MCO CO_2 Incubator FAQs

Feature Note

Hydrogen Peroxide (H_2O_2) Vapor Decontamination

MCO-230AIC series

MCO-170M series

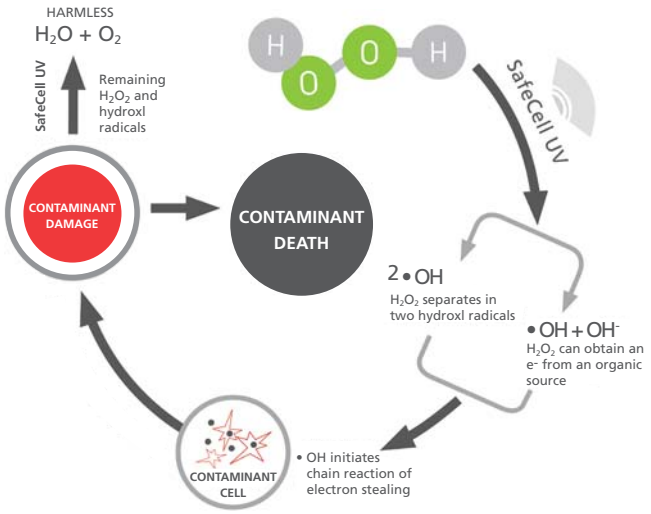
MCO-170AIC series

*1 Standard for Model No. Including UV
*2 Standard for Model No. Including UVH

H_2O_2 Decontamination Cycle

Hydrogen Peroxide (H_2O_2) Vapor Decontamination is available as an option on these PHCbi incubators. This system eliminates contamination. Developed with safe and effective cell culture decontamination processes using H_2O_2 vapor in conjunction with narrow-bandwidth ultraviolet light and copper enriched stainless steel to broaden CO_2 incubator application to highly regulated, environmentally sensitive cell cultures.

Throughout the entire cycle the incubator airflow system continues to gently circulate interior air assuring 100% vapor contact with all interior surfaces, ultimately creating a breakdown of H_2O_2 to harmless water and oxygen as it passes over the UV lamp. Ultimately converting all H_2O_2 to less than 1 part per million following completion of the decontamination cycle. No ozone is produced for this decontamination process.



PHC Corporation, Biomedical Division

Life Science Innovator Since 1966

H_2O_2 Section

UV Section

CO_2 Section

Miscellaneous

MCO-230AIC / MCO-230AICL (shown open, empty)

H_2O_2 Section

What do I need to do if power failure occurs during the decontamination process?
Immediately after power recovery, the UV resolving phase (90 minutes) starts. Even after the decontamination process is completed, however, a decontamination error message will be displayed. You should start the decontamination process again. During a power failure the door remains locked.

How is H_2O_2 resolved?
H_2O_2 is resolved into water and oxygen by UV irradiation to eliminate all of the H_2O_2. Without UV irradiation, only natural degradation of H_2O_2 gas concentration occurs and the condensation water inside the chamber will have an initial concentration (6%) of H_2O_2.

What marks a resolving phase completion?
When the process is completed the concentration of H_2O_2 gas is lower than 0.1 ppm (resolving time: 90 minutes). This period is preset and based on test results, not direct monitoring of actual H_2O_2 concentration levels.

During decontamination and resolving processes, is the chamber fan operating?
Yes. The fan is required to circulate the H_2O_2 vapor evenly inside the chamber during the decontamination process.

What triggers the switch from H_2O_2 generation to the resolving phase?
Once the volume of H_2O_2 solution in the generator falls below the predetermined level as monitored by a float sensor in the H_2O_2 generator, the resolving phase starts. The misting period is approximately 10 minutes and resolving period is approximately 90 minutes.

After decontamination, is it OK to leave the incubator unattended for a night or a couple of days? (Can I start the decontamination program just before going home?)
Yes, but end user must remember to clean out residual H_2O_2 before bringing cultures back in.

Can I use a commercial H_2O_2 solution?
No. Commercial H_2O_2 solutions typically contain impurities and their concentrations of H_2O_2 are often unstable in actual measurements. We do not guarantee the parts for MCO-170AICUVH/MCO-170AICUVHL, MCO-230AICUVL[3] and MCO-170M/MCO-170ML[4] (ex. IR sensor) and decontamination results when using any H_2O_2 solution other than the dedicated reagent purchased from PHC Corporation.

When should I perform the decontamination process?
The decontamination process should be performed whenever contamination occurs inside the chamber, or as a sterilization regiment before beginning a new culture. We also recommend performing the decontamination process just after installation and a minimum of 1× per month even if contamination isn't observed.

Why do you use a 6% MCO-H2O2 solution?
This is the upper limit of concentration allowable before a change in classification is necessary where it would need to be handled as a general drug in Japan and USA. The MCO-170AICUVH/MCO-170AICUVHL, MCO-230AICUVL[3] and MCO-170M/MCO-170ML[4] incubators are designed with this specific concentration for decontamination.

What temperature is needed for the storage of the H_2O_2 reagent?
Lower than 15°C. Do not freeze because it will affect concentration.

How should I store H_2O_2 reagent (MCO-H2O2)?
Before use store MCO-H2O2 reagent in a refrigerator. Please make sure not to freeze. Some household refrigerators may have poor temperature uniformity and regulation so please keep this in mind.

What happens if MCO-H2O2 is frozen? Is it OK to put it in a freezer when the expiration date has been exceeded?
We have not conducted the actual measurement, but theoretically it is presumed that the amount of H_2O_2 solution is reduced once frozen.

How is H_2O_2 reagent transported?
Air freight. Please store in a refrigerator immediately upon receipt.

Is it possible to put something that I want to decontaminate into the MCO-170AICUVH/MCO-170AICUVHL, MCO-230AICUVL[3] and MCO-170M[4]/MCO-170ML[4] incubators and decontaminate it with H_2O_2?
We do not guarantee the decontamination effect with other non-incubator components. This is because H_2O_2 gas may not reach all areas, grooves, or corners of a different object, which would be required for decontamination.

How is decontamination affected if extra trays or half trays are added into the incubator?
Tests have been performed that demonstrate adding 1 extra tray will not cause an issue (total 5 trays). Beyond this we have no data to confirm decontamination. If the trays used in the conventional MCO series or the half trays are put in chamber for decontamination, make sure to place them so that all surfaces are exposed.

How much ventilation is needed for the unit after H_2O_2 decontamination and before restarting cultures?
It is unnecessary to perform ventilation, since the chamber air is ventilated while putting inner parts back to their original locations after decontamination. Water condensation that remains at the bottom of the unit or under the duct which may contain low concentrations of H_2O_2 should be wiped out.

I am reluctant to put my hand into the unit to put inner parts back after H_2O_2 decontamination. May this compromise the decontaminated condition?
The purpose of H_2O_2 decontamination is to decontaminate the environment of the inner chamber, and not to maintain a sterile environment. Special facilities such as clean rooms are required to maintain a sterile environment. Any incubator with a door that allows air in and out is unable to maintain a sterile environment. High temperature sterilization incubators are subject to the same conditions.

Is it possible to decontaminate the connecting cable and connections of the H_2O_2 generator that connects to the chamber using H_2O_2 vapor?
No, it is not possible to decontaminate this by H_2O_2. However, it should not be a problem because the connection is covered by a cap during the normal cultivating operation. Therefore it is important to ensure the cap is secure.

Why does H_2O_2 solution remain in the H_2O_2 generator after decontamination?
The ultrasonic generator can be damaged if energized under dry conditions, so a bit of solution remains at the end of the cycle to prevent this from occurring.

How do you dispose of the remaining H_2O_2 solution?
Please dispose in accordance with the regulation or law of each country or state. For example, the regulation in Japan calls for disposal of H_2O_2 after diluting it with a large volume of water. After usage of the H_2O_2 equipment, the insides of the H_2O_2 generator needs to be rinsed with distilled water.

Does H_2O_2 gas leak from the door gasket?
No. If the vapor is created by heating, the air inside the chamber may leak to the outside because of volumetric expansion. However, there is no volumetric expansion for this product since the ultrasonic generator creates a cool mist.

Where will the condensation water remain after the decontamination process?
Condensation water will remain at the bottom of the duct and humidifying pan area (cold-spot).

3) MCO-230AICUV/MCO-230AICUVL requires MCO-170HB-PA/PE, MCO-170EL-PW for H_2O_2 decontamination
4) MCO-170AICL, MCO-170M/MCO-170ML and MCO-230AIC series requires MCO-170HB-PA/PE, MCO-170EL-PW and MCO-170UVS-PW for H_2O_2 decontamination

Why does the condensation that was collected in the cold spot after decontamination and resolution contain a small amount of H_2O_2? Shouldn't the condensation be just water since all H_2O_2 gas is resolved during the process?
The condensation itself does not contain H_2O_2. However, a small amount of 6% H_2O_2 solution may splatter from the H_2O_2 generator when it is generating H_2O_2 mist, which remains as liquid and unresolved by UV. This H_2O_2 residue is mixed with the condensation, resulting in condensation containing H_2O_2 of approximately 1%.

Does H_2O_2 affect the incubator (including gaskets)?
No. The interior components are designed to handle H_2O_2 exposure.

Can H_2O_2 gas kill any kind of microorganisms, fungus and spores?
Yes. The MCO-170AICUVH/MCO-170AICUVHL, MCO-230AICUVL[3] and MCO-170M[4]/MCO-170ML[4] incubators have been validated through testing to demonstrate the efficacy of H_2O_2 decontamination on a variety of microorganisms.

Why is the chamber temperature kept at 45°C during decontamination and resolution? And when does the chamber temperature go back to normal set temperature such as 37°C?
Keeping the unit at 45°C improves the effectiveness of vaporizing H_2O_2 and avoids condensation on most of the interior surfaces of the chamber. Once the decontamination cycle completes, the unit will go back to the normal operating temperature.

3) MCO-230AICUV/MCO-230AICUVL requires MCO-170HB-PA/PE, MCO-170EL-PW for H_2O_2 decontamination
4) MCO-170AICL, MCO-170M/MCO-170ML and MCO-230AIC series requires MCO-170HB-PA/PE, MCO-170EL-PW and MCO-170UVS-PW for H_2O_2 decontamination

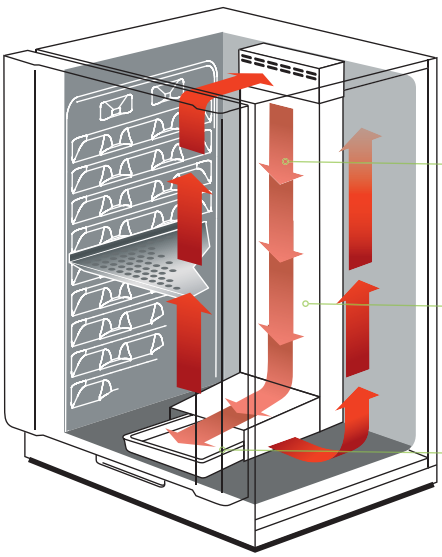
UV Section

What do I need to do if the UV lamp burns out during the decontamination process?
Although very unlikely to occur, when the UV lamp burns out during decontamination, the electric lock remains engaged and the door can't be opened until the time frame elapses. Over time the H_2O_2 vapor will naturally dissipate to below 0.1 ppm. In this case, you must exercise caution as water condensation remains inside chamber and can include approximately 6% H_2O_2 solution. Also, DO NOT manually open the door using a key until the electrical lock is released automatically.

What is the use of the UV lamp "automatic extension function"?
To compensate for the drop in UV wavelength intensity output due to aging of the UV lamp, the incubator automatically extends the UV lamp ON time depending on the accumulated illuminated age of the bulb. The extended time is displayed as a percentage under UV timer Ext, in the UV Setting Screen. The instruction manual contains this description.

When UV intensity degrades, can the resolving phase be executed properly?
When a UV lamp life indicator blinks that means the UV lamp has been illuminated for longer than 1000 hours or 5000 hours, depending on the model of the incubator and the decontamination process cannot be started. When the lamp has less than 1000/5000 hours and the UV lamp indicator is not blinking, the lamp can resolve the H_2O_2 gas.

Does the extension of the UV lamp ON time affect the performance of the incubator?
It does not affect the performance and does not cause an increase in chamber temperature.



Airflow Decontamination
Humidified, decontaminated air passes from the lower plenum for vertical convection through and around the perforated shelves.

UV Light
Ultraviolet light is contained behind an enclosed structure to confine rays to the water pan and airflow.

Humidity Reservoir
Contaminants trapped in the water pan are destroyed by high intensity, ozone-free ultraviolet light.

CO_2 Section

Why is a zero calibration pump no longer necessary?
The new dual wavelength IR sensor can detect CO_2 concentration inside the chamber and objective wavelength (atmosphere air as 0% CO_2) simultaneously using infrared light. This also contributes to increased reliability and lower vibration as there is no longer a need for an air pump.

What is the timing of CO_2 detection with a dual wave IR Sensor inside the chamber?
Real-time immediate response not affected by chamber humidity.

Why is a chamber air sampling pump no longer necessary?
As described below, the chamber air is able to reach the IR sensor using only the circulation flow via an inner fan and duct. This also increases reliability by reducing the amount of moving parts in the incubator.

Explanation of diagram: The air flows to the IR sensor. The direction of airflow to the IR sensor is from bottom to top through the IR sensor. The airflow volume is too low to measure with the airflow meter.

In principle, this can be explained as follows: The airflow inside the duct is from the top down with the two holes in the chamber connected to the IR sensor via tubes, which are at negative pressure. The air inside the tube is drawn from the lower hole as there is a difference in the pressure level of two holes caused by a pressure difference inside the chamber duct. The pressure at the upper hole is lower than at the lower hole. The environment inside the chamber flows constantly through the IR sensor so CO_2 levels at the IR sensor are measured continuously, allowing for quick and continuous monitoring and calibration.

Is it necessary to clean the IR sensor?
No.

Miscellaneous

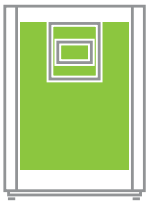
Are the following models stackable? Yes. See chart below.

Incubator Stacking Matrix for Model MCO-170AIC series / MCO-170M series				
	Model	Model	Model	Model
Top Incubator	MCO-170AIC series	MCO-170M series	MCO-170AIC series	MCO-170M series
Bottom Incubator	MCO-170AIC series	MCO-170AIC series	MCO-170M series	MCO-170M series

Incubator Stacking Matrix for Model MCO-230AIC series / MCO-170AIC series / MCO-170M series			
	Model	Model	Model
Top Incubator	MCO-230AIC series	MCO-170AIC series	MCO-170M series
Bottom Incubator	MCO-230AIC series	MCO-230AIC series	MCO-230AIC series

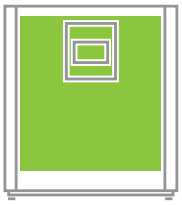
When should the electric lock be opened manually?
The lock should be opened manually whenever the incubator is moved. The door is locked when the incubator is switched off or during a power failure. Do not open manually during decontamination operation even if a power failure occurs.

Specifications are subject to change without notice.



Multi-Gas Incubators
MCO-170M / MCO-170ML

CO_2 Incubators
MCO-170AIC / MCO-170AICL
MCO-170AICUV / MCO-170AICUVL
MCO-170AICUVH / MCO-170AICUVHL



CO_2 Incubators
MCO-230AIC / MCO-230AICL
MCO-230AICUV / MCO-230AICUVL

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