HIGH-HEAT DECONTAMINATION CO_2 INCUBATOR

SHEL LAB®

110 – 120 Voltage

Installation - Operation Manual

SCO6AD

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

SCO6AD

HIGH-HEAT DECONTAMINATION CO_2 INCUBATOR

Part Number (Manual): 4861712

Revision: September 23, 2019

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

Safety Certifications

These units are CUE listed by TÜV SÜD as air jacketed CO_2 Incubators for professional, industrial, or educational use where the preparation or testing of materials is done at an ambient air pressure range of 22.14 – 31.3 inHg (75 – 106 kPa) and no flammable, volatile, or combustible materials are being heated.

These units have been tested to the following requirements:

CAN/CSA C22.2 No. 61010-1:2012
CAN/CSA C22.2 No. 61010-2-010:2004 Reaffirmed: 2014-07
UL 61010-1:2012-05
UL 61010A-2-010:2002-03
EN 61010-1:2010
EN 61010-2-010:2014
Supplemented by: UL 61010-2-010:2015

TABLE OF CONTENTS

TABLE OF CONTENTS

INTRODUCTION

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

READ THIS MANUAL

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

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

SAFETY CONSIDERATIONS AND REQUIREMENTS

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

SOPs

Because of the range of potential applications, this unit can be used for, the 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.

Intended Applications and Locations

The incubators are intended for constant temperature, CO_2-enriched, non-humidified general incubation applications in professional, industrial, and educational environments. The units are not intended for use at hazardous or household locations.

Power

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

- The unit is designed to connect to a power source using the specific power cord type shipped with the unit.
- Always plug the unit power cord into a protective earth grounded electrical outlet conforming to national and local electrical codes. If the unit is not grounded properly, parts such as knobs and controls can conduct electricity and cause serious injury.
- Do not bend the power cord excessively, step on it, or place heavy objects on it.
- A damaged cord can be a shock or fire hazard. Never use a power cord if it is damaged or altered in any way.
- Use only approved accessories. Do not modify system components. Any alterations or modifications to your unit can be dangerous and void your warranty.

CONTACTING ASSISTANCE

Phone hours for Sheldon Technical Support are 6 am – 4:30 pm Pacific Coast Time (west coast of the United States, UTC -8), Monday – Friday. Please have the following information ready when calling or emailing Technical Support: the **model number, serial number,** and **part number,** (see page 13).

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

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

MANUFACTURING WARRANTY

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

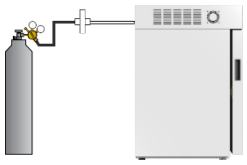
- sheldonmanufacturing.com/warranty

ENGINEERING IMPROVEMENTS

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

Note: A CO_2 gas regulator must be purchased separately from the incubator.

CO_2 Gas Supply



Supply Required!

The incubator must be connected to a carbon dioxide gas supply system in order to establish and maintain a CO_2-enriched incubation chamber atmosphere. The supply can be a building CO_2 gas system or a supply cylinder (tank).

Supply Quality

Use medical or food-grade CO_2. Use of industrial CO_2 risks introducing contaminants into the chamber, may damage the incubator, and will void the manufacturing defect warranty.

Supply Source and Pressure

The incubator requires 15 – 20 psi of CO_2 gas pressure at the incubator intake port (labeled CO_2 to Chamber).

Dual Stage Regulator

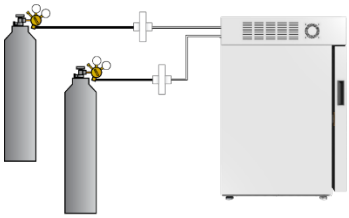
If connecting to a supply cylinder, **use a two-stage CO_2 pressure regulator**. During normal operations, the incubator uses only small quantities of CO_2 to maintain the chamber gas concentration, and precise regulation of the gas input flow is vital for the incubator performance. Some single-stage regulators have two gauges. Make certain your regulator is a two-stage regulator. Each cylinder requires a regulator.

Regulator Not Included

See page 59 for ordering information.

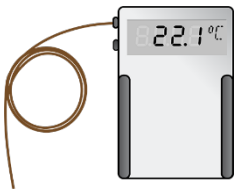
Dual Cylinder Connection

The incubator can be connected simultaneously to two CO_2 supply cylinders. The unit automatically switches drawing from one cylinder to the other when the first cylinder runs out of CO_2. Two gas regulators are required for this configuration.

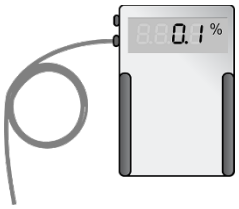


Reference Sensor Devices

Must be purchased separately



Temperature Reference



CO_2 Reference

Reference sensor devices or a combined device are required for calibrating the incubator temperature and CO_2 displays.

Reference devices must meet the following standards:

- Accurate to at least 0.1°C
- Accurate to at least 0.1% CO_2

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

Temperature Probes

For temperature, use a digital device with wire thermocouple probes that can be introduced into the incubation chamber through the unit access port. Select thermocouples suitable for the application temperature you will be calibrating at.

CO_2 Sampling

For best CO_2 accuracy, use a digital gas analyzer with sample tubing connecting to the incubator CO_2 sample port. The barbed adapter gas fitting on the sample port connects to **3/16-inch (4.76mm)** inner diameter (ID), 5/16-inch (7.94mm) outside diameter (OD) tubing.

Why Probes and Tubing?

Reference readings taken outside the chamber using wire temperature probes and CO_2 drawn through the sample port avoid chamber door openings. Openings disrupt the chamber temperature and CO_2 concentration level. Each disruption requires **a minimum 1-hour wait** to allow the atmosphere to re-stabilize before continuing.

No Alcohol or Mercury Thermometers

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

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 have been included.

Included Accessories

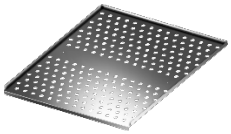
1 Anti-Microbial Copper Token

4 Leveling Feet

1 Power Cord

1 Stainless Steel Humidity Pan

3 Stainless Steel Shelves



6 Stainless Steel Shelf Slides

4 Stainless Steel Shelf Standards

1 CO_2 Tubing Kit

7. A silicone stopper should come installed in the access port on the right side of the unit. Verify the presence of the stopper.

8. Carefully check all packaging for accessory items before discarding.

ORIENTATION IMAGE

SCO6AD

RECORDING DATA PLATE INFORMATION

The data plate contains the incubator **model number** and **serial number**. Tech Support will need this information during any support call. Record it below for future reference.

- The data plate is located on the right side of the unit, above the copper-filtered access port

Data Plate Information

Model Number	
Serial Number	

RECEIVING YOUR UNIT

INSTALLATION CHECKLIST

For installing the unit in a workspace.

Pre-Installation

- ✓ Check that the required ambient conditions and ventilation spacing for the incubator are met, page 16.
  - Unit dimensions may be found on page 52
- ✓ Check for performance-disrupting heat and cold sources in the environment, page 16
- ✓ Check that a suitable electrical outlet and power supply is present, page 17
- ✓ Procure a CO_2 gas supply for the incubator. See page 9.

Install the Incubator in a suitable location

- ✓ Review the lifting and handling instructions, page 18
- ✓ Install the incubator in its workspace location, page 18
- ✓ Make sure the incubator is level, page 18

Set up the Incubator for use

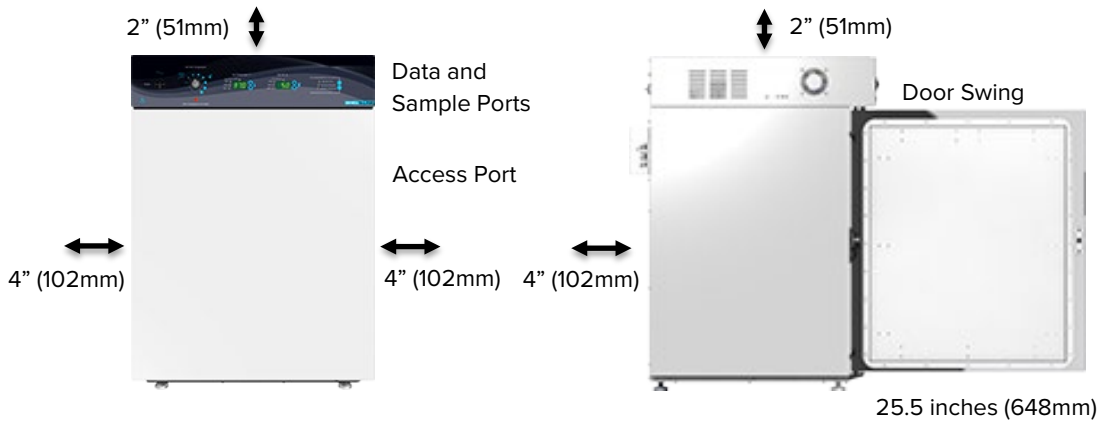
- ✓ Clean and disinfect the incubator and shelving accessories that will be placed in the incubation chamber, page 19
- ✓ Install the shelving in the incubation chamber, page 19
- ✓ Connect the incubator to the CO_2 gas supply source, page 20
- ✓ Verify that the high-temperature silicone stopper is installed in the access port on the outside of the incubator, page 21

Required Ambient Conditions

These units are intended for use **indoors**, at room temperatures between **15°C and 30°C (59°F and 86°F)**, at no greater than **80% Relative Humidity** (at 25°C / 77°F). Operating outside these conditions may adversely affect its incubator temperature stability and effective operating range.

Required Clearances

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



4 inches (102mm) of clearance is required on the sides and back.

2 inches (51mm) of headspace clearance between the top of the unit and any overhead partitions.

Environmental Disruption Sources

When selecting a location to install the unit, look for sources of heat, cold, and moving air that can affect the chamber temperature and atmospheric integrity.

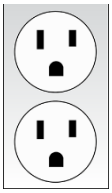
- Ovens, autoclaves, and any device that produces significant radiant heat
- High-traffic areas
- Direct sunlight
- Heating and cooling ducts or other sources of fast-moving air currents

POWER SOURCE REQUIREMENTS

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

Power Source

The power source for the unit must match the voltage and match or exceed the ampere requirements listed on the unit data plate. These units are intended for **110 – 120V 50/60 Hz** applications at **12 amps**.



Standard 15-amp NEMA 5-15 power outlet.

- **Supplied voltage must not vary more than 10%** from the data plate rating. Damage to the unit may result if the supplied voltage varies more than 10%.
- The wall power source must be protective earth grounded.
- Use a separate circuit to prevent loss of the unit due to overloading or circuit failure.
- **The recommended wall circuit breakers for these units are 15 amps.**
- The wall power source must conform to all national and local electrical codes.

Power Cord

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

- The unit comes provided with a 125 volt, 15Amp, 9ft 5 in (2.86m) NEMA 5-15P power cord.
- Always use this cord or an identical replacement.

Fuses

The unit ships with a fuse installed in the power cord inlet.

- The fuse must be installed and intact for the unit to operate.
- Always find and fix the cause of a blown fuse prior to putting the unit back into operation.
- Fuse type
    - 250V, Type H 12.5 amp, 5X20mm

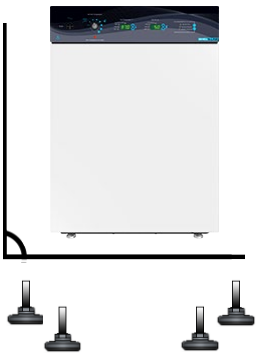
LIFTING AND HANDLING

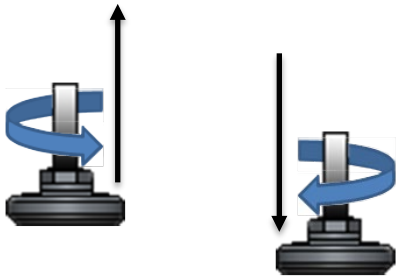
The unit is heavy. Use appropriate lifting devices that are sufficiently rated for these loads. Follow these guidelines when lifting the unit.

- Lift the unit only from its bottom surface.
- Doors, handles, and knobs are not adequate for lifting or stabilization.
- Restrain the unit 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 leveling feet in the 4 corner holes on the bottom of the unit. The unit must be level and stable for safe operation.





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

INSTALL INCUBATOR IN LOCATION

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

DEIONIZED AND DISTILLED WATER

Do not use deionized water to clean or humidify the incubator. Use of deionized water may corrode metal surfaces and voids the warranty. The manufacturer recommends the use of distilled water in the resistance range of 50K Ohm/cm to 1M Ohm/cm, or a conductivity range of 20.0 uS/cm to 1.0 uS/cm, for cleaning and humidifying applications.

INSTALLATION - CLEAN AND DISINFECT

Cleaning and disinfecting the incubation chamber and shelving components now reduces the risk of contamination. The chamber was cleaned and disinfected at the factory, however, the unit may have been exposed to contaminants during shipping.

- Remove all protective wrappings from shelving components prior to cleaning.
- See the **Cleaning and Disinfecting** entry on page 45 for information on how to clean and disinfect without damaging the incubator or its components.

SHELVING INSTALLATION

1. Install the shelf standard rails.
    a. Align the keyhole slot of the standard with the mounting peg on the side of the chamber wall.
    b. Mount the standard on the peg.

2. Install the shelf slides.
    a. Insert the shelf slide into the shelf standard using a rocking motion.
    - The shelf slide will sit level when correctly installed.

3. Place the shelves.
    a. Slide into position.

CONNECT TO THE CO_2 SUPPLY

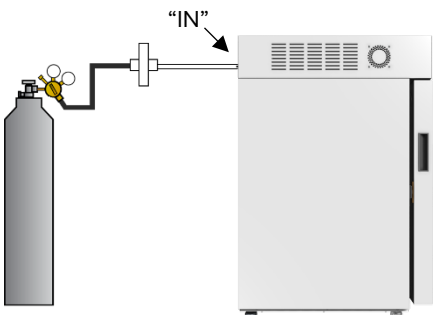
Note: See page 9 for CO_2 supply requirements.

Optional Tubing Kit
with Inline HEPA Filter

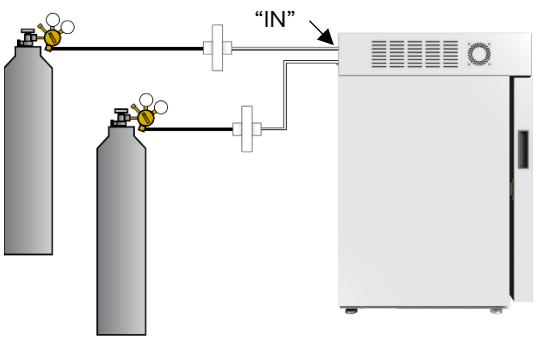
CO_2 to Chamber

Connects to 3/16"
(4.76mm) ID Tubing

Single Source



Dual Source



1. Connect the supply source to the incubator.
2. **Optional**: If connecting a second supply cylinder, do so now.

Do **not** initiate a flow of CO_2 to the incubator at this time.

Reminder: The building supply system or cylinder regulator(s) must deliver 15 – 20 psi flow pressure to the incubator.

End of procedure

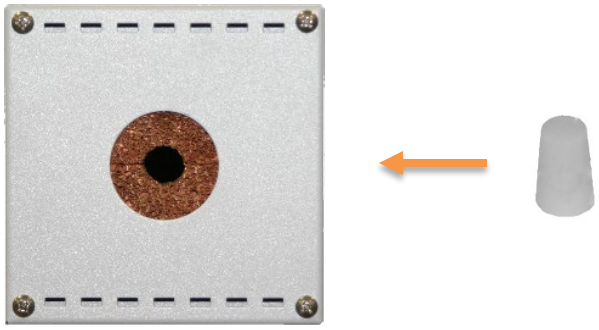
ACCESS PORT STOPPER

- Verify the port stopper is installed in the access port on the right side of the unit.
- The stopper must be installed on the outside of the unit.

The unit will not meet its temperature performance specifications or maintain a CO_2 setpoint concentration without the stopper installed.

The port may be used to introduce sensor probes into the incubation chamber. Use non-sticking tape or a modified stopper to seal any gaps in the port while probe wires are present.

Never tape over the copper mesh filter around the port. The incubator depends on a controlled flow of air through the filter to achieve its temperature and CO_2 setpoints while avoiding buildups of water condensate in the chamber.



Access Port and Stopper

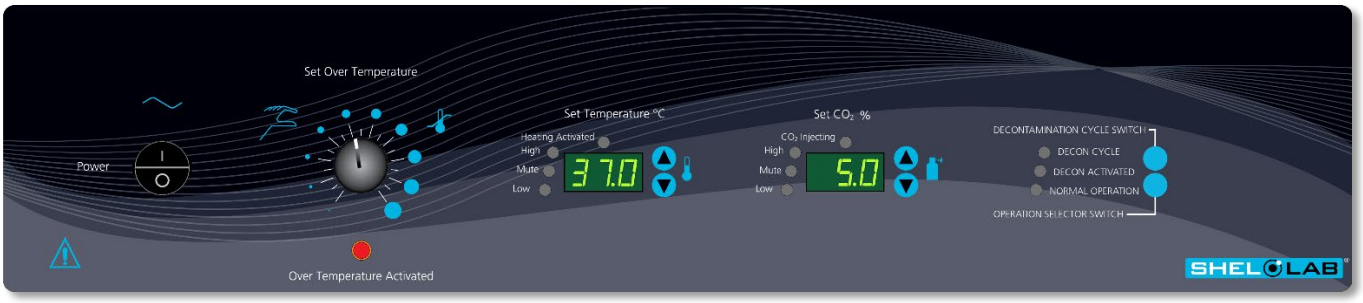
GRAPHIC SYMBOLS

Your incubator comes provided with graphic symbols on its exterior surfaces. These identify hazards and the function of the adjustable components, as well as important notes in the user manual.

Symbol	Definition
	Consult the user manual. Consulter le manuel d'utilisation
	Temperature display Indique l'affichage de la température
	Over Temperature Limit system Thermostat température limite contrôle haute
	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
	Adjusts UP and DOWN Ajuster le haut et vers le bas
	Manually adjustable Indique un réglage manuel
	Potential shock hazard Risque de choc électrique
	Recycle the unit. Do not dispose of in a landfill. Reycle l'unité. Ne jetez pas dans une décharge
	Indicates CO_2 Gas Indique gaz CO2

GRAPHIC SYMBOLS

CONTROL PANEL OVERVIEW



Control Panel

Power Switch

Power is supplied when the switch is in the (I) on position.

Over Temperature Limit

This graduated dial sets the Over Temperature Limit system heating cut off point. The OTL system helps prevents unchecked heating of the incubation chamber in the event the main temperature control system fails. For more details, please see the **Over Temperature Limit System** on page 28.

The red Over Temp Activated light illuminates when the Over Temperature Limit system cuts off heating to the incubation chamber by rerouting power away from the heating elements.

Temperature Control and Display

During normal operations, the Set Temperature display shows the current incubator air temperature, accurate to 0.1°C. The Up and Down buttons are used to change display modes and then input either a new temperature setpoint or a calibration adjustment. The display blinks continually while in setpoint or calibration adjustment modes, preceded by an “SP” for Setpoint or “C O” for calibration offset.

Red LED alarm indicators marked High and Low illuminate whenever the temperature deviates by ±1°C or greater from the current setpoint. The yellow LED marked Mute illuminates whenever an audible deviation alarm is being muted. See the **Muting the Audible Temperature Alarm** entry on page 33 for more information.

The green indicator labeled Heating Activated illuminates whenever the temperature control system is heating the incubation chamber.

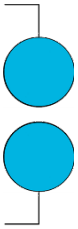
CO_2 Display

Labeled Set CO_2, this display shows the concentration of CO_2 as a percentage of the incubation chamber atmosphere. The display has a range of OFF (0%) to 20% and an accuracy of 0.1%. The display shows “LO” until the CO_2 sensor registers a concentration in the chamber greater than 0%. A few minutes of CO_2 injections may be required when initially starting the unit.

The Up and Down buttons are used to change display modes and then input either a new gas concentration setpoint or a calibration adjustment. The display blinks continually while in setpoint or calibration adjustment modes, preceded by an “SP” for Setpoint or “C O” for calibration offset.

Red LED alarm indicators marked High and Low illuminate whenever CO_2 deviations of ±1% or greater from the setpoint take place. The yellow LED marked Mute illuminates whenever an audible deviation alarm is being muted. See the **Muting the Audible CO_2 Alarm** entry on page 36 for more information.

Marked CO_2 Injecting, this green indicator illuminates while the incubator is injecting CO_2 into the incubation chamber. Injections are accompanied by a clicking sound that is the CO_2 solenoid opening and closing.



Decontamination Cycle

These controls initiate or abort the high-heat decontamination cycle. LEDs on the Decontamination panel indicate what stage of the cycle or cycle-abort the incubator is in.

THEORY OF OPERATION

The SCO6AD CO_2 incubator provides a constant-temperature CO_2-enriched environment suitable for mammalian cell sample cultivation and other incubation applications. The unit features an automated high-heat, chamber decontamination cycle that does not require the removal of the CO_2 sensor or other electronic components. The incubator also comes with a glass viewing door allowing visual inspection of samples without compromising the chamber CO_2 or humidity environment.

Heating

When powered, the incubator heats to and maintains a user-selected target setpoint in the incubation chamber. The incubator senses the chamber air temperature using a solid-state probe mounted on the chamber interior wall. When the incubator detects that the chamber temperature has dropped below the target setpoint, it pulses power to the heating elements inside the chamber walls and in the outer chamber door.

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

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

SCO incubators rely on natural heat radiation for cooling. These units can achieve a low-end temperature just above the ambient room temperature plus the internal waste heat of the unit.

The exterior chamber door is self-heating to bolster the thermal uniformity and stability of the chamber and to minimize condensation on the glass viewing door. Leaving the exterior door open for long durations may adversely impact the temperature performance of the incubation chamber. It may also create condensate on the viewing door. Door openings should be restricted to the minimum necessary to view or access samples in the chamber.

CO_2 Atmosphere

The controller controls the gas concentration of CO_2 in the chamber atmosphere by operating an internal injection solenoid valve connected to a gas intake port. The controller monitors the CO_2 level in the chamber using an infrared sensor located in the recirculation duct. The sensor operates on the principle that a specific frequency set of infrared light is absorbed by CO_2. The more CO_2 present in the chamber, the more of that band of infrared is absorbed. The sensor is only sensitive to CO_2, so measurement accuracy is consistent, regardless of the presence of other gasses in the incubator.

OPERATION

The processor employs proportional-integral-derivative analytic feedback-loop functions when measuring and controlling the CO_2 concentration. Injection lengths are proportional to the difference between the measured concentration and the gas setpoint. The frequency of injections is derived from the rate of change in the difference. Integrator feedback slows the rate of injection as the concentration approaches the setpoint, which helps prevent overshoots. When the chamber concentration is stable CO_2 injections take place in small bursts to correct for deviations less than 0.1%. The incubator is not provided with a means to actively remove CO_2 from the chamber atmosphere.

Humidification

Passive humidification is provided by filling the humidification pan included with the unit. The pan is then placed on the heated chamber floor. Evaporation, driven in part by heating, raises the relative humidity percentage (RH%) of the chamber. A copper token included with the pan helps to significantly slow the growth of microbiological populations in the humidification water supply.

The incubator must be humidified in order to achieve its stated temperature uniformity specification.

Decontamination Cycle

The SCO6AD comes with a user-initiated, eight-hour high heat cycle designed to kill microbiological organisms. This automated cycle consists of three stages: An approximately 1.5-hour ramp-up from room n temperature to 180°C; a 2-hour soak at 180°C; and a 4.5-hour cooldown. Prior to launching a decontamination cycle, drain the humidification pan and remove its copper antimicrobial token. Removal of the token prevents discoloration of the pan during the cycle.

Physical Access and Data Ports

A copper-filtered access port on the right side of the unit allows sensor and monitoring probes, such as thermocouples and humidity meter solid-state probes, to be inserted and left in the chamber without compromising the CO_2 atmosphere or chamber temperature. An atmosphere sample port for verifying the CO_2 concentration in the chamber is provided on a panel on the right side of the incubator. This panel also holds a dry contact on/off jack port that activates whenever a temperature or CO_2 alarm is triggered. A USB port on the same panel outputs temperature and CO_2 levels as a digital logline once per minute using serial com protocol. Please see the **Data Outputs** entry on page 42 for more details.

The Over Temperature Limit System (OTL)

When set, the mechanical OTL heating cutoff system prevents runaway heating in the unit chamber. The OTL operates independently of the microprocessor controller and connects to a hydrostatic temperature sensor probe located in the incubation chamber. In the event the chamber air temperature exceeds the current OTL setting, the OTL routes power away from the heating elements. The OTL will continue to prevent heating until the temperature drops below its limit setting. The Over Temperature Limit is **set by the user**, typically at approximately 1°C above the application temperature setpoint.

PUT THE INCUBATOR INTO OPERATION

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

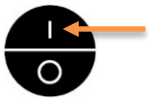
1.

2.

Attach the power cord that came with the unit to the power inlet receptacle on the side of the incubator.

Plug the power cord into the workspace electrical supply outlet.

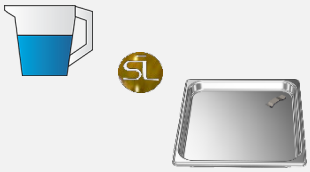
3.



Place the incubator **Power Switch** in the on (I) position.

- The Temperature and CO_2 displays will illuminate.

4.



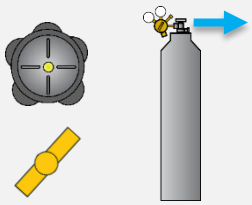
Install and fill the humidification pan in the incubation chamber, see page 31.

5.

Set the Temperature Setpoint to your incubation application temperature.

See page 32.

6.



Start a CO_2 Flow to the incubator.

- See page 34.

7.

Set the CO_2 Setpoint to your incubation application temperature.

- See page 35.

Continued on next page

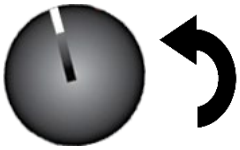
Put the Incubator into Operation (Continued)

8.

Allow the unit to run 8 hours to heat soak and achieve a stable chamber temperature.

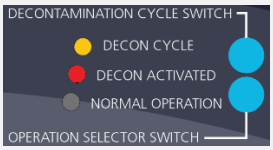
- The manufacturer recommends allowing the unit to run overnight.

9.



Set the Over Temperature Limit. See page 37.

- The incubator must be heated **and stable** at your application temperature prior to performing this procedure.



Optional: Run a **high-heat decontamination cycle**, page 38.

- A cycle was run at the factory to verify functionality prior to shipping.

10.

Place your samples in the incubation chamber.

- See **Loading the Incubator**, page 42
- Decon Cycle: If you run a high-heat decontamination cycle first, allow the chamber to cool to and stabilize at your application temperature prior to loading samples.

End of procedure

HUMIDIFYING THE INCUBATOR

The incubation chamber must be humidified to achieve its stated temperature uniformity specification. Humidification raises the relative humidity of the chamber to 95%, helping to slow the drying of samples in breathable sample containers such as Petri plates.

Installation

1. Secure the copper, antimicrobial token in the pan using the pan clip.
2. Place the pan on the **floor** of the incubation chamber.
    - The pan must be on the heated floor to fully humidify the chamber.
3. Fill the pan with water.
    - Never use deionized water to humidify the incubator!

Maintenance

- Regularly clean and disinfect or decontaminate the pan.
- Refill as needed and change the water in the pan at least once per week.
- Always place and secure the copper token in the pan to slow the growth of microbiological populations in the water supply.
    - The token must be removed prior to running a high-heat decontamination cycle to avoid discoloring the pan.
- The pan must be drained prior to a high-heat decontamination cycle.
- Use of chemical disinfectants added to the pan may alter the surface tension of the water. This may significantly reduce the rate of evaporation and impact the humidity level of the incubator chamber.

SET THE TEMPERATURE SETPOINT

1. Set OTL control to its maximum setting, if not already set to max.

- Turning the OTL all the way to the right (clockwise) prevents the heating cutoff system from interfering with this procedure.

2. Jump to the Temperature Setpoint Adjustment mode

Press and hold either

Set Temperature °C

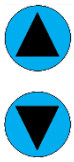
Setpoint Adjustment Mode

Set Temperature °C

Initial Set Poiint

Note: The display will automatically exit the adjustment mode after 5 seconds of inactivity on the arrow keys, saving the last shown setpoint value.

3. Set the Temperature Setpoint



Adjust

New Setpoint

Note: Adjust the setpoint to its lowest setting (OFF) to turn off heating in the chamber.

4. Wait for 5 seconds after entering the Setpoint

Set Temperature °C

HEATING ACTIVATED

- The display will stop flashing. The setpoint is now saved in the controller.

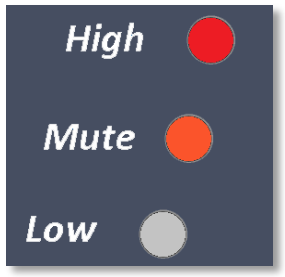
See the **Set the OTL procedure** on page 37 for how to set the OTL system once the incubation chamber has stabilized at your application temperature setpoint and after you have performed any display verifications or calibrations.

End of Procedure

Note: The Temperature Deviation Alarm is disabled during high-heat decontamination cycles.

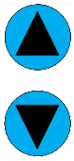
Muting the Audible Temperature Alarm

Audible and visual deviation alarms activate if the incubation chamber temperature deviates by 1°C above or below the temperature setpoint. The low deviation audible alarm has a delay of 15 minutes to prevent the low audible from sounding each time the doors are opened, causing a short-lived drop in temperature.



High Alarm Muted

To mute an audible high or low deviation alarm:



1. Press and hold either the **Up** or **Down** arrow on the Temperature Control until the amber Mute LED illuminates and the audible alarm shuts off.
   - The audible alarm will remain muted for the duration of the current temperature deviation.
   - The visual alarm indicator will remain illuminated.
   - Any **new** deviation of ±1°C or greater will reactivate the audible alarm.

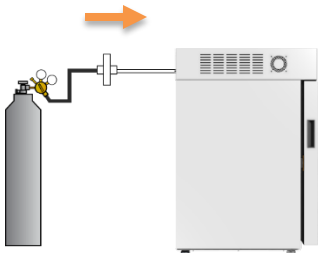
Automatic Door Cutoff

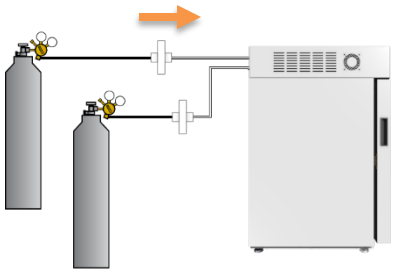
Gas and heating pause.

The incubator stops the flow of CO_2 into the chamber and depowers the heater elements when the outer door is opened. This limits the amount of CO_2 released into the workspace around the incubator if the viewing door is opened and prevents the heater from continually attempting to counteract any inflow of cooler air. Counteracting would cause a significant heat spike when the door is closed. Normal CO_2 injections and heating resume when the outer door is closed.

START A FLOW OF CO_2

The gas supply must be connected to the incubator per the instructions in the Installation chapter.



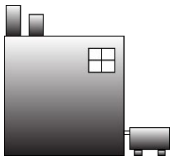


Gas Cylinder(s)

1. Open the cylinder valve(s) to supply CO_2 to the regulator.

2. Set cylinder regulator flow setting(s).

    - **Single source**: Set the regulator to deliver 15 - 20 Pounds per Square Inch (psi) to the incubator CO_2 in Port. **Never exceed 20 psi**.
    - **Dual source**: Set one cylinder regulator to 20 psi and the other regulator to 15 psi.
        - The incubator will draw from and empty the 20-psi cylinder, then draw from the 15-psi cylinder.
        - **Never exceed 20 psi.**



Building Supply System

1. Initiate a flow to supply 15 to 20 psi of CO_2 to the incubator either of the Gas In ports.

PSI	Megapascals	Kilopascals	Bar
15 – 20 psi	0.103 – 0.137 Mpa	103.42 – 137.89 Kpa	1.03 – 1.378 bar

End of procedure

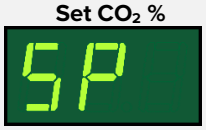
SET THE CO_2 SETPOINT

The incubator comes from the factory with the CO_2 setpoint set to Off. Set the setpoint percentage to the gas concentration required by your study or production protocol.

1. Jump to the CO_2 Setpoint Adjustment mode

Press and hold either

Set CO_2 %



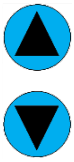
Setpoint Adjustment Mode

Set CO_2 %

Initial Setpoint

Note: The display will automatically exit the adjustment mode after 5 seconds of inactivity on the arrow keys, saving the last shown setpoint value.

2. Set the Gas Setpoint



Adjust

Set CO_2 %

New Setpoint

Note: To turn the CO_2 system off, set the setpoint to its lowest setting (OFF).

3. Wait for 5 seconds after entering the Setpoint

Set CO_2 %

CO_2 Injecting

- The display will stop flashing. The setpoint is now saved in the controller.
- The display will revert to showing the current chamber CO_2 concentration.

LO - Low CO_2

When starting with no CO_2 in the chamber, the display will show “LO” until the incubator registers a concentration greater than 0%. A few minutes of CO_2 injections may be required to build up a sufficient gas concentration.

End of Procedure

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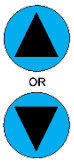
MUTING THE AUDIBLE CO_2 ALARM

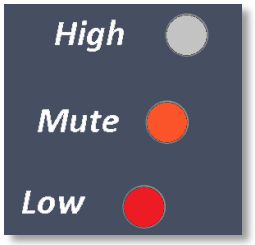
A visual deviation indicator alarm illuminates if the chamber CO_2 level deviates 1% above or below the CO_2 setpoint. An audible alarm sounds immediately for a high deviation. The low deviation audible alarm sounds only after the visual low indicator light has been continually illuminated for 15 minutes. This delay prevents the alarm from sounding each time the chamber doors are opened.

To mute a CO_2 deviation alarm:

1. Press and hold the Set CO_2 **Up** or **Down** arrow button until the Mute light illuminates.



- The alarm will stay muted for the duration of the current temperature deviation.
- A new deviation of 1% or more will reactivate the audible alarm.



Low Gas Alarm Muted

Low and No Gas Alarms Timeline

NO GAS SUPPLY ALARM (NGS)

A second alarm activates if the Low Gas deviation indicator light is illuminated for longer than 20 minutes.

- The letters “ngS” will appear in the CO_2 display indicating **No Gas Supply**.
- The alarm will remain active, even if the incubator is turned off and back on.
- The NGS alarm remains on until CO_2 is restored to the chamber. It may take 2 or more minutes of CO_2 injections to establish a concentration high enough to deactivate the alarm.

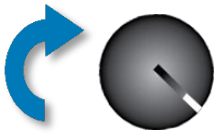
No Gas Supply

Note: Test the OTL system at least once per year for functionality.

SET THE OVER TEMPERATURE LIMIT

This procedure sets the OTL heating cutoff point approximately 1ºC above the current incubation chamber temperature. **The unit must be operating stabilized at your application temperature for at least 1 hour prior to setting the mechanical OTL cutoff system.**

1. **Set OTL control to its maximum setting,** if not already set to max.



2. **Turn the dial counterclockwise until the red Over Temperature Limit Light illuminates.**

3. **Slowly turn the dial clockwise until the OTL Activated light turns off.**

- The Over Temperature Limit is now set approximately 1˚C above the current incubator air temperature.

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

Optional: Turn the dial slightly to the left.

- This sets the OTL cutoff threshold nearer to the current incubator air temperature.

If the OTL is sporadically activating, you may 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. Check if any powered accessories in the chamber are generating heat. If you find no sources of external or internal temperature fluctuations, contact Tech Support or your distributor for assistance.

End of Procedure

Note: The incubator was run through a decontamination cycle at the factory. However, the manufacturer cannot guarantee the unit was not been exposed to contaminants during shipping.

DECONTAMINATION CYCLE

The incubator will not inject CO_2 gas during the cycle. The CO_2 sensor is protected from exposure to high temperatures does not need to be removed.

The incubator disables the Over Temperature Limit system during the cycle.

Timeline

1. Ramp up to 180°C ~1.5 Hours
2. Heat soak, 2 Hours
3. Cooldown to 50°C ~4.5 Hours

Preparation

Prior to Launching the auto decontamination cycle, perform the following steps:

1. Remove all samples, sample containers, and equipment.

2. Leave the shelving inside the chamber, if allowed by your laboratory protocol.

3. Empty the humidification pan of all water.
   - **Failure to empty the pan will lengthen the ramp-up and cooldown stages of the decontamination cycle**, as more mass must be brought to temperature. This may adversely impact the cycle efficacy.

4. Remove the copper token from the humidification pan.
   - Leaving the token in during a cycle will result in oxidation of the token and discoloration of the pan.
   - Manually disinfect the token using disinfectants and cleaning methods appropriate to your laboratory protocol.

5. Place the humidification pan back on the incubation chamber floor.

6. Close the chamber doors.
   - The cycle will not initiate while the doors are open.

Continued on next page

Decontamination Cycle

Perform the following steps to launch the cycle, then restore the incubator to normal operation mode upon completion.

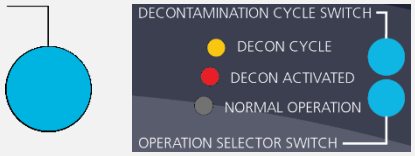
1. Take the incubator out of normal operation mode.

Press and Hold

a. Press and hold the **Operation Selector Switch** until the amber Decon Cycle indicator begins flashing.

- The green Normal Operation indicator will extinguish

2. Launch the Decontamination Cycle

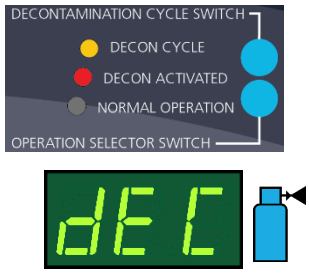


Press and Hold

a. Press and hold the **Decontamination Cycle Switch** until the amber Decon Cycle and red Decon Activated indicators begin flashing alternatingly.

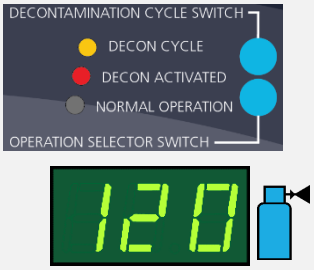
- The outer door will lock with an audible click.

3. Ramp Up stage



- Under normal conditions, the ramp-up takes 1.5 hours (90 minutes).
- The CO_2 display shows “dEC”, indicating the decontamination cycle is running.

4. The 2-hour Soak stage starts upon reaching 180°C

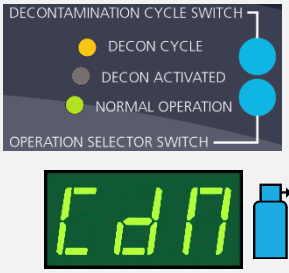


- The Decon Cycle and Decon Activated lights **stay on continuously** when the incubator chamber air temperature reaches 180°C.
- The CO_2 display shows a countdown, starting at 120 minutes.
- The 2-hour heat soak is required to kill most microbiological organisms.

Continued on next page

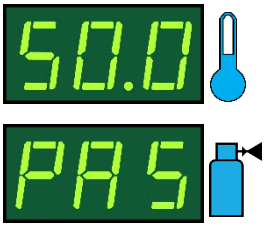
Decontamination Cycle (Continued)

5. The Cooldown stage begins when the 2-hour Soak timer reaches 0 (zero).



- The amber Decon Cycle and green Normal Operation indicators flash alternatingly during the Cooldown.
- The CO_2 shows “CdN”, indicating that the cycle has entered the cooldown stage.

6. The Cooldown stage ends when the chamber achieves 50°C.



- The CO_2 display shows “PAS”, indicating that the cycle has concluded.
- The outer chamber door automatically unlocks, accompanied by a click.

7. Restore the incubator to Normal Operations mode.

Press and Hold

a. Press and hold the **Operation Selector switch** until the amber Decon Cycle light extinguishes.

- The CO_2 display returns to showing the CO_2 concentration in the chamber.

Wait for Stabilization

After completing a decontamination cycle, wait until the chamber has stabilized at your application temperature before refilling the humidity pan and loading samples or adjusting the Over Temperature setting.

End of procedure

ABORTING THE DECONTAMINATION AUTO CYCLE

This procedure forces an active decontamination cycle to enter cooldown mode. Allow the incubator to cool to 50°C before opening the chamber door.

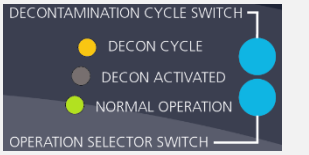
1. Abort the Cycle.

Press and Hold

a. Press and hold both the Decontamination Cycle and Operation Selector switches.

- After approximately 4 seconds, the CO_2 display shows “Ab”, indicating a successful abort.

2. The incubator ceases heating and enters Cooldown.

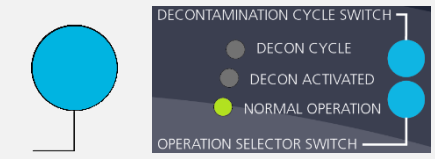


- The amber Decon Cycle and green Normal Operation indicators flash alternatingly during the Cooldown.
- The CO_2 display shows “CdN”, indicating the cycle has entered the cooldown stage.

3. The Cooldown stage ends when the chamber achieves 50°C.

- The CO_2 display shows “PAS”, indicating that the cycle has concluded.
- The outer chamber door automatically unlocks, accompanied by a click.

4. Restore the incubator to normal operations mode.



Press and Hold

a. Press and hold the **Operation Selector switch** until the amber Decon Cycle light extinguishes.

- The CO_2 display returns to showing the CO_2 concentration in the chamber.

End of procedure

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LOAD THE INCUBATOR

The chamber must be operating stabilized at your application temperature prior to loading samples. Place items on the shelves inside the incubation chamber as evenly spaced as possible. Proper spacing allows for maximum air circulation and a high degree of temperature uniformity. Leave 1 inch (25mm) between sample containers and the chamber walls.

This completes the **Put the Incubator into Operation procedure**.

ACCESSORY COMPATIBILITY

Make sure that any accessory equipment used inside the incubation chamber can safely and effectively operate within your selected range of temperature, humidity, and CO_2 levels. Do not leave accessory equipment in the chamber during auto decontamination.

DATA OUTPUT CAPABILITIES

USB Outputs

The incubator generates data outputs describing the chamber temperature and CO_2 concentration percentage as a digital log line, once per minute. These outputs are transmitted through a USB port located on the top, left side of the unit using RS232 serial protocol.

Required Software

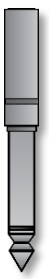
- Viewing and logging this output requires a terminal emulator program such as the open-source (BSD license) emulator, Tera Term.

Digital Outputs

Parameter	Output Channel
Temperature	C1
CO_2	C3

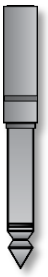
Example logline output: **C1=37.0 C3=5.0**

Dry Contact Alarm Port



This port communicates all alarm activations as On / Off outputs in which On indicates an alarm instance. The port connects to a standard audio jack and cable (male mono phono plug, ¼ inch (6.3 mm).

Jacks are **not** included with the incubator.



Optional Outputs

The SCO6AD may be ordered from the factory as a special quote (SQ) unit equipped with a pair of 4 to 20 milliamp analog outputs describing the current chamber temperature and CO_2 levels.

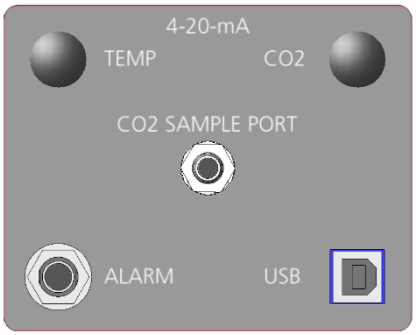
The outputs are transmitted through two jack ports on the right side of the incubator. The port connects to a standard audio jack and cable (male mono phono plug, ¼ inch (6.3 mm). Jacks are not included with the incubator.

Jack Outputs

Parameter	Parameter Value at 4mA	Parameter Value at 20mA
Temperature	0°C	60°C
CO_2	0% CO_2	20% CO_2

Data Monitoring Systems – Max Resistance

For building management and other data monitoring or logging systems, the maximum resistance of the current loop driven by either output from the 4-20mA module is 250 Ohms. At higher loop resistances, the current value will be erroneously low for parameter values near the top of the scale.



Data Ports

CONDENSATION AND THE DEW POINT

Relative humidity inside the incubator chamber should never be allowed to exceed 95%. Exceeding this threshold will likely result in condensation, possible leaks around the incubator, and may cause corrosion damage if allowed to continue for any significant length of time.

Condensation takes place whenever the humidity level in the incubator chamber reaches the dew point. The dew point is the level of humidity at which the air cannot hold more water vapor. The warmer the air, the more water vapor it can hold.

As the level of humidity rises in an incubation chamber, condensate will first appear on surfaces that are cooler than the air temperature. Near the dew point, condensate forms on any item or exposed surface even slightly cooler than the air. When the dew point is reached, condensate forms on nearly all exposed surfaces.

Managing condensation primarily depends on either lowering the humidity level or increasing the air temperature in the incubator chamber.

Note: Rising or falling air pressure from the weather will adjust the dew point up and down in small increments. If the relative humidity in the incubation chamber is already near the dew point, barometric fluctuations may push it across the dew point threshold.

Note: The thin air at higher altitudes holds less humidity than the denser air found at or near sea level.

If excessive condensate has appeared in the incubation chamber, dry the chamber interior and check the following.

- Is the access port stopper properly seated in the port on the **outside** of the unit? The Stopping up the port by placing the stopper in the port **inside the chamber** interferes with this leak rate.
- Has the copper mesh filter around the access port been taped over? SCO6ADs depends on a controlled atmospheric leak rate through the mesh to help prevent condensation.
- Make sure samples on the shelves are evenly spaced to allow for good airflow.
- Ensure the chamber doors close and latch properly.
- Are frequent or lengthy chamber door openings causing significant temperature disruptions and chilling the chamber surfaces? If so, reduce the number of openings.
- Are there are too many open containers of evaporating sample media in the chamber? If so, reduce the number of open sample containers.
- Does the ambient humidity in the room exceed the stated operating range of 80% relative environmental humidity? If so, lower the room humidity.
- Is the incubator exposed to an external flow of cold air such as an air-conditioning vent or a door to a cooler hallway or adjacent room? Block or divert the air, or reposition the unit.
- Check the door gaskets for damage, wear, or signs of brittleness or dryness. Arrange for replacement of the gaskets if damaged or excessively worn.

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

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

CLEANING AND DISINFECTING

If a hazardous material or substance has spilled in the unit chamber, 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 and disinfection are 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. 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.
4. Rinse with distilled water and wipe dry with a soft cloth.

Disinfecting

For maximum effectiveness, disinfection procedures are typically performed after cleaning. Keep the following points in mind when disinfecting the unit.

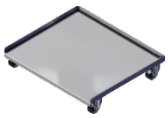
- Turn off and disconnect the unit to safeguard against electrical hazards.
- Disinfect the unit chamber using commercially available disinfectants that are non-corrosive, non-abrasive, and suitable for use on stainless steel and glass surfaces. Contact your local Site Safety Officer for detailed information 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.
- Gas concentrations from evaporating disinfecting agents can inhibit growth or cause metabolic symptoms in microbiological sample populations. Make sure that chlorines, amphyls, quaternary ammonias, or any other overtly volatile disinfecting agents have been rinsed or otherwise removed from the chamber surfaces, prior to placing samples in the chamber.

When disinfecting external surfaces, use disinfectants that will not damage painted metal, glass, and plastic

Minimizing Contamination Exposure

The following are suggestions for minimizing exposure of the incubation chamber to potential contaminants.

- Maintain a high air quality in the laboratory workspaces around the incubator.
- Avoid placing the incubator near sources of air movement such as doors, air vents, or high traffic routes in the workspace.
- Minimize the number of times the chamber door is opened during normal operations.



- Placing the unit on a rolling caster platform will facilitate cleaning of the floor around the unit. If possible, move floor seated units out of the space prior to cleaning the floor there. See the **Accessories** section on page 60 to order a castor platform from Sheldon Manufacturing.

GAS LINES AND HEPA FILTERS

The manufacturer recommends replacing in-line gas HEPA filters once per year or when a filter is noticeably discolored.

In-Line Gas Filter

- HEPA filters are directional and must be installed facing in the correct direction.
- The word "IN" is stamped on the rim of the filter assembly on the side that faces toward the gas supply. See page 20.

Gas lines should be replaced when cracking, brittleness, permanent kinking, or other signs of damage are present.

STORAGE OF THE INCUBATOR

Perform the following steps if the incubator will be out of use for more than 24 hours to prevent microbiological contamination such as fungus or mold.

1. Depower the incubator.
2. Disinfect and clean if required by your laboratory protocol, or if the chamber has been exposed to pathogenic microorganisms.
3. Use a soft cloth to dry the chamber surfaces.
    a. Do not place the incubator into storage while the chamber surfaces are damp.

MAINTAINING ATMOSPHERIC INTEGRITY

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

ELECTRICAL COMPONENTS

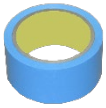
Electrical components do not require maintenance. If the incubator fails to operate as specified, please contact Technical Support.

CALIBRATE THE TEMPERATURE DISPLAY

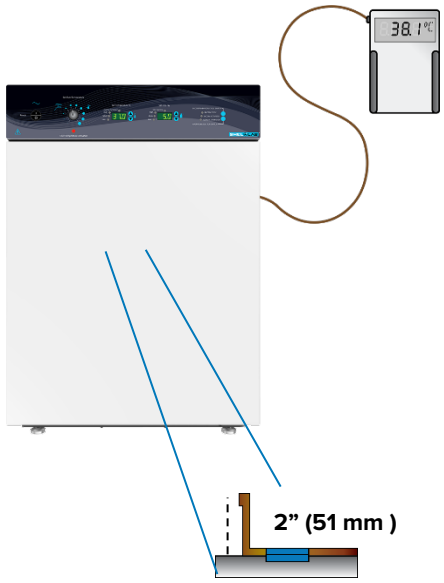
Note: This procedure requires a temperature reference device. Please see the **Reference Sensor Device entry** on page 10 for the device requirements.

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

A suggested calibration setup



Heat-resistant non-stick tape recommended



1. Introduce the reference device thermocouple sensor probe into the incubation chamber through the access port on the right side of the incubator.

2. Position the sensor probes in the incubator with the probe head close as possible to the geometric center of the incubation chamber at least at least 2 inches (51mm) above the the shelving.

3. Secure with non-stick, heat-resistant tape.

4. After securing the probe heads in position, carefully place the access port stopper in the port over the probe wires. Use non-stick tape to seal any gaps created between the stopper and the port by the probe wires.

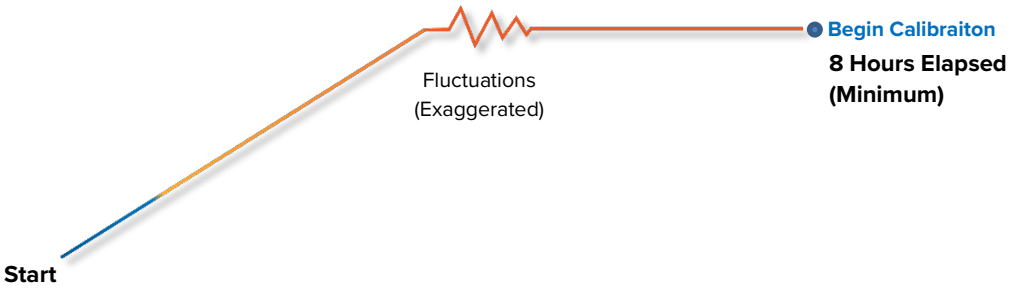
5. The incubation chamber doors must be closed and latched. Failure to do so will prevent an accurate calibration

CO_2 Calibration: A CO_2 calibartion may be performed during the temperature calibration so long as both chamber doors and the access port remain closed and sealed.

Temperature Stabilization

The incubator air temperature must be stable in order to perform an accurate calibration.

- Allow the incubator to operate undisturbed with the chamber door shut for **at least 8 hours** when first putting the unit into operation in a new environment.
- To be considered stabilized, the incubator chamber must operate at your calibration temperature for **at least 1 hour with no fluctuations of ±0.1°C or greater.**



Required temperature stability period operating undisturbed with the incubator door closed.

Suggested Temperature Calibration

1

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

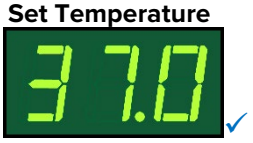
- If the readings are the same, or the difference between the two falls within the acceptable range of your protocol, the display is accurately showing the incubation chamber air temperature. **The Temperature Calibration procedure is now complete**.

-OR-

- If a difference falls outside of your protocol range, advance to Step 2.

Reference Device

Set Temperature



2

A display calibration adjustment must be entered to match the display to the reference device. See the next step.

Reference Device

Continued next page

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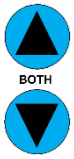
Temperature Calibration Continued

3

Place the display in its temperature calibration mode.



a. Press and hold both the **UP and DOWN** temperature arrow buttons simultaneously for approximately 5 seconds.

b. Release the buttons when the temperature display shows the letters “C O”. The display will begin flashing the **current temperature display value**.

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

4

Use the **Up** or **Down** arrows to adjust the current display temperature value until it matches the reference device temperature reading.

Reference Device

5

After matching the display to the reference device, wait 5 seconds.

- The temperature display will cease flashing and store the corrected chamber display value.
- The incubator will now begin heating or passively cooling in order to reach the setpoint with the corrected display value.

Heating to Setpoint

6

Allow the incubator to sit for at least 1 hour undisturbed to stabilize **after the unit has achieved the corrected temperature setpoint**.

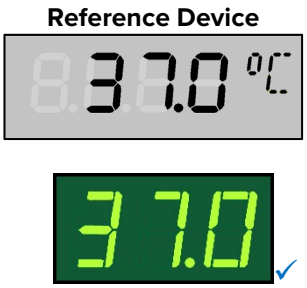
- Failure to wait until the incubator is fully stabilized will result in an inaccurate reading.

Setpoint Achieved

Continued next page

7

Compare the reference device reading with the chamber temperature display again.



- If the reference device and the chamber temperature display readings are the same or the difference falls within the range of your protocol, **the incubator is now calibrated for temperature**.

-OR-

- See the next step if the readings fail to match or fall outside of your protocol range.

8

If the two readings are not the same, and the difference still falls outside the acceptable range of your protocol, repeat steps 3 - 7 up to two more times.

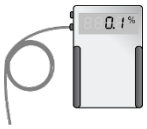
- Three attempts may be required to successfully calibrate units that are more than ±2°C out of calibration.

9

If the temperature readings of the incubator temperature display and the reference device still fall outside your protocol after three calibration attempts, contact your distributor or technical support for assistance.

End of procedure

CALIBRATE THE CO_2 DISPLAY



Note: This procedure requires a gas reference device. Please see the **Reference Sensor Devices entry** on page 10 for the device requirements.

Gas calibrations are performed to match the incubator CO_2 display to the actual CO_2 concentration inside the incubation chamber. The actual gas concentration is supplied by a calibrated reference device. Calibrations compensate for long-term drifts in the incubator microprocessor controller as well as those caused by the natural material evolution of the infrared sensor in the heated recirculation duct space. Calibrate as often as required by your laboratory or production protocol, or regulatory compliance schedule. Always calibrate to the standards and use the calibration setup required by your industry requirements or laboratory protocol.

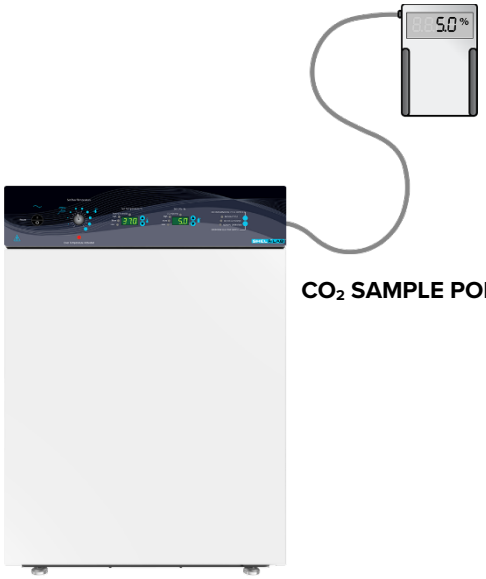
A suggested calibration setup

1. Connect the reference device sample tubing to the **CO_2 Sample Port** located on the top, right side of the incubator.

2. The incubation chamber doors must be closed and latched. Failure to do so will prevent accurate calibration.

3. CO_2 calibrations must be performed with the chamber **heated and stable at your application temperature setpoint**. Temperature helps drive gas diffusion in the chamber.

4. The incubator must be supplied with CO_2 during the entire calibration procedure.

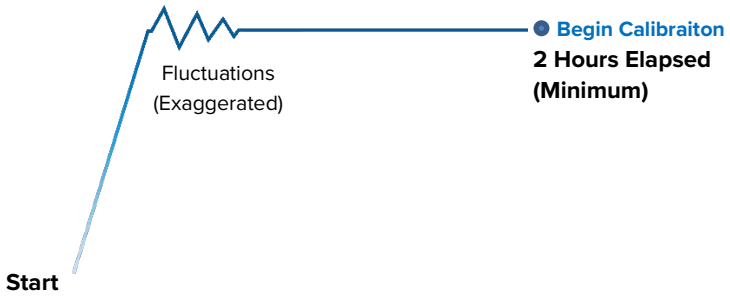


A CO_2 calibration may be carried out concurrently with a temperature calibration to save time, so long as both chamber doors and the access port remain closed and sealed.

Gas Stabilization

The CO_2 concentration in the incubation chamber must be given time to stabilize in order to perform an accurate calibration.

- The unit must be thermally stable, having operated at your application temperature for **at least 8 hours** prior to starting the gas calibration.
- After turning on a flow of CO_2 to the chamber and setting the CO_2 setpoint, allow the incubator to operate undisturbed with the chamber door shut for **at least 2 hours**.
- To be considered stabilized, the incubator chamber must operate at your calibration concentration for **at least 30 minutes with no fluctuations of ±0.1% or greater.**



Required stability period operating undisturbed with the incubator door closed and at temperature.

A Suggested CO_2 Calibration

1

Once the chamber CO_2 concentration has stabilized, compare the reference device and the incubator CO_2 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 CO_2 concentration. **The CO_2 Calibration procedure is now complete**.

-OR-

- If a difference falls outside of your protocol range, advance to Step 2.

Reference Device

Set CO_2 %

2

A display calibration adjustment must be entered to match the display to the reference device. See the next step.

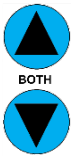
Reference Device

Continued next page

CO_2 Calibration Continued

3

Place the incubator CO_2 display in its calibration mode.



a. Press and hold both the **UP and DOWN** temperature arrow buttons simultaneously for approximately 5 seconds.

b. Release the buttons when the temperature display shows the letters “C O”. The display will then begin flashing the current CO_2 display value.

Note: If an arrow key is not pressed for five seconds, the display will cease flashing, and store the last displayed number as the CO_2 display value.

4

Use the **Up** or **Down** arrows to adjust the current display CO_2 % value until it matches the reference device concentration reading.

Reference Device

5

After matching the display to the reference device, wait 5 seconds.

Wait 5 Seconds

- The gas display will cease flashing and store the corrected chamber display value.
- The incubator will now begin injecting CO_2 or allowing the current concentration to decay in order to achieve the setpoint with the corrected display value.

Decaying to Setpoint

6

Wait 1 Hour

Allow the incubator to sit for at last one 1 hour undisturbed to stabilize **after the incubator has achieved the corrected gas setpoint**.

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

Setpoint Achieved

Continued next page

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CO_2 Calibration Continued

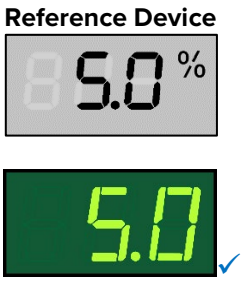
7

Compare the reference device reading with the incubator CO_2 display again.

- If the reference device and the incubator display readings are the same or the difference falls within the range of your protocol, **the incubator is now calibrated for CO_2.**

-OR-

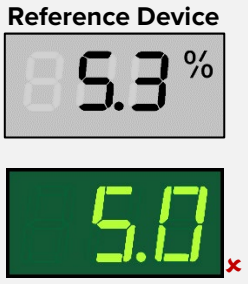
- See the next step if the readings fail to match or fall outside of your protocol range.



8

If the two readings are not the same, and the difference still falls outside the acceptable range of your protocol, repeat steps 3 – 7 up to two more times.

- Three calibration attempts may be required to successfully calibrate units that are more than ±2% out of calibration.



9

Contact your distributor or technical support for assistance, if the gas concentration readings of the incubator CO_2 display and the reference device still fall outside your protocol after three calibration attempts.

End of procedure

UNIT SPECIFICATIONS

The SCO6AD High-Heat Auto-Decontamination Incubator is a 110 – 120 voltage unit. Please refer to the unit 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 standard following DIN 12880 respecting the recommended wall clearances of 10% of the height, width, and depth of the inner chamber. All indications are average values, typical for units produced in the series. We reserve the right to alter technical specifications at all times.

WEIGHT

Shipping	Net Weight
268 lb / 121 kg	238.0 lb / 108.0 kg

DIMENSIONS

By inches

Exterior W × D × H	Interior W × D × H
28.5 x 30.8 x 39.5 inches	20.2 x 20.0 x 25.5 inches

By millimeters

Exterior W × D × H	Interior W × D × H
724 x 783 x 1004mm	513 x 508 x 648mm

Access Port

Diameter
1.5 inches (38mm)

CAPACITY

Cubic Feet	Liters
5.9	167.0

CHAMBER CO_2 PERFORMANCE

Range	Accuracy	Recovery Time
0 – 20%	± 0.1%	Less than 5 minutes

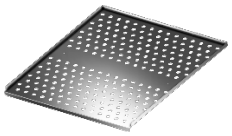
CHAMBER TEMPERATURE

Range	Uniformity	Stability
Ambient +5°C to 50°C	± 0.25°C at 37°C	± 0.1°C @ 37°C

POWER

Model	AC Voltage	Amperage	Frequency
SCO6AD	110 – 120	12.0	50/60 Hz

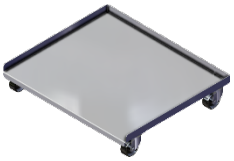
COMPONENTS

Description	Part Number	Description	Part Number
Access Port Stopper	 7750565	Humidification Pan	 995-00015
Brass Tubing Fitting (Gas Tubing Kit Component)	 3100520	Copper Token, Humidification Pan	 5800529
Viewing Door Gasket	 3450644	Power Cord 125 volt 9ft 5 in (2.86m) NEMA 5-15P	 1800510
Outer Door Gasket (Sold by the foot. Requires 9 feet)	 3450534	Shelf Slide	 5121028
Adjustable Leveling Feet	 2700506	Shelf Standard	 5170646
Fuse, 12.5 Amp, 250V,Type H, 5x20mm	 3300520	Stainless Steel Shelf	 5121777
Gas Line HEPA Filter, (CO_2 Gas Tubing Kit Component)	 2800525	Tubing Black 1/4 OD (Gas Tubing Kit Component)	 8500516
Complete CO_2 Gas Tubing Kit	 9710500	Tubing Clear 5/16 OD / 3/16 ID (Gas Tubing Kit Component)	 8500512

ORDERING

If you have the Part Number for an item, you may order it directly from Sheldon Manufacturing by calling 1-800-322-4897 extension 3. If you are not certain that you have the correct Part Number, or if you need that specific item, please contact Sheldon Technical Support for help at 1-800-322-4897 extension 4 or (503) 640-3000. Please have the **model number** and **serial number** of the incubator ready, as Tech Support will need this information to match your unit with its correct part.

ACCESSORIES



Caster Platform

A rolling platform for the SCO6AD for greater ease of transportation and floor space cleaning.

Part Number 9000574

CO_2 Cylinder Regulator Kit

Includes CO_2 gas tubing with an inline HEPA filter.

Part Number 9740558

Copper Shelf Assembly

Three copper shelves. Includes six copper shelf slides. Copper is known to have antimicrobial properties.

Part Number: **9750582,** complete assembly described above.

PN 5820504 Individual Shelf / PN 5820505 Individual Slide

Stacking Stand

A stacking stand for two SCO6AD incubators

Part Number 9000575

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