



Fisher Scientific

Isotemp

Laboratory CO₂ Incubators

Installation and Operation Manual

7003532 Rev. 6

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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:

3532 115V T/C Sensor
 3533 115V IR Sensor

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

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MANUAL NUMBER 7003532

6	25248/IN-3945	6/09/09	Updated drawer specs-sliding and stationary	ccs
5	23793/IN-3916	5/29/09	Updated 310-201-0-B - o-ring 101004	ccs
--	25499/IN-3936	5/29/09	Updated 310-203-0-D - part number 190876	ccs
4	25303/IN-3902	2/17/09	ULdecom warning pg 1-4	ccs
3	24975	10/31/08	Updated water specs on page 1-5	ccs
2	24613/IN-3857	6/9/08	Updated 3532-202-0-D drawing (removed HEPA reference info)	ccs
1	23784/IN-3748	11/22/06	Vinyl on duct sheets not removed before shipping, vinyl color chg	ccs
0	--	10/02/06	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.

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1-800-438-4851

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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).

Repairs NOT Covered Under Warranty

- **Calibration of control parameters.** Nominal calibrations are performed at the factory; typically $\pm 1^{\circ}\text{C}$ for temperature, and $\pm 1\%$ for gases. 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, etc.**

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Section 1 - Installation and Start-up

1.1 Name and Description of Parts

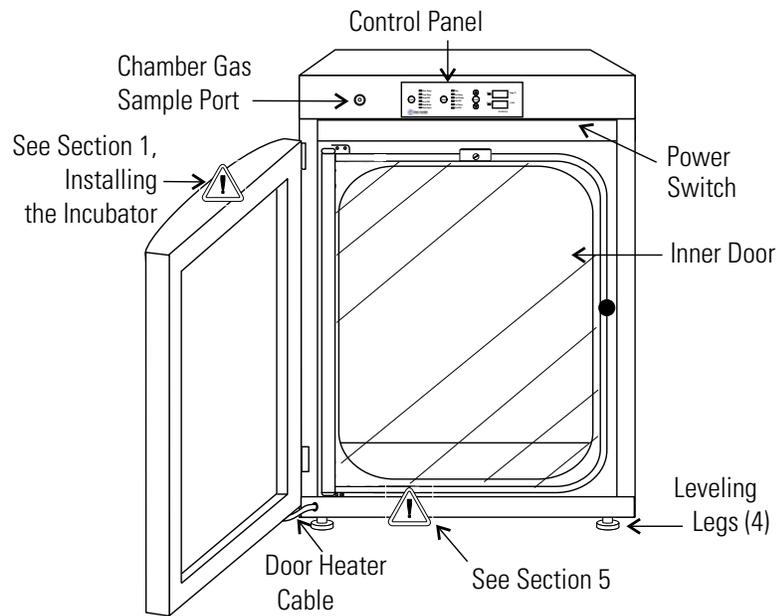


Figure 1-1
Direct Heat Incubator

- Outer Door - Reversible to opposite swing, see Section 4.4
- Heated Outer Door - Keeps interior door clear of condensation.
- Chamber Gas Sample Port - Used for sampling chamber CO₂ content, using a Fyrite or similar instrument.
- Main Power Switch - Outer door must be open to access
- Control Panel - Keypad, Displays and Indicators. (See Figure 1-2).
- Leveling Legs - Used to level the unit.

Note: The incubators are stackable. See Section 1.4.

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

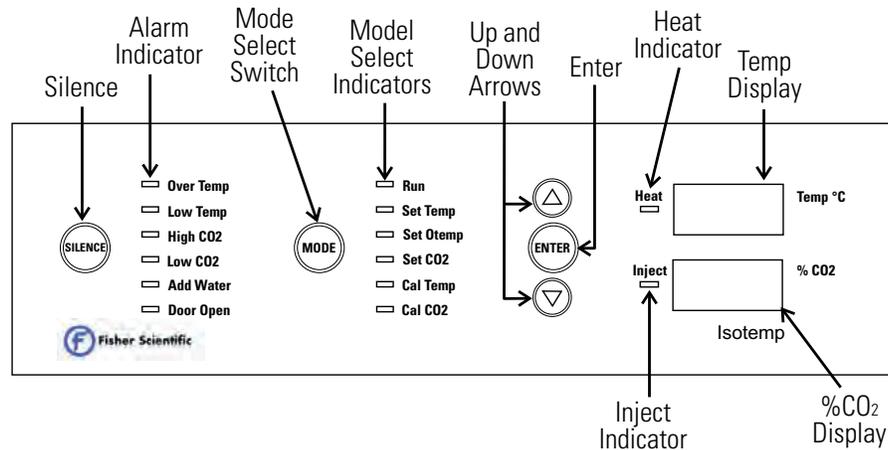


Figure 1-2
Control Panel

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 direct heat 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 weight of 205 lbs. (93kg).
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

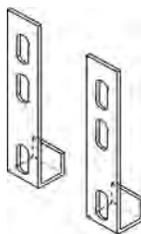


CAUTION! When stacking incubators, the direct heat incubator must be the top unit. Never stack a water-jacketed incubator on top of a Model 310 Series unit.

WARNING! With incubators in a stacked configuration, do not leave both exterior doors open at the same time.

WARNING! If the units have been in operation, shut them both off and disconnect from the power source before beginning any service work.

NOTE: Two stacking brackets (shown at right) are included in the parts bag shipped with each incubator.



1. Unscrew the slotted head screws on the top of the bottom incubator about an inch. Refer to Figure 1-4.

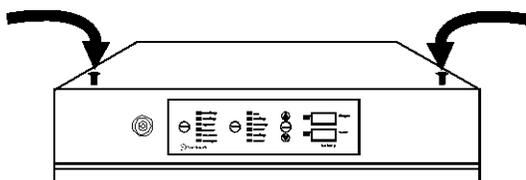


Figure 1-4

2. Remove the kickplate from below the door on the top incubator (Figure 1-5). Two Phillips screws secure the plate. Note the notches at the base of the incubator frame.

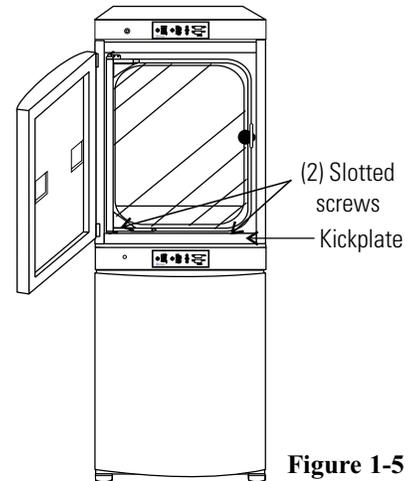


Figure 1-5

3. Disconnect the door cable from the connector behind the plate. Lift the door off the hinge pins and set it aside. The hinge pins are not attached to the brackets and may fall out when the door is lifted off.
4. Unscrew and remove the leveling feet from the top unit and lift it onto the bottom unit, offsetting the base of the top unit approximately 2-3 inches behind the screws identified by the arrows in Figure 1-4.



WARNING! This incubator weighs 205 lbs. Have sufficient personnel available when lifting. Lift the unit only by the sides of the cabinet base. Do not attempt to lift it by the front and back as this places stress on the outer door hinge.

5. Align the sides of the top unit with the bottom unit and slide the top unit forward until the notches in the base of the top unit align with the (2) slotted screws in the top of the bottom unit.
6. Remove the four nylon plugs on the lower back of the upper incubator.
7. Insert the stacking brackets into the slots on the back of the control panel of the bottom unit (Figure 1-6).

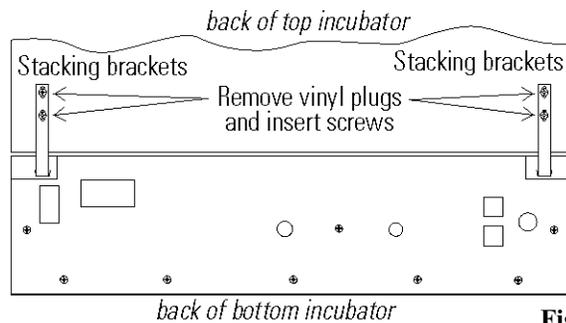


Figure 1-6

8. Align the slots in the brackets with the mounting holes on the back of the top incubator. Secure the brackets with the screws provided in the stacking kit.
9. Make sure the hinge pins are in the hinge brackets. Slide the door onto the hinge pins.
10. Secure the door heater cable to the connector below the door and replace the kick plate on the top unit, taking care not to crimp the cable.
11. The stacked incubators are ready for service.

c. Preliminary Cleaning

1. Remove the protective plastic coating on the shelf supports, duct sheets, and air duct, if present.
2. 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 Air Sample Filter

1. Remove the filter from the shipping bag.
2. Separate one section of the tubing from the filter. Install this section to the fitting on the blower plate.
3. After installing the top duct, connect the filter assembly to the tubing coming through the top duct.
4. Insert the free end of the air sample filter tubing into the larger hole in the back of the blower scroll. See Figure 1-7 for completed configuration.

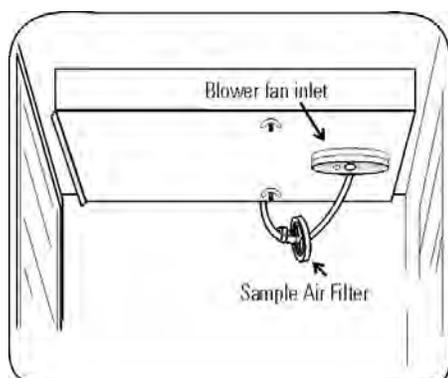


Figure 1-7

e. Installing the Shelves

1. Install the large sheet metal shelf supports with the tabs facing into the center of the chamber with their slots up. There are no right side or left side supports, simply turn one of them to fit the opposite side. Tilt the shelf supports as they are placed in the chamber so the tops fit into the top air duct, then guide them into the vertical position. Figure 1-8 shows the support as it would be oriented for the right side of the chamber.
2. Note there is no difference in the left side and right side shelf channels.

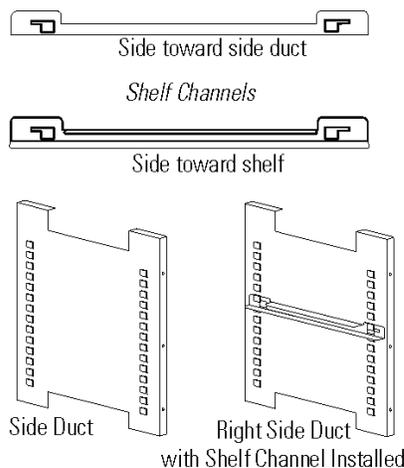


Figure 1-8

3. Install the shelf channels by placing the channel's rear slot over the appropriate rear tab on the shelf support. Pull the shelf channel forward and engage the channel's front slot into the shelf support's appropriate forward tab. Refer to Figure 1-9.

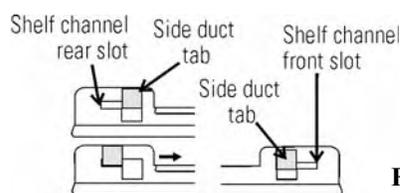


Figure 1-9

f. 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.

g. 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. 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 1-10) and into the grounded dedicated circuit.

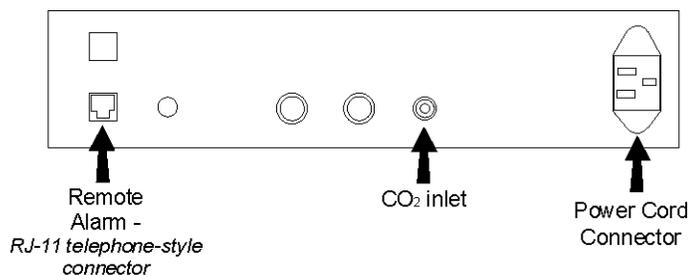


Figure 1-10

h. 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 reservoir. 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 reservoir.



CAUTION! Distilled or de-ionized water used in the humidity pan 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 with sterile pure water to within 1/2 inch of the top with sterile, distilled water. Place the pan directly in the center of 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. 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.

i. 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 serrated fittings on the back of the cabinet to connect the gas supply. Refer to Figure 1-10. The fitting is labeled CO₂ Inlet #1. Make sure that the connections are secured with clamp. Check fittings 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.

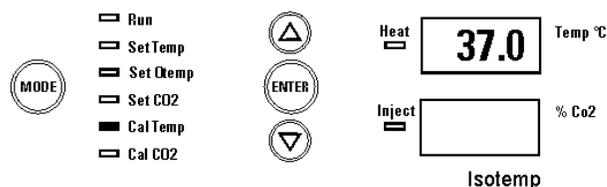
2.1 Calibrating the Temperature

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 3532 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.

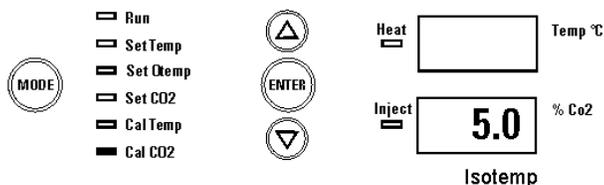
Changing temperature or changing from elevated humidity levels to room ambient humidity levels would necessitate a recalibration of the CO₂ control.

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 3533 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.
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 and 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 Direct Heat 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.

Isotemp DH Incubators _____ Preventive Maintenance



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, ½” 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 filters, if applicable (<i>or as needed</i>)				✓		

* Qualified service technicians only

Section 4 - Routine Maintenance



WARNING! *If the unit has been in service, turn it off and disconnect the power cord connector before proceeding with any maintenance.*

4.1 Disinfecting the Incubator Interior



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

Use an appropriate disinfectant. All articles and surfaces to be disinfected must be thoroughly cleaned, rinsed with sterile water, and rough dried.



WARNING! *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.*

Do not spray 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.

CAUTION! *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. Remove the shelves, sample air filter, left and right duct sheets and the top duct. The top duct requires the two wing nuts to be removed.
2. Wash the shelves, ducts, and wing nuts with disinfectant. Optional: These components may be autoclaved.
3. Remove the blower scroll held on by four screws. Remove the blower wheel. If a new blower wheel and scroll are going to be used, discard the old ones. If the old ones are being reused, wash and rinse all parts with disinfectant.

4. The CO₂ sensor may be lowered by unscrewing the retaining ring around the sensor. This will allow the sensor gasket to be removed, cleaned and replaced. WIPE the CO₂ sensor; do not spray or soak.
5. Wash the inner door gasket with disinfectant. The inner door gasket may be removed and/or replaced.
6. Wash the cabinet interior with disinfectant, starting at the top and working down. Refer to the disinfectant directions for length of time needed before rinsing. 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.
7. If the CO₂ sensor gasket was removed, spray it with 70% alcohol and install it. Install a new sample filter.
8. Install the top duct, left and right ducts, and inner door gasket, spraying each with 70% alcohol.
9. Install the shelves and spray with 70% alcohol.

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 Glass Doors

The chamber glass door and the optional independent inner glass doors may be cleaned using the same disinfectant used on the incubator interior. It is imperative that they be rinsed with sterile distilled water to remove the disinfectant residue. The doors should then be dried with a soft cloth.

Precautions in the cleaning and care of the glass doors:

Moisture leaches alkaline materials (sodium, Na) from the surface of the glass. Evaporation of the moisture concentrates the alkaline and may produce a white staining or clouding of the glass surface. Cleaning chemicals with a pH above 9 and heat (autoclaving) accelerate the corrosion process. Therefore, it is very important to rinse and dry the glass doors after cleaning. Autoclaving the glass doors should be avoided.

There is no simple method for repairing corroded glass. In most cases, the glass must be replaced.

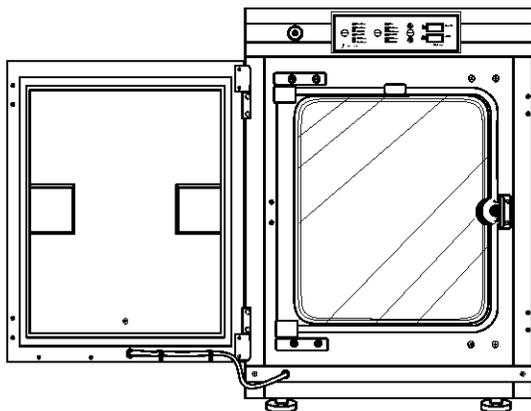
4.4 Cleaning the Humidity Pan

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.

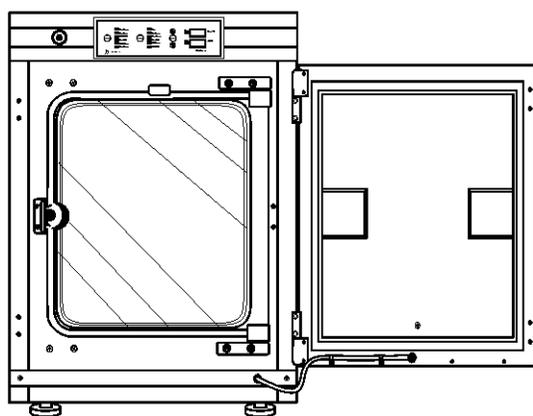
4.5 Reversing the Door Swing

For side-by-side operation or changing lab layouts, the inner and outer doors are field reversible. The procedure is written from the prospective 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 screwdriver, a 1/8" Allen wrench and a flatblade screwdriver.

The door reversing procedure takes about 30 minutes.



Left hand door swing



Right hand door swing

Figure 4-1

1. Remove the kick plate at the bottom of the cabinet by removing the two Phillips screws indicated by the black arrows in the illustration. Disconnect the cable inside the cabinet.
2. Open the outer door and remove it by lifting it off its hinge pins. Place the door on a padded surface to prevent scratches. See Figure 4-2.

NOTE: The hinge pins are not connected to the brackets and may fall out when the door is lifted off.

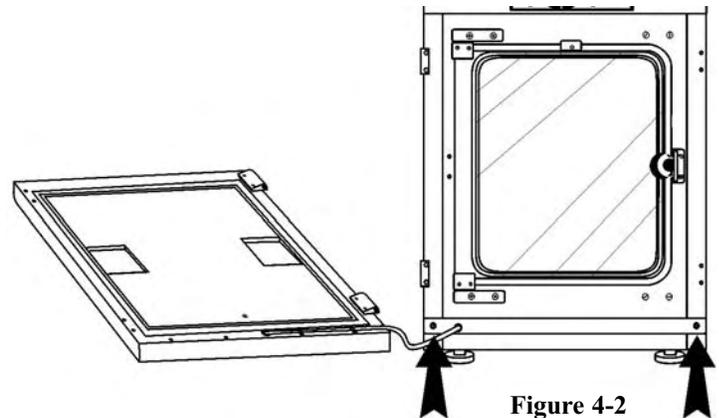


Figure 4-2

3. Refer to the illustration of the outer door in Figure 4-2. With a Phillips screwdriver, remove and save the four nylon screws from the door hinge mounting holes. The black arrows identify the screw locations.
4. Remove the door hinges, rotate them 180° and secure them on the left side of the door. Install the nylon screws into the newly exposed holes.
5. Remove the two plastic clips securing the door heater cable. These clips will be rotated 180° when installed on the left lower edge of the door frame.
6. Rotate the kick plate and attach the door heater cable with the clips as shown in Figure 4-3. The insert in the illustration shows the proper positioning of the clips.

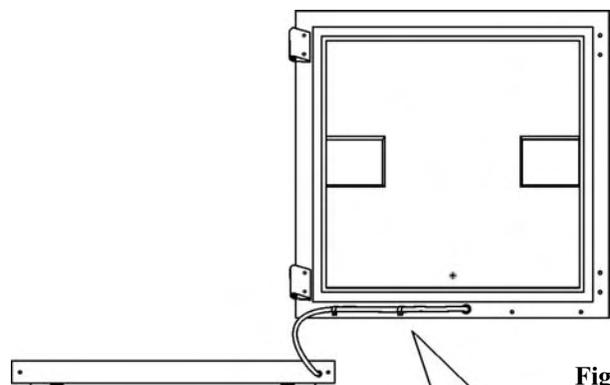
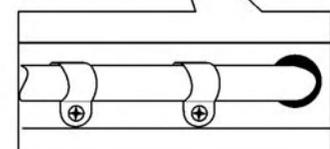


Figure 4-3



- The incubator and door should look similar to Figure 4-4.

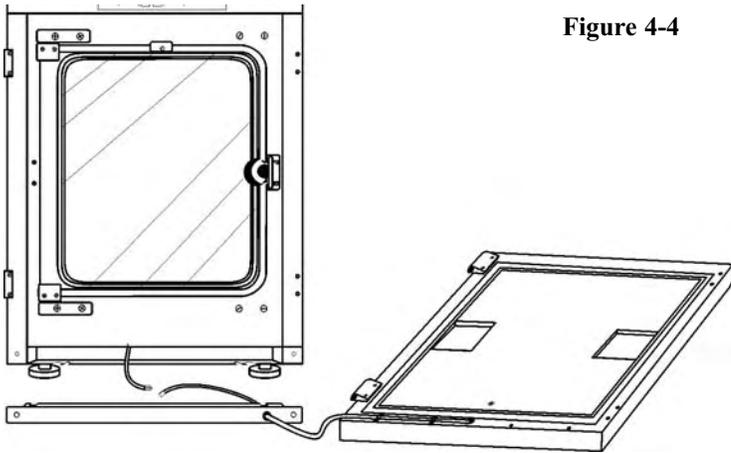


Figure 4-4

- Refer to Figure 4-5 for the next steps. Remove the nylon screws along the right side of the cabinet. Remove the outer door hinges. Rotate them 180° and install them on the right side of the cabinet. Install the nylon screws in the holes vacated by the hinges.

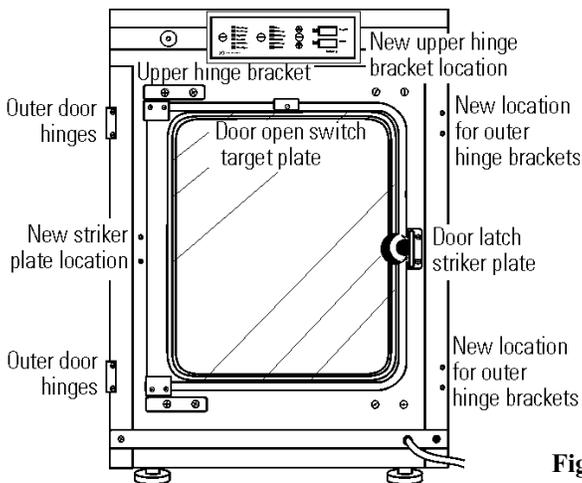


Figure 4-5

- With a 1/8" Allen wrench, remove the door open switch target plate on the top of the inner door.
- Remove the door latch striker plate.
- Hold the door securely and remove the upper hinge bracket on the cabinet. This hinge bracket will be rotated 180° and be placed in the lower right corner of the cabinet where indicated.
- Lift the glass door from the lower hinge and set it aside. Then remove the lower hinge from the cabinet. This hinge bracket will be rotated 180° and be placed in the upper right corner of the cabinet at where indicated.
- Remove the screws and washers from the new striker plate location. These screws and washers can be threaded into the holes vacated by the striker plate where indicated.

- Rotate the striker plate 180° from its original position and attach it to the cabinet where indicated.
- Using a flatblade screwdriver, remove the threaded nylon plugs from the new hinge bracket locations. Install the lower hinge bracket where indicated.
- Rotate the door 180° and place it in the lower hinge bracket. Install the upper hinge bracket where indicated.
- Screw the threaded plugs into the holes vacated by the door hinge brackets where indicated in Figure 4-5.
- Install the door open switch target plate. Refer to Figure 4-6 and 4-7. The plate must be positioned exactly 12.5 inches from the outside edge of the cabinet to the leading edge of the plate. Do not overtighten.

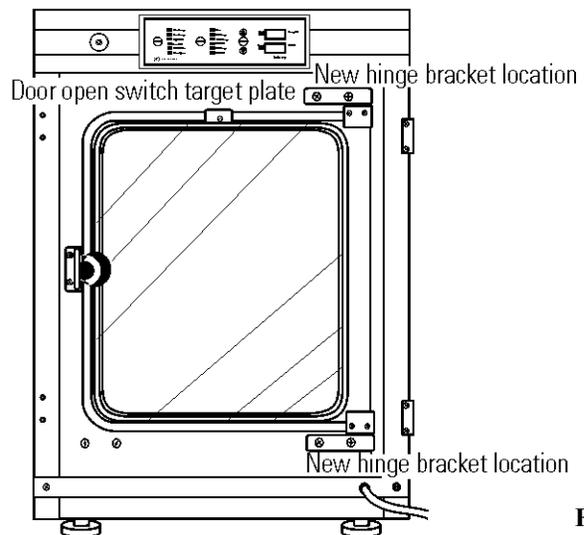


Figure 4-6

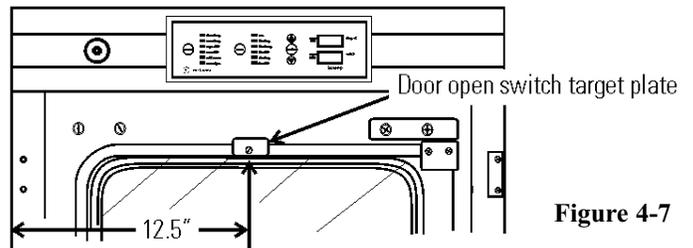


Figure 4-7

- Connect the door heater cable and install the kick plate with the door heater cable on the right side.
- Installing the outer door onto the hinge pins completes the door reversal procedure.

4.6 Replacing Fuses

There are only two replaceable fuses in the incubator. To access the fuses:

1. Turn off the incubator's power switch and unplug the power cord.
2. Open the outer door to the chamber.
3. Remove the two screws located below the control panel.
4. Lift up on the control panel, then pull it out.
5. Refer to Figure 4-8 for the location of the two fuses.

Table 4-1

Fuse Voltage	Manufacturers Part #	Amperage Rating	Rupture Speed	IEC Letter Code
115 VAC ACC	BUSS GMC - 1.0A	1.0 Amp	Time-Lag	T
24 VAC Door Heat	Schurter 034.3124	5.0 Amp	Time-Lag	T

6. See Table 4-1 for fuse replacement specifications.
7. Slide the control panel back in, replace the screws and return the unit to service. If the fuse(s) blow after restoring power to the incubator, contact Technical Services Department (see Page iii near the front of this manual).

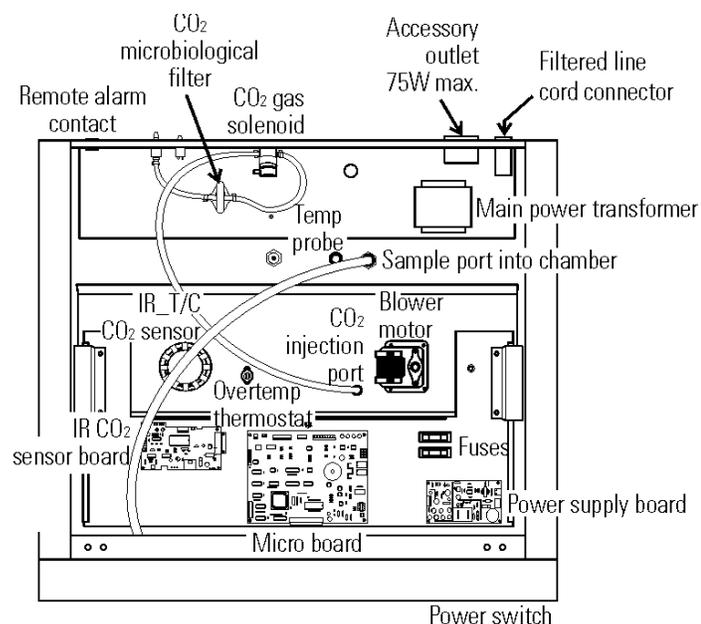


Figure 4-8

4.7 Electronics Section

1. Turn off the incubator's power switch and unplug the power cord.
2. Remove the two screws from the front of the cabinet top and the two screws in the uppermost corners of the back panel.
3. Slide the top about an inch to the rear and lift it off.

NOTE: There are small locking tabs in the rear which will be bent if the top is lifted off without sliding it first to the rear.

4.8 Replacing the Air Sample Filter

1. Connect one end of the sample port filter to the ceiling port.
2. Connect the other end of the filter to the back of the blower fan inlet.

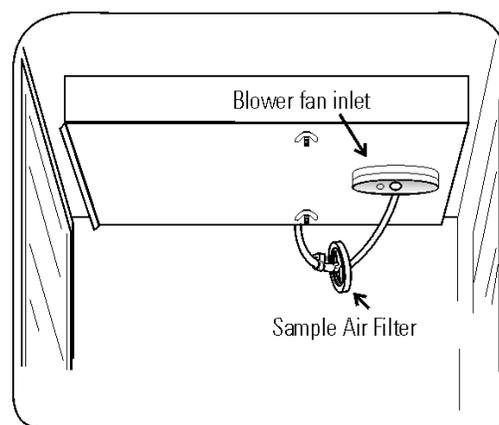


Figure 4-9

Section 5 - Factory Options

6.1 Connect Remote Alarm Contacts

A set of relay contacts is provided to monitor alarms through an RJ11 telephone style connector on the back of the cabinet. Refer to Figure 1-10 for the location of the alarm connector. The 12-foot telephone cord (P/N 190388) and RJ11-to-screw terminal conversion box (P/N 190392) are available through our Services department.

The remote alarm provides a NO (normally open) output, an NC (normally closed) output and COM (common). Refer to Figure 6-1.

The contacts will trip on a power outage or an overtemperature condition. The contacts may also be programmed to trip or not trip on temperature alarms, CO2 alarms, and RH alarms. See Section 3, Configuration Mode.

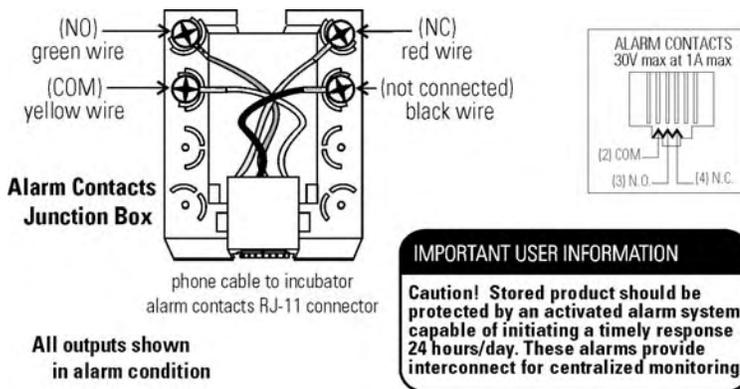


Figure 6-1



Section 6 - Specifications

Temperature

Control $\pm 0.1^{\circ}\text{C}$ Microprocessor PID Control
 SetpointDigital - Touch pad, 0.1°C
 Range $+5^{\circ}\text{C}$ above ambient to 50°C
 Uniformity $\pm 0.2^{\circ}\text{C}$ @ $+37^{\circ}\text{C}$
 Tracking alarm User programmable (low) indicator
 Overtemp . .Tracking, user programmable, action, and indicator
 DisplayDigital, LED, 0.1°C increments

Temperature Safety

Type Extreme temperature safety, action, and indicator
 Sensor Thermostat, independent of temp control system
 Indicator Audible and visual alarms

Relative Humidity

ControlHumidity Pan - natural vaporization
 Humidity with pan95% RH at 37°C

CO₂

Control $\pm 0.1\%$ microprocessor PID control
 SensorT/C or IR
 Readability0.1%
 Range0 to 20%
 Inlet pressure15 psig, ± 5 psig
 DisplayDigital LED, 0.1% increments

Shelves

Dimensions18.5" x 18.5" (47cm x 47cm)
 Construction Stainless steel (belt sanded, both sides)
 Surface area2.4 sq. ft. (0.22 sq. m) per shelf
 Max. per chamber38.4 sq. ft. (3.6 sq. m)
 Standard3
 Maximum16

Construction

Interior volume6.5 cu. ft.
 InteriorType 304 stainless steel shiny finish
 Exterior18 gauge cold roll steel
 Outer door gasket Four-sided molded, magnetic vinyl
 Inner door gasketFeather-edge, removable
 InsulationFiberglass

Fittings

CO₂ inlet1/4" barbed
 Sample portFront mounted barbed

Electrical

115 V models - 90-125VAC, 50/60 Hz, 1PH, 2.4 FLA
 Power switch/circuit breaker2 Pole, 6.0 Amp
 Accessory outlet Voltage equal to the cabinet input,
 75 Watts maximum, 0.5ma leakage current
 Alarm contacts . . Deviation of temperature, CO₂, power, NO
 and NC

Unit BTU Output

115V344 BTUH (100 watt)

Dimensions

Exterior26.0" W x 38.5" H x 25.0" F-B
 Interior21.4" W x 26.8" H x 20.0" F-B

Weight

Net205 lbs

Safety Specifications

Indoor Use Only

Altitude - 2,000 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 - Mains supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage

Installation Category II ¹

Pollution Degree 2 ²

Class of Equipment I

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

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

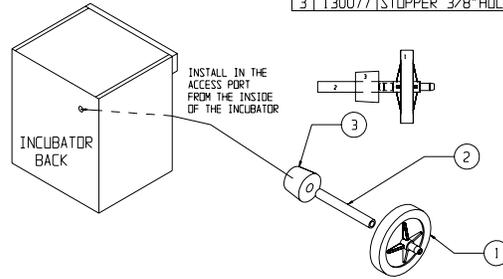
Section 7 - Parts

Part Number	Description
190699	Removable feather gasket
190670	Duct sheet and shelf channel kit
191957	Micro board, (main control)
230135	Fuse, 1A, TD, 5 x 20mm
230120	0.5A fuse, TD, 5 x 20mm (accessory outlet)
230161	Fuse, 5A, 5 x 20mm
1900071	Motor, 2-pole, 115VAC, 50/60 Hz
1900360	Display board
290184	Probe, 2252 Ohm/25°C, 1/8 x2
770001	Disposable filter, 99.97 (CO ₂ line, air sample)
224175	Shelf
190884	Stainless steel shelf kit (shelf with two channels)
190869	Decontamination kit
290090	Thermal conductivity type CO ₂ sensor
190885	Infrared type CO ₂ sensor w/ auto zero
250087	CO ₂ valve with fittings
965010	CO ₂ gas regulator
3050	External gas guard
190883	Sample port filter assembly
190661	IR sensor filter
190985	Filtered air exchange assembly
230153	6A, DPDT circuit breaker switch (power)
400199	Switcher, 40W, 12, 5, -12V
420096	130VA transformer, 12/24V S
194021	34 position control to display ribbon cable
1900063	Roller base

ID#	STK #	DESCRIPTION
1	310-201-0-0	IR/TC SENSOR ASSEMBLY
2	310-202-0-0	MOTOR/BLOWER ASSEMBLY
3	116022	HINGE, 1/4" GLASS
4	105060	DOOR, TEMPERED GLASS
5	180174	FACE FRAME, PVC
6	190611	HINGE PIN, STN STEEL
7	190612	HINGE BLOCK, ALUMINUM 2.0"
8	190643	TEMPERATURE PROBE ASSEMBLY
9	191534	REMOVEABLE FEATHER GASKET
10	113002	ADJUSTABLE FOOT
11	190788	OUTER DOOR W/ HEATER
12	190795	MAGNET MOUNT, DOOR
13	190833	LATCH MOUNT, INNER DOOR
14	180210	KNOB, BLACK
15	XXXXX	GAS INJECT PORT
16	360230	SWITCH, MAGNETIC ACTUATED
17	360231	MAGNET, DOOR
18	400133	THERMOSTAT, SNAP ACTION
19	990033	MAGNETIC GASKET, MOLDED
20		
21	840020	SAMPLE PORT BULKHEAD FITTING
22	132054	LEFT HEATER, 13 WATTS
23	132050	BACK HEATER, 30 WATTS
24	132051	BOTTOM HEATER, 24 WATTS
25	132055	RIGHT HEATER, 22 WATTS
26	132053	COLLAR HEATER, 9 WATTS
27	NA	DOOR HEATER, 69 WATTS
28	132056	FACE HEATER, 27 WATTS
29	1900252	MOTOR GUARD

PARTS LIST - DETAIL "A"

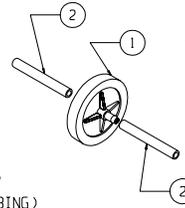
1	1770001	FILTER 50MM 1µM
2	950013	VINYL TUBE 3"
3	130077	STOPPER 3/8"HOLE



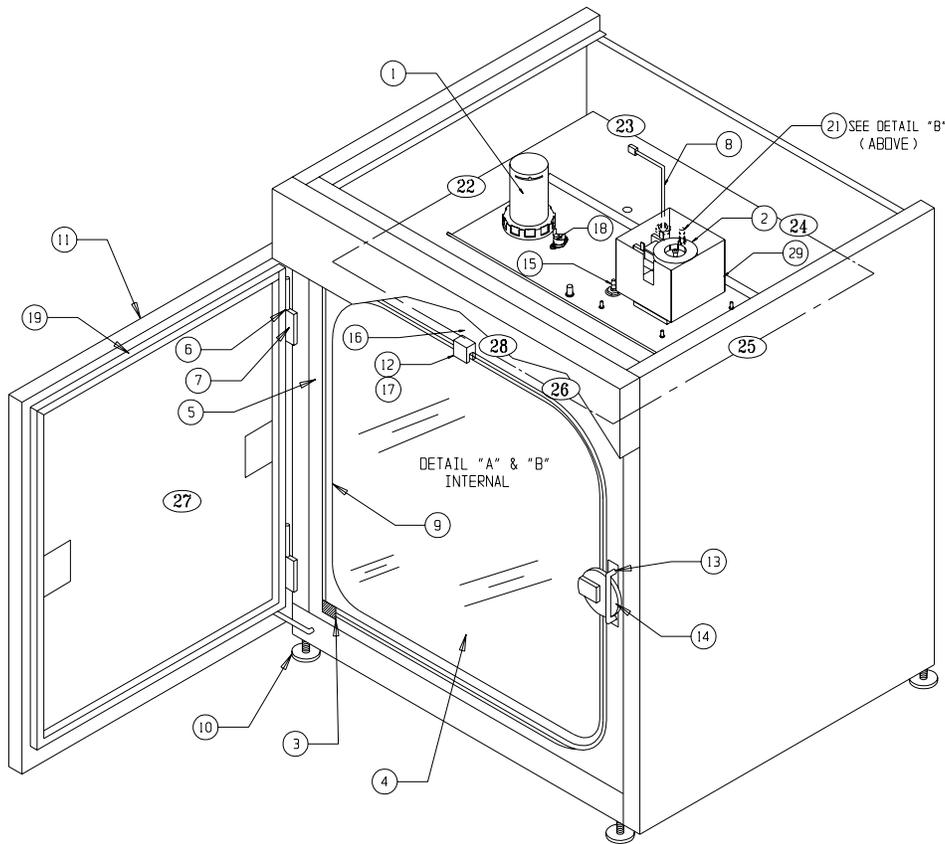
DETAIL "A"

PARTS LIST - DETAIL "B"

1	1770001	FILTER 50MM 1µM
2	244009	STL CONE TUBE 6"



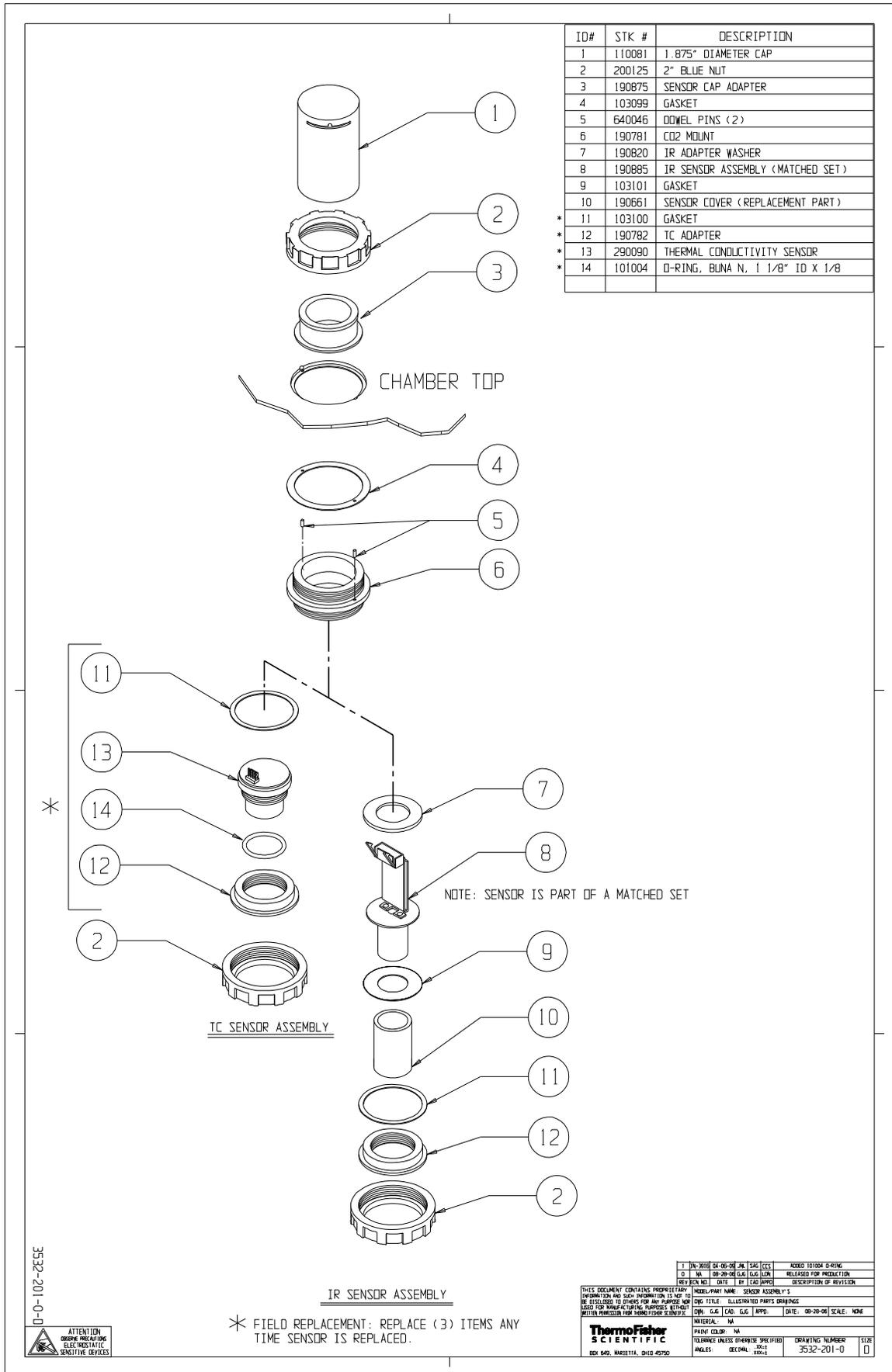
DETAIL "B"
(INTERNAL TUBING)



3532-200-0-0



Q	NA	08-20-08	C.G.	C.S.	CCS	RELEASED FOR PRODUCTION
REV	REV	DATE	BY	APP'D	DESCRIPTION	OR REVISION
<small>THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION IS NOT TO BE DISCLOSED TO OTHERS FOR ANY PURPOSE AND USED FOR MANUFACTURING PURPOSES WITHOUT WRITTEN PERMISSION FROM THERMO ELECTRONICS</small>						
<small>MODEL/PART NAME: NA (CANNOT BE DETERMINED FROM THIS DRAWING)</small>						
<small>OWN: C.G. CAD: C.G. APP'D: [] DATE: 08-20-08 SCALE: NONE</small>						
<small>MATERIAL: NA</small>						
<small>PAINT COLOR: NA</small>						
<small>TOLERANCE UNLESS OTHERWISE SPECIFIED: ANGLES: DECIMAL; XX+1 ANGLES</small>						
<small>Thermo ELECTRON CORPORATION</small>						<small>DRAWING NUMBER: 3532-200-0</small>
						<small>REV: 0</small>



ID#	STK #	DESCRIPTION	
1	110081	1.875" DIAMETER CAP	
2	200125	2" BLUE NUT	
3	190875	SENSOR CAP ADAPTER	
4	103099	GASKET	
5	640046	DOWEL PINS (2)	
6	190781	CO2 MOUNT	
7	190820	IR ADAPTER WASHER	
8	190885	IR SENSOR ASSEMBLY (MATCHED SET)	
9	103101	GASKET	
10	190661	SENSOR COVER (REPLACEMENT PART)	
*	11	103100	GASKET
*	12	190782	TC ADAPTER
*	13	290090	THERMAL CONDUCTIVITY SENSOR
*	14	101004	O-RING, Buna N, 1 1/8" ID X 1/8"

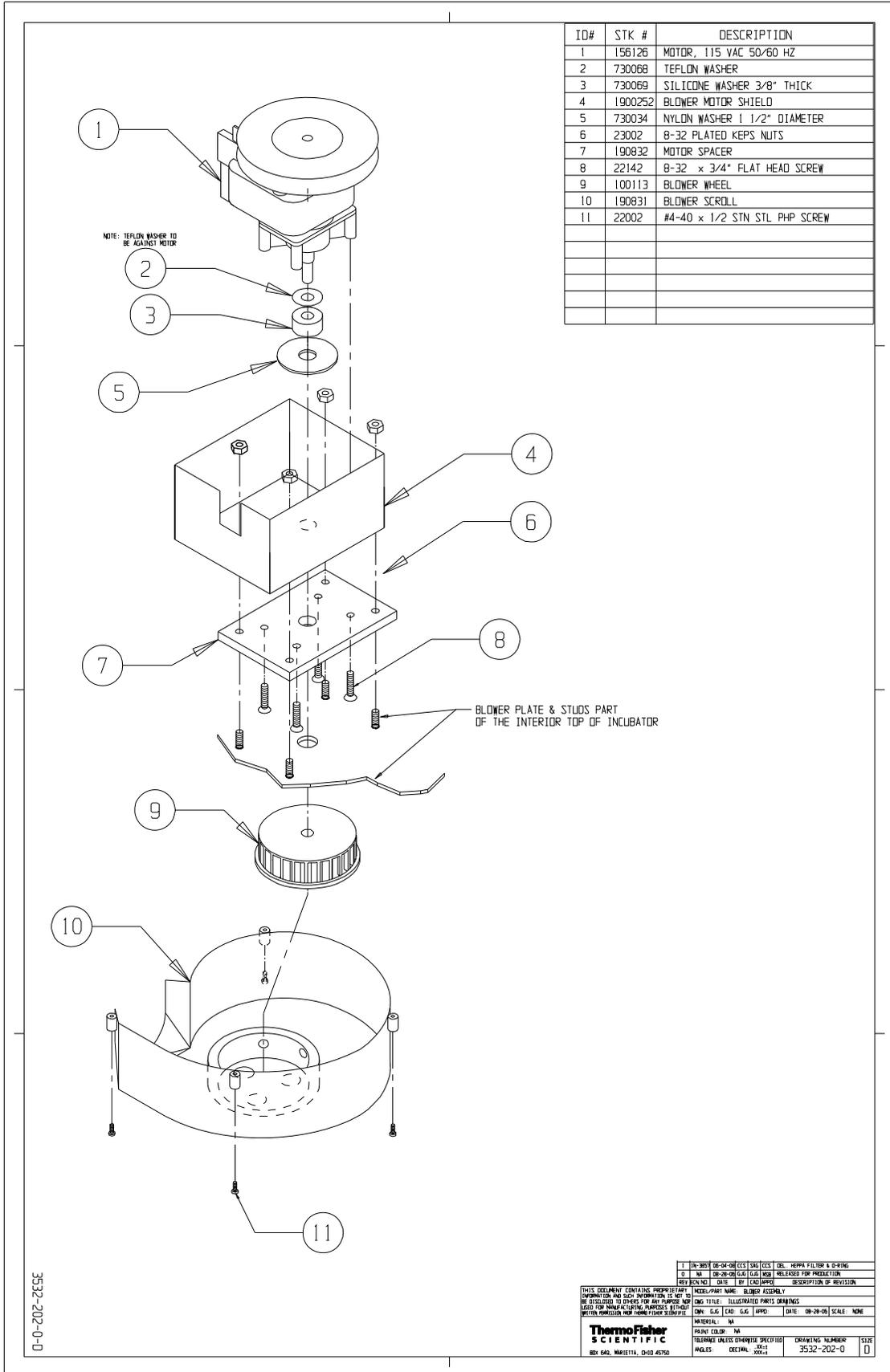
NOTE: SENSOR IS PART OF A MATCHED SET

* FIELD REPLACEMENT: REPLACE (3) ITEMS ANY TIME SENSOR IS REPLACED.

D-0-102-ZESE



1	11-2018	04-09-08	AK	SAG	CCS	ADDED 103100 O-RING
0	NA	09-20-08	GJC	GJC	HLN	RELEASED FOR PRODUCTION
REV	NO.	DATE	BY	CHKD	APPROV	DESCRIPTION OF REVISION
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 FISHER SCIENTIFIC			MODEL/PART NAME: SENSOR ASSEMBLY'S			
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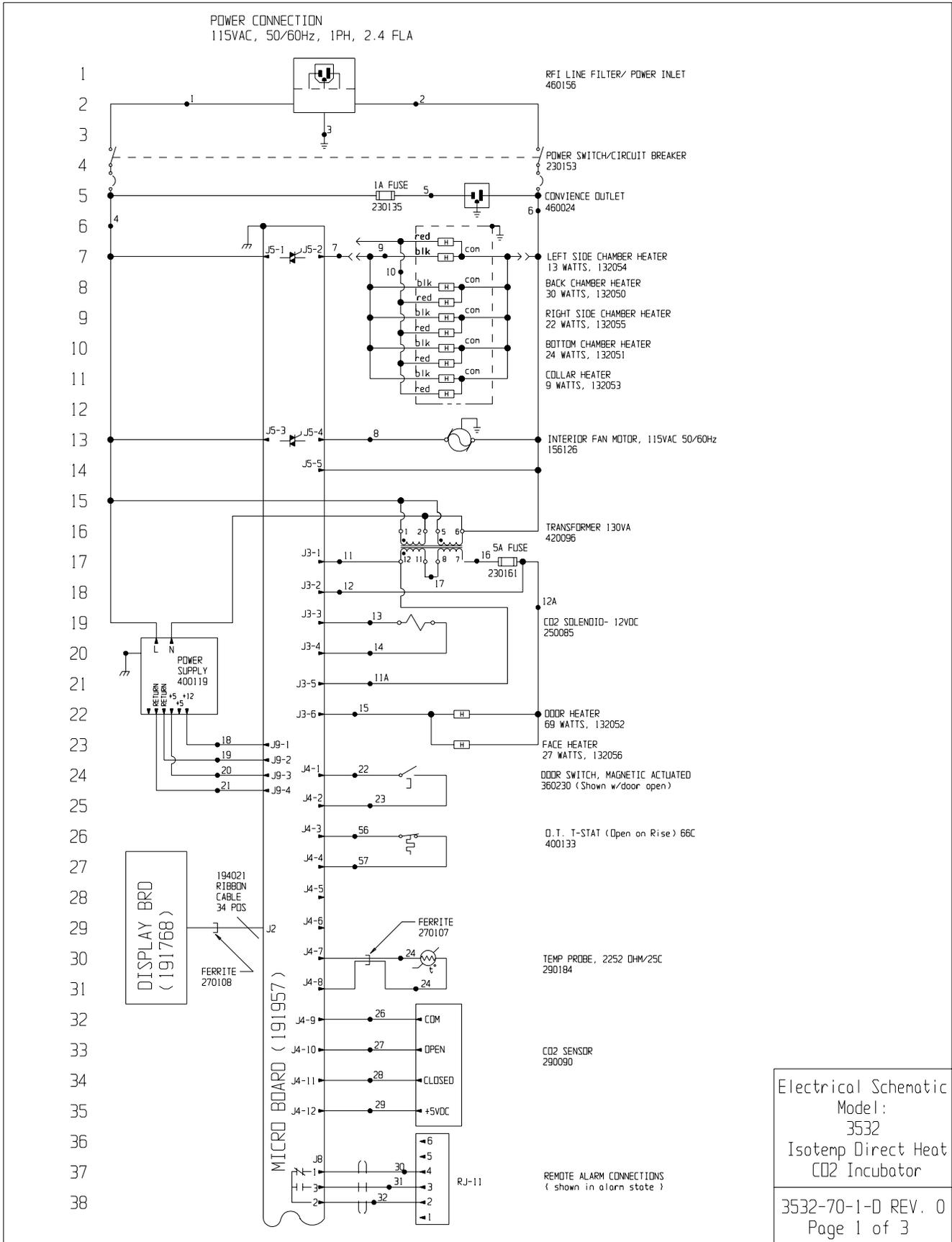
SYM	STK#	DESCRIPTION	SYM	STK#	DESCRIPTION	SYM	STK#	DESCRIPTION
1	22049	6-32 X 3/8 SS PHP SCREW	8	23029	4 SS EXT TOOTH LK WASHER	18	230153	6A DPDT CKT BKR/SW.BLK
2	22051	8-32 X 1/4 SS PHP SCREW	9	23059	8 SS EXT TOOTH LK WASHER	19	230161	FUSE, 5A, 5 X 20 MM
3	590027	6-32 X 1/4 SS PHP SEM SCREW	10	34014	1/2 PE HOLE PLUG, BLACK	20	250085	SOLENOID VALVE, 12V
4			11	123020	NYLON EDGE PROTECTOR	21	400119	SWITCHER 40W 12.5-12V
5	23002	8-32 LOCKWASHER HEX NUT	12	190222	SOLENOID VALVE SPACER	22	420096	130VA XFMR, INT'L, 12/24V
6			13	191958	WRD MICRO BOARD	23	420097	43VA XFMR, INT'L 115
7	23021	8 SS FLAT WASHER	14	190793	WIRED DISPLAY BOARD	24	460024	SNAP-IN OUTLET
			15	1900360	WIRED DISPLAY BOARD ASSEMBLY	25	460138	PWR OUTLET SWAP-IN RECEPT
			16	190794	HARNES. HT & LOW VOLT	26	460156	PWR ENTRY/RFT LINE FILTER
			17	230105	FUSEBLOCK 5 X 20MM	27	515094	1/4 X 9/16 THD STANDOFF
						28	600034	.375" SNAPPER HOSE CLAMP
						29	600063	3/12 SNAPPER HOSE CLAMP
						30	610055	CLIP-NUT 8-32 .02-1.15
						31	770001	DISPOSABLE FILTER 99.97
						32	840008	10-32 X 5/32 HOSE FTG
						33	840020	1/4 HOSE BR3 BULKHEAD FTG
						34	730044	NYLON WASHER
						35	23024	3/8 SS FLAT WASHER
						36	270106	FERRITE 1/400D CABLE
						37	190523	OPTIONAL RS-485 CABLE
						38	22052	8-32 X 3/8 SS PHP SCREW
						39	59007	4-40 X 3/8 SS PHP SCREW
						40	190786	BEZEL, 310 INCUBATOR
						41		
						42		
						43	190300	RIBBON CBLE ASSY, 34 PDS
						44	515084	1/4 X 3/8 LG SPACERS
						45	730017	3/8" BLACK FIBER WASHER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
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REV	DATE	BY	CHKD	DATE	BY	DESCRIPTION OF REVISION
1	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
2	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
3	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
4	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
5	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
6	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
7	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
8	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
9	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
10	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
11	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
12	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
13	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
14	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
15	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
16	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
17	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
18	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
19	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
20	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
21	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
22	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
23	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
24	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
25	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
26	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
27	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
28	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
29	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
30	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
31	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
32	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
33	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
34	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
35	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
36	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
37	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
38	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
39	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
40	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
41	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
42	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
43	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
44	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.
45	05-25-97	WJ	WJ	05-25-97	WJ	ISSUE 100% FOR P.R.

ATTENTION
RESERVE PRECAUTIONS
ELECTROSTATIC
SENSITIVE DEVICES

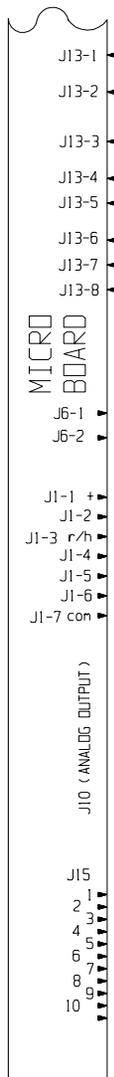
ThermoFisher
SCIENTIFIC
801 605 UNIVERSITY DR. #200
ANN ARBOR, MI 48106-1500



Electrical Schematic
Model:
3532
Isotemp Direct Heat
CO2 Incubator

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Electrical Schematic Model: 3532 Isotemp Direct Heat CO2 Incubator
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WIRE REFERENCE CHART								
NO.	GA.	COLOR	NO.	GA.	COLOR	NO.	GA.	COLOR
1	16	BROWN	22	22	BLUE	47	22	ORANGE
2	16	BLUE	23	22	BLUE	48	22	YELLOW
3	16	GRN/YEL	24	22	RED	49	22	BROWN
3B	16	GREEN	25	22	RED	50	22	RED
4	18	BLACK	26	22	GREEN	51	22	GREEN
4A	18	BLACK	27	22	GRAY	52	22	BLACK
5	18	BLACK	28	22	PURPLE	53	18	RED
6	18	WHITE	29	22	ORANGE			
7	18	ORANGE	30	22/3	BLACK			
8	18	BLUE	31	22/3	RED	56	22	BROWN
9	18	BLACK	32	22/3	WHITE	57	22	BROWN
10	18	RED	33	20	RED	58	22	BROWN
11	18	BROWN	34	20	RED	59	22	WHITE
11A	18	BROWN	35	20	BLUE			
12	18	RED	36	20	BLUE			
12A	18	RED	37	20	ORANGE			
13	18	YELLOW	38	20	ORANGE			
14	18	YELLOW	39	20	BLACK			
15	18	BLUE	40	22/2	RED			
16	18	RED	41	22/2	BLACK			
17	18	ORANGE	42	22/3	BLACK			
18	18	RED	43	22/3	RED			
19	18	GREEN	44	22/3	GREEN			
20	18	ORANGE	45	22	BLACK			
21	22	GREEN	46	22	BLUE			

SENSOR REFERENCE VALUES

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

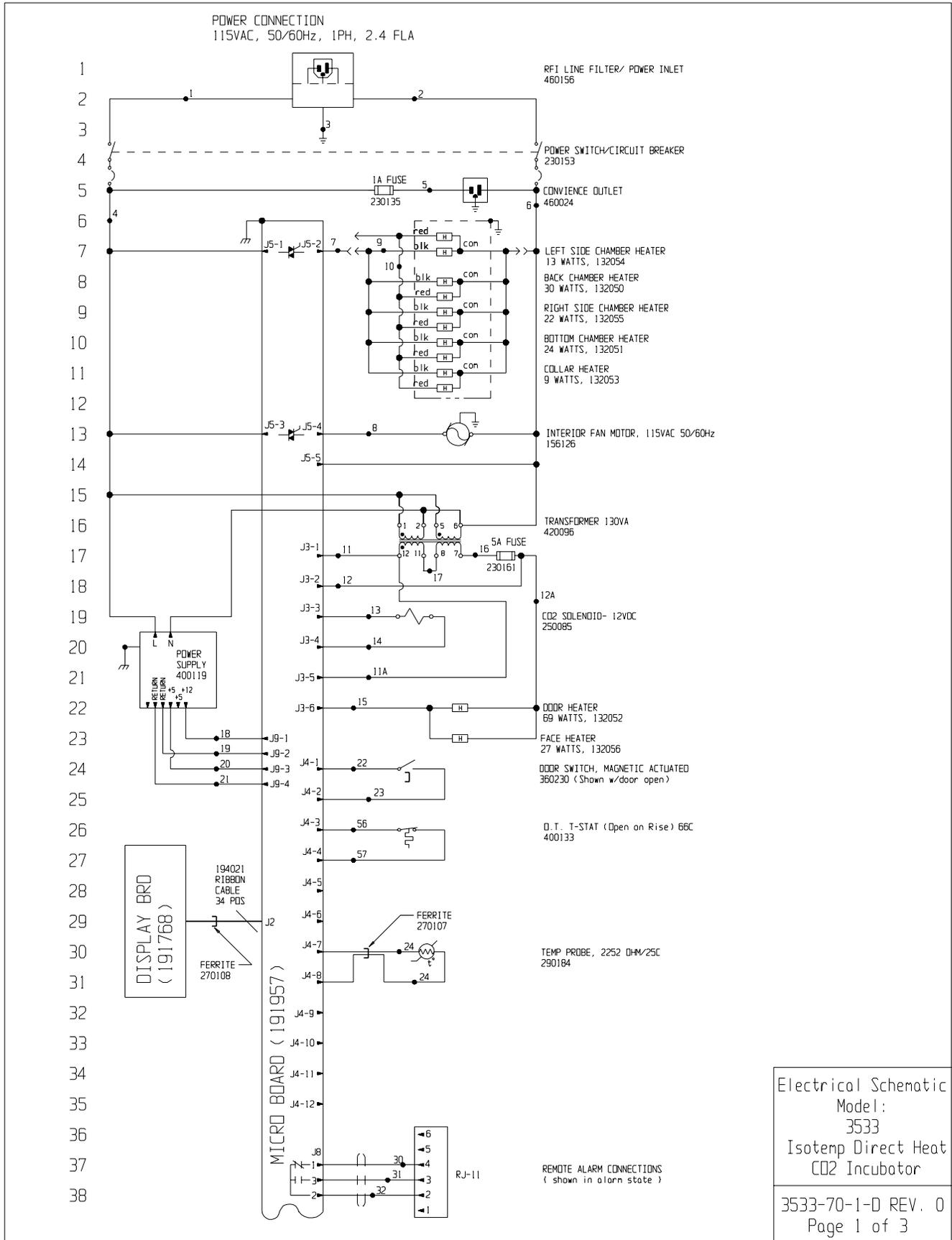
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REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
MODEL/PART NAME: 3532 DIRECT HEAT INCUBATOR W/TC SENSOR						
DWG TITLE: ELECTRICAL SCHEMATIC						
DWN:	GJG	CAD:	GJG	APPD:		DATE: 08-23-06 SCALE: NA
MATERIAL: NA						
PAINT COLOR: NA						
TOLERANCE UNLESS OTHERWISE SPECIFIED				DRAWING NUMBER		SIZE
ANGLES: DECIMAL: .XX=±				3532-70-1-		D

Electrical Schematic
Model:
3532
Isotemp Direct Heat
CO2 Incubator
3532-70-1-D REV. 0
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ATTENTION
OBSERVE PRECAUTIONS
ELECTROSTATIC
SENSITIVE DEVICES

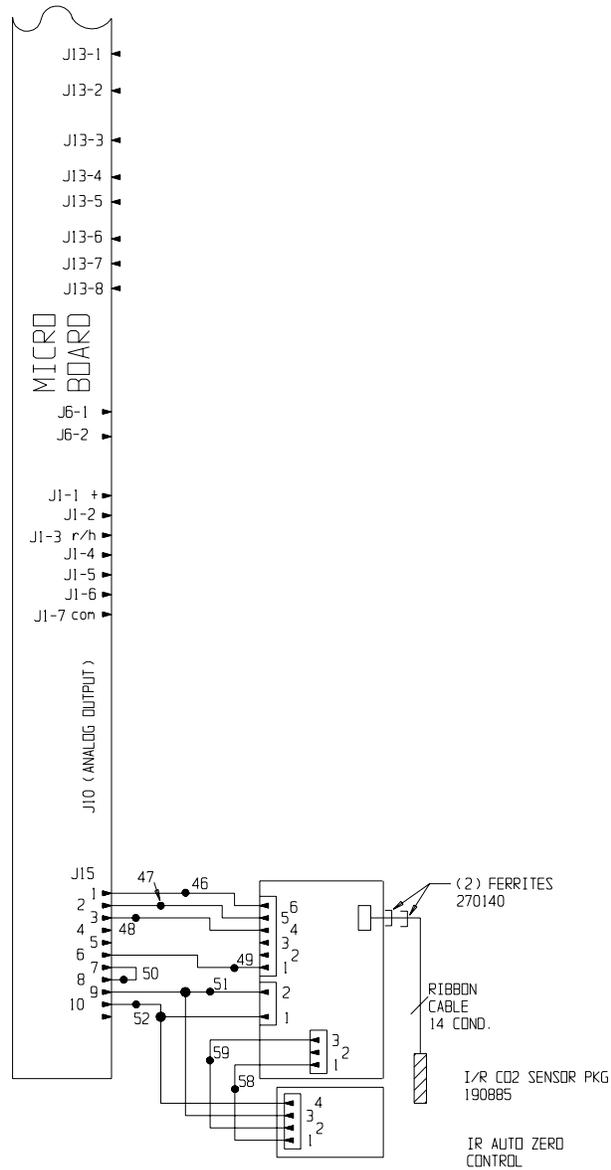




Electrical Schematic
Model:
3533
Isotemp Direct Heat
CO2 Incubator

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Electrical Schematic Model: 3533 Isotemp Direct Heat CO2 Incubator
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WIRE REFERENCE CHART								
NO.	GA.	COLOR	NO.	GA.	COLOR	NO.	GA.	COLOR
1	16	BROWN	22	22	BLUE	47	22	ORANGE
2	16	BLUE	23	22	BLUE	48	22	YELLOW
3	16	GRN/YEL	24	22	RED	49	22	BROWN
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4A	18	BLACK	27	22	GRAY	52	22	BLACK
5	18	BLACK	28	22	PURPLE	53	18	RED
6	18	WHITE	29	22	ORANGE			
7	18	ORANGE	30	22/3	BLACK			
8	18	BLUE	31	22/3	RED	56	22	BROWN
9	18	BLACK	32	22/3	WHITE	57	22	BROWN
10	18	RED	33	20	RED	58	22	BROWN
11	18	BROWN	34	20	RED	59	22	WHITE
11A	18	BROWN	35	20	BLUE			
12	18	RED	36	20	BLUE			
12A	18	RED	37	20	ORANGE			
13	18	YELLOW	38	20	ORANGE			
14	18	YELLOW	39	20	BLACK			
15	18	BLUE	40	22/2	RED			
16	18	RED	41	22/2	BLACK			
17	18	ORANGE	42	22/3	BLACK			
18	18	RED	43	22/3	RED			
19	18	GREEN	44	22/3	GREEN			
20	18	ORANGE	45	22	BLACK			
21	22	GREEN	46	22	BLUE			

SENSOR REFERENCE VALUES

CO2 (290090) DIFFERENCE VOLTAGE OF 3-6MV/1CO2
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: 3533 DIRECT HEAT INCUBATOR W/1R 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=± .XXX=±				3533-70-1-		D

Electrical Schematic
Model:
3533
Isotemp Direct Heat
CO2 Incubator
3533-70-1-D REV. 0
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ATTENTION
OBSERVE PRECAUTIONS
ELECTROSTATIC
SENSITIVE DEVICES



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.

