CELL CULTURE INCUBATORS CLEANING AND DECONTAMINATION METHODS

Basic care for optimum performance and care in the event of contamination

Models:

MCO-170AC-series
MCO-170AIC-series
MCO-170AICD-series
MCO-230AIC-series
MCO-170M-series
MCO-50AIC-series
MCO-50M-series

PHC Europe B.V.

www.phchd.com/eu/biomedical


PHCbi
37.0
5.0
PHCbi
37.0
5.0
PHCbi
37.0
5.0
PHCb

Cell culture incubators Cleaning and Decontamination Methods

Table of contents

Introduction to
Cell Culture Incubators

Cleaning and
Decontamination Methods

Introduction to cell culture incubators

A cell culture incubator is designed to artificially replicate in vitro conditions essential to in vivo physiology typical of human and animal models. Cell growth outside of a natural environment presents a multitude of challenges associated with exposure to microorganisms that are not present in the in vivo state. Depending on the type of cell cultures being managed, several operating parameters must be carefully controlled with accuracy, repeatability and flexibility in setpoint choices. These include temperature and gas control.

- Cell culture incubators are designed to establish and maintain a controlled, stable environment by regulating temperature at a typical setpoint of 37°C or over a range from ambient to points above 37°C.
- Incubator gases typically include CO_2 and/or O_2.

CO_2 is controlled at a precise setpoint to maintain desired pH in the cell culture media, whether liquid or gel. The CO_2 concentration in the incubator functions as a critical pH buffer.

Some biological materials may require different pH levels.

Desired CO_2 setpoint concentrations may differ. Most media contain an indicator which helps detect the change in pH.

- Optimal cell culture environments must include humidification to prevent desiccation of cell culture media.

While some incubators have internal humidification systems with heated water reservoirs, most incubators include simplified, removable humidifying trays designed to hold sterile distilled water which evaporates to naturally increase the relative humidity within the chamber.

- The use of deionized water should be avoided in the humidifying tray. Due to the lack of ions, deionized water will leach ions out of stainless steel causing pitting which can harbor contamination. Deionized water will react with the high concentration of CO_2 and form carbonic acid, causing further corrosion.

TYPES OF CELL CULTURE CONTAMINATION

Contamination of a cell culture in vitro is usually caused by the inadvertent introduction of one or more organisms that can damage or destroy the cell culture in progress.
These organisms include:

- Bacteria (including Thermophilic Bacteria) and Mycoplasma
- Molds and Yeasts
- Viruses

Other contaminants include dust, volatile organic compounds (VOC's) from adjacent instrumentation or processes, cross contaminants from other cultures in a shared incubator environment and particulates found in the natural environment. Regardless of the contaminant or its source, prudent laboratory techniques can help avoid the recurrence of contamination.

THE INCUBATOR BUBBLE

Unlike closed systems, such as hollow-fiber substrates, stirred tank or airlift bioreactors, the typical cell culture incubator is a conditioned chamber with a door that closes against a soft gasket. When the door is closed, the incubator creates an ideal environment for the cell culture process based on user defined setpoint parameters for temperature, CO_2 and O_2. Humidification is naturally evaporative from the humidifying tray, and an elevated relative humidity is sufficient to eliminate desiccation, especially in microplates with small media volumes. Some larger cell culture incubators use immersion heaters to supplement the natural humidification process.

When the incubator door is opened, however, the conditioned bubble is lost. Accessing cell culture labware for transport to a biological safety cabinet (BSC) or other processes is a normal part of laboratory workflow. Opening the door exposes the incubator interior walls, shelves, humidifying water tray and culture vessels to ambient conditions that carry the potential for contamination from molds, yeasts, fungi or other microorganisms such as mycoplasma and viruses. In a practical sense, unless the incubator is installed in a clean room, this exposure cannot be avoided. Proper technique can reduce the potential. The first consideration is to understand basic incubator systems and how they can harbor contamination.

INCUBATOR DESIGN PREREQUISITES

The first step in managing cell culture contamination is to consider the incubator design, specifically, the interior. All interior components exposed to the high humidity atmosphere should be constructed on high quality stainless steel and should be easily removable (preferably without tools) for manual cleaning or autoclaving. These include: shelves, shelf brackets, plenums, floors, humidifying trays, blower wheels, sensor housings, inner door gaskets and anything present in the chamber during cell culture. Control probes are often protected by stainless steel sheath housings. These must be cleaned according to the manufacturers' instructions.

Components manufactured from copper enriched or copper supplemented stainless steel contain an inherent germicidal property that resists airborne organisms introduced to the chamber during door openings. Such materials are considered "passive" contamination control insofar as the inability of organisms to sustain growth on these surfaces.

Important points for installation

There are many factors to consider when determining the permanent location of the cell culture incubator. It is desirable to locate the unit where there is minimal foot traffic and where air disturbance is of little consequence. This reduces the volatility of outside air entering the incubator during a door opening. Avoid installing the incubator near windows, air conditioners, ceiling or floor HVAC air diffusers and return air intakes, all of which are sources of airborne contamination.

INSTALLATION, LOCATION AND CLEARANCES

It is important to consider the function of the biological safety cabinet when planning for incubator contamination mitigation.
If feasible, locate the incubator as close to the biological safety cabinet (BSC) as possible. This limits the exposure when removing or replacing cell cultures for processing.

Improper use of the BSC, wrong sash window height, blockage of downflow slots and use of instrumentation or equipment on the BSC work surface can create pathways for contaminants to attach to the cell culture labware when working in the hood. These contaminants are then returned to the incubator where they can migrate to other cultures via cross contamination or to interior surfaces exposed to a conditioned atmosphere ideal for cell growth. While BSCs are usually equipped with HEPA filters designed to trap particulates of 0.3 microns (0.12 microns for ULPA filters), smaller viruses can easily pass through these barriers. Although the cell culture lab may normally be under positive pressure, this can change to neutral or even negative pressure when a BSC is operating, especially when the BSC has an exhaust transition connected to or over the exhaust filter.

Other laboratory equipment such as centrifuges, stirrers, shakers and robotic plate readers can aggravate an otherwise calm air environment to create aerosols that are easily airborne.

It is important to establish clearances adjacent to and behind the incubator because this space is required to provide easy access to gas supply tubing, tubing filters, gas input ports, pass-thru ports and blanking plugs and any interior components such as blower motors, fans or sensors that must be removed for maintenance.

Most CO_2 cylinders, for example, contain an industrial grade CO_2 supply in liquid form wherein the CO_2 gas evaporates and moves through the two-stage pressure regulator as a gas. It exits the regulator at a pressure of approximately 20 PSIG, sufficient to prevent the introduction of contaminants into the gas system. The CO_2 itself, however, often contains microscopic particles that may provide surfaces for contaminants. Thus, it is recommended that the final CO_2 supply tubing be fitted with a 0.3-micron HEPA filter prior to passage into the incubator.

Locations where there is a lot of foot traffic are not suitable for the unit.

- Locate the incubator in a clean room or location where few people enter
- Choose a clean room that is safe or a place where there are as few people as possible.

Set up the unit as high off the floor as possible

- Since there are fewer airborne bacteria in the upper part of a room, the incubator should be placed on a laboratory table or a special stand.
- If stacking two or three units on top of each other, use a special roller base for that purpose.

Place in a location that is not directly affected by outside air

- Avoid putting the unit in a location that will be directly affected by air from a window, door, or air conditioning/ heating vent.

Cleaning and decontamination methods

Most incubator manufacturers recommend a solution of 70% ethanol and manual cleaning prior to initial start-up and regularly thereafter. The 70% ethanol solution is intentionally diluted to give the ethanol time to kill the contaminant before the ethanol evaporates.

Why is 70% ethanol better than 100% ethanol in bacterial inhibition? 100% ethanol coagulates and dehydrates proteins so quickly that a layer of relatively impermeable denatured protein forms in the exterior parts of the bacterial cell (in and under the cell wall), and this prevents further diffusion of the alcohol into the cell. This protects the core of the cell from denaturation.

With 70% ethanol, the process is slower and the alcohol manages to diffuse throughout the cell denature proteins. In addition to conventional manual wipe down using 70% ethanol, the incubator may be equipped with a sterilisation cycle such as a high heat (180°C) system or a hydrogen peroxide vapor H_2O_2 system. The cycle should be performed prior to first use.

If commissioning and Current Good Manufacturing Practices (cGMP) criteria are in place, all contamination control efforts must be in compliance with previously approved best practices and facility protocol.

INSTRUMENTATION AND EQUIPMENT INTERFACE

Shakers, cell bottle rollers, magnetic stirrers and other devices are commonly used in the cell culture incubators. These must be free of contaminants before they are placed in the incubator.

Cell culture vessels usually include flasks with and without vent caps, petri dishes, roller bottles and multi-well plates. These are usually prepackaged and sterilized by gamma radiation prior to shipment. They should be opened only in a biosafety cabinet to preserve the integrity of the sterilisation.

Other labware returned from a central sterilisation room must be considered a source of contamination if exposed to ambient air during cart transit and shelf storage.

SUMMARY CONTAMINATION SOURCES

The following contamination points must be included in a regular schedule for cleaning in situ or removal and cleaning manually or by autoclaving.

INSIDE THE INCUBATOR
- Walls
- Ceiling
- Floor
- Chamber corners
- Ductwork and plenums
- Humidifying tray
- UV light housing if so equipped
- Temperature control probe and probe housing
- Probe wire to control panel

INCUBATOR CABINET
- Inner door gasket and feather surfaces
- Inner door latch
- Inner door glass
- Inner door hinges and fasteners
- Cool spots where condensation may accumulatedue to insufficient cabinet insulation

GAS SYSTEM
- CO_2 or O_2 sensor
- Sensor housing and connectors
- Injection tubing from control solenoid(s)
- Air pump
- Filters and housings
- Fan, shaft and seal

Basic care of cell culture incubators

Always puts on gloves before cleaning the unit.
As a basic rule, do not clean the incubator with bare hands.
Be sure to use rubber gloves.

Necessary materials
- Rubber gloves
- 70% ethanol
- Sterile non-woven cloth/paper

STEP 1

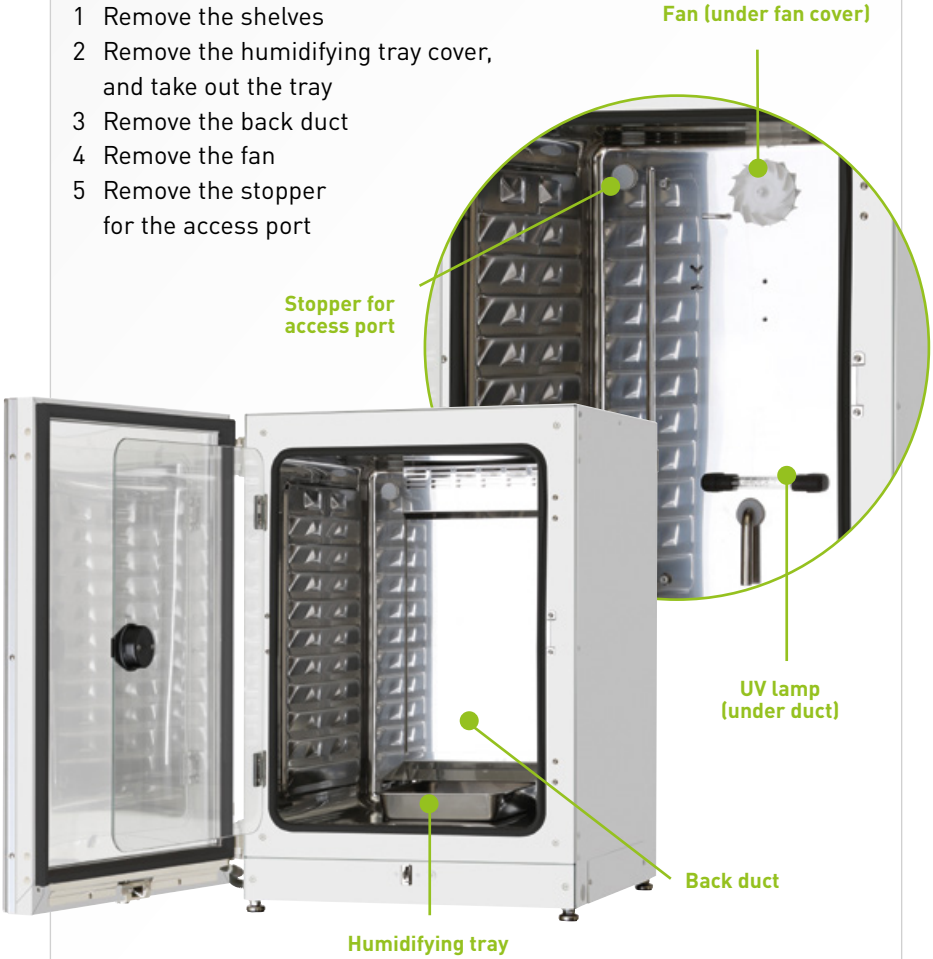
Turn off the power

STEP 2

Remove the interior components.

Remove the components in the correct order.

1 Remove the shelves
2 Remove the humidifying tray cover, and take out the tray
3 Remove the back duct
4 Remove the fan
5 Remove the stopper for the access port

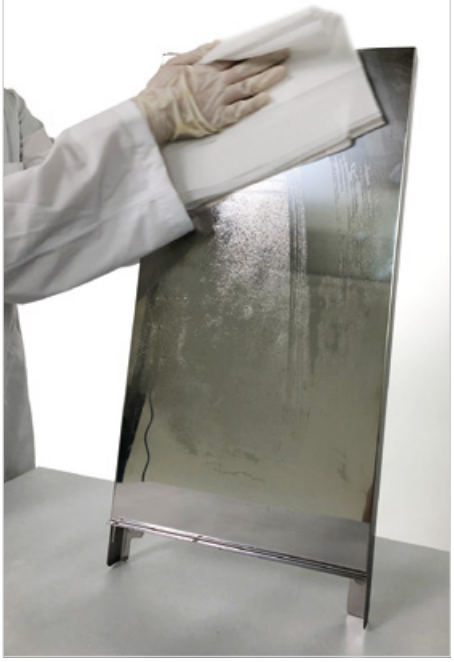


STEP 3

Clean the interior components

Use the correct cleaning procedure.

1 Wash with a neutral detergent (soap)
2 Rinse well with distilled water
3 Wipe with sterile non-woven cloth/paper



Basic care of cell culture incubators

STEP 4

Spray disinfecting alcohol inside the unit and wipe (70% ethanol).

Do not spray 70% ethanol into the sensor holes directly! Just wipe off with non-woven cloth/paper which is sprayed with 70% ethanol.

STEP 5

Disinfect all interior surfaces, internal components, shelves and water tray with 70% ethanol.

STEP 6

Please make sure to spread the ethanol for disinfection to all corners of the inner door gasket and sufficiently remove stains while wiping it clean.

If it is operated with the inner door gasket not in place, the humidified air will leak and will cause condensation between the unit and outer door. After wiping, confirm that the inner door gasket is securely in place and doesn't have any creases.

Adjust shape of inner door gasket after wiping
Adjust the shape of inner door gasket by sliding fingers from each corner in direction of arrows. Specifically, insert fingers behind fin of inner door gasket and slide.

The inner door gasket has an important role to maintain the chamber humidity. If it is operated with the inner door gasket not in place, the humidified air will leak and will cause condensation between the unit and outer door. After wiping, confirm that the inner door gasket is securely in place and doesn't have any creases. If the inner door gasket is not in place, please refer to the back side and adjust the shape of the inner door gasket.

STEP 7

Replace the interior components.

Replace the components in the reverse order of [STEP 2], and put sterilized distilled water in the humidifying tray.

1 Replace the stopper for the access port
2 Replace the fan, check to see if the fan spins smoothly by turning it with your hand.
3 Replace the back duct
4 Replace the humidifying tray cover, and put in the tray
5 Replace the shelves

STEP 8

Let it dual with the door ajar.

Before turning the power back on (restarting) let the inside dry out, check that there is no alcohol smell remaining.
If you turn the power on while it is still damp inside, the 0_2 and $C0_2$ sensors may be damaged.

STEP 9

If using a unit that is equipped with dual heat sterilisation function or H_2O_2 (hydrogen peroxide) decontamination function, performing sterilisation/decontamination before use will make prevention of contamination (bacterial contamination) more effective.

DUAL HEAT sterilisation

H_2O_2 decontamination

IncuSafe CO_2 Incubator with dual heat sterilisation:
MCO-170AICD-series

IncuSafe CO_2 Incubator with H_2O_2 decontamination:
MCO-170AICUVH, MCO-230AICUVH
MCO-50AICUVH, MCO-50MUVH
MCO-170MUVH

Basic care of cell culture incubators

CLEANING PRECAUTION

Get into the habit of wiping carefully

- Be sure to wear gloves to avoid cutting your hands on the interior component
- Do not use acid, alkali, or chlorine-based cleansers, disinfectants, or sanitizers

IMPORTANT POINT

Do not wipe with the same portion of the sterile non-woven cloth more than once.

If you wipe another area with same portion of the cloth, you will be spreading bacteria around.
Don't forget to wipe the gasket and the inside of the door.

CLEANING THE HUMIDIFYING WATER

When replacing the water, also clean the tray.
Do this at least once every two weeks.

- Remove the tray form the unit
- Wash it in neutral detergent before wiping it
- Spray it with 70% ethanol, and then wipe
- Fill the humidifying tray with sterile distilled water (preferably pre-heated to 37°C)

IMPORTANT POINT

Do not use ultrapure water, tap water, deinoize water or reverse osmosis water as these are not suitable for incubators.

Please avoid adding any chemicals to the humidifying tray.

Tips for the incubator which is prone to be contaminated easily

TIPS TO MINIMIZE CONTAMINATON

- Increase the frequency of cleaning and humidifying water replacement.
- Spray Biocidal ZF to the inside of chamber once every week.

Replacement of humidifying water
Recommended frequency: Once in two weeks (depending on frequency/ environment of use)

1 Remove the humidifying tray from an incubator
2 Wash the humidifying tray with neutral detergent, rinse it thoroughly with distilled water and wipe it off with sterile non-woven cloth/paper.
3 Spray ethanol to the humidifying tray and wipe off thoroughly.
4 Place the tray under the tray cover and pour sterile distilled water (preferably pre-heated to 37°C) into it.

IMPORTANT POINT

Do not replenish the humidifying water. The humidifying tray area is a major air way which is prone to collect dust and/or dirt that UV sterilisation can't remove.

The use of biodegradable Biocidal ZF spray-disinfectant in incubators will help protect cultures against bacteria, fungi and enveloped viruses.

Non-volatile:
The active microbiocidal ingredients of Biocidal ZF are non-volatile. These protect cell cultures from microbial contamination and do not invade cell cultures via air. Thus cell cultures are protected against contamination and the disinfectant itself.

TIPS TO MINIMIZE THE RISK OF CONTAMINATION

- Locate the incubator in a clean room or a site where there are few people.
- Install the incubator some distance above floor level (The higher you go, the less floating bacteria are found). Use a roller base to facilitate cleaning around and under the incubators.
- Install the incubator in an area away from draughts and easy air intrusion when opening and closing the incubator doors. Beware of air dust and the air flow direction of any air conditioning.
- Ensure that there is no condensation inside chamber.
- Always keep the interior of an incubator clean and free from culture medium and/or water and fingerprints. They must be wiped off immediately if ever spilled or smeared (When there is a film or foreign matter foamed or placed on the surface of the copper alloy, sterilisation effect will be lost).
- Always maintain and handle culture vessels under the maximum aseptic conditions possible. It is recommended to wipe off the bottom and periphery of the culture vessels with ethanol for sterilisation when taking them into or out of an incubator.
- Minimize the door opening and closing frequency.

Care in the event of contamination

Get into the habit of wiping carefully

- Be sure to wear gloves to avoid cutting your hands on the interior component
- Do not use acid, alkali, or chlorine-based cleansers, disinfectants, or sanitizers

Necessary materials

- Rubber gloves
- 70% ethanol
- Sterile non-woven cloth/paper

24 HOUR UV DECONTAMINATION

STEP 1

Turn off the power

STEP 2

Remove the interior components.

Remove the components in the correct order.

1 Remove the shelves
2 Remove the humidifying tray cover, and take out the tray
3 Remove the back duct
4 Remove the fan
5 Remove the stopper for the access port

STEP 3

Clean the interior components

Use the correct cleaning procedure.

1 Wash with a neutral detergent (soap)
2 Rinse well with distilled water
3 Wipe with a sterile non-woven cloth/paper

STEP 4

Spray 70% ethanol inside the unit and wipe

STEP 5

Disinfect all interior surfaces, internal components, shelves and water tray with 70% ethanol

SEE PAGE 9/10 FOR MORE DETAILS ABOUT STEP 1 TO 5

STEP 6

Turn on the power and (activate the UV lamp for 24 hours)

Once the interior components and UV lamp cover have been removed, carry out UV sterilisation for 24 hours. It is not necessary to wipe the interior with alcohol afterwards.

STEP 7

Replace the interior components.

Replace the components in the reverse order of [STEP 2], and put sterilized distilled water in the humidifying tray.
Before replacing all the components, check to see if the fan spins smoothly by turning it with your hand.

STEP 8

Let it dry with the door ajar.

Before turning the power back on (restarting) let the inside dry out, check that there is no alcohol smell remaining.
If you turn the power on while it is still damp inside, the 0_2 and $C0_2$ sensors may be damaged.

PHCbi IncuSafe CO_2 Incubators with Safecell UV Lamp:
MCO-50AICUV, MCO-50AICUVH,
MCO-170AICUV, MCO-170AICUVH,
MCO-170ACUV, MCO-230AICUV,
MCO-230AICUVH

PHCbi Multigas Incubator with Safecell UV Lamp:
MCO-50MUV, MCO-50MUVH,
MCO-170MUV, MCO-170MUVH

Care in the event of contamination

ACTIVATION UV LAMP 24H FOR MCO-170AIC AND MCO-230AIC SERIES

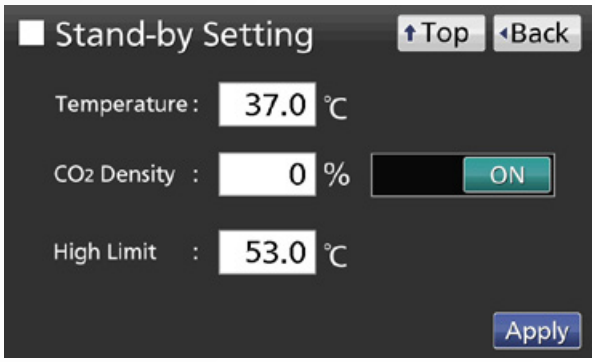
Lighting the UV lamp for 24 hours

If the chamber has been contaminated by dirt or by spilling the medium, use the following procedure to decontaminate it by lighting the UV lamp for 24 hours.

1. Remove all attachments from the chamber, including the trays, the fan cover, the duct, the fan, the humidifying tray, and the humidifying tray cover. Disinfect all the attachments in an autoclave or with alcohol.

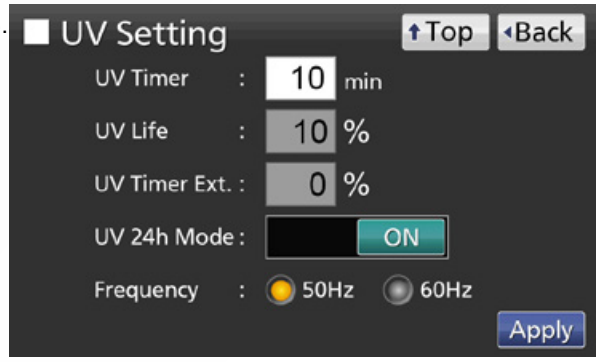
2. Clean and wipe down the inside of the chamber with alcohol.

3. Set the CO_2 density to 0 %.
   Go to the Stand-by-Setting screen (Menu > Set). enter 0 % at CO_2 density . Press "Apply" to save the entered values.

4. 

   Go to the Tools #1 screen (Menu > Tools#1).
   Press "UV Setting" to display the UV Setting screen.

5. Turn the UV 24h Mode to ON and press "Apply".

6. 

   The UV lamp will now light continuously for 24 hours. "UV 24h Mode ON" is displayed on the UV lamp condition display.

Notes:

- The UV 24-hour mode may activate the automatic set temperature alarm because of rising chamber temperature.
- If the outer door is opened when the UV lamp is lit, the UV lamp is turned OFF and UV 24-hour mode is cancelled. Repeat procedures **4** to **6** to restart the UV 24-hour mode.

7. After 24 hours, the UV lamp turns OFF automatically. Reinstall all the attachments removed in procedure 1.

ACTIVATION UV LAMP 24H FOR MCO-170AC AND MCO-50AIC SERIES

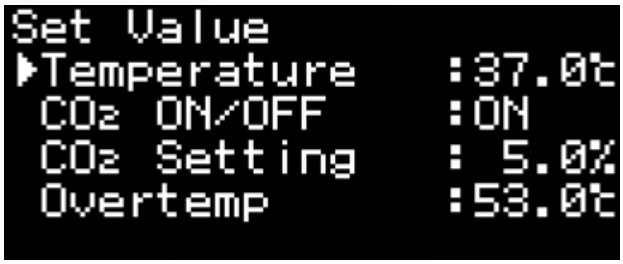
Lighting the UV lamp for 24 hours

If the chamber has been contaminated by dirt or by spilling the medium, use the following procedure to decontaminate it by lighting the UV lamp for 24 hours.

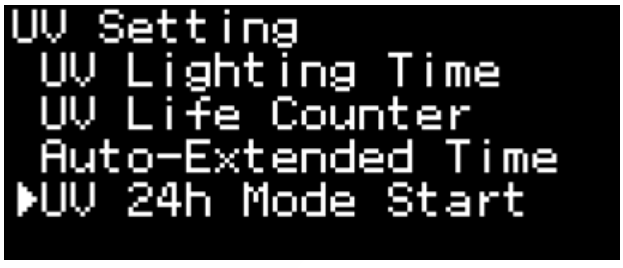
1. Remove all internal items from the chamber (racks, fan cover, duct, fan, humidifying tray and humidifying tray cover).
   Disinfect all the attachments in an autoclave or with alcohol.

2. Clean and wipe down the inside of the chamber with alcohol.

3. Set the CO_2 density to 0 %.

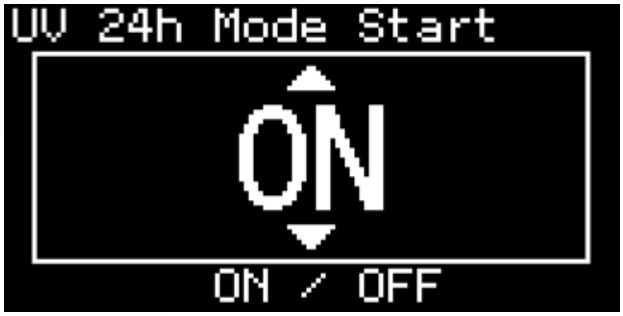


4. On the home screen press MENU. The left side of the display will change to Menu screen.
- Move the cursor to Alarms & Controls by using the up/down keys and press ENTER.
- Move the cursor to UV Setting by using the up/ down keys and press ENTER.



5. Move the cursor to UV 24h Mode Start by using the up/down keys and press ENTER.
   The right side of the display will change to the UV 24h Mode Start setting screen, the current setting (OFF) will be displayed.

6. Use the up/down keys to change the UV 24h lighting mode setting to ON and press ENTER.



7. Press the MENU key to display the home screen. The UV lamp will now light continuously for 24 hours.

Notes:
• The UV 24-hour mode may activate the automatic set temperature alarm because of rising chamber temperature.
• If the outer door is opened when the UV lamp is lit, the UV lamp is turned OFF and UV 24-hour mode is cancelled. Redo procedures from **4** to restart the UV 24-hour mode.

8. After 24 hours, the lamp UV turns OFF automatically.
   Reinstall all the attachments removed in procedure 1.

Care in the event of contamination

H_2O_2 DECONTAMINATION MCO-170 AND MCO-230 SERIES

No need to remove UV lamp and inner parts
No heat transfer when stacked
It doesn't use a heater, so it conserves energy

STEP 1

15 MIN

Preparation Time: 10 - 15 minutes

1. Remove all interior components
2. Wipe down the inside of the incubator
3. Reposition interior components to specified locations for in situ decontamination
4. Set up the H_2O_2 generator (MCO-HP)*
   *Optional Accessory. H_2O_2 reagent is required for this process.

Placement H_2O_2 generator

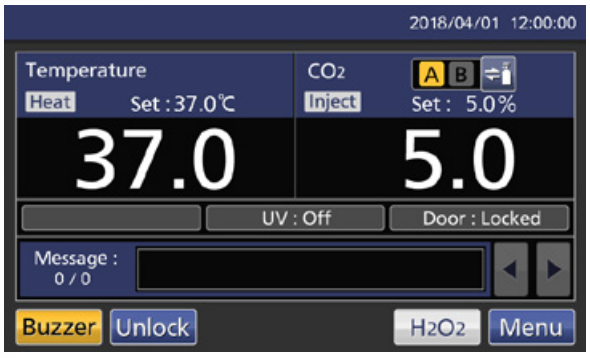
STEP 2

135 MIN

Decontamination Time: Approx. 135 minutes

Decontamination of the chamber can be completed by pushing just 2 buttons on the control panel

1. Press the H_2O_2 button.
2. The chamber will warm up to 45°C for optimum results
3. H_2O_2 vapour generation starts
4. Interior fan circulates vapour
5. UV lamp reduces H_2O_2 to water and oxygen



STEP 3

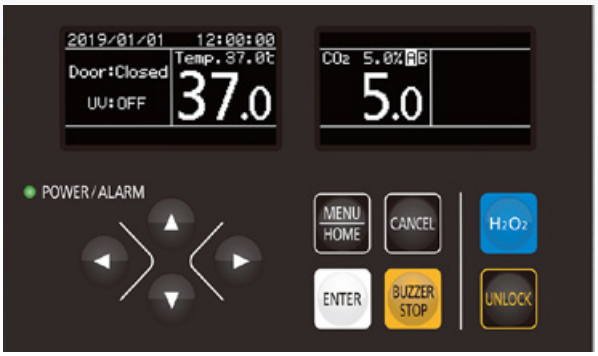
10 MIN

Finish Time: Approx. 10 minutes

1. Open chamber door
2. Wipe off remaining liquid with sterile cloth
3. Reposition interior components to normal positions

H_2O_2 DECONTAMINATION MCO-50 SERIES

FOLLOW STEPS 1 TO 3 FROM PAGE 18



H_2O_2 generator MCO-50 series (MCO-50HP)

HOW DOES IT WORK?

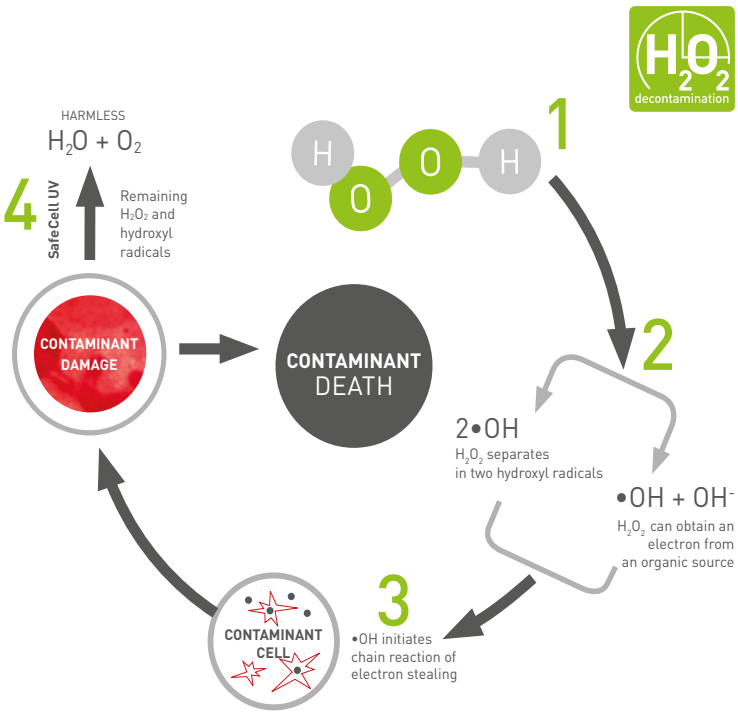
1. Hydrogen peroxide (aqueous) is converted to vapour using high frequency ultrasonics. During this process, the fan motor remains active, ensuring H_2O_2 vapour accesses every point of the chamber and the tubing to and from, and the inside of the CO_2 sensor.

2. The H_2O_2 vapour breaks down into hydroxyl radicals naturally.

3. The hydroxl radicals initiate a chain reaction of electron stealing.

4. This unstable internal environment leads to death of contaminants. Remaining hydroxyl radicals and H_2O_2 are resolved to H_2O (aqueous) & O_2 (gas).

PHCbi's H_2O_2 decontamination achieves at least a 6 log reduction of major contaminants. The full decontamination process takes less than three hours.



DNA is very susceptible to oxidative damage. Since most bacteria have a single chromosome controlling all their life functions, this kind of effect can be detrimental to their normal function. Prokaryotic organisms often lack repair mechanisms to limit such damage, making them more prone to change.

Care in the event of contamination

DUAL HEAT STERILISATION

Resolved the issues of using dual heat sterilisation which had to be restricted in spite of customer needs.
Convenient approx. 11 hrs. / 180 ºC dual heat sterilisation

STEP 1

15 MIN

Preparation time: 10 - 15 minutes

1. Press the Sterilisation button to see instructions on the display
2. Remove all interior components
3. Wipe down the inside of the incubator and the interior components with alcohol
4. Reposition interior components to specific locations for in situ sterilisation

STEP 2

11 HRS

Sterilisation time: approx. 11 hours

1. Close the inner and outer door and press OK. The outer door is now electronically locked and the chamber will warm up.
2. Sterilisation process will start after the entire inside of the chamber exceeds 180ºC and runs for 60 minutes.
3. The cooling process starts to cool down the chamber to 40°C

STEP 3

10 MIN

Finish time: Approx. 10 minutes

1. Outer door is unlocked upon completion.
2. Open chamber door
3. Reposition interior components to normal positions

no heat leakage

Both chambers can be in use at the same time even when double stacked.

One unit in dual heat sterilisation mode the other in incubation mode.

To prevent burning during the heat sterilisation cycle, the outer door is electronically locked. The top surface temperature of the MCO-170AICD during heat sterilisation is approximately 60°C. 60°C is within the tolerance described in the International Safety Standard IEC61010 10.1 Surface temperature limits for the burn prevention. Safety limit for outer metal is 65°C.

Care in the event of rust

Always put on gloves before cleaning the unit.
As a basic rule, do not clean the incubator with bare hands.
Be sure to use gloves.
Be careful as hands may get cut on the interior components.

Necessary materials
- Gloves
- 70% ethanol
- Sterile non-woven cloth/paper

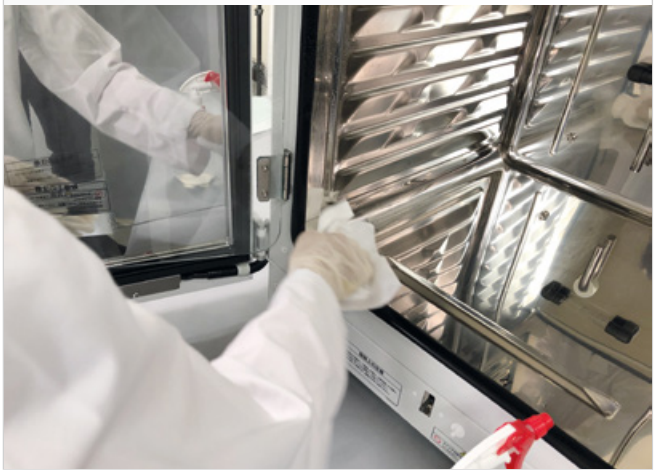
FIRST FOLLOW STEPS 1 TO 5 FROM PAGE 9/10

STEP 6

Remove the rust with a cream cleanser.
Use a suitable amount of fine-grained cream cleanser, and carefully remove the rust.

STEP 7

Wipe with 70% ethanol.



STEP 8

Activate the UV lamp for 24 hours.
*If it is a UV-lamp models

Once the interior component and UV lamp cover have been removed, carry out UV sterilisation for 24 hours. It is not necessary to wipe the interior with alcohol afterwards.

STEP 9

Replace the interior components.

Replace the components in the reverse order of [STEP 2], and put sterile distilled water in the humidifying tray.
Before replacing all the components, check to see if the fan spins smoothly by turning it with your hand.

KEEP IN MIND

These are the conditions that promote rust
- Insufficient wiping after the use of acid, alkali, or chlorine-based cleansers, disinfectants, or sanitizers
- Scratches on the surface of the unit interior or interior components
- The incubator is used with foreign matter left stuck to the inside of the unit or interior components
- Sodium dodecyl sulfate (SDS) is added to the humidifying water
- Using ultrapure water, deinoized water or reverse osmosis water in the humidifying tray
- Adding chemicals to the humidifying water

- **If an autoclave is used**
  If articles are stored wet in an enclosed place after coming out of an autoclave, rust can easily occur.

- **If a dual heat sterilizer is used**
  After coming out of a dual heat sterilizer, once oxide scale appears on the surface that turns yellow or black, rust can easily occur.

Best practice and good laboratory technique

The most obvious approach to contamination-free incubator operation is to keep the incubator clean. A combination of manual cleaning and automatic (if equipped) decontamination processes managed on a regular schedule help protect cultures in situ and minimize loss of work due to contamination and downtime. Predictive maintenance is analogous to preventive maintenance, whereby cleaning processes can be documented for standardization and compliance, scheduled in advance and assigned to laboratory staff as required. There is no substitute for aseptic technique when handling cell cultures. Both personal and laboratory hygiene are essential toa holistic contamination management program.

ACTIVE VS. PASSIVE DECONTAMINATION

Active decontamination, whether by manual wipe down, high heat sterilisation, H_2O_2 vapor or other method, must be initiated by the user. Design attributes inherent to a properly engineered cell culture incubator offer an additional layer of protection by working in the background to inhibit and destroy contaminants as they occur.

Active Decontamination

High Heat. A high heat process utilizes time and temperature, typically 160°C to 170°C for a two-hour period, for a proven method of decontamination. The PHCbi brand, new thermal decontamination system operates at a higher temperature. It is the fastest and most effective active method of decontamination in a cell culture incubator reaching 180°C for a two-hour dwell before returning to ambient temperature. To minimize downtime, total cycle time is less than 12 hours. This energy-efficient process does not require the removal of the CO_2 sensor and UV light in the PHCbi brand incubator.

Hydrogen Peroxide (H_2O_2) Vapor. PHCbi brand incubators permit the use of active hydrogen peroxide (H_2O_2) vapor decontamination with complete safety and zero impact on the surrounding environment. Hydrogen peroxide starts in aqueous form and is converted to vapor using a nebulizer; this exposes all interior surfaces to the H_2O_2 vapor which ultimately resolves to water and oxygen at lesss than 1 ppm when catalyzed by a UV lamp.

Passive Decontamination

Copper Enriched Stainless Steel (marketed as inCu-saFe® under the PHCbi brand) is a stainless steel and copper composite alloy that forms a germicidal barrier to prevent growth of organisms on surfaces. All interior surfaces, shelves and brackets are comprised of the inCu-saFe composite. This material is a hybrid of Type 304 stainless steel. It is 100% corrosion-proof and will not corrode or discolor like conventional C100 copper surfaces.

Ultraviolet Light (marketed as SafeCell™ UV under the PHCbi brand) consists of a concealed UV lamp that creates a serial exposure of 257.3 nm wavelength to destroy DNA of any organism passing through the airflow system as well as surface water contaminants in the removable humidity tray. The UV lamp initiates automatically upon a door opening/closing event. SafeCell UV inhibits the growth of mycoplasma, bacteria, molds, spores, viruses, yeasts and fungi without costly HEPA filter air scrubbers which accumulate contaminants in the filter media. Additionally, the UV lamp can be programmed for a timed 100% ON cycle for a supplemental chamber decontamination


PHCbi
37.0
5.0
PHCbi
37.0
5.0
PHCbi
37.0
5.0
PHCb

PHC Europe

A Member of PHC Group

Eikdonk 1 | 4825 AZ Breda | Netherlands
T: +31 (0) 76 543 3833
www.phchd.com/eu/biomedical

3-2020