

Products for Air Disinfection

UVC based air and surface disinfection for factories, food plants, surgeries, offices and homes

Bespoke Options Available Contact us to discuss

JenActUV

Signify

PHILIPS dynalitect









JenActUV Background

JenAct is a subsidiary of Jenton International Limited.

JenAct Limited specialises in UV Disinfection, UV Surface Sterilisation Systems and Microwave UV Technology, as well as new features, like Pulsed UV.

Designing and manufacturing bespoke and specialist machines for businesses, combining our technical expertise with a scientific approach, enables us to recommend and design the most appropriate UV equipment for wide range of applications.

Our customers benefit from state-of-the-art UV disinfection modelling software, which we have developed to achieve efficient sizing of UV Air Disinfection Systems

Our JenAct Ltd range of products includes:



Air disinfection of work areas, surgeries etc...



Surface disinfection – masks / PPE

JenAct has 11 separate granted patents, several internationally.

JenActUV

ACTIVE air disinfection

Air is driven past UV lamps in self contained units or air ducts and is exposed to UV and treated on the way.



(s) ignify

PASSIVE air disinfection

Room air is exposed to wall or ceiling mounted UV lamp fixtures by natural or fan assisted convection

The Science

UVC light at approx. 250-260 nanometers wavelength resonates and disrupts DNA/RNA in cell nuclei and viruses, **inactivating** it and causing disinfection.

JenAct and (signify systems do two things:

a) They generate and emit UVC light at 254nm at the maximum intensity possible.

b) They transmit and concentrate that light efficiently towards the spores, bacteria or **viruses** that need to be inactivated.





JenAct has developed sophisticated modelling software to make sure we do that right - reliably predicting performance



WAVELENGTH (nm)

JenAct

UV-C Sensitivity of Different Microorganisms

Viruses, such as coronaviruses, are easier to disinfect as their thin walls offer little resistance to UVC which will disrupt their RNA. Bacteria are also very suited to UVC disinfection. SARS-CoV-2 is proven (Boston University 2020) to be easy to disinfect with UVC. (ask JenAct contact for copy).



Dose (mJ*/cm2) = Irradiance (mW/cm2) x Exposure Time (s)

** of a UV light source at a defined distance

B Subtilis

Lethal Dose:

Dose required for the inactivation of a specific germ strain.

Lethal dose for 99.9% Inactivation of different:

BACTERIA	1	9	1
Saremalutea	59.0	B paratyphosus	9.6
B Subtilis	36.0	Escherichlia coli	9.0
Micrococcus sphaeroides	30.0	B Megatherium sp (spores)	8.0
S typhitmurium	24.0	Proteius vulgaris	7.8
Micrococcus Candiclus	19.0	Staphylococcus aureus	7.8
Staphylococcus lactis	18.0	Seratia marcescens	7.2
Pseudomonas Aeruginosa	16.5	Staphylococcus hemolyticus	6.6
Bacillus Anthracis	13.7	Eberthella typosa	6.3
Neisseria Catharrhalis	13.0	Staphylococcus vindans	6.0
Phytomonas turnefaciens	13.0	Staphylococcus albus	5.4
Spirillum rubrum	13.0	Shigella paradysenteriae	5.2
Pseudomonas fluorescens	10.5	B Megatherium sp (veg)	3.4
Corynebacterium diphteriae	10.0		1

signify

Lethal Dose

Lethal dose for 99.9% Inactivation

Viruses (airborne)	
Adenovirus	14.0
Bacteriophage MS2	13.0
Coxsackievirus	6.3
Influenza A	6.0
Coronavirus (SARS-CoV-2)	3.7*
Coronavirus (SARS-CoV)	2.1

* pre-printed paper (not peer-reviewed)

Lethal Dose Ranges for 99.9% (log 3) Inactivation:

Virus	
Bacteria	
Molds	

2 – 16 mJ/cm2 4 – 60 mJ/cm2 15 – 400 mJ/cm2



Signify



Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.

7

Products for Air Disinfection

Covid-19

The pathogen that everyone is interested in in 2021 is SARS-CoV-2, which causes COVID-19. The good news is that coronaviruses are very easy to inactivate with UVC. (see chart on previous page).

Although COVID-19 is new, coronaviruses are not.

Much work has been done on UVC's disinfection abilities on SARS-CoV-1 (SARS) which can be related to SARS-CoV-2 (COVID-19). In addition, work initiated by Signify in 2020 by Boston University confirms UVC effectiveness.

See: https://www.signify.com/global/our-company/news/pressreleases/2020/20200616-signify-boston-university-validate-effectiveness-signify-uvclight-sources-on-inactivating-virus-that-causes-covid19



Suggested:

Rapid and complete inactivation of SARS-CoV-2 by UV-C irradiation

Rapid and complete inactivation of SARS-CoV-2 by ultraviolet-C irradiation | Scientific Reports (nature.com)

SARS-CoV-2 response to UVC International Ultraviolet Association:

https://www.cdc.gov/coronavirus/2019ncov/community/office-buildings.html

UK Government

https://www.gov.uk/government/ publications/emg-role-of-ventilation-incontrolling-sars-cov-2-transmission-30september-2020

The best thing since... **FRESH AIR**

The best way to deal with airborne viruses to minimise cross infection is to flush them out with fresh air.

Open windows, doors or set ventilation systems to avoid recirculated air..

Or...if you can't do that...

You can use JenActUV systems to make your own "Covid fresh" air 99.99% virus free air

Our UV systems for air treatment (self contained or in ducts) will provide 99.99% disinfection of SARS-CoV-2 in the air going through the system.

Products for Air Disinfection

GRU-V®

It's a simple principle.

We generate UV.

We shine it at pathogens in the air and inactivate them causing disinfection





JenAct's Wide Range of Products



What can **JenActUV** do?

We know exactly how much UVC we produce in our systems.

From 100 years of many other people's research, science knows what levels of UV are required to disinfect all the 'major' viruses, bacteria and moulds.

We know what will happen if UVC from JenActUV systems reaches the DNA/RNA of target pathogens.

With air disinfection in controlled ducts we can do this very accurately. If we work in a duct and know air volume, air speed and target pathogen we can be 100% sure of what level of disinfection can be achieved.



People's skin must NOT be exposed to UVC.

Air disinfection with **GRU-V**®

JenAct GRU-V systems are designed for dynamic air disinfection - vertical wall or horizontal suspended mounting.

UV lamps are mounted longitudinally in a food/medical grade stainless steel duct unit with integral fan. Fan is sized to move an appropriate volume of air to achieve 4 log kill (99.99% disinfection) of viruses.

Signify (Philips) PL-L or equivalent [55w x 2] or [95w x 2] lamps are used for 100m3/hr or 160m3/hr airflow.

Variants available for 300-3500m3/hr.

FEP sleeves are used to keep bulbs clean and safe if broken. Bulbs have a rated life of 9,000 hour life (to 85% output) Annual changes recommended.







Office Examples







More Installations... Opticians

SARS-CoV-2 in aerosols presents a real problem for dentists, opticians, offices and immunocompromised people in all situations.

Bespoke Options Available Contact us to discuss

KRITTE

Easy to install with integrated wall mouting points and IEC 230V 5A Electrical connection



Products for Air Disinfection

GRUV-LB

JenAct GRUV-LB systems are designed to easily replace 1200x600 and 600x600 standard ceiling tiles.

UV lamps are mounted longitudinally in a lightweight steel duct with integral fan which is mounted directly on to a ceiling tile insert. Fan is sized to move an appropriate volume of air to achieve 4 log kill (99.99% disinfection) of viruses.

Philips PL-L or equivalent [55w x 2] lamps are used in 100m3/hr airflow

FEP sleeves can be used to keep bulbs clean and safe if broken. Bulbs have 8000 hour life.



UV Torpedo®

JenAct UV TORPEDO® systems are designed to fit longitudinally into existing HVAC and air ducts.



JenAct has designed optimised aluminium extrusion to ensure maximum UV harvest from the UVC lamps in the torpedo unit.

Lamps, ballasts and sizing all selected to suit each customer requirement based on airflow, temperature and identified problem pathogens.

Custom control systems allow local control operation and/or Building Control Systems (BMS)

Current public recommendations are not to use recirculating HVAC in a possible COVID-19 situation without disinfection. These systems prevent transfer of virus from one room/area to another.

"

Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.



Duct Mounting

Lamp modules are clamped to easily mounted rods across duct in calculated position for best results. Wires exit to PSU. Access hatch required.



- Products for Air Disinfection

UV Torpedo® Detail



"Quad"

"Quad Torpedo[®]" Quad has advantage of max UV output per unit length of all torpedo variants. Available in 550mm lengths applicable to short spaces and easy to modify existing ducts for mounting. Features Signify (Philips) PL-L lamps.





Systems for food production

GRU-V® Jet for food production areas





Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.

22

Getting it right

UV has been used for disinfection for over 100 years. During that time so much work has been done on testing, measuring and categorising performance in relation to viruses, bacteria and moulds that performance can be accurately and reliably modelled based on thousands of tests over the years.

JenAct has developed sophisticated modelling software and licences it to other companies in the UVC world.





Sample predictive modelling.



signify

PASSIVE air disinfection

Room air is exposed to wall or ceiling mounted UV lamp fixtures by natural or fan assisted convection Signify and Boston university have validated the effectiveness of our light sources on inactivating the virus that caused COVID-19.

In laboratory testing, our UV-C light sources inactivated 99% of SARS-CoV-2 virus on a surface with an exposure time of 6 seconds.¹

¹ Tests performed in a lab setting by Boston University using a Signify UV-C light source revealed that a dose of 5mJ/cm² reduced 99% of SARS-CoV2, the virus causing COVID-19, in juts 6 seconds. Based on the data, it was determined that a dose of 22mJ/cm² will result in a reduction of 99.9999% in 25 seconds. Research variables available upon request.

Signify Netherlands B.V. Efficacy Test Report



- "Our Philips UV-C disinfection upper air luminaires inactivate up to 99.9% of virus Coliphage φX174 in air within 10 minutes in a room with sufficient air circulation¹"
- More specifically for the ceiling mounted version: "Inactivates 99.99% of virus Coliphage \$\phi\$X174 in air within 10 minutes in a room with sufficient air circulation1"
- More specifically for the wall mounted version: "Inactivates 99.7% of virus Coliphage \$\phiX174\$ in air within 10 minutes in a room with sufficient air circulation1"

¹Results obtained from a laboratory test conducted by Intertek, a leading worldwide quality assurance services provider. For more information, please refer to Intertek's test report"

UV-C Solutions Portfolio



UV-C Upper Air

Application areas - General air purification

All professional indoor applications:

Meeting rooms, retail, hotel rooms, schools, universities, banks, gyms, restaurants

Typically 1 unit per 4m x 4m area

Once BioShift[®]



Application areas - Object/device cleaning

Office and industry: mail rooms, reception, factories, distribution centers

Retail & government: shared devices



UV-C Battens

Application areas - Indoor general room / surface space cleaning:

Pharmacies, retail, gym, spa, industries, cleanrooms, industrial kitchens, retaurant, transport, hotel rooms, schools, universities, banks

System to include fixtures, safety devices, lighting design and exposure time calculations





Application areas - Object / device cleaning

Office and industry: mail rooms, reception, factories, distribution centers

Retail & government: shared devices

Air Disinfection Solutions

UV-C upper air luminaires

- Intended to be used for the disinfection of the air within a given space / room
- Flexibility fixtures radiate UVC directly and only into the upper part of the ceiling – can be used in the high traffic / density spaces.
- It has been proven to be effective in healthcare settings to reduce exposure to viruses such as Tuberculosis¹
- Results in cleaner air in the space, equal to 18-24 air changes per hour



Coverage

- Ceiling and wall mounted options to suit your layout
- Typical coverage of 20m²

Safety

- Positioned above the highest door in a room and at a minimum height of 2.3m, out of the reach of people to disinfect the air at this level as it circulates
- Integrate with Interact to enable scheduled operation, remote control and monitoring



¹National Institute for Occupational Safety and Health (2009), Environmental Control for Tuberculosis: Basic Upper-Room Ultraviolet Germicidal Irradiation Guidelines for Healthcare Settings, 2009 -105



Air Disinfection Solutions

Upper air solutions provide an ideal way to disinfect air while the space is still occupied



UV-C Upper Air: Surface & Suspended Ceiling version

Surface mounted version

919206000101 SM345C 4xTUV PLS 9W HFM SMB







Surface mounted using a ceiling plate in a false recessed ceiling

Suspended version

919206000091 SM345C 4xTUV PLS 9W HFM SM4







Suspension Kit included

UV-C Upper Air: Surface & Suspended Ceiling version

Example installation using upper air units



INNOVATIVE BICANALYSIS creating solutions | getting results

Abstract: Efficacy of a wall mounted UV device against Aerosolized SARS-CoV-2

Background: This in vitro study was designed to determine the efficacy of The Philips UV-C disinfection upper air luminaire with a Philips T5 TUV lamp installed. The wall mounted luminaire is designed to decrease the concentration of pathogens in the air within a room when it is opened to lower the risk of transferring pathogens. For this challenge, the SAR-CoV-2-CA1/2020 pathogen was used. Coronavirus and similar pathogens can be spread through the air and by touching contaminated surfaces. Signify supplied a pre-packaged UV-C disinfection upper air wall mounted system for testing



purposes. For the testing, power was supplied through a power regulated 120v outlet with a 200w step up voltage transformer. Transformer was set to the needed 220v required to power the system. Test procedures were followed using internal SOPs for aerosolized viral pathogen challenges and subsequent decontamination. All internal SOPs and processes follow GCLP guiedlines and recommendations.

Conclusions

The Philips wall mounted UV-C system performed to manufacturer specifications and demonstrated a progressive reduction of active virus after 5 minutes of exposure in aerosol form. The live SARS-CoV-2 virus was not detectable at the 20-minute timepoint, (levels were below the 120 TCID50 / ml limit of quantification. This would equate to a 4-log reduction compared to the control values. Within 2 minutes there was an 83.6% reduction in recoverable active pathogens in the air. After 10 minutes of exposure in the chamber there was a 99.99% reduction of collectable active pathogens in the air.

Taking into consideration the starting concentration of active SARS-CoV-2 virus, the volume aerosolized, one could assume that the likelihood of entering an environment with this quantity of pathogen in a real-life circumstance to be unlikely.



Viral Challenge

The challenge pathogen, SARS-CoV-2-USA-CA1/2020, was used for testing the efficacy of the wall mounted UV system. During the challenge tests the pressure in the challenge chamber was monitored to confirm no portion of the chamber was leaking. The bioaerosol efficacy challenge was completed in four distinct trials with the live pathogen to create a baseline of data. The wall mounted Philips upper air UV-C was in the same position for each viral challenge and operated in the same manner. Prior to nebulizing the viral pathogen, the UV system was turned on and allowed to run for 15 minutes to simulate a real-world environment and allow the device to reach standard operative conditions. UV emissions were blocked by a rigid material connected

to an automatic drop system which prevented the UV from interacting with the virus during the nebulization period. Prior to starting the trial, the remote activated drop mechanism would be tripped, and the material would fall away from the UV system. Four low volume mixing fans were used throughout the entire control test and viral pathogen test. Sample times were as follows with T equal to minutes, T-2, T-5, T-10, T-20. Sampling occurred using 4 automatic air volume samplers that operated simultaneously for each collection. Samplers were pre-set to automatically shut off after 10 minutes of collection. Collections were made via the equipment utilizing viral media coated filters for maximum pathogen trapping and stability. Collection samples were provided to lab staff for pooling after each collection time point.

Checking it's right

Jenton have been representing EIT radiometers in the UK since 1990.

EIT manufacture NIST calibrated integrating UV radiometers and filtered UV lamp monitoring systems.

EIT UVC radiometers are filtered to measure 250-260nm and display power (mW/cm2) and energy [dose] (mJ/cm2)





Static disinfection of HVAC coils



More about moulds than COVID-19, *v* coil cleaning UVC can easily and cheaply prevent moulds from growing on HVAC coils and other condensing areas.



Static and surface disinfection from **(signify**)

UV-C Battens

- A fixed installation of luminaires on the ceiling are used at controlled times to fill a room or enclosed space with disinfecting UV-C radiation
- Provides disinfection outside of working hours for high contact areas such as material handling equipment

Coverage

 To ensure adequate coverage, our design team can help to create a layout with placements for your space

Safety

- Multiple safeguard options to be considered as a system
- Multiple, redundant occupancy detection methods to be designed in:
 - Built in occupancy sensor
 - Occupancy sensors in the space deactivate the system if someone is present during operation
 - Door sensors at each entrance provide a further deactivation trigger in case anyone tries to enter the space during operation
 - Visible and audible triggers can be used during operation



Philips UV-C Batten with sensor TMS031 for Surface Disinfection

Philips UV-C TMS031 Batten luminaire with sensor & UV-C T8 lamps designed for the disinfection of surfaces.



Key Features and Benefits

- Philips UV-C battens disinfect surfaces that are directly exposed to the UV-C light emitted by the UV-C batten
- UV-C batten provides universal UV-C irradiance with homogenous light distribution
- Additional safeguard of a microwave sensor eliminates the need for a more complex controls installation
- Includes safeguards such as an integrated microwave sensor that automatically shuts down the UV-C batten when a person or animal is sensed.

Batten with external microwave sensor

- Mirror optics to cut off UV-C irradiance beyond the sensor coverage area.
- Sensor Timer Pre-Sets for 30 mins, 1hr, 2hr and 3hrs for setting as per application.
- Reflector / louvres provide better beam control for the required UV-C dose
- Enhanced performance by a highly reflective and durable aluminium body directs the UV-C light to the desired irradiated surfaces and within the sensor range.

(signify)

Philips UV-C Batten with sensor TMS031 for Surface Disinfection

Key Features and Benefits

- All plastic components (lamp holders & end caps) are protected by dedicated UV-C shielding
- Replaceable UV-C light source with 1-lamp (T8-36W)
- UV radiation wavelength peak at 254nm output (Philips UV-C lamps) inactivates the DNA & RNA of bacteria, viruses and spores
- Environmentally friendly no ozone emissions during or after use.

Туре	Length (inc sensor)	Number of UV-Clamps	Lamp Wattage	Gear	Sensor	UV-Cirradiation values @ 2m distance
Philips TMS031 UV-C Batten	1320mm	1 x T8 TUV	36W	High Frequency Performer (HFP)	Microwave sensor	up to 0.92 µW/cm2

Mounting	Material	Temperature	Ratings	Lifetime	Warranty
Suspended, Surface	Aluminium (Housing & Reflector)	+10°C to + 45°C	IP20 IK02	Lamps:9,000hrs 90% UVC @ end of life	TMS031 Iuminaire: 1 year



Safeguards

- Complies with all applicable regulations and standards (UV-C RISK GROUP 3IEC 62471)
- Combined with safeguards such as controlled-access devices, it is used safely.
- No person or animals should be present at the time of usage, due to high risk of harm to eyes and skin.
- The UV-C product is not approved and/or certified as a medical device.



Philips UV-C Batten with sensor TMS030 for Surface Disinfection

Philips UV-C TMS030 Batten luminaire with sensor & UV-C T8 lamps designed for the disinfection of surfaces.



Non-reflector batten

Batten with reflector



Key Features and Benefits

- Philips UV-C battens disinfect surfaces that are directly exposed to the UV-C light emitted by the UV-C batten
- UV-C batten provides universal UV-C irradiance with homogenous light distribution
- Ceiling or wall mounted (adjustable bracket) fixture options help to radiate UV-C directly on the surface.
- Non-reflector battens and reflector versions provide better beam control for the required UV-C dose.

- High-reflective and durable aluminium housing improves performance by directing the UV-C light to the to-be irradiated surfaces.
- Disinfection capability is based on wattage use and a specific exposure time for a given distance from that surface.
- All plastic components (lamp holders & end caps) are protected by dedicated UV-C shielding

Philips UV-C Batten with sensor TMS030 for Surface Disinfection

Key Features and Benefits

- Replaceable UV-C light sources with 1-lamp (T8 18W) and 2-lamp (T8 36W) versions
- UV radiation wavelength peak at 254nm output (Philips UV-C lamps) inactivates the DNA & RNA of bacteria, viruses and spores
- Environmentally friendly no ozone emissions during or after use.

Түре	Length	Number of UV-C lamps	Lamp Wattage	Gear	Reflector	UV-C Irradiation values @ 2m distance	Mounting
Philips TMS030	614mm(2ft)	1 x T8 TUV	18W or 36W	High Frequency Performer (HFP)	No reflector (TMS030)	up to 0.92 µW/cm2	Ceiling
UV-C Batten	1224mm(4ft)	2 x T8 TUV			With reflector (TMS030R)	up to 1.22 µW/cm2	Wall (adjustable bracket)

Material	Temperature	Ratings	Lifetime	Warranty
Aluminium (Housing & Reflector)	+20°C to + 40°C	IP20 IK02	Lamps:9,000hrs 90% LIVC @ end of life	TMS030 luminaire: 1 year

The Limitations

UV-C light is unable to penetrate many materials, including most glass, plastic films and even small pieces of dirt.

In addition, one must consider shadowed areas, such as handles, folds, straps etc.

Shadowing can be an issue in UVC disinfection when the system is designed to cope with a large variety of complex objects.

When designing UV systems we position the UVC lamps in such a way to minimize this effect as much as possible, but on occasion you can get cold spots where the UV light is unable to reach the surface. UVC must reach the DNA that it is intended to disrupt.



PPE / Surface Disinfection

JenAct and Signify supply a range of UV cabinet variants for surface disinfection.

JenAct have commissioned successful laboratory tests in UK (Surrey Diagnostics) to prove performance of cabinets and confirm suitability for inactivation of SARS-CoV-2. (results available on request).





UV Disinfection Conveyors



JenAct manufacture a range of UV conveyors for surface disinfection.

UV conveyors using rollers, flat and wire belts can be used for product transfer to high care, goods inwards, post and parcel disinfection etc.



www.jenact.co.uk 01256 892194 sales@jenton.co.uk

Unit 9/10 Ardglen Industrial Estate, Whitchurch, Hampshire RG28 7BB



Experts in UV Disinfection of AIR and SURFACES