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Installation, Operation, Maintenance Manual UniFlow Perchloric Acid Laboratory Fume Hoods

Stainless Steel Perchloric Acid 12401, 12501, 12601, 12801, 12411, 12511, 12611
PVC Perchloric Acid 12421, 12521, 12621, 12431, 12531, 12631



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Upon Receiving Fume Hood

- **HEMCO** fume hoods are shipped palletized, fully crated, padded, and wrapped for maximum protection and ease of handling. Upon receiving, inspect for crate damage and possible concealed damage that may have occurred in transit. Save all delivery receipts and crating materials. If damaged, promptly call **HEMCO** at **(816) 796-2900**. Damage must be reported immediately for a claim to be processed.

- When uncrating the fume hood remove the band strap, which is securing the corrugate to the pallet.

- When ready to install fume hood, carefully lift from pallet and set on work surface in proper location (see fume hood Installation).

CAUTION: DO NOT lift the fume hood at any time by the airfoil as this will damage the unit. Fig 1



Figure 1

SITE PREPARATION

A fume hood requires that it be installed on a level surface. If fume hood base cabinets are included with the fume hood installation make sure the floor is clean and level.

All service lines for the Fume hood installation, such as water, air, gas, etc. should be purged of dirt, capped and tested prior to connection to the fume hood.

Laboratory fume hoods should be located to avoid cross-currents at the fume hood face due to heating, cooling or ventilation inlets.

Fume hoods should be located away from high traffic lanes within the lab to avoid air that could draw hazardous fumes into the room.

Passing personnel should provide sufficient aisle space in front of the fume hood to avoid disruption of the work or interference with the operating technician.

Safety devices such as drench showers, eyewash stations, fire extinguishers, first aid kits and fire blankets should be located convenient to the fume hood operating personnel and plainly labeled as to their use and function.

In addition, laboratory fume hoods are potential locations for fires and explosions due to the type of experiments conducted in these units. As such, fume hoods should be located so an explosion or fire within the hood would not impede exit from the lab

BASE CABINET INSTALLATION

Position the cabinets in the desired location approximately 7 inches from a rear wall or in a suitable island location. Top of the cabinet should be leveled using the adjustment feet on the bottom of the cabinet. If multiple cabinets are involved, bolt them together and then bolt to existing cabinets or walls and level as one unit. Fig 2



Figure 2

WORK SURFACE

Once the fume hood base cabinet is installed apply an adhesive to the top surface of the cabinet. Fig.3

Carefully place work surface on cabinet and make any corrections the position/alignment. Allow adhesive to dry before setting fume hood. Fig.4

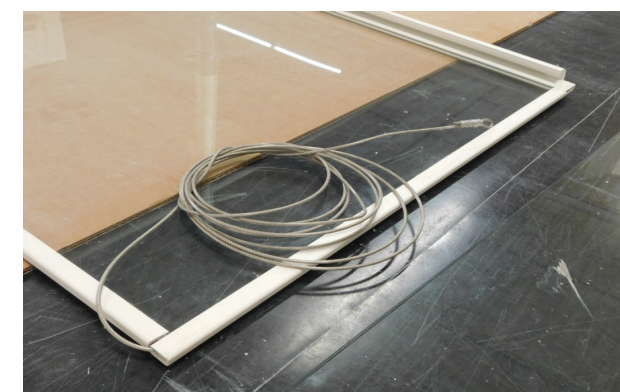
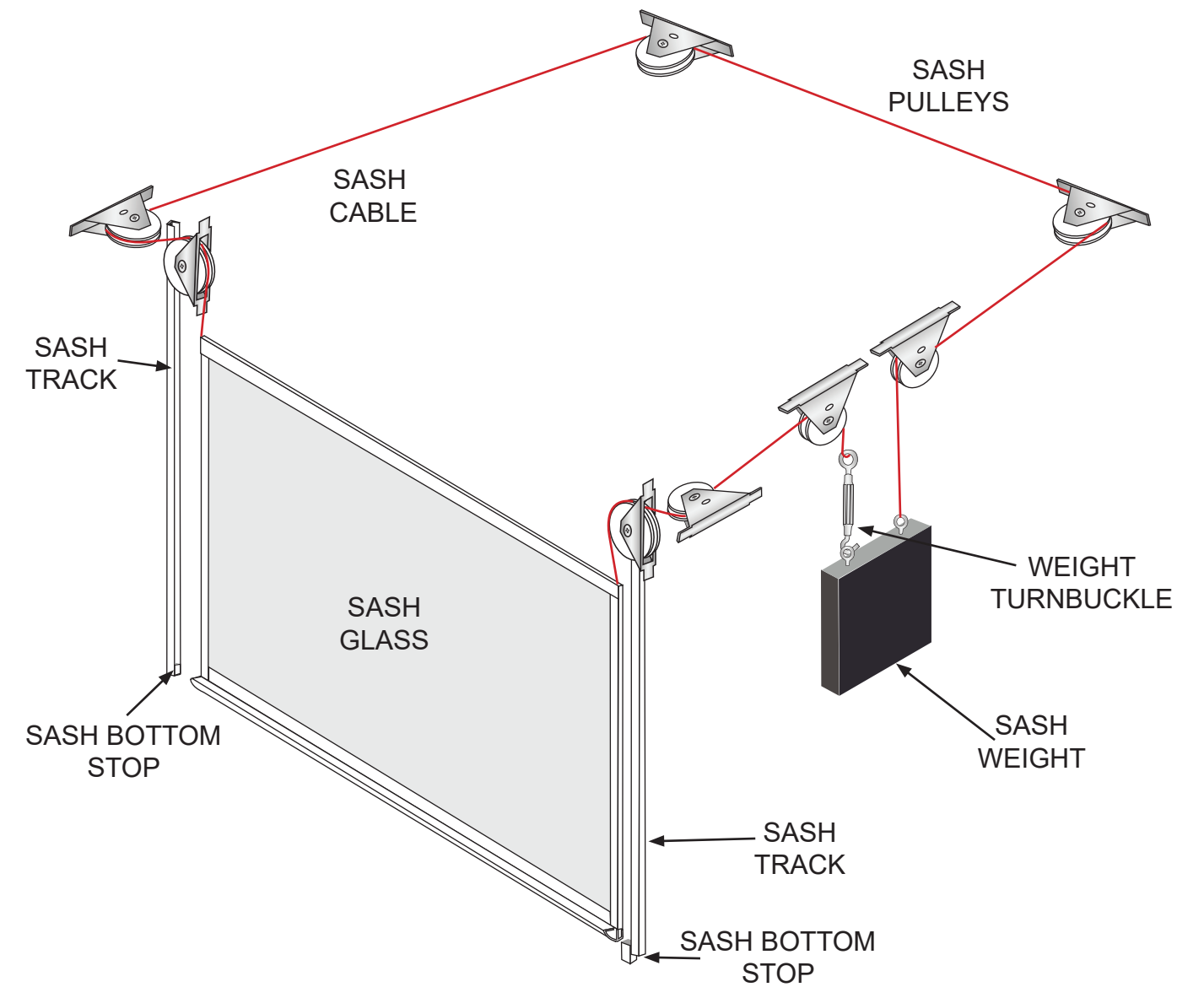


Figure 3



Figure 4

Cable Diagram Single Sash, 1 weight

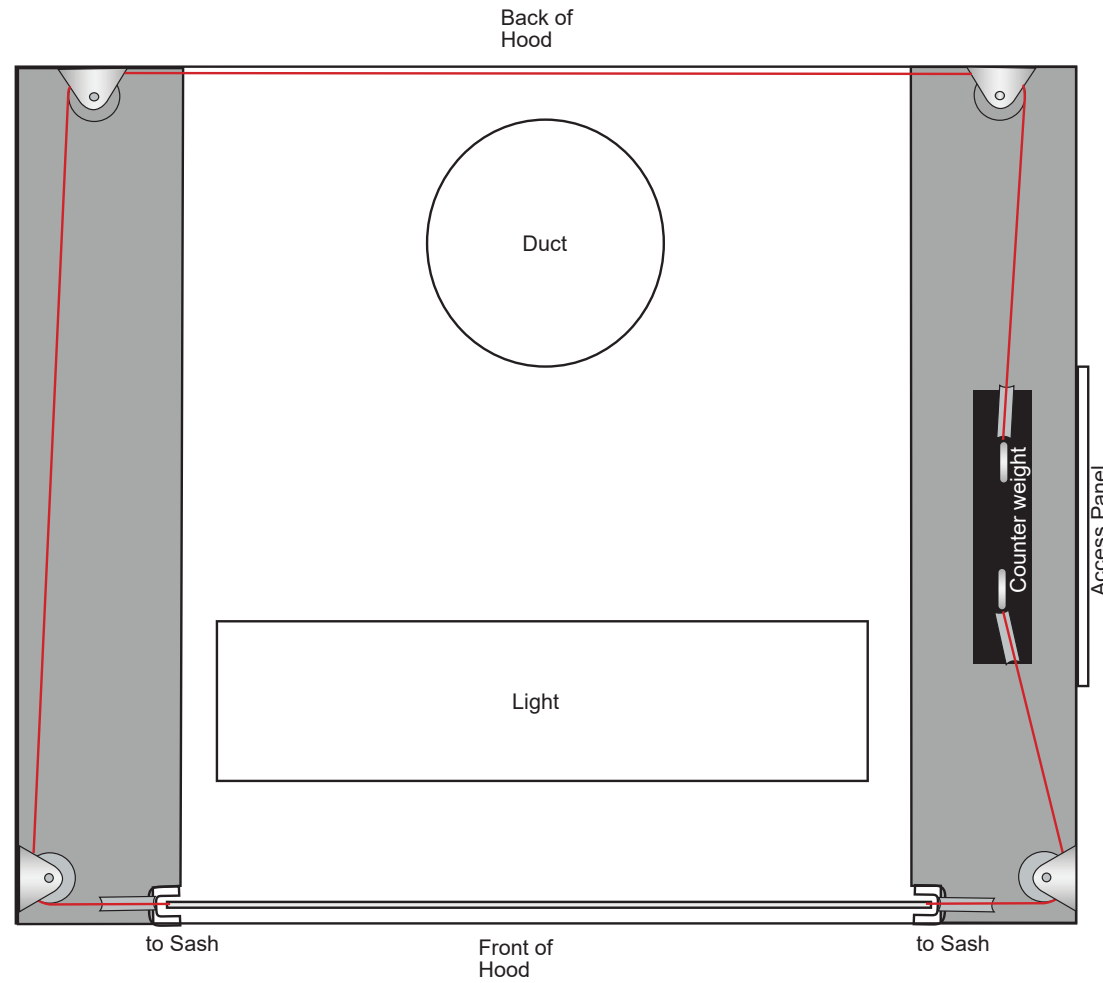


Detail: 1 Cable connecting to sash.



Detail: 2 Sash bottom stop located in track just above airfoil.

Cable Diagram Single Sash, 1 weight



Detail: Sash weight

Fume Hood Installation

1. Fume hood must be set on a work surface or a flat level surface, Fig 5 supported by a base cabinet or table. The Fume hood is a lab furnishing and shall **NOT** be installed in the walls, ceiling or any other structural feature of the building.
2. **DO NOT** lift the fume hood at any time by the airfoil as this will damage unit.
3. Once the fume hood is in place, service lines can be connected (See Electric and Plumbing).
4. Service panels are provided to allow access for service hookup. Outer service panels are removed by gently prying the inner panel away from the outer trim ring at the clearance spots. Inner service panels are removed by unlocking the locking spline of the rubber sealing gasket creating tolerance to remove the gasket and inner panel. Panels may be set aside for later replacement after the installation is complete. The front access panel above the sash is removable to allow access to the top of the fume hood (pull out on lower edge of upper most panel and push up to remove). The electrical junction box, light fixture, outlet collar for duct connection, special plumbing connections, and sash weight can be accessed / installed from this position.



Figure 5



Figure 6

5. Fume hoods are equipped with a tempered glass sash. Sash weight(s) are packed separately in a box on the pallet.
- The sash counter balance weight(s), installation can be accessed from the top of the fume hood. Fig 6.

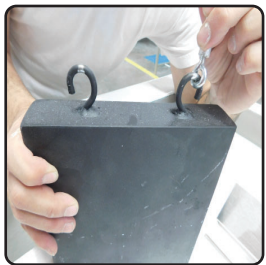


Figure 7

Hook turnbuckle into right top hook of sash weight Fig 7.



Figure 8

Hang sash weight(s) onto the two cable loops Fig 8.

The sash cable should ride fully in the pulley grooves prior to releasing the full weight of the counter weight. While maintaining sash cable to pulley alignment.

Once, the weight has been transferred, properly balance the sash using the adjustable mechanism (turnbuckle) located above the counter weight (right side). Fig 9.



Figure 9

6. A bead of white or clear silicone sealant should be applied between the work surface and the fume hood. Fig 10



Figure 10

7. Reinstall front access panel and service panels. Fig 11

8. Finally clean up with Formula Glass Cleaner.

9. To address seismic codes consult local codes that may apply to Fume Hood Installation.



Figure 11

Fume Hood Operation

Safety considerations require that a schedule of inspections and documentation be set up for every laboratory fume hood.

An inspection record should be maintained. This record may be in the form of a label attached to the fume hood or a log maintained by the laboratory director or safety officer.

Inspection procedures should include instrument verification of fume hood face velocity performance and usage by observations and interview.

Procedures should consist of a physical examination of liner condition and cleanliness, baffle and sash operation and condition, sash cable and guide wheels, and service fixture function.

All results should be recorded and reported to the proper authority for any required action.

NOTE: Special purpose fume hoods such as those used with radioactive materials or perchloric acids require additional inspection procedures to cover special equipment and requirements.

Options, such as airflow monitors or other types of monitors should be inspected annually.

Fume hood air face velocity is an important consideration. 100 feet per minute (FPM) is the standard requirement. Velocities in excess of 150 FPM may reduce fume hood performance and create hazardous condition(s).

The establishment of the proper face velocity for a specific laboratory fume hood should be based on a number of factors. The nature of the fumes emitted from the hood is of obvious importance. Consult your company safety department for recommendations covering the materials you plan on using.

Cross-drafts, created by the room ventilation system or from an open window or corridor, if located adjacent to the hood, can drastically disturb the flow of air entering the fume hood face and even cause a reverse flow of air out of the front of the hood. Room conditions such as these should be avoided. The velocity of the cross drafts should not exceed 20 percent of the fume hood face velocity.

Your Laboratory Safety Plan and Company Procedures should combine to create a safe and healthful work environment.

Perchloric Acid Fume Hood Operation / Maintenance

- A perchloric acid fume hood has the general characteristics of a bench-top fume hood except the worksurface and interior lining must be type 316 stainless steel or other non-reactive material such as PVC or polypropylene, when heat is not a concern. This material should extend all the way through the exhaust system.
- The use of perchloric acid creates extreme inherent hazard because of certain characteristics. Since there is a constant danger of explosion when using perchloric acid, it is recommended that laboratories employing its use in any quantity become well informed of its characteristics. Only personnel fully cognizant with the properties of perchloric acid and the hazards associated with it should perform perchloric acid procedures.
- This hood is specifically designed for use with perchloric acid. It should not be used as a general purpose laboratory fume hood. Because of extreme hazards, miscellaneous work should not be performed in this hood.
- Safety requires regular water washdown of fume hood interior, ductwork, and the air mover after use or preferably after each experiment. The baffle on this hood may be removed for access to all surfaces as a follow-up to washdown procedures. All deposits should be flushed away.
- Utilize lowest quantities of perchloric acid to fit procedural requirements.
- All apparatus used within the hood interior should have inorganic coatings and lubricants.
- Although the HEMCO Perchloric Acid Fume Hoods conform to all generally accepted standards of design for this type of equipment, we accept no responsibility or liability for accidents that may possibly occur in the use of perchloric acid in our hoods.
- **WARNING: The weight of the exhaust ductwork system should be supported independently of the hood superstructure. Do not allow this weight to be supported by the hood structure as damage to the hood may result.**
- The disposal of substances used in connection with this equipment may be governed by various federal, state or local regulations. All users of this equipment are urged to become familiar with any regulations that apply in the users area concerning the dumping of waste materials in or upon water, land or air and to comply with such regulations.
- Perchloric Acid fume hoods should never be manifolded into a common exhaust system. They should always feature an individual exhaust system.
- It is recommended that the Perchloric Acid Hood be washed down thoroughly after every usage or at least once a day.

Laboratory Safety for Chemical Fume Hoods

The Fume Hood is often the primary control device for protecting laboratory workers when working with toxic and/or flammable chemicals. OSHA's Laboratory Standard (29 CF 1910.1450) requires that fume hoods be maintained and function properly when used.

Before using the Fume Hood:

- Make sure that you understand how the Fume Hood works.
- You should be trained to use it properly.
- Know the hazards of the chemical you are working with; refer to the chemical (MSDS) Material Data Safety Sheet if you are unsure.
- Ensure that the Fume Hood is turned on.
- Make sure that the sash is open to the proper operating level, which is usually indicated by arrows on the frame.
- Make sure that the air gauge indicates that the airflow is within the required range.

When using the Fume Hood:

- Never allow your head to enter the plane of the hood opening. For example, for vertical rising sashes, keep the sash below your face; for horizontal sliding sashes, keep the sash positioned in front of you and work around the side of the sash.
- Use appropriate eye protection.
- Be sure that nothing blocks the airflow through the baffles or through the baffle exhaust slots.
- Elevate large equipment (e.g. a centrifuge) at least (2) inches off the base of the hood interior.
- Keep all materials inside the hood at least (6) inches from the sash opening. When not working in the hood, close the sash.
- Do not permanently store any chemicals inside the hood.
- Promptly report any hood that is not functioning properly to your supervisor. The sash should be closed and the hood "tagged" and taken out of service until repairs can be completed.
- When using extremely hazardous chemicals, understand your laboratory's action plan in case an emergency, such as a power failure, occurs

Maintenance

SASH

Standard fume hoods are provided with a type of movable sash or viewing window. The sash should be cleaned frequently to avoid the possibility of residue building up on the surface. A soft, cloth and mild cleaner should be used for best results.

FUME HOOD

Cleaning of fume hoods should include the removal of the baffle for full cleaning of interior surfaces. Sash guides, cables, pulley wheels and other working parts should be lubricated regularly. Spills should be flushed immediately using neutralizing compounds as required and cleaned thoroughly afterwards. If sashes are grabbing, lubrication of pulleys with a good quality machine oil and application of paraffin to sliding surfaces will help performance substantially. General cleaning can be done with mild detergents and water.

CABINETS

Although designed for wear and tear, the life of cabinets can be greatly extended through observance of proper cleaning and maintenance procedures. Drawers that are overloaded, doors misadjusted, and locks which malfunction can lead to undue stress on equipment, and can permanently affect performance. Metal casework and hardware should be cleaned periodically with good quality cream furniture Polish or an automotive cleaner and finishing wax. Use of rubbing compound often can restore superficial abrasions. Spills should be cleaned up immediately followed by a wash down with detergent and water.

Corrosive reagents should be stored in well ventilated casework specifically designed for corrosive storage. HEMCO offers a complete line of acid/corrosive cabinets and flammable/combustible cabinets.

SERVICE FIXTURES

Fixtures which have been subjected to chemical fumes over a prolonged period of time may show signs of corrosion. When this occurs thorough cleaning with formulated chrome cleaner followed by an application of paste wax is recommended.

Epoxy-coated fixtures used in chemical areas can be cleaned with detergent and water, dried, and lightly polished with a soft cloth. Do not use abrasive cleaners. High temperatures may alter the color of the plastic coating on fixtures; this condition cannot be cleaned away, but the chemical resistance of the finish is unchanged. A break in the plastic coating of these fixtures should be touched up immediately with matching paint or lacquer to protect the fixture.

BLOWER LOCATION AND SIZE

Where the building design permits, the exhaust blower should be located on the roof of the building to provide a negative pressure in the portion of the duct system located within the building. The exhaust blower should be sized to exhaust the volume of air necessary to attain the selected fume hood(s) design face velocity at the total system static pressure loss. Blower should also be sized to achieve the lowest practical rotational speed thereby minimizing noise/vibration.

BLOWER INSPECTION

It is recommended that both the blower motor and blades be periodically inspected. Belt wear, blade corrosion and exhaust port clogs are examples of blower problems that can develop over long-term use.

DUCTING

Ducting should be checked periodically for possible leaks.

FACE VELOCITY - CALIBRATION

Fume hood face velocity should be checked at a minimum annually, recommend checking face velocity bi-annually and the findings recorded and compared with previous readings. Significant changes in face velocity should be reported and investigated. Changes in face velocity may be caused by supply air changes, exhaust blower problems, or loose, broken, corroded, or blocked ducting. Recommended test protocol is at a minimum the face velocity and smoke visualization sections of the ASHRAE 110 – 1995 or current test procedure.

Safety Recommendations

DO - AVOID UNNECESSARY EXPOSURE OF PERSONNEL TO FUMES INSIDE HOOD BY KEEPING SASH CLOSED EXCEPT WHEN LOADING OR UNLOADING HOOD.

DO - KEEP MATERIALS 6" OR MORE FROM FRONT EDGE OF SASH PLANE.

DO - KEEP THE SASH AT DESIGN OPENING WHILE UTILIZING THE FUME HOOD.

DO - CLEAN UP IMMEDIATELY ANY MAJOR SPILLS OCCURRING INSIDE HOOD.

DO - USE ONLY GROUNDED ELECTRIC EQUIPMENT.

DO - REPORT ANY MALFUNCTION OF THE EXHAUST SYSTEM.

DO - ELEVATE CONTAMINATES AND EQUIPMENT ABOVE WORKSURFACE OF HOOD ENABLING AIR FLOW BE NEATH AND AROUND.

DO - KEEP MOVEMENTS IN THE HOOD AND IN FRONT OF THE HOOD TO A MINIMUM.

DO - CHECK FUME HOOD FACE VELOCITY ON A REGULAR SCHEDULE.

DO NOT - USE HOOD UNLESS EXHAUST SYSTEM IS IN OPERATION.

DO NOT - CHANGE DAMPER OR BAFFLE SETTINGS AFTER INITIALLY SET.

DO NOT - USE FUME HOOD FOR STORAGE OF CORROSIVE OR VOLATILE MATERIALS.

DO NOT - BLOCK BAFFLE OR GRILL OPENINGS.

DO NOT - GENERATE LARGE QUANTITIES OF INFLAMMABLES WITHIN THE FUME HOOD.

DO NOT - PERMIT TEMPERATURES OF SASH GLASS TO EXCEED 160 DEGREES FAHRENHEIT.

DO NOT - PLACE UPPER BODY OR HEAD INSIDE THE FRONT PLANE OF THE HOOD OPENING.

DO NOT - OPEN OR CLOSE SASH SWIFTLY AS THIS MAY CAUSE ADVERSE AIR FLOW CURRENTS.

DO NOT - APPROACH OR LEAVE HOOD FACE SWIFTLY AS THIS MAY CAUSE ADVERSE AIR FLOW CURRENTS.

Trouble Shooting

PROBLEM	CAUSE	CORRECTIVE ACTION
Insufficient Air Flow	<ol style="list-style-type: none"> 1) Improperly sized blower 2) Motor (impeller wheel) is running backwards 3) Obstruction in duct system 4) Leaks in duct system 5) Overloaded filters 	<ol style="list-style-type: none"> 1) Resize blower, change drive package 2) Correct wiring for reverse rotation of motor. 3) Locate and Remove obstruction 4) Trace and repair 5) Clean or replace filters
Fume Hood or Blower not operating	<ol style="list-style-type: none"> 1) Blown fuse or open circuit breaker 2) Defective motor 3) Thermal protector on 4) Motor improperly wired 	<ol style="list-style-type: none"> 1) Replace fuse or reset circuit breaker 2) Consult factory 3) Check for high or low voltage input or ambient temperatures over 40 degree C (104 degree F) 4) Correct wiring for reverse rotation of motor
Contaminates outside fume hood face	<ol style="list-style-type: none"> 1) Improper use or procedures 2) External factors 3) Improper face velocity 	<ol style="list-style-type: none"> 1) Follow safety guidelines and procedures 2) Check external air flow patterns around fume hood 3) Recertify fume hood face velocity and/or duct system
Sash binding	<ol style="list-style-type: none"> 1) Cable off of pulley / Cable Broke 	<ol style="list-style-type: none"> 1) Replace Sash / Cable
Air Flow Monitor	<ol style="list-style-type: none"> 2) Non-Responsive 	<ol style="list-style-type: none"> 1) Check Power Connection
Electrical Services not working	<ol style="list-style-type: none"> 1) Circuit Breaker 2) Corroded Contacts 	<ol style="list-style-type: none"> 1) Check Main Load Center 2) Clean or replace