



Smart Systems featuring Cold Plasma Bi-Polar Ionization Technology



Raising the IQ in IAQ

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ActiveAir Solutions- Developing Smart Systems to Improve Indoor Air Quality (IAQ)

ActiveAir Solutions specializes in providing intelligent, energy reducing air purification systems for indoor building environments. Our unique and proven air purification process will allow for significant and measurable energy reductions while also being able to dramatically reduce, control or eliminate airborne particulates, odors, germs, viruses, bacteria, volatile organic compounds, mold spores and other airborne contaminants that make their way through conventional filtration systems.

ActiveAir's smart systems can integrate state of the art, custom sensors to measure volatile organic compounds (VOC's), with the latest innovations in cold plasma bi-polar ionization (BPI) technology, and cutting edge air ion sensors which can interface with current building management systems to provide full control and measurable performance to substantially improve and purify the air we breathe where we live and work! **ActiveAir** products offer every indoor environment the opportunity to sustain the same clean and pure quality of air that is typically only found at higher mountain elevations.

The Environmental Protection Agency (EPA) has deemed Indoor Air Quality (IAQ) one of the top five environmental health risks faced by the USA today! Since both commercial and residential buildings are designed and built to be tighter, thus allowing in less fresh outside air, the EPA states that indoor air pollutant levels are often two to five times – and in many cases as much as 100 times – more than that of outdoor levels. (Source EPA IAQ Reference Guide at www.epa.gov).



Commercial Architecture



How ActiveAir Solutions BPI Technology Systems Work

Airflow through a buildings HVAC system passes over **ActiveAir's** Ion Generator. The generator energizes the air to create a higher concentration of both positive and negative air ions. The airflow then distributes the ions into all of the spaces served by the HVAC/Duct system. The Bi-Polar Ions (BPI) will dramatically affect a greater number and variety of airborne contaminants, as the ions enter into the breathing space, they seek out and neutralize the contaminants at their source. This is vastly superior to most air purification methods that rely on trying to bring all the contaminants through a device in order to be effective and usually suffer from insufficient airflow.

With ActiveAir Solutions– the air cleans itself where you breathe, just as occurs in nature.

How ActiveAir Solutions VOC Sensor Technology Work

German engineered and customized for *ActiveAir Solutions*, our VOC Sensors work by monitoring the changing electrical surface resistance of micro machined metal oxide sensors attached to the sensor insulator through the catalytic oxidation of the VOCs. *ActiveAir's* VOC sensors differ from others as they have been optimized for Demand Controlled Ventilation (DCV) and, utilizing a calibration algorithm, the output is highly correlated to CO2 levels allowing for users to implement the ASHRAE occupancy based VRP algorithm to control ventilation.

ActiveAir's VOC sensors have a less than 60 second response time through multiple LED VOC level indicators and are available to measure VOC's alone or also temperature and humidity.

Using *ActiveAir's* VOC sensors in combination with *ActiveAir's* Ion Generator allows operators to achieve real and measurably improved Indoor Air Quality, not just CO2 dilution.

How ActiveAir Solutions Ion Sensor Technology Systems Work

ActiveAir Solutions Ion Sensor technology has been customized to provide important feedback on IAQ to building management. The units are a small 4"X3.2"X1.6" and can be mounted in duct or plenum to validate both ion levels being delivered to and maintained in the targeted space. Operation involves a sensor contact relay which de-energizes when ion input falls below these factory pre-set detection gradients.

Each sensor has an LED light and direct interface with the building management system to indicate when ion levels have been met.



Office Environments



How ActiveAir Solutions Smart Systems Can Interface with Current or Additional Building Management BPI Technology Systems

Data collected by the *ActiveAir* VOC sensors and the *ActiveAir* Ion Sensors provide real time information to building operators on the performance of the *ActiveAir* Ion Generator and overall IAQ in a building space. Not only does this qualify operators to save significant energy by implementing the ASHRAE IAQ Procedure to reduce the volume of outside air, but ventilation can be further controlled either manually or automated to match the specific demands within the various parts of a building affecting IAQ. These demands could range from a variety of sources including but not limited to unusual flow or behavior of occupants, building cleaning or maintenance, new carpeting, décor, or furniture, or the introduction of atypical outside air pollutants.

The Smart Solutions from ActiveAir are raising the IQ in IAQ!

ActiveAir Solutions – Features & Benefits

ActiveAir's air purification (BPI) technology allows for measurable energy reduction while improving indoor air quality. Bi-polar ionization technology significantly reduces airborne contaminants such as, VOC's, bacteria, odors and also allows buildings to lower outside ventilation rates thus reducing HVAC energy costs. These systems can be designed into both new and existing buildings.

- **Particle Decay** – Particles are removed from the breathing range to the floor. Since (BPI) bi-polar ionization will go to the source of contamination, a larger percentage of particles are affected than with filter systems. It has the effective filtering capability of MERV 13 filtration without the static load on the air system. Ions interact with airborne particulates and cause them to be attracted together and bond with air ions. This is the process of “agglomeration”. Particles become larger in weight and size, these will now be a) trapped by the filter when drawn through the air return or b) drop from the breathing space to the floor. Resulting in air free from particulates where you breathe!



Hospitality



- **VOC and Odor Reduction** – Chemical off-gases and odors are eliminated by the interaction with ionized air, eliminating the use of masking agents that add to indoor pollution. Chemical off-gases occur from most building products, paints, flooring, furniture etc., as well as cleaning products, pesticides, solvents, mold, and mildew among other sources. They are irritating in most cases and toxic in many cases. BPI will interact with VOC's and break down their complex hydrocarbon chains into simple harmless elements such as carbon dioxide and water vapor in minute amounts.



Education Facilities



- **Microbial Reduction** – Airborne mold spores, bacteria and viruses (i.e.; Staph, MRSA, H1N1 etc.) are reduced by particle decay as well as by ionized air affecting their DNA and disturbing their reproductive cycle. Thereby affecting their ability to reproduce. The mold, bacteria or viruses stop growing and increasing in numbers as they normally would. Rather their numbers reduce and become less viable.
- **Energy Conservation** – By utilizing **ActiveAir** BPI, the ASHRAE IAQ Procedure can be utilized to reduce the volume of outside air while providing the above benefits and greatly improving the indoor air quality. Capital expenses on new installations are reduced through downsizing of HVAC equipment and infrastructure when utilizing the procedure. The energy savings can be significant and must be determined on a case by case basis.
- **LEED Credits** can be achieved such as – ID Credit 1: innovation in Design (1-5 Points), IEQ Credit 2: Increased Ventilation (1 Point), IEQ Credit 3.2: Construction Indoor Air Quality Management Plan – Before Occupancy (1 Point), IEQ Credit 5: Indoor Chemical and Pollutant Source Control (1 Point)
- **Static Electricity Removal**– with the use of **ActiveAir** BPI technology, the indoor environment is statically neutralized and static charges are eliminated.



Retail





Medical Facilities



ActiveAir Solutions Benefits Summary

- The only BPI product to have passed the UL 867 2007 ozone chamber & peak ozone test.
- Removes a wide range of airborne contaminants.
- Commercial, industrial and residential applications.
- Substantial energy cost reductions possible.
- Does not require increasing mechanical equipment, thereby keeping operating costs lower, allowing for a pre-design downsizing of HVAC systems to further costs savings.
- Does not increase fan static pressure; therefore does not require upgrading mechanical size and power.
- Lower HVAC operating costs via reduced outside air, and/or downsized mechanical equipment.
- Happier, healthier employees....tenants....guests....patients etc.
- Reduced absenteeism = increased or higher productivity.
- Can qualify a building owner for LEED credits in a number of categories.
- Clean, healthier air environments are an excellent marketing differentiator for building owners looking to lease out space.
- Rapid non-invasive installation, no disruptive down time during installation.
- Minimal maintenance with no need for ongoing operating replacement parts.

The buildings that incorporate **ActiveAir's** BPI technology benefit from a superior Indoor Air Quality that is a marketable commodity creating an environment that many people with asthma, allergies, and sensitivities to Airborne Contaminants or odors will benefit from. Building owners, landlords and tenants each can benefit financially in many ways by offering or working in buildings with **ActiveAir's** Cold Plasma Bi-Polar ionization Technology!



Assisted Living Facilities





Arenas



ActiveAir BPI Technology vs. Other Methods

ActiveAir Bi-Polar Ionization

- Disinfects air by producing and distributing a controlled amount of positive and negative air ions, which interact with oppositely charged elements.
- Does not rely on contaminants passing through the unit to be cleaned, the bi-polar process allows for air cleaning to occur within the desired space treating a larger volume of air within the breathing range.
- ActiveAir's BPI technology does not produce harmful chemicals or bi-products such as ultraviolet (UV) and ozone.
- Effective against bacteria, spores, VOC's and particulates.
- Will treat the source of contamination.
- Can be incorporated into central HVAC systems or used as standalone units.
- Will not restrict airflow when incorporated into central systems.

HEPA (High Efficiency Particulate Air) Filtration

- Pleated type filter that have proven 99.97% efficient to trap particles 0.3 microns and larger.
- Cannot treat source of contaminants, can only filter contaminated air from entering an area.
- Is not effective on many mold spores, bacteria and viruses.
- Is not effective on VOC's, gases and most odors.
- Will restrict airflow when incorporated into central systems and increase energy costs.
- Requires several maintenance visits to replace used filters each year.



Fitness

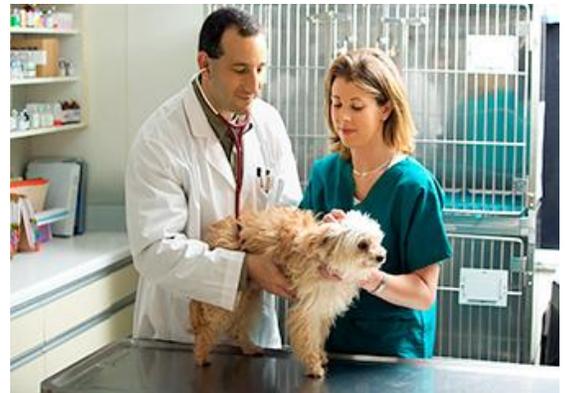


Ultra-Violet light Purification

- Disinfects by passing air through ultra-violet light.
- Can be incorporated into central HVAC systems or used as standalone units.
- UV light can only treat contaminants that pass directly through the light field. Ambient air that does not enter through the light field will not be affected.
- UV is dependent on contaminants being exposed to the light field for a time period long enough for the contaminant to be treated.
- UV is dangerous when exposed to humans.
- Some elements (for example Aspergillus Niger) are resistant to UV altogether.
- Is not effective on VOC's, gases and odors.
- Is not effective in reducing particulate levels
- Some of these systems produce undesirable ozone levels.
- Requires maintenance each year to replace worn bulbs.



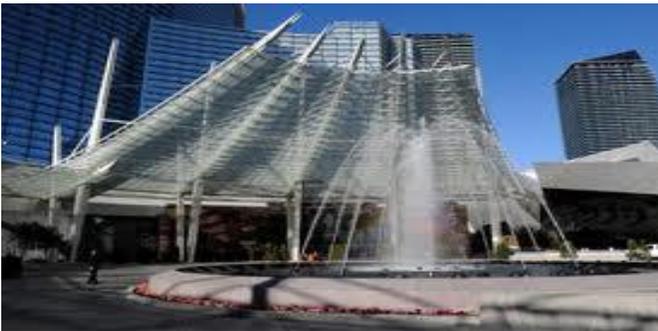
Veterinary



Electronic Air Cleaners

- Charges particles by generating single polarity ions to pass through the unit to attract to an oppositely charged collector cell.
- Uses high energy (up to 25,000 volts) to produce ions.
- Mostly ineffective against bacteria, spores, odors and voc compounds.
- Requires maintenance (sometimes monthly) to clean collector cells or unit's effectiveness will diminish.
- Can only treat air which passes through the collector cell.
- High energy used to generate ions will create harmful ozone.

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