User Manual

# Forma Environmental Chamber

## Model 3920

Operating and Maintenance Manual 7063920 Rev. 8

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Thermo SCIENTIFIC

**MANUAL NUMBER 7063920**

| | | | | |
|---|---|---|---|---|
| 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 |
| 5 | 29228 | 8/28/13 | Updated the warranty (at back of this manual) | ccs |
| 4 | 29088 | 9/26/12 | Updated Watlow specs - pgs 4-8 through 4-10 | ccs |
| 3 | 28639 | 6/15/12 | Updated software unlock chart on pg 4-3 | ccs |
| 2 | 24921/IN-3939 | 2/16/12 | Added Door Light Option 190032 | ccs |
| 1 | 27807 | 10/4/11 | Updated Watlow Configuration Menus - pgs 4-8 through 4-10 | 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. ▲

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

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.

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

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

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

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

Marking of electrical and electronic equipment, which applies to electrical and electronic equipment falling under the Directive 2002/96/EC (WEEE) and the equipment that has been put on the market after 13 August 2005.

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the WEEE symbol. Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State European Country, and this product should be disposed of or recycled through them. Further information on Thermo's compliance with this directive, the recyclers in your country and information on Thermo Scientific products will be available at www.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?

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| http://www.thermoscientific.com | Internet Worldwide Web Home Page |
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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
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 ±1°C for temperature, ±1% for gases, and ±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 $CO_2$ sensors, blower motors, water jackets, etc.**

# Table of Contents

# Section 1 Installation and Set-Up

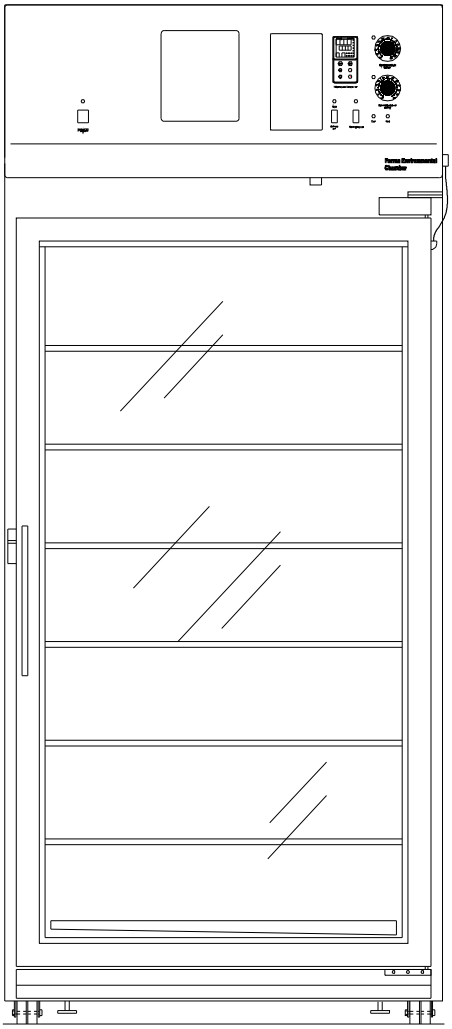


**Figure 1-1.** Front View

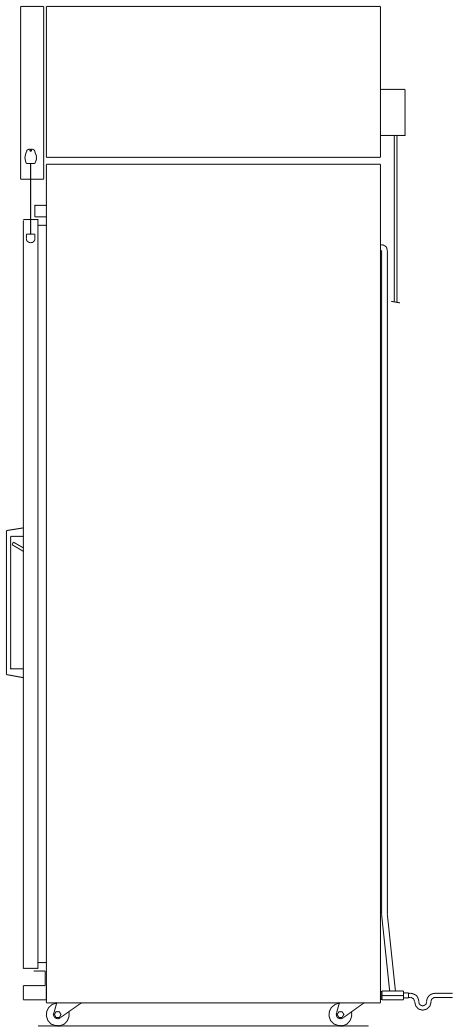


**Figure 1-2.** Side View

## Location

Locate the unit on a firm, level surface in an area of minimum ambient temperature fluctuation. A minimum of three (3) inches clearance is required at the top and back of the incubator. 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. Rinse thoroughly with sterile distilled water, then 70% ethanol. 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.

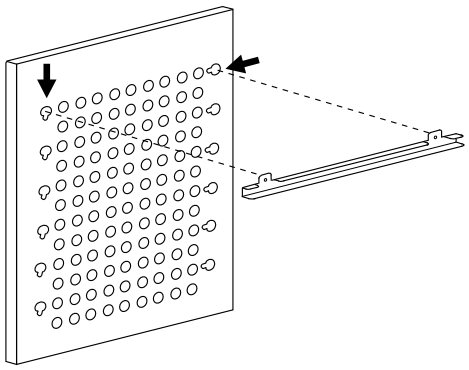


**Figure 1-3.** Shelf Channels

## 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 1-4). A P-trap is included with the unit and must be installed on the connection.

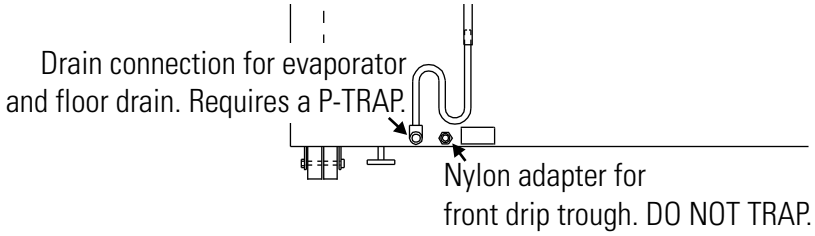



**Figure 1-4.** P-trap Installation Location

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 (Figure 1-4). 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.

## Remote Data Output

**IMPORTANT USER INFORMATION**

CAUTION! Stored product should be protected by a redundant 24 hour/day monitoring system with alarm capability. An interconnect jack and thermocouple are installed for centralized monitoring, should on-board system fail.

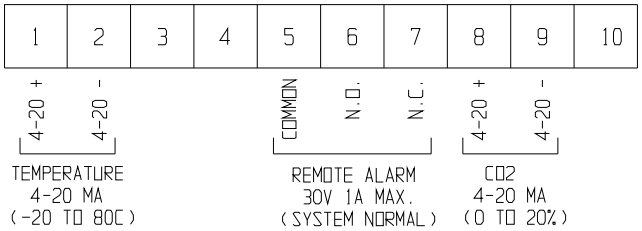



**Figure 1-5.** Terminal Strip Connections

### 4-20 Milliamp Output

The environmental chamber is equipped with 4-20mA output for the remote transmission of temperature or CO2 data. A terminal strip is located on the back of the incubator for convenience. Refer to Figure 1-5 for terminal pin identification.

### Remote Alarm Contacts

Remote alarm connections are also included on the terminal strip (Figure 1-5) 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 CO2 go out of the set alarm limits.

## Power Connection

See the serial tag on the side of the unit for electrical specifications, or 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 so the unit can be easily disconnected. ▲

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 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.

**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 1-6). If the unit is operating, the green LED lights steady. If the unit is not turned on, the LED blinks.

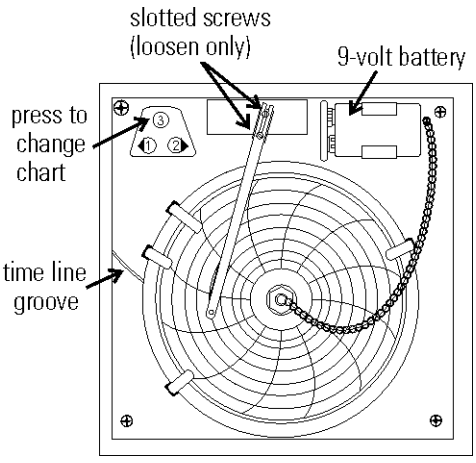



**Figure 1-6.** Recorder Components

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 1-6) 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

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.

## Connect the Recorder (continued)

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 panle. 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 $CO_2$ Option

This section applies to units with the IR CO2 option only.

## Connect $CO_2$ Source

For the most economical use, the liquid CO2 supply tanks should be without siphon tubes, so that only CO2 gas enters the incubator injection system. Two tanks may be joined together with a manifold to ensure a continuous CO2 supply.

Install a two-stage pressure regulator, with indicating gauges, at the supply cylinder outlet. The high-pressure gauge should have an indicating range of 0 to 2000 psig to monitor tank pressure. The low-pressure gauge should have an indicating range of 0 to 30 psig to monitor input pressure to the incubator injection system. A suitable two-stage pressure regulator is available.

The $CO_2$ source must be regulated at a pressure level of 15 psig, ±5. Higher pressure levels may damage the $CO_2$ control system. The user should determine the most economical pressure level, between 10 and 20 psig appropriate for the desired $CO_2$ percentage in the chamber. Use only sufficient pressure to maintain recovery time after door openings.

## Connect $CO_2$ Source (continued)

To connect the $CO_2$ supply:

1. Insert the copper tubing provided with the unit as far as it will go into the nut of the CO2 connection.
2. Turn the nut until it is finger tight.
3. For reference, scribe the nut at the 6:00 position.

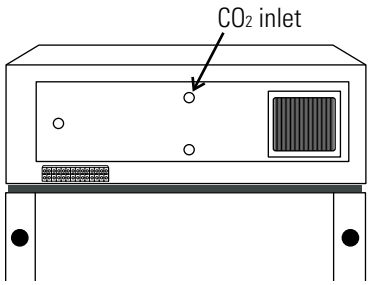



**Figure 1-7.** CO2 Inlet

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 $CO_2$ line to the open end of the copper tubing.
6. Check the tubing connection for leaks.

## Set $CO_2$ Content

The Watlow PM6 $CO_2$ controller's upper display shows the actual $CO_2$ content inside the chamber. The lower display shows the $CO_2$ setpoint.

Before setting the $CO_2$ Content, allow the chamber temperature to stabilize. Do not open door during the stabilization period.

To set the $CO_2$ content, press the Up or Down Arrow keys on the Watlow PM6 Controller.

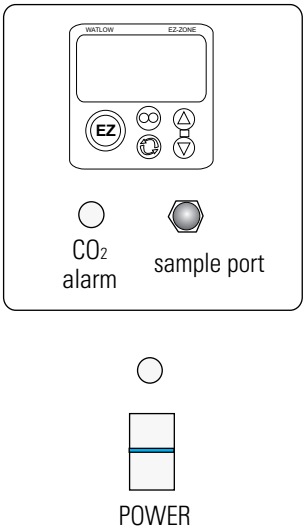



**Figure 1-8.** $CO_2$ Control and Indicators

## $CO_2$ Control and Indicators

The **sample port** is used for checking $CO_2$ percentage in the incubator chamber by an independent test instrument (such as with a Fyrite, or similar $CO_2$ test instrument).

**Caution** To prevent $CO_2$ loss, the sample port must be capped when it is not in use. ▲

The **$CO_2$ alarm** is factory set to activate when the chamber $CO_2$ content deviates from configured alarm set points (see configuration record). When a $CO_2$ alarm occurs, the $CO_2$ Alarm indicator on the control panel lights and the audible alarm sounds.

The $CO_2$ alarm high and low setpoints are established through the Watlow PM6 $CO_2$ controller (A.LO, and A.HI). Refer to the Configuration Record included at the end of Section 4.

# 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 1-10 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.

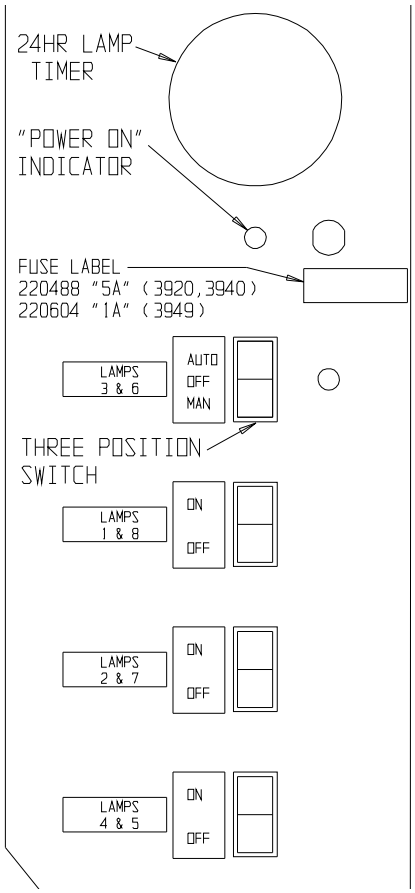
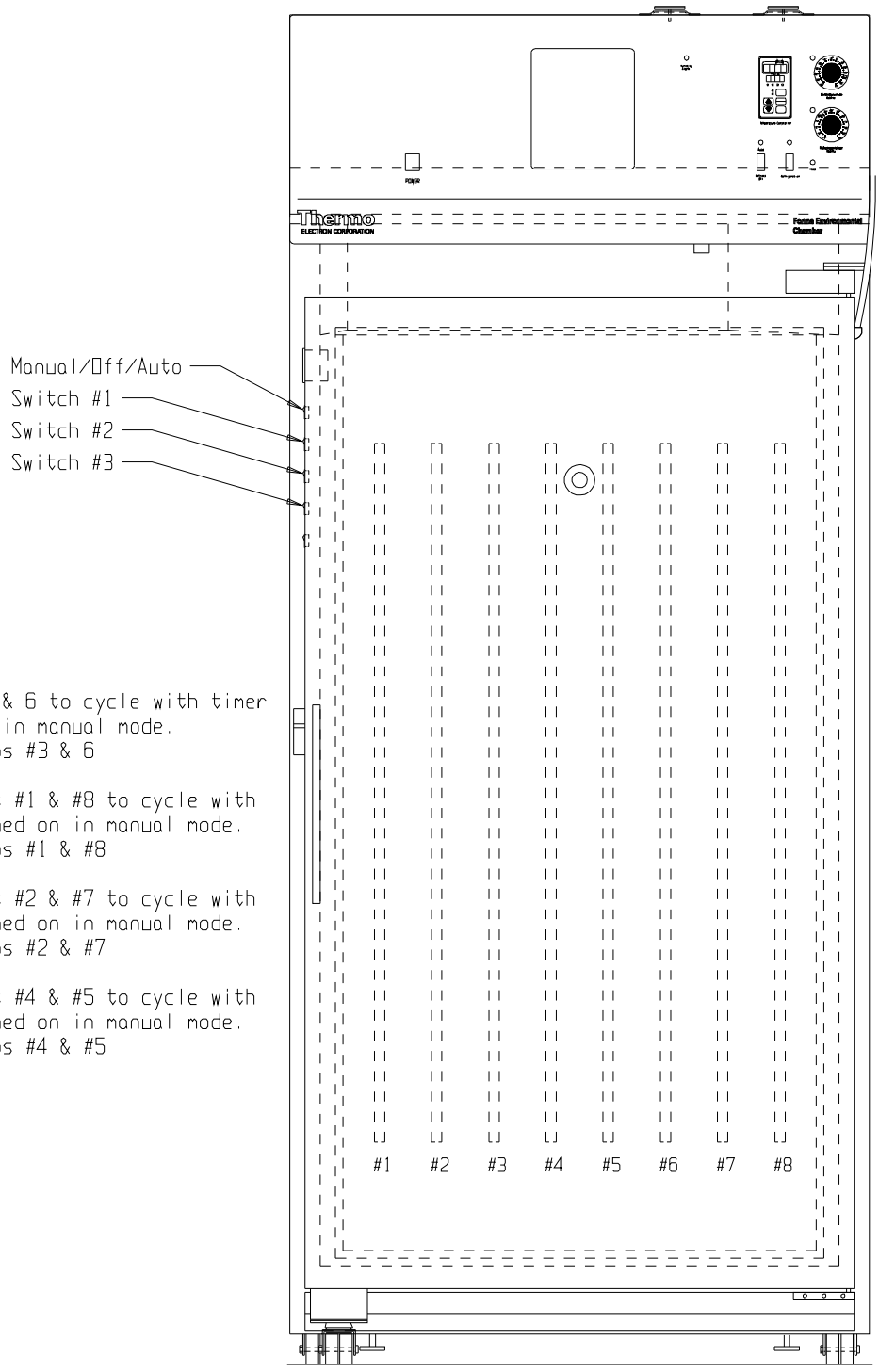



**Figure 1-9.** Door Light Timer

**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




* Auto/Off/Manual
Switch - ON = Enables Lamp #3 & 6 to cycle with timer or turned on in manual mode.
OFF = Disables Lamps #3 & 6

Switch #1 - ON = Enables Lamps #1 & #8 to cycle with timer or turned on in manual mode.
OFF = Disables Lamps #1 & #8

Switch #2 - ON = Enables Lamps #2 & #7 to cycle with timer or turned on in manual mode.
OFF = Disables Lamps #2 & #7

Switch #3 - ON = Enables Lamps #4 & #5 to cycle with timer or turned on in manual mode.
OFF = Disables Lamps #4 & #5

**Figure 1-10.** Door Light Configuration

# Section 2 Start-Up and Operation


**Figure 2-1.** Environmental Chamber Control Panel (shown with optional $CO_2$ 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 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, 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 $CO_2$ 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 | | | ☑ |
| 3 | Check air exchange ventilator caps for adjustment; open or close as required | | | ☑ |
| 4 | Perform a complete decontamination procedure. Wipe down interior, shelves, side panels with disinfectant. Rinse everything well with sterile distilled water. | | Between experiments<br>*More frequent decontamination may be required, depending on use and environmental conditions.* | |
| 5 | Verify and document all calibrations, at the minimum. | | ☑ | |
| -- | Clean drip pan and drain lines | | | ☑ |
| -- | Clean refrigeration system condenser | | ☑ | |
| -- | Verify defrost cycle for below 10°C operation | | ☑ | |
| -- | Change filters (under normal conditions) | | | ☑ |

* 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.

## 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 the access hole and into the 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. ▲

## Remove Software Lockout

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.

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).

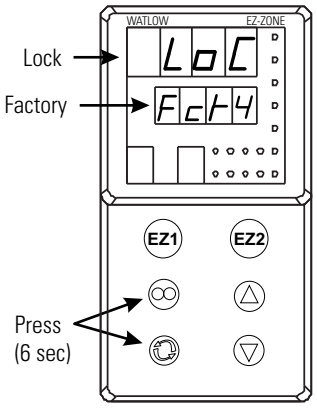



**Figure 4-1.** Displays

3. Press the Advance key to scroll through the menus as follows:

| 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

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

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

## Controller Configuration

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.

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

## Offset Calibration (Temperature)

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

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.

## Replace Optional Recorder and Probe(s)

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 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. ▲


**Figure 4-2.** Button

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.

## 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.

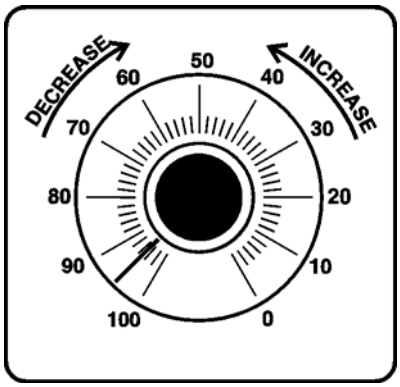



**Figure 4-3.** Heater Control

## $CO_2$ Controller Calibration

If it should become necessary to calibrate the $CO_2$ controller, perform the procedures on pages 4-3 through 4-4.

Start from the standard operating display (setpoint in bottom display, actual $CO_2$ reading in the upper display).

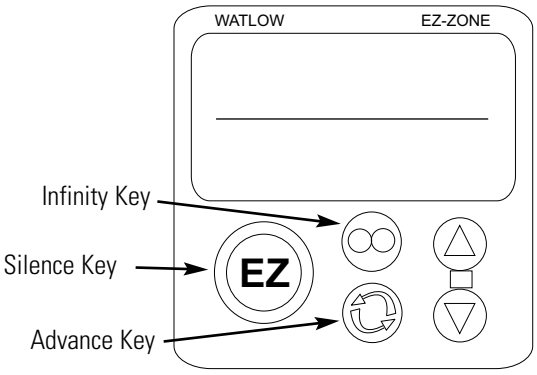



**Figure 4-4.** Key Locations

# TEMPERATURE CONFIGURATION RECORD (WATLOW PM8)

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

Operations Page: (Press "UP" & "DN" keys for 3 sec.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Ai:** | Ai 1 | | Ai 2 | | § = AC.Pu in version 10 firmware | | | |
| | §(Ain) | --- | §(Ain) | --- | | | | |
| | i.Er | * | i.Er | nSrc | | | | |
| | i.CA | @ | i.CA | @ | | | | |
| **Lnr:** | Lnr 1 | | Lnr 2 | | | | | |
| | Su.A | * | Su.A | * | | | | |
| | oFSt | @ | oFSt | @ | | | | |
| | o.u | * | o.u | * | | | | |
| **Pu:** | Pu 1 | | Pu 2 | | | | | |
| | Su.A | * | Su.A | * | | | | |
| | oFSt | @ | oFSt | @ | | | | |
| | o.u | * | o.u | * | | | | |
| **dio:** | dio 5 | | dio 6 | | | | | |
| | di.S | oFF | do.6 | oFF | | | | |
| | Ei.S | iACt | | | | | | |
| **Mon:** | C.MA | **Auto** | C.Pr | * | Pu.A | * | | |
| | h.Pr | * | C.SP | * | | | | |
| **LooP:** | 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** |
| **ALM:** | 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** |
| | [1](A.St) | * | [1](A.St) | * | [1](A.St) | * | [1](A.St) | * |
| **P.StA:** | P.Str | **1** | Ent1 | **oFF** | JC | **0** | | |
| | P.ACr | **nonE** | Ent2 | **oFF** | | | | |

(P.AtA group parameters are for Ramp/Soak programming only)

Setup Page: (Press "UP" & "DN" keys for 6 sec.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Ai:** | Ai 1 | | | | Ai 2 | | | |
| | SEn | **rO.IH** | dEC | **0.0** | SEn | **oFF** | [1](i.CA) | @ |
| | rt.L | **3** | [1](i.CA) | @ | FiL | **0.5** | [1](Ain) | * |
| | FiL | **2.0** | [1](Ain) | * | i.Er | **oFF** | [1](i.Er) | * |
| | i.Er | **oFF** | [1](i.Er) | * | dEC | **0** | | |
| **Lnr:** | Lnr 1 | | Lnr 2 | | (All other perameters at default values) | | | |
| | Fn | **oFF** | Fn | **oFF** | | | | |
| **Pu:** | Pu 1 | | Pu 2 | | | | | |
| | Fn | **oFF** | Fn | **oFF** | | | | |
| | FiL | **0.0** | FiL | **0.0** | | | | |
| **dio:** | dio 5 | | dio 6 | | | | | |
| | dir | otPt | dir | otPt | | | | |
| | Fn | oFF | Fn | oFF | | | | |

# TEMPERATURE CONFIGURATION RECORD (WATLOW PM8)

**MODELS:** **3911, 3913, 3920, 3940, & 3949**

**JOB NUMBER:**

**UNT SERIAL NUMBER:**

**CONTROL TYPE:** **Temperature**

**PREPARED BY:** **GLS** **DATE** **24-Sep-2011**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LooP:** | h.Ag | **Pid** | [1](db) | **0.0** | L.dE | **no** | SP.hi | **100.0** |
| | C.Ag | **Pid** | t.tUn | **no** | rP | **oFF** | [1](o.SP) | **0.0** |
| | C.Cr | **oFF** | [1](A.tSP) | 90 | L.SP | **-20.0** | [1](C.M) | **AUto** |
| | [1](h.Pb) | **2.3** | t.Agr | **Cr it** | h.SP | **60.0** | | |
| | [1](c.Pb) | **1.3** | P.dL | 0.0 | [1](C.SP) | * | | |
| | [1](ti) | **90** | UFA | **USEr** | [1](id.S) | **23.9** | | |
| | [1](td) | **12** | FAiL | **USEr** | SP.Lo | **-100.0** | | |
| **otPt:** | otPt 1 | | otPt 2 | | otPt 3 | | r.Lo | **-20.0** |
| | Fn | **CooL** | Fn | **hEAt** | o.ty | **MA** | r.hi | **80.0** |
| | o.tb | **30.0** | o.Ct | **Ftb** | Fn | **rMt** | o.CA | **@** |
| | o.Lo | **0** | o.tb | **5.0** | r.Sr | **Ai** | | |
| | o.hi | **100** | o.Lo | **0** | Fi | **1** | otPt 4 | |
| | | | o.hi | **100** | S.Lo | **4.00** | Fn | ALM |
| | | | | | S.hi | **20.00** | Fi | **1** |
| **ALM:** | ALM 1 | | ALM 1 | | ALM 1 | | ALM 2 | |
| | A.ty | **Pr.AL** | A.Sd | **both** | A.Si | **oFF** | A.ty | **oFF** |
| | Sr.A | **Ai** | [1](A.Lo) | **-20.0** | A.dSP | **oFF** | ALM 3 | |
| | iS.A | **1** | [1](A.hi) | **34.0** | [1](A.dL) | **0** | A.ty | **oFF** |
| | A.hy | **0.6** | A.LA | **nLAt** | [1](A.St) | * | ALM 4 | |
| | A.Lg | **AL C** | A.bL | **oFF** | | | A.ty | **oFF** |
| **FUn:** | FUn 1 | | FUn 2 | | | | | |
| | LEv | **high** | LEv | **high** | | | | |
| | Fn | **nonE** | Fn | **nonE** | | | | |
| | Fi | **0** | Fi | **0** | | | | |
| **gLbL:** | C_F | **C** | gSE | **oFF** | C.LEd | **both** | d.ti | **0** |
| | AC.LF | **60** | Si.A | **5** | ZonE | **oFF** | USr.S | **nonE** |
| | r.tyP | **ti** | Si.b | **6** | ChAn | **oFF** | USr.r | **nonE** |
| | P.tyP | **StPt** | Pot i | **0** | d.PrS | **1** | | |
| **CoM:** | Ad.S | **1** | MAP | **1** | nU.S | **yES** | | |
| **rtC:** | hoUr | @ | Min | @ | doW | @ | | |
| Factory Page: (Press "Infinity" & "Advance" kry for 6 sec.) | | | | | | | | |
| **LoC:** | LoC.o | **2** | PAS.E | **oFF** | SLoC | **1 $** | | |
| | LoC.P | 3 | rLoC | **1 $** | | | | |
| **CUSt:** | CUSt: 1 | | CUSt: 2 | | CUSt: 3 | | CUSt: 4 thru 20 | |
| | PAr | **AC.Pu** | PAr | **AC.SP** | PAr | **P.ACr** | PAr | **nonE** |

* 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.

[1] Indicates parameters added in version 11.00 control firmware. Not present in ver. 10.00

# CO2 CONFIGURATION RECORD (WATLOW PM6)

**MODELS:** **3920, 3940, & 3949 (KITS 1900226 & 1900227)**

**JOB NUMBER:**

**UNT SERIAL NUMBER:**

**CONTROL TYPE:** **CO2**

**PREPARED BY:** **GLS** **DATE 24-Sep-2011**

Program Page
See Programming Sheets if required.*

Operations Page: (Press "UP" & "DN" keys for 3 sec.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Ai:** | Ain | * | i.Er | * | i.CA | @ | | |
| **Lnr:** | Su.A | * | oFSt | @ | o.u | * | | |
| **Pu:** | Su.A | * | oFSt | @ | o.u | * | | |
| **Mon:** | C.MA | * | h.Pr | * | C.SP | * | Pu.A | * |
| **LOOP:** | C.M | **AUto** | C.SP | * | ti | **80** | o.SP | **0.0** |
| | A.tSP | **90** | id.S | **5.0** | td | **0** | | |
| | Aut | **no** | h.Pb | **1.0** | db | **0.0** | | |
| **ALM:** | ALM 1 | | ALM 2 | | ALM 3 | | ALM 4 | |
| | A.Lo | **-1.0** | A.Lo | **32.0** | A.Lo | **32.0** | A.Lo | **32.0** |
| | A.hi | **21.0** | A.hi | **300.0** | A.hi | **300.0** | A.hi | **300.0** |
| | [1](A.St) | * | [1](A.St) | * | [1](A.St) | * | [1](A.St) | * |

Setup Page: (Press "UP" & "DN" keys for 6 sec.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Ai:** | SEn | **MA** | r.Lo | **0.0** | i.Er | **oFF** | [1](i.Er) | * |
| | Unit | **Pro** | r.hi | **20.0** | dEC | **0.0** | | |
| | S.Lo | **4.00** | P.EE | **oFF** | [1](i.CA) | @ | | |
| | S.hi | **20.00** | FiL | **2.0** | [1](Ain) | * | | |
| **Lnr:** | Fn | **oFF** | (All other perameters at default values) | | | | | |
| **Pu:** | Fn | **oFF** | FiL | **0.0** | | | | |
| **LooP:** | h.Ag | **Pid** | t.tUn | **no** | rP | **oFF** | SP.hi | **100.0** |
| | C.Ag | **oFF** | [1](A.tSP) | **90** | L.SP | **0.0** | [1](o.SP) | **0.0** |
| | [1](h.Pb) | **1.0** | t.Agr | **Cr it** | h.SP | **20.0** | [1](C.M) | **AUto** |
| | [1](ti) | **80** | UFA | **USEr** | [1](C.SP) | * | | |
| | [1](td) | **0** | FAiL | **oFF** | [1](id.S) | **5.0** | | |
| | [1](db) | **0.0** | L.dE | **no** | SP.Lo | **-100.0** | | |
| **otPt:** | otPt 1 | | otPt 2 | | otPt 3 | | S.hi | **20.00** |
| | Fn | **hEAt** | Fn | **ALM** | o.ty | **MA** | r.Lo | **0.0** |
| | o.tb | **10.0** | Fi | **1** | fn | **rMt** | r.hi | **20.0** |
| | o.Lo | **0** | | | r.Sr | **Ai** | o.CA | **0.0** |
| | o.hi | **100** | | | Fi | **1** | | |
| | | | | | S.Lo | **4.00** | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **ALM:** | ALM 1 | | ALM 1 | | ALM 1 | | ALM 2 | |
| | A.ty | **Pr.AL** | [1](A.Lo) | **-1.0** | A.dSP | **on** | A.ty | **oFF** |
| | Sr.A | **Ai** | [1](A.hi) | **21.0** | [1](A.dL) | **0** | ALM 3 | |
| | A.hy | **0.3** | A.LA | **nLAt** | [1](A.St) | * | A.ty | **oFF** |
| | A.Lg | **AL o** | A.bL | **oFF** | | | ALM 4 | |
| | A.Sd | **both** | A.Si | **on** | | | A.ty | **oFF** |
| **FUn:** | LEv | **high** | Fn | **SiL** | Fi | **1** | | |
| **gLbL:** | C_F | **C** | ZonE | **oFF** | d.ti | **0** | | |
| | AC.LF | **60** | ChAn | **oFF** | USr.S | **nonE** | | |
| | C.LEd | **oFF** | d.PrS | **1** | USr.r | **nonE** | | |
| **CoM:** | Ad.S | **1** | MAP | **1** | nU.S | **yES** | | |

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

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **LOC:** | LoC.o | **2** | PAS.E | **oFF** | rLoC | **1 $** | SLoC | **1 $** |
| **CUSt:** | CUSt: 1 | | CUSt: 2 | | CUSt: 3 thru 20 | | | |
| | PAr | **AC.Pu** | PAr | **AC.SP** | PAr | **nonE** | | |

* 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.

[1] Indicates parameters added in version 11.00 control firmware. Not present in ver. 10.00

# Section 5 Specifications

**Temperature**

Control . . . . . .±0.3°C @ +25°C to +37°C
Range . . . . . .0°C (32°F) to +60°C (140°F)
Sensor . . . . . .RTD
Controller . . . . . .Digital electronic proportional
Setpoint . . . . . .Digital
Display . . . . . .Digital LED
Readability . . . . . .0.1°C
Setability . . . . . .0.1°C
Uniformity . . . ±0.3°C at 25°C to 37°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. (823 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.

**Weights**

Net . . . . . .700 lbs.

Shipping

Motor . . . . . .850 lbs.

**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 . . .None (lockable disconnect provided)

**Dimensions**

Exterior . . . . . .38.0"W x 87.5"H x 32.0"F-B
. . . . . .(96.5cm x 222.3cm x 81.3cm)

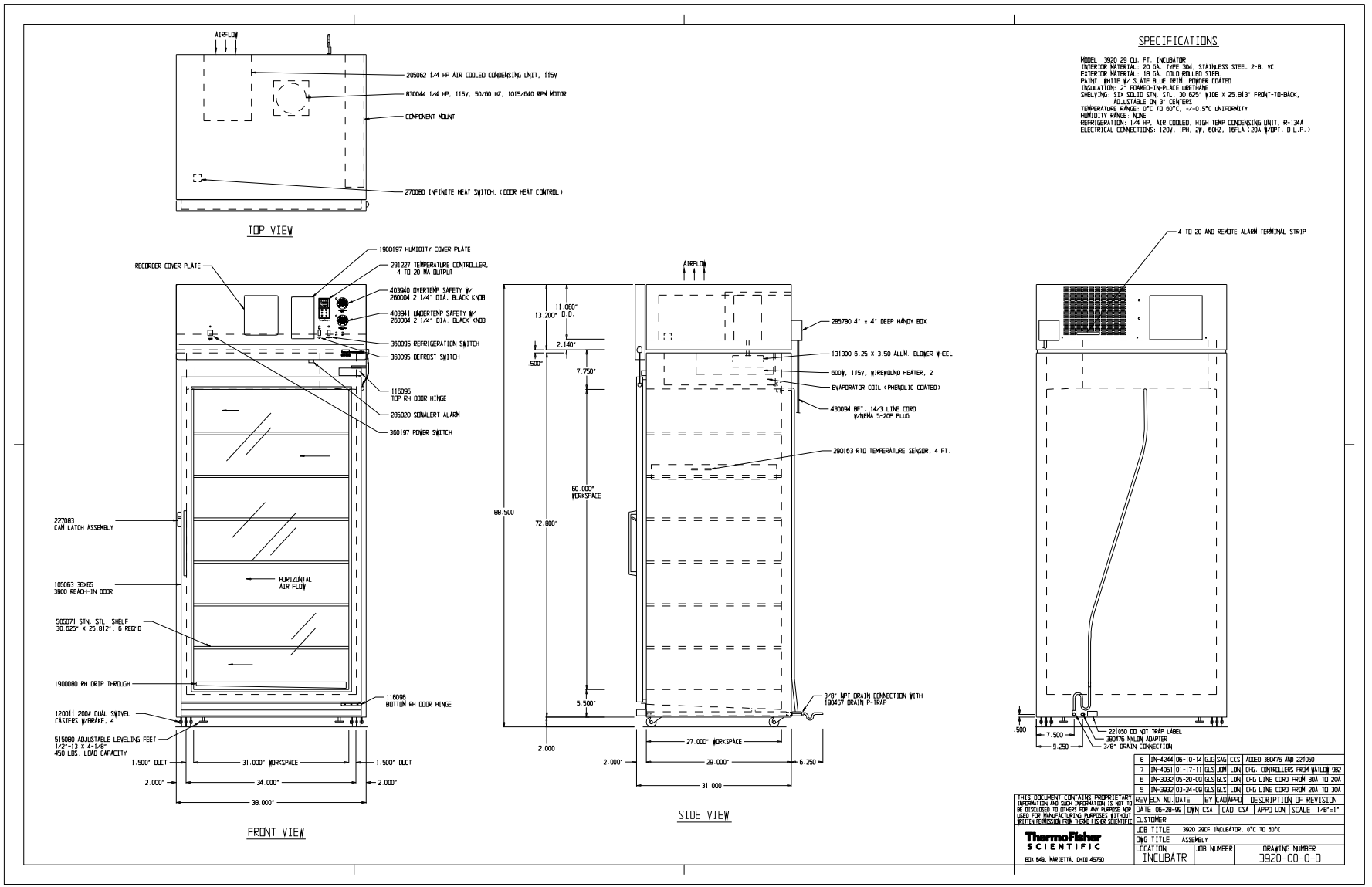
Interior . . . . . .31.0"W x 60.0"H x 27.0"F-B
. . . . . .(78.7cm x 152.4cm x 68.6cm)

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

** Better than ±0.5°C uniformity at all other temperature parameters.*

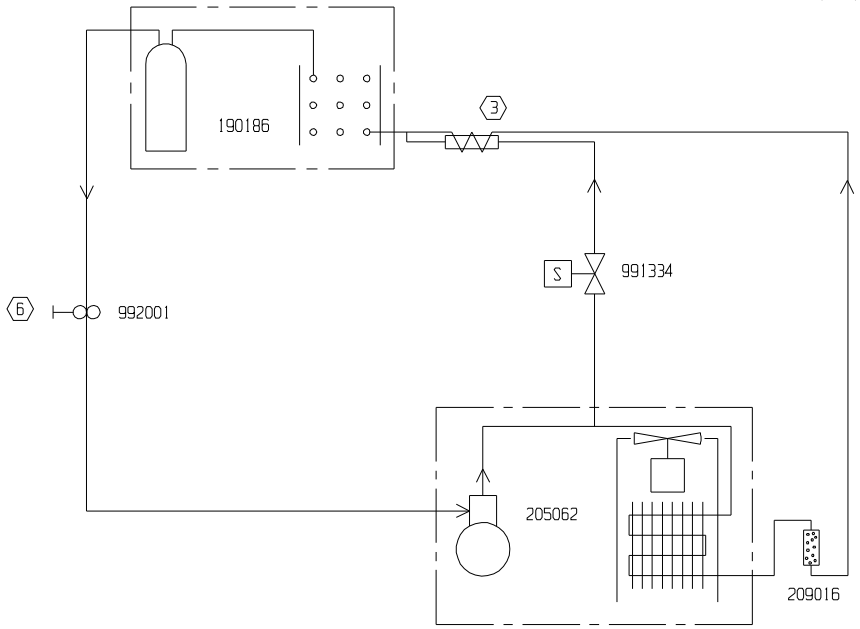
# Section 6 Spare Parts

| Part No. | Description | Qty |
|---|---|---|
| 290163 | RTD Temperature Sensor | 1 |
| 230066* | Fuse, Ceramic 10A 350V | 1 |
| 400051 | Power Supply ($CO_2$ option) | 1 |
| 231227 | Watlow PM8 Controller | 1 |
| 231226 | Watlow PM6 Controller ($CO_2$ option) | 1 |
| 285614 | 20A Fuse | 2 |
| 403940 | Over Temp Thermostat | 1 |
| 403941 | Under Temp Thermostat | 1 |
| 410048 | Defrost Timer | 1 |
| 630090 | Heater (wirewound) | 1 |
| 205062 | Condensing Unit, 1/4 HP 115V R-134A | 1 |
| 285599 | Thermal Fuse | 2 |
| 830044 | Blower Motor, 1/4 HP, 115V | 1 |


SPECIFICATIONS
MODEL: 3920 29 CU. FT. INCUBATOR
INTERIOR MATERIAL: 20 GA. TYPE 304, STAINLESS STEEL 2-B, VC
EXTERIOR MATERIAL: 18 GA. COLD ROLLED STEEL
PAINT: WHITE W/ SLATE BLUE TRIM, POWDER COATED
INSULATION: 2" FOAMED-IN-PLACE URETHANE
SHELVING: SIX SOLID STN. STL. 30.625" WIDE X 25.813" FRONT-TO-BACK, ADJUSTABLE ON 3" CENTERS
TEMPERATURE RANGE: 0°C TO 60°C, +/-0.5°C UNIFORMITY
HUMIDITY RANGE: NONE
REFRIGERATION: 1/4 HP, AIR COOLED, HIGH TEMP CONDENSING UNIT, R-134A
ELECTRICAL CONNECTIONS: 120V, 1PH, 2W, 60HZ, 10FLA (20A W/OPT. D.L.P.)
AIRFLOW
205062 1/4 HP AIR COOLED CONDENSING UNIT, 115V
830044 1/4 HP, 115V, 50/60 HZ, 1015/640 RPM MOTOR
COMPONENT MOUNT
270080 INFINITE HEAT SWITCH, (DOOR HEAT CONTROL)
TOP VIEW
1900197 HUMIDITY COVER PLATE
RECORDER COVER PLATE
231227 TEMPERATURE CONTROLLER, 4 TO 20 MA OUTPUT
403940 OVERTEMP SAFETY W/ 260004 2 1/4" DIA. BLACK KNOB
403941 UNDERTEMP SAFETY W/ 260004 2 1/4" DIA. BLACK KNOB
360095 REFRIGERATION SWITCH
360095 DEFROST SWITCH
116095 TOP RH DOOR HINGE
285020 SONALERT ALARM
360197 POWER SWITCH
227083 CAM LATCH ASSEMBLY
105063 36X85 3900 REACH-IN DOOR
505071 STN. STL. SHELF 30.625" X 25.812", 6 REQ'D
1900080 RH DRIP THROUGH
116096 BOTTOM RH DOOR HINGE
120011 200# DUAL SWIVEL CASTERS W/BRAKE, 4
515080 ADJUSTABLE LEVELING FEET 1/2"-13 X 4-1/8" 450 LBS. LOAD CAPACITY
HORIZONTAL AIR FLOW
1.500" DUCT
31.000" WORKSPACE
1.500" DUCT
2.000"
34.000"
2.000"
38.000"
FRONT VIEW
AIRFLOW
11.060" O.D.
13.200"
2.140"
.500"
7.750"
60.000" WORKSPACE
88.500
72.800"
5.500"
2.000
285780 4" x 4" DEEP HANDY BOX
131300 6.25 X 3.50 ALUM. BLOWER WHEEL
600W, 115V, WIREWOUND HEATER, 2
EVAPORATOR COIL (PHENOLIC COATED)
430094 8FT. 14/3 LINE CORD W/NEMA 5-20P PLUG
290163 RTD TEMPERATURE SENSOR, 4 FT.
3/8" NPT DRAIN CONNECTION WITH 190467 DRAIN P-TRAP
2.000"
27.000" WORKSPACE
29.000"
6.250
31.000
SIDE VIEW
4 TO 20 AND REMOTE ALARM TERMINAL STRIP
.500
7.500
9.250
221050 DO NOT TRAP LABEL
380476 NYLON ADAPTER
3/8" DRAIN CONNECTION
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
REV ECN NO. DATE BY CAD APPD DESCRIPTION OF REVISION
8 IN-4244 06-10-14 G.G SAG CCS ADDED 380476 AND 221050
7 IN-4051 01-17-11 G.S JDM LDN CHG. CONTROLLERS FROM WATLOW 982
6 IN-3932 05-20-09 G.S G.S LDN CHG LINE CORD FROM 30A TO 20A
5 IN-3932 03-24-09 G.S G.S LDN CHG LINE CORD FROM 20A TO 30A
DATE 06-28-99 DWN CSA CAD CSA APPD LDN SCALE 1/8"±1"
CUSTOMER
JOB TITLE 3920 29CF INCUBATOR, 0°C TO 60°C
DWG TITLE ASSEMBLY
LOCATION INCUBATR
JOB NUMBER
DRAWING NUMBER 3920-00-0-0

DRAWING NUMBER: 1900189-90-1

| REV | ECN NO. | DATE | BY | CAD | APPD | DESCRIPTION OF REVISION |
|---|---|---|---|---|---|---|
| 0 | IN3077 | 2-11-03 | CAW | CAW | | RELEASED FOR PRODUCTION |
| | | | | | | |
| | | | | | | |




6. CAP TUBE ITEM ⟨3⟩ , 6' OF .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.



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BOX 649, MARIETTA, OHIO 45750

MODEL/PART NAME: 3900 TOP HOUSING

DWG TITLE: REFRIGERATION SCHEMATIC

| DWN: CAW | CAD: CAW | APPD: | DATE: 2-11-03 | SCALE: NONE |
|---|---|---|---|---|

MATERIAL: N/A

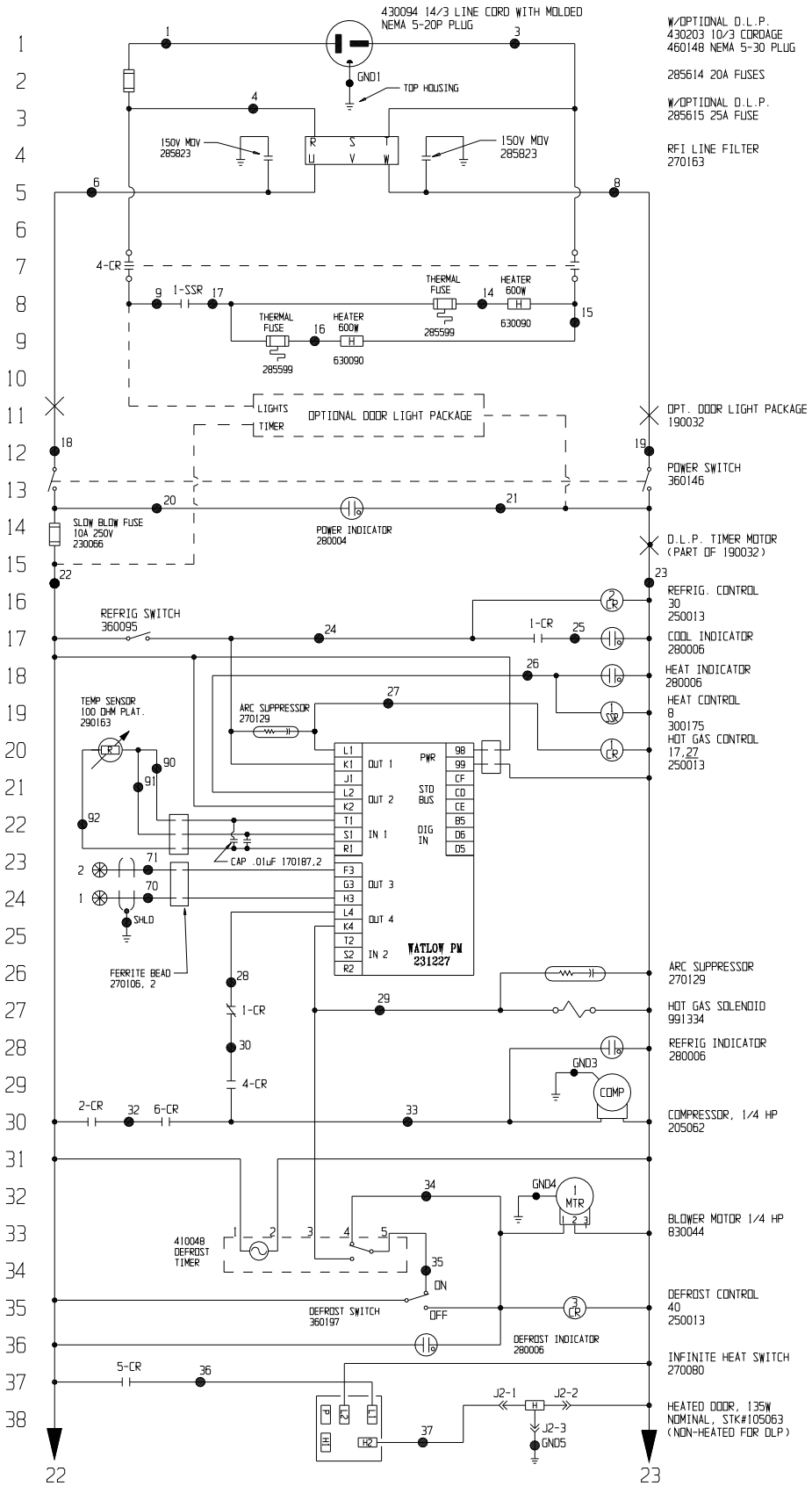
PAINT COLOR: N/A

TOLERANCE UNLESS OTHERWISE SPECIFIED

ANGLES: DECIMAL: .XX=± .XXX=±

DRAWING NUMBER: 1900189-90-1

SIZE: B




Electrical Schematic
Model:
3920
29 cu ft Incubator

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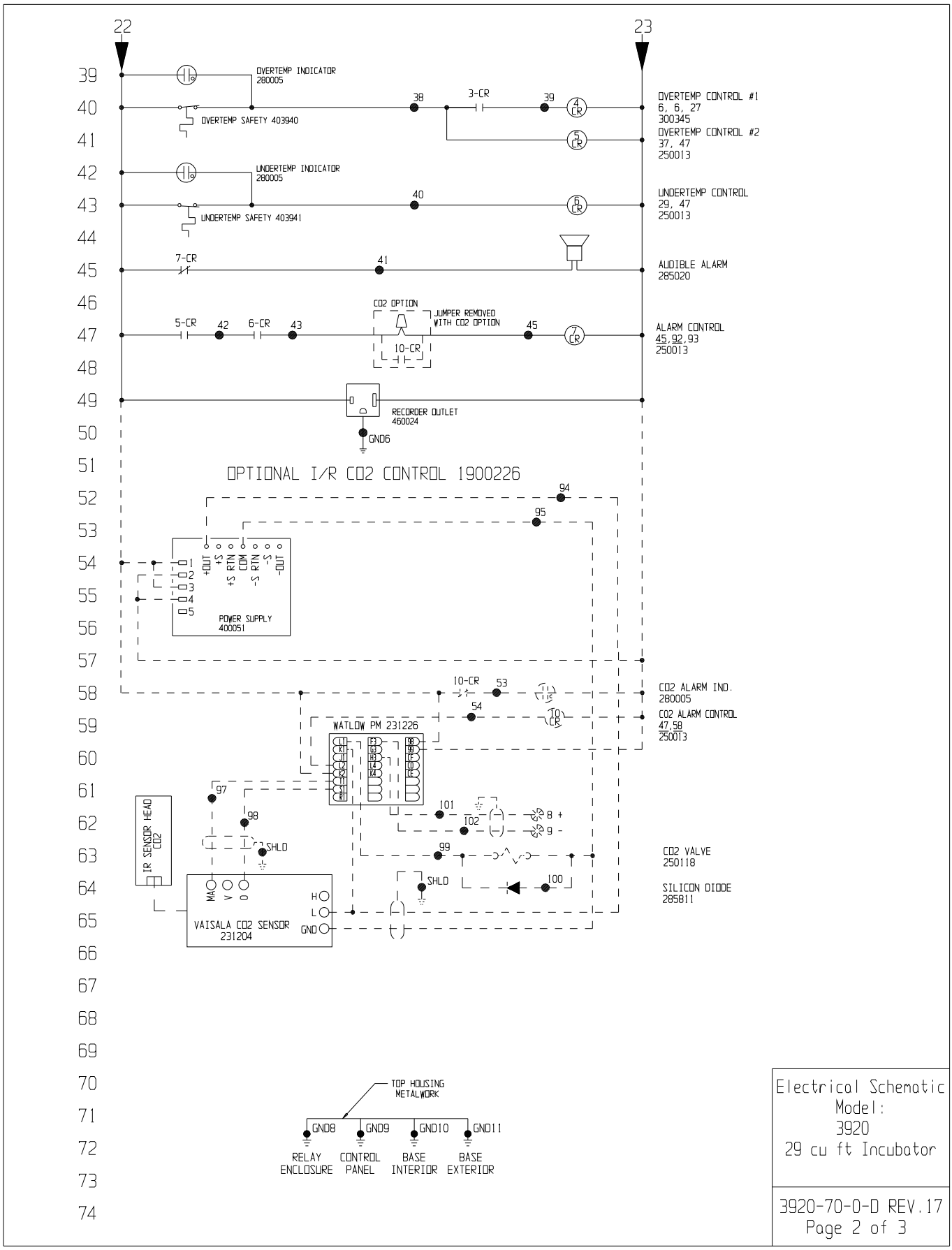
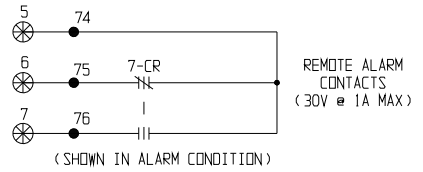
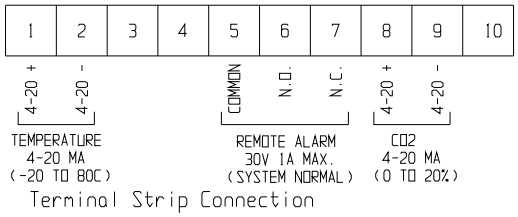



Electrical Schematic
Model:
3920
29 cu ft Incubator

3920-70-0-D REV.17
Page 2 of 3




Terminal Strip Connection

## 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 | --- | --- | --- | --- | --- | --- | GND9 | BRAID | N/A |
| 27 | 20 | YEL | --- | --- | --- | --- | --- | --- | GND10 | 16 | GRN |
| 28 | 20 | PUR | --- | --- | --- | --- | --- | --- | GND11 | 16 | GRN |
| 29 | 20 | ORG | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 30 | 20 | ORG | --- | --- | --- | --- | --- | --- | --- | --- | --- |

| REV | ECN NO. | DATE | BY | CAD | APPD | DESCRIPTION OF REVISION |
|---|---|---|---|---|---|---|
| 17 | IN-4051 | 02/21/11 | GLS | GLS | CCS | REMOVED ARC SUPPRESSOR |
| 16 | IN-4051 | 12/29/10 | GLS | GLS | MSB | REV. CONTROLS FROM 982 & SD, ADD OLP OPT. |
| 15 | IN-3932 | 05/20/09 | GLS | GLS | LDN | CHG LINE CORD FROM 30A TO 20A & ADD NOTES |
| 14 | IN-3932 | 03/24/09 | GLS | GLS | LDN | CHG LINE CORD FROM 20A TO 30A |
| 13 | IN-3830 | 12/29/07 | GLS | GLS | LDN | REWIRE ALARM RELAYS |



MODEL/PART NAME: 3920 REACH-IN INCUBATOR

DWG TITLE: ELECTRICAL SCHEMATIC

DWN: JAS | CAD: PDK | APPD: LDN | DATE: 06-28-99 | SCALE: NONE

MATERIAL:

PAINT COLOR:

TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=± .XXX=±

DRAWING NUMBER: 3920-70-0

SIZE: D

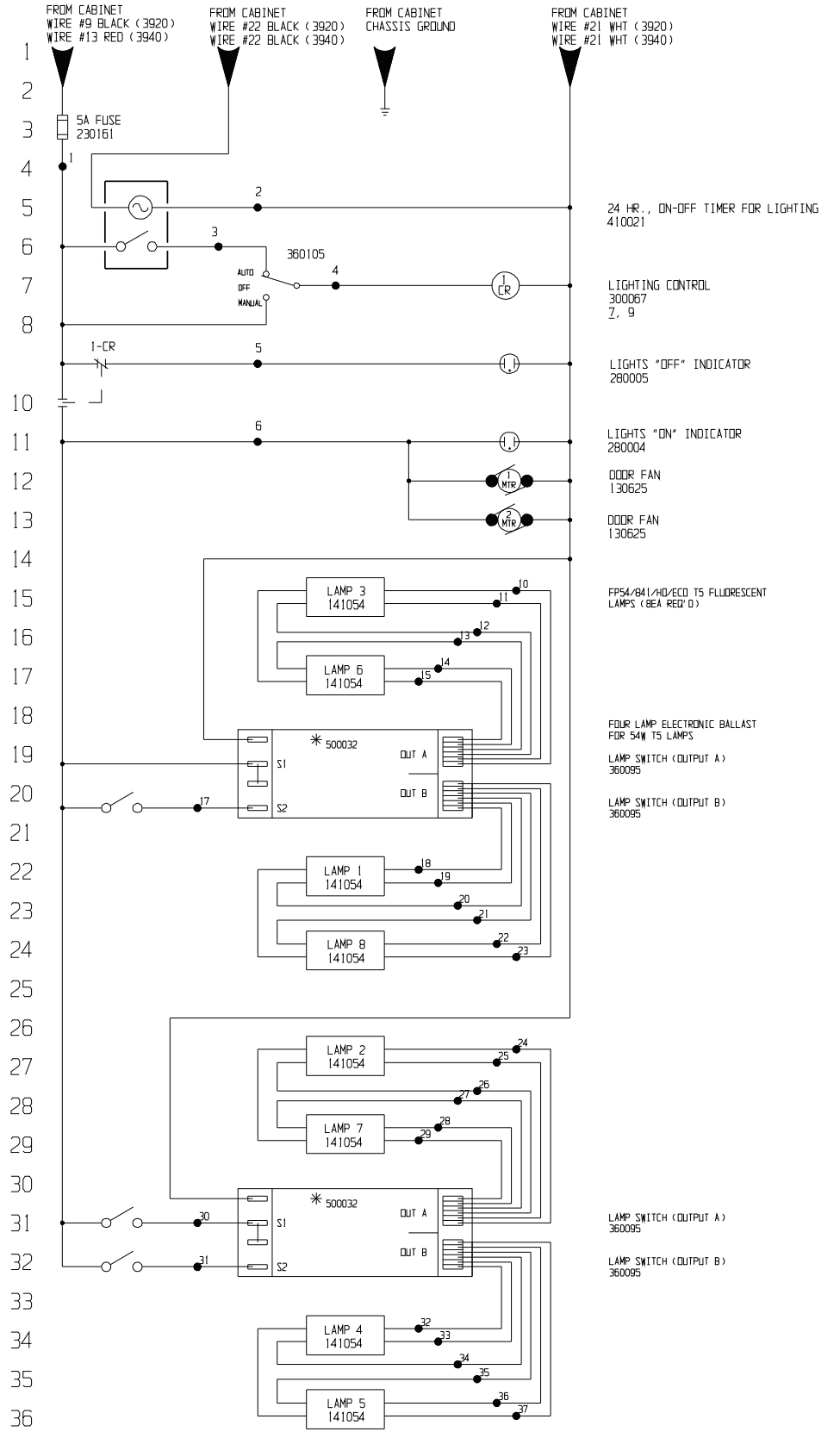
ATTENTION
OBSERVE PRECAUTIONS
ELECTROSTATIC
SENSITIVE DEVICES

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750

Electrical Schematic
Model:
3920
29 cu ft Incubator

3920-70-0-D REV.17
Page 3 of 3

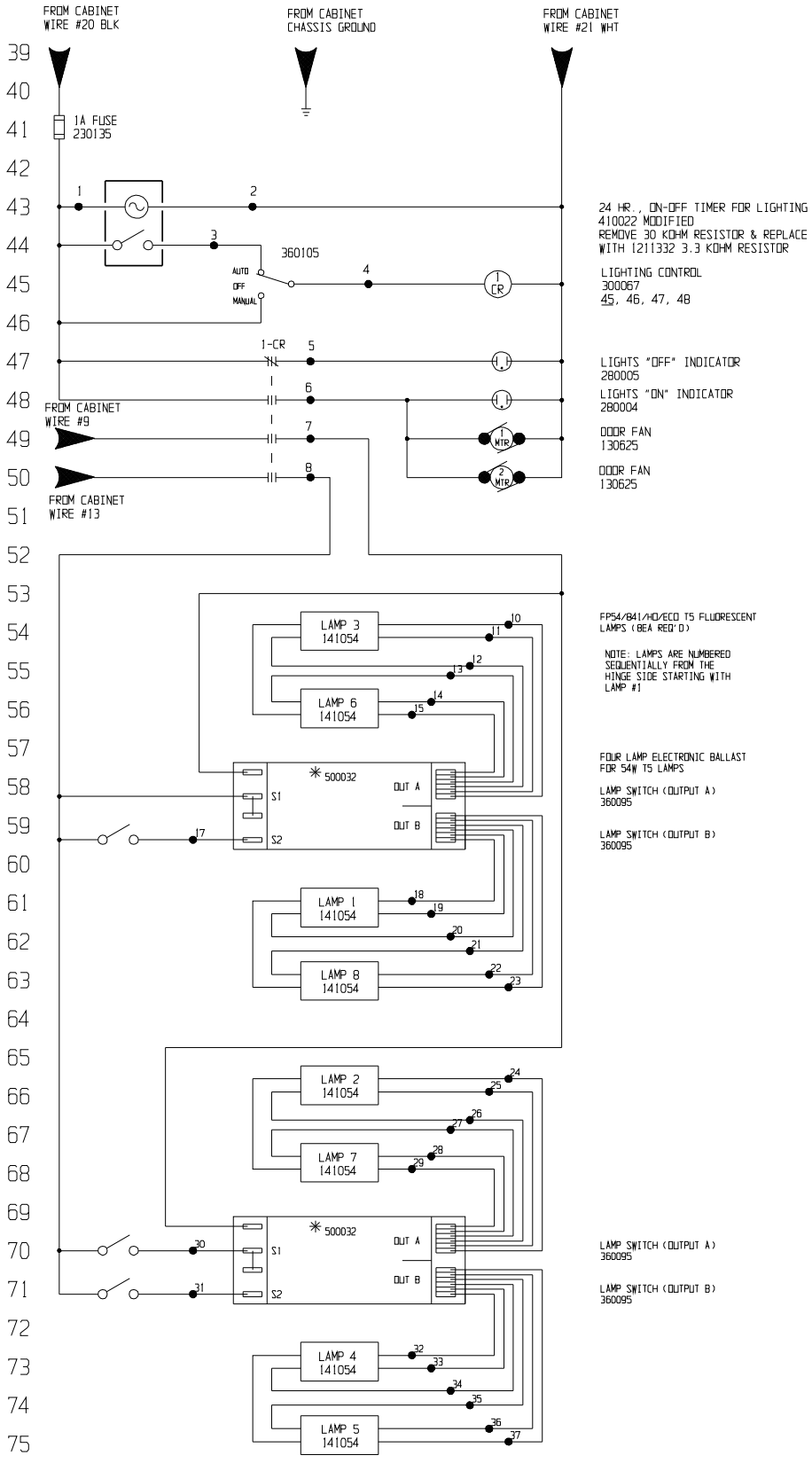
3920, 3940, 60Hz.




Electrical Schematic
3900 Series
Door Light Package

190032-70-0-D REV.17
Page 1 of 3

3949, 50Hz.




Electrical Schematic
3900 Series
Door Light Package

190032-70-0-D REV.17
Page 2 of 3

| 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 | 18 | RED |
| 11 | 18 | RED |
| 12 | 18 | ORG |
| 13 | 18 | ORG |
| 14 | 18 | BLU |
| 15 | 18 | BLU |
| 16 | --- | --- |
| ✳17 | 18 | BLK |
| 18 | 18 | BRN |
| 19 | 18 | BRN |
| 20 | 18 | BLU |
| 21 | 18 | BLU |
| 22 | 18 | YEL |
| 23 | 18 | YEL |
| 24 | 18 | RED |
| 25 | 18 | RED |
| 26 | 18 | ORG |
| 27 | 18 | ORG |
| 28 | 18 | BLU |
| 29 | 18 | BLU |
| 30 | 18 | BLK |
| ✳31 | 18 | BLK |
| 32 | 18 | BRN |
| 33 | 18 | BRN |
| 34 | 18 | BLU |
| 35 | 18 | BLU |
| 36 | 18 | YEL |
| 37 | 18 | YEL |

✳ WIRES FROM UNIVERSAL BALLAST B454PUNV-E01OC THAT CONNECT TO WIRES 17 AND 31 ARE GREY.

NOTES:

| | | | |
|---|---|---|---|
| ⊛ | Denotes Terminal Strip Connection | Parts List Reference Number | |
| 1-CR | Last Relay Number | ○ | Assembly |
| N/A | Last Terminal Number | ⬠ | Panel |
| 39 | Last Wire Number | ⬡ | Refrigeration |
| | | □ | Wiring |

CUSTOMER APPROVAL/REFERENCE

APPROVED BY _____

APPROVING FIRM _____

DATE OF APPROVAL _____



| REV | ECN NO. | DATE | BY | CAD | APPD | DESCRIPTION OF REVISION |
|---|---|---|---|---|---|---|
| 17 | IN-3939 | 12/14/10 | JDM | JDM | CCS | REVISED CABINET WIRE # |
| 16 | IN-3939 | 12/08/10 | JDM | JDM | MSB | CHG'D FROM CUST & REL FOR PROD |
| 15 | | 02/26/10 | GLS | GLS | MSB | REV WIRE CONNECTION TIMER MOTOR |
| 14 | | 12/03/08 | GLS | GLS | AAL | REV RELAY CONTACT NO. |
| 13 | | 03/03/06 | GLS | GLS | AAL | ADD BALLAST WIRING INFO. |

DATE 10/26/88 | DWN RLH | CAD RLH | APPD AAL | SCALE NONE

CUSTOMER

JOB TITLE 3900 SERIES DOOR LIGHT PACKAGE

DWG TITLE ELECTRICAL SCHEMATIC 50/60Hz

| LOCATION | JOB NUMBER | DRAWING NUMBER |
|---|---|---|
| STOCKN01 | | 190032-70-0-D |

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BOX 649, MARIETTA, OHIO 45750

Electrical Schematic
3900 Series
Door Light Package

190032-70-0-D REV.17

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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.

Rev. 5 8/13

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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.

**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

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Marietta, Ohio 45750
United States

www.thermofisher.com