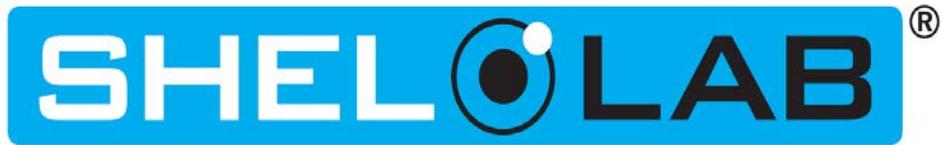


WATER-JACKETED CO₂ INCUBATOR

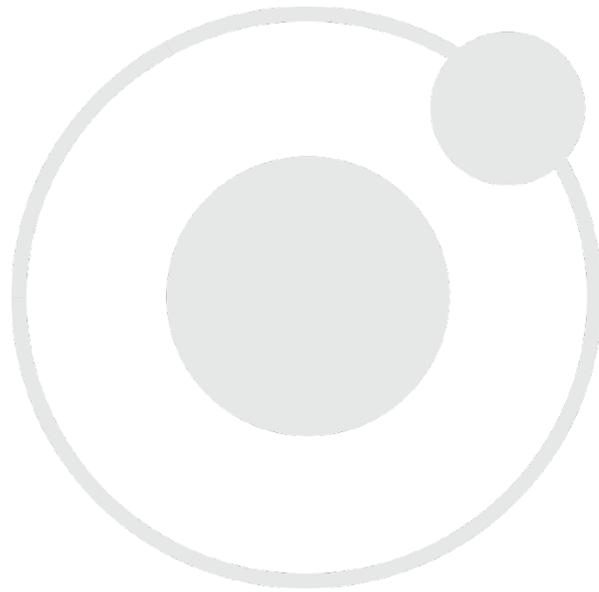


110 – 120 Volts



Installation - Operation Manual

SCO5W



SCO5W WATER-JACKETED CO₂ INCUBATORS

110 – 120 Voltage

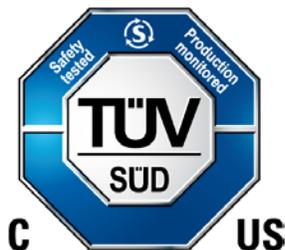
Part Number (Manual): 4861732

Revision: February 26, 2018



SHEL LAB is a brand of Sheldon Manufacturing, INC.

Safety Certifications



These units are TÜV listed as water jacket 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), with no flammable, volatile, or combustible materials 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

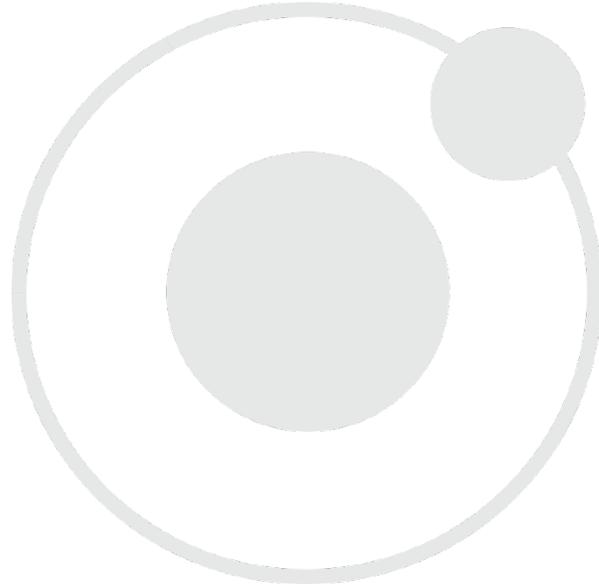
Supplemented by: UL 61010-2-010:2015

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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

These incubators are intended for laboratory, industrial, and educational microbiological cultivation applications. These incubators are not intended for use in 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 not explicitly authorized by the manufacturer can be dangerous and will 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 through Friday. Please have the following information ready when calling or emailing Technical Support: the **model number** and the **serial number** (see page 12).

EMAIL: support@sheldonmfg.com

PHONE: 1-800-322-4897 extension 4, or (503) 640-3000

FAX: (503) 640-1366

Sheldon Manufacturing, INC.

P.O. Box 627

Cornelius, OR 97113

ENGINEERING IMPROVEMENTS

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

INTRODUCTION

Note: A CO₂ gas regulator must be purchased separately from the incubator.

CO₂ GAS SUPPLY

Supply Required

The incubator must be connected to a carbon dioxide gas supply system in order to establish and maintain a CO₂-enriched incubation chamber atmosphere. The supply can be a building CO₂ gas system or one or two supply cylinders (tanks).

Supply Quality

Use medical or food grade CO₂. Use of industrial CO₂ 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 CO₂ gas pressure at the incubator intake port (labeled CO₂ to Chamber).

Two Stage Regulator

If connecting to a supply cylinder, **always use a two-stage CO₂ pressure regulator**. During normal operations, the incubator uses small quantities of CO₂ to maintain the chamber gas concentration. Under these conditions, 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.

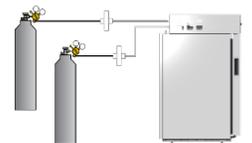


Regulator Not Included

See page 60 for ordering information.

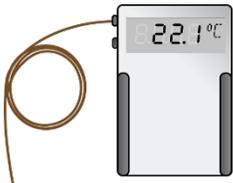
Dual Cylinder Connection.

The incubator can be connected simultaneously to two CO₂ supply cylinders. The unit automatically switches drawing from one cylinder to the other when the first cylinder runs out of CO₂. Two gas regulators are required for this configuration.



REFERENCE SENSOR DEVICES

Must be purchased separately



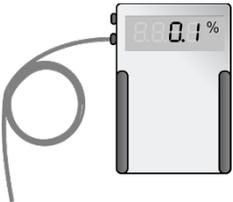
Temperature Reference

Reference sensor devices or a combined device are required for calibrating the incubator temperature and CO₂ displays.

Reference devices must meet the following standards:

- Accurate to at least 0.1°C
- Accurate to at least 0.1% CO₂

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



CO₂ Reference

Temperature Probes

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

CO₂ Sampling

For best CO₂ accuracy, use a digital gas analyzer with sample tubing connecting to the incubator CO₂ sample port. The barbed adapter gas fitting on the 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 CO₂ drawn through the sample port avoid chamber door openings. Openings disrupt the chamber temperature and CO₂ 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.
7. The access and water fill stoppers ship installed in their respective ports on the unit. Verify the presence of the stoppers.
8. Carefully check all packaging for accessory items before discarding.

Included Accessories

1 Copper Pan Token



1 Access Port Stopper



1 Ceiling Air Duct



1 Chamber HEPA Filter



1 Chamber Filter Cap



1 Fill Port Stopper



1 Humidification Pan



4 Leveling Feet



1 Power Cord



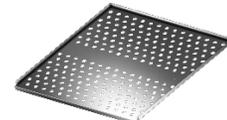
6 Shelf Slides



4 Shelf Standards



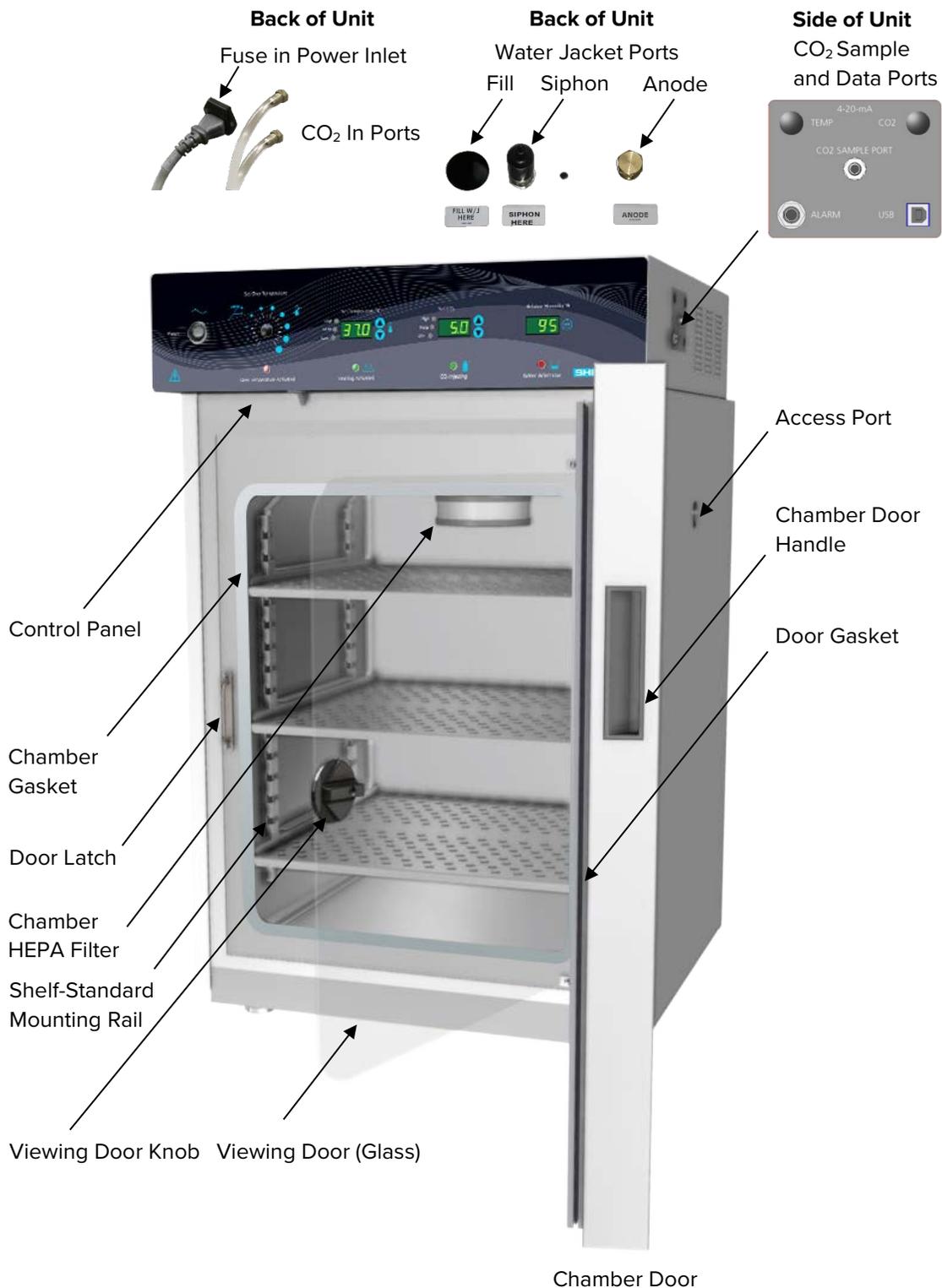
3 Shelves



RECEIVING YOUR UNIT

ORIENTATION IMAGE

SCO5W

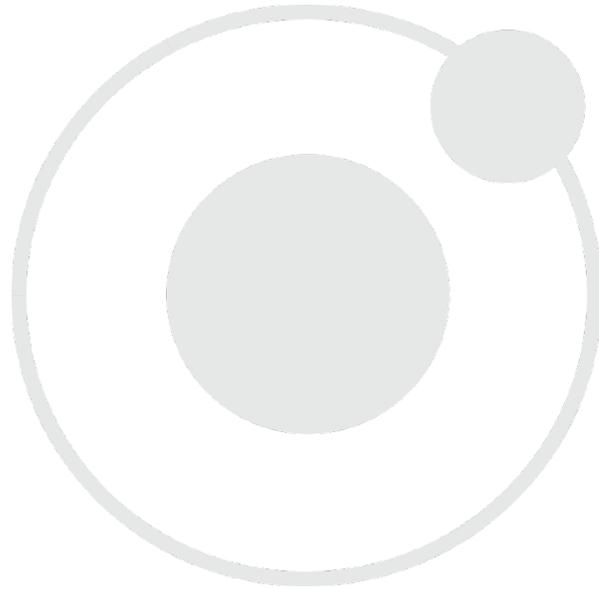


RECORDING DATA PLATE INFORMATION

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 inside of the chamber door, top-right corner.

Model Number	
Serial Number	



INSTALLATION CHECKLIST

Carry out the steps and procedures listed below to install the unit in a new workspace location and prepare it for use. All procedures are found in the Installation section of this manual.

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 57
- ✓ 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 CO₂ gas supply for the incubator page 9

Install the Incubator in a suitable location

- ✓ Review the lifting and handling instructions, page 18
- ✓ Place the incubator in its workspace location, page 19
- ✓ Make sure the incubator is level, page 18

Set up the incubator for use

- ✓ Clean and disinfect the incubator and accessories (except the HEPA filter) that will be placed in the incubation chamber, page 19
 - Do not use deionized water to clean the unit or fill the water jacket, see page 19
- ✓ Install the chamber HEPA filter and ceiling air duct in the incubation chamber, page 20
- ✓ Install the shelving in the incubation chamber, page 21
- ✓ Connect the incubator to the CO₂ gas supply source, page 22
- ✓ Verify that the rubber stopper is installed in the access port inside the incubation chamber, page 23
- ✓ Fill the water jacket with 19 gallons (71 liters) of water, page 23

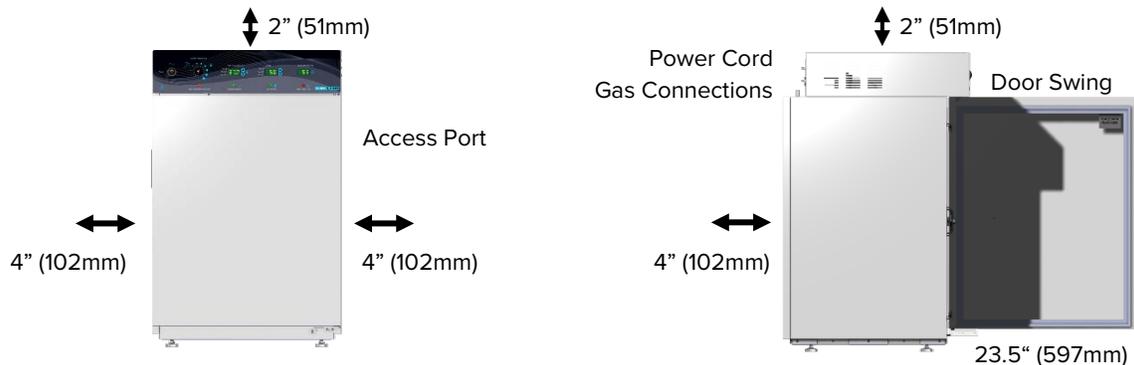
INSTALLATION

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

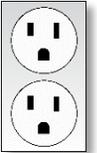
POWER SOURCE REQUIREMENTS

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 amperage requirements listed on the unit data plate. These units are intended for **110 - 120V 50/60 Hz** applications at **5 Amps**

- **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.



NEMA 5-15R
wall socket

Power Cord

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

- Each unit comes provided with a **115 volt 15 Amp, 9.2ft (2.86m) NEMA 5-15P** power cord.
- Always use this cord or an identical replacement.



Fuses

These units ship with a fuse installed in a fuse holder next to 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, T20, 5X20mm

INSTALLATION

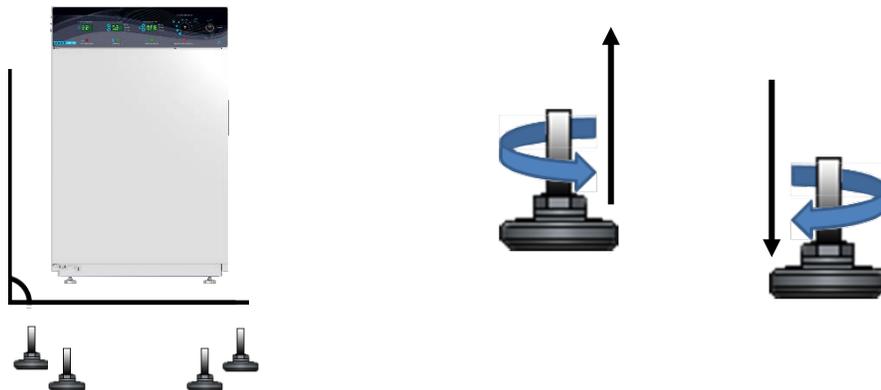
LIFTING AND HANDLING

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 4 leveling feet so that the leg of each foot sits inside the unit.

INSTALL THE INCUBATOR

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 or fill the water jacket. 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 and water jacketing applications.

INSTALLATION - CLEAN AND DISINFECT

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

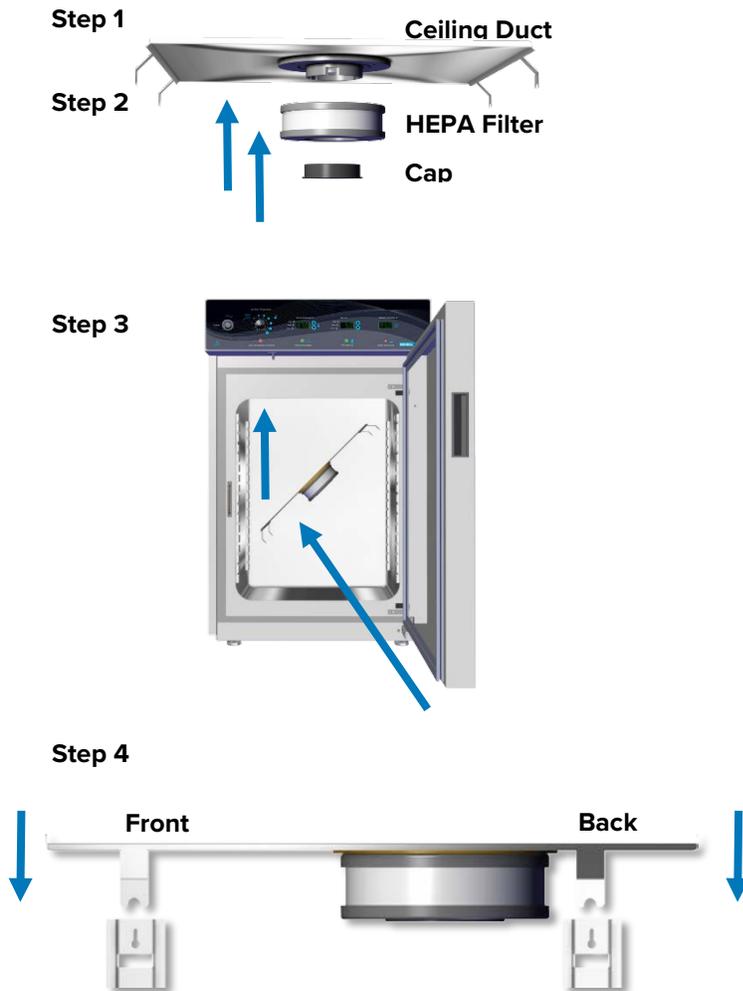
- Remove all protective wrappings from shelving components and the ceiling air duct prior to cleaning.
- **Do not clean the chamber HEPA filter**
- See the [Cleaning and Disinfecting](#) entry on page 43 for information on how to clean and disinfect without damaging the incubator or its components.

INSTALLATION

INSTALL CHAMBER HEPA FILTER AND CEILING AIR DUCT

The incubator must be unplugged while carrying out this procedure.

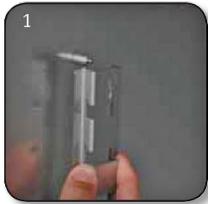
Exercise caution when installing the ceiling air duct. A plastic blower fan and the fragile head of the temperature and CO₂ sensors are located just above the duct and just to the right of the duct.



1. Attach the HEPA filter to the mounting ring on the ceiling air duct. The filter should snap into place.
 - It may be necessary to tilt the ring slightly to one side while doing so.
2. Attach the black plastic cap to the HEPA filter. Failure to do so will allow air to blow around the filter instead of blowing through it.
3. Place the duct and filter into the chamber, slightly tilted to one side or the other for ease of movement.
 - The filter must be toward the back of the chamber.
4. Inset the tabbed feet on the duct into the slots on the tops of the shelf standard rails.

SHELVING INSTALLATION

Install the shelving and humidification pan in the in the incubation chamber.



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



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



3. Install the shelves.
 - Slide into position.

Figure 1: Shelving Installation

INSTALLATION

CONNECT TO THE CO₂ SUPPLY

Note: See page 9 for CO₂ supply requirements.

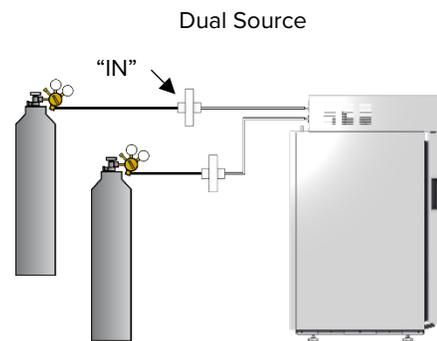
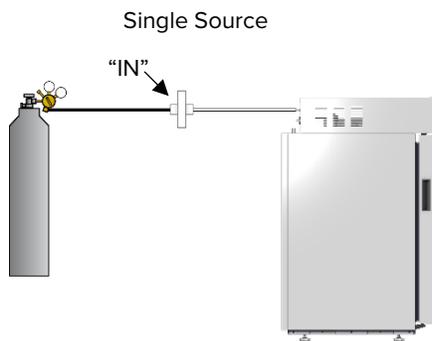


Optional Tubing Kit
with Inline HEPA Filter

CO₂ to Chamber



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



4. Connect the supply source to the incubator.
5. If connecting a second supply cylinder, do so now.
6. Do not initiate a flow of CO₂ to the incubator at this time.

End of procedure

ACCESS PORT STOPPER

Each incubator ships with a rubber stopper installed in the access port located on the right side the incubation chamber interior.

- The stopper should always be **installed inside the chamber** to obtain the best temperature uniformity and prevent condensation from forming inside the port.
 - Do not install the stopper on the outside of the incubator.
- Wires for thermocouples and other sensor probes may be introduced into the chamber through the access port. The stopper may be put in place over the wires.
- The unit will not meet its temperature or CO₂ specifications without the stopper installed.



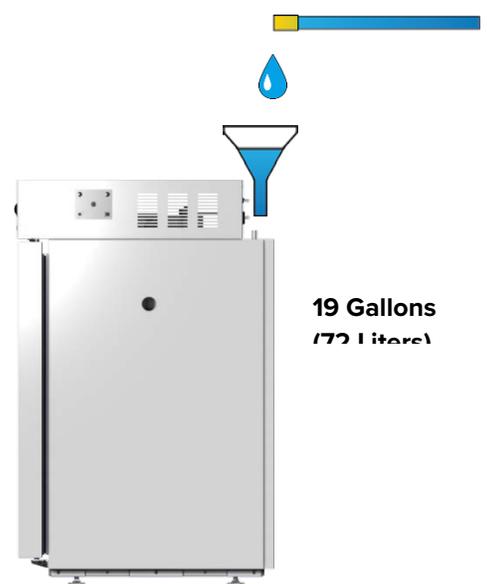
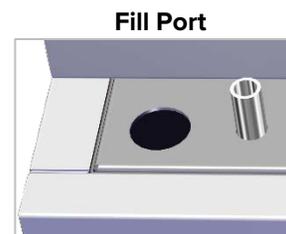
FILL THE WATER JACKET

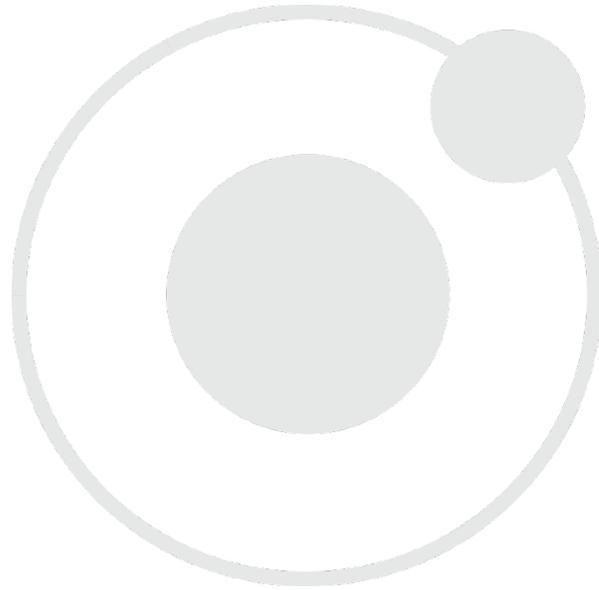
The water jacket requires **19 gallons (72 liters)** to provide sufficient thermal insulation for the incubator to operate at its stated temperature specifications.

The manufacturer recommends the use of distilled water or filtered tap water if possible. Please see the [Anode and Water Quality](#) entry in the maintenance section on page 55.

Use of a funnel or hose while filling the jacket is strongly recommended.

1. Locate the water fill port on the back right side of the incubator.
2. Remove the port stopper.
 - Place the port stopper in a location where it will be easy to find.
3. Fill the jacket with 19 gallons (72 liters) by pouring water in through the fill port.
4. Place the stopper back in the port.





GRAPHIC SYMBOLS

Each incubator is provided with multiple graphic symbols on its exterior and internal surfaces. These symbols identify hazards, and the functions 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

GRAPHIC SYMBOLS

Symbol	Definition
	Potential shock hazard Risque de choc électrique
	Indicates the unit should be recycled (Not disposed of in land-fill) Indique l'appareil doit être recyclé (Ne pas jeter dans une décharge)
	Indicates relative humidity Indique humidité relative
	Indicates water level low Indique faible niveau d'eau
	Indicates CO ₂ gas Indique gaz CO ₂
	Indicates the incubator heater is active L'élément chauffant est la production de chaleur

CONTROL PANEL OVERVIEW



Control Panel

Power Switch

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



Set Over Temperature

This graduated dial sets the Over Temperature Limit system heating cut off point. The OTL system helps prevent 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](#) description on page 30.



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 incubation chamber 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 set point or a calibration adjustment. The display blinks continually while in its set point or calibration adjustment modes, preceded by an “SP” for Set Point or “C O” for calibration offset.



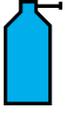
Red LED alarm indicators marked High and Low illuminate whenever the temperature deviates by $\pm 1^{\circ}\text{C}$ or greater from the current set point. The yellow LED marked Mute illuminates whenever an audible deviation alarm is being muted. See the [Muting the Audible Temperature Alarm](#) entry on page 35 for more information.

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



CONTROL PANEL OVERVIEW

CO₂ Display



Labeled Set CO₂, this display shows the concentration of CO₂ 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 CO₂ sensor registers a concentration in the chamber greater than 0%. A few minutes of CO₂ 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 set point or a calibration adjustment. The display blinks continually while in its set point or calibration adjustment modes, preceded by an “SP” for Set Point or “C O” for calibration offset.



Red LED alarm indicators marked High and Low illuminate whenever CO₂ deviations of $\pm 1\%$ or greater from the set point take place. The yellow LED marked Mute illuminates whenever an audible deviation alarm is being muted. See the [Muting the Audible CO₂ Alarm](#) entry on page 38 for more information.



Marked CO₂ Injecting, this green indicator illuminates while the incubator is injecting CO₂ into the incubation chamber. Injections are accompanied by a clicking sound that is the CO₂ solenoid opening and closing.



Humidity Display

Marked Set Relative Humidity %, the humidity display shows the current humidity inside the chamber as a relative percentage accurate to 1%.



The red indicator marked Water Jacket low illuminates when the water level of the jacket has fallen to a level that impacts the incubator temperature uniformity and stability. Add water to the water jacket as soon as this light illuminates. Fill until the light turns off. See page 23 in the Installation section for instructions.



THEORY OF OPERATION

SCO5W incubators are engineered to provide a constant temperature CO₂ incubation environment that is passively humidified to prevent the premature drying of sample media. Filling the humidification pan will result in a relative humidity (RH) of 90 – 95% in the chamber. Each incubator features a glass viewing door that allows visual inspection of samples without compromising the chamber CO₂ or humidity environment.

Heating

When powered, the unit heats to and maintains the incubation chamber air temperature at the currently programmed temperature set point. An internal microprocessor stores the temperature set point. The microprocessor board is wired to a solid-state temperature probe located on the chamber interior right wall. When the processor detects that the chamber temperature has dropped below the temperature set point, it pulses power to heating elements on the surface of the water-jacket insulation space, and in the outer chamber door. Heat from the elements on the jacket propagates through water inside the jacket to the chamber wall, and then to the chamber airspace. During normal operations, with the doors closed, most heating pulses correct for deviations of less than 0.1°C.



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

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

The chamber door is self-heating to bolster the thermal uniformity and stability of the chamber and to minimize condensation on the glass viewing door. The protection provided by the door against temperature and CO₂ disruptions is of limited duration. Minimize sample viewing times when possible.

Insulation – Water Jacket

Insulation is provided by the water-filled jacket surrounding the incubation chamber on the top, bottom, back, and left and right sides. The mass of the water, once heated to the set point, provides a high degree of temperature uniformity in the chamber, as well as thermal inertia. In other words, the chamber will retain heat in the event power to the heating elements is interrupted for significantly longer than an air-jacketed incubator. However, the water jacket does require a longer time to come up to temperature when placing the unit in operation from a cold state.

CO₂ Atmosphere



The microprocessor also controls the gas concentration of CO₂ in the chamber atmosphere by operating an internal injection solenoid valve connected to a gas input port. The processor monitors CO₂ concentration level in the incubator 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 CO₂. The more CO₂ present in the chamber, the more of that band of infrared is absorbed. The sensor is only sensitive to CO₂, so measurement accuracy is consistent, regardless of the presence of other gases in the incubator.

The processor employs proportional-integral-derivative (PID) analytic feedback-loop functions when measuring and controlling the CO₂ concentration. Injection lengths are proportional to the difference between the measured concentration and the set point. 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 set point, which helps prevent overshoots. When the chamber concentration is stable CO₂ 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 CO₂ 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.

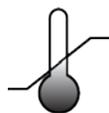
The incubator must be operated humidified in order to achieve its stated temperature uniformity specification.

Physical and Data Access



An access port on the right side of the unit allows sensors such as thermocouples probes to be inserted and left in the chamber without compromising the CO₂ atmosphere or chamber temperature. An atmosphere sample port for independently verifying the CO₂ concentration in the chamber is provided on the left side of the unit, adjacent to the control panel. A USB outputs CO₂ and temperature levels once per minute as a serial-protocol digital log line. An adjacent dry-contact jack communicates alarm activation incidents. Please see the [Data Output](#) entry on page 41 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 element. 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 set point.

OPERATION

Note: From a cold start, the incubator requires 12 hours to come up to and stabilize at temperature and humidity levels prior to loading samples. Stabilization safeguards samples.

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.



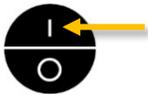
Attach the power cord that came with the unit to the power inlet receptacle on the side of the incubator.

2.



Plug the power cord into the workspace electrical supply outlet.

3.



Turn on the incubator.

- The Temperature and CO₂ displays will illuminate.

4.



Humidify the Incubator page 33



5.

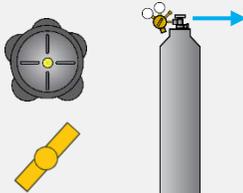


Set the Temperature Set Point to your incubation application temperature.

- See page 34.



6.



Start a CO₂ Flow to the incubator.

- See page 36.



7.



Set the CO₂ Set Point to your incubation application temperature.

- See page 37.



Put the Incubator into Operation (Continued)

8.

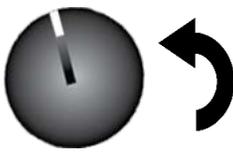


Allow the unit to run 12 hours prior to heat soak to achieve a stable temperature.

- The manufacturer recommends allowing the unit to run overnight.



9.



Set the Over Temperature Limit. See page 39.

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

10.

Place your samples in the incubation chamber.

- See **Loading the Incubator**, page 40

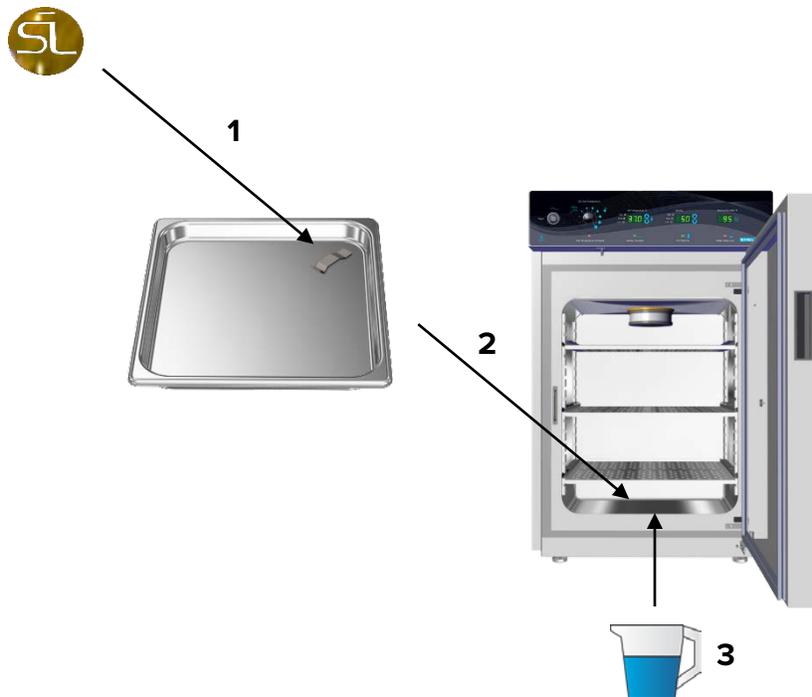
End of procedure

HUMIDIFY THE INCUBATOR



The humidification pan must be filled with water in order for the incubator to achieve its stated temperature uniformity specification.

Humidifying the chamber helps slow the drying of samples in open, “breathable” containers.



- Always place and secure the copper token in the pan to slow the growth of microbiological populations in humidification water supply.
- **Never use deionized water** to humidify the incubator.
- The pan must be placed on the chamber floor.
 - The floor is heated and helps evaporation to raise the humidity level to 90 – 95% relative humidity.
- Regularly clean and disinfect the pan.
- Refill as needed, and change the water in the pan at least once per week.
- 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.

OPERATION



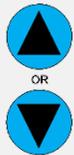
SET THE TEMPERATURE SET POINT

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. Navigate to the Temperature Set Point Adjustment mode



Push either button

Set Temperature °C



Set Point Adjustment Mode

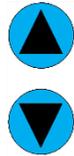
Set Temperature °C



Initial Set Point

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

3. Set the Temperature Set Point



Adjust



New Set Point

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

4. Wait for 5 seconds after entering the Set Point



Wait 5 Seconds

Set Temperature °C



HEATING ACTIVATED

The display will stop flashing. The set point is now saved in the controller.



See the [Set the OTL procedure](#) on page 39 for how to set the OTL system once the incubation chamber has stabilized at your application temperature set point and after you have performed any display verifications or calibrations.

End of Procedure

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 set point. 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.

To mute an audible high or low deviation alarm:



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 $\pm 1^\circ\text{C}$ or greater will reactivate the audible alarm.

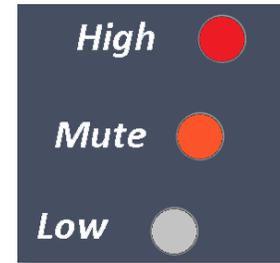


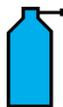
Figure 2: High Alarm Muted

AUTOMATIC DOOR CUTOFF

Gas, heating, and air circulation pause.

Whenever the incubation chamber door is opened, the incubator automatically stops the flow of CO₂ into the chamber, depowers the heater element, and ceases operation of the internal blower fan. This limits the amount of CO₂ released into the workspace around the incubator. It also prevents the heater from attempting to counteract the continual inflow of cooler air, which would cause a significant heat spike once the door is closed. Normal CO₂ injections, heating, and fan operation all resume automatically when the outer door is closed.

OPERATION



START A FLOW OF CO₂



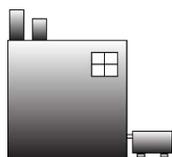
Gas Cylinder(s)



1. Open the cylinder valve to supply CO₂ to the regulator.



2. Set cylinder regulator flow setting.
 - **Single source:** Set the regulator to deliver 15 - 20 Pounds per Square Inch (psi) to the incubator CO₂ 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.**



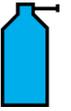
Building Supply System

1. Initiate a flow to supply 15 to 20 psi of CO₂ to the incubator either of the Gas In ports.

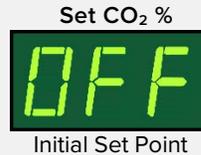
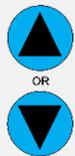
PSI	Megapascals	Kilopascals	Bar
15 - 20 psi	0.103 - 0.137 Mpa	103.42 - 137.89 Kpa	1.03 - 1.378 bar

SET THE CO₂ SET POINT

The incubator comes from the factory with the CO₂ set point set to Off. Set the set point percentage to the gas concentration required by your study or production protocol.



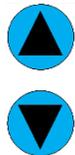
1. Navigate to the CO₂ Set Point Adjustment mode



Press and hold either

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

2. Set the CO₂ Set Point



Adjust



Note: To turn the CO₂ system off, set the set point to its lowest setting (OFF).

3. Wait for 5 seconds after entering the Set Point



The display will stop flashing. The set point is now saved in the controller.

The display will revert to showing the current chamber CO₂ concentration.

LO - Low CO₂

When starting with no CO₂ in the chamber, the display will show “LO” until the incubator registers a concentration greater than 0%. A few minutes of CO₂ injections may be required to build up a sufficient gas concentration.

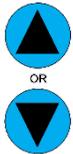
End of Procedure

MUTING THE AUDIBLE CO₂ ALARM

A visual deviation indicator alarm illuminates if the chamber CO₂ level deviates 1% above or below the CO₂ set point. 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 CO₂ deviation alarm:

Press and hold the Set CO₂ **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

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 CO₂ 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 CO₂ is restored to the chamber. It may take 2 or more minutes of CO₂ injections to establish a concentration high enough to deactivate the alarm.



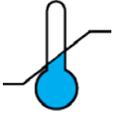
No Gas Supply

OPERATION

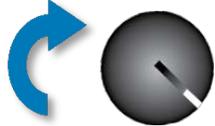
Note: Test the OTL system at least once per year for functionality.

SET THE OVER TEMPERATURE LIMIT

This procedure sets the OTL heating cutoff point to approximately 1°C 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 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

LOAD THE INCUBATOR

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 any accessory equipment used inside the incubation chamber can safely and effectively operate within your selected range of temperature and CO₂ levels.

OPERATION

DATA OUTPUT CAPABILITIES

USB Outputs

The incubator generates data outputs describing the chamber temperature and CO₂ 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
RH %	C4

Example logline output: **C1=37.0 C3=5.0 C4=95**



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 SCO5W-2 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 CO₂ 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	70°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.

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: 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.

- Verify that the access port stopper is in place, on the inside of the incubation chamber and not the unit exterior.
- Make sure samples on the shelves are evenly spaced to allow for good airflow.
- Ensure the chamber door is closing and latching 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 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.**
- **Do not clean or disinfect the ring-style chamber HEPA filter.** Replace the filter if discolored or if you believe it has been contaminated.

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, 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.

GAS LINES AND HEPA FILTERS

For the Optional Filtered Tubing Kit

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

- 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 22.

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



In-Line Gas Filter

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.
 - 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 your distributor or [Technical Support](#) for assistance (please see page 8).

USER MAINTENANCE

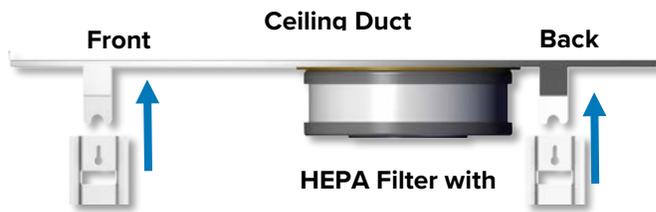
REPLACE THE CHAMBER HEPA FILTER

Always turn off and unplug the incubator before carrying out this procedure.

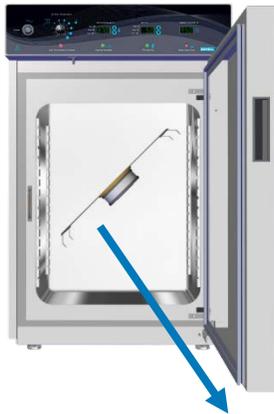
Replace the filter at least once per year, or when the filter is noticeably discolored.

Exercise caution when removing the ceiling air duct. A plastic blower fan and the fragile head of the temperature and CO₂ sensors are located just above the duct and just to the right of the duct.

Step 1



Step 2



1. Dismount the ceiling air duct, using firm but careful pressure to remove the duct feet from the tops of the shelf standards.
2. Remove the duct from the chamber.
3. Remove the black plastic cap from the HEPA filter by pulling down on it.
4. Remove the old HEPA filter by pulling down. It will snap out without difficulty.
5. Snap the new HEPA filter into position on the duct. It may be necessary to tilt the filter slightly to one side.

See the Installing the [Chamber Air Duct and HEPA](#) filter on page 20 for detailed instructions on reinstalling the filter and duct.

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.



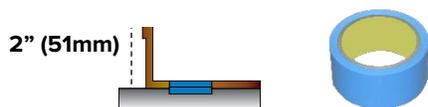
Temperature calibrations are performed to match the incubator temperature display to the actual air temperature inside the incubation chamber. The actual air temperature is supplied by a calibrated reference device. Calibrations compensate for long-term drifts in the incubator microprocessor controller 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.

Humidity

Humidity affects temperature uniformity and stability in the incubation chamber. The chamber must be humidified for at least 24 hours in order to conduct an accurate calibration.

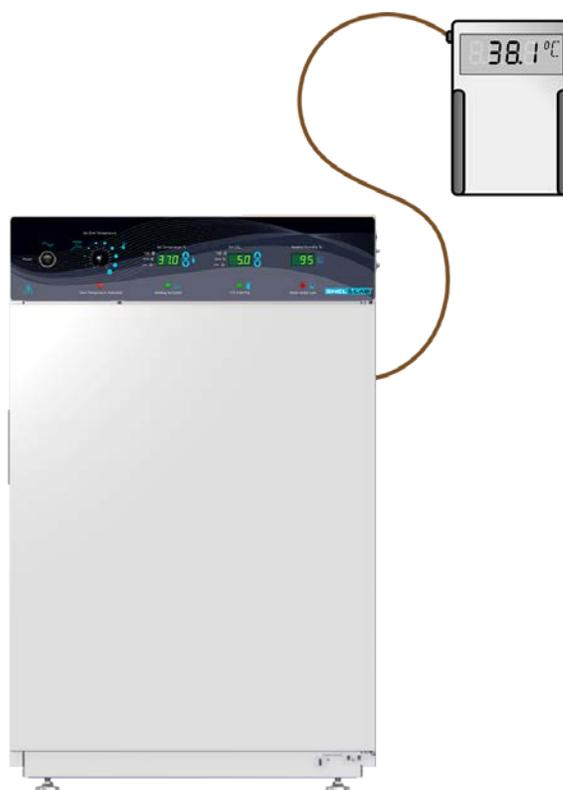
A suggested calibration setup

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 probe 2 inches (51mm) above the shelving, **as close as possible to the geometric center point of the chamber.** Secure with non-stick, heat-resistant tape.



3. 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.

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



CO₂ Calibration: A CO₂ calibration may be performed during the temperature calibration so long as both the chamber door and access port remain closed and sealed.

USER MAINTENANCE

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 12 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 $\pm 0.1^{\circ}\text{C}$ or greater.**



Required temperature stability period operating undisturbed with the incubator

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.

2

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



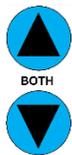
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USER MAINTENANCE

Temperature Calibration Continued

3

Place the display in its temperature calibration mode.



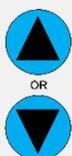
a. Press and hold both the **UP and DOWN** temperature arrow buttons simultaneously for approximately 5 seconds.

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 5 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.



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 set point with the corrected display value.



Heating to Set Point

6



Wait 1 Hour

Allow the incubator sit for at least one 1 hour undisturbed to stabilize **after the incubator has achieved the corrected temperature set point**.

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



Set Point Achieved

Continued next page

USER MAINTENANCE

Temperature Calibration Continued

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.

Reference Device



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 (2) more times.

- Three (3) attempts may be required to successfully calibrate units that are more than $\pm 2^{\circ}\text{C}$ out of calibration.

Reference Device



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 CO₂ 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 CO₂ display to the actual CO₂ 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.

Humidity

Because humidity impacts CO₂ concentration through its influence on temperature stability and uniformity, the CO₂ display should be calibrated with the chamber humidified.

A suggested calibration setup

1. Connect the reference device sample tubing to **CO₂ Sample Port** located on the top, left side of the incubator.

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

3. CO₂ calibrations must be performed with the chamber **fully heated and stable at your application temperature set point**. Temperature helps drive gas diffusion in the chamber.

4. The incubator must be supplied with CO₂ during the entire calibration procedure.

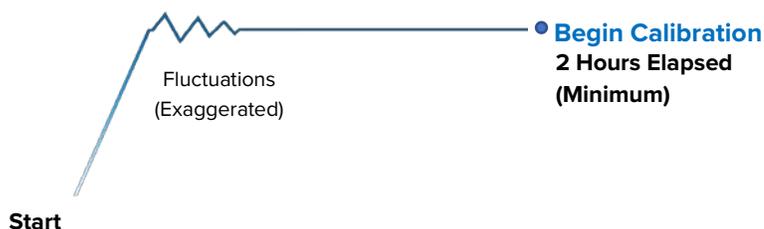


USER MAINTENANCE

Gas Stabilization

The CO₂ 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 12 hours** prior to starting the gas calibration.
- After turning on a flow of CO₂ to the chamber and setting the CO₂ set point, 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**.



A Suggested CO₂ Calibration

- 1 Once the incubator CO₂ concentration has stabilized, compare the reference device and the CO₂ 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 CO₂ concentration. **The CO₂ Calibration procedure is now complete.**

Reference Device

8 5.0 %

Set CO₂ %

5.0 ✓

-OR-

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

2

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

Reference Device

8 5.8 %

5.0 ✗

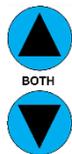
Continued next page

USER MAINTENANCE

CO₂ Calibration Continued

3

Place the incubator CO₂ 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 CO₂ 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 CO₂ display value.

4



Use the **Up** or **Down** arrows to adjust the current display CO₂ % 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 CO₂ or allowing the current concentration to decay in order to achieve the set point with the corrected display value.



Decaying to Set Point

6



Wait 1 Hour

Allow the incubator sit for at least one 1 hour undisturbed to stabilize **after the incubator has achieved the corrected gas set point.**

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



Set Point Achieved

Continued next page

USER MAINTENANCE

CO₂ Calibration Continued

7

Compare the reference device reading with the incubator CO₂ 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 CO₂**.

Reference Device



-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 (2) more times.

- Three (3) calibration attempts may be required to successfully calibrate units that are more than $\pm 2\%$ out of calibration.

Reference Device



9

Contact your distributor or technical support for assistance if the gas concentration readings of the incubator CO₂ display and the reference device still fall outside your protocol after three calibration attempts.

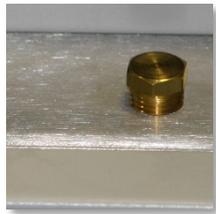
End of procedure

ANODE AND WATER QUALITY

A replaceable metal anode comes installed in a threaded port near the water-jacket fill port on the back of the unit. The anode dissolves when in contact with the mineral salts and dissolved gasses found in tap water. This helps to protect the liner of the water jacket from corrosion well as well as scaling and other mineral deposits. When 50% of the anode has eroded away a new anode must be installed.

Tap water with a hardness of more than 30 parts per million or 1.5 grains per gallon **will require assessment of the anode on a yearly basis**. Dissolved gasses in tap water used in the water jacket should never exceed more than 120 parts per million or 7 grains per gallon. The pH of the water should be between 6.0 and 8.5.

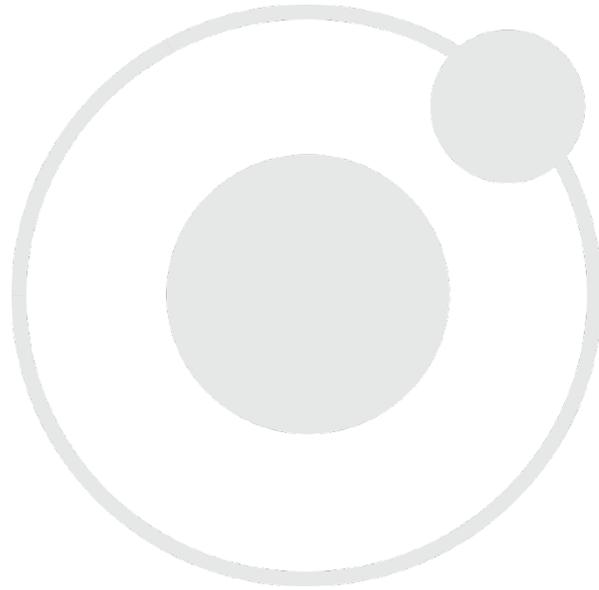
Use distilled water if possible. **Never use deionized water.**



Anode Installed, Back of Unit



Water Anode



UNIT SPECIFICATIONS

The SCO5W Incubator is a 110 – 120 volt unit. Please refer to the incubator data plate for individual electrical specifications.

Technical data specified applies to units with standard equipment at an ambient temperature of 25°C and a voltage fluctuation of $\pm 10\%$. The temperatures specified are determined in accordance to 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	Unit
284 lbs / 129kgs	254.0 lbs / 115.2 kg

DIMENSIONS

By inches

Exterior W × D × H	Interior W × D × H
26.0 × 25.5 × 40.3	19.3 × 19.8 × 23.0

By millimeters

Exterior W × D × H	Interior W × D × H
661 × 548 × 1024	490 × 503 × 584

Access Port All Units

Diameter
1 inch (285 mm)

UNIT SPECIFICATIONS

CAPACITY

Cubic Feet	Liters
5.1	144.0

CO₂

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

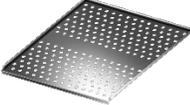
TEMPERATURE

Range	Uniformity	Stability
Ambient +5°C to 60°C	± 0.2°C at 37°C	± 0.1°C @ 37°C

POWER

Model	AC Voltage	Amperage	Frequency
SCO5W	110 - 120	5.0	50/60 Hz

PARTS LIST

Part	Part Number	Part	Part Number
Anode, Water Jacket	 0260500	Fuse T10A 250V 5X20mm	 3300516
Access Port Stopper, Size 6	 7750514	Gas Line HEPA Filter	 2800525
Chamber HEPA FILTER	 2800517	Humidification Pan	 995-00015
Chamber HEPA Filter Cap	 6500506	Leveling Foot	 2700512
Ceiling Air Duct (Chamber)	 5121518	Power Cord 115 volt 15 Amp, 9ft 5 in (2.86m) NEMA 5-15P	 1800510
CO ₂ Gas Tubing Kit with In-Line HEPA Filter	 9710500	Shelf Slides	 5121028
Copper Token, Humidification Pan	 5800529	Shelf Standards	 5170646
Fill Port Stopper, Water Jacket	 7750513	Shelf	 5121777

ORDERING PARTS AND CONSUMABLES

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 to its correct part.

ACCESSORIES

The following accessories are available for the SCO5W.

CO₂ Cylinder Regulator, Dual Stage

For use with a gas supply cylinder (tank).

Part Number 7150509



Copper Shelf Assembly

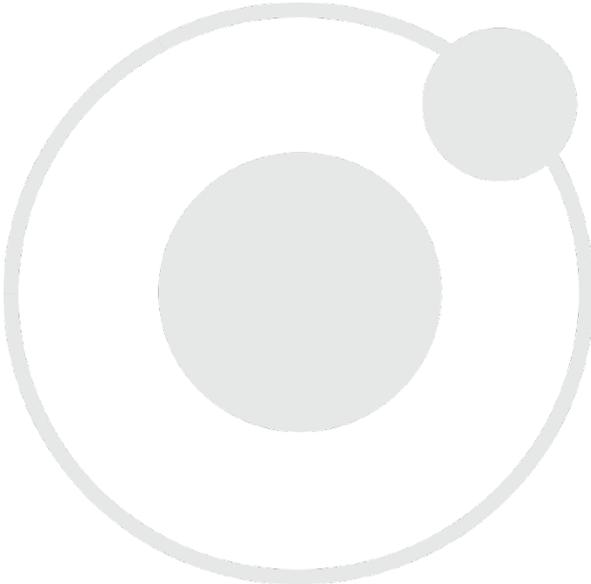
Three copper shelves. Includes six copper shelf slides. Copper is known to have antimicrobial properties.

Part Number: 9750582 complete assembly described above.

PN 5820504 Individual Shelf

PN 5820505 Individual Slide





A large, light grey abstract graphic consisting of a large circle and a smaller circle connected by a curved line, resembling a stylized 'S' or a molecular structure, is centered on the page.

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