Drying — Decarboxylation Oven

220 – 240 Voltage

Cascade Sciences

CDO-28

Installation - Operation Manual

This oven requires permanent connect wiring to a power source (also known as a hardwiring). It does not connect with a power cord.

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

CDO Drying and Decarboxylation Oven

220 – 240 Voltage

Installation and Operation Manual

Part Number (Manual): 4861778

Revision: November 7, 2019

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CERTIFICATIONS

This certificate satisfies NRTL safety requirements

TÜV SÜD CUE

Certificate Number: U8 17 03 64872 070

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

The units have been tested to the following requirements:

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

CERTIFICATIONS

UNIT SPECIFICATIONS

These ovens are 220 – 240 voltage single-phase units. Please refer to the oven data plate for individual electrical specifications.

Technical data specified applies to units with standard equipment at an ambient temperature of 25°C and 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

Range	Uniformity @240°F	Stability @ All Temps.
Ambient +26° to 300°F*	3.6°F	± 0.4°F

*As set at the factory, the oven controller software restricts the maximum operating temperature to 300°F. Contact Cascade Sciences to unlock the temperature restriction if you want to use the oven for applications other than biomass decarboxylation running above the factory-restricted max temperature.

The maximum unrestricted chamber temperature the oven can achieve is 350°F (177°C). **Do not use mesh bags** at temperatures exceeding 240°F (115°C)!

Heat Up Times from Ambient (77°F)

To 240°F
22 Minutes

Temperature Recovery Times, Door Opening @ 240°F

30 Second Opening	60 Second Opening
3 Minutes	5 Minutes

HVAC LOAD

BTU/Hour
6723

POWER

AC Voltage	Amperage	Frequency	Phase	Energy Consumption
220 – 240	26	50/60 Hz	1	47.3 kWh/Day

SPECIFICATIONS

Airflow Performance

Air Exchanges

Per Minute
125

Exhaust Airflow

Cubic Feet	Liters
17.3 per Minute	490 per Minute

Weight

Shipping	Unit Weight
694 lb / 315 kg	255.4 lb / 115.8 kg

Dimensions

By Inches

Exterior W × D × H	Interior W × D × H
42.5 x 34.1 x 85.9	31.7 x 26.0 x 60.9

By Millimeters

Exterior W × D × H	Interior W × D × H
1080 x 866 x 2182	805 x 660 x 1546

Capacity

Volume

Cubic Feet	Liters
28.0	792

Shelf Capacity by Weight

Per Shelf	Total
75 lb / 34 kg*	450 lb / 204 kg**

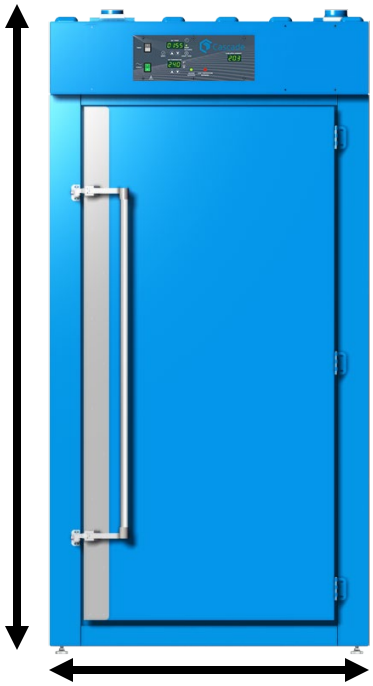
*75 lb / 34 kg with weight evenly distributed across the shelf.

**450 lb / 204 kg total load. Exceeding this limit risks damaging the chamber liner.

SPECIFICATIONS

Unit Dimension Drawings

Total Height: 85.9 inches (2182 mm)

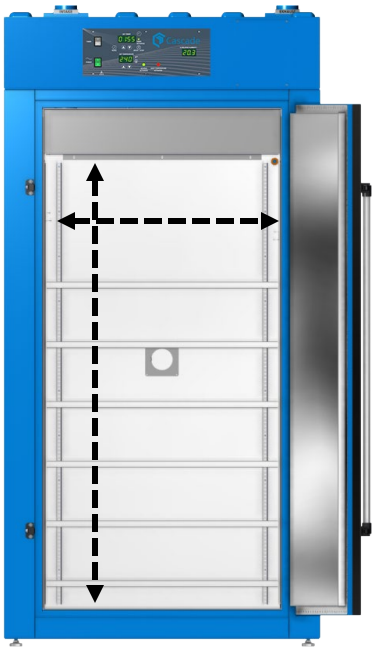


Width: 42.5 inches (1080 mm)

Exterior Dimensions

Depth: 34.1 inches (866 mm)

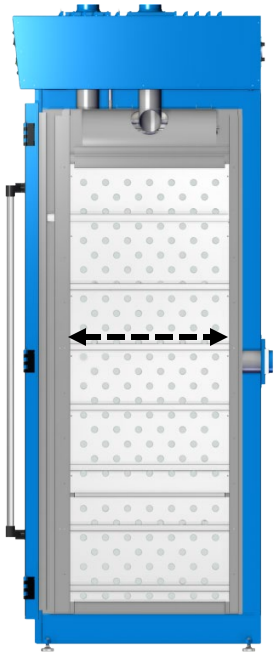
Width: 31.7 inches (805 mm)



Height: 60.9 inches (1546 mm)

Chamber Interior

Depth: 26.0 inches (660 mm)



Cutaway Side View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READ THIS MANUAL

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

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

Keep this manual available for use by all operators.

Intended Applications and Locations

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

CONTACTING ASSISTANCE

Please have the following information ready when calling or emailing Technical Support: the **model number** and the **serial number** (see page 15).

Phone: 503 847-9047

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

ENGINEERING IMPROVEMENTS

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

INTRODUCTION

RECEIVING YOUR UNIT

INSPECT THE SHIPMENT

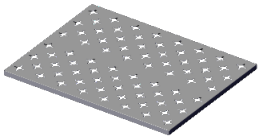
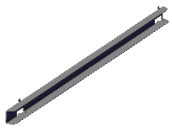
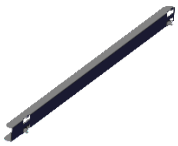
- When a unit leaves the factory, safe delivery becomes the responsibility of the carrier.
- **Damage sustained during transit is not covered by the manufacturing defect warranty.**
- Save the shipping carton until you are certain that the unit and its accessories function properly.

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

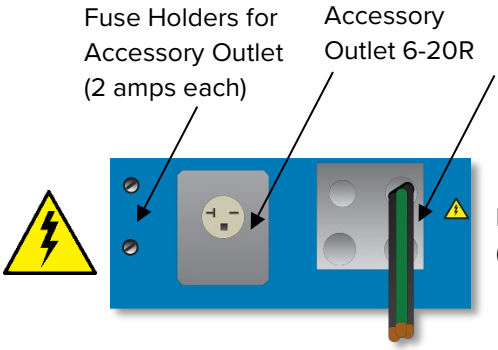
1. Carefully inspect the shipping carton for damage.
2. Report any damage to the carrier service that delivered the unit.
3. If the carton is not damaged, open the carton and remove the contents.
4. Inspect the unit for signs of damage. See the orientation depiction on the next page as a reference.
5. The unit should come with an Installation and Operation Manual.
6. Verify that the correct number of accessory items has been included.
7. Carefully check all packaging for loose accessory items before discarding.

Included Accessory Items:

Shelves	Shelf Sliders Left	Shelf Sliders Right	Leveling Feet
6	6	6	4


Orientation Images

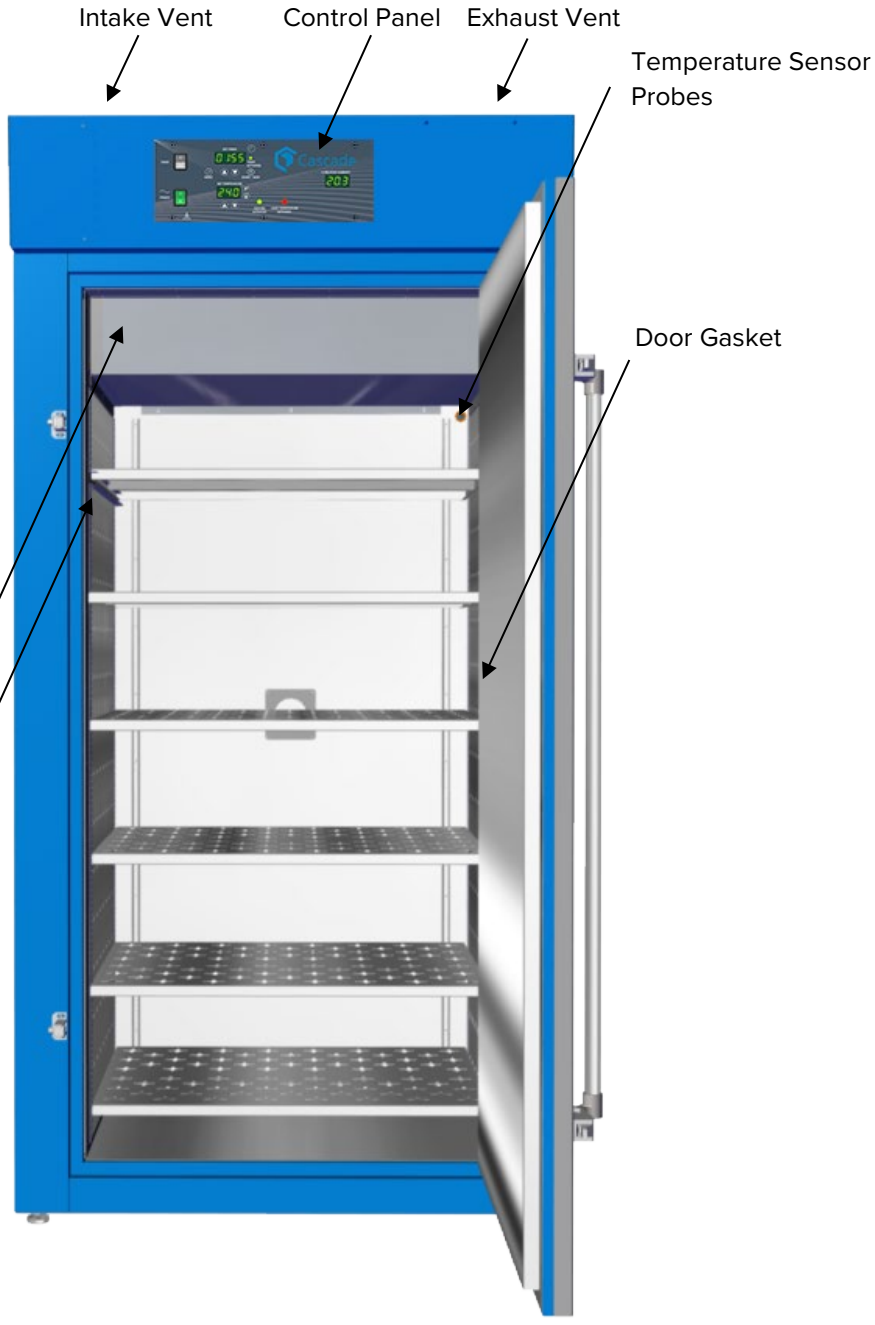


Power Panel (Back of Oven)

Permanent Connect Wire Braid 10-gauge, 6 inches (150 mm)

CDO-28

Access Port (Back of Oven)



RECORDING DATA PLATE INFORMATION

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

- The data plate is located on the back of the oven, below the power braid inlet.

Date Plate Information

MODEL NO:	
SERIAL NO:	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HARDWIRE REQUIREMENT

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

INSTALLATION PROCEDURE CHECKLIST

For installing the oven in a new workspace location.

Pre-Installation

- ✓ Check that the required ambient conditions for the oven are met, page 18.
- ✓ Check that the spacing clearance requirements are met, page 18.
    - Unit dimensions may be found on page 5.
- ✓ Check that a suitable permanent connect electrical power supply is present, page 19.

Install the oven in its workspace location

- ✓ Review the lifting and handling instructions, page 20.
- ✓ Install the leveling feet, page 21.
- ✓ Install the oven in its workspace location, page 21.
    - The oven may be connected to its power supply after this procedure.

Set up the oven for use

- ✓ Clean the oven shelving. Clean the chamber if needed, page 21.
- ✓ Install the shelving, page 22.

Required Ambient Conditions

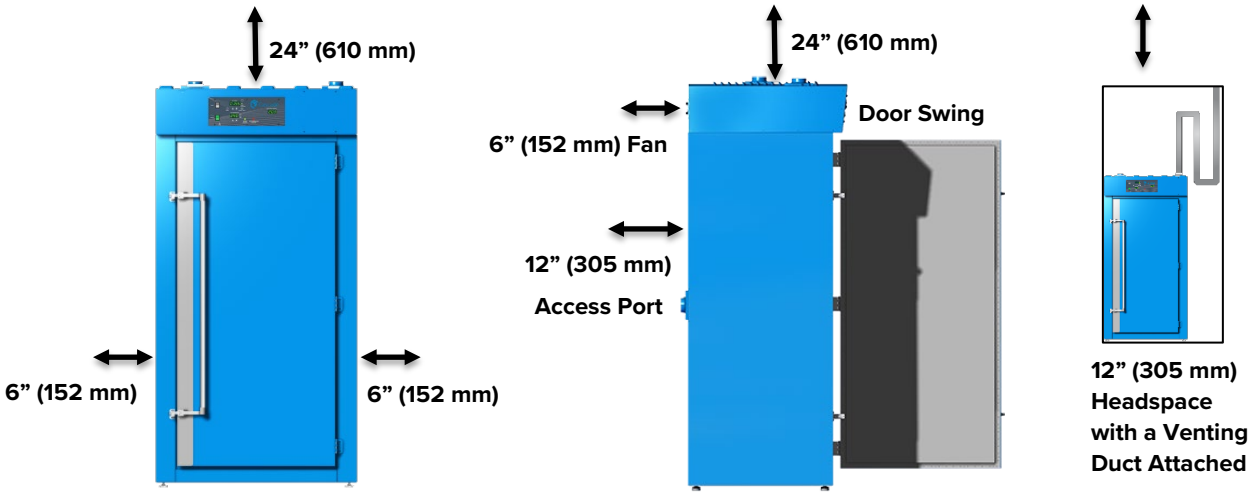
These units are built for use indoors at room temperatures between **15°C and 40°C (59°F and 104°F)** at no greater than **80% Relative Humidity** (at 25°C / 77°F). Operating outside these conditions may adversely affect the unit temperature performance.

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

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

Required Clearances

These clearances are required to provide air flows for ventilation and cooling.



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

24 inches (610 mm) of headspace clearance is required between the exhaust vent and any overhead cover or partition.

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

Do not place objects on top of the oven.

Allow at least **6 inches (152 mm)** from the access port and fan vent on the back of the oven to the nearest wall or partition. Keep the fan unobstructed at all times.

- The chamber access port is located on the back of the oven. Leave sufficient room for easy access if oven operators will be using the port.

POWER SOURCE REQUIREMENTS

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

Power supply: The power supply must meet the power requirements listed on the oven data plate (located on the back of the unit, beneath the power feed inlet.

- These ovens are intended for a **220 – 240 volt, 50/60 Hz** applications at **26 amps**.
- The power source must be **single (1) phase** and **protective earth grounded**.
- The power source must conform to all national and local electrical codes.
- **Supplied voltage must not vary more than 10% from the data plate rating**. Damage to the oven may result if the supplied voltage varies more than 10%.
- 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 oven data plate.

Switch or circuit-breaker: A switch or circuit-breaker must be used in the building installation to protect against overcurrent conditions involving the oven and its major components.

- The manufacturer recommended circuit-breaker is **30 amps**.

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

- The Disconnect must be in close proximity to the equipment and within easy reach of the operator.
- The Disconnect must be marked as the disconnecting device for the equipment.

Accessory Outlet fuses: The oven is also provided with a pair (2) of 2-amp fuses installed adjacent to the external power receptacle used to power accessories.

- The fuses protect against overcurrent conditions related to the operation of any attached accessories. If one fuse blows, the receptacle will depower. The cause of a blown fuse should be determined prior to replacing it.
- **These fuses do not provide protection against overcurrent events associated with major components of the oven**. Overcurrent protection for the oven must be set up in the location power supply external to the unit. See the circuit breaker requirements above.

Power Feed Wiring

The oven comes provided with an integral 6-inch (150 mm) wire braid consisting of two 10-gauge hot wires and a 10-gauge earth ground.

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

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

General Power Safety

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

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

- Always hardwire the unit power feed to a protective earth-grounded electrical source that conforms to national and local electrical codes. If the unit is not grounded, parts such as knobs and controls may conduct electricity and cause serious injury.
- Avoid damaging the power feed. Do not bend it excessively, step on it, or place heavy objects on it.
- A damaged power feed can be a shock or fire hazard. Never use a power feed if it is damaged or altered in any way.
- Position the equipment so the operator can quickly and easily disconnect or uncouple the power feed in the event of an emergency.

Lifting and Handling

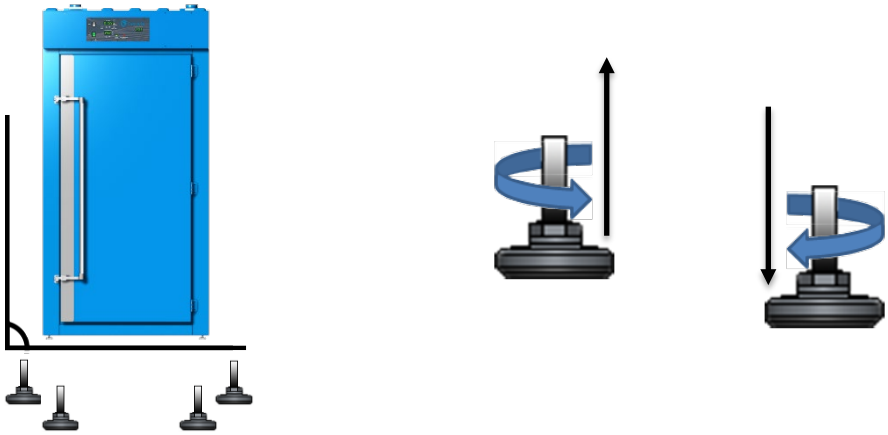
The oven is heavy. Use appropriate lifting devices sufficiently rated for these loads. Follow these guidelines when lifting the oven:

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

LEVELING

Install the 4 leveling feet with the 4 corner holes on the bottom of the oven.

The oven must be level and stable for safe operation.



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

INSTALL THE OVEN

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

- Verify that the oven stands level and does not rock. Adjust the leveling feet as needed.
- **Power**: The oven may now be hardwired to its power source.

INSTALLATION CLEANING

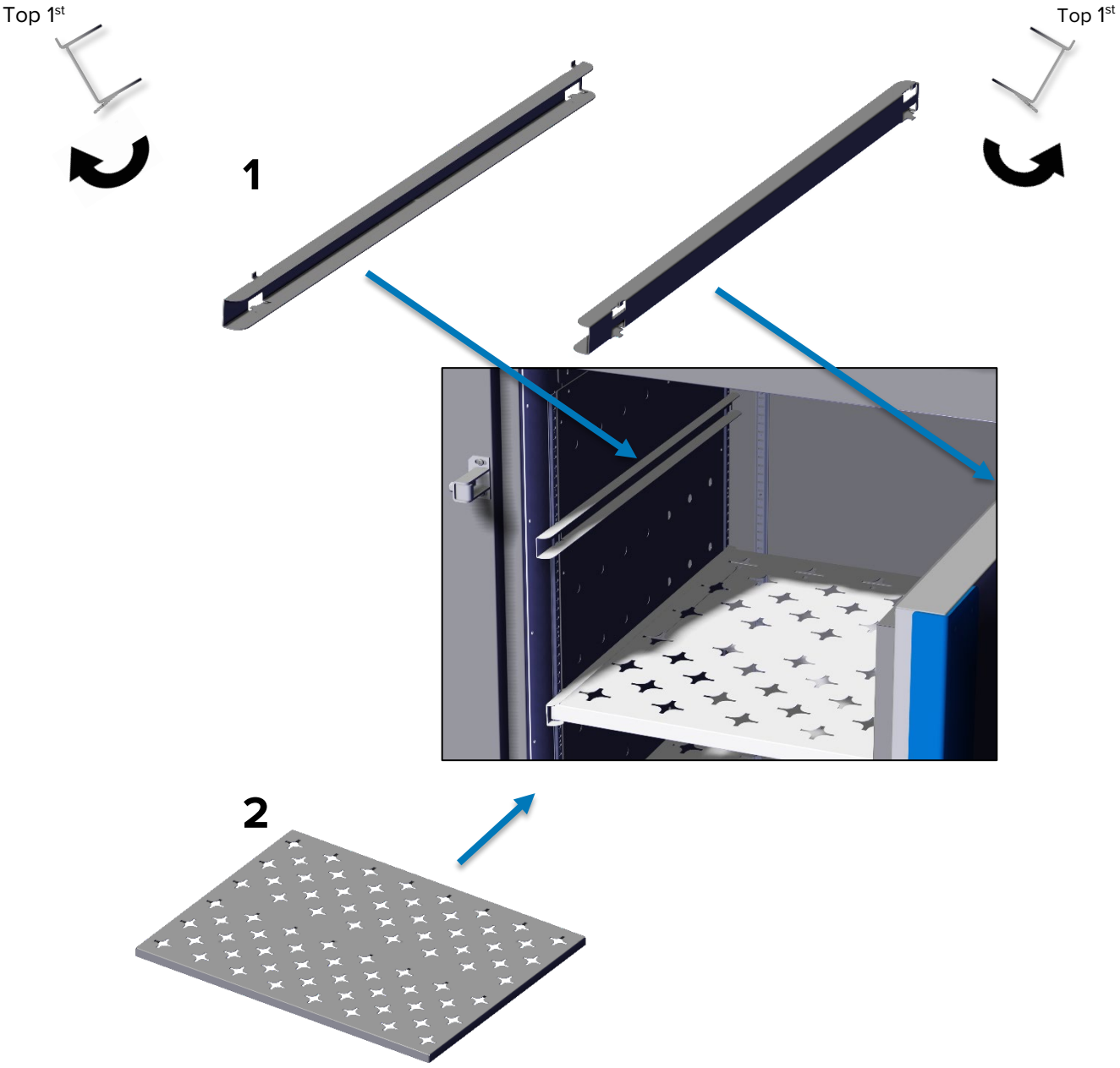
The manufacturer recommends cleaning the shelving and oven chamber prior to installation of the shelving in the chamber. The unit was cleaned at the factory but may have been exposed to contaminants during shipping.

- The unit was cleaned at the factory but may have been exposed to contaminants during shipping.
- Remove all wrappings and coverings from shelving prior to cleaning and installation.
- **Do not clean with deionized water.**
- See the **Cleaning and Disinfecting** topic in the User Maintenance section (page 39) for more information on how to clean and disinfect without damaging the unit.

INSTALL THE SHELVING

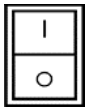
The horizontal airflow within the chamber moves from the small duct holes on the right-hand side of the chamber to the large holes on the left side. Place the shelves as not to obstruct the duct holes on either side. This maximizes airflow across the shelf space.

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



GRAPHIC SYMBOLS

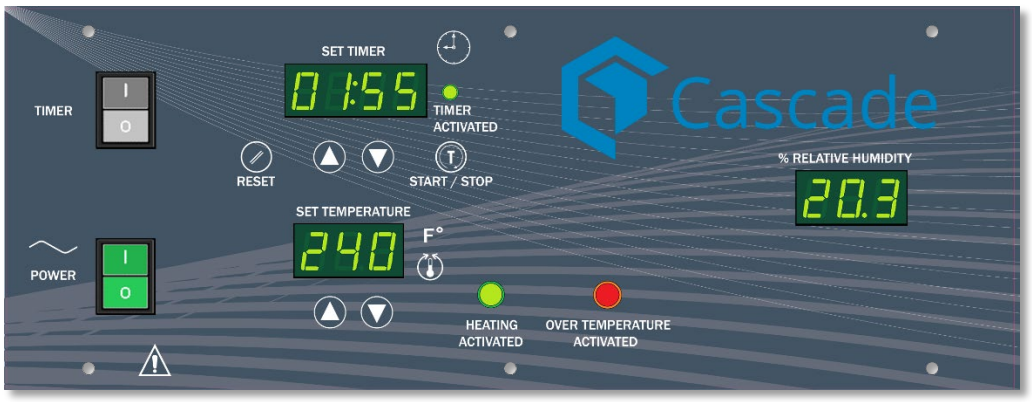
The unit is provided with graphic symbols on its exterior. These identify hazards and adjustable components as well as important notes in the user manual.

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

SYMBOLS

Symbol	Definition
	Indicates the timer Indique le minuterie
	Start or Stop the Timer Lancer ou arrêter le minuteur
	Reset the Timer Réinitialiser la minuterie
	Caution hot surface Attention surface chaude

CONTROL OVERVIEW



Control Panel

Timer Switch

The black Timer Switch controls power to the timer system. When this switch is in the ON position, the SET TIMER display illuminates, and the oven can run a timed steady-state heating profile at the current temperature setpoint. The oven **will not heat** while the Timer system is on unless a profile is running.

Power Switch

The green Power Switch controls all power to the oven. When in the ON (I) position, the switch illuminates.

Timer Display and Control Pad

When activated. the SET TIMER display shows the duration of the currently programmed heating profile, or a flashing duration adjustment mode, or the countdown of a running profile to 0.

The "//" **RESET** button is used to place the Timer display in its adjustable duration mode, and then to scroll through the duration time parameters.

The **SET TIMER** arrow buttons adjust the heating profile duration time parameters when the display is in its blinking adjustment mode.

The "**T" START/STOP** timer button launches a heating profile or pauses a running profile.

Main Temperature Display and Control

Marked SET TEMPERATURE, this display shows the current oven chamber air temperature accurate to within 1°F. The display can also show an adjustable temperature setpoint in the display's setpoint mode, as well as an adjustable offset while in calibration mode.

The arrow buttons can be used to adjust the temperature setpoint or place the unit in its calibration mode, and then enter a calibration offset value.

Heating Activated Light

The green pilot light located beneath the label HEATING ACTIVATED illuminates whenever the workspace oven heating elements are powered and warming the oven. The oven uses measured pulses to achieve and maintain the temperature setpoint.

OTL Light

Marked OVER TEMPERATURE ACTIVATED, this light illuminates whenever the Over Temperature Limit heating cutoff system is routing power away from the heating elements. The OTL cuts off heating when it detects an air temperature of 356°F (180°C) in the oven chamber.

Humidity Display

The humidity display shows the current humidity inside the oven chamber as a relative percentage accurate to 0.1%. The display range is 0.0 – 99%.

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

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

SAFETY GUIDELINES

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

- Follow all national laws, regulations, and local ordinances in your area regarding the use of this unit type and the applications you are using it for. If you have any questions about national and local requirements, please contact the appropriate agencies.
- Because of the range of potential applications this unit can be used for, the operator or their supervisors must draw up a site-specific standard operating procedure (SOP) covering each application and associated safety guidelines. This SOP must be written and available to all operators in a language they understand.
- Use only approved accessories. Do not modify system components. Any alterations or modifications to your oven can be dangerous and void your warranty.

Continued on next page

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

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

OPERATING PRECAUTIONS

- Do not use this oven in unsafe improper applications that produce flammable or combustible gases, vapors, liquids, or fuel-air mixtures in quantities that can become potentially explosive.
- Outgassing byproducts may be hazardous to or noxious for operating personnel. Exhaust should be vented to a location outside the workspace in a safe manner in accordance with all applicable laws, ordinances, and regulations. Do not operate the oven in an unsafe area with noxious fumes.
- Never allow baking materials to become airborne in the chamber. Airborne materials can pass through the side panels, into the air ducts, and into direct contact with the heating elements.
    - **Fibrous material:** CDO ovens come with mesh bags. These must be used to contain fibrous materials, preventing fibers from becoming airborne.
    - Never use this oven for applications heating hazardous dust or powders. Dusts and powders cannot be safely contained.
- Individual ovens are not rated to be explosion proof. Follow all building certification requirements and laws for Class I, II, or III locations as defined by the US National Electric Code.
- Do not place sealed or filled containers in the oven. These may burst open when heated.
- Do not place alcohol or mercury thermometers in the oven. These devices may rupture under heat or other improper uses.
- Do not move the oven until it has finished cooling.

THEORY OF OPERATION

Heating

When powered, the oven chamber heats to and then maintains the currently programmed temperature setpoint. The setpoint may be adjusted by the operator using the Set Temperature controls.

Heating is controlled by a microprocessor controller board that stores the temperature setpoint. The microprocessor senses the chamber air temperature via a solid-state probe located in the airstream on the back wall of the chamber. When the processor detects that the chamber temperature has dropped below the temperature setpoint, it pulses power to a heating element in a recirculation air duct space located above the oven chamber.

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

These ovens rely on natural heat radiation for cooling.

When the oven is powered the chamber air temperature cannot go below the ambient room temperature **plus** the internal waste heat of the oven. Waste heat is generated primarily by the operation of the internal blower fan motor and the resulting air compression in the duct spaces. In practice, the temperature floor is **ambient +26°F**.

The oven depends on the operation of the blower fan to maintain temperature uniformity and stability in the chamber.

Air Circulation

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

Vents – Intake and Exhaust

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

Timed Heating Profile

The oven is provided with a timer system that can run the oven in a steady-state heating profile at the current temperature setpoint from 1 minute up to 99 hours, 59 minutes. Allow the oven to heat to temperature prior to launching the profile. Launching a profile with the temperature setpoint set to 240°F immediately after turning on the oven will result in the first 22 minutes of the profile being spent with the chamber rising from room temperature to 240°F.

When the timer system is on, **the oven will not heat** unless a profile is running.

Accessory Power Exhaust Outlet

CDO forced-air ovens come with an external accessory power outlet intended to supply electricity to accessories attached to the oven exhaust vent. The outlet is always powered while the oven is on. The primary application of the power exhaust fan is to positively vent exhaust out of the workspace around the oven. The standard receptacle is a 240 volt, North American 6-20R.

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

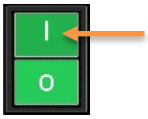
The Over Temperature Limit System

The oven is equipped with a heating cutoff system which automatically cuts off electricity to the oven heating elements when the chamber air temperature exceeds 356°F (180°C). This is intended to help prevent runaway heating in the event of a controller failure or if an outside temperature source generates a heat spike in the oven chamber. The Over Temperature Limit heating cutoff is a mechanical system that operates independently of the main digital temperature control system and comes equipped with its own hydrostatic temperature probe located in the oven chamber.

PUT THE OVEN INTO OPERATION

Carry out the following steps and procedures to put the oven into operation after installing it in a new workspace environment.

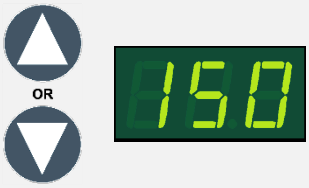
1.



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

- The switch will illuminate.
- The Temperature display will illuminate.

2.



Set the Temperature Setpoint to your baking application temperature.

- See page 32.

Optional: Set the oven timer duration.

- See page 33.

SET THE TEMPERATURE SETPOINT

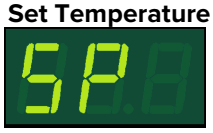
Adjust the oven temperature setpoint to that of your application.

Do not use mesh bags at temperatures exceeding 240°F (115°C). Only use heat-resistant, non-outgassing, FDA compliant mesh bags.

1. Navigate to the Temperature Setpoint Adjustment mode

Press and hold either

Set Temperature



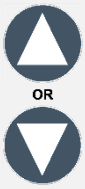
Setpoint Adjustment Mode

Current Setpoint

- The display will briefly flash the letters “SP”, then show the flashing, adjustable temperature setpoint.

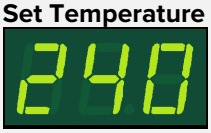
Note: The display will automatically exit the adjustment mode after 5 seconds of inactivity, with the last shown setpoint value saved.

2. Set the Temperature Setpoint



Adjust

Set Temperature



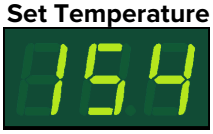
New Setpoint

Note: To prevent the oven from heating, push the down arrow button repeatedly until the display shows “OFF”. The lowest programmable setpoint is 77°F.

3. Wait for 5 seconds after entering the Setpoint

Wait 5 Seconds

Set Temperature



HEATING ACTIVATED

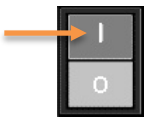
- The display will stop flashing. The setpoint is now saved in the controller.
- The oven will now automatically heat or passively cool to match the setpoint.
- The display will revert to showing the current chamber air temperature.

End of Procedure

SETTING THE TIMER

This procedure enters a heating profile duration in the Timer system. When launched, the profile runs the oven for the duration at the present temperature setpoint.

1. Turn on the Timer System



Push to ON (I)

Set Timer

1 Minute Profile

- The **Timer Display** will illuminate, showing the previously programmed profile duration.
- The oven will cease heating.

2. Place the Timer Display in its adjustable Set Timer mode

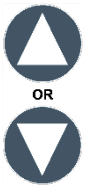
Press and hold RESET

Set Timer

Hours Selected

Note: If 5 seconds elapse with no activity on the Arrow Pad buttons, the Timer Display will exit the adjustment mode with the last entered time values saved.

3. Set the Hour parameter



Adjust

Set Timer

1 Hour, 1 Minute

4. Advanced to Tens-of-Minutes parameter

Push

Set Timer

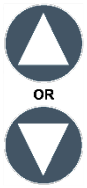
Tens of Minutes Selected

Note: Advancing saves the adjusted hour parameter.

Continued next page

Setting the Timer Continued

5. Set the Tens-of-Minute parameter



Adjust

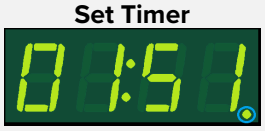
Set Timer

1 Hour, 51 Minutes

6. Advance to the Minutes parameter

Push

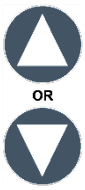
Set Timer



Minutes Selected

- The flashing decimal point will advance to between the third and fourth numbers, saving the new Tens-of-Minutes parameter setting

7. Set the Minutes parameter



Adjust

Set Timer

1 Hour, 55 Minutes

8. Wait for 5 seconds after entering the Minutes parameter

Wait 5 Seconds

Set Timer

- The display will exit adjustment mode.
- The Minutes parameter, along with the previous two parameter values, is now saved.

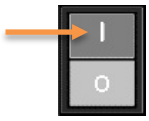
End of Procedure

Launch a Heating Profile

The oven can be run in a timed steady-state heating profile at the current temperature setpoint. Allow the oven to come up to temperature prior to launching a profile. See the **Setting the Timer procedure** on page 33 for how to set the length of the profile.

Note: While the Timer system is on, the oven will **not** heat unless a profile is running.

1. Turn on the Timer System



Push to ON (I)

Set Timer

1 Hour, 55 Minute Profile

- The **Timer Display** will illuminate, showing the previously programmed profile duration.
- The oven will cease heating.

2. Launch the current profile

Press and Hold

Set Timer

TIMER ACTIVATED

- The Timer Display will start counting down.
- The oven will resume heating.

Optional: Pausing a running profile

Push

- The oven will cease heating until the profile is restarted, reset, or the Timer system is turned off.
- To restart the profile where it left off, press the **Start/Stop** "T" button again.

3. The oven ceases heating upon reaching "00:00"

Set Timer

Profile Complete

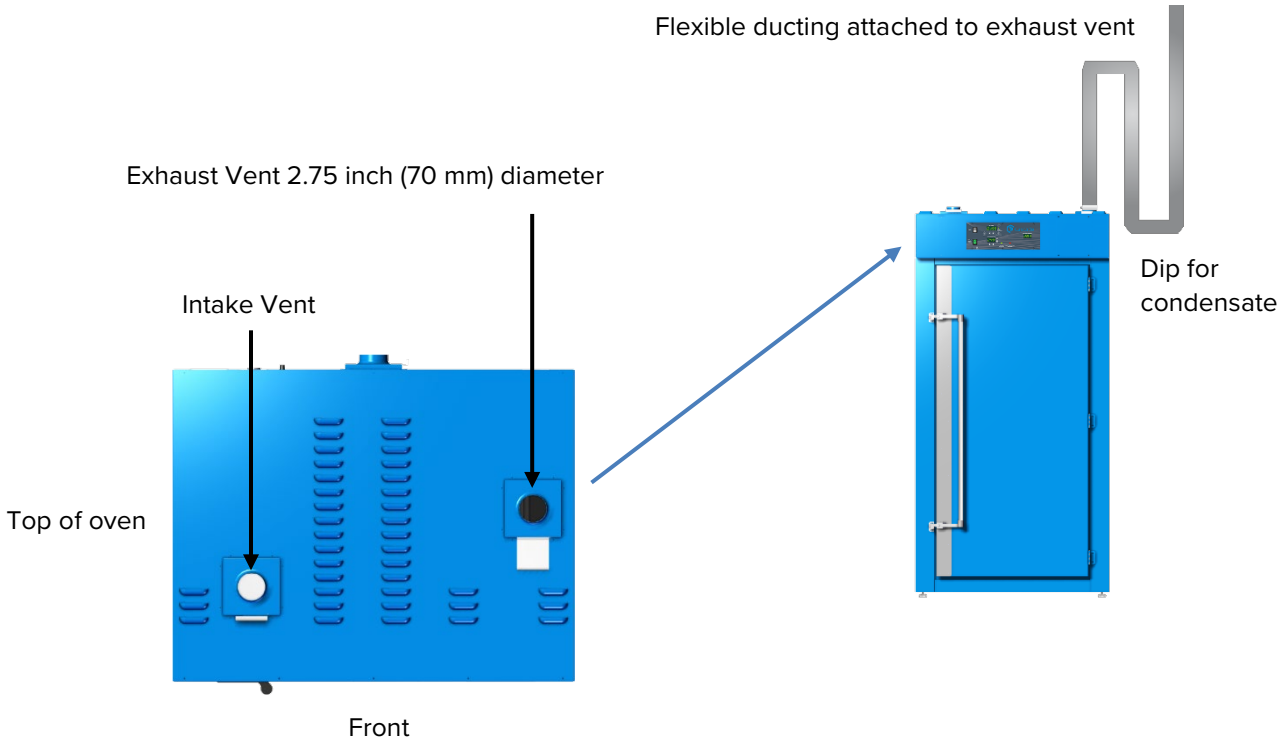
- To resume manual heating place the **Timer Switch** in the OFF (O) position.
- To launch another profile, press the "//" **Reset** button and enter a new profile, or allow the previous profile to reset automatically after 5 seconds.

End of Procedure

Venting the Exhaust Port

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

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



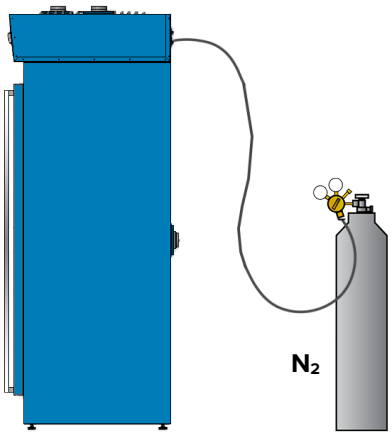
Drying Racks and other Accessories

Make sure that any accessories used inside the oven chamber, such as drying racks, are suitable for your application and will not suffer damage when brought to temperature. The manufacturing defect warranty does not cover damage caused by melted or otherwise overheated accessory items.

Note: The GN_2 purge is not intended to enhance air exchange rates or ventilation.

GN_2 Purge Option

CDO ovens may be ordered with a gas nitrogen purge option. This is a special quote build and must be requested at the time of purchase, prior to construction of the oven.



Purpose

A GN_2 purge establishes an inert atmosphere in the oven chamber, preventing condensation, corrosion, or product oxidation. This is accomplished through forcing out oxygen (O_2), humidity, and airborne impurities both prior to heating and throughout the baking application. The volume of nitrogen (N_2) required for a successful purge is 5 to 10 times that of the oven chamber volume.

Process Summary

Start the purge prior to heating the oven. Failure to do so may result in oxidation. A flow of N_2 must be maintained throughout the heating application or treatment. This generates overpressure, which prevents infiltration by free atmosphere (room air). The nitrogen atmosphere and overpressure should be maintained until the heat load is below the oxidation temperature of your sample or product material for the final time in the process.

Nitrogen Gas Supply Requirements

- Your supply source and regulator should provide at least 80 psi of pressure.
- Minimum 100 Standard Cubic Feet per Hour (SCFH) of GN_2 flow.
- Recommended flow rate: 400 Standard Cubic Feet per Hour (SCFH).
- Gas Line Adaptor: The oven GN_2 port is a ¼ inch (~6mm) threaded pipe.

Asphyxiation Hazard!

The oven will leak significant GN_2 into the workspace area surrounding it during a purge. This creates an asphyxiation hazard for oven operators. **The area must be sufficiently ventilated**.

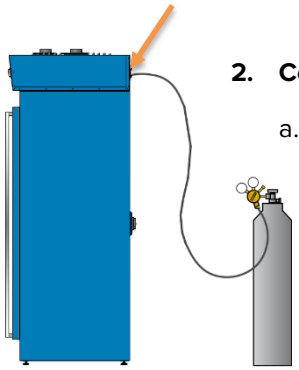
Le four libèrera la fuite de GN2 dans la zone de travail qui l'entoure pendant la purge. Cela crée un risque d'asphyxie pour les opérateurs de four. La zone doit être suffisamment ventilée.

- The onset of asphyxiation can be difficult to detect until personnel lose consciousness or suffer cognitive impairment.
- Ensure all areas in which expelled gas nitrogen is present are well ventilated with a **minimum** of 6 air changes per minute.
- Sufficient fresh air must be brought in with each air exchange to maintain a safe oxygen concentration in the workspace.

Set Up

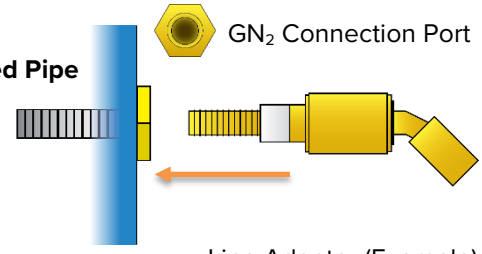
1. **Close the oven vents.** Failure to close the vents compromises the integrity of the purge.
   a. Close both the intake and exhaust vents on the top of oven.
   b. Close the access port on the back of the oven.

All 3 vents fully closed.



2. **Connect your nitrogen gas supply to the "GN2" connection port.**
   a. The port is located on the back of the oven at the top on the left side.

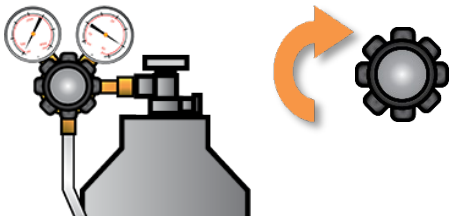
¼ inch Female Threaded Pipe
(Inside of Oven)

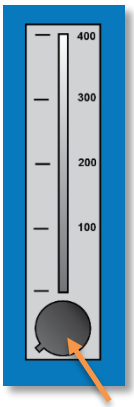


Line Adaptor (Example)

Start the Purge

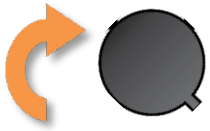
1. **Set the supply regulator flow pressure to 80 psi.**





Flow Rate Control

2. **Use the Flow Rate Control on the front of the oven (top left) to start the flow of GN_2 to the oven chamber.**
   a. 400 SCHF flow rate recommended.



Note: When ending the purge, make sure to set the Flow Rate Control to zero **and** close the regulator on your supply source.

3. **Continue purging the oven.**
   a. Do not end the purge until the oven chamber drops below the oxidation temperature of your product for the final time.

Warning: Prior to maintenance or service on this unit, disconnect the power feed from the power supply.

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

CLEANING AND DISINFECTING

If a hazardous material or substance has spilled in the oven, immediately initiate your site 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.
- 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.
- 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.**

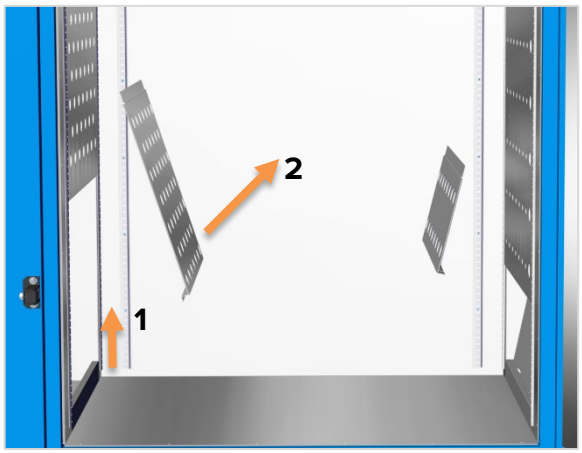
Warning: Exercise caution if cleaning the unit with alcohol or flammable cleaners. Always allow the unit to cool down to room temperature prior to cleaning and make sure all cleaning agents have evaporated or otherwise been completely removed prior to putting the unit back into service.

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

1. Disconnect the unit from its power supply.
2. Remove all removable interior components such as shelving and accessories.
3. Remove the bottom panels of the side air ducts. See next page.
4. Clean the unit with a mild soap and water solution, including all corners.
    - **Do not use an abrasive cleaner**, these will damage metal surfaces.
    - **Do not use deionized water to rinse or clean with.**
    - Take special care when cleaning around the temperature sensor probes in the chamber to prevent damage. Do not clean the probes.
    - Remove any contaminants that have built up in the side air duct bottoms.
5. Rinse with distilled water and wipe dry with a soft cloth.

Remove the bottom side air ducts panels by lifting each panel from near the bottom, then tilting the bottom outward. Remove any contaminants and clean the bottom of the ducts.



Disinfecting

Disinfect the oven if algae, mold, bacteria, or other biological contaminants are an issue. For maximum effectiveness, disinfection procedures are typically performed after cleaning.

Keep the following points in mind when disinfecting the oven:

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

Door Components

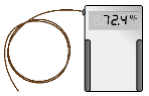
Periodically, inspect the door latch, trim, catch, and gasket for signs of deterioration. Failure to maintain the integrity of the door system shortens the life span of the oven.

These ovens use snap-in fiberglass door gaskets. The only tool required for swapping out these gaskets is a cutting implement for tailoring the length of the new gasket. Use proper PPE for handling exposed fiberglass when making the cuts.

Electrical Components

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

Calibrating 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 1°F and should be regularly calibrated by a third party. **Never use alcohol or mercury-based thermometers.**

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

Temperature calibrations match the temperature display to the actual air temperature inside the oven chamber. The actual air temperature is supplied by a reference sensor device. Always calibrate to the industry or regulatory standards required for your application.

A Suggested Calibration Set Up

1. Introduce the reference device thermocouple sensor probes into the oven chamber through the rear access port.

- There should be at least 12 inches (305 mm) of probe wire in the oven to prevent heatsinking the outside temperature.

2. Carefully close the port slider. Leaving a ¼ inch gap (6 mm) is acceptable when wire probes are in the port and should not interfere with the calibration accuracy.

- The chamber air pressure is close to neutral while the oven is in operation, limiting the exchange with cooler external atmosphere.

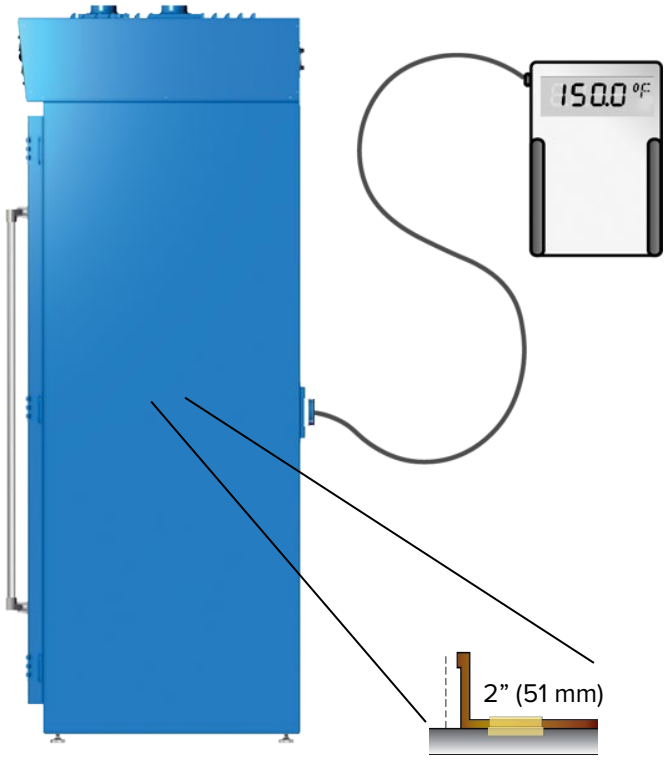
3. Position the sensor probes in the oven with the probe heads at least 2 inches (51 mm) from the surface of the shelving or walls to prevent heatsinking.

- Secure with non-stick, heat-resistant tape.
- If using only one thermocouple, place the sensor probe head as close to the geometric center of the oven chamber as possible.

4. The oven chamber door must be closed and latched.

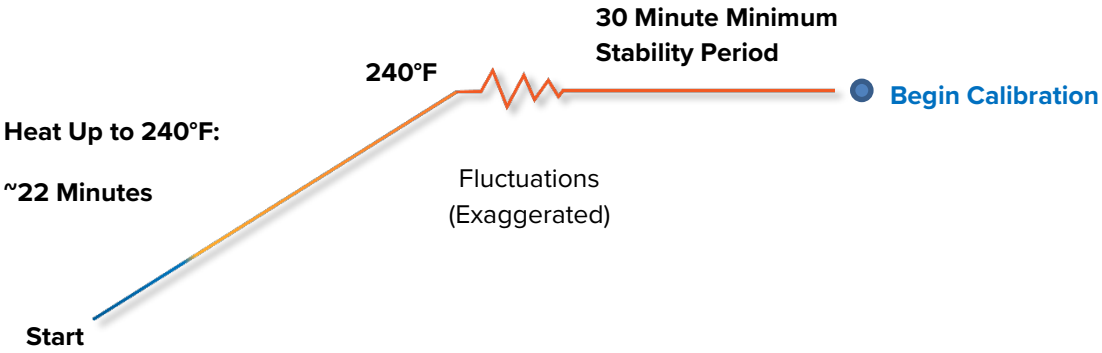
5. The intake and exhaust vents should **both** be closed to ensure an accurate calibration.

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



6. Heat up and stabilization period.

- The oven chamber must be stable at temperature in order to perform an accurate calibration.
- The temperature is considered stabilized when the oven chamber has operated at your calibration temperature for at least **30 minutes with no fluctuations of ±1°F or greater.**

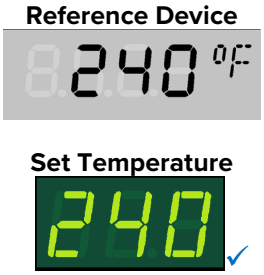


Oven Chamber Heat Up and Stabilization Phases

Suggested Calibration Procedure

1

Once the chamber has stabilized with no fluctuations, compare the reference temperature device and chamber temperature display readings.



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

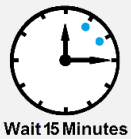
- Or -

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

2

The display requires calibration. Advance to Step 3.

- If the door was opened to check a reference device temperature inside the chamber, wait 15 minutes **after the reference device reading stops fluctuating** before proceeding.

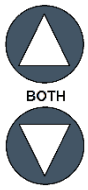


Continued next page

Calibration continued

3

Place the oven in temperature calibration mode.

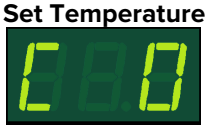


a. Press and hold **both** the **UP** and **DOWN** arrow buttons simultaneously.

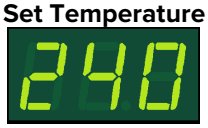
- The Temperature Display will show the letters “C O”, then begin flashing the **current temperature value**.

Note: If an arrow key is not pressed for five seconds, the Temperature Display will cease flashing and store the last displayed value as the new current chamber temperature value.

Set Temperature

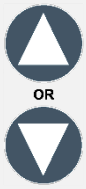


Set Temperature



Current Temp. Value

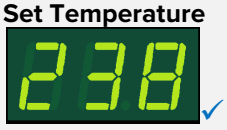
4



Adjust the current temperature value to match the reference device.

a. Use the **UP** and **DOWN** arrow buttons.

Set Temperature



Corrected

Reference Device

5

After entering the correction adjustment, wait 5 seconds.

Wait 5 Seconds

- The temperature display will cease flashing and store the correction as an offset.
- The oven will now begin heating or passively cool in order to reach your setpoint with the corrected display value.

Set Temperature

Heating with Corrected Value

6

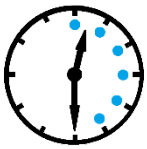
Wait for the oven to achieve the new setpoint with the corrected display value.

Set Temperature

Continued next page

Calibration continued

7



After the oven has achieved the setpoint, wait for the oven chamber temperature to stabilize.

- The chamber temperature is stabilized when no fluctuations of ±1°F or greater have been detected with the reference device for a minimum of 30 minutes.
- Failure to wait for stabilization will result in an inaccurate calibration.

Reference Device

8

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

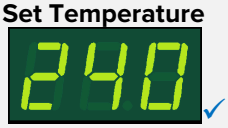
a. If the readings are the same, or the difference between the two falls within the acceptable range of your protocol, **the oven is calibrated for temperature.**

-Or-

b. Advance to step 9.

Reference Device

Set Temperature



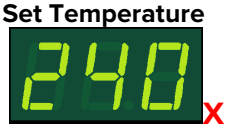
9

If the two readings still fall outside the acceptable range of your protocol, repeat steps 3 – 8 up to two more times.

- Three calibrations attempts may be required to successfully calibrate ovens more than ±3°F out of calibration.

Reference Device

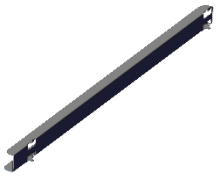
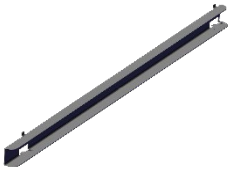
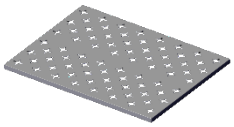
Set Temperature



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

End of Procedure

PARTS LIST

Description	Parts Number	Description	Parts Number
Adjustable Leveling Feet	 **2700506**	Shelf Slider Right	 **5121845**
Door Gasket Fiberglass with clips, 1 ft section Requires 17 feet for a complete replacement.	 **3450767**	Shelf Slider Left	 **5121844**
Shelf Assembly, 23” x 31”	 **995-00005**		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