NIGRO
DIAGNOSTIC SYSTEMS

SMART PLATFORM FOR INDOOR WELLNESS

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IAQ
Indoor Air Quality

Poor indoor air quality (**IAQ**) affects the onset of transmissible respiratory diseases or allergic and asthmatic symptoms.

Scientific studies have shown that **poor IAQ** is also an **aggravating factor in 50%** of cases of many diseases.

Numerous studies have also shown an average **loss of about 5 % productivity** in the workplace because of **poor IAQ**.

On the basis of these observations, a **smart hardware and software platform** has been designed for analyzing IAQ in public and private indoor environments through **active sanitisation** of aeraulic ducts and terminals, constant **monitoring of indoor air quality** via **Artificial Intelligence** and control **of energy consumption**.

NDS PLATFORM

Allows:

- the **reduction** of the spread of **bacteria and viruses**, including SARS-CoV 2-19, by actively sanitising aeraulic ducts.
- the protection of occupants' health by using **Internet of Things (IoT)** and **Artificial Intelligence (AI)** tools to **monitor indoor air**.
- the customer to use an **innovative, integrated and customised solution** based on their needs.
- the maintenance of a **safe and efficient environment** at workplace or home in a well-being perspective.

SANITISATION

ACTIVE SANITISATION

The device uses the **PCO (photocatalytic oxidation)** technology in order to sanitise the air in all types of air conditioning systems. It can be installed within AHUs (Air Handling Units) or in the ducts of the distribution system.

The PCO technology, originally used for the **NASA** space program, combines two techniques to eliminate pathogens:

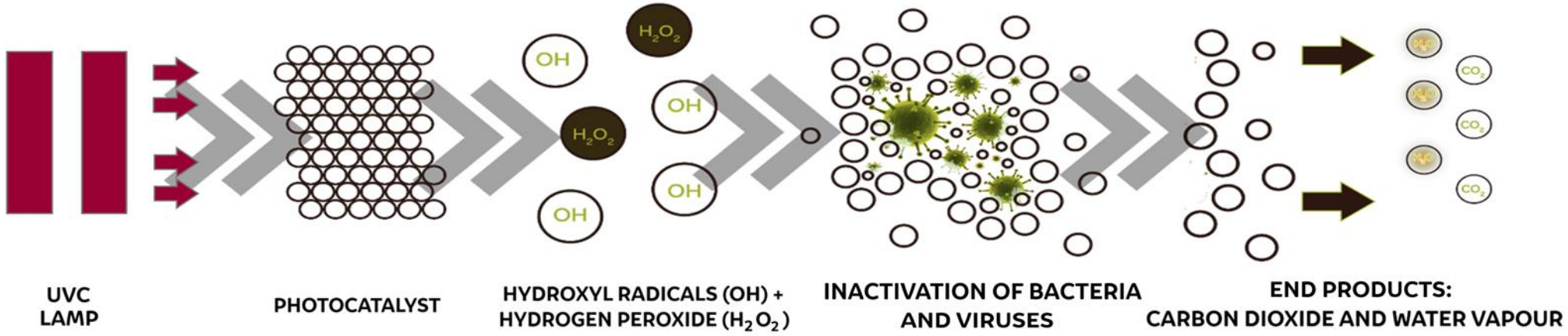
- **Photocatalytic oxidation**
- and **ultraviolet light**.

The PCO technology was originally patented to eliminate up to **99%** of airborne pathogens, by using special UV-C lamp and a photo-catalyst (Titanium Dioxide, TiO_2); this combination allows the generation of hydroxyl radicals and superoxide ions which decompose and inactivate pathogens in the air.

PHOTOCATALYTIC OXIDATION

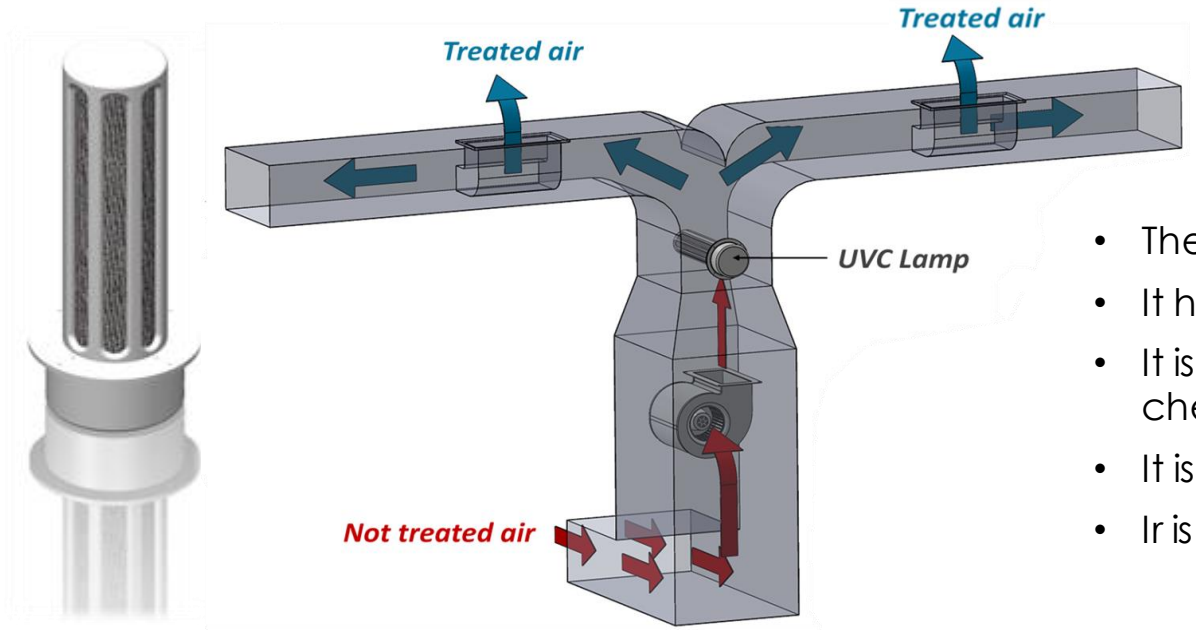
In the PCO (photocatalytic oxidation) process:

1) Moisture-laden airflow passes through the device.
2) The **UV-C lamp**, together with the photocatalyst (TiO_2), triggers photochemical oxidation reactions.
3) The products of the reaction (hydroxyl radicals $OH^{\bullet}$ and hydrogen peroxide H_2O_2) inactivate **bacteria, viruses and pollutants.**
4) The end products of this inactivation are only **carbon dioxide and water vapour.**



PHOTOCATALYTIC OXIDATION

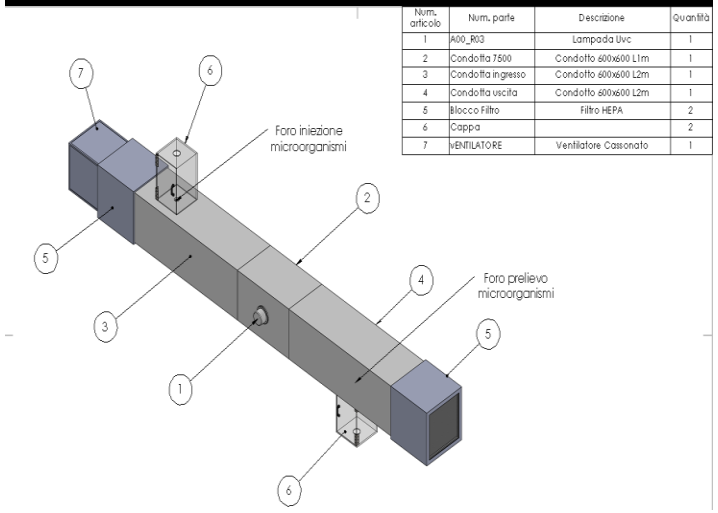
The UVC lamp with the $Ti O_2$ filter is integrated within the NDS system.



- The device eliminates **up to 99%** of bacteria and viruses
- It has been tested and certified according to **ISO 15714**
- It is eco-sustainable: **Sanitizes the environment** without the use of chemicals
- It is safe and **ozone-free**
- Ir is an automated system, since it requires **minimal assistance**

EXPERIMENTAL PROTOCOL

ISO 15714



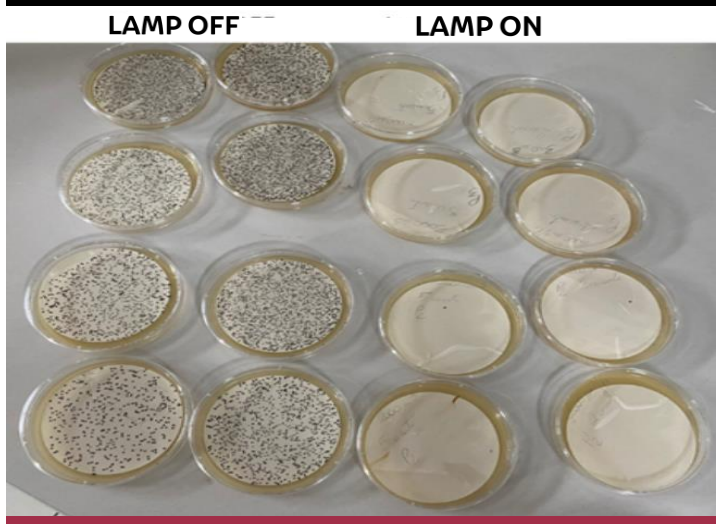
Num. articolo	Num. parte	Descrizione	Quantità
1	A00_R03	Lampada Uvc	1
2	Condotta 7500	Condotto 600x600 L1m	1
3	Condotta ingresso	Condotto 600x600 L2m	1
4	Condotta uscita	Condotto 600x600 L2m	1
5	Blocco Filtro	Filtro HEPA	2
6	Cappa		2
7	VENTILATORE	Ventilatore Cassonato	1

The UVC device has been tested following the regulation ISO 15714. The test was carried out by an ACCREDIA accredited laboratory. The experimental protocol was finally validated by the Department of Biology of the University of Bari Aldo Moro.

LABORATORY

Following the requirements of the ISO 15714 regulation, an appropriate aeraulic duct has been created for testing and verifying the bactericidal and germicidal capacity of the UVC lamp.

TEST RESULTS



The microbiological results showed that during the tests the device was able to eliminate up to 99% of bacteria. It is highly likely that the same device is able to inactivate different microorganisms, including Coronaviruses and other viruses, by using the same system.

MONITORING

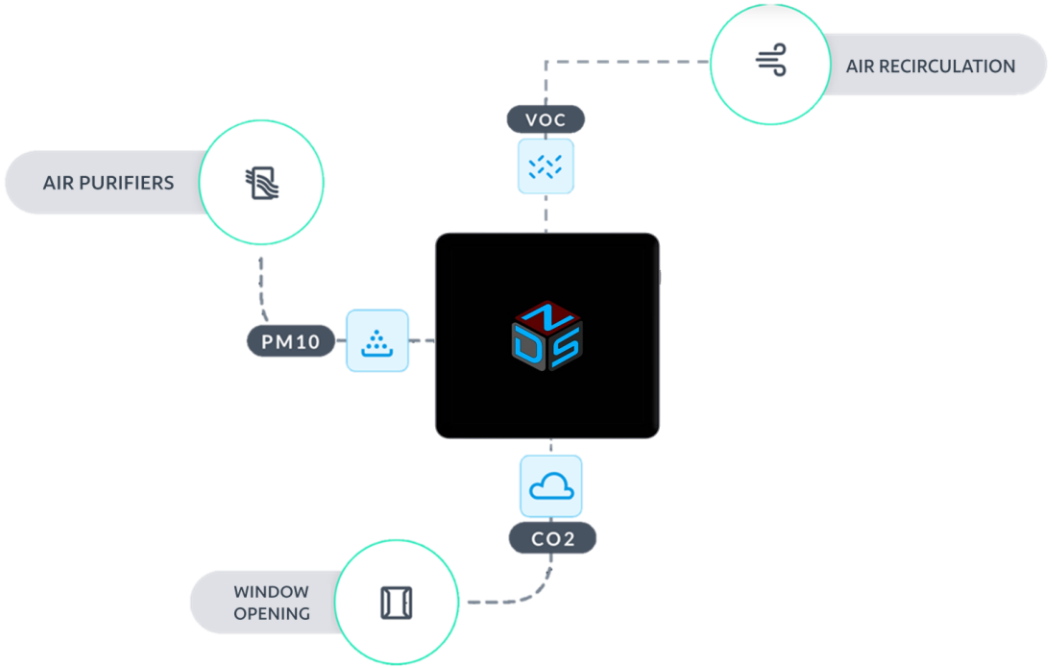
MONITORING
INDOOR AIR QUALITY

The multi-sensor device integrated in the NDS platform allows the user to monitor indoor air quality while actively promoting the well-being of occupants.

What does it **monitor**?:

- CO2
- Temperature Humidity
- Particulate matter (PM 10 and PM 2.5)
- VOC
- Gas Radon
- Formaldehyde
- Electricity consumption

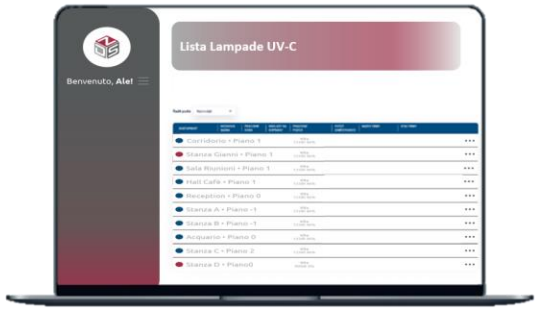
MONITORING INDOOR AIR QUALITY



- An area of **50 m²** is covered
- The device should be placed
  - at **110-170 cm** from the floor in crowded environments,
  - at **1 m** from doors, windows and air ventilators
  - at least **50 cm** from additional devices (for instance fan coils, fans, electronic devices, etc.)
- By using an appropriate **algorithm integrated** in the platform, the device warns the user through a **light alert** when to use specific **intervention methods** in order to bring the environmental parameters below the limit value.

CLOUD

The data collected by the sensors within the device are sent and stored in a specific cloud, thereby making the software like a cross-platform for Android, iOS and Windows.



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REGIONE PUGLIA

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Nigro Diagnostic System
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"IL FUTURO ALLA PORTATA DI TUTTI"