

Forma Scientific, Inc.
P.O. Box 649
Marietta, Ohio 45750
U.S.A.

Telephone: (740) 373-4763
Telefax: (740) 373-4189

Models:

1122/ 1124 and 1125

Biological Safety Cabinets Class II, Type A/B₃

Manual No: 7001122

Rev. 1

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.








**Refer to the serial tag on the
rear cover of this manual**



The material in this manual is for information purposes only. The contents and the product it describes are subject to change without notice. Forma Scientific Inc. makes no representations or warranties with respect to this manual. In no event shall Forma Scientific Inc. be held liable for any damages, direct or incidental, arising out of or related to the use of this manual.

MANUAL NO. 7001122			
-	14814	5/13/96	Added safety warnings about UV lights heg
1	HD-962	11/28/95	Change power cord to 430201 heg
0		9/15/94	Original Manual
REV	ECN	DATE	DESCRIPTION

General Safety Notes used in this Manual

	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. Potential eye damage may result from viewing 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.

TABLE OF CONTENTS

SECTION 1 - RECEIVING

- 1.1 Preliminary Inspection
- 1.2 Visible Loss or Damage
- 1.3 Responsibility for Shipping Damage

SECTION 2 - INTRODUCTION

- 2.1 Description

SECTION 3 - INSTALLATION

- 3.1. Location
- 3.2. Leveling
- 3.3 Installing the (optional) Duplex Outlet
- 3.4 Power Connection
- 3.5 Plumbing Connection
- 3.6 Exhaust Requirements
 - a. Direct Room Exhaust
 - b. External Exhaust System (Type II, B₃)
 - c. Duct Connection
 - d. Exhaust Transitions (Optional from Forma Scientific)
 - e. Nominal Exhaust Requirements
- 3.6. Exhaust System Connections
 - a. Canopy Connection
 - b. Airtight Connection

SECTION 4 - CABINET START-UP

- 4.1 General Recommendations
- 4.2 Use of Auxiliary Equipment in the Cabinet
- 4.3 Cabinet Check
- 4.4 Start-up Procedure
- 4.5 Cabinet Shut-down

SECTION 5 - OPERATION

- 5.1 Blower Switch
- 5.2 Light Switch
- 5.3 Ultra-Violet Light (optional)
- 5.4 Static Pressure Gauge
- 5.5 Reset Button
- 5.6 Receptacle Reset Button
- 5.7 Electrical Outlet
- 5.8 Drain Valve
- 5.9 Service Petcocks
- 5.10 Exhaust Filter Guard
- 5.11 Sliding Window Alarm

SECTION 6 - CERTIFICATION TESTING PROCEDURES

- 6.1 Certification of the Cabinet

SECTION 7 - ROUTINE MAINTENANCE

- 7.1 Checking the Static Pressure Gauge "Zero"
- 7.2 Replacing the Pre-Filter

SECTION 8 - SERVICE

- 8.1 Replacing the Exhaust HEPA Filter
- 8.2 Replacing the Supply HEPA Filter
- 8.3 Adjusting the Damper
- 8.4 Replacing the Blower and/or Motor
- 8.5 Replacing the Blower Speed Control
- 8.6 Blower Speed Control
- 8.7 Measuring the Blower Motor Voltage

SECTION 9 - TROUBLESHOOTING

- 9.1 Troubleshooting Guide

SECTION 10 - SPECIFICATIONS

SECTION 11 - PARTS LIST AND ACCESSORIES

SECTION 12 - SCHEMATICS

SECTION 13 - WARRANTY INFORMATION

SECTION 14 - CERTIFIERS

SECTION 1 - RECEIVING

1.1 Preliminary Inspection

This item was thoroughly inspected and carefully packed prior to shipment and all necessary precautions were taken to ensure safe arrival of the merchandise at its destination. Immediately upon receipt, before the unit is moved from the receiving area, carefully examine the shipment for loss or damage. Unpack the shipment and inspect both interior and exterior for any in-transit damage.

1.2 Visible Loss or Damage

If any loss or damage is discovered, note any discrepancies on the delivery receipt. Failure to adequately describe such evidence of loss or damage may result in the carrier refusing to honor a damage claim. Immediately call the delivering carrier and request that their representative perform an inspection. Do not discard any of the packing material or move the shipment from the receiving area.

1.3 Responsibility for Shipping Damage

For products shipped F.O.B. Marietta, Ohio, the responsibility of Forma Scientific, Inc. ends when the merchandise is loaded onto the carrier's vehicle.

On F.O.B. Destination shipments, Forma Scientific's and the carrier's responsibility ends when your Receiving Department personnel sign a free and clear delivery receipt.

Whenever possible, Forma Scientific, Inc. will assist in settling claims for loss or in-transit damage.

SECTION 2 - INTRODUCTION

2.1 Description

The Forma Scientific Model 1122/1124 Biological Safety Cabinet is listed by NSF International as a Class II Type A/B₃ Biological Safety Cabinet meeting all of the requirements of NSF Standard 49. The units are also approved by CSA. The cabinet provides protection for both personnel and product.

SECTION 3 - INSTALLATION

3.1 Location

Locate the cabinet on a level surface in an area of minimum temperature change. The cabinet should be placed away from personnel traffic, air-conditioning or heating ductwork and/or laboratory windows and doors. Proper cabinet location is essential as drafts can disrupt critical air flow characteristics and allow room contaminants to *enter* or *escape* the cabinet work area.

If space permits, fourteen inches should be clear on each side of the cabinet for maintenance and for best cabinet performance. A twelve inch space should also exist from the top of the cabinet to the ceiling.

3.2 Leveling

Place a bubble-type level on the work surface, and check to see if the cabinet is level. Adjust the leveling feet until the cabinet is level and the most comfortable working height is achieved.

3.3 Installing the (optional) Duplex Outlet

Note: The duplex outlet must be installed by a qualified electrician.

Power is supplied to the receptacle by a separate line cord. Refer to electrical schematic for further information.

1. Remove the cover plate from the outlet mounting on the right side of the work area.
2. Connect the wiring to the receptacle and mount the outlet. (Refer to electrical schematic for wiring configuration.)

3.4 Power Connection

This cabinet is equipped with two power cords: one for the cabinet blower motor and the other for the duplex utility outlets. For efficiency and product safety, it is recommended that the cords be plugged into separate circuits. Refer to the Specification Section of this manual or to the electrical data plate mounted on the unit.

3.5 Plumbing Connection

Petcocks are piped within the cabinet and connected to 3/8"-FPT couplings in the inner side walls. Access to internal couplings is through plugged access holes in the cabinet's side panels.



It is recommended that flammable gas not be used in the cabinet. If flammable gasses are used, external shut-off valves should be easily accessible. Observe all labels pertaining to restrictions and operating pressures.

3.6 Exhaust Requirements

a. Direct Room Exhaust

When directing exhaust air into the room, adequate space must be provided between the cabinet and the ceiling to allow discharged air to flow freely.

1. Remove the cardboard cover plate from the top of the unit.
2. Remove the screws and washers (located on top of unit, installed at factory) that will secure the exhaust filter grille.
3. Install the exhaust filter grille with the downward slope toward the front of the unit. (See Figure 3-2.)

b. External Exhaust System (for cabinets configured Type II, B₃ only)

Type II, B₃ Cabinets must be connected to a dedicated exhaust system. The exhaust system should be prepared before moving the cabinet to its location.



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

c. Duct Connection

8" Diameter

d. Exhaust Transitions (Optional from Forma Scientific)

Without Damper	Order Number
3' Thimble	191177
3' Airtight	191314
With Damper	Order Number
3' Thimble	191305
3' Airtight	191317

e. Nominal Exhaust Requirements:

Model 1122: 260-280 CFM

Model 1124: 220-245 CFM

Class II, Type A/B₃, biological safety cabinets can be attached to an exhaust system in one of two ways: a canopy connection or a direct, gas-tight connection. Canopy connection with a damper is recommended. The system must have adequate, but not excessive, static pressure for proper and safe operation of the cabinet.

3.7 Exhaust System Connections

a. Canopy Connection

The May 1992 revision of NSF Standard 49* recommends the canopy connection as the hookup of choice. The duct transition canopy piece hangs over the exhaust filter housing, overlapping it by one inch. The benefit of this system is that exhaust fluctuations are buffered by room air and have less effect on the unit's performance.

* NSF Standard 49, Annex E, Section I.b.1

When a canopy is used, the opening at the canopy should be checked with a smoke stick to insure that internal air turbulence does not cause outward air flow. The building exhaust system should be sized to exhaust 30% more air than the cabinet exhausts, the balance to be made up with room air. This will help to insure proper cabinet air balance at the front access opening and thus adequate containment.

b. Airtight Connection

The airtight connection is made using a steel transition duct that attaches directly to the exhaust filter housing. This type of connection allows a smaller volume of room to be exhausted and therefore saves energy. A possible disadvantage to the airtight connection is that any fluctuation in the building exhaust system may disrupt the air barrier at the cabinet window. The system should have interlocking safety devices and safeguards against an exhaust failure.

SECTION 4 - CABINET START-UP

4.1 General Recommendations

1. Keep the activity in the room to a minimum when the cabinet is in use.
2. Keep all laboratory doors closed to prevent drafts that will disturb critical air flow characteristics.
3. Pre-plan cabinet use, and place everything required for the complete procedure in the cabinet so that nothing passes through the air barrier (in or out) during the procedure.
4. Segregate clean and dirty materials.
5. Do not place anything on the intake or exhaust grills.
6. It is recommended that the operator wear long sleeves and surgical gloves when working in the cabinet.
7. Practice good aseptic technique to insure safe use of the cabinet.
8. Cover discarded pipettes before removing them from the cabinet.
9. If a spill occurs, clean it up immediately. Decontaminate the work area and all affected equipment. Discard items that cannot be decontaminated such as work pads, swabs, etc.

4.2 Use of Auxiliary Equipment in the Cabinet

The use of auxiliary equipment in the cabinet is acceptable only if the proper precautions are taken. Any appliance used in the work area may cause turbulence and disturb air flow. Use of such equipment should be carefully managed, preferably placed at the rear of the work space where air turbulence will have a minimal effect.

4.3 Cabinet Check

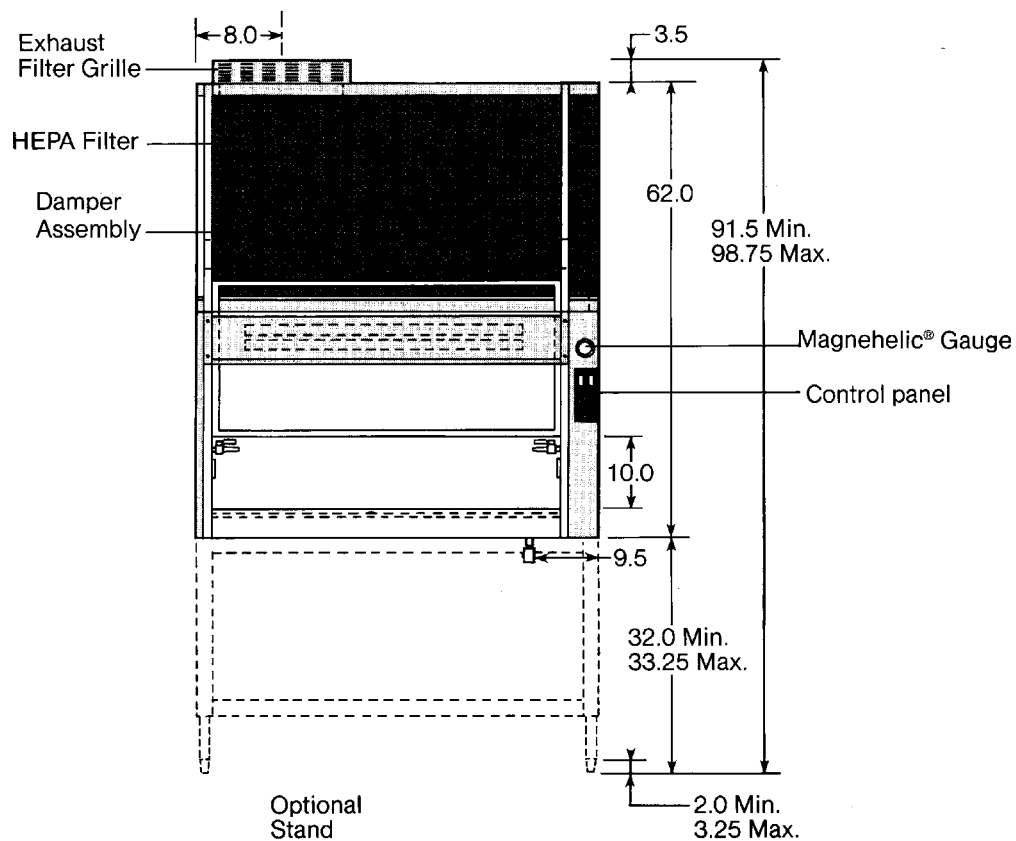
1. Verify that the Drain Valve is closed. If a spill should occur on the work surface it will remain in the plenum tub and not drain onto the floor.
2. Verify that the Service Petcocks are closed.
3. Check the supply and exhaust filters for leaks.

4.4 Start-Up Procedure

1. Turn ON the lights.
2. Check the intake and exhaust grills to ensure that they are not blocked.
3. Turn on the blower to purge the work area of contaminated air.
4. Wash hands and lower arms with germicidal detergent.
5. Disinfect the entire work area.
6. Place everything needed in the cabinet.
 - a. Do not block the intake or exhaust grills.
 - b. Place everything at least 4" (10.2 cm) inside the work area.
 - c. Segregate clean and contaminated items.
7. Position the height of the viewing window at 10".

4.5 Cabinet Shutdown

1. Surface decontaminate with the appropriate disinfectant and enclose all equipment that has been in direct contact with the research agent.
2. Cover trays of discarded pipettes and glassware.
3. Allow the cabinet to run for at least thirty minutes with no activity to allow time for all airborne contaminants to be purged from the work area.
4. Remove all equipment.
5. Clean all interior surfaces with an appropriate disinfectant.
6. If the drain system has been used, thoroughly flush it with a disinfectant solution and rinse with water.



**Model 1122/1124 Biological Safety Cabinet
(Front View)
Figure 4-1**

SECTION 5 - OPERATION

5.1 Blower Switch

Before operating the cabinet it is recommended that the user(s) become familiar with the following items on the cabinet.

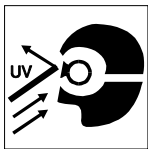
- The blower switch controls the on/off power to the blower.

5.2 Light Switch

The light switch controls power to the fluorescent lamps in the work area or the optional ultra-violet lamp.

5.3 Ultra-Violet Light (optional)

Cabinets may be equipped with an ultra-violet germicidal light as optional equipment. These lamps lose their effectiveness over a period of time and should be replaced (approximately every six months) when intensity drops below the optimum level.



Warning. On cabinets equipped with ultra violet lights, the lights must be turned off when working in the unit. Skin and/or eye damage may result from viewing the light produced by these ultra violet sources.

5.4 Static Pressure Gauge (In. W.G.)

The static pressure gauge, located above the control panel, measures the air pressure differential across the filters, providing an indication of filter "loading". As the filters become dirty, the resistance to air passage increases, and the reading on the static pressure gauge increases accordingly. When the reading increases by 50%, check the cabinet airflow with a thermoanemometer. The filters should be replaced if they are shown to be inefficient due to loading.

Note: The static pressure gauge should not be used as a direct measure of air flow.

5.5 Reset Button

The Reset Button is an in-line circuit breaker. If an overload condition occurs the circuit breaker trips, and the button protrudes from the panel. Depress the button to reset the circuit breaker.

5.6 Receptacle Reset Button (15 amp)

The Receptacle Reset Button is an in-line circuit breaker for the receptacle(s) only. If an overload condition occurs the circuit breaker trips, and the button protrudes from the panel. Depress the button to reset the circuit breaker.

5.7 Electrical Outlet

A single 115 Volt receptacle is located on the left side wall of the work station.

5.8 Drain Valve

The drain valve, located on the right front side of the cabinet, provides for the safe drainage of the drain pan in the event of a major spill. This valve should always remain closed while work is being performed in the cabinet.



If an accidental spill occurs, immediately consult a biological safety officer or other qualified individual for proper procedures. To insure proper containment of a spill, connect a sealed hose from the valve to a sealed container.

5.9 Service Petcocks

Two petcock valves are standard with each cabinet. These valves are located on the right and left side of the work station and are coded with the type of service that they supply.

5.10 Exhaust Filter Guard

The exhaust filter guard, located on top of the exhaust filter, prevents the storage of objects on the housing and helps protect exhaust air flow.

5.11 Sliding Window Alarm (Model 1124)

The cabinet's sliding window permits auxiliary equipment and research implements to be placed into the work area. When the cabinet is in use, the window must not be raised more than ten inches. If the window is raised higher, the air barrier at the front of the cabinet will be weakened and containment will be impaired. When this occurs, an audible alarm will sound, signaling the unsafe condition.

WARNING:

Do not disconnect, disable or silence the audible window alarm. The alarm is intended to draw attention to an unsafe operating condition and is installed for the operator's protection.

Caution: Any blockage of the cabinet's perforated grille disrupts airflow, causes increased turbulence and may promote cross-contamination within the cabinet.

SECTION 6 - CERTIFICATION TESTING PROCEDURES

Certification Companies

A list of certification companies is included with this manual.

6.1 Certification of the Cabinet

a. On-Site Certification:

Due to the stress of shipping and handling and the fragile nature of the HEPA filters, the cabinet must be thoroughly tested once it has been placed in its final location. The following tests should be performed*:

1. Tests directly related to containment (personnel and environmental protection) and product protection:
 - a. HEPA Filter Leak Test (DOP Test)
 - b. Downflow Velocity Profile Test

The downflow velocity grid is defined as: Perimeter points are 6 inches in from the work area sidewalls with successive points spaced 5.81 inches apart side-to-side thereafter; perimeter points are 6 inches in from the work area rear wall with successive points spaced 4.50 inches apart rear-to-front thereafter. This grid provides 4 lateral rows of points, 9 points to a row for a total of 36 points.

- c. Face Velocity Air Flow Test

The face velocity may be determined by using a direct reading instrument or by using an alternate thermoanemometer method. The inflow velocity grid used in the alternate thermoanemometer method, 4 inches above the exhaust filter as specified by the manufacturer, is defined as: Perimeter points are 3.83 inches in from the inside edge of the exhaust filter frame with successive points spaced 3.83 inches apart side-to-side thereafter; perimeter points are 3.75 inches in from the inside edge of the exhaust filter frame with successive points spaced 3.75 inches apart rear-to-front thereafter. This grid provides 5 lateral rows of points, 8 points to a row, for a total of 40 points. The exhaust velocity was determined with the cabinet exhausting directly to the room.

- d. Airflow Smoke Patterns
- e. Cabinet Leak Test

2. Tests related to worker comfort and safety:

- a. Electrical Leakage, Ground Circuit Resistance and Polarity Tests
- b. Lighting Intensity
- c. Vibration
- d. Noise Level

*Ref. Annex F, NSF International Standard, NSF 49-1992

These tests must be performed by qualified service specialists who are familiar with the methods and procedures of certifying biological safety cabinets. The certification should be performed upon installation, annually thereafter, after filter changes and after cabinet relocation.

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

SECTION 7 - ROUTINE MAINTENANCE

7.1 Checking the Static Pressure Gauge "Zero"

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

Upon initial start-up or after the HEPA filter has been replaced, the static pressure gauge should read (or be set to) zero when the cabinet is not operating. When the cabinet is restarted and proper air flow balance has been achieved, the gauge reading should be recorded. This reading will serve as a base line of subsequent filter loading. If the reading increases by approximately 50%, the air flow balance should be checked again.

SECTION 8 - SERVICE



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

Caution: Service to the unit must be performed by qualified personnel. The cabinet should then be certified.

8.1 Replacing the Exhaust HEPA Filter



De-energize all potential sources of energy to this unit and lockout/tagout their controls. (O.S.H.A. Regulation, Section 1910-147.)

Access to the exhaust HEPA filter is through the Front Access Panel on the exhaust housing at the top of the cabinet. (Refer to Figure 3-1.)

1. Remove the aluminum frame that supports the viewing window.
2. Remove the cap nuts that secure the front panel.
3. Remove the front access panel.
4. Loosen and remove the front filter clamps.

5. Loosen the rear filter clamps.
6. Pull the filter out and place it in a heat-sealable polyethylene bag for disposal.
7. With a vacuum cleaner, clean the filter seat, the exhaust filter guard and the flange.
8. Slide the new filter in place and verify that it is properly seated on the flange.
9. Replace the filter clamps, and tighten them alternately a few threads at a time to insure an even seal around the filter. Do not over tighten.
10. After filter replacement the cabinet should be certified.

8.2 Replacing the Supply HEPA Filter



De-energize all potential sources of energy to this unit and lockout/tagout their controls. (O.S.H.A. Regulation, Section 1910-147.)

Access to the exhaust HEPA filter is through the Front Access Panel on the exhaust housing at the top of the cabinet. (Refer to Figure 3-1.)

1. Remove the cap nuts and washers that secure the supply filter access panel in place and remove the panel.
2. Remove the filter clamps, pull the filter out and place it in a heat-sealable polyethylene bag for disposal.
3. With a vacuum cleaner, vacuum the diffuser plate, the filter seat, all accessible parts above the filter seat and the flange.
4. Slide the replacement filter in place and verify that it is properly seated on the flange.
5. Replace the filter clamps and alternately tighten them to insure an even seal around the gasket. Do not over tighten.
6. After filter replacement, the cabinet should be certified.

8.3 Adjusting the Damper

Since the HEPA filter resistance may vary considerably 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 damper regulates the exhaust air to maintain the proper intake and exhaust velocities. The damper is set at the factory and should not be adjusted unless the proper velocities cannot be attained.

1. The damper adjustment is located in the left front of the cabinet.
2. Remove the Damper Adjustment Access Cap with a flat blade screwdriver. (Figure 3-1.)
3. Using the flat blade screwdriver, turn the adjustment counterclockwise to close the damper and decrease the exhaust or turn the adjustment clockwise to open the damper and increase the exhaust.

8.4 Replacing the Blower and/or Motor



De-energize all potential sources of energy to this unit and lockout/tagout their controls. (O.S.H.A. Regulation, Section 1910-147.)

Access to the blower is through the access panel at the top of the cabinet.

1. Remove the aluminum frame that supports the viewing window.
2. Remove the cap nuts and washers that secure the Blower Housing Access Panel to the cabinet, and remove the panel. (Refer to Figure 3-1.)
3. Loosen the set bolt on the blower hub from inside the left side of the scroll.
4. Remove the three bolts and washers securing the motor to the scroll on the right side of the blower assembly.
5. Disconnect the wiring, making note of the wiring configuration.
6. Remove the blower motor, and replace it with the new motor. Align the blower wheel, and tighten.

7. Connect the wiring in the same configuration as the old blower motor.
8. Replace the blower housing access panel on the front of the cabinet, and tighten all nuts.
9. After replacement of the blower/motor, the cabinet should be certified.

8.5 Replacing the Blower Speed Control



De-energize all potential sources of energy to this unit and lockout/tagout their controls. (O.S.H.A. Regulation, Section 1910-147.)

The blower speed control may be replaced without decontaminating the cabinet.

1. Remove the two screws that secure the control panel.
2. Pull out the control panel, and locate the blower speed control on the right side of the control box.
3. Disconnect the wiring to the control, and make note of the wiring configuration.
4. Remove the speed control from the inside of the control box.
5. Install the new blower speed control by reversing the above procedure.

Note: After replacing the blower speed control, the cabinet must be certified.

8.6 Blower Speed Control

Note: The blower speed is set at the factory and should only be changed by a qualified technician.

The blower speed control is a variable resistor located on the printed circuit board inside the cabinet behind the blower power switches. (Figure 8-1) The control is used to adjust the air velocity from the blower motor. Adjust the blower speed as follows:

1. Remove the two slot head screws from the blower control section of the control panel.
2. Slide the blower control panel outward a few inches until about half of the printed circuit board is visible. (It is of drawer-type design and will slide easily. Connector wires prevent it from being removed completely.)
3. Locate the blower speed control adjustment pot on the circuit board per the illustration in Figure 8-1.
4. Adjust the speed by rotating the screw on top of the resistor. Turning the screw clockwise increases the air velocity, turning the screw counter-clockwise decreases the air velocity.

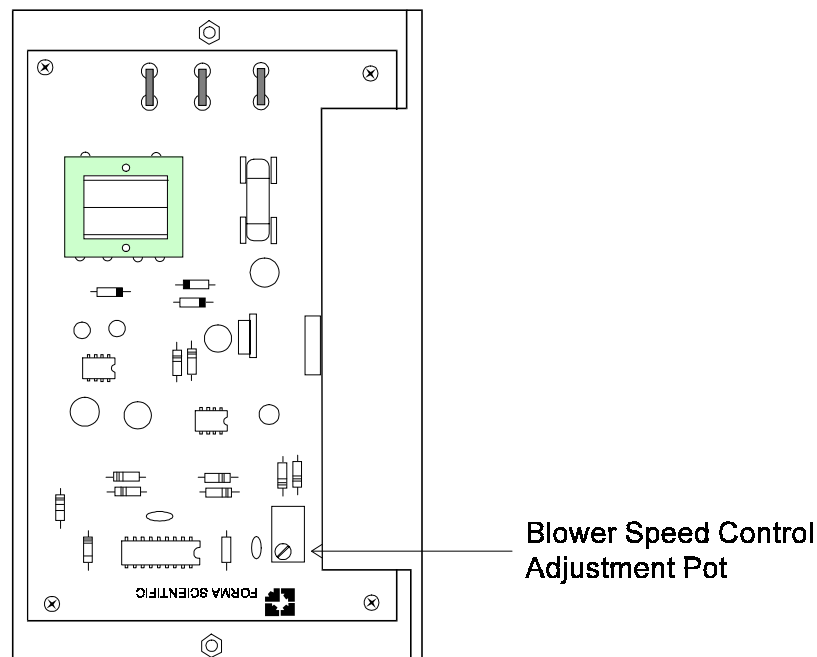


Figure 8-1
Component locations on the printed circuit control board

Warning:

Live voltage is present on the control terminals of the switches and dials on the front of the blower panel. Use extreme care to avoid touching these controls when reaching into the drawer and making any adjustments.

8.7 Measuring the 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 8-2.

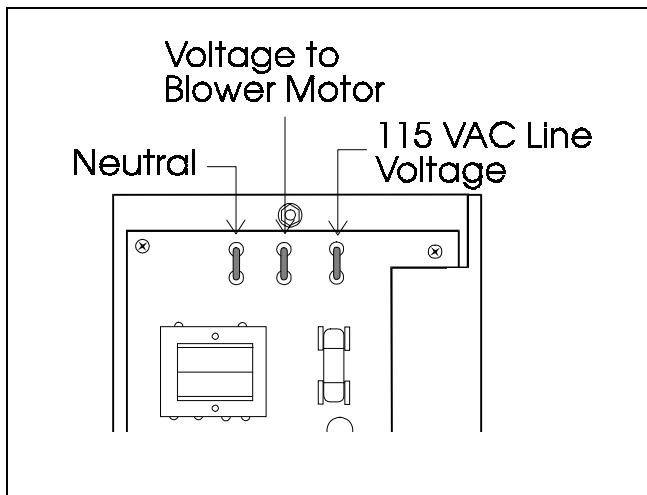


Figure 8-2
Circuit board voltage terminals

SECTION 9 - TROUBLESHOOTING

9.1 Troubleshooting Guide

The following is a guide to troubleshooting the safety cabinet system.



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

Problem: Air flow in the cabinet work area and through the exhaust filter is inadequate.

Possible Causes:

1. Exhaust filter is blocked by laboratory materials or the protective shipping cover.
2. If the biological safety cabinet is connected to an exhaust system, inadequate exhaust may exist. The system must then be balanced to handle the correct air volume. Consult with building maintenance engineers.
3. Low electrical voltage to the blower motor.
4. Blower motor or speed control is defective.
5. If the static pressure gauge reading has increased approximately 50% from its initial readings, the filter has likely loaded with dirt and the speed control must be adjusted. If proper airflow cannot be reached by adjusting the speed control, decontaminate the cabinet and replace all HEPA filters.

Problem: Ultra violet light does not work.

Possible Causes:

1. Verify that the lamp is properly installed into the fixture.
2. Starter for U/V light defective. Locate starter on far right side of U/V light and remove by twisting counter-clockwise. Replace starter.

Problem: Fluorescent light does not work.

Possible Causes:

1. Verify that the lamp is properly installed into the fixture.

Problem: Static pressure gauge does not work.

Possible Causes:

1. Verify that the hose is tightly attached to a high pressure port of the gauge and to the cabinet (front top right of the service box). If properly tightened, the static pressure gauge is likely defective and should be replaced.

Problem: Loud screeching noise

Possible Causes:

1. Bad bearings in the motor blower unit.
2. Blower scroll rubbing against housing.

SECTION 10 - SPECIFICATIONS

Models	Work Area Dimensions	Exterior Dimensions	Electrical (115V, 60HZ)	Shipping Wt.
1122, 3' Bench (Hinged)	34.50"W x 26.50"H x 25" F-B (87.6cm x 67.3cm x 63.5cm)	42"W x 65.50"H x 33.38" F-B (106.7cm x 166.4cm x 84.8cm)	7.6 FLA	650 lbs. (295 Kg)
1124, 3' Bench (Sliding)	34.50"W x 26.50"H x 25" F-B (87.6cm x 67.3cm x 63.5cm)	42"W x 65.50"H x 33.38" F-B (106.7cm x 166.4cm x 84.8cm)	7.6 FLA	650 lbs. (295 Kg)

SECTION 11 - PARTS LIST AND ACCESSORIES

11.1 Parts (Model 1122/1124, 3-foot)

Stock #	Description
105015	Glass, Clear Laminated, Safety
156044	Motor, 1/2 HP
170024	Capacitor, Motor
430201	Power cord, 12-foot
285812	Plug 15A, 120V Hospital Grade
500017	Ballast, Fluorescent Lamp
225328	Ballast, UV Lamp
500006	Starter, UV Lamp
141026	Lamp, Fluorescent, (F30T12/CW/HO)
141027	Lamp, UV, (G30T8)
104008	Gauge, Static pressure, 0-2" WR
191242	Actuator, Sliding Window Switch (Model 1124)
360106	Switch, Micro-Door Warning (Model 1124)
129009	Spring, Pneumatic, 35 lb. (Model 1122)
285758	Outlet, Duplex, 3 W, 15A
760090	Supply Filter, HEPA, 12x24x11-1/2
760056	Exhaust Filter, HEPA, 24x36x6
249013	Index Button, "AIR", Orange
249014	Index Button, "VAC", Air
249016	Index Button, "GAS", Blue
249017	Index Button, "NITROGEN"
190396	Motor Speed Control

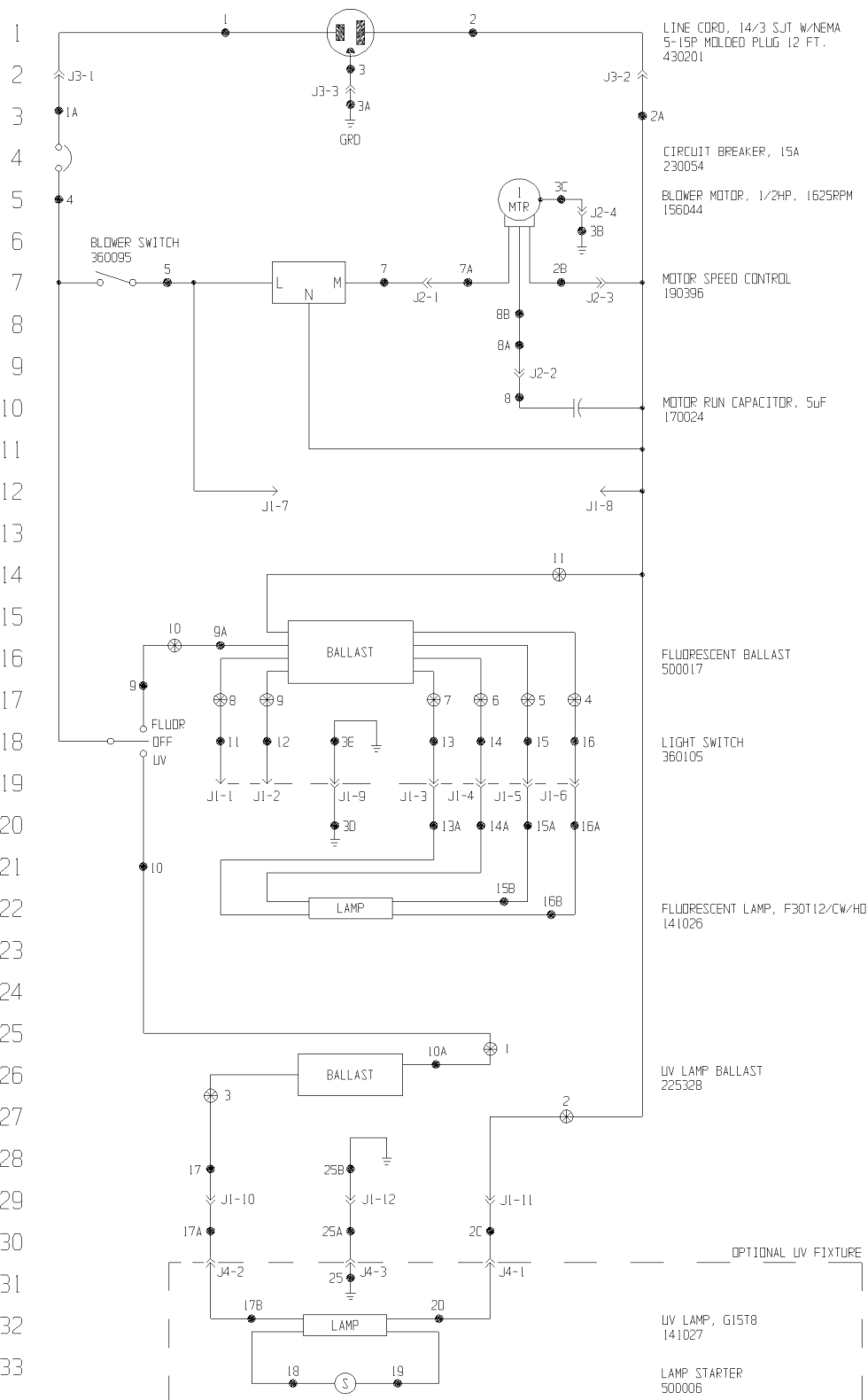
11.2 Accessories (Model 1122/1124, 3-foot)

Stock #	Description
191275	Service Valve Kit
191140	Extra Port (Side Wall Mounted)
191418	UV Light, 30 watt
191069	UV Light, 30 watt, Portable
191056	Ground Fault, Duplex Outlet*
191574	IV Rod, 3-foot
191388	30" Modular Stand, 3-foot
191168	Airflow Alarm
191389	36" Modular Stand, 3-foot
191416	Locking Caster for Modular Stand

* Factory Installed. Specify when ordering. All other items are customer installed.

POWER CONNECTION

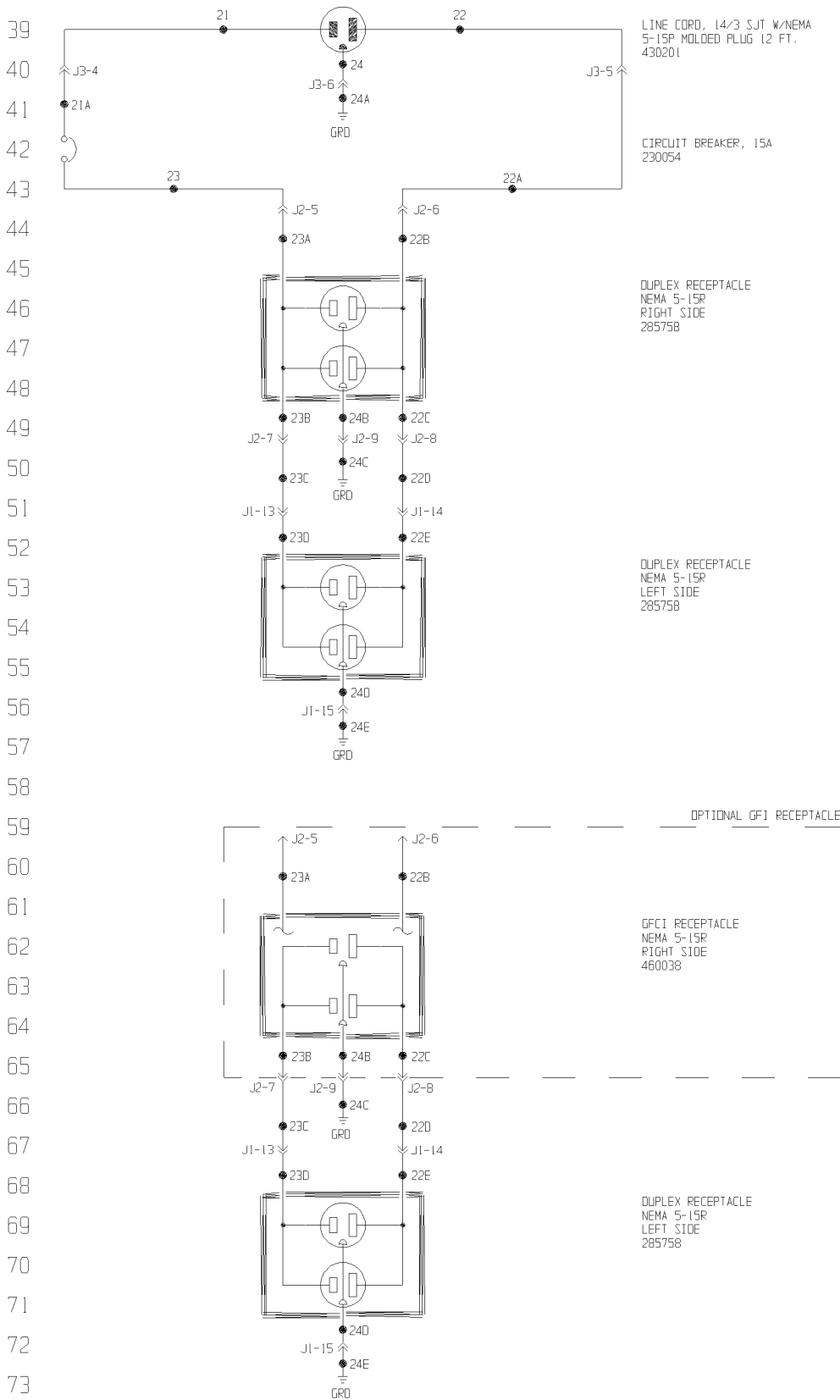
115 VAC, 1PH, 2W, 60HZ, 7.5FLA



Electrical Schematic
Forma Model:
1122
Bio-Safety Cabinet

POWER CONNECTION - STANDARD DUPLEX RECEPTACLES


115 VAC NOMINAL, 60HZ, 12FLA MAX.



WIRE REFERENCE CHART

	WIRE NO.	GAUGE	COLOR
77			
78	1	14	BLACK
	1A	16	BLACK
79	2	14	WHITE
	2A	14	WHITE
80	2B	14	WHITE
	2C	18	WHITE
81	2D	18	WHITE
	3	14	GREEN
82	3A	16	GREEN
	3B	16	GREEN
	3C	14	GREEN
83	3D	18	GREEN
	3E	16	GREEN
84	4	16	BROWN
	5	16	BLACK
85	6	NOT USED	
	7	16	RED
86	7A	14	BLACK
	8	16	BROWN
87	8A	14	RED
	8B	14	BROWN
88	9	20	PURPLE
	9A	20	BLACK
89	10	20	ORANGE
	10A	20	BLACK
90	11	20	YELLOW
	12	20	YELLOW
	13	20	BLUE
91	13A	18	BLUE
	14	20	BLUE
92	14A	18	PURPLE
	15	20	RED
93	15A	18	RED
	15B	18	RED
94	16	20	RED
	16A	18	BROWN
95	16B	18	RED
	17	20	BLACK
96	17A	18	BLACK
	17B	18	BLACK
97	18	18	BLACK
	19	18	BLACK
98	20	NOT USED	
	21	14	BLACK
99	21A	16	BLACK
	22	14	WHITE
	22A	16	WHITE
100	22B	14	WHITE
	22C	14	ORANGE
101	22D	16	WHITE
	22E	14	WHITE
102	23	16	BROWN
	23A	14	BLACK
103	23B	14	RED
	23C	16	RED
104	23D	14	BLACK
	24	14	GREEN
105	24A	16	GREEN
	24B	14	GREEN
	24C	16	GREEN
106	24D	14	GREEN
	24E	16	GREEN
107	25	18	GREEN
	25A	18	GREEN
	25B	20	GREEN

NOTES:		CUSTOMER APPROVAL/REFERENCE		7	HD-962	11-14-95	JAS	KDG		CHG. LINE CORD & PLU
⊕ Denotes Terminal Strip Connection	Parts List Reference Number	APPROVED BY		6	HD-719	4-29-94	JAS	JAS	LDN	REVISED SPEED CONTROL
N/A Last Relay Number	○ Assembly	DATE OF APPROVAL		5	HD-606	2-19-93	JAS	JAS	LDN	CHG. MOTOR, GEN. UPDATES
11 Last Terminal Number	◇ Panel	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 FORMA SCIENTIFIC								
25 Last Wire Number	○ Refrigeration	REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION		
	□ Wiring	DATE	12-13-85	DWN	GLM	CAD	MLF	APPD	LDN	SCALE NTS
		CUSTOMER								
		JOB TITLE 1122 3FT. BENCH TOP BIO-SAFETY CABINET								
		DWG TITLE ELECTRICAL SCHEMATIC								
		LOCATION			JOB NUMBER		DRAWING NUMBER			
		H000S01					1122-70-0-D			



Forma Scientific

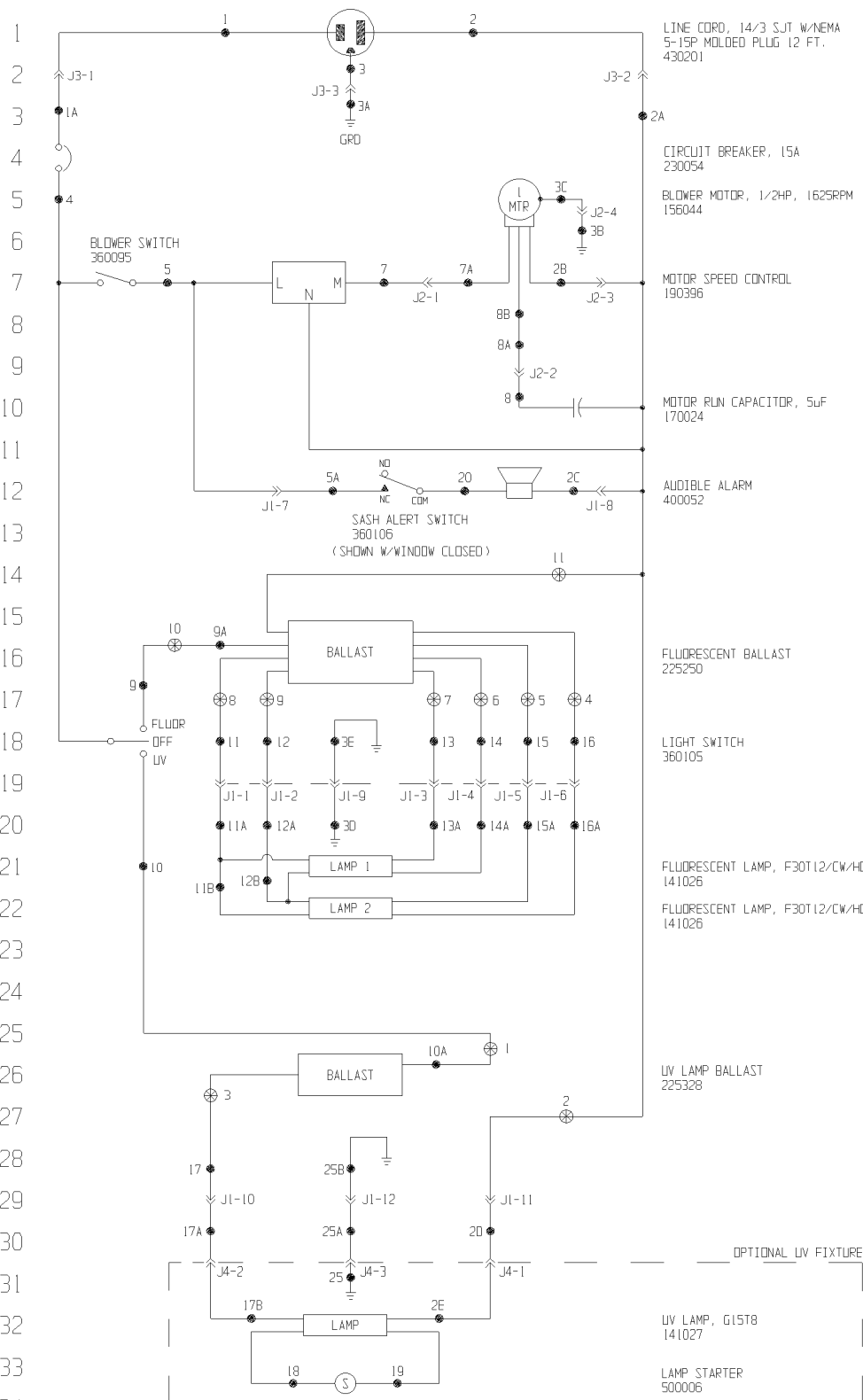
BOX 649 MARJETTA, OHIO 45750 TELE 24-5384
TOLL FREE USA 800-949-3080, (410) 614-373-4763

Electrical Schematic
Forma Model:
1122
Bio-Safety Cabinet

1122-70-0-D Rev. 7
Page 3 of 3

POWER CONNECTION

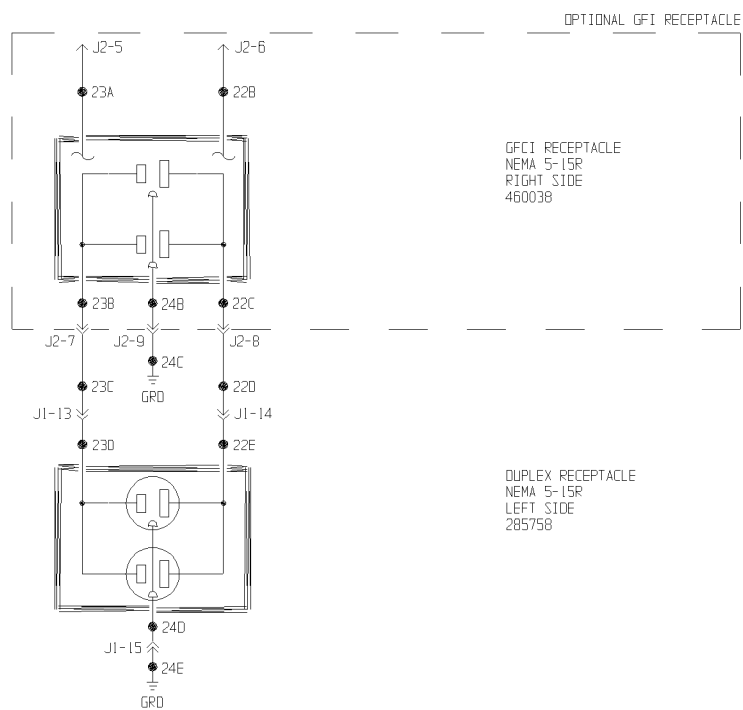
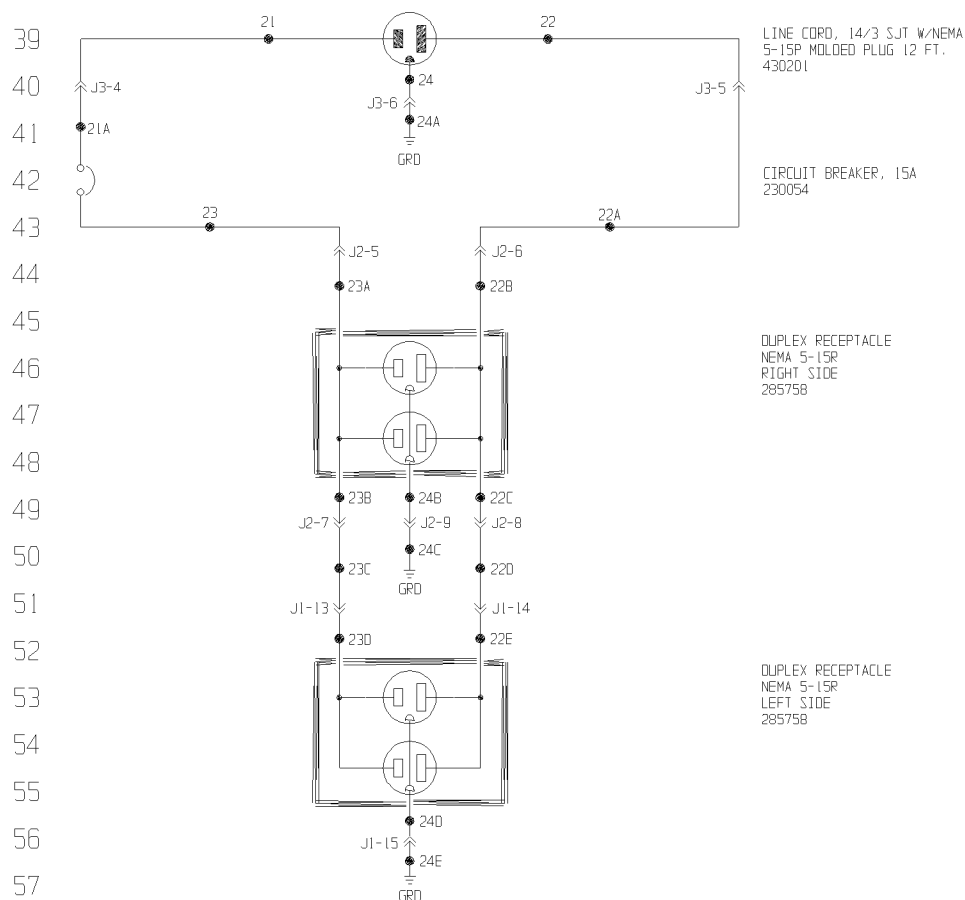
115 VAC, 1PH, 2W, 60HZ, 7.5FLA



Electrical Schematic
Forma Model:
1124
Bio-Safety Cabinet

1124-70-0-D Rev. 6
Page 1 of 3


POWER CONNECTION - STANDARD DUPLEX RECEPTACLES 115 VAC NOMINAL, 60HZ, 12FLA MAX.



WIRE REFERENCE CHART

	WIRE NO.	GAUGE	COLOR
77			
78	1	14	BLACK
	1A	16	BLACK
79	2	14	WHITE
	2A	14	WHITE
80	2B	14	WHITE
	2C	18	WHITE
81	2D	18	WHITE
	2E	18	WHITE
82	3	14	GREEN
	3A	16	GREEN
	3B	16	GREEN
83	3C	14	GREEN
	3D	18	GREEN
	3E	16	GREEN
84	4	16	BROWN
85	5	16	BLACK
	5A	18	BLACK
86	6	NOT USED	
	7	16	RED
	7A	14	BLACK
87	8	16	BROWN
	8A	14	RED
88	8B	14	BROWN
	9	20	PURPLE
89	9A	20	BLACK
	10	20	ORANGE
90	10A	20	BLACK
	11	20	YELLOW
	11A	18	YELLOW
91	11B	18	YELLOW
	12	20	YELLOW
92	12A	18	ORANGE
	12B	18	YELLOW
93	13	20	BLUE
	13A	18	BLUE
	14	20	BLUE
94	14A	18	PURPLE
	15	20	RED
95	15A	18	RED
	16	20	RED
96	16A	18	BROWN
	17	20	BLACK
97	17A	18	BLACK
	17B	18	BLACK
98	18	18	BLACK
	19	18	BLACK
99	20	18	BLACK
	21	14	BLACK
	21A	16	BLACK
100	22	14	WHITE
	22A	16	WHITE
101	22B	14	WHITE
	22C	14	ORANGE
102	22D	16	WHITE
	22E	14	WHITE
103	23	16	BROWN
	23A	14	BLACK
	23B	14	RED
104	23C	16	RED
	23D	14	BLACK
105	24	14	GREEN
	24A	16	GREEN
106	24B	14	GREEN
	24C	16	GREEN
	24D	14	GREEN
107	24E	16	GREEN
	25	18	GREEN
	25A	18	GREEN
	25B	20	GREEN

NOTES:		CUSTOMER APPROVAL/REFERENCE		6	HD-962	11-14-95	JAS	KDG		CHG. LINE CORD & PLUG
⊕ Denotes Terminal Strip Connection	Parts List Reference Number	APPROVED BY		5	HD-719	4-29-94	JAS	JAS	LD	REVISED SPEED CONTROL
N/A Lost Relay Number	○ Assembly	DATE OF APPROVAL		4	HD-606	2-19-93	JAS	JAS	LDN	CHG. MOTOR, GEN. UPDATES
11 Lost Terminal Number	◇ Panel	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 FORMA SCIENTIFIC								
25 Lost Wire Number	○ Refrigeration									
	□ Wiring									
				REV	ECR NO.	DATE	BY	CAD APPD	DESCRIPTION OF REVISION	
				DATE	12-13-85	DWN	GLM	CAD MLF	APPD LDN	SCALE NTS
				CUSTOMER						
				JOB TITLE 1124 3FT. BENCH TOP BIO-SAFETY CABINET						
				DWG TITLE ELECTRICAL SCHEMATIC						
				LOCATION		JOB NUMBER		DRAWING NUMBER		
				HOODS01				1124-70-0-D		



Forma Scientific

BOX 643 MAPLETTA, OHIO 45750 TELEX 24-5384
TOLL FREE USA 800-848-3080, OHIO 614-373-4763

Electrical Schematic

Forma Model:

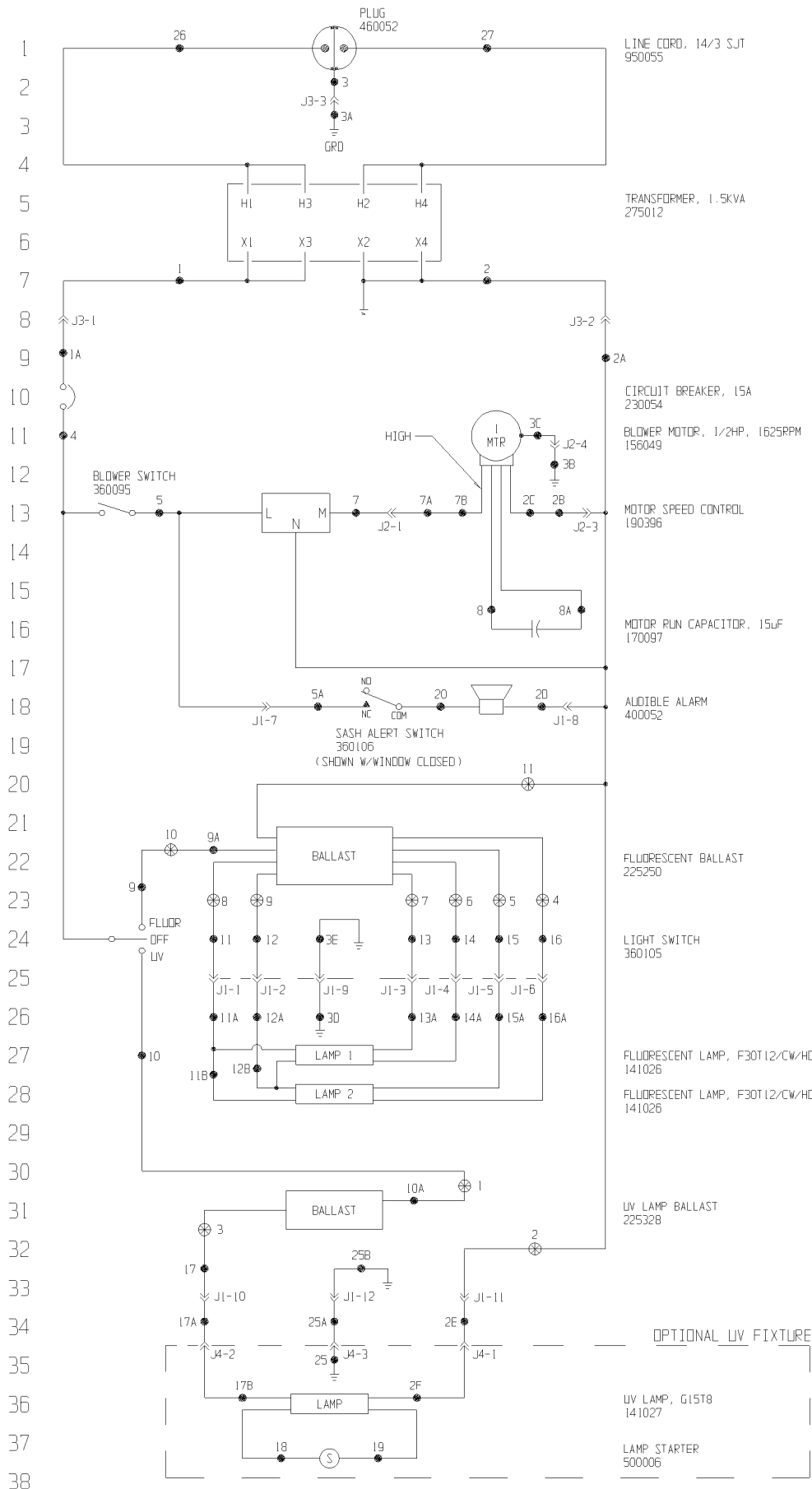
1124

Bio-Safety Cabinet

1124-70-0-D Rev. 6

Page 3 of 3

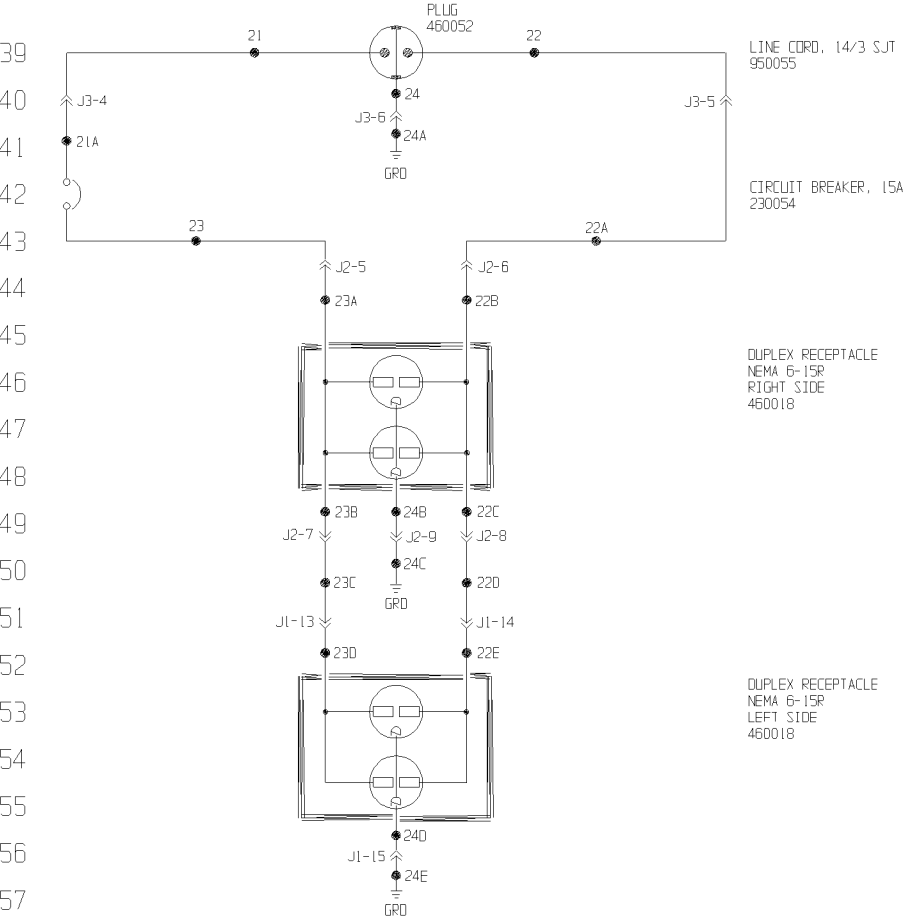
POWER CONNECTION 220 VAC, 1PH, 2W, 50HZ, 6FLA




Electrical Schematic
Forma Model:
1125
Bio-Safety Cabinet

1125-70-0-D Rev. 3
Page 1 of 3

POWER CONNECTION
220 VAC NOMINAL, 50HZ, 12FLA MAX.



WIRE NO.	GAUGE	COLOR
1	14	BLACK
1A	16	BLACK
2	14	WHITE
2A	14	WHITE
2B	14	WHITE
2C	16	WHITE
2E	18	WHITE
2E	18	WHITE
2F	18	WHITE
3	14	GREEN/YELLOW
3A	16	GREEN
3B	16	GREEN
3C	14	GREEN
3D	18	GREEN
3E	16	GREEN
4	16	BROWN
5	16	BLACK
5A	18	BLACK
6	NOT USED	
7	16	RED
7A	14	BLACK
7B	16	BLACK
8	16	BROWN
8A	16	BROWN/WHITE
9	20	PURPLE
9A	20	BLACK
10	20	ORANGE
10A	20	BLACK
11	20	YELLOW
11A	18	YELLOW
11B	18	YELLOW
12	20	YELLOW
12A	18	ORANGE
12B	18	YELLOW
13	20	BLUE
13A	18	BLUE
14	20	BLUE
14A	18	PURPLE
15	20	RED
15A	18	RED
16	20	RED
16A	18	BROWN
17	20	BLACK
17A	18	BLACK
17B	18	BLACK
18	18	BLACK
19	18	BLACK
20	18	BLACK
21	14	BROWN
21A	16	BLACK
22	14	BLUE
22A	16	WHITE
22B	14	WHITE
22C	14	ORANGE
22D	16	WHITE
22E	14	WHITE
23	16	BROWN
23A	14	BLACK
23B	14	RED
23C	16	RED
23D	14	BLACK
24	14	GREEN/YELLOW
24A	16	GREEN
24B	14	GREEN
24C	16	GREEN
24D	14	GREEN
24E	16	GREEN
25	18	GREEN
25A	18	GREEN
25B	20	GREEN
26	14	BLUE
27	14	BROWN

NOTES:			CUSTOMER APPROVAL/REFERENCE									<div>Electrical Schematic</div> <div>Forma Model:</div> <div>1125</div> <div>Bio-Safety Cabinet</div> <div>1125-70-0-D Rev. 3</div> <div>Page 3 of 3</div>					
⊕	Denotes Terminal Strip Connection	Parts List Reference Number	APPROVED BY _____														
N/A	Last Relay Number	○ Assembly	APPROVING FIRM _____														
11	Last Terminal Number	○ Panel	DATE OF APPROVAL _____			3			HD-719 5-6-94 JAS JAS REVISED SPEED CONTROL								
27	Last Wire Number	○ Refrigeration	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 FORMA SCIENTIFIC			2			HD-597 11-14-91 JAS JAS LON CHG. CAP. FROM 170039								
		□ Wiring				1			HD-559 11-14-91 JAS JAS LON UV LIGHT/RECEPT. UPDATE								
						REV			ECR NO. DATE BY CAD APPD DESCRIPTION OF REVISION								
			<div></div> <div>Forma Scientific</div> <div>BOX 649 MARJETTA, OHIO 45750 TELE 24-5294</div> <div>TOLL FREE USA 800-849-3088, OHIO 614-375-4763</div>			DATE 1-24-90			OWN	MLF	CAD		MLF	APPD	LON	SCALE	NTS
						CUSTOMER											
						JOB TITLE		1125 3FT. BENCH TOP BIO-SAFETY CABINET									
						DWG TITLE		ELECTRICAL SCHEMATIC									
						LOCATION		JOB NUMBER			DRAWING NUMBER						
			H000S01					1125-70-0-D									