

ACTIVE SANITIZING SYSTEMS



Air Knight[®]

INDUSTRIAL / COMMERCIAL



DISPOSITIVO MEDICO
CLASSE 1 CONFORME
ALLE DIRETTIVE UE/93/42 CEE



Micro Pure

RESIDENTIAL / OFFICE



THE ONLY SANITIZING SYSTEM
ALSO ACTIVE ON SURFACES



EFFECTIVELY REMOVES BACTERIA,
MOLD AND ODORS



ACTIVE 24/7 IN EVERY TREATED
SPACE

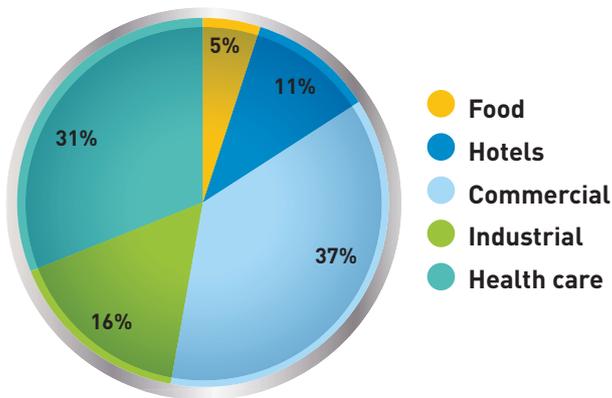


ELIMINATES POLLUTANTS
WHEREVER THEY ARE

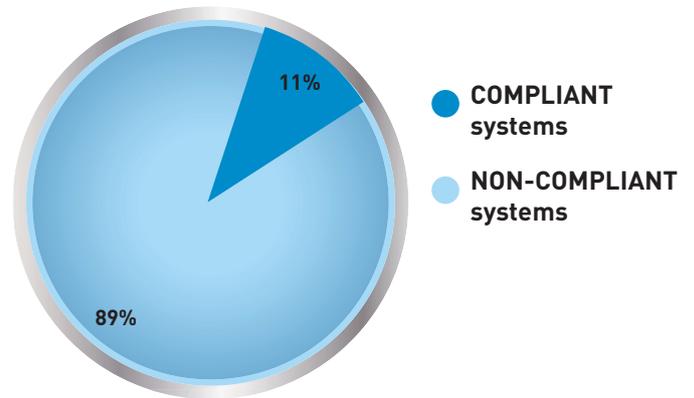
THE PROBLEM

In our society, we spend up to 90% of our time indoors and 30-40% of it at the workplace. The air we breathe in indoor environments is treated and distributed by air distribution systems that often contribute to air contamination.

INSPECTED SYSTEMS BY SECTOR



HYGIENIC AND SANITARY COMPLIANCE OF THE SYSTEMS



STATISTICS

From statistical studies carried out on a significant sample of buildings*, it has become known that:

- 65% of air ducts is contaminated
- 65% of the systems does not ensure an adequate air exchange
- In 35% of the sampled buildings, allergy problems were observed
- 10% of the sampled buildings is infected with pathogenic bacteria
- 8% of the sampled buildings contains airborne fiberglass particles
- In 4% of the sampled buildings, the air contains carbon monoxide from traffic emissions

* 112 buildings were sampled. Reference area: Northern Italy.



THE SANITIZING ACTION OF THE MODULS

ACTIVE SANITIZING SYSTEMS

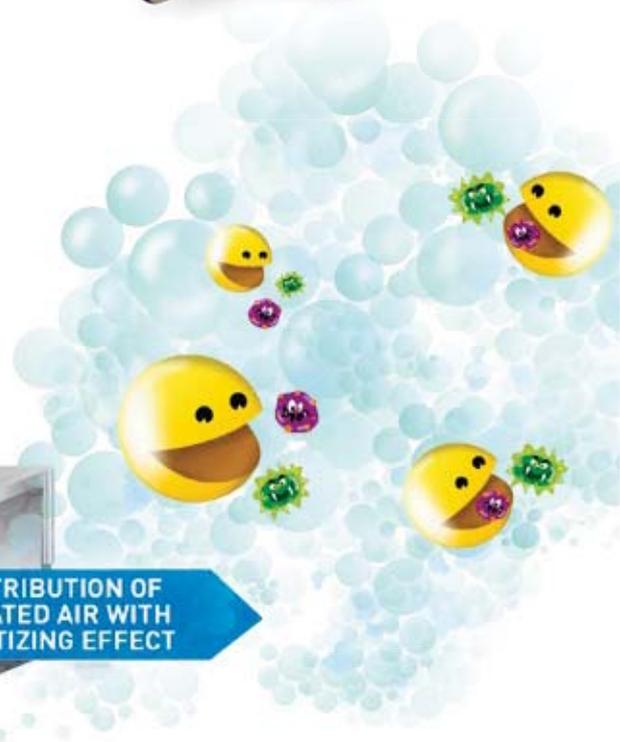
Air Knight



Micro Pure

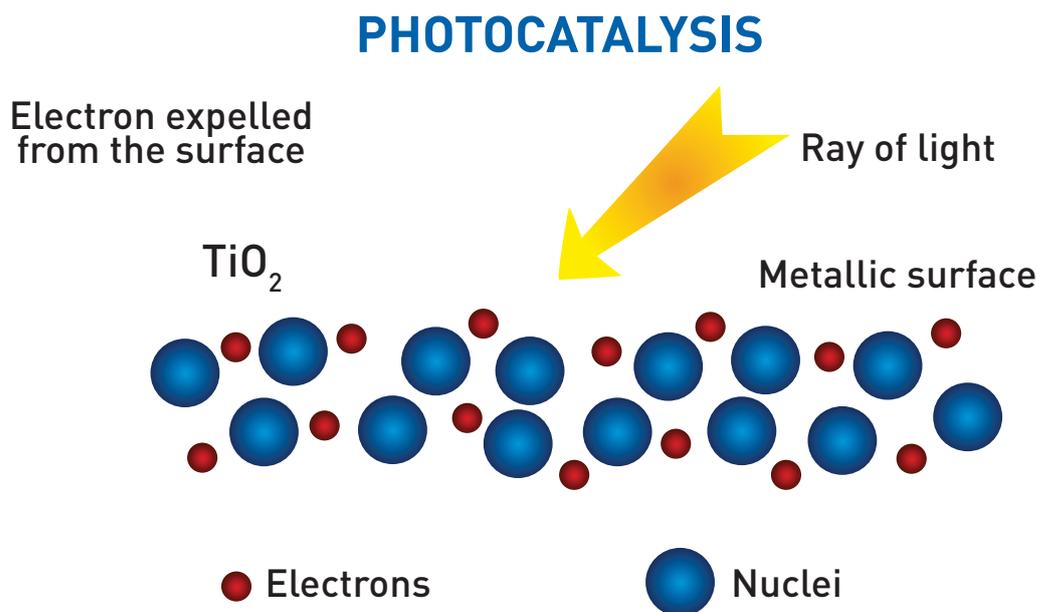


The **Dust Free** modules generate natural oxidizing ions [Pacman] which, being transported by the airflow, are able to destroy the pollutants encountered both in the ducts and in the environment.



PCO™ TECHNOLOGY

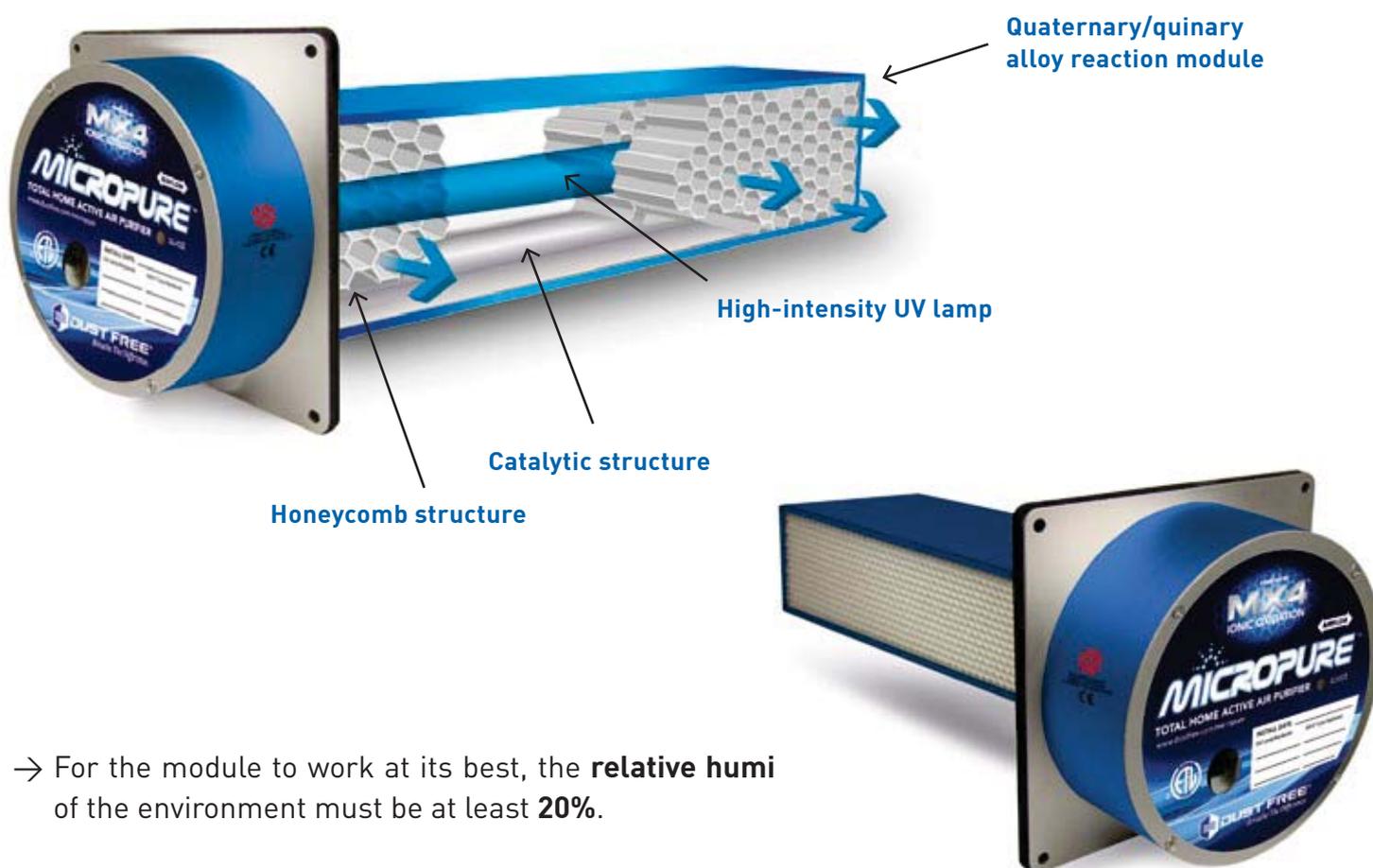
- PCO™ (Photocatalytic Oxidation) technology has been developed and used by NASA to sanitize the environments intended for space missions, where one of the main needs is the **quality** and **healthiness** of air.
- PCO™ technology imitates and reproduces what happens in nature through photocatalysis, a process which, thanks to the combined action of the sun's UV rays, air moisture and some noble metals present in nature, generates **oxidizing ions** that are able to destroy most of the toxic and polluting substances.
- Therefore, the photochemical reaction generated thanks to PCO™ allows the destruction of pollutants (in particular **bacteria, viruses** and **mold**) using an active natural ingredient.
- The Dust Free modules, invested by the airflow, generate a photochemical reaction that binds one additional molecule of oxygen (O) to the pre-existing hydrogen and oxygen molecules of the air moisture (H₂O), thus generating **hydrogen peroxide**.
- Hydrogen peroxide (H₂O₂), generated in small quantities (below 0.02 PPM) by the photocatalytic reaction, is highly effective **in destroying the microbial load**, both in the air and on surfaces.



HOW THE MODULE WORKS

The PCO™ technology of the Dust Free modules is based on the combined action of the rays of a special UV lamp and a **catalysing structure** made of a honeycomb matrix **metal alloy** mainly composed of TiO_2 (titanium dioxide) and other noble metals in a lower amount.

The air, loaded with moisture (H_2O), passes through the Dust Free module, which is composed of a quaternary or quinary alloy. A high-intensity UV lamp starts a photochemical oxidation reaction which binds an additional molecule of oxygen to H_2O ; **hydrogen peroxide** (H_2O_2), when spread in the environment, allows a **safe, efficient and above all complete sanitizing process**, as it is able to destroy most of the pollutants, such as bacteria, viruses, mold, allergens and odors.

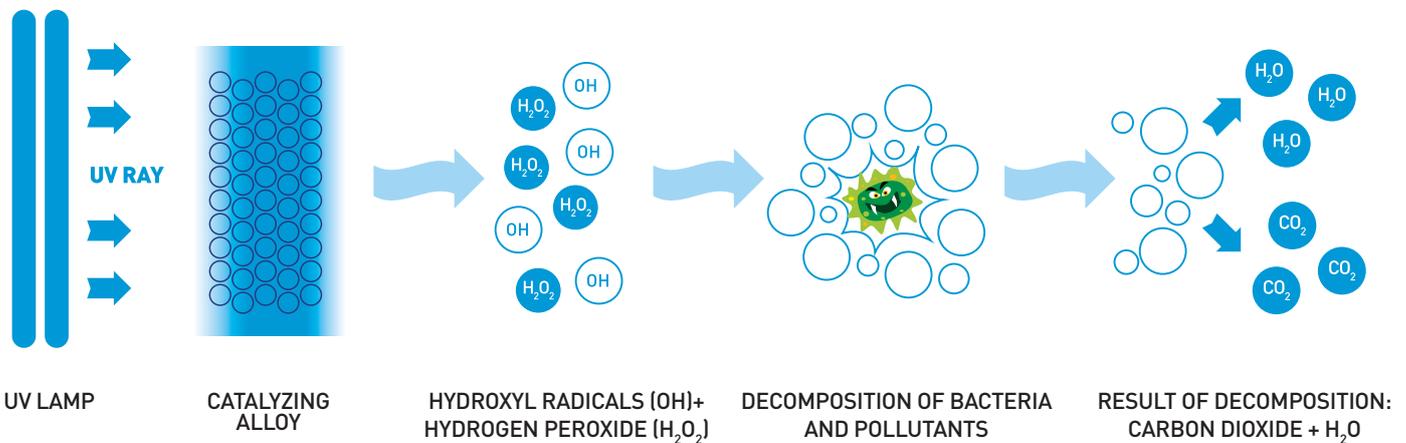


→ For the module to work at its best, the **relative humidity** of the environment must be at least **20%**.



SPACE Technology.

→ The hydrogen peroxide generated by the Dust Free modules is able to destroy most of the pollutants, such as **bacteria, viruses, mold, allergens and odors**.



→ Spread and carried by the airflow, hydrogen peroxide effectively exerts its **sanitizing** action on **duct** surfaces, in the ambient **air** and on the **surfaces** of the treated spaces, by falling on them.

DIFFERENCES FROM OTHER TECHNOLOGIES

PASSIVE SYSTEMS



MORE OR LESS EFFECTIVE, LIMITED TO THE ENVIRONMENT IN WHICH THEY ARE INSTALLED.

- Traditional filtration
- Classic ionization
- Germicidal lamps

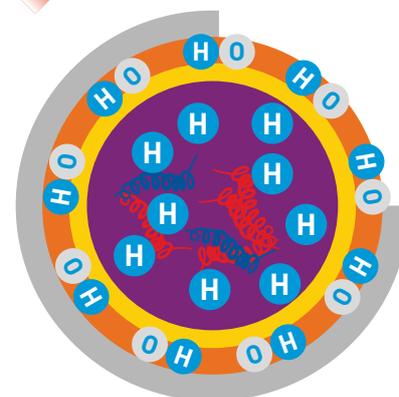


ACTIVE SYSTEMS



THE OXIDISING IONS GENERATED BY THE PCO PRODUCES A SANITIZING EFFECT NOT ONLY WHERE THE MODULE IS INSTALLED, BUT ON THE ENTIRE AEREAULIC SYSTEM AND IN THE TREATED ENVIRONMENTS.

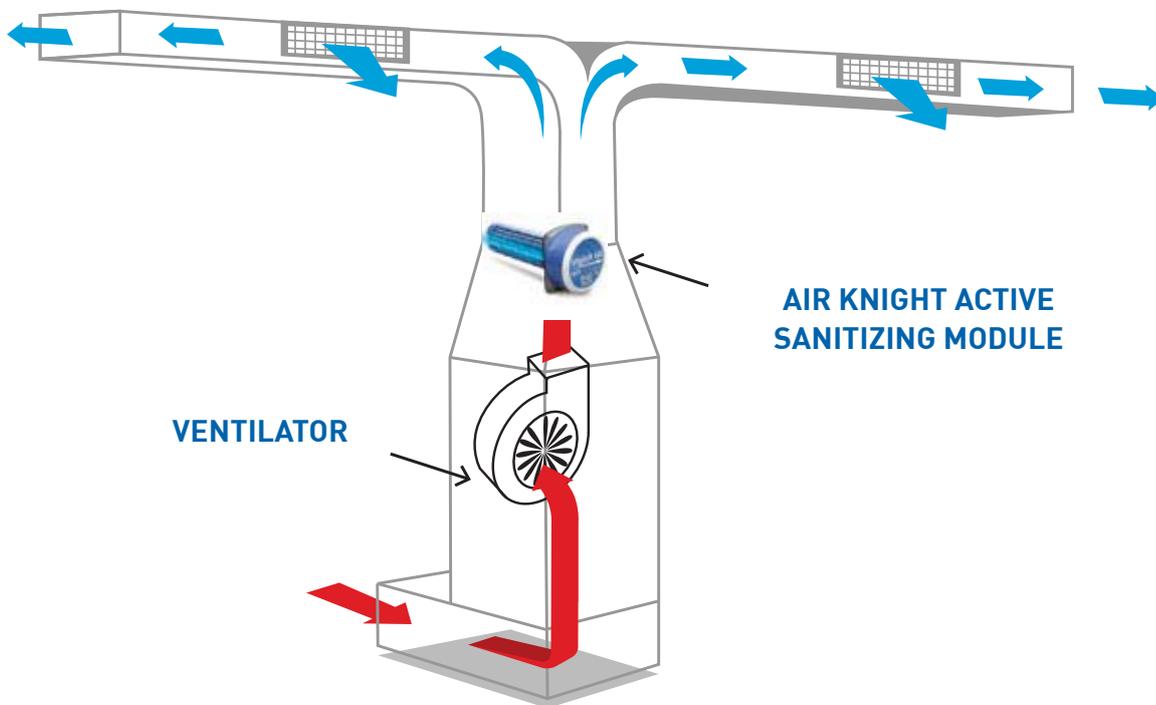
PCO TECHNOLOGY PhotoCatalytic Oxidation



By means of a photocatalytic reaction, the generated H_2O_2 is able to attack and destroy the molecular structure of the pollutants, by subtracting protons from the cell and creating a new hydrated compound.

WHERE TO INSTALL THE DUST FREE MODULES

- The Dust Free active sanitizing modules (**Micropure** and **Air Knight**) are to be installed in the ventilation duct downstream of the AHU so that the airflow comes into direct contact with the module and passes through it correctly.
- The Dust Free active sanitizing modules (**Micropure** and **Air Knight**) can be installed in any **HVAC system**, in a plenum or just above the ventilation unit. Should it be necessary to install multiple units in the same area of the plenum, it is advisable to ensure adequate space between the units, so that they can meet the **airflow** correctly.

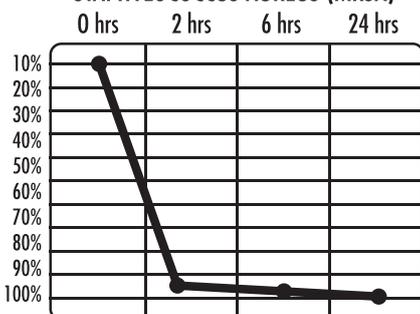


-  NON-TREATED AIR
-  AIR TREATED BY THE MODULE

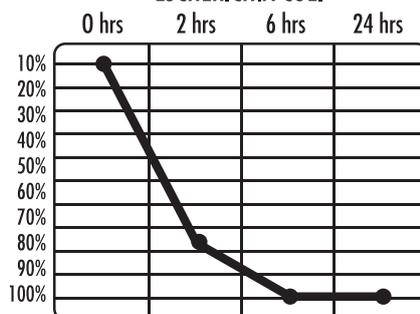


SCIENTIFIC RESEARCH AND STUDIES SHOW THE BENEFITS OF PCO™ TECHNOLOGY

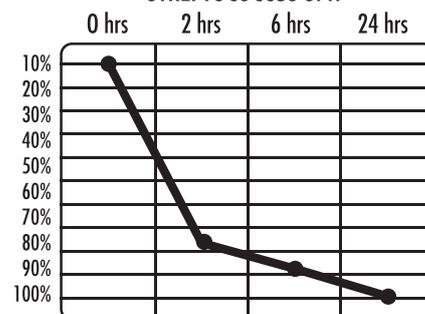
STAPHYLOCOCCUS AUREUS (MRSA)



ESCHERICHIA COLI



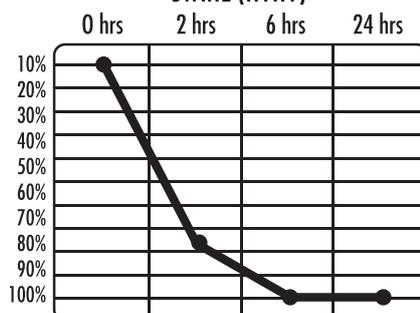
STREPTOCOCCUS SPP.



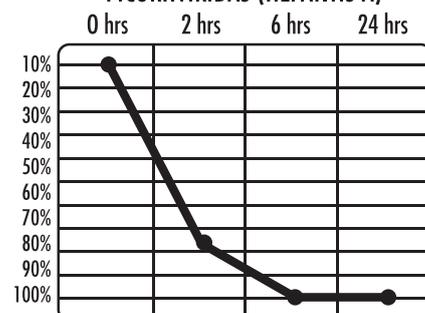
CANDIDA ALBICANDIS



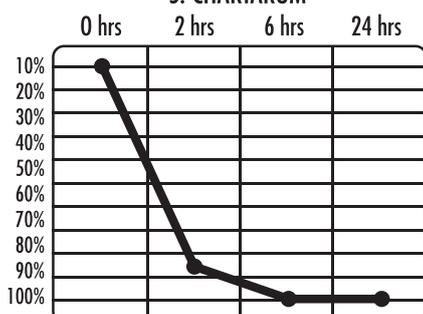
SWINE (H1N1)



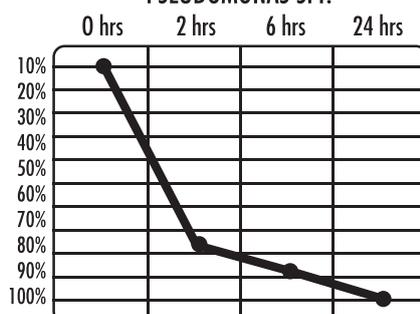
PICORNVIRIDAS (HEPATITIS A)



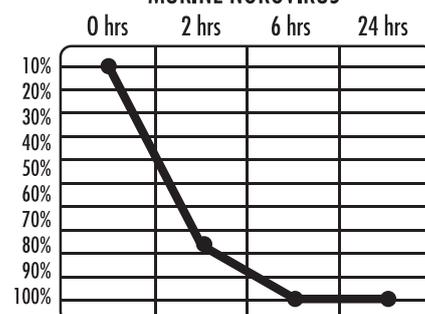
S. CHARTARUM



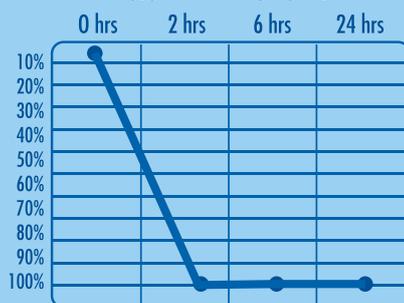
PSEUDOMONAS SPP.



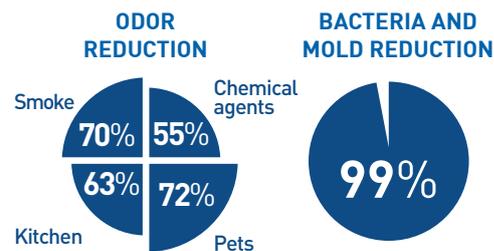
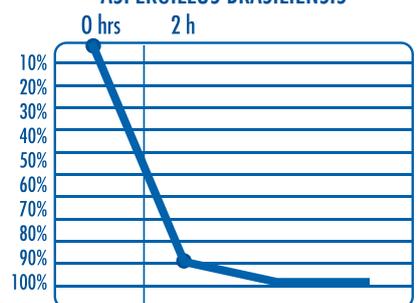
MURINE NOROVIRUS



LEGIONELLA PNEUMOPHILA



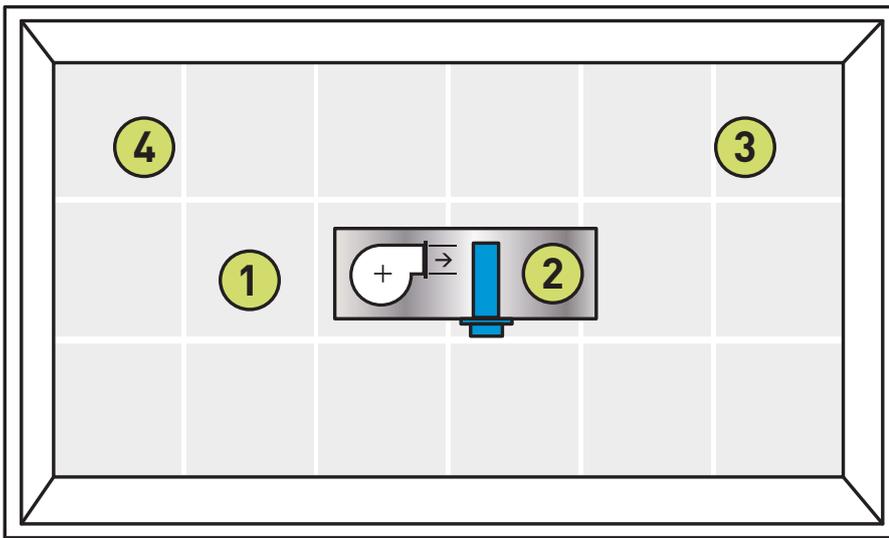
ASPERGILLUS BRASILIENSIS



The tests, conducted by American laboratories and universities, prove the effectiveness of the Photocatalytic Oxidation technology in destroying the bacterial load present in the environment. The tests were carried out in a 24-hour time span.

STUDY CARRIED OUT BY A TECHNOLOGICAL UNIVERSITY

MICROBIOLOGICAL TESTS conducted with PETRI dishes.
INDOOR SPACE MEASURING APPROXIMATELY 35m³
 LABORATORY TESTS



BOX EQUIPPED WITH:

- n° 1 Dust Free module
- n° 1 Ventilator
- n° 1 Outlet vent
- n° 1 Intake vent



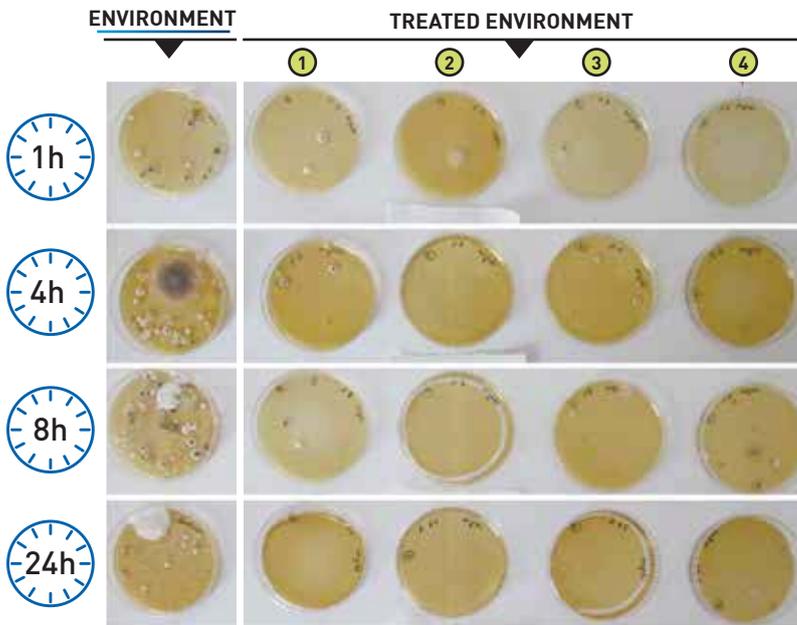
ARRANGEMENT OF THE CONTAMINATED DISHES IN THE ENVIRONMENT: ●

- 1 → External in the environment
- 2 → Inside the box
- 3 → External in the environment
- 4 → External in the environment

The test, carried out indoors in an approximately 35m³ space, consisted in contaminating agar culture media, both sterile and inoculated with the selected microorganisms in Petri dishes.

TEST 01

The use of a sterile culture medium was aimed at monitoring the microbial load in the environment with and without PCO-001, where the first one represents the control group.

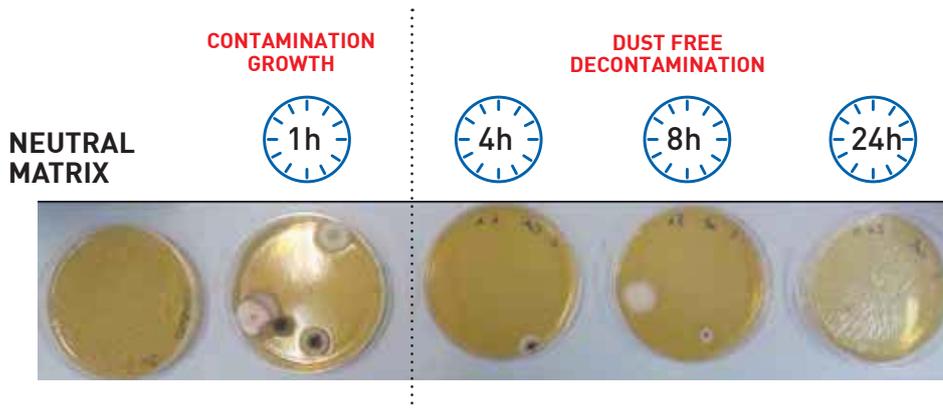


RESULTS

The microbial load that sedimented on the dishes containing the agar culture medium during the treatment with PCO-001 was significantly lower than the amount reached when the device was absent. It was possible to observe that the longer the time of exposure of the dishes, the greater the difference in contamination between sample and control. It was possible to reckon that after a 24-hour treatment, the microbial load observed on the agar culture medium (basically molds usually present in the environment) in the presence of PCO-001 was approximately 100 times lower (2 log) than the one on the control, namely the one present on a dish left in the same environment without Dust Free.

TEST 02

In the second test, the culture medium was previously inoculated with a microorganism, to test the ability of the Dust Free device to destroy the initial microbial load of a contaminated matrix.

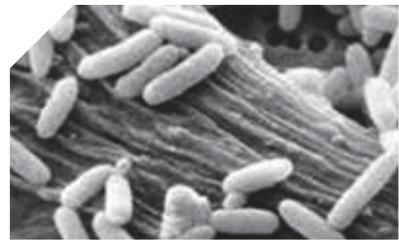


RESULTS

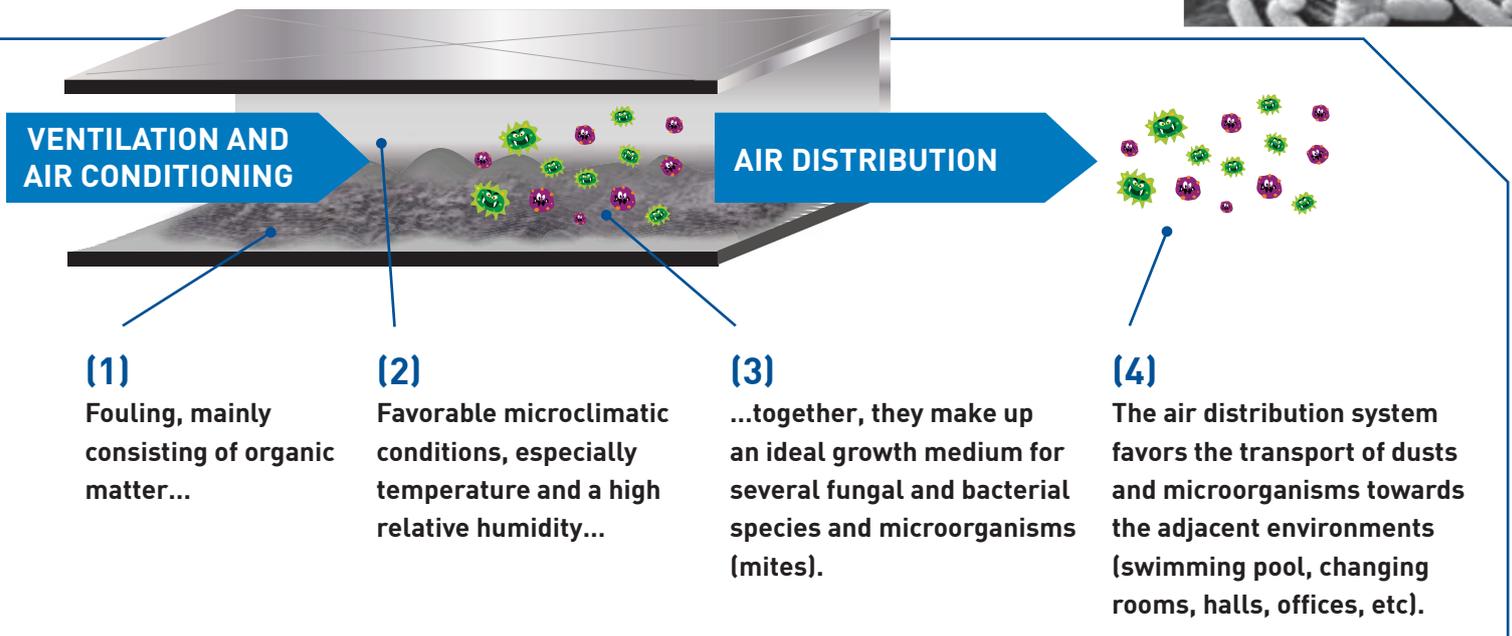
Test n°2 was conducted on dishes inoculated with a known number of E. coli colonies treated in an environment of limited size with a blower having a limited power. This made it possible to evaluate, under these conditions, the effectiveness of the device on a specific type of bacteria. In fact, the microbial load dropped dramatically even after a short treatment time (1 hour). It is possible to state with certainty that, after a 4-hours treatment, a complete abatement of the microbial load inoculated at time zero occurs.

THE RISKS OF A SCARCELY SANITIZED ENVIRONMENT

- **PCO™** technology is the principle underpinning the **Dust Free active sanitizing products**. Their photochemical reaction gives rise to a potential for action which also enables the sanitization of the **ducts themselves**, where molds and bacteria often proliferate, causing the spread of **diseases and allergies**, especially in the **work environment**.
- Over time, in fact, the **ducts** can easily be colonized by microorganisms such as bacteria, mold and fungi which, being carried by the air, can definitely increase the **potential infection** of the persons sharing the same environment.



AERAILIC DUCT SECTION

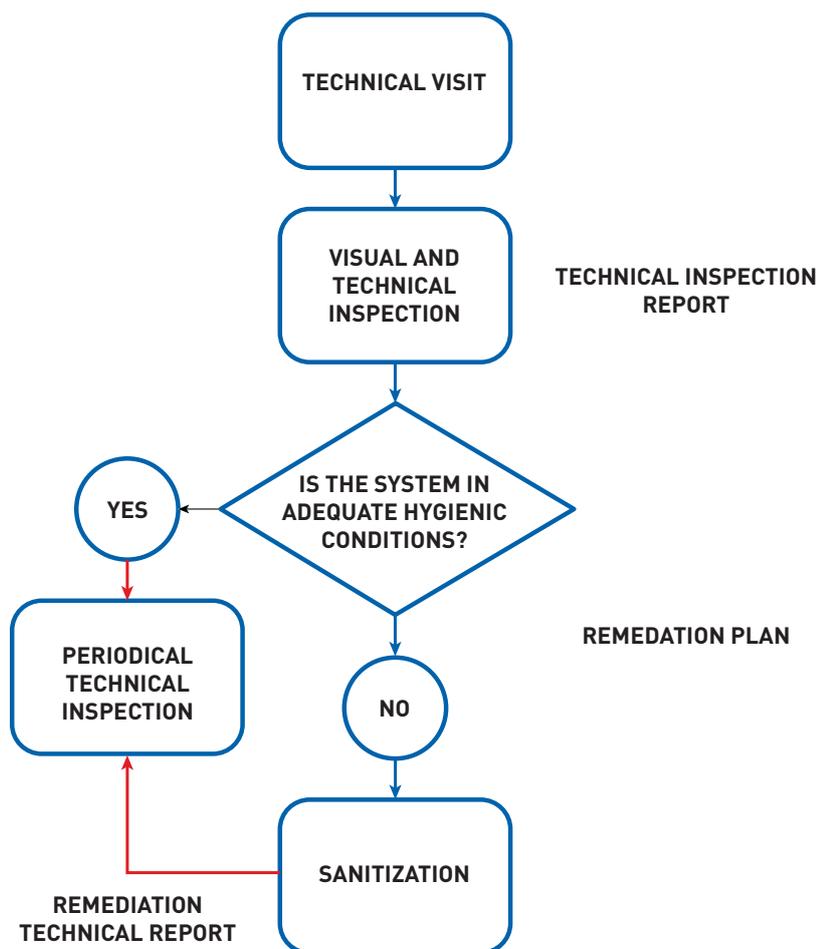


- Unlike the typical duct cleaning operations, which are anyway advisable in order to eliminate the particulate that has been sedimenting over time, the installation of the Dust Free modules makes it possible to continuously attack and destroy the harmful microorganisms both inside the ducts and in the environment. This way, the **proliferation of bacteria** and, most of all, **recontamination** (which may occur even in a short time) **are avoided**.



MAINTENANCE AND MONITORING PROCEDURE FOR CLEANING SYSTEMS

CONTROL PLAN: REGULAR TECHNICAL INSPECTION



→ If the visual/technical inspection of the systems leads to an evaluation of non-conformity to the hygiene levels required by the regulations, it is necessary to proceed with the sanitization and remediation of the systems. These expensive and comprehensive operations must be repeated each time the systems are found non-compliant during the next annual inspections.

SYSTEM MAINTENANCE IN THE PRESENCE OF DUST FREE MODULES

- The installation of the Dust Free modules makes it possible to keep the aeraulic system sanitized over time with only one initial activity: it is not a sanitizing operation to be repeated regularly, but it has an **ongoing effect**.
- The only maintenance operation needed for keeping the Dust Free modules efficient consists in **replacing the UV ray lamps every two years**.
- Installing the Dust Free modules also allows a decrease in the frequency of the cleaning operations as the oxidizing ions generated from photocatalytic oxidation **avoid** and drastically **reduce** the **gathering of clusters of dust**. However, an adequate maintenance of the systems remains necessary and unavoidable, paying attention in particular to:
 - Air handling unit
 - Filtration section.
- Installing the Dust Free modules allows therefore a significant decrease in the operations of remediation and sanitization of the ducts, as **bacteria and mold are continuously attacked** by the active effect of the photocatalytic oxidation.
- Moreover, the **dust deposit** on the surface of the ducts, that may be taken as sample during inspections, will turn out to be in a **much lower quantity**, as the oxidizing ions generated by the modules continuously prevent the aggregation of dust clusters.

CONCLUSIONS

Briefly, the benefits linked to the installation of the Dust Free modules with PCO™ technology may be summed up as follows:

- **Elimination of germs, bacteria and viruses** that, by proliferating, cause the spread of illnesses and allergies.
- **Elimination of odors** from the environment.
- **Drop in the amount of airborne harmful microparticles**, including the ultra-thin particulate that is not generally treated by common filters.
- **Decrease in dust clusters**
- **Better general quality** of indoor air
- **Active treatment** of surfaces, ducts and environments
- **Fewer periodical inspections** (hence lower costs) for cleaning the aeraulic ducts.
- **Fewer inspections** (hence lower costs) for the sanitization and remediation of the aeraulic ducts.

CHOICE OF THE MODULE

Air Knight

Micro Pure



→ INDUSTRIAL
→ COMMERCIAL

DUST FREE technology.

Developed for air purification in aerospace environments, the Dust Free technology produces positively and negatively charged air scrubbers that attract **contaminants and pollutants like a magnet, destroying them.**

POWERED BY
MX4™
IONIC OXIDATION

→ RESIDENTIAL
→ OFFICES

IPG ionic oxidation technology generates positively and negatively charged ions and combines the properties of a quinary alloy reaction module with the **energy** produced by a high intensity **UV ray** lamp. In this manner, it produces even more effective active air scrubbers, which can destroy most pollutants, such as **bacteria, viruses, mold, allergens and odors.**



MX4™ ionic oxidation technology combines the properties of the **quaternary alloy** reaction module with the **energy** produced by a high intensity **UV ray** lamp. In this manner, it produces even more effective active air scrubbers that can **destroy** most pollutants, such as **bacteria, viruses, mold, allergens and odors.**



EFFECTS OF ACTIVE SANITIZATION



ACTIVE 24/7 IN EVERY TREATED SPACE



ELIMINATES POLLUTANTS WHEREVER THEY ARE

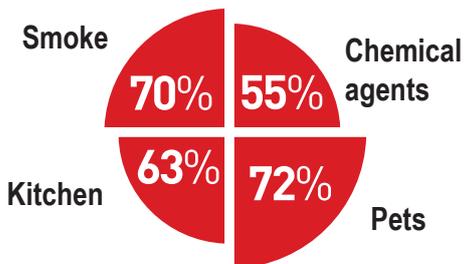


THE ONLY SANITIZING SYSTEM THAT HAS AN EFFECT ALSO ON SURFACES.



EFFECTIVELY REMOVES BACTERIA, MOLD AND ODORS

BACTERIA AND MOLD REDUCTION



MAIN FIELDS OF USE



FOOD/FOOD TRANSPORTATION

Elimination of mold and bacteria.
Better food preservation = more freshness and quality.



INDUSTRIAL

Sanitization of ducts and environments through abatement of chemical/biological pollutants
Healthier work environment.



HEALTH CARE

Significant decrease in bacterial proliferation.
Health care environment less exposed to bacterial contamination.



RESIDENTIAL VMC SYSTEM

Elimination of bacteria, allergens and odors.
Healthier and more comfortable environment.



OFFICE/WORKPLACE

Elimination of bacteria, allergens and odors.
Decrease in illnesses.



RESTAURANTS/HOTELS

Elimination of odors and bacteria.
More pleasant and longer stay in the premises.



TRANSPORT

Elimination of bacteria.
Lower exposure to bacterial contamination.
Healthier and more comfortable environment.



Micro Pure

5"



Covered surface in m²

80

Maximum airflow capacity in m³/h

1500

DESCRIPTION OF PCO™ TECHNOLOGY

The **Photocatalytic Oxidation** technology generates **natural oxidizing ions** that are able to attract and destroy the pollutants present in the air and on surfaces, using the combined action of **UV rays** and a **catalysing structure** made of a quaternary alloy, mainly composed of TiO₂ (titanium dioxide): when the air flows, the interaction of such elements generates **hydroperoxides, super-oxidizing ions and hydroxides** that are able to actively sanitize the air by destroying pollutants, in particular **bacteria, viruses, mold, allergens, odors and VOCs**.

FIELDS OF APPLICATION

- RESIDENTIAL
- SMALL OFFICES

INSTALLATION

- To be inserted in the pre-existing ductwork, usually in the supply plenum.
- Integrated in AHUs – heat recovery

TECHNICAL SPECS

Dimensions	15 x 15 x 19 cm
Weight	1,1 Kg
Depth of hole	14 cm
Electrical characteristics	24 V 50/60 Hz - 120 V / 230 V
Power consumption	13,3 Watt
Mechanical properties:	Plug&play safety switch – monitoring system for proper functioning of the UV lamp
Maximum operating temperature	60° C



Micro Pure



Covered surface in m²
150

Maximum airflow capacity in m³/h
2500

DESCRIPTION OF PCO™ TECHNOLOGY

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FIELDS OF APPLICATION

- RESIDENTIAL
- MEDIUM-SIZE OFFICES

INSTALLATION

- To be inserted in the pre-existing ductwork, usually in the supply plenum.
- Integrated in AHUs – heat recovery

TECHNICAL SPECS

Dimensions	15 x 15 x 29 cm
Weight	1,2 Kg
Depth of hole	24 cm
Electrical characteristics	24 V 50/60 Hz - 120 V / 230 V
Power consumption	13,3 Watt
Mechanical properties:	Plug&play safety switch – monitoring system for proper functioning of the UV lamp
Maximum operating temperature	60° C



Micro Pure

14"



Covered surface in m²
250

Maximum airflow capacity in m³/h
3500

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FIELDS OF APPLICATION

- RESIDENTIAL
- MEDIUM-SIZE DIMENSION

INSTALLATION

- To be inserted in the pre-existing ductwork, usually in the supply plenum.
- Integrated in AHUs – heat recovery

TECHNICAL SPECS

Dimensions	15 x 15 x 44 cm
Weight	1,3 Kg
Depth of hole	37 cm
Electrical characteristics	24 V 50/60 Hz - 120 V / 230 V
Power consumption	19,2 Watt
Mechanical properties:	Plug&play safety switch – monitoring system for proper functioning of the UV lamp
Maximum operating temperature	60° C

TECHNICAL DESCRIPTION – AIR KNIGHT MODULES



Air Knight

5"



SPACE Technology.



Covered surface in m²

80

Maximum airflow capacity in m³/h

1500

DESCRIPTION OF PCO™ TECHNOLOGY

The **Photocatalytic Oxidation** technology generates **natural oxidizing** ions that are able to attract and destroy the pollutants present in the air and on surfaces, using the combined action of **UV rays** and a **catalysing structure** made of a quinary alloy, mainly composed of TiO₂ (titanium dioxide). Compared to the Micropure modules, it contains one more metal, platinum, which makes the photocatalytic process faster and more efficient. When the air flows, the interaction of such elements generates **hydroperoxides, super-oxidizing ions and hydroxides** that are able to actively sanitize the air by destroying pollutants, in particular **bacteria, viruses, mold, allergens, odors and VOCs**.

FIELDS OF APPLICATION

- INDUSTRIAL
- COMMERCIAL

INSTALLATION

- To be inserted in the pre-existing ductwork, usually in the supply plenum.
- Integrated in AHUs – heat recovery

TECHNICAL SPECS

Dimensions	15 x 15 x 21 cm
Weight	1,1 Kg
Depth of hole	14 cm
Electrical characteristics	AC 24 V 50/60 Hz
Power consumption	7 Watt
Mechanical properties:	Plug&play safety switch – monitoring system for proper functioning of the UV lamp
Maximum operating temperature	60° C

TECHNICAL DESCRIPTION – AIR KNIGHT MODULES



Air Knight 9"



SPACE Technology.



Covered surface in m²

150

Maximum airflow capacity in m³/h

2500

DESCRIPTION OF PCO™ TECHNOLOGY

The **Photocatalytic Oxidation** technology generates **natural oxidizing** ions that are able to attract and destroy the pollutants present in the air and on surfaces, using the combined action of **UV rays** and a **catalysing structure** made of a quinary alloy, mainly composed of TiO₂ (titanium dioxide). Compared to the Micropure modules, it contains one more metal, platinum, which makes the photocatalytic process faster and more efficient. When the air flows, the interaction of such elements generates **hydroperoxides, super-oxidizing ions and hydroxides** that are able to actively sanitize the air by destroying pollutants, in particular **bacteria, viruses, mold, allergens, odors and VOCs**.

FIELDS OF APPLICATION

- INDUSTRIAL
- COMMERCIAL

INSTALLATION

- To be inserted in the pre-existing ductwork, usually in the supply plenum.
- Integrated in AHUs – heat recovery

TECHNICAL SPECS

Dimensions	15 x 15 x 29 cm
Weight	1,2 Kg
Depth of hole	24 cm
Electrical characteristics	AC 24 V 50/60 Hz
Power consumption	10 Watt
Mechanical properties:	Plug&play safety switch – monitoring system for proper functioning of the UV lamp
Maximum operating temperature	60° C

TECHNICAL DESCRIPTION – AIR KNIGHT MODULES



Air Knight

14"



SPACE Technology



Covered surface in m²

300

Maximum airflow capacity in m³/h

4000

DESCRIPTION OF PCO™ TECHNOLOGY

The **Photocatalytic Oxidation** technology generates natural oxidizing ions that are able to attract and destroy the pollutants present in the air and on surfaces, using the combined action of UV rays and a **catalysing structure** made of a quinary alloy, mainly composed of TiO₂ (titanium dioxide). Compared to the Micropure modules, it contains one more metal, platinum, which makes the photocatalytic process faster and more efficient. When the air flows, the interaction of such elements generates **hydroperoxides, super-oxidizing ions and hydroxides** that are able to actively sanitize the air by destroying pollutants, in particular **bacteria, viruses, mold, allergens, odors and VOCs**. In this module, PCO technology is enhanced by the effectiveness of photoionization and positive and negative ionization (**IPG technology**), making the IPG unit a cutting-edge product in the abatement of airborne pollutants, odors, smoke, mold, bacteria and viruses.

FIELDS OF APPLICATION

- INDUSTRIAL
- COMMERCIAL

INSTALLATION

- To be inserted in the pre-existing ductwork, usually in the supply plenum.
- Integrated in AHUs – heat recovery

TECHNICAL SPECS

Dimensions	15 x 15 x 44 cm
Weight	1,3 Kg
Depth of hole	37 cm
Electrical characteristics	AC 24 V 50/60 Hz
Power consumption	14 Watt
Mechanical properties:	Plug&play safety switch – monitoring system for proper functioning of the UV lamp
Maximum operating temperature	60° C

