



Models:
1284, 1285, 1286 and 1287

Forma Class II, A2
Biological Safety Cabinets

Operating and Maintenance Manual
Manual No: 7021284 Rev. 0

Read This Instruction Manual.

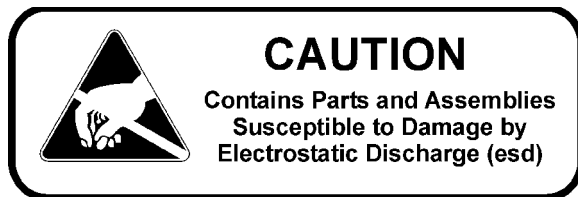
Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel, and poor equipment performance.



Lamps, thermometers and thermoregulators contain mercury. Do not put in trash! Recycle or dispose as hazardous waste.

CAUTION! All internal adjustments and maintenance must be performed by qualified service personnel.

Refer to the serial tag on the back of this manual.



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MANUAL NUMBER 7021284

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| -- | 21984 | 11/13/03 | Updated 1284 test sheet (added "four inches above window edge") | ccs |
| 0 | 21741/HD-1405 | 8/7/03 | Release 6 | aks |
| REV | ECR/ECN | DATE | DESCRIPTION | By |



Alerts the user to important operating and/or maintenance instructions. May be used alone or with other safety symbols. Read the accompanying text carefully.



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



Hazard. Do not touch. Instructions associated with this symbol should only be carried out when using special handling equipment or when wearing special, protective clothing.



Potential biological hazards. Proper protective equipment and procedures must be used when following instructions associated with this symbol. Reference O.S.H.A. Regulation 1910-1030.



Potentially hazardous energy. Equipment being maintained or serviced must be turned off and locked off to prevent possible injury. Reference O.S.H.A. Regulation 1910-147.



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



Warning. Skin damage and/or eye injury can result from the light produced by ultra violet light sources installed in this equipment. Never work in this unit with the ultra violet light operating.

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

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

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Section 1 - Receiving

1.1 Unpacking List

Included with the installation/operation manual are four identification index buttons. These buttons may be used to identify the type of service supplied to the service valves. Also included in a separate bag is the drain valve. Attached to the valve is a small Allen wrench used for calibrating the Static Pressure Gauge. This Allen wrench should be kept with the manual at all times.

Section 2 - Introduction

2.1 Description

The Models 1284, 1285, 1286 and 1287 are Class II, Type A2 cabinets. The "Type A2" designation indicates two alternative uses of the cabinet. The unit may be vented directly into the laboratory room or vented to the outside atmosphere, through an in-house exhaust system. Either usage of the cabinet offers both personnel and product protection.

The cabinet can be used in low-to-moderate risk environments and is designed to NSF, International Standard #49. Class 1, 2, and 3 (low-to-moderate risk) agents are described in the "Biosafety In Microbiological And Biomedical Laboratories"; CDC NIH Publication No. (NIH) 88-8395, 4th Edition, May 1999.

The cabinet's window permits the user to place auxiliary equipment and research implements in the work area. The work opening must be held to 10 inches during all work procedures. If the window is raised higher than the designated 10 inches, the air barrier at the front of the cabinet will be weakened and containment will be seriously impaired.

2.2 Theory of Operation

Clean, filtered air descends through the work zone with approximately 40% being discharged through the exhaust HEPA filter with the remaining air recirculating through the supply HEPA filter into the work area. Exhausted air is replaced by room air entering the system through the front access opening.

Room air entering the work zone, through the front access opening, completes the air barrier at the unit face and is responsible for the containment properties of the unit. All work must be performed beyond the intake grille, on the solid work tray.

Section 3 - Installation

3.1 Location

Locate the cabinet on a firm, level surface in an area of minimum temperature changes. The cabinet should be placed away from disruptive air currents caused by excessive personnel traffic, air-conditioning or heating ductwork, or laboratory windows and doors. Proper cabinet location is important, as drafts disrupt critical airflow characteristics and allow room contaminants to enter or escape the cabinet work area.

Where space permits, fourteen inches should be allowed on each side of the cabinet for maintenance. A twelve-inch height should be available from the top of the cabinet to the ceiling.

Place a bubble-type level on the work surface. Adjust the leveling feet until the cabinet is level and the most comfortable working height is achieved. Ensure that all four leveling feet are fully flush against the floor to prevent vibration.



Model 1284/1285 weighs 735 lbs. Model 1286/1287 weighs 940 lbs. Have sufficient personnel to lift it.

3.2 Power Connection

The power switch is located on the left side of the control panel (Figure 3 - 1). The power switch is also a circuit breaker that protects the unit. The electrical wall outlet leading to the cabinet should be accessible for electrical testing.

This cabinet is equipped with one power cord supplying power to the blower, lights and receptacles. The cord should be plugged into a grounded, dedicated circuit. Refer to Section 11 - Specifications or to the serial plate on the front of the unit for electrical specifications. With the power switch turned off, plug the line cord into the wall outlet.

3.3 Plumbing Connection

Models 1284 and 1285 have one standard service valve located on the right side of the work station. Models 1286 and 1287 have two standard service valves located on the right and left side of the work station. All service valves are piped within the cabinet. External connection is a 3/8" FPT coupling. Identification index buttons are supplied. Each cabinet can accommodate a total four service valves.



Explosive/flammable substances should never be used in the cabinet, unless approved and monitored by a biological safety officer or other qualified individual. However, if flammable gas is used, emergency shut-off valves must be located in an accessible area external to the cabinet.

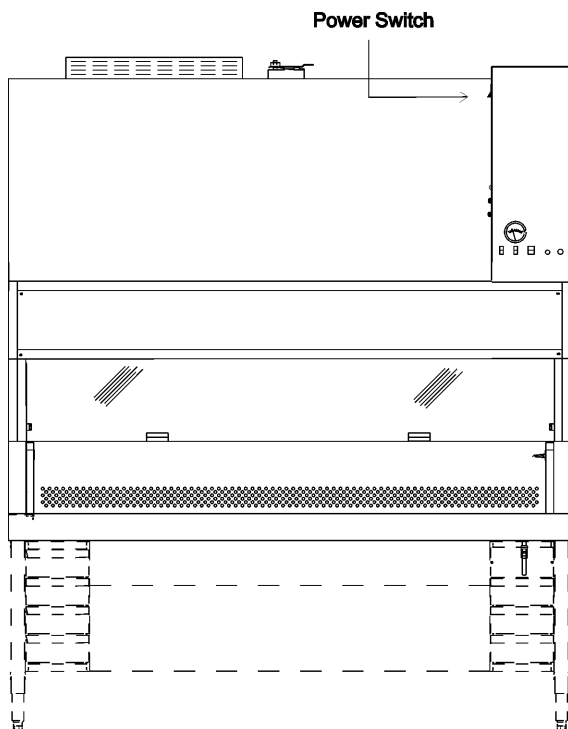


Figure 3 - 1

a. Universal Plumbing Option

The Universal Plumbing option is factory installed. External connection (1/4" NPT) to the unit is available on the top and the underside of the cabinet, as well as the standard side connection. See Figure 3-2.

3.4 Exhaust Requirements

Filtered air from the cabinet may be exhausted directly into the room or vented to the outside through an external exhaust system. Consult a biological safety officer or other qualified individual for cabinet-type exhaust requirements. Refer to NSF Standard, NSF 49-2002, Annex E.

a. Direct Room Exhaust

A cardboard cover plate is shipped under the exhaust filter guard. It must be removed before the unit is placed into service. Locate the exhaust filter guard on the top of the cabinet. Remove the guard and discard the cardboard. Secure the exhaust filter guard as previously.

b. External Exhaust System (For Class II Type A2)

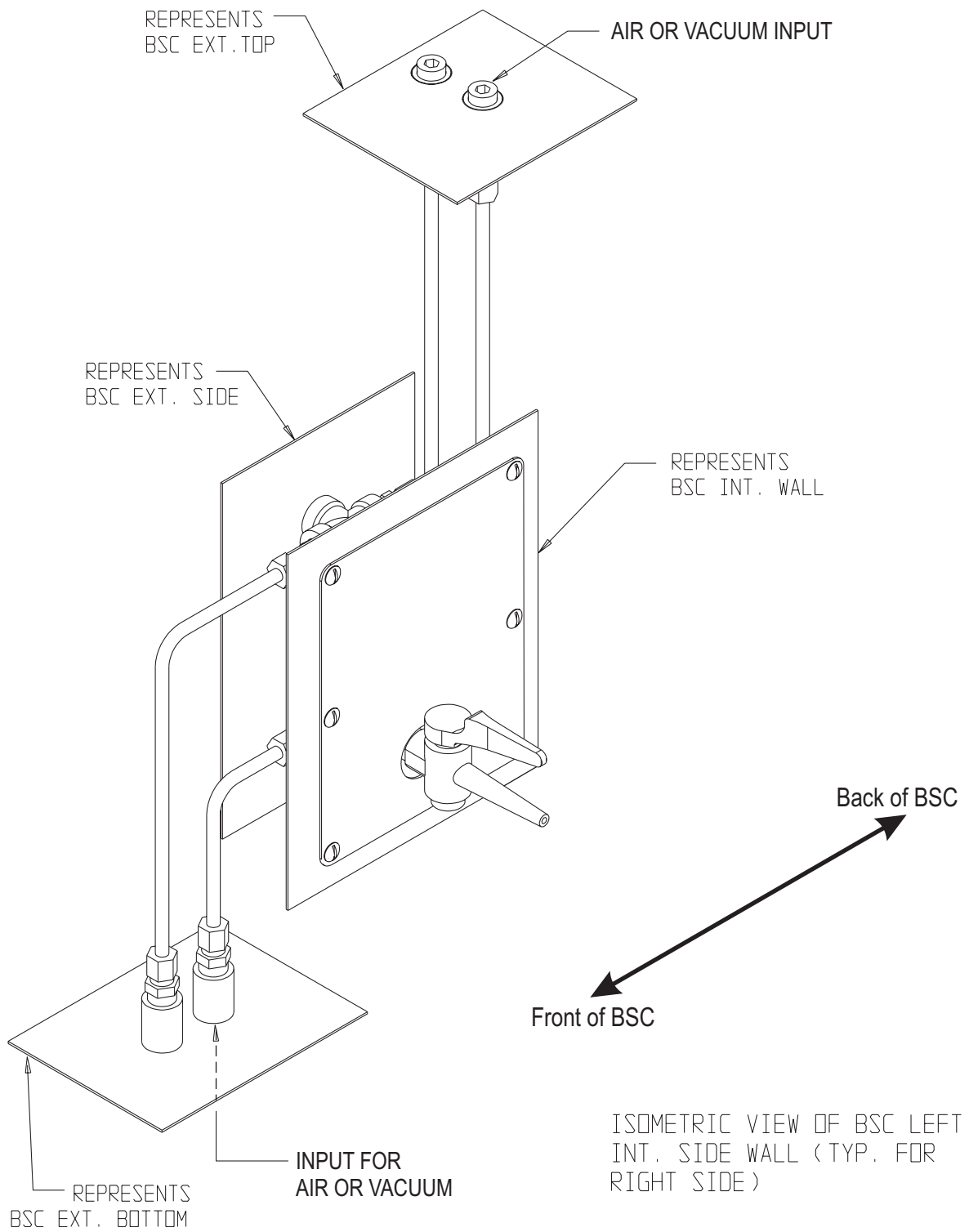
If an external exhaust system is needed, use a canopy (thimble) connection (Figure 3-3). When the cabinet is certified, check the opening in the canopy to ensure inward airflow, using a smoke stick. Ensure proper air balance at the front access opening for adequate containment. Verify that the building exhaust system is sized to exhaust 30% more air than the cabinet exhausts. Models 1284 and 1285 exhaust an air volume of 356-390 CFM. Models 1286 and 1287 exhaust an air volume of 530-581 CFM.



IMPORTANT! The exhaust air must be drawn from the cabinet through a dedicated exhaust system (only one BSC per exhaust system). The exhaust system may be connected to the collar (optional exhaust transition) located on the top of the unit.

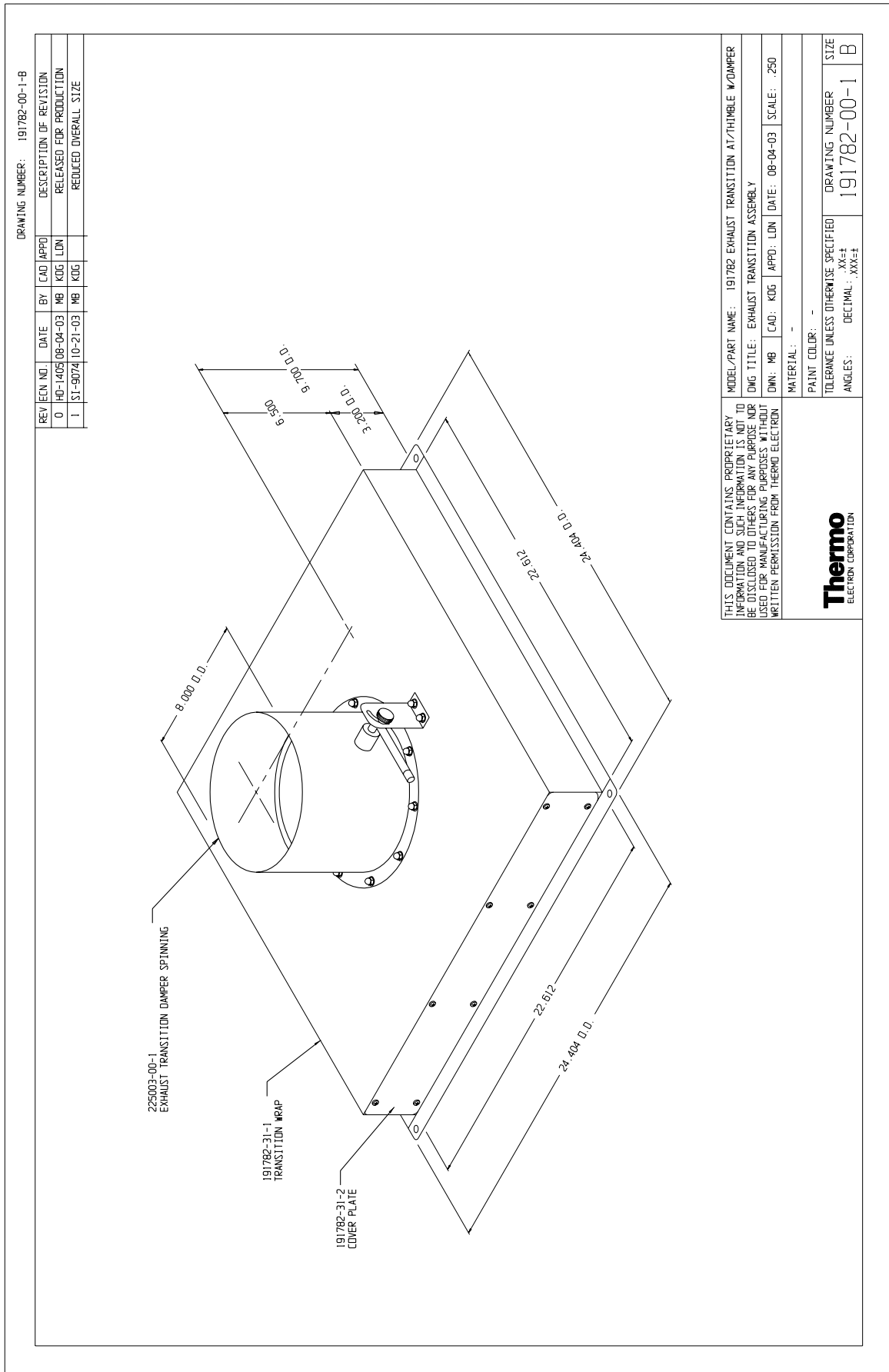
The exhaust system should have safeguards against exhaust failure. It is required that a biological safety officer, industrial hygienist or other qualified individual review the agents and chemicals used inside the cabinet to determine if additional filtration treatment is necessary before venting to the atmosphere.

Figure 3-2



UNIVERSAL PIPING

Figure 3-3



Section 4 - Certification Testing



Service and certification must be performed by qualified personnel.

4.1 Locating a Certification Company

Biological safety cabinet certification consists of a series of tests designed to verify that the cabinet is performing within operating parameters established by the manufacturer.

To assure that a biological safety cabinet is operating as intended, each cabinet should be field-tested at the time of installation and at least annually thereafter. Cabinets should be re-certified whenever HEPA filters are changed, internal maintenance is performed, or is relocated.

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

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

Biohazard Cabinet Field Certifier Program
NSF International
PO Box 130140
789 N. Dixboro Rd
Ann Arbor, MI 48113-0140
Telephone (734) 769-8010 Or (800) NSF-MARK
Fax (734) 769-0109
<http://www.nsf.org/Certified/Biohazard-Certifier>

IAFCA
PO Box 12155
Columbus, OH 43212
Telephone (888) 679-1904
Fax (614) 486-1108
<http://www.iafca.com/certifier.html>

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

Controlled Environment Testing Association
1500 Sunday Drive
Suite 102
Raleigh, NC 27607
Telephone (919) 787-5181
Fax (919) 787-4916
http://www.cetainternational.org/members/corp_indiv.htm

For your convenience we have included a partial list of agencies that perform certification on our website. Select Certification Companies located under the Services and Support heading at www.thermo.com/forma. If you do not find someone listed in your area, please contact the Technical Services Department for additional references.

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

Section 5 – Operation

5.1 Control / Indicating Devices (Figures 5-1, 5-2, 5-3)

Before operating the cabinet, become familiar with the following items:

Blower Switch- The blower switch controls power to the internal blower.

Light Switch- The “Lights” switch controls power to the fluorescent lamp or the optional ultraviolet lamp. Both lamps are located in the work area.

Ultra-Violet Light - Optional



On cabinets equipped with ultra violet lights, the lights must be turned off when working in the unit. Potential eye damage may result from viewing the light produced by ultra violet sources. The UV interlock on this cabinet prevents ultra violet illumination when the sliding window is raised. Make sure the sliding window is within approximately 3/8” of the fully closed position.

On cabinets equipped with the optional ultra-violet germicidal light, the dual purpose “Lights” switch provides the following settings:

“Off” = center

“On” top = fluorescent lamp

“On” bottom = ultra-violet lamp on with the window completely down.

Either the fluorescent lamp or the ultra-violet lamp may be lit at one time.

Alarm By-pass Switch - The Alarm By-pass switch silences the audible “Window Above 10 Inch” alarm for approximately five minutes. The red visual indicator remains illuminated. The alarm rings-back to remind the operator that the window is still open more than 10 inches.

Static Pressure Gauge (In. W.G.) - The static pressure gauge measures the air pressure differential across the filters providing an indication of filter “loading”. As the filters become loaded, resistance increases and the reading on the static pressure gauge increases accordingly. When the reading increases by 50% from original measurement, cabinet airflow should be checked with a thermoanemometer. Replace the filters if proper airflow cannot be obtained.

The static pressure gauge should not be used as a direct measure of airflow.

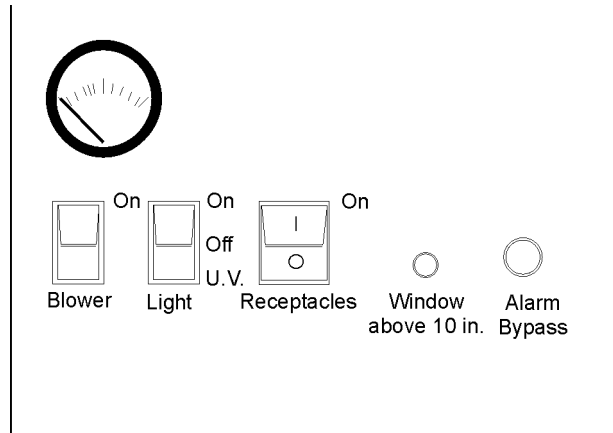
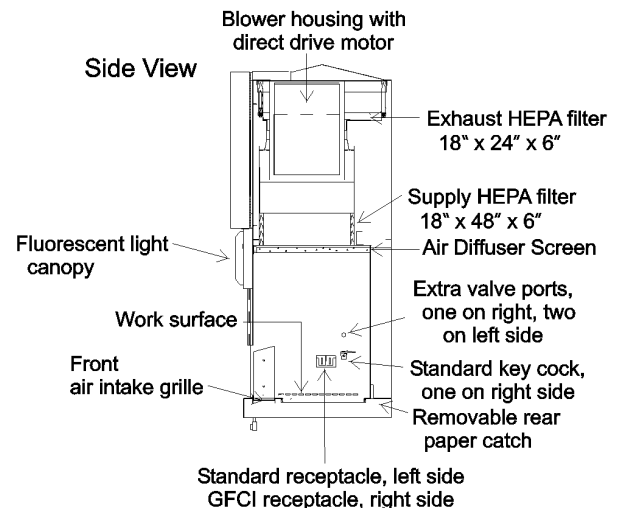
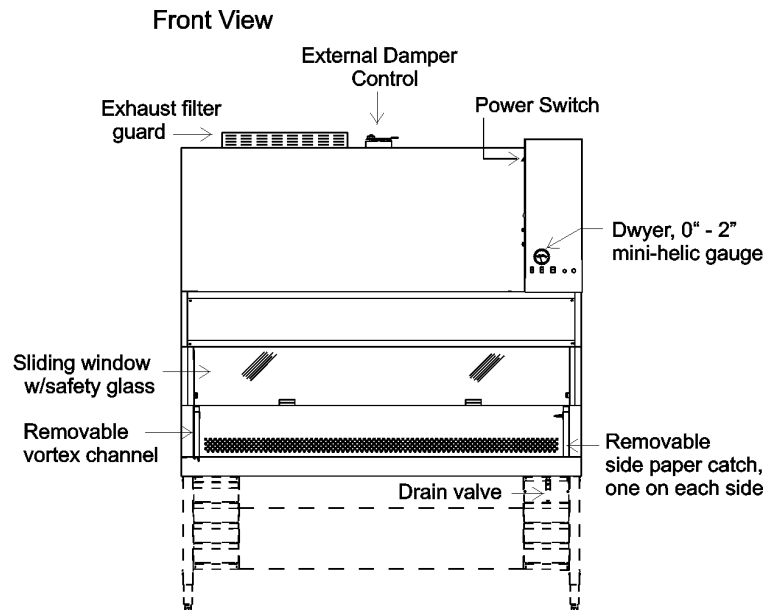


Figure 5-1



4 ft. Series, Models 1284 and 1285

Figure 5-2

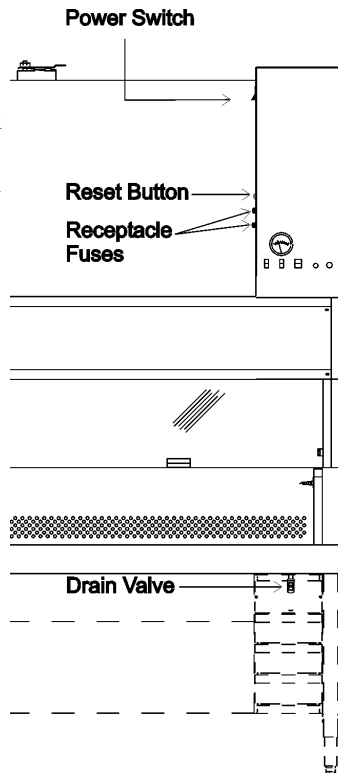
Power Switch - mains disconnect/circuit breaker for the cabinet.

Blower Motor/Lights Reset Button (15 Amp) - The Reset button (located on the left side of the control panel, directly above the Receptacle fuses) is an in-line circuit breaker for the internal blower motor and lighting. If an overload occurs, the circuit breaker will trip and the button will protrude from the panel. Depress the button to reset the circuit breaker.

- Note:**
- Turn power off to the blower.
 - Turn power off to the lighting.
 - Press the blower motor/lighting Reset button.

Receptacles - Receptacles (115 Volts) are located on the left and right sidewall of the workstation. Power is controlled by the receptacle switch located on the control panel. The maximum load is 5 amps total for Models 1284 and 1285. Models 1286 and 1287 have a maximum load of 2 amps total. Models 1285 and 1287 are equipped with 2 single European 230V receptacles.

Drain Valve - The drain valve, located on the right front side of the cabinet, is provided for the safe drainage of the drain pan. This valve must remain closed while work is being performed in the cabinet and be used only in the event of a major spill.

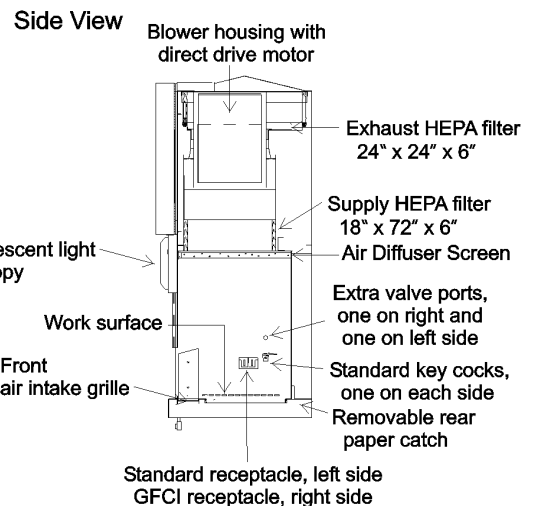
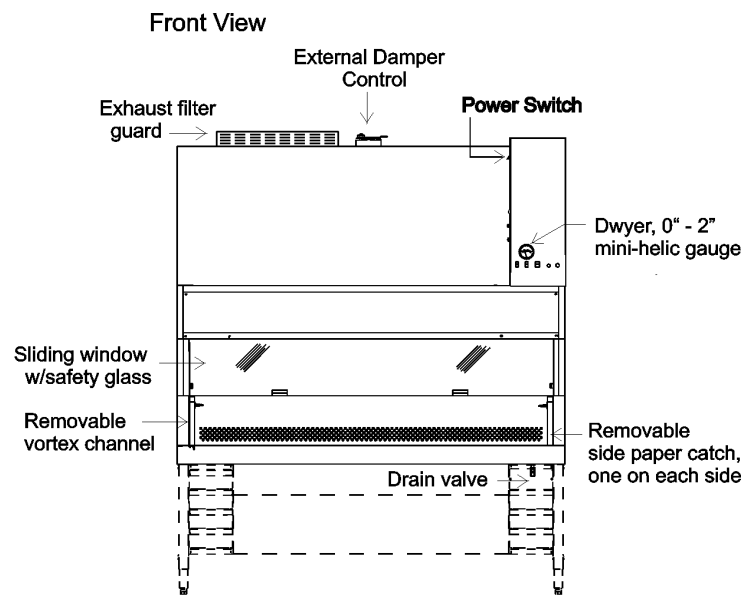


Exhaust Filter Guard - The exhaust filter guard, located on top of the exhaust filter, protects the exhaust airflow and prevents the storage of objects on top of the housing.

Sliding Window Assembly - The sliding window assembly allows the operator to raise the glass window to place items within the work area. If the sliding window is above the 10-inch level, a red light and audible alarm warns that an unsafe condition exists.



When work is being performed in the cabinet, the sliding window must be at the 10-inch position to avoid contamination to product and personnel.



If a spill occurs, immediately consult a biological safety officer or other qualified individual for proper procedures. To contain a spill, connect a sealed hose from the drain valve to a sealed container.

Service Valves - Models 1284 and 1285 have one standard service valve located on the right side of the cabinet. Models 1286 and 1287 have two standard service valves located on the right and left side of the workstation. The valve(s) can be coded with the type of service that they supply. Identification index buttons are supplied.

The cabinet supports four service valves. Additional valves are available.

Figure 5-3
6 ft. Series, Models 1286 and 1287

Section 6 - General Cautions and Cleaning

6.1 Caution Notes

- Following initial installation, the unit must be thoroughly tested and certified.
- All activities to be performed within the cabinet should be approved by a biological safety officer or other qualified individual.
- Since the HEPA filters remove particulates only (not gas), explosive/flammable substances should never be used in the cabinet, unless approved and monitored by a biological safety officer or other qualified individual.
- If the cabinet is to be used for biological or toxicological applications, a biological safety officer or other qualified individual must monitor it.
- If the unit needs to be serviced, it must be decontaminated to protect service personnel. After servicing, the cabinet must be recertified by a qualified certifying agency.
- None of the perforations in the work area may be covered or blocked, as airflow will be disrupted and contamination may occur.
- Paper catches should always be kept free of debris.

6.2 Cleaning

For general cleaning of dirt, dust and fingermarks, use a general household (non-abrasive) cleaner with a soft cloth or sponge and warm water. Cleaning should always be followed by rinsing with clean water and wiping the surface completely dry.

Before each use, the work surface, interior walls and interior surface of the window should be wiped with an appropriate disinfectant.

At the end of the work day, decontaminate the work surface, cabinet sides and back, and interior of the glass.



Alcohol, even a 70% solution, is volatile and flammable Use it only in a well ventilated area that is free from open flame. If any component is cleaned with alcohol, do not expose the component to open flame or other possible hazard. Allow the alcohol to fully dry before turning power on.

Do not use strong alkaline or caustic agents. Stainless steel is corrosion-resistant, not corrosion-proof. Do not use solutions of sodium hypochlorite (bleach) as they may also cause pitting and rusting.

Section 7 - Cabinet Start-Up

7.1 General Recommendations

- Keep movement in the room to a minimum when the cabinet is in use.
- Keep all laboratory doors closed to prevent drafts that may disturb critical airflow.
- Pre-plan cabinet use and place everything needed in the cabinet so that nothing passes through the air barrier (in or out) during the procedure.
- Practice good aseptic technique to ensure safe use of the cabinet.
- If a spill occurs, clean it up immediately. Decontaminate the work area and all affected equipment.
- Do not cover or block the exhaust grille.
- Do not cover or block any perforations (air holes) in the work area.

7.2 Use of Auxiliary Equipment in the Cabinet

Use auxiliary equipment in the cabinet only if proper precautions are taken. Appliances used in the work area will cause turbulence, disturb the airflow and need to be carefully managed. The equipment should be placed at the rear of the workspace where it will have minimal effect.

A blender may be used in the cabinet. But because of the amount of aerosol it produces and the turbulence it causes, it is recommended that it be removed from the cabinet as soon as possible.

7.3 Cabinet Checklist

1. Verify that the Drain valve is closed (the handle turned horizontal).
2. Verify that all service valves are closed.
3. Verify that the cardboard exhaust filter protector has been removed.

7.4 Start-Up Procedure

1. Turn the power switch on.
2. Turn the light on.
3. Check the intake and exhaust grilles to ensure they are not blocked.
4. Turn the blower on.
5. Place everything needed into the cabinet.
6. Place the viewing window at 10 inches.

Section 8 - Troubleshooting

8.1 Troubleshooting Guide

The following is a guide to troubleshooting the system. If a contaminated area of the cabinet must be entered to determine and/or resolve the source of a particular problem, *the cabinet must first be decontaminated.*



Servicing of the unit must be performed by qualified service personnel.

Problem 1: Airflow in the cabinet work area and through the exhaust filter is inadequate.

Possible causes:

- Exhaust filter is blocked by laboratory materials or the protective shipping cover.
- If the biological safety cabinet is connected to an exhaust system, there may be inadequate exhaust suction or back pressure in the duct system. The system must be rebalanced to handle the correct air volume. A biological safety officer should be consulted.
- Low voltage is being applied to the blower motor.
- Blower motor or speed control is defective.
- Supply HEPA filter and Exhaust HEPA filter may be loaded. Decontaminate the unit and replace both HEPA filters.



Before any maintenance work is performed in the biological safety cabinet, the unit must first be decontaminated.

Problem 2: Ultra violet light malfunction

Possible causes:

- Make sure the sliding window is within approximately 3/8" of the fully closed position.
- Check lamp pins and socket ends for contact.
- U.V. lamp is defective.
- Starter is defective for the UV light.
- Check UV interlock switch adjustment.

Problem 3: Fluorescent light malfunction

Possible causes:

- Check lamp pins and socket ends for contact.
- Lamp is defective.

Problem 4: Loud screeching noise

Possible causes:

- Bearings are bad in the motor blower assembly.
- Blower wheel is rubbing against the housing.

Section 9 - Routine Maintenance



Before any maintenance work is performed in the biological safety cabinet, the unit must first be decontaminated.



9.1 Checking the Static Pressure Gauge “Zero”

Note: In order to provide an accurate reading, the indicating needle of the static pressure gauge should be precisely at zero when the cabinet is shut off. If the cabinet is connected to a central exhaust system, the exhaust system must also be shut off.

Following HEPA filter replacement, the static pressure gauge should be checked for zero when the cabinet is shut off. (refer to Section 9.2). When the cabinet is started up and proper airflow balance has been reached, the reading on the gauge should be recorded. This initial reading will serve as a baseline indication of subsequent filter loading. When the reading increases by approximately 50%, the airflow balance should again be checked. Replacement of the filters may be required.

9.2 Zeroing the Static Pressure Gauge

1. Turn the cabinet off.
2. Remove the front cover from the static pressure gauge by grasping the front cover and turning it counterclockwise.
3. Locate the Allen-type adjustment screw beside the gauge needle.
4. Turn the adjustment screw counterclockwise to lower the reading; clockwise to raise it.

9.3 Adjusting the Damper

Since the HEPA filter resistance may vary from filter to filter (even filters of the same size), a damper has been installed in the cabinet exhaust system for maintaining proper airflow balance. The purpose of the damper is to regulate the amount of exhaust air, intake velocity and supply velocity. The damper has been preset at the factory and should not be readjusted unless the proper velocities cannot be obtained.



Adjustments must be made by qualified personnel only!

1. Layout test grids (refer to Section 9.4).
2. Start-up the cabinet and allow it to run for at least twenty minutes.
3. Take airflow measurements. If airflow specifications are not sufficient, open the control panel and check the voltage on the power switch.

Note: Airflow measurements and voltages are recorded at the factory with the cabinet connected to the appropriate AC power supply.

4. Open the hinged control panel by removing the screw on the top and bottom of the control panel and swinging the panel door open. Locate the blower motor circuit board. (Figure 9-1 & 9-2) Using a true RMS voltmeter, measure and record the voltage drop across the white and black wires leading to the terminal strip. (Figure 9-1) The blower speed control adjustment pot is located on the upper left side of the board. Clockwise adjustment of this pot increases voltage supply to the blower motor, counterclockwise adjustment lowers the voltage supply. Adjust it 2-3 volts, up or down, depending upon the airflow required. Retake the airflow measurements.

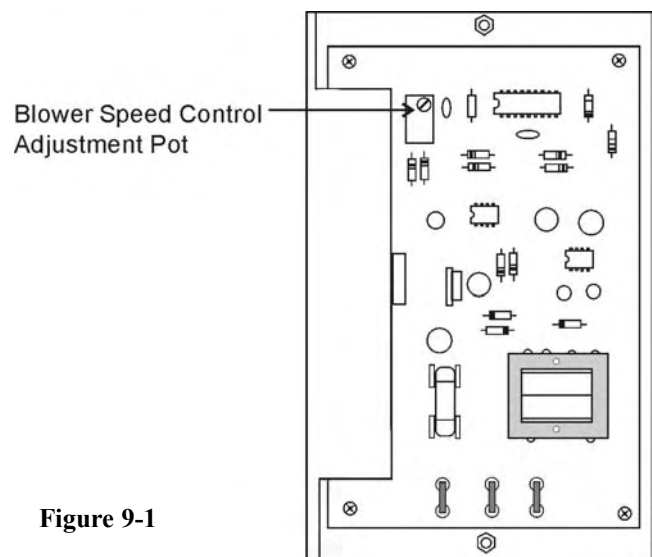


Figure 9-1

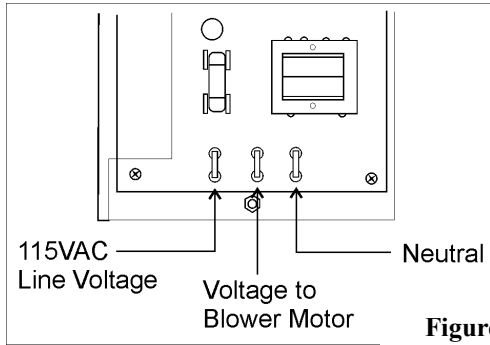


Figure 9-2

If it is determined that the damper must be adjusted in order for the proper airflow balance to be maintained, adjust it as follows:

1. The damper control (Figure 9-3) is located on the top of the cabinet.
2. Loosen the wingnut, move the lever to the desired position and retighten the wingnut.

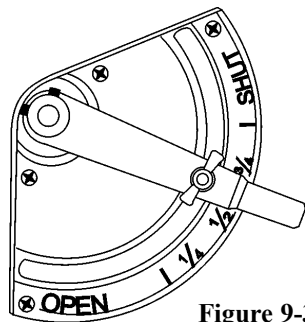
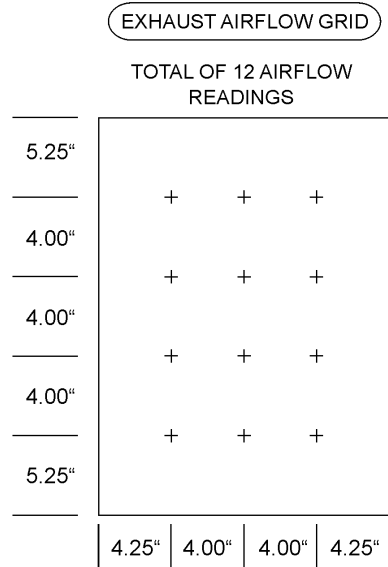
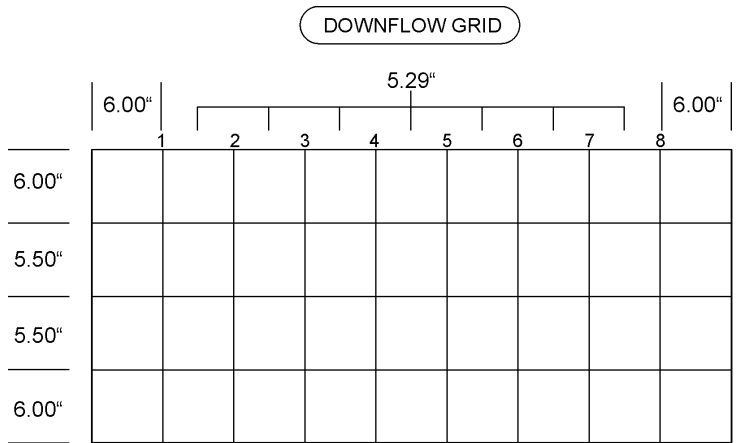


Figure 9-3

Copies of the factory airflow test sheets are available in the Specifications section.

9.4 Biological Safety Cabinet Test Grids

a. 4-foot Series, Models 1284 and 1285

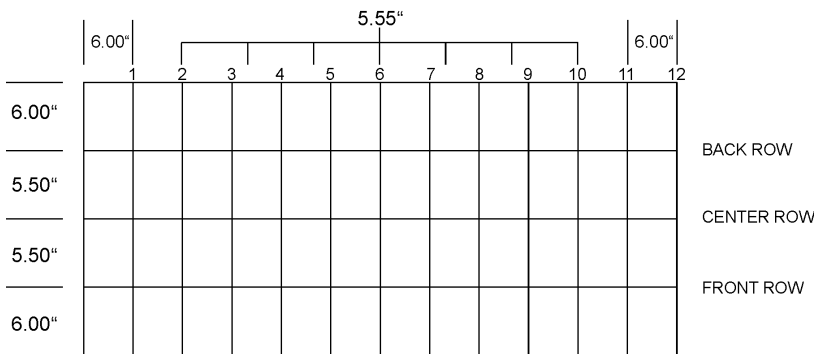


Work access opening face area = 3.385 ft.sq.

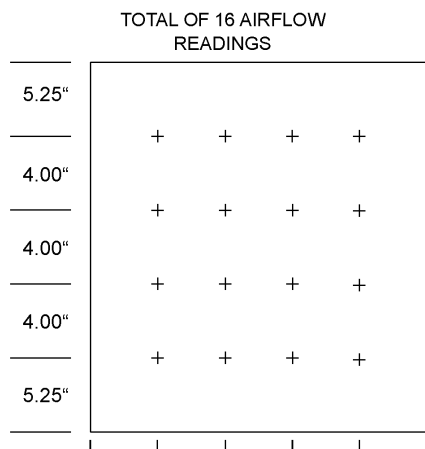
Open exhaust area* = 2.428 ft.sq.

*Total area minus obstructed area

DOWNFLOW GRID



EXHAUST AIRFLOW GRID



A list of certification companies is included on the Thermo Electron website, or call the Technical Services Department. See Page iii.

9.5 Blower Control



Live voltage is present on the control terminals of the switches and dials on the front of the blower panel. Avoid touching these controls when reaching into the control panel and making any adjustments.

Blower Speed Control - The blower speed control is accessed from the rear of the control panel by removing the thumbscrew on the exterior top and screw located at the bottom front of the control panel. Swing the control panel door open. The blower speed is adjusted by turning the screw on the variable resistor mounted on the circuit board adjacent to the controller. (Refer to Figure 9-1) Turning the screw clockwise increases air velocity; counterclockwise decreases it.

The blower speed is factory-set and should only be changed by a qualified technician.

Measuring Blower Motor Voltage - Both blower motor voltage and line voltage are measured at the three terminal connectors at the top of the circuit board. Refer to Figure 4-5.

9.6 Receptacle Fuses

Receptacle Fuses (7 Amp - Models 1284/1285, 3 Amp - Models 1286/1287) - The receptacle fuses (2), located directly below the blower motor/lights Reset button, are for the receptacles only. If an overload occurs, the fuses will open and require replacement.

- Note:**
- Turn the power off.
 - Unplug the unit.
 - Replace the fuses -
 P/N 230182, 7 Amp, 1/4" x 1 1/4"
 P/N 230166, 3 Amp, 1/4" x 1 1/4"
 (Two spare fuses are located in a bracket on the inside of the control panel.)

9.7 Ultraviolet Switch Adjustment Procedure

This procedure must be performed by qualified service personnel only.

Check UV interlock switch adjustment by fully closing the window and slowly raising. The UV light should turn off at a window gap no greater than 3/8". If adjustment is required, locate bracket with two screws on the right side light housing. Loosen these screws approximately one turn. Adjust the window gap to 3/8". While observing the UV light, adjust the bracket up or down until the lamp just turns off. **Note: UV light does not illuminate instantaneously.** Tighten screws and verify correct operation.

Section 10 - Service



Service to the unit must be performed by qualified personnel. Recertify the cabinet after servicing.



Before service is to be performed on the cabinet, the unit must be decontaminated!

10.1 Replacing Blower Motor (Models 1284/1285, 4 ft.)

a. Reversing the motor wiring (4 ft. models only)

1. On the replacement motor: Disconnect the faston connectors securing the Orange wire to the Brown wire and Yellow wire to the Purple wire.
2. Reconnect the Orange wire to the Purple wire and the Yellow wire to the Brown wire.

b. Replacing the motor

1. Turn the unit off and disconnect it from the power source.
2. Close the window.
3. Open the control panel.
4. Remove the four thumbscrews securing the lamp housing cover. Remove the cover.
5. Remove the dress panel.
6. Disconnect the window balance cord from one side of the window.



The balance cord is under extreme tension! Grip the cord attachment tab securely, disconnect, and allow the cord to retract slowly toward the top of the unit to avoid damage to the cord.

7. Remove the access panel.
8. Unfasten the two latches connecting the blower to the air plenum.
9. Remove the bolt toward the front of the cabinet that connects the blower housing bracket to the top of the cabinet.
10. Remove the front screw on the right hand side of the cabinet that connects the blower housing bracket to the right hand wall of the cabinet.

11. Loosen - do not remove, the two remaining bolts that connect the blower housing bracket to the top of the cabinet.
12. Loosen - do not remove, the two remaining screws that connect the blower housing bracket to the right wall of the cabinet.
13. Slide the blower housing toward the rear of the cabinet as far as it will go.
10. Unbolt the removable inlet collar from the blower housing.
11. Unbolt the four-point motor mounting bracket from the blower housing.
12. Disconnect the motor wiring harness at the quick-connect plug.
13. Pull the motor, motor mounting bracket, removable inlet collar and blower wheel out of the blower housing.
14. Be sure to mark on the motor shaft the location of the blower wheel so that the new motor shaft can be lined up correctly with the required blower wheel position to fit properly inside the blower housing.

Note: After the motor is installed, but before replacing the plenum access panel, turn the motor on to ensure that rotation is in the clockwise direction (when viewed from the motor side of the blower).

10.2 Replacing Blower Motor (Models 1286/1287, 6 ft.)

1. Turn the unit off and disconnect it from the power source.
2. Close the window.
3. Open the control panel.
4. Remove the six thumbscrews securing the lamp housing cover. Remove the cover.
5. Remove the dress panel.
6. Disconnect the window balance cord from one side of the window.



The balance cord is under extreme tension! Grip the cord attachment tab securely, disconnect, and allow the cord to retract slowly toward the top of the unit to avoid damage to the cord.

7. Remove the access panel.
8. Unfasten the two latches connecting the blower to the air plenum.
9. Remove the two bolts toward the front of the cabinet that connect the blower housing brackets to the top of the cabinet.

10. Loosen - do not remove, the four remaining bolts that connect the blower housing brackets to the top of the cabinet.
11. Slide the blower housing toward the rear of the cabinet as far as it will go.
12. Disconnect the motor wiring harness at the quick-connect plug.
13. Unbolt the removable inlet collar from the blower housing.
14. Pull the motor, motor mounting bracket, removable inlet collar, and blower wheel out of the blower housing.
15. Be sure to mark on the motor shaft the location of the blower wheel so that the new motor shaft can be lined up correctly with the required blower wheel position to fit properly inside the blower housing.
11. Disconnect the vinyl tubing that connects the Mag gauge to the plenum.
12. Remove the hex nuts (4 on the four-foot models, 6 on the six-foot models), springs, washers and hold-down brackets securing the plenum.
13. Remove the front filter hold-down studs (2 on the four-foot models, 3 on the six-foot models) in front of the plenum.
14. Slide the plenum from the cabinet.
15. Remove the supply filter and clean the filter mounting surface.
16. Loosen - do not remove, the four bolts, springs and washers that secure the exhaust filter.
17. Slide the exhaust filter out, clean the filter mounting surface and install the new filter, ensuring that *the gasket is on the top*.
18. Tighten the hex nuts to secure the new exhaust filter in position.
19. Install the new supply filter with the *gasket side down*.
20. Reinstall the supply plenum and assemble the components in reverse order.

10.3 Replacing Filters, All Models



Dispose of the old filters per established laboratory practices. If necessary, consult a bio-safety officer or other appropriate person.

1. Turn the unit off and disconnect it from the power source.
2. Close the window.
3. Remove the thumbscrews securing the lamp housing cover. Remove the cover.
4. Open the control panel.
5. Remove the screws securing the dress panel. Remove the panel and set it aside.
6. Disconnect the window balance cord from one side of the window.



The balance cord is under extreme tension! Grip the cord attachment tab securely, disconnect, and allow the cord to retract slowly toward the top of the unit to avoid damage to the cord.

7. Remove all hex nuts securing the pressure plate.
8. Pry the pressure plate loose from the gasket and set it to the side.
9. Pull the Velcro boot loose from the exhaust filter plenum.
10. Release the two latches securing the supply plenum to the blower housing.

The cabinet must be recertified after filter replacement.

Assembly Notes:

- Latches connecting the plenum to the blower housing have a safety lock that must be released prior to opening the latch.
- When tightening the filter hold-down nuts, the springs should be compressed from 1/2 to 3/4 of their original height.
- Ensure that the vinyl tubing from the Mag gauge is reconnected to the supply plenum.
- The Velcro connection on the exhaust boot must be smooth with no gaps or loose spots to ensure proper sealing.

Section 11 – Specifications

11.1 Models - 1284 and 1285 (4' Cabinet with Sliding Window)

| | |
|--------------------------------|---|
| Construction | Work Surface: Type 304 Stainless Steel, #4 Finish Cabinet: Cold Rolled Steel and Type 304 Stainless Steel Finish: White Baked Powder TCI Hybrid Paint |
| Dimensions | Exterior: 54.0"W x 64.0"H x 32.5"F-B Interior: 49.0"W x 28.3"H x 22.25"F-B |
| Electrical Requirements | |
| 1284 | Main/Outlets (5): 115VAC, 1 Phase, 2 Wire, 60 Hz, 13.5 FLA (Total amps include 5A receptacle) Circuit Breaker: 20 Amp Receptacle - NEMA 5-20R 0.5 ma leakage current |
| 1285 | Exhaust System Volume Requirements: 356-390 CFM Main/Outlets (5): 230VAC, 1 Phase, 2 Wire, 50 Hz, 9.6 FLA (Total amps include 5A receptacle) Circuit Breaker: 15 Amp Receptacle - European 0.5ma leakage current Exhaust System Volume Requirements: 356-390 CFM |
| Filters | (1) Supply HEPA Filter (48"W x 18"F-B x 5-7/8"H) (1) Exhaust HEPA Filter (18"W x 24"F-B x 5-7/8"H) |
| Lights | (2) Fluorescent 32W, (F32/T8) (1) Optional UV 30W, (G30T8) Germicidal Lamp |
| Blower Motor | 3/4 HP, 1625 RPM |
| Drain Pan Capacity | 18.7 Gallons |

11.2 Models - 1286 and 1287 (6' Cabinet with Sliding Window)

| | |
|--------------------------------|--|
| Construction | Work Surface: Type 304 Stainless Steel, #4 Finish Cabinet: Cold Rolled Steel and Type 304 Stainless Steel Finish: White Baked-on Powder TCI Hybrid Paint |
| Dimensions | Exterior: 78.0"W x 64.0"H x 32.5"F-B Interior: 73.0"W x 28.3"H x 22.25"F-B |
| Electrical Requirements | |
| 1286 | Main/ Outlets (5): 115VAC, 1 Phase, 2 Wire, 60 Hz, 13.8 FLA (Total amps include 2A receptacle) Circuit Breaker: 20 Amp Receptacle - NEMA 5-20R 0.5ma leakage current |
| 1287 | Exhaust System Volume Requirements: 530-581 CFM Main/Outlets (5): 230VAC, 1 Phase, 2 Wire, 50 Hz, 7.5 FLA (Total amps include 2A receptacle) Circuit Breaker: 15 Amp Receptacle - European 0.5 ma leakage current Exhaust System Volume Requirements: 530-581 CFM |
| Filters | (1) Supply HEPA Filter (72"W x 18"F-B x 5-7/8"H) (1) Exhaust HEPA Filter (24"W x 24"F-B x 5-7/8"H) |
| Lights | (2) Fluorescent 32W, (F32/T8) (1) Optional UV 30W, (G30T8) Germicidal Lamp |
| Blower Motor | 3/4 HP, 1500 RPM |
| Drain Pan Capacity | 27.0 Gallons |

11.3 Environmental Conditions

The biological safety cabinets are designed to be electrically safe in the following environmental conditions:

- Indoors
- Altitude: Up to 2,000 meters
- Temperature: 5°C to 43°C
- Humidity: 80% RH at or below 31°C, decreasing linearly to 50% RH at 40°C
- Mains Supply Fluctuations: $\pm 10\%$ of nominal.
- Installation Category II ¹
- Pollution Degree 2 ²
- Class of Equipment I

¹ Installation category (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its overvoltage protection means. For example, in CAT II which is the category used for instruments in installations supplied from a supply comparable to public mains such as hospital and research laboratories and most industrial laboratories, the expected transient overvoltage is 2500V for a 230V supply and 1500V for a 120V supply.

² Pollution degree describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally only non-conductive pollution such as dust occurs with the exception of occasional conductivity caused by condensation.

MODEL (S): 1284, 1285

Test Voltage: 115, 230 Frequency: 60, 50 Hz FLA: _____

Magnehelic Gauge Reading _____

Damper Position: _____

Position from "Open"

(Test points on speed control board - Terminal "N" neutral and Terminal "M" motor.)

True RMS Voltage To motor: _____

NOTE: Use True RMS volt meter.

Velocity Profile: 6.0 Inches from side with successive points 5.29 inches apart.
6.0 Inches from rear wall with successive points 5.50 inches apart in a plane four inches above the window edge.

Rear Wall

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Total Sum _____ ÷ 24 = average down flow velocity _____ LFPM.

Acceptable down flow range 65-75 in linear feet per minute.

Work Access Opening Airflow

A. Thermoanemometer Method

12 Readings

4 inches above the exhaust filter, 4.25 inches from the inside edge of the filter with successive points 4.00 inches side-to-side and 5.25 inches from inside filter edges with successive points 4.00 inches rear to front.

| | |
|------------------------------------|---------------|
| Exhaust filter area | 2.461 sq. ft. |
| Front access opening | 3.403 sq. ft. |
| Acceptable range for face velocity | 120-130 fpm |

B. Direct Reading Instrument Method

| | | |
|------------------------------------|---------|---------|
| Inflow volume (~ exhaust volume) | _____ | cu. ft. |
| ÷ Front access opening | 3.403 | sq. ft. |
| = Calculated face velocity | _____ | LFPM |
| Acceptable range for face velocity | 105-115 | LFPM |

TESTED BY: _____ DATE: _____

MODEL (S): 1286, 1287

Test Voltage: 115, 230 Frequency: 60, 50 Hz FLA: _____

Magnehelic Gauge Reading _____

Damper Position: _____

Position from "Open"

(Test points on speed control board - Terminal "N" neutral and Terminal "M" motor.)

True RMS Voltage To motor: _____

NOTE: Use True RMS volt meter.

Velocity Profile: 6.0 Inches from side with successive points 5.55 inches apart.
6.0 Inches from rear wall with successive points 5.50 inches apart in a plane at the window edge.

Rear Wall

| | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Total Sum _____ ÷ 36 = average down flow velocity _____ LFPM.

Acceptable down flow range 71-81 in linear feet per minute.

Work Access Opening Airflow

A. Thermoanemometer Method

16 Readings

4 inches above the exhaust filter, 5.25 inches from the inside edge of the filter with successive points 4.00 inches side-to-side and 5.25 inches from inside filter edges with successive points 4.00 inches rear to front.

| | |
|------------------------------------|---------------|
| Exhaust filter area | 3.368 sq. ft. |
| Front access opening | 5.052 sq. ft. |
| Acceptable range for face velocity | 100-110 fpm |

B. Direct Reading Instrument Method

| | | |
|------------------------------------|---------|---------|
| Inflow volume (~ exhaust volume) | _____ | cu. ft. |
| ÷ Front access opening | 5.052 | sq. ft. |
| = Calculated face velocity | _____ | LFPM |
| Acceptable range for face velocity | 105-115 | LFPM |

TESTED BY: _____ DATE: _____

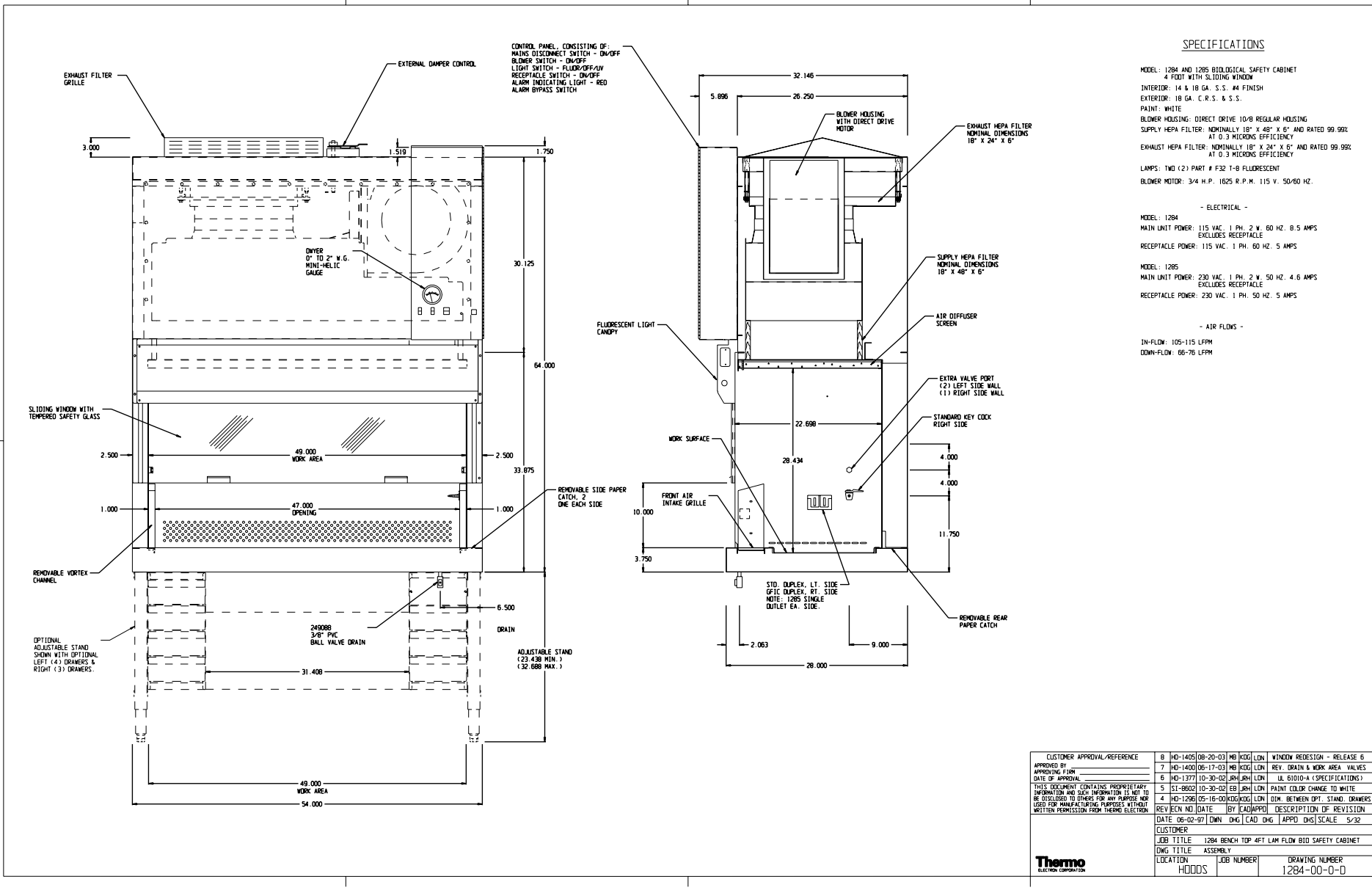
SPECIFICATIONS

MODEL: 1284 AND 1285 BIOLOGICAL SAFETY CABINET
 4 FEET WITH SLIDING WINDOW
 INTERIOR: 14 & 18 GA. S.S. #4 FINISH
 EXTERIOR: 18 GA. C.R.S. & S.S.
 PAINT: WHITE
 BLOWER HOUSING: DIRECT DRIVE 10/8 REGULAR HOUSING
 SUPPLY HEPA FILTER: NOMINALLY 18" X 48" X 6" AND RATED 99.99%
 AT 0.3 MICRONS EFFICIENCY
 EXHAUST HEPA FILTER: NOMINALLY 18" X 24" X 6" AND RATED 99.99%
 AT 0.3 MICRONS EFFICIENCY
 LAMPS: TWO (2) PART # F32 T-8 FLUORESCENT
 BLOWER MOTOR: 3/4 H.P. 1625 R.P.M. 115 V. 50/60 HZ.

- ELECTRICAL -
 MODEL: 1284
 MAIN UNIT POWER: 115 VAC, 1 PH, 2 W, 60 HZ, 8.5 AMPS
 EXCLUDES RECEPTACLE
 RECEPTACLE POWER: 115 VAC, 1 PH, 60 HZ, 5 AMPS

MODEL: 1285
 MAIN UNIT POWER: 230 VAC, 1 PH, 2 W, 50 HZ, 4.6 AMPS
 EXCLUDES RECEPTACLE
 RECEPTACLE POWER: 230 VAC, 1 PH, 50 HZ, 5 AMPS

- AIR FLOWS -
 IN-FLOW: 105-115 LPM
 DOWN-FLOW: 66-76 LPM



| | | | | | | | |
|--|--|----------------|-------------|------|-----------------------------|-------------|-------------------------------|
| CUSTOMER APPROVAL/REFERENCE | 8 | HD-1405 | 08-20-03 | MB | KCG | LEN | WINDOW REDESIGN - RELEASE 6 |
| APPROVED BY | 7 | HD-1400 | 06-17-03 | MB | KCG | LEN | REV. DRAIN & WORK AREA VALVES |
| DATE OF APPROVAL | 6 | HD-1377 | 10-30-02 | JRH | JRH | LEN | UL 61010-A (SPECIFICATIONS) |
| THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION IS NOT TO BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR USED FOR MANUFACTURING PURPOSES WITHOUT WRITTEN PERMISSION FROM THERMO ELECTRON | | | | | | | |
| REVISION NO. | DATE | BY | DESCRIPTION | DATE | DATE | DESCRIPTION | OF REVISION |
| 4 | HD-1296 | 05-16-00 | KCG/LEN | DM | BETWEEN OPT. STAND, DRAWERS | | |
| DATE: | 06-02-97 | DWN | DWG | CAD | ENG | APPRO | DWG SCALE: S/32 |
| CUSTOMER: | | | | | | | |
| JOB TITLE | 1284 BENCH TOP 4FT LAM FLOW BIO SAFETY CABINET | | | | | | |
| DWG TITLE | ASSEMBLY | | | | | | |
| LOCATION | JOB NUMBER | DRAWING NUMBER | | | | | |
| HODDS | | 1284-00-0-D | | | | | |

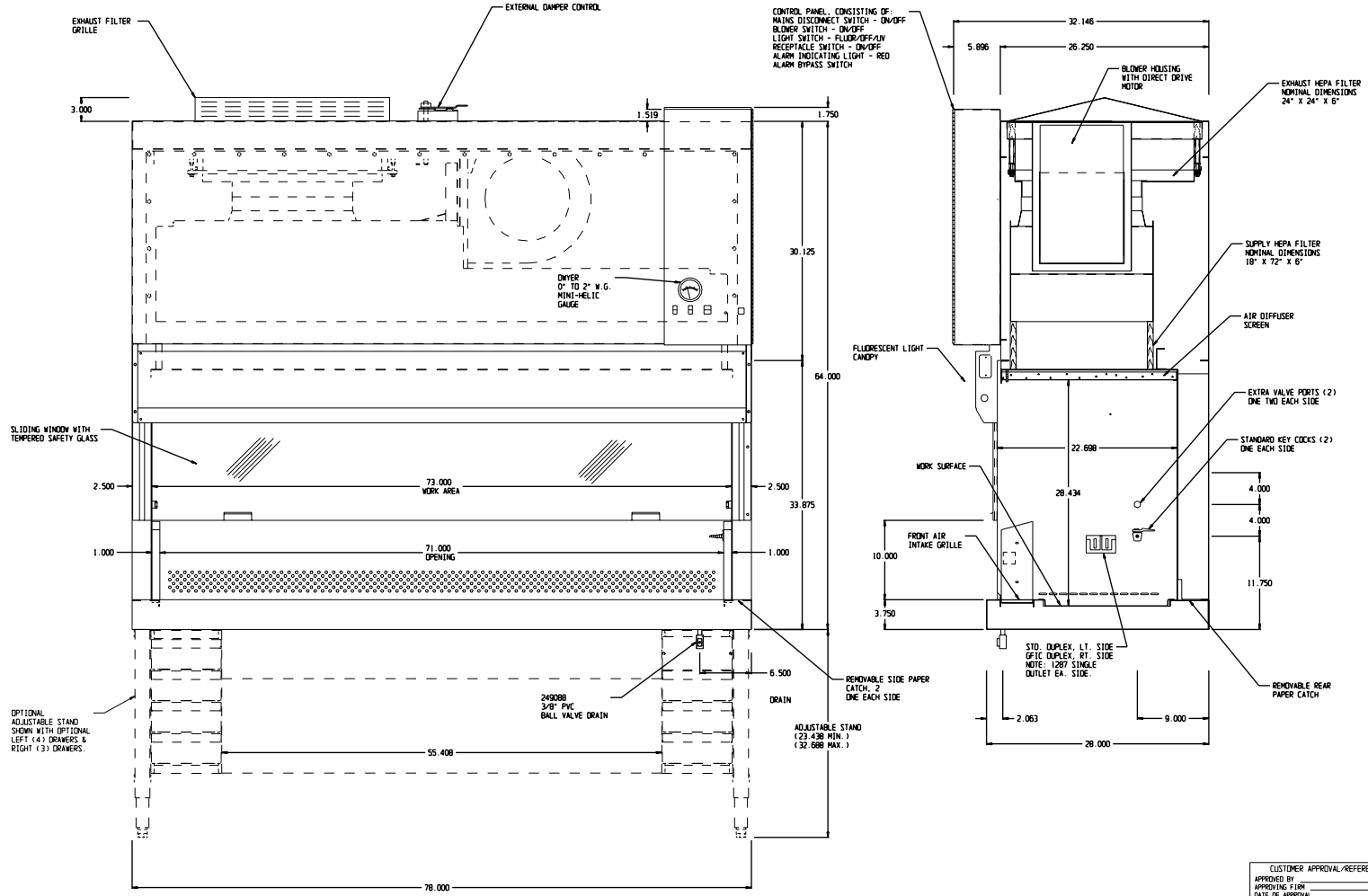


SPECIFICATIONS

MODEL: 1286 AND 1287 BIOLOGICAL SAFETY CABINET
 6 FOOT WITH SLIDING WINDOW
 INTERIOR: 14 & 18 GA. S.S. #4 FINISH
 EXTERIOR: 18 GA. C.R.S. & S.S.
 PAINT: WHITE
 BLOWER HOUSING: DIRECT DRIVE 10/9 REGULAR HOUSING
 SUPPLY HEPA FILTER: NOMINALLY 18" X 72" X 6" AND RATED 99.99% AT 0.3 MICRONS EFFICIENCY
 EXHAUST HEPA FILTER: NOMINALLY 24" X 24" X 6" AND RATED 99.99% AT 0.3 MICRONS EFFICIENCY
 LAMPS: TWO (2) PART # F32 T-8 FLUORESCENT
 BLOWER MOTOR: 3/4 H.P. 1500 R.P.M. 115 V. 50/60 HZ.

- ELECTRICAL -
 MODEL: 1286
 MAIN UNIT POWER: 115 VAC. 1 PH. 2 W. 60 HZ. 11.8 AMPS
 EXCLUDES RECEPTACLE
 RECEPTACLE POWER: 115 VAC. 1 PH. 60 HZ. 2 AMPS
 MODEL: 1287
 MAIN UNIT POWER: 230 VAC. 1 PH. 2 W. 50 HZ. 5.5 AMPS
 EXCLUDES RECEPTACLE
 RECEPTACLE POWER: 230 VAC. 1 PH. 50 HZ. 2 AMPS

- AIR FLOWS -
 IN-FLOW: 105-115 LFPM
 DOWN-FLOW: 71-81 LFPM



| APPROVED BY | CUSTOMER APPROVAL/REFERENCE |
|---|---|
| _____ | 8 HD-1405 08-20-03 MB ROG LON WINDOW REDESIGN - RELEASE 6 |
| _____ | 7 HD-1400 06-17-03 MB ROG LON CHG. SS DRAIN VALVE 24908B TO PVC |
| _____ | 6 HD-1371 10-30-02 JHM JHM LON LL-61010-4 (SPECIFICATIONS) |
| THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION IS NOT TO BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR USED FOR MANUFACTURING PURPOSES WITHOUT WRITTEN PERMISSION FROM THERMO ELECTRON. | |
| _____ | 5 ST-8802 10-30-02 EB JHM LON PAINT COLOR CHANGE TO WHITE |
| _____ | 4 HD-1298 05-16-00 GKG LON DIM. BETWEEN OPT. STAND, DRAWERS |
| _____ | REV. NO. DATE BY CAD/APP DESCRIPTION OF REVISION |
| _____ | DATE: 08-28-97 DWN MB CAD MB APPD CHS SCALE: 5/32"=1" |
| CUSTOMER | |
| JOB TITLE: 1286 BENCH TOP 6 FT. LAM FLOW BIO SAFETY CABINET | |
| DWG TITLE: ASSEMBLY | |
| LOCATION: HOODS | JOB NUMBER: 1286-00-0-0 |
| DRAWING NUMBER: 1286-00-0-0 | |



Section 12 - Accessories**Section 13 - Parts List**

| Description | Order Number | 13.1 | Model 1284 | Stock # | Description |
|--|---------------------|-------------|-------------------|----------------|--|
| Service Valve | 191275 | | | | |
| Armrest, 4' cabinet | 191509 | | | | |
| Armrest, 6' cabinet | 191512 | | | 156106 | 3/4 HP Blower Motor (1625 RPM) |
| Lab Chair with arms | 191486 | | | 170045 | Capacitor, Motor 25MFD, 370V |
| Lab Chair without arms | 191487 | | | 190396 | Motor Speed Control |
| Storage Cabinet, left side | 191494 | | | 500030 | Ballast (Fluorescent Lighting) |
| Storage Cabinet, right side | 191495 | | | 141048 | 48" Fluorescent Lamp (32 Watt) |
| UV Light, 30W | 191419 | | | 230054 | Circuit Breaker, 15A SP |
| UV Light, 30W portable | 191070 | | | 430263 | Line cord Assembly, 20A, 120V, Hospital Grade |
| IV Rod, stainless steel, 4' cabinet | 191571 | | | 760178 | Filter, Supply HEPA 18" x 48" x 5-7/8" Pressure Range: 0.78"-1.05" at 890 cfm, filter drop pressure tested per IES-RP-CC001.3 |
| IV Rod, stainless steel, 6' cabinet | 191572 | | | | |
| Adjustable Foot Rest, 4' cabinet | 191127 | | | | |
| ULPA Filter, 4 ft. cabinets, (1) exhaust & (1) supply* | 760192 | | | | |
| ULPA Filter, 6 ft. cabinets, (1) exhaust & (1) supply* | 760193 | | | 760179 | Filter, Exhaust HEPA 18" x 24" x 5-7/8" Pressure Range: 0.40"-0.65" at 360 cfm, filter drop pressure tested per IES-RP-CC001.3 |
| Exhaust Transition | 191782 | | | | |
| Hydraulic Stand, 4' cabinet | 191518 | | | | |
| Hydraulic Stand, 6' cabinet | 191519 | | | | |
| Adjustable Stand, 4' cabinet | 191550 | | | 500009 | Ballast, (UV Lighting) |
| Adjustable Stand, 6' cabinet | 191551 | | | 141014 | 30W Germicidal Lamp |
| 2-drawer Storage Cabinet, left side of stand | 191524 | | | 360095 | Rocker Switch, SPST, Flat Black |
| Service Valve Kit, use w/ Universal Piping | 191597 | | | 360105 | Rocker Switch, SPDT |
| Universal Piping Kit* | 191620 | | | 249025 | Valve Body w/Tip |
| ADA Control Panel* | 191496 | | | 104008 | Gauge, Static Pressure |
| Caster Pan, BSC Stand (customer installed) | 191684 | | | 360146 | Rocker Switch, DPST |
| Low Flow Alarm | 191168 | | | 230182 | Fuses, 7 Amp, 1/4" x 1-1/4" |
| *factory installed | | | | 230204 | Circuit Breaker/Switch 18A |
| | | | | 400163 | Sash Alarm Board |

The parts for the Model 1285 are the same as those listed above with the addition of the following:

| Stock # | Description |
|----------------|-------------------------------|
| 275012 | Transformer, 1.5KVA, 240/120V |
| 460270 | European Cord, 230V, 16A |
| 230203 | Circuit Breaker/Switch 13A |

13.2 Model 1286

| Stock # | Description |
|----------------|--|
| 156109 | HP Blower Motor (1500 RPM) |
| 170045 | Capacitor, Motor 25MFD, 370V |
| 190396 | Motor Speed Control |
| 500030 | Ballast (Fluorescent Lighting) |
| 141048 | Fluorescent Lamp (32 Watt) |
| 230054 | Circuit Breaker, 15A SP |
| 430263 | Line cord Assembly, 20A, 120V, Hospital Grade |
| 760180 | Filter, Supply HEPA 18" x 72" x 5-7/8" Pressure Range: 0.78"-1.05" at 1350 cfm, filter drop pressure tested per IES-RP-CC001.3 |
| 760181 | Filter, Exhaust HEPA 24" x 24 x 5-7/8" |
| 500009 | Ballast, (UV Lighting) |
| 141014 | 30W Germicidal Lamp |
| 360095 | Rocker Switch, SPST, Flat Black |
| 360105 | Rocker Switch, SPDT |
| 249025 | Valve Body w/Tip |
| 104008 | Gauge, Static Pressure |
| 360146 | Rocker Switch, DPST |
| 230166 | Fuses, 3 Amp 1/4" x 1-1/4" |
| 230204 | Circuit Breaker/Switch 18A |
| 400163 | Sash Alarm Board |

The parts for the Model 1287 are the same as Model 1286 with the addition of:

| Stock # | Description |
|----------------|-------------------------------|
| 275012 | Transformer, 1.5KVA, 240/120V |
| 430270 | European Cord, 230V, 16A |
| 230179 | Circuit Breaker/Switch 10A |

13.3 Filter Pressure Drop Conversion

Pressure drop across a HEPA filter is linear which allows one to accurately predict the pressure drop at various CFM if given a starting value. It is a straight proportion from one setting to the other.

Example:

A filter rating of 0.31" of water at 352 CFM needs to be converted to 530 CFM.

The formula is as follows:

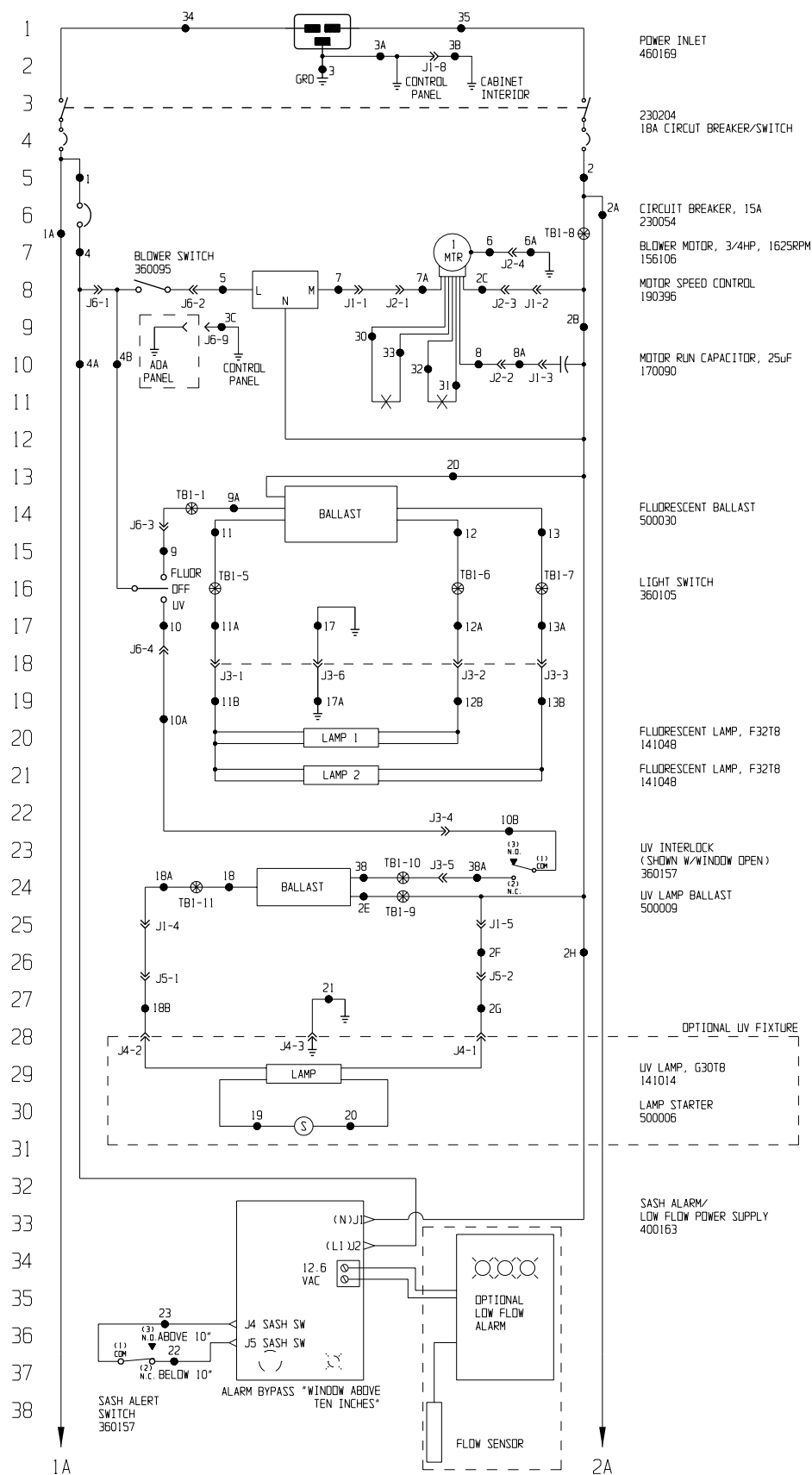
$$\frac{0.31}{352} = \frac{x}{530}$$

Solving for x (the needed pressure drop at 530 CFM)

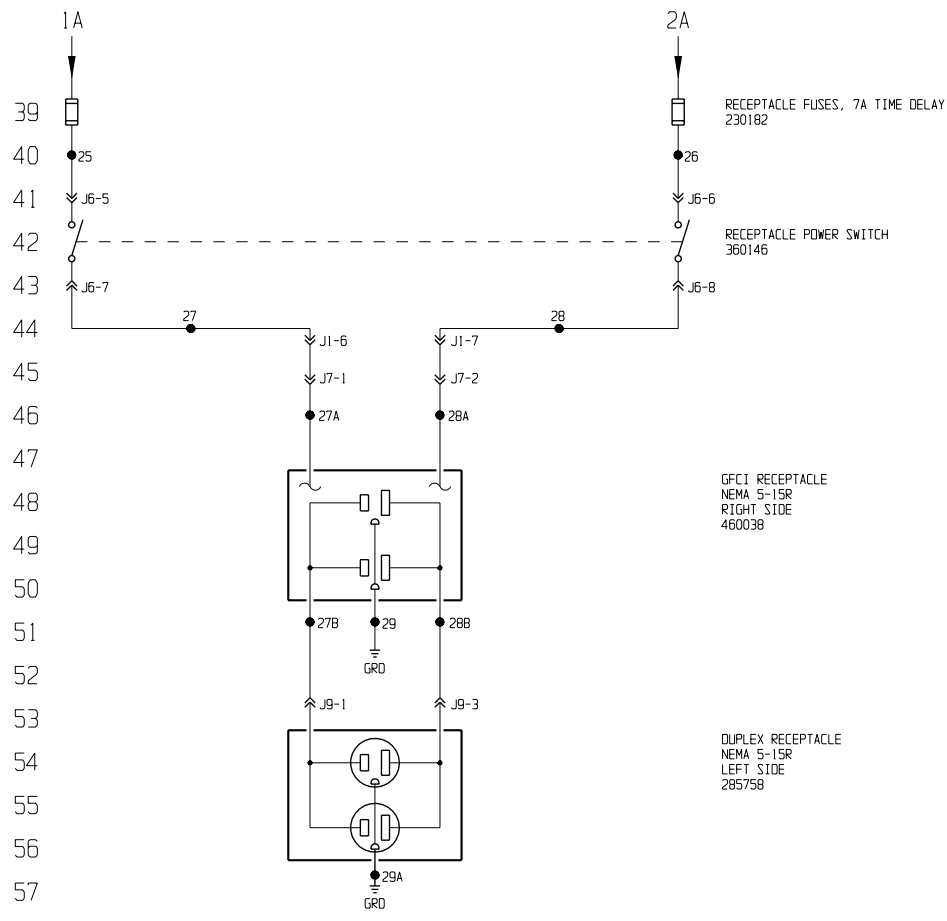
$$x = \frac{0.31}{352} * 530$$

x=0.47" of water (rounded)

POWER CONNECTION
115 VAC, 1PH, 2W, 60HZ, 8.5FLA (EXCLUDING 5AMP CONVENIENCE RECEPTACLES)



Electrical Schematic
Model:
1284
Bio-Safety Cabinet
1284-70-1-D Rev. 0
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| |
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| Electrical Schematic Model: 1284 Bio-Safety Cabinet |
| 1284-70-1-D Rev. 0 Page 2 of 3 |

WIRE REFERENCE CHART

| | WIRE NO. | GAUGE | COLOR |
|-----|----------|-------|--------------|
| 77 | | | |
| 78 | 1 | 12 | BLACK |
| | 1A | 16 | BROWN |
| | 2 | 12 | WHITE |
| 79 | 2A | 16 | BLUE |
| | 2B | 16 | WHITE |
| | 2C | 18 | WHITE |
| 80 | 2D | 18 | WHITE |
| | 2E | 18 | WHITE |
| | 2F | 16 | GRAY |
| 81 | 2G | 18 | WHITE |
| | 2H | 20 | WHITE |
| 82 | 2I | N/A | N/A |
| | 3 | 14 | GREEN/YELLOW |
| | 3A | 16 | GREEN/YELLOW |
| 83 | 3B | 16 | GREEN/YELLOW |
| | 3C | 16 | GREEN/YELLOW |
| 84 | 3D | N/A | N/A |
| | 4 | 14 | BROWN |
| | 4A | 20 | BROWN |
| | 4B | 16 | BROWN |
| 85 | 4C | N/A | N/A |
| | 5 | 16 | BLUE |
| 86 | 6 | 18 | GREEN |
| | 6A | 16 | GREEN |
| 87 | 7 | 16 | BLACK |
| | 7A | 18 | BLACK |
| | 8 | 18 | BROWN |
| | 8A | 16 | BROWN |
| 88 | 9 | 16 | PURPLE |
| | 9A | 18 | BLACK |
| 89 | 10 | 18 | ORANGE |
| | 11 | 18 | RED |
| 90 | 11A | 20 | RED |
| | 11B | 18 | RED |
| | 12 | 18 | BLUE |
| 91 | 12A | 20 | BLUE |
| | 12B | 18 | BROWN |
| | 13 | 18 | BLUE |
| 92 | 13A | 20 | BLACK |
| | 13B | 18 | BLACK |
| | 17 | 16 | GREEN |
| 93 | 17A | 18 | ORANGE |
| | 18 | 18 | BLUE |
| 94 | 18A | 16 | BLUE |
| | 18B | 18 | BLACK |
| | 19 | 18 | BLACK |
| 95 | 20 | 18 | BLACK |
| | 21 | 18 | GREEN |
| 96 | 22 | 20 | RED |
| | 22A | N/A | N/A |
| | 23 | 20 | RED |
| 97 | 24 | N/A | N/A |
| | 25 | 16 | YELLOW |
| 98 | 26 | 16 | GRAY |
| | 27 | 16 | ORANGE |
| | 27A | 18 | ORANGE |
| 99 | 27B | 18 | BLACK |
| | 28 | 16 | RED |
| 100 | 28A | 18 | RED |
| | 28B | 18 | WHITE |
| | 29 | 18 | GREEN |
| 101 | 29A | 18 | GREEN |
| | 30 | 18 | BROWN |
| | 31 | 18 | ORANGE |
| 102 | 32 | 18 | PURPLE |
| | 33 | 18 | YELLOW |
| 103 | 34 | 12 | BROWN |
| | 35 | 12 | BLUE |
| | 36 | N/A | N/A |
| 104 | 37 | N/A | N/A |
| | 38 | 18 | BLACK |
| | 38A | 18 | YELLOW |
| 105 | | | |
| 106 | | | |
| 107 | | | |

| NOTES: | | |
|---------------|-----------------------------------|-----------------------------|
| ⊕ | Denotes Terminal Strip Connection | Parts List Reference Number |
| ○ | Lost Relay Number | ○ Assembly |
| □ | 11 Lost Terminal Number | ○ Panel |
| ⊖ | 3B Lost Wire Number | ○ Refrigeration |
| CONNECTOR | FUNCTION | LOCATION |
| J1 (9 POS.) | CABINET PASS-THRU CONN. | CONTROL PANEL (TOP REAR) |
| J2 (5 POS.) | BLOWER MOTOR | CAB. TOP HOUSING (INTERIOR) |
| J3 (9 POS.) | FLUORESCENT LIGHTING | CONTROL PANEL (INTERIOR) |
| J4 (4 POS.) | 1/4" LAMP RECEPTACLE | WORK CHAMBER (RIGHT SIDE) |
| J5 (2 POS.) | 1/4" RECEPTACLE CONN. | CAB. TOP HOUSING (INTERIOR) |
| J6 (6 POS.) | SWITCH PANEL CONNECTIONS | CONTROL PANEL (INTERIOR) |
| J7 (2 POS.) | RIGHT RECEPTACLE CORD | CAB. TOP HOUSING (INTERIOR) |
| J9 (3 POS.) | LEFT RECEPTACLE CORD | CAB. TOP HOUSING (INTERIOR) |
| TB1 (11 POS.) | BALLAST CONNECTIONS | CONTROL PANEL |

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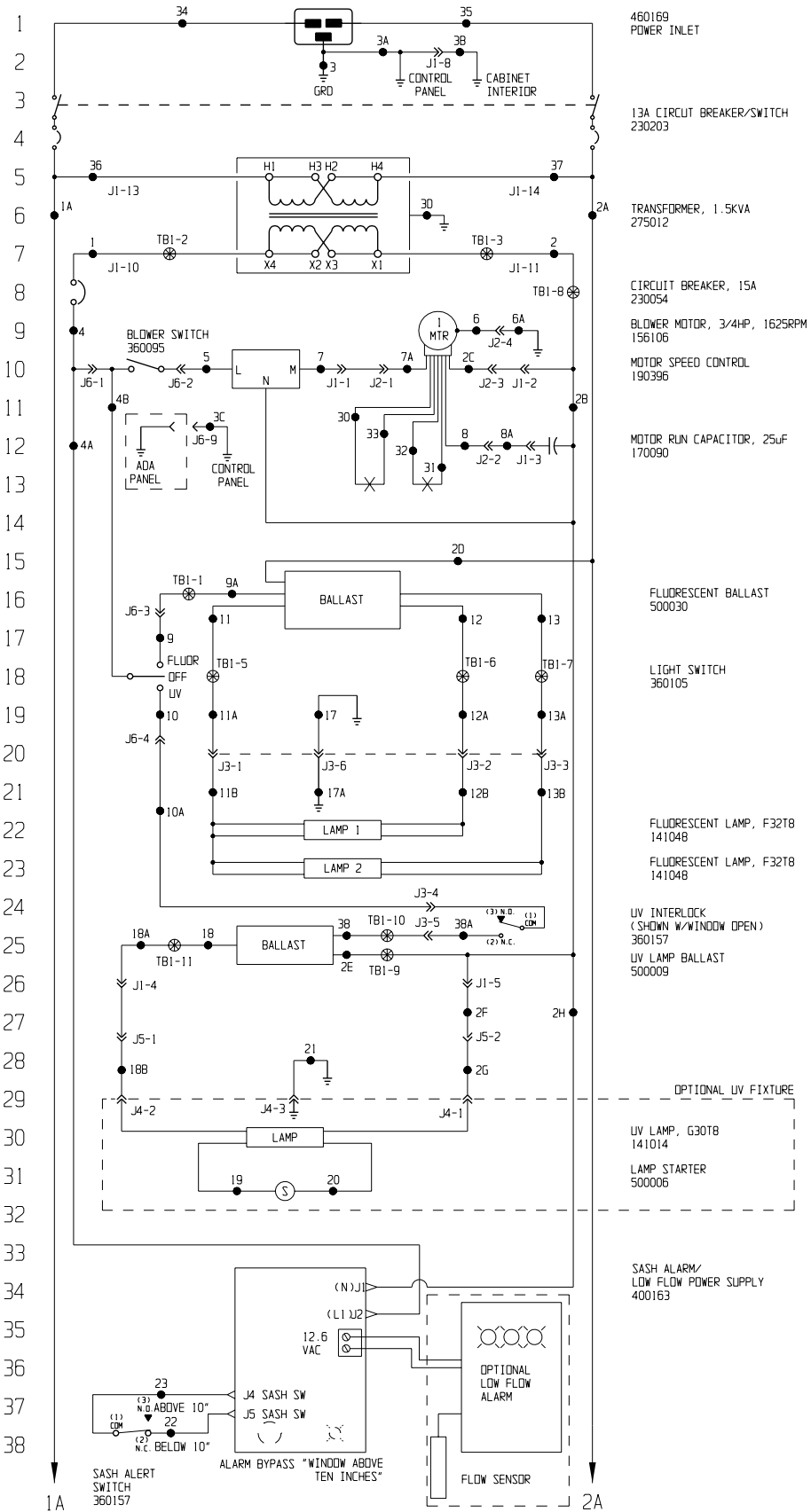


| REV | ECR NO. | DATE | BY | CAD | APPD | DESCRIPTION OF REVISION |
|--|---------|------------|-----|----------------|------|---------------------------------|
| 0 | HD-1405 | 07-14-03 | RTT | RTT | AKS | REL. 6, RELEASED FOR PRODUCTION |
| | | 07-10-03 | OWN | RTT | CAD | RTT APPD FCA SCALE NTS |
| CUSTOMER | | | | | | |
| JOB TITLE 1284 4FT. BIO-SAFETY CABINET | | | | | | |
| DWG TITLE ELECTRICAL SCHEMATIC | | | | | | |
| LOCATION | | JOB NUMBER | | DRAWING NUMBER | | |
| HOODS | | | | 1284-70-1-D | | |

Electrical Schematic
 Model:
 1284
 Bio-Safety Cabinet

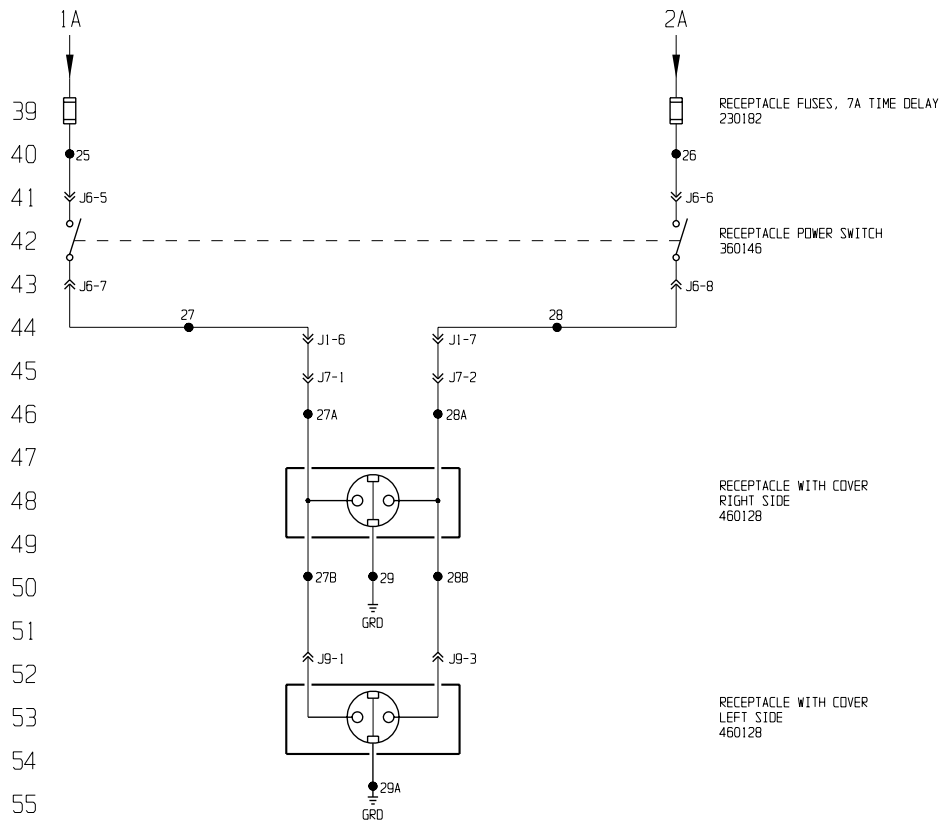
1284-70-1-D Rev. 0
 Page 3 of 3

POWER CONNECTION
230 VAC, 1PH, 2W, 50HZ, 4.6FLA (EXCLUDING 5AMP CONVENIENCE RECEPTACLES)



Electrical Schematic
Model:
1285
Bio-Safety Cabinet

1285-70-1-D Rev. 0
Page 1 of 3



| |
|--|
| Electrical Schematic Model: 1285 Bio-Safety Cabinet |
| 1285-70-1-0 Rev. 0 Page 2 of 3 |

WIRE REFERENCE CHART

| | WIRE NO. | GAUGE | COLOR |
|-----|----------|-------|--------------|
| 77 | 1 | 12 | BLACK |
| | 1A | 16 | BROWN |
| 78 | 2 | 12 | WHITE |
| | 2A | 16 | BLUE |
| 79 | 2B | 16 | WHITE |
| | 2C | 18 | WHITE |
| 80 | 2D | 18 | WHITE |
| | 2E | 18 | WHITE |
| | 2F | 16 | GRAY |
| 81 | 2G | 18 | WHITE |
| | 2H | 20 | WHITE |
| 82 | 2I | N/A | N/A |
| | 3 | 14 | GREEN/YELLOW |
| | 3A | 16 | GREEN/YELLOW |
| 83 | 3B | 16 | GREEN/YELLOW |
| | 3C | 16 | GREEN/YELLOW |
| | 3D | 16 | GREEN/YELLOW |
| 84 | 4 | 14 | BROWN |
| | 4A | 20 | BROWN |
| 85 | 4B | 16 | BROWN |
| | 4C | N/A | N/A |
| | 5 | 16 | BLUE |
| 86 | 6 | 18 | GREEN |
| | 6A | 16 | GREEN |
| | 7 | 16 | BLACK |
| 87 | 7A | 18 | BLACK |
| | 8 | 18 | BROWN |
| 88 | 8A | 16 | BROWN |
| | 9 | 16 | PURPLE |
| | 9A | 18 | BLACK |
| 89 | 10 | 16 | ORANGE |
| | 11 | 18 | RED |
| 90 | 11A | 20 | RED |
| | 11B | 18 | RED |
| | 12 | 18 | BLUE |
| 91 | 12A | 20 | BLUE |
| | 12B | 18 | BROWN |
| | 13 | 18 | BLUE |
| 92 | 13A | 20 | BLACK |
| | 13B | 18 | BLACK |
| | 17 | 16 | GREEN |
| 93 | 17A | 18 | ORANGE |
| | 18 | 18 | BLUE |
| 94 | 18A | 16 | BLUE |
| | 18B | 18 | BLACK |
| | 19 | 18 | BLACK |
| 95 | 20 | 18 | BLACK |
| | 21 | 18 | GREEN |
| 96 | 22 | 18 | RED |
| | 22A | N/A | N/A |
| | 23 | 20 | RED |
| 97 | 24 | N/A | N/A |
| | 25 | 16 | YELLOW |
| | 26 | 16 | GRAY |
| 98 | 27 | 16 | ORANGE |
| | 27A | 18 | ORANGE |
| | 27B | 18 | BLACK |
| 99 | 28 | 16 | RED |
| | 28A | 18 | RED |
| 100 | 28B | 18 | WHITE |
| | 29 | 18 | GREEN |
| | 29A | 18 | GREEN |
| 101 | 30 | 18 | BROWN |
| | 31 | 18 | ORANGE |
| 102 | 32 | 18 | PURPLE |
| | 33 | 18 | YELLOW |
| | 34 | 12 | BROWN |
| 103 | 35 | 12 | BLUE |
| | 36 | 12 | BROWN |
| 104 | 37 | 12 | BLUE |
| | 38 | 18 | BLACK |
| 105 | 38A | 16 | YELLOW |
| 106 | | | |
| 107 | | | |

| NOTES: | | |
|---------------|-----------------------------------|-----------------------------|
| ⊗ | Denotes Terminal Strip Connection | Parts List Reference Number |
| | Last Relay Number | ○ Assembly |
| 11 | Last Terminal Number | ○ Panel |
| 38 | Last Wire Number | ○ Refrigeration |
| CONNECTOR | FUNCTION | LOCATION |
| J1 (9 PDS.) | CABINET PASS-THRU CONN. | CONTROL PANEL (TOP REAR) |
| J2 (5 PDS.) | BLOWER MOTOR | CAB. TOP HOUSING (INTERIOR) |
| J3 (9 PDS.) | FLUORESCENT LIGHTING | CONTROL PANEL (INTERIOR) |
| J4 (4 PDS.) | UV LAMP RECEPTACLE | WORK CHAMBER (RIGHT SIDE) |
| J5 (2 PDS.) | UV RECEPTACLE CONN. | CAB. TOP HOUSING (INTERIOR) |
| J6 (9 PDS.) | SWITCH PANEL CONNECTIONS | CONTROL PANEL (INTERIOR) |
| J7 (2 PDS.) | RIGHT RECEPTACLE CORD | CAB. TOP HOUSING (INTERIOR) |
| J9 (3 PDS.) | LEFT RECEPTACLE CORD | CAB. TOP HOUSING (INTERIOR) |
| TB1 (11 PDS.) | BALLAST CONNECTIONS | CONTROL PANEL |

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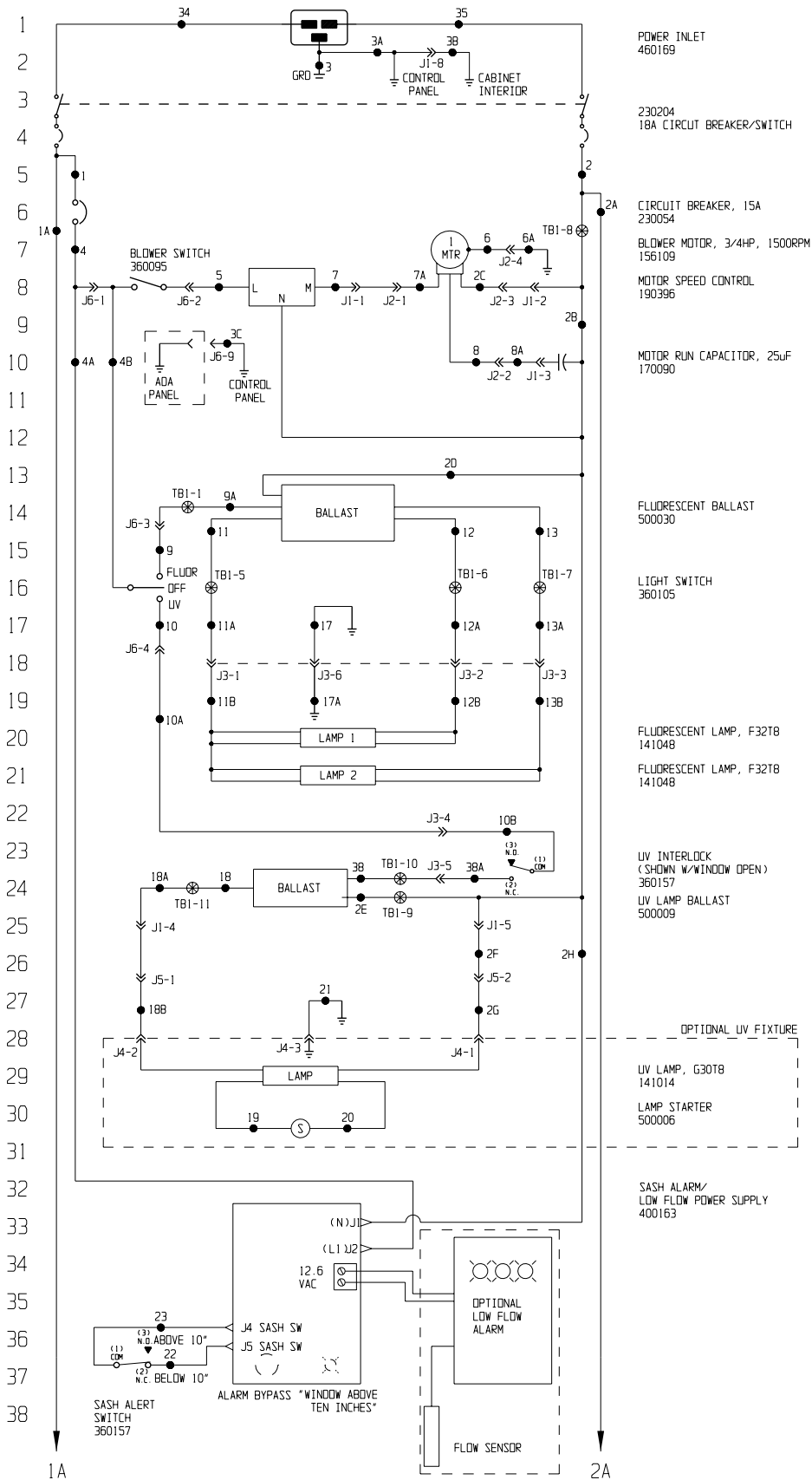


| REV | NO. | DATE | BY | APPD | DESCRIPTION OF REVISION | | | | |
|--|----------|----------|-----|------|-------------------------|----------------------------------|----------------|-------|-----|
| 0 | HO-1405 | 07-14-03 | RTT | RTT | AKS | REMOVED CONNECTORS, RIGHT RECEPT | | | |
| 1 | 07-14-03 | DWN | RTT | CAD | RTT | APPD | FCA | SCALE | NTS |
| CUSTOMER | | | | | | | | | |
| JOB TITLE 1285 4FT. BIO-SAFETY CABINET - 230V/50HZ | | | | | | | | | |
| DWG TITLE ELECTRICAL SCHEMATIC | | | | | | | | | |
| LOCATION HOODS | | | | | JOB NUMBER | | DRAWING NUMBER | | |
| | | | | | | | 1285-70-1-D | | |

Electrical Schematic
 Model:
 1285
 Bio-Safety Cabinet

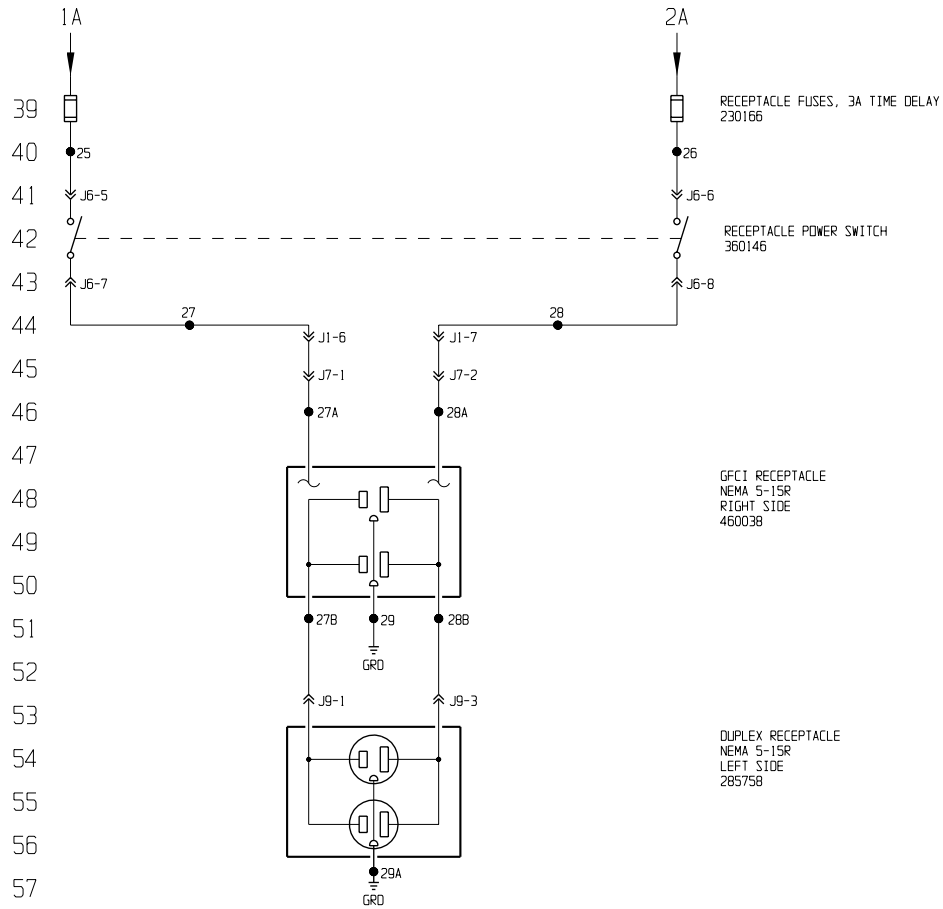
1285-70-1-D Rev. 0
 Page 3 of 3

POWER CONNECTION
115 VAC, 1PH, 2W, 60HZ, 11.8FLA (EXCLUDING 2AMP CONVENIENCE RECEPTACLES)



Electrical Schematic
Model:
1286
Bio-Safety Cabinet

1286-70-1-D Rev. 0
Page 1 of 3



Electrical Schematic
Model:
1286
Bio-Safety Cabinet

1286-70-1-0 Rev. 0
Page 2 of 3

WIRE REFERENCE CHART

| | WIRE NO. | GAUGE | COLOR |
|-----|----------|-------|--------------|
| 77 | | | |
| 78 | 1 | 12 | BLACK |
| | 1A | 16 | BROWN |
| | 2 | 12 | WHITE |
| 79 | 2A | 16 | BLUE |
| | 2B | 16 | WHITE |
| | 2C | 18 | WHITE |
| 80 | 2D | 18 | WHITE |
| | 2E | 18 | WHITE |
| | 2F | 16 | GRAY |
| 81 | 2G | 18 | WHITE |
| | 2H | 20 | WHITE |
| | 2I | N/A | N/A |
| 82 | 3 | 14 | GREEN/YELLOW |
| | 3A | 16 | GREEN/YELLOW |
| 83 | 3B | 16 | GREEN/YELLOW |
| | 3C | 16 | GREEN/YELLOW |
| | 3D | N/A | N/A |
| 84 | 4 | 14 | BROWN |
| | 4A | 20 | BROWN |
| | 4B | 16 | BROWN |
| 85 | 4C | N/A | N/A |
| | 5 | 16 | BLUE |
| 86 | 6 | 18 | GREEN |
| | 6A | 16 | GREEN |
| | 7 | 16 | BLACK |
| 87 | 7A | 18 | BLACK |
| | 8 | 18 | BROWN |
| | 8A | 16 | BROWN |
| 88 | 9 | 16 | PURPLE |
| | 9A | 18 | BLACK |
| 89 | 10 | 16 | ORANGE |
| | 11 | 18 | RED |
| | 11A | 20 | RED |
| 90 | 11B | 18 | RED |
| | 12 | 18 | BLUE |
| 91 | 12A | 20 | BLUE |
| | 12B | 18 | BROWN |
| | 13 | 18 | BLUE |
| 92 | 13A | 20 | BLACK |
| | 13B | 18 | BLACK |
| | 17 | 16 | GREEN |
| 93 | 17A | 18 | ORANGE |
| | 18 | 18 | BLUE |
| | 18A | 16 | BLUE |
| 94 | 18B | 18 | BLACK |
| | 19 | 18 | BLACK |
| 95 | 20 | 18 | BLACK |
| | 21 | 18 | GREEN |
| | 22 | 18 | RED |
| 96 | 22A | N/A | N/A |
| | 23 | 20 | RED |
| 97 | 24 | N/A | N/A |
| | 25 | 16 | YELLOW |
| | 26 | 16 | GRAY |
| 98 | 27 | 16 | ORANGE |
| | 27A | 18 | ORANGE |
| | 27B | 18 | BLACK |
| 99 | 28 | 16 | RED |
| | 28A | 18 | RED |
| 100 | 28B | 18 | WHITE |
| | 29 | 18 | GREEN |
| | 29A | 18 | GREEN |
| 101 | 30 | N/A | N/A |
| | 31 | N/A | N/A |
| 102 | 32 | N/A | N/A |
| | 33 | N/A | N/A |
| | 34 | 12 | BROWN |
| 103 | 35 | 12 | BLUE |
| | 36 | N/A | N/A |
| 104 | 37 | N/A | N/A |
| | 38 | 18 | BLACK |
| 105 | 38A | 16 | YELLOW |
| 106 | | | |
| 107 | | | |

| NOTES: | | |
|-------------------------------------|-----------------------------|-----------------------------|
| ⊗ Denotes Terminal Strip Connection | Parts List Reference Number | |
| Last Relay Number | ○ Assembly | |
| 11 Last Terminal Number | ○ Panel | |
| 3B Last Wire Number | ○ Refrigeration | |
| CONNECTOR | FUNCTION | LOCATION |
| J1 (9 POS.) | CABINET PASS-THRU CONN. | CONTROL PANEL (TOP REAR) |
| J2 (5 POS.) | BLOWER MOTOR | CAB. TOP HOUSING (INTERIOR) |
| J3 (9 POS.) | FLUORESCENT LIGHTING | CONTROL PANEL (INTERIOR) |
| J4 (4 POS.) | UV LAMP RECEPTACLE | WORK CHAMBER (RIGHT SIDE) |
| J5 (2 POS.) | UV RECEPTACLE CONN. | CAB. TOP HOUSING (INTERIOR) |
| J6 (9 POS.) | SWITCH PANEL CONNECTIONS | CONTROL PANEL (INTERIOR) |
| J7 (2 POS.) | RIGHT RECEPTACLE CORD | CAB. TOP HOUSING (INTERIOR) |
| J9 (3 POS.) | LEFT RECEPTACLE CORD | CAB. TOP HOUSING (INTERIOR) |
| TB1 (11 POS.) | BALLAST CONNECTIONS | CONTROL PANEL |

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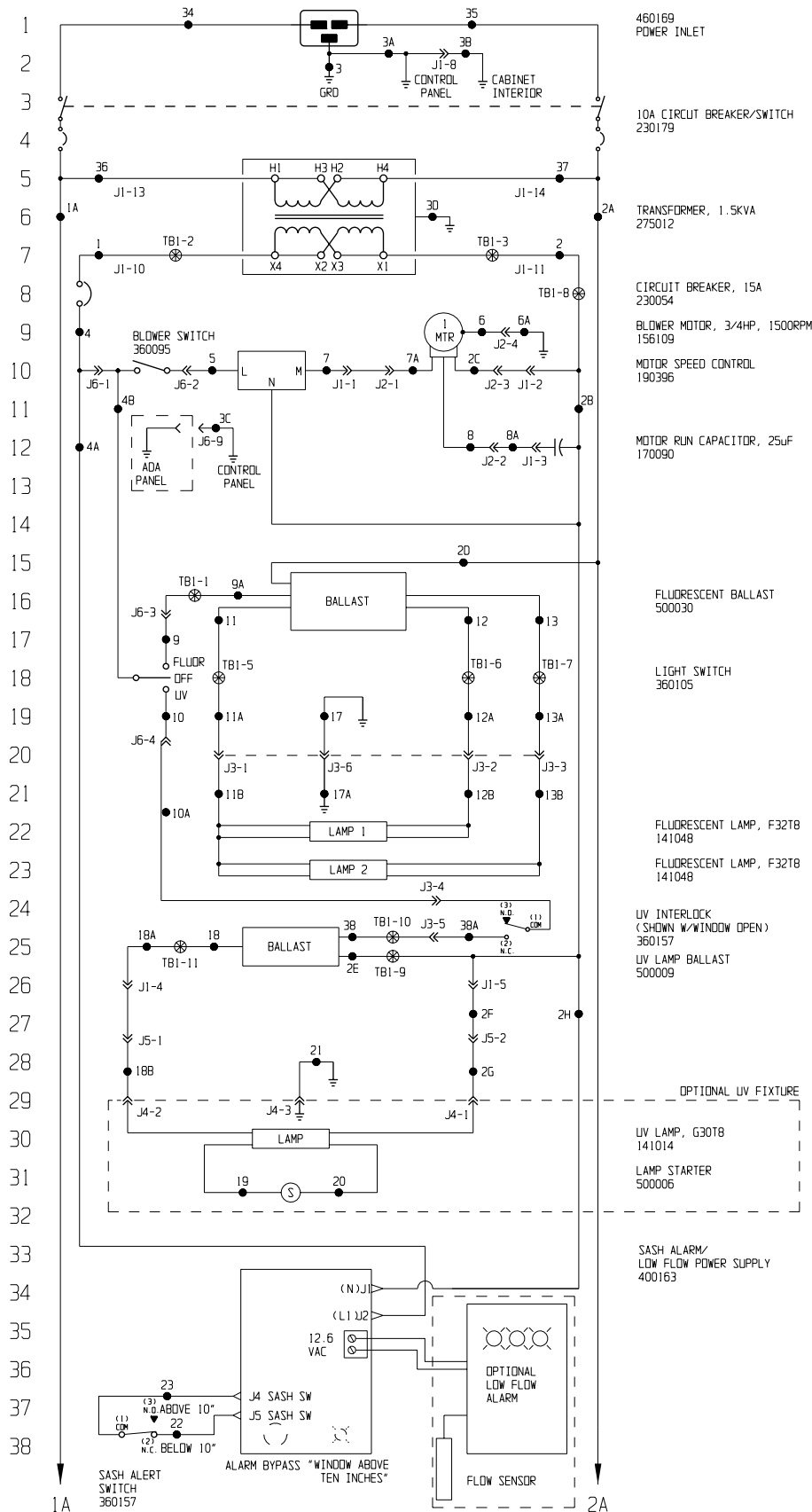


| 0 | HD-1405 | 07-14-03 | RTT | AKS | REL. 6, RELEASED FOR PRODUCTION |
|--|----------|------------|-----|----------------|---------------------------------|
| REV | ECR NO. | DATE | BY | CAD/APPD | DESCRIPTION OF REVISION |
| | 07-14-03 | DWN | RTT | CAD RTT | APPD FCA SCALE NTS |
| CUSTOMER | | | | | |
| JOB TITLE 1286 6FT. BIO-SAFETY CABINET | | | | | |
| DWG TITLE ELECTRICAL SCHEMATIC | | | | | |
| LOCATION | | JOB NUMBER | | DRAWING NUMBER | |
| HOODS | | | | 1286-70-1-0 | |

Electrical Schematic
Model:
1286
Bio-Safety Cabinet

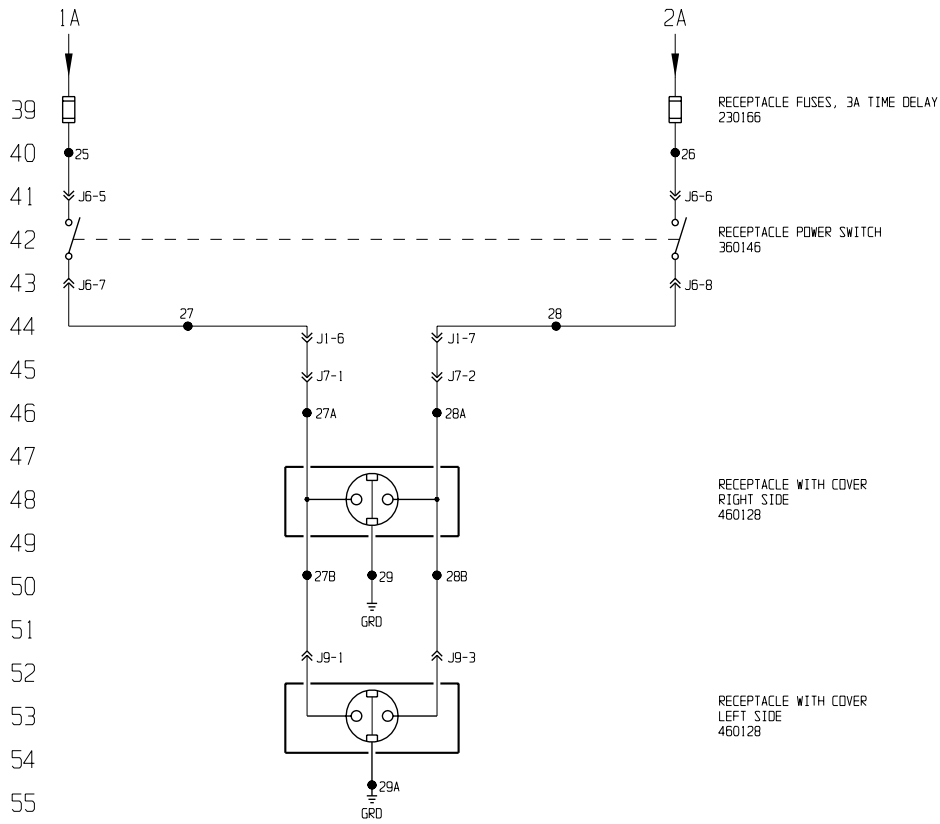
1286-70-1-D Rev. 0
Page 3 of 3

POWER CONNECTION
230 VAC, 1PH, 2W, 50HZ, 5.5FLA (EXCLUDING 2AMP CONVENIENCE RECEPTACLES)



Electrical Schematic
Model:
1287
Bio-Safety Cabinet

1287-70-1-D Rev. 0
Page 1 of 3



| |
|--|
| Electrical Schematic Model: 1287 Bio-Safety Cabinet |
| 1287-70-1-D Rev. 0 Page 2 of 3 |

WIRE REFERENCE CHART

| | WIRE NO. | GAUGE | COLOR |
|-----|----------|-------|--------------|
| 77 | | | |
| 78 | 1 | 12 | BLACK |
| | 1A | 16 | BROWN |
| | 2 | 12 | WHITE |
| 79 | 2A | 16 | BLUE |
| | 2B | 16 | WHITE |
| | 2C | 18 | WHITE |
| 80 | 2D | 18 | WHITE |
| | 2E | 18 | WHITE |
| | 2F | 16 | GRAY |
| 81 | 2G | 18 | WHITE |
| | 2H | 20 | WHITE |
| | 2I | N/A | N/A |
| 82 | 3 | 14 | GREEN/YELLOW |
| | 3A | 16 | GREEN/YELLOW |
| 83 | 3B | 16 | GREEN/YELLOW |
| | 3C | 16 | GREEN/YELLOW |
| | 3D | 16 | GREEN/YELLOW |
| 84 | 4 | 14 | BROWN |
| | 4A | 20 | BROWN |
| | 4B | 16 | BROWN |
| 85 | 4C | N/A | N/A |
| | 5 | 16 | BLUE |
| | 6 | 18 | GREEN |
| | 6A | 16 | GREEN |
| | 7 | 16 | BLACK |
| 87 | 7A | 18 | BLACK |
| | 8 | 18 | BROWN |
| | 8A | 16 | BROWN |
| 88 | 9 | 16 | PURPLE |
| | 9A | 18 | BLACK |
| 89 | 10 | 16 | ORANGE |
| | 11 | 18 | RED |
| | 11A | 20 | RED |
| 90 | 11B | 18 | RED |
| | 12 | 18 | BLUE |
| | 12A | 20 | BLUE |
| | 12B | 18 | BROWN |
| 91 | 13 | 18 | BLUE |
| | 13A | 20 | BLACK |
| | 13B | 18 | BLACK |
| | 17 | 16 | GREEN |
| 93 | 17A | 18 | ORANGE |
| | 18 | 18 | BLUE |
| | 18A | 16 | BLUE |
| | 18B | 18 | BLACK |
| | 19 | 18 | BLACK |
| | 20 | 18 | BLACK |
| | 21 | 18 | GREEN |
| | 22 | 18 | RED |
| 96 | 22A | N/A | N/A |
| | 23 | 20 | RED |
| | 24 | N/A | N/A |
| 97 | 25 | 16 | YELLOW |
| | 26 | 16 | GRAY |
| | 27 | 16 | ORANGE |
| | 27A | 18 | ORANGE |
| | 27B | 18 | BLACK |
| 99 | 28 | 16 | RED |
| | 28A | 18 | RED |
| | 28B | 18 | WHITE |
| 100 | 29 | 18 | GREEN |
| | 29A | 18 | GREEN |
| 101 | 30 | N/A | N/A |
| | 31 | N/A | N/A |
| | 32 | N/A | N/A |
| 102 | 33 | N/A | N/A |
| | 34 | 12 | BROWN |
| | 35 | 12 | BLUE |
| | 36 | 12 | BROWN |
| 103 | 37 | 12 | BLUE |
| | 38 | 18 | BLACK |
| 104 | 38A | 16 | YELLOW |
| 105 | | | |
| 106 | | | |
| 107 | | | |

| NOTES: | | |
|---------------|-----------------------------------|-----------------------------|
| ⊗ | Denotes Terminal Strip Connection | Parts List Reference Number |
| | ○ | Assembly |
| 11 | Last Terminal Number | ○ Panel |
| 3B | Last Wire Number | ○ Refrigeration |
| CONNECTOR | FUNCTION | LOCATION |
| J1 (9 POS.) | CABINET PASS-THRU CONN. | CONTROL PANEL (TOP REAR) |
| J2 (5 POS.) | BLOWER MOTOR | CAB. TOP HOUSING (INTERIOR) |
| J3 (9 POS.) | FLUORESCENT LIGHTING | CONTROL PANEL (INTERIOR) |
| J4 (4 POS.) | UV LAMP RECEPTACLE | WORK CHAMBER (RIGHT SIDE) |
| J5 (2 POS.) | UV RECEPTACLE CONN. | CAB. TOP HOUSING (INTERIOR) |
| J6 (9 POS.) | SWITCH PANEL CONNECTIONS | CONTROL PANEL (INTERIOR) |
| J7 (2 POS.) | RIGHT RECEPTACLE CORD | CAB. TOP HOUSING (INTERIOR) |
| J9 (3 POS.) | LEFT RECEPTACLE CORD | CAB. TOP HOUSING (INTERIOR) |
| TB1 (11 POS.) | BALLAST CONNECTIONS | CONTROL PANEL |

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| 0 | HD-1405 | 07-14-03 | RTT | RTT | AKS | REL. 6, RELEASED FOR PRODUCTION |
|--|---------|------------|-----|----------------|---------|---------------------------------|
| REV | ECR NO. | DATE | BY | CAD | APPO | DESCRIPTION OF REVISION |
| | | 07-14-03 | DWN | RTT | CAD RTT | APPO FCA SCALE NTS |
| CUSTOMER | | | | | | |
| JOB TITLE 1287 6FT. BIO-SAFETY CABINET - 230V/50HZ | | | | | | |
| DWG TITLE ELECTRICAL SCHEMATIC | | | | | | |
| LOCATION | | JOB NUMBER | | DRAWING NUMBER | | |
| HOODS | | | | 1287-70-1-D | | |

Electrical Schematic
 Model:
 1287
 Bio-Safety Cabinet

1287-70-1-D Rev. 0
 Page 3 of 3

THERMO ELECTRON CORPORATION LAMINAR FLOW EQUIPMENT WARRANTY USA

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

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

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any component or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo postage paid and replacement parts are shipped FOB destination.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages to lost profits or loss of products.

Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation and preventive maintenance.

If equipment service is required, please call your Technical Services Department at 1-888-213-1790 (USA and Canada) or 1-740-373-4763. We're ready to answer your questions on equipment warranty, operation, maintenance, service, and special applications. Outside the USA, contract your local distributor for warranty information.

Rev. 3 4/03



THERMO ELECTRON CORPORATION LAMINAR FLOW EQUIPMENT WARRANTY INTERNATIONAL

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

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

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any component or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo postage paid and replacement parts are shipped FOB destination.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages to lost profits or loss of products.

Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation and preventive maintenance.

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