optimumair

Indoor Air Quality Solutions

Advanced UV Technology for Eliminating Airborne Pathogens, Bacteria & Viruses

+Improving Indoor Air Quality
+Promoting Sustainability
+Reducing Energy Consumption
+Instituting Green Building Solutions

+Ultraviolet technology for a healthier, safer, cleaner, and more energy efficient building environment

Indoor Air Quality (IAQ) directly affects our wellbeing, productivity, and happiness, whether at school, work or during our leisure time. Healthy IAQ is essential as we may spend more than 90% of our time indoors.

A simple, yet very effective way to improve building IAQ is through the application of ultraviolet (UV) light technology. This energy efficient technology is a well proven solution for removing pollutants associated with poor indoor air quality such as bacteria, viruses, mould, VOCs (volatile organic compounds), and strong odours.

+ Optimum Air can deliver innovative, globally deployed UV solutions

Air

Air disinfection and purification systems installed in thousands of facilities worldwide

Surfaces

Mobile UV devices for infection control deployed in hundreds of hospitals globally

+Optimum Air advanced solutions go beyond traditional HVAC filtration!

TECHNOLOGY	SOLUTIONS	BIOLOGICAL	GASEOUS
UV	Coil Cleaning	✓	
UV	Air Disinfection	✓	
UV/PCO	Air Purification	✓	✓

Traditional filtration alone does not eliminate all biological or gaseous contaminants.

+ Why is indoor Air Quality Important?

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+ The Power of UV

Ultraviolet Light is Lethal to Bacteria, Viruses, and Mold

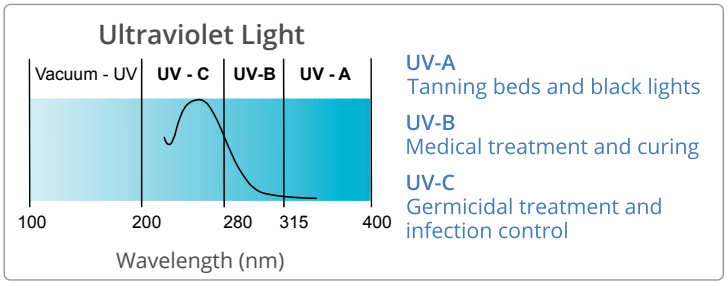
Ultraviolet can be broken down into three bands:

UV-A the most abundant in sunlight; responsible for skin tanning and wrinkles

UV-B primarily responsible for skin reddening and skin cancer; also used for medical treatments

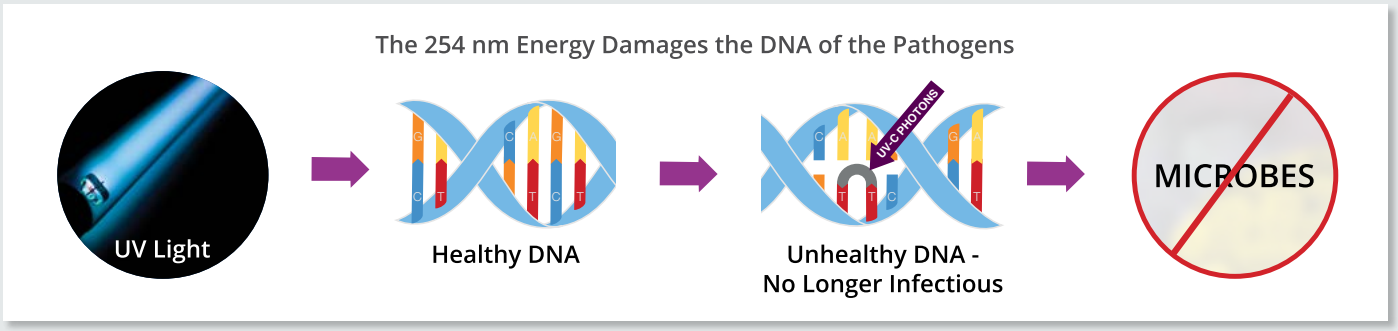
UV-C naturally blocked by the earth's ozone layer and is the germicidal wavelength

UV-C has been safely used for disinfection of microorganisms for over 100 years.



+ How Does UV Disinfect?

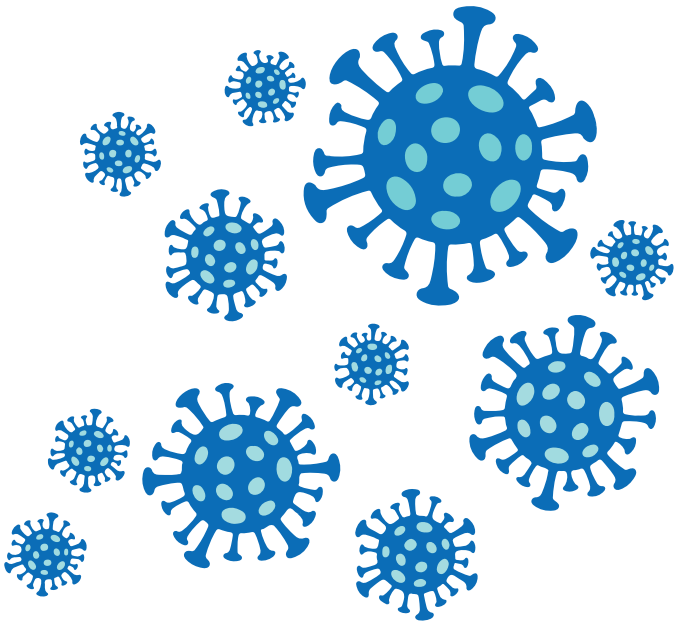
UV-C energy alters the DNA of microorganisms preventing them from reproducing and causing them to become non-pathogenic, or incapable of causing disease.



+ Why UV?

Because Even High Efficiency Filters Don't Remove Particles Smaller than 0.3 Microns!

HVAC filters are designed to only capture particles but not destroy the DNA of the microorganisms. Once captured, they can grow and thrive on the filter material. No other application is as effective as UV for the destruction of bacteria, viruses, and mold. These microorganisms profoundly impact HVAC system performance and building occupant safety and health.



+ Did You Know?

"There are various methods of infectious disease transmission, including contact, transmission by large droplets, and inhalation of airborne particles containing infectious microorganisms. The practice of the HVAC professional in reducing disease transmission is focused primarily on those diseases transmitted by airborne particles."

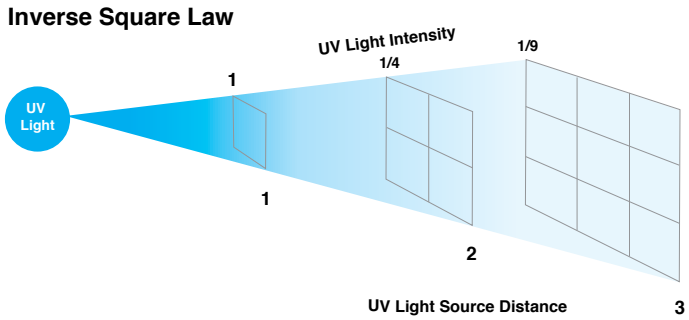
— Source: ASHRAE Position Document on Airborne Infectious Diseases, 2014

+ UV Dose — Critical to System Efficacy

Dose = Intensity x Time

UV dose, typically expressed in mJ/cm^2, J/m^2, or µWs/cm^2, is the total amount of UV intensity delivered over a period of time. UV intensity is a measure of UV energy delivered on a given surface. UV intensity obeys the inverse square law: It decreases as distance from the UV source increases

UV Dose (mJ/cm^2) = UV Intensity (µW/cm^2) x Exposure Time (s)



+ Delivering the Correct Dose for a Specific Application

The dose required to kill biological pathogens is well documented. The application challenge is to insure the targeted organism is exposed to sufficient UV dose in the available space and time of UV exposure.

Organism UV Dose in Micro-watt sec/cm2 for 99% kill factor

Bacteria.....**99%**
Bacillus anthracis spores.....46,200
Escherichia coli.....6,600
Legionella pneumophila.....12,300
Mycobacterium tuberculosis.....10,000
Staphylococcus aureus.....6,458
Pseudomonas aeruginosa.....3,597

Organism UV Dose in Micro-watt sec/cm2 for 99% kill factor

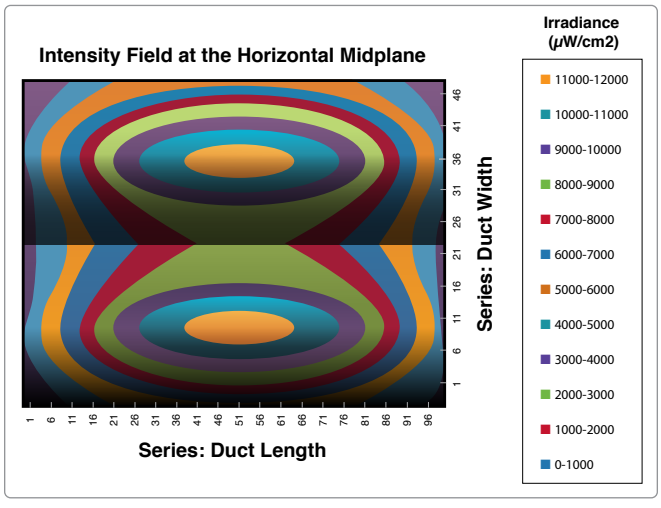
Virus.....**99%**
Influenza A.....4,558
Coronavirus (including MERS).....1,222

Mold.....**99%**
Aspergillus flavus.....99,000
Aspergillus niger.....330,000

+How Does Optimum Air Validate the Correct Delivered Dose?

Engineering Modeling Software

To ensure the proper dose is applied, software is used to model the lamp quantity and system arrangement needed for the specific application. The output of this modeling produces a very detailed report showing intensity distribution and kill rates. Factors impacting dose include: spatial constraints, airflow volume, speed, temperature, and UV device geometry and intensity.



Output Example of Engineering Modeling Software

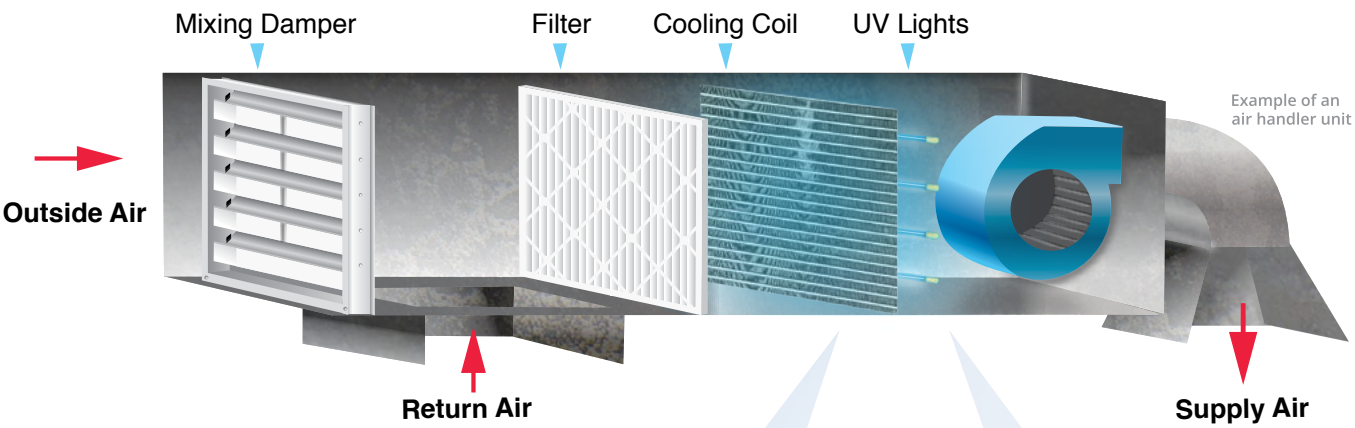
"The results of the program have been **validated in a series of some 30 laboratory tests** in which various microbes and UVGI systems were tested in two different laboratories. The results indicated **excellent accuracy..**"

W.J. Kowalski, PE, PhD
The Indoor Environment Center
The Pennsylvania State University

+Coil Cleaning

Coil Cleaning Systems Save Energy and Money!

UV Destroys the Microbiological Biofilm that Thrives in the Moist Coil Environment



Clogged Coil | UV Destroys Biofilm | Clean Coil Post UV

UV coil systems are typically installed downstream of the evaporator coil to destroy bacteria, mold, and organic matter that grows and collects on cooling coils and surrounding areas.

+Benefits of Coil Cleaning

Healthy Air Supply

UV energy destroys bacteria and mold that grow on the moist coil and drain pan surfaces eliminating “blow-off” of these into the air supply. This ensures that clean airflow is cooled by the coil without cross contamination.

Energy Savings

Maintaining a coil free of microbial growth will maximize coil heat transfer efficiency and reduce energy consumption up to 15% in some systems.

Better Comfort

Coil disinfection prevents biofilm accumulation on fins resulting in effective heat transfer with better temperature and humidity control.

Reduced Maintenance Cost and Less Downtime

UV energy ensures the cooling coil remains clean at all times, eliminating costly coil cleaning maintenance and reducing system downtime.

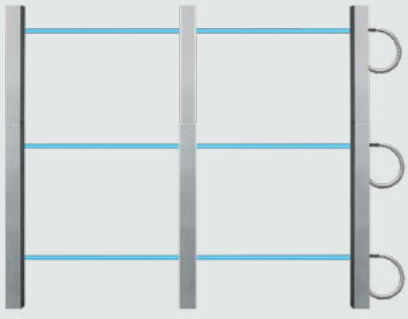
+ V-MAX™ Coil Cleaning

Delivers Optimum UV Dose for Coil Cleaning and Maintenance

+ V-MAX™ Coil Cleaning System Features

- Easy to install in both existing and new equipment
- Scalable design to fit any plenum size
- Fixtures can be mounted internally or externally
- Lamps can be easily mounted on vertical supports
- Negligible pressure drop
- Minimal space required for installation
- Low power consumption with universal voltage input
- Available in 21", 33", 48" and 61" lamp lengths

V-MAX™ Grid for
Coil Cleaning



+ Air Disinfection

Air Disinfection Systems Kill Airborne Pathogens 24/7

Airborne Pathogens are Eliminated as Air Passes through High Intensity UV

+Eliminates Viruses & Bacteria - up to 99% Kill Rate

• In facilities such as hospitals, schools, airports, and commercial buildings, airborne pathogens can spread through the air system threatening the health of occupants

• In-duct UV systems are designed to disinfect air as it passes through the HVAC system and irradiate the entire cross-section of a duct at high intensities

+ Benefits of Air Disinfection

Provide Healthy Indoor Air

UV disinfection reduces airborne infectious microorganisms that can cause the spread of illness and decreases instances of people becoming sick due to contamination by microorganisms such as viruses and bacteria.

Better Patient Outcomes in Hospitals

Assists in reducing HAIs (Hospital-Acquired Infections) when air disinfection and surface disinfection systems are used together.

Reduced Sick Days

Healthy indoor air helps minimize absenteeism and increases employee comfort and productivity.

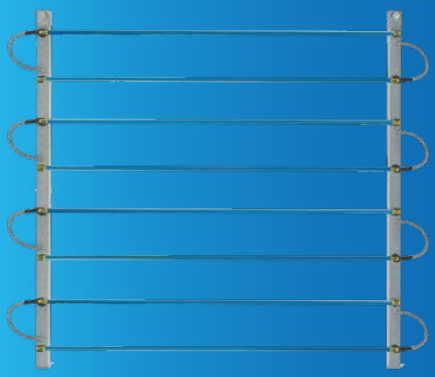
+ V-MAX™ Air Disinfection

Delivers Optimum UV Dose for Eliminating Airborne Pathogens

V-MAX™

+ In-Duct Air Disinfection System

- Designed for duct-mounting parallel to the airstream providing optimum UV exposure
- Fixtures can be mounted internally or externally on the duct
- Configurable to meet airstream kill rates up to 99% - backed by computational models to ensure performance
- Prewired lamp connection reduces installation time
- Low power consumption with universal voltage input
- Available in 21”, 33”, 48” and 61” lamp lengths



V-MAX™ Grid

+ AHU Air Disinfection System

- Easy to install in both existing and new equipment
- Scalable design to fit any plenum size
- Lamps can be easily mounted on vertical supports
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- Minimal space required for installation
- Negligible pressure drop
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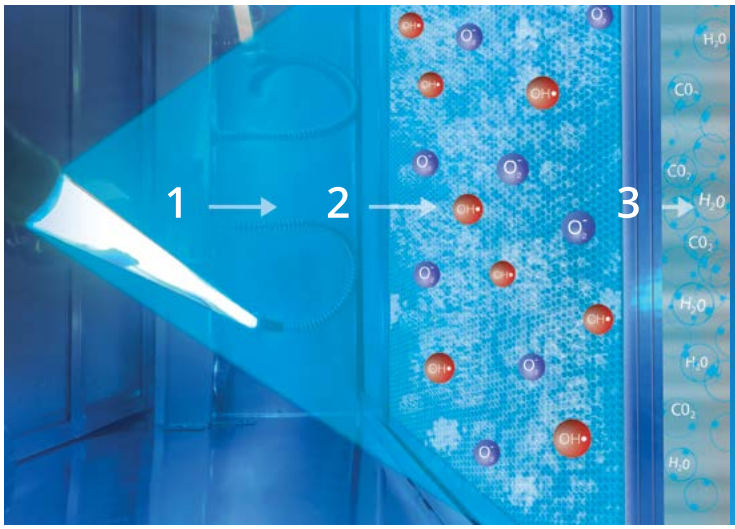
+ Air Purification

V-PAC™ - The Next Generation of Air Purification

Sustainable and More Effective than Typical Filtration



Eliminates VOCs & Odors

01. When UV light illuminates our titanium di-oxide (Ti02) coated photocatalytic oxidation (PCO) panel, an activation process begins.

02. The activation generates highly reactive hydroxyl radicals and super-oxide ions resulting in a strong chemical “oxidizing” reaction between the supercharged ions and gaseous pollutants such as VOCs and odor molecules.

03. This breaks the pollutant down into harmless carbon dioxide and water molecules, making the air more purified!

+ Benefits of Air Purification

Positive Impact on Occupant Health

Removes interior and exterior gaseous pollution sources such as tobacco smoke, cleaning solvents, off-gassing from building materials, human metabolic by-products, vehicle exhaust, jet fumes, manufacturing process emissions, and agriculture process emissions that cause illnesses.

Saves Energy

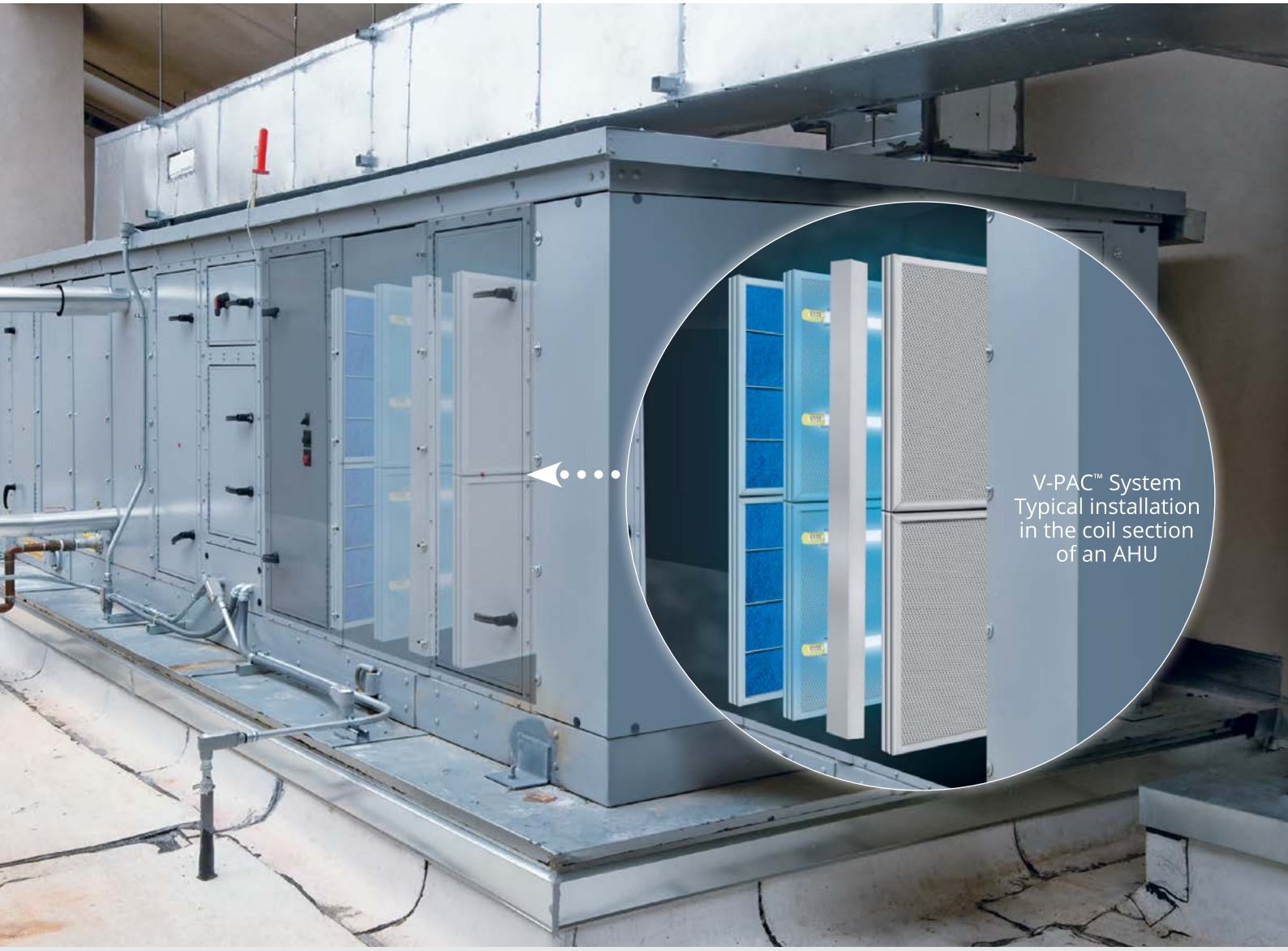
Reduces make-up air requirements for dilution and has low power consumption.

Environmentally-friendly

Chemical-free and, unlike other air purification technologies, does not produce ozone.

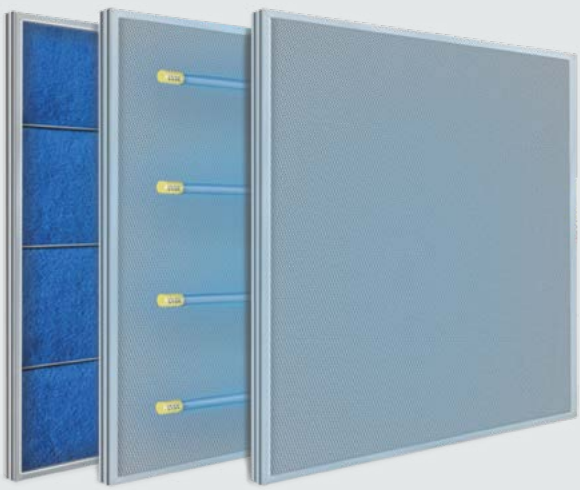
+ V-PAC™

V-PAC™ Air Purification System Purifies and Disinfects Your Air



+ V-PAC™ System Features

- Easy to install in both existing and new equipment
- Scalable design to fit any plenum size
- Photocatalytic Panels (PCO) and BPS™ Lite Activated Carbon Panels are designed for installation in standard filter tracks
- Utilizes V-MAX™ high output lamp systems
- Negligible pressure drop
- Complete system will fit in an airflow length that is as little as 9”
- Virus and bacteria reduction



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