



RPAMS CCV (ultraviolet-C) UVC Light Systems

A force multiplier in the fight to protect against COVID-19

EPA EST. NO. 97050-OR-1. RESTRICTED USE PESTICIDE/GERMICIDAL UVC



PRODUCT GUIDE

RPAMS CCV Hand-Held LPMA UVC Scanner with UV Glasses Model RP-CCV-002

RPAMS CCV Wide-Area Dual LPMA UVC Light System Model RP-CCV-004

DESCRIPTION

The RPAMS Ultra-Violet germicidal lamp is a low-pressure mercury lamp in which the envelope has high transmittance for 254nm radiation.

This lamp generates energy in the 254nm UV spectrum in order to destroy bacteria, fungi and viruses (microorganisms). Microorganisms include several distinct groups of disease causing germs (Viruses, Bacteria, Fungi, Algae and Protozoa)

The lamps operate at a very low gas pressure. They produce light when an electric current passes between two electrodes (also called cathodes) in a tube filled with low-pressure mercury vapor and other inert gases. The electric current excites the mercury vapor in the tube, generating radiant energy, primarily in the ultraviolet (UV) range.

THEORY OF GERMICIDAL OPERATION

The target of UV disinfection is the genetic material. As the UVC penetrates the cell and is absorbed, a rearrangement of the DNA occurs, interfering in the ability to reproduce. A cell that cannot reproduce is considered destroyed since it is unable to multiply within a host. The maximum absorption of UVC light by the DNA occurs at a wavelength of 260nm. The RPAMS germicidal lamp emits UVC at 254nm and is very close to the optimized wavelength for maximum absorption by DNA.

PRODUCT DETAILS

The RPAMS bulb tube is made of fused quartz which allows the 185nm and/or 253.7nm UVC produced by the mercury arc to pass out of the lamp unmodified. The germicidal lamps contain no fluorescent phosphor but produce a small amount of visible light due to mercury radiation bands.

Low-Pressure Mercury Germicidal Lamp Specifications

- Oldest and most established design
- Standard lengths and power
- Best electrical efficiency (Up to 40% of electrical power is converted to UV)
- Warm-up time approx. 30 - 60 sec.
- UVC output related to ambient temperature
- Ambient temperature is limited – max. 40 °C. At over 40 °C lamps will overheat and UVC will decline
- Low-pressure fill gas is Argon, Neon, Xenon, Helium and Mercury that reduces the required starting voltage for the discharge
- Lamps incorporate Synthetic Fused Quartz or Soft Soda-Lime Glass
- Transmits in 254nm region
- All are essentially high vacuum lamps filled to a very low pressure with one or more inert gases.

CHARACTERISTIC	LP (Quartz)
Emission	185+254nm
Gas Vapor Pressure	1 - 10 mbar
Hg Operating Temperatures	30-50°C
Arc Length	5 - 155 cm
Power Density (W/cm)	0.3 - 0.5
Influence of Ambient Temperature	HIGH

IF YOU HAVE QUESTIONS OR NEED INFORMATION PLEASE CALL

Jim Baynes 503-348-7950, Terry Wilmeth 971-237-3217 or CustomerService@RPAMS.com

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RPAMS maintains compliance to 40 CFR 156.10(a)(5) and FIFRA section 25(c)(3) as applicable to germicidal devices.

RPAMS *CCV UVC Light Systems*

INSTRUCTIONS FOR USE

BEFORE STARTING ANY RPAMS UVC LAMP DEVICE, STRICT ADHERENCE TO ALL WARNINGS AND INSTRUCTIONS MUST BE OBEYED.

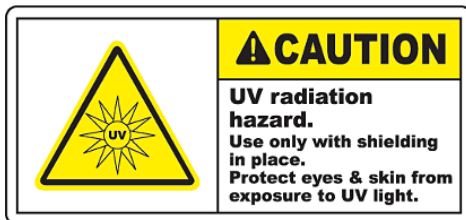
RPAMS CCV Hand-Held LPMA UVC Scanner with UV Glasses: RP-CCV-002

⚠ CAUTION: Comply with all safety and personal protection protocols.

- Conduct a detailed inspection of the light and power cord. Ensure no defects or indications of fraying. Ensure bulb is properly installed (**DO NOT touch quartz glass tube**).
- Prior to plugging power cord into outlet, verify **Activation Switch is OFF**.
- Hold device with light emitter window facing away from user. **ENSURE NO EXPOSURE TO USER OR OTHER PERSONS!**
- Slowly scan area to be disinfected at a distance of 4 inches to no more than 4 feet. *UVC is most effective when direct exposure of surface during scan is achieved. Areas of shadows or that are porous will require multiple sweeps in varying directions to ensure adequate exposure.*

NOTE: At 4 inches, allow for a minimum of 2-5 seconds of light exposure to the scanned area. At each additional distance of 12 inches, add 30 seconds minimal dosage. Beyond 4 feet but no more than 10 feet, expose the area to a minimum of 45 minutes but no more than 2 hours.

- Immediately unplug power cord.



NOTE: RPAMS Ultraviolet Germicidal Irradiation(UVGI) products conform to FDA regulatory standards of Title 21, CFR part 880.6600 for effective augmentation against SARS-CoV-2 virus

RPAMS CCV Wide-Area Dual LPMA UVC Light System: RP-CCV-004

It is recommended that **TWO (2) persons** perform the assembly, **DO NOT DO THIS ALONE**.

⚠ CAUTION: Comply with all safety and personal protection protocols.

- Deploy tripod and install light emitter module. Tighten the interface screw on tripod to affix the emitter module.
- Conduct a detailed inspection of the light, light module, tripod and power cord. Ensure no defects or indications of fraying. Ensure bulbs are properly installed (**DO NOT touch quartz glass tube**).
- Ensure remote power module is connected in series to the power cord.
- Prior to plugging power cord/remote power module into outlet, **verify activation switch (FOB) is secure** and not inadvertently activated until ready for UVC operation.
- Place device in central area of space to be sanitized, **with light emitters facing away from any potential EXPOSURE TO HUMANS!**

NOTE: UVC will have adverse effect to plants.

- Adjust emitter arrays to have maximum area exposure. Secure arrays by tightening adjustment knobs.
- Vacate area and initiate light with FOB activation. UVC is most effective when direct exposure of UVC to surface is achieved. Areas of shadows or that are porous will require positioning of tripod in varying directions and locations to ensure adequate UVC exposure.

NOTE: Expose area (nominal area 400 square feet) to minimum 30 minutes but no more than 1 hour.

- After process complete, turn off device.
- Immediately set aside FOB and unplug power cord.

Model RP-CCV-004 with Twin 50-200 Watt LPMA Emitters, Castors, Remote Wireless FOB, and Tripod



Hazard and Risks from UV Lamps

- UV lamps produce light radiation from ultraviolet through visible to infrared radiation. Hazard comes from the UVC. UVC cannot be seen and is not felt immediately, but it is harmful to both the eyes and skin. Users may not realize the danger until after the exposure has caused damage. Symptoms can occur 4 to 24 hours after exposure.
- The effects on skin are of two types: acute and chronic.
- Acute effects appear within a few hours of exposure, while chronic effects are long-lasting and cumulative and may not appear for years.
- An acute effect of UVC is redness of the skin called erythema (similar to sunburn). Chronic effects include accelerated skin aging and skin cancer.
- UV radiation is absorbed in the outer layers of the eye – the cornea and conjunctiva. Acute overexposure leads to a painful temporary inflammation, mainly of the cornea.
- Working unprotected for even a few minutes can cause injury.
- It is not possible to calculate threshold for chronic UVC exposure effects; therefore, because no exposure level is safe, exposure should be reduced as much as possible.

Other Hazards Related to Use of UV Lamps

- Avoid touching or scratching the glass section of the lamp. Fingerprints should be wiped off with isopropyl alcohol and a clean soft tissue; otherwise they will weaken the lamp envelope.
- Use cotton gloves for handling the lamp.
- Install replacement bulbs with proper polarity of electrical connections. Do not stress the glass parts when handling bulb.
- Replace the lamp when it reaches its lifetime limit of 3000 hours.

Mercury (Hg) – Mercury contamination can occur if a lamp breaks or explodes. Consult with OSHA and refer to MSDS on proper handling of mercury contamination.

Electrical Shock – During normal operation, the user is protected from contact with any energized electrical connections. However, electrical shock danger will occur if protective features are ignored or circumvented.

Never access the power supply section with the unit still plugged in.

Unplug the unit before replacing the bulb or servicing the lamp.

Controls – There are three types of control measures: engineering, administrative (procedural), and personal protective equipment (PPE).

ENGINEERING CONTROLS

Location – Having UVC generating devices located in an

Engineering Controls (continued)

unoccupied room, alcove, or low-traffic area of a facility during the sanitation process is ideal.

Enclosure – The UVC light has radiation barriers between bulb and operator. Always ensure this is positioned in such a way to prevent UVC emitting rays directly to the person handling the light. Any defect of the barrier should be replaced or repaired immediately.

ADMINISTRATIVE CONTROLS

Typical administrative controls include limiting access, ensuring that people are aware of the potential hazards, and providing training and safe working instructions for users.

Training

- Personnel should be trained in using the UVC generating devices safely.
- This manual provide specific information (type of eye/skin protection needed, hazards, etc.) that must be completely understood before using the equipment.
- If any uncertainty or concern exists regarding the safe use of UVC lights, contact RPAMS for clarification.
- Personnel should carefully study this manual and be familiar with its design, use and instructions. Never deviate from the instructions for safe operation.
- At a minimum, personnel should be familiar with the following when working with or around UVC light:
 - UVC light-producing equipment considerations and proper use
 - Protective equipment necessary for safe operations
 - Avoiding UVC exposure

Minimizing Exposure – Never view the UVC lamp directly. Although the inverse square law applies to non-laser-beam UVC radiation, it is not advisable to look directly at any UVC source at any distance.

Keep exposure time to a minimum, and where the source is not enclosed or shielded, keep as far away from it as practicable.

Restrict sanitizing area access only to those personnel who are directly conducting sanitation operation using the UVC light.

Hazard Warning Signs – Warning signs are recommended to inform persons about the risk of exposure during use and maintenance. Warning signs should be used where applicable to indicate the presence of potential UVC hazards, to restrict access, and to specify PPE requirements.

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Administrative Controls (continued)

Personal Protective Equipment – Appropriate PPE is required and includes eyewear, face shields, gloves, and protective clothing. PPE must be either readily available and cleaned between users or personally allocated to each user. Eye and face protection must be inspected either regularly or before each use for damage or defects such as cracks, crazing, or bleaching, and replaced when necessary. Note that PPE may need to serve multiple purposes, such as protecting against both UV and chemical splashes.



UV Protective Eyewear – Use eyewear that is appropriate for the work. Special safety glasses are available for the different UV ranges. For best UV protection, the eyewear should be compliant with ANSI Z87.1 and should have a UV filter marking, U, followed by a number on a scale from 2 to 6.

UV Protective Face Shields

CCV-004 – UV-absorbing full face shields should be worn in addition to safety glasses or goggles (goggles may not provide sufficient face protection). Severe skin burns can happen in a very short time, especially under the chin (which is often exposed).



Take-Away Safety Tips

- **ALWAYS** use appropriate PPE for the hazard: UVC, goggles, gloves, buttoned-up protective clothing, face shield.
- **Avoid** the light generated by the lamp to the extent possible.
- **Avoid** touching or scratching the glass section of the lamp. Fingerprints weaken the lamp envelope, and this may lead to lamp damage.
- **Do Not** touch the lamp bulb while working. Let the lamp cool at least 15 minutes before storing.
- **Do Not** use lamp material that have adverse reaction to UV-A/B/C.
- **Do Not** overcool the lamp. Air should never be directly forced on the bulb because it will result in uneven cooling. Recommended cooling methods are setting aside safely and cool through ambient air.
- **ALWAYS** store the light in a protective case or cover until use.



UV Protective Gloves – Wear nitrile, latex, or tightly woven fabric gloves to protect against the significant amounts of UVC that may pass through to the skin; these types of gloves have a low transmission of UV compared to vinyl gloves. Gloves should protect personnel from UV light, as well as from the hazard of the sanitation activity being performed.

Body Covering – Personnel should clothing that fasten securely up the neck so that no skin is exposed. Burns to wrists and the neck are not uncommon.

⚠️ RPAMS UVC LPMA bulbs have less than 10mg of mercury in the base of the lamps, significantly less than common fluorescent bulbs. If the LPMA bulb breaks or you wish to dispose of the bulb, follow state government regulations for proper disposal and refer to the OSHA Quick Card for Avoiding Mercury Exposure from Fluorescent Bulbs as revised.

⚠️ WARNING

RISK OF FIRE/INJURY TO PERSONS

1. To reduce the risk of electrical shock and fire, pull plug when relamping. **ONLY USE 13 Watt G23 germicidal or smaller qualifying bulb.**
2. **For light duty germicidal scanning only.**
3. **USE ONLY** in dry environment-risk of electrical shock.
4. **KEEP AWAY** from combustibles.
5. **KEEP OUT OF REACH OF CHILDREN.**
6. Keep light and cord away from hot and/or moving parts.
7. **DO NOT OPERATE** if any enclosure or parts are missing/damaged.
8. **ALWAYS** wear ANSI approved UV protection goggles and gloves.
9. Avoid exposure to ozone accumulation.

THE FDA AND ACS HAS INDICATED:

- Ultraviolet UV-C light is harmful to your eyes and skin. Use proper safety gear.
- **UV radiation (including UVA, UVB, and UVC) is carcinogenic to humans.**
- This product is prohibited for use by persons under the age of 18 years.
- This product must not be used if skin lesions or open wounds are present.
- This product should not be used near individuals who have had skin cancer or have a family history of skin cancer.
- Persons repeatedly exposed to UV radiation should be regularly evaluated for skin cancer.

⚠️ CAUTION: Certain oral and topical medicines, such as antibiotics, birth control pills, and benzoyl peroxide products, as well as some cosmetics, may increase skin and eye sensitivity to UV in all skin types. Check the product label and ask your doctor for more information.

DO NOT REMOVE THIS LABEL