



# Forma Environmental Chamber

## Model 3920

Operating and Maintenance Manual 7063920 Rev. 12

Visit us online to register your warranty  
[www.thermoscientific.com/labwarranty](http://www.thermoscientific.com/labwarranty)

**Thermo**  
SCIENTIFIC

**MANUAL NUMBER 7063920**

12	40398	4/20/17	Updated 3920 electrical schematics	bpg
11	40639	5/9/16	Added risk assessment information	ccs
10	40356/40509/ 40638/IN-4670	3/18/16	Updates to fuses, accessory outlet, electrical schematics	ccs
9	40638	1/26/16	Added wall anchor information to pg 1-2	ccs
8	40018	2/10/15	Added drain figure to pg 1-3	ccs
7	28882/IN-4244	9/24/14	Updated drains in assembly drawing 3920-00	ccs
--	31358/IN-4569	7/24/14	Door light option part number is now 1900604	ccs
6	30415	10/14/13	Added instructions for left hand door access to control panel and recorder install	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. ▲

**Warning** All internal adjustments and maintenance must be performed by qualified service personnel. ▲



- Use this product only in the way described in the product literature and in this manual. Before using it, verify that this product is suitable for the intended use.
- Do not modify system components, especially the controller. Use OEM exact replacement equipment or parts. Before use, confirm that the product has not been altered in any way.
- Disconnect the unit from all power sources before cleaning, troubleshooting, or performing other maintenance on the product or its controls. To disconnect power supply to the incubator, unplug the supply cord at the back of the incubator. Note that turning the key switch on the front control panel to the Off position is not sufficient to disconnect power.

**Warning** The user is responsible for carrying out appropriate decontamination procedures when hazardous materials are spilled on or inside the incubator. ▲

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

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

©2011 Thermo Fisher Scientific. All rights reserved.



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.



Asphyxiation Hazard Warning. High concentrations of CO<sub>2</sub> and N<sub>2</sub> can displace oxygen and cause asphyxiation!



Lifting Hazard Warning. The incubator weighs more than 200lbs (91kgs). 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).

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

## Do You Need Information or Assistance on 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

1-800-438-4851

1-877-213-8051

<http://www.thermofisher.com>

[service.led.marietta@thermofisher.com](mailto:service.led.marietta@thermofisher.com)

[www.unitylabservices.com](http://www.unitylabservices.com)

Direct

Toll Free, U.S. and Canada

FAX

Internet Worldwide Web Home Page

Tech Support Email Address

Certified Service Web Page

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.**

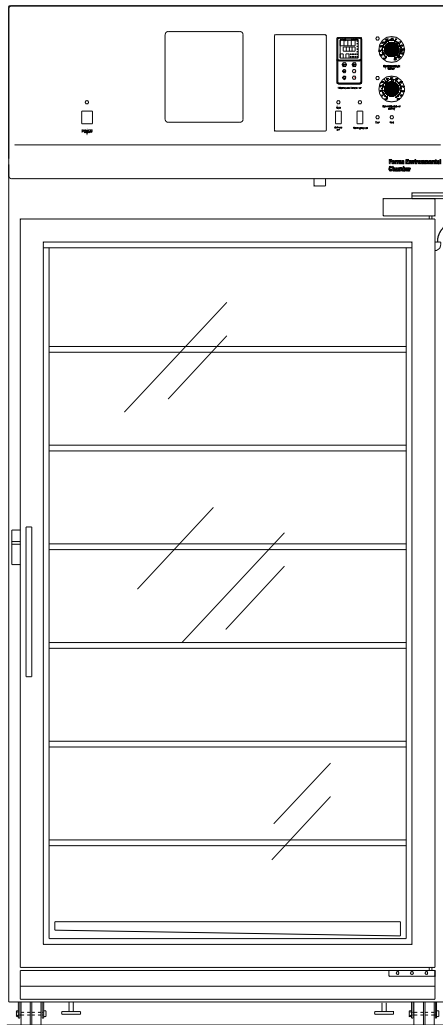
# Table of Contents

<b>Section 1</b>	<b>Installation and Set-Up</b>	<b>1-1</b>
	Location	1-1
	Preliminary Cleaning and Disinfecting	1-2
	Installing the Shelves	1-2
	Installing the Wall Anchors	1-2
	Attaching the Drain Connections	1-3
	Leveling the Unit	1-3
	4-20 Milliamp Output	1-3
	Remote Alarm Contacts	1-4
	Power Connection	1-4
	Start-Up	1-4
	Set Overtemp Safety Thermostat	1-4
	Set Overtemp Safety Thermostat	1-5
	Set Undertemp Safety Thermostat	1-5
	Prepare (Optional) CoBex Recorder	1-5
	Change Chart Paper	1-6
	Change Pen	1-6
	Honeywell Recorder (Optional)	1-6
	Access Control Panel w/ Left Hand Door Swing	1-7
	IR CO <sub>2</sub> Option	1-7
	Connect CO <sub>2</sub> Source	1-7
	Set CO <sub>2</sub> Content	1-8
	CO <sub>2</sub> Control and Indicators	1-8
	Accessory Outlet (Optional)	1-9
	Door Light (Optional)	1-9
<b>Section 2</b>	<b>Start-Up and Operation</b>	<b>2-1</b>
	Set the Operating Temperature	2-2
	Air Exchange Ventilator Caps	2-3
<b>Section 3</b>	<b>Routine Maintenance</b>	<b>3-1</b>

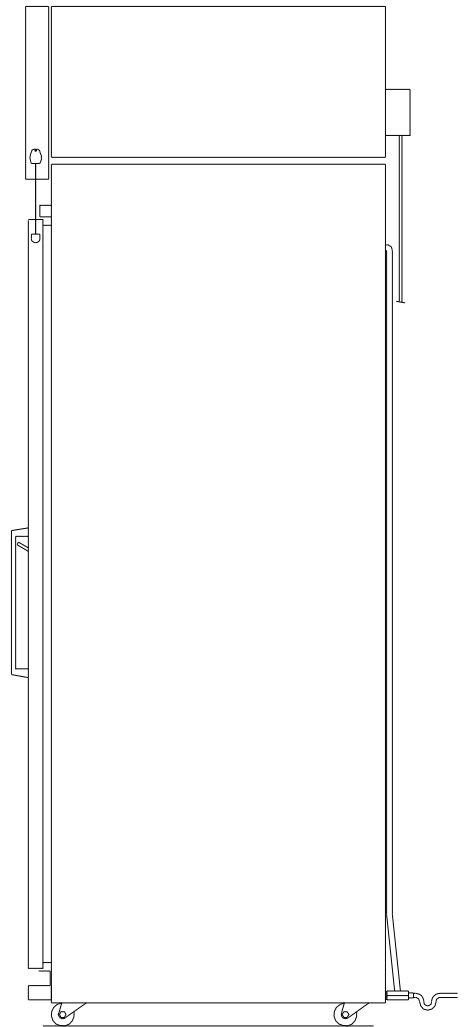
<b>Section 4</b>	<b>Service</b> .....	<b>4-1</b>
	Electrical Components .....	4-1
	Fuse Replacement .....	4-1
	Repl. Over/ Undertemp Probe & Thermostat .....	4-1
	Replace Temperature Sensor .....	4-2
	Program Temperature Controller .....	4-2
	Remove Software Lockout .....	4-3
	Restore Software Lockout .....	4-4
	Controller Configuration .....	4-4
	Offset Calibration (Temperature) .....	4-4
	Replace Optional Recorder and Probe(s) .....	4-5
	Set the Door Heater Control .....	4-6
	CO <sub>2</sub> Controller Calibration .....	4-6
<b>Section 5</b>	<b>Specifications</b> .....	<b>5-1</b>
<b>Section 6</b>	<b>Spare Parts</b> .....	<b>6-1</b>
<b>Section 7</b>	<b>Refrigeration Schematic</b> .....	<b>7-1</b>
<b>Section 8</b>	<b>Electrical Schematics</b> .....	<b>8-1</b>
	Wiring Diagrams .....	8-7
<b>Section 9</b>	<b>Warranty Information</b> .....	<b>9-1</b>



# Section 1 Installation and Set-Up



**Figure 1-1.** Front View



**Figure 1-2.** Side View

## Location

Locate the unit on a firm, level surface 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. This space is necessary to allow adequate air flow around the refrigeration system. At least eight (8) inches of clearance is required at the top of the incubator for service access.

## Preliminary Cleaning and Disinfecting

Disinfect all interior surfaces with a general-use laboratory disinfectant, such as quaternary ammonium, to remove any residues which may remain from production of the incubator. Rinse thoroughly with sterile distilled water, then 70% ethanol. Dry with a sterile cloth as needed.

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

## 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.

## Installing the Wall Anchors

The unit has two wall anchor studs located in the left and right side of the cabinet. Use the provided 5/16" bolts to secure the wall anchors to each side of the cabinet top. Anchors that connect between the cabinet sides to facility wall are customer supplied.

**Note** Wall anchors are required to meet UL Tip Test Safety Standards.

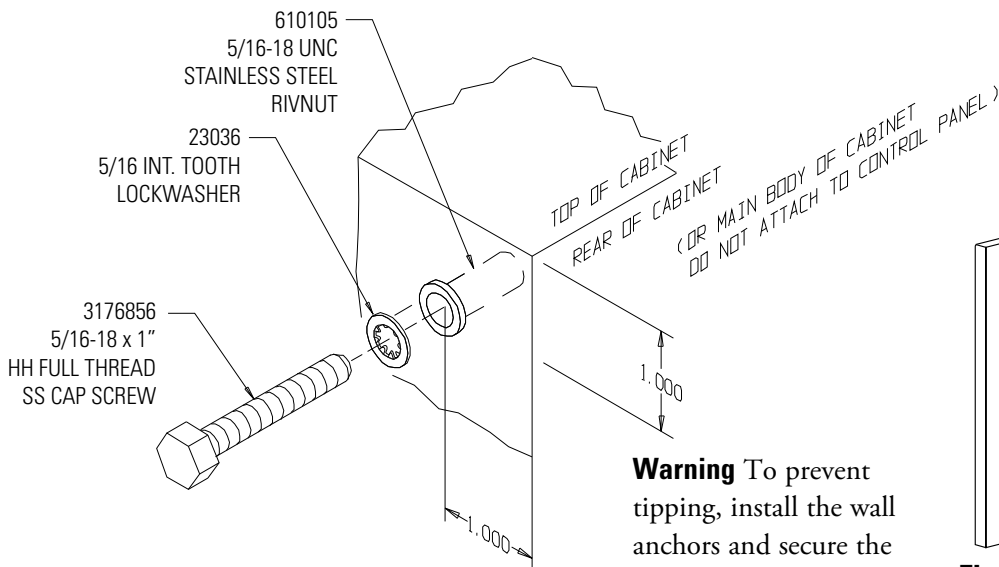


Figure 1-3. Wall Anchor Installation

**Warning** To prevent tipping, install the wall anchors and secure the unit before using. ▲

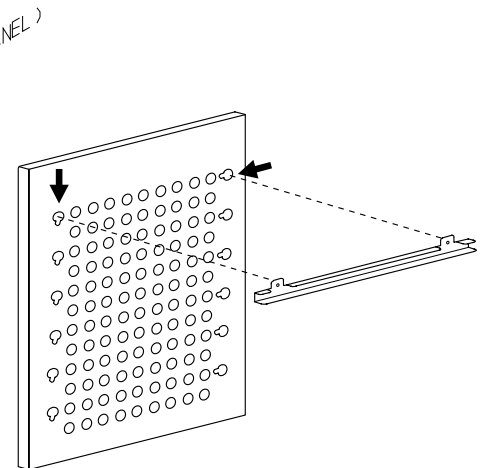


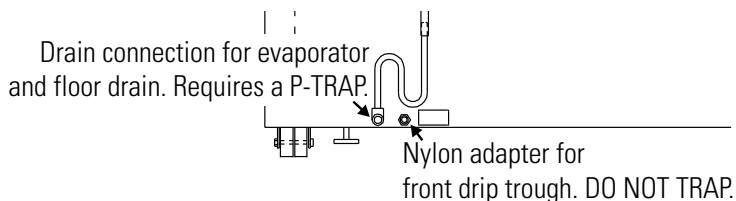
Figure 1-4. Shelf Channels

## 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 Connections

The cabinet's 3/8" MPT drain line connection is located on the rear (lower left side) of the cabinet (Figure 1-5). A P-trap is included with the unit and must be installed on the connection.



**Figure 1-5.** P-trap Installation Location

To install the drain connection:

1. Using Teflon pipe thread tape, tape the threads on the cabinet drain connection.
2. Using an open end adjustable wrench, install the P-trap onto the connection. Make sure the trap section is positioned down.
3. Push a piece of 3/8" ID tubing onto the trap and direct the tubing to a convenient drain. Install a hose clamp on the tubing, if desired. A condensate evaporator (P/N 1900031) or condensate pump (P/N 184062) may also be used.

To connect the nylon adapter from the front drip trough, **do not** install a p-trap. Push a piece of 3/8" ID tubing onto the nylon adapter and direct the tubing to a convenient drain. Install a hose clamp on the tubing, if desired.

## 4-20 Milliamp Output

The environmental chamber is equipped with 4-20mA output for the remote transmission of temperature or CO<sub>2</sub> data. A terminal strip is located on the back of the incubator for convenience. See Figure 1-6 for terminal pin identification.

1	2	3	4	5	6	7	8	9	10
4-20 +	4-20 -			COMMON	N.D.	N.C.	4-20 +	4-20 -	
TEMPERATURE 4-20 MA (-20 TO 80C)				REMOTE ALARM 30V 1A MAX. (SYSTEM NORMAL)			CO <sub>2</sub> 4-20 MA (0 TO 20%)		

**Figure 1-6.** Terminal Strip Connections

## Remote Alarm Contacts

Remote alarm connections are also included on the terminal strip (Figure 1-6) providing Normally Open (N.O.) and Normally Closed (N.C.) contacts. C is the Common terminal. The remote alarm will activate when either the incubator's temperature or CO<sub>2</sub> go out of the set alarm limits.

## Power Connection

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

**Caution** Connect the incubator to a grounded, dedicated circuit. The power cord connector is the mains disconnect device for the incubator. Position the incubator to allow unobstructed access to the power cord so it can be easily disconnected in an emergency. ▲

Plug the provided 8 ft. power cord with a NEMA 5-20 plug into the grounded dedicated electrical circuit. A NEMA 5-30 plug is provided on units with the optional door light package.

## Start-Up

Preset the controls as follows:

Overtemp Safety Thermostat . . . . . Fully clockwise  
Undertemp Safety . . Thermostat fully counterclockwise  
Main Power Switch . . . . . ON  
Temperature Controller . . . . . Desired setpoint  
Door Heater . . . . . 40% (factory set)

Turn the Main Power switch on. The Power indicator and Heat indicator (if temp setpoint is above ambient temp) will light. Turn the Refrigeration switch on and the indicator will light.

## Set Overtemp Safety Thermostat

Allow the chamber temperature to stabilize, then set the overtemp safety thermostat as follows:

1. Turn the overtemp control knob slowly counterclockwise until the audible alarm sounds and the overtemp indicator lights.
2. Turn the overtemp control knob clockwise at least 2 degrees. The alarm should be silenced and the overtemp indicator light should go out. The overtemp safety thermostat is now set a few degrees above the control temperature setpoint. When the chamber temperature rises to the overtemp control point, the alarm system will activate, power to the heaters will shut off, and the chamber temperature will be maintained at the overtemp control point.

When an overtemp condition occurs, the cause must be determined and corrected before normal operation under the main temperature controller can be resumed.

## Set Overtemp Safety Thermostat (cont.)

**Note** When the chamber temperature control setpoint is changed, the overtemp safety thermostat must be reset to accommodate the change. ▲

**Note** The overtemp control is not directly calibrated. The numbers on the dial are for reference only. ▲

## Set Undertemp Safety Thermostat

Allow the chamber temperature to stabilize, then set the undertemp safety thermostat as follows:

1. Turn the undertemp control knob slowly clockwise until the audible alarm sounds and the undertemp indicator lights.
2. Turn the undertemp control knob counterclockwise at least 2 degrees on the scale. The alarm should be silenced and the undertemp indicator light should go out.

The undertemp safety thermostat is now set a few degrees below the control temperature setpoint. When the chamber temperature drops to the undertemp control point, the alarm system will activate, power to the compressor will shut off, and the chamber temperature will be maintained at the undertemp control point.

When an undertemp condition occurs, the cause must be determined and corrected before normal operation under the main temperature controller can be resumed.

**Note** When the chamber temperature control setpoint is changed, the undertemp safety thermostat must be reset to accommodate the change. ▲

**Note** The undertemp control is not directly calibrated. The numbers on the dial are for reference only. ▲

## Prepare (Optional) CoBex Recorder

The seven-day circular chart recorder is located on the front of the incubator cabinet and is protected by a glass door.

To prepare the recorder for operation, open the glass door and snap the connector onto the 9-volt battery (Figure 1-8).

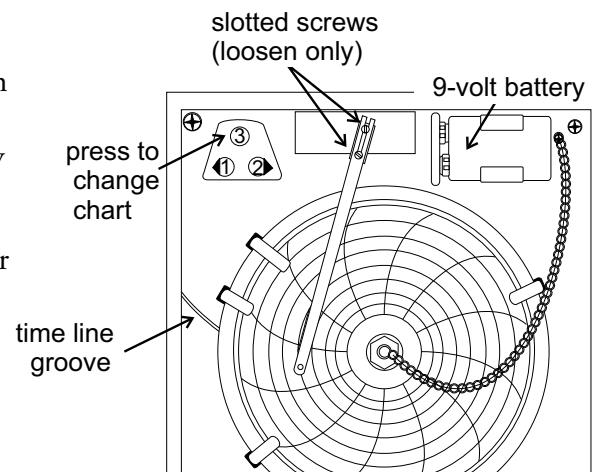


Figure 1-8. Recorder Components

## Set (Optional) CoBex Recorder (cont.)

If the unit is operating, the green LED lights steady. If the unit is not turned on, the LED blinks.

If the battery is weak or not connected, the green LED will flash. If power is lost to the cabinet, the LED will also flash. When replacing the 9-volt battery, use only an alkaline style battery. Dispose of the old battery following established environmental practices.

## Change Chart Paper

1. Press the #3 Change Chart button (Figure 1-8) and hold it for 1 second until the pen begins to move to the left of the chart.
2. Remove the existing chart by unscrewing the center knob securing it.
3. Install the new chart, positioning it so that the correct time line coincides with the time line groove on the chart plate.
4. Replace the center knob and screw it tightly against the chart.

## Change Pen

1. Using a small flat blade screwdriver, loosen the 2 screws holding the pen arm and remove the pen and arm as an assembly.
2. Unsnap the plastic hinge securing the pen. Remove and discard the old pen.
3. Install the new pen by snapping the hinge securely around the pen arm.
4. Re-install the pen assembly by sliding the pen arm under the screws, positioning the pen tip in the time line groove. Tighten the screws.
5. Push the Chart Change button and hold it for 1 second until the pen begins to move back onto the chart.

**Note** Make sure that the pen is marking on the chart. It may be necessary to gently lift the pen onto the chart paper. ▲

## Honeywell Recorder (Optional)

The Honeywell, DR 4500 Recorder is a one to four-channel microprocessor-based, circular chart recorder.

The recorder is capable of recording both temperature and humidity and printing alphanumeric chart data on blank heat-sensitive chart. Refer to the Honeywell Configuration Record at the end of Section 4 and the supplemental Honeywell Recorder manual.

## **Connect the Recorder (continued)**

1. After disconnecting the unit from power, remove the two screws from the top and the two screws on the bottom, of the control panel. Retain them for re-assembly.
2. Pull gently on the right side of the control panel to disengage it from the tabs. You may need to lift slightly to swing open the panel.
3. Install the recorder to the top of the unit, over the studs. Use the supplied nuts to secure tightly in place.
4. Locate the white connector in the top housing of the unit. Connect it to the plug in the base of the recorder.
5. Close and latch the control panel door.

## **Access Control Panel w/ Left Hand Door Swing**

1. After disconnecting the unit from power, disconnect the door plug from the lower left corner of the control panel. Allow it to hang, still connected to the door.
2. Remove the two screws from the top and the two screws on the bottom, of the control panel. Retain them for re-assembly.
2. Pull gently on the right side of the control panel to disengage it from the tabs. You may need to lift slightly to swing open the panel.

## **IR CO<sub>2</sub> Option**

This section applies to units with the IR CO<sub>2</sub> option only.

## **Connect CO<sub>2</sub> Source**

For the most economical use, the liquid CO<sub>2</sub> supply tanks should be without siphon tubes, so that only CO<sub>2</sub> gas enters the incubator injection system. Two tanks may be joined together with a manifold to ensure a continuous CO<sub>2</sub> supply.

**Note** For customer convenience, 12 feet of 1/4" I.D. vinyl tubing with two 3/8" hose clamps are included in the shipping materials for connecting the unit to the gas supply.

The CO<sub>2</sub> source must be regulated at a pressure level of 15 psig, ±5. Higher pressure levels may damage the CO<sub>2</sub> control system. The user should determine the most economical pressure level, between 10 and 20 psig appropriate for the desired CO<sub>2</sub> percentage in the chamber. Use only sufficient pressure to maintain recovery time after door openings.

## Connect CO<sub>2</sub> Source (continued)

To connect the CO<sub>2</sub> supply:

1. Insert the copper tubing provided with the unit as far as it will go into the nut of the CO<sub>2</sub> connection.
2. Turn the nut until it is finger tight.
3. For reference, scribe the nut at the 6:00 position.
4. While holding the fitting body steady with a wrench, tighten the nut 1-1/4 turns until the mark is at the 9:00 position.
5. Securely attach the CO<sub>2</sub> line to the open end of the copper tubing.
6. Check the tubing connection for leaks.

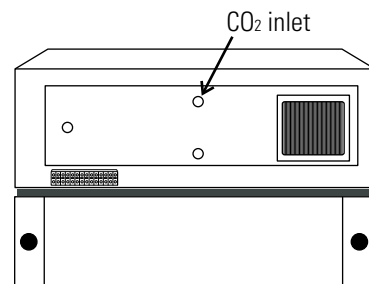


Figure 1-9. CO<sub>2</sub> Inlet

## Set CO<sub>2</sub> Content

The Watlow PM6 CO<sub>2</sub> controller's upper display shows the actual CO<sub>2</sub> content inside the chamber. The lower display shows the CO<sub>2</sub> setpoint.

Before setting the CO<sub>2</sub> Content, allow the chamber temperature to stabilize. Do not open door during the stabilization period.

To set the CO<sub>2</sub> content, press the Up or Down Arrow keys on the Watlow PM6 Controller.

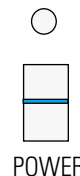
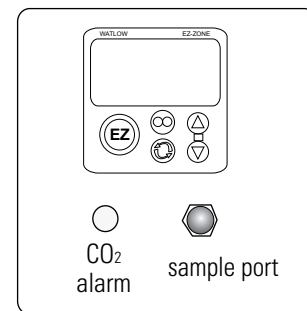


Figure 1-10. CO<sub>2</sub> Control and Indicators

## CO<sub>2</sub> Control and Indicators

The **sample port** is used for checking CO<sub>2</sub> percentage in the incubator chamber by an independent test instrument (such as with a Fyrite, or similar CO<sub>2</sub> test instrument).

**Caution** To prevent CO<sub>2</sub> loss, the sample port must be capped when it is not in use. ▲

The **CO<sub>2</sub> alarm** is factory set to activate when the chamber CO<sub>2</sub> content deviates from configured alarm set points (see configuration record). When a CO<sub>2</sub> alarm occurs, the CO<sub>2</sub> Alarm indicator on the control panel lights and the audible alarm sounds.

The CO<sub>2</sub> alarm high and low setpoints are established through the Watlow PM6 CO<sub>2</sub> controller (A.LO, and A.HI). Refer to the Configuration Record included at the end of Section 4.



## Accessory Outlet (Optional)



The accessory outlet is powered by an independent line cord, thus will be energized whenever its line cord is connected to a power source. Any devices using the accessory outlets must be approved to operate in the environment the cabinet is set to control. Additionally, the outlet is capable of providing up to 16A at 230V.

## Door Light (Optional)

The door lighting package provides light to the incubator chamber. The package consists of eight fluorescent lamps, a twenty-four hour timer, one Auto/Off/Manual switch to control the lights On/Off cycles and three switches to enable up to a total of 8 lamps.

Refer to Figure 1-12 on the following page. The electrical schematic for this option is included at the end of this manual.

Program the timer as follows:

1. Set the lamp control toggle switch to Auto. This will operate the lights based on timer settings.
2. Set the **Off trippers** by pushing them **outward** from the center of the dial to control the desired off-time. During the Off time, the Lights Off indicator will light.
3. Set the **ON trippers** by pushing them **toward** the center of the dial to control the desired On time. The orange or red band is exposed when the trippers are on.

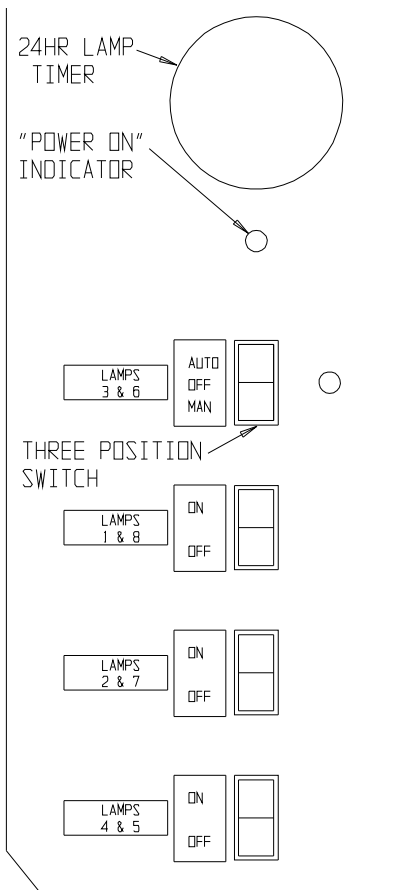


Figure 1-11. Door Light Timer

**Note** All lamps are controlled by the timer when the Auto/Off/manual switch is in the Auto position. By default, lamps 3 and 6 are controlled by the Auto/Off/ Manual switch. The other three light switches enable/disable the additional lamps to operate with the Auto/Off/Manual switch. ▲

# Door Light (Optional) continued

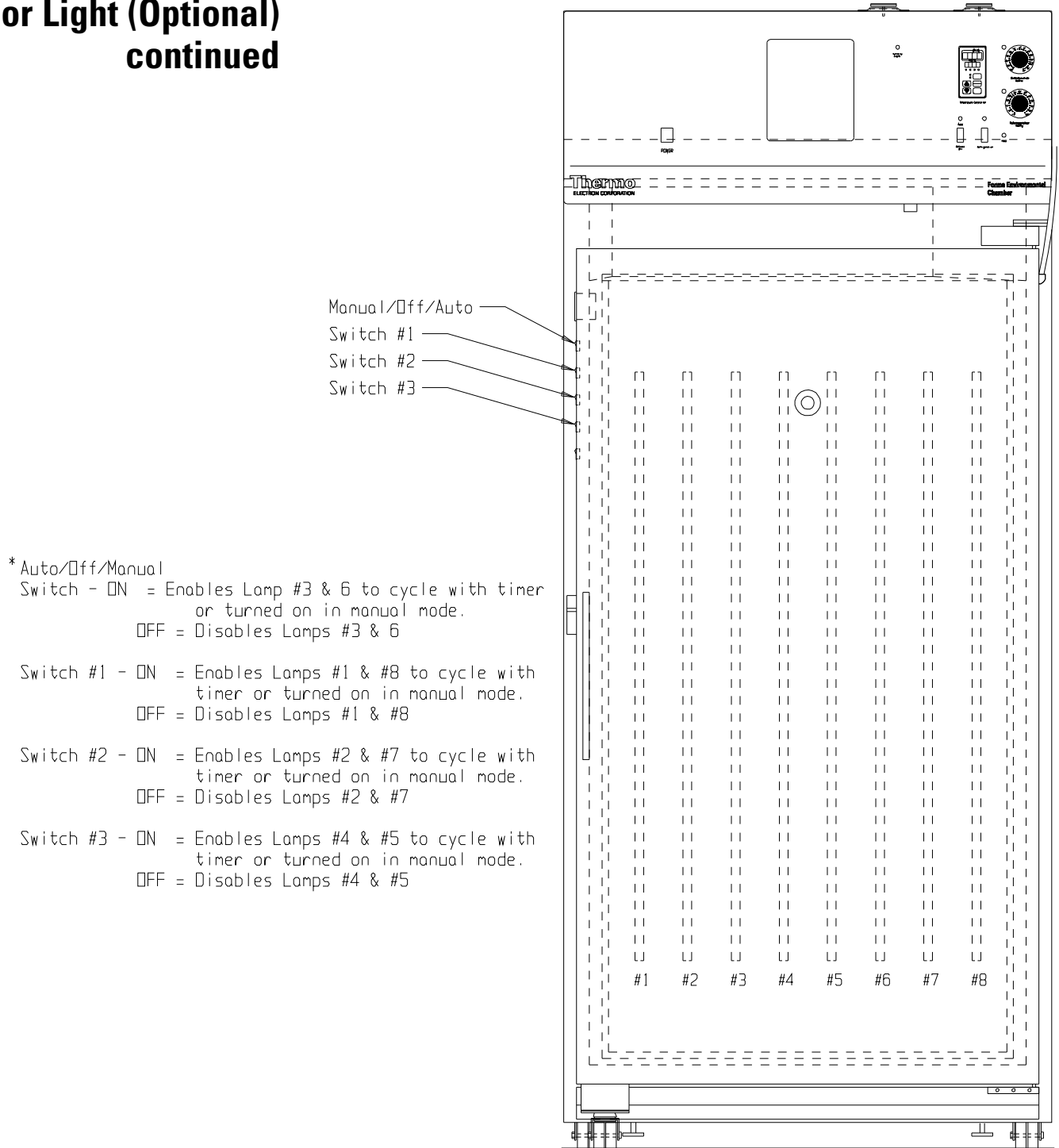


Figure 1-12. Door Light Configuration

## Section 2 Start-Up and Operation



**Figure 2-1.** Environmental Chamber Control Panel (shown with optional CO<sub>2</sub> control)

### Main Power Switch and Indicator Light

The main power switch controls power to the incubator. The main power indicator lights when the power switch is on and the unit is receiving power.

### Refrigeration Switch and Indicator Light

The refrigeration switch controls power to the refrigeration system. The refrigeration indicator lights when the refrigeration switch is on and the compressor is receiving power.

### Defrost Switch and Indicator Light

The defrost switch controls power to the defrost system. Setting the defrost switch to Auto will provide two 15-minute defrost cycles during a twenty-four hour period. The defrost indicator lights when the defrost switch is on and the incubator is in a defrost cycle.

**Caution** The defrost switch must be set to Auto when the temperature setpoint is 10°C, or below. ▲

### Cool Indicator

The Cool Indicator is illuminated when the refrigeration system is activated.

### Heat Indicator

The Heat Indicator is illuminated when the heater is activated.

### **Overtemp Safety Control, Indicator Light, and Audible Alarm**

The overtemp safety thermostat should be set slightly above the operating temperature of the incubator. In the event of an overtemp condition, the overtemp safety thermostat will:

- Activate the audible alarm and the overtemp indicator light.
- Interrupt power to the heaters and maintain the incubator's cabinet temperature at the overtemp safety control point.

**Note** The overtemp control is not directly calibrated. The numbers on the dial are for reference only. ▲

If an overtemp condition occurs, the alarm can only be silenced by raising the overtemp safety thermostat setting. However, the cause of the problem must be determined and corrected before normal operation under the main temperature controller is resumed.

### **Undertemp Safety Control, Indicator Light and Audible Alarm**

The undertemp safety thermostat should be set slightly lower than the operating temperature of the incubator. In the event of an undertemp condition, the undertemp safety thermostat will:

- Activate the audible alarm and the undertemp indicator light.
- Interrupt power to the refrigeration system and maintain the incubator's cabinet temperature at the undertemp safety control point.

**Note** The undertemp control is not directly calibrated. The numbers on the dial are for reference only. ▲

If an undertemp condition occurs, the alarm can only be silenced by lowering the undertemp safety thermostat setting. However, the cause of the problem must be determined and corrected before normal operation under the main temperature controller is resumed.

## **Set the Operating Temperature**

The Watlow temperature controller's upper numerical display shows the actual temperature inside the incubator chamber. The lower display shows the operating temperature setpoint.

### **Changing the Setpoint**

To raise or lower the setpoint, press the Up or Down Arrow. Temperatures are set in 0.1°C increments.

## **Air Exchange Ventilator Caps**

Air exchange for the incubator is regulated through the manually adjustable intake and exhaust ventilator caps located on the top of the cabinet.

When viewed from the front of the incubator, the intake cap is on the left and the exhaust cap is on the right. The ventilator caps may be opened by turning counterclockwise, and closed by turning clockwise.

**Caution** For optimum performance of the unit, the vent caps should be closed at all times. ▲

## Section 3 Routine Maintenance

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

The continued cleanliness of the stainless steel used in this unit has a direct effect on the appearance and operation of the unit. Use the mildest cleaning procedure that will do the job effectively. Clean the outside of the incubator with soap and water or with any non-abrasive commercial spray cleaner. Clean the inside of the chamber with alcohol and/or soap and water. Disinfect the interior panels with a general use laboratory disinfectant, such as quaternary ammonium, diluted according to the manufacturer's instructions. Rinse the surface thoroughly after each cleaning and wipe the surfaces dry. Always rub in the direction of the finish polish lines.

**Caution** Do not use chlorinated solvents on stainless steel as they can cause rusting and pitting. ▲

**Caution** Do not use volatile or aromatic solvents for cleaning inside the cabinet as their residue can contaminate the cabinet environment. ▲

The Thermopane glass door may be cleaned with commercial glass cleaner or with a solution of ammonia and water.

## PREVENTIVE MAINTENANCE

### Environmental Chambers

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 that 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 instruction manual for further details.

We have qualified service technicians, using NIST traceable instruments, available in many areas.

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

#### **Tips for all incubators:**

- Do NOT use bleach or any disinfectant that has high chloros.
- Use sterile, distilled or demineralized water.
- Avoid spraying cleaner on the CO<sub>2</sub> sensor.
- Do not use powdered gloves for tissue cultures.

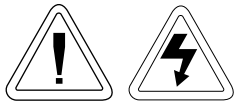
## Preventive Maintenance for Environmental Chambers

Refer to Manual Section	Action	Daily	Weekly	Yearly
--	Inspect door latch, hinges and door gasket seal			<input checked="" type="checkbox"/>
3	Check air exchange ventilator caps for adjustment; open or close as required			<input checked="" type="checkbox"/>
4	Perform a complete decontamination procedure. Wipe down interior, shelves, side panels with disinfectant. Rinse everything well with sterile distilled water.		Between experiments <i>More frequent decontamination may be required, depending on use and environmental conditions.</i>	
5	Verify and document all calibrations, at the minimum.	<input checked="" type="checkbox"/>		
--	Clean drip pan and drain lines			<input checked="" type="checkbox"/>
--	Clean refrigeration system condenser	<input checked="" type="checkbox"/>		
--	Verify defrost cycle for below 10°C operation	<input checked="" type="checkbox"/>		
--	Change filters (under normal conditions)			<input checked="" type="checkbox"/>

\* Regular monitoring routines of the various levels in your unit is encouraged.



## Section 4 Service



**Caution** Servicing must be performed by qualified service personnel only! ▲

**Warning** De-energize all potential sources of energy to this unit and lockout/tagout their controls. ▲

### Electrical Components

To gain access to the electrical components, remove the two screws located on the left side of the control panel with a Phillips screwdriver. The control panel is hinged and will swing open.

### Fuse Replacement

Qualified service personnel are required to replace any fuses. Refer to the electrical enclosure drawing in this manual, for fuse location/type.

### Repl. Over/ Undertemp Probe & Thermostat

1. Remove the incubator ceiling by removing screws holding it in place.
2. Remove the top three screws from the top of the right duct cover.
3. Lean the duct sheet out, and remove the Permagum seal from around the probe access hole.
4. Remove the 15” copper capillary overtemp probe by extracting two plastic clips that hold the probe in place.
5. Open the control panel by removing the two screws located on the left side of the control panel.
6. Pull the overtemp probe up through access hole and into control panel.
7. Follow the wires from the probe to the thermostat mounted on the control panel. Cut the tie wraps holding the overtemp cable to the existing wiring.
8. Pull the overtemp knob on the control panel off.
9. Remove the two screws holding overtemp assembly to control panel.
10. Disconnect the two wires from the back of the thermostat assembly.
11. Pull the entire assembly from the panel, and remove the unit.
12. Replace the thermostat and probe.

**Note** Reseal probe access hole with Permagum and tie-wrap overtemp cable to existing wires after replacing probe. ▲

## Replace Temperature Sensor

1. Remove the incubator top right side air dam by removing the screws holding it in place.
2. Remove the top three screws from the top of the right duct cover.
3. Lean the duct sheet out, and remove the Permagum seal from around the probe access hole.
4. Remove the 15" copper capillary overtemp probe by extracting two plastic clips that hold the probe in place.
5. Open the control panel by removing the four screws located on the top and bottom of the control panel.
6. Pull the probe up through the access hole and into the control panel.
7. Clip any plastic ties securing the probe wiring. Disconnect the probe.
8. Install the replacement probe in the chamber.
9. Route the probe wire through the access hole into the control housing.
10. Connect the probe to the appropriate controller wiring.
11. Reseal the probe access hole with Permagum and tie-wrap the probe wire to existing wires.

## Program Temperature Controller

The Watlow temperature controller has been set at the factory to operate the incubator within the specifications listed in Section 5 of this manual. Reference copies of the Watlow configuration records are included at the end of this section.

To prevent tampering, software lockouts are employed in the system. This lockout must only be removed by persons skilled in configuring controller software.

**Caution** Re-programming the temperature controller alters the factory defaults and will seriously alter the performance of the incubator. This may also void the warranty. Do not reconfigure the controller without first consulting the Technical Services Department. ▲

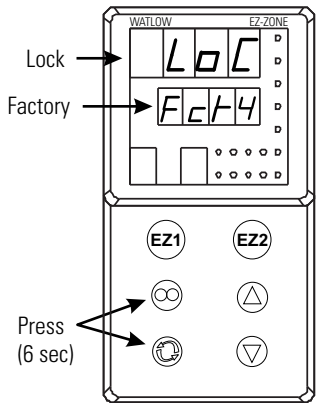
The Watlow temperature controller has been set at the factory to operate the incubator within the specifications listed in the Specifications section of this manual. Reference copies of the Watlow configuration records are included at the end of this section.

## Remove Software Lockout

To prevent tampering, software lockouts are employed in the system. These lockouts must only be removed by persons skilled in configuring controller software.

**Caution** Re-programming the temperature controller alters the factory defaults and will seriously alter the performance of the incubator. This may also void the warranty. Do not re-configure the controller without first consulting the Technical Services Department. ▲

1. Press the Advance and Infinity keys at the same time and hold them for about six seconds. The word “Fcty” (factory) will appear in the bottom display. If numbers in the bottom display begin to scroll up or down, the keys have not been pressed simultaneously. Try again.
2. Press the Up Arrow until “LoC” (lock) appears in the upper display. The word “Fcty” will remain in the lower display (Figure 4-1).
3. Press the Advance key to scroll through the menus as follows:



**To turn the software lockout back On:**

1. Set Lock values back to previous setting. See ‘Remove Software Lockout’ above.

**Figure 4-1.** Displays

Lower display	Upper display	Keystrokes
LoC.o	1	Change to 3 = unlocked
LoC.P	1	No changes required
PAS.E	1	No changes required
rLoC	1	Change to 5 = unlocked
SLoC	1	Change to 5 = unlocked

## Restore Software Lockout

The Watlow PM Temperature Controller has been configured at the factory. Copies of the Watlow Configuration records are included at the end of this section. Watlow factory manuals are included with this manual.

### Controller Configuration

**Caution** Do not re-configure the controller without first consulting the Technical Services department. ▲

It may be necessary to calibrate the temperature controller to match an independent temperature sensor. To do so, follow the next few steps.

### Offset Calibration (Temperature)

1. Perform the “Remove Software Lockout” procedure in this section.
  2. Suspend an independent, calibrated sensor(s) in the center of the interior chamber.
  3. Allow approximately 30 minutes for the incubator to stabilize.
  4. Press up and down arrow keys simultaneously for 3 seconds. The word “OPER” appears in the lower display.
  5. Press down arrow until “Ai” appears in the upper display.
  6. Press the Advance key until “i.CA” appears in the lower display. Press up or down arrow key to either add or subtract an offset value. This value is the difference between the actual value shown on the controller, and the reference sensor value.
  7. Press the Infinity key until the display reverts to normal operation.
  8. Perform the “Restore Software Lockout” procedure in this section.
- 
1. Open the incubator door, and locate the probe mounting plate attached to the center of the right interior wall. Remove the mounting plate.
  2. The recorder probe is attached to the lower end of the back of the

## Replace Optional Recorder and Probe(s)

- mounting plate. Remove the probe by carefully sliding it out of the housing.
3. Remove the screws securing the ceiling of the incubator and remove the ceiling.
  4. Remove the top three screws on both edges of the right duct sheet.
  5. Lean the duct sheet out in order to remove the Permagum seal from around the probe access hole.
  6. Remove the two screws located on the left side of the control panel and open the control panel door. Remove any Permagum from around the access hole.
  7. Pull the probe(s) carefully up through the hole.
  8. Follow the probe cable(s) to the back of the recorder, and carefully clip any plastic ties holding the cable(s) to other wiring.
  9. Remove the three screws securing the recorder and pull it carefully out from the front of the control panel.
  10. Replace the recorder with the correct part.

**Note** When replacing the recorder and probe(s), retie the probe cable(s) to the existing wires. ▲

Place an accurate thermometer(s) in the chamber next to the recorder's probe(s). After about three minutes, compare the thermometer with the chart recorder. For 2 pen operations, also compare the second thermometer.

**Note** For 2 pen operations, first select the pen you wish to calibrate. Hold down the #1 arrow for the red (#1) pen or the #2 arrow for the blue (#2) pen, until the light goes out (Figure 4-2). Then adjust as necessary. ▲

If an adjustment is necessary, press either the #1 or #2 button to move the pen left or right. The button must be held about five seconds before the pen begins to move. Release the button when the pen matches the thermometer.



**Figure 4-2.** Button

## Set the Door Heater Control

**Warning** High voltage is present behind control panel. Servicing must be performed only by qualified electrical service personnel. ▲

The infinite heater control is located in the left side of the incubator top compartment behind the control panel door. The control varies the amount of door heat from no heat (zero) to full heat (100) as indicated by the dial face. If the knob is turned past zero, a “click” will indicate that all power to the door is shut off. If turned past 100, a similar “click” will indicate that the heat is set at the maximum.

Initially, the units leave the factory with the dial set at 40. If desired, the amount of heat can later be reduced until moisture appears on the door, then the heat advanced. However, in fluctuating ambient conditions, it is recommended that a minimum of 40% door heat be used.

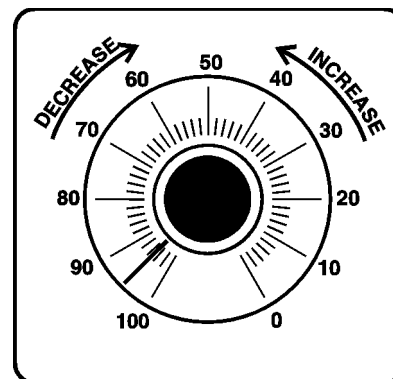


Figure 4-3. Heater Control

## CO<sub>2</sub> Controller Calibration

If it should become necessary to calibrate the CO<sub>2</sub> controller, perform the procedures on pages 4-3 through 4-4.

Start from the standard operating display (setpoint in bottom display, actual CO<sub>2</sub> reading in the upper display).

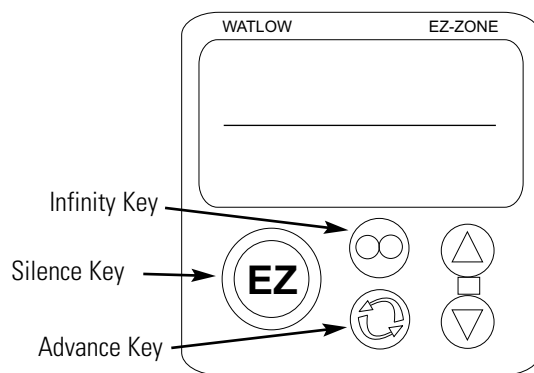


Figure 4-4. Key Locations

<b>TEMPERATURE CONFIGURATION RECORD (WATLOW PM8)</b>								
MODELS:	3907, 3911, 3913, 3920, 3940, 3948 & 3949							
JOB NUMBER:	_____							
UNT SERIAL NUMBER:	_____							
CONTROL TYPE:	Temperature							
PREPARED BY:	GLS	DATE	24-Sep-2011					
<b>Operations Page: (Press "UP" &amp; "DN" keys for 3 sec.)</b>								
<b>Ai:</b>	Ai 1		Ai 2		§ = AC.Pu in version 10 firmware			
§(Ain)	---	§(Ain)	---					
i.Er	*	i.Er	nSrc					
i.CA	@	i.CA	@					
<b>Lnr:</b>	Lnr 1		Lnr 2					
Su.A	*	Su.A	*					
oFSt	@	oFSt	@					
o.u	*	o.u	*					
<b>Pu:</b>	Pu 1		Pu 2					
Su.A	*	Su.A	*					
oFSt	@	oFSt	@					
o.u	*	o.u	*					
<b>dio:</b>	dio 5		dio 6					
di.S	oFF	do.6	oFF					
Ei.S	iACT							
<b>Mon:</b>	C.MA	Auto	C.Pr	*	Pu.A	*		
	h.Pr	*	C.SP	*				
<b>Loop:</b>	r.En	no	Aut	no	h.Pb	2.3	td	12
	C.M	AUto	C.SP	*	c.Pb	1.3	db	0.0
	A.tSP	90	id.S	23.9	ti	90	o.SP	0.0
<b>ALM:</b>	ALM 1		ALM 2		ALM 3		ALM 4	
	A.Lo	-20.0	A.Lo	32.0	A.Lo	32.0	A.Lo	32.0
	A.hi	34.0	A.hi	300.0	A.hi	300.0	A.hi	300.0
	<sup>1</sup> (A.St)	*	<sup>1</sup> (A.St)	*	<sup>1</sup> (A.St)	*	<sup>1</sup> (A.St)	*
<b>P.StA:</b>	P.Str	1	Ent1	oFF	JC	0		
	P.ACr	nonE	Ent2	oFF				
	(P.AtA group parameters are for Ramp/Soak programming only)							
<b>Setup Page: (Press "UP" &amp; "DN" keys for 6 sec.)</b>								
<b>Ai:</b>	Ai 1			Ai 2				
SEn	rO.IH	dEC	0.0	SEn	oFF	<sup>1</sup> (i.CA)	@	
rt.L	3	<sup>1</sup> (i.CA)	@	FiL	0.5	<sup>1</sup> (Ain)	*	
FiL	2.0	<sup>1</sup> (Ain)	*	i.Er	oFF	<sup>1</sup> (i.Er)	*	
i.Er	oFF	<sup>1</sup> (i.Er)	*	dEC	0			
<b>Lnr:</b>	Lnr 1		Lnr 2		(All other parameters at default values)			
	Fn	oFF	Fn	oFF				
<b>Pu:</b>	Pu 1		Pu 2					
	Fn	oFF	Fn	oFF				
	FiL	0.0	FiL	0.0				
<b>dio:</b>	dio 5		dio 6					
	dir	otPt	dir	otPt				
	Fn	oFF	Fn	oFF				

## TEMPERATURE CONFIGURATION RECORD (WATLOW PM8)

**MODELS:** 3907, 3911, 3913, 3920, 3940, 3948 & 3949  
**JOB NUMBER:** \_\_\_\_\_  
**UNT SERIAL NUMBER:** \_\_\_\_\_  
**CONTROL TYPE:** Temperature  
**PREPARED BY:** GLS      DATE    24-Sep-2011

<b>Loop:</b> h.Ag	<u>Pid</u>	<sup>1</sup> (db)	<u>0.0</u>	L.dE	<u>no</u>	SP.hi	<u>100.0</u>
C.Ag	<u>Pid</u>	t.tUn	<u>no</u>	rP	<u>oFF</u>	<sup>1</sup> (o.SP)	<u>0.0</u>
C.Cr	<u>oFF</u>	<sup>1</sup> (A.tSP)	<u>90</u>	L.SP	<u>-20.0</u>	<sup>1</sup> (C.M)	<u>AUto</u>
<sup>1</sup> (h.Pb)	<u>2.3</u>	t.Agr	<u>Cr it</u>	h.SP	<u>60.0</u>		
<sup>1</sup> (c.Pb)	<u>1.3</u>	P.dL	<u>0.0</u>	<sup>1</sup> (C.SP)	<u>*</u>		
<sup>1</sup> (ti)	<u>90</u>	UFA	<u>USEr</u>	<sup>1</sup> (id.S)	<u>23.9</u>		
<sup>1</sup> (td)	<u>12</u>	FAiL	<u>USEr</u>	SP.Lo	<u>-100.0</u>		

<b>otPt:</b>	<u>otPt 1</u>	<u>otPt 2</u>	<u>otPt 3</u>		<u>r.Lo</u>	<u>-20.0</u>	
Fn	<u>Cool</u>	Fn	<u>hEA</u>	o.ty	<u>MA</u>	r.hi	<u>80.0</u>
o.tb	<u>30.0</u>	o.Ct	<u>Ftb</u>	Fn	<u>rMt</u>	o.CA	<u>@</u>
o.Lo	<u>0</u>	o.tb	<u>5.0</u>	r.Sr	<u>Ai</u>		
o.hi	<u>100</u>	o.Lo	<u>0</u>	Fi	<u>1</u>		
		o.hi	<u>100</u>	S.Lo	<u>4.00</u>		
				S.hi	<u>20.00</u>		
						<u>otPt 4</u>	
						Fn	<u>ALM</u>
						Fi	<u>1</u>

<b>ALM:</b>	<u>ALM 1</u>	<u>ALM 1</u>	<u>ALM 1</u>	<u>ALM 2</u>	
A.ty	<u>Pr.AL</u>	A.Sd	<u>both</u>	A.ty	<u>oFF</u>
Sr.A	<u>Ai</u>	<sup>1</sup> (A.Lo)	<u>-20.0</u>		<u>ALM 3</u>
iS.A	<u>1</u>	<sup>1</sup> (A.hi)	<u>34.0</u>	A.ty	<u>oFF</u>
A.hy	<u>0.6</u>	A.LA	<u>nLAt</u>		<u>ALM 4</u>
A.Lg	<u>AL C</u>	A.bL	<u>oFF</u>	A.ty	<u>oFF</u>

<b>FUn:</b>	<u>FUn 1</u>	<u>FUn 2</u>	
LEv	<u>high</u>	LEv	<u>high</u>
Fn	<u>nonE</u>	Fn	<u>nonE</u>
Fi	<u>0</u>	Fi	<u>0</u>

<b>gLbL:</b>	<u>C</u>	<u>gSE</u>	<u>oFF</u>	<u>C.LEd</u>	<u>both</u>	<u>d.ti</u>	<u>0</u>
AC.LF	<u>60</u>	Si.A	<u>5</u>	ZonE	<u>oFF</u>	USr.S	<u>nonE</u>
r.tyP	<u>ti</u>	Si.b	<u>6</u>	ChAn	<u>oFF</u>	USr.r	<u>nonE</u>
P.tyP	<u>StPt</u>	Pot i	<u>0</u>	d.PrS	<u>1</u>		

<b>CoM:</b>	<u>Ad.S</u>	<u>MAP</u>	<u>1</u>	<u>nU.S</u>	<u>yES</u>
<b>rtC:</b>	<u>hoUr</u>	<u>Min</u>	<u>@</u>	<u>doW</u>	<u>@</u>

Factory Page: (Press "Infinity" & "Advance" kry for 6 sec.)

<b>LoC:</b>	<u>LoC.o</u>	<u>2</u>	<u>PAS.E</u>	<u>oFF</u>	<u>SLoC</u>	<u>1 \$</u>
	<u>LoC.P</u>	<u>3</u>	<u>rLoC</u>	<u>1 \$</u>		

<b>CUS:</b>	<u>CUS: 1</u>	<u>CUS: 2</u>	<u>CUS: 3</u>	<u>CUS: 4 thru 20</u>	
PAr	<u>AC.Pu</u>	PAr	<u>AC.SP</u>	PAr	<u>P.AC</u>
				PAr	<u>nonE</u>

\* Displays current controller value. (Display only)  
 \$ LOC should be set at 5 until factory testing and calibration is complete.  
 @ This is a calibration factor and will vary from unit to unit.  
<sup>1</sup> Indicates parameters added in version 11.00 control firmware. Not present in ver. 10.00



<b>CO2 CONFIGURATION RECORD (WATLOW PM6)</b>							
MODELS:	3920, 3940, 3948 & 3949 (KITS 1900226 & 1900227)						
JOB NUMBER:	_____						
UNT SERIAL NUMBER:	_____						
CONTROL TYPE:	CO2						
PREPARED BY:	GLS						DATE 24-Sep-2012
<u>Program Page</u>							
See Programming Sheets if required.*							
<u>Operations Page: (Press "UP" &amp; "DN" keys for 3 sec.)</u>							
<b>Ai:</b>	Ain	*	i.Er	*	i.CA	@	
<b>Lnr:</b>	Su.A	*	oFSt	@	o.u	*	
<b>Pu:</b>	Su.A	*	oFSt	@	o.u	*	
<b>Mon:</b>	C.MA	*	h.Pr	*	C.SP	*	Pu.A *
<b>LOOP:</b>	C.M	<u>AUto</u>	C.SP	*	ti	<u>80</u>	o.SP <u>0.0</u>
	A.tSP	<u>90</u>	id.S	<u>5.0</u>	td	<u>0</u>	
	Aut	<u>no</u>	h.Pb	<u>1.0</u>	db	<u>0.0</u>	
<b>ALM:</b>	<u>ALM 1</u>		<u>ALM 2</u>		<u>ALM 3</u>		<u>ALM 4</u>
	A.Lo	<u>-1.0</u>	A.Lo	<u>32.0</u>	A.Lo	<u>32.0</u>	A.Lo <u>32.0</u>
	A.hi	<u>21.0</u>	A.hi	<u>300.0</u>	A.hi	<u>300.0</u>	A.hi <u>300.0</u>
	<sup>1</sup> (A.St)	*	<sup>1</sup> (A.St)	*	<sup>1</sup> (A.St)	*	<sup>1</sup> (A.St) *
<u>Setup Page: (Press "UP" &amp; "DN" keys for 6 sec.)</u>							
<b>Ai:</b>	SEn	<u>MA</u>	r.Lo	<u>0.0</u>	i.Er	<u>oFF</u>	<sup>1</sup> (i.Er) *
	Unit	<u>Pro</u>	r.hi	<u>20.0</u>	dEC	<u>0.0</u>	
	S.Lo	<u>4.00</u>	P.EE	<u>oFF</u>	<sup>1</sup> (i.CA)	@	
	S.hi	<u>20.00</u>	FiL	<u>2.0</u>	<sup>1</sup> (Ain)	*	
<b>Lnr:</b>	Fn	<u>oFF</u>	(All other parameters at default values)				
<b>Pu:</b>	Fn	<u>oFF</u>	FiL	<u>0.0</u>			
<b>Loop:</b>	h.Ag	<u>Pid</u>	t.tUn	<u>no</u>	rP	<u>oFF</u>	SP.hi <u>100.0</u>
	C.Ag	<u>oFF</u>	<sup>1</sup> (A.tSP)	<u>90</u>	L.SP	<u>0.0</u>	<sup>1</sup> (o.SP) <u>0.0</u>
	<sup>1</sup> (h.Pb)	<u>1.0</u>	t.Agr	<u>Cr it</u>	h.SP	<u>20.0</u>	<sup>1</sup> (C.M) <u>AUto</u>
	<sup>1</sup> (ti)	<u>80</u>	UFA	<u>USEr</u>	<sup>1</sup> (C.SP)	*	
	<sup>1</sup> (td)	<u>0</u>	FAiL	<u>oFF</u>	<sup>1</sup> (id.S)	<u>5.0</u>	
	<sup>1</sup> (db)	<u>0.0</u>	L.dE	<u>no</u>	SP.Lo	<u>-100.0</u>	
<b>otPt:</b>	<u>otPt 1</u>		<u>otPt 2</u>		<u>otPt 3</u>		S.hi <u>20.00</u>
	Fn	<u>hEAt</u>	Fn	<u>ALM</u>	o.ty	<u>MA</u>	r.Lo <u>0.0</u>
	o.tb	<u>10.0</u>	Fi	<u>1</u>	fn	<u>rMt</u>	r.hi <u>20.0</u>
	o.Lo	<u>0</u>			r.Sr	<u>Ai</u>	o.CA <u>0.0</u>
	o.hi	<u>100</u>			Fi	<u>1</u>	
					S.Lo	<u>4.00</u>	
<b>ALM:</b>	<u>ALM 1</u>		<u>ALM 1</u>		<u>ALM 1</u>		<u>ALM 2</u>
	A.ty	<u>Pr.AL</u>	<sup>1</sup> (A.Lo)	<u>-1.0</u>	A.dSP	<u>on</u>	A.ty <u>oFF</u>
	Sr.A	<u>Ai</u>	<sup>1</sup> (A.hi)	<u>21.0</u>	<sup>1</sup> (A.dL)	<u>0</u>	<u>ALM 3</u>
	A.hy	<u>0.3</u>	A.LA	<u>nLAt</u>	<sup>1</sup> (A.St)	*	A.ty <u>oFF</u>
	A.Lg	<u>AL o</u>	A.bL	<u>oFF</u>	<u>ALM 4</u>		
	A.Sd	<u>both</u>	A.Si	<u>on</u>	A.ty	<u>oFF</u>	
<b>FUn:</b>	LEv	<u>high</u>	Fn	<u>SiL</u>	Fi	<u>1</u>	
<b>gLbL:</b>	C.F	<u>C</u>	ZonE	<u>oFF</u>	d.ti	<u>0</u>	
	AC.LF	<u>60</u>	ChAn	<u>oFF</u>	USr.S	<u>nonE</u>	
	C.LEd	<u>oFF</u>	d.PrS	<u>1</u>	USr.r	<u>nonE</u>	
<b>CoM:</b>	Ad.S	<u>1</u>	MAP	<u>1</u>	nUS	<u>yES</u>	
<u>Factory Page: (Press "Infinity" &amp; "Advance" kry for 6 sec.)</u>							
<b>LOC:</b>	LoC.o	<u>2</u>	PAS.E	<u>oFF</u>	rLoC	<u>1 \$</u>	SLoC <u>1 \$</u>
<b>CUS:</b>	<u>CUS: 1</u>		<u>CUS: 2</u>		<u>CUS: 3 thru 20</u>		
	PAr	<u>AC.Pu</u>	PAr	<u>AC.SP</u>	PAr	<u>nonE</u>	
* Displays current controller value. (Display only)							
\$ LOC should be set at 5 until factory testing and calibration is complete.							
@ This is a calibration factor and will vary from unit to unit.							
<sup>1</sup> Indicates parameters added in version 11.00 control firmware. Not present in ver. 10.00							

## Section 5 Specifications

### Temperature

Control	..... $\pm 0.3^{\circ}\text{C}$ @ $+25^{\circ}\text{C}$ to $+37^{\circ}\text{C}$
Range	..... $0^{\circ}\text{C}$ ( $32^{\circ}\text{F}$ ) to $+60^{\circ}\text{C}$ ( $140^{\circ}\text{F}$ )
Sensor	.....RTD
Controller	.....Digital electronic proportional
Setpoint	.....Digital
Display	.....Digital LED
Readability	..... $0.1^{\circ}\text{C}$
Setability	..... $0.1^{\circ}\text{C}$
Uniformity	... $\pm 0.3^{\circ}\text{C}$ at $25^{\circ}\text{C}$ to $37^{\circ}\text{C}$ with six shelves installed*

### Shelves

Standard	.....6
Maximum	.....19
Dimensions	.....30.62"W x 25.81"F-B .....(77.78 cm x 65.56 cm)
Construction	.....Solid stainless steel reinforced
Surface Area	.....5.4 sq. ft. (.51 sq. m) per shelf
Max. Per Chamber	.....104.3 sq. ft. (9.69 sq. m)
Clearance	.....Adjustable on 3" (7.62 cm) centers
Loading	.....35 lbs. (16 Kg) (slide in and out) .....50 lbs. (23 Kg) (stationary)

### Construction

Volume	.....29 cu. ft. (821 liters)
Interior	.....304 2B stainless steel
Exterior	.....Cold rolled steel
Insulation	......2" (5.1cm) Foamed urethane
Outer Door Gasket	..Four sided vinyl compression
Finish	.....Powder coated
Salt spray tests	exceed 1000 hrs. per ASTM Standard B117-85.

\* *Better than  $\pm 0.5^{\circ}\text{C}$  uniformity at all other temperature parameters.*

**Weights**

Net .....700 lbs. (317.5kg)  
Shipping  
Motor .....850 lbs. (385.5kg)

**Temperature Alarm**

Sensor .....Thermostat  
Controller .....Thermostat  
Setpoint .....Analog reference dial  
Alarm .....Audible/visual

**Fittings**

Drain Port .....3/8" OD Copper

**Unit Heat Load**

115V .....5500 BTUH (1600W)

**Refrigeration**

Compressor ..1/4 Horsepower, air-cooled R-134A

**Electrical**

.....120V, 1 PH, 2W, 60Hz, 16 FLA  
.....(20 FLA with optional door light package)  
Power Switch .....1 Pole  
Line Cord .....8 feet w/ NEMA 5-20 plug  
(8 feet w/ NEMA plug 5-30 plug w/ optional DLP)

**Dimensions**

Exterior .....38.00"W x 87.5"H x 32.00"F-B  
.....(96.52cm x 222.25cm x 81.28cm)  
Interior .....31.0"W x 60.0"H x 27.0"F-B  
.....(78.74cm x 152.4cm x 68.58cm)

## Safety Specifications

Ingress Protection IP20

Indoor use only

Altitude: . . . . .2,000 meters

Temperature: . . . . .5°C to 32°C

Humidity . . .80% RH for temperatures up to 31°C (non-condensing),  
. . . . .decreasing linearly to 50% RH at 32°C

Mains Supply Fluctuations . . .not to exceed  $\pm 10\%$  of nominal voltage

Installation Category II<sup>1</sup>

Pollution Degree 2<sup>2</sup>

Class of Equipment 1

*Continuing research and improvements may result in specification changes at any time. Performance plus or minus the least significant digit unless otherwise specified.*

---

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

---

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

## Section 6 Spare Parts

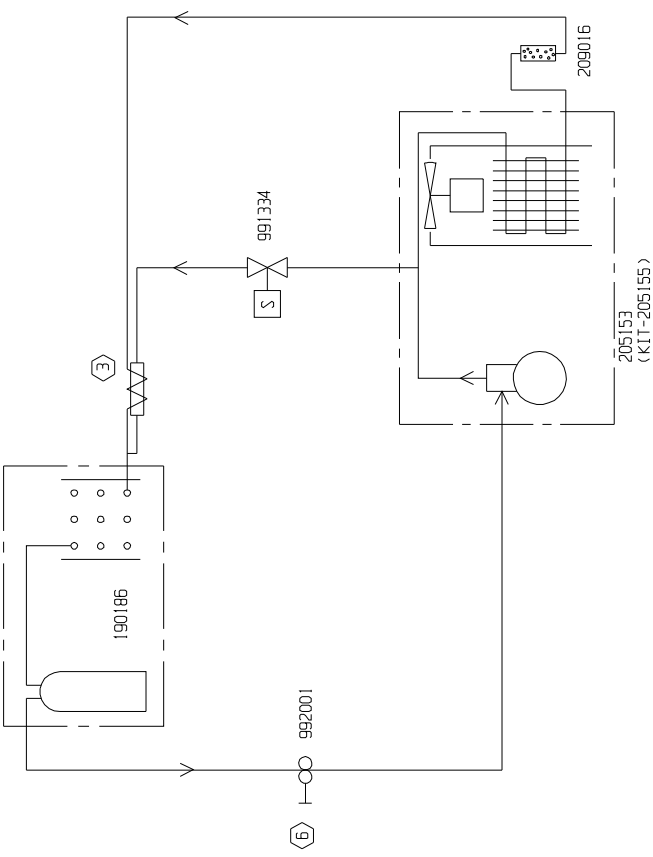
Part No.	Description	Qty
290163	RTD Temperature Sensor	1
230130	Fuse, Ceramic 12A 350V	1
400051	Power Supply (CO <sub>2</sub> option)	1
231227	Watlow PM8 Controller	1
231226	Watlow PM6 Controller (CO <sub>2</sub> option)	1
230148	20A Fuse	2
403940	Over Temp Thermostat	1
403941	Under Temp Thermostat	1
410048	Defrost Timer	1
630090	Heater (wirewound)	1
205153	Condensing Unit, 1/4 HP 115V R-134A	1
285599	Thermal Fuse	2
830044	Blower Motor, 1/4 HP, 115V	1

---



DRAWING NUMBER: 1900189-90-1

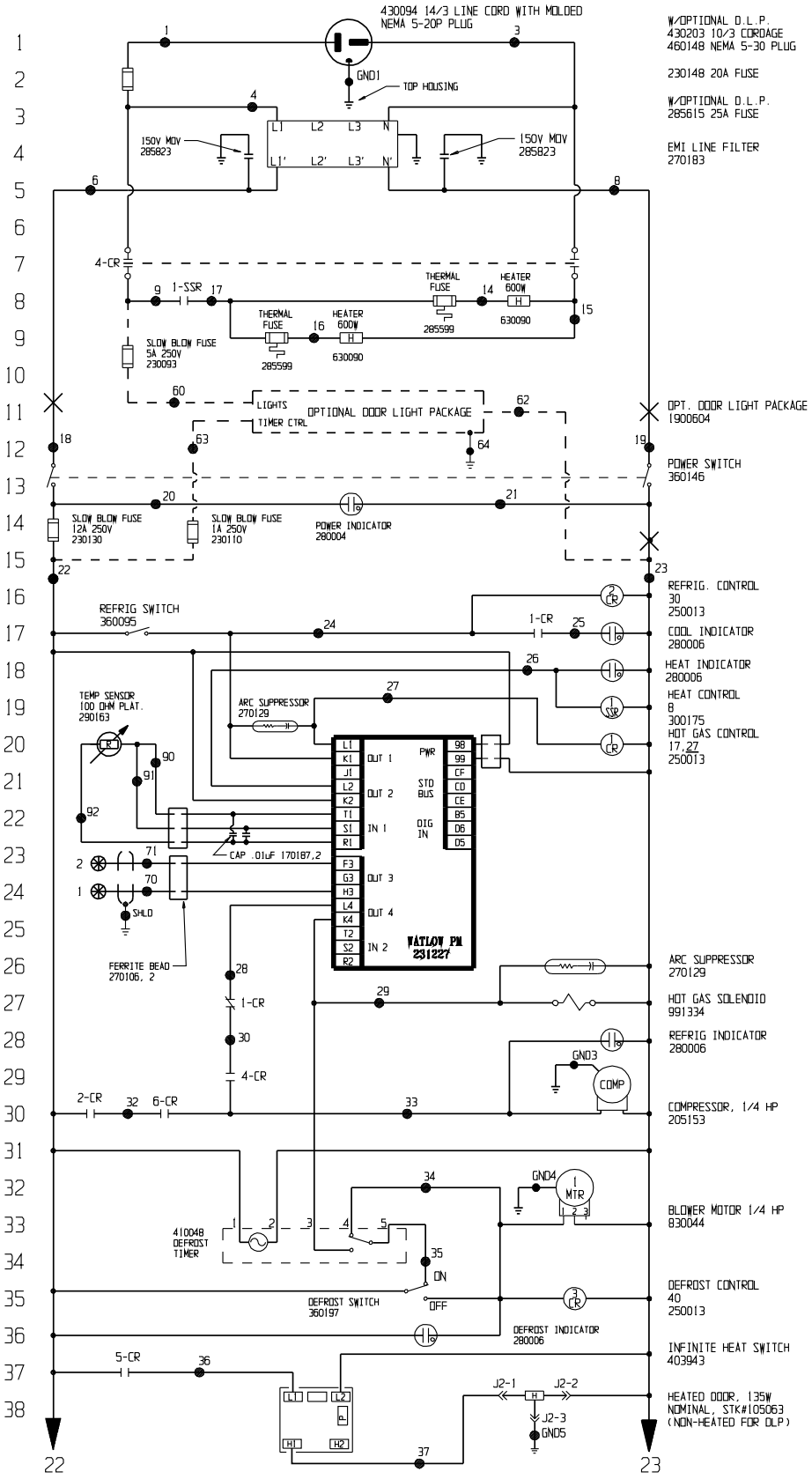
REV	ECN NO.	DATE	BY	CAD APPD	DESCRIPTION OF REVISION
0	IN3077	12-11-03	CAW	CAW/AAL	RELEASED FOR PRODUCTION
1	IN-4670	12-02-15	GLS	GLS/CCS	CHG FROM 205062 COND. UNIT



- 6. CAP TUBE ITEM (3) , 6' DF .050
- 5. WRAP 5' OF CAP TUBE TO 1/2" HOT GAS TUBE.
- 4. SUCTION LINE: 3/8" O.D.
- 3. HOT GAS LINE: 1/4" O.D.
- 2. SET CPR VALVE (6) AT 25 LBS.
- 1. REFRIGERANT 134A: 13.5 OZS.

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION IS NOT TO BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR USED FOR MANUFACTURING PURPOSES WITHOUT WRITTEN PERMISSION FROM THERMO FISHER		MODEL/PART NAME: 3500 TOP HOUSING
<b>ThermoFisher</b> <b>SCIENTIFIC</b>		DWG TITLE: REFRIGERATION SCHEMATIC
BOX 646, MARIETTA, OHIO 45750		DMW: CAW CAD: CAW APPD: AAL DATE: 2-11-03 SCALE: NONE
MATERIAL: N/A		PAIN'T COLOR: N/A
TOLERANCE UNLESS OTHERWISE SPECIFIED .XX±		ANGLES: DECIMAL: .XXX±
DRAWING NUMBER		SIZE
1900189-90-1		B

POWER CONNECTION  
 (20V, 1Ø, 2P, 3Ø (INC. GROUND), 60HZ, 16.0 FLA (20A W/OPTIONAL DLP))



W/OPTIONAL D.L.P.  
 430203 1Ø/3Ø CORDAGE  
 460148 NEMA 5-3Ø PLUG

230148 20A FUSE  
 W/OPTIONAL D.L.P.  
 285615 25A FUSE

EMI LINE FILTER  
 270183

OPT. DOOR LIGHT PACKAGE  
 1900604

POWER SWITCH  
 360146

REFRIG. CONTROL  
 30 250013

COOL INDICATOR  
 280006

HEAT INDICATOR  
 280006

HEAT CONTROL  
 8 300175

HOT GAS CONTROL  
 17, 27 250013

ARC SUPPRESSOR  
 270129

HOT GAS SOLENOID  
 991334

REFRIG INDICATOR  
 280006

COMPRESSOR, 1/4 HP  
 205153

BLOWER MOTOR 1/4 HP  
 830044

DEFROST CONTROL  
 40 250013

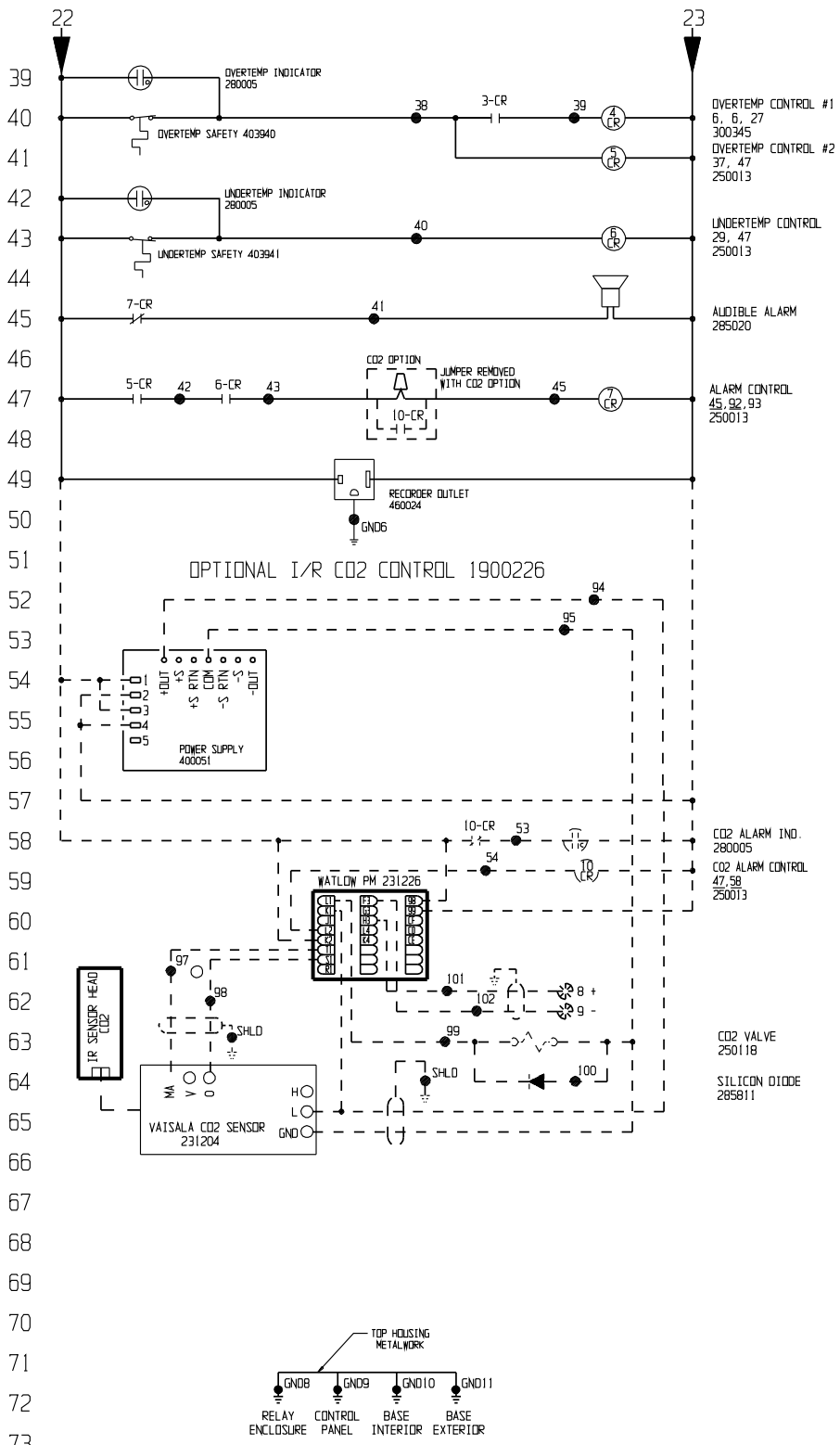
INFINITE HEAT SWITCH  
 403943

HEATED DOOR, 135W  
 NOMINAL, STK#105063  
 (NON-HEATED FOR DLP)

Electrical Schematic  
 Model:  
 3920  
 Environmental  
 Chamber

3920-70-0-D REV.19  
 Page 1 of 3

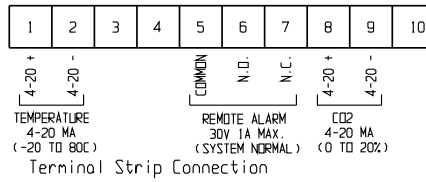
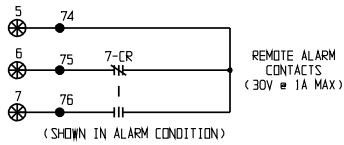




Electrical Schematic  
 Model:  
 3920  
 Environmental  
 Chamber

3920-70-0-D REV.19  
 Page 2 of 3

77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107



WIRE REFERENCE CHART											
NO.	AWG	COLOR	NO.	AWG	COLOR	NO.	AWG	COLOR	NO.	AWG	COLOR
1	12	BLK	31	NA	NA	70	22	RED	79	N/A	N/A
2	NA	NA	32	16	BRN	71	22	BLK	---	---	---
3	12	WHT	33	16	BLU	72	NA	NA	90	22	WHT
4	12	BLK	34	16	YEL	73	NA	NA	91	22	RED
5	NA	NA	35	16	BRN	74	22	RED	92	22	BLK
6	12	BLK	36	20	RED	75	22	BLK	93	NA	NA
7	12	WHT	37	20	BLK	76	22	WHT	94	22	GRN
8	12	WHT	38	20	RED	77	N/A	N/A	95	22	BLK
9	16	BLK	39	20	RED	78	N/A	N/A	96	NA	NA
10	NA	NA	40	20	BLU	79	N/A	N/A	97	22	RED
11	NA	NA	41	20	YEL	---	---	---	98	22	BLK
12	NA	NA	42	20	PUR	---	---	---	99	22	RED
13	NA	NA	43	20	PUR	---	---	---	100	22	WHT
14	16	BLK	44	NA	NA	---	---	---	101	22	BLK
15	16	WHT	45	20	PUR	---	---	---	102	22	WHT
16	16	BLK	46	NA	NA	---	---	---	---	---	---
17	16	PUR	47	NA	NA	---	---	---	---	---	---
18	14	BLK	48	NA	NA	---	---	---	GND1	12	GRN
19	14	WHT	49	NA	NA	---	---	---	GND2	16	GRN
20	14	BLK	50	NA	NA	---	---	---	GND3	16	GRN
21	14	WHT	51	NA	NA	---	---	---	GND4	16	GRN
22	16	BLK	52	NA	NA	---	---	---	GND5	20	GRN
23	16	WHT	53	20	YEL	---	---	---	GND6	16	GRN
24	20	BLU	54	20	RED	---	---	---	GND7	NA	NA
25	20	BLU	---	---	---	---	---	---	GND8	14	GRN
26	20	RED	60	16	BLK	---	---	---	GND9	BRAID	N/A
27	20	YEL	61	16	RED	---	---	---	GND10	16	GRN
28	20	PUR	62	16	WHT	---	---	---	GND11	16	GRN
29	20	ORG	63	16	ORG	---	---	---	---	---	---
30	20	ORG	64	16	GRN	---	---	---	---	---	---

REV	EN	NO.	DATE	BY	CAD	APPR	DESCRIPTION OF REVISION
19	IN-	4806	04-14-17	GLS	SAG		403943 WAS 270000. CHG SWITCH WIRING
18	IN-	4670	11/18/15	GLS	GLS	MSE	CHG LINE FILTER, ADD OLP FUSES
17	IN-	4051	02/21/11	GLS	GLS	MSE	REMOVED ARC SUPPRESSOR
16	IN-	4051	12/28/10	GLS	GLS	MSE	REV. CONTROL FROM 982 & SD. ADD OLP OPT.
15	IN-	3932	05/20/09	GLS	GLS	LON	CHG LINE CORD FROM 30A TO 20A & ADD NOTES
14	IN-	3932	03/24/09	GLS	GLS	LON	CHG LINE CORD FROM 20A TO 30A

**ATTENTION**  
OBSERVE PRECAUTIONS  
**ELECTROSTATIC SENSITIVE DEVICES**

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION IS NOT TO BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR USED FOR MANUFACTURING PURPOSES, WITHOUT WRITTEN PERMISSION FROM THERMO FISHER SCIENTIFIC

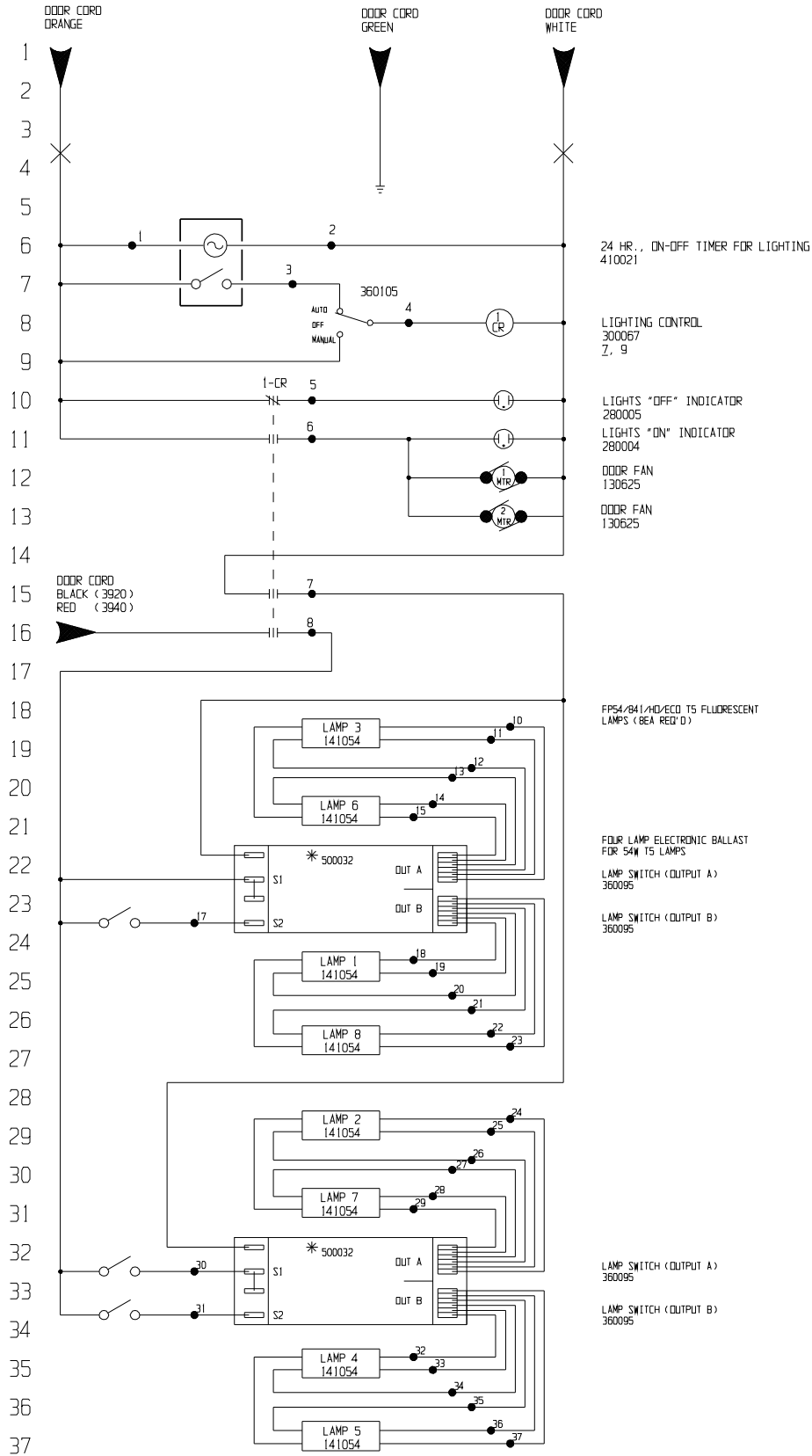
**ThermoFisher SCIENTIFIC**  
BOX 649, MARIETTA, OHIO 45750

MODEL/PART NAME: 3920 REACH-IN INCUBATOR  
DWG TITLE: ELECTRICAL SCHEMATIC  
DWN: JAS CAD: PDK APPR: LON DATE: 06-28-09 SCALE: NONE  
MATERIAL:  
PAINT COLOR:  
TOLERANCE UNLESS OTHERWISE SPECIFIED  
ANGLES: DECIMAL: .XX±  
DRAWING NUMBER: 3920-70-0  
SIZE: D

Electrical Schematic  
Model:  
3920  
Environmental Chamber

3920-70-0-D REV.19  
Page 3 of 3

1900604 - 3920 120V 60Hz.  
 190032 - 3940 220V 60Hz.



24 HR., ON-OFF TIMER FOR LIGHTING  
 410021

LIGHTING CONTROL  
 300067  
 Z, 9

LIGHTS "OFF" INDICATOR  
 280005

LIGHTS "ON" INDICATOR  
 280004

DOOR FAN  
 130625

DOOR FAN  
 130625

DOOR CORD  
 BLACK (3920)  
 RED (3940)

FPS4/841/HD/ECO T5 FLUORESCENT  
 LAMPS (BEA REQ'D)

FOUR LAMP ELECTRONIC BALLAST  
 FOR 54W T5 LAMPS

LAMP SWITCH (OUTPUT A)  
 360095

LAMP SWITCH (OUTPUT B)  
 360095

COMMON TO: 190032, 1900604, 1900605

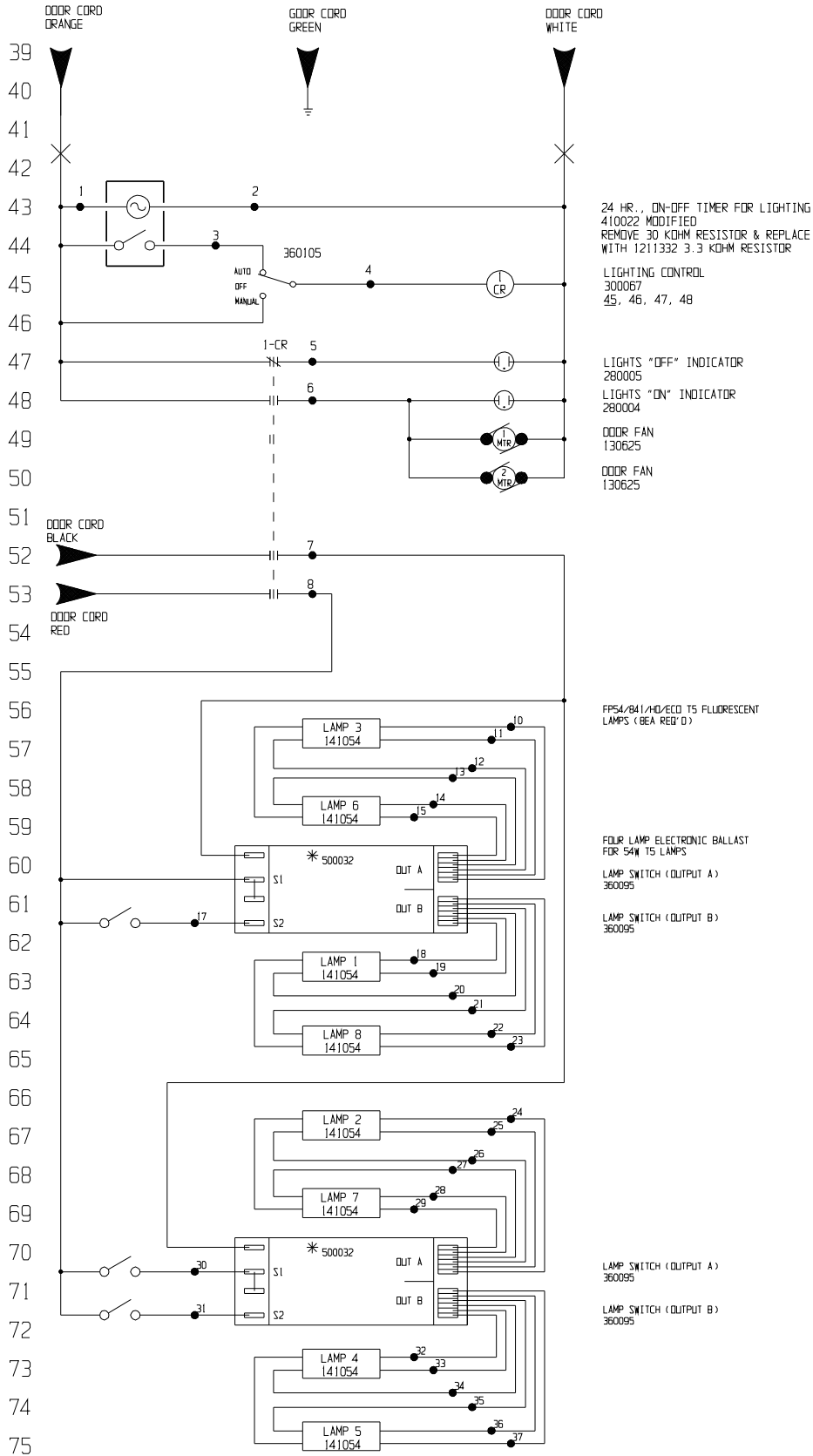
LAMP SWITCH (OUTPUT A)  
 360095

LAMP SWITCH (OUTPUT B)  
 360095

Electrical Schematic  
 Model:  
 190032  
 Door Light Package

190032-70-0-0 REV.19  
 Page 1 of 3

1900605 - 3949 220V 50Hz.



Electrical Schematic  
Model:  
190032  
Door Light Package

190032-70-0-D REV.19  
Page 2 of 3

77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107

WIRE REFERENCE CHART		
NUMBER	GAUGE	COLOR
1	16	RED
2	16	WHT
3	20	RED
4	20	YEL
5	20	BLU
6	16	BLK
7	16	BLU
8	16	BRN
9	--	--
10	16	RED
11	16	RED
12	16	DRG
13	16	DRG
14	16	BLU
15	16	BLU
16	---	---
* 17	16	BLK
18	16	BRN
19	16	BRN
20	16	BLU
21	16	BLU
22	16	YEL
23	16	YEL
24	16	RED
25	16	RED
26	16	DRG
27	16	DRG
28	16	BLU
29	16	BLU
30	16	BLK
* 31	16	BLK
32	16	BRN
33	16	BRN
34	16	BLU
35	16	BLU
36	16	YEL
37	16	YEL

\* WIRES FROM UNIVERSAL BALLAST B454PLNW-E010C THAT CONNECT TO WIRES 17 AND 31 ARE GREY.

NOTES:	CUSTOMER APPROVAL/REFERENCE	19	IN-4670	11/19/15	GLS	GLS	CCS	REV. POWER WIRING	
⊗ Denotes Terminal Strip Connection	Parts List Reference Number	APPROVED BY	18	IN-4569	07/21/14	BOB	SAG	MSB	ADDED 1900604 AND 1900605
1-CR Last Relay Number	○ Assembly	DATE OF APPROVAL	17	IN-3939	12/14/10	JOM	JOM	MSB	REVISED CABINET WIRE #
N/A Last Terminal Number	◇ Panel	THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION IS NOT TO BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR USED FOR MANUFACTURING PURPOSES WITHOUT WRITTEN PERMISSION FROM THERMO FISHER SCIENTIFIC	16	IN-3939	12/08/10	JOM	JOM	MSB	CHG'D FROM CUST & REL FOR PROD
39 Last Wire Number	○ Refrigeration		15		02/26/10	GLS	GLS	MSB	REV WIRE CONNECTION TIMER MOTOR
	□ Wiring	REV ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION	SCALE	NONE
		CUSTOMER							
		JOB TITLE 3900 SERIES ODDR LIGHT PACKAGE							
		DWG TITLE ELECTRICAL SCHEMATIC 50/60Hz							
		LOCATION	JOB NUMBER	DRAWING NUMBER					
		STOCKNO1		190032-70-0-0					
		BOX 649, MARIETTA, OHIO 45750							

Electrical Schematic  
Model:  
190032  
Door Light Package  
190032-70-0-0 REV.19  
Page 3 of 3



## **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.



Rev. 5 8/13

## **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.

**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.

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



**[thermoscientific.com](http://thermoscientific.com)**

© 2014 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific and its subsidiaries. Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.

**Thermo Fisher Scientific (Asheville) LLC**

401 Millcreek Road  
Marietta, Ohio 45750  
United States

**Thermo**  
S C I E N T I F I C  
A Thermo Fisher Scientific Brand