



# Mechanical Convection Ovens

**Models:** MO1420A/SA  
MO1430A  
MO1440A/SA  
MO1440C/SC  
MO1450A/SA  
MO1450C

## Installation and Operation Manual

### Table of Contents

|                                    |    |
|------------------------------------|----|
| Introduction .....                 | 1  |
| Safety Considerations .....        | 2  |
| Pre-Installation .....             | 2  |
| Installation .....                 | 3  |
| Start Up .....                     | 4  |
| Operation — UT150 Controller ..... | 5  |
| Communication Option .....         | 8  |
| Maintenance .....                  | 10 |
| Troubleshooting .....              | 11 |
| Wiring Diagrams .....              | 12 |
| Warranty .....                     | 19 |

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**Table of Contents**

**1 Introduction . . . . . 1**

    1.1 Front Panel Components . . . . . 1

    1.2 Components Located Off the Panel . . . . . 1

    1.3 Specifications . . . . . 1

**2 Safety Considerations . . . . . 2**

**3 Pre-Installation . . . . . 2**

    3.1 Unpacking . . . . . 2

    3.2 Atmosphere Systems . . . . . 2

**4 Installation . . . . . 3**

    4.1 Location . . . . . 3

    4.2 Wiring . . . . . 3

    4.3 Exhaust Modifications . . . . . 3

**5 Start Up . . . . . 4**

    5.1 Oven Operation . . . . . 4

    5.2 Intake and Exhaust Vents . . . . . 4

**6 Operation – UT150 Controller . . . . . 5**

    6.1 Normal Controller Operation . . . . . 5

    6.2 Setting the Temperature . . . . . 6

    6.3 Setting the Overtemperature Protection (OTP) Temperature . . . . . 6

    6.4 Changing Between Celsius and Fahrenheit . . . . . 6

    6.5 Setting the Ramp to Setpoint Rate . . . . . 6

    6.6 Auto Tuning the Controller . . . . . 7

**7 Communication Option . . . . . 8**

    7.1 Cable Installation . . . . . 8

    7.2 UT150 Communications Setup Parameters . . . . . 8

    7.3 Software Installation . . . . . 8

    7.4 Communications Test . . . . . 9

    7.5 Ordering SpecView . . . . . 9

    7.6 Troubleshooting . . . . . 9

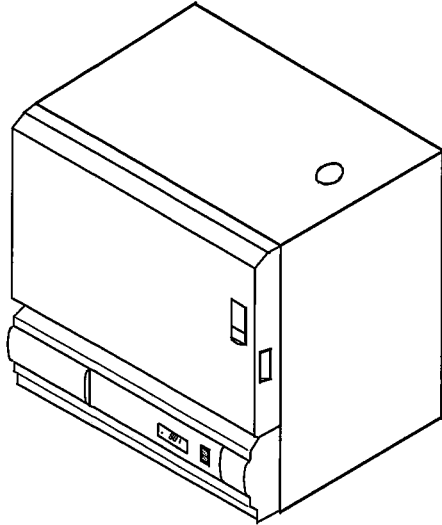
    7.7 Decimal Point Adjustment . . . . . 9

    7.8 Addresses for Multiple Controllers . . . . . 9

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|           |   |           |
|-----------|---|-----------|
| <b>8</b>  | <b>Maintenance</b> .....  | <b>10</b> |
| 8.1       | Cleaning .....  | 10        |
| 8.2       | Heating Elements .....  | 10        |
| 8.3       | Blower Motor .....  | 10        |
| 8.4       | Overtemperature Alarm Protection (OTP) .....                                | 10        |
| 8.5       | Oven Overtemperature Control (OTC) .....                                    | 10        |
| 8.6       | Door System Check .....   | 10        |
| <b>9</b>  | <b>Troubleshooting</b> .....  | <b>11</b> |
| <b>10</b> | <b>Wiring Diagrams</b> .....  | <b>12</b> |
| <b>11</b> | <b>Warranty</b> .....   | <b>19</b> |
| 11.1      | Domestic Warranty (United States and Canada) .....                          | 19        |
| 11.2      | International Warranty (excluding Canada)<br>12 Months Parts Warranty ..... | 19        |

## 1 Introduction



The Lindberg/Blue M MO Series Mechanical Convection Ovens include a microprocessor-based temperature controller which automatically optimizes control parameters during oven operation. An internal blower circulates heated air for maximum temperature uniformity throughout the chamber.

### 1.1 Front Panel Components

The front panel contains the following features:

- Power On switch.
- Temperature Controller senses the process temperature of the oven and controls the heaters, supplying the heat necessary to achieve the desired setpoint.
- 7-day digital timer (optional).

### 1.2 Components Located Off the Panel

The following components are located off the front panel:

- The Temperature Limit Switch disconnects power to the heater in the event of an overtemperature condition. The switch requires manual reset after the overtemperature condition is corrected.
- The Overtemperature reset mechanism is a green lever accessible through a hole above the mounting screws on the lower left side of the unit.
- Intake and Exhaust Vents. The intake vent is located at the center of the left side and the exhaust vent is located at the right side of the top face.
- The Overtemperature Protection Relay disconnects the heater in the event of an overtemperature condition.

### 1.3 Specifications

Table 1. Lindberg/Blue M MO 1420–1450 Series Mechanical Convection Ovens

| Model    | Dimensions W x D x H in. (cm)  |                                     |                                 | Voltage                          | Exterior Finish | Weight lbs. (kg)                 | Heater Power kW | Line Current Amps | Max. Temp. °F (°C) |
|----------|--------------------------------|-------------------------------------|---------------------------------|----------------------------------|-----------------|----------------------------------|-----------------|-------------------|--------------------|
|          | Chamber                        | Exterior                            | Shipping (Approximate)          |                                  |                 |                                  |                 |                   |                    |
| MO1420A  | 13 x 16 x 10<br>(33 x 41 x 25) | 25 x 22.5 x 32<br>(64 x 57 x 81)    | 30 x 28 x 38<br>(76 x 71 x 97)  | 120 V, 50/60 Hz.<br>Single Phase | Painted Steel   | 130<br>(59)                      | 1.0             | 11.1              | 572<br>(300)       |
| MO1430A  | 13 x 16 x 15<br>(33 x 41 x 38) | 25 x 22.5 x 37<br>(64 x 57 x 94)    | 30 x 28 x 43<br>(76 x 71 x 109) |                                  |                 | 180<br>(82)                      | 1.3             | 13.6              |                    |
| MO1440A  | 22 x 16 x 15<br>(56 x 41 x 38) | 34 x 22.5 x 37<br>(86 x 57 x 94)    | 39 x 28 x 43<br>(99 x 71 x 109) |                                  |                 | 240 V, 50/60 Hz.<br>Single Phase | 200<br>(91)     | 1.9               |                    |
| MO1440C  |                                |                                     |                                 | 9.3                              |                 |                                  |                 |                   |                    |
| MO1450A  | 22 x 16 x 24<br>(56 x 41 x 61) | 34 x 22.5 x 46.5<br>(86 x 57 x 118) | 39 x 28 x 53<br>(99 x 71 x 135) | 120 V, 50/60 Hz.<br>Single Phase |                 | 220<br>(100)                     | 2.1             | 20.3              |                    |
| MO1450C  |                                |                                     |                                 | 240 V, 50/60 Hz.<br>Single Phase |                 |                                  |                 | 10.2              |                    |
| MO1420SA | 13 x 16 x 10<br>(33 x 41 x 25) | 25 x 22.5 x 32<br>(64 x 57 x 81)    | 30 x 28 x 38<br>(76 x 71 x 97)  | 120 V, 50/60 Hz.<br>Single Phase | Stainless Steel | 130<br>(59)                      | 1.0             | 11.1              |                    |
| MO1440SA | 22 x 16 x 15<br>(56 x 41 x 38) | 34 x 22.5 x 37<br>(86 x 57 x 94)    | 39 x 28 x 43<br>(99 x 71 x 109) |                                  |                 | 240 V, 50/60 Hz.<br>Single Phase | 200<br>(91)     | 1.9               |                    |
| MO1440SC |                                |                                     |                                 | 9.3                              |                 |                                  |                 |                   |                    |
| MO1450SA | 22 x 16 x 24<br>(56 x 41 x 61) | 34 x 22.5 x 46.5<br>(86 x 57 x 118) | 39 x 28 x 53<br>(99 x 71 x 135) | 120 V, 50/60 Hz.<br>Single Phase |                 | 220<br>(100)                     | 2.1             | 20.3              |                    |

## 2 Safety Considerations



**WARNING!** Do not modify or change system components. Replacement parts must be O.E.M. (Original Equipment Manufacturer) exact replacement equipment. Modification or use of the equipment in a manner other than expressly intended may cause death or serious injury. This includes use of user-supplied components and materials not specifically designed for the oven. Reconfiguring the controller may cause death or serious injury.

Before using, user shall determine the suitability and integrity of the product for the intended use and that the unit has not been altered in any way. User assumes all risk and liability whatsoever therewith.



**CAUTION!** Do not locate the oven near combustible materials, or corrosive or hazardous fumes or vapors. Incorrect oven location may cause personal injury, damage to the oven, or property damage.



**CAUTION!** Make sure the oven door is closed when the oven is operating. Operating the oven with the door open for extended periods of time may cause personal injury, damage to the oven, or property damage.



**WARNING!** This oven is not intended for hazardous materials workload processing. Contact your safety engineering staff before processing questionable loads in this oven. Contact Lindberg/Blue M for information on other products designed to process hazardous materials. Processing combustible or volatile fluids or materials in this oven may emit explosive vapors, which may cause death or serious injury.



**WARNING!** For proper operation of the unit and for safety, make sure that the unit is level when installed. Door may swing shut on personnel if the unit is tilted and the entire unit may tip when the door is open.



**CAUTION!** Keep combustible materials away from the heating element located at the bottom of the oven. Combustible materials spilled or dropped on the heating element may cause personal injury, damage to the oven, or property damage.

## 3 Pre-Installation

All standard Lindberg/Blue M Mechanical Convection Ovens are shipped electrically complete. Positioning and connecting correct electrical service are the only requirements for placing the oven into operation.

### 3.1 Unpacking

*Carefully unpack and inspect the unit and all accessories for damage. If you find any damage, keep the packing materials and immediately report the damage to the carrier. We will assist you with your claim, if requested. Do not return goods to Lindberg/Blue M without written authorization. When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment.*

### 3.2 Atmosphere Systems

This oven is not designed to operate in corrosive environments.



**WARNING!** Do not locate units in areas near combustible materials or hazardous fumes or vapors.



**CAUTION!** Corrosive environments can lead to shortened life or deterioration of unit and performance. This unit is not designed to maintain a positive pressure. Not suitable for use with toxic, flammable, or volatile materials.

## 4 Installation

Do not exceed the electrical and temperature ratings printed on the dataplate of the oven.



**WARNING!** Improper operation of the oven could result in dangerous conditions. To preclude hazard and minimize risk, follow all instructions and operate within design limits noted on the dataplate.

### 4.1 Location

Keep line voltage variations to a minimum for best control accuracy. Do not locate unit in areas of wide ambient temperature variation, such as near vents or outdoor entrances. Place unit at least one foot from walls, although more space may be required for ease of maintenance.



**WARNING!** For proper operation of the unit and for safety, make sure that the unit is level when installed. Door may swing shut on personnel if the unit is tilted and the entire unit may tip when the door is open.

### 4.2 Wiring

For detailed wiring information, refer to the wiring diagrams at the end of this manual.



**CAUTION!** Connect the oven to the proper power source. Failure to use the specified voltage can result in damage to the oven.

All models are supplied with a line cord. If you prefer to connect directly to a circuit breaker, remove the line cord and replace it with appropriately rated hard wiring.

Information for sizing fuse, circuit breaker, or power lines appears on the oven dataplate and in the general specifications table (refer to Table 1 on page 1). Fuse protection must never exceed 125% of oven's current rating.



**DANGER!** For personal safety and trouble-free operation, this unit must be properly grounded before it is used. Always conform to the National Electrical Code and local codes. Utilize proper grounding techniques to reduce RFI and EMI for electronic gear. Do not connect unit to already overloaded power lines; lower voltage to unit will decrease power to the heating elements.

### 4.3 Exhaust Modifications

Never use an exhaust stack directly between the oven and the exhaust. A draft diverter, vacuum breaker, exhaust hood, or similar device (refer to Figure 1) must be connected between the oven and the exhaust. This connection prevents "chimney effect" which sucks heat out of the chamber and results in slow run-up time or poor temperature uniformity.

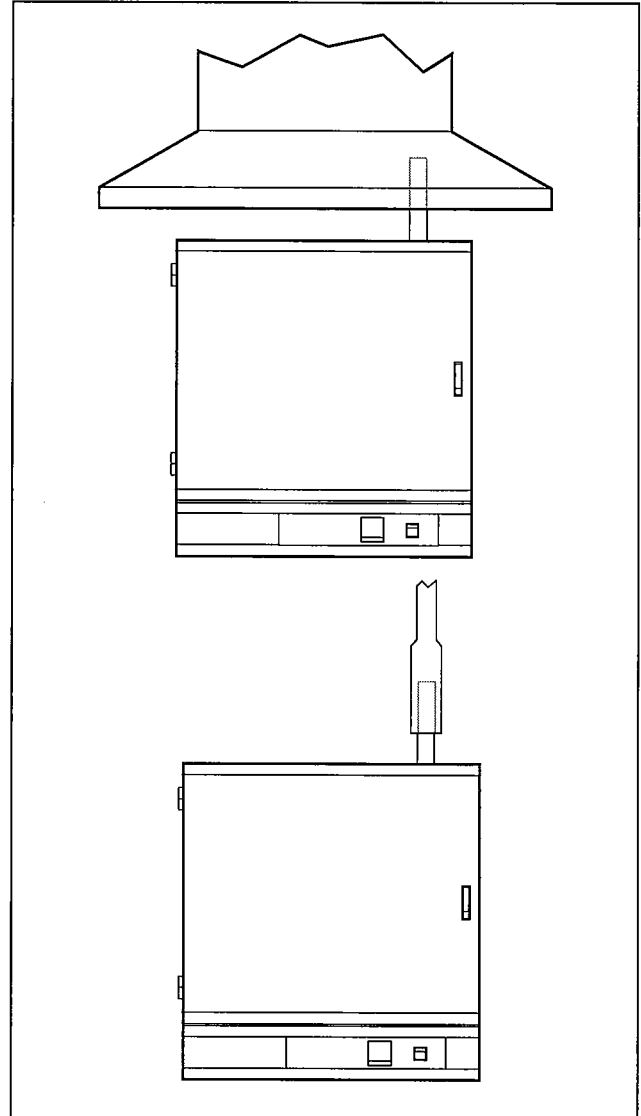


Figure 1. Exhaust Modifications

## 5 Start Up



**WARNING!** Before operating this equipment, read the applicable MSDS (Material Safety Data Sheets) at the back of this manual.



**WARNING!** When installing, maintaining, or removing the fiberglass insulation, the following precautions will minimize airborne dust and fiber:

- Keep personnel not involved in the installation out of the area.
- Use a good vacuum to clean area and equipment. Use a dust suppressant if sweeping is necessary. Do **not** use compressed air.
- Use disposable mask suitable for nuisance dust.
- Wear long sleeve clothing, gloves, hat, and eye protection to minimize skin and eye contact. Do not wear contact lenses.
- Thoroughly wash self after work is complete.
- Launder work clothing separate from other clothes and thoroughly clean laundering equipment after use. If clothing contains a large amount of dust and/or fiber, dispose of rather than clean.
- Promptly place used fiberglass parts and dust in plastic bags and dispose of properly.

### 5.1 Oven Operation

1. Turn on the main power switch. Allow the controller to run through its initial diagnostics.
2. Verify operation of the blower motor.
3. Place workload into oven.
  - To open the oven door, press the lower portion of the black door latch located on the front of the oven (refer to Figure 2).
  - To close the door, push it shut tightly while pressing the upper portion of the black door latch (refer to Figure 2).
4. Select the alarm setpoint (follow instructions in Section 6.3).
5. Press  $\triangle$  or  $\nabla$  until the desired setpoint shows on the bottom line of the display (refer to Figure 3 on page 5). Be sure to press **SET/ENT** to register the changed setpoint.

### 5.2 Intake and Exhaust Vents

The intake vent is located at the center of the left side and the exhaust vent is located at the right side of the top face. For most applications, vents should be closed during operation of the oven; closed vents result in more efficient operation and greater temperature stability. However, there are some applications which benefit from partially or fully open vents.

Vents should be partially or fully open for the following application:

- To provide operation near ambient temperatures. The oven may not reliably control temperatures near ambient. Opening the vents allows sufficient heat loss to permit such operation.
- To provide slow cool down of work load. Some work loads may be damaged by heat shock when the oven door is opened. Vents can be opened to allow work load to cool gradually.
- To provide removal of vapors which result from the heating process. Most drying operations that release vapors are best

performed with vents partially opened to prevent the accumulation of solid by-products.

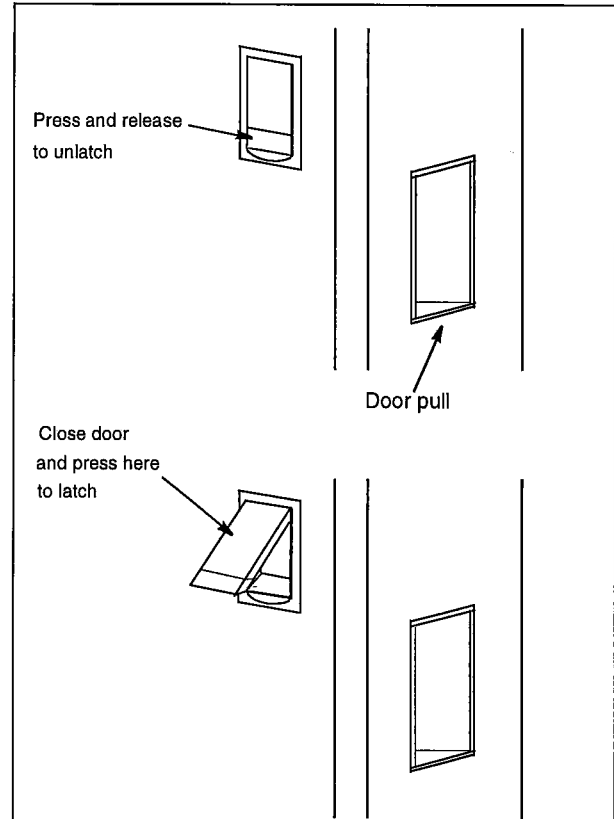
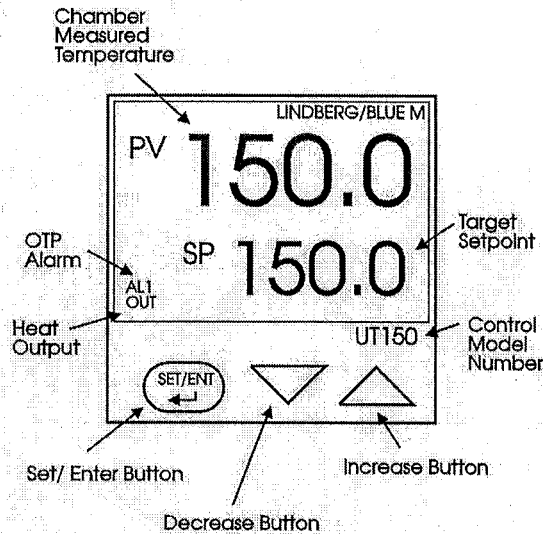


Figure 2. Oven Door Operation

## 6 Operation – UT150 Controller



**Figure 3. UT150 Control Panel**

The oven temperature controller is configured and tuned at the factory to function well for most applications. Occasionally, it may be advisable to configure the temperature controller differently to suit a particular working environment or process.



**CAUTION!** Before reconfiguring the controller, read this chapter and the UT150 operation manual. Reconfiguring the controller can change the unit characteristics and design parameters, which can hamper performance and make the equipment dangerous to use.

This chapter provides brief instructions on how to perform the following configuration changes:

- Setting the temperature
- Setting the Overtemperature Protection Temperature
- Changing between celsius and fahrenheit
- Setting the ramp to setpoint time
- Autotuning the controller

Detailed instructions on configuring the temperature controller are found in the UT150 operation manual.

For instructions on the Controller-PC Communication Option, refer to Section 7 on page 8.

### 6.1 Normal Controller Operation

The Temperature Controller senses the chamber air temperature of the oven (the PV, or process value) and supplies the heat necessary to achieve the desired setpoint. The controller includes an LED display and a pushbutton keypad. Refer to Table 2 and Table 3 for lists of displayed parameters and keypad functions.

**Table 2. UT150 Parameter Functions**

| Parameter Code  | Factory Set Value | Description                              |
|---|-------------------|--|
| <i>Operating parameters (access by holding the SET/ENT key)</i> |                   |  |
| A1  | 315.0             | Alarm setpoint (°C; 600°F)               |
| CTL   | Pid               | Control mode                             |
| At  | oFF               | Auto tuning                              |
| P   | 6.0               | Proportional band (°C; °F=10.8)          |
| I   | 80                | Integral time                            |
| d   | 1                 | Derivative time                          |
| Ct  | 1                 | Heat cycle time                          |
| FL  | 2                 | Sensor filter                            |
| bS  | 0.0               | PV bias (offset)                         |
| LoC   | 0                 | Key lock                                 |
| <i>Setup parameters (access by setting LoC=-1)</i>              |                   |  |
| In  | 5                 | Input type (J thermocouple in °C; °F=35) |
| SPH   | 300               | High setpoint limit °C; °F=572           |
| SPL   | 0.0               | Low setpoint limit °C; °F=32             |
| Upr   | oFF               | Up ramp rate (degrees C or F / minute)   |
| dnr   | oFF               | Down ramp rate (degrees C or F / minute) |
| AL 1  | 9                 | Alarm 1 type                             |
| AL 2  | oFF               | Alarm 2 type                             |
| HY 1  | 0.5               | Alarm 1 hysteresis (°F=1)                |
| HY 2  | 0.0               | Alarm 2 hysteresis                       |
| SC  | on                | Super Control                            |
| dr  | 0                 | Direct/reverse action                    |

**Table 3. Pushbutton Keypad**

| Button | Function   |
|--------|--|
|        | Pressing and holding the SET/ENT for three seconds advances the display to the Operation Parameters Menu.<br>While in the Operation Parameters Menu, use SET/ENT to move from one parameter to the next, and to register changes you have made in setpoint and parameter values.<br>Holding SET/ENT for three seconds exits either the Operation or Setup Parameters menu. |
|        | Use the Up Arrow button to increase the temperature setpoint display and to change parameter values in the Operation and Setup Parameter menus. Whenever you change the value of a setpoint or parameter, the decimal point flashes to remind you to register the changed value with SET/ENT.  |
|        | Use the Down Arrow button to decrease the temperature setpoint display and to change parameter values in the Operation and Setup Parameter menus. Whenever you change the value of a setpoint or parameter, the decimal point flashes to remind you to register the changed value with SET/ENT.  |



## 6.2 Setting the Temperature

To set the temperature to the desired setpoint, complete the following steps:

1. Press  $\triangle$  or  $\nabla$  until the desired setpoint is indicated on the bottom line of the display.
2. Press **SET/ENT** to register the new setpoint.

## 6.3 Setting the Overtemperature Protection (OTP) Temperature

The high limit alarm system with the temperature controller disables the heater output. To set the alarm on the temperature controller (typically 5°C above the desired main temperature setpoint), complete the following steps:

1. Press and hold **SET/ENT** for 3 seconds, until **A1** is displayed on the upper line.
2. Press  $\triangle$  or  $\nabla$  until the desired overtemperature limit setpoint shows on the bottom line of the display.
3. Press **SET/ENT** to register the new overtemperature alarm setpoint.
4. Press and hold **SET/ENT** for 3 seconds to return to the normal display.

## 6.4 Changing Between Celsius and Fahrenheit

The controller is factory-set to operate with degrees Celsius. To change the display modes and parameter settings to the Fahrenheit scale, you will need to change the Input Type parameter **In** and also the values of various scale-dependent parameters. If during this procedure the buttons are inactive for more than two minutes, the controller will return to the standard display.

To change from Celsius to Fahrenheit:

1. With the controller operating, access the Operating Parameters menu by pressing and holding **SET/ENT** for 3 seconds.
2. Press and release **SET/ENT** repeatedly until the upper display reads **LoC**.
3. Press  $\nabla$  until the displayed value of **LoC** is **-1**; then press **SET/ENT** to access the Setup Parameters menu (refer to Table 2 on page 5).
4. The first setup parameter displayed is **Input Type (In)**. Press to change its value from **5** to **35**. After making this adjustment (and all following parameter adjustments) be sure to press and release **SET/ENT** again to register the change.
5. Press and release **SET/ENT** to advance to the **SPH** parameter and change its value to **572**.
6. Press and release **SET/ENT** to advance to the **SPL** parameter and change its value to **32**.
7. Press and release **SET/ENT** to advance to the **HY1** parameter and change its value to **1**.
8. Press and hold **SET/ENT** for 3 seconds to exit the Setup Parameters Menu.
9. Press and hold **SET/ENT** for 3 seconds to enter the Operating Parameters Menu and display the **A1** parameter.

10. Use the  $\triangle$  button to set the **A1** parameter to the desired overtemperature limit in °F.
11. Press and release **SET/ENT** to advance to the **P** parameter and change its value to **10.8**.
12. Press and hold **SET/ENT** for 3 seconds to exit the Operating Parameters Menu.
13. The new temperature units are now effective. Follow the instructions in Section 6.2 to reset the temperature setpoint in °F.
14. Apply the °F label over the °C label on the control panel.

## 6.5 Setting the Ramp to Setpoint Rate

The Ramp Rate feature allows the chamber to be heated or cooled at any rate slower than the maximum capability of the unit. To fine tune ramp rates, you may need to test using loads with similar mass and thermal properties to loads you intend to use in oven applications.

To set the ramp to setpoint time, complete the following steps. If during this procedure the buttons are inactive for more than two minutes, the controller will return to the standard display.

1. With the controller operating, press and hold **SET/ENT** for 3 seconds to enter the Operating Parameters menu.
2. Press and release **SET/ENT** until the **LoC** parameter is on the upper display.
3. Press the down arrow button to show **'-1'**, and press **SET/ENT** once to enter the Setup Parameters menu.
4. Press and release **SET/ENT** until the **Upr** parameter is on the upper display.
5. Press the arrow buttons to select the new **Up Ramp Rate** value, in °C per minute or °F per minute, or 'oFF'. Press and release **SET/ENT** to register the value change.
6. Press and release **SET/ENT** until the **dnr** parameter is on the upper display.
7. Press the arrow buttons to select the new **Down Ramp Rate** value, in °C per minute or °F per minute, or 'oFF'. Press and release **SET/ENT** to register the value change.
8. Press and hold **SET/ENT** for three seconds to exit the Setup Parameters menu.
9. The new Ramp Rates are now effective.
10. Follow the instructions in Section 6.2 to reset the temperature setpoint.

**Note:** *The ramp rate begins when the SET/ENT button is pressed after the target setpoint is selected. The setpoint display on the controller will show the changing setpoint at the selected ramp rate.*

To view the target setpoint during the ramp rate, press and release an arrow button. The lower display will show the setpoint next to the selected target setpoint. Return to the ramping setpoint display by pressing and releasing the other arrow button.

## 6.6 Auto Tuning the Controller

Factory settings are provided for general purposes, but your process can be enhanced through the auto tune feature. For a given process temperature and product load, auto tuning maximizes the performance of the chamber by operating with the quickest response and minimal temperature overshoot.

To auto tune the controller.

1. Load the chamber with materials that have the same mass and thermal characteristics as a typical product load.
2. Operate the chamber to the process temperature.
3. Press and hold **SET/ENT** for 3 seconds to display the A1 parameter of the Operating Parameter menu.
4. Press and release **SET/ENT** to show the At parameter.
5. Press and release the arrow buttons to show on in the lower display.
6. Press **SET/ENT** once to enter the auto tune mode and exit the Operating Parameters menu.

The controller will cycle three times through a heating and cooling pattern, measuring the characteristics of the load and chamber temperature controls. During the auto tuning, At will alternately flash with the measured temperature (PV) to indicate that the auto tuning is in progress. The length of time for the auto tune varies with the load, chamber size and temperature selected.

The auto tune is completed when the regular display of the measured temperature is shown. The chamber should now operate to the process temperature with the given product load, with the quickest response and minimal temperature overshoot.

If the process temperature or load changes significantly, another auto tune session may be necessary to optimize the chamber performance.

## 7 Communication Option

The Communication Option enables digital communication between the UT150 controller and a PC. It is a factory-installed temperature controller and cable assembly using an RS-485 connection through a DB9 cable.

This option is supplied with the necessary cable and diagnostic software to set up and check the connections between the unit and the PC. Follow the steps below to make the cable connections and to check the data transfer. If you have purchased the 'SpecView Plus Communication Software' with the copy protection key, refer to the SpecView instructions in parallel with this setup outline.

### 7.1 Cable Installation

1. To install the 25-foot external cable, disconnect the electrical power from both the unit and PC.
2. Connect the cable end with a black housing to the 9-pin port on the rear of the Lindberg/Blue M unit.
3. Connect the other cable end with the RS-232/485 Converter to the COM 1 Port (or other COM port of your choice) on the rear of the PC.
4. If you have purchased the SpecView Plus Communication Software with the copy protection key, install this key on your parallel port. It may be necessary to locate the key between a cable and the parallel port.
5. Apply electrical power to the unit and the PC.

### 7.2 UT150 Communications Setup Parameters

Table 4 shows the default values for UT150 Communications Setup Parameters. To access these parameters:

1. Hold the **SET/ENT** button for three seconds to display the Operating Parameters. Press and release the **SET/ENT** button to display the 'LoC' parameter. Press the down arrow to show '-1' in the lower display and press **SET/ENT** to acknowledge and enter the Setup Parameters menu.
2. Press and release the **SET/ENT** button to access the six parameters specific to the communications option.

**Table 4. UT150 Communications Parameters**

| Parameter Code                         | Factory Set Value | Description        |
|--|-------------------|--------------------|
| <i>Communications Setup Parameters</i> |                   |                    |
| PSL                                    | 0                 | Protocol selection |
| Adr                                    | 1                 | Controller address |
| bPs                                    | 9600              | Baud rate          |
| Pr 1                                   | EVN               | Parity (even)      |
| StP                                    | 1                 | Stop bit           |
| dLn                                    | 8                 | Data length        |

### 7.3 Software Installation

1. Load the SpecView software onto the PC hard drive, using the disks provided.
2. Run the software. (If you have purchased the SpecView Plus Communication Software with the copy protection key, skip step 3.)
3. If you do not have a copy protection key, a 'SpecView' window opens with the message, "Problem with Dongle: 'Dongle' (Copy Protection Key) not detected on parallel port." Click the OK button to acknowledge the message. Without the copy protection key, this diagnostic/sampler software has a 20-minute time limit on each run. If the message 'demo version of SpecView has stopped communicating - values are frozen' appears before the communication diagnostics are finished, close the software and reopen it for another 20-minute segment.
4. When the 'Configurations Found..' window opens, click on the "Test Comms for New Config." Button.
5. The 'Input Required..' window then opens. Enter a new Config. Name (up to 8 characters with no spaces) or accept the 'DEFAULT' name. Click OK.
6. The 'Ports and Protocol' window opens next. On the 'COM1:' line (if the COM1 port is the serial port used to connect to the controller) select the pulldown menu from Protocol column. Highlight "\*Yokogawa 100" or "100 Series" for controller model UT150.
7. Select the pulldown menu from the Baud Rate column. Highlight "9600". Click on the 'Start Scan' button.
8. The SpecView program scans all 99 possible controller addresses and places a representative 'instrument view' of the temperature controller on the PC screen for each controller found connected to the PC. The factory-set addresses are 1, 2, 3, etc., depending on the number of controllers with communications in a single oven. Additional units with communications will require the controller's address to be changed. See Section 7.8 on page 9 for detailed instructions on configuring multiple controllers.
9. After the instrument scan is completed, a SpecView window appears with the message, "All channels scanned. Press OK to continue, or cancel to rescan". Press OK if all of the connected controllers are properly displayed. If no controls are displayed, check the "troubleshooting" section at the end of this setup.
10. To begin communication between the PC and the controller, click on the 'Enter Runtime' button (an icon of a running figurine). This action will ask for a file name to save this display: use the given default or select another.
11. The "SpecView" window will be displayed, showing the current PV (process variable) and SP (set point). If the SpecView display of the controller shows X's, the communications connection or power to the control may have been interrupted.
12. On some controllers, the decimal point position has been changed from the Yokogawa factory default. This will make the SpecView display differ from the controller. If this is the case, follow the instructions in Section 7.7 on page 9.

## 7.4 Communications Test

When you have established a working communications link between the controller and PC, you should check the link by varying the target set point function:

1. Click on the arrows of the controller(s) shown in the SpecView window. This will open a keypad window where the set point can be changed.
2. Select a temperature set point a few degrees from the current temperature and press the 'send' button. Verify that the controller display shows the setpoint change.
3. Select the original temperature set point through the keypad on the controller and observe the change on the PC display.
4. The controller parameters may be viewed through SpecView by clicking on the 'PAR' button. A window opens that lists the controller parameters. Each parameter can be changed by selecting it and clicking on the 'Alter' button. Select the 'Close' button. Make no changes at this time.

This concludes the initial software diagnostics.

## 7.5 Ordering SpecView

If this software program is what you need as a tool to organize and operate the digital communication on Lindberg/Blue M equipment, contact Lindberg/Blue M sales, SpecView directly at sales@specview.com, or on their Internet site at www.specview.com, and request "SpecView Plus".

## 7.6 Troubleshooting

If your connection is not working properly, check the following conditions:

- A. Verify complete and tight cable connections between the Lindberg/Blue M unit and the PC.
- B. Verify that power has been supplied to the unit and temperature controller before starting the software program.
- C. Verify the configuration values in the controller, listed in the Table 4 on page 8.
- D. Verify the values in the 'Ports & Protocols' window (see step 6 in Section 7.3).

## 7.7 Decimal Point Adjustment

If the decimal point on the PC display of the controller does not match the controller display, you can make an adjustment to correct this:

1. From the Configuration Mode (available through the 'file' drop down while in the Runtime Mode), select the 'Variables List' icon, represented by a page with lines on it.
2. Select the controller model number and select 'Properties' button. The 'Add/Rename Instrument' box appears.
3. In the Address window, highlight the middle digit (usually a 1), and change to '0' (zero).
4. Click the 'Rename Only' button. Close the 'Variables' box (click on 'X' in corner of smaller box).
5. Select the 'Enter Runtime' icon to see the results of the change.

## 7.8 Addresses for Multiple Controllers

When more than one controller has the same communication address, alternative addresses need to be set up in the individual controllers. Addresses 1 through 99 can be selected on the same communication link to each PC COM port.

1. Determine a unique address for each temperature controller equipped with the communications option.
2. On the UT150 controller, access the Operating Parameters menu by pressing and holding **SET/ENT** for 3 seconds.
3. Press and release **SET/ENT** repeatedly until the upper display reads LoC.
4. Press  $\nabla$  until the displayed value of LoC is -1; then press **SET/ENT** to access the Setup Parameters menu .
5. Press and release the **SET/ENT** button to access the six parameters specific to the communications option. Compare the displayed values to those in Table 4 on page 8. Make adjustments as needed.
6. Press and hold **SET/ENT** for 3 seconds to exit the Setup Parameters Menu.

## 8 Maintenance



**CAUTION!** Maintenance should only be performed by trained personnel.



**WARNING!** Disconnect oven from main power before attempting any maintenance to oven or its controls.



**WARNING!** Before maintaining this equipment, read the applicable warning at the back of this manual.

For wiring schematics and replacement parts specifications, refer to Section 10 on page 12.

### 8.1 Cleaning

Disconnect power and use a high pressure compressed air hose to blow dust out of the oven compartment. Clean the stainless steel oven interior with a cloth dampened in clean water. Remove stubborn stains with mild dishwashing detergent.

### 8.2 Heating Elements

Periodically inspect the heating element and blower wheel compartments for cleanliness, especially when operating the unit in a dusty environment. Failure to keep these areas clean can lead to early element burn-out.

To replace heating elements, complete the following steps:

1. Disconnect power.
2. Remove the inner chamber compartment.
3. Disconnect the leads from element terminals located in the wiring compartment.
4. Straighten the element leads and pull them through the insulators into the element compartment.
5. Depress the element support clips and remove the element.
6. To install the new element, reverse the above procedure. Check gasket seal integrity before securing the inner chamber compartment.

### 8.3 Blower Motor

The blower is fitted with a sealed bearing and requires no lubrication for the life of the unit.

### 8.4 Overtemperature Alarm Protection (OTP)

The Load Overtemperature Alarm System indicates if the temperature inside the chamber exceeds the load alarm setpoint. To insure proper operation, this alarm system must be checked at least once a month.

To test the load overtemperature alarm, complete the following steps:

1. Operate the oven without a product load at your normal operating temperature.
2. Readjust main temperature control to a temperature above the load alarm setting (refer to Section 6.2).
3. Observe the unit closely until the load alarm trips, indicated on the controller beside the A1 label.
4. Reset the main temperature control to normal operating temperature. Once the unit cools below the alarm setpoint, the A1 indicator will go off.

### 8.5 Oven Overtemperature Control (OTC)

The Oven Overtemperature System operates only if a problem occurs with the main controller or solid-state relay. This system is factory set to prevent catastrophic failure of the oven.

When the temperature exceeds the factory-set alarm setpoint, the overtemperature device disables the heaters until manually reset.

The Overtemperature Reset resets the overtemperature device identified as LS on the wiring diagram. It is a green lever accessible through a hole above the mounting screws on the lower left side of the unit.



**CAUTION!** Use an electrically insulated tool for Overtemperature reset.

### 8.6 Door System Check



**WARNING!** Disconnect oven from main power before attempting any maintenance to oven or its controls.

Periodically inspect the door latch, trim, catch, and gasket for signs of deterioration (unusual paint discoloration on the front face of the oven, softness or deformation of the plastic, slower response times, cracking or tearing at the gasket). Failure to maintain the integrity of the door system will reduce the lifespan of the oven.

To replace the gasket, complete the following steps:

1. Remove the inner chamber mounting screws (under the gasket and on the rear chamber wall).
2. Pull the inner chamber away from the cabinet.
3. Slip the gasket off the perimeter of the inner chamber.
4. Repeat Steps 1 through 3 in reverse order to install the new gasket. Be certain that the gasket does not roll under the inner chamber when pushing the inner chamber back into the cabinet.

## 9 Troubleshooting



**WARNING!** Troubleshooting procedures involve working with high voltages which can cause injury or death. Troubleshooting should only be performed by trained personnel.

Table 5 is a guide to troubleshooting controller and oven problems.

**Table 5. Oven Troubleshooting**

| Problem                                    | Probable Causes  | Solution   |
|--|--|--|
| Controller reads P.Er.                     | Abnormal parameter value   | Check controller parameter settings and reset to proper values.  |
| Controller reads b. o                      | Input burnout  | Check the sensor wiring, replace sensor if necessary.  |
| Controller reads ooo.                      | PV exceeds effective range   | Check the input type and range settings and correct them.  |
| Controller reads UUU.                      | PV is below effective range  | Check the input type and range settings and correct them.  |
| Controller reads Err                       | Probable hardware failure  | Call Service for controller repair.  |
| The controller displays do not illuminate. | The oven is not connected to the power supply.   | Check oven connection to power source.   |
|  | Main switch is defective.  | Replace power switch or controller.  |
|  | Fuse(s) blown.   | Replace fuse(s) and verify power connections.  |
| Temperature varies or fluctuates.          | Improper loading.  | Test the unit empty. If results are satisfactory, the oven was improperly loaded. Redistribute the load. |
|  | Poor sensor connections.   | Check connections. Clean and tighten.  |
|  | Contaminated sensor.   | Replace sensor.  |
|  | Poor ventilation of base.  | Clear the area around the base.  |
|  | Inlet and/or exhaust vents are open.   | Close vents.   |
|  | Inadequate tuning values.  | Auto-tune the controller.  |
|  | Insufficient stabilization time.   | Allow load ample time to reach equilibrium.  |
| Temperature Offset.                        | Controller degradation and/or sensor degradation.  | Offset or bias the controller and/or replace the sensor.   |
|  | Intermittent failure of switch, controller, limit switch, or wiring.                       | Verify wiring connections.   |
| Oven does not heat.                        | No power.  | Check power source, fuses, breakers, and connections.  |
|  | Defective solid-state relay.   | Replace solid-state relay.   |
|  | Tripped overtemperature control (see Section 8.5 on page 10).                              | Reset the OTC system, following the instructions in Section 8.5.   |
|  | Defective sensor.  | Replace sensor.  |
|  | Controller malfunction.  | Verify controller parameters/replace controller.   |
|  | One or more heater coils are burned out (coil may be open, shorted, or shorted to ground). | Replace heater.  |
| Slow heat up.                              | Heater coils are improperly connected.   | Verify power source with the appropriate schematic representation.                                       |
|  | Low line voltage.  | Install line of sufficient and proper voltage (isolate the oven from other electrical loads).            |
|  | Heavy load in chamber.   | Reduce load in chamber to allow sufficient circulation.  |
|  | One heater coil burned out.  | Replace heater.  |
|  | Open inlet and/or exhaust vents.   | Close vents.   |
|  | Improper door closure.   | Adjust door latch compression nut to meet gasket on all edges.   |
| Gasket deterioration.                      | Replace gasket.  |  |

## **10 Wiring Diagrams**

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The following pages contain the wiring schematics and replacement parts tables for all the MO Series models described in this manual.

Wiring diagram for MO1420 and MO1430 models with voltage "A"

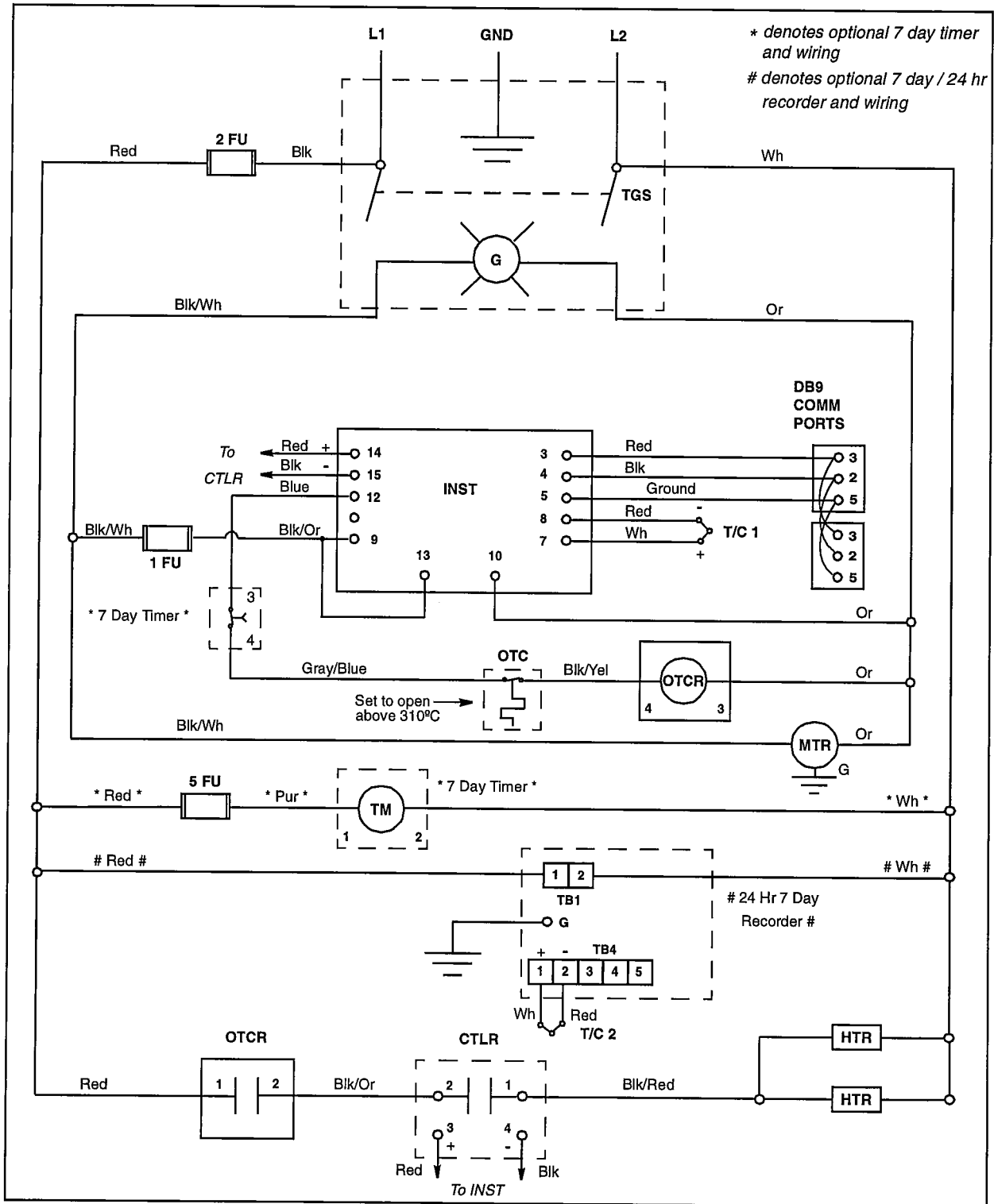
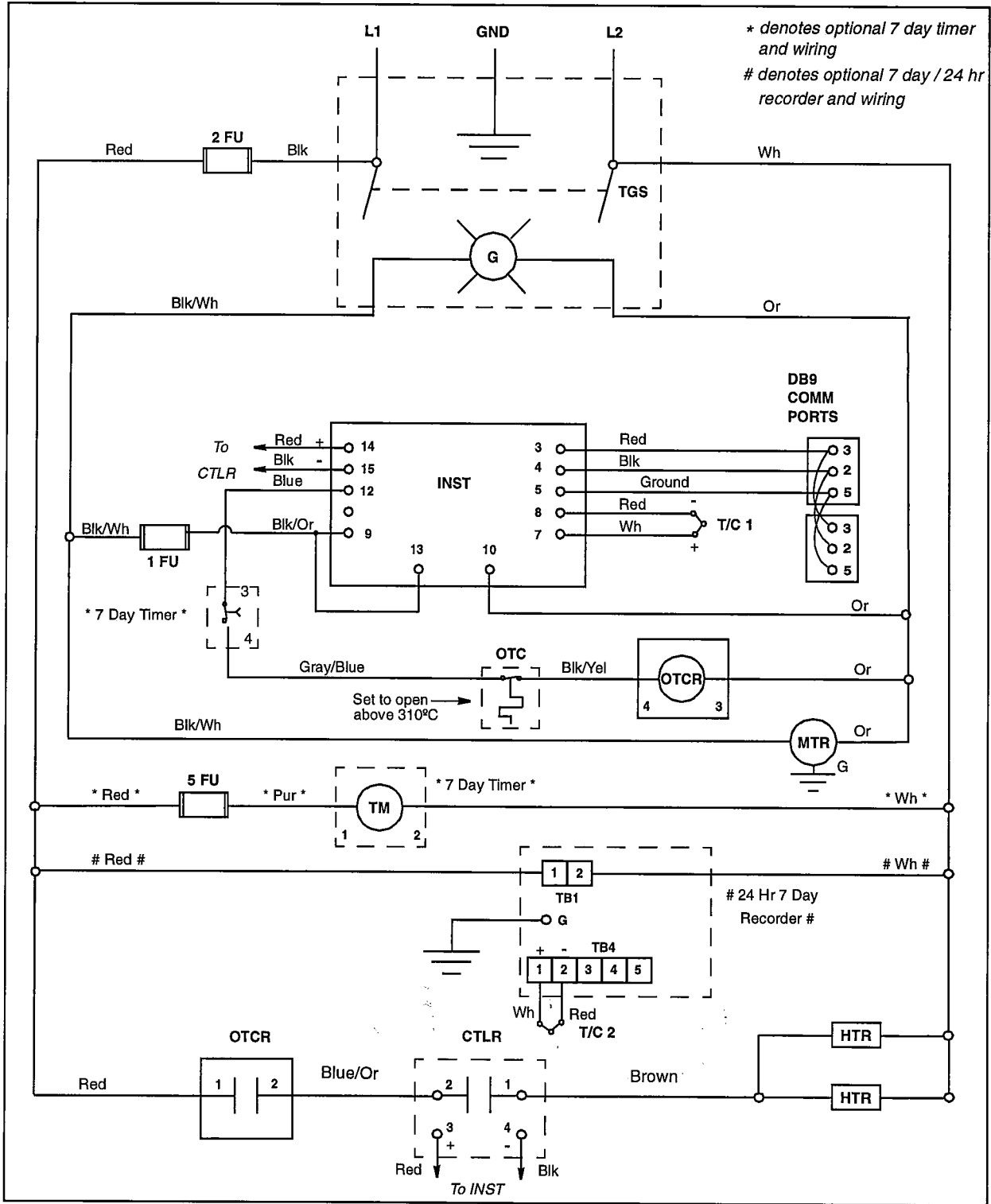




Table 6. Replacement Parts - Models MO1420A, MO1420SA, and MO1430A Only.

| Item Number | Description        | Model Number                       |                                    |
|-------------|--------------------|------------------------------------|------------------------------------|
|             |                    | MO1420A, MO1420SA                  | MO1430A                            |
| CTLR        | Control Relay      | 102460                             | 102460                             |
| 1 FU        | Control Fuse       | E04J-1                             | E04J-1                             |
| 2 FU        | Heater Fuse        | E04J-15                            | E04J-15                            |
| HTR         | Heater             | A-121-979                          | A-121-976                          |
| INST        | Control            | 303115H03<br>(303115H04 with Comm) | 303115H03<br>(303115H04 with Comm) |
| LS          | Limit Switch (OTC) | 38687H01                           | 38687H01                           |
| PL          | Plug               | 118124                             | 48951H02                           |
| OTCR        | OTC Relay          | E02K-3-07                          | E02K-3-07                          |
| T/C         | Thermocouple       | C11B-1-1                           | C11B-1-1                           |
| TGS         | Toggle Switch      | 118007                             | 118007                             |
| MTR         | Blower Motor       | 118921                             | 118921                             |

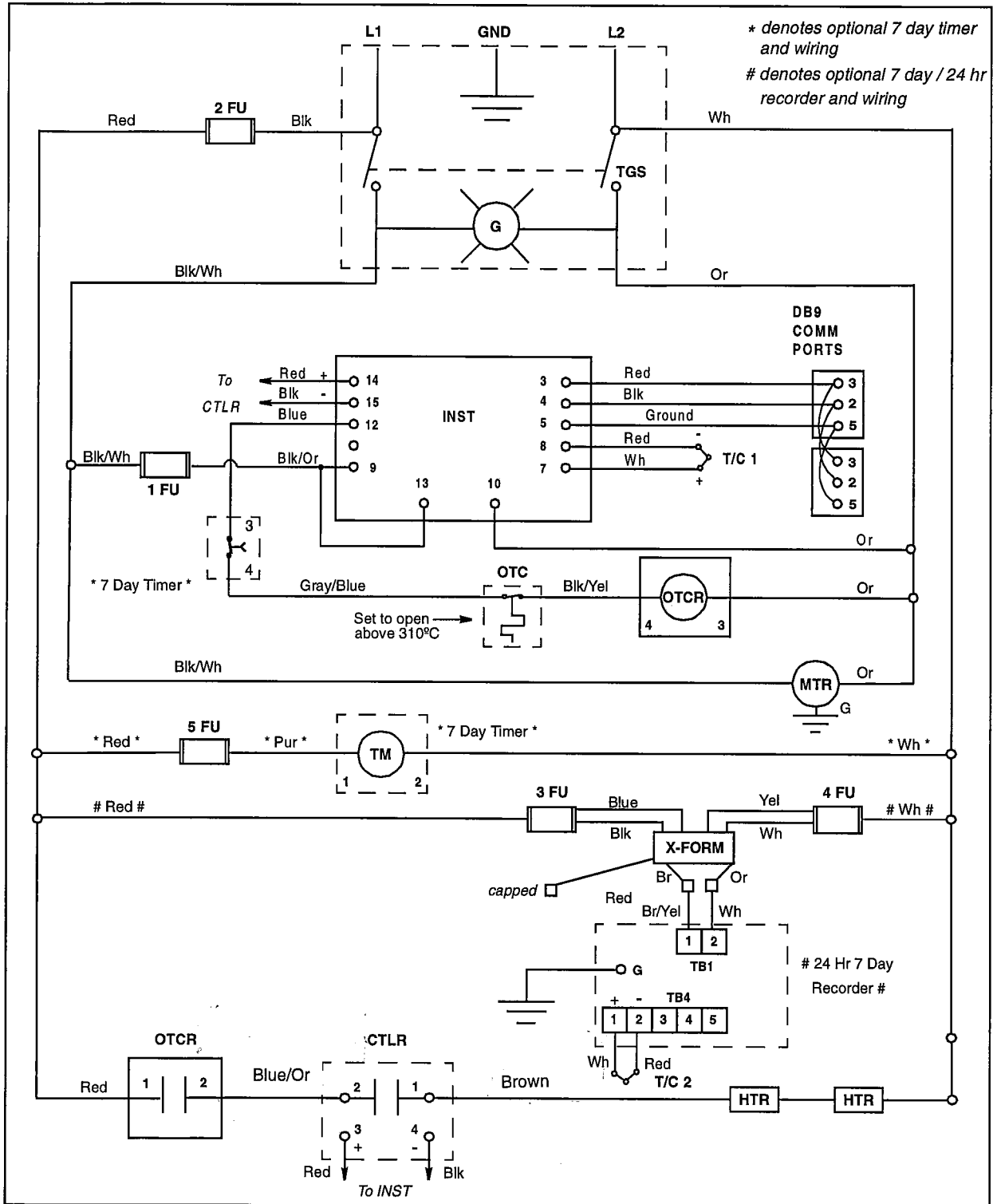
Wiring diagram for MO1440 and MO1450 models with voltage "A"



**Table 7. Replacement Parts - Models MO1440A, MO1440SA, MO1450A, and MO1450SA Only**

| Item Number | Description        | Model Number                       |                                    |
|-------------|--------------------|------------------------------------|------------------------------------|
|             |                    | MO1440A, MO1440SA                  | MO1450A, MO1450SA                  |
| CTLR        | Control Relay      | 102460                             | 102460                             |
| 1 FU        | Control Fuse       | E04J-1                             | E04J-1                             |
| 2 FU        | Heater Fuse        | E04J-20                            | E04J-20                            |
| HTR         | Heater             | A-121-972                          | A-121-977                          |
| INST        | Control            | 303115H03<br>(303115H04 with Comm) | 303115H03<br>(303115H04 with Comm) |
| LS          | Limit Switch (OTC) | 38687H01                           | 38687H01                           |
| PL          | Plug               | 48951H07                           | 48951H07                           |
| OTCR        | OTC Relay          | E02K-3-07                          | E02K-3-07                          |
| T/C         | Thermocouple       | C11B-1-1                           | C11B-1-1                           |
| TGS         | Toggle Switch      | 118007                             | 118007                             |
| MTR         | Blower Motor       | 118921                             | 118921                             |

**Wiring diagram for MO1440 and MO1450 models with voltage "C"**



## Installation and Operation

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**Table 8. Replacement Parts - Models MO1440C, MO1440SC, and MO1450C Only**

| Item Number | Description        | MO1440C and MO1440SC               | MO1450C                            |
|-------------|--------------------|------------------------------------|------------------------------------|
| 1 FU        | Control Fuse       | E04J-1                             | E04J-1                             |
| 2 FU        | Heater Fuse        | E04J-10                            | E04J-15                            |
| HTR         | Heater             | A-121-972                          | A-121-977                          |
| INST        | Control            | 303115H03<br>(303115H04 with Comm) | 303115H03<br>(303115H04 with Comm) |
| LS          | Limit Switch (OTC) | 38687H01                           | 38687H01                           |
| OTCR        | OTC Relay          | E02K-2-04                          | E02K-2-04                          |
| CTLR        | Control Relay      | 102460                             | 102460                             |
| T/C         | Thermocouple       | C11B-1-1                           | C11B-1-1                           |
| TGS         | Toggle Switch      | 118006                             | 118006                             |
| MTR         | Blower Motor       | 118921                             | 118921                             |
| PL          | Plug               | 48951H03                           | 48951H03                           |

## 11 Warranty

### 11.1 Domestic Warranty (United States and Canada)

Lindberg/Blue M warrants this product to the owner for a period of twelve (12) months from date of shipment by Lindberg/Blue M. Under this warranty Lindberg/Blue M through its authorized Dealer or service organizations, will repair or at its option replace any part found to contain a manufacturing defect in material or workmanship, without charge to the owner, for a period of ninety (90) days, the labor, and a period of one (1) year, the parts, necessary to remedy any such defect. All components used in the manufacture of this product are covered by this warranty excluding heating elements and thermocouples.

This warranty is limited to products purchased and installed in the United States and Canada. It does not apply to damage caused from failure to properly install, operate, or maintain the product in accordance with the printed instructions provided. This warranty shall not apply to equipment or parts which have been subjected to negligence, accident, or damage by circumstances beyond Lindberg/Blue M's control or improper operation, application, maintenance, or storage.

To obtain prompt warranty service, contact the nearest Lindberg/Blue M authorized service center or Dealer. A listing of these companies will be provided upon request. Lindberg/Blue M's own shipping records showing date of shipment shall be conclusive in establishing the warranty period.

This warranty is in lieu of any other warranties, expressed or implied, including merchantability or fitness for a particular purpose. The owner agrees that Lindberg/Blue M's sole liability with respect to defective parts shall be as set forth in this warranty, and any claims for incidental or consequential damages are expressly excluded.

### 11.2 International Warranty (excluding Canada) 12 Months Parts Warranty

Lindberg/Blue M warrants this product to the original owner for a period of twelve (12) months from the date of shipment from the Lindberg/Blue M factory. Thermocouples and heating elements are excluded from this warranty. If any part is found to contain a manufacturing defect in material or workmanship Lindberg/Blue M will, at its option, repair or replace the part. Lindberg/Blue M assumes no responsibility for any labor expenses for service, removal, or reinstallation required to repair or replace the part, or for incidental repairs, and such costs are the responsibility of the Owner and his Dealer.

The warranty does not apply to damage caused by accidents, misuse, fire, flood, Acts of God or any other events beyond Lindberg/Blue M's control or to damage caused from failure to properly install, operate, or maintain the product in accordance with the printed instructions provided by Lindberg/Blue M. To obtain prompt warranty service, simply contact the Dealer from whom you purchased the product or the nearest Dealer handling Lindberg/Blue M products. Lindberg/Blue M's own shipping records showing date of shipment shall be conclusive in establishing the warranty period.

This warranty is in lieu of any other warranties, expressed or implied, including merchantability or fitness for a particular purpose. The owner agrees that its sole remedy and Lindberg/Blue M's sole liability with respect to defective parts or any other claim shall be as set forth in this warranty, and any claims for incidental, consequential or other damages are expressly excluded.

# WEEE Compliance

## Great Britain



**WEEE Compliance.** This products is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96EC. It is marked with the following symbol. Thermo Scientific has contracted with one or more recycling/disposal companies in each EU Member State, and this products should be disposed of or recycling through them. Further information on Thermo Scientific's compliance with these Directives, the recyclers in your country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available at [www.thermo.com/WEEERoHS](http://www.thermo.com/WEEERoHS)

## Deutschland



**WEEE Konformität.** Dieses Produkt muss die EU Waste Electrical & Electronic Equipment (WEEE) Richtlinie 2002/96EC erfüllen. Das Produkt ist durch folgendes Symbol gekennzeichnet. Thermo Scientific hat Vereinbarungen getroffen mit Verwertungs-/Entsorgungsanlagen in allen EU-Mitgliederstaaten und dieses Produkt muss durch diese Firmen wiederverwertet oder entsorgt werden. Mehr Informationen über die Einhaltung dieser Anweisungen durch Thermo Scientific, die Verwerter und Hinweise die Ihnen nützlich sein können, die Thermo Scientific Produkte zu identifizieren, die unter diese RoHS Anweisung fallen, finden Sie unter [www.thermo.com/WEEERoHS](http://www.thermo.com/WEEERoHS)

## Italia



**Conformità WEEE.** Questo prodotto deve rispondere alla direttiva dell'Unione Europea 2002/96EC in merito ai Rifiuti degli Apparecchi Elettrici ed Elettronici (WEEE). È marcato col seguente simbolo. Thermo Scientific ha stipulato contratti con una o diverse società di riciclaggio/smaltimento in ognuno degli Stati Membri Europei. Questo prodotto verrà smaltito o riciclato tramite queste medesime. Ulteriori informazioni sulla conformità di Thermo Scientific con queste Direttive, l'elenco delle ditte di riciclaggio nel Vostro paese e informazioni sui prodotti Thermo Scientific che possono essere utili alla rilevazione di sostanze soggette alla Direttiva RoHS sono disponibili sul sito [www.thermo.com/WEEERoHS](http://www.thermo.com/WEEERoHS)

## France



**Conformité WEEE.** Ce produit doit être conforme à la directive européenne (2002/96EC) des Déchets d'Equipements Electriques et Electroniques (DEEE). Il est marqué par le symbole suivant. Thermo Scientific s'est associé avec une ou plusieurs compagnies de recyclage dans chaque état membre de l'union européenne et ce produit devrait être collecté ou recyclé par celles-ci. Davantage d'informations sur la conformité de Thermo Scientific à ces directives, les recycleurs dans votre pays et les informations sur les produits Thermo Scientific qui peuvent aider le détection des substances sujettes à la directive RoHS sont disponibles sur [www.thermo.com/WEEERoHS](http://www.thermo.com/WEEERoHS)

## Important

For your future reference and when contacting the factory, please have the following information readily available:

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

The above information can be found on the dataplate attached to the equipment. If available, please provide the date purchased, the source of purchase (Lindberg/Blue M or specific agent/rep organization), and purchase order number.

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### IF YOU NEED ASSISTANCE:

#### LINDBERG/BLUE M SALES DIVISION

Phone: 828/658-2711  
800/252-7100

FAX: 828/645-3368

#### LABORATORY PARTS and SERVICE

Phone: 828/658-2891  
800/438-4851

FAX: 828/658-2576

#### TECHNICAL SUPPORT

Phone: 800/438-4851

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