This manual includes information for installation, operation, maintenance and spare parts. We recommend that it be kept near the cabinet for ready reference.
INTRODUCTION AND WELCOME

It is a pleasure to welcome you to the growing number of customers who own and operate Baker biological safety cabinets. As the inventors of the laminar flow biological safety cabinet and the leaders in the field, Baker people take special pride in providing a cabinet that is designed for maximum performance.

Your new SterilGARD® cabinet includes many unique features which are included to give you superior performance, simpler maintenance and lower life cycle cost. Your SterilGARD® cabinet is designed for both safety and value.

In addition to the high quality you expect from all Baker equipment, this model has been ergonomically designed to provide the lab user with many exciting design features. The revolutionary ergonomic design will help prevent repetitive motion injury, reduce fatigue and lab accidents and enhance productivity.

You will find your SterilGARD® cabinet suitable for use not only for research and clinical diagnostic work involving tissue culturing of possibly infectious samples, but also for I.V. drug preparations and other pharmaceuticals that could have adverse health effects on operators and other techniques requiring a contamination-free atmosphere.

Please note that all open-front containment cabinets, including this one, are for use with low to moderate risk agents only. Open-front cabinets do not provide absolute protection for the user. The adequacy of a cabinet for user safety should be determined on-site by an industrial hygienist, safety officer or other qualified person. Remember that you, the owner and user, are ultimately responsible and that you use your cabinet at your own risk.

We recommend that this manual, along with factory test report, be kept near the cabinet for convenient reference by operators and qualified maintenance personnel. If you have any questions about the use or care of your new SterilGARD® cabinet, please do not hesitate to contact our Customer Service Department at 800-992-2537 for assistance or e-mail us at bakerco@bakerco.com.

Sincerely,

David Eagleson
President
The Baker Company, Inc.
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I - FUNCTION OF THE SterilGARD® C³

SterilGARD® Airflow and Base Features

Room air enters the front access opening of the cabinet at a rate of 0.53 m/s [105 FPM] then enters the front work surface perforation. Most of the HEPA filtered down flow air passes through a diffuser but some of the air is dumped down the back of the viewscreen creating a high velocity air curtain at the front access opening. The HEPA filtered down flow air in the work area splits at the work surface. Some of the air enters the rear work area perforation while the remainder of the air enters the front work surface perforation. The air is pulled through the drain pan area, up the rear and side wall plenums, to the cabinet blower. The air is then pushed into the positive pressure plenum. At that point most of the air is pushed through the down flow HEPA filter while the remainder is exhausted out the exhaust HEPA filter and through a perforated filter protector at the top of the cabinet. [Reference Figure 1]

Figure 1, Airflow Inside Cabinet

EXHAUST

EXHAUST HEPA FILTER

POSITIVE PRESSURE PLENUM

DOWN FLOW HEPA FILTER

INTAKE (ROOM)

WORK AREA

DRAIN PAN AREA

= ROOM AIR
= CONTAMINATED AIR
= HEPA FILTERED AIR
Base Features

- HEPA filtration of air before it enters the work area.
- Front accessibility to electrical components, lamp, blower, and filters.
- Sliding viewscreen sloped 10 degrees for worker comfort.
- Removable work surface and supports for easy cleaning of the drain pan area.
- Down flow & exhaust filter diffuser / protector.
- Membrane switch control pad.
- Fluorescent lamp and UV light.
- Cabinet alarm system.
- Petcock on left hand wall.
- Receptacle (2)
- Padded armrest.
- Hour meter.
Design Details

Cabinet Pressure Plenums

The cabinets work area is surrounded by negative pressure and all external seals are under negative pressure. All internal positive pressure plenum seals are surrounded by negative pressure plenums.

Airflow control system

The cabinet blower has an electronic control system that automatically adjusts for changes in filter resistance to maintain near constant airflow. This helps to extend the life of the HEPA filters and enhance the safe operation of the cabinet.

Internal balancing damper

The cabinet has an internal balancing damper that compensates for down flow and exhaust imbalances due to pressure drop differences between the down flow and exhaust filters.

ReadySAFE™ Mode

The ReadySAFE™ mode is a feature that reduces the total airflow and energy consumption of the cabinet when it is not being used. Operation of the cabinet in ReadySAFE™ mode maintains personnel, product and environmental protection. The ReadySAFE™ mode is activated when the sash reaches it’s fully closed position and is indicated by reduced blower speed and the fluorescent lights automatically turning off. When the sash is returned to safe operating height the cabinet airflow will return to its original setpoint. The fluorescent light can then be turned on.

Cabinet alarm system

The cabinet has an alarm system that monitors the cabinet’s airflow pressure and view screen sash position. If the cabinet is not running at the proper airflow or if the sash is not at the proper operating height then a visual and audible alarm will come on.

Tested HEPA filters

All filters in the cabinet are scan-tested HEPA filters. They are conforming to the requirements of EN 13091:1999 and of at least class H14 (99.995%) or higher of EN 1822-1. Each filter is photometer leak checked after installation to assure that there are no leaks greater than 0.01% of the upstream concentration.

Easy filter access

For convenience and ease of service, all filters are front accessible. They can be removed through an access panel located behind the dress panels on the front of the cabinet. Only qualified technicians should replace the filters.

One-piece interior wall construction

The interior side and rear work area walls are constructed from a single piece of 16-gauge [1.6 mm] type 304 stainless steel. It has 11.1mm [7/16”] radius (rounded) corners to help prevent buildup of contaminants and aid in cleanup.
Front access high velocity air slots

At the intersection of both sidewalls and front access opening there are high velocity air slots. The purpose of the slots is to capture any particulate traveling near the sidewalls and access opening.

Towel guard

The towel guards are located under the work surface at the bottom rear and sides of the return-air plenums. Acting as a protective screen, integral to the interior walls, they help prevent wipes and other paper materials from being drawn into the blower system. They need to be kept clean at all times.

All-metal plenums

The plenums are constructed entirely of either carbon steel, or stainless steel, in order to provide strength, durability, air-tightness and resistance to deterioration.

Removable recessed stainless steel work surface

The work surface is constructed of corrosion resistant 16-gauge [1.6 mm] type 304 stainless steel, with a satin finish that diminishes light reflection. It is recessed to retain spills and can be removed along with its supports to gain access to the drain pan.

Cabinet exterior panels

External panel construction is of 16 & 18-gauge [1.6 & 1.3 mm] cold rolled steel, protected by a smooth white baked enamel finish.

Drain pan

The drain pan is designed with 11.1mm [7/16"] radius in all four bottom corners to facilitate cleaning and disinfection. Drainage is provided by a 12.7mm [1/2"] diameter stainless steel ball valve with secure-able handle located at the bottom of the drain pan.

Viewscreen

The cabinet’s 6.35mm [1/4"] safety plate glass sliding viewscreen may be opened to 508 mm [20"] for placing of large items in the work area, and may be fully closed for system shutdown or UV light operation.

Work area lighting

The work area is illuminated by two external fluorescent lamps which provide over 1,076 lux [100 foot-candles] of light at the work surface.

Electronic ballast

The SterilGARD® features solid-state electronic ballasts for the fluorescent and UV lights. These ballasts increase reliability, efficiency, and service life with lower heat output.
Sponge armrest pad

The armrest pad is made out of EPDM sponge material and is resistant to most chemicals and UV exposure. It is held in place with a low tack adhesive so the pad can be easily removed for cleaning. It also can be autoclaved.

UniPressure plenum

A telescoping all steel positive pressure plenum provides a more even clamping force on the filter frames and helps deliver the down flow air more uniformly. The plenum can be easily telescoped for quick filter changing.

Motor / Blower assembly

The motor and blower are assembled on a slide plate. This allows the assembly to be easily removed from the positive pressure plenum for faster servicing or replacement.

UV light

The ultraviolet (germicidal) lamp is permanently installed in the work area.

---

**WARNING**

- Do not defeat interlock, UV light is hazardous!
- Eyes and skin should not be exposed to direct ultraviolet light.
- Ultraviolet light should not be relied upon as the sole decontaminating agent. Additional surface disinfection should be performed both before and after every cabinet use.
- A biological safety cabinet acts as a supplement to good aseptic practices, not as a replacement.

---

Hour meter

The hour meter records the cabinet’s total running hours.

Advanced Control Board

The SterilGARD® is equipped with a control board with enhanced reliability and diagnostic capability. The board is designed to have built in immunity to momentary voltage interruption (flicker), electrical noise, and vibration. Diagnostic indicators provide easier troubleshooting of critical components without the need of special instruments. (See “Operator Controls” in Section III of this manual for control features)

Cable ports

One cable port comes as a standard item on the right side wall, and one can also be added into the cabinet’s left side wall as an option. It provides a way of introducing power and data cables, or siphoning tubes into the work area of the cabinet without having to go through the front viewscreen access opening. A plug is provided for each port for use when the port is not being used or for when the cabinet is being decontaminated.
Adjustable height channel stand (Optional)

The channel stand has adjustable legs and leg levelers. The legs provide 152.4mm [6"] of height adjustment and the leg leveler provides an additional 63.5mm [2.5"] of height adjustment.

Specifications

Weights:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Stand Option</th>
<th>Unit Weight W/ Stand</th>
<th>Weight W/Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>SterilGARD ®e³ SG403HE-EN</td>
<td>Channel Stand</td>
<td>303 kg. (668 Lbs.)</td>
<td>362 kg. (798 Lbs.)</td>
</tr>
<tr>
<td>SterilGARD ®e³ SG603HE-EN</td>
<td>Channel Stand</td>
<td>376 kg. (830 Lbs.)</td>
<td>454 kg. (1000 Lbs.)</td>
</tr>
</tbody>
</table>

Electrical Specifications

All electrical wiring to the cabinet should comply with all applicable Local Electrical Codes at the site of installation.

A single 220V AC, 16A, 50/60 Hz, 1 Phase dedicated circuit is required to power this unit. This circuit shall provide the protective earth ground for the cabinet.

The standard unit is furnished with one 14’ power cord with European “Schuko”, 250Volt, 16Amp plug, Type EU1-16P. Other listed plug and receptacle combinations may be provided for different international locations.

- Cabinet ratings:
  - 220V AC, 50/60Hz, 1 Phase, 13A maximum useable current
  - Typical current for standard unit (less receptacles) 3.0 to 5.0 Amps
  - The cabinet’s actual operating current (less outlets and options) is listed in the accompanying test report.

  The power cord is the Main Disconnect device for the unit. The unit should be positioned in a manner that allows easy access to the power cord connection to the electrical utility.

The cabinet Blower, Lighting, and Control circuits are protected by 250V AC, 6.3A fuses.

The cabinet is provided with two 220VAC, Single phase receptacles. The circuit is protected by a 5A self-resetting breakers on both Line and Neutral.

The cabinet is provided with an UV lamp.

The cabinet is provided with 24V DC power supply for cabinet pressure monitors.
Environmental Conditions
The cabinet is designed for use in the following conditions:

- Indoor use
- Altitudes up to 2000 meters
- Temperature range from 5°C to 40°C
- Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% at 40°C
- Main Supply voltage 220V±10%VAC
- Transient over voltage according to Installation Category (OVERVOLTAGE CATEGORIES) II per EN 61010-1, 3rd Edition
- Pollution Degree 2

Symbols and Terminology

Protective Earth: Any terminal intended for connection to external protective conductor for protection against electric shock in case of a fault.

Caution: Refer to instruction manual for information regarding personnel and environment on.
II - PREPARING THE STERILGARD® E³ FOR USE

Checking the Cabinet Upon Arrival

Upon receipt of your new SterilGARD® cabinet, first inspect the exterior of the crate, box and/or skid. If there is any visible damage, that fact should be noted on the receiving slip and immediately reported to the delivering carrier.

Next, remove the outer packing material and inspect the cabinet itself. If any concealed damage is found it should be reported to the delivery carrier. A claim for restitution should be filed within 15 days.

Due to the risk of mishandling by trucking companies, Baker has removed certain parts of the cabinet and has packed them separately. These items are listed on the packing slip, which accompanies the cabinet. Please check the packing slip carefully to be sure that all items have been located.

The Uses of a Biological Safety Cabinet

The SterilGARD® has been designed to provide a work area which protects the experiment from the environment, and the environment and operator from the experiment. The laminar flow biological safety cabinet is designed for work with Biosafety Levels 1, 2 and 3 (low to moderate risk) agents as listed in The Center for Disease Control's "Biosafety in Microbiological and Biomedical Laboratories" (U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and National Institutes of Health, U.S. Government Printing Office, Washington, D.C. 20402. (HHS publication number CDC 93-8395).

Biosafety level 4 or extremely high risk agents should never be used in this cabinet, except in conjunction with a one-piece positive pressure personnel suit ventilated by a life support system within a high containment facility. Please consult your safety professional for a proper risk assessment.

CAUTIONS

* The use of any hazardous material in the cabinet requires that it be monitored by an industrial hygienist, safety officer, or other qualified individual.
* Explosive or flammable substances should never be used in the cabinet unless a qualified safety professional has evaluated the risk.
* If hazardous biological work is to be performed, apply the enclosed biohazard decal.
* If chemical, radiological or other non-microbiological hazards are present, be sure to employ appropriate protective measures. Call upon a suitably trained individual to monitor the operation.

Installing the Cabinet

Installation of this cabinet should be carried out in accordance with appropriate regulations and other regulatory agencies having jurisdiction.
To insure operator safety the cabinet must be installed and operated per the manufacturer’s instructions.

1. Remove the strapping that holds the cabinet to the pallet.
2. Remove the cabinet from the skid with a forklift or other available equipment.
3. Move the cabinet into the laboratory room. Remove all tape, plastic wrap and other packaging materials on the cabinet.
4. Remove ¼-20 hex head screws that hold the weight box closure panel located on the right side of the cabinet. The counterweight is located inside the right side panel of the cabinet. Remove all tape, plastic wrap and other packaging materials inside the panel. Remove two ¼-20 hex head shipping screws that hold the viewscreen counterweight from moving. Verify viewscreen moves freely. Reinstall the closure panel.
5. Change out shipping hardware with ¼-20 thumb screws provided. A drawing showing the location of the shipping hardware on the cabinet is provided.
6. The cabinet’s adjustable leg levelers for the stand, and exhaust filter guard are shipped with the unit in a small cardboard box.
7. Be sure to remove the protective material covering the cabinet exhaust opening.
8. Install the exhaust filter guard on top of the cabinet exhaust opening using the hardware provided.
9. Follow the base stand assembly and adjustment instructions provided in the appendix of this manual to set the cabinet to the worksurface height desired.
10. Position the cabinet in its desired location within the laboratory room.

Location Within the Laboratory

Proper placement within the laboratory is essential. The ideal location for any biological safety cabinet is in a dead-end corner of the laboratory away from personnel traffic, vents, doors, windows, and any other sources of disruptive air currents. Published research from The Baker Company and unpublished tests performed at the National Cancer Institute show that if a draft or other disruptive air current were to exceed the intake velocity of the cabinet, contamination can enter the work area or escape from it. Contact The Baker Company if more information is required.

If the cabinet exhausts air into the laboratory instead of venting to the outside, it is important that there is adequate space between the top of the cabinet and the ceiling. A solid ceiling located too close to the exhaust filter will restrict the air and limit the intake velocity. The exhaust filter guard, an inverted “V” shaped perforated steel plate included with your SterilGARD® cabinet, will provide the necessary distance between exhaust opening and ceiling. If the filter guard is not installed, the cabinet exhaust opening should be no closer than 76.2mm [3"] from the ceiling, to enable proper airflow. For information about the implications of improper exhaust and alternative exhaust methods contact The Baker Company.

Vented into the Room

1. Never use the top of the cabinet or the work area for storage purposes.
2. Never use flammable, explosive or toxic vapors/gases, or substances which generate them, unless a qualified safety professional has evaluated the risk. The filters only remove particulates and not gases.
3. Keep the exhaust filter guard on the cabinet. It will help protect the filter from objects being dropped on it and keep the cabinet spaced from the ceiling or other objects so it can exhaust properly.
Cabinet Venting into the Room

Final Connections and Tests

1. The plumbing connection to the service petcocks must be made with great care because the effluent from a safety cabinet may be biologically hazardous. When present, petcocks are piped within the cabinet. The external connection uses 3/8” compression fitting at the rear, top, or bottom of the cabinet outer sidewall seal panel. Qualified personnel with proper materials and technique should make connection to plant utilities per local and national codes. Flammable gas should not be piped into any cabinet.

2. Thoroughly clean the interior of the cabinet. Locate the viewscreen at the correct opening height 203.2 mm [8”].

3. Plug the power cord into a 220V, 16A, 50/60 Hz dedicated circuit. The cabinet alarm will come on and stay on until the cabinet reaches +/-20% of the cabinet’s initial airflow velocity set point.

NOTE: See Section III - PROPER CABINET USE “Operator Controls and Sash Level Alarm” for information regarding steps 4, 5, & 6 below.

4. Turn on the Blower. The indicator light will illuminate and the running blower will make an audible sound.

5. Turn on the Fluorescent Light. The indicator light will illuminate along with the interior work area.

6. Lower the viewscreen to its fully closed position and turn the UV light on to make sure it is operational.

7. Although all units are carefully tested at the factory, it is advisable that certain other checks are made on-site by a qualified technician after installation. These include testing the filters for leaks and checking the air balance of the cabinet. A description of these tests can be found in Section IV, “On-site Checks and Maintenance Procedures”.

It is recommended that all personnel who will be using the cabinet study this manual to learn how to use the cabinet effectively. For additional start up and use procedures, reference Section III, Proper Cabinet Use.

FOR MORE INFORMATION

For a complete listing of articles, papers, and reports related to containment, clean air products and safety, contact The Baker Company for our complete Bibliography or visit our website at www.bakerco.com
A biological safety cabinet is a valuable supplement to good sterile technique, but is not a replacement for it.

If the cabinet is not understood and operated correctly it will not provide an adequate protective barrier. To insure operator safety the cabinet must be installed and operated per the manufacturer’s instructions.

All activities that are to be performed in your cabinet should first be approved by a competent professional, such as an industrial hygienist or safety officer, to make sure that the cabinet is appropriate for the work it will be required to do. This person should monitor the cabinet and its operating personnel at regular intervals to see that it is being used correctly.

In order to keep the interior work area clean and free of particulates, all Baker biosafety cabinets are designed for continuous operation. If the blower is turned off, the work area will become contaminated with room air. Therefore it is recommended that the blower be left on at all times.

**Operation and Controls**
The operator controls with indicators are arranged on the front electrical panel of the cabinet. A number of switches are arranged in a single membrane switch assembly. [Reference Figure 3]

- Ultraviolet (UV) Light On / Off – This switch controls the UV Light inside the work area. **The viewscreen must be fully closed before the UV light will turn on.** The Fluorescent Light and the UV Light are interlocked. When the viewscreen is closed, turning the UV Light On will automatically turn the Fluorescent Light Off. Turning the Fluorescent Light On will automatically turn the UV Light Off. The UV light will automatically shut off if the viewscreen is opened. A yellow indicator light located below the switch will illuminate when the switch is on.

- Fluorescent Light On / Off – This switch controls operation of the Fluorescent Light. **The cabinet blower must be on for the Fluorescent Light to operate.** The Fluorescent Light and the UV Light are interlocked. When the viewscreen is closed, turning the UV Light On will automatically turn the Fluorescent Light Off.

![Figure 3: Operator Controls](image)
Turning the Fluorescent Light On will automatically turn the UV Light Off. A Blue indicator light located below the switch will illuminate when the switch is on.

- Receptacles On / Off – This switch controls the receptacles in the work area. A Blue indicator light located below the switch will illuminate when the switch is on.

- Blower On / Off – This switch controls the power to the cabinet blower. A Green indicator light located below the switch will illuminate when the switch is on. **The blower switch has to be depressed for 10 seconds to turn the blower on or off.**

- Sash level alarm – For normal operation, the viewscreen must be placed at the allowable opening of 203.2mm [8’’]. The sash alarm will be activated whenever the viewscreen is NOT in a safe position. **Per EN Standard 12469:2000 the sash alarm must sound continually until it is returned to its proper level.**

  Please Note: The alarm does NOT sound when the viewscreen is in the closed position.

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**Cabinet Alarm System**

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- Pressure Monitors – Redundant alarm system where each monitor senses pressure in the same location within the cabinet. It is set to alarm when the downflow velocity changes +/- 20% or greater from the cabinets initial airflow velocity set point, indicating an unsafe change in cabinet total airflow and/or airflow balance.
- **Hour Meter** – Displays total cabinet blower running hours.
- **Warning Light** – Flashing red light comes on when cabinet is in an unsafe airflow condition and/or viewscreen sash is in an improper position.
- **Warning Buzzers** – Emit an audible sound when cabinet is in an unsafe airflow condition and/or viewscreen sash is in an improper position.

**Programmable Delay Off Time Function**

The following procedure can be used to program a Delay Off time for UV, receptacles, or fluorescent lights:

**NOTE** - The device to be programmed should be in the OFF condition before you start programming.

**15 minute increment programming:**

1. Press and hold the pushbutton of the device you want to program.
2. In about 3 seconds you will hear a short ‘beep’. This indicates that you have turned the device ON, are in the programming mode for the device, and have programmed it to turn OFF in 15 minutes. Release the pushbutton.
3. Each subsequent press of the device pushbutton while in the programming mode will add 15 minutes to the Delay Off time. (e.g. pressing the pushbutton 3 additional times would set the delay to 60 minutes, 15 min. initially plus 3 x 15 minutes additional delay times).
4. The device control will remain in the programming mode for about 4 seconds if the pushbutton is not pressed.
5. Once the programming mode for the device has ended the device can be turned OFF normally, if desired, by pressing the device pushbutton.
6. The programmed device will turn OFF automatically at the end of the Delay Time.
7. Each time a programmed device is turned off manually or automatically the programming is cleared and must be reentered, if desired.

**1 hour increment programming:**

1. Press and hold the pushbutton of the device you want to program.
2. In about 3 seconds you will hear a short ‘beep’. Continue to hold the pushbutton. In about an additional 3 seconds you will hear a longer ‘beep’. This indicates that you have turned the device ON, are in the programming mode for the device, and have programmed it to turn OFF in 1 hour. Release the pushbutton.
3. Each subsequent press of the device pushbutton while in the programming mode will add 1 hour to the Delay Off time. (e.g. pressing the pushbutton 3 additional times would set the delay to 4 hours, 1 hour initially plus 3 x 1 hour additional delay times).
4. The device control will remain in the programming mode for about 4 seconds if the pushbutton is not pressed.
5. Once the programming mode for the device has ended the device can be turned OFF normally, if desired, by pressing the device pushbutton.
6. The programmed device will turn OFF automatically at the end of the Delay Time.
7. Each time a programmed device is turned off manually or automatically the programming is cleared and must be reentered, if desired.
Daily Start-up Procedure

1. If the cabinet has not been left running continuously, turn on the blower. **The blower switch has to be depressed for 10 seconds to turn blower on or off.** An indicator light located below the switch will illuminate when the switch is on. Listen for the sound of the cabinet blower running. Check the readings on both pressure monitors, they should read a pressure consistent with the last time the cabinet was on.

2. Turn on the fluorescent light. The fluorescent light will not operate unless the Cabinet Blower is on.

3. To verify that user protection alarm is operational, lower the sash to it’s fully closes position. The sash-closed position automatically places the cabinet into a low energy usage mode and shuts off the fluorescent light automatically.

4. Verify that the red low alarm indicator light is present on the pressure monitoring device mounted to the front dress panel as indicated below. Once verified, open the sash to its normal operating height indicated by the red arrows. The low alarm indicator shall continue to flash and how the audio and visual indicator on the dress panel should activate before cabinet returns to normal flow.

5. Verify sash position sensor operation by moving the sash above and below normal operating level activating audio and visual indicator.

6. Wipe down the interior area of the cabinet with surface disinfectant. **NOTE: Some disinfectants, such as bleach or iodine, may corrode or stain the steel surfaces. Good practice is to thoroughly clean the surface afterward with a detergent and rinse with sterile water to prevent corrosion.**

7. Place all materials to be used for the next procedure inside the cabinet on the solid work surface. **Disinfect the exterior of these materials prior to placing them on the work surface.** Everything required, and only what is required, should be placed in the cabinet before beginning your work so that nothing passes in or out through the air barrier, until the procedure is completed. Implements should be arranged in the cabinet’s work area in logical order so that clean and dirty materials are segregated, preferably on opposite sides of the work area. Blocking the front and rear perforated grilles must be avoided. If wipes or absorbent towels are used on the work surface, be sure to keep them away from the grilles.

8. After your equipment is in place inside the cabinet, adjust the sliding viewscreen so it is open to the correct opening height 203.2 mm [8”]. An alarm will signal if you are not at the proper opening. This position is important to maintain proper cabinet airflow.

9. Insure that the padded armrest assembly is properly installed.

10. You can begin working in the cabinet after it has run for at least three minutes with the viewscreen in the proper position.
Working in the Cabinet

WARNING
Never work inside the cabinet when an alarm condition exists.

1. This section contains some suggested basic work practices that should be observed when using a biosafety cabinet. It is not intended to be a comprehensive list for all applications. A good reference source is *The Biosafety in Microbiological and Biomedical Laboratories* (BMBL) 5th edition published by the U.S. Department of Health & Human Services as HHS Publication No. (CDC) 21-1112 advisory document for safe work practices.

2. The operator’s hands and arms should be washed thoroughly with germicidal soap both before and after working in the cabinet. It is recommended that long-sleeved gowns or lab coats with tight-fitting cuffs and sterile gloves are worn, to minimize the shedding of skin, or related contaminants, into the work area and to protect hands, arms and clothing from contamination.

3. Avoid using floor-type pipette discard canisters. It is important that used pipettes be discarded into a tray or other suitable container inside the cabinet. This reduces unnecessary movement in and out of the work area. Because of the restricted access, pipetting within the cabinet will require the use of pipetting aids.

4. All work should be performed using the recessed area of the solid work surface. Work should be performed using slow movements, and the number of movements should be limited as much as possible. All materials required should be placed in the cabinet prior to starting a procedure to reduce the need for the operator to move arms in and out of the cabinet through the air barrier.

5. Room airflow can significantly affect cabinet operation. Opening and closing doors in the laboratory can cause air disturbances which might interfere with cabinet airflow. This kind of activity should be kept to a minimum while the cabinet is in use. Personnel should avoid walking by the front of the cabinet while it is in use. The location of facility air diffusers and personal fans can have an adverse effect on cabinet safety.

6. Use good aseptic techniques.

7. When a procedure has been completed, all equipment that has been in contact with the research agent should be enclosed and the entire work surface decontaminated. Trays of discarded pipettes, glassware, etc. should be covered. The cabinet should then be allowed to run for a minimum of three minutes, with no activity, so that the airborne contaminants will be purged from the work area. Once this has been done remove all equipment from the cabinet.

WARNING
Never use the cabinet to store supplies or laboratory equipment.

8. After removing all materials, culture apparatus, etc. from the cabinet, decontamination of the interior surfaces should be repeated. Check the work area carefully for spilled or splashed nutrient that might support bacterial growth.

9. It is recommended that the cabinet be left running continuously to ensure containment and cleanliness. When the cabinet is not in use, the ReadySAFE™ mode can be engaged to reduce energy consumption by fully closing the sash. The blower speed is reduced and the fluorescent lights automatically turn off. The sash alarm will be silenced when the sash is in the fully closed position. When the sash is returned to safe operating height, the cabinet returns to normal operation and the lights can be turned on again.
Reacting to Spills

Spills should be cleaned immediately to prevent cross contamination to the work and to avoid any damage to the stainless steel surfaces.

It is recommended that the researcher, in coordination with their consulting safety professional, have a written plan available in case of an accidental exposure or spill. The safety plan should include all of the emergency procedures to be followed in the event of an accident. All users of the cabinet should be familiar with the safety plan.

Should a large enough spill occur and flow into the cabinet drain pan area, it should be flooded with an appropriate disinfecting agent.

Cable Ports

One cable port comes as a standard item on the right side wall, and one can also be added into the cabinet’s left side wall as an option. They provide a way of introducing power and data cables, or siphoning tubes into the work area of the cabinet without having to go through the front viewscreen access opening. A plug is provided for each port, when the port is not being used or for when the cabinet is being decontaminated.

It is important not to overload the port with too many cables/tubing (a bundle approximately 28.6 mm [1 1/8"] maximum diameter). Cables/tubing in the work area need to be suspended on cable hooks provided. The hooks are located along the interior rear wall. This keeps the cables/tubing from affecting the airflow in the work area and placing unwanted stress on the cable port gaskets. [Reference Cable Port Illustration in appendix]

Ultraviolet Germicidal Lamp

The SterilGARD® can be provided with an optional ultraviolet light. The light is controlled by an on/off switch on the front panel. [See Figure 2]. The UV light will not operate unless the viewscreen is completely down, and the fluorescent light is off.

NOTE: Germicidal lamps are designed to emit UVC radiation because of its ability to kill bacteria. In humans, UVC is absorbed in the outer layers of the epidermis. Accidental overexposure to UVC can cause corneal burns, commonly termed welders’ flash, snow blindness, and severe sunburn. While UVC injury usually clears up in a day or two, it can be extremely painful.

**WARNING**

- UV light is hazardous! Do not defeat the interlock.
- Eyes and skin should not be exposed to direct ultraviolet light.
- Ultraviolet light should not be relied upon as the sole decontaminating agent. Additional surface disinfection should be performed both before and after every cabinet use.
- A biological safety cabinet acts as a supplement to good aseptic practices, not as a replacement.

Ultraviolet lamps lose their effectiveness over time and should be replaced when the intensity at the work surface drops below 40 microwatts per cm² at a wavelength of 253.5 x 10⁻⁹ meters. Be sure to check regularly.
Cleaning and Disinfecting Stainless Steel

Simple Cleaning

**Caution**

Do not use steel wool or steel pads when cleaning stainless steel.

Dirt deposits on stainless steel (dust, dirt and finger marks) can easily be removed. Frequently, warm water, with or without detergent, is sufficient. If this does not remove the deposits, mild, non-abrasive household cleaners can be used with warm water and bristle brushes, sponges or clean cloths.

Iron rust discoloration can be treated by rubbing the surface with a solution of 15% to 20% by volume of Nitric Acid and water and letting it stand for one to two minutes to loosen the rust.

Disinfection

The purpose of disinfection is to destroy particular organisms that could pose a potential hazard to humans or compromise the integrity of the experiment. It is important to use a suitable disinfectant in the concentration appropriate to the organism being killed. Standard disinfectants include: Iodophor-Detergent, Ethanol, and Phenol. Hypochloride (chlorine bleach) can also be used in dilute concentrations but caution is needed as Hypochloride can cause pitting and/or cracking of stainless steel if it is either too concentrated or not completely removed from the surface in a timely manner.

**Important**

Disinfection and cleaning should always be followed by rinsing in clean hot water and wiping the surface completely dry.

Disinfect the work surface before and after every procedure.
1. Disinfect surfaces of all equipment used.
2. Remove all items from the inside of the cabinet.
3. Place all items that may have come in contact with the agent(s), such as used pipettes, in a biohazard bag or other suitable container.
4. Disinfect the entire inside surface of the cabinet.

Space Decontamination

**WARNING**
The cabinet must be decontaminated with an appropriate agent prior to conducting maintenance, service or repairs in any biologically contaminated area of the BSC. Contaminated areas of the BSC are indicated by red WARNING labels. Before selecting a decontamination agent, the user and biosafety cabinet certifier must verify compliance with local, state and federal regulations. Any specialized equipment within the cabinet work area should be evaluated for material compatibility prior to using the decontamination agent.

The National Institute of Health, National Cancer Institute and the Centers for Disease Control recommend the use of formaldehyde gas, chlorine dioxide gas or hydrogen peroxide vapor all proven successful against most microbiological agents. All space decontamination activities shall be performed by individuals experienced in the handling and use of decontamination agents such as an accredited biosafety cabinet certifier. The selected decontamination agent should be determined effective against all of the biological agents within the cabinet. Personnel should always use the proper safety equipment (gas masks, protective clothing, etc.) for the specific hazard. The antidote for the selected agent should be immediately available, in a visible and nearby location.

A good reference for understanding space decontamination procedures is provided in the most current version of the NSF/ANSI Standard 49 in Annex G “Recommended Microbiological Decontamination Procedures,” NSF International, 789 North Dixboro Road, P.O. Box 130140, Ann Arbor, Michigan, 48113-0140.

Carcinogens and other toxins present a unique chemical deactivation problem and standard biological decontamination will not be effective against chemicals or other non-biological materials. A qualified safety professional, knowledgeable of the hazard, should be consulted to determine the proper procedure in these cases. Relocation of a BSC must involve a risk assessment to determine the need and space decontamination method.

**Space Decontamination Efficacy**

To demonstrate the efficacy of a space decontamination procedure it is recommended to use an appropriate bacterial endospore found to be the most resilient to the agent used. B. atrophaeus is a common biological indicator (BI), targeting a 6-log viable population reduction of the endospores. To demonstrate the appropriate penetrability to all interior cavities and components, the location of the BIs should be placed at the most challenging areas of the biosafety cabinet. Recommended BI locations within the biosafety cabinet are; above the exhaust filter, under the work surface, below the supply diffuser, on the interior sidewalls and under the worksurface of the biosafety cabinet. After 7 to 10 days of incubation, the result of space decontamination will be deemed successful if no turbidity or growth is discovered inside the media tubes where the (BIs) had been placed.
Recommended Space Decontamination Procedure

**WARNING**
Only qualified technicians shall perform this procedure.

**IMPORTANT!**
Although this Space Decontamination procedure provides evidence of cycle efficacy, it is strongly recommended to validate this process independently. Proper PPE should always be worn as required by individual laboratory protocols.

The following space decontamination procedure will employ the use of Chlorine Dioxide gas. The DRS Laboratories Mini Chlorine Dioxide System (MCS) was used for this space decontamination process however other types of Chlorine Dioxide generating systems are available. As with any device or system used, follow all manufacturers’ recommendations to ensure safe and effective use of the system.

Safety Precautions for the MCS Mini Chlorine Dioxide System

1. Post all appropriate OSHA approved warning signs and restrict all access to the area where the space decontamination is taking place. Use Caution tape as an additional safety measure if necessary. Warning signs shall remain posted during the entire decontamination process until confirmation that the area is safe for entry.

2. Consideration of the BSC location should be within an un-recirculated space with a pressure negative relative to all boarding areas such as labs, hallways, or anterooms.

3. Appropriate Personnel Protective Equipment (PPE). Lab coat and Gloves are recommended. CD Generation Chemicals is corrosive to skin. A full face respirator (preferably a PAPR type) is required to be worn from the time one loads the CD generation chemicals until the device under decon conditions is scrubbed and the MCS reservoir bowl water has been neutralized. The respirator shall only be removed after the decon air is deemed at a safe PPM levels. Use a portable CD gas analyzer, Dräger tube or equivalent testing device to determine if the OSHA permissible exposure limit (PEL) is below 0.1 ppm (0.3mg/m³) as an 8-hour time weighted average (TWA) of concentration. (NIOSH) recommended exposure limit is the same as (OSHA) but as a 10 hour (TWA). (ACGIH) The American Conference of Governmental Industrial Hygienists assigned the (STEL) Short-term permissible limit is 0.3ppm (0.9mg/m³) not to exceed 15 minutes and only four times a day at separated intervals of 60 minutes.

4. In the event of a power failure or the CD generation pump does not work after you have dropped the CD generation chemicals, immediately drop the neutralizer powder into the reservoir. Wait a minimum of 10 minutes for the neutralization chemicals to dissolve. If water still looks green, drop another neutralizer powder pack, wait 10 minutes, then dispose down the drain with running water. (In the event of a power failure, drop the neutralizing powder into the reservoir and wait until power is restored). There may be gas within the MCS reservoir bowl, so always wear appropriate respirator protection.

5. The MCS Mini Chlorine Dioxide System should be checked for air leakage prior to performing any decontamination cycles. No chemicals should be added during this inspection phase. This operation is
recommended after the biosafety cabinet has been completely sealed and ready to perform the decontamination. It is important to ensure process integrity and there is not a potential that hazardous gas may escape out into the surrounding environment.

- Ensure all slide gates on the MCS are closed to keep the dispensing cylinders dry.
- Turn on the biosafety cabinet to ensure operation and to check if any air is leaking through any seals.
- Turn on the MCS system and test both the manual and auto function for operation. Observe mild bubbling of water in the reservoir.
- During this operation check supply and return lines plus connections for any air leakage.
- Test MCS scrubbing motor blower for operation.
- Turn off the biosafety and MCS at the end of the testing.
- If a leak cannot be repaired or the machine is not functioning properly do not continue until the problem is resolved. Consult the MCS instructional manual or contact the equipment manufacturer.

### Recommended Cabinet Sealing Method

#### WARNING

Supply power must be disconnected

<table>
<thead>
<tr>
<th>Sealing the cable ports:</th>
<th><img src="image4.png" alt="Figure 4" /> <img src="image5.png" alt="Figure 5" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Remove the outer right side panel cover by loosening (9) ¼-20 hex head screws to reveal the right side cable port. (See Figures 4 and 5)</td>
<td></td>
</tr>
<tr>
<td><img src="image6.png" alt="Figure 6" /> <img src="image7.png" alt="Figure 7" /></td>
<td></td>
</tr>
<tr>
<td>2. Seal the cable port opening using the supplied metal plugs or seal the opening with a good quality adhesive tape. (See Figures 6)</td>
<td></td>
</tr>
<tr>
<td><img src="image8.png" alt="Figure 8" /> <img src="image9.png" alt="Figure 9" /></td>
<td></td>
</tr>
<tr>
<td>3. If equipped with an additional cable port on the left side wall, seal the outer opening and (See Figures 6)</td>
<td></td>
</tr>
<tr>
<td>4. Close all interior wall petcock valves inside the cabinet (See Figures 8 and 9)</td>
<td></td>
</tr>
</tbody>
</table>
Removal of the vertical dress panel:

5. Remove two #8-32 truss head screws located on the lower corners of the dress panel. (See Figure 10)

6. Pull the bottom edge of the dress panel out away from the cabinet. Hinge the dress panel standoff down and lower the vertical panel on it. (See Figure 11)

7. Disconnect the clear tubing going to the pressure indicators at the “Y” fitting. Disconnect electrical wiring going to the panel.

8. Lower and firmly grip the bottom edge of the vertical dress panel with both hands, slide the panel to the right and lift the panel off the cabinet.

Removal of the light canopy:

9. Remove the light canopy fasteners inside the sloped dress panel and lower the canopy. (See Figure 12)

10. Disconnect the canopy support cables (one on each end) from the electrical mounting board. (See Figure 13)

11. Mark the location of the wires going to the circuit board. (See Figure 14)

12. Unplug the wires going from the light canopy to the electrical mounting board. (See Figure 15)

13. Lift the canopy off the cabinet.
Removal of the sloped dress panel:

14. Loosen the four lock nuts holding the electrical mounting board. (See Figures 16 and 17)

15. Unclip wiring from the front dress panel.

16. Remove the two thumbscrews at the top holding the sloped dress panel. (See Figures 18 and 19)

17. Lift the panel off the cabinet.

18. Disconnect the sash level switch wiring and remove the sash level switch assembly by removing two \( \frac{3}{8} \) inch slotted screws, (See Figure 20)
Removal of the electrical mounting board:

19. Remove the power cord from the cable clips and pull to the front. (See Figure 21)

20. Remove the motor controller cover by loosening the two #8-32 screws on the top and bottom and slide the cover out. (See Figure 22)

21. Disconnect the connector on the left side. (See Figures 23 and 24)

22. Carefully lift the electrical mounting board with the power cord assembly off the cabinet.
Removal of sliding viewscreen:

23. Lift the viewscreen up to its maximum height and place #8-32 x ¾” long truss head screw in tapped hole at top of sash brackets under each viewscreen cable tab. Leave the screws out approximately 9.5mm to 12.7mm (3/8” to 1/2”). This will support the viewscreen while the cables are being disconnected. (See Figures 25 and 26)

24. Mark the location of the hex head screws. (See Figures 27 and 28)

25. Remove the #8-32 hex head screw that holds the cable to the viewscreen cable tab. Repeat the process for other side of the viewscreen. (See Figures 29 and 30)

26. Remove lower left and right hand viewscreen tracks. (See Figures 31 and 32)

27. Carefully lift the viewscreen up and off the cabinet. This should be done with two people.
### Removal of exhaust filter protector:

28. Remove the two #8-32 cap nuts from the front of the filter protector. (See Figure 33)

29. Carefully remove the filter protector.

### Removal of pressure plate:

30. Disconnect pressure sensor tubing.

31. Remove the two hex bolts and the #8-32 cap nuts from the pressure plate. (See Figure 34)

32. Carefully remove the pressure plate from the exhaust filter opening.

### Sealing the cabinet:

33. **This step is recommended before sealing the cabinet.** Place (bio-indicator) spore strips inside the cabinet to confirm that the decontamination process efficacy. Recommended locations for spore strips are above the exhaust filter, under the work surface, below the diffuser and on the interior sidewalls.

34. Seal the front access opening and exhaust filter opening with sheet plastic at least 4 mils thick. (See Figures 35 and 36)

*Before taping, always clean and remove any substances that may inhibit a good seal to the taped surface. Taping along flat even surfaces provides the best sealing application.*

**CAUTION**

*To prevent leakage ensure that no wrinkles or voids are present in the plastic sheeting while applying tape(See figures 37 and 38)*
35. Replace the electrical mounting board and light canopy in order to operate the blower and receptacles during the decontamination process. (See figures 39 and 40)

36. Reconnect the wiring to the motor controller and to the circuit board. (See Figures 41 and 42)
### Cabinet and Mini-CD (MCS) System Preparation for Decontamination

#### Installation of humidifier:

37. After the front and exhaust openings have been sealed off. Cut an opening for the MCS front supply sealing panel. The panel has a connection for the MCS supply hose with a power cord connection for the humidifier. (See Figure 35)

38. Place the humidifier filled with tap water ¼ to a maximum of ½ the way up the sight glass onto the cabinet work surface. Connect the humidifier to the inside power plug on the MCS seal panel. (See Figure 36)

39. Cut an opening and place a RH gauge in the cabinet to measure humidity. The requirement range is 60-85% RH with a target value of 70%. (See Figure 36)

   Optional: Use a temperature measuring device to verify the range. 59-104°F (15-40°C) is typically within range.

#### Taping sealing panel:

40. Tape the MCS inflow connection seal panel in place and tape around any other penetrations that were made to allow RH and temperature devices inside the cabinet to monitor the decontamination process. (See Figure 36)
Installing MCS exhaust sealing panel and Hoses:

41. At the exhaust opening cut a hole towards the middle of the cabinet (see figure 38) and tape the MCS exhaust connection seal panel in place. This is the recommended exhaust hose location for gas distribution throughout the exhaust filter and cabinet.

42. Both the exhaust hose and the supply hose may be connected at this time. The connecting ports and supply/return lines are identified with yellow tape for supply and black tape for exhaust. Ensure couplings are “locked”. (See Figures 37 and 38 for supply and exhaust connections)

43. Connect supply and exhaust hoses to MCS machine. (See Figure 39)
Elimination of light during decontamination process:

44. It is recommended that the chlorine dioxide fumigation process be in a dark environment for effective space decontamination.

45. Turn off all types of lights during the decontamination process. Ensure the area around or into the cabinet is dark as well.

46. If this is not possible, cover all light access openings into the cabinet with dark plastic or cloth so that light will not penetrate through during the decontamination process, including the exhaust area. (See Figures 40 and 41)
Cabinet Decontamination

**Preparation of MCS machine and cabinet for decontamination:**

47. Uninstall the MCS reservoir bowl with the wrench provided and fill with ½ liter (to the bottom notch located on the outside of the bowl) with cold tap water \( \leq 70^\circ/21^\circ \text{C} \), reinstall and tighten. (Figure 42)

48. Prepare the MCS by ensuring all slide gates in the dispensing cylinders are dry. Temperature and relative humidity should be brought up to the correct decontamination ranges in the cabinet before loading the CD generation tablets into the dispensing cylinders.

49. Run the cabinet blower throughout the entire humidification process and run the MCS “manual CD generation” (without CD tablets in the reservoir bowl). It should take about 5 minutes to attain the correct temperature and RH range. (Target value 70%, recommended range 60 to 85% RH / 59-104°F (15-40°C) Temp.) Turn off the cabinet blower, MCS manual CD generation and humidifier once the RH has been attained. (Figure 43)

50. At this time it is also recommended to check for air leaks around all taped seals by feeling for air or using a smoke making device.
IMPORTANT

ALL REQUIRED SAFETY WEAR AND PRECAUTIONS MUST BE FOLLOWED BEFORE CONTINUING WITH THE PROCESS.

Review steps 3 and 4 of the Safety Precautions Section before performing chemical loading and drop procedures. (See page 3). When the decontamination process has been started and during the loading the CD generation chemicals it is recommended to wear gloves and apply a full face respirator (preferably a PAPR type) to be worn until the decontamination process has been neutralized. The respirator shall only be removed after the decon air has been deemed to be at a safe PPM level. Use a portable CD gas analyzer, Dräger tube or equivalent testing device to determine if the OSHA permissible exposure limit (PEL) is below 0.1 ppm (0.3mg/m³) as an 8-hour time weighted average.

Before adding decontamination and neutralizing agents:

51. Before adding CD Generation tablets you must wipe out dispensing cylinders to remove moisture and powder build up. Ensure the slide gates are closed before introducing tablets.

52. Depending on the volume of the cabinet use the table to determine the correct amount of decontamination and neutralizing agents required.

The volume of the SG403HE-EN is 1.4 m³ [49 ft³] and the SG603HE-EN is 2.21 m³ [78 ft³]

<table>
<thead>
<tr>
<th>Minimum Volume - ft³ (m³)</th>
<th>Maximum Volume - ft³ (m³)</th>
<th>BSC Size Width - ft. (m)</th>
<th>CD Generation Chemicals (packs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (0)</td>
<td>25 (0.7)</td>
<td>0.2 ft. (0.0-0.6)</td>
<td>(1) A / (1) B</td>
</tr>
<tr>
<td>25 (0.7)</td>
<td>60 (1.7)</td>
<td>3-4 ft. (0.95-1.22)</td>
<td>(2) A / (2) B</td>
</tr>
<tr>
<td>60 (1.7)</td>
<td>90 (2.5)</td>
<td>5-6 ft. (1.52-1.83)</td>
<td>(3) A / (3) B</td>
</tr>
</tbody>
</table>
Adding of decontamination and neutralizing agents:

53. **Add 1 Neutralizer packet** and **correct amount of MCS CD Generation Chemicals** in their proper dispensing cylinders, and **re-cap**. (Figures 44 and 45)

- The CD Generation Chemicals are always equal packets of CD Component “A” and Component “B”.
- Always (1) Neutralizer packet is ever used.
- Never use more than (3) equal packs of CD Component “A” and “B” at once.

![Figure 44: Neutralizer dispensing cylinder](image1)

![Figure 45: CD Generation dispensing cylinder](image2)
Decontamination cycle:

54. Turn on the MCS by depressing the “AUTO Start” button; wait and listen for the bubbling to start and visually confirm. (See Figure 46)

55. Immediately pull the green handle for CD chemical cylinder and verify the CD Generation tablets drop into the MCS reservoir bowl. This is the beginning of the decontamination cycle. Make a note of the start time. (See Figure 47)

56. It is recommended to “Bump” the biosafety cabinet blower for 5 seconds, roughly 3-4 times every 7 to 10 minutes after starting the CD Generation to aid the gas distribution inside the safety cabinet. After 30 minutes from introduction of the CD chemicals the MCS will automatically turn off.

Note: If the biosafety cabinet blower fails to activate always double the CD generation time to 60 minutes by turning off the “AUTO start” button and depress the “MANUAL start” this will ensure adequate gas exposure inside the biosafety cabinet. After 60 minutes turn on the “MANUAL” scrubbing blower for 45 minutes.

57. The MCS will automatically “Bump” the Generation pump every 15 minutes for duration of 3 minutes to redistribute the RH and CD gas. There will be a total of (3) automated bump cycles. After an additional 60 minutes or a total of 90 minutes after introduction of the MCS CD Generation Chemicals the CD gas contact cycle is complete.
### Scrubbing cycle:

58. The MCS scrubbing blower will turn on automatically after 90 minutes. The MCS scrubbing cycle will run for 45 minutes and then shut off. The cabinet blower may be turned on during this phase to help “scrub” or recirculate the gas.

### Neutralization cycle:

59. Pull the white handle on the neutralizer dispensing cylinder, tap to ensure all the neutralizer tablets have dropped into the reservoir bowl. Make sure to push handle back into place after tablets have been dropped. (See Figure 48)

60. Turn on the MCS (manual) CD Generation and confirm that it is bubbling. Once the solution turns from a light green to a cloudy clear color the reaction has been completed. This will take about 10 minutes. (See Figure 49)
Decontamination complete:

61. After the 45 minute scrubbing cycle and bowl neutralization the cabinet may be unsealed. Always monitor the air quality before unsealing any cabinet or device after a decontamination process. Monitor the air quality in the area around the cabinet and inside the cabinet by cutting a small slit in the plastic before unsealing the cabinet.

62. After the unsealing process retrieve all (BI’s) biological indicators and place inside a safety cabinet or air controlled device so not to compromise the results.

63. Aseptically place the (BI’s) inside soybean broth tubes and incubate for 7 to 10 days. Always use one (BI) that has not been used for the decontamination process as a “control” to validate the growth of the endospore strip.

A full face respirator (preferably a PAPR type) is required to be worn after a decon process has been “scrubbed” and the MCS reservoir bowl water has been neutralized. The respirator shall only be removed after the decon air is deemed at a safe PPM levels. Use a portable CD gas analyzer, Dräger tube or equivalent testing device to determine if the OSHA permissible exposure limit (PEL) is below 0.1 ppm (0.3mg/m³) as an 8-hour time weighted average (TWA) of concentration.

Reference the Mini-CD System (MCS) Instruction Manual for more detailed information on the use of the MCS to decontaminate a biosafety cabinet. A copy can be obtained through DRS Laboratories, Inc. web site (www.drs Laboratories.com)
Using Ancillary Equipment

The rule to keep in mind is that the more equipment placed in the cabinet, the greater will be the air turbulence it causes. The turbulence resulting from equipment and materials can disrupt the designed airflow and reduce the effectiveness of the cabinet. When you use equipment which rotates, vibrates or heats, be sure to place it at the rear of the work area if possible. This will minimize the turbulence at the access opening.

About the HEPA Filters

CAUTION

- The HEPA filter consists of continuous sheet of glass fibers plated and mounted in a rigid frame. It is very delicate and the filter media should never be touched.
- HEPA filters are not intended to filter gases or vapors. Since this cabinet is partially recirculating, there will be gaseous buildup to the point of equilibrium if gasses or vapors are used.
- Misuse of chemicals, Bunsen burners, or a heavy dust load will shorten the filter’s life.

The High Efficiency Particulate Air (HEPA) filter is one of the essential components of a clean air cabinet. It is the shield, which stands between the product and the environment.

Proven efficiency in all HEPA filters used in Baker cabinets are conforming to the requirements of EN 13091:1999 and of at least class H14 (99.995%) or higher of EN 1822-1. Experiments with various viruses and microbial agents have proven the effectiveness of HEPA filters. If desired, contact The Baker Company for more information.

The room and cabinet particulate levels along with the capacity of the building exhaust fan determines the life of a filter. Under most laboratory conditions, you should expect a long filter life. However, misuse or a heavy particulate load within the cabinet will shorten any filter's life. Over time as the cabinet operates, the filters will collect particulate. When the cabinet can no longer maintain proper airflow balance due to the loading of the filters, they will need to be replaced. Only qualified technicians should check the cabinet filters to verify that they have not loaded with particulate to the extent that airflow balance is compromised. If any filter has visible signs of damage or leaks it should be fixed or replaced immediately.
IV - ONSITE CHECKS AND MAINTENANCE PROCEDURES

We recommend that the following checks be performed before initial use, after relocation, and after each filter change. They should also be carried out at regular intervals, usually six months or one year, as specified by an industrial hygienist, safety officer or other qualified person. The tests described below meet recommended minimum requirements and only experienced technicians using proper procedures and instruments must perform them. Our representatives can tell you about other tests, which you may consider desirable.

As reported earlier in this manual, each individual cabinet made by The Baker Company is carefully tested before it leaves the factory. Your copy of the test report, which you will find at the back of this manual, gives the factory test results for your own SterilGARD® cabinet. Use it as your record of the original testing, and as your guide to testing in the future. To gain many years of satisfactory service, please be sure that your maintenance personnel come as close as possible to duplicating these original test figures.

Your test procedures should be identical to ours so that achieving similar test results and comparison of data will be possible. Please correspond directly with us to request detailed procedures for your particular cabinet model. Alternate testing procedures can be found in the EN 12469:2000 standard.

The Airflow Balance

**WARNING**

Only qualified technicians shall perform this procedure.

The airflow balance, which is set at the factory, provides your cabinet with the proper air volume and velocity control to minimize leakage of airborne contamination either into or out of the work area.

In order to duplicate as closely as possible the airflow characteristics described in the original factory test report, please follow these steps:

1. Adjust the window to its designed opening height.

2. Perform inflow and down flow velocity tests per EN 12469:2000. Specific details are on the cabinet instruction label (See Figure 18) and in the factory test report.

![Figure 18: Cabinet Instruction Label](image-url)
3. Compare your results with those originally recorded at the factory.

4. The cabinet blower has an electronic control system that automatically adjusts for changes in filter resistance to maintain near constant airflow. If there is any imbalance between exhaust and down flow, adjustment can be made through the cabinet’s internal damper. The damper control is located on the top left side of the cabinet and can be adjusted with a wrench or screwdriver [See Figure 19 and Chart 1: “Air Balancing Guidelines.”]

![Figure 19: Top view of cabinet](image)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down flow</td>
<td>Inflow</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

Chart 1: Air Balancing Guidelines

5. Adjusting Motor Speed

Under normal operating conditions the motor control should not require adjustment except when setting of alarms.

See Appendix Motor Control Adjustment Detail for specifics on motor speed adjustment.
Filter Leak & Smoke Testing

**WARNING**
Only qualified technicians shall perform this procedure.

The filters in your cabinet were tested at our factory before shipment to ensure that the media, gasket, and frame were not exceeding EN12469:2000 allowable leak rates. Since filters may become damaged in transport, we recommend that the filters be re-tested by qualified technicians before the cabinet is used. The filters should also be leak tested at prescribed intervals as specified by an industrial hygienist, safety officer or other qualified person. EN12469:2000 details the steps for performing the filter leak test. While using the procedure outlined below refer to the filter leak testing label attached to the front top filter access panel.

Filter leak test procedure – Down flow filter

1. Turn on cabinet blower.

2. Raise the viewscreen to the full open position.

3. Remove diffuser under down flow filter to access filter media and frame by removing two cap nuts at the front, lowering the front and sliding the diffuser forward off rear wall mounting studs.

4. The port for measuring upstream concentration is located on the top rear left hand side of the cabinet.

**WARNING**
If the cabinet has been in use then it must be decontaminated before removing the plug.

5. Introduce the aerosol challenge to the cabinet blower at the front work surface perforation.


7. Repair any discovered leaks.

Filter leak test procedure – Exhaust filter

1. Turn on cabinet blower.

2. If the cabinet has a CEC, remove the access panel for leak scanning the exhaust filter. If the cabinet is exhausting to the room, carefully remove the exhaust filter protector and the exhaust pressure panel located on the left side of the exhaust filter. This will cause the (pressure) alarms to activate. (See Figure 20).
3. The port for measuring upstream concentration is located on the top rear left hand side of the cabinet.

WARNING
If the cabinet has been in use, it must be decontaminated before removing the plug

4. Introduce the aerosol challenge to the cabinet blower at the front work surface perforation.

6. Repair any discovered leaks.

7. Replace all parts that were removed for testing (Supply Diffuser, Exhaust Pressure Panel, Exhaust Filter Protector.) Note: Pressure alarms must be calibrated following the filter leak test procedure. See pg. 29-32 for calibration steps.
Airflow smoke pattern test

We recommend that qualified technicians verify the direction of airflow within your cabinet before the cabinet is used. The direction of airflow should also be verified at prescribed intervals as specified by an industrial hygienist, safety officer or other qualified person. NSF/ANSI Standard 49 details the steps for performing the airflow smoke pattern test.

Electrical safety tests

Since electrical components may become damaged in transport, we recommend qualified technicians retest them, before the cabinet is used. Note: Gasketed panels may not provide a good electrical ground.

Dielectric strength, electrical leakage, ground circuit resistance, and outlet polarity tests are performed at our factory before shipment. Since electrical components may become damaged in transport, we recommend qualified technicians retest them, before the cabinet is used. These electrical safety tests should also be performed at prescribed intervals as specified by an industrial hygienist, safety officer or other qualified person. EN61010-1, 3rd Edition recommends a dielectric strength test of 1390VAC, 5 seconds / 1970VDC, 5 seconds, and a total current leakage of 0.5ma from primary circuits to ground for the “normal” condition, all grounds intact, or 3.5ma for the “single fault” condition, incoming ground disconnect.

Note: While performing the electrical safety tests, ensure that the connections with the test leads are solid, as poor connections will increase the resistance reading. Also, ensure that the exposed metal being touched is solidly connected to the cabinet frame. Gasketed panels may not provide a reliable measurement.

Calibration procedure for inflow and downflow alarm Pressure Monitors

There are two Pressure Monitors installed on the cabinet. They are connected to measure the differential pressure between the exhaust pressure plate (positive P) and the negative pressure to the cabinet blower (negative P). This provides redundant alarm monitoring of cabinet airflow.

WARNING
Only qualified technicians shall perform this procedure.

This Biological Safety Cabinet provides personnel, product, and environmental protection. If this cabinet’s airflow increases or decreases by 20% of the setpoint average, an audible alarm will sound notifying that an unsafe condition has been detected. The following calibration procedure is crucial in providing this protection.

Note: This procedure MUST be followed every time the cabinet internal damper position is changed, or an adjustment has been made to the speed of the blower wheel.

Nominal Set Point Settings

Prior to starting this procedure the cabinet air flow should be balanced at the nominal operating set point per manufacturer instruction. The instructions for obtaining nominal set point are located on the front of the cabinet.
Downflow Alarm Setting Procedure

Read and understand the procedure in the section on Adjusting Motor Speed and Pressure Monitor Programming before attempting this calibration procedure. A complete Installation and Operating Instruction Manual for the installed Pressure Monitors is located in the Appendix.

1. With the cabinet at nominal set point, place a hot wire anemometer at one of the Downflow grid locations where the reading represents the average downflow velocity.
2. Record the reading of the Downflow Alarm pressure monitors.
3. Decrease the motor / blower speed until the selected Downflow velocity reading is 20% lower than the set point average. This will be the low Downflow Alarm Point.
4. Set both Pressure Monitors low alarm set point to this 20% reduction in Downflow point pressure.
5. With the hot wire anemometer still located as noted in step 1, increase the motor / blower speed until the average Downflow velocity reading is 20% above the average.
6. Set both Pressure Monitors high alarm set point to this higher pressure.
7. Return the motor / blower to its original operating condition, at set point, by adjusting the motor / blower speed and checking the hot wire anemometer reading.

Check the Calibration

Repeat steps 1 through 3. Check that the cabinet alarm activates. If no alarm sounds repeat step 4. Repeat step 5. Check that the cabinet alarm activates. If no alarm sounds repeat step 6. Repeat the procedure until the cabinet alarms at the proper settings.

Inflow Alarm Setting Procedure

Due to the common plenum design of the SterilGARD any increase or decrease in inflow will cause a downflow alarm condition notifying the user of an unsafe condition.

Pressure Monitor Programming Instructions- Sensocon Pressure Monitor

1. **Apply power to the device**
   - Press & Hold the Up arrow pushbutton until the “Main” menu is displayed ~3 seconds
   - Press & Hold the Up arrow pushbutton until the “Setup” menu is displayed ~1 second
   - The Control [Ctrl] parameter should be highlighted
   - Control Type:
     - Press the Right arrow pushbutton to access the Control setting list1SP/2SP/SPAL/AL
     - Use the Up and/or Down arrow pushbuttons to highlight “2SP”
     - Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting

2. **Set Point One Configuration:**
   - Press the Down arrow pushbutton to highlight [Set 1]
   - Press the Right arrow pushbutton to access the Set 1 setting list
   - Use the UP and Down arrow pushbuttons to highlight “db”
   - Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting
   - Press the Down arrow pushbutton to highlight [1 act]
   - Press the Right arrow pushbutton to access the 1 act setting list
   - Use the Up and Down arrow pushbuttons to highlight “dir”.
   - Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting
   - Press the Down arrow pushbutton to highlight [SP1 D]
If this is not at ‘0’ press the Right arrow pushbutton to access the SP1 D setting list
Set the delay to ‘0’ using Right and Left pushbuttons to select the digit and Up and Down pushbuttons
increase/decrease the value.
Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting

3. Set Point Two Configuration
Press the Down arrow pushbutton to highlight [Set 2]
Press the Right arrow pushbutton to access the Set 2 setting list
Use the UP and Down arrow pushbuttons to highlight “db”
Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting
Press the Down arrow pushbutton to highlight [2 act]
Press the Right arrow pushbutton to access the 2 act setting list
Use the Up and Down arrow pushbuttons to highlight “rev”.
Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting
Press the Down arrow pushbutton to highlight [SP2 D]
If this is not at ‘0’ press the Right arrow pushbutton to access the SP2 D setting list
Set the delay to ‘0’ using Right and Left pushbuttons to select the digit and Up and Down pushbuttons to increase/decrease the value.
Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting

4. Set Point One Value and Deadband settings:
Press & Hold the Up arrow pushbutton until the “Main” menu is displayed
Press the Up and/or Down arrow pushbuttons to highlight “SP1”
Press the Right arrow pushbutton to access SP1 value setting
Use the Right and Left pushbuttons to select the digit and Up and Down pushbuttons increase/decrease the value.
  o This is the “high” or “upper” setpoint.
  o Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting
Press the Down arrow pushbutton to highlight “SP 1 db
Press the Right arrow pushbutton to access the SP1 db value setting
Use the Right and Left pushbuttons to select the digit and Up and Down pushbuttons increase/decrease the value.
  o This is the “high” or “upper” setpoint deadband. Set at 2.0
Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting

5. Set Point Two Value and Deadband settings:
Press the Down arrow pushbutton to highlight “SP2”
Press the Right arrow pushbutton to access SP2 value setting
Use the Right and Left pushbuttons to select the digit and Up and Down pushbuttons increase/decrease the value.
  o This is the “low” or “lower” setpoint.
Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting
Press the Down arrow pushbutton to highlight “SP 2 db
Press the Right arrow pushbutton to access the SP2 db value setting
Use the Right and Left pushbuttons to select the digit and Up and Down pushbuttons increase/decrease the value.
  o This is the “low” or “lower” setpoint deadband. Set at 2.0
Press & Hold the Right arrow pushbutton ~ 1 second then release to accept this setting

6. Other Settings:
  • Check the rest of the Setup Menu values. These are noted in the Menu Settings chart on the last page.
The display resolution should be set at 3 digits using the same setting procedure described above.

- **Menu Settings:**

The pressure monitor is connected from a Positive pressure plate on the top of the cabinet to the “HIGH” port on the Sensocon. Set Point 1 will be the High Pressure Set point. Set Point 2 will be the Low Pressure Set Point.

**Main Menu:**

<table>
<thead>
<tr>
<th>SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setpoint 1</td>
</tr>
<tr>
<td>Setpoint 1 Deadband</td>
</tr>
<tr>
<td>Setpoint 2</td>
</tr>
<tr>
<td>Setpoint 2 Deadband</td>
</tr>
</tbody>
</table>

**Set-Up Menu:**

<table>
<thead>
<tr>
<th>Control</th>
<th>Ctrl</th>
<th>2SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Point 1 Setting</td>
<td>Set 1</td>
<td>db</td>
</tr>
<tr>
<td>Actuation 1</td>
<td>1 act</td>
<td>dir</td>
</tr>
<tr>
<td>Set Point 1 Delay</td>
<td>SP1 D</td>
<td>0</td>
</tr>
<tr>
<td>Set Point 2 Setting</td>
<td>Set 2</td>
<td>db</td>
</tr>
<tr>
<td>Actuation 2</td>
<td>2 act</td>
<td>rev</td>
</tr>
<tr>
<td>Set Point 2 Delay</td>
<td>SP2 D</td>
<td>0</td>
</tr>
<tr>
<td>Peak</td>
<td>Peak</td>
<td>Varies, Read Only</td>
</tr>
<tr>
<td>Valley</td>
<td>Valy</td>
<td>Varies, Read Only</td>
</tr>
<tr>
<td>Mode</td>
<td>Mode</td>
<td>Pres</td>
</tr>
<tr>
<td>Units</td>
<td>Units</td>
<td>PA</td>
</tr>
<tr>
<td>Resolution</td>
<td>Res</td>
<td>3 dig</td>
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<td>std</td>
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<td>Contrast</td>
<td>Contr</td>
<td>N-med</td>
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</table>

**Secure Menu:** Should not need adjustment

<table>
<thead>
<tr>
<th>Zero</th>
<th>Zero</th>
<th>Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span (Do not adjust)</td>
<td>Span</td>
<td>249</td>
</tr>
<tr>
<td>Access</td>
<td>Access</td>
<td>Secure</td>
</tr>
<tr>
<td>Factory Default</td>
<td>Reset</td>
<td>No/Yes</td>
</tr>
<tr>
<td>Process Output Lo</td>
<td>pol</td>
<td>-1.000 to 1.000, Analog Only</td>
</tr>
<tr>
<td>Process Output Hi</td>
<td>poh</td>
<td>-1.000 to 1.000, Analog Only</td>
</tr>
<tr>
<td>Current Power Source</td>
<td>P/S</td>
<td>On</td>
</tr>
</tbody>
</table>
Maintenance Notes

Cleaning the Work Area

Spills that fall through the perforated grilles can be removed by cleaning the drain pan.
To wash the drain pan, first lift up, surface decontaminate and remove the solid work surface and work surface supports. This provides unobstructed access to the drain pan for easy cleaning. Remember that this area must be assumed to have contamination, so use caution in the way you approach the task.

Ultraviolet Germicidal Lamp

UV germicidal lamps lose their effectiveness over time and should be replaced when their intensity at the work surface drops below 40 microwatts per cm$^2$ at a wavelength of $253.5 \times 10^{-9}$ meters.

If your cabinet has a germicidal lamp, frequently measure its intensity at the geometric center of the work surface with an ultraviolet light meter. The visual appearance does not indicate UV effectiveness.

---

**WARNING**

- UV light is hazardous! Do not defeat the interlock.
- Eyes and skin should not be exposed to direct ultraviolet light.
- Ultraviolet light should not be relied upon as the sole decontaminating agent. Additional surface disinfection should be performed both before and after every cabinet use.
- A biological safety cabinet acts as a supplement to good aseptic practices, not as a replacement.

---

Towel Guards

Protective screens are installed at the bottom rear and sides of the drain pan to prevent wipes and other paper materials from being drawn into the blower system. These screens should be kept clean at all times.
Replacing the Cabinet Filters

**WARNING**
- Only qualified technicians shall perform this procedure.
- Decontaminate the cabinet before changing the filters

When the cabinet can no longer automatically maintain airflow balance due to filter loading and adjusting the cabinet internal balancing damper does not correct the problem then the filters will need to be replaced. If the filters are damaged, they will also need to be replaced. Both exhaust and downflow filters need to be replaced together as a set.

Before any seal panels are removed, the cabinet should be decontaminated. The filters are sure to have collected microorganisms and other potentially harmful particles generated in the work area during their lifetime, and maintenance personnel should not allow themselves to be exposed. It should also be remembered that a specific gaseous decontamination might work against microorganisms, but not against chemical agents. Where chemicals are present, consult an industrial hygienist or other qualified person.

A chemically contaminated filter must be handled with caution. Clothing and/or breathing apparatus should be used to protect personnel as necessary to reduce the hazard. It is advisable to seal the contaminated side of the filter by taping a plastic sheet or cardboard over the face before removal. This should minimize the number of particles shaken loose from the filter. Once removed, the filter should immediately be sealed in a chemical hazard bag and then disposed of safely in accordance with environmental regulations.

After filter replacement has been completed, the cabinet and the room should be cleaned and decontaminated in a manner consistent with the nature of the hazardous material. The cleaning materials, along with the protective gear and clothing should be properly disposed.

HEPA filters are very fragile, and you will want to use great care in handling so as to avoid any damage to the filter media and gasket surfaces. When installing the new filters, it is a good idea to tape a piece of cardboard over the filter media to give protection against dropped wrenches or misdirected fingers. Of course, you'll need to make sure that the cardboard is removed before the access panels are re-installed. Inspect the filters carefully before and after installation. A broken or damaged filter is worthless.

For detailed instructions on changing the filters, see the following two sections.

**Accessing the down flow and exhaust filters**
1. Decontaminate the cabinet and disconnect power.
2. Close the viewscreen.
3. Pull the bottom edge of the vertical dress panel out away from the cabinet. Hinge the dress panel standoff down and lower the vertical panel on it. Unplug the Tygon tube and 6 pin connection plug inside the panel. Firmly grip the bottom edge of the vertical dress panel with both hands, slide the panel to the right and lift the panel off the cabinet.
4. Remove the light canopy locking fasteners inside the sloped dress panel and lower the canopy. Make sure the canopy support cables on each end are secured.
5. Loosen the four lock nuts holding the electrical mounting board and carefully lift the board off. Lay it face down inside the light canopy. (No electrical connections should need to be disconnected)
6. Disconnect the cable connected to the viewscreen limit switch located on the sloped dress panel. Remove the two screws at the top of the sloped dress panel. Lift the sloped dress panel off the cabinet.
7. Loosen each of ten (10) 3/8” hex head bolts holding the front access panel. Be careful not to damage or lose the seal washer on each bolt when removing them. Remove the access panel. Be careful not to damage the panel gasket.

8. You now have direct access to change the down flow and exhaust filters. (See Figure 21)

**Figure 21: Interior view of positive pressure plenum with blower and filters**

### Changing the down flow filter

1. Loosen the two (2) ½” hex head down flow plenum clamping bolts located on either side of the down flow plenum, alternating two or three revolutions at a time until the plenum is raised about 6.4mm [¼”]. This will allow the down flow filter to slide out the front towards you. If the filter gasket sticks to the cabinet, use a putty knife to break it free.

2. Slide the filter out the front towards you. Be careful not to contact the filter media.

**WARNING**

Once removed, the filter should immediately be sealed in a chemical hazard bag appropriately marked for the type of hazard and then disposed of safely in accordance with environmental regulations.

If you also need to change the exhaust filter, go directly to “Changing the exhaust filter” steps now.

3. Slide the new down flow filter all the way in until it stops against the rear filter stop. Be careful not to contact the filter media with your fingers. Position the filter so its frame is aligned with the cabinet frame.

4. Tighten the two (2) ½” hex head down flow plenum clamping bolts, alternating two or three revolutions at a time until the filter gaskets are compressed approximately 3.2mm [1/8”].

5. Reassemble the cabinet following the previous instructions in reverse order.
6. Reconnect power.
7. Check the filter and gasket for leaks.
8. Check / reset cabinet airflow balance and alarms.

Changing the exhaust filter

1. Loosen the two (2) ½” hex head exhaust plenum clamping bolts located on either side of the exhaust plenum, alternating two or three revolutions at a time. This will lower the plenum and allow the exhaust filter to drop down and slide out towards you. You should **not** have to remove the bolts to get the filter to slide out. If the filter gasket sticks to the cabinet, use a putty knife to break it free.
2. Slide the filter out towards you, making sure not to contact the filter media.

**WARNING**

Once removed, the filter should immediately be sealed in a chemical hazard bag appropriately marked for the type of hazard and then disposed of safely in accordance with environmental regulations.

3. Slide the new exhaust filter in all the way in until it stops against the rear filter stop. Be careful not to contact the filter media with your fingers. Align the filter frame, left to right, so it is positioned directly over the exhaust plenum. Verify the flow arrow label orientation on the filter frame matches the actual flow direction.
4. Tighten the two (2) ½” hex head exhaust plenum clamping bolts until the clamp’s lower pivoting bracket contacts the upper fixed bracket.
5. Reassemble the cabinet following the previous instructions in reverse order.

**IMPORTANT**

When reinstalling the front seal panel, first tighten each ¼-20 hex cap screw until the bolt seal washer is engaged with the panel. Next turn each bolt 1 ¼ to 2 ½ revolutions until the panel is evenly compressed approximately half way. Do not over tighten. Use caution if using a power driven tool.
Troubleshooting

**IMPORTANT**
Always check for proper airflow balance first.

Here are some suggestions based on our experience with the use and misuse of biological safety cabinets.

**When a pressure monitoring alarm sounds** -
1. Verify that the cabinet is at the nominal set point with respect to intake and downflow velocity.
2. Verify that there is no blockage of the towel guards which are located under the work surface at the sidewall and back wall, restricting airflow.
3. Make sure that the exhaust damper is adjusted to its factory-marked position and that no objects are blocking the exhaust opening.
4. Check that there are no items blocking the front and rear work surface perforated sections.
5. Check the tubing running from the top of the cabinet to the back of the pressure monitoring device for kinks and tight connections.
6. Replacement filters may have slightly different performance characteristics. For this reason, the set-point for the low exhaust alarms should be checked after the unit has been installed, and after the filters have been changed.
7. Check the exhaust opening at the top of the cabinet for items blocking exhaust airflow.

**When there is low airflow within the work area and through the exhaust filter** -
Contact The Baker Company for instructions on how to proceed.

**If there is no air flow within the work area** -
1. Check to make sure the unit is plugged into a dedicated electrical receptacle (220VAC, 16A, 50/60 HZ)
2. Check to make sure the blower switch is turned on. **The blower switch has to be depressed for 10 seconds to turn unit on or off.** The green indicator below the button should be on.
3. Check to make sure the wiring connections inside the left end of the light canopy are pushed together properly.
4. Check to see if the lights are working. If they are, contact The Baker Company for instructions on how to proceed.

**If one (or both) of the electrical receptacles does not function** -
1. Check to make sure the receptacle switch is in the on position. The blue indicator below the switch should be on.
2. The receptacles are also protected by a self-resetting thermal circuit breaker. A qualified electrician, using the wiring diagram in the Appendix of this manual, can check this breaker.

**If the ultraviolet light does not work** -
1. Check for proper installation of the ultraviolet bulb in the lamp sockets.
2. Ensure that the window is completely closed and the fluorescent light is off.
3. Check to make sure the UV light switch is turned on. The yellow indicator below the button should be on.
4. Inspect the ultraviolet light bulb; replace if necessary.
5. Have a qualified electrician check the wiring and ballast for continuity. The wiring can be traced to the source of a break. If none of the above is effective, the ballast may need replacing.

**When there is uneven fan operation, or noise from the motor/blower assembly -**

Contact The Baker Company for instructions on how to proceed.

**If the fluorescent light does not work -**

1. Verify that the blower switch is turned on. The green indicator below the switch should be on. **The blower switch has to be depressed for 10 seconds to turn unit on or off.**
2. Verify that the fluorescent light switch is turned on. The blue indicator below the button should be lighted.
3. Lower the light canopy from the unit and check the multi-pin connectors at each end to be sure they are securely engaged. If the lamp flickers and can be corrected by vigorous rubbing of the bulb, there is probably an improper ground. The wiring can be traced to the source of a break.

**Main Circuit Board L.E.D. Troubleshooting**

Note: A troubleshooting guide for the control board is provided at the end of the appendix section.
V - DISASSEMBLY INSTRUCTIONS

**IMPORTANT**
Only qualified technicians should perform this procedure. If the cabinet has been in use it will need to be decontaminated.


1. Unplug cabinet from power source. Lower viewscreen.
2. Removal of the vertical dress panel:
   A. Remove two #8-32 truss head screws located on the lower corners of the dress panel. Pull the bottom edge of the dress panel out away from the cabinet. Hinge the dress panel standoff down and lower the vertical panel on it.
   B. Disconnect the Tygon tubing going to the pressure indicators at the “Y” joint. Disconnect wiring going to the panel.
   C. Lower and firmly grip the bottom edge of the vertical dress panel with both hands, slide the panel to the right and lift the panel off the cabinet.
3. Removal of the light canopy:
   D. Remove the light canopy fasteners inside the sloped dress panel and lower the canopy.
   E. Disconnect the canopy support cables (one on each end) from the electrical mounting board.
   F. Unplug the wires going from the light canopy to the electrical mounting board.
   G. Lift the canopy off the cabinet.
4. Removal of the sloped dress panel:
   H. Loosen the four lock nuts holding the electrical mounting board. Remove the two screws at the top and loosen the lower lock nuts holding the sloped dress panel.
   I. Lift the panel off the cabinet.
5. Removal of the electrical mounting board:
   J. Disconnect the Sash Level Sensor.
   K. Disconnect the power cord assembly at the top of the cabinet that goes up from the electrical mounting board.
   L. Disconnect the plug on the left side.
   M. Carefully lift the electrical mounting board with the power cord assembly off the cabinet. Store in a safe place.
6. Removal of sliding viewscreen:
   N. Lift the viewscreen up to its maximum height.
   O. Place #8-32x 3/4” long truss head screw in tapped hole at top of sash brackets under each viewscreen cable tab. Leave the screws out approximately 9.5mm to 12.7mm (3/8” to 1/2”). This will support the viewscreen while the cables are being disconnected.
   P. Remove the #8-32 hex head screw that holds the cable to the viewscreen cable tab. Repeat the process for other side of the viewscreen.
   Q. Remove lower left and right hand viewscreen tracks.
   R. Carefully lift the viewscreen up and off the cabinet. This should be done with two people.
7. Remove work surface, armrest, and work surface supports.
8. Removal of the front access panel:
   S. Remove the ten (10) hex head bolts with seal washers holding the panel to the cabinet. Remove the center top bolt last.
T. Lift the panel off the cabinet, being careful not to damage the panel gasket.

9. Removal of the left side panel:
   U. Remove the ¾” brass nuts from each plumbing connection.
   V. Remove Sash cables from the pulley assembly.
   W. Remove the ¼-20 hex head bolts and seal washers [7 with seal washers]. Disconnect any wiring in the panel. Remove panel, being careful not to damage the panel gasket.

10. Removal of right side panel with counter weight:
    A. Remove outer right side panel cover (11) ¼-20 hex head screws.
    B. Disconnect view screen counter weight cables from view screen counter weight. Reinstall cable attachment bolt to prevent the weight box from opening during removal.
    C. Remove the counter weight box by sliding it up and out the top of its tracks.
    D. If optional side wall plumbing is installed, disconnect the tubing at both ends and remove. Unthread the upper elbows and remove.
    E. Remove the sash cables from the pulley assemblies.
    F. Remove the hex head screws (7 with seal washers) and remove the panel using caution not to damage the gasket. Notice the arrangement of the rubber washer on the side wall plumbing for reassembly. Clean and apply new Teflon tape during the reassembly of the plumbing elbow. These fittings have to seal to the side panel.

11. See “Replacing the HEPA Filters” for instructions on how to remove the filters.

12. Removal of the blower assembly:
    A. Remove (2) ¼-20 hex head screws that holds the assembly to the positive pressure plenum.
    B. Disconnect the motor wiring and slide the blower assembly out toward you.

13. Remove the positive pressure plenum assembly by loosening the bolts on the inside of the exhaust plenum enough to allow the clamping hardware to angle out away from the slotted retaining brackets, then unscrew the positive pressure plenum clamping bolts.

Use these instructions in reverse order to reassemble the cabinet.
Appendix

Electrical Replacement Parts List:

*OTHER DEVICES MAY BE PROVIDED DEPENDING ON THE DESTINATION COUNTRY

See end of appendix for drawings showing location of electrical parts

<table>
<thead>
<tr>
<th>Electrical Items</th>
<th>Baker Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SG403HE-EN</td>
</tr>
<tr>
<td>Fluorescent lamp</td>
<td>41387</td>
</tr>
<tr>
<td>Ultraviolet lamp</td>
<td>18024</td>
</tr>
<tr>
<td>Fluorescent lamp holders – plunger end / fixed end</td>
<td>41438 / 41439</td>
</tr>
<tr>
<td>Ultraviolet lamp holders – plunger end / fixed end</td>
<td>20281 / 20283</td>
</tr>
<tr>
<td>Fluorescent ballast</td>
<td>41741</td>
</tr>
<tr>
<td>Ultraviolet ballast</td>
<td>40899</td>
</tr>
<tr>
<td>Motor drive</td>
<td>41780</td>
</tr>
<tr>
<td>Transformer</td>
<td>34327</td>
</tr>
<tr>
<td>Relay, solid state</td>
<td>42574</td>
</tr>
<tr>
<td>Terminal block</td>
<td>40894</td>
</tr>
<tr>
<td>Limit switch [For viewscreen position]</td>
<td>41023</td>
</tr>
<tr>
<td>Membrane Switch Controller (MSC) board</td>
<td>40702</td>
</tr>
<tr>
<td>Label / Membrane switch / Overlay</td>
<td>41588</td>
</tr>
<tr>
<td>Plug, European*</td>
<td>41706</td>
</tr>
<tr>
<td>Fuse, 6.3A</td>
<td>37591</td>
</tr>
<tr>
<td>Receptacle*</td>
<td>39740</td>
</tr>
<tr>
<td>Hour meter</td>
<td>41846</td>
</tr>
<tr>
<td>Pressure monitor</td>
<td>43139</td>
</tr>
<tr>
<td>EAO buzzer (Air Monitor Alarm)</td>
<td>34440</td>
</tr>
<tr>
<td>EAO red flasher assembly (Air Monitor Alarm Light)</td>
<td>39585</td>
</tr>
</tbody>
</table>
## Mechanical Replacement Parts List:

<table>
<thead>
<tr>
<th>Mechanical Items</th>
<th>SG403HE-EN</th>
<th>SG603HE-EN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down flow ULPA filter</td>
<td>43240 (20”x48”x3”)</td>
<td>43244 (20”x72”x3”)</td>
</tr>
<tr>
<td>Exhaust ULPA filter</td>
<td>43241 (16”x30”x6”)</td>
<td>43242 (16”x42”x6”)</td>
</tr>
<tr>
<td>Motor / Blower assembly</td>
<td>335A203</td>
<td>335A203</td>
</tr>
<tr>
<td>Armrest pad</td>
<td>389A750</td>
<td>365A750</td>
</tr>
<tr>
<td>Work surface</td>
<td>366X104</td>
<td>367X104</td>
</tr>
<tr>
<td>Work surface support</td>
<td>333P706</td>
<td>333P706</td>
</tr>
<tr>
<td>Down flow diffuser</td>
<td>366P704</td>
<td>367P707</td>
</tr>
<tr>
<td>Viewscreen</td>
<td>366A303</td>
<td>367A303</td>
</tr>
<tr>
<td>Viewscreen track, right hand</td>
<td>355A305</td>
<td>355A305</td>
</tr>
<tr>
<td>Viewscreen track, left hand</td>
<td>355A304</td>
<td>355A304</td>
</tr>
<tr>
<td>Cable, right side, viewscreen</td>
<td>41455</td>
<td>41455</td>
</tr>
<tr>
<td>Cable, left side, viewscreen</td>
<td>41461</td>
<td>41462</td>
</tr>
<tr>
<td>Pulley, 1.062”OD</td>
<td>41454</td>
<td>41454</td>
</tr>
</tbody>
</table>
Top view of cabinet without dress panels

Cable, Left Side, Viewscreen:
P/N-41461 [SG403HE-EN]
P/N-41462 [SG603HE-EN]

Pulley:
P/N-41454 [SG403HE-EN & SG603HE-EN]

Cable, Right Side, Viewscreen:
P/N-41455 [SG403HE-EN & SG603HE-EN]
Dimensional Drawing – SG403HE-EN

- 333D061 Rev D  
- 62 of 80
Dimensional Drawing – SG603HE-EN
Cable Port Illustration

- **INTERIOR WALL**
  - CABLE PORT GASKET PART# 41126
  - CABLE PORT RING PART# 190P728
- **INTERIOR WALL**
  - (4) #8-32 X 5/16" WELD STUD WITH HEX CAP NUT/ LOCK WASHER / FLAT WASHER
    - PART#'S 10758 / 10553 / 11307 / 11279

**EXTERIOR SEAL PANEL**

**REMOVABLE INNER WALL PANEL**

- **INTERIOR WALL**
  - CABLE PORT GASKET PART# 41126

**INTERIOR VIEW**

**EXTERIOR VIEW**

[Cable port plug not shown]
Ladder Schematic: SGX03HE-EN (Page 1 of 2)
Stand Assembly Leg Extension Procedure – INT Version

The unit is shipped with the legs bolted in the shipping position. The unit has two work surface height/range settings:

- 765.2mm [30 1/8"] and 828.6mm [32 5/8"] - Adjustable Leg Leveler
- 917.6mm [36 1/8"] and 981.1mm [38 5/8"] - Adjustable Leg Leveler

Remove the following parts from the hardware box shipped with the unit. Check the quantities with the parts list below.

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Part Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adjustable leg leveler (or Caster, if applicable)</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Hex head bolt, (\frac{3}{8})&quot;-16 x 1&quot; long</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Lock Washer, (\frac{3}{8})&quot;</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Flat Washer, (\frac{3}{8})&quot;</td>
<td>8</td>
</tr>
</tbody>
</table>

Adjustable leg leveler  Caster  Hex head bolt  Lock & flat washer
Getting the unit off the pallet

1) To protect the floor finish, use a moving blanket. Carefully slide the unit off the pallet onto the moving blanket.

2) Slide the unit into its destination room before going further with the assembly/installation.

Installing the Adjustable Leg Levelers

3) Lift one end of the unit / stand assembly up a minimum of 178mm [7"] and block in position. See illustration below.

4) Screw in two of the Adjustable Leg Leveler (Item# 1). Screw in by hand as tight as you can then remove the blocking.
5) Repeat steps 3 and 4 for the other end of the unit.

**Raising the Unit to 765.2mm [30 1/8"] Work Surface Height**

6) Lift one end of the unit up a minimum of 127mm [5"] and block in position.

7) Unscrew the bolts (One per leg) that hold the legs in the shipping position.

8) Slide the leg out of the stand until the holes line up at the next position.

9) Bolt the leg in position with items 2, 3, and 4. (Two bolts per leg)

10) Repeat steps 7 through 9 for the other leg then remove the blocking.
11) Repeat steps 6 through 10 for the other end of the unit.

Raising the Unit to the 981.1mm [38 5/8”] Work Surface Height

12) Lift one end of the unit up a minimum of 178mm [7"] and block in position.

13) Unscrew the bolts (Two per leg) that hold the legs in the current work surface height position.

14) Slide the leg out of the stand until the holes line up at the next position.

15) Bolt the leg in position with items 2, 3, and 4. (Two bolts per leg)

16) Repeat steps 14 through 16 for the other leg then remove the blocking.

17) Repeat steps 13 through 17 for the other end of the unit.

Rotate foot for fine adjustment to aid in leveling of cabinet
Channel Stand Installation or Removal Procedure

Tools required: $\frac{7}{16}\"$ deep socket, $\frac{9}{16}\"$ wrench or socket

Parts List:

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Channel stand, back</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Channel stand, side</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Bolt, carriage, $\frac{1}{4}&quot;$-20 x 2&quot; long</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Bolt, hex head, $\frac{3}{8}&quot;$-16 x 1&quot; long</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Flat washer, $\frac{1}{4}&quot;$</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Lock washer, $\frac{1}{4}&quot;$</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Flat washer, $\frac{3}{8}&quot;$</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>Lock washer, $\frac{3}{8}&quot;$</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Hex nut, $\frac{1}{4}&quot;$</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>Adjustable leg leveler (or optional castor)</td>
<td>4</td>
</tr>
</tbody>
</table>

NOTE: Caster stand option requires four modified leg assemblies and two 45º stand supports (Not shown).

Procedure:

**Step 1:** Remove stand components from rear of cabinet skid.

**Step 2:** Gather all stand components, hardware, and tools.
Step 3: Place stand sides on a flat floor so that the stainless steel legs are setting on the floor. Next place the stand back between the sides so that the open part of the channel is facing towards the floor.

Step 4: Using the $\frac{3}{8}$" x 1" hex head bolt with lock and flat washers [Items 4, 7, & 8], attach the sides and back by inserting the bolts thru the (4) holes located in the channel stand back into the already installed rivnuts in the two sides. (2) bolts per side. Do not tighten any of these bolts until you have all (4) threaded in slightly. Tighten bolts after this is done.

Step 5: With stand assembly complete, rotate stand upside down. Attach the leg levelers by screwing them into the bottom of the telescoping legs.

The telescoping legs can now be adjusted to the desired height requirement. This is done by removing the $\frac{3}{8}$" bolts in each leg, extending the leg and reinstalling the bolts at the new hole location (2 bolts per leg).

NOTE: If the cabinet is not in its final room location you may want to perform the leg adjustment after assembling the cabinet to the stand and moving it to the room.

Step 6: Rotate the stand assembly to the upright position so that the leg levelers are now resting on the floor.
**Step 7:** Lift the cabinet high enough to allow clearance for the stand assembly to be positioned under it.

Once the stand is positioned under the cabinet, install (4) ¼” x 2” carriage bolts into the key way slots located under the cabinet in each of the (4) corners. The cabinet is now ready to be lowered onto the stand. There are (4) holes on the top of the stand which the bolts must be guided through. Be careful not to let the bolts drag on the edge of the holes while lowering as burrs may occur on the bolts and cause threading problems.

**Step 8:** With the cabinet resting on top of the stand assembly, place (1) ¼” flat washer, lock washer, and hex nut onto each of the bolts. Tighten after all (4) nuts are threaded on.

**Step 9:** The lift device should be removed if not being used to move cabinet into position within the room. If the lift device is mobile it may be used to maneuver cabinet into the desired location. A blanket could also be placed under the leg levelers while sliding the cabinet to avoid scuffing the flooring.
<table>
<thead>
<tr>
<th>Steps</th>
<th>Diagrams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unplug the cabinet power cord from its outlet.</td>
<td><img src="image" alt="Fluorescent Light on/off" /></td>
</tr>
<tr>
<td>2. Pull the vertical panel out enough at the bottom so that the thumbscrews can be accessed. Hinge the dress panel standoff (located on the left side of the sloped dress panel) down and lower the vertical panel on it. While removing the thumbscrews, support the light canopy with the other hand. Lower the canopy until the restraint cables hold it in place.</td>
<td><img src="image" alt="Thumbscrew" /> <img src="image" alt="Panel Standoff" /></td>
</tr>
<tr>
<td>3. Disconnect the restraint cables from the face of the electrical mounting board at both ends of the light canopy. Gently hinge the canopy down until it rests on the front of the unit.</td>
<td><img src="image" alt="Fluorescent Light on/off" /> <img src="image" alt="Panel Standoff" /></td>
</tr>
<tr>
<td>4. Using both hands, grasp one lamp carefully near each end. Slide the lamp sideways into the plunger socket until the other end of the lamp comes out of the fixed socket. Swing the lamp toward you and remove. Repeat the process for removing the second lamp and dispose of them properly.</td>
<td><img src="image" alt="Plunger socket" /> <img src="image" alt="Fixed socket" /></td>
</tr>
</tbody>
</table>
5. Install new lamps by doing step #4 in reverse order.

6. Plug the cabinet power cord back into its outlet. Hinge light canopy up temporarily and press the light on/off switch to verify that both lamps are working.  
**NOTE:** The cabinet blower must be on in order for the light to function.

7. Lower canopy halfway and re-insert restraint cables on either end of electrical mounting board. Close the canopy and install the thumbscrews finger tight.

8. While lifting the vertical dress panel up slightly, hinge the dress panel standoff up against the sloped dress panel. Gently lower the vertical dress panel down until it rests against the cabinet.

### Ultraviolet Lamp Replacement

UV germicidal lamps lose their effectiveness over time and should be replaced when the intensity at the work surface drops below 40 microwatts per cm² at a wavelength of 253.5 x 10⁻⁹ meters.

**IMPORTANT**
Before replacing a UV germicidal lamp it might be necessary to check with an industrial hygienist, safety officer or other qualified person in the lab to make sure that there is nothing stored in the cabinet that could potentially be a hazard to you or could be contaminated by room air.

1. Unplug the cabinet power cord from its outlet.
2. Raise the viewscreen to its maximum open position.
3. Using both hands, grasp the UV lamp carefully near each end and move it approximately 13mm (½”) to the right side of the cabinet until the UV lamp is released from the lamp socket on the left side. Carefully remove lamp from cabinet and dispose of it properly.
4. Install new lamp by following step 2 in reverse order. Making sure that the lamp is held securely in place.
5. Plug the cabinet power cord back into its outlet.
6. Lower the viewscreen to full closed and turn on the UV light momentarily to verify that it comes on. Immediately turn the UV off again.
7. Raise the viewscreen to the proper sash opening height. This will cancel the audible alarm and flashing indicator light.
Motor Control Adjustment Detail

SGx03HE-EN cabinets utilize the Control Resources Motor Control as seen above. Instructions to adjust motor speed are as follows:

Adjusting the Control Resources VFD
1. Before powering cabinet, ensure that the jumper selection is wired for the unit’s incoming voltage; top 2 terminals (115V), lower 2 terminals (230V).
2. Verify that the wires secured to the terminal block are in this order from top to bottom: motor white, motor red, motor black, ground green or green/yellow, line white, line black.
3. Once the unit is powered up, standard intake and down flow measurements can be made. In order to adjust the motor controller, the left DIP switch must be in the downward position to switch into PGM mode.
4. With the drive in PGM, the blue speed potentiometer can be used to increase (turn clockwise) or decrease (turn counterclockwise) the cabinet airflow.
5. After the cabinet damper and motor controller are set to produce the desired intake and supply airflow, allow the drive to operate for at least 1 minute in PGM mode. After 1 minute, set the left DIP switch to the (AUTO) position. This switches the drive into the
standard operating mode.

6. Once in AUTO, the drive will automatically compensate for filter loading, and will maintain set point airflow for the life of the HEPA filters.
Warranty

The Baker Company, Inc., expressly represents and warrants all goods (a) to be as specified (and described) in The Baker Company catalogues and literature, and (b) to be free under normal use, service and testing (all as described in The Baker Company, Inc., catalogues and literature) from defects in material and workmanship from a period of seventy-two (72) months from the invoice date [US/Canada only] and Twelve (12) month warranty for international.

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Patent pending – Air Bypass Armrest, Cable Port
Electrical Schematic and Assembly Drawings (Pg 71 to 77)

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SG403HE-EN Electrical Assembly drawing .......................................................... Page 72
SG403HE-EN Alarm Circuit Assembly drawing ................................................... Page 73
SG403HE-EN Center Section Assembly drawing .................................................. Page 74
SG603HE-EN Electrical Assembly drawing ......................................................... Page 75
SG603HE-EN Alarm Circuit Assembly drawing ................................................... Page 76
SG603HE-EN Center Section Assembly drawing .................................................. Page 77
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