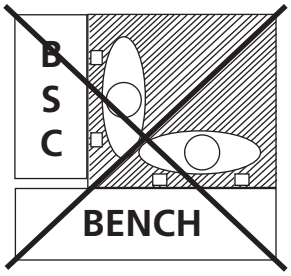
As with walls, any large obstruction such as a pillar or column projecting beyond the plane of the front aperture should not be within 30 cm (1') of the sides of the cabinet.



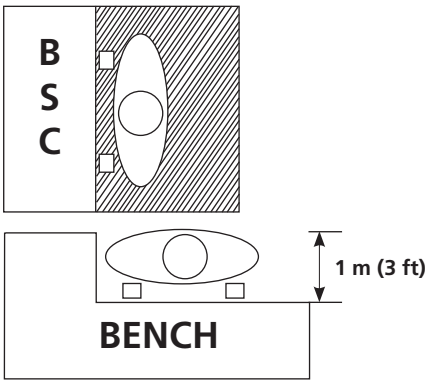
You should not position the cabinet in a location where there is an opposing wall (or other obstruction likely to affect airflow) within 2 metres (7') of the front aperture.



The distance between the aperture of the cabinet and the front of a bench opposite should not be less than 1.5 metres (5'). Containment performance may not be affected if this distance is reduced, to allow the operator to use the bench whilst working in the cabinet for instance. You should measure any such effects using relevant operator protection factor tests to determine safety limits.



Avoid positioning a bench at right angles to the cabinet. Whilst this may reduce traffic in front of the cabinet, any other person working at the bench is likely to disturb airflow close to the cabinet.



A projecting bench will help minimize traffic in front of the cabinet and anyone working at the bench is unlikely to have a significant effect on the airflow as long as the front of the bench is situated at least 1 metre (3') from the side of the cabinet.

2.1.2. Preparing For Installation

2.1.2.1 Support Requirements

Esco provides a number of support stand options, these are summarized below.

- Fixed height
- Telescoping height
- Infinitely adjustable cradle stand

Esco support stand with leveling feet is recommended for biological safety cabinets. It is recommended that the installation of the support stand be carried out by qualified personnel (contact your Esco Distributor for assistance).

After installation of the cabinet on the support stand with leveling feet, using a level placed in the centre of the work tray, adjust the legs to achieve a level work surface. First level from left to right and then from front to back. The NSF approved leg levelers provide a maximum of 50mm (2") adjustment.

Two persons would be needed for assembling the support stand as it is quite heavy.

Should the cabinet be relocated after the initial installation, take all the necessary precautions as the cabinet is very heavy.

If the cabinet is not installed on Esco's optional support stand, Esco can not guarantee cabinet's resistance against tipping and hence the user would be solely responsible for ensuring that the cabinet is securely fastened to third party stand or table.

The use of non-leveling feet Esco support stand will nullify the third party certification (NSF or TÜV) that the cabinet may have, because only Esco leveling feet support stand was used during certification.

While 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, nonporous and resistant to those disinfectants and chemicals, to which the cabinet is regularly exposed.

2.1.2.2 Exhaust Requirements

The exhaust filter area is especially susceptible to disruptive air currents or air drafts. A clearance of at least 30 cm (1') is recommended between the highest point of the cabinet and the ceiling. If the distance is less than 30 cm (1'), the airflow alarm system may need re-calibration. In fact, for proper exhaust filter leak scanning purposes, a minimum clearance of 50 cm (1'8") is recommended.

If you intend to connect your cabinet to an external exhaust system, Esco offers an optional Exhaust Collar for Thimble-Ducting. Installation requirements and instructions are provided with the Exhaust Collar.

2.1.2.3 Electrical Requirements

The cabinet should be connected to its own dedicated power outlet(s).

The power rating for each model is shown in Section 3.10. Environmental and Electrical Requirements in the Product Specification Section. Ensure that the outlet is rated accordingly.

The power cable is located on the right hand side of the cabinet and the cord is 2.5m long. When preparing the installation site try to ensure the outlet is located to the right of the cabinet for ease of access.

2.1.2.4 Service Line Requirements

All service lines should be installed by a suitably qualified and certified engineer, in accordance with all applicable local, state and government regulations.

Service line attachments should be equipped with an emergency shut off valve that can be accessed quickly and with ease, should the need arises.

You should check with your local service installer as to whether there is a need to install pressure regulators to reduce the line pressure.

Your cabinet can accommodate service fixtures on the left or right hand side of the cabinet. Make allowance for the positioning of service lines when planning the installation site to ensure ease of access to emergency shut off valves.

2.1.3 Optional Retrofit Kits

Full instructions for optional retrofit kits are included with the kit. Please refer to the manual that accompanies the kit for installation instructions. Following is a list of retrofit kits available for this unit, you may also want to visit www.escoglobal.com for more information.

Accessories and Options

Esco offers a variety of options and accessories to meet local applications. Contact Esco or your local sales representative for ordering information.

Accessory / Option	Description
Electrical Outlets and Utility Fittings	• Electrical outlet, ground fault, North America • Electrical outlet, Europe/Worldwide • Petcock(air,gas,vacuum)-North America(American) style-Europe/Worldwide style DIN 12898, DIN 12919, DIN 3537
Support Stands	• Fixed height, available 711 mm (28”) or 864 mm (34”), ±38.1 mm (1.5”)- With leveling feet- With casters
	• Adjustable height, hydraulic range from 711 mm to 864 mm (28” to 34”)-With leveling feet - With casters
	• Telescoping height stand for leveling feet, nominal range 660 mm or 960 mm (26” or 37.8”)
	• Telescoping height stand for casters, nominal range 660 mm or 880 mm (26” or 34.6”) - Adjustable in 25.4 mm (1”) increments
	• Cradle stand, electrical hydraulic, infinitely adjustable, with casters - Elevates to seating or standing work surface height. - When lowered permits movement through standard doorway. **Note:** *Increases exterior dimensions.*
Cabinet Accessories	• PVC armrest- Chemically treated, improves operator comfort, easy-to-clean. 712 mm (28”) standard size.
	• Ergonomic lab chair- Laboratory grade construction,meets Class 100 cleanliness; alcohol resistant PVC materials - Adjustable 395-490 mm (15.6”-19.3”)
	• Germicidal UV lamp - Controlled by automatic UV lamp timer through Sentinel microprocessor control panel - Emission of 253.7 nanometers for most efficient decontamination - Lamp is positioned away from operator’s line-of-sight for safety and proper exposure to interior surfaces. **Note:** *UV lamp intensity reduces over time and its effectiveness is subject to factors such as relative humidity in the cabinet, ambient air temperature and microbial species in he work zone.* **Safety warning:** *Avoid UV exposure to eyes and skin. Ensure the sash is fully closed before UV lamp is switched ON.*
	• Ergonomic foot rest - Angled, helps maintain proper posture - Adjustable height - Anti-skid coating, chemical resistant finish
	• IV Bar, with hooks - Stainless steel construction - Available for all standard cabinets
	• Microscope viewing device - Mounting and viewing pouch integrated into sash. Factory installed; specify when ordering.

2.2 EXHAUST COLLAR INSTALLATION

Note : *Please check which type of damper that you have. For older cabinet with the old style damper, please contact Esco or your local distributor for a retrofit kit. For new cabinet with the staggered damper, please proceed to install the exhaust collar below.*

Thimble exhaust collar / exhaust transition is used when a Class II Type A2 biosafety cabinet is intended to be used for handling trace amount of chemical vapor that is potentially harmful to the user, if the vapor is exhausted into the lab. By using an exhaust system, chemical vapor is removed from the area above the exhaust ULPA filter to outside environment.

The exhaust collar shall be used in conjunction with staggered exhaust damper. Below is the instruction to install the collar and staggered damper:

1. Remove the thumbscrews and lift the sliding damper (Figures 1 and 2):

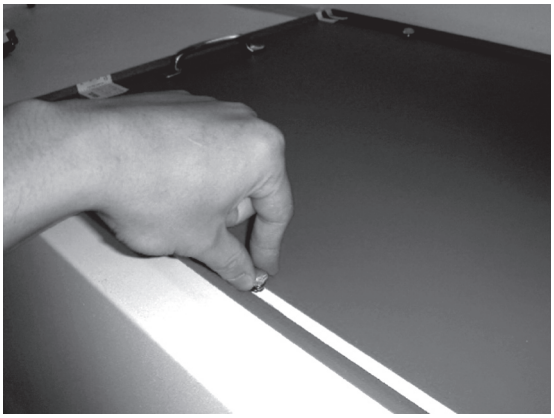


Fig. 1 *Remove the damper thumb screws*

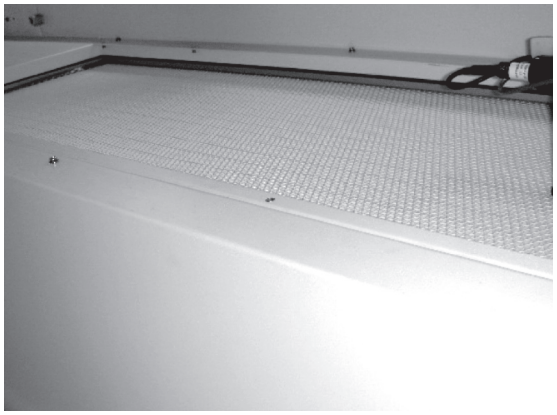


Fig. 2 *Sliding damper removed*

2. Install the staggered exhaust damper as follows (Figures 3 and 4):

Fig. 3 *Secure bottom part with thumb screw first, then put the top part*

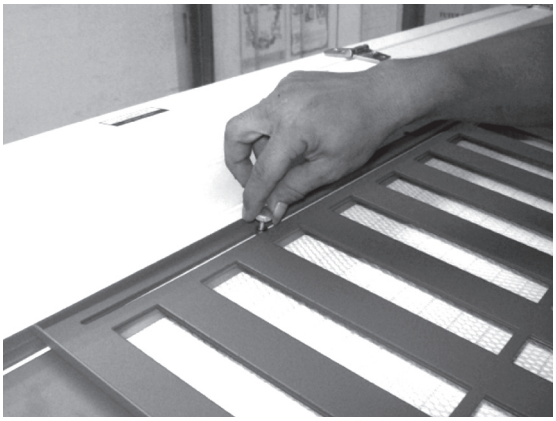


Fig. 4 *Secure the top part with thumb screw, that also passing through the slots on bottom part*

Note: *If the cabinet is already equipped with staggered damper, there is no need to change it, so please proceed to next section about exhaust collar installation. The procedure above only applies if the cabinet is equipped with sliding damper.*

3. Please ensure that the space around airflow sensor box is covered by the damper (Figures 5 and 6):

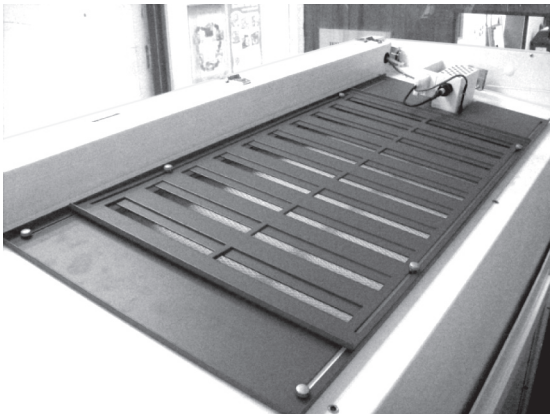


Fig. 5 *Overall view of damper, covering entire top area*

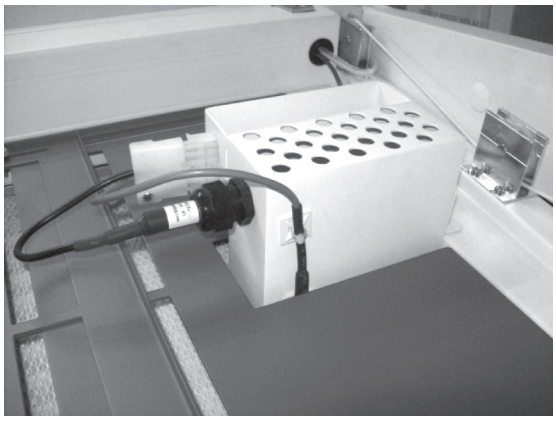


Fig. 6 *The larger cutout gives room for the temperature sensor cable*

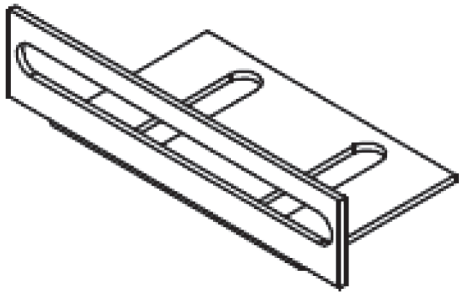


Fig. 7 *If the sensor box hits the damper, replace the sensor box L-bracket with this slotted L-bracket, that enables adjustment of sensor box position*

4. Balance the cabinet inflow and downflow, by adjusting the damper opening. Do this before installing the exhaust collar, so it's easier to adjust the damper opening. Measure and record the damper opening length. Maximum possible opening length is 1.5" (38 mm), when the slots from top and bottom plates align together.
5. Install the exhaust collar (Figures 8, 9, and 10):

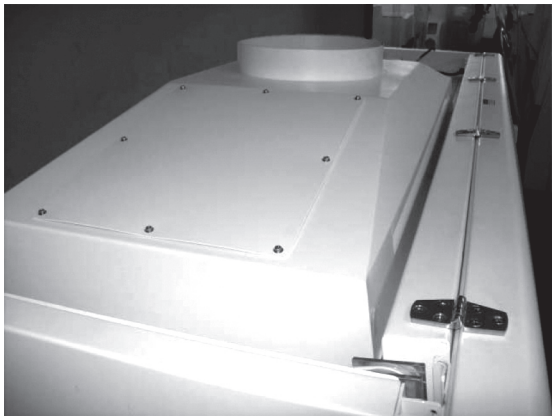


Fig. 8 *Exhaust collar, with slots only in front and back*

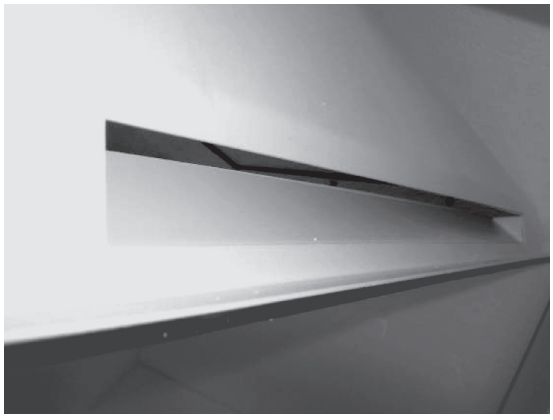


Fig. 9 *The collar must have 45° Air guide*

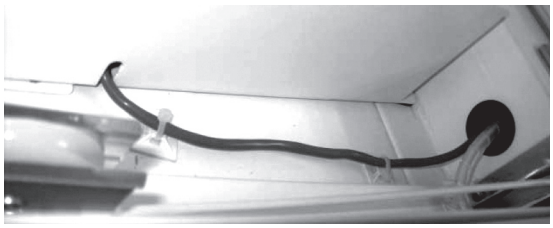


Fig. 10 *The airflow sensor cable should go through the cable slot on the exhaust collar*

6. Connect the exhaust collar with the exhaust duct, then turn on the cabinet fan and the exhaust fan.
7. Adjust the exhaust fan suction to be strong enough so that the smoke from the smoke tube can rapidly goes into the slots throughout their length, especially on the slot portion near the airflow sensor box (Figure 11)

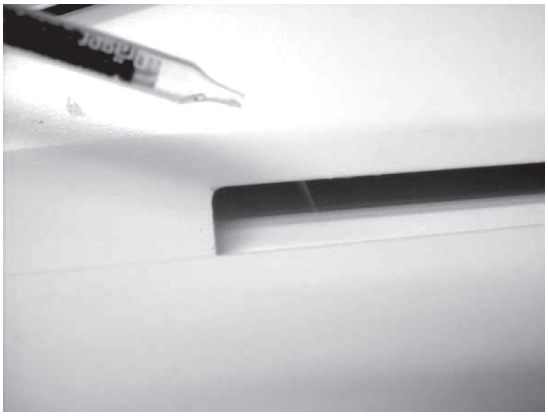


Fig. 11 *Smoke should be drawn rapidly into the slots, especially on the area near the airflow sensor box*

8. Measure the airflow coming into the exhaust collar inlets using thermo-anemometer, placed with vertical orientation pointing down (Figure 12), with the center of the sensor placed using the following grid:

Distance from outer points to walls	10 cm (4 inches)
Distance between one point to another	≤ 10 cm (4 inches)

Fig. 12 *Thermo-anemometer is placed vertically, with the center of the white tip at the center of the slot height. Mark the grid using pen and masking tape directly on the exhaust collar*

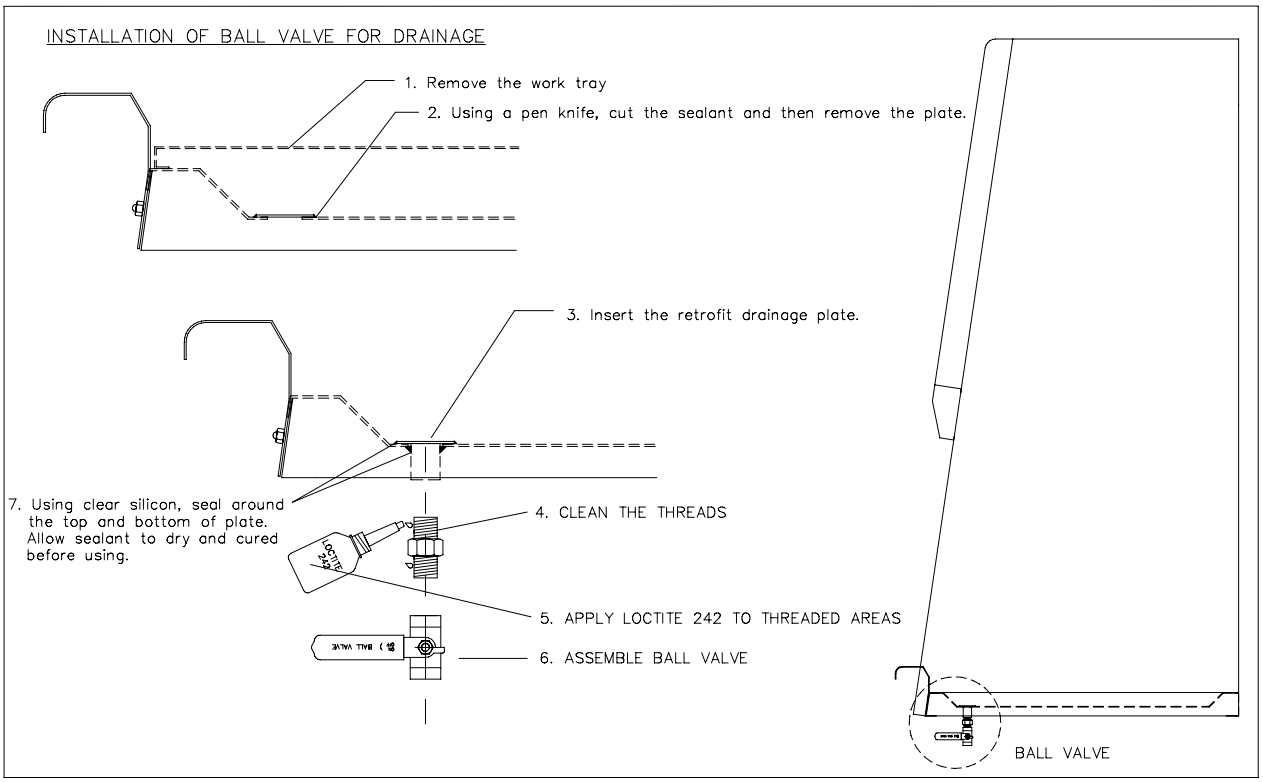
The approximate minimum collar slot air velocity and external fan negative pressure required for some cabinets:

No	Cabinet	Front Slot	Back Slot	Pressure required
1	LA2-3	0.67 m/s (132 fpm)	0.56 m/s (110 fpm)	5 Pa (0.02 "WG)
2	LA2-4	1.34 m/s (264 fpm)	1.37 m/s (270 fpm)	23 Pa (0.09 "WG)
3	LA2-6	1.39 m/s (274 fpm)	1.58 m/s (311 fpm)	40 Pa (0.16 "WG)

Note that the values above are minimum required inflow velocity. Having slightly greater velocity than the table above will increase containment, but if the velocity is too high, the downflow velocity may be weakened.

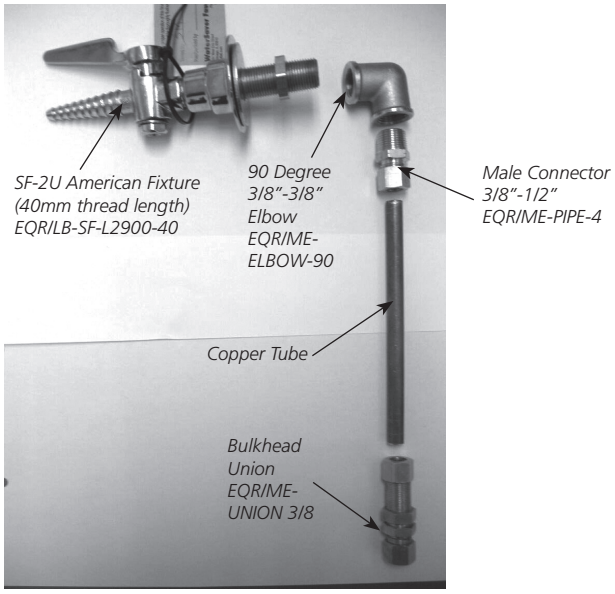
9. Re-calibrate the airflow sensor. Because the airflow velocity through the sensor box is different after the staggered damper and exhaust collar were installed, the airflow sensor requires re-calibration.

2.3 DRAIN VALVE INSTALLATION

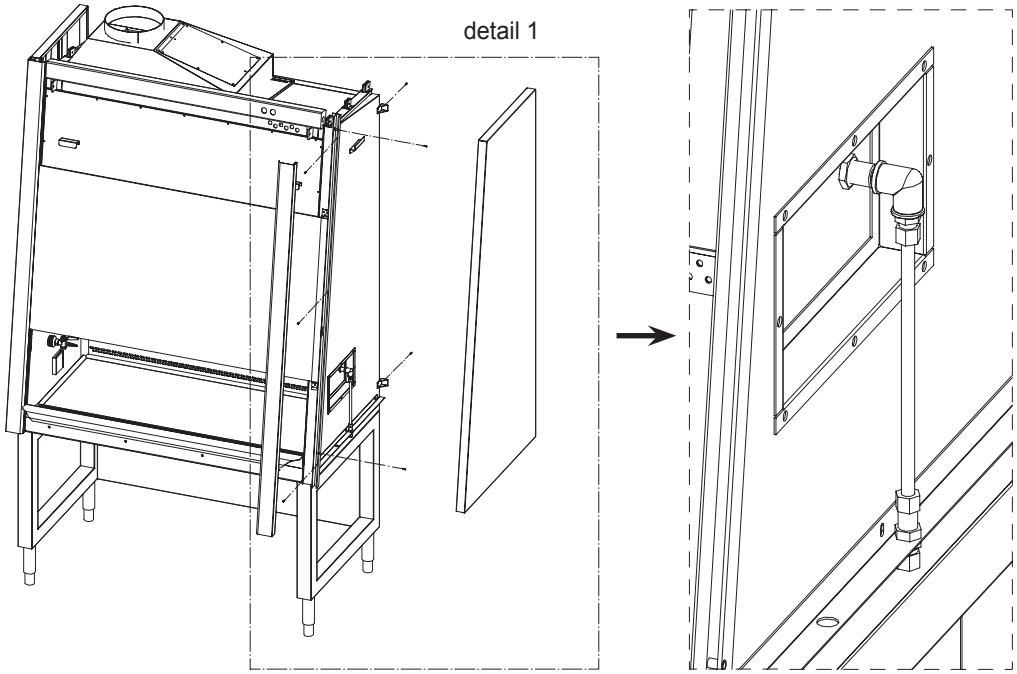


2.4 CABINET PLUMBING

1. All LA2 cabinets sent to North America/Taiwan (LA2-_A2) have pre-installed plumbing. Customers are only required to connect their ½" Copper Tube to the connectors at the bottom side of the cabinet. The components of the plumbs are as followed:



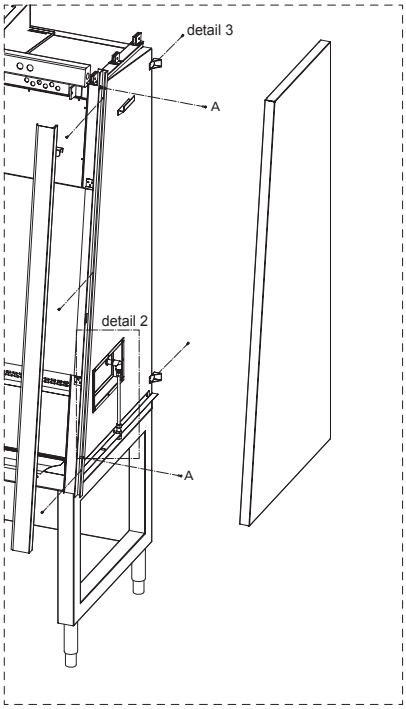
2. The way that the pipes installed onto the cabinets are as followed:



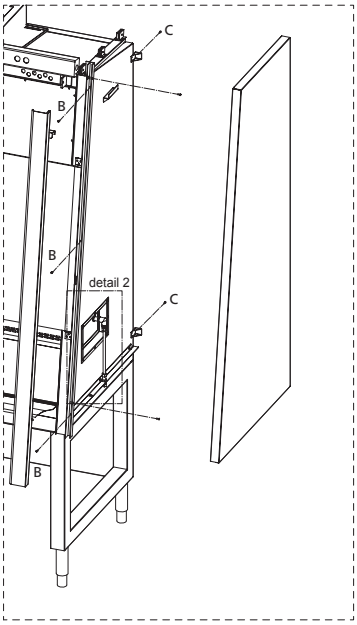
3. In order to replace, repair, or install a plumbing system, following steps need to be followed:

a. Open the front panel and keep it at fully open position

b. Open the front profile cover on the side where the plumbing is, by loosening the countersunk screws (A) from the side of the cabinet.

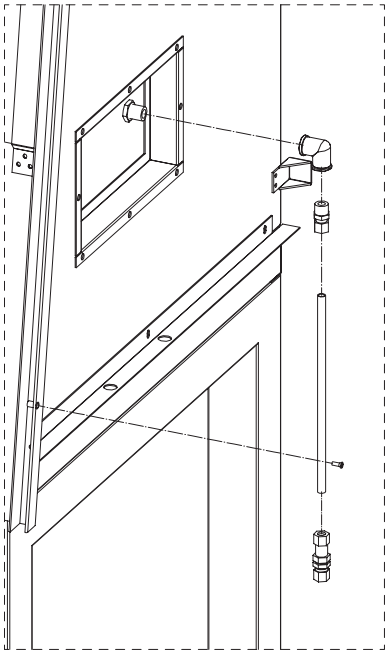


c. Unscrew 3 countersunk screws that connect the profile base to the side dress panel (B) and screws that connect the module to the dress panel at the back (C)



d. Lift the dress panel slightly up (around 15 mm), then pull the dress panel out to make the fixtures provision exposed.

e. Replace/ Repair/ Install the plumbing while it is open. Ensure connection is tight and loctite/seal tape is being used to prevent leakage. Test the connections based on Esco pre-installed piping standard of 80 psi, and check whether there is leakage or not.



f. Place back the side dress panel and reverse steps a to d to complete the installation.

2.5 CONNECTING THE CABINET

2.5.1 Connecting the Drain Valve

Connect the drain valve using the supplied PTFE tape and ensure it is turned to the off position.

2.5.2 Connecting the Electrical Supply

Connect the supplied electrical cord to the input on the top of the cabinet. Make sure the cable connector is seated firmly in the socket.

2.5.3 Connecting the Service Fixture(s)

If you have purchased service fixtures for your cabinet these will either have been factory installed or provided in a package located inside the work tray when you unpacked the cabinet.

If the fixtures have been provided for site installation there will be full instructions provided with them. Please refer to the instructions provided to install your retrofit kits.

Connecting the cabinet to service lines must be performed by a suitably qualified and certified engineer, in accordance with all applicable local, state and government regulations.

Where applicable, each connection should be tested and certified by the installation engineer.

Connections to service lines may be subject to the provision of pressure regulators and should always have an emergency shut off valve installed within easy reach of the cabinet operator.

2.5.4 Connecting to an Exhaust System

If you intend connecting the cabinet to an external exhaust system you will need an optional thimble (non air-tight) exhaust collar.

Full installation instructions are provided with the exhaust collar. Please refer to the instructions provided with the collar.

2.5.5 Safety and Warning Labels

The two biohazard decals included with this manual should be fixed to the door leading to your biohazard laboratory.

2.5.6 Preliminary Cleaning

Wipe the interior and exterior of the cabinet with water or a mild household detergent.

2.6 PERFORMANCE VALIDATION / CERTIFICATION

After having installed the cabinet but before starting to use it, cabinet performance must be validated and certified to factory standards. It is recommended that this validation and certification be performed only by a qualified technician who is familiar with the methods and procedures for certifying biological safety cabinets.

The testing methods and equipment needed for carrying out the tests are specified on the test report accompanying your cabinet.

Esco recommends that these tests be performed by a suitably qualified technician, familiar with both the methods and procedures for certification and your Esco product. Please refer to escoglobal.com to locate a local Esco Certified Partner.

2.6.1 Disclaimer

The performance and safety of all Esco cabinets are rigorously evaluated at our factory. Regular field certification is important to ensure factory standards are maintained.

REFERENCES FOR QUALIFIED CERTIFIERS

North America

- NSF (http://www.nsf.org/Certified/Biosafety-Certifier/)
- Esco (www.us.escoglobal.com)
- IAFCA-member certifying company (www.iafca.com/listview)

UK, China , India, Middle East/North Africa, Malaysia, Singapore

- Esco offers field certification services directly. Contact the local Esco office.

Other Countries

- Contact Esco or local distributor