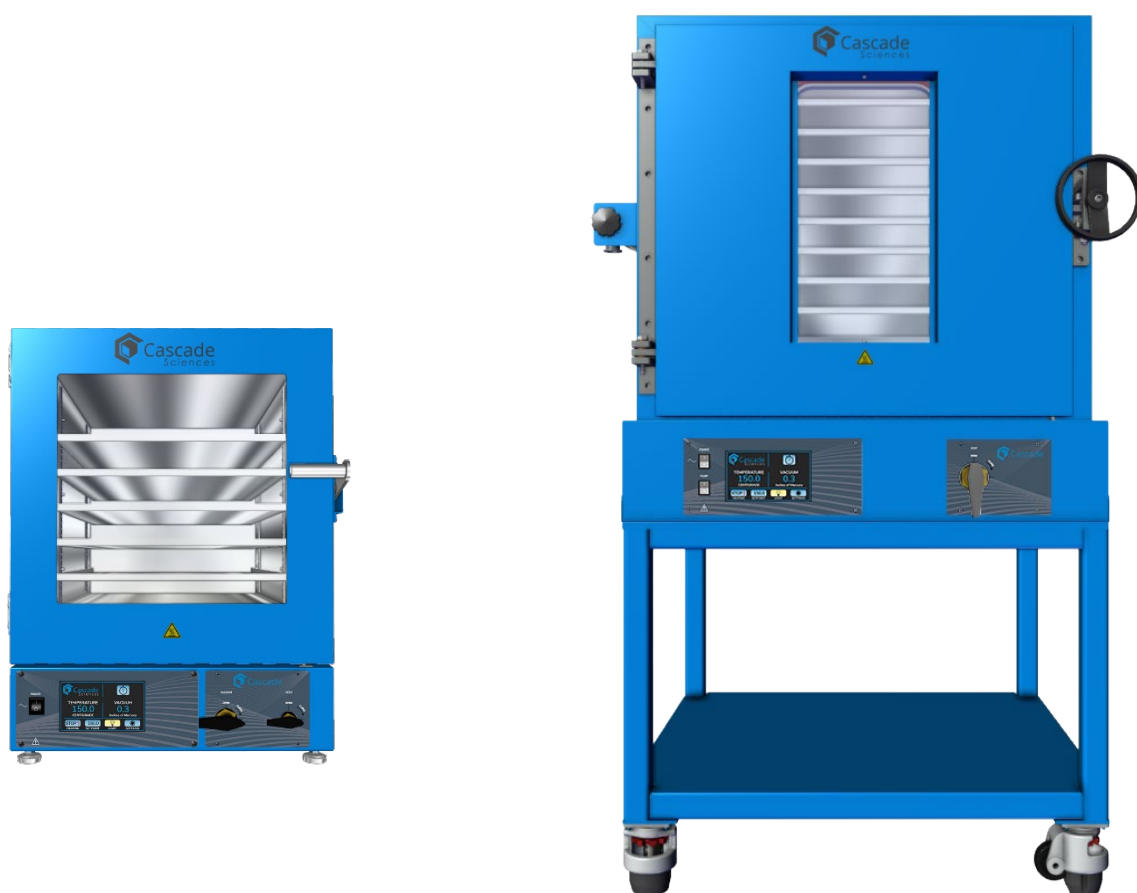


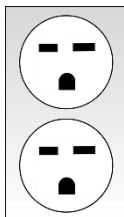
Vacuum Ovens



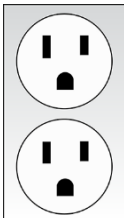
CVO-5 CVO-5-2 CVO-10

Installation - Operation Manual

The **CVO-10** and **CVO-5-2** require a 220 – 240-volt power supply outlet to plug into (NEMA 6-15R).



The **CVO-5** requires a standard 110 – 120-volt power supply outlet to plug into (NEMA 5-15R).



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

Vacuum Ovens

CVO-10, CVO-5-2: 220 – 240 Voltage

CVO-5: 110 – 120 Voltage

Installation and Operation Manual

Part Number (Manual): 4861833

Revision: January 22, 2020

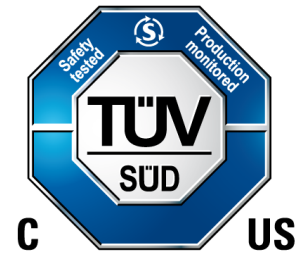
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This certificate satisfies NRTL safety requirements

TÜV SÜD CUE

Certificate Number: U8 064872 0095

These units are CUE listed by TÜV SÜD as vacuum ovens for appropriate professional, industrial, or educational use. TÜV SÜD America Inc. is an OSHA recognized NRTL and a Standards Council of Canada accredited certification body.

The units have been tested to the following requirements:

CAN/CSA-C22.2 No. 61010-1:2012/U2:2:2016-04

CAN/CSA C22.2 No. 61010-2-010:2015

UL 61010-1:2012/R:2016-04

UL 61010-2-010:2015

EN 61010-1:2010

EN 61010-2-010:2014



UNIT SPECIFICATIONS

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 $\pm 3^\circ$ (77°F $\pm 5.4^\circ$) and at nominal voltage. The temperatures specified are determined in accordance with factory standards 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.

TEMPERATURE PERFORMANCE

Operating Range

Model	Fahrenheit	Celsius
CVO-10	Ambient +26° to 302°F	Ambient +15° to 150°C
CVO-5	Ambient +26° to 302°F	Ambient +15° to 150°C
CVO-5-2	Ambient +26° to 302°F	Ambient +15° to 150°C

Temperature Uniformity

Fahrenheit

Model	@ 105°F	@ 200°F	@ 300°F
CVO-10	$\pm 2.5^\circ\text{F}$	$\pm 7.5^\circ\text{F}$	$\pm 16.0^\circ\text{F}$
CVO-5	$\pm 2.5^\circ\text{F}$	$\pm 7.5^\circ\text{F}$	$\pm 16.0^\circ\text{F}$
CVO-5-2	$\pm 2.5^\circ\text{F}$	$\pm 7.5^\circ\text{F}$	$\pm 16.0^\circ\text{F}$

Celsius

Model	@ 40°C	@ 90°C	@ 150°C
CVO-10	$\pm 1.4^\circ\text{C}$	$\pm 4.2^\circ\text{C}$	$\pm 8.9^\circ\text{C}$
CVO-5	$\pm 1.4^\circ\text{C}$	$\pm 4.2^\circ\text{C}$	$\pm 8.9^\circ\text{C}$
CVO-5-2	$\pm 1.4^\circ\text{C}$	$\pm 4.2^\circ\text{C}$	$\pm 8.9^\circ\text{C}$

SPECIFICATIONS

Temperature Stability

Fahrenheit

Model	@ 105°F	@ 200°F	@ 302°F
CVO-10	±0.3°F	±0.3°F	±0.3°F
CVO-5	±0.3°F	±0.3°F	±0.3°F
CVO-5-2	±0.3°F	±0.3°F	±0.3°F

Celsius

Model	@ 40°C	@ 90°C	@ 150°C
CVO-10	±0.2°C	±0.2°C	± 0.2°C
CVO-5	±0.2°C	±0.2°C	± 0.2°C
CVO-5-2	±0.2°C	±0.2°C	± 0.2°C

Heat Up Time from Ambient (77°F / 25°C)

Ambient to stabilization with the chamber under vacuum. Heat up times may be influenced by ambient conditions.

Model	To 105°F (40.5°C)	To 200°F (93.3°C)	To 302°F (150°C)
CVO-10	60 minutes	126 minutes	180 minutes
CVO-5	60 minutes	126 minutes	180 minutes
CVO-5-2	60 minutes	126 minutes	180 minutes

Cool Down Times

Approximate times with the chamber under vacuum. Cooling rates can be influenced by ambient conditions.

Model	From 105°F (40°C)	From 200°F (90°C)	From 300°F (150°C)
CVO-10	345 Minutes	345 Minutes	345 Minutes
CVO-5	345 Minutes	345 Minutes	345 Minutes
CVO-5-2	345 Minutes	345 Minutes	345 Minutes

SPECIFICATIONS

POWER

Model	AC Voltage	Amperage	Frequency	Phase
CVO-10	220 – 240	13.0	50/60 Hz	1
CVO-5	110 – 120	14.0	50/60 Hz	1
CVO-5-2	220 – 240	7.0	50/60 Hz	1

WEIGHT

Model	Shipping	Net Weight
CVO-10	775 lb / 352 kg	663.0 lb / 301.0 kg
CVO-5	449 lb / 204 kg	360.0 lb / 163.3 kg
CVO-5-2	449 lb / 204 kg	360.0 lb / 163.3 kg

DIMENSIONS

By Inches

Model	Exterior W × D × H	Interior W × D × H
CVO-10	42.0 x 40.2 x 67.4 in	28.0 x 24.0 x 24.0 in
CVO-5	25.0 x 33.1 x 31.3 in	18.0 x 24.0 x 18.0 in
CVO-5-2	25.0 x 33.1 x 31.3 in	18.0 x 24.0 x 18.0 in

By Millimeters

Model	Exterior W × D × H	Interior W × D × H
CVO-10	1067 x 1021 x 1712 mm	711 x 609 x 609 mm
CVO-5	635 x 841 x 795 mm	457 x 609 x 457 mm
CVO-5-2	635 x 841 x 795 mm	457 x 609 x 457 mm

SPECIFICATIONS

CAPACITY

Model	Cubic Feet	Liters
CVO-10	9.3	263.0
CVO-5	4.5	127.0
CVO-5-2	4.5	127.0

SHELF CAPACITY BY WEIGHT

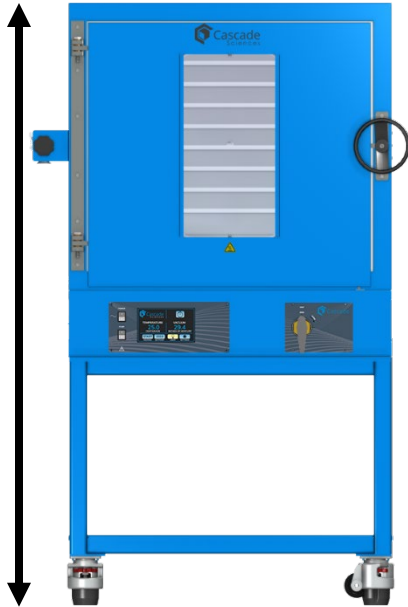
Model	Per Shelf	Total
CVO-10	50.0 lb / 22.7 kg	225.0 lb / 102.0 kg
CVO-5	50.0 lb / 22.7 kg	225.0 lb / 102.0 kg
CVO-5-2	50.0 lb / 22.7 kg	225.0 lb / 102.0 kg

SPECIFICATIONS

UNIT DIMENSION DRAWINGS

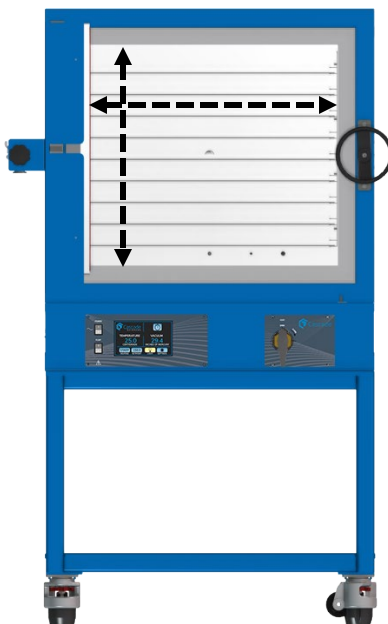
CVO-10

Total Height: 67.4 inches (1712 mm)



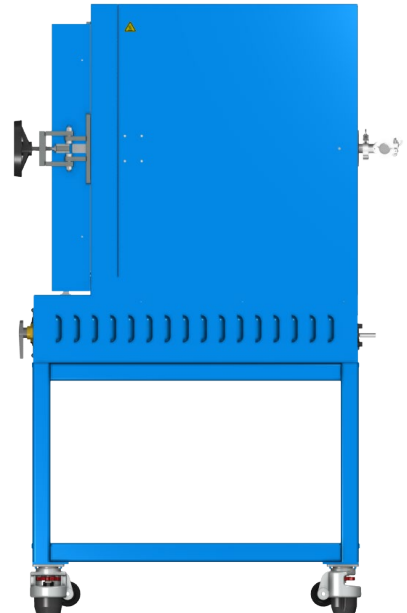
Width: 42.0 inches (1067 mm)

Width: 18.0 inches (457 mm)



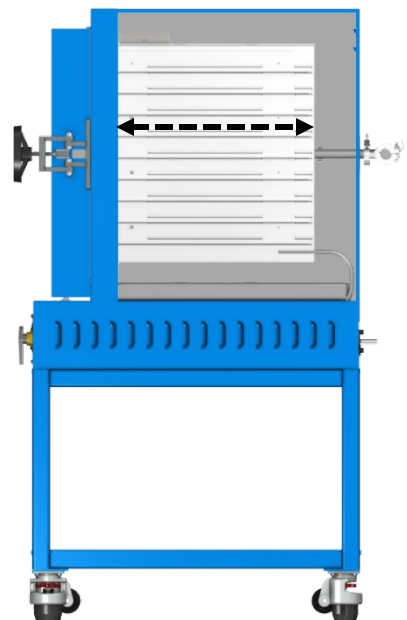
Height: 18.0 inches (457 mm)

Exterior Dimensions



Depth: 40.2 inches (1021 mm)

Depth: 24.0 inches (609 mm)

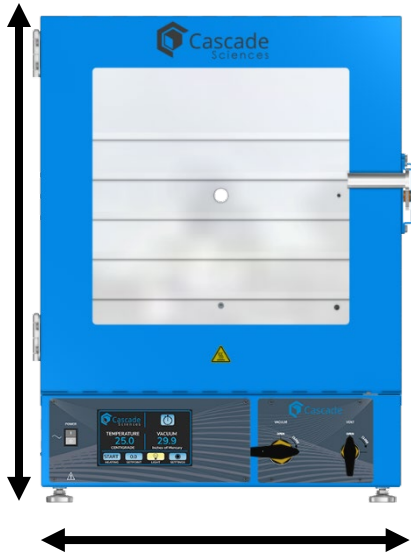


Cutaway Side View

SPECIFICATIONS

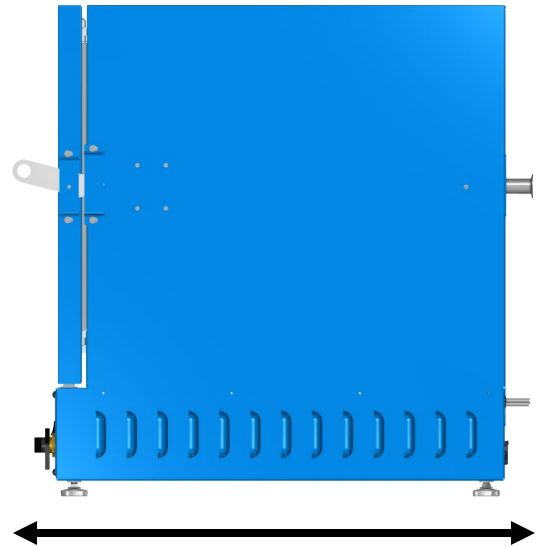
CVO-5 & CVO-5-2

Total Height: 31.3 inches (795 mm)



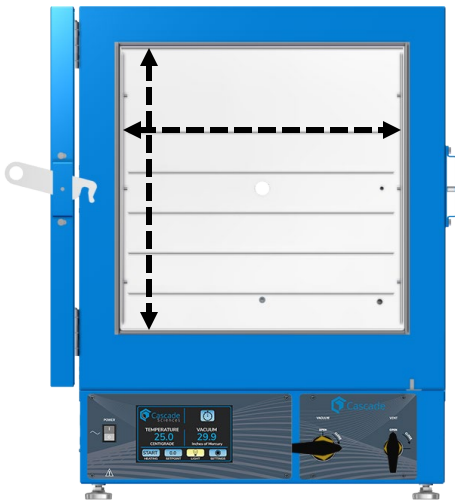
Width: 25.0 inches (635 mm)

Exterior Dimensions



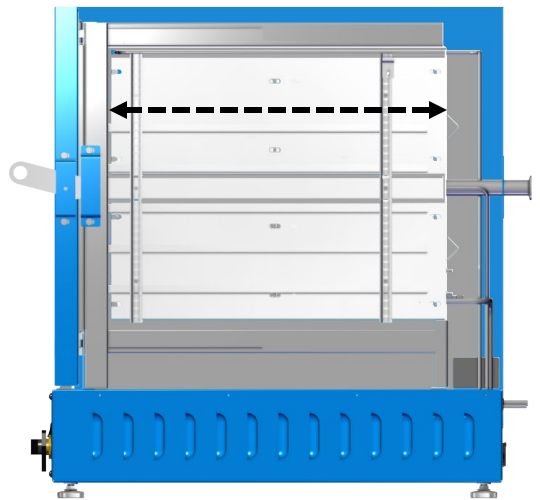
Depth: 33.1 inches (841 mm)

Width: 18.0 inches (457 mm)



Height: 18.0 inches (457 mm)

Chamber Interior



Cutaway Side View

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 operators are given appropriate training before the unit begins service.

Keep this manual available for use by all operators.

Intended Applications and Locations

CVO vacuum ovens are engineered for drying, curing, and baking applications under vacuum in professional, industrial, and educational environments. The ovens are not intended for use at hazardous or household locations.

CONTACTING ASSISTANCE

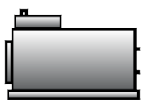
Please have the following information ready when calling or emailing Technical Support: the **model number** and the **serial number** (see page 23).

Phone: 503 847-9047

Cascade Sciences
6725 NE Evergreen Pkwy
Ste 106
Hillsboro, OR 97124

ENGINEERING IMPROVEMENTS

Cascade Sciences 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 oven dealer or customer service representative for assistance.



Vacuum Pump



Building

Vacuum Supply

VACUUM SUPPLY REQUIRED

CVO ovens require a vacuum supply source, which **must be purchased separately from the oven**. Please see the Cascade Sciences website for pumps and vacuum system accessories suitable for your application.

cascadesciences.com/vacuum-pumps

GASKETS

CVO-10

The oven comes with cured silicone gaskets built into the oven door and door window. The door gasket must seal against the un-nicked contact surface on the oven body in order for the oven chamber to hold vacuum. It does not typically require replacement unless damaged by being cut or nicked.

The manufacturer recommends keeping at least one spare door gasket on hand. This allows the oven to be quickly put back into operation if the gasket is damaged during oven operations.

The gasket is a consumable component and not covered under the manufacturer warranty.

CVO-5s



Each oven comes with a replaceable cured silicone gasket installed on the chamber liner. This gasket seals against the chamber door to maintain the vacuum integrity of the chamber. The gasket must be replaced periodically and is rated to 230°C. It is vulnerable to acids and solvents.

The chamber liner gasket is a non-warranty item subject to compression forces, heat, and outgassed byproducts. Heavy usage rates may necessitate frequent replacements. The manufacturer strongly recommends keeping at least one spare gasket on hand during operation.

RECEIVING YOUR UNIT

INSPECT THE SHIPMENT

- When a unit leaves the factory, safe delivery becomes the responsibility of the carrier.
- **Damage sustained during transit is not covered by the manufacturing defect warranty.**
- Save the shipping carton until you are certain that the unit and its accessories function properly.

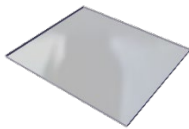
When you receive your unit, inspect it for concealed loss or damage to its interior and exterior. If you find any damage to the oven, **follow the carrier's procedure for claiming damage or loss.**

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. Inspect the unit for signs of damage. See the orientation depictions on the next pages as reference.
5. Verify that the correct number of accessory items has been included.
6. The unit should come with an Installation and Operation Manual.
7. Carefully check all packaging for loose accessory items before discarding.

Included Accessory Items

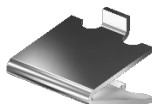
CVO-10

Shelves	Power Cord	Vacuum Connection Kit
9	1	1



CVO-5 & CVO-5-2

Shelves	Shelf Clips	Leveling Feet	Power Cord
5	20	4	1

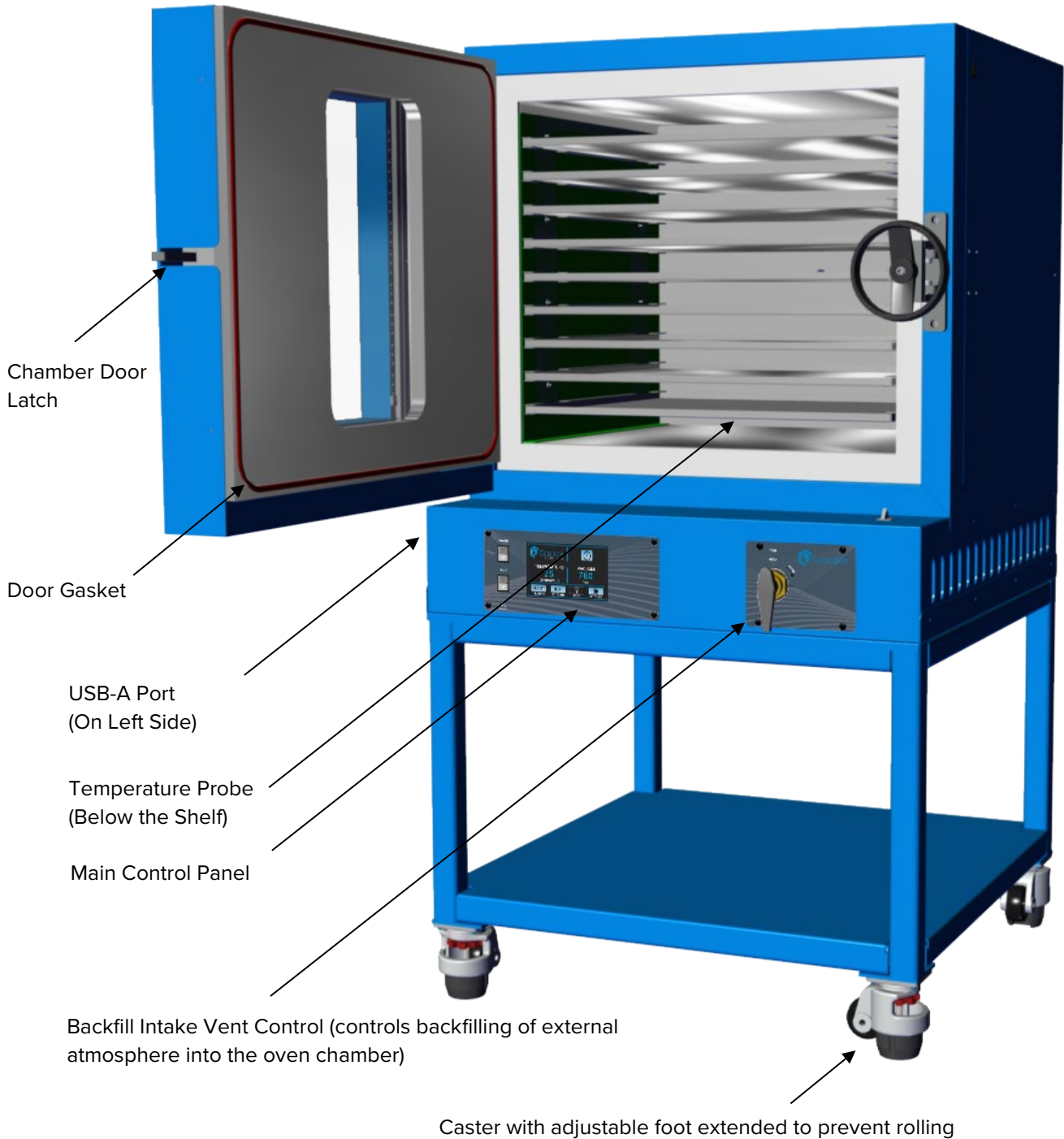


RECEIVING

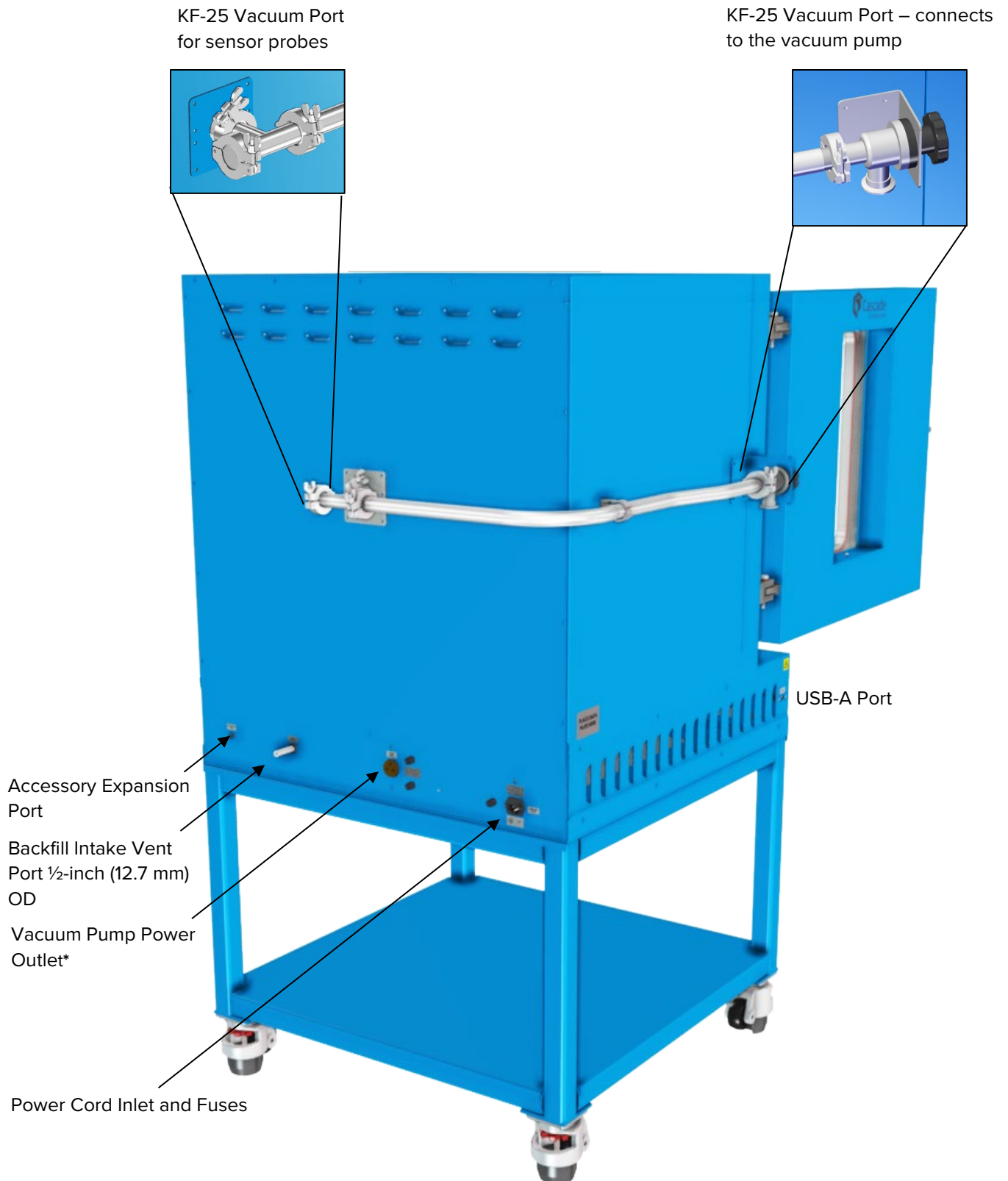
ORIENTATION IMAGES

Oven Chamber Door

CVO-10

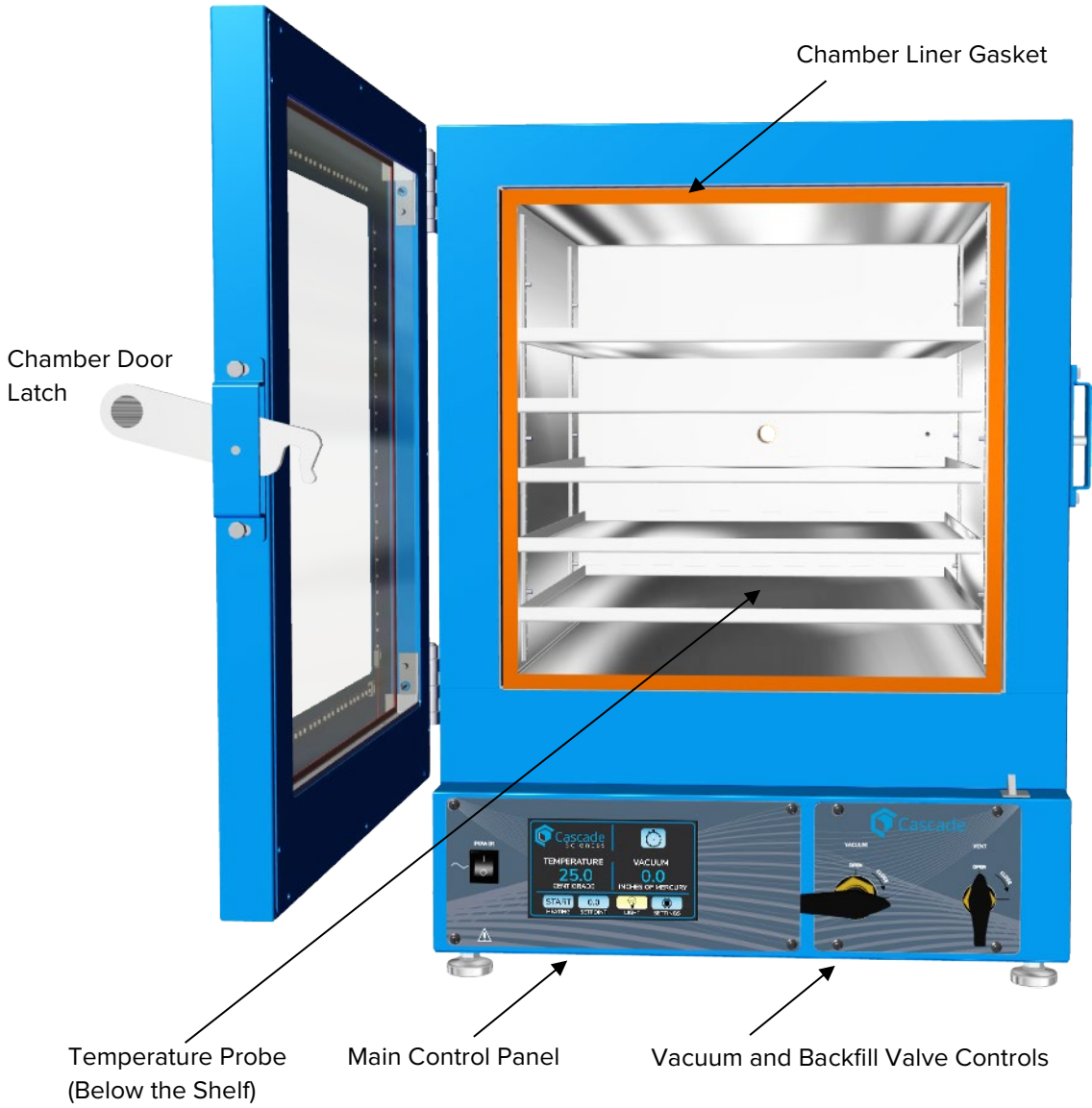


CVO-10 Back

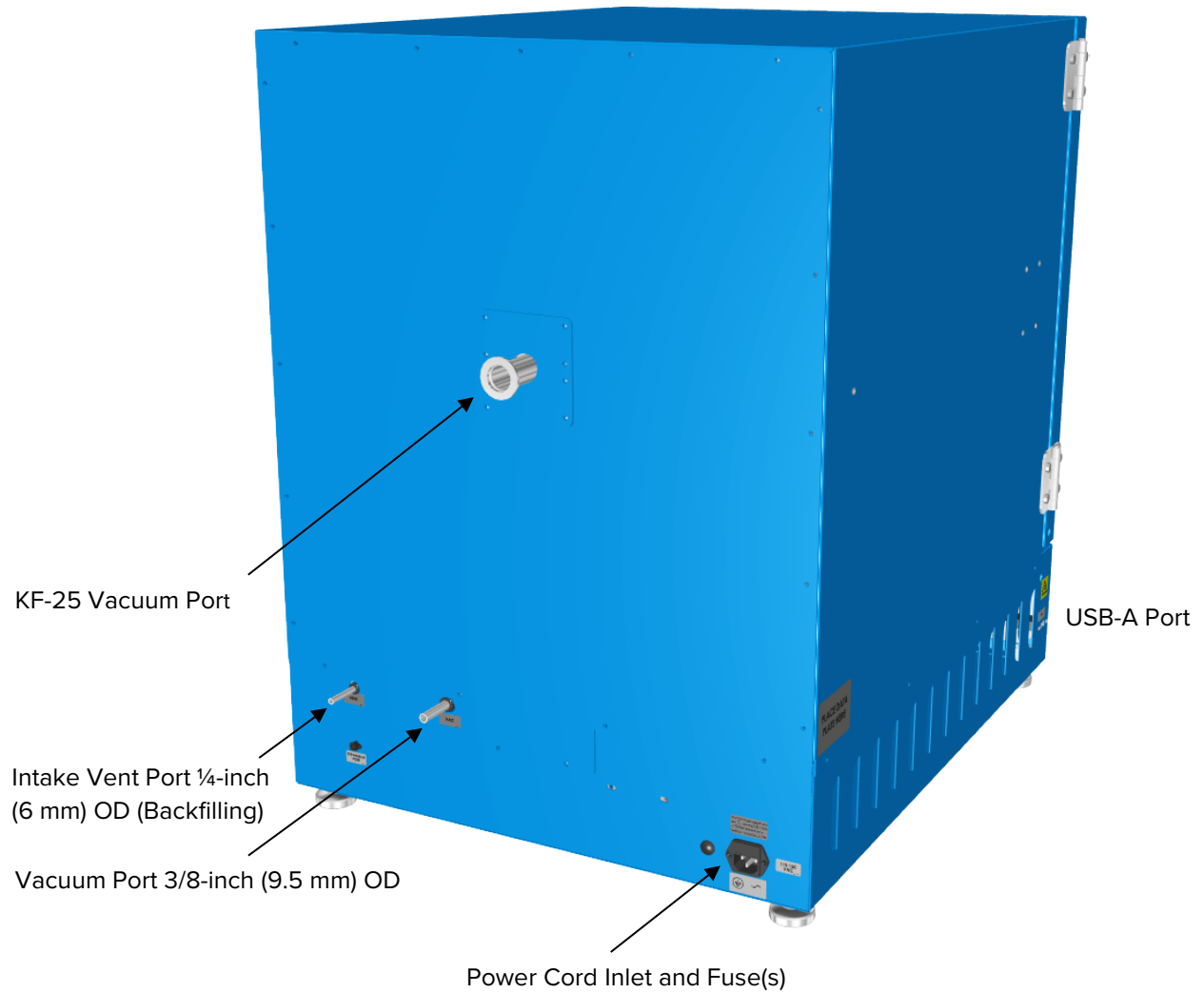


*This power outlet is solely intended for powering a vacuum pump connected to the oven

CVO-5 and CVO-5-2



CVO-5 and CVO-5-2 Back

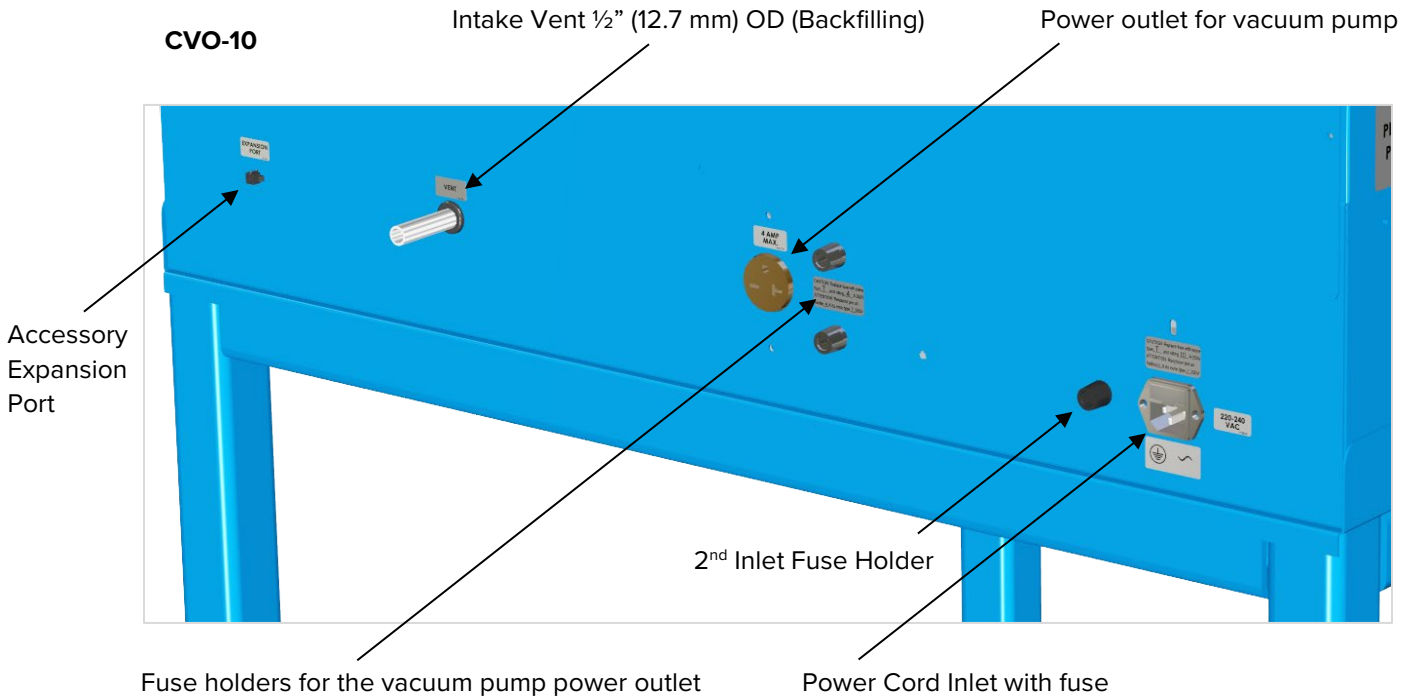


RECEIVING

Power Panels

Located on the back of each unit

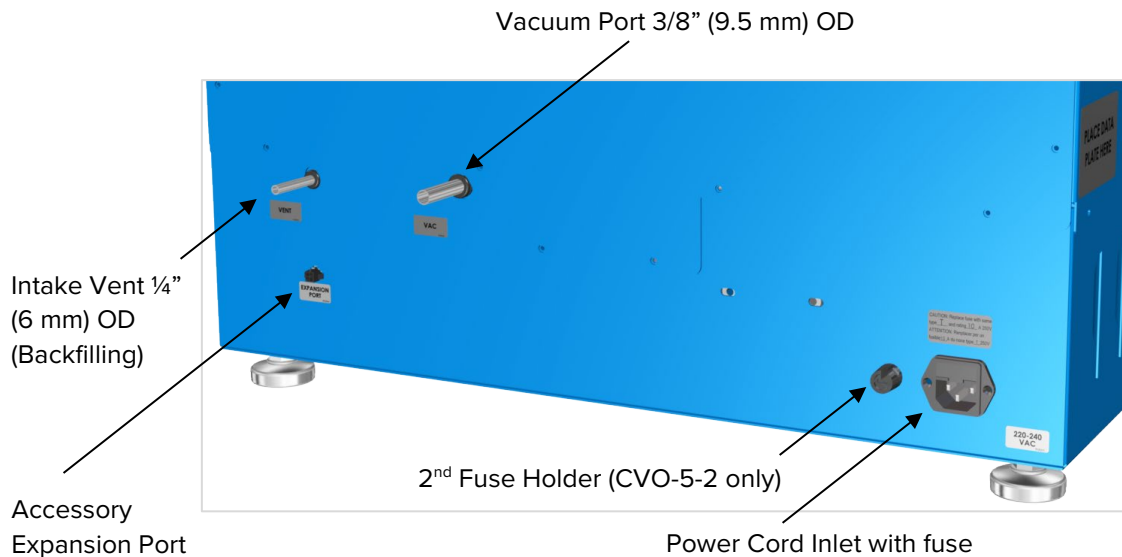
CVO-10



CVO-10 Vacuum Pump Power Outlet

Voltage	Outlet Type	Max. Amperage
220 – 240	NEMA 6-20R	4

CVO-5 and CVO-5-2



RECORDING DATA PLATE INFORMATION

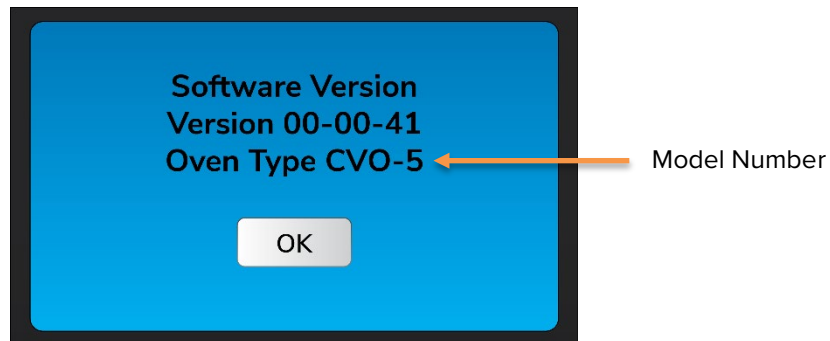
Record the unit **model number and serial number** below for future reference. Tech Support needs this information to provide accurate help during support calls and emails.

- The data plate is located on the lower left side of the oven near the back.

Data Plate Information

MODEL NO:	
SERIAL NO:	

The unit Model Number can also be found on the See Version screen in the settings menu.





INSTALLATION PROCEDURE CHECKLIST

For installing the oven in a new workspace location.

Pre-Installation

- ✓ Verify a vacuum supply source suitable for your application is available and can be connected to the oven, page 16.
 - See page 34 for the oven gas and vacuum port locations.
- ✓ Check that the required ambient conditions for the unit are met, page 26.
- ✓ Check that the spacing clearance requirements are met, page 26.
 - Unit dimensions may be found on page 7.
- ✓ Check that a suitable electrical outlet and power supply is present, page 27.

Install the oven in a suitable workspace location

- ✓ Review the lifting and handling instructions, page 29.
- ✓ Level the oven, page 30.
- ✓ Install the oven in its workspace location, page 30.

Set up the oven for use

- ✓ Clean the oven shelving. Clean the chamber if needed, page 31.
- ✓ Install the shelving.
 - CVO-10, see page 32
 - CVO-5s, see page 33
- ✓ Connect the vacuum supply to the oven, pages 34 and 35.
- ✓ Optional: Connect the oven to an inert backfilling gas, page 36.

INSTALLATION

REQUIRED AMBIENT CONDITIONS

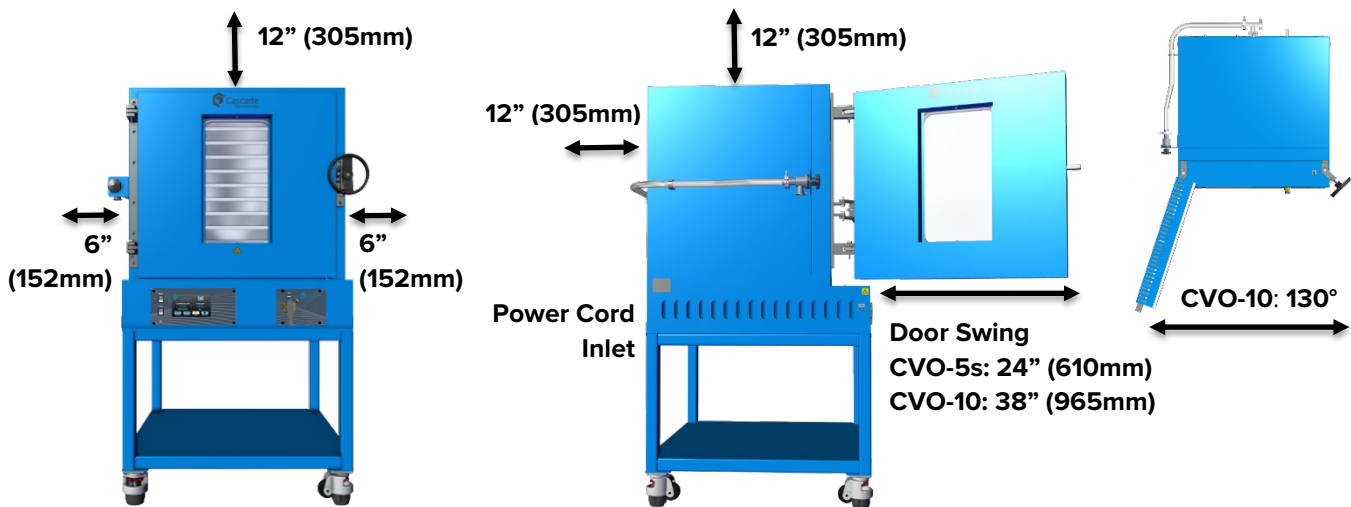
These units are built for use indoors at room temperatures between **15°C and 40°C (59°F and 104°F)**, at no greater than **80% Relative Humidity** (at 25°C / 77°F). Operating outside these conditions may adversely affect the unit temperature performance.

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, or any other device producing 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 for all ovens to provide airflows for ventilation and cooling.



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

12 inches (305 mm) of clearance is required on the back.

12 inches (305 mm) of headspace clearance is required between the top of the unit and any overhead partitions.

Do not place objects on top of the oven.

A KF-25 vacuum port is located on the back of the oven for introducing vacuum-rated thermocouple feedthroughs into the chamber or connecting to an external vacuum supply source. Leave sufficient clearance for operators to safely access this port.

CVO-10: Leave sufficient clearance for the door to swing in a 130° arc. Opening the door this wide allows sample trays to be safely removed from the chamber without damaging the door seal or metal sealing surfaces.

INSTALLATION

POWER SOURCE REQUIREMENTS

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

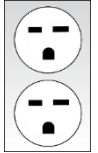
Power Source

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

Model	Voltage	Amps	Frequency
CVO-10	220 – 240	13	50/60 Hz
CVO-5-2	220 – 240	7	50/60 Hz
CVO-5	110 – 120	14	50/60 Hz

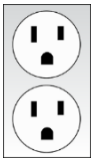
- **The unit may be damaged if the supplied voltage varies by more than 10% from the data plate rating.**
- Wall power sources must be **single-phase (1)** and **protective earth grounded**.
- Use a separate circuit to prevent loss of the unit due to overloading or circuit failure. The circuit must meet or exceed the amperage requirements listed on the unit data plate.
- The recommended wall circuit breakers for these units are:
 - CVO-10, CVO-5-2: **20 amps**
 - CVO-5: **15 amps**
- The wall power source must conform to all national and local electrical codes.

CVO-10
CVO-5-2



NEMA 6-15R

CVO-5



Standard NEMA
5-15R Outlet

Power Cord

The unit must be positioned so that all operators can quickly unplug the power cord in the event of an emergency.

- The **CVO-10** and **CVO-5-2** are provided with a **250V, 15A, 8ft 2in (2.5m) NEMA 6-15P** power cord.
- The **CVO-5** is provided with a **125V, 15A, 9ft 5in (2.86m), NEMA 5-15P** power cord.
- Always use the same type of power cord shipped with the oven.



Continued next page

INSTALLATION



Fuses

All fuses must be installed and not blown for the unit to operate. The cause of a blown fuse should always be determined and fixed prior to returning the oven to operation.

CVO ovens ship with the following 5x20mm fuses installed:

Model	Type	Quantity	Location
CVO-10	T 12.5A 250V	2	Power cord inlet and fuse holder adjacent to the cord inlet.
CVO-5-2	T 10A 250V	2	Power cord inlet and fuse holder adjacent to the cord inlet.
CVO-5	T 16A 250V	1	Power cord inlet

CVO-10 Vacuum Pump Power Outlet Fuses: The CVO-10 ships with two 5x20mm fuses installed in fuse holders next to the vacuum pump outlet.

Model	Type	Quantity	Max allowed outlet draw
CVO-10	T4A 250V	2	4 amps

- These fuses **do not** protect against overcurrent conditions in the major systems of the oven. The fuses only safeguard against events involving the outlet power supply.
- If one fuse blows, the outlet will cease to provide power. The cause of a blown fuse should always be determined and fixed prior to using the outlet or oven.

GENERAL POWER SAFETY

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

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

- Always plug the unit power cord into a protective earth grounded electrical outlet that conforms to national and local electrical codes. If the unit is not grounded properly, parts such as knobs and controls can conduct electricity and cause serious injury.
- Do not bend the power cord excessively, step on it, or place heavy objects on it.
- A damaged cord can be a shock or fire hazard. Never use a power cord if it is damaged or altered in any way.

INSTALLATION

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.

CVO-10: To safely lift or transport the unit, use appropriate powered lifting equipment such as a forklift.

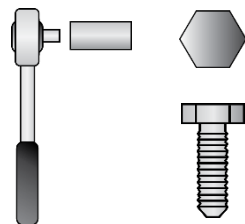
REMOVING FROM THE PALLET

CVO-10

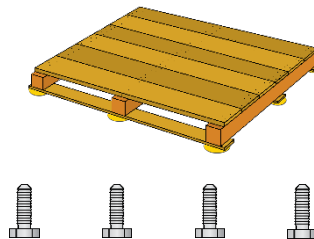
The CVO-10 ships strapped to the pallet seated on 4 caster feet. It will require a powered lifting device to lift off the pallet.

CVO-5s

These ovens come secured to a shipping pallet with ½" hex bolts inserted through the 4 leveling feet holes on the bottom of the unit. Use a socket wrench to remove the bolts and release the unit from the pallet.



0.5 inch (12 mm)



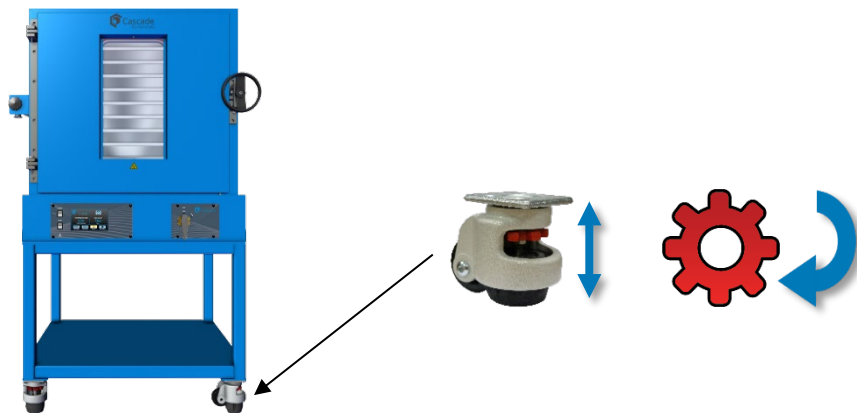
INSTALLATION

LEVELING

CVO-10

To lower a caster foot's leveling footpad, turn the foot's orange cog-style dial clockwise. To raise the footpad, turn the dial counterclockwise. All 4 footpads must be fully raised in order to safely move the oven.

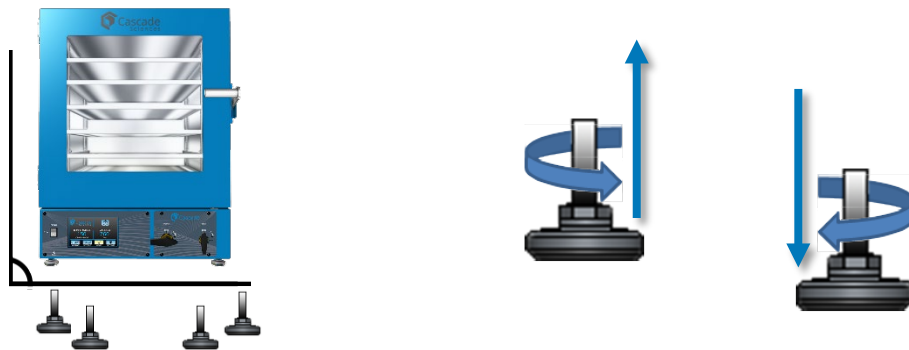
When installing in a workspace, the pads should be lowered far enough to prevent the oven from moving. For safe operation, the oven must be level, stable, and secured to prevent rolling.



CVO-5s

Install the 4 leveling feet in the 4 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 the oven stands level and does not rock. Adjust the leveling feet or casters as needed.

INSTALLATION CLEANING

The manufacturer recommends cleaning the shelving and oven chamber prior to installation of the shelving in the chamber. The unit was cleaned at the factory but may have been exposed to contaminants during shipping.

- The unit was cleaned at the factory but may have been exposed to contaminants during shipping.
- Remove all wrappings and coverings from shelving prior to cleaning and installation.
- **Do not clean with deionized water.**
- See the [Cleaning and Disinfecting](#) topic in the User Maintenance section (page 59) for more information on how to clean and disinfect without damaging the unit.

INSTALLATION

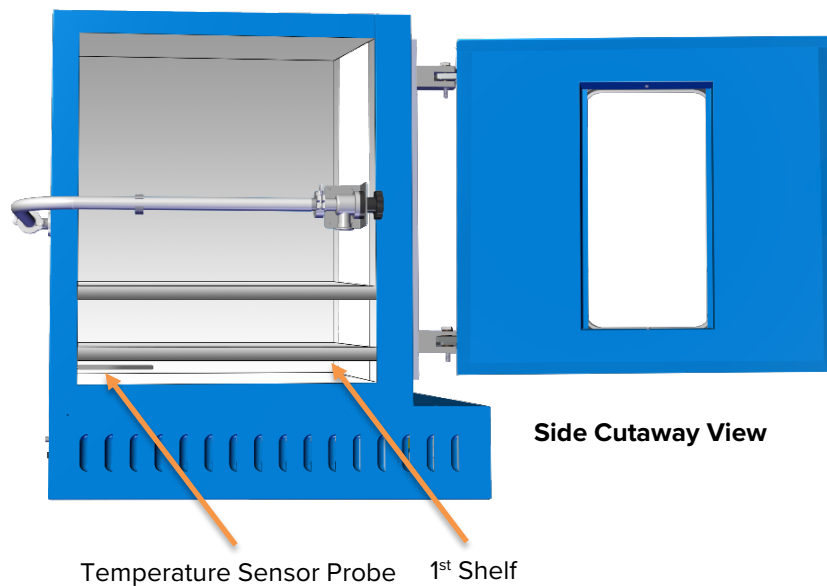
INSTALL THE SHELVING

CVO-10

Oven stand hidden for illustrative purposes only.



1. Install the first shelf in the bottom-most pair of shelf slides, just above the temperature sensor probe.
 - A shelf must be installed here for the oven to accurately control the chamber temperature.
2. Slide the remaining shelves into the shelf slides.



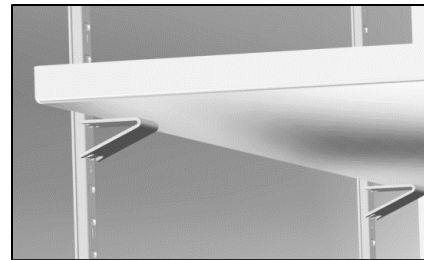
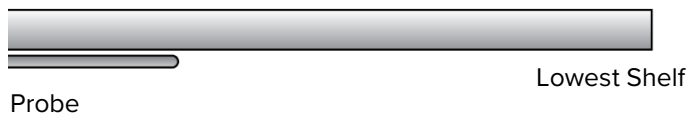
INSTALLATION



CVO-5 and CVO-5-2

The bottom of the lowest shelf must be placed close to the oven temperature probe. This is to ensure accurate temperature measurement. The probe extends out from the chamber back wall.

- Do not place the shelf in direct contact with the probe.
- Install the shelves evenly spaced in the oven chamber to maximize temperature uniformity.
- Please see the orientation image on page 20.



1. Install the shelf clips in the slots of the shelf standard mounting rails located on the sides of the chamber interior, 4 clips per shelf.

- Squeeze each clip, insert the top tab first, and then the bottom tab using a rocking motion.

Set the shelves on the clips and verify the shelves are level.

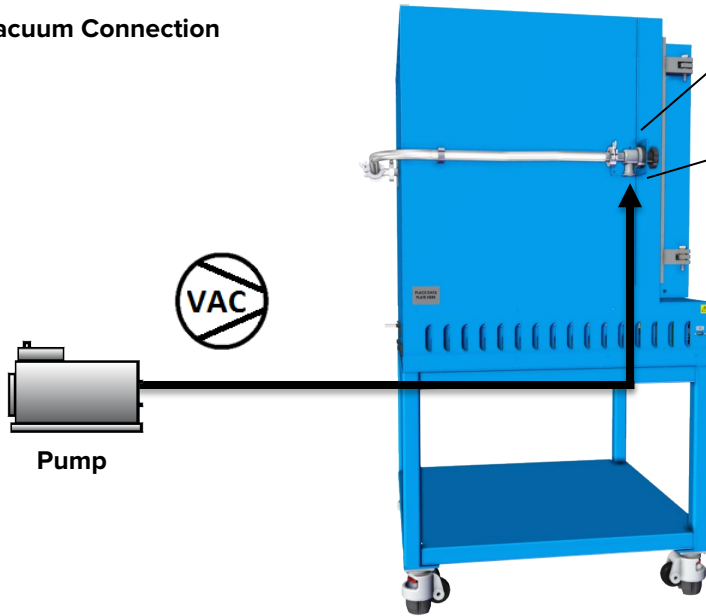
INSTALLATION

CONNECT TO THE VACUUM SUPPLY

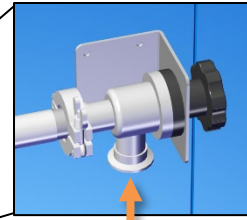


CVO-10

Vacuum Connection



KF-25

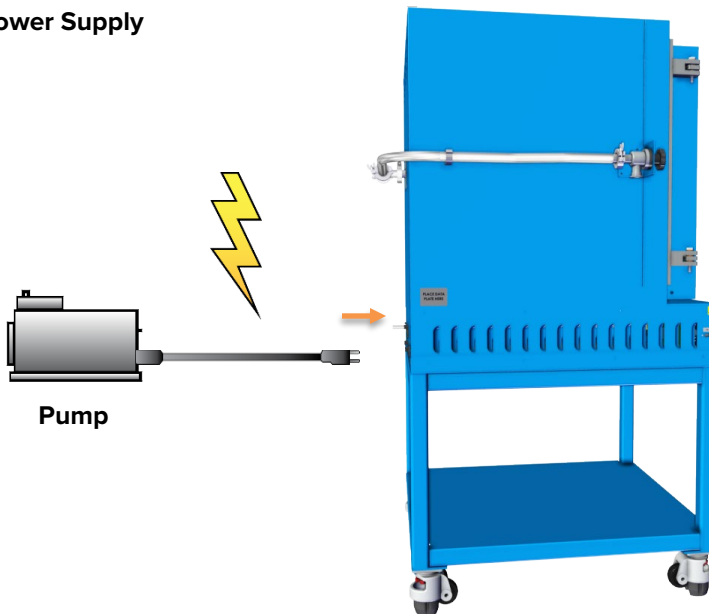


Connect your vacuum supply to this KF-25 port.



Connection Kit

Power Supply



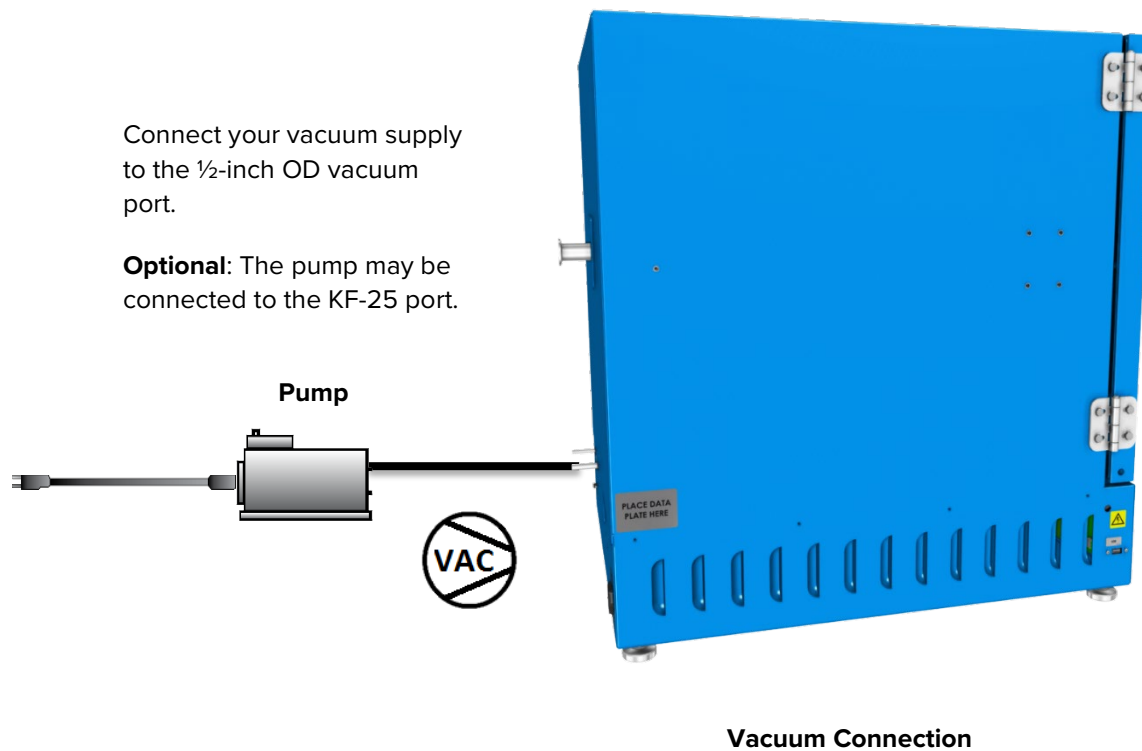
Optional: Connect the vacuum pump to the accessory power outlet on the back of the oven. The Pump power switch on the oven front control panel will turn the pump on and off.

4 amps is the maximum allowed power draw for the accessory outlet on all CVO-10 ovens.

INSTALLATION

Connect to the Vacuum Supply (Continued)

CVO-5 & CVO-5-2



Vacuum Connection

CVO-5 and CVO-5-2 units require a separate wall power source to power the vacuum pump.

INSTALLATION

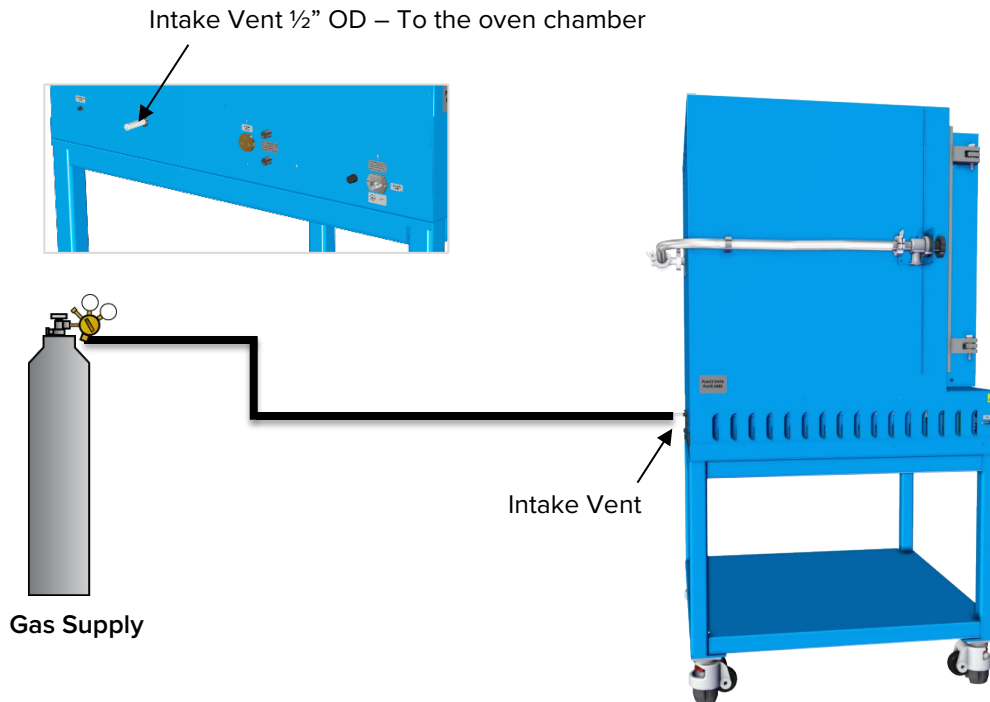
Exceeding 15 psi of gas backfill pressure may damage the oven.

CONNECT TO A GAS BACKFILL SUPPLY

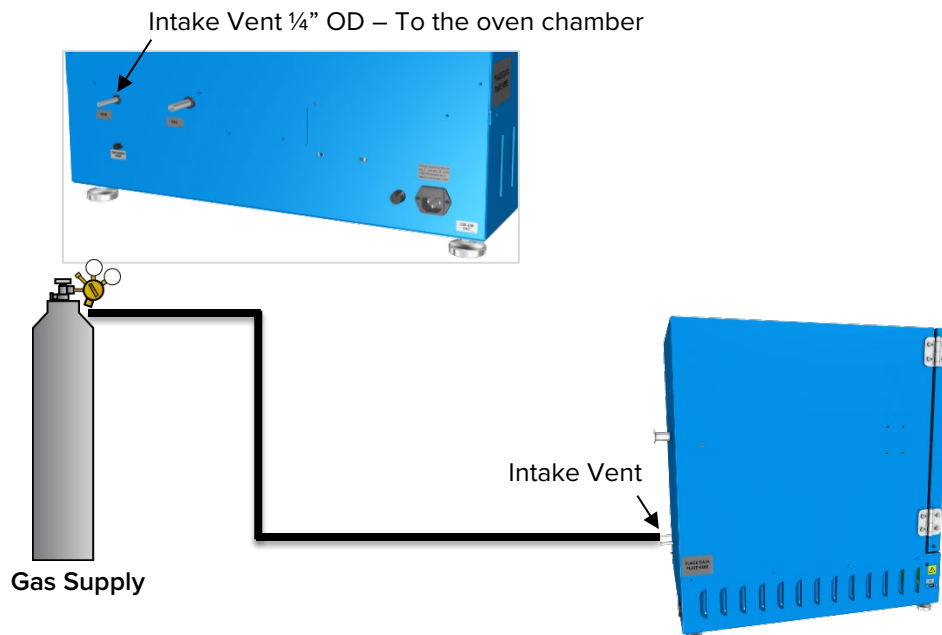
Optional: A clean or inert gas supply — such as nitrogen (N₂) or argon — may be connected to the vent intake port located on the back of the oven. This supply will backfill the evacuated oven chamber when the vent intake valve is opened on the front control panel.

The maximum allowed gas backfill pressure is 15 psi.

CVO-10




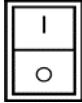



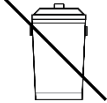



CVO-5 & CVO-5-2



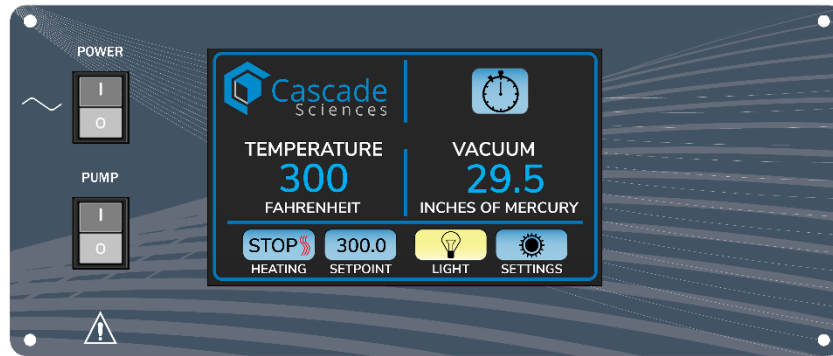
GRAPHIC SYMBOLS

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.

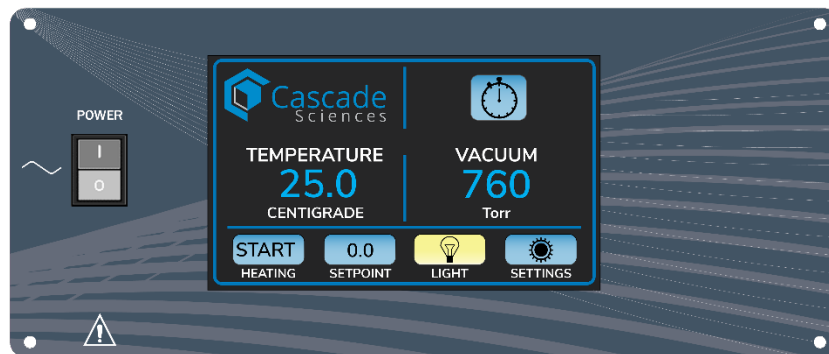
Symbol	Definition
	Consult the user manual Consulter le manuel d'utilisation
	Caution hot surface Attention surface chaude
	AC Power Repère le courant alternatif
	I/ON O/OFF I indique que l'interrupteur est en position marche. O indique que le commutateur est en position d'arrêt.
	Oven heating Chauffage au four
	Lighting Indique l'éclairage
	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.
	Protective earth ground Terre électrique



CONTROL OVERVIEW



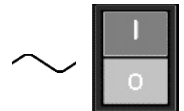
CVO-10 Main Control Panel



CVO-5s Main Control Panel

Power Switch

Controls all power to the oven and its systems.



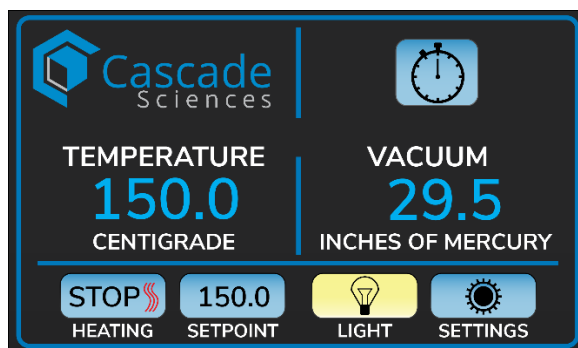
Pump Switch – CVO-10

This switch supplies power to the vacuum pump power outlet on the back of the CVO-10 oven.



Touchscreen – Homepage

This display controls heating and lighting in the oven chamber and displays the current chamber temperature and vacuum pressure. It also accesses the Settings Menu.



Note:

- ~0 Inches of Mercury is room atmosphere pressure at or near sea level.
- Room pressure may read as 5+ Inches of Mercury at higher altitudes.
- 29.9 Inches of Mercury is a perfect vacuum.

The display can be set to show temperature and vacuum values in standard or metric units of measurement. See page 49 for information on how to change the units of measurement.

CONTROLS

Home Screen Icons and Controls

Heating Button

A blue rounded rectangular button with the word "START" in white capital letters.

Controls heating in the oven chamber. Tap START to begin heating to the current constant temperature setpoint. The Start button then becomes a Stop button.

A blue rounded rectangular button with the word "STOP" in white capital letters and three red wavy lines to its right.

Tap STOP to turn off heating in the chamber.



Heating Icon

Pulses when the oven is pulsing power to the heating elements.

Setpoint Button

A blue rounded rectangular button displaying the number "150.0" in white.

Shows the current constant temperature setpoint. This setpoint is the temperature the oven heats to and maintains after the START Button is tapped. Tap the Setpoint Button to bring up the setpoint menu.

Light Button



Turns the chamber lighting on and off. The light button turns black when the oven chamber lighting is off.

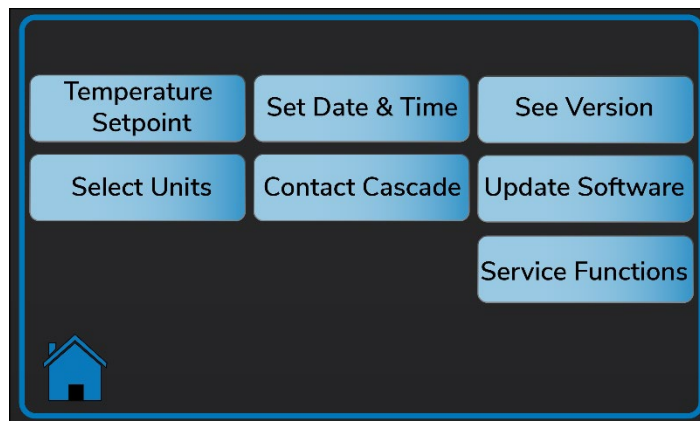
Settings Button



Brings up the Settings Menu.



The Home Button returns the display to the previous screen.

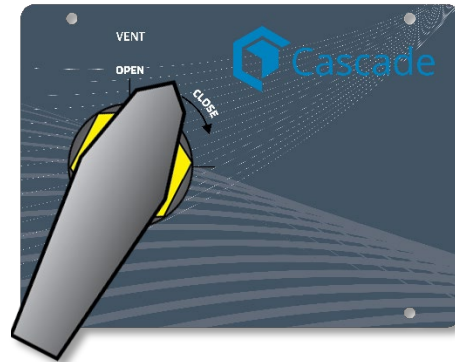


CVO-10 Valves

Side Vacuum Valve



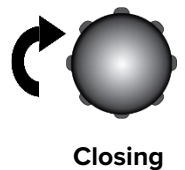
Vent Valve (Backfilling)



Vacuum Valve Control

The CVO-10 Vacuum Valve is located on the left side of the oven on a KF-25 vacuum port. This valve adjusts the level of vacuum draw applied to the oven chamber through the vacuum port.

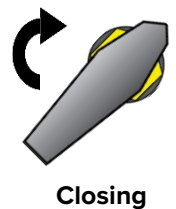
- When **open**, this valve allows the connected vacuum supply to evacuate the oven chamber.
- In the **closed** position, the valve closes off the vacuum draw.



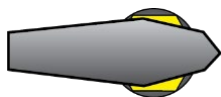
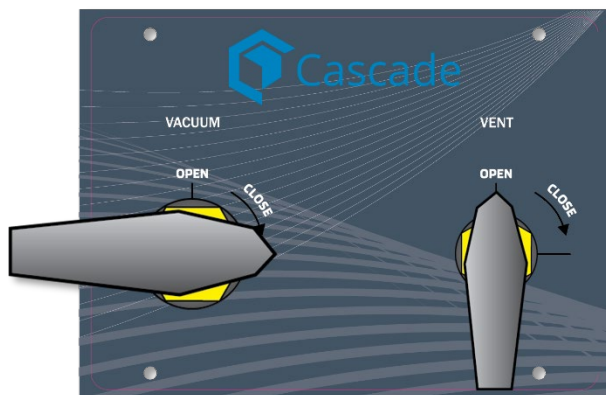
Vent Valve Control (Backfilling)

This valve opens and closes the chamber inlet Vent Port on the back of the CVO-10.

- When the control is in the **open** position, the evacuated oven chamber backfills with atmosphere.
- Optional: An inert or clean backfilling gas supply connected to the Vent Port will flow gas from the pressurized supply to the oven chamber when the Vent Valve is open.
- When the valve control is in the **closed** position, the chamber is cut off from the external atmosphere and any gas supply.
 - **The vent must be closed prior to vacuuming down the chamber.** Failure to do so may result in damage to your vacuum pump.



CVO-5 Valves



Closed

Vacuum Valve Control

This valve adjusts the level of vacuum draw applied to the CVO-5 chamber through the vacuum port on the back of the oven.

- When **open**, this valve allows the connected vacuum supply to evacuate the oven chamber.
- In the **closed** position, the valve closes off the vacuum draw.

Vent Valve Control (Backfilling)

This valve opens and closes the chamber inlet Vent Port on the back of the CVO-5.



Open

- When the control is in the **open** position, the evacuated oven chamber backfills with atmosphere.
- Optional: An inert or clean backfilling gas supply connected to the Vent Port will flow gas from the pressurized supply to the oven chamber when the Vent Valve is open.
- When the valve control is in the **closed** position, the chamber is cut off from the external atmosphere and any gas supply.
 - **The vent must be closed prior to vacuuming down the chamber.** Failure to do so may result in damage to your vacuum pump.

Safe operation of the oven is dependent on the actions and behavior of the oven operators. **Operating personnel must read and understand the Safety Guidelines and 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 Safety Guidelines and Operating Cautions, 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.



SAFETY GUIDELINES

Failure to follow the guidelines and instructions in this manual may create a protection impairment by disabling or interfering with unit safety features. This can result in damage to the unit and injury, death, or negative effects on the health of the oven operators.

- Follow all national laws, regulations, and local ordinances in your area regarding the use of this unit type and the applications you are using it for. If you have any questions about national and local requirements, please contact the appropriate agencies.
- Because of the range of potential applications this unit can be used for, the operator 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 operators in a language they understand.
- 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.

Continued next page



Warning Hot Surfaces: These areas are marked with Hot Surface labels. Proper protective equipment should be employed to minimize the risk of burns.

Avertissement Surface Chaude: Ces zones sont marquées avec des étiquettes de surface chaude. Un équipement de protection approprié devrait être utilisé pour minimiser le risque de brûlures.

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. Vacuum pump 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 the chamber is under vacuum.
- Do not place alcohol or mercury thermometers in the oven. With improper use, they can rupture.
- Do not move the oven until it has finished cooling.

THEORY OF OPERATION

Vacuum

Vacuum is supplied by an external vacuum pump connected to the oven vacuum port. Vacuum levels obtained in the oven chamber are dependent on pump type and performance, valve settings, and the nature of the application or process, including the volume of materials outgassed.



The chamber atmospheric pressure is shown on the touchscreen display homepage.

The chamber should be sealed and evacuated at the start of a vacuum baking application. The oven is not built to operate with the chamber exposed to atmosphere. Running the oven with the door or the vent open risks destroying the vacuum pump, damaging the integrity of the oven chamber, and may oxidize chamber surfaces.

Vacuum pumps and door gaskets should be selected on the basis of application type or process. Pumps vary in suitability and safety depending on the outgassed byproduct types and moisture level produced in the oven chamber. Gasket types have varying resistances and vulnerabilities to different outgassed chemicals.

Heating in a Vacuum

In conventional ovens, powered elements transfer heat into the chamber air. The heated air then circulates by natural convection or blower fan action, surrounding the product on the shelves and gradually bringing it to temperature. In a vacuum oven, heat transport takes place by both direct infrared radiation and metal-to-metal conduction. The oven heating elements are located inside the chamber walls or floor, which transfer some heat to the walls and then to the shelves. Each shelf then transports heat to the products or samples resting on it.



CVO-10: The oven shelf brackets come with copper springs built in. These springs increase the surface area contact with shelf sides to improve heat conduction and temperature uniformity on the relatively large shelves of the oven. The springs will gradually change from copper-colored to a silver or platinum hue. This is a normal effect of being heated and is permanent. It will not impact the oven temperature performance. Copper is known to have anti-microbial properties and is commonly used in hospital and laboratory applications for this purpose.

Gas Backfill

A gas or clean air supply can be connected to the vent port (backfill inlet) or KF-25 port located on the back of the oven. Nitrogen or another inert gas is typically used to avoid particulate or humidity contamination or oxidation of product and shelving that has not cooled down. The maximum allowed backfill pressure is 15 psi of delivery at the port.



Heating Control

The oven controller monitors the chamber shelving temperature using a thermocouple temperature probe extending into the chamber from the back wall. In a vacuum environment, the probe senses the temperature of the shelf placed immediately above it. Placement of a shelf in close proximity to, but not in contact with the probe, is crucial for accurate measurement of the shelving temperature in the vacuum chamber.

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

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

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

Warm Up

Only preheat the oven if this is compatible with your application and safe practices. To achieve the best temperature stability and uniformity, allow the oven to heat up under vacuum prior to loading product. This heat soaks the oven body and insulation masses. Allowing the oven to heat up with atmosphere in the chamber can result in a significant temperature drop when heated atmosphere is evacuated from the chamber.

Heating Cutoff System

The oven is equipped with a thermal cutoff system that automatically cuts off electricity to the oven heating elements when the shelving temperature exceeds approximately 340°F (170°C). This safeguards the oven in the event of a failure of the main temperature control circuitry or main temperature sensor probe. The cutoff system will reset when the chamber temperature drops below its cutoff setting.

OPERATION

Note: There may be **light smoking** from protective oil coatings on the elements when running the oven near its maximum temperature for the first time.

PUT THE OVEN INTO OPERATION

Verify all required procedures in the Installation chapter have been completed before beginning.

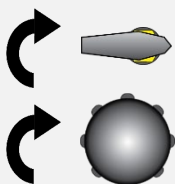
1. Plug In the power cord



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

Plug the power cord into the workspace electrical supply.

2. Verify the vacuum and vent valves are both closed



Always verify the oven chamber is sealed prior to starting the oven.

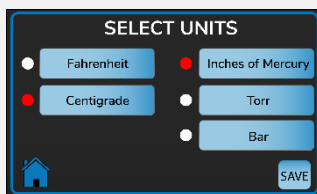
- This helps safeguard your vacuum pump from prolonged and possibly damaging exposure to streaming atmosphere.

3. Turn on the oven



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

Optional: Change the units of measurement



The oven comes set to display the chamber temperature in degrees Fahrenheit and the chamber pressure in inches of Mercury.

- To change the display units, see the [Select Units of Measurement](#) procedure on page 49.

Continued on next page

OPERATION

Continued from the previous page.



4. Verify the vacuum system integrity



10 Minute Minimum

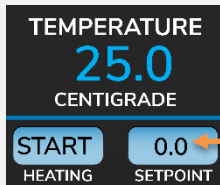
Perform the **Pump down the oven chamber** procedure to evacuate the oven chamber for a **minimum of 10 minutes** to verify the integrity of the vacuum supply system. The oven chamber should be empty except for the shelving.

- **CVO-10:** See the procedure on page 50.
- **CVO-5s:** See the procedure on page 51.

The oven is now ready for use



Setting an operating temperature



- To set an operating temperature, see the **Set the Oven Temperature** procedure on page 52.
- See page 53 for the **Heat the Oven** procedure.
- To heat the oven for a limited time, see the **Set the Timer** procedure on page 56.



OPERATION

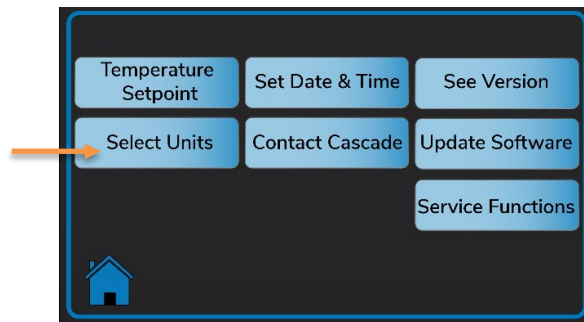
CHANGE THE UNIT OF MEASUREMENT

Change the Homepage Temperature and Vacuum display values.

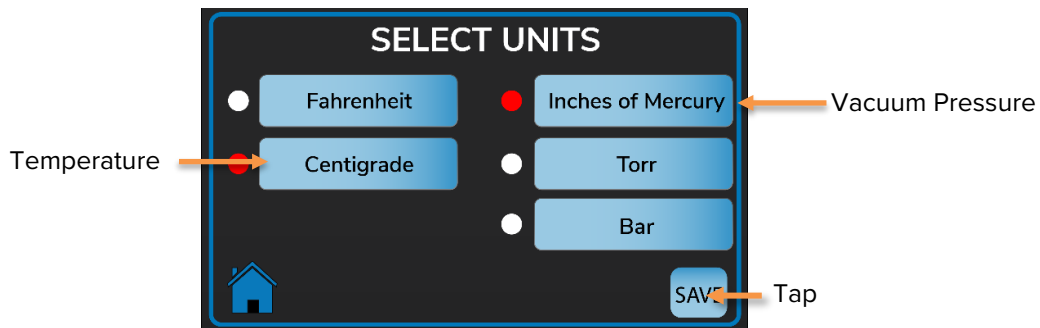
1. Tap the Settings button on the Homepage.



2. Tap the Select Units button on the Settings page.



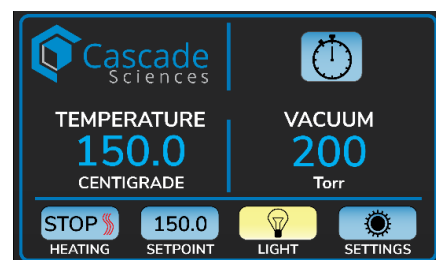
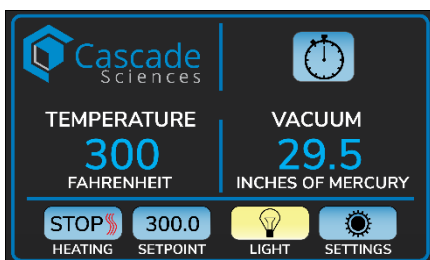
3. Select the desired units of measurement for both the temperature and vacuum display values.



4. Tap the Save button to save the new units of measurement.


- The display will automatically return to the Settings menu page.

5. Tap the Home button to return to the Homepage from the Settings menu.



OPERATION

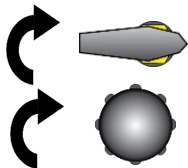
CVO-10 – PUMPING DOWN AND BACKFILLING

 Put the oven chamber under vacuum and hold for at least 10 minutes when first putting the oven into operation in a new location to verify the integrity of the vacuum supply system. The oven chamber must be drawn down to at least 26inHg (500 torr) in order to seal.



Evacuate the Oven Chamber

1. Verify the Vacuum and Vent Valve controls are in the closed position



- This protects your vacuum pump from exposure to streaming atmosphere.

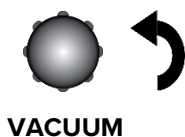
2. Turn on your vacuum pump



Place the **Pump** switch on the front panel in the ON (I) position.

3. Open the oven Vacuum Valve

Turn the control all the way counterclockwise.



- The Vacuum level on the main controller should show the chamber pressure decreasing.
- The achievable vacuum level is dependent on altitude above sea level as well as the vacuum supply efficiency and the volume of outgassed byproducts.

VACUUM
29.5
INCHES OF MERCURY

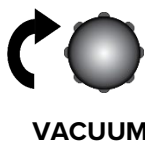
Holding at Vacuum



Continue evacuating the chamber throughout the baking application to vent outgassed byproducts.

Backfilling the Oven Chamber

4. Close the Vacuum Valve



Turn the Vacuum Valve control back to the closed position (clockwise) to protect the vacuum pump from extended exposure to streaming atmosphere.

- The pump may remain on.

5. Slowly open the Vent Valve



- The chamber will return to room pressure.

VACUUM
0.3
INCHES OF MERCURY

End of Procedure

OPERATION

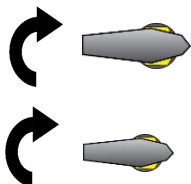
CVO-5s – PUMPING DOWN AND BACKFILLING

Put the oven chamber under vacuum and hold for at least 10 minutes when first putting the oven into operation in a new location to verify the integrity of the vacuum supply system. The oven chamber must be drawn down to at least 26inHg (500 torr) in order to seal.



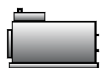
Evacuate the Oven Chamber

1. Verify the Vacuum and Vent Valve controls are in the closed position

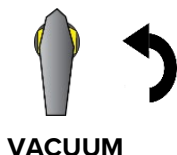


- This protects your vacuum pump from exposure to streaming atmosphere.

2. Turn on your vacuum pump



3. Open the oven Vacuum Valve



Turn the control all the way counterclockwise

- The Vacuum level value on the homepage display should show the chamber pressure decreasing.
- The achievable vacuum level is dependent on altitude above sea level as well as the vacuum supply efficiency and the volume of outgassed byproducts.

VACUUM
29.5
INCHES OF MERCURY

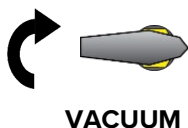
Holding at Vacuum



Continue evacuating the chamber throughout the baking application to vent outgassed byproducts.

Backfilling the Oven Chamber

4. Close the Vacuum Valve



Turn the Vacuum Valve control back to the closed position (clockwise) to protect the vacuum pump from extended exposure to streaming atmosphere.

- The pump may remain on.

5. Slowly open the Vent Valve



- The chamber will return to room pressure.

End of Procedure

VACUUM
0.3
INCHES OF MERCURY

OPERATION

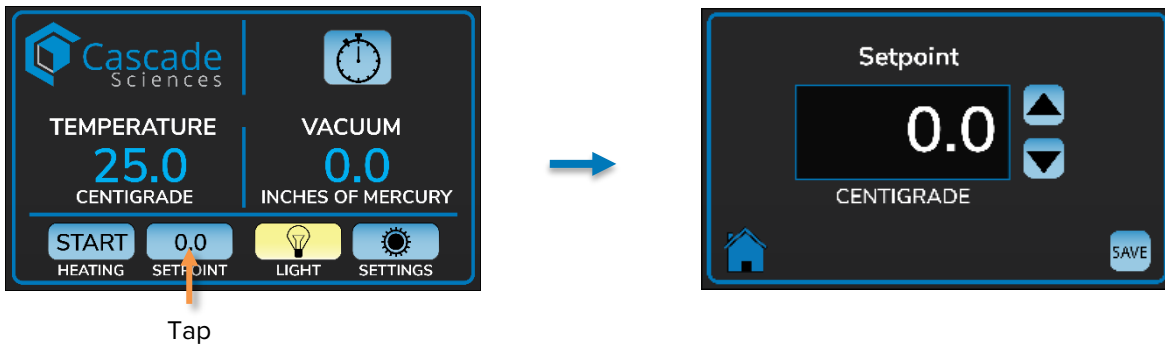
Note: The oven temperature probe must be in close proximity to a shelf to obtain an accurate display reading. See page 32 for the CVO-10 or page 33 for the CVO-5s.



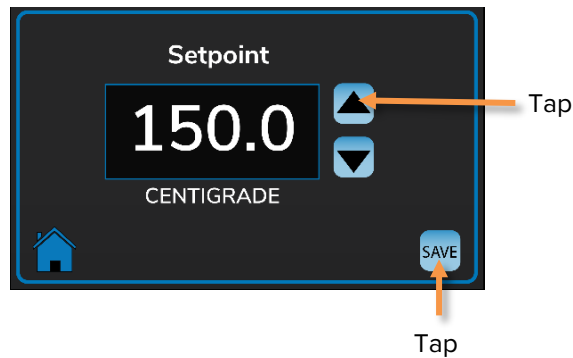
SET THE TEMPERATURE SETPOINT

Enter the target temperature of your constant temperature baking application.

1. Tap the **Setpoint** button on the Homepage.

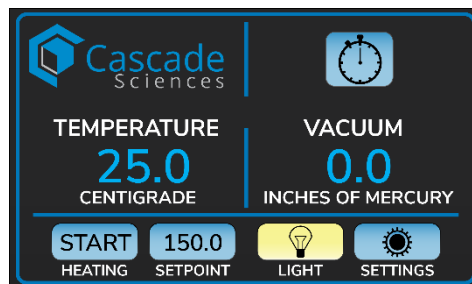


2. Use the arrow buttons to adjust the setpoint. (optional).



3. Tap the **Save** button to save the new setpoint.

- The display automatically returns to the Homepage.



Note: See the next page for how to begin heating the oven chamber.

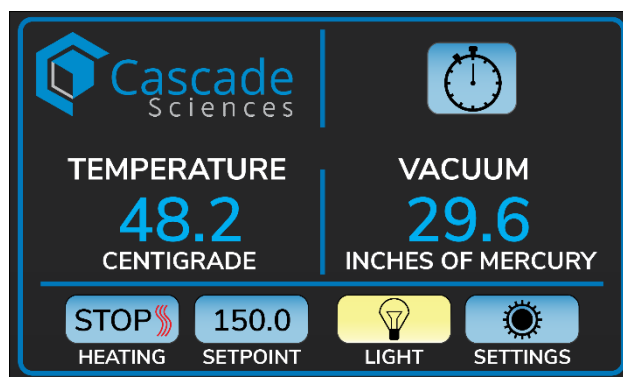
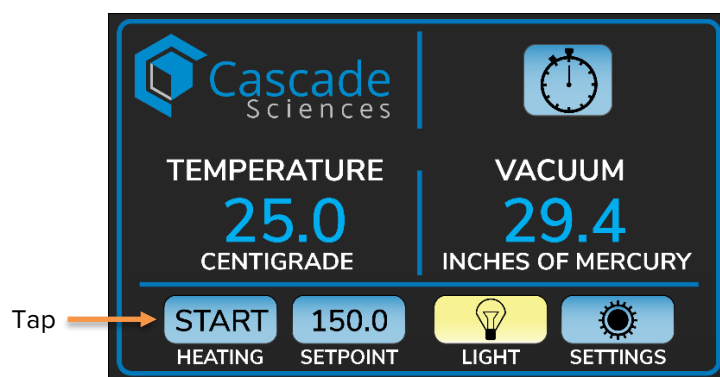
OPERATION

HEAT THE OVEN

After saving a constant temperature setpoint, the oven is ready to begin heating.

To heat the oven:

1. Tap the **START Heating** button.



Oven heating to 150°C

- A STOP button replaces the START button.
- The heat icon on the STOP button blinks on and off as the oven powers the heating elements.

End Heating

Tap the STOP button on the display screen to end heating in the oven chamber. Heating at the same setpoint may be resumed by tapping the START button.



End of Procedure

OPERATION

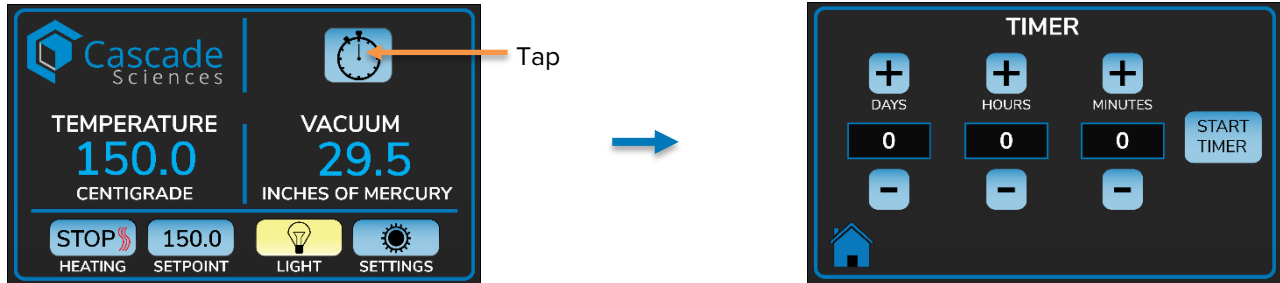
Note: Starting the timer does not begin heating. Heating must be separately launched by the operator.



USING THE TIMER

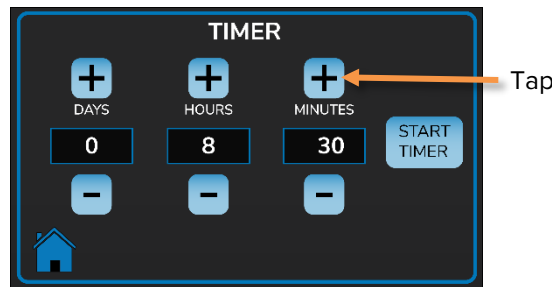
The oven can be set to heat for a limited duration. At the end of this timed period, the oven automatically stops heating.

1. Tap the Timer button to open the Timer menu.

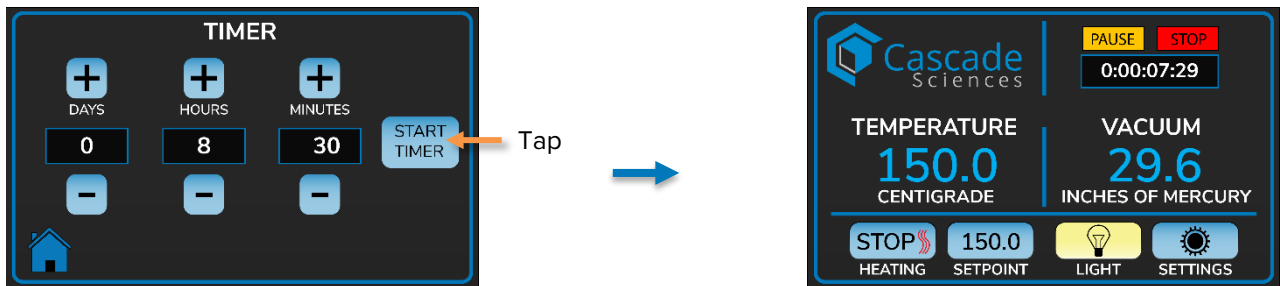


2. Use the plus and minus buttons to adjust the Timer runtime.

- The maximum Timer runtime is 31 Days, 23 Hours, and 59 Minutes.



3. Tap the Start Timer button to begin the timer countdown.



- The oven will run at the current temperature setpoint throughout the timed period.
- The oven turns off heating when the timer reaches 0 (zero).
- The timer can be paused or stopped (aborted) at any time by the oven operator.
 - Pausing the timer also pauses the oven heating.
- Tap the red timer Stop button to clear the Timer Finished message.

PAUSE

STOP

BACKFILLING TEMPERATURE DISPLAY PAUSE

The display screen will temporarily freeze the displayed oven chamber temperature when the oven detects the chamber pressure rising by 10% or more. This is done so that the display shows the last measured shelving temperature and not the temperature of the air or backfilling gas flowing into the chamber.

The initial air temperature can be up to +3°F (+1.6°C) higher than shelving temperatures immediately after the chamber has backfilled. However, the temperature of the solid metal shelves has a significantly stronger effect on product or samples in the oven chamber than the initial air temperature.

The display resumes showing the temperature in real time as soon as the measured air temperature drops back down to the vacuum shelving temperature shown when the oven detected the chamber pressure rise. Under most circumstances, this happens when the shelving and air temperature equalizes and typically takes place in just a few minutes.

Temperature equalization may take significantly longer if the oven was ramping up to a set point or if the oven chamber was near to room temperature when it was backfilled. Cycling the power (turning the oven off and on) will resume heating of the chamber.

DOOR HEATING INTERRUPTION

The oven will not heat while the chamber door is open. Opening the door automatically turns off the heat function.

DATA PORTS

USB

A USB-A data port is located on the front, left side of the oven. This port is used for updating the oven controller software.



Accessory Expansion Port

The 24-volt expansion port powers and supports accessories offered by Cascade Sciences. **Only plug-in devices specifically authorized for this port.**



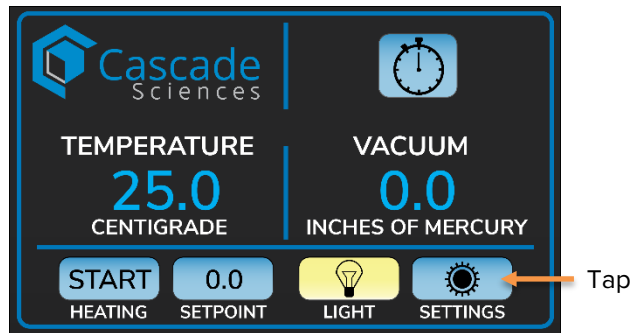
OPERATION



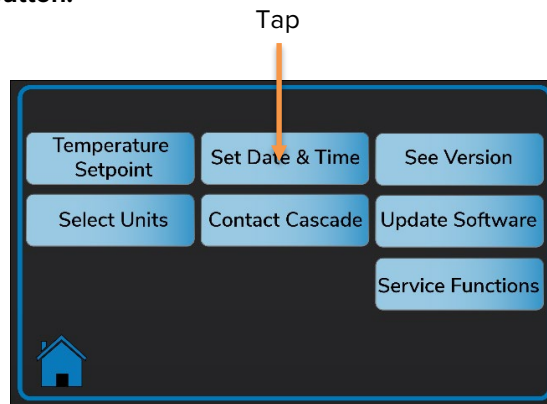
SET THE DATE AND TIME

The date and time function is intended to support future data logging and export features.

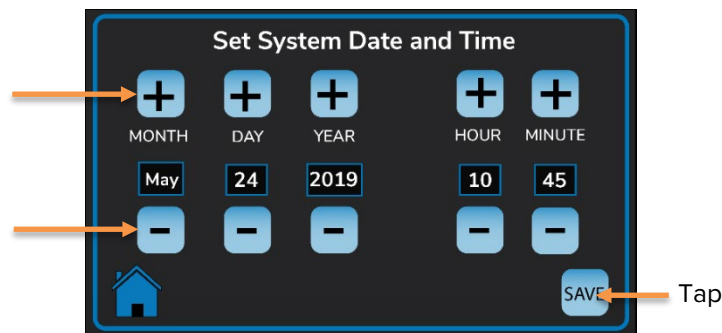
1. Tap the **Settings** button on the Homepage.



2. Tap the **Set Date and Time** button.



3. Adjust the oven date and time to your local date and time.



4. Tap the **Save** button to save your date and time and return to the **Settings** menu.

- Tapping the Home button returns to the Settings menu without saving any changes.

CVO-10 SHELF SPRINGS

See the Theory of Operations for an explanation of the copper shelf spring temperature function.

Color Change

The copper shelf springs will permanently change color from copper to a silver or platinum appearance when the oven is run at temperature. This is a normal process of oxidation and some annealing and does not affect the oven temperature performance.

Anti-Microbial

Copper is known to have anti-microbial properties and is commonly used in hospital and laboratory applications for this purpose. The color change does not reduce the efficacy of the copper against microbes.

Shelf Spring Removal

Please see the [Cleaning topic](#) on page 60 for how to remove the shelf springs for cleaning and disinfection.

- **Always reinstall the springs prior to using the oven.** The CVO-10 will not reach its stated temperature specifications without the springs installed.

OVEN HEATING USE

Vacuum ovens heat slowly compared to conventional ovens. This is due in part to the physics of heat flow in an environment without an atmosphere to help transport thermal energy. The slow heat-up is also used to help prevent temperature overshoots in the vacuum environment.

Best practices for vacuum oven heating include:

- **Never place product or samples on the floor of the oven chamber!** The chamber floor runs significantly hotter than the shelving.
- Leave the oven on and under vacuum after it has reached your setpoint temperature. The oven can be left on overnight, unattended.
- Leaving the oven on at temperature eliminates repeating the time-consuming long heat up and provides better temperature stability than repeated cooldowns and heat-ups.
- An oven chamber under vacuum is efficient at retaining heat and can require less energy to maintain temperature than heating up again.
- Leave the shelves in the heated chamber. This allows for optimal heat absorption in preparation for vacuum heating applications.
- Unused shelves outside the oven chamber can be stored on top of the oven to keep warm.

OVEN COOLDOENS

The oven chamber is well insulated and requires a significant length of time to cool down while remaining sealed.

- 6 hours may be required to cool down from 150°C to 100°C.
- 16 hours may be needed for the oven to return to room temperature cooling from 150°C.
- Normally, backfilling the oven does not significantly increase the rate of cooling.

Introducing free atmosphere into the oven chamber at temperatures above 100°C risks oxidizing chamber surfaces.

INCHES OF MERCURY

The oven can measure and display vacuum pressure in Torr, Barr, and inches of mercury (InHgh). Torr and Barr are absolute measurements. Inches of mercury is a relative measurement of how much pressure has been vacuumed from the oven chamber. Its baseline is set at the factory near sea level.

- At or near sea level, the oven will read approximately 0 inches of mercury. This can fluctuate with the weather and changes in barometric pressure.
 - Readings of -0.2 to 0.2 or more are common for room pressure at these altitudes.
- At higher altitudes (5000 feet / 1500 meters, the inches of mercury measurement may display 5 inches of mercury or more at room pressure.
 - This reflects the fact that room atmospheric pressure is less at high altitude than the sea-level environment the measurement uses as its baseline.

USER MAINTENANCE

Warning: Disconnect this unit from its power supply prior to performing maintenance or services.

Avertissement: Débranchez cet appareil de son alimentation électrique avant d'effectuer la maintenance ou les services.



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.

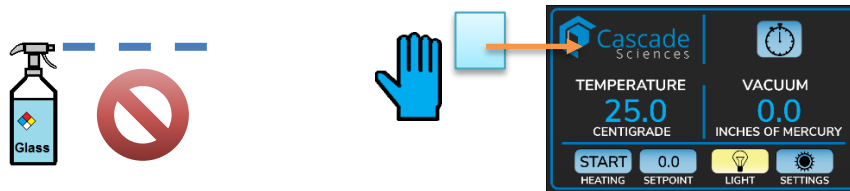
- Periodic cleaning is required.
- Do not use spray-on cleaners or disinfectants. These can leak through openings and coat electrical components.
- Do not use cleaners or disinfectants that contain solvents capable of harming paint coatings or stainless-steel surfaces. **Do not use chlorine-based bleaches 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 the material contained in it.

Warning: Exercise caution if cleaning the unit with alcohol or flammable cleaners. Always allow the unit to cool down to room temperature prior to 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 and Disinfecting the Display Screen



- Do not spray cleaning or disinfecting agents directly onto the screen.
 - Spray onto a lint-free soft wipe or cloth, then apply.
- The manufacturer recommends non-chlorine-based wipes to clean and disinfect with.
 - Isopropyl alcohol wipes are acceptable.
- If the oven is powered, begin cleaning by placing the cleaning and disinfecting wipe on a logo on the display screen.
 - Wipe across the screen surface while maintaining continual contact. This should avoid triggering any of the buttons.

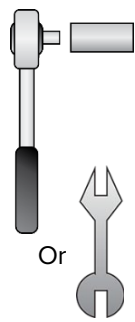
MAINTENANCE

Cleaning

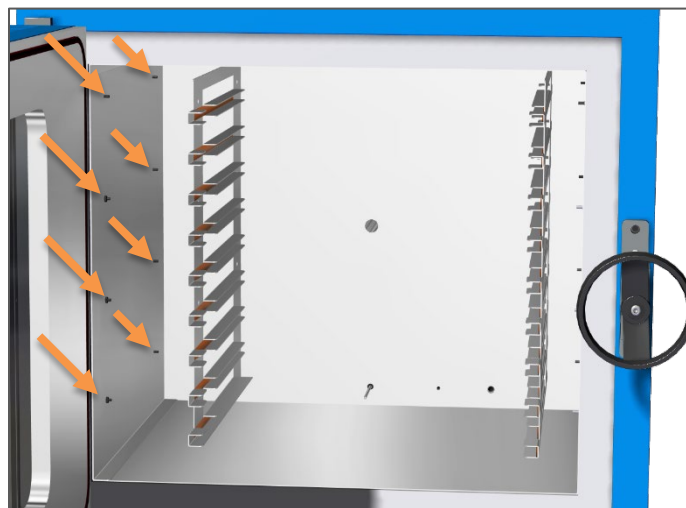
1. Disconnect the unit from its power supply.
2. Remove any removable chamber accessory items, such as shelving, if present.
3. Use 99% isopropyl alcohol to clean chamber surfaces and shelving. Apply using lint-free wipes.
4. Take special care when cleaning around temperature sensor probes. Do not clean the probes.
5. Clean all removable accessories and components.
6. Verify the cleaning alcohol has evaporated completely from all chamber surfaces and accessories prior to reconnecting the unit to its power source.

Shelf Slider Rack Removal (CVO-10s only)

The racks may be removed for cleaning and disinfecting.



Remove the eight
11/32-inch hex nuts



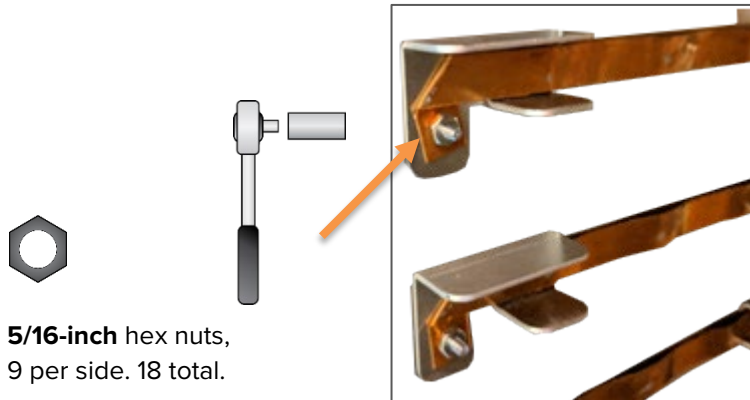
The manufacturer recommends an 11/32-inch socket wrench for removing the slider racks.

- Disconnect the oven from its power source prior to removing the racks.
- The shelves must be removed from the oven chamber.
- Remove the eight 11/32-inch hex nuts holding securing each rack.
 - The nuts are located at the front and back of the rack on the vertical strips.
 - These are not the nuts securing the copper shelf springs to the rack.

Continued on the next page

MAINTENANCE

Removing the Copper Shelf Springs



5/16-inch hex nuts,
9 per side. 18 total.

The manufacturer recommends a 5/16-inch socket wrench for removing the shelf springs from the Shelf Slider Rack.

- Remove 5/16-inch hex nut at the front of each spring.
- After removing the nut, slide the spring out toward the front of the oven.

Always reinstall the springs prior to using the oven. The CVO-10 will not reach its stated temperature specifications without the springs installed.

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:

- 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 interior accessories (any 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.

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.

GASKETS

The ovens come with cured silicone gaskets that help seal the chamber door when under vacuum. The gaskets are rated to 446°F (230°C) and are vulnerable to acids and solvents. See the Replacement Parts chapter at the end of this manual to order replacement gaskets.

CVO-10

The door gasket most typically needs to be replaced due to cuts and nicks. The risk of this type of damage can be significantly reduced by opening the door 130°, keeping it well out of the way of shelves or sample trays being removed from or inserted into the chamber.

Replacement Procedure: The manufacturer recommends having a rubber mallet and exam gloves on hand to perform this procedure. Cover the mallet head with a clean plastic bag to help reduce contamination of the door. Wearing exam gloves likewise reduces the chance of contaminating the chamber door interior.

1. Remove the old gasket by pulling it out of the gasket well in the door.
2. Insert a few centimeters (inches) of the narrow side of the replacement gasket into the gasket well on the top of the door.
3. Insert a few centimeters (inches) of the narrow side of the gasket into the well on the bottom of the door.
4. Insert a few centimeters (inches) of the narrow side of the gasket into the well on the left side, then on the right side of the door.
5. Continue around the door in this fashion, alternating sides.
 - a. The rubber mallet can be used to help seat the gasket. Use moderate strokes.

CVO-5s

The chamber liner gasket is exposed to heating, the chamber atmosphere, and significant compressive force, and requires periodic replacement. Check the liner gasket for cracking, dryness, brittleness, or other signs indicating a loss of elasticity. Heavy use will necessitate frequent checks and replacements of the door gasket.

Continued on next page

Replacement Procedure: The gasket can be pulled off and the replacement easily installed by pushing it into place. The edges of the chamber liner at the door may be sharp. Exercise caution while working with the seal.

ELECTRICAL COMPONENTS

Electrical components do not require maintenance. If the unit electrical systems fail to operate as specified, please contact Technical Support for assistance.

VACUUM PUMP MAINTENANCE

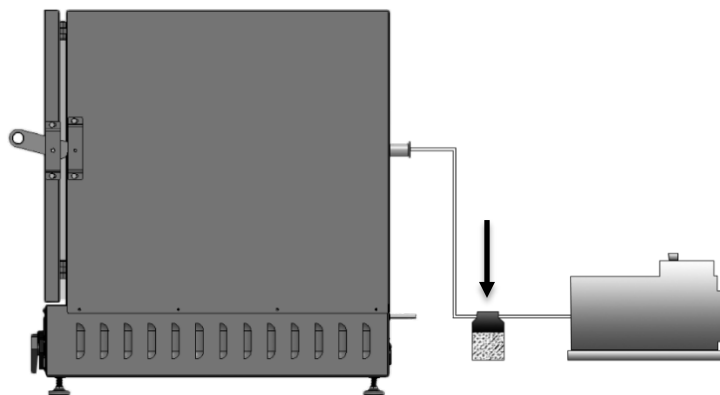
Vacuum pumps are high wear equipment and require replacement of seals and diaphragms **at least** once per year. Poor vacuum performance or bubbling or strained noises from the pump may indicate that the pump is in need of maintenance.

Pump Manual

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 changeouts. **Contact your vacuum pump supplier if you do not have an operation manual.**

Trap

A filter trap plumbed to the vacuum line between the pump and the oven helps protect the pump from outgassed byproducts and extends the operational lifespan of the pump.



Example of a trap plumbed between an oven and vacuum pump

CALIBRATE THE TEMPERATURE DISPLAY

Note: A calibration reference device must be purchased separately. For best results, use a digital device with thermocouple probes. The device must be accurate to at least 0.1°C and should be regularly calibrated by a third party. A vacuum-rated KF-25 feedthrough is required for feeding the thermocouple probe into the oven chamber. **Never use alcohol or mercury-based thermometers.**

Cascade Sciences CVO ovens do not normally require calibration. Should your SOP or quality program require calibrations, follow this guideline.

Temperature calibrations match the oven temperature display to the actual shelving temperature inside the oven chamber. The actual temperature is supplied by a reference sensor device. Calibrations compensate for long-term drifts in the microprocessor controller as well as those caused by the natural material evolution of the sensor probe in the oven chamber. Calibrate as often as required by your laboratory or production protocol or regulatory compliance schedule. Always calibrate to the standards and use the calibration setup required by your industry requirements or laboratory protocol.

A Suggested Calibration Set-Up

1. Introduce the reference device thermocouple probe into the oven chamber through a vacuum-rated feedthrough on the KF-25 port on the back of the oven.

- There must be at least 12 inches (305 mm) of wire in the chamber to prevent heat sinking, which would result in a false low temperature reading.

2. Position the sensor probe head at the center of the bottom shelf, with the probe head in direct contact with the shelf surface. Secure the probe head in this position using the polyamide tape.

3. After securing the probe head in position, use the KF-25 clamp to secure the feedthrough and seal the port.

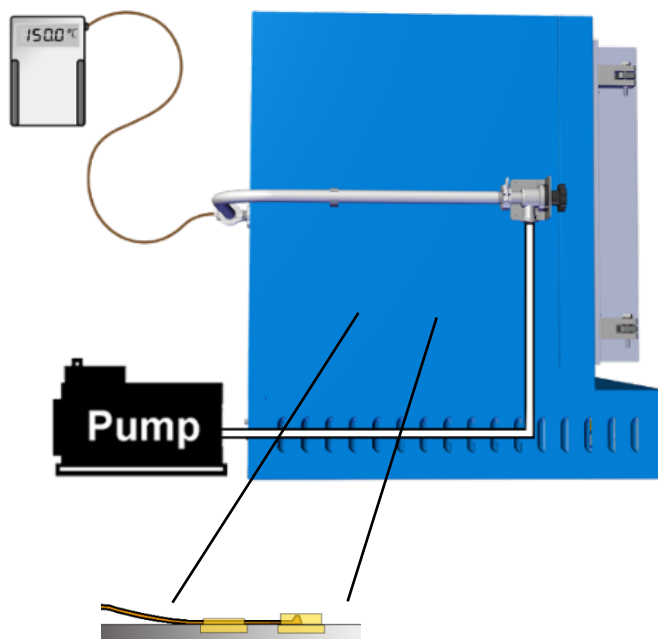
4. The oven door must be closed and latched. Failure to do so will prevent an accurate calibration.

5. Evacuate the chamber to the vacuum level of your application or baking process. The chamber must be under vacuum to perform an accurate calibration.

Continued on next page



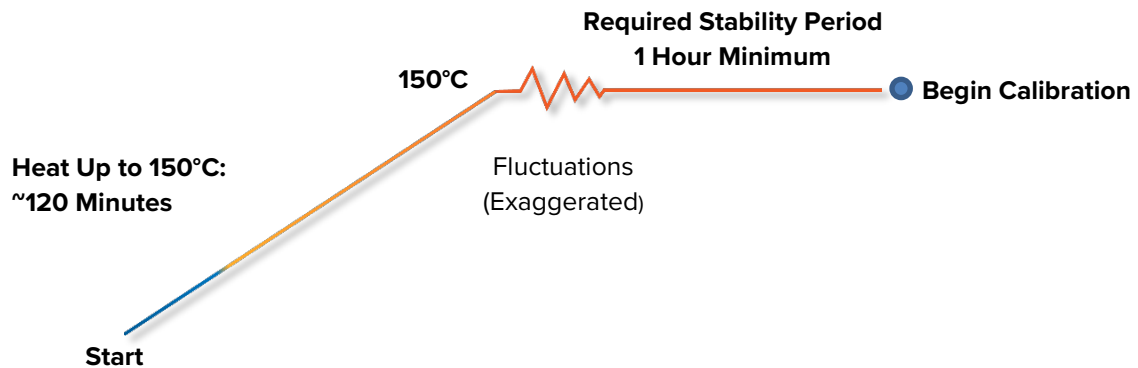
Heat-resistant polyamide tape recommended



MAINTENANCE

5. Heat up and stabilization period: The oven shelving temperature must be stable at temperature in a vacuum environment to perform an accurate calibration.

- The temperature is considered stabilized when the oven chamber has operated at your calibration temperature for at least 1 hour with no fluctuations greater than the specified temperature stability of the oven



Oven Chamber Heat Up and Stabilization Phases

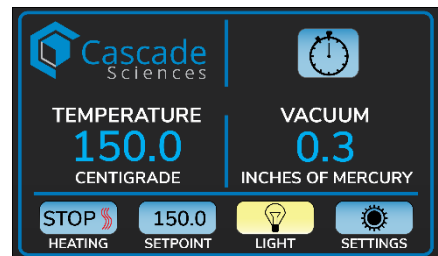
Suggested Calibration Procedure

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



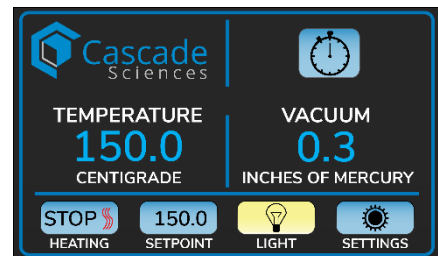
Reference Device

Unit in Calibration



Reference Device

Calibration Required



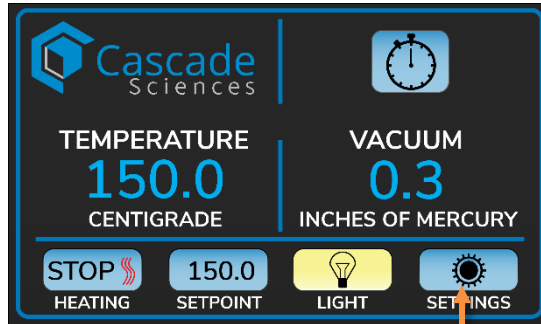
- If the readings are the same, or the difference between the two falls within the acceptable range of your protocol, the display is accurately showing the chamber shelf temperature. **The Temperature Calibration procedure is now complete.**
- If the difference falls outside of your protocol range, advance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

MAINTENANCE

Temperature Calibration Continued

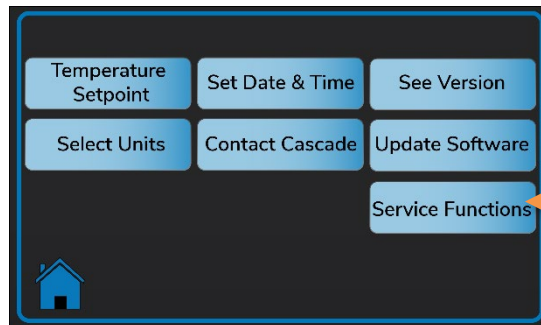


2. Tap the Settings button on the Homepage.



Tap

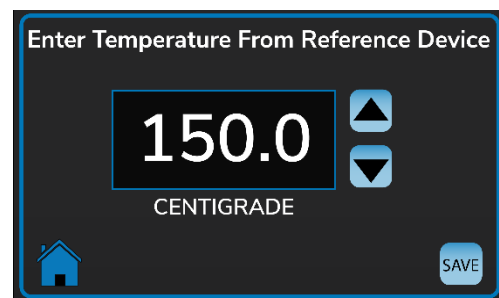
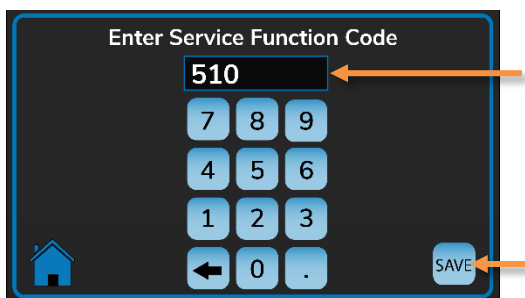
3. Tap the Service Functions button.



Tap

4. Enter 510 in the Service Function Code field and then tap the Save button.

- This brings up the Calibration Menu.



Continued next page

MAINTENANCE

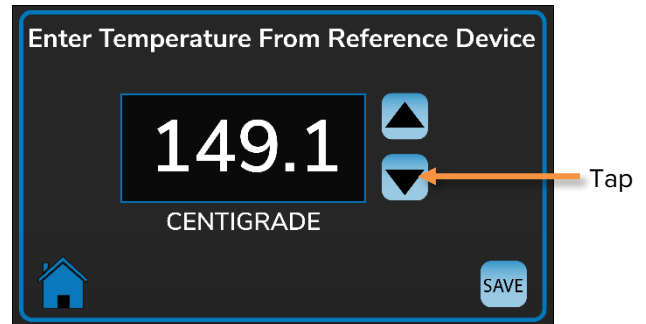
Temperature Calibration Continued

5. Use the arrow buttons to enter the reference device reading.

- The temperature calibration function has a range of approximately $\pm 10^{\circ}\text{C}$ (18°F). For temperature deviations outside these parameters, contact **Technical Support**.



Reference Device



6. Tap the Save button to save the new temperature.

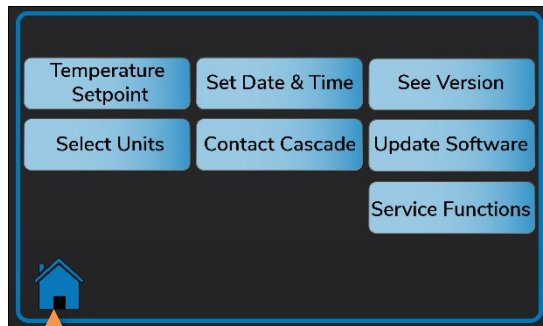


- The display will automatically return to the Settings menu page.

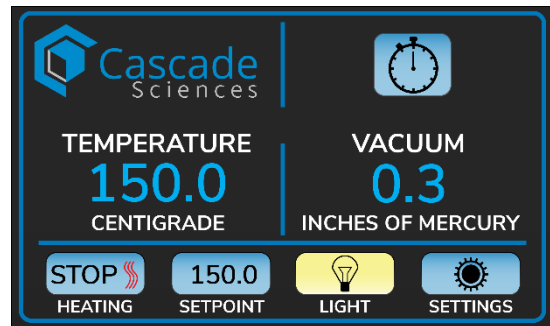
7. Tap the Home button to return to the Homepage from the Settings menu.



- The unit will begin heating or passively cooling to achieve the setpoint temperature.
- Note:** The Homepage will not immediately show the corrected display temperature. See the next page for how to change this.



Tap



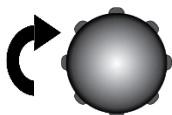
Continued next page

MAINTENANCE

Temperature Calibration Continued

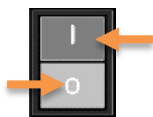
8. Isolate the oven chamber and cycle the oven power off and on.

Turning on the oven off and then on again resets the display, so that it shows the corrected temperature. Otherwise, the oven will take about 10 minutes to adjust the display to the corrected temperature.



A. Close the oven Vacuum Valve

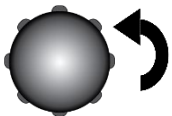
- This prevents external atmosphere from backfilling through the vacuum pump if cycling interrupts power to the pump.
- Cycling the power on a CVO-10 oven that has a vacuum pump plugged into the outlet on the oven will interrupt power to the pump.



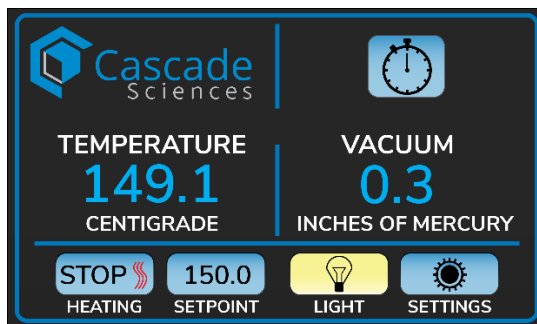
B. Cycle the oven power off and back on.

- The oven should now display the corrected temperature.

C. Verify the vacuum pump is running.



D. If the pump is running, open the Vacuum Valve to resume evacuating the oven chamber.

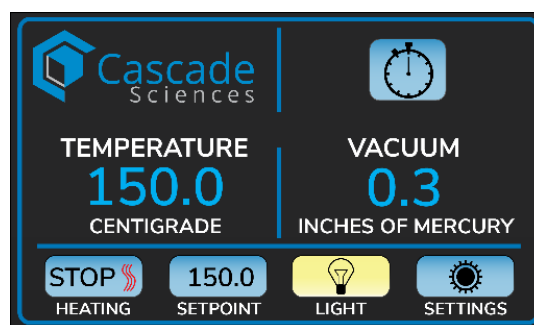


9. Allow 1 hour for the oven to stabilize after it has reached the corrected setpoint temperature.

- Failure to wait until the oven is fully stabilized will result in an inaccurate reading.



Wait 1 Hour



Continued next page

MAINTENANCE

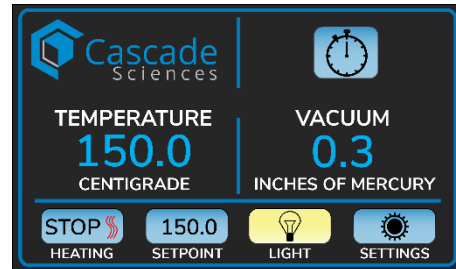
Temperature Calibration Continued

10. Compare the reference device and the corrected oven temperature display readings again.



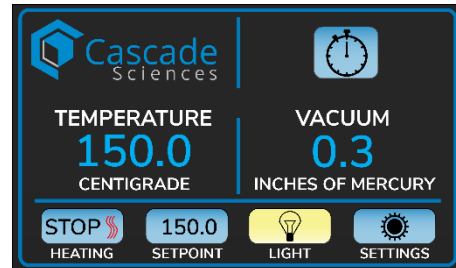
Reference Device

Unit in Calibration



Reference Device

Further Calibration Required









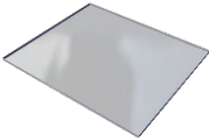

- If the reference device and the chamber temperature display readings are now the same or the difference falls within the range of your protocol, **the oven is now calibrated for temperature.**
- If the difference still falls outside the acceptable range of your protocol, repeat calibration steps 2 – 10 up to two more times.

If the temperature readings of the oven temperature display and the reference device still fall outside your protocol after 3 calibration attempts, contact **Technical Support** for assistance.

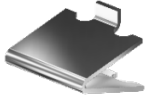




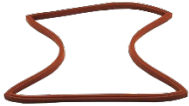

End of Procedure



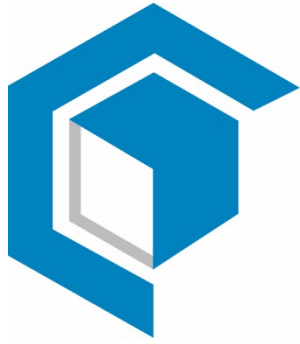
REPLACEMENT PARTS

Description	Parts Number
Adjustable Caster Foot for CVO-10 , 1 each (requires 4)	 1000520
Adjustable foot for CVO-5 and CVO-5-2 , 1 each (requires 4)	 2700506
Fuse CVO-10 T12.5A 250V, 5x20mm 2 fuses are required to operate the oven, with one in the power inlet and the other in an adjacent fuse holder. Please see the power panel illustration on page 22 for the fuse locations.	 3300520
Fuse, CVO-10 accessory power outlet. T4A, 250V, 5x20mm. 2 fuses are required to operate the accessory power outlet. These go in the fuse holders adjacent to the power outlet on the back of the oven. Please see the CVO-10 illustration on page 22.	 3300537
Fuse CVO-5 T16A, 250V 5x20mm 1 fuse located in the power inlet is required to operate the oven. Please see the power panel illustration on page 22 for the fuse inlet location.	 3300513
Fuse CVO-5-2 T10A, 250V 5x20mm 2 fuses are required to operate the oven, with one in the power inlet and the other in an adjacent fuse holder. Please see the power panel illustration on page 22 for the fuse locations.	 3300516
Shelf, CVO-10	 5680562
Shelf, CVO-5 and CVO-5-2	 5680563

PARTS

Description	Parts Number
Shelf clips for CVO-5 and CVO-5-2 ovens Requires 4 clips per shelf	 1250510
Power cord, CVO-5-2 and CVO-10 250 Volt, 15Amp, 8.2 feet (2.5m), NEMA 6-15P	 1800539
Power cord, CVO-5 125 volt, 15Amp, 9ft 5 in (2.86m), NEMA 5-15P	 1800510
Cured silicone door gasket, CVO-10	 9490597
Cured silicone door window gasket, CVO-10	 9490598
Cured silicone chamber liner gasket, 18 x 18 Inches (457 x 457 mm) CVO-5 and CVO-5-2	 9490544
Vacuum Tubing Connection Kit, CVO-10 Tubing with KF-25 fittings and 2 KF-25-sized clamps.	 9990876





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