ELECTROSTATIC FILTER
FE SYSTEM



Indoor Air Quality with low energy consumption

expansion® electronic

BETTER AIR FOR A BETTER QUALITY OF LIFE

Since 1981 **Expansion Electronic** designs and manufactures machines and systems to treat the air with electrostatic filtration technology.

Recently the company has developed a new filter with incorporated electronics for the indoor air quality, which will immediately find a variety of applications.

The patented system is named with the initials of electrostatic filtration, indicating the birth of a new standard in this field.

FE SYSTEM PATENTED

The electrostatic filters FE SYSTEM have been certified according to EN ISO 16890, which determines the new classification of filtration for "air filter for general ventilation".
The filters efficiency is determined with regard to the particulate classes ePM_1, $ePM_{2,5}$, ePM_{10}, and COARSE which are also used as evaluation parameters by the WHO (World Health Organization) and environmental authorities.
The electrostatic filters FE SYSTEM, have also been tested according to UNI 11254 Standard (Italian norms) which determines a specific classification of electrostatic filters based on the efficiency % measured with test dust DEHS on particles of 0 ,4 µm: A, B, C, D.

The main features:

- standard dimensions, according to standard sizes of pocket filters 592x592 and 592x287 (according to EN 15805);
- incorporated electric circuit, waterproof isolated to be cleaned in the water;
- multipolar connection suitable for the network supply (230V-50/60Hz) as well as for several parallel;
- a self-centering system allows to compensate manufacture intolerances up to 3 mm;
- remote control/signal functioning from external PLC display or directly from the led in the filter.

Performances:

- high efficiency filtration on particles of 0,3-0,4 micron, comparable to class E10, E11 efficiency according to EN 1822:2009, and to filtration classes ePM_1, $ePM_{2,5}$, ePM_{10} according to EN ISO 16890;
- excellent solution to fight outside polluted air from PM10, PM2,5 and PM1 particles;
- high reduction of bacteria and virus in the air;
- excellent protection of the heat exchanger and of the air pipes from obstruction of polluting agents.

In relation to the conventional filtration, the FE SYSTEM allows:

- considerable energy saving due to the low resistance on air-flow and therefore reduced voltage;
- constant efficiency of the filtration up to a 600 g fine particles - load.

CERTIFICATIONS

ILH BERLIN INSTITUT FÜR LUFTHYGIENE

BSRIA

CETIAT ensemble, innover et valider

Consiglio Nazionale delle Ricerche

CTI ENERGIA AMBIENTE

SP Science pour l'art

POLITECNICO DI TORINO

IRAM Instituto Argentino de Normalización y Certificación

CE

ISO 16890

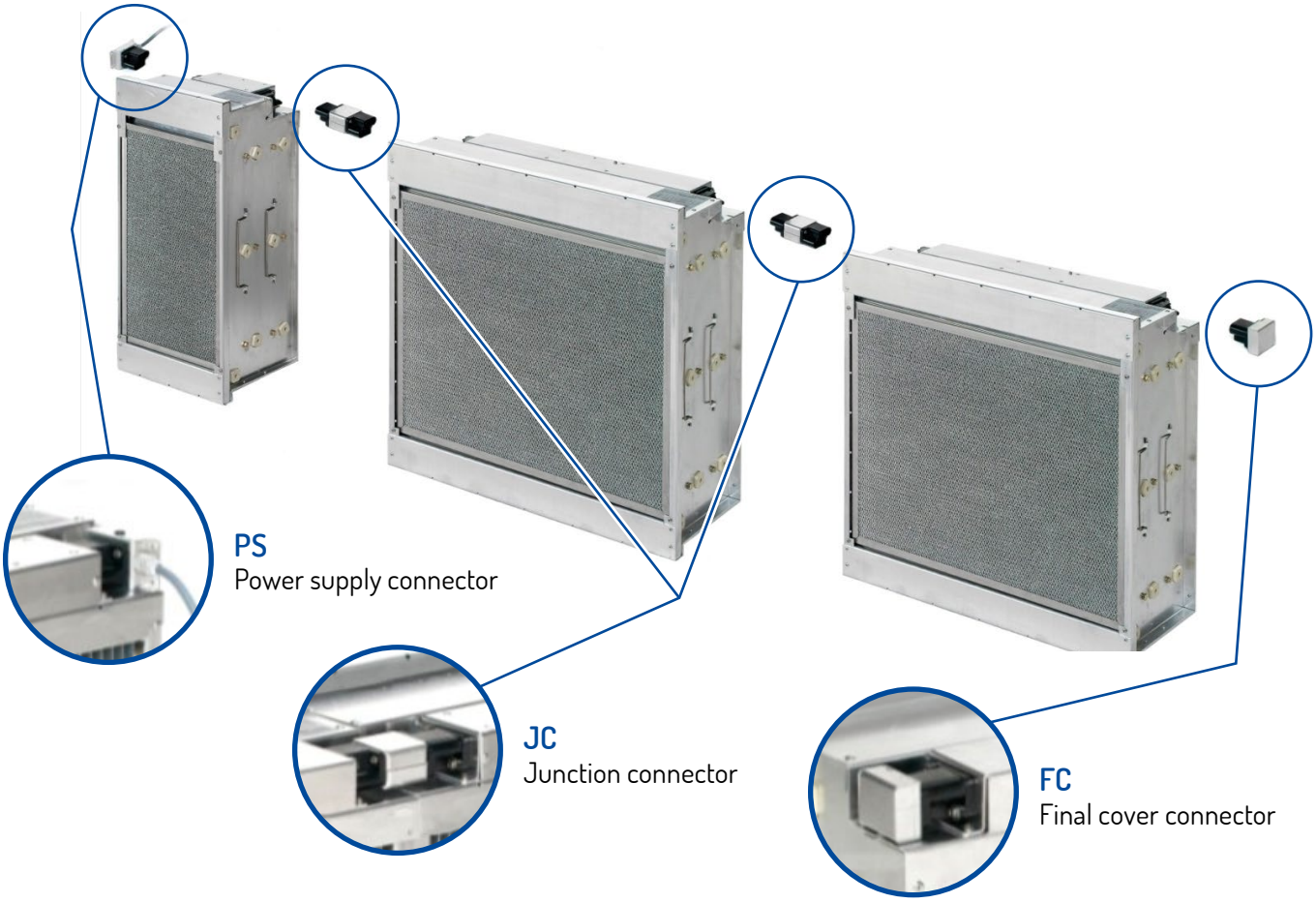
EASY INSTALLATION

The electrostatic filter FE SYSTEM represents an alternative to the common pocket filters and it is conceived to simplify the usage of electrostatic filters in **AHU** (Air Handling Unit) and **Rooftop**.

Its adoption within ventilation systems in general, and more specifically in the air conditioning plants, does not imply any variation regarding constructive and dimensional characteristics of the plants themselves.

Thanks to its multipolar connection system, assembly and disassembly FE electrostatic filters become simple, it is enough to slide in and out the filtering units inside the support filter frame.

Assembled filters



APPLICATION FIELDS

AIR TREATMENT AND AIR CONDITIONING
Installation inside of Air Handling Units and Rooftop for residential, tertiary and industrial fields.

HOSPITALS
Control of airborne contamination for bedrooms, clean rooms, medical settings, waiting rooms and more.

AGRO-ALIMENTARY
Control of airborne contamination during food processes.

INDUSTRIAL
- Manufacturing process: Filtration of micro dust and fumes in general, with max concentration of 20 mg/m^3.
- Welding: Filtration of welding smokes as ferrous metals, precious metals, control boards, etc.

ENERGY SAVING

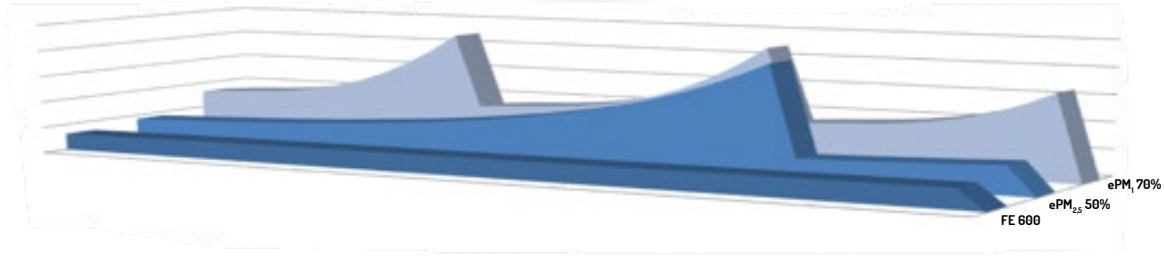
In the active electrostatic filter FE SYSTEM, the initial pressure drop increases slowly while the filter gets dirty. This characteristic, combined to an extraordinary capacity of pollutants accumulation, allows the filter to have a long operation time between maintenance and the other one.

In a traditional pocket filter the initial pressure drop is higher than in a FE SYSTEM, and it increases considerably during its clogging. The pocket filter must be replaced when it reaches the maximum pressure drop of 300 Pa.

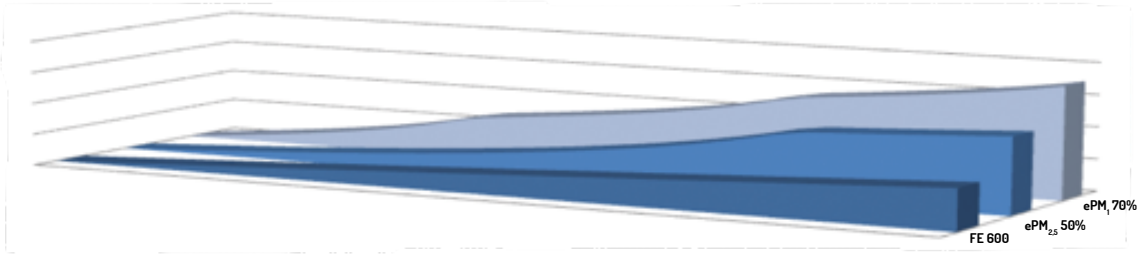
Comparing the FE SYSTEM with two other different filtering systems, operating at the same contaminated indoor air conditions and at the same air flow capacity, we can observe that the FE SYSTEM has a pressure drop that grows very slowly, while a pocket filter $ePM_{2,5}$ 50% (ex F7) reaches the max pressure drop of 300 Pa before the filter is saturated. Even more evident is the operation time of a pocket filter ePM_1 70% (ex F9) that needs to be replaced three times in the same period of operation compared to FE SYSTEM.

A higher flow restriction means merely higher energy consumption for the pocket filters. Compared with an electrostatic filter FE SYSTEM, we can estimate a double energy consumption using an $ePM_{2,5}$ 50% and three times more using an ePM_1 70%.

Air pressure drop



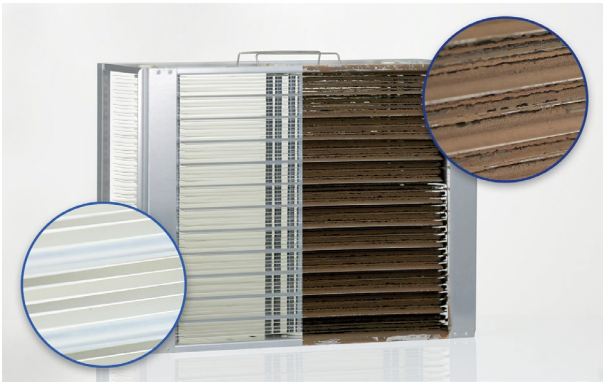
Energy saving



COMPLETELY REGENERABLE

The filter is embedded with a rigid rugged aluminum frame which gets dirty by attracting and holding airborne particles of pollutants which remain accumulated on collector plates. When the filter is saturated, it can be easily washed with flushing water and detergent to remove dirtiness and put it back as new.

If the washing operations are done properly and carefully the filter can last for many years.



ANTIBACTERIAL EFFECT

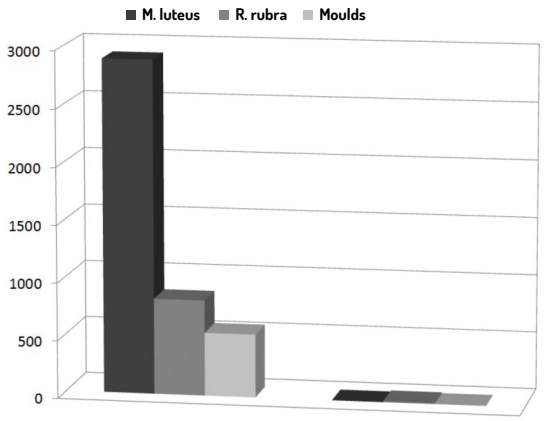
The electrostatic filter has an elevated antibacterial power thanks to its high collection efficiency of submicronic particles, then also because of its strong electric field force. In the Test A it has been measured the concentration of some bacteria commonly present in a given ambient air, before and after the electrostatic filter. The efficiency is between 98 and 99,9%. Test B shows how the concentration of moulds in the air gets reduced when the ambient is equipped with an electrostatic air filter.

Bacterial colonies growing on a plate exposed to the air.



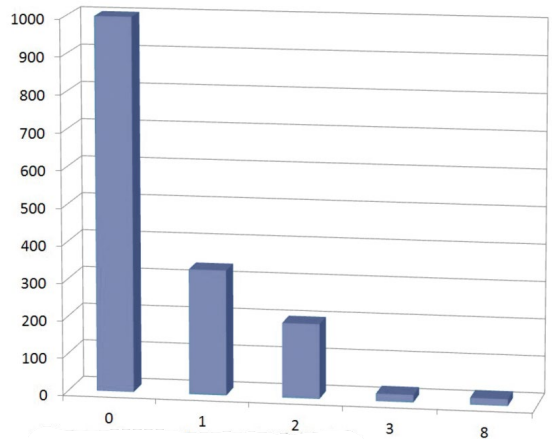
Unfiltered air | Filtered air

Measurement of the bacterian load in the air before and after the electrostatic filter



	CFU before the filter	CFU after the filter
M. luteus	2896	0
R. rubra	830	9
Moulds	548	2

Reduction of moulds inside an elettrostatically filtered ambient



Operating hours of an electrostatic filter

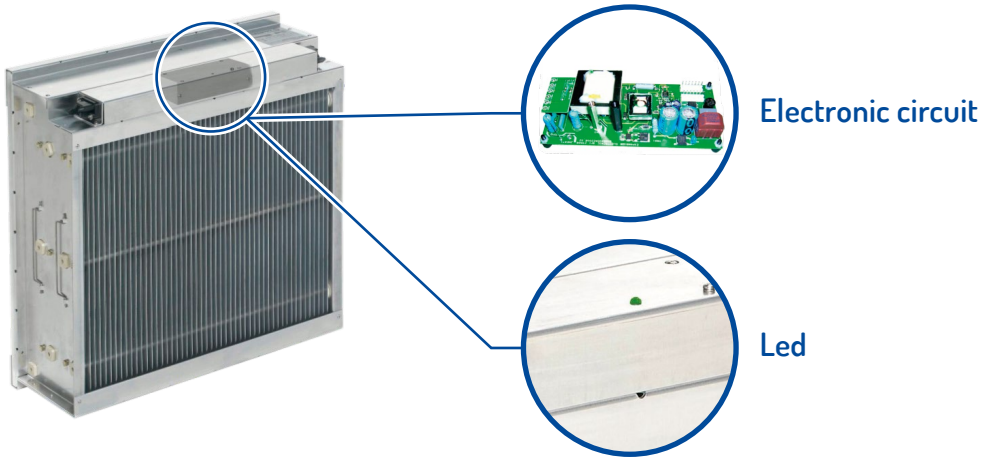
	0	1	2	3	8
CFU Moulds	1000	335	200	20	18

INCORPORATED ELECTRONIC

An incorporated electronic circuit permits to generate the necessary voltage of works directly in the filter itself.

Through the multipolar connectors PS, JC, FC it is possible to carry the power supply to the filter with power voltages of 230V-50Hz and give out the alarm signal.

Efficient watertight solutions allow to wash the electrostatic filters without removing the electronic circuit box.



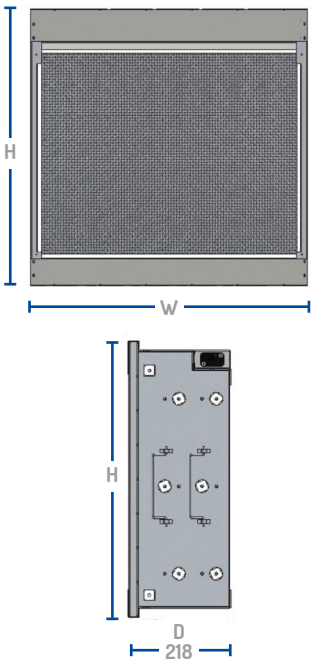
TECHNICAL DATAS

Model	Energy consumption W	Accumulation capacity g	Air flow capacity m³/h					Annual energy consumption (KWh/Y)	
FE150RV	9	140	200	400	550	625	700	150	A+
FE250RV	9	216	380	480	600	720	800	170	A+
FE250	9	216	470	600	750	900	1200	256	A+
FE300RV	9	240	250	500	630	720	1000	213	A+
FE300	9	280	600	800	1000	1200	1600	341	A+
FE450	16	378	820	1050	1310	1570	2100	448	A+
FE500	16	494	1070	1400	1730	2100	2770	590	A+
FE550	16	460	990	1270	1590	1910	2550	544	A+
FE600	16	600	1300	1700	2100	2550	3400	702	A+

FILTRATION CLASS ACCORDING TO UNI EN ISO 16890	ePM%	ePM_1 95%	ePM_1 95%	ePM_1 90%	ePM_1 90%	ePM_1 70%
Filtration class according to UNI 11254	(A, B, C, D)	A	B	C	D	-
Filtration class according to EN 1822	(E10 - E11)	E11	E10	-	-	-
Air speed passage on the filter	m/s	1	2	2,5	3	4
Percentual of max air flow capacity	%	40%	50%	65%	75%	100%
Pressure drop according to ISO 16890	Pa	10	17	24	37	64
Filtration class according to old EN 779	(F7 - F8 - F9)	-	-	F9	F8	F8

FRAME material: aluminium - PREFILTER material: metal mesh

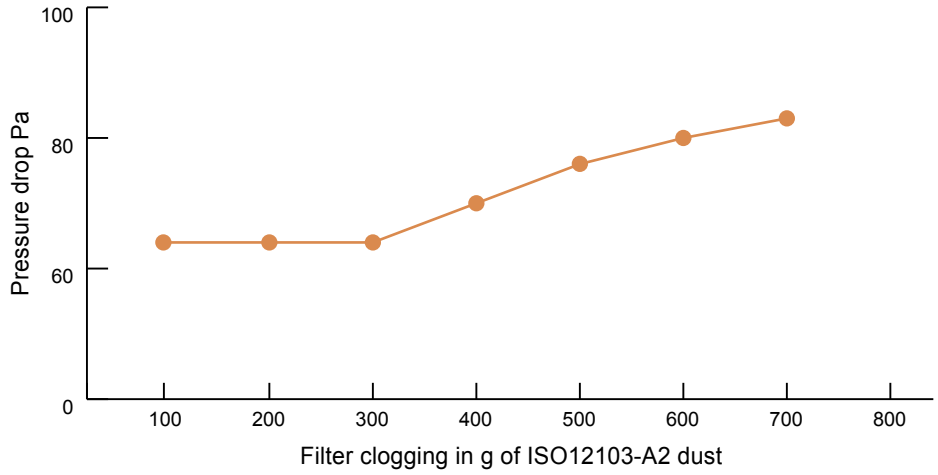
DIMENSIONS



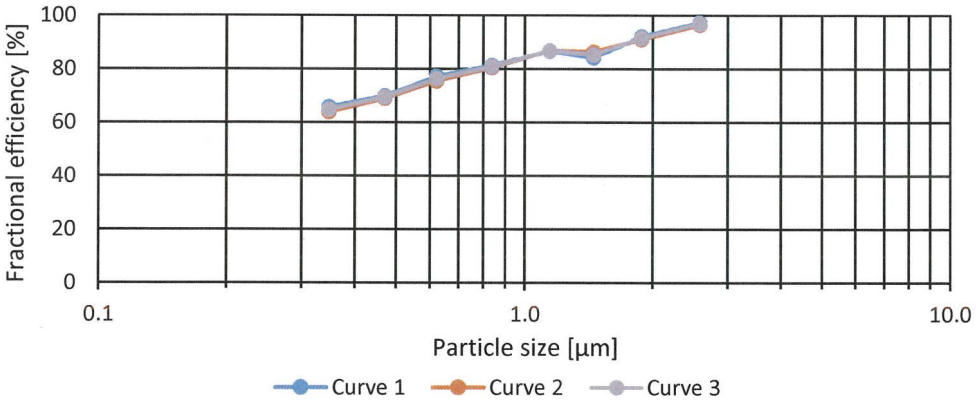
Model	Dimensions W x H x D mm	Weight Kg
FE150RV	287x287x218	4,5
FE250RV	490x287x218	8
FE250	287x490x218	8
FE300RV	592x287x218	9
FE300	287x592x218	10
FE450	490x490x218	14
FE500	490x592x218	16
FE550	592x490x218	16
FE600	592x592x218	19

CHARTS

Pressure drop as a function of air flow rate (clean filter)



Test performed at 3400 m³/h - Speed air passage 4m/s



Curve 1

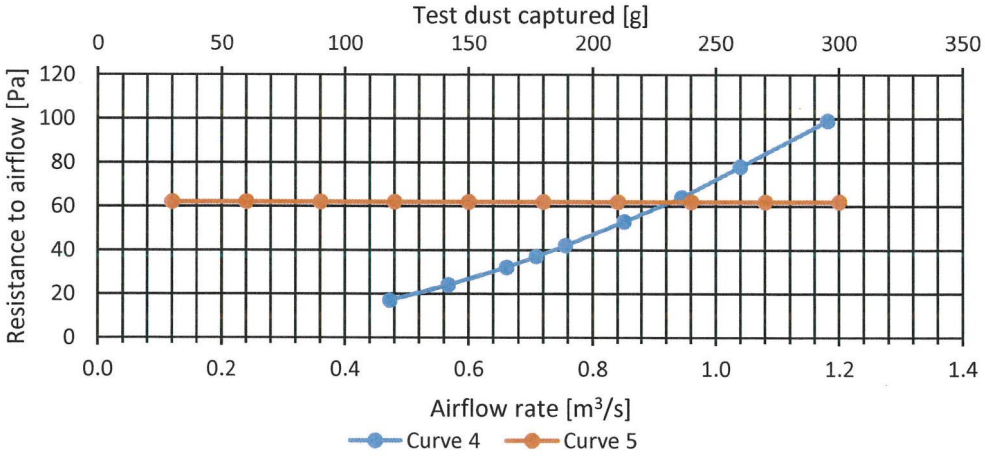
Initial fractional efficiency E_i
(ISO 16890-2)

Curve 2

Conditioned fractional efficiency $E_{D,i}$
(ISO 16890-4)

Curve 3

Average fractional efficiency $E_{A,i}$
(ISO 16890-1)



Curve 4

Pressure differential as a function of the airflow rate (Clean filter)
(ISO 16890-2)

Curve 5

Pressure differential as a function of the test dust captured
(ISO 16890-3)

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