

# RACK BASED UV SANITIZER UNIT UV-RAC-6U



**Designed and Developed By**

**NUCLEONIX SYSTEMS PRIVATE LIMITED**

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## **SAFETY WARNING**

- This equipment works on 230V AC mains. While working with the equipment exercise, care is taken not to get in touch with AC mains voltage.
- UVC type radiation is present within the equipment. Hence do not attempt to power ON the unit, while door is open. Use of recommended any accidental exposure.
- UVC radiation causes damages to materials like plastics, fabric, etc. upon prolonged exposure. Hence sterilization duration do not exceed beyond 30 sec. For each exposure is not recommended.
- UVC radiation is hazardous, avoid looking directly and also do not expose your skin to UVC radiation. Ensure that AC Power is switched off, when not in use.
- Also, while servicing the equipment, greater care is taken, when making any internal adjustments, etc.



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# CHAPTER - I

## INTRODUCTION

### 1.1 INTRODUCTION

'Nucleonix Systems' a high technology Instrumentation company, with its vast design experience in the field of Nuclear Instrumentation, has taken up the mission to develop and introduce, equipments for covid-19 combating, in this global pandemic scenario. This UV-RAC-6U, developed and made available for combatting of COVID-19 is one such product.

UV germicidal irradiation (UVGI) is a well-known inactivation technology. Of all the technologies available, UV irradiation is superior, as it is non-contacting type, to sanitize various household and office articles, gadgets. **It effectively damages DNA/RNA of the viruses; thereby damaged organisms cannot replicate.** This UV sanitization technology is useful for all types of gadgets. It kills variety of viruses, bacteria, fungi etc., including COVID- 19.

#### 1.2 Features:

- Uses two UVC tubes of each 16W, totaling to 64w total output.
- UV sanitizer destroys bacteria, viruses and fungi within a few seconds with 99.99% probability including COVID-19 on exposed surfaces.
- Enclosure: MS Powder coated door with suitable lock and timer.
- It effectively damages DNA/RNA of the viruses; thereby damaged organisms cannot replicate.
- Applications: Ideal choice for sanitization of all small articles/gadgets at office & home on scanning.
- "UVC sterilized face masks" can be re-used by health care professionals and general public.

#### 1.1 SPECIFICATIONS

UV Radiation Type: Type C @ 253.7nm

Wattage and No. of Lamps: 16W, 4no

Sterilization Time: 30 sec (adjustable as necessary)

No. of Sample Tray: 1 / 3

Construction Material: MS Powder coated enclosure.

Inside Dimensions: 450mm W x 225mm H x 250mm D

Operating Voltage: 230VAC+/-10%, 50/60Hz

## CHAPTER - II

### UNPACKING

#### 2.1 UNPACKING

UV SANITIZER UNIT TYPE UV-RAC6U is packed and sent in ready to use condition in suitable corrugated box. After unpacking, please observe for any physical damages to the unit.

In the event of any physical damages, please write/call back on the below mail ID/phone numbers to enable us to arrange for rectification/replacement of the unit, once the defective piece is received back at our works.

#### **FOR ANY SALES/SERVICES RELATED QUERIES FOR COVID RELATED PRODUCTS, KINDLY CONTACT**

<p><b>Address:</b></p> <p><b>NUCLEONIX SYSTEMS PVT. LTD.</b> Plot No. 162A &amp;B, Phase II, I.D.A. Cherlapally, Hyderabad Telangana, India – 500 051 Ph.: 040-29706483, 040-29706484, +91 7331104481, Tele Fax: 040-29706486 Email: <a href="mailto:uvc-sales@nucleonix.com">uvc-sales@nucleonix.com</a>. Website: <a href="http://www.nucleonix.com">www.nucleonix.com</a></p>	<p>Quick response contact for Covid Combating products</p> <p>Email Id: <a href="mailto:uvc-sales@nucleonix.com">uvc-sales@nucleonix.com</a> Ph: 040-29706483/84/85.</p> <p>Contact Team: Mr. Bhaskara I.V – Marketing Manager; Mob: +91- 9392704610 Mr. Maniram – Marketing Executive; Mob: +91- 9392704610 Ms. Sowmya – Marketing Executive; Mob: +91- 9392704610</p>
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**RACK BASED UV SANITIZER UNIT  
UV-RAC-6U**

## CHAPTER – III

### OPERATING INSTRUCTIONS

#### 31 OPERATING INSTRUCTIONS

This chapter gives the most important instructions for safe operation of the equipment and to ensure a perfect sterilization of the object meant to be sterilized and to avoid Spread of Viral Contamination through Direct / Indirect contact.

#### **Recommended Standard Operating Procedure for Avoiding Viral Spread through Direct / Indirect Contact:**

- 3.1.1 Go through this user Hand book and also YouTube Video, or take instructions from Nucleonix support staff before you start operating the unit. Of course, it is a very simple and easy to operate this product.
- 3.1.2 Go through the YouTube link and follow the instructions  
<https://www.youtube.com/watch?v=fFDr3CHCWlc&feature=youtu.be>
- 3.1.3 It may be good practice, to sanitize objects/materials in the home or office by spraying / cleaning / mopping using disinfectants before you use.
- 3.1.4 Before handling the UV sterilization equipment first both the hands have to be **sanitized using “hands free liquid disinfectant sanitizer”**. Also, it is suggested to wear gloves on both hands before operating the unit.
- 3.1.5 Now to commence the sterilization process, remember that always **Use Left hand to operate the door of the UV Sanitizer Unit and Right hand to handle the Materials (if feasible)**. By this way contamination does not transfer to the Material or vice-versa.
- 3.1.6 When sterilization process is in continual sequence, ensure to store all the sterilized material on Sterilized platforms / Boxes / Storage area before processing the next material. s
- 3.1.7 To sterilize Material, UV Sanitizer door is opened by the operator using **Left Hand**. Now the material to be sterilized can be placed on the platform / sample tray by using **Right Hand**.
- 3.1.8 Now the User can close the Door using left hand and to commence the sterilization cycle for 30 seconds.
- 3.1.9 After UV sterilization, the Door has to be opened again using **Left Hand** and Sterilized material can be retrieved using **Right Hand** and transferred to Sterilized Zone / platform / boxes.

**3.1.10** For Sanitization follow the timings given below in the table for D90 and D99.99% COVID kill.

Test point at center of the RAC	Readings in $\mu\text{W}/\text{Cm}^2$	D90 exposure time	D99.9 exposure time
Uv power at Top facing	1280	<b>7 sec</b>	<b>30sec</b>
Uv power at Bottom facing	1300		
Uv power at Left facing	1100		
Uv power at Right facing	1100		
Uv power at Front facing	300		
Uv power at Rear facing	450		

**NOTE 1: D90 means time required to kill 90% of the viruses. D99.9 means time required to kill 99.9% of the viruses.**

**NOTE 2: This timing calculations are based on the published, technical reports and information.**

**3.1.11** Once the material is sterilized care should be taken to avoid re-contamination of material. Shift the material / items inside for use.

**3.1.12** Switch off the unit, once the operation is completed and keep it in a safe place, inaccessibility to children / unauthorized persons.

**3.1.13** Any difficulty in operating the unit, you may go through the YouTube link <https://www.youtube.com/watch?v=fFDr3CHCWlc&feature=youtu.be> given or contact our Services Executive for technical help, given under 2.1 of this hand book, for guidance.

## Applications:

- UVC light penetrates into micro-organism's cell membrane. This damages its DNA, prevents growth & kills the organism.
- UVC sanitizer destroys 99.9% of bacteria & viruses within a few seconds.
- Eliminates up to 99% of MRSA & H1N1 in just few seconds & kills 99% of germs, viruses and other micro-organisms on solid and nonporous surfaces.
- Ideal for use on any solid objects. It is great for sanitizing even small items such as remote controllers, lights, toys, faucets, mobile phones, music players and more.
- Uvc light varies based on the type of porous surface and soil loading.
- It can be used to sanitize fruits and vegetables.
- N95 masks can be Uvc sterilized by healthcare professional for reused.

## Quality Assurance (QA) Plan:

Nucleonix has a robust QA plan, for all the products manufactured and supplied, including COVID safety products.

We perform Mechanical, electrical inspection and additionally we check UVC power output at different points using UVC light meter in  $\text{mW}/\text{cm}^2$ . This is very important to know whether sufficient power output is delivered by the unit to kill COVID & other Viruses.



**UV\_RAC 6U**



**UVC Light Meter**



## CHAPTER – IV

### WARRANTY / POST-WARRANTY SUPPORT PROCEDURES FOR COVID COMBATING PRODUCTS.

#### (a) During Warrantee

The following procedure is to be followed by the customers with in India for availing services/ repairing facility during warrantee period.

- Equipments are to be sent to our works for availing free repair services during warrantee, after the customer receives approval from the customer support division, by sending an e-mail.
- Of course, services/repairs to equipments are provided free of cost during warranty, if the defects developed are due to normal / natural failures. Any failures due to over voltage, electrical disturbances / short circuits / improper earthing or due to mishandling of equipment, including physical damage or breakage, then the customer has to pay for the repairs even if it is under warranty.
- When the equipments are sent to our works for warrantee services, they are to be properly packed with adequate cushion to prevent any transportation damages. Nucleonix Systems is not responsible for damages or loss during transportation. Transit insurance is to be covered by party/customer only, both ways, if the customer feels it is necessary. Insurance coverage details are to be sent in advance.
- Local customers can send the equipments, personally, to our works for repairs and collect them back after repairs.
- **Packing / Freight charge** is to be borne by customer **both ways**, if they are sending by any mode of transportation.
- Please indicate in your correspondence, equipment model & serial number, before you send it to us.
- All the equipments are to be sent to our works only on door delivery basis.
- For Door Delivery Transportation contact XPS/GATI cargo in your city / town or a reliable courier service to pick the consignment from your place. For their nearest local address & phone no's look into their websites. You can also send smaller boxes by speed post.
- Nucleonix Systems will not receive the equipments sent by other modes of transportation, such as Rail / Road.
- After servicing, equipments we will and send back the equipment by same mode of transportation such as XPS/GATI/COURIER/RPP/SPEED POST.

- All, out of state, customers can contact our authorized service dealer, if we have appointed anybody, operating in your city.
- All types of UVc tubes are glassware, which are fragile are not covered in warrantee, if the failure is due to physical damage, external or internal damage due to shock, dropping, miss-handling etc. If the failure is due to a natural fault then only it is covered under warrantee. However complete electronic ballast is covered for 1 year warrantee.
- You can also send the equipment personally to our works for repairs either during or after warrantee, after fixing up with our service dept (Customer Support Division). If possible, we may repair on same day or your person can stay for a day & get it repaired.

### **(b) Post-Warrantee Services**

- On expiry of 1yr warrantee if you like to send the equipment for repairs to our works, you may please observe the following procedure.
- Send an e-mail with details mentioning that you would like to send a COVID combat product (for repairs give details of product name, sl.no etc) and of course insurance to be covered by party both ways. Also indicate that you agree to pay service charges which includes: Basic service charges per unit + cost of components + packing charges + Return Freight charges @ actual etc.
- Once our customer support department responds & requests you to dispatch the equipment to our works for repairs, you may do so by following the steps for transportation as mentioned under warrantee services, and avail the services.

## CHAPTER – V

### How long corona virus survives on surfaces

#### Introduction:

Scientists from the National Institute of Allergy and Infectious Diseases, the Centre for Disease Control, (CDC) Princeton University, and University of California, Los Angeles, experimented with the [SARS-CoV-2](#) virus under laboratory conditions to determine how fast virus particles broke down outside of a host body.

The coronavirus that causes COVID-19 mainly spreads from person to person. When someone who is infected coughs or sneezes, they send droplets containing the virus into the air. A healthy person can then breathe in those droplets. You may also catch the virus if you touch a surface or object that has the virus on it and then touch your mouth, nose, or eyes.

The study suggests that people may acquire the coronavirus through the air and after touching contaminated objects.

"This virus is quite transmissible through relatively casual contact, making this pathogen very hard to contain," said James Lloyd-Smith, a co-author of the study and a University of California, Los Angeles, professor of ecology and evolutionary biology. "If you're touching items that someone else has recently handled, be aware they could be contaminated and wash your hands."

The study attempted to mimic the virus being deposited onto everyday surfaces in a household or hospital setting by an infected person through coughing or touching objects, for example.

People infected with the virus -- officially named SARS-CoV-2 -- may be spreading the virus without knowing they have it or before symptoms appear. Lloyd-Smith said the biology and epidemiology of the virus make infection extremely difficult to detect in its early stages because the majority of cases show no symptoms for five days or longer after exposure, scientists then investigated how long the virus remained infectious on these surfaces.

#### **How does the virus that causes COVID-19 compare with other corona viruses, and why are we seeing so many more cases?**

SARS-CoV-2 behaves like a typical respiratory coronavirus in the basic mechanisms of infection and replication. But several mutations allow it to bind tighter to its host receptor and increase its transmissibility, which is thought to make it more infectious.

The New England Journal of Medicine study suggests that the stability of SARS-CoV-2 is very similar to that of SARS-CoV1, the virus that caused the 2002-2003 SARS global outbreak. But researchers believe people can carry high viral loads of the SARS-CoV-2 in the upper respiratory tract without recognizing any symptoms, allowing them to shed and transmit the virus.

## **Coronavirus: What you Need to Know:**

The coronavirus can live for hours to days on surfaces like countertops and doorknobs. How long it survives depends on the material the surface is made from.

### **Different Kinds of Surfaces**

#### **Aerosol**

Scientists discovered the virus is detectable for up to 3 hours in aerosols

#### **Metal**

Examples: doorknobs, jewelry, silverware

5 days

#### **Glass & Ceramics**

Examples: drinking glasses, measuring cups, mirrors, windows, dishes, pottery, mugs

Up to 5 days

#### **Paper**

Examples: mail, newspaper

The length of time varies. Some strains of coronavirus live for only a few minutes on paper, while others live for up to 5 days.

#### **Wood**

Examples: furniture, decking

4 days

#### **Plastics**

Examples: milk containers and detergent bottles, subway and bus seats, backpacks, elevator buttons

2 to 3 days

#### **Stainless steel**

Examples: refrigerators, pots and pans, sinks, some water bottles

2 to 3 days

#### **Cardboard**

Examples: shipping boxes

24 hours

#### **Copper**

Examples: Coins, cookware

4 hours

#### **Aluminum**

Examples: soda cans, tinfoil, water bottles

2 to 8 hours

#### **Food**

Examples: takeout, produce

Coronavirus doesn't seem to spread through cooked food.

#### **Water**

Coronavirus hasn't been found in drinking water. If it does get into the water supply, your local water treatment plant filters and disinfects the water, which should kill any germs.

### **Fabrics, On Clothes, linen**

There's not much research about how long the virus lives on fabric, but it's probably not as long as on hard surfaces. Well, as suggested by an article in *New York Times* by Tara Parker-Pope who talked to an aerosol scientist and a paediatric infectious disease specialist, it could be cardboard because both can consist of fibers that absorb moisture. The virus needs some moisture to survive. Without it, the virus can quickly dry up and no longer be viable. So, should you assume that the virus can survive on your clothes for up to 24 hours? Maybe. Perhaps.

Keep in mind that clothes aren't necessarily all fabric. They may have metal or plastic parts like buttons or clasps. That's certainly the case if your clothes have giant plastic windows on them. In theory, the virus could survive longer on less absorbent portions of your clothes.

### **Shoes**

One study tested the shoe soles of medical staff in a Chinese hospital intensive care unit (ICU) and found that half were positive for nucleic acids from the virus. But it's not clear whether these pieces of the virus cause infection. The hospital's general ward, which had people with milder cases, was less contaminated than the ICU.

### **Skin and hair**

There's no research yet on exactly how long the virus can live on your skin or hair. Rhinoviruses, which cause colds, survive for hours. That's why it's important to wash or disinfect your hands, which are most likely to come into contact with contaminated surfaces.

### **Coronavirus survival by surface**

"The virus typically doesn't like to live on surfaces that have a lot of holes or microscopic little grooves, nooks or crannies," explains Dr. Esper. "It likes surfaces that are very smooth, like door knobs. "Early research has demonstrated that the virus's survival depends on the type of surface it lands on. The live virus can survive anywhere between three hours and seven days, depending on the mate.

## CHAPTER – VI

### **Safety guidelines, Exposure limits to follow & Corrective Measures**

#### **against UV radiation:**

The following are the guidelines given by “International Commission on Non-Ionizing Radiation Protection” (ICNIRP) – on limits of exposure to UV radiation of wavelengths between 180nm & 400 nm (incoherent optical radiation) published in health physics – 2004.

**Exposure Limits:** For both general and occupational exposure to UVR incident upon skin or eye within an 8-hour period, the following applies.

#### **Exposure to eyes:**

UV radiation exposure in the spectral region of 180 to 400 nm incident upon the unprotected eye(s) should not exceed 30 J/m<sup>2</sup>.

#### **Exposure to Skin:**

For the most sensitive non-pathologic, skin photo types (known as “melano-comprised UV radiation exposure in the spectral region (180-400 nm) upon the unprotected skin should not exceed 30J/m<sup>2</sup>.

#### **Limiting UV exposure duration based on Exposure limit:**

Duration of exposure per day 10s effective irradiance 3.0 w/ m<sup>2</sup> or 300 μw/cm<sup>2</sup>.

#### **Protective Measures:**

- While you work with the UVC sanitizer gadgets do not directly see the UV light, when it is in ON, condition.
- Use UV resistant goggles, spectacles while working preferably, to be on safe side, to prevent any accidental exposure.
- Protect your eyes & skin, from direct exposure.
- Keep your UVC sanitizer unit, not accessible to children, from a possible misuse.
- Read safety instructions before you switch ON the gadget and operate.
- Go through the demo video/instructions, prepared & given by the company, before you operate.
- Manufacturing company is not responsible for any damage caused, while using the equipment by not following proper instructions.
- UVC gets radiation attenuated and does not penetrate thru glass, Perspex, plastic sheet, paper, etc.