Crystall Air Quality

Cleaner air inside residential, commercial,
healthcare, industrial spaces

Environmental wellbeing

What is it that gives us that feeling of wellbeing when we are in a confined environment, whether it is our home, our office, or a gathering or recreational place?

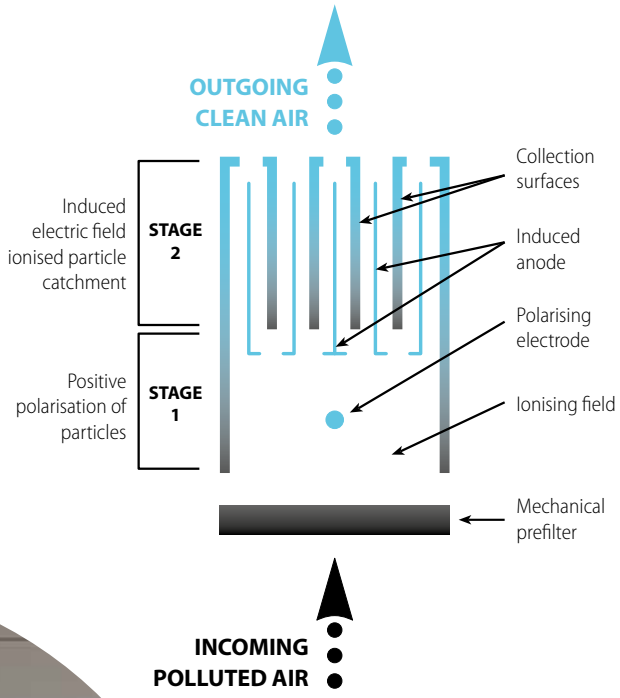
In thermal engineering the expression "**conditions of wellbeing**" refers to the ideal levels of a number of factors affecting the habitability of an indoor space: air temperature, radiant temperature of surfaces, relative humidity if the air, concentration of any pollutants, air speed, etc.
These factors must fall within pre-established limits, so that the people spending time in a given room for a long enough time feel comfortable, without experiencing any unpleasant sensations of hot, cold, unpleasant odours or the presence of substances that are harmful to health.
Naturally the concept of indoor comfort has changed over time.
A few years ago the primary and sometimes only requirement was to have in a warm space in the winter and a cool one in summer. But over time the bar has been raised. And now, with the right temperature as a given, we have started thinking about the **quality of the sources of hot and cold**, introducing non-hazardous machines set up in specific and dedicated places, to remove or dilute the harmful substances produced in the indoor spaces.
The concept of wellbeing has recently developed even more, and the awareness of the importance that the quality of the air that we breathe in confined spaces has on our wellbeing, our health, has grown. This is why some machines conceived for air conditioning are now built and installed with **innovative filtering systems that are able to improve the quality of air**, drastically reducing the harmful substances contained in it and therefore the health risk, and improving the sensation of wellbeing of the people in the room even more.

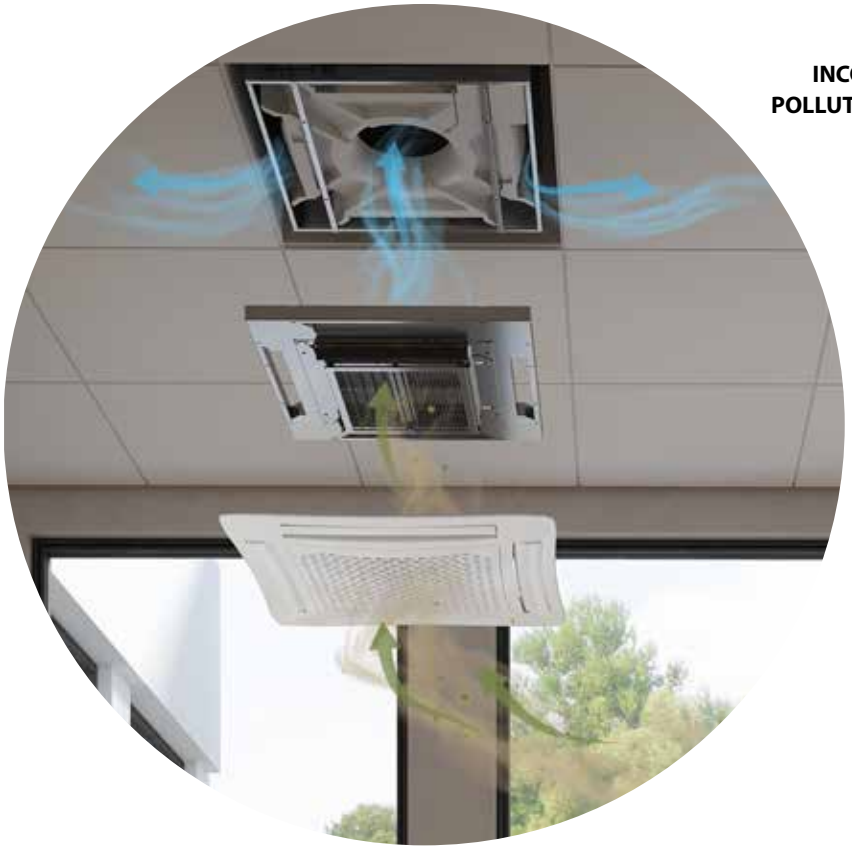
Today this need for clean air is a necessity, but it will be so even more in the future, on par with if not more than the demand for air conditioned spaces and rooms.

Crystall. The electronic filter of indoor air

The Crystall electronic air filter has been **designed specifically to improve the quality of air in indoor rooms and to protect the health of the inhabitants** of the rooms.

Produced by Sabiana, today it is applied to many air conditioning devices and air terminals without any reduction in thermal performance, rather, it integrates and completes them with its precious and peculiar function.

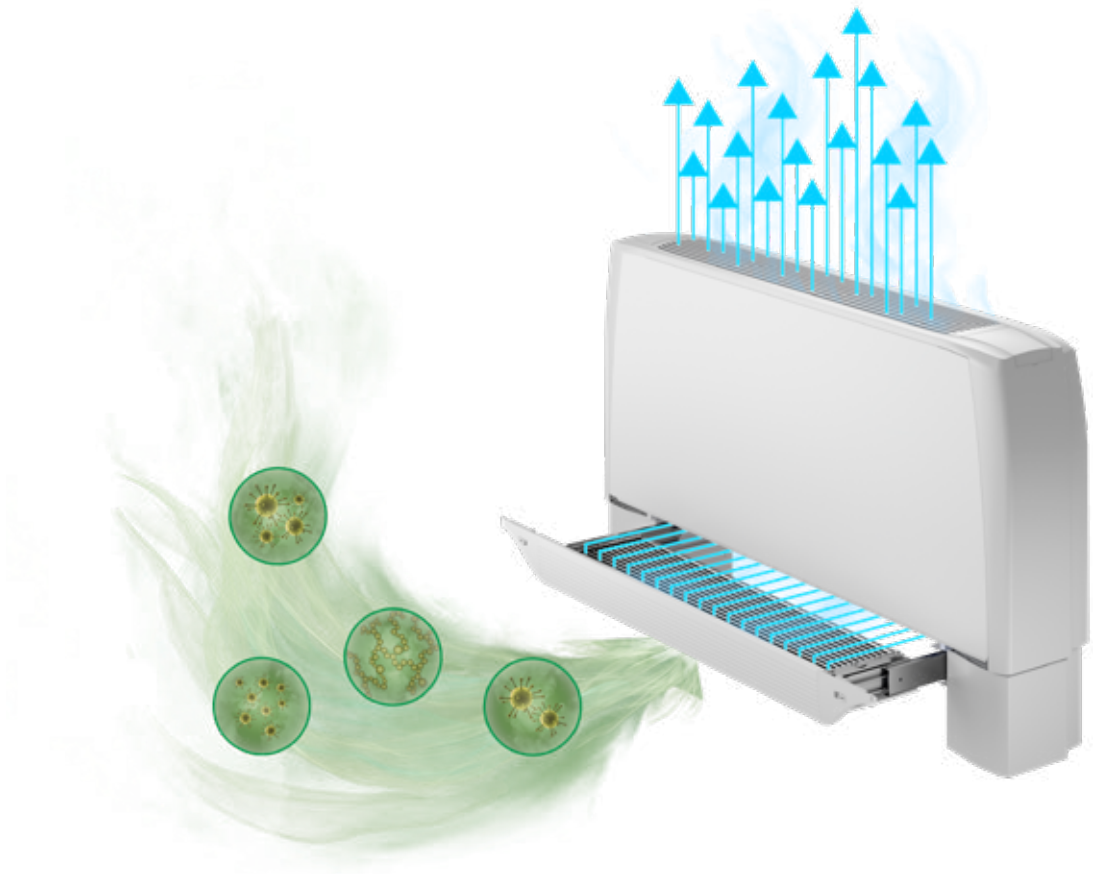




How it works

The Crystall electronic air filter **is based on the principle of separation of the particles contained in the air through electrical polarisation and their subsequent treatment on counterposed metal surfaces, with opposite polarity**. It is built with thin metal blades tapered together, forming numerous and intense electrical fields. The polluting particles that transit there, charged by a special electrode, are attracted and captured, as though by small magnets, on the counterposed surfaces of the blades. The energy consumption of this process is low, approximately 4/7 W for every 1000 m³ of air. The electronic filter is built with metal materials (aluminium) and can be easily regenerated with water and common non-aggressive detergents, hence its remarkable duration.

Following efficiency tests conducted at certified laboratories (the Politecnico of Turin and CTS Lab), the Crystall filter **is classified according to regulations in force UNI EN ISO 16890:2017 and UNI 11254:2007** obtaining high performance also on MPPS particles (dimensions of the most penetrating particles) typically between 0.1 µm - 0.3 µm.
PLEASE NOTE: Sabiana's Crystall products achieve a filtering efficiency of 99.5% on PM1 particulate (ePM1 95%) and up to 98.5% on particles from 0.1 µm.



Applications of the Crystall electronic air filter

Fan coils

On many models and versions of **Carisma** and **SkyStar** fan coils, the patented Crystall electronic filter is exclusively available.
The use of an electronic filter stems from the need to concentrate air conditioning and purifying functions in a single unit. In particular, **pollutants contained in the air are eliminated**, such as: cigarette smoke, dust, fibres, microbiological substances such as viruses, bacteria, fungi etc., which are harmful to human health. Purifying air does not only mean improving wellbeing, but also **saving energy**, as fresh air exchanges that entail greater energy consumption can be optimised.
Choosing to purify air with the Crystall unit does not reduce the living spaces, as the dimensions of the fan coil basically remain unchanged (only 8 cm more in height for Carisma and 5 cm more for SkyStar).

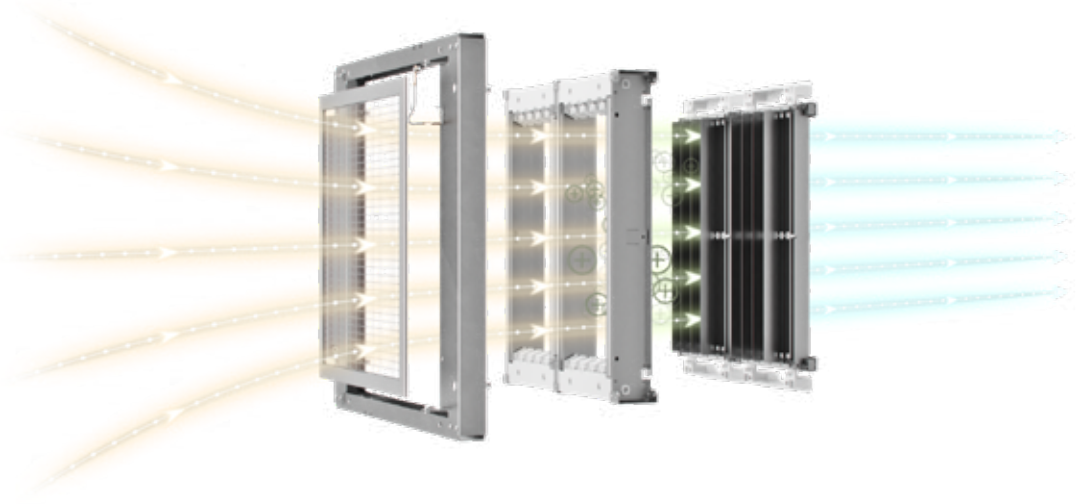
The placement of the electrostatic filter means **simple** and efficient **maintenance** as it is **easy to clean** and its duration is essentially eternal. During in-between seasons, when the room does not require air conditioning and/or heating, the unit simply operates as an air purifier.

Carisma and SkyStar fan coils can be supplied with either the Crystall electronic filter fully wired, for installation like a traditional fan coil, or without for installation at a later time, as a guarantee of the investment.

Air diffusers and terminals

Crystall Duct System and **Crystall Flex System** are innovative filtering systems that can be combined with air outlet grids or can be inserted inside duct connections. These systems have been designed **to reduce the transit of various types of polluting agents contained in the duct connections** of the air conditioning systems in confined spaces. They are therefore suited for different facilities such as schools, hospitals, nursing and care homes, hallways, waiting rooms, wards, outpatient clinics and hotels. Essentially anywhere it is necessary to improve the quality of the indoor air.

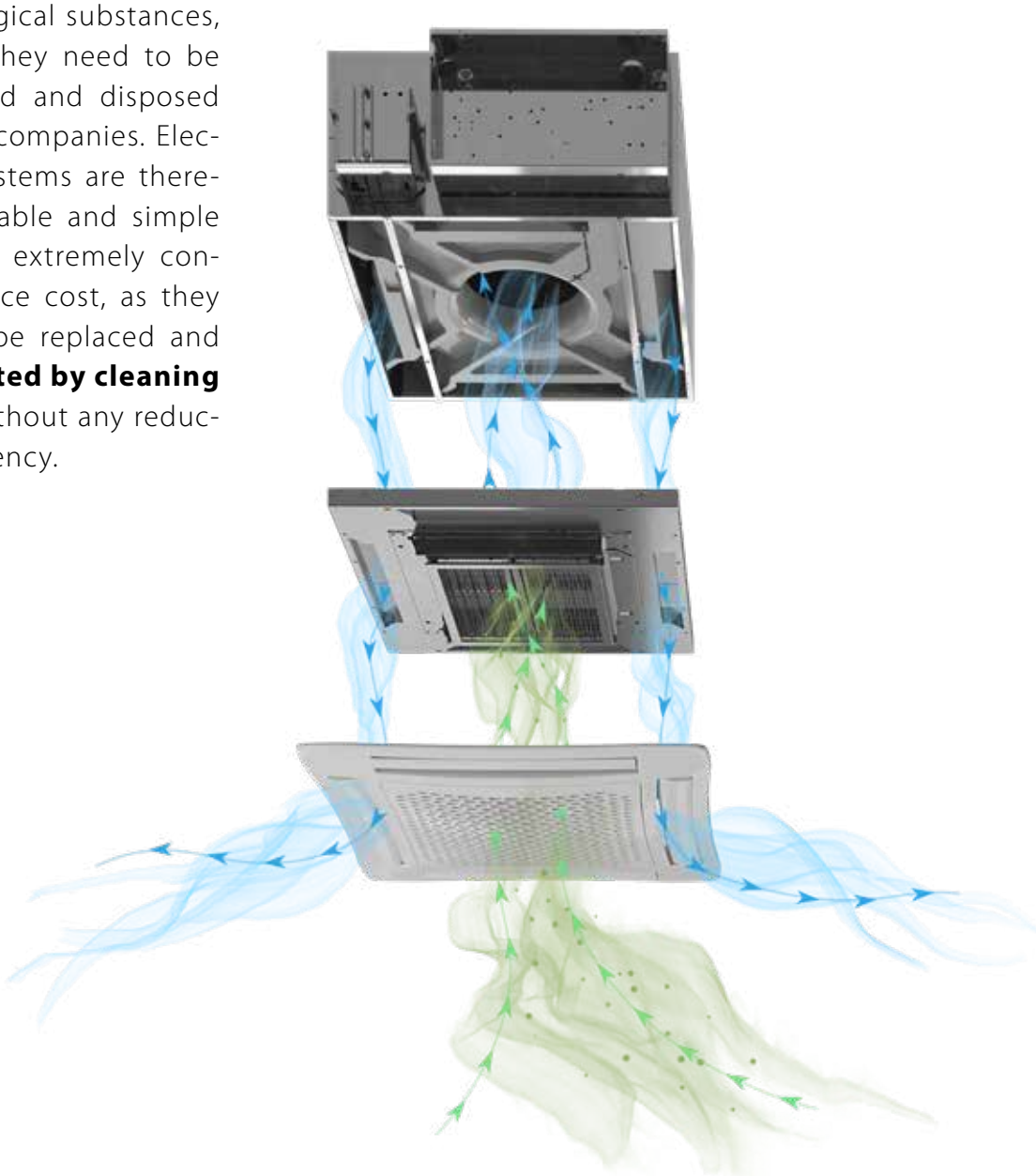
There are multiple causes for the presence of polluting agents in ducts, starting with poor or non-existent cleaning and maintenance, incorrect balance and/or pressurisation of the ducts, air circulation between rooms when the system is off, no suitable filters or the presence of a high air by-pass as well as poor care in replacing them, the existence of favourable temperature and humidity conditions, the proliferation of bacterial organisms, etc.
Even of it is possible to reduce the pollution of the ducts through suitable periodic maintenance, in reality this is rarely carried out due to considerable costs, difficult access or the impossibility of prolonged system stops.
One possible alternative solution to **considerably reduce the health risk and to drastically contain the costs of duct maintenance** is represented by the installation of electrostatically-operated filtering barriers immediately before the air is delivered to the rooms through grids and diffusers.



As known, the electronic filter is **very effective in capturing particles, fibres, biological substances etc.** even if tiny in diameter (less than a micron) while still offering the transiting air a modest pressure drop both initially (clean filter) and over time, i.e. in the presence of soiling on its surfaces. The bactericide action of the electronic filters **fights the diffusion of biological substances** (bacteria, mould, yeast, etc.) on the surfaces of the transiting dust, even if they are not captured by the filter, but especially fights their proliferation when they are captured and deposited on the filter collection surfaces.

The results of tests conducted by the University of Ancona, specifically on Sabiana Crystall filters, were also published in a relevant international scientific magazine (Indoor and Built Environment).

Other mechanical filtering means, on the other hand, can offer help with the proliferation of biological substances, the reason why they need to be correctly managed and disposed of by specialised companies. Electronic filtering systems are therefore efficient, reliable and simple products with an extremely contained maintenance cost, as they do not need to be replaced and **can be regenerated by cleaning the manifold**, without any reduction in their efficiency.



Air handling units

Air handling units always require high amounts of electrical energy, mainly due to pressure drops induced by the distribution duct connections and filters. If with duct connections it is difficult to imagine introducing significant improvements in the short term, it is different with filters where the savings on electrical consumption can be significant and immediate.

Limited to filtering only, one can see how the extent of pressure drops is directly proportional to the level of efficiency of the installed filters. This efficiency is determined by the desired quality level of the indoor air and by the available quality of the fresh air, naturally in addition to how clogged the filters are. It is necessary to bear in mind that the quality standards of indoor air are increasingly stricter, while the quality of fresh air features the same worrisome levels of harmful dust and gas concentrations, especially in intensely developed and industrial zones. This leads to two apparently irreconcilable needs: the demand for increasingly better filtration, combined with maximum energy containment of the systems. The Crystall electronic air filter represents the first valid solution that is able to reconcile these two needs, as it is characterised by high efficiency and very reduced pressure drops throughout its entire operational life.

Over time, the build-up of polluting particles leads to increased pressure drops of the mechanical filters, leading to an increase in the electrical energy absorbed by the fan motors in order to ensure the project air flow rate. With the Crystall electronic air filter, suspended particles are carried by the air flow and adhere to the collection plates set up along the direction of transit. Subsequently even large amounts of build-up do not obstruct the air transit very much, offering very low and constant pressure drops. The Crystall electronic air filter ensures high real efficiency of the system and significant energy savings. Also, as the difference in pressure drop between clean and soiled filter is almost negligible, it is not necessary to implement any particular devices to compensate for pressure drops, to maintain the variation in air flow rate within the allowed limits, thereby simplifying both system installation and management. The comparative economic considerations must also take into account this feature and there will always be less power absorbed by the fan in comparison to the mechanical filters, as these filters must be accounted for with the maximum allowed pressure drop.

Other possible applications

The Crystall electronic filter can have many other applications in all cases requiring air filtration combined with low energy consumption of the fan unit; it can also be applied where the noise level and dimensions are discriminatory elements for the adoption of efficient air filters. The principle of construction can be modified, within certain limits, for the purpose of adapting to the dimensions of the equipment housing it.

Below are some possible applications:
- Home and tertiary energy recovery units
- Domestic systems for the forced natural ventilation of fresh air.
- Systems that feature air handling, both mechanical and natural.
- Upgrade of existing air handling units, of any manufacturer.
- Systems that provide air deodorisation.

Design, technical consulting and after-sales assistance

The care for our customers, combined with the certainty of proposing an innovative and unique solution of its kind, drives our company to offer additional services such as consulting, preliminary surveys, feasibility studies and design aimed at sizing and installing Crystall electrostatic filtering systems on existing systems, guaranteeing operation and efficiency over time.
With CFCC trained and professional Crystall electrostatic filtering centres of excellence across the territory, it is also possible to check the state of use of components and their function, and determine their behaviour in terms of both energy and hygiene.

Folllow us on

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