



Please read user's manual before
operating equipment

Original Instructions

LABCONCO CORPORATION

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labconco.com

Technical Manual

Logic+[®] and Cell Logic+[®] A2 | B2 Biosafety Cabinets
Axiom[®] C1 Biosafety Cabinets
PuriCare[®] Procedure Stations



Register this product

Logic⁺® Type A2 Biosafety Cabinets

30231xxx1 30241xxx1 30251xxx1 30261xxx1
30238xxx1 30248xxx1 30258xxx1 30268xxx1
30242xxx1 30252xxx1 30262xxx1

PuriCare[®] Procedure Stations

31241xxx1 31261xxx1 31242xxx1 31252xxx1 31262xxx1

Logic⁺® Type B2 Biosafety Cabinets

30348xxx1 30368xxx1

Cell Logic⁺® Type A2 Biosafety Cabinets

32239xxx1 33239xxx1 34239xxx1
32249xxx1 33249xxx1 34249xxx1
32259xxx1 33259xxx1 34259xxx1
32269xxx1 33269xxx1 34269xxx1

Cell Logic⁺® Type B2 Biosafety Cabinets

32348xxx1 33348xxx1 34348xxx1
32368xxx1 33368xxx1 34368xxx1

Axiom[®] Type C1 Biosafety Cabinets

30441xxx1 30448xxx1 30461xxx1 30468xxx1

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Labconco Customer Care +1 (816) 333-8811

Labconco Technical Support (800) 821-5525

Hours 7:30 a.m.-5:30 p.m. CST

**Part #3849920 Rev. F
ECO N456**

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1: Introduction

This text is designed for biosafety cabinet certifiers and servicers. Labconco has compiled this information to use in the certification or servicing of our Logic+, Cell Logic+ and Axiom biosafety cabinets, and Puricare procedure stations.

As always, we at Labconco want to assist you in a better understanding of our products and their operation; if you have any questions, or need additional information, please contact us.

Thank you for all your support in the past, and in the future.

Contacting Labconco

LABCONCO Corporation
8811 Prospect Avenue
Kansas City, MO 64132
USA

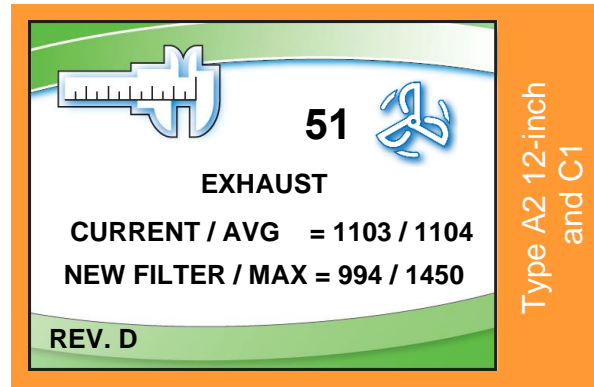
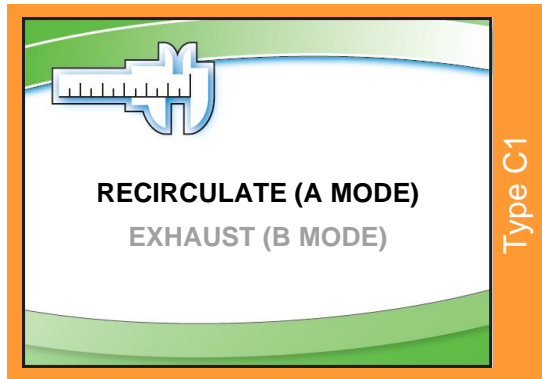
Our hours of operation are from 7:30 am - 5:30 pm CST, Monday through Friday, except national holidays

We can be reached at the following numbers:
1 (800) 821-5525 +1 (816) 333-8811

Should you require technical assistance, service parts, or have general questions regarding the product, please direct them to our Product Service Department, so that your call can be properly routed and answered.

About This Manual

This manual contains technical information for all types and models of Labconco biosafety cabinets and procedure stations. Type A2 biosafety cabinets with a 12 inch sash operating height, and C1 biosafety cabinets utilize two internal blowers, and Type A2 and B2 biosafety cabinets with sash operating heights of 8, 9, or 10 inch utilize one internal blower. Where information is applicable only to Type A2 12 inch or Type C1 models, a color-coded bar is provided to alert model-specific information. Below are examples of this color-coded bar.



Theory of Operation

This section offers a brief overview of the operation of Type A2, B2, and C1 biosafety cabinets.

Type A2

All Logic+ Type A2 biosafety cabinets meet the airflow requirements of ANSI/NSF Standard 49. Approximately 55-60% of the air in the cabinet is filtered and recirculated, while 40-45% is filtered and exhausted. All Type A2 Logic+ biosafety cabinets feature intrinsically safe designs, jacketing contaminated positive pressure areas with negative pressure zones.



Type B2

All Logic+ Type B2 biosafety cabinets meet the airflow requirements of ANSI/NSF Standard 49. All of the air in the cabinet is filtered and none is recirculated. All Type B2 Logic+ biosafety cabinets feature intrinsically safe designs, with all contaminated areas under negative pressure.



Figure 1-2

Type C1 – A mode

All Logic+ Type C1 biosafety cabinets meet the airflow requirements of ANSI/NSF Standard 49. Approximately 55-60% of the air in the cabinet is filtered and recirculated, while 40-45% is filtered and exhausted back to the lab. All Type C1 Logic+ biosafety cabinets feature intrinsically safe designs, jacketing contaminated positive pressure areas with negative pressure zones.

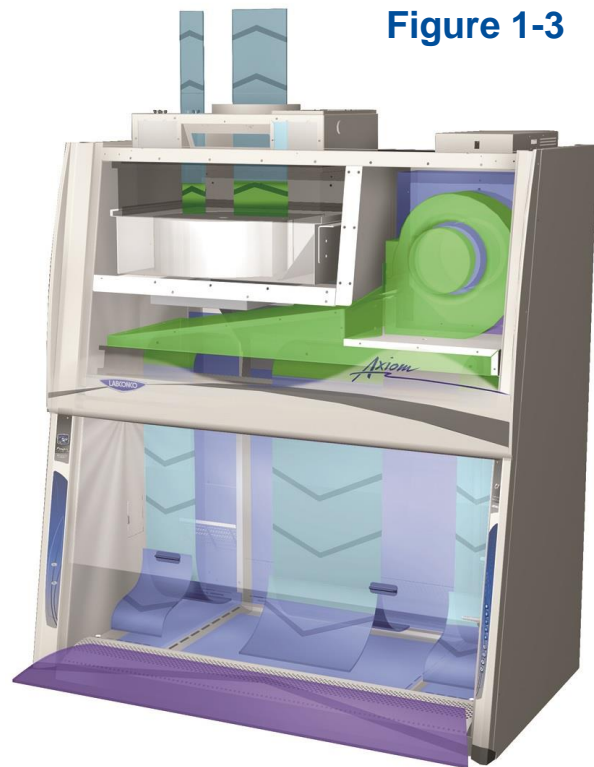


Figure 1-3

Type C1 – B mode

All Logic+ Type C1 biosafety cabinets meet the airflow requirements of ANSI/NSF Standard 49. The Chem-Zone™ (center work surface) air is filtered and exhausted via a remote building exhaust system, while the inflow and outer work surface air is filtered and recirculated. All Type C1 Logic+ biosafety cabinets feature intrinsically safe designs, jacketing contaminated positive pressure areas with negative pressure zones.

Figure 1-4



2: Safety Precautions

Before unpacking, installing, operating, maintaining, or servicing this equipment, read the following safety warnings and precautions.

Avant le déballage, l'installation, le fonctionnement, l'entretien ou la maintenance de cet équipement, lire les avertissements de sécurité et les précautions d'emploi.



CAUTION – See Manual. When this symbol is on the equipment, it indicates a caution that is detailed in this manual.

MISE EN GARDE – Voir le manuel. Lorsque ce symbole est apposé sur l'équipement, il renvoie à une mise en garde détaillée dans ce manuel.

Typographical Conventions



DANGER – An imminently hazardous situation which, if not avoided, will result in death or serious injury.

DANGER – Situation dangereuse imminente qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves.



CAUTION – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or damage to property.

MISE EN GARDE – Signale une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut provoquer des blessures mineures à modérées ou des dommages matériels.



NOTE – Advice or suggestions to help the process.

REMARQUE – Conseils ou suggestions pour le déroulement du processus.



BURN RISK (HIGH TEMPERATURE) – Air or components that will be very hot. Take care not to touch these defined areas. Failure to avoid these areas may result in moderate to severe injury.

RISQUE DE BRÛLURE (TEMPÉRATURE ÉLEVÉE) – Air ambiant ou composant devenant très chaud. Veiller à ne pas toucher ces zones délimitées. L'absence de précaution pour éviter ces zones peut entraîner des blessures modérées, voire graves.



EXTREME COLD (LOW TEMPERATURE) – Air or components that will be very COLD. Take care not to touch these defined areas. Failure to avoid these areas may result in moderate to severe injury.

FROID INTENSE (TEMPÉRATURE BASSE) – Air ambiant ou composant devenant très froid. Veiller à ne pas toucher ces zones délimitées. L'absence de précaution pour éviter ces zones peut entraîner des blessures modérées voire graves.



PINCH POINT – Areas or components that can pinch or cut. Take care not to touch these defined areas.

POINT DE PINCEMENT – Zones ou composants présentant un risque de pincement ou de coupure. Veiller à ne pas toucher ces zones délimitées.



MOVING PARTS – Areas or components that contain moving parts. Take care not to touch these defined areas.

PIÈCES MOBILES – Zones ou composants contenant des pièces mobiles. Veiller à ne pas toucher ces zones délimitées.



RISK OF ELECTRICAL SHOCK – The specified procedure or area poses a risk of electrical shock. ALWAYS disconnect main power cord or electrical supply before proceeding.

RISQUE DE CHOC ÉLECTRIQUE – La procédure ou la zone spécifiée présente un risque de choc électrique. TOUJOURS débrancher le cordon d'alimentation secteur ou l'alimentation électrique avant toute intervention.



FLAMMABLE / NO SOLVENTS – Do not place flammable liquids or solvents in this product.

INFLAMMABLE / PAS DE SOLVANTS – Ne placez aucun liquid inflammable dans cette produit.



LIFTING HAZARD – Do not lift or move this equipment without assistance.
DANGER DE LEVAGE – Ne pas soulever ou déplacer cet équipement sans assistance.



MAGNETIC FIELD IN USE – Magnets or magnetic field present.
CHAMP MAGNETIQUE UTILISE – Présence d'aimants ou de champ magnétique.



DO NOT TOUCH – Components or areas indicated are sensitive and will suffer damage if touched. Take care not to touch these defined components or areas. Failure to avoid these areas will result in damage to the product.
NE PAS TOUCHER – Les composants ou les zones indiquées sont sensibles et subiront des dégâts s'ils sont touchés. Veiller à ne pas toucher ces composants ou zones délimité(e)s. L'absence de précaution pour éviter ces zones endommagera le produit.



TOOL REQUIRED – Tool required to access specified area.
OUTIL NÉCESSAIRE – Outil nécessaire pour accéder à la zone spécifiée.

General Safety Precautions

Follow all the safety precautions described in this section.



Before removing any panels which require a tool for removal, ALWAYS disconnect the main power cord or electrical supply. Failure to remove all electrical power before proceeding will result in moderate to serious injury, death, or damage to property.

Avant le retrait d'un panneau nécessitant l'utilisation d'un outil, TOUJOURS débrancher le cordon d'alimentation secteur ou l'alimentation électrique. Le non-respect de la consigne consistant à couper complètement l'alimentation électrique avant toute intervention peut entraîner des blessures graves, la mort ou des dommages matériels.



Never contact moving parts with your person. Failure to avoid moving parts will result in moderate to serious injury, death, or damage to property.

Ne jamais toucher les parties mobiles. Le non-respect de la consigne consistant à éviter les pièces mobiles peut entraîner des blessures graves, la mort ou des dommages matériels.



Never misuse this product. Never disable, override, or otherwise bypass safety guards, panels, switches, sensors or alarms. Doing so will result in moderate to serious injury, death, or damage to this product or property.

Ne jamais utiliser ce produit à mauvais escient. Ne jamais désactiver, annuler ou contourner les capots, panneaux, interrupteurs, capteurs ou alarmes de sécurité. Ceci entraînerait des blessures graves, la mort ou des dommages matériels à ce produit ou à d'autres biens.



If the unit is not operated as specified in this manual it may impair the protection provided by the unit.

Si l'unité n'est pas utilisée comme spécifié dans ce manuel il peut diminuer la protection fournie par l'unité.



Do not position the unit so that it is difficult to operate the main disconnect device.

Ne placez pas l'appareil de sorte qu'il est difficile de faire fonctionner le dispositif principal de déconnexion.



Do not lift or move this equipment without assistance.

Ne pas soulever ou déplacer cet équipement sans assistance.

Safety Precautions for this Product



Electrical outlets in the cabinet are restricted to 5 amps (100-115v) or 3 amps (230v) maximum current.

Prises électriques dans l'armoire sont limitées à 5 (100-115v) o 3 (230v) courant maximum ampères.



Do not use any detachable power cord that is not adequately rated for the unit.

Ne pas utiliser un fil électrique amovible qui n'est pas du tension nominale de l'appareil.

The biosafety cabinet should be certified by a certification technician before its initial use. The cabinet should be recertified whenever it is relocated, serviced or at least annually thereafter. Filter integrity and airflow performance should be verified before using the cabinet.



Some internal components of the biosafety cabinet may become contaminated during operation of the unit. Only experienced personnel competent in decontamination procedures should decontaminate the cabinet before servicing these components. If you have any questions regarding certification agencies, or need assistance in locating one, contact Labconco's Product Service Department at 800-821-5525 or 816-333-8811.

DO NOT load more than 150 lbs. (68 kg) in the work area. Exceeding this limit may damage the work surface and its supports. Excessive weight in the cabinet may increase the risk of it overturning, or failure of hydraulic lift stands, resulting in the cabinet and stand overturning. If your application requires loading more than 150 lbs. (68 kg), contact Labconco's Product Service Department at 800-821-5525 or 816-333-8811 for assistance.



Avoid the use of flammable gases or solvents in the biosafety cabinet. Care must be taken to ensure against the concentration of flammable or explosive gases or vapors. An open flame should NOT be used in the biosafety cabinet. Open flames will disrupt airflow patterns, burn the HEPA filter and/or damage the filter's adhesive. Gases under high pressure should not be used in the biosafety cabinet, as they may disrupt its airflow patterns.

HEPA filters only remove particulate matter. Operations generating volatile toxic chemicals or radionuclides must be evaluated carefully.



The media of HEPA filters is fragile and should not be touched. Avoid puncturing either HEPA filter during installation or normal operation. If you suspect that a HEPA filter has been damaged, DO NOT use the cabinet; contact a local certification agency or Labconco at 800-821-5525 or 816-333-8811 for re-certification information.

The HEPA filters in the biosafety cabinet will gradually accumulate airborne particulate matter from the room and from work performed in the cabinet. The rate of accumulation will depend upon the cleanliness of the room air, operating time and the nature of work being done in the cabinet. The Filter Gauge accurately displays the amount of filter life remaining.

Proper operation of the cabinet depends largely upon its location and the operator's work habits.

Avoid direct exposure of plastic or coated materials to ultraviolet (UV) radiation. Never bypass the UV safety interlock that only allows the UV light to work when the sash is closed. When surface disinfecting the biosafety cabinet:

- Avoid splashing the disinfecting solution on skin or clothing.
- Ensure adequate ventilation.
- Carefully follow the disinfectant's safety instructions.
- Always dispose of disinfecting solutions in accordance with local and national laws.
- DO NOT allow disinfectants with high concentrations of free chlorine to contact the stainless steel components of the biosafety cabinet for a long period of time. Free chlorine will corrode stainless steel after extended contact.



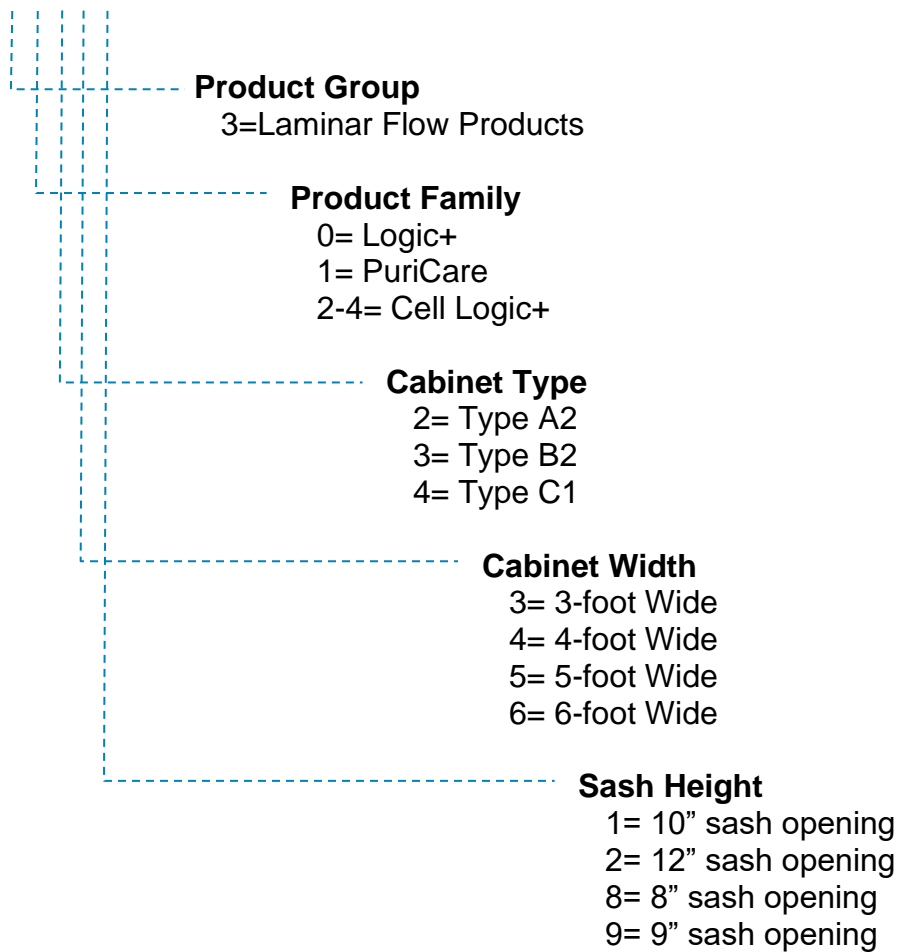
Biosafety cabinets should be decontaminated for any of the following reasons:

- Before maintenance work requiring entry into contaminated areas.
- Before HEPA filter changes.
- Before performing certification tests requiring entry into contaminated areas.
- Before relocating the cabinet.
- Before changing research programs.
- After the gross spill of biohazardous material or toxic chemicals.

3: Catalog Number Configurator

Logic+ and Axiom biosafety cabinets and Puricare procedure stations utilize catalog numbers (also referred to as model numbers) where each digit of the catalog number provides key information about the model. Use the configurator below to identify specifics about your product.

30248xxx1



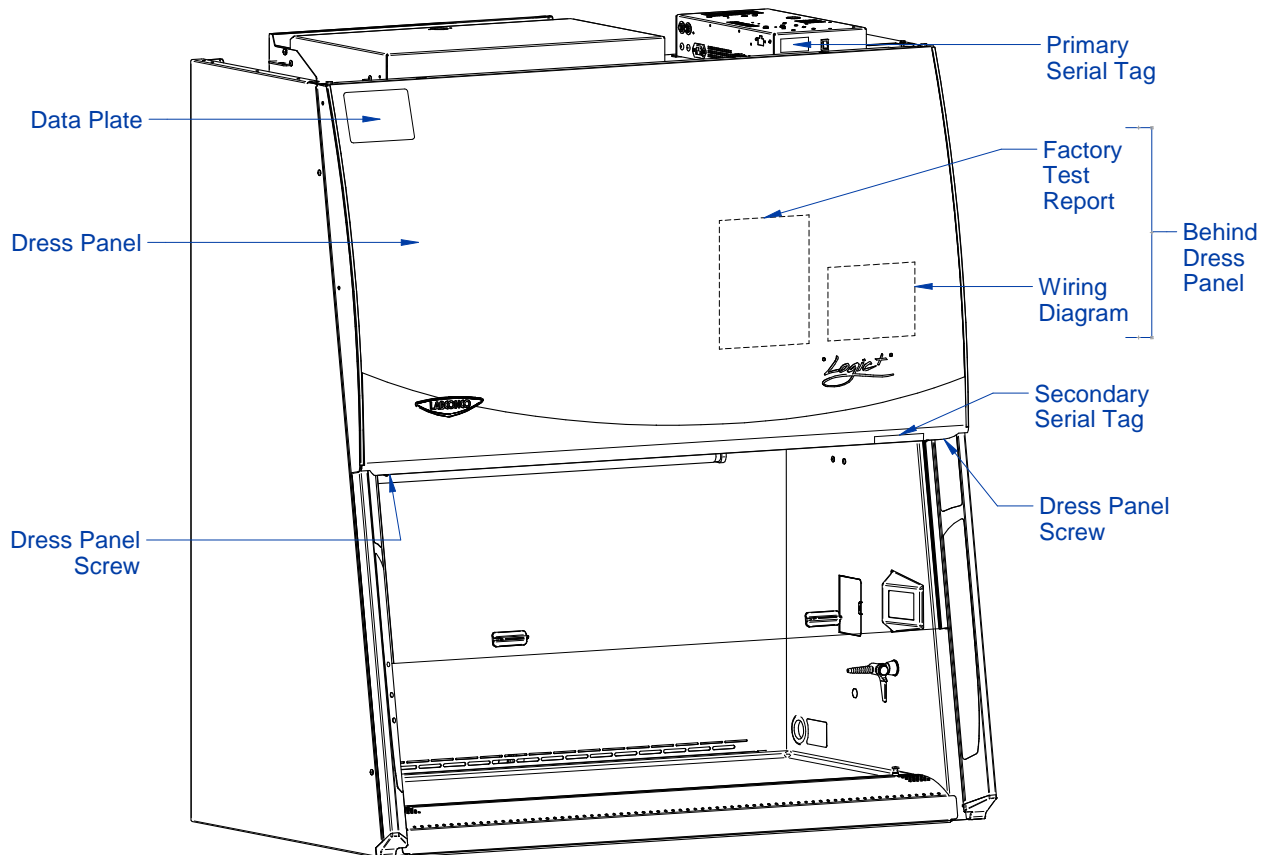
4: Serial Tag

If you need to contact Labconco regarding this product, it is required you provide the serial number. The serial number provides all product details, including the revision level under which the product was constructed. It is the single, most important piece of information when assistance is requested.

Serial Tag Location

See Figure 4-1 for the location of the primary and secondary serial tags.

Figure 4-1



Serial Tag Information

The following information is located on the Serial Tags:

Primary Serial Tag

- Serial Number
- Catalog (Model) Number
- Revision
- Electrical Requirements
 - Voltage
 - Frequency
 - Amperage
 - Phase

Figure 4-2

Made in U.S.A.			
LABCONCO CORPORATION			
KANSAS CITY, MISSOURI 64132			
CATALOG NO.	SERIAL NO.	REV.	
<input type="text"/>			
VOLTS AC.	PHASE	CYCLE	AMP. Δ
<input type="text"/>			

Secondary Serial Tag

- Serial Number
- Catalog (Model) Number

Figure 4-3

Parts & Service	LABCONCO
800-522-7658	OUTSIDE U.S. 816-333-8811
CATALOG NO.	SERIAL NO.
<input type="text"/>	

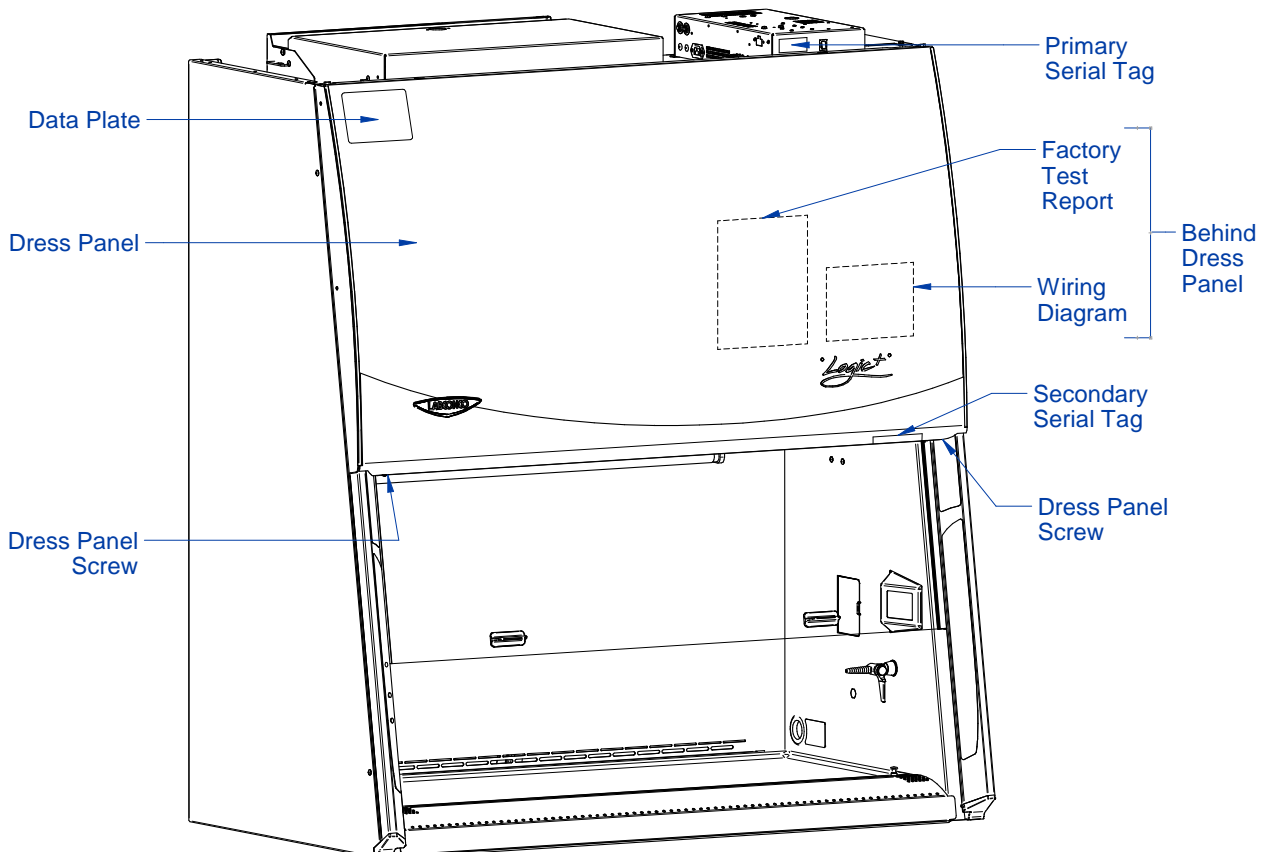
5: Factory Test Report

The factory test report is a valuable reference for the product's airflows and blower setting(s), as well as information about the HEPA filters, and accessories that may be factory installed.

Test Report Location

The test report is located on the blower/plenum cover, which is behind the front dress panel. See Figure 5-1. The Dress Panel Screws must be removed and the Dress Panel lifted off to reach the test report.

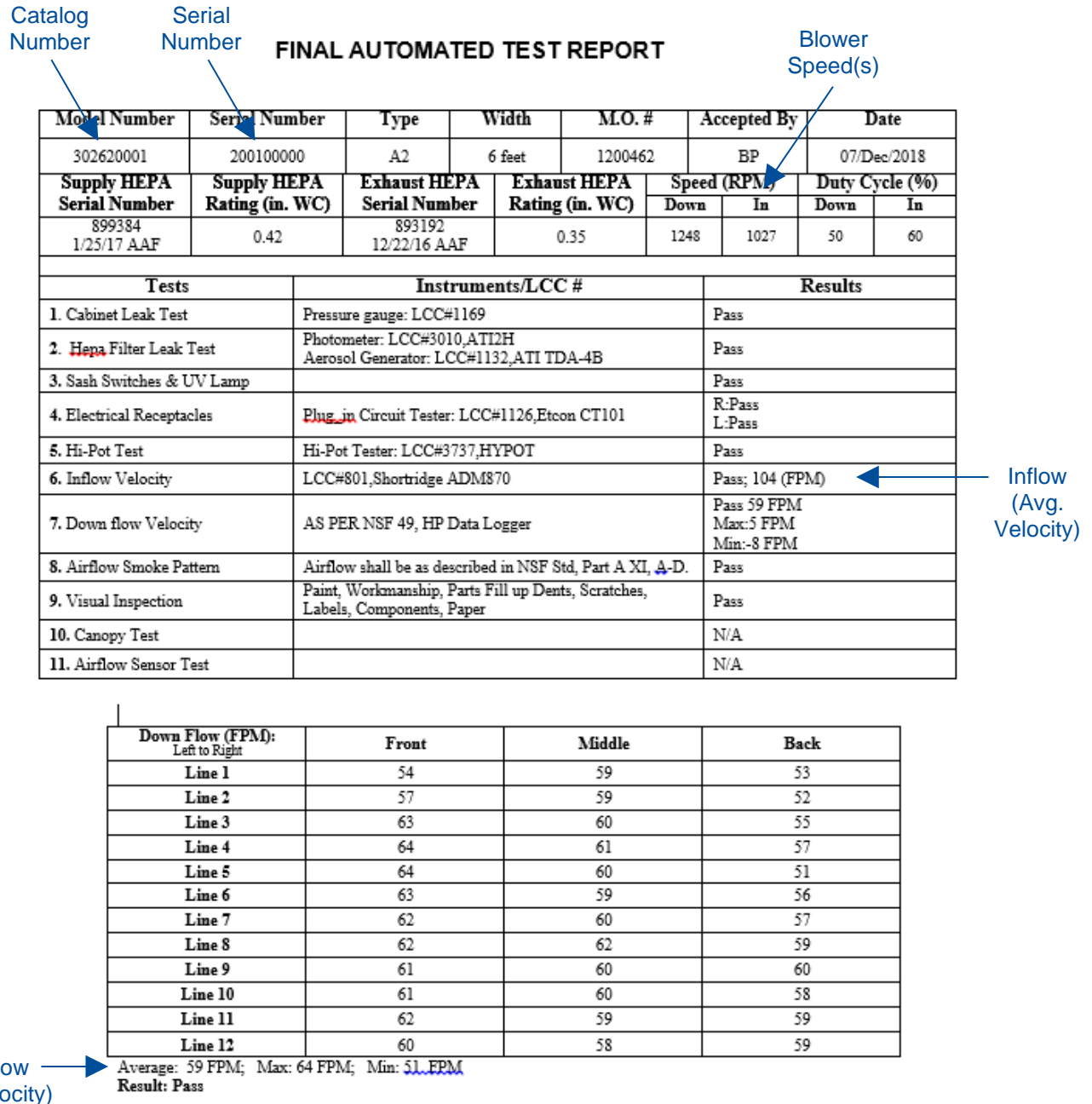
Figure 5-1



Test Report Information

See Figure 5-2 for a typical test report. Review this carefully to identify where on the report specific information is located. Important information is highlighted below.

Figure 5-2



Note: The test report shown is an A2-12inch model with two internal blowers. A2-12inch and C1 model reports list two blower speeds (supply and exhaust blower). All other models report one blower speed.

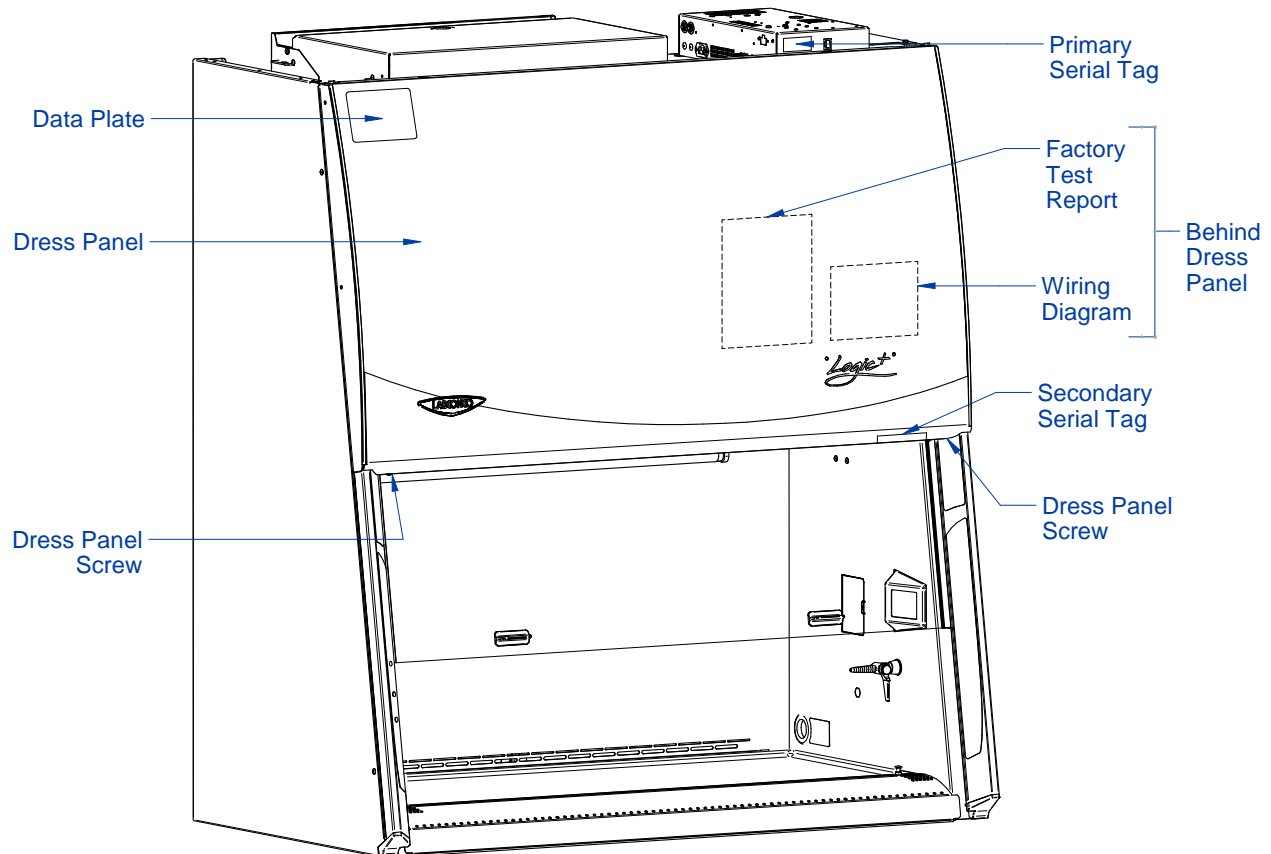
6: Additional Product Information

All NSF-Listed biosafety cabinets are required by NSF49 regulations to display a Data Plate on the front of the product in a readily visible location.

Data Plate Location

See Figure 6-1 for the Data Plate location.

Figure 6-1



Data Plate Information

The Data Plate provides the following important information for certifier use during on-site certifications:

- Nominal Airflows (Inflow and Downflow)
- Downflow Grid Test Point Locations
- Introduction Location for Test Aerosol
- Secondary Inflow Methodology
- NSF49 standard revision under which the biosafety cabinet is listed

Figure 6-2 shows a Type A2, 4-foot width Data Plate as an example to identify where the required information is located on the Data Plate. All Labconco Data Plates are in the same format.

Figure 6-2

4 FOOT CLASS II, TYPE A2 BIOSAFETY CABINET

NOMINAL AIRFLOWS: INFLOW - 105 FPM,
DOWNFLOW - 8 & 10 INCH SASH - 55 FPM
- 12 INCH SASH - 60 FPM.

DOWNFLOW GRID PERIMETER: 6 IN. FROM SIDES, SASH AND REAR WALL.
GRID ROWS, FRONT TO BACK: 8 INCH SASH - 5.75 INCHES APART.
10 INCH SASH - 5.55 INCHES APART.
12 INCH SASH - 5.44 INCHES APART.

GRID COLUMNS: 5.21 INCHES APART, FROM SIDE TO SIDE.

TEST GRID POINTS: 3 ROWS WITH 8 POINTS PER ROW

FILTER TEST AEROSOL: INTRODUCE AT REAR GRILLE, LEFT SIDE.

SECONDARY INFLOW METHODOLOGY

- MUST USE CERTIFIER KIT #3836405.
- FIX ANEMOMETER SENSOR IN HOLDER 3.25 INCHES ABOVE ITS BOTTOM EDGE.
- PLACE THE SASH STOP GAUGES "4+" ON SASH STOPS AT BOTTOM OF THE SASH TRACKS. LOWER THE SASH UNTIL IT CONTACTS THE GAUGE.
- ON EACH SIDE OF THE FRONT ROW OF GRILLE HOLES, MARK THE 6TH, THEN EVERY 9TH HOLE, YIELDING 4 POINTS ON EACH SIDE, OR A TOTAL OF 8.
- TAKE INFLOW VELOCITIES AT EACH POINT, AVERAGE, AND CORRECT FOR LOCAL CONDITIONS. THIS NUMBER IN FPM EQUALS THE INFLOW VOLUME IN CFM.

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7: Exhaust System Connections

Not all models of biosafety cabinets are connected to a remote or building exhaust system. Type A2 models may recirculate their exhaust back to the laboratory, or remove their exhaust air from the lab via a Ventus™ Canopy (also referred to as a Thimble Connection) connected to a remote (building) exhaust system. Type B2 models must always be connected to an exhaust system. Type C1 models may operate in A-mode where the exhaust is recirculated to the laboratory, or B-mode when connected to a remote exhaust system.

This section provides recommended best practices when connecting a biosafety cabinet to a remote exhaust system to avoid operational problems with the cabinet. In addition, the specific exhaust volumes and vacuum pressures required to properly operate each cabinet model are listed by cabinet width and sash operating height.

If a biosafety cabinet is being altered from recirculating operation to ducted (exhausted) operation in the field, it must be recertified by a qualified certifier before being used.

Exhaust Connection Best Practices



Note: Only connect the biosafety cabinet to a suitable exhaust system that is dedicated to the biosafety cabinet, or dedicated to exhausting laboratory ventilation equipment. Do NOT connect the biosafety cabinet to the building's general HVAC system for room exhaust.

Examine the location to ensure that it accommodates the cabinet's exhaust duct. The area directly above the cabinet's exhaust port should be clear of structural elements, water and utility lines, or other fixed obstructions. There should be enough clearance to accommodate a 10-inch diameter duct. See Figure 7-1.

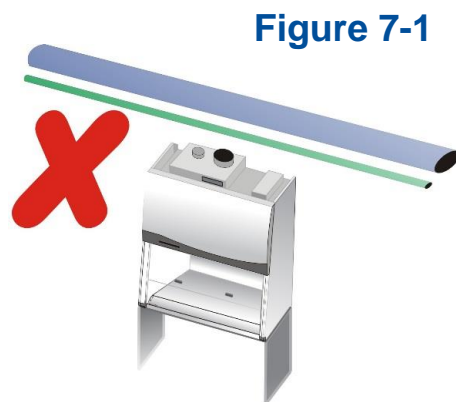
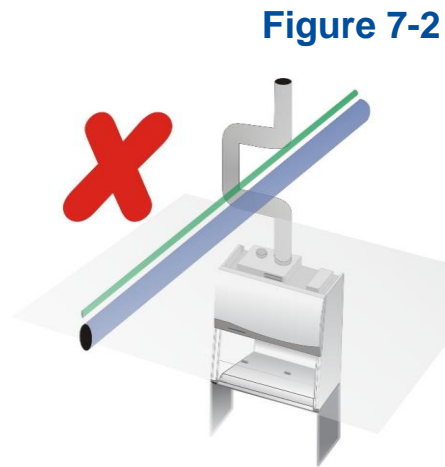


Figure 7-1

Avoid cabinet locations that require an elbow directly above the cabinet's exhaust connection or an excessive number of elbows in the exhaust system. There should be a straight length 10 duct diameters long between the cabinet connection and any elbow, and between subsequent elbows. See Figure 7-2.



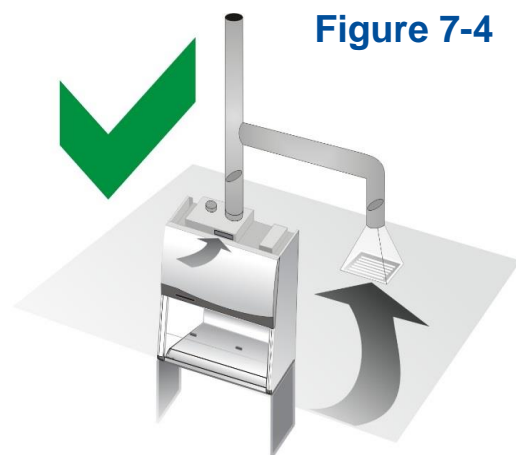
This information applies to Canopy-Exhausted Type A2 and C1 (in B-Mode) only

The Inlet Relief Valve located on the top of the cabinet is designed to draw a maximum of 100 CFM (170 m³/hr).

Attempting to draw additional room air through the valve (room air exhaust), can result in unstable cabinet operation. See Figure 7-3.



If additional room exhaust needs to be drawn through the exhaust system, install an additional duct and balancing damper downstream of the cabinet's damper. This will allow for proper balancing of the system. See Figure 7-4.

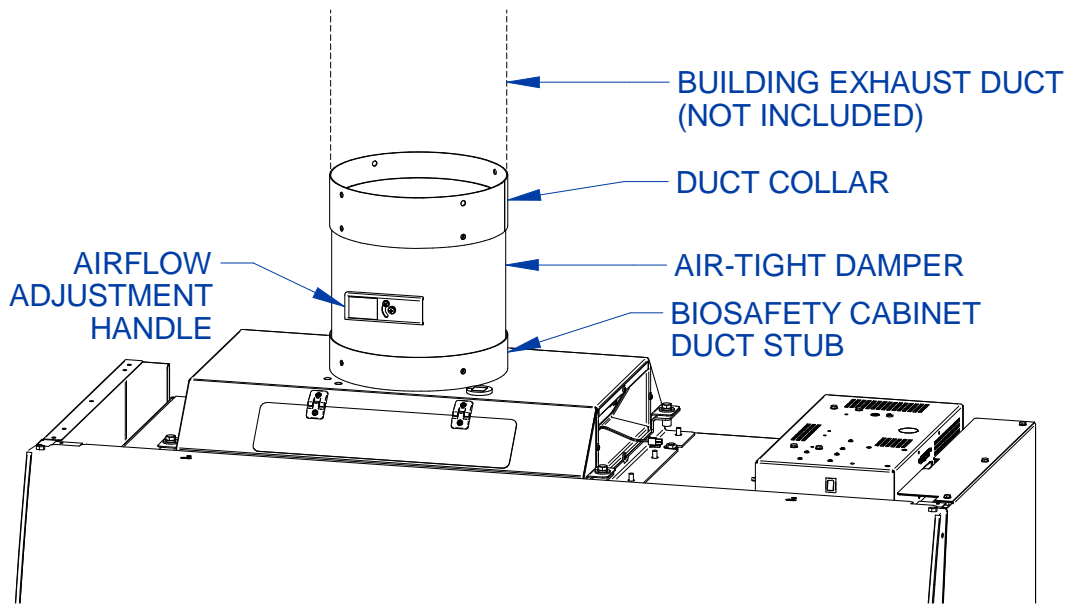




Air-Tight Damper

On canopy-exhausted Type A2 and C1 (operating in B-mode) models, Labconco highly recommends installing an air-tight damper above each biosafety cabinet when connected to a building exhaust system. The air-tight damper allows for fine adjustment of the exhaust air volume provided, in order to correctly set the necessary exhaust airflow for each biosafety cabinet. It also allows the biosafety cabinet to be sealed off from the building exhaust system, should it become necessary to do so.

Figure 7-5



Visual appearance of biosafety cabinet and exhaust connection may vary by model.



Note: Type B2 models must always be connected to a remote exhaust system. Type B2 models have an air-tight damper built into the biosafety cabinet's exhaust housing.

Exhaust System Requirements

The exhaust system must be capable of moving the following volumes of exhaust air at the negative pressures listed. The **Airflow Volumes** are the values recorded via direct measurement using a flow hood at the front opening of the cabinet. The **Concurrent Balance Values** are measured in the exhaust duct via traverse methodology, and will always be higher due to differences in volume measurement methodologies.

For Type A2 models with Ventus Canopy Connections, see Table 7-1.

For Cell Logic+ Type A2 models with Ventus Canopy Connections, see Table 7-2

For Type B2 models, see Table 7-3.

For Type C1 models operating in B-mode, see Table 7-4.

Type A2 Models

Table 7-1

Logic+ Type A2 Model	Airflow Volume		Concurrent Balance Value		Recommended Duct Vacuum ¹	
	ft ³ /min	m ³ /hr	ft ³ /min	m ³ /hr	WC ²	Pa
3-foot, 8" Sash	263	447	289	491	0.15	38
3-foot, 10" Sash	316	537	348	591	0.15	38
4-foot, 8" Sash	333	566	366	622	0.15	38
4-foot, 10" Sash	404	687	444	754	0.15	38
4-foot, 12" Sash	474	805	521	885	0.15	38
5-foot, 8" Sash	403	685	443	753	0.15	38
5-foot, 10" Sash	491	834	540	917	0.15	38
5-foot, 12" Sash	580	985	638	1084	0.15	38
6-foot, 8" Sash	473	804	520	883	0.15	38
6-foot, 10" Sash	579	984	637	1082	0.15	38
6-foot, 12" Sash	686	1166	755	1283	0.15	38

1: Unlike Type B biosafety cabinets, the recommended vacuum will remain constant throughout the life of the exhaust HEPA filter. Duct vacuums below 0.05 inches H₂O (12 Pa) or above 0.5 inches H₂O (125 Pa) may result in erratic operation and throw an alarm condition from the product.

2: WC = Inches of Water Column, typically expressed in units of *inches H₂O*.

Cell Logic+ Type A2 Models

Table 7-2

Logic+ Type A2 Model	Airflow Volume		Concurrent Balance Value		Recommended Duct Vacuum ¹	
	ft ³ /min	m ³ /hr	ft ³ /min	m ³ /hr	WC ²	Pa
3-foot, 9" Sash	290	492	319	541	0.15	38
4-foot, 9" Sash	369	627	405	688	0.15	38
5-foot, 9" Sash	447	760	492	835	0.15	38
6-foot, 9" Sash	526	894	579	983	0.15	38

1: Unlike Type B biosafety cabinets, the recommended vacuum will remain constant throughout the life of the exhaust HEPA filter. Duct vacuums below 0.05 inches H₂O (12 Pa) or above 0.5 inches H₂O (125 Pa) may result in erratic operation and throw an alarm condition from the product.

2: WC = Inches of Water Column, typically expressed in units of *inches H₂O*.

Type B2 Models

Table 7-3

Logic+ Type B2 Model	Airflow Volume		Concurrent Balance Value		Recommended Duct Vacuum	
	ft ³ /min	m ³ /hr	ft ³ /min	m ³ /hr	WC ¹	Pa
4-foot, 8" Sash	723	1228	852	1448	1.8	450
6-foot, 8" Sash	1083	1840	1265	2149	2.2	550

1: WC = Inches of Water Column, typically expressed in units of *inches H₂O*.

Table 7-4

Axiom Type C1 Model	Airflow Volume		Concurrent Balance Value		Recommended Duct Vacuum ¹	
	ft ³ /min	m ³ /hr	ft ³ /min	m ³ /hr	WC ²	Pa
4-foot, 8" Sash	323	549	387	658	0.30	75
4-foot, 10" Sash	400	680	480	816	0.30	75
6-foot, 8" Sash	463	787	556	945	0.30	75
6-foot, 10" Sash	570	968	684	1162	0.30	75

1: Unlike Type B biosafety cabinets, the recommended vacuum will remain constant throughout the life of the exhaust HEPA filter. Duct vacuums below 0.05 inches H₂O (12 Pa) or above 0.5 inches H₂O (125 Pa) may result in erratic operation and throw an alarm condition from the product.

2: WC = Inches of Water Column, typically expressed in units of *inches H₂O*.

8: Configuration

This section provides instructions to access and understand the current configuration of the biosafety cabinet, and make changes to the configuration.



Keypad button presses are shown as **[BLUE WITH BRACKETS]**. Menu screen selections are shown as *green italics*.

Current Configuration

It is important to understand the current configuration of the biosafety cabinet for many reasons, some of which include:

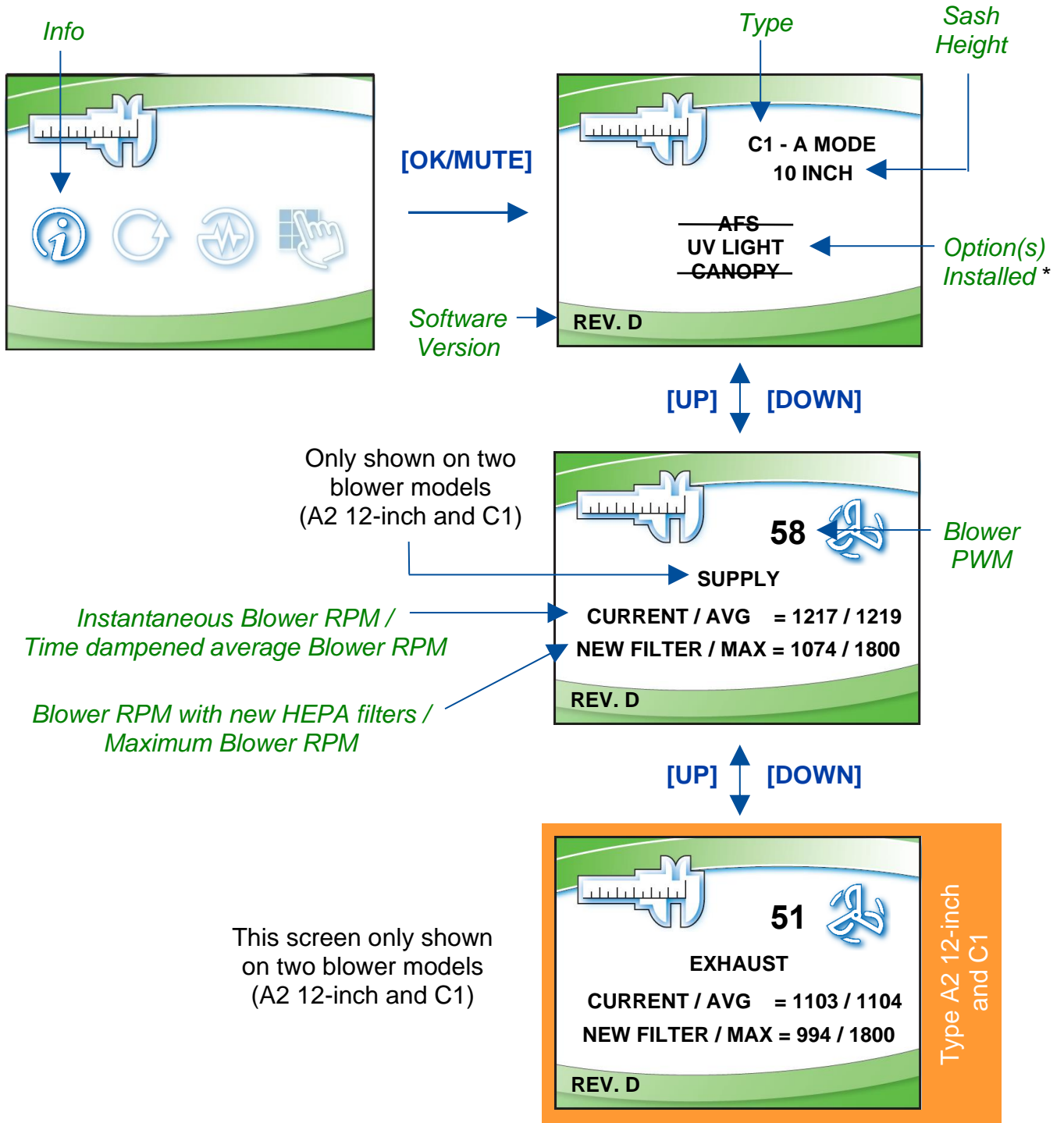
- Verify model and type
- Verify accessories installed
- Troubleshooting

The Info Screen provides information on the current configuration of the biosafety cabinets, and details the current blower speed(s). The Info Screen is not password protected. To access this screen, follow these steps:

1. From the Main Menu, press **[MENU]**, using **[UP]** or **[DOWN]** select the *Tools* icon. Press **[OK/MUTE]**.



2. The *Info* icon should be highlighted, if not select *Info*, press **[OK/MUTE]**.



*Option(s) not installed are shown with a strikethrough. To activate options (after field installation), see [Change Configuration](#) later in [Section 8](#). To change the blower speed(s), see [Section 9: Calibration and Certification](#).

Change Configuration

Changes to the biosafety cabinet configuration can be made in the field. This typically occurs after an accessory is field installed, or the user requests a change to the sash height (between 8 and 10 inches) on a Type C1 only.



Never change the following configuration parameters:

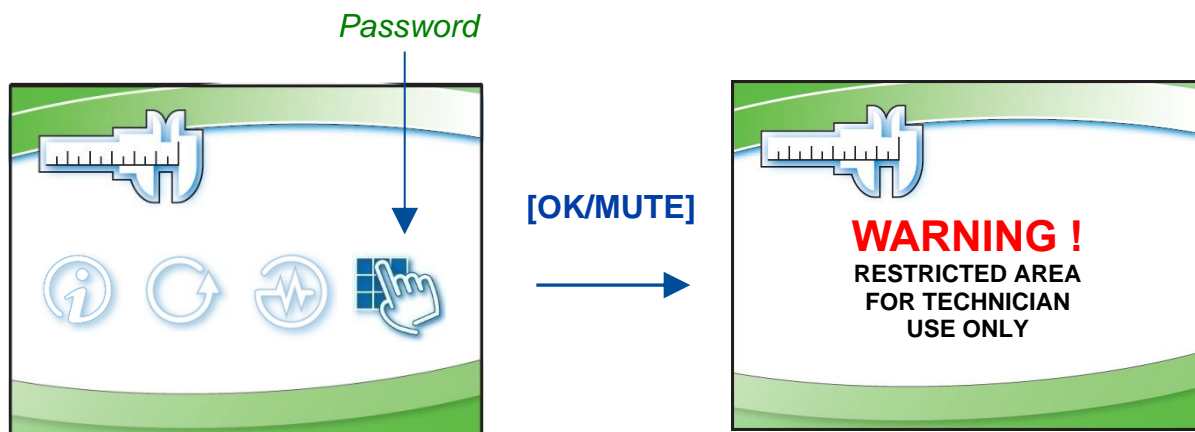
- Cabinet Type – if the cabinet type is changed, it can result in incorrect operation of the biosafety cabinet, and the biosafety cabinet may not protect the product, personnel, or environment.
- Sash Height – On Type A2 and B2 cabinets, never change the sash height.

The following instructions detail all screens in the Configuration menu, which is password protected. The password is **[LIGHT] [UV LIGHT] [TIMER] [TIMER] [OK/MUTE]**.

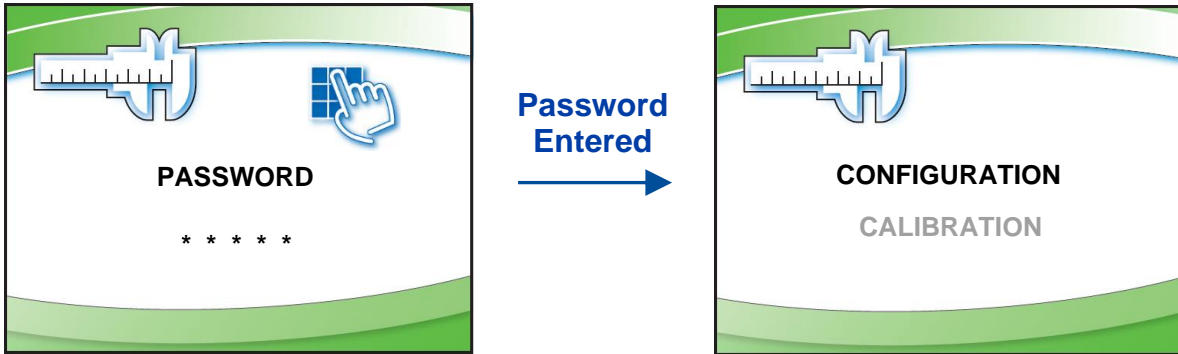
1. From the Main Menu, press **[MENU]**, using **[UP]** or **[DOWN]** select the *Tools* icon. Press **[OK/MUTE]**.



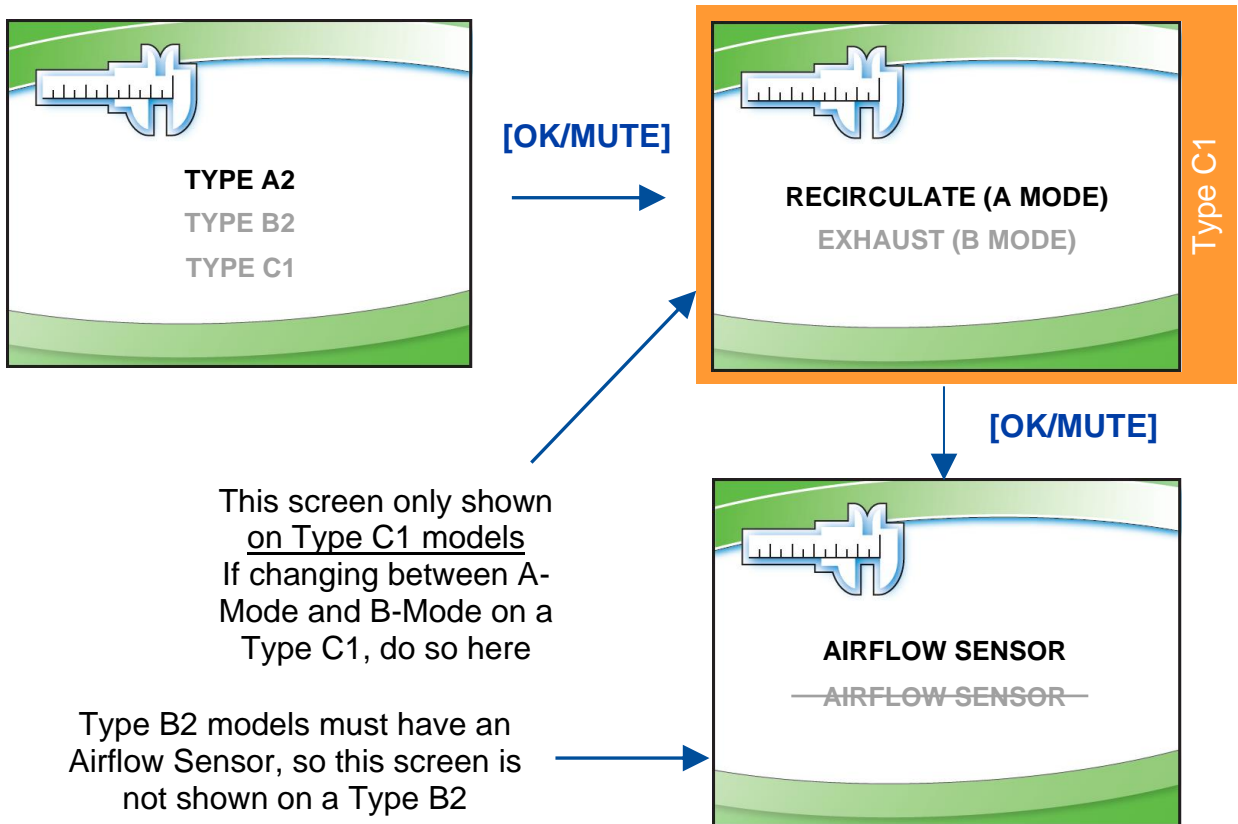
2. Use **[UP]** or **[DOWN]** to select the *Password* icon, press **[OK/MUTE]**.



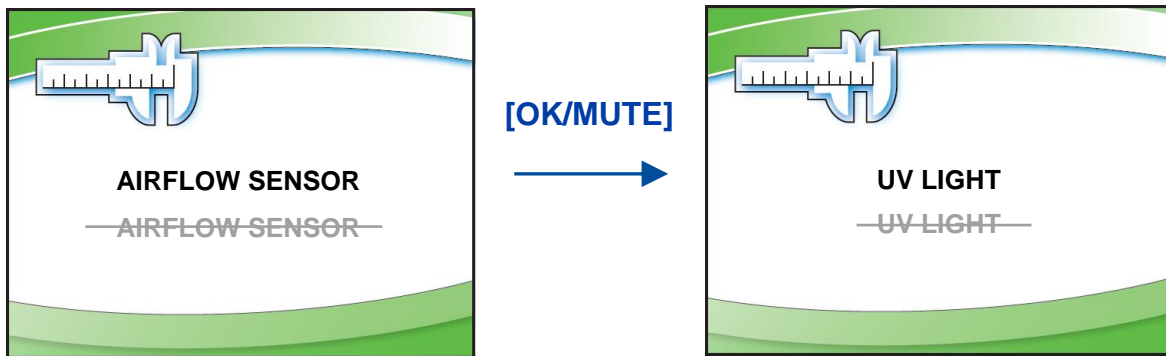
- From the *Warning* Screen, press **[OK/MUTE]** to acknowledge the warning that the following screens are restricted.
- On the *Password* Screen, enter the password: **[LIGHT] [UV LIGHT] [TIMER] [TIMER] [OK/MUTE]**.



- Configuration* should be highlighted, if not, select it, press **[OK/MUTE]**. The first screen will display the biosafety cabinet type. Do **NOT** change this selection, press **[OK/MUTE]**.



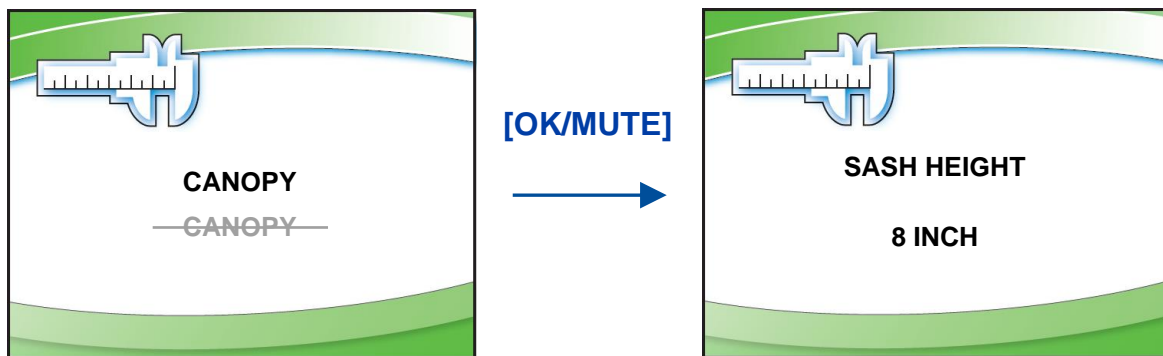
6. On a Type A2 or C1 only, if field installing, or removing the Airflow Sensor, change the selection accordingly, press **[OK/MUTE]**.



7. On all biosafety cabinet types, if field installing, or removing the UV Light, change the selection accordingly (screen shown above), press **[OK/MUTE]**.
8. On Type A2 models only, if field installing, or removing the Canopy connection, change the selection accordingly, press **[OK/MUTE]**.



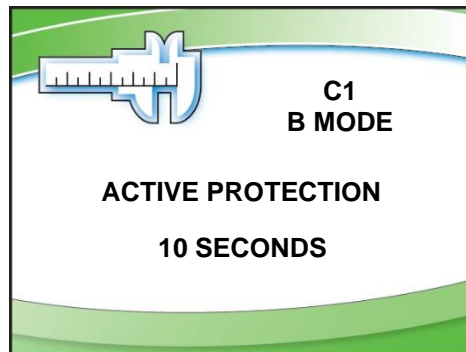
Note: When a Type C is selected previously, the *Canopy* Screen will not appear, but the software will default the selection correctly based on whether A-mode (No Canopy) or B-mode (Canopy) was previously selected.



9. The *Sash Height* selection will display next, and should **NOT** be changed, unless the model is a C1, and the user has decided to switch between 8-inch and 10-inch sash operation. Press **[OK/MUTE]**.

If the biosafety cabinet is a Type A2 or B2, this is the final screen selection. If a C1, proceed to step #10.

10. If a Type C1 model, and B-Mode operation was selected previously, the *Active Protection* Screen will appear. This allows the selection of the time for which the Type C1 will continue to operate (while sounding an alarm) when a remote (building) exhaust failure occurs. This allows the user time to secure critical work and exit before the cabinet shuts off. Set in 10 second increments up to 5 minutes (300 seconds). Use **[UP]** or **[DOWN]** to select the Active Protection time. Press **[OK/MUTE]**.



9: Calibration

This section provides instructions to access and understand the procedures to calibrate the biosafety cabinet. Use this section in conjunction with [Section 10: Certification](#) when performing initial or annual certification.



Never enter the password-protected area, or change settings of the biosafety cabinet if you are not a trained and qualified certifier or technician. Changing parameters in the password-protected area may impair the product's performance and result in loss of protection and/or harm or death to personnel in the laboratory.

Certifier Password

The certifier password is: **[LIGHT] [UV LIGHT] [TIMER] [TIMER] [OK/MUTE]**.

Use this password for all normal calibration and certification activities.

If installing or replacing an Airflow Sensor, the sensor will need a zero point calibration. In order to access the zero-point calibration screen, a different password is required. This password is: **[LIGHT] [UV LIGHT] [TIMER] [OUTLET] [OK/MUTE]**.

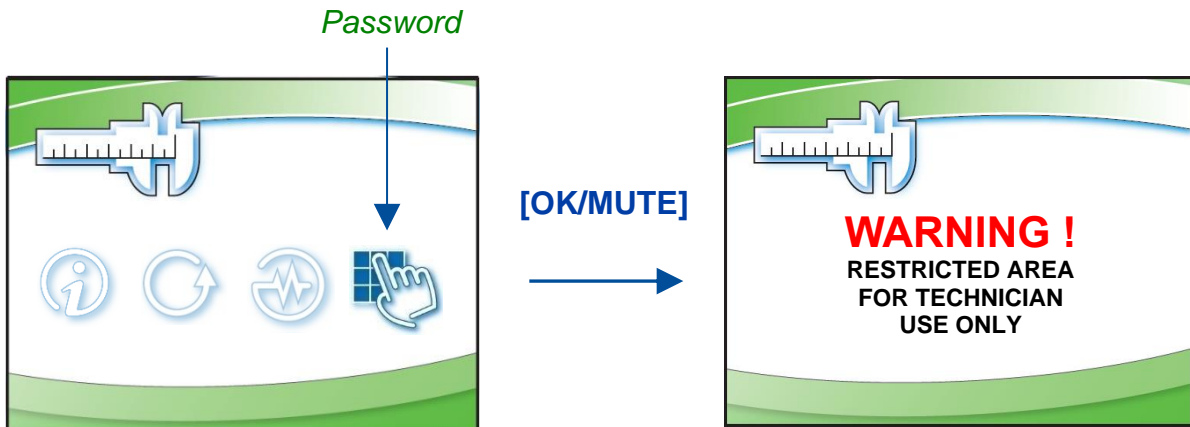
Adjusting Blower Speed

During initial or annual certification of the biosafety cabinet, the blower speed may need to be adjusted. Blower speed must only be adjusted by a trained, qualified certifier. To adjust the blower speed, following these instructions.

1. From the Main Menu, press **[MENU]**, using **[UP]** or **[DOWN]** select the *Tools* icon. Press **[OK/MUTE]**.

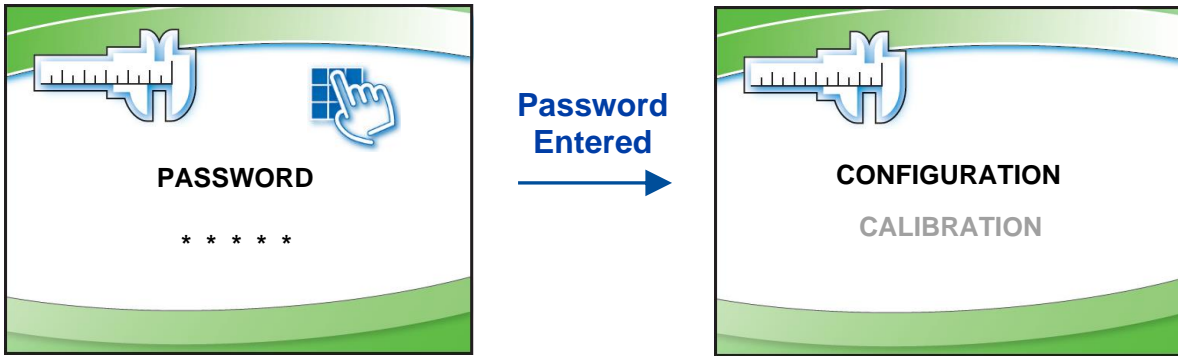


2. Use **[UP]** or **[DOWN]** to select the *Password* icon, press **[OK/MUTE]**.



3. From the *Warning* Screen, press **[OK/MUTE]** to acknowledge the warning that the following screens are restricted.

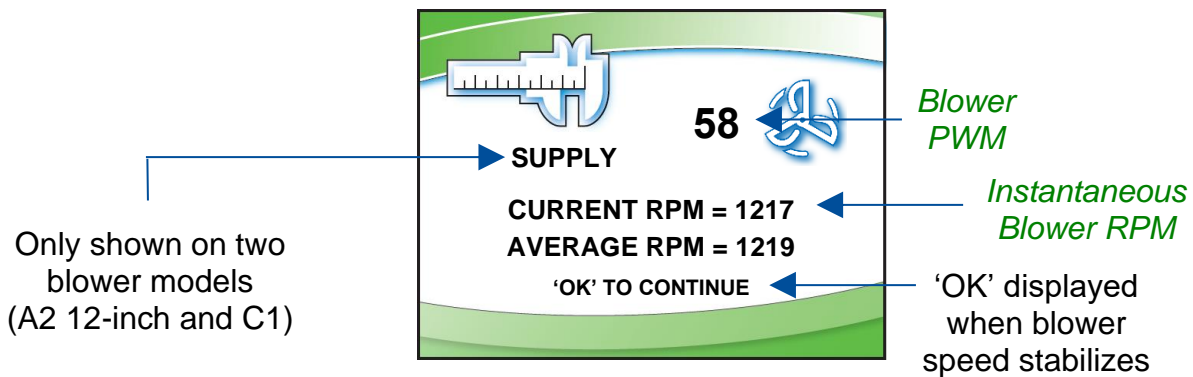
- On the *Password* Screen, enter the password: is **[LIGHT]** **[UV LIGHT]** **[TIMER]** **[TIMER]** **[OK/MUTE]**. If also installing a new airflow sensor, see *Certifier Password* earlier in this section to enter the correct password to allow for zero-point calibration of the airflow sensor.



- Use **[UP]** or **[DOWN]** to select *Calibration*. Press **[OK/MUTE]**.



Note: The sash must be at operating height when pressing **[OK/MUTE]**. Access will not be granted if the sash is closed.



Use **[UP]** or **[DOWN]** to adjust the blower speed. Each single press of **[UP]** or **[DOWN]** increments the PWM signal sent to the blower by 0.5. It may take two presses of the button to see the displayed PWM value change; however the blower speed will adjust with each button press.

When the Instantaneous Blower rpm is within 15 rpm of the Average Blower rpm, the blower speed has stabilized, and **[OK/MUTE]** can be pressed to move to the next screen.

Adjusting the Internal Air Damper

On Type A2 8-inch through 10-inch sash heights and all Type B2 (single blower) models, during the certification of the biosafety cabinet, it may be necessary to adjust the split of air between downflow and exhaust. This is an important part of balancing the biosafety cabinet and hitting the specified average downflow and inflow values specified for each model and size cabinet.



Note: On Type A2 12-inch sash height and Type C1 (dual blower) models, there is no internal air damper. One blower is dedicated to the supply (downflow) air, and one to exhaust (inflow) air. On these models, the blower speed of each will be set electronically. See the previous section [Adjusting Blower Speed](#), and note the text “Supply” displayed on Step #5. After setting the supply blower speed, the screens will advance to the exhaust blower speed adjustment.

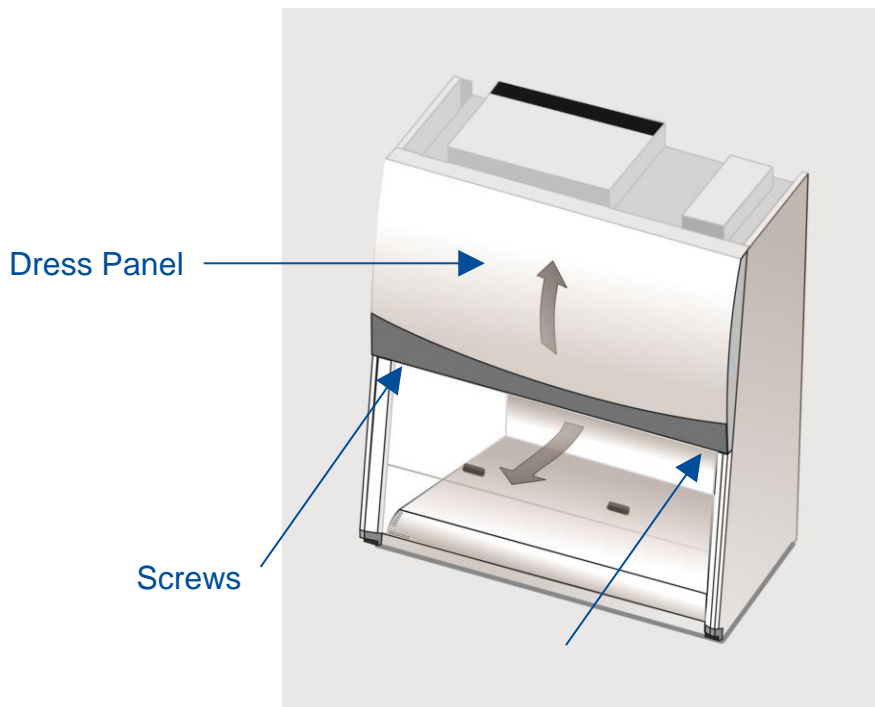
To adjust the internal damper, follow these instructions:

1. Remove the front Dress Panel (reference Figure 5-1 and 9-1) by removing the two (2) Dress Panel Screws, pulling the bottom of the Dress Panel away from the cabinet, and the lifting up on the Dress Panel.



CAUTION: The Dress Panel is large and heavy, especially on models 5-feet in width and larger. Use two (2) persons to safely lift and remove the Dress Panel.

Figure 9-1



2. Locate the exhaust damper adjustment bolt (reference Figure 9-2). The adjustment bolt is in the center of a flexible, orange cup seal. Use a 7/16-inch nut driver or socket and ratchet to turn the bolt. The bolt has 16 turns from fully open to fully closed. The adjustment decal shows the number of turns from fully closed that balanced the biosafety cabinet correctly at the factory. The adjustment bolt and adjustment decal are shown in Figure 9-2.

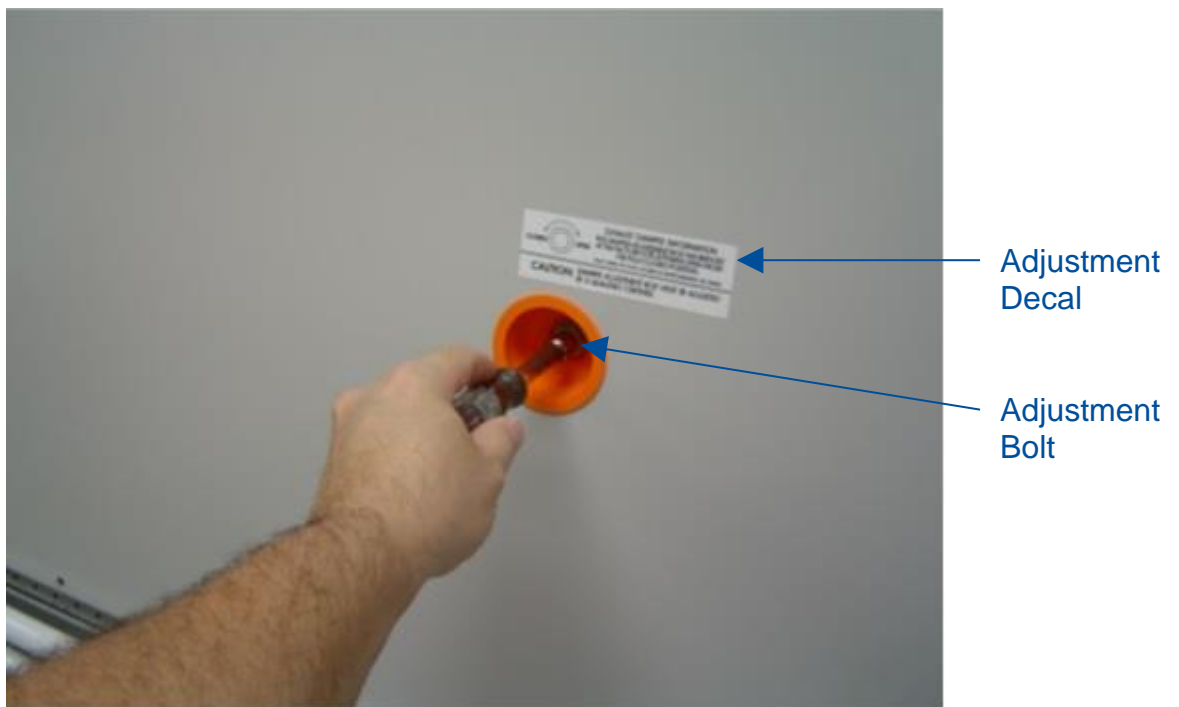
Turning Clockwise:

- Increases Inflow (Exhaust)
- Decreases Downflow

Turning Counterclockwise:

- Decreases Inflow (Exhaust)
- Increases Downflow

Figure 9-2



Setting the Filter Life Gauge

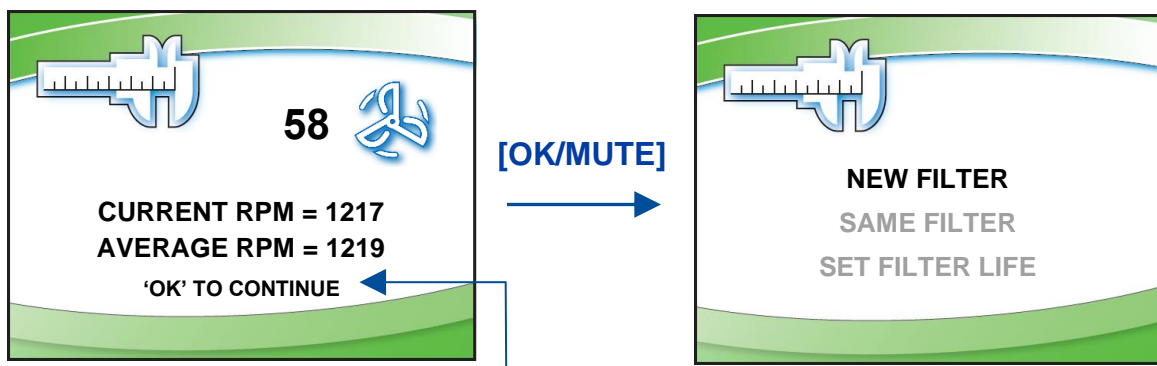
During initial or annual certification of the biosafety cabinet, and after the HEPA filters are changed, the Filter Life Gauge may need to be reset. There are three options to choose from when resetting the Filter Life Gauge. Below are the three options, and an explanation on which to select.

1. **New Filter** – Select this option when the HEPA filters are new. This occurs during initial certification of a new biosafety cabinet, or after new HEPA filters are installed and the biosafety cabinet's Inflow and Downflow have been verified by a trained and qualified certifier.
2. **Same Filter** – Select this option when passing through this screen in the Calibration submenu to reach the sensor calibrations, or when the blower speed(s) have been adjusted slightly (but the HEPA filters have not been replaced) during an annual certification.
3. **Set Filter Life** – This option is seldom selected. It may be used to set the Filter Life Gauge to a specific percentage, for example, after the display circuit board is replaced, and the settings from the previous display board need to be programmed into the new display board.

To access the Filter Life Gauge screen(s), follow the steps in *Adjusting the Blower Speed* previously shown in this section, until on the **Blower Speed** screen. Then follow these instructions:

Type A2 (8-inch through 10-inch sash) and Type B2

1. On the **Blower Speed** screen, press **[OK/MUTE]**.

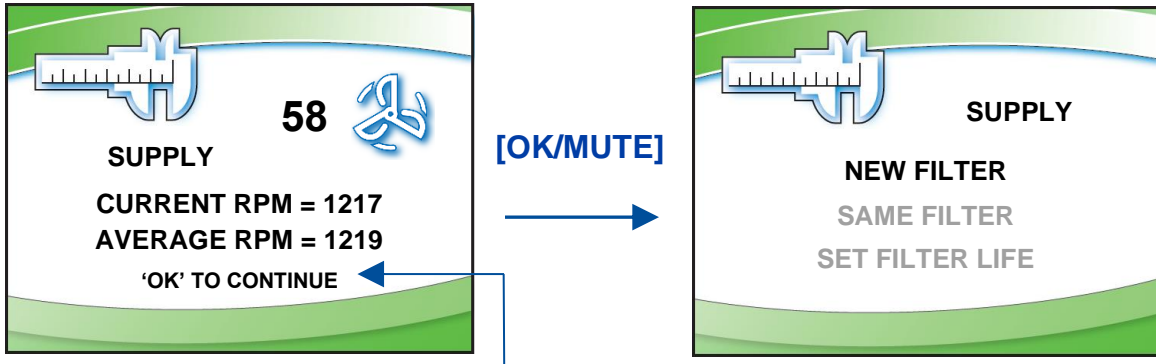


'OK' displayed when blower speed stabilizes

2. Use **[UP]** or **[DOWN]** to select one of the three Filter Life options displayed, press **[OK/MUTE]**.

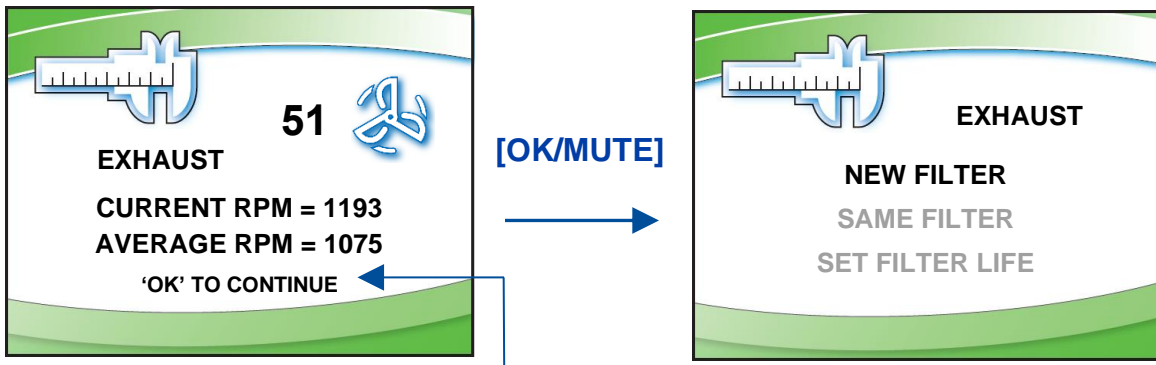
Type A2 (12-inch sash) and Type C1

1. On the *Supply Blower Speed* screen, press **[OK/MUTE]**.



'OK' displayed when blower speed stabilizes

2. Use **[UP]** or **[DOWN]** to select one of the three Filter Life options displayed, press **[OK/MUTE]**.
3. On the *Exhaust Blower Speed* screen, press **[OK/MUTE]**.



'OK' displayed when blower speed stabilizes

4. Use **[UP]** or **[DOWN]** to select one of the three Filter Life options displayed, press **[OK/MUTE]**.



Note: On dual blower models, each filter has a separate Life Gauge for percentage of filter remaining. The lower of the two Filter Life percentages is displayed on the Home Screen.

Airflow Sensor Calibration

All Type B2 biosafety cabinets have an airflow sensor to sense the exhaust air pulled from the cabinet by the remote (building) exhaust system. Type A2 and C1 biosafety cabinets may have an airflow sensor as an optional accessory.

Unless installing or replacing the airflow sensor, the zero point should be correctly set from the factory (see *Zero Point Calibration* later in this section). Once proper airflows have been set by a trained and qualified certifier, the nominal set point should be calibrated after setting the Filter Life Gauge in the Calibration menu. For a Type B2 biosafety cabinet, both the nominal and alarm set point will be calibrated.

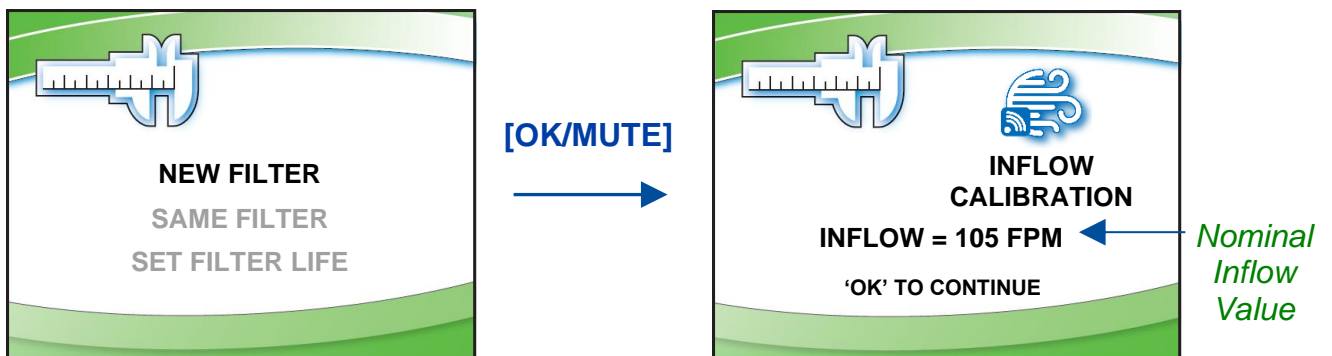
Type A2 and Type C1



Note: If installing an airflow sensor on an A2 or C1 biosafety cabinet in the field, which did not previously have this accessory installed, first enable the Airflow Sensor in *Configuration*, as described in [Change Configuration](#) in [Section 8: Configuration](#).

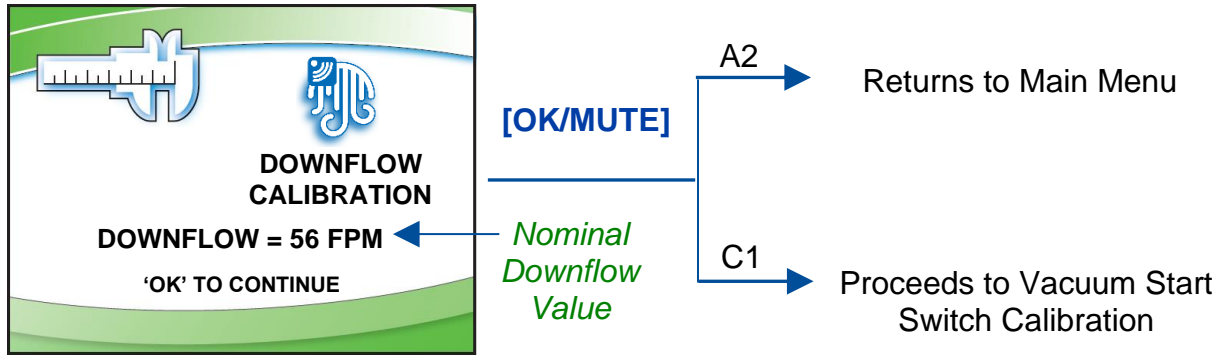
To access the Airflow Sensor Calibration screen(s), follow the steps in [Adjusting the Blower Speed](#) and [Setting the Filter Life Gauge](#) previously shown in this section, until on the *Filter Life Selection* screen. Then follow these instructions:

1. On the *Filter Life Selection* screen, press **[OK/MUTE]**.



2. Using the average inflow velocity measured during airflow certification, use **[UP]** or **[DOWN]** to adjust the *Nominal Inflow Value* to match this measured velocity. The *Nominal Inflow Value* will flash, and it will be displayed in feet per minute (FPM) or meters per second (M/S) based on the desired units selected in the *Settings* submenu. Once set, press **[OK/MUTE]**.

- Using the average downflow velocity measured during airflow certification, use **[UP]** or **[DOWN]** to adjust the *Nominal Downflow Value* to match this measured velocity. The *Nominal Downflow Value* will flash, and it will be displayed in feet per minute (FPM) or meters per second (M/S) based on the desired units selected in the *Settings* submenu. Once set, press **[OK/MUTE]**.

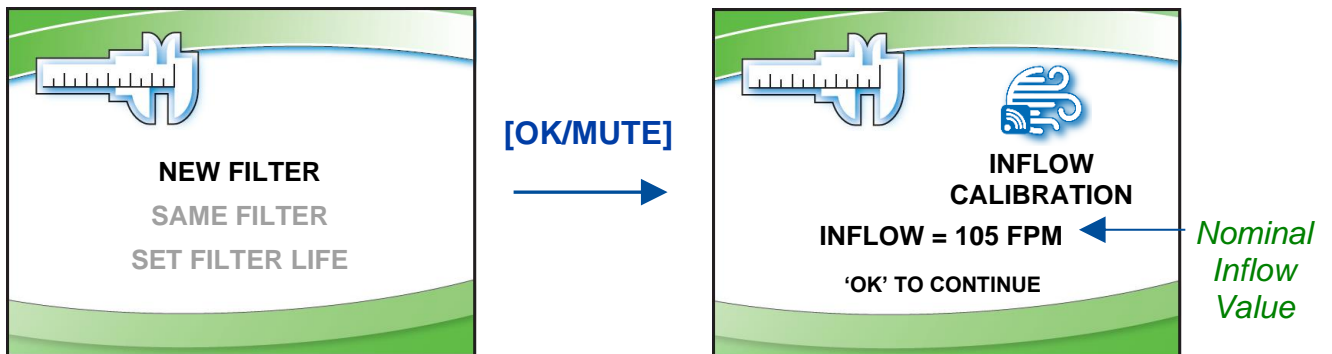


Note: Type C1 models with an airflow sensor will only display Inflow on the Home Screen.

Type B2

To access the Airflow Sensor Calibration screen(s), follow the steps in [Adjusting the Blower Speed](#) and [Setting the Filter Life Gauge](#) previously shown in this section, until on the *Filter Life Selection* screen. Then follow these instructions:

- On the *Filter Life Selection* screen, press **[OK/MUTE]**.



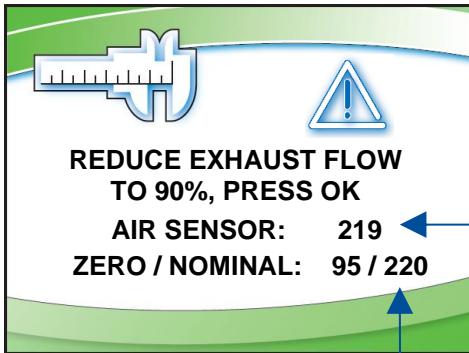
- Using the average inflow velocity measured during airflow certification, use **[UP]** or **[DOWN]** to adjust the *Nominal Inflow Value* to match this measured velocity. The *Nominal Inflow Value* will flash, and it will be displayed in feet per minute (FPM) or meters per second (M/S) based on the desired units selected in the *Settings* submenu. Once set, press **[OK/MUTE]**.

- The nominal set point for Inflow has been set in the previous step. Now the alarm set point must be established. The screen below is displayed. While on this screen, reduce the remote or building exhaust system until the **TOTAL** volume of air drawn by the remote exhaust system is reduced to 90% of nominal. For a B2 biosafety cabinet, the remote exhaust system pulls both the downflow air volume AND inflow air volume from the cabinet and exhausts it.



Note: To set alarm point airflow, if unable to measure airflow in the exhaust duct above the biosafety cabinet, slowly close the Air-Tight Damper until the Inflow into the cabinet equals the values in Table 9-1.

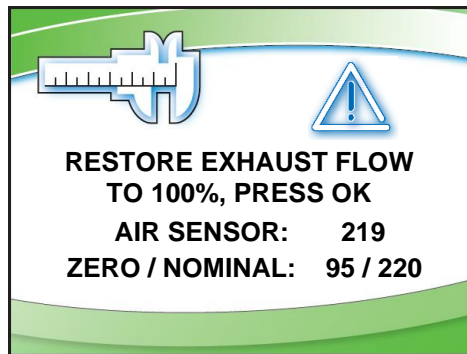
Table 9-1



Logic+ Type B2 Model	Inflow @ 90% Alarm Set Point	
	ft ³ /min	m ³ /hr
4-foot, 8" Sash	216	367
6-foot, 8" Sash	322	547

Nominal Sensor Value *Current Sensor Value*

- Once the total exhaust airflow has been reduced to 90% of nominal, look at the *Current Sensor Value*. It should be at least 4 or 5 points less than the *Nominal Sensor Value*. These values are not velocity or flow values, they are the raw digital output values from the airflow sensor. To avoid nuisance alarms in operation, these two values should be at least 4 or 5 points apart. Press **[OK/MUTE]**.



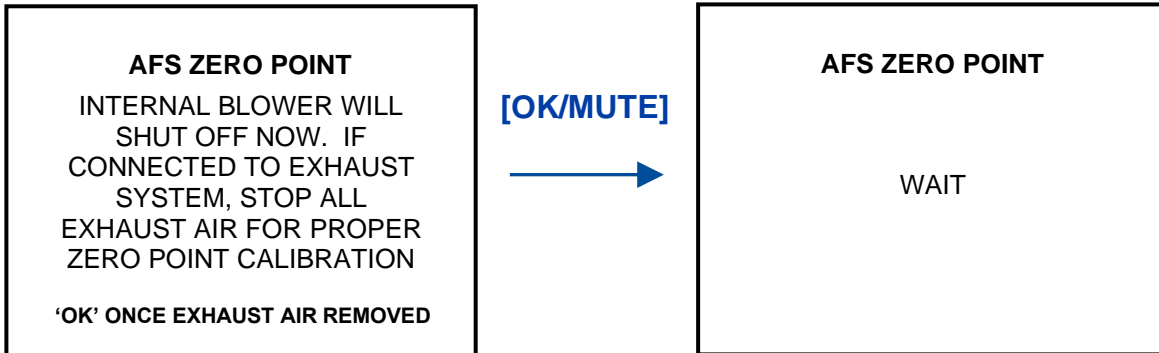
- Restore the remote exhaust system to nominal airflow. Press **[OK/MUTE]**.

Zero Point Calibration

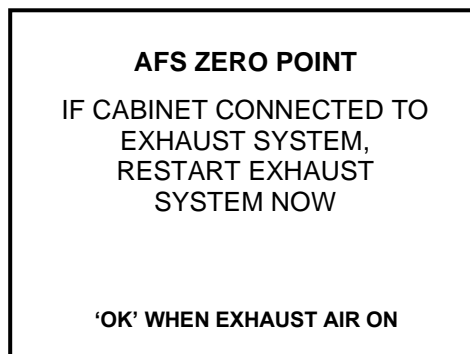
If a new airflow sensor is being calibrated (field installation or replacement), a zero point calibration will be performed. To gain access to the *Zero Point Calibration* screens, a different password must be entered on the *Password* Screen. This password is: **[LIGHT] [UV LIGHT] [TIMER] [OUTLET] [OK/MUTE]**

Upon entering this password successfully, select *Calibration* on the first screen shown. Press **[OK/MUTE]**. Follow these instructions:

1. Before entering the *Blower Speed* screen(s), the *Zero Point Warning* screen is shown (below). The biosafety cabinet's internal blower(s) will automatically shut off. If the biosafety cabinet is connected to a remote exhaust system, stop all exhaust airflow before proceeding. Once all airflow is removed, press **[OK/MUTE]**.



2. The biosafety cabinet will display *Wait* for approximately 15 seconds while it samples the airflow sensor readings. When complete, the screen below is shown. At this time, if the biosafety cabinet is connected to a remote exhaust system, restart the remote exhaust now. Press **[OK/MUTE]**.



3. Zero point calibration is now complete. The follow screens will proceed through setting the blower speed(s) as would normally be done if the standard password had been entered.

Vacuum Start Switch Calibration (Type C1 only)

A Type C1 biosafety cabinet operating in B-mode must sense sufficient remote exhaust volume before starting the internal blowers. This is accomplished with the Vacuum Start Switch (VSS) located in the exhaust housing of the biosafety cabinet. After setting the Filter Life Gauge, or calibrating the Airflow Sensor (if present), a Type C1 biosafety cabinet will ask if the VSS needs to be calibrated.



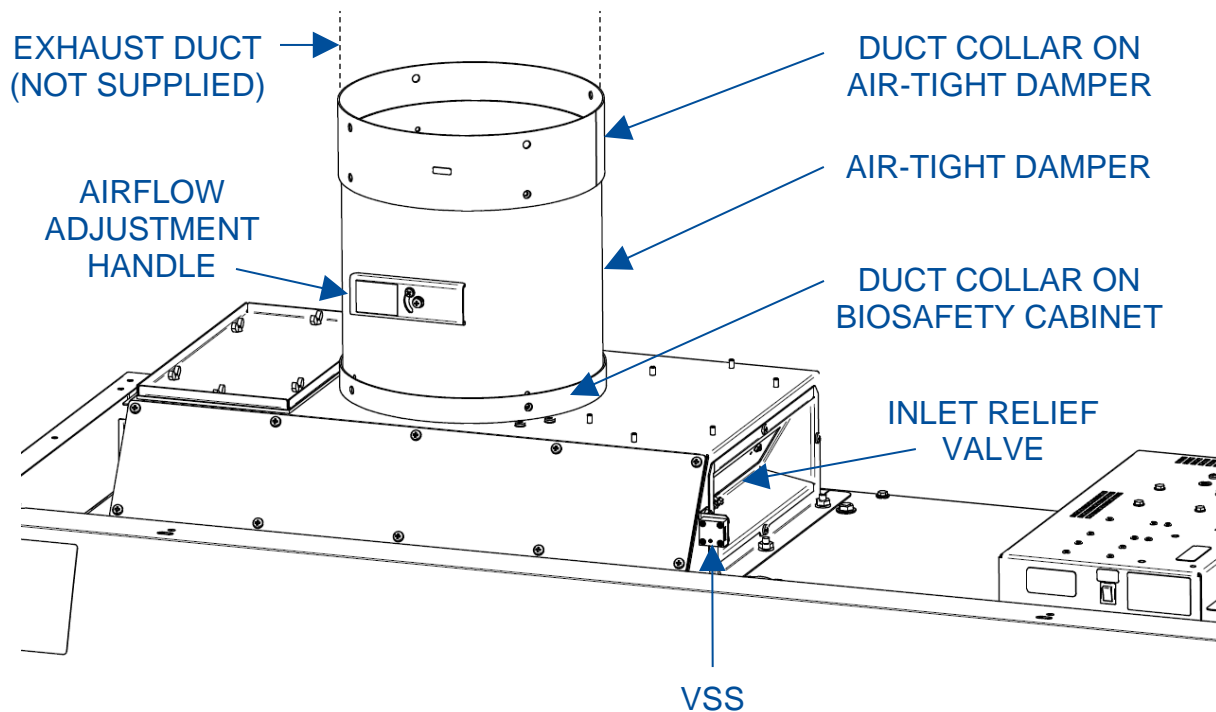
The VSS is factory calibrated, and should not need recalibration. If the biosafety cabinet fails to start its internal blowers on demand, and an Exhaust Failure Alarm is displayed after the Exhaust Airflow Check fails, the VSS may need to be recalibrated if it has been determined the remote exhaust system is pulling the correct airflow volume.

To reach the VSS calibration screen, access the *Calibration* submenu as described in *Adjusting the Blower Speed* earlier in this section. Pass through the *Blower Speed*, *Filter Life*, and (if present) *Airflow Sensor Calibration* screens using **[OK/MUTE]**.

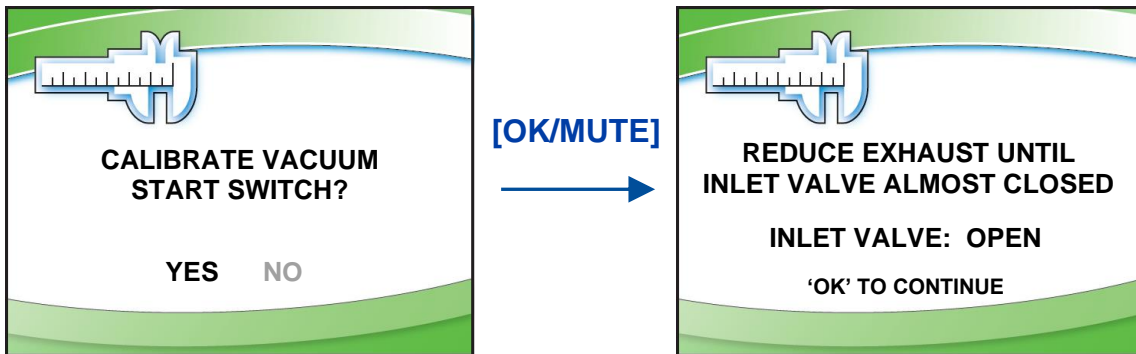
If not recalibrating the VSS, select *No* on the screen below and press **[OK/MUTE]**. To recalibrate the VSS, select *Yes* on the screen below and press **[OK/MUTE]**. Follow these instructions:

1. Identify the VSS and Inlet Relief Valve atop the cabinet, see Figure 9-3. The Inlet Relief Valve is a clear flap; the VSS is a black cube with clear hose protruding.

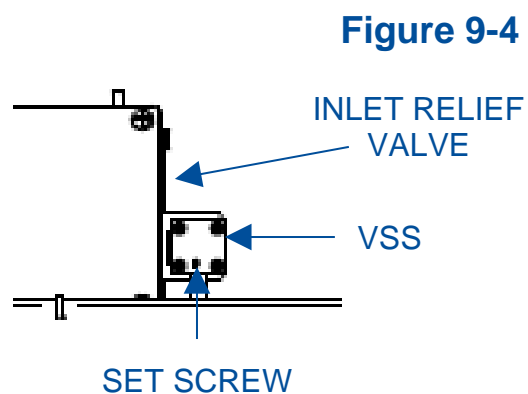
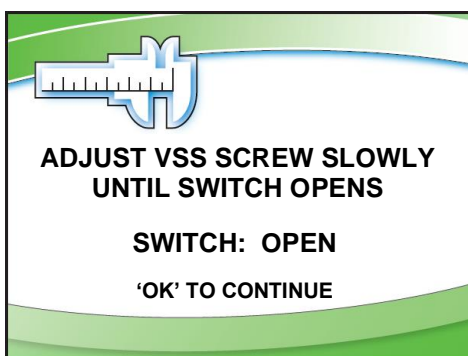
Figure 9-3



1. After selecting **Yes** on the screen to the left below and pressing **[OK/MUTE]**, watch the Inlet Relief Valve and slowly reduce the remote exhaust system flow until the Inlet Relief Valve begins to flutter, but is not completely closed. Hold the remote exhaust system flow at this point. The state of the Inlet Relief Valve can be seen on the display screen. The Inlet Relief Valve should still be **Open**. In this state, press **[OK/MUTE]**.



2. When the screen below is shown, the biosafety cabinet's internal blowers will shut off. Using a small, flat blade screwdriver, if the VSS status shown is **Open**, adjust the VSS set screw slowly clockwise until the VSS status changes to **Closed**. See Figure 9-4 for reference. Then slowly turn the set screw counterclockwise until the status changes to **Open**. Because the screen is not readily visible when adjusting the set screw, the biosafety cabinet will play an audible alarm tone whenever the VSS status is **Closed**. Stop turning the set screw counterclockwise when this tone stops. The VSS Calibration is complete.



3. Restore the remote exhaust system to nominal airflow. Press **[OK/MUTE]**.

10: Certification

This section provides instructions to certify the biosafety cabinet. Use this section in conjunction with [Section 9: Calibration](#) when performing initial or annual certification.



Never enter the password-protected area, or change settings of the biosafety cabinet if you are not a trained and qualified certifier or technician. Changing parameters in the password-protected area may impair the product's performance and result in loss of protection and/or harm or death to personnel in the laboratory.

Certifier Password

The certifier password is: **[LIGHT] [UV LIGHT] [TIMER] [TIMER] [OK/MUTE]**.

Use this password for all normal calibration and certification activities.

If installing or replacing an Airflow Sensor, the sensor will need a zero point calibration. In order to access the zero-point calibration screen, a different password is required. This password is: **[LIGHT] [UV LIGHT] [TIMER] [OUTLET] [OK/MUTE]**.

Type A2 HEPA Filter Leak Test Preparation

All biosafety cabinet models were tested to the HEPA Filter Leak Test as described in the current NSF/ANSI Standard 49. This section describes the methods, specifications, and Pass/Fail criteria to challenge each HEPA filter in the biosafety cabinet.



You never know what a biosafety cabinet has been exposed to, so it is always recommended to surface decontaminate any components prior to working inside the biosafety cabinet and/or removing components from the biosafety cabinet.

1. Remove the work surface by lifting the handles on either end. Pull the work surface straight out of the biosafety cabinet.
2. Turn the blower(s) of the biosafety cabinet on.
3. Place the aerosol generator in the left, rear corner of the biosafety cabinet's drip pan, see Figure 10-2. Ensure that the generator is level, and the oil level is within 1/8 inch (3 mm) of the level line.

4. If the model has a pre-filter installed on the towel catch, remove it for testing.
5. If the aerosol generator requires pressurized air, connect the air line. Turn on the appropriate number of Laskin nozzles for the model under test based on Table 10-1 to ensure they are each working properly.
6. Verify the generator's air pressure is 23 psi.
7. Turn on the photometer and allow it to operate for a minimum of 5 minutes. Leave the valve in the "CLEAR" setting.

Theoretical Upstream Concentration

If the biosafety cabinet has been used with biohazards, toxic chemicals, or radioisotopes, the Upstream Sample Tube cannot be used (Figure 10-1). Testing at Labconco has shown the actual concentration varies from the theoretical value. Table 10-1 shows the actual vs. calculated concentrations for Type A2 models. Establish the 100% and 0% concentration levels for the photometer using the actual values provided in Table 10-1 for the model being tested.

Upstream Concentration Sampling

If the biosafety cabinet has **NOT** been used with biohazards, toxic chemicals, or radioisotopes, the Upstream Sample Tube can be used (Figure 10-1).



You never know what a biosafety cabinet has been exposed to, so it is always recommended to surface decontaminate any components prior to working inside the biosafety cabinet and/or removing components from the biosafety cabinet.

1. Locate the Upstream Sample Tube on the right side, protruding from the rear baffle. See Figure 10-1. On some models this tube is clear.
2. Pull the Upstream Sample Tube forward. Do not remove the cap yet.
3. When prompted by the photometer, turn on the appropriate number of Laskin nozzles on the aerosol generator, uncap the Upstream Sampling Tube and sample the upstream concentration to establish the 100% concentration level.
4. Establish the 0% concentration level according to your photometer's instructions.

Figure 10-1



Figure 10-2

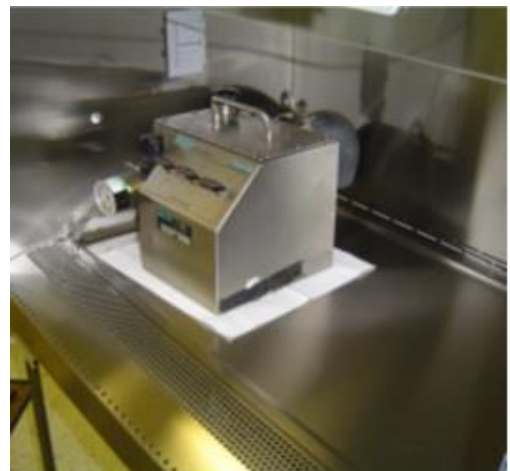


Table 10-1

Type A2 Cabinet Width	Sash Height (inches)	Air Displacement (CFM)	Laskin Nozzles Required	Calculated Concentration (ug/L) ¹	Actual Concentration (ug/L) ²
3-foot	8	550	1	25	14
	9	570	1	24	12
	10	600	1	23	12
4-foot	8	725	2	37	21
	9	760	2	36	18
	10	800	2	34	18
	12	900	3	30	15
5-foot	8	900	2	30	17
	9	950	2	28	14
	10	1000	2	27	14
	12	1130	3	24	13
6-foot	8	1100	2	25	17
	9	1140	2	24	15
	10	1200	2	23	15
	12	1350	3	20	10

1. The calculated concentration was established using the formula:
Concentration (ug/l) = (# Laskin nozzles @ 23 PSIG x 13,500) / Volume of air displaced
2. Based on Mineral oil

Type A2 Supply HEPA Filter Leak Test

During this test the supply HEPA filter will be challenged and scanned to check for leaks. This section describes how to access and test the supply HEPA filter on a Type A2 biosafety cabinet. The aerosol generator and photometer should be prepared at this point as described in the preparation steps listed in the previous section.

1. Raise the glass sash as high as it will go.
2. Using a 7/16 inch nut driver or socket and ratchet, remove the two acorn nuts along the front of the diffuser. See Figure 10-3. Note: Dress Panel and LED lamps removed for clarity.

Figure 10-3



Note: The diffuser acorn nuts are secured to the studs with a removable thread locking compound to prevent them from vibrating loose during shipment. There may be some resistance the first time the nuts are removed; this is normal. No additional thread locking compound need be applied to these acorn nuts unless the unit is being prepared for shipment.



Acorn Nuts (2)

3. Lower the front edge of the diffuser until it clears the bottom of the sash, then pull the diffuser straight out of the biosafety cabinet. See Figure 10-4.

Figure 10-4



4. The supply HEPA filter is now ready to be scanned. Set the photometer sampling valve to "DOWNSTREAM". Ensure proper vacuum at the sampling nozzle.

5. Open the correct number of Laskin Nozzles on the aerosol generator (refer to Table 10-1).
6. Scan the downstream side of the supply HEPA filter by passing the sampling nozzle in slightly overlapping strokes over the entire surface of the filter. The sampling nozzle must be no more than 1 inch from the surface of the filter media. Scan at a traverse rate of not more than 2 inches per second.
7. Scan the entire periphery of the supply HEPA filter, including the gasket between the filter frame and the biosafety cabinet structure.



Note: When scanning the front edge of the supply HEPA filter, photometer operation may become erratic due to the aspiration of room air into the front of the work area. This problem can be minimized or eliminated by placing the edge of a sheet of rigid plastic or metal just outside the edge of the HEPA filter when scanning the front edge. See Figure 10-5 as reference.

Figure 10-5



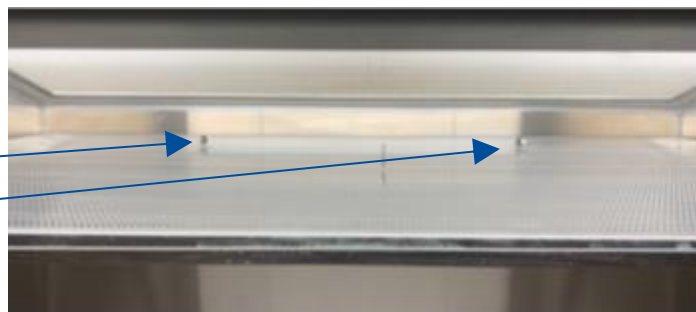
Acceptance Criteria

Aerosol penetration shall not exceed 0.01%.

Reinstall the diffuser, ensuring the two holes in the back of the diffuser frame engage the posts on the rear wall of the cabinet. See Figure 10-6 for reference.

Figure 10-6

Diffuser Pins
engaged
correctly



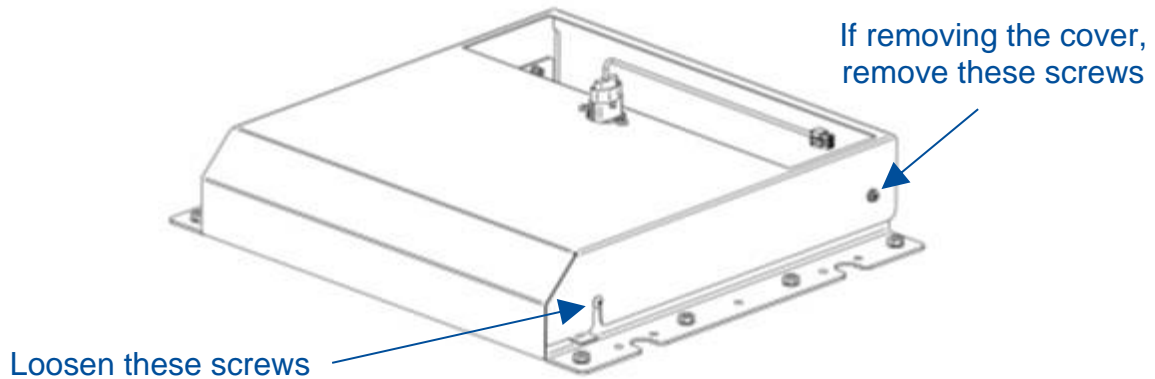
Type A2 Exhaust HEPA Filter Leak Test

During this test the exhaust HEPA filter will be challenged and scanned to check for leaks. This section describes how to access and test the exhaust HEPA filter on a Type A2 biosafety cabinet. The aerosol generator and photometer should be prepared at this point as described in the preparation steps listed in the previous section.

Before starting, examine the clearance between the top of the biosafety cabinet and the ceiling or any overhead obstructions. If there is 18 inches (46 cm) or more of overhead clearance, follow the procedure below to hinge the exhaust cover open. If there is not enough clearance, remove the exhaust cover altogether.

1. Loosen the two (2) Phillips screws on the front sides of the exhaust filter cover, see Figure 10-7. Tilt the cover back to access the downstream side of the filter.

Figure 10-7



The exhaust HEPA filter media is now exposed. Never touch the media, it is easily damaged.

2. The exhaust HEPA filter is now ready to be scanned. Set the photometer sampling valve to "DOWNSTREAM". Ensure proper vacuum at the sampling nozzle.
3. Open the correct number of Laskin Nozzles on the aerosol generator (refer to Table 10-1).
4. Scan the downstream side of the exhaust HEPA filter by passing the sampling nozzle in slightly overlapping strokes over the entire surface of the filter. The sampling nozzle must be no more than 1 inch from the surface of the filter media. Scan at a traverse rate of not more than 2 inches per second.
5. Scan the entire periphery of the exhaust HEPA filter, including the gasket between the filter frame and the biosafety cabinet structure.



Note: When scanning the edges of the exhaust HEPA filter, photometer operation may become erratic due to the aspiration of room air into the exhaust air stream. This problem can be minimized or eliminated by placing the edge of a sheet of rigid plastic or metal just outside the edge of the HEPA filter when scanning the filter edges. See Figure 10-8 as reference.

Figure 10-8



Acceptance Criteria

Aerosol penetration shall not exceed 0.01%.

Replace and secure the exhaust cover and its screws.

Type B2 Supply HEPA Filter Leak Test Preparation

All biosafety cabinet models were tested to the HEPA Filter Leak Test as described in the current NSF/ANSI Standard 49. This section describes the methods, specifications, and Pass/Fail criteria to challenge the supply HEPA filter in the biosafety cabinet.



You never know what a biosafety cabinet has been exposed to, so it is always recommended to surface decontaminate any components prior to working inside the biosafety cabinet and/or removing components from the biosafety cabinet.

1. Remove the work surface by lifting the handles on either end. Pull the work surface straight out of the biosafety cabinet.
2. Turn the blower of the biosafety cabinet on.
3. Check the oil level of the aerosol generator is within 1/8 inch (3 mm) of the level line.
4. If the aerosol generator requires pressurized air, connect the air line.
5. Verify the generator's air pressure is 23 psi.
6. Turn on the photometer and allow it to operate for a minimum of 5 minutes. Leave the valve in the "CLEAR" setting.

Theoretical Upstream Concentration

If you do not wish to connect the Upstream Sampling Tube to the photometer to establish the actual 100% concentration value, the theoretical value will need to be used instead. Testing at Labconco has shown the actual concentration varies from the theoretical value. Table 10-2 shows the actual vs. calculated concentrations for Type B2 models. Establish the 100% and 0% concentration levels for the photometer using the actual values provided in Table 10-2 for the model being tested.

Upstream Concentration Sampling



You never know what a biosafety cabinet has been exposed to, so it is always recommended to surface decontaminate any components prior to working inside the biosafety cabinet and/or removing components from the biosafety cabinet.

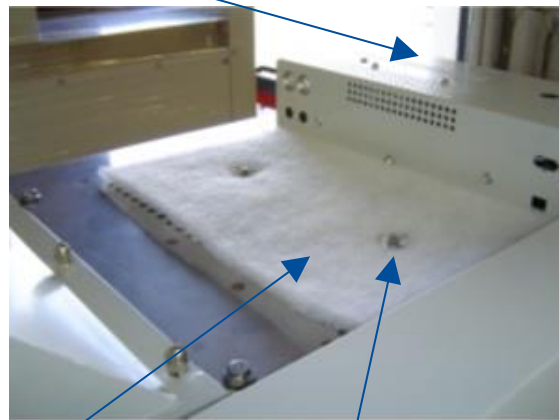
1. Locate the Upstream Sample Tube on the right side, protruding from the rear baffle. See Figure 10-9. On some models this tube is clear.
2. Pull the Upstream Sample Tube forward. Do not remove the cap yet.
3. Place the aerosol generator on top of the biosafety cabinet, see Figure 10-10.
4. Remove the inlet pre-filter (Figure 10-10).
5. When prompted by the photometer, turn on the appropriate number of Laskin nozzles on the aerosol generator (see Table 10-2), uncap the Upstream Sampling Tube and sample the upstream concentration to establish the 100% concentration level.
6. Establish the 0% concentration level according to your photometer's instructions.

Figure 10-9



Place aerosol generator here

Figure 10-10



Pre-Filter

Thumbnuts (2)

Table 10-2

Type B2 Cabinet Width	Sash Height (inches)	Supply Air Displacement (CFM)	Laskin Nozzles Required	Calculated Concentration (ug/L) ¹	Actual Concentration (ug/L) ²
4-foot	8	445	1	30	15
6-foot	8	665	1	20	12

1. The calculated concentration was established using the formula:
 $\text{Concentration (ug/l)} = (\# \text{ Laskin nozzles @ 23 PSIG} \times 13,500) / \text{Volume of air displaced}$
2. Based on Mineral oil

Type B2 Supply HEPA Filter Leak Test

During this test the supply HEPA filter will be challenged and scanned to check for leaks. This section describes how to access and test the supply HEPA filter on a Type B2 biosafety cabinet. The aerosol generator and photometer should be prepared at this point as described in the preparation steps listed in the previous section.

1. Raise the glass sash as high as it will go.
2. Using a 7/16 inch nut driver or socket and ratchet, remove the two acorn nuts along the front of the diffuser. See Figure 10-11. Note: Dress Panel and LED lamps removed for clarity.

Figure 10-11



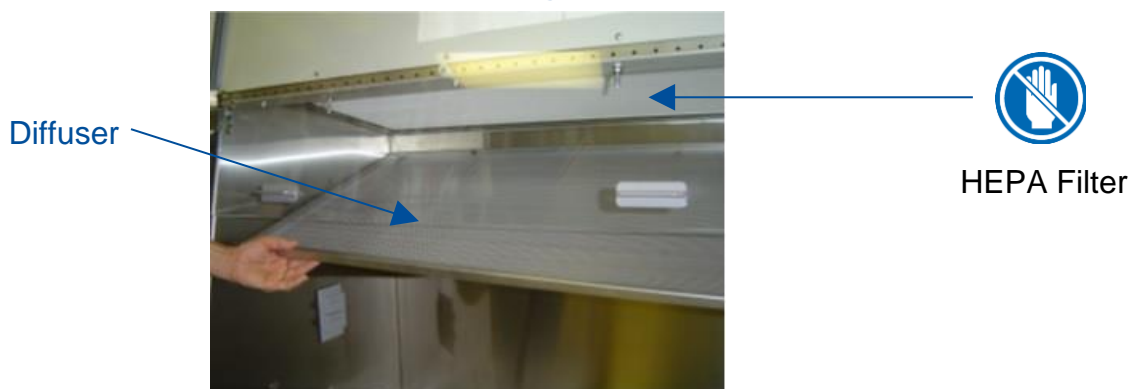
Note: The diffuser acorn nuts are secured to the studs with a removable thread locking compound to prevent them from vibrating loose during shipment. There may be some resistance the first time the nuts are removed; this is normal. No additional thread locking compound need be applied to these acorn nuts unless the unit is being prepared for shipment.



Acorn Nuts (2)

3. Lower the front edge of the diffuser until it clears the bottom of the sash, then pull the diffuser straight out of the biosafety cabinet. See Figure 10-12.

Figure 10-12



4. The supply HEPA filter is now ready to be scanned. Set the photometer sampling valve to "DOWNSTREAM". Ensure proper vacuum at the sampling nozzle.

5. Open the correct number of Laskin Nozzles on the aerosol generator (refer to Table 10-2).
6. Scan the downstream side of the supply HEPA filter by passing the sampling nozzle in slightly overlapping strokes over the entire surface of the filter. The sampling nozzle must be no more than 1 inch from the surface of the filter media. Scan at a traverse rate of not more than 2 inches per second.
7. Scan the entire periphery of the supply HEPA filter, including the gasket between the filter frame and the biosafety cabinet structure.



Note: When scanning the front edge of the supply HEPA filter, photometer operation may become erratic due to the aspiration of room air into the front of the work area. This problem can be minimized or eliminated by placing the edge of a sheet of rigid plastic or metal just outside the edge of the HEPA filter when scanning the front edge. See Figure 10-13 as reference.

Figure 10-13



Acceptance Criteria

Aerosol penetration shall not exceed 0.01%.

Reinstall the inlet pre-filter and diffuser, ensuring the two holes in the back of the diffuser frame engage the posts on the rear wall of the cabinet. See Figure 10-14 for reference.

Figure 10-14



Type B2 Exhaust HEPA Filter Leak Test Preparation

All biosafety cabinet models were tested to the HEPA Filter Leak Test as described in the current NSF/ANSI Standard 49. This section describes the methods, specifications, and Pass/Fail criteria to challenge the exhaust HEPA filter in the biosafety cabinet.



You never know what a biosafety cabinet has been exposed to, so it is always recommended to surface decontaminate any components prior to working inside the biosafety cabinet and/or removing components from the biosafety cabinet.

1. Remove the work surface by lifting the handles on either end. Pull the work surface straight out of the biosafety cabinet.
2. Turn the blower of the biosafety cabinet on.
3. Place the aerosol generator in the left, rear corner of the biosafety cabinet's drip pan, see Figure 10-15. Ensure that the generator is level, and the oil level is within 1/8 inch (3 mm) of the level line.
4. If the aerosol generator requires pressurized air, connect the air line.
5. Verify the generator's air pressure is 23 psi.
6. Turn on the photometer and allow it to operate for a minimum of 5 minutes. Leave the valve in the "CLEAR" setting.

Theoretical Upstream Concentration

Actual upstream sampling is not possible on a Type B2 exhaust filter, so the theoretical concentration will be used. Testing at Labconco has shown the actual concentration varies from the theoretical value. Table 10-3 shows the actual vs. calculated concentrations for Type B2 models. Establish the 100% and 0% concentration levels for the photometer using the theoretical values provided in Table 10-3 for the model being tested.

Figure 10-15

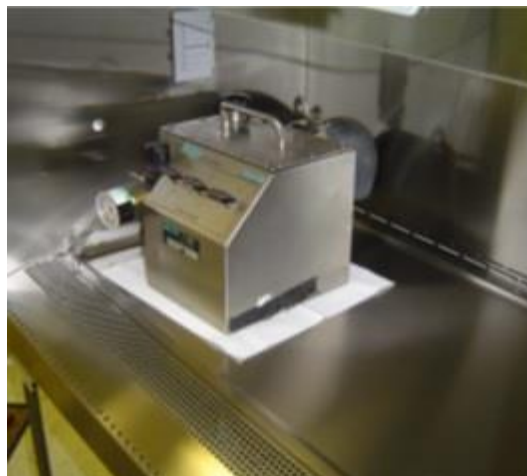


Table 10-3

Type B2 Cabinet Width	Sash Height (inches)	Exhaust Air Displacement (CFM)	Laskin Nozzles Required	Calculated Concentration (ug/L) ¹	Actual Concentration (ug/L) ²
4-foot	8	723	2	38	21
6-foot	8	1083	2	25	17

1. The calculated concentration was established using the formula:
Concentration (ug/l) = (# Laskin nozzles @ 23 PSIG x 13,500) / Volume of air displaced
2. Based on Mineral oil

Type B2 Exhaust HEPA Filter Leak Test

During this test the exhaust HEPA filter will be challenged and a downstream average utilized to check for leaks. This section describes how to test the exhaust HEPA filter on a Type B2 biosafety cabinet. The aerosol generator and photometer should be prepared at this point as described in the preparation steps listed in the previous section.

1. Locate a sampling port downstream of the exhaust HEPA filter. The sampling port is not part of the biosafety cabinet. It must be facility supplied as part of the facility's exhaust system ducting. The sampling port should ideally be at least 10 duct diameters downstream of the exhaust HEPA filter, and the same distance from any elbows in the duct work.
2. Connect the sampling port to the photometer.
3. Set the photometer sampling valve to "DOWNSTREAM". Ensure proper vacuum at the sampling tube.
4. Open the appropriate number of Laskin nozzles on the aerosol generator (see Table 10-3).
5. Observe the average concentration of aerosol downstream.

Acceptance Criteria

Aerosol penetration shall not exceed 0.005%.

Reinstall the work surface.

Type C1 Supply HEPA Filter Leak Test Preparation

All biosafety cabinet models were tested to the HEPA Filter Leak Test as described in the current NSF/ANSI Standard 49. This section describes the methods, specifications, and Pass/Fail criteria to challenge the supply HEPA filter in the biosafety cabinet.



You never know what a biosafety cabinet has been exposed to, so it is always recommended to surface decontaminate any components prior to working inside the biosafety cabinet and/or removing components from the biosafety cabinet.

1. Remove the center work surface by lifting the handles on either end. Pull the work surface straight out of the biosafety cabinet. Remove the two work surface wings.
2. Turn the blower of the biosafety cabinet on.
3. Place the aerosol generator on the center drip tray exposed when the center work surface was removed, see Figure 10-16.
4. Use an extension tube (see Figure 10-16) on the aerosol generator to ensure the challenge aerosol is delivered to the left most part of the rear baffle. The challenge must not be delivered to the center portion of the rear baffle (defined by the center drip tray the generator is resting on).
5. Check the oil level of the aerosol generator is within 1/8 inch (3 mm) of the level line.
6. If the aerosol generator requires pressurized air, connect the air line.
7. Verify the generator's air pressure is 23 psi.
8. Turn on the photometer and allow it to operate for a minimum of 5 minutes. Leave the valve in the "CLEAR" setting.

Theoretical Upstream Concentration

If you do not wish to connect the Upstream Sampling Tube to the photometer to establish the actual 100% concentration value, the theoretical value will need to be used instead. Testing at Labconco has shown the actual concentration varies from the theoretical value. Table 10-4 shows the actual vs. calculated concentrations for Type C1 models. Establish the 100% and 0% concentration levels for the photometer using the actual values provided in Table 10-4 for the model being tested.

Upstream Concentration Sampling



You never know what a biosafety cabinet has been exposed to, so it is always recommended to surface decontaminate any components prior to working inside the biosafety cabinet and/or removing components from the biosafety cabinet.

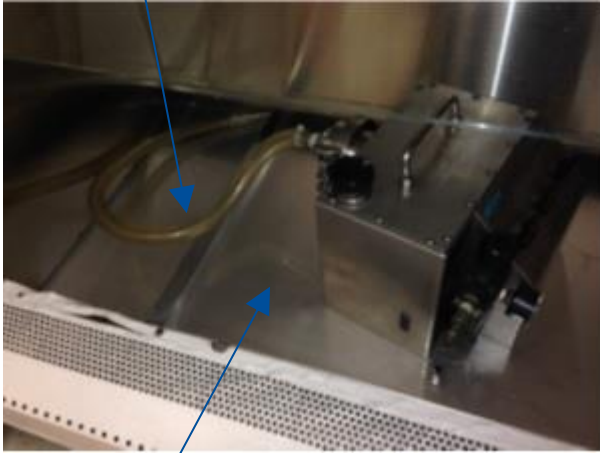
1. Locate the Upstream Sample Tube on the right side, protruding from the rear baffle. See Figure 10-17. On some models this tube is clear.
2. Pull the Upstream Sample Tube forward. Do not remove the cap yet.
3. When prompted by the photometer, turn on the appropriate number of Laskin nozzles on the aerosol generator (see Table 10-4), uncap the Upstream

Sampling Tube and sample the upstream concentration to establish the 100% concentration level.

4. Establish the 0% concentration level according to your photometer's instructions.

Extension Tube

Figure 10-16



Center Drip Tray

Figure 10-17



Table 10-4

Type C1 Cabinet Width	Sash Height (inches)	Supply Air Displacement (CFM)	Laskin Nozzles Required	Calculated Concentration (ug/L) ¹	Actual Concentration (ug/L) ²
4-foot	8	520	1	26	13
	10	520	1	26	13
6-foot	8	665	1	20	12
	10	665	1	20	12

1. The calculated concentration was established using the formula:

$$\text{Concentration (ug/l)} = (\# \text{ Laskin nozzles @ 23 PSIG} \times 13,500) / \text{Volume of air displaced}$$
2. Based on Mineral oil

Type C1 Supply HEPA Filter Leak Test

During this test the supply HEPA filter will be challenged and scanned to check for leaks. This section describes how to access and test the supply HEPA filter on a Type C1 biosafety cabinet. The aerosol generator and photometer should be prepared at this point as described in the preparation steps listed in the previous section.

1. Raise the glass sash as high as it will go.
2. Using a 7/16 inch nut driver or socket and ratchet, remove the two acorn nuts along the front of the diffuser. See Figure 10-18. Note: Dress Panel and LED lamps removed for clarity.

Figure 10-18



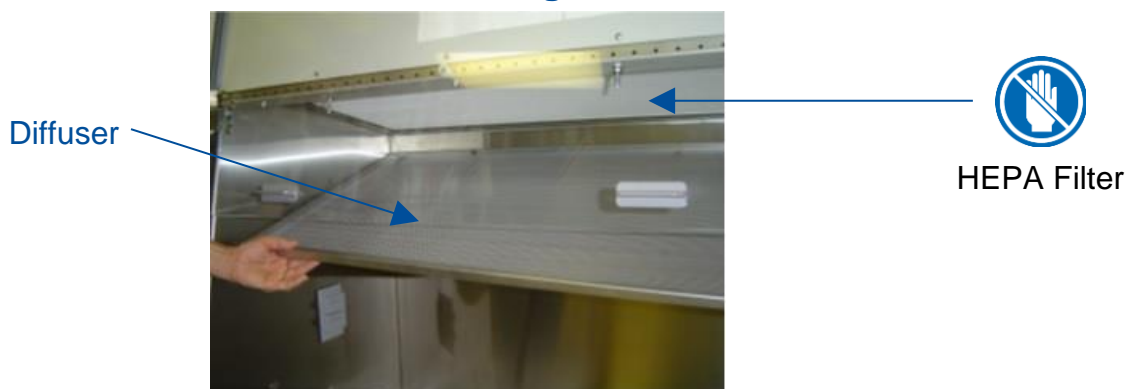
Note: The diffuser acorn nuts are secured to the studs with a removable thread locking compound to prevent them from vibrating loose during shipment. There may be some resistance the first time the nuts are removed; this is normal. No additional thread locking compound need be applied to these acorn nuts unless the unit is being prepared for shipment.



Acorn Nuts (2)

3. Lower the front edge of the diffuser until it clears the bottom of the sash, then pull the diffuser straight out of the biosafety cabinet. See Figure 10-19.

Figure 10-19



4. The supply HEPA filter is now ready to be scanned. Set the photometer sampling valve to "DOWNSTREAM". Ensure proper vacuum at the sampling nozzle.

5. Open the correct number of Laskin Nozzles on the aerosol generator (refer to Table 10-4).
6. Scan the downstream side of the supply HEPA filter by passing the sampling nozzle in slightly overlapping strokes over the entire surface of the filter. The sampling nozzle must be no more than 1 inch from the surface of the filter media. Scan at a traverse rate of not more than 2 inches per second.
7. Scan the entire periphery of the supply HEPA filter, including the gasket between the filter frame and the biosafety cabinet structure.



Note: When scanning the front edge of the supply HEPA filter, photometer operation may become erratic due to the aspiration of room air into the front of the work area. This problem can be minimized or eliminated by placing the edge of a sheet of rigid plastic or metal just outside the edge of the HEPA filter when scanning the front edge. See Figure 10-20 as reference.

Figure 10-20

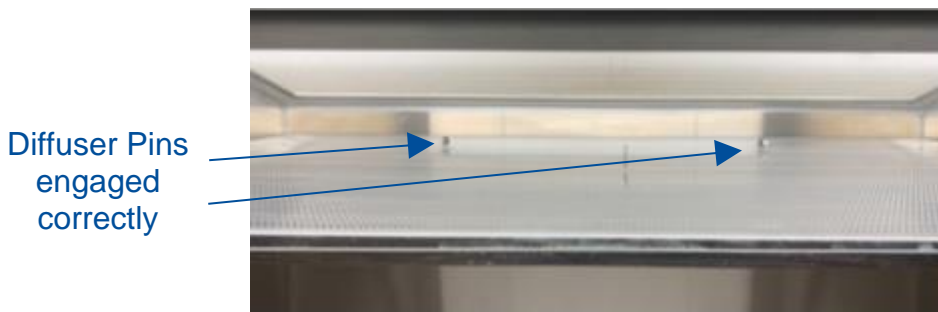


Acceptance Criteria

Aerosol penetration shall not exceed 0.01%.

Reinstall the diffuser, ensuring the two holes in the back of the diffuser frame engage the posts on the rear wall of the cabinet. See Figure 10-21 for reference.

Figure 10-21



Type C1 Exhaust HEPA Filter Leak Test Preparation

All biosafety cabinet models were tested to the HEPA Filter Leak Test as described in the current NSF/ANSI Standard 49. This section describes the methods, specifications, and Pass/Fail criteria to challenge the exhaust HEPA filter in the biosafety cabinet.



You never know what a biosafety cabinet has been exposed to, so it is always recommended to surface decontaminate any components prior to working inside the biosafety cabinet and/or removing components from the biosafety cabinet.

1. Remove the center work surface by lifting the handles on either end. Pull the work surface straight out of the biosafety cabinet. Remove the two work surface wings.
2. Turn the blower of the biosafety cabinet on.
3. Place the aerosol generator on the center drip tray exposed when the center work surface was removed, see Figure 10-22.
4. Use an extension tube (see Figure 10-22) on the aerosol generator to ensure the challenge aerosol is delivered to the center part of the rear baffle (defined by the center drip tray the generator is resting on). The challenge must not be delivered to the far left or right portion of the rear baffle.
5. Check the oil level of the aerosol generator is within 1/8 inch (3 mm) of the level line.
6. If the aerosol generator requires pressurized air, connect the air line.
7. Verify the generator's air pressure is 23 psi.
8. Turn on the photometer and allow it to operate for a minimum of 5 minutes. Leave the valve in the "CLEAR" setting.

Theoretical Upstream Concentration

Actual upstream sampling is not possible on a Type C1 exhaust filter, so the theoretical concentration will be used. Testing at Labconco has shown the actual concentration varies from the theoretical value. Table 10-5 shows the actual vs. calculated concentrations for Type C1 models. Establish the 100% and 0% concentration levels for the photometer using the theoretical values provided in Table 10-5 for the model being tested.

Figure 10-22

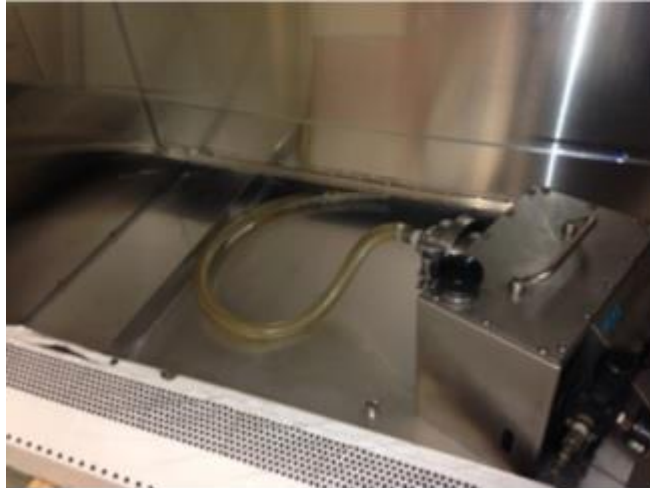


Table 10-5

Type C1 Cabinet Width	Sash Height (inches)	Exhaust Air Displacement (CFM)	Laskin Nozzles Required	Calculated Concentration (ug/L) ¹	Actual Concentration (ug/L) ²
4-foot	8	283	1	48	28
	10	354	1	38	22
6-foot	8	423	1	32	19
	10	529	1	26	15

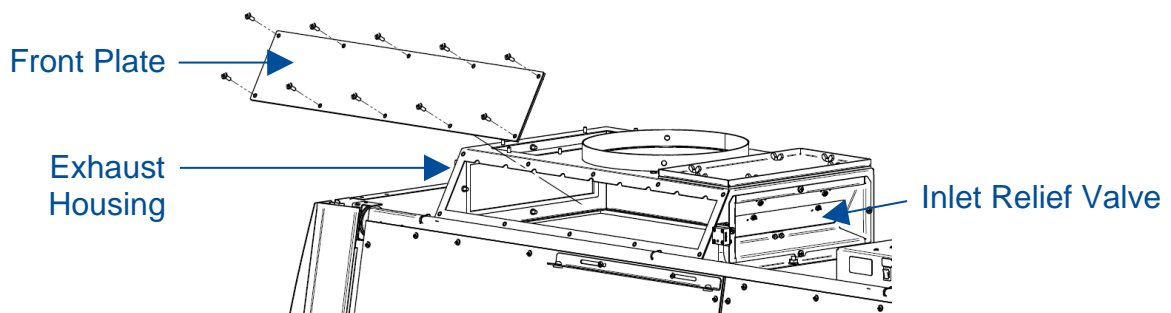
1. The calculated concentration was established using the formula:
Concentration (ug/l) = (# Laskin nozzles @ 23 PSIG x 13,500) / Volume of air displaced
2. Based on Mineral oil

Type C1 Exhaust HEPA Filter Leak Test

During this test the exhaust HEPA filter will be challenged and a downstream average utilized to check for leaks. This section describes how to test the exhaust HEPA filter on a Type C1 biosafety cabinet. The aerosol generator and photometer should be prepared at this point as described in the preparation steps listed in the previous section.

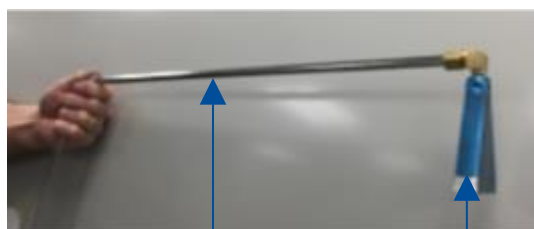
1. If the biosafety cabinet is connected to an exhaust system, secure the Inlet Relief Valve in an open position (to keep the cabinet's blowers running during the test). Then remove the perimeter screws that secure the front plate of the exhaust housing. Set the front plate aside. See Figure 10-23 for reference.

Figure 10-23



2. Set the photometer sampling valve to "DOWNSTREAM". Ensure proper vacuum at the sampling tube.
3. Open the appropriate number of Laskin nozzles on the aerosol generator (see Table 10-5).
4. Using a rigid tube (18 inch long x 3/8 inch OD) connected to the photometer probe pickup (see Figure 10-24), scan the downstream side of the filter, resting the tube in the ridges located on the top of the opening (see Figures 10-24 & 10-25). By resting the tubing in successive ridges, and alternatively pushing the probe in on the first ridge, then shifting the tube to the next ridge, and pulling it out, you can quickly scan the filter surface in overlapping strokes. By resting your index finger under the tube during scanning, you can accurately control the probe position and height.

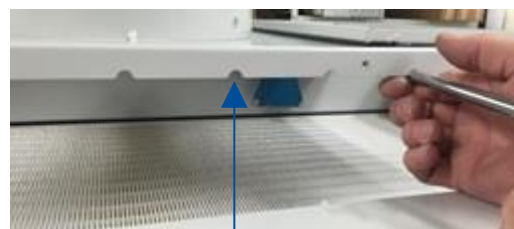
Figure 10-24



Rigid extension tube

Sampling Nozzle

Figure 10-25



Ridge cutouts

5. Observe the average concentration of aerosol downstream.

Acceptance Criteria

Aerosol penetration shall not exceed 0.01%.

Reinstall the exhaust housing front plate, unsecure temporary Inlet Relief Valve hold open, reinstall the work surface pieces.

Downflow Velocity

All models of Labconco biosafety cabinets are classified as uniform downflow, as tested per the current NSF Standard 49. This section describes how to prepare and test the downflow velocity on all Types of biosafety cabinets.



Before setting up the downflow velocity test, if any accessories are installed inside the biosafety cabinet (UV lamp, IV Bar, etc.), remove them for this test. Ensure sash is at the correct operating height, and remote (building) exhaust is on (if exhaust connected).



On all biosafety cabinet types and models, the downflow test points are to be taken at a height of **4 inches (10 cm) above the bottom edge of the glass sash**.



The thermal anemometer probe should always point toward the nearest side wall or the sash, whichever is closer to the probe. Therefore, on the two rear rows, the probe should point to the left side wall when taking the left half of test points, and the right side wall when taking the right half of test points. And, on the front row, the probe should always point forward towards the glass sash. See Figures 10-26 and 10-27 for reference.

Figure 10-26

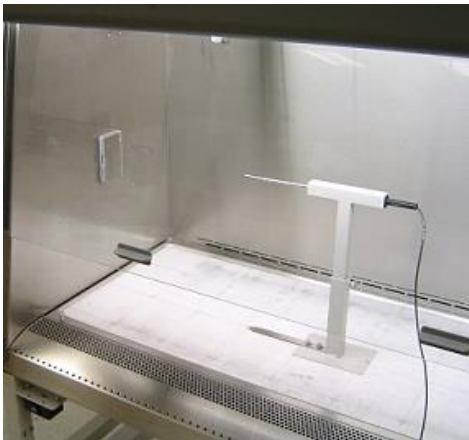


Figure 10-27



The thermal anemometer probe stand shown in the above figures is available from Labconco. The catalog number for the stand is 3858410.



Set the thermal anemometer's **time constant to 10 or 15 seconds** for greater data stability.

1. For the Type and sash height biosafety cabinet under test, set up the test grid based on the dimensions provided in Table 10-6. Start the blower(s).

Table 10-6

Type A2 & B2 Cabinet Width	Sash Height	Downflow Average ¹	Test Grid		Distance in inches (cm)		
	inches	FPM (m/s)	Total Test Points	Rows x Columns	From Back & Sides	Between Rows	Between Columns
3-foot	8, 9	55 (.28)	21	3 x 7	6.0 (15)	5.75 (14.6)	4.08 (10.4)
	10	55 (.28)	21	3 x 7	6.0 (15)	5.55 (14.1)	4.08 (10.4)
4-foot	8, 9	55 (.28)	24	3 x 8	6.0 (15)	5.75 (14.6)	5.21 (13.2)
	10	55 (.28)	24	3 x 8	6.0 (15)	5.55 (14.1)	5.21 (13.2)
	12	60 (.30)	24	3 x 8	6.0 (15)	5.44 (13.8)	5.21 (13.2)
5-foot	8, 9	55 (.28)	30	3 x 10	6.0 (15)	5.75 (14.6)	5.39 (13.7)
	10	55 (.28)	30	3 x 10	6.0 (15)	5.55 (14.1)	5.39 (13.7)
	12	60 (.30)	30	3 x 10	6.0 (15)	5.44 (13.8)	5.39 (13.7)
6-foot	8, 9	55 (.28)	36	3 x 12	6.0 (15)	5.75 (14.6)	5.50 (14.0)
	10	55 (.28)	36	3 x 12	6.0 (15)	5.55 (14.1)	5.50 (14.0)
	12	60 (.30)	36	3 x 12	6.0 (15)	5.44 (13.8)	5.50 (14.0)
Type C1 Cabinet Width	Sash Height	Downflow Average ¹	Test Grid		Distance in inches (cm)		
	inches	FPM (m/s)	Total Test Points	Rows x Columns	From Back & Sides	Between Rows	Between Columns
4-foot	8	65 (.33)	24	3 x 8	6.0 (15)	5.75 (14.6)	5.21 (13.2)
	10	65 (.33)	24	3 x 8	6.0 (15)	5.55 (14.1)	5.21 (13.2)
6-foot	8	55 (.28)	36	3 x 12	6.0 (15)	5.75 (14.6)	5.50 (14.0)
	10	55 (.28)	36	3 x 12	6.0 (15)	5.55 (14.1)	5.50 (14.0)

1. Tolerance for Average Downflow Velocity = +/- 5 FPM (+/- 0.03 m/s)

2. Take the downflow velocity reading at each test point location of the test grid.
3. Average all individual test point velocity readings.
4. If the average is not within the acceptance criteria range, adjust the biosafety cabinet according to *Adjusting the Blower Speed* and/or *Adjusting the Internal Damper* found in [Section 9: Calibration](#).

Acceptance Criteria

Average downflow shall be as specified in Table 10-6 column “Downflow Average” +/-5 FPM (+/-0.03 m/s), and all individual test points within +/-16 FPM (+/-0.081 m/s) from the average.

Inflow Velocity

All models of Labconco biosafety cabinets are tested per the current NSF/ANSI Standard 49. This section describes how to prepare and test the inflow velocity on all Types of biosafety cabinets.



The front Dress Panel must be installed on the biosafety cabinet to obtain accurate inflow results. If the biosafety cabinet is connected to a remote (building) exhaust system, ensure the remote exhaust system is on.

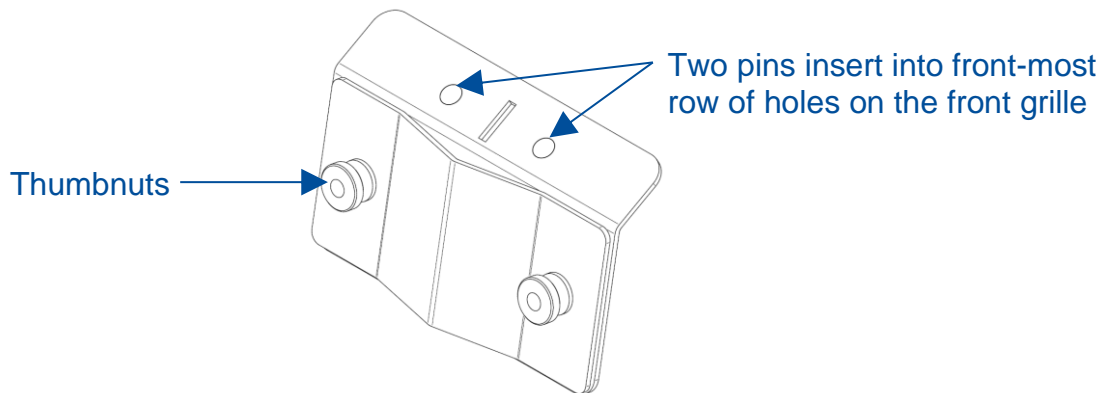
Primary Method

NSF/ANSI Standard 49 now requires the Primary Method for determining inflow be utilized unless there is less than 41 inches (104 cm) clearance between the front of the biosafety cabinet and the nearest physical, permanent obstruction.

The Primary Method requires the following:

- DIM (Direct Inflow Meter), such as a Shortridge™
- Labconco Holder Bracket Assembly (Catalog Number 3836405), shown below in Figure 10-28.
- Thin, rigid plastic (or similar material) blocking plates, to close off front work opening on either side of the DIM so all inflow air is directed through the DIM.
- Removable tape to secure the plastic blocking plates.

Figure 10-28



1. Start the blower(s), ensure the sash is at the correct operating height.
2. Attach the Labconco Holder Bracket Assembly to the front grille centered left-to-right on the biosafety cabinet. Loosen the two Thumbnuts to create a gap between the two plates.
3. Place the DIM's skirt frame into the gap between the two plates on the Bracket Assembly.

4. Lower the sash until the skirt frame rests on the inside of the glass and remains in place. A tall stand may be used to support the opposite end of the DIM if desired.
5. If a sash alarm occurs, press [\[OK/MUTE\]](#).
6. Install a blocking plate on either side of the DIM, and tape them securely on all four sides. All air should enter through the DIM, seal gaps around blocking plates completely.
7. Turn on the DIM, set it to read airflow volume continuously.
8. Take 5 readings over a 1 minute period. Average the results.
9. Compare results with column "Inflow Volume Range" based on Type and model shown in Table 10-7.
10. If the Inflow Volume is not within the acceptance criteria range, adjust the biosafety cabinet according to [Adjusting the Blower Speed](#) and/or [Adjusting the Internal Damper](#) found in [Section 9: Calibration](#).

Table 10-7

Type A2 & B2 Cabinet Width	Sash Height	Inflow Average ¹	Sash Open Area		Inflow Volume	Inflow Volume Range	
	inches	FPM (m/s)	ft ²	m ²	CFM	CFM	m ³ /hr
3-foot	8	105	2.03	0.19	213	203-223	345-379
	9	105	2.28	0.21	240	228-251	387-426
	10	105	2.53	0.24	266	253-278	430-472
4-foot	8	105	2.69	0.25	283	269-296	457-503
	9	105	3.03	0.28	318	303-333	515-566
	10	105	3.37	0.31	354	337-371	573-630
	12	105	4.04	0.38	424	404-444	686-754
5-foot	8	105	3.36	0.31	353	336-370	571-629
	9	105	3.78	0.35	397	378-416	642-707
	10	105	4.20	0.39	441	420-462	714-785
	12	105	5.05	0.47	530	505-555	858-943
6-foot	8	105	4.03	0.37	423	403-443	685-753
	9	105	4.53	0.42	476	453-498	770-846
	10	105	5.03	0.47	529	503-553	855-940
	12	105	6.06	0.56	636	606-666	1030-1132
Type C1 Cabinet Width	Sash Height	Inflow Average ¹	Sash Open Area		Inflow Volume	Inflow Volume Range	
	inches	FPM (m/s)	ft ²	m ²	CFM	CFM	m ³ /hr
4-foot	8	105	2.69	0.25	283	269-296	457-503
	10	105	3.37	0.31	354	337-371	573-630
6-foot	8	105	4.03	0.37	423	403-443	685-753
	10	105	5.03	0.47	529	503-553	855-940

1. Tolerance for Average Inflow Velocity = +/- 5 FPM (+/- 0.03 m/s)

Acceptance Criteria

Inflow Volume shall be in the range specified in Table 10-7 column “Inflow Volume Range”.

Secondary Method

NSF/ANSI Standard 49 now requires the Primary Method for determining inflow be utilized unless there is less than 41 inches (104 cm) clearance between the front of the biosafety cabinet and the nearest physical, permanent obstruction. If there is less than 41 inches (104 cm) between the front of the biosafety cabinet and the nearest physical, permanent obstruction, the Secondary Method for measuring inflow may be used.

The Secondary Method requires the following:

- Thermal Anemometer
 - Labconco Certifier Kit (Catalog Number 3858400), which contains:
 - Labconco Holder Bracket Assembly (Catalog Number 3836405)
 - Left and Right Sash Stops, to position sash at correct restricted height
 - 3-ft through 6-ft (Logic Generation)
 - 3-ft through 6-ft (Logic+ Generation)
1. Based on the width of biosafety cabinet under test, identify the correct set of Sash Stops (1 right and 1 left). Find the set of Second Generation Sash Stops, which have a '+' engraved under the width number. For example, if a 4-ft model is under test, select the two Sash Stops engraved with a '4 +'.
 2. Place the thermal anemometer probe into the Labconco Holder Bracket Assembly. For convenience, the 6-ft Sash Stops have two lines to position the tip of the thermal anemometer correctly in the Holder. The thermal anemometer should be positioned such that the distance from the bottom of the Holder Bracket to the center of the anemometer element equals the value in column "Probe Distance" in Table 10-8 based on model width. 3-ft and 6-ft model widths require the 3.25 inch (83 mm) position; 4-ft and 5-ft model widths require the 4.00 inch (102 mm) position. See Figures 10-29 (Sash Stop) and 10-30 (direct measurement with a ruler) below. Tighten thumbnuts on Holder to secure probe.

Figure 10-29

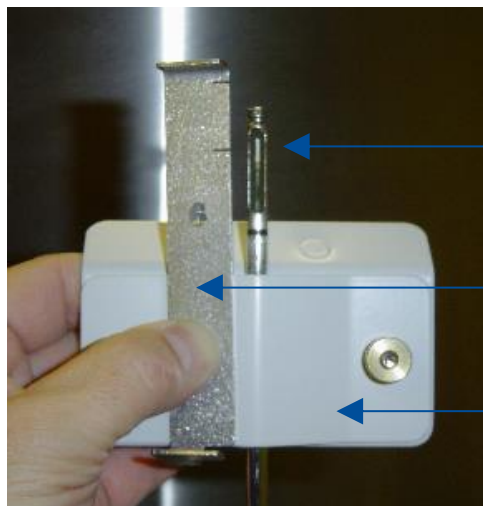
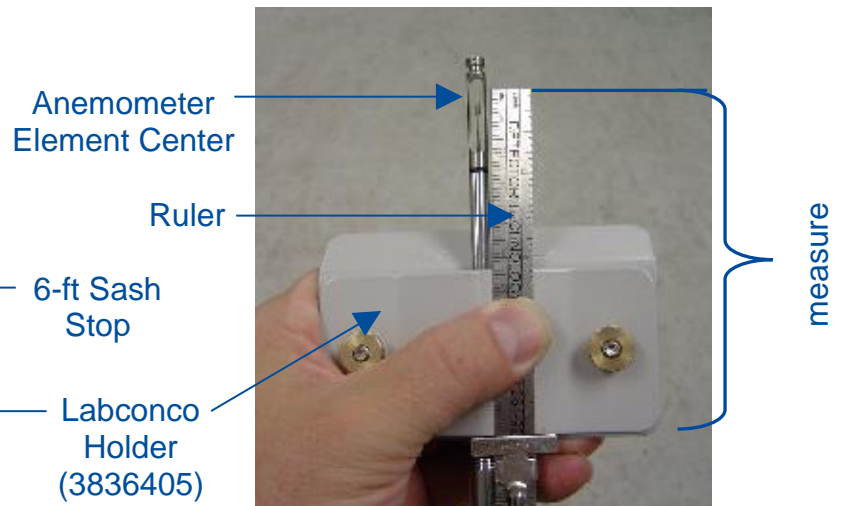
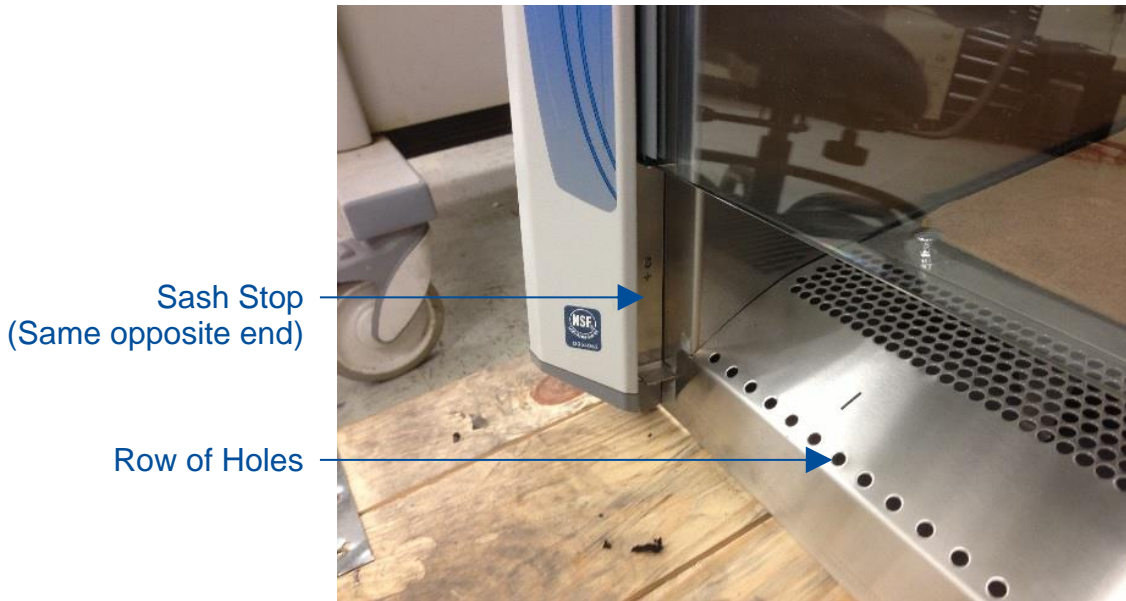


Figure 10-30



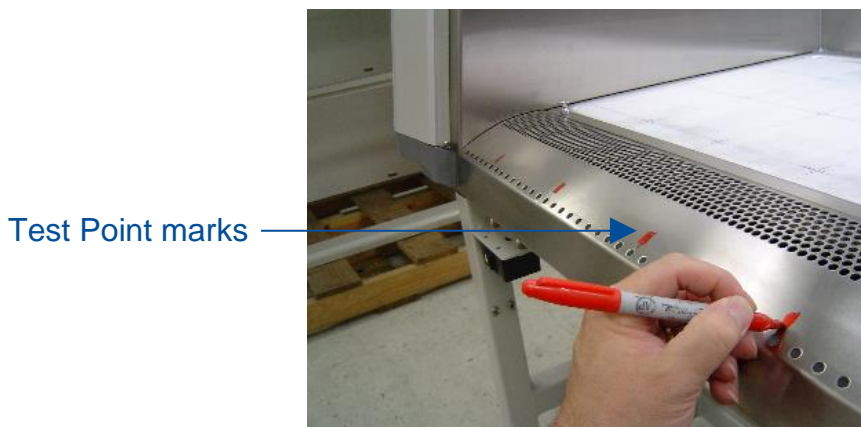
3. Insert the appropriate left and right stop into the recess in each corner post, as shown in Figure 10-31. Lower the sash until it contacts the Sash Stops.

Figure 10-31



4. Locate the single row of holes at the front-most edge of the grille, see Figure 10-31.
5. Mark the 6th hole from the **left** side wall and subsequently mark every 9th hole until the number of test points marked equals the width of the biosafety cabinet in feet. For example, a 5-ft width model should have 5 test points marked.
6. Mark the 6th hole from the **right** side wall and subsequently mark every 9th hole until the number of test points marked equals the width of the biosafety cabinet in feet. For example, a 5-ft width model should have 5 test points marked. All test points should be marked on the grille. See Figure 10-32 for reference.

Figure 10-32



7. Place the thermal anemometer, now secured to the Labconco Holder, onto the grille. The two pins in the Holder will drop into two holes on the grille. The thermal anemometer probe should line up with the test point mark made earlier. Start by placing the anemometer and Holder at the far left test point mark. See Figure 10-33 for reference.

Figure 10-33



11. Start the blower(s), and let the cabinet operate for at least 5 minutes. After the warm-up period expires, the biosafety cabinet will display a sash alarm. This is because the sash is at the restricted height required for this test. Press **[OK/MUTE]** to silence the alarm for 5 minutes.
12. This test requires the anemometer to provide highly accurate results. Establish the necessary correction factor to the thermal anemometer from its calibration performance test in a calibrated wind tunnel. This should be available from the calibration institution or company used to calibrate the thermal anemometer. Calculate the thermal anemometer manufacturer's recommended correction factor(s) for conditions of temperature, humidity, barometric pressure, and altitude.
13. Set the anemometer's time constant to 10-15 seconds for greater data stability.
14. Take one velocity reading at each of the marked test points.

15. Average all the readings. Apply the wind tunnel correction and local condition corrections factors to the average velocity reading.

16. Multiply the average inflow velocity by the column "Correction Factor" based on Type and model in Table 10-8.

Table 10-8

Type A2 & B2 Cabinet Width	Sash Height	Sash Stop Template	Probe Distance	# of Test Points	Correction Factor	Corrected Inflow Volume Range	
	inches		inches (mm)			CFM	m ³ /hr
3-foot	8	3+	4 (102)	6	0.95	203-223	345-379
	9	3+	4 (102)	6	1	228-251	387-426
	10	3+	4 (102)	6	0.95	253-278	430-472
4-foot	8	4+	3.25 (83)	8	1	269-296	457-503
	9	4+	3.25 (83)	8	1	303-333	515-566
	10	4+	3.25 (83)	8	1	337-371	573-630
	12	4+	3.25 (83)	8	1.08	404-444	686-754
5-foot	8	5+	3.25 (83)	10	1	336-370	571-629
	9	5+	3.25 (83)	10	1	378-416	642-707
	10	5+	3.25 (83)	10	1	420-462	714-785
	12	5+	3.25 (83)	10	1	505-555	858-943
6-foot	8	6+	4 (102)	12	1.83	403-443	685-753
	9	6+	4 (102)	12	1.83	453-498	770-846
	10	6+	4 (102)	12	1.83	503-553	855-940
	12	6+	4 (102)	12	2.0	606-666	1030-1132
Type C1 Cabinet Width	Sash Height	Sash Stop Template	Probe Distance	# of Test Points	Correction Factor	Corrected Inflow Volume Range	
	inches		inches (mm)			CFM	inches
4-foot	8	4+	3.25 (83)	8	1.08	269-296	457-503
	10	4+	3.25 (83)	8	1.08	337-371	573-630
6-foot	8	6+	4 (102)	12	2	403-443	685-753
	10	6+	4 (102)	12	2	503-553	855-940

17. Compare the inflow volume in CFM calculated in step #15 with the value in column "Corrected Inflow Volume Range" based on Type and model shown in Table 10-8.
18. If the Inflow Volume is not within the acceptance criteria range, adjust the biosafety cabinet according to *Adjusting the Blower Speed* and/or *Adjusting the Internal Damper* found in [Section 9: Calibration](#).

Acceptance Criteria

Inflow Volume shall be in the range specified in Table 10-8 column "Corrected Inflow Volume Range".

Work Area Air Cleanliness Test (optional)

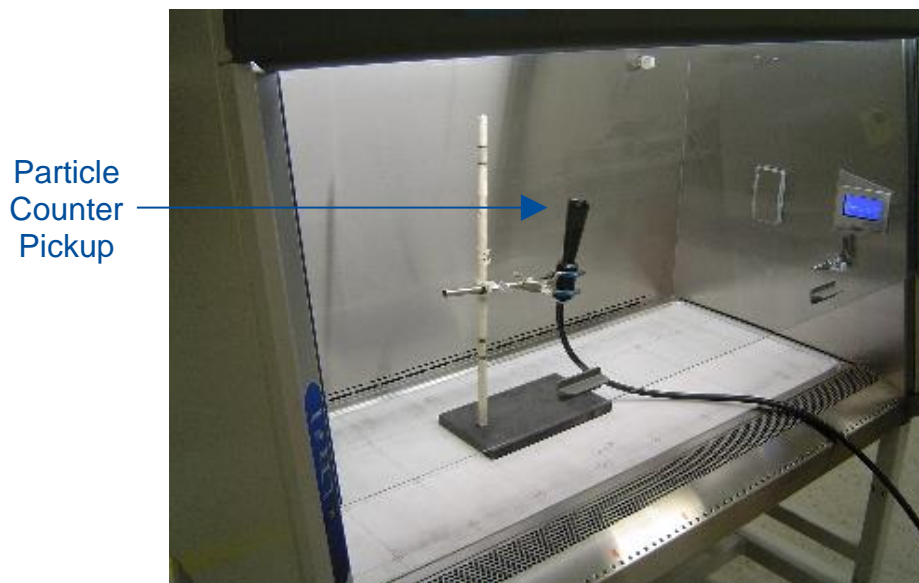
Air cleanliness is a measurement of all particles (greater than or equal to 0.5 micron in size) in the air. This is not an NSF Standard 49 test. However, if the end user would like to verify air cleanliness in the work area, follow these instructions:

1. Mark test points at the geometric center of the work surface, and midway between the center test point and each side wall.
2. Place a particle counter pickup at a height of 16 inches (41 cm) above the work surface, pointing up into the airflow. Place the particle counter pickup at each of the three marked test points, and take one sample at each test point of 1.0 ft³ of air. See Figure 10-34 for reference.

Note: if sampling 1.0 m³ instead of 1.0 ft³, see Acceptance Criteria below for passing threshold.

3. Average the particle count results from each of the three test points.

Figure 10-34



Acceptance Criteria

The average particle count is less than 100 particles 0.5 micron and larger per cubic foot, or less than 3,520 particles 0.5 micron and larger per cubic meter.

Lighting Test (optional)

The light intensity should be measured as described in the current NSF/ANSI Standard 49 Annex F. To test the light intensity at the biosafety cabinet's work surface, follow these instructions:



Note: A light meter that is color- and cosign-corrected must be used for accurate results.

1. Mark test points on the work surface as follows:
 - a. Mark the front-to-back centerline of the work surface
 - b. Starting 6 inches (15.2 cm) from the left side wall, mark a test point on the front-to-back centerline.
 - c. Continue marking additional test points along the centerline at 12 inch (30.5 cm) increments until the left-to-right center of the work surface is reached.
 - d. Repeat steps b and c starting from the right side wall.
 - e. All test points are now marked.
2. With the biosafety cabinet lights off, take a background reading with the light meter. It should be 15 foot-candles (161 lux) or less.
3. Turn on the lights of the biosafety cabinet. Wait 1 minute.
4. Place the light meter sensor at each of the marked test points and take a reading.
5. Average all test point readings.

Acceptance Criteria

The average light level shall be no less than 45 foot-candles (484 lux) greater than the background light level reading.

Noise Test (optional)

The noise (sound pressure) should be measured as described in the current NSF/ANSI Standard 49 Annex F. To test the biosafety cabinet's noise level, follow these instructions:

1. Establish the sound meter location, as follows:
 - a. On the left-to-right centerline of the biosafety cabinet
 - b. 14 inches (35.6 cm) above the work surface
 - c. 12 inches (30.5 cm) from the front of the biosafety cabinet
2. With the biosafety cabinet's blower(s) off, take a background reading with the sound meter. It should be less than 55 dbA.
3. Start the blower(s) on the biosafety cabinet.
4. Place the sound meter at the location defined in Step 1, take a sound reading.

Acceptance Criteria

The noise (sound pressure) shall be no more than 67 dbA when the biosafety cabinet is new, and no more than 73 dbA when the filters are loaded with particulate.

Vibration Test (optional)

The vibration level at the work surface should be measured as described in the current NSF/ANSI Standard 49 Annex F. To test the biosafety cabinet's work surface vibration level, follow these instructions:



Note: The vibration meter must have a range of 20-20,000 Hz and provide an output in displacement to proceed with this test.

1. Mark the geometric center of the work surface.
2. Place the vibration meter probe at this point, and with the biosafety cabinet's blower(s) off, take a background reading.
3. Start the biosafety cabinet's blower(s). Wait 1 minute.
4. Take a reading at the same work surface location.
5. Subtract the reading with the blower(s) on from the background reading.

Acceptance Criteria

Net vibration shall be less than 0.0002 inches (5×10^{-6} m) when the biosafety cabinet is new.

UV Light Intensity Test (optional)

To test the biosafety cabinet's UV light intensity level at the work surface, follow these instructions:



Note: The UV radiometer must measure light at a wavelength of 254 nm to proceed with this test.

1. Mark the geometric center of the work surface.
2. Place the radiometer probe at this point, and with the biosafety cabinet's blower(s), light, and UV light off, take a background reading.
3. Close the sash. Turn on the biosafety cabinet's UV Light. Wait 5 minutes.
4. Take a reading at the same work surface location.
5. Subtract the reading with the UV Light on from the background reading.

Acceptance Criteria

Net UV light intensity shall be at least 100 $\mu\text{W}\cdot\text{cm}^2$ or greater when the biosafety cabinet's UV light lamp is new.

Ground Fault Circuit Interrupter (GFCI) Test

To test the biosafety cabinet's internal GFCI outlets, follow these instructions:



This test may only be applied on 100-115v models. 208-230v models do not contain GFCI outlets internal to the biosafety cabinet.



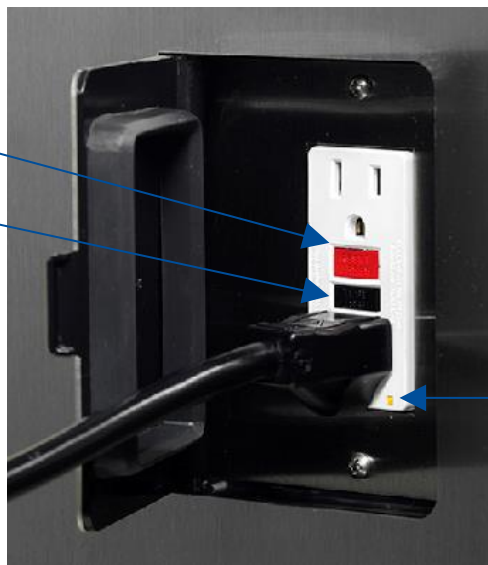
Note: The GFCI tester must be capable of simulating a fault of 3mA.

1. Place the tester into any of the biosafety cabinet's outlets. The left side outlet is a standard (non-GFCI) outlet, but it is wired to the LOAD side of the GFCI outlet on the right side wall. It will respond the same; however, to reset power to the outlets after the test, the Reset Button on the right side outlet needs to be pressed.
2. Press the test button on the GFCI tester. The indicator lights on the tester should indicate the outlet is inactive, and the GFCI outlet's power indicator LED should be off. See Figure 10-35 for reference.
3. Reset the GCI by pressing the RESET button on the right side outlet. The tester should indicate power is correctly present at the outlet, and the GFCI outlet's power indicator LED should be on.

Figure 10-35

GFCI Reset Button

GFCI Test Button



GFCI Power Indicator LED



The GFCI outlet's RESET and TEST buttons may be white, or red/black (as shown in this figure)

Acceptance Criteria

The GFCI tester and GFCI outlet in the biosafety cabinet respond as indicated in steps 2 and 3.

11: QuickCharts

The QuickCharts section provides a central location for all critical data and specifications of all biosafety cabinet types and models. The data included on these charts includes: downflow, inflow, building exhaust system requirements, HEPA filter specifications and leak test parameters.

The charts are provided in imperial (English) units only. Much of the data is located in other areas of this document as they relate to specific calibration and certification procedures and is provided in metric units in those locations. The charts are separated by biosafety cabinet type: A2, B2, and C1.

QuickChart – Type A2 3-ft & 4-ft

Type A2 Cabinet Width	3-ft			4-ft			
Sash Opening (inches)	8	9	10	8	9	10	12
Starting Serial #	1905_	1905_	1905_	1905_	1905_	1905_	2006_
Downflow Data							
Nominal Avg. Downflow (FPM)	55+/-5	55+/-5	55+/-5	55+/-5	55+/-5	55+/-5	60+/-5
Grid points (rows x columns)	21 (3x7)	21 (3x7)	21 (3x7)	24 (3x8)	24 (3x8)	24 (3x8)	24 (3x8)
Grid distance from back & sides	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Distance between rows	5.75	5.75	5.55	5.75	5.75	5.55	5.44
Distance between columns	4.08	4.08	4.08	5.21	5.21	5.21	5.21
Inflow/Exhaust Data							
Nominal Average Inflow (FPM)	105+/-5	105+/-5	105+/-5	105+/-5	105+/-5	105+/-5	105+/-5
Sash Open Area (Sq. Ft)	2.03	2.28	2.53	2.69	3.03	3.37	4.04
Nominal Avg. Inflow Vol. (CFM)	213	240	266	283	318	354	424
Avg. Inflow Vol. Range (CFM)	203-223	228-251	253-278	269-296	303-333	337-371	404-444
Secondary Inflow Data							
Sash Opening Template ¹	3+	3+	3+	4+	4+	4+	4+
Sensor distance (inches) ²	4	4	4	3.25	3.25	3.25	3.25
# of Test points	6	6	6	8	8	8	8
Avg. Inflow Vel. Range (FPM)	214-235	228-251	266-293	269-296	303-333	337-371	374-411
Correction Factor (CF)	0.95	1	0.95	1	1	1	1.08
Corrected Inflow Volume (CIV) (Avg. velocity x CF)	203-223	228-251	253-278	269-296	303-333	337-371	404-444
HEPA Filter Leak Test Data							
Air Displacement (CFM)	550	570	600	725	760	800	900
Laskin Nozzles needed	1	1	1	2	2	2	3
Theoretical aerosol conc. (ug/l) ³	25	24	23	37	36	34	30
Actual aerosol conc. (ug/l) ⁴	14	12	12	21	18	18	15
Supply HEPA Data							
Labconco P/N ¹¹	3838400	3838400	3838400	3838401	3838401	3838401	3838401
Width x Depth x Height (in.) ⁵	36x18x3.06	36x18x3.06	36x18x3.06	48x18x3.06	48x18x3.06	48x18x3.06	48x18x3.06
Performance (CFM)	335	335	335	445	445	445	445
Pressure Drop (in. H ₂ O)	.62+/- .1"	.62+/- .1"	.62+/- .1"	.5+/- .1"	.5+/- .1"	.5+/- .1"	.5+/- .1"
Exhaust HEPA Data							
Labconco P/N	3838500	3838500	3838500	3838501	3838501	3838501	3838501
Width x Depth x Height (in.) ⁵	18x18x5.88	18x18x5.88	18x18x5.88	26x18x5.88	26x18x5.88	26x18x5.88	26x18x5.88
Performance (CFM)	266	266	266	354	354	354	354
Performance (in. H ₂ O)	.25-.35"	.25-.35"	.25-.35"	.2-.37"	.2-.37"	.2-.37"	.2-.37"
LED Lamp Data (2 each)⁷							
Labconco P/N	1297503	1297503	1297503	1297504	1297504	1297504	1297504
LED Lamps (Direct Drive)	12T8-36	12T8-36	12T8-36	15T8-48	15T8-48	15T8-48	15T8-48
Color (°K)	4000	4000	4000	4000	4000	4000	4000
Lumens	1200	1200	1200	1850	1850	1850	1850
Glass Type	Frosted	Frosted	Frosted	Frosted	Frosted	Frosted	Frosted
Ventus Canopy Data							
Labconco Canopy P/N	3889200	3889200	3889200	3889201	3889201	3889201	3889201
Canopy Slot Area (ft ²)	.12	.12	.12	.12	.12	.12	.12
Nominal Canopy Inflow (CFM)	50	50	50	50	50	50	50
Nominal Canopy Slot Velocity (FPM)	240-260	240-260	240-260	240-260	240-260	240-260	240-260
Canopy Vacuum (in. H ₂ O)	0.15	0.15	0.15	0.15	0.15	0.15	0.15
DIM Total Exhaust Volume Cabinet + Canopy (CFM) ⁹	263	290	316	333	369	404	474
Traverse Total Exhaust Volume Cabinet + Canopy (CFM) ⁹	289	319	348	366	405	444	521
Volume of Hull							
Cubic Feet	29	29	29	39	39	39	39

QuickChart – Type A2 5-ft & 6-ft

Type A2 Cabinet Width	5-ft				6-ft			
Sash Opening (inches)	8	9	10	12	8	9	10	12
Starting Serial #	1905_	1905_	1905_	2006_	1905_	1905_	1905_	2006_
Downflow Data								
Nominal Avg. Downflow (FPM)	55+/-5	55+/-5	55+/-5	60+/-5	55+/-5	55+/-5	55+/-5	60+/-5
Grid points (rows x columns)	30(3x10)	30(3x10)	30(3x10)	30(3x10)	36(3x12)	36(3x12)	36(3x12)	36(3x12)
Grid distance from back & sides	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Distance between rows	5.75	5.75	5.55	5.44	5.75	5.75	5.55	5.44
Distance between columns	5.39	5.39	5.39	5.39	5.50	5.50	5.50	5.50
Inflow/Exhaust Data								
Nominal Average Inflow (FPM)	105+/-5	105+/-5	105+/-5	105+/-5	105+/-5	105+/-5	105+/-5	105+/-5
Sash Open Area (Sq. Ft)	3.36	3.78	4.20	5.05	4.03	4.53	5.03	6.06
Nominal Avg. Inflow Vol. (CFM)	353	397	441	530	423	476	529	636
Avg. Inflow Vol. Range (CFM)	336-370	378-416	420-462	505-555	403-443	453-498	503-553	606-666
Secondary Inflow Data								
Sash Opening Template ¹	5+	5+	5+	5+	6+	6+	6+	6+
Sensor distance (inches) ²	3.25	3.25	3.25	3.25	4	4	4	4
# of Test points	10	10	10	10	12	12	12	12
Avg. Inflow Vel. Range (FPM)	336-370	378-416	420-462	505-556	220-242	248-272	275-302	303-333
Correction Factor (CF)	1	1	1	1	1.83	1.83	1.83	2.0
Corrected Inflow Volume (CIV) (Avg. velocity x CF)	336-370	378-416	420-462	505-555	403-443	453-498	503-553	606-666
HEPA Filter Leak Test Data								
Air Displacement (CFM)	900	950	1000	1135	1100	1140	1200	1380
Laskin Nozzles needed	2	2	2	3	2	2	2	3
Theoretical aerosol conc. (ug/l) ³	30	28	27	24	25	24	23	20
Actual aerosol conc. (ug/l) ⁴	17	14	14	13	17	15	15	10
Supply HEPA Data								
Labconco P/N ¹¹	3838402	3838402	3838402	3838402	3838403	3838403	3838403	3838403
Width x Depth x Height (in.) ⁵	60x18x3.06	60x18x3.06	60x18x3.06	60x18x3.06	72x18x3.06	72x18x3.06	72x18x3.06	72x18x3.06
Performance (CFM)	555	555	555	555	665	665	665	665
Pressure Drop (in. H ₂ O)	.5+/- .1"	.5+/- .1"	.5+/- .1"	.5+/- .1"	.38-.5"	.38-.5"	.38-.5"	.38-.5"
Exhaust HEPA Data								
Labconco P/N	3838502	3838502	3838502	3838502	3838503	3838503	3838503	3838503
Width x Depth x Height (in.) ⁵	36x18x5.88	36x18x5.88	36x18x5.88	36x18x5.88	48x18x5.88	48x18x5.88	48x18x5.88	48x18x5.88
Performance (CFM)	441	441	441	441	529	529	529	529
Performance (in. H ₂ O)	.2-.37"	.2-.37"	.2-.37"	.2-.37"	.2-.37"	.2-.37"	.2-.37"	.2-.37"
LED Lamp Data (2 each)⁷								
Labconco P/N	1297505	1297505	1297505	1297505	1297506	1297506	1297506	1297506
LED Lamps (Direct Drive)	24T8-60	24T8-60	24T8-60	24T8-60	32T8-72	32T8-72	32T8-72	32T8-72
Color (°K)	4000	4000	4000	4000	4000	4000	4000	4000
Lumens	2400	2400	2400	2400	3200	3200	3200	3200
Glass Type	Frosted	Frosted	Frosted	Frosted	Frosted	Frosted	Frosted	Frosted
Ventus Canopy Data								
Labconco Canopy P/N	3889202	3889202	3889202	3889202	3889203	3889203	3889203	3889203
Canopy Slot Area (ft ²)	.12	.12	.12	.12	.12	.12	.12	.12
Nominal Canopy Inflow (CFM)	50	50	50	50	50	50	50	50
Nominal Canopy Slot Velocity (FPM)	240-260	240-260	240-260	240-260	240-260	240-260	240-260	240-260
Canopy Vacuum (in. H ₂ O) ¹⁰	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
DIM Total Exhaust Volume Cabinet + Canopy (CFM) ⁸	403	447	491	580	473	526	579	686
Traverse Total Exhaust Volume Cabinet + Canopy (CFM) ⁹	443	492	540	638	520	579	637	755
Volume of Hull								
Cubic Feet	49	49	49	49	58	58	58	58

See footnotes on following page

Type A2 Footnotes

Type and Model Identification

- ✓ The primary serial tag is on the lower right edge of the front dress panel.
- ✓ The secondary serial tag is on the front of the electronics module on the cabinet's top right side.
- ✓ The first two digits of the serial number are the year of production; the next two are the month. The next 5 digits are the sequence of production, and the letter following the serial number is the revision level of the cabinet.
- ✓ See *Section 3:Catalog Number Configurator* to discern Type, Model, and Sash Height from Catalog Number found on the serial tag.

Downflow Test Specifications

- ✓ All models are classified as uniform downflow.
- ✓ All tests performed as described in the current NSF/ANSI Standard 49.
- ✓ UV Lamp, IV bar and all other accessories must be removed before measuring downflow.

Inflow Test Specifications

- ✓ All tests performed as described in the current NSF/ANSI Standard 49.

Secondary Inflow Test Specifications

- ✓ Must use Labconco holder P/N 3836405 to perform this test properly.
- 1. Use the appropriate template included in Certifier Kit# 3858400.
- 2. Measured from bottom edge of the probe holder to center of the thermal anemometer element.
- ✓ Locate the single row of holes at the front of the grille. Mark the 6th hole from the side wall and subsequent test points every 9 holes until the number of test points marked equals the width of the cabinet in feet (i.e. 3-foot cabinet, mark the first 3 points). Repeat for the opposite side.

HEPA Filter Leak Test Specifications

- 3. Based on mineral oil.
- 4. The actual aerosol concentration is what was observed during testing.
- ✓ Aerosol generator should be placed in the left rear corner of the work area, pointing at the rear grille.
- ✓ For uncontaminated units, the upstream concentration can be sampled from the tube located under the work surface.

Supply and Exhaust HEPA Filter Specifications

- 5. Without gasket
- 11. Supply HEPA Filter part numbers listed are not for service/replacement ordering. Reference part numbers provided in Section 23 for ordering a service or replacement Supply HEPA Filter.

Motor / Blower Specifications

- ✓ Each motor must be programmed by Labconco for the appropriate width cabinet. The PWM setting will fluctuate depending on local temperature and pressure.

LED Lamp Specifications

- 7. THIS PRODUCT USES DIRECT DRIVE T8 LED LAMPS INSTEAD OF FLUORESCENT LAMPS. THERE IS NO BALLAST; LINE VOLTAGE IS SUPPLIED TO THE LAMP SOCKETS. DO NOT INSTALL FLUORESCENT LAMPS! FOR REPLACEMENT LED LAMPS, CONTACT LABCONCO PRODUCT SERVICE DEPARTMENT.

Canopy & Remote Exhaust System Data

- 8. DIM = Direct Inflow Meter
- 9. Measured as per ASHRAE methodology for measuring air volume in round ducts. These values are approximations, as the calculated traverse volume value may vary depending on sampling location, exhaust system, and methodology.
- 10. Measured at the exhaust transition sampling point, relative to atmosphere.

UV lamp Specifications

- ✓ For all models, the UV lamp model is G30T8. Labconco p/n is 1271300.
- ✓ For all 115/230 VAC models, the ballast assembly is Labconco p/n 3829901.
- ✓ For all 100 VAC models, the ballast assembly is Labconco p/n 3830600.

QuickChart – Type B2

Type B2 Cabinet Width	4-ft	6-ft
Sash Opening (inches)	8	8
Starting Serial #	1905_	1905_
Downflow Data		
Nominal Avg. Downflow (FPM)	55+/-5	55+/-5
Grid points (rows x columns)	24 (3x8)	36(3x12)
Grid distance from back & sides	6.0	6.0
Distance between rows	5.75	5.75
Distance between columns	5.21	5.50
Inflow/Exhaust Data		
Nominal Average Inflow (FPM)	105+/-5	105+/-5
Sash Open Area (Sq. Ft)	2.69	4.03
Nominal Avg. Inflow Vol. (CFM)	283	423
Avg. Inflow Vol. Range (CFM)	269-296	403-443
Secondary Inflow Data		
Sash Opening Template ¹	4+	6+
Sensor distance (inches) ²	3.25	4
# of Test points	8	12
Avg. Inflow Vel. Range (FPM)	269-296	220-242
Correction Factor (CF)	1	1.83
Corrected Inflow Volume (CIV) (Avg. velocity x CF)	269-296	403-443
Supply HEPA Filter Leak Test Data		
Air Displacement (CFM)	445	665
Laskin Nozzles needed	1	1
Theoretical aerosol conc. (ug/l) ³	30	15
Actual aerosol conc. (ug/l) ⁴	20	12
Supply HEPA Data		
Labconco P/N ¹²	3838401	3838403
Width x Depth x Height (in.) ⁵	48x18x3.06	72x18x3.06
Performance (CFM)	445	665
Pressure Drop (in. H ₂ O)	.5+/- .1"	.38-.5"
Exhaust HEPA Filter Leak Test Data		
Air Displacement (CFM)	723	1083
Laskin Nozzles needed	2	2
Theoretical aerosol conc. (ug/l) ³	38	25
Actual aerosol conc. (ug/l) ⁴	21	17
Exhaust HEPA Data		
Labconco P/N	3438501	3438503
Width x Depth x Height (in.) ⁵	26x18x8.08	48x18x8.08
Performance (CFM)	720	1100
Performance (in. H ₂ O)	.48+/- .07"	.37+/- .07"
LED Lamp Data (2 each)⁷		
Labconco P/N	1297504	1297506
LED Lamps (Direct Drive)	15T8-48	32T8-72
Color (°K)	4000	4000
Lumens	1850	3200
Glass Type	Frosted	Frosted
Remote Exhaust System Data		
DIM ⁸ Total Exhaust Airflow (CFM) ⁹	723	1083
Traverse Total Exhaust Airflow (CFM) ¹⁰	852	1265
Recommended Duct Vacuum (in. H ₂ O) ¹¹	1.8	2.2
Exhaust (Inflow) Alarm Data		
Inflow Alarm Set Point (CFM)	210 +/-5	315 +/-5
Volume of Hull		
Cubic Feet	39	58

See footnotes on following page

Type B2 Footnotes

Type and Model Identification

- ✓ The primary serial tag is on the lower right edge of the front dress panel.
- ✓ The secondary serial tag is on the front of the electronics module on the cabinet's top right side.
- ✓ The first two digits of the serial number are the year of production; the next two are the month. The next 5 digits are the sequence of production, and the letter following the serial number is the revision level of the cabinet.
- ✓ See *Section 3:Catalog Number Configurator* to discern Type, Model, and Sash Height from Catalog Number found on the serial tag.

Downflow Test Specifications

- ✓ All models are classified as uniform downflow.
- ✓ All tests performed as described in the current NSF/ANSI Standard 49.
- ✓ UV Lamp, IV bar and all other accessories must be removed before measuring downflow.

Inflow Test Specifications

- ✓ All tests performed as described in the current NSF/ANSI Standard 49.

Secondary Inflow Test Specifications

- ✓ Must use Labconco holder P/N 3836405 to perform this test properly.
- 1. Use the appropriate template included in Certifier Kit# 3858400.
- 2. Measured from bottom edge of the probe holder to center of the thermal anemometer element.
- ✓ Locate the single row of holes at the front of the grille. Mark the 6th hole from the side wall and subsequent test points every 9 holes until the number of test points marked equals the width of the cabinet in feet (i.e. 4-foot cabinet, mark the first 4 points). Repeat for the opposite side.

HEPA Filter Leak Test Specifications

- 3. Based on mineral oil.
- 4. The actual aerosol concentration is what was observed during testing.
- ✓ Aerosol generator should be placed in the left rear corner of the work area, pointing at the rear grille.
- ✓ For uncontaminated units, the upstream concentration for the Supply HEPA only can be sampled from the tube located under the work surface.

Supply and Exhaust HEPA Filter Specifications

- 5. Without gasket
- 12. Supply HEPA Filter part numbers listed are not for service/replacement ordering. Reference part numbers provided in Section 23 for ordering a service or replacement Supply HEPA Filter.

Motor / Blower Specifications

- ✓ Each motor must be programmed by Labconco for the appropriate width cabinet. The PWM setting will fluctuate depending on local temperature and pressure.

LED Lamp Specifications

- 7. THIS PRODUCT USES DIRECT DRIVE T8 LED LAMPS INSTEAD OF FLUORESCENT LAMPS. THERE IS NO BALLAST; LINE VOLTAGE IS SUPPLIED TO THE LAMP SOCKETS. DO NOT INSTALL FLUORESCENT LAMPS! FOR REPLACEMENT LED LAMPS, CONTACT LABCONCO PRODUCT SERVICE DEPARTMENT.

Remote Exhaust System Data

- 8. DIM = Direct Inflow Meter
- 9. Total Exhaust Volume required from remote (building) exhaust system.
- 10. Measured as per ASHRAE methodology for measuring air volume in round ducts. These values are approximations, as the calculated traverse volume value may vary depending on sampling location, exhaust system, and methodology.
- 11. Measured at the exhaust transition sampling point, relative to atmosphere.

UV lamp Specifications

- ✓ For all models, the UV lamp model is G30T8. Labconco p/n is 1271300.
- ✓ For all 115/230 VAC models, the ballast assembly is Labconco p/n 3829901.
- ✓ For all 100 VAC models, the ballast assembly is Labconco p/n 3830600.

QuickChart – Type C1

Type C1 Cabinet Width	4-ft		6-ft	
Sash Opening (inches)	8	10	8	10
Starting Serial #	2006_	2006_	2006_	2006_
Downflow Data				
Nominal Avg. Downflow (FPM)	65+/-5	65+/-5	55+/-5	55+/-5
Grid points (rows x columns)	24 (3x8)	24 (3x8)	36(3x12)	36(3x12)
Grid distance from back & sides	6.0	6.0	6.0	6.0
Distance between rows	5.75	5.55	5.75	5.55
Distance between columns	5.21	5.21	5.50	5.50
Inflow/Exhaust Data				
Nominal Average Inflow (FPM)	105+/-5	105+/-5	105+/-5	105+/-5
Sash Open Area (Sq. Ft)	2.69	3.37	4.03	5.03
Nominal Avg. Inflow Vol. (CFM)	283	354	423	529
Avg. Inflow Vol. Range (CFM)	269-296	337-371	403-443	503-553
Secondary Inflow Data				
Sash Opening Template ¹	4+	4+	6+	6+
Sensor distance (inches) ²	3.25	3.25	4	4
# of Test points	8	8	12	12
Avg. Inflow Vel. Range (FPM)	249-274	312-344	202-222	252-277
Correction Factor (CF)	1.08	1.08	2	2
Corrected Inflow Volume (CIV) (Avg. velocity x CF)	269-296	337-371	403-443	503-553
Supply HEPA Filter Leak Test Data				
Air Displacement (CFM)	520	520	665	665
Laskin Nozzles needed	1	1	1	1
Theoretical aerosol conc. (ug/l) ³	26	26	20	20
Actual aerosol conc. (ug/l) ⁴	13	13	12	12
Supply HEPA Data				
Labconco P/N ¹³	3838401	3838401	3838403	3838403
Width x Depth x Height (in.) ⁵	48x18x3.06	48x18x3.06	72x18x3.06	72x18x3.06
Performance (CFM)	445	445	665	665
Pressure Drop (in. H ₂ O)	.5+/- .1"	.5+/- .1"	.38-.5"	.38-.5"
Exhaust HEPA Filter Leak Test Data				
Air Displacement (CFM)	283	354	423	529
Laskin Nozzles needed	1	1	1	1
Theoretical aerosol conc. (ug/l) ³	48	38	32	26
Actual aerosol conc. (ug/l) ⁴	28	22	19	15
Exhaust HEPA Data				
Labconco P/N	3838501	3838501	3838503	3838503
Width x Depth x Height (in.) ⁵	26x18x5.88	26x18x5.88	48x18x5.88	48x18x5.88
Performance (CFM)	353	353	529	529
Performance (in. H ₂ O)	.2-.35"	.2-.35"	.2-.35"	.2-.35"
LED Lamp Data (2 each)⁷				
Labconco P/N	1297504	1297504	1297506	1297506
LED Lamps (Direct Drive)	15T8-48	15T8-48	32T8-72	32T8-72
Color (°K)	4000	4000	4000	4000
Lumens	1850	1850	3200	3200
Glass Type	Frosted	Frosted	Frosted	Frosted
Remote Exhaust System Data¹²				
DIM Total Exhaust Volume Cabinet + Canopy (CFM) ⁸	323	404	473	579
Traverse Total Exhaust Volume Cabinet + Canopy (CFM) ⁹	366	444	520	637
IRV ¹¹ Slot Area (ft ²)	.12	.12	.12	.12
Nominal IRV Inflow (CFM)	50	50	50	50
Nominal IRV Slot Velocity (FPM)	240-260	240-260	240-260	240-260
Recommended Duct Vacuum (in. H ₂ O) ¹⁰	0.3	0.3	0.3	0.3
Volume of Hull				
Cubic Feet	39	39	58	58

See footnotes on following page

Type C1 Footnotes

Type and Model Identification

- ✓ The primary serial tag is on the lower right edge of the front dress panel.
- ✓ The secondary serial tag is on the front of the electronics module on the cabinet's top right side.
- ✓ The first two digits of the serial number are the year of production; the next two are the month. The next 5 digits are the sequence of production, and the letter following the serial number is the revision level of the cabinet.
- ✓ See *Section 3:Catalog Number Configurator* to discern Type, Model, and Sash Height from Catalog Number found on the serial tag.

Downflow Test Specifications

- ✓ All models are classified as uniform downflow.
- ✓ All tests performed as described in the current NSF/ANSI Standard 49.
- ✓ UV Lamp, IV bar and all other accessories must be removed before measuring downflow.

Inflow Test Specifications

- ✓ All tests performed as described in the current NSF/ANSI Standard 49.

Secondary Inflow Test Specifications

- ✓ Must use Labconco holder P/N 3836405 to perform this test properly.
- 1. Use the appropriate template included in Certifier Kit# 3858400.
- 2. Measured from bottom edge of the probe holder to center of the thermal anemometer element.
- ✓ Locate the single row of holes at the front of the grille. Mark the 6th hole from the side wall and subsequent test points every 9 holes until the number of test points marked equals the width of the cabinet in feet (i.e. 3-foot cabinet, mark the first 3 points). Repeat for the opposite side.

HEPA Filter Leak Test Specifications

- 3. Based on mineral oil.
- 4. The actual aerosol concentration is what was observed during testing.
- ✓ Aerosol generator should be placed in the left rear corner of the work area, pointing at the rear grille.
- ✓ For uncontaminated units, the upstream concentration can be sampled from the tube located under the work surface.

Supply and Exhaust HEPA Filter Specifications

- 5. Without gasket
- 13. Supply HEPA Filter part numbers listed are not for service/replacement ordering. Reference part numbers provided in Section 23 for ordering a service or replacement Supply HEPA Filter.

Motor / Blower Specifications

- ✓ Each motor must be programmed by Labconco for the appropriate width cabinet. The PWM setting will fluctuate depending on local temperature and pressure.

LED Lamp Specifications

- 7. THIS PRODUCT USES DIRECT DRIVE T8 LED LAMPS INSTEAD OF FLUORESCENT LAMPS. THERE IS NO BALLAST; LINE VOLTAGE IS SUPPLIED TO THE LAMP SOCKETS. DO NOT INSTALL FLUORESCENT LAMPS! FOR REPLACEMENT LED LAMPS, CONTACT LABCONCO PRODUCT SERVICE DEPARTMENT.

Remote Exhaust System Data

- 8. DIM = Direct Inflow Meter
- 9. Measured as per ASHRAE methodology for measuring air volume in round ducts. These values are approximations, as the calculated traverse volume value may vary depending on sampling location, exhaust system, and methodology.
- 10. Measured at the exhaust transition sampling point, relative to atmosphere.
- 11. IRV = Inlet Relief Valve. Located on the front face of the Type C1 Exhaust Housing.
- 12. This section is only applicable to Type C1 biosafety cabinets operating in B-mode.

UV lamp Specifications

- ✓ For all models, the UV lamp model is G30T8. Labconco p/n is 1271300.
- ✓ For all 115/230 VAC models, the ballast assembly is Labconco p/n 3829901.
- ✓ For all 100 VAC models, the ballast assembly is Labconco p/n 3830600.

12: Advanced Service Procedures

This section provides instructions to perform advanced service procedures on the biosafety cabinet. Such procedures include changing HEPA filters, adjusting the sash or sash position sensors, replacing LED or UV lamps, and more.



Tools

Required

- #2 Phillips screwdriver or #2 Phillips bit (4 inches long minimum)
- Ratchet with extension
- Sockets
 - 5/16-inch
 - 3/8-inch
 - 7/16-inch
 - 1/2-inch
- 3/8-inch nut driver
- 1/2-inch nut driver

Optional

- Cordless screwdriver/drill
- Cordless ratchet (low profile right angle impact driver)
- Pliers (standard and needle nose)
- #10-24 Tap
- 5/16-18 Tap



If a cordless screwdriver or drill is used to drive screws, reduce the torque setting to a minimum to avoid stripping the screw head.

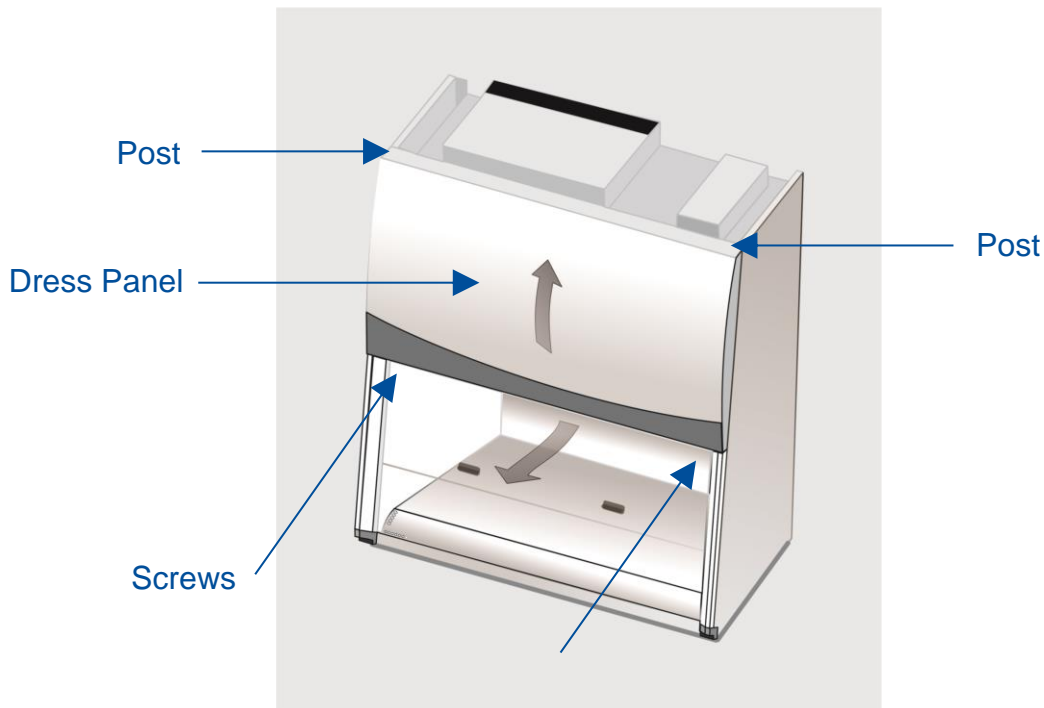
Removal of External Dress Panels

To access the HEPA filters, LED lamps, sash sensors, the LCD display, and other service areas, the front panel and side panels will be removed. This section describes removal of the external dress panels.

Dress Panel

1. Locate and remove the two Phillips screws that secure the front dress Panel as shown in Figure 12-1.

Figure 12-1



2. Swing the bottom edge of the dress panel out (away from biosafety cabinet) to clear the LED lamps underneath. Then lift the entire dress panel up to clear the two white posts on the top right and left corners of the dress panel. The two posts protrude down from the top flange of the dress panel.



The dress panel is heavy, and awkward to maneuver, use two persons to lift the dress panel.

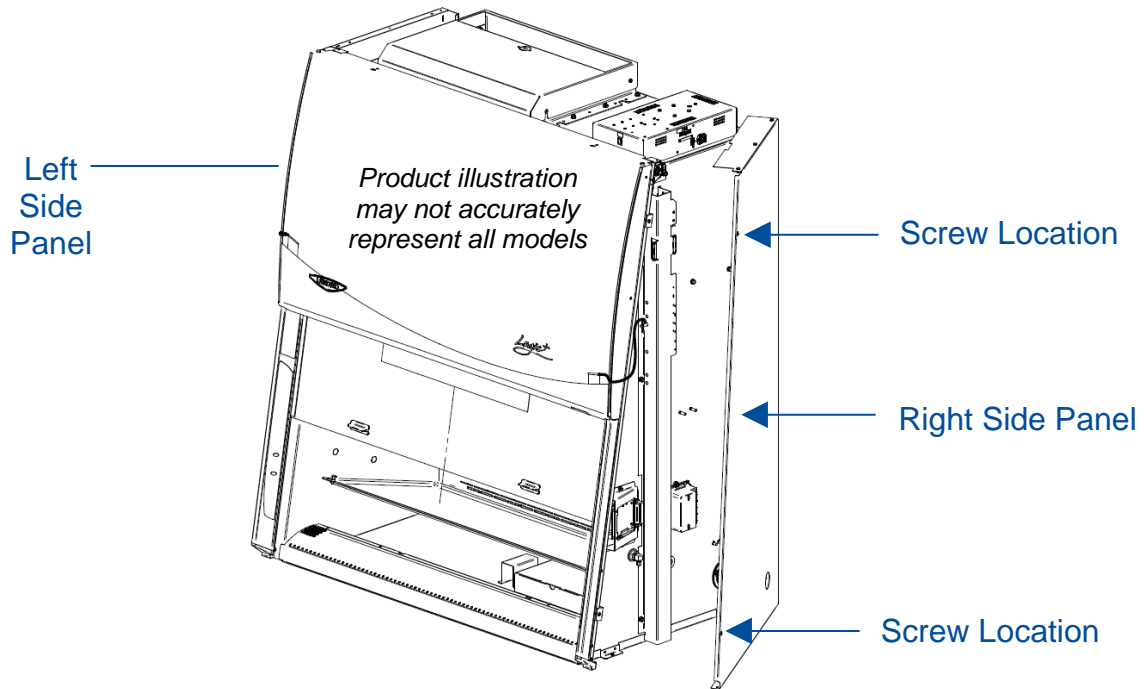
Reinstallation Notes:

1. Make sure the two white posts are fully engaged into the top of each corner post before replacing the two screws at the bottom corners of the dress panel.

Side Panels

1. Locate and remove the two Phillips screws along the front edge of each side panel.

Figure 12-2



2. The side panels will hinge open once the screws are removed.
3. If side panel needs to be removed, position the panel so that it is almost closed. Grasp the panel by the front and rear edges. Lift the panel up approximately 2 inches (5 cm), then pull it straight away from the end of the biosafety cabinet.

Front Sash

The glass sash utilizes a cable and pulley system with counter weights located in the right and left end service compartments. This section describes adjustments or repairs to the sash or sash sensors.

Sash Level Adjustment

The sash and its two counter weights are joined together with two sash cables, one per counter weight. The sash cables run on pulleys, which are joined together by a common axle. Each pulley is locked to this axle with a cotter pin. This prevents the sash from racking when raised from only one end of the sash glass. The sash should have approximately 1/8 inch (3 mm) of lateral play or movement. Under normal operation, the sash should remain level. Occasionally, during transport of the biosafety cabinet, the sash may become unlevel. Follow the instructions below to resolve this issue.

1. Lower the sash until it is fully closed. Identify which end of the sash is high.
2. Hinge open or remove the side panel on the high end of the sash. Side panel access and removal is described earlier in this section under [Removal of External Dress Panels](#).
3. Using pliers, grasp the S-Hook atop the counterweight. Pull up on the counterweight to allow some slack in the sash cable. See Figure 12-3.
4. The high end of the sash should lower against the sash stop, and the sash is now level. Carefully lower the counterweight and sash cable back onto the pulley.

Figure 12-3



Sash Sensor Adjustment or Replacement

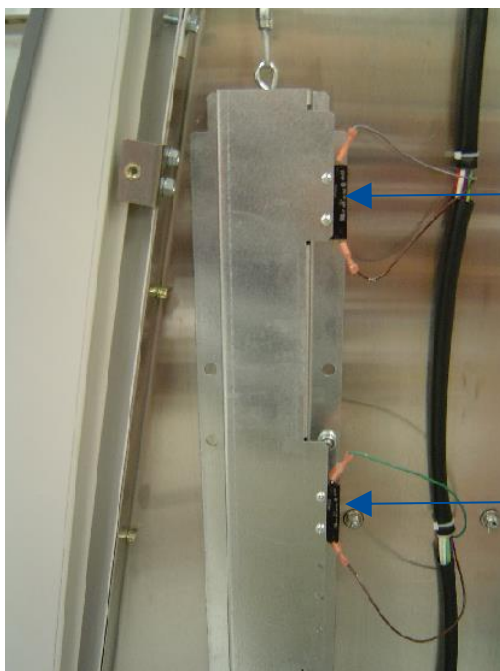
The biosafety cabinet senses the sash's vertical position with mechanical switches located on the counterweight channel in the right end service compartment. The switches activate off of the counterweight as it travels in the channel. These switches are reliable and do not require calibration. Should the biosafety cabinet not respond as expected to the position of the sash (for example, automatic blower/light operation when sash is closed/opened, or a sash alarm when sash not within 1 inch (25 mm) of nominal operating position), examine the sash switches and adjust/replace as necessary.

1. Hinge open or remove the right end side panel as described earlier in this section under [Removal of External Dress Panels](#).
2. Locate the sash switches on the counterweight channel. Table 12-1 indicates which switches will be present based on the type and sash height. Figure 12-4 identifies the location of these switches.

Table 12-1

Type	Sash Height (inches)	Closed	Almost Closed	Operating Position 1	Operating Position 2
A2	8, 9, 10	Yes		Yes	
	12	Yes	Yes	Yes	
B2	8	Yes		Yes	
C1	8, 10	Yes	Yes	Yes	Yes

Figure 12-4



Top switch location

CLOSED switch: silver tab UP

ALMOST CLOSED switch (if present): silver tab DOWN

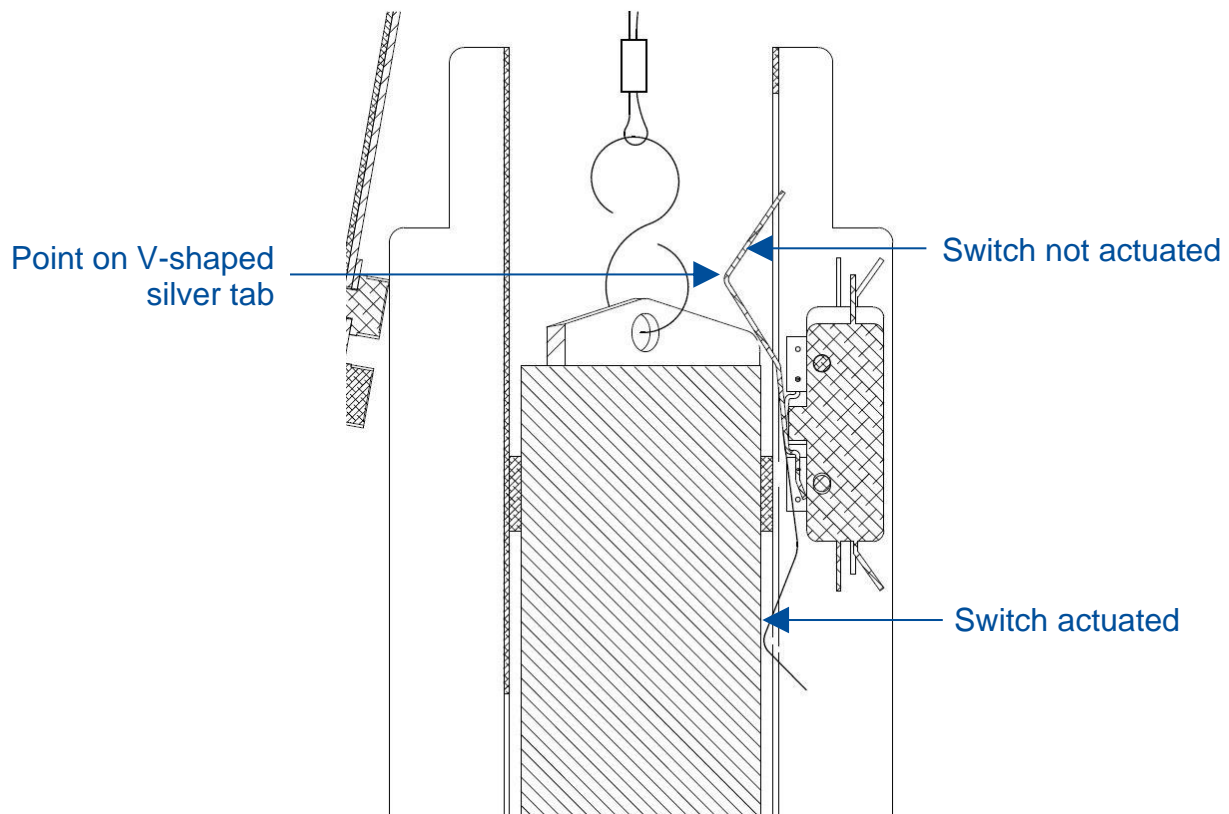
Bottom switch location

Operating Pos. 1 switch: silver tab DOWN

Operating Pos. 2 switch (if present): silver tab UP

3. If the blower is on, turn it off, and turn off other noise producing equipment nearby. This step involves listening for a click from each switch. Check each switch function by slowly raising and lowering the sash. Check each switch to see if an audible click is heard when the sash is at key positions:
 - a. CLOSED – close (lower) the sash, and within 1 inch (25 mm) of fully closed, an audible click is heard from the CLOSED switch shown in Figure 12-4.
 - b. (If a Type C1 or A2 12-inch sash model) ALMOST CLOSED – from the fully closed position, raise the sash slowly until the CLOSED switch disengages (first click), and within 2 inches (50 mm) of upward travel a second click should be heard from the ALMOST CLOSED switch.
 - c. OPERATING POSITION 1 – continue raising the sash slowly from closed, and when the bottom edge of the sash glass is within 1 inch (25 mm) of the sash height decal on the left corner post, a click is heard from the OPERATING POSITION 1 switch shown in Figure 12-4.
 - d. (If a Type C1 model) – OPERATING POSITION 2 – continue raising the sash past the 8-inch operating sash position, and when within 1 inch (25 mm) of the 10-inch operating position, a click is heard from the OPERATING POSITION 2 switch. This switch is only found on Type C1 models, and corresponds to the 10-inch operating sash height position.

Figure 12-5



4. If operation is not as described in Step 3, repeat Step 3, positioning yourself to view the silver, formed tabs on each sash switch. Watch as the counterweight approaches each switch. Here is the expected behavior:
 - a. CLOSED and ALMOST CLOSED (if present) switches – The silver tab should engage and rotate away from the sash counterweight, with the click occurring as soon as the point of the V-shaped silver tab reaches the top of the counterweight. See Figure 12-5 for reference.
 - b. OPERATING POSITION switches – The silver tab should engage and rotate away from the sash counterweight, but the click should occur when the stainless steel “bump” attached to the counterweight reaches the point of the V-shaped silver tab.
5. If a switch is not actuating properly, move the sash so that the counterweight is well below the switch in question. Move the silver tab on the switch with your finger. If an audible click is heard when moving by hand, using pliers CAREFULLY bend the silver tab so that it protrudes further into the counterweight channel. Hold the base of the silver tab with one set of pliers, and form the tab by pushing it with your finger. Prying on the silver tab without supporting the base (where it is hinged on the black switch body), may break the tab off of the switch, in which case the switch is permanently damaged and needs to be replaced.
6. If the switch is defective, replace it by removing the two machine screws and nuts holding the sensor in place. Take care to note the orientation of the switch and wiring before switch removal, so the new switch can be properly re-wired and reassembled.

HEPA Filter Replacement

The HEPA filters load with particulate as the biosafety cabinet operates. Eventually, the filters will need to be replaced. Only replace a HEPA filter if you are a qualified and trained certifier or technician.



The HEPA filters on a biosafety cabinet will be contaminated with biohazardous material. Always assume the HEPA filter is contaminated, even if you are told the biosafety cabinet has not been used. For your safety, take all necessary precautions before opening the filter cover(s), including: gaseous decontamination of the biosafety cabinet, proper breathing, eye, and skin protection from biohazards.

Type A2 (8, 9, 10-inch sash)



Follow these instructions carefully, and in the order documented. Always remove the exhaust HEPA filter first. The exhaust filter pan can be damaged if the plenum is raised with the exhaust HEPA filter in place.



HEPA filters can be awkward to handle, and quite heavy for larger models. Use safe lifting techniques when removing and replacing the filters. Always use two persons to remove and replace each HEPA filter.



1. Thoroughly and properly decontaminate the biosafety cabinet.
2. Remove the front dress panel as described earlier in this section under [Removal of External Dress Panels](#). Unplug the power cord to this biosafety cabinet.
3. Loosen all of the Phillips screws around the perimeter of the blower/plenum cover. Remove all screws except two along the top edge of the cover. This will support the cover. The sash stop bracket is held in place by two of the blower/plenum cover screws. Remove this bracket.
4. Release the damper seal (Figure 12-6) by pulling the outside edge of the seal towards the bolt at the center, and then push the seal inside the blower/plenum cover (Figure 12-7).

Figure 12-6

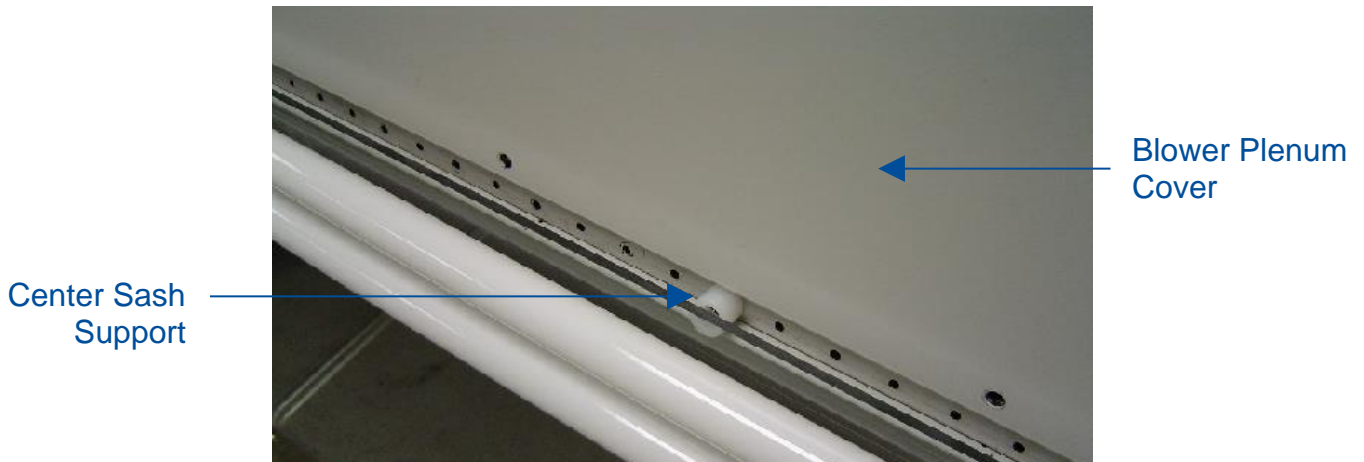


Figure 12-7



- Remove the last two screws. The blower/plenum cover will rest on the center sash support (Figure 12-8) after the final screws are removed. Gently break the gasket seal on the cover by starting in one corner. Use a flat screwdriver if necessary, taking care not to damage the gasket or panel by prying too hard in one area. Once the gasket seal is free, slide the cover to the left or right, and bend it slightly to free one end by getting it past the corner post. Lift the blower/plenum cover off.

Figure 12-8



For 4, 5, 6 foot width models:

- Using a 1/2-inch socket, loosen the 4 bolts at each corner of the exhaust filter tray (Fig. 12-9), until filter drops 1/2 inch (13 mm).

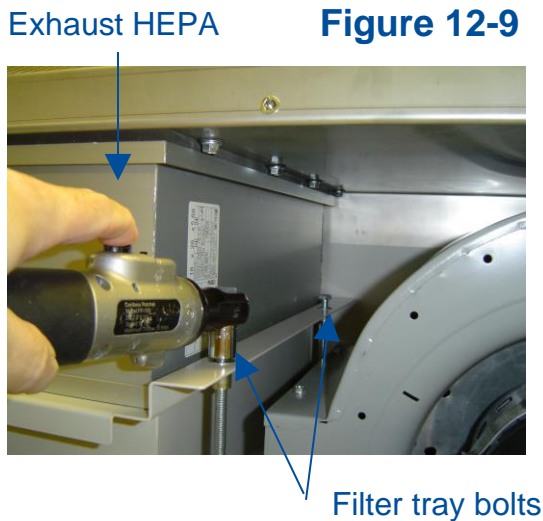


Figure 12-9

For 3 foot width models:

- Using a 1/2-inch socket, loosen the 4 bolts on top of the cabinet liner (Fig. 12-10), until filter drops 1/2 inch (13 mm).

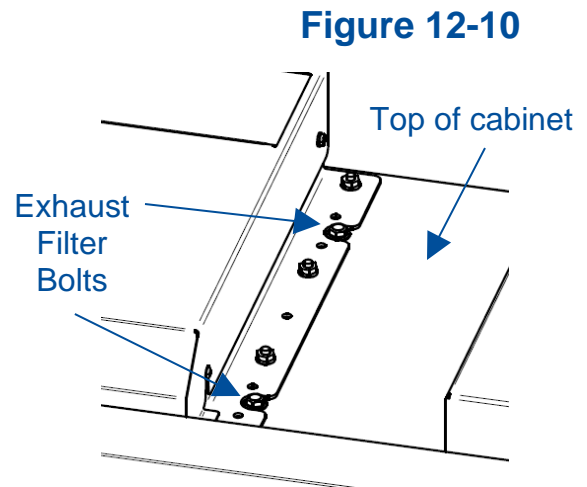
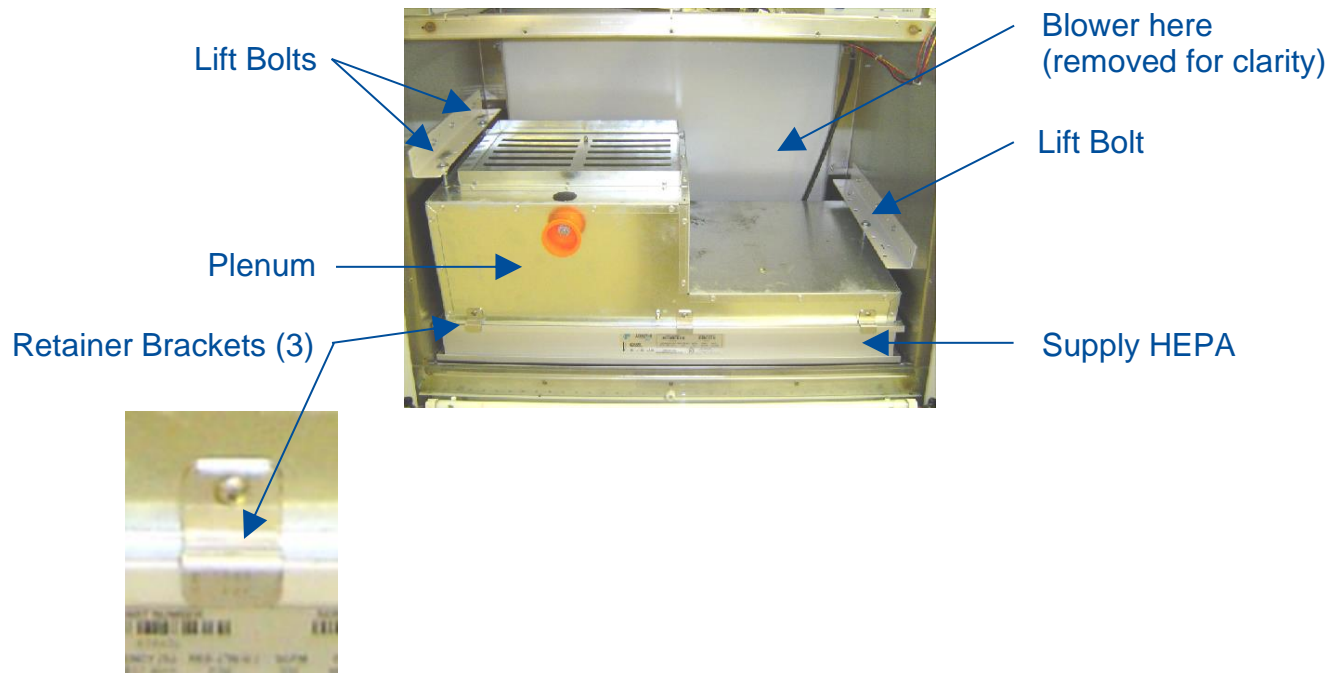


Figure 12-10

7. Slide the exhaust HEPA filter straight out of the biosafety cabinet.
8. To remove the supply HEPA filter, the exhaust HEPA filter must be removed first. Using a 1/2-inch socket, tighten the 3 plenum lift bolts (turning each bolt clockwise will raise the plenum) until the plenum raises 1/2-inch (13 mm). See Figure 12-11 for reference.

Figure 12-11



9. Remove the 3 supply HEPA filter retainer brackets (see Figure 12-11).
10. Lift up on one corner of the supply HEPA filter to break the seal between the filter gasket and the filter shelf. Once the filter is free, slide it straight out.

Reinstallation Notes:

1. When reinstalling the supply HEPA filter, to lower the plenum onto the supply HEPA, turn the 3 plenum lift bolts counter-clockwise. Turn each bolt part way, working in a pattern amongst the 3 bolts to lower the plenum evenly.
2. When downward pressure begins to be applied onto the supply HEPA (and upward pressure on the exhaust HEPA when it is reinstalled separately), the brackets holding the bolts you are tightening will flex slightly. Only tighten until the filters are secure and the filter gasket has 50% compression. Do not over-tighten the bolts.
3. After reinstalling the blower/plenum cover, be sure to replace the orange seal on the blower/plenum cover by snapping or flexing it onto the hole in the cover.

Type A2 (12-inch sash)

Follow these instructions carefully, and in the order documented.



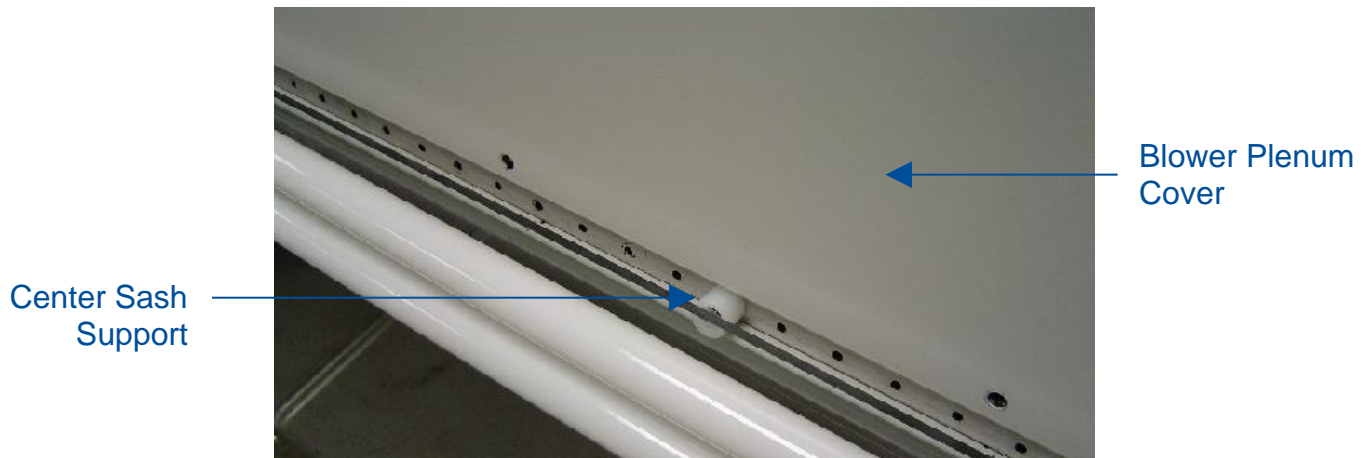
HEPA filters can be awkward to handle, and quite heavy for larger models. Use safe lifting techniques when removing and replacing the filters. Always use two persons to remove and replace each HEPA filter.



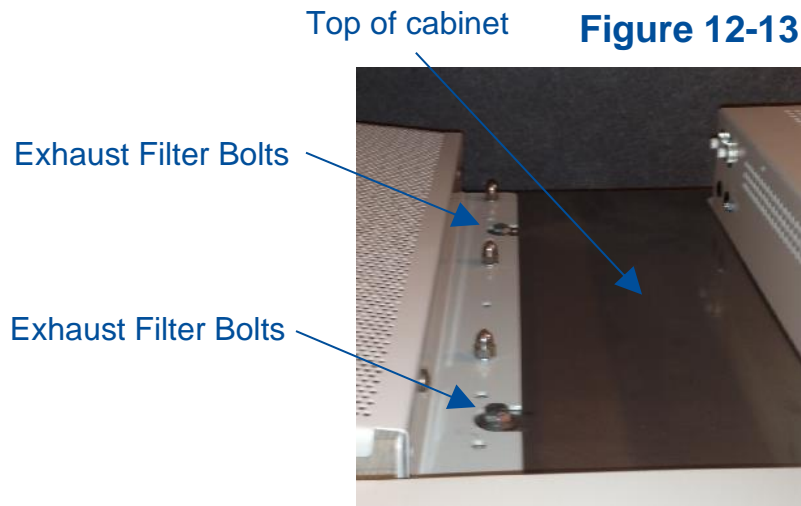
1. Thoroughly and properly decontaminate the biosafety cabinet.
2. Remove the front dress panel as described earlier in this section under [Removal of External Dress Panels](#). Unplug the power cord to this biosafety cabinet.
3. Loosen all of the Phillips screws around the perimeter of the blower/plenum cover. Remove all screws except two along the top edge of the cover. This will support the cover. The sash stop bracket is held in place by two of the blower/plenum cover screws. Remove this bracket.
4. Remove the last two screws. The blower/plenum cover will rest on the center sash support (Figure 12-12) after the final screws are removed. Gently break the gasket seal on the cover by starting in one corner. Use a flat screwdriver if necessary, taking care not to damage the gasket or panel by prying too hard in one area. Once the gasket seal is free, slide the cover to the left or right, and bend it slightly to free one end by getting it past the corner post. Lift the blower/plenum cover off.



Figure 12-12



- To remove the exhaust HEPA filter, use a 1/2-inch socket to loosen the 4 bolts on top of the cabinet liner (Figure 12-13) until filter drops 1/2 inch to 3/4 inch (19 mm). Do not remove these 4 bolts, just loosen them to lower the exhaust filter.



- Slide the exhaust HEPA filter straight out of the biosafety cabinet.



Note: When sliding the exhaust HEPA filter out, the rear edge of the filter frame may catch and stop the filter from easily sliding out. If this happens, push the filter back in about 1 inch (25 mm), pull the front edge of the filter down, which will tilt the back edge up. Maintain this filter position, and slide the filter out.

- To remove the supply HEPA filter, use a 1/2-inch socket to tighten the 3 plenum lift bolts (turning each bolt clockwise will raise the plenum) until the plenum raises 1/2-inch (13 mm). See Figure 12-14 for reference.

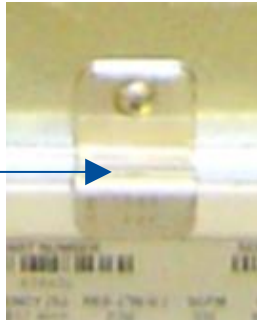
Figure 12-14



9. Remove the 3 supply HEPA filter retainer brackets (see Figure 12-15).

Figure 12-15

Filter Retainer Bracket



10. Lift up on one corner of the supply HEPA filter to break the seal between the filter gasket and the filter shelf. Once the filter is free, slide it straight out.

Reinstallation Notes:

1. When reinstalling the supply HEPA filter, to lower the plenum onto the supply HEPA, turn the 3 plenum lift bolts counter-clockwise. Turn each bolt part way, working in a pattern amongst the 3 bolts to lower the plenum evenly.
2. When downward pressure begins to be applied onto the supply HEPA (and upward pressure on the exhaust HEPA when it is reinstalled separately), the brackets holding the bolts you are tightening will flex slightly. Only tighten until the filters are secure and the filter gasket has 50% compression. Do not overtighten the bolts.

Type B2

Follow these instructions carefully, and in the order documented.



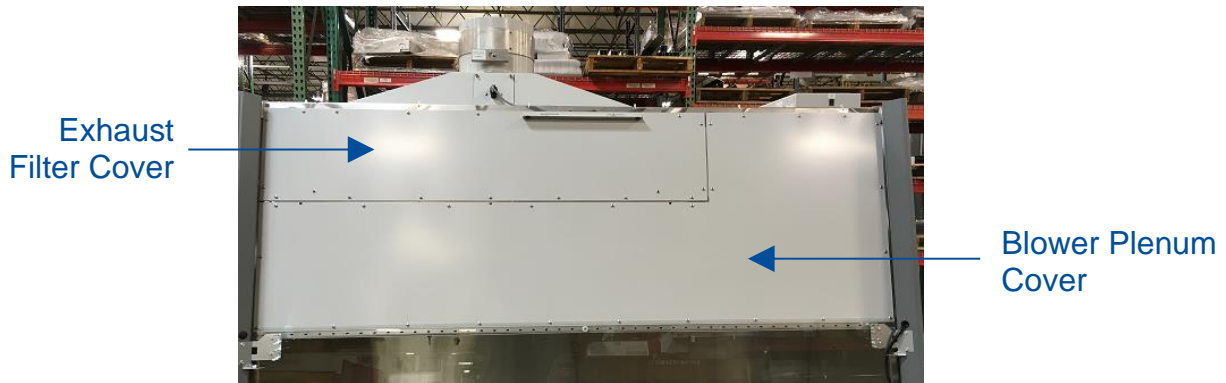
HEPA filters can be awkward to handle, and quite heavy for larger models. Use safe lifting techniques when removing and replacing the filters. Always use two persons to remove and replace each HEPA filter.



1. Thoroughly and properly decontaminate the biosafety cabinet.
2. Remove the front dress panel as described earlier in this section under [Removal of External Dress Panels](#). Unplug the power cord to this biosafety cabinet.
3. Remove all of the Phillips screws around the perimeter of the exhaust filter cover. Gently break the gasket seal on the cover by starting in one corner. Use a flat screwdriver if necessary, taking care not to damage the gasket or panel by prying too hard in one area. Remove the exhaust filter cover. See Figure 12-16.

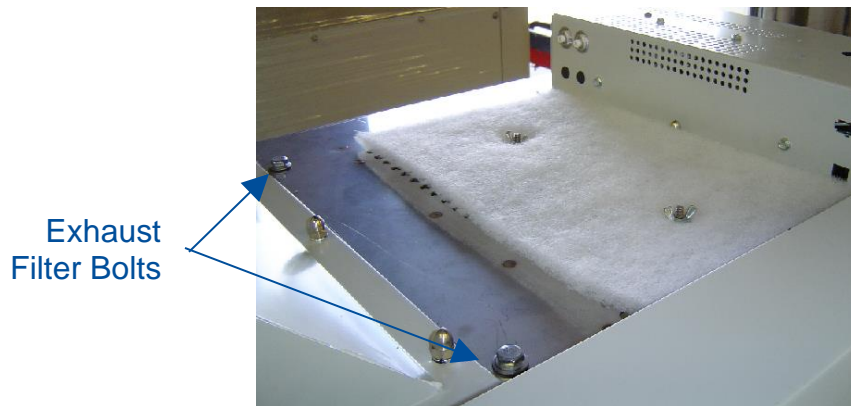


Figure 12-16



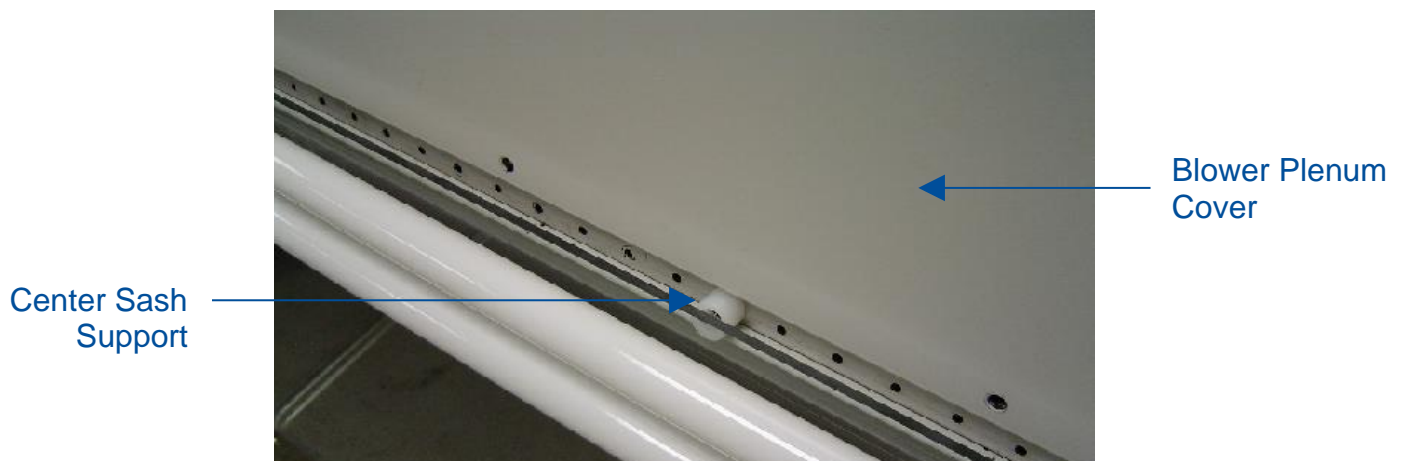
4. To remove the exhaust HEPA filter, use a 1/2-inch socket to loosen the 4 bolts on top of the cabinet liner (Figure 12-17) until filter drops 1/2 inch to 3/4 inch (19 mm). Do not remove these 4 bolts, just loosen them to lower the exhaust filter.
5. Slide the exhaust HEPA filter straight out of the biosafety cabinet.

Figure 12-17



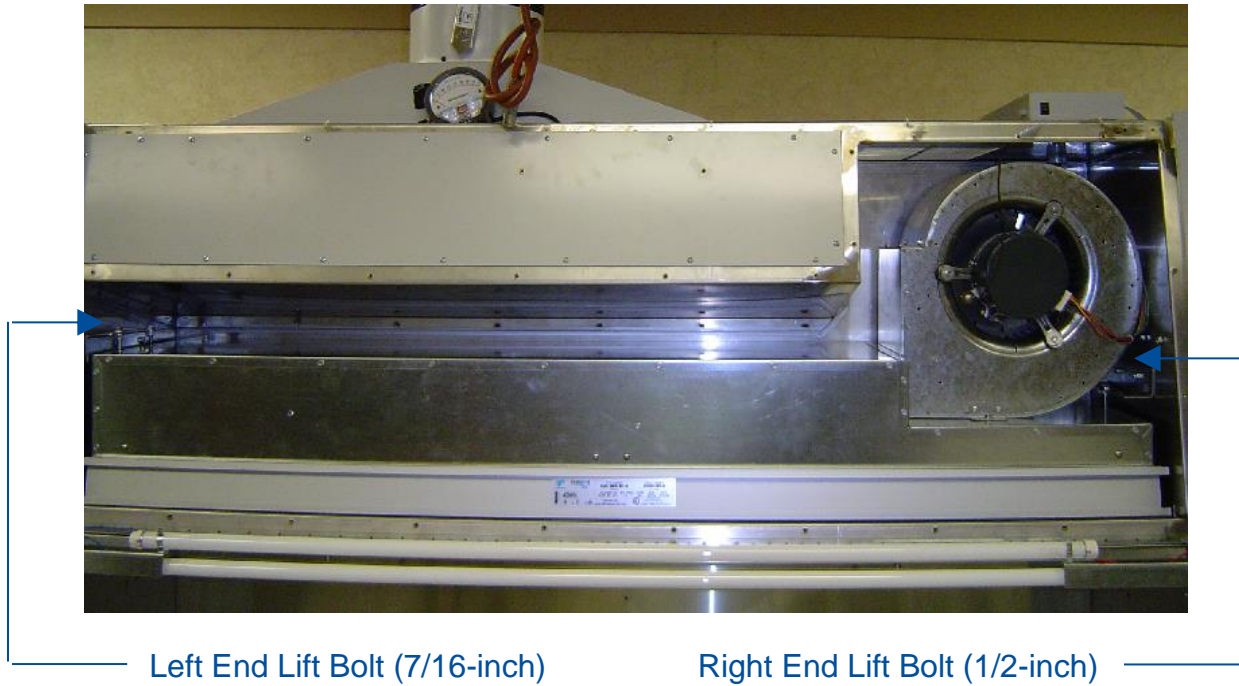
6. To remove the supply HEPA filter, loosen all of the Phillips screws around the perimeter of the blower/plenum cover. Remove all screws except two along the top edge of the cover. This will support the cover. The sash stop bracket is held in place by two of the blower/plenum cover screws. Remove this bracket.
7. Remove the last two screws. The blower/plenum cover will rest on the center sash support (Figure 12-18) after the final screws are removed. Gently break the gasket seal on the cover by starting in one corner. Use a flat screwdriver if necessary, taking care not to damage the gasket or panel by prying too hard in one area. Once the gasket seal is free, slide the cover to the left or right, and bend it slightly to free one end by getting it past the corner post. Lift the blower/plenum cover off.

Figure 12-18



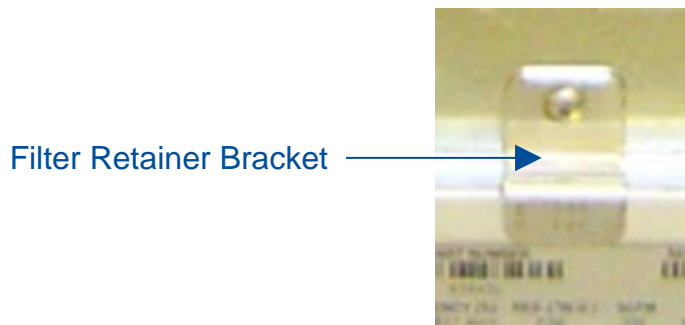
8. Use a 1/2-inch socket on the right end lift bolt and a 7/16-inch socket on the left end lift bolt, tighten the 2 plenum lift bolts (turning each bolt clockwise will raise the plenum) until the plenum raises 1/2-inch (13 mm). See Figure 12-19 for reference.

Figure 12-19



9. Remove the 3 supply HEPA filter retainer brackets (see Figure 12-20).

Figure 12-20



11. Lift up on one corner of the supply HEPA filter to break the seal between the filter gasket and the filter shelf. Once the filter is free, slide it straight out.

Reinstallation Notes:

1. When reinstalling the supply HEPA filter, to lower the plenum onto the supply HEPA, turn the 2 plenum lift bolts counter-clockwise. Turn each bolt part way, working back and forth between the 2 bolts to lower the plenum evenly.
2. When downward pressure begins to be applied onto the supply HEPA (and upward pressure on the exhaust HEPA when it is reinstalled separately), the brackets holding the bolts you are tightening will flex slightly. Only tighten until the filters are secure and the filter gasket has 50% compression. Do not overtighten the bolts.

Type C1

Follow these instructions carefully, and in the order documented.



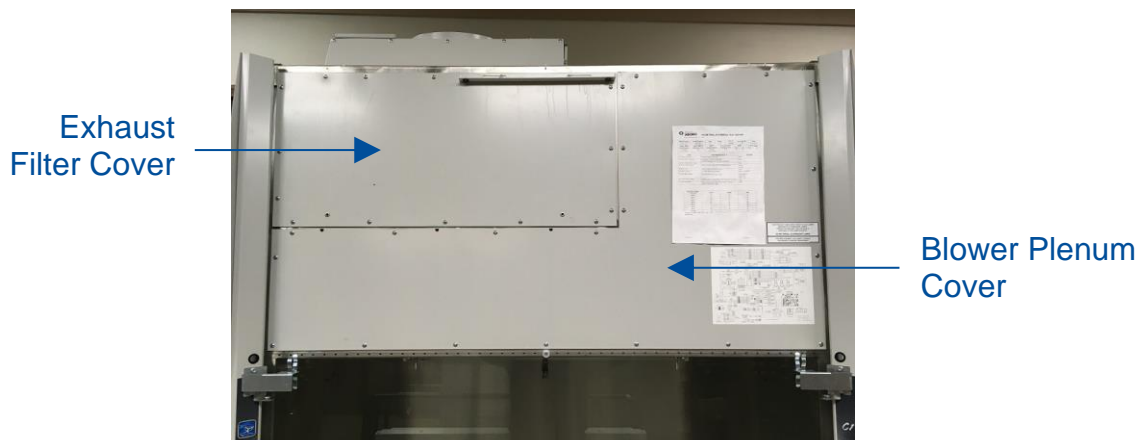
HEPA filters can be awkward to handle, and quite heavy for larger models. Use safe lifting techniques when removing and replacing the filters. Always use two persons to remove and replace each HEPA filter.



1. Thoroughly and properly decontaminate the biosafety cabinet.
2. Remove the front dress panel as described earlier in this section under [Removal of External Dress Panels](#). Unplug the power cord to this biosafety cabinet.
3. To remove the exhaust HEPA filter, remove all of the Phillips screws around the perimeter of the exhaust cover. Gently break the gasket seal on the cover by starting in one corner. Use a flat screwdriver if necessary, taking care not to damage the gasket or panel by prying too hard in one area. Remove the exhaust filter cover. See Figure 12-21.



Figure 12-21

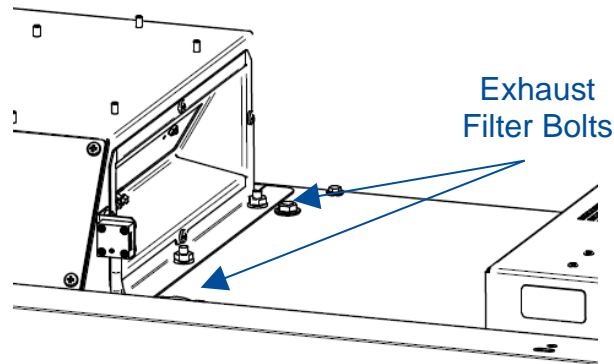


4. Using a 1/2-inch socket, loosen the 4 bolts on top of the cabinet liner (Figure 12-22), until filter drops 1/2 inch to 3/4 inch (19 mm). Do not remove these 4 bolts, just loosen them to lower the exhaust filter.
5. Slide the exhaust HEPA filter straight out of the biosafety cabinet.



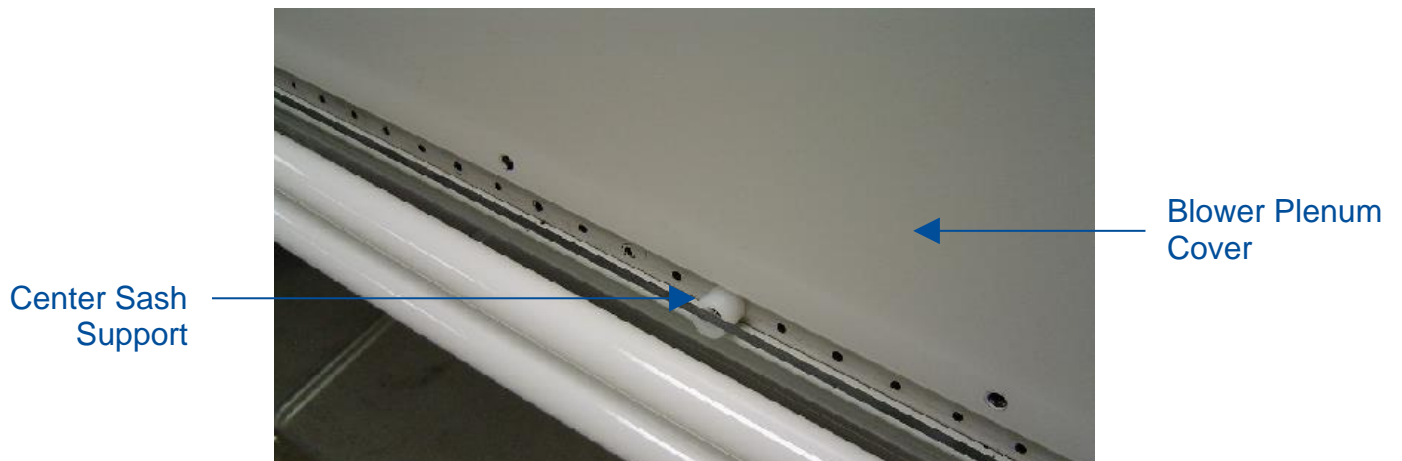
Note: When sliding the exhaust HEPA filter out, the rear edge of the filter frame may catch and stop the filter from easily sliding out. If this happens, push the filter back in about 1 inch (25 mm), pull the front edge of the filter down, which will tilt the back edge up. Maintain this filter position, and slide the filter out.

Figure 12-22



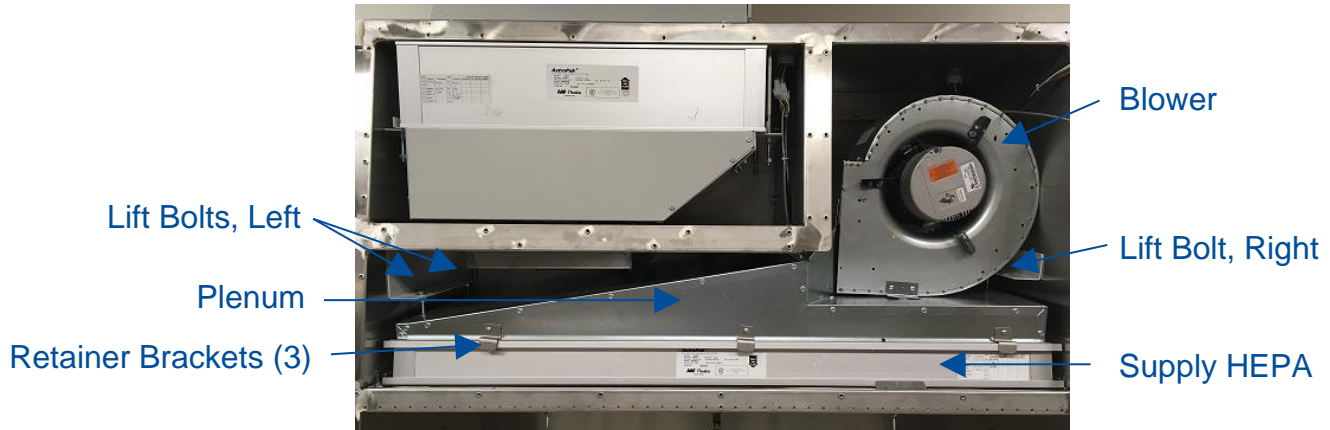
6. To remove the supply HEPA filter, loosen all of the Phillips screws around the perimeter of the blower/plenum cover. Remove all screws except two along the top edge of the cover. This will support the cover. The sash stop bracket is held in place by two of the blower/plenum cover screws. Remove this bracket.
7. Remove the last two screws. The blower/plenum cover will rest on the center sash support (Figure 12-23) after the final screws are removed. Gently break the gasket seal on the cover by starting in one corner. Use a flat screwdriver if necessary, taking care not to damage the gasket or panel by prying too hard in one area. Once the gasket seal is free, slide the cover to the left or right, and bend it slightly to free one end by getting it past the corner post. Lift the blower/plenum cover off.

Figure 12-23



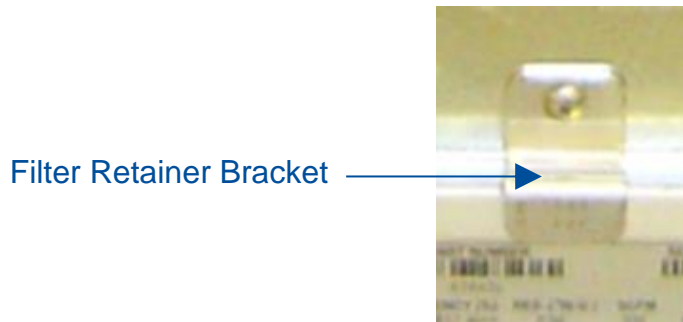
9. To remove the supply HEPA filter, use a 1/2-inch socket to tighten the 3 plenum lift bolts (turning each bolt clockwise will raise the plenum) until the plenum raises 1/2-inch (13 mm). See Figure 12-24 for reference.

Figure 12-24



10. Remove the 3 supply HEPA filter retainer brackets (see Figure 12-25).

Figure 12-25



11. Lift up on one corner of the supply HEPA filter to break the seal between the filter gasket and the filter shelf. Once the filter is free, slide it straight out.

Reinstallation Notes:

1. When reinstalling the supply HEPA filter, to lower the plenum onto the supply HEPA, turn the 3 plenum lift bolts counter-clockwise. Turn each bolt part way, working in a pattern amongst the 3 bolts to lower the plenum evenly.
2. When downward pressure begins to be applied onto the supply HEPA (and upward pressure on the exhaust HEPA when it is reinstalled separately), the brackets holding the bolts you are tightening will flex slightly. Only tighten until the filters are secure and the filter gasket has 50% compression. Do not overtighten the bolts.

Blower/Motor Replacement

The motor(s) in the biosafety cabinet are ECM, brushless DC motors with extremely high reliability. It is rare for the motor to fail. If the blower(s) fail to start, check all possible causes first. The most likely cause for blower failure is a loose wire connection. Another reason for accessing the blower/motor is a foreign object caught in the blower wheel, or the blower wheel is out of balance.



The blower/motor assembly on a biosafety cabinet will be contaminated with biohazardous material. Always assume the blower/motor is contaminated, even if you are told the biosafety cabinet has not been used. For your safety, take all necessary precautions before opening the blower/plenum cover, including: gaseous decontamination of the biosafety cabinet, proper breathing, eye, and skin protection from biohazards.

Type A2 (8, 9, 10-inch sash) & B2



If replacing a blower/motor assembly, the motor must be programmed at Labconco. The blower/motor assembly must also be balanced by Labconco, and therefore it is strongly recommended to replace the blower/motor assembly, never the motor or blower individually. Failure to replace the blower/motor with a genuine Labconco assembly will result in failed or incorrect operation, which can jeopardize the protection the biosafety cabinet provides the operator, product, and lab environment.



Blower/motors can be awkward to handle, and the blower wheel may contain sharp edges. Use safe lifting techniques when removing and replacing the blower/motor. Always wear gloves and eye protection when handling a blower/motor assembly.



1. Thoroughly and properly decontaminate the biosafety cabinet.
2. Remove the front dress panel as described earlier in this section under [Removal of External Dress Panels](#). Unplug the power cord to this biosafety cabinet.
3. Loosen all of the Phillips screws around the perimeter of the blower/plenum cover. Remove all screws except two along the top edge of the cover. This will support the cover. The sash stop bracket is held in place by two of the blower/plenum cover screws. Remove this bracket.
4. **A2 ONLY:** Release the damper seal (Figure 12-26) by pulling the outside edge of the seal towards the bolt at the center, and then push the cover inside the blower/plenum cover (Figure 12-27).

B2 – Skip Step 4, proceed to Step 5.

A2 ONLY - Figure 12-26

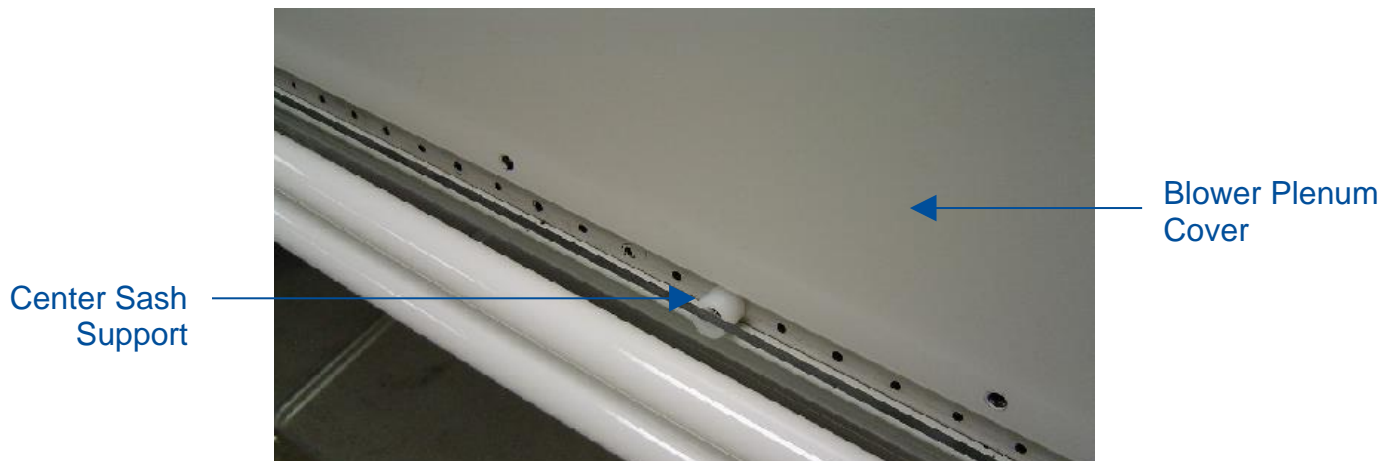


A2 ONLY - Figure 12-27



5. Remove the last two screws. The blower/plenum cover will rest on the center sash support (Figure 12-28) after the final screws are removed. Gently break the gasket seal on the cover by starting in one corner. Use a flat screwdriver if necessary, taking care not to damage the gasket or panel by prying too hard in one area. Once the gasket seal is free, slide the cover to the left or right, and bend it slightly to free one end by getting it past the corner post. Lift the blower/plenum cover off.

Figure 12-28

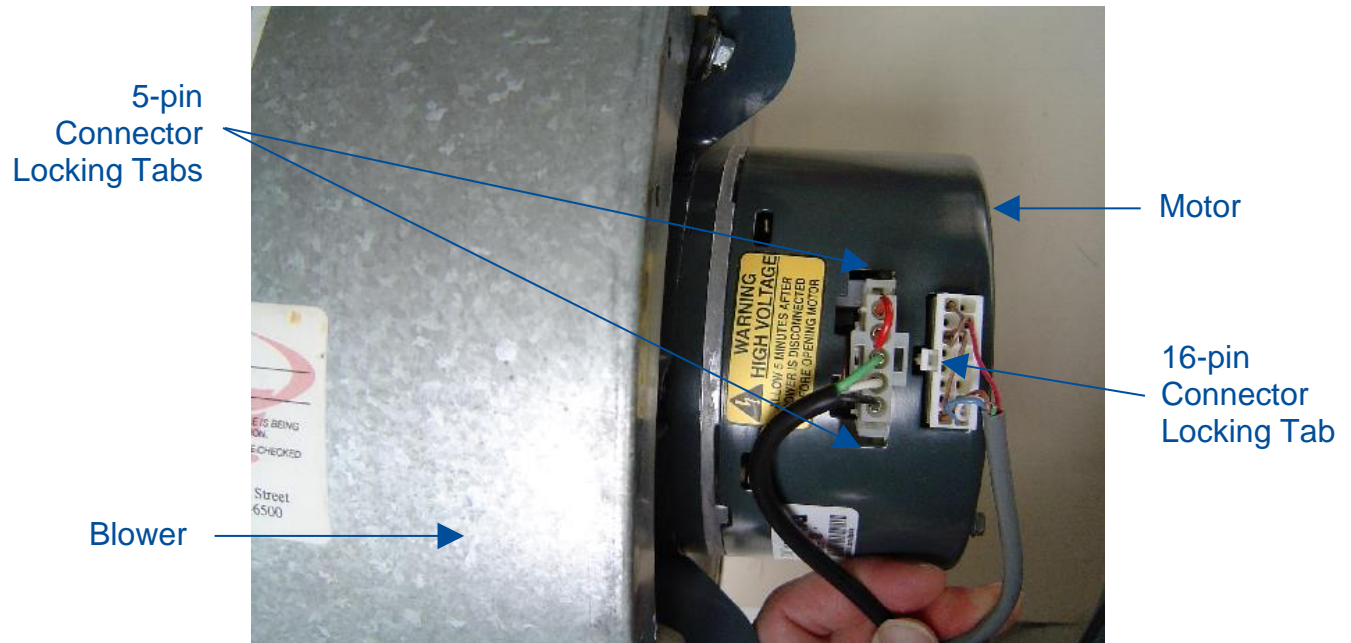


6. Locate the blower/motor assembly, it will be on the right side of the compartment, and resting atop the large, metal plenum.



7. Double check all power has been removed from the biosafety cabinet.
8. Disconnect the two (2) wire harness connections from the motor. The 5-pin connector, located closest to the blower, is released by depressing the locking tabs on either side of the connector. The 16-pin data connector is released by depressing the single locking tab in the center of the connector, on the side of the connector closest to the blower. See Figure 12-29.

Figure 12-29



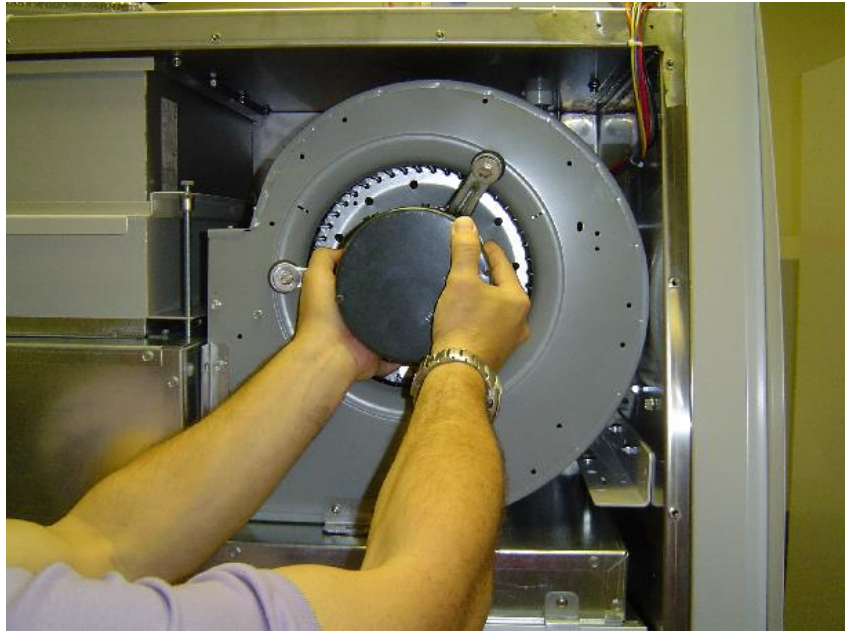
9. Using a 1/2-inch socket or wrench, remove the two upper and one lower mounting bolts. See Figure 12-30.

Figure 12-30



10. Grasp the motor and pull the assembly straight out of the biosafety cabinet. See Figure 12-31.

Figure 12-31



Reinstallation Notes:

1. During reinstallation of the blower/motor assembly, angle the rear blower bracket into the plenum opening. Make sure this rear blower bracket is **INSIDE** the plenum opening. Once reinstalled, and the three blower mounting bolts are installed and tightened, verify the rear blower bracket is positioned correctly by trying to rotate/move the blower/motor assembly. If the entire assembly is rigid (does not move in any direction), the rear blower bracket is properly secured.



Type A2 (12-inch sash) & C1 Supply Blower/Motor

Type A2 12-inch models and Type C1 models have two blower/motor assemblies. One is the supply blower/motor, and one is the exhaust blower/motor assembly. This section describes access/replacement of the supply blower/motor assembly.



If replacing a blower/motor assembly, the motor must be programmed at Labconco. The blower/motor assembly must also be balanced by Labconco, and therefore it is strongly recommended to replace the blower/motor assembly, never the motor or blower individually. Failure to replace the blower/motor with a genuine Labconco assembly will result in failed or incorrect operation, which can jeopardize the protection the biosafety cabinet provides the operator, product, and lab environment.

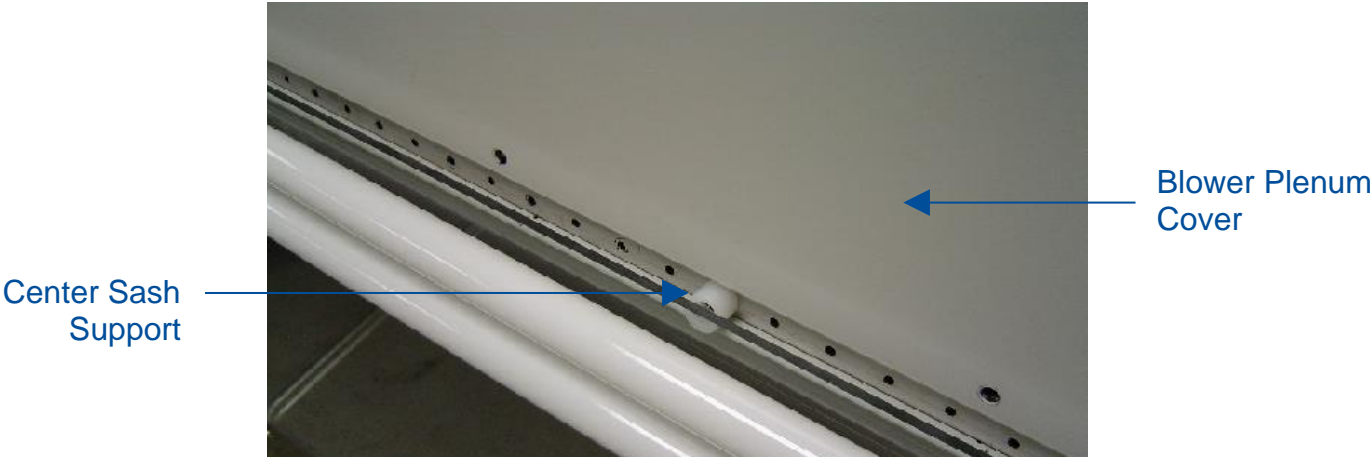


Blower/motors can be awkward to handle, and the blower wheel may contain sharp edges. Use safe lifting techniques when removing and replacing the blower/motor. Always wear gloves and eye protection when handling a blower/motor assembly.



1. Thoroughly and properly decontaminate the biosafety cabinet.
2. Remove the front dress panel as described earlier in this section under [Removal of External Dress Panels](#). Unplug the power cord to this biosafety cabinet.
3. Loosen all of the Phillips screws around the perimeter of the blower/plenum cover. Remove all screws except two along the top edge of the cover. This will support the cover. The sash stop bracket is held in place by two of the blower/plenum cover screws. Remove this bracket.
4. Remove the last two screws. The blower/plenum cover will rest on the center sash support (Figure 12-32) after the final screws are removed. Gently break the gasket seal on the cover by starting in one corner. Use a flat screwdriver if necessary, taking care not to damage the gasket or panel by prying too hard in one area. Once the gasket seal is free, slide the cover to the left or right, and bend it slightly to free one end by getting it past the corner post. Lift the blower/plenum cover off.

Figure 12-32



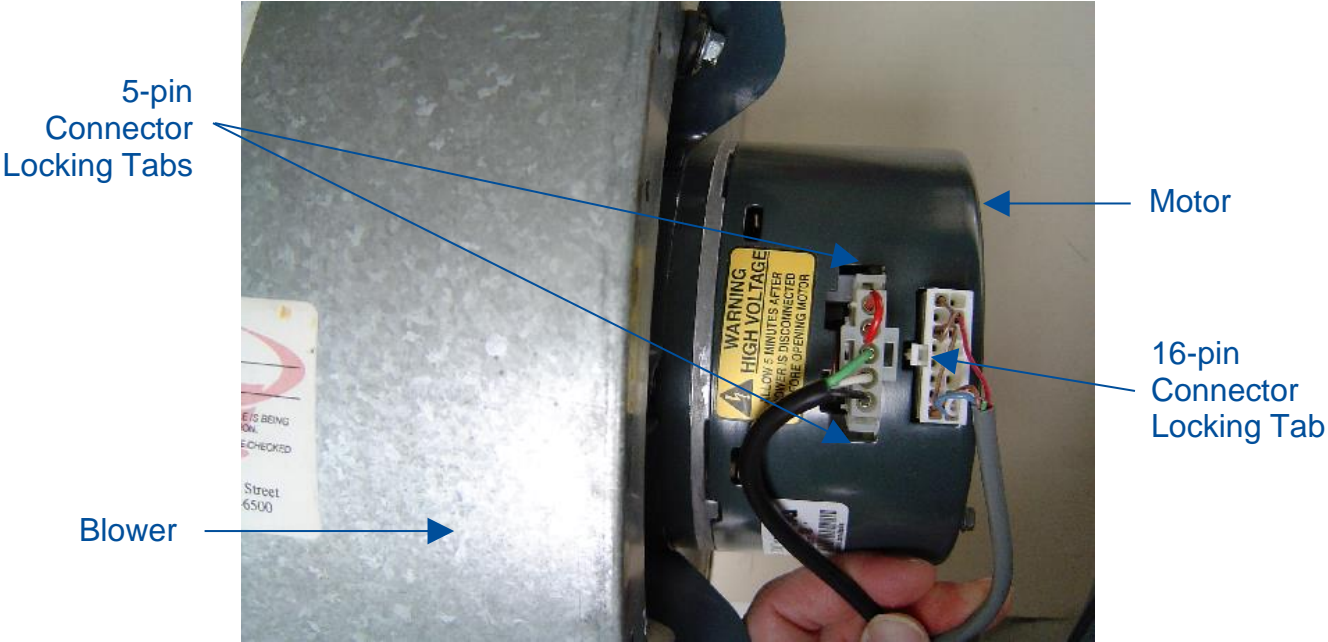
5. Locate the supply blower/motor assembly, it will be on the right side of the compartment, and resting atop the large, metal plenum.



6. Double check all power has been removed from the biosafety cabinet.

7. Disconnect the two (2) wire harness connections from the motor. The 5-pin connector, located closest to the blower, is released by depressing the locking tabs on either side of the connector. The 16-pin data connector is released by depressing the single locking tab in the center of the connector, on the side of the connector closest to the blower. See Figure 12-33.

Figure 12-33



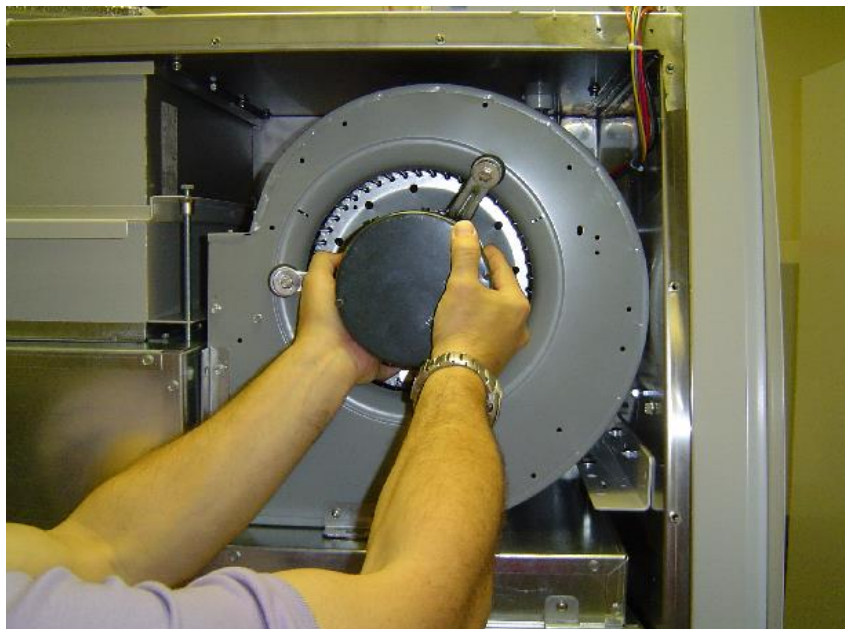
- Using a Phillips screwdriver, remove the two sealing plate screws and remove the sealing plate. See Figure 12-34.
- Using a 1/2-inch socket or wrench, remove the two upper and one lower mounting bolts. See Figure 12-34.

Figure 12-34



- Grasp the motor and pull the assembly straight out of the biosafety cabinet. See Figure 12-35.

Figure 12-35



Reinstallation Notes:

1. During reinstallation of the blower/motor assembly, angle the rear blower bracket into the plenum opening. Make sure this rear blower bracket is **INSIDE** the plenum opening. Once reinstalled, and the three blower mounting bolts are installed and tightened, verify the rear blower bracket is positioned correctly by trying to rotate/move the blower/motor assembly. If the entire assembly is rigid (does not move in any direction), the rear blower bracket is properly secured.

Type A2 (12-inch sash) & C1 Exhaust Blower/Motor



Type A2 12-inch models and Type C1 models have two blower/motor assemblies. One is the supply blower/motor, and one is the exhaust blower/motor assembly. This section describes access/replacement of the exhaust blower/motor assembly.



If replacing a blower/motor assembly, the motor must be programmed at Labconco. The blower/motor assembly must also be balanced by Labconco, and therefore it is strongly recommended to replace the blower/motor assembly, never the motor or blower individually. Failure to replace the blower/motor with a genuine Labconco assembly will result in failed or incorrect operation, which can jeopardize the protection the biosafety cabinet provides the operator, product, and lab environment.



Blower/motors can be awkward to handle, and the blower wheel may contain sharp edges. Use safe lifting techniques when removing and replacing the blower/motor. Always wear gloves and eye protection when handling a blower/motor assembly.

1. Thoroughly and properly decontaminate the biosafety cabinet.
2. Remove the front dress panel as described earlier in this section under [Removal of External Dress Panels](#). Unplug the power cord to this biosafety cabinet.



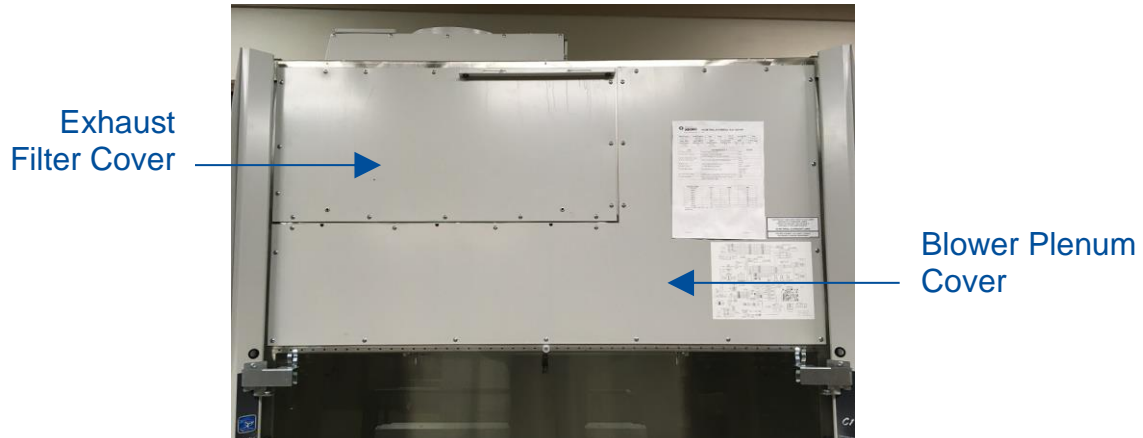
For A2 12-inch models

3. See the previous section [Type A2 \(12-inch\) & C1 Supply Blower/Motor](#) to remove the blower/plenum cover. Proceed to Step 4

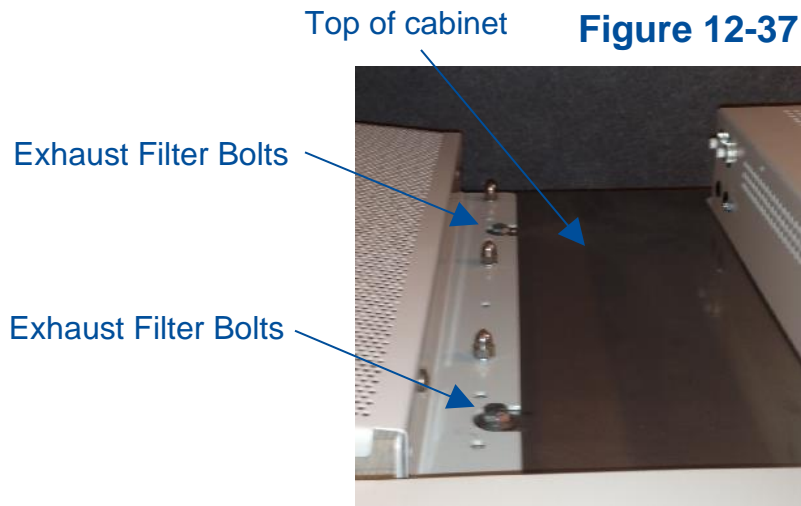
For C1 models

3. Remove all of the Phillips screws around the perimeter of the exhaust cover. Gently break the gasket seal on the cover by starting in one corner. Use a flat screwdriver if necessary, taking care not to damage the gasket or panel by prying too hard in one area. Once the gasket seal is free, remove the exhaust cover. See Figure 12-36.

C1 – ONLY Figure 12-36



4. Using a 1/2-inch socket, loosen the 4 bolts on top of the cabinet liner (Figure 12-37), until filter drops 1/2 inch to 3/4 inch (19 mm). Do not remove these 4 bolts, just loosen them to lower the exhaust filter.



5. Slide the exhaust HEPA filter straight out of the biosafety cabinet.

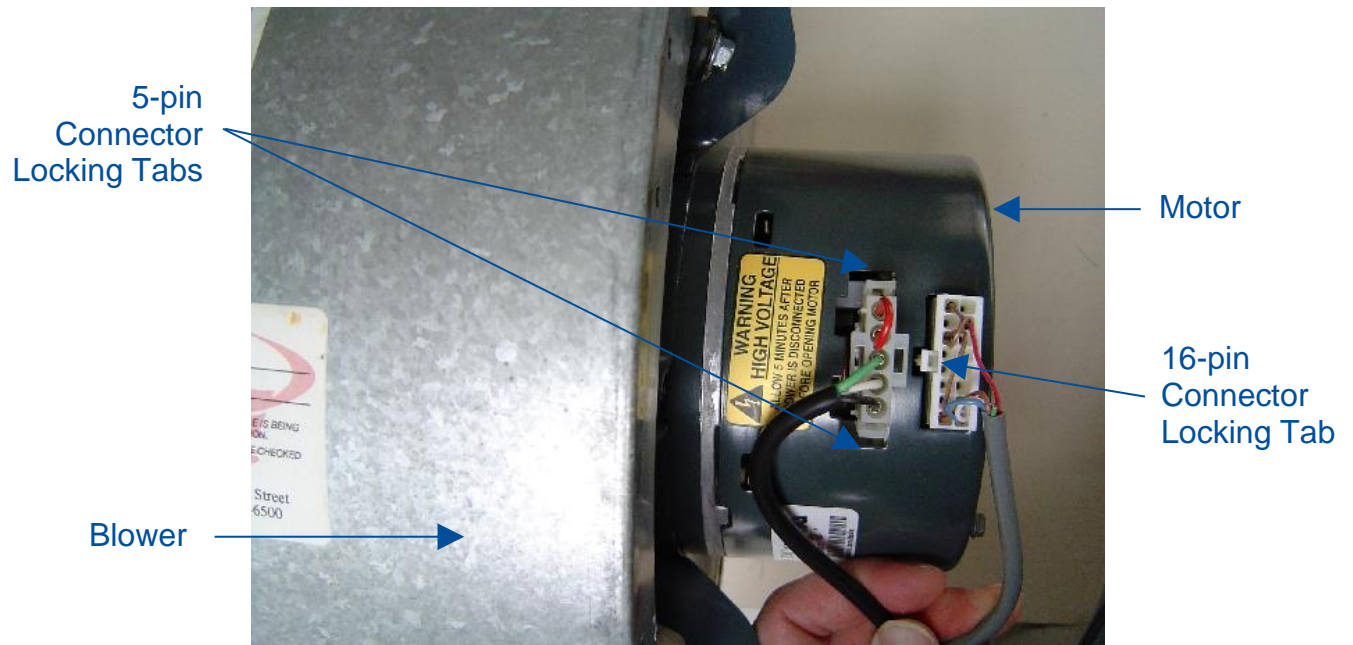


Note: When sliding the exhaust HEPA filter out, the rear edge of the filter frame may catch and stop the filter from easily sliding out. If this happens, push the filter back in about 1 inch (25 mm), pull the front edge of the filter down, which will tilt the back edge up. Maintain this filter position, and slide the filter out.



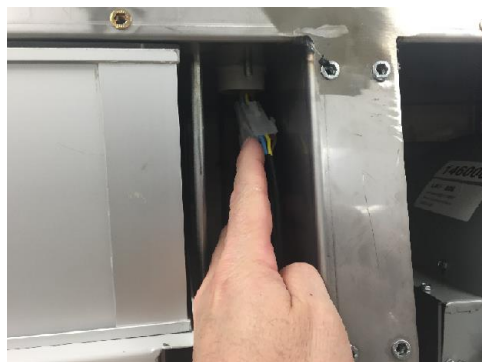
6. Double check all power has been removed from the biosafety cabinet.
7. Disconnect the two (2) wire harness connections from the motor. The 5-pin connector, located closest to the blower, is released by depressing the locking tabs on either side of the connector. The 16-pin data connector is released by depressing the single locking tab in the center of the connector, on the side of the connector closest to the blower. See Figure 12-38.

Figure 12-38

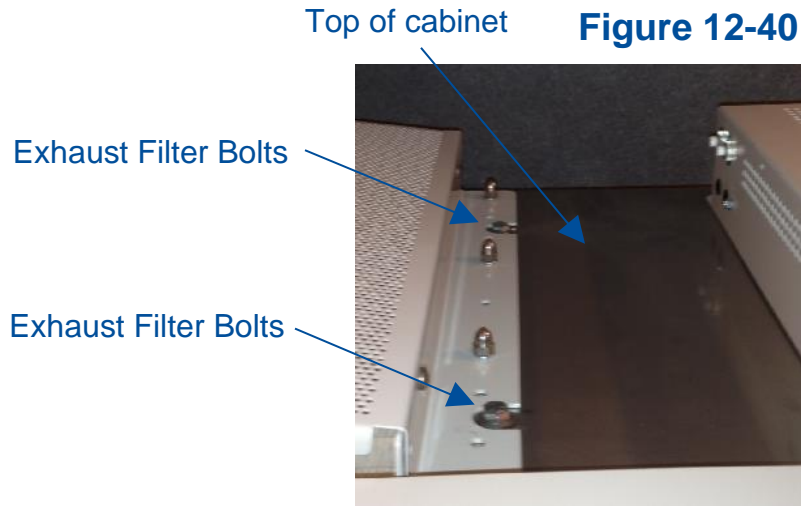


Note: On a Type C1, it may be difficult to reach the two motor wiring connectors described in Step 7. If this is the case, disconnect the exhaust motor wire harness at the pass-thru port near the top of the exhaust compartment. Once the exhaust plenum is free from the biosafety cabinet, the two wire connectors can easily be disconnected from the exhaust motor. See Figure 12-39.

Figure 12-39



- Loosen the four filter exhaust filter bolts until the exhaust plenum is free of the four bolts. See Figure 12-40.



It is recommended to have two persons perform Steps 8 and 9. When the exhaust filter bolts are freed from the exhaust plenum, it will fall without support. Utilize a second person to support the exhaust plenum while the bolts are removed one at a time. When the bolts on one side are free, set that end of the exhaust plenum down gently, then proceed to the two bolts on the opposite end.



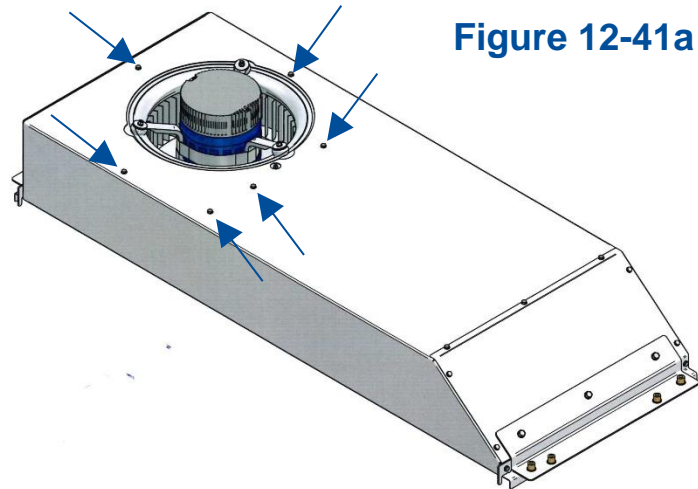
Note: 2x4 boards may be utilized to help support the exhaust plenum, particularly on a Type C1, when the exhaust filter bolts are removed. The boards allow for easier removal of the exhaust plenum from the biosafety cabinet on a Type C1 because there is a lip that the exhaust plenum must be lifted over, if boards are not utilized. See Figure 12-41 for reference.

Figure 12-41

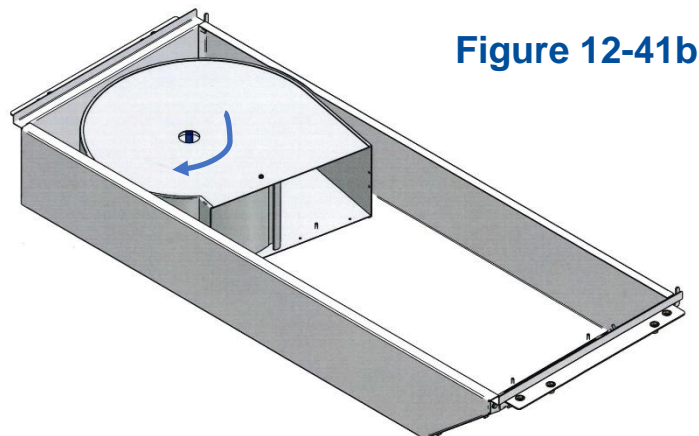


- Lift and slide the exhaust plenum out of the cabinet.

10. The exhaust blower/motor assembly may be removed from the exhaust plenum at this point by removing the several thread-cutting, hex head screws located on the motor side of the exhaust plenum. Use a 5/16-inch socket or nut driver to remove these screws. The blower/motor assembly must be rotated approximately 45 degrees to orient it correctly for removal.



11. The blower/motor assembly must be rotated approximately 45 degrees to orient it correctly for removal, as shown in Figure 12-41b.



Reinstallation Notes:

1. When upward pressure begins to be applied onto the exhaust HEPA, only tighten until the filter is secure and the filter gasket has 50% compression. Do not overtighten the bolts.

Changing the LED Lamps



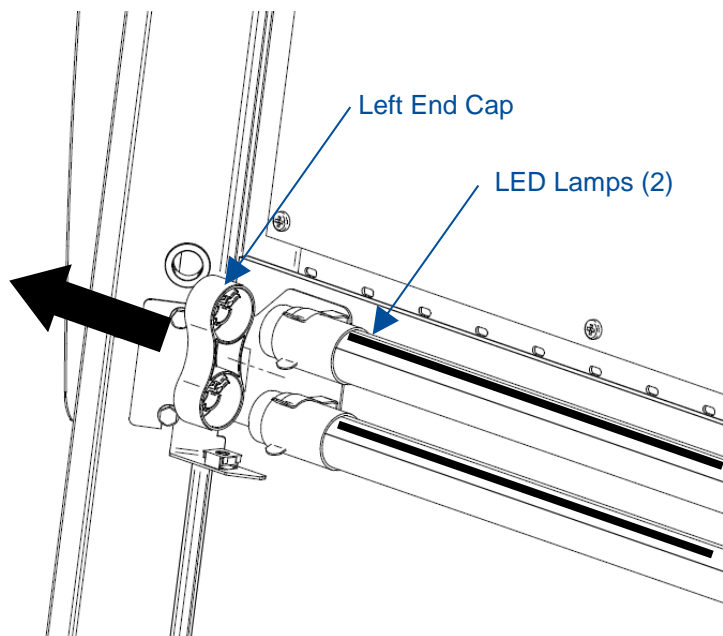
Before proceeding, make sure all electrical power has been removed from the cabinet by disconnecting the main electrical connection, which is the power cord.



This product uses only LED direct drive lighting. Do NOT install fluorescent bulbs.

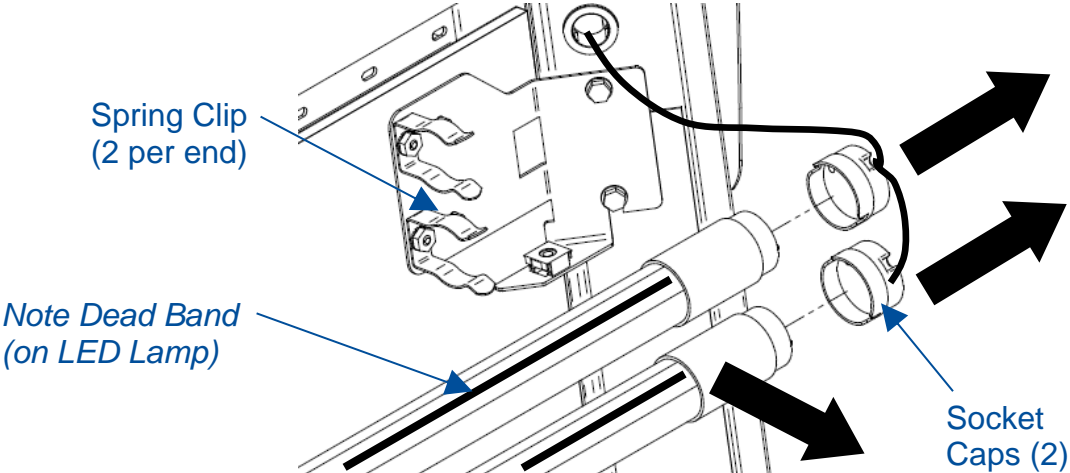
1. Remove the dress panel as described in *Removal of External Dress Panels*.
2. Locate the Left End Cap that aligns both LED lamps (Figure 12-42), remove the Left End Cap by pulling it away from the lamp ends.

Figure 12-42



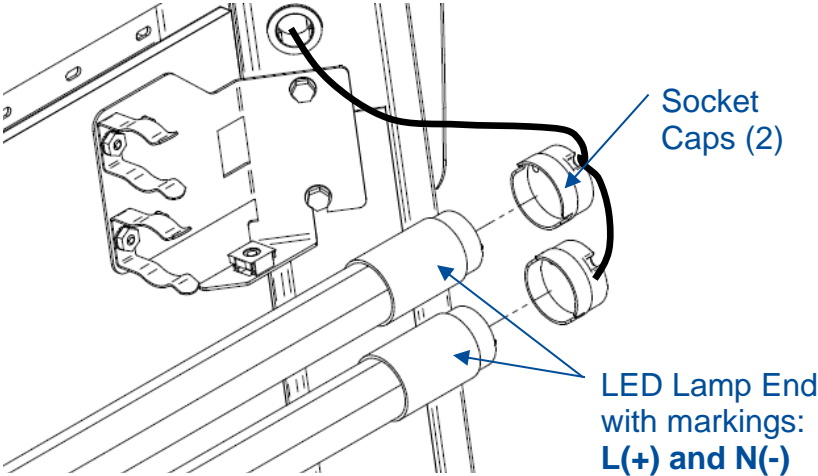
3. Remove both Socket Caps (on the right end of each LED lamp) by pulling each Socket Cap straight off the right end of the lamp one at a time (Figure 12-43).

Figure 12-43



- 4. Pull each LED Lamp straight toward you to release the lamp from the two Spring Clips holding it in place (Figure 12-43). Note the rotational position of the old LED lamps (there is a dead band stripe that will need to be oriented the same when reinstalling the new LED Lamps).
- 5. Install the new LED Lamps by reversing the removal procedure. Take care to look at both ends of the new LED Lamps. One end is labeled with a '+' & '-' and 'L' & 'N' (Figure 12-44). This end of the new LED Lamp must go to the right, and is inserted into the Socket Cap.

Figure 12-44



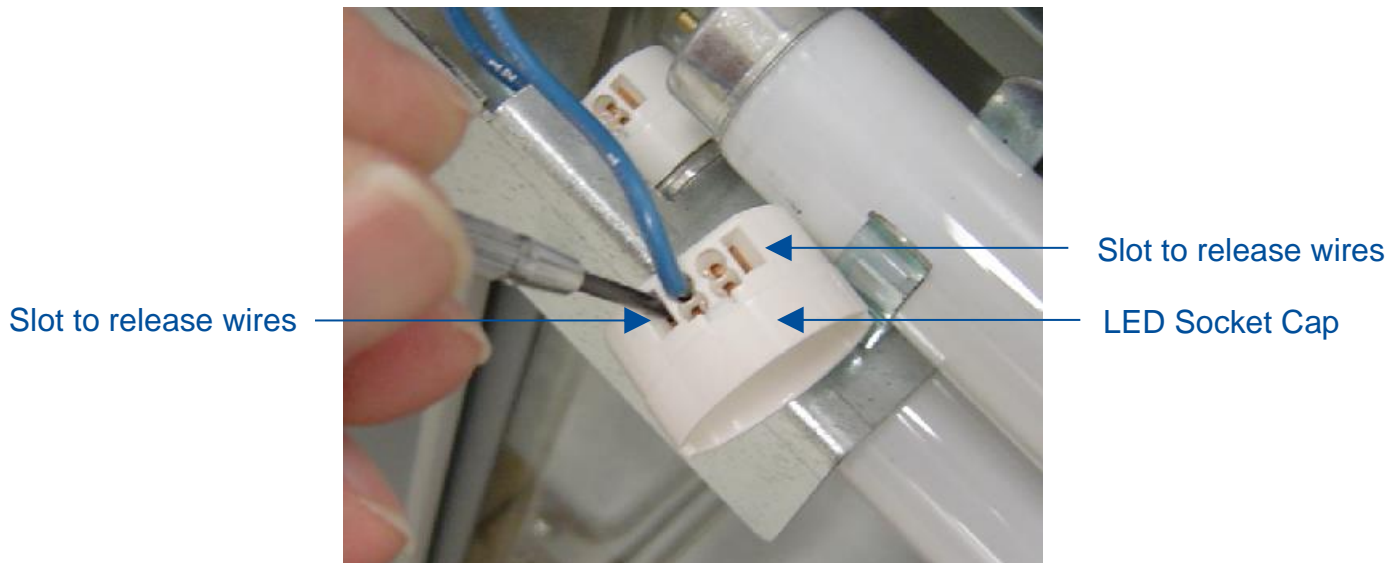
- 6. When reinstalling the Left End Cap, the pins on each LED Lamp must align rotationally with the Left End Cap. This ensures the dead band stripe is positioned correctly for maximum cabinet lighting.

LED Lamp Socket Cap Replacement

If a lamp socket cap for the LED lamps is damaged and needs to be replaced, follow these instructions.

1. Unplug the cabinet from all electrical power.
2. Remove the front dress panel as described earlier in *Removal of External Dress Panels*.
3. Remove the LED lamps from the socket caps as described in the previous section [Changing the LED the Lamps](#).
4. To replace a socket cap, insert a small straight bladed screwdriver into the socket near the lamp wire, as shown in Figure 12-45.

Figure 12-45



5. Once wires removed from the socket, the socket cap is free to be discarded, and the new socket reassembled.

Reinstallation notes:

1. Be sure to press each wire into the holes on the new LED socket cap until they are locked in place. Try pulling each wire back out after inserted, if they will not come out, they are inserted correctly.

Changing the Optional UV Lamp

The UV Lamp is an optional feature and may not be found on all models.



THE UV LAMP IN THIS PRODUCT CONTAINS MERCURY

Manage in accordance with local disposal laws. DO NOT place lamps in trash. Dispose as a hazardous waste. For information regarding safe handling, recycling and disposal, consult www.lamprecycle.org

CETTE LAMPE (UV) DANS CE PRODUIT CONTIENT DU MERCURE

Éliminez ou recyclez conformément aux lois applicables. Pour de l'information concernant des pratiques de manipulation sécuritaires et l'élimination sécuritaire et le recyclage, veuillez consulter www.lamprecycle.org

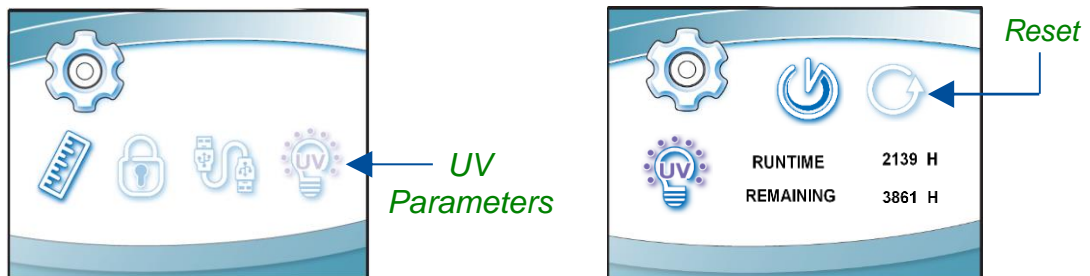


For optimum performance, the UV lamp should be changed as indicated by the UV lamp hourmeter found on the LCD Display in the *Settings* submenu.

The UV lamp and the work area of the cabinet must be thoroughly decontaminated before removing the lamp.



1. Start the cabinet blower and let it operate for 5 minutes.
2. Raise the sash to its full open position.
3. Thoroughly surface decontaminate the UV lamp and the work area of the cabinet.
4. Unplug the cabinet from all electrical power.
5. Remove the UV lamp by rotating it 90 degrees and lifting it straight up and out of its sockets.
6. Install new lamp by reversing the removal procedure.
7. Reset the UV Hourmeter as follows:



In the *Settings* submenu enter *UV Parameters*, then select *Reset*, press **[OK/MUTE]**. The hour text will begin to flash, hold **[OK/MUTE]** for 3 seconds.

UV Lamp Socket Replacement

If a lamp socket for the UV lamp is damaged and needs to be replaced, follow these instructions.

1. Start the cabinet blower and let it operate for 5 minutes.
2. Raise the sash to its full open position.
3. Thoroughly surface decontaminate the UV lamp and the work area of the cabinet.
4. Remove the UV lamp by rotating it 90 degrees, then lift it straight up to free it from the sockets.
5. Use a #1 Phillips screwdriver to remove the screw by the defective socket.
6. Rotate the defective socket and pull it out of the cutout in the baffle.
7. Disconnect the two wire connections, and treat the defective socket as contaminated biohazardous waste when disposing of it.
8. Install the new socket.

Type B2 Prefilter Replacement

A Type B2 biosafety cabinet has a prefilter on top of the cabinet, to the left of the electronics module. This prefilter removes large particulate from the room air drawn into the biosafety cabinet by the supply blower. When this prefilter becomes loaded with particulate, replace it as follows.



Note: The prefilter is not washable, it must be replaced when dirty.

1. Turn off the biosafety cabinet's blower.
2. Following all facility safety requirements, use a step ladder to access the prefilter atop the biosafety cabinet.
3. Remove the two thumbnuts that hold the prefilter in place. See Figure 12-46.

Figure 12-46



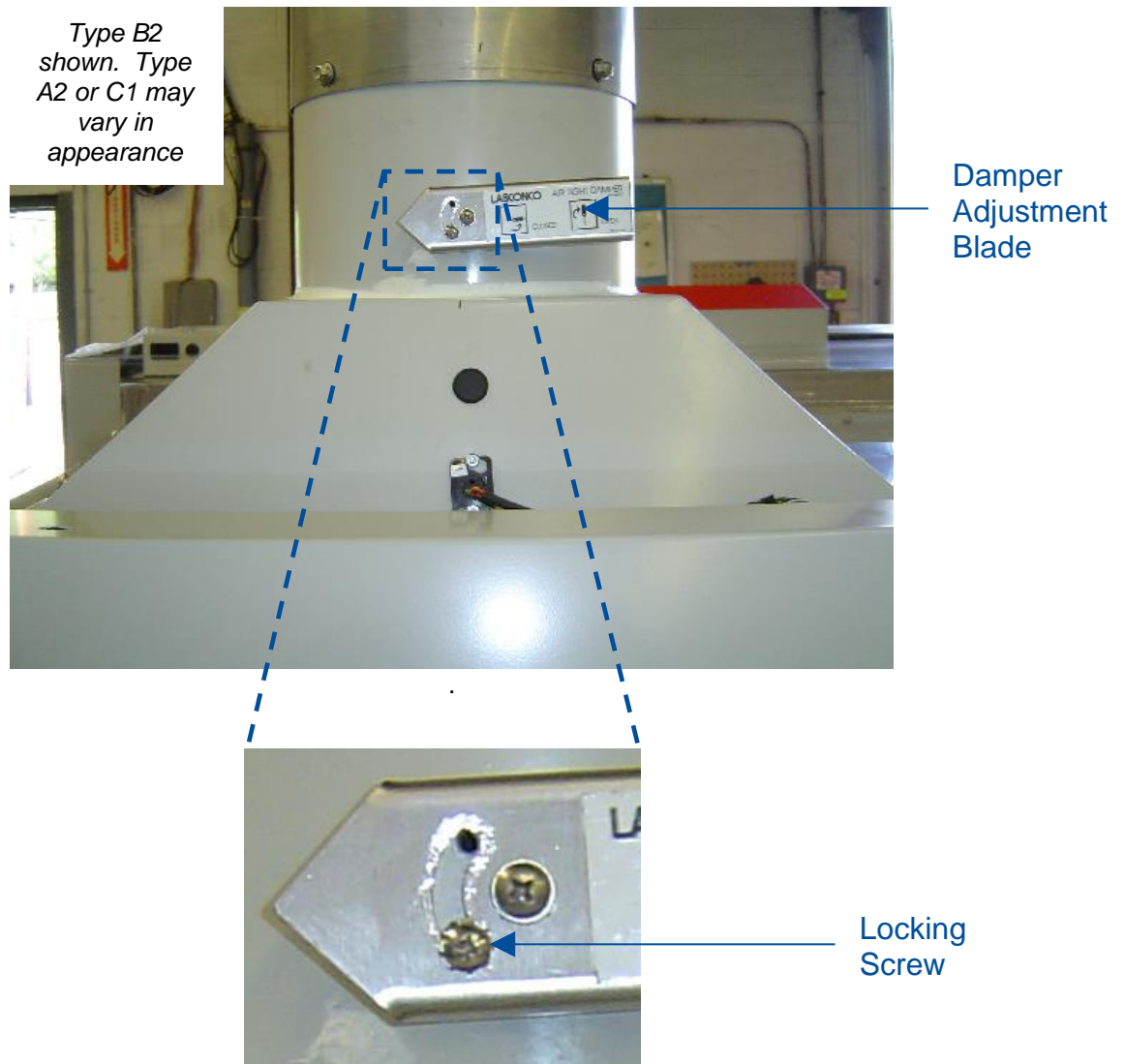
4. Remove and replace the prefilter.

Air-Tight Damper Adjustment

An air-tight damper is integral to the exhaust housing on a Type B2 biosafety cabinet. It may also be used on a Type A2 or C1 that is connected to a remote (building) exhaust system. The air-tight damper is used to adjust the remote exhaust system airflow drawn from a particular biosafety cabinet to fine-tune the exhaust flow to meet the model's requirements. A remote exhaust connected Type A2 will require the Ventus Canopy Connection Kit installed for the air-tight damper to be installed above it. To adjust airflow on a Labconco air-tight damper follow these instructions.

1. Locate the damper adjustment blade (see Figure 12-47) on the air-tight damper.
2. Using a #2 Phillips screwdriver, loosen the locking screw on the damper adjustment blade. Adjust the damper blade to allow more or less exhaust air to the biosafety cabinet as needed. Retighten the locking screw.

Figure 12-47



Preparing the Biosafety Cabinet for Gaseous Sterilization



Note: This section only reviews the steps required for preparing the biosafety cabinet for gas sterilization. Thoroughly understand the sterilization procedures and protocols supplied by the manufacturer of the sterilizing system before attempting this operation.

1. Consult the sterilization equipment manufacturer to determine if the biosafety cabinet's internal blower(s) should be on or off during the sterilization process.
2. Thoroughly surface decontaminate the working area of the cabinet.
3. Remove the work surface after it has been surface decontaminated.
4. Remove the front grille.
5. Place the work surface and the grille into the work area for decontamination.
6. Remove the front dress panel.
7. Remove the sash stop bracket, located near the top of the blower plenum cover.
8. Lift the sash up until the bottom edge of the sash clears the bottom edge of the Supply HEPA Filter shelf.
9. Using flexible plastic sheet 5-8 mil thick and duct tape, seal the perimeter of the front opening. If you wish to connect the sterilizer's discharge tube to the biosafety cabinet's Upstream Sampling/Decontamination Tube, it is located by the towel catch.
10. Open the exhaust filter cover.



Note: DO NOT attempt to remove the brackets that secure the exhaust filter cover; they are needed to maintain rigidity on the top of the chassis.

11. Using flexible plastic sheet and duct tape, seal the exhaust filter opening.
12. The biosafety cabinet is now prepared for gaseous decontamination.

Service Fixture Installation & Service Connection

Service fixtures are not pre-installed on all models. If connecting a service line to a pre-installed fixture, or installing a service fixture on the biosafety cabinet, follow these instructions. The field install service fixture kit contains additional installation instructions.



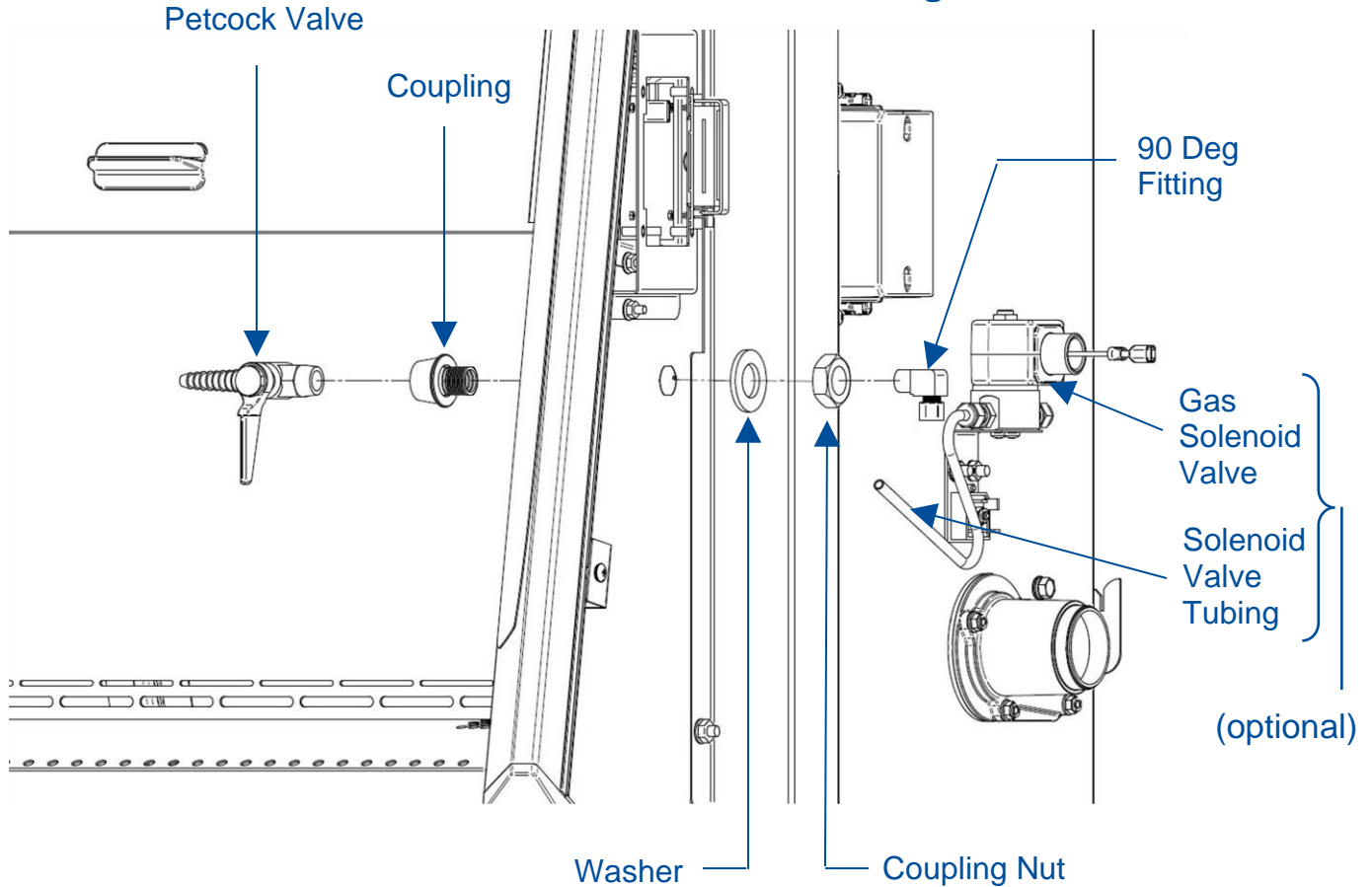
Note: Some models have a solenoid valve connected to the service valve on the right side, rear position. The solenoid prevents gas from flowing to the service valve when the cabinet's blower is off, or there is a loss of electrical power. It is the only service valve position that can be fitted with a solenoid valve. Connect the gas service to the solenoid valve. The tubing between the service fixture and the solenoid valve is provided.

If service fixture is already installed, proceed to Step 9. Reference Figure 12-48 for the procedure below.

1. Remove the right or left side panel based on which side the service fixture is to be located, as described in [External Dress Panel Removal](#) earlier in this section.
2. Identify the appropriate knockout plug on the biosafety cabinet (2 per side are provided on standard models). Using a large, flat blade screwdriver and hammer, remove the knockout by placing the screwdriver on the top or bottom of the plug, strike the screwdriver with the hammer. Repeat alternating between the top and bottom until the plug is loose enough to remove with pliers.
3. Using PTFE pipe thread tape on the male threads of the petcock valve, install the coupling onto the male threads of the petcock valve. Tighten fully.
4. Apply a thin coat of silicone around the knockout opening on the OUTSIDE of the cabinet wall. Apply PTFE pipe thread tape on the male threads of the coupling.
5. Insert the male threads of the coupling through the knockout opening, slide the washer (from the OUTSIDE) over the male threads of the coupling. Install the coupling nut hand-tight.
6. Rotate the petcock valve to position the handle as desired for user operation of the valve. Fully tighten the coupling nut.
7. Apply PTFE pipe thread tape on the male threads of the 90 degree fitting. Install the male threads of the 90 degree fitting into the female threads of the coupling. Tighten fully, taking care to position the compression end of the 90 degree fitting in the proper position to accept the customer-supplied tubing. Note: if a gas solenoid valve is ordered, the tubing between the 90 degree fitting and the solenoid is Labconco supplied.

- Close the petcock valve and leak check all connections with an inert gas and appropriate detector. If a leak is found, tighten the appropriate fitting connection further.

Figure 12-48



- Ensure the customer-supplied service line tubing is $\frac{1}{4}$ inch O.D., soft metal, and that the end has been completely deburred.
- Route the tubing from the rear or bottom of the cabinet, ensuring that it will line up with the slot in the rear or bottom of the side panel. The rear slot is located from $8\frac{3}{4}$ to $11\frac{1}{4}$ inches (222 to 288 mm) from the bottom of the cabinet.



Note: Make sure that the tube routing will not contact any electrical wires. DO NOT loop service line tubing within the side panels of the cabinet.

- Make sure the compression nut on the 90 degree fitting is loose, but do not remove it. Verify the tubing ferrule is in the fitting (just behind/inside the compression nut).

12. Push the tube into the fitting until it is properly seated. The tube will go approximately $\frac{3}{4}$ inch (19 mm) into the fitting when properly seated.
13. Tighten the 90 degree fitting compression nut hand-tight and then, using a $\frac{7}{16}$ -inch wrench, tighten it at least $\frac{3}{4}$ turn more.
14. Close the service valve in the cabinet and then slowly open the shutoff valve on the service valve. Test all fittings for leakage. Tighten the tube nut slightly if needed.

13: Electrical Components

This section details the electrical components found on the biosafety cabinet.

Electronics Module

The electronics module is located on the top, right side of the biosafety cabinet. To access the module, follow these instructions.

1. Remove all power from the biosafety cabinet by unplugging the power cord.
2. Using a 7/16-inch socket or nut driver, remove the three nuts holding the module to the top of the biosafety cabinet. Two nuts are on the rear edge of the module, and one nut is on the left edge of the module.
3. Tip the module on its side, and secure it.

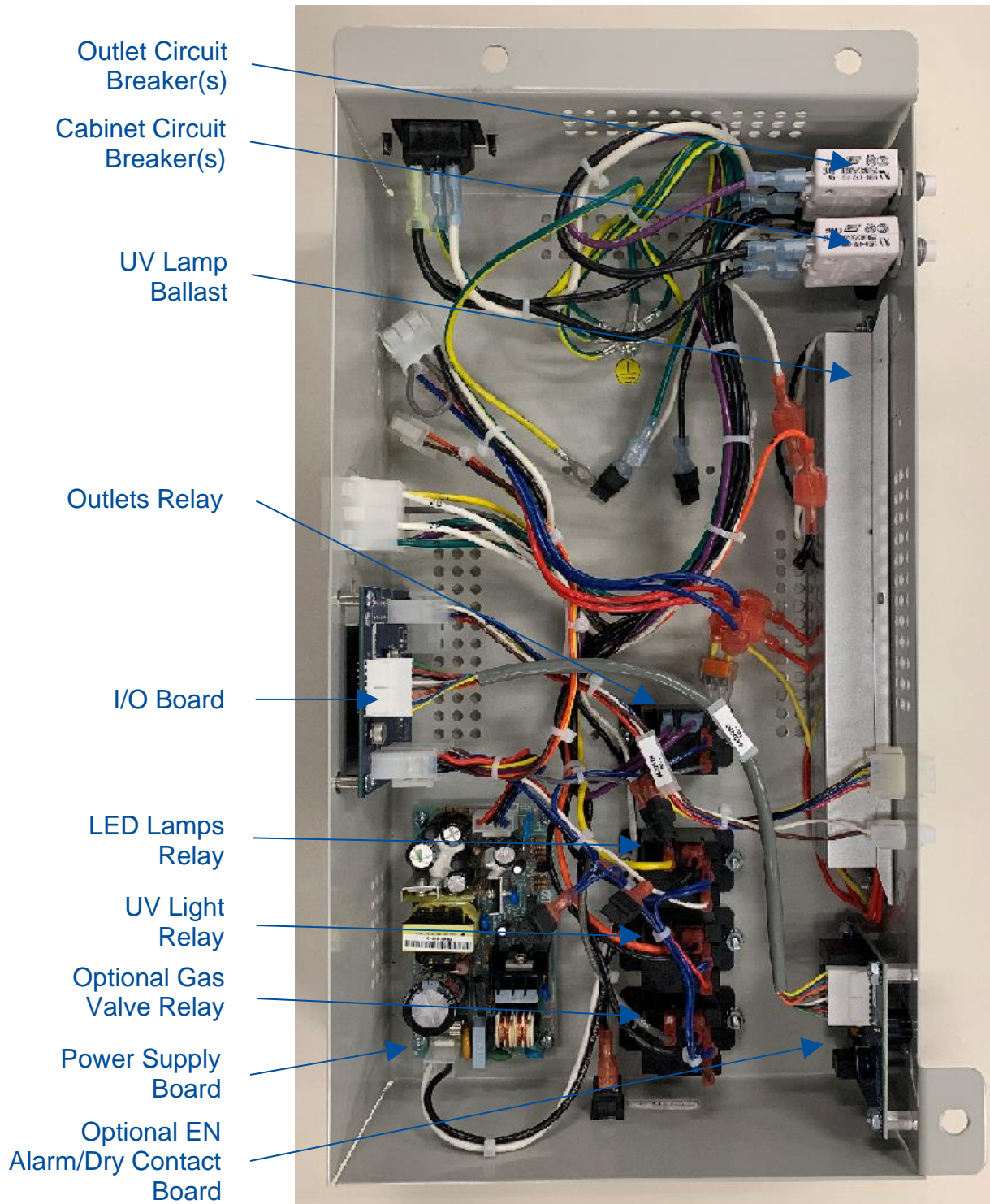
To completely remove the electronics module, follow these instructions.

1. Remove all power from the biosafety cabinet by unplugging the power cord.
2. Using a 7/16-inch socket or nut driver, remove the three nuts holding the module to the top of the biosafety cabinet. Two nuts are on the left edge of the module, and one nut is on the rear edge of the module.
3. Open the right side panel, and disconnect all wire harness connectors on the right side of the electronics module.
4. Tip the module on its side, and secure it. Locate the green/yellow ground wire towards the rear of the module. It is still connected to the top of the biosafety cabinet with a ground nut. Using a 7/16-inch socket or nutdriver, remove the ground nut and free the ring terminal connected to the end of the green/yellow wire.
5. Remove the electronics module.

Electronic Module Components

The electronics module contains the circuit breakers, AC relays, power supply board, transition I/O board, EN Alarm/Dry Relay Contact (optional), and UV lamp ballast (optional). These components are identified in Figure 13-1.

Figure 13-1



Resetting a Circuit Breaker

Should an over current situation arise during normal operation, the circuit breakers located on the left side of the electronics module will trip, protecting the cabinet from damage.

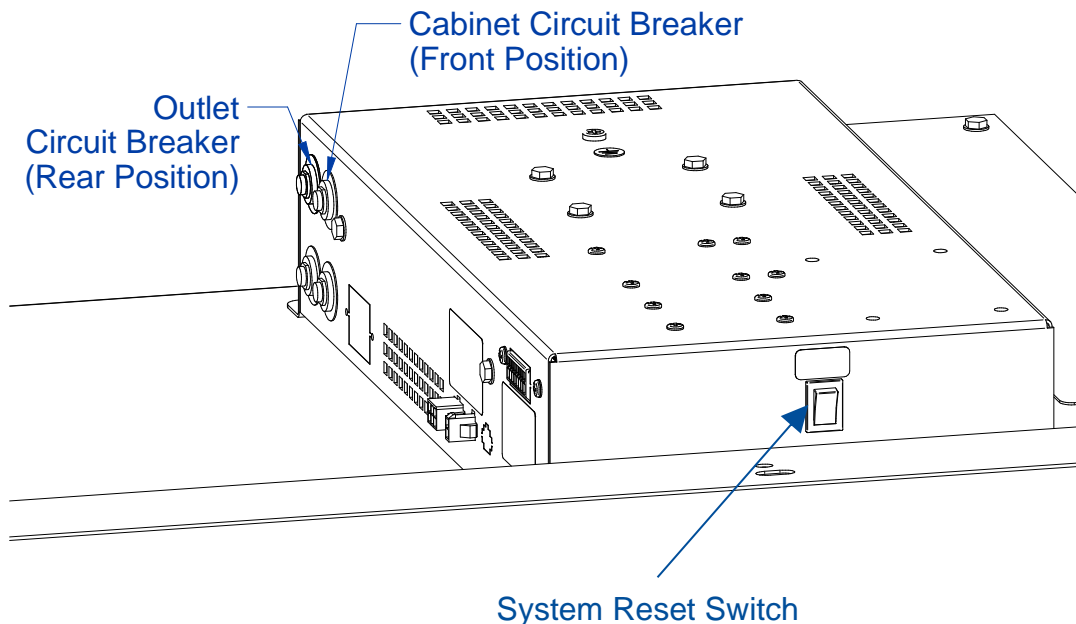
The biosafety cabinet offers internal outlets to power small devices inside the cabinet. The internal outlets are protected by one circuit breaker (two circuit breakers on 230v models), and the cabinet electronics are protected by a different circuit breaker (two different circuit breakers on 230v models). This allows the cabinet to continue to operate, providing protection to the product and user, should a device connected to an internal outlet experience an over current situation.

If the internal outlets do not have power when the **Outlet** icon is displayed on the Home Screen, reset the appropriate circuit breaker(s) as shown in Figure 13-2. The outlet circuit breaker(s) are in the Rear Position(s).

If the cabinet does not have power when the System Reset Switch (Figure 13-2) is on, reset the appropriate circuit breaker(s) as shown in Figure 13-2. The cabinet circuit breaker(s) are in the Front Position(s).

The thrown circuit breaker will be easy to identify, as the white barrel will be extended further than the other circuit breaker(s). To reset, simply push it in.

Figure 13-2



Power Supply Board

The power supply board converts the AC voltage supplied through the power cord to DC voltage to power the relays and microprocessor. It is an open-frame, dual output (5VDC and 12VDC) voltage power supply. If the power supply board is not operational or defective, the LCD Display will not power on, and the biosafety cabinet will not function.

The power supply board contains an integral fuse rated at 2.5 amps at 250VAC. It is a 5 x 20 mm barrel fuse. See Figure 13-3.

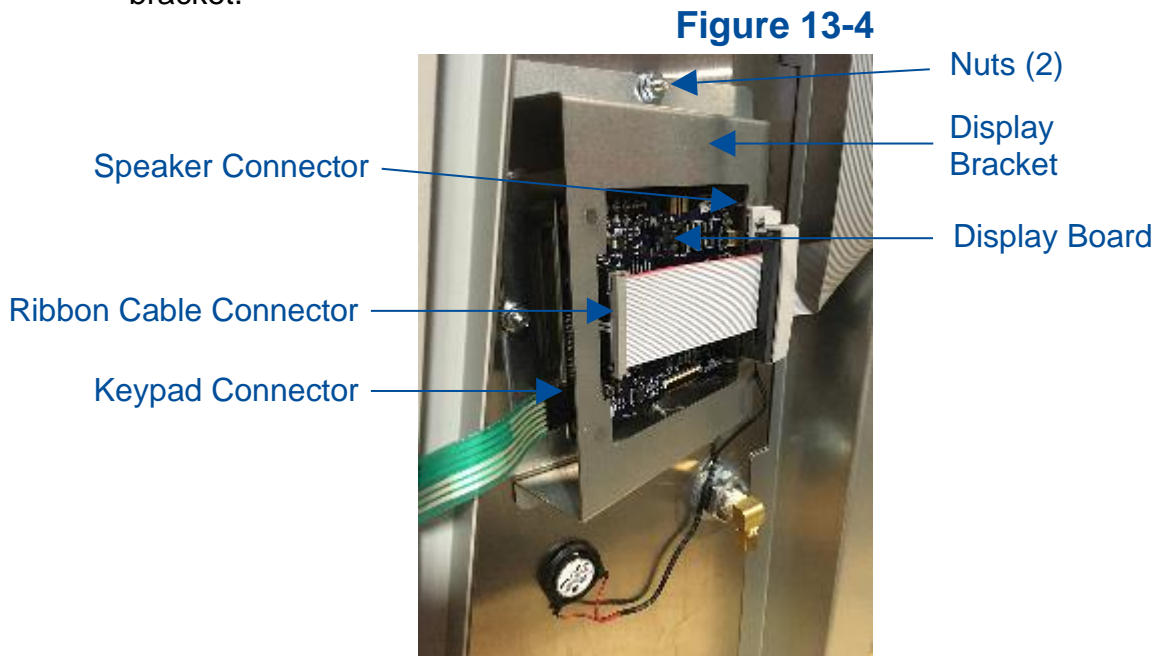
Figure 13-3



Display Board

The LCD display and circuit board assembly contain the microprocessor which controls all functions of the biosafety cabinet. The data ribbon cable, keypad cable, and speaker cable all connect to the display board. To replace the display board, follow these instructions.

1. Open the right side panel as described in [Removal of External Dress Panels in Section 13](#).
2. Disconnect the three wire connections to the display board, see Figures 13-4 and 13-5 for reference. **Note:** Speaker connector easier to remove after Step 3.
3. Using a 3/8-inch socket or nut driver, remove the two nuts securing the display bracket. See Figure 13-4 for reference. The display board is attached to the display bracket, and will come with the display bracket. Remove the display bracket.

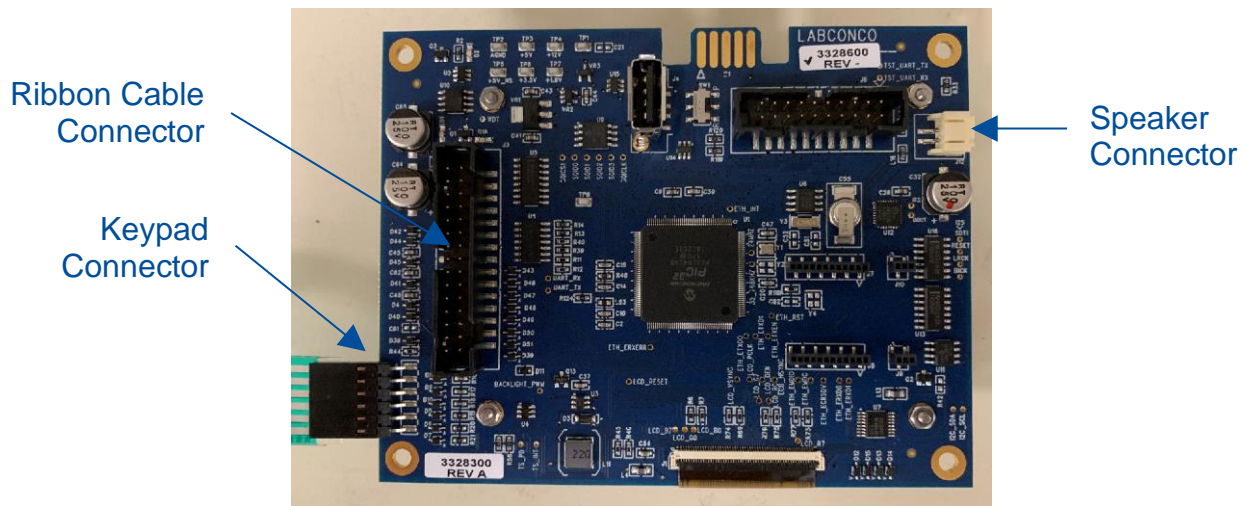


4. Using a #2 Phillips screwdriver, remove the four (4) screws holding the display board to the display bracket.

Reinstallation Notes:

1. When reconnecting the keypad connector to the display board, it can be assembled correctly or backwards. The correct orientation is for the visible silver connectors on one side of the keypad connector to face away from the LCD display screen on the display board. See Figure 13-5 for reference.

Figure 13-5

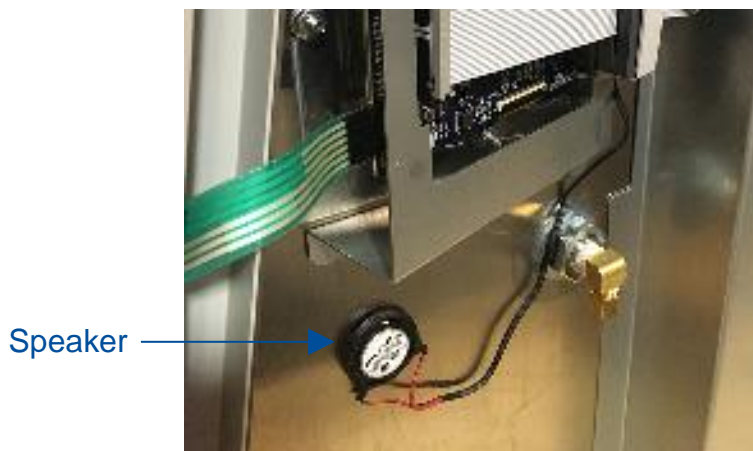


Speaker

The speaker produces all audible alarms and tones. It connects to the display board. To replace the speaker, follow these instructions.

1. Disconnect the speaker wire connector from the display board. See Figure 13-4.
2. Using a putty knife, or similar instrument, dislodge the speaker from the biosafety cabinet's liner. See Figure 13-6 for reference.
3. If the adhesive holding the defective speaker to the liner wall is too difficult to remove, the defective speaker can be left in place, and the new speaker adhered next to it.

Figure 13-6



Blower Motor

The blower motor(s) on the biosafety cabinet require a power connection (with AC voltage) and a data connection. The AC power supplied to the motor electronic module is converted to DC inside the motor. The motor is an ECM (electronically commutated motor), which is a brushless DC motor. The electronics head is programmed by Labconco for each particular model to operate in constant volume to deliver correct airflows even as the HEPA filter loads with particulate. If troubleshooting a non-responsive blower motor, use the following information.



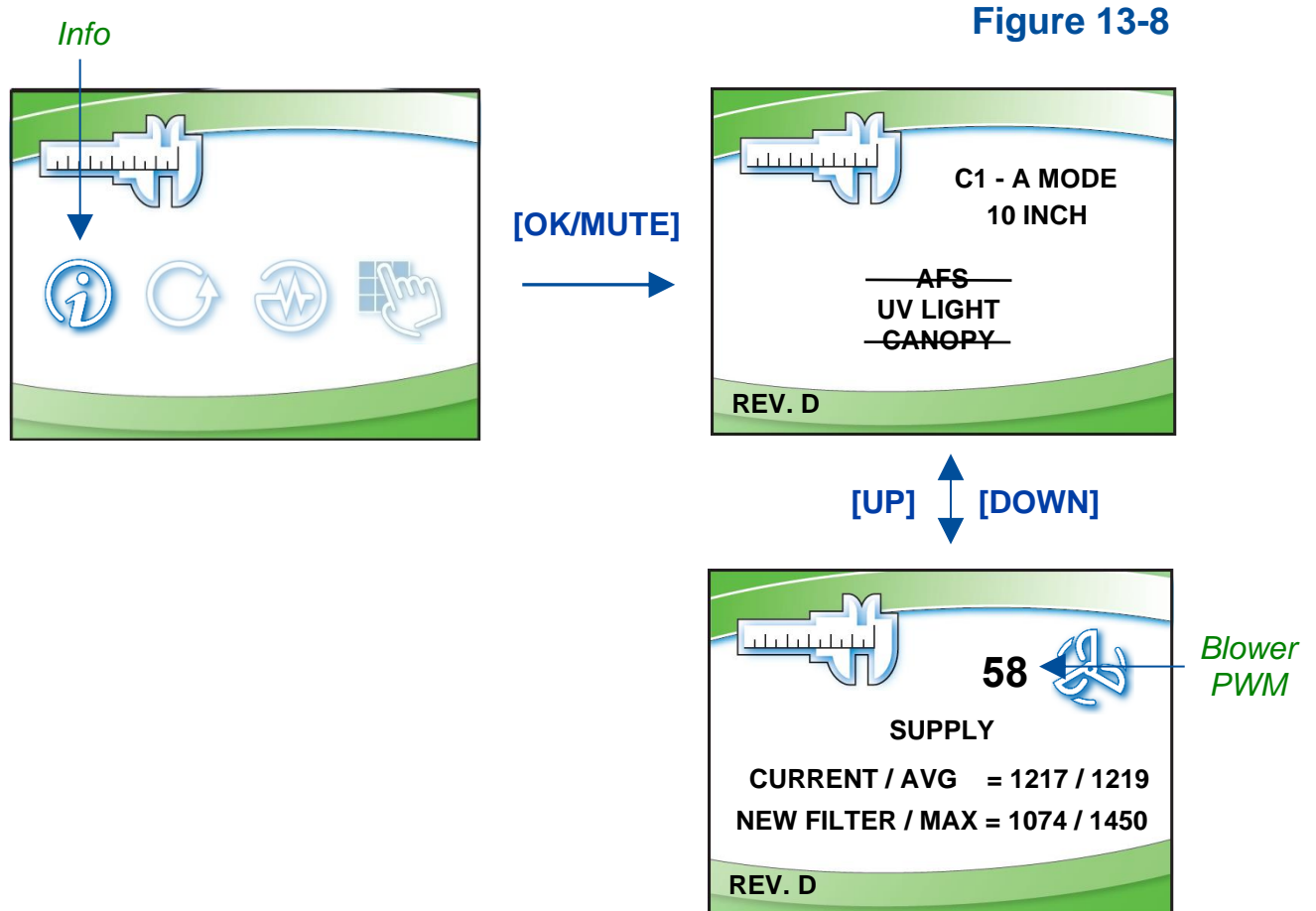
In order to confirm proper voltage presence on the motor, the biosafety cabinet must have power supplied to it. Take extra care when testing these wires to avoid electrical shock.

1. The following wiring information lists each wire color as it enters the motor. Since the motor is in a contaminated area of the biosafety cabinet, it may be desired to trace these wires back to the top electronics module to verify voltages without opening the contaminated areas of the biosafety cabinet.
 - a. The AC line voltage supplied to the biosafety cabinet (100v, 115v, or 208/230v) should be present on the power connector across pins 4 (black wire) and 5 (white wire).
 - b. 24VDC should be present on the data connector across pins 1 (brown) and 15 (yellow).
 - c. A pulse width modulation signal (PWM) should be present on the data connector across pins 1 (brown) and 10 (purple).

Figure 13-7



- To verify the PWM measured in step 1 c (above) is correct, access the *Tools* submenu from the display. Follow the steps in Figure 13-8 to identify the PWM signal the microprocessor is sending to the blower motor.

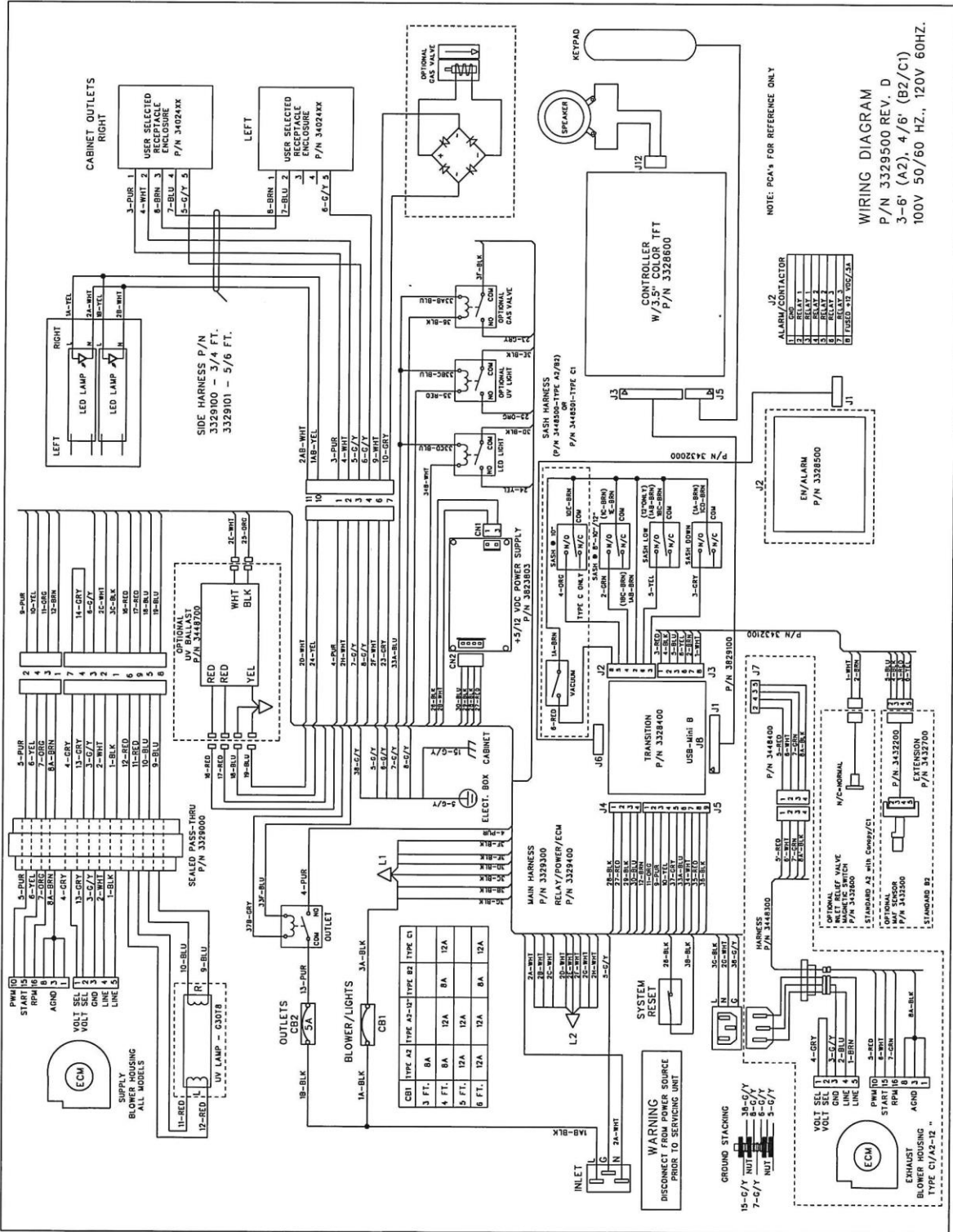


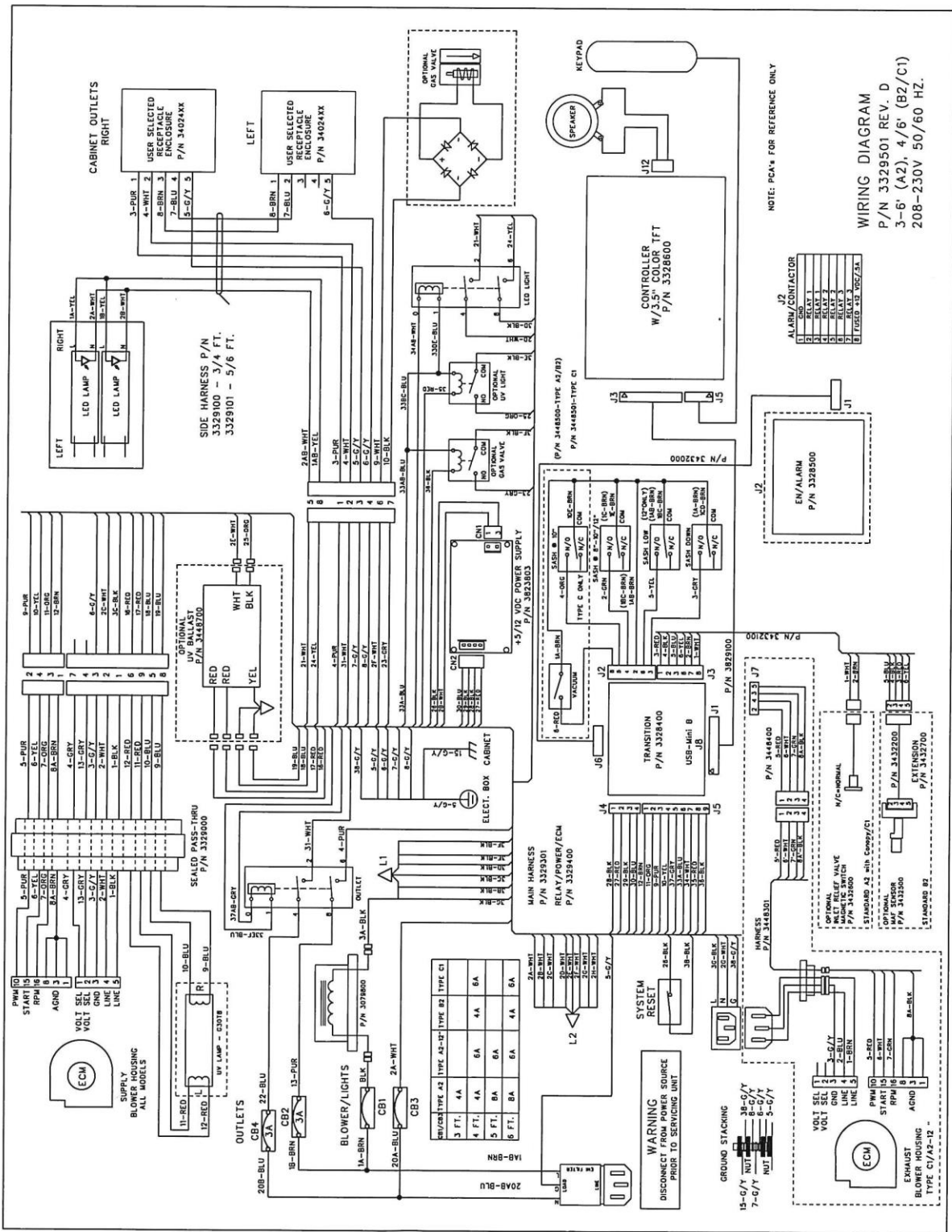
- Divide the PWM voltage measured in step 1 c (above) by the DC voltage measured in step 1 b (above). For example, 13.7 volts measured across pins 1 & 10 (PWM line), and 23.7 volts measured across pins 1 & 15. $[13.7] / [23.7] = 0.58$. This means the PWM signal is $0.58 = 58\%$. The *Blower PWM* value displayed under the *Info* screen (above) should match this calculated value.

Wiring Diagrams

The wiring diagram is also located on the blower/plenum cover behind the dress panel.

100-115V

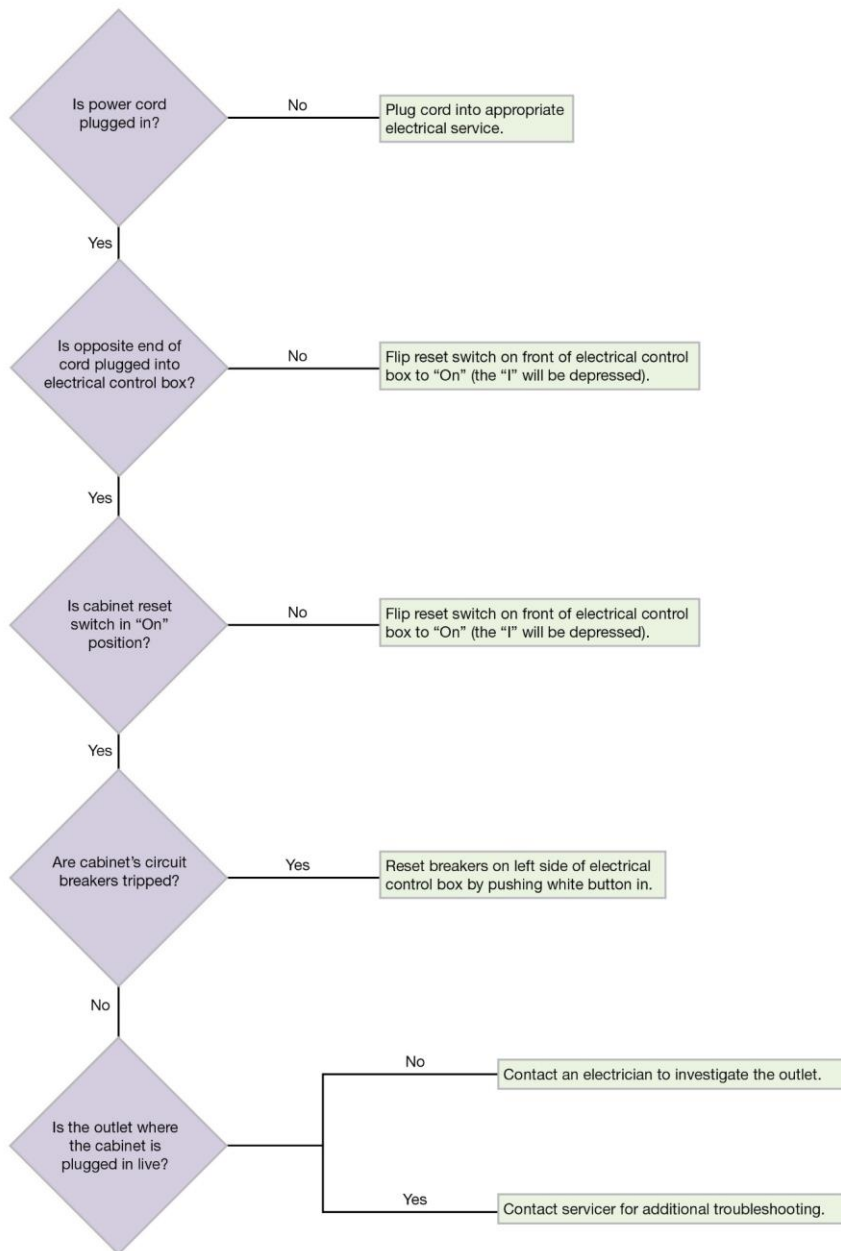




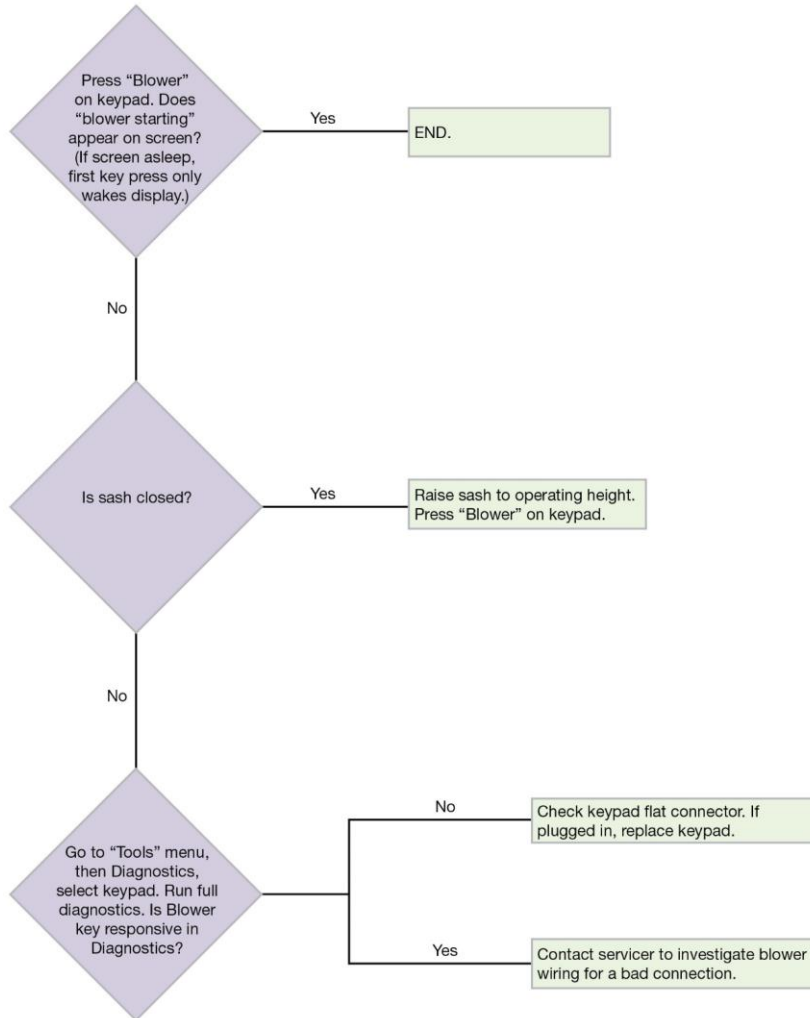
14: Troubleshooting

This section details common troubleshooting for the biosafety cabinet.

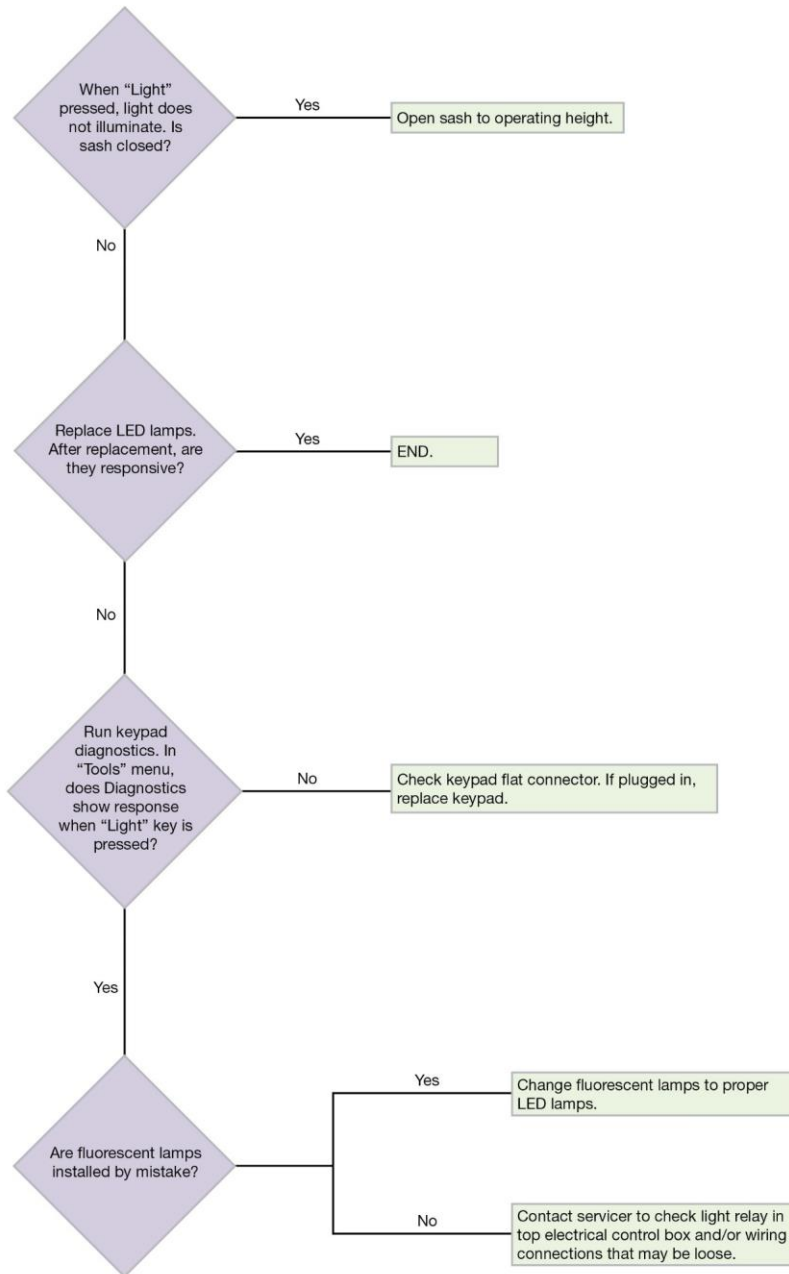
Blower and Lights not working



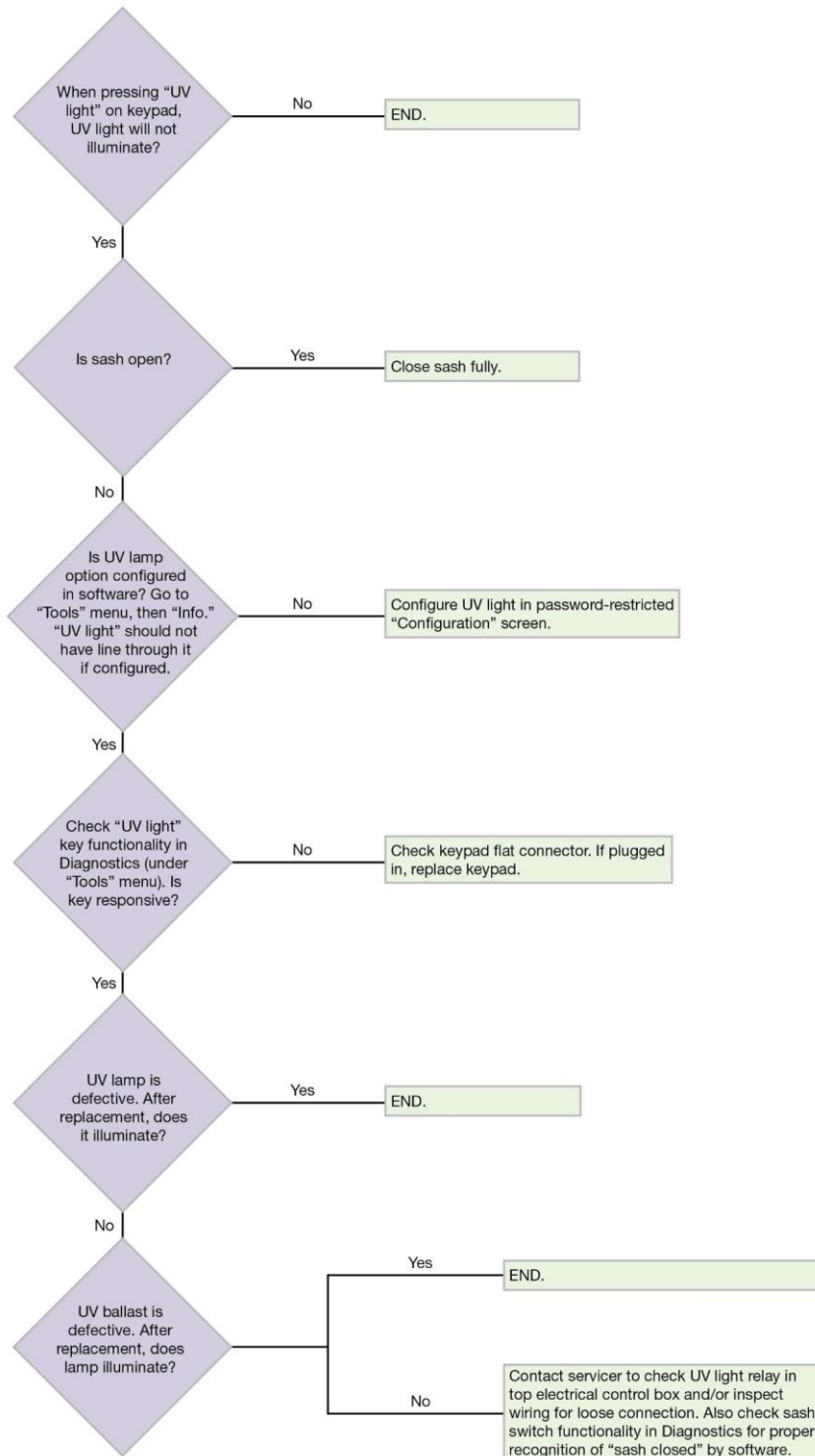
Blower only will not start



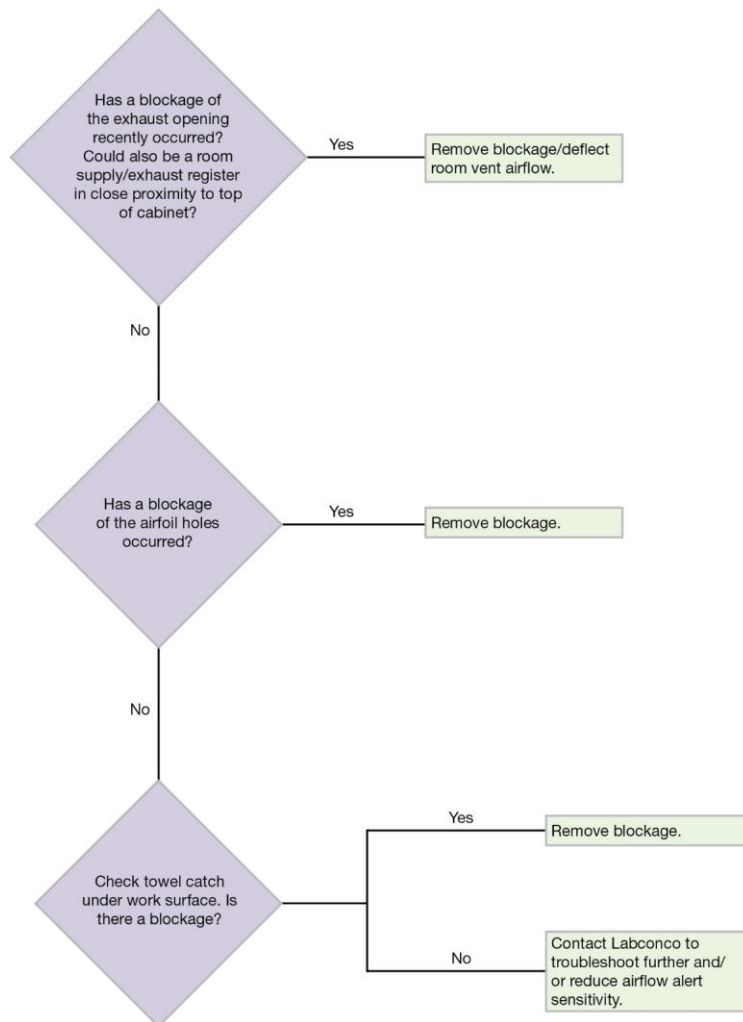
Lights only will not illuminate



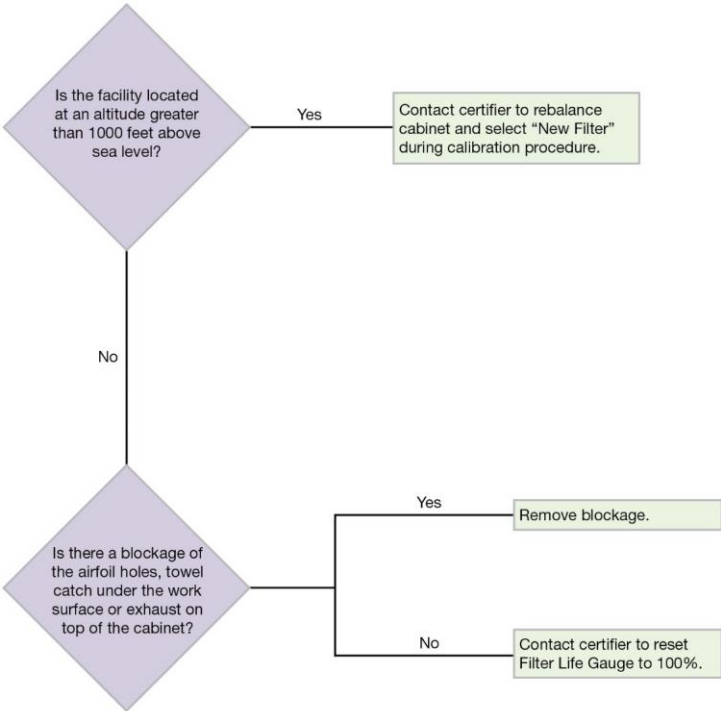
UV Light will not illuminate



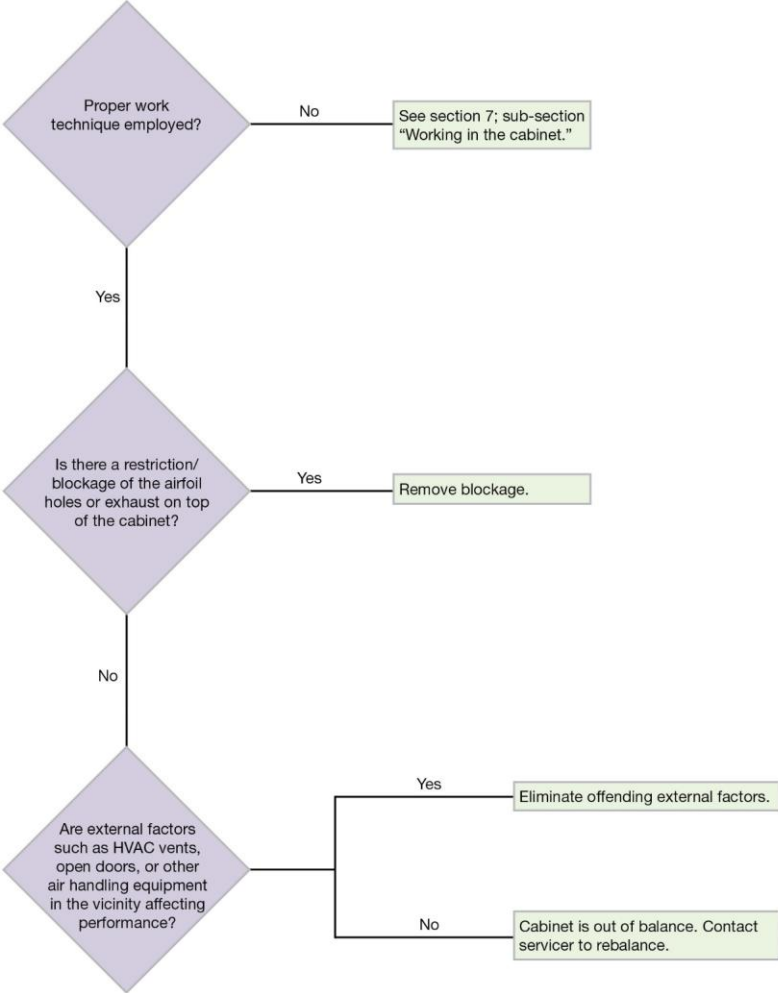
Airflow Alert activating



Filter Life Gauge not at 100% when new



Contamination in the work area



15: Diagnostics

This section details diagnostic functions available through the software of the biosafety cabinet.

Sash Sensors

1. From the Home Screen, press **[MENU]**.
2. Press **[UP]** to select the *Tools* option.
3. Press **[OK/MUTE]** to enter the submenu.

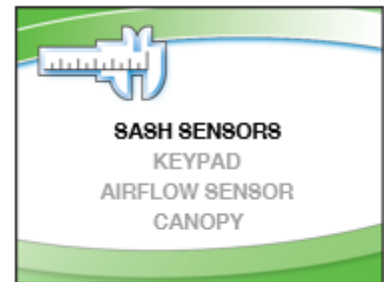


4. Press **[DOWN]** until the *Diagnostics* option is highlighted, then **[OK/MUTE]** to enter the submenu.

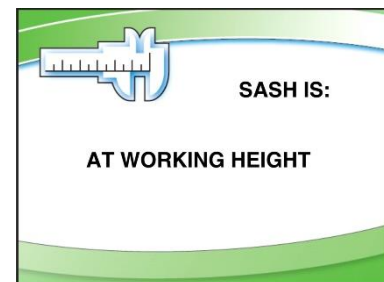


5. The *Sash Sensors* option is the first option, press **[OK/MUTE]** to enter Sash Sensor diagnostics.

Note: If the blower is on when entering the Sash Sensor Diagnostic screen, it will automatically turn off.



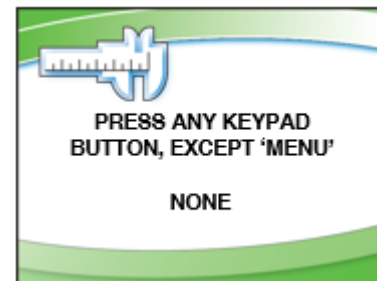
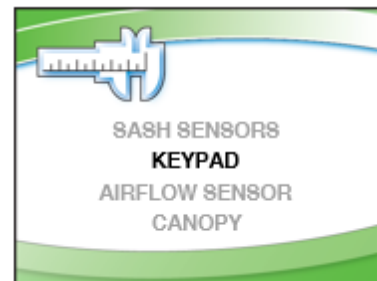
6. Slowly raise the sash from fully closed to open. When closed, the screen will report *CLOSED*. Below or above the proper sash height, the screen will report *NOT AT WORKING HEIGHT*. At the proper sash height (+/- 0.75 inches), the screen will report *AT WORKING HEIGHT*. Type A2 12-inch and C1 will also report *ALMOST CLOSED* when sash 2-3 inches (5-8 cm) above closed.



7. Press **[MENU]** to return to the Diagnostic submenu.

Keypad

1. From the Home Screen, press **[MENU]**.
2. Press **[UP]** to select the *Tools* option.
3. Press **[OK/MUTE]** to enter the submenu.
4. Press **[DOWN]** until the *Diagnostics* option is highlighted, then **[OK/MUTE]** to select the submenu.
5. Press **[DOWN]** to select the *Keypad* option, press **[OK/MUTE]** to enter Keypad diagnostics.
6. Press and hold the keypad button to be tested. When pressed, the corresponding icon is displayed on the screen. When no buttons are pressed, *NONE* will appear.
7. Press **[MENU]** to return to the Diagnostic submenu.

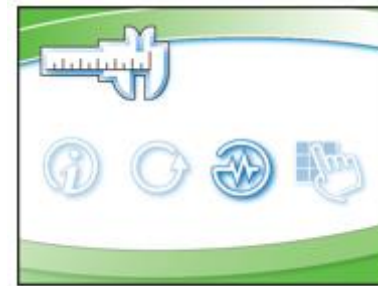


Airflow Sensor (optional)

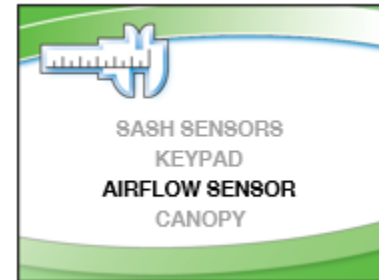
1. From the Home Screen, press **[MENU]**.
2. Press **[UP]** to select the *Tools* option.
3. Press **[OK/MUTE]** to enter the submenu.



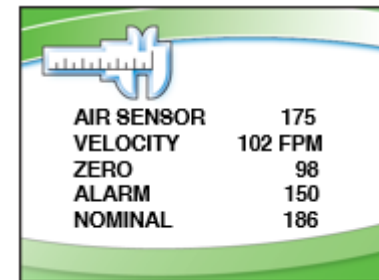
4. Press **[DOWN]** until the *Diagnostics* option is highlighted, then **[OK/MUTE]** to enter the submenu.



5. Press **[DOWN]** until the *Airflow Sensor* option is highlighted, then **[OK/MUTE]** to enter Airflow Sensor diagnostics.



6. The display shows the status of the airflow sensor in the following order:
 - current sensor output in millivolts,
 - current inflow, corrected for the display
 - zero set-point in millivolts
 - alarm set-point in millivolts
 - nominal (105 FPM or 0.53 m/s) output in millivolts.



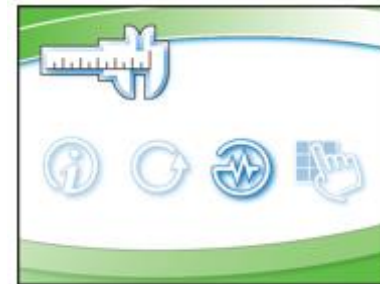
7. Press **[MENU]** to return to the Diagnostic submenu.

Canopy (optional)

1. From the Home Screen, press **[MENU]**.
2. Press **[DOWN]** to select the *Tools* option.
3. Press **[OK/MUTE]** to enter the submenu.

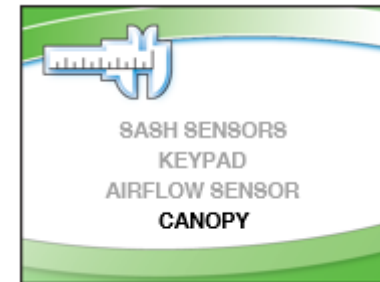


4. Press **[DOWN]** until the *Diagnostics* option is highlighted, then **[OK/MUTE]** to enter the submenu.



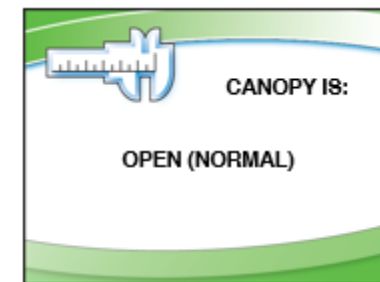
5. Press **[DOWN]** until the *Canopy* option is highlighted, then **[OK/MUTE]** to enter Canopy diagnostic.

NOTE: Type B2 cabinets will not display *Canopy*, because they cannot have a canopy.



6. The display shows the status of the Canopy Inlet Valve. During normal operation, it will be *OPEN*; during a canopy alarm, it will be *CLOSED*.

NOTE: The Canopy Inlet Valve position is OPPOSITE the magnetic switch condition used to detect the Inlet Valve position! – WHEN THE INLET VALVE IS OPEN (NORMAL), THE MAGNETIC SWITCH IS CLOSED (completes the electrical circuit).

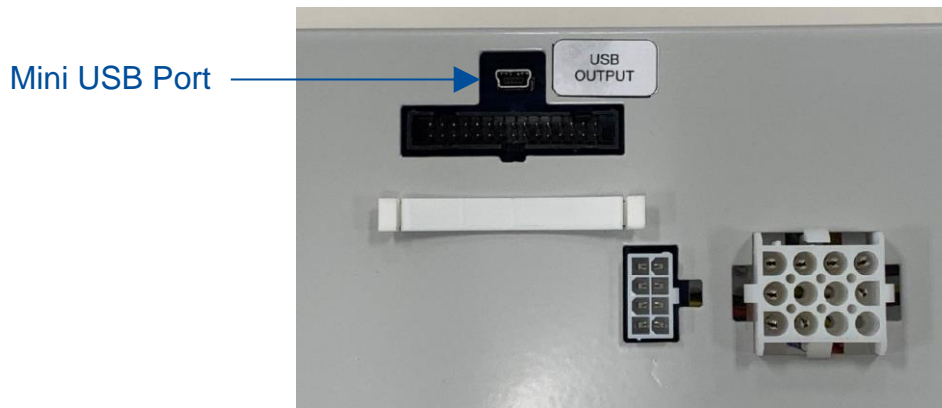


7. Press **[MENU]** to return to the Diagnostic submenu.

16: BMS Data Output Connection

The operation of the Logic+ Biosafety Cabinet can be monitored using a computer connected to the mini USB port on the side of the electronics module on top of the cabinet (see Figure 16-1). The remotely connected computer can monitor the cabinet, but not control the cabinet.

Figure 16-1



Connection Type

To connect to the mini USB port on the cabinet, a **mini USB A** connector is required (see Figure 16-2).

Figure 16-2



Data Output Format

To correctly receive data output from the Logic+ cabinet, set the following communication configurations on the receiving computer:

1. Data Rate = 9600 Baud
2. Word Length = 8-Bit
3. 1 Start Bit, 1 Stop Bit
4. No parity is transmitted
5. Standard ASCII character set

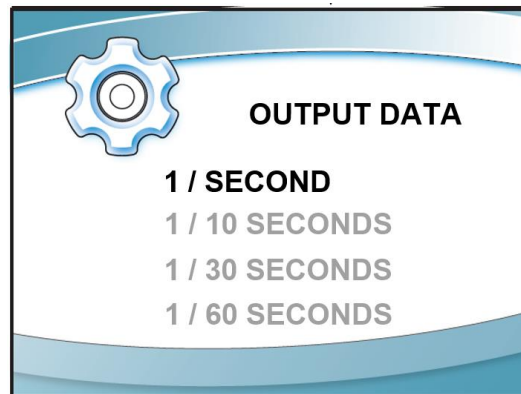


Note: The mini USB port on the biosafety cabinet does not supply power, it only transmits data.

Data Output Rate

Status data is broadcast whether a recipient is receiving or not. The rate at which status data is broadcast is variable through the *Settings* submenu of the biosafety cabinet display (see Figure 16-3).

Figure 16-3



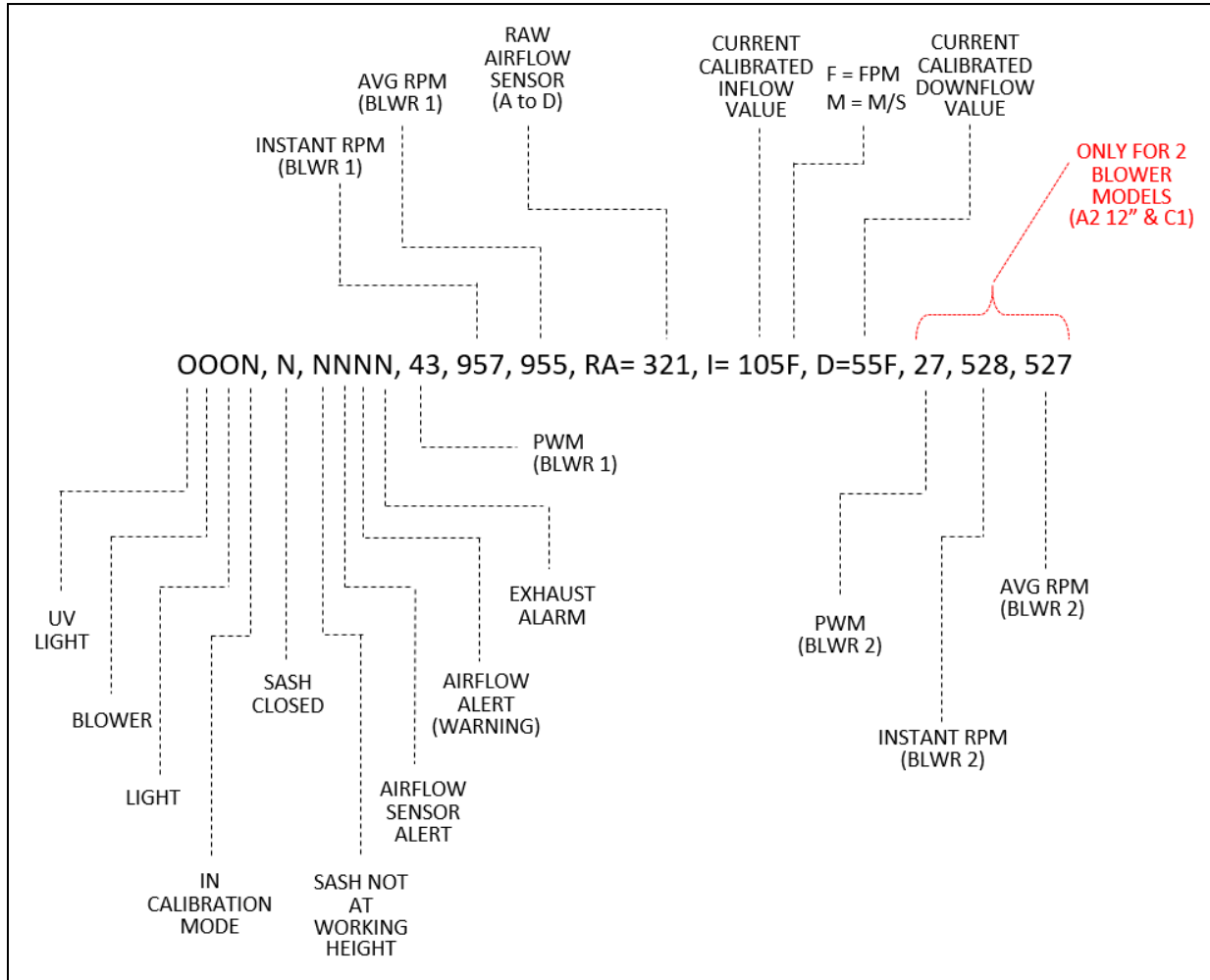
Output rate options are:

- Once per second
- Once every 10 seconds
- Once every 30 seconds
- Once every 60 seconds

Data Output String Definition

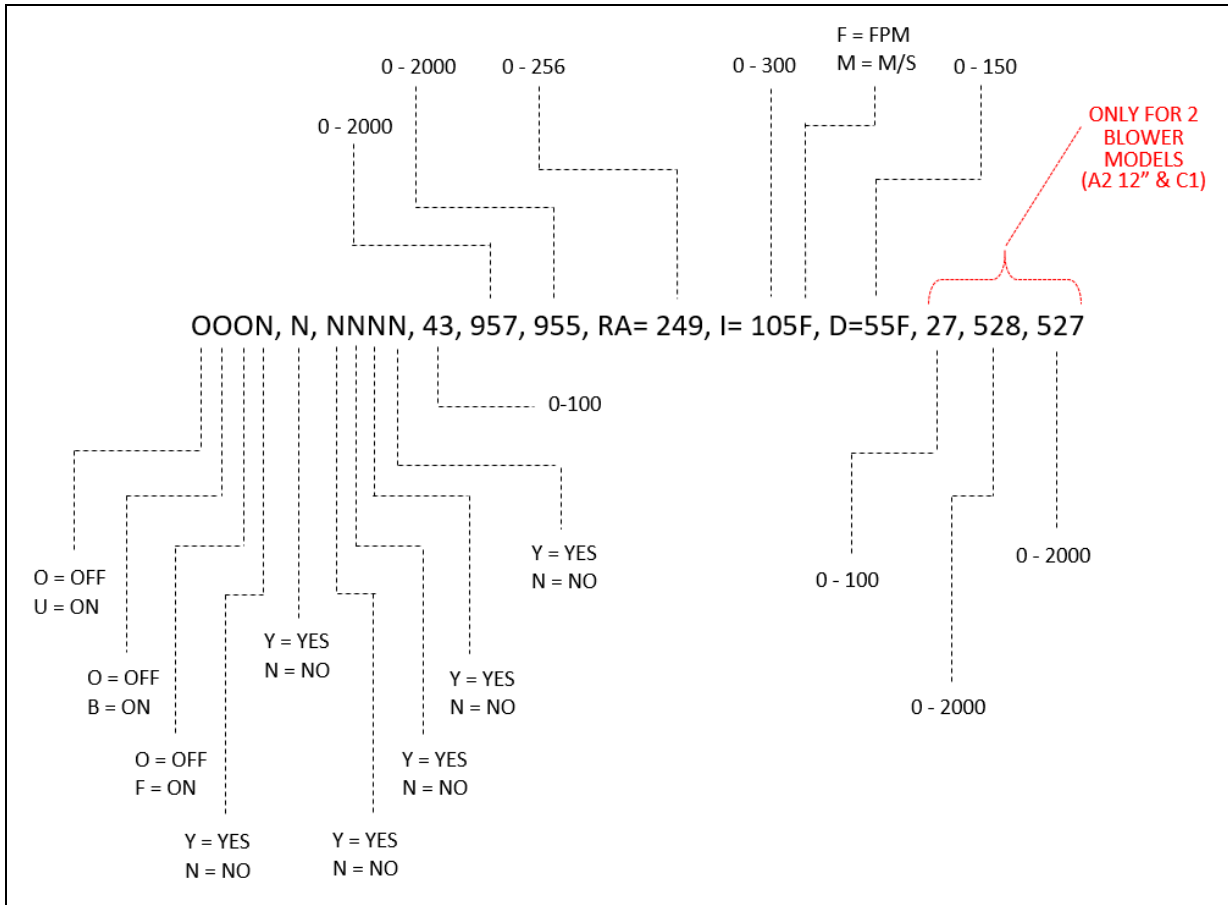
The data string is limited to 80 characters, including spaces and commas. Use Figure 16-4 to understand the character significance.

Figure 16-4



See Figure 16-5 on the following page for each character field's value range.

Figure 16-5



Data Output Software Requirements

There are several commercially available software packages, which can read RS232-type data and enter the data into a computer program such as a word processor (to create a text file) or spreadsheet (to tabulate and plot the data). Consult your laboratory supply dealer regarding the latest software available.

17: Ventus™ Canopy Connection Kit

To remote exhaust connect any Type A2 biosafety cabinet, the Ventus canopy connection kit must be utilized. The Ventus canopy system consists of a high efficiency, low profile canopy that interfaces directly with the Logic+'s control board. Ventus offers several features that are a distinct improvement over prior canopy designs:

- The alarm system is simple, rugged, and durable; a magnetic reed switch located on the intake valve. The intake valve is also referred to as the inlet relief valve.
- The intake valve is angled such that the incoming make-up (room) air must keep the valve open to maintain normal operation; a loss of exhaust volume will allow gravity to close the intake valve and open the magnetic switch, resulting in a canopy alarm.
- During a canopy alarm, in addition to the audible and visual alarms, relief valves in the canopy will open, and the control board will run the Logic+'s blower at full speed. These coordinated actions will help to maintain a safe inflow to protect the operator during the alarm.

Figure 17-1

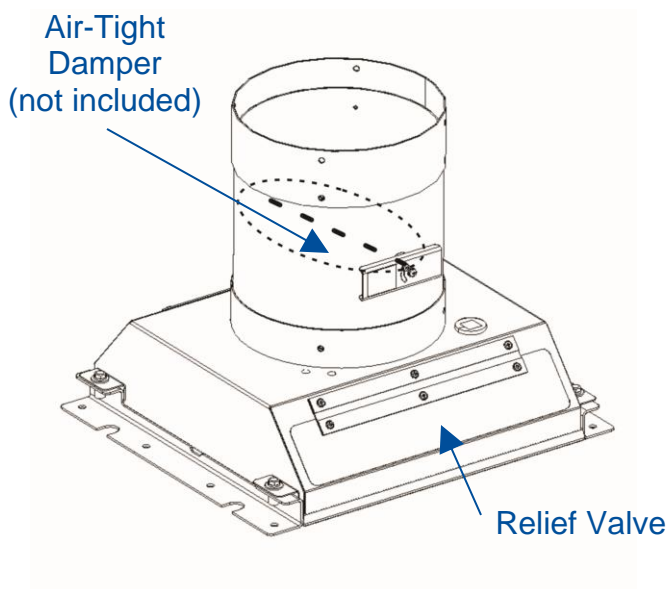
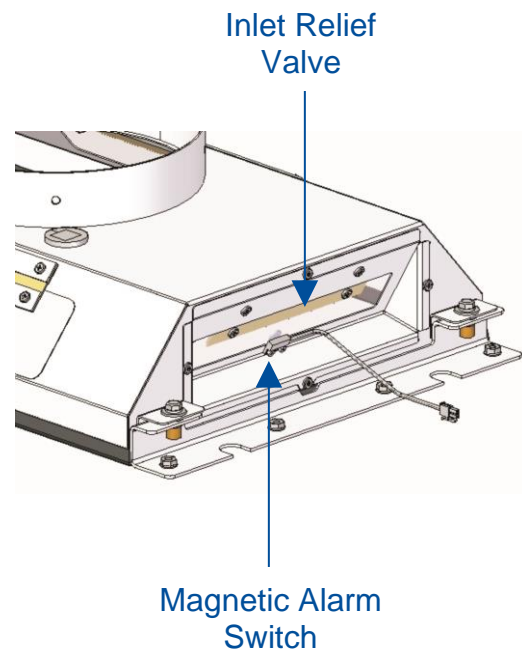


Figure 17-2



Kit Catalog Numbers

Table 17-1

Cabinet Width (Feet)	Catalog Number
3-ft	3889200
4-ft	3889201
5-ft	3889202
6-ft	3889203

Installation Procedure



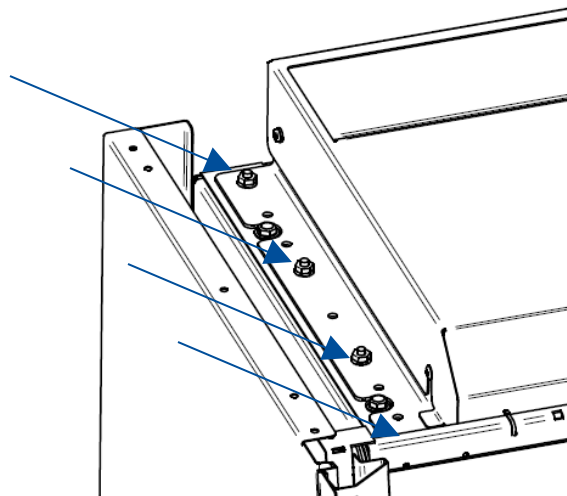
NOTE: Before beginning this installation, Turn the unit on, press the **[MENU]** button, select the *Tools* option, then *Information*. This will bring up the current settings screen. Record the motor(s) average RPMs once the unit operation stabilizes. Type A2-12 inch and C1 models will have two different (supply and exhaust) motor RPMs to record.



Exercise caution when removing or installing the exhaust filter cover, to prevent damaging the Exhaust HEPA filter.

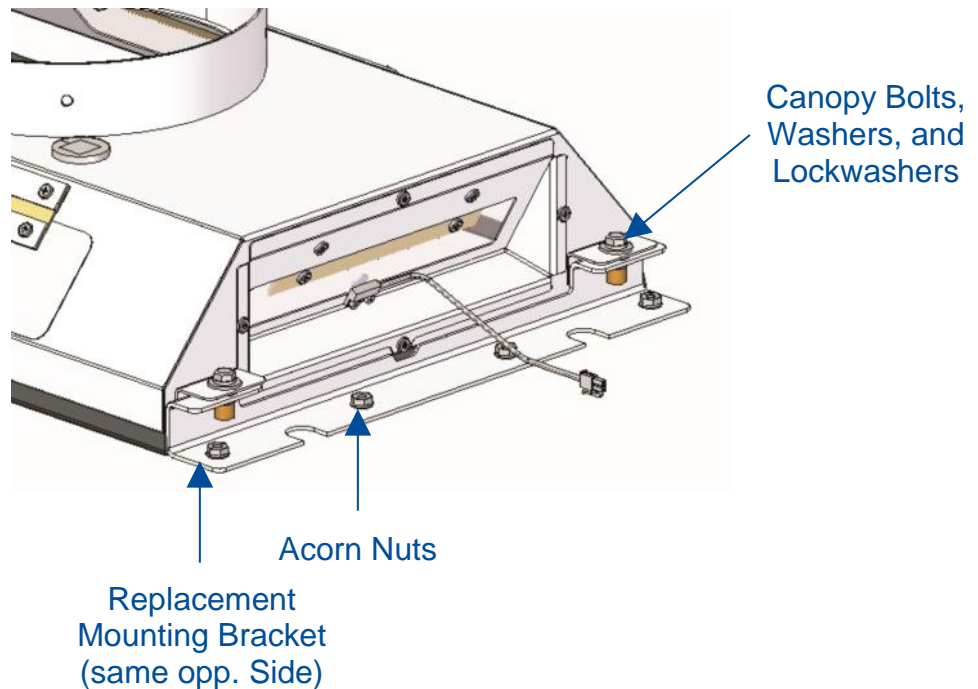
1. Turn off the Biosafety Cabinet.
2. Locate and remove the four acorn nuts and lockwashers that secure each side of the exhaust cover and the angle bracket to the top of the unit (8 nuts & washers total).
3. Lift the cover and angles straight up off of the top of the cabinet. Keep the nuts and washers; you may also want to retain the cover and angles for the future, if the cabinet will be disconnected from the exhaust system.

Figure 17-3



4. Install the replacement brackets as shown, with the lockwashers, and tighten the acorn nuts. Reference Figure 17-4.
5. Carefully place the canopy between the brackets. Ensure the canopy fits on the inside of the two mounting brackets as shown. Line up the holes in the canopy connection with the threaded holes in the mounting bracket flanges. Reference Figure 17-4.
6. Install the four canopy bolts, washers and lockwashers supplied with the canopy connection kit into the mounting bracket threaded holes, and tighten them to secure the canopy as shown. Reference Figure 17-4.

Figure 17-4



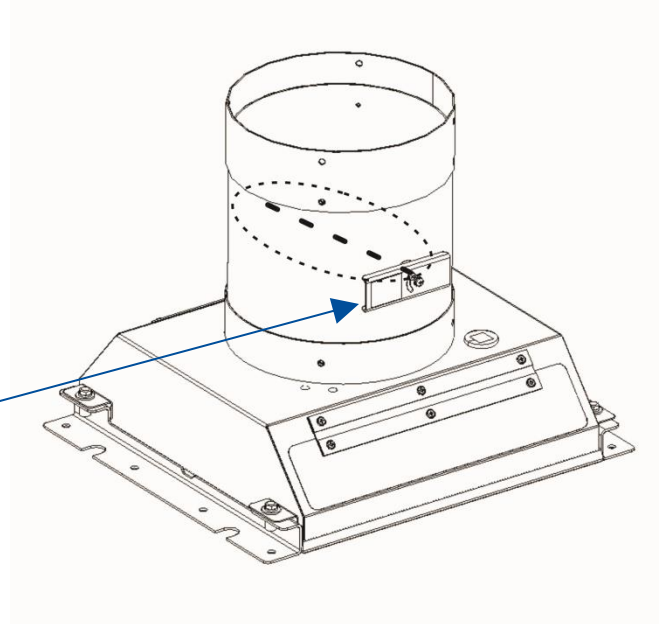
Exhaust Damper Installation Procedure

The air-tight damper shown is not supplied with the canopy kit. Proper installation of the canopy's damper is crucial for correct alarm system operation. If you have questions, please call Labconco's Product Service Department. Labconco offers an optional gas-tight exhaust damper (Catalog Number 3776800). An equivalent 10-inch OD damper can be used if desired.

Figure 17-5

1. Install the damper on top of the canopy, ensuring that the control lever faces the front of the unit as shown in Figure 17-5.
2. Use a proper silicone sealant (not supplied) and the screws supplied with the air-tight damper to seal the damper to the canopy.

Damper Flow Control Lever



Canopy Switch Wiring Connection

1. Ensure that the cabinet is unplugged.
2. Connect the canopy connector to the two pin connector located on the left side of the electronics module (see Figure 17-6). Ensure there is slack in the sensor cable where it connects to the harness, and it does not impede the operation of the intake valve.

Figure 17-6



Connect canopy wire harness here

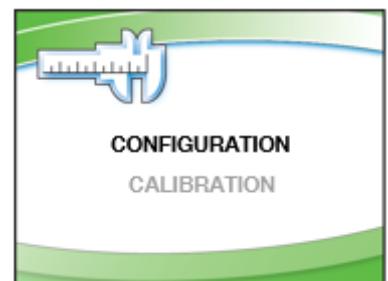
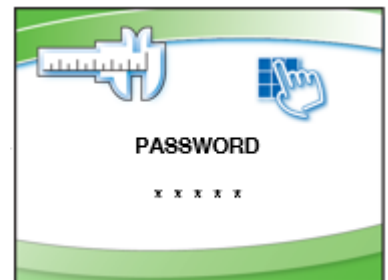


Ensure the sensor harness does not contact any moving parts.

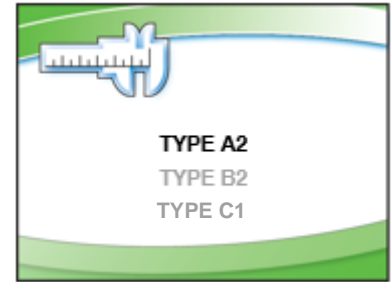
Calibrate for Operation

After canopy installation, you **MUST** reconfigure the biosafety cabinet to have a canopy.

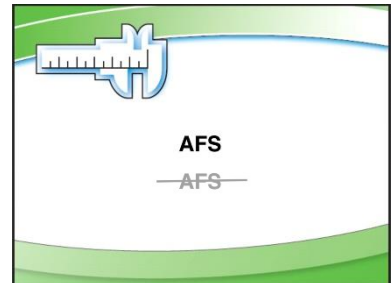
1. From the Home Screen, press the **[MENU]** button.
2. Press the **[DOWN]** button until the *Tools* option is highlighted.
3. Press **[OK/MUTE]** to enter the menu screen.
4. Press the **[DOWN]** button until the *Password* option is highlighted, then press **[OK/MUTE]** to select the certifier's submenus.
5. You will see a *Warning Screen* alerting you that you are about to enter an area that can alter the BSC's settings; Press **[OK/MUTE]** to input the password.
6. When requested for the password press: **[LIGHT]**, **[UV LIGHT]**, **[TIMER]**, **[TIMER]** then **[OK/MUTE]**.
7. If the password is entered correctly, you can select between altering the cabinet's configuration, or calibration. Highlight the *Configuration* option, then press **[OK/MUTE]** to start the configuration procedure.



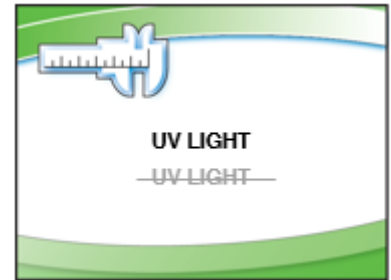
8. This screen allows you to set the Type of cabinet. Leave this setting alone, and press **[OK/MUTE]**.



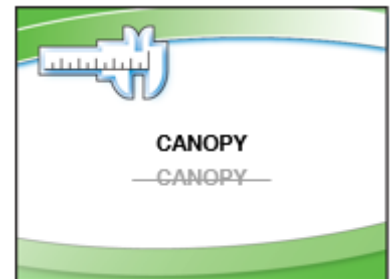
9. This screen allows you to configure the cabinet for an airflow sensor or not. If you are not changing the selection, press **[OK/MUTE]**.



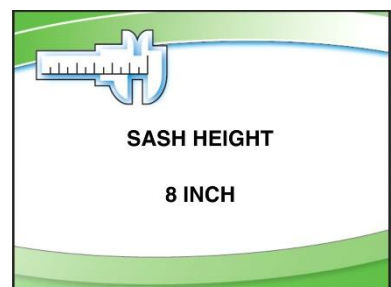
10. This screen configures the unit for a UV light or not. Leave this setting alone, and press **[OK/MUTE]**.



11. This screen allows you to configure the cabinet for a canopy or not. Use **[UP]** or **[DOWN]** to select *Canopy*. After your selection is chosen, press **[OK/MUTE]**.



12. This screen allows you to configure the cabinet's sash height. Leave this setting alone, and press **[OK/MUTE]**. The unit will then return to the Home Screen in the new configuration.



13. Take Inflow and Downflow readings as described in [Section 9: Calibration](#). If not within acceptable tolerance for the model, adjust the biosafety cabinet's internal damper and/or blower(s) speed until Inflow and Downflow are correct. Use the original blower speed(s) as a reference.

18: Airflow Sensor Kit

To add an airflow sensor (Catalog Number 3405500) to a Type A2 or C1 biosafety cabinet, follow these instructions. If replacing an airflow sensor, it is not necessary to configure the airflow sensor, as the biosafety cabinet will already have this feature enabled.



Note: These instructions describe installation on a Type A2 biosafety cabinet. Installation on a Type C1 is very similar, except the installation location is in the exhaust housing, and the sensor wire pass-thru is in the rear of the exhaust housing.

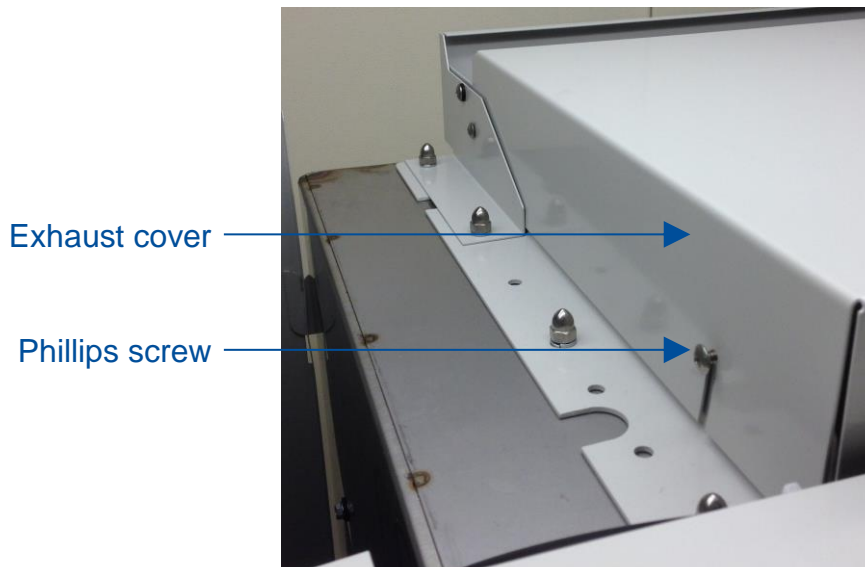


Exercise caution when working around the exhaust HEPA filter atop the biosafety cabinet. The filter media can be damaged easily. Never touch the filter media.

Installation – Type A2 without Ventus Canopy

1. Disconnect all power from the biosafety cabinet by unplugging the power cord.
2. Loosen the two Phillips screws on the front sides of the exhaust cover. See Figure 18-1.

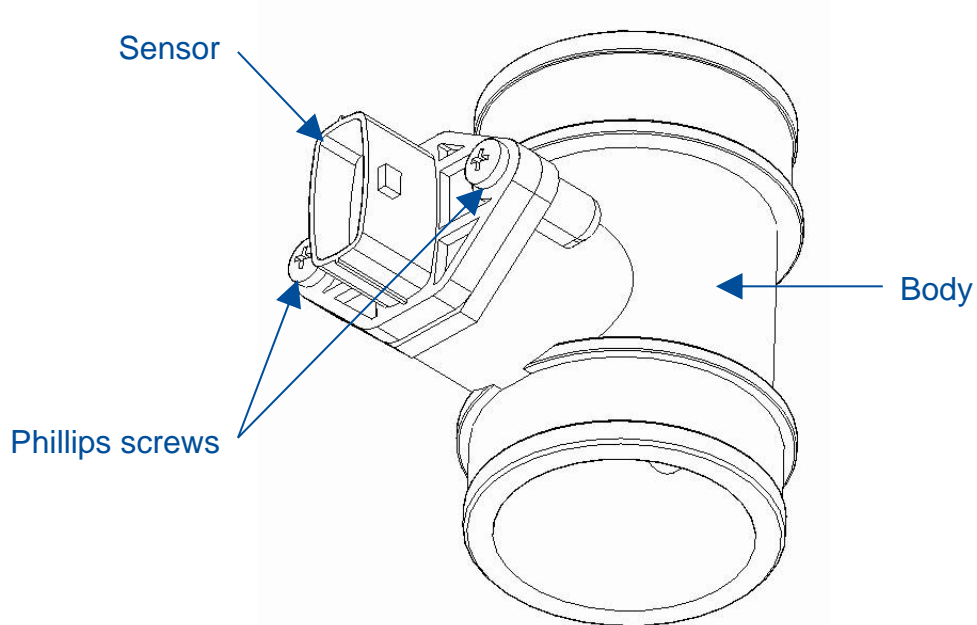
Figure 18-1



3. Tilt the exhaust cover up to access the underside of the cover.

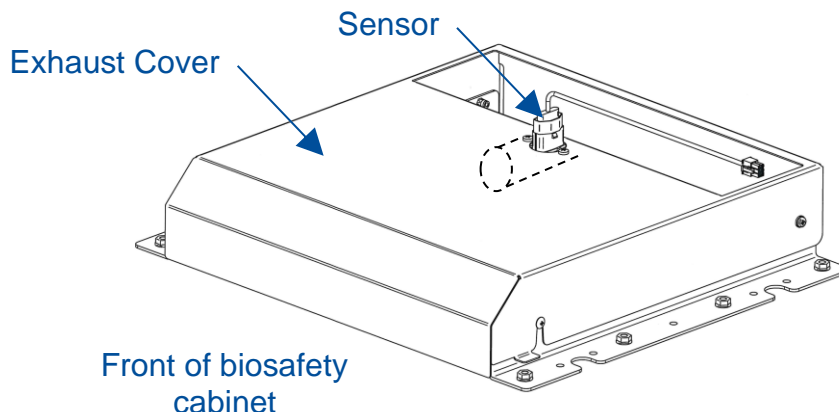
4. On the new airflow sensor, remove the two screws holding the sensor into its body. See Figure 18-2. Do **NOT** pull the sensor out of the body.

Figure 18-2



5. Position the sensor on the underneath side of the exhaust cover so that the screen end of the sensor body is oriented towards the front of the biosafety cabinet. Reinstall the two screws removed in the previous step through the exhaust cover and into the sensor body. Tighten the two screws. See Figure 18-3 for reference.

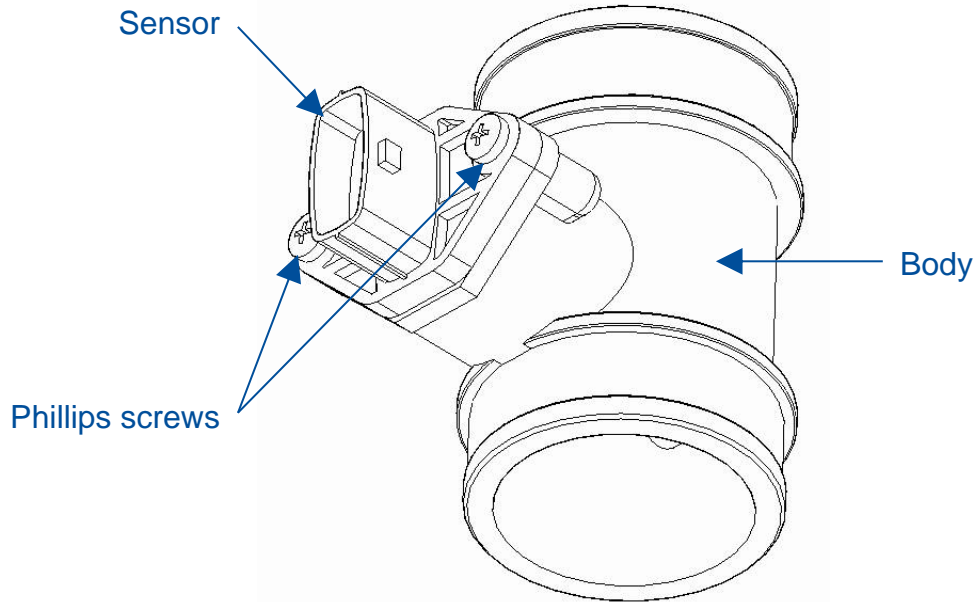
Figure 18-3



Installation – Type A2 with Ventus Canopy

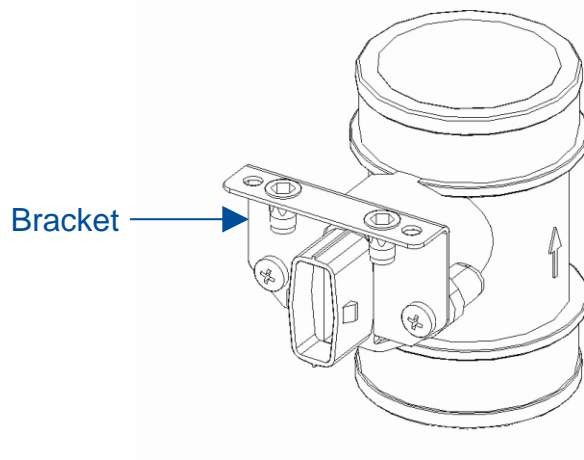
1. On the new airflow sensor, remove the two screws holding the sensor into its body. See Figure 18-4. Do **NOT** pull the sensor out of the body.

Figure 18-4



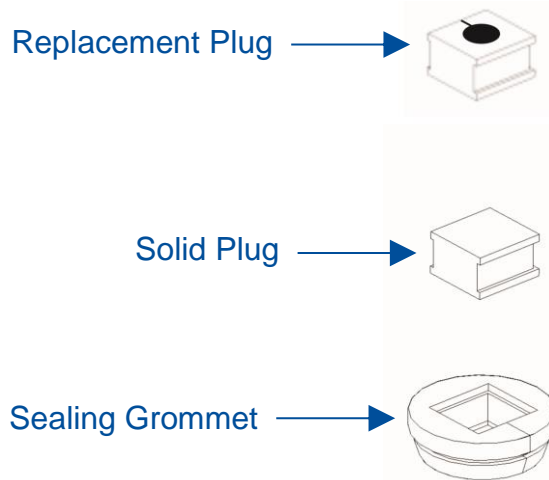
2. Install the bracket supplied with the kit onto the airflow sensor as shown in Figure 18-5, using the two screws removed in Step 1.

Figure 18-5



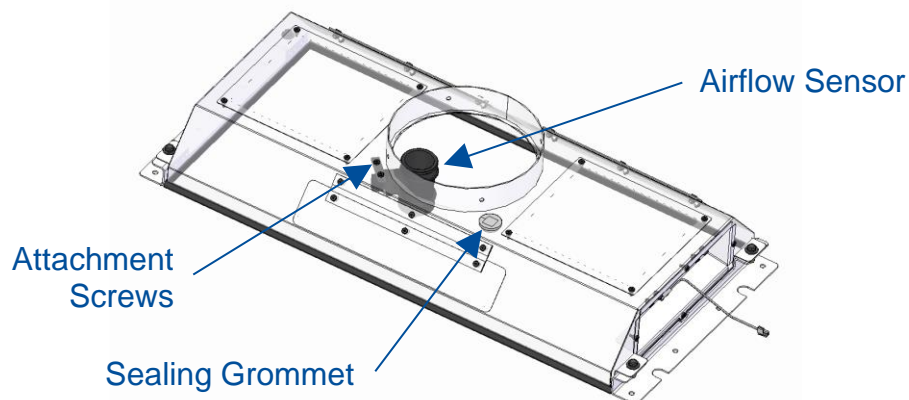
3. New installation only – Gently remove the cable sealing grommet, located on the top of the canopy (Type A2) or exhaust housing (Type C1). Remove the square solid plug from inside the sealing grommet. Locate the replacement plug in the airflow sensor kit. Push the cable from the airflow sensor over the slit in the replacement plug. Gauge the location of the replacement plug on the cord based on where the sensor will sit when installed, and the pass through cutout for the grommet in the sheetmetal. Install the sealing grommet over the replacement plug, noting the keyed orientation between the grommet and the plug. See Figure 18-6 to identify the grommet and plugs described. Note – after becoming familiar with the sealing grommet and replacement plug installation on the cable, remove the grommet and plug until after Step 4.

Figure 18-6



4. For new installation, pry out the two hole plugs in the top of the canopy (A2) or exhaust housing (C1). Working through the duct stub opening, or one of the service panel openings, place the airflow sensor as shown in Figure 18-7. Secure the sensor with two attachment screws supplied in the kit.

Figure 18-7



5. Run the cable and its connector through the sheetmetal hole for the sealing grommet. Make any final adjustments to the location of the sealing grommet and replacement plug on the airflow sensor cable. Press the sealing grommet into the sheetmetal hole from the top of the canopy or exhaust housing.

Connection to Electronics Module

After installation, follow these steps to connect the airflow sensor to the biosafety cabinet's electronics module.

1. Identify the "Optional Airflow Sensor Input" label on the left side of the biosafety cabinet's electronics module. See Figure 18-8.

Figure 18-8

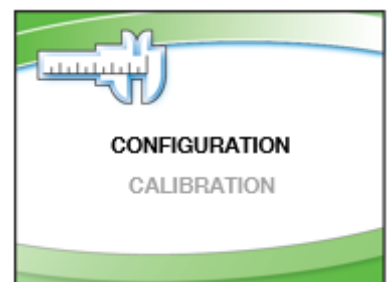
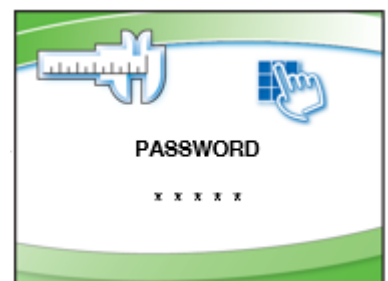


2. Connect the airflow sensor cable to this connector on the electronics module.
3. Tidy up excess length of cable from the airflow sensor by creating a few loops if necessary, and zip tie the loops. Secure the cable to the top, front lip of the biosafety cabinet with zip ties to ensure it does not interfere with the sash pulley axle.
4. Reconnect the biosafety cabinet to electrical power.

Configuration (new install only)

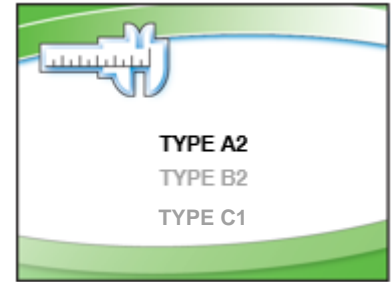
After airflow sensor installation, you MUST reconfigure the biosafety cabinet to enable the airflow sensor.

1. From the Home Screen, press the **[MENU]** button.
2. Press the **[DOWN]** button until the *Tools* option is highlighted.
3. Press **[OK/MUTE]** to enter the menu screen.
4. Press the **[DOWN]** button until the *Password* option is highlighted, then press **[OK/MUTE]** to select the certifier's submenus.
5. You will see a *Warning Screen* alerting you that you are about to enter an area that can alter the BSC's settings; Press **[OK/MUTE]** to input the password.
6. When requested for the password press: **[LIGHT]**, **[UV LIGHT]**, **[TIMER]**, **[OUTLET]** then **[OK/MUTE]**.
7. If the password is entered correctly, you can select between altering the cabinet's configuration, or calibration. Highlight the *Configuration* option, then press **[OK/MUTE]** to start the configuration procedure.

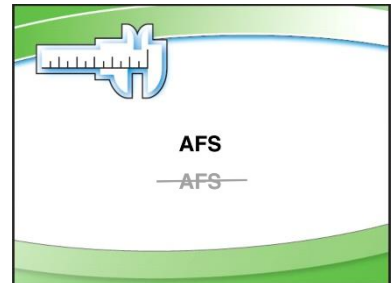


8. This screen allows you to set the Type of cabinet. Leave this setting alone, and press **[OK/MUTE]**.

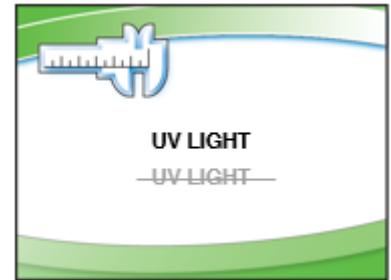
If a Type C1, an additional screen will display to select A-mode or B-mode, leave this selection unchanged, and press **[OK/MUTE]**.



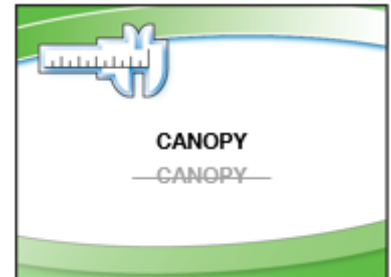
9. This screen allows you to configure the cabinet for an airflow sensor or not. Change the selection to **AFS**, press **[OK/MUTE]**.



10. This screen configures the unit for a UV light or not. Leave this setting alone, and press **[OK/MUTE]**.

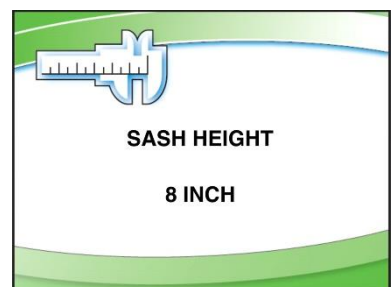


11. This screen allows you to configure the cabinet for a canopy or not. Leave this setting alone, and press **[OK/MUTE]**.



12. This screen allows you to configure the cabinet's sash height. Leave this setting alone, and press **[OK/MUTE]**. The unit will then return to the Home Screen in the new configuration.

If a Type C1 in B-mode, an additional screen will be displayed to select Active Protection Time. Leave this setting alone, and press **[OK/MUTE]**.



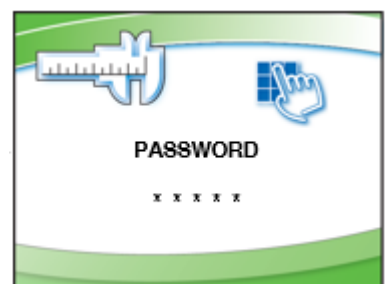
Calibration

After airflow sensor installation, you MUST calibrate the new sensor. Follow these steps to calibrate the new sensor.

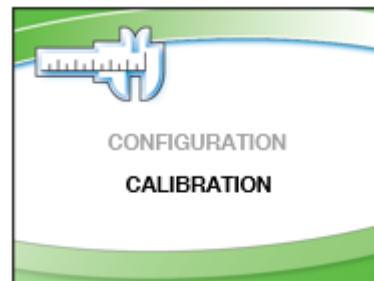


Note: To properly calibrate the airflow sensor, a qualified certifier must verify the inflow and downflow values.

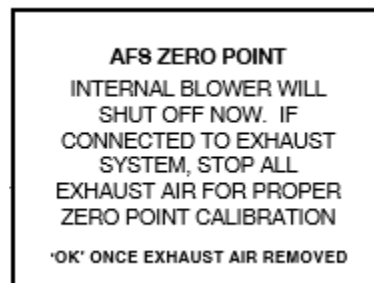
1. From the Home Screen, press **[MENU]**.
2. Press **[DOWN]** until the *Tools* option is highlighted.
3. Press **[OK/MUTE]** to enter the menu screen.
4. Press the **[DOWN]** button until the *Password* option is highlighted, then press **[OK/MUTE]** to select the certifier's submenus.
5. You will see a *Warning Screen* alerting you that you are about to alter the BSC's settings; Press **[OK/MUTE]** to input the password.
6. When requested for the password press **[LIGHT]**, **[UV LIGHT]**, **[TIMER]**, **[OUTLET]** then **[OK/MUTE]**.



7. If the password is entered correctly, you will be allowed to select between altering the cabinet's configuration, or calibration. Press the **[DOWN]** button until the *Calibration* option is highlighted, then press **[OK/MUTE]** to start the calibration procedure.

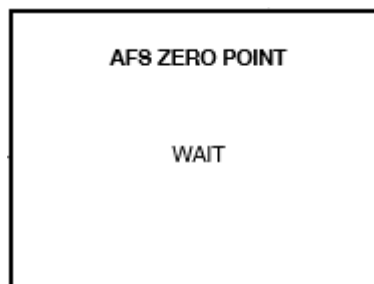


IF THE UNIT IS CONNECTED TO AN EXHAUST SYSTEM, YOU MUST STOP ALL AIRFLOW OVER THE SENSOR DURING THE INITIAL ZEROING OF THE SENSOR - DO THIS BY SHUTTING OFF THE EXHAUST SYSTEM, OR BLOCKING THE SENSOR INTAKE WITH TAPE.



8. If the biosafety cabinet's internal blower was on, it will automatically turn off. Once all airflow from a remote (building) exhaust system has been removed (if a Type A2 with canopy, Type B2, or Type C1 operating in B-mode), press **[OK/MUTE]** to continue.

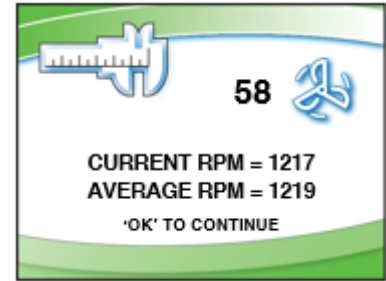
9. The unit must sit for approximately 30 seconds with no airflow over the sensor in order to establish the zero point value.



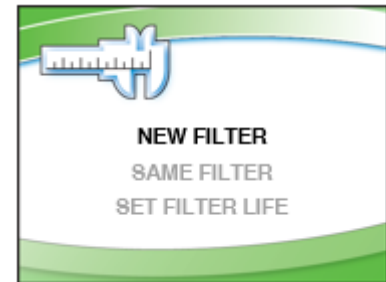
10. After approximately 30 seconds, the cabinet blower(s) will restart, and then the exhaust flow over the sensor must be reestablished – either open the exhaust valve, or uncover the sensor, press **[OK/MUTE]** to continue.



11. When the cabinet blower speed stabilizes, it may be changed if needed to rebalance the unit. When the blower speed stabilizes, 'OK' TO CONTINUE will appear, when any adjustment to the blower speed is complete, press [OK/MUTE].

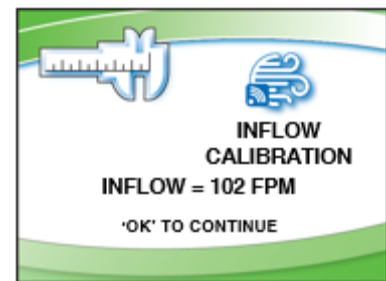


12. If this is an initial certification, or a recertification after HEPA filter replacement, select *New Filter*. If this is an annual recertification or install of a new Airflow Sensor, select *Same Filter*. If you want to set the filter gauge at a preset value, select *Set Filter Life*. Press [OK/MUTE].



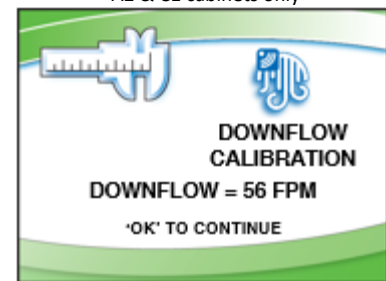
If the biosafety cabinet is an A2 12-inch or C1, two additional screens will appear similar to those in Steps 11 & 12 for the exhaust blower.

13. Change the average inflow to match the value you obtained when you measured it. Use [UP] or [DOWN] to change the inflow as needed. When the displayed value matches the value obtained during certification, press [OK/MUTE].



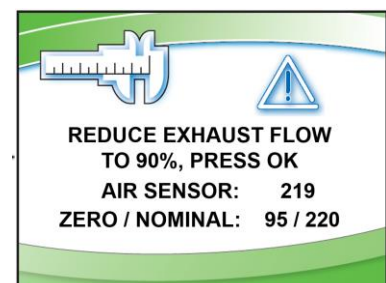
A2 & C1 cabinets only

14. On type A2 & C1 cabinets only, calibrate the average downflow to match the value you obtained when you measured it. Use [UP] or [DOWN] to change the inflow as needed. When the displayed value matches the value obtained during certification, press [OK/MUTE].



B2 cabinets only

15. Type B2 units will now ask you to reduce the **total exhaust volume** to 90% of the nominal value. When you have done this, press [OK/MUTE]. **Note: This step is critical - it sets the alarm point for the exhaust flow. If you press [OK/MUTE] before reducing the flow to 90%, the BSC will assume the alarm setpoint is equal to the nominal airflow, and the unit will return an Exhaust Alarm constantly.** When complete, reset the exhaust damper to its nominal setting.



Calibration mode is finished, if a Type C1, select *No* when prompted to calibrate VSS.

19: UV Lamp Kit

All biosafety cabinets are pre-wired for installation of the UV Lamp Kit. The kit consists of the UV Ballast, UV Lamp, Relay, and installation hardware.

Kit Catalog Numbers

Table 19-1

Cabinet Voltage	Catalog Number
100 V	3858501
115 V	3858500
230 V	3858502

Installation

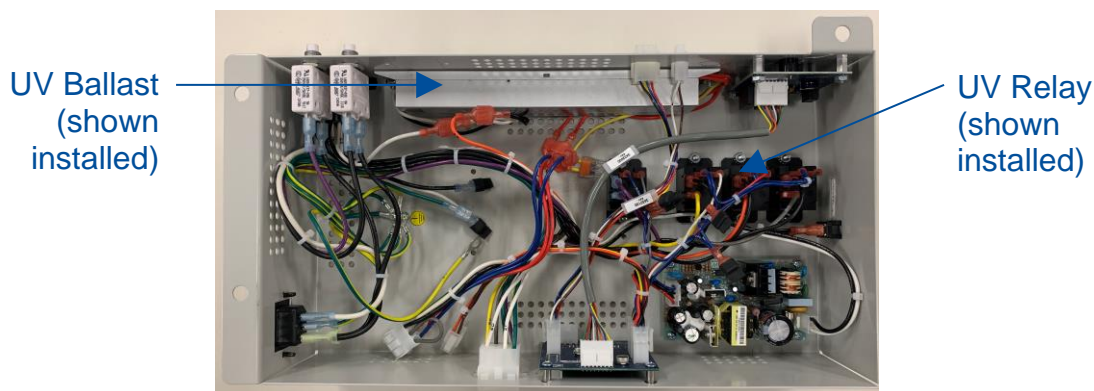


A qualified electrician or certifier should install this kit.

Decontaminate all interior work surfaces before installing the UV Lamp.

1. Disconnect all electrical power to the biosafety cabinet by unplugging the power cord.
2. Using a 7/16-inch socket or nut driver, remove the three acorn nuts that secure the electronics module to the top, right side of the biosafety cabinet.
3. Tilt the electronics module on its side, and secure the module.

Figure 19-1



4. Install the UV ballast with the hardware (two screws, washers and nuts) provided in the kit. See Figure 19-1 for reference.
5. Install the relay as shown in Figure 19-1, and secure it with the hardware provided in the kit.
6. Identify the four circuit wire connectors described below, remove the protective black cover from each connector with a utility knife, and wire the relay.

Relay Coil: 35-RED & 33BC-BLU (no orientation sensitivity)
NO (normally open): 25-ORG
COM (common): 3E-BLK

7. Connect the UV ballast into the electronics module wiring harness as described below:

UV Ballast Wires

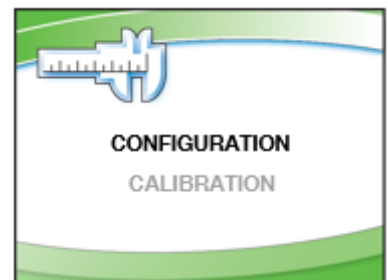
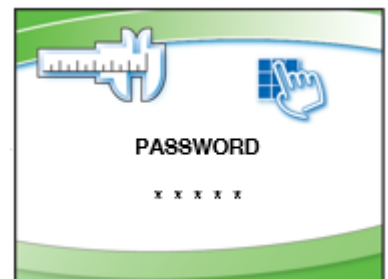
White wire	2E-WHT
Black wire	25-ORG
Red wires	16-RED & 17-RED (no orientation sensitivity)
Yellow wires	18-BLU & 19-BLU (no orientation sensitivity)

8. Reattach the electronics module to the top of the biosafety cabinet and tighten the three acorn nuts.
9. Raise the sash and install the UV lamp by placing the lamp pins into each socket, pressing down on the UV lamp (gently), and then rotating the lamp 90 degrees to lock it in the lamp sockets.
10. Lower the sash to the fully closed position. Restore electrical power to the biosafety cabinet.

Configuration

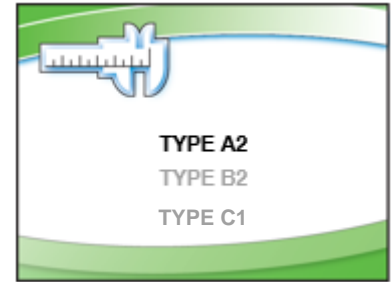
After UV Lamp components are installed, you **MUST** reconfigure the biosafety cabinet to enable the UV lamp.

1. From the Home Screen, press the **[MENU]** button.
2. Press the **[DOWN]** button until the *Tools* option is highlighted.
3. Press **[OK/MUTE]** to enter the menu screen.
4. Press the **[DOWN]** button until the *Password* option is highlighted, then press **[OK/MUTE]** to select the certifier's submenus.
5. You will see a *Warning Screen* alerting you that you are about to enter an area that can alter the BSC's settings; Press **[OK/MUTE]** to input the password.
6. When requested for the password press: **[LIGHT]**, **[UV LIGHT]**, **[TIMER]**, **[TIMER]** then **[OK/MUTE]**.
7. If the password is entered correctly, you can select between altering the cabinet's configuration, or calibration. Highlight the *Configuration* option, then press **[OK/MUTE]** to start the configuration procedure.

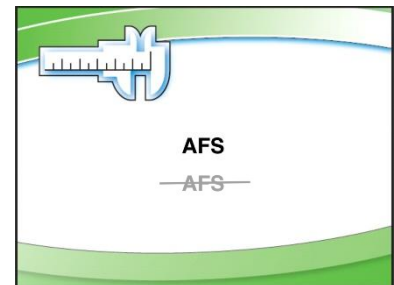


8. This screen allows you to set the Type of cabinet. Leave this setting alone, and press **[OK/MUTE]**.

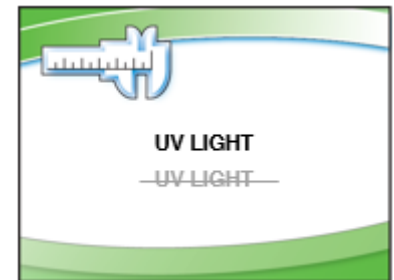
If a Type C1, an additional screen will display to select A-mode or B-mode, leave this selection unchanged, and press **[OK/MUTE]**.



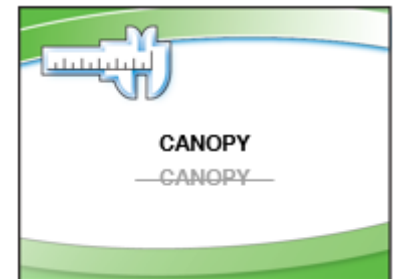
9. This screen allows you to configure the cabinet for an airflow sensor or not. Leave this setting alone, and press **[OK/MUTE]**.



10. This screen configures the unit for a UV light or not. Change the selection to *UV Light*, press **[OK/MUTE]**.

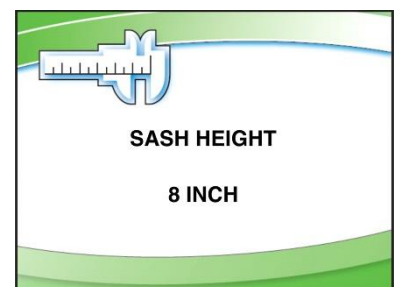


11. This screen allows you to configure the cabinet for a canopy or not. Leave this setting alone, and press **[OK/MUTE]**.



12. This screen allows you to configure the cabinet's sash height. Leave this setting alone, and press **[OK/MUTE]**. The unit will then return to the Home Screen in the new configuration.

If a Type C1 in B-mode, an additional screen will be displayed to select Active Protection Time. Leave this setting alone, and press **[OK/MUTE]**.



20: IV Bar Kit

All biosafety cabinets are prepared with the necessary mating hardware to accept an IV Bar Kit. To install the IV Bar, follow these instructions.

Kit Catalog Numbers

Table 20-1

Cabinet width (feet)	Catalog Number
3-ft	3858600
4-ft	3858601
5-ft	3858602
6-ft	3858603

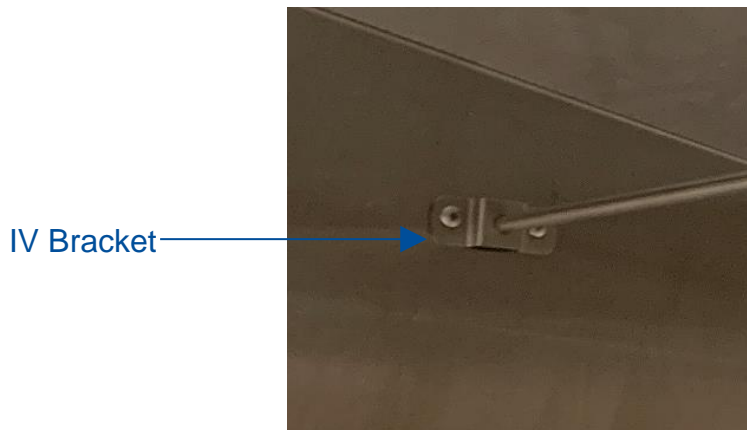
Installation



Decontaminate all interior work surfaces before installing the UV Lamp.

1. Disconnect power to the biosafety and raise the sash to the fully open position.
2. Remove the four screws on the sidewalls and save them.
3. Mount one of the IV brackets on either sidewall. Orient and secure the bracket using the flat washers, lock washers and the screws as shown in Figure 20-1.

Figure 20-1



4. **For the 5-ft and 6-ft IV Bars only**, insert the center support brace on the IV Bar. Position the center support as shown in Figure 20-2 while completing Step 5.

Figure 20-2



5. Slide the other bracket onto the IV bar, and fasten it to the opposite sidewall as done in Step 3.
6. **For the 5-ft and 6-ft IV Bars only**, fasten the center support brace onto the back wall with the two screws provided in the kit.
7. Secure each of the brackets by tightening all of the fasteners.

21: Prefilter Kit

All Type A2 and B2 biosafety cabinets are prepared with the necessary mating components to accept a Prefilter Kit. To install the Prefilter Kit, follow these instructions.

Kit Catalog Numbers (Type A2 and B2 only)

Table 21-1

Cabinet width (feet)	Catalog Number	
	G4 Paper	Aluminum
3-ft	3406000	3406100
4-ft	3406001	3406101
5-ft	3406002	3406102
6-ft	3406003	3406103

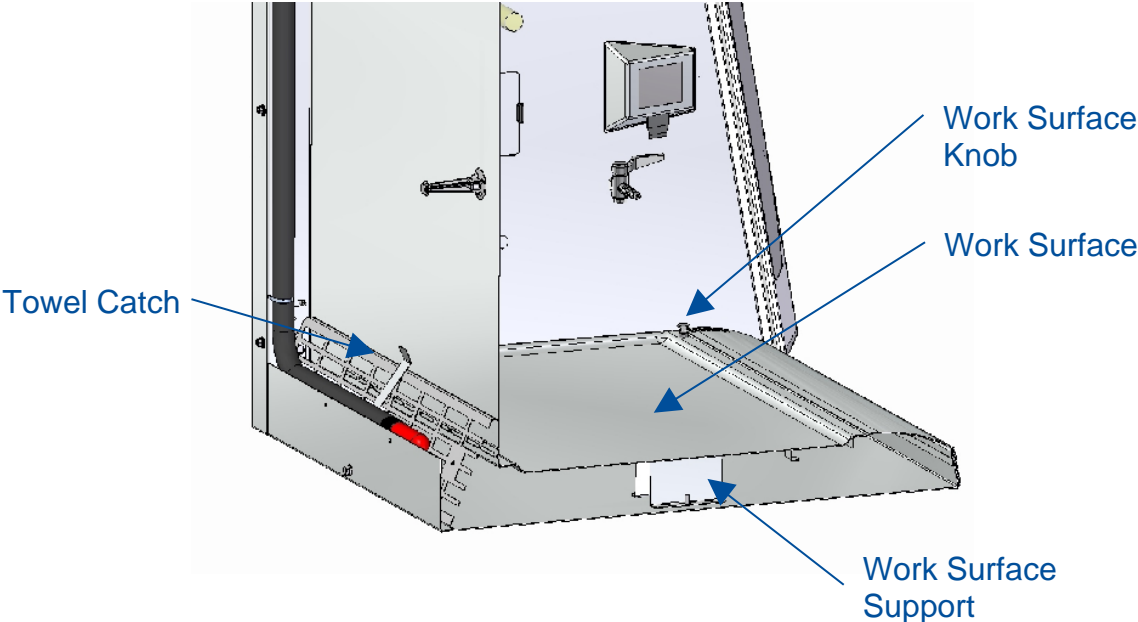
Installation



Decontaminate all interior work surfaces and work surface components before installing the prefilter.

1. Remove the work surface of the cabinet by lifting the front edge by one of the front corner knobs. Slide the work surface forward to disengage the rear tabs. Support the underneath side with one hand while stabilizing the front edge with the other. Set the work surface aside. Reference Figure 21-1.
2. Pinch and lift the work surface support straight up to remove it. Make sure it is surface decontaminated before removing it from the biosafety cabinet. Reference Figure 21-1.
3. Access the towel catch by pivoting the bottom out towards you. Surface decontaminate the towel catch before removing it from the biosafety cabinet. Reference Figure 21-1.

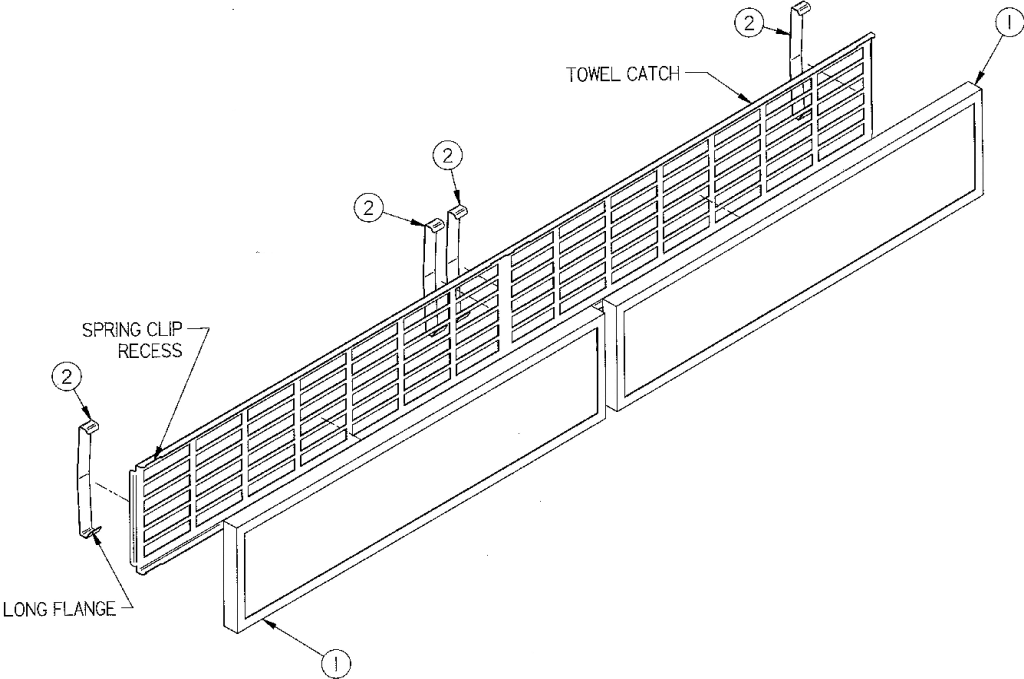
Figure 21-1



Attach Prefilter(s) to Towel Catch – G4 Paper

- 1. Set the prefilter(s) (item 1 in Figure 21-2) into the towel catch so they are located between the top and bottom long flanges on the towel catch. See Figure 21-2.

Figure 21-2

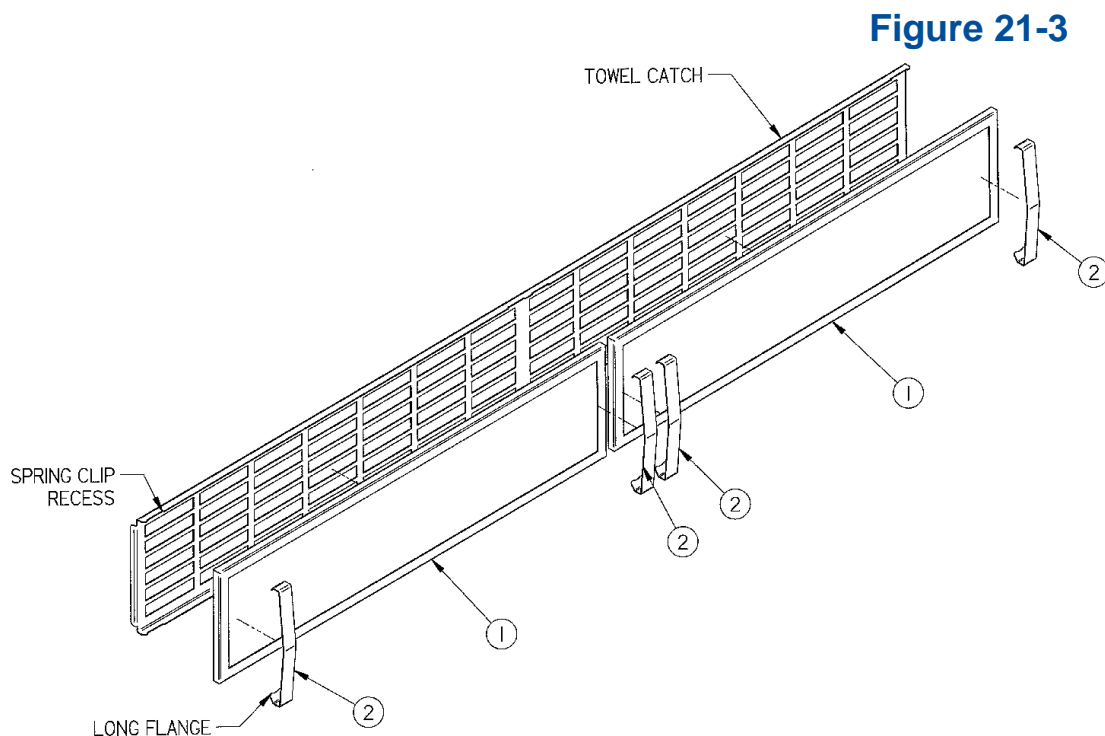


2. Install two spring clips (item 2 in Figure 21-2) per prefilter. Install the spring clips from the back (opposite side from the prefilter) side of the towel catch. Position the spring clips with the long flange (see Figure 21-2) around the bottom of the towel catch. Next, carefully clip each spring clip over the top of the towel catch to engage the top edge of the filter frame. Each spring clip should capture the top and bottom of the filter frame. Make sure each spring clip is aligned with the spring clip recess (Figure 21-2) in the towel catch.

Note: Only one prefilter and two spring clips are used on 3-ft models.

Attach Prefilter(s) to Towel Catch – Aluminum Washable

1. Set the prefilter(s) (item 1 in Figure 21-2) into the towel catch so they are located between the top and bottom long flanges on the towel catch. See Figure 21-3.



2. Install two spring clips (item 2 in Figure 21-3) per prefilter. Install the spring clips from the front (prefilter) side of the towel catch. Position the spring clips with the long flange (see Figure 21-3) around the bottom of the towel catch. Next, carefully clip each spring clip over the top of the prefilter to engage over the top edge of the towel catch. Make sure each spring clip is aligned with the spring clip recess (Figure 21-3) in the towel catch.

Note: Only one prefilter and two spring clips are used on 3-ft models.

22: EN Alarm/Relay Contact Kit

All biosafety cabinets are prepared with the necessary wiring/mating components to accept a EN Alarm/Relay Contact Kit (Catalog Number 3858320). This kit provides two functions:

1. An audible alarm upon power loss per EN12469:2000 for microbiological safety cabinets (primarily required in Europe).
2. A set of 3 relay contacts, which close upon three cabinet conditions:
 - a. Blower start is desired, and blower running
 - b. Blower enters reduced setback speed (NightSmart with sash closed)
 - c. Any alarm condition

To install the kit, follow these instructions.

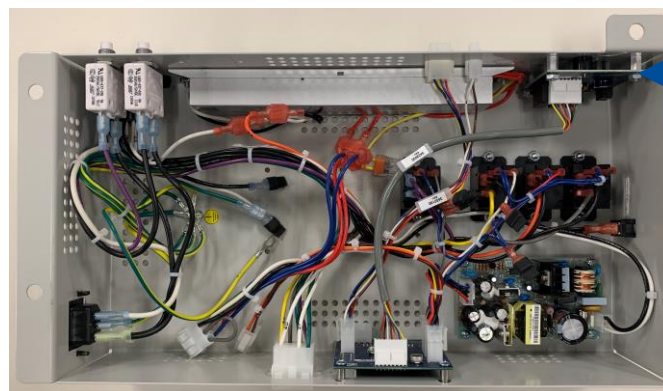
Installation



A qualified electrician or certifier should install this kit.

1. Disconnect all electrical power to the biosafety cabinet by unplugging the power cord.
2. Using a 7/16-inch socket or nut driver, remove the three acorn nuts that secure the electronics module to the top, right side of the biosafety cabinet.
3. Tilt the electronics module on its side, and secure the module. See Figure 22-1.

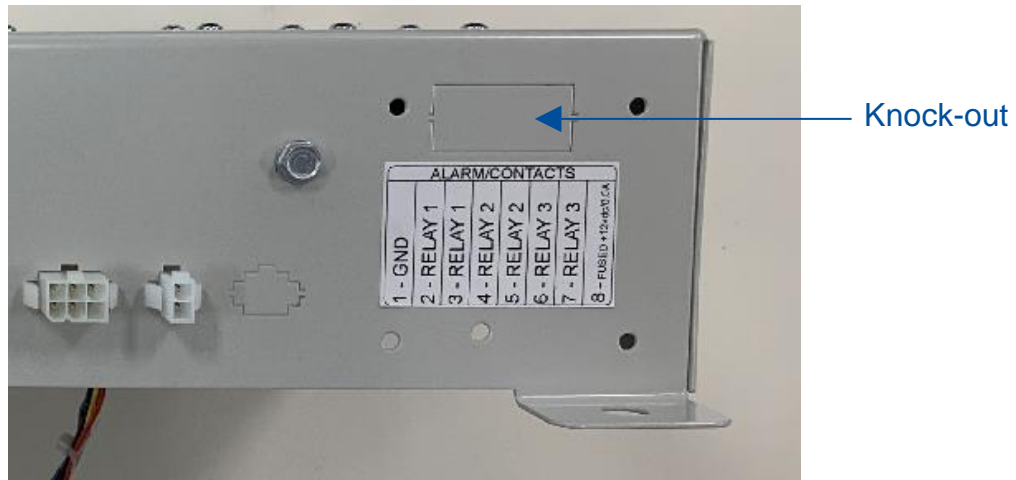
Figure 22-1



EN Alarm/Relay
Contact Board
(shown installed)

4. Carefully remove the rectangular knock-out shown in Figure 22-2. It is on the left side of the electronics module when normally positioned atop the biosafety cabinet. The knock-out is just above the label “Alarm Contacts”.

Figure 22-2



5. Locate the gray rectangle connector labeled as J2 (see Figure 22-3) on the Alarm/Relay Contact board supplied with the kit. This connector shows through the knock-out opening previously removed on the electronics control module. Note the location of the connector J1 (Figure 22-4) on the opposite side of the board for use later.

Figure 22-3

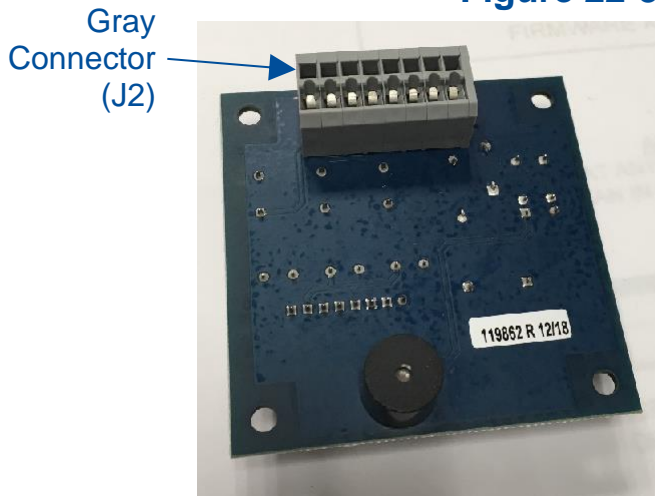
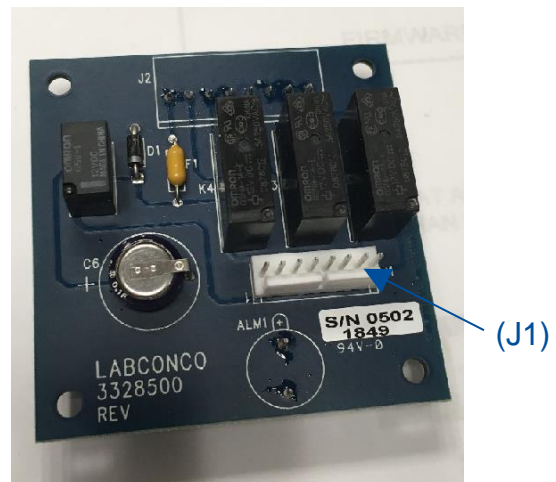


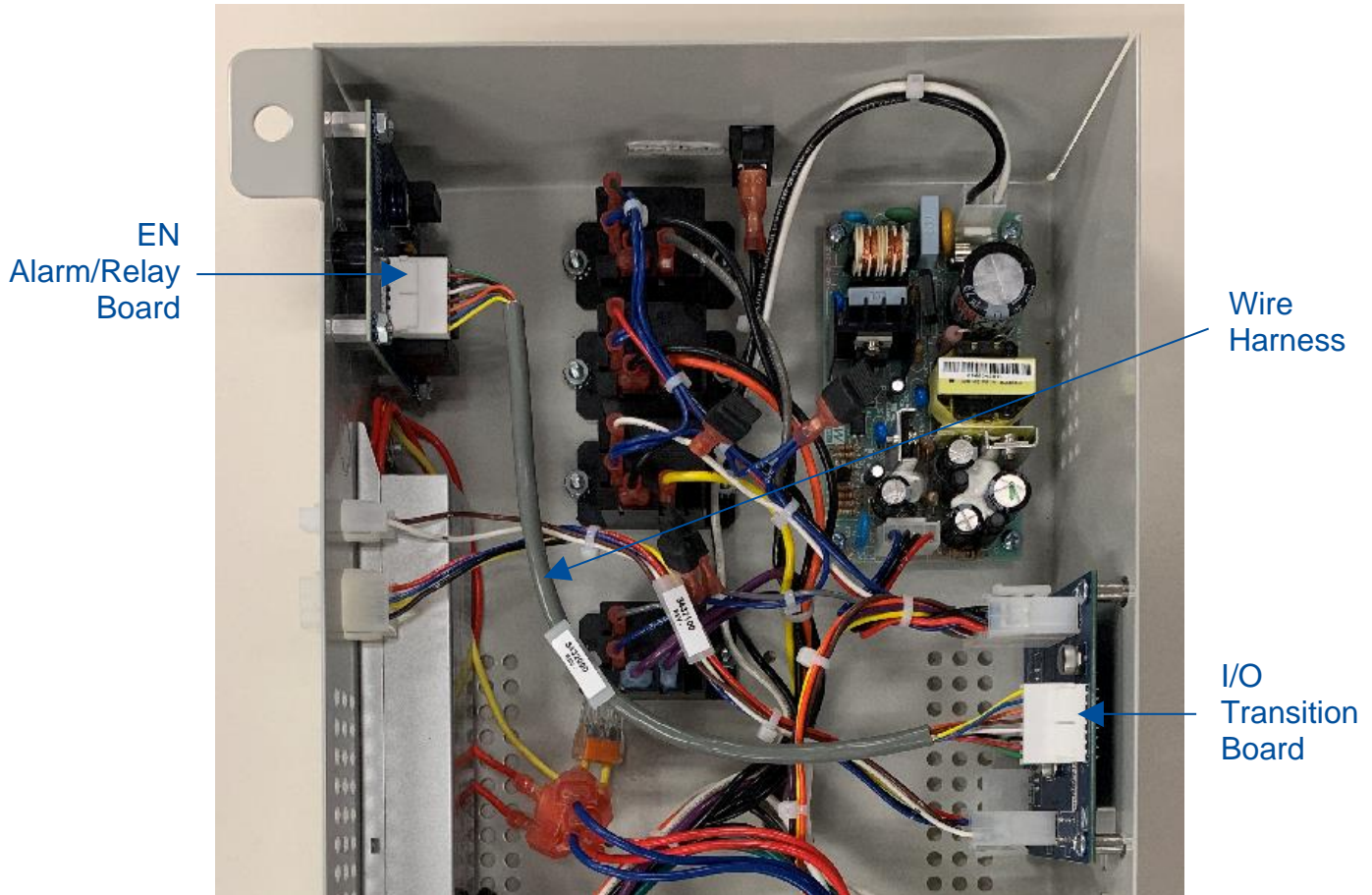
Figure 22-4



6. Install the Alarm/Relay Contact board inside the electronics module using the screws, standoffs, lockwashers, and nuts included with the kit. First, secure each standoff inside the electronics module with a screw and lockwasher (screw and lockwasher on outside of module). Then, place circuit board over standoffs male threads, and secure board with the four nuts.

7. Locate the wire harness included in the kit. Connect it between the Alarm/Relay Contact circuit board's J1 connector and the I/O Transition board's J6 connector. See Figure 22-5 for reference.

Figure 22-5

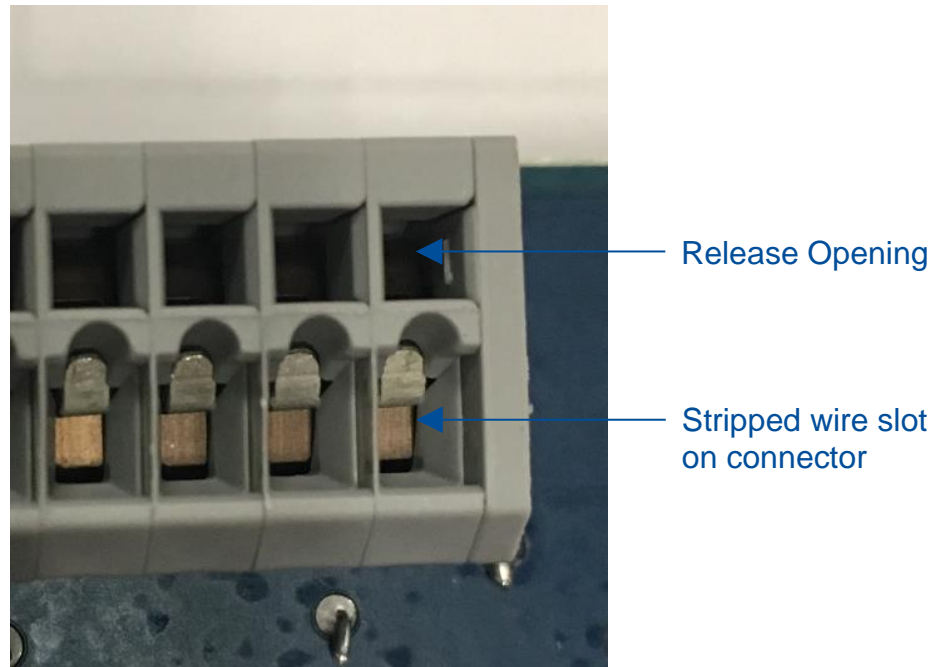


8. Re-secure the electronics module to the top of the biosafety cabinet.

If not utilizing the Relay Contacts, stop here.

9. Connect user-supplied wires to the appropriate contacts as desired. **Use 22-24 AWG wires ONLY.** Strip insulation back from wire end 0.25 inches (6 mm).
10. Using a small jeweler's flat blade screwdriver or similar instrument, push the screwdriver into the release opening (see Figure 22-6), and rotate the screwdriver up (away from the wiring connection) slightly. This will open the clamp. Slide the stripped wire end into the appropriate slot on the connector, then remove the screwdriver. To release a wire, reinsert the screwdriver, rotate it up (away from the wire), and pull the wire straight out from the connector. See Figure 22-6 for reference.

Figure 22-6



The relay contact closes when the condition is present on the biosafety cabinet. See the pinout configuration below in Table 22-1 to properly connect the wires.

Table 22-1

Position	Contact Label	Condition/Description
1	GND	Common used with +12 VDC
2	RELAY 1	Closes upon Blower start (remains closed while Blower at Normal Speed)
3	RELAY 1	
4	RELAY 2	Closes upon any Alarm Condition
5	RELAY 2	
6	RELAY 3	Closes upon Blower at Reduced Speed (Night Setback – sash closed)
7	RELAY 3	
8	FUSED +12 VDC	+12 VDC supplied (Fused @ 0.5 A)



CAUTION: The provided contacts can only switch very low amounts of electrical current. To control high current, AC line-operated devices, the provided contacts must be used to control yet another set of contacts that are rated for the actual load being switched (see examples below).

Example 1 – Blower Relay Contact (Single Phase AC)

The Blower set of contacts (Relay 1, pins 2 & 3) will indicate when the cabinet's blower is on. On an A2 cabinet, this contact will close once the blower key is pressed on the cabinet's keypad, and remain closed while the blower is at Normal Speed.

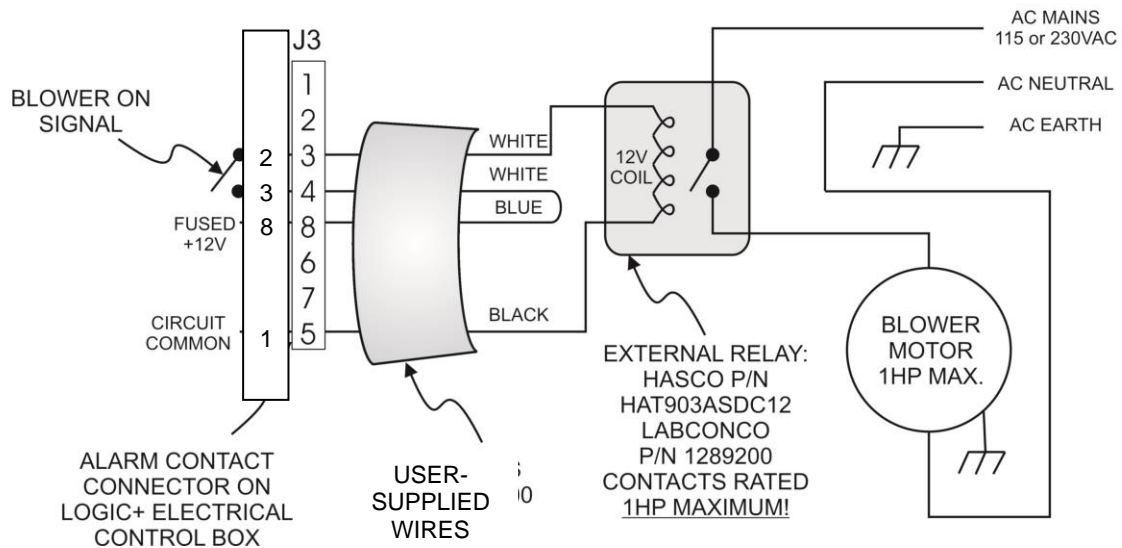
However, on a B2 cabinet, the contacts will close when the blower key is pressed to signal (through this Relay 1 contact) a remote exhaust blower to start. The cabinet's blower will NOT start until the internal Airflow Sensor verifies proper exhaust airflow from the remote exhaust blower. Once the blower successfully starts, the contact will remain closed.

The generalized circuit shown below indicates how to interface the cabinet's provided contacts to power a single phase high current device (like a remote exhaust blower).

Note: The cabinet's provided contacts are used to actuate the low-power coil of a user-supplied external power relay/contacter. Never run high current or AC voltage through the cabinet's provided contacts!

The relay in the example below is: Hasco HAT903ASDC12 (Labconco P/N 1289200), the 12V coil draws only .08Amps (the provided +12VDC is fused at 0.5 Amps total, so choose a relay with an amp draw for the actuator coil less than 0.5 A) ***If using two or three of the provided relay contacts, the sum total of all current draw from three relay actuator coils must be less than 0.5A.***

CONNECTING AN EXTERNAL AC BLOWER TO THE LOGIC+ USING A 12VDC RELAY



Example 2 – Blower Relay Contact (Three Phase AC)

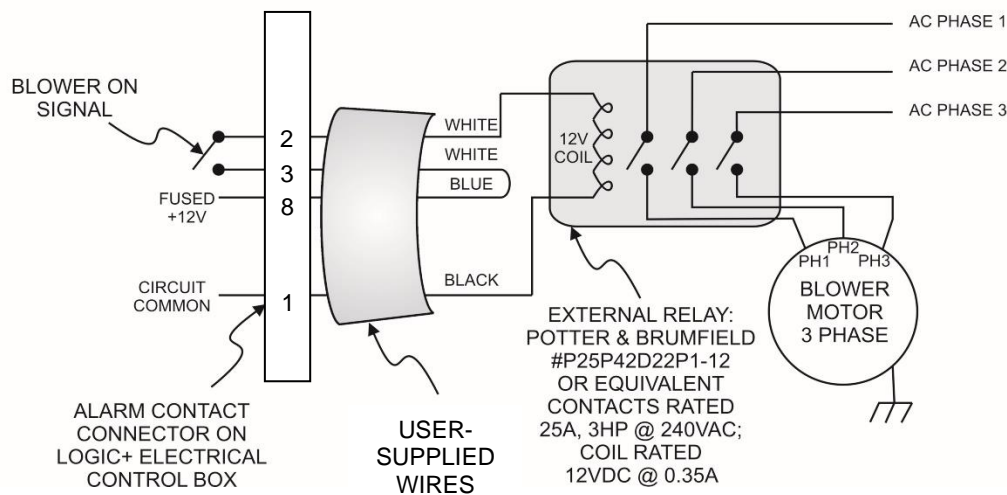
The Blower set of contacts (Relay 1, pins 2 & 3) will indicate when the cabinet's blower is on. On an A2 cabinet, this contact will close once the blower key is pressed on the cabinet's keypad, and remain closed while the blower is at Normal Speed.

However, on a B2 cabinet, the contacts will close when the blower key is pressed to signal (through this Relay 1 contact) a remote exhaust blower to start. The cabinet's blower will NOT start until the internal Airflow Sensor verifies proper exhaust airflow from the remote exhaust blower. Once the blower successfully starts, the contact will remain closed.

The generalized circuit shown below indicates how to interface the cabinet's provided contacts to power a Three Phase high current device (like a remote exhaust blower). **Note that the cabinet's provided contacts are used to actuate the low-power coil of a user-supplied external power relay/contactor. Never run high current or AC voltage through the cabinet's provided contacts!**

The relay in the example below is: Potter & Brumfield P25P42D22P1-12, the 12V coil draws .35Amps (the provided +12VDC is fused at 0.5 Amps total, so choose a relay with an amp draw for the actuator coil less than 0.5 A). **If using all three provided relay contacts, the sum total of all current draw from three relay actuator coils must be less than 0.5A.**

CONNECTING AN EXTERNAL 3 PHASE BLOWER TO THE LOGIC+



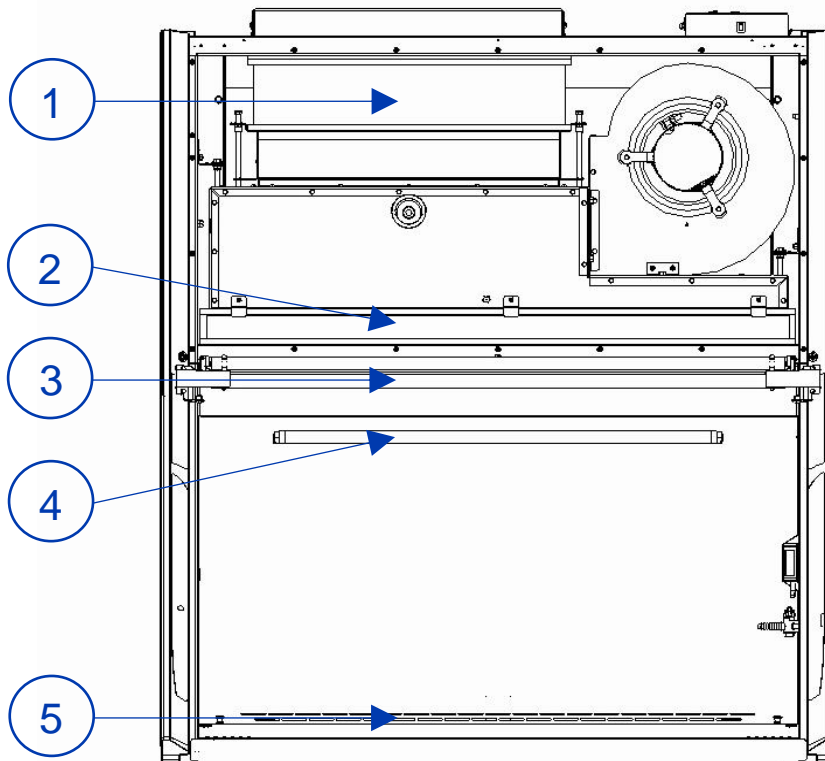
23: Parts List

Type A2 Consumables

Table 23-1

Item	Quantity Required	Catalog Number	Description
1	1	3838500	Exhaust HEPA Filter 3 Foot Model
	1	3838501	Exhaust HEPA Filter 4 Foot Model
	1	3838502	Exhaust HEPA Filter 5 Foot Model
	1	3838503	Exhaust HEPA Filter 6 Foot Model
2	1	3838410	Supply HEPA Filter 3 Foot Model
	1	3838411	Supply HEPA Filter 4 Foot Model
	1	3838412	Supply HEPA Filter 5 Foot Model
	1	3838413	Supply HEPA Filter 6 Foot Model
3	2	1297503	Lamp, LED, 3 Foot Model
	2	1297504	Lamp, LED, 4 Foot Model
	2	1297505	Lamp, LED, 5 Foot Model
	2	1297506	Lamp, LED, 6 Foot Model
4	1	1271300	Lamp, UV (models with UV light only)
5	2	3795300	Prefilter, 24" (Qty. 2 per 4 Foot Puricare Model)
	1 / 1	3795300 / 3795301	Prefilter (Qty. 1 each size 5 Foot Puricare Model)
	2	3795301	Prefilter, 36" (Qty. 2 per 6 Foot Puricare Model)

Figure 23-1

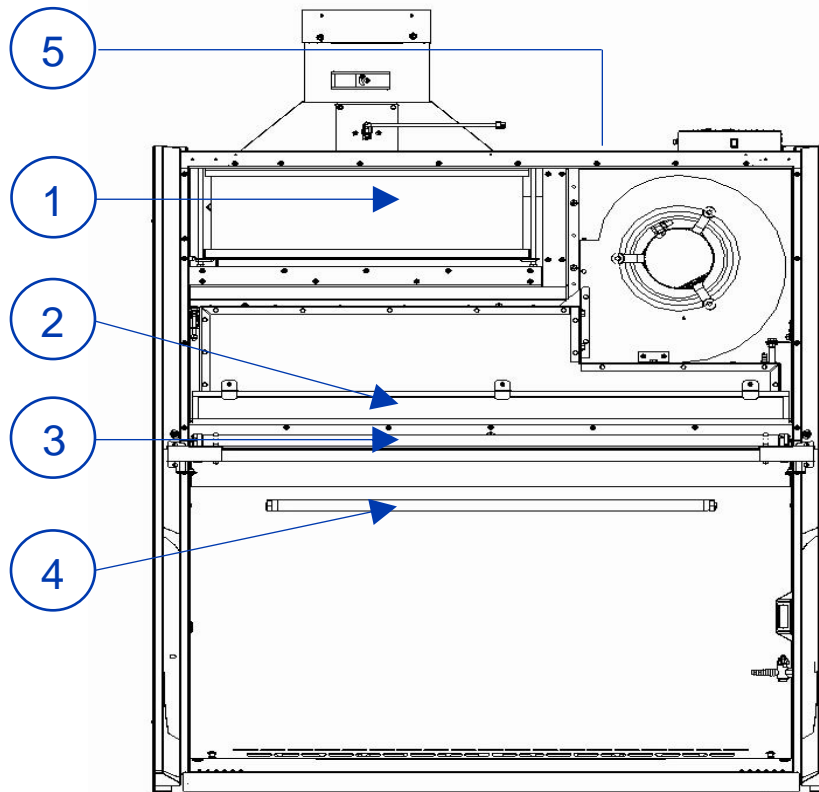


Type B2 Consumables

Table 23-2

Item	Quantity Required	Catalog Number	Description
1	1	3438501	Exhaust HEPA Filter 4 Foot B2 Model
	1	3438503	Exhaust HEPA Filter 6 Foot B2 Model
2	1	3838411	Supply HEPA Filter 4 Foot Model
	1	3838413	Supply HEPA Filter 6 Foot Model
3	2	1297504	Lamp, LED, 4 Foot Model
	2	1297506	Lamp, LED, 6 Foot Model
4	1	1271300	Lamp, UV (models with UV light only)

Figure 23-2

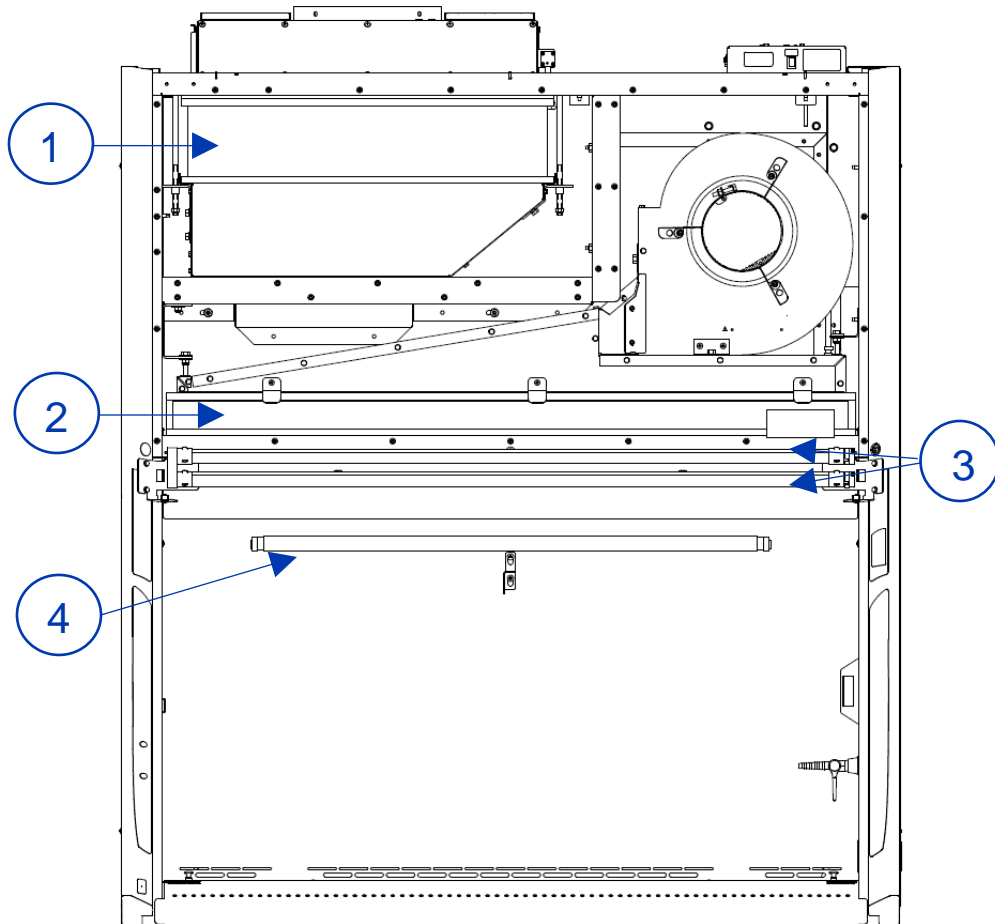


Type C1 Consumables

Table 23-3

Item	Quantity Required	Catalog Number	Description
1	1	3838501	Exhaust HEPA Filter 4 Foot Model
	1	3838503	Exhaust HEPA Filter 6 Foot Model
2	1	3838411	Supply HEPA Filter 4 Foot Model
	1	3838413	Supply HEPA Filter 6 Foot Model
3	2	1297504	Lamp, LED, 4 Foot Model
	2	1297506	Lamp, LED, 6 Foot Model
4	1	1271300	Lamp, UV (models with UV light only)

Figure 23-3



Advanced Service Components

Table 23-4

Item	Shown on Figure	Catalog Number	Description
1	23-4	3332400	Keypad
2		3832400	Sash Sensor Switch
3		3322900P	Work Surface, 3ft
		3322901P	Work Surface, 4ft
		3322902P	Work Surface, 5ft
		3322903P	Work Surface, 6ft
4		3436800	Air Foil Grille, 3ft
		3436811	Air Foil Grille, 4ft
		3436812	Air Foil Grille, 5ft
		3436813	Air Foil Grille, 6ft
		3436814	Air Foil Grille, 4ft (A2 12" Sash models)
		3436815	Air Foil Grille, 5ft (A2 12" Sash models)
5		3436816	Air Foil Grille, 6ft (A2 12" Sash models)
		3401300	Towel Catch, 3ft
		3401301	Towel Catch, 4ft
		3401302	Towel Catch, 5ft
6		3401303	Towel Catch, 6ft
		3328600	Display PCB
7		3329700	Speaker
8		1233000	Outlet Receptacle, 115v, GFCI (US)
		1232800	Outlet Receptacle, 115v (US)
		1283900	Outlet Receptacle, 230v (US)
		1296100	Outlet Receptacle, 230v (China/Australia)
		1296200	Outlet Receptacle, 230v (UK)
		1296300	Outlet Receptacle, 230v (Schuko)
		1296400	Outlet Receptacle, 230v (India)
9		23-5	3823803
10	3328400		I/O Transition Board
11	3448700		UV Ballast
12	3328500		EN Alarm/Relay Contact Board
13	1289200		Relay, SPST
13	1289100		Relay, DPST

Figure 23-4

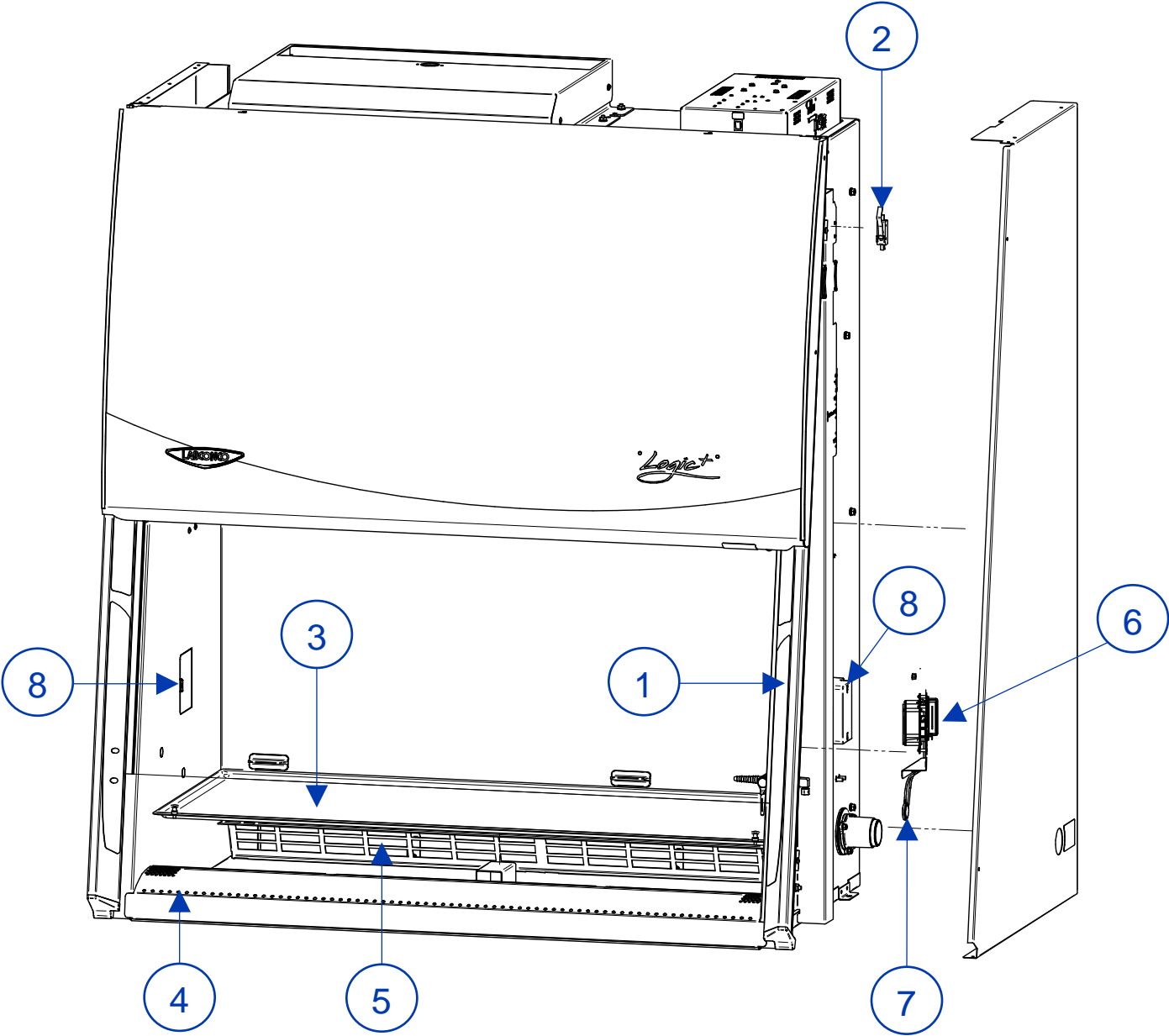
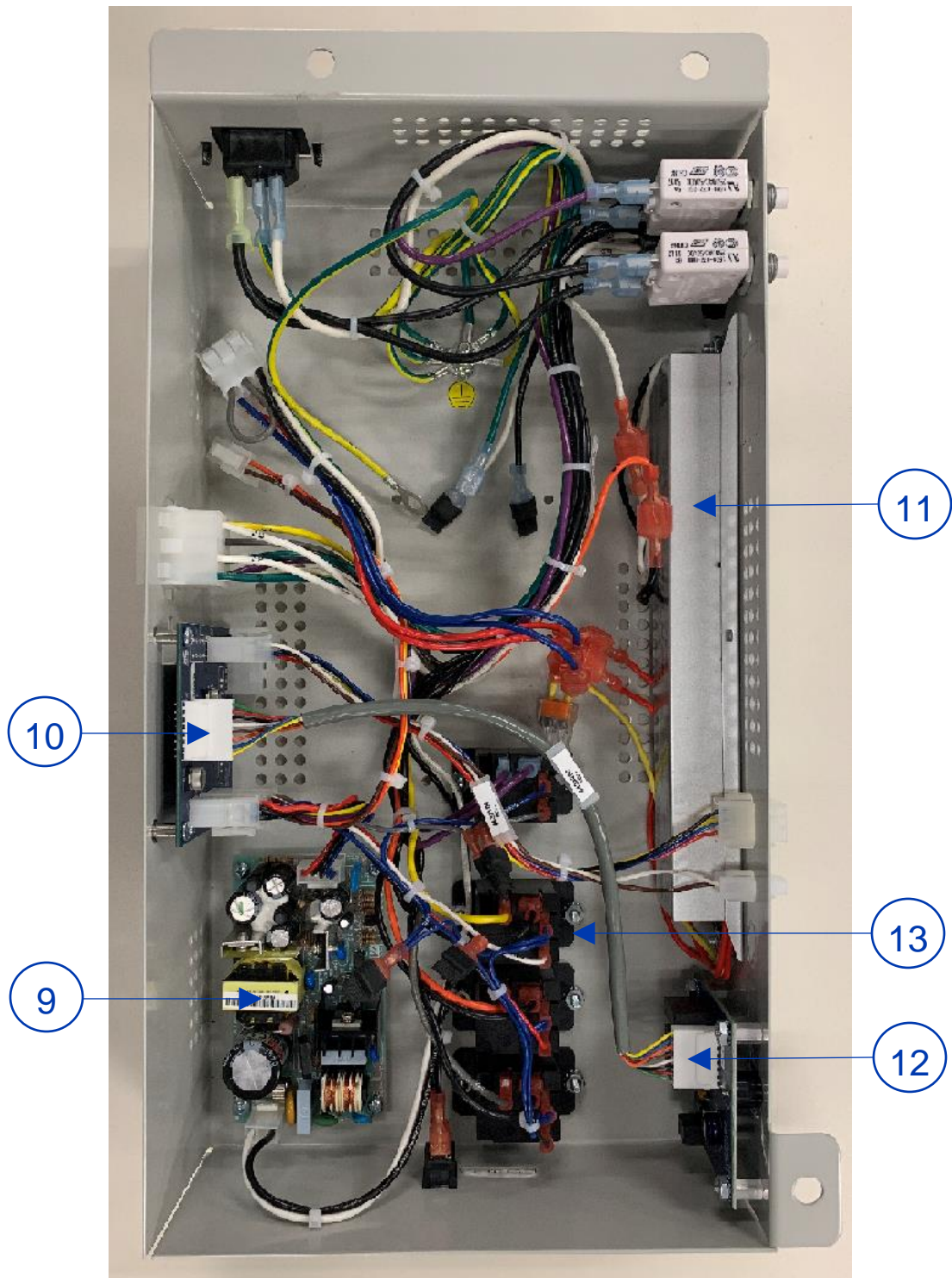


Figure 23-5



END OF 3849920