Flammable Solvent Ovens

CVO-5-EX Oven Series

Installation - Operation Manual

Depicted on the front cover: CVO-5-EX-SS

User Manual Limitation

This manual is designed to provide general information as it relates to the safe operation and understanding of the vacuum oven. It does not cover all possible applications and use. Cascade Sciences will not be held liable or responsible for damages resulting from the use of this manual or the vacuum oven.

Power Cord Plug-In Location Requirement

CVO-5-EX-SS ovens that come with power cords must plug into a power outlet located safely outside of the hazardous location zone the oven will be installed in. This is to prevent the possibility of sparking in the presence of potentially explosive concentrations of hazardous gases or vapors. The outlet must also meet the other electrical safety requirements described in this manual. The supplied power cord is 15-feet long (4.6 meters).

Hardwire Connection Location Requirements

CVO-5-EX-SS ovens with hardwire power feeds may be wired to a power source inside the hazardous location Zone. However, this connection must meet all applicable electrical safety standards requirements Zone 2 or Class 1 Zone 2 or Class 1 Division 2 hazardous (classified) locations. Additionally, the connection must be made by a qualified electrical service technician who is competent to work in the hazardous location zone and with these equipment types.

CVO-5-EX-SS Flammable Solvent Ovens

115 Voltage Models: CVO-5-EX-SS, CVO-5-EX-SS-H

230 Voltage Models: CVO-5-EX-2-SS, CVO-5-EX-2-SS-H

Part Number (Manual): 4861849

Revision: April 5, 2022

Item and Part ID Numbers

The "M Part ID" denotes the build type of the model. Cascade Sciences periodically releases new build types of these models incorporating new features and refinements of existing ones.

115 Volt Hardwire Units

Model Name	CVO-5-EX-SS-H
Item Number	TBD
M Part ID	CSVXBS522-H120

230 Volt Hardwire Units

Model Name	CVO-5-EX-2-SS-H
Item Number	TBD
M Part ID	CSVXBS522-H

115 Volt Power Cord Units

Model Name	CVO-5-EX-SS
Item Number	CS-2101121603
M Part ID	CSVXBS522-N
Cord Type:	NEMA 5-15P

230 Volt Power Cord Units

Model Name	CVO-5-EX-2-SS	CVO-5-EX-2-SS
Item Number	TBD	TBD
M Part ID	CSVXBS522-NA	CSVXBS522-NE
Cord Type:	NEMA 6-15P	EURO CEE 7/7

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EX HAZARDOUS LOCATION CERTIFICATION

Explosive Atmospheres: These ovens have been tested and certified by Intertek as meeting relevant IEC 60079 Ex equipment safety directives with UL, CSA, and ATEX national and group differences. These compliances cover operating in Zone 2, Class 1 Zone 2, and Class 1 Division 2 hazardous locations. This means the ovens are certified for safe operation in locations where explosive concentrations of specific volatile gases or vapors occur infrequently, unintentionally, and only for short durations — typically due to accidents, leaks, or failure of a positive ventilation system. These concentrations are only allowed within the temperature class range and for the specified hazardous material types denoted on the unit data plate marks. Those marks are replicated on this page for reference. A more detailed explanation of allowed temperatures and hazardous material categories can also be found in the Introduction chapter of this manual starting on page 23. The specific safety standards are listed on the next page.

Recognized Test Body: Intertek is an OSHA-recognized NRTL in the US, a Standards Council of Canada accredited certification body, and an EU Notified Body.

NFPA 70: The UL 60079-2 hazardous equipment standards listed in this chapter satisfy the US National Electrical Code's NFPA 70 Article 500 and 505 requirements for hazardous (classified) location equipment installed in Class 1 Division 2 and Class 1 Zone 2 locations as well as NFPA 496 requirements for purge and pressurized equipment.

CEC: The CSA 60079-2 hazardous equipment standards listed in this chapter satisfy Section 18 of CSA C22.1 in the Canadian Electrical Code for equipment installed in Zone 2 locations.

North America and Canada Oven Safety Markings and Certificate Number:

Class I, Zone 2, AEx ia mc pzc IIC T2 Gc
Class I, Division 2, Groups A-D, T2
Ex ia mc pzc IIC T2 Gc
Ambient Temperature Range: +10°C ≤ Ta ≤ +40°C
cETL Cert No: ETL21CA104549658X

IECEx Oven Safety Markings and Certificate Number

Ex ia mc pzc IIC T2 Gc
+10°C ≤ Tamb ≤ +40°C
IECEx Cert No.: IECEx ETL 21.0016X

Italy ATEX and UKCA Oven Safety Markings and Certificate Number

ATEX II 3 G Ex ia mc pzc IIC T2 Gc
+10°C ≤ Ta ≤ +40°C
Italy ATEX Cert No.: ITS-I21ATEX29544X
UKCA Cert No.: ITS21UKEX0118X

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Conforms to Hazardous Location Equipment Standards

UL STD 600079-0, 60079-2, 60079-11, 60079-18 (USA)
EN STD 600079-0, 60079-2, 60079-11, 60079-18 (EU and Great Britain)
IEC STD 600079-0, 60079-2, 60079-11, 60079-18 (International Electrotechnical Commission)

Certified to Hazardous Location Equipment Standards

CSA-C22.2 No. 60079-0, 60079-2, 60079-11, 60079-18 (Canada)

ELECTROMECHANICAL AND HEATING SAFETY

IEC 61010-1 and 61010-2 Safety Certified + USA, Canada, Europe Differences

This certificate satisfies NRTL electrical, mechanical, temperature safety requirements in the United States.

These unit models are certified by Intertek as compliant with the International Electrotechnical Commission's 61010 safety standards for electrical and mechanical hazards as well as the heating of materials in laboratory devices. The units also conform or are certified to the following national and group differences.

Conforms to UL Standards (United States)

UL 61010-1:2012/AMD1:2016
UL 61010-2-010:2019

Certified to CSA Standards (Canada)

C22.2 #61010-1-12:2012
C22.2 #61010-2-010:2019

5019746

Certified to EN Standards (European Standards)

EN 61010-1:2012/AMD1:2016
EN 61010-2-010:2019

Intertek is an OSHA-recognized NRTL, a Standards Council of Canada accredited certification body, and an EU Notified Body.

CE COMPLIANT

These unit models meet all required Electromagnetic Compatibility (EMC), EU low-voltage, and RoHS safety directives.

UKCA COMPLIANT

These unit models meet all required Electromagnetic Compatibility (EMC), low-voltage, and RoHS safety directives.

ISO CERTIFIED MANUFACTURER

These models are manufactured for Cascade Sciences by Sheldon Manufacturing, INC, an ISO-certified manufacturer.

CALIFORNIA PROPOSITION 65 STATEMENT

For US compliance only.

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

SAFETY CERTS AND STATEMENTS

UNIT SPECIFICATIONS

Please refer to the oven data plate to confirm the electrical specifications for your unit.

Technical data specified applies to units with standard equipment at an ambient temperature of 25°C ±3° (77°F ±5.4°) 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
All Units	Ambient +26° to 392°F	Ambient +15° to 200°C

Temperature Uniformity

Model	Fahrenheit	Celsius
All Units	± 3% of Setpoint	± 3% of Setpoint

Temperature Stability

Model	Fahrenheit	Celsius
All Units	± 0.3°F	±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 104°F (40°C)	To 248°F (120°C)	To 392°F (200°C)
All Units	60 Minutes	120 Minutes	180 Minutes

Cool Down Times

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

Model	From 105°F (40°C)	From 200°F (90°C)	From 300°F (150°C)
All Units	345 Minutes	345 Minutes	345 Minutes

WEIGHT

Model	Shipping	Net Weight
All Units	690 lb / 313 kg	430.0 lb / 195.0 kg

DIMENSIONS

In Inches

Model	Exterior W × D × H	Interior W × D × H
All Units*	29.3 x 39.1 x 34.4 in	18.1 x 24.0 x 18.1 in

*Units with optional side-mounted vacuum valve have exterior dimensions 33.3 x 42.4 x 34.4 in

In Millimeters

Model	Exterior W × D × H	Interior W × D × H
All Units*	744 x 993 x 874 mm	460 x 611 x 460 mm

*Units with optional side-mounted vacuum valve have exterior dimensions 846 x 1077 x 874 mm

CAPACITY

Model	Cubic Feet	Liters
All Units	4.5	127.4

SHELF CAPACITY BY WEIGHT

Model	Per Shelf	Total
All Units	50.0 lb / 22.7 kg	225.0 lb / 102.0 kg

POWER

Power Cord Models

Model	AC Voltage	Amperage	Frequency	Phase
CVO-5-EX-SS	115	12	50/60 Hz	1
CVO-5-EX-2-SS	230	6	50/60 Hz	1

Hardwired Power Feed Models

Model	AC Voltage	Amperage	Frequency	Phase
CVO-5-EX-SS-H	115	12	50/60 Hz	1
CVO-5-EX-2-SS-H	230	6	50/60 Hz	1

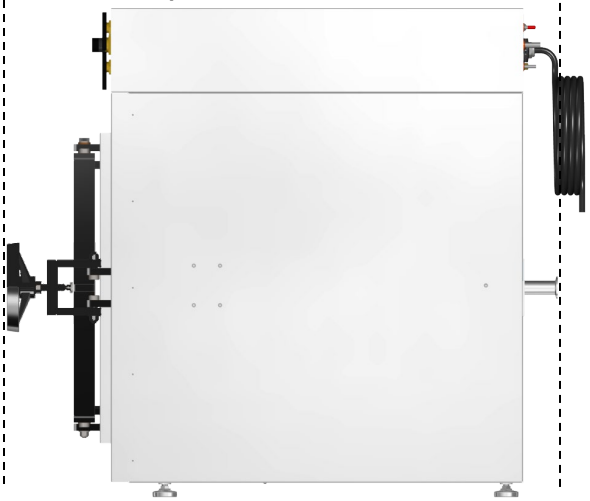
UNIT DIMENSION DRAWINGS

Total Height: 34.4 inches (874 mm)

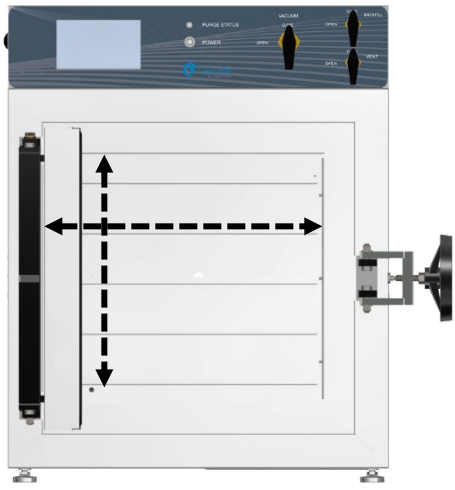
Width: 29.3 inches (744 mm)

Exterior Dimensions

Depth: 39.1 inches (993 mm)



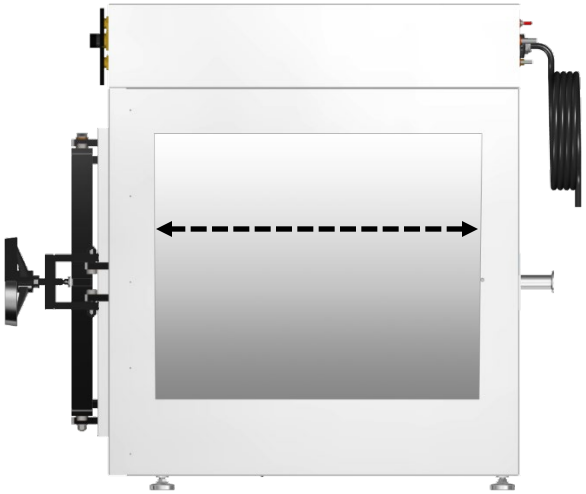
Width: 18.1 inches (460 mm)



Height: 18.1 inches (460 mm)

Chamber Interior

Depth: 24.0 inches (611 mm)



Cutaway Side View

Ovens with the Optional Side Valve

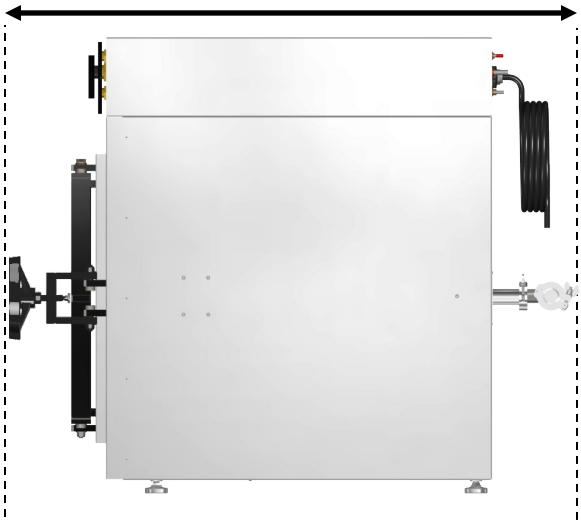
See the previous page for internal dimensions.

Exterior Dimensions

Total Height: 34.4 inches (874 mm)

Width: 33.3 inches (846 mm)

Depth: 42.4 inches (1077 mm)

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Sciences

READ THIS MANUAL

Read the Entire 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.
- The Introduction chapter of this manual only provides a summary overview. It does not substitute for reading the specific procedures as well as the warnings and cautions in subsequent chapters on how to safely install, operate, and maintain the oven.
- Keep this manual available for use by all operators.

This manual is informational only, and the manufacturer accepts no liability due to actions taken or not taken on basis of the content contained within it.

Introduction Chapter Overview

This chapter provides a summary overview of knowledge required to understand the locations the oven can be installed in; the hazardous material types it is engineered to work with or around; operator competencies; the explosion-preventing protection technologies it employs; special repair (service) and repair documentation requirements; utilities such as gas and vacuum as well as consumables required to operate the oven.

OVEN OVERVIEW

IEC Ex-marked CVO-5-EX-SS vacuum ovens are designed to help prevent the ignition of potentially explosive concentrations of gases or vapors in the workspace atmosphere surrounding the oven. This helps safeguard against concentrations created by accidents such as solvent spills, evaporation from solvent containers inadvertently left open, or the failure of a room ventilation system. The ovens **are not designed or certified** for use in locations where explosive concentrations are always or frequently present in the workspace atmosphere as a part of normal operations.

To help safeguard against igniting ambient explosive concentrations, the oven automatically purges and over pressurizes internal enclosures containing its high-voltage electronic components, including the heating elements. This purge and pressurize process is described in detail in this manual and must be allowed to complete before the oven can be turned on. Additional safety interlocks and features help to further protect against ignition.

The oven is engineered to help prevent the ignition of some hazardous gas and vapor types that are regularly present and contained in the oven chamber and vacuum plumbing as a part of standard operations. This includes solvent outgassing during extraction processes under vacuum

using n-butane, propane, and other flammable solvents falling within the approved hazardous material categories listed in this manual. These gases or vapors must be safely exhausted from the workspace environment after being pumped out through the vacuum pump connected to the oven.

Intended Uses and Locations

These flammable solvent ovens are engineered for drying, curing, extraction, and baking applications under vacuum. It is designed for use in the specified hazardous location zones, with specified hazardous materials groups, and within specific internal operating and ambient temperature ranges. The ovens are not intended for use at household locations.

This equipment is not intended for uses outside the applications and conditions noted in this section.

Standard Atmospheres and Materials Only

No Enriched Oxygen Atmospheres

The oven protection features in no way mitigate or safeguard against hazards created by enriched oxygen atmospheres. These hazards fall outside the IEC 60079 hazardous location equipment directives the oven is designed to meet.

No Pyrotechnics or Explosives

The oven is not built to work with pyrotechnics or explosives. It is not an explosion safety oven. It is not designed to contain or channel explosions. As an oven built with explosion protection systems, it is intended to help prevent hazardous atmospheres blasts rather than mitigate explosions.

Required Hazardous Location Competencies

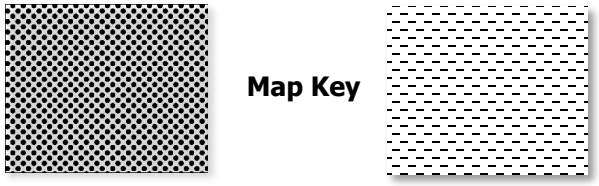
Oven operators, process technicians, installers, and anyone else who will interact with these ovens must be competent to work in the hazardous classified location type it will be installed and operated in. Trainers, SOP writers, and anyone who instructs or trains personnel on these ovens must be at least knowledgeable of the hazardous location type and the explosion protection systems used in the oven.

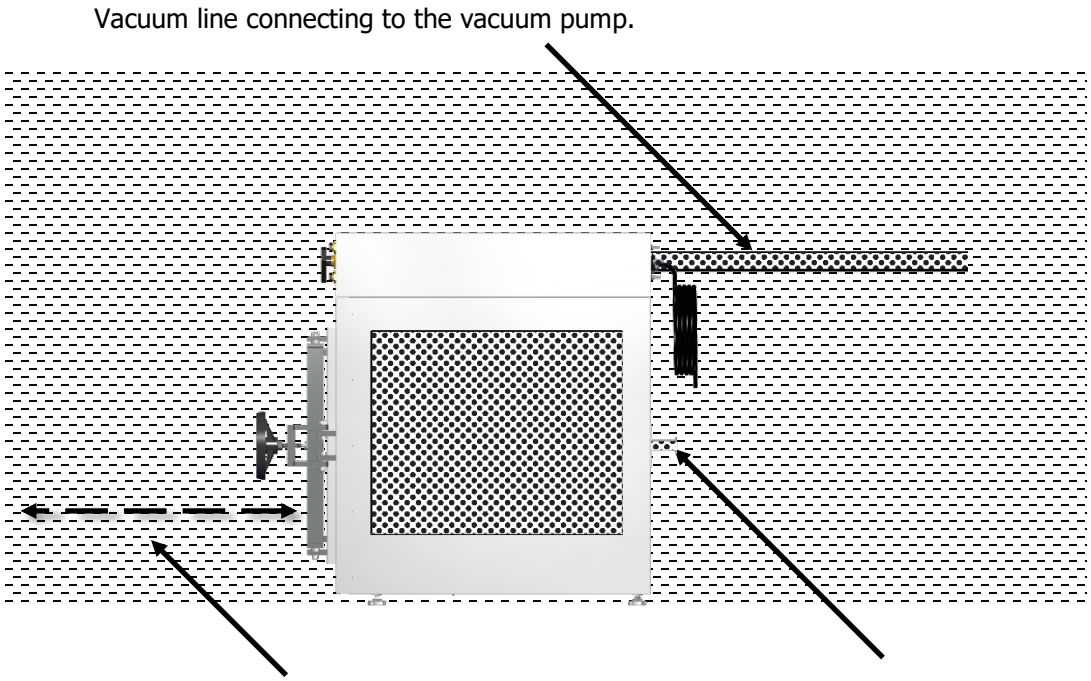
HAZARDOUS ZONES MAP

Zone 1: Explosive concentrations of gases or vapors are frequently present during normal operations inside the Zone 1 spaces of the oven chamber, KF-25 fitting, and vacuum system.

Zone 2: Any explosive concentrations of gases or vapors in the Zone 2 space surrounding the oven, its KF-25 fitting, and the vacuum system are unintentional, infrequent, and short-lived – typically the result of an accident, a hazardous materials leak, or a ventilation system failure. Explosive concentrations are never present as a part of normal operations in the Zone 2 space.

Zone 2 Hazardous Zone Assessment: The full extent of the Zone 2 hazard area around the oven and vacuum system must be based on an assessment of **your site**. Assessment factors include the site airflows, air exchange rate, and the characteristics of your HVAC or other climate control system.





Allowed Locations, Materials, and Temperatures

Prior to purchasing or installing one of these ovens, verify which hazardous location compliances are required by the safety authority having jurisdiction in your area for explosive atmospheres hazards.

Hazardous Location Types

The oven is not a complete solution for explosive atmosphere hazards but intended for use in a workspace configured to mitigate these hazards. Specifically, the oven is designed for installation and use in the following classes of hazardous locations.

- IECEx 60079: In locations where explosive concentrations of gasses or vapors are only present infrequently and for short durations and only as the result of accidents or leaks. The creation of explosive concentrations around the oven during normal operations is not allowed.
- UL 60079 (USA National Differences)
    - Zone 2
    - Class 1 Zone 2
    - Class 1 Division 2
- CSA 60079 Zone 2 (Canada National Differences)
- ATEX 60079 Zone 2 (EU and Great Britain Group and National Differences)

Equipment Type

The oven is classified as the following types of hazardous location equipment.

- IECEx 60079 EPL category Gc
- UL 60079 Category 3G
- CSA 60079 Category 3G
- ATEX 60079 Category 3G

Allowed Hazardous Materials

Per 60079 directives, these ovens are built to safely work with the following material groups. Only hazardous materials in these groups may be placed in the oven or used in the zone surrounding it.

- IECEx with UL, CSA, and ATEX differences: Material Groups IIA, IIB, and IIC
- UL Class 1 Division 2: Material Groups A – D

These groups include propane and n-butane.

Temperature Class

- The oven is IECEx 60079 temperature class 2 equipment (T2), including under UL, CSA, and ATEX Differences.
- The oven is also UL Class 1 Division 2 temperature class 2 equipment (T2).

These classifications allow a maximum internal surface temperature of no more than **300°C (572°F**). The maximum target temperature setpoint this oven can be set to **200°C (392°F)**.

Hottest Internal Surface Temperature

Hotspots exceeding the temperature displayed on the oven control panel will form on the walls, ceiling, and floor of the oven chamber while the oven is heating. The oven is engineered so these hot spots never exceed the displayed temperature by the following amount:

- +100°C (+212°F)

Maximum Process Temperature

A safety interval must be maintained between the hottest baking process temperature setpoint and the ignition point of flammable material in the oven chamber.

- The highest baking application or process temperature setpoint must stay **at least 125°C (257°F) lower** than the auto-ignition temperature of the flammable material.

Data Plate Markings

The hazardous location markings on the unit data plate are the ultimate indicators of whether the oven is compatible with your hazardous location zone and materials type. Always check the data plate prior to installing the oven in a hazardous location.

HAZARDOUS LOCATION CONSIDERATIONS

Note: Detailed requirements for these considerations are found in the Installation chapter of this manual. **This section is intended as an overview only.**

Safe operation of the oven is not only dependent on operator behavior and the protection systems of the oven but on establishing safe environmental conditions at your site. By itself, the oven does not satisfy the required safe environmental conditions. Additionally, the oven can cause explosions if misused by the operator in an environment where explosive concentrations of volatile gases or vapors are present.

Required Ambient Conditions

Safe operation of the oven requires a specific set of environmental conditions including an allowed ambient temperature range, limited environmental temperature variation during baking applications, and a maximum allowed relative humidity level outside the oven. These are addressed in the Installation and Operation chapters of this manual.

Ventilation

The hazardous location workspace around the oven must be provided with sufficient air circulation and ventilation to prevent a buildup of explosive gas or vapor concentrations. Additionally, if you will be using gas nitrogen (GN_2) to operate the oven purge and pressurization safety system, the ventilation system must be sufficient to prevent a dangerous buildup of the gas in the room atmosphere in the event of a leak. Elevated concentrations of neutral gases are an asphyxiation hazard.

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Spark Elimination

The workspace location must be configured and properly equipped to eliminate the potential for mechanical or electrical sparking in compliance with your fire or other safety jurisdiction standards. Power outlets for the oven and its vacuum pump to plug into must be located outside of the workspace hazardous (classified) location to preclude the potential for sparking in the presence of any explosive concentrations of gases or vapors. Ovens and pumps with hardwire power feeds may be wired to the power source within the hazardous location or area, but the connection must meet all safety compliance requirements for the location, division, or zone.

Additional Workspace Requirements

You must also satisfy all laws, ordinances, standards bodies, or regulations required by the safety authority having jurisdiction for your location. This includes following relevant national and regional laws as well as local ordinances dealing with potentially explosive vapors and gases.

Fire safety and other safety authorities having jurisdictions may have differing interpretations of national directives or codes for hazardous location equipment. The oven manufacturer strongly recommends consulting with these authorities to determine their compliance requirements when purchasing a flammable solvents oven. These ovens are engineered to meet IECEx 60079-1 and 60079-2 with UL, CSA, and ATEX national and group differences for equipment safety requirements for explosive atmospheres in their specified Zone or Division types.

Maximum Hazard Frequency Reminder (Zone 2, Class 1 Zone 2, and Class 1 Division 2)

The workspace location around the oven must conform to the requirements previously discussed in this chapter and stated in the Safety Certs and Statements Chapter: Specifically, the maximum hazard frequency allowed by the zone or division type.

EXPLOSION PREVENTION SYSTEMS OVERVIEW

The oven incorporates features designed to reduce the potential for the ignition of flammable or combustible gases in the previously specified hazardous location types. These systems do not eliminate the risk and do not reduce the requirements for operators competent to work in hazardous locations or adherence to hazardous location standards or directives.

- **Chamber Build:** The oven chamber is a sealable environment containing no electronic components and does not allow outgassed gases or vapors access to components elsewhere in the oven.

- **Door Window:** The oven door window is a blast-safe safety window to protect against implosions due to vacuum in the oven chamber.

- **Purge and Pressurize System (Ex pzc)**: The oven electronics and heating elements are situated in internal enclosures. These connected enclosures are automatically purged and over-pressurized with a safe gas before the oven's high voltage components can be powered. The over-pressurized enclosures automatically seal when the oven is turned on by the oven operator.

- **IS and Encapsulated Components (Ex ia mc):** Only Intrinsically Safe components and circuits and encapsulated components are powered in the electronics enclosure before the completion of the purge and over-pressurization process.

- **Overpressure:** The electronics and heating element enclosures maintain an overpressure after the purge to prevent potential intrusions of explosive gases or vapors.

- **Safety Interlocks:**

    - The oven's high-voltage components (electronic controls, display, and heating elements) automatically depower if the connected electronics and element enclosures lose over-pressurization.

    - High-voltage components and oven heating can only be turned back on after an overpressure loss once the oven has purged and pressurized the enclosures again.

    - The oven chamber will only heat when under vacuum. The oven automatically depowers the heating elements if vacuum is lost in the chamber.

    - An internal gas regulator helps prevent excessive over-pressurization of the internal enclosures that could damage the oven. The oven is also equipped with a pressure relief valve in the event the enclosures become excessively over-pressurized.

Continued next page

Oven Systems Continued

- **OTL System:** The oven comes with an over-temperature limit heating cutoff system.
    - This is an independent mechanical heating cutoff system set to a heating cutoff temperature by the oven operator. The system diverts power from the heating elements in the event of an over-temperature event. It must be set prior to running a baking application and set well below the auto-ignition temperature of the solvent being used.

- **Chamber Temperature Interval**: The oven chamber is engineered so that the hottest spot in the chamber while heating remains well below the auto-ignition temperature of the hazardous material types allowed by the hazardous location safety certifications for the oven.

SERVICE REQUIREMENTS

For repairs, overhauls, scheduled preventative maintenance, and other service-level procedures.

IEC Ex Certified Service Facility Required

The oven must be serviced by an IEC Ex-certified facility or by IEC Ex-certified technicians from such a facility deemed competent to work with the explosion protection types used in this oven (Ex ia, pzc, mc).

- The oven user (the owner or designated responsible individual) is obligated under IEC 60079-19 4.3.4 to verify that the service facility chosen to work on the oven demonstrates compliance with IEC 60079-19.
- Your safety jurisdictions' health and safety laws or ordinances may also require this compliance.

Explosion Protection Systems Compromised

- Failure to have the oven serviced by an IEC Ex competent facility can lead to the oven explosion protection systems being compromised, endangering your employees and facility.

Loss of Ex Marks and Safety Certification

- The oven Ex marking and Ex explosion certifications are no longer valid if the oven is serviced by a non-certified facility. This may void or adversely impact insurance policies and regulatory compliance standing.
- An oven that loses its Ex certification must be re-certified by an IEC Ex qualified NRTL or accredited or notified body.

SERVICE DOCUMENTATION REQUIREMENTS

Per IEC 60079-19 4.3.2, the oven owner must maintain documentation for each IEC Ex safety marked oven listing the repairs, overhauls, and any modifications or other services conducted on it. Documentation must be maintained for the duration of the oven's operating life.

- **Oven Operator Access:** Oven operators must have access to this documentation file or log to assess whether the oven is in a safe state to operate in the hazardous location environment. This includes verifying the oven was tested and restored to a safe state after its most recent repair or other service.
- **Service Technician Access:** Service facilities and their technicians must have access to the documentation when inspecting and servicing the oven.

A services log or other document of record may be filled out using information in a repair report from the qualified service facility.

REPAIR REPORT REQUIRED

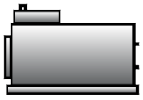
Always obtain a repair report from the facility servicing your oven. Per IEC 60079 4.4.1.5.2, the report will provide detailed information including diagnosed faults and repairs and the results of tests and verifications, as well as the tests or validations confirming that the oven is safe to return to use. The report may be used to fill out a repair log and should be added to the service document file for the oven. Depending on your jurisdiction, region, or country, the report may also be referred to as a job report or inspection report or go by another term.

VACUUM SUPPLY REQUIRED

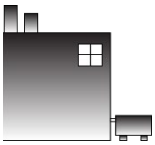
In order to function, the oven requires either a vacuum pump or a connection to a building vacuum system.

Please contact Cascade Sciences for details on the appropriate vacuum pumps and vacuum system accessories suitable for your application. Vacuum pumps with explosion-proof motors are available.

- Tel. 503-847-9047
- sales@cascadesciences.com



Vacuum Pump



Building Vacuum Supply

Vacuum System Safety Requirements

- The pump or building system must be capable of safely pumping explosive atmospheres from the oven chamber, which is a C1D1; Class 1 Zone 1; ATEX Zone 1 location**. Potentially explosive concentrations of vapors or gases will be present in the chamber environment and its exhaust**.
- **Hazardous Location Compliance**: The pump or system must meet the appropriate C1D2; Class 1 Zone 2; ATEX Zone 2; IECEx equipment requirements for the hazardous classified location or zone it will be installed and operate in.
- **Ventilation Pump Clearances**: See the pump user manual for the clearance spaces required to disperse heat and avoid overheating the pump. Pumps can overheat and potentially ignite solvents if placed in confined spaces.
- **Explosive Exhaust**: The HVAC or other ventilation system the pump exhaust is connected to must be able to safely handle explosive atmospheres pumped from the oven chamber.
- **Exhaust Ventilation**: Outgassed byproducts may be hazardous to or noxious for operating personnel. These must be expelled from the workspace area in compliance with applicable laws, regulations, or ordinances.
- **Pump Suitability and Requirements**: Refer to the vacuum pump manufacturer manual for specifications and compatibility with applications. Consult the manual for operating requirements such as pump oil and sorbent use, as well as maintenance requirements.

PURGE GAS SYSTEM REQUIREMENTS

Oven Purge and Pressurize System Function

A safe gas supply is required to purge and over-pressurize the oven electronics and heating elements safety enclosures before the oven can be turned on. The compressed gas may be:

- Air of instrument quality
- Gas nitrogen (GN_2)

Oven Chamber Backfilling Function

In its default configuration, the oven uses the purge and pressurize gas supply to backfill the vacuumed down oven chamber. **Optional:** A second clean air or gas nitrogen supply can be attached to the Backfill port to backfill the oven chamber with a gas source separate from the purge and pressurize system source.

Your process SOP or recipes must state which gas source will be used to backfill the oven chamber.

Purge and Pressurize Gas Supply System Requirements

- The oven requires a sustained flow of **4.2 cubic feet per minute** of gas flow to purge the electronics and heating elements enclosures and to establish and maintain overpressure **(117.5 normal liters per minute).**
- The gas supply tubing connected to the oven must be protected against mechanical damage and accidental disconnection.
- **The gas supply system must have a power source separate from the oven** If it is electronically controlled or generated.
- The gas system must supply a continual flow of gas to the oven during oven operation.

Connection Requirements

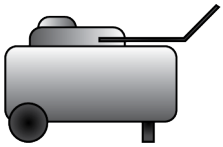
Use ¼ inch OD (outside dimension) tubing to connect to the ¼ inch gas port fittings on the back of the oven. These ports are labeled **Purge & Pressurize** and **Backfill.** Use tubing clamps to secure the tubing to the fitting.

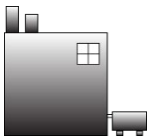
Continued next page

Air Compressor Requirements

An air compressor system supplying compressed clean air for purging and pressurizing or backfilling must meet the following requirements in addition to those previously listed:

- The air intake for the compressor must be located outside of the hazardous location, area, or zone.
- The line must be filtered or otherwise protected to prevent flammable dusts, gases, and vapors from entering the compressed gas supply.
- The intake line must be composed of noncombustible materials.



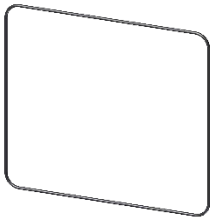


Building Pneumatic Supply

GASKET CHEMICAL VULNERABILITIES

The oven comes with a *Viton®* gasket built into the oven door. The gasket must seal against the un-nicked contact surface on the oven body for the oven chamber to hold vacuum.

The gasket is a low-wear, long-duration component that is rated to 220°C and typically replaced only during scheduled services on the oven. However, the gasket is attacked by ketones, low molecular weight esters, and compounds containing nitros. Exposing the gasket to these may damage its integrity and require an early replacement. The gasket is a consumable component and is not covered under the manufacturing defect warranty.



CONTACTING ASSISTANCE

Please have the following information ready when calling or emailing Customer Support: the **model number, serial number,** and the **Part ID** (see page 43).

Tel. 503 847-9047
repairs@cascadesciences

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

ENGINEERING IMPROVEMENTS

Cascade Sciences continually improves 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 differ from those described in this manual, please contact your oven dealer or customer service representative for assistance.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INSPECT THE SHIPMENT

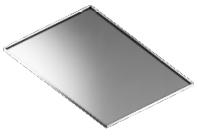
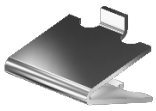
- When a unit leaves the factory, safe delivery becomes the responsibility of the carrier.
- **Damage sustained during transit is not covered by the manufacturing defect warranty.**
- Save the shipping carton until you are certain that the unit and its accessories function properly.

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

Shelves	Shelf Clips	Leveling Feet
5	20	4

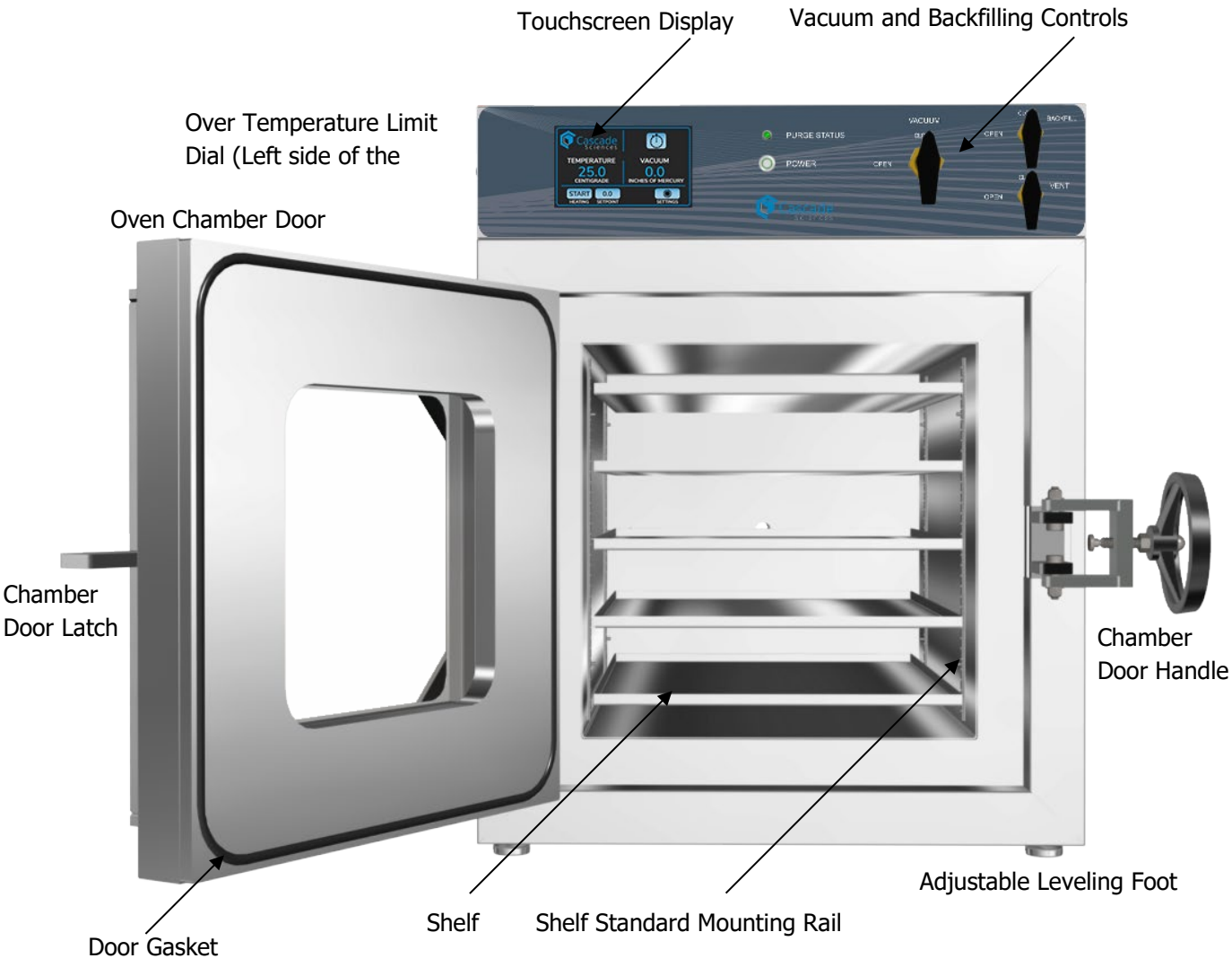




Optional Side Valve Units

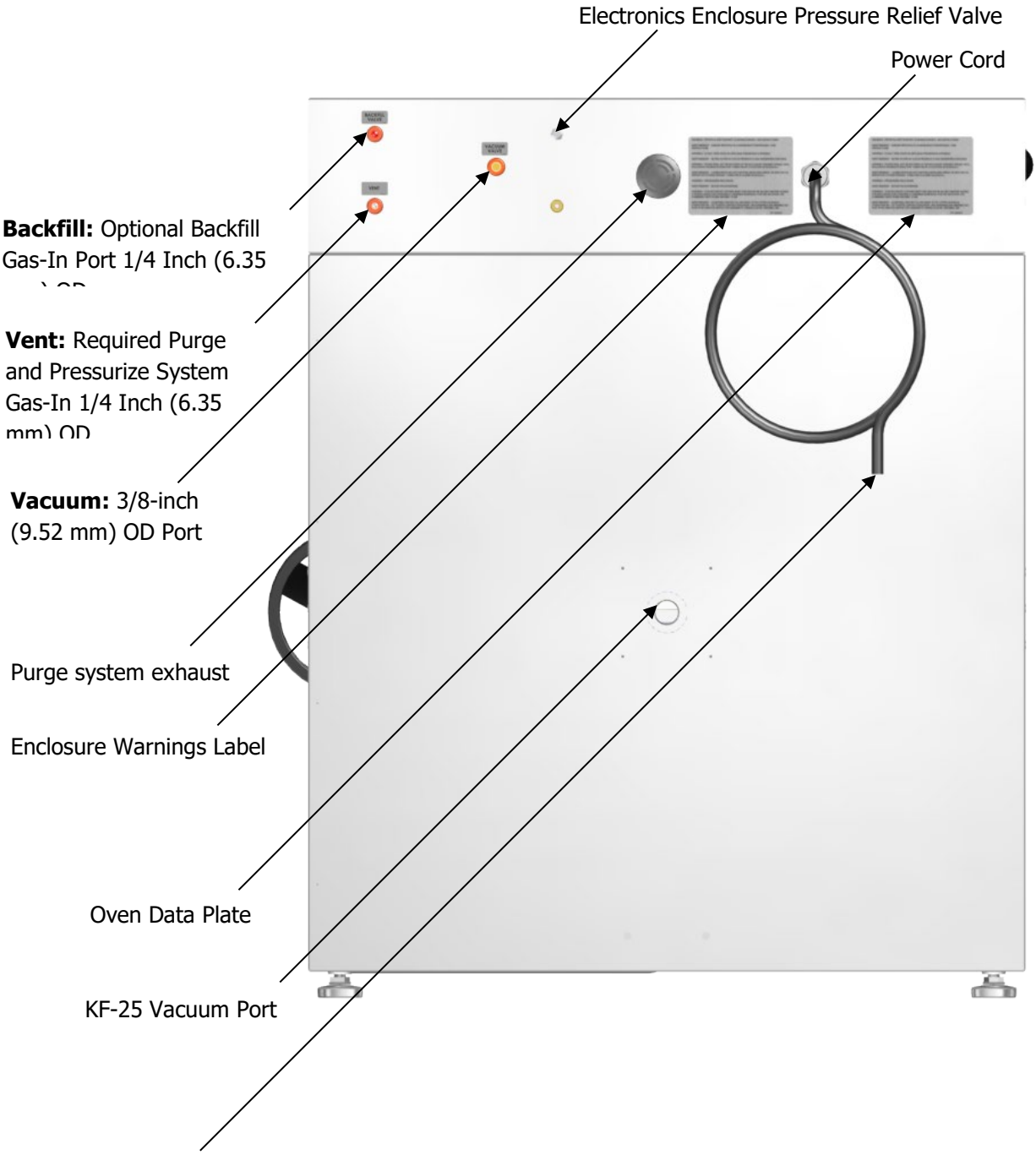
Vacuum Connection Kit
1

ORIENTATION IMAGES

CVO-5-EX-SS Ovens



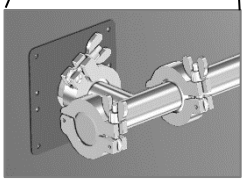
Unit Back, All Standard Models



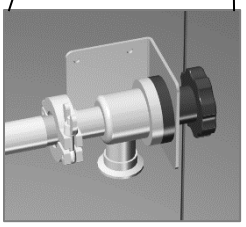
The Power Cord connection terminus is not pictured and varies by connection type (hardwire perm connect 110 volt or 220 volt, 110-volt NEMA 5-15P plug-in, 220-volt Euro CEE7/7, etc.)

Optional Side Valve

All oven models may be ordered with an optional side-mounted KF-25 vacuum port and hand-valve.



KF-25 Vacuum Port for sensor probes



KF-25 Vacuum Port – connects to the vacuum pump

RECORDING DATA PLATE INFORMATION

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

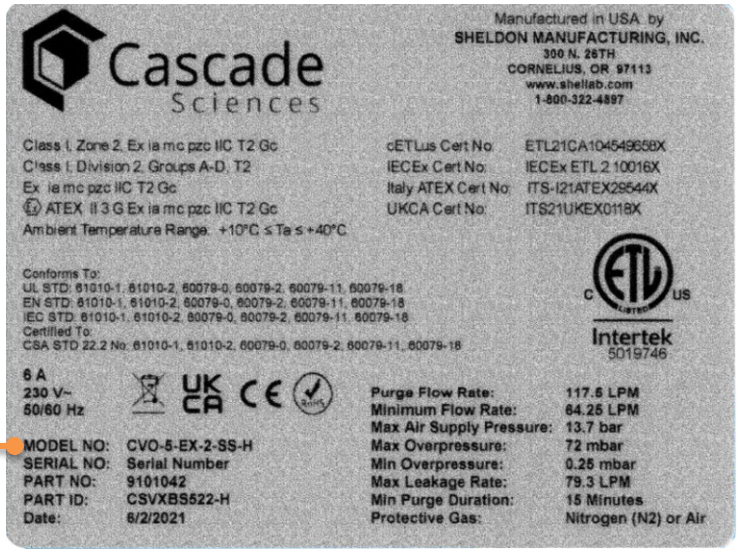
- The data plate is located on the back of the oven, near the power cord or feed.

Unit Data Plate Information

MODEL NO:	
SERIAL NO:	
SERIAL NO:	
PART ID	

Sample Data Plate

Unit Information Location (Example Only)

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Note: The installation party must possess the required competencies for installing equipment in the hazardous location zone.

INSTALLATION PROCEDURES 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 33.
    - See page 59 for the oven gas and vacuum port locations.
- ✓ Arrange for a workspace ventilation assessment if one has not been performed, page 46.
- ✓ Check that the required ambient conditions for the unit are met, page 48.
- ✓ Check that the spacing clearance requirements are met, page 49.
    - Unit dimensions may be found on page 12.
- ✓ Check that a suitable electrical power supply is present.
    - For ovens with power cords, see page 50.
    - For ovens with hardwire power feeds, see page 53.

Install the oven in a suitable workspace location.

- ✓ Review the lifting and handling instructions, page 56.
- ✓ Level the oven, page 57.
- ✓ Install the oven in its workspace location, page 57.

Set up the oven for use.

- ✓ Clean the oven shelving. Clean the chamber if needed, page 58.
- ✓ Install the shelving, page 58.
- ✓ Connect the vacuum supply to the oven, page 59.
- ✓ Connect the oven to its pressurized gas supply source, page 62.
    - A separate, optional backfill gas supply may also be connected, page 63.
- ✓ **Hardwire Ovens**: Wire the oven to its power source but do not energize the supply circuit at this time except to test, page 64.

VENTILATION ASSESSMENT REQUIRED

The ventilation system for the hazardous location the oven will be installed in must prevent buildups of potentially explosive gas or vapor mixtures in the air. Conditions under which this could occur include:

- Excessive amounts of solvents or other hazardous materials evaporating from samples while being loaded into the oven chamber.
- Residual hazardous materials outgassing from treated product or samples while being unloaded from the oven after processing.
- Explosive concentrations arising from spilled hazardous materials.
- Contents evaporating from hazardous materials containers accidentally left open.

Determining Sufficient Ventilation

This determination must be **based on an evaluation of your site** with its airflow and HVAC characteristics, the specifics of your baking application and the hazardous materials involved. The HVAC or other climate control system should meet all applicable hazardous location requirements for the safety jurisdiction you are located in.

General considerations:

- Consult with your fire or other safety jurisdiction officials to verify the applicable ventilation requirements and the local interpretations of those requirements.
- The airflow or active ventilation provided at the front of the oven must be sufficient to prevent the buildup of explosive gas or vapor concentration from samples, products, or solvents being handled by the oven operators and other process technicians.

Neutral Gas Ventilation

- If you are using gas nitrogen (GN_2) for purging and pressurizing the oven safety enclosures or for backfilling, ensure there is sufficient ventilation in the workspace area to prevent asphyxiation or hypoxia conditions.
- The ventilation must be sufficient to protect employees in the event of a leak in the GN_2 supply system.
- The workspace ventilation system must provide a minimum of **6 air changes per minute.**

SPARK REDUCTION OR ELIMINATION

Your workspace must meet any spark reduction or elimination requirements mandated by your fire locality or other safety authority having jurisdiction.

GENERAL POWER SAFETY

Your unit and its recommended accessories are engineered and tested to meet strict safety requirements and designed to connect to a power source using the specific power cord or hardwire power feed type built into the unit.

Always follow basic safety precautions including:

- Do not bend a power cord or power feed excessively, step on it, or place heavy objects on it.
- A damaged cord or hardwire feed can be a shock or fire hazard. Never use a power cord or feed if it is damaged or altered in any way.
- **Plug-in Ovens**: Always plug the unit power cord into a protective earth grounded electrical outlet that conforms to national and local electrical codes.

REQUIRED AMBIENT CONDITIONS

Required Location Conditions

These units are built for use indoors for operating under the following conditions only.

- 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)
- An altitude up to **2000 meters**
- The units are rated to operate in a **Pollution Degree 2** environment.
- The ambient temperature **should not change by 2°C (3.6°F)** or more during operation.

Operating outside these conditions may affect unit performance and safety.

Location Temperature Considerations

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

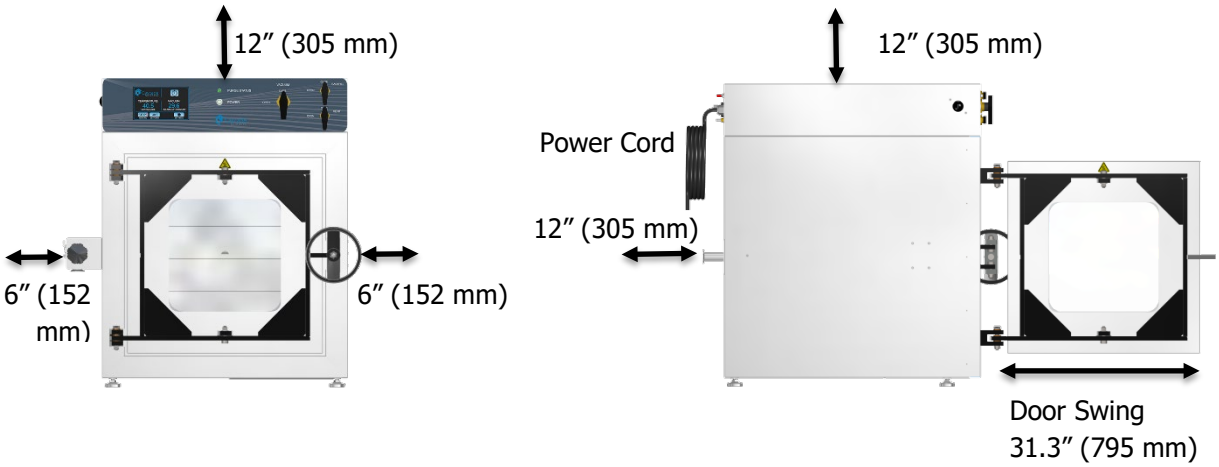
- Proximity to other ovens, autoclaves, or any other device producing significant radiant heat
- Heating and cooling vents or other sources of fast-moving air currents
- High-traffic areas
- Direct sunlight

Maximum Hazard Frequency Reminder

The workspace location must not exceed the maximum hazardous conditions frequency specified for your hazardous location or zone as described on page 27 in the Installation chapter **Hazardous Location Consideration** topic.

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.

KF-25: 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.

Door Swing: 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 gasket and the metal sealing surfaces.

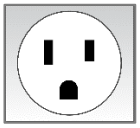
PLUG-IN POWER SOURCE REQUIREMENTS

For ovens with plug-in power cords.

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

Power Source: The power source must meet the power requirements listed on the unit data plate.

Model	Voltage	Amps	Frequency
CVO-5-EX-SS	115	12	50/60 Hz
CVO-5-EX-2-SS	230	6	50/60 Hz

Model	Part ID	Power Outlet Type	
CVO-5-EX-SS	CSVXBS522-N		Standard NEMA 5-15R
CVO-5-EX-2-SS	CSVXBS522-NA		NEMA 6-15R
CVO-5-EX-2-SS	CSVXBS522-NE		CEE7 sockets compatible with CEE7/7 plugs

- **Single Phase and Grounded:** The wall power source must be single-phase (1) and protective earth grounded.
    - If the unit is not grounded properly, parts such as knobs and controls can conduct electricity and cause serious injury.
- **Electrical Codes**: The wall power source must conform to all national and local electrical codes.
- **Safe Voltage Range:** The unit may be damaged if the supplied voltage varies by more than 10% from the data plate rating.
    - The unit is safety rated to withstand transient overvoltage levels up to Overvoltage Category II.
- **Separate Circuit**: 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.

Continued next page

Power Cord Oven Requirements Continued

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

- **Outside Zone 2**: The switch or circuit breaker must be safely located outside the hazardous location Zone.
- **Circuit Breakers**: The recommended circuit breakers for these units are:
    - CVO-5-EX-SS: **20 amps**
    - CVO-5-EX-2-SS: **15 amps**

Power Cord

The cord must be plugged in outside of the hazardous Zone to preclude any possibility of sparking igniting and explosive concentration of gases or vapors. **Do not plug in the cord at this time.**

- Each CVO-5-EX-SS oven comes with an integral **15-foot (4.57-meter)** power cord.
- The suffix on the end of the oven Manufacturer Part ID indicates which cord type is attached to the oven.
    - **-N**, NEMA 5-15P 115 Volt Cord
    - **-NA**, NEMA 6-16P 230 Volt Cord
    - **-NE**, Euro CEE 7/7 230 Volt Cord



The power cords are rated to the following specifications:

- US National Electrical Code permitted for exposed runs outside of sealed conduits in hazardous locations.
- Temperature rated to 125°C protection from thermal overloads.
- Complies with UL 2225 crush and impact requirements for metal-clad hazardous location cables.

HARDWIRE SOURCE REQUIREMENTS

For ovens with hardwire power feeds. Also known as fixed installation or permanent connect wiring.

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

Power Source: The source must meet the requirements listed on the unit data plate.

Model	Voltage	Amps	Frequency
CVO-5-EX-SS-H	115	12	50/60 Hz
CVO-5-EX-2-SS-H	230	6	50/60 Hz

- **Single Phase and Grounded**: The power source must be single-phase (1) and protective earth grounded.
    - If the unit is not grounded properly, parts such as knobs and controls can conduct electricity and cause serious injury.
- **Electrical Codes**: The power source must conform to all national and local electrical codes.
- **Safe Voltage Range**: The unit may be damaged if the supplied voltage varies by more than 10% from the data plate rating.
    - The unit is safety rated to withstand transient overvoltage levels up to Overvoltage Category II.
- **Separate Circuit**: 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.
- **On / Off:** The circuit must allow the operator to turn off power to the oven when not in use.
- **Zone Connection Protection:** The oven may be connected to a power source inside the hazardous location Zone around the oven under the following conditions:
    - A connection in the hazardous zone must be made via a suitable hazardous location rated junction box meeting the requirements for Zone 2 or (UL) Class 1 Division 2 or Class 1 Zone 2 locations.
    - The connection must be made by a qualified electrical service technician who is competent to work in the hazardous location zone.

Continued next page

Hardwire Power Requirements Continued

Hardwired Power Cord Disconnect: The oven must be positioned so that all operators have access to the power cord disconnect in case of emergencies.

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

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

- **Outside Zone 2**: The switch or circuit breaker must be safely located outside the hazardous location Zone.
- **Circuit Breakers**: The recommended circuit breakers for these units are:
    - CVO-5-EX-SS-H: **20 amps**
    - CVO-5-EX-2-SS-H: **15 amps**
- **Required Safety Compliances**
    - Circuit breakers for hardwire (permanent connect) ovens must comply with IEC-60947-2.
    - Switches must comply with IEC 60947-3.

Power Feed

The power feed is **15 feet (4.57 m)** long and rated to the following specifications:

- US National Electrical Code permitted for exposed runs outside of sealed conduits in hazardous locations.
- Temperature rated to 125°C protection from thermal overloads.
- Complies with UL 2225 crush and impact requirements for metal-clad hazardous location cables.

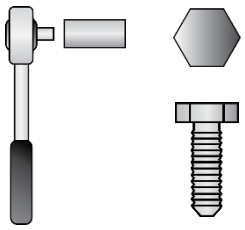
LIFTING AND HANDLING

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

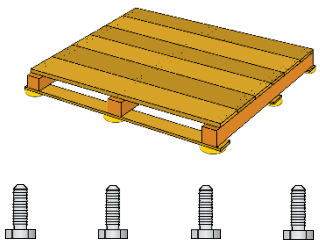
- Lift the oven only from its bottom surface.
- Doors, handles, and knobs are not adequate for lifting or stabilization.
- Restrain the oven completely while lifting or transporting so it cannot tip.
- Remove all moving parts, such as shelves and trays, and lock doors in the closed position during transfers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

REMOVING FROM THE PALLET

Ovens that do not ship mounted on rolling stands 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.



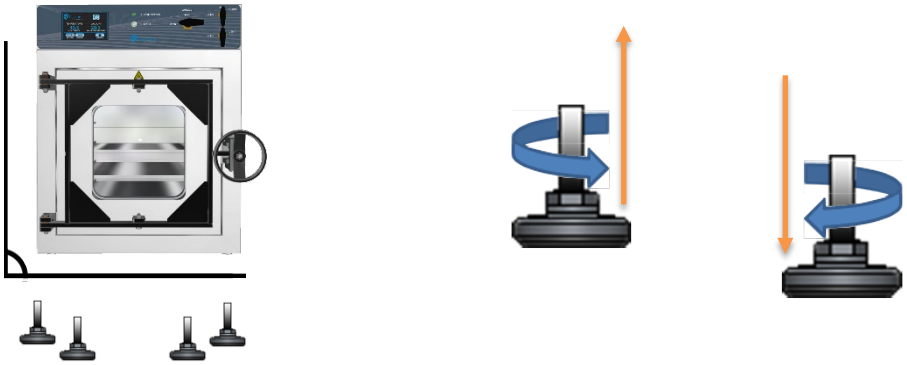
0.5 inch (12 mm)



LEVELING

For ovens that do not come mounted on a rolling stand, 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 AND SECURE THE OVEN

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

1. Verify the oven is level and does not rock. Adjust the leveling feet or rolling stand casters as needed.

- Ovens mounted on rolling stands must be secured in position so that the stand cannot be moved intentionally or accidentally while the oven is in operation or while cooling.

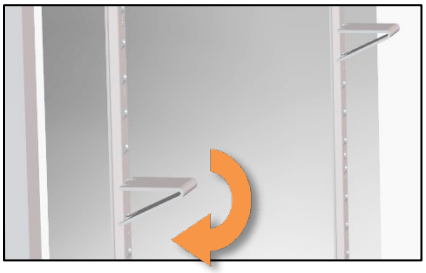
INSTALLATION CLEANING

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

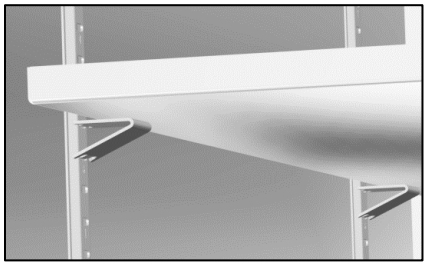
- Remove all wrappings and coverings from shelving before cleaning and installation.
- **Do not clean with deionized water.** DI water can be corrosive to metal surfaces.
- See the **Cleaning** topic in the User Maintenance section (page 117) for more information on how to clean and disinfect without damaging the unit.

INSTALL THE SHELVING

Install the shelves evenly spaced in the oven chamber to maximize temperature uniformity. Please see the orientation image on page 40 as a reference.



Shelf Clip Rocking Motion



Shelf seated on clips

For each shelf:

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.
2. Set the shelf on the clips and verify the shelf is level.

End of Procedure

VACUUM SUPPLY INSTALLATION

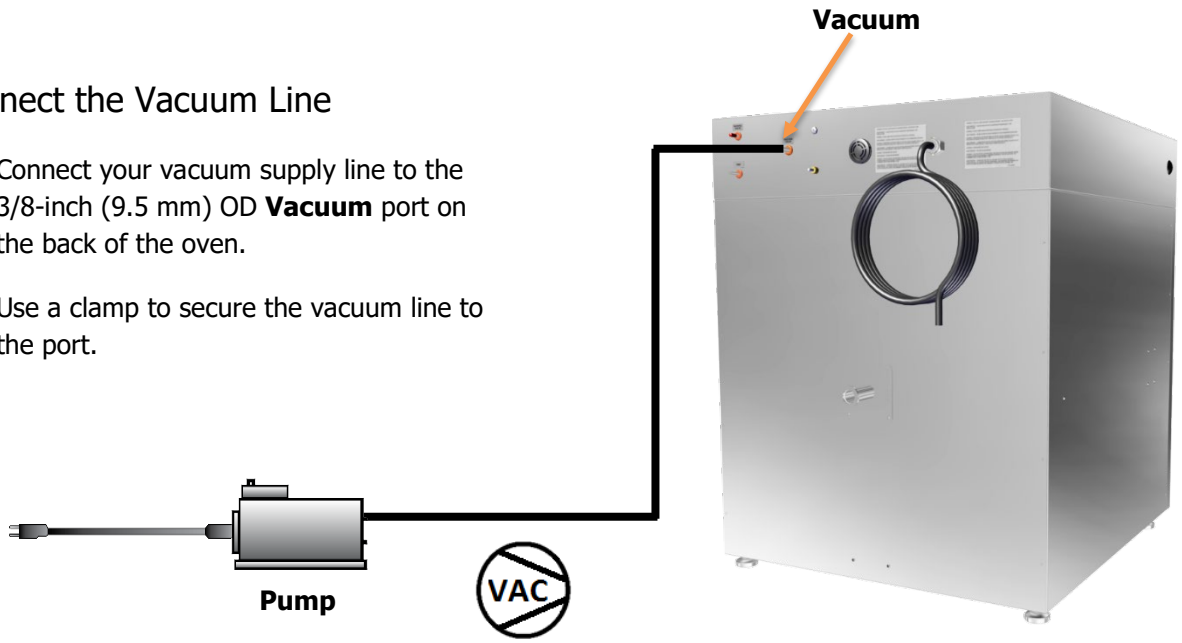
Install the vacuum pump, connect it to the oven vacuum system, and set up the pump exhaust to vent safely outside the workspace.

1. Install the Pump

- Read the vacuum pump manual and safety instructions prior to connecting the pump to the oven and a vacuum pump exhaust line.
- Physically secure the pump in place so it cannot be accidentally dislodged or disconnected during operation.
- Ensure the vacuum pump has adequate spacing to prevent overheating.
    - Overheating the pump can ignite extracted solvent.

2. Connect the Vacuum Line

- Connect your vacuum supply line to the 3/8-inch (9.5 mm) OD **Vacuum** port on the back of the oven.
- Use a clamp to secure the vacuum line to the port.

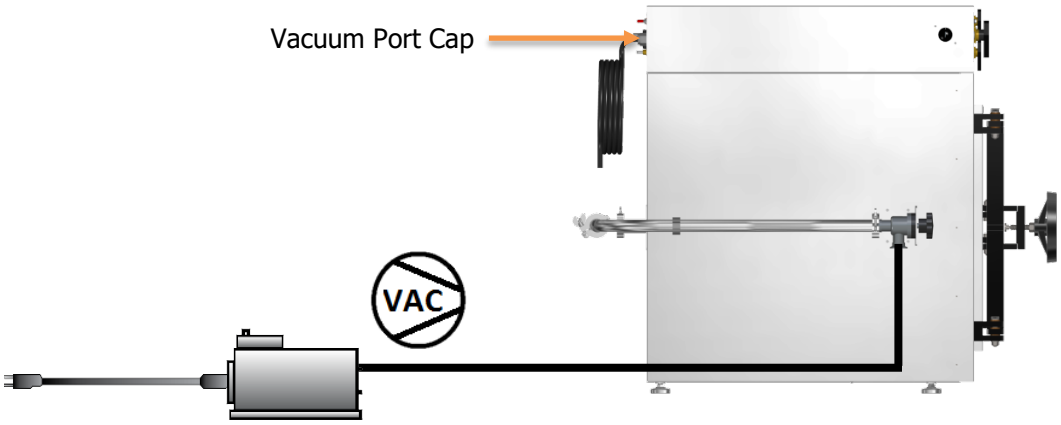


Standard Vacuum Connection

See the next page for the side valve connection option.

Optional Side Valve Vacuum Supply Connection

- Cap the Vacuum port on the back of the oven when using the side valve configuration. This is required to help safeguard against the intrusions of Zone 2 atmosphere into the oven chamber.



Optional: Connect your vacuum supply to this KF-25 port

3. Connect the Pump to its Power Supply

- **Power Cords**: A vacuum pump with a power cord must plug into a power outlet located safely outside of the hazardous location.
- **Hardwire**: A pump with a hardwire power feed can be connected to a permanent connect power source outside of or inside the hazardous zone.
    - Any connection made in the hazardous zone must meet all applicable requirements for Zone 2 or for (UL) Class 1 Zone 2 or Class 1 Division 2 hazardous (classified) locations.
    - The connection must be made by a qualified electrical service technician who is competent to work in the hazardous location zone.

4. Connect the Vacuum Pump Exhaust

- **The pump exhaust is a Zone 1 hazardous atmosphere**. Explosive concentrations of hazardous gases will be present in it during routine operations.
- Connect the pump exhaust port to the suitable venting or HVAC system to safely remove outgassed products and other exhausts from the workspace area.
- The HVAC or other climate control system must the requirements described in the **Installation chapter Vacuum Supply Required** topic on page 33.

End of Procedure

Connect the Purge and Pressurize Gas Supply

The purge and pressurize gas supply must meet the requirements described in the Introduction chapter **Gas Supply Requirements** on page 34. **Reminder**: The purge and pressurize gas supply also backfills the oven chamber when the Vent valve handle on the front control panel is in the open position.

- The oven cannot be turned on without the purge and pressurize gas supply.

Procedure

1. Connect the purge and pressurize gas supply to the **Vent** port (bottom gas-intake port) on the left side of the oven back.
2. Use a clamp to secure the gas line to the port.

Note: In this configuration, oven operators use the valve control labeled **Vent** on the front control panel to backfill the oven. This should be noted in your process SOPs or recipe procedures.

Purge and Pressurize Gas Supply

Optional Backfill Gas Supply

A second supply of clean air or inert gas can be connected to the oven. This gas source is separate from the one used by the oven Purge and Pressurize system and provides an option to backfill the oven chamber with a different gas supply. For example, some facilities may wish to purge and pressurize the oven safety enclosures using a compressed clean air system but backfill the hot oven chamber from a gas nitrogen source.

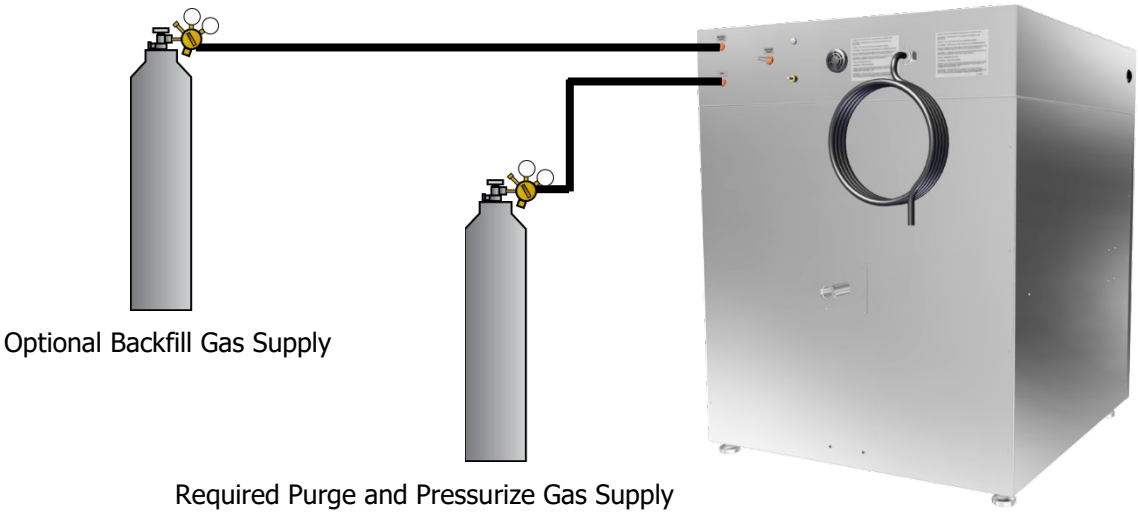
- **The maximum allowed gas pressure for the backfill gas supply is 15 psi.**
- Exceeding 15 psi of gas pressure may damage the oven.

Procedure

1. After connecting the Purge and Pressurize gas supply, connect your optional backfill gas supply to the Backfill gas-in port.
2. Use a clamp to secure the gas line to the port.

Note: in this configuration, oven operators use the valve control labeled **Backfill** on the front control panel to backfill the oven from the optional gas source. This should be noted in your process SOPs or recipe procedures.

Backfill gas port to oven chamber. ¼ inch (6 mm) outside dimension.



Optional Backfill Gas Supply

Required Purge and Pressurize Gas Supply

Warning: The technician must verify there are no hazardous substances or potentially explosive atmospheres present prior to and while hardwiring an oven to its power supply and when initially testing the connection.

Avertissement: Le technicien doit vérifier qu'il n'y a pas de substances dangereuses ou d'atmosphères potentiellement explosives présentes avant et pendant le câblage d'un four à son alimentation électrique.

HARDWIRE TO POWER SUPPLY

Hardwire Ovens Only

Power Feed Types

Each hardwire oven comes provided with an integral **15 ft (4.57 m)** power feed consisting of:

115 Volt Ovens: CVO-5-EX-SS-H

- One 14-gauge hot wire: black
- One 14-gauge earth ground: green-yellow

230 Volt Ovens: CVO-5-EX-2-SS-H

- One 14-gauge hot wire: black
- One 14-gauge hot wire: white
- One 14-gauge earth-ground: green-yellow

Grounding Required

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.

Connect the Oven Now

A qualified and competent electrical technician should now wire the oven power feed to a power supply meeting the requirements on page 50. If the connection is being made within the hazardous area around the oven, the connection must meet all applicable requirements for your jurisdiction to ensure the connection is isolated from potentially explosive atmospheres. After making the connection, do not turn on the power supply circuit at this time other than to test the connection.

If you have a plug-in power cord oven, do **not** plug it in now.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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
	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


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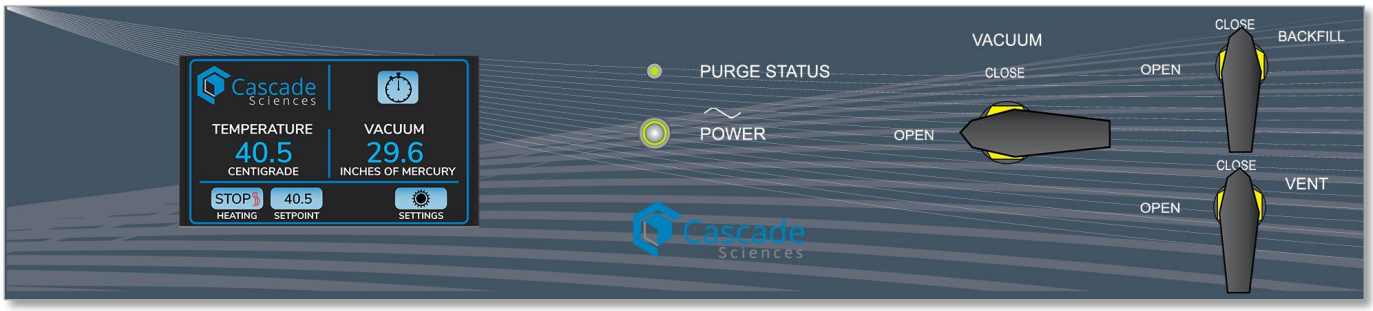


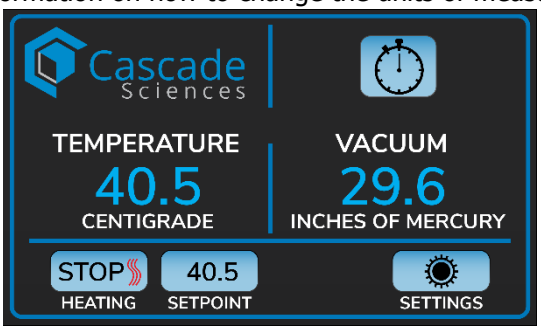
Main Control Panel

Touchscreen Display and Controls

The 15-minute automatic purge and pressurization cycle must complete before the oven operator can turn on the touchscreen controller using the Power button. When powered, the touchscreen controls heating in the oven chamber and displays the current chamber temperature and vacuum pressure. It also provides access to the Settings and Timer menus.

The touchscreen controller and oven heating system immediately turn off if the purged safety enclosures lose overpressure.

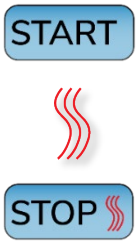
Units of Measurement: The display can be set to show temperature in standard or metric units of measurement. Vacuum can be shown in Torr, Bar, or Inches of Mercury. See page 96 for information on how to change the units of measurement.



Using Inches of Mercury for the Vacuum Display

- ~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.

Heating Button



This button contains the word Start or Stop in it depending on whether the oven is heating or not. Tapping the button when it shows START starts the oven chamber heating. Pushing the button when it shows Stop stops heating in the oven chamber. While heating, a red heating icon will fade in and out on the button. This indicates the oven is pulsing power to the chamber heating elements.

Safety Interlock Reminder: The chamber must be vacuumed down below 76 Torr (0.1 bar) before the oven will heat.

Continued next page

Touchscreen Display and Controls continued

Setpoint Button

Shows the current temperature setpoint. This is the target temperature the oven chamber will heat to and then maintain after the Heating Button is tapped. Tap this button to change the setpoint.

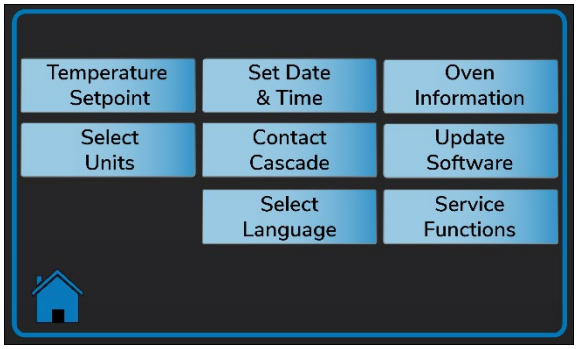
Timer Button

Brings up the Timer menu.

Settings Button

Brings up the Settings menu.

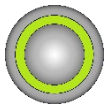
The Home Button returns the display to the previous screen.



Purge Status Light

Indicates the status of the purge and pressurization process.

- Blinking Red: No pressurization is detected in the safety enclosures.
- Blinking Green: Purging of the safety enclosures is underway. Requires approx. 15 minutes.
- Solid Green: The enclosures are fully purged and maintaining over pressurization to prevent intrusions of outside atmosphere.



Power Button

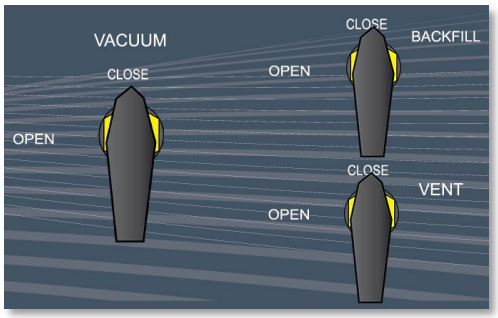
This lighted pushbutton is used to turn on the oven once the automatic purge and pressurize cycle is finished.

- When the cycle completes, the button's lighted inner ring blinks green to indicate the oven is in standby mode and ready to be turned on.
- Pushing the button when in standby mode turns on the oven, powering the touchscreen display and changing the lighted ring from blinking to solid green.

Note: Backfilling is the process of restoring atmosphere to the vacuumed down oven chamber. This is done by flowing gas into the chamber from a safe gas source connected to one of the gas-in ports on the back of the oven.

Vacuum and Backfilling Gas Supply Valves

Vacuum and Vent Valves



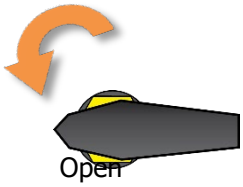
Vacuum Valve Control

The large valve handle labeled Vacuum adjusts the level of vacuum draw applied to the oven chamber through the 1/4 Inch (6.35 mm) Vacuum Port on the back of the oven.

- When **open**, this valve allows a vacuum pump connected to the Vacuum Port to pump down the oven chamber.
- In the **closed** position, the valve closes and seals the port.

Vent (Bottom)

Turning the Vent handle to the open position flows gas from the Purge and Pressurize supply to flow into the oven chamber.



- When the Vent valve handle is in the **closed** position, the oven chamber is isolated from the Purge and Pressurize gas supply.
- The Vent valve should be kept in the closed position when not backfilling.

Backfill (Top)

Warning: Do not open this valve unless the Backfill gas-in port on the back of the oven is connected to a safe gas supply. The port must remain capped when not connected.

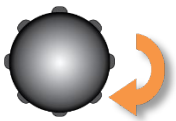
Avertissement: N'ouvrez pas cette vanne à moins que l'orifice d'entrée de gaz de remplissage à l'arrière du four ne soit connecté à une alimentation en gaz sûre. Le port doit rester fermé lorsqu'il n'est pas connecté.

- This valve opens and closes the **Backfill** port on the back of the oven.
- This is intended for an optional gas supply used to backfill the oven chamber.
- **Before opening this valve, always verify** the Backfill port is connected to a safe gas supply.
- The Backfill port must be capped when not connected to a supply to prevent potentially explosive gases or vapors from reaching the oven chamber.

Continued next page

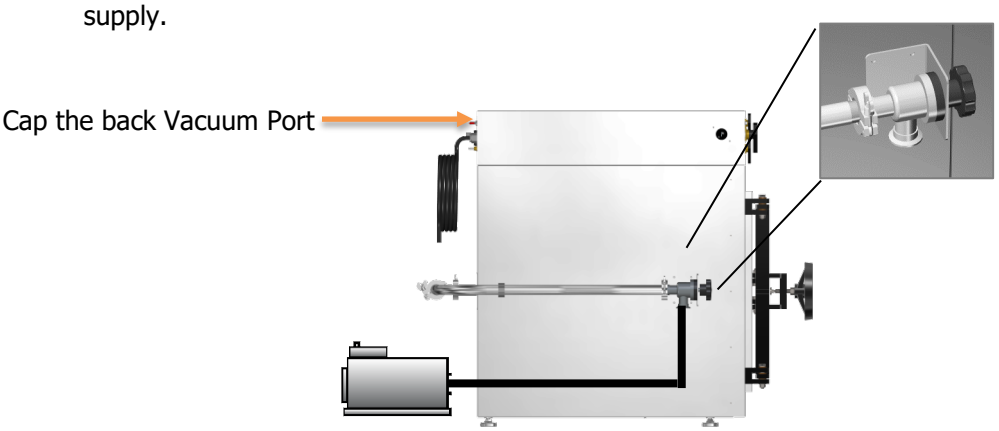
Optional Side Vacuum Valve

- When **open**, the Side Valve allows a vacuum supply connected to the KF-25 side-mounted port to evacuate the oven chamber.
- In the **closed** position, the valve closes and seals the port.



Closin

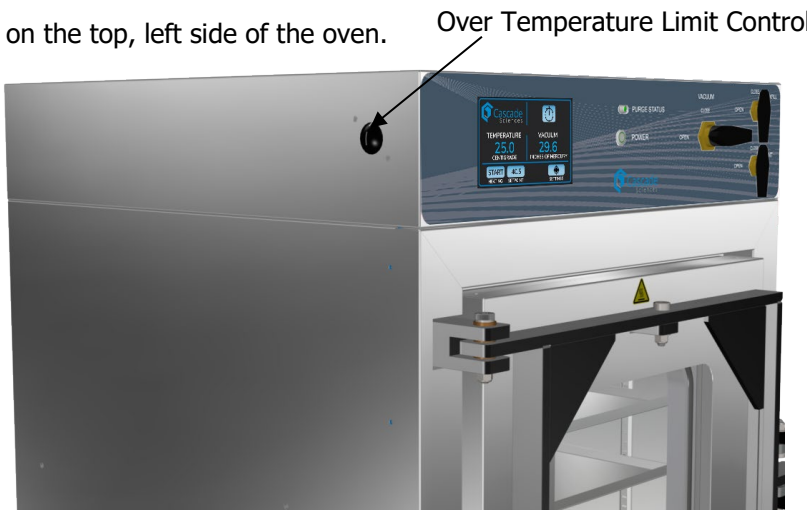
- Verify the 1/4-inch Vacuum Port on the back of the oven is capped when using the side valve. Leave the Vacuum control on the front panel in the closed position to prevent potentially explosive gas or vapor concentrations from entering through the port.
- This KF-25 port must be capped and clamped when it is not connected to a vacuum supply.



Over Temperature Limit (OTL)

This graduated dial sets the heating cutoff point of the mechanical Over Temperature Limit system. The system prevents unchecked heating of the chamber in the event of an electronics failure or external heat spike.

The OTL dial is located on the top, left side of the oven.



Operator Responsibilities

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 chapter 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.

General 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.
- 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.

SOPs and Operator Training

- **SOPs Required**: The oven manufacturer cannot anticipate all baking applications or processes that this oven may be used for. Specific, written SOPs are required for each application the oven is used for at your site. These must be written by someone:
    - Who is familiar with your site.
    - Who is knowledgeable about each application or process the oven will be used for.
    - Who knows the safety requirements applicable to your hazardous location and the oven explosion protection systems.
- **SOP Language:** SOPs must be written and available to all operators in a language they understand.
- **Competency**: Oven operators must be competent to work in your hazardous location type.
- **Material Properties**: The authors of your site SOPs and all oven operators must be knowledgeable of the chemical and physical properties of any potentially explosive or flammable materials being extracted or outgassed in the oven or any such materials present in the hazardous classified location. This includes the auto-ignition temperature of all substances used in your application.
- **Approved Substances Only:** Oven operators and SOP authors must verify that only approved hazardous substances will be placed in the oven chamber. These substances can only belong to the hazardous materials groups described in the Installation chapter **Allowed Hazardous Materials and Temperatures** entry in this manual. See page 27.
- **Toxicity and Other Hazards**: The oven operators and SOP authors must also know the potential toxicity and other health hazards associated with solvents or other volatiles used in your baking application. The oven does not safeguard against toxicity hazards.
- **PPE**: Oven operators and other personnel in the workspace must be trained to utilize appropriate PPE for applicable toxicity, explosion, and flammability hazards.

Inert Gas Asphyxiation Hazard

Gas Nitrogen used in the purge and pressurize process or for backfilling the oven chamber can create a significant asphyxiation hazard by crowding out oxygen in the room atmosphere. The onset of asphyxiation can be difficult to detect until personnel lose consciousness or suffer cognitive impairment.

- The workspace ventilation system must provide a minimum of **6 air changes per minute**. This helps protect the operator in the event of a gas system leak or if several backfilled ovens are opened in a short period, releasing a large, combined volume of inert gas.

- Turn off the GN_2 flow after the oven is turned off. This helps reduce the risk of a leak or accidental release while the oven is not in use.

Warning Potential Electrostatic Charging Hazard: Operator actions can load the oven with potentially hazardous electrostatic charge. See the instructions on this page.

Avertissement Risque potentiel de charge électrostatique: les actions de l'opérateur peuvent charger le four avec une charge électrostatique potentiellement dangereuse. Consultez les instructions ci-dessous.

HAZARDOUS ATMOSPHERES PRECAUTIONS

- **Catastrophic Electrostatic Discharge**: Operators and other personnel must avoid behaviors that can generate static discharges or load the oven with a static charge. For example, they should never rub a dry cloth on non-metallic oven surfaces.
- **Solvents used in the oven must be of ultra-high purity** (99% for hydrocarbon-based solvents).
- **Vacuum and Gas In Vent Ports Verifications**: Before powering the oven, verify all oven vacuum and gas-in ports are either connected to a gas or vacuum supply line or are capped. This helps prevent potential intrusions of outside vapors or gases into the oven chamber.
- **Process Awareness:** The operation processes described in your SOP must prevent solvents or other flammables and combustibles from igniting in the oven chamber, vacuum plumbing, and in the attached vacuum pump and pump exhaust. Specifically, operators need to be aware of the following:
    - The concentrations of ignitable vapors or gases present in the chamber during the baking application and any cooldown period.
    - Pressure changes that will take place in the chamber during the procedure.
    - Any moisture released during the process. This can change the concentration of vapors or gases and add heat to the oven chamber.
    - Any possible release of energy from samples or products that can drive up the oven chamber temperature during the baking application.
- **Temperature Interval**: Oven operators must maintain a safe temperature interval between the hottest spot in the oven chamber and the auto-ignition point of the solvent or other combustible materials present in the chamber.
    - See the **Maximum Process Temperature** topic page 25 for the lowest allowed interval between the oven setpoint and the flammable material auto-ignition temperature.
- **Shelving Temperatures:** The shelving temperature must also be below the sublimation temperature of solid materials in the chamber.
- **Process Log**: Oven operators should maintain a log of baking processes run, including the setpoint temperature the oven is being operated at, vacuum level, and the type of solvent or other approved hazardous material being used or extracted during the baking application.

- **Follow the SOP**: SOPs should be followed during the operation of the oven, including strict adherence to the maximum allowed operating temperatures and setting the over-temperature limit system.

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

- Verify the oven is in a safe state prior to powering it. Always check the service documentation file when returning the oven to operation after any repairs, maintenance, or other service procedures are performed on it.
- Always utilize appropriate Personal Protective Equipment (PPE) when the oven chamber is heated. Physical contact with chamber surface temperatures of 60°C (140°F) or higher can result in burn injuries.
- Do not use this oven in unsafe improper applications using hazardous materials outside the groups approved for use in and around the oven. Be sure material in the vacuum oven will not pose a flammable risk based on your drying process, temperatures, and exposure times.
- Follow all applicable laws, regulations, and statutes in your location for handling compressed gases.
- 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 area with noxious fumes.
- Individual ovens are not rated to be explosion-proof.
- Never use the bottom of the chamber as a work surface.
- **Never place samples or product on the oven chamber floor.** Hotspots on the floor can run significantly hotter than the shelf temperatures.
- 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. These can rupture with improper use.
- Do not move the oven until it has finished cooling.
- Do not place corrosive materials in the oven. These will damage the oven chamber liner, shelving, and plumbing as well as compromise the exterior vacuum tubing.

- **Fire Suppression:** Ensure the fire suppression system and extinguishers are always operational or available during oven operation and comply with all applicable standards for your hazardous location and fire jurisdiction.

ELECTRONICS ENCLOSURE WARNINGS

These warnings are marked on a label plate on the oven exterior. The term Enclosure in the markings refers to the electronics component bay located inside the top of the oven.

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

AVERTISSEMENT – DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES – VOIR INSTRUCTIONS

(See page 77 in this chapter.)

WARNING – DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.

AVERTISSEMENT – NE PAS OUVRIR EN CAS DE PRÉSENCE D'UNE ATMOSPHÈRE EXPLOSIVE

(This warning applies to the electronics enclosure located inside the top of the oven.)

WARNING – PROTECTIVE GAS SUPPLY VALVE – FOLLOW INSTRUCTIONS BEFORE CLOSING

AVERTISSEMENT - SOUPAPE D'ALIMENTATION EN GAZ DE PROTECTION - SUIVEZ LES INSTRUCTIONS AVANT LA FERMETURE

WARNING – POWER SHALL NOT BE RESTORED AFTER ENCLOSURE HAS BEEN OPENED UNTIL ENCLOSURE HAS BEEN PURGED FOR 15 MINUTES AT A FLOW RATE OF 64.25 NL/min.

AVERTISSEMENT - L'ALIMENTATION NE DOIT PAS ÊTRE RESTAURÉE APRÈS L'OUVERTURE DU BOÎTIER JUSQU'À CE QUE LE BOÎTIER A ÉTÉ PURGE PENDANT 15 MINUTES À UN DÉBIT DE 64,25 NL/min.

WARNING – PRESSURISED ENCLOSURE.

AVERTISSEMENT - BOITIER SOUS PRESSION

WARNING – THIS ENCLOSURE CONTAINS INERT GAS AND MAY BE AN ASPHYXIATION HAZARD. THIS ENCLOSURE ALSO CONTAINS A FLAMMABLE SUBSTANCE THAT MAY BE WITHIN THE FLAMMABLE LIMITS WHEN EXPOSED TO AIR.

AVERTISSEMENT - CE BOÎTIER CONTIENT DU GAZ INERT ET PEUT ÊTRE UN RISQUE D'ASPHYXIATION. CETTE BOÎTE CONTIENT ÉGALEMENT UNE SUBSTANCE INFLAMMABLE QUI PEUT ÊTRE DANS LES LIMITES D'INFLAMMABILITÉ LORSQU'ELLE EST EXPOSÉE À L'AIR.

PURGE AND PRESSURIZATION SYSTEM SPECIFICATIONS

The purge and pressurization protection system has the following characteristics.

- Purge Flow Rate: 117.5 NLPM (Normal Liters per Minute)
- Minimum Flow Rate: 64.25 NLPM
- Maximum Air Supply Pressure: 13.7 bar
- Maximum Overpressure: 72 mbar
- Minimum Overpressure: 0.25 mbar
- Maximum Leakage Rate: 87.5 NLPM
- Minimum Purge Duration: 15 Minutes
- Protective Gas: Nitrogen (N_2) or Air

THEORY OF OPERATION

Purge and Pressurize Process

The built-in purge and pressurize system is engineered to prevent potentially explosive atmospheres from coming into contact with the oven's high-voltage electronic components when they are powered. This prevents the components — including the heating elements — from serving as explosion-ignition sources. The controller, power, and other major systems components are located in an enclosure at the top of the oven. The heating elements are positioned in an internal enclosure wrapped around the oven chamber exterior on the side walls, the ceiling, and the floor. The two enclosures are connected for purge gas flow and over-pressurization. Both are isolated from the oven chamber atmosphere and the contents of the internal vacuum plumbing.

The purge and pressurize process is automatic, fully automated, and must complete before the oven can be turned on. The purge is controlled by a timer. The timer only starts the purge when two conditions are both met. When power is provided to the oven (when it is plugged into a wall socket or the hardwire connection to the oven is energized) **and** when the purge gas is flowing through both enclosures. The timer automatically resets if the gas flow is interrupted or stops during the purge.

Prior to and while the oven is purging, only two types of electronic components are powered in the enclosures. Encapsulated components isolated from the enclosure atmosphere. Intrinsically safe components and circuits are designed to lack the spark potential and heat needed to ignite the hazardous atmosphere types the oven is engineered and certified to work with.

Purge gas flowing at the rate specified in this user manual purges the enclosure volumes five times within 15 minutes. While maintaining an overpressure slightly higher than the ambient atmosphere, the purge gas first diffuses through the electronics enclosure, then down a pipe into and through the elements enclosure, and then exits through the Purge System Exhaust vent on the back of the oven. When the purge completes, the gas flow maintains the overpressure and the oven enters a standby mode. An internal gas pressure regulator and an enclosure pressure-relief valve help safeguard against damaging levels of overpressure throughout the purge and after.

Once in standby mode, the oven can be fully powered (turned on) by an operator. When turned on, the oven seals the over-pressurized enclosures by internally closing the purge gas line and the Purge System Exhaust vent internal solenoids. However, the oven will automatically revert to standby mode, depowering the elements and other high-voltage components, if the overpressure is lost. The oven gas-in Vent port should remain connected to the pressurized gas supply flow while the oven is operating to help guard against the loss of overpressure by backstopping the pressurized enclosures.

The oven has been tested to the IECEx 60079 standards governing purge and pressurization, encapsulated components, and intrinsically safe components and circuits as protective concepts for preventing the ignition of explosive gases. **These features do not make the oven explosion-proof** or guarantee it cannot ignite explosive concentrations of gas or vapor if operated incorrectly. Residual risks are inherent in extracting or working with flammable materials and potentially ignitable atmospheres.

Vacuum System

In addition to the purge and pressurize requirements, the oven does not allow the heating elements to energize unless the oven chamber is vacuumed down to 0.1 bar (76 Torr) or lower. The heating elements are automatically depowered if the pressure rises above 0.1 bar.

Vacuum is supplied by an external vacuum pump or building supply system connected to an oven vacuum port. The oven comes with a vacuum fitting on its back that is opened and closed by the vacuum valve control on the front control panel. An optional side-mounted hand valve with a KF-25 vacuum fitting may be ordered when purchasing the oven.

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. Please see the **Vacuum Supply Required** topic on page 33 in the Introduction chapter for pump selection and safety considerations.

Heat Transport 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.

Internal Hotspots

Hotspots form on the chamber floor, walls, and ceiling while the oven is heating. These typically peak at their highest temperatures when the oven is heating from room temperature to an application setpoint. The oven is built to prevent these spots from approaching the auto-ignition temperature of the hazardous material groups allowed in this oven.

Your site-specific baking application SOPs must ensure the oven operates with a safety margin well below the auto-ignition temperature of any hazardous materials present in the oven chamber. This safety margin is always for the hottest potential hotspot in the oven chamber and not for the shelf temperature displayed on the front control panel.

Heating Control

The oven uses a solid-state temperature sensor attached to the exterior of the oven chamber wall. However, the display shows the oven shelving temperature, which is derived from the chamber wall measurements and has been confirmed through testing at the factory. A tuned proportional – integral – derivative (PID) loop is used in controlling power to the heating elements to avoid significantly overshooting the temperature setpoint. The rate of heating will slow as the oven shelving approaches the target temperature setpoint. 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.

The 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.

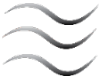
External Hot Spots

The oven is constructed to limit that the warmest hot spot on the oven exterior when operating within the allowed ambient operational range of 15° to 40°C (59° to 104°F). Operating the oven in a workspace with an ambient temperature exceeding 40°C (104°F) is not allowed as it can raise the temperature of external hot spots above the allowed limit.

The Over Temperature Limit System

The over-temperature limit system (OTL) is an operator-set, mechanical heating cutoff connected to a hydrostatic sensor probe on the oven chamber wall exterior. The system operates independently of the main temperature controller and routes power away from the oven heating elements if the chamber wall temperature exceeds the OTL temperature cutoff setting. It will continue doing so as long as the chamber temperature remains above the OTL setting. This helps safeguard the unit by preventing runaway heating in the event of electronics failures or a sudden external heat spike.

The OTL must be set by the oven operator to function. Failure to set the Over Temperature Limit system voids the unit manufacturing defect warranty in the event of an overtemperature event.



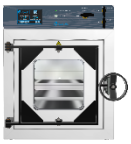
Oven Chamber Gas Backfill

The vacuumed down oven chamber can be backfilled and restored to room pressure through one of two methods. Opening the Vent Valve on the front control panel will backfill the oven chamber with pressurized gas from the same supply as the purge and pressurize system through the Vent gas-in port on the back of the oven. An optional backfill gas source may be connected to the Backfill gas-in port. This port is controlled by the Backfill control on the front control panel and allows the operator to backfill the oven chamber with a gas source separate from the purge and

pressurize supply source. The choice of backfilling gas source must be included in your site SOPs for each baking application.

Note: All procedures in the Installation chapter must be completed prior to starting the operational setup on this page.

PUT THE OVEN INTO OPERATION



After the oven is installed in a new workspace location, complete the steps and procedures listed in this entry. These test the vacuum integrity of the oven and connected vacuum system and set the over-temperature heating cutoff system prior to using the oven for a baking process or application. The process may require 1 to 3 hours depending on the temperature the oven will be heated to. **No hazardous substances or potentially explosive concentrations of gases or vapors are allowed in the oven or in the workspace area around the oven during this operational set-up with its vacuum system verification**.

Preparation

✓ Determine the highest temperature the oven will heat to during the first baking procedure.

✓ Perform the **Pre-Operation Safety Verifications** procedure on page 91.

✓ Verify no hazardous substances are present in the workspace location.

✓ Verify your process SOPs designate either the Vent or Backfill valve control on the front panel to backfill the oven chamber when restoring room pressure to the oven chamber.

First Activation

✓ Perform the **Supply Gas to the Purge and Pressurize System** procedure found on page 91.

✓ Provide power to the oven.

Power Cord Ovens: Plug the oven into its power outlet. Reminder: This outlet must be located outside the hazardous classified location.

Hardwire Ovens: Energize the power supply feed to the oven.

- The Purge Indicator light will illuminate in blinking green if you have started the purge and pressurize gas flow.
- **Note**: The Purge Indicator light will begin blinking red if no purge gas is flowing through the enclosures.

Continued next page

✓ Wait until the automatic purge cycle completes – approximately 15 minutes – ensuring any potentially explosive concentrations of gases or vapors have been expelled from the oven electronics and heating element enclosures.

✓ Perform the **Turn on the Oven** procedure on page 92.

Vacuum-Test, Heat, Set the OTL

Optional: You may change the display language from English to French and change the units of measurements for temperature and vacuum prior to performing the procedures in this section. See pages 94 and 96 for making these changes.

✓ Perform the following procedures to put the oven into operation.

1. Close and seal the oven chamber door using the **Latch the Oven Chamber Door** procedure on page 97.

2. Test the integrity of the vacuum system by pumping down the oven chamber in preparation for heating the oven. See the **Pumping Down and Backfilling** procedures on pages 99 and 100.

- Leave the oven chamber under vacuum while performing the following procedures.

3. Use the **Set the Temperature Setpoint** procedure on page 101 to set the oven to the highest setpoint of your baking application.

4. Perform the **Heat the Oven** procedure on page 103 to begin heating to your setpoint.

5. Allow the oven to heat to the setpoint.

6. Once the oven has thermally stabilized by operating for at least 30 minutes at your application temperature, perform the **Set the Over Temperature Limit** heating cutoff procedure on page 106.

The oven is now ready for operational use. You may turn off the oven heating and backfill the oven chamber. See the **Pumping Down and Backfilling** procedure on page 99. Note that the oven is well insulated and will require a significant period to cool as described in the **Oven Cooldowns** explanation on page 109.

This concludes the Put the Oven into Operation setup.

PRE-OPERATION SAFETY VERIFICATIONS

Prior to providing power or gas to the oven, the operator should verify the following.

1. Verify the oven is safe to put into operation. Check the documentation service file if restoring the oven to operation after a repair or other service. The file should indicate the oven was tested by a qualified service technician and is safe to put into operation.

2. Verify the vacuum and gas ports on the oven are either connected to a vacuum or gas supply line or are capped. This helps prevent the workspace atmosphere from entering the oven chamber when powered and heated.

3. Verify and log the highest temperature to be run during the setup or baking application.

4. Verify any hazardous substance that will be placed in the oven during a baking application belongs to an allowed hazardous material group. This includes substances used to treat products or samples.

5. Check which gas supply is designated in the process SOP for backfilling the oven chamber.

- The Vent valve control on the oven panel uses the Purge and Pressurize gas supply to backfill the chamber.
- The Backfill valve control flows gas from the Backfill gas-in port on the back oven to backfill the chamber.

6. Verify the **Vacuum**, **Vent**, and **Backfill** valve controls on the oven control panel are in the closed position. If the oven has a side-mounted vacuum control valve, that valve must also be in the closed position.

SUPPLY GAS TO THE PURGE AND PRESSURIZE SYSTEM

Supply a flow of gas to the oven before supplying power. **Note:** The exact order of operation of the following steps depends on your regulator type and gas system configuration.

- Set the Purge and Pressurize gas supply regulator to provide **4.2 cubic feet per minute (117.5 normal liters per minute)** of gas flow to the oven.
- Start a flow of gas to the Purge and Pressurize Gas-In Port.

Reminder: Power cord ovens must be plugged into an electrical outlet located outside of the hazardous location Zone.

Rappel: les fours à cordon d'alimentation doivent être branchés dans une prise électrique située à l'extérieur de l'emplacement ou de la zone classée dangereuse.

Supply Power to the Oven

This procedure triggers the automated purge and pressurize process.

Power Cord Ovens

1. Plug the oven power cord into the power outlet identified during the oven installation process. See page 50.

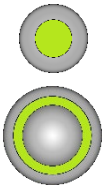
Hardwire Power Ovens (AKA fixed installation or permanent connect wiring)

1. Energize the circuit providing power to the oven.

Purge and Pressurize Process

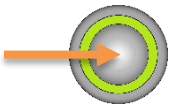
- Once power **and** a flow of purge gas are supplied, the oven will start purging the electronics and heating elements enclosures.
    - Purge Light on the front control panel will blink on and off as a green light, during the purge.
    - If the Purge Light is blinking red, the purge gas is not flowing through the enclosures.

- The oven automatically over pressurizes the electronics and heating elements enclosures at the end of the purge cycle.
- The purge cycle requires approximately 15 minutes for the oven to complete.
    - The Purge Light will illuminate continuously when the purge is complete.
    - The Power Button will blink on and off as a green light, indicating the oven is now in standby mode and ready to be turned on.

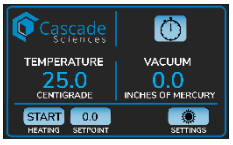


Turn on the Oven

The oven controls and other high-voltage components in the oven can be turned on once the automated purge and pressurize process is complete.



1. Push the Power Button.

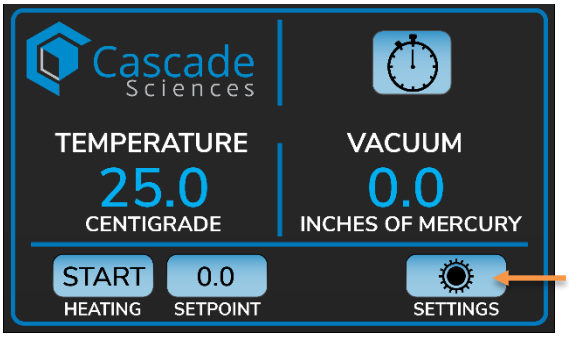


- The Button will illuminate continuously, and the Control Display screen will activate.

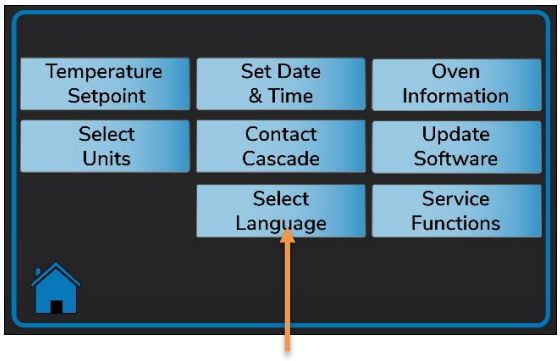
SELECTING A LANGUAGE

The unit controller can display information in either English or French.

1. Tap the Settings button on the Homepage.



2. Tap the Select Language button.



3. Choose the language for the oven display.

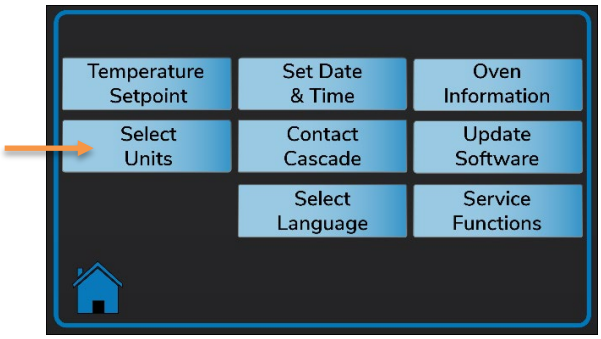
4. Tap the Home button to return to the Settings menu.

End of Procedure

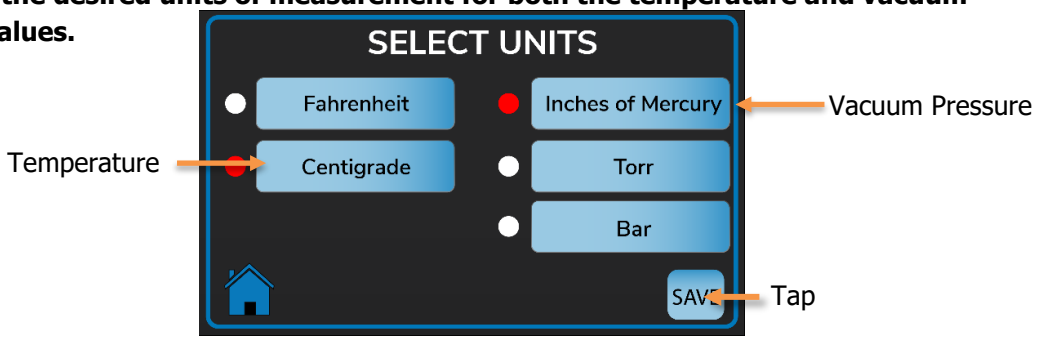
Changing the Unit of Measurement

1. Tap the Settings button on the Homepage. 

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

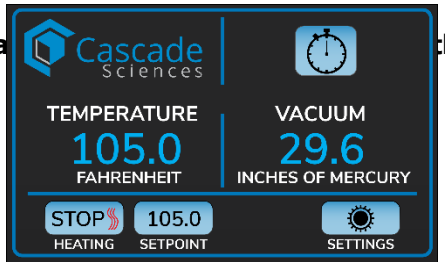
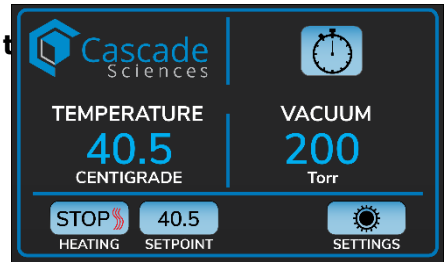


3. Select the desired units of measurement for both the temperature and vacuum display values.



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

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

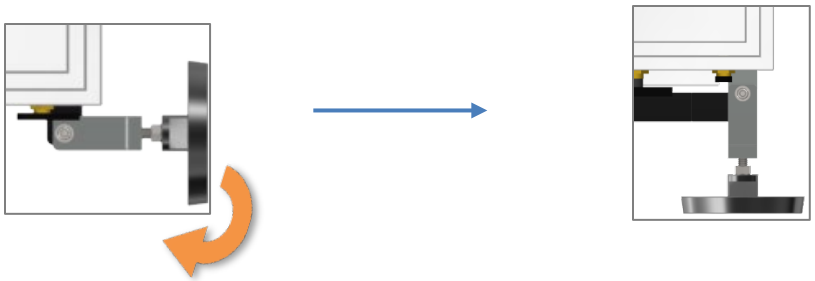
5. Ta  **he Homepage from t** 

Latch the Oven Chamber Door

Ensure the oven door is securely latched before placing the chamber under vacuum.

1. Position the door handle.

- Swing the handle wheel all the way to the left, until it is facing forward.



2. Secure the chamber door.

- Using one hand, turn the handle wheel clockwise (to the right) until the tongue of the handle wheel makes contact with the hasp on the chamber body.

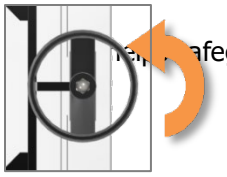
3. Tighten the handle wheel.

- Turn the wheel a **maximum of 3 more times** to tighten the door handle.
    - **Do not force or overtighten the wheel**. This can damage the door handle or latch.

4. Pump down the oven chamber to seal the door.

- See page 99 or 100.

5. Loosen the handle wheel after the oven chamber pressure drops below 400 Torr.



afeguard against inadvertently overpressurizing the chamber while backfilling.

- Turn the wheel **3 times** counterclockwise (to the left) to loosen the handle.

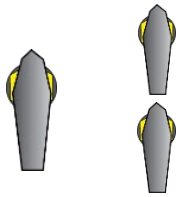
- Leave the handle facing forward. This prevents the door from springing open if the chamber is overpressurized.

Pumping Down and Backfilling the Oven

Reminder: Verify which valve control your process uses for backfilling the oven (Backfill or Vent).

Pump Down the Oven Chamber

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



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

2. Turn on your vacuum pump.

- If using a building supply system, verify it is providing vacuum to the oven vacuum port.

3. Open the oven Vacuum Valve.

Turn the control all the way counterclockwise.

VACUUM

- 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.

Holding at Vacuum

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

Backfilling the Oven Chamber

4. Close the Vacuum Valve.

VACUUM

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 or Backfill valve per your SOP.

VENT or Backfill

- The chamber will return to room pressure.

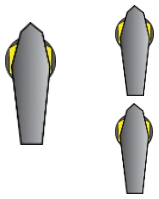
End of Procedure

Pump Down and Backfill – Side Valve

Reminder: Verify which valve control your process uses for backfilling the oven (Backfill or Vent).

Pump Down the Oven Chamber

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



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

2. Turn on your vacuum pump

- If using a building supply system, verify it is providing vacuum to the oven vacuum port.

3. Open the oven side Vacuum Valve

Turn the control all the way counterclockwise.

VACUUM

- The Vacuum level on the main controller should show the chamber pressure decreasing.

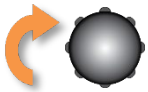
- The achievable vacuum level is dependent on altitude above sea level as well as the vacuum supply efficiency and the volume of outgassed byproducts.

Holding at Vacuum

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

Backfilling the Oven Chamber

4. Close the side Vacuum Valve



VACUUM

Turn the side 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 or Backfill valve per your SOP

VENT or Backfill

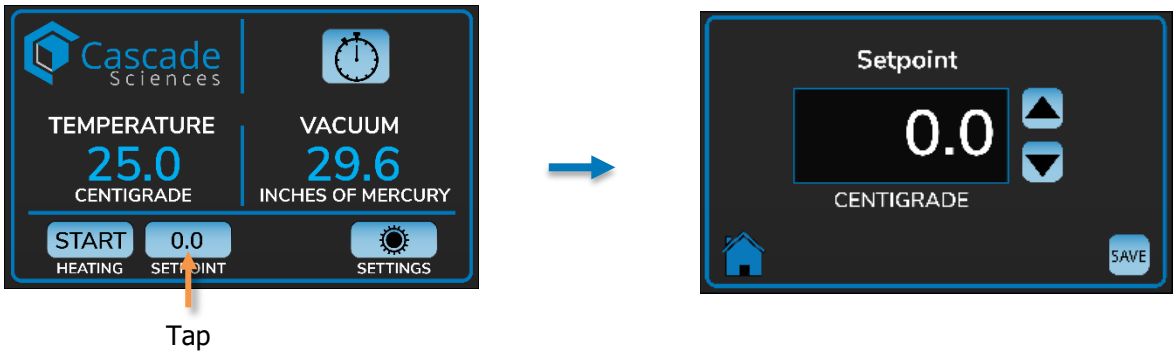
- The chamber will return to room pressure.

End of Procedure

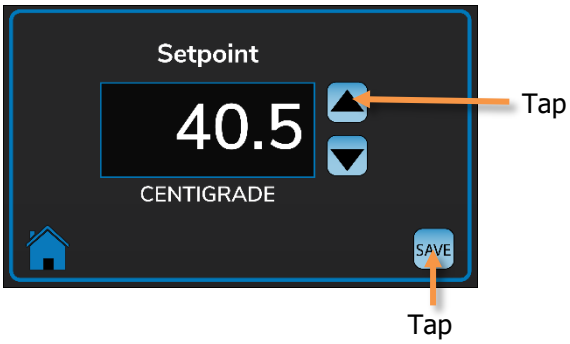
SET THE TEMPERATURE SETPOINT

Enter the target temperature of your baking application.

1. Tap the Setpoint button on the Homepage.

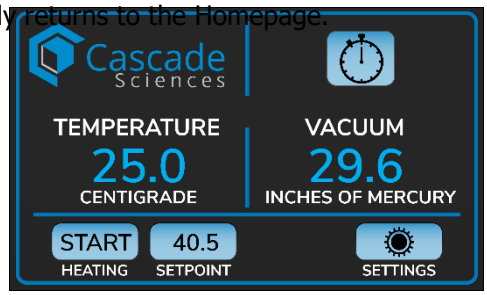


2. Use the arrow buttons to adjust the setpoint.



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

- The display automatically returns to the Homepage.



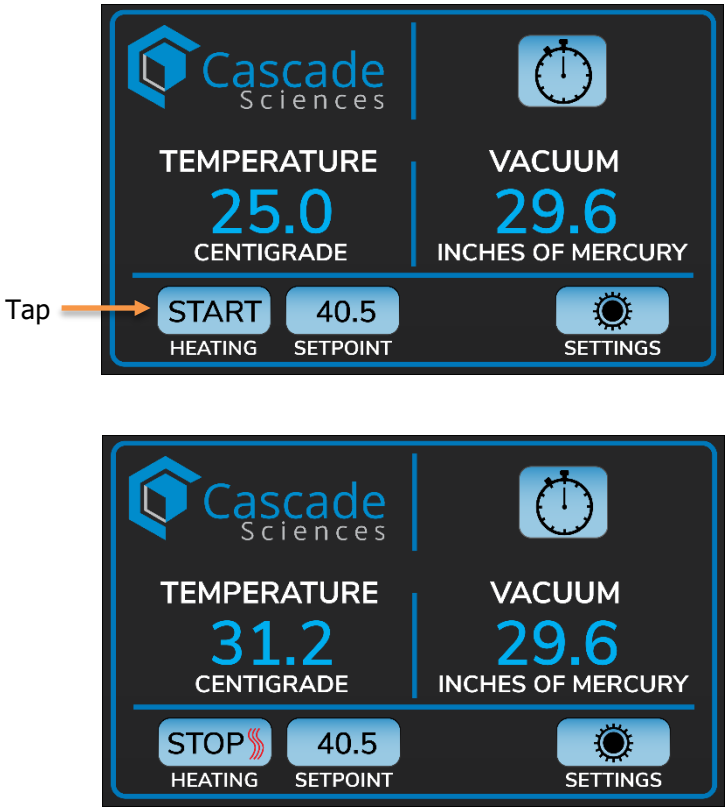
Note: See the next page for how to begin heating the oven chamber.

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 40.5°C

- **Reminder:** The oven will not heat unless the oven chamber is vacuumed down to 76 Torr (0.1 bar) or lower.
- A STOP button replaces the START button.
- The heating icon on the STOP button pulses 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

OVEN HEATING SAFETY INTERRUPTS

Oven Chamber Vacuum Pressure Rises

The oven automatically stops heating when the oven chamber pressure rises above 76 Torr (0.1 bar). Heating remains off until the chamber pressure drops to 76 Torr or lower.

Overpressure Loss

The oven reverts to standby mode If the electronics or heating element safety enclosures lose overpressure.

- The oven heating elements and the touchscreen display turn off.
- The Purge Light will change to blinking green to indicate that the oven is purging the electronics and heating elements enclosures.
    - If the purge and pressurize gas supply has been lost or has insufficient pressure, the Purge Light will blink red until the supply has been restored.
- The oven must run through the purge cycle before heating resumes.

Over Temperature Limit System Tripped

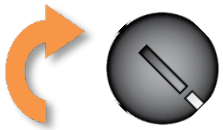
The oven reroutes power from the heating elements if the chamber temperature exceeds the temperature cutoff setting of the independent, mechanical OTL system.

Note: Test the OTL system at least once per year to verify its functionality. **Failure to set the OTL voids the manufacturing defect warranty if over-temperature damage occurs.**

Set the Over Temperature Limit

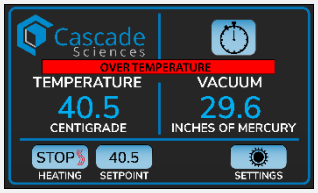
Perform this procedure when the unit has been running under vacuum at your baking application's highest temperature for at least 30 minutes with no temperature fluctuations.

1. Set OTL control to its maximum setting.



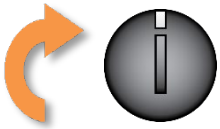
- If not already set to max.

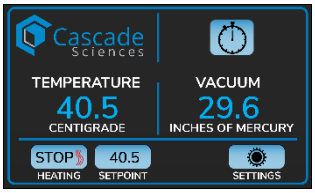
2. Turn the dial counterclockwise (to the left) until the Over Temperature alert appears on the display.



- An alert bar labeled "Over Temperature" will flash on the oven display screen indicating the OTL heating cutoff is active.
- There is a soft click when the OTL begins rerouting power away from the heating elements.

3. Slowly turn the dial clockwise (to the right) until the Over Temperature alert turns off.





- The red flashing alert bar will disappear from the display screen.
- The Over Temperature Limit is now set at approximately 10˚C above the current chamber temperature.

4. Leave the OTL dial set just above the activation point.

Optional: Turn the dial slightly to the left (counterclockwise).

- This sets the cutoff threshold nearer to the current chamber temperature.

If the Over Temperature Limit sporadically activates after setting the control, turn the dial very slightly to the right (clockwise). If the OTL continues activating, check for ambient sources of heat or cold that may be adversely impacting the unit temperature stability. If you find no sources of

external or internal temperature fluctuations, contact Customer Support or your distributor for assistance.

End of Procedure

OVEN HEATING DYNAMICS

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 and evenly distribute thermal energy in the oven chamber.

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 displayed on the oven control panel.
- Leave the oven on and under vacuum after it has reached your setpoint temperature. The oven can be left on between baking applications if permitted by your site SOPs.
- 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.
- If permitted by your site SOPs, leave the shelves in the heated chamber. This allows for optimal heat absorption in preparation for vacuum heating applications.

LOADING AND UNLOADING THE OVEN

Keep the following considerations in mind when loading and unloading the oven:

- Ensure the Vent and Backfill handles are closed, preventing compressed gases from streaming out into the workspace while unloading materials.
- Avoid handling solvents (pouring, treating samples) or other actions that risk spilling or aerosolizing solvents near the oven or vacuum pump.
- Verify sufficient workspace ventilation is present prior to loading solvent-treated material in the oven chamber.

OVEN COOLDOWNS

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.

POWER INTERRUPTIONS

In the event of short-lived loss of power (in the range of two minutes), the oven will resume operating at its previous state when power is restored.

This period can vary depending on how long the oven has been off prior to use and the number of recent power interruptions. The oven has a finite onboard power supply to temporarily store the settings of its last operational state.

Power Interruption Indicator

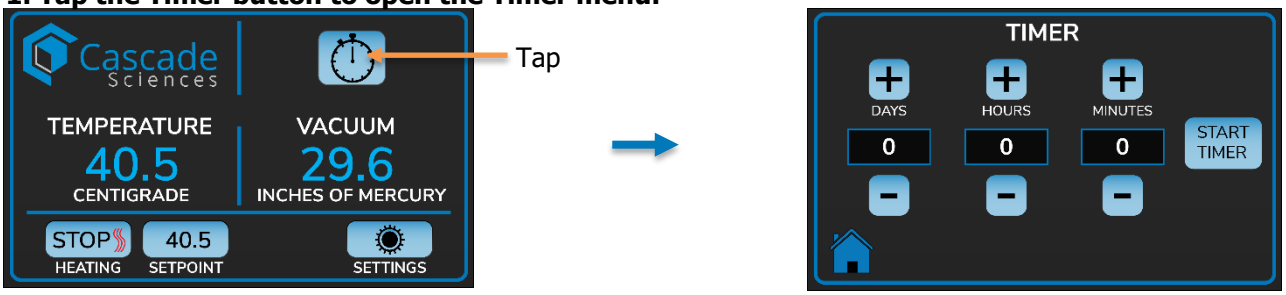
When the oven resumes operating, the Purge indicator light will be off. This is the only time the Purge lamp is off while the oven is connected to an energized power supply.

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

USING THE TIMER

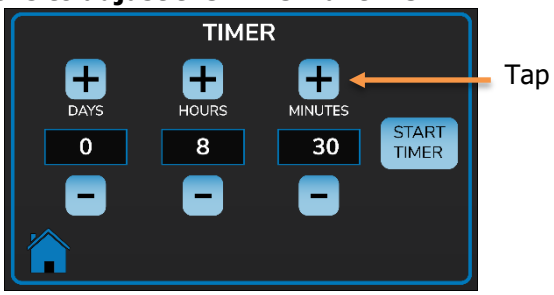
The oven can be set to heat for a limited duration. At the end of this timed period, the oven stops heating.

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

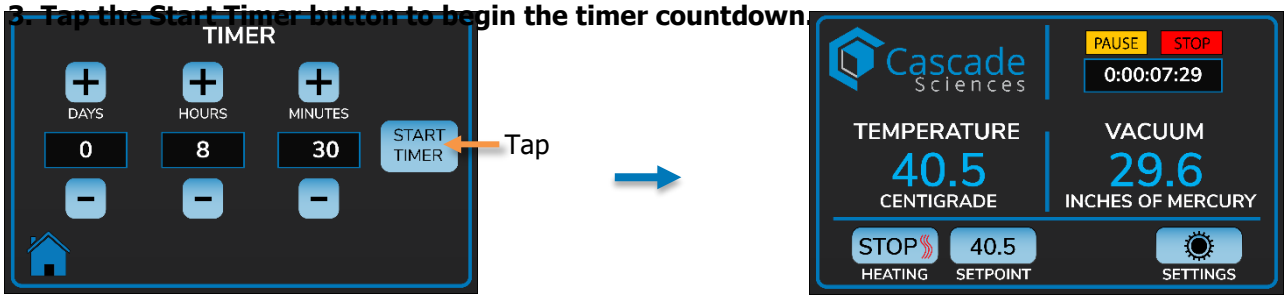


2. Use the plus and minus buttons to adjust the Timer runtime.

- 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.

PAUSE

- Tap the red timer Stop button to clear the Timer Finished message.

INCHES OF MERCURY DISPLAY

The oven can measure and display vacuum pressure in Torr, Barr, and inches of mercury (InHg). Torr and Barr are absolute measurements. Inches of mercury is a relative measurement of how much pressure has been pumped from the oven chamber. The baseline InHg pressure is set for just above sea level.

- At or near sea level pressure, 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 when at room pressure.
    - This reflects the fact that room atmospheric pressure is less at high altitudes than the sea-level environment the measurement uses as its baseline.

Service and Service Documentation Requirements

Reminders

- **Certified Repair Facility Required**: Repairs, overhauls, and other services must be performed at an IEC Ex-certified facility or by certified and competent technicians from a certified facility.
- **Service Documentation File Access**: Service facilities and their technicians must have access to the oven service document file when inspecting and servicing the oven.
- **Repair Report Required:** A repair report (also known as a job or service report) must be provided by the service facility. The report must be filed or logged in the oven service file.

See pages 31 and 32 for more information.

User Manual Access

Service technicians working on CVO-5-EX-SS ovens must have access to a copy of this manual.

Safety After Repairs and Maintenance

Verify the oven is in a safe state prior to returning it to operation after any repairs, maintenance, or other service procedures are performed on it.

- Consult the oven service document file to help verify the oven is safe to operate.
- Review the Installation chapter and verify the oven is correctly and safely installed in its workspace location.
- Perform the **Put the Oven into Operation** procedure starting on page 89 to ensure the oven is safely configured for use.

Electrical Components

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

Fuses: Replacement of fuses is a service level procedure and should only be performed by a qualified technician. All fuses are located inside the sealed electronics component enclosure and are

isolated by the purge and pressurization safety system from contact with potentially explosive atmospheres during powered operation.

Software and Firmware Updates

Software and firmware updates are service-level procedures and require opening the electronics enclosure. Ex-marked explosion protection ovens for Zone 2 and Class 1 Division 2 spaces cannot have an external data port for updates due to the sparking hazard.

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.

Door Gasket Replacement

The door gasket is a low-wear item. It typically only needs to be replaced due to being cut or nicked. The risk of this type of damage can be significantly reduced by opening the door to 130°, keeping it well out of the way of shelves or sample trays being removed from or inserted into the chamber.

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 reduced 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 gasket's narrow side 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.

End of Procedure

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

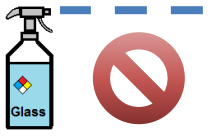
If a hazardous material or substance has spilled in the oven, immediately initiate your site's Hazardous Material Spill Containment protocol. Contact your local Site Safety Officer and follow instructions per the site policy and procedures.

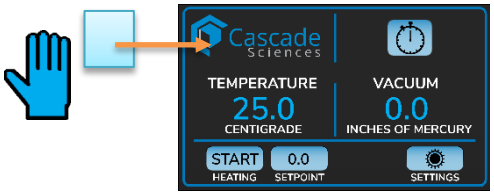
- Periodic cleaning is required.
- Do not use spray-on cleaners or disinfectants. These can leak through openings and coat electrical components.
- Do not use cleaners or disinfectants that contain solvents capable of harming paint coatings or stainless-steel surfaces. **Do not use chlorine-based bleaches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





- Do not spray cleaning or disinfecting agents directly onto the screen.
- Spray onto a lint-free soft wipe or cloth ensuring the entire cloth is damp, then apply.
- The manufacturer recommends non-chlorine-based wipes to clean and disinfect. Isopropyl alcohol wipes are acceptable.
- If the oven is powered, begin cleaning by placing the cleaning and disinfecting wipe on the display screen logo.

- Wipe across the screen surface while maintaining continual contact. This should avoid triggering the buttons.

Continued from the previous page

Oven Chamber Cleaning Guidelines

- Remove any removable chamber accessory items such as shelving if present.
- Use 99% isopropyl alcohol to clean chamber surfaces and shelving. Apply using lint-free wipes.
- Clean all removable accessories and components.
- Verify the cleaning alcohol has evaporated completely from all chamber surfaces and accessories prior to reconnecting the unit to its power source.
- **Do not clean with deionized water.** DI water can be corrosive to metal surfaces.

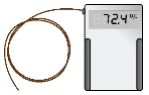
VACUUM PUMP MAINTENANCE

Vacuum pumps are high-wear equipment and require the 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 requires maintenance. After maintenance, verify the pump is in a safe state prior to restoring it to service.

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.**

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.

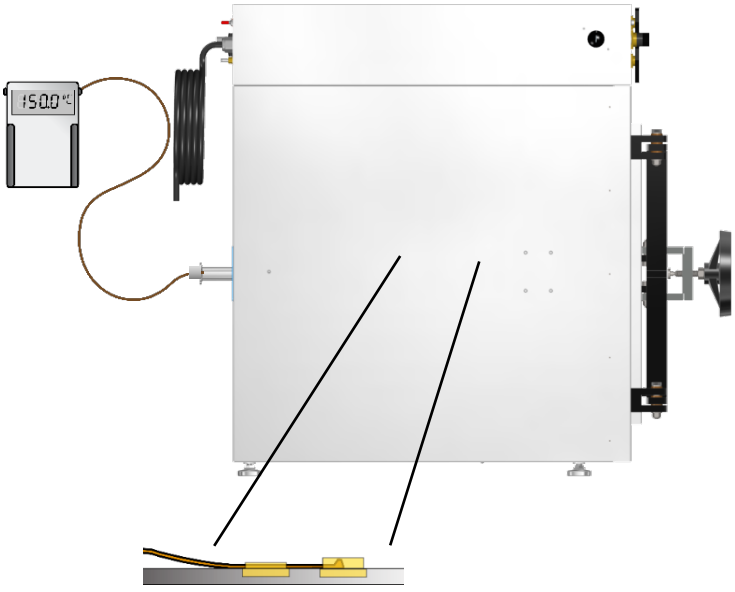
Ensure that no hazardous materials or gases are present in the chamber before beginning calibration.

Heat-resistant polyamide tape recommended

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.

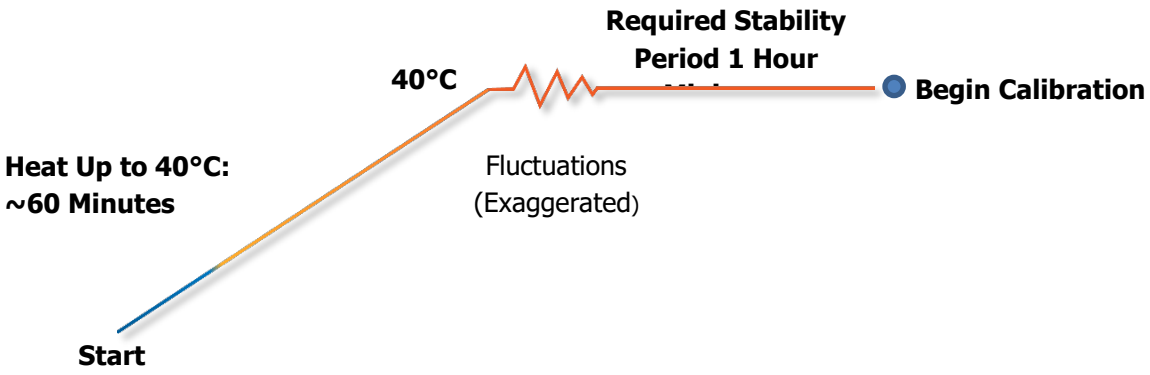
3. After securing the probe head in position, use the KF-25 clamp to secure the feedthrough and seal the port.

4. Close and latch the oven chamber door in preparation for pumping down the oven chamber.

5. Pump down the oven chamber, them heat the chamber to your calibraton temperature.

6. 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

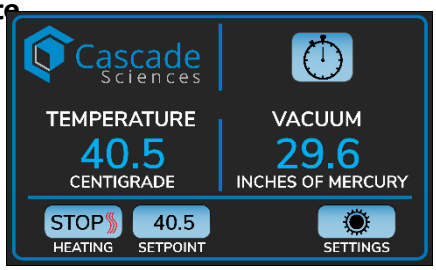
Suggested Calibration Procedure

1. Compare the reference 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 shelf temperature. **The Temperature Calibration procedure is now complete.**

Reference

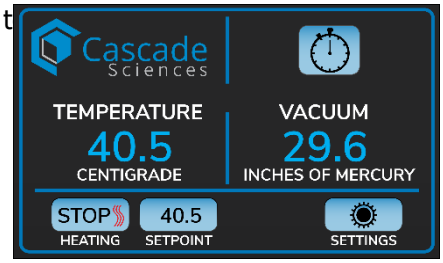
Unit in Calibration



- If the difference falls outside of your protocol range, advance t

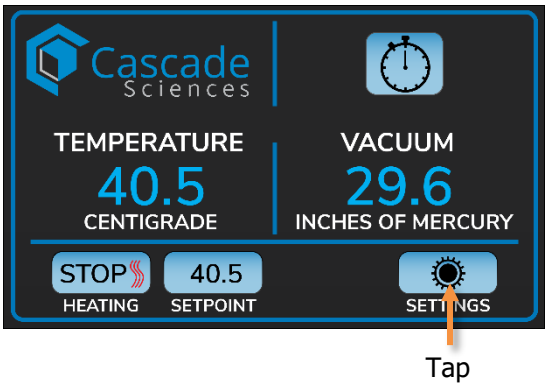
Reference Device

Calibration Required

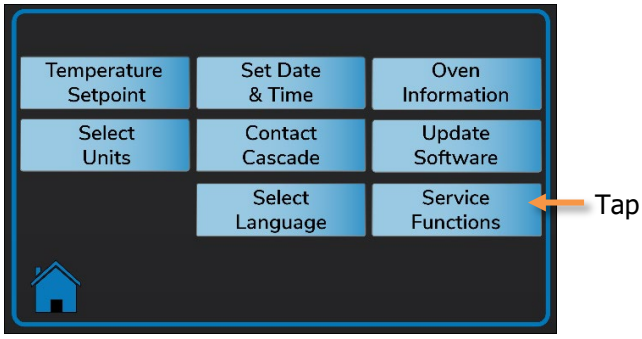


Temperature Calibration Continued

2. Tap the Settings button on the Homepage.

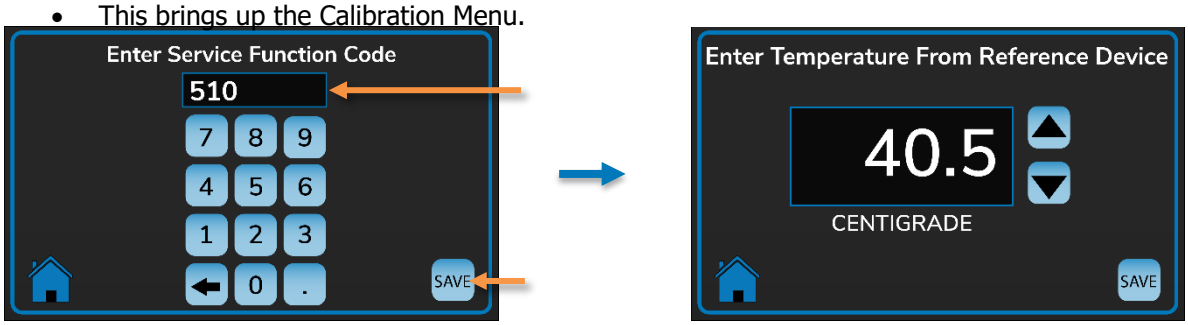


3. Tap the Service Functions button.



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

- This brings up the Calibration Menu.



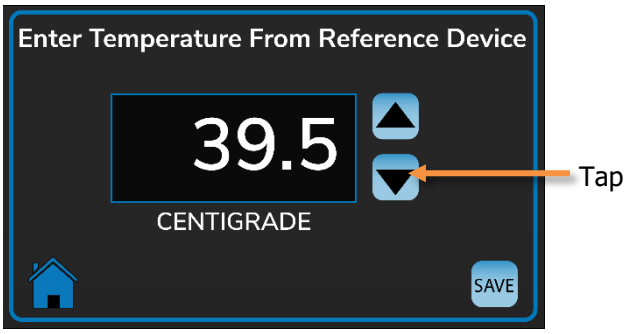
Continued next page

Temperature Calibration Continued

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

- The temperature calibration function has a range of approximately ±10°C (18°F). For temperature deviations outside these parameters, contact **Technical Support**.

Reference

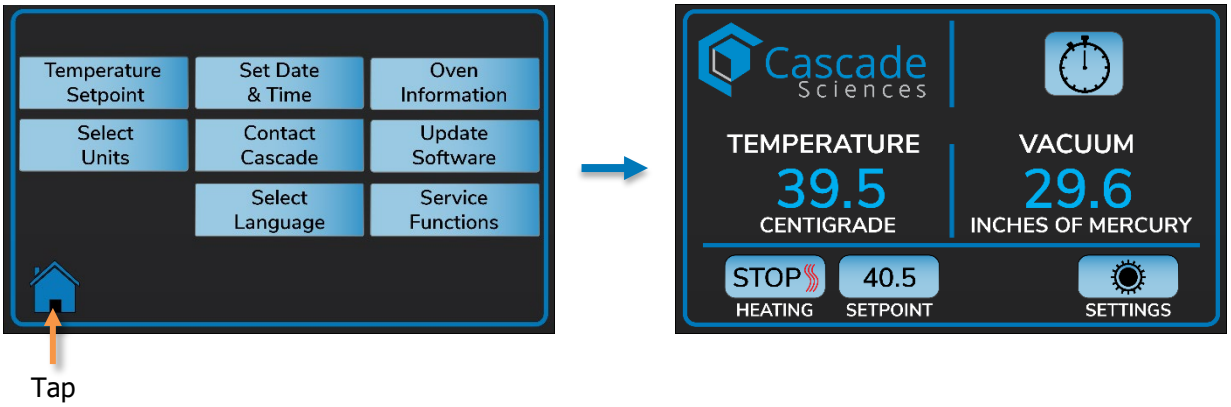


6. Tap the Save button to save the new temperature.

- 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.



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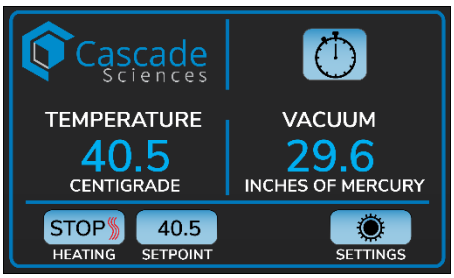
Temperature Calibration Continued

8. Allow 1 hour for the oven to stabilize



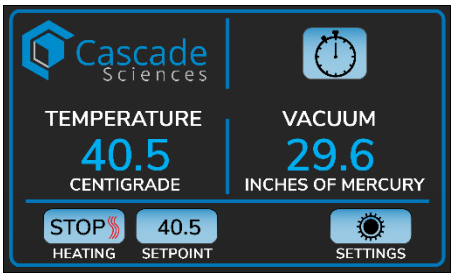
- Wait one hour after the oven has reached the corrected temperature.
- Failure to wait until the oven is fully stabilized will result in an inaccurate reading.

9. Compare the reference device and the corrected oven temperature display

- 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**.

Reference

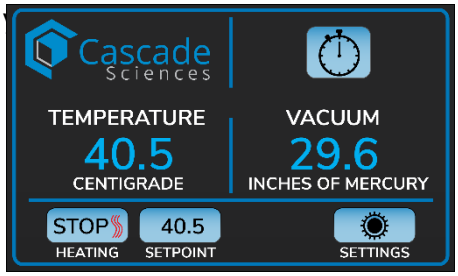
Unit in Calibration



- If the difference still falls outside the acceptable range of steps 2 – 9 up to two more times.

Reference

Further Calibration Required



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

Ensure that the temperature probe has been removed and the oven chamber fully sealed before putting the oven back into operation.

End of Procedure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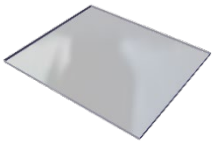
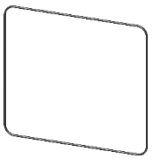
REPLACEMENT PARTS

Description	Parts Number
Adjustable leveling foot, 1 each (requires 4)	 **2700506**
Shelf	 **5680563**
Shelf clips Requires 4 clips per shelf	 **1250510**
Door Gasket	 **3450789**
Vacuum Tubing Connection Kit, **Side Vacuum Valve Option** Tubing with KF-25 fittings and 2 KF-25-sized clamps.	 **9990876**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SPECIAL CONDITIONS OF USE

Potential Electrostatic Charging Hazard

This equipment incorporates non-metallic parts of the enclosures. These components should only be contacted with a damp cloth as per the warnings on the equipment and in the manual to prevent the possibility of ignition through static discharge.

See page 77 for additional hazard warnings and precautions.

Fixed Installation Ovens

(Hardwire power source oven models)

If the system will be installed as a fixed installation configuration, the electrical connection of the equipment must be made either via a suitable hazardous location rated junction box or outside the hazardous zone.

Ovens with plug-in power cords must be plugged into an outlet located outside the hazardous zone.


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