Effective UV decontamination using economically and environmentally-friendly LEDs in CO_2 incubators. Moreover, LED is introduced in the new models, allowing for a more economic and environmentally-friendly sterilization.

WHITE PAPER

Microbial contamination is a persistent threat

Hands and fingers cannot be kept microbe-free when they come into contact with the air and objects, even if meticulous precautions are taken. Measures such as gloves do not eliminate the risk of microbial adherence, and if microbes are resistant to drying conditions, instruments and equipment such as cleaned pipettes can become a source of contamination. If a flask is touched by hand or inadvertently placed outside a biosafety cabinet, there is a risk that microbes adhering to the flask surface will multiply in the cabinet's humidity water. For example, Mycoplasma species are found in animals and on human hands, and if contamination occurs they are harder to detect than other microbes and can have a significant impact on experiments. The basic countermeasure for this is to regularly decontaminate the inside of the incubator where microbes may adhere.

UV decontamination is effective as contamination control

Methods of preventing contamination include frequently cleaning the inside of the CO_2 incubator with 70% ethanol, but it is often impossible to interrupt cell culture during experiments, and it may be difficult to secure a backup CO_2 incubator for transfer of cells during cleaning. One technology developed to prevent contamination during cell culture is a ultraviolet (UV) decontamination system. UV is broadly classified into three types according to wavelength: UV-A, UV-B and UV-C. Of these, UV-C (wavelength range: 100–280 nm) has the strongest microbicidal effect and is therefore used in UV decontamination systems. PHC has developed two UV decontamination systems using mercury lamps and LEDs as light sources.

Both are installed in CO_2 incubators, where they destroy the sources of contamination by irradiating the circulating air or the humidity water in the incubator with UV-C for a certain period of time after the incubator door is closed, or when the door has not been opened or closed for a certain period of time. However, as direct exposure to UV-C is considered harmful to the human body, these incubators are designed to ensure the safety of both culture cells and researchers by having a shielding structure to prevent UV leakage to the culture area and a function that automatically stops UV irradiation when the incubator door is opened.

mercury lamp

UV-LED
(MCO-171AICUVD)

Reduces lost time and costs due to contamination of cells in culture

PHC's CO_2 incubators equipped with UV can perform frequent decontamination of humidity water as the main source of contamination, giving you peace of mind. Also, because contamination can be prevented during culture, there is no need to interrupt research and transfer cells to another incubator. The new, economical UV-LED model is even more effective at decontamination.

Also effective for contamination control in the pharmaceutical industry

-Potential risks
1) Contamination of primary cells harvested from mice after drug administration
2) Contamination of antibody-producing cells after being cloned and confirmed as effective for the development of vaccines and antibody drugs

CO_2/multi-gas incubator with UV decontamination system

Available in limited countries only.

MCO-80IC*
MCO-80ICL*

MCO-230AIC*/MCO-230AICL*/
MCO-230AICUV/MCO-230AICUVL/
MCO-230AICUVH

MCO-170AIC*/AICL*/AICUV/AICUVL/
AICUVH/AICUVHL/
MCO-170M*/**/ML*/**/MUVH**/MUV**
MCO-170AC*/ACL*

NEW UV-LED

MCO-171AICD*
MCO-171AICUVD

MCO-50AIC*/AICL*
MCO-50M*/**

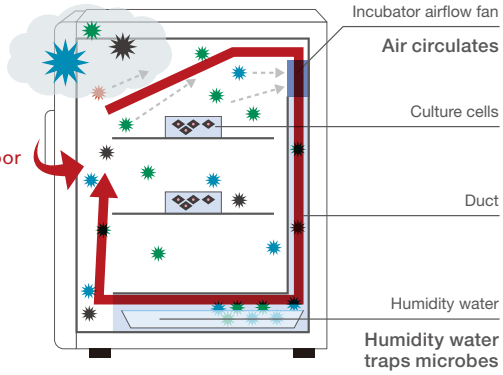
*UV decontamination system optional.
**Models with M in the model number are multi-gas incubators. Other models are CO_2 incubators.

Life Science Innovator Since 1966

Contamination control can be achieved effortlessly by UV decontamination during culture.There is no need to change a HEPA filter or press a sterilization switch.

Air circulation only

- Microbial contamination by opening and closing door
- Cause of contamination



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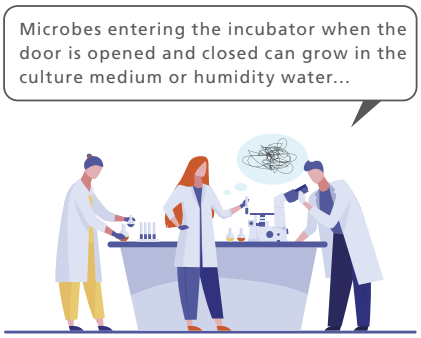
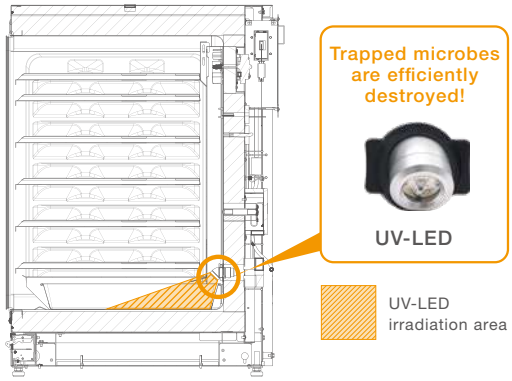


Equipped with UV-LED decontamination function

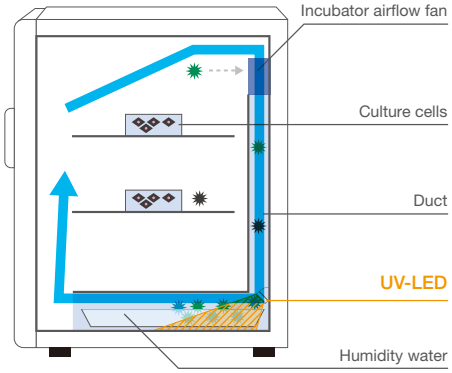
Direct UV irradiation of humidity water, the main source of contamination



MCO-171AICUVD

Circulation of decontaminated humidity water in the incubator

Clean air circulation



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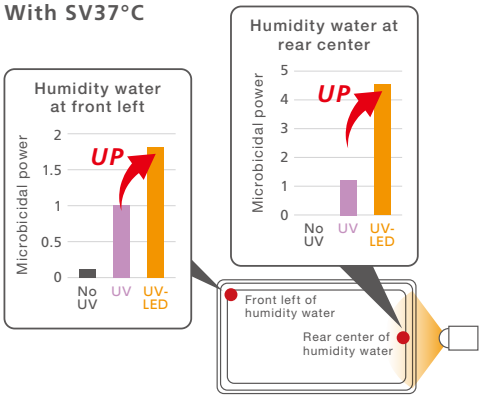
PHC tested the microbicidal performance of two types of UV decontamination systems using a CO_2 incubator. These tests verified the microbicidal effect of the UV decontamination system, regardless of the UV light source.

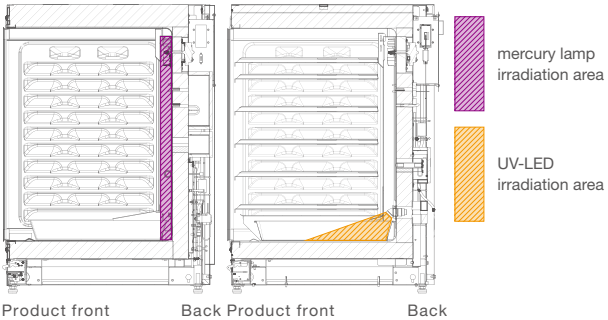
The microbicidal effect of the new UV-LED model was also verified

The microbicidal effect in humidity water was verified and the improved effectiveness of the new UV-LED model was confirmed

With SV37°C



Position of light source and range of irradiation (cross-sectional view of product)



Test method: A fixed amount of Bacillus subtilis was added to 1.5 L of humidity water, and after one cycle of UV irradiation the bacteria were counted and the microbicidal power was calculated.The irradiation time per cycle was determined by balancing the effect on the incubator's internal temperature and the lamp lifespan, with the conventional UV model irradiating for 10 min and the new UV-LED model irradiating in intermittent operation for 20 min.