THERMOLYNE
Type 10500 Furnace
OPERATION MANUAL

BARNSTEAD/THERMOLYNE CORPORATION

MODEL NUMBERS
FA10524P & FA10524P-1
FA10525P & FA10525P-1
FA10528P & FA10528P-1
FA10520P & FA10520P-1
FA10520P-26 & FA10520P-1-26

READ ALL WARNINGS, CAUTIONS, AND INSTRUCTIONS CAREFULLY BEFORE OPERATING THIS THERMOLYNE FURNACE.

Record serial number here ____________________________
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAFETY INFORMATION</td>
<td>1</td>
</tr>
<tr>
<td>SIGNAL WORDS</td>
<td>1</td>
</tr>
<tr>
<td>WARNINGS</td>
<td>1</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>2</td>
</tr>
<tr>
<td>GENERAL SPECIFICATIONS</td>
<td>5</td>
</tr>
<tr>
<td>UNPACKAGING</td>
<td>7</td>
</tr>
<tr>
<td>INSTALLATION</td>
<td>7</td>
</tr>
<tr>
<td>OPERATION</td>
<td>8</td>
</tr>
<tr>
<td>PREVENTIVE MAINTENANCE</td>
<td>9</td>
</tr>
<tr>
<td>TROUBLE SHOOTING GUIDE</td>
<td>10</td>
</tr>
<tr>
<td>MAINTENANCE AND SERVICING</td>
<td>13</td>
</tr>
<tr>
<td>EXPLODED VIEW</td>
<td>19</td>
</tr>
<tr>
<td>REPLACEMENT PARTS LIST</td>
<td>20</td>
</tr>
<tr>
<td>SCHEMATICS</td>
<td>21</td>
</tr>
<tr>
<td>ORDERING PROCEDURES</td>
<td>22</td>
</tr>
<tr>
<td>WARRANTY INFORMATION</td>
<td>22</td>
</tr>
</tbody>
</table>
SAFETY INFORMATION

Your Thermolyne furnace has been designed with function, reliability and safety in mind. It is the user's responsibility to insure conformance with required electrical codes. For safe operation, please observe the following:

SIGNAL WORDS

| "DANGER" | notes apply when there are hazards which result in severe personal injury or death. |
| "WARNING" | notes apply when there is a possibility of personal injury. |
| "CAUTION" | notes apply when there is a possibility of damage to the equipment. |
| "NOTES" | alert the user of the manual to pertinent facts and conditions. |

WARNINGS

WARNING

TO AVOID ELECTRICAL SHOCK, THIS FURNACE MUST:
1) BE INSTALLED BY A COMPETENT, QUALIFIED ELECTRICIAN WHO INSURES COMPATIBILITY AMONG FURNACE SPECIFICATIONS, POWER SOURCE AND GROUNDING CODE REQUIREMENTS.
2) ALWAYS BE DISCONNECTED FROM THE POWER SUPPLY PRIOR TO MAINTENANCE AND SERVICING.
3) HAVE THE DOOR SWITCH OPERATING PROPERLY.

TO AVOID BURNS, THIS FURNACE MUST:
1) NOT BE TOUCHED ON THE EXTERIOR OR INTERIOR FURNACE SURFACES DURING USE OR FOR A PERIOD OF TIME AFTER USE.

TO AVOID PERSONAL INJURY:
1) DO NOT USE IN THE PRESENCE OF FLAMMABLE OR COMBUSTIBLE CHEMICALS. FIRE OR EXPLOSION MAY RESULT; THIS DEVICE CONTAINS COMPONENTS WHICH MAY IGNITE SUCH MATERIALS.

CAUTION: (For Models FA10520P, FA10525P & FA10528P)
DISCONNECT FROM POWER SUPPLY IF TEMPERATURE EXCEEDS 2000°F.

CAUTION: (For Models FA10520P-1, FA10525P-1 & FA10528P-1)
DISCONNECT FROM POWER SUPPLY IF TEMPERATURE EXCEEDS 2150°F.
WARNINGS

WARNING

THIS FURNACE CONTAINS REFRACTORY CERAMIC INSULATION WHICH CAN PRODUCE RESPIRABLE FIBERS AND DUST WHEN HANDLED. THESE FIBERS CAN CAUSE IRRITATION AND CAN AGGRAVATE PRE-EXISTING RESPIRATORY DISEASE. THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS CLASSIFIED REFRACTORY CERAMIC FIBER AS POSSIBLY CARCINOGENIC. AFTER SERVICE REFRACTORY CERAMIC FIBER DUSTS MAY CONTAIN CRYSTALLINE SILICA, WHICH MAY CAUSE LUNG DAMAGE (SILICOSIS) AND WHICH HAS BEEN CLASSIFIED BY IARC AS A PROBABLE CARCINOGEN.

CONSULT THE OWNER'S MANUAL FOR THIS EQUIPMENT BEFORE YOU MAKE ANY REPAIRS TO OR REPLACE ANY PARTS, INCLUDING REPAIRS TO OR REPLACEMENTS OF ELECTRICAL COMPONENTS OR INSULATING MATERIALS. THE OWNER'S MANUAL CONTAINS INFORMATION AND WARNINGS RELATING TO THE HAZARDS ASSOCIATED WITH THE REPAIR AND MAINTENANCE OF THIS EQUIPMENT.

WARNING

REFER SERVICING TO QUALIFIED PERSONNEL.

INTRODUCTION

A. Intended Use

The Type 10500 furnaces are general laboratory and heat treating furnaces. Standard models are intended for applications requiring temperatures from 400°F (204°C) to 1800°F (982°C) for continuous use, or temperatures from 1800°F (982°C) to 2000°F (1093°C) for intermittent use. High temperature (-1) models are intended for applications requiring temperatures from 400°F (204°C) to 1950°F (1066°C) for continuous use, or temperatures from 1950°F (1066°C) to 2150°F (1177°C) for intermittent use. Continuous use is operating the furnace for more than 3 hours and intermittent use is operating the furnace for less than 3 hours.

The unit consists of 1) a heating chamber, 2) an automatic proportioning temperature control, 3) a two-position power switch. See Figure 1 for the overall shape and general features of the unit.

B. Principles of Operation

The furnace chamber is heated by four electric resistance heaters which are embedded in a refractory material. The chamber is insulated with a ceramic fiber insulation. The temperature is controlled by an automatic proportioning controller using a chromel/alumel thermocouple. The control unit is located under the furnace chamber, well insulated from the furnace chamber. Also, a vent port at the rear of the furnace chamber aids in venting noxious gases and other vapors.

This furnace is equipped with thermocouple break protection, a door safety switch, and cold junction compensation. The triac which controls power to the heating elements is controlled by internal circuitry to operate as zero switching devices. This zero switch capability prevents line interference which can effect other sensitive equipment.
TYPE 10500 FURNACE
FIGURE 1
# GENERAL SPECIFICATIONS: FURNACES

<table>
<thead>
<tr>
<th>Model #</th>
<th>FA10524P</th>
<th>FA10525P</th>
<th>FA10528P</th>
<th>FA10520P</th>
<th>FA10520P-26</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions</strong></td>
<td><strong>Chamber</strong> Width</td>
<td>5-1/2 (14)</td>
<td>5-1/2 (14)</td>
<td>5-1/2 (14)</td>
<td>5-1/2 (14)</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>3-3/4 (9)</td>
<td>3-3/4 (9)</td>
<td>3-3/4 (9)</td>
<td>3-3/4 (9)</td>
<td>3-3/4 (9)</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>6-1/2 (17)</td>
<td>6-1/2 (17)</td>
<td>6-1/2 (17)</td>
<td>6-1/2 (17)</td>
<td>6-1/2 (17)</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>14-1/2 (37)</td>
<td>14-1/2 (37)</td>
<td>14-1/2 (37)</td>
<td>14-1/2 (37)</td>
<td>14-1/2 (37)</td>
</tr>
<tr>
<td><strong>Weight</strong> LBS. (KG)</td>
<td>34 (15)</td>
<td>34 (15)</td>
<td>34 (15)</td>
<td>34 (15)</td>
<td>34 (15)</td>
</tr>
<tr>
<td><strong>Electrical Ratings</strong></td>
<td><strong>Volts</strong></td>
<td>100</td>
<td>120</td>
<td>208</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td><strong>Amps</strong></td>
<td>15</td>
<td>14</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td><strong>Watts</strong></td>
<td>1500</td>
<td>1680</td>
<td>1680</td>
<td>1680</td>
</tr>
<tr>
<td></td>
<td><strong>Freq.</strong></td>
<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td></td>
<td><strong>Phase</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td><strong>Oper. Temp.Range</strong></td>
<td><strong>Cont.</strong></td>
<td>1800°F (982°C)</td>
<td>1800°F (982°C)</td>
<td>1800°F (982°C)</td>
<td>1800°F (982°C)</td>
</tr>
<tr>
<td></td>
<td><strong>Intermittent</strong></td>
<td>2000°F (1093°C)</td>
<td>2000°F (1093°C)</td>
<td>2000°F (1093°C)</td>
<td>2000°F (1093°C)</td>
</tr>
</tbody>
</table>

**NOTES:**
- Not supplied with cord and plug. Supplied with Chromel/Alumel thermocouples.
- Continuous use for standard models is operating at temperatures between 400°F (204°C) and 1800°F (982°C) for more than 3 hours. (-1) models temperatures between 400°F (204°C) and 1950°F (1066°C) for more than 3 hours.
- Intermittent use for standard models is operating at temperatures between 1800°F (982°C) and 2000°F (1093°C) for less than 3 hours. (-1) models temperatures between 1950°F (1066°C) and 2150°F (1177°C) for less than 3 hours.
# GENERAL SPECIFICATIONS:
## FURNACES

<table>
<thead>
<tr>
<th>Model #</th>
<th>FA10524P-1</th>
<th>FA10525P-1</th>
<th>FA10528P-1</th>
<th>FA10520P-1</th>
<th>FA10520P-1-26</th>
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<tr>
<td><strong>Dimensions</strong></td>
<td><strong>Chamber</strong></td>
<td><strong>Width</strong></td>
<td>5-1/2</td>
<td>5-1/2</td>
<td>5-1/2</td>
</tr>
<tr>
<td><strong>in. (cm)</strong></td>
<td></td>
<td></td>
<td>(14)</td>
<td>(14)</td>
<td>(14)</td>
</tr>
<tr>
<td></td>
<td><strong>Height</strong></td>
<td>3-3/4</td>
<td>3-3/4</td>
<td>3-3/4</td>
<td>3-3/4</td>
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<tr>
<td></td>
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<td>(9)</td>
<td>(9)</td>
<td>(9)</td>
<td>(9)</td>
</tr>
<tr>
<td></td>
<td><strong>Depth</strong></td>
<td>6-1/2</td>
<td>6-1/2</td>
<td>6-1/2</td>
<td>6-1/2</td>
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<tr>
<td></td>
<td></td>
<td>(31)</td>
<td>(31)</td>
<td>(31)</td>
<td>(31)</td>
</tr>
<tr>
<td></td>
<td><strong>Height</strong></td>
<td>18-1/4</td>
<td>18-1/4</td>
<td>18-1/4</td>
<td>18-1/4</td>
</tr>
<tr>
<td></td>
<td><strong>Depth</strong></td>
<td>14-1/2</td>
<td>14-1/2</td>
<td>14-1/2</td>
<td>14-1/2</td>
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<td></td>
<td>(37)</td>
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<td><strong>LBS. (KG)</strong></td>
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<tr>
<td></td>
<td><strong>Watts</strong></td>
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<td>50/60</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td></td>
<td><strong>Phase</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Oper. Temp.Range</strong></td>
<td><strong>Cont.</strong></td>
<td>1950°F (1066°C)</td>
<td>1950°F (1066°C)</td>
<td>1950°F (1066°C)</td>
<td>1950°F (1066°C)</td>
</tr>
<tr>
<td></td>
<td><strong>Intermittent</strong></td>
<td>2150°F (1177°C)</td>
<td>2150°F (1177°C)</td>
<td>2150°F (1177°C)</td>
<td>2150°F (1177°C)</td>
</tr>
</tbody>
</table>

**NOTES:**
- Not supplied with cord and plug. Supplied with Chromel/Alumel thermocouples.
- Continuous use for standard models is operating at temperatures between 400°F (204°C) and 1800°F (982°C) for more than 3 hours. (-1) models temperatures between 400°F (204°C) and 1950°F (1066°C) for more than 3 hours.
- Intermittent use for standard models is operating at temperatures between 1800°F (982°C) and 2000°F (1093°C) for less than 3 hours. (-1) models temperatures between 1950°F (1066°C) and 2150°F (1177°C) for less than 3 hours.
UNPACKAGING

1-1. Unpack furnace from box. The owners manual and door handle are included in the box. After unpacking the furnace, attach the door handle and remove packing material from inside furnace chamber. The Type 10500 furnaces, are supplied with a three wire cord and plug.

INSTALLATION

2-1. SITE SELECTION: Install furnace on a sturdy surface and allow space for ventilation.

CAUTION: Allow at least three inches of space between the furnace and any vertical surface. This permits the heat from furnace case to escape so as not to create a possible fire hazard.

2-2. The electrical specifications are located on the specification plate on the back of the furnace. Consult Thermolyne if your electrical service is different than those listed on the specification plate. Prior to connecting your Type 10500 furnace to your electrical supply, be sure the two-position power switch is in the OFF position.

WARNING

TO AVOID ELECTRICAL SHOCK, THIS FURNACE MUST BE INSTALLED BY A COMPETENT, QUALIFIED ELECTRICIAN WHO INSURES COMPATIBILITY AMONG FURNACE SPECIFICATION, POWER SOURCE AND GROUND CODE REQUIREMENTS.

GENERAL OPERATION OF FURNACE

OBSERVE THESE WARNINGS BEFORE OPERATING YOUR FURNACE:

WARNING

TO AVOID PERSONAL INJURY DO NOT USE IN THE PRESENCE OF FLAMMABLE OR COMBUSTIBLE MATERIALS. FIRE OR EXPLOSION MAY RESULT; THIS DEVICE CONTAINS COMPONENTS WHICH MAY IGNITE SUCH MATERIALS.

WARNING

TO AVOID BURNS, THIS FURNACE MUST NOT BE TOUCHED ON THE EXTERIOR OR INTERIOR OF FURNACE SURFACES DURING USE OR FOR A PERIOD OF TIME AFTER USE.
3-1. **POWER SWITCH:** The power switch is a two-position switch marked OFF and ON. To operate the furnace, the switch must be in the ON position. The green power light will be illuminated. Be sure the door is closed, otherwise, the furnace will not heat and the green and amber pilot lights will not become illuminated. The amber control light will be illuminated only when the heating elements are drawing power.

3-2. **DOOR SAFETY SWITCH:** The door safety switch removes power from the heating elements when the door is opened. Open and close door a few times, note that both the power and control lights will be out while the door is open. If this condition is not true, consult the Trouble Shooting section before proceeding.

**WARNING**

TO AVOID ELECTRICAL SHOCK, THIS FURNACE MUST HAVE THE DOOR SWITCH OPERATING PROPERLY.

3-3. **TEMPERATURE CONTROL**

**CAUTION:** Do not exceed limitations set for continuous and intermittent operating temperatures. Exceeding these limits will result in severely reduced heating element life.

Make sure door is closed fully before operating furnace. Move the power switch to the ON position. The POWER light should be illuminated. Turn temperature dial clockwise to set desired temperature. (Temperature dial is graduated in both centigrade and fahrenheit degrees.) The control light will be illuminated until the temperature approaches the desired temperature, then the control light will flash intermittently. The controller then automatically maintains chamber temperature at the desired setting. To turn the furnace off, turn power switch to the OFF position.

3-4. The element wire on high temperature models (-1) is protected at high temperatures by the formation of an aluminum oxide on the surface of the heating element. This oxide layer gives the heating element its strength at high temperatures and prevents contamination from outside sources. Formation of the aluminum oxide takes approximately 8-10 hours of operation at a temperature of at least 1800°F (982°C). Formation of the oxide is relatively critical to the overall life of the heating unit. Any substance coming into contact with the heating element and preventing formation of the oxide will cause premature failure.

3-5. **FURNACE LOADING:** For best results of furnace loading, use less than two-thirds of any dimension of the chamber.

**CAUTION:** Do not overload your furnace chamber. If the load is to be heated uniformly, it should not occupy more than two-thirds of any dimension of the chamber. Failure to observe this caution could result in damage to furnace components.

3-6. If you are heating a number of small parts, spread them throughout the middle two-thirds of the chamber.

3-7. Keep objects away from thermocouple.

3-8. Block up load with small pieces of ceramic, or use hearth plate. (Refer to parts list.)

3-9. Use insulated tongs and mittens when loading and unloading furnace.

3-10. Always wear safety glasses.
PREVENTIVE MAINTENANCE

WARNING

THIS FURNACE CONTAINS REFRACTORY CERAMIC INSULATION WHICH CAN PRODUCE RESPIRABLE FIBERS AND DUST WHEN HANDLED. THESE FIBERS CAN CAUSE IRRITATION AND CAN AGGRAVATE PRE-EXISTING RESPIRATORY DISEASE. THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS CLASSIFIED REFRACTORY CERAMIC FIBER AS POSSIBLY CARCINOGENIC.

AFTER SERVICE REFRACTORY CERAMIC FIBER DUSTS MAY CONTAIN CRYSTALLINE SILICA, WHICH MAY CAUSE LUNG DAMAGE (SILICOSIS) AND WHICH HAS BEEN CLASSIFIED BY IARC AS A PROBABLE CARCINOGEN.

The refractory ceramic materials are located in the door, the hearth collar bricks, and in the chamber of the furnace. Tests performed by the manufacturer indicate that there is no significant risk of exposure to dust or respirable refractory ceramic fiber resulting from operation of the equipment under normal conditions. However, there may be a risk of exposure to respirable refractory ceramic dust or fiber when repairing or maintaining the insulating materials, or when otherwise disturbing the materials in a manner which causes release of dust or fibers therefrom. Through the use of proper handling procedures you can work safely with these insulating materials and minimize any exposure. Accordingly, before you repair or replace any insulating materials, or perform any other servicing on this product which could disturb or cause exposure to dust from insulating materials, you should consult the appropriate Material Safety Data Sheets (MSDS’s) for such products with respect to proper handling and appropriate protective equipment. For additional MSDS’s, or additional information concerning the handling of refractory ceramic products, please contact the Customer Service Department of Barnstead/Thermolyne Corporation.

WARNING

REFER SERVICING TO QUALIFIED PERSONNEL.

WARNING

TO AVOID ELECTRICAL SHOCK, THIS FURNACE MUST ALWAYS BE DISCONNECTED FROM THE POWER SUPPLY PRIOR TO MAINTENANCE AND SERVICING.

4-1. This unit is equipped with a venting system at the rear of the furnace chamber. This is for the removal of fumes from the chamber of the unit. Contamination is a major cause of element failure, therefore, when possible remove the fume forming material before heating. (e.g., cleaning cutting oil from tool steel.)

4-2. Housekeeping is vital to your electric furnace—KEEP IT CLEAN! Run your furnace up to 1600°F empty occasionally to burn off the contamination that may exist on the insulation and elements.

4-3. Element life is reduced somewhat by repeated heating and cooling. If the furnace is to be used again within a few hours, it is best to keep it at the operating temperature or at a reduced level such as 500°F (260°C).

4-4. During normal use the thermocouple in your furnace can become oxidized and cause inaccurate readings, therefore, we suggest that if you use your furnace regularly, you should change your thermocouple once every six months to assure the accuracy of your furnace temperature.
TROUBLE SHOOTING TIPS

5-1. The Trouble Shooting Tips section is intended to aid in defining and correcting possible service problems. When using the chart, select the problem category that resembles the malfunction, then proceed to the possible causes category and take necessary corrective action.

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>PROBABLE CAUSE</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power light does not illuminate.</td>
<td>1. The furnace is not connected to power supply.</td>
<td>1. Check furnace connection to power source.</td>
</tr>
<tr>
<td></td>
<td>2. ON and OFF power switch is defective.</td>
<td>2. Replace power switch.</td>
</tr>
<tr>
<td></td>
<td>3. Furnace door is not fully closed.</td>
<td>3. Close furnace door.</td>
</tr>
<tr>
<td></td>
<td>4. Door switch malfunction.</td>
<td>4. Realign or replace door safety switch.</td>
</tr>
<tr>
<td>The furnace does not heat.</td>
<td>1. No power.</td>
<td>1. Check power source and fuse.</td>
</tr>
<tr>
<td></td>
<td>2. Defective electrical hookup.</td>
<td>2. Repair electrical hookup.</td>
</tr>
<tr>
<td></td>
<td>3. Thermocouple is oxidized and opened the circuit.</td>
<td>3. Replace thermocouple.</td>
</tr>
<tr>
<td></td>
<td>4. Control unit malfunction.</td>
<td>4. Replace control unit.</td>
</tr>
<tr>
<td></td>
<td>5. One or more heating elements in 208V or 240V furnace are burned out.</td>
<td>5. Replace defective elements.</td>
</tr>
<tr>
<td></td>
<td>6. Two or more heating elements in a 120V or 100V furnace are burned out.</td>
<td>6. Replace defective elements.</td>
</tr>
<tr>
<td></td>
<td>7. Door switch malfunction.</td>
<td>7. Realign or replace door safety switch.</td>
</tr>
<tr>
<td>Temperature erratic or no control over</td>
<td>1. Triac malfunction.</td>
<td>1. Replace triac.</td>
</tr>
<tr>
<td>temperature.</td>
<td>2. Control malfunction (PCB) printed circuit board.</td>
<td>2. Replace printed circuit board.</td>
</tr>
<tr>
<td></td>
<td>3. Potentiometer malfunction.</td>
<td>3. Replace potentiometer (recalibration required for control - refer to parts list).</td>
</tr>
<tr>
<td>PROBLEM</td>
<td>PROBABLE CAUSE</td>
<td>CORRECTIVE ACTION</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Slow heatup.</td>
<td>1. Low line voltage.</td>
<td>1. Install line of sufficient size and proper voltage. (Isolate furnace from other electrical loads).</td>
</tr>
<tr>
<td></td>
<td>2. Heavy load in chamber.</td>
<td>2. Lighten load in chamber to allow heat to circulate.</td>
</tr>
<tr>
<td></td>
<td>3. Wrong heating element.</td>
<td>3. Install proper element.</td>
</tr>
<tr>
<td></td>
<td>4. One or two heating elements in a 120V or 100V furnace are burned out.</td>
<td>4. Replace burned out elements.</td>
</tr>
<tr>
<td></td>
<td>5. Wired improperly.</td>
<td>5. Check wiring diagram for correct wiring of your furnace.</td>
</tr>
<tr>
<td>Door switch does not cut power to the furnace chamber.</td>
<td>1. Door switch not functioning.</td>
<td>1. Realign or replace door switch.</td>
</tr>
<tr>
<td></td>
<td>2. Heating harmful materials.</td>
<td>2. Enclose material in container. Clean up spills in chamber. Ventilate chamber by leaving door cracked slightly open when heating known harmful reagents.</td>
</tr>
<tr>
<td></td>
<td>4. Wrong element.</td>
<td>4. Install proper element.</td>
</tr>
<tr>
<td></td>
<td>5. Oxidized thermocouple.</td>
<td>5. Replace thermocouple.</td>
</tr>
<tr>
<td></td>
<td>6. Contamination present from previous burnout.</td>
<td>6. Clean and/or replace insulation material.</td>
</tr>
<tr>
<td></td>
<td>7. Wired improperly.</td>
<td>7. Check wiring diagram for correct wiring of your furnace.</td>
</tr>
<tr>
<td>PROBLEM</td>
<td>PROBABLE CAUSE</td>
<td>CORRECTIVE ACTION</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Inaccurate temperatures.</td>
<td>1. Oxidized or contaminated thermocouple.</td>
<td>1. Replace thermocouple.</td>
</tr>
<tr>
<td></td>
<td>2. Poor thermocouple connections.</td>
<td>2. Tighten connections.</td>
</tr>
<tr>
<td></td>
<td>3. Triac malfunction.</td>
<td>3. Replace triac.</td>
</tr>
<tr>
<td></td>
<td>4. Improper loading.</td>
<td>4. Use proper loading procedures.</td>
</tr>
<tr>
<td></td>
<td>5. Poor ventilation of base.</td>
<td>5. Clear area around furnace base.</td>
</tr>
<tr>
<td></td>
<td>6. Temperature dial knob has slipped on shaft.</td>
<td>6. Reset knob.</td>
</tr>
<tr>
<td></td>
<td>7. Control out of calibration.</td>
<td>7. Contact Thermolyne.</td>
</tr>
<tr>
<td></td>
<td>8. Thermocouple connections reversed.</td>
<td>8. Refer to thermocouple Installation 6-2.</td>
</tr>
</tbody>
</table>
MAINTENANCE AND SERVICING

WARNING

THIS FURNACE CONTAINS REFRACTORY CERAMIC INSULATION WHICH CAN PRODUCE RESPIRABLE FIBERS AND DUST WHEN HANDLED. THESE FIBERS CAN CAUSE IRRITATION AND CAN AGGRAVATE PRE-EXISTING RESPIRATORY DISEASE. THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS CLASSIFIED REFRACTORY CERAMIC FIBER AS POSSIBLY CARCINOGENIC.

AFTER SERVICE REFRACTORY CERAMIC FIBER DUSTS MAY CONTAIN CRYSSTALLINE SILICA, WHICH MAY CAUSE LUNG DAMAGE (SILICOSIS) AND WHICH HAS BEEN CLASSIFIED BY IARC AS A PROBABLE CARCINOGEN.

The refractory ceramic materials are located in the door, the hearth collar bricks, and in the chamber of the furnace. Tests performed by the manufacturer indicate that there is no significant risk of exposure to dust or respirable refractory ceramic fiber resulting from operation of the equipment under normal conditions. However, there may be a risk of exposure to respirable refractory ceramic dust or fiber when repairing or maintaining the insulating materials, or when otherwise disturbing the materials in a manner which causes release of dust or fibers therefrom. Through the use of proper handling procedures you can work safely with these insulating materials and minimize any exposure. Accordingly, before you repair or replace any insulating materials, or perform any other servicing on this product which could disturb or cause exposure to dust from insulating materials, you should consult the appropriate Material Safety Data Sheets (MSDS's) for such products with respect to proper handling and appropriate protective equipment. For additional MSDS's, or additional information concerning the handling of refractory ceramic products, please contact the Customer Service Department of Barnstead/Thermolyne Corporation.

NOTE:
Perform only maintenance described in this manual. Contact an authorized dealer or our factory for parts and assistance.

6-1. TO REPLACE A HEATING ELEMENT:
(SEE Figure 1 for location of components mentioned below.)

a. Disconnect furnace from power supply.

b. Remove the back terminal cover of the furnace (four screws). (Note placement and connection of wires.)
c. Loosen the nuts on the terminals of the element to be replaced.
d. Straighten the leads of the old element.
e. Open the door and pull the defective element out. (It may be easiest to turn the furnace so that the element to be removed is on top.)
f. Slide the new element into place, threading the leads through the insulating porcelain bushing in the back of the furnace.
g. Bend the elements across the "U" shaped terminal clamp washer. Replace the adjacent element lead across the washer. Put the round terminal clamp washer over the element leads and tighten the nut securely. Cut off any excess lead wire.
h. Replace the back terminal cover with the four screws.
i. Reconnect furnace to power supply.
j. Test operation of furnace.

6-2. TO REPLACE A THERMOCOUPLE:
(SEE Figure 1 for location of components mentioned below.)

a. Disconnect furnace from power supply.
b. Remove the back terminal cover of the furnace (four screws). (Note placement and connection of wires.)
c. Remove the nuts and washers from the thermocouple terminals and pull thermocouple straight out.
d. Insert the new thermocouple into the furnace with "+" mark on the ceramic insulator toward the terminal marked "+ ".
e. Grip the wires near the ceramic insulator with a needle nose pliers and hold firm. With another pliers bend the wires down and loop around the terminals. Connect T/C wire " + " to " + ". Form wires so approximately 1/8" of the ceramic insulators remain outside the furnace back. (A polarity test of the thermocouple and lead wire is easily made with the use of a magnet. On Chromel/Alumel thermocouples and lead wire, the non-magnetic wire is positive (+) and the magnetic wire is negative (-).)
f. Secure connections with nuts and washers removed in 6-2c.
g. Replace the back terminal cover with the four screws.
h. Reconnect furnace to power supply.
i. Test operation of furnace.

6-3. TO REPLACE PRINTED CIRCUIT BOARD:

a. Disconnect furnace from power supply.
b. Turn furnace upside down to expose bottom plate.
c. Remove the bottom plate.
d. Remove the screw and bushing which holds the printed circuit board in place.
e. Pull out the old circuit board.

f. Remove red and yellow wires from printed circuit board by loosening the two screws.

g. Insert red wire into screw opening marked red on new circuit board and tighten screw.

h. Insert yellow wire into screw opening marked yellow on new circuit board and tighten screw.

i. Insert screw into new circuit board and slide bushing on the other side of circuit board before inserting circuit board.

j. Insert circuit board and tighten screw into bracket.

k. Replace bottom plate and secure with four screws.

l. Reconnect furnace to power supply.

6-4. TO REPLACE POTENTIOMETER:

NOTE: Recalibration of control is necessary when the potentiometer is replaced. (Contact Thermolyne.)

a. Disconnect furnace from power supply.

b. Turn furnace upside down to expose bottom plate.

c. Remove the bottom plate.

d. Desolder the orange, yellow and brown wires from the potentiometer mounted on the dial plate.

e. Remove the knob on temperature dial by removing two Allen set screws.

f. Remove nut holding potentiometer to the outside of the dial plate and remove potentiometer.

g. Insert new potentiometer and turn it until the three terminals are facing towards the ON and OFF switch, then secure with the nut on the outside of the dial plate.

h. Looking at the mounted potentiometer from the rear, solder the three wires in the order orange, yellow, brown from top to bottom.

i. Turn the potentiometer shaft fully counterclockwise and slide the knob over the shaft.

j. Secure knob onto shaft with two Allen set screws making sure the line on the dial coincides with the long line on the dial plate.

k. Replace the bottom plate and secure with the four screws.

l. Reconnect furnace to power supply.

m. Test operation of furnace.

6-5. TO REPLACE TRIAC:

a. Disconnect furnace from power supply.

b. Turn furnace upside down to expose bottom plate and remove the four screws from this plate.
c. Remove bottom plate.

d. Disconnect control light and power light wires from terminals. **Identify or mark wires disconnected to insure proper placement and connection when reinstalling.**

e. Remove the fastening clips from lights. Remove lights by pulling them through the front of the control unit.

f. Desolder the wires from the triac. **Identify or mark wires disconnected to insure proper placement and connection when reinstalling.**

g. Remove four nuts that hold plate assembly to front control plate and remove plate assembly.

h. Remove nut and washer from triac, then remove triac.

i. Insert new triac and position it so the large flat terminal is horizontal and is on top. Secure triac with washer and nut.

j. Slide plate assembly back into front control plate and secure with four screws.

k. Resolder the wires as identified or marked in Step (f).

l. Insert the control light (amber) and the power light (green) through their respective holes. Secure the lights with the metal clips.

m. Reconnect the control light and power light wires identified or marked in Step (d).

n. Replace bottom plate and secure with four screws.

o. Turn furnace upright and reconnect furnace to power supply.

p. Test operation of furnace.

6-6. **TO REPLACE FRONT CONTROL PLATE:**

a. Disconnect furnace from power supply.

b. Turn furnace upside down to expose bottom plate.

c. Remove bottom plate.

d. Disconnect the necessary wires from front control plate to enable it to be remove. **Identify or mark wires disconnected to insure proper placement and connection when reinstalling.**

e. Remove four screws from the outside of the front control plate and remove the control plate.

f. Insert new control plate and secure with four screws.

g. Reconnect the wires identified or marked in Step (d) to front control plate.

h. Replace bottom plate and secure with four screws.

i. Turn furnace upright and reconnect furnace to power supply.

j. Test operation of furnace.
6-7. TO REPLACE CONTROL UNIT (Entire Base Section):

   a. Disconnect furnace from power supply.
   b. Turn furnace upside down to expose bottom plate.
   c. Remove bottom plate.
   d. Remove the back terminal cover and its four screws. (Note placement and connection of wires, SEE Figure 2.)
   e. Disconnect terminal one (T1) and terminal two (T2) wires.
   f. Disconnect red and yellow wires from thermocouple by loosening nuts.
   g. Remove the four screws that hold control unit to heating chamber.
   h. Remove control unit.
   i. Set new control unit on heating chamber and secure to heating chamber with four screws.
   j. Reconnect the T/C lead wires to thermocouple. The yellow wire fastens to the positive terminal (+) and the red wire fastens to the opposite terminal (-). Remember red is negative in thermocouple color coding. (SEE Figure 2 for wiring.)
   k. Reconnect the short white insulated wire to terminal one (T1) and the longer one to terminal two (T2).
   l. Replace bottom plate and secure with four screws.
   m. Replace back terminal cover and secure with four screws.
   n. Reconnect furnace to power supply.
   o. Test operation of furnace.

6-8. TO REPLACE INSULATION:

   WARNING

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   CONSULT THE OWNER’S MANUAL FOR THIS EQUIPMENT BEFORE YOU MAKE ANY REPAIRS TO OR REPLACE ANY PARTS, INCLUDING REPAIRS TO OR REPLACEMENTS OF ELECTRICAL COMPONENTS OR INSULATING MATERIALS. THE OWNER’S MANUAL CONTAINS INFORMATION AND WARNINGS RELATING TO THE HAZARDS ASSOCIATED WITH THE REPAIR AND MAINTENANCE OF THIS EQUIPMENT.

   a. Disconnect furnace from power supply.
   b. Remove the back terminal cover with its four screws. (Note placement and connection of wires.)
c. Disconnect terminal one (T1) and terminal two (T2) wires.
d. Disconnect thermocouple and the thermocouple lead wires.
e. Disconnect all element lead wires from terminals and straighten the lead wires to allow them to pass through the back-cover of the heating chamber.
f. Remove the four elements by pulling each element through the front of the furnace. (The top element is usually the easiest to remove first.)
g. Remove back cover with its six screws to expose insulation.
h. From the inside of the furnace, push out the middle insulating piece.
i. Remove the two side insulating pieces through the back of the furnace.
j. To remove the top and bottom pieces of insulation (these are the larger pieces), remove the bottom plate with its four screws.
k. Remove the four screws that hold the control section to the heating chamber and remove the control section.
l. Remove the five screws of the bottom plate of the heating chamber to expose the bottom piece of insulation.
m. Push the sides of the heating chamber out to remove the bottom and top insulating pieces.
n. Insert the new insulation piece in the top first, then the side pieces, and the bottom insulating piece is last. (For best results, push sides of heating chamber out for the bottom piece of insulation.)
o. Replace the bottom heating chamber plate and the five screws.
p. Re-fasten control section onto heating chamber using four screws and replace bottom plate onto control section with four screws. Turn furnace upright.
q. Re-insert elements from the front towards the back. Insert the bottom element first, then the sides, and the top element last. (Make sure elements are flush and are approximately one inch from door opening.)
r. Re-insert back piece of insulation over element leads and insulated porcelain bushings.
s. Replace back terminal plate over element leads with the six screws.
t. Reconnect yellow wire to positive terminal and the red wire to the opposite terminal (negative). Insert thermocouple and fasten the lead tagged positive (+) to the positive terminal and the other lead to the opposite terminal (negative).
u. Bend the element leads across the "U" shaped terminal clamp washer and secure element leads. (SEE Figure 2.)
v. Replace the links across the adjacent terminals and fasten the short white insulated wire to terminal two (T2) and the long one to terminal one (T1). Secure the terminal wires and links. (SEE Figure 2.)
w. Replace the back terminal cover with four screws.
x. Reconnect furnace to power supply.
y. Test operation of furnace.
6-9. TO REPLACE DOOR SWITCH (Micro Switch):

a. Disconnect furnace from power supply.

b. Turn furnace upside down and remove bottom plate.

c. Disconnect the wires from door switch. Identify or mark wires disconnected to insure proper placement and connection when reinstalling.

d. Remove two screws from micro switch and slide switch off the wire rod.

e. Insert new door switch while sliding it over the wire rod. Secure door switch to bracket.

f. Reconnect wires identified or marked in Step (c) to new door switch.

g. Replace bottom cover and secure with four screws.

h. Turn furnace upright and reconnect to power supply.

i. Test operation of door switch.

6-10. TO REALIGN DOOR SWITCH:

a. Disconnect furnace from power supply.

b. Loosen set screw on cam and adjust it so that the power is removed when approximately a 15° movement is made with the door handle. (When opening the door.)

c. Tighten set screw on adjusting cam. Reconnect furnace to power supply. Test operation of door switch.
# REPLACEMENT PARTS LIST: MUFFLE FURNACE

**Model No’s.:** FA10520P & -1, FA10524P & -1, FA10525P & -1, FA10520P-1-26, FA10520P-26  
**Series No.:** 325

## Key

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>KEY</th>
<th>NO.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>FX15</td>
<td>Fastener, Rivet (4 required)</td>
<td>41</td>
<td>KBX31</td>
<td>Knob</td>
<td></td>
</tr>
</tbody>
</table>
| 3   | DR325X1A | Door Assembly | 42  | FSX15 | Fastener, Screw (4 required) |}

Parts should be ordered from dealer where furnace was purchased. If part is not in dealer’s stock, it may be ordered from the manufacturer. **When ordering, please give serial and model numbers.**
Figure 4
Wiring Diagram
ORDERING PROCEDURES

Please refer to the Specification Plate for the complete model number, serial number and for series number when requesting service, replacement parts or in any correspondence concerning this THERMOLYNE unit. All parts listed herein may be ordered from the BARNSTEAD/THERMOLYNE dealer from whom you purchased this unit or can be obtained promptly from the factory. When service or replacement parts are needed we ask that you check first with your dealer, if he cannot handle your request, then contact our Customer Service Department - (319) 556-2241 or (800) 553-0039.

Prior to returning any materials to Barnstead/Thermolyne Corp., please contact our Customer Service Department for a “Return Goods Authorization” number (RGA). Material returned without a RGA number will be refused.

ONE YEAR LIMITED WARRANTY

Barnstead/Thermolyne Corporation warrants this product to be free from defects in material and workmanship for a period of one year from date of purchase. This warranty applies only to defects in original parts or components, and does not apply to claims or alleged product failures resulting from unauthorized repairs, misuse, accidents or lack of proper maintenance, failure to follow Barnstead/Thermolyne's instructions for use or from ordinary wear and tear. Warranty service may be obtained by returning any defective product to an authorized Barnstead/Thermolyne dealer or to Barnstead/Thermolyne. Heating elements, because of their susceptibility to overheating and contamination, must be returned to our factory and if, upon inspection, it is concluded that failure is not due to excessive high temperature or contamination, warranty replacement will be provided. Barnstead/Thermolyne's sole obligation under this warranty shall be to repair or replace any products which it delivers and are found to be defective.