

ACTIVE AIR CLEANING WITH VARIONIX®

BIPOLAR IONIZATION

TECHNOLOGY

How can you avoid or alleviate the contamination of your building? Advanced air purification solutions are vital. Varionix systems, when installed in the existing HVAC systems of buildings or as a standalone unit, actively and efficiently eliminate microbes and viruses at the source, from the indoor air. In this way, they remove the risk of HVAC systems contaminating entire buildings by delivering and depositing infectious particles. The continuous application of bipolar cluster ions emitted to ambient air is the most effective air purifying technology for decontaminating indoor air safely. This also keeps circulating air actively safe, clean, and free of odors and VOCs

BENEFITS OF VARIONIX® TECHNOLOGY

- ✓ Active air cleaning technology that works in the air we breathe, seeking out and disinfecting contaminants at their source.
- ✓ Varionix® technology is tested to decontaminate influenza and coronaviruses from the air completely within minutes.
- ✓ Reduction of other common irritants. Bipolar cluster ions break down toxic gases and compounds from dangerous chemicals such as cleaning products, pesticides, paints, solvents, mold, mildew, and more.
- ✓ A fresh, clean building. Bipolar cluster ions break down odors at their source and neutralizes them. No diluting!
- ✓ Environmentally friendly. The Varionix® Bipolar Ionization System is a safe, natural, and environmentally friendly process. Varionix® technology uses no chemicals, heavy metals, or mercury, and produces no harmful by-products.
- ✓ Varionix® cluster ion technology works actively in the occupied space, at the source of the contaminants so there is no need to recycle the air through a filter device, nor to increase the air exchange rate to eradicate Coronavirus.
- ✓ For your convenience also standalone devices are available for setting on the floor or suspending from the wall or ceiling.
- ✓ Improved energy — and financial — conservation. Recycling conditioned, purified air reduces the need for cooling or warming the ambient air, giving an opportunity to save energy costs up to 70%.
- ✓ Varionix technology is the most efficient way to keep your buildings indoor air as safe as possible while occupied.



IN THE PAST, IMPROVING INDOOR AIR QUALITY WAS OFTEN THOUGHT AS A LUXURY, NOW IT NEEDS TO BE CONSIDERED AS ESSENTIAL.



HOW BIPOLAR IONIZATION WORKS?

IONS AND IONIZATION

Ionization is a process where an electrically neutral atom or molecule acquires either a positive or a negative electrical charge. The Varionix® ionization technology uses alternating current (AC) and forms clouds of negative and positive ions, resulting in a non-thermal unstable gas plasma in the air. The ions generated by Varionix® devices belong to mainly small and middle-sized ions. The most important negative ion is the superoxide radical anion O_2^- that can also form hydrates $O_2 \cdot (H_2O)_m$ (where m is a natural number). These intermediate species are collectively called "cluster ions". Water (H_2O) molecules in the cluster ions protect the ionized molecule from neutralization. The small ions have a relatively short lifetime, but the cluster ions, on the contrary, have a lifetime long enough to make them applicable for active air purifying purposes.

The Dielectric Barrier Discharge (DBD) ion generation (cluster ions) of Varionix® Bipolar Ionization systems avoids high particle deposition or a spontaneous attachment of particles to surfaces. This high particle deposition, also known as "Brown Wall Syndrome" is one of the issues with needlepoint ionization technology and not an issue with Varionix Bipolar Ionization systems

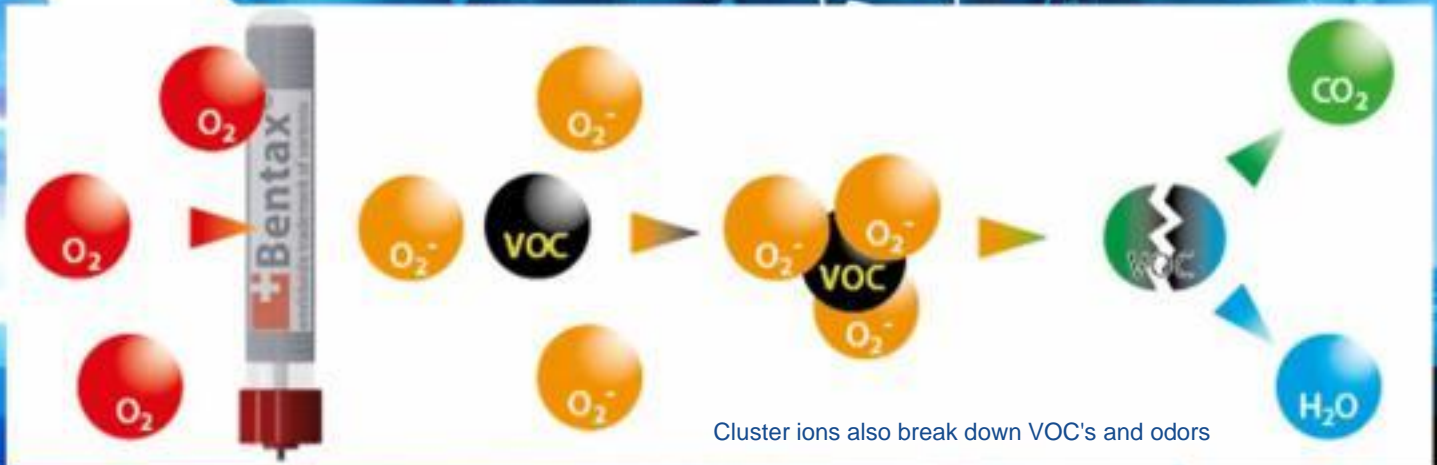
The ionization cannot be seen but its presence will result in fresh and clean air. The airflow distributes the energized cluster ions produced by an in-duct unit into all spaces served by the HVAC system, or into the application space if a standalone unit is used. Unlike most air purification systems, Varionix® seeks out particulates and contaminants, including viruses, molds, bacteria, and germs, and does not wait for pollutants to find their way into the filter within the air handler. Instead charged ions track down and destroy the contaminants in

MECHANISM FOR INACTIVATING AIRBORNE VIRUS

The positive (H^+) and negative (O_2^-) ions surround the hemagglutinin (surface proteins that form on organisms and trigger infections) and change into highly reactive OH groups called hydroxyl radicals ($\bullet OH$). These take a hydrogen molecule from the hemagglutinin and change into water (H_2O). The ions destroy the virus' surface structure, for example its envelopes and spikes, on a molecular level. As a result, the virus cannot infect even if it enters the body.

MECHANISM FOR INACTIVATING BACTERIA, FUNGI, AND OTHER MICROBES

The positive (H^+) and negative (O_2^-) ions cluster together on the surface of mold, bacteria, or fungi, causing a chemical reaction that results in the creation of highly reactive OH groups called hydroxyl radicals ($\bullet OH$). The hydroxyl radical will take a hydrogen molecule from the cell wall of an airborne mold, bacteria, or fungi particle.



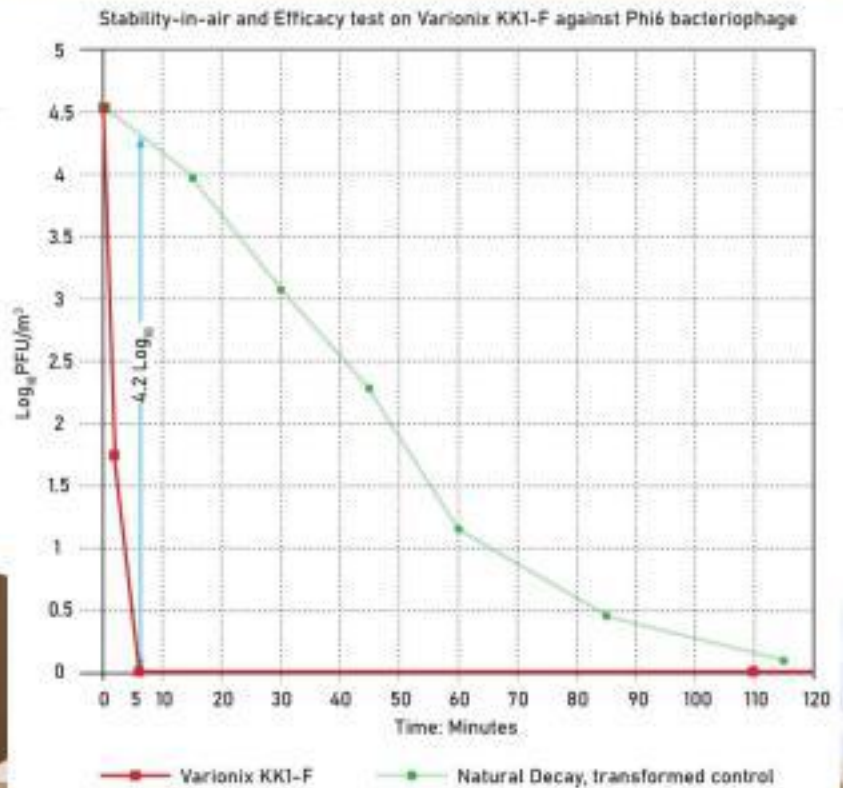
HISTORY AND SCIENTIFIC STUDIES Air ionization has a long history of varied applications. Studies on controllable air ionization processes have led to applications for chemical and biological decontamination in indoor environments. These include significant reductions in airborne viruses, microbes (mold, bacteria, and fungi), neutralization of odors, and reduction of VOC's. Also, removal of very fine particulates (PMx) is enhanced by air ionization. The continuous application of bipolar cluster ions emitted to ambient air is the most effective air purifying technology for decontaminating indoor air safely. You don't have to hope the germs will make their way back to an air filter and be trapped there. This keeps circulating air actively safe and cleaner and free of odors and VOCs.

CLUSTER IONS IMMEDIATELY SEEK
OUT THE CORONAVIRUS AND
COMPLETELY DESTROY IT FROM
THE AIR IN MATTER OF MINUTES.



CORONAVIRUS CONCERNS

Although health experts are still trying to understand all of the possible ways for COVID-19 to propagate, it is widely believed to spread through aerosols lingering in the air for several hours. Typical air handling systems are not designed to eliminate all of these micro-droplets and therefore can help spread them from room to room. Even with mask mandates in the office, if an employee takes off their mask, in the privacy of their office, and sneezes the virus can be easily spread through the whole building or at least the section served by the same HVAC system.



The coronavirus was completely gone from the air in 5 minutes 24 seconds.
The test was made (8/18/20) by 3rd party laboratory, CREM Co Labs.

ACTIVE AIR CLEANING TECHNOLOGY BY VARIONIX IS VERIFIED TO DESTROY CORONAVIRUS IN THE AIR

The testing used a 918 ft³ size real-life situation simulation chamber, proving that bipolar ionization by Varionex® technology can actively cleanse the air in spaces like office or classrooms, instead of only reducing contaminants from the airflow in the duct or air handling unit.

The newest series of tests was performed by CREM Co Labs (Mississauga, ON, Canada) according to Air Decontamination Protocol based on U.S. EPA Guidelines OCSPP 810.2500 for efficacy Test Recommendations on Air Sanitizers. They concluded that there was a 99.9% disinfection rate in 184 seconds, among the influenza and coronavirus (including SARS-CoV-2 virus that causes COVID-19) surrogate Phi6. And after 5 minutes, 24 seconds (384 seconds), there was a 99.993% disinfection rate. The bacteriophage Phi6 used in this test is a surrogate for enveloped viruses such as influenza and coronaviruses. CREM Co Labs is a laboratory positioned to provide value to the infection prevention and control (IPAC) industry as well as those working in health-related environmental microbiology and molecular biology.

VARIONIX DBD BIPOLAR IONIZATION IS
 PROVEN TO BE THE MOST EFFICIENT
 TECHNOLOGY AVAILABLE FOR
 DECONTAMINATING INDOOR AIR



WHY TO CHOOSE VARIONIX® TECHNOLOGY?

	VARIONIX® BPI TECHNOLOGY	NEEDLEPOINT IONIZATION	UV LIGHT	PCO	MEDIA FILTRATION	CARBON FILTERS
Active air cleaning	YES	NO	NO	YES	NO	NO
VOC reduction	YES	LOW	NO	NO	NO	YES
Odor reduction	YES	NO	NO	NO	NO	YES
Particle reduction	YES	LOW	NO	NO	YES	NO
Low pressure drop	YES	YES	YES	YES	NO	NO
Industrial applications	YES	NO	YES	NO	YES	YES
Large scale capability	YES	NO	YES	NO	YES	YES

EFFICIENCY OF DISINFECTING CORONAVIRUS

Varionix® DBD Bipolar Ionization 99.9% in 3 minutes, negative ion concentration 300 cc

DBD Bipolar Ionization composite tubes 99.9% in 30 minutes, negative ion concentration 1,500 cc

90% in 60 minutes, ion concentration 300,000,000 cc

Needlepoint Bipolar Ionization

SOME OF THE VARIONIX® CUSTOMERS



MONSTER
ENERGY



AIRBUS



Mercedes-Benz

1. THE FASTEST WAY TO DISINFECT THE AIR YOU BREATHE
2. THE MOST EFFICIENT TECHNOLOGY TO ACTIVELY DECONTAMINATE INFLUENZA AND CORONAVIRUS
3. AIR CLEANING WORKS IMMEDIATELY WHEN SOMEONE SNEEZES OR COUGHS, AT IT'S SOURCE
4. NO HARMFUL BY-PRODUCTS OR HEAVY METALS
5. WORKS ON ALL MICROBES INCLUDING MOLD
6. REMOVES ODORS AND VOCS
7. IONIZATION TUBES x2.5 LIFETIME UP TO 45,000 HOURS

- ✓ > 10,000 BUILDINGS
- ✓ > 40,000 SYSTEMS installed
- ✓ > 170 MILLION ft² actively purified
- ✓ Made in SWITZERLAND
- ✓ Distributors all over the world

The core of the Varionix technology is the ionization tube fabricated of a proprietary glass alloy. This glass gives the Varionix system superior ion cluster production rates not found in any other device at the lowest possible ozone levels. Varionix's standard VTUX-Tube has a service life of 30,000 hours. The optional long-life VTUX-Tube is rated for 45,000 hours of usage.

When designing a project, the right quantity of tubes is decided and then based on the circumstances the right device is chosen to run them for the best possible outcome.

VARIONIX® PRODUCT LINES

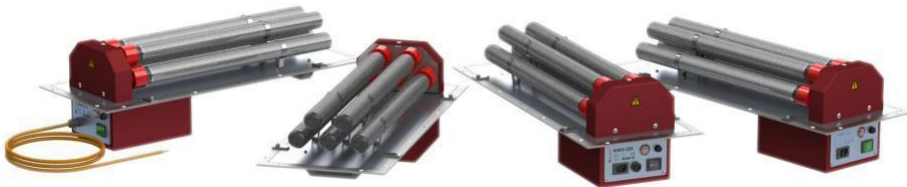


IM-SERIES



Used in large HVAC systems
 Tubes: 8, 12, 16, or 24 pcs.(tube sizes F/E)
 In-duct air cleaning capacity: 40,000-120,000 CFM
 Return air cleaning capacity: 160,000-480,000 CFM
 Active air cleaning area: 32,000-96,000 ft²
 Power consumption: 55-165 W (single-phase 115V)
 Mounting: In-duct / AHU / Slide-in rails

K-H-SERIES



Used in mid-size and large HVAC systems
 Tubes: 5 pcs.(Tube size F)
 In-duct air cleaning capacity: 25,000 CFM
 Return air cleaning capacity: 100,000 CFM
 Active air cleaning area: 20,000 ft²
 Power consumption: 42 W (single-phase 115V)
 Mounting: In-duct / AHU / OEM

K-K-SERIES



Used in small to mid-size HVAC systems
 Tubes: 1 or 2 pcs. (tube sizes F/E/D/C)
 In-duct air cleaning capacity: 5,000-10,000 CFM
 Return air cleaning capacity: 20,000-40,000 CFM
 Active air cleaning area: 2,500-8,000 ft²
 Power consumption: 2,6-6,4 W (single-phase 115V)
 Mounting: In-duct / AHU / OEM

K-D-SERIES



Used as standalone or in small HVAC systems
 Tubes: 1 pc. (tube sizes F/E/D/C)
 In-duct air cleaning capacity: 5,000-10,000 CFM
 Return air cleaning capacity: 20,000-40,000 CFM
 Active air cleaning area: 150-4,000 ft²
 Power consumption: 2,6-18,4 W (single-phase 115V)
 Mounting: In-duct / AHU

Standalone version with a fan for ion distribution

All the suggested air cleaning capacities are for typical office building's HVAC system configurations.