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# User's Manual

## Paramount® Ductless Enclosures

### **Models**

69632 Series, 2' Widths  
69633 Series, 3' Widths  
69634 Series, 4' Widths  
69635 Series, 5' Widths  
69636 Series, 6' Widths

To receive important product updates,  
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**Please read the User's Manual before operating the equipment.**

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The warranty for Paramount® Ductless Enclosures 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.

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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.

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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.

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# Chapter 1:

## Introduction

Congratulations on the purchase of a Labconco Paramount® Ductless Enclosure, commonly called a ductless fume hood. Unlike traditional fume hoods, the Paramount Ductless Enclosure is considered **green as it conserves energy because it requires no ducting**. The Paramount Ductless Enclosure is a self-contained work station that protects the operator from specified vapors and/or particulates released in the work area, through the use of carbon filters and/or HEPA filters. Typical organic solvents, formaldehyde, acid gases, ammonia, amines, particulates, and powders are contained inside the enclosure to protect the operator and then filtered. Purified air is drawn from the filters and returned to the room. Vapors are adsorbed on activated carbon filters or impregnated carbon filters and particulates/powders are filtered by the HEPA filter.

Each Paramount Ductless Enclosure includes the Safety-First™ Vapor Sensor that detects filter saturation and alerts the operator to replace the filters. The early warning provided by the Safety-First Vapor Sensor provides the user ample time (5-10% remaining filter life) to complete work in process before changing the filters. The Safety-First Vapor Sensor includes a primary and secondary sensor for redundant monitoring and the sensor detects typical organic solvents, smoke particulates, ammonia gases, formaldehyde gases, and hydrogen sulfide gases. The Paramount Ductless Enclosure is the result of Labconco's years of experience in the design and manufacture of fume hoods and ductless hoods.

The Paramount Ductless Enclosure offers many unique features to enhance safety, performance, and ergonomics. Safety is illustrated with the Safety-First Vapor Sensor. Performance and Safety are illustrated with validated containment and patented aerodynamic features (U.S. Patent No. 6,461,233). Ergonomics is illustrated with the patented inclined design (U.S. Patent No. D538,941). To take full advantage of all features, please acquaint yourself with this manual and keep it handy for future reference. If you are unfamiliar with how ductless enclosures operate, please review *Chapter 4: Performance Features and Safety Precautions*, before you begin working.

Even if you are an experienced ductless enclosure user, please review *Chapter 5: Using the Ductless Enclosure*; it describes the Paramount Ductless Enclosure features so that you can use it efficiently and effortlessly. **The Paramount Ductless Enclosure ships without any filters. *Chapter 3: Getting Started* and *Chapter 6: Maintaining the Ductless Enclosure*, must be followed to properly select and install filters.**

**This manual and other technical information is available in PDF format at our website: [www.labconco.com](http://www.labconco.com).**

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## Chapter 2: Prerequisites

Before you install the Paramount Ductless Enclosure, you need to prepare your site for installation. A dedicated source of electrical power should be located near the installation site to power the ductless 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 and stability requirements.
- The location and air current requirements.
- The exhaust and blower requirements.
- The electrical power requirements.
- 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 and Stability Requirements

At a minimum, the supporting structure usually consists of a base cabinet or stand and a chemically resistant work surface. Please consider the following:

- Work surfaces should be of a thick rigid material that remains stable.
- A bench that is rigidly mounted to the floor or fixed to the wall may be appropriate.
- Tubular stands or mobile benches with locking casters may be appropriate.



### Location and Air Current Requirements

The Paramount Ductless Enclosures have been designed to contain hazards by negating typical cross drafts and turbulence within the opening. However, it is recommended that the enclosure 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.
- Near doorways or windows that may be opened.

### Exhaust and Blower Requirements

The Paramount Ductless Enclosure uses a green, 95% energy efficient, electronically-commutated motorized (ECM) impeller to draw room air past the operator and through the enclosure (see Appendix D for power usage by model). This contaminated air is passed through filters and exhausted out the top of the enclosure. The filtered exhaust air is normally recirculated into the laboratory or may be exhausted outside with the addition of the Canopy Exhaust Connection and remote blower listed in Chapter 7. Contact Labconco for blower sizing assistance for exhausting to the outside. Electrical connections are covered in Chapter 2 for this configuration.

Data for the enclosure's exhaust volume, noise pressure and face velocity are listed on the next page in chart form for each Paramount Ductless Enclosure model at face velocities of 60, 80, and 100 fpm. All models are shipped to operate at 75-80 fpm, but can be reset by the Safety Officer or certification technician through a password protected menu.

**Important Note:** 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 ductless enclosures. See Chapter 7 for information on accessories.

Model No.	Voltage	Enclosure Width	Internal Working Height	Sash Opening	Exterior Depth	Exterior Height	Face Velocity (fpm)	Airflow Exhaust Volume (CFM)	Noise Pressure (dbA)
6963200	100-115V	2'	22.7"	9.4"	29"	43.7"	60 80 100	85 115 145	50 54 59
6963220	208-230V	2'	22.7"	9.4"	29"	43.7"	60 80 100	85 115 145	50 54 59
6963300	100-115V	3'	22.7"	9.4"	29"	43.7"	60 80 100	130 175 220	46 52 56
6963301	100-115V	3'	32"	12"	29"	53"	60 80 100	170 230 285	52 57 62
6963302	100-115V	3'	32" x 360°	12"	29"	53"	60 80 100	170 230 285	52 57 62
6963320	208-230V	3'	22.7"	9.4"	29"	43.7"	60 80 100	130 175 220	46 52 56
6963321	208-230V	3'	32"	12"	29"	53"	60 80 100	170 230 285	52 57 62
6963322	208-230V	3'	32" x 360°	12"	29"	53"	60 80 100	170 230 285	52 57 62
6963400	100-115V	4'	22.7"	9.4"	29"	43.7"	60 80 100	175 235 295	53 57 62
6963401	100-115V	4'	32"	12"	29"	53"	60 80 100	230 305 380	57 62 67
6963402	100-115V	4'	32" x 360°	12"	29"	53"	60 80 100	230 305 380	57 62 67
6963403	100-115V	4'	35"	12"	35.5"	56"	60 80 100	230 305 380	59 62 67
6963420	208-230V	4'	22.7"	9.4"	29"	43.7"	60 80 100	175 235 295	53 57 62
6963421	208-230V	4'	32"	12"	29"	53"	60 80 100	230 305 380	57 62 67
6963422	208-230V	4'	32" x 360°	12"	29"	53"	60 80 100	230 305 380	57 62 67
6963423	208-230V	4'	35"	12"	35.5"	56"	60 80 100	230 305 380	59 62 67
6963501	100-115V	5'	32"	9.4"	29"	53"	60 80 100	220 295 370	57 62 67
6963503	100-115V	5'	35"	9.4"	35.5"	56"	60 80 100	220 295 370	57 62 67
6963521	208-230V	5'	32"	9.4"	29"	53"	60 80 100	220 295 370	57 62 67
6963523	208-230V	5'	35"	9.4"	35.5"	56"	60 80 100	220 295 370	57 62 67
6963601	100-115V	6'	32"	12"	29"	53"	60 80 100	350 465 580	57 61 66
6963603	100-115V	6'	35"	12"	35.5"	56"	60 80 100	350 465 580	57 61 66
6963621	208-230V	6'	32"	12"	29"	53"	60 80 100	350 465 580	57 61 66
6963623	208-230V	6'	35"	12"	35.5"	56"	60 80 100	350 465 580	57 61 66

### **Electrical Requirements**

Standard duplex electrical receptacles should be nearby for connecting the Paramount Ductless Enclosure and other equipment. The enclosures include iris pass-through ports to allow electrical cords through the back of the enclosure without leaving a large hole for contaminants to escape. (See Appendix C for amperage.)

There is no provision for controlling a remote blower for exhausting air from the Paramount Ductless Enclosure. If remote blower control is required, a qualified electrician may connect a wall-mounted power outlet switch receptacle nearby so that the switch controls both the remote blower and the outlet. The power cord for the Paramount is then plugged into this outlet.

### **Space Requirements**

The dimensions for the different models are shown in the chart in Chapter 2 and detailed in *Appendix B: Dimensions*. To convert inches to millimeters, multiply by 25.4.

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## Chapter 3: Getting Started

Now that the site for your Paramount Ductless Enclosure 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.
- Install carbon filters and/or HEPA filters.
- Connect the electrical supply.
- Set Filter Life and Filter Check Timers.
- Reset or change the face velocity, if necessary.
- Validate the enclosure.
- Seal the enclosure to the work surface.
- If applicable, connect to an exhaust system.

Depending upon which model you are installing, you may need common mechanical and electrical installation tools in addition to 5/16", 3/8", 7/16", and 1/2" wrenches, ratchets, sockets, a nut driver set, a flat-blade screwdriver, a Phillips screwdriver, and a carpenter level to complete the instructions in the chapter.

**Note: Each enclosure model weighs between 125 to 350 lbs. (55 to 152 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

We recommend that you do not remove the enclosure from its shipping container until it is ready to be placed into its final location. Move the unit by placing a flat, low dolly under the shipping skid, or by using a floor jack.

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.

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

**Note:** Do not return goods without the prior authorization of Labconco. Unauthorized returns will not be accepted.

**Note:** If the 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 damages.

Do not discard the packing material until you have checked all of the components and tested the enclosure.

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

### Set Up the Ductless Enclosure on a Supporting Structure and Work Surface

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. **See Chapter 7: Accessorizing the Paramount Ductless Enclosure for appropriate work surfaces, stands, and cabinets.** 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 as shown in Figure 3-1. Mounting holes are provided in the Labconco accessory work surfaces to secure the enclosure. RTV Silicone sealant can be applied to seal the work surface to the enclosure.

#### Work Surface Specifications

The work surface should be smooth, rigid, and durable. The surface should be non-porous and resistant to the powders, solvents and chemicals used in conjunction with the Paramount Ductless Enclosure.

### **Work Surface and Enclosure Installation**

1. Level the base cabinets and the work surface. Work surface should be placed flush with the front of the stand or base cabinet as shown in Figure 3-1.
2. Identify and position the work surface ensuring the mounting holes will align with the four screw locations on the base of the enclosure. (Rear mounting holes are located close to the rear edge.)
3. Secure the work surface to the base cabinet with a structural adhesive or silicone sealant.
4. Before moving the enclosure, 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. For the stainless work surfaces, use a #10-24 x 3/8" hex washer head screw (Labconco part number 1885806).
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.
7. If desired, apply RTV silicone to seal the work surface and enclosure.



**Figure 3-1**  
**Paramount Ductless Enclosure Installation**

### **Install Carbon Filters and/or HEPA Filters**

Refer to Figure 3-2 for a view of the filter loading compartment with the front panel removed. **The Paramount Ductless Enclosure ships without filters that must be ordered separately. It is highly recommended that an extra set of new filters be on hand on a continuous basis.**

To remove the front panel, use a Phillips screwdriver to loosen the two screws holding the front panel in position; slide the front panel forward and then up to remove. The filter loading compartment is hinged and supported by gas spring cylinders. Lift the handle up and remove the cardboard packing. The cardboard packing will be replaced with filters that always stack two high.

The Paramount Ductless Enclosure has seven different filter types identified below:

6938100	HEPA Filter, 15" x 18" x 1.5", 99.99% efficient particulate on 0.3 micron
6938200	Activated Carbon Filter, Organic Vapor 7.5 lbs.
6938201	Impregnated Carbon Filter Acid-Sulfur 10 lbs.
6938202	Impregnated Carbon Filter, Ammonia-Amine 11 lbs.
6938203	Impregnated Carbon Filter, Formaldehyde-Formalin 10 lbs.
6938204	Mixed Bed Carbon Filter, Org. Vap., Acid-Sul., Ammon, Form (25% Mix) 10 lbs.
6938205	Impregnated Carbon Filter, Radioisotope 10 lbs.

All impregnated Carbon Filters, specific chemical treated, have an organic vapor capacity of 25%. Mixed Bed Carbon Filters have an organic vapor capacity of 50%. For example, the Impregnated Acid Filter has 25% of 10 pounds or 2.5 pounds of organic vapor capacity. Thus, a common application using solvents with acids would require one Activated Carbon Filter for organic vapors and one Impregnated Acid Filter for acid vapors.

Any combination of two filter types may be used. Filters are always loaded with the gasket side up. If placing the Paramount Ductless Enclosure in a clean room, always place the HEPA filter above the carbon filter to eliminate any trace carbon particles from entering the clean room. Load the stacked filters into the individual filter compartments. The Paramount model sizes, filter compartments, and number of filters are listed below for installation convenience.

Paramount Size	Filter Compartments	Required No. of Filters	Total Organic Vapor Filter Weight
2'	1	2	15 lbs.
3'	2	4	30 lbs.
4'	3	6	45 lbs.
5'	3	6	45 lbs.
6'	4	8	60 lbs.

To install the filters, push the stacked filters to the stop in the rear of each filter compartment. After loading the stacked filters into the compartments, close the gas spring cylinders by pulling the handle down and compressing the filter gaskets. Filter installation is complete.





**Figure 3-2**  
**Filter Installation**

### **Connect the Electrical Supply**

Simply connect the 115V power cord supplied to the IEC electrical supply plug on the back of the enclosure. For 230V, the same procedure applies except it is shipped without a plug. Install the appropriate plug for your electrical specifications per local codes. (See Appendix C for amperage.)

### **Set Filter Life and Filter Check Timers**

Once the filters are installed and electrical power is connected, it is necessary to set the Filter Life Timers in the Filter Setup menus described in *Chapter 5: Using the Ductless Enclosure*. Consult the separate *Paramount Chemical Guide, Appendix E: Estimated Filter Life Calculation*, and/or Labconco Specialist to determine the filter capacity. Through the use of all three sources, set the Filter Life Timers.

### **Initial Safety-First™ Vapor Sensor Warm Up Period**

The Safety-First™ Vapor Sensor includes a 5V, 0.28W integrated heater and any detectable gas that accumulates during shipment must be driven off the organic sensor over an initial 10-30 minute warm up period with the blower activated. Refer to the Diagnostic Program Screen for Organic Sensor on page 32 in Chapter 5 to view the display of the millivolt levels of the Vapor Sensor. With new filters installed, the Organic Sensor should read between 1300-1500 millivolts after the initial 10-30 minute warm up period with the blower running. All filters should be changed upon

completion of work once the Organic Sensor sees an increase of 400-500 millivolts with the display indicating “Replace Filters.”

## **Reset or Change the Airflow Face Velocity (If Necessary)**

The face velocity for the Paramount Ductless Enclosure has been preset at the factory between 75-80 fpm. **Important Note:** Transport, altitude, and temperature differences may require a reset of the “Calibration” of the “Pressure Sensor” as outlined in *Chapter 5: Using the Ductless Enclosure*. When “Calibration” of the “Pressure Sensor” is reset, it is best to try the previously calibrated values of motor speed and airflow face velocity and then confirm the average face velocity through the enclosure sash opening. Adjust the motor speed and airflow face velocity as necessary after confirmation. Average face velocity measurements are made using a calibrated thermal anemometer and taking an average across the sash opening at 5" directly below the sash handle.

Additionally, the same “Calibration” menu in *Chapter 5* should be used to change the face velocity to another value. For most applications, 75-80 fpm is ideal. However, there are some requirements for 100 fpm. Furthermore, the face velocity alarm has been preset at the factory at 60 fpm. If needed, follow the “Calibration” menu for the “Airflow Alarm” in *Chapter 5* and adjust the alarm value between 10-20 fpm below the actual face velocity.

The Paramount Ductless Enclosure has been set up to accept the Smart-Flow™ feedback system. The Smart-Flow feature adjusts the motor speed automatically for filter pressure drop, barometric pressure, and room temperature, and maintains constant airflow velocity at the calibrated value. **Note:** At altitudes above or below 900 feet, the Paramount must be recalibrated to account for significant pressure changes that will have an effect on face velocity. Face velocity measurements are always made using a calibrated thermal anemometer and taking an average across the sash opening. Follow the “Calibration” menu for “Pressure Sensor” as outlined in *Chapter 5: Using the Ductless Enclosure* for recalibration of face velocity.

## **Validate the Enclosure**

To determine the actual face velocity at the sash opening, airflow velocity readings are taken. Each Paramount Ductless Enclosure has been preset at 75-80 fpm. The “average face velocity” is achieved by taking readings across the enclosure with the readings 6" from the ends and evenly spaced every 12". Readings are measured at 5" directly below the upper sash handle. Refer to Chapter 2 for proper airflow volumes for your particular model.

The Paramount Ductless Enclosures have been tested at Labconco's airflow test facility per ASHRAE 110-1995. 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 particulate powder validation, Labconco had containment testing performed to validate the enclosures for naproxen sodium powders. The Paramount Ductless Enclosures demonstrated excellent containment when used by an operator using excellent technique and good containment when used by an operator using marginal technique. While no enclosure can compensate for improper technique, these tests confirm that the Paramount Ductless Enclosures provide a safe working environment. For copies of these validation reports, contact Labconco at 800-821-5525 or 816-333-8811.

### **Seal the Enclosure to the Work Surface**

When the enclosure has been set in place, it can 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.

### **Connecting to the Exhaust System (If Applicable)**

**WARNING:** 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.**

Normal operations with the Paramount Ductless Enclosure are exhausted into the room and the accessory Canopy Exhaust Connection is not required. The Canopy Exhaust Connection aids in the further removal of chemicals beyond the filters or applications where a higher degree of powder and particulate removal is required. However, if desired, the Canopy Exhaust Connection (see Chapter 7) accessory has been designed to accept 6" diameter ductwork. Review Chapter 2 for exhaust prerequisites and review Chapter 7 for ordering blower exhaust equipment. Consult Labconco 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.

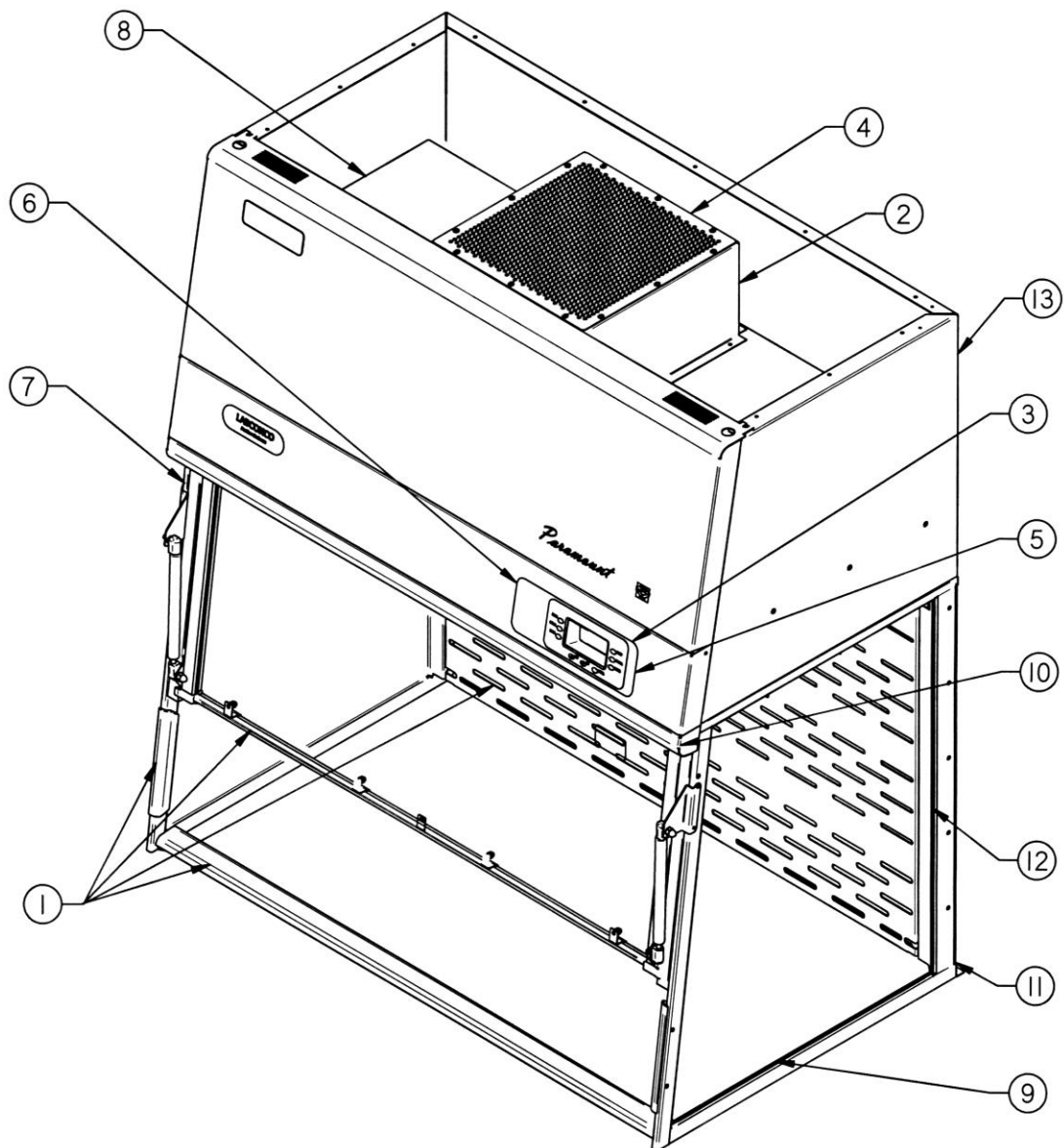
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## Chapter 4: Performance Features and Safety Precautions

The Paramount Ductless Enclosure is a self-contained filtered enclosure that protects the operator from specified vapors and particulates through the revolutionary combination of features to enhance safety, performance, and ergonomics. Carbon filters and/or HEPA filters **must** be installed.

All Paramount Ductless Enclosures have the following performance features as illustrated in Figure 4-1:

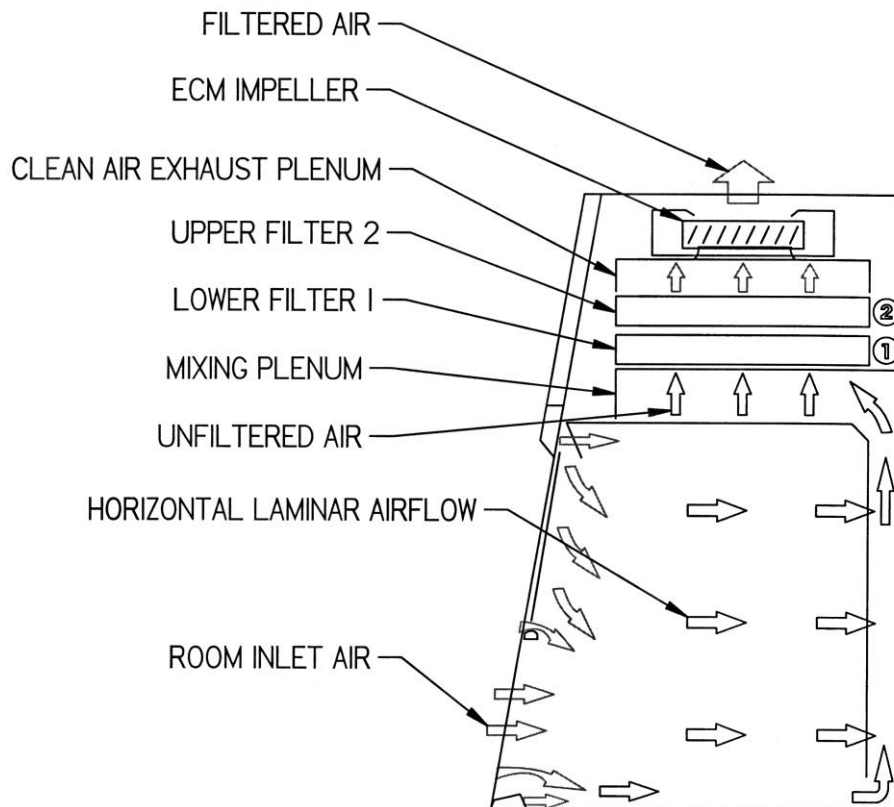
1. High Performance Containment
2. Safety-First™ Vapor Sensor
3. Smart-Flow™ Airflow Monitor
4. Quiet, Energy-Efficient ECM Impeller
5. Audible/Visual Alarms
6. Large Control Panel LCD Display
7. Ergonomic Sloped Front
8. Convenient Filter Replacement
9. Durable Construction
10. Fluorescent Light with Electronic Ballast
11. Utility Iris Ports
12. Maximum Visibility
13. Simple Electrical Connection



**Figure 4-1**  
**Performance Features**

## High Performance Containment

The Paramount Ductless Enclosures use patented technology to direct air into and through the contaminated air chamber (U.S. Patent 6,461,233). The containment enhancing and aerodynamic designs of the lower Clean-Sweep™ Air Foil, upper sash foil, side air foils, upper dilution air supply, and zoned rear perforated baffle all work in concert to produce horizontal airflow patterns that significantly reduce chemical concentrations through the work area (illustrated in Figure 4-2). The unique lower air foil shape and Clean-Sweep™ openings sweep the work surface and create a constant protective barrier from contaminants. The radiused upper sash foil includes an open air passage directly atop the sash foil into the enclosure chamber and directs chemical concentrations away from the sash opening. The side entry air foils allow turbulence-free air to enter the enclosure from the sides and allow clean air to sweep the interior walls. The upper dilution air supply provides by-pass air from above the work surface to constantly bathe the inside of the sash and upper chamber with clean air to reduce chemical concentrations. The zoned rear perforated baffle directs horizontal laminar air streams to the three zones to minimize the potential for air to roll forward preventing contaminants from moving toward the sash opening.



**Figure 4-2**  
**Airflow Diagram**

## Safety-First™ Vapor Sensor

The Safety-First™ Vapor Sensor detects filter saturation in the exhaust to alert the operator to replace the filters. The early warning provided by the Safety-First Vapor Sensor provides the user ample time (5-10% remaining filter life) to complete work in process before replacing the filters. The early warning signals with an intermittent beep and the LCD display message alerts the user to replace filters. The final warning signals with a constant alarm and the LCD display message alerts the user to replace filters. The Safety-First Vapor Sensor includes a primary and secondary backup sensor for redundant monitoring. Both sensors detect typical organic vapor solvents, smoke particulates, ammonia gases, formaldehyde gases and hydrogen sulfide gases. The Safety-First Vapor Sensor has an optimal detection range of 1-10 ppm. Typical concentrations tested by Labconco for chemicals in separate chemical families are listed in order of sensor sensitivity as follows:

Chemical Family	Chemical	Sensitivity Alert Concentration	Odor Threshold (ppm)	Exposure Limit TWA (ppm)	Filter Capacity (%W)	Filter Type
Aldehydes & Ketones	Cyclohexanone	0.2-0.5 ppm	0.068	50	22%	OV
Mixture of Aliphatic Hydrocarbons	Gasoline	0.3-1.0 ppm	0.3	300	11%	OV
Particulates	Cigarette smoke	0.4-1.0 ppm	N/A	N/A	N/A	OV & HEPA
Aldehydes & Ketones	Acetone	0.5-1.0 ppm	4.58	250	2%	OV
Aromatic Hydrocarbons	Toluene	0.5-1.0 ppm	0.16	100	20%	OV
Ethers	Methyl Tert-Butyl Ether	0.5-1.0 ppm	0.053	50	9%	OV
Sulfur Compounds	Hydrogen Sulfide	0.5-2.0 ppm	0.0005	10	10%	AG, Acid-Sulfur
Nitrogen Compounds	Diethylamine	1.5-2.0 ppm	0.186	10	7%	OV
Esters	Ethyl Acetate	1.5-4 ppm	0.61	400	9%	OV
Ethers	Diethyl Ether	2-4 ppm	2.29	400	4%	OV
Aldehydes	Formaldehyde	2-4 ppm, best to use other detector methods	0.87	0.1 ceiling, 0.016	10%	FORM
Nitrogen Compounds	Ammonia Solution (Ammonium Hydroxide)	2-5 ppm	5.75	25	10%	AM, Ammonia-Amine
Alcohols	Ethyl Alcohol*	2.5-4 ppm	0.136	1000	1.3%	OV
Acids	Acetic Acid	5-6 ppm	0.016	10	4%	OV
Halogens	Chlorobenzene	5-8 ppm	0.741	10	20%	OV
Alcohols	Isopropyl Alcohol	8-11 ppm	22	200	7%	OV
Aliphatic Hydrocarbons	Hexane	9-15 ppm	21.9	50	11%	OV
Alcohols	Methanol*	15-25 ppm	141	200	0.1%, very low	not recommended
Mineral Acids	Hydrochloric Acid	Not Detected, use other detector means	0.77	5	17%	AG, Acid-Sulfur

**\* Important Note: Clean up procedures using alcohols or volatile chemicals with low filter capacity could saturate the filters quickly.**

**Important Note:** The vapor sensor does not detect mineral acid gases such as hydrochloric acid, nitric acid, or sulfuric acid and other detector means such as a mineral acid sensor or interval timed sampling with sampling tubes must be used.

**Chemical Safety Note:** The chart above is only a guideline! Frequent chemical testing or filter monitoring is recommended for other chemicals. If chemical suitability is ever in question, always work below the acceptable exposure limit/TWA to maximize both safety and filter performance.

### Smart-Flow™ Airflow Monitor

The Smart-Flow™ Airflow Monitor continuously monitors airflow and displays face velocity. An audible/visual alarm alerts the user to low airflow conditions. The Smart-Flow Airflow Monitor enables the motor speed to automatically adjust for conditions such as temperature, barometric pressure, and filter loading and maintain constant programmed airflow speed. The Smart-Flow feedback maintains constant airflow speed through the use of constant velocity pressure measurement accomplished with a pitot tube and pressure sensor mounted on the control board. Transport, altitude, and temperature differences require the airflow re-calibration steps as outlined in Chapter 5 and 6. Use the “Calibration” menu in *Chapter 5* to reset the “Pressure Sensor” values for “motor speed” and “airflow face velocity.”

### Quiet, Energy-Efficient ECM Impeller

The electronically commutated motorized (ECM) impeller is 95% energy efficient providing “green” energy savings (See Appendix D). Because of the high efficiency, the impeller runs extremely quiet for the comparative amount of airflow volume. All Paramounts run at or below 62 dbA at 80 fpm and most Paramounts run at or below 59 dbA at 80 fpm. By design, the ECM impeller is located after the filters assuring an intrinsically safe design where all contaminated air is filtered effectively. See *Chapter 2: Prerequisites* for complete airflow exhaust volume, noise pressure, and face velocities of 60, 80 and 100 fpm. The ECM impeller has a programmable blower timer should you desire additional “green” energy savings.

### Audible/Visual Alarms

The audible/visual alarms remind the operator to check the filters with sampling tubes or replace the filter. Filter replacement alarms occur in audible/visual modes for both filter saturation activated by the Safety-First Vapor Sensor or the final filter elapsed time. A low airflow alarm occurs when the face velocity drops below programmed levels.



## **Large Control Panel LCD Display**

The large (3" x 1.5") LCD message center provides continuous status reports for each filter, displays airflow speed, and displays alarm messages for both filters and airflow. The touchpad can be programmed for filter types, filter check times, and filter replacement times.

Audible/visual alert time messages appear after the specified number of hours has elapsed. The audible/visual alarm reminds the operator to check the filters with sampling tubes or replace the filters. Filter replacement audible/visual alarms occur for both the Safety-First Vapor Sensor and final filter elapsed time.

## **Ergonomic Sloped Front**

The ergonomic slope provides maximum visibility and comfort, reduces glare, thereby minimizing operator fatigue. The space saving design (U.S. Patent No. D538,941) increases effective laboratory work space, because the impeller and filters are all self-contained within the enclosure and a separate filtered blower unit is not required.

## **Convenient Filter Replacement**

The Paramount filter compartment was designed to make filter replacement convenient and easy. The gas spring assisted clamping mechanism opens effortlessly and applies uniform pressure across the entire top surface of the filters for leak-proof, one-step filter replacement from the front of the enclosure.

## **Durable Construction**

Unlike comparable plastic or acrylic ductless fume hoods and enclosures, the Paramount Ductless Enclosure is manufactured with durable tempered safety glass and dry powder epoxy-coated aluminum and steel. The sides and sash are made from tempered safety glass that will not easily discolor or craze like plastic. The frame is made from dry powder epoxy-coated aluminum and steel providing further strength and corrosion resistance to solvents and acids.

## **Fluorescent Light with Electronic Ballast**

The fluorescent light is located above the work area, out of contact with contaminated air and easy to service. All Paramounts have a fluorescent light and energy saving light timer with electronic ballast. The light timer is a programmable feature should you desire additional "green" energy savings.

### Utility Iris Ports

All Paramounts have two utility iris ports that allow electrical cords and data cords to pass through the back of the enclosure without leaving a large hole for contaminants to escape. The enclosure ships with both solid plugs and iris ports for your convenience.

### Maximum Visibility

Visibility is maximized on all units with at least 270 degree visibility from both sides and the front pivoting sash. Some 3' and 4' models have 360 degree visibility which is especially useful in classroom demonstrations. See *Chapter 2: Prerequisites* for model differences and model numbers.

### Simple Electrical Connection

All 100-115V Paramounts are pre-wired with circuit breaker and IEC electrical power cord that is simply plugged into a nearby electrical receptacle. 230V units are shipped without a plug. Install the appropriate plug for your electrical specification per local codes. All the impeller, light, and airflow monitor wiring is internal and no electrical wiring connections are needed. Paramounts are available in two voltages, 100-115V, 50/60 Hz and 230V, 50/60 Hz. See *Chapter 2: Prerequisites* for model numbers.

### 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 airflow monitor will 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 powders, chemicals and apparatus inside the lower air foil of the enclosure.
6. Do not work in this enclosure without the blower running and a face velocity of 60-100 fpm.

7. 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. The enclosure should be validated whenever it is relocated.
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.
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 at least annually thereafter.
15. Use of an open flame must be avoided in the Paramount. Open flames may disrupt the airflow patterns in the cabinet and cause a fire hazard with volatile chemicals and solvents.
16. Handle new and used filters with care during installation and removal. Refer to Installation Instructions in this manual for proper handling of filters.
17. Saturated carbon filters and HEPA filters are to be disposed of as hazardous waste. The user is responsible for recording the chemicals adsorbed or removed by the filters and disposing of them properly.
18. Use in areas where only trained users have access to the enclosure. Any new users must be trained and should also read this User's Manual.
19. Do not use the Paramount in a poorly ventilated area. If the Paramount 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 exposure limit/TWA.
20. 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 filter may be saturated. In other words, it is best when the odor threshold is less than the exposure limit/TWA.
21. Highly toxic vapors, unknown reaction, hazardous particulate, or processes generating high levels of contaminants are not intended for use in the Paramount.

22. Labconco Filter labels are color coded to match NIOSH respirator types. Only chemicals which can be safely adsorbed/treated with the specific carbon based filters installed or removed by HEPA filters are appropriate for use in this enclosure.
23. Use the smallest possible quantity of chemical(s) within the enclosure and never exceed the amount which can be effectively adsorbed by the filters before breakthrough.
24. Leave the blower on for at least one minute after work in the enclosure has been completed.
25. If a chemical is spilled on the work surface **DO NOT** switch off the blower until all traces of the chemical has been removed.
26. Make sure filters are installed prior to each use. Remove the front panel to install the filters.
27. If the blower fails during use, chemical processes should cease and the area should be vacated and ventilated before servicing the blower.
28. Always refer to the Paramount Chemical Guide and/or the NIOSH Pocket Guide to Chemical Hazards before proceeding. For additional help with filter and chemical selection, contact Labconco at 800-821-5525 or 816-333-8811.
29. The surface of the HEPA filter is fragile and should not be touched. Care must be taken to avoid puncturing the HEPA filter during installation or normal operation. If you suspect that a HEPA filter has been damaged DO NOT use the enclosure; contact a local certification agency or Labconco. Reference Chapter 6 for the HEPA filter certification procedure.
30. The HEPA filter in the enclosure will gradually accumulate airborne particulate matter from the room and from work performed in the enclosure. The rate of accumulation will depend upon the cleanliness of the room air, the amount of time the enclosure is operating and the nature of work being done in the enclosure.
31. Ensure that the ductless enclosure is connected to an 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 enclosure from electrical service.

32. Tag the enclosure with appropriate warning, if any filters have been removed for service.

### **Misapplications that Could Result in a Hazardous Situation**

There is one scenario where the Paramount's misapplication could be a part of a hazardous condition. That situation is where;

1. the Inlet Concentration is greater than the exposure limit/TWA,
2. the filter becomes saturated,
3. the user continues to operate,
4. and the ventilation of the room is insufficient to dilute the exhaust of the Paramount to below the exposure limit/TWA for the chemical.

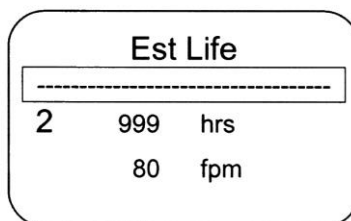
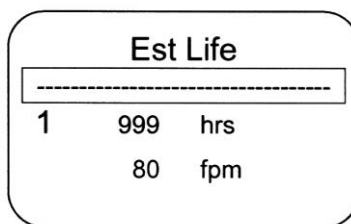
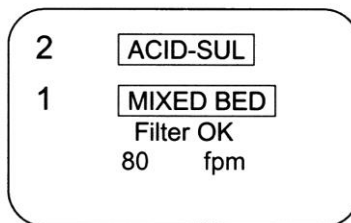
**Important Note:** When the inlet concentration is greater than the exposure limit/TWA, extra measures must be taken to monitor the number of air room exchanges. A well designed room with proper air exchanges will properly dilute the exhaust from the Paramount by a multiplier of 25%.

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## Chapter 5: Using the Ductless Enclosure

### Information Center

The Information Center is an LCD display located on the control panel. The center's display is divided into three screens that alternate in normal mode, as shown below to display filter status, estimated filter life, filter type, filter replacement alarms, inflow face velocity, and airflow alarms.



### Status Area

The LCD displays the Paramount Ductless Enclosure's condition during operation such as the filter types, face velocity, and bar graph to display the remaining filter life in hours. This line can display any of the following messages:

#### Filters OK

Both filters are operating properly. (No audible alarm)

#### Check Filter-t

The filter check life timer has expired as programmed and the filters should be checked with colormetric detector tubes or other instrumentation. (Intermittent audible alarm)

#### Replace Filter-s or -t

The filter needs to be replaced immediately as either the Safety-First Vapor Sensor (-s) has detected filter breakthrough or the filter final life timer (-t) has expired. (Continuous audible alarm; can be muted for 5 minutes)

Note: The early warning signal that occurs with 5-10% remaining filter life is an intermittent audible alarm along with "Replace Filter-s."

#### Check Airflow

The airflow patterns in the ductless enclosure have changed, resulting in a sudden change in the motor speed. This is most likely due to a blockage of the exhaust filter outlet, complete blockage of the filters, filter saturation, or motorized impeller failure. (Continuous audible alarm; can be muted for 5 minutes)

### Operating the Pivoting Sash

You can open or close the sash by pivoting the sash. A latch or gas spring will retain the sash in the open position for loading only. Always work with the sash in the closed position.

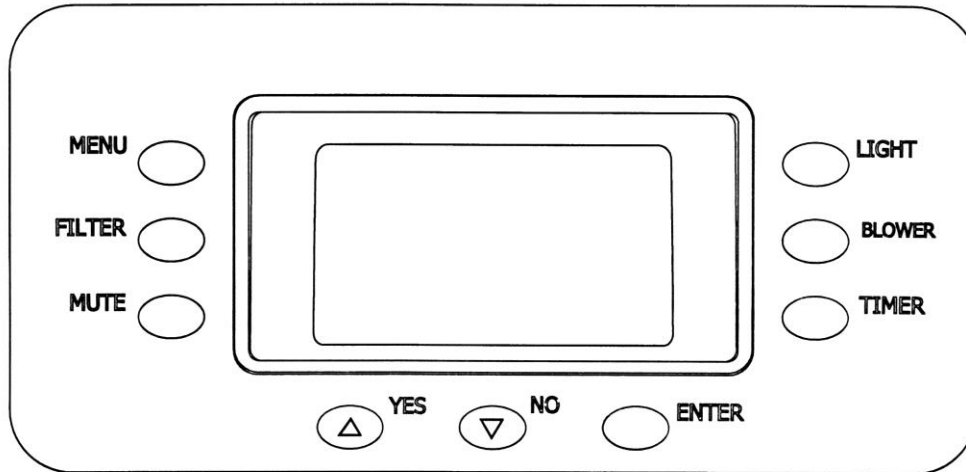
### Starting the Ductless Enclosure

1. To start the ductless enclosure, press the "Blower" button.
2. To turn the fluorescent light on, press the "Light" button.

**Note:** The sash must be completely closed before performing work in the enclosure.

## The Paramount Touchpad

The touchpad of the Paramount Ductless Enclosure is shown below. Take a moment to get familiar with the buttons, their location and function. Also familiarize yourself with the display located on the front. The display will report system functions, such as filter types, filter life, timer displays, filter status, and low airflow alarm messages.



**Menu Button** – This button toggles the display between menu modes. When in the menu mode, this button returns you to the previous menu.

**Filter Button** – Automatically goes to the filter setup menu, which allows you to display and change the programmable filter parameters such as filter type, filter location, filter check time, and filter final time.

**Mute Button** – Allows you to temporarily mute an alarm for 5 minutes.

**Select Up/Down Yes/No Buttons** – Allows you to change options and values in the menu mode.

**Enter Button** – Allows you to enter or select a value or select an option in menu mode.

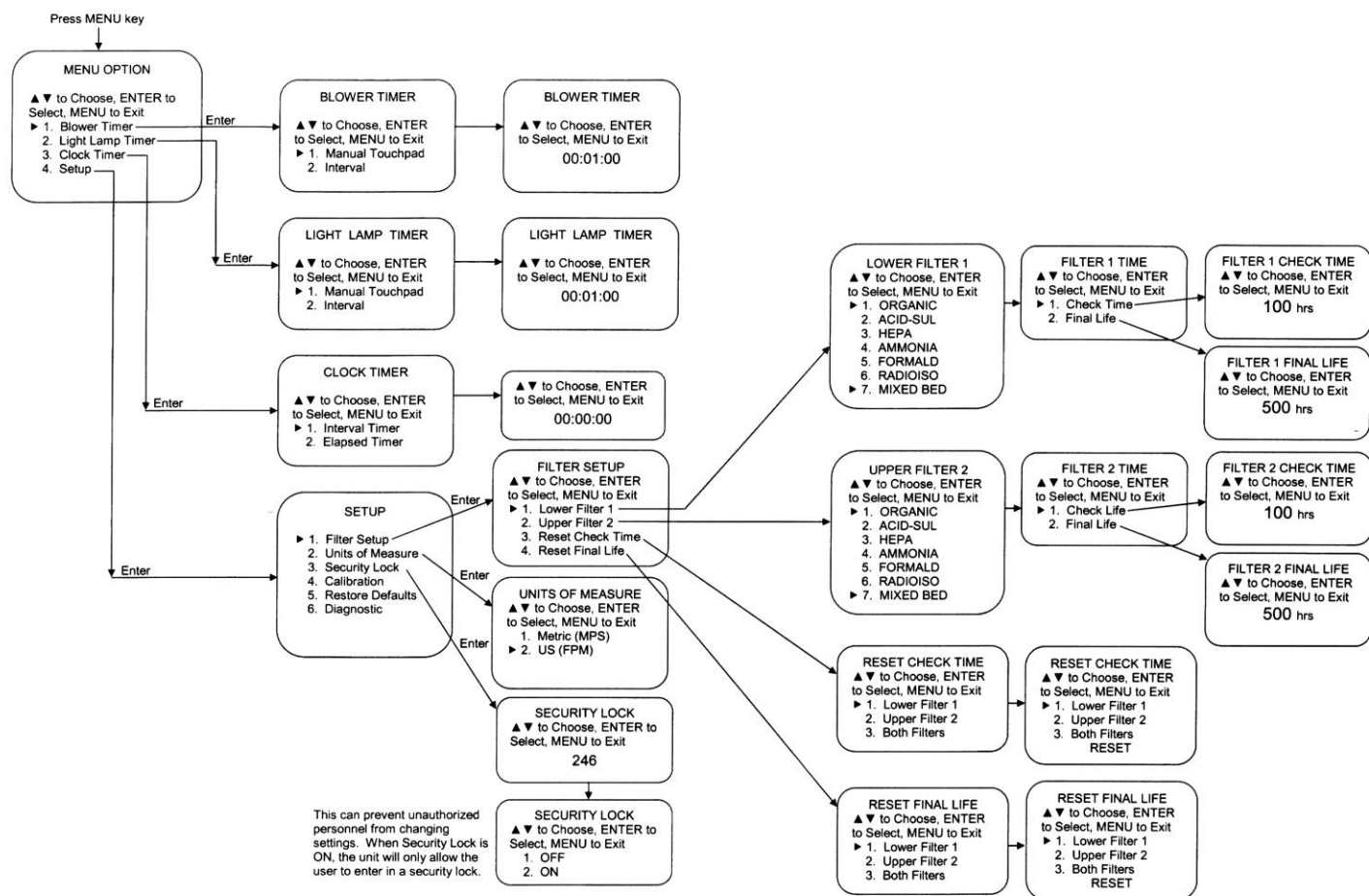
**Timer Button** – Allows you to select either a repeating interval timer or an elapsed timer.

**Blower Button** – Starts or stops the enclosure blower. When the blower button is activated, the inflow face velocity will register a face velocity.

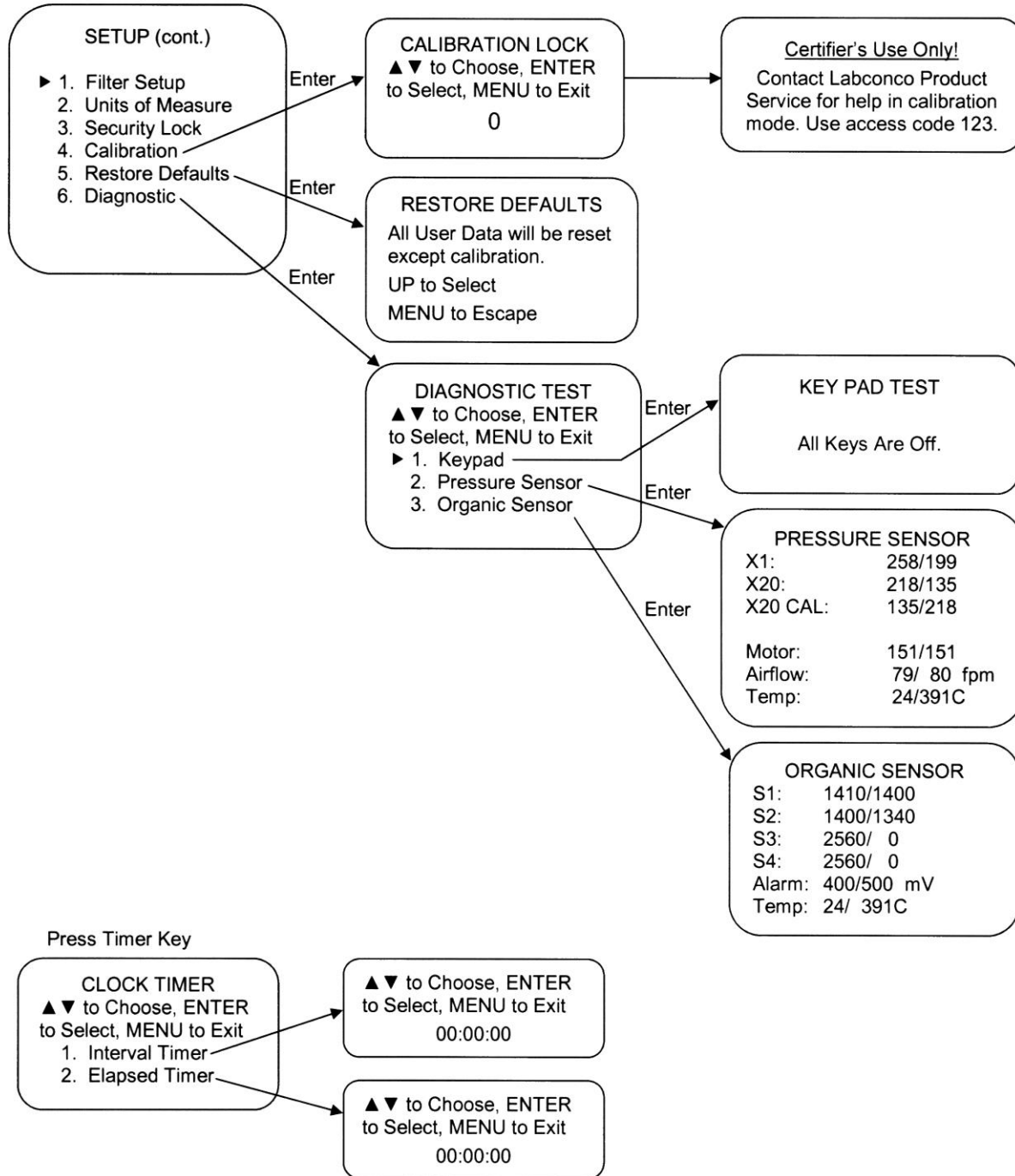
**Light Button** – Turns the fluorescent light on or off.



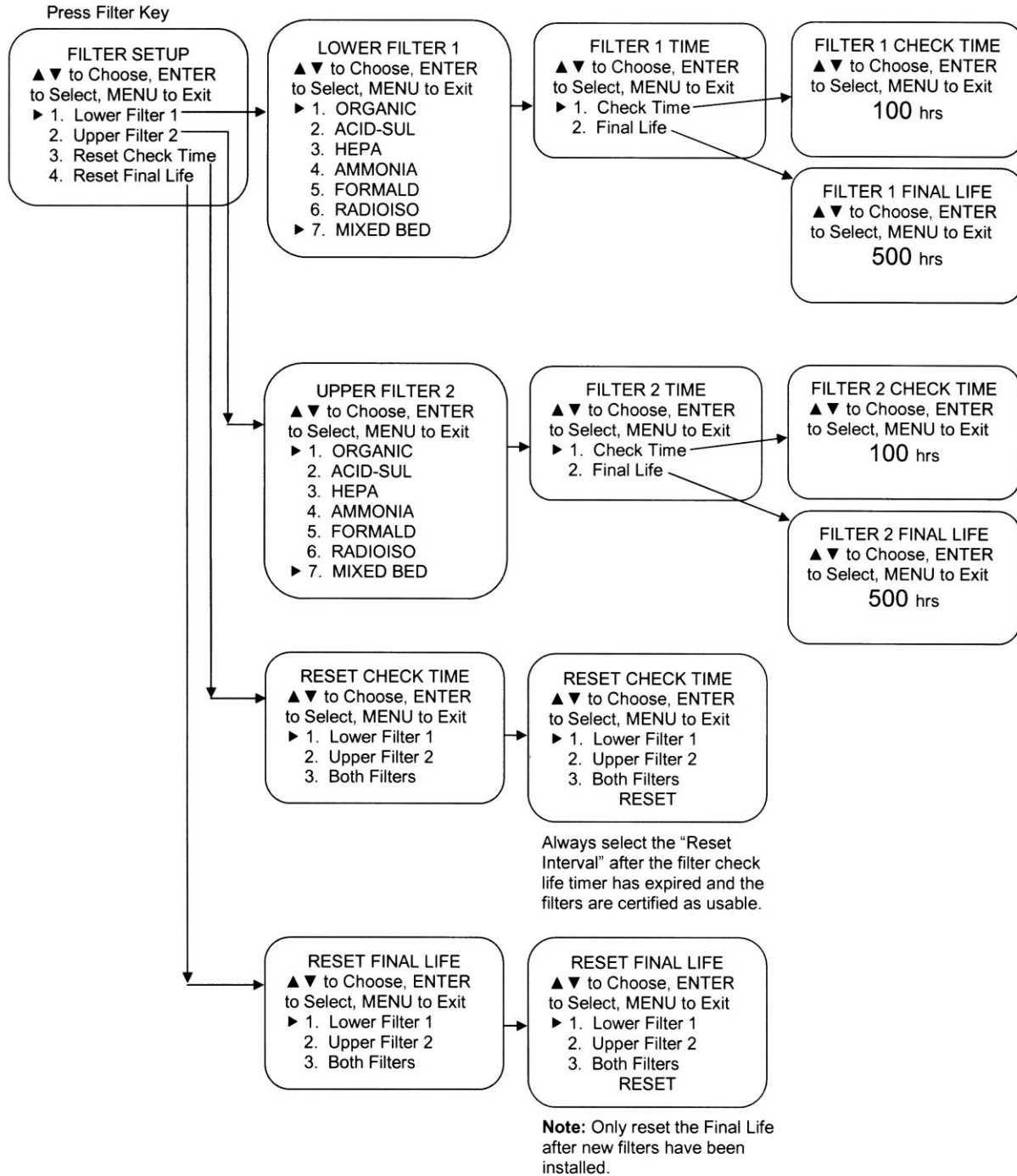
## All Program Screens



## Main Setup Screens

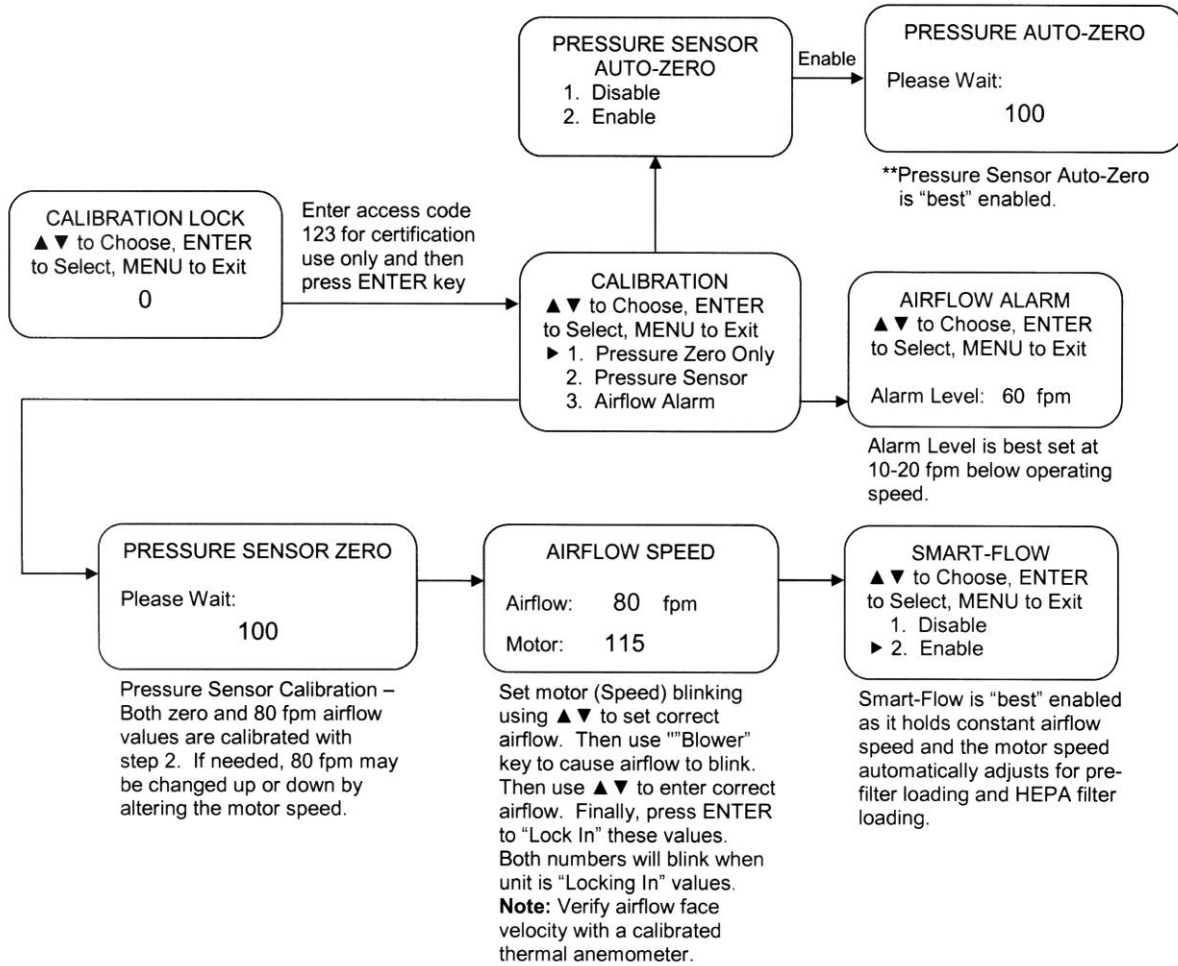


## Filter Setup Program Screens



## Calibration Program Screens

### Paramount Programming Screens – Calibration Mode

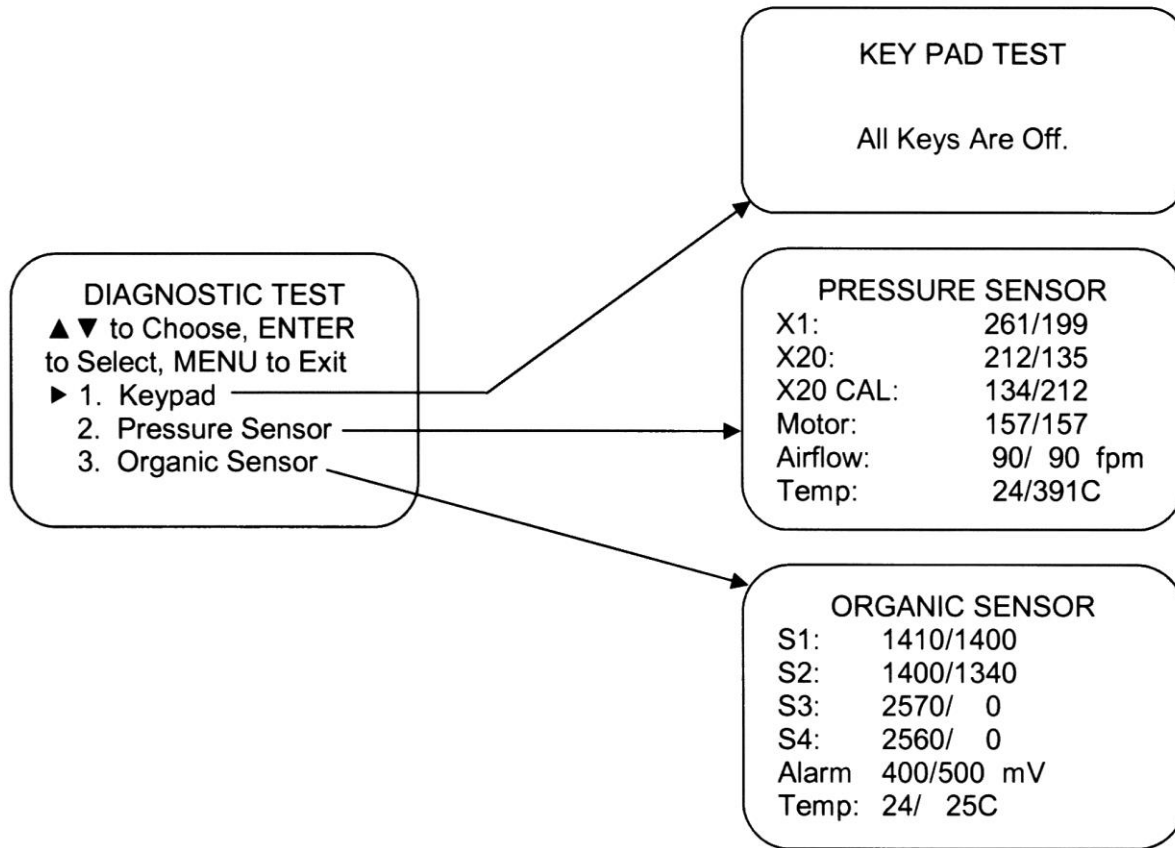


Hood Size x Sash Opening	Approx. Motor Speed Setting for 80 fpm	Approx. X20 CAL Pressure	Minimum Difference between X20 CAL Values*
2' x 9.4"	105	165	12
3' x 9.4"	105	170	40
3' x 12"	120-135	195	50
4' x 9.4"	105	185	50
4' x 12"	120	210	50
5' x 9.4"	120	210	50
6' x 12"	135	240	60

\*Minimum Difference Note: (X20 CAL Value, i.e. 131/208 difference would be 208-131=77)

\*\*Pressure Sensor Auto-Zero Note: Every time blower is shut off, wait 100 seconds and then take zero data for 30 seconds. Auto-Zero occurs while the blower is off for the entire time span. The "span" or difference between zero airflow and 80 fpm is saved from "Pressure Sensor" calibration in step 2.

## Diagnostic Program Screens



**Pressure Sensor Diagnostic Notes:**  
X20 CAL example represents a pressure of 134 with the impeller off and 212 with the motor speed at 157 producing 90 fpm for this calibration example. With Smart Flow enabled, the Paramount maintains constant pressure as indicated by the pitot tube and pressure sensor to maintain constant airflow face velocity.

**Organic Sensor Diagnostic Notes:**  
Organic Sensor example represents sensor S1 calibrated in clean air at 1400 millivolts. When sensor S1 sees an increase of 400 millivolts to 1800 millivolts, the Early Warning "Replace Filter-s" appears on the LCD display with an intermittent beep as only 5-10% filter life remains. Filters should be changed upon completion of work. When sensor S1 sees an increase of 500 millivolts to 1900 millivolts, the Final "Replace Filter-s" Alarm sounds a continuous beep that can only be muted for 5 minutes.

## User Selectable Features

The Paramount Ductless Enclosure offers the user unsurpassed flexibility and convenience.

**To access the menu, press the “MENU” button. The LCD display panel will show the first level menu. To select from the various menu options press the “▲” and “▼” buttons until the selected option is displayed. Press “ENTER” to accept that option, or press “MENU” to return to the previous menu.**

For further explanation of the menu and its options, please refer to the Paramount Touchpad at the beginning of Chapter 5.

## Clock Timer Operation

**NOTE: The Timer button displays the menu functions of an Interval (countdown) Timer or Elapsed (stopwatch) Timer. The timers cannot be operated simultaneously.**

To access the main timer menu, press the “TIMER” button anytime during normal operation. The main timer menu is shown on the LCD display. Use the “▲” and “▼” buttons to highlight the Interval or Elapsed Timer. Press the “Enter” button to select the highlighted timer function.

## Interval Timer Operation

1. When selected, the Interval Timer menu is displayed on the LCD. The timer defaults to 0:00:00 (hours:minutes:seconds).
2. Press and hold the “▲” or “▼” buttons to increase or decrease the timer interval.
3. When the proper interval is entered on the display, press the “ENTER” button to start the timer.
4. When the timer reaches 0:00:00, an audible alarm will sound, and the timer will reset itself and repeat the countdown.
5. Press the “ENTER” button to pause the timer.
6. Press the “MENU” button to clear the interval timer and return to the main timer menu.

## Elapsed Timer Operation

1. When selected, the Elapsed Timer menu is displayed on the LCD. The timer defaults to 0:00:00 (hours:minutes:seconds),
2. Press the “ENTER” button to start the timer.
3. Press the “ENTER” button again to zero the timer.
4. Press the “MENU” button to clear the elapsed timer and return to the main timer menu.

### Light Lamp Timer and Blower Timer

Both timers allow you to decide whether the fluorescent lamp or blower will operate continuously or for a limited time period that you select. This may be desired for energy-savings as well as a safeguard for light-sensitive materials.

#### Interval

When the “interval” option is selected, the Light Lamp Timer or Blower Timer menu is displayed.

##### Interval Timer

This window lets you set the amount of time for the fluorescent lamp to stay lit once activated or the blower to stay running. Use the “▲” and “▼” buttons to select the amount of time, then press the “ENTER” button to set the interval.

#### Continuous

In the continuous mode, the fluorescent lights or blower will remain on until the “LIGHT” button is pressed, or the “BLOWER” button is pressed.

### Blower Operation

This blower switch allows you to run the ductless enclosure and the face velocity will be displayed. **Note:** Always work in the ductless enclosure with the blower running.

### Enclosure Set Up

These selections allow for the customization of the display and the ductless enclosure operation.

#### Units of Measure

This option allows you to select the air velocity units of measure. When “Metric” is selected, the air velocities are displayed in meters-per-second. When “US” is selected, the velocities are displayed in feet-per-minute.

#### Security Lock

**NOTE:** The security lock automatically reactivates and locks out the keypad.

The security lock feature prevents parameters of the Paramount from being changed by unauthorized users. To engage the security lock, access the Security Lock submenu. Select the “ON” option, and press the “ENTER” button. Once engaged, the operator must enter the proper password to lock or unlock the enclosure.

### **Filter Setup Display Options**

This menu selection determines which filters are loaded and displayed in the lower and upper positions. One of seven filter types must be selected for each filter position.

The filter check time and filter final life must be selected next for each filter position. Consult Chapter 3, Appendix E, the Labconco Specialist, and the Paramount Chemical Guide for proper program times.

### **Restoring Software Default Settings**

To restore the default settings to their original configuration:

1. Access the Menu, and select “SETUP.” Press “ENTER.”
2. In the Setup submenu, select “Restore Defaults.” Press “ENTER.”

**Table of Default Settings**

<b>Blower:</b>	<b>Smart-Flow enabled</b>
<b>Units of Measure:</b>	<b>fpm</b>
<b>Security Lock:</b>	<b>OFF, Non-secure</b>
<b>Timers:</b>	<b>Blower and Light Timers disabled.</b>
<b>Filter Timers:</b>	<b>Enabled; Interval set at 100 hours, Final set at 500 hours.</b>

### **Calibration**

This password-protected selection is for qualified certifiers to adjust the blower speed, face velocity, and the low airflow alarm setpoint. Certifier access code is set at 123.



### Diagnostic Test Operation

When the “Diagnostic Test” menu is selected, the LCD allows “Keypad Test” to help troubleshoot any malfunction. The “Pressure Sensor” displays pressure values to help troubleshoot an airflow malfunction. The “Organic Sensor” displays chemical breakthrough (millivolt readings) and alarm setpoints to troubleshoot an organic sensor malfunction.

### If a Check Airflow Activates

The most common causes of a check airflow alarm are:

- Blockage of the inlet perforated baffle or exhaust outlet.
- Loading or blockage of the filters resulting in low airflow.
- Motorized impeller failure or faulty electrical connector to the impeller.

**Note:** If the alarm sounds during use, immediately take appropriate action to prevent contamination to you and other personnel in the area.

### Resetting the Airflow Alert System

The Check Airflow Alarm automatically resets to normal operation and displays the face velocity once the face velocity has increased and stabilized.

## Working In the Paramount Ductless Enclosure

### 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 cabinet is in use.

### Start-up

- Turn on blower and observe face velocity.
- Turn on the fluorescent light.
- Allow the enclosure to operate unobstructed for 1 minute.
- Wear a long sleeved lab coat with knit cuffs and over-the-cuff rubber gloves. Use protective eyewear. Wear a protective mask if appropriate.

### **Loading Materials and Equipment**

- Only load the materials required for the procedure. Do not overload the enclosure.
- Do not obstruct the enclosure's perforated baffle.
- Large objects should not be placed close together.
- Always operate with the sash in the closed position.

### **Work Techniques**

- Keep all materials a minimum of 4 inches (100 mm) from the inside of 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.
- Arrange materials to minimize the movement of contaminated materials into clean areas.
- Keep all discarded contaminated material to the rear of the work area.
- Avoid moving materials or the operator's hands and arms through the front access opening during use.
- Avoid the use of an open flame.
- 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.

### **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.

### Wipe-Down

- Wipe down the interior surfaces of the enclosure with suitable solvent, disinfectant, or cleaner. **Important Note: Clean up procedures using alcohols or volatile chemicals with low filter capacity could saturate the filters quickly.**
- Dispose of used rubber gloves appropriately, and have soiled/contaminated lab coats laundered properly.
- Wash hands and arms thoroughly with soap.

### Shutdown

- Turn off the fluorescent light and enclosure blower to preserve filter life.

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## **Chapter 6:**

# **Maintaining the Ductless Enclosure**

Replacing the carbon filters, HEPA filters, and fluorescent light is the primary routine maintenance required.

Review this chapter on maintenance for the following:

- Routine Maintenance.
- Determination of when to replace carbon filters.
- Determination of when to replace HEPA filters.
- Install carbon filters and/or HEPA filters.
- Set Filter Life and Filter Check Timers.
- HEPA filter leak test.
- Reset or change the inflow face velocity, if necessary.
- Initial Certification.
- Re-Certification.
- Fluorescent light replacement.
- Motorized impeller replacement.
- Main control board replacement.
- Organic sensor board replacement.

## **Routine Maintenance Schedule**

### **Weekly**

- Wipe down the interior surfaces of the enclosure with a suitable solvent, 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 on the display and airflow through the enclosure using a source of visible smoke.

### **Quarterly (or more often as required)**

- Note the airflow velocity on the display. Determine the actual airflow 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).
- The enclosure's perforated baffle should be checked for any blockage to ensure that the enclosure is maintaining proper airflow.
- Replace **carbon** filters when chemical breakthrough is indicated by organic sensor, odor, time, detector tube, or for some chemicals, analytical instrumentation. See "Install Carbon Filters" section of this manual in *Chapter 3*.
- While the enclosure is filled with a 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 a minimum of 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.
- All weekly activities.

### **Annually**

- Replace fluorescent lamps, if necessary.
- Replace **HEPA** filters if the face velocity drops below the recommended speed for your facility as the airflow alarm alerts you.
- Have the enclosure validated by a qualified certification technician. See Certification and Recertification in *Chapter 6*.
- All quarterly activities.

## **Determination of When to Replace Carbon Filters**

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

1. The Safety-First Vapor Sensor indicates chemical breakthrough with an audible alarm and the display reads "Replace Filters."
2. The Filter Life timer has expired as programmed for typical usage.
3. Chemical odor in the work area is detectable, or the concentration of the chemical in the work area is greater than the exposure limit/TWA.
4. Gas detector tubes change color when sampling the ductless enclosure outlet (exhaust), indicating breakthrough.

There are five means of determining when its 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. Odor is an indicator that chemicals are passing through the carbon filter. Additionally, several points need to be understood:

- Odor can be used as a prompt to sample the exhaust to confirm breakthrough.
- Organic chemicals approved for use in the ductless hood usually have odors that are detectable before reaching the time weighted exposure limits.

**Safety-First Vapor Sensor** - The organic sensor detects filter saturation from exhaust gas concentration to alert the operator to replace filters. The electronic sensor will signal when the concentration is under 5 ppm for most chemicals with a range of 0.1-30 ppm. The early warning provided by the Safety-First Vapor Sensor provides the user ample time (5-10% remaining filter life) to complete work in process before replacing the filters. The vapor sensor includes a primary and backup sensor for redundant monitoring and both sensors detect typical organic solvents, smoke particulates, ammonia gases, formaldehyde gases, and hydrogen sulfide gases; the vapor sensor does not detect mineral acid gases such as hydrochloric acid, nitric acid, or sulfuric acid. Consult the table in *Chapter 4* for a partial listing of tested chemicals in order of sensitivity as the sensitivity differs for each chemical; most tested chemicals have a sensitivity alert concentration below 5 ppm as provided in the table in *Chapter 4*.

**Safety Note:** The use of the organic sensor is **not recommended** for the determination of filter saturation when the exposure limit/TWA for the chemical is under 5 ppm. Other detection methods **must** be implemented **unless** testing is performed by the end user and the known exhaust concentration is below the acceptable exposure limit/TWA.

**Detection Tubes** - Color change indicators can be used to measure the concentration of the chemical at the exit side of the carbon filter, between filters, 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, mineral acid, 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 ductless enclosure exhaust. The hose from the sampling syringe inlet can

be inserted between the stacked filters to sample the lower filter or inserted through the holes in the blower exhaust cover to sample both filters. 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 exposure limit/TWA's, it is recommended that specific detector tubes be purchased directly from Sensidyne, Dräger 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 exposure limit/TWA and the concentration value measured is not important. When a user observes any 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 exposure limit/TWA levels based on prior experience. However, this does not replace the need for sampling. Consult Labconco Specialist for an estimate of carbon filter life based on chemical usage. Refer to *Chapter 3* on how to "Set the Filter Life and Filter Check Timers." 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 exposure limit/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. One relatively low cost method of analytical instrumentation includes the use of a PID (photoionization detector) that measures gas concentrations and is available from RAE Systems or PID Analyzers, LLC.

### Determination of When to Replace HEPA Filters

The HEPA filters in ductless enclosures gradually accumulate airborne particulate matter and powders from the enclosure and room. The rate of accumulation will depend upon the cleanliness of the room air, the amount of time the enclosure is operating, and the nature of work being done in the enclosure. Replace HEPA filters if the face velocity drops below the recommended velocity. Replace HEPA filters if it fails the HEPA Filter Leak Test in *Chapter 6*.

## Install Carbon Filters and/or HEPA Filters

Refer to the instructions in *Chapter 3* on filter installation during startup.

## Set Filter Life and Filter Check Timers

Refer to the instructions in *Chapter 3* on setting the Filter Life and Filter Check Life Timers. Refer to the Filter Setup menus in *Chapter 5*.

## HEPA Filter Leak Test

### Purpose

After installing the new HEPA filter, the HEPA filter can be leak checked. This test is performed to determine the integrity of the HEPA filter, the filter housing, and the filter mounting frames. Leak testing is to be done by a qualified technician with calibrated equipment. Leak check testing is performed as a downstream average above the perforated exhaust cover above the motorized impeller. The filter passes the leak test at .01% or better. Reference Leak Testing and Photometer scanning from the Institute of Environmental Services (IES-RP-CC001.3)

### Apparatus

1. **An aerosol photometer ATI model 2D, 2E, 2G or equivalent.** Air Techniques Hamilton Associates inc. 11403 Cron Ridge Dr. Owings Mills, MD 21117
2. **One aerosol generator of the Laskin nozzle(s) type.** An aerosol of mineral oil or suitable liquid shall be created by flowing air through it. The compressed air supplied to the generator should be adjusted to a pressure of  $10 \pm 1$  psig. during operation. Air Techniques Inc. Model TDA-4A or equal. One nozzle at 10 psig is (67.5 cfm x 100ug/l)/(Vol. of air), For the 2' at 80 fpm or 115 cfm, one nozzle @ 10 psig is 6,750/115 cfm = 59 ug/l. For the 3' at 80 fpm or 230 cfm, one nozzle @ 10 psig is 29 ug/l. For the 4' at 80 fpm or 305 cfm, one nozzle at 10 psig is 22 ug/l. For the 5' at 80 fpm or 295 cfm, one nozzle at 10 psig is 23 ug/l. For the 6' at 80 fpm or 230 cfm (two impellers draw 465 cfm), one nozzle at 10 psig is 29 ug/l.
3. **Mineral oil** (Catalog #1491400).
4. **Sampling Nozzle, Rectangular 1/2" x 3-1/4"**, Air Techniques, Inc.



### Procedure

#### For the ATI 2G Photometer

1. Turn on the photometer and allow it to operate for a minimum of 5 minutes. Leave the valve in the "CLEAR" setting.
2. Press the "ENTER" keypad. Press the "REF" keypad.
3. The display will display "P1" for approximately 1 second, and then display a numerical value.
4. Using the "▲" or "▼" keypads, respectively, increase or decrease the numerical value until it equals 59 (2'), 29 (3'), 22 (4'), 23 (5'), 29 (6') for the enclosure at 80 fpm inflow velocity.
5. Press the "ENTER" Keypad. The photometer will scan for 15 seconds, and then the "0" keypad will flash. Press the "Enter" keypad. The unit will scan for 5 seconds, the display will read "0000," and the unit will sound a confirming tone.
6. Set the valve to "DOWNSTREAM." Place the palm of your hand over the sampling port of the pistol. There should be a strong vacuum at this port. If the vacuum is weak, contact Air Techniques Hamilton Associates.
7. Turn the enclosure on and let it operate for a minimum of 5 minutes.
8. Maintain the following airflows at 80 fpm; 2' (115 cfm), 3' (230 cfm), 4' (305 cfm.), 5' (295 cfm), 6' (230 cfm, each impeller).
9. Position the aerosol generator discharge in the intake of the baffle inside the enclosure. For 6' sizes with two impellers, position the generator to the far left and the far right to test each filter.
10. Start the aerosol generator (Pressure to be +/- 1 psig). (10 psig). Ensure that one Laskin nozzle is in the "open" position.
11. Allow the generator to operate for a minimum of 15 seconds. For all integral motorized impeller models, scan the downstream exhaust side of the HEPA filter by passing the sampling nozzle of the gun above the perforated exhaust cover above the impeller. Scan the entire periphery of the perforated exhaust cover, within 1 inch of the surface.

### Acceptance

Aerosol penetration as a downstream average shall not exceed 0.01 percent measured by the photometer.

## Change the Airflow Face Velocity (If Necessary)

The Paramount has been tested and shipped at a face velocity of 75-80 fpm. If necessary, refer to the instructions in *Chapter 3* to change the face velocity. Refer to the “Calibration” menus in *Chapter 5* that refer to the “Pressure Sensor” and “Airflow Alarm.” The “Calibration” menus require a password to protect the ductless enclosure integrity and the password can only be obtained from Labconco Product Service for certifier use. The “Airflow Alarm” should be set at 10-20 fpm below the normal operating face velocity and it was tested and shipped at 60 fpm.

## Initial Certification

The ductless enclosure has been certified at the factory for an inflow velocity of 75-80 fpm. The ductless enclosure should be certified for the proper inflow velocity required by your Safety Officer. Transport, altitude, or temperature differences may require the “Calibration” of the “Pressure Sensor” to be reset as outlined in *Chapter 5: Using the Ductless Enclosure*. If a HEPA filter is used, it is a conservative recommendation to perform the HEPA Filter Leak Test should there be any damage to the media caused during transport.

## Re-Certification

Under normal operating conditions, the enclosure should be recertified at least annually if serviced. The certifier should perform the following tests.

- Airflow Velocity Test. If necessary, reset the Airflow Face Velocity and Motor Speed per the “Calibration” of the “Pressure Sensor” menu listed in *Chapter 5*.
- HEPA Filter Leak Test, if installed.

In addition, the following test should also be performed at the user’s discretion:

- Smoke Test to determine proper airflow patterns.



**Figure 6-1**  
**Light Replacement**

## Fluorescent Light Replacement

1. Disconnect the power.
2. Locate the small light reflector located under the control panel shown in Figure 6-1.
3. Remove the light reflector by removing two Phillips screws on the bottom of the light reflector.
4. Remove the old fluorescent lamp from the light sockets and metal support clips as shown in Figure 6-2.
5. Reinstall the new fluorescent lamp and light reflector in reverse order.
6. Power the unit up and try the new fluorescent lamp.

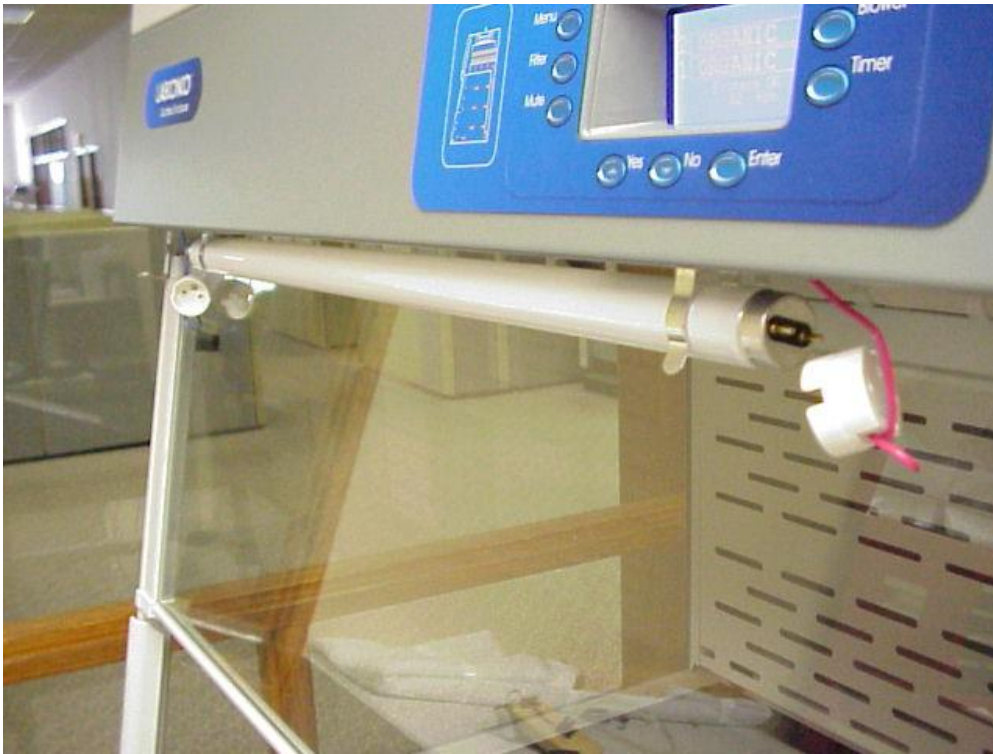


THE LAMP(S) IN THIS PRODUCT CONTAIN MERCURY

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](http://www.lamprecycle.org)

CETTE LAMPE DANS CE PRODUIT CONTIENT DU MERCURE

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



**Figure 6-2**  
**Light Replacement**

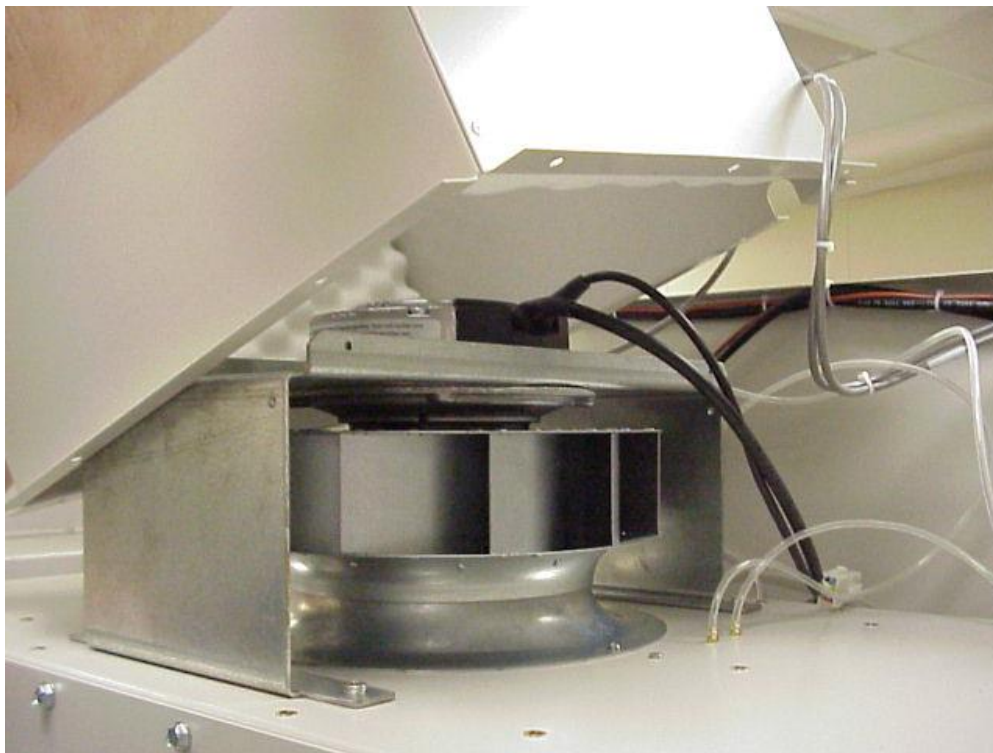
## Motorized Impeller Replacement

The motorized impeller (ECM) must be replaced as a complete unit; it has over 50,000 hours of useful life as tested. See Appendix A for Replacement Parts Diagram. See Figure 6-3 for a view of the motorized impeller plenum assembly.

1. Disconnect all power and consult the wiring diagram on the back of the front panel and disconnect all the wires of the motorized impeller from the quick disconnect connector. Be sure to connect wires on the new motor in the same way the old motor was wired and not get the wires or hoses tangled in the impeller.
2. Remove four screws in the motorized impeller bracket that hold it down. Remove the motorized impeller and bracket.

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

3. Reassemble the new motorized impeller by reversing the assembly steps.



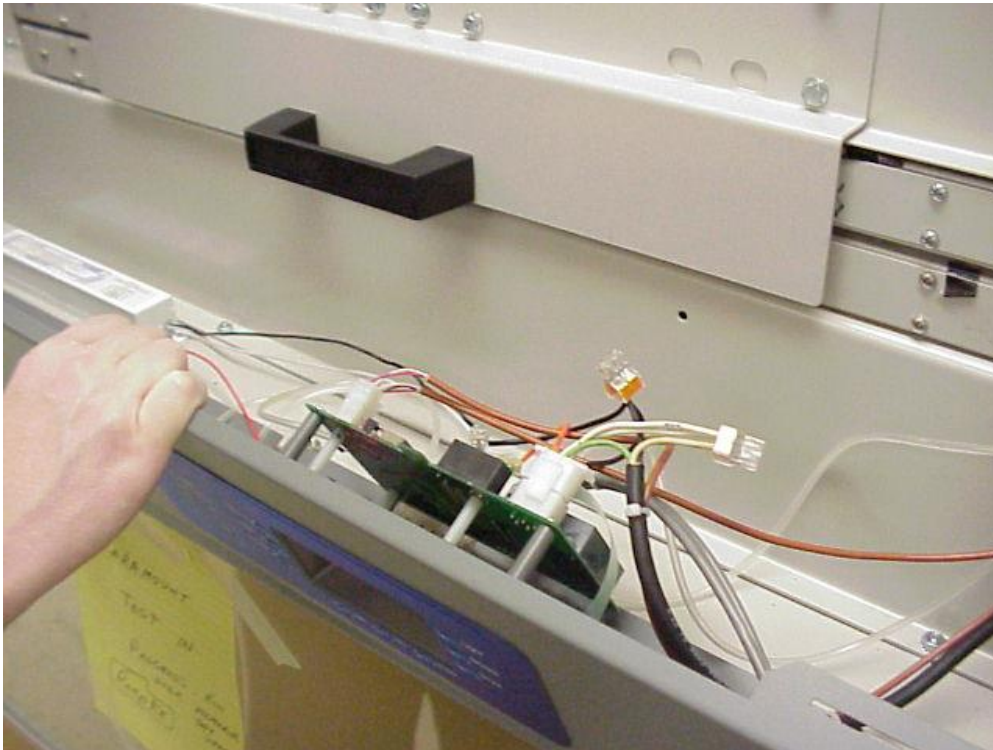
**Figure 6-3**  
**Motorized Impeller Replacement**



## Main Control Board Replacement

If the main control board is replaced, the Paramount must be calibrated per the menu screens in *Chapter 5*. See *Appendix A: Replacement Parts*, and reference Figure 6-4.

1. Consult the wiring diagram on the back of the front panel and disconnect all power.
2. Remove the hardware to rotate the header control panel.
3. Locate the connectors to the main control board and remove the connectors per the wiring diagram.
4. Label the two pressure hoses and remove the two pressure hoses from the control board. The hoses must be installed properly with the front hose corresponding with the front “total pressure” hose from the motorized impeller assembly (front to front throughout).
5. Remove the control board from the plastic display bezel by removing the four Phillips screws.
6. Reassemble the new control board in reverse order and follow the “Calibration” menu screens from *Chapter 5* as the Pressure Sensor, Airflow Alarm, and Organic Sensor all need calibration.



**Figure 6-4**  
**Main Control Board**

## Organic Sensor Board Replacement

If the organic sensor board is replaced, the Paramount must be calibrated for the “Organic Sensor.” Contact Labconco Product Service. See *Appendix A: Replacement Parts* and reference Figure 6-5. Please note that the 6' Paramount utilizes two organic sensor boards, one for each motorized impeller.

1. Consult the wiring diagram on the back of the front panel and disconnect all power.
2. Remove the organic sensor connector as shown in Figure 6-5.
3. Remove the four Phillips screws that mount the organic sensor board.
4. Install the new organic sensor board in reverse order. **Note:** Be careful with the delicate electronic sensors on the organic sensor board and do not move them or rotate them.
5. Follow the “Calibration” menu screens from *Chapter 5* as the Organic Sensor needs calibration. A separate code and procedure is required and Product Service must be contacted.



**Figure 6-5**  
**Organic Sensor Board**

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## Chapter 7: Accessorizing the Ductless Enclosure

There are several ways to accessorize and/or modify the ductless enclosure for your individual requirements. These include the addition of carbon filters, HEPA filters, work surfaces, impregnated carbon filters, base stands, base stand shelves, storage cabinets, seismic support, exhaust transition, remote blowers, exhaust dampers, utility shelf kits, syringe pump kits, deck mounted valves with work surface and sash closures.

### 1. Filters

The Paramount Ductless Enclosure operates with seven different filter types with at least one filter type required for successful operation:

Catalog #	Description
6938100	HEPA Filter, 15" x 18" x 1.5", 99.99% efficient particulate
6938200	Activated Carbon Filter, Organic Vapor 7.5 lbs.
6938201	Impregnated Carbon Filter Acid-Sulfur 10 lbs.
6938202	Impregnated Carbon Filter, Ammonia-Amine 11 lbs.
6938203	Impregnated Carbon Filter, Formaldehyde-Formalin 10 lbs.
6938204	Mixed Bed Carbon Filter, Org. Vap., Acid-Sul., Ammon, Form (25% Mix) 10 lbs.
6938205	Impregnated Carbon Filter, Radioisotope 10 lbs.

The Paramount model sizes, filter compartments, and number of filters are listed below for installation convenience.

Paramount Size	Filter Compartments	Required No. of Filters	Total Organic Vapor Filter Weight
2'	1	2	15 lbs.
3'	2	4	30 lbs.
4'	3	6	45 lbs.
5'	3	6	45 lbs.
6'	4	8	60 lbs.



## **2. Work Surfaces**

An optional work surface is available to attach to the ductless enclosure. The black epoxy work surfaces are contoured to fit the dimensions of the ductless enclosures to contain spills. The stainless work surfaces include a front trough to contain spills. See Figure 3-1 for installation.

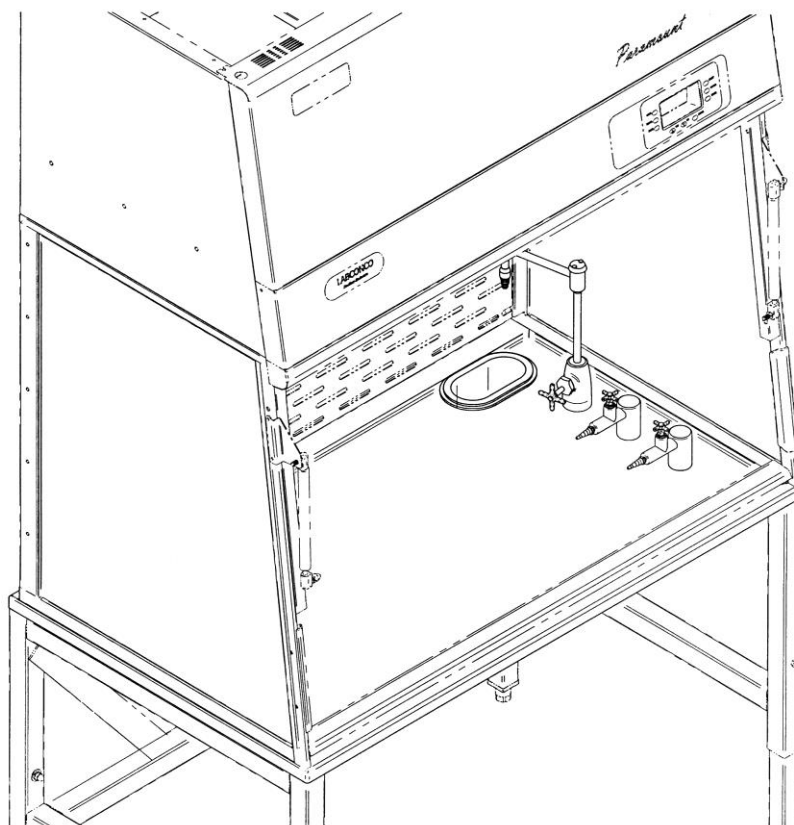
<b>Catalog #</b>	<b>Description</b>	<b>Dimensions (W x D x H)</b>
3909900	Black, 2' W x 29", Epoxy	24" x 29" x 1"
3909901	Black, 3' W x 29", Epoxy	36" x 29" x 1"
3909902	Black, 4' W x 29", Epoxy	48" x 29" x 1"
3909906	Black, 4' W x 35.5" Epoxy	48" x 35.5" x 1"
3975504	4' (Deep) Stainless w/Trough	48" x 35.5" x 0.8"
3909907	Black, 5' W x 29" Epoxy	60" x 29" x 1"
3909908	Black, 5' W x 35.5" Epoxy	60" x 35.5" x 1"
3975502	5' Stainless w/ Trough	60" x 29" x 0.8"
3975503	5' (Deep) Stainless w/ Trough	60" x 35.5" x 0.8"
3909910	Black, 6' W x 29" Epoxy	72" x 29" x 1"
3909911	Black, 6' W x 35.5" Epoxy	72" x 35.5" x 1"
3975602	6' Stainless w/ Trough	72" x 29" x 0.8"
3975603	6' (Deep) Stainless w/ Trough	72" x 35.5" x 0.8"

### 3. Work Surface with Deck Mounted Valves, Gooseneck, and Cupsink

The work surfaces supplied with deck mounted valves allow the convenience of water, air, and vacuum along with a cupsink and cold water gooseneck fixture.

**NOTE: Work Surfaces with Deck Mounted Service Fixtures cannot be used with a Protector Solvent Cabinet. Solvent Cabinets have a top that cannot be penetrated.**

Catalog #	Description
6963800	3' w x 29" d Black Epoxy Work Surface w/three deck mounted valves, cupsink, and gooseneck
6963801	4' w x 29" d Black Epoxy Work Surface w/three deck mounted valves, cupsink, and gooseneck
6963802	5' w x 29" d Black Epoxy Work Surface w/three deck mounted valves, cupsink, and gooseneck
6963803	6' w x 29" d Black Epoxy Work Surface w/three deck mounted valves, cupsink, and gooseneck



#### 4. Base Stands, Accessory Shelves, Seismic Supports, and Hydraulic Lift Base Stands

The following base stands, hydraulic lift base stands, accessory shelves, and seismic supports may be used with the accessory work surfaces to support the Paramount Ductless Enclosures. Hydraulic Lift Base Stands allow easy movement up and down and through doorways as they are portable and can be supplied with toe-locking casters.

Catalog #	Description	Size (if applicable)
3746700	2' Base Stand w/Feet	2' x 29" x 27.5"-33.5"
3746701	3' Base Stand w/Feet	3' x 29" x 27.5"-33.5"
3746702	4' Base Stand w/Feet	4' x 29" x 27.5"-33.5"
3746703	5' Base Stand w/Feet	5' x 29" x 27.5"-33.5"
3746704	6' Base Stand w/Feet	6' x 29" x 27.5"-33.5"
3746710	2' Base Stand w/Casters	2' x 29" x 27.5"-33.5"
3746711	3' Base Stand w/Casters	3' x 29" x 27.5"-33.5"
3746712	4' Base Stand w/Casters	4' x 29" x 27.5"-33.5"
3746713	5' Base Stand w/Casters	5' x 29" x 27.5"-33.5"
3746714	6' Base Stand w/Casters	6' x 29" x 27.5"-33.5"
3811100	2' Shelf, Base Stand	25.4" x 20.4"
3811101	3' Shelf, Base Stand	25.4" x 32.4"
3811102	4' Shelf, Base Stand	25.4" x 44.4"
3811103	5' Shelf, Base Stand	25.4" x 56.4"
3811104	6' Shelf, Base Stand	25.4" x 68.4"
3857000	Seismic Support Bracket Kit	N/A
3780310	Portable 3' SoLo Hydraulic Lift Base Stand, 115V	53.5" x 34.3" x 17.2"-36.8"
3780314	Portable 3' SoLo Hydraulic Lift Base Stand, 230V	53.5" x 34.3" x 17.2"-36.8"
3780311	Portable 4' SoLo Hydraulic Lift Base Stand, 115V	65.5" x 34.3" x 17.2"-36.8"
3780315	Portable 4' SoLo Hydraulic Lift Base Stand, 230V	65.5" x 34.3" x 17.2"-36.8"
3780312	Portable 5' SoLo Hydraulic Lift Base Stand, 115V	77.5" x 34.3" x 17.2"-36.8"
3780316	Portable 5' SoLo Hydraulic Lift Base Stand, 230V	77.5" x 34.3" x 17.2"-36.8"
3780313	Portable 6' SoLo Hydraulic Lift Base Stand, 115V	89.5" x 34.3" x 17.2"-36.8"
3780317	Portable 6' SoLo Hydraulic Lift Base Stand, 230V	89.5" x 34.3" x 17.2"-36.8"
3780300	3' Electric Hydraulic Lift Base Stand, 115V, 60Hz	36.0" W x 29.0" Dp
3780303	3' Electric Hydraulic Lift Base Stand, 230V, 50Hz	36.0" W x 29.0" Dp
3780301	4' Electric Hydraulic Lift Base Stand, 115V, 60 Hz	48.0" W x 29.0" Dp
3780304	4' Electric Hydraulic Lift Base Stand, 230V, 50 Hz	48.0" W x 29.0" Dp
3780302	6' Electric Hydraulic Lift Base Stand, 115V, 60 Hz	72.0" W x 29.0" Dp
3780305	6' Electric Hydraulic Lift Base Stand, 230V, 50 Hz	72.0" W x 29.0" Dp
3780400	3' Manual Hydraulic Lift Base Stand	36.0" W x 29.0 Dp
3780401	4' Manual Hydraulic Lift Base Stand	48.0" W x 29.0" Dp
3780402	6' Manual Hydraulic Lift Base Stand	72.0" W x 29.0" Dp
3784000	Portable Caster Kit for Electric and Manual Hydraulic Lift Base Stands	N/A

## 5. Storage Cabinets

The following storage cabinets may be used with the accessory work surfaces to support the Paramount Ductless Enclosures.

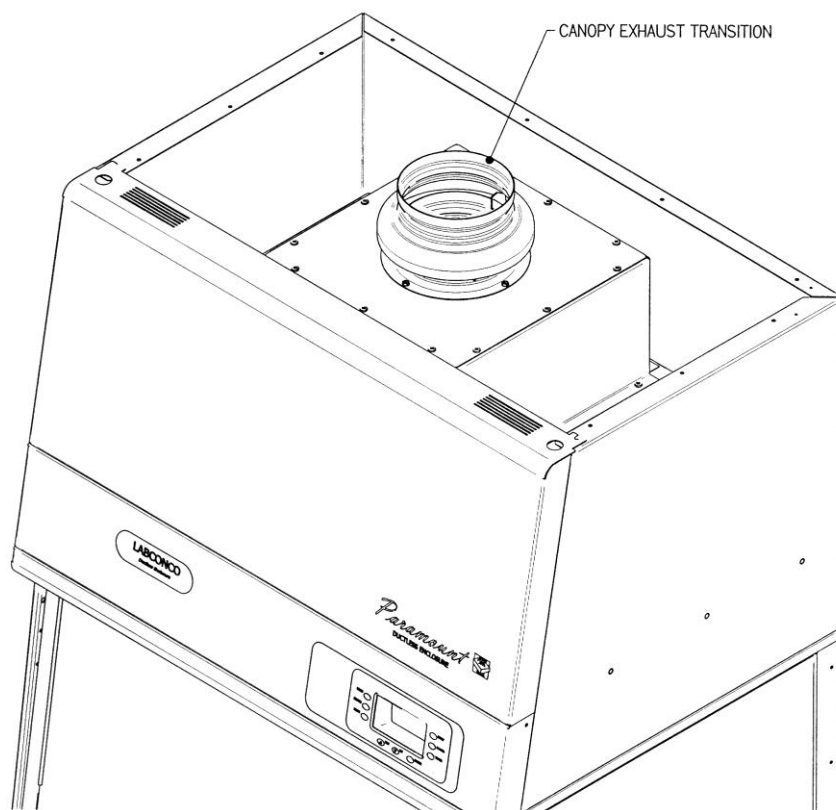
Size/Description	SOLVENT			ACID		
	Dual Doors	Right Hinge	Left Hinge	Dual Doors	Right Hinge	Left Hinge
48"	9902000	-	-	9901000	-	-
36"	9902100	-	-	9901100	-	-
30"	9902200	-	-	9901200	-	-
24"	-	9902300	9902400	-	9901300	9901500
18"	-	-	-	-	9901400	9901600
48" w/Self-Closing Doors	9903000	-	-	-	-	-
36" 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

Size/Description	STANDARD BASE			VACUUM PUMP		
	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	-	-	-

### 6. Exhaust Transitions

Canopy Exhaust Transitions connect each motorized impeller for ducting to the outside. The Canopy Exhaust Transition is available for 6" nominal duct (6' Paramount requiring two). The Canopy Exhaust Transition should be sealed to the top of the enclosure with silicone sealant to prevent leaks.

Catalog #	Description
6963700	Canopy Exhaust Transition (Paramount)
3927600	Flexible Hose, 6" ID Black with 6.09" ID cuffs, suitable for pharmaceutical and clean room applications. 8' length with two hose clamps.

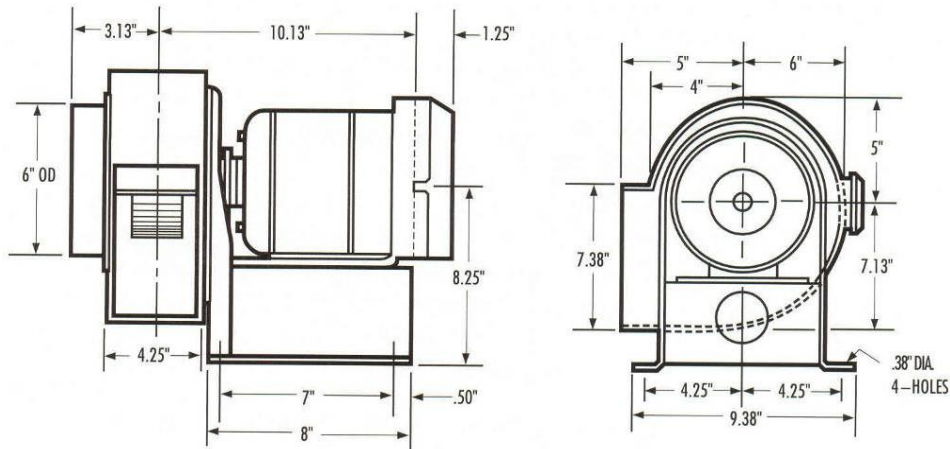


## 7. Remote Blowers – used to exhaust to the outside only.

6" nominal ID inlet blower 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 <sub>2</sub> O						
S.P.	0.0"	0.125"	0.25"	0.50"	0.75"	0.87"
CFM	595	560	515	420	300	167

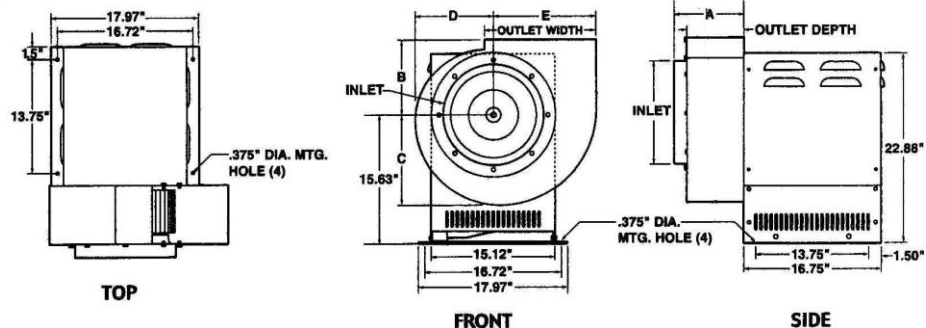
Catalog #	Description	Shipping Wt. (lbs./kg.)
4863500	Remote Blower, 115 V, 60 Hz. 4.4 amps	35/16
4863501	Remote Blower, 115/230 V, 50 Hz, 5.6/2.8 amps	35/16
7053501	Explosion-Proof Remote Blower, 115 V, 60 Hz, 4.4 amps	40/18



10" nominal ID inlet blower has a 1/4 hp or 1/3 hp adjustable belt drive motor and corrosion resistant epoxy coated steel housing and wheel with blower inlet of 10.87" ID. Outlet dimensions are 5.5" x 10" OD.

Catalog #		HP	Description	CFM@RPM Ranges at Static Pressure (inches of H <sub>2</sub> O)						
Std.	EP			.25"	.38"	.50"	.62"	.75"	.88"	1.00"
7068200		1/4	Remote Blower, 115V, 60 Hz, 4.4 A	540@800	410@800	350@870	390@970			
	7068300	1/4	Explosion Proof Blower 115V, 60 Hz, 4.5 A	720@950	760@1050	710@1060	620@1060			
7068400		1/3	Remote Blower, 115V, 60 Hz, 6.1 A		760@1050	710@1060	620@1060	430@1060	460@1150	500@1220
	7068500	1/3	Explosion Proof Blower, 115V, 60 Hz, 6.4 A		850@1130	825@1160	790@1190	770@1220	740@1260	640@1260

Dimensions	
A	7.16"
B	7.00"
C	8.13"
D	6.81"
E	9.25"
Inlet	10.87" ID
Outlet	5.5"D x 10.0"W
Wheel	9.0" Dia.



## **8. Exhaust Dampers**

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

<b>Catalog #</b>	<b>Description</b>
3924000	6" Epoxy Coated Steel In-Line adjustable damper
4724200	6" PVC In-line adjustable damper
5983400	10" PVC In-line adjustable
3776800	10" Airtight Damper (10" tall)

## **9. Utility Shelf Kits and Holders**

Labconco offers a utility shelf kit part number 3925000 consisting of three shelves to 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.

Labconco also offers a 3927700 Bottle Holder with a 3" diameter opening and a 3927800 Tissue Holder to hold a 4.63" x 4.75" box of tissues. These holders also hang from slots in the rear baffle.

## **10. Syringe Pump Kit and Detector Tubes**

The Syringe Pump Kit and chemical specific detector tubes may be used as a timed detection means to determine filter replacement. Chemical specific organic vapor detector tubes and pumps may be ordered from your laboratory supply dealer or directly from Dräger, Inc. or Sensidyne.

<b>Catalog #</b>	<b>Description</b>
6924900	Syringe Pump Kit
6925700	Detector Tubes, Ammonia – Pkg. of 3
6925800	Detector Tubes, Acid – Pkg. of 3
6926000	Detector Tubes, Formaldehyde – Pkg. of 3

### 11. Sash Closures

All Paramount Ductless Enclosures have a standard sash opening at the bottom consisting of 9.4" or 12". Sometimes it is necessary to close the lower sash opening during operating procedures. The Sash Closure consists of bi-fold doors to close the opening.

Catalog #	Description
6963900	2' w x 9.4" h Sash Closure
6963901	3' w x 9.4" h Sash Closure
6963902	3' w x 12" h Sash Closure
6963903	4' w x 9.4" h Sash Closure
6963904	4' w x 12" h Sash Closure
6963905	5' w x 9.4" h Sash Closure
6963906	6' w x 12" h Sash Closure





## Chapter 8: Troubleshooting

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

PROBLEM	CAUSE	CORRECTIVE ACTION
<b>“Replace Filters” continuous alarm occurs</b>	Improper final time programmed and display reads “Replace Filters-t”, (t = time)	See Chapters 3 and 5 to properly set the Filter Final Life Timer.
	Organic sensor alarms and display reads “Replace Filters-s”, (s = organic sensor)	Organic sensor has detected filter breakthrough. Replace filters immediately. A spare set of filters should always be on hand. Consult Chapters 3, 4, and 5, the Labconco Specialist, and the Chemical Guide for estimated filter life based on specific chemical use. All chemicals have a different estimated filter life based on specific chemical use. Always limit chemical use, cover up chemicals when not in use and turn off blower to preserve filter life.
	“Mute” will not stay operational	The “Mute” alarm can only be off for 5 minutes and must be pushed every 5 minutes until the filters have been replaced. See Chapters 3, 5 & 6.
<b>“Check Filters” intermittent alarm occurs frequently</b>	Improper check time programmed and display reads “Check Filters-t”, (t = time)	See Chapters 3 and 5 to properly set the Filter Check Life Timer.

PROBLEM	CAUSE	CORRECTIVE ACTION
<b>Replace filters intermittent alarm occurs</b>	Organic sensor alarms intermittently and display reads "Replace Filters-s", s = organic sensor	Organic sensor has detected filter breakthrough and only 5-10% of filter life remains. Replace filters with a spare set of filters stored. Consult Chapters 3, 4, and 5, Filter Specialist, and Chemical Guide for filter life based on specific chemical use. All chemicals have different life. Always limit chemical use, cover up chemicals and turn off blower when not in used to preserve life.
	Carbon filter loaded with chemicals.	Replace carbon filter.
<b>Contaminants outside of enclosure</b>	Improper user techniques for the enclosure.	See "Validate the Enclosure" Chapter 3 and "Safety Precautions" Chapter 4 sections in the manual.
	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, "Validate the Enclosure" Chapter 3, and "Safety Precautions" Chapter 4 sections of this manual.
	Enclosure has improper face velocity.	Have enclosure certified per Chapter 6 and check exhaust system. Check carbon filters and replace if necessary. Enclosure should have an average face velocity of 60-100 fpm.
<b>Blower will not operate</b>	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 membrane switch on control panel.
	Motorized impeller is defective.	Replace motorized impeller. See Chapter 6.
<b>Low face velocity</b>	Enclosure sash not closed.	Close sash to the lowest position.
	HEPA filter clogged.	Replace HEPA filter.
<b>Blower and lights will not operate</b>	Unit not plugged into outlet.	Plug enclosure into appropriate electrical service.
	Circuit breaker(s) tripped.	Reset or replace circuit breaker.

PROBLEM	CAUSE	CORRECTIVE ACTION
<b>Lights do not work</b>	Lamp not installed properly.	Inspect lamp installation.
	Lamp wiring disconnected.	Inspect lamp wiring.
	Defective lamp.	Replace lamp.
	Light switch is defective.	Replace membrane switch on control panel.
	Defective electronic ballast.	Replace ballast.
<b>Airflow monitor malfunction</b>	No audible alarm.	Alarm has been temporarily silenced using "mute" button.
	Wrong alarm set point.	Airflow monitor alarm is preset at 60 fpm. Repeat calibration steps outlined in this manual in Chapter 3, Chapter 5 and Chapter 6.
	Constant audible alarm.	Check airflow and calibration of airflow monitor. See Chapter 5 & 6.
	Continuous alarm.	Check the face velocity of the enclosure as the airflow of the system may have changed. If incorrect, follow the calibration steps in Chapters 3, 5 and 6. The carbon filter pre-filter or HEPA filter may have become loaded.
	Low airflow.	Check airflow and reset airflow monitor. See Chapter 5 & 6. Look for filter blockage or paper debris.

# Appendix A:

## Replacement Parts

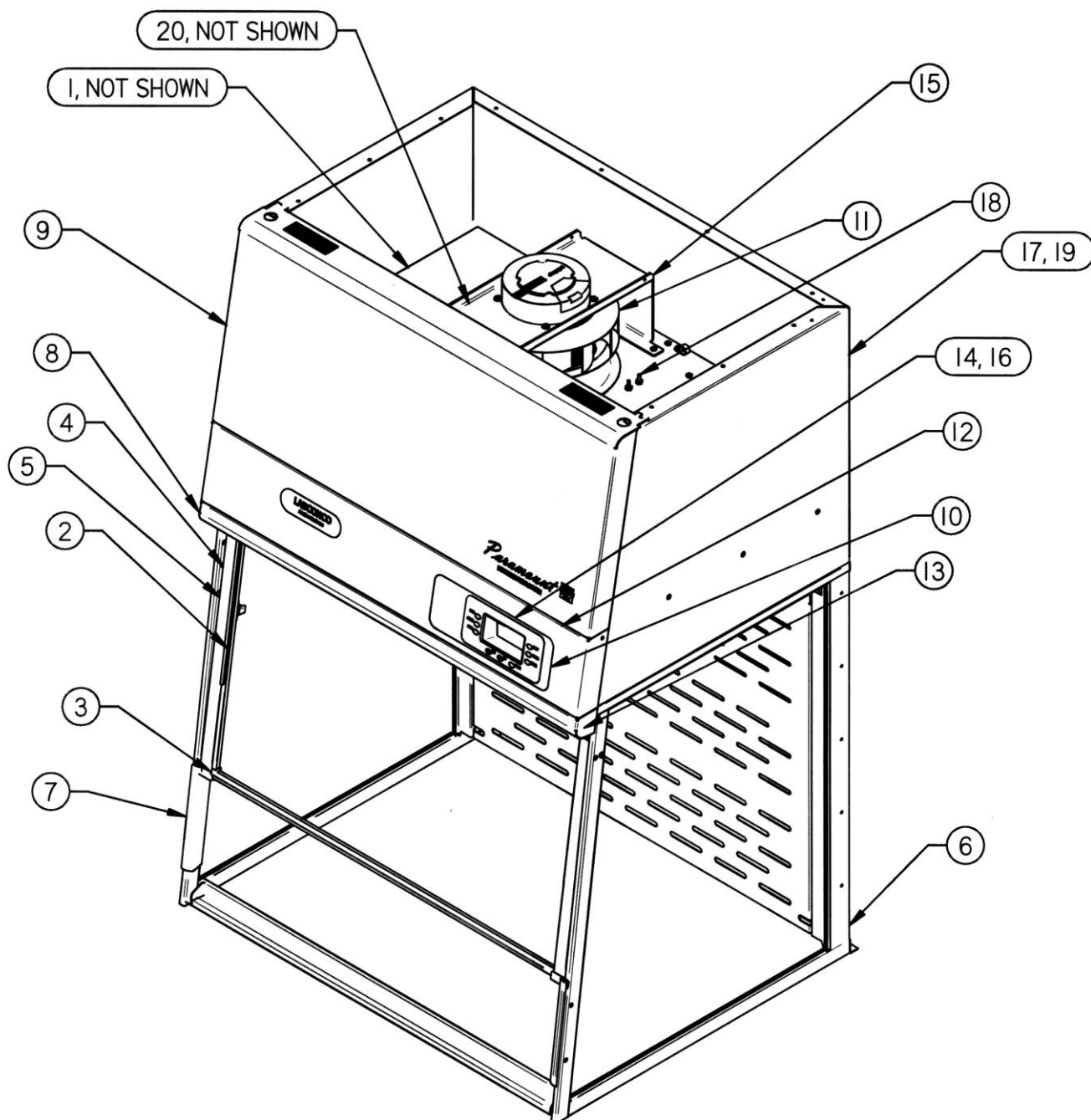
The components that are available for your ductless enclosure are listed. The parts shown are the most commonly requested. If other parts are required, please contact Product Service.

Item	Quantity	Part No.	Description
1A	1	6938100	HEPA Filter, 99.99% efficient on 0.3 micron, particulate
1B	1	6938200	Activated Carbon Filter, Organic Vapor, 7.5 lbs.
1C	1	6938201	Impregnated Acid-Sulfur Filter, 10 lbs.
1D	1	6938202	Impregnated Ammonia-Amine Filter, 11 lbs.
1E	1	6938203	Impregnated Formaldehyde-Formalin Filter, 10 lbs.
1F	1	6938204	25% Mixed Bed Carbon Filter, OV, Acid-Sul, Ammon, Form, 10 lbs.
1G	1	6938205	Impregnated Radioisotope Filter, 10 lbs.
2A	1	3991500	Sash Assy., 2' Short (22.7" IH)
2B	1	3991501	Sash Assy., 3' Short (22.7" IH)
2C	1	6970100	Sash Assy., 3' Tall (32" IH)
2D	1	3991502	Sash Assy., 4' Short (22.7" IH)
2E	1	6970101	Sash Assy., 4' Tall (32" IH)
2F	1		Sash Assy., 4' Extra Tall (35" IH)
2G	1	6976300	Sash Assy., 5' Tall (32" IH)
2H	1		Sash Assy., 5' Extra Tall (35" IH)
2I	1	3957301	Sash Assy., 6' Tall (32" IH)
2J	1		Sash Assy., 6' Extra Tall (35" IH)
3A	1	3907500	Sash Stop R.H.
3B	1	3907501	Sash Stop L.H.
4A	1	6916500	Latch, Sash
4B	1	3906700	Bracket, Latch
4C	1	1927403	Spring, Compression
4D	2	1893206	Screw, 8-32 x .38" lg. Phillips Pan S.S., Type F
4E	2	3973204	Sash Gas Spring Assy., 15# (3')
4F	2	3973203	Sash Gas Spring Assy., 20# (4')
4G	2	3973200	Sash Gas Spring Assy., 30# (5', 6')
5	1.9'	6913700	Wiper, Sash Seal
6A	2	1936800	Bushing, Closed 1.50" Dia.
6B	2	1934601	Bushing, w/Flex Shutter 1.50" Dia.
7	2	3915403	Side, Air Foil
8A	1	3907700	Light Reflector, 2' w
8B	1	3907701	Light Reflector, 3' w
8C	1	3907702	Light Reflector, 4' w
8D	1	3907703	Light Reflector, 5' w
8E	1	3907704	Light Reflector, 6' w
8F	2, 4 or 6	3908899	Reflector Tape
8G	2	1889308	Screw, #10-24 x 0.50 Phillips

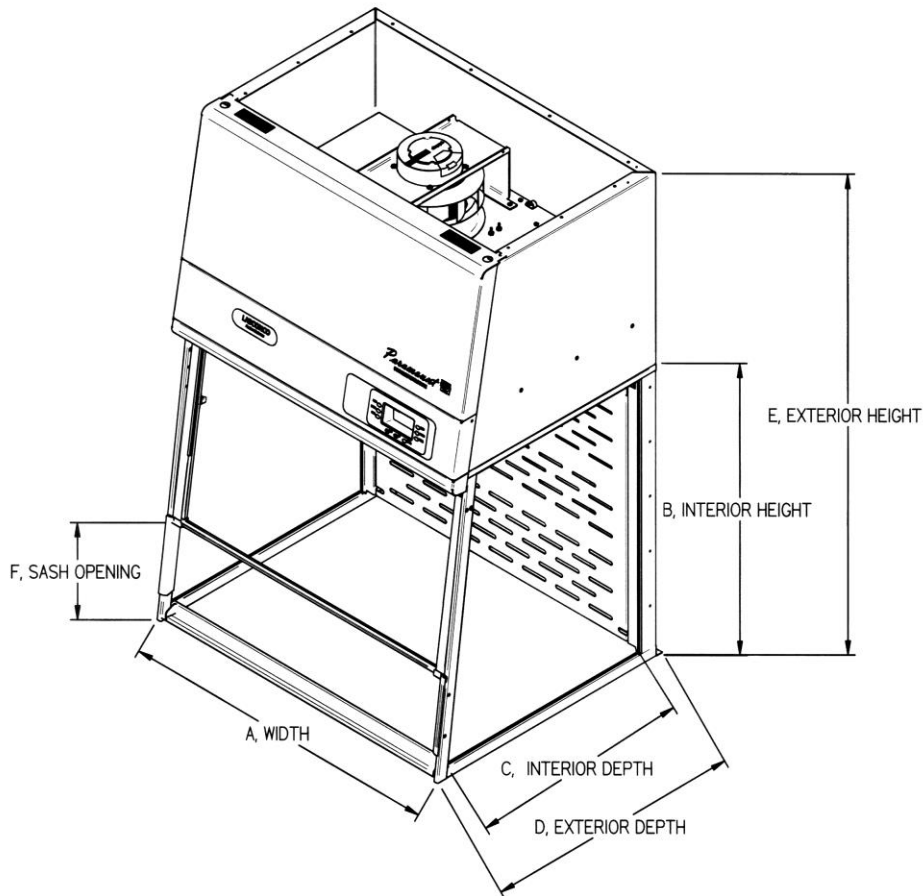
## Appendix A: Replacement Parts

Item	Quantity	Part No.	Description
9A	1	6964700	Front Panel, 2'
9B	1	6964701	Front Panel, 3'
9C	1	6964702	Front Panel, 4'
9D	1	6964703	Front Panel, 5'
9E	1	6964704	Front Panel, 6'
9F	1	6964101	Label, Front Panel
10	1	6964100	Membrane Switch
11A	1	6964300	ECM Motorized Impeller, 115V
11B	1	6964301	ECM Motorized Impeller, 230V
12A	1	6972200	Ballast, 2' (uses 1295510 ballast with mtg. bracket)
12B	1	1295400	Ballast (3', 4', 5', or 6')
13A	1	3708300	Lamp, Fluorescent 2' (F15T8-SP35)
13B	1	9721902	Lamp, Fluorescent 3' (F17T8)
13C	1	9721901	Lamp, Fluorescent 4' (F25T8)
13D	1	9721900	Lamp, Fluorescent 5' (F32T8)
13E	1	9721903	Lamp, Fluorescent 6' (F40T8)
13F	2	3836800	Lamp Holder Socket, Push-On
13G	2	3836700	Clip, Lampholder
14	1	6964500	Main Control Board
15A	1 or 2	6965200	Organic Sensor Board
15B	1	6967800	Harness, Organic Sensor, 2' w
15C	1	6967900	Harness, Organic Sensor, 3'-5' w
15D	1	6968000	Harness, Organic Sensor, 6' w
16A	1	6967500	Main Harness, 2' w
16B	1	6967600	Main Harness, 3', 4', 5', 6' w
16C	1	6967700	Main Harness, 6' w Extra ECM Blower
17A	1 or 2	1327204	Circuit Breaker, 5A (115V) - 2', 3', 4', 5' or (230V) - 6'
17B	2	1327200	Circuit Breaker, 3A (230V) - 2', 3', 4', 5'
17C	1	1327201	Circuit Breaker, 10A, 6' (115V)
18A	30'	1554304	Tubing, Pressure Sensor – Airflow
18B	1 or 2	6969300	Bracket, Pitot Tube – Airflow
18C	4 or 8	1449400	Fitting, Pitot – Airflow
18D	1	6977400	Connection Tee, 6' Unit
19A	1	1305800	Power Cord, 115V, Right Angle
19B	1	1305900	Power Cord, 230V, Right Angle
20A	1 or 2	6913000	Gas Assist Spring, Filter Clamping
20B	2 or 4	1906225	Jam Nut 3/8-16
20C	2 or 4	1910018	Lockwasher 3/8 Split
20D	2 or 4	1881712	Screw, 3/8-16 Hex, .75 lg.

A-1



## Appendix B: Paramount Dimensions



Models	Paramount Description	A	B	C	D	E	F
6963200, -20	2' Short	24.0	22.7	23.4	29.0	43.7	9.4
6963300, -20	3' Short	36.0	22.7	23.4	29.0	43.7	9.4
6963301, -21	3' Tall	36.0	32.0	23.4	29.0	53.0	12.0
6963302, -21	3' x 360 Visibility	36.0	32.0	23.4	29.0	53.0	12.0
6963400, -20	4' Short	48.0	22.7	23.4	29.0	43.7	9.4
6963401, -21	4' Tall	48.0	32.0	23.4	29.0	53.0	12.0
6963402, -22	4' x 360 Visibility	48.0	32.0	23.4	29.0	53.0	12.0
6963403, -23	4' Deep	48.0	35.0	30.0	35.5	56.0	12.0
6963501, -21	5' Tall	60.0	32.0	23.4	29.0	53.0	9.4
6963503, -23	5' Deep	60.0	35.0	30.0	35.5	56.0	9.4
6963601, -21	6' Tall	72.0	32.0	23.4	29.0	53.0	12.0
6963603, -23	6' Deep	72.0	35.0	30.0	35.5	56.0	12.0

(All dimensions in inches)

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# Appendix C:

## Specifications

This Appendix contains technical information about all the Paramount Ductless Enclosures including electrical specifications and environmental operating conditions.

### Electrical Specifications

- All 2', 3', 4', 5' Paramounts – 100-115V, 5 Amps, 50/60 Hz or 230V, 3 Amps, 50/60 Hz.
- 6' Paramounts – 100-115V, 10 Amps, 50/60 Hz or 230V, 5 Amps, 50/60 Hz.

### Environmental Conditions

- Indoor use only.
- Maximum altitude: 10,000 feet (3,058 meters). Airflow must be recalibrated at altitudes above or below 900 feet (275 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  $\pm 10\%$  of the nominal voltage.
- Transient overvoltages according to Installation Categories II (Overvoltage 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

Model No.'s	6963200, -20	6963300, -20	6963301, -02, -21, -22	6963400, -20	6963401, -02, -03, -21, -22, -23	6963501, -03, -21, -23	6963601, -03, -21, -23
Model Size	2'	3'	3'	4'	4'	5'	6'
Sash Height from Work Surface (inches)	9.4	9.4	12.0	9.4	12.0	9.4	12.0
Total Open Area with Bypass (sq. ft.)	1.45	2.20	2.85	2.95	3.80	3.70	5.80
Exhaust Airflow Volume at 80fpm (CFM)	115	175	230	235	305	295	465
Alarm Airflow Volume at 60 fpm (CFM)	85	130	170	175	230	220	350
*Motor Horsepower (HP)	0.06	0.06	0.09	0.09	0.16	0.16	0.26
Fluorescent Lights	F15T8-SP35	F17T8	F17T8	F25T8	F25T8	F32T8	F40T8
Number of Filters	2	4	4	6	6	6	8

### Paramount Ductless Enclosure Wattage, Energy Use, and Operating Costs.

Blower Power (watts)	49	45	73	71	122	118	197
Light Power (watts)	22	24	24	32	32	39	53
Total Power w/display(watts)	66	65	93	99	150	153	241
Electric Energy Cost (\$) (based on 2000 hours per year and \$0.078/kwh)	\$11	\$11	\$16	\$16	\$25	\$26	\$40
Operating Filter Cost (\$) (based on one annual organic filter change)	\$400	\$800	\$800	\$1200	\$1200	\$1200	\$1600
Ductwork Installation Cost (\$)	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Adaptability/Mobility Cost (\$)	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total Annual Operating Cost (\$)</b>	<b>\$411</b>	<b>\$811</b>	<b>\$816</b>	<b>\$1216</b>	<b>\$1225</b>	<b>\$1226</b>	<b>\$1640</b>
Conventional Fume Hood Comparison based on \$7 per CFM at 100 fpm	\$1015	\$1540	\$1995	\$2065	\$2660	\$2590	\$4060

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## Appendix E: Estimated Filter Life Calculation

The following examples are useful for estimating filter life so the Filter Life Timers can be set properly.

### Organic Vapor Carbon Filter Life

Consult the separate Paramount Chemical Guide and/or Labconco Specialist to determine the filter capacity for your chemical. For example, assume you are working with 10 ppm acetone in a 3' Paramount loaded with the required four filters. Acetone has a specific gravity SPGR = 0.79 with a molecular weight MW = 58.1. A 3' Paramount at 80 fpm uses 175 CFM or 4956 LPM. The evaporation rate in ml/min can be solved by the following equation:  $PPM = (SPGR/MW) * (24400000/Airflow (LPM)) * Evap. Rate (ml/min)$ .

For 10 ppm acetone or 90 ml lost per week during 2 hours use per day, the equations are solved below:

- $10 = (0.79/58.1) * (24400000/4956) * Evap. Rate (ml/min)$
- $Evap. Rate = 0.15 ml/min = 90 ml/week * 1 week / 10 hours use * 10 hours/600 minutes$
- $Evap. Rate in (g/min) = 0.15 ml/min * 0.79 g/ml = 0.12 g/min$

There are 30 pounds of activated carbon in a 3' Paramount which equals 13,500 g. Thus, the carbon Filter Life Time is calculated for acetone with a 2% filter capacity at  $(13,500 g/0.12 g/min) / (1 hour/60 min) * 2\%$  capacity = 38 hours. The Final Life Timer should be set for 40 hours, rounded up from 38 hours. The Check Life Timer should be set for 20-25% intervals or every 10 hours and the carbon filters can be validated every 10 hours to verify safe filter use.

Other chemicals such as ethyl acetate at 9% filter capacity and toluene at 20% filter capacity have much longer filter lives. For example, ethyl acetate at 10 ppm used in the 3' Paramount will have a Filter Life of 120 hours. Furthermore, toluene at 10 ppm used in the 3' Paramount will have a Filter Life of 240 hours. These three chemicals are summarized in the table that follows to show the Filter Life ranges and you should consult the Labconco Specialist and/or Paramount Chemical Guide for further information on other chemicals.

## Appendix E: Accessories

Inlet Concentration	Evap. Rate (ml/min)	Organic Chemical	SPGR	MW	Organic Vapor Adsorbed Filter Capacity	Estimated Filter Life	Estimated Check Life	2' (2 Filters)		3' (4 Filters)		4' & 5' (6 Filters)		6' (8 Filters)	
								Adsorbed Weight	Adsorbed Volume	Adsorbed Weight	Adsorbed Volume	Adsorbed Weight	Adsorbed Volume	Adsorbed Weight	Adsorbed Volume
10 ppm	0.15	Acetone	0.79	58.1	2%	40 hours	10 hours	135 g	171 ml	270 g	342 ml	405 g	513 ml	540 g	684 ml
10 ppm	0.20	Ethyl Acetate	0.90	88.1	9%	120 hours	30 hours	608 g	675 ml	1216 g	1350 ml	1824 g	2025 ml	2432 g	2700 ml
10 ppm	0.22	Toluene	0.87	92.1	20%	240 hours	60 hours	1350 g	1552 ml	2700 g	3104 ml	4050 g	4656 ml	5400 g	6208 ml

If the inlet concentration is decreased to 1 ppm, then the estimated filter life will be increased by an average factor of 5. Likewise, if the inlet concentration is increased to 25 ppm, then the estimated filter life will be decreased by an average factor of 2. Experience with routine use will establish a predictable filter life that is representative of your specific chemical work.

### Impregnated Carbon Filter Life

To estimate impregnated carbon filter life for acids, formaldehyde-formalin, and ammonia, use the following chart below. The values in the chart below are expressed in weight (grams) and volume (milliliters) which can be used to estimate Filter Life from a known usage.

For example, you estimate that 37% hydrochloric acid is being used at 500 ml per week and want to know how to program the Filter Life timer for a 3' Paramount. A 3' Paramount uses 40 pounds of impregnated carbon at 17% estimated life before saturation. 17% of 40 pounds is equivalent to 3060 grams of available carbon. There are 424 g/L of hydrochloric acid in a 37% solution. Thus, there are 3060 grams/424 g per L or 7.2 Liters (7200 ml) of hydrochloric acid before saturation. Assuming there are 10 hours of use per week at 500 ml per week, the expected Final Life is programmed at 140 hours and the Check Life is programmed at 40 hours and it comes from

$$(7200 \text{ ml}/500 \text{ ml/week}) * 10 \text{ hours/week} = 144 \text{ hours, rounded to 140 hours}$$

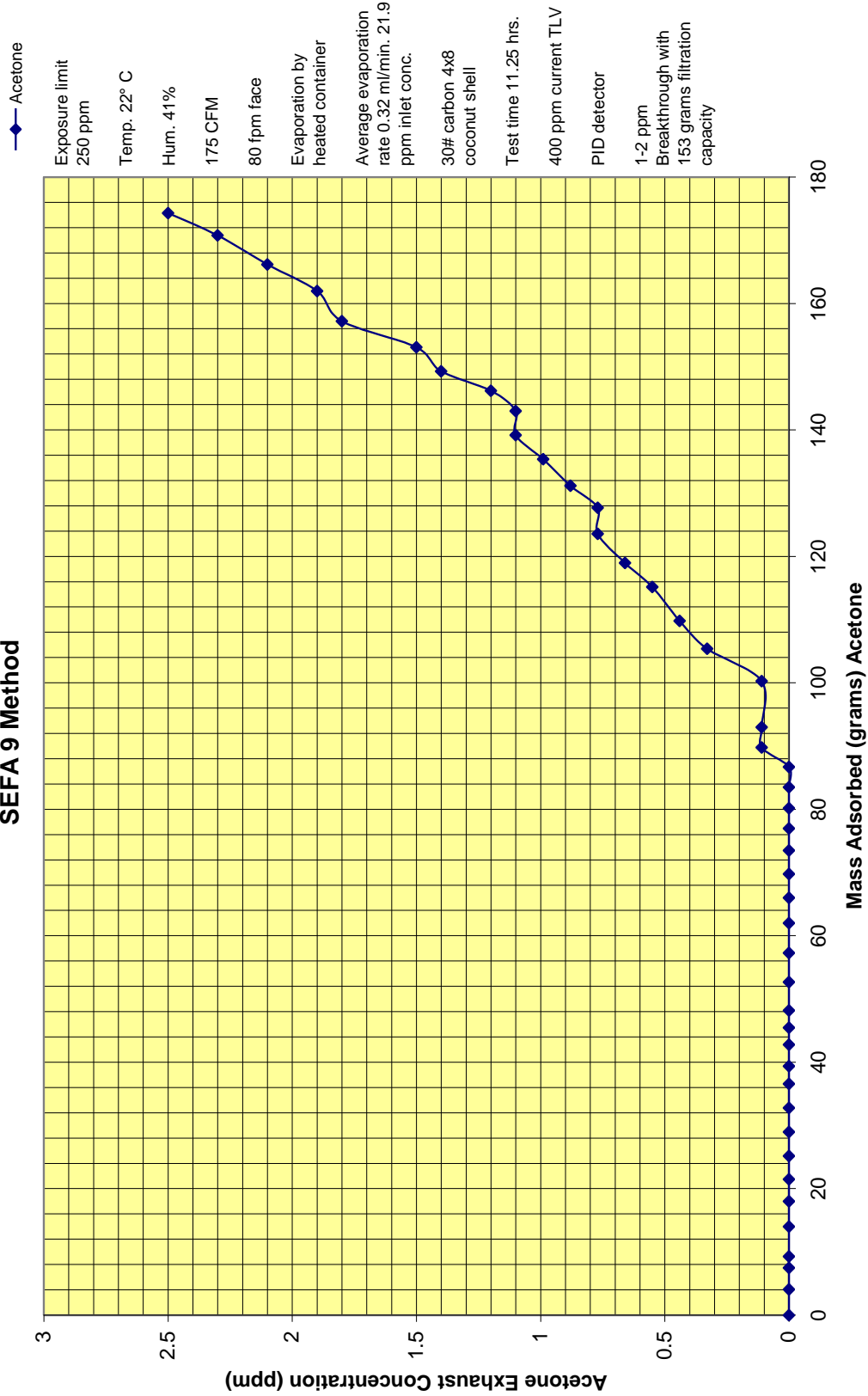
Chemical	Impregnated Carbon Adsorbed Filter Capacity	2' (2 Filters)		3' (4 Filters)		4' & 5' (6 Filters)		6' (8 Filters)	
		Adsorbed Weight	Adsorbed Volume	Adsorbed Weight	Adsorbed Volume	Adsorbed Weight	Adsorbed Volume	Adsorbed Weight	Adsorbed Volume
37% Hydrochloric Acid	17%	1530 g	3600 ml	3060 g	7200 ml	4590 g	10800 ml	6120 g	14400 ml
67% Nitric Acid	12%	1080 g	1150 ml	2160 g	2300 ml	3240 g	3450 ml	4320 g	4600 ml
96% Sulfuric Acid	11%	990 g	560 ml	1980 g	1120 ml	2970 g	1680 ml	3960 g	2240 ml
37% Formaldehyde or Formalin	10%	900 g	2250 ml	1800 g	4500 ml	2700 g	6750 ml	3600 g	9000 ml
50% Ammonia Solution (Ammonium Hydroxide)	10%	990 g	1980 ml	1980 g	3960 ml	2970 g	5940 ml	3960 g	7920 ml

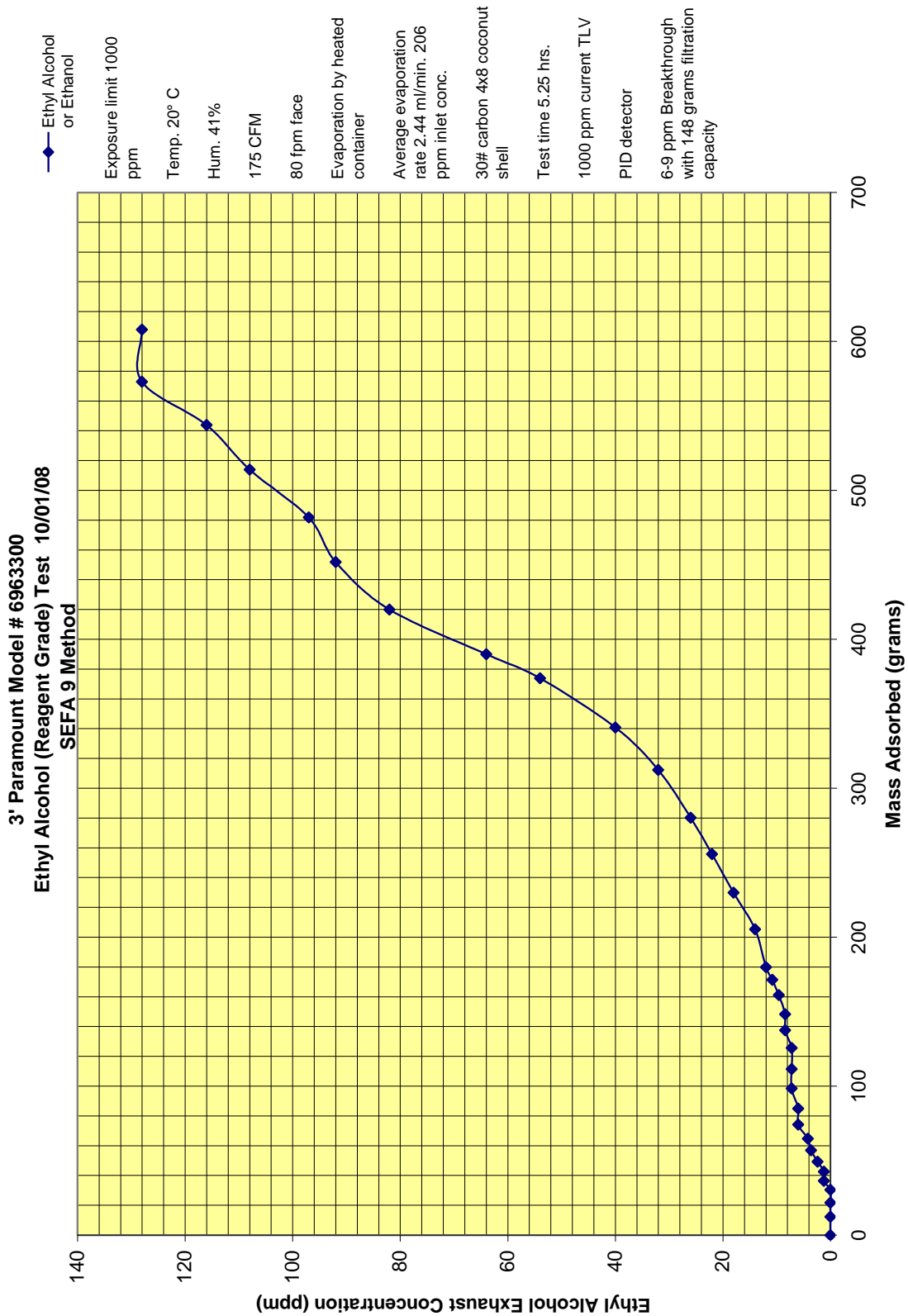
## Appendix F: Filtration Efficiency Test Results

Ductless enclosures require filtration efficiency testing to validate performance. Independent testing, conducted by a consultant and the University of Kansas, concluded the tested filtration efficiency for acetone, ethanol, isopropyl alcohol, toluene and hydrochloric acid was excellent. Filtration capacity is defined as a percentage of the chemical mass adsorbed compared to the total carbon filter weight. Utilizing analytical instrumentation, the organic vapor filter and acid vapor filter were both independently tested for filtration efficiency. The solvents and acids listed below were evaporated at both low and high evaporation rates. Low evaporation rates are typical in ductless enclosures in order to maximize useful carbon filter life. Both ethanol and acetone were specifically tested at low evaporation rates of 14ppm and 22ppm, respectively, to simulate real laboratory conditions of chemicals with low filter capacities. High evaporation rates of 100-462ppm were used for most of the organic solvents and mineral acid to accelerate the testing process of chemicals with higher filtration capacity and determine filter saturation and chemical breakthrough. The testing was designed to assess the filtration efficiency of the filters. As suggested by carbon manufacturers, carbon filters usually have a 30 percent to 40 percent filtration capacity of theoretical values for organic chemicals with higher carbon affinity. The test results show a filtration efficiency of 33-39 percent for chemicals with higher affinity for organic vapor carbon and directly in line with the 30-40 percent as suggested by carbon manufacturers. Since ethanol has very low filter capacity, it is not alarming that the filtration efficiency is 17-19 percent; the test results prove the practical matter of using low quantities of ethanol or any other chemical with very lower filter capacity. The mineral acid filtration efficiency of hydrochloric acid approached 83 percent of theoretical value and is attributed to the chemisorption process of the treated acid filters. To conclude, the filtration efficiency test data and charts indicate the ductless enclosure filtration was in line with carbon manufacturer expectations and will provide a safe working environment for controlled environments.

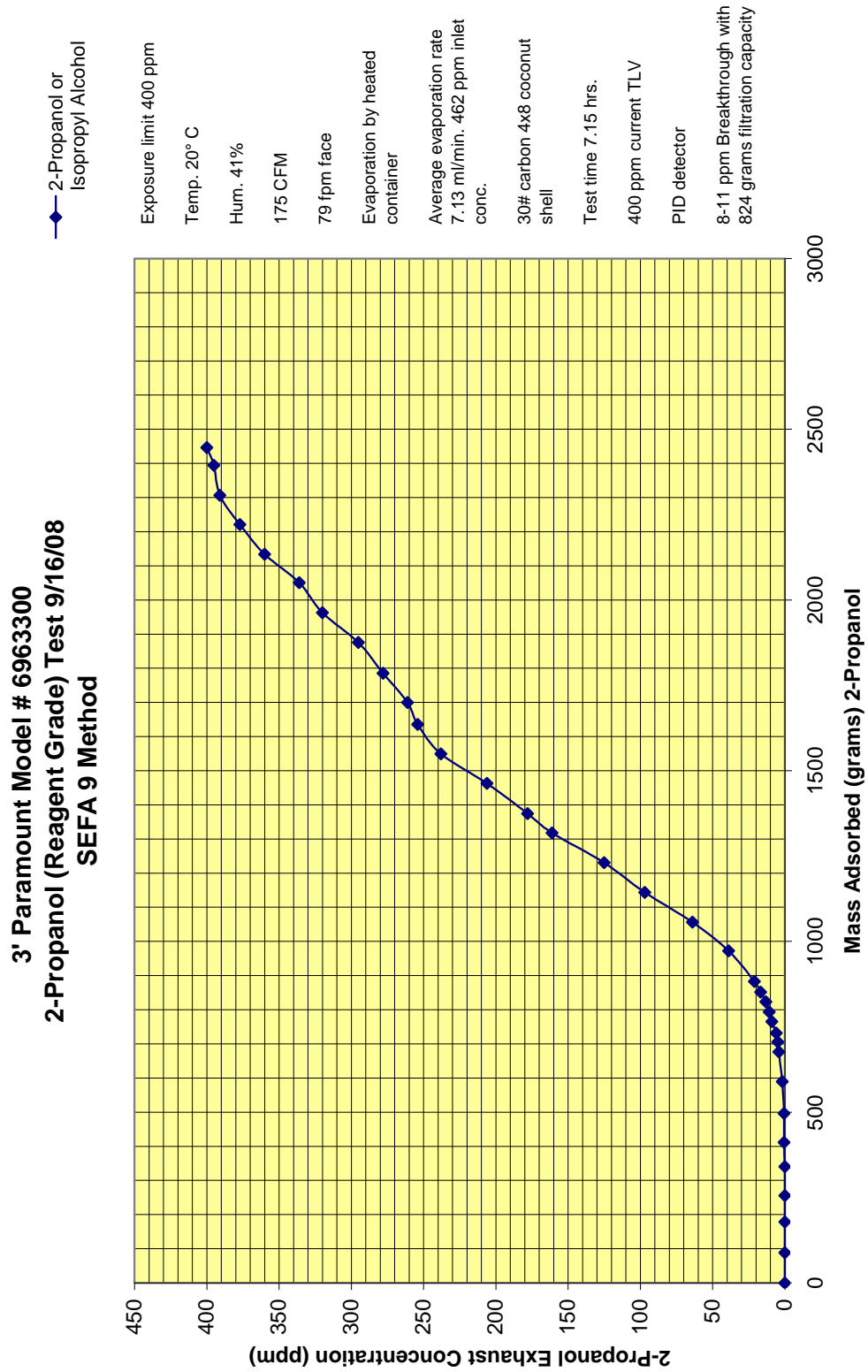
<u>Chemical</u>	<u>Exposure Limit</u>	<u>Evaporation Rate</u>	<u>No. of Filters</u>	<u>3' Paramount Carbon Filter Mass</u>	<u>Chemical Mass Adsorbed</u>	<u>Detected Saturation Breakthrough Concentration</u>	<u>Filtration Capacity Tested</u>	<u>Filtration Capacity Theoretical</u>	<u>Filtration Efficiency</u>
Acetone	250 ppm	22 ppm	4	13500 grams	153 grams	1-2 ppm	1.1%	2.8%	39%
Ethanol or Ethyl Alcohol	1000 ppm	14 ppm	4	13500 grams	32 grams	6-9 ppm	0.3%	1.6%	19%
	1000 ppm	206 ppm	4	13500 grams	148 grams	6-9 ppm	1.1%	6.3%	17%
Isopropyl Alcohol	400 ppm	462 ppm	4	13500 grams	824 grams	8-11 ppm	6.1%	17.7%	34%
Toluene	100 ppm	155 ppm	4	13500 grams	1317 grams	0.5-1 ppm	9.8%	29.7%	33%
37% Hydrochloric Acid	5 ppm	100 ppm	4	18000 grams of treated carbon	2529 grams	0.5-1 ppm	14.1%	17.0%	83%

## 3' Paramount Model #6963300 Acetone (Reagent Grade) Test 9/10/08 SEFA 9 Method

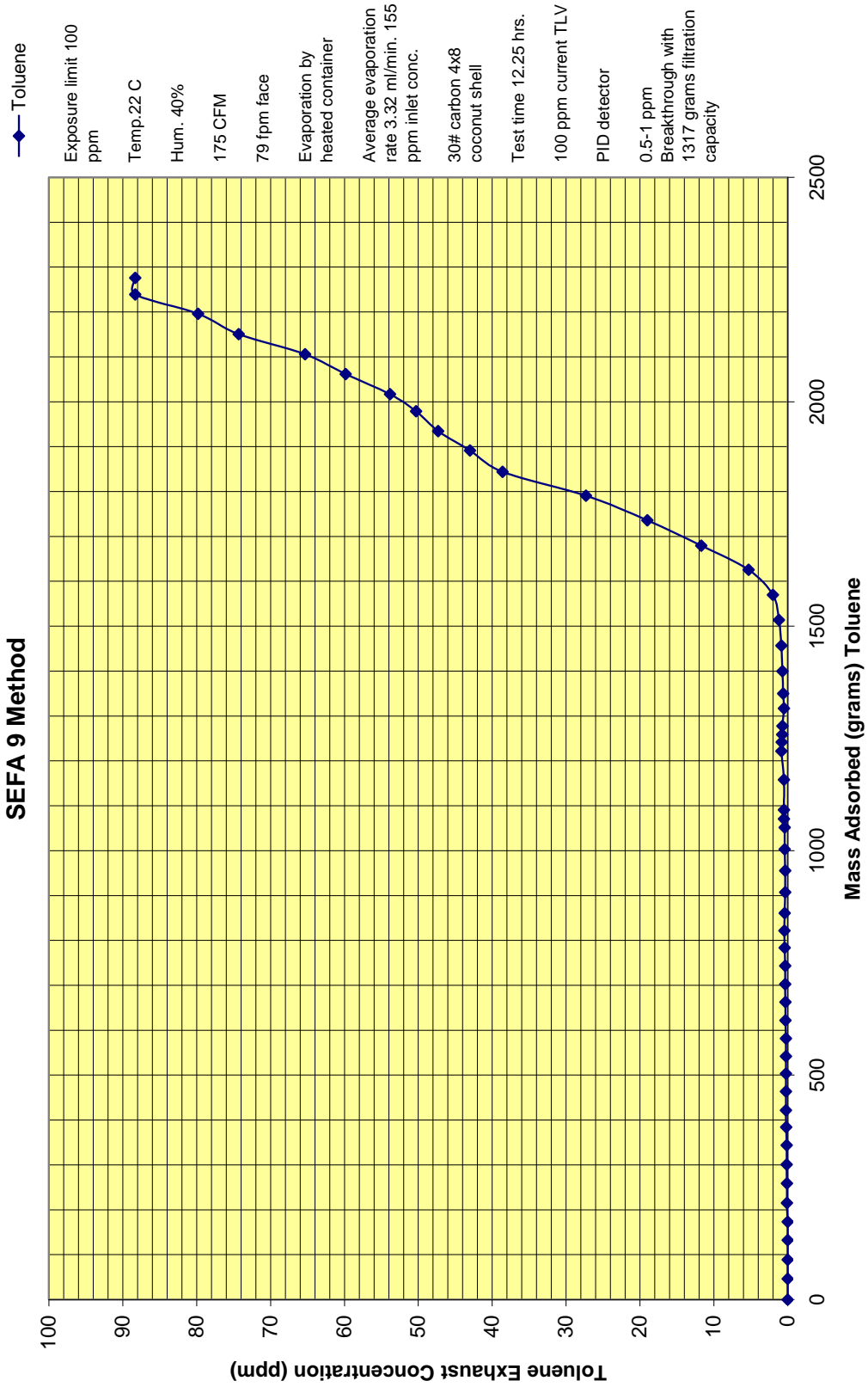




## Appendix F: Filtration Efficiency Test Results



## 3' Paramount Model # 6963300 Toluene (Reagent Grade) Test 9/23/08 SEFA 9 Method





## Appendix F: Filtration Efficiency Test Results

3' Paramount Model # 6963300  
HCL Acid Test 10/02/08  
SEFA 9 Method

