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Cole-Parmer® Basic PCR Laminar Flow Cabinets



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Safety Warnings

- This cabinet offers no operator protection, only product protection.
- This cabinet is capable of achieving ISO Class 3 air cleanliness within work zone as per ISO 14644.1 (equivalent to Class 1 as per US Federal Standard 209E).
- Read all instructions before proceeding and observe the installation procedure and environmental/electrical requirements.
- **NEVER OPERATE UV LAMP WITHOUT EYE AND SKIN PROTECTION.**
- Anyone working with, on or around this equipment should read this manual. Failure to read, understand and follow the instructions given in this documentation may result in damage to the unit, injury to operating personnel and/or poor equipment performance.
- Any internal adjustment, modification or maintenance to this equipment must be undertaken by qualified service personnel.
- The use of any hazardous material in the cabinet must be monitored by an industrial hygienist, safety officer or some other suitably qualified individual.
- Explosive or inflammable substances should never be used in the cabinet unless a qualified safety professional has evaluated the risk involved.
- If chemical, radiological or other non-microbiological hazards are being used in the cabinet, additional protective measures should be taken. The operation should also be monitored by a suitably trained individual.
- Before you proceed, you should thoroughly understand the installation procedures and take note of the environmental/electrical requirements of the cabinet.
- If the equipment is used in a manner not specified by this manual, the protection provided by this equipment may be impaired.

Symbols



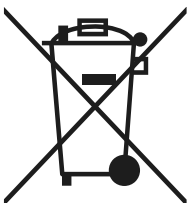
Warning of hazardous area or situation



Warning of dangerous electric voltage

Limitation of Liability

The disposal and/or emission of substances used in connection with this cabinet may be governed by various local regulations. Familiarization and compliance with any such regulations are the sole responsibility of the users of the cabinet. The liability of Cole-Parmer is limited with respect to user compliance with such regulations.



At the end of your product and accessories life, it must not be discarded as domestic waste. Ref: EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment Directive (WEEE). Please contact your distributor / supplier for further information. For end users outside of the EU consult applicable regulations.

Warranty

The manufacturer agrees to correct for the original user of the product, either by repair (using new or refurbished parts), or at the manufacturer's election, by replacement (with a new or refurbished product), any defects in material or workmanship which develop during the warranty period. The standard warranty is twelve (12) months after delivery of the product for Non-Consumable and Electrical parts, excluding Filters and other Consumables. In the event of replacement, the replacement unit will be warranted for the remainder of the original warranty period or ninety (90) days, whichever is longer. For purposes of this limited warranty, "refurbished" means a product or part that has been returned to its original specifications. In the event of a defect, these are your exclusive remedies.

If the product should require service, contact the manufacturer's/supplier's office for instructions. When return of the product is necessary, a return authorization number is assigned and the product should be shipped, transportation charges pre-paid, in either its original packaging or packaging affording an equal degree of protection to the indicated service center. To ensure prompt handling, the return authorization number must be placed on the outside of the package. A detailed explanation of the defect should be enclosed with the item. The warranty shall not apply if the defect or malfunction was caused by accident, neglect, unreasonable use, improper service, acts of God, modification by any party other than Cole-Parmer, or other causes not arising out of defects in material or workmanship.

EXCLUSION OF IMPLIED WARRANTIES. THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THOSE OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHICH EXTEND BEYOND THE DESCRIPTION AND PERIOD AS STATED IN THE OPERATOR'S MANUAL INCLUDED WITH EACH PRODUCT. LIMITATION ON DAMAGES. THE MANUFACTURER'S SOLE OBLIGATION UNDER THE WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT OF A DEFECTIVE PRODUCT AND THE MANUFACTURER SHALL NOT, IN ANY EVENT, BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND RESULTING FROM USE OR POSSESSION OF THIS PRODUCT.

Some states do not allow: (A) limitations on how long an implied warranty lasts; or (B) the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may have other rights that vary from state to state.

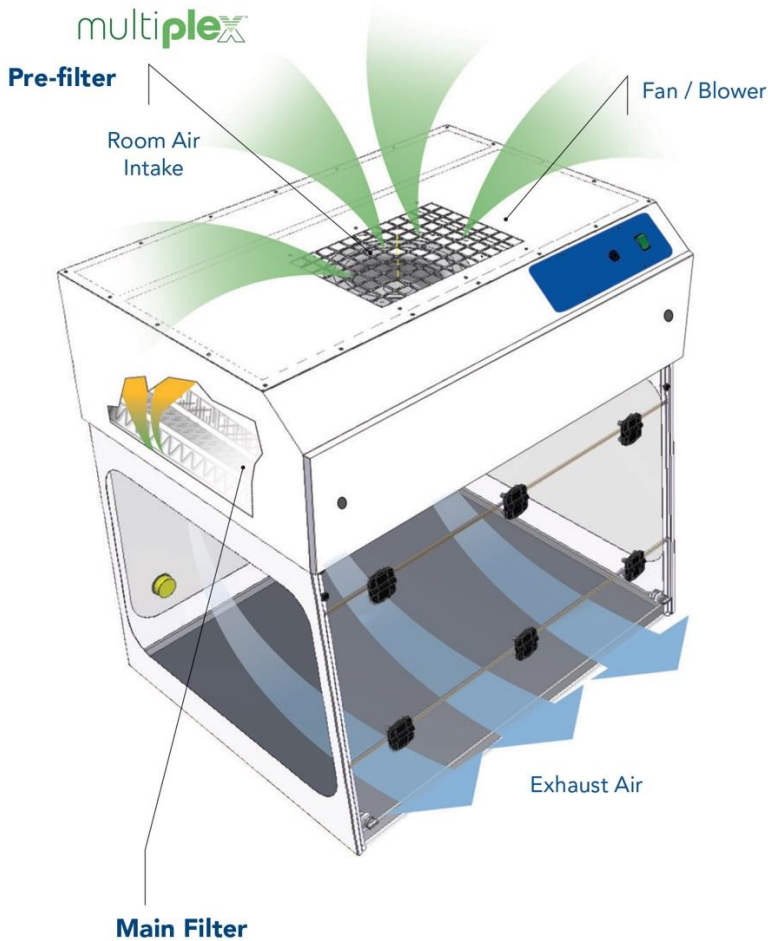
I . Product Information

Based on our vertical laminar flow cabinet product line, our PCR cabinet has been designed specifically for polymerase chain reaction (PCR) applications. The cabinet isolates critical steps in the PCR process by providing a particulate-free work environment and can be operated effectively as a “mini-environment” in the laboratory. Vertical laminar flow cabinets offer proven protection for your sample and processes where operator protection is not required. They are suitable for applications which require ISO Class 3 air cleanliness within the work zone as per ISO 14644-1 (equivalent to Class 1 per US Federal Standard 209E).

Airflow Pattern Inside the Cabinet

The disposal and/or emission of substances used in connection with this cabinet may be governed by various local regulations. Familiarization and compliance with any such regulations are the sole responsibility of the users of the cabinet. The liability of Cole-Parmer is limited with respect to user compliance with such regulations.

Cole-Parmer_PCR Airflow Pattern



II . Unpacking Your Cabinet

This chapter aims to provide relevant information on how to handle the cabinet properly upon receipt. Failure to follow these instructions may damage the cabinet. We strongly advise you to read this chapter carefully before proceeding further.

2.1 Step-By-Step Procedure

1. Inspecting the Crate, Pallet, Boxes

- » Upon receipt of your new cabinet, inspect all cartons. If there is any visible damage to the exterior please contact our customer service.

2. Moving the Pallet

- » The pallet is designed to protect the cabinet from any foreseeable circumstances. However, excessive impact on the boxes or pallet may also damage the cabinet. Prevent any direct impact or hitting to the pallet when moving.
- » When lifting the pallet, always ensure that the floor jack or mechanical lift truck has fully entered under the pallet in order to achieve stability. Failure to do so will increase the risk of the pallet falling off the floor jack or mechanical lift truck during handling. Please use a suitable extension bar when necessary.

3. Opening the Boxes

- » If you did not receive one or more of the parts listed on the packing checklist, or if any of the items are damaged, please contact our customer service.

4. Removing the Packaging Material

- » The cabinet is protected by ~~extruded polystyrene foam~~ styrofoam, cardboard and/or shrink-wrap.
- » If you find any damage during this stage of unpacking please refer to please contact our customer service.
- » We recommend leaving the cabinet secured with straps to the pallet until the cabinet is located in its approximate final position to facilitate ease and safety in handling.

NOTE: Choosing the best location for your cabinet in order to achieve optimum operating performance is determined by a number of factors. Please refer to the next chapter for some guidelines.

5. Moving the Cabinet

- » When lifting the pallet with the cabinet, always ensure that the floor jack or mechanical lift truck has fully entered under the pallet. This is to increase the stability of the cabinet and reduce the risk of the cabinet falling down. Please use a suitable extension bar when necessary. During the moving of the cabinet, ensure there is enough distance between the supports of the pallet and the ground. Dragging the pallet against the ground will damage the pallet and possibly your new cabinet.
- » When removing cabinet from pallet or placing cabinet onto pallet, use at least two people.

6. Removing the Strapping

- » Remove the strapping by cutting it at a safe position to prevent scratching the surface of your new cabinet.
- » Do not discard the packaging material for your cabinet until you have checked all of the components, installed and tested the unit.

7. Lifting the Cabinet

- » The cabinet can be lifted in two sections: The HEAD unit and ENCLOSURE.
- » Install the cabinet on the existing work surface or Cole-Parmer support stand (if ordered).

NOTE:

- » When installing the cabinet onto an existing work surface, ensure that the structure can safely support the combined weight of the cabinet and any related equipment. Some modifications to the work surface may be necessary.
- » The work surface should be smooth, non-porous and resistant to the disinfectants and chemicals used in conjunction with the cabinet.

2.2 Packaging Contents

The following items are included with your manual:

- Test Certificate
- Test Report

In case this manual and/or test report is lost or misplaced, the factory retains a copy in our files. A replacement copy can be obtained by contacting Cole-Parmer and providing the cabinet model, serial number and a brief description of the information desired.

III . Installing Your Cabinet

3.1 Choosing a Suitable Location

Location impacts the nature and extent of external airflow disturbances, which may affect performance of the cabinet when it is exposed to these disturbances.

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

Please follow these guidelines when choosing a suitable location for your cabinet.

- The location must be far away from:
 - » Personnel traffic flows.
 - » Air vents (in and out).
 - » Doors and windows.
 - » Any other sources of disruptive air currents or air drafts.
- If drafts or other disruptive air currents exceed the face velocity of the filter, the potential exists for contaminated air to enter the work zone of the cabinet.
- A minimum distance of 50 cm (20 in.) to the top of the ceiling is recommended for blower changing purposes.
- A clearance of 183 cm (6 ft) in front of the cabinet is strongly advised in order to maintain proper airflow.
- Please permit adequate space for cleaning behind the cabinet.

3.2 Environmental / Electrical Conditions

The equipment is designed to be safe for at least the following conditions:

- » Indoor use.
- » Altitude < 2,000 m (6,562 ft).
- » Temperature range 5°C to 40°C (41°F to 104°F) ambient.
- » Relative humidity <80% up to 31°C (88°F) decreasing to <50% at 40°C (104°F).
- » UL Installation Category II.
- » UL Pollution Degree 2.
- » Continuous operation.
- » Electrical supply tolerance of –10% / +10%.
- » 120VAC, 60Hz, 10A or 230VAC, 50Hz, 5A.
- » Fuse: 250V, 10A, Time Lag for 120VAC or Fuse: 250V, 5A, Time Lag for 230VAC.
- » Always ensure unit is connected to a reliable and properly grounded receptacle.
- » Appliance inlet on this device is disconnect device; appliance should not be positioned so that it is difficult to operate it.

Power Cord:

- » 1) For units intended to be operated at 120 volts (North America): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.
- » 2) For units intended to be operated at 230 volts: Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

3.3 Installing Your Cabinet

1. Please refer to [Unpacking Your Cabinet - page 6](#).
2. Inspect your cabinet carefully. Should you find any defect please refer to the warranty.
3. Peel off any protective masking that was left on the cabinet during manufacturing.
4. Wipe down the interior and exterior of the cabinet with water or a mild household detergent.
5. Connect cabinet to the main power supply and turn on the blower. Each cabinet requires its own dedicated 13A (230V) or 15A (115V) power outlet which should not be shared with other appliances.



WARNING! Do not move the cabinet without observing the following precautions:

- Observe the necessary precautions when relocating the cabinet, as it is heavy.
- Warning - Tipping Hazard. Pushing high up on the unit may cause system to tip over. Be careful when moving. Move with assistance only.

3.4 Performance Validation / Certification

After installation and prior to use, cabinet performance must be validated and certified to factory standards.

The following tests should be performed:

- Airflow Velocity
- Filter Leak Test (filter media leak test and filter gasket leak test)

The testing methods and equipment required are specified on the test report. It is recommended that these tests be performed only by a qualified technician who is familiar with the methods and procedures for certifying laminar flow cabinets.

3.4.1 Importance of Performance Validation / Certification

An airflow velocity value that falls below the value specified inside the test report will not provide adequate product protection.

Airflow Velocity

The testing methods and equipment required are specified on the test report. It is recommended that these tests be performed only by a qualified technician who is familiar with the methods and procedures for certifying these types of cabinets.

3.4.2 Recertification

After the initial certification, the cabinet shall be recertified in the following situations:

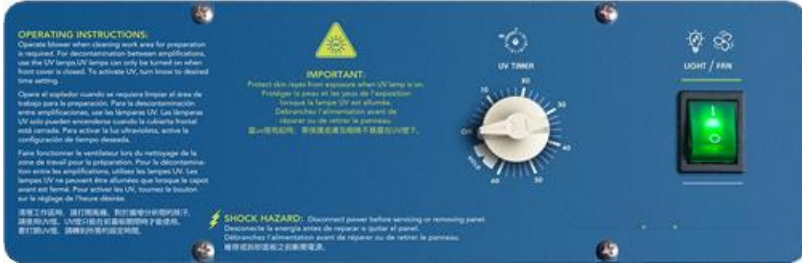
1. Relocation of cabinet.
2. When performance is suspect.
3. Major maintenance or service (filter changing, blower changing, etc.).
4. At least annually.

3.4.3 Disclaimer

The performance of the cabinet, while rigorously evaluated at the factory, cannot be guaranteed after transit and installation. Therefore on-site testing is always recommended.

IV . Operating Your Cabinet

4.1 Standard Integrated Control Panel



Main On / Off for Light and Fan

Press the switch up to turn on. The green indicator lamp will illuminate to confirm the power is on. The fan will start and the internal task light unit will illuminate.

UV Timer Dial

Permits UV to be activated.



WARNING!

- Eyes and skin should not be exposed to direct ultraviolet light.
- Front door/sash must be completely closed before activating.

4.3 Cabinet Start-Up Procedure

1. Adjust the seating position so that the user's face is above the front opening. Adjustable stool is recommended.
2. Turn on the fan. Leave the cabinet on for 5 minutes before beginning work in order to purge airborne contamination from the work area.
3. Prepare a written checklist of materials/apparatus necessary for immediate usage and surface-decontaminate before loading them into the work zone. This is to prevent overloading and to minimize the number of arm movements that might disrupt the airflow.
 - » Never use the cabinet to store supplies or laboratory equipment.
 - » Keep the back air grilles unobstructed by arms or objects.
 - » Always surface-decontaminate all items before inserting into the work zone.
4. Load and arrange the materials/apparatus to minimize the movement of contaminated items over clean items by segregating the contaminated items from the clean items.
5. A clean, long-sleeved laboratory coat may be used to protect personal clothing.
6. Wash hands thoroughly using germicidal soap. Wear gloves for hand protection. Gloves should be pulled over the knitted wrists of the gown rather than worn inside.
7. Minimize room activity (personnel movements, closing and opening doors, etc.).

4.4 Working In The Cabinet

1. Work from clean to dirty by following the segregation of clean and dirty materials/apparatus as described in the Start-Up Procedure above.
2. Particularly critical objects may be arranged such that air flows directly against them while the back air grilles remain unobstructed by arms or objects.
3. Do not use a gas flame, if possible, as it interferes with airflow.
4. Do not use writing materials inside the work area as they generate aerosols.
5. Do not change the original blower speed of the cabinet unless the change is required by a decrease in measured air velocity. Adjustment should be made only by a qualified technician.
6. Do not operate the cabinet if fan fails to run.
7. Do not cough or sneeze into the work zone.
8. Minimize arm movement. Move arms in and out of the cabinet slowly to avoid disrupting cabinet airflow.
9. Use absorbent pads on the work surface where appropriate to minimize splatter and aerosol generation in case of spillage.
10. Clean materials should be at least 150 mm away from aerosol generating objects to minimize the chance for cross contamination.
11. Hold lids/covers above dishes/sample plates in order to prevent air impingement where appropriate.
12. Arrange objects to avoid airflow turbulence.
13. Keep arms as far away as possible from items in the work zone.
14. Keep heads (large potential for aerosol generation) out of the work zone.
15. It is recommended that the cabinet be operated continuously whenever possible to ensure cleanliness.

4.5 Cabinet Shutdown Procedure

1. Close front cover/sash and activate UV lamp cycle.
 - » Eyes and skin should not be exposed to direct ultraviolet light.
 - » Ultraviolet light should not be relied upon as the sole disinfecting agent.
 - » Check the UV interlock regularly for correct operation.
 - » Use of UV lamp in laminar flow cabinets is explicitly discouraged in all major international standards and recommendations.
2. Once complete, turn off the cabinet, remove laboratory gloves and coat and thoroughly wash hands using germicidal soap.

4.6 Ergonomics

During cabinet operation, you will most likely be seated.

Advantages of the sitting position:

1. Physiological energy costs and fatigue are reduced.
2. Body is provided with stable support.

Disadvantages of the sitting position:

1. Limited working area.
2. Possible risk of being constrained in a fixed posture for a long period of time.
3. One of the most stressful positions for the back.

Create a more comfortable and healthier working condition by following these simple steps:

1. Ensure that there is enough space for your legs and feet.
2. Keep the lower back comfortably supported by your chair. Adjust the chair or use a pillow behind your back when necessary.
3. Position your feet flat on the floor or on a footrest. Do not dangle your feet and compress your thighs.
4. Vary your sitting position throughout the day. Do not sit in one fixed posture all day.

Guidelines for eyes:

1. Give your eyes frequent breaks. Periodically look away from the work area and focus on a distant point.
2. Keep your glasses clean.
3. Arrange and position frequently used work materials to minimize the possibility of eye strain.

V . Maintaining Your Cabinet

5.1 Maintenance Schedule

Please follow the suggested maintenance schedule in order to maintain your Cole-Parmer cabinet at its optimum performance.

Monthly

Using a damp cloth, clean the exterior surfaces of the cabinet, particularly the front and top of the cabinet, to remove any accumulated dust. When needed use soap or other mild household detergent.

Quarterly

- Replace pre-filters.
- All monthly activities.

Annually

- Replace the UV lamp.
- All quarterly activities.

Biannually

- Replace the fluorescent lamps.
- All annual activities.

User Monthly Maintenance Schedule

Model:		Year:	
Serial Number:		Responsible Person:	
Month	Clean Exterior Surface	Notes	By Whom
Jan			
Feb			
Mar			
Apr			
May			
Jun			
Jul			
Aug			
Sep			
Oct			
Nov			
Dec			

5.2 Disinfecting Agents

1. For polycarbonate, all common polycarbonate cleaners or disinfecting agents except alcohol or chlorine-based agents are suitable.
2. For powder coated surfaces, all common disinfecting agents are suitable.



WARNING!

Do not use any disinfectant containing alcohol or chlorine-based substance as this will cause irreparable damage to the cabinet structure.

VI . Maintenance By Service Personnel Only

6.1 Cabinet Airflow Balancing

After some period of usage, the pressure drop across HEPA/ULPA filters will increase, otherwise known as “filter loading”. Compensate for this effect by increasing the fan speed, however the limit to this increment in speed is the maximum supply voltage according to the fan performance curve. If this happens and the required cabinet performance cannot be achieved, the filters must be changed. (Please refer to the filter changing section below.) Please follow the steps described below to adjust the fan speed:

1. Remove front control panel.
2. Adjust speed control to achieve desired velocity.
3. Recertify the cabinet after speed is adjusted.

6.2 Filter Changing

The HEPA/ULPA filter, under normal usage and barring an accident such as a puncture, does not need replacement until the airflow velocity cannot be maintained at the specifications required by the test report, even though the fan has been set to maximum speed. The filter changing procedure is described below. The cabinet must undergo recertification after filter changing. Before the new filters are installed, all surfaces should be thoroughly cleaned of silicon and/or adherent gasket material. The new filter should be carefully handled and examined prior to fitting. It is important that the filters and the gaskets be checked for leaks prior to use.

Filter Changing:

1. Remove blue filter door with key provided.
2. Remove filter/blower plenum via filter clamps by releasing bolts.
3. Remove supply filter carefully. Replace new filter by reversing above steps.

NOTE: THE FOLLOWING APPLIES FOR BOTH HORIZONTAL AND VERTICAL LAMINAR FLOW CLEAN BENCHES.

- The nuts that are used to clamp the filter must be tightened until 50% compressed with alternating pattern after the new filter is installed. The nuts must be equally tightened to provide uniform compression. This prevents over compression on one side of the filter that may cause filter leakage.
- Pre-filters (all units) - Remove pre-filter from top of cabinet and replace.

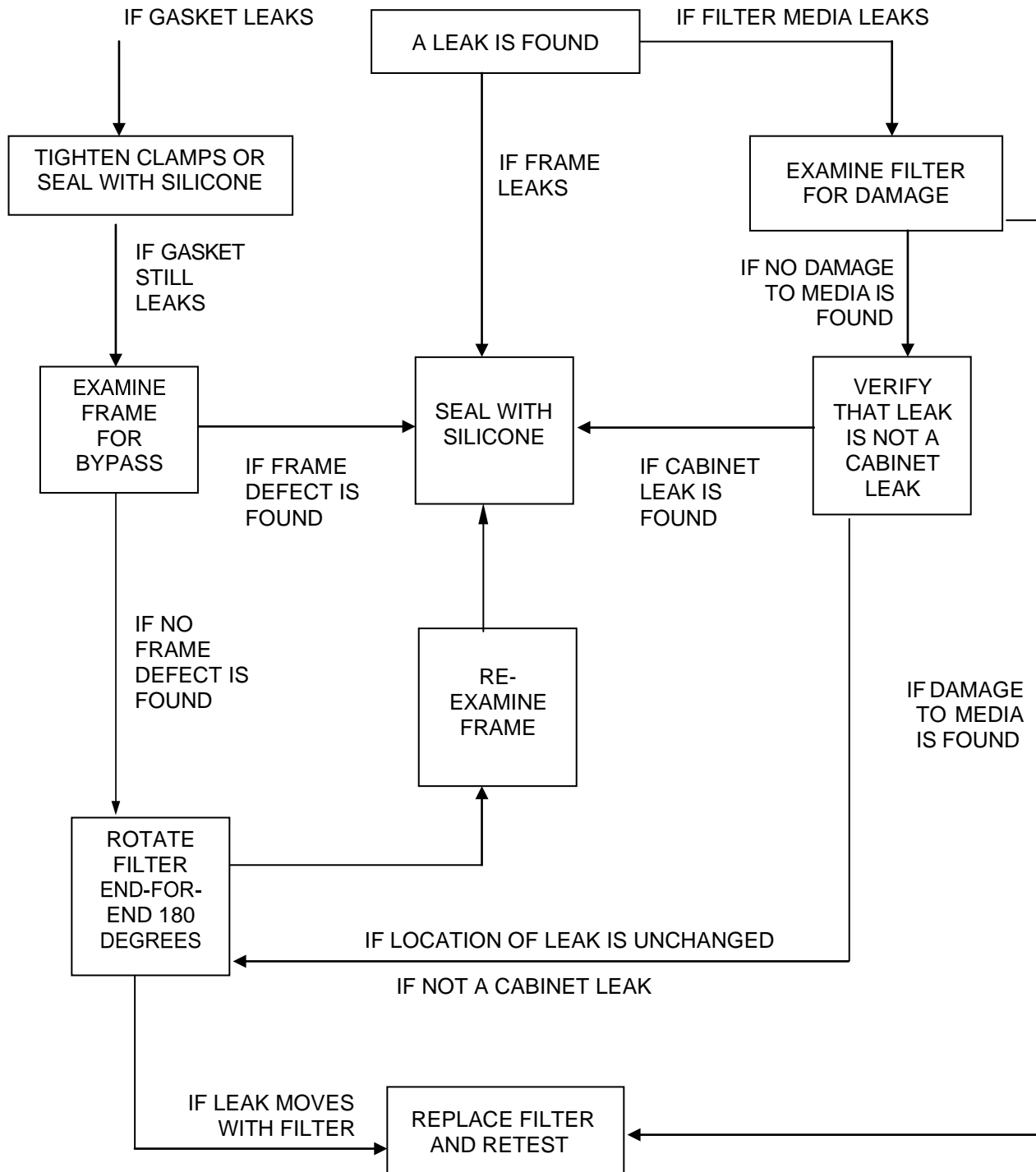
6.3 Recertification

The following tests should be performed:

- Airflow Velocity
- Filter Leak Test (filter media leak test and filter gasket leak test)

The testing methods and equipment required are specified on the test report. It is recommended that these tests be performed only by a qualified technician who is familiar with the methods and procedures for certifying laminar flow cabinets.

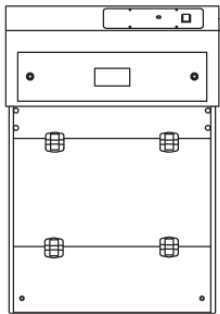
64 Leak Testing Of HEPA Filters



VII . Troubleshooting Common Problems

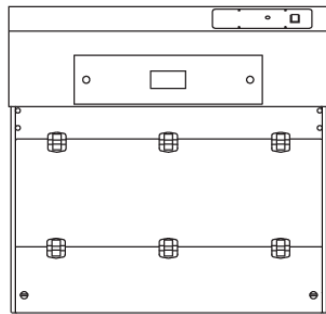
Problem	Potential Cause	Corrective Action
Cabinet does not start / no power	<ul style="list-style-type: none"> • Wrong electrical connection 	<ul style="list-style-type: none"> » Check that electrical cord is connected properly. » Check that wall socket is operational. » Reset circuit breaker on top of unit.
Motor silent	<ul style="list-style-type: none"> • Blown fuse • Faulty relay • Faulty speed control • Auto-thermal cut-off engaged • Faulty fan capacitor • Motor failure 	<ul style="list-style-type: none"> » Switch off cabinet and check. » Short out control by placing jumper wire directly across connections to the two speed control leads. » If fan operates, speed control is defective. » If fan does not run, speed control is not the problem. » Blower was overheated. » Shut off, wait 30 minutes and try to restart. » Replace fan capacitor. » Disconnect two motor leads at motor. Connect a proper AC voltage source directly to motor. » If motor starts to run, problem is in the wiring connection. Refer to blown fuse or faulty relay section. » If motor does not run, motor is defective. Replace motor.
Inoperative switches	<ul style="list-style-type: none"> • Connection problem 	<ul style="list-style-type: none"> » Check if cable from electrical panel is properly connected to switch.
Low airflow / high airflow	<ul style="list-style-type: none"> • Adjust speed control setting • Faulty fan capacitor (low airflow) • Faulty speed control 	<ul style="list-style-type: none"> » Adjust speed control as needed. » Replace fan capacitor. » Short out control by placing jumper wire directly across connections to the two speed control leads. » If fan operates, speed control is defective. » If fan does not run, speed control is not the problem.
Excessive fan noise	<ul style="list-style-type: none"> • Loose motor or blower wheel mount 	<ul style="list-style-type: none"> » Check tightness of set screw holding blower wheel. » Check tightness of all blower and motor mounting bolts.
Light always off	<ul style="list-style-type: none"> • Faulty bulb • Faulty relay 	<ul style="list-style-type: none"> » Tighten bulb to ensure proper fit. » Replace bulb. » Switch off cabinet and check.
UV lamp always off	<ul style="list-style-type: none"> • Faulty bulb • Faulty relay • Door microswitch 	<ul style="list-style-type: none"> » Tighten bulb to ensure proper fit. » Replace bulb. » Switch off cabinet and check. » Ensure door microswitch is intact and making contact with door magnet. Ensure microswitch is switching on relay.
Contaminated samples	<ul style="list-style-type: none"> • Filter leaking • Low airflow 	<ul style="list-style-type: none"> » Repair or replace filters. » Readjust airflow setting.

VIII. Product Specifications



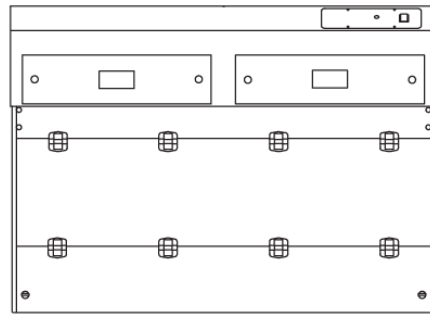
24"

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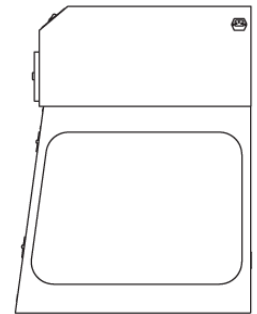
36"

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48"

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Side View

MODEL	DIMENSIONS					WEIGHT (lbs/Kg)	
	Nominal Width	Internal Height	Internal Depth	External (W x D x H)	Shipping (W x D x H)	Net	Ship
24	24" / 610 mm	24" / 610 mm	26.75" / 679 mm	24" x 27" x 35" / 610 x 686 x 889 mm	48" x 40" x 45" / 1219 x 1016 x 1143 mm	72 / 33	150 / 68
36	36" / 914 mm	24" / 610 mm	26.75" / 679 mm	36" x 27" x 35" / 914 x 686 x 889 mm	48" x 40" x 45" / 1219 x 1016 x 1143 mm	99 / 45	175 / 79
48	48" / 1219 mm	24" / 610 mm	26.75" / 679 mm	48" x 27" x 35" / 1219 x 686 x 889 mm	60" x 40" x 45" / 1524 x 1016 x 1143 mm	138 / 63	225 / 102

PRODUCT SPECIFICATIONS

	24	36	48
Filtration			
Airflow	<... Vertical downflow; 0.3 m/s - 0.45 m/s (60 - 90 fpm). ...>		
Pre-Filter	<... Disposable polyester fibers with 85% arrestance. ...>		
Main Filter	<... HEPA efficiency, 99.99% at 0.3µm. ...>		
Clamping	<... Screw compression clamp. ...>		
Construction			
Finish (exterior)	<... White epoxy-coated steel frame with white legs on cabinet sides. ...>		
Windows	<... Polycarbonate, transparent, UV absorbing. ...>		
Blower	<... ebm-papst centrifugal fan. ...>		
Controls	<... Main On/Off switch for fan and lighting. Solid-state fan speed control with RFI filter maintains blower uniformity. UV timer, safety interlock shut-off. ...>		
Electrical	<... 120V, 60Hz or 230V, 50Hz voltages available. Specify when ordering. Other voltage options available. ...>		
Work Surface	<... Standard, black polypropylene. Optional, white polypropylene or stainless steel. Specify when ordering. ...>		
Pass Through Ports	<... Two, standard, knock-out. ...>		
Shelving	<... Decontamination shelf on rear wall. ...>		
Front Sash	<... Standard, hinged double with safety interlock. ...>		
Efficiency			
Lighting	<... LED lighting. ...>		
UV Lamp	<... 1 x 253.7 nanometer 15 watt. ...>		
Noise, dBA*	< 63	< 66	< 66

* Measured 12" (30 cm) from the cabinet front and 15" (38 cm) above the work surface plane.

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