

# *Type F21100* **Tube Furnace**

## OPERATION MANUAL AND PARTS LIST *SERIES 1260*

<b>Model #</b>	<b>Voltage</b>	<b>Control</b>
F21125	120	Manual
F21120	240	Manual
F21120-33	230	Manual
F21130	240	Single Set Point
F21130-33	230	Single Set Point
F21135	120	Single Set Point

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# General Information

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## Alert Signals



### Warning

Warnings alert you to a possibility of personal injury.



### Caution

Cautions alert you to a possibility of damage to the equipment.



### Note

Notes alert you to pertinent facts and conditions



### Hot Surface

Caution: Hot Surface. Avoid Contact. To avoid burns do not touch this furnace on the exterior or interior surfaces during use or for a period of time after use.

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## Safety Information

Your BarnsteadThermolyne Tube Furnace has been designed with function, reliability, and safety in mind. It is your responsibility to install it in conformance with local electrical codes. For safe operation, please pay attention to the alert boxes throughout the manual.

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## Warnings

To avoid electrical shock, this furnace must:

1. Use a properly grounded electrical outlet of correct voltage and current handling capacity.
2. Disconnect from power supply before servicing.
3. Always use a properly sized combustion tube.

To avoid personal injury:

1. 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.
2. Refer servicing to qualified personnel.

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# Warning



## **Warning**

Please note the following warnings.

## **WARNING**

This warning is presented for compliance with California Proposition 65 and other regulatory agencies and only applies to the insulation in this product. This product contains refractory ceramic, refractory ceramic fiber or fiberglass insulation, which can produce respirable dust or fibers during disassembly. Dust or fibers can cause irritation and can aggravate pre-existing respiratory diseases. Refractory ceramic and refractory ceramic fibers (after reaching 1000°C) contain crystalline silica, which can cause lung damage (silicosis). The International Agency for Research on Cancer (IARC) has classified refractory ceramic fiber and fiberglass as possibly carcinogenic (Group 2B), and crystalline silica as carcinogenic to humans (Group 1).

The insulating materials can be located in the door, the hearth collar, in the chamber of the product or under the hot plate top. Tests performed by the manufacturer indicate that there is no risk of exposure to dust or respirable fibers resulting from operation of this product under normal conditions. However, there may be a risk of exposure to respirable dust or fibers when repairing or maintaining the insulating materials, or when otherwise disturbing them in a manner which causes release of dust or fibers. By using proper handling procedures and protective equipment you can work safely with these insulating materials and minimize any exposure. Refer to the appropriate Material Safety Data Sheets (MSDS) for information regarding proper handling and recommended protective equipment. For additional MSDS copies, or additional information concerning the handling of refractory ceramic products, please contact the Customer Service Department at Barnstead International at 1-800-553-0039.

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# Introduction

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## Introduction

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### Intended Use

The type 21100 furnaces are small, inexpensive furnaces ideally suited for school, chemical and industrial laboratories. They are intended for applications requiring temperatures up to 1100°C for manual control bases or temperatures up to 1200°C for the electronic single set point control bases. See specification sheet for continuous and intermittent operating temperatures.

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### General Usage

Do not use this product for anything other than its intended usage.

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### Principles of Operation

The furnace chamber is heated by heating elements embedded in a refractory material. The tubular chamber is insulated with a ceramic fiber insulation. The furnace chamber is supported by the control base which also houses the electrical connections. Two types of controls are used:

- 1. Manual Control** - A percentage input control which compensates for line voltage fluctuation and ambient temperature changes. The temperature is measured by a thermocouple and is displayed on a pyrometer.
- 2. Single Set Point Control** - An electronic control which enables the user to bring the furnace up to a pre-set temperature and hold the temperature.

# General Specifications

Model Number	F21135, *F21125	F21130, *F21120	F21130-33, *F21125-33
Dimensions - In. (cm)			
Overall Width Height	16 (40.6) 14.63, *14.75 (37.2, *37.5)	16 (40.6) 14.63, *14.75 (37.2, *37.5)	16 (40.6) 14.63, *14.75 (37.2, *37.5)
Chamber Width Height	12 (30.5) 1.0 & 2.0 Dia. (2.5 & 5)	12 (30.5) 1.0 & 2.0 Dia. (2.5 & 5)	12 (30.5) 1.0 & 2.0 Dia. (2.5 & 5)
Weight - lbs (Kg)	19 lbs 5 oz (8.8) *19 lbs 12 oz (9.0)	19 lbs 5 oz (8.8) *19 lbs 12 oz (9.0)	19 lbs 5 oz (8.8) *19 lbs 12 oz (9.0)
Electrical Ratings			
Volts	120	240	230
Amps	11.25	5.6	5.4
Watts	1350	1350	1240
Freq.	50/60	50/60	50/60
Phase	1	1	1
Temperature Ratings °C	100 - 1200°C *371 - 1100°C	100 - 1200°C *371 - 1100°C	100 - 1200°C *371 - 1100°C

\* For models with manual control.

Temperatures specified, obtained with both 1.0" Dia. and 2.0" Dia. ceramic process tubes, 17" long.

## Environmental Conditions

Operating: 17°C - 27°C; 20% to 80% relative humidity, non-condensing. Installation Category II (over-voltage) in accordance with IEC 664. Pollution Degree 2 in accordance with IEC 664.

Altitude limit: 2,000 meters.

Storage: -25°C to 65°C; 10% to 85% relative humidity.

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## Declaration of Conformity

(for 230 volt, CE Models Only)

Barnstead International hereby declares under its sole responsibility that this product conforms with the technical requirements of the following standards:

EMC:	EN61000-3-2	Limits for Harmonic current emissions
	EN61000-3-3	Limits for voltage fluctuations and flicker
	EN61326-1	Electrical equipment for measure, control, and laboratory use; Part I: General Requirements
Safety:	EN61010-1	Safety requirements for electrical equipment for measurement, control, laboratory use; Part I: General Requirements
	EN61010-2-010	Part II: Particular requirements for laboratory equipment for the heating of materials

*per the provisions of the Electromagnetic Compatibility Directive 89/336/EEC, as amended by 92/31/EEC and 93/68/EEC, and per the provisions of the Low Voltage Directive 73/23/EEC, as amended by 93/68/EEC.*

*The authorized representative located within the European Community is:*

Electrothermal Engineering Ltd.  
419 Sutton Road  
Southend On Sea  
Essex SS2 5PH  
United Kingdom

Copies of the Declaration of Conformity are available upon request.

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# Unpacking

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## Unpacking

Unpack furnace from box and remove packing material from inside furnace chamber. The furnace is supplied with a three wire cord and plug & 2-JC211x1 (1") diameter tube mounting vestibules. Furnace does not contain a refractory process tube.



**Note**

Contact the dealer from which your furnace was purchased to obtain proper process tube and information regarding its use.



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# Installation

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## Installation

**SITE SELECTION:** Install furnace on a sturdy surface and allow space for ventilation.

The electrical specifications are located on the specification plate on the back of the furnace. Consult Barnstead/Thermolyne if your electrical service is different than those listed on the specification plate. Prior to connecting your Type 21100 furnace to your electrical supply, be sure the power or control switch is in the OFF position.



### Caution

Be sure ambient temperature does not exceed 104°F (40°C); ambients above this level may result in damage to the control.

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



### Note

Furnace comes with both 1" and 2" dia. end caps. Install the end cap which fits the tube you plan to use.



### 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.

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# Operation



## Caution

Monitor furnace if percent time input is set greater than 40% on and particularly when the control is set on "9" or above. The furnace may overheat and burn out the elements or thermocouple if not properly monitored under these conditions.



## Caution

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.



## Hot Surface

"Caution: Hot Surface. Avoid Contact."  
To avoid burns, do not touch this furnace on the exterior or interior surfaces during use or for a period of time after use.

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## Operation of Manual and Automatic Models

### Observe These Warnings Before Operating Your Furnace:

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#### Manual Control Models (F21120-33, F21125, F21120)

The control switch is a combination ON/OFF switch and temperature control. The furnace is ON at any setting of the control switch except in the OFF position. Turn the control switch counterclockwise to set rate of heating.

**Cycle Light:** The amber cycle light will illuminate whenever the power is being applied to the elements.

The marks on the control indicate the percent of time power is applied to the heating elements. An increase in percent time "On" results in a higher chamber temperature. Adjust control switch to maintain desired temperature setting. To turn the furnace off, turn control either fully clockwise or fully counterclockwise to the OFF position.

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#### Pyrometer

The pyrometer with a thermocouple indicates the chamber temperature. It does not control the furnace in any manner. It is provided to enable the operator to observe the temperature within the chamber.

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# Operation

## All Modes Single Set Point Temperature Control (Automatic) (F21130, F21130-33, F21135)



### **Warning**

To avoid personal injury 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.



### **Hot Surface**

Caution: Avoid Contact. To avoid burns, this furnace must not be touched on the exterior or interior surfaces during use or for a period of time after use.



### **Warning**

Always wear safety glasses or a safety shield and high temperature gloves when loading or unloading the furnace. Long sleeved, fire retardant clothing and a fire retardant apron is also recommended.

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### **Power Switch**

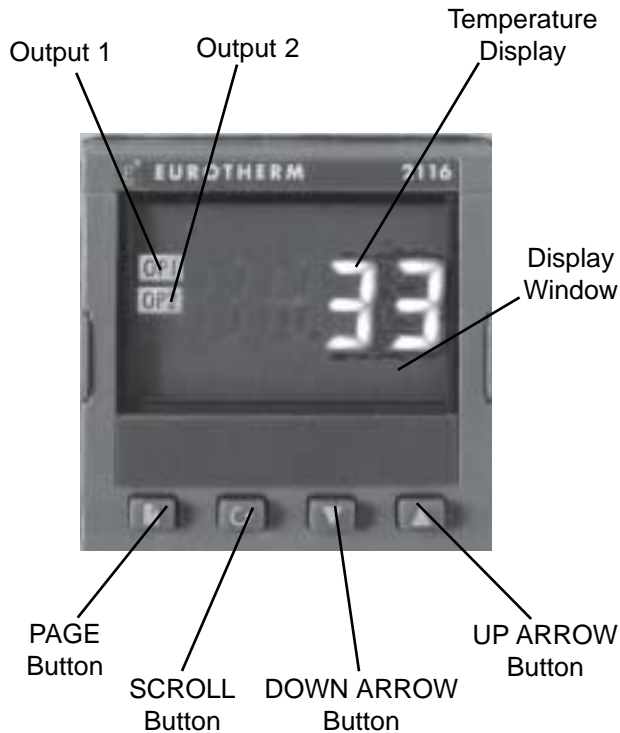
Both the ON/OFF power switch and the digital display will illuminate when power is switched ON. The furnace will begin to heat to the controller's current setpoint.

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### **Cycle Light**

The amber cycle light will illuminate whenever the power is being applied to the heating elements. The cycle light will turn on and off as the furnace reaches the setpoint.

# Single Setpoint Controller



The **single setpoint model** furnace controller is a single setpoint controller which provides a single digital display to indicate the current chamber temperature or setpoint temperature. This temperature controller features sensor break protection and self-tuning capability.

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## Basic Operation

When the controller is turned ON it will perform a short self-test and then display the measured value (process value) in the HOME DISPLAY.

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## Buttons and Indicators

**OP1 (Output 1):** Illuminates when the logic output is ON.

**OP2 (Output 2):** Illuminates when the relay output is ON (will go out during an alarm situation).

**PAGE button:** Allows you to select a new list of parameters.

**SCROLL button:** Allows you to select a parameter within a list of parameters.

**DOWN button:** Allows you to decrease a value.

**UP button:** Allows you to increase a value.

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## To View or Change the Setpoint

To view the setpoint, press and release the UP or DOWN buttons. If you want to change the setpoint, continue pressing until the desired setpoint value is displayed and then release the button. A few seconds after the button is released, the controller will accept the new value and revert to the HOME DISPLAY.

### Single Setpoint Models



#### Note

If at any time you want to return to the HOME DISPLAY, simultaneously press the PAGE and SCROLL buttons.

desired setpoint value is displayed and then release the button. A few seconds after the button is released, the controller will accept the new value and revert to the HOME DISPLAY.

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## To View the Display Units

From the HOME DISPLAY press the SCROLL button. The display will show the temperature units in °C/F/K and then return to the HOME DISPLAY. (Call Customer Service if you require a different temperature unit.)

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## To View the % Output Power

From the HOME DISPLAY press the SCROLL button twice. Press and release the UP or DOWN button to view the % output power. This value is a read-only value and cannot be changed.

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## Controller Parameters

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### Home display

**°C:** Temperature units in Celsius. Temperature units can not be changed without entering the configuration. Contact Customer Service if a different temperature unit is required.

**OP:** % output power demand.

**IdHi:** Deviation high alarm.

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### Al List

**IdHi:** Deviation high alarm.

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### Atun List

**tunE:** One-shot autotune enable.

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### Pid List

**Pb:** Proportional band (in display units).

**ti:** Integral time in seconds.

**td:** Derivative time in seconds.

**ACCS List Code:** Access code (Code needed to enter or change the other configuration parameters which are not normally accessible.) Not accessible.

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## Alarms

The controller will flash an alarm message in the home display if an alarm condition is detected.

**2FSH:** Measured value full scale high alarm.

**IdHi:** Measured value deviation high alarm.

**S.br:** Sensor break: check that sensor is connected correctly.

**L.br:** Loop break: check that the heating circuits are working properly.

**Ld.F:** Heater Circuit fault: indication of either an open or short solid state relay, a blown fuse, missing supply or open circuit heater.



### Note

The following alarm messages are factory default settings and may vary if you have changed the configuration of your controller:

**IDHi:** = 50°C  
**2FSH:** = 1225°C

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## Sensor Break Protection

This controller provides sensor break protection in the event the thermocouple opens. If an open thermocouple condition occurs, the digital display will blink "S.br" and the power to the heating element will be shut OFF (Cycle light will extinguish).

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## Over-Temperature Protection (OTP)

The OTP will be in effect during any alarm condition when the temperature of the furnace has deviated beyond the limit. The "Deviation High" alarm is the only alarm value which can be changed. To change it, press

the SCROLL button until “IdHi” appears on the display. Press the UP or DOWN button to select the OTP value you desire. We recommend a value of 20° above your working temperature to provide protection for your workload.

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## Tuning

This controller incorporates a self-tuning feature which determines the optimum control parameters for the best temperature accuracy with your load and setpoint. Use this feature the first time you use your furnace and each time you change either your setpoint or the type of load you are heating. Barnstead|Thermolyne recommends you use this feature to provide the best temperature accuracy the controller can attain. To use the tuning feature:

1. Adjust the setpoint to your desired value.
2. Press the PAGE button until display reads, “Atun.”
3. Press the SCROLL button. Display will read, “tunE.”
4. Press the UP or DOWN button to select, “on.”
5. Simultaneously press the PAGE and SCROLL buttons to return to the HOME DISPLAY. The display will alternately flash between “tunE” and the HOME DISPLAY while tuning is in progress.
6. The controller will then turn the heating on and off to induce an oscillation. When the measured value reaches the required setpoint the first cycle will end.
7. Tuning will be complete after two oscillation cycles and then the tuner will turn itself off.
8. Normal control function will resume after the controller calculates tuning parameters.

**Note**

“Stat” and “Sp.r” in Sp list must be set to OFF or “tunE” will not initiate.

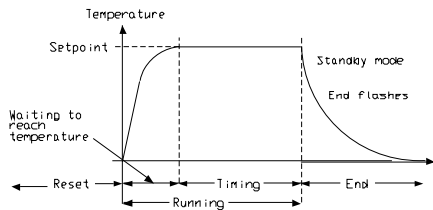
**Note**

Furnace must be at ambient temperature before starting a tune.

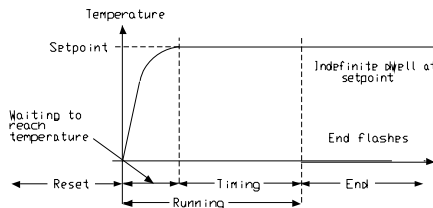
**Note**

Tune has completed when “tunE” stops flashing on display.

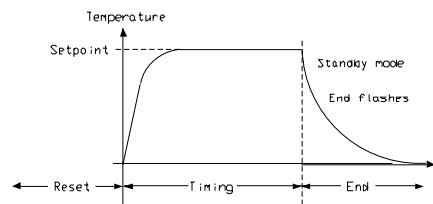
# Single Ramp & Dwell



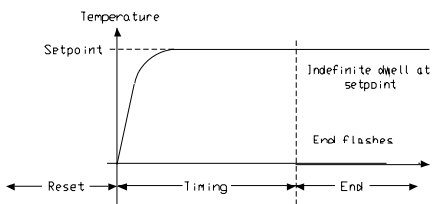
Mode 1 (Opt. 1)



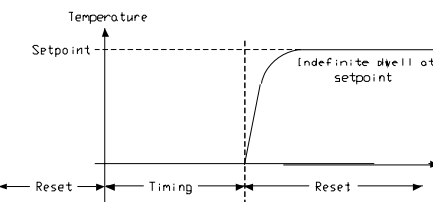
Mode 2 (Opt. 2)



Mode 3 (Opt. 3)



Mode 4 (Opt. 4)



Mode 5 (Opt. 5)

## Functions

This type of controller has single ramp and dwell programming capabilities. The Ramp and Dwell can be configured to five different modes.

1. Mode 1 (Opt. 1) is a Ramp (if needed) to the Setpoint temperature, a Dwell, and then a cool down.
2. Mode 2 (Opt. 2) is the same as mode 1, except the controller continues to heat at the Setpoint after the Dwell has completed. (This mode does not cool down.)
3. Mode 3 (Opt. 3) is the same as mode 1, except the Dwell time includes the Ramp (if needed).
4. Mode 4 (Opt. 4) is the same as mode 2, except the Dwell time includes the Ramp (if needed).
5. Mode 5 (Opt. 5) is a Dwell (delay time) before the controller Ramps (if needed) to the Setpoint temperature.

## Program Overview

- A program mode can be set by changing the "tm.OP" variable to "Opt. 1, Opt. 2, Opt. 3, Opt. 4, or Opt. 5.
- A Ramp rate may be set by changing the "SPrr" variable to a value. The Ramp rate units are in degrees per minute.
- The Dwell time can be set by changing the "dwEll" variable to the desired value. Dwell time units are in minutes.
- The program Status can be set by changing the "StAt" variable to "run" or "oFF." This variable will start or stop the program.





**Note**

The program must be stopped and the controller must be displaying the actual temperature before beginning the Setup.

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## Program Setup

1. Press the PAGE button until the “SP” is displayed.
2. Press the SCROLL button once, “SPrr” (Ramp Rate) will be displayed, set the desired Ramp rate with the UP or DOWN buttons, if the ramp to set-point feature is needed. If the Ramp rate is not needed, then set to “OFF” with the UP or DOWN buttons.
3. Press the SCROLL button once, “tm.OP” (Ramp & Dwell mode) will be displayed, select the desired mode with the UP or DOWN buttons. (Opt. 1, Opt. 2, Opt. 3, Opt. 4, Opt. 5)
4. Press the SCROLL button once, “dwell” will be displayed, set the desired Dwell time with the UP or DOWN buttons. (Dwell in minutes.)
5. Press the PAGE button until the Actual temperature is displayed.

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## Running the Program

1. Press the SCROLL button until “StAt” is displayed, set to “run” with the UP or DOWN buttons.
2. Press the PAGE button to display Actual temperature.

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## Stopping the Program

Press the SCROLL button until “StAt” is displayed, set to “oFF” with the UP or DOWN buttons.

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## Clearing the Flashing End

Press the PAGE and SCROLL buttons at the same time.

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## Verifying a Running Program

Press the SCROLL button until "StAt" is displayed. The display will show "run" if the program is running, or "oFF" if it is not running. Press the PAGE button to display Actual temperature.

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# Furnace Loading

**Caution**

Do not overload your furnace chamber. Failure to observe this caution could result in damage to furnace components.

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## Furnace Loading

For best results of furnace loading and temperature uniformity, use only the center six inches of the furnace chamber.

Keep objects away from thermocouple.

Use insulated tongs and mittens when loading and unloading furnace.

Always wear safety glasses.

Use the proper process tube.

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# Preventative Maintenance



## Warning

To avoid electrical shock, this furnace must always be disconnected from the power supply prior to maintenance and servicing.

Refer servicing to qualified personnel.

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## Preventative Maintenance

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).

Housekeeping is vital to your electric furnace—KEEP IT CLEAN! Run your furnace up to 871°C empty occasionally to burn off the contamination that may exist on the insulation and elements. Run for approximately two hours with the process tube removed.

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 260°C.

During normal use the thermocouple in your furnace can become oxidized and cause inaccurate readings; therefore, we suggest that if you regularly use your furnace **you should change your thermocouple once every six months to assure the accuracy of your meter readings.**

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## General Cleaning Instructions

Wipe exterior surfaces with lightly dampened cloth containing mild soap solution.

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# Troubleshooting

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## Troubleshooting



### **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 DUST 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 hearth collar 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 International.

REFER SERVICING TO QUALIFIED PERSONNEL.



### **WARNING**

Disconnect from the power supply prior to maintenance and servicing.

Refer servicing to qualified personnel.

## TROUBLESHOOTING

The Troubleshooting 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.

<b>Problem</b>	<b>Possible Causes</b>	<b>Corrective Action</b>
The power switch light does not illuminate.	The furnace is not connected to power supply.	Check furnace connection to power supply.
No display on Single Set Point Control	ON and OFF power switch defective.	Replace power switch.
The furnace does not heat.	No power.	Check power source and fuses or breakers.
	Thermocouple is open or thermocouple leads reversed.	Replace thermocouple or check thermocouple connections.
	Controller malfunction.	Verify and correct all parameters and configuration values. If "malfunction" persists, replace control.
	Element burned out.	Replace element.
	Solid state relay defective.	Replace solid state relay.
	Chamber section not connected to base.	Reconnect chamber section to base.
Slow heatup.	Low line voltage.	Install line of sufficient size and proper voltage. (Isolate furnace from other electrical loads.)
	Heavy load in chamber.	Lighten load in chamber to allow heat to circulate.
	Wrong heating element.	Install proper element.
	Low SPrr setting.	Increase setting.

<b>Problem</b>	<b>Possible Causes</b>	<b>Corrective Action</b>
Repeated element burnout.	<p>Overheating furnace.</p> <p>Control malfunction.</p> <p>Incorrect element.</p> <p>Oxidized thermocouple leading to inaccurate reading.</p> <p>Wired improperly.</p>	<p>Keep furnace under maximum temperature. Closer supervision of control setting.</p> <p>Replace control.</p> <p>Install proper element.</p> <p>Replace thermocouple.</p> <p>Check wiring diagram for correct wiring of your furnace.</p>
Inaccurate temperature readout.	<p>Oxidized or contaminated thermocouple.</p> <p>Poor thermocouple connection.</p> <p>Improper loading procedures.</p> <p>Poor ventilation of base.</p> <p>Thermocouple connections reversed.</p> <p>*Static charge on pyrometer case. breathing on cover,</p> <p>Control out of calibration.</p> <p>P.I.D. values invalid.</p> <p>Control malfunction.</p>	<p>Replace thermocouple.</p> <p>Tighten connections.</p> <p>Use proper loading procedures.</p> <p>Clear area around furnace base.</p> <p>Reconnect thermocouple correctly.</p> <p>Dispel static charge by treat for static charge.</p> <p>Contact Barnstead International</p> <p>Re-tune control.</p> <p>Verify and correct all parameter and configuration values. If "malfunction" persists, replace control.</p>

*\*Applies to the manual temperature control models.*

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# Maintenancing and Servicing

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## Maintenancing and Servicing

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### To Replace Vestibule End Caps

- a. Disconnect furnace from power supply.
- b. Remove the metal end cap.
- c. Remove old vestibule. Insert the new vestibule, aligning the two holes in the vestibule with the holes on the bracket.
- d. Before pushing the metal end caps back onto the chamber, insert the two screws through the holes in the metal end cap and vestibule. Then, start the two screws into the holes in the bracket two or three turns, push the metal end cap onto the chamber and finish tightening the two screws.
- e. Reconnect furnace to power supply.



#### Note

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

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### To Replace Heating Element

- a. Disconnect furnace from power supply.
- b. Disconnect the cord from furnace chamber to control base. Identify the color and placement of the thermocouple extension wires and disconnect from control base.
- c. Remove furnace chamber from the bracket.
- d. Remove both end caps and vestibules of furnace chamber.
- e. Remove terminal plate with four screws to expose wiring. (Note placement and connection of thermocouple and element wires.)
- f. Remove two element lead wires from terminal block. Also, remove thermocouple by removing two screws on terminal block then pulling it straight back.
- g. Remove the four screws that secure heating element tube inside the case, then slide out the old heating element tube.
- h. Insert new heating element tube and thread each element lead wire through the brass bushings.
- i. Secure heating element tube to case.
- j. Reinstall thermocouple and connect thermocouple and new element lead wires to terminal block.
- k. Replace terminal plate.
- l. Insert the screw on the terminal plate through the mounting bracket and secure with knob.
- m. Replace both end caps and vestibules.
- n. Reconnect power cord from furnace chamber to control base.
- o. Reconnect thermocouple extension wires to control base



terminal block. Looking from the rear of the furnace, reconnect the red wire to the terminal on the far right side of the block. The yellow wire connects to the terminal second from the right side of the terminal block.

- p. Reconnect furnace to power supply.

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### To Replace Pyrometer (Manual Control Models)

- a. Disconnect furnace from power supply.
- b. Remove furnace chamber from control base.
- c. Turn control base upside down and remove bottom cover.
- d. Remove black and red wires from terminal block on back of unit.
- e. Remove pyrometer from dial plate of control base.
- f. Insert new pyrometer and secure to dial plate.
- g. Looking from the rear of the furnace, reconnect red thermocouple extension wire to the terminal on the far right side of the terminal block. Reconnect black thermocouple extension wire to the terminal second from the right side of the terminal block.
- h. Replace bottom cover.
- i. Turn control base upright and secure furnace chamber to it.
- j. Reconnect furnace to power supply.

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### To Replace Manual Temperature Control Switch

- a. Disconnect furnace from power supply.
- b. Remove furnace chamber from control base.
- c. Turn control base upside down and remove bottom cover.
- d. Remove control knob with two Allen set screws.
- e. Remove two screws by pulling straight out.
- f. Disconnect wires from control. Identify or mark wires disconnected from control to insure proper placement and connection when reinstalling. Remove defective control.
- g. Looking from the rear of the furnace, insert new control with the H<sub>1</sub> (vertical lead) and H<sub>2</sub> (horizontal lead) leads on top and secure to dial plate.
- h. Replace knob by sliding knob over shaft.
- i. Reconnect the wires identified or marked in Step (f) to new control.
- j. Replace bottom cover.
- k. Turn control base upright and secure furnace chamber to it.

- i. Reconnect furnace to power supply.

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### To Replace Furnace Chamber

- a. Disconnect furnace from power supply.
- b. Remove black knob holding furnace chamber to bracket and remove furnace chamber.
- c. Remove terminal plate on back of furnace chamber. (Note placement and connection of wires.)
- d. Disconnect thermocouple extension wires and power cord from terminal block.
- e. Remove back terminal plate on new furnace chamber.
- f. Insert power cord and thermocouple extension wires through their proper holes in the bracket on the new furnace chamber. (See Figure 2 for placement and connection of wires.)
- g. Replace back terminal plate.
- h. Insert screw on back terminal plate through bracket slot and secure with knob.
- i. Reconnect furnace to power supply.

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### To Replace Type K (Chromel/Alumel) Thermocouple (Manual Control Models)

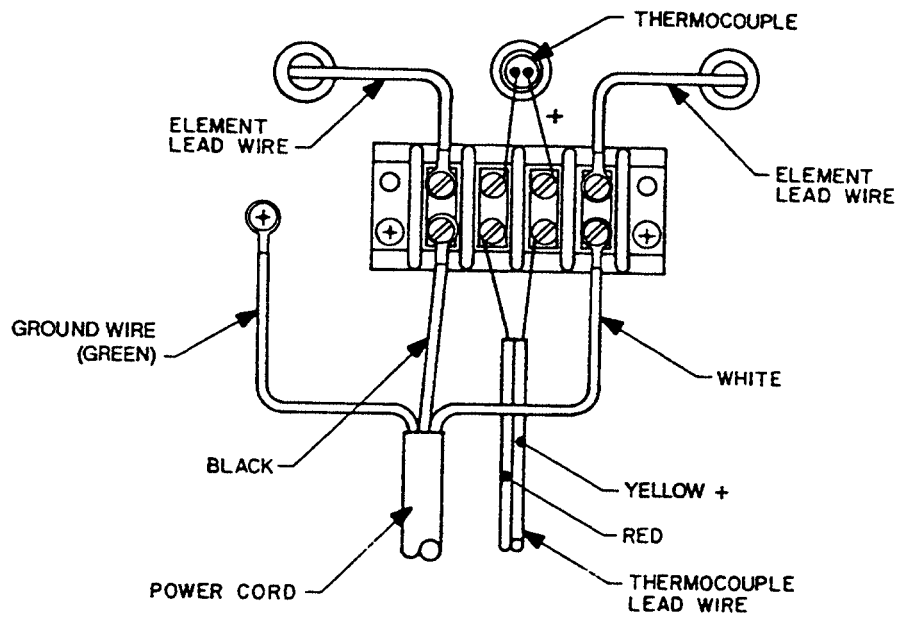
- a. Disconnect furnace from power supply.
- b. Remove knob that holds furnace chamber to the bracket and remove the furnace chamber.
- c. Remove terminal plate on back of furnace chamber.
- d. Remove two screws that secure the old thermocouple and remove thermocouple by pulling straight back.
- e. Insert the new thermocouple until tip extends approximately 1/4" into the heating chamber. Connect the lead marked (+) on insulator of thermocouple to the terminal across from yellow thermocouple extension wire, and fasten the other thermocouple lead (-) to the remaining terminal. (See Figure 2.)  
(A polarity test of the lead wire is easily made with the use of a magnet. On chromel/alumel thermocouples and extension wires, the non-magnetic wire is positive (+) and the magnetic wire is negative (-).
- f. Replace terminal plate.
- g. Insert the screw on the terminal plate through the mounting bracket and secure with knob.
- h. Reconnect furnace to power supply.

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### To Replace Type Platinel II Thermocouple (Single Set Point Control Models)

- a. Disconnect furnace from power supply.
- b. Remove knob that holds furnace chamber to the bracket and remove the furnace chamber.
- c. Remove terminal plate on back of furnace chamber.
- d. Remove two screws that secure the old thermocouple and remove thermocouple by pulling straight back.
- e. Insert the new thermocouple until tip extends approximately 1/4" into heating chamber.
- f. Connect the blue and yellow beaded thermocouple lead to the terminal across from yellow thermocouple extension wire and the other thermocouple lead to the remaining terminal. (See figure 2)
- g. Insert the screw on the terminal plate through the mounting bracket and secure with knob.
- h. Reconnect furnace to power supply.

**MAINTENANCE AND SERVICING**



**Figure 2 All Models**

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# Replacement Parts List

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## Replacement Parts List Series 1259

Part Number	Description	Model Number
EL211X1B	120V Element	F21125, F21135
EL211X2B	230V Element	F21120, F21130, F21130-33, F21120-33
TC211X1A	Thermocouple, Chromel/Alumel	All Manual Control Models
TC662X1A	Thermocouple, Platinel II	All Electronic SSP Models
CN71X105	Electronic SSP Control	All Electronic SSP Models
CNX60	Manual Control	F21125
CNX61	Manual Control	F21120, F21120-33
ME1260X1	Pyrometer	F21120, F21120-33, F21125
RYX34	Solid State Relay	F21130, F21130-33, F21135
440-0020	Fuse, Type ABC, 250V, 8 Amp	F21120, F21120-33, F21130, F21130-33
2-58147 Fuse,15 Amp	F21125, F21135	
SWX143	Main Power Switch	F21125, F21135
SWX144	Main Power Switch	F21120, F21120-33, F21130, F21130-33
CAX44	Filter, EMI	F21130-33, F21120-33
CS1260X4	Furnace Chamber Complete, 240V	F21120, F21120-33, F21130, F21130-33
CS1260X3	Furnace Chamber Complete, 120V	F21125, F21135

## Ordering Procedures

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### Ordering Procedures

Please refer to the Specification Plate for the complete model number, serial number, and series number when requesting service, replacement parts or in any correspondence concerning this unit.

All parts listed herein may be ordered from the **Barnstead International** 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 the dealer cannot handle your request, then contact our Customer Service Department at 563-556-2241 or 800-553-0039.

Prior to returning any materials to **Barnstead International**, please contact our Customer Service Department for a "Return Materials Authorization" number (RMA). Material returned without a RMA number will be refused.

# Wiring Diagrams

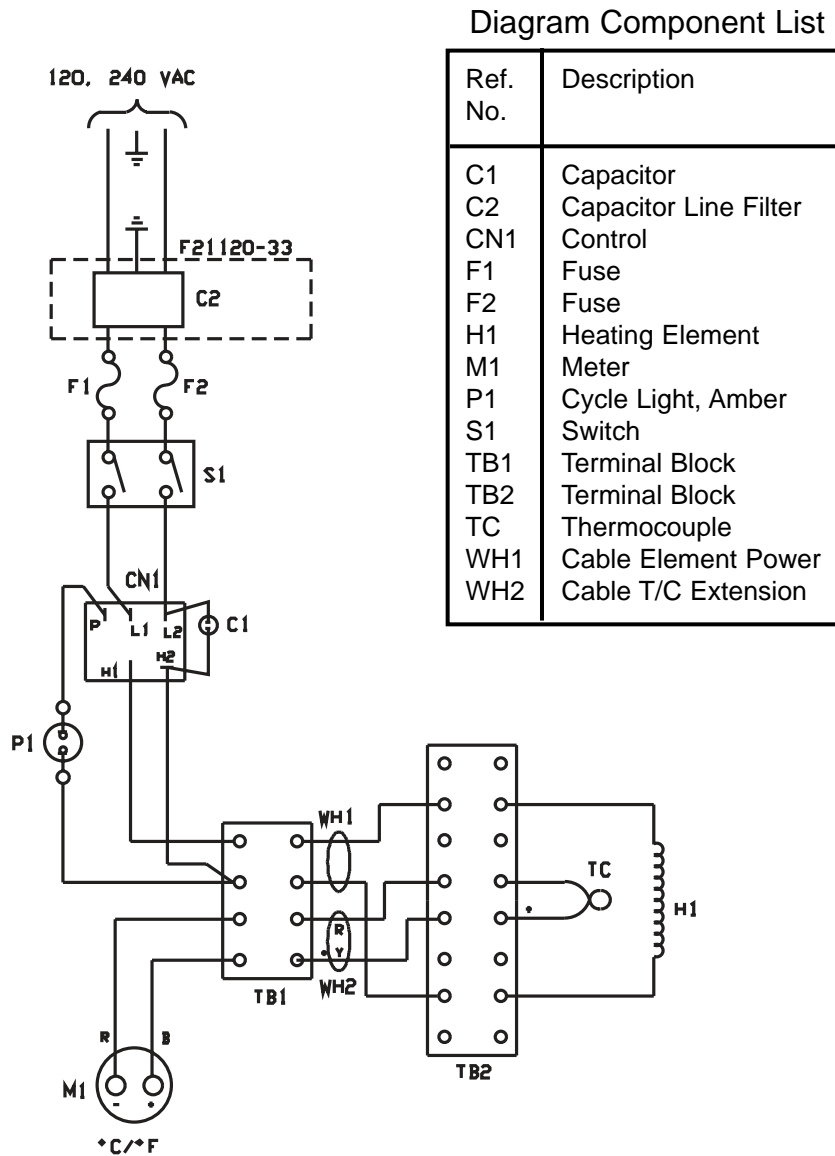


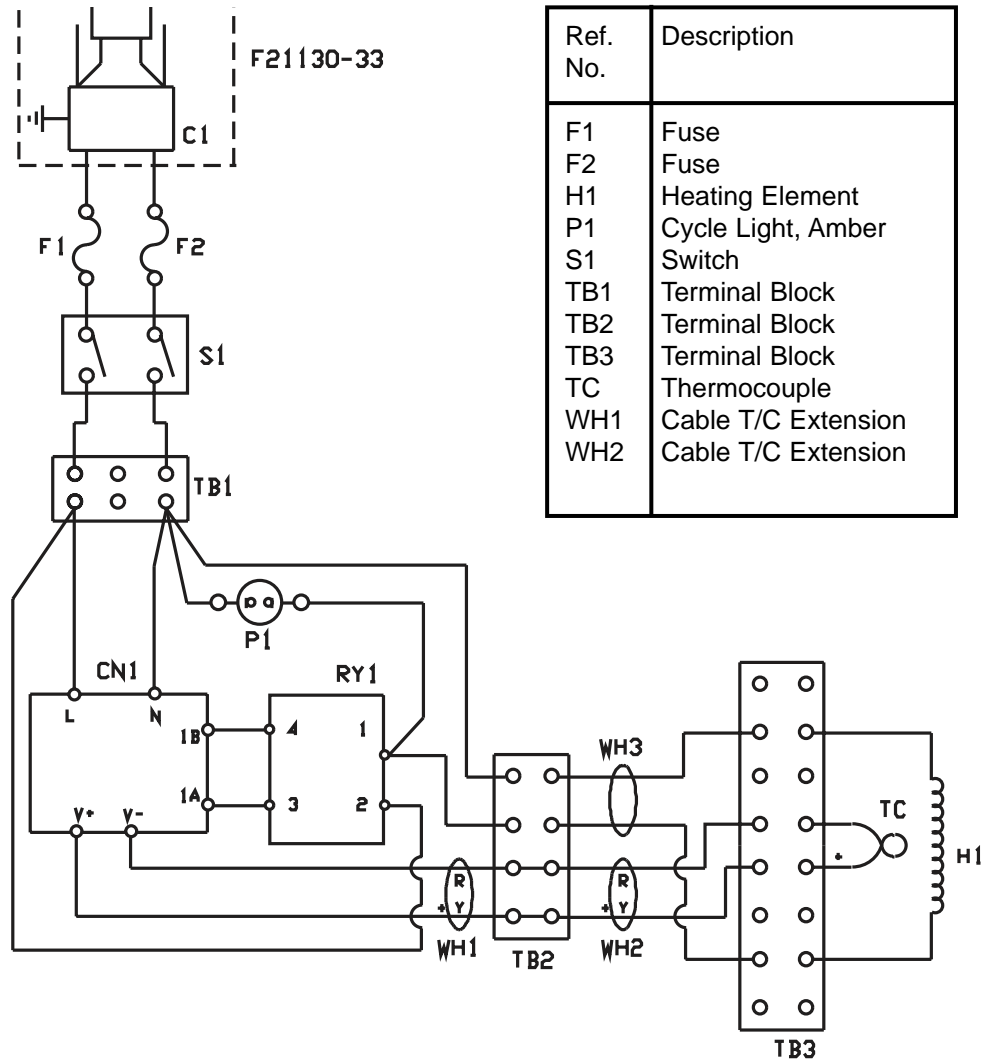
Diagram Component List

Ref. No.	Description
C1	Capacitor
C2	Capacitor Line Filter
CN1	Control
F1	Fuse
F2	Fuse
H1	Heating Element
M1	Meter
P1	Cycle Light, Amber
S1	Switch
TB1	Terminal Block
TB2	Terminal Block
TC	Thermocouple
WH1	Cable Element Power
WH2	Cable T/C Extension

**Wiring Diagram for Models F21120, F21120-33, F21125**

Diagram Component List

Ref. No.	Description
F1	Fuse
F2	Fuse
H1	Heating Element
P1	Cycle Light, Amber
S1	Switch
TB1	Terminal Block
TB2	Terminal Block
TB3	Terminal Block
TC	Thermocouple
WH1	Cable T/C Extension
WH2	Cable T/C Extension



Wiring Diagram for Models F21130, F21130-33, F21135

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# One Year Limited Warranty

Barnstead International (“BARNSTEAD”) warrants that if a product manufactured by Barnstead shall be free of defects in materials and workmanship for one (1) year from the first to occur of (i) the date the product is sold by BARNSTEAD or (ii) the date the product is purchased by the original retail customer (the “Commencement Date”). Except as expressly stated above, BARNSTEAD MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS AND EXPRESSLY DISCLAIMS ANY AND ALL WARRANTIES, INCLUDING BUT NOT LIMITED TO, WARRANTIES OF DESIGN, MERCHANT ABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



An authorized representative of BARNSTEAD must perform all warranty inspections. In the event of a defect covered by BARNSTEAD’s warranty, BARNSTEAD shall, as its sole obligation and exclusive remedy, provide free replacement parts to remedy the defective product. In addition, for products sold by BARNSTEAD within the continental United States or Canada, BARNSTEAD shall provide free labor to repair the products with the replacement parts, but only for a period of ninety (90) days from the Commencement Date.

BARNSTEAD’s warranty provided hereunder shall be null and void and without further force or effect if there is any (i) repair made to the product by a party other than BARNSTEAD or its duly authorized service representative, (ii) misuse (including use inconsistent with written operating instructions for the product), mishandling, contamination, overheating, modification or alteration of the product by any customer or third party or (iii) use of replacement parts that are obtained from a party who is not an authorized dealer of BARNSTEAD.

Heating elements, because of their susceptibility to overheating and contamination, must be returned to the BARNSTEAD factory and if, upon inspection, it is concluded that failure is due to factors other than excessive high temperature or contamination, BARNSTEAD will provide warranty replacement. As a condition to the return of any product, or any constituent part thereof, to BARNSTEAD’s factory, it shall be sent prepaid and a prior written authorization from BARNSTEAD assigning a Return Materials Number to the product or part shall be obtained.

IN NO EVENT SHALL BARNSTEAD BE LIABLE TO ANY PARTY FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, OR FOR ANY DAMAGES RESULTING FROM LOSS OF USE OR PROFITS, ANTICIPATED OR OTHERWISE, ARISING OUT OF OR IN CONNECTION WITH THE SALE, USE OR PERFORMANCE OF ANY PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, TORT (INCLUDING NEGLIGENCE), ANY THEORY OF STRICT LIABILITY OR REGULATORY ACTION.

The name of the authorized Barnstead International dealer nearest you may be obtained by calling 1-800-446-6060 (563-556-2241) or writing to:

 **Barnstead**International   
an Apogent company *Your Lab Starts Here*  
2555 Kerper Boulevard  
P.O. Box 797  
Dubuque, Iowa 52001-0797  
Phone: 563-556-2241 or 800-553-0039  
Fax: 563-589-0516  
E-mail: [mkt@barnstead.com](mailto:mkt@barnstead.com)  
[www.barnstead.com](http://www.barnstead.com)