

Hi-Temp “Squaroid” Vacuum Ovens

Model No.

3625

3625REC

3625-1

3628

3628-1

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Safety Information

**Warning**

Warnings alert you to a possibility of personal injury.

**Caution**

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

**Note**

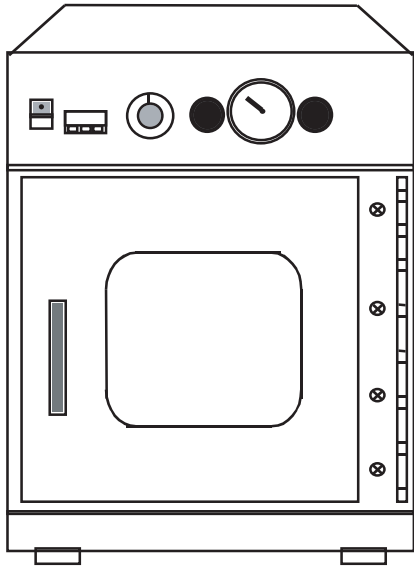
Notes alert you to pertinent facts and conditions.

**Hot Surface**

Hot surfaces alert you to a possibility of personal injury if you come in contact with a surface during use or for a period of time after use.

Your Barnstead|Lab-Line's Hi-Temp "Squaroid" Vacuum Ovens have been designed with function, reliability, and safety in mind. It is your responsibility to install it in conformance with local electrical codes. This manual contains important safety information. You must carefully read and understand the contents of this manual prior to the use of this equipment. For safe operation, please pay attention to the alert signals throughout the manual.

Description



Barnstead Lab-Line's Hi-Temp "Squaroid" Vacuum Ovens are designed for various drying operations under carefully controlled conditions at either normal atmosphere or up to 30 inches Hg of vacuum. These operations include dessication, vacuum embedding, plating, process control and inert atmosphere applications. Nitrogen, CO² and other non-corrosive, nonflammable gases may be used in the ovens.

Radiant warm wall heating provides uniform temperatures in the chamber. The hazards associated with open wire heaters are eliminated because the heaters are clamped to the outside of the oven chamber. In addition, valuable space in the chamber is conserved.

A PID microprocessor controller maintains temperature to a maximum of 300°C. A user-adjustable safety thermostat provides over-temperature protection in the event of primary control failure. Status lamps indicate which control is maintaining chamber temperature.

Vacuum levels are controlled precisely between 0 and 30 inches Hg. A silicone door gasket assures a tight seal at all vacuum levels. The door also includes a high-strength tempered glass window affording full view of the samples without disturbing the chamber contents. The chamber of the unit is NOT designed for exposure to concentrated solvents, oils, concentrated acids or dilute sodium hydroxide.

Two solid aluminum shelves provide heat conduction to samples. Shelves are removable for easy cleaning and maintenance. The interior of the chamber is stainless steel and the exterior construction is powder coated enameled steel.

Specifications

Power Requirements

3625: 120 VAC, 50/60 Hz, 10.0 Amps, 1200 Watts
3625-1: 240 VAC, 50/60 Hz, 5.0 Amps, 1200 Watts
3628: 120 VAC, 50/60 Hz, 12.0 Amps, 1400 Watts
3628-1: 240 VAC, 50/60 Hz, 6.0 Amps, 1400 Watts

Temperature Range

Slightly above ambient to 300°C

Dimensions

3625, 3625-1: Chamber: 12"W x 13-1/2"D x 12"H (30 x 34 x 30 cm)
Overall: 20"W x 18"D x 27"H (51 x 46 x 69 cm)

3628, 3628-1: Chamber: 12"W x 20"D x 12"H (30 x 51 x 30 cm)
Overall: 20"W x 26"D x 27"H (51 x 66 x 69 cm)

Volume

3625, 3625-1: 1.1 cubic feet (31.1 liters)
3628, 3628-1: 1.7 cubic feet (48.1 liters)

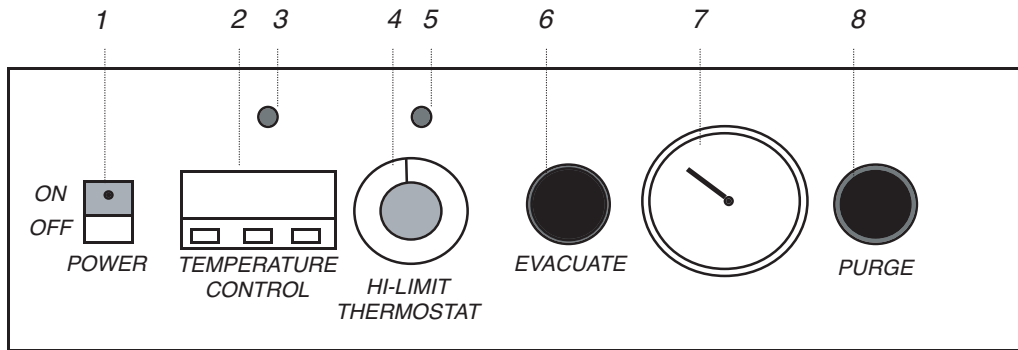
Shipping Weight

3625, 3625-1: 200 lbs. (91 kg)
3628, 3628-1: 270 lbs. (122 kg)

Unit's Environmental Operating Conditions

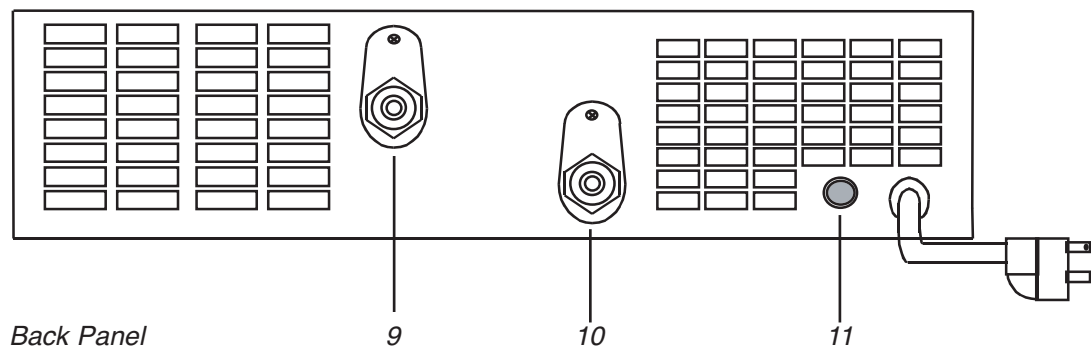
Pollution Degree: 2
Installation Category: II
Altitude: 2000 Meters MSL (Mean Sea Level)
Humidity: 80% maximum, non-condensing
Electrical Supply: 120VAC or 240VAC
Voltage Tolerance: ±10% of normal rated line
Temperature: 15°C to 40°C
Product Usage: This product is intended for use indoors only

Features



Control Panel

1. **POWER SWITCH:** Controls electric power to entire unit.
2. **PID MICROPROCESSOR-BASED CONTROLLER:** Maintains chamber temperature.
3. **TEMPERATURE CONTROL STATUS LAMP:** Lights when electric power is being applied to heaters.
4. **HI-LIMIT SAFETY THERMOSTAT:** Protects chamber against overheating in case of primary control failure.
5. **HI-LIMIT SAFETY THERMOSTAT STATUS LAMP:** Lights when power to heating circuit has been interrupted by high limit safety thermostat. When this high limit status lamp is lit the temperature control status lamp should be off
6. **EVACUATE (VACUUM) CONTROL:** Adjusts valve connected to vacuum pump; rotate counterclockwise to open, clockwise to close.
7. **VACUUM GAUGE:** Displays level of vacuum inside the chamber graduated in inches of mercury.
8. **PURGE (AIR) CONTROL:** Adjusts chamber exhaust vent, counter-clockwise to open, clockwise to close.



9. AIR INTAKE: Fixture connecting ambient air to chamber through air control valve.
10. VACUUM PUMP FITTING: This bulkhead fitting connects vacuum pump to chamber through vacuum control valve. Add 1/4" OD (6 mm) hard tubing to fitting. The user supplies vacuum pump and connecting hose.
11. CIRCUIT BREAKER RESET BUTTON: Resets tripped circuit breaker—push in to reset.

Unpacking and Installation

Shipping Carton

This should be inspected upon delivery. When received, carefully examine for any shipping damage before unpacking. If damage is discovered, the delivering carrier should both specify and sign for the damage on your copy of the delivery receipt.

Open the carton carefully making certain that all parts are accounted for before packaging materials are discarded—after unpacking, if damage is found, promptly report it to the carrier and request a damage inspection promptly.

IMPORTANT: Failure to request an inspection of damage within a few days after receipt of shipment absolves the carrier from any liability for damage: you must call for a damage inspection promptly.

Location

Place the oven in a location away from drafts and free of wide variations in temperature. Leave enough space around the oven so that air can circulate freely. Heat escaping through the oven walls must be carried off by normal convection. Avoid placing the oven near open windows, radiators and ventilators. Do not place on a combustible surface.

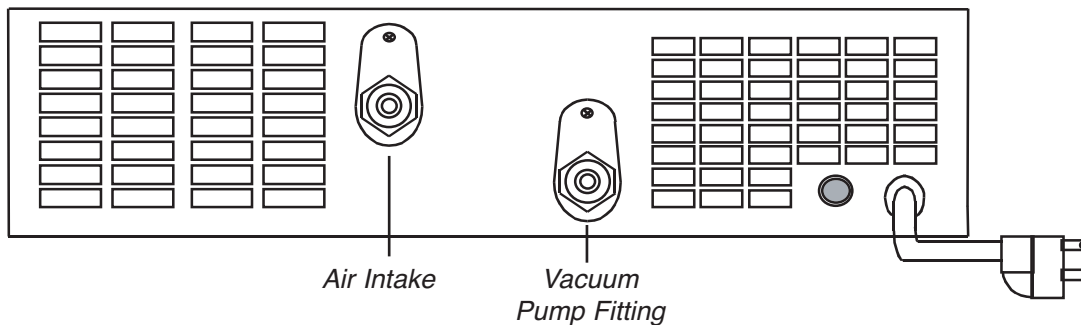


Note

The user supplies Vacuum pump and hose.

Vacuum Pump Connection

To operate the unit as a vacuum oven, connect a short length of 1/4" OD hard tubing to the vacuum bulkhead fitting on the back of the oven. Connect hose from the vacuum pump to the tubing.



Shelves

Place the shelves in the oven and stack them. While the door is open, apply high quality vacuum grease to the gasket.

Electrical Power

Turn the power switch off and plug the electrical cord into a receptacle that will provide the power specified for the unit.

Electrical Connection

Before making the electrical connection, make certain that the grounded outlet provides the electrical characteristics listed on the nameplate. Vacuum ovens are supplied with a 3-wire line cord. It should be plugged into an outlet wired for 3-prong plugs. If an extension cord is used, it also should be the 3-wire grounded type.

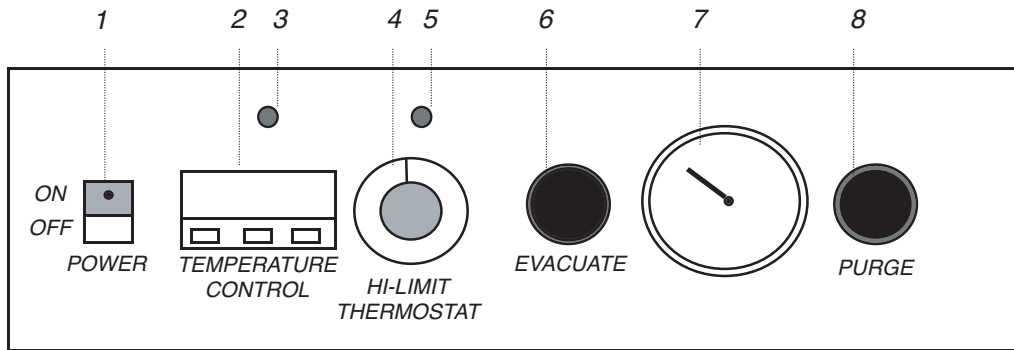
For an outlet wired for 2-prong plugs (ungrounded), have a qualified electrician replace it with a grounded outlet.

If a plug must be installed, use only the 3-prong grounded type, rated for the unit load requirements and matching the power outlet. Make sure that the green ground wire is secured to the plug ground terminal. Refer to the wiring schematics at the end of this manual if necessary.

Loading the Oven

Distribute the load in the chamber to obtain the most efficient evacuation. There should be at least a one-inch clearance between the walls and the load. Avoid spilling acids in the chamber. Do not place flammable solvents or vapors in the oven. Take precautions against heating substances above their auto-ignition temperatures.

Operation



- | | | | |
|----|------------------------------------|----|--|
| 1. | Power Switch | 5. | Hi-Limit Safety Thermostat Status Lamp |
| 2. | Temperature Controller | 6. | Evacuate (Vacuum) Control |
| 3. | Temperature Controller Status Lamp | 7. | Vacuum Gauge |
| 4. | Hi-Limit Safety Thermostat | 8. | Purge (Air) Control |



Warning

Do not use in the presence of flammable or combustible materials or explosive gases. Do not use in the presence of pressurized or sealed containers—fire or explosion may result, causing death or severe injury.

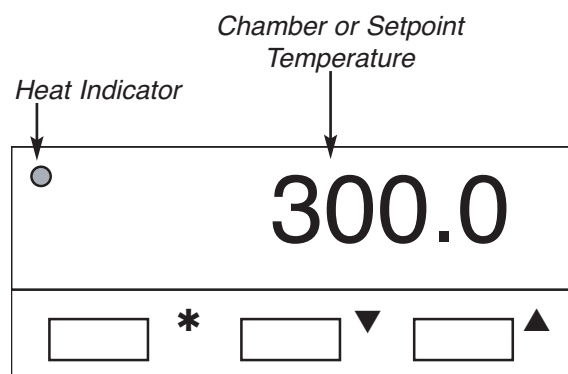


Caution

When the oven is operating at higher temperatures, do not touch the exterior walls—they become quite warm. Also, do not set the oven for temperatures above 300°C. Operating the oven at temperatures in excess of 300°C will void the warranty.

Setting Temperature

1. Turn the power switch ON.
2. Turn the hi-limit safety thermostat fully clockwise. Set the temperature controller to the desired chamber temperature.
3. Allow time for the oven temperature to stabilize. Once the oven temperature has stabilized, more precise settings can be made.
4. When the chamber temperature has stabilized, rotate the hi-limit safety thermostat dial counter-clockwise slowly until the hi-limit thermostat status lamp lights. Slowly rotate the hi-limit safety thermostat dial clockwise until its status lamp goes off, then continue in the same direction for approximately 5 degrees rotation.
5. The oven controls will need to be changed only when another temperature setting is desired. To change the temperature setting, repeat Steps 2,3 and 4.



Temperature Controller:

1. **CONTROLLER SELF-TEST:** When the oven is powered up, the controller will display 8888 along with the three decimal points and the heat ON indicator lamp. The display will then blank out for 2 seconds before showing the chamber temperature.
2. **HEAT ON INDICATOR:** The heat ON indicator lamp is lit when the chamber heater is receiving power. The lamp will normally flash when the chamber temperature is at set point.
3. **SET POINT ADJUSTMENTS:** The temperature controller normally displays the chamber temperature. To view or change the temperature set point proceed as follows:

Press	Controller
*	View Set Point
* ▼	Decrease Set Point
* ▲	Increase Set Point

- A. Press and hold the star key and use either the up or down arrow key to adjust the set point to the desired temperature. Release the star key.
- B. Allow at least 30 minutes for the chamber temperature to stabilize.

Auto Tune

The auto tune program automatically adjusts the controller parameters to achieve optimal temperature control.

It is not necessary to run the auto tune program when setting up the incubator. However, if the temperature appears to be unstable, the auto tune program can be run using the procedure shown below:

For Best Results:

- Set the usual set point temperature and use normal load conditions.
- Allow the incubator to stabilize at set point for at least 30 minutes.

Auto Tuning Procedure

- A. Enter the program mode by pressing and holding BOTH the up and down arrow keys for 3 seconds.
- B. Release BOTH arrow keys when **tunE** is displayed.
- C. The controller display should now be alternating between **tunE** and **oFF**.
- D. Press and hold the “STAR” (*) key. Press and release the up arrow key until **At.SP** is displayed. Release the “STAR” (*) key.
- E. After one minute has elapsed, the controller display will begin to alternate between showing the chamber temperature, **tunE** and **At.SP**.
- F. Allow the program to run until the display again shows only the chamber temperature.

Temperature Calibration

- A. Place a calibrated digital thermometer in the approximate geometric center of the chamber.
- B. Press and hold the “STAR” (*) key and using the up or down arrow key, adjust the set point to the desired temperature.
- C. Allow the unit to run for at least 30 minutes.
- D. The controller display should now be indicating the set point temperature. Make note of the thermometer reading.
- E. Press and hold both arrow keys until the controller display indicates **tunE**. Release the arrow keys. Press and release the down arrow key, the display should now indicate **LEUL**. Press and hold the “STAR” (*) key and using the up arrow key adjust the display to read 3. Release the “STAR” (*) key. Press and release the up arrow key until the display indicates **Zero**. The display should now alternate between **Zero** and a numerical value.
- F. Using the examples shown below and the value obtained in step above, enter the correct **Zero** value into the controller by pressing the “STAR” (*) key and using the up or down arrow keys. If there is already a **Zero** value present then add the new value to the one already present.

Thermometer	=	200°C	Thermometer	=	205°C
Controller Reading	=	205°C	Controller Reading	=	200°C
Subtract	=	-5°C	Subtract	=	+5°C
Enter Zero value of -5°C			Enter Zero value of +5°C		

- G. When the correct **Zero** value has been entered, press and hold the two arrow keys together until the display again indicates the chamber temperature. If the procedure was done correctly, the controller display should now agree with the thermometer reading to within $\pm 0.5^\circ\text{C}$.

- H. Allow the unit to run for at least 30 minutes.
- I. Recheck the thermometer reading, the controller display and the thermometer should agree to within $\pm 0.5^{\circ}\text{C}$. If not repeat steps D, E and F above.

Vacuum Control

- 1. Apply high quality vacuum grease to the door gasket.
- 2. Distribute the load evenly in the chamber for optimum evacuation. Allow at least one-inch clearance between the chamber walls and the load.
- 3. Close and latch the door.
- 4. Close the purge (air) control completely by turning it fully clockwise.
- 5. Open the evacuate (vacuum) control by turning it fully counterclockwise.
- 6. Turn the user-supplied vacuum pump on and note the vacuum gauge dial that is graduated in inches of mercury. The needle will advance slowly counterclockwise; just as it reaches the desired setting, close the evacuate (vacuum) control valve completely clockwise and turn off the pump.
- 7. After a period of several hours, the vacuum level is liable to decrease an inch or so. The original level may be established again by repeating Steps 4 and 5.



Note

If there is a greater vacuum than desired in the chamber, open the purge (air) control slightly until the correct reading is obtained, then close it.

**Warning**

Do not pressurize the oven chamber to a level higher than atmospheric pressure. When the vacuum gauge reads zero, turn off the gas—the oven was designed to retain a vacuum, not to withstand a positive internal pressure and possibly damage the vacuum gauge.

Purging Chamber with Inert Gas

- Some applications call for replacing the vacuum with an inert gas while the bake continues. Use only non-corrosive, nonflammable gases such as nitrogen and CO² for purging.
- Connect user-supplied 1/4" ID tubing to the hose air connector. Connect the other end of the tubing to the user-supplied regulator on a gas cylinder or bottle.
- Start the gas flowing at no more than 5 psi. Open the front panel purge (air) control valve. Observe the front panel vacuum gauge. The vacuum level will fall as the chamber approaches atmospheric pressure.
- The ovens do not require a great deal of gas to fill the chamber:

Models 3625 and 3625-1: Interior volume is 1.1 cubic feet (31.1 liters)

Models 3628 and 3628-1: Interior volume is 1.7 cubic feet (48.1 liters)
- Turn off the gas when the vacuum gauge reads zero. Close the purge (air) valve. Disconnect the hose from the air intake port.

Maintenance



Note

Make no attempt to service or repair a Barnstead Lab-line product under warranty before consulting your Barnstead International dealer. After the warranty period, such consultation is still advised, especially when the repair may be technically sophisticated or difficult.

If assistance is needed beyond what the distributor can provide, please call the Barnstead International customer relations department at (563) 556-2241 or (800) 553-0039. No merchandise, however, should be returned directly to Barnstead International without prior approval from Barnstead International.



Note

Do not attempt any repair or service of this unit without first removing power cord from electrical outlet.

Hi-Temp Squaroid Ovens require very little maintenance, other than occasional cleaning. Although designed for a long period of trouble-free operation, the ovens may at some time have to be repaired. The following lists the most likely repairs that will have to be made.

Thermostat Replacement

- Turn power switch OFF and unplug unit from outlet.
- Remove the top cover and back panel.
- Pull out the insulation on top of the oven chamber.
- Loosen the clamp holding the thermostat bulb to the chamber and slide the bulb free.
- On the front panel, remove the 2 screws holding the defective thermostat.
- Disconnect wiring to the thermostat and pull the thermostat completely out of the oven.
- Install the replacement thermostat, then reconnect.

Replacing Temperature Controller

1. Place ON/OFF switch in OFF position.
2. Unplug oven from outlet power supply.
3. To remove controller from control housing:
 - use both hands to firmly grip each side of the controller bezel.
 - press on the bezel side grips until the bezel tabs release.
 - slowly pull controller from housing.

**Note**

PCB contacts at rear of controller fit into contacts at rear of controller housing

4. To install new, factory configured controller:
 - Carefully slide new controller into controller housing.
 - Press controller bezel into controller housing until bezel tabs securely lock controller into place.
5. Plug oven into outlet power supply.
6. Place ON/OFF switch in ON position.

**Caution**

Do not permit any silicone oils or greases to come into contact with the gasket groove or mounting surface.

Gasket Replacement

- Remove all dirt and foreign matter from inside the gasket groove and from all surfaces of the mounting ring on the oven.
- Press the new gasket onto the mounting ring at some starting point and massage it into place with a damp cloth.
- Check the door alignment to be certain that the inner glass surface fits evenly against the rounded sealing surface of the gasket along its entire periphery. The door latch may require some adjustment to accomplish this.
- Run the oven at maximum temperature under full vacuum for 8 hours to vulcanize the gasket to the mounting surface.
- When evacuating the oven for the first time after installation of a new gasket, the final self alignment and seal can be facilitated by pushing in on the outer surface of the glass.

Heater Replacement

An indication of heater failure is the oven not being able to reach the desired temperature. To identify the bad heater, use an ohmmeter to test the resistance of each heater.

- Turn power switch OFF and unplug unit from outlet.
- Remove the back and top panels to gain access to the heaters and their wiring.
- Disconnect one wire from each heater and touch the ohmmeter's probes to the heater's terminals.
- The correct resistance may be figured by the equation: $R = (E \times E)/W$

R = Resistance in ohms

E = Line voltage

W = The heater element's wattage rating

- If the actual resistance of the heater measures substantially different than the computed value, the heater is defective. Replace it.
- Check all the heater elements in this fashion.
- Re-connect heaters. Replace the top and back panels.

Replacement Parts

Description	Part Number
Models 3625 & 3625-1	
Circuit Breaker, 15 Amps (3625):	330-124-00
Circuit Breaker, 8 Amps (3625-1):	330-140-00
Cordset:	470-105-00
Door Glass:	540-119-00
Gauge, Vacuum:	660-103-00
Gasket, Door:	530-103-00
Heater, 200 Watt, 120 VAC (6):	340-002-00
Knob:	560-223-00
Rubber Feet (4):	790-078-00
Shelf, Bottom:	587-451-00
Shelf, Top:	013-900-00
Status Lamp Base (2):	360-233-01
Status Lamp Lens (amber):	360-235-00
Status Lamp Lens (red):	360-234-00
Switch, Power (3625):	440-359-00
Switch, Power (3625-1):	440-292-00
Configured Temperature Controller:	485-360-09
Solid State Relay:	400-233-00
RTD Temperature Sensor:	410-632-00
Thermostat:	920-223-00
Valve, Needle:	950-145-00
Wiring Schematic, 3625:	229-217-00
Wiring Schematic, 3625-1:	229-218-01
Models 3628 & 3628-1	
Circuit Breaker, 15 Amps (3628):	330-124-00
Circuit Breaker, 10 Amps (3628-1):	330-119-00
Cordset:	470-105-00
Door Glass:	540-119-00
Gauge, Vacuum:	660-103-00
Gasket, Door:	530-103-00
Heater, 100 Watts, 120 VAC (2):	340-152-00
Heater, 200 Watts, 120 VAC (6):	340-002-00
Knob:	560-223-00
Rubber Feet (4):	790-078-00
Status Lamp Base (2):	360-233-01
Status Lamp Lens (amber):	360-235-00
Status Lamp Lens (red):	360-234-00
Shelf, Bottom:	587-454-00
Shelf, Top:	013-899-00
Switch, Power (3628):	440-359-00
Switch, Power (3628-1):	440-292-00
Configured Temperature Controller:	485-360-09
Solid State Relay:	400-233-00
RTD Temperature Sensor:	410-632-00
Thermostat:	920-223-00
Valve, Needle:	950-145-00
Wiring Schematic, 3628:	229-219-00
Wiring Schematic, 3628-1:	229-220-00

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 Goods Authorization" number (RGA). Material Returned without an RGA number will be returned.

Two Year Limited Warranty

BARNSTEAD INTERNATIONAL ("BARNSTEAD") warrants that a product manufactured by Barnstead shall be free of defects in materials and workmanship for two (2) 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 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
Your Lab Starts Here

2555 Kerper Boulevard
Dubuque, Iowa 52001-9918
Phone: 563-556-2241 or 800-553-0039
Fax: 563-589-0516
E-mail: mkt@barnstead.com
www.barnstead.com

