



# Forma 29 cu ft Reach-In Incubator

## Model 3950 and 3951

Operating and Maintenance Manual 7003950 Rev. 30

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**Thermo**  
SCIENTIFIC

| Covered Models | CO <sub>2</sub> Sensor* | Voltage** |
|----------------|-------------------------|-----------|
| 3950           | T/C                     | 100-120   |
| 3951           | T/C                     | 200-230   |

\* T/C is a thermal conductivity sensor.

\*\* All units are 50/60 Hz.

### Manual Number 7003950

|    |                |            |  |     |
|----|----------------|------------|--|-----|
| 30 | ECNM-001355    | 12/06/21   | Updated Exploded Spare Parts Drawings in pages 8-9 and 8-10.                                 | TFI |
| 29 | ECNM-001110    | 11/06/2020 | Updated Intended and Non-Intended use statements and Assembly Drawings in pages 8-5 and 8-6. | TFI |
| 28 | 41882          | 2/14/18    | Added Intended use and Non-Intended use statement  | bpg |
| 27 | 41283          | 1/29/18    | Updated dwg 3950-8   | bpg |
| 26 | 40087/IN-4743  | 7/27/16    | Changed the label in the remote alarm artwork to a note - pg 6-1                             | ccs |
| 25 | 40639          | 5/3/16     | Updated for UL (G Smith), added risk assessment info   | ccs |
| 24 | 31580/IN-4675  | 10/5/15    | Motor chg - part number, expl dwg, schematic   | ccs |
| 23 | 31289          | 7/18/14    | Removed CE reference on pg 7-3   | ccs |
| 22 | 30374/IN-4419  | 4/22/14    | Updated 1900008-06 drawing - pg 8-11 (left hand door swing)                                  | ccs |
| 21 | 29318//IN-4272 | 12/14/12   | Clarified usage on exploded drawing 3950-08-4 list   | ccs |
| 20 | 28773/IN-4231  | 10/8/12    | Updated Figure 1-6 to current  | ccs |
| 19 | 28267          | 2/20/12    | Added cautions for running high RH or temps  | ccs |
| 18 | 24921/IN-3939  | 2/16/12    | Removed accessory list - pg 7-2  | ccs |



**Important** 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. s

**Caution** All internal adjustments and maintenance must be performed by qualified service personnel. s

**Warning** If the incubator is not used in the manner specified in this operating manual, the protection provided by the equipment design may be impaired. s

**Caution** When operating this unit under high temperatures and/or relative humidity (RH), caution must be observed when the unit is shut down, unexpectedly or by choice. Condensate can form on the interior of the chamber as it cools. This includes the heating element surfaces. Heavy condensate can bridge the ceramic insulators and cause a temporary electrical short to ground. This electrical circuit is protected by a circuit breaker. However, to avoid this contingency if these conditions occur, open the door of the unit and allow it to stand open until the water vapor disperses. s

**Intended Use:** The Thermo Scientific Large Capacity Reach in CO<sub>2</sub> Incubators are intended to maintain an optimal environment for the incubation of cells and tissues for scientific research and clinical applications. These models maintain temperature and carbon dioxide (CO<sub>2</sub>) levels as set by the operator with increased relative humidity.

**Non-Intended Use:** The Thermo Scientific Large Capacity Reach-In CO<sub>2</sub> Incubators are not intended for use where electrical or physical contact with the patient is established. Not intended for use by the general public. Not intended for use within the patient environment. Not to be used outdoors. Not intended to be operated in potentially explosive environments or for use with flammable materials.

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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.



Lifting Hazard Warning. The incubator weighs more than 200lbs (91 kgs). Take adequate safety measures when moving this device.



WEEE Compliance: Thermo Fisher Scientific has contracted with companies for recycling/disposal in each EU Member State. For further information, send an email to [weee.recycle@thermofisher.com](mailto:weee.recycle@thermofisher.com).

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

## Do You Need Information or Assistance on Thermo Scientific Products?

If you do, please contact us 8:00 a.m. to 6:00 p.m. (Eastern Time) at:

1-740-373-4763

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1-877-213-8051

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Our **Sales Support** staff 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.

Our **Service Support** staff can supply technical information about proper setup, operation or troubleshooting of your equipment. We can fill your needs for spare or replacement parts or provide you with on-site service. We can also provide you with a quotation on our Extended Warranty for your Thermo Scientific products.

Whatever Thermo Scientific 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 warranty, we will arrange for the unit to be repaired at our expense and to your satisfaction.

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

Thermo Fisher Scientific (Asheville) LLC

401 Millcreek Road, Box 649

Marietta, OH 45750

International customers, please contact your local Thermo Scientific 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 CO<sub>2</sub> sensors, blower motors, water jackets, etc.**



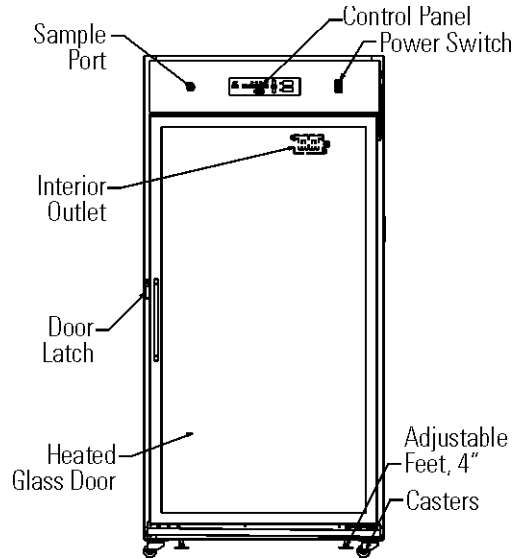
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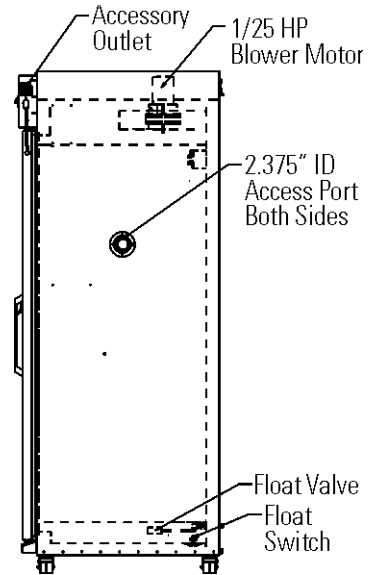


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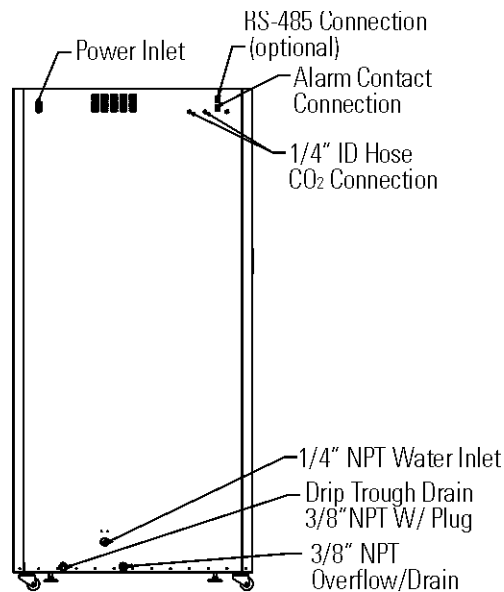
# Section 1 Installation and Start-Up



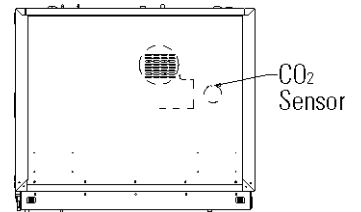
**Figure 1-1.** Front View



**Figure 1-2.** Side View

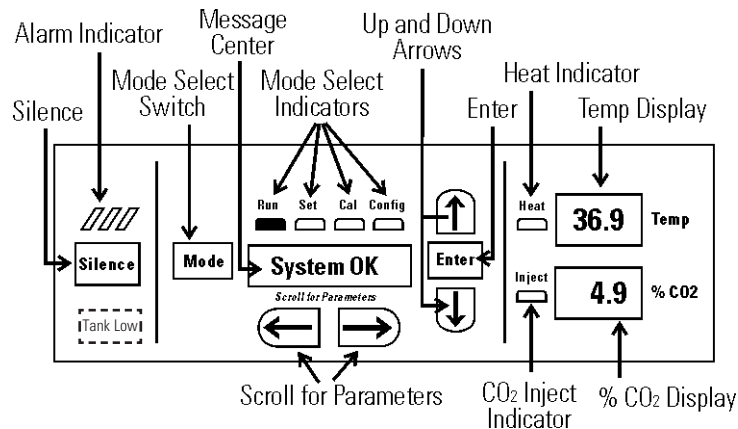


**Figure 1-3.** Back View



**Figure 1-4.** Top View

## Control Panel Keys, Displays, & Indicators



**Figure 1-4.** Control Panel Components

**Tank Low Indicator** - Used with Gas Guard, lights when gas tank is low, if applicable.

**Silence** - Mutes the audible alarm. See Section 4 for ringback times.

**Alarm Indicator** - Light pulses on/off during an alarm condition in the cabinet.

**Mode Select Switch** - Used to select Run, Setpoints, Calibration and System Configuration Modes.

**Message Center** - Displays system status.

**Mode Select Indicators** -

- Run: Run Menu
- Set: Set Points Menu
- Cal: Calibrate Menu
- Config: Configuration Menu

**Up and Down Arrows** - Increases or decreases the number values, toggles between parameter values of the selected mode.

**Enter** - Stores the changed value into computer memory.

**Heat Indicator** - Lights when power is applied to the heaters.

**Temp Display** - Displays temperature continuously

**Scroll for Parameters Arrows** - Moves the operator through the parameters of the selected mode. Right arrow goes to next, left arrow goes to previous parameter.

**CO<sub>2</sub> Inject Indicator** - Lights when CO<sub>2</sub> is being injected into the incubator.

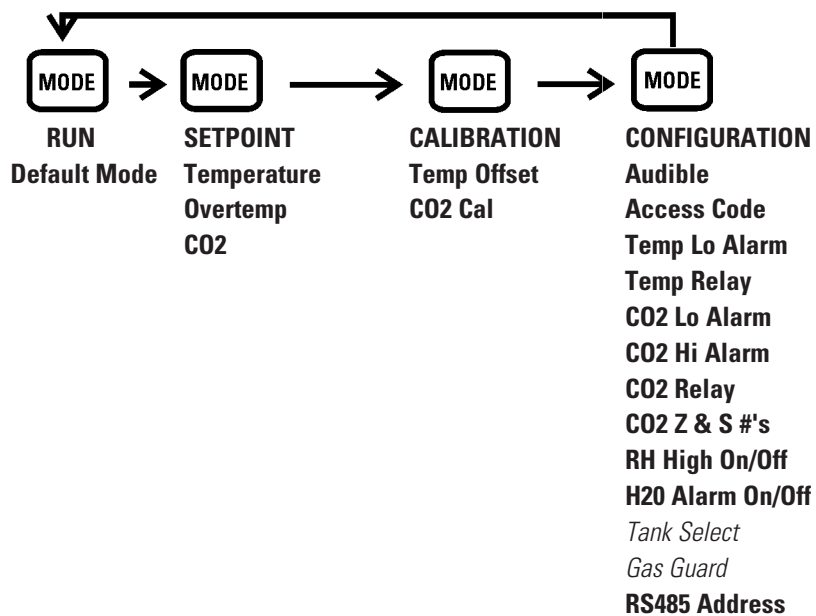
**% CO<sub>2</sub> Display** - Displays CO<sub>2</sub> percentage continuously.

## Keypad Operation

The Model 3950 Series Reach-In Incubator has four basic modes that allow incubator setup: Run, Setpoints, Calibration and System Configuration.

- Run is the default mode during normal operation.
- Set is used to enter system setpoints.
- Calibration is used to calibrate various system parameters.
- Configuration allows for custom setup of various options.

The chart below shows the selections under each of the modes.



**\*\*Base Unit Displays**

*\*\*Option Displays*

## Unit Installation

**Caution** Units must be installed against a wall or similar structure in an area of minimum ambient temperature fluctuation. A minimum of six (6) inches clearance is required at the top and back of the incubator plus a minimum three (3) inch clearance on each side for electrical, water and gas hook-ups. At least eight (8) inches clearance above the cabinet is required for service access.

Locate the unit on a firm level surface capable of supporting the unit weight of approximately 500 lbs.

Position the incubator away from doors and windows and heating and air conditioning ducts.

**Warning** This incubator weighs approximately 500 lbs. Have sufficient personnel available when moving.

## Preliminary Cleaning and Disinfecting

Disinfect all interior surfaces with a general-use laboratory disinfectant, such as quaternary ammonium, to remove any residue from the production of the incubator. Rinse thoroughly with sterile distilled water, then 70% alcohol. Dry with a sterile cloth as needed. Disinfect the shelf channels and shelves, then rinse with distilled water before installing.

**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.

## Installing the Shelves

The shelves may be installed at any level in the incubator. Install a shelf channel on each side. With the tabs pointing up, attach the channel by locating the rivet into a slotted hole, far end first. Pull the channel toward the front and slide the front rivet on the channel into the slotted hole and press down. Make sure that the channels are opposite each other so that the installed shelf will be level.

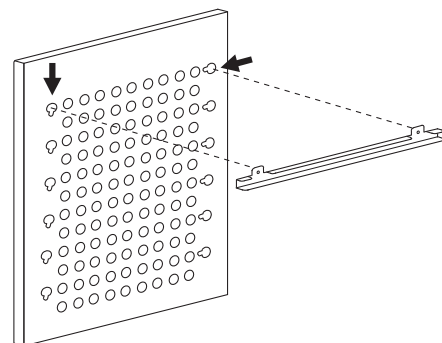


Figure 1-5. Shelf Channel

## Leveling the Unit

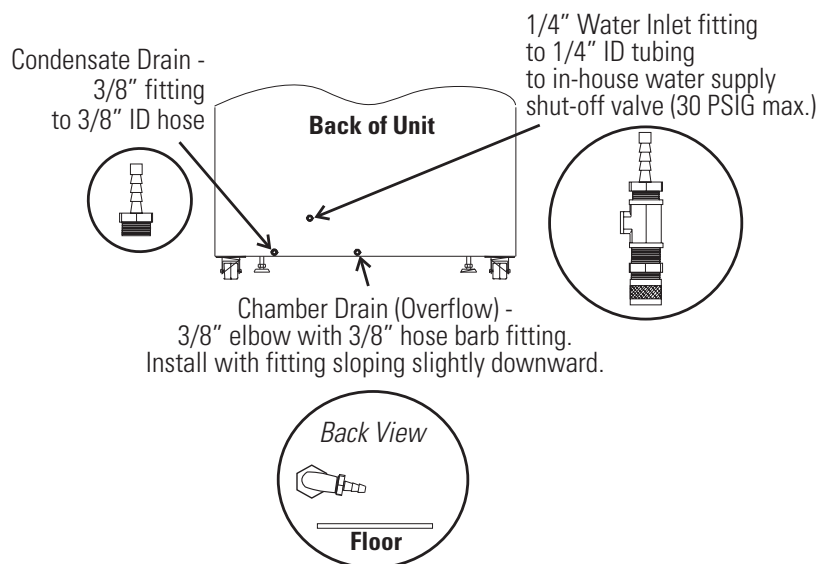
Place a bubble-type level on a shelf inside the incubator. Adjust the feet as needed; counterclockwise to lengthen or clockwise to shorten. Level the unit front-to-back and left-to-right.

## Attaching the Drain Lines

**Note** Drain connections on the back of the unit are shipped capped. If humidity is not required, the caps should be left on the drains. s

If manual or gravity feed method is used for humidity in the cabinet, connecting the drains is optional.

If an in-house pure water supply is used to fill the reservoir, it is recommended that the drains be connected to a floor drain.



**Figure 1-6.** Top View of Fitting Connections

## The Water Supply

For best operation of the incubator, sterilized distilled, demineralized or de-ionized water should be used in the humidity reservoir. Water purity should be in the resistance range of 50 K to 1 M 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 1 M to 18 M 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.

## **The Water Supply (continued)**

**Caution** Distilled or de-ionized water used in the humidity reservoir must be within a water quality resistance range of 50 K to 1 M 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 may void warranty. s

The incubator is equipped with a liquid level float switch that detects low water levels in the humidity reservoir and produces an alarm condition. As all applications do not require humidity, this alarm can be disabled. To disable the ADD WATER alarm, see Section 3. If humidity is required in the current application, press the Silence key on the control panel to mute the alarm while the humidity reservoir is being filled.

## **Filling the Humidity Reservoir**

There are three methods for filling the humidity reservoir; an in-house pure water supply, the manual and the gravity feed methods.

### **In-house Pure Water Supply**

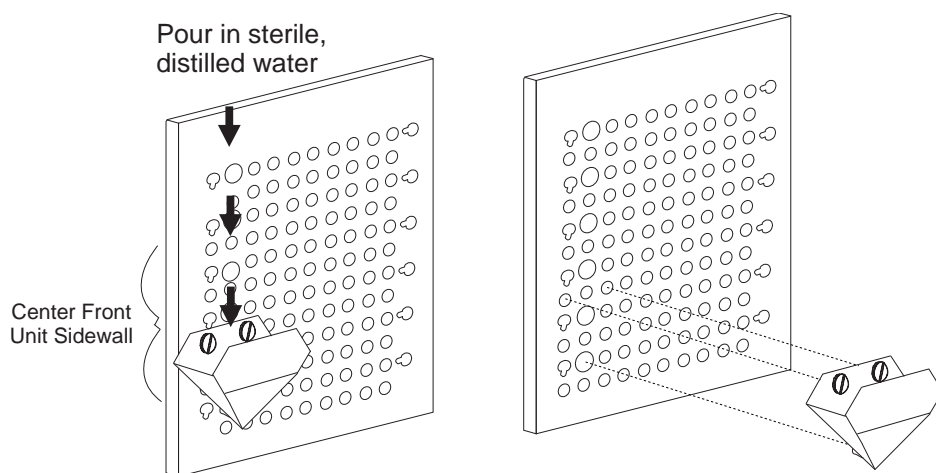
All incubators provide a connection for using an in-house water supply. Connect a low pressure (not more than 30 PSI) water line, equipped with a manual shut-off valve, to the inlet fitting on the float valve reservoir. The 1/4" hose connection is located on the rear of the incubator cabinet. With the water turned on, a float valve inside the incubator regulates the water level in the humidity reservoir. When the reservoir is full, a 10-second audible tone is heard and the ADD WATER message no longer displays.

### **Manual Method**

This fill system consists of a funnel attached to the side duct sheet and tubing located inside the incubator. Disinfect the funnel and rinse with sterile water before using. This funnel may be moved to a preferred location by unscrewing the well nuts and disconnecting it from the sidewall. Tighten the nuts after relocation. The holes allotted for funnel use are slightly larger and in a centralized area. See Figure 1-7.

To fill the reservoir, pour sterile distilled water (approximately 2.5 gallons) into the funnel. When the float switch trips, a 10-second audible tone sounds and the ADD WATER message no longer displays. Add 1 gallon after the 10-second tone is heard.

## Manual Method (continued)



**Figure 1-7.** Manual Feed Method with Funnel

## Gravity Feed Method

An optional carboy water fill system is also available. The carboy option kit includes an instruction sheet that details the installation of the system.

## Connecting the Unit to Electrical Power

See the serial tag on the side of the unit or the Specifications section for electrical specifications. Refer to the electrical schematics at the end of this manual.

**Warning** Connect the incubator to a grounded, dedicated circuit. The power cord connector is the mains disconnect device for the incubator. Position the incubator so the unit can be easily disconnected. s

Plug the provided power cord into the power inlet connector on the back of the cabinet, then into a grounded, dedicated electrical circuit.

The Model 3950 Series also has an internal outlet located on the right side of the interior back wall. The outlet is to provide power (230 W maximum) to accessory equipment. This outlet is not to be used when the temperature is above 40°C and the RH more than 50%.



## Connecting the CO<sub>2</sub> Gas Supply

**Warning** High concentrations of CO<sub>2</sub> gas can cause asphyxiation. OSHA Standards specify that employee exposure to carbon dioxide in any 8-hour shift of a 40-hour work week shall not exceed the 8-hour time weighted average of 5000 PPM (0.5% CO<sub>2</sub>). The short-term exposure limit for 15 minutes or less is 30,000 ppm (3% CO<sub>2</sub>). Carbon dioxide monitors are recommended for confined areas where concentrations of carbon dioxide gas can accumulate.

This incubator is designed for CO<sub>2</sub> gas only. Connecting a flammable or toxic gas could result in a hazardous condition.

Gases other than CO<sub>2</sub> should not be connected to this equipment. CO<sub>2</sub> gas cylinders have a UN1013 label on the cylinder and are equipped with a CGA 320 outlet valve. Check the gas cylinder for the proper identification labels. The CO<sub>2</sub> gas supply being connected to the incubator should be industrial grade, 99.5% pure. Do not use CO<sub>2</sub> gas cylinders equipped with siphon tubes. A siphon tube is used to extract liquid CO<sub>2</sub> from the cylinder, which can damage the pressure regulator. Consult with your gas supplier to ensure that the CO<sub>2</sub> 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 CO<sub>2</sub> 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) for proper performance of the CO<sub>2</sub> control system. A single stage CO<sub>2</sub> pressure regulator will not maintain 15 psig (103.4 kPa) to the incubator as the pressure in the CO<sub>2</sub> cylinder decreases; therefore, a two-stage regulator is recommended.

If higher purity CO<sub>2</sub> 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 CO<sub>2</sub> 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 applicable in your area. s

The CO<sub>2</sub> 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. 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.

## Connecting CO<sub>2</sub> Gas Supply (continued)

**Caution** Each tank should be connected to one incubator only. s

The incubator has serrated fittings on the back of the cabinet to connect the gas supply (Figure 1-2). The fitting is labeled CO<sub>2</sub> Inlet #1 Tank. Secure connections with clamps. Check all fittings for leaks.

For units having the CO<sub>2</sub> Gas Guard option, refer to Section 6.

## Incubator Start-Up

With the incubator properly installed, connected to power, the humidity reservoir filled and the unit connected to a gas supply, system setpoints can be entered. The following setpoints can be entered in Set Mode: Temperature, Overtemperature and CO<sub>2</sub>. To enter Set Mode, press the Mode key until the Set indicator lights. Press the right and/or left arrow keys until the proper parameter appears in the message display center. See Chart 1-1 for more detail.

## Setting the Operating Temperature

This incubator has an operating temperature setpoint range of 5.0°C above ambient to 60.0°C. It is shipped from the factory with a temperature setpoint of 10.0°C. At this setting, all heaters are turned off. To change the operating temperature setpoint:

1. Press the Mode key until the Set indicator lights.
2. Press the right arrow until “Temp XX.X” is displayed in the message center.
3. Press up/down until the desired temperature setpoint is displayed.
4. Press Enter to save the setpoint.
5. Press the Mode key until the Run indicator lights for Run mode or press the right/left arrow keys to go to next/previous parameter.

**Caution** Any equipment placed inside chamber must be rated for unit operating temperature and humidity. s

## Setting the Overtemp Setpoint

**Warning** The independent overtemp system 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.

All Model 3950 Series incubators are equipped with a secondary temperature monitoring system to monitor the air temperature inside the cabinet. This system is designed as a safety device to turn off all heaters in the event of a temperature control failure. The temperature control point in the incubator will be approximately  $\pm 1^{\circ}\text{C}$  of the overtemp setpoint.

The overtemp setpoint is set by the factory (default) at  $40^{\circ}\text{C}$ . However, the overtemp can be reset over a range from  $0.5^{\circ}\text{C}$  above the operating temperature setpoint to  $65^{\circ}\text{C}$ .

If the incubator's operating temperature setpoint is set above the overtemp setpoint, the overtemp setpoint will automatically update to  $1^{\circ}\text{C}$  above the temperature setpoint. It is recommended that the overtemp setpoint be maintained at  $1^{\circ}\text{C}$  over the operating temperature setpoint.

To set the Overtemp setpoint:

1. Press the Mode key until the Set indicator lights.
2. Press the right arrow until Otemp XX.X is displayed in the message center.
3. Press the up or down arrow until the desired Otemp setpoint is displayed.
4. Press Enter to save the setting.
5. Press the Mode key until the Run indicator lights, or press the right or left arrow to go to the next or previous parameter.

## Setting the CO<sub>2</sub> Setpoint

All CO<sub>2</sub> cells are calibrated at the factory at  $37^{\circ}\text{C}$ , medium humidity and 10% CO<sub>2</sub>. Therefore, if a temperature setpoint of  $37^{\circ}\text{C}$  has been entered, the humidity reservoir has been filled and the CO<sub>2</sub> control is set to run between 0-10%, the CO<sub>2</sub> setpoint may be entered immediately. Otherwise, it is important to allow the unit 12 hours to stabilize at the temperature setpoint before entering the CO<sub>2</sub> setpoint.

## **Setting the CO<sub>2</sub> Setpoint (continued)**

All models of the incubator have a CO<sub>2</sub> setpoint range of 0.0% to 20.0%. The incubator is shipped from the factory with a CO<sub>2</sub> setpoint of 0.0%. At this setting, all CO<sub>2</sub> control and alarms are turned off.

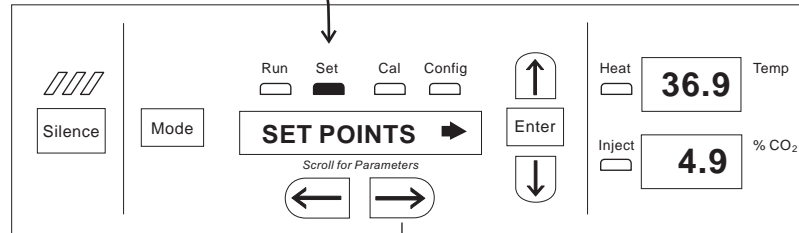
To change the CO<sub>2</sub> setpoint:

1. Press the Mode key until the Set indicator lights.
2. Press the right arrow until “CO<sub>2</sub> XX.X” is displayed in the message center.
3. Press the up/down arrow until the desired CO<sub>2</sub> setpoint is displayed.
4. Press Enter to save the setpoint.
5. Press the Mode key until the Run indicator lights to go to Run mode, or press the right/left arrow keys to go to next/previous parameter.

Chart 1-1

# Set Mode

Press MODE to light SET



To Set:

Operating Temperature

Press MODE to move to CALIBRATE mode

Mode TEMP XX.X C

Press ← to return to previous parameter

Numbers increase  
Press Enter to save setting  
Numbers decrease

Over Temperature

Mode OTEMP XX.X C

Press ← to return to previous parameter

Numbers increase  
Press Enter to save setting  
Numbers decrease

Percent CO<sub>2</sub>

Mode CO2 XX.X%

Press ← to return to previous parameter

Numbers increase  
Press Enter to save setting  
Numbers decrease

## Section 2 Calibration

After the unit has stabilized, several different systems can be calibrated. In the calibration mode, the air temperature, CO<sub>2</sub> and RH levels can be calibrated to reference instruments. To access the calibration mode, press the Mode key until the Cal indicator lights. Press the right and/or left arrow until the proper parameter appears in the message center. See Chart 2-1 at the end of this section for more detail.

Calibration frequency is dependent on use, ambient conditions and accuracy required. A 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 the calibration mode, all system control functions are stopped so the unit remains stable. Readout of the system being calibrated will appear on the message center. If no keys are pressed for approximately five minutes while in Calibration mode, the system will reset to Run mode so control functions are reactivated.

**Caution** Before making any calibration or adjustments to the unit, it is imperative that all reference instruments be properly calibrated. s

### Calibrating the Temperature

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

#### Temperature Stabilization Periods

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

**Presently Operating** - Allow at least 2 hours after the display reaches setpoint for temperature to stabilize before proceeding.

## Calibrating the Temperature (cont.)

1. Press the Mode key until Cal indicator lights.
2. Press the right arrow until “TEMPCAL XX.X” appears in the message center.
3. Press the up/down arrow to match the display to the calibrated instrument.
4. Press Enter to store calibration.
5. Press the Mode key to return to Run or the right/left arrow to go to next/previous parameter.

## Calibrating the CO<sub>2</sub> System

Model 3950 Series incubators have a CO<sub>2</sub> sensor. The incubator atmosphere is not only effected by the quantity of CO<sub>2</sub> present but also by the air temperature and water vapor present in the incubator atmosphere. In monitoring the effects of CO<sub>2</sub>, air temperature and absolute humidity must be held constant so any change is caused by a change in CO<sub>2</sub> concentration.

Changing temperature or changing from elevated humidity to room ambient humidity levels will require re-calibration of the CO<sub>2</sub> control.

### CO<sub>2</sub> Sensor Stabilization Periods

**Start-Up** - The CO<sub>2</sub> sensor has been calibrated at the factory for 37°C and elevated humidity. Allow the temperature, humidity and CO<sub>2</sub> levels in the chamber to stabilize at least 12 hours before checking the CO<sub>2</sub> concentration with an independent instrument.

**Presently Operating** - Make sure the chamber doors are closed. Allow at least 2 hours after the temperature and CO<sub>2</sub> displays reach their setpoints for chamber atmosphere stabilization.

## **Calibrating the CO<sub>2</sub> System (continued)**

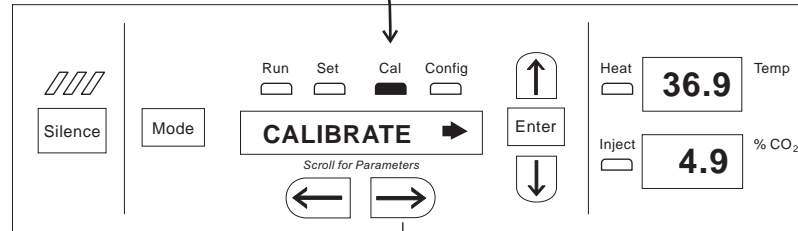
1. Make sure the stabilization periods outlined above are followed.
2. Sample the chamber atmosphere through the sample port with an independent instrument. Sample the atmosphere at least 3 times to ensure accuracy of the instrument.
3. Press the Mode key until the Cal indicator lights.
4. Press the right arrow until “CO<sub>2</sub> CAL XX.X” is displayed in the message center.
5. Press the up /down arrows to change the display to match the independent instrument.
6. Press Enter to store the calibration.
7. Press the Mode key to return to Run or the right or left arrows to go to the next/ previous parameter.



Chart 2-1

# Calibrate Mode

Press MODE to light CAL



To Calibrate:

Operating Temperature

Press MODE to move to SYS CONFIG mode

Mode

TEMPCAL XX.X

Scroll for Parameters

Press ← to return to previous parameter



Enter



Numbers increase

Press Enter to save setting

Numbers decrease

CO<sub>2</sub>

Mode

CO2ZERO XX.X

Scroll for Parameters

Press ← to return to previous parameter



Enter



Numbers increase

Press Enter to save setting

Numbers decrease

## Section 3 Configuration

Several features available in Configuration Mode allow custom setup of the incubator. These features are listed and described below. All features may not be necessary in all applications, but are available if needed. To enter Configuration mode, press the Mode key until the Config indicator lights. Press the right and/or left arrow until the appropriate parameter appears in the message center. See Chart 3-1 at the end of this section for more detail.

### Disable the ADD WATER Alarm

All applications do not require humidity. For this reason, the ADD WATER alarm can be disabled. The factory default for the ADD WATER alarm is ON.

1. Press Mode key until Config indicator lights.
2. Press right arrow until H2O ALM XXX is displayed in message center.
3. Press up/down arrow to toggle H2O ALM ON or OFF.
4. Press Enter to save the setting.
5. Press Mode key to return to Run mode or right/left to go to next/previous parameter.

**Note** Verify that the RH HIGH feature is set to OFF after disabling the ADD WATER alarm. s

### Turn All Audible Alarms ON/OFF

The audible alarms can be turned on or off. The factory setting is ON.

1. Press Mode key until Config indicator lights.
2. Press right arrow until AUDIBLE XXX is displayed in message center.
3. Press up/down arrow to toggle AUDIBLE ON/OFF.
4. Press Enter to save the setting.
5. Press Mode key to return to Run mode or right/left to go to next/previous parameter.

## Set an Access Code

A 3-digit Access Code can be entered to avoid unauthorized personnel from changing the setpoints, calibration, or configuration. A setting of 000 will bypass the access code. The factory setting is 000.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until ACC CODE XXX is displayed in the message center.
3. Press up or down arrow to change the access code.
4. Press Enter to save the access code.
5. Press the Mode key to return to the Run mode or right/left to go to next/previous parameter.

## Set a Low Temp Alarm Limit

The low temperature alarm limit (tracking alarm) is the deviation from the temperature setpoint, which will cause a low temp alarm. The low temp alarm is variable from 0.5° below setpoint to 5.0° below setpoint. The factory setting is 1.0° below setpoint. A minus sign in the display indicates that the alarm setting is below the setpoint.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until TEMP LO -X.X is displayed in the message center.
3. Press up/down arrow to change the low temp alarm limit.
4. Press Enter to save the low temp alarm limit.
5. Press the Mode key to return to Run mode or right/left to go to next/previous parameter.

## **Enable Temp Alarms to Trip Relay Contacts**

The temperature alarms can be programmed to trip the remote alarm contacts. A setting of ON will cause this, a setting of OFF will not allow temperature alarms to trip the contacts. The factory setting is ON.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until TMP RLY XXX is displayed.
3. Press the up/down arrow to toggle the setting ON/OFF.
4. Press Enter to save the setting.
5. Press the Mode key to return to Run or the right/left arrow key to go to next/previous parameter.

## **Set Low CO<sub>2</sub> Alarm Limit**

The low CO<sub>2</sub> alarm limit (tracking alarm) is the deviation from the CO<sub>2</sub> setpoint, which will cause a low CO<sub>2</sub> alarm. The setpoint is variable from 0.5% CO<sub>2</sub> below setpoint to 5.0% CO<sub>2</sub> below setpoint. The factory setting is 1.0 % CO<sub>2</sub> below setpoint. A minus in the display indicates that the alarm setting is below the setpoint.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until CO<sub>2</sub> LO -X.X is displayed in the message center.
3. Press up/down arrow to change the low CO<sub>2</sub> alarm limit.
4. Press Enter to save the low CO<sub>2</sub> alarm limit.
5. Press the Mode key to return to Run mode or right/left to go to next/previous parameter.

## Set High CO<sub>2</sub> Alarm Limit

The high CO<sub>2</sub> alarm limit (tracking alarm) is the deviation from the CO<sub>2</sub> setpoint, which will cause a high CO<sub>2</sub> alarm. The setpoint is variable from 0.5% CO<sub>2</sub> above setpoint to 5.0% CO<sub>2</sub> above setpoint. The factory setting is 1.0 % CO<sub>2</sub> above setpoint.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until CO<sub>2</sub> HI X.X is displayed in the message center.
3. Press up/down arrow to change the high CO<sub>2</sub> alarm limit.
4. Press Enter to save the high CO<sub>2</sub> alarm limit.
5. Press the Mode key to return to run mode or right/left to go to next/previous parameter.

## Enable CO<sub>2</sub> Alarms to Trip Relay Contacts

High and Low CO<sub>2</sub> alarms can be programmed to trip the remote alarm contacts. A setting of ON will cause this, a setting of OFF will not allow CO<sub>2</sub> alarms to trip the contacts. The factory setting is ON.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until CO<sub>2</sub> RLY XXX is displayed in the message center.
3. Press up/down arrow to toggle the setting ON/OFF.
4. Press Enter to save the setting.
5. Press the Mode key to return to Run Mode or right/left to go to next/previous parameter.

## Set New Zero # and Span # for CO<sub>2</sub> Sensors

If a new T/C CO<sub>2</sub> sensor is being installed, the two numbers on the factory installed sticker on the cell must be entered to calibrate the CO<sub>2</sub> in the unit.

**Note** For the technician's convenience, a second label containing the two numbers is supplied with the new T/C cell and should be affixed over the original label, inside the electronics drawer. s

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until T/C ZR# XXXX is displayed in the message center.
3. Press up/down arrow to change the zero number to match the sticker.
4. Press Enter to save the setting.
5. Press the right arrow until T/C SP# XXXX is displayed in the message center.
6. Press up/down arrow to change the span number to match the sticker.
7. Press Enter to save the setting. Pressing Enter will erase any CO<sub>2</sub> Cal offset value previously entered into the Calibration menu.
8. Press the Mode key to return to Run mode or right/left to go to next/previous parameter.

## Enable the High Humidity Feature

In normal operation, the incubator will maintain the humidity level above 80%. If a higher RH level is required, the RH HIGH feature may be turned ON. This allows the heater attached to the humidity reservoir to be enabled, resulting in RH levels above 90%. The factory default for the RH HIGH feature is OFF.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until RH HIGH XXX is displayed in the message center.
3. Press up/down arrow to toggle RH HIGH ON or OFF.
4. Press Enter to save the setting.
5. Press the Mode key to return to Run mode or right/left to go to next/previous parameter.

**Note** Verify that the ADD WATER alarm is set to ON after enabling the RH HIGH feature. s

## Select a Primary Tank w/Gas Guard Option

On units equipped with the Gas Guard option, a primary tank can be selected. The primary tank will be either Tank 1 or 2. The factory setting is Tank 1.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until TANK SEL X is displayed in the message center.
3. Press the up/down arrow to toggle the setting between 1 and 2.
4. Press Enter to save the setting.
5. Press the Mode key to return to Run mode or right/left to go to next/previous parameter.

## **Disable the Gas Guard System**

On units equipped with the Gas Guard option, the Gas Guard system may be turned ON, or OFF if it is not in use. The factory setting is ON.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until GAS GRD XX is displayed in the message center.
3. Press up/down arrow to toggle the setting ON/OFF.
4. Press Enter to save the setting.
5. Press the Mode key to return to Run mode or right/left to go to next/previous parameter.

## **Set RS485 Address**

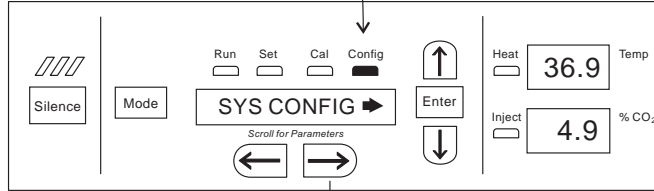
On units that have the RS485 option, direct communication with the Model 1535 alarm system can be established. Each piece of equipment connected to the 1535 must have a unique address. An address of 0-24 can be entered for the incubator. A setting of 0 is an invalid address that the 1535 will ignore. The factory setting for the RS485 address is 0.

1. Press the Mode key until the Config indicator lights.
2. Press the right arrow until 485 ADDR XX is displayed in the message center.
3. Press up/down arrow to move the RS485 address.
4. Press Enter to save the RS485 address.
5. Press the Mode key to return to Run mode or right/left to go to next/previous parameter.

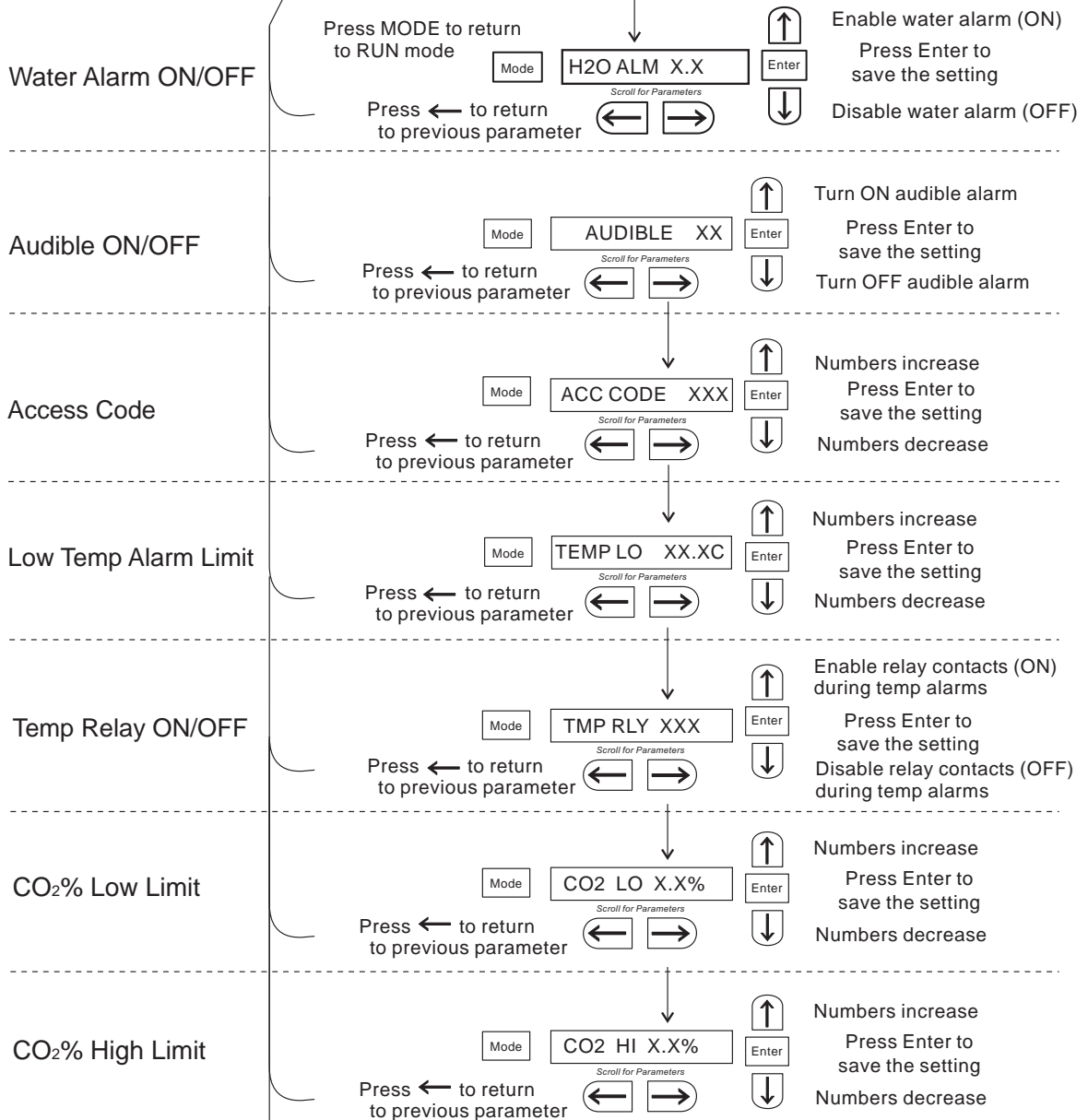


# Configure Mode

Press MODE to light CONFIG



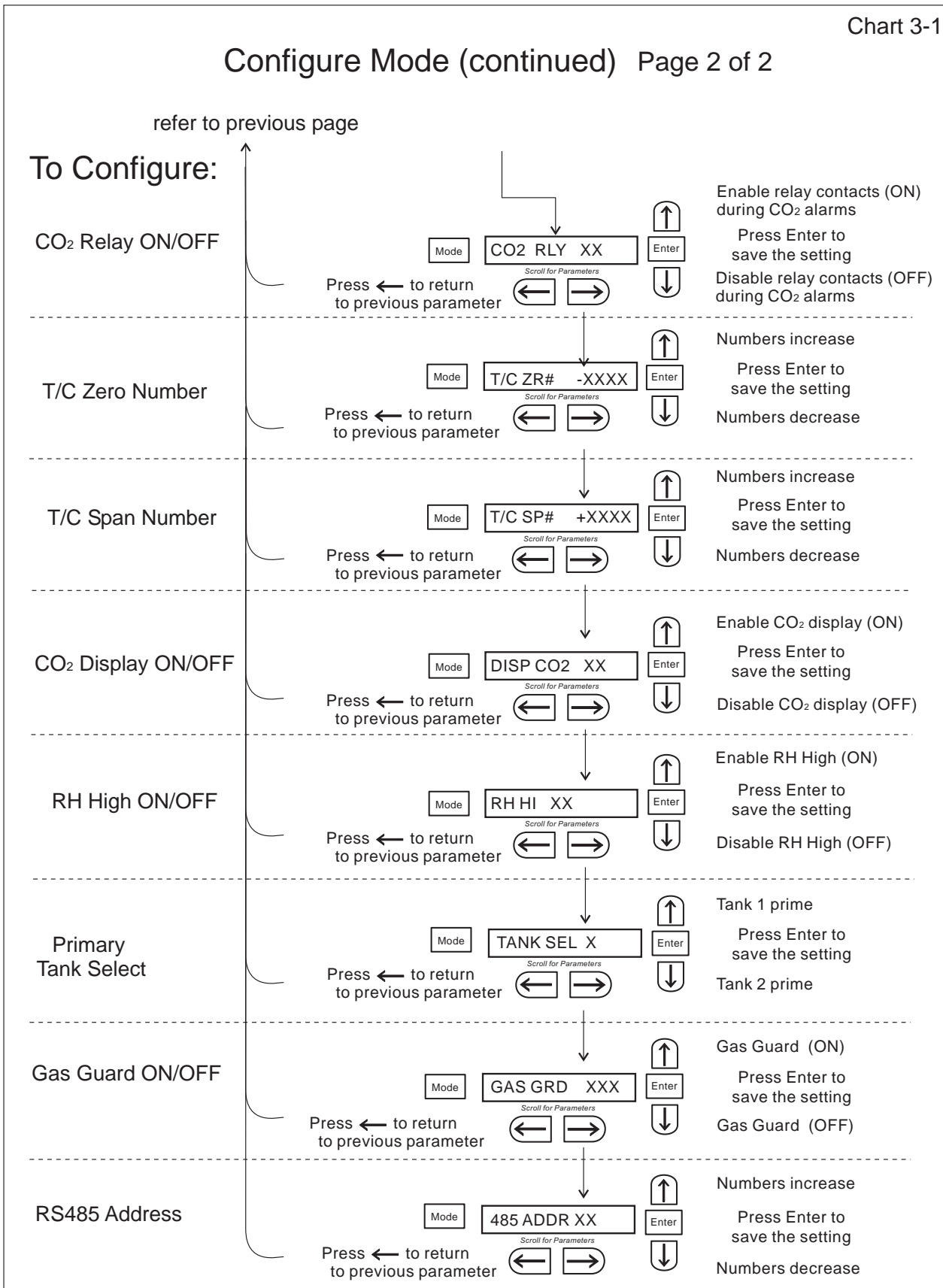
To Configure:



refer to next page

Chart 3-1

Configure Mode (continued) Page 2 of 2



**Section 3**  
Configuration

## Section 4 Alarms

The Model 3950 Series incubator is equipped with a system that notifies the user of an alarm condition inside the incubator. All alarms display in the control panel message center. The following table contains information on all possible system alarms.

**Table 4-1.** Alarms

| Description                                      | Message Code     | Delay   | Ringback | Relay        |
|--|------------------|---------|----------|--------------|
| No alarm condition exists                        | SYSTEM OK        | ----    | ----     | ----         |
| Temp > Otemp Set point                           | SYS IN OTEMP     | 0 min.  | 15 min.  | Yes          |
| Air Temp Sensor Fault (See Section 4.2)          | AIR SNSR ERR     | 0 min.  | 15 min.  | No           |
| Temperature Controller Failure (See Section 4.2) | TMP CTRL ERR     | 0 min.  | 15 min.  | YES          |
| CO2 Sensor Fault (See Section 4.2)               | CO2 SNSR ERR     | 0 min.  | 15 min.  | No           |
| Water Level in Reservoir is Low                  | ADD WATER        | 0 min.  | 15 min.  | No           |
| Inner Door is Open                               | DOOR IS OPEN     | 15 min. | 15 min.  | No           |
| CO2 > CO2 High Tracking Alarm                    | CO2 IS HIGH      | 15 min. | 15 min.  | Programmable |
| CO2 < CO2 Low Tracking Alarm                     | CO2 IS LOW       | 15 min. | 15 min.  | Programmable |
| TEMP < TEMP Low Tracking Alarm                   | TEMP IS LOW      | 15 min. | 15 min.  | Programmable |
| Tank 1 is low, switch to Tank 2 (Gas Guard only) | TANK1 LOW        | 0 min.  | ----     | No           |
| Tank 2 is low, switch to Tank 1 (Gas Guard only) | TANK2 LOW        | 0 min.  | ----     | No           |
| Both tanks are low (Gas Guard only)              | TANK 1 and 2 LOW | 0 min.  | 15 min.  | No           |

*All alarm delays and ringback times are  $\pm 30$  seconds.*

To avoid alarms going off in day-to-day use, some alarms are equipped with a time delay feature. For this to function correctly, the alarm condition must exist for the specified length of time before the message center will display the alarm. This allows for interruptions, such as door openings, to occur without incubator being in a continuous state of alarm.

When an alarm condition exists, press the Silence key to temporarily mute the audible alarm. The message center continues to show the alarm condition. If the alarm condition is not corrected within a specified length of time, the alarm sounds again or “ringback” to remind the user.

When multiple alarm conditions occur, active messages are displayed in the display center one at a time, updating at 5-second intervals. Pressing Silence during multiple alarms causes all active alarms to be muted and to ringback in 15 minutes.

## **Sensor Fault Alarms**

The microprocessor in Model 3950 Series incubators continually scans all available sensors to ensure that they are operating properly. Should an error be detected, the incubator will sound an alarm and display the appropriate message. If such an alarm occurs, contact your local distributor or the Technical Services Department.

## PREVENTIVE MAINTENANCE

### Incubators

Your equipment has been thoroughly tested and calibrated 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 Technical Services.

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 chlorine content
- Do not use powdered gloves for tissue cultures.
- Use sterile, distilled or demineralized water.

### Preventive Maintenance for Model 3950 Series Incubators

| Refer to Manual Section | Action  | Daily  | Weekly | Yearly |
|-------------------------|---|--|--------|--------|
| 1                       | Check CO <sub>2</sub> tank levels.  | ✓  |        |        |
| 1                       | Check CO <sub>2</sub> and temperature display versus setpoints, w/ independent instrument   |  | ✓      |        |
| --                      | Inspect door latch, hinges and door gasket seal.  |  |        | ✓      |
| 2                       | Verify and document CO <sub>2</sub> and temp calibration, as applicable. See Calibration section.   |  |        | ✓      |
| 1 & 5                   | Perform a complete decontamination procedure. Wipe down interior, shelves and side panels with disinfectant. Drain water reservoir and wipe down with disinfectant. Rinse everything well with sterile distilled water. | Between experiments<br><i>More frequent decontamination may be required, depending on use and environmental conditions</i> |        |        |
| Figure 6-5              | *Change CO <sub>2</sub> filter (under normal conditions)  |  |        | ✓      |
| 1                       | Check operation of the float assembly and water level switch  |  |        | ✓      |

\* *Qualified service personnel*

**Section 4**  
Alarms

## Section 5 Maintenance

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

**Caution** Before using any cleaning or decontamination method not recommended by manufacturer, users should check with manufacturer that the proposed method would not damage the equipment. s

### Cleaning

The chamber interior may be cleaned with a general-use laboratory disinfectant or alcohol.

The cabinet exterior may be cleaned with soap and water or any non-abrasive commercial glass cleaner. The Thermopane glass door may be cleaned with commercial glass cleaner or with a solution of ammonia and water.

**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. s

**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 cause pitting and rust. s

### Cleaning the Glass Doors

The chamber glass door and the optional independent inner doors may be cleaned using the same disinfectant as 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 sterile soft cloth.



## Cleaning the Glass Doors (continued)

Some precautions in the cleaning and care of the incubator 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 accelerate the corrosion process. Therefore, it is very important to rinse and dry the glass doors after cleaning.

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

## Cleaning the Humidity Reservoir

Periodic cleaning of the humidity reservoir beneath the incubator floor is recommended in order to remove bacteria, fungi or any accumulated mineral deposits.

1. Turn off and/or disconnect the water supply to the humidity reservoir.
2. Attach a drain fitting and hose to the drain port on the back of the unit. Run the hose to an appropriate drain.
3. With an adjustable wrench, remove the brass overflow fitting located at the rear of the humidity reservoir. Allow reservoir to drain. Reservoir holds approximately 4 gallons (15.4 L).
4. Disassemble the hose bracket from the incubator floor.
5. Remove the 8 screws securing the floor. Using the circular black plastic grommet, slide the floor outward to expose the humidity reservoir.
6. Remove any remaining water and sediment from the reservoir with a clean sponge.
7. Clean the reservoir with a general-use laboratory disinfectant. Rinse well with sterile distilled water and wipe dry with a clean cloth.

**Note** On reassembly, brass overflow fitting must be checked for leaks. s

**Caution** Use of chlorinated water, or decontamination products containing chlorine, will deteriorate the stainless steel and cause rust, voiding the warranty. s

**Caution** Do not use strong alkaline or caustic agents. Stainless steel is corrosion resistant, not corrosion proof. s

## Replacing the Power Fuses

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

**Warning** High voltage is present behind control panel. The remote overtemp alarm system should be installed only by qualified electrical service personnel. s

There are only two replaceable fuses in the incubator.

1. Turn off the incubator's power switch and unplug the power cord.
2. Remove the top of the unit to access the fuses.
3. Refer to Figure 6-5 for the location of the two fuses.
4. Install the top cover and return the unit to service. If the fuse(s) blow after restoring power to the incubator, contact the Technical Services Department.

**Table 5-1.** Fuse Replacement Chart

| Fuse Voltage and Application | Manufacturers Part # | Amp Rating | Rupture Speed | IEC Letter Code |
|------------------------------|----------------------|------------|---------------|-----------------|
| 115 VAC Accessory Outlet     | GMC-1 A              | 1.0 Amp    | Time-Lag      | T               |
| 230 VAC Accessory Outlet     | GMC-500 mA           | 0.5 Amp    | Time-Lag      | T               |
| 115 VAC Interior Outlet      | GMC-2.5 A            | 2.5 Amp    | Time-Lag      | T               |
| 230 VAC Interior Outlet      | GMC-1.5 A            | 1.5 Amp    | Time-Lag      | T               |

## Discarding/Removing Incubator from Service

**Caution** Federal regulations require that doors be removed from incubators before units are removed from service or discarded. s

**Caution** When operating this unit under high temperatures and/or relative humidity (RH), caution must be observed when the unit is shut down, unexpectedly or by choice. Condensate can form on the interior of the chamber as it cools. This includes the heating element surfaces. Heavy condensate can bridge the ceramic insulators and cause a temporary electrical short to ground. This electrical circuit is protected by a circuit breaker. However, to avoid this contingency if these conditions occur, open the door of the unit and allow it to stand open until the water vapor disperses. s

**Section 5**  
Maintenance

## Section 6 Factory Options

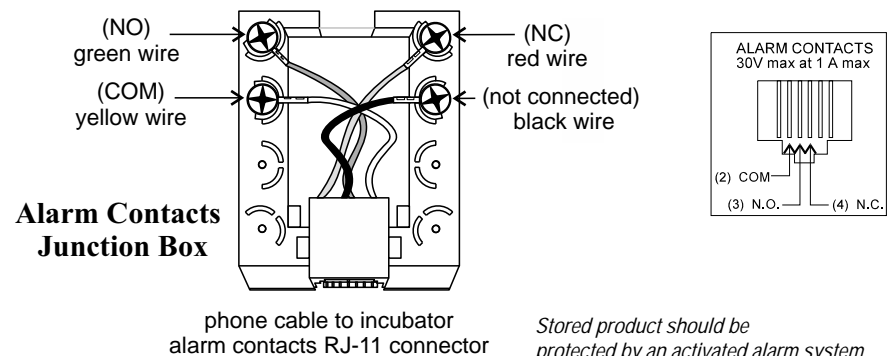
Instructions for connecting the incubator to external equipment follow.

### Connect the Remote Alarm Contacts

A set of relay contacts is provided to monitor alarms through a RJ-11 telephone style connector on the back of the unit. Refer to Figure 6-3 for the location of the alarm connector. The 12-foot telephone cord (P/N 190388) and RJ11-to-screw terminal conversion box (190392) are available through the Technical 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 and CO<sub>2</sub> alarms. See Section 3, Configuration Mode.



**Alarm Contacts Junction Box**

phone cable to incubator  
alarm contacts RJ-11 connector

*Stored product should be protected by an activated alarm system capable of initiating a timely response 24 hours/day. These alarms provide an interconnect for centralized monitoring.*

**All outputs shown  
in alarm condition**

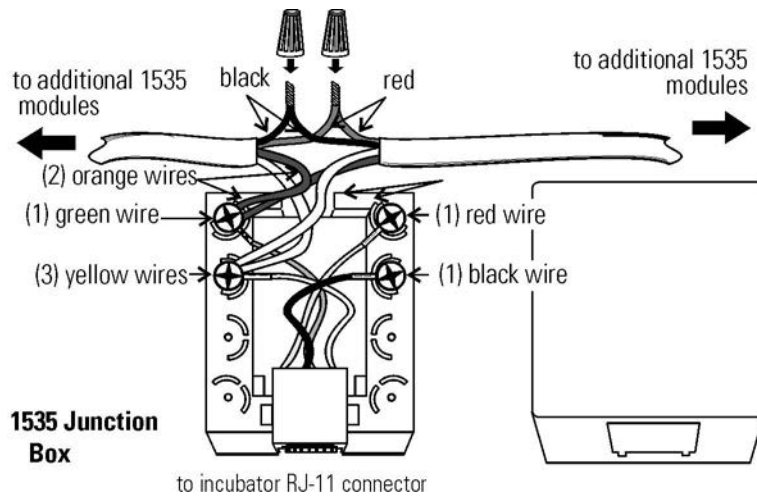
**Figure 6-1.** Remote Alarm Outputs



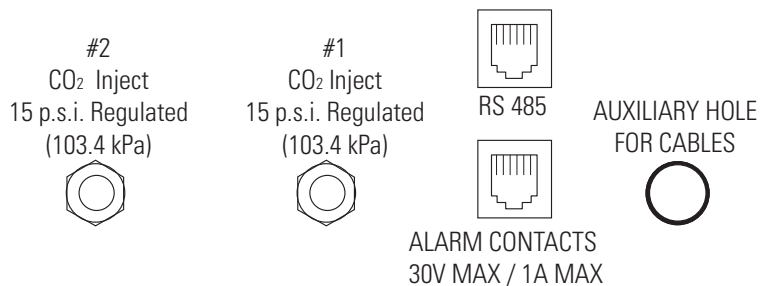
## Connect the RS485 Interface (P/N 190523)

All incubator models can be purchased with the RS485 communications option. This option allows the incubator to be directly connected to a Model 1535 alarm system without the use of a communications module. A junction box is provided with each RS485 option. Refer to Figure 6-2 for wiring details. Figure 6-3 shows the location of the RS485 connector on the back of the incubator.

To allow the incubator and the 1535 to communicate, an address must be allocated on the 1535. Refer to Section 5.8 of the 1535 operating manual. The same address number must be assigned to the incubator. Refer to Section 3, Configuration Mode, of this manual.



**Figure 6-2.** RS485 Interface Wiring



**Figure 6-3.** RS485 Connector Location on Unit Back

## Connect Analog Output Boards (P/N 190512, 190543, & 190544)

**Warning** The electronics section contains hazardous voltages. Only qualified electrical service personnel should access this area. s

The analog output board is an option that allows the incubator to output analog signals representing the air temperature and CO<sub>2</sub> content of the incubator interior. There are three different analog output board options available: 0-1 V, 0-5 V or 4-20 mA signals. Negative display readings will output 0 V. The outputs do not have isolated grounds. See Table 6-1 for output specifications of the three boards.

**Table 6-1.** Analog Output Board Specifications

|                       | <b>190512 4-20 mA<br/>Output Scaling<br/>4-20 mA Equals</b> | <b>190544 0-1 V<br/>Output Scaling<br/>0-1 V Equals</b> | <b>190543 0-5 V<br/>Output Scaling<br/>0-5 V Equals</b> |
|-----------------------|---|---|---|
| <b>Temperature</b>    | 0.0-100.0°C   | 0.0-100.0°C   | 0.0-100.0°C   |
| <b>CO<sub>2</sub></b> | 0.0-100.0% CO <sub>2</sub>                                  | 0-100.0% CO <sub>2</sub>                                | 0-100.0% CO <sub>2</sub>                                |

For the 0-1 V and 0-5 V boards, the recording device must supply a load  $\geq 1000$  ohm. For the 4-20 mA board, the recorder must supply a load of  $\leq 100$  ohm.

To wire in the analog output board, the shielded 22 gauge, 3-conductor wire, Part # 73041, is recommended, maximum length 50 ft (15.2 m). This wire is also readily available from other vendors including Alpha, Part #2403, and Deerborn, Part # 972203.

**Caution** Accuracy of the output at the board terminal strip to the incubator display is  $\pm 1$  unit. There is no calibration from the incubator. Calibration to the incubator display must be at the instrument connected to the output board. s

To access the analog board:

1. Turn off the incubator and disconnect it from the power source.
2. Remove the top of the incubator.
3. Locate the Analog Output board.

*(continued)*

- Strip the ends of the conductor and wire it to the appropriate terminals of connectors J2 on the analog board. Refer to Figure 6-4.

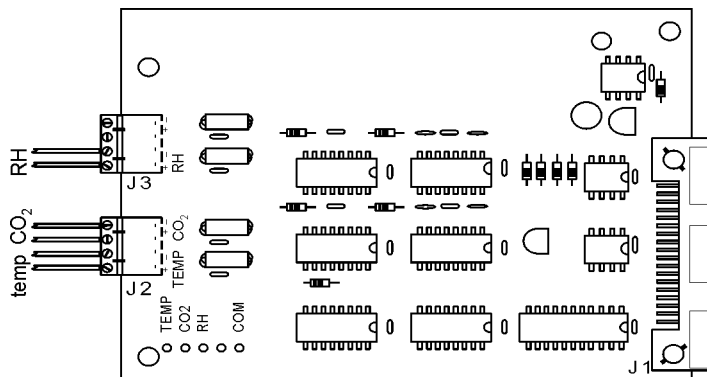


Figure 6-4. Terminals on Analog Board

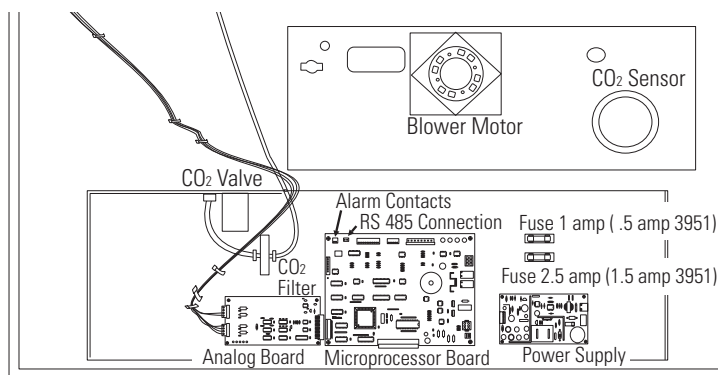


Figure 6-5. Route Wires

- Route the wires through the auxiliary hole located on the back of the unit. See Figure 6-3 and Figure 6-5.
- When wiring is completed, replace the unit top and return the unit to service.

## CO<sub>2</sub> Gas Guard (P/N 1900000)

**Warning** CO<sub>2</sub> can be lethal in high concentrations. Refer to the warnings in Section 1 of this manual.

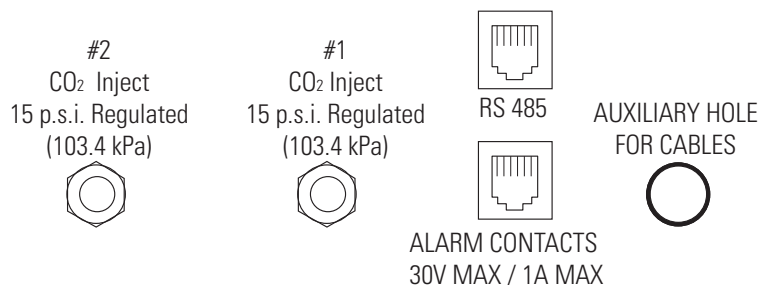
The 3950 Series incubators can be equipped with a built-in Gas Guard system that will operate with a CO<sub>2</sub> gas supply. The Gas Guard uses two pressure switches to continuously monitor the pressures of two independent CO<sub>2</sub> supplies and automatically switches from one supply to the other when the supply pressure drops below 10 psig (0.690 bar). Do not use the Gas Guard with multiple incubators.

## CO<sub>2</sub> Gas Guard (continued)

The CO<sub>2</sub> gas supplies must be equipped with two-stage pressure regulators with gauges. The high pressure gauge at the tank should have a 0-2000 psig range and the low pressure gauge should have a 0-30 psig range. The gas supply to the incubator must be maintained at 15 psig (1.034 bar). Gas pressures below 15 psig will cause nuisance alarms to occur on incubators equipped with the built-in Gas Guard.

### Connect CO<sub>2</sub> Gas Supplies

The CO<sub>2</sub> inlets for the Gas Guard are located on the back of the unit. Using 1/4" ID tubing, connect one of the CO<sub>2</sub> supply tanks to the fitting labeled CO<sub>2</sub> Inlet #1 Tank. Connect the second CO<sub>2</sub> supply tank to the fitting labeled CO<sub>2</sub> Inlet #2 Tank. Install 3/8" hose clamps to secure the 1/4" ID tubing to the fittings. Refer to Figure 6-6.



**Figure 6-6.** CO<sub>2</sub> Connections on Unit Back

### De-activate Gas Guard

The built-in Gas Guard is turned ON when shipped from the factory. The tank selected (Tank Sel) has been specified as Tank 1. Refer to Section 3 Configuration, to de-activate the Gas Guard or change Tank Sel from #1 to #2. If the Gas Guard system is not used, the incubator functions normally by supplying CO<sub>2</sub> from the supply tank connected to Inlet #1.

### Operation of CO<sub>2</sub> Gas Guard

With the Gas Guard in operation, the incubator uses the gas supplied by the tank connected to Inlet #1 until pressure drops below 10 psig (68.95 kPa). At this time, the Gas Guard automatically switches to gas supplied through CO<sub>2</sub> Inlet #2.

In addition, the incubator automatically changes Tank Sel in Configuration Mode from 1 to 2 to indicate that the incubator is now using gas supplied through Inlet # 2. If the gas supply to Inlet # 1 is replenished, the incubator continues to operate using the gas supplied through Inlet #2 unless the operator changes Tank Sel from #2 to #1 through Configuration Mode. Refer to Section 3, Configuration.



## Operation of CO<sub>2</sub> Gas Guard (continued)

Audible and visual alarms occur on the control panel when the gas guard switches from one supply to the other. The audible alarm sounds until the operator presses the Silence key on the control panel. The visual alarm in the Message Center reads 'Tank 1 Low' while the audible alarm is sounding, but the message is removed when the operator presses the Silence key. However, the 'Tank Low' indicator on the control panel stays lit until the condition is resolved. The unit operates normally.

**Caution** Both the audible and visual alarms described above do not ring back once the Silence key is pressed. s

If the Gas Guard system does not detect an adequate gas supply at CO<sub>2</sub> Inlet #1 or Inlet #2, a visual and audible alarm again occurs on the control panel. The visual alarm in the Message Center reads 'Tank 1&2 Low'. The audible alarm continues to ring until the Silence key is pressed. The audible alarm rings back every 15 minutes after the alarm is silenced, if the Gas Guard continues to detect that both gas supply pressures are below 10 psig (68.95 kPa).

## Inner Doors

Align the shelves and shelf channels with each of the inner doors to facilitate introduction and removal of trays. Clean these doors with the same care as the single door. See Section 5.

## Shaker Support Shelves

Shaker support shelves are reinforced and secured to the walls of the incubator. They have a load limit of (1) shaker or 200 pounds per shelf, one shelf being the floor of the unit. The shaker platform limit is 50 pounds. Shakers must not exceed 250 rpm when used inside this incubator. For shaker power connection, an internal outlet in the upper right corner of the back wall is installed. Casters are installed at the factory for moving the cabinet to the desired location. After the unit is in place and prior to operation, the casters must be removed. The large rubber vibration feet, factory installed, are positioned correctly for operation. Do not adjust.

**Caution** Any equipment placed inside the chamber must be rated for unit operating temperature and humidity. s

## Section 7 Specifications

*\* Specifications are based on nominal voltages of 115 V or 230 V in ambient temperature of 22°C to 25°C.*

### Temperature

Control . . . . . $\pm 0.1^{\circ}\text{C}$  Microprocessor PID  
Setpoint . . . . .Digital – Touch Pad,  $0.1^{\circ}\text{C}$   
Range . . . . . $+5^{\circ}\text{C}$  above ambient to  $60^{\circ}\text{C}$   
Uniformity . . . . . $\pm 0.3^{\circ}\text{C}$  @  $+37^{\circ}\text{C}$   
Tracking Alarm. . .User programmable (low) indicator  
Overtemp . . .Tracking, user programmable, action and indicator  
Display . . . . .Digital, LED,  $0.1^{\circ}\text{C}$  increments

### Temperature Safety

Type . . .Extreme temperature safety, action and indicator  
Sensor . . .Thermostat, independent of temperature control system  
Indicator . .Message center, audible and visual alarms

### Relative Humidity

Selectable Ranges .Medium ( $>80\%$ ), High ( $>90\%$ )

### CO<sub>2</sub>

Control: . . . . . $\pm 0.1\%$  microprocessor PID  
Sensor: . . . . .Thermal conductivity  
Readability: . . . . . $0.1\%$   
Range: . . . . .0 to 20%  
Inlet Pressure: . . . . .15 PSIG ( $\pm 5$  PSIG)  
Display: . . . . .Digital LED,  $0.1\%$  increments

### Shelves

Dimensions . . .30.62” W x 25.81” F-B (77.78 cm x 65.56 cm)  
Construction: . . . . .Solid stainless steel, 2B finish  
Surface Area . . . . .5.4 sq. ft (0.51 sq. m) per shelf  
Max per Chamber: . . . . .145.8 sq. ft (13.55 sq. m)  
Standard: . . . . .5 (shipped with unit)  
Maximum: . . . . .27 (maximum)  
Clearance: . . . . .Adjustable on 2” (5 cm) centers

### Construction

Interior volume . . . . .29 cu ft (823 liters)  
Interior . . . . .304 stainless steel, 2B finish  
Exterior . . . . .18-gauge cold rolled steel  
Exterior Door . .Heated, triple pane tempered glass  
Outer Door Gasket . . . . .Molded vinyl  
Insulation . . . . .2” fiberglass

### Fittings

Access Port . . .2.4” (6.1 cm) ID, one port per side  
CO<sub>2</sub> Inlet . . . . .1/4” barbed  
Sample Port . . . . .Front mount, 1/4” barbed  
Water Inlet . . . . .1/4” MPT for automatic fill  
Overflow Drain . . . . .3/8” MPT  
Condensate Drain . . . . .3/8” FPT

### Electrical

Model 3950:100-120 VAC, 50/60 Hz, 1 PH, 10.0 FLA  
Operating Range, including fluctuations - 90-125 V, 50-60 Hz,  
15 A Breaker power switch  
Model 3951:200-230 VAC, 50/60 Hz, 1 PH, 6.0 FLA  
Operating Range, including fluctuations - 180-250 V, 50-60 Hz,  
8 A Breaker power switch  
Power Switch . . . . .2-pole circuit breaker  
Accessory Outlet . . . Voltage equal to the cabinet input, 75 W max.,  
0.5 mA leakage current  
Interior Outlet . . . . Voltage equal to cabinet input, 230 W max,  
0.5 mA leakage current  
Remote Alarm Contacts . . . Deviation of temperature, CO<sub>2</sub> & power.  
N.O. & N.C.

**Unit BTU Output**

115V / 230V: .....510 BTUH (150 W)

**Dimensions**

Exterior .....38.0” W x 80.0” H x 33.0” F-B  
.....(96.5 cm x 203.2 cm x 83.8 cm)

Interior .....31.0” W x 60.0” H x 27.0” F-B  
.....(78.7 cm x 152.4 cm x 68.6 cm)

**Weight** .....500 lbs. (226.8 kg)

**Safety Specifications**

Altitude: .....Up to 2,000 meters

Temperature: .....5°C to 40°C

Humidity . . .Maximum 80% RH for temperatures up to 31°C,  
decreasing linearly to 50% RH at 40°C non-condensing.

Mains Supply Fluctuations . . .not to exceed ±10% of nominal voltage

Installation Category II

Pollution Degree 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 2500 V for a 230 V supply and 1500 V for a 120 V supply.

---

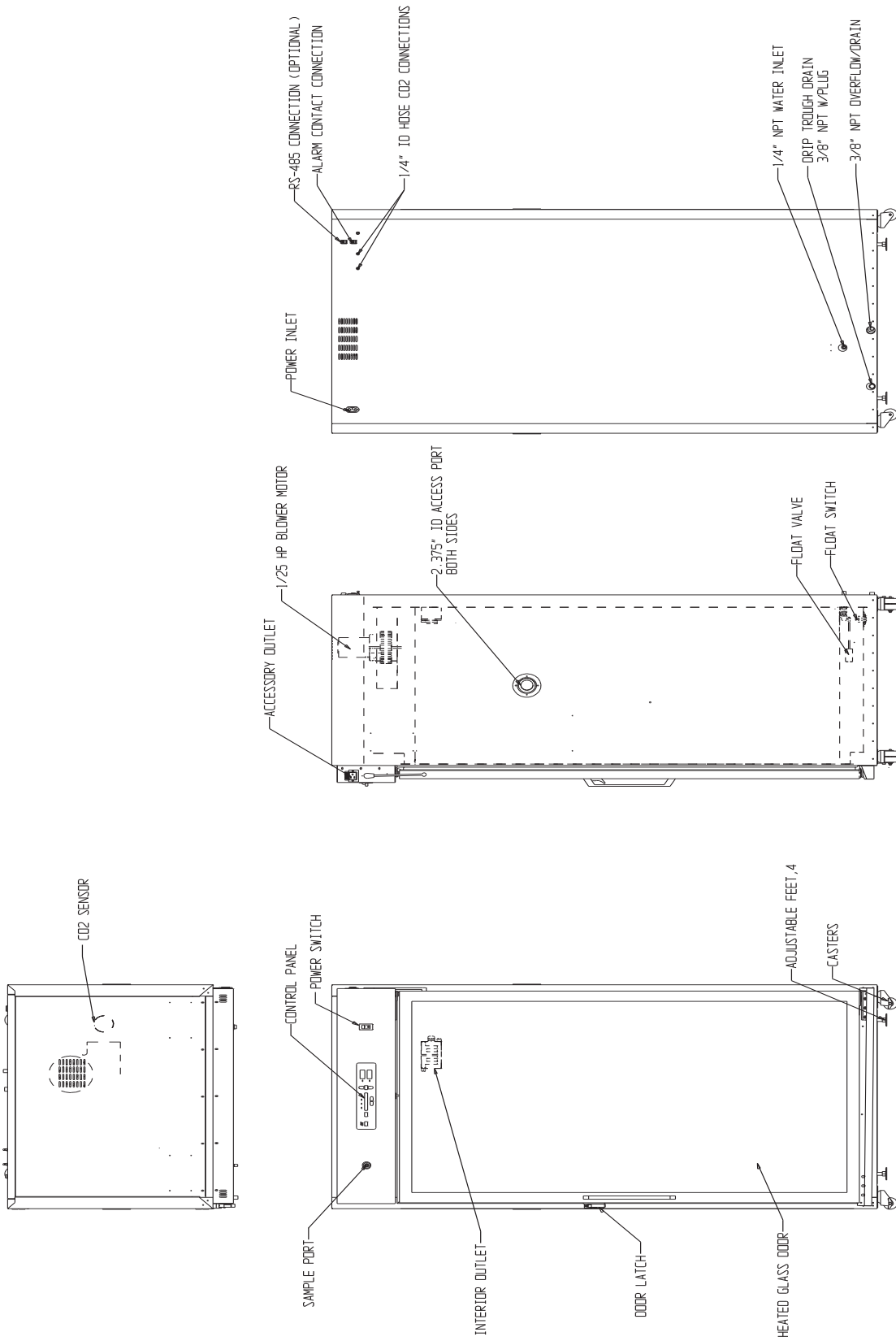
2 Pollution degree describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally only non-conductive pollution such as dust occurs with the exception of occasional conductivity caused by condensation.

**Section 7**  
Specifications

## Section 8 Spare Parts

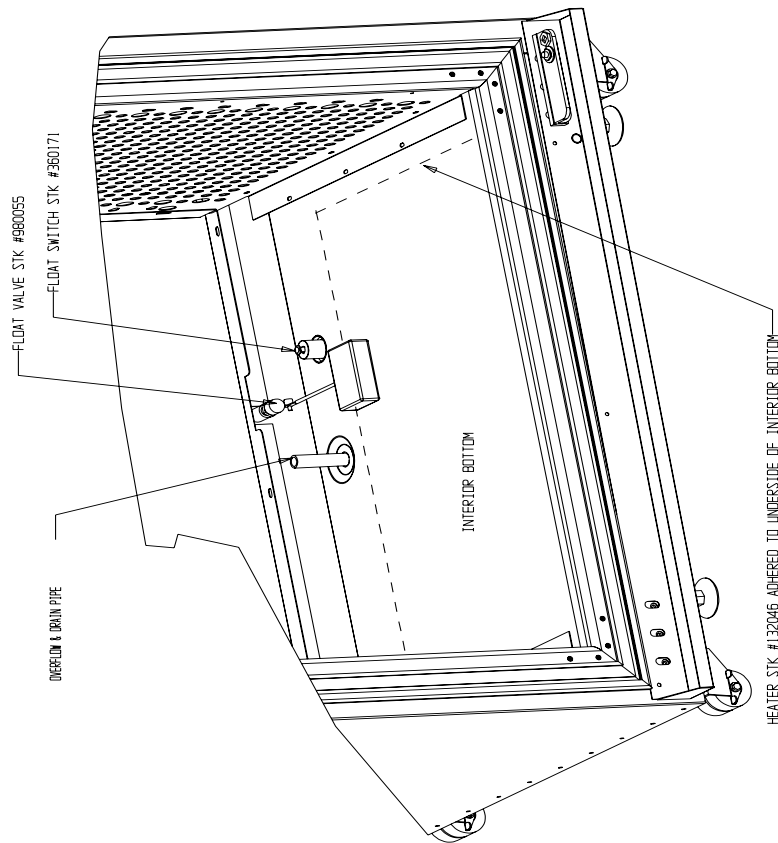
| <b>Part Number</b> | <b>Description</b>                                |
|--------------------|---|
| 230135             | 1 amp fuse (3950 accessory outlet)                |
| 230158             | 2.5 amp fuse (3950 interior outlet)               |
| 230120             | 0.5 amp fuse (3951 accessory outlet)              |
| 230106             | 1.5 amp fuse (3951 interior outlet)               |
| 1900621            | Blower motor service kit                          |
| 170164             | Motor capacitor 3 MFD, 370 VAC                    |
| 600210             | 300 watt wire-wound heater                        |
| 250118             | CO <sub>2</sub> solenoid 12 V DC                  |
| 360157             | Door switch                                       |
| 1900471            | Add Water float switch with pins                  |
| 290138             | Temperature control sensor                        |
| 191563             | Microprocessor board                              |
| 290090             | CO <sub>2</sub> sensor                            |
| 400119             | Power supply                                      |
| 190641             | Gas guard manifold with pressure switches & valve |
| 980055             | Float valve assembly, 100 PSI                     |
| 515080             | Leveler, 2" diameter                              |
| 227083             | Door latch assembly                               |
| 770001             | Inline CO <sub>2</sub> filter                     |
| 600034             | 0.375" hose clamp                                 |
| 950013             | 1/4" vinyl tubing for CO <sub>2</sub> connection  |
| 505071             | Stainless steel shelf                             |
| 190012             | Stainless steel shelf channel                     |
| 180006             | 0 - 60°C chart paper, 1 pen recorder              |
| 197075             | 0 - 100°C chart paper, 2 pen recorder             |
| 190467             | 3/8" MPT x 3/8" tube P-trap                       |
| 380177             | 3/8" FPT brass elbow                              |

**Section 8**  
Spare Parts



DWG. NUMBER: 3950-01-1-B

| REV | ECN NO. | DATE    | BY  | APPD | DESCRIPTION OF REVISION           |
|-----|---------|---------|-----|------|-----------------------------------|
| 0   | N/A     | 6/22/99 | DCB | MAH  | RELEASE FOR PRODUCTION            |
| 1   | IN-2740 | 9/29/99 | DCB | DCB  | DCB TO DWG & STK'S (MS 3950-07-3) |



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**Thermo**  
SCIENTIFIC  
Controlled Environment Equipment  
Box 956, Norwalk, CT 06850

MODEL/PART NAME: 3950 REACH-IN INCUBATOR

DWG TITLE: INTERIOR BOTTOM VIEW

DWG: DATE: CAD: DCB APPD: MAH DATE: 6/22/99 SCALE: 0:100

MATERIAL: N/A

PAINT: N/A

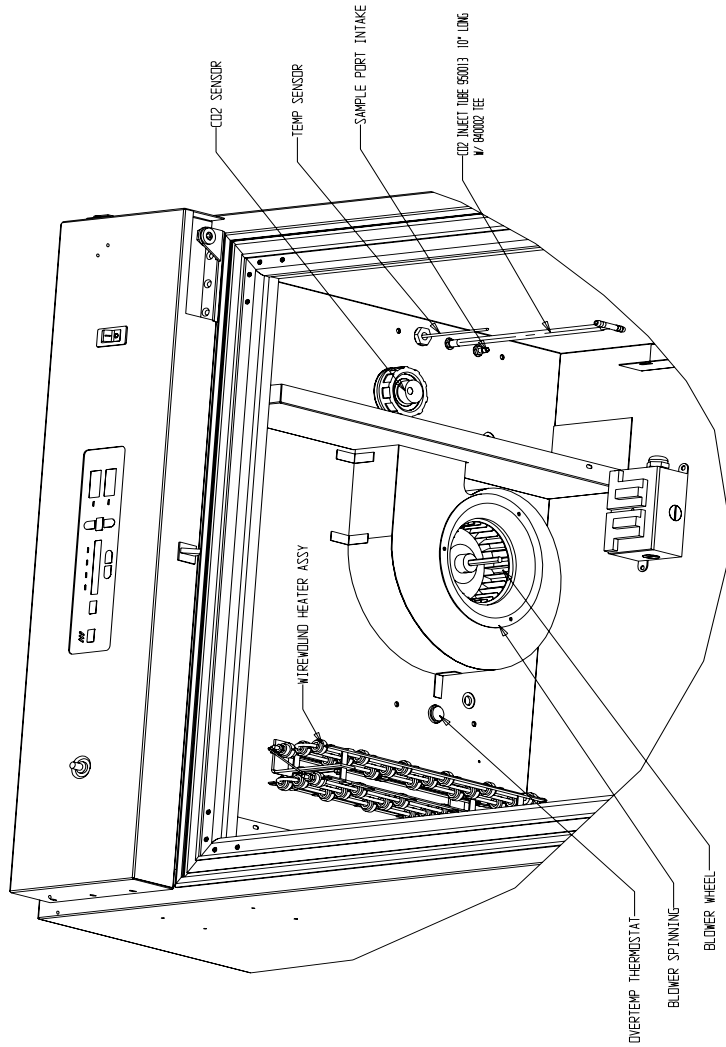
|                                      |                |      |
|--------------------------------------|----------------|------|
| TOLERANCE UNLESS OTHERWISE SPECIFIED | DRAWING NUMBER | SIZE |
| ANGLES: DECIMAL: .xxx±               | 3950-01-1      | B    |



**Section 8**  
Spare Parts

DRG. NUMBER: 3950-01-2-B

| REV | ECN NO. | DATE    | BY  | CAO | APPO | DESCRIPTION OF REVISION            |
|-----|---------|---------|-----|-----|------|------------------------------------|
| 0   | N/A     | 6/29/99 | DCB | DCB | MAH  | RELEASE FOR PRODUCTION             |
| 1   | IN-2740 | 9/27/99 | DCB | DCB | CCS  | DRG 0.DWG & SHIP'S (WAS 3950-07-5) |



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**Thermo**  
Scientific  
Laboratory Equipment  
One 8th, North, St. Louis, MO 63101

MODEL/PART NAME: 3950 REACH-IN INCUBATOR

DRG TITLE: INTERIOR TOP VIEW

DRG. DATE: [CAO: DCB] APPD: MAH

DATE: 6/29/99 SCALE: 0.188

MATERIAL: N/A

PRINT: N/A

TOLERANCE UNLESS OTHERWISE SPECIFIED

ANGLES: DECIMAL: .XX±

ANGLES: .XXX±

DRAWING NUMBER

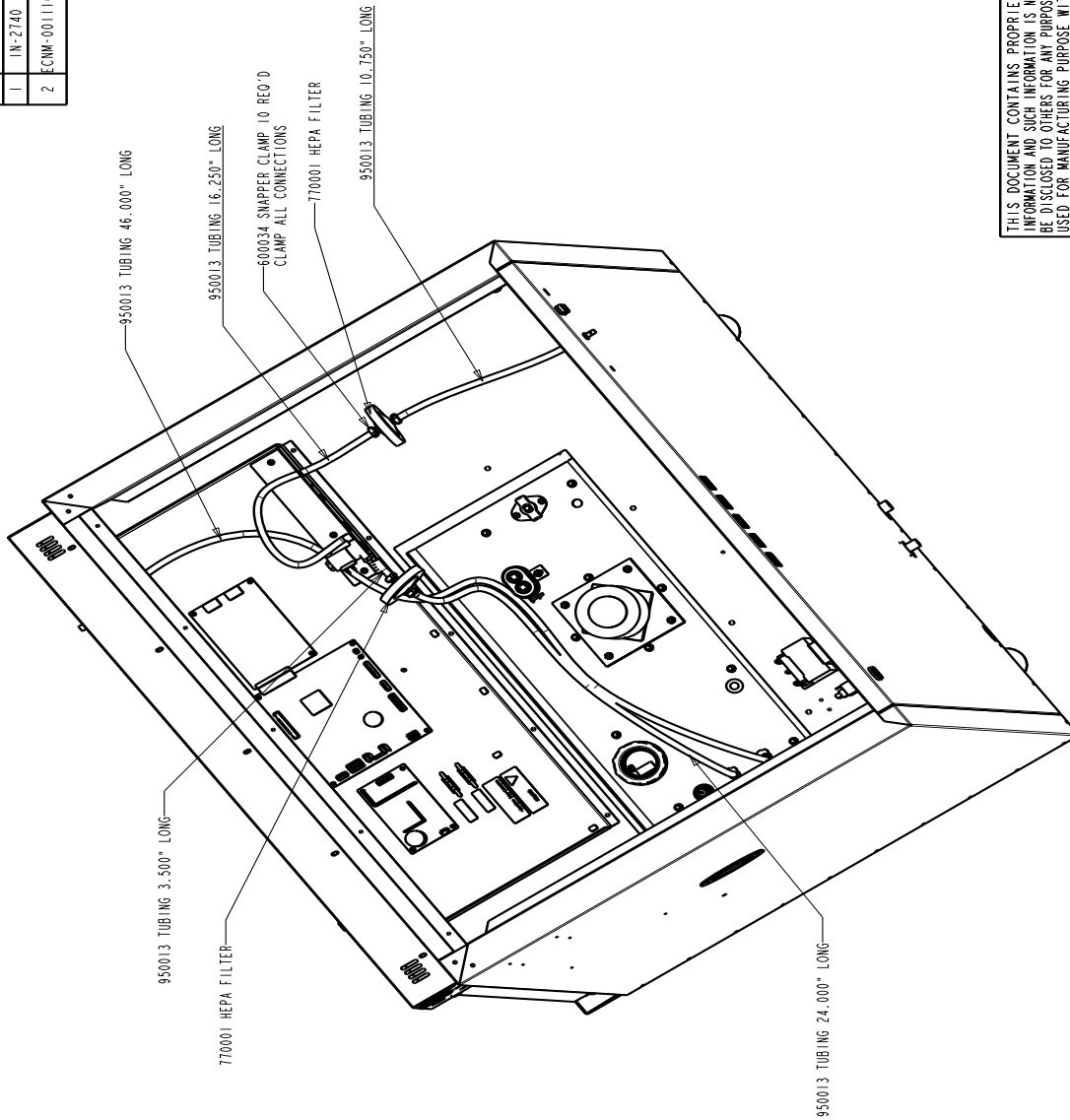
3950-01-2

SIZE

B

DWG. NUMBER: 3950-01-3-B

| REV | ECN NO.     | DATE       | BY  | CAD | APPD | DESCRIPTION OF REVISION   |
|-----|-------------|------------|-----|-----|------|---|
| 0   | NA          | 6/23/99    | DCB | DCB | MAH  | RELEASE FOR PRODUCTION  |
| 1   | 1N-2740     | 9/23/99    | DCB | DCB | DMF  | CHG'D DWG & STR#'S WAS 3950-08-2  |
| 2   | ECNM-001110 | 10-30-2020 | TFI | TFI | BT   | ADDED (1) 770001 HEPA FILTER, (2) 600034 SNAPPER CLAMP & UPDATED TUBING ACCORDINGLY |

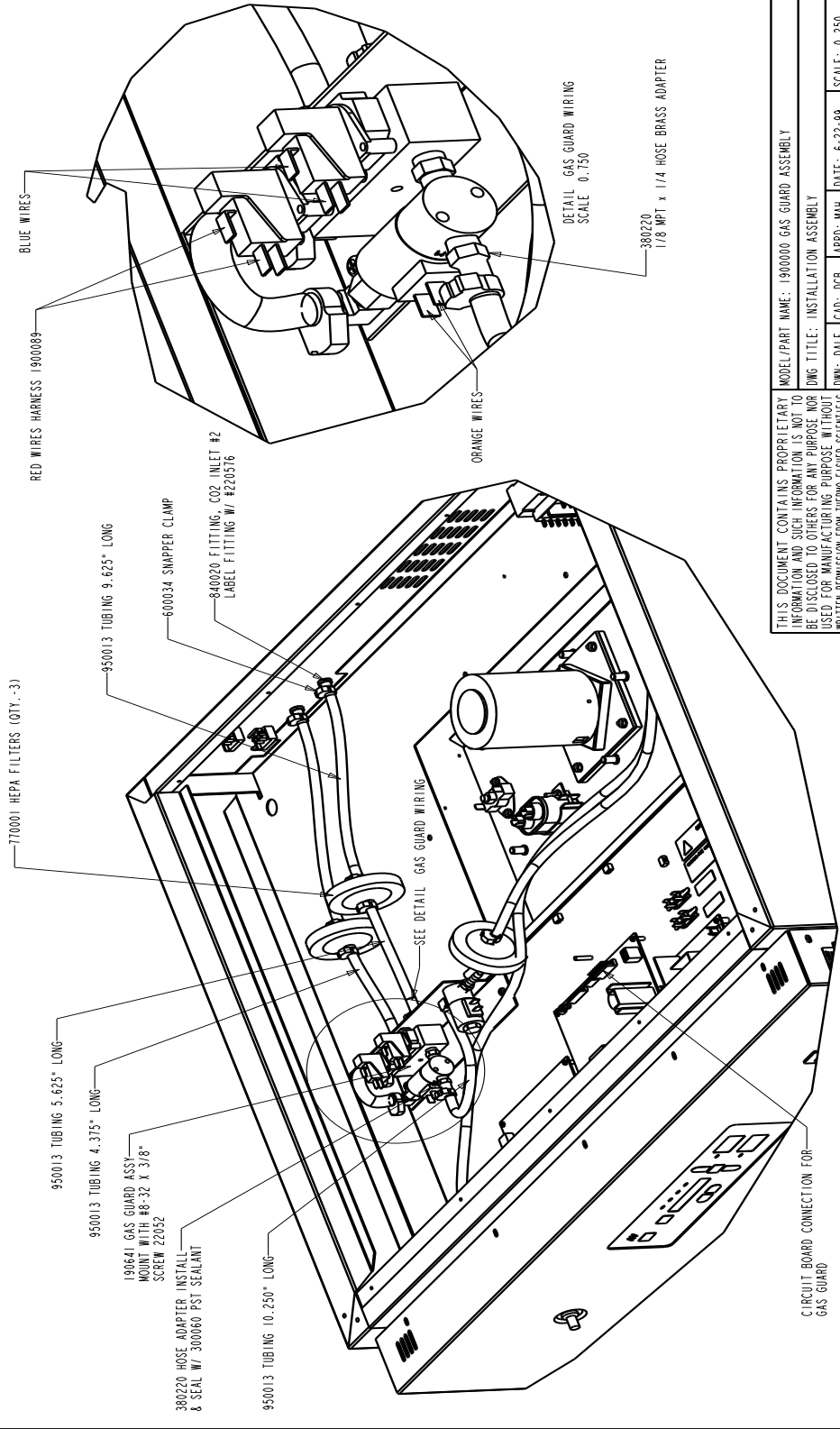


|  |                |  |               |
|--|----------------|--|---------------|
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|  |                | DWG TITLE: TUBING ASSEMBLY               |               |
| DWN: DALE  | CAD: DCB       | APPD: MAH                                | DATE: 6-22-99 |
| MATERIAL: N/A  |                | SCALE: 0.156                             |               |
| PAINT: N/A   |                |  |               |
| TOLERANCE UNLESS OTHERWISE SPECIFIED   |                | DRAWING NUMBER                           |               |
| ANGLES: .XX±   | DECIMAL: .XXX± | 3950-01-3                                |               |
| ThermoFisher<br>SCIENTIFIC   |                |  | SIZE<br>B     |
| BOX 649, MARIETTA, OHIO 45750  |                |  |               |

**Section 8**  
Spare Parts

DWG. NUMBER: 1900000-06-1-B

| REV | ECN NO.     | DATE       | BY  | CAD APP'D | DESCRIPTION OF REVISION                                 |
|-----|-------------|------------|-----|-----------|---|
| 0   | N/A         | 6/21/99    | DCB | MAH       | RELEASE FOR PRODUCTION                                  |
| 1   | IN-2740     | 9/29/99    | DCB | MAH       | REV DWG & STRIKE'S                                      |
| 2   | IN-2740     | 11-16-99   | LW  | PKD LON   | REVISED PART DESCRIPTION                                |
| 3   | IN-4201     | 05-24-12   | DLR | LDC DRP   | OBS.: 190522. USE 1900089 HARNESS                       |
| 4   | ECN#-001110 | 10-30-2020 | TF1 | BT        | ADDED (1) 770001 HEPA FILTER & (2) 600034 SWAPPER CLAMP |



|   |              |   |
|---|--------------|---|
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|   |              | DWG TITLE: INSTALLATION ASSEMBLY            |
| DWN: DALE   | CAD: DCB     | APP'D: MAH                                  |
| DATE: 6-22-99   | SCALE: 0.250 |   |
| MATERIAL: N/A   |              |   |
| PAINT: N/A  |              |   |
| TOLERANCE UNLESS OTHERWISE SPECIFIED ANGLES: .XX±   |              |   |
| DRAWING NUMBER  |              | 1900000-06-1                                |
| SIZE  |              | B   |

**ThermoFisher**  
**SCIENTIFIC**  
BOX 649, MARETTA, OHIO 45750

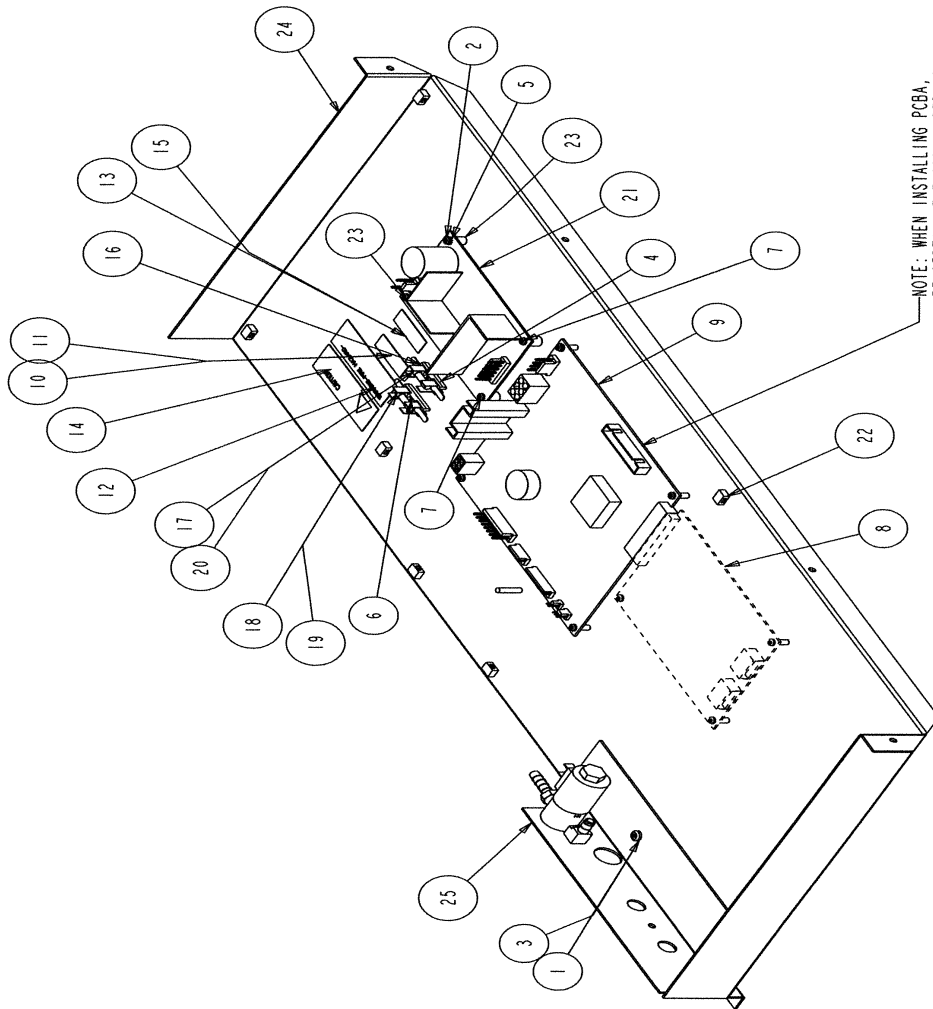
1. WHEN INSTALLED REFER TO TEST PROCEDURE #FPS-3950-140-000-16 FOR TESTING

DWG. NUMBER: 3950-08-4-B

| REV/ECN NO. | DATE             | BY  | APPD    | DESCRIPTION OF REVISION              |
|-------------|------------------|-----|---------|--------------------------------------|
| 0           | 12-10-99         | LW  | PKD LON | RELEASED FOR PRODUCTION              |
| 1           | 1N-3048 09-25-02 | GJG | KDG LON | ADDED (4) 515084 SPACERS             |
| 2           | 1N-4073 09-15-11 | GJG | LDC MSB | REPLACED (2) 515084 W/125035         |
| 3           | 1N-4274 12-03-12 | BOB | SAG DRP | MODEL NUMBER NOTES IN BOM CORRECTED  |
| 4           | 1N-4910 11-01-17 | DAG | SAG     | 192094 WAS 191563, 402202 WAS 400119 |

**BILL OF MATERIALS**

| ITEM NO. | PART NO.     | PART DESCRIPTION                    | W/C | QTY |
|----------|--------------|-------------------------------------|-----|-----|
| 1        | 22052        | #6-32 X 3/8 SS PHP SCREW            |     | 3   |
| 2        | 22130        | #4-40 X 1/4 SS PHP SCREW            |     | 11  |
| 3        | 23002        | #6-32 ZP LKWASH HEX NUT             |     | 3   |
| 4        | 23006        | #4-40 ZP LKWASH HEX NUT             |     | 2   |
| 5        | 23029        | #4 SS EXT TOOTH LOCKWASHER          |     | 2   |
| 6        | 59007        | #4-40 X 3/8 SS PHP SCREW            |     | 2   |
| 7        | 125035       | 5/1600 X .19210 X 3/8L NYLON SPACER |     | 2   |
| 8        | 190571       | 4-20MA ANALOG BOARD (OPTIONAL)      |     | 1   |
| 9        | 192094       | 3950/3960 MICRO BOARD               |     | 1   |
| 10       | 220359       | 1 AMP FUSE LABEL (3950 ONLY)        |     | 1   |
| 11       | 220378       | .5 AMP LABEL (3951 ONLY)            |     | 1   |
| 12       | 220437       | FIRE HAZARD LABEL                   |     | 1   |
| 13       | 220439       | 1.5 AMP LABEL (3951 ONLY)           |     | 1   |
| 14       | 220555       | ESD LABEL                           |     | 1   |
| 15       | 220569       | 2.5 AMP FUSE LABEL (3950 ONLY)      |     | 1   |
| 16       | 230105       | FUSE BLOCK 5 X 22 MM                |     | 2   |
| 17       | 230106       | FUSE_1_5A_5X22MM (3951 ONLY)        |     | 1   |
| 18       | 230120       | FUSE_5A_5X22MM (3951 ONLY)          |     | 1   |
| 19       | 230135       | FUSE_1A_5X22MM (3950 ONLY)          |     | 1   |
| 20       | 230158       | FUSE_2_5A_5X22MM (3950 ONLY)        |     | 1   |
| 21       | 400202       | SWITCHER                            |     | 1   |
| 22       | 440002       | TIE WRAP PUSH-IN ANCHOR             |     | 6   |
| 23       | 515084       | 1/4 DIA. X 3/8L SS SPACER           |     | 2   |
| 24       | 1900006-17-3 | COMPONENT MOUNT SUB-ASSY            |     | 1   |
| 25       | 3950-08-3    | SOLENOID VALVE SUB-ASSY             |     | 1   |



NOTE: WHEN INSTALLING PCBA,  
BE CERTAIN THE CO2 JUMPER IS  
INSTALLED; FOR 3950/3951 ONLY.

|  |               |  |
|--|---------------|--|
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| DWG TITLE: COMPONENT MOUNT ASSEMBLY (3950, 3951)   |               | DWG DATE: 12-10-99                       |
| MATERIAL:  |               | APPD: LON DATE: 12-10-99 SCALE: 0.312    |
| PAINT: -   |               |  |
| TOLERANCE UNLESS OTHERWISE SPECIFIED   | DECIMAL: .XX± | DRAWING NUMBER                           |
| ANGLES: .XX±   |               | 3950-08-4                                |
|  |               | SIZE                                     |
|  |               | B  |

**ThermoFisher**  
**SCIENTIFIC**

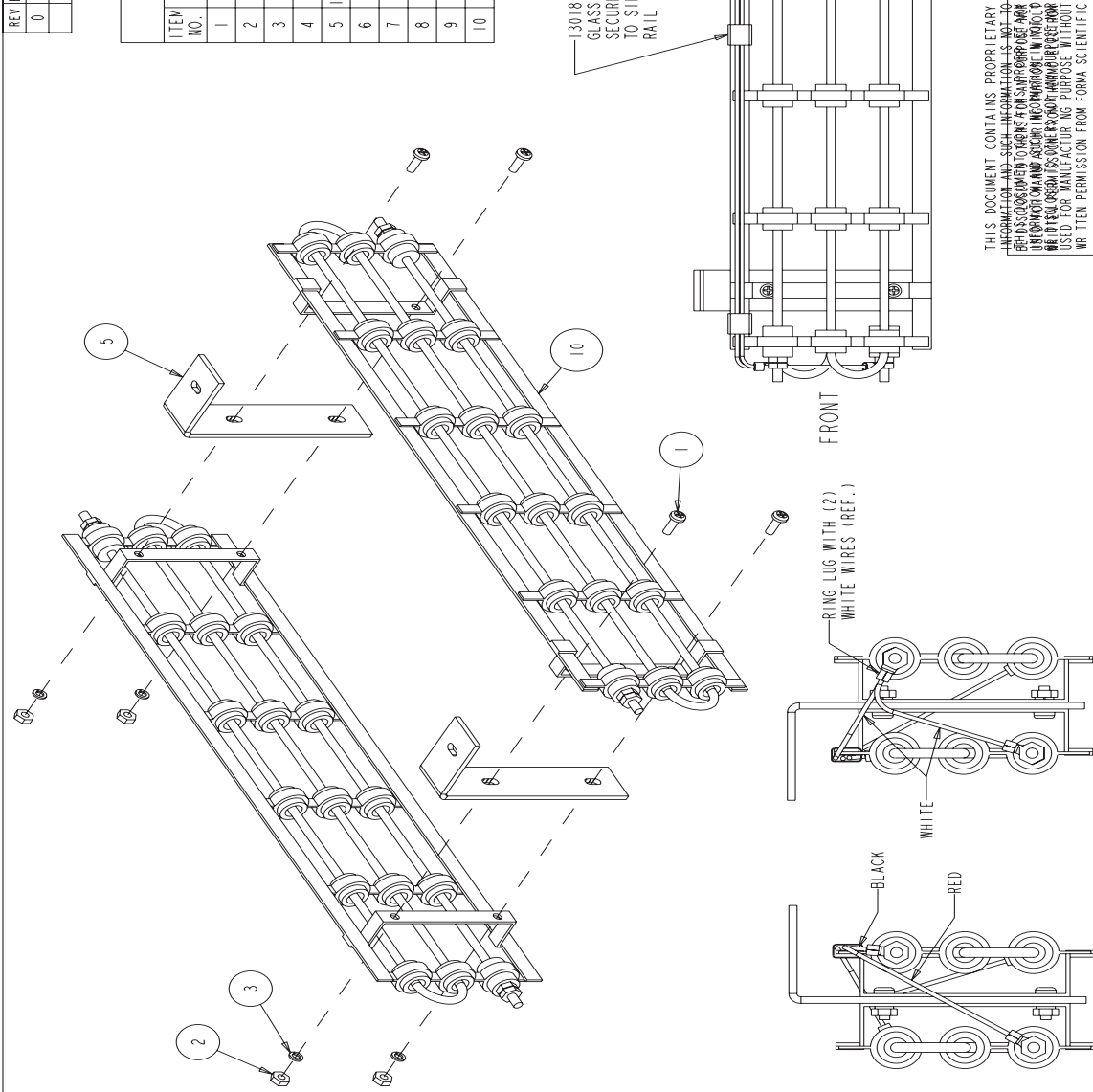
Box 649, Marietta, Ohio 45750

**Section 8**  
Spare Parts

DWG. NUMBER: 3950-08-5-B

| REV | ECN NO. | DATE     | BY | CAD | APPD | DESCRIPTION OF REVISION |
|-----|---------|----------|----|-----|------|-------------------------|
| 0   | IN-2740 | 12-10-99 | LW | PKM | CCS  | RELEASED FOR PRODUCTION |

| BILL OF MATERIALS |              |                            |         |
|-------------------|--------------|----------------------------|---------|
| ITEM NO.          | PART NO.     | PART DESCRIPTION           | W/C QTY |
| 1                 | 22053        | #8-32 X 1/2 SS PHP SCREW   | 379 4   |
| 2                 | 23010        | #8-32 SS HEX NUT           | 379 4   |
| 3                 | 23080        | #8 SS SPRING LOCKWASHER    | 379 4   |
| 4                 | 13018.TAPE   | -                          | 379 3   |
| 5                 | 1900036-31-I | HEATER MOUNT               | 379 2   |
| 6                 | 191593.BLKW  | -                          | 379 1   |
| 7                 | 191593.LWTW  | -                          | 379 1   |
| 8                 | 191593.REDW  | -                          | 379 1   |
| 9                 | 191593.SWTW  | -                          | 379 1   |
| 10                | 600210-HTR   | WIREWOUND HEATER 300W 120V | 379 2   |



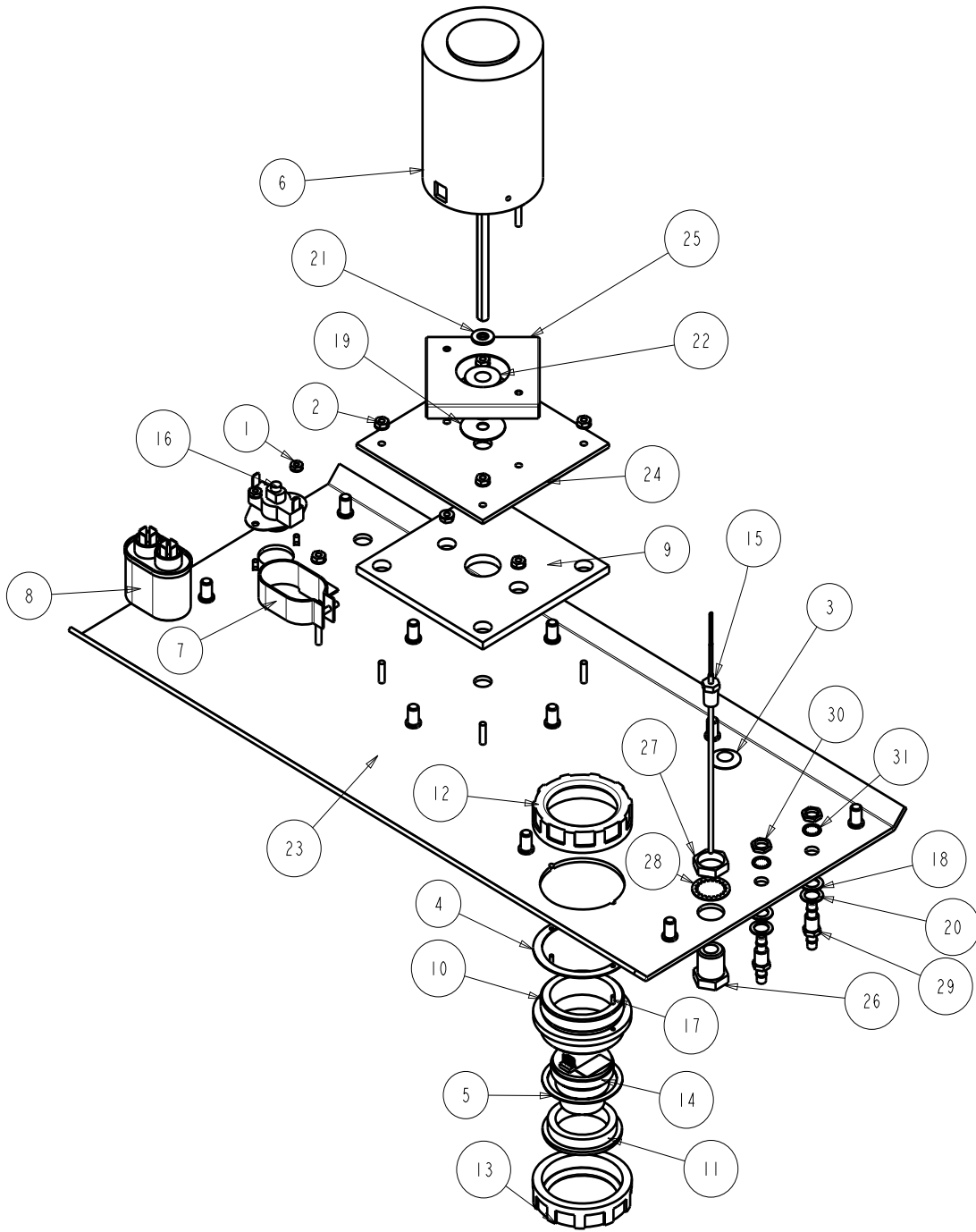
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Scientific  
Controlled Environment Equipment  
Box 649, Marietta, Oh 45750

|                                      |                       |
|--------------------------------------|-----------------------|
| MODEL/PART NAME                      | 3950 SERIES INCUBATOR |
| DWG TITLE                            | HEATER SUB-ASSEMBLY   |
| DWN MB                               | CAD PDK               |
| APPD                                 | DATE 12-10-99         |
| SCALE                                | 0.438                 |
| MATERIAL                             | PAINT -               |
| TOLERANCE UNLESS OTHERWISE SPECIFIED | DRAWING NUMBER        |
| ANGLES: .XX±                         | 3950-08-5             |
| .XX±                                 | SIZE                  |
|                                      | B                     |

REAR VIEW  
SCALE 0.563

FRONT VIEW  
SCALE 0.563



EXPLODED PARTS DRAWING  
BLOWER MOTOR MOUNT ASSEMBLY

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PAGE 1 OF 2

**Section 8**  
Spare Parts

| BILL OF MATERIALS |              |                                 |     |     |
|-------------------|--------------|---------------------------------|-----|-----|
| ITEM NO.          | PART NO.     | PART DESCRIPTION                | W/C | QTY |
| 1                 | 23001        | #6-32 ZP LKWASH HEX NUT         |     | 2   |
| 2                 | 23002        | #8-32 ZP LKWASH HEX NUT         |     | 7   |
| 3                 | 34014        | 1/2" SNAP-IN HOLE PLUG (BLACK)  |     | 1   |
| 4                 | 103099       | SENSOR MOUNT GASKET (3850 ONLY) | N/A | 1   |
| 5                 | 103100       | CO2 CELL ADAPTR GASKET          | N/A | 1   |
| 6                 | 156161       | MOTOR 1/30HP PSC 6-POLE         | N/A | 1   |
| 7                 | 170025       | CAPACITOR MOUNT                 | N/A | 1   |
| 8                 | 170164       | 3MFD RUN CAPACITOR              | N/A | 1   |
| 9                 | 190151       | MTR MNT GASKET .250 X 5 X 5     | N/A | 1   |
| 10                | 190781       | CO2 CELL MOUNT                  | N/A | 1   |
| 11                | 190782       | CO2 CELL ADAPTER                | N/A | 1   |
| 12                | 200125       | 2" BLACK PLASTIC CONDUIT BUSH   |     | 1   |
| 13                | 200181       | 2" GREY PLASTIC CONDUIT BUSH    |     | 1   |
| 14                | 290090       | TC CO2 SENSOR ASSY              | N/A | 1   |
| 15                | 290138       | THERMISTER PROBE ASSY           | N/A | 1   |
| 16                | 400141       | 60T15 THERMOSTAT 180F           | N/A | 1   |
| 17                | 640046       | 3/32 X 1/4 DOWEL PIN            |     | 2   |
| 18                | 730031       | NEOPRENE WASHER                 |     | 2   |
| 19                | 730055       | .315" ID NYLON WASHER           |     | 1   |
| 20                | 730060       | .416 SS WASHER                  |     | 2   |
| 21                | 730068       | .310 ID TEFLON FLAT WASHER      |     | 2   |
| 22                | 730069       | SILICONE WASHER                 | N/A | 1   |
| 23                | 1900021-06-1 | BLOWER MOUNT SUB-ASSY           |     | 1   |
| 24                | 1900022-31-1 | BLOWER MNT PLATE                | N/A | 1   |
| 25                | 1900620-31-1 | MOTOR SPACER                    | N/A | 1   |
| 26                | 380502_FTG   | .125 NPT X .75-20 BLKHD FTG     | N/A | 1   |
| 27                | 380502_NUT   | .750 X 20 BLKHD FTG NUT         | N/A | 1   |
| 28                | 380502_WSHR  | .750 INTL WASHER BLKHD FTG      | N/A | 1   |
| 29                | 840020_FTG   | .250 BULKHEAD FITTING           | N/A | 2   |
| 30                | 840020_NUT   | .375 NUT BLKHD FITTING          | N/A | 2   |
| 31                | 840020_WSHR  | .375 IT WASHER BLKHD FTG        | N/A | 2   |

1. APPLY A SMALL AMOUNT OF 737 SILICONE TO THREADS OF SENSOR.
2. SCREW SENSOR ONTO BOTTOM OF ASSEMBLY.
3. PLACE GASKET (orange w/o hole) ONTO ASSY.
4. PLACE ASSEMBLY ONTO POLY CAP.
5. APPLY A SMALL AMOUNT OF SILICONE TO EXTERIOR OF THREADS ON TOP PART OF ASSEMBLY INSTALLED IN TOP OF UNIT.
6. SECURE BOTTOM ASSEMBLY TO TOP ASSEMBLY. FINGER TIGHT.

EXPLODED PARTS DRAWING  
BLOWER MOTOR MOUNT ASSEMBLY

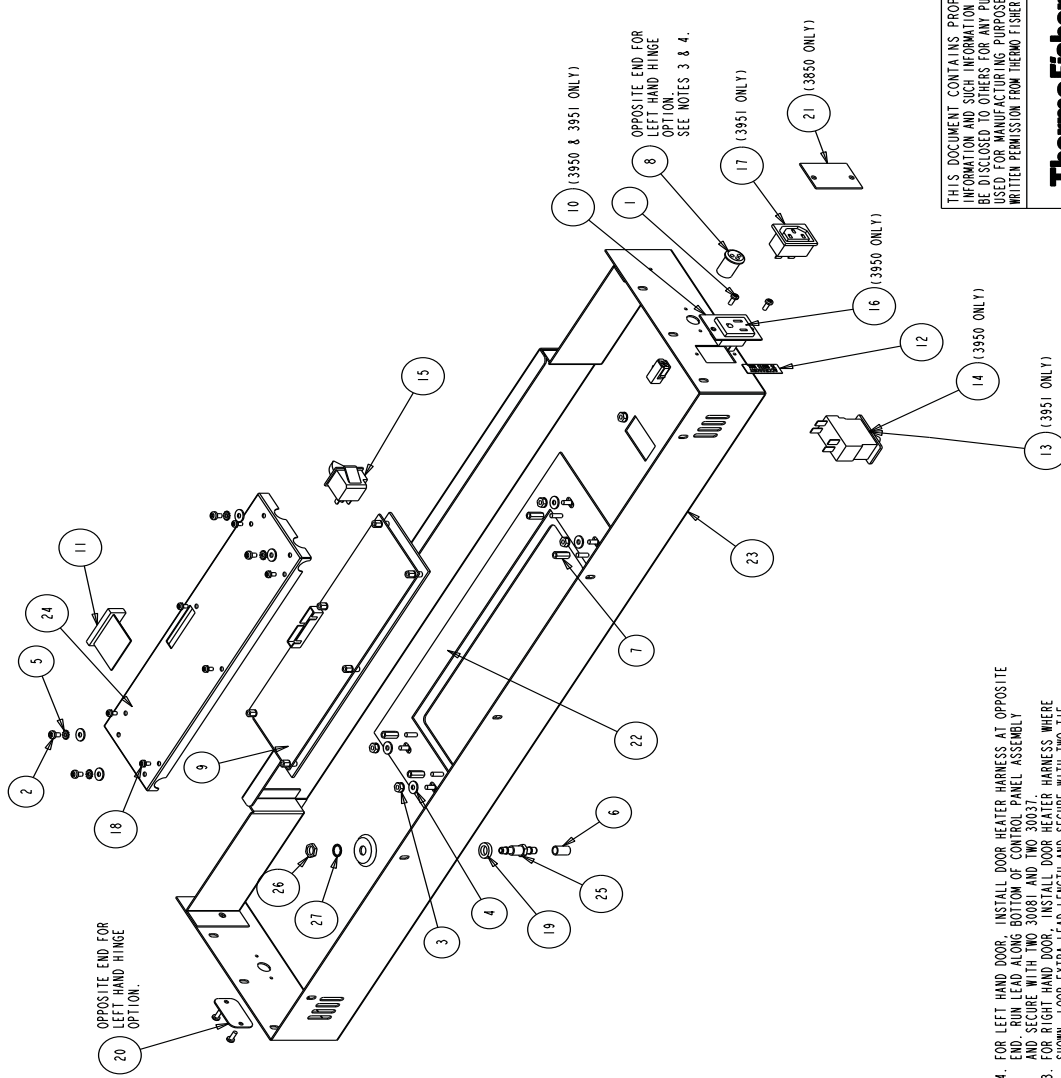
1900007-06-1-B Rev. 11  
PAGE 2 OF 2

DWG. NUMBER: 1900008-06-1-B

| REV | ECN NO. | DATE     | BY  | CAD APPD | DESCRIPTION OF REVISION                     |
|-----|---------|----------|-----|----------|---|
| 6   | IN-3019 | 02-15-02 | WCM | LDN      | CHANGED FROM 22115 & 23030 TO 590027        |
| 7   | IN-4175 | 03-15-12 | RJH | KDG      | DRP CREATED NEW STK: 1900484 FOR METAL WORK |
| 8   | IN-4419 | 11-05-13 | JOM | SAG      | DRP ADDED LEFT HAND HINGE OPTION            |
| 9   | IN-4458 | 02-18-14 | BOB | KDG      | CCS REF. 1900583 OUTLET COVER PLATE (3850)  |

**BILL OF MATERIALS**

| ITEM NO. | PART NO.     | PART DESCRIPTION                  | W/C | QTY |
|----------|--------------|-----------------------------------|-----|-----|
| 1        | 22049        | #6-32 X 3/8 SS PHP SCREW          |     | 4   |
| 2        | 22051        | #6-32 X 1/4 SS PHP SCREW          |     | 4   |
| 3        | 23002        | #6-32 ZP LWASH HEX NUT            |     | 5   |
| 4        | 23021        | #8 SS FLAT WASHER                 |     | 8   |
| 5        | 23059        | #8 SS EXT TOOTH LOCKWASHER        |     | 4   |
| 6        | 110008       | BLACK VINYL CAP                   |     | 1   |
| 7        | 127071       | #6-32 X 9/16L ALUM HEX STANDOFF   |     | 4   |
| 8        | 188896       | DOOR HEATER HARNESS               |     | 1   |
| 9        | 190609       | INCUBATOR CP ASSEMBLY             |     | 1   |
| 10       | 190994       | ACCESSORY OUTLET MOUNT            |     | 1   |
| 11       | 194021       | 7" LONG 34 POS CABLE              |     | 1   |
| 12       | 220259       | ACCESS OUTLET LABEL               |     | 1   |
| 13       | 230178       | 8 A DPDT RKR CB/SWITCH            |     | 1   |
| 14       | 230184       | 15A DPDT RKR CB/SWITCH            |     | 1   |
| 15       | 360157       | Momentary Rocker Switch SPDT      |     | 1   |
| 16       | 460024       | SNAP-IN OUTLET, WHITE             |     | 1   |
| 17       | 460138       | POWER OUTLET                      |     | 1   |
| 18       | 590027       | #6-32 X 1/4 SS PHP EXT SEMS SCREW |     | 6   |
| 19       | 730017       | 3/8 BLACK FIBER WASHER            |     | 1   |
| 20       | 1900574      | REACH-IN DOOR CORD BLANK PLATE    |     | 1   |
| 21       | 1900583      | OUTLET COVER PLATE 3850           |     | 1   |
| 22       | 1900016-16-1 | OVERLAY MOUNT SUB-ASSEMBLY        | N/A | 1   |
| 23       | 1900464-16-1 | CONTROL PANEL SUB-ASSEMBLY        |     | 1   |
| 24       | 190615-31-1  | CONTROL PANEL BRACE & COVER       | N/A | 1   |
| 25       | 840020.FTG   | .250 BULKHEAD FITTING             | N/A | 1   |
| 26       | 840020.NUT   | .375 NUT BLKHD FITTING            | N/A | 1   |
| 27       | 840020.WSR   | .375 IT WASHER BLKHD.FTG          | N/A | 1   |



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MODEL/PART NAME: REACH-IN INCUBATOR CONTROL PANEL STK #1900008  
 DWG TITLE: CONTROL PANEL ASSEMBLY (3850, 3951)

DATE: CAD: DCB APPD: MAH DATE: 5/25/99 SCALE: 0.250

MATERIAL: N/A  
 PAINT: N/A  
 TOLERANCE UNLESS OTHERWISE SPECIFIED: .111±  
 ANGLES: DECIMAL: .111±

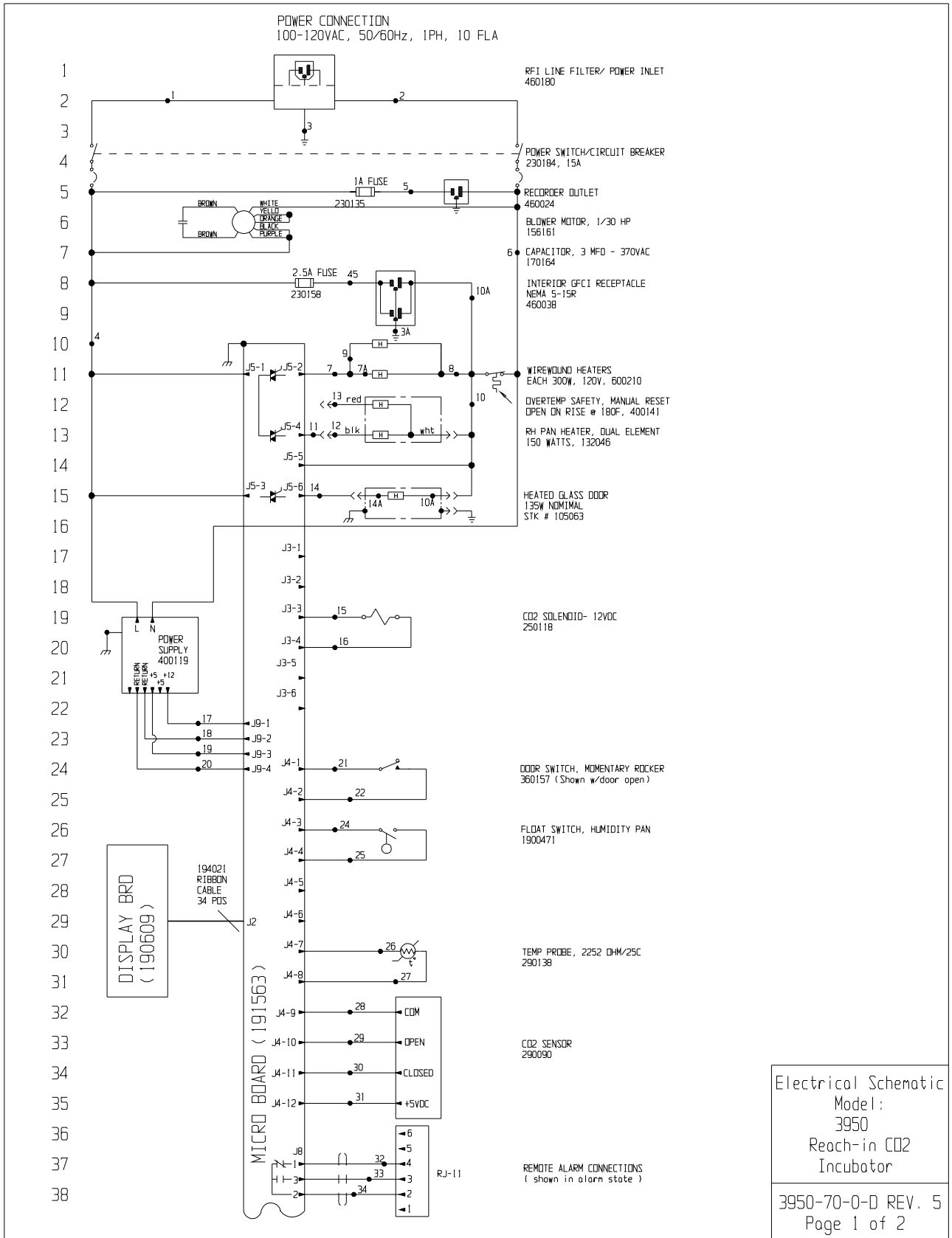
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DRAWING NUMBER: 1900008-06-1  
 SIZE: B

4. FOR LEFT HAND DOOR, INSTALL DOOR HEATER HARNESS AT OPPOSITE END. RUN LEAD ALONG BOTTOM OF CONTROL PANEL ASSEMBLY AND SECURE WITH TWO 30081 AND TWO 30037.
3. FOR RIGHT HAND DOOR, INSTALL DOOR HEATER HARNESS WHERE SHOWN. LOOP EXTRA LEAD LENGTH AND SECURE WITH TWO TIE ANCHORS (30081) AND TWO WIRE TIES (30037).
2. INSTALL OUTLET GREEN WIRE TO #8-32 CORNER STUD W/KEEPS NUT 1. TAP .106 HOLES (8 EACH) #6-32



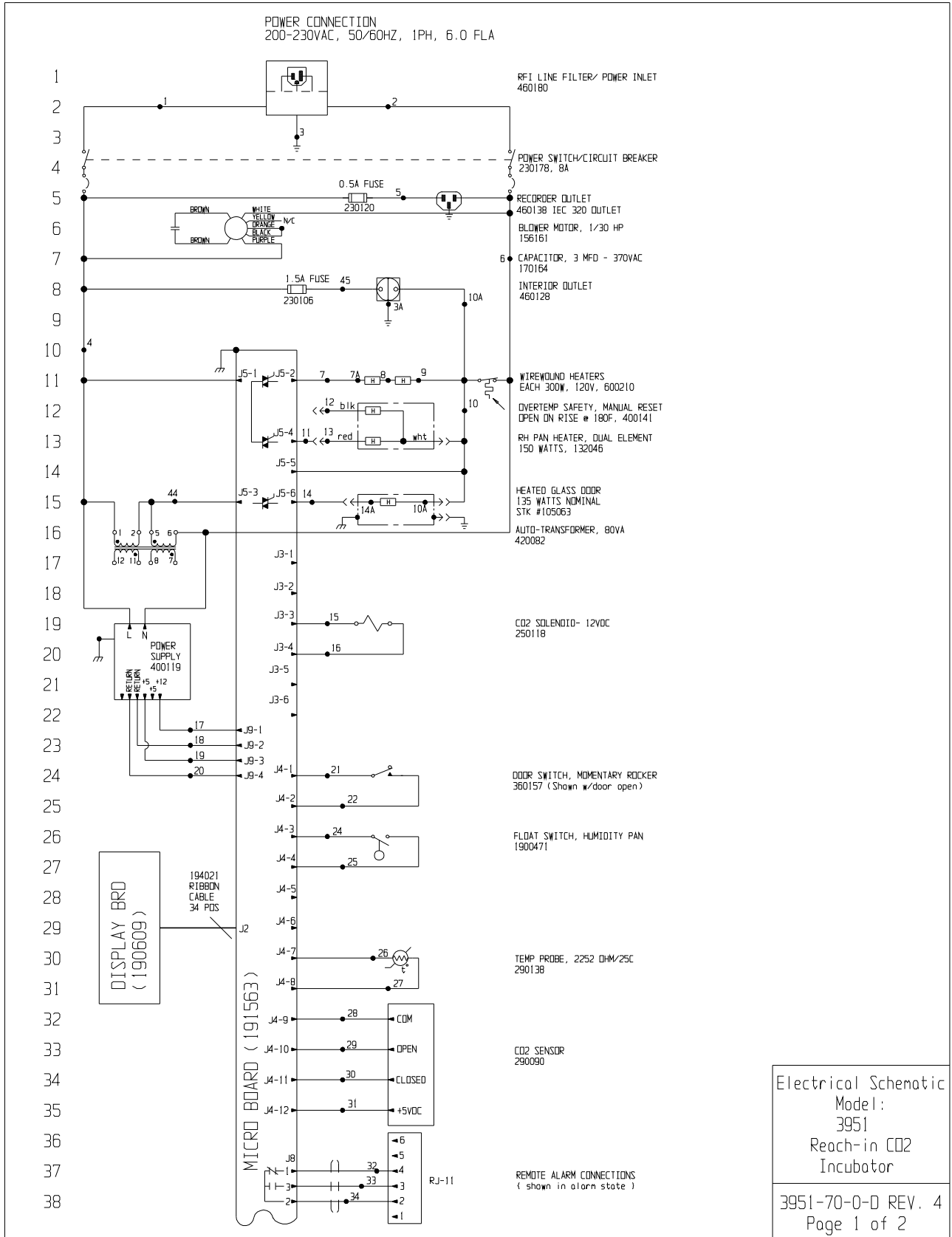
**Section 8**  
Spare Parts



Electrical Schematic  
Model:  
3950  
Reach-in CO2  
Incubator

3950-70-0-D REV. 5  
Page 1 of 2



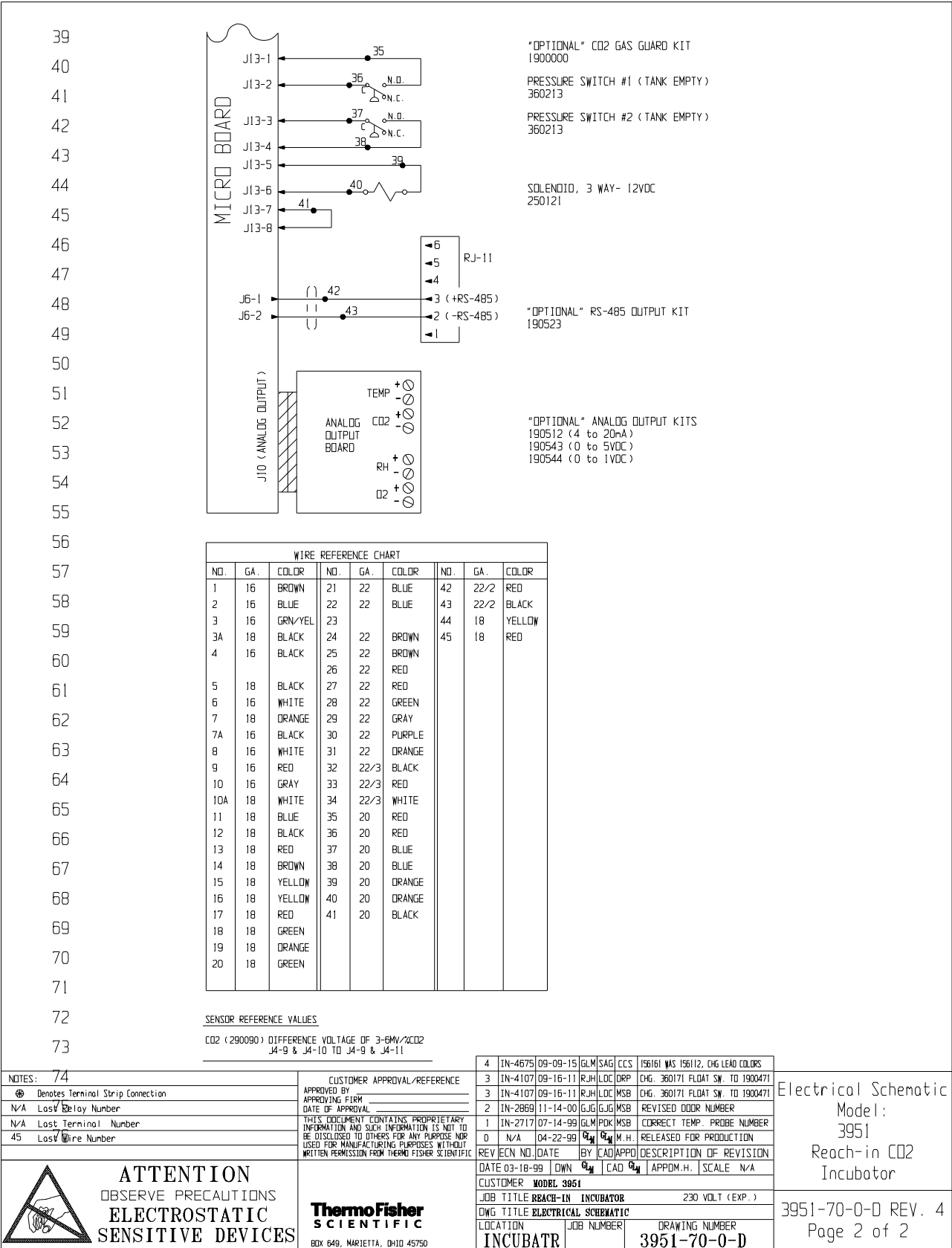


Electrical Schematic  
Model:  
3951  
Reach-in CO2  
Incubator

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3951-70-0-D REV. 4  
Page 1 of 2

**Section 9**  
Electrical Schematics



NOTES: 74

⊕ Denotes Terminal Strip Connection

N/A Last Delay Number

N/A Last Terminal Number

45 Last Wire Number

CUSTOMER APPROVAL/REFERENCE

APPROVED BY \_\_\_\_\_

APPROVING FIRM \_\_\_\_\_

DATE OF APPROVAL \_\_\_\_\_

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|   |         |          |     |      |     |        |     |        |                            |
|---|---------|----------|-----|------|-----|--------|-----|--------|----------------------------|
| 4 | IN-4675 | 09-09-15 | GLM | SAG  | CCS | 156161 | MS  | 156112 | CHG LEAD COLORS            |
| 3 | IN-4107 | 09-16-11 | RJH | LDC  | DRP |        | CHG | 360171 | FLOAT SW. TO 1900471       |
| 3 | IN-4107 | 09-16-11 | RJH | LDC  | MSB |        | CHG | 360171 | FLOAT SW. TO 1900471       |
| 2 | IN-2869 | 11-14-00 | GJG | GJG  | MSB |        |     |        | REVISED DOOR NUMBER        |
| 1 | IN-2717 | 07-14-99 | GLM | POK  | MSB |        |     |        | CORRECT TEMP. PROBE NUMBER |
| 0 | N/A     | 04-22-99 | GLM | W.H. |     |        |     |        | RELEASED FOR PRODUCTION    |

REV ECN NO. DATE BY CAD/APPO DESCRIPTION OF REVISION

DATE 03-18-99 DWN GLM CAD GLM APPDM.H. SCALE N/A

CUSTOMER MODEL 3951

JOB TITLE REACH-IN INCUBATOR 230 VOLT (EXP.)

DWG TITLE ELECTRICAL SCHEMATIC

LOCATION JOB NUMBER DRAWING NUMBER

INCUBATR 3951-70-0-D

Electrical Schematic  
Model:  
3951  
Reach-in CO2  
Incubator

3951-70-0-D REV. 4  
Page 2 of 2

**ATTENTION**  
OBSERVE PRECAUTIONS  
ELECTROSTATIC  
SENSITIVE DEVICES

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## THERMO FISHER SCIENTIFIC 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. The Watlow EZ-ZONE PM controller is covered for one additional year for repair or replacement (parts only), provided the unit has not been misapplied. 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 Fisher Scientific 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 1-800-438-4851 (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.



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### **THERMO FISHER SCIENTIFIC INTERNATIONAL DEALER WARRANTY**

The Warranty Period starts two months 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. Dealers who stock our equipment are allowed an additional six months for delivery and installation, provided the warranty card is completed and returned to the Technical Services Department.

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 excluded. The Watlow EZ-ZONE PM controller is covered for one additional year for repair or replacement (parts only), provided the unit has not been misapplied. 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, reagents, tubing, 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 postage paid and replacement parts are shipped FOB destination.

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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.

Contact your local distributor for warranty information. We're ready to answer your questions on equipment warranty, operation, maintenance, service and special application.



Rev. 5 8/13

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**Thermo Fisher Scientific (Asheville) LLC**

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Marietta, Ohio 45750  
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