



1500 Series A2

Class II, Type A2 Biological Safety Cabinet

Operating Manual Rev. 00

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Dear User,

Congratulations on your purchase of a Thermo Scientific 1500 Series Class II, Type A2 biological safety cabinet! Your 1500 Series A2 biological safety cabinet has been tested and certified in accordance to NSF/ANSI 49, and is designed to protect the user, the environment, and your research from harmful substances and cross-contamination. This user's manual provides instructions on how to use the 1500 Series A2 most effectively and safely. A printed copy of this user's manual is available from Technical Services, if required.

Containment * Comfort * Convenience™

The 1500 Series A2 offers a unique range of product features that will enhance your safety and improve overall operating efficiency. Should you have any questions on using this product or need further explanation of any of its features, please contact Technical Services (Page iv), or your local distributor.

This manual covers the models shown below:

Stainless Steel Interior		Coated Interior		Size	Voltage
10 inch opening	8 inch opening	10 inch opening	8 inch opening		
1574		1584		4 ft	230V, China
1579		1589		6 ft	230V, China

** Includes cabinet, adjustable height stand, UV light and armrest.*

NOTE: Model 1584/1574/1589/1579 see more catalogues, whose configuration of Power Cord and Outlet as shown in the following Table.

Model	Catalogue	Power Cord	Outlet
1584/1574	1584-F/1574-F	Type F	Type F
	1584-G/1574-G	Type G	Type G
	1584-M/1574-M	Type M	Type F
1589/1579	1574-GP	China Power Cord	China Outlet
	1589-F/1579-F	Type F	Type F
	1589-G/1579-G	Type G	Type G
	1589-M/1579-M	Type M	Type F
	1579-GP	China Power Cord	China Outlet



Important Read this instruction manual. Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel, and poor equipment performance. ▲

Caution All internal adjustments and maintenance must be performed by qualified service personnel. ▲

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Important operating and/or maintenance instructions. Read the accompanying text carefully.



Potential electrical hazards. Only qualified persons should perform procedures associated with this symbol.



Equipment being maintained or serviced must be turned off and locked off to prevent possible injury.



Hot surface(s) present which may cause burns to unprotected skin, or to materials which may be damaged by elevated temperatures.



WEEE Compliance: Thermo Fisher Scientific has contracted with companies for recycling/disposal in each EU Member State. For further information, send an email to weee.recycle@thermofisher.com.



- ✓ Always use the proper protective equipment (clothing, gloves, goggles, etc.)
- ✓ Always dissipate extreme cold or heat and wear protective clothing.
- ✓ Always follow good hygiene practices.
- ✓ Each individual is responsible for his or her own safety.

Do You Need Information or Assistance on Thermo Scientific Products?

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Our **Sales Support** staff can provide information on pricing and give you quotations. We can take your order and provide delivery information on major equipment items or make arrangements to have your local sales representative contact you. Our products are listed on the Internet and we can be contacted through our Internet home page.

Our **Service Support** staff can supply technical information about proper setup, operation or troubleshooting of your equipment. We can fill your needs for spare or replacement parts or provide you with on-site service. We can also provide you with a quotation on our Extended Warranty for your Thermo Scientific products.

Whatever Thermo Scientific products you need or use, we will be happy to discuss your applications. If you are experiencing technical problems, working together, we will help you locate the problem and, chances are, correct it yourself...over the telephone without a service call.

When more extensive service is necessary, we will assist you with direct factory trained technicians or a qualified service organization for on-the-spot repair. If your service need is covered by the warranty, we will arrange for the unit to be repaired at our expense and to your satisfaction.

Regardless of your needs, our professional telephone technicians are available to assist you Monday through Friday from 8:00 a.m. to 6:00 p.m. Eastern Time. Please contact us by telephone or fax. If you wish to write, our mailing address is:

Thermo Fisher Scientific (Suzhou) Instruments Co., Ltd
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International customers, please contact your local Thermo Scientific distributor.

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Section 1 Description

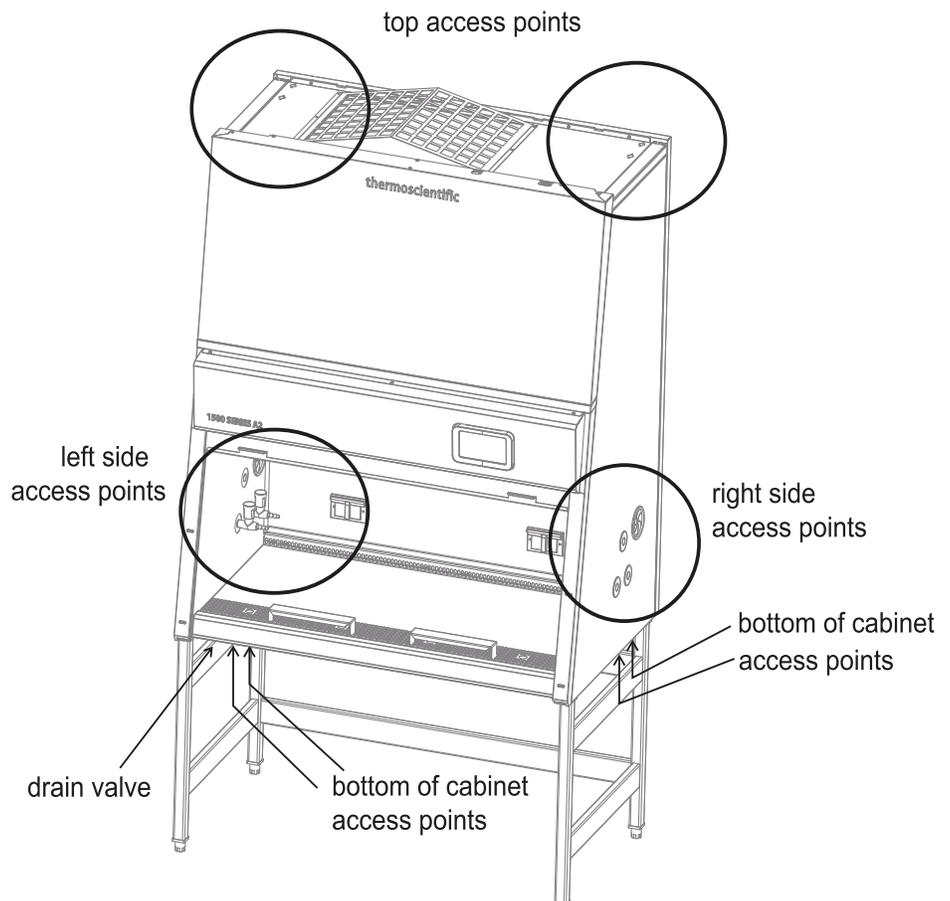


Figure 1-1. Unit Components

The Thermo Scientific 1500 Series A2 offers innovative SmartFlow™ Plus technology; an automatic airflow compensation system that adjusts motor speed as filters load, without the use of a manual damper. The SmartFlow™ Plus system ensures safe working conditions, even between annual certifications.

The plenum assembly consists of a plenum for the downflow blower and a plenum for the exhaust air blower. Each blower includes a filter. The exhaust air is discharged through an opening in the top of the cabinet.

Chamber lighting includes one LED bulb for 4 foot models and two for 6 foot models.

The factory-installed UV light is installed in the ceiling at the front of the sample chamber. For 6 foot model there are two UV lights installed.

Three service valve access ports are located on each side panel. When installing service valves, remove the center of the port plugs at the perforations.

The optional stand may be ordered in two configurations; a manually adjustable from 30” to 38” working height, and a fixed 34” working height with attached casters.

A stainless steel one-piece work surface is standard. Armrests ensure a comfortable working position for the user and minimize blockage of airflow at the front grille.

Internal outlets, provided as the power source for accessories, are provided standard in the following configuration:

1584, 1589, 1574, 1579: two single right and left side

Test hoses (aerosol challenge ports) are located under the work tray. The supply plenum hose is located on the left and the exhaust plenum hose on the right.

Note Do not remove the caps of the two test hoses to check for supply and exhaust airflow. ▲

Safety Systems

Negative pressure air system

A negative pressure air system combines with HEPA filters in the supply and exhaust airflow for personnel and product protection.

Personnel protection

Inflow air along the entire working opening at a constant high velocity prevents leakage from the work opening of the chamber.

Exterior air pressure being higher than the internal air pressure creates negative pressure, ensuring containment in case of cabinet leakage.

Product protection

Steady airflow within the air system ensures constant downflow, allowing the HEPA filters to remove contaminants so that the samples are always surrounded by ultra-pure air. Harmful particles are not carried over the sample chamber (protection from cross-contamination).

HEPA filters

The downflow air within the chamber and the exhaust air are cleaned by HEPA filters.

Safety Systems (continued)

Safety lockout

To protect from UV radiation, the optional UV light will not turn on if the front window is open. While the UV light is on, the front window should remain closed. The closed window blocks out the UV rays. Opening the window will cause the UV light to turn off.

Digital Airflow Verification (DAVe)

Independent monitoring of inflow and downflow air velocities guarantees that product and personnel protection remain uncompromised. Airflow monitoring determines the velocity of the airflow in the sample chamber as well as the inflow velocity of air through the exhaust opening. As soon as airflow velocities rise above or fall below a specified safety value, an audible and a visual alarm is activated.

Window position monitoring

The position sensors detect the size of the front window opening and indicate whether the window is open to the specified work position, closed (energy saving) or in an unsafe intermediate position.

HEPA Filters

The filter system consists of two HEPA filters for downflow (supply) and exhaust air.

Room air is drawn into the sample chamber through the work position window opening. The room air is drawn into the negative pressure drain pan air duct, then pulled into the air plenum in the top portion of the cabinet. The room air is mixed with recirculating HEPA filtered air from the chamber, and filtered proportionally by the downflow and exhaust filters. The filtered air is then supplied as ultra-pure air into the sample chamber of the unit, and exhausted as ultra-pure air into the room environment, or into an external exhaust system via an exhaust transition.

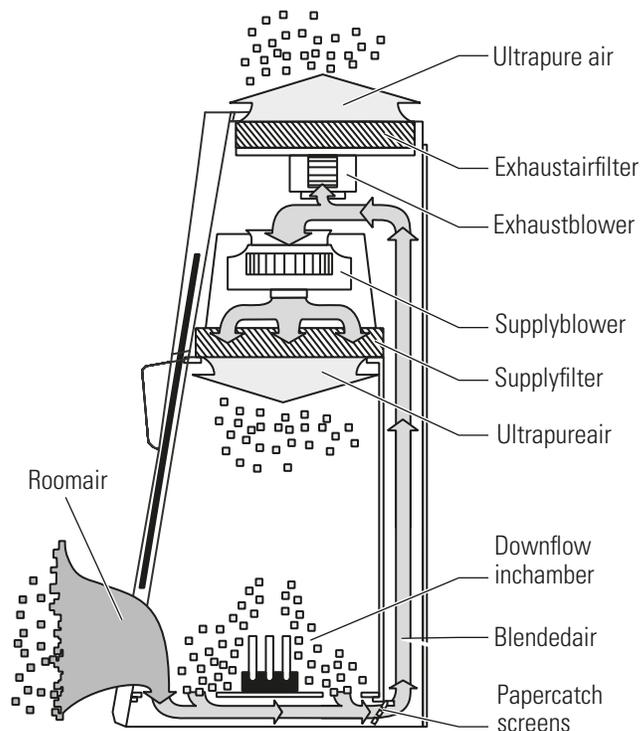


Figure 1-2. Airflow Filtering System

Paper Catch Grids

Sectional paper catch grids are installed beneath the work tray in the air duct between the inner and outer back wall of the unit. These grids prevent large items such as paper towels and tissues from entering the plenum where they may impair the function of the blowers or the filters. The grids can be easily removed for cleaning.

Use of the Window

The sample chamber is accessible through various positions of the front window. The working position of the window is a 10 inch opening, +0.25", -0.75" (depending on model - check data label and first page of this manual). For loading the chamber, the window opens fully. For decontamination and energy saving, enter into Night-Set-Back mode by closing the window. When the window is closed, the blower speed is reduced, minimizing energy consumption and noise emittance without compromising particulate containment inside the work chamber.

Note The working and loading window positions are indicated on the user interface, as controlled by micro switches and displayed by status indicators on the control panel. ▲

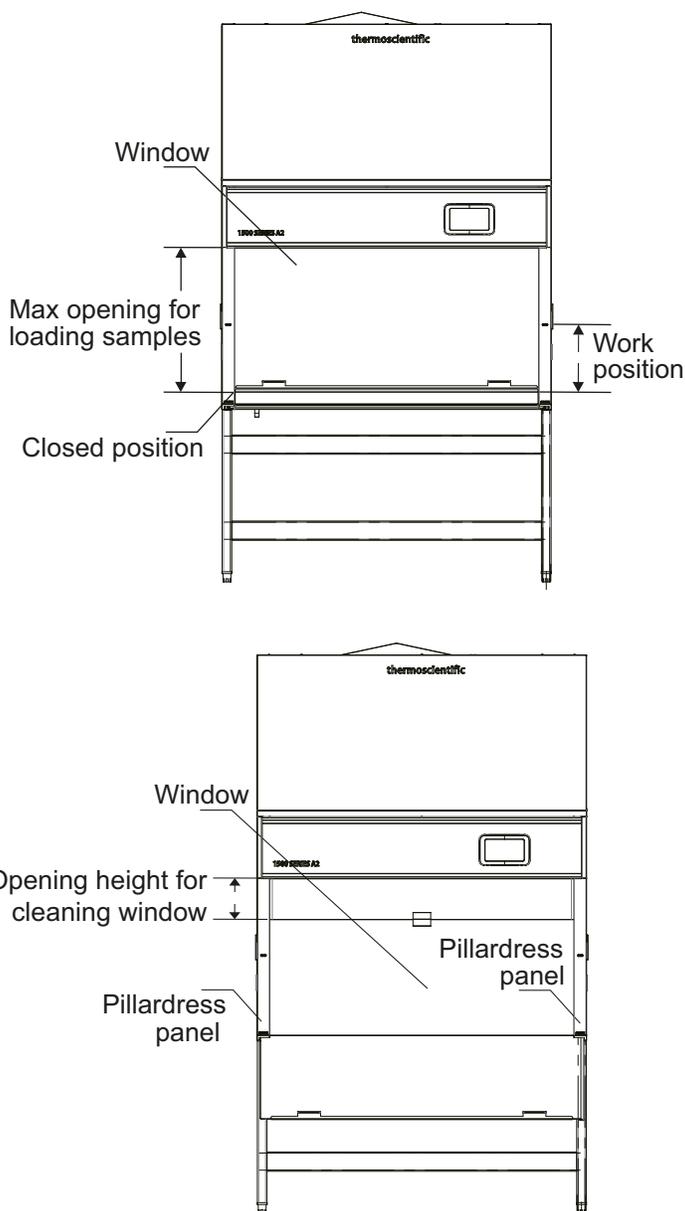


Figure 1-3. Window Openings

Use of the Window (continued)

To place the window at the work position, move it to the area of the top 'dimple' (Figure 1-4).

To place the window in the closed or reduced mode position, move it to the "STANDBY" position (Figure 1-5) and. Make sure that the window touches the gasket below.



Figure 1-4. Work Position



Figure 1-5. Fully Closed Position (UV, if applicable)

Use of the Window (continued)

Our patented-pending SmartClean™ window design easily lowers below the work position for replacing the sample chamber light bulbs.

Caution If the front window jams or is sluggish to move, do not use force! Contact Technical Services immediately. Do not attempt to repair this problem. ▲

Unit Interface

The standard unit includes accessory outlets, service valve access ports, an USB connection and a remote alarm connection.

The power cord to be connected to the power source is located on the top, near the front of the cabinet.

The accessory outlets (max 5A) are located on the interior chamber back wall.

On top of the cabinet are the two fuseholders for the 5A accessory outlet fuses and an USB connection (signal source, not customer interface).

Service valve access ports are located on each side of the cabinet. To use these ports, remove the center perforation. Service valves are available as optional accessories.

The remote alarm accessory can be used for notification of window movement or access.

Warning If a gas burner is to be operated in the sample chamber, an appropriate shut-off valve for the gas supply must be installed. Use only laboratory safe burners in the sample chamber. ▲

Unit Interface (continued)

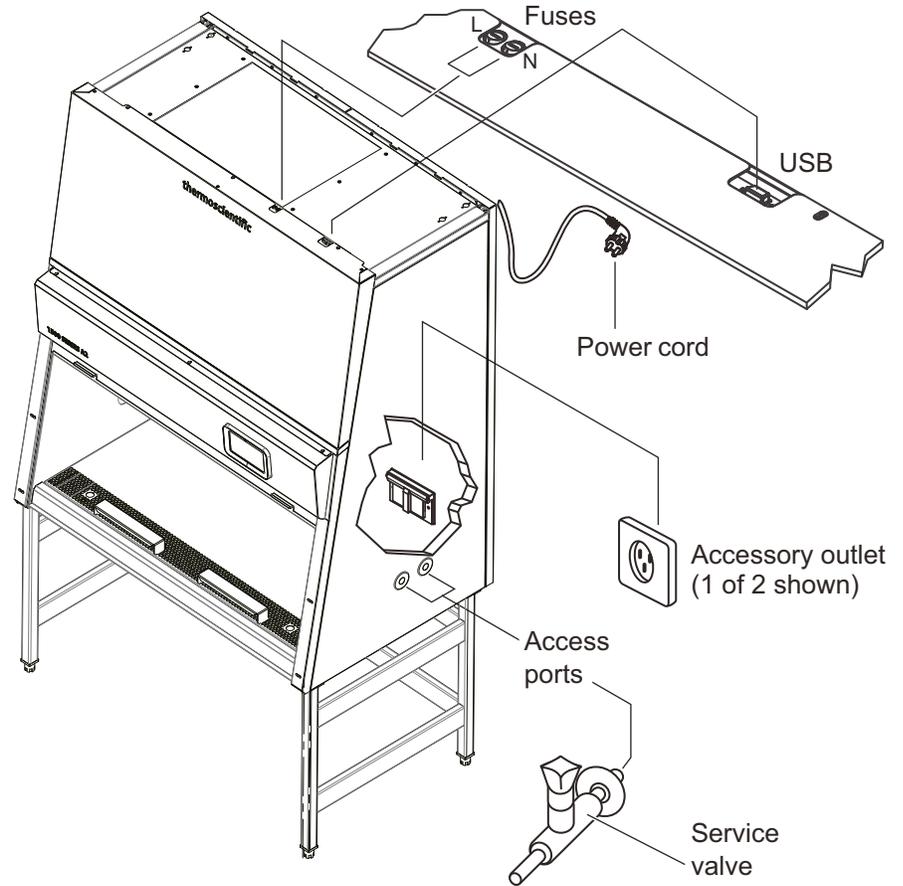


Figure 1-6. Interfaces (2 of 4 access ports are shown)

Chamber Lighting

The Thermo Scientific 1500 Series A2 offers a bright workspace for a more comfortable working environment. Models with coated rear and side walls resist glare and make it easier for the user to work safely.

Lighting for the sample chamber includes one LED bulb for 4 foot units, and two bulbs for 6 foot units. The bulb(s) is installed behind the light canopy.

UV Lights

The optional, factory-installed UV light is installed at the top of the front section of the sample chamber.

The operating time of the UV light is preset for 1 hour. The UV disinfection procedure can be started by pressing the “UV” key on the control panel with the window in the closed position. If the window is opened, the procedure is immediately cancelled.

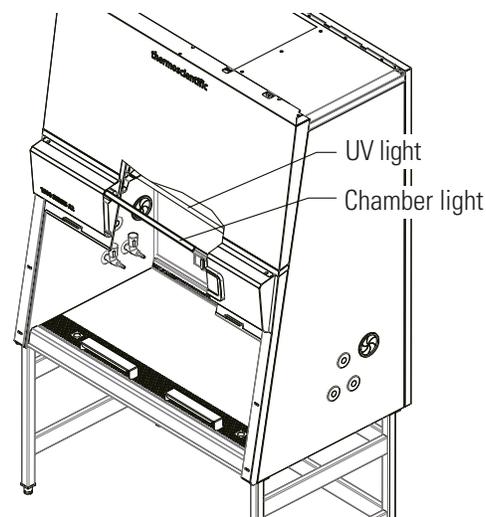


Figure 1-7. Lights

Note To protect from UV radiation, the UV light can only be turned on when the window is completely closed. ▲

Work Area

The single piece work tray is provided with the cabinet. It is placed onto the frame above the sample chamber drain pan. It can be removed by lifting up, using the large holes in the work tray.

The working area for optimal product protection extends over the entire width and depth of the work tray. The two armrests are positioned in the center of the working area 8 inches (20 cm) from each other. To attach the armrests, insert into the first perforated track of the work tray.

Warning Work safety is assured only if the armrests are used correctly! ▲

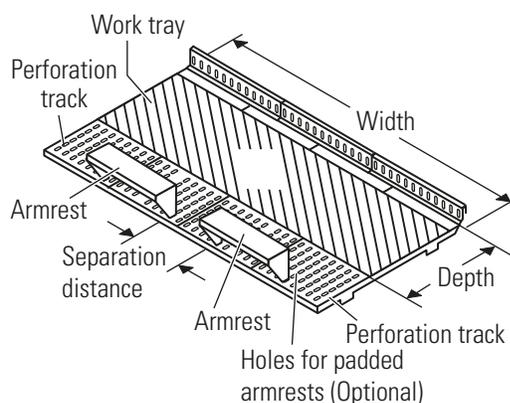


Figure 1-8. Work tray

Section 2 Installation

The operational safety and proper function of the unit depend on the location where it is to be operated. The cabinet should be operated only in the ambient conditions listed below.

- Up to 6562 ft. (2000 m) above sea level.
- Power outlet accessible to authorized personnel only. Ideally, the outlet should be installed above the biological safety cabinet. The power cord is the mains disconnect.
- Location capable of supporting the weight of the device and non-flammable.
- If the factory-approved stand is not purchased, the holding device must be rated for twice the cabinet weight.
- Adequate room height. For devices that are not connected to an exhaust system, the distance between the exhaust air opening at the device and the room ceiling must be at least 8 inches (200 mm).
- Equipped with an appropriate ventilation system.
- Room temperature between 10°C and 40°C (50°F and 104°F).
- Relative humidity must not exceed 80%, up to 31°C and decreasing linearly to 50% at 40°C.
- For indoor use only.

Room ventilation should preferably be a ventilation system that complies with the national requirements for the application.

The inlet air and exhaust air openings of the room ventilation must be located so that drafts do not impair the function of the biological safety cabinet air system.

When positioning the cabinet, make sure the counterweight on the back of the unit can move freely. The minimal distance to the wall or adjacent objects should be 3 inches (7.6 cm), unless upper wall brackets are used.

Optional Exhaust Transition

The part numbers for the optional thimble exhaust connection are 1911316 for four foot units, and 1911317 for six foot units.

The test conditions according to NSF/ANSI 49 were performed with the standard version of the safety cabinet, without exhaust system accessories.

An available accessory for the biological safety cabinet exhaust system is an exhaust thimble connection for an on-site exhaust system with blower. According to NSF/ANSI Standard 49, an exhaust alarm is required with this connection.

Exhaust System Accessories

The exhaust system components are installed to the exhaust opening on top of the cabinet. The threaded inserts for the retaining screws are pre-installed in the unit.

Installation on 4 model:

1. Turn the unit off and disconnect it from the power source.
2. Thoroughly clean the surfaces around the exhaust opening and of the accessory to be installed, to ensure that they are free of debris.
3. Secure the accessory by tightening the supplied retaining screws (M5) wrench-tight.
4. Using the adjustment nuts on the sliding panel, set the gap height to an opening of 2 inches.

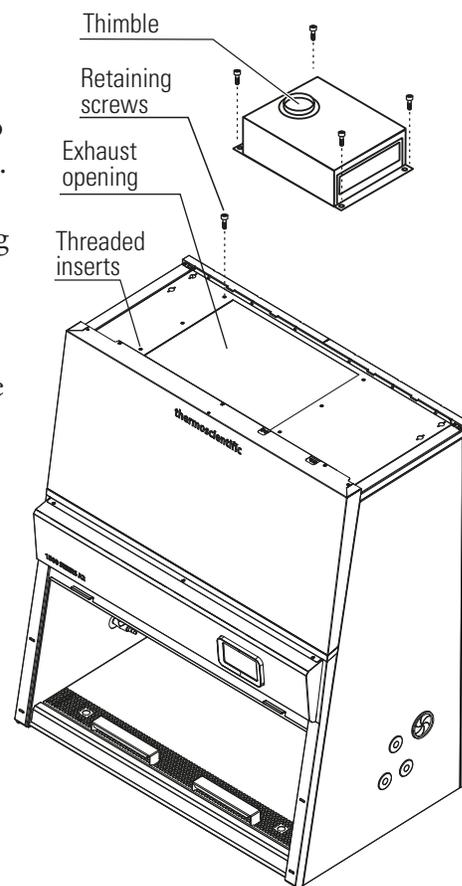


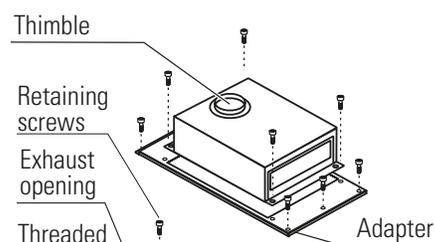
Figure 2-1. 4 ft Thimble

Exhaust System Accessories (continued)

The exhaust thimble connection is installed to the top of the cabinet using an additional adapter. The threaded inserts for the retaining screws of the adapter are pre-installed to the top of the cabinet.

Installation on a 6 ft. model:

1. Turn the unit off and disconnect it from the power source.
2. Clean the contact surfaces around the exhaust opening, and the upper and lower contact surfaces of the adapter thoroughly to ensure that all grease and dust residue are removed.
3. Secure the adapter to the pre-installed threaded inserts on top of the cabinet using the supplied four retaining screws. Tighten the screws hand-tight.
4. Secure the accessory by tightening the supplied retaining screws (M 5) wrench-tight.
5. Using the adjustment nuts on the sliding panel, set the gap height to an opening of 2 inches.



Connecting Sleeve

1. Place the connecting sleeve onto the connecting opening of the accessory and secure it with the screws.
2. Fit the connecting pipe (200 mm [8 in]) of the on-site exhaust air system to the connecting sleeve.
3. Seal the unused connecting opening with the cover. Place the cover onto the connecting opening at the housing and secure it with the screws.

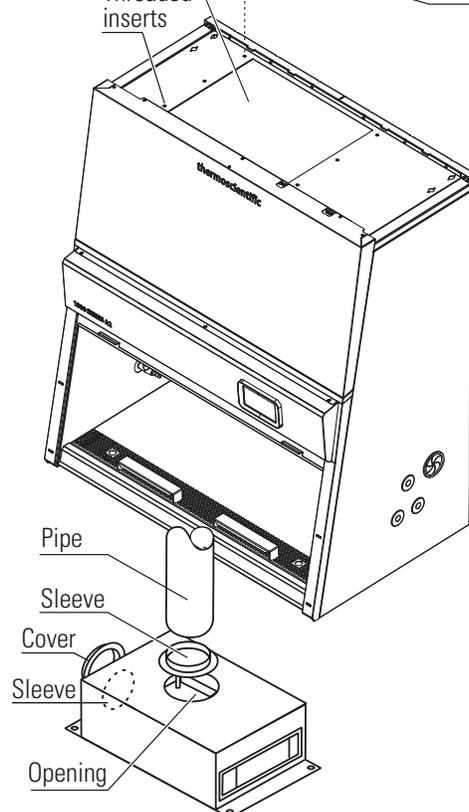


Figure 2-2. 6 ft Thimble and Sleeve

Moving the Unit

To prevent tilting, always transport the cabinet separate from the stand, using equipment capable of supporting the weight, even for a move within a building.

Caution When moving the unit, lift only at the lift points shown in Figure 2-3. ▲

Caution Do not allow the weight of the cabinet to rest on the drain pan! ▲

Warning The weight of the window is balanced by the counterweight on the back of the cabinet. Do not move the unit unless the counterweight has been locked in place with the shipping screws (see Figure 3-2). ▲

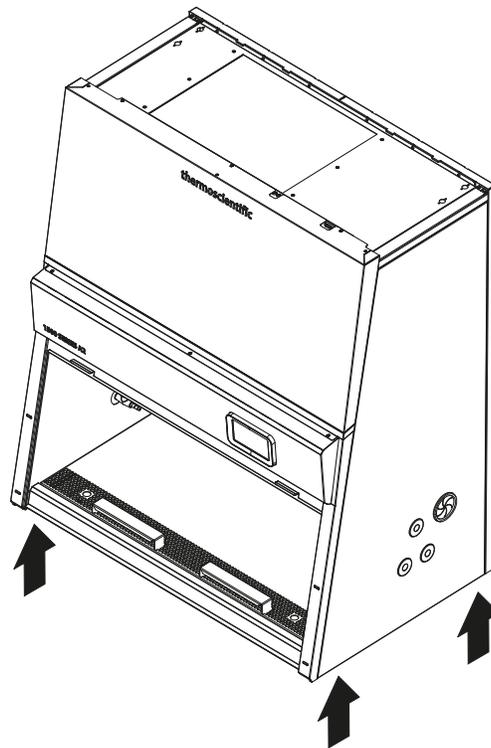


Figure 2-3. Lift points

Service Valve Connections

Install the service valve(s) by removing the centers of the plug (brass) or piercing it at the pre-determined location (plastic).

Installation spacing on side of unit is indicated in Figure 2-4.

Note The plugs must only be used for the installation of service valves in accordance with the applicable national regulations. ▲

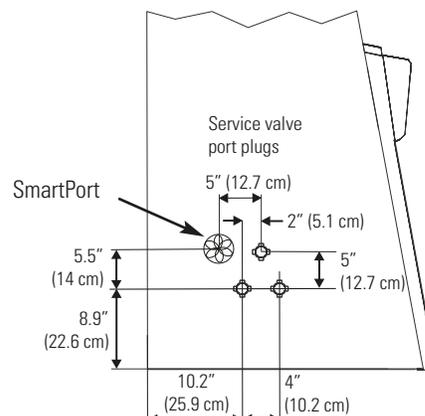


Figure 2-4. Valve Location

At each side panel, service valves can be installed through the three service valve port plugs (P/N 249095-exterior port plug, 249096-interior port plug).

1. Move the front window to the fully open position.
2. Turn the unit off and disconnect it from the power source.
3. Score the plug circularly at the pre-determined point (inside and outside). Remove the centers.
4. Referring to Figure 2-5 on the following page, slide the bezel onto the threaded pipe of the service valve. Apply a thin bead of silicon to the inner flange of the service valve.
5. From inside the sample chamber, slide the service valve through the desired plug.
6. From the outside, slide the washer onto the service valve threaded pipe and apply a thin bead of silicon to the outer flange of the service valve.
7. Secure the service valve to the side panel using the nut.
8. Establish the connection to the supply line using a union nut.

Note If a service valve is removed, the service valve port plug should be re-installed. ▲

Valve Connections (continued)

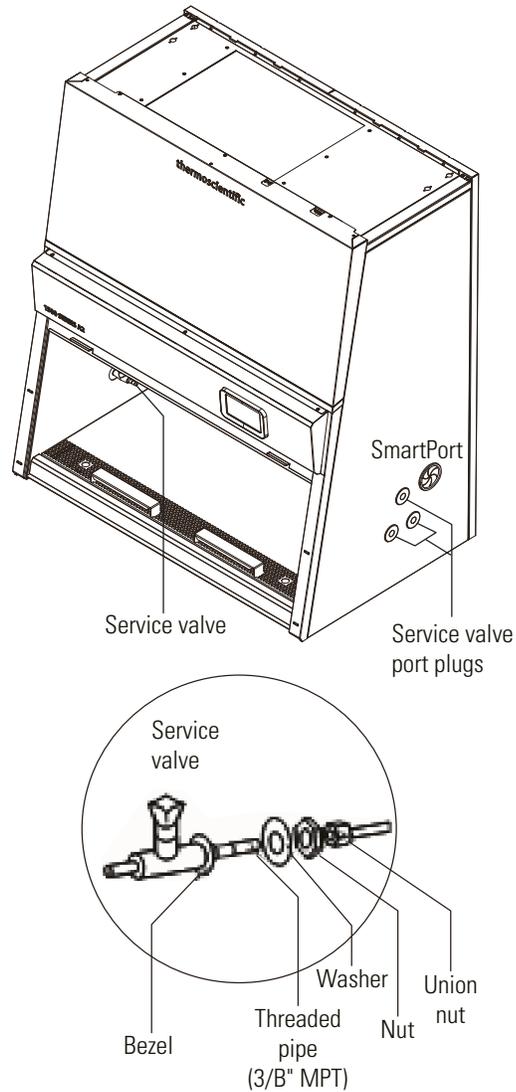


Figure 2-5. Valve Assembly and Installation

Replace the SmartPort™ Before Decontamination

If SmartPorts are installed, replace the SmartPort grommet before starting a decontamination procedure. Two replacements (P/N 114111) are shipped with each unit, or the 1910112 kit containing 4 grommets can be ordered.

SmartPort locations are indicated above (one on each side).

Universal Piping Connections

Universal piping is a factory-installed option. The piping can be installed on either, or both, sides. Access points, depending on selected installation, are available on the top, side or bottom of the cabinet. Pipe threads are 1/4" FPT. Refer to illustration below.

Note The top left access point is not available on 3 cu ft units, due to the proximity of the exhaust filter. On 3 cu ft units, the right side access points are next to the right side rope channel. The left side access points are to the left of these. ▲

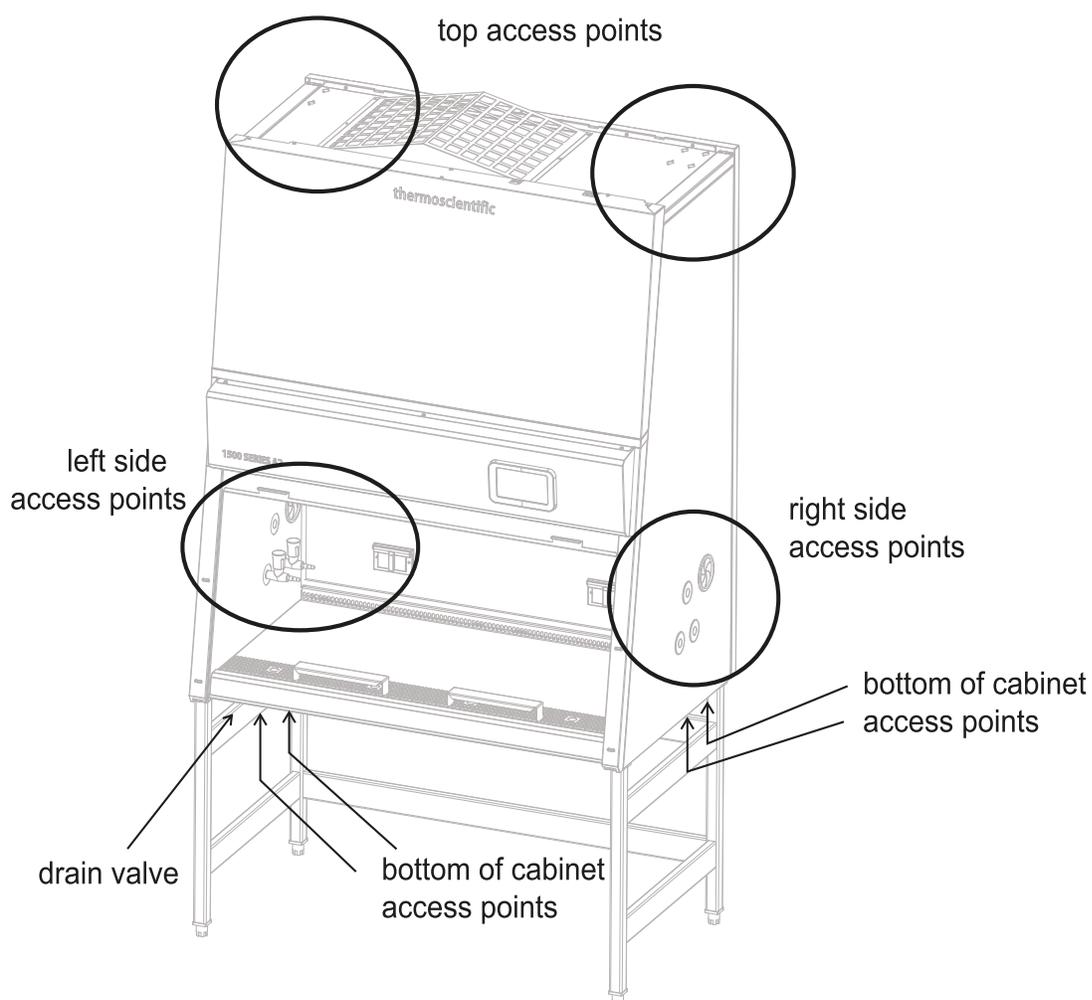


Figure 2-6. Possible Universal Piping Access Points/Drain Valve

SmartPort

The SmartPort is an optional feature on the 1500 Series A2, designed to improve work area organization inside the biological safety cabinet. It is designed to accommodate the routing of vacuum line tubing, line cords and data cables from the interior of the cabinet to the exterior working area, freeing up space inside the work area.

A 3 inch access port with an inner and outer solid rubber grommet is located on both side walls of the cabinet. Soap bubble leak test should be performed while the grommet is closed. Using a surgical scalpel, the user may cut the inner and outer grommet along the pre-cut indentations, cutting only what it needed to accommodate the tubing or cable. The negative pressure air channel within the side walls ensures that no particles escape into the lab.

At any time, new solid rubber grommets may be installed into the SmartPort to provide a complete seal in the side walls. It is recommended that new solid grommets be installed on the exterior side walls, prior to decontaminating the cabinet. Two new solid grommets are supplied with the cabinet for this purpose, or kit # 1910112 (four grommets) can be ordered.

Drain Valve

After the unit has been installed, either on a stand or a workstation, the drain valve should be installed. The drain valve itself is shipped in the manual bag taped to the inside of the unit.

Locate the drain piping underneath the unit on the left side (see Fig 2-6). Apply thread sealant sparingly to the threads.

Install the drain valve. Ensure the valve is in the closed position.

Be aware of the valve when moving the unit from the stand or workstation.

Section 3 Start-Up

Caution Correct assembly and installation is essential for proper start-up and operation. ▲

Assemble the Stand

For a unit without a stand, place the cabinet onto a stable structure capable of supporting two times the unit weight. Make sure the weight is not resting on the drain valve or nipple.

For a unit with a stand, first assemble the stand per the instructions included with the stand. Then fit the cabinet onto the stand. See steps below.

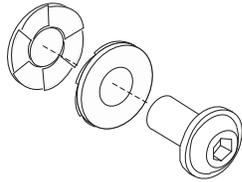
Caution Make sure each leveler is turned all the way in, to avoid bending an edge during installation. ▲

1. Locate the four telescoping legs in the side panel packaging. Install adjustable leveler from the hardware bag into the swaged end of the telescoping legs (if not already installed). **NOTE:** Make sure leveler is screwed all the way in, before installation. Using a hammer, tap the leveler into place.
2. Locate the left and right side panels. Install the telescoping leg assemblies into the side panels as shown in Figure 3-1.
3. The height-adjustable stand can be set to a height range of 26.8 - 34.7 in. (680 - 880 mm). To set the stand to the desired height, pull the legs downward out of the channels to the desired height. Lock the height adjustment in place by installing two lockwashers/screws per channel to the leg.

Note All lockwashers are a wedgelock type. The wedges fit together with the smoother sides toward the unit and the screw. See Detail. ▲

4. Locate the two crossmembers from the packaging. Note they are packaged separately from the side panels. With the label on the crossmember to the outside (Figure 3-1), install the crossmembers onto the retaining tabs of the side panels. Place lockwashers on screws, then install all screws by hand, before tightening to secure together.
5. To install the cabinet frame to the stand, insert four flatwashers and Allen screws loosely into the threaded holes at the bottom of the cabinet.

Assemble the Stand (continued)



Detail. Order of Assembly

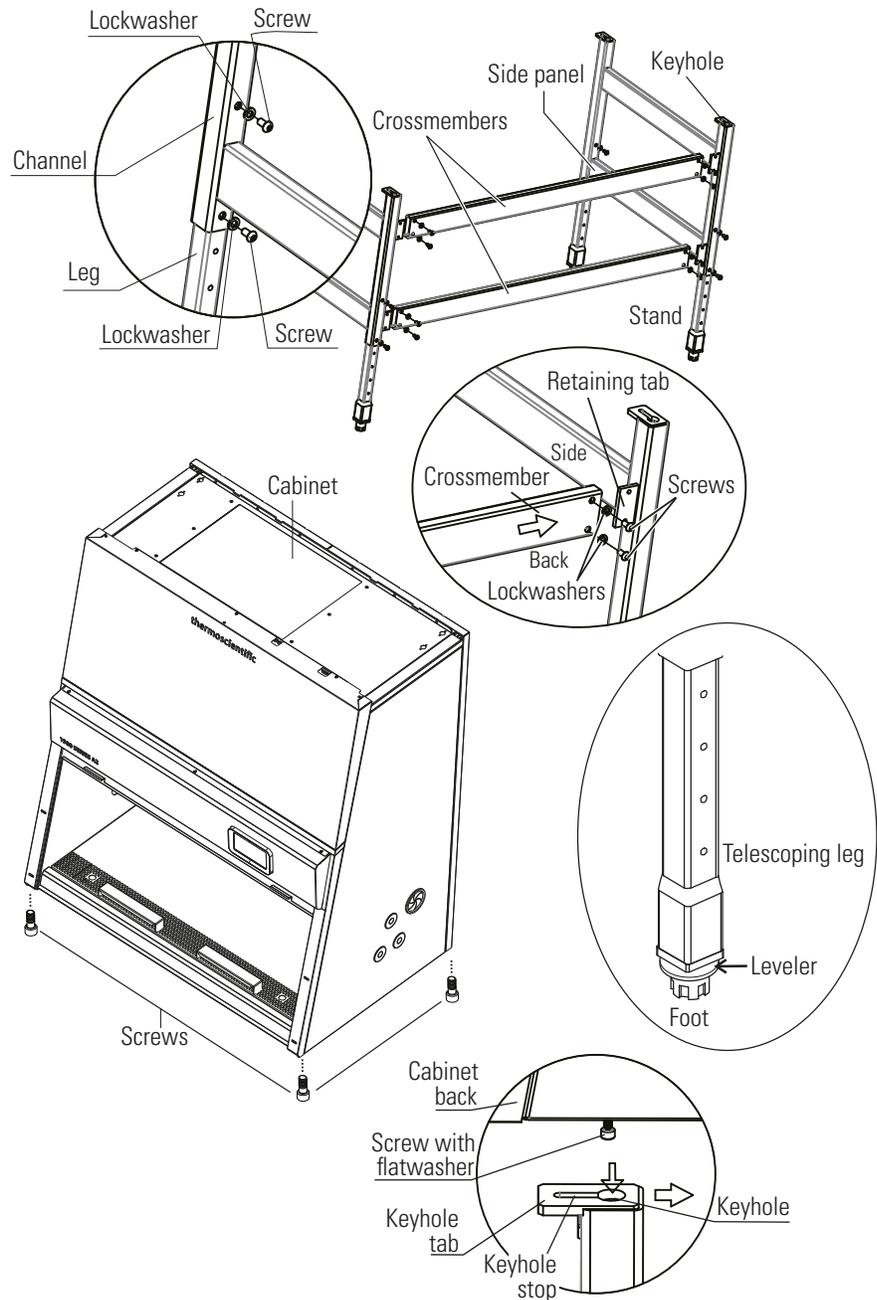


Figure 3-1. Stand Assembly

6. Place the safety cabinet onto the stand so that the Allen screws are routed through the holes of the keyhole tabs.
7. Slide the cabinet frame to the keyhole stop (see Figure. 3-1).
8. Tighten the four Allen screws.
9. Level the cabinet (instructions follow in this section).

Unlock Counterweight

The window counterweight is secured to the back of the cabinet to protect the window from damage during shipping.

Caution The counterweight on the cabinet back compensates for the weight of the front window. Do not try to move the front window before the counterweight has been unlocked. ▲

Warning After unlocking, keep hands and fingers away from the motion range of the counterweight! ▲

To unlock the counterweight, remove the shipping screws (see location arrows in Figure 3-2) and retain them for future shipping needs. A Torx wrench is shipped in the manual bag for this purpose.

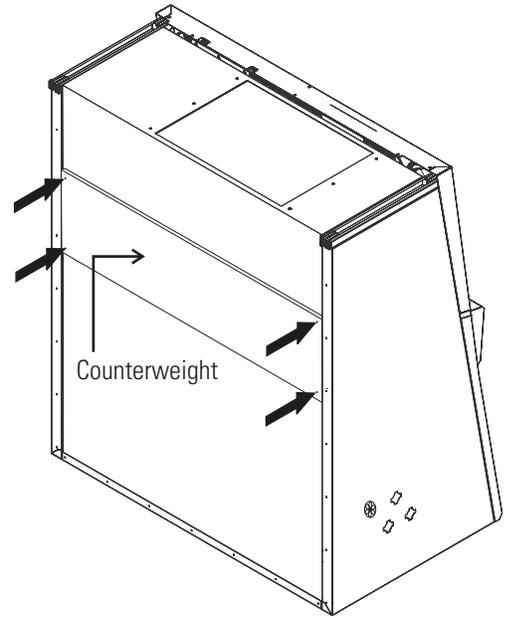


Figure 3-2. Unlocking the Counterweight

Warning One person should hold the counterweight while a second person removes the screws. This facilitates screw removal and avoids the possibility of stripping the screws. ▲

Level the Cabinet

Note The cabinet should be leveled only after it has been located in the desired working location. ▲

For cabinets without a stand, place a bubble level onto the work tray surface and adjust the cabinet until the level indicates an absolutely horizontal position in all directions.

For cabinets with an optional stand, place a bubble level onto the work tray and adjust the four levelers of the stand using an open end or adjustable wrench until the bubble level indicates an absolutely horizontal position in all directions. Check from right to left, and from back to front.

Power Connection

Warning Contact with electrical components can cause a lethal shock.

Warning Before connecting the unit to a power source, check plug and power cord for possible damage. Do not use damaged components to connect the unit to the power source! ▲

1. Before connecting the unit to the power source, verify that the voltage of the outlet matches the specifications on the cabinet nameplate. If the ratings given for voltage (V) and maximum current (A) do not match, do not connect the unit to the power source.
2. Connect the power cord to a properly grounded and fused outlet. The outlet must be fused separately, using a fusible link T15A or using a circuit breaker B15. If the configuration of the receptacle does not match the power plug, consult a qualified electrician to replace or install the correct receptacle.
3. Make sure that the power cord is routed away from the counterweight and cable guide. The left side of the cabinet has additional fastening points that can be used for routing the power cord.
4. Make sure that the power cord is not stretched or pinched.

To protect from accidental disconnection, the power source outlets should be located out of casual reach and be accessible only to authorized persons. Ideally, the outlet should be located above the cabinet to avoid accidental shut-off.

The power supply cord is the mains disconnect. Maintain access at all times.

If the unit includes service valves (gas, water), the valves must be installed properly to ground, to the unit's main ground.

Installation Tests

Warning Do not operate the unit before initial operation, installation and certification tests have been performed. ▲

The installation test must be performed in accordance with the specifications of NSF/ANSI 49. The cabinet may be operated as a Class II biological safety cabinet, in accordance with NSF/ANSI 49, if the unit functions listed below were verified and if the test results are within the safety value tolerances as specified in NSF/ANSI 49, Annex F.

- Inflow velocity profile test
- Downflow velocity profile test
- HEPA filter leakage test
- Airflow smoke pattern test
- Site installation assessment tests
- A repeat test must also be performed annually, after repairs to the unit or after location changes.
- The operator should request a written test report from the authorized service technician.

Warning The operational safety of the unit, particularly the personnel and product protection, are guaranteed only if all safety functions of the unit have been tested and approved. ▲

Caution Thermo will not warrant operational safety if the unit is operated without the required installation and certification test, or if these tests and repeat test are not performed by adequately trained and authorized personnel. ▲

Caution The initial operation with subsequent installation test does not include any decontamination measures. The sample chamber and any accessories required must be disinfected and cleaned in accordance with the hygiene guidelines set forth for the desired application. ▲

Caution Alarms on this unit are not factory-set. Set the alarms to avoid product loss and ensure personnel safety. Refer to Certification section. ▲

Locating a Certifier

Caution Service and certification must be performed by qualified personnel. ▲

Biological safety cabinet certification consists of a series of tests designed to verify that the cabinet is performing within operating parameters established by the manufacturer. To assure that a biological safety cabinet is operating as intended, each cabinet should be field-tested at the time of installation and at least annually thereafter. Cabinets should be re-certified whenever HEPA filters are changed, internal maintenance is performed, or the unit is relocated.

Three industry-related organizations maintain lists of companies and individuals who are active in the certification industry. You may contact these organizations at the addresses listed below.

NSF International (NSF) and International Air Filtration Certifiers Association (IAFCA) sponsor certifier accreditation programs. Accredited certifiers have demonstrated proficiency at testing biological safety cabinets by successfully completing written and/or practical examinations.

Biohazard Cabinet Field Certifier Program

NSF International

PO Box 130140

789 N. Dixboro Rd

Ann Arbor, MI 48113-0140

Telephone (734) 769-8010 Or (800) NSF-MARK

Fax (734) 769-0109

<http://www.nsf.org/Certified/Biohazard-Certifier>

IAFCA

PO Box 12155

Columbus, OH 43212

Telephone (888) 679-1904

Fax (614) 486-1108

<http://www.iafca.com/certifier.html>

Locating a Certifier (continued)

The Controlled Environment Testing Association (CETA) is a trade association devoted to promoting and developing quality assurance within the controlled environment testing industry. A list of active members is available by contacting the organization.

Controlled Environment Testing Association

1500 Sunday Drive

Suite 102

Raleigh, NC 27607

Telephone (919) 787-5181

Fax (919) 787-4916

http://www.cetainternational.org/members/corp_indiv.htm

Note Unless certification was expressly called for in the specification, quotes and/or purchase order, the cost for this on-site testing is to be paid for by the customer. ▲

Section 4 Operation

Initial Setup

This section explains how to set up the device using the initial setup routine.

When the unit is turned on for the first time after delivery to the customer site, you must complete an initial setup process before you can use the unit.

Proceed as follows to start up the unit:

1. Power up the device by connecting the external power source. A startup screen with a “Start Setup” button appears, prompting you to run the setup, as shown below.



Figure 4-1. Initial Startup: Startup Screen

2. Tap the “Start Setup” button. The initial setup screen appears as shown below, prompting you to choose a display language, set the date and time.



Figure 4-2. Initial Setup

Initial Setup (continued)

3. Tap the language button to turn blue to set the language (default is English).

Tap the date button “MM”, “DD”, “”YYYY” to open the keypad to set the date.



Figure 4-3. Date Setup

4. Tap the time button “HH”, “MM” to open the keypad to set the time.



Figure 4-4. Time Setup

5. Tap the “Finish” button to complete the initial set up. The unit comes up in idle mode, as shown below, assuming that the window is closed.

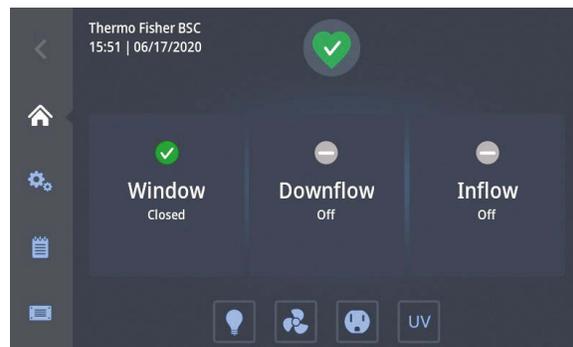


Figure 4-5. Main screen – Unit in Idle Mode

Initial Setup (continued)

The Setup is complete now. You can now begin using the unit.

NOTE All of the settings made in the previous steps can be edited by tapping the “Settings” icon in the left-hand Main Navigation Bar. See “Main Navigation Bar (Region R3)”.

Operation

This chapter describes how to control the Biological Safety Cabinets from the touchscreen display mounted in the light dome of the unit.

The screen display unit measures 17.8 cm (7 inches) diagonally across and has touch-sensitive areas that support finger gestures like tapping, it can be used with gloves.

Screen Layout

The touchscreen display unit of the Biological Safety Cabinets is subdivided into the four main screen regions. Figure 21 presents the arrangement of the screen areas discussed in the following.



Figure 4-6. Screen Areas

The four screen areas offer the following features:

- The Info & Health Status area (Region 1 in Figure 4-6 above) shows the biological safety cabinet’s name, the current date and time, the unit’s overall health status. For an overview, see “Info & Health Status Area”

Screen Layout (continued)

- The Main Screen (Region 2 in Figure 4-6 above) displays the main operating parameters of the unit, including window status and airflow speeds. When alarms or reportable events occur, this part of the display screen shows alarm or event information. For an overview, see “Main Screen (Region R2)”
- The Control Panel (Region 2B in Figure 4-6 above) offers touch-sensitive buttons for controlling the major functions of the unit, such as Light Bulb, Fan, Power Receptacle, UV button. For an overview, see “Control Panel (Region R2B)”
- The Main Navigation Bar (Region R3) holds iconic shortcuts to the related screens. For an overview, see “Main Navigation Bar (Region R3)”

Info & Health Status Area

The Info & Health Status Area at the top of the display window appears in all screen displays. Figure 4-7 shows an example of the Info & Health Status Area on a unit that is in a proper working condition.



Figure 4-7. Info & Health Status Area

The Info & Health Status Area displays the following information:

- Unit Name (top left in Figure 4-7).
- Date/Time (bottom left in Figure 4-7), as entered during the initial setup (see “Initial Setup”) or adjusted later on (see “Display Setting”).
- The “Unit Health Status” icon (center in Figure 4-7) is a touch-sensitive area that opens a Health Status pop-up window on top of the Main Screen.
- The following different icons may appear in this place, representing the overall health status of the biological safety cabinet:

**Info & Health Status Area
(continued)**

Icon	Meaning
	<p>The green “Health Status Good” icon indicates that the unit is in proper operating condition. The “Unit Health Status” icon is a touch-sensitive area that opens a Health Status pop-up window on top of the Main Screen the unit itself.</p>
	<p>The yellow alert triangle is a “Health Status Alert” icon. It indicates that there is a warning that is unexpected by the operator, yet requires the operator’s attention soon, such as during the starting up of unit (The fan speed is not ready). The “Unit Health Status” icon is not a touch-sensitive area.</p>
	<p>The yellow alert triangle is a “Health Status Alert” icon. It indicates that there is an issue that does not stop operation of the biological safety cabinet immediately, yet requires the operator’s attention soon, such as a HEPA filter to be replaced. The “Unit Health Status” icon is a touch-sensitive area that opens a Health Status pop-up window on top of the Main Screen the unit itself. The blue circle indicates how many alerts exist.</p>
	<p>The “red bell” “Health Status Alarm” icon indicates that there are one or more major alarm conditions that need to be corrected because they may constitute a hazard to the operator or the “Unit Health Status” icon is a touch-sensitive area that opens a Health Status pop-up window on top of the Main Screen the unit itself. The blue circle indicates how many alarms exist.</p>
	<p>A red bell with sound waves on both sides (top) means that the alarm is sounding, while the red bell with the diagonal line across (bottom) shows that the alarm has been snoozed.</p>

Main Screen (Region R2)

The Main Screen takes up the main part of the “Display Settings” screen and displays the status details on the biological safety cabinet.

Figure 4-8 shows the unit in working mode, with the window ready in the working position and the downflow and inflow speeds at operational speeds, and blowers are all on.



Figure 4-8. Main Screen

Main Screen (Region R2) (continued)

The screen content changes with operational state, depending on whether the unit is:

- in startup mode, as shown in “Startup Mode”
- in working mode, as shown in Figure 4-8 above
- in standby mode, as explained in “Standby Mode”
- in idle mode, as explained in “Idle Mode”
- running UV Disinfection, as explained in “Running UV Disinfection”

Three status indicator boxes appear in the center of the Main Screen. They show, from left to right, the state of the window, downflow and inflow statuses. Status indicator boxes may display with five different status icons:

Indicator	Meaning
	The checkmark on the green circle indicates that this particular function is working properly
	The yellow animated “Timer” icon indicates that the unit is working up towards an operational state.
	The white cross on the red circle indicates that there is a problem with that particular function.
	The light gray dash on the gray circle signifies there is no activity. This icon indicates, for example, that there is no airflow when the unit is on, but the blowers are off.
	The yellow alert triangle icon indicates that there is an alert with that particular function.

Control Panel (Region R2B)

The Control Panel in Screen Region R2B contains a complete set of controls for operating the functions of the biological safety cabinet, as can be seen in Figure 4-9.

The Control Panel is visible at all times below the Main Screen.

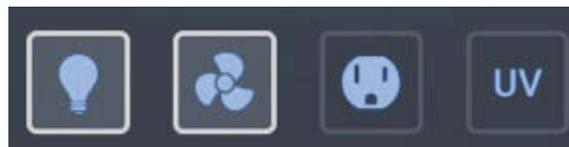


Figure 4-9. Control Panel for fully equipped Unit

Control Panel (Region R2B) (continued)

Button/Indicator	Meaning
	The "Light Bulb" button switches the interior sample chamber illumination of the biological safety cabinet on and off.
	The "Fan" button switches the device on and off. Tap and hold this button for 5 sec. to switch the device off (including the blowers) during the Standby mode. Tap and hold this button for 2 sec. to switch the device on (including the blowers) during the OFF(Idle)mode. During the UV disinfection cycle, the blowers run in reduced flow mode, which is indicated by a small blue circle labeled "1/2" (see lower image on the left side). The fans also run in reduced flow mode when the front window is closed and there is no UV disinfection ongoing.
	The "Power Receptacle" button switches the power receptacles in the sample chamber of the biological safety cabinet on and off.
	The "UV" button switches UV disinfection of the sample chamber on and off.

NOTE The work mode of the unit determines whether the control panel button is operable or not. The unit will ignore the inoperable icon tapping.

Button	OFF mode	Work mode	Window open mode	Standby mode	UV mode
Light Bulb	Operable	Operable	Operable	Operable	Inoperable
Fan	Operable	Inoperable	Inoperable	Operable	Inoperable
Receptacle	Operable	Operable	Operable	Operable	Operable
UV	Inoperable	Inoperable	Inoperable	Operable	Operable

Main Navigation Bar (Region R3)

The Main Navigation Bar (in Screen Region R3) holds icons for all major settings of the biological safety cabinets.

The Main Navigation Bar is visible at all times on all screens.



Figure 4-10. Main Navigation Bar

Main Navigation Bar (Region R3) (continued)

Icon	Meaning
	“Back” button: tapping this button will bring the user back up one level if one level or several levels down. If there is no level to go back to, this icon must be dark grey and must not be tappable. If there is a level to go back to, this icon must be blue and must be tappable.
	“Home” icon: returns to the Main screen.
	“Settings” icon: opens the “Settings” screen with various options for parameter settings.
	“Alarm/Alert log” icon: record all the alarms/alerts. It means that this is the historical record.
	“Data Plate” icon: opens the “Data Plate” screen showing general data about the unit.

Startup Mode

Figure 4-11 shows the Main Screen while the unit is starting up. The following startup screen shows what happens when the “Fan” button is tapped for turning on fans. The screen shows the alert because the airflow speeds are not up to speed yet.



Figure 4-11. Main Screen - Unit starting up

The yellow alert triangle indicates that the airflow is not ready. The three status indicator boxes show:

- A green checkmark icon in the window status box to indicate that the window is ready.
- Yellow “Timer” icons with rotating hands show in the Downflow and Inflow boxes, signifying that the airflows are not up to proper speed yet.

Startup Mode (continued)

NOTE When the operational downflow and inflow speeds are reached, the yellow timers are replaced by green checkmark icons. The Biological Safety Cabinets enter the working mode.

Figure 4-11 shows a typical startup mode example for starting up, with the “Light Bulb”, “Fans” buttons already enabled.

Working Mode

Figure 4-12 shows the unit in working mode, with the window ready in the working position and the downflow and inflow speeds at operational speeds. The sample space illumination, and blowers are all on.



Figure 4-12. Main Screen - Unit working

Buttons are highlighted in the Control Panel Area to indicate that the sample chamber illumination and blowers are both on. Power receptacle and UV functions are both off.

Standby Mode

Figure 4-13 shows the Main Screen in standby mode.



Figure 4-13. Main Screen - Unit in Standby

Standby Mode (continued)

Standby mode is entered when you close the window from within a working session.

A Standby Mode header appears to show the unit is in standby mode, maintaining cleanliness and containment, and ready to resume work when you move the window back to the working position. The green “Health Status Good” icon on the Info & Health Status Area signifies that everything is working properly.

In the Control Panel Area, the buttons are highlighted to indicate that functions are still on, including the blowers.

If the window is closed, the blowers will switch to reduced flow, as indicated by the small blue circle with the “1/2” label .

Idle Mode

Idle mode is entered when you turn the fans off, it is better for user to make sure that the window is either in the working position or closed.

Figure 4-14 shows that it is in Idle mode with the window closed. Idle mode is indicated by the gray “no activity” icons in the downflow and inflow status indicator boxes.



Figure 4-14. Main Screen - Unit in Idle Mode, window closed

Idle Mode (continued)

Figure 4-15 shows that it is in Idle mode with the window ready. In this case, the downflow and inflow status indicator boxes show an “Alert” icon.



Figure 4-15. Main Screen - Unit in Idle Mode, window ready

Figure 4-16 shows that it is in Idle mode with the window open. In this case, the window status indicator boxes show an “Alert” icon.



Figure 4-16. Main Screen - Unit in Idle Mode, window opened

Running UV Disinfection

The biological safety cabinet has a built-in UV disinfection routine that affords an intensifying additional disinfection after a standard wipe/spray disinfection. UV disinfection can be started by pressing the “UV” button on the Control Panel or can be started automatically with the specified time if the UV-auto-start function is enabled.

For running the UV disinfection routine, the front window must be completely lowered to protect against UV radiation. A safety interlock ensures that the routine cannot be run until the front window is in the closed position. And the LED light must be switched off.

Manual UV disinfection

If the UV button is pressed while the window is open and/or the LED light is on, the following pop-up window shown below is displayed on the Main Screen:

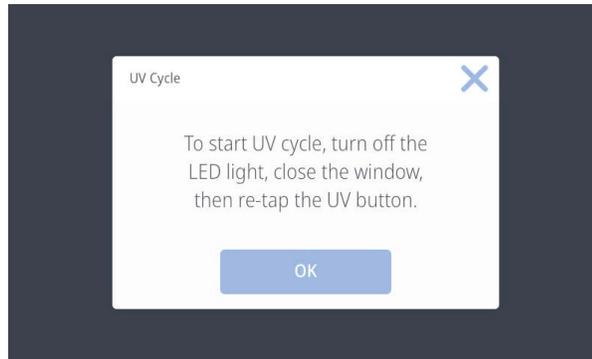


Figure 4-17. Main Screen - “UV disinfection” rejected

While the routine is running, the “UV disinfection” screen shown below is displayed on the Main Screen.



Figure 4-18. Main Screen - “UV disinfection” running

Additionally, the “Total cycle time” in hours and the time remaining in hours, minutes and seconds are displayed.

UV disinfection ends when the preset total cycle time for the routine has elapsed. Then, the UV lamps are switched off automatically, and the “UV disinfection” screen goes away.

Auto UV disinfection

The UV disinfection can be started automatically with the specified time if the UV-auto-start function is enabled. Refer to Section 4.13.3.

Auto UV disinfection (continued)

Note: when it is not in the main screen(standby mode) the UV disinfection will not be started automatically even though the specified time has reached, which means that the UV disinfection will be ignored once.

During the Disinfection cycle, when the “Light Bulb” button is tapped, Biological Safety Cabinets will ignore this operation. But opening the window will interrupt the disinfection cycle. As shown in Figure 4-19. If tapping the “Terminate”, the disinfection cycle will be stopped. If tapping the “Restart UV Cycle”, the disinfection will be restarted.



Figure 4-19. UV Cycle Interrupt when Window is open

Viewing Status and Replacing UV Bulb

Tapping the “Health Status Good” icon in the Info & Health Status Area takes you to the unit status shown in Figure 4-20 In this screen, you can check the operating hours, UV status and the Filter status.

Viewing General Status Information

- Operating hours, shows the total work hours.
- UV, shows the total UV work hours and the UV bulb install date.
- Filter, shows the filter running time, estimated left service time, and the filter install date

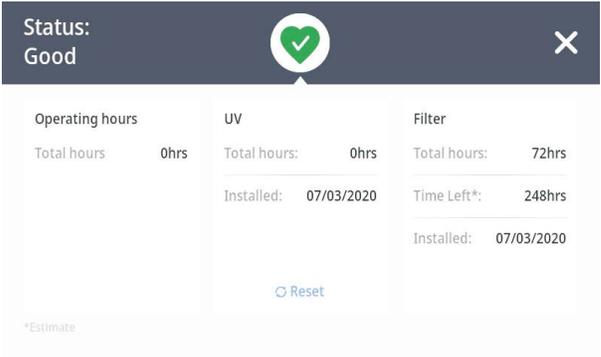


Figure 4-20. “Status” Main Screen

Replacing UV Bulb

If you replace a new UV bulb, please follow below process to update the UV status

- Tap the “Reset” button to update the installed date, and the UV work hours will be fall to zero. When you tap the “Reset button”, a pop-up screen shown in Figure 4-21

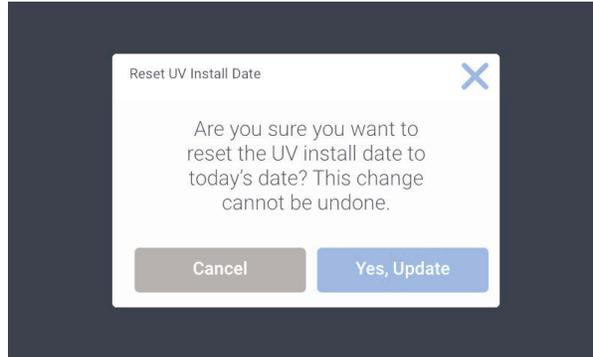


Figure 4-21. UV Reset Confirm Pop-up Screen

- Tap “Yes, Update” button to save your setting, you can also tap “Cancel” button to cancel your setting. If you tapped the “Yes, Update” button, a pop-up screen shown in Figure 4-22

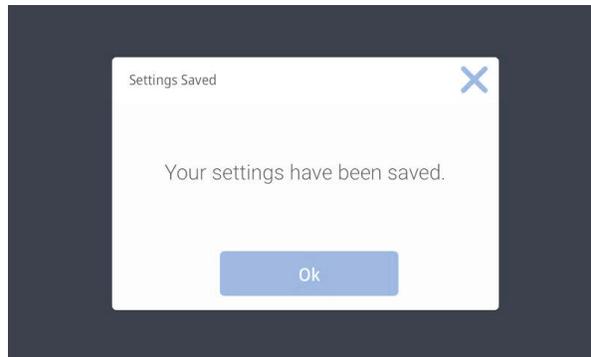


Figure 4-22. UV Reset Saved Pop-up Screen

Alarms

If the downflow, inflow or other parameters are not at operational settings, there may be at risk of exposure to biohazardous material or contamination. In this case, the biological safety cabinet emits a visual and audible alarm to alert the user, as shown in Figure 4-23 below.

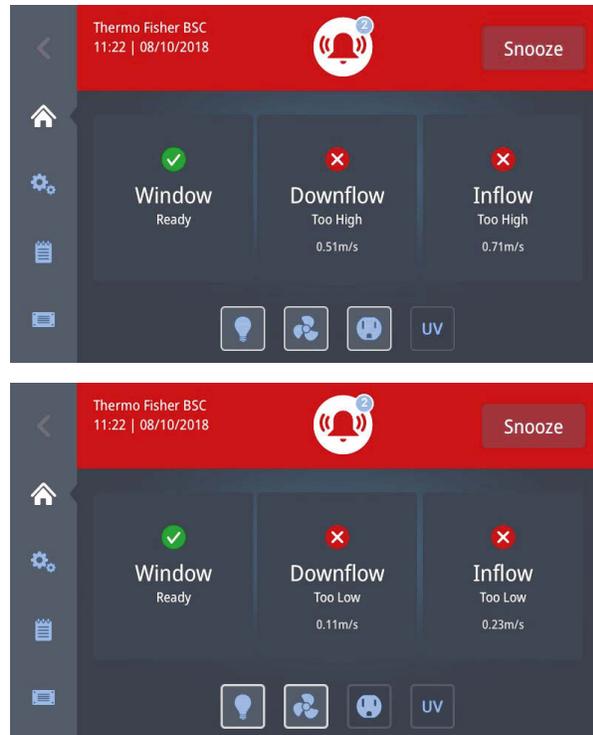


Figure 4-23. Alarming Screen for Downflow too high and too low Alarm

A “Health status” icon in the shape of an alarm bell appears on a red background, along with a “Snooze” button.

Additionally, the “Health status” icon has a small blue circle overlay that shows the number of pending alarms.

NOTE Applicable BSC standards in effect may not allow temporary muting of audible alarm.

Tapping the “Snooze” button silences the audible alarm temporarily for a pre-set timeout period. (The default alarm snooze timeout period is 5 minutes, but the setting may be changed in the “Alarms and Alerts” screen, as explained in “Snooze Timeout”). The “Alarm bell” icon is crossed out to indicate that the audible alarm signal has been snoozed (Figure 4-24).

Alarms (continued)

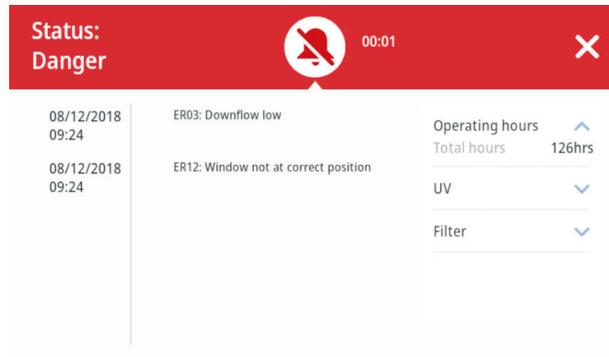


Figure 4-24. Main Screen after two Cycles of Alarm Ticker Message

The “Health status” icon has changed to show the audible alarm is snoozed. To the right of the “Health status” icon is a countdown timer showing the snooze time remaining, that is, the time period after which the audible alarm is resumed.

When the issue causing the alarm has been resolved, for example, when the user moves the front window to the appropriate position, the audible and visual alarms automatically disappear, and the screen display returns to the healthy state.

Events that produce alarms include:

Information Displayed on Screen	Alarm Type
ER01:Inflow low	Inflow alarm low
ER02:Inflow high	Inflow alarm high
ER03:Downflow low	Downflow alarm low
ER04:Downflow high	Downflow alarm high
ER05:Inflow pressure error	Inflow pressure error:
ER06:Downflow pressure error	Downflow pressure error
ER07:NVRAM error	NVRAM Error
ER09:Window switch error	Faulty window position switch
ER10:Communication error	Communication error
ER11:Frequency error	FAN frequency error
ER12:Window not at correct position	Window not at the correct position

Handling Alarms

To handle the problem, proceed as follows:

- Inspect the small blue alarm counter in the red “Health Status Alarm” icon to find out how many alarms you have to handle.

Handling Alarms (continued)

- Tap the red “Health Status Alarm” icon to display the “Health Status Alarm” screen, then you can review the alarm list. Figure 4-25 is an example.



Figure 4-25. “Health Status Alarm” Screen

- Correct each issue that has caused an alarm.
As you correct the pending issues, they will disappear from the alarm list on the “Health Status Alarm” screen one by one.
When the last issue has been cleared, the screen display returns to the healthy state and the green “Health Status Good” icon replaces the red “Health Status Alarm” icon .

Alerts

Some events in the biological safety cabinet that do not immediately affect containment or cleanliness produce alerts. These alerts appear with the visual features shown in the example in Figure 4-26.



Figure 4-26. “Alert” Screen

The “Health Status Alert” icon in the shape of a yellow “Alert triangle” icon appears on a black background.

Alerts (continued)

Additionally, the “Health status” icon has a small blue circle overlay that shows the number of pending alerts.

If you tap the “Alert triangle” icon, you will be taken directly to the “Status Alert” screen with its alert list, as shown in Figure 4-27.

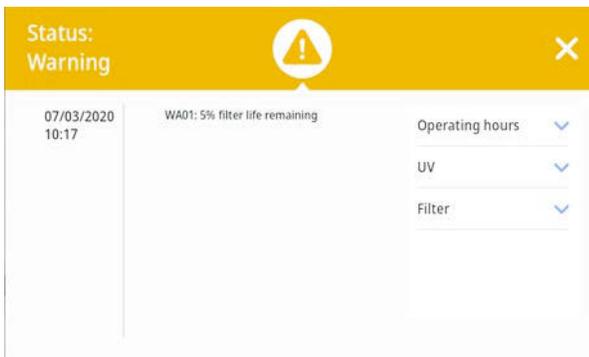


Figure 4-27. “Status Alert” Screen with Alert Screen Message

Events that produce alerts include:

Information Displayed on Screen	Alert Type
WA01:5% or less filter life remaining	5% or less filter life remaining
WA02:Annual field certification expiring	Annual field certification expiring
WA03:5% or less UV life remaining	5% or less UV life remaining

Handling Alerts

To handle alerts, proceed as follows:

- When an alert appears, inspect the small blue alarm counter in the “Health Status Alert” icon to find out how many alerts you have to handle.
- Tap the yellow “Health Status Alert” icon to display the “Status Alert” screen shown in Figure 4-24 and review the alerts list.
- Correct each issue that has caused an alarm.

As you correct the pending issues, they will disappear from the alerts list on the “Health Status Alert” screen one by one.

When the last issue has been cleared, the screen display returns to the healthy state and the green “Health Status Good” icon replaces the yellow “Health Status Alert” icon .

Settings

This section explains how to set up the unit using the various options of the “Settings” screen. After completing the initial setup process, you can further set up and customize the unit by using the options of the “Settings” screen shown below in Figure 4-28.

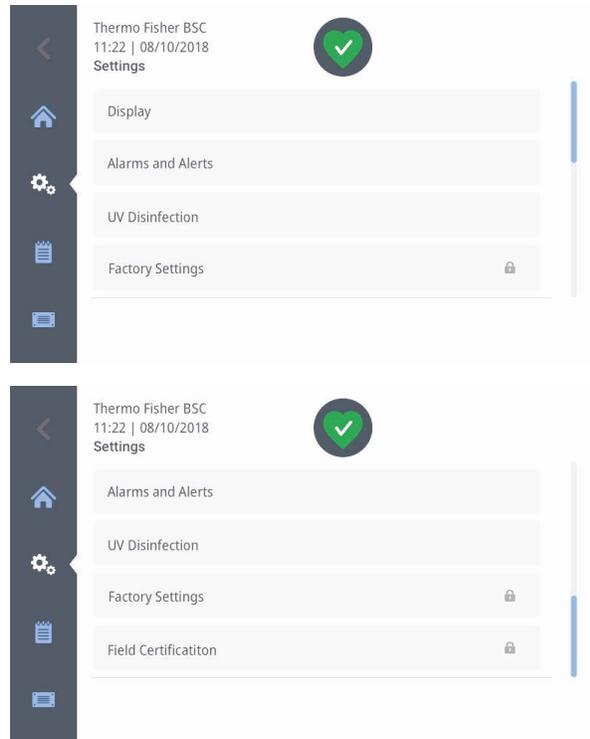


Figure 4-28. “Settings” Screen

Display Setting

Tapping the “Display” icon in the “Settings” screen takes you to the unit display setting shown in Figure 4-29. In this screen, you can set below 5 parameters.

- **Brightness.** The unit offers 4 brightness: 25%, 50%, 75% and 100%. 50% brightness is the default setting.
- **Language.** The unit offers 2 languages for display, English and Chinese. English is the default setting.
- **Units of Measurement.** The unit offers 2 units for flow display, metric units and imperial units. metric units is the default setting.
metric units: m/s (meters per second), cmh (cubic meters per hour).
imperial units: fpm (feet per minute), cfm (cubic feet per minute).
- **Date.** Please refer to the initial setup process.

Display Setting (continued)

- Time. Please refer to the initial setup process.

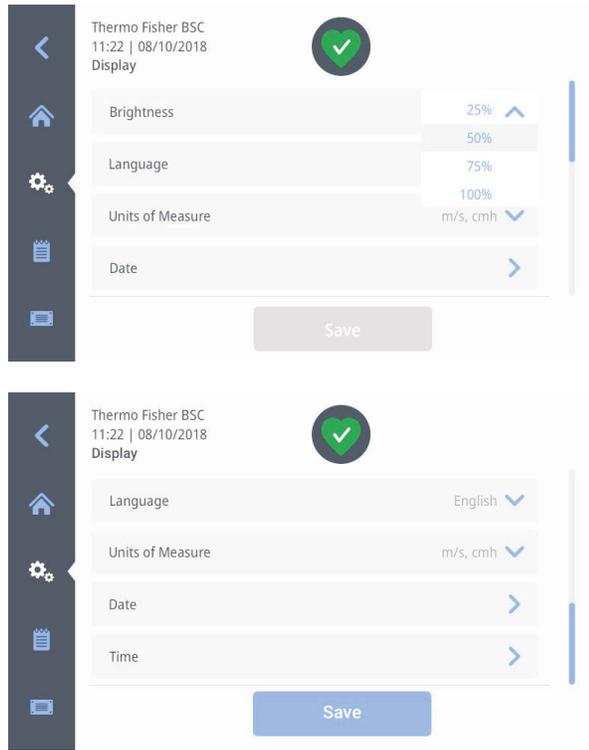


Figure 4-29. "Display" Setting Screen

Alarms and Alerts Snooze Time Setting

Tapping the "Alarms and Alerts" button on the "Settings" screen takes you to the "Alarms and Alerts" screen, shown in Figure 4-30 below.

From the "Alarms and Alerts" screen, you may change the audible alarms suspend time when Snooze button was tapped. Minutes are selectable from a drop-down list. The default setting is 5 minutes. You can tap the "Save" button to save the setting.

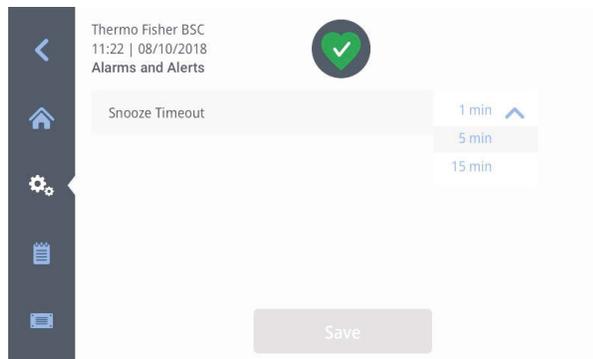


Figure 4-30. "Alarms and Alerts" Settings Screen

UV Disinfection

Tapping the “UV Disinfection” button takes you to the “Disinfection Settings” screen, shown in Figure 4-31 below. From this screen, you can change the default running time of the UV disinfection cycle. This value is used by default when you start the Disinfection cycle by tapping the “UV light” button in the Control Panel Area of the display window.

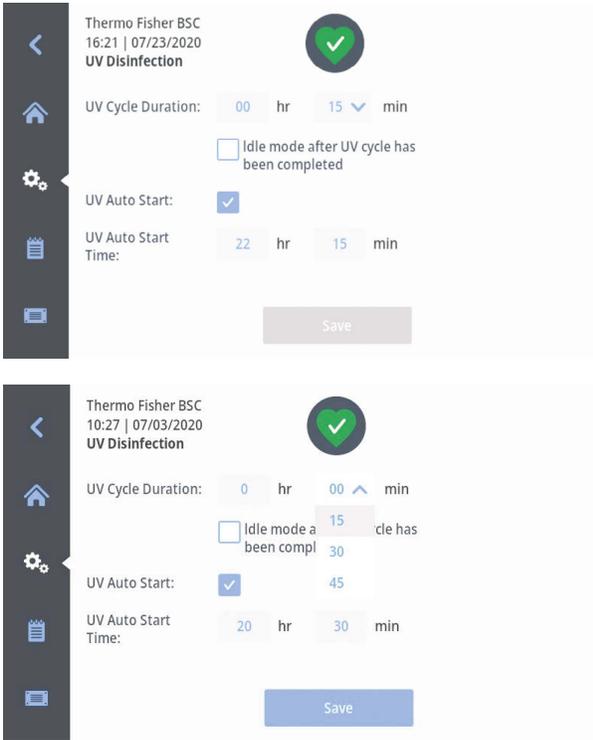


Figure 4-31. “Disinfection Settings” Screen

The “Disinfection Cycle Settings” screen displays the following fields:

- “UV Cycle Duration”: Sets the duration of the UV Disinfection cycle from 0 to 23 hours, with additional intervals of 00, 15, 30, and 45 minutes. Hours are entered by using a calculator-style keypad, minutes are selectable from a drop-down list. After UV cycle has been completed, the default setting is to enter standby mode, and you can also choose to enter idle mode by selecting the “Idle mode after UV cycle has been completed”

NOTE: The default setting is 1 hour, 00 minutes. 0 hours and 00 minutes is NOT a selectable option.

- “UV Auto Start” & “UV Auto Start Time”: Enable/Disable the Auto UV disinfection function by "UV Auto Start". If the Auto UV disinfection function is enabled, you can also set the auto start time by "UV Auto Start Time".
- Tap the “Save” button to save the setting.

Factory Settings

Factory Settings is reserved for manufacture & Field Service.

Field Certification

Field Certification is reserved for the professionals.

Alarm/Alert Log

Tapping the “Alarm/Alert log” icon in Main Navigation Bar takes you to the alarm/alert log screen shown in Figure 4-32. You can browse up to 50 latest records of alarm/alert events.

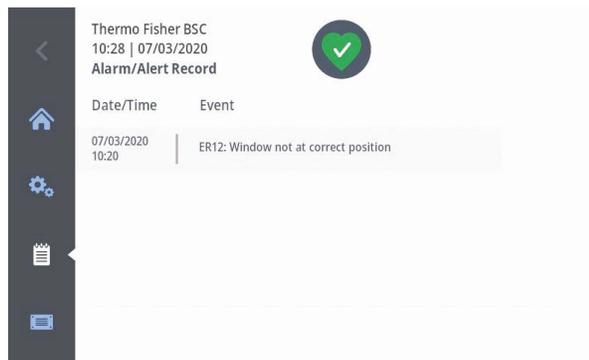


Figure 4-32. “Alarm/Alert log” Logfile Screen

Data Plate

Tapping the “Data Plate” icon in the “Settings” screen takes you to the unit information shown in Figure 4-33. you can check the unit information

- model
- serial number
- main board firmware version
- GUI display board firmware version



Figure 4-33. “Data Plate” Screen

Loading the Chamber

1. Move the front window to the maximum opening position. This automatically switches the blowers to full speed.
2. Install needed work materials within the sample chamber work area. Avoid blocking the front air intake grille.
3. Move the front window to the work position (the green status indicator Front Window in Work position is illuminated) and wait until the airflow has stabilized (the green status indicator Airflow steady is illuminated).

Warning Personal and product protection is ensured only if the airflow system of the device is working properly. If the alarm system issues a failure message for more than a few minutes while the front window is in work position, stop all applications that may jeopardize worker safety. ▲

4. Load the work tray with samples.
5. For work breaks or for extended experimental phases without manual intervention, switch the device to standby mode by closing the window.

Working Recommendations

The observance of work rules ensures a minimum of operational safety when handling the biological safety cabinet.

Before starting a procedure, take off all jewellery, put on required personal protective equipment (gloves, goggles, apron), and clean and disinfect the sample chamber surfaces at regular intervals.

During operation:

- Place samples only within the defined work area of the work tray.
- Do not place unnecessary items into the sample chamber.
- Use only disinfected and cleaned accessories for the work process.
- Do not cause air turbulence by quick hand, arm or body movements in the sample chamber or in front of the work opening.
- Do not place accessories into the sample chamber that cause air turbulence or emit excessive heat.
- Do not block air circulation at the ventilation slots of the work tray.

Working (continued)

- A height-adjustable working chair with an adjustable seat back should be used during extended work periods at the cabinet.
- When the forearm rests on the armrest, it should be in a nearly horizontal position.
- When the upper leg is in a horizontal position, the angle between upper and lower leg should not exceed 90°.
- To compensate between the floor and sitting height, a footrest should be used. The minimal effective size of the footrest should be 18 x 14 in (45 x 35 cm). The slope should be adjustable to within a range from 5° to 15°. The adjustable height should extend to a minimum of 4 in (11 cm) above the floor.

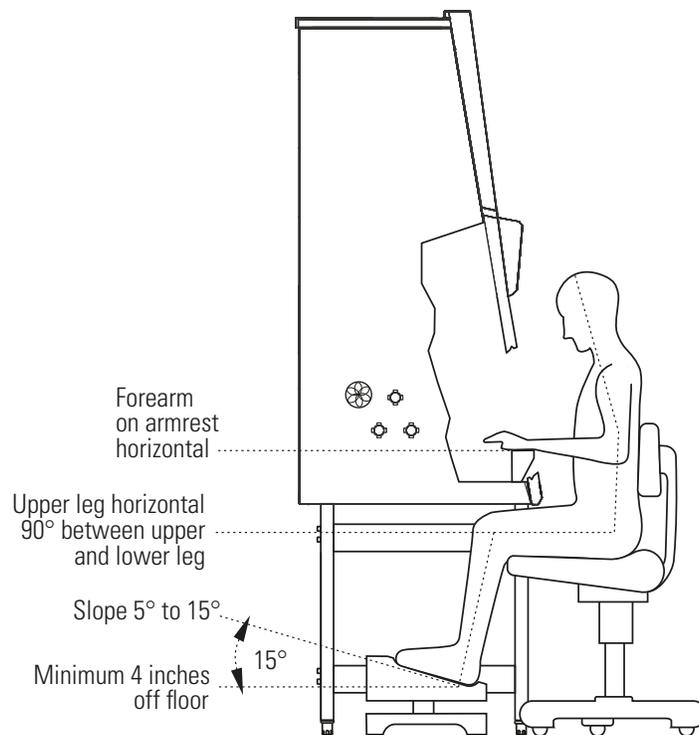


Figure 4-34. Sitting Posture

After completing a procedure,

1. Remove samples from the sample chamber and store them properly.
2. Clean and disinfect the sample chamber surfaces, including the work tray and the drain pan.
3. Clean and disinfect all accessories.

Unit Shut-down

To turn the unit off:

1. Remove all samples from the chamber and store them properly.
2. Remove any accessories from the chamber, and clean and disinfect them.
3. Clean and disinfect the chamber surfaces, work tray, and drain pan.
4. Turn the unit to standby mode by first closing the window. Then press the “Fan” button to turn off the blowers.

Caution For safety reasons, the blowers can be switched off only when the front window is closed. ▲

Power supply connection

The safety cabinet should remain connected to the power supply system at all times to ensure that settings for the individual unit configuration remain active in the memory. If the power supply is interrupted and later the power supply connection has been reestablished, the system switches to the operating mode that had been active last. Additionally, a window with the message „Mains voltage has been restored“ appears as soon as power has been restored, prompting the user to confirm by tapping OK. This message may, for example, be caused by a power outage.

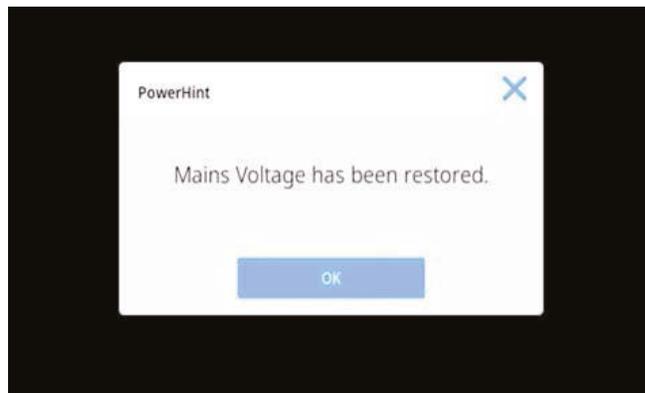


Figure 4-35. Power Supply Connection

Extended Period Shut-down

If the device is not to be used or is to be stored for an extended period of time, it must be completely decontaminated.

Warning To shut the device down, the sample chamber must be disinfected completely and the plenum, including the filters, must be decontaminated using the appropriate and authorized procedures. ▲

1. After the device has been decontaminated, close the window completely.
2. Disconnect the unit from the power source.

Unit Disposal

All components with the exception of the HEPA filters can be discarded after having been thoroughly cleaned and decontaminated. The HEPA filters must be discarded in accordance with the applicable national, state and local regulations for special solid waste.

Warning As this unit can be used for processing and treating infectious substances, it must be decontaminated prior to disposal, in accordance with acceptable standards and procedures.

Section 5 **Cleaning / Decontamination**

Several procedures can be used for decontaminating the biological safety cabinet. Which procedure is selected, depends on the potential risk imminent in the agents used, and/or the degree of cleanliness required by an experiment or work process.

One possible decontamination procedure is to clean, rinse and dry with a disinfection liquid or spray, and sterile distilled water.

UV disinfection can also be used. It is particularly suited as a more intense disinfection after the above procedure.

Autoclaving (sterilization with steam) can be used for treating the removable stainless steel components. The work tray(s), armrests and paper catch grids are autoclavable components.

Disinfection with formaldehyde can be performed if a sterile sample chamber is required for the work procedure. This sterilization procedure is mandatory before filters are replaced, or before the unit is discarded.

Care and Cleaning of Stainless Steel

Stainless steel is a combination of many different metals including iron and chromium. Iron, the primary element in stainless steel, tends to corrode (rust) when in its natural state. The chromium content in stainless steel prevents corrosion.

Stainless steel is not corrosion or rust proof, just resistant to stains, or stains “less”. The chromium, in the presence of oxygen, forms a tough, invisible, passive layer of chromium oxide film on the steel surface. If damaged mechanically or chemically, this film is self-healing as long as it has enough oxygen. The presence of any liquid or solid that remains in contact with the stainless steel for a prolonged time can prevent oxygen contact and promote corrosion, as can prolonged contact with cleaners or disinfectants containing chlorine, ammonia, iodine or other caustic agents.

Cleaning/Caring for Stainless Steel (cont.)

1. To properly care for stainless steel, use cleaners and disinfectants free of caustic agents such as chlorine, iodine and ammonia.
2. Always follow the application of any cleaner or disinfectant with a *minimum* of two clean distilled water rinses, then a thorough drying with a clean soft cloth. By rinsing with distilled water and drying, any remaining residue is removed from contact with the stainless steel.

Caution Never use abrasive cleaners, scouring pads or steel wool when caring for stainless steel. ▲

If the stainless steel does become stained, corroded or rusted, the iron deposits left on the surface can be removed by neutralizing them with the passivation process. This process uses an acid to neutralize the “free iron” deposits left on the steel where there has been deprivation of oxygen. This stops the spread of the corrosion or rust. It will not return the stainless steel to its original finish.

Cleaning and Caring for Coated Surfaces

All the coated surfaces of this equipment are powder coated. Powder coating is a method of applying a dry powder to electro-statically charged metal, then baked in an oven where the dry powder molecules are melted and fused together. This is by far the most durable finish available today and, if cared for properly, will last for many years. The coated surfaces should be cleaned with a neutral detergent and rinsed twice with clean distilled water, then dried thoroughly with a clean soft cloth. Cleaning or disinfecting coated surfaces without rinsing with clean distilled water and drying thoroughly will result in smearing, streaking and dulling of the coated surfaces. Never use abrasive cleaners, scouring pads or steel wool. If the coated surfaces do become dull, streaked, smeared or marred in some other way, there is no known method to restore the finish.

Disinfection

1. Remove all samples from the chamber and store them properly.
2. Remove accessories from the cabinet and disinfect them using the disinfection procedure recommended by the manufacturer of the accessory.
3. The work tray(s) and stainless steel components can be removed from the chamber and disinfected separately.
4. Clean all chamber surfaces with disinfectant.
5. Do not remove the optional UV lights from the sockets. Clean thoroughly with a damp cloth. Do not saturate. Be sure to dry completely.

Rinsing

1. Rinse all surfaces *twice* with clean distilled water.
2. Discard any liquid from the drain pan. Rinse pan.
3. Dry all chamber surfaces completely.

UV Disinfection After Cleaning

UV disinfection can be performed by using the optional factory installed UV light.

To start the UV disinfection procedure,

1. Close the front window, the air system operates in the reduced mode.
2. Press the UV key on the control panel.

To interrupt or cancel the UV disinfection procedure, just press the UV key (the display shows the operating hours) and slide the window up.

Microbiological Space Decontamination

NSF/ANSI 49, Annex G recommends a microbiological space decontamination when maintenance work, filter changes, and performance tests require access to any contaminated portion of the cabinet and before the BSC is moved to another location. A microbiological space decontamination may also be required by the BSC owner or user before certification or as a part of their work procedures. NSF/ANSI 49 provides recommended procedures for microbiological space decontamination using formaldehyde and chlorine dioxide. NSF/ANSI 49 also recognizes that alternative methods including the use of vaporized hydrogen peroxide are sometimes validated and approved by BSC owners and users. The appropriate method and procedure should be reviewed and approved by interested parties including the BSC user, institution biological safety officer, and BSC certification and service personnel as appropriate.

Warning Decontamination with formaldehyde and chlorine dioxide must be performed in accordance with the specifications of NSF/ANSI 49, Annex G. As this procedure has considerable risks, it must only be performed by specially trained and authorized service personnel! Before Decontamination with chlorine dioxide, the BSC must be sealed at the exhaust opening and front opening to eliminate exposure to chlorine dioxide, of the power supplies, PCBs and other components under the front canopy as **they are susceptible to damage from the process.** ▲

Thermo Fisher Scientific has developed validated procedures for the decontamination of the Thermo Scientific 1500 Series A2 using the Steris VHP (Vaporized Hydrogen Peroxide) system. These procedures are available on request.

Clean Exterior Surfaces

Clean the exterior surfaces of the cabinet using a solution of tepid water and commercially available mild dishwashing agent. Then, dry all surfaces well, using a soft, clean cloth.

Clean Window

For cleaning, the window can be lowered beyond the closing position (Use of the Window, Section 1).

Creating a gap at the window's upper edge ensures that the upper portion of the window can be cleaned and/or disinfected. Use a commercially available window cleaner to clean the window.

Clean the Drain Pan

Clean the drain pan, using a solution of tepid water and commercially available mild dishwashing agent.

1. Remove the work tray(s) from the chamber.
2. Clean thoroughly to remove any residues and/or deposits.
3. Wipe the drain pan, using a clean cloth and plenty of clean water.
4. Discard any liquid in the drain pan. Rinse and dry thoroughly.

Note After cleaning, make sure that all cleaning product has been removed completely from the drain pan. ▲

5. Re-install the work tray.

Clean the Paper Catch Grid

The protective paper catch grids are retained in the airduct wall by their own tension.

1. To remove a grid section, push the retaining tab down until the section can be moved out from under the inner back wall.
2. To install the grid section, first place it on the lip of the back wall, then push the retaining tab down and towards the back until the locking tabs are secured behind the inner back wall.

Caution Do not operate the unit without the paper catch grids installed! ▲

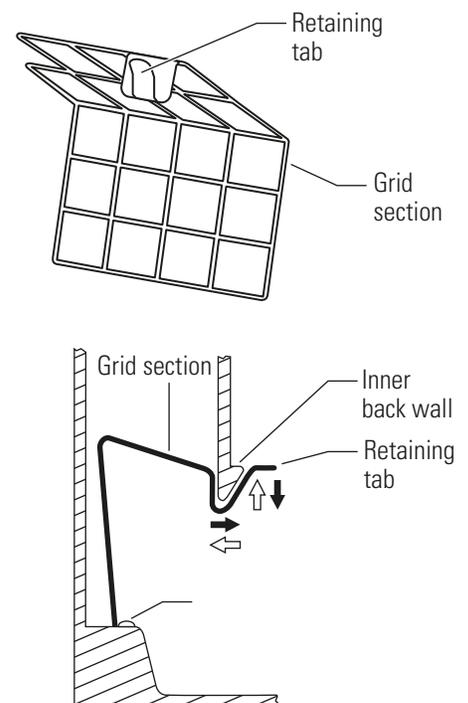


Figure 5-1. Protective Paper Catch Grid

Section 6 Maintenance

The annual certification consists of the following checks:

- Electrical safety in accordance with national regulations.
- Functional test of the device.
- Checking all components for possible damage.
- Checking the filter state.
- Verifying device air flows
- Checking the airflow conditions.
- Repeat test in accordance with NSF/ANSI 49.

Recommended annual maintenance tasks

- Ensure the unit is within its certification window
- Clear debris from under the worktray and paper traps
- Confirm that both LED bulbs are working (Replace as necessary)
- Replace UV bulb if necessary (1500 hour life)
- Ensure the counterweight path is clear and unobstructed
- Ensure the sash is moving freely through its full range of travel
- Check sash cords and pulleys for wear and/or damage
- Inspect sash attachment points for cracks or damage
- Ensure all service valves are working properly

Contact our service department if help is needed on any of these maintenance steps.

Warning The diffuser plate on the chamber ceiling serves as protection for the downflow filter and prevents refluxing of downflow air. When scanning the filter surface for a leak test, the perforated plate must be removed. ▲

Service

As filter replacement is an interference with the safety system of the unit, filters must only be replaced by adequately trained and authorized service personnel.

Warning For any service work in a potentially contaminated section of the biological safety cabinet, the unit must first be decontaminated. ▲

Sample Chamber Lights

The sample chamber is illuminated by one (4 ft units) or two (6 ft units) LED bulbs. The LED bulbs are installed in the light mounting frame in the sample chamber (Fig. 6-1).

The lifetime of LED bulb is 25000h.

1. Switch the unit off and disconnect it from the power source.
2. Move the window to the cleaning position (below closed position) to ensure a sufficient gap between the window's upper edge and the light dome.
3. The LED bulbs are installed in rotating sockets. To remove, rotate the bulb counterclockwise to disengage the latch and remove it from the sockets.
4. To install, slide the bulb contact pins into the rotating socket grooves and rotate the bulb clockwise to latch the sockets.

Optional UV Lights

The factory installed UV light is installed in the chamber ceiling immediately behind the window. The UV light should be replaced after 1500 operating hours. See Figure 6-1. The UV light model is G36T5.

1. Turn the unit off and disconnect it from the power source.
2. Move the window to the maximum open position.
3. Wear protective gloves to prevent skin oils from burning into the bulb. The UV bulb is installed in rotating sockets. To remove, rotate the bulb counterclockwise to disengage the latch and remove it from the sockets.
4. To install, slide the bulb contact pins into the rotating socket grooves and rotate the bulb clockwise to latch the sockets.

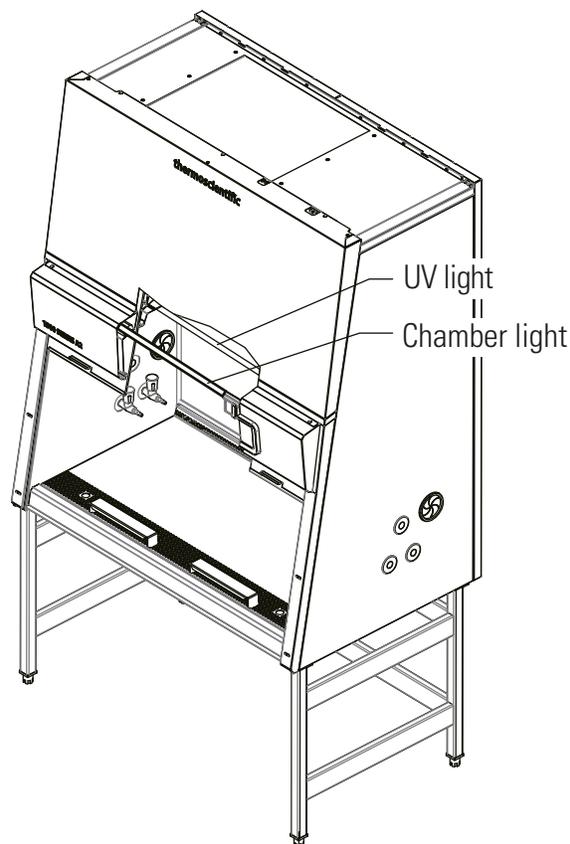


Figure 6-1. Light Replacement

Replacements and Repairs

Caution Remote alarm systems can be retrofitted and integrated into the unit controls. Alarm contacts change state based on window position. Airflow changes from window position could impair personnel and product protection. Installation of these systems should only be performed by authorized service personnel. ▲

Unit Disposal

The entire cabinet with the exception of the HEPA filters can be discarded after having been thoroughly cleaned and decontaminated. The HEPA filters must be discarded in accordance with the applicable national, state and local regulations for special solid waste.

Warning As this unit can be used for processing and treating infectious substances, it may become contaminated. Prior to disposal, the entire unit with filters must be decontaminated in accordance with acceptable standards and procedures. ▲

Section 7 Specifications

Dimensions		
Description		4ft Models (10" window opening work position) 1574,1584 6ft Models (10" window opening work position) 1579,1589
Exterior dimensions		
Width	mm / in	1300 / 51.2 1900 / 74.8
Depth	mm / in	800 / 31.5
Height	mm / in	1568 / 61.8
Interior dimensions		
Width	mm / in	1200 / 47.2 1800 / 70.9
Depth	mm / in	630 / 24.8
Height	mm / in	780 / 30.7
Front window		
Working position	mm / in	254 / 10 - pertains to all 4' & 6' models listed above with 10" window work position
Opening max.	mm / in	535 / 21.1
Working area height with adjustable height stand		
Height Range	mm / in	750 / 29.5 to 950 / 37.4
SmartPort - Diameter	mm / in	76.0 / 3.0
Remaining side wall access ports -Diameter	mm / in	23 / 0.91
SmartPort - Distance lower edge	mm / in	365.8 / 14.4
Remaining upper ports - Distance edge	mm / in	226.1 / 8.9
Remaining lower ports - Distance lower edge	mm / in	353.1 / 13.9
Distance from back panel		
SmartPort	mm / in	182.9 / 7.2
First access port	mm / in	259.0 / 10.2
Second access port	mm / in	309.9 / 12.2
Third access port	mm / in	360.7 / 14.2

Section 7
Specifications

Volume, weights, and loads			
Description		4ft Models (10" window opening work position) 1574,1584	6ft Models (10" window opening work position) 1579,1589
Volume			
Drain pan	l / gal	20 / 5.3	30 / 7.9
Weights			
Cabinet	kg / lb	200 / 441	280 / 617
Stand	kg / lb	26.3 / 58.0	30.0 / 66.1
Loads			
Maximum load on work surface	kg / lb	25 / 55	
Maximum load on overall working area	kg / lb	50 / 110	75 / 165
Ambient conditions (indoor use only)			
Temperature			
Max. ambient temp during operation	°C / °F	40 / 104	
Min. ambient temp during operation	°C / °F	10 / 50	
Humidity			
Max. humidity / operation	% r.H.	90, non-condensing	
Max. humidity / storage	% r.H.	95	
Heat dissipation to environment			
Room temperature 20°C	kJ/s / BTU/s	4ft models 10": 0.2 / 0.19	6ft. models 10": 0.4 / 0.38
Room temperature rise			
Above room temp with window closed	°K	< 2	< 2
Ergonomics			
Noise level*	dB(A)	4ft. models 10": 63, ±2	6ft models 10": 65, ±2

*The noise level was determined in accordance with NSF/ANSI 49. The measurement uncertainty is within a range of ± 2 dB.

Electrical data			
Models (Nominal voltages ±10%)		120V Models - 4 ft / 6 ft	230V Models - 4 ft / 6 ft 1584,1574/1589,1579
Voltage			
Rated voltage	V	1/N/PE AC, 120V, 50/60 Hz	1/N/PE AC, 230V, 50/60 Hz
Blower voltage	V		48 V DC
Current			
Power consumption maximum	A	8 / 10	7 / 8
Leakage current IEC 61010-1, UL61010-1	mA		< 3.5
Motherboard fusing	A		2 x T 15 A
Outlet fusing	A		2 x T 5 A
On-site fusing	A		Circuit breaker 15 A / Fuse T 15 A
Power			
Power input maximum *	W	1130 / 1700	1440 / 2000
Protection			
Protection class			I
Protection type			IP 20
Overvoltage category (IEC 61010-1, UL61010-1)			II
Contamination degree (IEC 61010-1, UL61010-1)			2
Connecting lines			
Mains connection		Power Cord (>3 m / 10 ft) with NEMA 5-15 plug	CEE 7/7 Plug

* With additional 5A load on cabinet receptacles, blowers at 100% and cabinet lighting switched on.

Section 7
Specifications

Airflow system			
Description		4ft Models (10" window opening work position) 1584,1574	6ft Models (10" window opening work position) 1589,1579
Airflows / Airflow velocities			
Inflow	m/s		0.53
	ft/min		105
Downflow	m/s		0.32
	ft/min		63
Air volume			
Overall volume flow	m ³ /h	1415	2122
	ft ³ /min	833	1249
Downflow volume flow	m ³ /h	829	1244
	ft ³ /min	488	732
Exhaust air volume flow	m ³ /h	585	878
	ft ³ /min	344	517
Filters			
Type			HEPA
Material			Fiberglass
Separability in MPPS	%		99.995
Separability at 0,3 µm particle size	%		99.999
Downflow			
Height	mm / in		457 / 18
Length	mm / in	1220 / 48	1830 / 72
Depth	mm / in		107 / 4.2
Exhaust air			
Height	mm / in	610 / 24	457 / 18
Length	mm / in	457 / 18	915 / 36
Depth	mm / in		130 / 5.1

Section 8 Certification Testing

Classification of the Safety Cabinet

For application in the USA, the unit has been rated as a Class II safety cabinet, Type A2, in accordance with NSF/ANSI 49.

For operation as a unit of said classifications, a certification test and repeat test in accordance with NSF/ANSI 49, Annex F should be completed at the time of installation, and at least annually thereafter. As described in Annex F, recertification should be performed whenever HEPA filters are changed, maintenance repairs are made to internal parts, or the cabinet is relocated. More frequent recertification should be considered when working with safety-critical materials (three to six months).

Test Terms

Nominal value:

Default value as specified by Thermo.

Measured value:

Value measured at the location of the safety cabinet.

Tolerance:

Acceptable deviation from the nominal value.

Average value:

The sum of the measuring values divided by the number of tests. The average value is compared to the nominal value.

Setpoint:

Acceptable operating value for the inflow and downflow velocities.

Inflow velocity (FPM):

Velocity of the air entering the sample chamber opening.

Downflow velocity (FPM):

Velocity of the displacement flow circulating through the work chamber.

Exhaust velocity (FPM):

Velocity of the airflow discharged through the exhaust filter opening.

Exhaust airflow volume (CFM):

Amount of air discharged at the exhaust filter.

Testing

According to NSF/ANSI 49, tests related to the safety of the personnel, product and environment that must be conducted on-site for Class II, Type A2 biological safety cabinets, at a minimum frequency of annually, are;

- Downflow velocity profile test
- Inflow velocity test
- Airflow smoke patterns test
- HEPA filter leak test
- Site installation assessment tests
 - Alarm functions
 - Exhaust system performance (proper exhaust duct negative pressure and canopy performance).

As described in Annex F, in addition to the above, the following tests performed at the request of the customer, or at the discretion of the certification provider.

- Comfort and safety tests
 - Lighting intensity
 - Noise level
 - Vibration
 - Electrical leakage, ground circuit resistance and polarity tests

Note Service with costs: Unless certification was expressly called for in the specification, quotes and/or purchase order, the cost for this on-site testing is to be paid for by the customer. ▲

Test Equipment

For conducting these tests, Thermo recommends testing equipment of the manufacturers listed below.

Testing equipment	Manufacturer	Application
Smoke tubes	MSA Pittsburgh, Pennsylvania, 15230	Airflow pattern test
Thermoanemometer	TSI Shoreview, Minnesota 55126	Downflow velocity test and alternate method for inflow velocity using constricted access
Digital Safety Inspector	Ohmic Instruments Co. Easton, Maryland 21601	Electrical leakage and ground resistance tests
GFI Circuit Tester	Leviton Manufacturing Little Neck, New York, 11362	Electrical leakage, ground resistance, and polarity tests
Photometer	Air Techniques Owing Mills, Maryland, 21117	Filter leak test
Aerosol Generator	Air Techniques Owing Mills, Maryland, 21117	Generation of aerosol mist
Vibration Meter	Quest Technologies Oconomowoc, Wisconsin, 53066	Vibration test
Flow Hood Air Data Multimeter	Shortridge Instruments. Inc. Scottsdale, Arizona, 85260	Inflow velocity test

Testing Information

Inflow Velocity – DIM Method (Primary)

Description: Inflow velocity using the direct inflow measurement method (DIM).

Equipment: . . .Shortridge ADM-870, or equivalent
.Flow hood Series 8400, or equivalent

Method:

1. Move the front window to the work position (25.4 cm/10 in).
2. Attach the flow hood [1] in the work opening [2] and seal the remaining open areas.
3. Operate the system blowers for approx 20 min.
4. Record at least 5 measurements of the inflow air volume.
5. Average those readings and calculate the inflow velocity (V1) as described below.

Testing Information (continued)

Inflow Area:

- 4ft Models (10" window opening work position) 1584,1574: Front opening 3.28 sq ft
- 6ft Models (10" window opening work position) 1589,1579: Front opening 4.92 sq ft

Calculation:

- Inflow Velocity (V1) = Inflow Air Volume (V2)/Actual Inflow Area (A2)

Acceptance:

- 100 – 110 FPM

Inflow Velocity – Constricted Window Method (Secondary)

Description:

- Inflow velocity measured at several points through a constricted window.

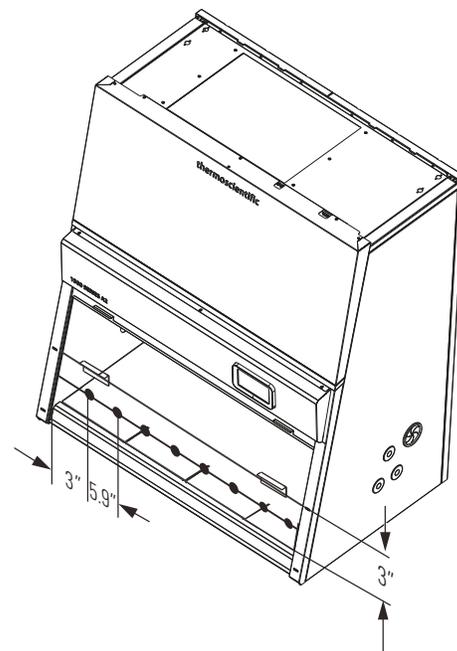
Equipment:

- Thermal Anemometer, or equivalent (hotwire)
- Anemometer Probe Holder, part number 1911325

Testing Information (continued)

Method:

1. Lower the front window to a height of 3 in. (7.6 cm).
2. Operate the system blowers for approximately 20 minutes.
3. Insert the thermal anemometer probe into the probe holder. Place the probe holder at the window opening work surface, ensuring it is seated properly. See Figure 8-1. Adjust the probe so the air passing through probe is centered in the window opening (1.5 in. [3.8 cm]).



Note The thermoanemometer probe must be positioned at a 10° angle from front vertical and located on the same plane as the inside of the window glass.

4. Beginning 3 inches in from the left inside wall, record successive readings every 5.9 inches (8 readings for 4 ft, and 12 readings for 6 ft models).
5. Average those readings and correct result for true velocity.
6. Calculate the inflow velocity as described below.

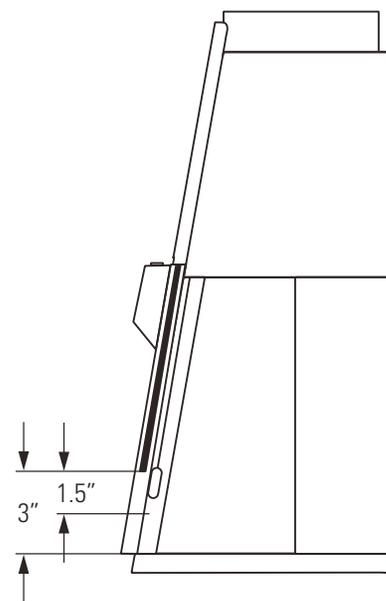


Figure 8-1. Constricted Window Method

Calculation:

- Inflow velocity (V1) = average of actual inflow velocity * K factor * 0.3 for 10" window opening work position

K factor = 1.04 for 4 ft w/ 10" opening.

K factor = 1.067 for 6 ft w/ 10" opening.

Acceptance:

- 100 – 110 FPM

Refer to the data plate on the lower right corner of the unit face. ▲

Testing Information (continued)

Inflow Velocity – Calculating Exhaust Flow (Alternative)

Description:

- Exhaust velocity measurements to determine inflow velocity.

Equipment:

- Thermal Anemometer, or equivalent (hotwire)
- Freestanding Fixture, or equivalent

Method:

1. Operate the unit in the work position for approximately 20 minutes.
2. Insert the anemometer probe into the probe stand, adjusting the height to 4 inches (10 cm) above the exhaust filter.
3. Record the readings on a horizontal plane 4 inches (10cm) above the effective exhaust filter area, in a grid pattern not to exceed 4 inches (10 cm) x 4 inches (10 cm).
4. Average the readings and calculate the inflow velocity.

Grid Pattern:

- 4 ft Models 1584,1574

20 points									3.94
									2.98
									2.98
									2.98
									3.94
		3.94	3.74	3.74	3.74	3.74	3.74	3.94	inches

- 6ft Models 1589,1579

32 points										3.94
										2.98
										2.98
										2.98
										3.94
		3.94	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.94

Effective Exhaust Filter Area:

- 4 ft Models 1584,1574
- 6ft Models 1589,1579: 16.8" x 34.8", 4.06 sq ft

Inflow Area:

- 4ft Models (10" window opening work position) 1584,1574: Front opening 3.28 sq ft

Testing Information (continued)

- 6ft Models (10" window opening work position) 1589,1579: Front opening 4.92 sq ft

Calculation:

- Average exhaust velocity (V2) = Sum of measurements / Number of readings
- Exhaust Volume (V3) = Average velocity (V2) x Effective filter area (A3)
- Inflow velocity (V1) = Exhaust volume (V3) / Work opening area (A2)

Acceptance:

- 100 – 110 FPM

Downflow Velocity – Uniform Cabinet

Description:

- Measures the velocity of air flow onto the work surface through the supply filter.

Equipment:

- Thermal Anemometer, or equivalent (hotwire)
- Freestanding Fixture, or equivalent

Method:

1. Operate the unit in the work position for approximately 20 minutes.
2. Insert the anemometer probe into the probe stand, adjusting for a height of 4 inches (10 cm) above the bottom edge of the window opening while in the work position.
3. Record the readings on a horizontal plane 4 inches (10 cm) above the bottom edge of the window opening while in the work position, in a grid pattern not to exceed 6 inches (15 cm) x 6 inches (15 cm).

Grid Pattern:

- 4 ft Models 1584,1574

21 points

								6
								5.5
								5.5
								6
6	3.9	3.9	3.9	3.9	3.9	3.9	6	inches

5.7 for
← 8 in
opening
← models

Testing Information (continued)

21 points

												6
												5.5
												5.5
												6
6	5.88	5.88	5.88	5.88	5.88	5.88	5.88	5.88	6	6	inches	

← 5.7 for
8 in
← opening
models

- 6 ft Models 1589,1579

33 points

													6
													5.5
													5.5
													6
6	5.88	5.88	5.88	5.88	5.88	5.88	5.88	5.88	5.88	5.88	6	6	inches

← 5.7 for
8 in
← opening
models

Calculation:

- Average Downflow Velocity = Sum of all measurements / Number of readings

Acceptance:

- 58-68 FPM

HEPA Filter Leak Test

Description:

- Determines the integrity of the downflow and exhaust filters.

Equipment:

- Aerosol Photometer, or equivalent
- Aerosol Generator, or equivalent

Filters that can be Accessed and Scanned

Method:

1. Allow the cabinet to operate for approximately 20 minutes.
2. Remove the work tray and protective covers, as appropriate.
3. Introduce the aerosol from the generator in the center rear of the work area, using a tee fitting to evenly distribute the aerosol.

Filters that can be Accessed and Scanned (continued)

4. If desired, and if the cabinet has not been used with hazardous materials since an effective decontamination, the upstream concentration can be measured. If desired, connect the photometer sample hose to the appropriate (supply or exhaust) test hose connection (exhaust test hose - right side / supply test hose - left side) from under the work tray.
5. Using either the appropriate upstream challenge measurement or calculated challenge value, set the photometer accordingly.
6. Scan the downstream side and perimeter of the filter as prescribed in NSF/ANSI 49, Annex F.

Acceptance:

- Filters scanned – 0.01% of upstream concentration at any point.

Filters that cannot be Accessed or Scanned

Method:

1. Set up as in Steps 1 through 5 above
2. In the duct, downstream of the filter, sample in accordance with NSF/ANSI 49.

Acceptance:

- Filters not scanned – 0.005% of upstream concentration

Airflow Pattern Test

Description:

- Determines the internal and external behavior of the air movement.

Equipment:

- Cold smoke (titanium tetrachloride)

Method:

- Downflow:

Pass smoke across the centerline of the work surface, 4 inches (10 cm) above the work opening.

- View Screen Retention:

Pass smoke 1 inch (2.5 cm) behind the window opening, 6 inches (15 cm) above the work opening.

Airflow Pattern Test (continued)

- Work Opening Edge Retention:

Pass smoke around the entire outside work opening, approximately 1.5 inches (3.8 cm) away from the cabinet.

- Window Seal Test:

Pass smoke up both sides and across the top of the window opening from inside the work area, approximately 2 inches (5 cm) from the edges.

Acceptance:

- No smoke shall have dead spots, reflux or escape the cabinet once drawn in.

Elect. Leakage , Ground Resistance, Polarity Tests

Description:

- Refer to UL 61010-1

Site Installation Assessment Tests

Description:

- Verify the unit is integrated properly into the facility.

Airflow Alarms

Description:

- Verify the airflow alarms will activate within 15 seconds when there is a 20% loss.

Equipment:

- Thermal Anemometer or equivalent (hotwire)
- Anemometer probe holder, part 1911325
- Shortridge ADM-870 or equivalent
- Flowhood series 8400 or equivalent

Note: To test the function of Airflow Alarms you need to access to the Field Certification screen. This function is reserved to Thermo Scientific Field Service and requires a special passcode.

Acceptance:

- Unit alarm activates within 15 seconds.

Sash Alarms

Description:

- Verify the window alarms are operating properly

Equipment:

- Operating manual

Method:

- Raise the window 1 inch (2.5 cm) above work position

Acceptance:

- Window alarm activates

Exhaust System Performance

Description:

- Verify the exhaust system is functioning properly

Canopy Connections

Equipment:

- Cold smoke (titanium tetrachloride)

Method:

- Pass smoke around the air gap, to ensure negative pressure exists

Acceptance:

- No smoke refluxes back into the room once drawn into the canopy.

THERMO FISHER SCIENTIFIC LAMINAR FLOW EQUIPMENT WARRANTY INTERNATIONAL

The Warranty Period starts two months from the date your equipment is shipped from our facility. This allows shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner.

During the first thirty six (36) months, component parts proven to be non-conforming in material or workmanship will be repaired or replaced at Thermo's expense, excepting labor. Installation, calibration and certification is not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, glass, filters and gaskets are excluded from this warranty.

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