

Ultravation®
UVMatrix™

INDOOR AIR QUALITY (IAQ) IMPROVEMENT PRODUCTS
ENERGY USE OPTIMIZATION
LARGE AIR HANDLER APPLICATIONS

COMMERCIAL
INSTITUTIONAL
MEDICAL
MANUFACTURING

Ultravation®

Better Air | Better Water | Better Living™





Since 1935 ultraviolet light has been used for disinfection for a variety of applications including air treatment. It has gained a reputation for being a cost effective and environmentally friendly disinfection technology.

- UV provides high operating efficiency by way of its consistent prevention of bio-growth on HVAC components
- UV reduces or completely eliminates the need for other types of system / cooling coil cleaning
- Runtime is reduced through maintained optimized heat transfer
- HVAC airstream exposure to germicidal UV can reduce airborne pathogen counts throughout an air conditioned space
- UV can eliminate the HVAC system as a significant source of odors and unhealthful air contamination.

For more than thirty-five years, the people at the heart of Ultravation have been working together to study, engineer and manufacture products that improve people's well being with the proven application of UV light.

— Scott Russell, President and Founding Partner

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Bio-growth in HVAC systems is inevitable

UV-C light is the cost effective and sustainable solution



Air conditioning has brought great benefits to people in terms of productivity in the workplace and making our lives far more comfortable at home as well. It has become ubiquitous and fully integrated into everyday life.

As air conditioning came into use, the need to maintain the equipment became necessary to keep the air flowing smoothly and drain pans from clogging.

UV is effective, energy saving and the only method that continually keeps bio-growth from taking hold in the constantly wet coils, drain pans and other moist areas which are ideal breeding ground for microbes.

Ultravation® also manufactures both HVAC airstream disinfection and convection driven upper room products that have been suggested by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). They emit pure 254 NM UVC (UVGI) with no production of ozone.



UV light is nature's way of controlling bio-growth

Natural UV controls microorganism populations outdoors. UVMatrix™ brings UV inside.

UV emitted from lamps installed in an HVAC system is unfiltered and far more lethal to microbes than sunlight. Unchecked, even a thin bio-film measuring just a few thousandths of an inch on a cooling coil can reduce HVAC efficiency by 30% to 50% – as well as cause HVAC odors. This fact alone makes UV well worth consideration for maintaining the efficiency and cleanliness of an HVAC system.

Non-chemical sustainability

UV light does not pose a threat to the environment and consumables are recyclable.

UV-C short wave ultraviolet light generates no ozone

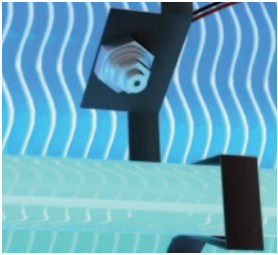
Ultravation UV lamps are focused at the most lethal wave length of UV light – the UV-C range – and specifically centered on 254nm. It is possible for UV to generate ozone, but only at the lower frequency of 185nm which is not emitted by Ultravation lamps.

Ultravation UV is 40% more intense

40% additional UV intensity over typical UV installations by **Ultravation's T3 UV Lamp technology**. The UV lamps are encased in water-tight transparent quartz sleeves that insulate the lamp, optimizing operating temperature. Output intensity is raised *without additional power consumption*.

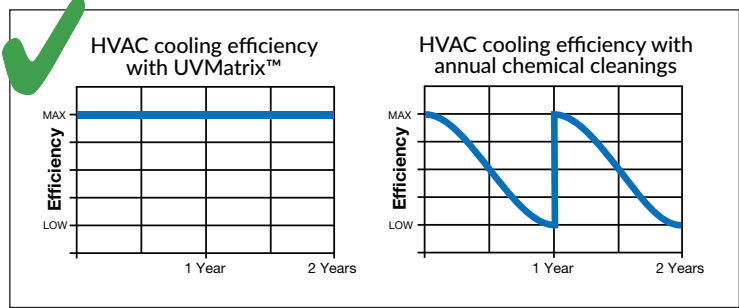
Real time monitoring

Sensors that monitor actual UV intensity are available that provide assurance of needed UV dose at all times. Available for all UVMatrix products.

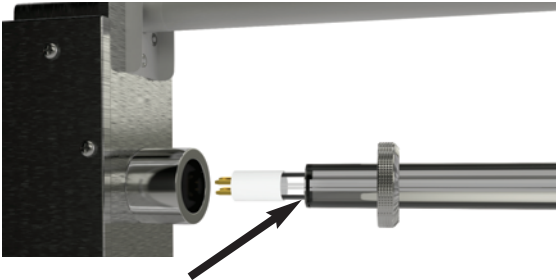
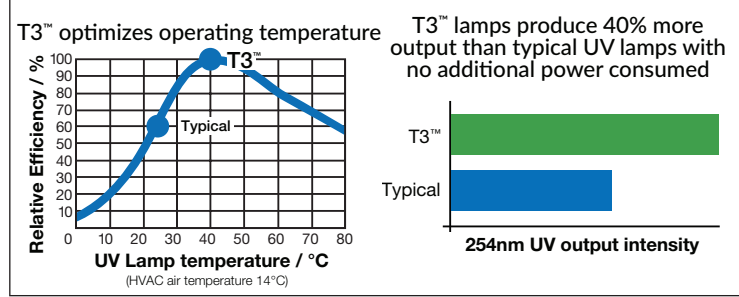


Microbials killed by UV-C light

- | | | | | | |
|------------------------|------------------|------------------------|-------------------------|---------------------------|------------------------|
| Bacteria | Ragweed | Humidifier Fever | Neoformans | Mycrobacterium aviumintra | Neisseria meningitidis |
| Viruses | Dust mites | Microplasma pneumoniae | Mucor | Streptococcus pyogenes | Moraxella |
| Legionella pneumophila | Measles | Penicillium expensum | Aspergillus niger | Bacillus anthracis | Acinetobacter |
| Molds | Tuberculosis | Cryptococcus | Adenovirus | Cornebacterium diptheria | Haemophilus influenzae |
| Fungi | Chicken Pox | Stachybotrys atra | Coxsackievirus | Serratia marcescens | Pseudomonas aeruginosa |
| | SARS Coronavirus | | Mycrobacterium kansasii | | |



Continually clean and efficient: Without UV, manual / chemical cleanings are needed to restore efficiency, but performance begins to degrade almost immediately. Peak operation is limited. UV disinfection maintains peak efficiency for substantial energy conservation.



T3™ design encases UV lamps in protective quartz glass sleeves that insulate the lamp from the cold HVAC airstream, allowing them to operate at optimum temperature

Warranty

Ultravation® UVMatrix™ commercial application products are covered by Ultravation's Lifetime Warranty*
 *when used with genuine Ultravation UV lamps

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UVMatrix™ SI

HVAC coil and interior surface disinfection

The **UVMatrix SI-Series** is an innovative UV equipment design that stresses germicidal effectiveness as well as HVAC energy efficiency. It is also engineered to facilitate installation, maintenance, longevity and a low cost of ownership.

- Built-in expansion system assures excellent fit and UV exposure
- Stainless steel construction available
- Complete system — no extra framework or hardware to purchase
- Rapid return on investment
- Reduces wear and tear, extends HVAC lifespan
- Complete assessment and sizing service provided



Ultravation SI Series is protected under U.S. Patent #7419642B2



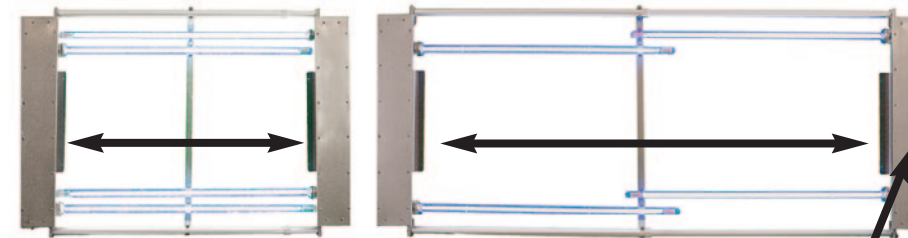
UVMatrix™ CP system monitoring with elapsed time display and available real-time UVC intensity display with individual lamp performance sensors and remote alarm triggers.

Factory techs available for installation: Ultravation engineers are available to assist with specifying product configuration and sizing, as well as provide on site installation.



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Expands to fit any HVAC system, new or retrofit

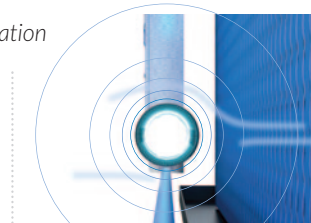
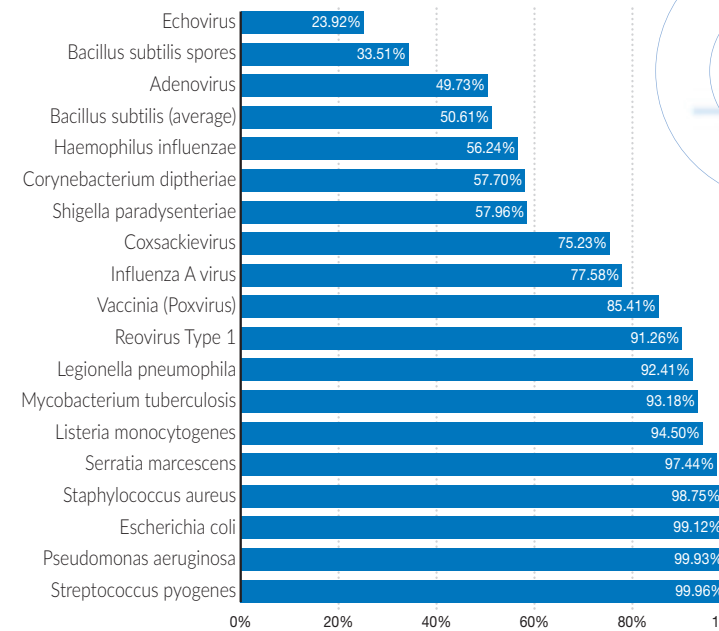


The SI-Series extends for perfect fit — sliding adjustability widens for exact fit! Ensures optimized UV coverage for all air handlers. Ships disassembled in a compact carton with 15 minute assembly procedure.

The SI-series is self-contained and does not need additional framework or hardware..

360° UV dispersion maximizes HVAC surface coverage plus airstream disinfection

Results of airstream disinfection from a UVMatrix™ SI installation



Low turbulence T3™ UV lamp design requires no reflective panels on the lamps, extending disinfection 360° for complete coil exposure plus adjacent surfaces — and the airstream itself.



T3™ temperature optimized UV lamps with water-tight connections for tolerance of wet HVAC environments.

UVMatrix™ SI-Series Energy Reduction Results

Measured benefits from adding UV to a clogged HVAC system — from an independent study

System Performance Factors



Energy Used kWh/yr.



Net Energy Savings
112,075 kWh or \$13,090
 Electric rate @ \$0.1168 kWh

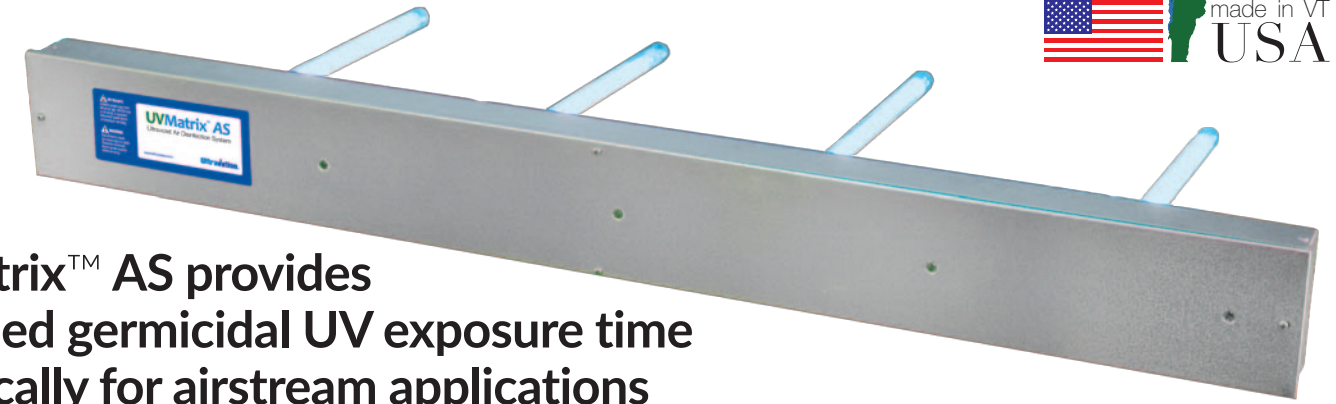
An independent study conducted by and copyright © B. Alan Whitson Company

Ultravation® UVMatrix™ AS airstream disinfection for healthier working environments

The UVMatrix™ AS-Series is capable of exposing airborne microorganisms circulating through an HVAC system to high levels of UVC energy. A major benefit of HVAC airstream disinfection is the reduction of airborne bacteria and viruses that accumulate in one area from being spread to other areas of the building. Another is the ability to apply a very intense germicidal dose with needed exposure or dwell time since people are completely shielded from the germicidal UV light.

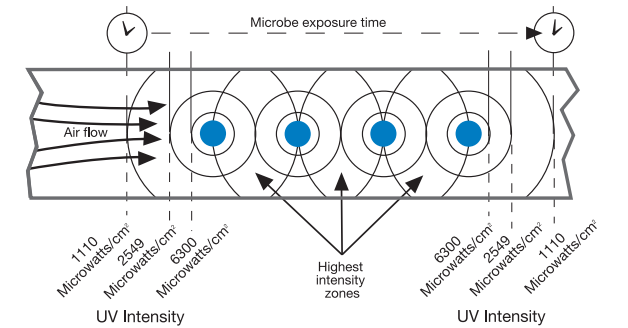
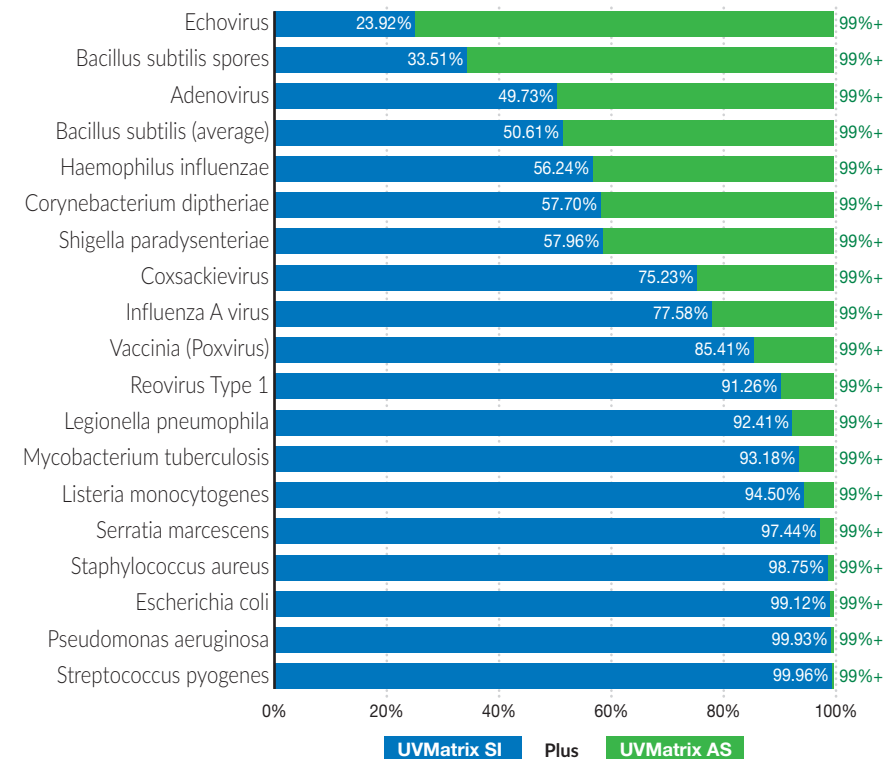
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T3™ T3™ temperature optimized, high intensity UV lamps
Optimized Ultraviolet

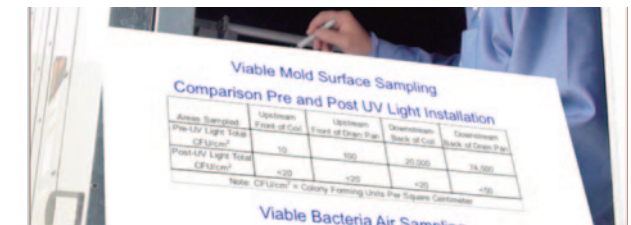


UVMatrix™ AS provides extended germicidal UV exposure time specifically for airstream applications

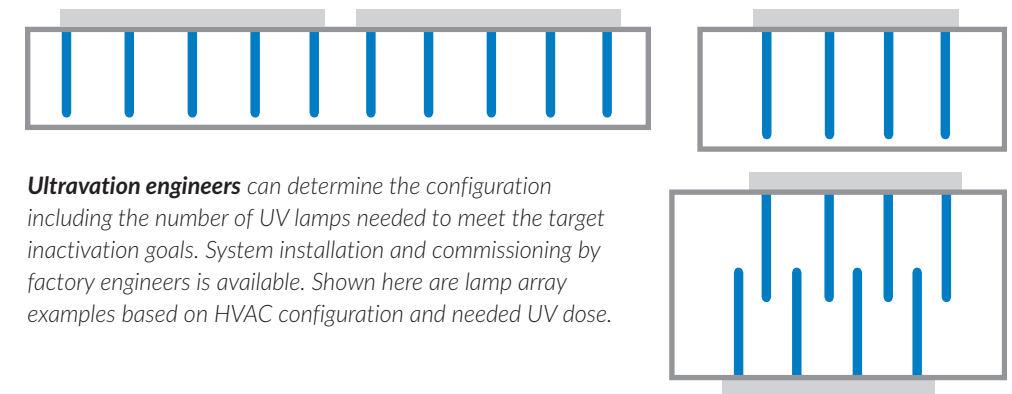
The AS-Series can be configured for nearly any airstream disinfection task. It is often used in tandem with UVMatrix SI as an efficient, unified system that provides coil and surface irradiation while efficiently combining the airstream disinfection of both systems.



Getting the right UV dose: Ultraviolet light disinfection effectiveness is based on UV intensity and duration of contact. UVMatrix™ AS installs in-line along the ductwork to obtain necessary contact time. Pre and post testing can be performed to confirm performance. Realtime monitoring is available.



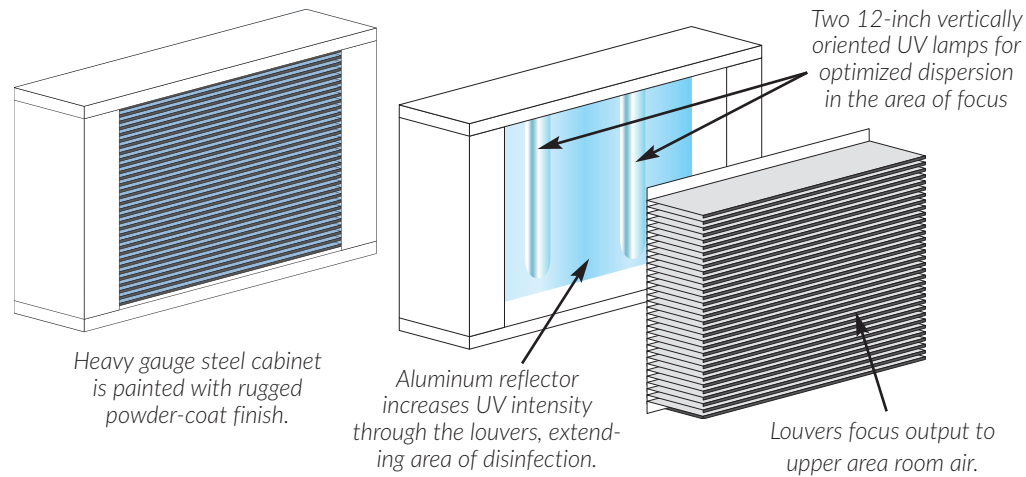
Factory technicians are available for HVAC analysis and UV system installation



Ultravation engineers can determine the configuration including the number of UV lamps needed to meet the target inactivation goals. System installation and commissioning by factory engineers is available. Shown here are lamp array examples based on HVAC configuration and needed UV dose.

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UVMatrix™ FS is an “upper air” system
 that disinfects the air naturally circulating
 in a room

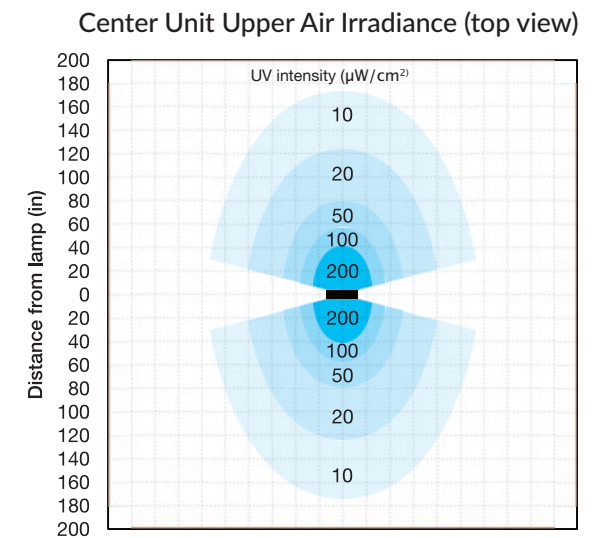
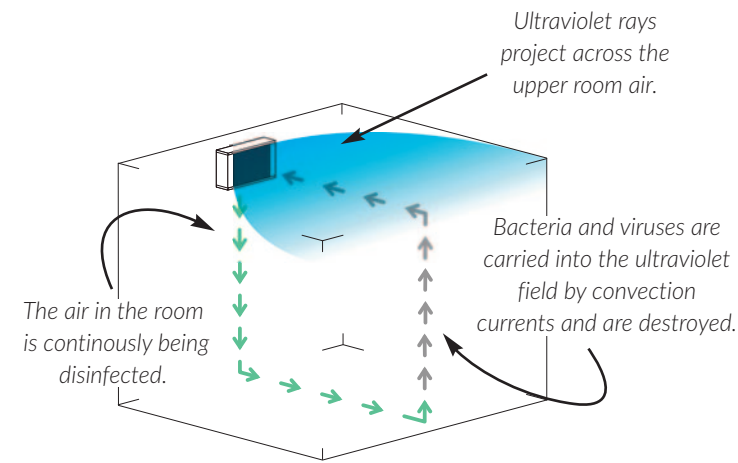
The Ultravation UVMatrix™ FS-Series is a stand-alone UV air disinfection system for use in individual spaces. As air naturally circulates in a room by way of convection, it will all be exposed to germicidal UV light. Yet the design makes it possible for the room to be occupied during the disinfection process – which is the ideal time to reduce the risk of spreading infection. It also provides continual air disinfection. The FS-Series system uses fins or louvers to exclusively and safely direct germicidal ultraviolet rays emitted from two vertical UV lamps across the room’s upper air.



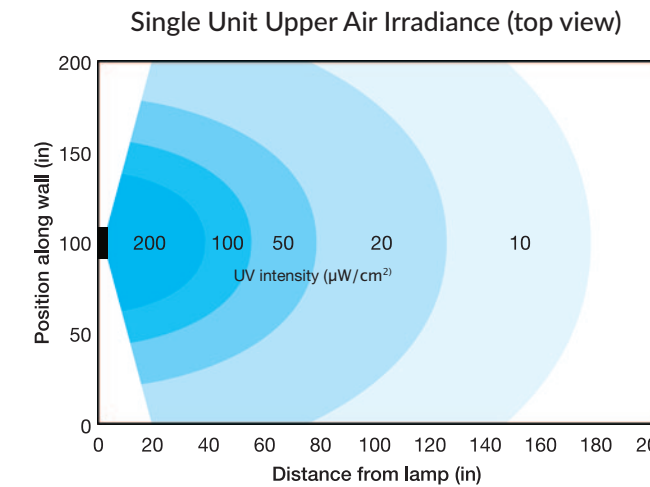
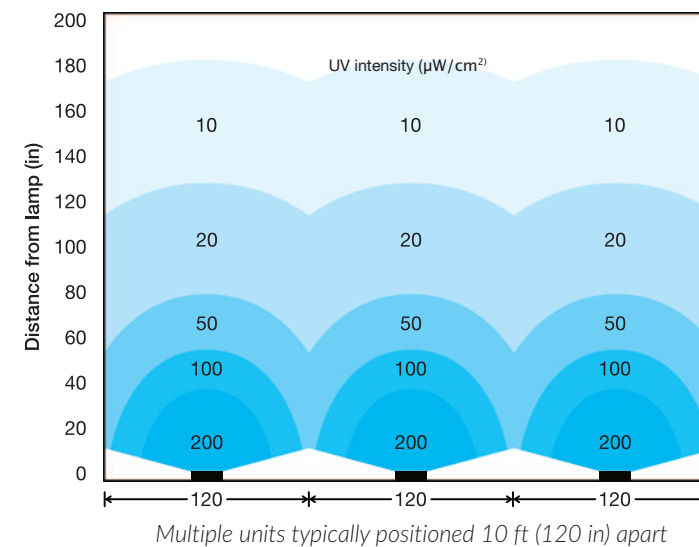
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The 7-foot minimum installation height requirement must be observed to assure the safety of the occupants.

How UVMatrix™ FS uses convection to reduce airborne microbials



Multiple Units Upper Air Irradiance (top view)



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UVMatrix™ Specialized Applications

The same UVMatrix disinfection performance is available in these special application products

Ultravation® UVMatrix™ LCI-Series

Light commercial/industrial UVGI disinfection provides a solution for smaller air handlers or installations that require independent support framework.



Ultravation® UVMatrix™ 4X-Series

For outdoor / rooftop HVAC applications with remote monitoring available.



Ultravation® UVMatrix™ EZ-Light

Design accommodates ice machines and PTAC systems to kill bio-growth and prevent “dirty sock” odors from contaminated cooling coils.



Member:



EPA establishment number: 074725-VT-001

Manufactured in the USA by **Ultravation, Inc.**, PO Box 165, Poultney, VT 05764

Ultravation's T3™ system is protected by US patents 6,809,326B2 and 6,838,057B2
Ultravation's SI-Series™ system design is protected by U.S. patents 7419642B2 and 682805B2

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