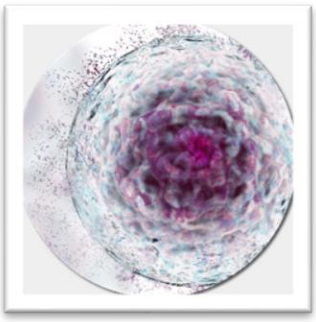
Introduction

A CO_2 incubator is a device designed to emulate the cells' natural environment by controlling physical parameters such as the temperature, humidity, CO_2, and O_2 levels for the optimum growth and development of cells. It provides high-quality incubation performance through the precise control of heating and gas injections combined with multiple contamination control and ergonomic features appropriate for safe incubation of many types of cells and tissues.

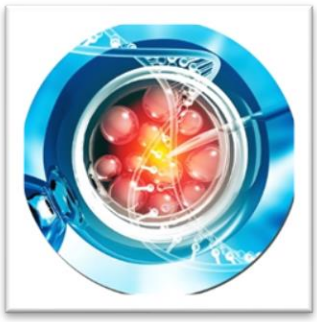
Application

CO_2 incubators are widely used in scientific research. Typical fields of application include the following:

Neuroscience



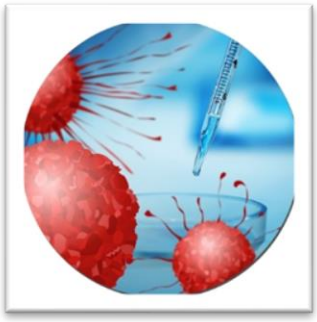
Stem Cell Research



***In Vitro* Fertilization**

Tissue Engineering

Mammalian Cell Research



Cancer Research

Maintenance

Proper and timely maintenance is crucial for trouble-free functioning of any device and your CO_2 incubator is no exception to this rule. We strongly recommend that you follow the maintenance schedule suggested hereunder to obtain optimal incubator performance.

No	Description of Task to Perform	Maintenance to be carried out			
		Daily	Weekly	Yearly	As Needed
1	Check CO_2/N_2 gas tank level	✓			
2	Check water level in the humidity pan		✓		
3	Clean the interior and exterior of incubator		✓		
4	Calibration of O_2 sensor			✓	✓
5	General inspection			✓	
6	Calibration of temperature sensor			✓	
7	Calibration of CO_2 sensor			✓	
8	Calibration of humidity sensor			✓	
9	Change ULPA filter (170L/240L)			✓	
10	Change inlet filters			✓	
11	Change outer door magnetic gasket				✓
12	Change UV lamp (for units with UV lamp)				✓
13	Decontamination				✓

- **Check CO_2/N_2 Gas Tank Level**
  - Check the pressure gauge on the two-stage gas regulator daily to ensure the pressure is not below 15 psig.
  - Replace with a new tank if necessary.

- **Check Water Level in the Humidity Pan**
  - Check weekly to ensure there is sufficient water in the pan.
  - It is recommended to check the water level and refill the humidity pan with sterile distilled water once a week.

- **Clean the Interior and Exterior of Incubator**
  - Disinfect surfaces with a general-purpose laboratory cleaning agent weekly.

- **General Inspection**
  Check the following regularly (at least annually):
  - Tightness of the glass door seal and hinge screws on door's moving parts.
  - Glass door latch if working properly.
  - Functional check of the operating panel and device control.
  - Electrical safety check in accordance with the standard regulations

- **Calibration of Temperature, CO_2, O_2, and Humidity**
  - Calibrate at least once a year to ensure continuous and optimal performance of the CO_2 incubator.

- **ULPA Filter Replacement**
  - It is recommended to replace the ULPA filter once a year or when the filter is dirty by visual inspection.

- **Inlet Filter Replacement**
  - Replace the inlet filter at least once a year or when the filter is dirty by visual inspection.

- **Outer Door Magnetic Gasket Replacement**
  - It is recommended to check the magnetic door gasket for signs of brittleness, corrosion, wearing, or any form of damage when needed.

- **UV Lamp Replacement (for units with UV lamp)**
  - It is advisable to replace the UV lamp every 1000 hours of running time (approximately around 4 years).

- **Decontamination**
  - Decontaminate the inner chamber of the incubator as needed.

- **Maintenance/Service Log**
  - It is a good practice to maintain a log of all maintenance work carried out on your incubator.

Cleaning Procedure

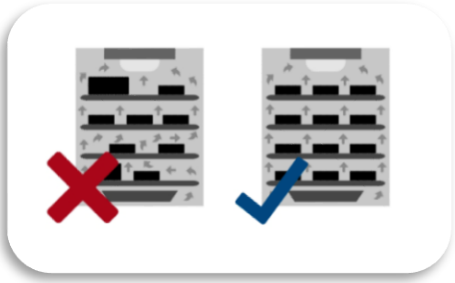
- During the cleaning process, the operator should use Personal Protective Equipment (PPE) according to the provisions of the laboratory.
- Prepare the materials needed for the cleaning process such as mild soap solution, distilled water in a wash bottle, sponge, clean cloth or tissue, disinfectant, and wash tray or bucket (if a sink is not available).
- Metal surfaces can be cleaned using stainless steel cleaning agents. The inner glass door surfaces can be cleaned using glass cleaners. Never use chlorine-based disinfectants.
- Transfer all samples to another CO_2 incubator or store them in a safe place.
- Turn off and unplug the device. If needed, mark that the unit is deactivated or being serviced.
- Remove the shelves, shelving system, top plenum, and humidity pan.
- Thoroughly remove dirt and residues from the surfaces of the work space using mild soap solution and a sponge, or spray the appropriate disinfectant onto work space surfaces and all dismantled parts. Allow the disinfectant to react as specified by the manufacturer.
- Do not spray disinfectant directly on the sensors, control panel, and surfaces near the electrical panel to prevent damage to the electrical parts. Use a cloth soaked with disinfectant to wipe the control panel and the exterior body.
- Rinse the soap solution or disinfectant twice using the distilled water in a wash bottle. If the part is hard to rinse with a wash bottle, use a wet sponge to remove the soap.
- Dry all rinsed part with a clean lint-free cloth or paper towel.
- Wipe the interior components and exterior surfaces with 70% ethanol then allow to dry.
- Re-assemble the unit and ensure that the equipment has completely dried before commencing normal operation.
- Activate the decontamination/sterilization cycle program.

Working Safely with CO_2 Incubator

- **Use the CO_2 incubator only for incubating cells or tissues.** For your safety, never load samples with unknown or potentially harmful composition.

- **Never leave the door open during normal operations.** Leaving the door open causes the incubator to overheat, pose a fire hazard, and expose the inner chamber to room contaminants. Must minimize door opening frequency.

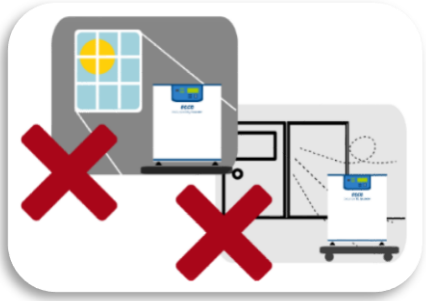
- **Ensure proper spacing between samples when loading the incubator**. Never place any item touching the side walls of the incubator as it may take a longer time to reach the set temperature.



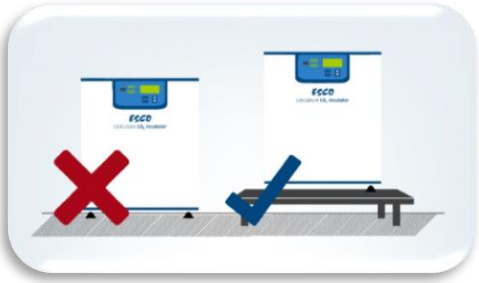
- **Do not place the CO_2 incubator near flammable materials or equipment that produce excess heat**. Equipment such as autoclaves, radiators, and ovens, which can produce too much heat, will greatly affect the incubator's performance.

- **Ensure adequate ventilation around the equipment**. Allow proper heat and gas dissipation around the incubator, but do not place the unit directly in the path of moving air currents.

- **CO_2 incubators are for indoor use only**. Do not install equipment outdoors, near windows, doors and other areas with rapidly moving air currents and/or direct sunlight.

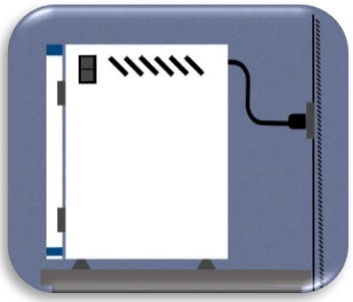


- **Never place the equipment directly on the floor**. Place the unit on top of a dry, stable, and sturdy working surface or on a floor stand to elevate the unit from the floor.



- **Follow the required room temperature and humidity according to the manufacturer.** Environmental conditions are indicated in the user manual to maximize the use of the incubator to its best performance.

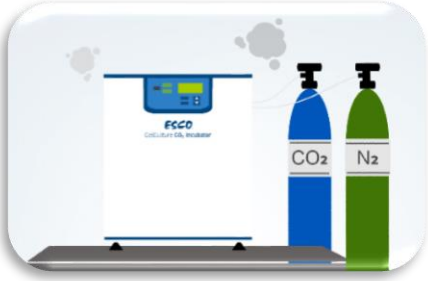
- **Ensure that the unit is connected to the correct power source.** Follow the electrical requirements indicated in the serial number tag of the unit to prevent electrical hazard.



- **There should be unobstructed access to the main power plug.** The power plug is the main disconnecting device on the unit.

- **Install a 2-stage gas pressure regulator on its gas tank**. Pressure regulator will prevent over-pressurization of gas supply into the incubator which may cause the tubing to burst.

- **Avoid contact with CO_2/N_2 gas while working around the unit**. During normal operations, small amounts of gas are released by the incubator to its surroundings. These gases can have a suffocating effect in high concentrations.



- **When filling the humidity pan, never use chlorinated tap water.** Chlorine deteriorates the stainless-steel components of the incubator. Tap water also produces a build-up of scale on the water pan.

- **Sterilize the water or treat it with a disinfectant before adding in water pan.** Disinfectant to be used must be safe for the incubator components and for the cells/tissues incubated. Do not add decontaminant if sensitive cells are being cultured.

- **Check UV lamp functionality within less than 10 seconds only.** This ensures minimal risk of UV radiation.

- **Troubleshooting of the unit must be done only by qualified service personnel.**