



Beyond Clean Air



The Value of Clean Air

Good indoor air quality, thermal comfort, daylight, good acoustics and amenities – all play a vital role in creating a healthy and productive workplace. A healthy and productive work environment is a key element of any green sustainable building, given that the vast majority of real costs for any business are connected to staffing costs, including salaries and benefits.

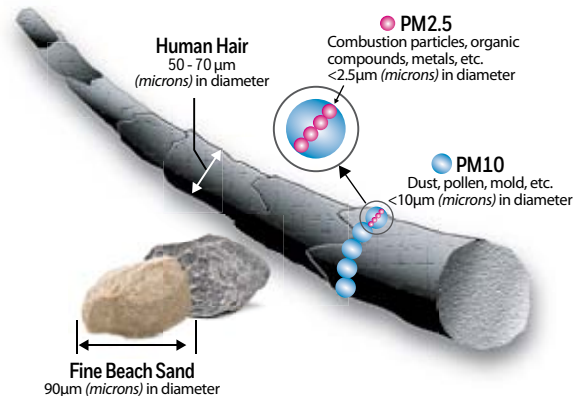
The long-term impact of clean air goes beyond enhancing occupant wellbeing, health and safety. Clean air keeps the air-conditioning system clean, prevents cooling coil fouling and maximizes cooling coil heat transfer efficiency and energy savings.



Basic Air Pollutant Information

Particle pollution, also called particulate matter or PM, is a mixture of solids and liquid droplets floating in the air.

The smallest particles that can be seen with the naked eye are around 40–50 micron (1 micron is one thousandth of a millimetre) in size. Particles less than or equal to 10 microns in diameter are so small that they can get into the lungs, potentially causing serious health problems. The particles with the greatest capacity for reaching the deepest areas of our respiratory system are very small, approximately 0.01–1 micron in size.

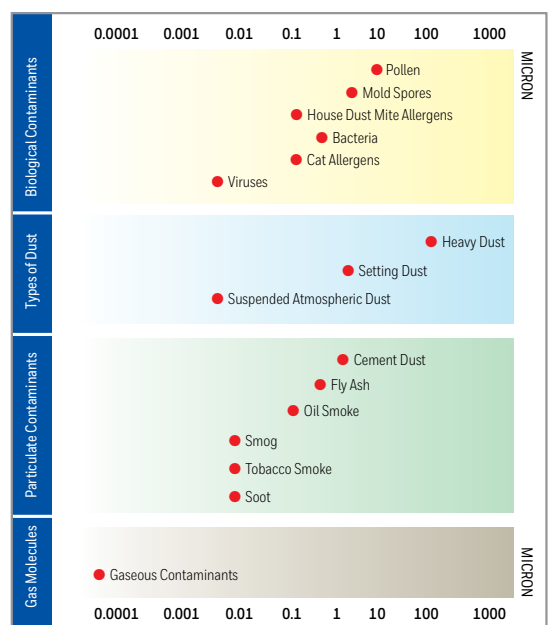


“Particle pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems.” *United States Environmental Protection Agency*

Health Impact of Particle Pollution

People with heart or lung diseases, older adults and children are most likely to be affected by particle pollution exposure. However, even healthy people may feel temporary symptoms if they are exposed to high levels of particle pollution. Numerous scientific studies connect particle pollution exposure to a variety of health issues, including:

- Irritation of the eyes, nose and throat
- Coughing, chest tightness and shortness of breath
- Reduced lung function
- Irregular heartbeat
- Asthma attacks
- Heart attacks
- Premature death in people with heart or lung diseases



Science of Electrostatic Precipitation

An electrostatic precipitator, also called electrostatic air cleaner or electronic air cleaner (EAC) is a device that uses an electric charge to remove impurities – either solid particles or liquid droplets – from the air. The electronic air cleaner functions by applying energy only to the particulate matter to be collected, without significantly impeding the flow of air.

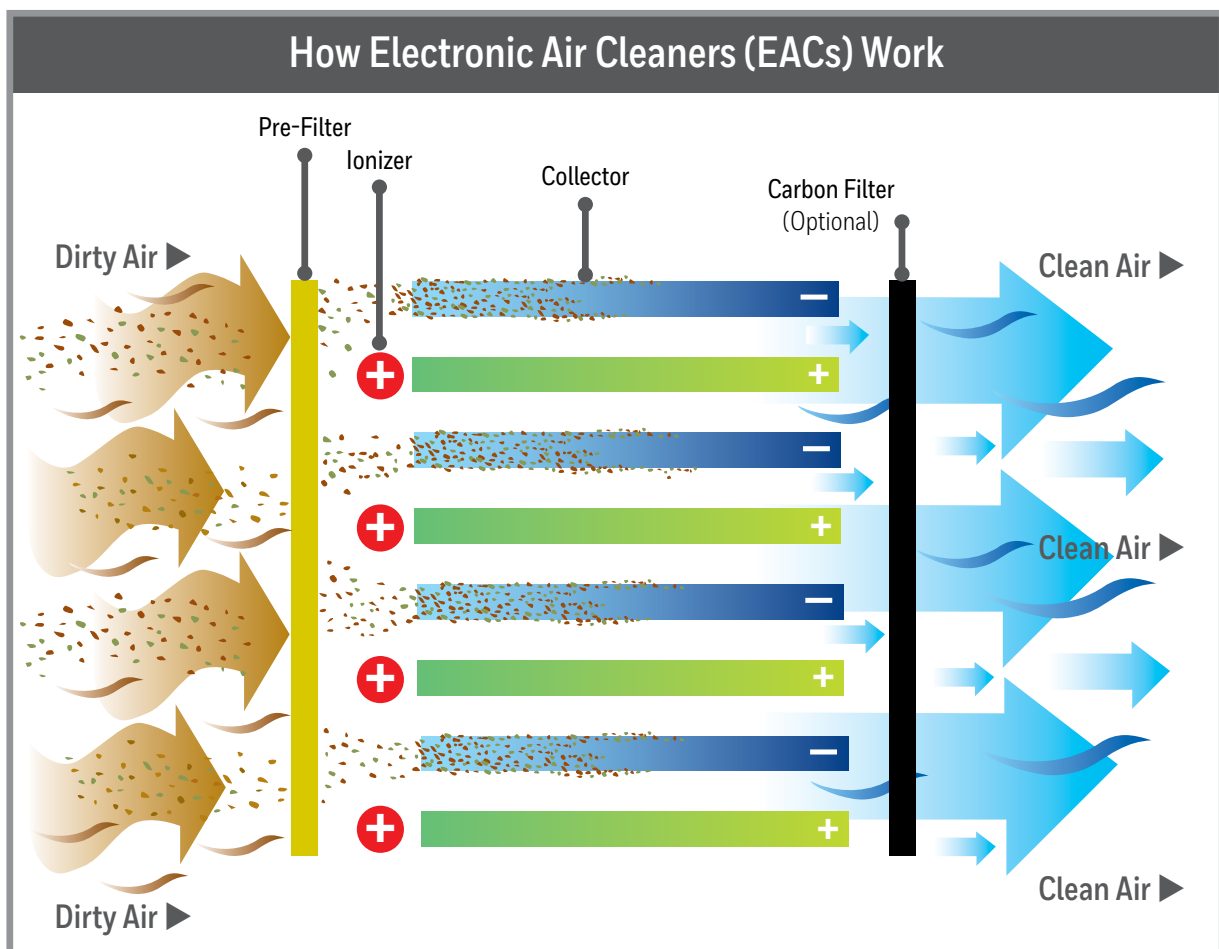
Originally designed for recovery of valuable industrial-process materials, electronic air cleaners are used for air pollution control, particularly for removing particles from waste gases at industrial facilities and power-generating stations. Today, electronic air cleaners are also used for indoor air pollution control.

A Honeywell two-stage electronic air cleaner consists of two sections – a charging section and a collection section. A high voltage is applied to the ionizing wires to form a strong electric field between the wires. Electrons present in contaminated air containing pollutants such as fine dust, smoke particles, pollens, mould spores and bacteria are pushed at high velocity (due to strong Coulomb Forces) from the negative charged electric field to the positive charged electric field. Along the

“The electronic air cleaner functions by applying energy only to the particulate matter being collected, without significantly impeding the flow of air.”

way they collide with the contaminants, releasing more electrons.

The ionized particles are moved by the moving air into the strong electric field at the collectors and are trapped at the charged collector plates.



Honeywell Electronic Air Cleaners (EACs)

The key to lower your Ecological Footprint



An ecological footprint is a measure of human impact on Earth's ecosystems. Honeywell EACs offer opportunities to reduce energy consumption by:

- Reducing the pressure drop across the EACs when compared with conventional media-type air filters.
- Enabling the use of smaller AHU (Air Handling Unit) fan motors which consume less energy. Based on the usual operating hours of AHUs in commercial buildings, EAC investments are paid back in about one and a half years through AHU fan energy savings when compared with media air filters.

Unlike conventional media filters or charged media filters which are thrown away at the end of their service life, Honeywell's electronic cells and pre-filters are washable and reusable. Typical life span of Honeywell EACs is 15 years. Disposable media air filters clog up landfills or if they are incinerated in land scarce countries like Singapore, greenhouse gases are released into the environment, exacerbating global warming.

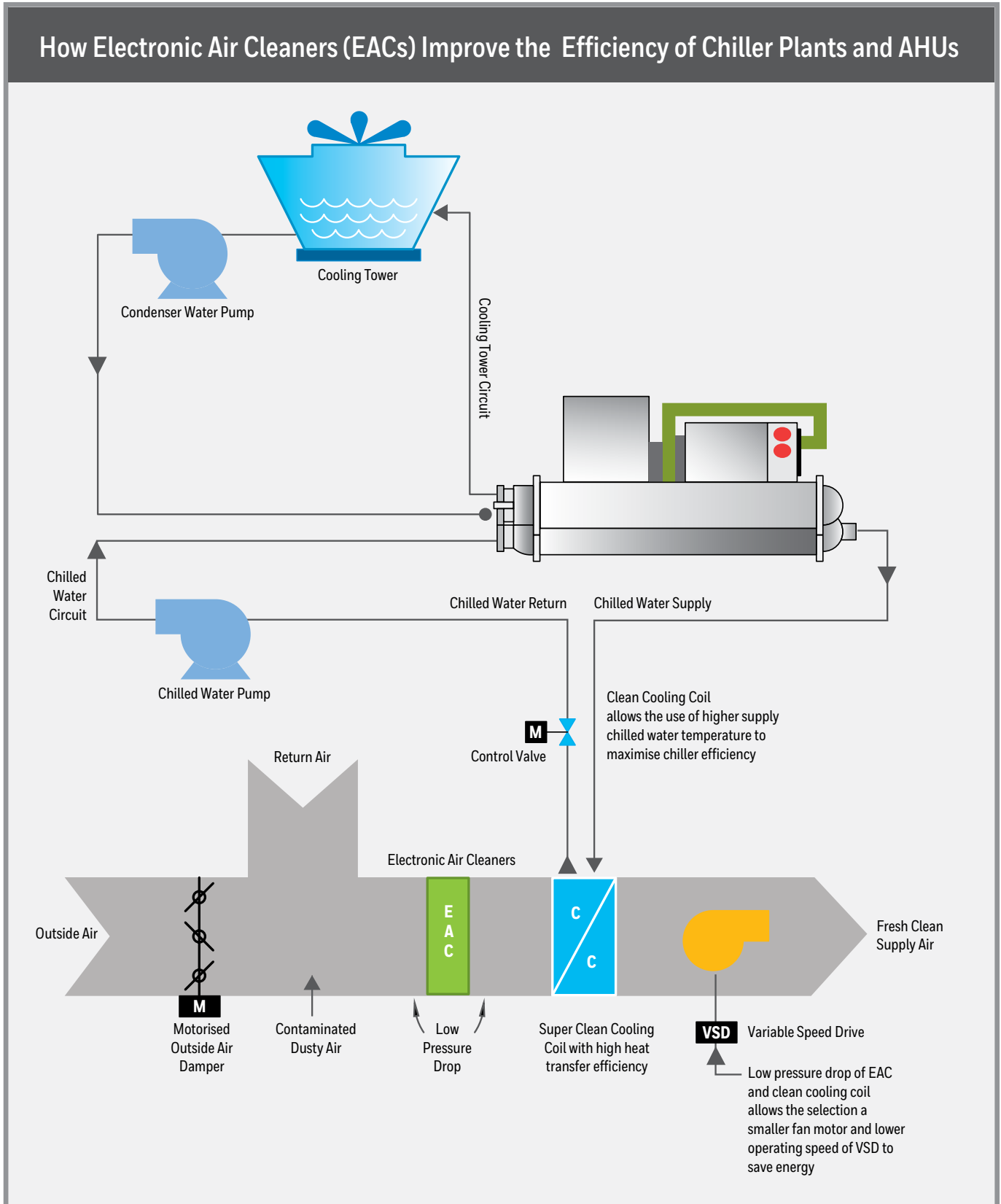
Honeywell EACs have been independently tested and verified by LMS Technologies Inc, a reputable third-party testing laboratory in the United States

to meet **MERV 14** rating, the highest among all EACs in the market. MERV which stands for Minimum Efficiency Reporting Value, is a measurement scale designed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) to rate the effectiveness of air filters in removal of tiny air particles.

Honeywell's **MERV 14** air filtration efficiency rating meets the stringent requirements as prescribed by the latest Singapore IAQ Code of Practice SS 554 and the latest BCA Green Mark Assessment Criteria for New Buildings (Non-Residential) 2015.

Integration of Honeywell EACs into Air-Conditioning Systems

How Electronic Air Cleaners (EACs) Improve the Efficiency of Chiller Plants and AHUs



Honeywell Building IAQ and Energy Case Study by NUS



A comprehensive IAQ and energy case study at the Honeywell Building in Changi Business Park in Singapore was undertaken by the National University of Singapore in 2001 **as part of a Masters dissertation**. The case study was carried out by Ranjith A., a graduate at the Department of Building, NUS and supervised by Assoc. Professor Tham Kwok Wai. The case study was subsequently published (see reference).

The focus of the study was to evaluate the air filtration effectiveness of media filters, electronic air cleaners (EACs) and EACs with carbon filters and their impact on the energy performance of the air-conditioning system. Instruments were deployed in the building to measure air particles, bacteria and chemical pollutants before and after the filters in the air-handling units. Energy meters and other instruments were used to compute energy used based on the three types of air filtration systems used. EACs and carbon filters used for the study were manufactured by **Honeywell**.

IRAS Asean Energy Award



Singapore's IRAS' Building was fitted with Honeywell EACs for Enhanced IAQ and Energy Performance.

Particle size	FILTER TYPE		
	EAC + Carbon	EAC	Media
>0.3µm ²	87%	72%	2%
>0.4µm ²	90%	75%	5%
>0.5µm ²	95%	82%	14%
>0.65µm ²	98%	90%	35%
>0.8µm ²	99%	93%	51%
>1.0µm ²	100%	95%	65%
>1.6µm ²	100%	97%	76%
>2.0µm ²	100%	98%	85%
>3.0µm ²	100%	99%	96%
>4.0µm ²	100%	99%	98%
>5.0µm ²	100%	100%	99%
>7.5µm ²	100%	100%	100%
>10.0µm ²	100%	100%	100%
>15.0µm ²	100%	100%	100%
>20.0µm ²	100%	100%	100%

Reference

Tham, K W and A Ranjith, "An Integrated Energy IAQ Study on the Impact of Filtration Techniques in an Air Conditioned Office Building in the Tropics".

Summary of findings from the study:

- EACs with carbon filters remove **18%** or more of volatile organic compounds compared with media filters.
- EACs (with and without carbon filters) remove **88%** and **69%** of cultural bio-aerosols (bacteria) compared with media filters which removed **45%**.
- The particulate control efficiency of the EACs far surpasses that of the media filters, especially for respirable-sized particles 1 micron or smaller that can penetrate deep into the lungs. For 0.3 micron particles, the media filters could remove only **2%** of the particles compared with **72%** to **87%** for EACs. The differences in filtration performance across various particulate sizes are indicated in the table above.
- The use of EACs results in **5%** reduction in air-conditioning energy compared with media filters.

F58G / F58H

Duct Mounted Commercial Electronic Air Cleaner

Features

- Capacity :
1000 cfm (1700m³/hr) on F58H
2000 cfm (3400m³/hr) on F58G
- Interconnectable units to form array of air cleaners
- Connectable to Building Management Systems
- Removes airborne particles as small as 0.01 micron
- Solid state power supply
- Able to maintain peak efficiency during a wide range of cell dirt-loading conditions
- Test button checks system operation
- Heavy duty commercial cells and pre-filters are removable for cleaning

Technical Information

MODEL	F58H1006	F58G1016
No. of Cells	1 Heavy Duty Commercial Cell	2 Heavy Duty Commercial Cells
Capacity	1000 cfm (1700 m ³ /hr)	2000 cfm (3400 m ³ /hr)
Mounting	Duct Mounted	
Housing	Galvanised Steel Cabinet	
Operating Ambient	4°C to 52°C	
Colour	Silver	
Dimensions	350 x 610 x 171 mm	670 x 610 x 171 mm
Weight	16.9 kg (Shipped)	19.1 kg (Shipped)
Certifications	UL / PSB / MERV 14	
Electrical Ratings	Voltage and Frequency Power Supply : 220 - 240 Vac, 50 Hz Power Consumption : 36 W maximum Current Draw : 0.2 A Ionizer Voltage : 8150 Vdc Collector Voltage : 4075 Vdc	



F58G1016



F58H1006



Sectional view of F58G1016



Pull out view of F58H1006



Illustration of a connected F58G1016 and F58H1006

F57A / F57B

Flush-Mount Commercial Electronic Air Cleaner

Features

- Three-speed motor driven fan
- Capacity :
485 cfm (714 m³/hr) on F57B
1030 cfm (1750 m³/hr) on F57A
- Coanda air distribution (provides recirculation of clean air in 6 directions)
- Choice of infrared remote control models for easy operation
- Solid state power supply
- Able to maintain peak efficiency during a wide range of cell dirt-loading conditions
- Test button checks system operation
- Heavy duty commercial cells and pre-filters are removable for cleaning

Technical Information

MODEL	F57B1075	F57A1101
No. of Cells	1 Heavy Duty Commercial Cell	2 Heavy Duty Commercial Cells
Capacity	485 cfm (714 m ³ /hr)	1030 cfm (1750 m ³ /hr)
Mounting	Ceiling Mounted (Flush-mount)	
Housing	Galvanised Steel Cabinet	
Operating Ambient	4°C to 52°C	
Colour	Off-White	
Dimensions	572 x 572 x 343 mm	1168 x 569 x 343 mm
Weight	29.0 kg (Shipped)	48.1 kg (Shipped)
Certifications	UL, CSA, CE	
Electrical Ratings	Power Supply : 220-240 Vac, 50 Hz	

MODEL	Fan Setting	220-240Vac, 50Hz		Air Flow Capacity	
		A	W	cfm	m ³ /min
F57A	HI	1.8	315	875	25
	MED	1.4	250	730	21
	LOW	1.2	205	640	18
F57B	HI	1.9	275	460	13
	MED	1.0	150	375	11
	LOW	0.7	100	260	7



F57A1101

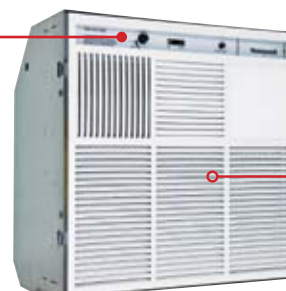


F57B1075

F57B without grille assembly



Fan speed control



F300A / F300B

Electronic Air Cleaner

Features

- Capacity :
1000 cfm (1700 m³/hr) on F300B
2000 cfm (3400 m³/hr) on F300A
- Pressure drop is approximately equal to that of a regular fibre glass filter
- Removes airborne particles as small as 0.01 micron
- Solid state power supply
- Able to maintain peak efficiency during a wide range of cell dirt-loading conditions
- Heavy duty commercial cells and pre-filters are removable for cleaning

Technical Information

MODEL	F300B2012/U	F300A2025/U
No. of Cells	1 Heavy Duty Commercial Cell	2 Heavy Duty Commercial Cells
Capacity	1000 cfm (1700 m ³ /hr)	2000 cfm (3400 m ³ /hr)
Mounting	Duct Mounted (Return air duct)	
Housing	Galvanised Steel Cabinet	
Operating Ambient	4°C to 52°C	
Colour	Silver	
Dimensions	333 x 605 x 172 mm	648 x 583 x 172 mm
Weight	11.3 kg (Shipped)	17.2 kg (Shipped)
Certifications	UL	
Electrical Ratings	Voltage and frequency Power Supply : 240 Vac, 60 Hz, Power Consumption : 22 W Ionizer Voltage : 8150 Vdc Collector Voltage : 4075 Vdc	Voltage and frequency Power Supply : 120 Vac, 60 Hz, *Use 203365A conversion kit to convert to 240 Vac, 60 Hz or 220 / 240 Vac, 50 Hz Power Consumption : 36 W Ionizer Voltage : 8150 Vdc Collector Voltage : 4075 Vdc



F92C

Electronic Air Cleaner

Features

- Capacity varies accordingly to fan speed :
- Integral carbon filter
- Solid state power supply
- Able to maintain peak efficiency during a wide range of cell dirt-loading conditions
- Heavy duty commercial cell are removable for cleaning
- Quiet running even at maximum fan speed
- Adjustable louvers
- Modular construction

m ³ /hr	Fan Speed
250	1
330	2
500	3

Technical Information

MODEL	F92C3027
No. of Cells	1 Heavy Duty Commercial Cell
Capacity	Max 300 cfm (500 m ³ /hr)
Mounting	Wall, Ceiling or Floor-stand Mounted
Housing	White Plastic
Operating Ambient	5°C to 35°C
Colour	Off-White
Dimensions	610 x 565 x 185 mm
Weight	16.0 kg (Shipped) / 13.0 kg (Installed)
Certifications	Meet all relevant EU directives
Electrical Ratings	Supply Voltage : 230 Vac, 50-60 Hz Power Consumption : 140 W



Ceiling mounted view of F92C 3027



Back view of F92C 3027



Top view of F92C 3027



Infrared sensor

Fan speed control

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