



Energy • Environment • Sustainability



**HIGH**  
PERFORMANCE  
engineering solutions

[www.ensavior.com](http://www.ensavior.com)



## ENSAVIOR

*“In this age of globalization, the smarter and healthier buildings require high-performance engineering solutions.*

*Today is the need for businesses to make a switch to best engineering practices and promote environmentally responsible products and services”*



# Who we are



## Ensuring Quality, Retaining Trust

Ensavior was founded on the belief that the smarter and healthier buildings require high-performance engineering solutions which stem from adopting best engineering practices and promoting products and services in environmentally responsible ways.

We combine state of the art products and professional engineering expertise with a special emphasis on Economic, Environmental and Social Sustainability to exceed our customer's expectations and provide them with fast, thorough and innovative solutions.

Ensavior is a full-service Design, Engineering, Sales and Maintenance firm providing various services in Heating, Ventilation, Air conditioning (HVAC), Public Health Engineering (PHE), Fire. These services include, but are not limited to the following:

- Pumps for HVAC, Plumbing, Fire
- Pressure Maintaining System
- Automatic Balancing & PICV Valves
- Customised Air Purification
- Gas Phase Filtration System
- Ultra Violet Germicidal Irradiation (UVGI) System
- Electrostatic Precipitation System;
- HVAC Sensors & Transducers.
- Gas Leak Detection Systems
- Thermal Energy Storage System;
- Water Filtration for Suspended Solids
- Electrolytic Scale Treatment (EST) System for Dissolved Salts
- Condenser Cleaning System (Automatic Tube Cleaning System)
- Deaeration System

We engage in the project right from the conceptualization stage and thereby help in right selection, optimum design and implementation of most energy-efficient products. Besides that, we ensure on-site job training to project managers, facility managers and operators so that the systems are operated in most efficient and simplest manner. Based on the needs of the project, we also undertake the operation and maintenance of the system for which we have back up of spare parts and trained manpower.

For us, every project is a golden opportunity for continuous improvement and swift growth. This results in maximum cost-effectiveness, efficiency, and productivity for our customers. Realizing the rapid pace of new innovative product solutions reaching the marketplace, and ever-changing National Code revisions and requirements, we take pride in educating and training of our staff to offer our customers the latest in safety, convenience, and improvements.

At Ensavior, we firmly believe that the more you engage with customers, the clearer things become and it is easier to cater to their requirements. We have a well-established track record, and our services have always met with excellent customer satisfaction. It is our constant endeavor to make every aspect of the customer's requirement a little bit better since we know when a customer comes first, the relationship lasts.

| *Pumps - HVAC, Plumbing & Fire*

| *Hydronic Balancing Valves*

| *Suspended Solids Filtration*

| *Electrolytic Scale Treatment*

| *Chilled Water Thermal Storage*

| *Customised Air Purification*

| *HVAC Sensors & Transducers*

| *Gas / Refrigerant Leak Detection*

# Message From Founder

## DEVELOPING AND IMPLEMENTING

The building services industry, in which Ensavior operates, is a vital element of any economy and has a significant impact on the environment. This industry is one of the largest users of energy, resources, and water. With respect to such significant influence of the building industry, the sustainable building approach has a high potential to make a valuable contribution to sustainable development.

At this time when sustainability is a growing concern in all business sectors as people are waking up to the threat it poses, Ensavior is geared up to promote the products and services those revolve around the fundamentals of saving Energy and Environment with an emphasis on Economic, Environmental and Social Sustainability.

With a commitment to excellence in quality, engineering, and service, Ensavior has established enduring relationships with the major contractors and corporate entities, proudly contributing to the creation of airports, office complexes, IT parks, trade centers,

metro rails, shopping malls, hospitals, five-star hotels, schools and manufacturing facilities across the Indian sub-continent.

We have a highly competent, passionate, and experienced team of professionals who are not just enthusiastic about what we do, but also find it fascinating why and how we do it. Our people are encouraged by our values and ethos and are the real ambassadors of a culture that aims to think better, advise better, engage with clients better, and deliver better.

## Air Solutions





# Values Propositions

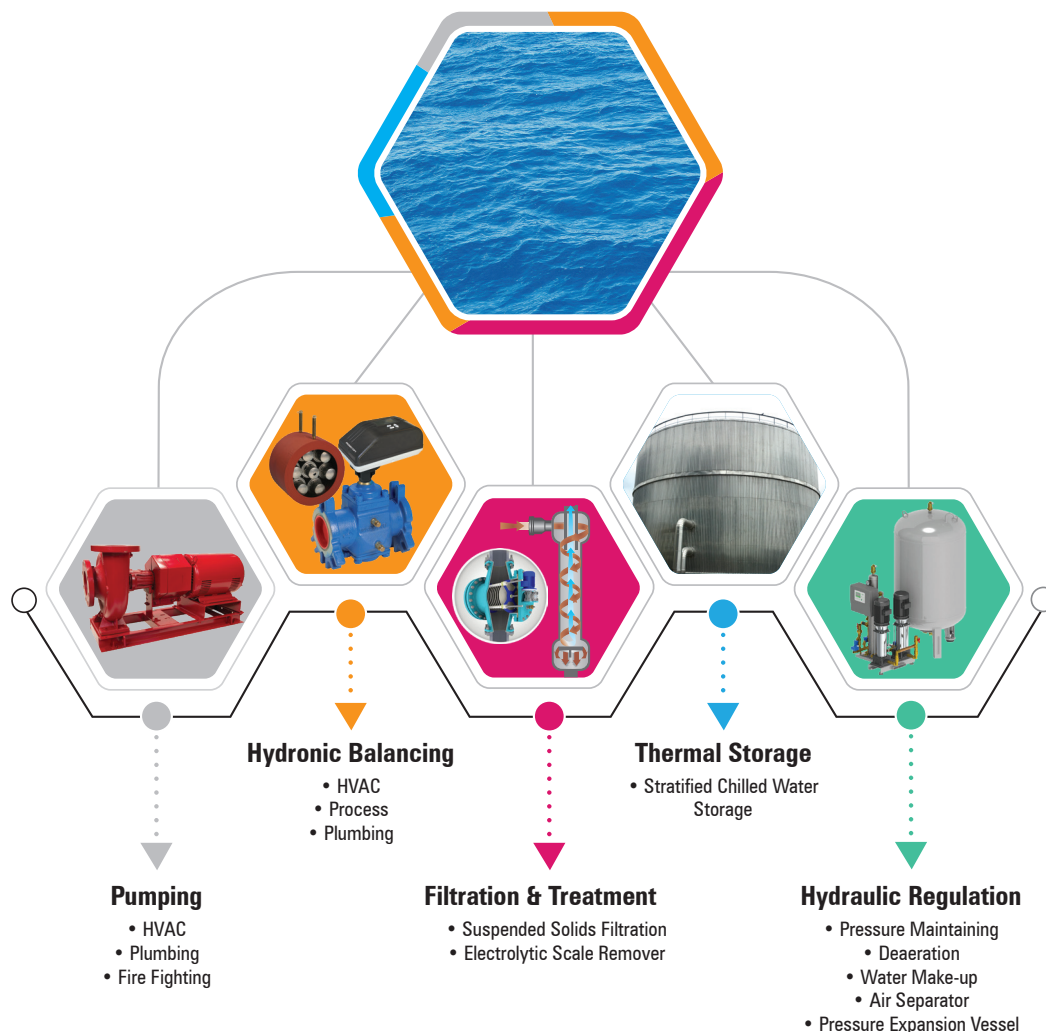
WHOLESOME POLICIES | AWESOME RESULTS

The momentous success of Ensavior is credited to the principles and values rooted in the heart of everyone who forms a significant part of the organization. The employees and senior management always come together to build a working culture that appreciates honesty, trust, integrity, and mutual respect. We have unshakable faith in teamwork and professionalism which also has served as the main contributing force behind the successful completion of all our projects. Fulfillment of all the commitments and promises made to our clients is the mantra of achieving excellence and client satisfaction throughout our journey.

Surely, the business success rests heavily on the dedication and talent of the employees and Ensavior is a pre-eminent example of this belief. Every employee is provided with all his human and employee rights along with an appreciation of every small or big contribution that he makes for our organization. We never miss an opportunity to promote and nurture their talents and fuel their personal and professional growth so that all the individual goals

as well as business objectives are impressively achieved. Offering them a multitude of opportunities to grow, we encourage all our employees to pursue their education and frequently organize training sessions to educate them on how to serve clients in a better and competent manner, how to assist them in resolving their issues, and how to customize our services best suited for them.

## Water Solutions



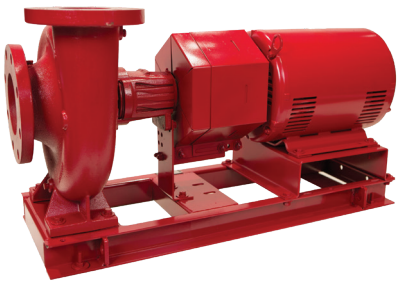


## Pumps - HVAC, Plumbing & Fire Expansion Tank and Air Separator



Xylem is a leading water technology company committed to “solving water” by creating innovative and smart technology solutions to meet the world’s water, wastewater and energy needs. In a world of ever growing challenges, Xylem delivers innovative water technology solutions throughout the cycle of water. Their technological strength across the life cycle of water is second-to-none. From collection and distribution to reuse and return to nature, their highly efficient water technologies, industrial pumps and application solutions not only use less energy and reduce life-cycle costs, but also promote sustainability.

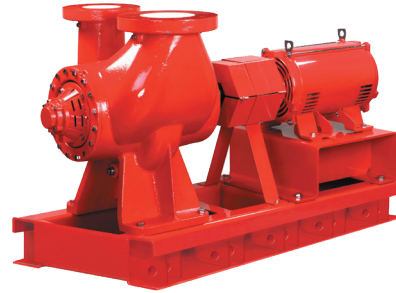
- ◆ Base Mounted End Suction Pumps
- ◆ Chilled Water Variable Speed Pumping System
- ◆ Split-Coupled Vertical In-line Centrifugal Pumps
- ◆ Double Suction Horizontal/Vertical Split Case Pumps
- ◆ Hydro-Pneumatic Pumping System
- ◆ Modular Firefighting Booster Set
- ◆ Submersible, Sewage & Drainage Pumps
- ◆ AC-Fire Pumps
- ◆ Expansion Tank and Air Separator



### Base Mounted End Suction Pumps

Bell & Gossett has redesigned the complete line of its best-in-class End Suction pump — to provide the highest overall efficiency in the segment for HVAC and plumbing applications. With the largest efficiency compared to other similar pumps, it reduces electricity consumption, improves overall system performance and lowers life cycle costs. This series is available in variety of sizes and configuration options that enables customization and flexibility to fit a broad range of operating conditions.

- ◆ Available with stainless steel impeller with standard working pressure of 175 PSI and optional 250 PSI.
- ◆ Available in closed coupled design also



### Double Suction Vertical Split Case Pumps

Double suction Vertical Split Case in Top Suction Top discharge or Side suction with top discharge / side discharge configuration. Reduced pump room footprint by up to 40% when compared to traditional split-case and vertical inline pumps. Simply select your hydraulic requirements and then pick any one of three different suction and discharge flange orientations that best suit your installation requirements

### Pump Logic Controller & Variable Frequency Drive

The TECHNOLOGIC® Intelligent Pump Controller (IPC) provides variable speed pumping to control speed, pressure, flow and level over a wide range of hydronic system applications. Variable speed ensures your HVAC pumps operate efficiently and reliably. Programming with the setup Genie simplifies the setup process and ensures proper system configuration and TECHNOLOGIC Variable Frequency Drive Protection.



### In-Line Mounted Centrifugal Pump

Split coupled vertical in-line pump available in 1-1/2" through 14" discharge sizes. Motors range from 1 to 300HP with flows to 8500 GPM and heads to 202 feet. Standard features include a unitized EPR/ Carbon-Ceramic mechanical seal, ANSI/OSHA compliant guard, stainless steel pump shaft and a shaft jacking coupling to simplify maintenance.

- ◆ Available with stainless steel PSI and optional 250 PSI.
- ◆ Available in closed coupled design also



### Rolairtrol® Air Separator



A full-flow separator to remove or eliminate entrained system air. Standard models from 2" to 24." Custom units in sizes 26" and larger. Flow rates to 17,000 GPM at 125 psi and 350°F. All units are ASME coded. Flanged or grooved connections on 3" and larger. The Rolairtrol is available with a strainer, or without a strainer for a lower pressure drop.



## Hydronic Balancing Valves

High Performance Engineering

**FlowCon**  
international  
A Griswold Controls LLC/FlowCon International Company

FlowCon International was founded in 1985 and boasts more than 50 years of HVAC market experience. They have offices in California (USA), Singapore, Dubai, China and Denmark to handle all sales and marketing world-wide. Furthermore, they act as the sales and marketing organization of Griswold Controls' products out of the USA. A company that is 100% devoted to dynamic flow regulation and pressure independent temperature control. FlowCon builds on innovation and shifts from idea to action very rapidly. They offer a better product range and up-to-date application know-how, to offer the optimum solution for a well-balanced HVAC system.

At FlowCon International focus is directly on development of new products as well as further development of current product range so that a wide range of options is offered to the customers in order for them to be able to choose the proper application product. FlowCon spends a lot of time in research to remain the front-runner offering state-of-the-art product solutions.

- ◆ PICV Valves From 15-250mm
- ◆ Automatic Balancing Valve
- ◆ FlowCon Energy FIT System





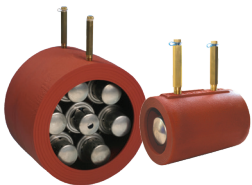
## FlowCon Green

The FlowCon Green insert is designed as a 3-in-1 solution combining a full stroke modulation control valve, an automatic balancing valve and a differential pressure control valve. This new insert includes an innovative self-adjustment feature, which enables each valve continuously to self-balance. This ensures delivery of precisely the flow rate required by each terminal unit, independent of pressure fluctuations in the hydronic system. Each FlowCon Green insert can also be adjusted to set an accurate maximum flow rate limit to each circuit without stroke limitation.



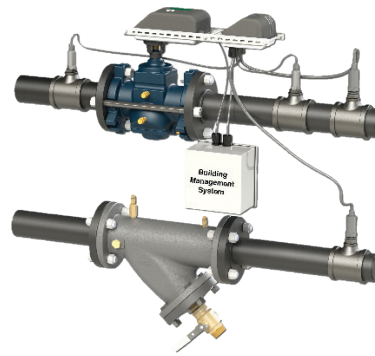
## FlowCon SM

The FlowCon SM valve is a dynamic control valve, which means the valve automatically keeps a constant differential pressure across the internal controlling orifice of the valve. Consequently, pressure drop fluctuations across the FlowCon SM will not affect the set flow through the valve. FlowCon SM can be set to limit the maximum design flow, which makes over-sizing control valves obsolete. Extensive calculations and assessments of the authority of the selected valve are eliminated. The dynamic flow characteristics keep the FlowCon SM in constant authority and automatically balanced, eliminating the requirement for a separate balancing valve in the circuit.



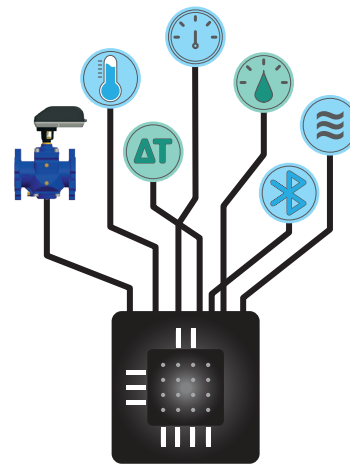
## FlowCon High Flow

The FlowCon high flow series of valves are designed to meet the higher capacity flow limiting requirements of pumps, chillers, boilers, condensers, heat exchangers, cooling towers and filters. Available in AHU-Wafer, and Wafer. Applications range from air handling units and boiler flow control in common HVAC systems over multiple chillers/multiple heat exchangers or pump balancing system in high-rise buildings to fueling, industrial process and filtration applications.



## FlowCon Energy FIT System

FlowCon Energy FIT System, the world's first pressure and temperature independent regulation valve. With the FIT System get monitoring, measuring, connectivity and control in one package including PICV valve, sensor kit and the new FlowCon Intelligent Interface. The FIT System measures energy usage while monitoring coil performance and adjusts the PICV valve to optimize coil performance. The PICV valve maintains the correct flow, despite pressure changes, and guarantees that flow will only change when demand requirements change or  $\Delta T$  is outside specification. FIT System is typically installed on AHUs or in the plant room and includes:



	Intelligent Interface
	PICV with electrical display actuator
	Temperature sensors
	Pressure sensors
	Integrated BTU meter
	Integrated Flow meter
	Bluetooth®
	$\Delta T$ control



# TES

Stratified Chilled Water  
Thermal Energy Storage



Stratified Chilled water storage tanks employed in the Chilled Water systems operate on the principle of thermal stratification to maintain the separation between the cold and warm water during the charging and discharging operation. The two physical properties of water that are of special interest to the TES Design Engineer are:

- ◆ The Density as it varies with Temperature.
- ◆ The Kinematic Viscosity as it varies with Temperature.

## Mechanism & Performance

These two properties provide the basic mechanism for successfully stratifying water of different temperature within a single vessel. The density difference between two liquids at different temperature creates buoyancy forces where the warm liquid is literally floated on top of the cool liquid. The relatively large difference in Kinematic Viscosity of liquids separated only by a few degrees in temperature suppresses any mixing of the two fluids, due to flow disturbances and free convection at the vessel walls. The stratification of CHW TES can be achieved by utilization of the water density difference according to the water temperature. The density of water is heaviest at 4.0 °C. The performance of the chilled water tanks depends on the charge and discharge water flow rates, temperature difference ( $\Delta T$ ) between the cold and warm water streams, aspect ratio of the tank, and the design of the supply and return diffusers. The goal of the TES tank design is to maximize the performance by keeping the thickness of the thermocline as small as possible during the charging and discharging operation.

## Applications

### Demand Supply Management – Load Shifting

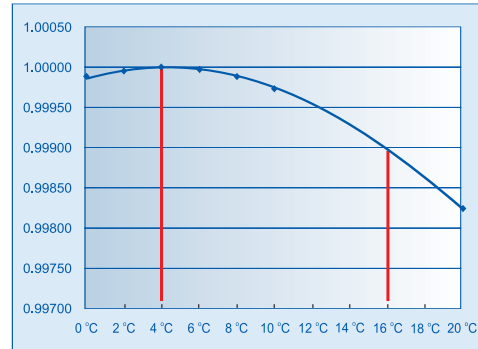
Load shifting is typically the main reason to install a chilled water storage system. And some key benefits of such load shifting are summarized as below:

- ◆ Reduced Capital Cost Savings.
- ◆ Energy Savings.
- ◆ Increased Flexibility.
- ◆ Extend the Capacity of an existing system.

### Zero Downtime of Chilled Water Supply for Mission Critical Facilities

- ◆ High Tech Manufacturing
- ◆ Data Centers

Most critical application air-conditioning systems require some form of standby or backup facility to protect against system failures, which can prove to be extremely costly. The TES is an ideal and efficient solution for these applications. The TES offers rapid response backup in the form of an independent, static technology solution which ensures the highest degree of reliability. In times of uncertain power availability, the TES system can provide non-stop cooling, even without grid power.

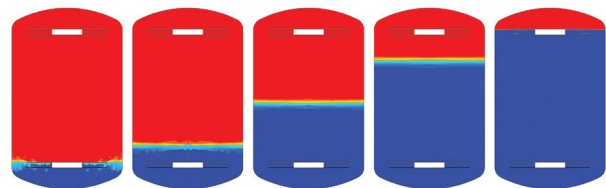


## Computational Fluid Dynamics (CFD) Model

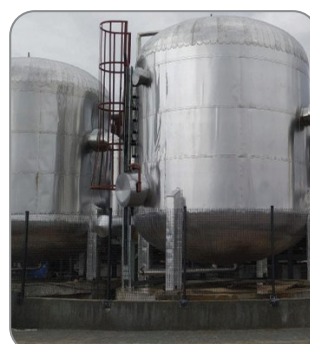
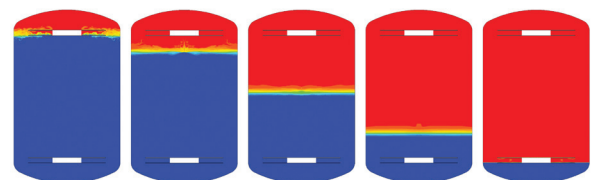
CFD analysis provide insights into:

- ◆ Prediction of the discharge water temperature with time.
- ◆ Prediction and optimization of thermocline thickness.
- ◆ Analysis of diffuser design on the performance of the tank.
- ◆ Design and optimization of supply and return diffusers.
- ◆ Three dimensional visualization of water flow patterns in the tank.
- ◆ Visualization location and thickness of thermocline with time.

CFD Modelling – Charging



CFD Modelling – Discharging







## ADVANCED – Cooling Tower Water Treatment

Electrolytic Scale Treatment  
Screen Filtration with Basin Sweeping



Cooling tower water for industrial/process applications or comfort cooling requires a filtration system for suspended solids and a chemical or non-chemical based scale preventing/removal system. This system is necessary in ensuring an efficient process and long equipment service life heat exchangers, chiller tubes, evaporative condensers, cooling tower basin, piping system and also downstream equipment.

Water in cooling towers attract and absorb large volumes of airborne contaminants on a continuous basis - acting as an air scrubber filtering the surrounding air. With time, these fine particles can build up and settle within the system, adversely affecting cooling performance while lowering the life of sub-components. Predominantly, the contaminants in the system are sand, silt, scale and rust. These contribute to the creation of deposits (scale, corrosion, bio-fouling and biological activity) negatively impacting heat transfer efficiency. Solids accumulation in cooling towers and condensers cause increased bacteria growth (legionella bacteria and other health risks). Such concerns then lead to:

- ◆ Reduction in heat transfer efficiencies and an increase in energy consumption,
- ◆ More blow down, resulting in more makeup water and chemical usage,
- ◆ Higher down time and system operating & maintenance costs.



## Automatic Self-Cleaning Electrolytic Scale Treatment System (EST) with Water Disinfection

Automatic Self-cleaning Electrolytic Scale Treatment helps remove/prevent the scale formation by controlled electrolytic operation in a reaction chamber, without adding chemicals (Zero Chemical). The system generates oxidants in the cooling tower water to help mitigate Scaling, Corrosion, Bio-fouling, Micro-organism growth and spread of bacteria.

The electrolytic process attains the chemical decomposition of water by passing DC electrical current from positive element to the negative element, thus creating a high pH in the vicinity of the negative element. High pH enables scale to be deposited on the negative element (cathode). The system precipitates all scale forming ions, not just magnesium and calcium but other ions that are susceptible to dropping out of the liquid at high pH viz., Silica, Ferum, Manganese etc. The chlorides, that are present in the water, are transformed to free chlorine or hypochlorite (OCl-), near the anode surface. The process ensures sufficient production of free chlorine/hypochlorite/ radical oxygen/ ozone/hydrogen peroxide to disinfect the water and to take care of microbes/bacteria/algae, etc.

The system is installed independent of the condenser water flow. It draws water from the Cooling Tower Basin, performs the electrolytic process and sends the water to the Filter system to remove organic and inorganic particulate and after the filtration process, clean water is sent back for sweeping of the cooling tower basin.

The treatment system eliminates the need of any dosing chemicals to treat cooling water, and substantially reduces the Bleed-Off (Blow Down) requirement by increasing the Cycle of Concentration, thereby saving large quantity of make-up water.



## Automatic Screen Filtration System with Cooling Tower Basin Sweeping System

Water after electrolytic treatment enters the Automatic Screen Filter system to remove organic and inorganic particulate from the cooling tower water until either a pressure drop across the filter is reached or a preselected time set at the controller, has elapsed. At either point the filter automatically initiates a flushing cycle and then returns to original filtration mode. During the flushing cycle, system flow is not interrupted.

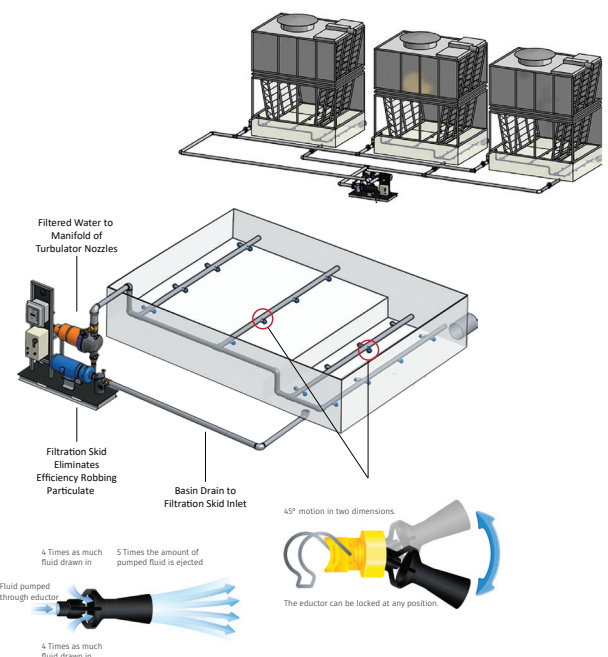
Automatic Screen Filter shall remove all particles larger than specified micron rating (50 micron standard), in one pass, as well as some particles smaller than the specified rating due to filter cake build up.

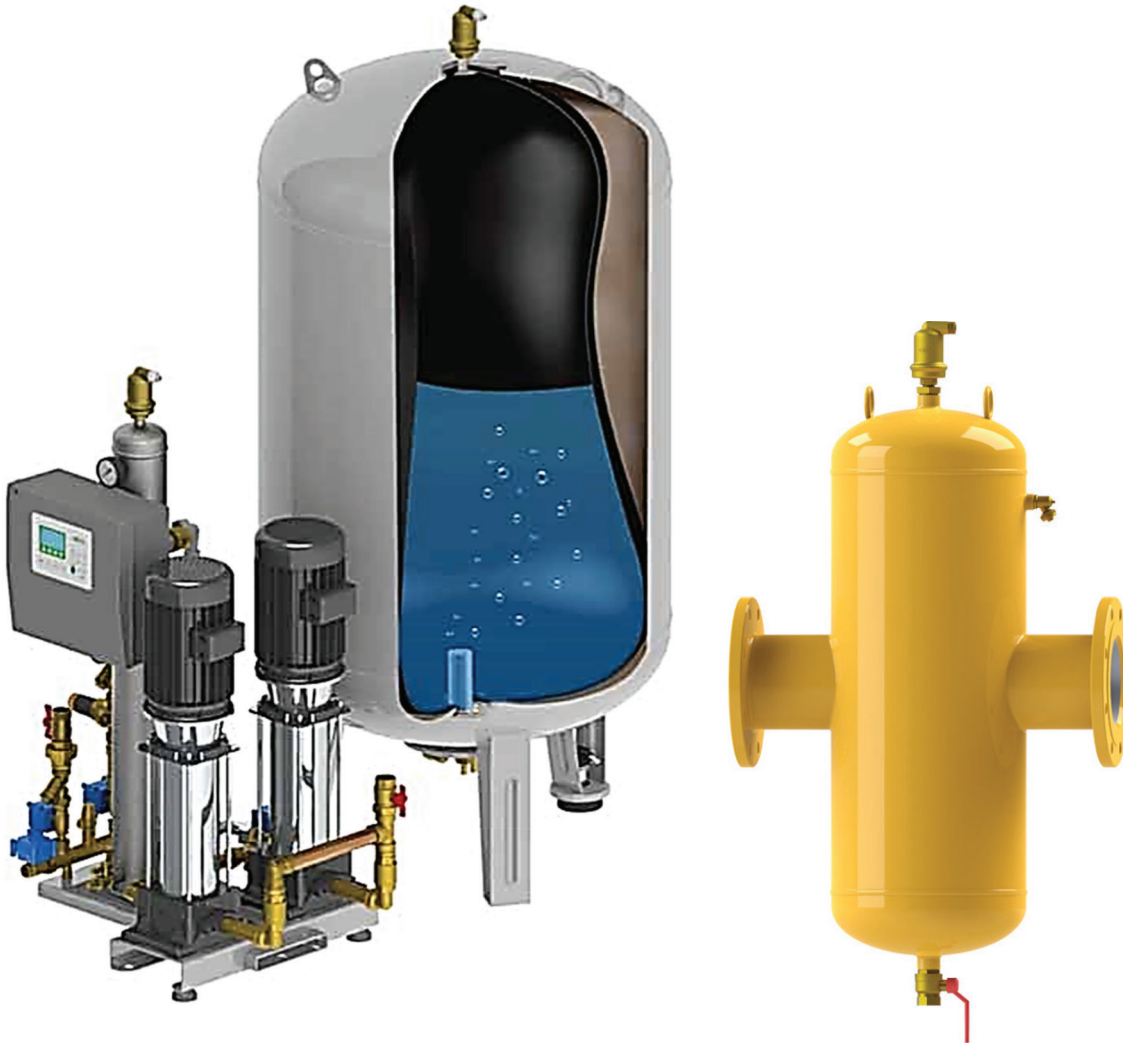
The screen filtration system provides a solution for the removal of particulate from water based on the micron selected, this is to ensure that 100% particulate removal efficiency is achieved and is not dependent on the specific gravity of the particulate or varying flow rates, as is the case in centrifugal separators.

Automatic Screen Filter used in conjunction with turbulator eductor nozzles ensure:

- ◆ Adequate agitation and coverage of the cooling tower basin to keep solids in suspension for removal in the filtration system
- ◆ Efficiently maintain a clean tower basin by removing all particulate, even as light as algae or as small as silt, without interrupting the facility's processes
- ◆ Significantly reduce tower blow down cycles, water wastage, equipment maintenance, and chemical use.

Turbulator eductor nozzles are evenly distributed in the basin and oriented in a manner that all the debris is swept towards the pump intake point in the basin.





## Hydraulic Regulation

Pressure Maintaining and Water Make-up  
Deaeration and Hydraulic Separation  
Automatic on-line Rubber Ball Cleaning



Dissolved and free gases and dirt in any cooling, heating and solar energy system creates problem like air blocking, poor heat transfer, more wear and tear, air barking that affects system's safety and thermal economy. The Deaeration device can effectively exhaust these gases in the system water and make up water by means of vacuum spray method while maintaining constant pressure.

- ◆ Maintains the System Pressure within Precise Limits
- ◆ Automatic Deaeration and Make-up
- ◆ RS-485 Interface
- ◆ Real-time Monitoring

The Multi function Hydraulic Balance Separators can separate Air, Micro-bubbles, Dirt and sludge from the system and reduce cavitation phenomenon, operational noise and improve heat exchange efficiency.



## Supertec

### **Pressure Maintaining Device with the Vacuum Spray-tube**

Pressure maintaining device with the vacuum spray-tube can be applied in closed systems such as heating, refrigerating or solar energy, and can discharge dissolved and free gas in the system water and refilled water through vacuum container while maintaining the pressure of the system. As the gas in the system pipelines can be almost exhausted during continuous cycles, the gas jam, gas blowing as well as factors that negatively affect system's safety and heat economy caused by the gas can be totally resolved.



## Vatec

### **Vacuum Spray-tube Degassing Device**

The vacuum spray-tube degassing device is applied in closed systems such as heating or refrigerating, which can vacuumize the autovac and use atomizing ejection to discharge dissolved and free gas in the system. As the gas in the system pipelines can be almost discharged during continuous cycles, the gas jam, gas blowing as well as factors that negatively affect system's safety and heat economy caused by the gas can be totally erased.



## Multitec

### **Pressure Maintaining Device-Deaeration & Water Make-up**

Multitec pressure maintaining device with deaeration and water make-up can be applied in heating, regional heating, refrigerating, as well as solar energy to monitor the pressure in real time, which can precisely and steadily control pressure and realize automatic gas discharge and water supply.



## Cleantec

### **Automatic on-line Rubber Ball Cleaning Device**

With effective combination of hydrodynamics and intelligent control, Cleantec automatic on-line rubber ball cleaning device continuously moves the specially structured rubber ball back and forth to keep tubes clean and in a state of highly efficient and continuous heat exchange to prolong the service life of the equipment.



## Filltec

### **Water Make-up Device**

The water make-up device can not only solve deficient pressure of waterhead used for compensation in open systems such as domestic water supply, but also can be used in combination with pressure expansion tank for pressure-stabilized water compensation for closed systems such as heating or refrigerating.



## Twin Separator

### **Micro-Bubbles Deaeration and Decontamination Device**

With the combined advantages of Air Separator micro-bubbles exhausting device and Dirt Separator micron dirt separator, the Twin Separator micro-bubbles exhaustion and decontamination device can quickly and effectively remove free gas, micro-bubbles, and dissolved gas in the system, while at the same time continuously collecting dirt in the circulation system and easing the dirt accumulation within the pipelines.



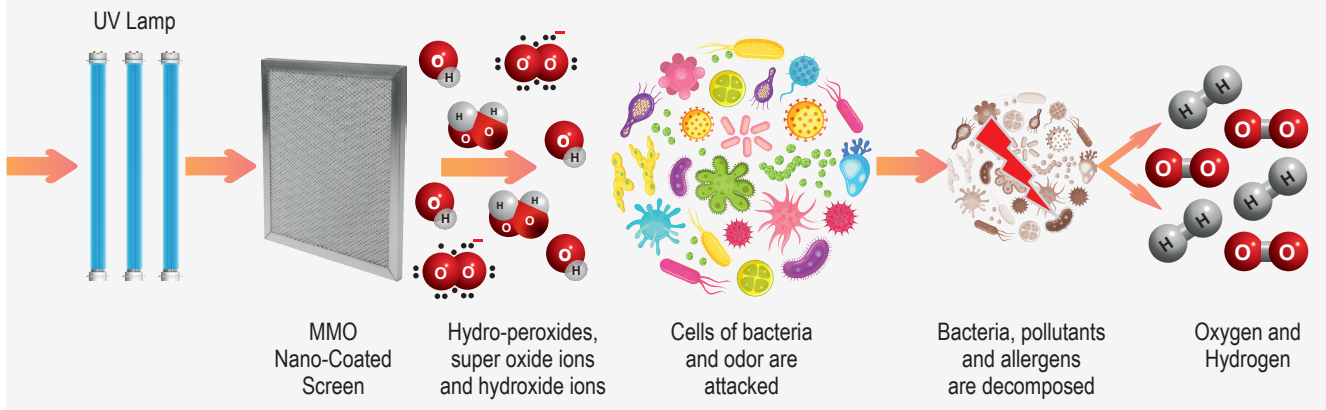
# Advanced Photo Hydro-Ionized Oxidation (PHI-Plus) Cell

Air Purification System

The PHI-Plus Cell is designed to effectively reduce the odors, air pollutants, VOCs (chemical odors), smoke, mold bacteria and viruses from the moving air in AHUs and inside the air-ducts. The PHI-Plus Cells are easy to mount in the air conditioning ducts , thereby eliminating the sick building syndrome risks.

PHI-Plus Cell employs the most advance nano-technology of specialized multi-metallic oxide (MMO) coating on metallic surface and UV lamp for Advanced Oxidation Process (AOP), thereby creating: Hydro-peroxides, super-oxide ions and hydroxide ions. The ions generated in the process are friendly oxidizers, that convert back to oxygen and hydrogen after the oxidation of the pollutant.

### Advanced Photo Hydro-Ionized Oxidation (PHI-Plus) Principle

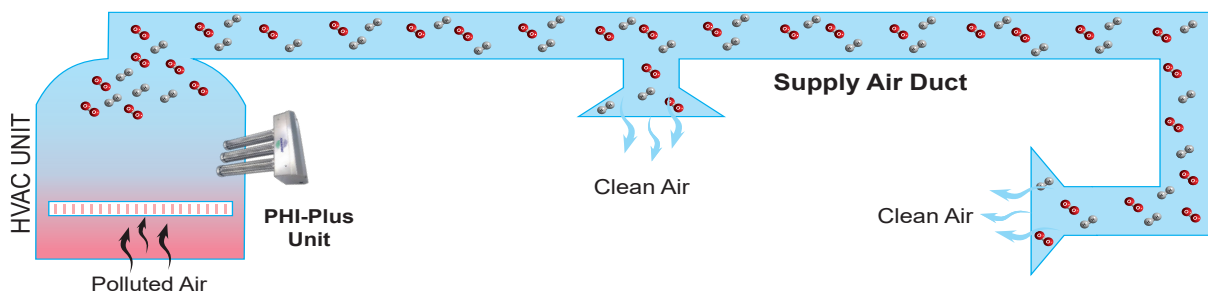


### Advanced Photo Hydro-Ionized Oxidation Cell (PHI-Plus) Technology

Ultra-Violet lamps having germicidal properties are being used extensively as an effective tool for destroying micro-organisms (germs, viruses, bacteria). Germicidal UV lamps combined with Advanced Photo Hydro-Ionized Oxidation is effective not only in reducing the airborne micro-organisms that come in contact directly with the UV light rays but is very effective on gases, vapors, VOCs and odors.

reaction. This reaction produces hydro-peroxides, super-oxide ions and hydroxides. By using proper UV light wavelength, in combination with AOP function, the PHI-Plus Cell purifies the air. With the Advanced Photo Hydro-Ionized Oxidation Cell System, micro-organisms can be reduced by over 95%. Gases, VOCs and odors can also be reduced significantly, and the room will have hydro-peroxides, super oxide ion and hydroxides which will help give your room fresh, clean and odor free air.

UV light enhanced by the specialized MMO coating on metallic surface, develops an Advanced Oxidation Process (AOP)



#### PHI+Plus Applications

• Hospital, Clinic & Laboratories	• Commercial Buildings
• School, Universities, Libraries, Museums	• Hotels, Restaurants, Food Courts
• Food & Packaging Industries	• Casinos, Bars, Pubs
• Clean Room Applications	• Data Centers, Semi Conductor Facilities

#### Technical Data

Installation	Installed in HVAC Duct or Plenum	Model - E/PHI-Plus-1-12	Upto 5,000 CFM
Electrical	220 VAC, 50 Hz, 26 Watts/Cell	Model - E/PHI-Plus-2-12	Upto 15,000 CFM
Materials	Powder Coated MS Housing	Model - E/PHI-Plus-3-12	Upto 25,000 CFM
Replaceable Parts	PHI-Plus Cell	Lamp Type	UV-C
CFM Range	300 CFM - 34,000 CFM	Wave Length / Driver	254 nm / Electronic Ballast

- ◆ Consult factory for other models.
- ◆ Due to continuous development, the specifications and product appearance subject to change without prior notice.





## Catalytic Air Purification

### PCO with Gas Phase Filtration

It is an advanced process by which volatile organic compounds (VOCs), bacteria, molds and fungus are destroyed by incorporating photon and ultraviolet (UV) energy activating a catalyst thereby creating the photo catalytic oxidation (PCO) process. UVPCO often utilizes a honeycomb configured, reactor coated with titanium dioxide (TiO<sub>2</sub> or titania) as the photo-oxidative catalyst. This design potentially can have high conversion rates with low pressure drop making it suitable for use in building HVAC systems.

The coated screen is irradiated with UV light near 254 nm UVC. Air containing organic pollutants flows through the screen, where the VOCs adsorb on the catalyst. The UV light interacting with the catalyst in the presence of oxygen and water vapor, produces hydroxyl radicals. Hydroxyl radicals are highly chemically reactive and, in-turn, breakdown the adsorbed VOCs, ideally producing only carbon dioxide and water as by products.

Gas Phase Filtration with Photo-Catalyst Oxidation systems are tailored precisely to your needs and operate with the highest efficiency. The multistage design allows for selection of the required filters in a specific sequence to meet the requirements of each application.

- ◆ Destroys molds, viruses, bacteria and allergens etc.
- ◆ Maintains desired levels of particulate matter
- ◆ Efficient regeneration of media
- ◆ Flexible design, Easy to retrofit
- ◆ Adequate controls for safety
- ◆ No harmful emissions
- ◆ Reduces all odorous and hazardous air pollutants
- ◆ Provides very high single-pass efficiency of gas removal
- ◆ Prevents corrosion / breakdown of electronic equipment

#### Optional Equipment

- ◆ Differential Pressure Monitoring System
- ◆ VOC Sensors
- ◆ Lab Analytical Services

## Stage 1 – Pre-Filtration

- ◆ Air entering the system passes first through a MERV 8 high-efficiency particulate filter, which captures many of the larger biological contaminants and small airborne particles such as mold spores and pollen.
- ◆ Bag Pre-Filters are provided with 95% efficiency (MERV 14, EU 8), bag filter made of 100% dual layer synthetic fibers to capture finer particulates.

## Stage 2 – Radical Chemistry (PCO)

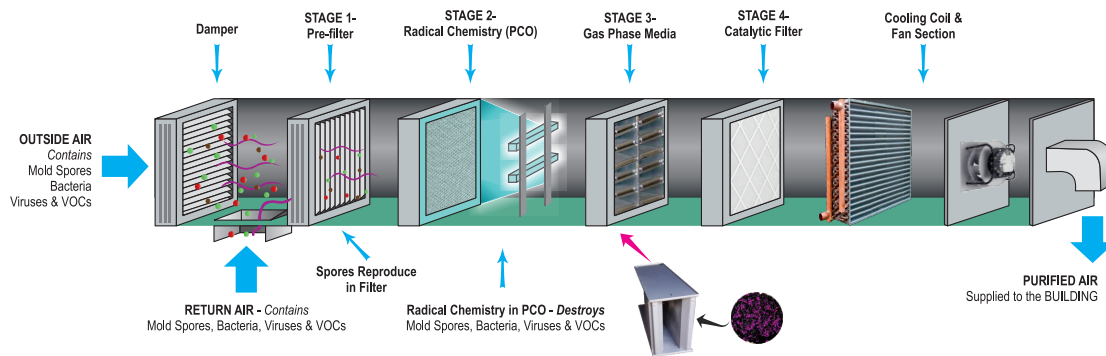
- ◆ Viruses, odors, VOCs and micro-organisms are exposed to a high-intensity ultraviolet light. This UV radiation penetrates micro-organisms such as fungi, bacteria and viruses and damages their DNA bonds, sterilizing them.
- ◆ This air passing through a panel coated with titanium dioxide (TiO<sub>2</sub>), when subjected to ultraviolet photons, creates hydroxyl radicals. The radicals oxidize gaseous organic compounds, e.g. odors and VOCs

## Stage 3 – Gas Phase Media

- ◆ The system media panel is uniquely designed to continually renew itself and has a very long life, under normal use.
- ◆ Media is in the form of granular pellets that are made of binders and activated alumina or other elements. Potassium permanganate is used as media, as it boosts the adsorption rate for a longer duration. The filtration media generally targets contaminants such as sulphur oxides, hydrocarbons, formaldehyde, organic acids, hydrogen sulphide, nitric oxide, and VOC's.

## Stage 4 – Final Filters

- ◆ Final set of pleated disposable fiber matrix filters are provided with 30% efficiency (MERV 8, EU 4), to capture any left over elements.

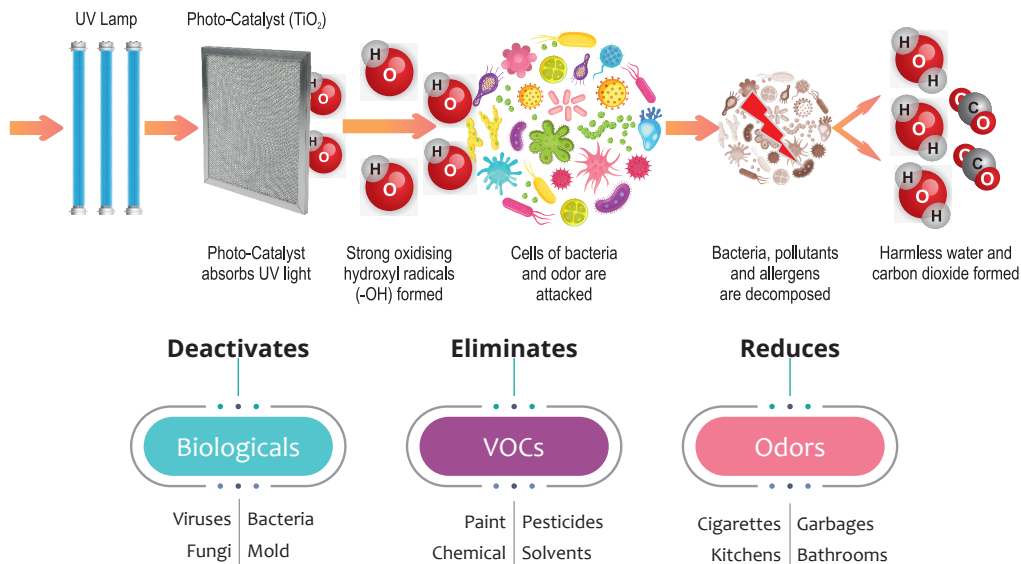


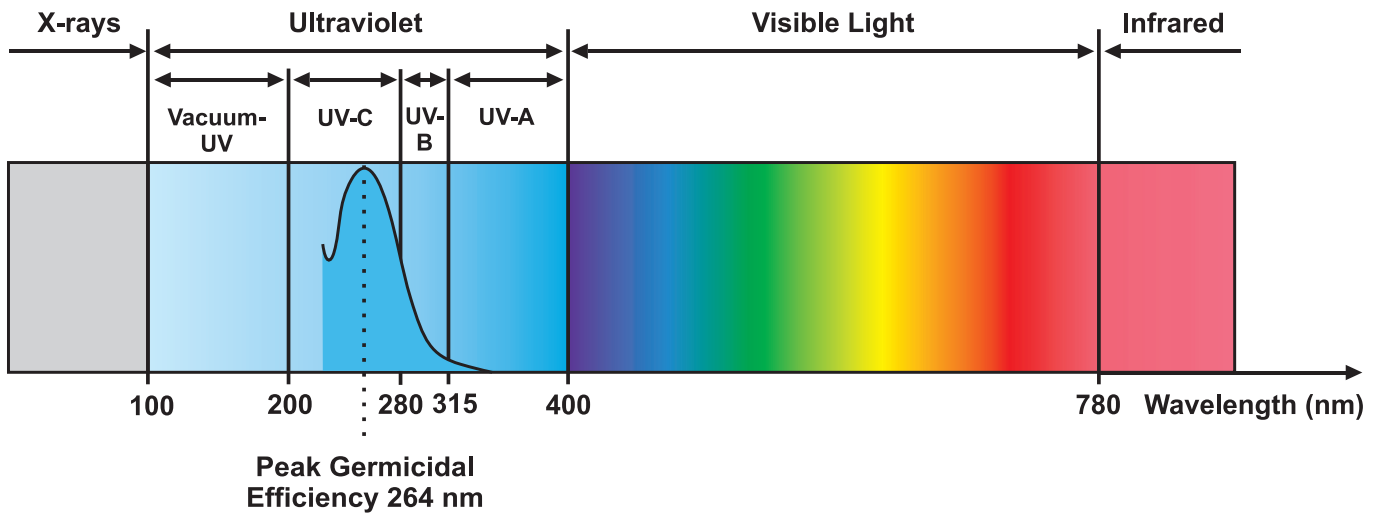
## Photo-Catalytic Oxidation

Photo-Catalytic Oxidation (PCO) is a reaction that occurs when Titanium Dioxide (TiO<sub>2</sub>) is exposed to ultraviolet (UV) light rays. VOCs, gaseous contaminants, and odors gets converted to odorless, harmless water vapor and Carbon Dioxide when they come into contact with the catalytic surface making the air ultra

purified. The titanium dioxide catalyst is activated by UV light which neutralizes biological contaminants such as bacteria, viruses, mold and fungi. When used properly, PCO is a powerful element ideal for controlling air quality.

### PRINCIPLE OF PHOTO-CATALYTIC OXIDATION





## UVGI Solutions

### Ultra Violet Germicidal Irradiation

Ultra Violet Germicidal Irradiation (UVGI) is the use of ultraviolet (UV) energy to kill or inactivate microbes (viral, bacterial and fungal species).

UV energy attacks the DNA of a living cell, penetrating the cell membrane, breaking the DNA structure of the micro-organism, inhibiting reproduction. UVC is effective in destroying biological contaminants and odors such as mold, bacteria and viruses.

The sun delivers specific UV wavelengths that destroy and deactivate chemical contaminants that are introduced into the atmosphere. Our UV lamp produces the same UV wavelength the sun produces. UVC (Germicidal 254nm) and UVV (Oxidizing 187nm) are produced using quartz glass. UVV (Vacuum UV) is used for oxidization; this is the portion of the lamp that destroys chemicals and odours, such as cigarette smoke, VOC's, diesel fumes, formaldehyde, amongst others. Both UV wavelengths work together to destroy thousands of biological and chemical contaminants that continually circulate within the building.

#### Ultraviolet Solutions

- ◆ 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



## Surface Disinfection

### **Coil-o-Care AHU Coil and Drain Pan Irradiation**

UVC is now used as an engineering control to interrupt the transmission of pathogenic organisms. UVC lamp devices and systems are placed in air-handling systems and in room settings for the purpose of air and surface disinfection. Control of bio-aerosols using UVC can improve indoor air quality (IAQ) and thus enhance occupant health, comfort, and productivity.

HVAC systems can promote the growth of bacteria and mold-containing bio-films on damp or wet surfaces such as cooling coils, drain pans, plenum walls, humidifiers, fans, energy recovery wheels, and filters. Locations in and down-stream of the cooling coil section are particularly susceptible because of condensation and carryover of moisture from coil fins.

Conventional methods for maintaining air-handling system components include chemical and mechanical cleaning, which can be costly, difficult to perform, and dangerous to maintenance staff and building occupants. Vapours from cleaning agents can contribute to poor air quality, chemical runoff contributes to groundwater contamination, and mechanical cleaning can reduce component life. Furthermore, system performance can begin to degrade again shortly after cleaning, as microbial growth reappears or re-activates. UVC applied in air-handling units, complements conventional system maintenance procedures has shown to be effective in reducing air-side pressure drop and increasing air-side heat transfer coefficient of wetted cooling coils.

Cooling coil fouling by bio-films may increase coil pressure drop and reduce airflow and heat exchange efficiency. Filters capture bacteria, mould, and dust, which may lead to microbial growth in damp filter media. As the growth proliferates, a filter's resistance to airflow can increase. This can result in more frequent filter change-outs and increased exposure to microbes for maintenance workers and building occupants. As airflow and coil performance degrades, so does the air quality in occupied spaces.



*Coil-o-Care UVC lamp Assembly Arrangement for AHU Coil Cleaning*

## Air Disinfection

### **Ducto-o-Care - In-Duct Cleaning**

Environmental conditions within an air-duct promotes the growth of biological contaminants (viz. mould). This contamination eventually spreads down the ductwork and into the living spaces.

The in-duct UVGI System is designed to maximize airborne kill of dangerous pathogens such as viruses, bacteria, and mold spores. This duct-mounted UVGI system is designed for intensive air-stream UVC irradiation.

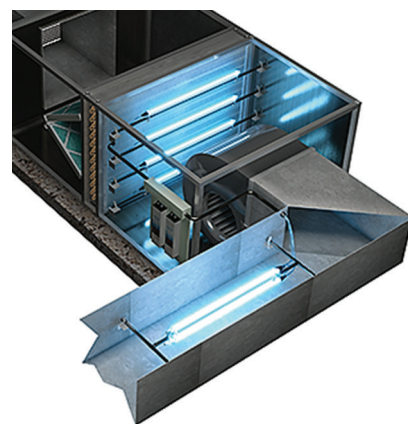
The system features multiple UV high-output germicidal UV lamps which sterilize airborne biological contaminants as they pass by. The In-duct UVGI system is fully customizable and can be configured to fit a wide variety installation parameter.

The desired exposure time for adequate dosage in ductwork is an important design criteria. When there is limited time of exposure due to the velocity of the moving air-stream, more than one UV light unit may be required to achieve adequate exposure time.

The primary variables important to the design configuration of a UVGI system include: air duct dimensions (W x H x L); airflow rate; UV lamp specifications (viz. UV power, arc length, lamp radius); lamp quantity and locations; duct reflectivity; and filtration.

When the air-stream disinfection is the approach, then having the most amount of UV production possible is the preferred method. This can be achieved by using high output (HO) UV lamps.

The average irradiance for a typical air duct application should range from 1,000 to 10,000  $\mu\text{W}/\text{cm}^2$  depending on the microbe to be inactivated and operating conditions such as air temperature, air velocity, and humidity.



*Illustration showing the AHU Coil cleaning and Duct cleaning arrangement in a HVAC system.*

*(Source: <https://www.achrnews.com/articles/128955-uv-and-airpurification-effectively-contain-airborne-pathogens>)*



### **SteraShield – Upper Air Room UVGI**

*A shield of UV beam in the upper section of the room*

#### **Suitable for**

- ◆ Healthcare Sector
- ◆ Hospitality Sector
- ◆ IT Sector
- ◆ Industrial Sector
- ◆ Educational Institutions
- ◆ Commercial Spaces
- ◆ Residential Spaces

## **UVGI SteraShield**

Ultra Violet Germicidal Irradiation

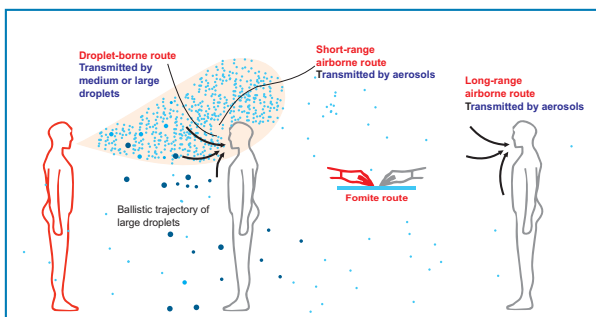
SteraShield is an in-room air treatment equipment designed specifically for upper air irradiation. This type of equipment has been successfully used worldwide, to control the spread of airborne micro-organisms in hospitals, clinics, schools, offices and government buildings since 1960. SteraShield incorporates louvers that safely direct UVC energy above contact level (7+ feet) of occupants, ensuring it disinfects the air in the occupied room.

## Airborne Spread of Infectious Agents

### In Indoor Environment

Airborne transmission of infectious agents involves droplets that are expelled by sneezing or coughing or are otherwise distributed into the air. Although the liquid/vapor around the infectious agent evaporates, the residue (or droplet nuclei) may remain in the air for long periods, depending on such factors as particle size, velocity, force of expulsion, particle density, infectivity (ie., viability of the microorganism when exposed to the environment and its ability to cause infection when a susceptible host is subsequently exposed), humidity, and rate of air flow.

Airborne spread of infectious agents is directly relevant to the airborne route, and indirectly to the droplet-borne and fomite routes.



Small droplets (<5  $\mu\text{m}$ ), called aerosols, are responsible for the short & long-range airborne route, and indirect contact route. Large droplets are responsible for the direct spray route and indirect contact route

UVGI has been used as a supplement to mechanical ventilation to inactivate airborne infectious agents to protect the health of hospital/clinic occupants. UV-C lamp systems, that kill 70 to 95% of all microbes in the air, can be deployed in the following areas:

### UVGI System Configurations to Help Mitigate Viruses

- ◆ On AHU Coils for Cleaning the Supply Air
- ◆ In Supply / Return Air Ducts
- ◆ Wall Mounted Upper-Room Air Disinfection
- ◆ Portable Hand-Held Surface Cleaner

### Hospital Wide Application Areas of the UVGI System

- ◆ Operating Rooms, ICU / CCU
- ◆ Doctors Cabin
- ◆ Patient Rooms / Wards
- ◆ Out-Patient Waiting Areas

### Applications

- ◆ Hospitals
- ◆ Hotels, Casinos
- ◆ Pharmaceutical
- ◆ Food Processing
- ◆ Waiting Rooms
- ◆ Residential Spaces
- ◆ IT Parks, Schools and Colleges
- ◆ Commercial Spaces – Malls, Restaurants, Pubs



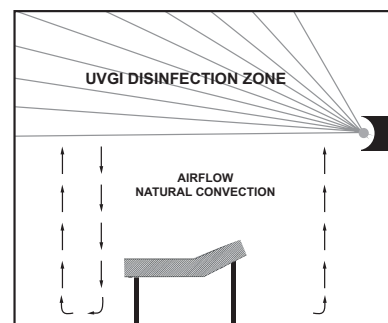
## Upper-Room Air Disinfection

### SteraShield - Wall Mounted Upper-Room Air Disinfection

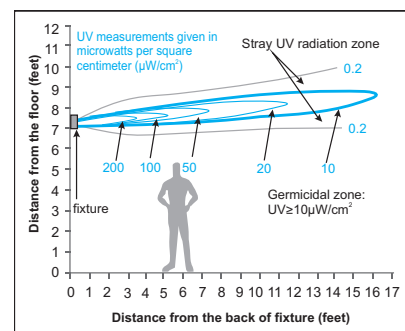
The most widely used application of UVGI is in the form of passive upper-room fixtures containing UVGI lamps that provide a horizontal layer of UV energy field above the occupied zone.

- ◆ Effective control against secondary air borne infection, including drug resistant pathogens.
- ◆ Works 24/7 without affecting occupants of the space.
- ◆ Cost effective system.
- ◆ Does not require any air-conditioning/ventilation system.
- ◆ No secondary contaminants are produced.
- ◆ Maintenance free system.

The device consists of a UV-C lamps mounted in a specially designed reflector assembly which is mounted on wall to create a UVC beam directed to the ceiling. Natural convective currents take microbes to upper level which are effectively eliminated by the germicidal action of UV-C. It is very helpful to the patients and even more to the health care workers.



Installation in a Room of SteraShield - Wall Mounted System



UV Intensity Distribution in a Room with SteraShield - Wall Mounted System



## Sterasure

Mobile Air Sanitizer with UV, PCO/PHI-Plus Cell and Filters

UVGI is the use of ultra-violet (UV) energy to kill or inactivate microbes (viral, bacterial and fungal species). UV energy attacks the DNA of a living cell, penetrating the cell membrane, breaking the DNA structure of the micro-organism, inhibiting reproduction. UVC is effective in destroying biological contaminants and odors such as mold, bacteria and viruses. UVGI has been used as a supplement to mechanical ventilation to inactivate airborne infectious agents to protect the health of building occupants.

The sun delivers specific UV wavelengths that destroy and deactivate chemical contaminants that are introduced into the atmosphere. Our UV lamp produces the same UV wavelength the sun produces. UVC (Germicidal 254nm) and UVB (Oxidizing 187nm) are produced using quartz glass. UVB (Vacuum UV) is used for oxidization; this is the portion of the lamp that destroys chemicals and odours, such as cigarette smoke, VOC's, diesel fumes, formaldehyde, amongst others. Both UV wavelengths work together to destroy thousands of biological and chemical contaminants that continually circulate within the building.

### Ultraviolet Solutions

- ◆ 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

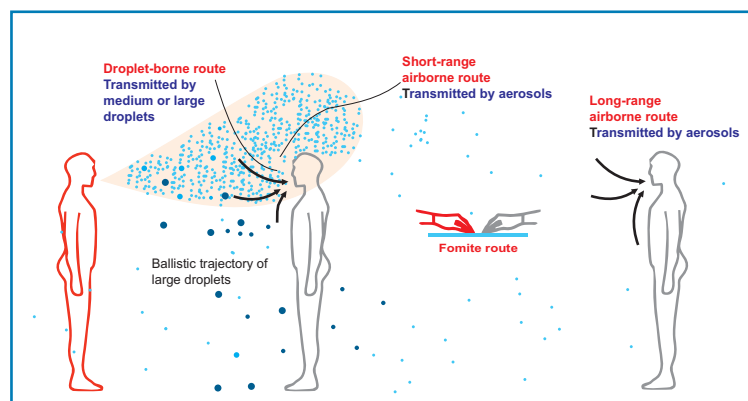
## Airborne Spread of Infectious Agents

### In Indoor Environment

Airborne transmission of infectious agents involves droplets that are expelled by sneezing or coughing or are otherwise distributed into the air. Although the liquid/vapor around the infectious agent evaporates, the residue (or droplet nuclei) may remain in the air for long periods, depending on such factors as particle size, velocity, force of expulsion, particle density, infectivity (ie., viability of the microorganism when exposed

to the environment and its ability to cause infection when a susceptible host is subsequently exposed), humidity, and rate of air flow.

Airborne spread of infectious agents is directly related to the airborne route, and indirectly to the droplet-borne and fomite routes.



*Small droplets (<math><5\ \mu\text{m}</math>), called aerosols, are responsible for the short & long-range airborne route, and indirect contact route. Large droplets are responsible for the direct spray route and indirect contact route.*

**SteraSure** Room Air Sanitizers can help protect occupants including but not limited to personnel, clients, and patients from infection due to airborne microbes, particularly in crowded or poorly ventilated areas, and in situations where the risk of cross infection is high.

These sanitizers are equipped with Pre-Filter, Activated Carbon Filter, HEPA filter and Advanced PCO/PHI-Plus cells with UV-C Lamp. Advanced PCO/PHI-Plus cells effectively destroy airborne microbes including bacteria, mold, and virus in enclosed occupied spaces.

The unit is mobile and requires no installation. Roll the unit into the occupied area to be treated and plug into an appropriate power source. During operation, air is drawn into the unit through the Pre-filter. The air passes into the exposure chamber, where it is irradiated by PCO/PHI-Plus cells. The treated air then passes through the Activated Carbon and HEPA Filter to trap odours and particulate matters. The unit protects the occupants from ultraviolet exposure, by restricting ultraviolet radiation from passing into the occupied room.

### PCO/PHI-Plus Cell

- ◆ PCO/PHI-Plus Cell employs the most advanced nanotechnology of specialized multi-metallic oxide (MMO) coating on metallic surface and UV lamp for Advanced Oxidation Process (AOP), thereby creating: Hydroperoxides, super-oxide ions and hydroxide ions. The ions generated in the process are friendly oxidizers, that

convert back to oxygen and hydrogen after the oxidation of the pollutant.

- ◆ PCO/PHI-Plus Cell are completely enclosed within an exposure chamber and are safe for use in every application.

### UV-C Lamps and Ballast

- ◆ Lamps are instant starting and provide the utmost in quality, sustained output, and longevity
- ◆ Electronic ballasts for the operation of ultraviolet lamps, provide high lamp output; are lightweight, efficient, and operate cool for longer life.

### Disposable Filters

- ◆ Cost effective, disposable Pre-Filter, Activated Carbon Filter and HEPA filter are provided to trap dust, odours and other particles suspended in the air.

### Power Supply and Interlock Safety Switch

- ◆ Detachable power cord is provided for power supply.
- ◆ The interlock safety switch disconnects power to the unit when the access panel is opened for servicing the PCO/PHI-Plus cells or Fan.

### AQI Monitor & Controller

- ◆ Air quality controller is provided with touch screen to display air quality readings, such as PM2.5, CO<sub>2</sub>, TVOC, Temperature, Humidity, etc.
- ◆ The controller can control the system, e.g., switch the fan and UV Lamps ON or OFF, based on the set parameters of PM, CO<sub>2</sub> and VOC.

### Fan

- ◆ Fan is provided for efficient air handling.



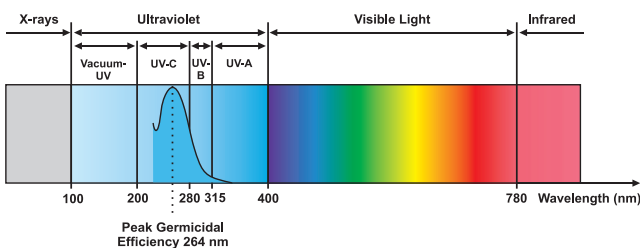


## UVGI SteraBelt

### Ultra-Violet Germicidal Irradiation in Baggage Conveyor System

UVGI is the use of ultra-violet (UV) energy to kill or inactivate microbes (viral, bacterial and fungal species). UV energy attacks the DNA of a living cell, penetrating the cell membrane, breaking the DNA structure of the micro-organism, inhibiting reproduction. UVC is effective in destroying biological contaminants and odors such as mold, bacteria and viruses. UVGI has been used as a supplement to mechanical ventilation to inactivate airborne infectious agents to protect the health of building occupants.

The sun delivers specific UV wavelengths that destroy and deactivate chemical contaminants that are introduced into the atmosphere. Our UV lamp produces the same UV wavelength the sun produces. UVC (Germicidal 254nm) and UVV (Oxidizing 187nm) are produced using quartz glass. UVV (Vacuum UV) is used for oxidization; this is the portion of the lamp that destroys chemicals and odours, such as cigarette smoke, VOC's, diesel fumes, formaldehyde, amongst others. Both UV wavelengths work together to destroy thousands of biological and chemical contaminants that continually circulate within the building.



#### Ultraviolet Solutions

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 SteraBelt for Baggage Conveyor

### Objective

To reduce the risk of bacteria and viruses spreading through the movement of baggage into the buildings.

### The Conveyor System

The system is an automated stand-alone roller-based conveyor carriage system, which is equipped with accurately calibrated and optimally placed UVC lamps to disinfect any item within seconds, passing through the chamber. The sensing mechanism of the system automatically detects the entry of bags and powers on the UVC illumination.

The system has been specifically designed to irradiate the outer surface of the baggage in all directions and disinfects the entire surface at the required intensity levels and exposure time. It also has inbuilt safety features for ensuring the prevention of any direct UVC exposure outside the chamber.

### Applications

This system is suitable for Airports, Railway Stations, Metro Stations, Bus Stations, Hotels, Malls, Hospitals, Industrial and Institutional gates.

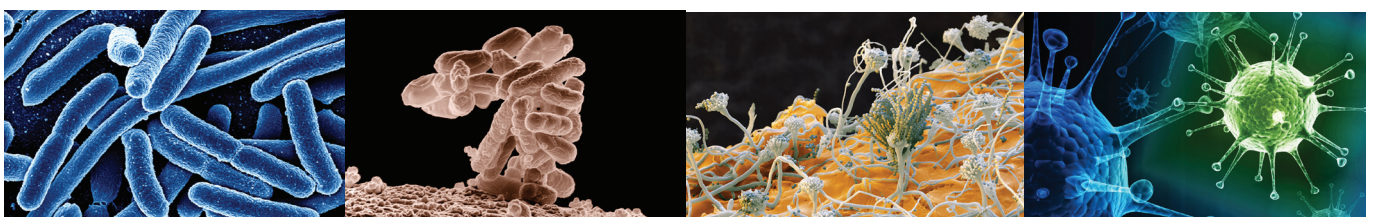
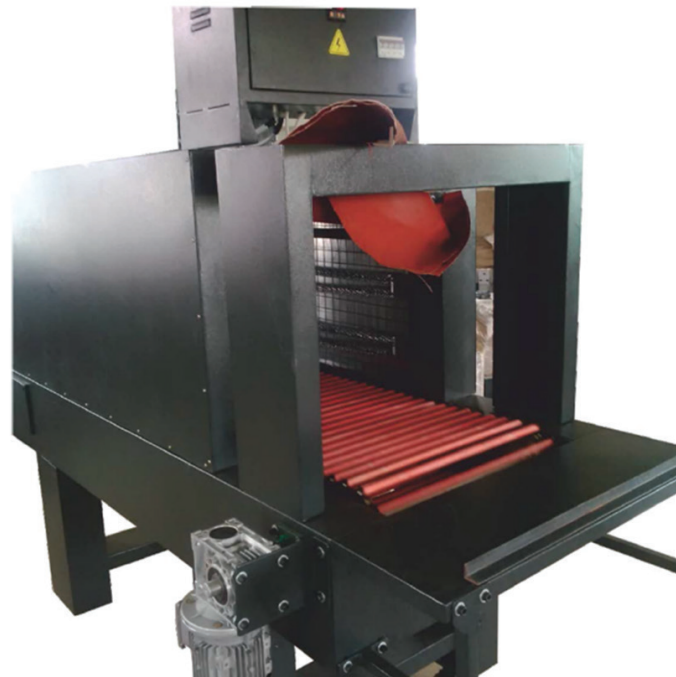
### Design

UVC lamps provides an average intensity of 2,300 microwatt/cm<sup>2</sup> in the tunnel. For 90% reduction of bacteria and viruses, the sanitation time is 10 seconds. For 99% reduction of bacteria and viruses, the sanitation time must be increased to 20 seconds.

A higher sanitation time is considered to provide for redundancy such as various shapes of material. Also, there will be certain areas in the tunnel section, where there shall be shadow due to the size and shapes of material passing through it.

### Details of the Conveyor System

- ◆ UV System Wattage – 520 Watts
- ◆ Number of UV Lamps – 4 Nos.
- ◆ UV Enclosure Length – 1,800 mm
- ◆ UV Enclosure Opening – 560 x 560 mm
- ◆ Conveyor Length – 2,100 mm
- ◆ Conveyor Width – 600 mm
- ◆ Conveyor Height – 900 mm
- ◆ Motorized Rollers – Included, with Variable Speed Drive



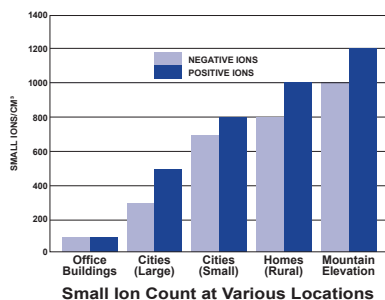


# BiPolar Ioniser

## Plasma Air Purifier

Plasma is called the fourth state of matter after solid, liquid, and gas. When sufficient energy is provided to a gas, free electrons from atoms or molecules are created (reduce or increase the number of electrons in them), thereby creating charged particles: positive electrons/ions and negative electrons/ions. The motion and behaviour of plasmas are affected by electrical and magnetic fields. Most matter in the universe is "ionised".

Plasma BiPolar Ioniser is designed to be installed in variety of applications: High Wall AC, Cassette AC, in Ducts, in AHUs and also stand alone with wall mounting enclosure.



### ION Deficiency Issues

Human activities lead to an increase in ions. Most of these activities cause depletion in the ion count indoors.

Independent laboratory testing studies have shown that; ion depletion can cause sleepiness, attention deficit, discomfort and headaches. These effects can be controlled by artificially increasing ion levels using needle-point bipolar ionisation, which has been reported to reverse the issues.

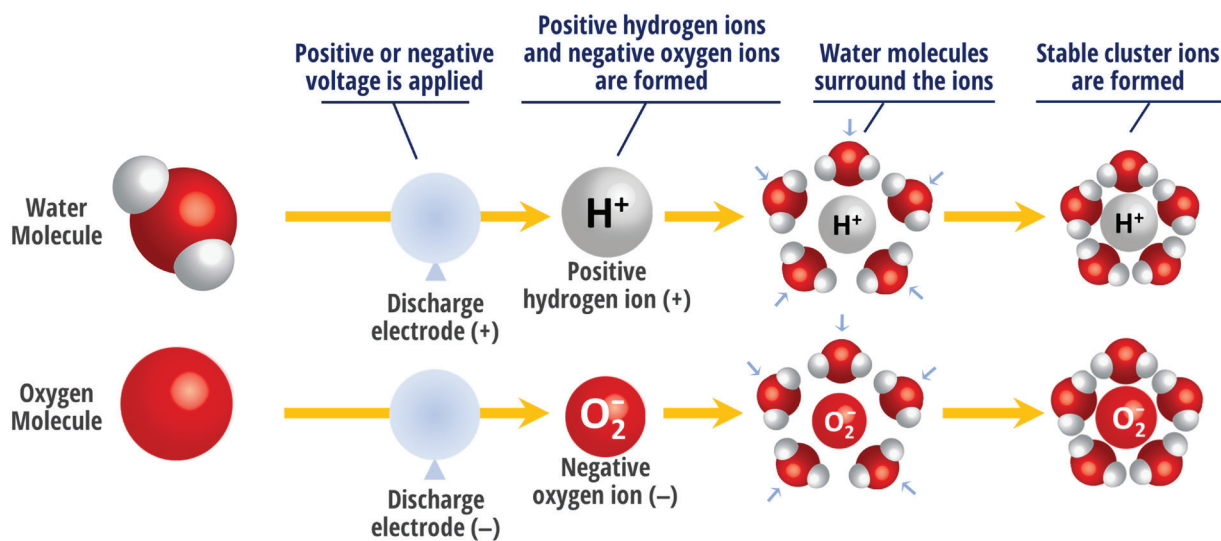


## How Plasma BiPolar Ioniser work to improve IAQ?

BiPolar Ioniser employs needle point brush plasma ionisation technology to safely clean the air inside commercial, residential buildings. The technology uses an electronic charge to create a plasma field filled with a high concentration of + and - ions. These ions travel with the air stream and attach to particles, pathogens and gases.

- ◆ The ions help to agglomerate fine sub-micron particles which then cluster together, making them filterable.

- ◆ Positive and negative ions has microbicidal effects on pathogens, which ultimately disrupts their surface proteins and renders them inactive.
- ◆ The ions also breakdown the VOCs with an Electron Volt Potential of under twelve volts (eV<12), into harmless compounds like O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub>, and H<sub>2</sub>O.
- ◆ The ions produced travel within the air stream into the occupied spaces, cleaning the air everywhere the ions travel, even in spaces not visible.



### Models — Specifications

Model		EBPI-600	EBPI-1500	EBPI-3000	EBPI-4500	EBPI-6000
Application		Non Ducted Splits	In Duct for Ducted Units / AHU Systems			
BPI Pairs		1	1	2	3	4
Size	W - mm	84	120	120	170	170
	H - mm	54	120	120	120	120
	D- mm	28	105	105	105	105
Flange & Gasket		N/A	25 mm on all sides			
Capacity	TR	Up to 4 TR	4	8	11	15
	Air Qty - CFM	N/A	1500	3000	4500	6000
Power		230 VAC/ 50 Hz				
Power Input	Watts	3	3	6	9	12

## More on how Plasma BiPolar Ioniser reduces the Viruses (microbes) in indoor air

During the process of BiPolar ionisation, ions are drawn to viruses/pathogens. Common pathogens being Norovirus, *Legionella* and various strains of the flu.

- ◆ Ions bond on the surface of airborne virus/pathogen and extract hydrogen (H) from the protein on their surface, thus decomposing the protein and neutralising and

deactivating them. Once the process of deactivation is complete, a virus/pathogen then becomes inactive and unable to reproduce.

- ◆ This technology delivers effective control of viruses/pathogens as confirmed by independent research bodies.



## SteraDryScrub

Electrostatic Precipitator (ESP)

**FOR COMMERCIAL KITCHEN EXHAUST**

Problems associated with contaminated Air exhausted from commercial kitchens are very common, particularly in urban areas where housing may be adjacent to or even immediately above catering premises. These premises might include pubs, clubs, restaurants, and takeaways that may be open until the early hours of the morning,

Our SteraDryScrub have been specifically designed for kitchen extract systems which an ideal solution for removing oil, smoke, grease, mist and fly ash from commercial cooking plumes. ENSAVIOR SteraDryScrub is designed and manufactured with latest technology standards and upgrades keeping pressure drop as minimal and are user friendly, efficient and maintenance friendly.

## Principle of Operation

Contaminated air to be cleaned from the process is drawn into SteraDryScrub by fan/blower through a washable metal mesh pre-filter which traps large size contaminants, then it passes through Ionizer-Collector Cells.

**Ionizer - Collector Cells** comprise of two parts, one is Ionizer section and the other is Collection section. Contaminated air first passes through Ionizer section wherein ionizers (tungsten wire or SS spiked blades) which are supplied with 12 kVDC voltage creates a high intensity field where the particulate matter in the air becomes electrically positively charged.

These positively charged particles then pass through a collector plate section made up of a series of equally spaced parallel plates. Each alternate plate is charged with 6 kVDC the same polarity as the particles, which repel, while the interleaving plates are grounded, which attract and collect.

The ionizer-collector cells, pre-filters and post-filters are removed through the side access door for periodic cleaning of the contaminants. SteraDryScrub removes extremely small particulate matter from the air stream with relatively no resistance to air flow, due to the open area of the collecting elements. Low resistance is maintained from start to the completion of the collection cycle. Unit operates in the higher efficiency collection range, upward of 90-95% DOP Method on particles ranging in size from 10 microns down to 0.01 microns in size.

## Associated Equipment

### Adsorber Module

Adsorber Modules are for heavy odours abatement and are designed to mate SteraDryScrub modules consisting of Activated Carbon/Potassium Permanganate Cassettes arranged in V-formation/Cylindrical Canister.

### Ozone Generator

Ozone Generators create and inject Ozone into the exhaust air ducts to get rid of odours, VOC and grease particles. Also helps to keep the ducts free from grease.

### Automatic Wash

Intelligent PLC controlled, in-place automatic wash module for cleaning. Reduces the frequency of maintenance.

### Exhaust Air Fan

Grease-Rated Fan Package with complete accessories for commercial kitchen exhaust application. Various options available suiting to site conditions.

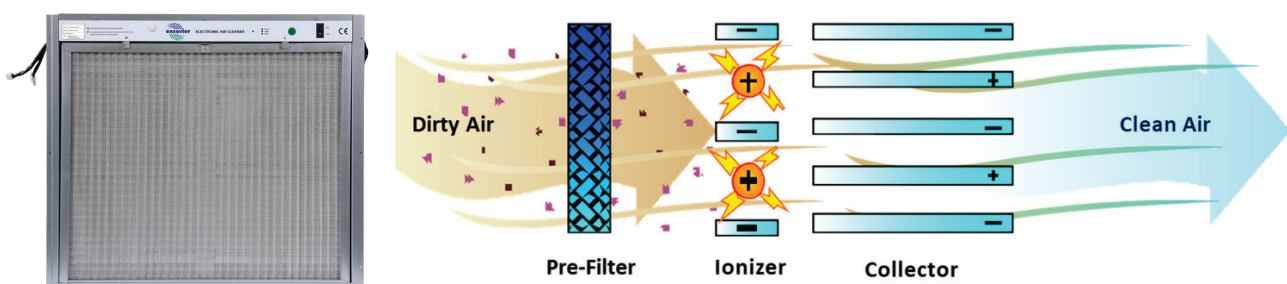


## Electronic Air Filter

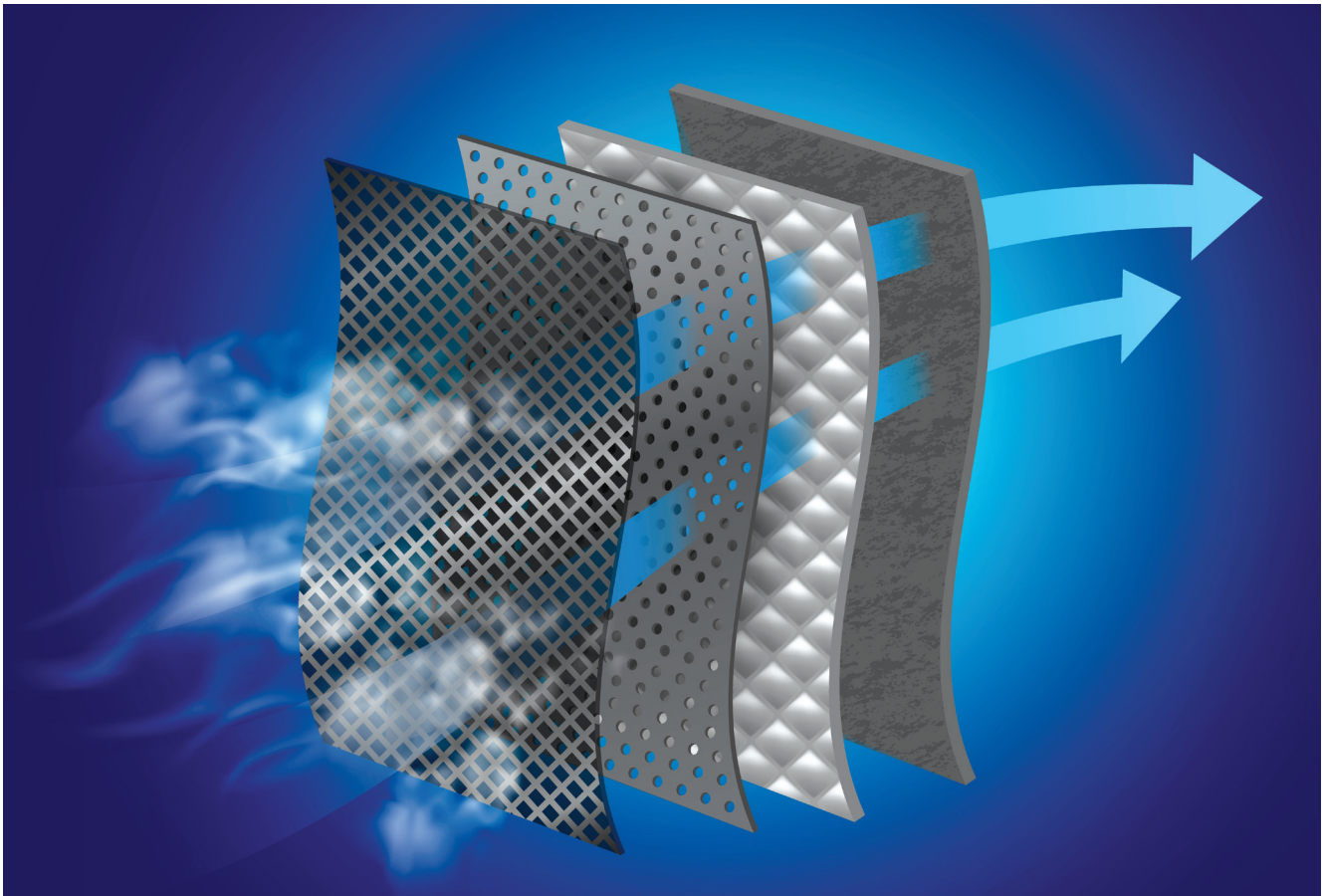
The SteraEAC Series Electronic Air Filters are designed to remove Indoor Air Pollutants like smoke, dust, pollen, tiny micro-organisms, and fumes from the indoor spaces: restaurants, bars, offices, hotels & hospitals, public gathering areas, industries, waiting rooms, designated smoking areas, and more. These filters also act as guard filter to HEPA filters in any typical clean-room or hospital application. Polluted air does not just harm the health of occupants; it is also harmful to HVAC equipment. Dirty air particles stick to the internal components of the system, damaging internal motors and fans and lead to poor heat transfer on the system's coils. Electronic air filters keep the system clean and operating at peak energy efficiency.

## Working Principle

SteraEAC Electronic Air Filters include two parts: the charging and the collecting sections. In the charging section, the incoming smoke, dust, and other particulates pass by ionizer wires which impart a positive electrical charge to these contaminants. The charged contaminant particles then pass into a collector plate section made up of a series of equally spaced parallel plates. Each alternate plate is charged with the same polarity as the particles, which repel, while the interleaving plates are grounded, which attract and collect the contaminants. The contaminants are held in these plates until they are washed away. Air cleaners trap dry particulates like dust, dirt, lint, pollens, haze particles etc.







## FiberShield

Antimicrobial Filter | Air Filtration Solution

A total antimicrobial filter solution with customizable options to accommodate space restraints, pressure drop restrictions, and other customer requirements. Easy to install, cost-effective, proven antimicrobial HVAC solutions through PureAir Filtration 100% Made in USA and available today.

FiberShield™ developed with Noble Biomaterials an antimicrobial fiber fabric that can be used in HVAC systems to help fight against viruses and bacteria. FiberShield™ is the only antimicrobial filter fabric of its kind on the market as developed by PureAir Filtration. Made of a proprietary blend of non-woven, nylon microfibers, impregnated with Ionic+™ sterilizing silver particles, the powerful antimicrobial fabric can be incorporated into any particulate filter, allowing filter manufacturers the flexibility to simply add antimicrobial technology to existing products. The Ionic+™ silver particles not only give the fabric fibers the ability to inactivate microbes, but they also create an ionic field around each fiber that inactivates pathogens, thus enhancing it's ability to reduce the number of viruses and bacteria in the environment.



FiberShield™ is a revolutionary product that is designed to provide an added layer of protection against pathogens in new filtration systems and easily be retrofitted into existing HVAC installations. For many years, this proven technology has been used in other industries and products, such as athletic apparel, wound care materials, and healthcare personal protective equipment.

Third party testing confirms FiberShield™ kills over 99% of microbes with which it comes in contact, including SARS-CoV-2.



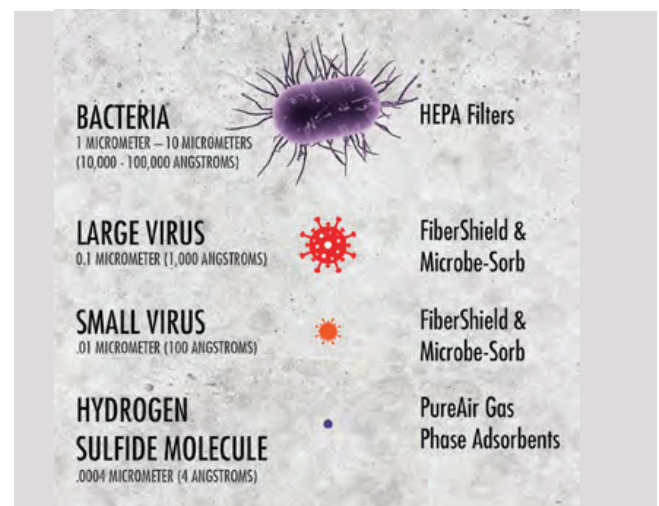
### How Does FiberShield™ with Ionic+™ Technology Stand-up to Third Party Testing?

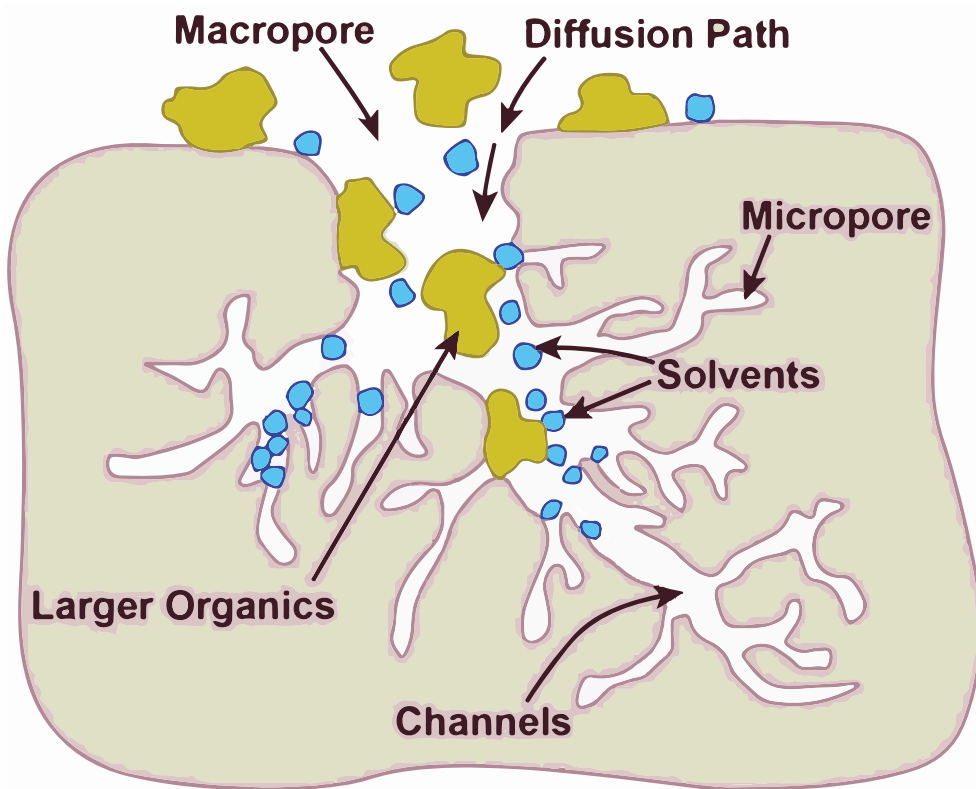
Virus or Organism Tested	Test Results (% Reduced)
SARS-CoV-2	99.89%
H1N1	99.06%
HCOV 229E	98.92%
Staphylococcus aureus	99.99%
Klebsiella Pneumoniae	99.90%
Escherichia coli	99.90%
Candida Albicans	99.90%

### How Does FiberShield™ with Ionic+™ Technology Compare to Competition?

Comparable products on the market include mainly fabrics that are made of fibers coated in copper or zinc, which are also metals known to have some antimicrobial properties. Less advanced products on the market claim copper and zinc to be the strongest natural antimicrobial; however, this is not the case. Laboratory test results confirm silver to be the strongest natural antimicrobial with limited adverse effects. Here are some other ways FiberShield™ out-performs the competition:

- ◆ One of the only technologies specifically tested against SARS-CoV-2, the virus that causes COVID19
- ◆ Longer lifespan
- ◆ Stronger against wear and crush
- ◆ Lower cost and higher value
- ◆ Flexible integration into existing products





## Activated Carbon

Air Filtration Solution



Activated carbon, also called activated charcoal, is a form of carbon processed to have small, low-volume pores that increase the surface area available for adsorption or chemical reactions. Due to its high degree of microporosity, one gram of activated carbon has a surface area in excess of 3,000 sq mt as determined by gas adsorption. An activation level sufficient for useful application may be obtained solely from high surface area. Further chemical treatment often enhances adsorption properties. Activated carbon is usually derived from charcoal or coconut shell.



## Modular V-bank Carbon Filter

The V-shape allows for larger receiving surface and longer dwell time. The modular design provides ease of installation and maintenance for the serviceman.



V, Shape  
Carbon Panels



GI/Aluminium  
Alloy/SS Casing



Modularized  
Construction



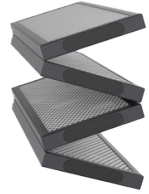
Coal/Coconut based  
Cylindrical Carbon



Carbon Refill  
with Ease



Highly Effective  
in Odor Removal



Model	ESPACF-I	ESPACF-II	ESPACF-III	ESPACF-IV	ESPACF-V
Cabinet Size (mm) (Wx Lx H)	565x800x 565	1020x800x 565	1525x800x 565	2025x800x 565	2525x800x 565
Cabinet Material	1. 6 mm MS, Powder Coated				
Carbon Tray Size [mm]	610x610x50				
Carbon Weight per Tray [kg]	10				
No. of Trays	2	4	6	8	10
Carbon Tray Frame Material	GI / Aluminium Alloy / SS				
Air Flow Capacity Max. [cfm]	2100	4200	6300	8400	101500
Residence Time [Second]	0.1 to 0.2				
Air Flow	Left to Right or Right to Left				
Initial Resistance [Pascal]	50				
Final Resistance [Pascal]	100				
CTC Adsorption	60%				
Pre-Filter	MERV-8				

## GI Powder Coated Modules

These media modules are made from GI and coated with Powder Resin. The media modules are refillable.

Characteristic	Media Module
Module Nominal Size	8x 12x 24 Inch (H x W x D)
Module Type	V Shaped/Re-fillable
Media Quantity	0.65 ~ 0.67 ft <sup>3</sup>
Nominal Bed Depth	2 Inch
Modules per 4 ft <sup>2</sup> (2' x 2' cell)	6 Nos.
Air Flow	Bi-directional
Pressure Drop	Not above 0. 71 WG @500 fpm
Media Blend	Activated Carbon +
Blend Ratio	Alumina Impregnated with KMnO <sub>4</sub>
	50/50 by Volume
Activated Carbon Grade	4 x 6-Granular
Iodine Value	≥1000 mg/g
CTC	60%
pH Range	9~11







## Microbe-Sorb

Antimicrobial Filter | Air Filtration Solution

---

Microbe-Sorb™ adsorbent media has highest concentration of permanganate, along with a proprietary mixture of substances that deactivate over 99% of viruses. Microbe-Sorb™ promotes a safe environment by killing pathogens, while also improving overall indoor air quality. With over 12% permanganate in the proprietary formulation, it deactivates cold and flu causing viruses. Breathe easy knowing that Microbe-Sorb™ is keeping people and resources safe and healthy. Microbe-Sorb™ comes in multiple forms, such as granular or pelletized, and can be incorporated into filters and air handling units, in the same way as traditional activated carbon.

Antimicrobial Filters are an easy to install, cost-effective solution. Cheaper and safer than ozone generators. Proven effective against 99.9% of bacteria, fungi, and viruses, including SARS-CoV-2.



## Breathe Easy

Microbe-sorb™ adsorbent media has highest concentration of permanganate, along with a proprietary mixture of substances that deactivate over 99% of viruses. Adsorbent media has been trusted for years by customers to remove gaseous contaminants from industrial and commercial facilities, and now, our newest media has been developed with additional antimicrobial properties to keep environments safe from antigens.

Permanganate has been used in medicinal practices since as early as the 1800s. Since then it has been added to the World Health Organizations list of essential medicines. Proprietary formulation in Microbesorb™ enhances these antimicrobial properties to keep air quality healthy and safe. Rigorous, third-party testing in internationally renowned labs confirms the media to be successful in eliminating 99.83% of the H1N1 virus.

Microbesorb™ promotes a safe environment by killing pathogens, while also improving overall indoor air quality, with over 12% permanganate in the proprietary formulation, it deactivates cold and flu causing viruses. Breathe easy knowing that Microbesorb™ is keeping people and resources safe and healthy. Microbesorb™ comes in multiple forms, such as granular or pelletized, and can be incorporated into filters and air handling units, in the same way as traditional activated carbon. See more examples and applications on back.

Customers can purchase loose Microbesorb™ media, or they can choose from a variety of sizes and types of filter housings, such as the PP18 Module, Honeycomb Trays, or bonded to Pleated Filters shown above respectively, in order to meet any customer needs, restrictions, and pressure drop parameters. Contact us for details.





# Odor Control Solutions

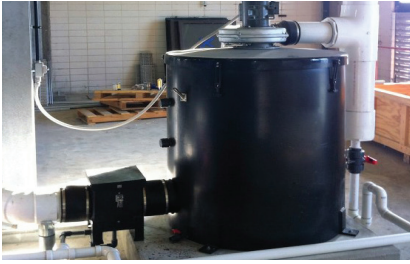
Reliable, Customizable, Advanced Solutions

No one solution meets the varied needs of different odor control applications. Understanding the unique needs of different applications and responding with designs to fit your needs is our specialty. **Our six odor control solution products feature:**

- ◆ Multiple materials of construction to fit the client’s need and budget – Fiberglass, Stainless Steel, Aluminum, HDPE etc.
- ◆ Multiple, long lasting adsorbent medias in each unit to capture all odors
- ◆ Preconditioning of the air to optimize the system performance – standard mist and grease elimination and optional humidity reduction
- ◆ Monitoring of the media consumption – two options: the standard visual media bed monitor, or the optional Electronic Media bed Monitor (EBM)

Model:	Airflow Range (CFM):	Further Details:
Drum Scrubber (DS)	UP to 1,000	Small, low cost, lift stations
Vertical Bed Scrubber (VBS)	Up to 15,000	Larger capacity than DS but still economical. Relatively small footprint
Packed Bed System (PBS)	Up to 8,000	Low profile systems, with multiple beds accessed through easy side access doors, lowest noise
V-Bank Transition System (VTS)	Up to 40,000	Very high airflow capacity and multiple beds
Vortex Radial Flow (RF)	Up to 40,000	High airflow, but small footprint
BEAST Bioscrubber (BST)	Up to 8,000	Uses biological and dry scrubbing technology to remove the highest amounts of H2S





## Drum Scrubber (DS)

The Drum Scrubber is a completely self-contained vent control system for small-flow odor air streams ranging in volume without prefiltering or mist/grease elimination.

- ◆ Typical applications are small and low cost
- ◆ Multiple materials of construction
- ◆ Provides airflow up to 1,000 CFM



## Vertical Bed Scrubber (VBS)

The Vertical Bed Scrubber (VBS) provides continuous high efficiency air purification for contaminated air streams up to 15,000 CFM.

- ◆ A completely self-contained, vertical airflow unit
- ◆ Potential for air bypass is completely eliminated with the system's vertical airflow
- ◆ Available in blow-through, draw-through, or dual bed configuration Provides airflow up to 1,000 CFM



## Packed Bed System (PBS)

The PBS System is a completely self-contained, horizontal airflow package for up to 8,000 CFM.

- ◆ Low profile, multiple beds, lowest noise
- ◆ Horizontal configuration
- ◆ Easy bulk loading and unloading



## V-Bank Transition System (VTS)

The VTS system is a high-volume, low-maintenance solution for industrial and wastewater odor control.

- ◆ High airflow, multiple beds
- ◆ Total solution with customizable beds
- ◆ Provides airflows up to 40,000 CFM



## Vortex Radial Flow (RF)

The Radial Flow Vortex System is a round tank design meant for high airflows (above 4,000 CFM) where footprint is more of a concern than height.

- ◆ Provides a high airflow solution in a small footprint
- ◆ Round tank design that swirls the air through a column of adsorbent media
- ◆ Provides airflows up to 40,000 CFM



## BEAST Bioscrubber (BST)

The BEAST (Biologically Engineered Adsorbent Scrubber Technology) Bioscrubber System consists of a Bioscrubber Tower, followed by a polishing unit, to ensure the most efficient removal of even the highest H<sub>2</sub>S levels. One system can clean 8,000 CFM of airflow, and unlike other systems on the market, the BEAST is low maintenance.

- ◆ Provides the highest odor removing power (300+ ppm of H<sub>2</sub>S)
- ◆ Full remote monitoring and notification system
- ◆ Advanced Biomedium has 10+ years of life



## HVAC Sensors



Greystone Energy Systems Inc., is one of the largest ISO registered manufacturers of HVAC sensors and transmitters for Building Automation Management Systems. They have established a worldwide reputation as an industry leader by maintaining leading-edge design technology, prompt technical support, and a commitment to on-time deliveries.

The company's vision is to design and manufacture a wide range of products for sensing measurement and transmittal of data related to temperature, humidity, pressure, current, air quality, and hazardous gases. This vision is being realized through their continued quest to advance the state of the industry through research and development and also to maintain an exemplary adherence to Quality Management Standards.

- ◆ Temperature Sensors
- ◆ Temperature Transmitters
- ◆ Humidity Transmitters
- ◆ Gauge Pressure Transmitters
- ◆ Differential Pressure Transmitters
- ◆ Static Pressure Transmitters
- ◆ Air Flow Transmitters
- ◆ Current Switches & Sensors
- ◆ Analog to Pneumatic (I/P) Transducers
- ◆ Signal Conditioning Interfaces
- ◆ Power Supplies
- ◆ Air Quality Monitors
- ◆ Carbon Dioxide Detectors
- ◆ Carbon Monoxide Detectors





**Temperature Sensors/Transmitters –  
TSRC, TE200, TSPC, TXRC, TE500, TE511/2 SERIES**

- ◆ Platinum & Nickel RTD, or NTC thermistor Sensors
- ◆ Wall, duct, duct average, immersion, outside air, etc.
- ◆ Optional features include set point adjust, push button switch, fan speed switch and external/internal jacks
- ◆ High accuracy temperature transmitters for any application
- ◆ Transmitters with optional output signal types, power supplies and temperature ranges
- ◆ BACnet ® Communications
- ◆ Optional LCD temperature indication

**Relative Humidity Transmitters –  
SPC, HRC, HTRC, RH\*00, RH\*10 SERIES**

- ◆ Wall, duct or outside models
- ◆ Accuracy ±1%, ±2%, 3% or ±5%
- ◆ Humidity span 0% to 100%
- ◆ Highly stable, Fast response
- ◆ Field selectable outputs 4-20mA, 0-1 Vdc, 0-5 Vdc, 0-10 Vdc
- ◆ LCD and Temperature options available
- ◆ Optional set point adjust, Push button switch, fan speed switch & AC/DC operation

**Duct Smoke Detectors – SL-2000 -  
Precision Carbon Dioxide Control/Sensing**

- ◆ 24 VAC/DC or 120/240 VAC operation
- ◆ Low flow air velocity rating from 100 to 4000 FPM
- ◆ UL, CSFM and MEA Listed
- ◆ Two (2) sets of 10A form 'C' alarm contacts
- ◆ One (1) set of 10A form 'C' trouble contacts

**Carbon Monoxide (CO) Detectors –  
CMD Series**

- ◆ Space or duct mount models
- ◆ Setup/calibration fully menu driven
- ◆ Long-life electrochemical sensor
- ◆ Various analog outputs
- ◆ Field-selectable ranges of 0-100, 150, 300, 400 or 500 PPM
- ◆ Powered by either AC or DC source
- ◆ 3 field-selectable analog outputs linearized over full range
- ◆ Field replaceable calibrated sensor module
- ◆ LCD display PPM level and menu options
- ◆ Optional relay outputs & audible alarm
- ◆ BACnet or Modbus communication

**Carbon Dioxide (Co<sub>2</sub>) & Temperature Detectors – CDD  
BACnet® or ModBus Communication, BTL Listed (B-ASC)**

- ◆ Optional RH and/or Temperature, Setpoint and/or Override
- ◆ Space, Duct & Outside Models
- ◆ 2 Available Ranges
- ◆ CO<sub>2</sub>, Temperature Outputs
- ◆ Optional Slide-pot & Override, On-board Relay, LCD Display
- ◆ Wall or duct models
- ◆ Setup/calibration fully menu driven
- ◆ Electrochemical sensing element
- ◆ Field-selectable ranges of 0-100, 150, 300, 400 or 500 PPM
- ◆ LCD for displaying PPM level and menu options
- ◆ Built-in test switch and –field adjustable alarm buzzer
- ◆ Powered by either AC or DC source
- ◆ 3 Field-selectable analog outputs linearized over full range
- ◆ Field replaceable calibrated sensor module

**Pressure Switch (Gfs) And Air Flow Transmitter –  
Pressure Switch -GFS (ESF-35-2)**

- ◆ Contains diaphragm, calibration knob and snap acting SPDT switch
- ◆ Enclosure Cover guards against accidental contact
- ◆ Optional pressure ranges, Setpoint Indication

**Air Flow Transducer (ESF-35-2)**

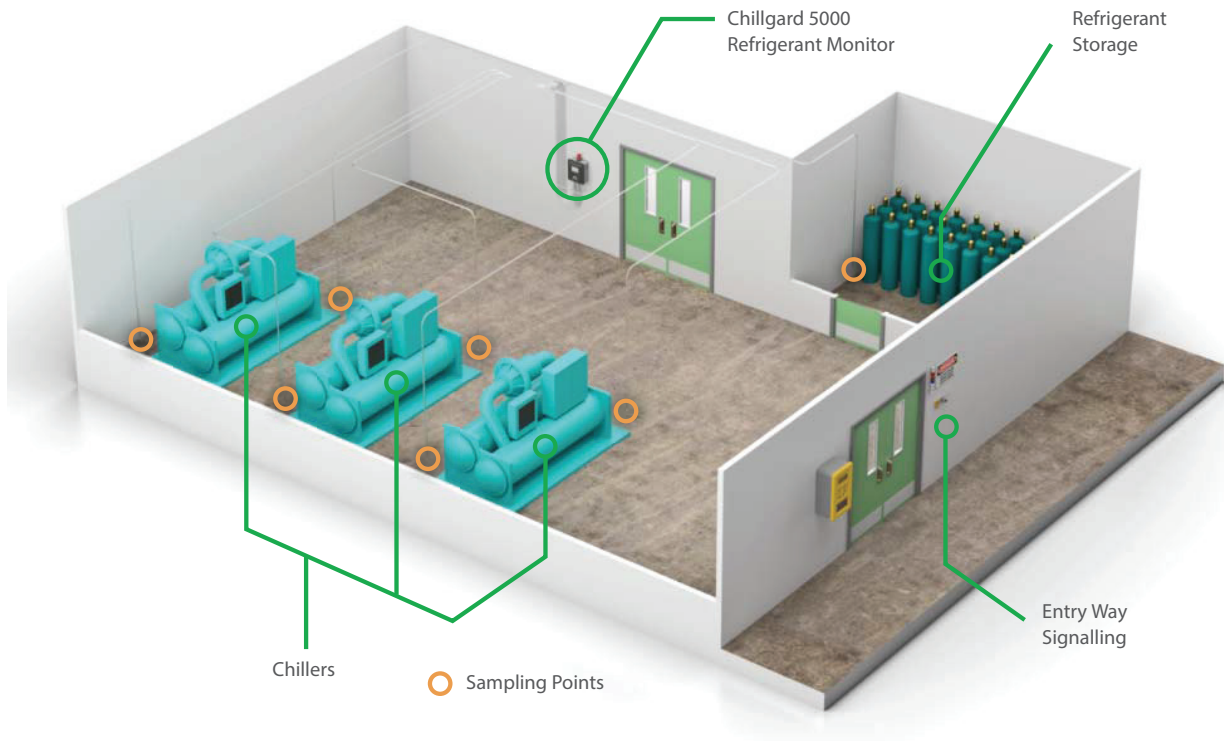
- ◆ Converts airspeed into a 4-20mA or a 0-10 VDC signal
- ◆ Linear output signal
- ◆ Made with corrosion resistant material
- ◆ Fully electronic registration of airflow speed

**Current Switches, Sensors – CS / SC Series**

- ◆ 2 solid core models (CS Series), Split core models (SC Series)
- ◆ Self-powered and no insertion loss
- ◆ Mosfet or triac switching models
- ◆ Fixed or adjustable trip point models
- ◆ High current output models
- ◆ Easy –field adjustment with status LED's on some models
- ◆ Input / Output isolation via current transformer
- ◆ Optional snap-on command relay
- ◆ No field adjustment necessary, factory calibrated
- ◆ Outputs: 4-20 mA, 0-5 Vdc and 0-10 Vdc (Model speci–fic)
- ◆ True RMS measurement for sine waves or variable frequency drives on some models

**Cleanroom Monitor – CR3 Series**

- ◆ The CR3 Series Cleanroom Monitor, was developed specifically to allow for monitoring of confined spaces with accuracy and reliability. The CR3 allows for either in-room or remote monitoring with three different models; integrated sensors, remote sensors or display only to suit a variety of installation needs. It features a flush fitting stainless-steel front plate that enables the user to wipe-down the unit when necessary
- ◆ Humidity, Temperature & Pressure
- ◆ BACnet®, Modbus or Analog Outputs
- ◆ In-room or Remote Monitoring
- ◆ Individual alarms for ALL parameters with Large Display



# Gas Leak Detection System



**MSA**, an American company known as **'The Safety Company'** because of its precision technology to make safety the highest quality so that people can work anywhere in the world in the safest possible environment. Its core products include self-contained breathing apparatus, fixed gas and flame detection systems, portable gas detection instruments and personal protection products for fire, rescue and fall.

**Gas leak detection** is the process of identifying potentially hazardous gas leaks by sensors. These sensors usually employ an audible alarm to alert people when a dangerous gas has been detected and can interface with a control system so as to automatically shut down a process or start a ventilation system. Which variant of gas detection is best; depends on location, preferences and different sources that may pose a danger to human/animal life.

Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. These devices are used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes, HVAC plant rooms, water treatment plants, sewage systems and firefighting etc. Exposure to toxic gases can also occur in operations such as painting, fumigation, fuel filling, construction, excavation of contaminated soils, landfill operations, entering confined spaces, etc.

Common sensors include combustible gas sensors, photoionization detectors, infrared point sensors, ultrasonic sensors, electrochemical gas sensors, and semiconductor sensors. More recently, infrared imaging sensors have come into use.

The HVAC industry requires a wide variety of gas detection needs. From boiler rooms, battery rooms, engineering and research labs, and transportation maintenance facilities to many other industrial building and facility applications, each environment has its own monitoring needs. To enable personnel to work safely within these environments, monitoring of toxic gases, oxygen enrichment and deficiency and combustible gases is necessary.



## MSA Chillgard® 5000 Refrigerant Leak Monitor

The Chillgard-5000 Refrigerant Leak Monitor provides the earliest level of detection of costly refrigerant gas leaks in mechanical equipment rooms. Sampling system with patented photo-acoustic infrared (PAIR) technology detects leaks as low as 1 part per million (ppm). Intuitive, touchscreen user interface makes it easy to operate. Predictive maintenance and diagnostics keep you operational. Meets ASHRAE 15 requirements to provide visual and audible alarms both inside and outside of mechanical equipment rooms and to activate mechanical ventilation.

### Highlights

- ◆ Sensitivity - earliest level of detection down to 1 ppm
- ◆ Reliability - advanced sensor diagnostics and predictive maintenance
- ◆ Versatility - monitors up to 6 refrigerants field selectable through a refrigerant library
- ◆ Stability - minimal drift, not affected by temperature or humidity

### **Intuitive, multi-lingual user interface provides valuable data through Real-time dashboard:**

- ◆ One-touch calibration
- ◆ Event logs
- ◆ Password protected

### **Digital communications:**

- ◆ BACnet®
- ◆ Modbus



## MSA Chemgard® Photoacoustic Infrared Gas Monitor

The Chemgard Photoacoustic Infrared Gas Monitor Series with photoacoustic infrared (IR) sensing technology provides precise, low-cost, high-performance monitoring for many gases such as Sulfur hexafluoride (SF6), hydrocarbons, solvents, alcohols, CO2, CO, and additional toxic gases.

The Chemgard Gas Monitor is extremely stable and highly selective to the gas of interest and can operate for months with virtually no zero drift. It offers detectability as low as 0.01 ppm for certain applications. The Chemgard Monitor is factory calibrated, ready to detect a specific gas in the range desired. Cross-sensitivity to water vapor, a common concern with other types of infrared analyzers, does not occur with this instrument. Proprietary sensing technique determines a sample's amount of water vapor, then subtracts that amount from the gas reading, allowing for extremely stable gas readings and no sensitivity compromise.

### Data Logging

- ◆ Can log data, giving users access to date stamped information on key events including gas readings, alarms and fault conditions.
- ◆ Gas readings can be logged as maximum or average readings over 15-minute or 1-hour time periods.
- ◆ Data is accessible through front panel display or RS-232 port.







## Automatic Tube Cleaning System

Solution for Heat Exchangers

### How ATCS Works:

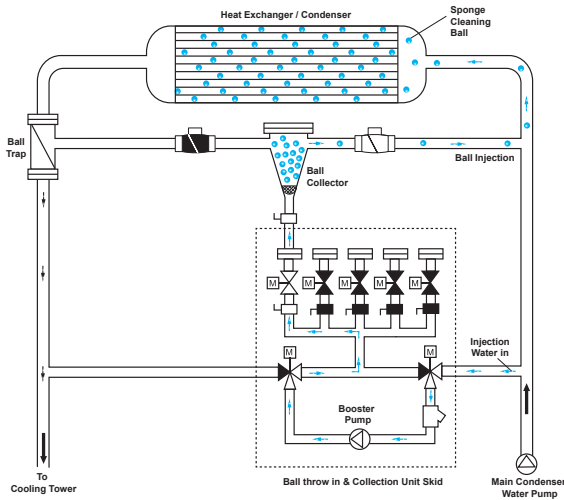
The Ensavior Automatic Tube Cleaning System features specially developed sponge balls, which are injected into the chiller condenser water flow to provide continuous tube cleaning while the chiller is in operation.

### ATCS Working:

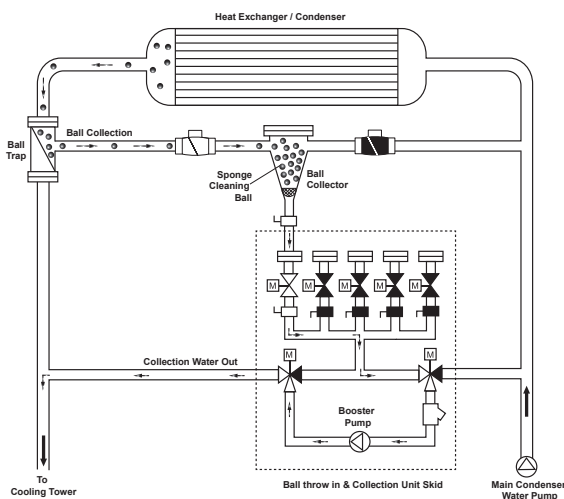
Sponge balls resting in the Ball Collector are periodically injected to the condenser cooling water inlet pipe by the operation of a booster pump and control valves mounted on a Skid. These balls travel with normal condenser water flow in the condenser and pass through the tubes. While passing through the tubes ball carry away all the Soft Scales and deposits accumulated on the inner surface of the tubes and so keep the tubes continuously clean. The balls come out of the condenser and get trapped in the Ball Trap, while hot return water goes to the cooling tower. Ball trap is installed on the cooling water return pipe. Once all the balls are out of condenser and get trapped, these are pulled back and washed in the Ball Collector by operation of the same booster pump and control valves mounted on a Skid. The cycle is repeated every 10 to 30 minutes to ensure 100% tubes get cleaned. The operation is fully automatic and controlled through PLC with no human intervention.



### BALL INJECTION CYCLE



### BALL COLLECTION CYCLE



## Facts

- ◆ 0.3 mm scale formation inside condenser tubes reduces heat transfer coefficient by 25%
- ◆ 0.6mm scale layer on condenser tubes reduces chiller heat transfer efficiency by 34% and increases energy consumption by 21%.
- ◆ 1 mm fouling will increase Power Consumption by 36%
- ◆ 1 °C increase in condenser approach is equivalent to 3.5% power loss.
- ◆ Despite Manual cleaning, COP is reduced over time which results in higher energy consumption and under performance of chillers.
- ◆ Fouling generally results in 30% increase in specific power consumption (IKW/TR) of water-cooled chillers.



## Additional Features

- ◆ All Components are from Global Manufacturers. Spares are available in any part of the world. No dependency for spares on us. Spares/Service can be sourced from open market.
- ◆ 100% Chemical Free System.
- ◆ Ball Collector and Ball Trap are Hot Dip Galvanised for much longer life.
- ◆ Tower Light with buzzer for annunciation from a distance in noisy atmosphere of Plant Room.
- ◆ Seven Inch Multi colour HMI Touch Screen.
- ◆ Complete System Graphics on HMI Screen for easy monitoring of system.
- ◆ Same P&I diagram for Steam Condensers, Ammonia Condensers, Chillers, VAM etc.
- ◆ Multiple Condensers (Maximum up to 5) can be cleaned by a single Skid.
- ◆ Maximum Safety for all the operational components. Apart from MPCB, MCB, protection for under/ over voltage, phase sequence is provided for Pump Motor protection.
- ◆ Can mostly be installed on standby condenser / chillers while those working can continue to be in operation with no water drainage from the circuit.
- ◆ Alert for balls needing replacement.
- ◆ Chiller Bypass Facility.
- ◆ Universally designed Ball Trap can be installed in horizontal / vertical pipeline or bend.
- ◆ Ball Trap comes with open-able cover for cleaning of mesh and Trap.
- ◆ Alert on Increase of Condenser Approach through parameters monitoring on SCADA / BMS (optional).
- ◆ Fully SCADA / BMS compatible via Modbus (optional).
- ◆ Remote monitored/controlled (optional).
- ◆ Ball Counter (optional).

## Our Offering

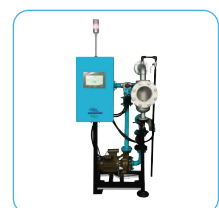
**SKID:-** This part comprises of booster pump and control valves controlled by a PLC to initiate mechanisms from injection of sponge balls to their collection. The complete system is so programmed to inject and collect the balls in set time interval.



ATCS Online



ATCS for Multiple Chillers



ATCS for Individual Chiller

# Major Clients



## Associated Brands





## **Ensavior Technologies Pvt. Ltd.**



+91 9658-373-373



info@ensavior.com  
www.ensavior.com



Plot No. 17A, Block A,  
Sector 19, Dwarka,  
New Delhi-110075, India



Pumping | Pressurisation & Deaeration | PICV & Automatic Balancing Valves | Thermal Storage | Water Filtration  
Electrolytic Scale Remover | Air Purification | Dry Scrubber | UVGI | HVAC Sensors | Gas / Refrigerant Leak Detector

**Branch Offices: Bengaluru | Kolkata | Mumbai | Singapore**

CIN: U72900DL2011PTC222724

Specifications and features can change without prior notice for developing a better and cost effective product.