

VACUUM OVENS 110 - 120 Volts



Installation and Operation Manual

SVAC1 SVAC2 SVAC4
Previously Designated:
1425, 1445, 1465

This page left blank

Vacuum Ovens 110 - 120 Voltage

Installation and Operation Manual

Part Number (Manual): 4861767

Revision: July 5, 2016

Pictured on Front Cover: Left to right SVAC1, SVAC2, SVAC4

These units are TÜV CUE listed as vacuum ovens for professional, industrial or educational use where the preparation or testing of materials is done at an ambient air pressure range of 22.14 – 31.3 inHg (75 – 106 kPa), and no flammable, volatile or combustible materials are being heated. These units have been tested to the following requirements:

CAN/CSA C22.2 No. 61010-1:2012

CAN/CSA C22.2 No. 61010-2-010/R:2009

UL 61010-1:2012

UL 61010A-2-010:2002

EN 61010-1:2010

EN 61010-2-010:2003

TABLE OF CONTENTS

INTRODUCTION.....	7
<i>General Safety Considerations</i>	<i>7</i>
<i>Engineering Improvements</i>	<i>8</i>
<i>Contacting Assistance.....</i>	<i>8</i>
RECEIVING YOUR OVEN.....	9
<i>Inspect the Shipment</i>	<i>9</i>
<i>Orientation Photos.....</i>	<i>10</i>
<i>Record Data Plate Information.....</i>	<i>14</i>
<i>Vacuum Supply Required</i>	<i>14</i>
<i>Gaskets</i>	<i>15</i>
<i>Temperature Reference Sensor Device</i>	<i>15</i>
INSTALLATION	17
<i>Installation Checklist</i>	<i>17</i>
<i>Required Ambient Conditions</i>	<i>18</i>
<i>Environmental Disruption Sources.....</i>	<i>18</i>
<i>Power Source Requirements</i>	<i>19</i>
<i>Lifting and Handling</i>	<i>20</i>
<i>Leveling</i>	<i>20</i>
<i>Install the Oven</i>	<i>20</i>
<i>Installation Cleaning.....</i>	<i>20</i>
<i>Shelving Installation</i>	<i>21</i>
<i>Connect to the Vacuum Supply.....</i>	<i>22</i>
GRAPHIC SYMBOLS.....	23
CONTROL OVERVIEW	24
OPERATION	27
<i>Operating Precautions</i>	<i>27</i>
<i>Theory of Operation</i>	<i>28</i>
<i>Put the Oven into Operation.....</i>	<i>30</i>
<i>Set the Constant Temperature Set Point.....</i>	<i>32</i>
<i>Put the Chamber Under Vacuum.....</i>	<i>33</i>
<i>Temperature Accuracy Verification.....</i>	<i>34</i>
<i>Set the Over Temperature Limit.....</i>	<i>36</i>
<i>Programmed Operations (Heating Profiles).....</i>	<i>37</i>
<i>Vacuum Gauge Operations.....</i>	<i>38</i>
<i>Maximum Obtainable Vacuum.....</i>	<i>39</i>
<i>Pressure Units Conversion Chart.....</i>	<i>39</i>
<i>Data Port.....</i>	<i>40</i>
USER MAINTENANCE.....	41
<i>Cleaning and Disinfecting</i>	<i>41</i>
<i>Maintaining Atmospheric Integrity.....</i>	<i>42</i>
<i>Electrical Components</i>	<i>42</i>
<i>Vacuum Pump Maintenance.....</i>	<i>43</i>
<i>Storage.....</i>	<i>43</i>
<i>Calibrate the Temperature display.....</i>	<i>44</i>
<i>Diagnostics - Heating Issues.....</i>	<i>48</i>
UNIT SPECIFICATIONS.....	56
<i>Weight</i>	<i>56</i>
<i>Dimensions.....</i>	<i>56</i>
<i>Capacity</i>	<i>57</i>

<i>Vacuum</i>	57
<i>Temperature</i>	57
<i>Power</i>	57
REPLACEMENT PARTS LIST	58
<i>Replacement Gaskets</i>	59

This page left blank

INTRODUCTION

Thank you for purchasing a Shel Lab product. In today's competitive marketplace, customers have many choices when it comes to constant temperature equipment. We appreciate you choosing ours. Our continued reputation as a leading laboratory product manufacturer rests with you. We stand behind our products and will be here for you if you need us.

These vacuum ovens are intended for professional, industrial, and educational applications. The oven is engineered to operate with the oven chamber under vacuum. The ovens are not intended for use at hazardous or household locations.

This manual contains instructions on how to receive, install, operate, and maintain the unit in a safe manner. Read the manual before using the unit. Ensure all users are given appropriate training prior to operating the unit. Keep the manual available for trained users to reference during operation.

GENERAL SAFETY CONSIDERATIONS

Note: Failure to follow the guidelines and instructions in this manual may create a protection impairment by disabling or interfering with the unit safety features. This can result in injury or death.

Your unit and its recommended accessories are designed and tested to meet strict safety requirements. It is designed to connect to a power source using the specific power cord type shipped with the unit.

For continued safe operation of your unit, always follow basic safety precautions including:

- Always plug the unit power cord into a protective earth grounded electrical outlet that conforms to national and local electrical codes. If the unit is not grounded properly, parts such as knobs and controls can conduct electricity and cause serious injury.
- Do not bend the power cord excessively, step on it, or place heavy objects on it.
- A damaged cord can be a shock or fire hazard. Never use a power cord if it is damaged or altered in any way.
- Always position the unit so that end-users can quickly unplug it in the event of an emergency.
- Do not attempt to move the unit while in operation or before the unit has cooled.
- Use only approved accessories. Do not modify system components. Any alterations or modifications to your oven can be dangerous and void your warranty.
- Follow all local ordinances in your area regarding the use of this unit. If you have any questions about local requirements, please contact the appropriate agencies.

INTRODUCTION (CONTINUED)

ENGINEERING IMPROVEMENTS

Sheldon Manufacturing continually improves all of its products. As a result, engineering changes and improvements are made from time to time. Therefore, some changes, modifications, and improvements may not be covered in this manual. If your unit's operating characteristics or appearance differs from those described in this manual, please contact your Shel Lab dealer or customer service representative for assistance.

CONTACTING ASSISTANCE

If you are unable to resolve a technical issue with the oven, please contact Sheldon Technical Support. Phone hours for Sheldon Technical Support are 6am – 4:30pm Pacific Coast Time (west coast of the United States, UTC -8).

Please have the following information ready when calling or emailing Technical Support: the **model number** and the **serial number**. These will be found on the unit's data plate, which is located on the back of the unit at the top right, next to the power supply as mandated by regulatory requirement. See page 14.

EMAIL: tech@shellab.com 1-800-322-4897 extension 4, or (503) 640-3000 FAX: (503) 640-1366

Sheldon Manufacturing INC.
P.O. Box 627
Cornelius, OR 97113

RECEIVING YOUR OVEN

INSPECT THE SHIPMENT

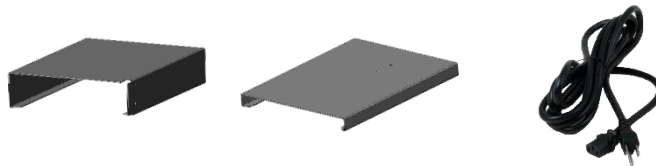
- When a unit leaves the factory, **safe delivery becomes the responsibility of the carrier.**
- Damage sustained during transit is not covered by the manufacturing defect warranty.

When you receive your unit, inspect it for concealed loss or damage to its interior and exterior. If you find any damage to the unit, **follow the carrier's procedure for claiming damage or loss.**

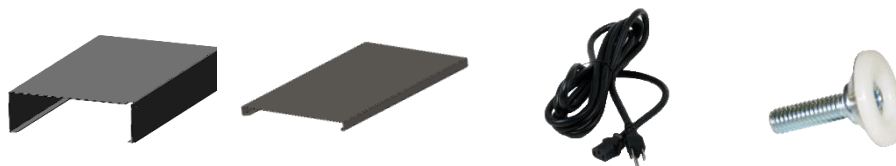
1. Carefully inspect the shipping carton for damage.
2. Report any damage to the carrier service that delivered the unit.
3. If the carton is not damaged, open the carton and remove the contents.
4. The unit should come with an end-user Installation and Operation Manual and a programming guide for the Watlow EZ-Zone Controller.
5. Verify that the correct number of accessories have been included.

Included Accessories:

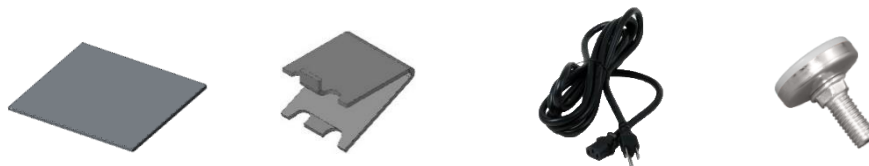
SVAC1	Tall Shelves	Short Bottom Shelf	Power Cord	
	2	1	1	



SVAC2	Tall Shelves	Short Bottom Shelf	Power Cord	Leveling Feet
	2	1	1	4



SVAC4	Shelves	Shelf Clips	Power Cord	Leveling Feet
	3	12	1	4



RECEIVING YOUR OVEN (CONTINUED)

ORIENTATION PHOTOS

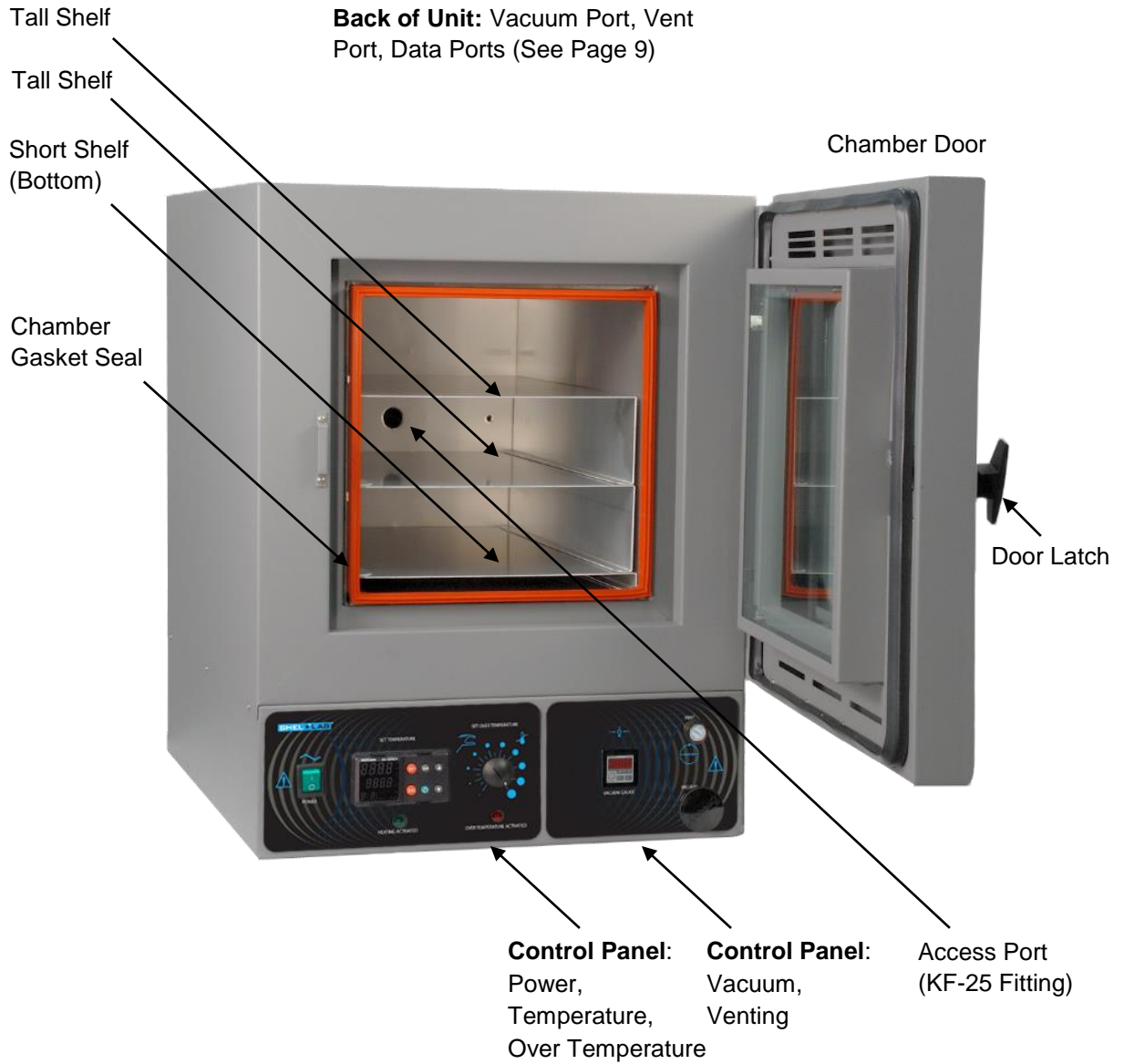
Figure 1: SVAC4

Back of Unit: Vacuum Port, Vent Port, Data Ports (See Page 9)



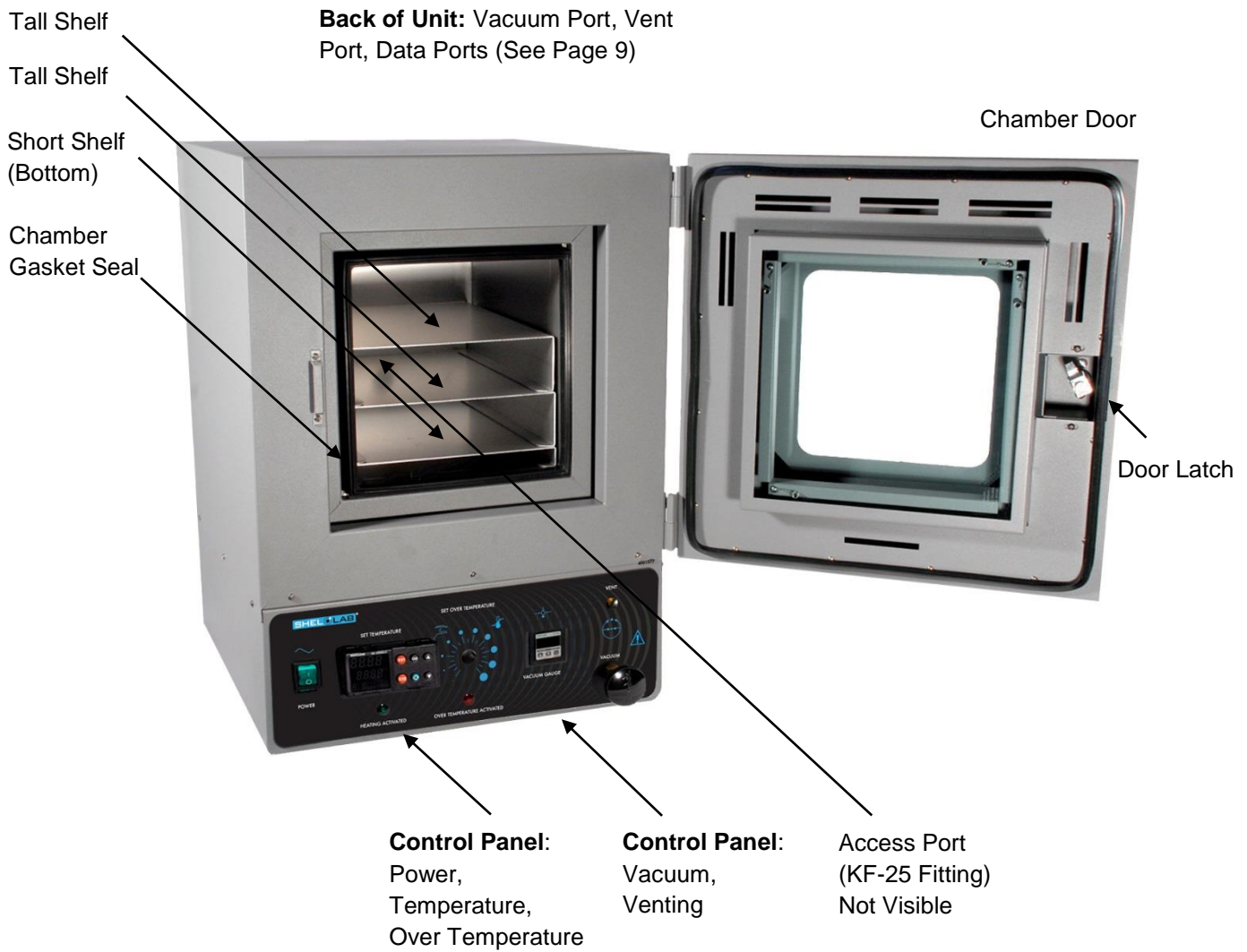
RECEIVING YOUR OVEN (CONTINUED)

Figure 2: SVAC2

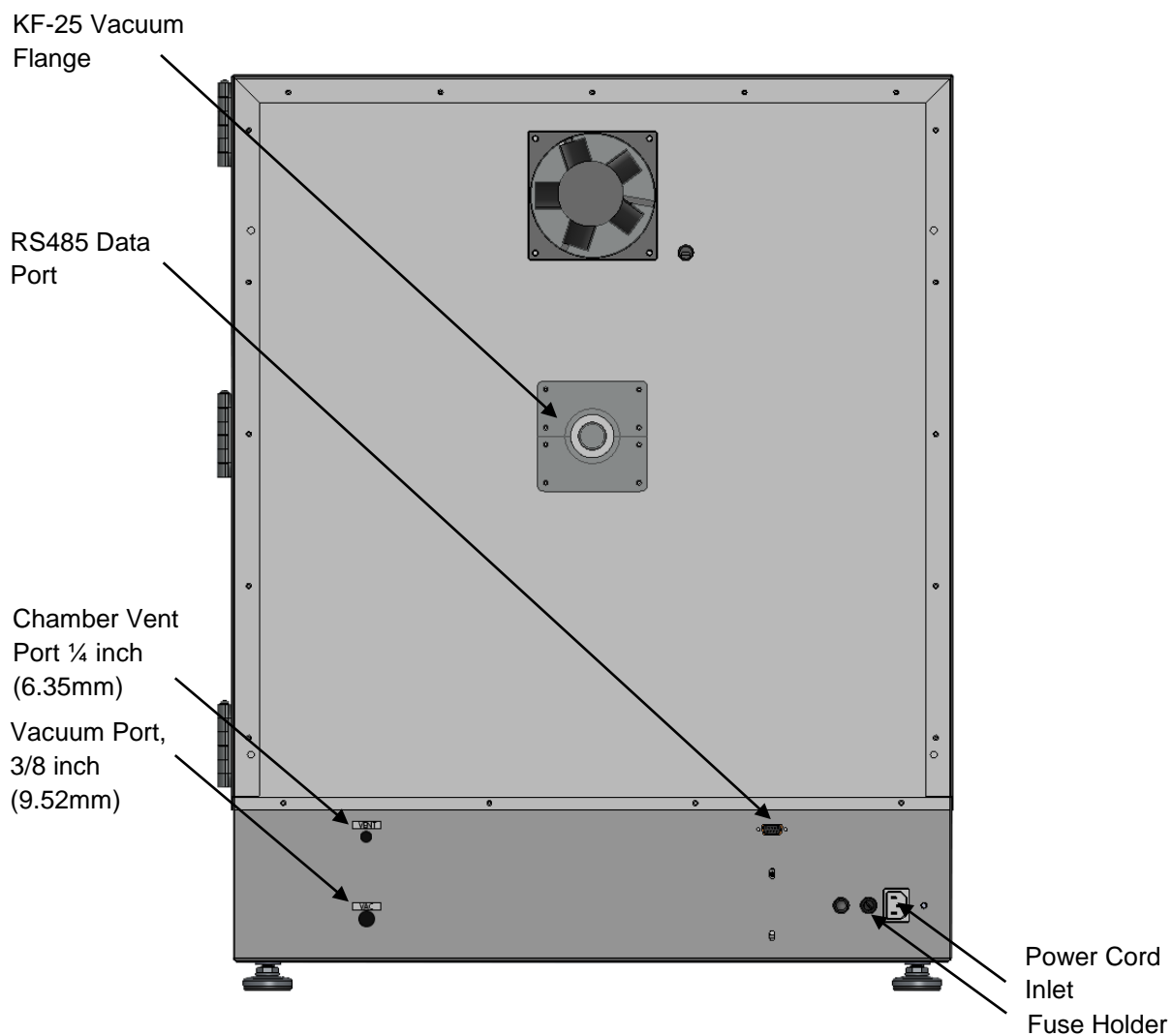


RECEIVING YOUR OVEN (CONTINUED)

Figure 4: SVAC1



RECEIVING YOUR OVEN (CONTINUED)



RECEIVING YOUR OVEN (CONTINUED)

RECORD DATA PLATE INFORMATION

Locate the data plate on the back of the oven, just above the power cord inlet. The data plate contains the oven model number and serial number. Enter this information below for future reference.

Date Plate Information

Model Number	
Serial Number	

VACUUM SUPPLY REQUIRED

The oven does not come with a vacuum pump. **A pump must be separately purchased for the oven.**

Consult a vacuum pump specialist to determine the pump type best suited to your baking application. The correct selection of a vacuum pump is critical for evacuating the chamber to the level required for your vacuum baking applications in a timely manner. The nature of the sample or product being heated should drive the selection of the pump, including the types of chemicals outgassed during the baking process. Common pump types include Chemical Duty PTFE Dry, Standard Duty Dry, Compact Direct-Drive, and specialty pumps for Corrosive gasses. Selection of an application-specific pump can improve the overall oven performance and minimize pump maintenance costs.

A dry pump with a pumping capacity of 100 liters per minute can generally evacuate a volume of 840 liters or less in a reasonable time. High vacuum pumps based on oil-sealed rotary vane technology use a rule of thumb of 1 to 1.5 times the volume of space to determine pumping capacity. Evacuating 300 liters to a high level of vacuum requires a 300 to 350 liters per minute pump.

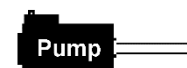
Oil-sealed pumps should evacuate a chamber to below 10torr in less than 10 to 15 minutes in order to avoid overheating the pump. Oil-free piston pumps do not run the same risk of overheating, but the time to maximum vacuum is longer because of less pumping capacity.

Use of an oil trap plumbed on the vacuum line between the oven and the pump is strongly recommended. The trap protects the pump from any oils outgassed during your baking procedure. This extends the life of the pump. All maintenance and instructional information should be obtained from the pump manufacturer if it not shipped with the pump. Use of clamps to secure vacuum tubing is also recommended.

Minimum Vacuum Draw

In order to seal completely, the oven chamber must be under a minimum vacuum draw of:

inHg	mmHg	kPa	bar
-3.0	-76	-10	-0.1016



Building
Vacuum Supply

RECEIVING YOUR OVEN (CONTINUED)

GASKETS

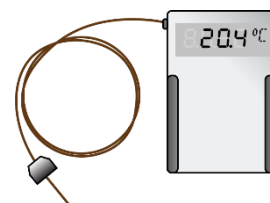
Each SVAC oven comes with a replaceable silicon gasket installed on the chamber liner. This gasket seals against the chamber door to maintain the vacuum integrity of the chamber. The gasket must be replaced periodically and is rated to 230°C. It is resistant to acids but not solvents. The manufacturer also offers for sale *Viton®*, fluorosilicone, and Buna gaskets. See page 59 for information on gasket type suitability for baking applications.



Gaskets are high-wear items, subject to compression forces, heat, and outgassed byproducts. Keeping a spare gasket on hand during operations is strongly recommended.

TEMPERATURE REFERENCE SENSOR DEVICE

A temperature reference sensor for performing accuracy verifications or calibrations of the oven temperature display **must be purchased separately from the oven**. The reference device must be accurate to at least 0.1°C. Use a digital device with a potted (sealed) thermocouple probe that can be inserted through and seal a KF-25 vacuum flange. Select a probe suitable for the application temperature you will be verifying and calibrating the display at.



Alcohol thermometers are insufficient for conducting accurate temperature verifications and calibrations. Do not use a mercury thermometer. **Never place alcohol or mercury thermometers in the oven chamber.**

RECEIVING YOUR OVEN (CONTINUED)

This page left blank

INSTALLATION

INSTALLATION CHECKLIST

Carry out the procedures and steps listed below to install the oven in a new workspace location and prepare it for use. All procedures are found in the Installation section of this manual.

Pre-Installation

- ✓ Verify that a vacuum supply source (stand-alone pump or in-house system) suitable for your application is available and can be connected to the oven. See page 22 for the oven gas and vacuum port locations.
- ✓ Check that the required ambient conditions, ventilation, and spacing for the oven are met, page 18.
 - Unit dimensions may be found on page 44
- ✓ Check for performance-disrupting heat and cold sources in the environment, page 18
- ✓ Check that a suitable electrical outlet and power supply is present, page 19

Install the Oven in a suitable workspace location

- ✓ Review the lifting and handling instructions, page 20
- ✓ Install the oven in its workspace location, page 20
- ✓ Make sure the oven is level, page 20

Set up the Oven for use

- ✓ Clean the oven shelving. Clean the chamber if needed, page 20
- ✓ Install the shelving in the oven chamber, page 21
- ✓ Connect the oven to its vacuum supply source, page 22
- ✓ **Optional:** Connect the oven to a neutral purging gas. See page 22

INSTALLATION (CONTINUED)

REQUIRED AMBIENT CONDITIONS

This oven is intended for use indoors, at room temperatures between **15°C and 40°C (59°F and 104°F)**, at no greater than **80% Relative Humidity** (at 25°C / 77°F).

Clearances

- Allow **12 inches (30cm)** of vertical headspace clearance above the top of the oven for unobstructed airflow and cooling.
- Allow a minimum of **12 inches (30cm)** of horizontal clearance between the oven and any walls or partition.
 - Allow at least **12 inches (30cm)** from the fan on the back of the oven to the nearest wall or partition. Keep the fan unobstructed at all times.
 - Make sure there is sufficient space for connecting the vacuum supply line and any purge gas line to the back of the oven.

Operating the unit outside these conditions may adversely affect its temperature range and stability. For conditions outside of those listed above, please contact your distributor to explore other oven options suited to your laboratory or production environment.

ENVIRONMENTAL DISRUPTION SOURCES

When selecting a location to install the unit, consider all environmental conditions that can adversely impact its temperature performance. These include:

- Proximity to other ovens, autoclaves, and any device that produces significant radiant heat
- Heating and cooling vents or other sources of fast-moving air currents
- High-traffic areas
- Direct sunlight

INSTALLATION (CONTINUED)

POWER SOURCE REQUIREMENTS

When selecting a location for the unit, verify that each of the following requirements are satisfied:

The wall power outlet must meet the power requirements listed on the unit data plate.

Model	AC Voltage	Amperage	Frequency
SVAC1	110 - 120	7	50/60 Hz
SVAC2	110 - 120	10	50/60 Hz
SVAC4	110 - 120	13	50/60 Hz

- Wall power sources must be protective earth grounded and **single phase**.
- Wall power sources must conform to all national and local electrical codes.
- **Supplied voltage must not vary more than 10% from the data plate rating.** Damage to the unit may result if supplied voltage varies more than 10%.
- **The recommended wall circuit breakers for these units are 15 amps.**
- Use a separate circuit to prevent loss of product due to overloading or circuit failure. The circuit must match or exceed the amperage requirement listed on the unit the data plate.

The unit must be positioned so that all end-users can quickly unplug the oven in the event of an emergency.

- The unit comes provided with a 125 volt, 15 amp, 9ft 5 in (2.86m) NEMA 5-15P power cord.
- These units are provided with a 16 amp 250V 5x20mm fuse located in a fuse holder immediately adjacent to the power cord inlet.

INSTALLATION (CONTINUED)

LIFTING AND HANDLING

The oven is heavy. Use appropriate lifting devices that are sufficiently rated for these loads. Follow these guidelines when lifting the oven:

- Lift the oven only from its bottom surface.
- Doors, handles, and knobs are not adequate for lifting or stabilization.
- Restrain the oven completely while lifting or transporting so it cannot tip.
- Remove all moving parts, such as shelves and trays, and lock doors in the closed position during transfers to prevent shifting and damage.

LEVELING

The unit must be level and stable for safe operation. The SVAC2 and SVAC4 ovens ship with four leveling feet.

1. Insert one leveling foot into each of the four holes in the bottom corners of the oven.
2. Stand the oven upright.
3. Adjust the foot at each corner until the oven stands level and solid without rocking.
 - a. To raise a foot, turn it in a counterclockwise direction.
 - b. To lower a foot, turn it in a clockwise direction.

To prevent damage when moving the oven, turn each of the four leveling feet completely clockwise.

INSTALL THE OVEN

Install the unit in a workspace location that meets the criteria discussed in the previous entries of the Installation section.

- Do not connect the oven to its power source at this time.

INSTALLATION CLEANING

The manufacturer recommends cleaning the shelving and oven chamber prior to installation of the shelving in the chamber. The unit was cleaned at the factory, but may have been exposed to contaminants during shipping. Remove all wrappings and coverings from shelving prior to cleaning and installation. **Do not clean with deionized water.**

See the [Cleaning and Disinfecting](#) topic in the User Maintenance section (see page 41) for more information on how to clean the oven chamber and shelving.

INSTALLATION (CONTINUED)

SHELVING INSTALLATION

Heating in a vacuum environment takes place primarily through conduction. Heat is transported from the heating elements to the samples or product through the shelves. Perform the following steps to install the shelves so that heat conducts properly.

SVAC1 and SVAC2

These ovens are provided with three stacking shelves. The short shelf goes on the bottom of the stack.

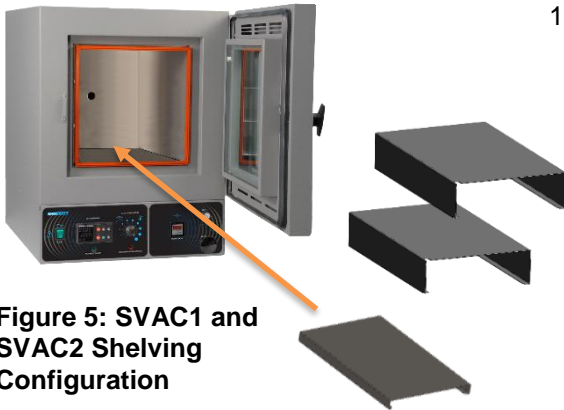


Figure 5: SVAC1 and SVAC2 Shelving Configuration

1. Carefully slide the short shelf into position on the chamber floor.
 - Do not make physical contact between the chamber temperature probe and the shelf.
 - Close proximity between the shelf and probe is sufficient for the oven to make accurate shelving temperature measurements.
 - The short shelf must be on the bottom of the shelf-stack to ensure the oven meets its temperature uniformity specifications.
2. Stack the 2 tall shelves on top of the short shelf.

SVAC4

1. Install the shelf clips in the slots of the shelf standard mounting rails located on the sides of the chamber interior, four clips (4) per shelf.
2. Squeeze each clip, insert the top tab first, and then the bottom tab using a rocking motion.
3. Set the shelves on the clips. Make sure the shelves are level.

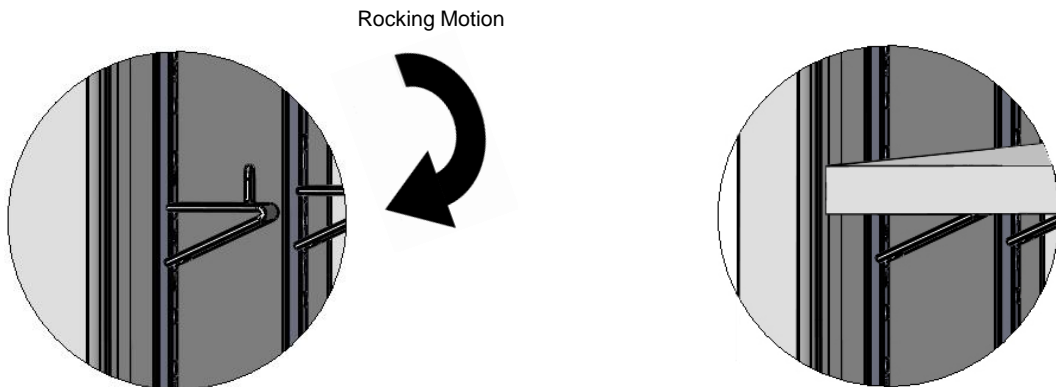


Figure 7: Installing Shelf Clip

Figure 6: Shelf set on Clips

INSTALLATION (CONTINUED)

CONNECT TO THE VACUUM SUPPLY

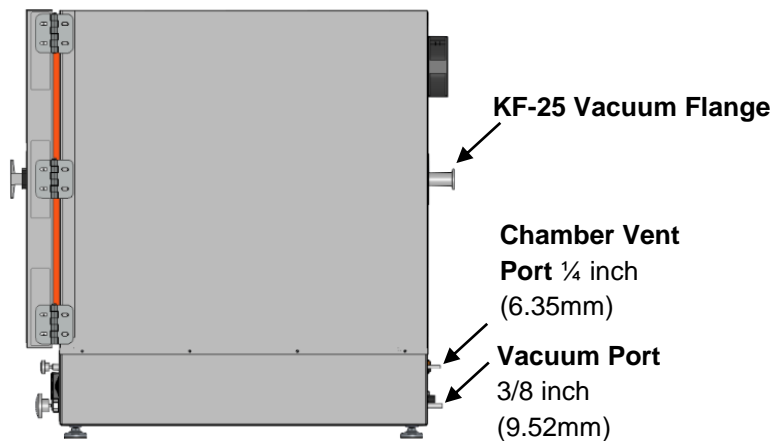


Figure 8: Vacuum and Purge Gas Connections

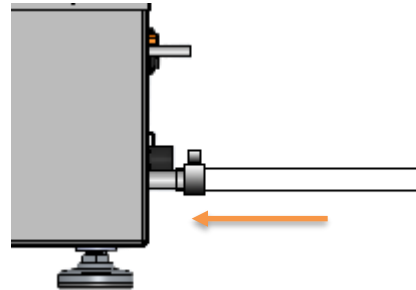





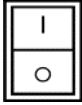





Figure 9: Vacuum Line Connected to Vacuum Port

Use of clamps to secure tubing to the Vacuum Port and Chamber Vent is recommended.

- **The Vacuum Port – 3/8 Inch (9.52mm) OD**
 - Connect a vacuum supply capable of supplying up to -29 inches of mercury (inHg) of vacuum to this port. Chamber atmosphere is evacuated through this port.
 - This port is opened and closed by the Vacuum Valve control on the front control panel.
- **The Chamber Vent Port – 1/4 Inch (6.35mm) OD**
 - The vent port allows external atmosphere back into the oven chamber when the chamber Vent Valve control on the front control panel is open.
 - Optional: An inert purging gas supply source may be connected to this port. **The maximum allowed pressure for a purge gas is 15 psi.**
- **KF-25 Fitting**
 - This large fitting is normally used to introduce potted (sealed) sensor probes into the oven chamber for temperature display verifications and calibrations. Probes must be inserted and secured prior to placing the chamber under vacuum.
 - A vacuum supply can be connected to the KF-25 flange for increased efficiency in vacuuming down the chamber. However, the Vacuum Valve control on the front control panel will not affect the level of vacuum, and must be set to closed to prevent atmosphere from entering the chamber through the Vacuum Port.

GRAPHIC SYMBOLS

The oven is provided with multiple graphic symbols on its interior and exterior surfaces. The symbols identify hazards and the functions of the adjustable components, as well as important notes in the user manual.

Symbol	Definition
	Indicates that you should consult your user manual for further instructions. Indique que l'opérateur doit consulter le manuel d'utilisation pour y trouver les instructions complémentaires.
	Indicates the Over Temperature Limit system Indique le système de dépassement de température
	Indicates AC Power Repère le courant alternative
	Indicates I/ON and O/OFF I repère de la position MARCHE de l'interrupteur d'alimentation O repère de la position ARRÊT de l'interrupteur d'alimentation
	Indicates a Manually Adjustable control Indique un bouton réglable manuellement
	Indicates a Potential Shock Hazard Signale danger électrique
	Indicates the unit should be recycled (Not disposed of in land-fill) Indique l'appareil doit être recyclé (Ne pas jeter dans une décharge)
	Indicates protective earth ground Repère terre électrique
	Indicates: Caution hot surface Indique: Avertissement symbole de surface chaude

CONTROL OVERVIEW

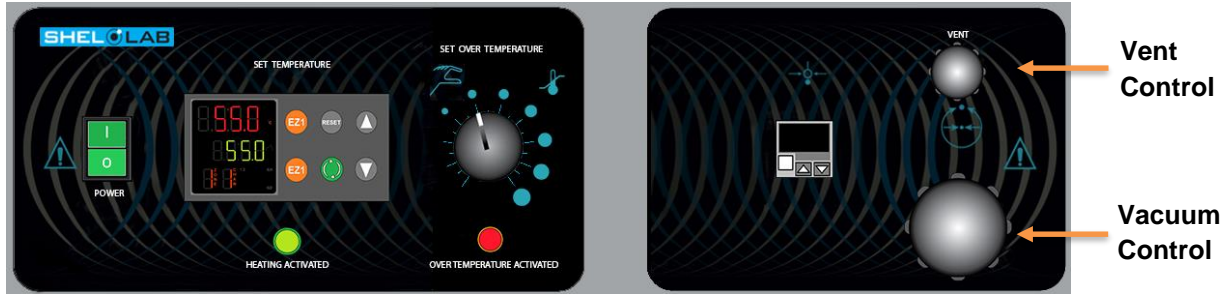


Figure 10: SVAC2 and SVAC4 Control Panel

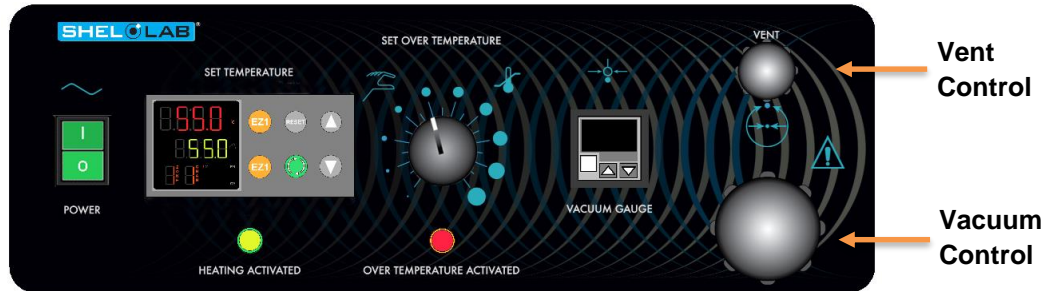


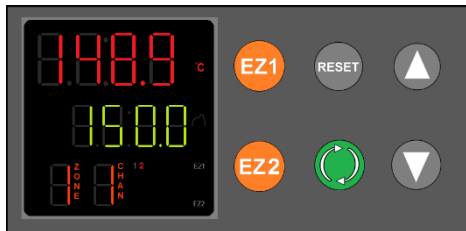
Figure 11: SVAC1 Control Panel

Power Switch



The self-illuminating main power switch controls all power the oven and its systems. The switch must be in the (I) on position for the unit to function.

Temperature Controller - Display on Home Page



Top Line (Red): Present chamber shelving temperature

Middle Line (Green): The constant temperature set point

Bottom Line: Flashing "2" indicates active heating



While on the Home Page, the **Up** and **Down arrow** buttons adjust the constant temperature set point. Pressing and holding both buttons jumps from the Home Page to menu pages. On the menu pages, the buttons adjust calibrations offsets and heating profile variables.



The green **Advance** button scrolls forward through menus and parameters lists when programming heating profiles or performing a temperature calibration.



The gray **Reset** button scrolls the display back to the previous page or menu. Pressing the Reset button repeatedly returns the display to the home page. On older controllers, the Reset button may be labeled with an infinity ∞ symbol rather than RESET.



The Orange **EZ1** button launches and aborts Heating Profile 1. The EZ2 button has no function.

CONTROL OVERVIEW (CONTINUED)

Over Temperature Limit Control (OTL)

This graduated dial sets the heating cutoff limit for the Over Temperature Limit system. The OTL is an independent mechanical heating cutoff that prevents unchecked heating of the oven in the event of a failure of the main temperature controller system. For more details, please see the explanation of the [Over Temperature Limit System](#) on page 29 in the Theory of Operation entry.



OTL Light

Marked OVER TEMPERATURE ACTIVATED, this light illuminates while the OTL System is routing power away from the heating elements to prevent heating in the oven chamber. Under normal operating conditions this light should not illuminate.



Vacuum Gauge

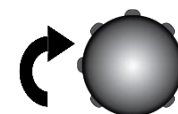
This digital gauge shows the chamber vacuum level relative to the ambient atmospheric pressure. The gauge activates automatically when the Main Power switch is in the On (I) position.



In its factory setting, the gauge shows the chamber pressure in inches of mercury (inHg), with a display range of 0 – 29.9inHg. 0 is the room atmosphere pressure and -29.9inHg a near-perfect vacuum, relative at sea level. See page 38 for how to set the gauge to show other units of measurement.

Vacuum Control Valve

This valve adjusts the level of vacuum draw applied to the oven chamber through the 3/8in Vacuum Port on the back of the oven.

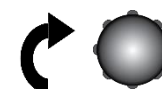


Close

- In the **open** position, this valve applies vacuum draw down to the oven chamber from a connected, active vacuum supply source.
- In the **closed** position, the valve closes off the vacuum draw.

Vent Control Valve

This valve controls the chamber Vent Port on the back of the oven.



Close

- In the **open** position, the oven chamber is open to external atmosphere through the Vent Port.
- Optional: A neutral purge gas supply connected to the Vent Port will flow gas from the supply to the oven chamber when the Vent Valve is open.
- When the valve control is in the **closed** position, the chamber is cut off from external atmosphere and any purge gas supply.
 - **The vent must be closed before applying vacuum to the chamber.** Failure to do so may result in damage to the vacuum pump.

CONTROL OVERVIEW (CONTINUED)

This page left blank

OPERATING PRECAUTIONS



Warning: SVAC ovens are not explosion-proof units!

Avertissement: Ce sont des fours pas résistants aux explosions.

1. These ovens are not designed to safely contain explosive, flammable, or combustible gasses, vapors, or liquids.
 2. Do not place explosive, combustible, or flammable materials into the chamber, or items that have been processed with or tainted by explosive, combustible, or flammable substances.
 3. The bottom surface of the chamber should **not** be used as a work surface.
 4. Never place samples or product on oven chamber floor.
 5. Do not operate the oven in an environment with noxious fumes.
 6. Outgassed byproducts may be hazardous to or noxious for operating personnel. If either is the case, oven exhaust should be positively ventilated to a location outside workspace in accordance with national and local regulations.
 7. Do not place sealed or filled containers in the oven. These may burst open when the chamber is under vacuum.
 8. Do not place alcohol or mercury thermometers in the oven.
 9. The oven is not designed for use in Class I, II, or III locations as defined by the US National Electric Code.
-



Warning Hot Surfaces: These areas are marked with Hot Surface labels. Proper PPE should be employed to minimize risk to burn.

Avertissement Surface Chaude: Ces zones sont marqués avec des étiquettes de Surface chaude. Les EPI approprié devraient être employée pour réduire au minimum le risque de brûler.

OPERATION (CONTINUED)

THEORY OF OPERATION

The SVAC ovens are intended for use in closed-cycle, under-vacuum applications.

Vacuum

Vacuum is supplied to the chamber by an external vacuum pump or building system. The supply is connected to the Vacuum Port on the back of the oven. The current level of relative vacuum is displayed on the Vacuum Gauge on the main control panel.

The oven chamber is pressure rated to -29.91inHg gauge pressure at near sea level. Vacuum levels obtained in the oven chamber are dependent on pump performance, valve settings, and the nature of the application or process, including the volume of material outgassed. The maximum attainable vacuum is governed by altitude above sea level (see page 39 for more information).

The chamber must be sealed off from the room atmosphere prior to the start of a vacuum baking application. The oven is not built to operate with the chamber exposed to free atmosphere or to circulate air within the chamber. Running the oven with the door or the vent open may risks destroying the vacuum pump and damaging the integrity of the oven chamber.

Vacuum pumps and door gaskets should be selected on the basis of the application or process. Some gaskets are vulnerable to different chemicals, and vacuum pumps vary in suitability and safety depending on the outgassed byproduct types and moisture level produced in the oven chamber.

Purging

A cylinder of neutral gas may be connected to the vent port to purge the oven chamber during the final phase of applications or processes structured to prevent the oxidation of product or samples.

Heating Options

The oven can either heat to and run at a constant temperature set point or execute a programmable multistep heating profile with ramp up, heat soak, and ramp down intervals.

Heating in a Vacuum

In normal ovens, a powered element transfers heat into the chamber air. The heated air then circulates by natural convection or blower fan action, and surrounds the product on the shelves, gradually bringing it to temperature. In a vacuum oven, there is no atmosphere to transport heat evenly from the elements to the product. Instead, heat transport takes place primarily by conduction. The oven heating elements are located in side ducts and heat the chamber walls, which in turn transfer heat to the shelves. Each shelf then transports heat to the products or samples resting on it.

OPERATION (CONTINUED)

Direct radiant heating through infrared emission in a vacuum environment provides poor temperature uniformity compared to conductive heating.

The oven internal microprocessor stores a user-selected temperature set point. When powered, the oven heats the chamber shelves to the currently programmed temperature set point. The microprocessor board is wired to a solid-state temperature probe located in the chamber on the rear wall. When the processor detects that the shelf temperature has dropped below the temperature set point, it pulses power to the heating elements.

The processor employs proportional-integral-derivative analytical feedback-loop functions when measuring and controlling the shelving temperature. PID-controlled heating pulse intensities and lengths are proportional to the difference between the measured shelf temperature and the current set point. The frequency of pulses is derived from the rate of change in that difference. The integral function slows the rate of pulses when the temperature nears the set point to avoid overshooting.

SVAC ovens rely on natural heat radiation for cooling. The oven can achieve a low-end operating temperature of the ambient room temperature plus 10°C.

Allowing the oven to heat up with atmosphere in the chamber can result in a significant heat spike when the chamber is brought under vacuum.

The Over Temperature Limit System (OTL)

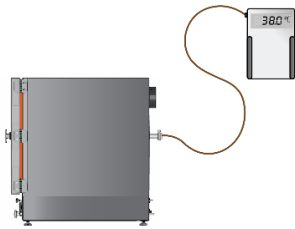
When set, the mechanical OTL heating cutoff system prevents runaway heating in the oven chamber. The OTL cutoff operates independently of the main controller, a microprocessor, and is provided with a separate, hydrostatic temperature sensor probe located in the oven chamber. In the event the chamber shelving temperature exceeds the current OTL setting, the OTL routes power away from the heating elements. The OTL will continue to prevent heating until the temperature drops below its limit setting. **The Over Temperature Limit is set by the end-user**, typically at approximately 5°C above the application constant temperature set point or the highest set point of a multi-step heating profile application.

OPERATION (CONTINUED)

PUT THE OVEN INTO OPERATION

Perform the following steps and procedures to put the oven into operation in a new location.

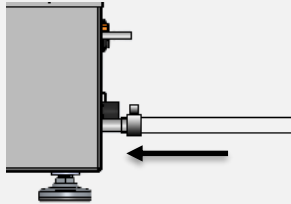
1



Optional: Set up for the Temperature Display Accuracy Verification. A potted thermocouple sensor probe for a temperature reference device may be introduced into the oven chamber at this time through the KF-25 flange. Do this if you wish to perform the optional accuracy verification of the temperature display. The oven display was calibrated to 150°C at the factory.

Note: See page 34 for the proper placement of a reference device thermocouple probe in the chamber.

2



If you have not done so already, connect a vacuum supply to the oven vacuum port.

3



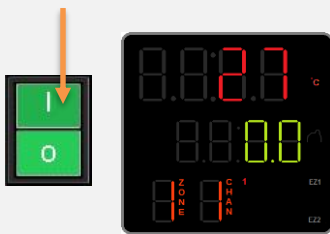
Attach the power cord that came with the unit to the power inlet receptacle on the back of the oven.

4



Plug the power cord into the workspace electrical supply outlet.

5

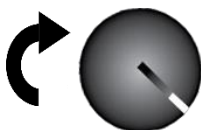


Place the oven **Power Switch** in the on (I) position.

The controller display will illuminate and default to its home page.

The red top line shows the current chamber shelving temperature, the green line in the middle shows the present temperature set point.

6



Verify the Set Over Temperature Limit dial is turned to its maximum position. This prevents the OTL system from interfering with the setup process.

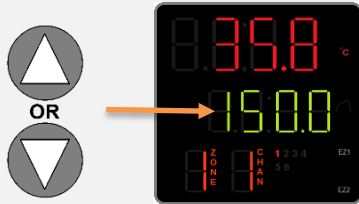
If it is not at maximum, turn the dial to its max setting (clockwise) now.

Continued on next page

OPERATION (CONTINUED)

Continued from the previous page

7



Set the Temperature the Set Point. See page 32

Set the oven to a constant temperature set point equal to your constant temperature baking application. If you will be running a multi-step heating profile, set the constant temperature set point equal to the highest temperature of the profile.

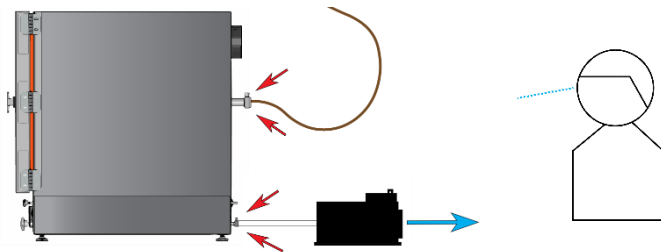
Doing so prepares the oven for setting the Over Temperature Limit and the optional Temperature Display Accuracy Verification.

You may set the constant temperature set point to zero (no heating) or to a warm up temperature **after** completion of the “Put the Oven into Operation” procedure.

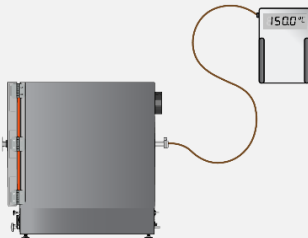
8



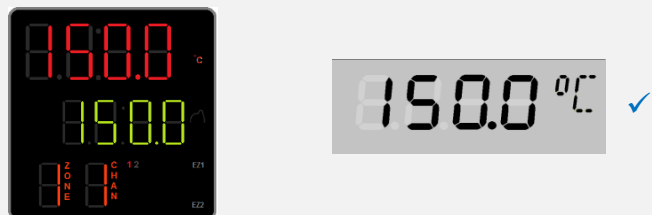
Place the Chamber Under Vacuum for 10 minutes to verify the integrity of the vacuum supply system. See page 33



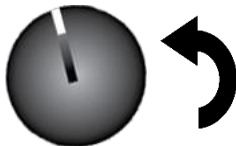
9



Optional: Temperature Display Accuracy Verification. See page 34



10



Set the Over Temperature Limit. See page 36

The oven must be heated and under vacuum to perform this procedure.

The oven is now ready for use.

End of procedure

OPERATION (CONTINUED)

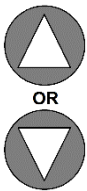
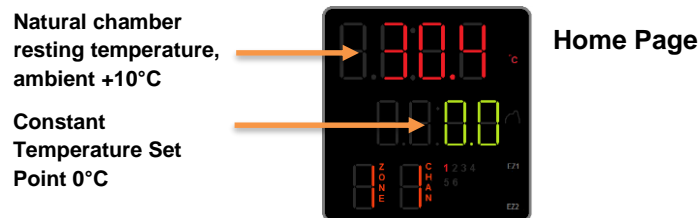
Note: When putting the oven into operation in a new location, set the constant temperature set point equal to your application or the highest temperature of your multi-step heating profile.

Note: An active profile overrides the constant temperature set point. The constant temperature set point cannot be adjusted while a heating profile is active.

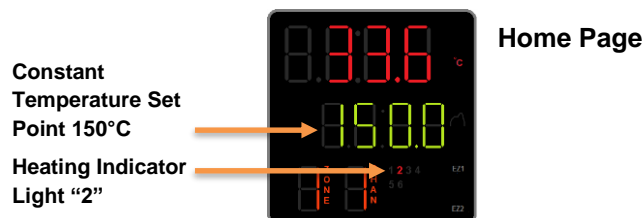
SET THE CONSTANT TEMPERATURE SET POINT

This procedure sets a constant temperature set point. When powered, the oven will heat to and then maintain the constant temperature set point.

The controller must be on its Home Page to adjust the constant temperature set point.



1. Use the Up and Down arrow keys to adjust the green constant temperature set point on the second row to match your set point.
 - a. Holding down an arrow key causes the temperature to advance in increments of tens rather than ones.
2. Release the Arrow key once you have reached your set point. There may be a brief pause before the oven starts heating.



Note: After setting the Over Temperature Limit Setting, the constant temperature set point may be set to zero (0) or any temperature lower than the present Over Temperature Limit that best facilitates operations. Note that running the oven at temperature with atmosphere in the chamber—for example between baking runs—may result in a temperature spike when vacuuming down the chamber.


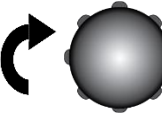
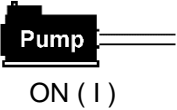

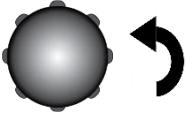
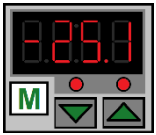
End of procedure

OPERATION (CONTINUED)


PUT THE CHAMBER UNDER VACUUM

Put the oven chamber under vacuum for at least 10 minutes when first putting the oven into operation in a new location to verify the integrity of the vacuum supply system. The oven chamber requires at least -3inHg (-76mmHg or -10kPa) of vacuum draw in order to seal.

Vacuum Down the Oven Chamber

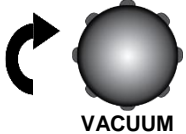
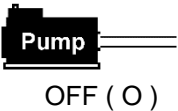

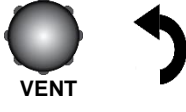
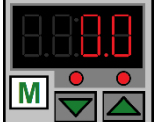
-  Turn the oven Vent Valve control to the closed position (all the way clockwise)
-  Turn the Vacuum Valve control to the closed position (all the way clockwise), if it is not already closed. **Note:** Always make sure the Vacuum and Vent valves are closed prior to applying vacuum to the chamber. This protects the vacuum supply system from damage.
-  Turn on the vacuum source so that it supplies vacuum to the oven. 
-  Open the oven Vacuum Valve by turning it all the way counterclockwise to bring oven chamber under vacuum draw. The Vacuum Gauge on the front panel should show a negative number counting down. 

Holding At Vacuum

-  Keep the oven chamber under vacuum throughout the duration of your baking application to help evacuate outgassed byproducts.

The achievable vacuum level is dependent on altitude above sea level as well as the vacuum supply efficiency and volume of outgassed byproducts.

Restore Atmosphere to the Oven Chamber

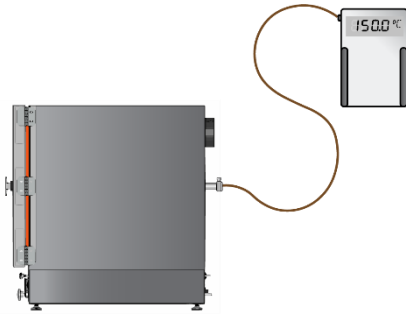
-  Turn the Vacuum Valve control back to the closed position (clockwise) to protect the vacuum pump from exposure to free atmosphere.
-  Turn off the pump. 
-  Slowly turn the Vent Valve control to the Open position to reintroduce atmosphere or a purge gas (15 psi max.) to the oven chamber. 

End of procedure

OPERATION (CONTINUED)

TEMPERATURE ACCURACY VERIFICATION

Note: Performing an accuracy verification of the temperature display requires a temperature reference device. Please see the [Reference Sensor Devices entry](#) on page 15 for device requirements.



Optional: A verification of the temperature display accuracy may be carried out when preparing the oven for use, if required by your laboratory or production protocol. The verification compares the displayed temperature of the oven with the actual temperature of the chamber shelving as provided by a reference sensor device.

If a difference between the actual and displayed temperatures is discovered, perform a temperature calibration. Please see the [Calibrate Temperature Display procedure](#) on page 44 in the User Maintenance section. The oven was factory calibrated at 150°C.

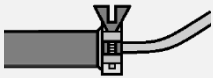
Verification Set Up

1



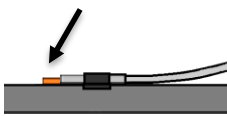
Introduce a potted (sealed) thermocouple sensing probe from a reference device into the oven chamber through the KF-25 flange on the back of the oven.

2



Use the KF-25 clamp included with the oven to secure the potted probe and seal the flange.

3



Place the sensor probe of the temperature reference device inside as close as possible to the geometric center of the chamber. **The exposed thermocouple sensor probe end must be in direct contact with the shelving.**

The probe may be taped to the shelf using heat resistant non-stick tape. Use the tape to secure any loose wiring.

4

VACUUM GAUGE



Vacuum down the chamber. **The chamber must be under vacuum in order to perform an accurate temperature verification.** Factory testing and calibrations are carried out at -25inHg, near sea level.

Continued on next page

OPERATION (CONTINUED)

- 5 **Stability:** The oven temperature must be stable in order to perform an accurate verification. The temperature is considered stabilized when the oven chamber has operated under vacuum at your verification temperature for at least 1 hour with no fluctuations of $\pm 0.1^\circ\text{C}$ or greater for the SVAC1, $\pm 0.2^\circ\text{C}$ or greater for the SVAC2, $\pm 0.25^\circ\text{C}$ or greater for the SVAC4.

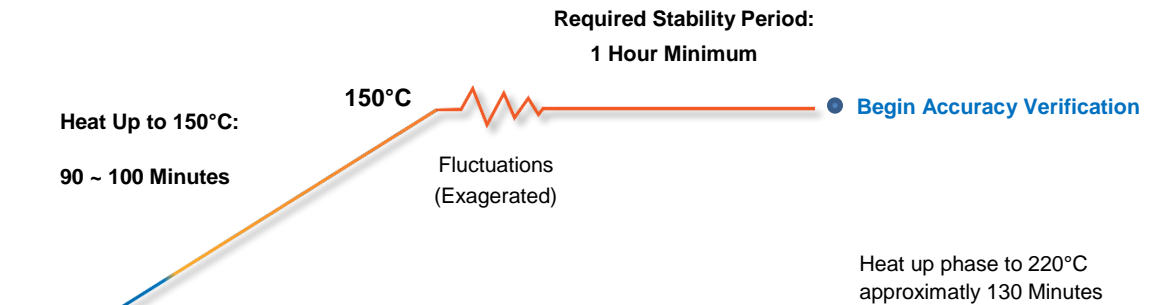

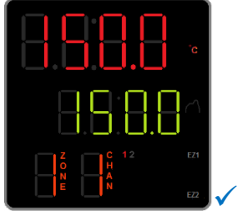




Figure 12: Oven Chamber Heat Up and Stabilization Phases

Temperature Display Accuracy Verification	
<p>1. Once the chamber temperature has stabilized, compare the reference device and the oven display temperature readings.</p> <ol style="list-style-type: none"> If the readings are the same, or the difference between the two (2) falls within the acceptable range of your protocol, the display is accurately showing the oven chamber shelving temperature. The Temperature Verification procedure is now complete. See step 2 if a difference falls outside the acceptable range of your protocol. 	<p>Reference Device</p>  
<p>2. Perform a temperature calibration to match the controller display to the actual chamber temperature if a difference falls outside your protocol range.</p> <ol style="list-style-type: none"> Please see page 44 in the User Maintenance section 	<p>Reference Device</p>  

End of procedure

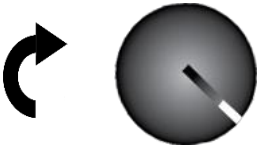
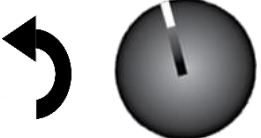
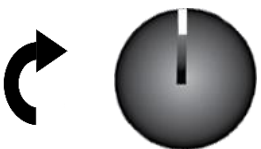
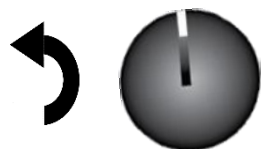

OPERATION (CONTINUED)

Note: The chamber must be under vacuum to successfully set the Over Temperature Limit.

SET THE OVER TEMPERATURE LIMIT

This procedure sets the Over Temperature Limit heating cutoff to approximately 5°C above the current chamber temperature. Perform the steps below once the oven has run with the chamber under vacuum and with no temperature fluctuations at your application temperature set point for at least 30 minutes.

If you will be running a multi-step heating profile, run the oven at the hottest set point of the profile when setting the OTL.

Set OTL	Example
1. Turn the Set Over Temperature Limit control dial clockwise to the maximum position, if not already set to maximum.	
2. Turn the control dial counterclockwise until the red Over Temperature Limit Activated light illuminates.	
3. Slowly turn the dial clockwise until the Over Temperature Limit Activated light turns off. Stop turning the control. a. The Over Temperature Limit is now set approximately 5°C above the current chamber temperature.	
4. Optional: You may turn the dial slightly to the left to bracket in closer to the set point temperature. This sets the OT Limit nearer to the current chamber temperature.	
5. Leave the OTL dial set just above the activation point.	

If the OTL sporadically activates after setting the control, turn the dial very slightly to the right (clockwise). The Over Temperature Limit System routes power away from the oven heating elements whenever the chamber shelf temperature exceeds the setting of the OTL System.

Continued on next page

OPERATION (CONTINUED)

OTL Activation During Normal Operations

Possible causes:

- A user has set the Over Temperature Limit below the current set point for either an active heating profile or single constant-temperature set point.
- An external heat source or a heat source inside the chamber is causing the chamber temperature to spike.
- The temperature controller or its sensor probe have failed and must be replaced in order to resume safe operation of the oven.

If the OTL activated during normal operations, adjust the control dial clockwise halfway to the next dot to increase the setting. If the OTL continues to interrupt heating of the oven chamber and there are no obvious external sources of nearby heating (autoclaves, another oven), depower the oven and allow the oven chamber to cool before opening the oven door or troubleshooting.

End of procedure

PROGRAMMED OPERATIONS (HEATING PROFILES)

The Watlow controller can hold four (4) ten-step heating profiles. Additionally, profiles may be combined by programming profile steps sequentially to run as a single profile of between two (2) and forty (40) steps.

Please see the *Programming Guide – Watlow EZ-Zone Controller Heating Profiles* document, which came included with the oven, for instructions on how to program heating profiles. The guide is an illustrated explanation of all major heating profile functions and programming steps.

Refer to Chapter 7 of the “EZ-Zone PM User’s Manual” for highly detailed instructions on how to program the EZ Watlow Controller.



**EZ1 Button
Launches and
Aborts Profile 1**



**Home Page:
Profile Active
Indicator**

OPERATION (CONTINUED)

VACUUM GAUGE OPERATIONS

Change the Unit of Measurement

Perform the steps below to switch the unit of measurement displayed by the gauge.



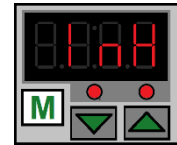
1. Place the vacuum gauge in its adjustment mode.
 - a. Press and hold the “M” button for approximately 3 seconds
 - b. The display will begin to blink and show a unit of measurement



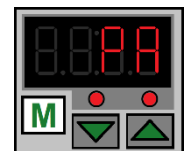
2. Use the arrow keys to scroll between units.



3. Exit the adjustment mode.
 - a. Press and hold the “M” button for approximately 3 seconds
 - b. The display will cease blinking and show the current chamber pressure.



Inches of Mercury

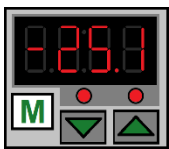


Kilopascals

Units of Measurement – Display Characters

kPa	Kgf/cm ²	bar	psi	mmHg	inHg	mmH ₂ O
00.00	0.098	0.000	0.051	0.000	0.000	0.020

Zero Out the Gauge



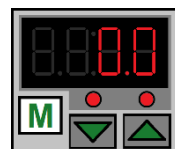
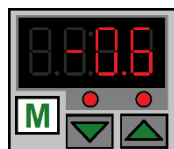
As set at the factory, the vacuum gauge shows a reading of 0 inches of mercury (inHg) when the chamber is at ambient (room) pressure. The display was set at near sea level.

If the gauge does not show 0inHg when the chamber is at room atmospheric pressure, perform the following step. [See page 57](#) for the zero equivalent for units of measurement other than inHg.



Both

1. With the chamber door open, press and hold both the Up and Down arrow buttons.
 - a. Release the buttons when the display shows 0.0.



OPERATION (CONTINUED)

MAXIMUM OBTAINABLE VACUUM

The maximum vacuum obtainable is a set by the altitude of the oven workspace or laboratory environment. The atmosphere is less dense at higher altitudes than at sea level. While a vacuum pump will evacuate the same percentage of atmosphere from the oven chamber, less overall pressure is expelled because of the reduced density.

Altitude (Feet)	Altitude (Meters)	Atmospheric Pressure	Maximum Vacuum Level Attainable
Sea Level	Sea Level	14.70 psi	29.9 inHg
1000ft	305m	14.16 psi	28.9 inHg
2000ft	610m	13.66 psi	27.8 inHg
3000ft	914m	13.16 psi	26.8 inHg
4000ft	1219m	12.68 psi	25.8 inHg
5000ft	1524m	12.22 psi	24.9 inHg
6000ft	1829m	11.77 psi	24.0 inHg
7000ft	2134m	11.33 psi	23.1 inHg
8000ft	2438m	10.91 psi	22.2 inHg
9000ft	2743m	10.50 psi	21.4 inHg
10,000ft	3048m	10.10 psi	20.6 inHg

PRESSURE UNITS CONVERSION CHART

	InHg	kPa	Kgf/cm ²	bar	psi	mmHG	mmH ₂ O
1 inHg	1	3.3863	0.0345	0.3386	0.4911	25.400	345.32
1 kPa	0.2953	1	0.0102	0.01	0.1450	7.5006	101.97
1 Kgf/cm ²	28.9590	98.0665	1	0.9806	14.2233	735.55	10000.27
1 bar	29.5300	100	1.0197	1	14.5037	750.06	10197.44
1 psi	2.0360	6.8947	0.0703	0.0689	1	51.7150	703.09
1 mmHG	0.0394	1.3332	0.0014	0.0013	0.0193	1	13.5954
1 mmH ₂ O	0.0028	0.0098	0.0001	0.0001	0.0014	0.0029	1

OPERATION (CONTINUED)

DATA PORT

The 9-pin RS485 data port, located on the back of the oven, connects to the oven temperature controller. It is primarily intended for updating the controller software.

The port can also be used for temperature monitoring and data logging in a graphic user interface environment using National Instruments' LabView software or Watlow's Specview. Watlow's EZ Zone™ Configurator software can be used to program heating profiles in a drop-down menu environment.

USER MAINTENANCE



Warning: Prior to maintenance or cleaning of this unit, disconnect the power cord from the power supply.

Avertissement: Avant d'effectuer toute maintenance ou entretien de cet appareil, débrancher le cordon secteur de la source d'alimentation.

CLEANING AND DISINFECTING

If a hazardous material or substance has spilled in the oven, immediately initiate your site's Hazardous Material Spill Containment protocol. Contact your local Site Safety Officer and follow instructions per the site policy and procedures.

The oven chamber should be cleaned prior to first use.

Do not use spray on cleaners or disinfectants. These can leak through openings and coat electrical components. Do not use cleaners or disinfectants that contain solvents capable of harming paint coatings or stainless steel surfaces. **Do not use chlorine-based bleaches or abrasives; these will damage the chamber liner.**

Consult with the manufacturer or their agent if you have any doubts about the compatibility of decontamination or cleaning agents with the parts of the equipment or with the material contained in it.



Warning: Never clean the unit with alcohol or flammable cleaners.

Avertissement: Ne jamais nettoyer l'appareil à l'alcool ou avec des nettoyeurs inflammables.

Cleaning

1. Remove all non-attached chamber components and accessories (shelves, racks, and any additional items), if present.
2. Clean the chamber interior with a mild soap and water solution, including all corners.
3. Take special care when cleaning around the chamber sensor probes. Do not clean the probes.
4. Clean all removable accessories and components.
5. Rinse the chamber surfaces and shelving with distilled water and wipe dry with a soft cloth.
Do not use deionized water.
 - a. Deionized water is an aggressive solvent that will attack most metals. Never use deionized water to clean your oven, even if it is readily available in your laboratory or production workspace.

USER MAINTENANCE (CONTINUED)

Disinfecting

Disinfect the oven if algae, mold, bacteria, or other biological contaminants are an issue. For maximum effectiveness, disinfection procedures are typically performed after cleaning. Perform the following steps to manually disinfect the oven:

1. Turn the unit off. Open all doors and carry out your laboratory or production space disinfection protocol.
2. Disinfect the oven chamber using commercially available disinfectants that are non-corrosive, non-abrasive, and suitable for use on stainless steel surfaces. If disinfecting external surfaces use disinfectants that will not damage painted metal or plastic. Contact your local Site Safety Officer for detailed information on the disinfectants compatible with your application or process.
3. If permitted by your protocol, remove all interior accessories (shelving and other non-attached items) from the chamber when disinfecting.
4. Disinfect all surfaces in the chamber, making sure thoroughly disinfect the corners. Exercise care to avoid damaging the sensor probes.

MAINTAINING ATMOSPHERIC INTEGRITY

Periodically, inspect the door latch, trim, catch, and gasket for signs of deterioration. Failure to maintain the integrity of the door system shortens the lifespan of the unit.

ELECTRICAL COMPONENTS

Electrical components do not require maintenance. If the oven fails to operate as specified, please contact your distributor or [Sheldon Technical Support](#) for assistance.

USER MAINTENANCE (CONTINUED)

VACUUM PUMP MAINTENANCE

Refer to the operation manual supplied with your vacuum pump for recommended maintenance routine, such as oil levels, replacement of sorbent charge, and exhaust filter change outs. **Contact your vacuum pump supplier if you do not have an operation manual.**

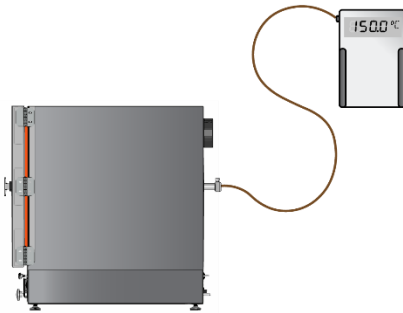
STORAGE

To prepare the unit for storage, remove all shelves, dry the chamber completely, and disconnect the power supply. Be certain that the door is positively locked in the closed position.

USER MAINTENANCE (CONTINUED)

CALIBRATE THE TEMPERATURE DISPLAY

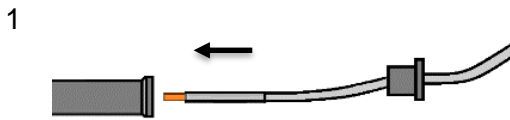
Note: Performing a temperature display calibration requires a temperature reference device. Please see the [Reference Sensor Devices entry](#) on page 15 for device requirements.



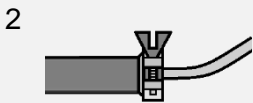
Temperature calibrations are performed to match the temperature display to the actual shelving temperature inside the oven chamber. The actual shelving temperature is supplied by a reference sensor device. Calibrations compensate for drifts in the controller as well as those caused by the natural material evolution of the sensor probe in the heated oven chamber. Calibrate as often as required by your laboratory or production protocol, or regulatory compliance schedule.

The manufacturer recommends calibrating at your the constant set point temperature of your application or at the median of your multi-step set heating profile

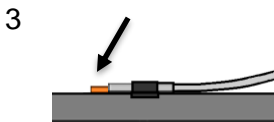
Temperature Calibration Set Up



Introduce a potted (sealed) thermocouple sensing probe from a reference device into the oven chamber through the KF-25 flange on the back of the oven

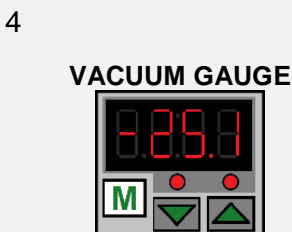


Use the KF-25 clamp included with the oven to secure the potted probe and seal the flange



Place the sensor probe of the temperature reference device inside as close as possible to the geometric center of the chamber. **The exposed thermocouple sensor probe end must be in direct contact with the shelving.**

The probe may be taped to the shelf using heat resistant non-stick tape. Use the tape to secure any loose wiring.



Place the oven chamber under vacuum at the level of your application or baking process. **The chamber must be under vacuum in order to perform an accurate temperature calibration.**

Factory calibrations are performed at -25inHg near sea level.

Continued on next page

USER MAINTENANCE (CONTINUED)

- 5 **Stability:** The oven temperature must be stable in order to perform an accurate calibration. The temperature is considered stabilized when the oven chamber has operated under vacuum at your calibration temperature for at least 1 hour with no fluctuations of $\pm 0.1^{\circ}\text{C}$ or greater for the SVAC1, $\pm 0.2^{\circ}\text{C}$ or greater for the SVAC2, $\pm 0.25^{\circ}\text{C}$ or greater for the SVAC4.

The oven was calibrated at the factory at 150°C .

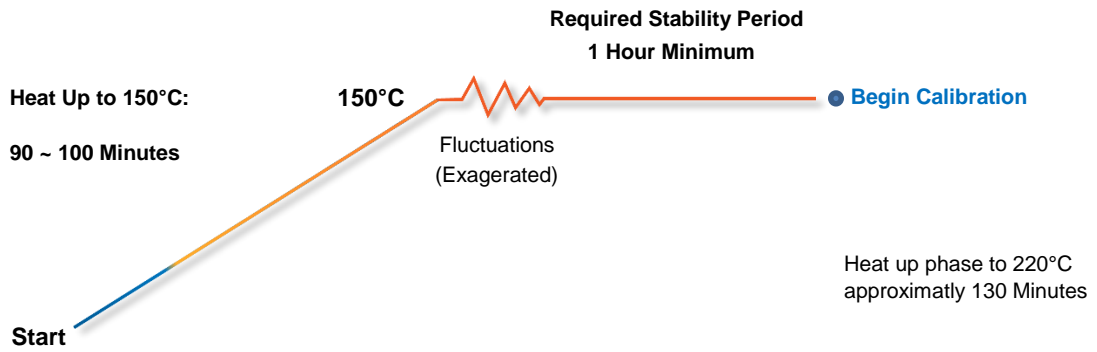

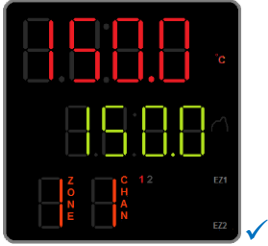

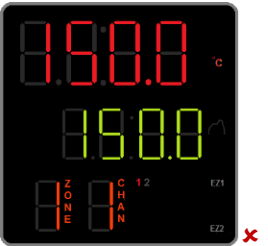
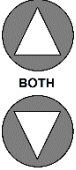


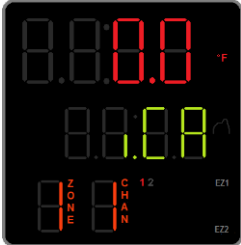
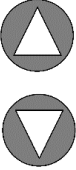



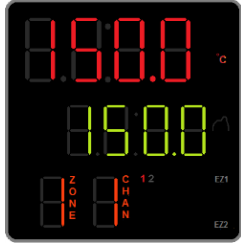


Figure 13: Oven Chamber Heat Up and Stabilization Phases




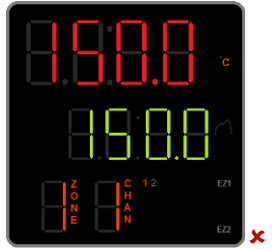

Temperature Calibration													
<p>1. Once the chamber has stabilized, compare the reference temperature device and chamber temperature display readings.</p> <ol style="list-style-type: none"> If the readings are the same, or the difference between the two (2) falls within the acceptable range of your protocol, the display is accurately showing the chamber temperature. The Temperature Calibration procedure is now complete. See step 2 if a difference falls outside the acceptable range of your protocol. 	<p>Reference Device</p>  												
<p>2. The display requires calibration.</p> <ol style="list-style-type: none"> The difference (also known as an error) between the reference device and the display is an offset. Examples of offset values: <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Reference Sensor Reading</th> <th>Oven Temp Display</th> <th>Offset Value</th> </tr> </thead> <tbody> <tr> <td>152.0°C</td> <td>150°C</td> <td>2</td> </tr> <tr> <td>149.1°C</td> <td>150°C</td> <td>-0.9</td> </tr> <tr> <td>148.0°C</td> <td>150°C</td> <td>-2</td> </tr> </tbody> </table> <ol style="list-style-type: none"> Note the offset value for use in Step 5. 	Reference Sensor Reading	Oven Temp Display	Offset Value	152.0°C	150°C	2	149.1°C	150°C	-0.9	148.0°C	150°C	-2	<p>Reference Device</p>  
Reference Sensor Reading	Oven Temp Display	Offset Value											
152.0°C	150°C	2											
149.1°C	150°C	-0.9											
148.0°C	150°C	-2											

USER MAINTENANCE (CONTINUED)

Temperature Calibration (Continued)		
<p>3. Open the temperature controller Operations Selection Menu.</p> <p> BOTH</p> <p>a. Press and hold both the Up and Down Arrow buttons simultaneously for approximately 3 seconds.</p> <p>b. Release the buttons when “A1” appears in the Upper Display and “Oper” appears in the Lower Display.</p>	 <p>Operations Selection Menu</p>	
<p>4. Advance through the Operations menu to the Temperature Calibration page.</p> <p></p> <p>a. Push the green Advance button repeatedly until “i.CA” appears in the green middle display and a number value in the red top display.</p>		
<p></p> <p>5. Adjust the number value in the top display to match the offset value, using the arrow buttons.</p>		
<p>6. Save the calibration offset and return to the Home Page.</p> <p> RESET</p> <p>a. Push the Reset Button repeatedly until the display shows the home page.</p> <p>b. The oven will begin to heat or passively cool to reach the current set point with the offset display value.</p>		
<p>7. Allow the oven to stabilize after achieving the temperature set point using the offset display value.</p>		

Continued on next page

USER MAINTENANCE (CONTINUED)

Temperature Calibration (Continued)	
<p>8. Once the chamber has stabilized for a half hour, compare the reference temperature device and oven temperature display readings.</p> <ol style="list-style-type: none"> If the readings are the same, or the difference between the two (2) falls within the acceptable range of your protocol, the display is now accurately showing the chamber temperature. The Temperature Calibration procedure is now complete. See step 9 if a difference falls outside the acceptable range of your protocol again. 	<p>Reference Device</p>  
<p>9. Repeat steps 2 – 8, up to two more times.</p> <ol style="list-style-type: none"> Three calibration attempts may be required to successfully calibrate ovens that are more than $\pm 2^{\circ}\text{C}$ out of calibration. See the next step if the second two calibration attempts fail. 	<p>Reference Device</p>  
<p>10. If the temperature readings difference still falls outside your protocol after three calibration attempts, contact your distributor or Technical Support for assistance.</p>	

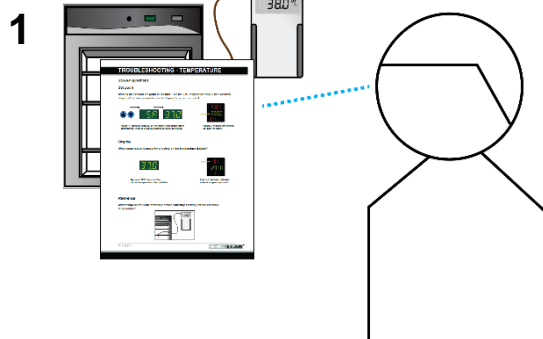
End of procedure

USER MAINTENANCE (CONTINUED)

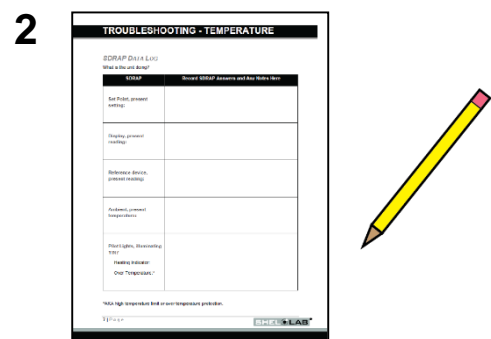
DIAGNOSTICS - HEATING ISSUES

If the unit is experiencing heating issues, use the following guide to gather information on the unit, prior to contacting Technical Support. Gathering and sharing this information with Tech Support significantly increases the chance a service technician will be dispatched with the parts needed to fix your unit during their first visit.

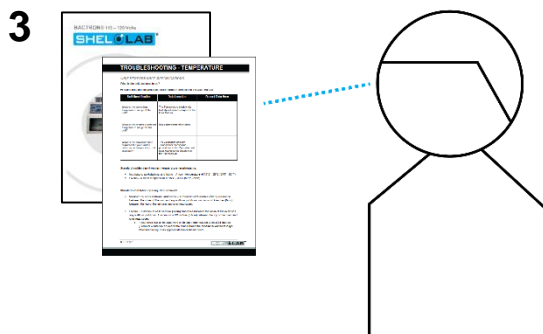
Steps



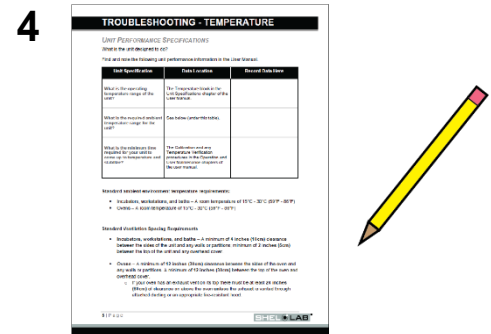
Read the SDRAP diagnostic questions on pages 53 and 54 and observe the unit in operation.



Record the observations in the SDRAP Data Log on page 49.



Read the Unit Performance Specification questions on page 50 and consult the user manual for answers.



Record the answers in the Unit Specifications Log on page 50.

5 **Share this information with Tech Support!**

USER MAINTENANCE (CONTINUED)

SDRAP Data Log

What is the unit doing? See pages 53 - 54 for the detailed walkthrough of the SDRAP questions.

SDRAP	Record SDRAP Answers and Any Notes Here
S et Point, present setting:	
D isplay, present Temperature reading:	
R eference device, present reading:	
A mbient, present temperature:	
P ilot Lights, illuminating Y/N?	Heating Indicator:
	Over Temperature Activated:

This page may be copied for institutional use

USER MAINTENANCE (CONTINUED)

Unit Performance Specifications

What is the unit designed to do?

Find and note the following unit designation and performance information in the user manual.

Unit Specification	Data Location	Record Data Here
Model Type:	This manual covers SVAC4s, SVAC2s, and SVAC1s. See the Orientation Photos on pages 10 through 12 or the data plate on the unit to identify your model type.	
What is the operating temperature range of the unit?	The Temperature block in the Unit Specifications chapter, page 57.	
What is the required ambient temperature range for the unit?	See below (under this table).	
What is the minimum time required for your unit to come up to temperature and stabilize?	Allow 100 minutes for the unit to achieve 150°C or 130 minutes to achieve 220°C.	

Standard ambient environment temperature requirements:

- A room temperature of 15°C - 30°C (59°F - 86°F)

Standard Ventilation Spacing Requirements

- A minimum of **12 inches (30cm)** clearance between the sides of the oven and any walls or partitions. A minimum of **12 inches (30cm)** between the top of the oven and overhead cover.

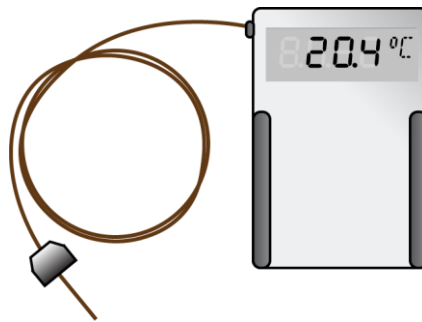
This page may be copied for institutional use

USER MAINTENANCE (CONTINUED)

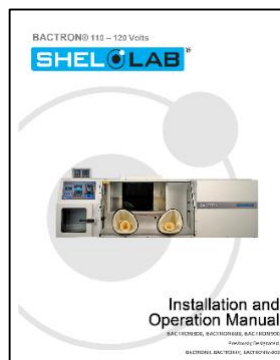
Required Items

You must have the following items on hand to answer the diagnostic questions.

A temperature reference device – A calibrated digital thermometer with a potted sensor probe. The device must be at least as accurate as the temperature display of your unit.



A copy of the user manual for the unit – Must be available in the same room as the unit for use.

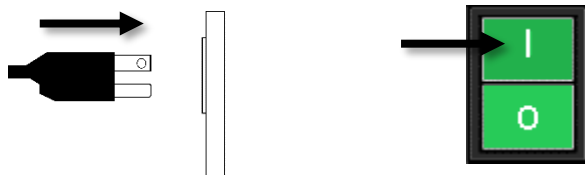


USER MAINTENANCE (CONTINUED)

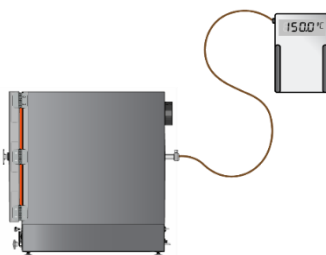
Note: Does the car actually have gas in the tank? Have you physically verified the computer is plugged in? Yes, we are going to ask some very basic questions. Please bear with. Methodical verifications and the elimination of assumptions are often the quickest means of getting a unit back into operation.

Before Starting

1. The unit must be connected to a power source that meets the requirements in the Installation chapter (page 19) and turned on.



2. A reference temperature device sensor probe must be placed in the chamber.
 - See the probe placement instructions in the [Temperature Display Verification procedure](#) on page 34.



3. The oven chamber must be sealed and be under vacuum. See the [Place the Chamber Under Vacuum](#) entry on page 33.



4. The unit must have adequate time to come up to temperature and stabilize. **Failure to wait will result in an inaccurate diagnosis.**



- Allow 100 minutes for the unit to achieve 150°C or 130 minutes to achieve 220°C.
- Start the “Diagnostic Data Procedure” **when the allotted time has passed**, even if the unit fails to achieve the set point temperature.

TROUBLESHOOTING - TEMPERATURE

Diagnostic Data Procedure – SDRAP Questions

Set point?

What is the present set point of the unit? See the Set Temperature entry in the “Operation” chapter of the user manual for how to display the present set point.

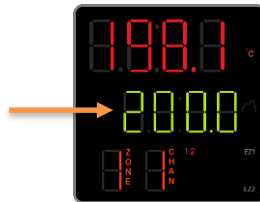


Figure 14: Set Point in Green

Display?

What chamber temperature is presently showing on the temperature display?

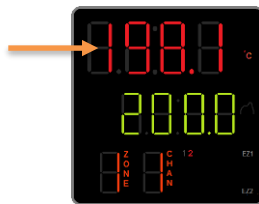
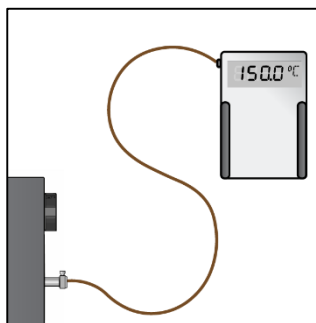


Figure 15: Present temperature in red

Reference?

What temperature is the reference device currently showing for the chamber temperature?

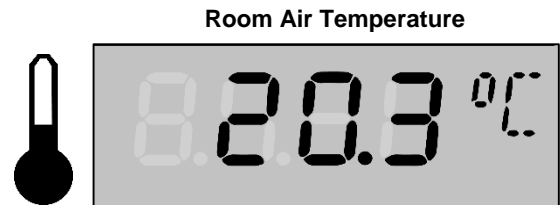


TROUBLESHOOTING - TEMPERATURE

Ambient?

What is the room temperature?

- For best results, measure the temperature in the same section of the room where the unit is located. Do not place your thermometer on the unit.



Pilot Lights?

1) Is the heating active indicator on the control panel flashing or otherwise illuminating.

Figure 16: Heating Indicator



"2" indicates the controller is calling for power to the element(s)

2) Is the Over Temperature Limit Activated indicator illuminating? Answer yes if the light is on continually or if it is pulsing.



OVER TEMPERATURE ACTIVATED

USER MAINTENANCE (CONTINUED)

Share!

Share the SDRAP and Unit Specifications data with Technical Support. This data is crucial for offsite personnel making accurate remote diagnoses. The information is used to help ensure service techs are dispatched with the tools and parts needed to fix your unit during the first visit.

Facilities Technicians

SDRAP and Unit Specifications data are also useful to any institutional repair technicians at your facility who may be responsible for servicing of out-of-warranty units.

End Diagnostic Data Procedure

UNIT SPECIFICATIONS

This oven is a 110 – 120 volt unit. Please refer to the oven data plate for individual electrical specifications.

Technical data specified applies to units with standard equipment at an ambient temperature of 25°C and a voltage fluctuation of ±10%. The temperatures specified are determined in accordance to factory standard following DIN 12880 respecting the recommended wall clearances of 10% of the height, width, and depth of the inner chamber. All indications are average values, typical for units produced in the series. We reserve the right to alter technical specifications at all times.

WEIGHT

Model	Shipping Weight	Unit Weight
SVAC1	137lbs / 62.0kg	105lbs / 47.6kg
SVAC2	218lbs / 99.0kg	179lbs / 81.2kg
SVAC4	449lbs / 203.7kg	360lbs / 163.3kg

DIMENSIONS

Inches

Model	Exterior W x D x H	Interior W x D x H
SVAC1	17.5 x 22.8 x 23.5	9.0 x 12.0 x 9.0
SVAC2	20.5 x 29.5 x 26.3	12.0 x 20.0 x 12.0
SVAC4	26.5 x 34.5 x 32.3	18.0 x 24.0 x 18.0

Millimeters

Model	Exterior W x D x H	Interior W x D x H
SVAC1	445 x 578 x 597	228 x 304 x 228
SVAC2	502 x 749 x 667	304 x 508 x 304
SVAC4	673 x 876 x 819	457 x 609 x 457

UNIT SPECIFICATIONS (CONTINUED)

CAPACITY

Model	Cubic Feet	Liters
SVAC1	0.6	15.9
SVAC2	1.67	47.2
SVAC4	4.50	127.4

VACUUM

Operational Vacuum Range - All Ovens

inHg	mmHg	kPa	bar
-3.0 to -29.9	-76 to -760	-10 to -101	-0.1016 to -1.0125

Vacuum Display Range – All Ovens

inHg	mmHg	kPa	bar
0.0 to -29.9	37.5 to - 757	5 to -101	0.05 to -1.013

TEMPERATURE


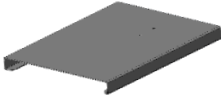

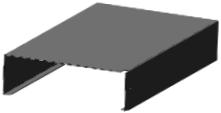





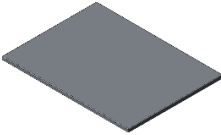
Model	Range	Stability	Uniformity
SVAC1	Ambient +10° to 220°C	± 0.1°C @ 150°C	±6% of Set Point
SVAC2	Ambient +10° to 220°C	± 0.2°C @ 150°C	±6% of Set Point
SVAC4	Ambient +10° to 220°C	± 0.25°C @ 150°C	±6% of Set Point

POWER

Model	AC Voltage	Amperage	Frequency
SVAC1	110 - 120	7	50/60 Hz
SVAC2	110 - 120	10	50/60 Hz
SVAC4	110 - 120	13	50/60 Hz

REPLACEMENT PARTS LIST

See the next page for gaskets

Description	Parts Number		
Adjustable Leveling Feet, SVAC2	 2700512	Shelf Short, SVAC1	 5680519
Adjustable Leveling Feet, SVAC4	 2700506	Shelf Tall, SVAC2	 5680567
Fuse, T16A 250V 5x20mm	 3300513	Shelf Short, SVAC2	 9751226
Power Cord 125 volt, 15Amp, 9ft 5 in (2.86m) NEMA 5-15P	 1800510	Shelf Clip, Individual (1), SVAC4	 1250510
Shelf Tall, SVAC1	 5680506	Shelf, SVAC4	 5680563

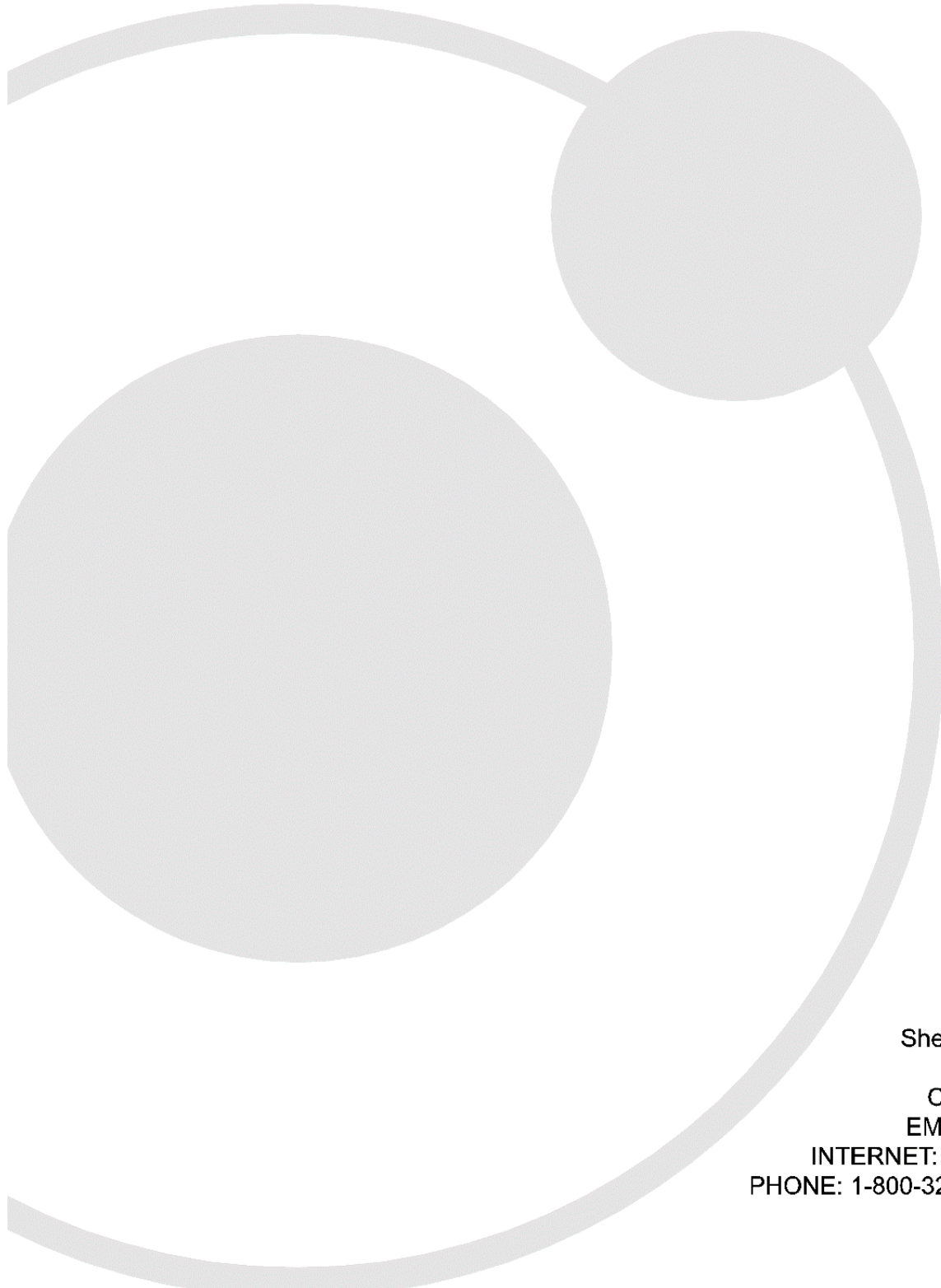
REPLACEMENT PARTS LIST (CONTINUED)

REPLACEMENT GASKETS

Available Gaskets Types	Part Number
<p>Silicon, black or red, (comes with oven), rated to 230°C</p> <p>Applications: General and high temperature</p> <p>Resistant to: Moderate or oxidizing chemicals, ozone, and concentrated sodium hydroxide</p> <p>Attacked by: Many solvents, oils, concentrated acids, and diluted sodium hydroxide</p>	<p>SVAC1: 3450706</p> <p>SVAC2: 3450707</p> <p>SVAC4: 3450719</p>
<p>Buna, rated to 105°C</p> <p>Applications: Solvent</p> <p>Resistant to: Many hydrocarbons, fats, oils, greases, and hydraulic fluids.</p> <p>Attacked by: Ozone (except PVC blends), ketones, esters, aldehydes, chlorinated, and nitro hydrocarbons.</p>	<p>SVAC1: 3450712</p> <p>SVAC2: 3450708</p> <p>SVAC4: 3450724</p>
<p>Fluorosilicone rated to 175°C</p> <p>Applications: Acidic</p> <p>Resistant to: Moderate or oxidizing chemicals, ozone, aromatic chlorinated solvents, and bases.</p> <p>Attacked by: Brake fluids, hydrazine, and ketones.</p>	<p>SVAC1: 3450610</p> <p>SVAC2: 3450611</p> <p>SVAC4: 3450612</p>
<p>Viton®, rated to 205°C</p> <p>Applications: Acidic</p> <p>Resistant to: All aliphatic, aromatic and halogenated hydrocarbons, acids, and animal and vegetable oils.</p> <p>Attacked by: Ketones, low molecular weight esters, and compounds containing nitro.</p>	<p>SVAC1: 3450669</p> <p>SVAC2: 3450670</p> <p>SVAC4: 3450671</p>
<p>Gasket Dimensions</p> <p>SVAC1 – 9.2 X 9.3 Inches (22.86 x 22.86cm)</p> <p>SVAC2 – 12 x 12 Inches (30.48 x 30.38cm)</p> <p>SVAC4 – 18 x 18 Inches (45.72 x 45.72cm)</p>	

Ordering Parts and Consumables

If you have the Part Number for an item, you may order it directly from Sheldon Manufacturing by calling 1-800-322-4897 extension 3. If you are not certain that you have the correct Part Number, or if you need that specific item, please contact Sheldon Technical Support for help at 1-800-322-4897 extension 4 or (503) 640-3000. Please have the **model** and **serial number** of the oven ready, as Tech Support will need this information to match your unit to its correct part.



Sheldon Manufacturing Inc.
P.O. Box 627

Cornelius, Oregon 97113

EMAIL: tech@Shellab.com

INTERNET: <http://www.Shellab.com>

PHONE: 1-800-322-4897 (503) 640-3000

FAX: (503) 640-1366

