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User's Manual

Protector® Work Stations

Models
3930000
3930001
3930020
3930021

To receive important product updates,
complete your product registration card
online at **register.labconco.com**

Please read the User's Manual before operating the equipment.

Warranty

Labconco Corporation provides a warranty to the original buyer for the repair or replacement of parts and reasonable labor as a result of normal and proper use of the equipment with compatible chemicals. Broken glassware and maintenance items, such as filters, gaskets, light bulbs, finishes and lubrication are not warranted. Excluded from warranty are products with improper installation, erratic electrical or utility supply, unauthorized repair and products used with incompatible chemicals.

The warranty for Protector® Work Stations will expire one year from date of installation or two years from date of shipment from Labconco, whichever is sooner. Warranty is non-transferable and only applies to the owner (organization) of record.

Buyer is exclusively responsible for the set-up, installation, verification, decontamination or calibration of equipment. This limited warranty covers parts and labor, but not transportation and insurance charges. If the failure is determined to be covered under this warranty, the dealer or Labconco Corporation will authorize repair or replacement of all defective parts to restore the unit to operation. Repairs may be completed by 3rd party service agents approved by Labconco Corporation. Labconco Corporation reserves the rights to limit this warranty based on a service agent's travel, working hours, the site's entry restrictions and unobstructed access to serviceable components of the product.

Under no circumstances shall Labconco Corporation be liable for indirect, consequential, or special damages of any kind. This warranty is exclusive and in lieu of all other warranties whether oral, or implied.

Returned or Damaged Goods

Do not return goods without the prior authorization from Labconco. Unauthorized returns will not be accepted. If your shipment was damaged in transit, you must file a claim directly with the freight carrier. Labconco Corporation and its dealers are not responsible for shipping damages.

The United States Interstate Commerce Commission rules require that claims be filed with the delivery carrier within fifteen (15) days of delivery.

Limitation of Liability

The disposal and/or emission of substances used in connection with this equipment may be governed by various federal, state, or local regulations. All users of this equipment are required to become familiar with any regulations that apply in the user's area concerning the dumping of waste materials in or upon water, land, or air and to comply with such regulations. Labconco Corporation is held harmless with respect to user's compliance with such regulations.

Contacting Labconco Corporation

If you have questions that are not addressed in this manual, or if you need technical assistance, contact Labconco's Customer Service Department or Labconco's Product Service Department at 1-800-821-5525 or 1-816-333-8811, between the hours of 7:30 a.m. and 5:30 p.m., Central Standard Time.

Part #3939000, Rev. G
ECO L352

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Chapter 1: Introduction

Congratulations on your purchase of a Labconco Protector® Work Station. Your enclosure provides personnel protection through superior containment while conserving energy at OSHA approved velocities as low as 60 feet per minute. It is the result of Labconco's more than 50 years of experience in manufacturing fume hoods and more than 30 years of experience in manufacturing filtered enclosures.

These enclosures will effectively contain toxic or noxious fumes and chemicals when properly installed and operated. Each enclosure uses either a carbon filter for exhausting low concentrations to the room or an accessory remote blower or accessory FilterMate Portable Exhauster for exhausting high concentrations to the outside. The carbon filters are available with three different carbons for adsorbing organic vapors, formaldehyde or ammonia and amines. The accessory FilterMate Portable Exhauster can also filter particulates. The Protector Work Stations offer many unique features to enhance safety, performance, and energy savings. To take full advantage of them, please acquaint yourself with this manual and keep it handy for future reference. If you are unfamiliar with how high performance Protector Work Stations operate, please review *Chapter 4: High Performance Features and Safety Precautions* before you begin working in the enclosure. Even if you are an experienced user, please review *Chapter 5: Using Your Protector Work Station,* which describes the features so that you can use the enclosure efficiently. See chart that follows for application review and contact Labconco for additional ordering information.

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.

No.	Use Protector Work Station Model No's.	Filter	Blower	Application	Exhaust
1.	3930000 (115V) 3930020 (230V)	Carbon Filter* Organic Vapor, Formaldehyde or Ammonia	Built-In Integral Motorized Impeller	If ducting to the outside is not feasible, the filters keep low level concentrations below OSHA recommended time weighted averages, restoring clean air to the laboratory.	To the room
2.	3930001 (115V) 3930021 (230V)	None	Remote Blower or House Exhaust	Best choice for high level concentrations or when chemical concentrations are unknown or unpredictable	To the outside
3.	3930001 (115V) 3930021 (230V)	FilterMate Carbon Filter* and/or HEPA Filter for particulates	FilterMate Portable Exhauster	Best choice when particulate removal is required in addition to carbon filtration and ducting to the outside is not feasible	To the room

* It is recommended that a Labconco product specialist review the chemical application to determine if it is suitable. Consult Chapter 5 and Chapter 6.

Protector Work Station 3930001 is shown on Work Surface with Sink 6942003 and Telescoping Base Stand 3746702. Blower, ductwork, work surface and supporting base must be ordered separately.

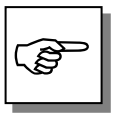
Typographical Conventions

Recognizing the following typographical conventions will help you understand and use this manual:

- Steps required to perform a task are presented in a numbered format.
- Comments located in the margins provide suggestions, reminders, and references.

- Critical information is presented in boldface type in paragraphs that are preceded by the exclamation icon. Failure to comply with the information following an exclamation icon may result in injury to the user or permanent damage to the enclosure.

- Critical information is presented in boldface type in paragraphs that are preceded by the wrench icon. A trained certifier or contractor should only perform these operations. Failure to comply with the information following a wrench icon may result in injury to the user or permanent damage to your hood.



- Important information is presented in capitalized type in paragraphs that are preceded by the pointer icon. It is imperative that the information contained in these paragraphs be thoroughly read and understood by the user.

- CAUTION – See Manual. When this symbol is on the unit it indicates a caution that is detailed in this manual.
- ATTENTION - Voir manuel. Lorsque ce symbole est sur l'unité, il indique une mise en garde qui est indiqué dans ce manuel.

Chapter 2: Prerequisites

Before you install the enclosure, you need to prepare your site for installation. You must be certain that the area is level and of solid construction. In addition, a dedicated source of electrical power should be located near the installation site to power the enclosure, and other apparatus. Additionally, the enclosure should be strategically placed in the lab to provide efficient workflow.

Carefully read this chapter to learn the requirements for your installation site:

- The support, vibration and movement requirements.
- The location and air current requirements.
- The exhaust and blower requirements.
- The electrical power requirements.
- The space requirements.

Refer to *Appendix B: Dimensions* for complete enclosure dimensions.

Refer to *Appendix C: Specifications* for complete enclosure electrical and environmental conditions, specifications and requirements.

Support, Vibration and Movement Requirements

At a minimum, the supporting structure usually consists of a base cabinet or base stand and chemical-resistant work surface. See Chapter 3 for setting up installation.

Location and Air Current Requirements

The Protector Work Stations have been designed to contain hazards by negating typical cross drafts and turbulence within the opening. Normal air movement does not affect installation of the Protector Work Station. However, as a precautionary safety measure and a higher level of quality management, it is recommended that the Protector Work Station be placed in an area to avoid:

- High traffic areas where walking might cause an air disturbance or be a nuisance.
- Overhead or wall HVAC diffusers, fans, radiators or other lab equipment producing air currents.
- Next to doorways or windows that may be opened.

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.

Exhaust and Blower Requirements

The Protector Work Station draws room air past the operator and through the enclosure. This contaminated air is either pulled through a carbon filter and exhausted to the room or exhausted outside by a remote blower.

Data for the exhaust volume and enclosure static pressure loss are listed for the Protector Work Station at face velocities of 60, 80 and 100 fpm.

Enclosure Width	Model Description	Face Velocity (fpm)	Exhaust Volume (CFM)	Initial Static Pressure Loss for Enclosure with Remote Blower	Integral Blower Noise Pressure (dbA)
4'	4' Protector Work Station	60 80 100	150 200 250	.06" .10" .16"	57-59 62-64 69-71

Proper blower selection can be determined from these exhaust requirements and the total system static pressure loss for outside exhaust. The enclosure must be connected to either a dedicated blower or a house exhaust system.

Labconco offers accessory remote blowers and transition adapters listed in Chapter 7. Labconco also offers accessory FilterMate Portable Exhausters listed in Chapter 7. Contact Labconco for blower sizing assistance.

If the enclosure is connected directly to a house exhaust system, an adjustable damper (or valve) must be installed to control the airflow properly. This is equally important when a house exhaust system is controlling multiple enclosures. See Chapter 7 for accessory Adjustable Damper ordering information.

Electrical Requirements

Standard duplex electrical receptacles should be nearby for connecting the enclosure or other equipment. The enclosures for remote blower exhaust include iris pass-throughs to allow electrical cords through the back of the enclosure without leaving a large hole for contaminants to escape.

The remote blower for the Protector Work Station may be connected to the blower switch on the enclosure. There is an outlet on the back of the upper light housing for this specific purpose. We recommend a maximum amperage of 6 amps for this circuit to the remote blower. Please refer to the wiring diagrams in Appendix C. Connect the blower wires to the remote blower per local electrical codes.

Space Requirements

The dimensions for the different models are shown in *Appendix B: Dimensions*.

Chapter 3:
Getting Started

Now that the site for your Protector Work Station is properly prepared, you are ready to unpack, inspect, install, and validate your system. Read this chapter to learn how to:

- Unpack and move the enclosure.
- Set up the enclosure with the proper supporting structure and work surface.
- Connect to an exhaust system (only applicable for remote blower).
- Installation of carbon filters (only applicable for integral blower exhausted to the room).
- Connect the electrical supply.
- Set the face velocity with the speed control adjustment, only applicable for integral blower.
- Arrange validation for the enclosure.
- Seal the enclosure to the work surface.

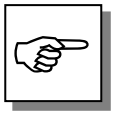
Depending upon which model you are installing, you may need common mechanical and electrical installation tools in addition to wrenches, ratchets, sockets, a nut driver set, a flat-blade screwdriver, a Phillips screwdriver, and a carpenter level to complete the instructions in this chapter.

Each enclosure weighs either 85 or 105 lbs. each (37 or 46 kg). The shipping container allows for lifting with a mechanical lift truck or floor jack. If you must lift the enclosure manually, follow safe-lifting guidelines. Do not lift by the front air foil.

Unpacking the Enclosure

The United States Interstate Commerce Commission rules require that claims be filed with the delivery carrier within fifteen (15) days of delivery.

Carefully remove the shrink-wrap or carton on the enclosure and inspect it for damage that may have occurred in transit. If damaged, notify the delivery carrier immediately and retain the entire shipment intact for inspection by the carrier.



DO NOT RETURN GOODS WITHOUT THE PRIOR AUTHORIZATION OF LABCONCO. UNAUTHORIZED RETURNS WILL NOT BE ACCEPTED.

IF ENCLOSURE WAS DAMAGED IN TRANSIT, YOU MUST FILE A CLAIM DIRECTLY WITH THE FREIGHT CARRIER. LABCONCO CORPORATION AND ITS DEALERS ARE NOT RESPONSIBLE FOR SHIPPING DAMAGE.

Do not discard the packing material until you have checked all of the components and tested the enclosure. We recommend that you do not remove the enclosure from its shipping container until it is ready to be placed in its final location. Move the unit by placing a flat, low dolly under the shipping skid, or by using a floor jack.

Do not move the enclosure by tilting it onto a hand truck.

Installing the Enclosure on a Supporting Structure and Work Surface

Use caution when lifting or moving the enclosure.

When installing the enclosure onto a chemical-resistant work surface or benchtop, ensure that the structure can safely support the combined weight of the enclosure and any related equipment. The work surface should be at least as wide as the enclosure to properly support it. The front of the enclosure should be aligned within 0.3" of the front of the work surface. Mounting holes are provided in the Labconco accessory work surfaces to secure the enclosure.

Work Surface Specifications

The work surface should be smooth, rigid, and durable, such as a chemical-resistant epoxy resin. The surface should be non-porous and resistant to the powders, solvents and chemicals used in conjunction with the enclosure. The work surface should also contain a dished recessed area for containing primary spills.

Work Surface and Enclosure Installation

1. Level the base cabinet or stand and the work surface. Work surface should be placed flush with the front of the base stand or cabinet as shown in Figure 3-1.
2. Position the work surface in its intended location and with the front of the work surface towards you. (Rear mounting holes are located close to the rear edge.)
3. Secure the work surface to the base stand or cabinet with a structural adhesive or silicone sealant.
4. Insert the supplied mounting screws in the four holes. Allow a minimum of 1/8" clearance under the head of the screw for positioning the enclosure. (On 6942003 work surface with sink, the fasteners are omitted and the enclosure is secured to the work surface with silicone sealant.
5. Place the enclosure on the work surface and slide the rear flange and front air foil flanges under the mounting screw heads.
6. Tighten the four screws to complete the installation.

If the accessory histology/pathology work surface with sink is to be installed (Labconco #6942003) then use general plumbing to connect the hot and cold water supply lines and sink drain line. The valves are supplied with 1/2" OD slip joint by 1/4" NPT female connector. The drain line requires 1-1/2" NPT female pipe connector and an optional polypropylene P-trap (Labconco P/N 1432600)

See Chapter 7 for Dimensions on work surfaces.

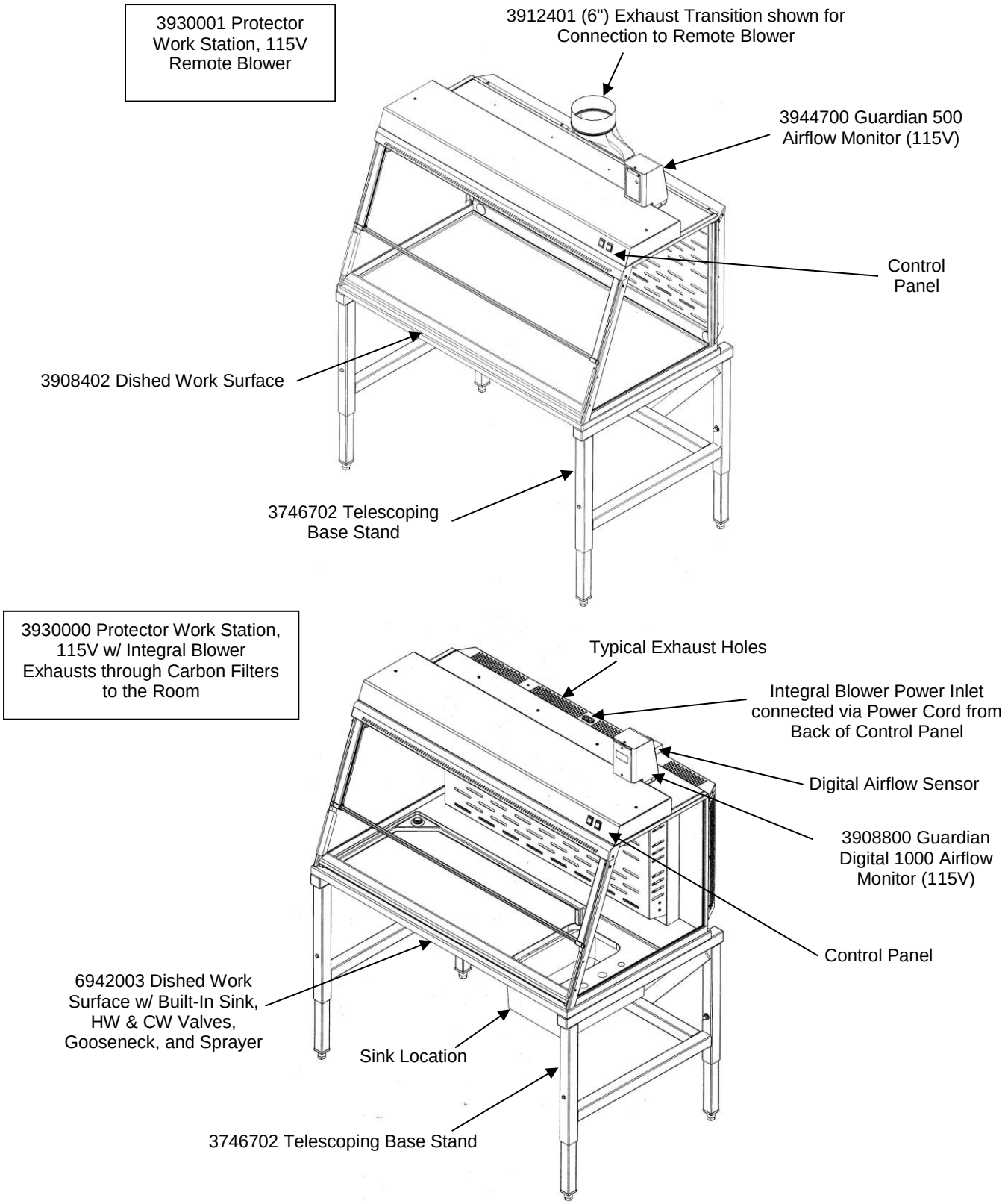

3930001 Protector Work Station, 115V Remote Blower
3912401 (6") Exhaust Transition shown for Connection to Remote Blower
3944700 Guardian 500 Airflow Monitor (115V)
Control Panel
3908402 Dished Work Surface
3746702 Telescoping Base Stand
3930000 Protector Work Station, 115V w/ Integral Blower Exhausts through Carbon Filters to the Room
Typical Exhaust Holes
Integral Blower Power Inlet connected via Power Cord from Back of Control Panel
Digital Airflow Sensor
3908800 Guardian Digital 1000 Airflow Monitor (115V)
Control Panel
6942003 Dished Work Surface w/ Built-In Sink, HW & CW Valves, Gooseneck, and Sprayer
Sink Location
3746702 Telescoping Base Stand

Figure 3-1

Connecting to the Exhaust System (Required on Protector Work Station for Remote Exhaust)

ATTENTION: The weight of the exhaust ductwork system must be supported independently of the enclosure superstructure or damage may occur.

The exhaust system should be installed by a qualified HVAC contractor.

The exhaust connection on the remote Protector Work Station Enclosure has been designed to accept a 2" x 10" (5.1cm x 25.4cm) nominal transition adapter. See Chapter 7 for ordering accessory Transition Adapters. Labconco manufactures transition adapters for either top or bottom exhaust and for both 5" dia. hose or 6" dia. duct. Review Chapter 2 for remote blower and FilterMate Portable Exhauster exhaust prerequisites and review Chapter 7 for ordering blower exhaust equipment. For your convenience several exhaust options are shown in Figures 3-2 and 3-3. Consult Labconco Customer Service should you require help sizing your blower for the exhaust volume and system static pressure loss.

To ensure compatibility, the selected exhaust duct material should match the enclosure, procedures and chemical applications.

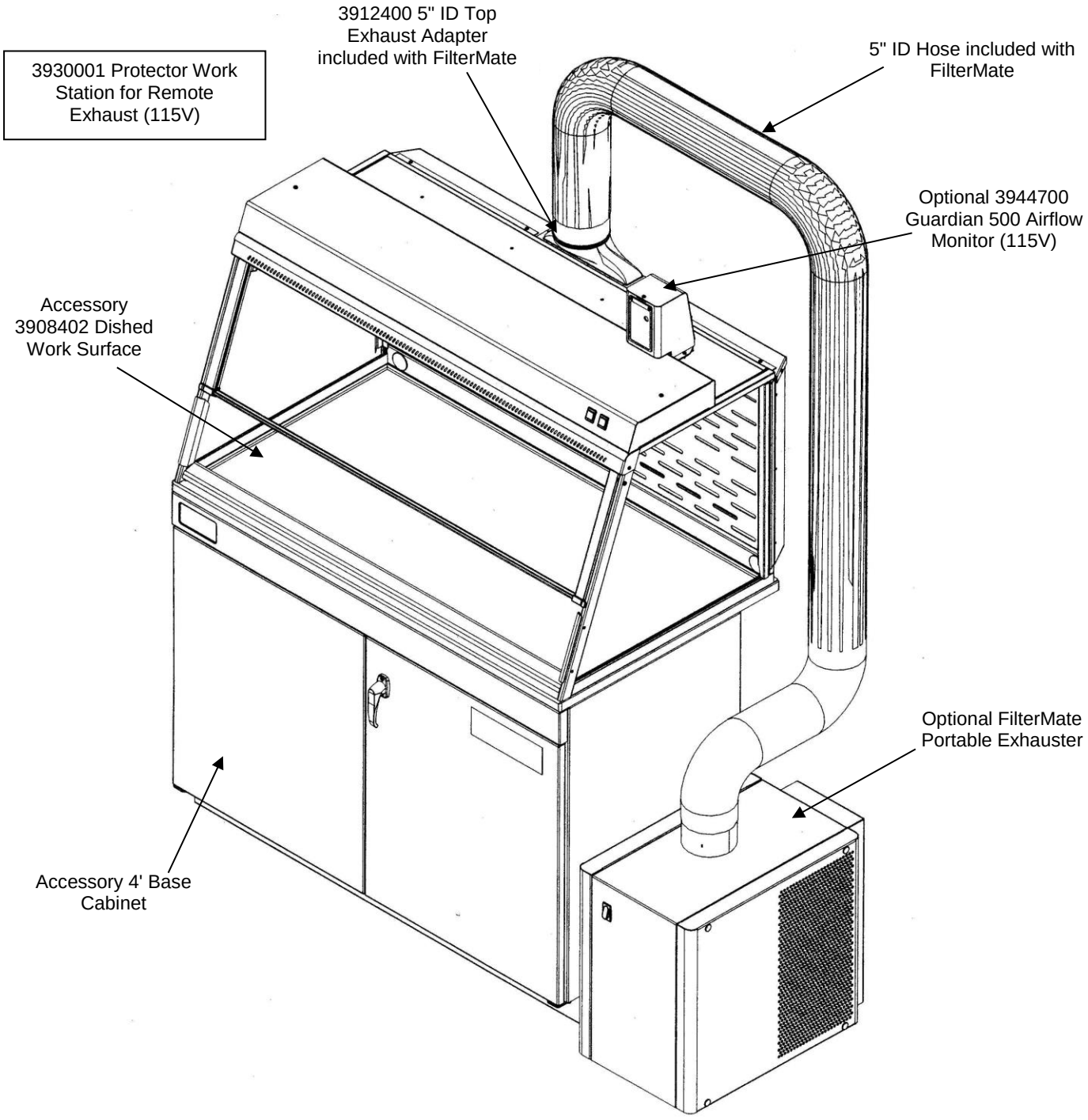


Figure 3-2
5" Top Exhaust for Remote Protector Work Station Connected to a FilterMate Portable Exhauster

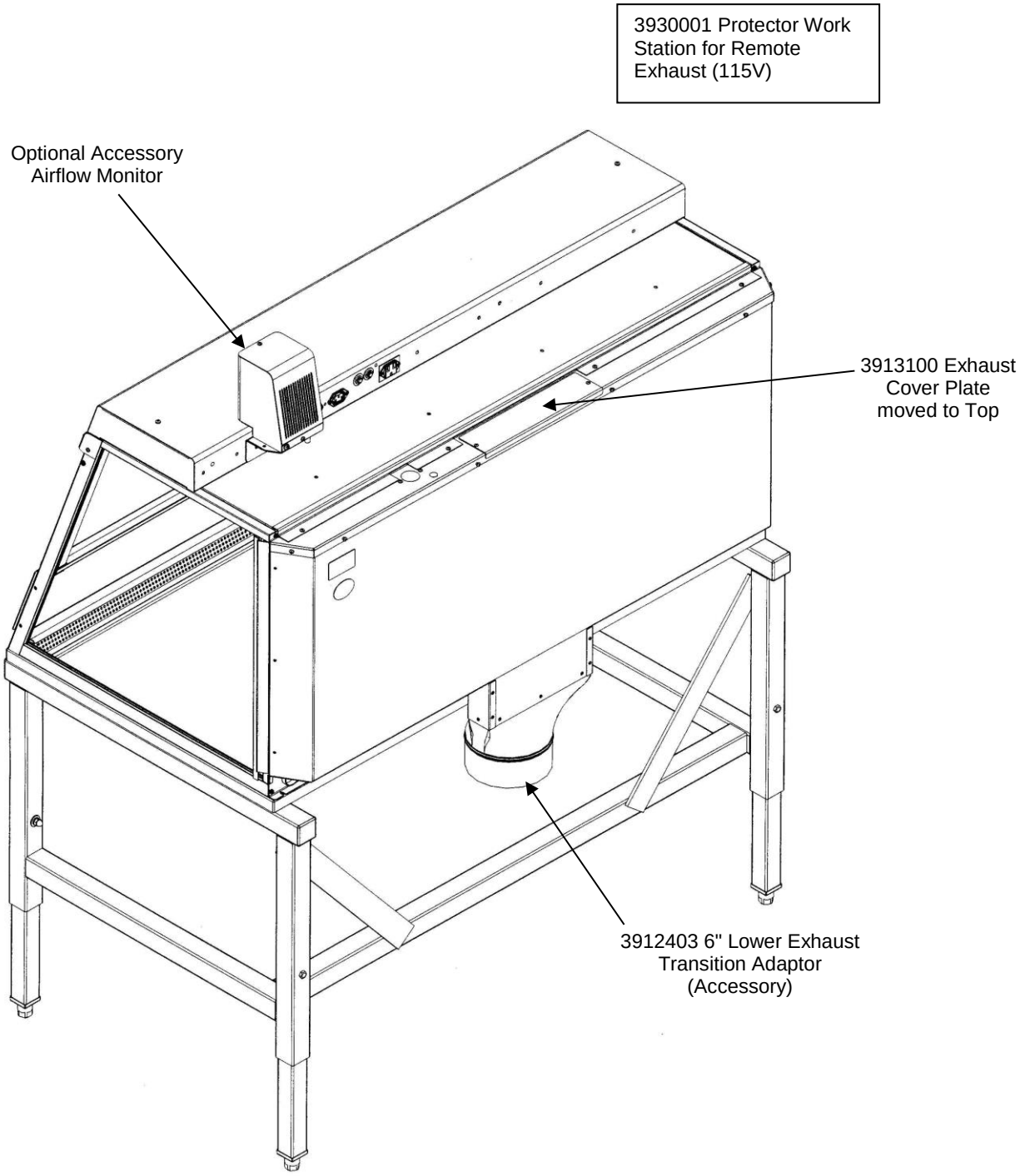


Figure 3-3
Back View of Protector Work Station with Lower 6" Remote Exhaust

Installation of Carbon Filters for Room Exhaust

For carbon filter installation, first unthread the knobs on the perforated baffle located inside the enclosure in the upper corners. Use caution when slowly lowering the perforated baffle. See Figure 6-4 in Chapter 6 for location of the perforated baffle and knobs. See the following list of available carbon filters below and in Chapter 7. All carbon filters are simply installed with the gasket side on the downstream exhaust side. Install the correct carbon filter for the application and call Labconco for assistance. *Two* carbon filters must be installed behind the perforated baffle. These *two* filters provide additional capacity and mixing of the air stream for proper performance. If using both a formaldehyde filter and organic vapor filter at the same time you must place the formaldehyde filter downstream of the organic vapor filter. (With the perforated baffle tilted down, the formaldehyde filter is on top of the organic vapor filter.)

Filter Type	Appropriate Use
Organic Vapor Activated Carbon 3924200 10.5 lbs.	Adsorbs organic compounds designated by NIOSH guidelines as acceptable for use with chemical cartridge-type respirators. Concentrations in the enclosure's work area must not exceed the IDLH for the chemical and the exhaust from the enclosure must be perfectly monitored not to exceed the TWA.
Formaldehyde (Formalin) 3924201 13.3 lbs.	Formaldehyde requires the use of an impregnated carbon. Concentrations in the enclosure's work area must not exceed the IDLH for the chemical and the exhaust from the enclosure must not exceed the TWA.
Ammonia and Amines 3924202 15.2 lbs.	Treats ammonia, low molecular weight amines and other bases designated by NIOSH as acceptable for use with ammonia cartridge type respirators. Requires the use of an impregnated carbon. Concentrations in the enclosure's work area must not exceed the IDLH for the chemical and the exhaust from the enclosure must not exceed the TWA.

Important: Carbon filters do not provide any particulate protection, but provide odor control for low level concentrations below OSHA recommended time weighted averages.

Connecting the Electrical Supply Source to the Enclosure

115V Models

Simply connect the 115V power cord supplied to the IEC electrical supply plug on the back of the enclosure, then connect the integral blower power cord from the motorized impeller outlet on the exhaust to the back of the upper light control panel. If operating at 50 Hz operations, integral blower performance maximum airflow will be reduced by 17%. See Figure 3-4 on the following page.

For the remote blower used for Protector Work Stations, follow the wiring diagram in Appendix C and wire the remote blower wires to the switched outlet on the back of the upper light control panel. These wires are switched by the blower switch. Refer to Figure 3-5.

The maximum circuit load for the blower is 6 amps. The lights and airflow monitor are powered from a standard duplex electrical receptacle located nearby for connecting the power cord. All wiring for the Protector Work Station should be performed by a licensed electrician and conform to local codes. In most cases, the remote blower Protector Work Station for use with a remote blower will require the use of an additional power cord routed from the switched power outlet on the back. See Figure 3-5 and power cord, item 24 in Figure A-2. Modify the power cord, item 24, in Figure A-2 for connection to the remote blower via a customer supplied junction box located nearby. The grounding connection shall not be made to the terminal box cover of the remote blower. The building electrical supply system for the remote blower should include overload protection such as a switch or circuit breaker in close proximity and within easy reach of the operator. The switch or circuit breaker shall be marked as the disconnecting device. Consult NEC-2002 for proper installation.

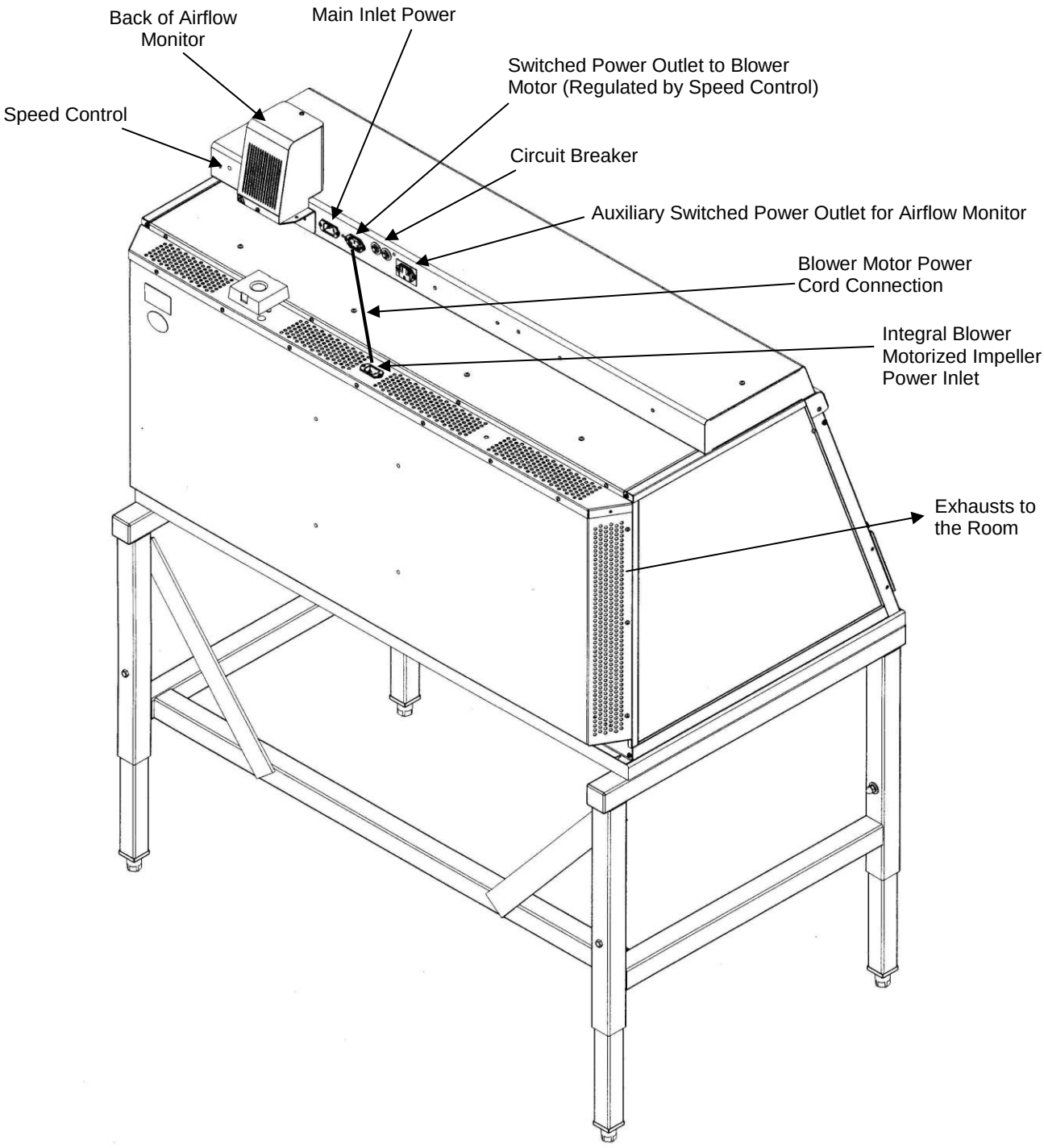


Figure 3-4
Protector Work Station with Integral Blower Power Cord and Speed Control

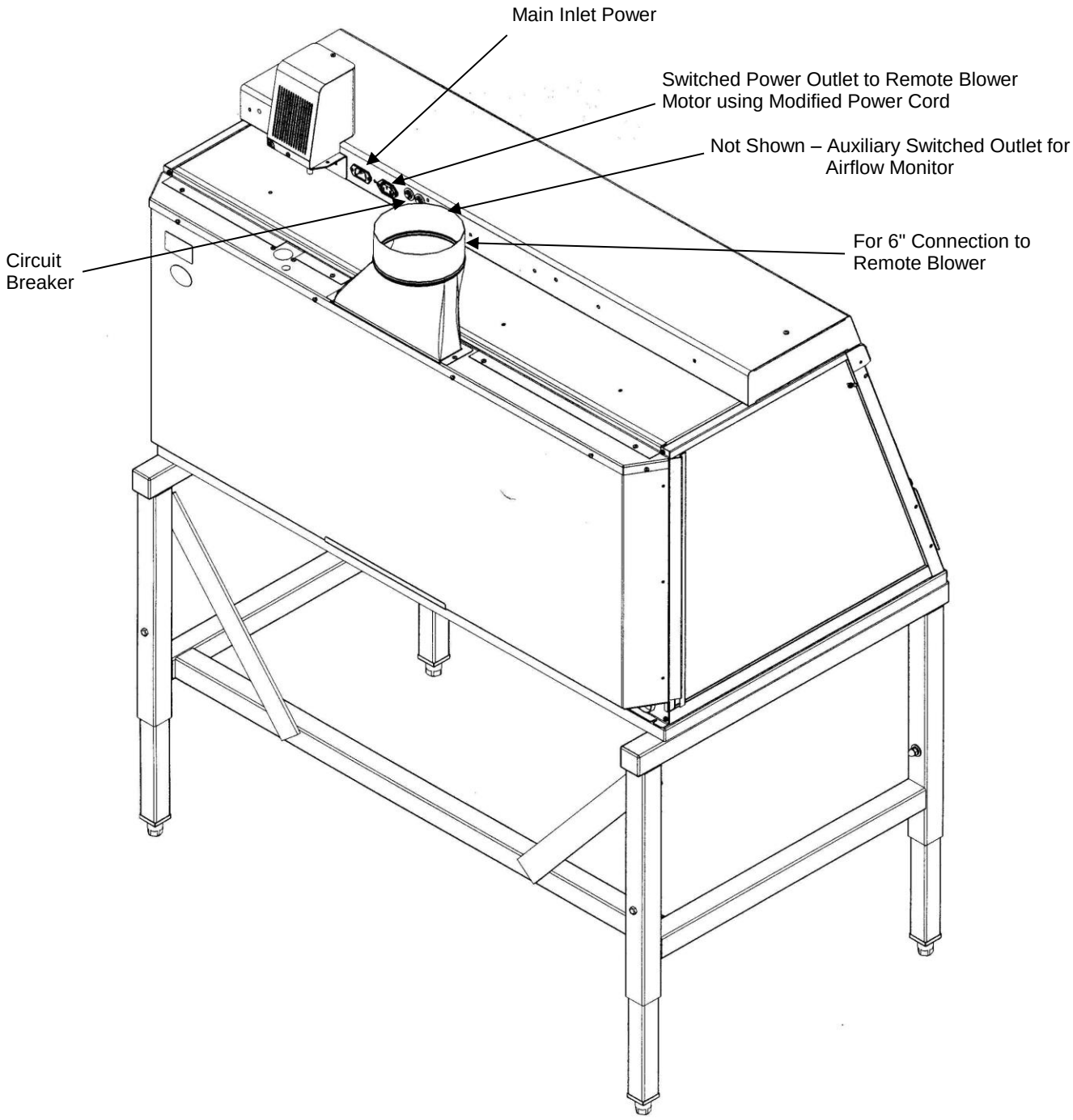


Figure 3-5
Protector Work Station for Remote Exhaust

230V Models

The same procedure applies for the 230V except it is shipped without a plug. Install the appropriate plug for your electrical specifications per local codes.

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

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

Set the Face Velocity with the Speed Control Adjustment

For Protector Work Stations with integral blower, adjustment of the speed control gives the correct face velocity and is located behind the upper light control panel. The face velocity should be adjusted from 60 to 100 fpm. (Consult your Safety Officer for airflow recommendations for your application). Containment is maximized at a setting within this range. Working at the lowest face velocity appropriate for the application will give the quietest operation. Face velocity measurements are made using an anemometer. An electric anemometer can be obtained from your laboratory supply dealer. Face velocity measurements should be taken in accordance with the *Industrial Ventilation Manual*. (See Appendix E) Using a small Phillips screwdriver, adjust the speed control to give the required face velocity. See Figure 3-4 to locate the speed control. The face velocity is increased by turning the speed control counter clockwise and clockwise to decrease face velocity.

Validating the Protector Work Station Enclosure

To determine the actual face velocity at the sash opening, airflow velocity readings are taken. This should be done across the sash opening of the enclosure in accordance with the *Industrial Ventilation Manual*. (See Appendix E) The "average face velocity" is achieved by taking readings in two rows across the enclosure with the readings 6" from the ends and evenly spaced every 12"; the first row is 3" down from the upper sash foil and the second row is 3" up from the work surface. A total of eight readings are taken for the 4' enclosure and then averaged. Refer to Chapter 2 for proper airflow volumes for your particular model.

The Protector Work Station enclosures have been tested at Labconco's airflow test facility per ASHRAE 110-1995. (See Appendix E) All enclosures achieve an "as manufactured rating" of less than 0.05 part per million (ppm) at 4 liters per minute (lpm); AM <0.05 (Consult Labconco for individual ratings). For "field use" ASHRAE testing contact Labconco for a certified on-site contractor. While no enclosure can compensate for improper technique, these tests confirm that the Protector Work Station enclosures provide a safe working environment.

NOTE: Face velocity profiles and smoke testing should be performed frequently per your organization's quality system to ensure safe performance.

Sealing the Enclosure to the Work Surface

When the enclosure has been set in place it may be sealed at the work surface to prevent spilled materials from collecting under the walls. A bead of silicone sealant is recommended to seal the enclosure to the work surface.

Chapter 4:
High Performance Features and Safety Precautions

High Performance Features

The patented[1] Protector Work Stations are designed to meet the needs of the laboratory scientist, and provide superior containment while conserving energy at OSHA approved “low flow” velocities as low as 60 feet per minute. The enclosures have been tested to effectively contain toxic and noxious materials when properly installed and operated. What makes the enclosures so unique is the revolutionary way they direct air into and through the contaminated air chamber. Labconco engineered the enclosures to minimize the effects of turbulence. The containment-enhancing and aerodynamic designs of the upper sash foil, side air foils, lower air foil, upper dilution air supply, and rear perforated baffle all work in concert to produce horizontal airflow patterns that significantly reduce powder, chemical and particulate concentrations through the work area.

These concentrations of materials are predominantly removed on the “first pass” of airflow through the chamber resulting in high performance containment.

The Protector Work Station with integral blower is designed only for low-level concentrations for use with carbon filters and exhausting to the room. The Protector Work Station for use with a remote blower is designed for high-level concentrations for exhausting to the outside.

[1] U.S. Patent No. 6,461,233

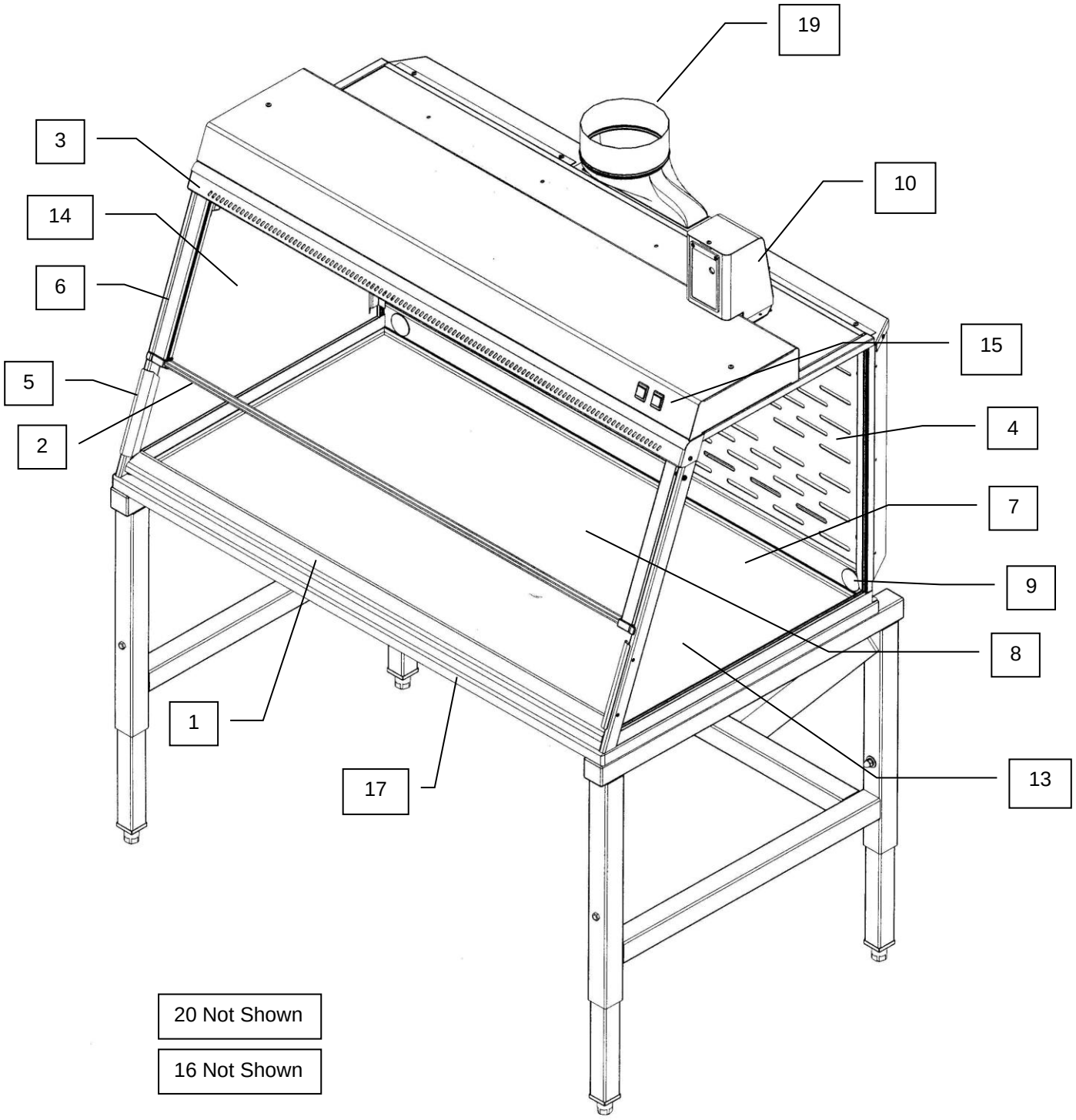


Figure 4-1
Protector Work Station for use with Remote Blower

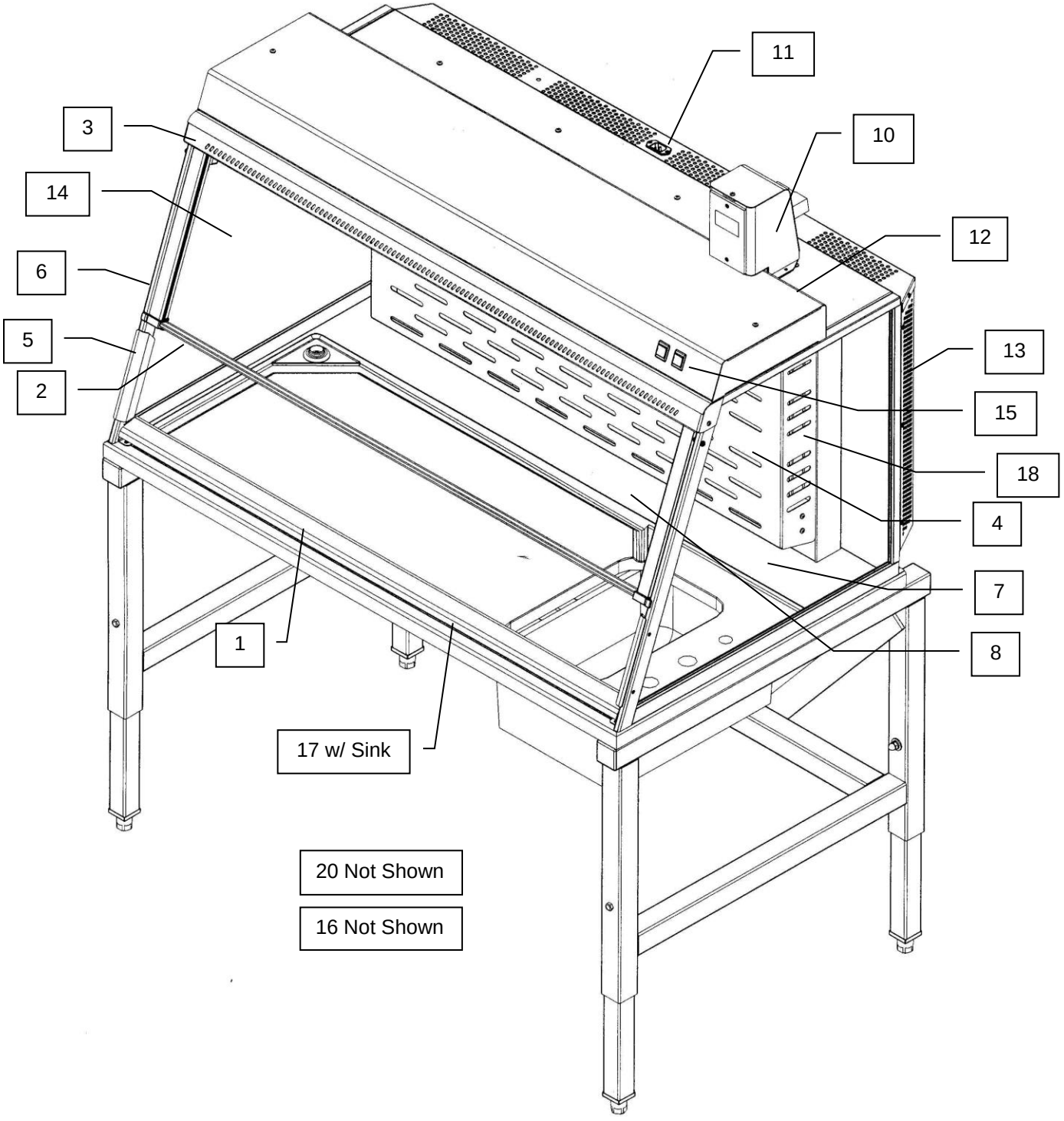
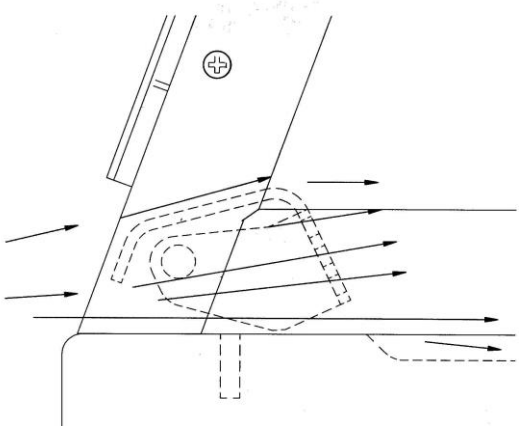


Figure 4-2
Protector Work Station with Integral Blower

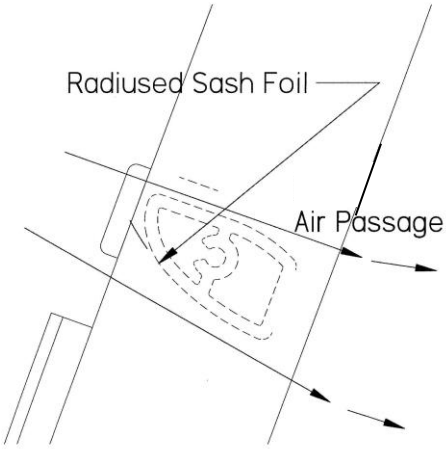
1. **Aerodynamic Clean-Sweep™ Air Foil** has a unique shape that allows air to sweep the work surface for maximum containment. The Clean-Sweep™ openings create a constant protective barrier from contaminants. Should the operator inadvertently block the airflow entering the air foil, air continues to pass under the air foil and through the Clean-Sweep openings. See Figures 4-1, 4-2 and 4-3.

Figure 4-3



2. **Containment-Enhancing Upper Sash Foil** includes an open air passage directly atop the sash foil to bleed air into the hood chamber and direct chemical concentrations away from the sash opening. The radiused sash foil sweeps airflow into the enclosure with minimal turbulence. See Figures 4-1, 4-2 and 4-4.

Figure 4-4



3. **Upper Dilution Air Supply** provides bypass air from above the work area. This feature constantly bathes the inside of the sash with clean air and reduces chemical concentrations along the sash plane, near the critical breathing zone. Five to seven percent of the required air volume is introduced through the upper dilution air supply. The upper dilution air supply also reduces stagnant pockets of air in the upper interior. See Figures 4-1 and 4-2.
4. **Stainless Steel Zoned Rear Perforated Baffle** directs horizontal laminar air streams to the three-zoned sections of the perforated baffle. The three-zoned sections have increasingly more open area at the bottom that help form laminar airflow. This minimizes the potential for air to roll forward preventing contaminants from moving toward the sash opening. The majority of contaminants are highly diluted, captured and removed on the first pass through the enclosure. See Figures 4-1 and 4-2.
5. **Side-Entry Air Foils** allow turbulence-free air to enter the enclosure from the sides and allow clean air to sweep the interior walls of the enclosure. See Figures 4-1 and 4-2.
6. **Ergonomic Slope** of 20 degrees provides maximum visibility and comfort, reduces glare thereby minimizing operator fatigue. See Figures 4-1 and 4-2.
7. **Internal Work Space** provides necessary depth to perform work inside the Protector Work Station without it extending outside the enclosure or resting on the lower air foil. Remote blower model provides 23" working depth and integral blower model provides 17.19" working depth. See Figures 4-1 and 4-2.
8. **Safety Glass Sash with Spring-Loaded Latch** has a wiping seal for maximum containment and features a spring-loaded latch to secure sash open for loading and cleaning. The sash must be down for normal operation. See Figures 4-1 and 4-2.
9. **Utility Ports with Iris (Work Station for Remote Exhaust Only)** allows electrical cords and data cords to pass through the back of enclosure without leaving a large hole for contaminants to escape. The enclosure ships with both solid plugs and iris plugs. See Figure 4-1.
10. **Accessory Guardian™ 500 Airflow Monitor or Guardian™ 1000 Digital Airflow Monitor** continuously monitors airflow. An audio/visual alarm alerts the user to low airflow conditions on both the Guardian 500 and Guardian 1000 Digital airflow monitors. The Guardian™ 1000 Digital Airflow Monitor also displays a face velocity value, provides an RS232 output, a night setback mode and several auxiliary relay ports. Both airflow monitors are available options on all Protector Work Station models. See Figure 4-1 and 4-2. See Chapter 6 for complete details, installation and calibration.

11. **Built-In Motorized Impeller (Integral Blower Models Only)** eliminates the need for a remote blower when using low level concentrations of chemicals. The impeller wheel is dynamically balanced. See Figure 4-2.
12. **Speed Control (Integral Blower Models Only)** regulates the speed of the motorized impeller and is used by the certifier to validate and adjust the inflow velocity. It is located behind the upper light assembly. See Figures 4-2 and Figure 3-4.
13. **Space-Saving Design** increases effective laboratory workspace, because the impeller and carbon filter are self-contained on integral blower models. On remote blower models, the interior space is increased to 23" interior depth vs. 17.19" for integral blower models. See Figure 4-1.
14. **Sash.** The sash is constructed of 1/4 inch tempered safety glass. It pivots up for loading and cleaning. See Figures 4-1 and 4-2.
15. **Control Panel**. The control panel, which is located above the sash, contains the control switches and the electronics. See Figures 4-1 and 4-2.
16. **Lamp Ballast (Not Shown)** for the fluorescent lamp is located behind the control panel.
17. **Accessory Work Surface** is dished and contoured to fit the dimensions of the enclosure to contain spills. For histology/pathology applications, a wet chemistry work surface is available with a sink and valves. See Chapter 7.
18. **Carbon Filters (for Integral Blower Models Only)** are necessary on integral blower models. Carbon filters are designed to remove small amounts of noxious fumes and chemicals. The carbon filters are supported behind the perforated baffle. Two carbon filters are required. Carbon filters are listed in Chapter 7. See Figure 4-2 and Figure 6-4.
19. **Accessory Exhaust Connection Kits (For Remote Blower Models Only)** are available to duct to the outside. The exhaust connection allows the operator additional protection from hazardous fumes or vapors and should always be used if carbon filters capacity are not appropriate for your application. See figures in Chapter 3 and Chapter 7 to order.
20. **Utility Shelves** (not shown) allow the user to hold utensils and printers on shelves inside the enclosure. See Chapter 7.

Safety Precautions

1. Although the enclosure has been engineered to maintain optimum operator safety, caution should always be used while working. Prior to using the enclosure, check to make sure that the exhaust blower is operating and that air is entering the enclosure at its specified face velocity. The use of an airflow monitor is recommended to alert the user to a problem with airflow.
2. Use good housekeeping in the enclosure at all times. Clean up spills immediately. Periodically clean enclosure interior.
3. Do not overload the work surface with apparatus or work material. The safe operation of the enclosure is based upon having proper airflow through the structure. Do not place large objects directly on the work surface. Instead, elevate the object 3/4" on blocks to allow a flow of air under the object and into the rear baffle exhaust slots. Ensure blocks are level and secured in place.
4. Blocking large portions of the rear baffle will change the airflow pattern in the enclosure causing turbulence. (Do not store containers or supplies against the rear baffle, as this will affect airflow).
5. Always work with your hands as far back into the enclosure as possible. Keep all chemicals, materials and apparatus inside the lower air foil of the enclosure.
6. Do not work in this enclosure without the exhaust system running.
7. General acid use, as well as Perchloric acid use in this enclosure is prohibited.
8. High-level radioisotope materials are prohibited in this enclosure. Consult your Safety Officer.
9. Avoid cross drafts and limit traffic in front of the enclosure. Air disturbances created may draw contaminants out of the enclosure.
10. A qualified certification technician should test the enclosure before it is initially used.
11. The use of safety goggles, protective clothing, gloves and any other personal protective equipment recommended by your safety officer should be used.
12. The sash must remain in the down position while using the enclosure to ensure containment.
13. Proper performance of the enclosure depends largely upon its location and the operator's work habits. Consult the references in *Appendix D.*
14. The enclosure should be recertified whenever it is serviced or relocated and at least annually thereafter.

15. Avoid the use of flammable gases or solvents in the enclosure if possible. Care must be taken to ensure against the concentration of flammable or explosive gases or vapors. Use of an open flame should be avoided in the enclosure. Gases under high pressure should not be used in the enclosure as they may disrupt the airflow patterns.
16. Manipulations that generate gases or vapors from toxic chemicals or radionuclides must be evaluated carefully from the standpoint of buildup to dangerous levels above the TWA of the chemical.
17. Ensure that the work station is connected to electrical service in accordance with local and national electrical codes. Failure to do so may create a fire or electrical hazard. Do not remove or service any electrical components without first disconnecting the work station from electrical service.
18. Carbon filters are disposed as hazardous waste. The user is responsible for recording the chemicals adsorbed or treated by the filters and disposing properly.
19. Ensure only trained operators use the enclosure. New users should review the User's Manual and become familiar with the operation of the enclosure.
20. If the work station is to be used in a confined space, make sure the space is well ventilated and the concentration of toxic contaminants cannot accumulate greater than the TWA.
21. Proper operation of the enclosure depends largely upon the enclosure location and the operator's work habits. The enclosure should be located away from traffic patterns, doors, fans, ventilation registers, fume hoods, and any other air-handling device that could disrupt its airflow patterns. Consult *Chapter 2: Prerequisites* and *Chapter 3: Getting Started* sections of this manual for further details.
22. Only chemicals that can be safely adsorbed and treated with specific carbon based filters are appropriate for use in this enclosure. Two carbon filters must always be used. Contact Labconco for chemical assessment.
23. The warning properties (i.e., odor, taste) of the volatile organic compounds or other material being used in the enclosure must be adequate to provide an early indication that the carbon filters may be saturated or inadequate. Contact Labconco for help with chemical assessment.
24. Use the smallest possible quantity of chemical(s) within the enclosure and never exceed the amount that can be effectively adsorbed by the carbon filters before breakthrough.
25. For all procedures, adjust face velocity between 60 and 100 FPM for effective operation.

26. Leave the blower on for at least one minute after work in the enclosure has been completed.
27. If a chemical is spilled on the work surface, **DO NOT** switch off the blower until all traces have been removed.
28. Tag the enclosure with appropriate warning if filters have been removed for service.
29. If the blower fails during use, processes should cease and the area should be vacated and ventilated.
30. Always refer to the NIOSH Pocket Guide to Chemical Hazards before proceeding (See Appendix E). For additional help with filter and chemical selection contact Labconco at 1-800-821-5525 or 1-816-333-8811.

Chapter 5: Appropriate Applications for Your Enclosure

Now that the installation of your enclosure is completed, you are ready to use your Protector Work Station. Read this chapter to learn about:

1. Routine Daily Work Procedures.
2. Suitable Applications.
3. Carbon Filter Applications.
4. Definition of Terms.
5. Appropriate Chemicals for Carbon Filters.
6. Hazardous Misapplications for Carbon Filters.
7. Chemical Carcinogen use with Carbon Filters.
8. Prohibited Acid Use. (On Integral Blower Models)

Routine Daily Work Procedures

Planning

- Thoroughly understand procedures and equipment required before beginning work.
- Arrange for minimal disruptions, such as room traffic or entry into the room while the enclosure is in use.

Start-up

- Turn on exhaust system and accessory light.
- Only raise the sash for loading and cleaning.
- Check the baffle air slots for obstructions.
- Allow the enclosure to operate unobstructed for 1 minute.
- Wear a long sleeved lab coat and rubber gloves. Use protective eyewear. Wear a protective mask if appropriate. Consult your Safety Officer for additional personal protective equipment recommendations.

Loading Materials and Equipment

- Load only the materials required for the procedure. Do not overload the enclosure.
- Do not obstruct the air foil, or rear baffle slots.
- Large objects should not be placed close together and should be elevated above the work surface to permit airflow to sweep under the equipment.
- After loading, wait one minute to purge airborne contaminants from the work area.

Work Techniques

- Keep all materials inside the lower air foil, and perform all contaminated operations as far to the rear of the work area as possible.
- Segregate all clean and contaminated materials in the work area.
- Avoid using techniques or procedures that disrupt the airflow patterns of the enclosure.

Final Purging

- Upon completion of work, the enclosure should be allowed to operate for two to three minutes undisturbed, to purge airborne contaminants from the work area before shutting off the blower.

Unloading Materials and Equipment

- Objects in contact with contaminated material should be surface decontaminated before removal from the enclosure.
- All open trays or containers should be covered before being removed from the enclosure.

Shutdown

- Turn off the exhaust system and light.

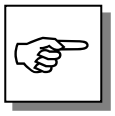
Suitable Applications

NIOSH (National Institute for Occupational Safety and Health, USA) has established guidelines for chemical cartridge and HEPA filtered respirators. Suitable applications for the carbon filtered enclosures are based on these guidelines. As with respirators, chemical contaminants are adsorbed or treated by carbon.

Carbon Filter Applications (sold as an accessory for Integral Blower Models)

- Release of low concentrations of vapors effectively adsorbed or treated in carbon based filters.
- Treatment of low-level carcinogens or suspected carcinogens. (See Chemical Carcinogens in Chapter 5)
- Procedures that may have traditionally been done on the open bench (low levels only).
- Odoriferous chemicals that are an unpleasant nuisance.

Other applications, not fitting the above guidelines, would be better suited with the exhaust ducted to the outside by using a Protector Work Station with remote blower.



REFERENCES TO NIOSH OR OSHA GUIDELINES AND REGULATIONS APPLY TO ANY WORK PLACE UNDER THE JURISDICTION OF THE U.S. DEPARTMENT OF LABOR. OTHER COUNTRIES OUTSIDE THE U.S. HAVE ESTABLISHED STANDARDS, WHICH MAY DIFFER SLIGHTLY FROM THOSE USED AS GUIDELINES FOR THIS PRODUCT. IT IS THE USER'S RESPONSIBILITY TO BECOME AWARE OF LOCAL REGULATIONS GOVERNING THE SAFE USE AND DISPOSAL OF CHEMICALS AND CARBON FILTERS. KNOWLEDGE OF ESTABLISHED SAFE EXPOSURE LEVELS IS IMPERATIVE TO THE PROPER USE OF CARBON FILTERED ENCLOSURES.

Definition of Terms

NIOSH – National Institute for Occupational Safety and Health/Mine Safety and Health Administration. (U.S.A.)

TWA – Recommended Exposure Limits expressed as a Time Weighted Average. The exposure limit for that chemical for up to a 10-hour workday, 40 hours a week. Expressed in units of parts per million or milligrams per cubic meter.

Odor Threshold – The value in parts per million or milligrams per cubic meter for which one might expect to smell a chemical's presence in the air. This value is very subjective and detection will vary with the sensitivity of one's nose. The period of time until the odor threshold is reached in the exhaust stream can be estimated from Labconco's exclusive chemical assessment program. Contact Labconco on carbon filter life for specific applications. See Chapter 6.

Saturation Level or Time – There is a limit to the amount of chemical that can be adsorbed by activated carbon or neutralized by chemically-treated carbon. Once the capacity of the carbon is reached, it is considered to be saturated and will adsorb (or neutralize) no further material; the outlet concentration of the chemical will equal the inlet concentration from that point until the filter is replaced. (Note that the capacity of activated carbon is not a constant, but varies with the inlet concentration). Labconco Product Specialists can determine the estimated saturation time for a particular chemical.

IDLH (Immediately Dangerous to Life and Health). An atmosphere that poses an immediate hazard to life or produces immediate irreversible health effects. IDLH concentrations should not be approached in the enclosure.

Appropriate Chemicals for Carbon Filters

Below is a general set of rules to determine appropriateness of chemical usage.

Selected organic chemicals considered to be occupational carcinogens by NIOSH can be used in the filtered enclosure with carbon filters under rigid restrictions. **See separate discussion on next page on carcinogens for special instructions**.

Organics must have time weighted exposure limits (TWA) of 1 PPM or greater.

Chemicals must have a detectable odor at concentrations below the TWA for the chemical.

Chemicals must be designated by NIOSH guidelines as acceptable for use with chemical cartridge-type respirators (the exception is formaldehyde and ammonia/amines, which used impregnated carbon). Chemicals not listed by NIOSH in the Pocket Guide must be approved by Labconco Product Specialist (or Engineering).

Inlet concentration must never exceed the IDLH (Immediately Dangerous to Life and Health) concentrations.

Chemicals having a recommendation by NIOSH of at least “Escape GMFOV” (Gas Mask Full-Face Respirator).

When evaporating a mixture of chemicals, the chemical having the lowest TWA will be used to determine if the mixture meets the guidelines.

Call a Labconco Product Specialist at 1-800-821-5525 for assistance in determining chemical appropriateness.

Hazardous Misapplications for Carbon Filters with Volatile Chemicals

There is one scenario where the accessory carbon filter misapplication would be a part of a hazardous condition. If the user continues to operate the enclosure with any of the following conditions present a potentially hazardous condition will exist:

1. The inlet concentration of vapors is greater than the TWA.
2. The carbon filter becomes saturated.
3. The ventilation of the room is insufficient to dilute the exhaust of the enclosure to below the TWA for the chemical.

When the inlet concentration is greater than the TWA, extra measures must be taken to monitor the filter and number of room air exchanges.

Chemical Carcinogen Use with Carbon Filters

Selected carcinogens may be used safely with carbon filters under the following restrictions.

The use of a vented fume hood or ventilated enclosure with ducting to the outside is always the preferred method when working with carcinogens. The carbon filters should only be used as a last resort when venting to the outside is not an option.

The potential carcinogens are listed in the NIOSH Pocket Guide to Chemical Hazards as “Ca.” Each potential carcinogen must have a TWA of 1 or greater; have minimum respirator recommendation of Escape GMFOV, and an odor threshold significantly lower than the TWA for the chemical.

The inlet concentration or the evaporation rate of the chemical must never exceed the TWA for the chemical.

Consult a Labconco Technical Specialist for estimated saturation life. See Chapter 6 for an example of estimating saturation life. Another source is the Labconco chemical guide for carbon filtered enclosures.

Prohibited Acid Use

The Protector Work Station with Integral Blower motorized impeller cannot be exposed to acids. Where applications require the use of acids a vented fume hood, or vented enclosure should be used with a remote blower and ducted to the outside. Consult Labconco for other small enclosures suitable for acid work. No exceptions are permitted, as the Protector Work Station with Integral Blower impeller life span will be limited with acid use. Additionally, the Protector Work Station for use with a remote blower cannot be used with acids because the acids will corrode the stainless steel baffle. Consult Labconco for Protector XVS Enclosures suitable for acid work.

Chapter 6
Maintaining Your Enclosure

Monitoring airflow and changing the carbon filters (if equipped) is the primary maintenance required.

Review this chapter on maintenance for the following:
1. Routine Maintenance.
2. Speed control adjustment and setting the inflow face velocity.
3. Operating and calibrating the airflow monitors.
4. Determination of when to replace carbon filters and how to replace.
5. Calculating carbon filter life.
6. Fluorescent light replacement.
7. Motorized impeller replacement.
8. Speed control replacement.

Routine Maintenance Schedule

Weekly

- Wipe down the interior surfaces of the enclosure with a disinfectant or cleaner, depending upon the usage of the unit and allow to dry.
- Using a damp cloth, clean the exterior surfaces of the enclosure, particularly the front and top to remove any accumulated dust.
- Operate the exhaust system, noting the airflow velocity through the enclosure using a source of visible smoke. Airflow monitors are recommended for constant monitoring.

Monthly (or more often as required)

- Determine the actual face velocity through the sash opening of the enclosure where the average reading should be at the specified velocity. (Use calibrated thermal anemometer or other approved apparatus). Airflow alarms are recommended for constant monitoring.
- The enclosure rear baffle should be checked for any blockage to ensure that the enclosure is maintaining proper airflow.
- All weekly activities.

- While the enclosure is filled with the contaminant, test filter condition on carbon filters using the appropriate gas detector tube at intervals of 20% of the total estimated time. The exception to the 20% recommendation is formaldehyde or any carcinogen or suspected carcinogen. These hazardous chemicals must be checked at least every 10% of the total estimated time. Gas detector tubes for the specific chemicals that are being used in the enclosure can be obtained from your laboratory supply dealer.
- Replace carbon filters when chemical breakthrough is indicated by odor, time, detector tube, or for some chemicals, analytical instrumentation. See “Replacing Carbon Filters” section of this manual in Chapter 6.

Annually

- Replace the fluorescent lamps.
- Have the enclosure speed and carbon filters (if equipped) validated by a qualified certification technician.
- All monthly activities.

Setting the Inflow Face Velocity with the Speed Control Adjustment

1. The speed control is located behind the switched control panel. See Figure 6-1.
2. Adjust the speed control with a small Phillips screwdriver by turning the screw counterclockwise to increase blower speed or clockwise to decrease the blower speed. The speed control is very sensitive, so proceed with caution.
3. Measure the inflow velocity per the averaging technique outlined in Chapter 3 and adjust the speed control slowly for the desired speed. Allow the speed to stabilize and re-measure the inflow velocity to confirm.

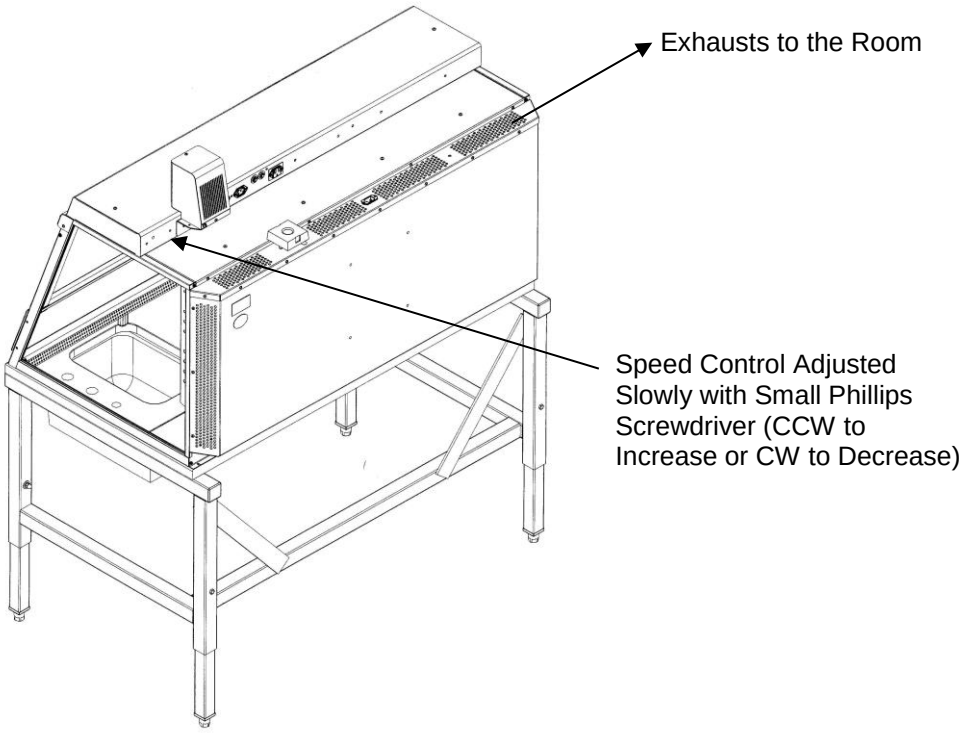


Figure 6-1
Speed Control Used on Integral Blower Protector Work Station

Guardian™ 500 Airflow Monitor Kit No. 3944700 or 3944701

The Guardian 500 Airflow Monitor is designed to continuously monitor airflow through enclosures and fume hoods. This permanently installed device provides both visual and audible alarms to alert the user of abnormal airflow conditions. A green light on the front of the monitor indicates normal flow conditions. When flow conditions lower than the set point are encountered, a flashing red light is activated along with an audible alarm. To temporarily mute the audible alarm, press and release the test/reset button. The Guardian 500 Airflow Monitor has a built-in sensor, 3 relay inputs and 1 relay output. The relay inputs can be configured for night setback, external alarm, and sash high alarm. The night setback features disables the alarm. The relay output is configured for Low Air Alarm.

Guardian 500 Component Identification

See Figure 6-2 below.

1.	Air Inlet	A portion of the air coming into the enclosure passes through the air inlet and across the flow sensors.
2.	Normal Flow Indicator	This green light indicates normal flow conditions.
3.	Alarm Indicator	This red light is activated approximately 10-30 seconds after the low flow set point is reached. Low flow set points are 10-20 fpm below normal flow.
4.	Mute Button	If no alarm is present, this button will cause the red lamp to light and the audible alarm to sound. If an alarm is present, the button will silence the audible alarm.
5.	Adjustment for Alarm Set Point	This potentiometer is used to set the low flow indicators for the alarm. It is adjusted with a small screwdriver.

Figure 6-2
Component Identification

Guardian 500 Installation Procedure

1. The enclosure comes prepared to except the Guardian™ 500 Airflow Monitor.
2. First remove the large 1.19" dia. gray hole plug. See Figure 6-3. See Figure 6-4 only to reference internal assembly of the airflow monitor. Locate the elbow, locknut, and washer and install it in the 1.19" dia. hole per Figure 6-3 and Figure 6-4. The enclosure baffle pivots down to install the elbow, washer and locknut.
3. Cut the 1" hose supplied with the kit to 15.5" approximate length and install it between the airflow sensor and the elbow.
4. Secure the Guardian 500 Airflow Monitor to the enclosure with double stick tape as shown in Figure 6-5. The airway passage between the alarm module and the enclosure is now complete.
5. Locate the metal hose cover and install with double stick tape per Figure 6-5.
6. Locate the power supply transformer. One end should already be connected to the two-pin connector labeled 15 VDC on the back of the alarm module and through the strain relief bushing. If disconnected, then reconnect to power the airflow monitor. Plug the 115V power supply into a standard 115V duplex receptacle, the back of the accessory FilterMate portable exhauster or the back of the accessory light. For 230V, plug into a standard receptacle with your specific outlet plug. **(It is recommended that the airflow monitor be connected directly to the FilterMate switched auxiliary outlet so the airflow monitor is powered at the same time.)**
7. Installation is now complete.

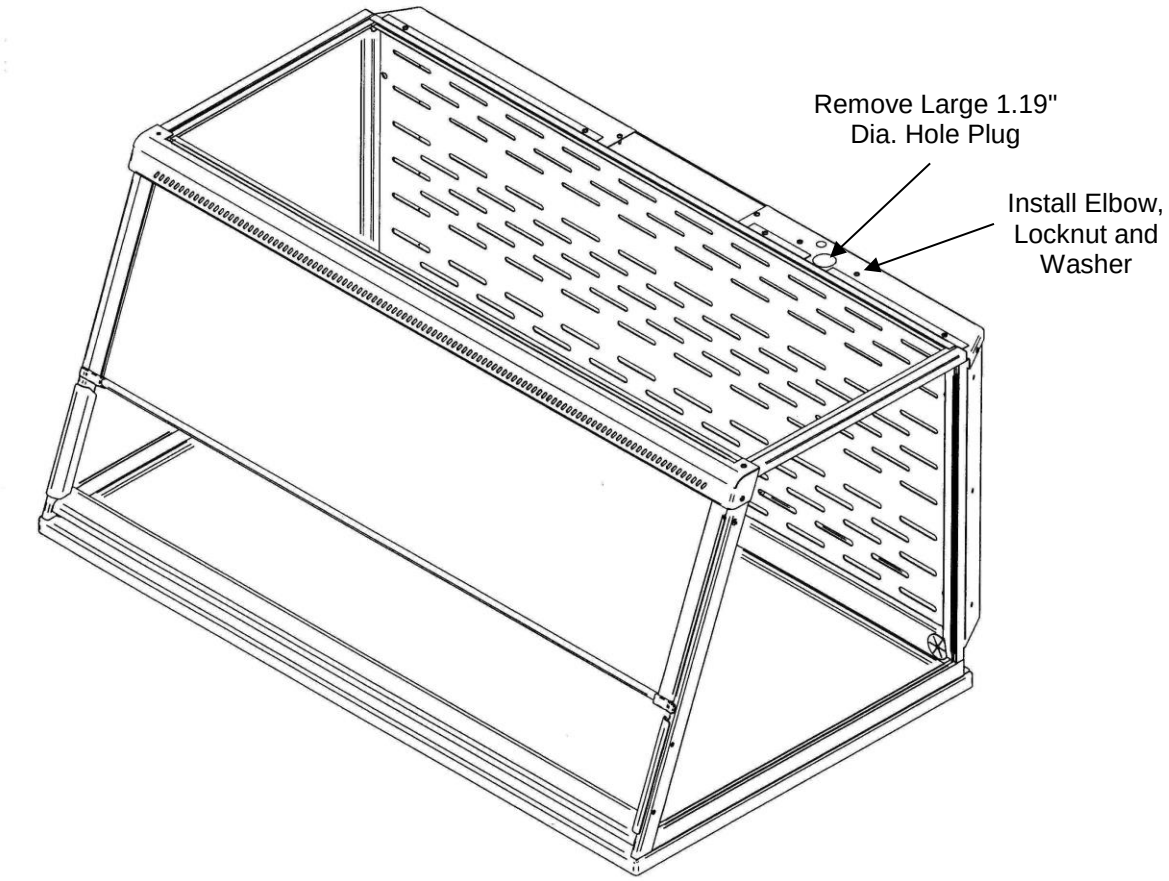


Figure 6-3
Hole Plug and Mounting Screws Location

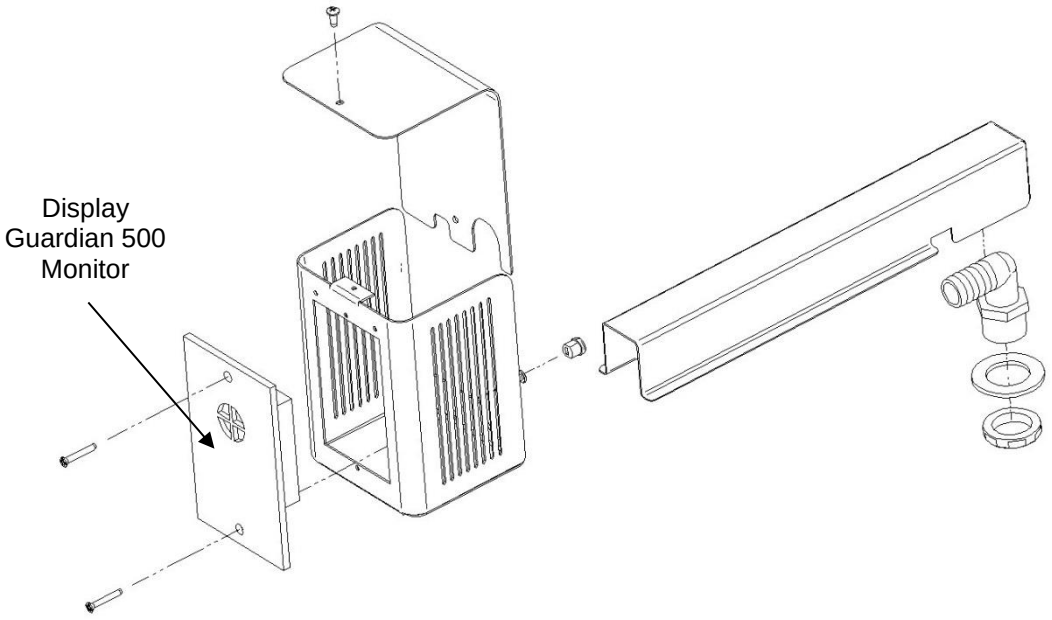


Figure 6-4
Guardian 500 Details

Guardian 500 Calibration Procedure

Each alarm module and enclosure/fume hood is unique and needs to be individually calibrated in the field. The procedure for the adjustment is as follows:

1. Double check the installation to make sure that monitor and power supply are properly installed.
2. Allow 10 minutes for the monitor to warm up once power has been connected.
3. Determine the low flow set point for your monitor. This is the value where the monitor will first indicate a low flow condition. The red light will be on for this value. Refer to your industrial hygiene officer for the proper low flow set point or consult the table below.
4. Adjust your enclosure/fume hood airflow to the low flow set point as previously determined. The exhaust flow can be lowered by adjusting the speed control on the FilterMate or by using an adjustable damper on the exhaust blower. Typical alarm conditions are set at face velocities of 10 to 20 feet per minute below the normal operating conditions due to supply air and exhaust air fluctuations, as well as room air cross drafts. See note 8 if the low airflow volume or sash opening cannot be adjusted.
5. Using a properly calibrated thermoanemometer, determine the velocity through the face of the enclosure by taking a detailed velocity traverse. Divide the face area into equal increments. One reading per square foot of face area is normally recommended for an accurate traverse. Compute the average velocity for this area.

6. If the red light alarm is on, slowly turn the adjustment screw counterclockwise until the green light is activated. If the green light is on, slowly turn the adjustment screw clockwise until the red light comes on. Slowly turn the adjustment screw back until the red light is activated. It is important that these adjustments be done in small increments, at intervals about 30 seconds apart to allow for delayed reaction of the alarm itself. The alarm low flow set point should now be set and the red light activated.
7. Readjust the enclosure airflow to its normal operating levels. The green light should now be activated. Calibration is now complete.

Enclosure Operating In Flow Speed	Alarm Condition Set Point Speed
100 fpm	80 - 90 fpm
80 fpm	60 - 70 fpm
60 fpm	40 - 50 fpm

8. Note: If the low airflow volume or sash opening cannot be adjusted, then a 1/4 to 1/3 of a turn counterclockwise can be adjusted to set the airflow alarm condition at 10-25% below normal operating levels.

Guardian 500 Alarm Activation

The audio and visual alarm will activate approximately 10-30 seconds after an alarm condition is detected. To temporarily mute the audible alarm, press and release the test/reset button.

NOTE: After an alarm condition has been detected, the red light will stay on. The audible alarm will remain muted until airflow returns to normal levels.

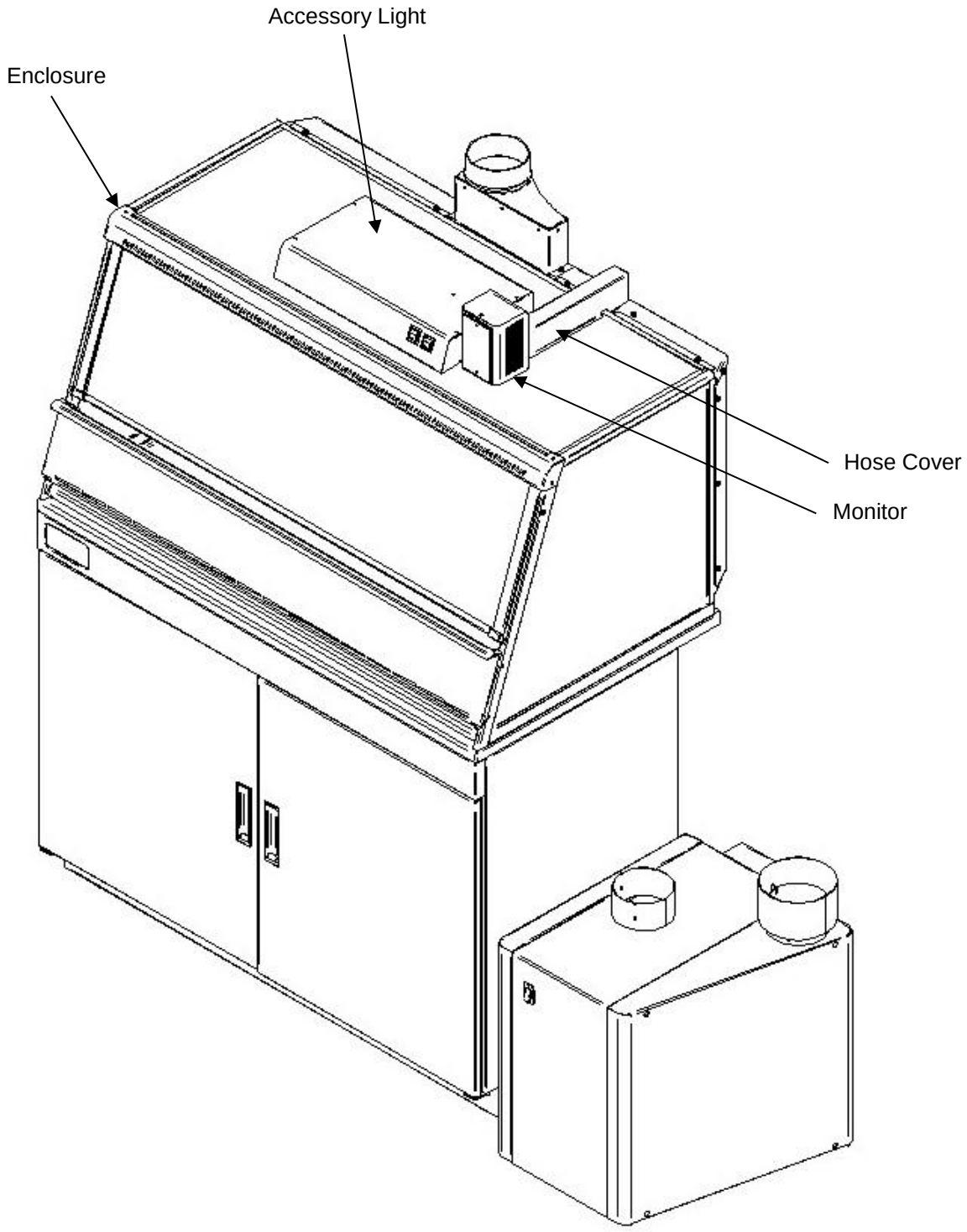


Figure 6-5
Guardian 500 Installation

Guardian™ Digital Kit No 3908800 or 3908801

Guardian Digital 1000 Operation

The Guardian Digital Airflow Monitor consists of the airflow sensor, the Alarm Unit and the 15 VDC power supply. For 115V operation the alarm unit is powered by plugging the power supply into the factory-prepared digital airflow monitor socket. For 230V operation, the Alarm Unit is powered by plugging the power supply into a building outlet. The alarm has “Enter”, “+”, and “-” buttons to program the monitor. There is also a green LED “SAFE”, yellow LED “CAUTION”, and red LED “LOW” with audible alarm for airflow conditions. The audible alarm can be permanently muted if desired. The Guardian Digital 1000 Airflow Monitor displays a face velocity value, provides an RS232 communications port to a PC or building computer system, can be configured for external input connections such as night setback or external alarm and provides up to three output relays that can be configured. For complete detailed information, please refer to the separate Labconco 1000 Alarm User’s Manual provided with the enclosure.

Guardian Digital 1000 Installation Procedure

1. The enclosure comes prepared to accept the Guardian Digital airflow monitor system.
2. First remove the large 1.19" dia. gray hole plug. See Figure 6-6. See Figure 6-7 only to reference internal assembly of the airflow monitor. Locate the elbow, locknut, and washer and install it in the 1.19" dia. hole per Figure 6-6 and Figure 6-7. The enclosure baffle pivots down to install the elbow, washer and locknut.
3. Cut the 1" hose supplied with the kit to 10.5" approximate length and install it between the airflow sensor and the elbow.
4. Secure the Guardian Digital alarm to the enclosure with double stick tape as shown in Figure 6-9. The airway passage between the alarm module and the enclosure is now complete.
5. Locate the metal hose cover and install with double stick tape per Figure 6-8.
6. Locate the power supply transformer. One end should already be connected to the two-pin connector labeled 15 VDC on the back of the alarm module and through the strain relief bushing. If disconnected, then reconnect to power the airflow monitor. Plug the 115V power supply into a standard 115V duplex receptacle, the back of the accessory FilterMate portable exhauster or the back of the accessory light. For 230V, plug into a standard receptacle with your specific outlet plug. **(It is recommended that the airflow monitor be connected directly to the FilterMate switched auxiliary outlet so the airflow monitor is powered at the same time.)**
7. Installation is now complete.

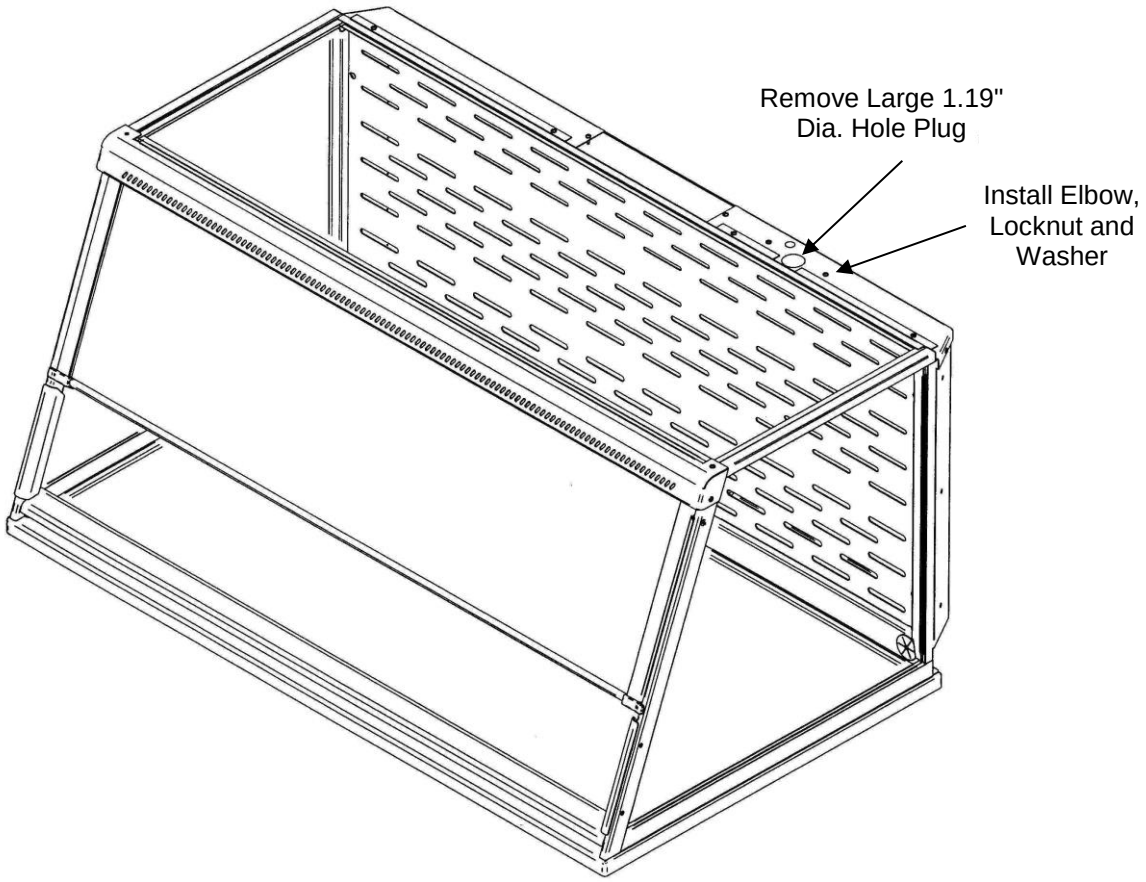


Figure 6-6
Hole Plug and Mounting Screws Location

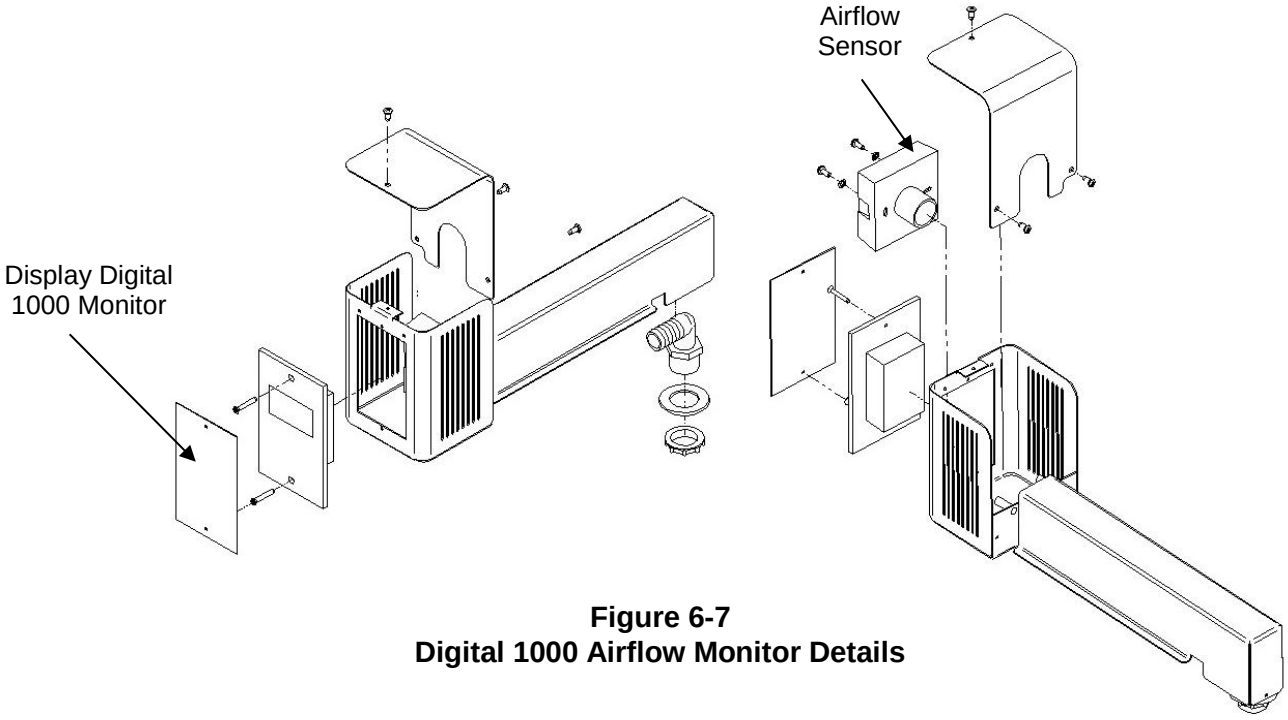


Figure 6-7
Digital 1000 Airflow Monitor Details

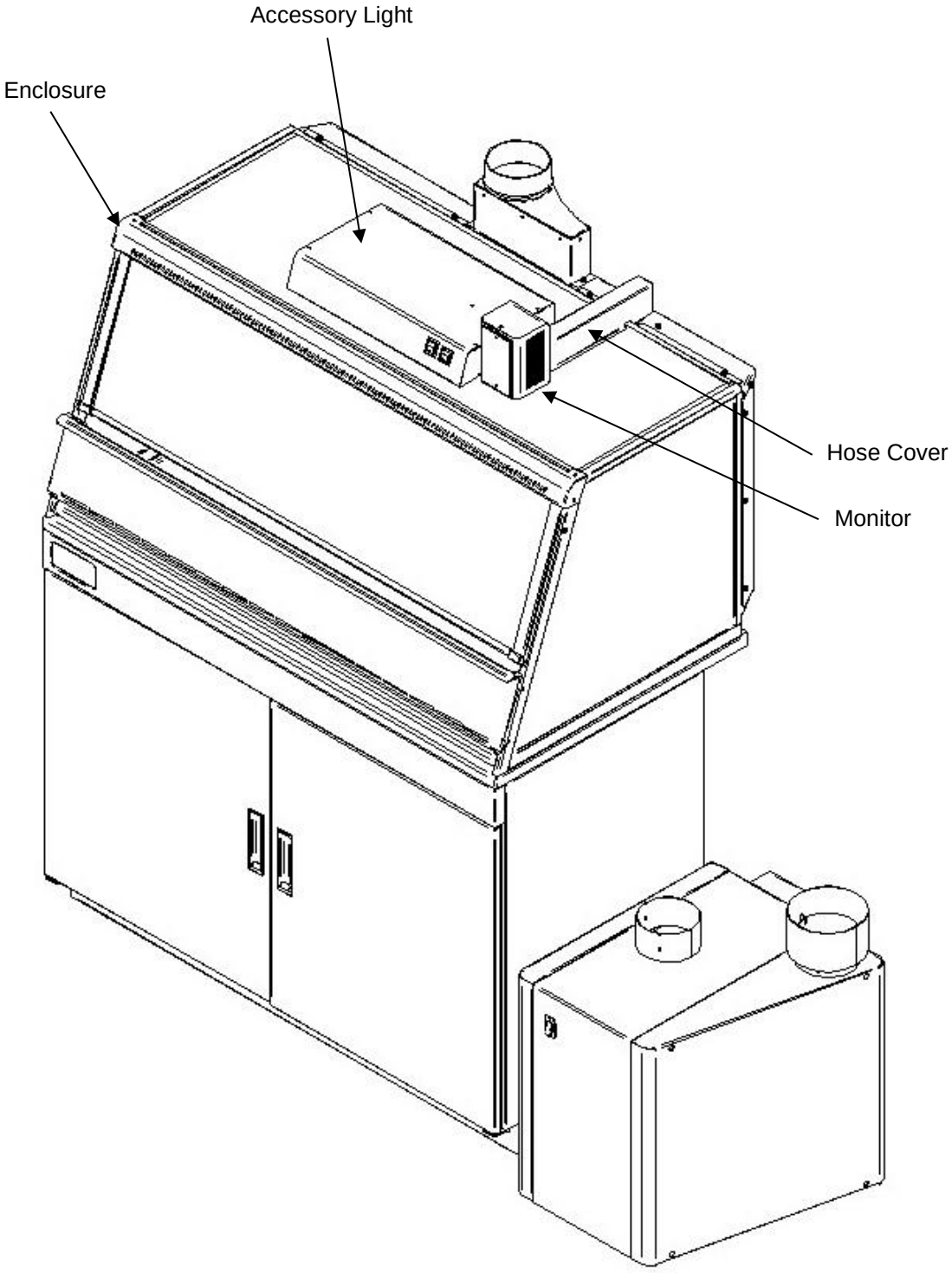


Figure 6-8
Digital 1000 Airflow Monitor Installation

Digital 1000 Calibration

1. Calibrate the airflow monitor according to the instruction manual that comes with the kit. To successfully calibrate, it will be necessary to change the face velocity by adjusting the airflow exhaust volume. The exhaust volume can be adjusted with the speed control on the FilterMate or by using an adjustable damper on the exhaust blower. Typical calibration conditions are set at face velocity air sample differences of at least 20 feet per minute. The airflow monitor is factory set to be calibrated with a difference of at least 50 fpm and can be changed by changing the "lower/higher air sample difference". The following suggested in flow face velocity speeds are recommended to successfully calibrate. Typical low air alarms are set 10-20 fpm below operational speeds. Follow Step 2 below and review the Labconco 1000 Alarm User's Manual that comes with the airflow monitor.

Low Air Alarm Set Point	Enclosure Operating In flow Speed	Low Calibration Set Point	High Calibration Set Point
40 - 50 fpm	60 fpm	40 - 60 fpm	100 – 120 fpm
60 - 70 fpm	80 fpm	50 - 90 fpm	100 – 150 fpm
80 – 90 fpm	100 fpm	50 – 110 fpm	100 – 170 fpm

2. Go to setup and then CAL CONFIG MENU and change the "lower/higher air sample difference" to 20 fpm. This will allow you to successfully calibrate with values of a minimum of 20 fpm difference.
3. While in CAL CONFIG MENU, change the "sensor difference" from 10% to 3%.
4. While in CAL CONFIG MENU, adjust the red low air alarm to the desired setting such as 55 fpm. Then adjust the yellow "CAUTION or WARNING" to 59 fpm. Then adjust the "CAUTION or WARNING" air reset to 3 fpm. This sets the alarm condition.
5. To complete the CAL CONFIGURATION, be sure to enter "DONE".
6. To start the calibration mode, use the Labconco 1000 Manual and enter "CALIBRATION" mode on the display from the SETUP menu.
7. Follow the instructions on the display and alter the low exhaust volume with the speed control on the FilterMate or exhaust damper. Measure the average face velocity and enter the low value on the display. Be careful not to block the opening. The low exhaust volume calibration will take about 5 seconds.
8. Now alter the high exhaust volume with the speed control on the FilterMate or exhaust damper. Measure the average face velocity and enter the high value on the display. The high value must be at least 20 fpm greater than the low value. The high exhaust volume calibration will take about 5 seconds.

9. Be sure to enter “DONE” after successfully completing the low and high calibration set points.
10. Once calibration is completed, go to “RUN” and hit “ENTER”. The value should read close to the high calibration set point.
11. To lower the face velocity to the operating point, simply alter the exhaust volume with the speed control on the FilterMate or exhaust damper. Then recheck the face velocity with an anemometer to confirm the display on the digital airflow monitor.

Digital 1000 Alternate Calibration Procedure - Constant Volume Conditions

1. To successfully calibrate, it will be necessary to change the face velocity by opening and closing the enclosure’s sash. The airflow monitor is factory set to be calibrated with a difference of at least 50 fpm and can be changed by adjusting the “lower/higher air sample difference”. The inflow face velocity speeds provided in the chart below are suggested to successfully calibrate the Digital 1000.
2. Before proceeding with calibration, it will first be necessary to configure the airflow monitor. Go to the setup and then CAL CONFIG MENU and adjust the “lower/higher air sample difference” to 10 fpm. This will allow you to successfully calibrate with minimum difference values of 10 fpm.
3. While in CAL CONFIG MENU, change the “sensor difference” from 10% to 3%.
4. While in CAL CONFIG MENU, adjust the red low alarm to the desired setting (See the chart below for range and suggested settings). Then adjust the yellow “CAUTION or WARNING” to the desired setting (See the chart below for range and suggested settings). Then adjust the “CAUTION or WARNING” air reset to 3 fpm. This sets the alarm condition.

CAUTION WARNING “YELLOW LED” Setting		**LOW ALARM “RED LED” Setting**		**Low Calibration Set Point** *Sash Open* (fpm)		**High Calibration Set Point** or Enclosure Operating Inflow Speed *Sash Closed*
Range *user defined* (fpm)	**Suggested Set Point** (fpm)	**Range** *user defined* (fpm)	* **Suggested Set Point** (fpm)	8" Sash Height	10" Sash Height	
43 – 53	51	40 – 50	48	27	23	60 fpm
63 – 73	67	60 – 70	64	37	30	80 fpm
83 - 93	83	80 - 90	80	47	37	100 fpm

* Because of airflow fluctuations in a typical laboratory environment Labconco suggests setting the “RED LED” low alarm set point to 20% below the enclosure’s operating speed.

5. To complete the CAL CONFIGURATION, be sure to enter “DONE”. If needed, *refer to the Configuration procedure provided on the following page for additional details.*
6. To start the calibration mode, enter “CALIBRATION” mode on the display from the SETUP menu.
7. Follow the instructions on the display and simulate the low exhaust volume by fully opening the sash. You may measure the average face velocity for the low calibration set point or utilize the calculated value provided in the chart above. The average face velocity for the low set point is accurately measured by dividing the opening of the enclosure into equal area grids consisting of at least 9 data collection points and measuring the velocity at the center of each grid with a calibrated thermo anemometer. Enter the low value on the display. Be careful not to block the opening. The low exhaust volume calibration will take about 5 seconds.
8. Now simulate the high exhaust volume by fully closing the sash to its normal operating position. Measure the average face velocity for the high calibration set point to confirm that the source of constant air volume is providing the desired face velocity for the enclosure. The average face velocity for the high set point is accurately measured by dividing the opening of the enclosure into equal area grids consisting of at least 3 data collection points and measuring the velocity at the center of each grid with a calibrated thermo anemometer. Enter the high value set point on the display. The high value must be at least 10 fpm greater than the low value. The high exhaust volume calibration will take about 5 seconds.
9. Be sure to enter “DONE” after successfully completing the low and high calibration set points.
10. Once calibration is completed, go to “RUN” and hit “ENTER”. The value should read close to the high calibration set point.
11. With the sash fully open, the Digital 1000 monitor should go into “RED LED” low air alarm if successfully calibrated.

Note: Enter Button stores information and +/- Buttons allow for scrolling.

1. Push the “ENTER” Button on the face of the alarm until the “SET UP” Menu is displayed.
2. Scroll to “SET UP” and hit “ENTER”.
3. The PASSWORD MENU displays (The Password is 0000). Press the ENTER button repeatedly until the CAL CONFIG MENU is displayed.
4. In the CAL CONFIG MENU set the following:

CALIBRATION - CONFIGURATION MENU	SETTINGS
DISPLAY UNITS	FPM
LOW AIR ALARM “RED LED”	* 48 FPM (60 fpm Operating inflow)
	* 64 FPM (80 fpm Operating inflow)
	* 80 FPM (100 fpm Operating inflow)
LOW AIR CUTOFF	OFF
WARNING AIR ALARM “YELLOW LED”	* 51 FPM (60 fpm Operating inflow)
	* 67 FPM (80 fpm Operating inflow)
	* 83 FPM (100 fpm Operating inflow)
WARNING AIR RESET	3 FPM
HIGH AIR ALARM	OFF
LOWER AIR SAMPLE FLUCTUATIONS	OFF
HIGHER AIR FLUCTUATIONS	3%
LOWER / HIGHER AIR SAMPLE DIFFERENCE	3%
WARN TO ALARM AIR TIME	10 SECONDS
ALARM TO WARN AIR TIME	3 SECONDS
SHOW AIR FLOW	ON
SHOW TIME LINE OFF = DISPLAYS BAR GRAPH	OFF
AUDIBLE ALARM	ENABLED
SENSOR DIFFERENCE	2%
SENSITIVITY	80%

* (Suggested Air Alarm Settings) Refer to the chart on the previous page for a range of air velocity settings that may be used.

5. To complete the CAL CONFIG, be sure to enter “DONE”. You are returned to the Main Menu.

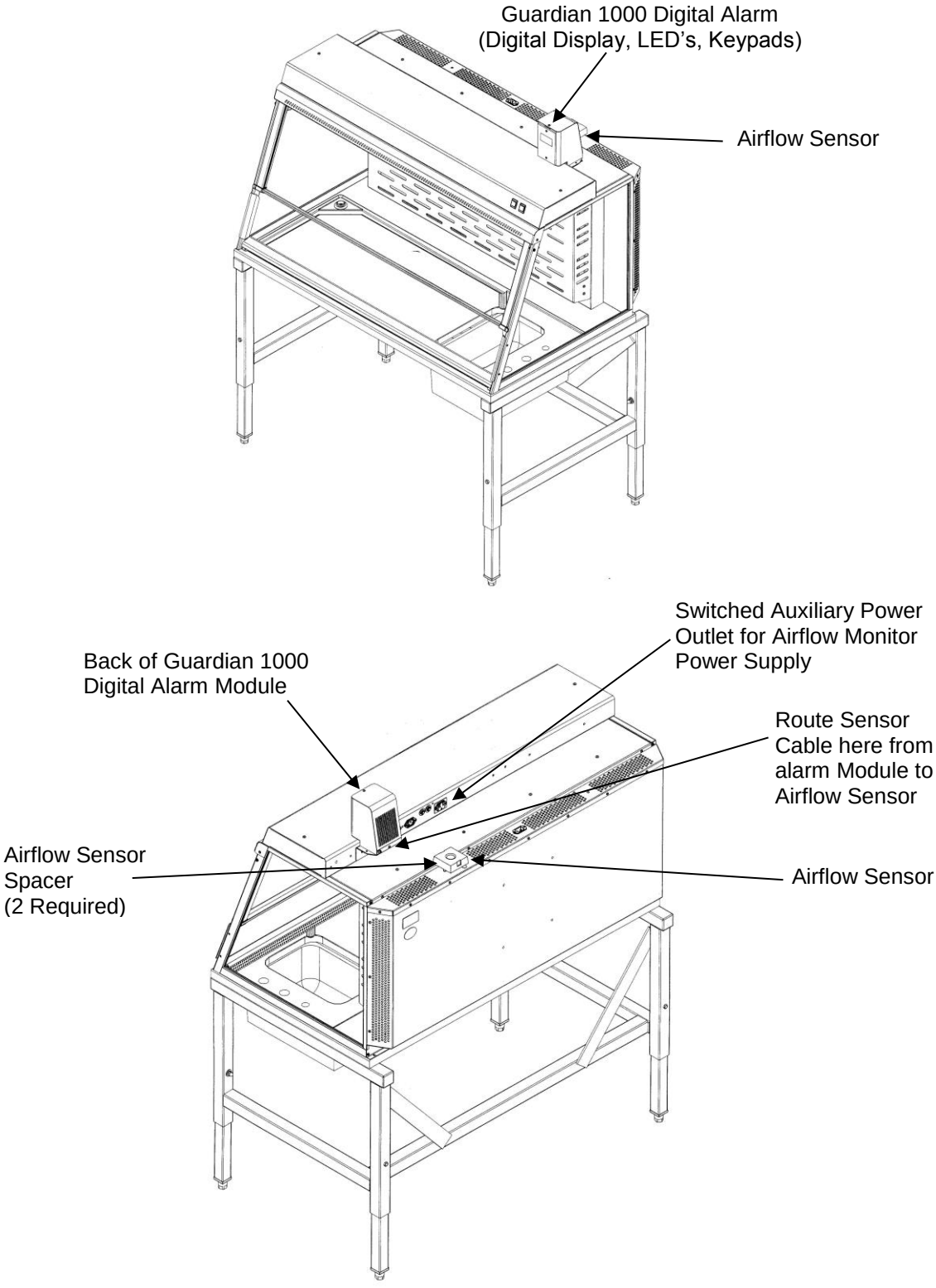


Figure 6-9
Guardian 1000 Digital Airflow Monitor

Determination of When to Replace Carbon Filters and How to Replace

Both carbon filters **MUST** be replaced when any one of the following two conditions are met:

1. The filtered enclosure outlet (exhaust) concentration approaches the inlet concentration, indicating filter saturation.
2. The odor in the work area becomes intolerable or the concentration of the chemical in the work area is greater than the TWA.

There are four means of determining when it is time to change the carbon filters (not shown in the order of preference).

Odor - A person's sensitivity to odor, tolerance of odor and their comfort level under odoriferous conditions vary with the individual. While odor is an indicator that chemicals are passing through the carbon filter, several points need to be understood:

- Odor within the room is not necessarily an indication of saturation or hazardous exposure concentrations.
- Odor can be used as a prompt to sample the chemical concentration on the exit side of the carbon filter.
- Organic chemicals approved for use in the filtered enclosure have odors that are detectable before reaching the time weighted exposure limits.

Detection Tubes - Color change indicators can be used to measure the concentration of the chemical at the exit side of the carbon filter or in the outlet exhaust. A kit including syringe pump and flexible tubing can be purchased as an accessory from Labconco (Catalog # 6924900). Labconco Customer Service Representatives are supplied with detector tube catalog numbers, as well as telephone numbers to direct you to where to purchase these items.

For Organic, Formaldehyde and Ammonia, chemical specific detector tubes should be purchased when installing fresh filters. Each kit contains instructions on how many strokes of the syringe are required to obtain the stated sensitivity. The sampling syringe is connected to the filtered enclosure exhaust. Connect the syringe to the detector tube while the system is running and pull the air through the tube with the syringe. Each stroke of the syringe represents a 100-ml sample and corresponds to the number of strokes necessary to give the indicated color changes. Due to the wide variety of organics and varying TWA's, it is recommended that specific detector tubes be purchased directly from Sensidyne, Draeger or your laboratory supply dealer. Alternate detector pumps can also be purchased from your laboratory supply dealers. The vast majority of detector tubes available start measuring at the TWA. When a user

observes a color change in the tube, they should replace the filter immediately. If no detector tube for your specific chemical is available, other means of detection must be used.

Time - For applications that have very consistent inlet concentrations and operating time, "Time" can be used to anticipate saturation or TWA levels based on prior experience. However, this does not replace the need for sampling. Consult Labconco technical specialist for an estimate of carbon filter life based on chemical usage. Detector tubes, or analytical instrumentation should **always** be used to determine concentrations in the carbon filter. It is recommended that the carbon filters be checked with detector tubes or other means at intervals of 20% of the total estimated filter life. The exception to the 20% recommendation is formaldehyde and any carcinogen or suspected carcinogen. These more hazardous chemicals must be checked at least every 10% of the total estimated time.

Analytical Instrumentation - This is the most accurate means of measuring concentrations of any chemical. It is the method of choice when no detector tubes are available or the tubes are not sensitive enough to measure at the TWA concentration for the chemical. This method is also to be used to determine saturation when the chemical concentration is below the measurement range of detector tubes.

Carbon Filter Replacement Procedure – See Figure 6-10 for Carbon Filter Replacement.

1. The carbon filters are replaced by first removing the two knobs, which hold the rear perforated baffle in place. Then carefully lower the perforated baffle, which is heavy because of the carbon filters.
2. Carefully remove both carbon filters.
3. If using formaldehyde, the formaldehyde filter is always placed downstream of the organic vapor filter. (The formaldehyde filter is on top of the organic vapor filter in the loading position. The same applies with ammonia and formaldehyde. No specific placement is required with organic vapor and ammonia.
4. Re-install the new carbon filters with the gasket up or on the downstream side.
5. Pivot the perforated baffle up and replace and tighten the knobs.

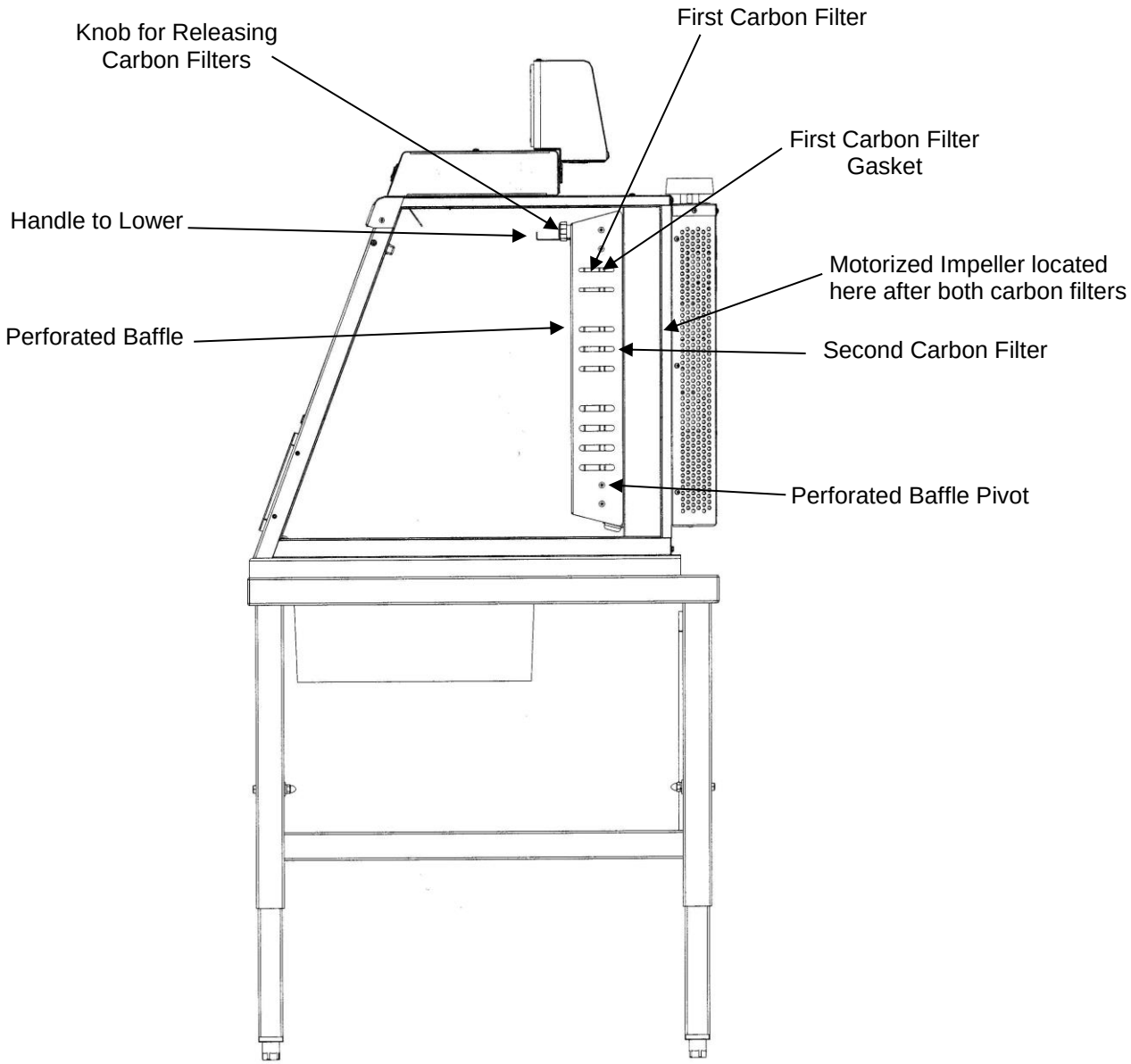


Figure 6-10
Carbon Filter Replacement

Calculating Carbon Filter Life

Labconco developed a modeling program to estimate the filter life for typical carbon filters. Since filter life is dependent on the chemical used, the airflow, filter size, and the dwell time, refer to the Chemical Guide for the Paramount® Filtered Enclosure. The estimated life for carbon filters for the Protector Work Stations with integral blower is conservatively calculated at 50% or half of the published values for the Paramount in the Chemical Guide. For example, if you use isopropyl alcohol to disinfect and use approximately 100 ml per week during 2 hours of use per day then follow these steps to calculate the concentration in parts per million (ppm). **Important**: Two filters are always required for operation. If mixing filter types, then use 25%.

Steps for Calculating PPM and Filter Life

1. Determine the amount of the proposed chemical lost to evaporation over a given amount of time. For example, if you use isopropyl alcohol and lose approximately 100 ml per week during 2 hours of use per day.
2. Convert the amount lost into ml/min. For this example:

$$\frac{100\text{ ml}}{\text{week}} \times \frac{1\text{ week}}{10\text{ hours use}} \times \frac{10\text{ hours}}{600\text{ minutes}} = \frac{100\text{ ml lost}}{600\text{ minutes}} = .17\text{ ml/min}$$

3. Convert ml/min to PPM by multiplying ml/min by the conversion factor found in the second to the last column on the right. For isopropyl alcohol .17 x 41 = 7.0 PPM.
4. Find the PPM value on the chart that comes closest to the value you just calculated in step #3. In this example, round up to 10 PPM, which is close to the calculated 7.0. We may approximate the filter life to be around 155 hours of actual use, but use 50% of this for the filters or 78 hours.
5. Insert the estimated filter life into the estimated usage to determine how long filters will last.

$$\frac{78\text{ hours filter life}}{10\text{ hours per week use}} = 7.8\text{ weeks before filter saturation}$$

6. These values are for two organic vapor filters. If mixing the filters with formaldehyde or ammonia, then use 25% instead of 50%.

Formaldehyde only

For formaldehyde, use 10% of the impregnated carbon weight. Formalin is 37% formaldehyde by weight. The density of formalin is 1.08 g/ml. These values are for one filter. If using two filters, then double the adsorption volume.

Number of Filters	Filter Size	Pounds of Formasorb Carbon	Adsorbed weight of Formaldehyde	Adsorption Volume of Formalin
1	36 x 18 x 1	13.3	1.33 lbs./604g	1512 ml

Ammonia only

For ammonia, use 10% of the impregnated carbon weight. Assume use of a 50% solution of ammonia for these calculations. These values are for one filter. If using two filters, then double the adsorption volume.

Number of Filters	Filter Size	Pounds of Ammonasorb II Carbon	Adsorbed weight of Ammonia	Adsorbed Volume of 50% Ammonia Solution
1	36 x 18 x 1	15.2	1.52 lbs./ 690 g	1382ml

Fluorescent Light Replacement

1. Disconnect the power.
2. Locate the two Phillips machine screws on top of the light and remove. Lift up the light assembly.
3. Rotate and remove the old fluorescent lamp.
4. Reinstall the new fluorescent lamp and screws in reverse order.
5. Power the unit up and try the new fluorescent lamp.

Hg

THE LAMP(S) IN THIS PRODUCT CONTAIN 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 DANS CE PRODUIT CONTIENT DU MERCUE

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

Motorized Impeller Replacement

The motorized impeller must be replaced as a complete unit. When the motorized impeller is replaced, the capacitor may also be replaced. See Appendix A for Replacement Parts Diagram. See Figure 6-11 for an isometric view of the motorized impeller.

Do NOT contact blower wheel while still in motion.

NE PAS être en contact avec la roué du ventilateur tant qu'il est en marche.

1. Wear appropriate personal protective equipment to decontaminate the filtered enclosure and then unplug from the electrical outlet.
2. Lower carbon filters per removal procedure outlined in this chapter.
3. Consult the wiring diagram in Appendix C of the manual and disconnect all the wires of the motorized impeller. Be sure to connect wires on the new motor in the same way the old motor was wired.
4. Remove the machine screws that support the plenum pan with the air intake hole for the motorized impeller.
5. Remove four nuts in the motor bracket and the four screws and lockwashers to the bracket.

ATTENTION: High-speed blower. Never operate impeller with housing off.

6. Replace the capacitor with a new one of equal voltage and capacity.
7. Reassemble the new motorized impeller by reversing the assembly steps.

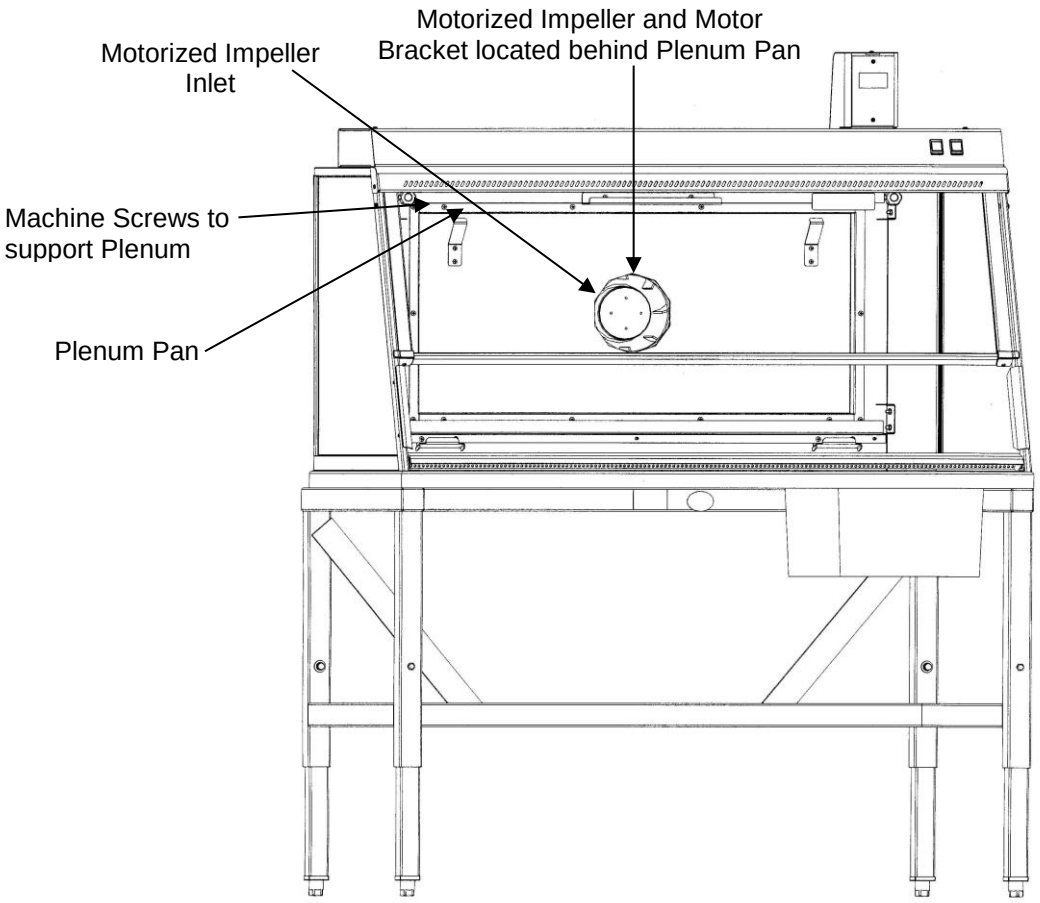


Figure 6-11
Motorized Impeller Replacement

Speed Control Replacement

1. Follow the procedure to replace the fluorescent light to access the speed control.
2. Remove the light reflector after following the light removal procedure. This allows access to the speed control.
3. Remove the two nuts holding the speed control. Refer to Appendix A for Replacement Parts Diagram.
4. Disconnect all wires leading to the speed control. Connect wires on new speed control in the same position as the old speed control.
5. Reassemble to the system in the same position and with the same screws that were removed earlier.

Chapter 7: Accessorizing and Modifying Your Enclosure

There are several ways to accessorize the enclosure for your individual requirements. These include the addition of accessory work surfaces, airflow monitors, exhaust transition adapters, remote blowers, exhaust dampers, FilterMate Portable Exhausters, carbon filters, storage cabinets, stands and utility shelf kit.

1. **Work Surfaces**

   An optional dished work surface is available to attach to the enclosure.

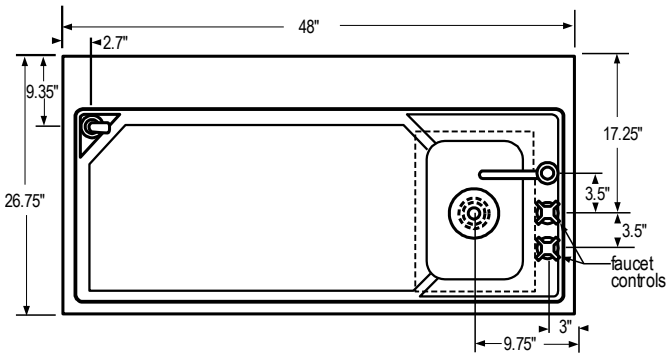
   Dished work surfaces are contoured to fit the dimensions of the Protector Work Stations to contain spills. Epoxy is chemical resistant. Work surfaces are available either with or without a sink. See Chapter 3 for illustrations and below for dimensions of work surfaces. See Appendix B for Protector Work Station dimensions.

Catalog #	Description	Dimensions (W x D x H)
6942003	Black w/sink, 4-foot wide	48" x 26.75" x 1.25" includes valves HOT/CW gooseneck and sprayer
3908402	Black, 4-foot wide	48" x 26.66" x 1.00"

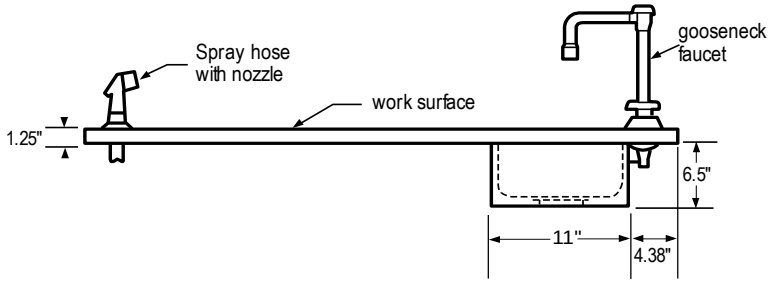
NOTE: 6942003 Work Surface with sink may be mounted on Base Stands 3746702 or 3746712.

6942003 Work Surface with Sink

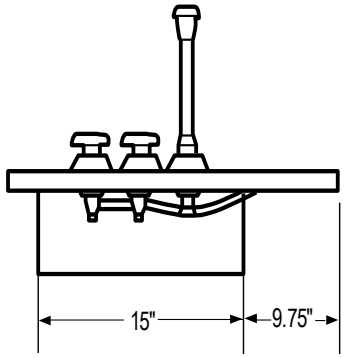
Fabricated from durable epoxy resins, this unique work surface is designed to accept standard dissecting boards and is dished to contain spills. It resists corrosion and will not stain or absorb liquids. Easy to clean, the work surface comes with a 10" x 14" x 6" deep molded epoxy sink. Fixtures include a chrome-plated gooseneck faucet with vacuum breaker, two chrome-plated faucet controls, and a spray nozzle with hose. Sink requires a 1.5" drain connection. 48" w x 26.75"d x 1.25" thick. Shipping weight 115 lbs (52 kg). This work surface may be mounted on Telescoping Base Stand 3746702 or 3746712.



TOP



FRONT



RIGHT SIDE

2. **Guardian™ 1000 Digital Airflow Monitor or Guardian™ 500 Airflow Monitor**

   The Guardian 1000 Digital Airflow Monitor or Guardian 500 Airflow Monitor allows you to continuously monitor airflow through the enclosure. The rear exhaust plenum and upper light is factory prepared to mount either monitor.

Catalog #	Description
3944700	Guardian 500 Airflow Monitor, 115V, 60 Hz
3944701	Guardian 500 Airflow Monitor, 230V, 50 Hz
3908800	Guardian 1000 Digital Airflow Monitor 115V, 60 Hz
3908801	Guardian 1000 Digital Airflow Monitor 230V, 50 Hz

3. **Exhaust Transition Adapters (For Remote Blower models only)**

   Adapter connects to the enclosure (on remote Protector Work Stations) from either the top or the bottom of the rear plenum so the duct can be routed either up or down, respectively. The transition is available for either 5.00" ID hose or 6" OD duct. The 5.00" ID hose upper connection is standard and included with the FilterMate.

Catalog #	Description	Material
3912400	Upper connection, 5" Hose	Coated Steel, Epoxy Coated
3912401	Upper connection, 6" Duct	Coated Steel, Epoxy Coated
3912402	Lower connection, 5" Hose	Coated Steel, Epoxy Coated
3912403	Lower connection, 6" Duct	Coated Steel, Epoxy Coated

4. **Remote Blowers (For Remote Protector Work Station Only)**

   Has a 1/4 hp direct drive motor and corrosion-resistant epoxy-coated steel housing and wheel with blower inlet of 6.00" ID. Outlet dimensions are 4.25" x 7.38" OD.

CFM @ Static Pressure-Inches of H_2O						
S.P.	0.0"	0.125"	0.25"	0.50"	0.75"	0.87"
CFM	595	560	515	420	300	167

Catalog #	Description	Shipping Wt. (lbs./kg.)
4863500	Remote Blower, 115 V, 60 Hz. 4.4 amps	35/16
4863501	Remote Blower, 115/230 V, 50 Hz, 5.6/2.8 amps	35/16
7053501	Explosion-Proof Remote Blower, 115 V, 60 Hz, 4.4 amps	40/18

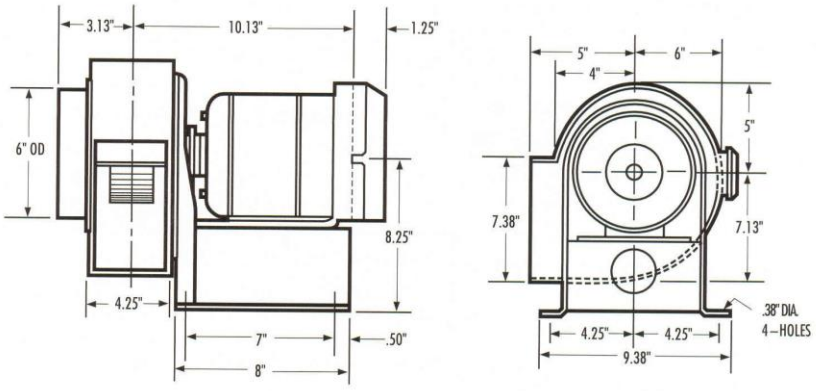


Figure 7-1

5. **Exhaust Dampers (For Remote Protector Work Station Only)**

   Exhaust dampers allow an adjustment required to maintain proper airflow for roof-mounted blowers or house exhaust systems.

Catalog #	Description
3924000	6" Epoxy Coated Steel In-Line adjustable damper
4724200	6" PVC In-line adjustable damper

6. **FilterMate Portable Exhausters and Filters (For use with Remote Protector Work Station Only)**

   For filtered exhaust, Labconco offers FilterMate Portable Exhausters capable of exhausting up to 280 cfm of HEPA or carbon filtered air or up to 220 cfm of combination HEPA/Carbon or Dual Carbon filtered air when connected to the enclosure.

Catalog #	Voltage	Filter	Exhaust Connection	Exhaust Airflow (cfm)
3970000	115 Volt/60 Hz	HEPA	None	280
3970001	115 Volt/60 Hz	Carbon	None	280
3970002	115 Volt/60 Hz	HEPA	Thimble to outside	280
3970003	115 Volt/60 Hz	HEPA/Carbon	None	220
3970004	115Volt/60 Hz	Carbon/Carbon	None	220
3970020	230 Volt/50 Hz	HEPA	None	280
3970021	230 Volt/50 Hz	Carbon	None	280
3970022	230 Volt/50 Hz	HEPA	Thimble to outside	280
3970023	230 Volt/50 Hz	HEPA/Carbon	None	220
3970024	230Volt/50 Hz	Carbon/Carbon	None	220

HEPA Filter (For FilterMate Only)
Part #3707900 is 99.99% efficient on particles 0.3 micron.

HEPA Filter Bag-In/Bag-Out Bag (For FilterMate Only)
Part #3776002 helps contain hazardous particulate matter during filter changing operations.

Carbon Filter (for FilterMate Only)
Provides granular activated carbon or impregnated carbon.

Filter Classification	Part #	x Pounds
Organic	3923400	12.0 lbs. activated carbon
Formaldehyde	3923401	14.0 lbs. impregnated carbon
Ammonia	3923402	16.0 lbs. impregnated carbon

7. **Carbon Filters (Only for Protector Work Station with Integral Blower)**

   IMPORTANT NOTE: Two filters are always required or a combination of filters. If using formaldehyde and organic vapor, the formaldehyde filter is placed downstream of the exhaust of the organic vapor filter.

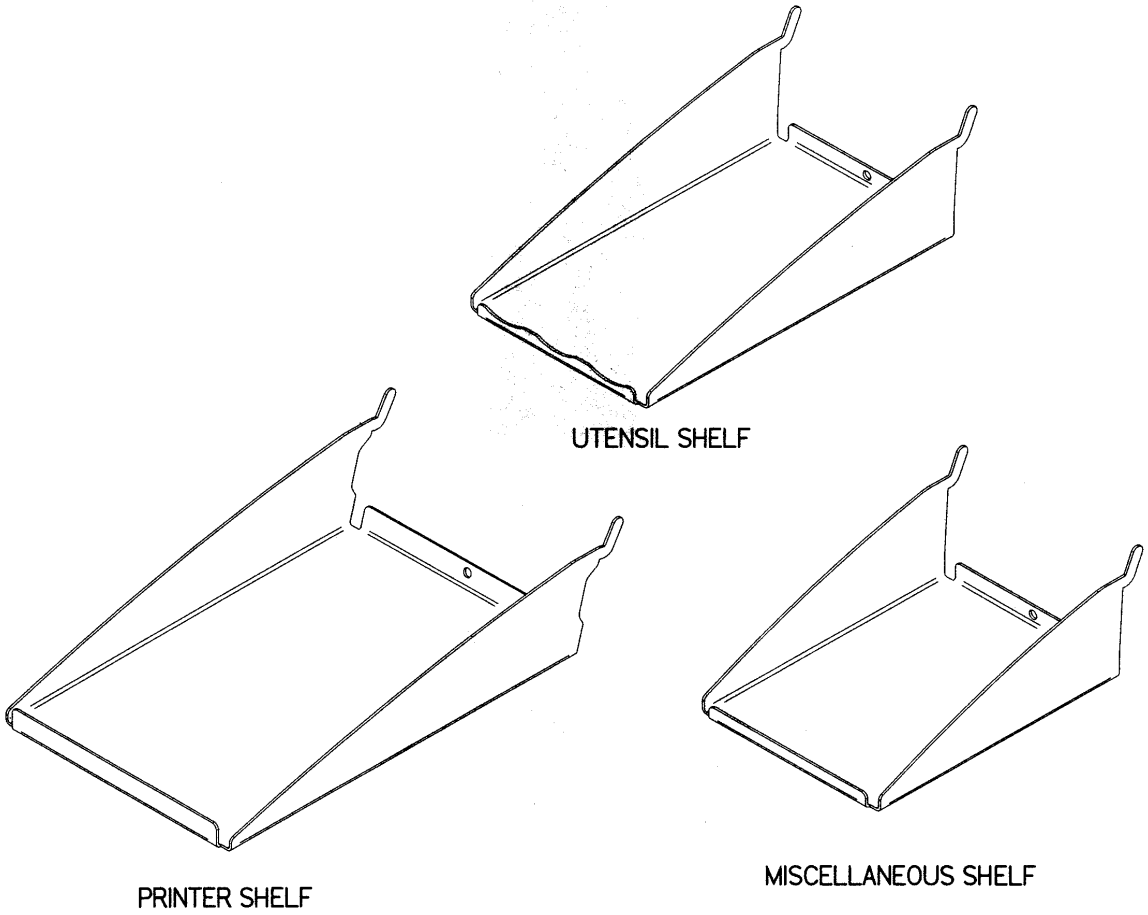
Catalog Number	Filter Size	Pounds of Carbon	Carbon Type	For Use With	Adsorbtion Weight	Adsorbtion Volume
3924200	18 x 36 x 1	11.0	RL10 Organic Vapor	Organic Vapors	Varies, see Chemical Guide	Varies, See Chemical Guide and Chapter 6
3924201	18 x 36 x 1	13.3	Impregnated Formasorb	Formaldehyde	10%, 1.33 lbs.	1512 ml of 37% Formalin
3924202	18 x 36 x 1	15.2	Impregnated Ammonasorb II	Ammonia and Amines	10%, 1.52 lbs.	1382 ml of 50% Ammonia Solution

8. **Storage Cabinets and Stands**

	SOLVENT			ACID		
Size/Description	Dual Doors	Right Hinge	Left Hinge	Dual Doors	Right Hinge	Left Hinge
48"	9902000	-	-	9901000	-	-
36"	9902100	-	-	9901100	-	-
30"	9902200	-	-	9901200	-	-
24"	-	9902300	9902400	-	9901300	9901500
18"	-	-	-	-	9901400	9901600
12"	-	-	-	-	-	-
48" w/Self-Closing Doors	9903000	-	-	-	-	-
36" w/Self-Closing Doors	9903100	-	-	-	-	-
30" w/Self-Closing Doors	9903200	-	-	-	-	-
24" w/Self-Closing Doors	-	9903300	9903400	-	-	-
24" ADA	-	9906000	9906100	-	9905000	9905200
24" ADA w/Self-Closing Doors	-	9906200	9906300	-	-	-
18" ADA	-	-	-	-	9905100	9905300
12" ADA	-	-	-	-	-	-

	STANDARD BASE			VACUUM PUMP		
Size/Description	Dual Doors	Right Hinge	Left Hinge	Dual Doors	Right Hinge	Left Hinge
48"	9900000	-	-	-	-	-
36"	9900100	-	-	-	-	-
30"	9900200	-	-	-	-	-
24"	-	9900300	9900600	-	-	-
18"	-	9900400	9900700	-	9907000	9907100
12"	-	9900500	9900800	-	-	-
48" w/Self-Closing Doors	-	-	-	-	-	-
36" w/Self-Closing Doors	-	-	-	-	-	-
30" w/Self-Closing Doors	-	-	-	-	-	-
24" w/Self-Closing Doors	-	-	-	-	-	-
24" ADA	-	9904000	9904300	-	-	-
24" ADA w/Self-Closing Doors	-	-	-	-	-	-
18" ADA	-	9904100	9904400	-	-	-
12" ADA	-	9904200	9904500	-	-	-
Stands						
	3746702	Telescoping Stand with Fixed Feet, 48" x 29" x 27.5" to 33.5"				
	3746712	Telescoping Stand with Locking Casters, 48" x 29" x 27.5" to 33.5"				

9. **Utility Shelves 3925000**
   Three shelves hold items inside the enclosure. One shelf may be used for the printer, one shelf for spatulas and weigh brushes, and one miscellaneous shelf. The shelves hang from slots in the rear baffle.



10. **Hoses, Hose Clamps, and Hose Kits**

Provides alternatives for ducting.

Catalog #	Description
4868600	8 Feet of 5" ID gray flexible polypropylene hose (included with FilterMate). General purpose chemical resistant hose suitable in pharmaceutical applications.
1921000	5" T-Bolt Hose Clamp (two included with FilterMate)
3927500	8 Feet of 5" ID Clear smooth bore static dissipation hose with two hose clamps. Suitable in clean rooms or pharmaceutical applications.
3927600	8 Feet of 6" ID Black thermoplastic hose with two 6.09" ID cuffs. Includes two 6" hose clamps. Suitable for connection to house exhaust and pharmaceutical applications.
1921500	6" T-Bolt Hose Clamp

Chapter 8: Troubleshooting

Refer to the following table if your Protector Work Station fails to operate properly. If the suggested corrective actions do not solve your problem, contact Labconco for additional assistance.

PROBLEM	CAUSE	CORRECTIVE ACTION
Contaminants outside of enclosure.	Improper user techniques for the enclosure.	See “Certifying the Enclosure” Chapter 3 and “Safety Precautions” Chapter 4 sections in the manual. (Ref. Appendix D).
	Restriction of the baffle air slots or blockage of the exhaust outlet.	Remove obstruction to ensure that all air slots and the exhaust outlet are unobstructed.
	External factors are disrupting the enclosure airflow patterns or acting as a source of contamination.	See “Location Requirements” Chapter 2, “Certifying the Enclosure” Chapter 3, and “Safety Precautions” Chapter 4 sections of this manual. (Ref. Appendix D).
	Enclosure has improper face velocity.	Have enclosure certified and check exhaust system. Check carbon filters for loading. Check accessory FilterMate HEPA filters for loading. Adjust enclosure speed control. Enclosure should have an average face velocity of 60-100 fpm.
Blower won’t operate.	Unit not plugged into outlet.	Plug the enclosure into appropriate electrical service.
	Circuit breaker(s) or Ground Fault Interrupter.	Reset circuit breaker.
	Blower wiring is disconnected.	Inspect blower wiring.
	Blower switch is defective.	Replace switch.
	Motorized impeller or blower is defective.	Replace motorized impeller or blower. See Chapter 6.

PROBLEM	CAUSE	CORRECTIVE ACTION
Low face velocity or poor containment of contaminants.	Enclosure sash not closed.	Close sash to the lowest position.
	HEPA filter clogged on FilterMate.	Replace HEPA filter or increase speed.
	Carbon filter loaded with chemicals.	Replace carbon filter.
Blower and lights won't operate.	Unit not plugged into outlet.	Plug enclosure into appropriate electrical service.
Lights do not work.	Circuit breaker(s) tripped.	Reset or replace circuit breaker.
	Lamp not installed properly.	Inspect lamp installation.
	Lamp wiring disconnected.	Inspect lamp wiring.
	Defective lamp.	Replace lamp.
	Light switch is defective.	Replace light switch.
	Defective electronic ballast.	Replace ballast.
Airflow monitor malfunction.	No power. No lights. No display.	Power cable to circuit board is disconnected and needs to be connected. Sensor cable needs to be connected. Power supply is not plugged into proper voltage; plug in power supply. Verify that all airflow monitor interface cables are connected. Check circuit breaker on enclosure.
	No audible alarm.	Alarm has been temporarily silenced using "SILENCE ALARM" or "enter" buttons.
	Wrong alarm set point.	Airflow monitor was not properly adjusted. Repeat calibration steps outlined in this manual in Chapter 6 or in the supplied Guardian 1000 Digital Monitor Manual.
	Constant audible alarm.	Check airflow and calibration of airflow monitor. See Chapter 6.

PROBLEM	CAUSE	CORRECTIVE ACTION
Airflow Monitor Malfunction (Continued)	Continuous alarm.	Check the face velocity of the enclosure as the airflow of the system may have changed. If incorrect, adjust the speed control to increase face velocity. The HEPA filter on the accessory FilterMate may have become loaded. If face velocity is correct, calibrate the airflow monitor outlined in this manual in Chapter 6.
	Monitor alarms; air way to airflow monitor sensor is blocked by insects, dust or debris.	Lightly clean the airway with clean air. Be careful not to touch sensitive electrical components.
	Audible disable will not stay operational.	An alarm condition must be continuously present before the audible alarm can be silenced. If flow conditions fluctuate near the alarm set point, the airflow monitor will automatically reset it. Action should be taken to bring the enclosure airflow into proper operating parameters or adjust the alarm set point lower.

Appendix A: Enclosure Components and Replacement Parts

The components that are available for your Protector Work Station are listed. The parts shown are the most commonly requested. If other parts are required, please contact Product Service.

Item	Qty.	Part Number	Description
1	1	3906500	Glass, Side
2	1	3906102	Glass, Sash 4'
3	1	3905202	Sash Assembly, 4'
4	1	3905602	Lower Air Foil, 4'
5A	1	3929800	Bracket, Air Foil R.H.
5B	1	3929801	Bracket, Air Foil L.H.
6A	1	3907500	Stop, Sash R.H.
6B	1	3907501	Stop, Sash L.H.
7A	1	6916500	Latch, Sash
7B	1	3906700	Bracket, Latch
7C	1	1927403	Spring, Compression Latch
7D	2	1893206	Screw, 8-32 x .38" Lg. Phillips Pan S.S. Type F
8A	2	1889316	Screw, 10-24 x 1.00 PH Phil SS
8B	2	1912108	Washer, Plastic .194 ID x .380 OD
8C	2	7868402	Bushing, Spacer .31 x .63
9	2.3 Ft.	6913700	Wiper Seal, Sash
10A	2	1936800	Bushing Heyco Closed 1.50 Dia.
10B	2	1934601	Bushing, Heyco with Flex Shutter 1.50 Dia.
11A	2	3915400	Side Air Foil
11B	4	1889912	Screw #6-32 x .75" Oval HD Type F S.S.
12A	1	3932100	Reflector, Light 4'
12B	8	1894808	Screw, Deflector #8 x ½ PH
13	1	9721901	Lamp, Fluorescent 4' (F25T8)
14A	1	3932200	Wiring Harness, Main 115V
14B	1	3932201	Wiring Harness, Main 230V
15	1	3929300	Label, Front Protector Work Station
16	2	1307000	Rocker Switch, 2 Position
17A	1	3921700	Motorized Impeller, 115V
17B	1	3921701	Motorized Impeller, 230V
18A	1	1306600	Capacitor, 115V 15 MFD
18B	1	1306800	Capacitor, 230V 4 MFD
19	1	1294000	Ballast, Fluorescent 115V or 230V
20A	1	3922100	Speed Control, 115V
20B	1	3922101	Speed Control, 230V
21A	2	3924200	Carbon Filter, Organic Vapor 18x36x1
21B	2	3924201	Carbon Filter, Formaldehyde 18x36x1
21C	2	3924202	Carbon Filter, Ammonia 18x36x1
22A	1	1334500	Power Cord, Main 115V
22B	1	1334100	Power Cord, Main 230V
23A	1	1327201	Circuit Breaker, 10A
23B	2	1327204	Circuit Breaker, 5A

Item	Qty.	Part Number	Description
24	1	1306000	Integral Blower Power Cord, IEC
25	1	1595619	Hole Plug, 0.50 Dia.
26	1	1595621	Hole Plug, 1.187 Dia.
27	2	1879400	Knob, Perforated Baffle Integral Blower
28A	1	3931500	Perforated Baffle Assy, Integral Blower
28B	2	3931600	Baffle Support
29	1	3938400	Perforated Baffle, Remote Blower
30	1	3929200	Wiring Harness, Integral Blower
31	2	3932700	Standoff, Light Support, ½ Hex x 10-24
32A	1	3913100	Cover Plate, Remote Exhaust
32B	2	1893008	Screw, #8-32 x .50 Self-Tapping

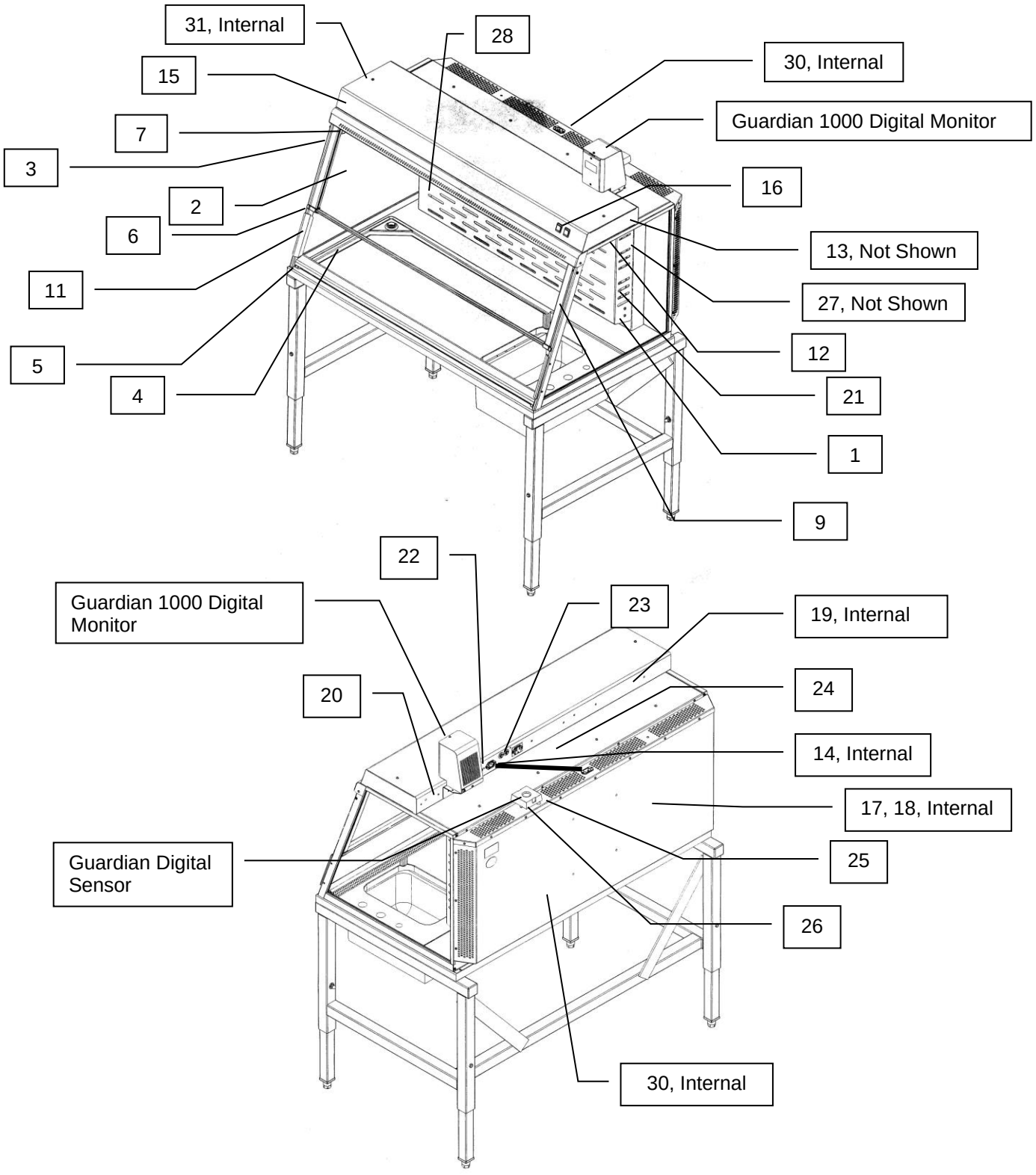


Figure A-1
Protector Work Station with Integral Blower

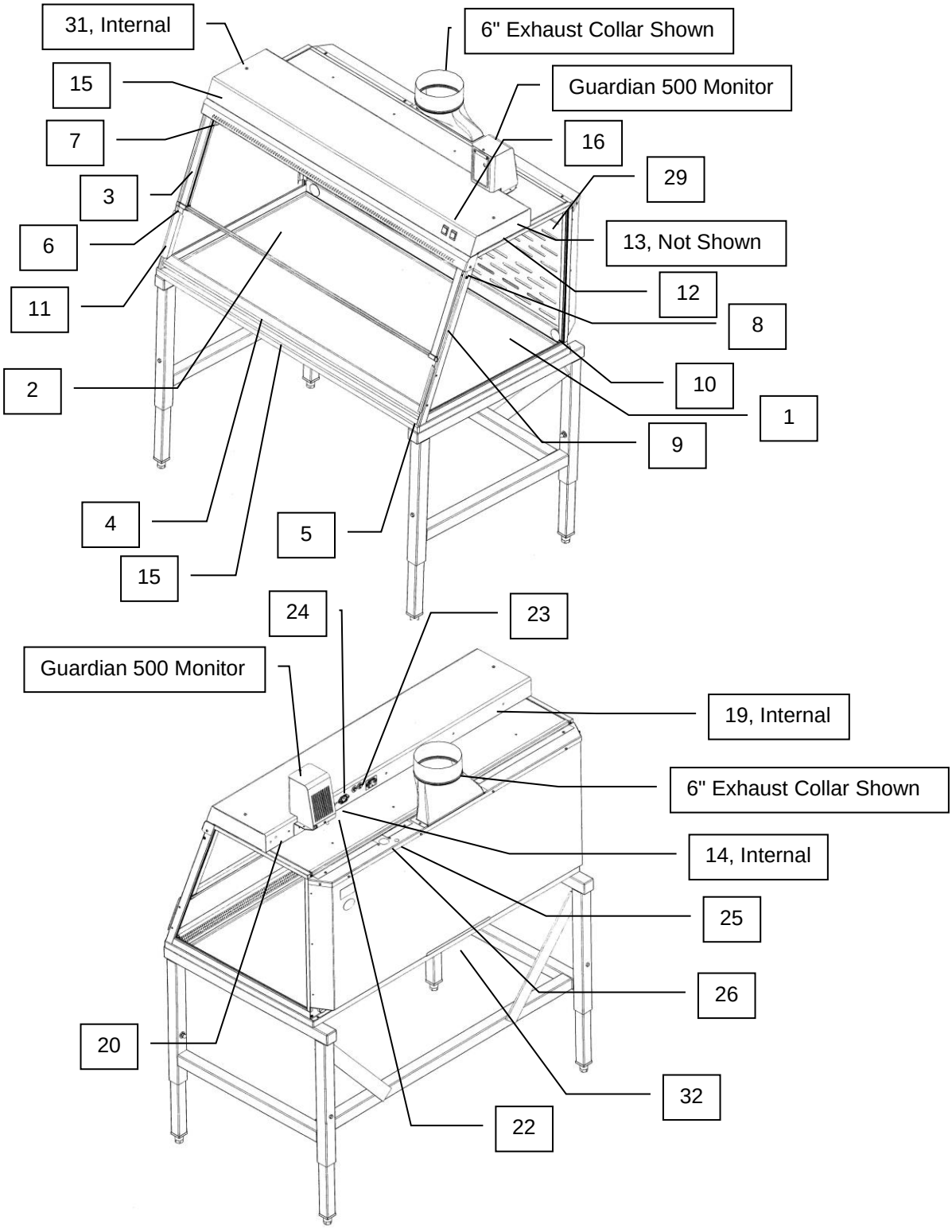
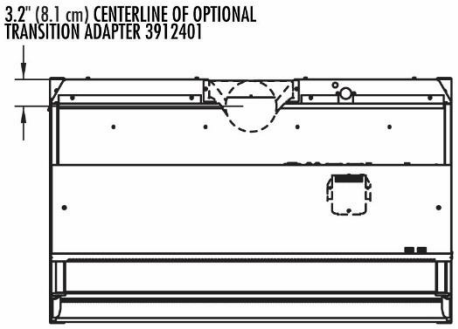


Figure A-2
Protector Work Station for use with Remote Blower

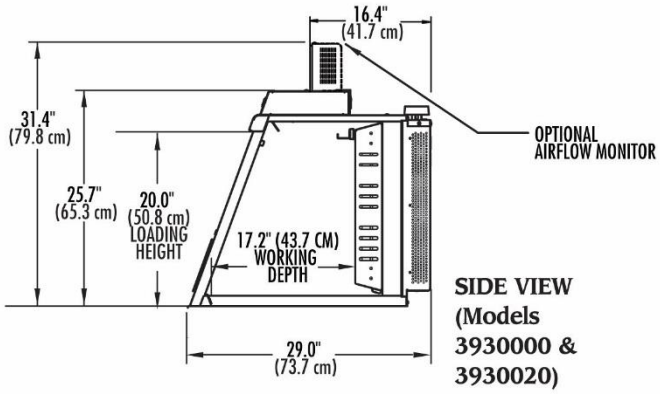
Appendix B: Dimensions and Exhaust Options

Catalog Number	Electrical Requirements	Power Cord & Plug	Blower	Carbon Filters*	Shipping Weight lbs./kg
3930000	115 volts, 60 Hz, 10 amps	6.5'	Built-in	Requires two	120/54
3930001	115 volts, 60 Hz, 10 amps	6.5'	Requires remote blower, house exhaust or FilterMate Portable Exhauster**		100/45
3930020	230 volts, 50 Hz, 5 amps	9'. No Plug.	Built-in	Requires two	120/54
3930021	230 volts, 50 Hz, 5 amps	9'. No Plug.	Requires remote blower, house exhaust or FilterMate Portable Exhauster**		100/45

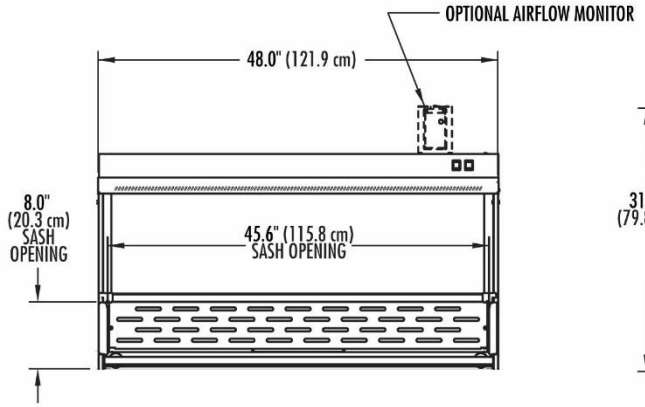
** See pages 94-95 for ordering information.* *** See page 97 for ordering information on Remote Blowers and pages 86-87 for ordering information on FilterMate Portable Exhausters.*



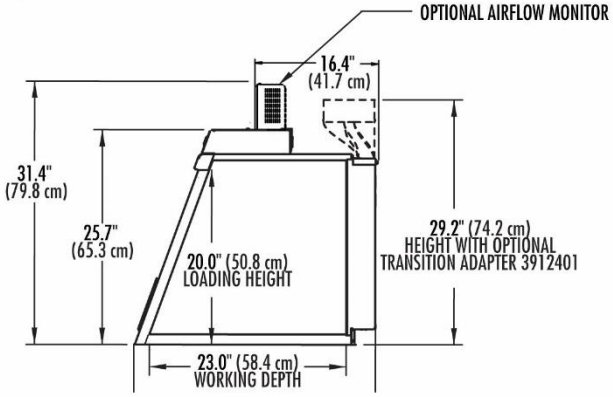
TOP VIEW (Models 3930001 & 3930021)



SIDE VIEW (Models 3930000 & 3930020)

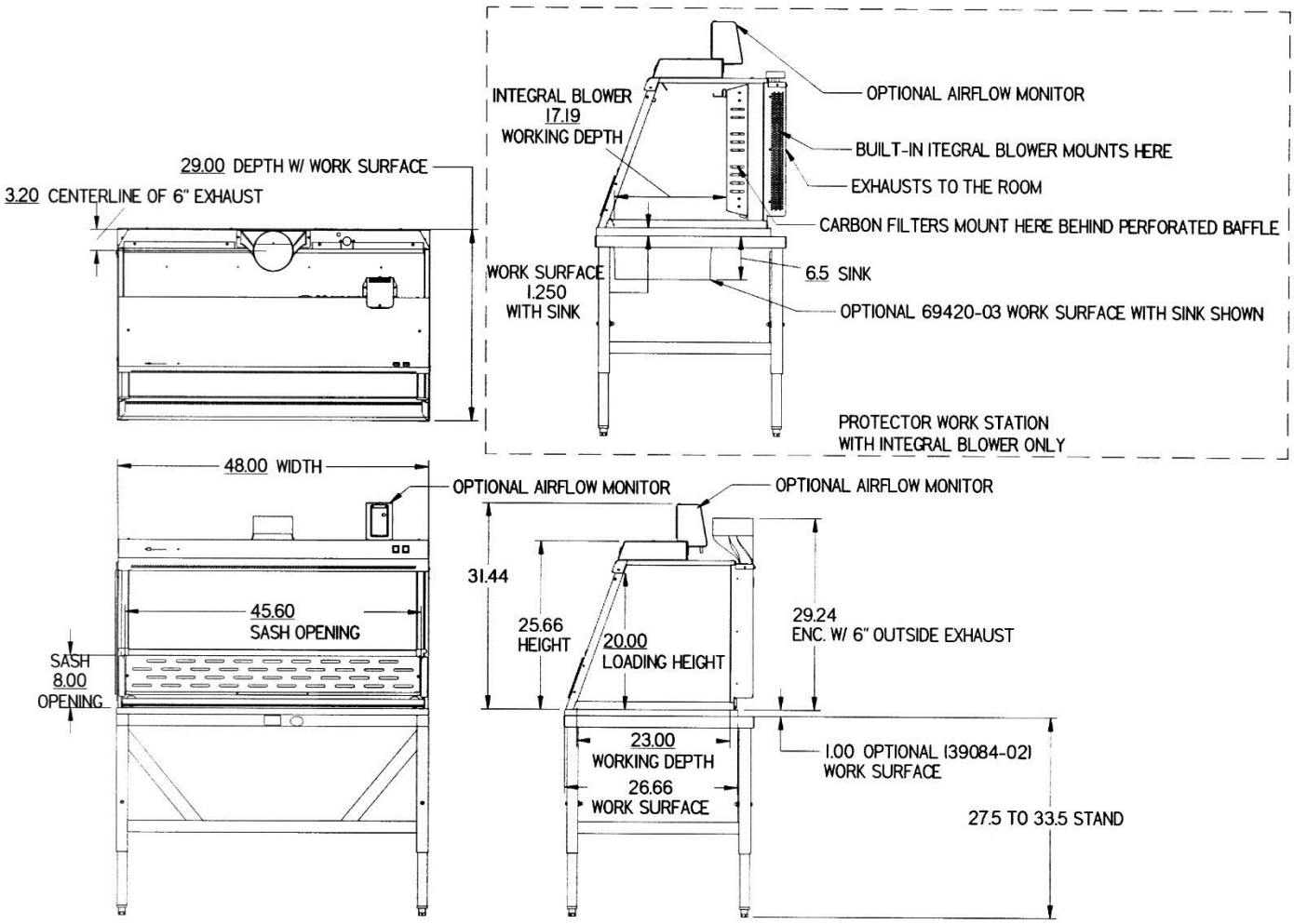


FRONT VIEW (All Models)



SIDE VIEW (Models 3930001 & 3930021)

B-1



PROTECTOR WORK STATION DIMENSIONS FOR OUTSIDE EXHAUST AND ROOM EXHAUST

Appendix C: Protector Work Station Specifications

This Appendix contains technical information about all the Protector Work Station enclosures including electrical specifications and environmental operating conditions.

Electrical Specifications

- 10 Amps, 115V, 50/60 Hz
- 5 Amps, 230V, 50/60 Hz

Environmental Conditions

- Indoor use only.
- Maximum altitude: 6562 feet (2000 meters).
- Ambient temperature range: 41° to 104°F (5° to 40°C).
- Maximum relative humidity: 80% for temperatures up to 88°F (31°C), decreasing linearly to 50% relative humidity at 104°F (40°C).
- Main supply voltage fluctuations not to exceed ±10% of the nominal voltage.
- Transient over-voltages according to Installation Categories II (Over-voltage Categories per IEC 1010). Temporary voltage spikes on the AC input line that may be as high as 1500V for 115V models and 2500V for 230V models are allowed.
- Used in an environment of Pollution degrees 2 (i.e., where normally only non-conductive atmospheres are present). Occasionally, however, a temporary conductivity caused by condensation must be expected, in accordance with IEC 664.

Appendix D:
Quick Chart for the Protector Work Stations

Model Size	4'
Sash Height from Work Surface (inches)	8.00
Total Open Area with Bypass (sq. ft.)	2.50
Exhaust Airflow Volume at 80fpm (CFM)	200
Alarm Airflow Volume at 60 fpm (CFM)	150
*Motor Horsepower (HP)	0.30
*Capacitor (MFD, Volts)	15MFD, 115V 4MFD, 230V
Fluorescent Lights	F25T8

*excludes remote Protector Work Station, since it has no integral blower.

To determine the actual face velocity at the sash opening, airflow velocity readings will need to be taken. This should be done across the sash opening of the enclosure in accordance with the *Industrial Ventilation Manual*. (See Appendix E) The “average face velocity” is achieved by taking readings in two rows across the enclosure with the readings 6" from the ends and evenly spaced every 12"; the first row is 3" down from the upper sash foil and the second row is 3" up from the work surface. A total of eight readings are taken for the 4' Protector Work Station and then averaged.

Appendix E: References on Ventilation, Safety, Occupational Hazards, Biosafety & Decontamination

Many excellent reference texts and booklets are currently available. The following is a brief listing:

Laboratory Ventilation Standards

Federal Register 29 CFR Part 1910
Non-mandatory recommendations from "Prudent Practices."

- Fume hoods should have a continuous monitoring device
- Face velocities should be between 60-100 linear feet per minute (lfpm)
- Average 2.5 linear feet of hood space per person

Occupational Health and Safety
U.S. Department of Labor
200 Constitution Avenue N.W.
Washington, DC 20210
(202) 523-1452
www.osha.gov

Industrial Ventilation-ACGIH

- Fume hood face velocities between 60-100 lfpm
- Maximum of 125 lfpm for radioisotope hoods
- Duct velocities of 1000-2000 fpm for vapors, gasses and smoke
- Stack discharge height 1.3-2.0 x building height
- Well designed fume hood containment loss, <0.10 ppm

Industrial Ventilation, A Manual of Recommended Practice.
24th Edition, 2001
American Conference of Governmental Industrial Hygienists
1330 Kemper Meadow drive
Cincinnati, OH 45240-1634
(513) 742-2020
www.acgih.org

ASHRAE 110-1995 Method of Testing Performance of Fume Hoods
Evaluates fume hood's containment characteristics

- Three part test: Smoke generation, Face velocity profile, Tracer gas release @ 4 liters per minute
- Rated As Manufactured (AM), As Installed (AI) and As Used (AU)

American Society of Heating, Refrigerating, and Air Conditioning Engineers
1791 Tullie Circle N.E.
Atlanta, GA 30329
(404) 636-8400
www.ashrae.org

ANSI Z9.5-1993 Laboratory Standard
Covers entire laboratory ventilation system.

- Vertical stack discharge @ 2000-3000 fpm
- New and remodeled hoods shall have a monitoring device
- Ductless hoods should only be used with non-hazardous materials
- Fume hood face velocities between 80 – 120 fpm

American Industrial Hygiene Association
2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031
(703) 849-8888
www.aiha.org

SEFA 1-2002

- Fume hood face velocities based on toxicity levels of chemicals
  Class A – 125 to 150 fpm
  Class B – 80 to100 fpm
  Class C – 75-to 80 fpm
- Test method – face velocity profile and smoke generation

Scientific Equipment & Furniture Association
1028 Duchess Drive
McLean, VA 22102
(703) 538-6007
www.sefalabs.com

NFPA 45 – 2002 Fire Protection for Laboratories Using Chemicals

- Laboratory hoods should not be relied on for explosion protection
- Exhaust air from fume hoods should not be recirculated
- Services should be external to the hood
- Canopy hoods only for non-hazardous applications
- Materials of construction should have flame spread of 25 or less
- 80 to 120 fpm to prevent escape

NFPA 30 – 2000 Flammable and Combustible Liquids Code

- Approved cabinets may be metal or wood
- Vent location on cabinets are required
- Venting of cabinets not a requirement

National Fire Protection Association
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
(800) 344-3555
www.nfpa.org

General References

American Conference of Governmental Industrial Hygienists. *Industrial Ventilation, A Manual of Recommended Practice,* Cincinnati, OH

ASHRAE Standard Committee. *ASHRAE Standard* Atlanta: ASHRAE Publications Sales Department, 1995

British Standards Institution*, Laboratory Fume Cupboards*. Parts 1, 2 and 3, London: 1990

Department of Labor, Occupational Safety and Health Administration, *29 CFR Part 1910, Occupational Exposures to Hazardous Chemicals in Laboratories, Final Rule*. Vol. 55, No. 21. Washington D.C.:1990

DiBerardinis. L. et al. *Guides for Laboratory Design, Health and Safety Considerations*. Wiley & Sons, 1987

McDermott, Henry, *Handbook of Ventilation for Contaminant Control*, *2nd Edition*. Butterworth Publishers, 1985.

NIH Guidelines for the Laboratory Use of Chemical Carcinogens. NIH Publication No. 81-2385.

Sax, N. Irving and Lewis, JR., Richard J. *Rapid Guide to Hazardous Chemicals in the Workplace*. Van Nostrand Reinhold, 1987.

Schilt, Alfred A. *Perchloric Acid and Perchlorates*. The G. Frederick Smith Chemical Company, Columbus, OH: 1979.

Steere, Norman. *CRC Handbook of Laboratory Safety, 2nd Edition*. CRC Press, 1971.