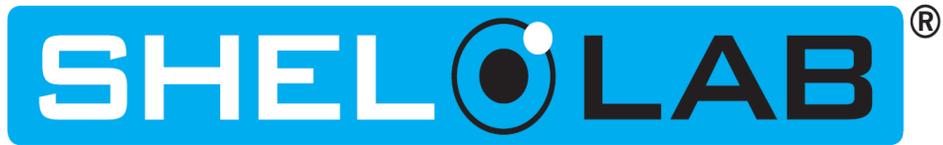


HIGH-PERFORMANCE OVEN



220 – 240 Voltage



Installation - Operation Manual

SMO5HP-2

These ovens require permanent connect wiring (also known as hardwiring) to a power supply.

Gas Purge Port Option

The SMO5HP-2 can be built with a 3/8-inch ID (9.5mm) gas in-port on the back of the oven. This optional port can be connected to a cylinder of nitrogen (N₂) or other inert gas to purge the oven chamber during baking applications. **This option must be ordered before the construction of the oven.**

Warning: This product contains chemicals, including triglycidyl isocyanurate, known to the State of California to cause cancer as well as birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.



¡Advertencia! Este producto contiene sustancias químicas, incluido el triglicidil isocianurato, que el estado de California sabe que causa cáncer, así como defectos de nacimiento u otros daños reproductivos. Para obtener más información, visite www.P65Warnings.ca.gov.

Avertissement! Ce produit peut vous exposer à des produits chimiques, dont l'isocyanurate de triglycidyle, reconnu par l'État de Californie pour provoquer le cancer, des anomalies congénitales ou d'autres problèmes de reproduction. Pour plus d'informations, visitez le site www.P65Warnings.ca.gov.

SMO5HP-2 High-Performance Oven

220 – 240 Voltage

Part Number (Manual): 4861706

Revision: June 23, 2020

Model	SMO5HP-2
Part ID	SLFHP522-H

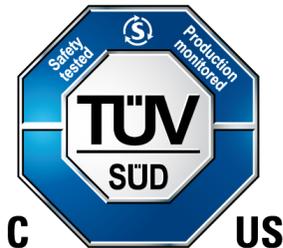
The Part ID denotes the build type of the model. The manufacturer periodically releases new build type designs incorporating new features and refinements of existing ones.



SHEL LAB is a brand of Sheldon Manufacturing, INC, an ISO 9001 certified manufacturer.



Safety Certifications



These units are CUE listed by TÜV SÜD as forced air 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.

The units have been tested to the following requirements:

- CAN/CSA-22.2 No. 61010-1:2012
- CAN/CSA-C22.2 No. 61010-2-010:2015
- UL 61010-1:2012
- UL 61010-2-010:2015
- EN 61010-1:2010
- EN 61010-2-010:2014

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INTRODUCTION

Thank you for purchasing a SHEL LAB oven. We know you have many choices in today's competitive marketplace when it comes to constant temperature equipment. We appreciate you choosing ours. We stand behind our products and will be here if you need us.

READ THIS MANUAL

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

Before using the unit, read the manual in its entirety to understand how to install, operate, and maintain the unit in a safe manner. Ensure all end-users are given appropriate training before the unit begins service.

Keep this manual available for use by all end-users.

SAFETY CONSIDERATIONS AND REQUIREMENTS

Follow basic safety precautions, including all national laws, regulations, and local ordinances in your area regarding the use of this unit. If you have any questions about local requirements, please contact the appropriate agencies.

SOPs

Because of the range of potential applications this unit can be used for, the end-user or their supervisors must draw up a site-specific standard operating procedure (SOP) covering each application and associated safety guidelines. This SOP must be written and available to all end-users in a language they understand.

Intended applications and Locations

SMOHP forced-air ovens are engineered for constant temperature forced-air drying, curing, and baking applications in professional, industrial, and educational environments. The ovens are not intended for use at hazardous or household locations.

Power

Your unit and its recommended accessories are designed and tested to meet strict safety requirements.

- Always hardwire the unit power feed to a protective earth grounded electrical source that conforms to national and local electrical codes. If the unit is not grounded, parts such as knobs and controls may conduct electricity and cause serious injury.
- Position the unit so the end-user can quickly and easily disconnect or uncouple the power feed in the event of an emergency.
- 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.
- Use only approved accessories. Do not modify system components. Any alterations or modifications to your unit not explicitly authorized by the manufacturer can be dangerous and will void your warranty.

CONTACTING ASSISTANCE

Phone hours for Sheldon Customer Support are 6 am – 4:30 pm Pacific Coast Time (west coast of the United States, UTC -8), Monday – Friday. Please have the following information ready when calling or emailing Customer Support: the **model number, serial number, part number, and part ID**. See page 11.

support@sheldonmfg.com
1-800-322-4897 extension 4
(503) 640-3000 extension 4
FAX: (503) 640-1366

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

MANUFACTURING WARRANTY

For information on your warranty and online warranty registration please visit:

- sheldonmanufacturing.com/warranty

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.

INTRODUCTION

REFERENCE SENSOR DEVICE

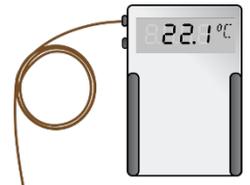
Must be purchased separately

A reference sensor device is required for calibrating the unit temperature display.

Reference devices must meet the following standards:

- Accurate to at least 0.1°C

The device should be regularly calibrated, preferably by a third party.



Temperature Reference

Temperature Probe

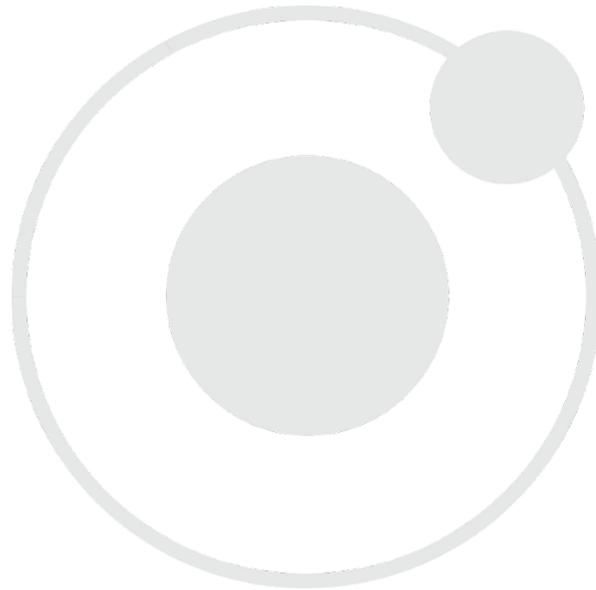
Use a digital device with a wire thermocouple probe that can be introduced into the unit chamber through the door space. Select a thermocouple suitable for the application temperature you will be calibrating at.

Why Probes?

Reference readings taken outside the chamber using wire temperature probes avoid chamber door openings. Openings disrupt the chamber temperature. Each disruption requires **a minimum 1-hour wait** to allow the atmosphere to re-stabilize before continuing.

No Alcohol or Mercury Thermometers

Alcohol thermometers do not have sufficient accuracy to conduct accurate temperature calibrations. **Never place a mercury thermometer in the unit chamber.** Always use thermocouple probes.



RECEIVING YOUR UNIT

INSPECT THE SHIPMENT

Safe delivery becomes the responsibility of the carrier when a unit leaves the factory. **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.** Save the shipping carton until you are certain that the unit and its accessories function properly.

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. Inspect the unit for signs of damage. Use the orientation images in this chapter as references.
5. The unit should come with an Installation and Operation Manual and heating recipe programming guide.
6. Verify that the correct number of accessory items has been included. See the next page.
7. Carefully check all packaging for accessory items before discarding.

Included Accessories

Shelves	Shelf Mounts	Leveling Feet
2	4	4

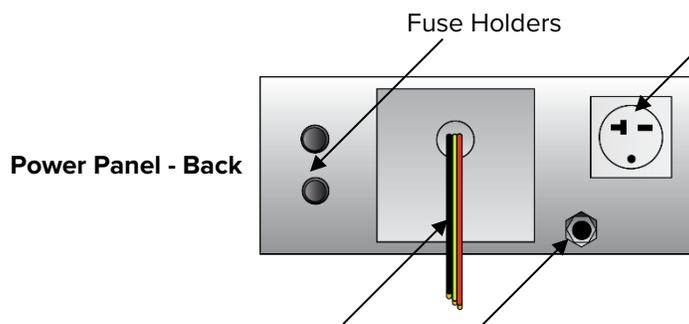


RECEIVING

ORIENTATION

SMO5HP-2

External Power Outlet: Varies by country and voltage type



Permanent Connect Wire Braid 14 gauge, 6 inches (150 mm)

Purge Gas Inlet. 3/8 in ID

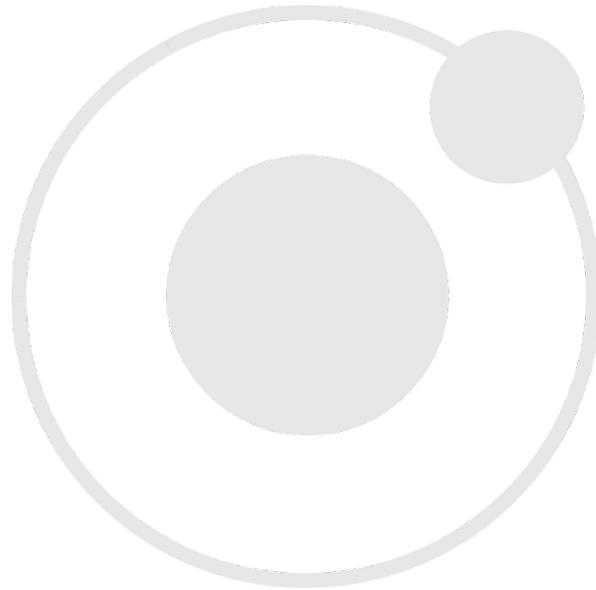


RECORDING DATA PLATE INFORMATION

Record the unit **model number**, **serial number**, **part number**, and **part ID** below for future reference. Customer Support needs this information to provide accurate help during support calls and emails.

- The data plate is located on the back of the oven, next to the power inlet.

MODEL NO:	
SERIAL NO:	
PART NO:	
PART ID:	



HARDWIRE REQUIREMENT

The oven requires permanent connect wiring (commonly known as hardwiring). Wiring to the power source **must be performed by a qualified electrical technician**. All other Installation steps may be performed by the end-user.

INSTALLATION PROCEDURE CHECKLIST

For installing the unit in a new workspace location.

Pre-Installation

- ✓ Check that the required ambient conditions for the oven are met, page 14.
- ✓ Check that the spacing clearance requirements are met, page 14.
 - Unit dimensions may be found on page 41.
- ✓ Check that a suitable permanent connect electrical power supply is present, page 15.

Install the oven in a suitable workspace location

- ✓ Review the lifting and handling instructions, page 16.
- ✓ Make sure the oven is level, page 17.
- ✓ Install the oven in its workspace location, page 17.
 - The oven may be connected to its power supply after this procedure.

Set up the oven for use

- ✓ Clean the unit and shelving (recommended), page 17.
- ✓ Install the shelving, page 18.

INSTALLATION

REQUIRED AMBIENT CONDITIONS

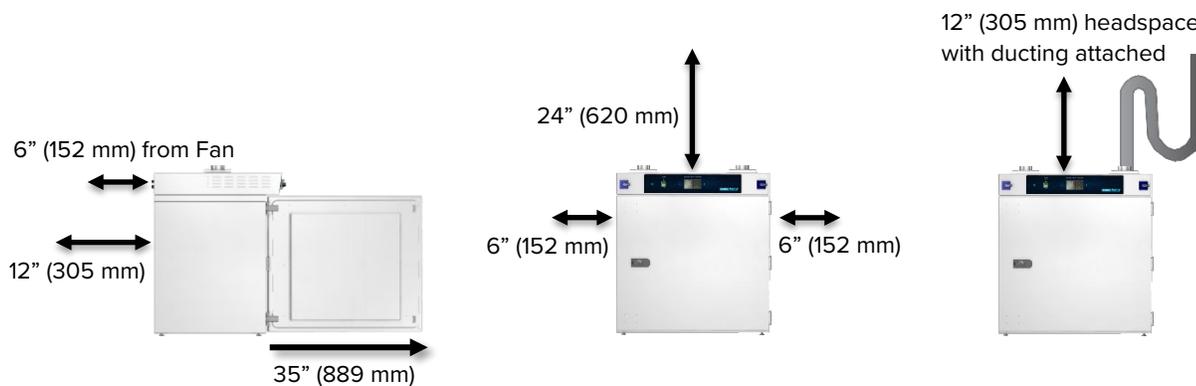
These units are built for use indoors at room temperatures between **15°C and 40°C (59°F and 104°F)**, at no greater than **80% Relative Humidity** (at 25°C / 77°F). Operating outside these conditions may adversely affect the unit temperature performance.

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

REQUIRED CLEARANCES

These clearances are required to provide airflows for ventilation and cooling.



6 inches (152 mm) of clearance is required on the sides and back of the unit.

12 inches (305 mm) of headspace clearance is required if the oven exhaust is vented from the workspace through a duct or other channeling.

24 inches (620 mm) of headspace clearance is required between the exhaust vent and any overhead cover or partition. This may be reduced to **12 inches (305 mm)** if ducting is connected to the exhaust port.

Do not place objects on top of the oven. Exception: A power exhaust blower may be mounted on the top exhaust vent.

POWER SOURCE REQUIREMENTS

When selecting a location for the oven, verify that each of the following requirements is satisfied:

Power Supply: The power supply must meet the power requirements listed on the unit data plate.



Voltage	Amperage	Frequency
220 – 240	12	50/60 Hz

- The power source must be **single phase** and **protective earth grounded**.
- The power source must conform to all national and local electrical codes.
- **The unit may be damaged if the supplied voltage varies by more than 10% from the data plate rating.**
- Use a separate circuit to prevent loss of the unit due to overloading or circuit failure.

Switch or circuit breaker: A switch or circuit-breaker must be used in the building installation to protect against overcurrent conditions.

- The recommended circuit-breaker is **20 amps**.

Power Feed Disconnect: The oven must be positioned so that all end-users have access to the power feed disconnect in case of emergencies.

- The disconnect must be near the equipment and within easy reach of the end-user.
- The disconnect must be marked as the disconnecting device for the equipment.

Fuses: The oven ships with two fuses installed in fuse holders adjacent to the power feed braid on the rear power panel of the unit.

- Both fuses must be installed and intact for the unit to operate. Always find and fix the cause of a blown fuse before putting the unit back into operation.
- Fuse Type: 20 amp, 240V, 5x20mm.

Accessory Outlet Fuses: The oven is also provided with a pair of 2-amp fuses installed adjacent to the external power receptacle used to power accessory blower fans.

- The fuses only protect against overcurrent conditions related to the operation of an attached external exhaust blower.
- The fuses do not protect against overcurrent events associated with major components of the oven.



POWER FEED WIRING

The oven comes provided with an integral 6-inch (150 mm) wire braid consisting of:

- 14-gauge high-temperature (300°C) hot wire – Black
- 14-gauge high-temperature (300°C) hot wire – Red
- 14-gauge earth ground wire – Green/Yellow

The wires for power source connection should be Green/Yellow – Earth; Black – Hot; Red – 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 potential fire hazard.

LIFTING AND HANDLING

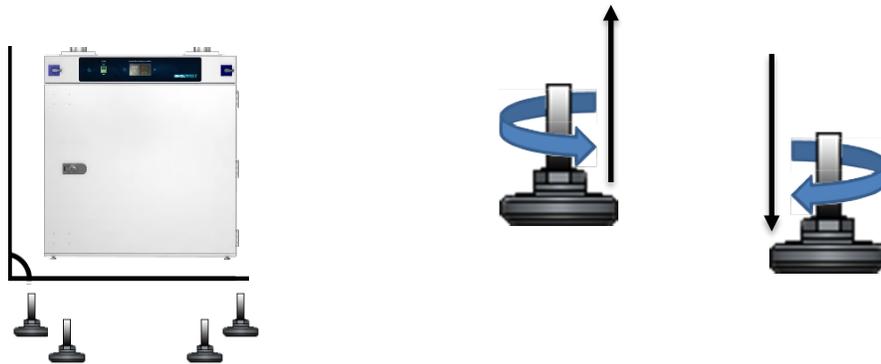
The oven is heavy. Use appropriate lifting devices that are sufficiently rated for these loads. Follow these guidelines when lifting the oven:

- Lift the unit 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 secure the door in the closed position during transfers to prevent shifting and damage.

INSTALLATION

LEVELING

Install the 4 leveling feet in the corner holes in the bottom of the oven. The oven must be level and stable for safe operation.



Note: To prevent damage when moving the unit, turn all 4 leveling feet so that the leg of each foot sits inside the unit.

INSTALL THE OVEN

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

- Verify that the oven stands level and does not rock. Adjust the leveling feet as needed.
- **A qualified technician may now connect the oven to its power source.**



INSTALLATION CLEANING

The manufacturer recommends cleaning the shelving and chamber before installing the shelving in the chamber.

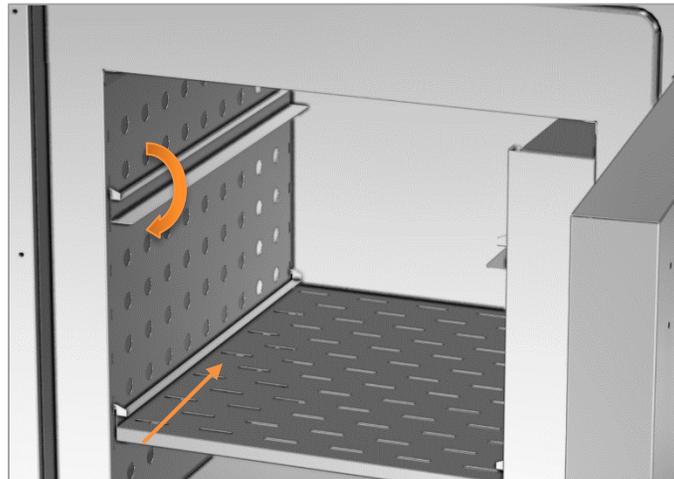
- Remove all wrappings and coverings from shelving before cleaning and installing.
- **Do not clean with deionized water.**
- See the [Cleaning and Disinfecting](#) topic in the User Maintenance chapter (page 33) for information on how to clean the oven chamber and shelving.

INSTALLATION

INSTALL THE SHELVING

The horizontal airflow within the chamber moves from the small duct holes on the right-hand side of the chamber to the large holes on the left side. Place the shelves so as not to obstruct the duct holes on either side. This maximizes airflow across the shelf space.

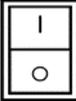
Space the shelves evenly in the oven chamber to ensure the best possible air circulation and temperature uniformity.

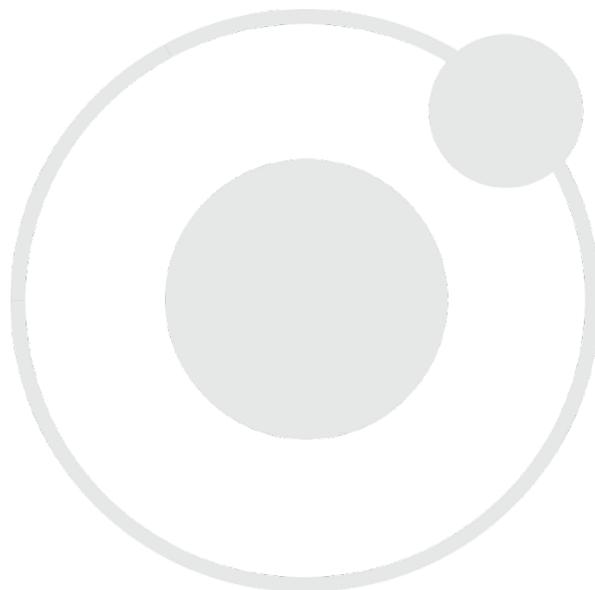


1. Install the shelf slide hangers on the left and right walls of the oven.
 - a. Insert the tabs of each slider into the chamber's mounting slots.
 - b. Push down gently to secure the slider.
2. Slide the shelves onto the shelf sliders.

GRAPHIC SYMBOLS

The unit is provided with graphic symbols on its exterior. These identify hazards and adjustable components as well as important notes in the user manual.

Symbol	Definition
	Consult the user manual. Consulter le manuel d'utilisation
	Indicates adjustable temperature Indique température réglable
	AC Power Repère le courant alternatif
	I/ON O/OFF I indique que l'interrupteur est en position marche. O indique que le commutateur est en position d'arrêt.
	Protective earth ground Terre électrique
	Indicates UP and DOWN respectively Touches de déplacements respectifs vers le HAUT et le BA
	Potential shock hazard Risque de choc électrique
	Recycle the unit. Do not dispose of in a landfill. Recycler l'unité. Ne jetez pas dans une décharge.
	Caution hot surface Attention surface chaude



CONTROL OVERVIEW



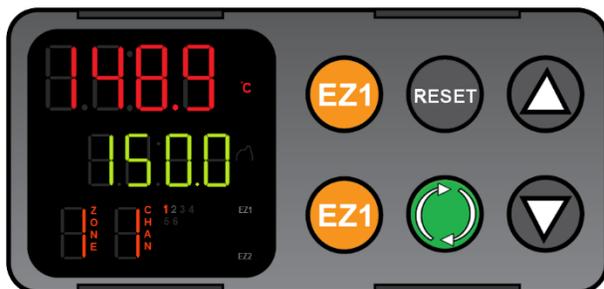
Control Panel

Power Switch

The switch illuminates when in the ON (I) position.



Temperature Controller – Display on Homepage



Top Line (Red): Present chamber air temperature

Middle Line (Green): The constant temperature setpoint

Bottom Line: Flashing “1” indicates active heating



While on the homepage, the **Up** and **Down** arrow buttons adjust the constant temperature setpoint. Pressing and holding both buttons navigates from the homepage to menu pages. On the menu pages, the buttons adjust calibration offsets and heating program variables.



When starting on the homepage, the green **Advance** button navigates forward through parameter option pages and units of measurement (Celsius or Fahrenheit). The button also advances through options in menus and parameter lists when programming heating recipes.



The gray **Reset** button returns the display to the previous page or menu. Pushing the Reset button repeatedly returns the display to the homepage.



Continued next page

EZ1

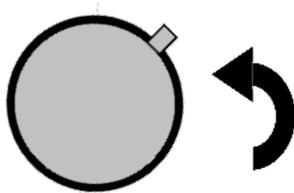
The EZ1 button launches heating Program 1. Pushing EZ1 again while running aborts Program 1.

EZ2

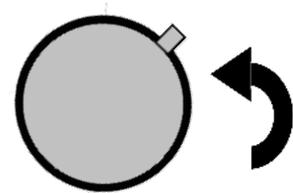
The EZ2 button has no function.

Vent Valves

The SMO5HP-2 comes with two vent valve controls on the front control panel. These open and close the intake and exhaust vents located on the top of the unit.



Turn knobs counter-clockwise
to close vents.



Safe operation of the oven is dependent on the actions and behavior of the oven operators.

Operating personnel must read and understand the Operating Precautions in this section prior to operating the oven. The operators must follow these instructions to prevent injuries and to safeguard their health, environment, and the materials being treated in the oven, as well as to prevent damage to the oven. Failure to adhere to the Operating Precautions, deliberately or through error, is a hazardous behavior on the part of the operator.



Le fonctionnement sûr du four dépend des actions et du comportement des opérateurs du four. Le personnel d'exploitation doit lire et comprendre les consignes de sécurité et les précautions d'utilisation de cette section avant d'utiliser le four. Les opérateurs doivent suivre ces instructions pour prévenir les blessures et protéger leur santé, leur environnement et les matériaux traités dans le four, ainsi que pour éviter d'endommager le four. Le non-respect des consignes de sécurité et des précautions d'utilisation, délibérément ou par erreur, est un comportement dangereux de la part de l'opérateur.



OPERATING PRECAUTIONS

- Do not use this oven in unsafe improper applications that produce flammable or combustible gases, vapors, liquids, or fuel-air mixtures in quantities that can become potentially explosive.
- Outgassed byproducts may be hazardous to or noxious for operating personnel. Exhaust should be vented to a location outside the workspace in a safe manner in accordance with all applicable laws, ordinances, and regulations. Do not operate the oven in an unsafe area with noxious fumes.
- Do not use this oven for applications heating hazardous fibers or dust. These materials can become airborne and come into contact with hot surfaces.
- Individual ovens are not rated to be explosion proof. Follow all building certification requirements and laws for Class I, II, or III locations as defined by the US National Electric Code.
- The bottom surface of the chamber should not be used as a work surface. It runs hotter than the shelf temperatures. Never place samples or product on the oven chamber floor.
- Do not place sealed or filled containers in the oven. These may burst open when heated.
- Do not place alcohol or mercury thermometers in the oven. These devices may rupture under heat or other improper uses.
- Do not move the oven until it has finished cooling.

Warning: The vent dampeners may be hot to the touch. These areas are marked with Hot Surface labels. Proper PPE should be employed to minimize the risk of burns.

Avertissement: Les clapets d'aération peuvent être chauds au toucher. Ces zones sont marqués avec des étiquettes de Surface chaude. Les EPI approprié devraient être employée pour réduire au minimum le risque de brûler.



THEORY OF OPERATIONS

Heating



The oven temperature controller stores an end-user selected constant temperature setpoint. When powered, the oven heats the chamber atmosphere to the setpoint. The controller board is wired to a solid-state temperature probe located in the chamber on the right wall. When the controller detects that the chamber temperature has dropped below the temperature setpoint, it pulses power to the heating element.

The oven uses Proportional – Integral – Derivative (PID) control to avoid significantly overshooting the setpoint. This means the rate of heating slows as the chamber temperature approaches the target temperature. If the chamber temperature is above the setpoint, the oven uses minimum heating to control the rate of cooling and avoid dipping below the setpoint.

Additionally, the PID loops optimize heating rates for the temperature environment around the oven. If the oven is operating in a cool room, it will increase the length of heating pulses to compensate. Likewise, when operating in a warm room the oven uses shorter pulses. If the ambient temperature conditions change significantly, there may be minor over or undershoots as the oven adapts.

The oven relies on natural heat radiation for cooling. The oven can achieve a low-end operating temperature of the ambient room temperature plus the internal waste heat of the oven.

Heating Options



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

Air Circulation



The oven continually circulates air internally while powered to maintain temperature uniformity and stability in the oven chamber and to speed drying rates. Air is forced through vent holes on the right side of the chamber, blows across the shelf space, and is then pulled into a duct that makes up the left chamber wall. From there, the air is drawn upward into a heating duct by the action of the blower fan. The oven is intended to be run as a closed air-cycle system.

Vents: Intake and Exhaust

The oven is provided with intake and exhaust vent dampeners that may be opened or closed using controls on the front panel of the oven. The vent dampeners are intended to be opened **after** the heat treatment or bake out phases of an application are complete. Opening the dampener vents during an application may speed the rate of material drying, depending on the nature of the sample material, outgassed byproducts, and ambient conditions. However, running the oven with the dampeners open introduces a significant flow of cool air into the chamber while allowing heated air to exit. This will impact the temperature uniformity and stability of the chamber and lower the operational temperature ceiling.



Accessory Power Exhaust Outlet

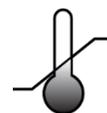
The oven comes with an external accessory power outlet to supply electricity to a power exhaust fan attached to the oven exhaust vent. The outlet and any attached blower are either activated by the temperature controller as part of a user-programmed heating recipe program or can be activated from the homepage options when the oven is running a constant temperature setpoint. The primary application of the power exhaust fan is to positively vent exhaust out of the workspace around the oven. The standard receptacle is a 240 volt, North American 6-20R.



The operation of the fan affects the oven chamber temperature, significantly lowering the temperature ceiling by boosting the rate that cooler outside air is brought in.

High Limit Control System

The temperature controller contains a heating cutoff system with independent circuitry connected to a redundant solid-state temperature sensor probe inside the oven chamber. This high limit system depowers the oven heating elements whenever the chamber air temperature exceeds the current limit setting. This safeguards the oven in the event of a failure of the main temperature control circuitry or main temperature sensor probe.



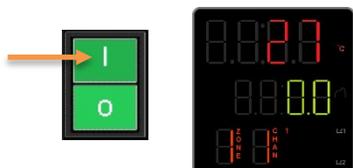
The high limit is set by the end-user to a minimum of 10°C above the highest temperature of the application process the oven is currently being used for. Failure to set the high limit control system voids the oven manufacturing defect warranty in the event of an overtemperature event.

OPERATION

PUT THE OVEN INTO OPERATION

Perform the following steps and procedures to put the unit into operation after installing it in a new workspace environment.

1. Power the Oven



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

- The controller display will illuminate, show the current firmware revision number, and then default to the homepage.

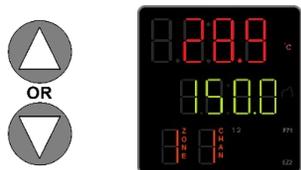


2. Set the High Limit Temperature



Use the [Set the High Temperature Limit](#) procedure on page 27 to set the Limit heating cutoff to at least 10°C above the highest intended temperature of your application.

3. Set the Operating Temperature



Read these procedures and descriptions.

[Setting the Constant Temperature Setpoint](#). See the procedure on page 28.

[Program multistep heating recipes](#). See the description on page 28.

Reminder: The intake and exhaust vents must be closed for the oven to meet its temperature specifications.

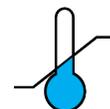
The oven is now ready for use.

OPERATION

SET THE HIGH-TEMPERATURE LIMIT

Note: Test the high limit system once per year for functionality.

The high-temperature limit is set by the end-user, typically at 10°C above the highest temperature the oven will run during your recipe program or constant-temperature application.



1. Advance to the Limit High Setpoint, starting on the homepage



Push Advance multiple times



- Push the Advance button repeatedly until “Lh.S1” (Limit High Setpoint) shows in the green mid-level display line.

2. Adjust the high limit to at least 10°C above the highest temperature of your application



Adjust



- The oven will automatically save and apply the new High Limit setting after you have stopped adjusting.

Note: If you are just checking the current high-temperature limit setting, push the Reset button to exit the Limit High Setpoint menu and return to the homepage without saving any changes.

3. Return to the Homepage



Push Reset



- Returned to the homepage.

End of Procedure



SET THE CONSTANT TEMPERATURE SETPOINT

1. Adjust the Constant Temperature Setpoint on the Homepage



- Stay 10°C below the high limit setpoint.

Note: Holding down an arrow button will cause the temperature to advance in increments of ten (10).

2. Release the Arrow buttons after adjusting the Setpoint



Oven Heating

- There may be a brief pause as the oven controller calculates the optimum power usage to achieve the setpoint starting from the current oven chamber temperature.
- A small illuminated 1 near the bottom of the display indicates the temperature controller is calling for heat.

TEMPERATURE PROGRAMS



Please see the temperature program manual included with this oven for how to program automated heating recipes. The manual provides illustrated explanations for all major program functions and programming steps.

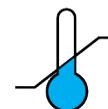


Pushing EZ1 launches the heating Program 1 recipe. Pushing EZ1 again while running aborts the recipe.

OPERATION

HIGH TEMPERATURE LIMIT ACTIVATED

The High Limit system blocks heating in the oven chamber if the chamber temperature meets or exceeds the present High Limit setting. Heating remains disabled until the High Limit cutoff is manually cleared by the oven end-user.



Indicators

Two alternating alert screens flash when a High Limit cutoff is active. Activation of the cutoff is also accompanied by a click. Additionally, an illuminated “4” on the bottom-most display block indicates the oven is routing electricity away from the heating elements.

Alternating Alert Screens



Attention Screen

High Limit Activation Conditions

- The current temperature setpoint is above or near the High Limit cutoff setting. The High Limit should be set to **at least 10°C above** the highest intended temperature of your heating application. Possible causes include:
- A heat source in the oven chamber is pushing the oven temperature above the limit setting.
- Significant outgassing in the chamber may be interfering with the measured temperature.
- Attempting to heat a significant mass of product or samples may trigger a temperature overshoot.
- The main controller circuitry or sensor probe has failed.



Heating Off

If you suspect an ignition event in the oven chamber or hardware failure, **turn off the oven and wait for the oven to cool to room temperature before opening the chamber door.** Contact [Customer Support](#) for assistance.

Clearing the High Limit Heating Cutoff

- Clearing the cutoff restores power to the oven heating elements.
- The oven chamber temperature must be below the High Limit cutoff setting in order to clear the cutoff.
- Always verify it is safe to resume heating before clearing the High Limit cutoff.

Push the Reset button.

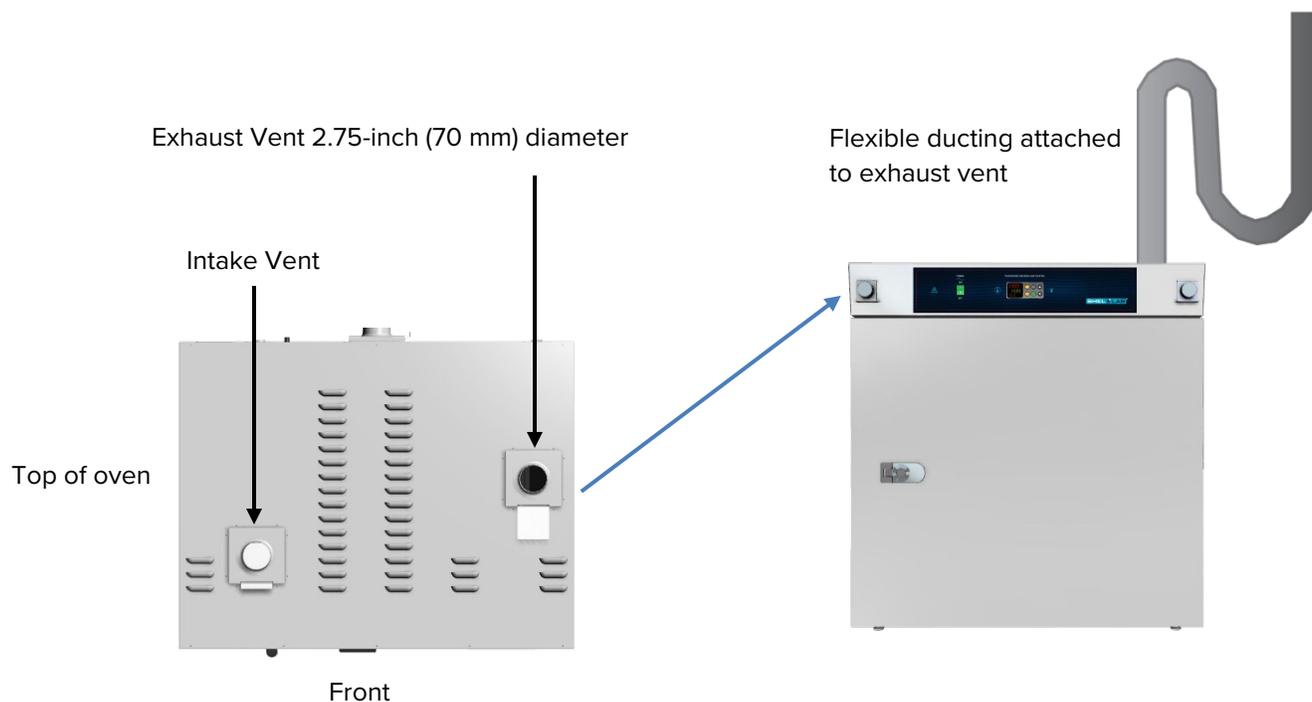


- The alert screens will flash 2 additional times before the oven controller ends the cutoff.

VENTING OVEN EXHAUST

Optional: The oven does not require venting to operate. However, evacuating exhaust out of the workspace can help prevent elevated temperatures and the buildup of unpleasant odors.

- Obtain flexible, non-insulated ducting.
- Attach the ducting to the lip of the exhaust port on the top, right side of the oven. See the images below.
 - Secure the ducting to the lip using a clamp (for example a crimp clamp).
- Include a U-shaped bend in the duct to prevent moisture condensate in the ducting from sliding back down into the oven chamber.
- Position or connect the free end of the ducting so that it safely channels exhaust away from the workspace and any areas occupied by personnel.
- Ensure the exhaust port is open when venting.



OPERATION

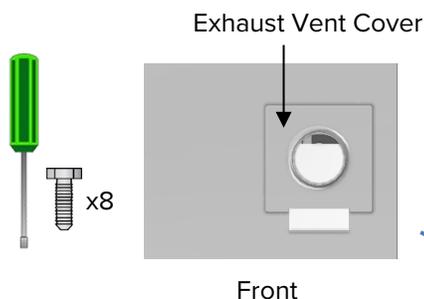
POWER EXHAUST BLOWER

Note: Exposure to sustained oven chamber temperatures above 80°C will damage the exhaust blower while it is turned off. Leave the oven exhaust vent dampener closed until it is time to turn on the blower and actively vent the oven chamber.

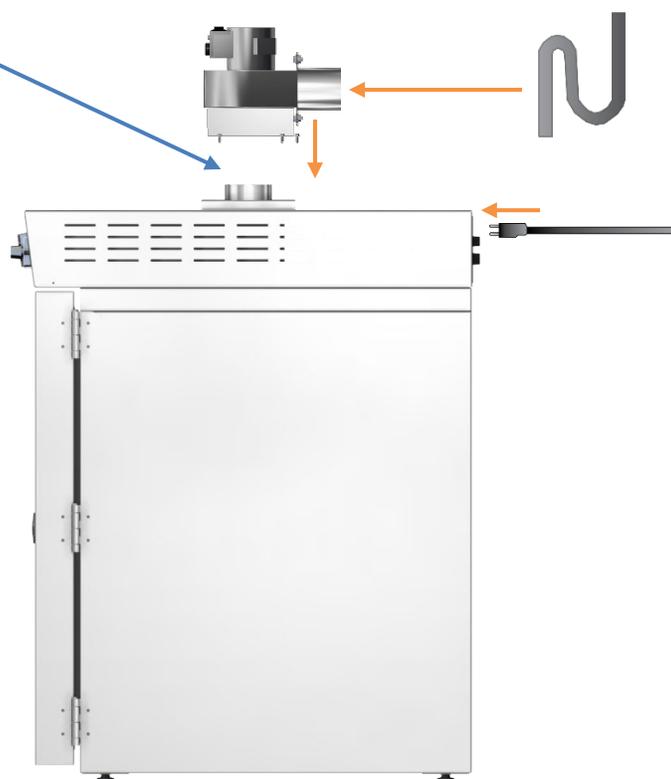
SHEL LAB offers an accessory forced-air power exhaust blower that can be mounted directly on the exhaust vent cover. **Note:** Running the exhaust blower will significantly impact the oven chamber temperature and should be used after completing a heat application.



Mounting the Exhaust Blower



- 1.** Remove the 8 screws from the exhaust vent cover assembly on the top, right side of the oven. **Leave the cover assembly in place.**
- 2.** Mount the blower on the vent cover, positioning the exhaust output toward the back of the oven. Ensure that the exhaust blower and assembly screw holes are aligned.
- 3.** Reinstall the 8 screws to secure the exhaust blower and vent assembly to the unit.
- 4.** Attach flexible ducting to the exhaust blower to vent exhaust away from the workspace.
- 5.** Plug the exhaust blower into the 220 – 240 volt receptacle on the back of the oven.



Continued on next page

OPERATION

Continued from the previous page

Activating the Power Exhaust Blower

The exhaust blower can be activated either as part of a heating recipe program or manually from the homepage Options menu while running a constant temperature setpoint.

Manually Turning on the Exhaust Blower



1. Advance to the homepage Event parameter.
 - a. Starting on the homepage, push the green Advance button 8 times until the green display reads “Ent 1”.



2. Turn on the blower.
 - a. Push the Up or Down arrow button to change the red top-line display from off to on.
 - The blower power outlet will turn on after approximately 2 seconds. Activation of the power outlet is indicated by the Red “3” light on the oven display.



3. Push the Reset button to return to the homepage.

To turn off the blower, advance to the Event parameter again from the homepage and change the setting from on to off.

Warning: Disconnect the unit from its power supply prior to maintenance or cleaning of this unit.

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



CLEANING AND DISINFECTING

- Periodic cleaning is required.
- 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.
- If a hazardous material or substance has spilled in the unit, immediately initiate your site Hazardous Material Spill Containment protocol. Contact your local Site Safety Officer and follow instructions per the site policy and procedures.

Warning: Exercise caution if cleaning the unit with alcohol or flammable cleaners. Always allow the unit to cool down to room temperature before cleaning and make sure all cleaning agents have evaporated or otherwise been completely removed prior to putting the unit back into service.

Avertissement: Soyez prudent lorsque vous nettoyez l'appareil avec de l'alcool ou des produits de nettoyage inflammables. Laissez toujours refroidir l'appareil à la température ambiante avant le nettoyage et assurez-vous que tous les produits de nettoyage se sont évaporés ou ont été complètement enlevés avant de remettre l'appareil en service.



Cleaning

1. Disconnect the unit from its power supply.
1. Remove all removable accessory components such as shelving.
2. Clean the unit with a mild soap and water solution, including all corners.
 - **Do not use an abrasive cleaner.** These will damage metal surfaces.
 - **Do not use deionized water to rinse or clean with.**
 - Take special care when cleaning around the temperature sensor probes in the chamber to prevent damage. Do not clean the probes.
3. Rinse with distilled water and wipe dry with a soft cloth.

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.

Keep the following points in mind when disinfecting the oven:

- Turn off and unplug the unit to safeguard against electrical hazards.
- Disinfect the oven chamber using commercially available disinfectants that are non-corrosive, non-abrasive, and suitable for use on stainless steel and glass surfaces. Contact your local Site Safety Officer for detailed information on which disinfectants are compatible with your applications.
- If permitted by your protocol, remove all removable interior accessories (shelving and other non-attached items) from the chamber when disinfecting.
- Disinfect all surfaces in the chamber, making sure to thoroughly disinfect the corners. Exercise care to avoid damaging the sensor probes.
- When disinfecting external surfaces, use disinfectants that will not damage painted metal, glass, and plastic.

DOOR GASKETS AND CHAMBER 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 life span of the oven.

The unit uses silicone-rubber gaskets. The only tool required for swapping out these gaskets is a cutting implement for tailoring the length of the new gasket.

ELECTRICAL COMPONENTS

Electrical components do not require maintenance. If the oven fails to operate as specified, please contact your SHEL LAB distributor or Customer Support for assistance.

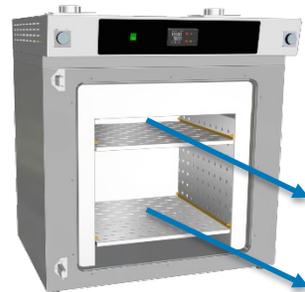
MAINTENANCE

REMOVING THE CHAMBER LINER

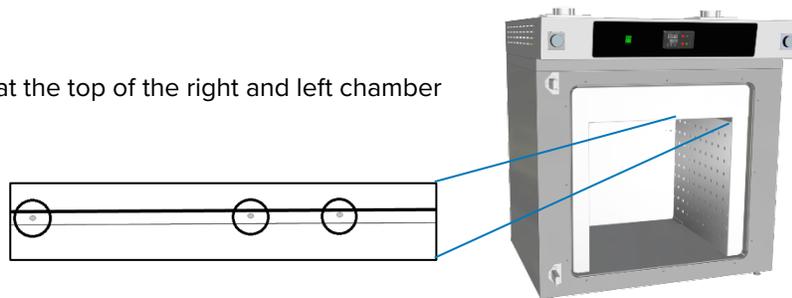
The chamber liner and ducts should be removed periodically and cleaned, and the surfaces beneath them cleaned.

Note: Door removed in illustrations for clarity. Do not remove the door from the oven.

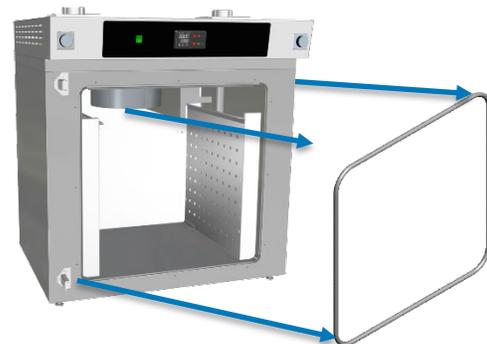
1. Remove all shelves and shelf sliders from the oven.



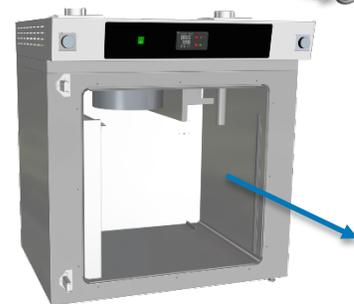
2. Unscrew the nuts located at the top of the right and left chamber walls.



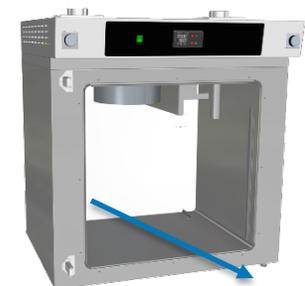
3. Remove the chamber gasket so that there is room to pull the ceiling liner out through the door space. The gasket may be fully or partially removed.
4. Remove the chamber ceiling liner by pulling it out through the oven door space. The liner may require some side-to-side motion to free up.



5. Remove the right wall air duct by pulling it out through the door space.



6. Remove the left wall air duct by pulling it out through the door.



CALIBRATING THE TEMPERATURE DISPLAY

Note: Performing an accurate calibration of the temperature display requires a temperature reference device. Please see the [Reference Sensor Devices entry](#) on page 7 for the minimum device requirements.

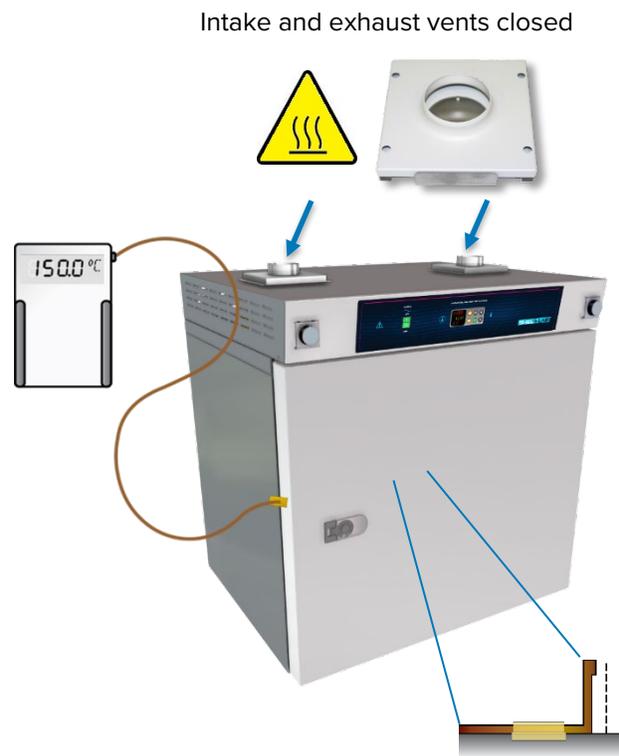
Temperature calibrations match the temperature display to the actual air temperature inside the oven chamber. The actual air temperature is supplied by a reference sensor device. Calibrations compensate for software drifts in the controller as well as deviations caused by the natural material evolution of the sensor probe in the heated chamber space. Calibrate as often as required by your laboratory or production protocol, or regulatory compliance schedule. Always calibrate to the industry or regulatory standards required for your application.

A Suggested Calibration Setup



Use non-marking, heat-resistant polyamide tape to hold the thermocouple probe in place. The oven manufacturer recommends Kapton brand tape, 0.5 inches width (12.7 mm), 2 mil thickness.

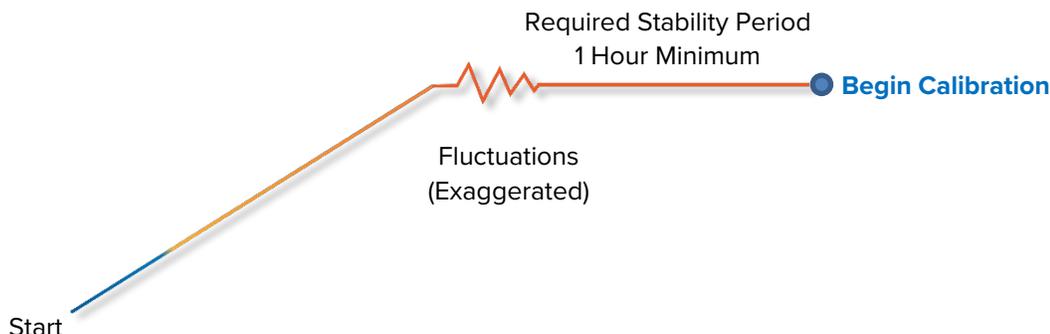
1. Introduce the reference device thermocouple sensor probe into the oven chamber through chamber door space.
2. Position the probe in the chamber.
 - Place the probe head as close as possible to the geometric center point of the chamber.
 - The probe head must be at least 2 inches (51 mm) from the surface of the shelving to prevent heatsinking.
3. Secure the probe head in position with the non-marking, heat-resistant tape.
4. Close and latch the oven door. The door must be closed and latched to carry out an accurate calibration.
5. Use the tape to seal any gaps in the door seal created by the probe.
6. Close the intake and exhaust vents to ensure an accurate calibration



MAINTENANCE

7. The oven temperature must be stable in order to perform an accurate calibration. The temperature is considered stabilized when the oven chamber has operated with the door closed at your calibration temperature for at least one hour with no fluctuations greater than the specified stability of the oven (see page 41).

Oven Chamber Heat Up and Stabilization Phases



Suggested Calibration Procedure

1

Once the chamber has stabilized, compare the reference temperature device and chamber temperature display readings.

- If the readings are the same, or the difference between the two falls within the acceptable range of your protocol, the display is accurately showing the chamber temperature. **The Temperature Calibration procedure is now complete.**

-OR-

- See Step 2 if a difference falls outside the acceptable range of your protocol.

Reference Device



2

The display requires a calibration adjustment.

- The difference between the reference device and the display is an **offset value**.
- 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

- Note the offset value for use in Step 5.

Reference Device

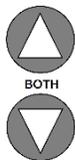


Continued next page

Calibration continued

3

Navigate to the Operations menu.



- Press and hold both the **Up** and **Down** arrow buttons simultaneously for approximately 5 seconds.
- Release the buttons when "A1" appears on the top display line and "oPEr" appears in the mid display line.



Operations Menu

4

Advance through the Operations menu options to the Temperature Calibration offset parameter.



- Push the green **Advance** button repeatedly until "i.CA" appears in the green mid display line and a number value in the red top line.



5

Adjust the number value in the top display line to match the offset value from step 2, using the arrow buttons.



6

Save the calibration offset and return to the homepage.



- Push the Reset button three times so the display shows the homepage.
 - The oven will begin to heat or passively cool to reach the current setpoint using the offset display value for the current temperature.



Continued next page

Calibration continued

7

Allow the oven to stabilize after achieving the temperature setpoint using the offset display value.

Note: The unit is stabilized when no fluctuations of $\pm 0.2^{\circ}\text{C}$ or greater are detected.



8

Once the chamber has stabilized, compare the reference temperature device and oven temperature display readings.

- If the readings are the same or the difference between the two falls within the acceptable range of your protocol, the display is accurately showing the chamber temperature.
The calibration procedure is now complete.

-OR-

- Advance to the next step if the difference falls outside the acceptable range of your protocol again.

Reference Device



9

Repeat steps 2 - 8 up to two more times.

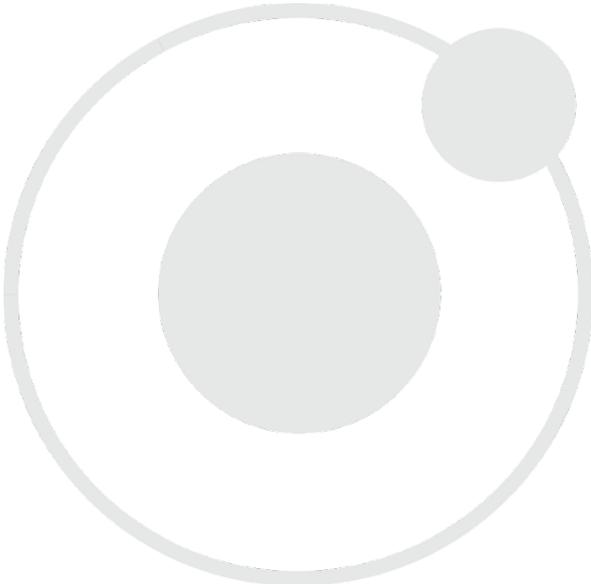
- Three calibration attempts may be required to successfully calibrate ovens that are more than $\pm 2^{\circ}\text{C}$ out of calibration.

Reference Device



If the temperature reading difference still falls outside your protocol after three calibration attempts, contact your distributor or [Customer Support](#) for assistance.

End of procedure



UNIT SPECIFICATIONS

The SMO5HP-2 is a 220 – 240 voltage unit. Please refer to the unit data plate for individual electrical specifications.

Technical data specified applies to ovens with standard equipment at an ambient temperature of 25°C and nominal voltage. The temperatures specified are determined in accordance with 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
412 lbs / 187 kg	325.0 lbs / 147.0 kg

DIMENSIONS

By Inches

Exterior W × D × H	Interior W × D × H
35.0 x 30.0 x 37.6	20.5 x 20.7 x 20.0

By millimeters

Exterior W × D × H	Interior W × D × H
889 x 747 x 955	520 x 527 x 508

CAPACITY

Cubic Feet	Liters
4.9	139.0

SHELF CAPACITY BY WEIGHT

Pounds	Kilograms
50.0 lbs. per shelf	22.7 kg per shelf

TEMPERATURE

Range	Stability
Ambient + 20 to 306°C	±0.3°C at 150°C

SPECIFICATIONS

Uniformity

@80°C	@150°C	@306°C
± 1.0°C	± 2.0°C	± 3.5°C

Time to Temperature: From an ambient temperature of 20°C.

Heating Time to 80°C	Heat Up Time to 150°C	Heat Up to 306°C
10 minutes	22 minutes	35 minutes

Recovery Time: From a 30-second door opening.

Recovery to 80°C	Recovery to 150°C	Recovery to 306°C
4 minutes	5 minutes	5 minutes

Recovery Time: From a 60-second door opening.

Recovery to 80°C	Recovery to 150°C	Recovery to 306°C
5.5 minutes	6.5 minutes	7.5 minutes

AIRFLOW PERFORMANCE

Ventilation Rates

Cubic Feet per Minute @80°C	Liters per Minute @80°C
7.6	215

Air Changes per Hour
93

Air Velocity Across Shelf Space

Linear Feet per Minute	Meters per Minute
145	44.2

POWER

AC Voltage	Amperage	Frequency
220 – 240	12	50/60 Hz

REPLACEMENT PARTS

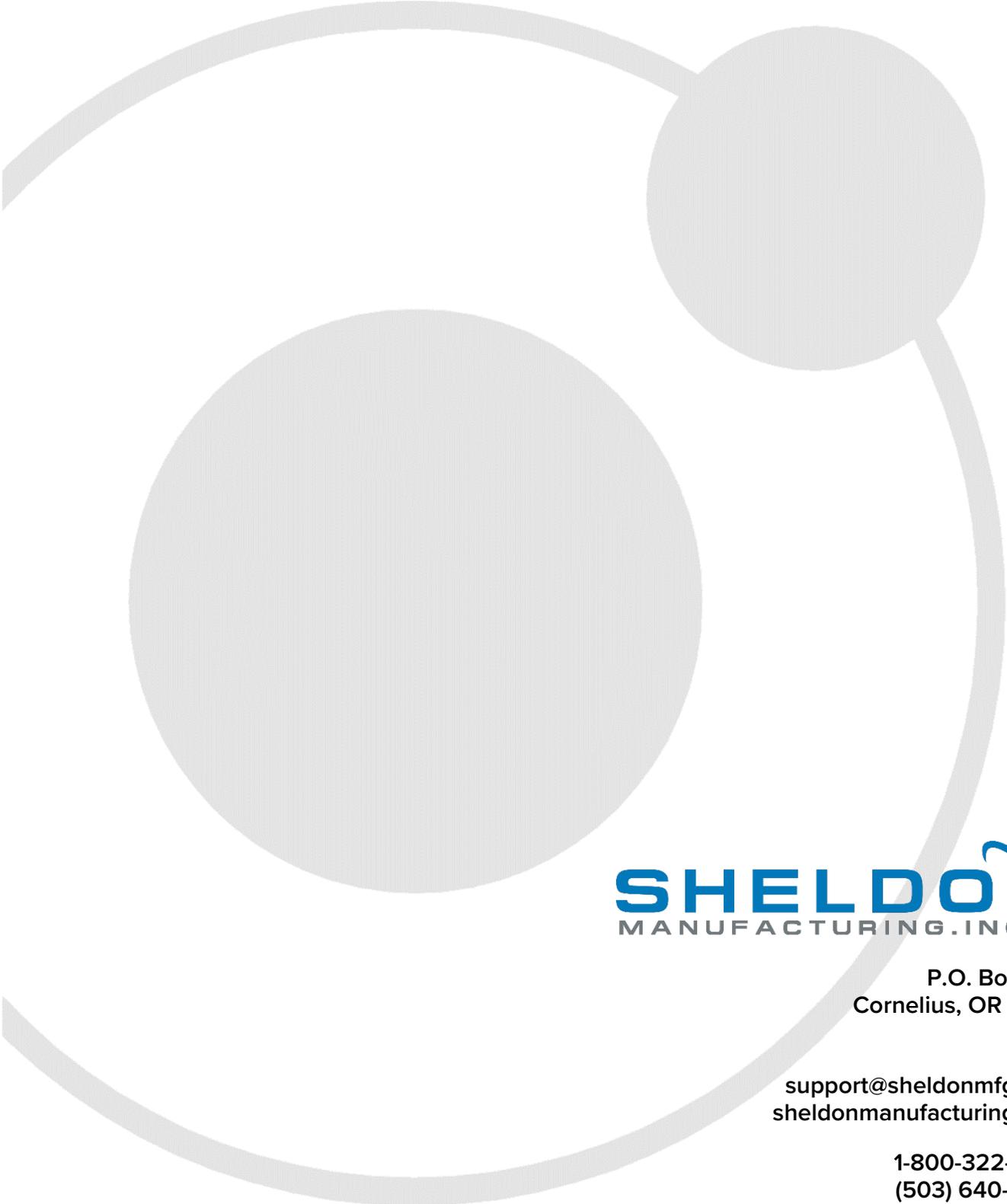
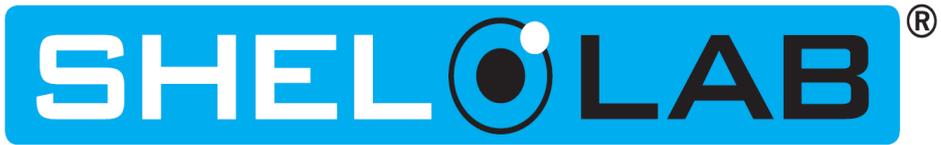
Description	Parts Number	Description	Parts Number
Adjustable Foot	 2700512	Fuse, Accessory Outlet, 2 amp, 250V, 5x20mm. Requires 2 fuses.	 3300502
Silicone Chamber Gasket (unit of sales is per foot, requires 11 feet)	 3450546	Shelf Slide	 5121189
Silicone Door Gasket (unit of sales is per foot, requires 11 feet)	 3450587	Shelf	 5121195
Fuse, Oven, 20 amp Slow Blow, 240V, 5x20mm. Requires 2 fuses.	 3300538	Optional: Power Exhaust Blower Unit 220 – 240 Volt	 9990741

Ordering

Accessories and replacement parts can be ordered online at parts.sheldonmfg.com.

If the required item is not listed online, or if you require assistance in determining which part or accessory you need contact SHEL LAB by emailing parts@sheldonmfg.com or by calling 1-800-322-4897 ext. 3 or (503) 640-3000 ext. 3.

Please have the **Model**, **Serial**, and **Part** numbers, and the **Part ID** of the unit ready. Customer Support needs this information to match your unit to its correct part.



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