

SpeedyCare™ UV

SARS-COV DISINFECTING ROBOT

scientifically proven

SpeedyCare™ UV is an innovative robot emitting UV-C light in the germicidal range of 254 nm, overcoming the rising threat of pathogens like viruses, bacteria & fungi. This technology ensures proper surface and airborne disinfection, destroying the ability of microorganisms to reproduce by causing photochemical changes in nucleic acids. Designed in 2020, SpeedyCare™ UV robot has been engineered to be easy and safe to operate in hospitals, hotels, shops, gyms, care homes and any habitable space.

AIR & SURFACE UV-C DISINFECTION

UV-C light is a non-invasive disinfection method, delivering instantly a lethal dose of radiation to pathogens both in surface and air, deactivating their capabilities to reproduce.

50 M2 IN 4 MIN 99% DISINFECTION

SpeedyCare™ UV robot is a disinfection device which delivers UV-C light omnidirectionally to all the objects in the room. 99% of pathogens are eliminated from surface and air within minutes.

CERTIFICATION SAFETY ACCORDING 15858:2016

SpeedyCare™ UV disinfection performance has been certified by an accredited laboratory that guarantees the UV-C radiation performance and hence the disinfection capabilities. The device is also designed following the standards according ISO 15858:2016.

DISINFECT IN MINUTES FROM A SINGLE PLACEMENT

SpeedyCare™ UV's robot hi-output UV lamps allows a single placement operation for a complete room disinfection. Large areas to be disinfected in several cleaning cycles.

LIDAR EXACT DOSAGE/TIME CALCULATION

A Light Detection and Ranging system to conduct measurement of the dimensions of the room, providing information to the microprocessor to calculate the optimal antimicrobial UV-C dosage and associated exposure timing

MOTION SENSORS AUTO-STOP FUNCTION

Four built in motion sensors are located at the top of the robot, for a 360° auto-stop safety function, avoiding unprogrammed light exposures.

SpeedyCare UV

PROFESSIONAL UV-C DISINFECTING ROBOT

Disinfects 50 m2 in 4 min at 99% Deactivates SARS-COV family of viruses Automatic Dose Calculation Intrinsically safe, auto-stop function Tablet or phone operated



UV-C DISINFECTING ROBOT

SpeedyCare UV

Disinfection Cycle

SpeedyCare™ UV robot disinfects rooms within minutes. Place the robot in the middle of the room and let it do the work, deactivating the pathogens in both air and surfaces. UV-C light disinfection performance is scientifically proven and ensures proper surface and airborne disinfection, destroying the ability of microorganisms to reproduce by causing photochemical changes in nucleic acids

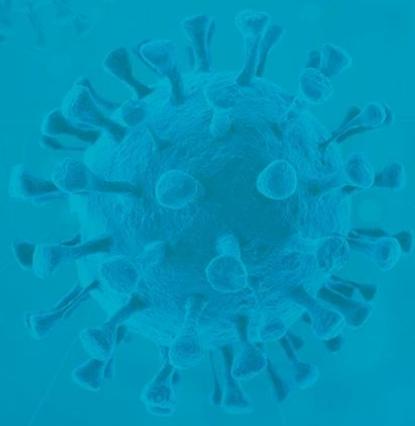


UV IS A SCIENTIFICALLY PROVEN TECHNOLOGY FOR DISINFECTION

Features & Characteristics

SpeedyCare™ UV is an innovative robot emitting UV-C light in the germicidal range of 254 nm, overcoming the rising threat of pathogens like viruses, bacteria & fungi. This technology ensures proper surface and airborne disinfection, destroying the ability of microorganisms to reproduce by causing photochemical changes in nucleic acids.

SpeedyCare™ UV is an advanced robot designed in 2020, engineered to be easy and safe to operate several applications as hospitals, hotels, shops, gyms, care homes and any habitable space.



EFFICIENT UV-C DISINFECTING ROBOT

Airborne Disinfection

The sensitivity to UV-C of microbes suspended in the air is much greater than in surfaces. (Webb 1965). As several studies confirm, pathogens are more vulnerable to UV inactivation in air, it is therefore conservative to assume surface rate constants as sufficient to deactivate virus, bacteria and fungi suspended in air.

A 99% PATHOGENS INACTIVATION

Fast Disinfection

SpeedyCare™ UV robot features a set of UV-C lamps delivering the right dose of radiation to effectively deactivate at 99% pathogens in both air and surface. User selects the a LOG factor, meaning the % percentage of disinfection. Typical used values are 90%, 99% and 99.9%.

For a 99% pathogens inactivation a standard room of 5x6 m can be disinfected in 3 min. The larger is the room and the higher is the LOG factor, the longer will be the disinfection time.

Room Dimensions	90% Disinfection	99% Disinfection
10 m ²	0.5 min	1 min
20 m ²	0.75 min	1.5 min
30 m ²	1 min	2 min
40 m ²	1.35 min	2.7 min
50 m ²	2 min	4 min
60 m ²	2.5 min	5 min
70 m ²	2.75 min	5.5 min
80 m ²	3 min	6 min



EFFICIENT UV-C DISINFECTING ROBOT

Hi-Output UV-C lamps

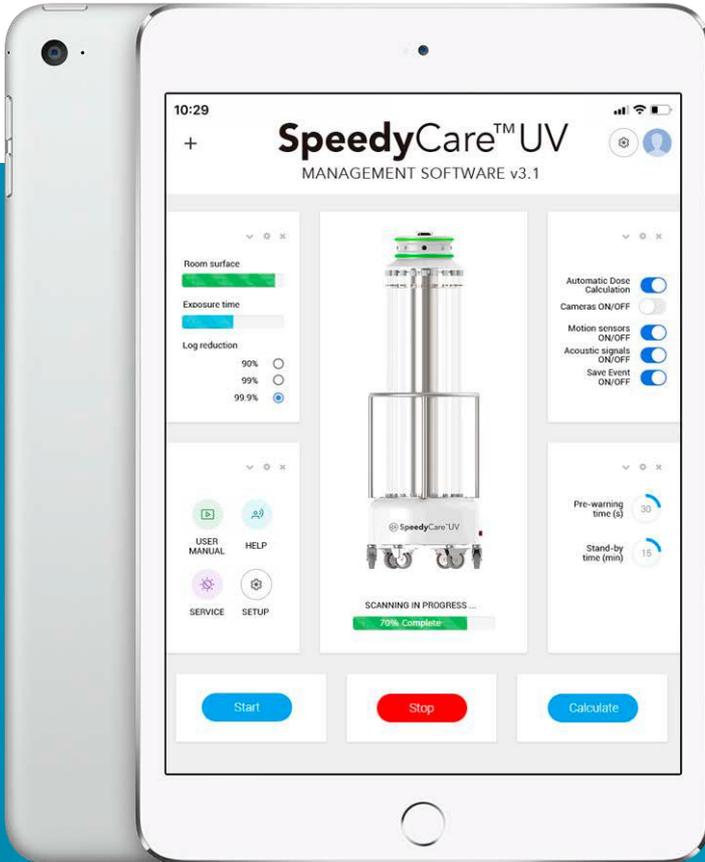
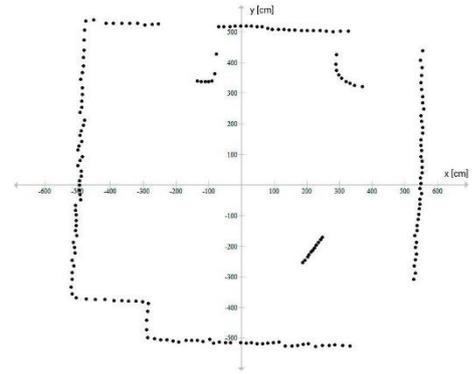
A set of 20 hi-power lamps in cylindrical disposition emit UV-C light to ensure efficient and fast virus deactivation. More powerful UV-C devices improve and reduce the exposure times to disinfect, representing a more efficient and cost effective equipment.

PHILIPS

LIGHT DETECTION AND RANGING SYSTEM

LIDAR Class 1 Safety Standard

A LIDAR (Light Detection and Ranging system) conducts measurement of the dimensions of the room, providing information to the microprocessor to calculate optimal UV-C dosage and exposure timing. This LIDAR adopts a modulated pulse low power infrared laser light, emitting light in a very short time frame which can ensure its safety to human. It is Class 1 Safety Standard.



EFFICIENT UV-C DISINFECTING ROBOT

Controlled by phone or tablet



SpeedyCare™ UV generates its own WiFi network so can wirelessly be controlled by a conventional tablet or smartphone. Our own app - SpeedyCare™ UV Management Software provides access to all the necessary functions such as - delay time definition in accordance to user's preferences, automatic dose calculation, build in camera modules control panel, user manual and more.

The SpeedyCare™ UV disinfection robot, after connecting to any WAN, offers an integrated maintenance and remote diagnostic capability.



CHEMICAL FREE

A NON-TOXIC ANTIMICROBIAL AGENT

UV-C is a non-toxic light

UV-C Light is a non-toxic antimicrobial agent that inactivates pathogens both in air and surfaces. UV-C Light produces photochemical reactions that kills viruses, bacteria and fungi, avoiding the need of using aerosols or harsh chemicals. This makes SpeedyCare UV a safe disinfection device for the operating staff, without the need of ventilating or waiting before bringing the space back to service.

UV-C Light is a non-toxic antimicrobial agent that inactivates pathogens. UV-C Light produces photochemical reactions that kills viruses, bacteria and fungi, avoiding the need of using aerosols or harsh chemicals.

SpeedyCare™ UV

PROFESSIONAL UV-C DISINFECTING ROBOT

SpeedyCare™ UV is an innovative robot emitting UV-C light in the germicidal range of 254 nm, overcoming the rising threat of pathogens like viruses, bacteria & fungi

360° LIDAR

A Light Detection and Ranging system to conduct measurement of the dimensions of the room, providing information to the microprocessor to calculate optimal UV-C dose and exposure timing.

LED Lights & Acoustics

A multicolor LED omnidirectional light provides color-codes for extra safety and information about the operation of the SpeedyCare™ UV robot.

Acoustic signal brings extra information to the robot user.

Cylindrical Base

A cylindrical base with 6 wheels ensures robot stability and easy access to rooms through standard doorways.



CCTV Cameras

Four cameras to provide a 360° field of view of the room. Extra safety features and event image recording for supervisor traceability.

Motion sensors. Auto-Stop

Four embedded motion sensors for a 360° auto-stop safety function, avoiding unprogrammed light exposures to operators.

Hi-power UV-C lamps

A set of 20 hi-power lamps in cylindrical disposition emit UV-C light to ensure efficient and fast virus deactivation.

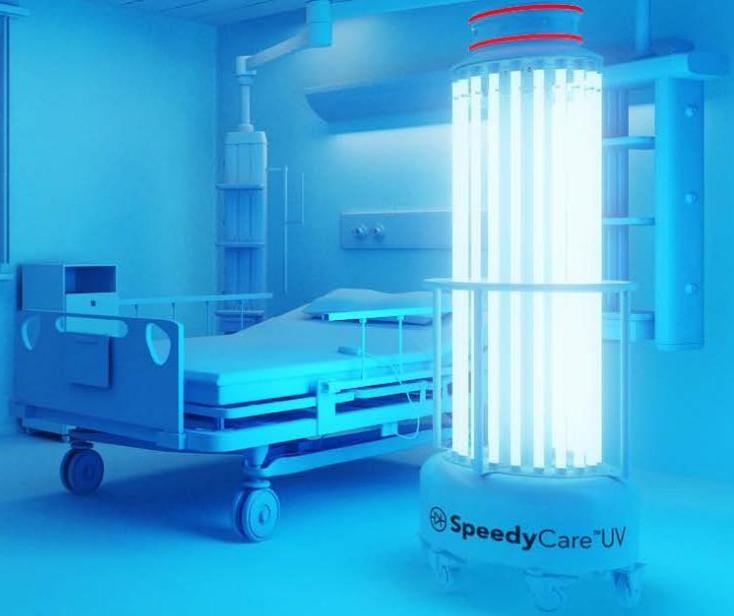
Applications

Where can SpeedyCare™ UV operate?

EFFICIENT UV-C DISINFECTING ROBOT

HOSPITALS

UV-C robots have been widely used for years in hospitals to minimize HAIs (Healthcare Associated Infections). SpeedyCare™ UV robot helps to prevent infections by reducing the pathogens providing the safest environment possible for both - staff and patients. This robot is likely to be used to disinfect rooms, operating theaters and corridors. UV-C disinfecting technology would save a significant amount of time providing automated disinfection with a minimal human intervention.



EFFICIENT UV-C DISINFECTING ROBOT

HOTEL & RESTAURANTS

SpeedyCare™ UV robot supports hotel industry providing an effective and rapid method of disinfecting guest rooms. The robot versatility, portability and cleaning speed perfectly integrates with hotel housekeeping cleaning procedures. Every room can be disinfected within minutes by the cleaning staff, without the need of intervention by specialist service operators or external third parties. We provide custom solutions adapting to every project.



EFFICIENT UV-C DISINFECTING ROBOT GYMS

Extra physical activity might result in an increased probability of superficial infection of objects in a workout room environment. Fitness machines, dressing rooms, bathrooms and other common spaces would certainly require extra disinfection with efficient technology. Disinfection should preferably not be based on aerosols but on contact-less technology. UV-C radiation provides a fast method of inactivating pathogens within minutes. SpeedyCare UV robot can be operated by the usual cleaning staff immediately after completing a full training session.

EFFICIENT UV-C DISINFECTING ROBOT PUBLIC TRANSPORTATION

Hi-density spaces represent a typical situation where viruses can easily and more intensively reproduce. It comes along with an evident increase of the probability of superficial infection of objects and consequently represents a potential risk for the users. This would certainly require extra disinfection with an efficient technology. UV-C radiation provides a fast method of inactivating pathogens within minutes, being compatible with the existing cleaning procedures and services stops.

EFFICIENT UV-C DISINFECTING ROBOT SCHOOLS & EDUCATION

As part of the daily cleaning process, schools might request to improve cleaning procedures by implementing disinfection in classrooms, bathrooms and corridors.

Within minutes, SpeedyCare™ UV will take the responsibility of deactivating viruses (and any pathogen) in surfaces and air. Walls, boards, doors, tables would be omnidirectionally exposed to a powerful UV-C radiation minimizing the presence of viruses. SpeedyCare UV robot can be operated by the usual cleaning staff immediately after completing a full training session



EFFICIENT UV-C DISINFECTING ROBOT SHOPS & RETAIL

COVID19 outbreak at the beginning of 2020 has created a new mindset when it comes to shop disinfection.

Customers and workers perception of this thread moved in the same direction as well, wondering the level of safety involved in the usual shopping activities.

SpeedyCare™ UV robot can disinfect surfaces by deactivating pathogen ability to perform vital cellular functions.

SpeedyCare™ UV robot can systematically be used to disinfect displays, changing rooms, counters and shelves.



SPEEDYCARE™ UV DISINFECTING PERFORMANCE

Disinfecting Speeds

SpeedyCare™ UV robot disinfection capabilities are proportional to the exposure time. The UV-C lamps work at maximum output; it is lighting time what defines the degree of pathogens deactivation. But disinfection rate is not an absolute variable. Microbiologists use the log reduction factor to express the level of microorganisms' disinfection, and this reduction factor conditions the exposure time for a given disinfecting UV-C device.

Room Dimensions	90% Disinfection	99% Disinfection
10 m ²	0.5 min	1 min
20 m ²	0.75 min	1.5 min
30 m ²	1 min	2 min
40 m ²	1.35 min	2.7 min
50 m ²	2 min	4 min
60 m ²	2.5 min	5 min
70 m ²	2.75 min	5.5 min
80 m ²	3 min	6 min



EFFICIENT UV-C DISINFECTING ROBOT READY TO FLY!

When shipping is your only option, use SpeedyCare™ UV flying case to protect your disinfection equipment from rough handling by freight employees around the world. While trusting airlines and freight companies to get your gear to a location, rely on SpeedyCare™ UV transport cases to get it there in working order. SpeedyCare™ UV flight case is made of aluminium, zinc coated steel and phenolic faced birch plywood.



TECHNICAL SPECIFICATIONS

SpeedyCare™ UV Technical Specifications

UV-C Light Source
UV light source
UV-C peak wavelength
Lamps Life (60.000 cycles @ 15 min)

Hi-Power Mercury Lamps
254 nm (nanometers)
9-10.000 h

Disinfection speeds*	@90%	@99%
Small room (i.e. 30 m2)	1 min	2 min
Middle size room (i.e. 50 m2)	2 min	4 min
Large room (i.e. 80 m2)	3 min	6 min

Physical	
Dimensions (LxWxH)	182 x 60 x 60 cm
Total Weight	59 kg
Material	Chasis based on stainless steel & aluminum
Support	Structure with 6 wheels
Transport flight & protection case	80x80x200 mm

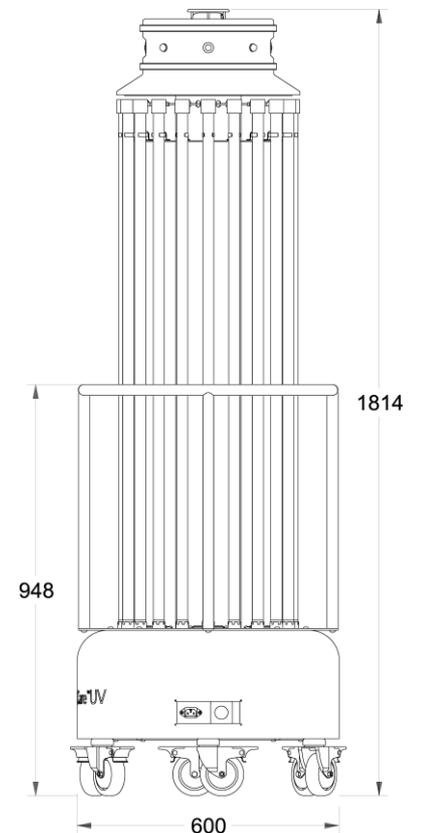
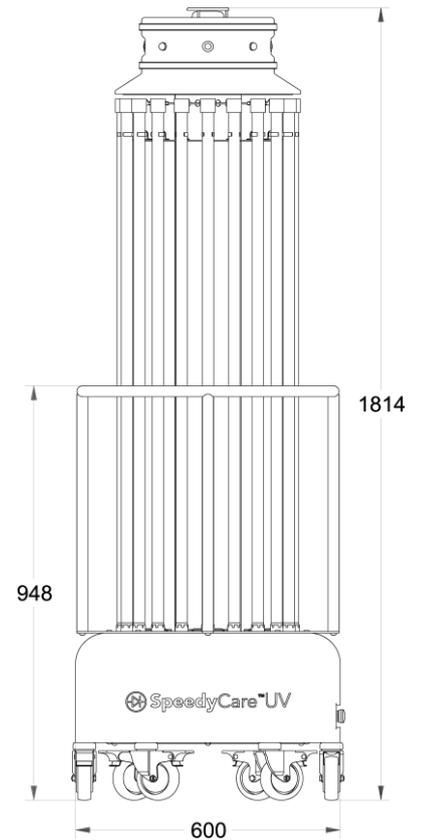
Computer	
Type	Industrial computer
Memory	4GB RAM
CPU	Quad-core ARM-8 1,5 GHz

Connectivity	
WI-FI connectivity	Dual band 2,4 GHz & 5 GHz
Mode	AP & STA

Safety & Sensors	
Auto-stop function	Yes, by motion sensors & cameras
Visual alarms	Yes, RGB LEDs strip with blinking indicator
Acoustic alarms	Yes, Beeper/ Voice synthesizer in option

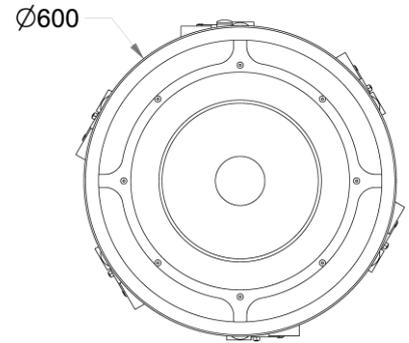
Motion Sensors	
Number of sensors	Yes, 4 @ 90°
Type	PIR
Eye Safe	Yes (infrared)
Measurement range	10 m

CCTV Cameras	
Number of cameras	Yes, 4 @ 90°
Resolution	FHD 1920x1080 (2Mpx)
Frame rate	15 fps
Lens Field of View	109.4°
Algorithms	AGC, AWB, BLC, HLC, 2D DNR, DWDR
Certificates	CE: (EN55032, EN55024, EN50130-4) FCC: (CFR 47 FCC Part 15 sub part B, ANSI C63.4-2014)



TECHNICAL SPECIFICATIONS

Automatic Exposure Time Calculation Technology	Light Detection & Ranging, LIDAR
Measurement range	Up to 10 m
Eye Safe	Yes (infrared 785nm)
Scan rate	Up to 15 Hz
Samples per scan	Typical 400
Distance resolution	Up to 0,5mm
Laser safety class	FDA Class I
Power requirements	
Voltage	230 V/50 Hz – 110 V/60 Hz
Mains requirement	E-type or Std. Schuko wall socket
Connection	5 m power cord with V-lock system
Power Supply	
Voltage	220 V
Power	1700 W
Mains requirement	Std. Schuko wall socket

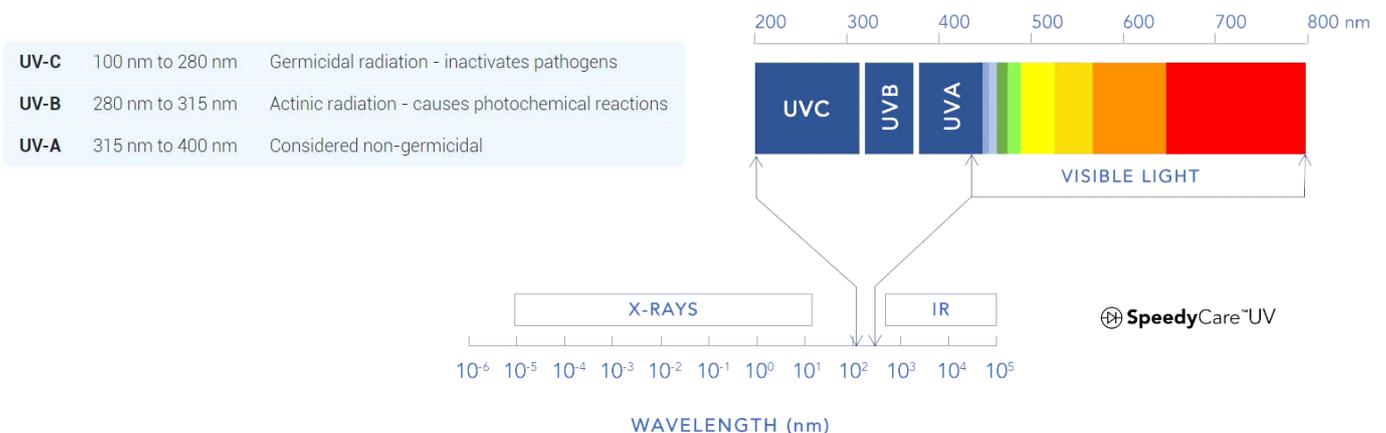


UV LIGHT IS AN ELECTROMAGNETIC RADIATION

What is UV-C?

Ultraviolet (UV) light is an electromagnetic radiation. Its wavelength spectrum falls in the region between visible light and X-Rays. It is invisible and ranges from 100 nm to 400 nm has been traditionally subdivided in 3 categories or regions.

Natural UV radiation is of course coming from the Sun. Around 10% of all that energy falls within the UV range, and only 4% is capable of crossing our atmosphere and reaching the Earth's surface where we live. The rest is absorbed by the oxygen (O₂) and ozone (O₃) in stratosphere, blocking most of the UV-B and all the UV-C component of the UV light.





UV-C DISINFECTING ROBOT

Why UV-C Deactivates Viruses?

UV-C is an electromagnetic radiation that destroys the ability of microorganisms to reproduce by causing photochemical changes in nucleic acids. Wavelengths in the UV-C range are especially damaging to cells because they are absorbed by nucleic acids, disabling their ability to perform vital cellular functions. The germicidal effectiveness of UV-C peaks at about 250–265 nm, this corresponds to the UV absorption by bacterial DNA. The germicidal effectiveness of UV-C radiation can vary between pathogens, and the broader range wavelengths that include UV-B also make a small contribution to inactivation (Webb and Tuveson 1982).

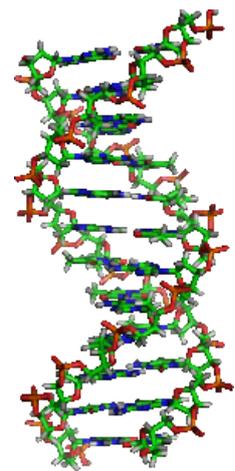
UV-C radiation has been proven as an effective disinfection method for 80 years now.

UV IS A WELL-KNOWN TECHNOLOGY IN THIS FIELD

Has UV been used before for Inactivation of Viruses?

Yes, in fact UV is a well-known technology in this field. It is reported that Hart in 1937 used an array of UV lamps to sterilize supply air in a surgical operating room. Hart employed direct, high-intensity UV for the disinfection of hospital operating room air at the Duke University Hospital, after traditional methods had failed. Riley, in 1972, installed UV lamps in a school ventilation system dramatically reducing the incidence of measles, and subsequent applications enjoyed similar successes. Since then, UV-C has been successfully implemented in a number of appliances and devices to support inactivating microorganisms, such as bacteria, viruses and fungi.

The first UVC continuous disinfection robots were built ca. 15 years ago, mainly to decrease the number of HealthCare-Associated Infections (HAIs).



Disinfecting Speeds for SpeedyCare UV Robot

SpeedyCare™ UV robot disinfection capabilities are proportional to the exposure time. The UV-C lamps work at maximum output and is lighting time what defines the degree of pathogens deactivation.

But disinfection rate is not an absolute variable. Microbiologists use the log reduction factor to express the level of microorganisms' disinfection, and this reduction factor conditions the exposure time of a given disinfecting UV-C device.

SPEEDYCARE™ UV DISINFECTING PERFORMANCE

The Log Reduction Concept explained

Log Reduction is a mathematical term that is used to express the percentage or proportion of microorganisms deactivated in a disinfection process. It is calculated by the 10-base logarithm of the relation between the pathogen's units before and after the UV light exposure.

This table shows the reduction after disinfection for every given Log Reduction factor.

Log Reduction	Reduction Factor	Percent Reduced
1	10	90%
2	100	99%
3	1,000	99.9%
4	10,000	99.99%

A FUNCTION OF MAINLY 4 VARIABLES

How light exposure time is calculated

Exposure time to disinfect a room is a function of mainly 4 variables, these are:

1. Pathogen UV-C susceptibility (microbe-fluence)
2. Log Reduction Factor (LRF)
3. UV-C device radiation power (DRP)
4. Distance from UV-C device to the exposed microbial Exposure

Time = Φ (microbe-fluence, LRF, DPR, Distance)

Disinfection times for SARS-CoV-2

It is expected that fluence for the SARS-CoV-2 virus to be similar to any other enveloped coronavirus.

According several susceptibility studies, it is proven the right dose to disinfect 90% of coronaviruses ranges from 6 mJ/cm² (mili-Joule per square cm) to 24 mJ/cm². To be on the safe side, we assume 25 mJ/cm² as expected fluence to kill 90% (Log Factor 1) of SARS- CoV-2 in surfaces.

To achieve 99% (Log Factor 2) average increase of fluence for most of the known coronaviruses is 100%, so it is considered 50 mJ/cm² as the minimum dosage to deactivate 99% of SARS-CoV-2.

Log Factor 3, this is, 99,9% reduction would recommend exposing the virus to 75 mJ/cm².

Room Dimensions	90% Disinfection	99% Disinfection
10 m ²	0.5 min	1 min
20 m ²	0.75 min	1.5 min
30 m ²	1 min	2 min
40 m ²	1.35 min	2.7 min
50 m ²	2 min	4 min
60 m ²	2.5 min	5 min
70 m ²	2.75 min	5.5 min
80 m ²	3 min	6 min

About COVID19 & SARS-CoV-2

COVID-19 is the respiratory disease caused by the SARS-CoV-2 virus that has generated outbreaks worldwide. Structurally, this virus is not unique and is similar to other coronaviruses such as Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). The SARS-CoV-2 has been identified as a new variant in the betacoronavirus family (Fisher 2020).

Every virus requires a certain dose of UV-C energy to disable their ability to perform vital cellular functions. The SARS-CoV-2 virus is now under ongoing ultraviolet susceptibility studies, but there is a common understanding that due to the fact that is a typical enveloped RNA virus, the dosage is expected to be similar to SARS-CoV-2, but many other tests on related coronaviruses have been conducted over the years. Many tests on related virus have concluded that coronaviruses are highly susceptible to ultraviolet inactivation. This report reviews these studies and provides an estimate of the ultraviolet susceptibility.

Virus type	Deactivation Dose (90%)	Source
Coronavirus	0,70 (mJ/cm2)	Walker 2007
Berne virus (coronaviridae)	0,70 (mJ/cm2)	Weiss 1986
Murine coronavirus (MHV)	1,50 (mJ/cm2)	Hirano 1978
Canine Coronavirus (CCV)	2,90 (mJ/cm2)	Saknimit 1988
Murine coronavirus (MHV)	2,90 (mJ/cm2)	Saknimit 1988
SARS Coronavirus CoV-P9	4,00 (mJ/cm2)	Duan 2003
Murine coronavirus (MHV)	10,30 (mJ/cm2)	Liu 2003
SARS Coronavirus (Hanoi)	13,40 (mJ/cm2)	Kariwa 2004
SARS Coronavirus (Urbani)	24,10 (mJ/cm2)	Darnell 2004

As soon as SARS-CoV-2 virus deactivation dose is measured, SpeedyCare™ UV robot would incorporate that value into its database to recalculate the right timing. In the meantime, SpeedyCare™ UV robot would consider a dose of 50 mJ/cm2 for a deactivation rate of 99%.

INTERNATIONAL STANDARD SPECIFIES

Safety Standards: ISO 15858:2016

This International Standard specifies minimum human safety requirements for the use of UVC lamp devices. It is applicable to in-duct UVC systems, upper-air in room UVC systems, portable in-room disinfection UVC devices, and any other UVC devices which may cause UVC exposure to humans. It is not applicable to UVC products used for water disinfection.

Maximum daily dose per person is set in 6 mJ/cm2. SpeedyCare UV robot includes a set of safety features, including motion sensors which ensure an immediate switch-off to prevent the operator from UV-C exposure. However, in case of direct exposure to UV-C and according this standard, any operator could be safely exposed every day to 1 min at a distance of 4 m from the device.

Despite of the evident low risk of exposure, we recommend the use protective clothing and goggles, typically used for occupational safety and health purposes.