

Vacuum Oven 230 Voltage



Installation and Operation Manual

SVAC9-2

Previously Designated:

VPX9-2

SVAC9-2 Vacuum Oven 230 Voltage

Installation and Operation Manual

Part Number (Manual): 4861570

Revision: February 4, 2016

Pictured on front: Standard powder coat paint

Stainless steel exterior clean room option



This oven requires permanent connect wiring (aka hardwiring) to a power source. The oven does not plug into a wall power outlet using a power cord.

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 61010A-2-010:2002
UL 61010-1:2012
EN 61010-1:2010
EN 61010-2-010:2003

TABLE OF CONTENTS

| | |
|--|-----------|
| INTRODUCTION | 4 |
| <i>General Safety Considerations</i> | 4 |
| <i>Engineering Improvements</i> | 5 |
| <i>Contacting Assistance</i> | 5 |
| <i>Recording Data Plate Information</i> | 5 |
| <i>Clean Room Option</i> | 5 |
| RECEIVING YOUR OVEN | 6 |
| <i>Inspect the Shipment</i> | 6 |
| <i>Orientation Photo</i> | 7 |
| <i>Vacuum Pump</i> | 8 |
| <i>Gaskets</i> | 8 |
| <i>Reference Sensor Device</i> | 8 |
| INSTALLATION | 10 |
| <i>Required Ambient Conditions</i> | 10 |
| <i>Environmental Disruptions</i> | 10 |
| <i>Power Source Requirements</i> | 11 |
| <i>Power Feed Wiring</i> | 11 |
| <i>Vacuum Plumbing</i> | 12 |
| <i>Lifting and Handling</i> | 14 |
| <i>Install Oven in Location</i> | 14 |
| <i>Leveling</i> | 14 |
| <i>Initial Cleaning</i> | 15 |
| <i>Shelving Installation</i> | 15 |
| GRAPHIC SYMBOLS | 16 |
| CONTROL OVERVIEW | 18 |
| OPERATION | 21 |
| <i>Operating Precautions</i> | 21 |
| <i>Theory of Operation</i> | 22 |
| <i>Preparing the Oven</i> | 24 |
| <i>Vacuum Verification</i> | 26 |
| <i>Set the Temperature Set Point</i> | 27 |
| <i>Temperature Accuracy Verification</i> | 28 |
| <i>Set the Over Temperature Limit</i> | 30 |
| <i>Programmed Operations</i> | 31 |
| USER MAINTENANCE | 32 |
| <i>Cleaning and Disinfecting</i> | 32 |
| <i>Maintaining Atmospheric Integrity</i> | 33 |
| <i>Electrical Components</i> | 33 |
| <i>Vacuum Pump Maintenance</i> | 33 |
| <i>Calibrate the Temperature display</i> | 34 |
| UNIT SPECIFICATIONS | 38 |
| <i>Weight</i> | 38 |
| <i>Dimensions</i> | 38 |
| <i>Capacity</i> | 38 |
| <i>Shelf Capacity by Weight</i> | 38 |
| <i>Temperature</i> | 39 |
| <i>Power</i> | 39 |
| REPLACEMENT PARTS | 40 |

INTRODUCTION

Thank you for purchasing a Sheldon Manufacturing SVAC9-2 large capacity vacuum oven. We know that 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 your satisfaction. Sheldon Manufacturing, Inc. stands behind our products, and we will be here if you need us.

These vacuum ovens are intended for professional, industrial, and educational applications. The ovens are not intended for use at hazardous or household locations.

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's safety features. This can result in injury or death.

Before you use the oven read this entire manual carefully to understand how to install, operate, and maintain the oven in a safe manner. Keep this manual available for use by all oven operators. Ensure that all operators are given appropriate training before the oven begins service.

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

- Always hardwire the unit power feed to an earth grounded electrical source that conforms to national and local electrical codes. If the unit is not earth grounded, parts such as knobs and controls may conduct electricity and cause serious injury.
- Avoid damaging the power feed. Do not bend it excessively, step on it, place heavy objects on it. A damaged power feed can easily become a shock or fire hazard. Never use a power feed after it has been damaged.
- Do not position the equipment in such a manner as to make it difficult to disconnect or uncouple the power feed.
- Do not attempt to move the unit while in operation or before the unit has cooled.
- Only use this equipment for its intended range of applications.
- Follow any local or regional ordinances in your area covering the use of this unit.
- Use only approved accessories. Your oven and its recommended accessories have been designed and tested to meet strict safety requirements.
- Do not modify system components. Any alterations or modifications to your oven may be dangerous and will void your warranty.

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 your unit, please contact Sheldon Customer Support. Phone hours for Customer Support are 6 am – 4:30 pm 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** (see page 5).

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

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

RECORDING DATA PLATE INFORMATION

Locate the data plate on the back of the oven next to the power 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 | |

CLEAN ROOM OPTION

An optional stainless steel exterior is available for the SVAC9-2 from Sheldon Manufacturing. Suitable for many cleanroom applications, the paint-free exterior surfaces are corrosion resistant and help to prevent contamination from paint flecking and surface particle retention. Special Quote (SQ) Number: 910-980-0004.

This option must be chosen prior to the oven being built. All SVAC9-2 ovens come with stainless steel interiors.



Figure 1: SVAC9-2 with Stainless Steel Exterior

RECEIVING YOUR OVEN

INSPECT THE SHIPMENT

- When an oven 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 oven, **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 oven.
3. If the carton is not damaged, open the carton and remove the contents.
4. The unit should come with an Installation and Operation Manual, a Certificate of Compliance, a *Watlow EZ-Zone Programming Guide*, and a *Watlow EZ-Zone User Manual*.
5. Verify that the correct number of accessories have been included.

Included Accessories



*The oil drain tray is included for use with vacuum pumps that produce oil leakage.

6. Carefully check all packaging before discarding. Save the shipping carton until you are certain that the unit and its accessories function properly.

RECEIVING YOUR OVEN (CONTINUED)

ORIENTATION PHOTO

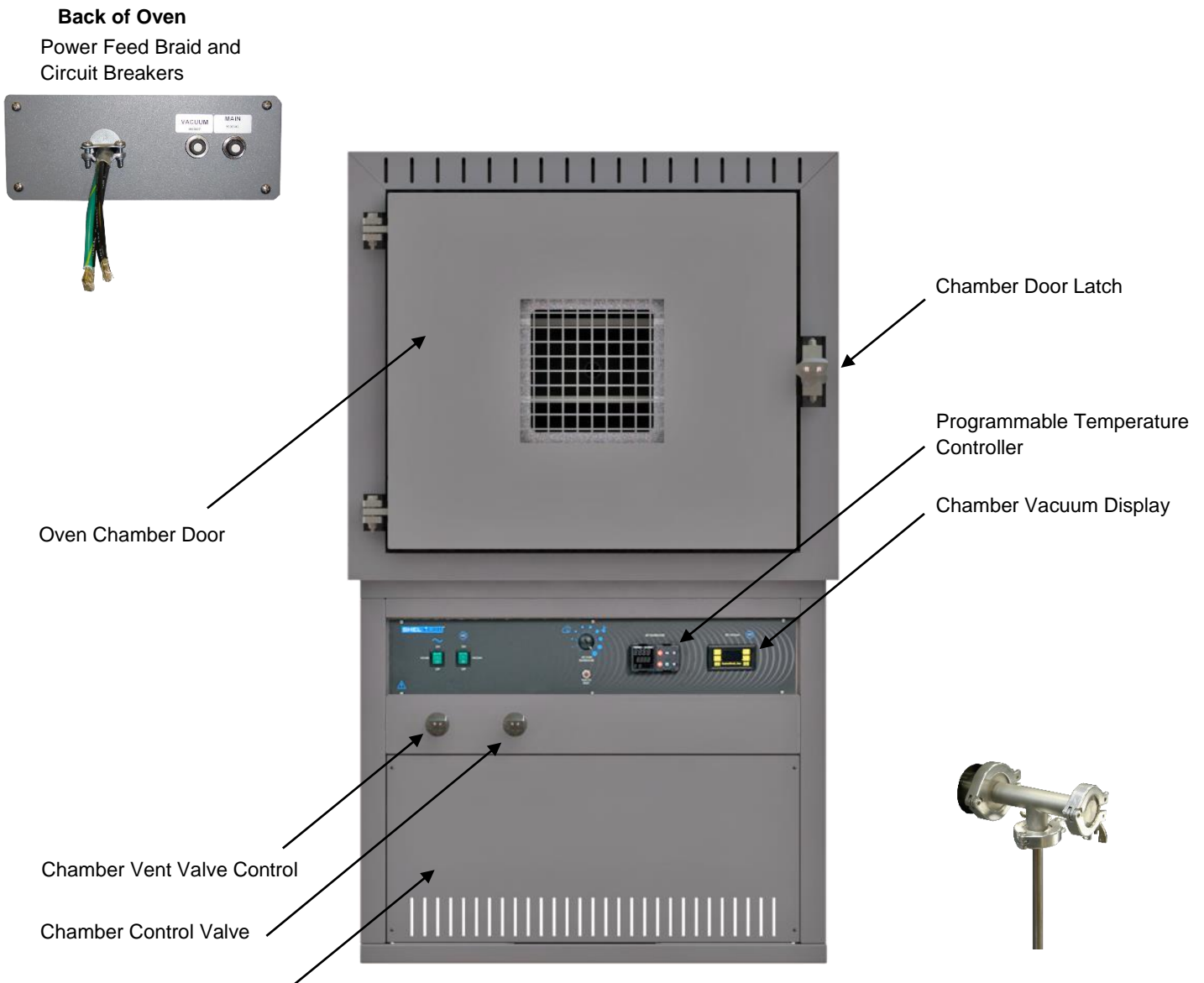


Figure 2: SVAC9-2

Vacuum Plumbing Cabinet: Contains a pump mount point and power supply outlet for a vacuum pump, as well as a KF25 vacuum port fitting and vent fitting.

The plumbing cabinet requires a screwdriver for access.

The oven is provided with two KF25 vacuum access port fittings. One fitting is located on the back of the oven. The other is inside the vacuum plumbing cabinet

RECEIVING YOUR OVEN (CONTINUED)

VACUUM PUMP

The SVAC9-2 oven requires a vacuum source. The oven does not come with a vacuum pump.

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 application or 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.

Mounting studs and an electrical outlet for powering a vacuum pump are installed in the cabinet inside the base of the oven. See the [Vacuum Plumbing](#) entry in the Installation section (page 12) for more information on plumbing.

GASKETS

The SVAC9-2 comes with Viton door and window gaskets installed. These are rated to 205°C and resistant to acids, but not solvents. Sheldon Manufacturing also offers Buna gaskets resistant to solvents and rated to 100°C.

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 0.2°C. For best results, use a digital device with a potted (sealed) thermocouple probe. Select a probe suitable for the application temperature you will be verifying or 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.**

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INSTALLATION

Installation of the unit requires permanent connect wiring (commonly known as hardwiring) and **must be performed by a qualified electrical technician**. All other steps can be performed by the end user.

REQUIRED AMBIENT CONDITIONS

This oven is intended for use indoors at room temperatures between **15°C and 40°C (59°F and 86°F)**, at no greater than **80% Relative Humidity** (at 25°C / 77°F). Allow a minimum of **12 inches (30cm)** between the oven and any walls or partitions, as well as **12 inches (30cm)** of vertical headspace clearance above the top of the oven for unobstructed airflow and cooling.

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

ENVIRONMENTAL DISRUPTIONS

When selecting a location to install the oven, consider all environmental conditions that can affect effective temperature range, uniformity, and stability of the oven. For example:

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

INSTALLATION (CONTINUED)

POWER SOURCE REQUIREMENTS

When selecting a location for the oven, check that **each** of the following requirements are satisfied:

- The oven must be positioned so that all operators have access to the power feed disconnect in case of emergencies.
 - The Disconnect must be in close proximity to the equipment and within easy reach of the operator.
 - The Disconnect must be marked as the disconnecting device for the equipment.
- The power source must be **single (1) phase** and **protective earth grounded**. The source must conform to all national and local electrical codes.
- The power source voltage and ampere must match the power requirements listed on the oven data plate (located on the back of the unit, beneath the power feed inlet).
 - **230 Volt, AC, 5/60 Hz, single (1) phase**
- **Supplied voltage must not vary more than 10% from the data plate rating**. Damage to the oven may result if supplied voltage varies more than 10%. Use a separate circuit to prevent loss of the unit due to overloading or circuit failure.
- **A switch or circuit-breaker must be used in the building installation** to protect against overcurrent conditions.
 - Required circuit-breaker for the wall power source is 30 Amps
- A separate circuit for the oven is recommended to prevent possible loss of product due to overloading or failure of other equipment on the same circuit.

Circuit Breakers

The SVAC9-2 oven comes equipped with two (2) 20 amp circuit breakers located on the back of the oven. If a breaker trips, turn the oven power switch to off and locate a cause for the overcurrent before resetting the breaker.

POWER FEED WIRING

The oven comes provided with an integral 6 inch (15 cm) wire braid consisting of:

- Two 10-gauge hot wires and a 10 gauge earth ground

The wires for power source connection should be in accordance with the following:
Green/Yellow – Earth; Black – Hot; Black – Hot.

The oven must be earth grounded using the protective conductor terminal (green with yellow stripe wire). Do not remove the protective conductor (earth connection). Removing the protective conductor will negate the oven's protections against potentially dangerous electric shocks and create a possible fire hazard.

INSTALLATION (CONTINUED)

VACUUM PLUMBING

Select a location for the oven based on which KF-25 vacuum fitting you will use to supply vacuum to the oven chamber. Additionally, any purge gas supply line must be connected to the chamber vent intake port located in the cabinet at the base of the oven.

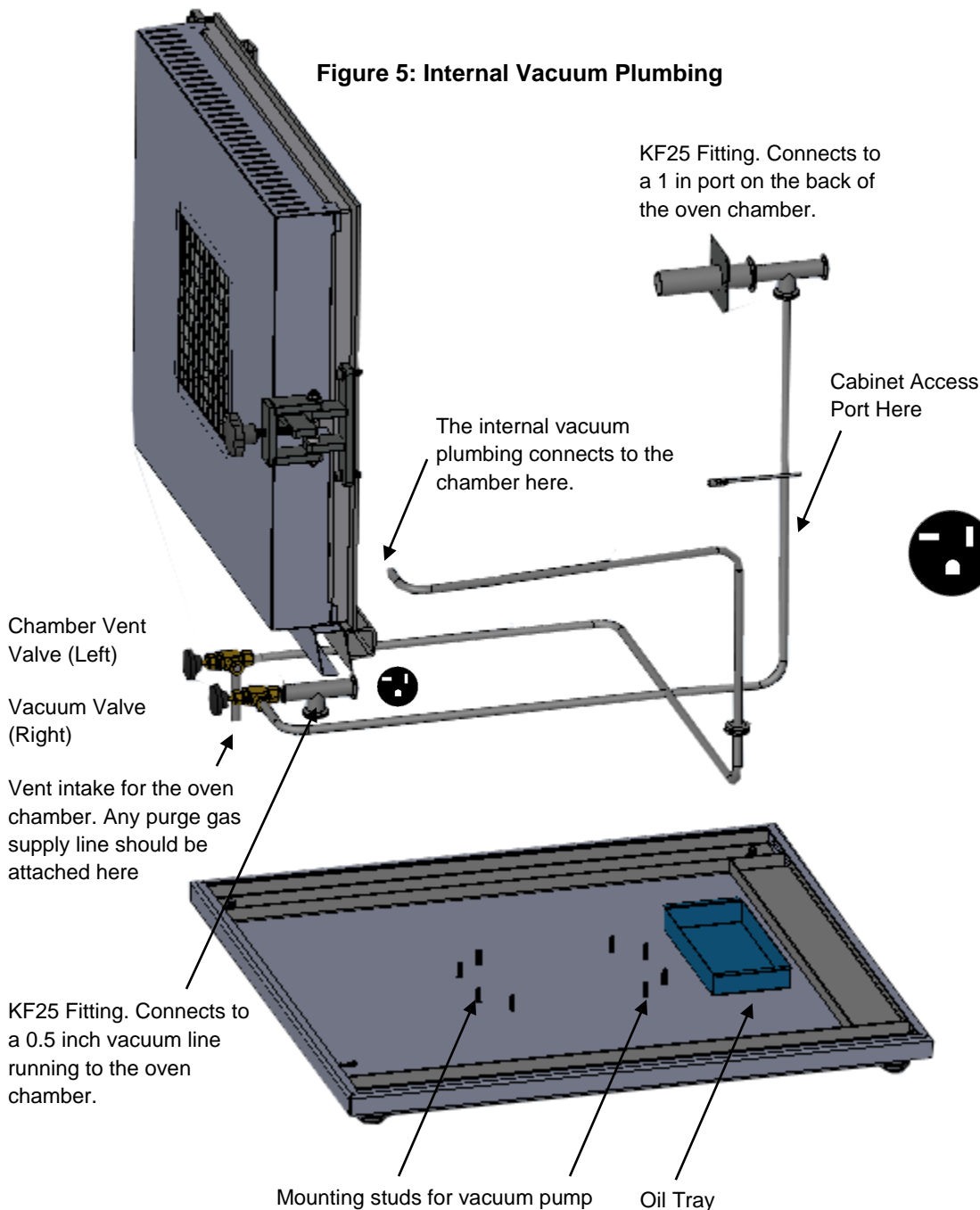
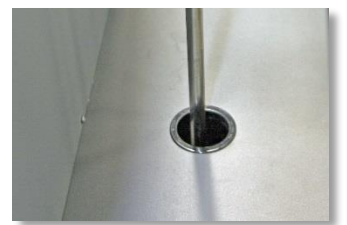


Figure 3: KF-25 Fitting – Back of Oven



Figure 4: Cabinet Access Port – Back Deck of Oven



A NEMA 6-20R electrical outlet suitable for powering a vacuum pump is provided in the cabinet.

Use caution when introducing purge gas or vacuum lines into the cabinet through the cabinet access port on the back of the oven. The metal vacuum line running to the rear KF25 fitting may grow hot during oven use. Secure introduced lines so as not to sit in contact with the metal line.

INSTALLATION (CONTINUED)

Vacuum Plumbing Continued

Note: The cabinet front and back panels must be reinstalled and secured prior to powering the oven. Operating the oven with one or both panels off exposes powered electrical lines and components.



Figure 6: Front Cabinet Panel Removed

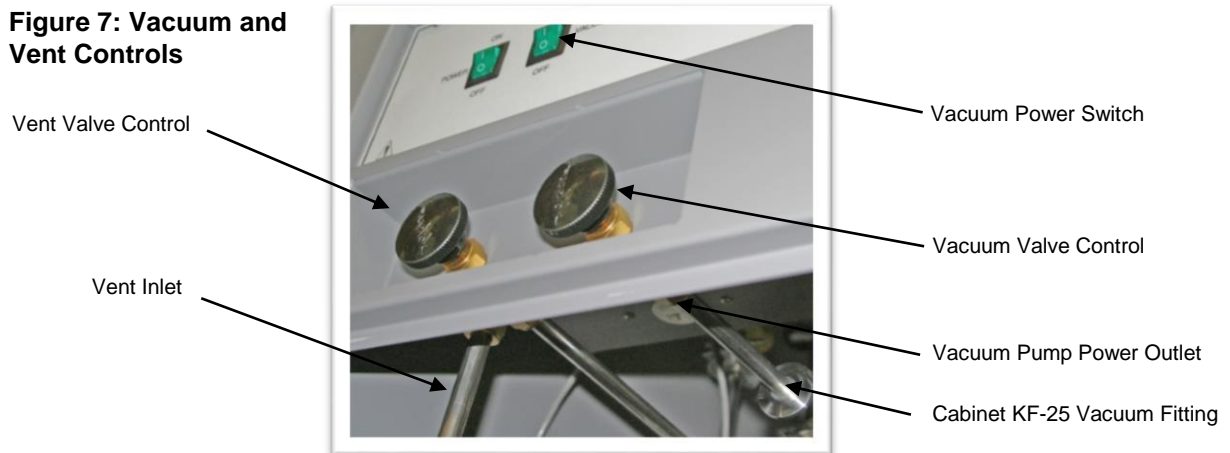
Purging Gas

A cylinder of a neutral purging gas, such as nitrogen or argon, may be connected to the vent intake fixture inside the cabinet. A gas line from a purging gas cylinder may be introduced into the cabinet through the cabinet access port on the back deck of the oven. Ensure the gas line does not sit in contact with the metal vacuum line as the vacuuming line may grow hot during operation.

Vacuum Pump

A vacuum pump may be mounted or placed inside the cabinet. Power to the NEMA 6-20R supply outlet in the cabinet is controlled by the Vacuum power switch on the front control panel.

Figure 7: Vacuum and Vent Controls



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.

INSTALL OVEN IN LOCATION

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

1. Have a qualified electrical technician wire the oven to its power source.
 - a. Do not power the oven at this time, except to briefly test the connection.
 - b. See Step 1 of the [Preparing the Oven](#) procedure on page 24 for how to reset the oven power relays before powering the oven.
2. The oven may be connected to the vacuum supply at this time.
 - a. Do not bring the oven under vacuum.

LEVELING

Make sure that the unit is level and stable. Each oven ships 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.

INSTALLATION (CONTINUED)

INITIAL CLEANING

The unit was cleaned at the factory, but not sterilized. Additionally, it may have been exposed to contaminants en route during shipping. See the [Cleaning and Disinfecting](#) topic in the User Maintenance section (see page 32) for more information on how to clean and disinfect the oven chamber and shelving.

Remove all wrappings and coverings from shelving prior to cleaning and installation.

SHELVING INSTALLATION

Heating in a vacuum environment takes place primarily through conduction. Heat is transported from heating elements in the chamber walls to your samples or product through the shelves and shelf clips. Perform the following steps to install the shelves so that heat is conducted properly.

1. Install the shelf clips in the slots located on the sides of the chamber interior, four (4) per shelf.
2. Squeeze each clip, insert the top tab first, and then the bottom tab using a rocking motion.
3. Hang the metal shelves from the clips.

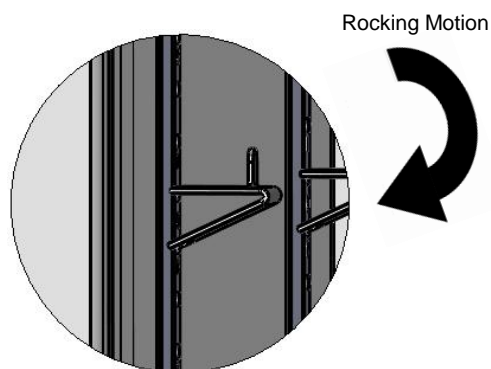


Figure 9: Installing Shelf Clip

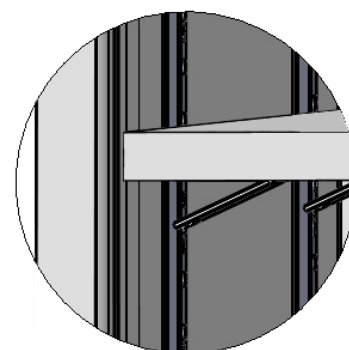



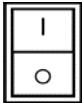








Figure 8: Shelf Hung

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 service 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 vacuum pump is active Indique la pompe à vide est active |
|  | 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 |

GRAPHIC SYMBOLS (CONTINUED)

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CONTROL OVERVIEW



Figure 10: Control Panel SVAC9-2 and Watlow Temperature Controller

Power Switch



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

Vacuum Power Switch



This self-illuminating switch controls power to the outlet in the cabinet space, which is provided to power vacuum pumps. The outlet and any connected pump are powered when the switch is in the illuminated (I) on position.

Temperature Controller

The Main Temperature Controller consists of a Watlow EZ-Zone Controller. The Controller **Up** and **Down arrow** buttons adjust temperature set points. The arrow keys are also used to perform temperature calibrations. The green **Advance** button scrolls forward through menus and parameters lists.



Advance



RESET



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

A small flashing “2” toward the center bottom of the display indicates when the controller is powering the oven’s heating elements. A small flashing “1” indicated internal communications functions within the controller.

CONTROL OVERVIEW (CONTINUED)

Vacuum Gauge

Labeled SET VACUUM, this digital gauge displays the chamber vacuum level in Torr or m/Torr.

In the SVAC9-2 vacuum oven, the InstruTech 301 VGC301 Convection Vacuum Gauge Controller is intended for use as an automatically functioning vacuum gauge and display with no required user inputs. Users interested in employing the VGC310 for other applications should obtain a copy of the controller user manual from InstruTech, Inc. Other functions include displaying the chamber vacuum pressure in units other than torr.



Push to Reset

The red reset button on the control panel is used to reset two power relays that are opened by the Over Temperature Limit System in the event of its activation or by power outages. Reset must be pushed after each OTL interruption of heating or power outage. The button should also be pushed during the initial setup of the oven.



Vacuum Valve

This valve is located just below the control panel and marked VACUUM.

- In the open position (turn counterclockwise) this valve applies vacuum to the oven chamber **from an active vacuum supply source connected to the KF-25 fitting located in the cabinet.**
- In the closed position (turn fully clockwise) the valve closes off the supply of vacuum from the cabinet KF-25 fitting.



Vent Valve

This control is located to the left of Vacuum Valve. The valve opens and closes the chamber vent intake port located in the cabinet.

- When in the **open** position the chamber is exposed to external atmosphere through the intake Port.
- **Optional:** A neutral purge gas supply connected to the Vent Port will flow gas from the supply to the chamber when the Vent Valve control is set to open.
- When the valve control is in the **closed** position (fully clockwise) 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 will likely result in damage to the vacuum pump.





Over Temperature Limit Thermostat (OTL)

This graduated dial sets the heating cut off point for the OTL temperature limit system. The OTL system prevents unchecked heating of the chamber. For more details, please see the [Over Temperature Limit System](#) description in the Theory of Operations (page 23).

When the OTL has been tripped, it cuts off power to both the oven heating elements and the Watlow temperature controller.

OPERATION

OPERATING PRECAUTIONS

Warning: The oven is not an explosion-proof unit!



Avertissement: Ce sont des fours pas résistants aux explosions.

1. These ovens are not designed to safely contain flammable or combustible gasses, vapors, or liquids.
2. Do not place combustible or flammable materials into the chamber, or items that have been processed with or tainted by 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 personal. 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 SVAC9-2 is intended for use in closed cycle under-vacuum applications such as drying, baking out volatiles, and evolutions of molecular clouds. The oven chamber is not built to operate exposed to free atmosphere or to circulate air within the chamber. Running the oven with the door or vent open risks damaging the vacuum pump and the integrity of the oven.

Vacuum

Vacuum is supplied to the chamber by an outside vacuum pump or building system. The vacuum supply is connected to one of the two KF-25 fittings on the oven. Vacuum levels in the oven are dependent on pump performance, valve settings when connected to the cabinet KF-25, and the nature of the baking application or process, including the amount of material outgassed from your product or samples.

The InstruTech 301 VGC301 vacuum gauge on the control panel displays vacuum in torr and mTorr (millitorr). The oven is rated to 10 millitorr.

The chamber must be sealed off from the room atmosphere prior to the start of a vacuum baking application.

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

Purging

A cylinder of neutral gas may be connected to the vent intake port in the cabinet to purge the oven chamber during the final phase of applications and procedures structured to prevent oxidation.

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. 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. The shelving then carries the heat to the product or samples resting on it.

Compared to conductive heating, direct radiant heating by infrared emission from heating elements provides poor temperature uniformity and stability in a vacuum environment.

OPERATION (CONTINUED)

An 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.

The oven relies on natural heat radiation for cooling.

Heating Profiles

The Watlow EZ-Zone controller stores 40 programmable heating steps in its memory, each with parameter options. The steps are divided between 4 profiles with ten steps each, though the steps may be programmed sequentially to run as longer profiles. Extended profiles must divide the 40 steps between them.

The Over Temperature Limit System

The OTL is a backup mechanical heating control system. It consists of a thermostat, dial control, and independent hydraulic temperature probe. If the temperature in the oven chamber exceeds the current OTL setting, the OTL opens a pair of power relays. This cuts off power to all four of the oven heating elements as well as the temperature controller, causing the controller display to go dark. The vacuum display will remain powered. The OTL helps prevent runaway heating or heat spikes in the chamber from external heat events and guards against internal hardware failures.

The OTL must be set by an end-user. After the OTL is tripped the temperature must be below the current OTL setting and then the red Reset button pushed in order to restore power to the temperature controller and heating elements. If the temperature controller screen is dark but the vacuum display still powered, it is likely that the OTL has tripped.

OPERATION (CONTINUED)

Note: When running the oven at or near its maximum temperature for the first time, there may be light smoking from protective oil coatings on the element.

PREPARING THE OVEN

Perform the following steps and procedures to prepare the oven for use in a new location.



1. If this is the first use of the oven, press the red Push to Reset button to reset the heating element power relays.
 - a. The oven display will not power up unless the relays are set.
 - b. Do not press the gray Reset switch on the controller.
2. Optional: 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. This is done if you will be performing the optional accuracy verification of the temperature display.
 - a. See page 28 for the proper placement of a reference device thermocouple probe in the chamber.



3. If you have not done so already, connect the vacuum supply to the oven vacuum port.
4. Place the oven **Power Switch** in the on (I) position.
 - a. The controller display will illuminate and default to its home page.
5. Carry out the following procedures in the Operation section:

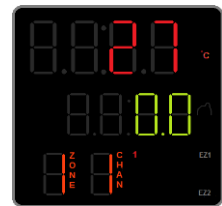
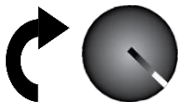


Figure 11: Display Home Page
Current Chamber Temperature in Red
Set Point in Green



Turn the OTL Dial to its maximum position, if not already set to max. This prevents the OTL system from interfering with the setup process.

[Vacuum Verification](#) page 26

[Set the Temperature the Set Point](#) page 27

[Optional: Temperature Display Accuracy Verification](#) page 28

[Set the Over Temperature Limit](#) page 30

End of procedure

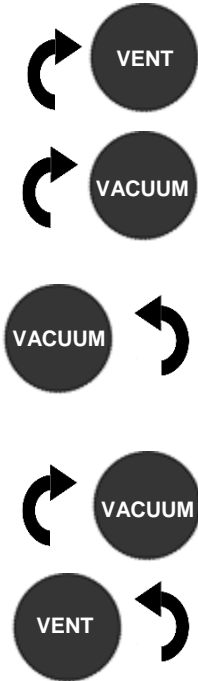
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OPERATION (CONTINUED)

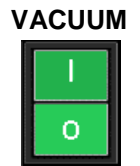
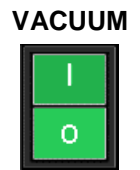
VACUUM VERIFICATION

Place the oven chamber under vacuum to verify the functionality of your vacuum supply, the plumbing to the oven, and the integrity of the oven chamber.

For a Vacuum Pump Plumbed to the Cabinet KF-25 Fitting



1. Turn the oven Vent Valve control to the closed position.
2. Turn the Vacuum Valve control to the closed position, if it is not already closed.
 - a. Always make sure the Vacuum and Vent valves are closed prior to applying vacuum to the chamber. This protects the vacuum supply system.
3. Turn on the vacuum pump so that it is supplying vacuum to the oven.
4. Open the oven Vacuum Valve to bring oven chamber under vacuum.
5. Allow the oven to sit for ten minutes under vacuum at your application level.
 - a. Monitor for leaks.
6. Turn the Vacuum Valve control back to the closed position.
7. Turn off the pump so that it is no longer supplying vacuum to the oven.
8. Slowly turn the Vent Valve control to the open position to reintroduce atmosphere to the oven chamber.

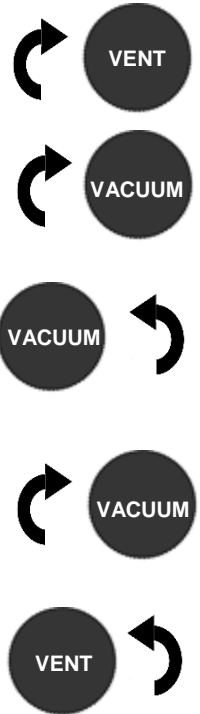


Note: You may leave the oven powered and place the oven back under vacuum using steps 2 – 5 if you will be performing the optional Temperature Verification procedure.

OPERATION (CONTINUED)

For a Vacuum Source Plumbed to Back KF-25 Fitting

1. Turn the oven Vent Valve control to the closed position.
2. Turn the Vacuum Valve control to the closed position, if it is not already closed.
 - a. Always make sure the Vacuum and Vent valves are closed prior to applying vacuum to the chamber. This protects the vacuum supply system.
3. Open the regulator or valve on your vacuum system to supply vacuum to the oven.
4. Open the oven Vacuum Valve to bring oven chamber under vacuum.
5. Allow the oven to sit for ten minutes under vacuum at your application level.
 - a. Monitor for leaks.
6. Turn the Vacuum Valve control back to the closed position.
7. Close the regulator or control valve on your system to stop supplying vacuum to the oven.
8. Slowly turn the Vent Valve control to the open position to reintroduce atmosphere to the oven chamber.

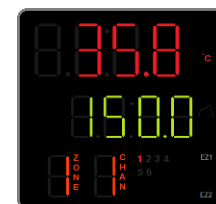
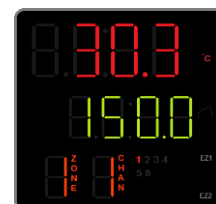


Note: You may leave the oven powered and place the oven back under vacuum using steps 2 – 5 if you will be performing the optional Temperature Verification procedure.

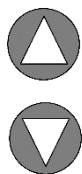
SET THE TEMPERATURE SET POINT

This procedure sets the chamber air temperature set point to that of your application or procedure.

1. On the home page, use the Up and Down arrow keys to adjust the set point in the green display to your baking application or process temperature set point.
 - a. Holding down an arrow key will cause the temperature to advance in increments of tens rather ones.
2. Release the Arrow key once you have reached your required set point. There may be a brief pause before the oven starts heating.
 - a. A small flashing 2 in the display indicates when the temperature controller is calling for heat.



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 8 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 34 in the User Maintenance section.

Vacuum

The oven chamber must be under vacuum in order to perform an accurate temperature verification. Performing the verification procedure with an atmosphere in the oven chamber will not confirm if the oven display is accurately showing the shelving temperature.

Probes

A potted (sealed) thermocouple sensing probe from a reference device can be introduced into the oven chamber through the KF-25 flange on the back of the oven (see Figure 13 below). 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 should be in direct contact with the shelving. The probe sleeve may be taped to the shelf using a heat resistant, non-stick tape to secure the wires and the sensor probe. If the exposed probe end is not touching the shelf the verification will be invalid.

Stability

Prior to a verification, the oven must operate under vacuum at its verification temperature set point for **at least 1 hour with no fluctuations** of $\pm 0.2^{\circ}\text{C}$ or greater in order to be considered stabilized. Failure to wait for stabilization will result in an invalid verification.



Wait 1 Hour

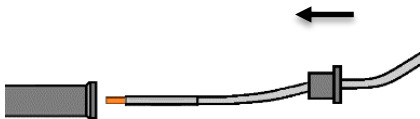


Figure 13: Introducing a potted sensor probe into the KF-25 Flange

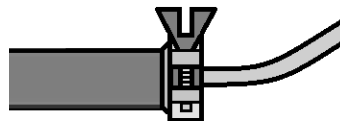


Figure 14: Probe pot secured with KF-25 Clamp

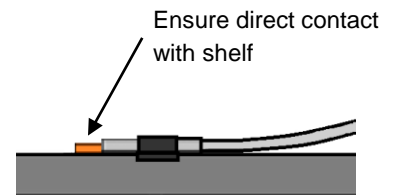




Figure 12: Probe taped to shelf

OPERATION (CONTINUED)

| Verifying the Temperature Display Accuracy | |
|---|--|
| <ol style="list-style-type: none">1. Once the chamber temperature has stabilized, compare the reference device and the oven display temperature readings.<ol style="list-style-type: none">a. 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 air temperature. The Temperature Verification procedure is now complete.b. See step 2 if a difference falls outside the acceptable range of your protocol. | <p>Reference Device</p>  <p>Oven display showing 150.0 °C (red) and 150.0 °C (green) with a blue checkmark.</p> |
| <ol style="list-style-type: none">2. Perform a temperature calibration to match the controller display to the actual chamber temperature if a difference falls outside your protocol range.<ol style="list-style-type: none">a. Please see 34 in the User Maintenance section | <p>Reference Device</p>  <p>Oven display showing 150.0 °C (red) and 150.0 °C (green) with a red X.</p> |

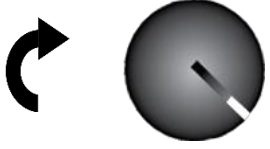
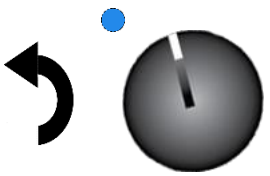
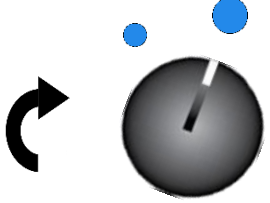


End of procedure

OPERATION (CONTINUED)

SET THE OVER TEMPERATURE LIMIT

This procedure sets the Over Temperature Limit heating cutoff to approximately 5°C above the current temperature set point. If you will be running a heating profile run the oven at the highest temperature of the profile when setting the over temperature limit. Otherwise, set the oven to the steady state temperature set point of your application.

Perform the steps below once the oven temperature has stabilized for at least 30 minutes.

| Set The OTL Cutoff | Example |
|---|---|
| <p>1. If you have not done so already, turn the Set Over Temperature Limit control dial clockwise to the maximum position.</p> |  |
| <p>2. Turn the Over Temperature Limit control dial counterclockwise until the temperature controller display goes dark.</p> |  |
| <p>3. Carefully turn the dial clockwise until the dial indicator line lines up on the next dot on the control panel.</p> |  |
| <p>4. Restore power to the temperature controller and heating elements.</p> <ol style="list-style-type: none"> Press the red Reset button on the control panel. The display panel should illuminate. Do not press the grey Reset button on the controller. <p>Note: The temperature in the oven chamber must be below the current OTL setting to successfully restore power to the controller and heating elements.</p> |  <p>PUSH TO RESET</p> |
| <p>5. Leave the OTL dial set in its new position.</p> |  |

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 heat source inside the chamber is causing the chamber air temperature to spike.
- The temperature controller or its sensor probe have failed, and must be replaced in order to maintain 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. Then restore power to the controller by pressing the red Reset button. If the OTL continues to interrupt heating of the oven chamber and there 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

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 comes included with the SVAC9-2, for instructions on how to program heating profiles. The guide is intended as a simplified explanation for 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.

USER MAINTENANCE



Warning: Prior to any 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 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 temperature sensor 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 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.

VACUUM PUMP MAINTENANCE

Refer to the operation manual supplied with your vacuum pump for recommended maintenance routines 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.**

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 8 for device requirements.

Temperature calibrations are performed to match the temperature display to the actual shelving temperature inside the incubation 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 under temperature in the chamber space. Calibrate as often as required by your laboratory or production protocol, or regulatory compliance schedule.

Vacuum

The oven chamber must be under vacuum in order to perform an accurate temperature calibration. Performing the calibration procedure with an atmosphere in the oven chamber will result in an inaccurate temperature display reading.

Probe

A potted (sealed) thermocouple sensing probe from a reference device can be introduced into the oven chamber through the KF-25 flange (see Figure 12 below). 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 should be in direct contact with the shelving. The probe sleeve may be taped to the shelf using a heat-resistant, non-stick tape. Wires may also be secured using tape of the same. If the exposed probe end is not touching the shelf the calibration procedure will not match the actual shelving temperature.

Stability



Wait 1 Hour

Prior to a calibration, the oven must operate under vacuum at its verification temperature set point for **at least 1 hour** with no fluctuations of $\pm 0.4^{\circ}\text{F}$ ($\pm 0.2^{\circ}\text{C}$) or greater in order to be considered stabilized. Failure to wait for stabilization will result in an inaccurate temperature display reading.

For best results, allow the unit to operate undisturbed for at least 2 hours before the procedure, heated and under vacuum.



Figure 17: Introducing a potted sensor probe into the KF-25 Flange

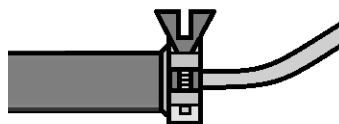


Figure 16: Probe pot secured with KF-25 clamp

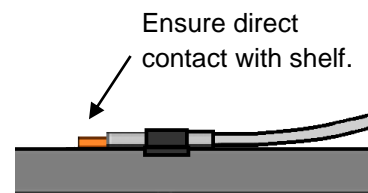


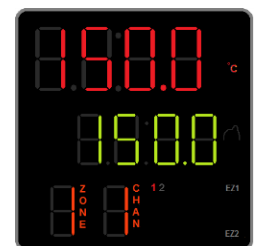
Figure 15: Probe taped to shelf

USER MAINTENANCE (CONTINUED)

Temperature Calibration

1. Once the chamber has stabilized with no fluctuations of 0.2°C or greater, compare the reference temperature device and chamber temperature display readings.
 - a. 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 Verification procedure is now complete.**
 - b. See step 2 if a difference falls outside the acceptable range of your protocol.

Reference Device

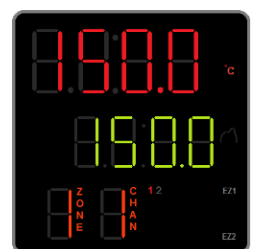
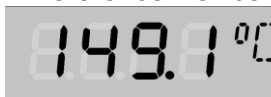


2. The display requires calibration.
 - a. The difference (also known as an error) between the reference device and the display is an **offset**.
 - b. Examples of offset values:

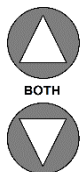
| Reference Sensor Reading | Oven Temp Display | Offset Value |
|--------------------------|-------------------|--------------|
| 152.0°C | 150°C | 2 |
| 149.1°C | 150°C | -0.9 |
| 148.0°C | 150°C | -2 |

- c. Note the offset value for use in Step 5.

Reference Device



3. Place the controller display in the Operations selection menu.





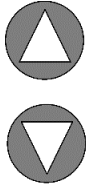
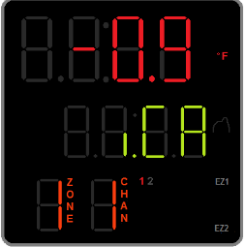



- a. Press and hold both the **Up** and **Down** Arrow buttons simultaneously for approximately 3 seconds.
 - b. Release the buttons when “A1” appears in the Upper Display and “Oper” appears in the Lower Display.



Operations Selection Menu


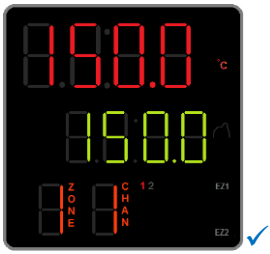

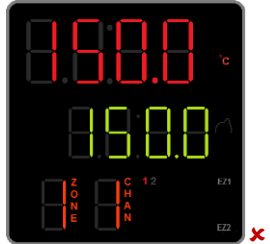
Continued on next page

USER MAINTENANCE (CONTINUED)

| Temperature Calibration (Continued) | |
|--|---|
| <p>4. Advance through the Operations menu to the Temperature Calibration page.</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>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>a. Press 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 (no fluctuations of 0.2°C or greater) 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 Verification 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 ±2°C out of calibration. | <p>Reference Device</p>   |
| <p>10. If the temperature readings difference still falls outside your protocol after three calibration attempts, contact your distributor or Sheldon Technical Support for assistance.</p> | |

End of procedure

UNIT SPECIFICATIONS

The SVAC9-2 is a 230 AC voltage, single-phase 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

| Shipping | Net Weight |
|------------------|------------------|
| 770lbs. / 349kgs | 492lbs. / 223kgs |

DIMENSIONS

Inches

| Exterior W x D x H | Interior W x D x H |
|-----------------------|---------------------|
| 38 x 46.8 x 63 inches | 28 x 24 x 24 inches |

Centimeters

| Exterior W x D x H | Interior W x D x H |
|-----------------------|---------------------|
| 96.5 x 118.9 x 160 cm | 71 x 60.9 x 60.9 cm |

CAPACITY

| Cubic Feet | Liters |
|------------|--------|
| 9.3 | 264 |

SHELF CAPACITY BY WEIGHT

| Per Shelf | Total |
|--------------|----------------|
| 75lbs / 34kg | 225lbs / 102kg |

UNIT SPECIFICATIONS (CONTINUED)

TEMPERATURE

| Range | Uniformity | Stability |
|-----------------------|---------------------------------|---------------------------|
| Ambient. +15 to 220°C | $\pm 7^{\circ}\text{C}$ @ 150°C | $\pm 0.2^{\circ}\text{C}$ |




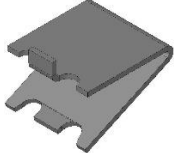


Heat Up Time to 150°

120 minutes

POWER

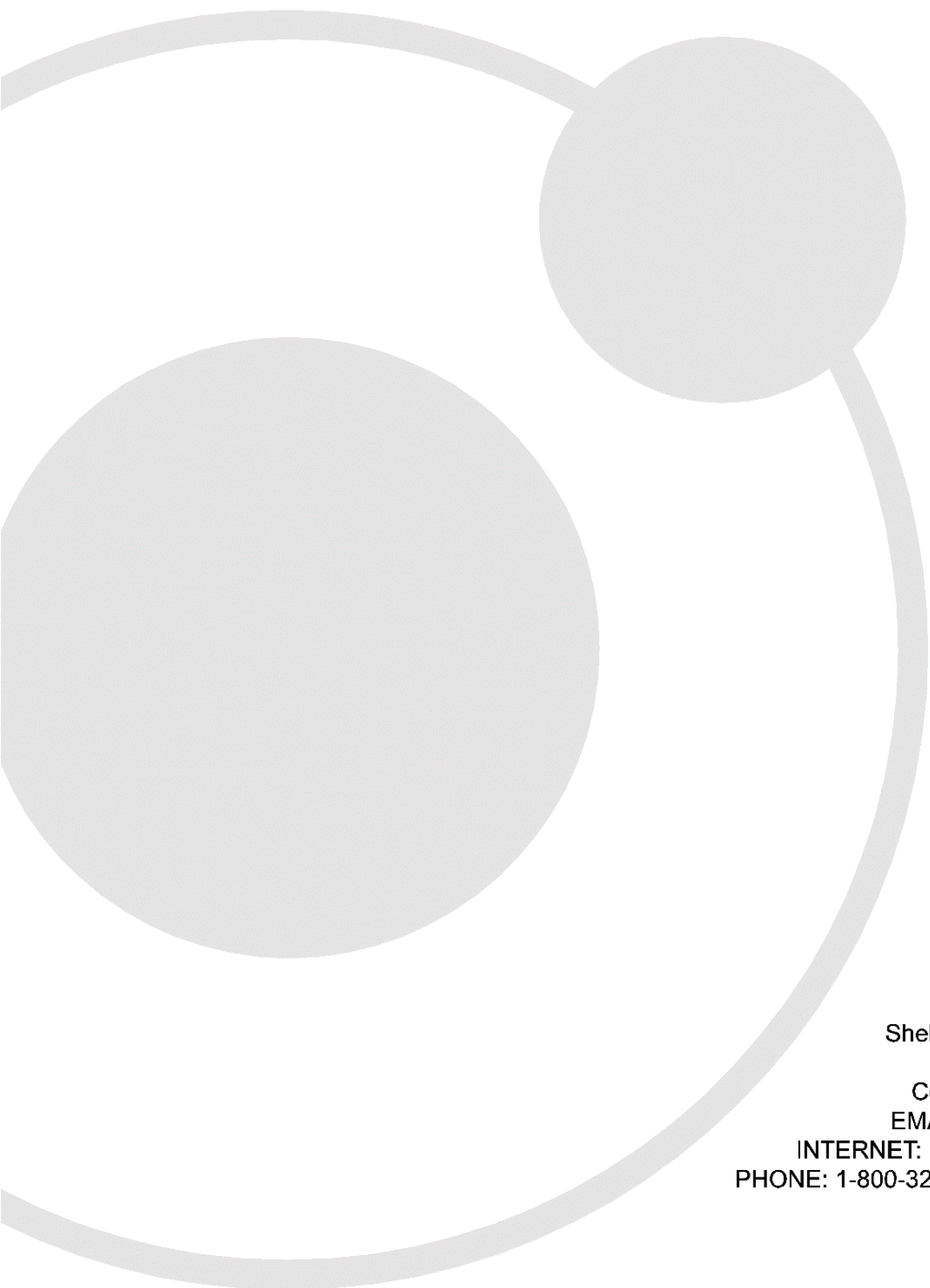
| Model | AC Voltage | Amperage | Frequency | Phase |
|---------|------------|----------|-----------|-------|
| SVAC9-2 | 230 | 20A | 50/60 Hz | 1 |

REPLACEMENT PARTS

| Description | Parts Number |
|--|--|
| Adjustable Feet |  2700506 |
| Oil Tray, for Vacuum Pump |  5402470 |
| Shelf, SVAC9-2 |  5680562 |
| Shelf Clip |  1250510 |
| Viton O-Ring Gasket (60 inches OD, 3 inches ID) for Oven Door |  3450579 |
| Viton O-Rig Gasket (60 inches OD, 3 inches ID) for Door Window |  3450560 |

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 uncertain 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 number** and **serial number** of the unit ready, as Tech Support will need this information to match your oven with its correct part.





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FAX: (503) 640-1366

SHELLAB®