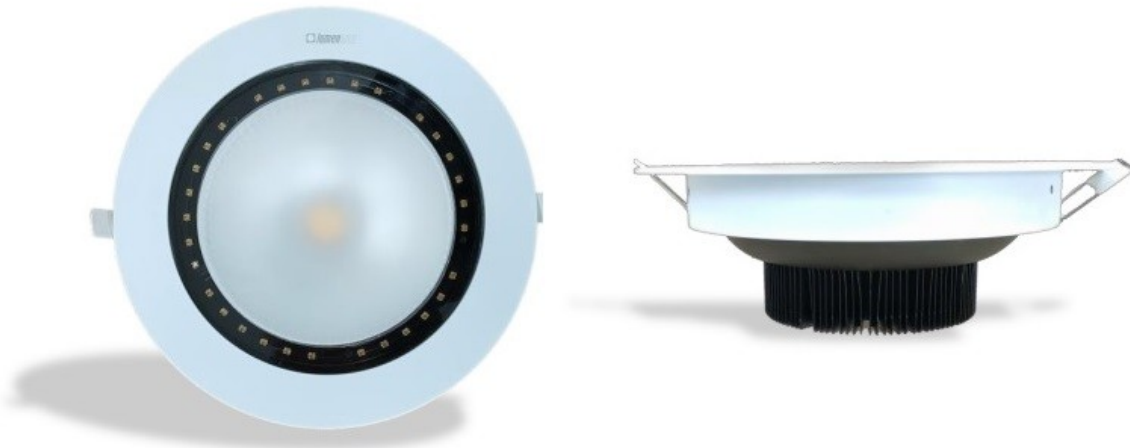




ANNIHILATOR

UVC LED HYBRID LIGHTING

by



WHAT IS ANNIHILATOR LUMENMAX?

ANNIHILATOR LUMENMAX is a Polish production system of professional hybrid LED downlight disinfection ceiling luminaires, available in surface-mounted, suspended versions and in a variant recessed into a drop ceiling. Our luminaires will effectively illuminate and sanitize any room from a height of up to (yes, it's no mistake!) TWENTY-FIVE METERS!

Each ANNIHILATOR LUMENMAX luminaire is equipped with two LED modules. The COB LED module is responsible and intended for energy-saving lighting of rooms. The LED UVC module, on the other hand, is responsible for the professional disinfection of surfaces and air. Both modules operate alternately, so we can choose the lighting mode or the decontamination mode.

These luminaires can be combined into groups and controlled remotely via mobile devices thanks to the ANNIHILATOR LUMENMAX application, which is available free of charge in the Google PLAY Store.

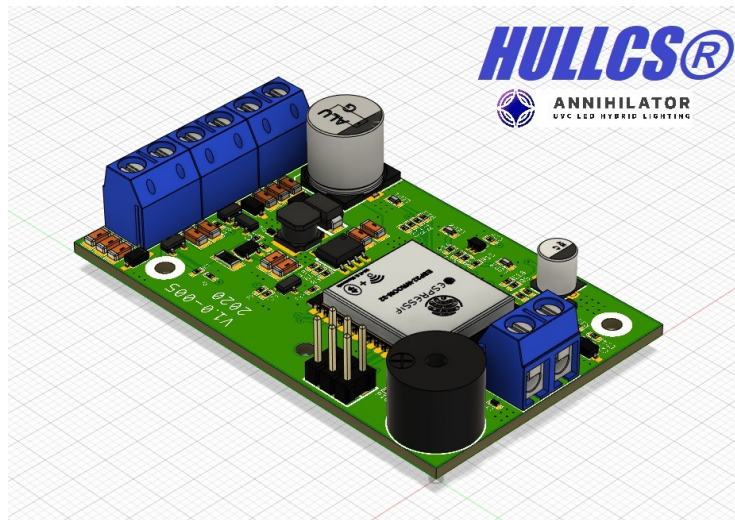
Remote control (e.g., via smartphone) is possible thanks to the HULLCS® controller developed by the LUMENMAX team.

Controllers used in the luminaires are based on BLUETOOTH BLE and WIFI technology. They provide the following functionalities:

- safety regarding the access of bystanders to control of ultraviolet UVC radiation

- white light brightness control
- cooperation with dedicated wired or wireless sensors which disconnect radiation when motion is detected
- setting the time of the disinfection process, the start delay time and the volume of the warning signal
- change of preferences and administration of a group of luminaires

Administration and control of a group of ANNIHILATOR LUMENMAX luminaires thanks to HULLCS® controllers is intuitive and exceptionally simple, and at the same time highly functional.



STATE OF THE ART DISINFECTION

It is undeniable that LED technology will soon replace discharge sources of UV radiation, i.e., fluorescent lamps, quartz lamps and UV lamps from individual market sectors. On top of that, sterilizers based on the so-called Excimer lamps and created recently as a result of the economic response to the COVID-19 outbreak, due to their size, appearance and cost of production, are not able to threaten the imminent domination of the disinfection industry by LED technology.

Where is the superiority of LED UVC over old-type artificial UVC radiation sources?

- no toxic mercury contents
- a wavelength of light that is more effective in combating pathogens - a narrower and more precise range of radiation
- thanks to the small dimensions - the possibility of implementing LED UV light sources in any type of lighting fixture and lamp and the possibility of easy integration with electronic control systems
- precise control of the UVC beam, allowing the calculation of radiation doses necessary for disinfection, helps to achieve greater energy efficiency of the disinfection process and to avoid dynamic photodegradation of the irradiated materials
- no ozone production harmful to humans and animals - **without needing** to ventilate the rooms after the disinfection process is completed
- longer service life of the LED UVC module, low operating costs - no need to periodically replace the radiators

ANNIHILATOR LUMENMAX is the first professional, remote-controlled hybrid LED ceiling luminaire - a combination of an energy-saving LED luminaire with an LED sterilizer.

From now on, the sterility of rooms and the health of users will be protected by modern and elegant LED lighting equipment.

ACCURACY AND RELIABILITY OF OPERATION

ANNIHILATOR LUMENMAX PL/CL24 is currently the only professional hybrid LED luminaire on the market that combats pathogens. Its effectiveness in inactivating viral and bacterial pathogens has been confirmed by research conducted at the Department of Biotechnology and Food Microbiology at the University of Life Sciences in Wrocław.

The LED ANNIHILATOR LUMENMAX ceiling lighting and disinfection system owes its effectiveness to a number of technical aspects.

This is possible by applying the highest quality UVC LEDs with a semi-conductor chipset from a leading Korean manufacturer in the frame, and thanks to the use of double-cleaned JGS-1 quartz lenses with the appropriate focus, we have created a LED module, which is an extremely effective weapon in the fight against viral and bacterial pathogens.

Carefully selected radiation power of the ANNIHILATOR LUMENMAX module, with a peak wavelength of 273 nm, causes dynamic destruction and inactivation of pathogenic microorganisms. ANNIHILATOR LUMENMAX is a virucidal and bactericidal setting, however, with the appropriate exposure time (and the resulting radiation dose), annihilation also **destroys** single-celled fungi, mold spores, protozoa, mites or algae. Thanks to the multi-point (coming from many individual frames) conical radiation emission, surfaces are decontaminated by rays reaching them at different angles, thus increasing the effectiveness of destroying pathogens located on them, which are caught in the crossfire.

The ANNIHILATOR LUMENMAX system is focused on decontamination of indoor air and surfaces exposed to the probability of prior direct contact with people who are potential carriers of viruses and bacteria. The key is to decontaminate areas most exposed to contact with pathogens: work surfaces (0.85m above the floor), floors, public devices, tables, chairs, doors and more. However, it should be noted that a well-designed ANNIHILATOR LUMENMAX disinfection system provides for disinfection of even the highest parts of walls and the ceiling.

The time required for effective surface disinfection ranges from 10 minutes to 6 hours and is specified in detail in each individual simulation provided to the customer. The average time of the UVC disinfection process recommended by LUMENMAX is 3 hours. It should be remembered that the time of disinfection of air penetrated by UVC radiation is much shorter. The effectiveness of combating pathogens present in the air, as a result of direct and continuous ultraviolet radiation, is incomparably greater and more dynamic than the effectiveness of UV flow disinfection lamps and ozonators.

The operation and effectiveness of the ANNIHILATOR LUMENMAX luminaire have been tested in the laboratory of the Department of Biotechnology and Food Microbiology at the University of Life Sciences in Wrocław, on the following pathogens:

- Bacterial virus P22 ATCC 97540
- Bacterial virus FELIX01 DSM 18524

- Gram negative bacteria Escherichia coli BAA 2469 (NDM)
- Gram negative bacterium Salmonella typhimurium ATCC 140288
- Gram positive bacterium Staphylococcus aureus ATCC 43300 (MRSA)

Irradiating samples with the above pathogens at a concentration of $1-2 \times 10^5$ cfu/ml, at a distance of 2.5 meters (time from 20 minutes to 120 minutes), contributed to their reduction by 99.5% - 100%.

FREE DESIGN AND TRAINING

We are the sole company that presents to each customer a separate, accurate simulation of UVC radiation for a given room. By providing detailed data on the intensity of radiation on all illuminated surfaces, we simulate the necessary exposure time to achieve the state of room disinfection with exceptionally high accuracy. The customer has the ability to choose the number, location and spacing of luminaires on the ceiling surface, which suggests the time necessary to deactivate pathogens, as well as lighting values - white light intensity, luminance and light distribution factor. Before the purchase, our customers receive a free lighting design along with a reliable LUMENMAX-certified individual simulation (also graphically) of the necessary disinfecting exposure time, having the option to choose the configuration and number of luminaires, even from several proposals!

Each customer, LUMENMAX will provide training in the operation and safe use of the ANNIHILATOR LUMENMAX system. Depending on the needs and possibilities, it can be stationary or remote training.

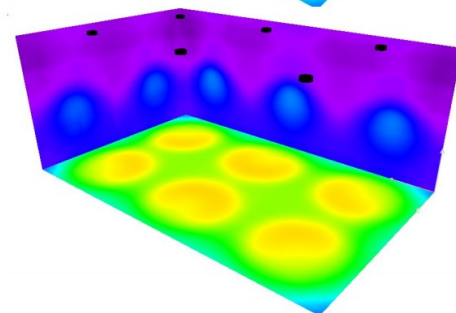
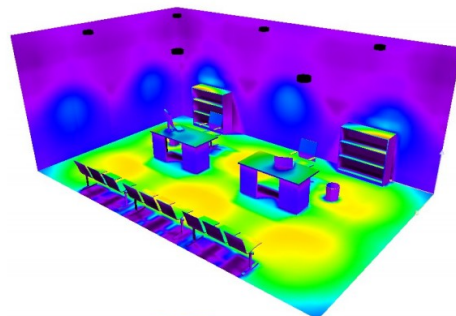
Individual Simulation of Decontamination



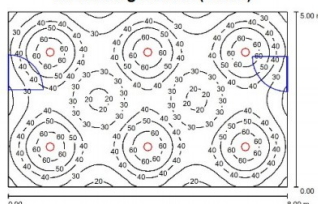
INPUT DATA		
Lumenmax Annihilator model	CL24-COB-D-UVC	
Power consumption for UV-C mode	21,30	W
UVC radiation power per luminaire	274,00	mW
Quantity of luminaires	6	pcs
Total power consumption for UV-C mode	127,80	W
Total UVC radiation power	1,64	W
Height to ceiling	3,30	m
Cubic capacity	132,00	m ³
Floor area / working surface area	40,00	m ²

UV-C RADIATION				
Surfaces	Irradiance [$\mu\text{W}/\text{cm}^2$]			
	Em	Emin	Emax	Emin / Em
Working surface (0.85m)	3,900	1,600	6,300	0,410
Floor	3,500	1,900	4,300	0,543
Ceiling	0,565	0,433	0,634	0,766
Walls	1,000	0,543	1,900	0,543
Average irradiance value for all surfaces	2,24			

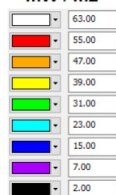
DECONTAMINATION TIME			
Irradiation dose [J/m^2]	Irradiation time [h]	Total emitted UVC energy [kJ]	
Dose recommended by LUMENMAX	200	2,48	14,67
D99.9 dose for SARS-CoV-2	169	2,09	12,40
D90 dose for SARS-CoV-2	37	0,46	2,71



Irradiance values [mW/m²] on working surface (0.85m)



mW / m²



Design:	No 101.03.21
Facility:	Dental clinic
Room:	Registration room
Date:	11.02.2021r.
Customer:	xxxxxx
Performed by:	Mateusz Zudrak
Remarks:	-

SUPERIOR APPLICATION RANGE

Due to the mounting height, the disinfecting and lighting efficiency of the ANNIHILATOR LED modules falls in the range from 0 to even 25 meters! (recommended max height is 6m, due to the controllers reception range). We can successfully use it as a luminaire for low, medium and high ceiling mounting for lighting and disinfection of high-walled rooms such as lobbies, patios, auditoriums and halls. Thanks to the IP44 level of tightness of the front part of the luminaire, it can be used in rooms with increased air humidity.

Owing to their minimalist design, the fixtures fit any type of room. The combination of lighting and disinfecting functionality does not disturb the elegance and design of the luminaire - on the contrary - the gold-colored SMD UVC LEDs used in the ANNIHILATOR module, seasoned with quartz lenses, together with decorative purple gems from SWAROVSKI, constitute a subtle design art.

Installation of the system is particularly recommended in places with a significant daily flow of people:

- hospitals
- clinics
- waiting rooms
- canteens, toilets
- restrooms
- conference and lecture rooms
- service points (hairdresser, beautician, tattoo studios)
- nursing homes
- offices, services
- sports facilities, fitness clubs and gyms
- communication lanes and lobbies
- hotel industry and gastronomy
- shops, shopping malls
- kindergartens, schools, nurseries
- flats, houses

THE PERFECT COB LED LIGHTING MODULE

The ANNIHILATOR LUMENMAX luminaire is based on the famous LUMENMAX PL/CL series models. It is a timeless, minimalistic, universal, but very elegant luminaire, designed for almost any type of room.

The clear advantage compared to competing downlights has been achieved thanks to:

- high efficiency (for the luminaire 100 lm/W, for the LED module 115 lm/W)
- high color fidelity (CRI Ra > 90)
- very good, if we take downlights with a medium wide beam angle, unpleasant glare factor (UGR <22-25)

Due to top quality of the used components and structures, allowing for very efficient heat dissipation, the warranty period for the luminaire is up to 5 years. That said, this does not limit their maximum lifetime - unlike most LED downlights available on the market, both LED modules, as

well as the power supply and controller, are fully interchangeable, so these luminaires deserve the name “immortal”.

Due to the specially selected beam angle, with a relatively large beam of light, the mounting height range of ANNIHILATOR LUMENMAX luminaires is exceptionally large. Luminaires will effectively illuminate rooms, even from a height of several meters!

Further advantages of the luminaire for the lighting mode:

- Replaceable COB LED, driver and power supply
- Timeless, minimalist and compact design
- Eulumdat files for lighting design (DIALUX) available
- Superior quality of light, luminous efficacy, energy efficiency (A +) and photobiological safety
- An exceptionally wide range of applications (office, commercial, residential, service and other facilities)
- Adjusting the light intensity - dimmable using a smartphone
- Corrosion resistance (Aluminum 6063, 6082)
- The tightness class from the front of the luminaire IP44 allows the luminaire to be used in rooms with increased air humidity
- White light diffuser resistant to UVC photodegradation
- Easy to install and available in recessed or surface-mounted versions
- Full compliance with CE EMC, CE LVD, ROHS, RED standards
- High power factor, $\cos\phi > 0.96$

SAFETY

Disinfection carried out by the ANNIHILATOR LUMENMAX system, in accordance with the manufacturer’s recommendations, ensures superior epidemiological safety of the premises.

A security system based on HULLCS® controllers, which our luminaires are equipped with, ensures a safe disinfection procedure:

- remote activation and deactivation of the disinfecting mode by the administrator is possible only thanks to a mobile device with the ANNIHILATOR LUMENMAX application installed, protected by the device code
- Compatibility with dedicated 12V wired and wireless surface-mounted and door-mounted motion detectors which disconnect radiation
- remote configuration of the disinfection mode start delay time
- remote editing of the disinfection mode duration
- visual signaling of the disinfection mode operation thanks to the SMD UVA LED
- remotely configurable volume of the warning beep accompanying the activated disinfection mode
- possibility of emergency disinfection mode switch off by pressing the wall switch (immediate switching to the lighting mode)

The luminaires of the ANNIHILATOR LUMENMAX system are relatively safe for inanimate surfaces compared to sterilizers based on mercury-vapor discharge UV lamps. The value of the intensity of ultraviolet UVC radiation is aimed at the rapid annihilation of pathogenic pathogens,

but it is not as excessive as to lead to dynamic photodegradation of materials.

The relatively low power of UVC radiation and its conical emission angle, compared to sterilizers equipped with high-power UV discharge lamps, **provide** a considerable safety margin for bystanders who, for any reason, could be present in the room during the disinfection mode. The radiation intensity is not so high as to lead to permanent damage to health in a short time, nevertheless, in reference to the CIE (International Lighting Committee) guidelines, we hereby warn about the harmfulness of UVC radiation for human and animal health and its destructive effect on plant tissues. When using the ANNIHILATOR LUMENMAX system, the user - system administrator is obliged to follow the operating rules contained in the product manual and the information obtained during training on its use.

“Products that emit UV-C radiation are extremely useful in disinfecting air and surfaces, and sterilizing water. The CIE and WHO caution against the use of UV disinfection lamps to disinfect hands or other areas of the skin (WHO, 2020), unless clinically justified. UV-C radiation can be very dangerous to humans and animals; therefore, it can only be used if the products that generate this radiation are of an appropriate design that meets safety regulations or used in strictly controlled conditions where human safety is a priority, consisting in ensuring that the maximum allowable exposure to UV radiation specified in ICNIRP (2004) and IEC/CIE (2006) is not exceeded. Appropriate UV measurements are essential for proper UV assessment and risk management”.

Source:

CIE POSITION STATEMENT ON THE USE OF ULTRAVIOLET (UV) RADIATION TO MANAGE THE RISK OF COVID-19 TRANSMISSION", 12th May 2020