

DATA SHEET



 **BIOviolet** 360  
Fastest UV sterilization

UV ILLUMINATION  
FOR DISINFECTION

W180 UVC  
W330 UVC  
W660 UVC



**Control tablet INCLUDED**  
\* pre-configured \*

**PRODUCT CHARACTERISTICS**

Performance up to 20mW / W  
High quality 3535 UVC LEDs  
Top & 360 ° radiation  
Portable device

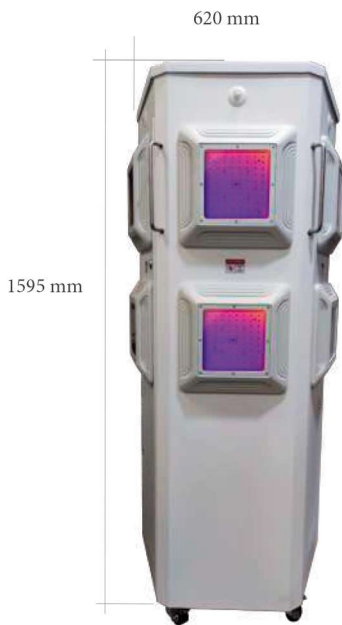
**DISINFECTION**  
**99,99%**  1-20 min



**UVC**  
275 nm

- Made entirely of galvanized sheet metal and oven finished in polymerized powder, guaranteeing excellent insulation and high safety, UVC LED chips covered by a **high purity JGF2 quartz crystal**.
- LED chips made with 93% penetration rate of quartz glass, ceramic and Cu lead frame.
- Security PIR sensor, deactivates UV-C light emissions when detecting movement nearby.
- **LED light indicator for power on and ultraviolet-C arming alarm with adjustable sound intensity.**
- Control off / on and consumption by a pre-configured 10.4 "tablet with up to 7 independent times, internal WiFi router.
- **Built-in Uninterruptible Power Supply (UPS) to avoid tablet / IRIS PENTA interruptions between movements. Up to 6 hours of uninterrupted battery, (once disinfection is finished, turn off the UPS to conserve the remaining battery)**
- Luminaire with ultraviolet-C wavelength of 275 nm.
- **Disinfection in confined spaces can exceed 99.99%.**
- **Simple and fast disinfection method, eliminates viruses and bacteria in 1-20 minutes.**
- Made in Spain with a minimum guarantee of 10,000 hours.

Not visible light  
Disinfects and removes viruses  
and bacteria with UV-C light **UVC**



### COLORS

WHITE

### CHIP

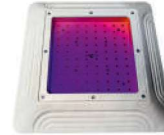
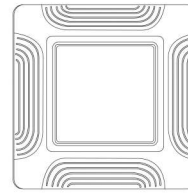
High performance UVC LEDs

### SETTINGS

Automation by remote control through pre-configured tablet (SAMSUNG)

### LIGHTING SYSTEM

6 / 11 x IRIS NUBE UVC



### PRESENCE DETECTION

5 x PIR for automatic disconnection



#### Important note:

The equipment incorporates motion sensors that will turn off UVC emissions if activated

**DO NOT ENTER THE STAY DURING DISINFECTION**

In case of interruption, the equipment will emit UVC again after 21 seconds, although the disinfection process must be started again

## DATA SHEET

### GENERIC INFORMATION

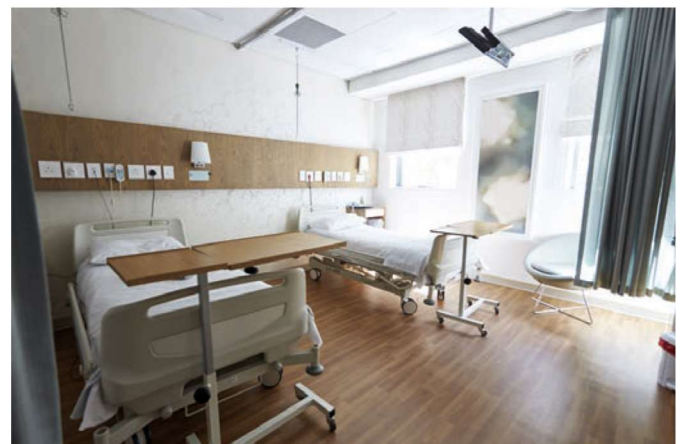
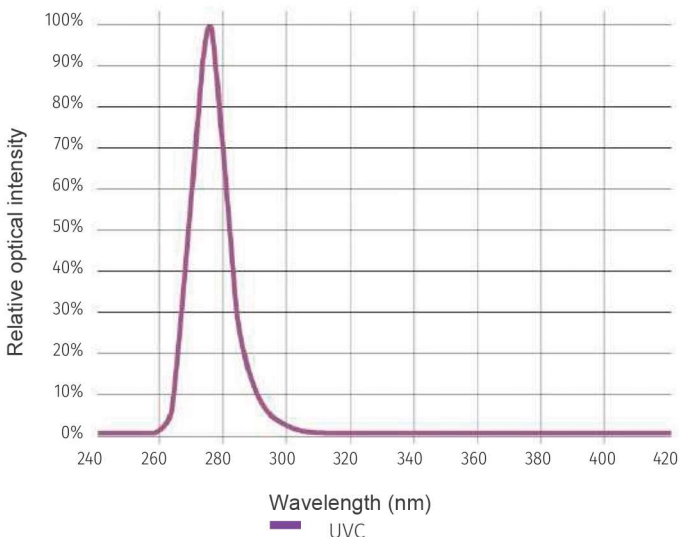
LED Chips	3535 UVC	Lifetime	>10,000 hours
Power factor	>0,97	Tension	175/265V AC ~ 50/60Hz
Disinfection	>99.99% virus and bacteria	Construction material	Galvanized sheet
Luminaire device	UV-C LEDs on Aluminum PCB	Crystal	JGF2 Quartz
Opening	360°	Work temperature	-20°C ~ 50°C

SPECIFIC INFORMATION	180 W	330 W	660 W
UVC flux	3.508 mW m <sup>2</sup>	6.431 mW m <sup>2</sup>	12.861 mW m <sup>2</sup>
UVC type	275 nm	275 nm	275 nm
Luminaire device	x6 IRIS NUBE UV-C projectors	x11 IRIS NUBE UV-C projectors	x11 IRIS NUBE UV-C projectors
Measures	620 x 1595 mm	620 x 1595 mm	620 x 1595 mm
Weight	92.840 g	106.040 g	106.040 g

### ICONOGRAPHY



(I<sub>f</sub> = 60mA (UVC) T<sub>a</sub> = 25°C)



### APPLICATIONS

Disinfection of hospitals, clinics, hotels, offices, gyms, companies ...

MODULES CONFIGURATION

To start the configuration of any module (example: Program, Room, Operating Room ...) we will click on the one we want to configure and we will click on "... " (settings) as shown in the following image

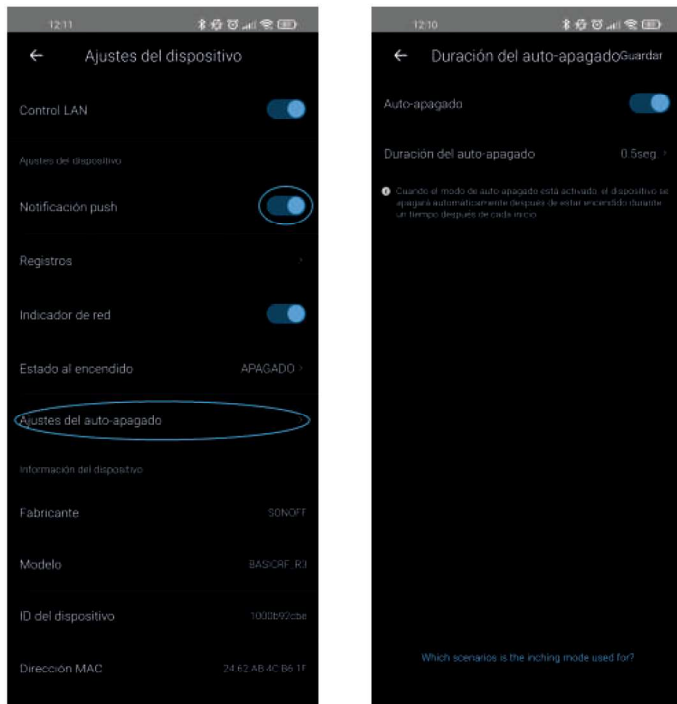


We activate "Push notification"

Finally we select "Auto-shutdown settings", activate the "Auto-shutdown" box and program the desired time for disinfection + 21 extra seconds (system reset time)

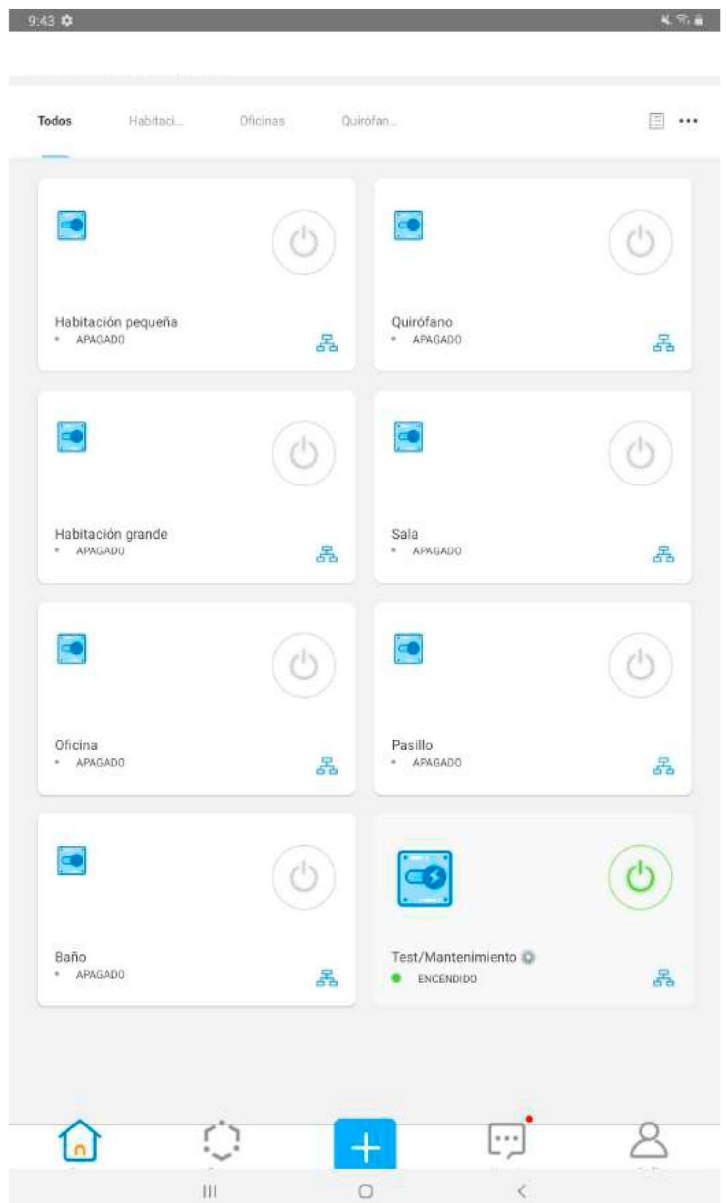
NOTE: THE SYSTEM COMES ALREADY PRE-CONFIGURED FROM FACTORY, THESE WOULD BE THE STEPS IN CASE YOU WANT TO CHANGE THE DEFAULT TIMES OF ANY OF THE 7 MODULES

Example: disinfection time for room = 3:30 minutes (we add the + 21sec of reset) so it will be necessary to program 3:51 minutes in total



NOTE: IF YOU WANT TO CHANGE THE NAME OF THE MODULE (example: from "Operating Room" to "Room") it is necessary for the tablet to have INTERNET access

Example of the renamed control panel and modules



- Up to 7 modules with independent disinfection times
- Editable times
- Editable names (INTERNET access required)
- Test / Maintenance mode (always on)

Using the Test / Maintenance mode:

module for exclusive use to check the correct operation of the system, by accessing it we can observe the amount of watts (W) used by the IRIS PENTA system in real time.

NOTE: WITHOUT INTERNET ACCESS, YOU WILL HAVE TO WAIT 5 MINUTES UNTIL THE EQUIPMENT SEND THE DATA, IN CASE OF HAVING INTERNET THE SYSTEM WILL SEND THE DATA IMMEDIATELY.

For correct operation, the following values must be observed:

180-210W (PENTA180), 330-355W (PENTA330), 660-685W (PENTA660)

\*En caso de observar MENOS (W) contactar con el servicio técnico.



# UV LIGHT

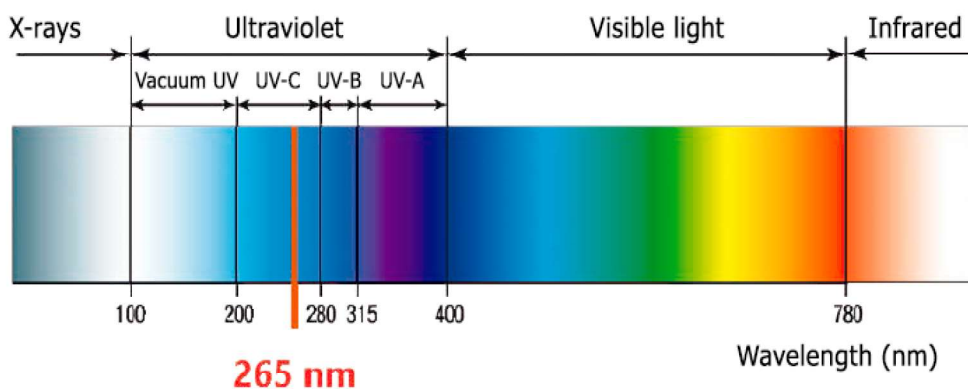
## WHAT IS ULTRAVIOLET (UV) LIGHT?

Ultraviolet (UV) light is a form of light that is invisible to the human eye. It occupies the portion of the electromagnetic spectrum between X-rays and visible light. The sun emits ultraviolet light; however, the earth's ozone layer absorbs much of it.

## TYPES OF UV

According to their wavelength, four types of ultraviolet radiation are differentiated: UV-A, UV-B, UV-C and vacuum ultraviolet or UV-V.

UV-A	UV-B	UV-C	UV-V
It is the band from 320 nm to 380 nm.	Band from 280 to 320 nm.	It is the radiation located between 200 nm and 280 nm. It interacts with DNA and RNA, causing normally irreparable damage.	Spectrum comprised between 100 and 200 nm.



Ultraviolet light is invisible to the human eye but can be used for disinfection against microorganisms, including chlorine-resistant protozoa.

UV light provides rapid and efficient inactivation of microorganisms through a physical process. When bacteria, viruses, and protozoa are exposed to the germicidal wavelengths of UV light, they become unable to reproduce and infect.

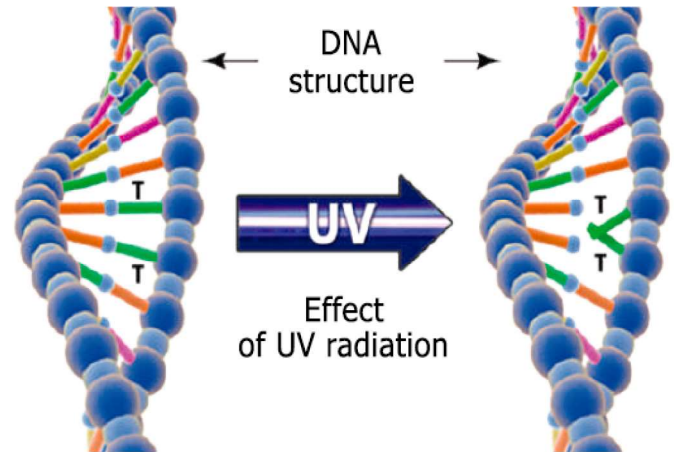
## HOW UV DISINFECTION WORKS

When bacteria, viruses, and protozoa are exposed to the germicidal wavelengths of UV light, they become unable to reproduce and infect. UV light has been shown to be effective against pathogenic microorganisms, such as those that cause cholera, polio, typhoid fever, hepatitis, and other bacterial, viral, and parasitic diseases.

UV-C penetrates the cell wall of microorganisms, being absorbed by the genetic material (DNA or RNA), causing damage and delaying the ability of microorganisms to survive, which leads to their inactivation (inability to replicate) or death of the cell (Bolton, 2008; USEPA 2002; USEPA 2004).

The mechanism involves the absorption of a UV photon by pyrimidine bases (mainly thymine) where two pyrimidine bases are next to each other on the DNA strand. "Photochemistry" involves the formation of a "dimer" that joins the two bases. This causes a break in the DNA chain, so that when the cell undergoes mitosis (cell division), DNA replication is inhibited. In the case of RNA chain viruses, the base affected by the ultraviolet photon would be uracil, forming said dimer.

UV rays do not have ionizing activity, but they cause these chemical changes in absorbing molecules, so that altered molecules appear in DNA and RNA and these are generically called photoproducts.



*DNA and RNA absorb radiation at 260-265 nm, due to the double bond between positions 4 and 5 of the puric and pyrimidine bases.*

UV light prevents microorganisms from reproducing by damaging their nucleic acid. UV disinfection is not a chemical process and does not produce any waste.

## INACTIVATION DOSE

The amount of inactivation is directly proportional to the dose of UV-C received, and this in turn is the result of the intensity and duration of exposure:

$$\text{Dose} = \text{intensity} \times \text{time}$$

The further away the light source is, the less UV-C will reach the target, so there is only a quarter of the UV-C left when the distance is doubled. This is due, like any wave phenomenon, to the application of the Inverse Law of the Square whose intensity is inversely proportional to the square of the distance from the center where the source of the wave originates, in the present case. light. This means that objects close to the light source will have a higher exposure, therefore shorter disinfection cycles compared to objects further away.



*UV light prevents microorganisms from reproducing by damaging their nucleic acid.*

## 2. LOGARITHMIC REDUCTION

After microorganisms have been subjected to UVR-C, they must undergo a reduction in their number, one log (logarithm) is equivalent to a reduction of 90%:

Logarithmic reduction	Reduction percentage	Microorganisms removed
1	90%	900.000
2	99%	990.000
3	99.9%	999.000
4	99.99%	999.990
5	99.999%	999.999

The quantity that is therefore used to indicate the radiation to which some microorganisms have been subjected is the Ultraviolet Radiation Dose. The term dose is used to describe the total capacity of energy that we need a microorganism to absorb to eliminate and disable its reproduction.

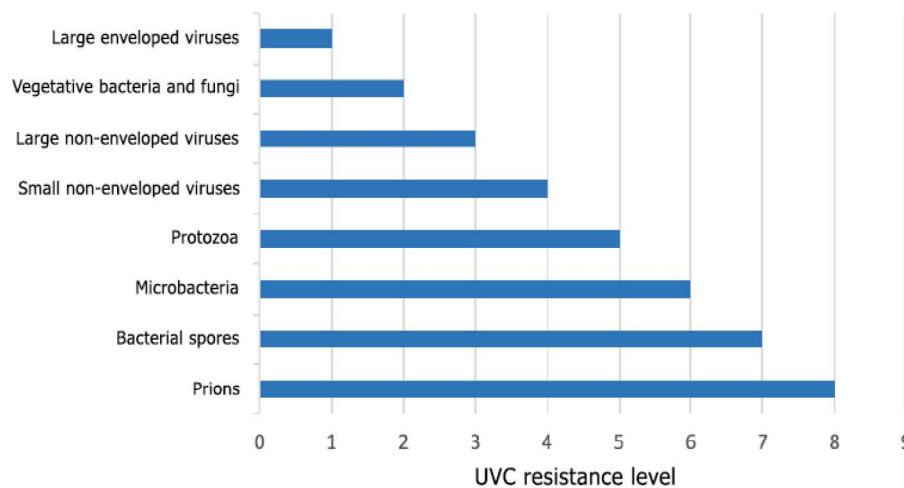
## REQUIRED TIMES

The  $\text{mJ} / \text{cm}^2$  value is a quantity that is useful to technicians, engineers, etc. to calculate number of luminaires, distances, etc. and in this way to be able to size a UV-C installation or to design devices capable of disinfecting a certain space.

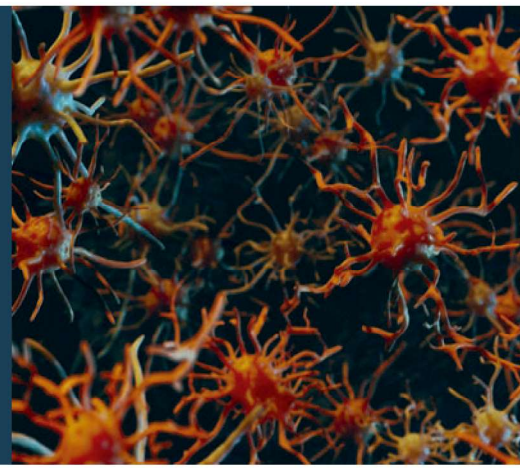
But how effective can one of these installations or device be? Obviously, everything depends on the amount of UV-C, since the other variant is the time in seconds, increasing one we reduce the other, and vice versa, to achieve the required dose, but an average hospital room with an adequate installation can to be decontaminated in 15 minutes with a very important reduction in the pathogenic load, these times are sufficient even for the “shaded” areas. (Room decontamination with UV

radiation. Rutala W, Gergen M, Weber D. Infect Control Hosp Epidemiol 2010; 31 (10): 1025-9).

### UVC resistance



AT BioVIOLET WE HAVE ALL THE KNOWLEDGE AND TECHNICAL MEANS DESTINED TO PERFORM THE CALCULATIONS TO THE CORRECT INACTIVATION TIMES.





# COVID-19

## THE VIRUS

The current global coronavirus pandemic is of great concern due to its high transmission speed and its rapid spread throughout the world. The mortality rate is between 2% and 4% with no antiretroviral drugs or vaccines, at the moment, available to health care services. Structurally, this virus is not unique and is similar to other coronaviruses such as Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), and can be addressed with existing chemical disinfectant methods and new technologies such as UV -C.

UV-C can be an effective measure to disinfect the air and surfaces that may be contaminated by the SARS-CoV-2 virus, inducing, as we have explained in this document, photodimers in the RNA of its genome. Ultraviolet light has been shown to be capable of destroying viruses, bacteria and fungi in hundreds of laboratory studies "Kowalsky W. (2009), Ultraviolet Germicidal Irradiation Handbook". Although the SARS-CoV-2 virus has not yet been specifically proven to be susceptible to UV-C inactivation, there are many other studies on coronaviruses, including the SARS-CoV-1 coronavirus that attest to this.

From **Bio-Violet** we hope to present, shortly, another study on the efficacy of UV-C as an instrument for the inactivation of micro-organisms, which cause most of the infectious diseases in our society, in this study, of course, we will include SARS-CoV-2.

Microbe	D <sub>90</sub> Dose J/m <sup>2</sup>	UV k m <sup>2</sup> /J	Base Pairs kb	Source
Coronavirus	7	0.35120	30741	Walker 2007 <sup>a</sup>
Berne virus (Coronaviridae)	7	0.32100	28480	Weiss 1986
Murine Coronavirus (MHV)	15	0.15351	31335	Hirano 1978
Canine Coronavirus (CCV)	29	0.08079	29278	Saknimit 1988 <sup>b</sup>
Murine Coronavirus (MHV)	29	0.08079	31335	Saknimit 1988 <sup>b</sup>
SARS Coronavirus CoV-P9	40	0.05750	29829	Duan 2003 <sup>c</sup>
Murine Coronavirus (MHV)	103	0.02240	31335	Liu 2003
SARS Coronavirus (Hanoi)	134	0.01720	29751	Kariwa 2004 <sup>d</sup>
SARS Coronavirus (Urbani)	241	0.00955	29751	Darnell 2004
<b>Average</b>	<b>67</b>	<b>0.03433</b>		

<sup>a</sup> (Jingwen 2020)

<sup>b</sup> (estimated)

<sup>c</sup> (mean estimate)

<sup>d</sup> (at 3 logs)



## SAFETY

All disinfection methods require security measures at the time of manufacture, transport, storage, implementation and subsequent fitting out of the treated spaces. UV-C is, in this chain, one of the least problematic systems. Only at the time of its operation should be taken due precautions, before and after it is totally harmless.

## SAFETY IN FACILITIES

The facilities or equipment that are equipped with Ultraviolet C Radiation can cause damage to the skin and eyes of people or animals.

It is important to provide security systems to these facilities to prevent their operation in the presence of living beings.

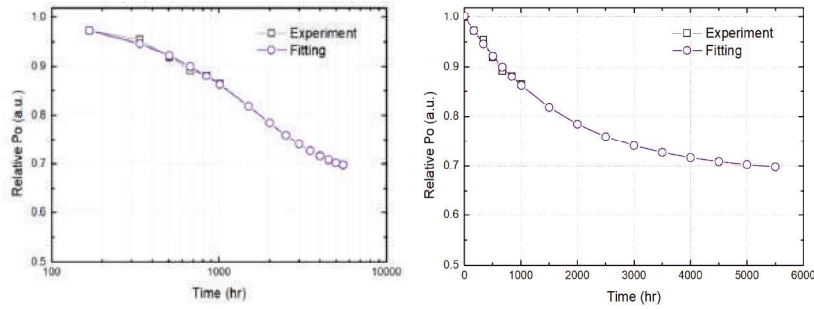
At GEALED we have taken this aspect into account throughout the IRIS UV range. Our system consists of several security barriers:

- 1 Ultraviolet C radiation is not visible to people that is why we have provided a certain amount of visible light to our luminaires to warn of their operation. Likewise, some equipment is equipped with optical and / or acoustic alarms.
- 2 If by accident some person enters the room or space that is being treated with UV-C, the installation will automatically disconnect.
- 3 The equipment and facilities will be remotely operated, once the person in charge of the disinfecting operation deems it appropriate, he will disconnect, also remotely, said facility.
- 4 Notice on all access doors to the treatment room of the operation of the UV-C system.

After evaluating all possible scenarios, we have developed these measures and with the appropriate protocol, the risk of accident or mishap is reduced to a minimum. In any case and taking into account special functional, architectural or use circumstances by certain people in which these measures cannot be effective, please contact **Bio-Violet** to be able to implement other measures such as acoustic alarms, door blockers or disconnectors, etc.

Likewise, in case of having to operate before the light in operation, it must be done with the corresponding PPE and the authorized personnel have the necessary training and / or training.

The following table shows the increase in disinfection time as the UVC diodes lose performance due to the hours of use.





As the time of use of the system passes, the total kWh consumption given in the internal meter of the system must be reviewed and compared with the following table to know the time of hours that the UVC diodes have been working, according to this it will have to be edited in "Settings auto-off" the time and add the appropriate percentage for the IRIS PENTA equipment to work correctly

Nº HOURS	CONSUMPTION KW	TIME
1000	700kW	ORIGINAL
2000	1400kW	20%
3000	2100kW	25%
4000	2800kW	30%
5000	3500kW	35%
6000	4200kW	37%
7000	4900kW	40%
8000	5600kW	43%
9000	6300kW	46%
10000	7000kW	50%

Example: -disinfection time for room = 3.5 minutes

- consumption history to date = 2100kWh (+ 25%) (3000 hours of use)
- we add the percentage to the original time = 4.38 minutes
- finally we add the team start time (21 sec) = 4.59 minutes



 **CAUTION**

**UV RADIATION HAZARD**  
Use only with adequate protection.  
Protect your eyes and skin from UV light exposure.



**PRECAUTIONS**

- People and animals must leave during disinfection; otherwise, the eyes and skin will be damaged for a long time.
- Regular use can effectively reduce the growth of viruses and bacteria.
- Make sure the power is off during installation.
- Lamp installation must be done by a qualified electrician or technician in accordance with local regulations.

**IMPORTANT NOTE**

The International Ultraviolet Association cautions that devices sold on some online sites such as Amazon and Alibaba are not regulated for UV output, and these devices sold as UV-C emitters cannot be guaranteed to perform as advertised. UV-C sources and devices should be purchased from reputable and reliable suppliers, requiring where necessary the appropriate documents attesting that they are indeed sources of UV-C. Consult a reputable dealer or manufacturer.



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Membership Number 54731871



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