



Fisher Scientific

Isotemp

Laboratory CO₂ Incubators

Installation and Operation Manual

7003530 Rev. 3

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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.

Models covered in this manual:

- 3530 115V T/C Sensor
- 3531 115V IR Sensor

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

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MANUAL NUMBER 7003530

3	25248/IN3945	6/09/09	Updated drawer specs-sliding and stationary	ccs
2	25303/IN-3902	2/17/09	UL decom warning pg 1-4	ccs
1	24975	10/31/08	Updated water specs on page 1-6	ccs
0	--	9/28/06	Original	ccs
REV	ECR/ECN	DATE	DESCRIPTION	By



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



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



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



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

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

Do You Need Information or Assistance on Fisher Scientific Incubators?

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

1-800-438-4851

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Fisher Scientific, Toll Free, US

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Fisher Scientific Product Service Support at Thermo Forma can supply technical information about proper setup, operation or troubleshooting of your equipment. We can fill your needs for replacement parts or provide you with on-site service. We can also provide you with a quotation on our Extended Maintenance Program for our products.

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

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

Regardless of your needs, professional service technicians are available by telephone to assist you concerning our products Monday through Friday from 8:00 a.m. to 6:00 p.m. Eastern Time. Please call or fax us at:

1-740-373-4763

1-800-438-4851

1-740-373-4189

service.led.marietta@thermofisher.com

Direct

Toll Free U.S. and Canada

Fax

E-mail

International customers, please contact your local Thermo distributor.

Warranty Notes

Information You Should Know Before Requesting Warranty Service

- **Locate the model and serial numbers.** A serial tag is located on the unit itself.
- For equipment service or maintenance, or with technical or special application inquiries, contact Technical Services at 1-800-438-4851 or 1-740-373-4763 (USA and Canada). Outside the USA, contact your local distributor.

Repairs NOT Covered Under Warranty

- **Calibration of control parameters.** Nominal calibrations are performed at the factory; typically $\pm 1^{\circ}\text{C}$ for temperature, $\pm 1\%$ for gases, and $\pm 5\%$ for humidity. Our service personnel can provide precise calibrations as a billable service at your location. Calibration after a warranty repair is covered under the warranty.
- **Damage resulting from use of improper quality water, chemicals or cleaning agents detrimental to equipment materials.**
- **Service calls for improper installation or operating instructions.** Corrections to any of the following are billable services:
 - 1) electrical service connection
 - 2) tubing connections
 - 3) gas regulators
 - 4) gas tanks
 - 5) unit leveling
 - 6) room ventilation
 - 7) adverse ambient temperature fluctuations
 - 8) any repair external to the unit
- **Damage resulting from accident, alteration, misuse, abuse, fire, flood, acts of God, or improper installation.**
- **Repairs to parts or systems resulting from unauthorized unit modifications.**
- **Any labor costs other than that specified during the parts and labor warranty period, which may include additional warranty on CO₂ sensors, blower motors, water jackets, etc.**

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Section 1 - Installation and Start-up

1.1 Name and Description of Parts

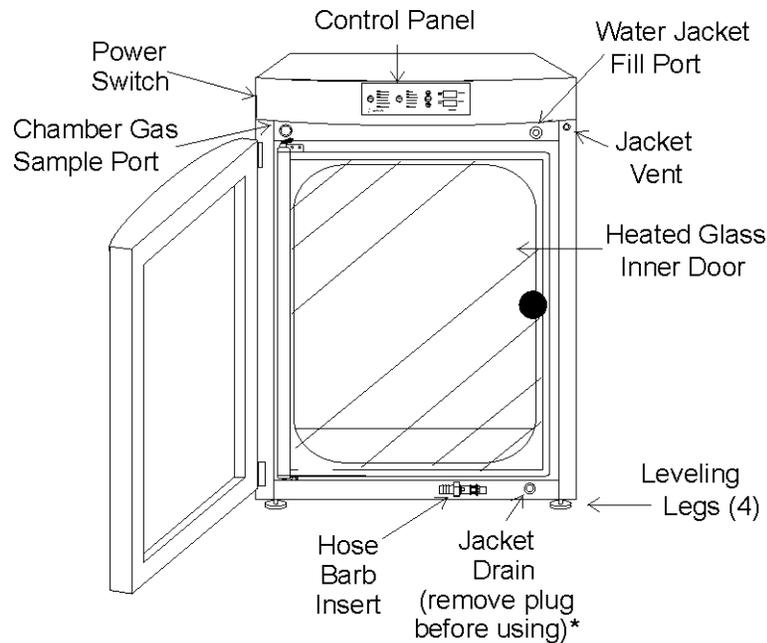


Figure 1-1
Water Jacket Incubator

- Outer Door - Reversible to opposite swing, see Section 4.4
- Heated Inner Door - Keeps chamber interior dry. Reversible to opposite swing, see Section 4.4.
- Chamber Gas Sample Port - Used for sampling chamber CO₂ content, using a Fyrite or similar instrument.
- Main Power Switch
- Control Panel - Keypad, Displays and Indicators. (See Figure 1-2).
- Fill Port - Used for filling the water jacket.
- Water Jacket Vent- Do not cover! Allows air to escape from the water jacket during filling and normal expansion and contraction when the incubator heats or cools.
- Leveling Legs - Used to level the unit.
- Water Jacket Drain – Remove plug and use hose barb insert included. Plug when not in use.

Note: The incubators are stackable. See Section 1.4.

**When setting up the incubator, install the cover plate packed inside the incubator shipping carton.*

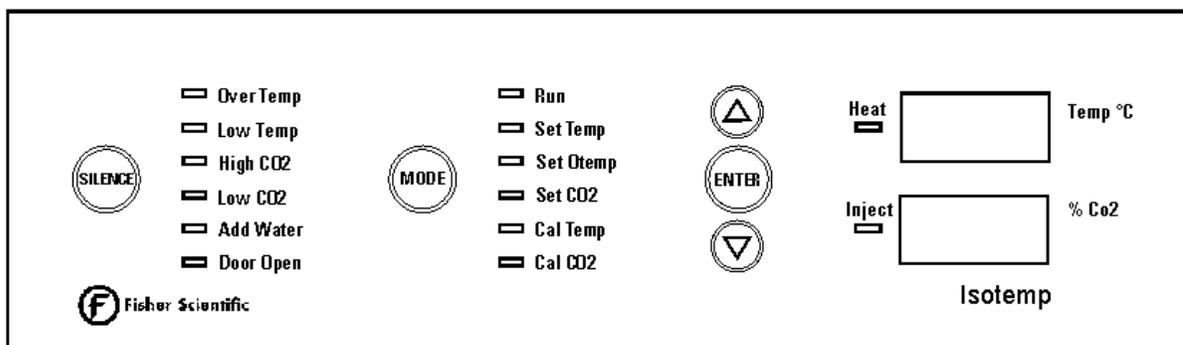


Figure 1-2
Control Panel

1.2 Control Panel Keys, Displays and Indicators

SILENCE - Silences the audible alarm.

Alarm Indicators - Specific indicator flashes during an alarm condition.

MODE Select Switch - Used to select desired mode.

Mode Indicator - Selected mode indicator lights.

Mode Select Indicators-

Run: Normal Operation

Set Temp: Set Temperature Setpoint

Set Otemp: Set Overtemperature Setpoint

Set CO2: Set CO₂ Control Setpoint

Cal Temp: Calibrate Displayed Temperature (Offset)

Cal CO2: Calibrate Displayed CO₂ Value (Offset)

Up and Down Arrows: Increase or decrease parameter values.

ENTER: Saves the value being changed.

Heat Indicator: Lights when power is applied to the heaters.

Inject Indicator: Lights when gas is being injected into the incubator.

Temperature Display: Shows chamber temperature, temperature setpoint or overtemperature setpoint.

CO₂ Display: Shows the percentage of CO₂ in the chamber or CO₂ setpoint.

1.3 Operating the Control Panel

The Isotemp water jacket incubator has six modes, which allow incubator setup. The modes are as follows:

- **Run** is the default mode that the incubator will normally be in during operation.
- **Set Temp** is used to enter system temperature setpoints for incubator operation.
- **Set Otemp** is used to enter system overtemperature setpoints for incubator operation.
- **Set CO₂** is used to enter system CO₂ setpoints for incubator operation.
- **Cal Temp** is used to calibrate displayed chamber temperature.
- **Cal CO₂** is used to calibrate displayed percentage of CO₂ in the chamber.

1.4 Installing the Unit

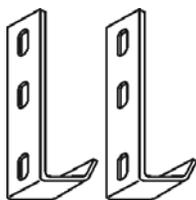
a. Choosing the Location

1. Locate the unit on a firm, level surface capable of supporting the unit's operational weight of 365 lbs. (166kg).
2. Locate away from doors and windows and heating and air conditioning ducts.
3. Allow enough clearance behind the unit for electrical and gas hook-up.

b. Stacking the Incubators



If the units have been in service, disconnect the power cord connector and drain the water jacket of the designated top unit before stacking.



Note: Stacking brackets (shown at left) stacking bolts, washers, and bolts for stacking are included with each unit.

Figure 1-3 Stacking brackets

1. Designate one incubator to be the top unit and the other as the bottom unit. Remove the base cover plate from the top unit using the finger holes in the base or using a slotted screwdriver. (Figure 1-4)

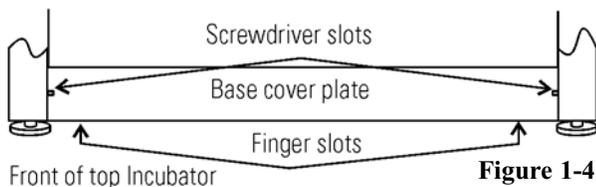
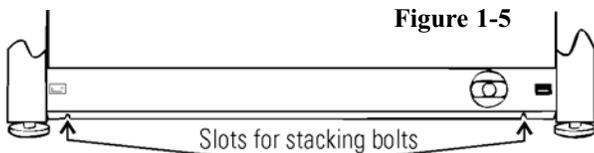


Figure 1-4

2. Note the two slots in the base of the incubator which accommodate the stacking bolts. Refer to Figure 1-5.



Front of top incubator, base cover plate removed

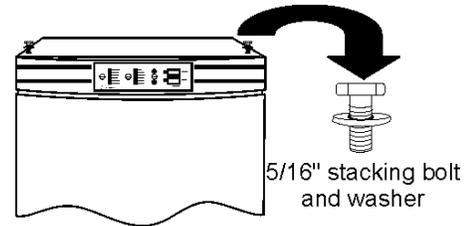


Figure 1-6

3. Remove the two plastic plugs from the bolt holes in the exterior top of the bottom unit. Install the 1/2" long 5/16-18 stacking bolts and washers into the bolt holes - do not tighten the bolts at this time. Refer to Figure 1-6.
4. Unscrew and remove the leveling feet from the top unit and lift it onto the bottom unit, off-setting the base of the top unit approximately 2-3 inches behind the stacking bolts and washers.



This incubator weighs 265 lbs (120kg) before filling. Have sufficient personnel to lift it.

5. Align the sides of the top unit with the bottom unit and slide the top unit forward until the slots in the base of the top unit align with the 5/16"-18 stacking bolts in the exterior top of the bottom unit. Refer to Figure 1-7.

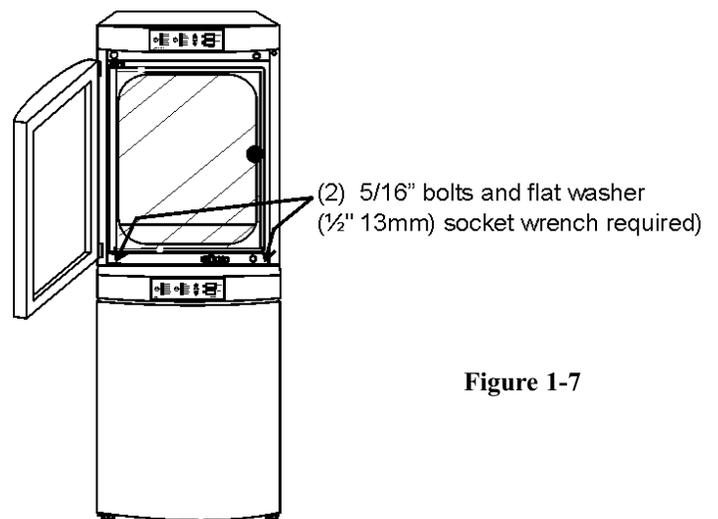
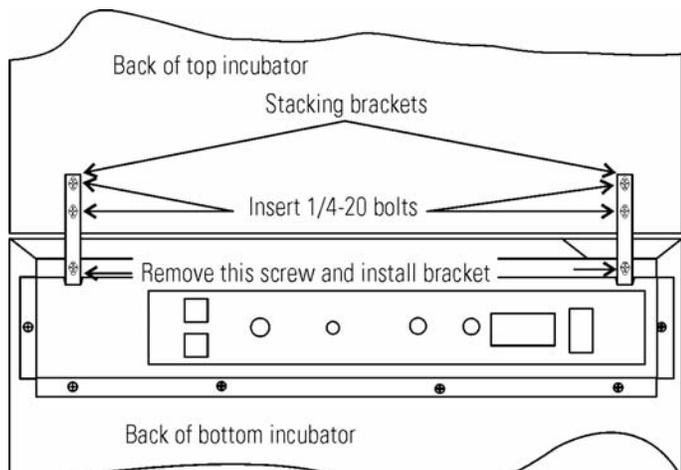


Figure 1-7

- Remove and save the two screws from the back of the control panel on the bottom unit as shown in Figure 1-8.



- Insert the stacking brackets into the slots on the rear of the control panel of the bottom unit (Figure 1-5). Align the slots in the brackets with the mounting holes on the rear of the incubators. Secure the brackets with the screws saved above and the 1/4-20 bolts provided in the stacking kit. A 7/16" wrench or socket will be required for the bolts.
- Secure the base of the top unit to the exterior top of the bottom unit by tightening the 5/16-18 stacking bolts using a 1/2" (13mm) wrench or suitable tool.
- Replace the base cover on the top unit.
- The stacked units are ready to be placed into service.

c. Preliminary Cleaning

- Remove the protective plastic coating on the shelf supports and air duct, if present.
- Using a suitable laboratory disinfectant, clean all interior surfaces including shelves and shelf supports, door gaskets, blower wheel and CO₂ sensor. See Section 5.1.



CAUTION! Before using any cleaning or decontamination method except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment. Accidental spills of hazardous materials on or inside this unit are the responsibility of the user.

d. Installing the Access Port Filter

Locate the opening in the top left corner of the interior chamber. Remove the tape from the opening on the outside of the unit. Locate the stopper with filter in the hardware bag. Install in the opening inside the chamber. See Figure 1-9.

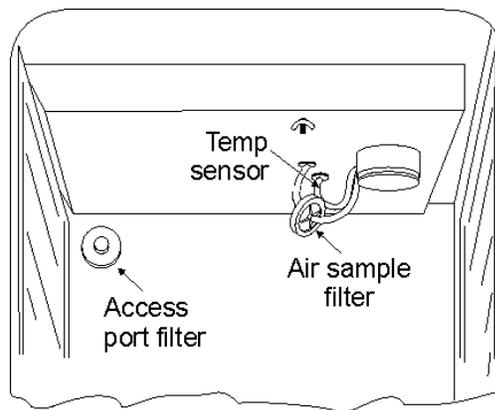


Figure 1-9

e. Installing the Air Sample Filter

- Remove the filter from the shipping bag.
- Separate one section of the tubing from the filter. Install this section to the fitting on the blower plate.
- After installing the top duct, connect the filter assembly to the tubing coming through the top duct.
- Insert the free end of the air sample filter tubing into the larger hole in the back of the blower scroll. See Figure 1-9 for completed configuration.

f. Installing the Shelves

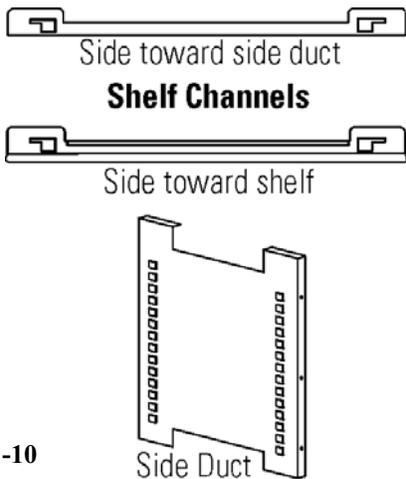


Figure 1-10

1. Install the side ducts with the tabs facing into the center of the chamber with their slots up. There are no right side or left side ducts, simply rotate one of them to fit the opposite side. Tilt the side ducts as they are placed in the chamber so the tops fit into the top air duct, then guide them into the vertical position. Figure 1-10 shows the duct as it would be oriented for the right side of the chamber.
2. Referring to Figure 1-10, note that there is no difference between left and right side shelf channels.
3. Install the shelf channels by placing the channel's rear slot over the appropriate rear tab on the side duct. Pull the shelf channel forward and engage the channel's front slot into the side duct's appropriate forward tab. Refer to Figure 1-11.

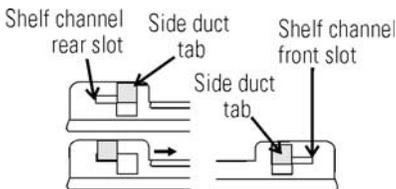


Figure 1-11

4. Figure 1-12 shows one of the channels installed on the right side duct.

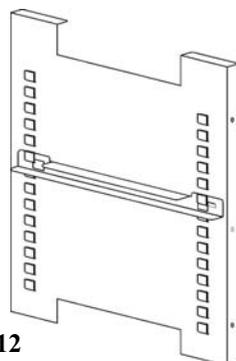


Figure 1-12

g. Leveling the Unit

Check the unit for being level by placing a bubble-style level on one of the shelves. Turn the hex nut on the leveler counterclockwise to lengthen the leg, or clockwise to shorten it. Level the unit front-to-back and left-to-right.

h. Connecting the Unit to Electrical Power

See the serial tag on the side of the unit for electrical specifications, or refer to the electrical schematics included in this manual.



Connect the incubator to a grounded dedicated circuit only.
The power cord connector is the mains disconnect device for the incubator. Position the unit so that it can be easily disconnected.

Plug the provided power cord into the power inlet connector (See Figure 1-13) and into the grounded dedicated circuit.

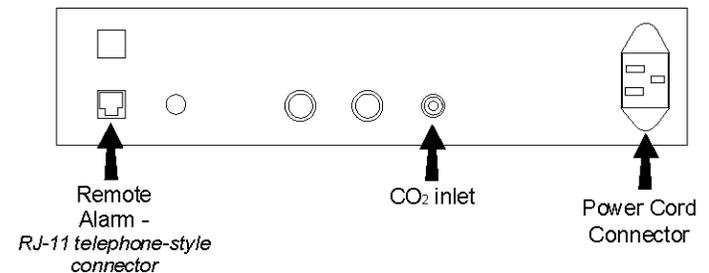


Figure 1-13, Rear Panel View, showing all options

Electrical Specifications: 115V, 50/60Hz, 3.6A, 1 PH, 2W

i. Filling the Water Jacket

Turn the power switch on. ADD WATER will appear in the display. Press the Silence key to silence the alarm.

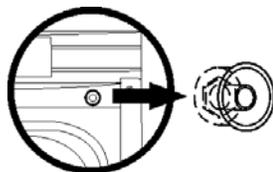
Note: The fill port has a plug that must be removed before filling and replaced after filling is complete.



CAUTION! Chlorine is detrimental to stainless steel. Using chlorinated tap water, or additives that contain chlorine, will void the water-jacket warranty!

Fill the water jacket with 11.7 gallons (43.5 liters) of sterile distilled water. Silicone tubing and a funnel are shipped in the accessory bag with the unit.

For ease of connecting/disconnecting, use the silicone tubing provided to connect directly to the fill port. See Figure 1-1 and this detail. Do not install vinyl tubing directly onto the fill port as it may be difficult to remove. A 3/8" to 3/8" hose connector has been provided to attach lengths of vinyl tubing to the silicone fill port tubing, to reach the distilled water source.



Detail 1

When the jacket is full, the audible alarm sounds a continuous tone for 10 seconds and the alarm condition clears. Refer to Section 4.1, Table of Alarms.

Note: Isotemp incubator is shipped from the factory with a rust inhibitor added to the water inside the unit. *The rust inhibitor must be replenished every 2 years.* See Section 5.9 to drain the water jacket and Section 5.12 for the correct proportion of rust inhibitor to the water.

j. Filling the Humidity Pan

For best operation of the incubator, sterilized distilled, demineralized or de-ionized water should be used in the humidity pan. Water purity should be in the resistance range of 50K to 1M Ohm/cm, or a conductivity range of 20.0 to 1.0 uS/cm. Refer to ASTM Standard D5391-93 or D4195-88 for measuring water purity.

Distillation systems, as well as some types of reverse osmosis water purity systems, can produce water in the quality range specified. Tap water is not recommended as it may contain chlorine, which can deteriorate the stainless steel. Tap water may also have a high mineral content, which would produce a build-up of scale in the pan. High purity or ultra pure water is not recommended as it is an extremely aggressive solvent and will deteriorate the stainless steel. High purity water has a resistance of above 1M to 18M Ohm. Even high purity water can contain bacteria and organic contaminants.

Water should always be sterilized or treated with a decontaminant, safe for use with stainless steel as well as safe for the product, prior to being introduced into the humidity pan.



CAUTION! Distilled or de-ionized water used in the humidity reservoir must be within a water quality resistance range of 50K to 1M Ohm/cm to protect and prolong the life of the stainless steel. Use of water outside the specified range will decrease the operating life of the unit and void warranty.

Fill the humidity pan to within 1/2 inch of the top with sterile, distilled water. Place the pan directly on the incubator floor to ensure optimum humidity and temperature response.

For applications requiring higher humidity conditions, the pan should be placed against the left side wall of the incubator. The ductwork has been modified for this purpose. Also, the CO₂ sample port may be capped to assist in achieving greater RH. In some ambients, this may cause condensation to form in the chamber.

Check the level and change the water frequently to avoid contamination. Do not allow the water level to fluctuate significantly. "Dry-outs" will have an adverse effect on the humidity level, as well as CO₂ calibration.

k. Connecting the CO₂ Gas Supply



High concentrations of CO₂ gas can cause asphyxiation! OSHA Standards specify that employee exposure to carbon dioxide in any eight-hour shift of a 40-hour work week shall not exceed the eight-hour time weighted average of 5000 PPM (0.5% CO₂). The short term exposure limit for 15 minutes or less is 30,000 PPM (3% CO₂). Carbon dioxide monitors are recommended for confined areas where concentrations of carbon dioxide gas can accumulate.

The CO₂ gas supply being connected should be industrial grade 99.5% pure and should not contain siphon tubes. Install a two-stage pressure regulator at the cylinder outlet. The high pressure gauge at the tank should have 0-2000 psig range and the low pressure gauge, at the incubator inlet, should have a 0-30 psig range. Input pressure to the incubator must be maintained at 15 psig (103.4 kPa), ±5 psig.

The incubator has a serrated fitting on the back of the cabinet to connect the gas supply. Refer to Figure 1-13. The fitting is labeled CO₂ Inlet. Make sure that the connection is secured with a clamp. Check fitting for leaks.



This incubator is designed to be operated with CO₂ gas only. Connecting a flammable or toxic gas can result in a hazardous condition.

Gases other than CO₂ should not be connected to this equipment. CO₂ gas cylinders have UN1013 labeled on the cylinder and are equipped with a CGA 320 outlet valve. Check the gas cylinder for the proper identification labels. The CO₂ gas supply being connected to the incubator should be industrial grade, 99.5% pure. Do not use CO₂ gas cylinders equipped with siphon tubes. A siphon tube is used to extract liquid CO₂ from the cylinder, which can damage the pressure regulator. Consult with your gas supplier to ensure that the CO₂ cylinder does not contain a siphon tube. Gas cylinders should also be secured to a wall or other stationary object to prevent them from tipping. A two-stage CO₂ pressure regulator is required to be installed on the outlet valve of the gas cylinder. Input pressure to the incubator must be maintained at 15 psig (103.4 kPa), ± 5 psig, for proper performance of the CO₂ control system. (A single stage CO₂ pressure regulator will not maintain 15 psig.

If higher purity CO₂ is desired inside the incubator (greater than 99.5% pure), the pressure regulator should be constructed with a stainless steel diaphragm along with specifying the purity of the CO₂ from the gas supplier. Follow the manufacturer's instructions to ensure proper and safe installation of the pressure regulator on the gas cylinder. Consult your facility safety officer to ensure that the equipment is installed in accordance with the codes and regulations that are applicable in your area.

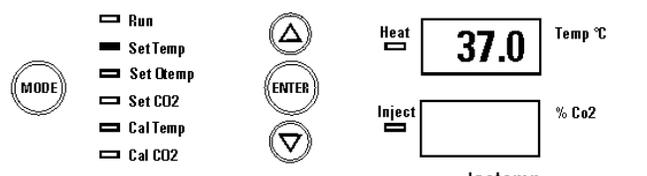
1.5 Incubator Start-Up

Now that the incubator has been properly installed, connected to power, filled with water, humidity pan filled, and connected to gas supply, system setpoints can be entered. The following setpoints can be entered: temperature, over temperature, and CO₂.

a. Setting the Operating Temperature Setpoint

The temperature setpoint range (settable to within 0.1°C) is 10° to 55°C for units with a T/C sensor, and 10° to 50°C for units with an IR sensor. The lowest temperature the incubator can control is +5°C above the ambient temperature at the incubator's location.

This incubator is shipped from the factory with a temperature setpoint of 10°C. At this setting, all heaters are turned off.



To change the temperature setpoint:

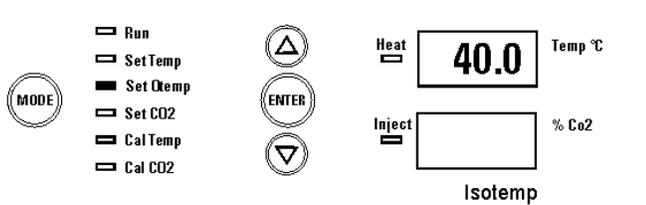
1. Press the Mode key until the Set Temp indicator lights.
2. Press the up/down arrow until the desired temperature setpoint is displayed.
3. Press Enter to save the setpoint.
4. Press the Mode key until the Run Indicator lights to go to Run mode.

b. Setting the Overtemp Setpoint



The overtemp circuit is designed as a safety to protect the incubator only. It is not intended to protect or limit the maximum temperature of the cell cultures or customer's equipment inside the incubator if an overtemp condition occurs.

The factory setting for the Overtemperature setpoint is 40°C. It can be set over a range of temp setpoint +0.5°C to 60°C. If the temperature setpoint is moved above the Overtemp setpoint, the Overtemp will automatically update to 1.0°C + the temp setpoint. It is recommended that the Overtemp setpoint be 1°C over the temp setpoint.

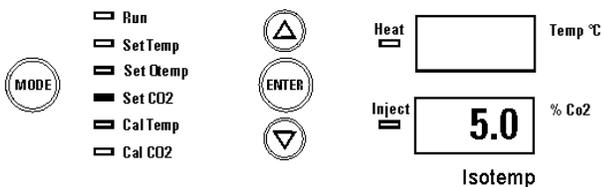


To set the Overtemp setpoint:

1. Press the Mode key until the Set Otemp indicator lights.
2. Press the up/down arrow until the desired Overtemp setpoint is displayed.
3. Press Enter to save the setpoint.
4. Press the Mode key until the Run Indicator lights to go to Run mode.

c. Setting the CO₂ Setpoint

All T/C CO₂ cells are precalibrated at the factory at 37°C, high humidity, and 10% CO₂, settable to within 0.1% CO₂. Therefore, if a temperature setpoint of 37°C has been entered, the humidity pan filled, and the CO₂ control is to run between 0-10% with a T/C CO₂ sensor, the CO₂ setpoint may be entered immediately. Otherwise, it is important to allow the unit 12 hours to stabilize at the temperature setpoint before entering the CO₂ setpoint.



The CO₂ setpoint range is 0.0% to 20.0%. The incubator is shipped from the factory with a CO₂ setpoint of 0.0%. At this setting, all CO₂ control and alarms are turned off.

To change the CO₂ setpoint:

1. Press the Mode key until the Set CO₂ indicator lights.
2. Press the up/down arrow until the desired CO₂ setpoint is displayed.
3. Press Enter to save the setpoint.
4. Press the Mode key until the Run indicator lights to go to Run mode.

Section 2 - Calibration

After the unit has stabilized, the air temperature and CO₂ display reading can be calibrated to reference instruments.

Calibration frequency is dependent on use, ambient conditions, and accuracy required. Good laboratory practice would require at least an annual calibration check. On new installations, all parameters should be checked after the stabilization period.

Prior to calibration, the user should be aware of the following system functions. While the unit is in Cal Temp Mode, temperature control is stopped so that chamber temperature remains stable. When the unit is in Cal CO₂ mode, CO₂ control is stopped so that CO₂ levels remain stable. If no keys are pressed for approximately five minutes while in either of these two modes, the system resets to Run Mode so control can be reactivated.



Before making an adjustment or calibration to the unit, it is imperative that all reference instruments be properly calibrated.

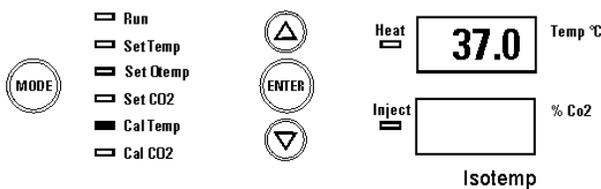
2.1 Calibrating the Temperature

Place the calibrated instrument in the center of the chamber. The instrument should be in the airflow, not against the shelf. Before calibration, allow the cabinet temperature to stabilize.

Temperature Stabilization Periods

Start-Up - Allow 12 hours for the temperature in the cabinet to stabilize before proceeding.

Operating Unit - Allow at least two hours after the display reaches setpoint for the temperature to stabilize before proceeding.



1. Press the Mode key until the Cal Temp indicator lights.
2. Press the up/down arrow to match the display to a calibrated instrument.
3. Press Enter to store the calibration into memory.
4. Press the Mode key to return to Run mode.

2.2 Calibrating Thermal Conductivity CO₂ System

Model 3530 has a thermal conductivity (T/C) CO₂ sensor. Thermal conductivity of the incubator atmosphere is not only effected by the quantity of CO₂ present, but also by the air temperature and the water vapor present in the incubator atmosphere. In monitoring the effects of CO₂, air temperature and absolute humidity must be held constant so any change in thermal conductivity is caused only by a change in CO₂ concentration.

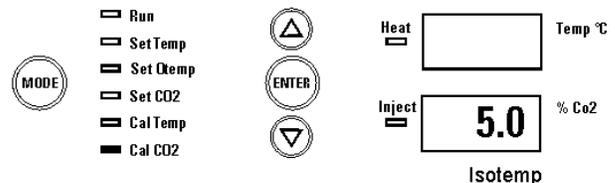
Changing temperature or changing from elevated humidity levels to room ambient humidity levels would necessitate a recalibration of the CO₂ control.

T/C CO₂ Sensor Stabilization Periods

Some T/C CO₂ sensors go through an aging period, especially on new installations. Calibration should be checked on a weekly basis, and adjusted as necessary. When stabilization occurs, checks may become less frequent.

Start-up - The CO₂ sensor has been calibrated at the factory for 37°. Allow temperature, humidity, and CO₂ levels in the chamber to stabilize at least 12 hours before checking the CO₂ concentration with an independent instrument.

Presently operating - Make sure the chamber doors are closed. Allow at least 2 hours after the temperature and CO₂ displays reach their setpoints for chamber atmosphere stabilization.



1. Make sure stabilization periods outlined above are followed.
2. Sample the chamber atmosphere through the sample port with an independent instrument. Sample the atmosphere at least 3 times to ensure the accuracy of the instrument.
3. Press the Mode key until the Cal CO₂ indicator lights.
4. Press the up/down arrow to change the display to match the independent instrument.
5. Press Enter to store calibration.
6. Press the Mode key to return to Run Mode.

2.3 Calibrating Infra-red CO₂ System

Model 3531 has an infra-red CO₂ sensor. Infra-red CO₂ sensors are not effected by chamber atmosphere temperature or humidity. However, the light detector in the sensor is effected by wide temperature changes. Therefore, changing temperature setpoints could necessitate a recalibration of the CO₂. Chamber temperature should be allowed to stabilize before checking CO₂ concentrations with an independent instrument, especially on start-up.

All models equipped with an IR CO₂ sensor have a automatic calibration that occurs every 24 hours, and lasts for 5 to 6 minutes. During automatic calibration, the CO₂ display shows a series of dashes, as room air is pumped through the CO₂ sensor. A new CO₂ calibration value is stored in memory for use as the 0.0% CO₂ reference point. The control panel is locked during calibration (Cal CO₂ indicator flashes).

IR CO₂ Sensor Stabilization Times

Startup - Allow the temperature and the CO₂ of the cabinet to stabilize at least 12 hours before proceeding.

Operating Unit - Allow CO₂ to stabilize at least 2 hours at setpoint before proceeding.

To ensure accurate calibration, the unit will not allow CO₂ to be spanned below 3%. If the cabinet does not contain at least 3% CO₂, increase the setpoint and allow the unit to stabilize before completing this procedure.

1. Measure the CO₂ concentration in the chamber through the gas sample port with a Fyrite or other independent instrument. Several readings should be taken to ensure accuracy.
2. Press the Mode key until the Cal CO₂ indicator lights.
3. Press the up/down arrow to adjust the display to match the independent instrument reading.
4. Press Enter to store calibration.
5. After Enter is pressed, the unit will go into a calibration cycle that lasts 5 to 6 minutes. Control panel is locked during this cycle.
6. When the cycle is complete, the unit returns to Run mode. After a few seconds, the new CO₂ value displays. Note that this value is less (~0.4%) than the calibration value.

Section 3 - Alarms

3.1 Alarms

The Isotemp incubator alarm system is shown in the table below. When an alarm is active, the LED next to the alarm condition flashes. Pressing Silence causes all active alarms to be silenced for the ringback period. However, the visual alarm continues until the incubator returns to a normal condition. The alarms are momentary alarms only. When an alarm condition occurs and then returns to normal, the incubator automatically clears the alarm condition.

Temperature alarms are disabled when the temp setpoint is 10.0°C. CO₂ alarms are disabled when the CO₂ setpoint is 0.0%. The Low Temp alarm delay is set to 9 hours automatically on system power-up. This allows the user to avoid nuisance alarms when the system is first turned on. If the temp comes within the alarm limits prior to the 9 hour delay, the alarms will be enabled.

Table 3-1

Alarm	Description	Delay	Ring-back
Over Temp	Temperature is greater than Over Temperature setpoint	0 min.	15 min.
Low Temp	Temperature is at least 1°C lower than the temperature setpoint	15 min.	15 min.
High CO ₂	CO ₂ is at least 1% higher than the CO ₂ setpoint	15 min.	15 min.
Low CO ₂	CO ₂ is at least 1% lower than the CO ₂ setpoint	15 min.	15 min.
Add Water	Water is low in jacket	0 min.	15 min.
Door Open	Inner glass door is open	15 min.	15 min.
Temp display toggles between temp reading and E01	Temperature sensor failure	0 min.	15 min.
CO ₂ display toggles between CO ₂ reading E11	CO ₂ sensor failure	0 min.	15 min.
CO ₂ display toggles between CO ₂ reading and E12	IR CO ₂ sensor cannot be calibrated (IR option only)	0 min.	15 min.
CO ₂ display toggles between CO ₂ reading and E13	IR CO ₂ auto-zero fault (IR option only)	0 min.	15 min.

All alarm delays and ringback times are ±30 seconds.

PREVENTIVE MAINTENANCE

Fisher Isotemp Water Jacket Incubators

Your equipment has been thoroughly tested before shipment. Regular preventive maintenance is important to keep your unit functioning properly. The operator should perform routine cleaning and maintenance on a regular basis. For maximum performance and efficiency, it is recommended the unit be checked and calibrated periodically by a qualified service technician.

The following is a condensed list of preventive maintenance requirements. See the specified section of the operating manual for further details.

We have qualified service technicians, using NIST traceable instruments, available in many areas. For more information on Preventive Maintenance or Extended Warranties, please contact us at the number listed below.

Cleaning and calibration adjustment intervals are dependent upon use, environmental conditions and accuracy required.

Tips for all incubators:

- Do NOT use bleach or any disinfectant that has high chloros
- Use sterile, distilled or demineralized water.
- Avoid spraying cleaner on the CO₂ sensor.
- Do not use powdered gloves for tissue cultures.





Refer to Manual Section	Action	Daily	Weekly	Monthly	6 Months	Yearly	2 years
--	Check CO ₂ tank levels.	✓					
--	Inspect door latch, hinges and door gasket seal.					✓	
1.4j	Check water level in the humidity pan, 1/2" from top		✓				
2.1 2.2 T/C or 2.3 IR	Verify CO ₂ and temperature calibration with independent instrumentation			✓			
2.1, 2.2	Validate and document CO ₂ and temperature calibration, as applicable					✓	
4.1 4.3	Perform a complete decontamination procedure. Wipe down interior, shelves and side ducts with disinfectant. Change or clean blower wheel and scroll. Clean top duct. Clean humidity pan. Rinse everything well with sterile distilled water.	Between experiments <i>More frequent decontamination may be required, depending on use and environmental conditions</i>					
4.6, 4.7	Change air sample and access port filters, if applicable (or as needed)				✓		
4.9	Replenish rust inhibitor in water jacket.						✓

Section 4 - Routine Maintenance



Before using any cleaning method except those recommended by the manufacturer, users must check with the manufacturer that the proposed method will not damage the equipment.

4.1 Cleaning the Incubator Interior



If the units have been in service, disconnect the power cord connector before cleaning.

Use an appropriate disinfectant. All articles and surfaces must be thoroughly cleaned, rinsed and rough-dried.



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 spray the T/C sensor with flammable solutions. The internal temperature of the CO₂ sensor is approximately 150°C when the unit is in operation. Allow sufficient time for the sensor to cool before cleaning.



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.

1. Turn the incubator off and disconnect the plug from the power source.
2. Remove the shelves, access port filter and side duct sheets. Remove the temperature sensors and the air sample filter tubing from the back of the blower scroll. Refer to Figure 4-1.
3. Remove the filter from the air sample filter tubing.

4. Remove the wingnuts securing the top duct to the interior. Carefully slide the top duct down and off the temperature sensor, air sample filter tubing.
5. Wash the shelves, ducts, wingnuts and stopper with disinfectant and rinse with sterile water. Option: Autoclave shelves, ducts and wingnuts.
6. Remove the blower scroll by first pushing the black lever clip closest to you toward the scroll. Then turn the scroll to the right to disengage it from the blower scroll plate. Some manipulation may be required as the alignment holes are keyhole-shaped.
7. Remove the remaining wingnut, then pull down on the blower wheel. If a new wheel and scroll are going to be used, discard the old ones. If the old ones are being reused, wash all parts with disinfectant and rinse with sterile water.
8. Remove the blower scroll plate by first pushing the black lever clip toward the chamber ceiling. Then turn the plate to the left to disengage it from the alignment keyholes. Clean as above, or autoclave.
9. Wash the cabinet interior with disinfectant starting at the top and working down. Wash the inner door both inside and out. The cabinet and door must be rinsed with sterile water until the disinfectant has been removed. After the cabinet has been rinsed, spray with 70% alcohol.
10. Reinstall the blower scroll plate by aligning it with the larger end of the keyholes and turning it to the left to lock it on. Pull the black lever clip downward from the ceiling.
11. Install the blower wheel onto the motor shaft, aligning the d-shaped flat sides of each. See Figure 4-2. Secure the blower wheel with the wingnut. Make sure the wheel turns freely.
12. Locate the blower scroll over the blower wheel into the larger end of the keyholes on the scroll plate. Turn the scroll to the right to lock it into the keyholes. Pull the black lever clip closest to you toward the front of the unit.

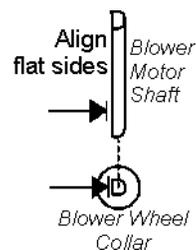


Figure 4-2

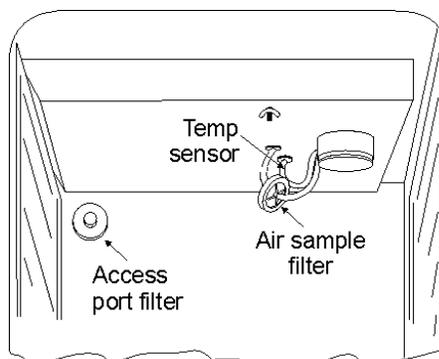


Figure 4-1

13. Install the top duct by feeding the temperature sensors, air sample tubing through the appropriate holes in the duct as it is raised to the top of the chamber. Be careful not to pull the grommets through the duct (Figure 4-3).

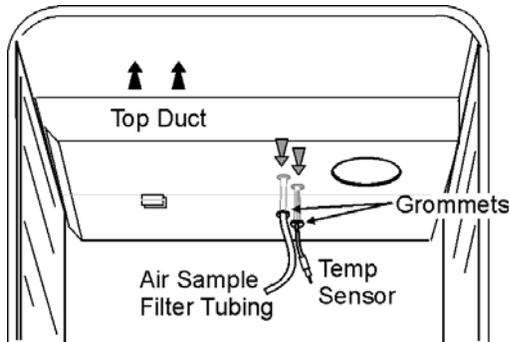


Figure 4-3

14. Locate the mounting studs and blower scroll into the appropriate holes in the top duct and install the wingnuts to secure the duct.
15. Install the air sample filter onto the top duct tubing.
16. Carefully pull the temperature sensor and air sample filter tubing down until they can be inserted approximately 1 inch into the appropriate holes in the back of the blower scroll. See Figure 4-4.

UNDERSIDE VIEW OF CHAMBER CEILING
front of unit

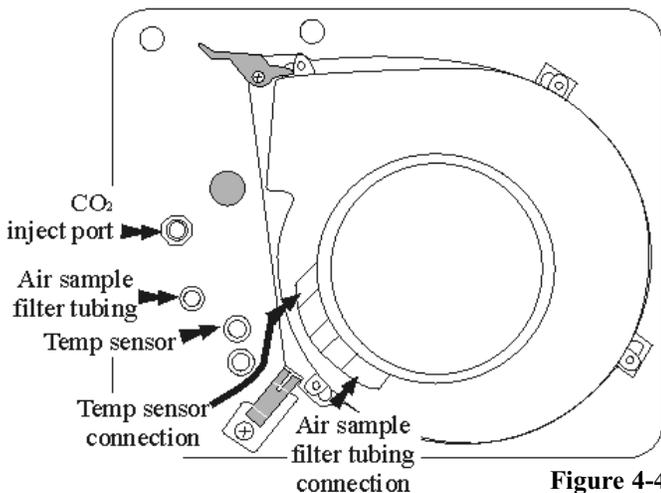


Figure 4-4

17. Install the left and right ducts, and the access port stopper with filter, spraying each with 70% alcohol (do not saturate).
18. Install the shelves and spray with 70% alcohol.
19. Plug the incubator in and turn the power switch on. Allow the unit to run empty for 24 hours before returning to service.

4.2 Cleaning the Cabinet Exterior

Clean the incubator exterior with a damp sponge or soft, well-wrung cloth and mild detergent dissolved in water. Dry with a soft cloth.

4.3 Cleaning the Humidity Pan

Clean the humidity pan with soap and water and a general-use laboratory disinfectant. Rinse with sterile water and spray with 70% alcohol. The humidity pan may be autoclaved.

4.4 Reversing the Door Swing

For side-by-side operation or changing lab layouts, the inner and outer doors are field-reversible. The procedure is written from the perspective of changing the door swing from a left-hand to a right-hand swing. All screw holes are pre-drilled for reversing the door. The tools required are a Phillips and a flatblade screwdriver.



If the units have been in service, disconnect the power cord connector before reversing the door swing.

a. Reversing the Hinges for Exterior Door

Refer to Figure 4-7A. The following instructions will refer to the letters within the circles.

1. Open the outer door and remove it by lifting it off the hinge pins. Lay this door down on its face on a padded surface to prevent scratches.
2. Remove the two outer door hinges identified by the “A” in the illustration.
3. Remove the four nylon screws in locations “B”, which will be the new locations for the inner door hinges.
4. With the Phillips screwdriver, remove and save the four nylon screws from the outer door hinge mounting holes, noted as locations “C” on the right side of the door frame.
5. Remove the electrical connector on the top of the inner door hinge by carefully prying up the black strain relief.

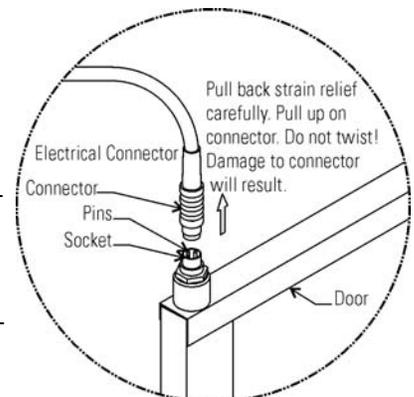
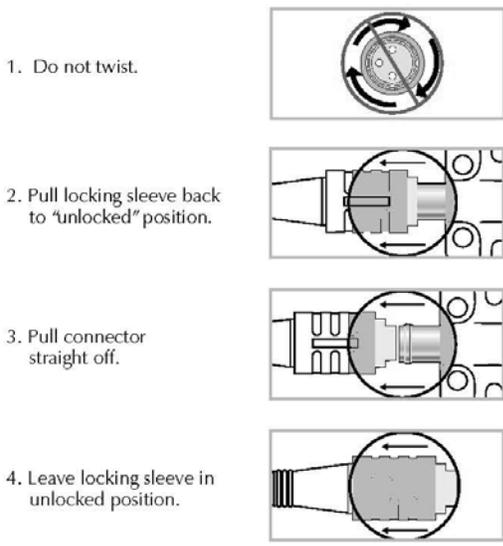


Figure 4-5

- Refer to item “D” in Figure 4-7A. The heater wiring connector is of yellow rubber which should be visible when the strain relief is moved upward as shown. Refer to connector manufacturer’s instructions below.

To Detach:



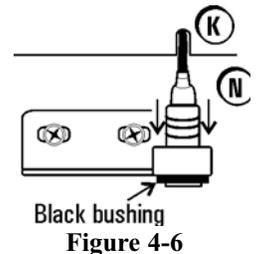
- Grasp the upper portion of the yellow connector and pull it up and out of the hinge socket.
- Remove the inner door upper hinge, shown as “E”. This hinge will be inverted and become the lower inner door hinge when the hardware is reassembled. When removing the door, set it aside on a flat surface, taking care not to damage the electrical sockets on the top and bottom of the door frame. At this time, remove the 5/8” black plastic bushing from the hinge. This bushing will be inserted in the top hinge when the door is installed on the right side of the cabinet.



Electrical connectors are mounted on the frame along the hinge side of the inner glass door at both the top and bottom of the door. Be careful not to damage the connectors by resting the weight of the door on them. Place the inner glass door on a flat surface where it cannot be damaged before moving on to the next step.

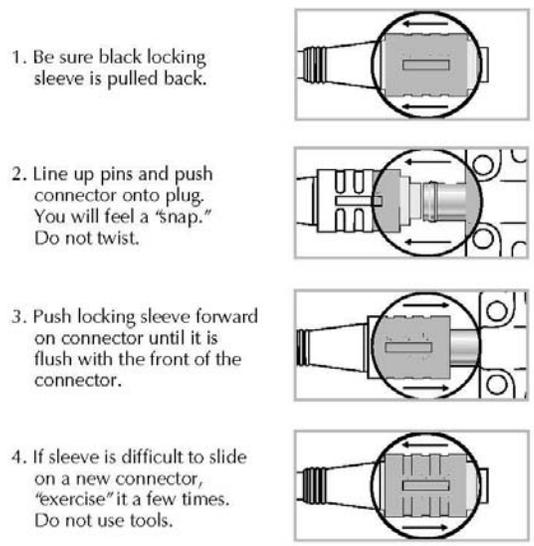
- Remove the lower inner door hinge, “F”. Note that this hinge will be inverted and become the upper inner door hinge when the hardware is reassembled. Also, remove the 1” long white plastic bushing from the center of the hinge and insert it into the hinge removed in the step above.
- The shoulder of the bushing must be on top as shown in Figure 4-7. Install the black plastic bushing into the hinge just removed and which will be the top hinge when the door is reversed. Refer also to Figure 4-5.

- Remove the two nylon screws at location “G”.
- Remove the door strike plate at location “H” and install the two nylon screws just removed into the vacant holes.
- Remove the two outer Phillips screws on the frame beneath the control panel, identified as “I” in the illustration. Remove only the two outer screws and pull the electronics tray out about one-inch.
- Verify that the nylon screws have been installed in the vacant door strike holes, identified as “J” (Figure 4-7B).
- Move the door heater cable to the slot on the right side of the tray as shown in location “K”.
- Push any excess cable into the tray area, making sure the wire will not be damaged when the tray is pushed back in and secured.
- Install the lower inner door hinge, identified as location “L” in the drawing. (This was the top inner door hinge removed in Step 8 and should have the white plastic bushing installed.) Do not completely tighten the screws.
- Insert the inner door into the lower hinge with the latch to the left. Align the door to the chamber opening and place the upper hinge in position as identified as “M”.
- Insert the screws into the hinge but do not completely tighten them.
- Match the pins on the yellow connector with the socket on the door. Press the connector completely into the socket and slide the strain relief down until no yellow is visible on the plug as shown in “N” of Figure 4-6.



Manufacturer instructions follow.

To Attach:



- Be sure black locking sleeve is pulled back.
- Line up pins and push connector onto plug. You will feel a “snap.” Do not twist.
- Push locking sleeve forward on connector until it is flush with the front of the connector.
- If sleeve is difficult to slide on a new connector, “exercise” it a few times. Do not use tools.

21. Push the power cable completely into the slot in the electronics tray. Press the tray into position and secure it with the screws at the "S" locations.
22. Align the silver power buss visible through the glass along the hinge side of the door with the gasket along the right side of the chamber opening.

23. When both hinges are in place with the hinge screws still loosened, push up on the bottom hinge. This will shift both hinges and the door upward. Tighten the hinge screws.
24. Attach the strike plate at location "O", aligning it so the knob secures the door against the gasket.

Left Hinge Door

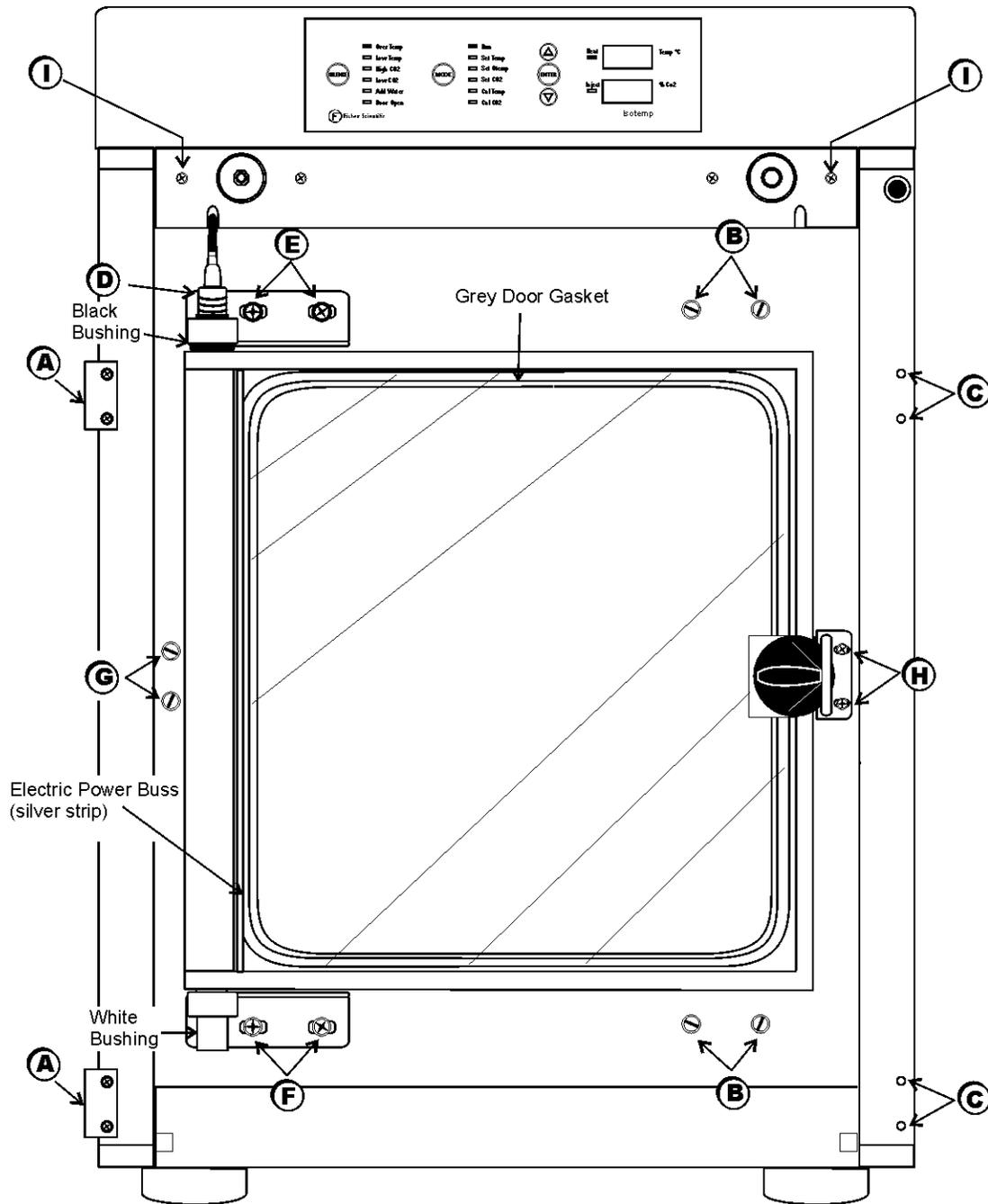


Figure 4-7 A

25. Attach the outer door hinges at the “P” locations.
26. Install the nylon screws at the “R” locations.
27. Install the nylon screws in the “Q” locations.
28. Assemble the outer door to the incubator and return the unit to service.

Right Hinge Door

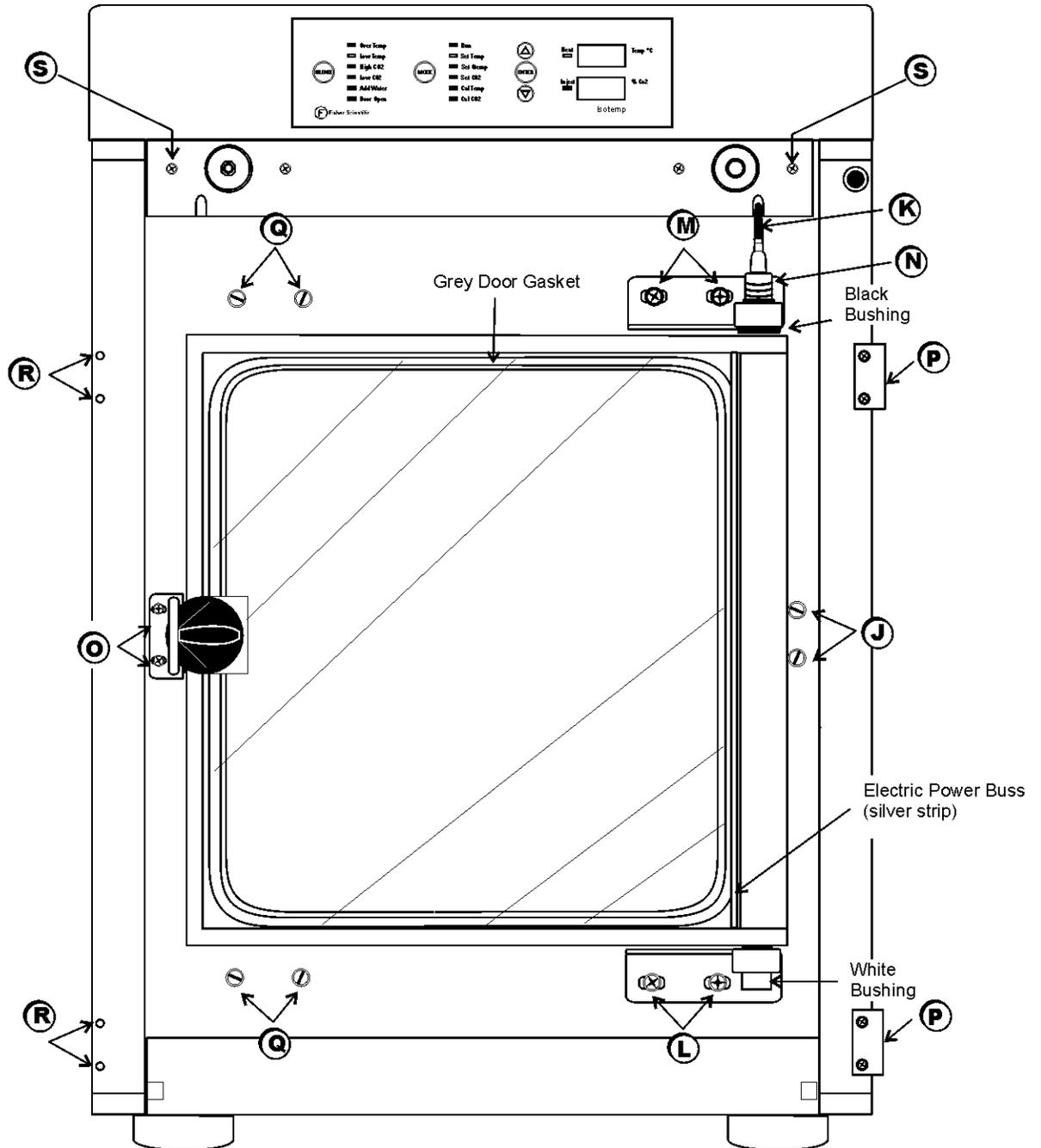


Figure 4-7B

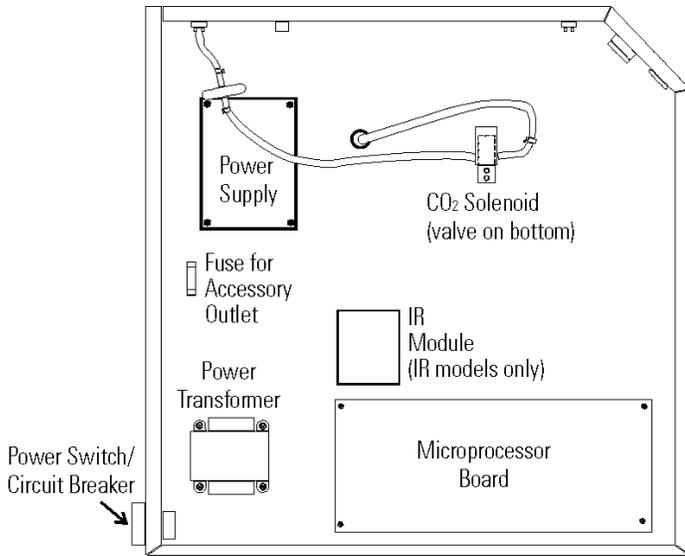


Figure 4-8, Electronics Drawer

1. When the fuse has been replaced, slide the electronics drawer back in, being very careful to place the door heater cable back into the provided slot so that the drawer does not pinch the cable.
2. Replace the two screws removed earlier.
3. Close the exterior door.
4. Plug the power cord back into the dedicated, grounded circuit.
5. Turn on power switch. If the unit operates properly, it may now be returned to service.

There is one fuse in the incubator that is not replaceable. This fuse is intended for catastrophic failure only and is located on the power supply circuit board in the electronics drawer. If this fuse is blown, the power supply must be replaced. Contact the factory for more information.

4.5 Replacing Fuses



The electronics drawer contains hazardous voltages. Replacing the fuses should be performed by qualified personnel only.

There are two fuses in the incubator that can be replaced. To replace a fuse:

1. Turn off the incubator’s power switch and unplug the power cord from the wall outlet.
2. Open the exterior cabinet door.
3. Remove two screws as shown. See item “S” in Figure 4-7B.
4. Carefully slide out electronics drawer.

There are two fuses on the main microprocessor board labeled ‘F1 24VAC Door Heater’ and ‘F4 24VAC Collar Heater’. Refer to Figure 4-8 for the location of the main micro board. Remove the fuse and replace it with a new one of the same specification. See Table 4-1.

Fuse #	Manufacturer P/N	Amperage Rating	Rupture Speed	IEC Letter Code
F1	BUSS GMC-3.5A	3.5 Amp	Time-Lag	T
F4	BUSS GMC-2.5A	2.5 Amp	Time-Lag	T

Table 4-1, Fuse Replacement Chart

4.6 Replacing the Air Sample Filter

The air sample filter should be replaced as needed; every 6 months is recommended. On the inside of the chamber, inserted into the back of the blower scroll, is the air sample filter and its connecting tubing. Disengage the tubing from the back of the scroll, then remove the filter from the tubing and discard. Install the new filter. Connect it securely to the air sample filter tubing, then insert the tubing into the back of the blower scroll.

4.7 Replacing the Access Port Filter

The access port filter should be replaced as needed; every 6 months is recommended. The filter is connected to the stopper in the upper left corner of the inside chamber back wall. Remove the filter from the connecting tubing and discard. Install the new filter.

4.8 Draining Water Jacket

1. Turn the unit off. Remove the plug from the power source.
2. Remove the front cover plate below the door. There are small flatblade screwdriver pry slots on each end of the plate to help remove it. See Figure 4-9.

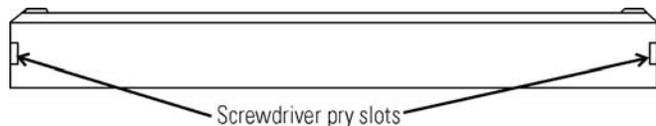


Figure 4-9, Front Cover Plate Below the Door

3. Remove the drain plug. Retain for use after draining is complete.
4. Connect the hose barb insert to the drain on lower front of the water jacket and to the drain hose.

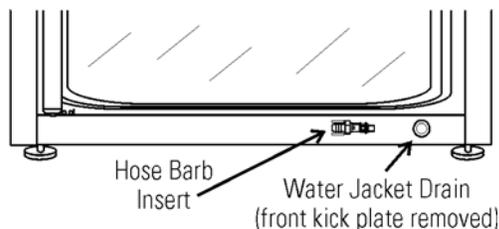


Figure 4-10, Water Jacket Drain and Hose Barb Insert

5. After water jacket has finished draining, remove the hose barb insert and secure on the front of the unit. See Figure 4-10 and 4-11.
6. Install the plug into the drain on the incubator
7. Install cover plate.
8. To fill the water jacket, see Section 1.5j. Be sure to add the rust inhibitor to the water when filling. For the proportions of rust inhibitor to water and the part number, see Section 4.12.



Figure 4-11

4.9 Adding or Replenishing the Rust Inhibitor

Isotemp incubators are shipped from the factory with a rust inhibitor added to the water in the jacket. This inhibitor must be replenished every 2 years. Mix 1 bag/bottle of the rust inhibitor with a gallon of distilled, demineralized or de-ionized water. Drain a gallon of water from the jacket and replace it with the rust inhibitor mixture.

Rust Inhibitor (0.5 lb.) bag	1900100
Rust Inhibitor (800ml) bottle (use in units with a cooling coil)	1900101

Section 5 - Remote Alarm

5.1 Connecting the Remote Alarm Contacts



A set of relay contacts are provided to monitor alarms through an RJ-11 telephone style connector on the back of the cabinet. Refer to Figure 1-13 for the location of the alarm connector.

The remote alarm provides a NO (normally open) output, a NC (normally closed) output and COM (common). Refer to Figure 5-1.

The contacts will trip on a power outage, temperature alarm or CO₂ alarm. See Table 3-1.

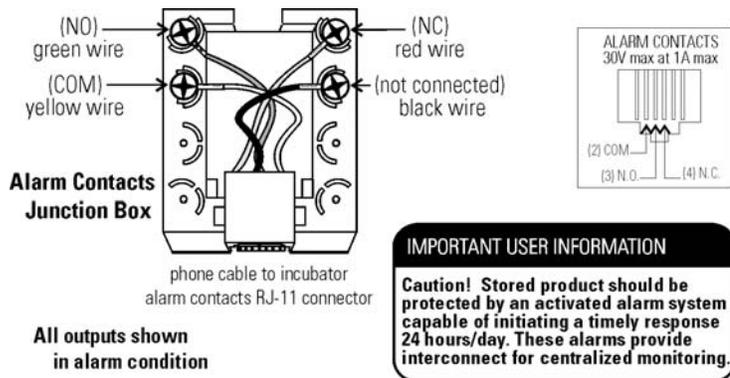


Figure 5-1

Section 6 - Specifications

*Specifications are based on nominal voltages of 115V in ambients of 22°C to 25°C.

Temperature

Control	±0.1°C
Range (+5°C above ambient)	10° to 55°C for units with a T/C sensor 10° to 50°C for units with an IR sensor
Uniformity	±0.3°C @ +37°C
Low Temp Tracking Alarm	Fixed at 1.0°C below setpoint

Temperature Safety

Sensor	Precision thermistor
Setability	0.1°C

CO₂

CO ₂ Control	Better than ±0.1%
CO ₂ Range	0-20%
Inlet Pressure	15 PSIG (1.034 bars), ±5 PSIG
CO ₂ Sensor	T/C or IR
Readability	0.1%
Setability	0.1%
Low CO ₂ Tracking Alarm	Fixed at 1.0% below setpoint
High CO ₂ Tracking Alarm	Fixed at 1.0% above setpoint

Humidity

RH	Ambient to 95% @ +37°C (98.6°F)
Humidity Pan	0.8 gal. (3 liters) standard

Fittings

Fill Port	3/8" barbed
Drain Port	1/4" barbed
Access Port	1-1/4" (3.18cm) removable neoprene plug
CO ₂ Inlet	1/4" hose barbed

Unit Heat Load

115V	344 BTUH (100 Watt)
------	---------------------

Shelves

Dimensions	18.5" x 18.5" (47.0cm x 47.0cm)
Construction	Stainless steel, perforated
Surface area	2.4 sq. ft. (0.22 sq. m) per shelf
Max. per Chamber	38.4 sq. ft. (3.6 sq. m)
Loading	35 lbs (16kg) slide in and out, 50 lbs (23kg) stationary
Standard	3
Maximum	16

Construction

Water Jacket Volume	11.7 gal. (43.5 liters)
Interior Volume	6.5 cu. ft. (184.1 liters)
Interior	Stainless steel
Exterior	18 gauge, cold rolled steel, powder coated
Outer Door Gasket	Four-sided, molded magnetic vinyl
Inner Door Gasket	Removable, cleanable, feather-edged, silicone

Electrical

115V	90-125VAC, 50/60 Hz, 1 PH, 3.6 FLA
Circuit Breaker/Power Switch	6 Amp/2 Pole
Alarm Contacts	Power interruption, deviation of temp., CO ₂ customer connections through jack on back of unit. 30V, 1A max.
Installation Category	Overvoltage Category II Pollution Degree 2
Maximum Leakage Current	With ground disconnected, 0.65mA Maximum permissible leakage, 3.5mA

Dimensions

Interior	21.3" W x 26.8" H x 20.0" F-B (54.1cm x 68.1cm x 50.8cm)
Exterior	26.3" W x 39.5" H x 25.0" F-B (66.8cm x 100.3cm x 63.5cm)

Weight (per unit)

Net	265 lb. (120.2 kg)
Net Operational	365 lb. (165.6 kg)
Shipping	324 lb. (147.0 kg)

Safety Specifications

Altitude	2000 meters
Temperature	5°C to 40°C
Humidity	80% RH at or below 31°C, decreasing linearly to 50% RH at 40°C
Mains Supply Fluctuations	Operating Voltage Range
Installation Category 2 ¹	
Pollution Degree 2 ²	
Class of Equipment	

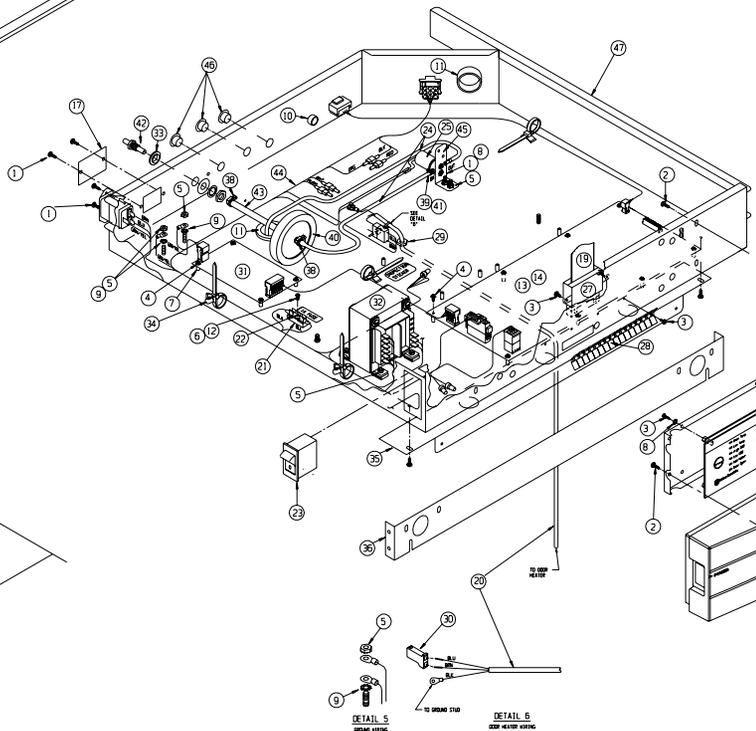
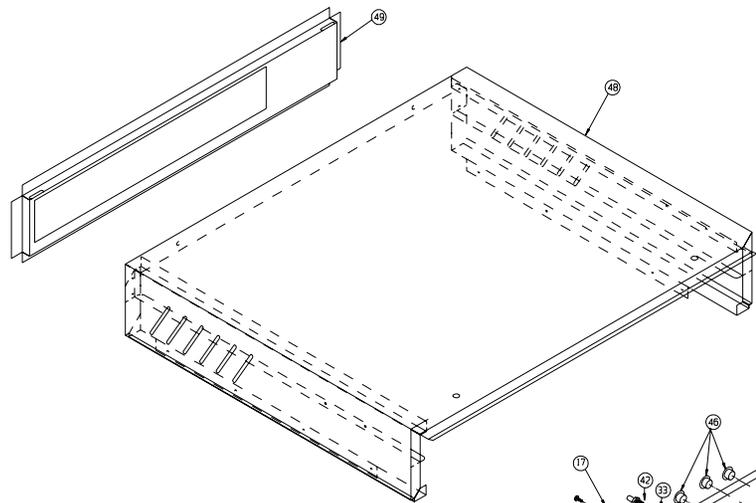
¹ Installation category (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its overvoltage protection means. For example, in CAT II which is the category used for instruments in 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.

Section 7 - Spare Parts

<u>Part #</u>	<u>Description</u>
360171	Liquid Level Switch
191534	Feather Gasket
113002	5/16-18 Glide Foot
132046	115/230V Dual Heater
132056	Face Heater 27W, 24VAC
1900203	Heated Inner Door
700046	Lower Inner Door Hinge Nylon Bearing
700013	Upper Inner Door Hinge Nylon Bearing
990026	Door Gasket w/ Magnet
290184	Temp Probe 2252 Ohm
191960	Micro Board
1900360	Display Board
230153	6A Circuit Breaker/Switch
460157	Line Filter/Power Inlet
420096	130VA Transformer, International, 14/28V S
230159	3.5 Amp Fuse - Door
230158	2.5 Amp Fuse - Face Heater
250087	Solenoid Valve Kit with assorted fittings
770001	Bacterial Air Filter (CO ₂ line, air sample and access port)
100113	Blower Wheel 3.5x1.5 CCW
190831	Blower Scroll Assembly
290090	CO ₂ Sensor Assembly
190985	#6 Silicone Stopper w/ Filter (P/N 770001)
180001	Polypropylene Funnel
430108	Line Cord Set
1900071	Blower Motor Replacement Kit
2270105	Motor, Sensor Gasket Replacement Kit
247013	Drain Fitting Hose Barb
190634	Inner Door Strike with Door Switch
400119	40W Power Supply
400132	Low Leakage Current Power Supply
965010	CO ₂ Gas Regulator
190647	Roller Base
190884	Stainless Steel Shelf Kit
3050	External Gas Guard
190885	IR Sensor

SYM	STK #	DESCRIPTION	SYM	STK #	DESCRIPTION	SYM	STK #	DESCRIPTION
1	22049	6-32 X 3/8 PHP SCREW	26	270107	FERRITE SPLIT, 1/2 OD CABLE	50		
2	22052	6-32 X 3/8 PHP SCREW	27	270108	FERRITE 40 PDS. RIBBON CABLE	51		
3	22115	6-32 X 1/4 PHP SCREW	28	270139	BERYLLIUM COPPER FINGERS, 6"	52		
4	590032	4-40 X 1/4 PHP SEM SCREW	29	340030	LIQUID TIGHT CONNECTOR	53	190885	IR CO2 SYSTEM (SENSOR & BOARD) 3531 ONLY
5	23002	8-32 LK WASHER HEX NUT	30	370472	CAF, 2 PDS. MINI WATE-H-LOK	54	246008	1/16 ID TYGON TUBING 3531 ONLY
6	23006	4-40 LK WASHER HEX NUT	31	400119	SWITCHER PWR SUPPLY 40W	55		
7	515094	1/4 X 3/8 LG SPACER	32	420096	130VA XFMR, INT'L 12/24V	56		
8	23030	6 SS INT TOOTH LK/WASHER	33	730044	SHOULDER WASHER, .385	57	350006	1/8 HOSE X 10-32 MIN.F ADAPTER 3531 ONLY
9	23059	8 SS EXT TOOTH LK/WASHER	34	440022	PUSH MOUNT TIE & ANCHOR	58	840027	1/16 TUBE X 10-32 NYLON 3531 ONLY
10	30014	1/2 IN SNAP BUSHING	35	190735	FRONT TRIM MOUNT	59		
11	30087	1-1/4 SNAP BUSHING	36	190736	FRONT DRAWER TRIM	60		
12	59007	4-40 X 3/8 PHP SCREW	37	460157	PWR ENTRY/RFI LINE FILTER	61		
13	191958	MICRO BOARD FOR 3530	38	600034	SNAPPER HOSE CLAMP, .375	62	190715	HARNES- 1/R SENSOR & BOARD 3531 ONLY
14	191634	MICRO BOARD FOR 3531	39	600063	SNAPPER HOSE CLAMP, .312	63		
15	1900360	CONTROL PANEL, DISPLAY	40	770021	DISPOSABLE FILTER, 99-97	64		
16	190615	DISPLAY BOARD MOUNT	41	840008	HOSE FITTING, 10-32 X 5/32	65		
17	1900221	COVER PLATE	42	840020	BULKHEAD FTG, BRASS 1/4			
18	180172	CONTROL PANEL BEZEL	43	950013	VINYL TUBING 1/4 ID			
19	194021	RIBBON CABLE 34 PDS.	44	1900050	HARNES, DRAWER			
20	210385	COROSIT M/FEMALE RECEPTACLE	45	1900054	SILENCIO MOUNT			
21	230105	FUSEBLOCK 5 X 20MM	46	34014	PE HOLE PLUG, BLACK			
22	230135	FUSE, 1 A TO, 5 X 20MM	47	1900606	COMPONENT DRAWER			
23	230153	6A DPDT CKT BKR/SWITCH	48	190605	CONTROL HOLDING WRAP			
24	246010	VINYL TUBING, 3/16 ID	49	190605	CONTROL HOLDING BACK			
25	250095	CO2 SILENCIO VALVE, 12 VDC						



I/R ASSEMBLY (3531 ONLY)

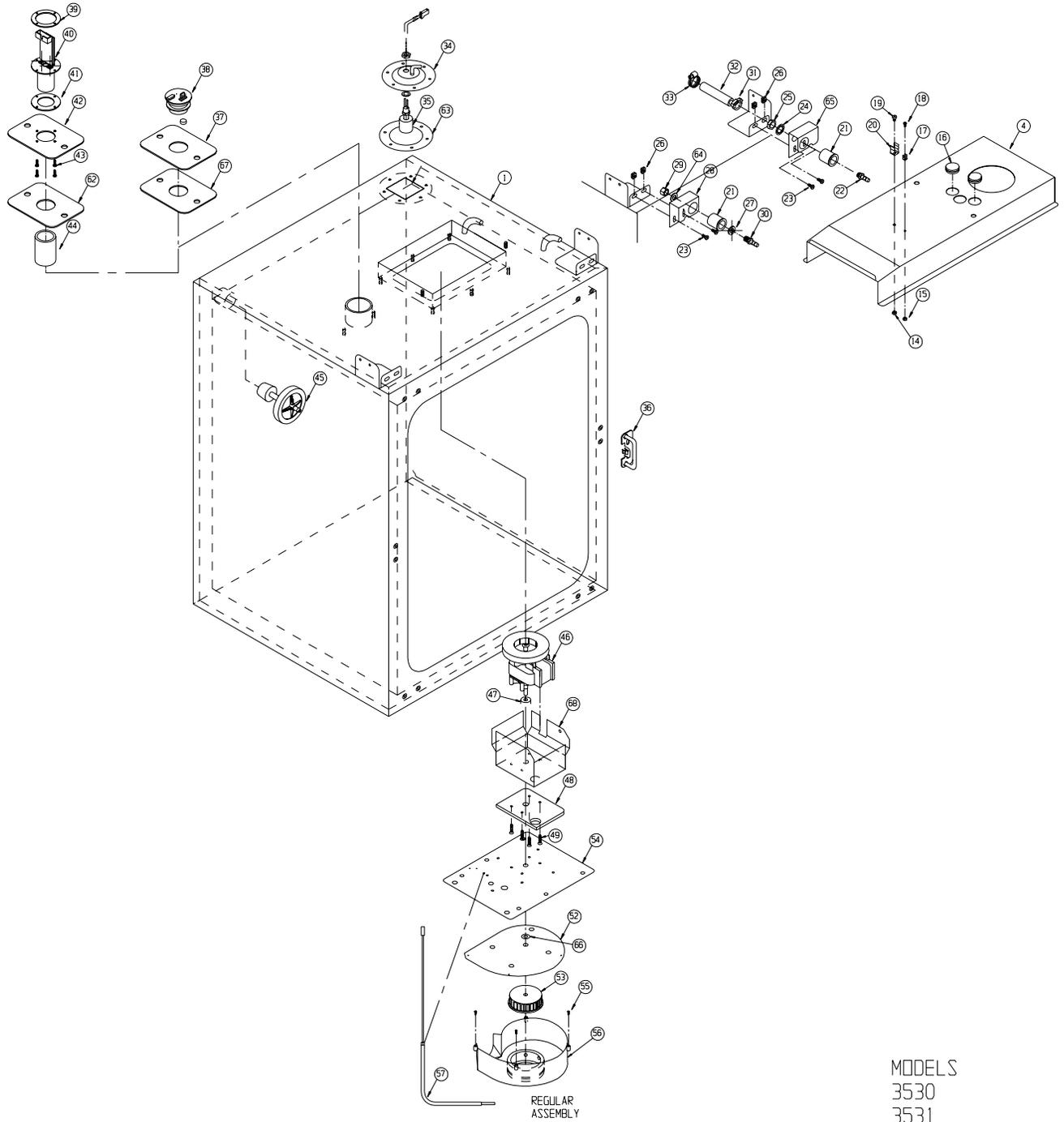
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ELECTRONICS DRAWER

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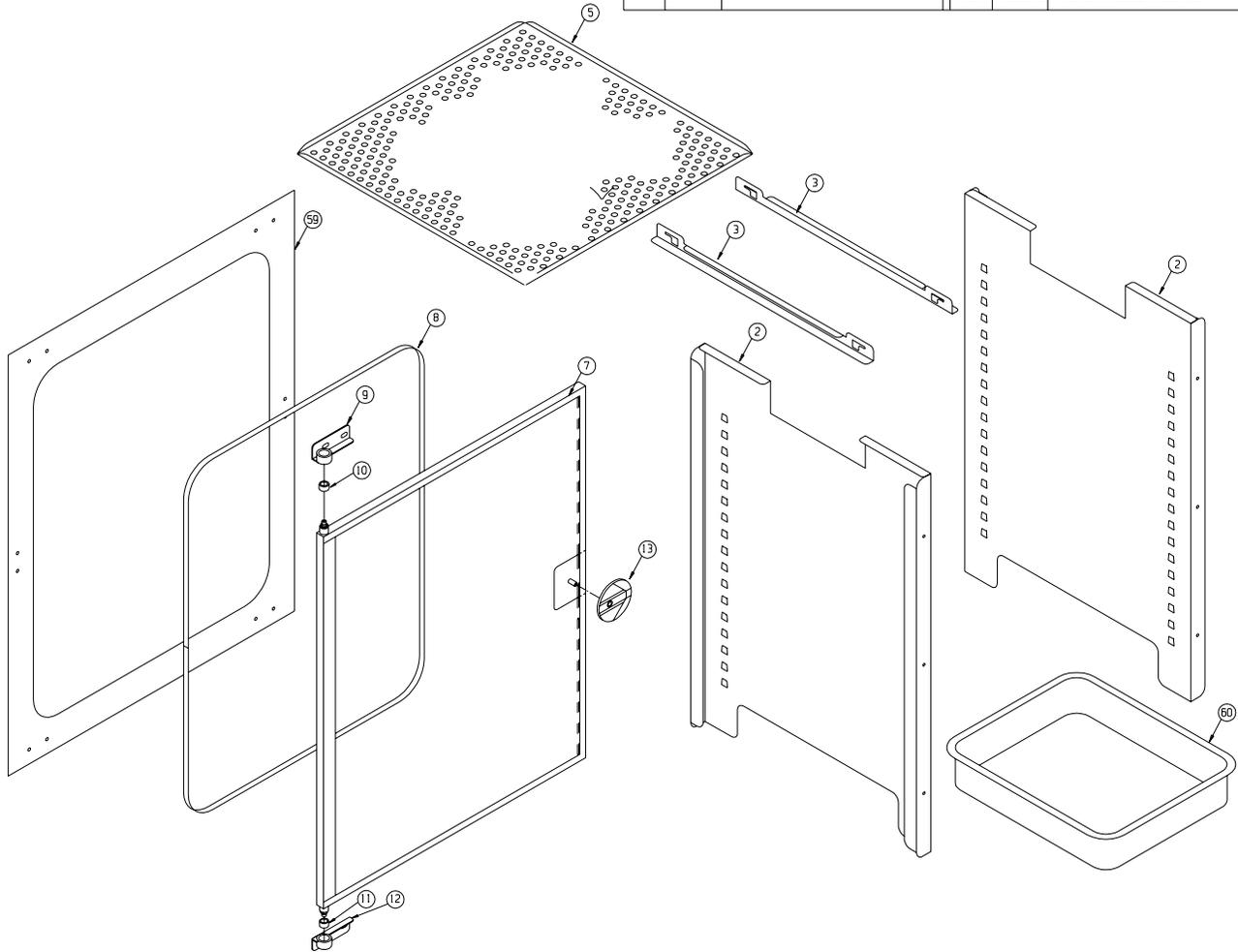


CABINET ASSEMBLY

MODELS
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SYM	STK #	DESCRIPTION	SYM	STK #	DESCRIPTION
1	1900215	WATER JACKET CHAMBER	34	190306	FLOAT SWITCH MOUNT
2	1900218	INTERIOR DUCT SHEETS	35	360171	FLOAT SWITCH
3	1900220	SHELF CHANNELS	36	190634	INNER OODR LATCH
4	1900219	TOP DUCT (1900057 COPPER)	37	190649	TC SENSOR PLATE
5	224175	SHELF	38	290090	TC SENSOR
6	-----	-----	39	190712	IR MOUNTING RING
7	1900203	INNER GLASS OODR	40	190708	"DCS" IR SENSOR
8	103108	INNER OODR GASKET	41	103083	IR SENSOR GASKET
9	190618	TOP INNER OODR HINGE	42	190711	IR MOUNTING PLATE
10	700013	TOP INNER OODR HINGE BUSHING	43	22130	4-40 X 1/4 SS SCREW
11	700046	BOTTOM INNER OODR HINGE BUSHING	44	190708	IR SENSOR FILTER (PART OF ITEM 40)
12	190619	BOTTOM INNER OODR HINGE	45	190985	FILTERED STOPPER ASSEMBLY
13	180210	INNER OODR KNOB	46	156126	BLOWER MOTOR
14	23010	8-32 SS NUT	47	730069	MOTOR SHAFT SEAL
15	23005	4-40 SS NUT	48	190655	MOTOR SPACER PLATE
16	114022	15/16 BLIND GROMMET	49	590023	8-32 X 3/4 SS SCREWS
17	111022	1/4" PROBE CLIP	50	-----	-----
18	22130	4-40 X 1/4 SS SCREW	51	-----	-----
19	22051	8-32 X 1/4 SS SCREW	52	190893	SCROLL PLATE
20	111007	13/32 RH PROBE CLIP	53	100113	BLOWER WHEEL "O" SHAFT
21	190294	FILL PORT ACCESS	54	1900053	STANDARD BLOWER PLATE
22	840043	PLASTIC HOSE BARB	55	22134	6-32 X 1/2 "FILISTER" HEAD SCREW
23	22052	8-32 X 3/8 SS SCREW	56	190846	BLOWER SCROLL
24	290128	1/2" LOCK WASHER	57	290184	TEMPERATURE PROBE
25	840043	NUT (PART OF #22)	58	-----	-----
26	610055	8-32 CLIP NUT	59	180174	PVC FACE FRAME
27	730060	SEAL WASHER	60	237016	HUMIDITY PAN
28	190675	LEFT MOUNT	61	-----	-----
29	840035	3/16 ADAPTER	62	103084	IR SENSOR PLATE GASKET
30	840065	1/4 HOSE BARB	63	103032	FLOAT SWITCH GASKET
31	600065	SNAPPER CLAMP	64	23024	3/8 FLAT WASHER
32	246011	3/8 VINYL TUBING	65	190675	RIGHT MOUNT
33	600055	SS HOSE CLAMP	66	730068	TEFLON WASHER
			67	103074	SENSOR PLATE SEAL
			68	1900249	MOTOR SHIELD & GUARD

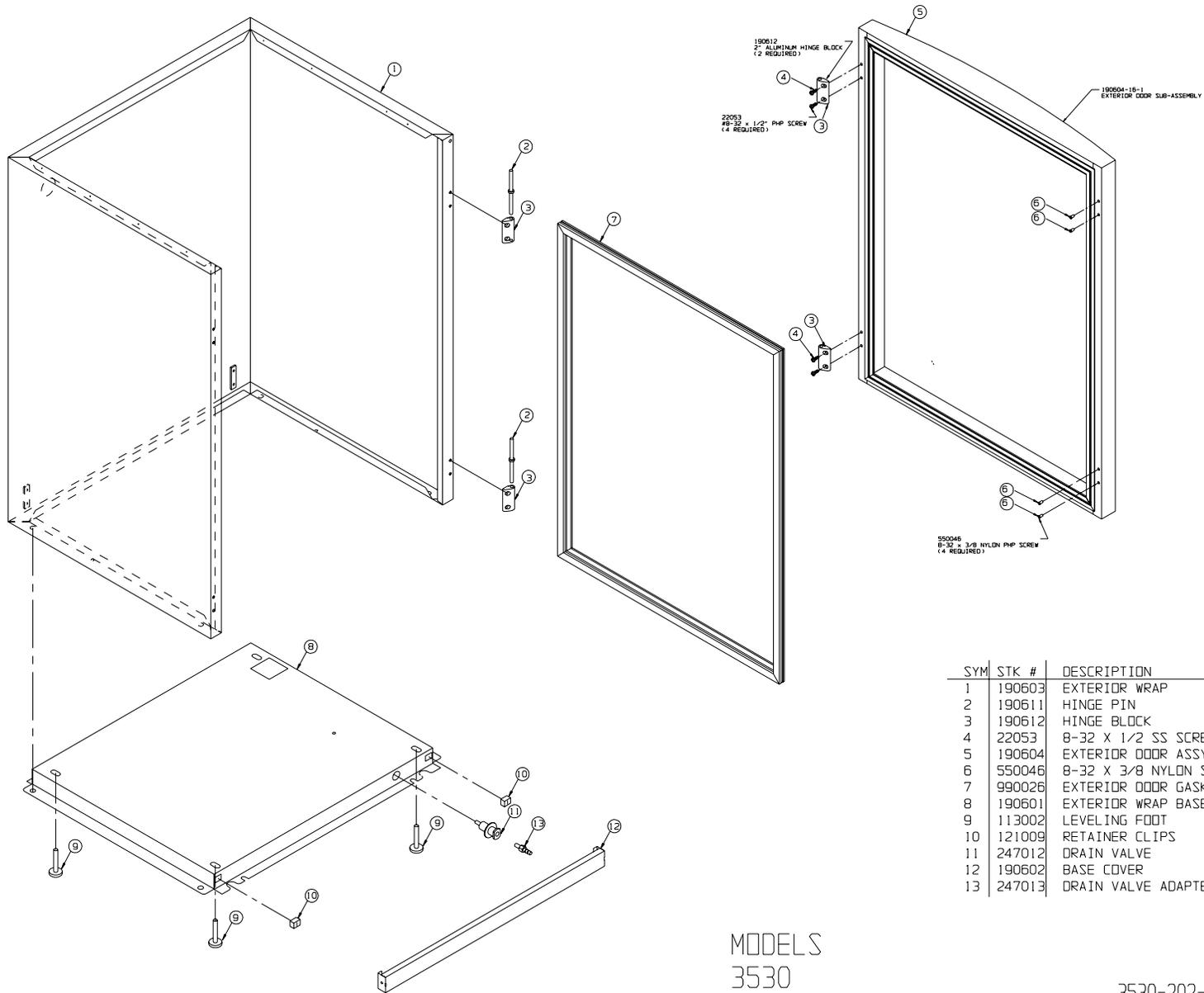


CABINET ASSEMBLY

MODELS
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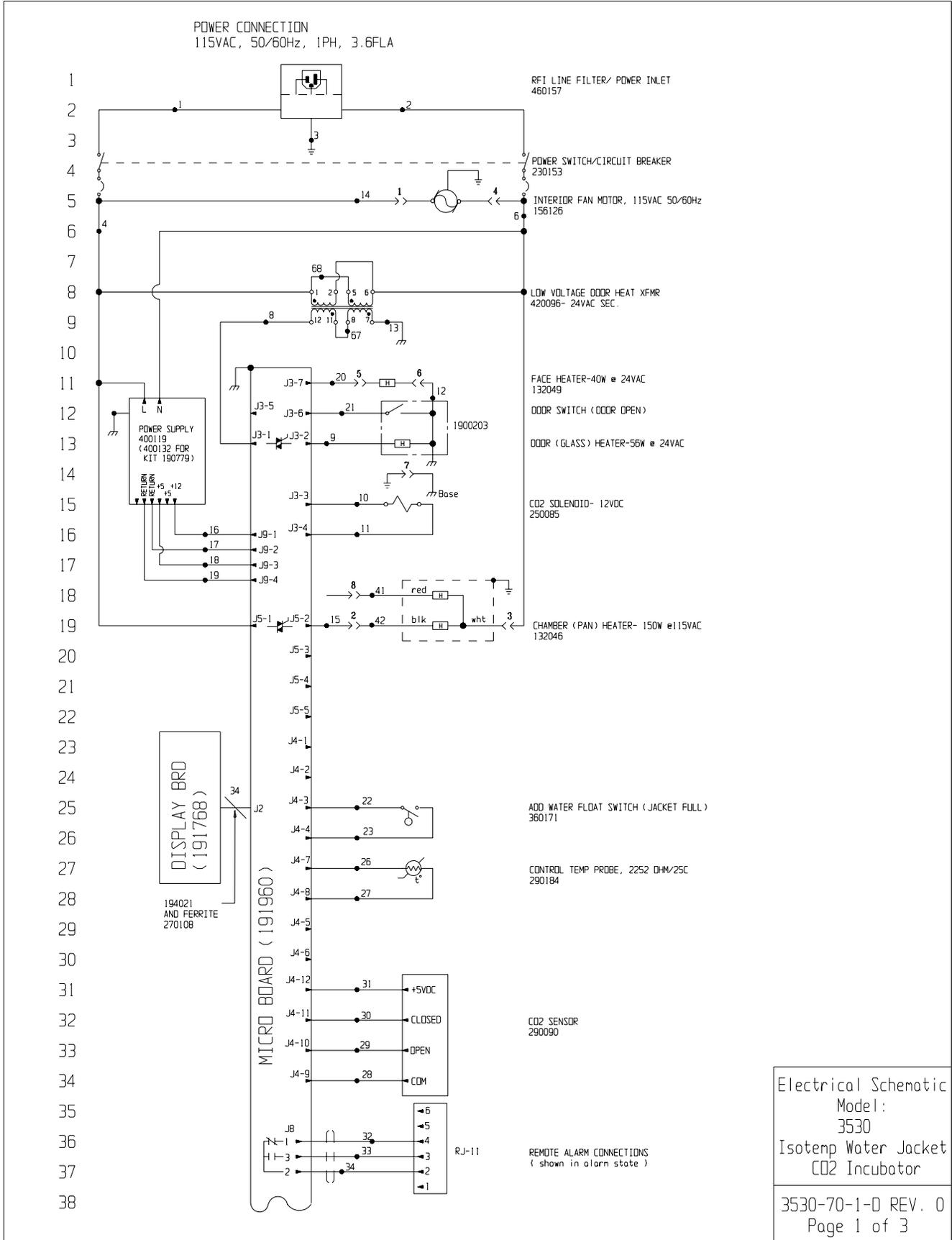
CABINET AND DOOR ASSEMBLY



SYM	STK #	DESCRIPTION
1	190603	EXTERIOR WRAP
2	190611	HINGE PIN
3	190612	HINGE BLOCK
4	22053	8-32 X 1/2 SS SCREW
5	190604	EXTERIOR OODR ASSY
6	550046	8-32 X 3/8 NYLON SCREW
7	990026	EXTERIOR OODR GASKET
8	190601	EXTERIOR WRAP BASE
9	113002	LEVELING FOOT
10	121009	RETAINER CLIPS
11	247012	DRAIN VALVE
12	190602	BASE COVER
13	247013	DRAIN VALVE ADAPTER

MODELS
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3531

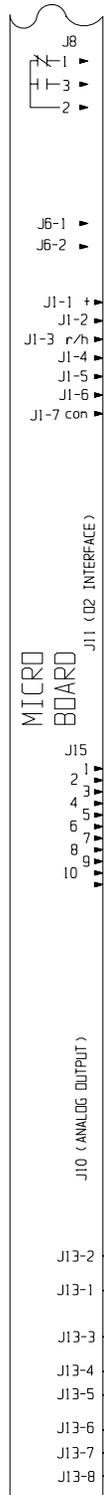
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Electrical Schematic
Model:
3530
Isotemp Water Jacket
CO2 Incubator

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Electrical Schematic Model: 3530 Isotemp Water Jacket CO2 Incubator
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WIRE REFERENCE CHART					
NO.	GA.	COLOR	NO.	GA.	COLOR
1	16	BROWN	26	22	YELLOW
2	16	BLUE	27	22	YELLOW
3	16	GRN/YEL	28	22	GREEN
3B	16	GREEN	29	22	GRAY
4	18	BLACK	30	22	PURPLE
5	N/U		31	22	ORANGE
6	18	WHITE	32	22/3	BLACK
7	N/U		33	22/3	RED
8	18	BROWN	34	22/3	WHITE
9	18	BLUE	41	18	RED
10	18	YELLOW	42	18	BLACK
11	18	YELLOW	67	18	RED
12	18	BLACK	68	18	ORANGE
13	18	GREEN			
14	18	BLUE			
15	18	ORANGE			
16	18	RED			
17	18	GREEN			
18	18	ORANGE			
19	18	GREEN			
20	18	ORANGE			
21	22	BROWN			
22	22	BLUE			
23	22	BLUE			
24	22	RED			
25	22	RED			

SENSOR REFERENCE VALUES
CO2 (290090) DIFFERENCE VOLTAGE OF 3-6MV/%CO2
J4-9 & J4-10 TO J4-9 & J4-11

0	NA	08-23-06	GJG	GJG	CCS	RELEASED FOR PRODUCTION
REV	ECN NO.	DATE	BY	CAD	APPO	DESCRIPTION OF REVISION
MODEL/PART NAME: 3530 WATER JACKET INCUBATOR			DWG TITLE: ELECTRICAL SCHEMATIC			
DWN:	GJG	CAD:	GJG	APPO:	DATE:	08-23-06 SCALE: NA
MATERIAL: NA						
PAINT COLOR: NA						
TOLERANCE UNLESS OTHERWISE SPECIFIED			DRAWING NUMBER		SIZE	
ANGLES: DECIMAL: .XX± .XXX±			3530-70-1-		D	

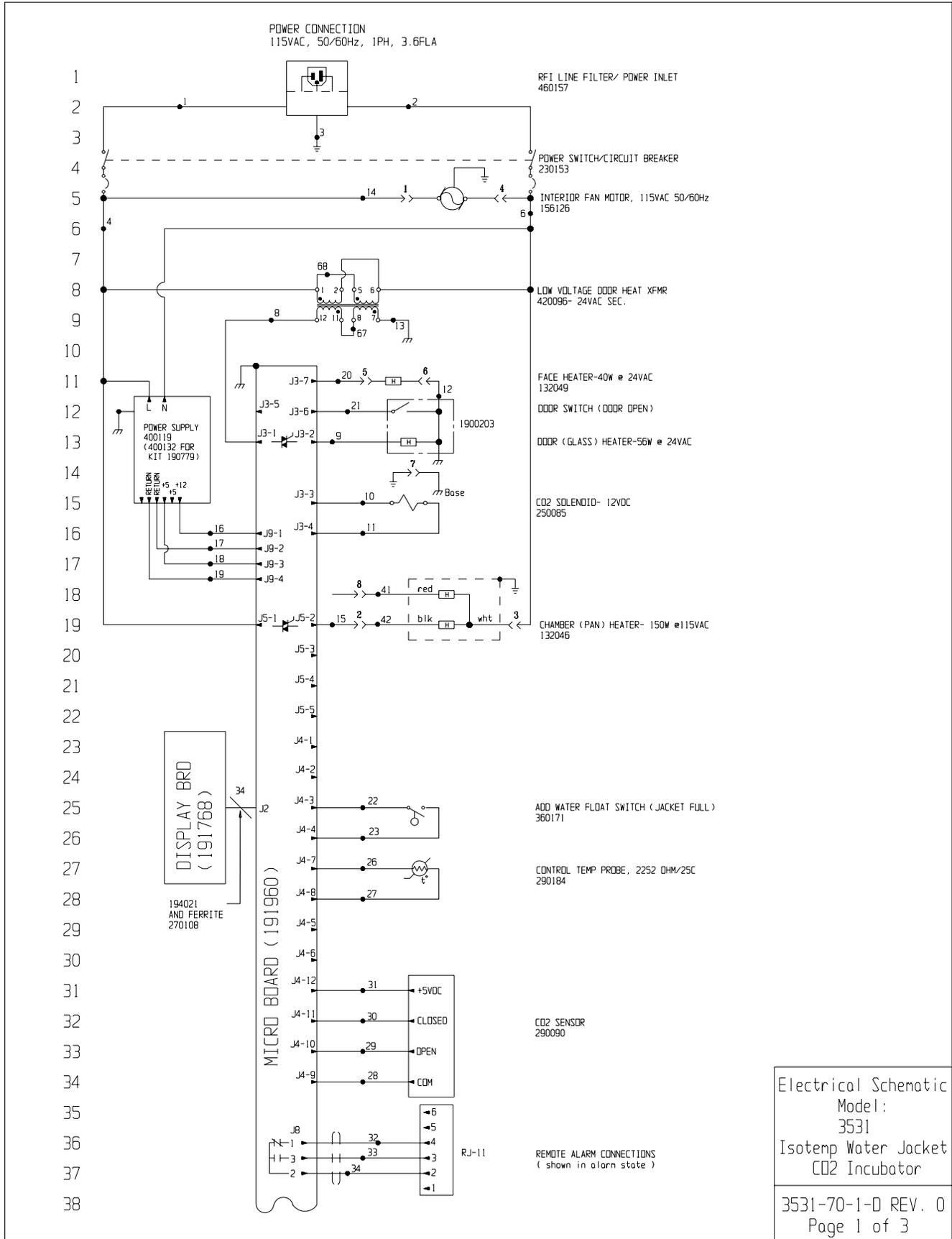
Electrical Schematic
Model:
3530
Isotemp Water Jacket
CO2 Incubator
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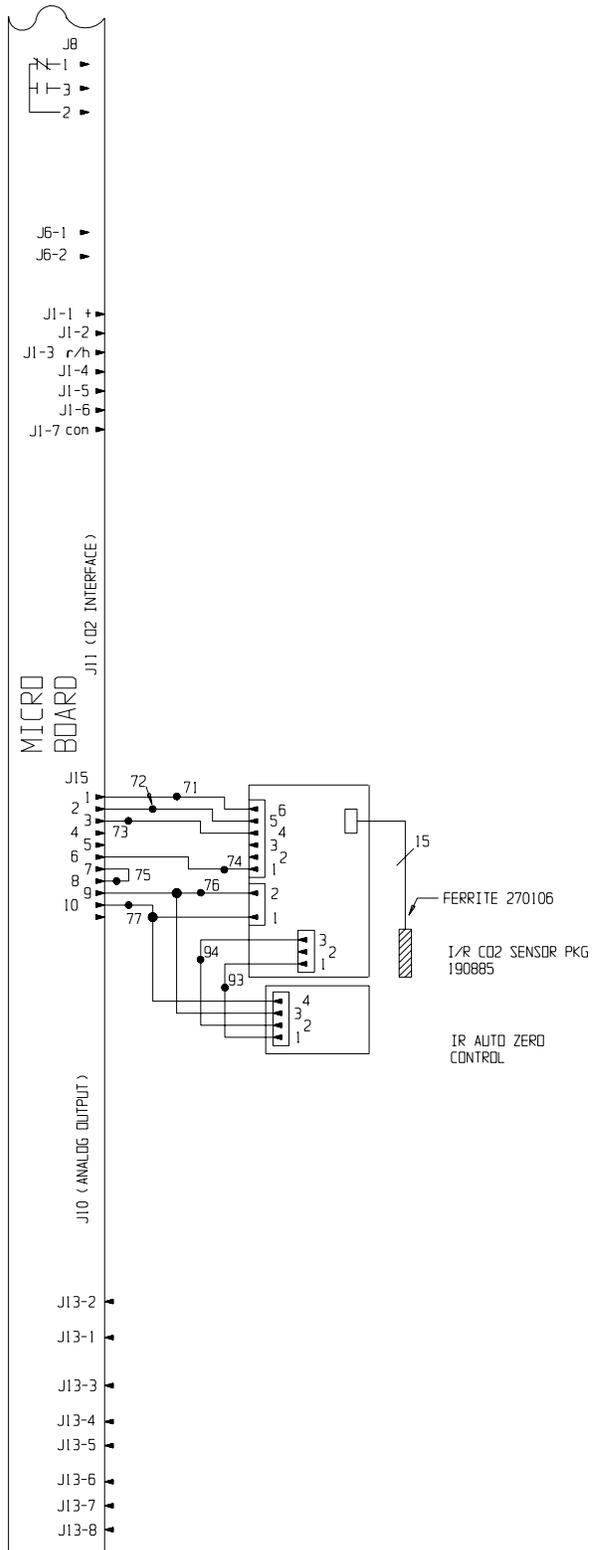
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ELECTROSTATIC
SENSITIVE DEVICES

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Electrical Schematic Model: 3531 Isotemp Water Jacket CO2 Incubator
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WIRE REFERENCE CHART					
NO.	GA.	COLOR	NO.	GA.	COLOR
1	16	BROWN	26	22	YELLOW
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11	18	YELLOW	67	18	RED
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13	18	GREEN			
14	18	BLUE			
15	18	ORANGE			
16	18	RED			
17	18	GREEN			
18	18	ORANGE			
19	18	GREEN			
20	18	ORANGE			
21	22	BROWN			
22	22	BLUE			
23	22	BLUE			
24	22	RED			
25	22	RED			

SENSOR REFERENCE VALUES

CO2 (290090) DIFFERENCE VOLTAGE OF 3-6MV/%CO2
J4-9 & J4-10 TO J4-9 & J4-11

0	NA	08-23-06	GJG	GJG	CCS	RELEASED FOR PRODUCTION
REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
MODEL/PART NAME: 3531 WATER JACKET INCUBATOR W/IR SENSOR						
DWG TITLE: ELECTRICAL SCHEMATIC						
DWN: GJG		CAD: GJG		APPD:		DATE: 08-23-06 SCALE: NA
MATERIAL: NA						
PAINT COLOR: NA						
TOLERANCE UNLESS OTHERWISE SPECIFIED				DRAWING NUMBER		SIZE
ANGLES: DECIMAL: .XX±				3531-70-1-		D

Electrical Schematic
Model:
3531
Isotemp Water Jacket
CO2 Incubator
3531-70-1-D REV. 0
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THERMO ELECTRON CORPORATION STANDARD PRODUCT WARRANTY

The Warranty Period starts two weeks from the date your equipment is shipped from our facility. This allows for 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 year warranty period.

During the first year, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, labor included. Installation and calibration are 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 components 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 components or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo Electron Corporation 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 relating 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 application. Outside the USA, contact your local distributor for warranty information.

