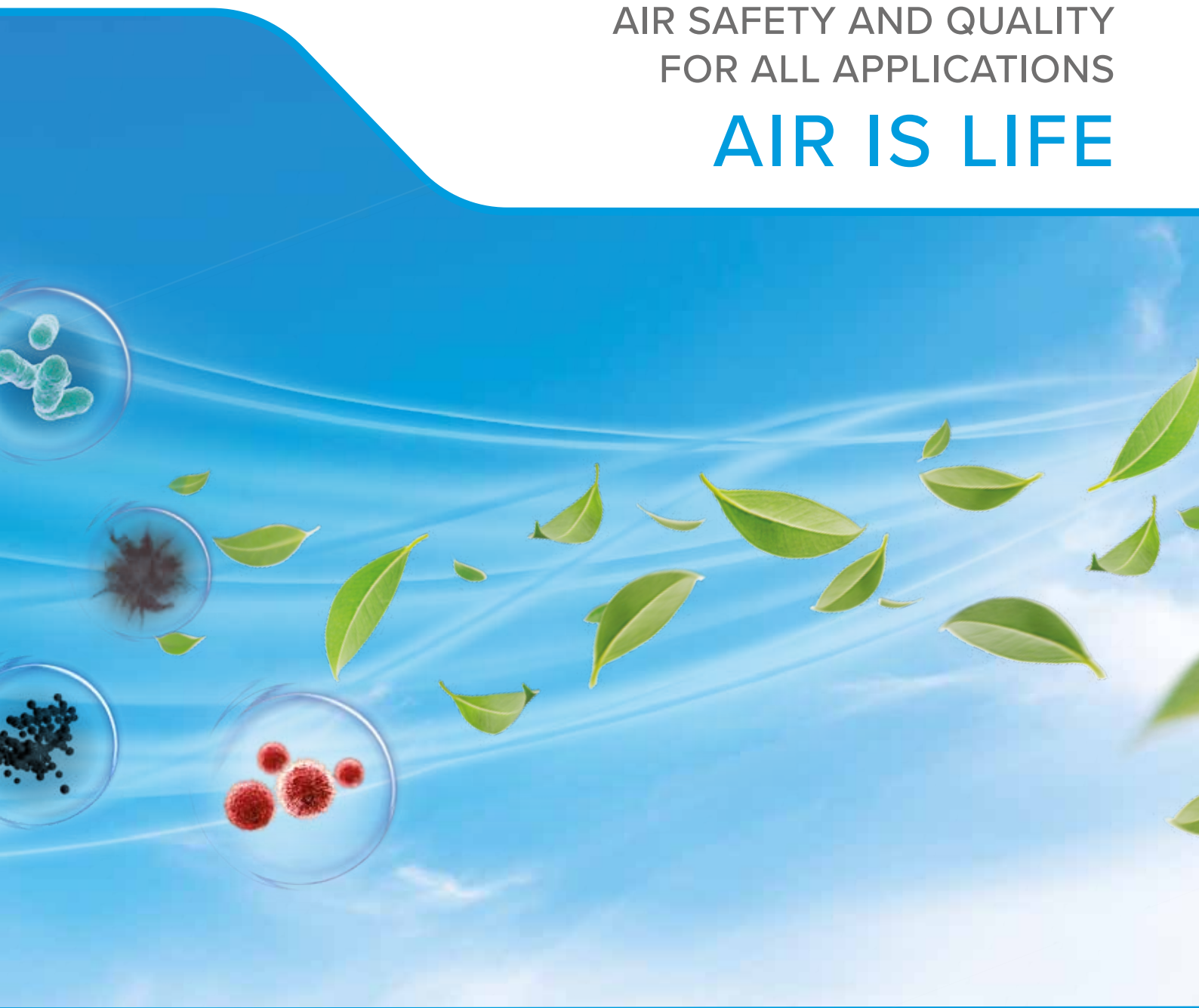




AIR SAFETY AND QUALITY
FOR ALL APPLICATIONS

AIR IS LIFE



Inspiring Solutions since 1989



The World Health Organization highlights the importance of air exchange with mechanical ventilation.

The possible presence of infected people in a confined environment causes an increase in the viral loads contained in the air and therefore the risk for the occupants to be infected is higher.

Recent surveys show that infection risk increases when there are large amounts of aerosols (PM₁₀, PM_{2.5} e PM₁ aerosols with dimensions respectively lower than 10 µm, 2,5 µm and 1 µm) present in high concentrations, as they can act as a transport mean and vital sub-layer for the virus.

The diagram illustrates the role of air-conditioning systems in disease transmission. It shows a person on the left coughing, releasing bio-aerosols into the air. These aerosols are transported by air (indicated by a cloud and arrows) and can be inhaled by another person. Direct contact (handshake) and indirect contact (via surfaces like a steering wheel, coffee cup, or shopping cart) are also shown as transmission routes. On the right, a grid of icons represents various control measures: avoiding handshakes, maintaining distance, wearing masks, hand hygiene, and using gloves.

Air renewal and filtration have an important role to reduce the risk of virus contagion as COVID-19. Both international and national associations suggest to increase as much as possible the renewal air inlet in existing installations and to ensure the right pressure difference between the rooms and

the toilet facilities and the outside. It is important to point out that in addition to these systems it is necessary to comply with Government Guidelines related to: social distance, hand and surfaces hygiene and face mask use.

Renewal with controlled mechanical ventilation with passive recovery



Renewal with controlled mechanical ventilation with active recovery and electronic filtration



CMV renewal with thermodynamic recovery allows the extraction of stale air and the efficient recovery of the energy contained in it, with very high thermal and cooling capacities, and ensures the heating and cooling of the air even in the mid-seasons. The electronic filter guarantees very high filtration efficiency.

Reduction risk allied



Hairdressers and beauty salons



Restaurants



Bar



Shops



Private houses



Offices

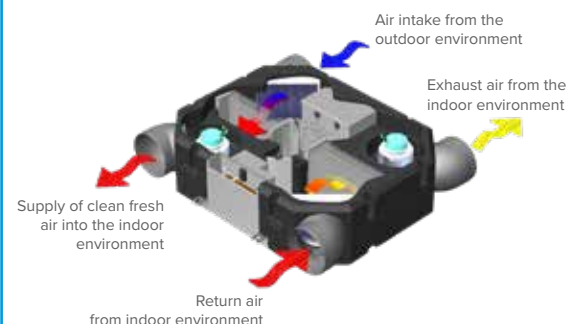


Clivet has always paid the utmost attention to IEQ (Indoor Environmental Quality) for residential, commercial and industrial applications. The Company over the years has developed innovative CMV (Controlled Mechanical Ventilation) systems particularly suitable for rapid installation. These are high efficiency autonomous systems, which do not require to be supplied with hot or chilled water or refrigerant gas.

Clivet systems are equipped with active thermodynamic recovery and electronic filters that stop aero-disperse particles by means of an electrostatic field.

Clivet air renewal and purification systems can be installed in combination with heating and air conditioning systems, even existing ones, of any type: with heat pump, boiler, Split or VRF.

ELFOFresh EVO FOR MEDIUM-SMALL SPACES



- ✓ Air renewal (flows from 125 to 500 m³/h)
- ✓ Electronic filtration
- ✓ Active thermodynamic recovery
- ✓ First energy source
- ✓ Summer outdoor air dehumidification

Controlled Mechanical Ventilation



Schools



Public buildings



Health Care Residences



Gyms



Small accommodation facilities



Medical clinics



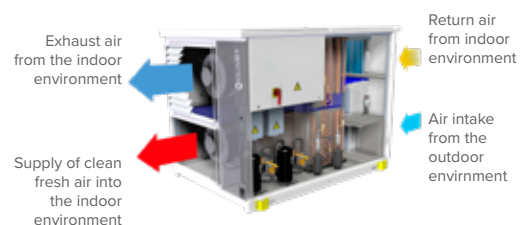
Installation for medium-small spaces

- ✓ Shops, offices, beauty salons, bar, restaurants, gyms, schools and public buildings or surfaces up to 80 m² with air renewal volumes up to 500 m³/h
- ✓ Installation of several air renewal units in order to cover larger spaces
- ✓ Installation in false ceiling (ELFOFresh EVO is only 29 cm high)
- ✓ Air duct distribution (ELFOAir)
- ✓ ELFOControl³ EVO control (ELFOFresh² and ELFOFresh EVO) and management via Wi-Fi (only ELFOFresh EVO)

Installation for large spaces

Clivet offers different solutions to meet the air renewal needs of larger buildings, such as ELFOFresh Large and ZEPHIR³.

ZEPHIR³ FOR MEDIUM AND LARGE SPACES



- ✓ Air flow rate from 1000 to 14000m³/h
- ✓ Electronic filtration
- ✓ Constant temperature control
- ✓ Active thermodynamic recovery
- ✓ Packaged unit

Reduction risk allied



Shopping Centres



Shopping Malls/Galleries



Multiplex Cinemas



Theatres



Railway stations



Airports



The system for commercial and industrial applications

Clivet offers various solutions to increase air safety and quality in buildings, both new and refurbished.

Rooftop units are specialised in the air conditioning of large spaces with medium and high attendance or full fresh air applications. All units can be programmed to manage greater quantities of fresh air according to actual system requirements and, as far as technically possible, to ensure occupants' comfort.

The technologies available to purify the air and inhibit the proliferation of bacterial and viral load, such as that of the Covid-19, are:

- ✓ electronic filters;
- ✓ UV-C lamps with germicidal action.

CLIVETPack² FOR LARGE COMMERCIAL AND INDUSTRIAL SPACES



Packaged units that enclose all the system components already installed and tested.

- ✓ Air flow rates from 3200 to 60000m³/h
- ✓ Cooling capacity 20-350kW
- ✓ Air renewal management
- ✓ Freecooling management
- ✓ Thermodynamic recovery of stale air

Air renewal in medium and large spaces



Goods sorting warehouses



Office Buildings



Commercial buildings



Healthcare environments



Industry



Process industry



The system for commercial, industrial and healthcare applications

AQX are the Air Handling Units used for air renewal in commercial, industrial and healthcare environments.

These units are custom designed to meet the specific needs of each application and can be highly customised with a wide range of accessories.

To increase air quality they can be selected with:

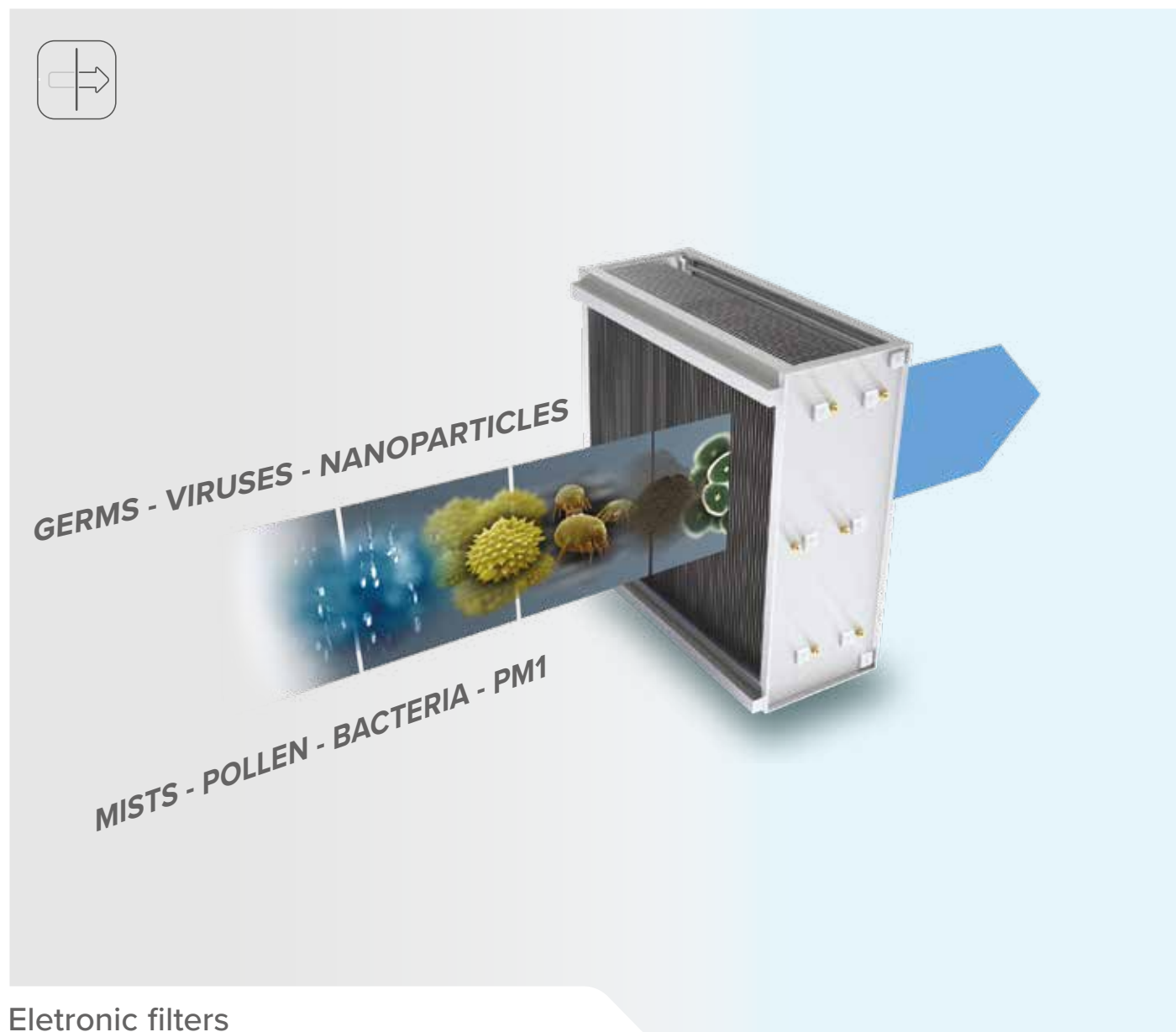
- ✓ electronic filters;
- ✓ absolute filters classified HEPA;
- ✓ UV-C lamps with germicidal action;
- ✓ photocatalytic oxidation sanitation modules.

AQX FOR LARGE COMMERCIAL, INDUSTRIAL AND HEALTHCARE SPACES



The AQX series is available in 32 standard sizes, for indoor or outdoor installation, with air flow from 1300 to 100000 m³/h.

- ✓ Thermal break on frame and panelling
- ✓ Tailor-made construction
- ✓ Wide choice of options and components
- ✓ Ideal for hydronic or direct expansion systems
- ✓ Energy recovery on exhaust air



Electronic filters

Electronic filters supplied within Clivet products capture particles from $0.01\text{ }\mu\text{m}$ to $100\text{ }\mu\text{m}$ with variable efficiency depending on the speed of the air passing through them.

They allow the intake of purified and handled external air and, thanks to the very low pressure drops, they allow a considerable economic saving for ventilation.

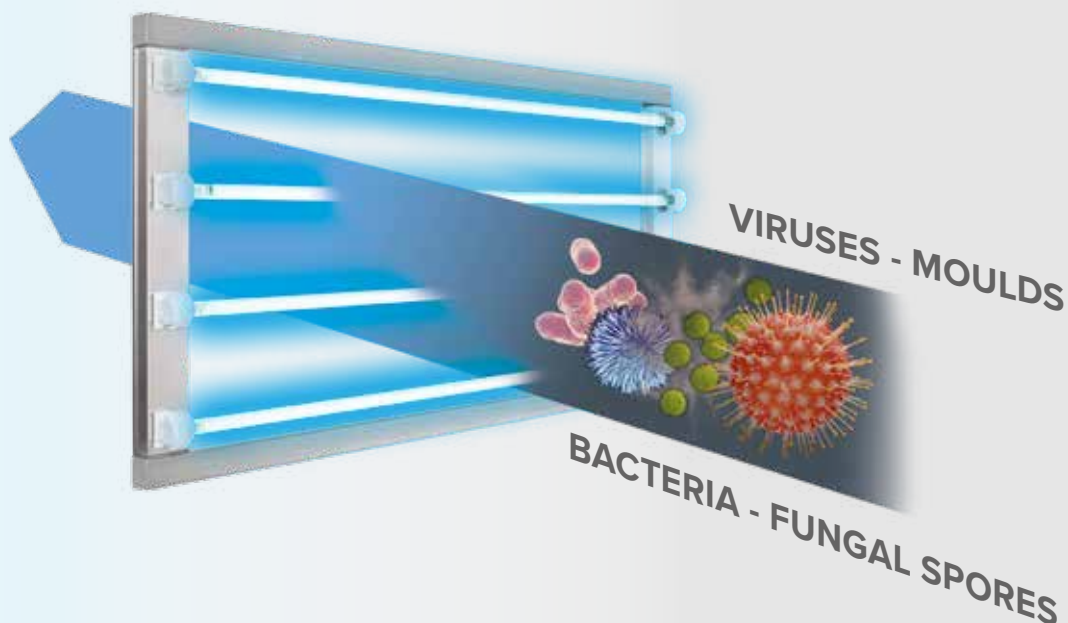
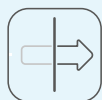
The electronic filters guarantee very high filtration efficiencies up to ISO ePM1 90% (ISO EN 16890).

Electronic filters also have a high microbicide power thanks to their high efficiency on sub-microbial particles.

This is due to the destruction of the external membrane of bacteria/virus caused by thermoelectric shock generated by the ionized section of the filter.

The concentration of some common bacteria were measured before and after the electronic filter and the efficiency, certified by ILH Institute of Berlin, is between 98 and 99%.

These filters are washable and do not require replacement.



UV-C Lamps with germicidal effect

UV-C lamps use ultraviolet radiation to purify the air from bacteria, mould, fungal spores and viruses. This technology has been used for many years to sanitise objects, surfaces and to purify water. Recent Japanese¹ and Italian² studies have demonstrated its effectiveness on Covid-19 by defining the dose of UV-C rays required for their inactivation.

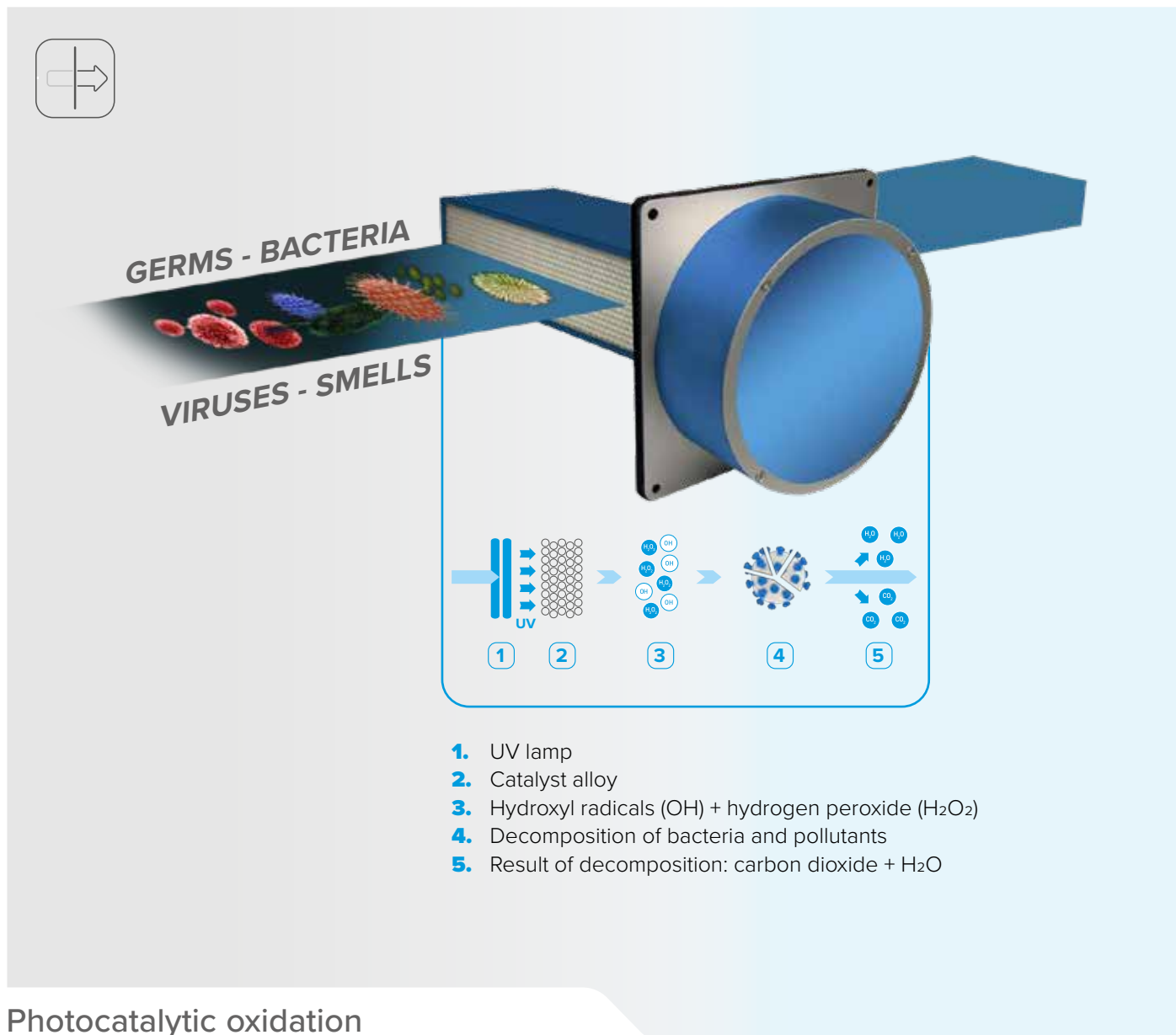
The bactericidal and virucidal action is achieved with low-pressure mercury lamps through direct radiation of the air flow with a wavelength of 254 nm.

In rooftop systems, UV-C lamps are positioned downstream of the treatment battery and act directly in the air flow and on irradiated surfaces, such as the treatment battery and condensate collection tray. The lamps are conveniently placed inside the unit, which avoids potential exposure of operators to the emitted light.

1. *Rapid inactivation of SARS-CoV-2 with Deep-UV LED irradiation*, Hiroko Inagaki, Akatsuki Saito, Sugiyama, Tamaki Okabayashi, Shouichi Fujimoto. Faculty of Medicine, University of Miyazaki, Japan.

2. *UV-C irradiation is highly effective in inactivating and inhibiting SARS-CoV-2 replication*, aut. vari; Italian National Institute for Astrophysics (INAF), Department of Biomedical and Clinical Sciences L. Sacco, University of Milano, Istituto Nazionale dei Tumori Milano Italia.

Air sanitization



Photocatalytic oxidation

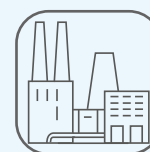
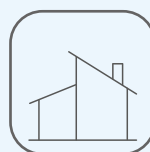
The technology based on photocatalytic oxidation has been developed and used in the aerospace industry for the sanitisation of space exploration environments.










The process imitates what happens in nature through photocatalysis, i.e. the combination of UV rays from the sun, air humidity and some noble metals present in nature: it generates hydroxyl radicals and hydrogen peroxide molecules capable of destroying most pollutants and toxins.

It is effective in the continuous sanitisation of air distribution channels and the rooms served, therefore it is able to reduce the risk of contamination of the environment. The device is inserted in the air flow to be treated and is active in the elimination of germs, bacteria, viruses and even smells.

Clivet for each building

Each type of building has different air conditioning needs
Clivet offer different air renewal and purification systems for commercial, residential and industrial applications.



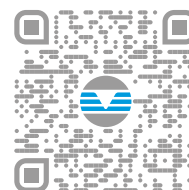
unit	flow rates of handled air	main functions	applications
Air renewal with active recovery			
 ELFOFresh EVO  ELFOFresh²	125-500 m³/h (full fresh air)	✓ filtration and renewal • electronic filters	✓ residential ✓ small shops ✓ public buildings ✓ school buildings
 ELFOFresh Large	1200-3300 m³/h (full fresh air)	✓ filtration and renewal • electronic filters	✓ commercial
 ZEPHIR³	1000-14000 m³/h (full fresh air)	✓ filtration and renewal • electronic filters	✓ commercial
Air renewal with passive recovery			
 HRV-DX	500-1000 m³/h (full fresh air)	✓ renewal	✓ small shops ✓ commercial <i>only in conjunction with VRF systems</i>
Autonomous air conditioners			
 ELFOPack	400 m³/h	✓ filtration and renewal • electronic filters ✓ air-conditioning ✓ sanitary hot water	✓ residential: consumo nearly zero houses
 SMARTPack²  CLIVETPack²	3200-60000 m³/h	✓ purification and renewal • electronic filters • UV-C lamps ✓ air-conditioning	✓ commercial: medium and high attendance spaces and full fresh air (commercial centres, multiplex cinemas, restaurants, kitchens, ...)
Air handling units			
 AQX	1000-100000 m³/h	✓ purification and renewal • electronic filters • UV-C lamps • photocatalytic oxidation ✓ air-conditioning	✓ commercial ✓ hospitals ✓ process industry



For more information on the system and Clivet products best suited to your needs please contact your local Agency

FOR OVER 30 YEARS WE HAVE BEEN OFFERING
SOLUTIONS TO ENSURE SUSTAINABLE COMFORT
AND THE WELL-BEING OF
PEOPLE AND THE ENVIRONMENT

www.clivet.com



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