



AmericanAirFilter®

AstroFan EC FFU

Better Air is Our Business



AstroFan EC FFU

- EC FFU with HEPA/ULPA filter
- 30–40% lower energy consumption compared to AC FFU
- Low noise level—5dBA lower noise level compared to AC FFU
- Convenient large-scale integrated control via eLisa system
- Low off-gassing components
- Easy Installation



The Fan Filter Unit (FFU) is a self-contained ceiling unit for use in turbulent mixing and laminar flow clean room applications like semiconductor, electronics, food, flat panel, biological pharmacy and other applications where airborne contaminants must be carefully controlled. This unit is designed to achieve clean room Class 100 to Class 1.

As the world's largest manufacturer and retailer of air filters & equipments, AAF's AstroFan FFU always leads the innovation and revolution of air filtration industry. AAF has provided millions of high quality FFU for hundreds of thousands of corporations all around the world.

AAF accumulated rich experience through these successful cases and know better of the needs of customers. To meet the needs of customers we developed an effective solution, including the HEPA/ULPA EC FFU. This not only meets the current needs, but also considers the potential needs of future customers.

30–40% lower energy consumption

The AAF MEGAcel II line filters use the PTFE pleated pack, its resistance is 40% lower than conventional micro-glass fiber media, which contributes to greatly reducing fan energy consumption. Besides, DC motor is more energy saving than AC motor. EC FFU has a 30–40% lower energy consumption than AC FFU.

Low noise level, 5dBA lower compared to AC FFU

AAF AstroFan EC FFU is characterized with high efficiency, low noise, and low maintenance with a long life DC motor which can reduce the noise level by 5 dBA compared to AC motor.

Easy to control

It is easy to achieve large-scale integrated control via eLisa system, and every FFU is individually controlled and monitored by the central computer. The elisa system can also indicate the followings: operator logging, energy consumption analysis, diagnosis error messages and error localization, graphics, etc.

Industry application



Low off-gassing components

All components are low off-gassing to meet stringent requirements of specific industries. And PTFE is characterized for zero dissemination of chemical elements (Boron, sodium, potassium, silicon and so on).

Easy installation

AAF AstroFan FFU is designed to be easily set in place on ceiling grids without any hold-down clamping. When the filter is knife-edge, the unit can also be utilized in the AstroGel ND liquid-seal ceiling grid. Room Side Replaceable (RSR) is available with an optional adapter panel, for quick and easy filter replacement.

High total static pressure at full airflow

The low-pressure drop of the MEGAcel II filter, in combination with the high total static pressure of the fan, provide an external static pressure of 50 to 150 Pa at full rated airflow. It allows for additional attachment of an optional pre-filter.

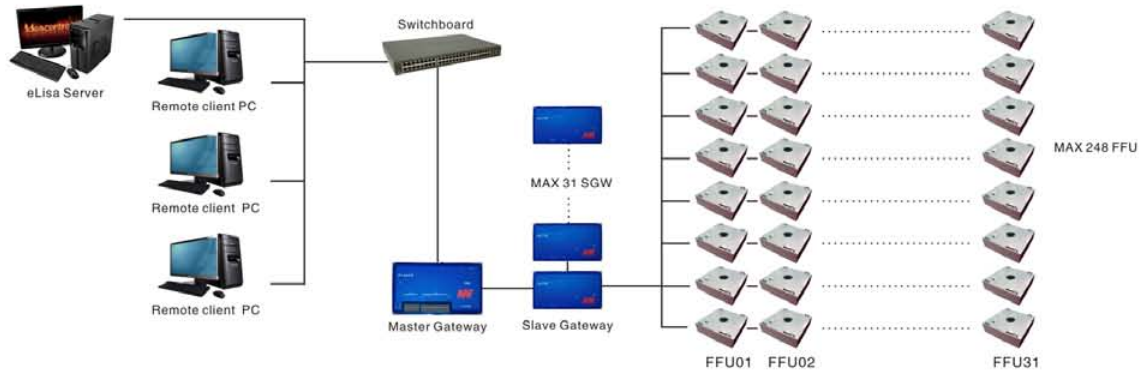
Product assembling line



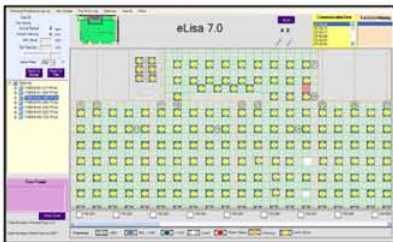
AstroFan EC FFU Operating System

AstroFan EC FFU Electric Connection Diagram

Under the eLisa electronic control system, AAF AstroFan EC FFU shows the operating condition of all FFUs directly and operates one by one according to the conditions via the host and PC.



eLisa Management



1 Gateway/Fan Management



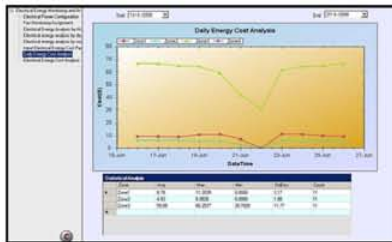
2 Area chart



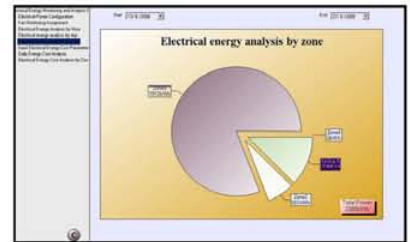
3 Administrative Module



4 Personal Preference Setup



5 Electrical Energy Analysis-1



6 Electrical Energy Analysis-2

| Time | Area | Unit | Message |
|---------------------|------|------|--------------------------------|
| 2010/06/15 10:00:00 | 101 | 101 | Fan-01: Fan-01: Fan-01: Fan-01 |
| 2010/06/15 10:00:00 | 101 | 101 | Fan-02: Fan-02: Fan-02: Fan-02 |
| 2010/06/15 10:00:00 | 101 | 101 | Fan-03: Fan-03: Fan-03: Fan-03 |
| 2010/06/15 10:00:00 | 101 | 101 | Fan-04: Fan-04: Fan-04: Fan-04 |
| 2010/06/15 10:00:00 | 101 | 101 | Fan-05: Fan-05: Fan-05: Fan-05 |
| 2010/06/15 10:00:00 | 101 | 101 | Fan-06: Fan-06: Fan-06: Fan-06 |
| 2010/06/15 10:00:00 | 101 | 101 | Fan-07: Fan-07: Fan-07: Fan-07 |
| 2010/06/15 10:00:00 | 101 | 101 | Fan-08: Fan-08: Fan-08: Fan-08 |
| 2010/06/15 10:00:00 | 101 | 101 | Fan-09: Fan-09: Fan-09: Fan-09 |
| 2010/06/15 10:00:00 | 101 | 101 | Fan-10: Fan-10: Fan-10: Fan-10 |

7 Fan Error Log

| Time | Event | Area | Unit | Message |
|---------------------|-------|------|------|--------------------------------|
| 2010/06/15 10:00:00 | 1 | 101 | 101 | Fan-01: Fan-01: Fan-01: Fan-01 |
| 2010/06/15 10:00:00 | 2 | 101 | 101 | Fan-02: Fan-02: Fan-02: Fan-02 |
| 2010/06/15 10:00:00 | 3 | 101 | 101 | Fan-03: Fan-03: Fan-03: Fan-03 |
| 2010/06/15 10:00:00 | 4 | 101 | 101 | Fan-04: Fan-04: Fan-04: Fan-04 |
| 2010/06/15 10:00:00 | 5 | 101 | 101 | Fan-05: Fan-05: Fan-05: Fan-05 |
| 2010/06/15 10:00:00 | 6 | 101 | 101 | Fan-06: Fan-06: Fan-06: Fan-06 |
| 2010/06/15 10:00:00 | 7 | 101 | 101 | Fan-07: Fan-07: Fan-07: Fan-07 |
| 2010/06/15 10:00:00 | 8 | 101 | 101 | Fan-08: Fan-08: Fan-08: Fan-08 |
| 2010/06/15 10:00:00 | 9 | 101 | 101 | Fan-09: Fan-09: Fan-09: Fan-09 |
| 2010/06/15 10:00:00 | 10 | 101 | 101 | Fan-10: Fan-10: Fan-10: Fan-10 |

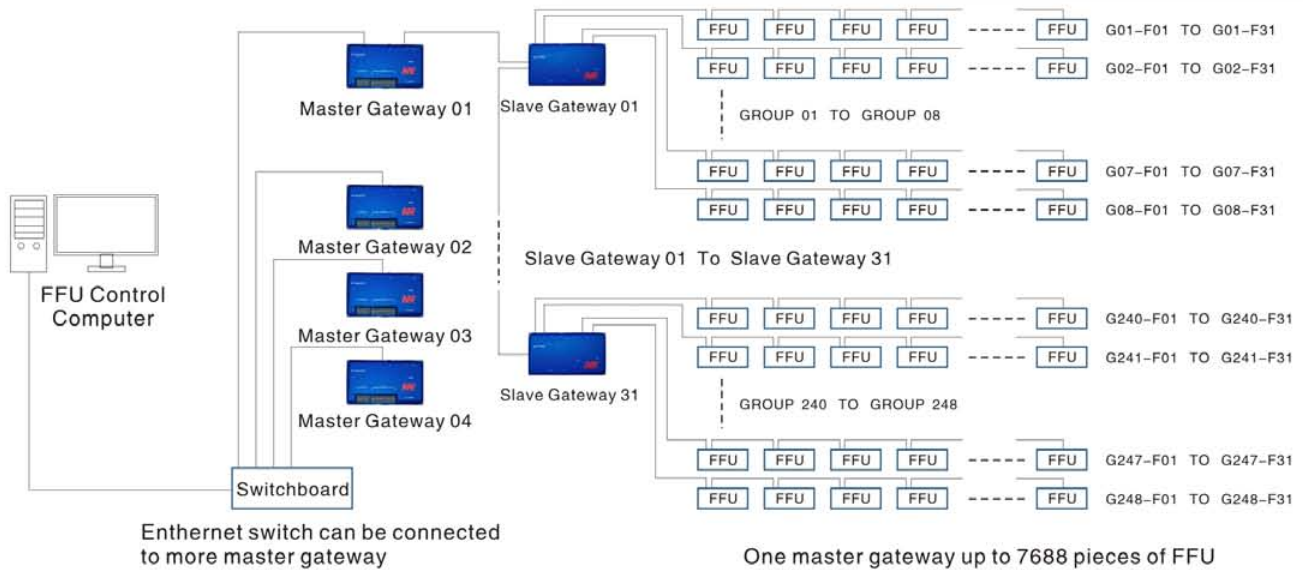
8 Register record

| User Name | Area | Unit | Access Level |
|----------------|------|------|--------------|
| Administrator | 101 | 101 | 5 |
| System Manager | 101 | 101 | 3 |
| Operator | 101 | 101 | 2 |
| Guest | 101 | 101 | 1 |

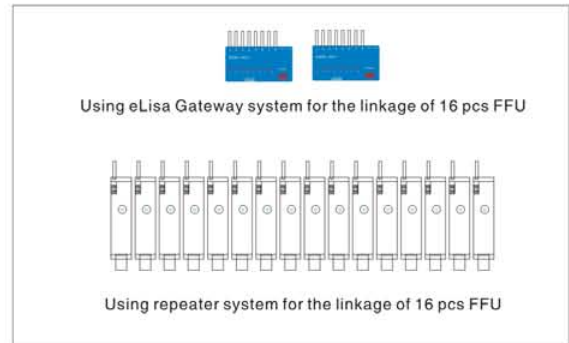
9 Verified user's access right

AstroFan EC FFU Control System

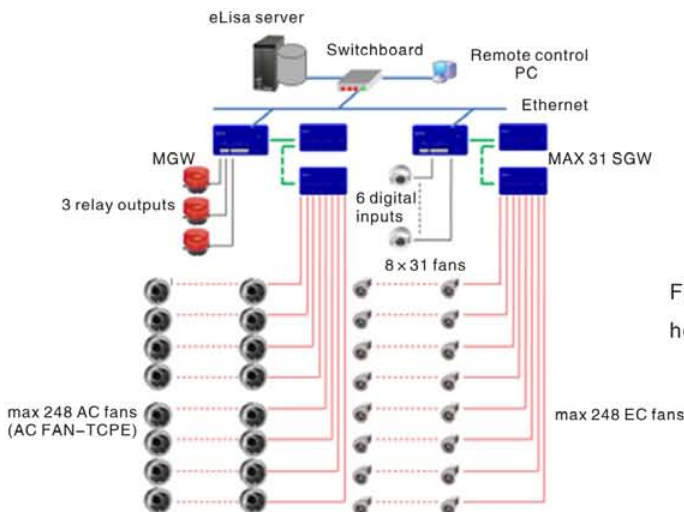
Electric Connection Diagram of Control Interface and Gateway



- Compared with AC FFU system, it's scanning speed is 90% faster
- Easy installation due to a small number of connections
- Small installation volume (see chart, right)
- Increasing a primary gateway when adding another 7688 pcs FFU
- Convenient large-scale integrated control via eLisa system
- One secondary gateway connects 8 groups of FFU, including 248 pieces of machines
- It can be connected to several PCs to realize remote and hierarchical control
- One primary gateway connects 31 secondary gateways, up to 7688 pieces of FFU



AC FFU Joint with EC FFU



AAF is providing the resolution to combine the moment AC FFU with the added EC FFU into the same controlling system to help you realize the controlling of AC and EC FFU.

AstroFan EC FFU Specifications

● Table 1: AstroFan EC FFU Specifications (glass fiber filter)

| Model | AstroFan EC FFU Glass | |
|-----------------------------|-----------------------|--------------------|
| Size(length x wide)(mm) | 1175 x 575 | 1175 x 1175 |
| Inlet cone diameter (mm) | 275+25(inlet cone) | 320+35(inlet cone) |
| Weight(kg,GL) | 33.5 | 54.6 |
| Casing material | SUS/AL/GL | |
| Appropriate temperture (°C) | -25~40 | |
| Air velocity (m/s) | 0.45 | |
| Filter | glass fiber | |
| Filter thickness (mm) | 69 | |
| Gasket | Neoprene/EPDM | |
| Power Supply | 220V 1 50/60HZ | |

● Table 2: AstroFan EC FFU Specifications (PTFE filter)

| Model | AstroFan EC FFU PTFE | |
|-----------------------------|----------------------|--------------------|
| Size(length x wide)(mm) | 1175 x 575 | 1175 x 1175 |
| Inlet cone diameter (mm) | 275+25(inlet cone) | 320+35(inlet cone) |
| Weight(kg,GL) | 31.5 | 53.6 |
| Casing material | SUS/AL/GL | |
| Appropriate temperture (°C) | -25~40 | |
| Air velocity (m/s) | 0.45 | |
| Filter | PTFE | |
| Filter thickness (mm) | 50 | |
| Gasket | Neoprene/EPDM | |
| Power Supply | 220V 1 50/60HZ | |

AstroFan EC FFU Performance parameter

● Table 3: AstroFan EC FFU 1175 x 575 Performance (0.45m/s)

| Model | AstroFan EC FFU 1175 x 575 glass fiber filter | | | | | | AstroFan EC FFU 1175 x 575 PTFE filter | | | | | |
|-----------------------------|---|-------|-------|-------|-------|-------|--|-------|-------|-------|-------|-------|
| | 0 | | 50 | | 100 | | 0 | | 50 | | 100 | |
| External pressure drop (Pa) | | | | | | | | | | | | |
| Efficiency | H13 | U15 | H13 | U15 | H13 | U15 | H13 | U15 | H13 | U15 | H13 | U15 |
| Total pressure drop (Pa) | 105.0 | 120.0 | 155.0 | 170.0 | 205.0 | 220.0 | 60.0 | 80.0 | 110.0 | 130.0 | 160.0 | 180.0 |
| Filter pressure drop | 105.0 | 120.0 | 105.0 | 120.0 | 105.0 | 120.0 | 60.0 | 80.0 | 60.0 | 80.0 | 60.0 | 80.0 |
| Power consumption (W) | 53.0 | 62.5 | 71.5 | 90.6 | 100.0 | 116 | 41.0 | 52.0 | 57.0 | 76.0 | 86.0 | 95.0 |
| Power (A) | 0.250 | 0.290 | 0.330 | 0.415 | 0.460 | 0.530 | 0.199 | 0.253 | 0.293 | 0.351 | 0.416 | 0.429 |
| Noise level (dBA) | 42.7 | 46.3 | 46.8 | 48.7 | 47.4 | 50.4 | 41.0 | 42.1 | 42.5 | 45.0 | 46.0 | 46.9 |

● Table 4: AstroFan EC FFU 1175 x 1175 Performance (0.45m/s)

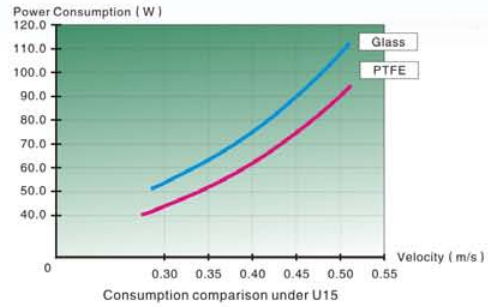
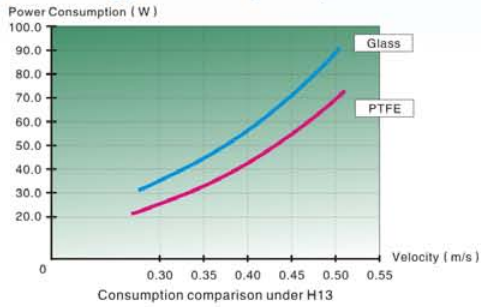
| Model | AstroFan EC FFU 1175 x 1175 glass fiber filter | | | | | | AstroFan EC FFU 1175 x 1175 PTFE filter | | | | | |
|-----------------------------|--|-------|-------|-------|-------|-------|---|-------|-------|-------|-------|-------|
| | 0 | | 50 | | 100 | | 0 | | 50 | | 100 | |
| External pressure drop (Pa) | | | | | | | | | | | | |
| Efficiency | H13 | U15 | H13 | U15 | H13 | U15 | H13 | U15 | H13 | U15 | H13 | U15 |
| Total pressure drop (Pa) | 105.0 | 120.0 | 155.0 | 170.0 | 205.0 | 220.0 | 60.0 | 80.0 | 110.0 | 130.0 | 160.0 | 180.0 |
| Filter pressure drop | 105.0 | 120.0 | 105.0 | 120.0 | 105.0 | 120.0 | 60.0 | 80.0 | 60.0 | 80.0 | 60.0 | 80.0 |
| Power consumption (W) | 100.0 | 109.0 | 135.0 | 140.0 | 168.0 | 190.0 | 95.0 | 105.0 | 111.0 | 118.0 | 148.0 | 166.0 |
| Power (A) | 0.461 | 0.504 | 0.621 | 0.638 | 0.744 | 0.864 | 0.438 | 0.484 | 0.511 | 0.540 | 0.680 | 0.760 |
| Noise level (dBA) | 46.3 | 46.5 | 49.7 | 50.4 | 51.5 | 52.4 | 47.2 | 47.7 | 49.6 | 49.7 | 50.5 | 51.2 |

* Above are testing data from AAF laboratory.

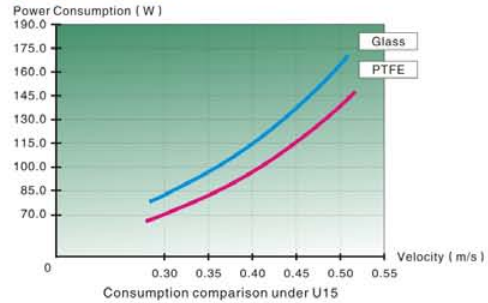
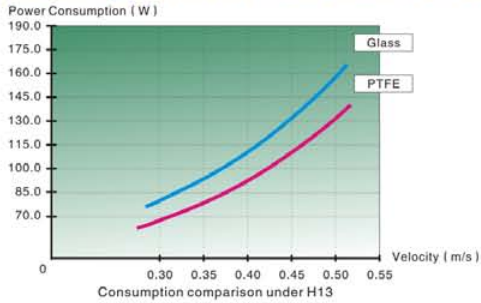
* Datas for table 3 are based on ebm 310 fan, Datas for table 4 are based on ebm 400 fan.

Energy Consumption Between PTFE and Glass Fiber Filter

Air Velocity vs Energy Consumption(AstroFan EC FFU 1175×575)



Air Velocity vs Energy Consumption (AstroFan EC FFU 1175×1175)



* Through the comparison, we can conclude that the PTFE filter energy consumption is 20% lower than glass fiber filter.

Case Study

Testing condition

| Area | Sample area 1: glass fiber filter | Sample area 2: PTFE filter |
|-----------------|---|------------------------------|
| FFU standard | EC FFU 1175×1175 glass fiber filter | EC FFU 1175×1175 PTFE filter |
| Filter | AstroCel II | MEGAcel II |
| Efficiency | H14 | H14 |
| Sampling method | Random sample 10 FFUs, test the power under the three common air velocities: 0.35m/s, 0.40m/s, and 0.45m/s to get the weighted average. | |

Testing data

| Air velocity (m/s) | EC FFU 1175×1175 glass fiber filter | EC FFU 1175×1175 PTFE filter | Testing Data | |
|----------------------|-------------------------------------|------------------------------|------------------------|-----------------------------------|
| | Power (W) | Power (W) | Power difference (W) | Average energy saving ratio (%) |
| 0.45 | 174.7 | 110.3 | 64.4 | 36.85 |
| 0.40 | 144 | 91 | 53 | 36.8 |
| 0.35 | 112.9 | 75.4 | 37.5 | 33.2 |

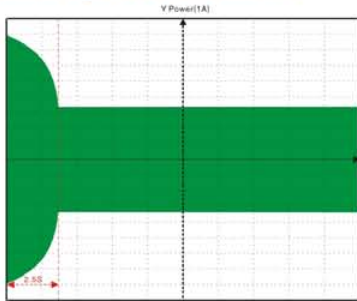
Comparison of energy consumption between glass fiber and PTFE filter in an optoelectronics company. Total use of 20,000 AAF EC FFUs, PTFE start operation in June 2010, tested in December 2012, operating for 2.5 years. Found using PTFE filter has more than 30% energy saving than using glass fiber filter.



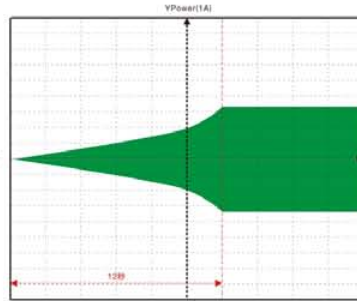
*Above are testing data from AAF laboratory.

Advantages of AstroFan EC FFU

No current surges during start-up, low torque load to bearings and structure

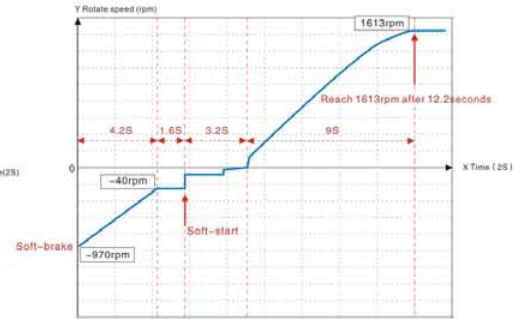


Graph 1 Startup Current of AC Fan



Graph 2 Startup Current of EC Fan

Soft-start and Soft-brake to Safeguard Fan



Graph 3: AAF Astrofan EC FFU Soft-start Diagram

As we can see from chart 1, the startup current of AC FFU= 3.5 * nominal current. It causes great impacts to power and switching system.

AAF Astrofan EC FFU is functioned to current amplification with the original imported EBM fan. The current amplify gradually to the operating current in 12 seconds after starting to protect power and switching system as chart 2 shows.

As it shows in chart 3, AAF Astrofan EC FFU is functioned soft-start and soft-brake. The fan is located in reverse 970rpm at the beginning (with 250Pa external press). Then it comes into the soft-start and the reverse current is absorbed with the rotate speed down to 40rpm when starting 4.2 seconds. And 12.2 seconds later, it promotes to forward 1613rpm when coming with working order.

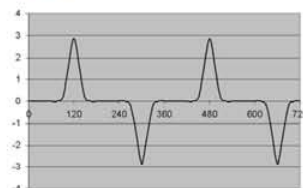
PFC Power Factor Correction

Current Oscillogram under different filtering systems



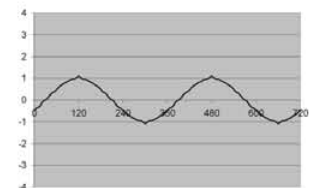
No PFC

As we can see, without PFC, the current waveform of power system distorted seriously.



Passive PFC

The waveform restless is removed in the common FFU PFC, but the general distortion doesn't disappear with the 60% efficiency.

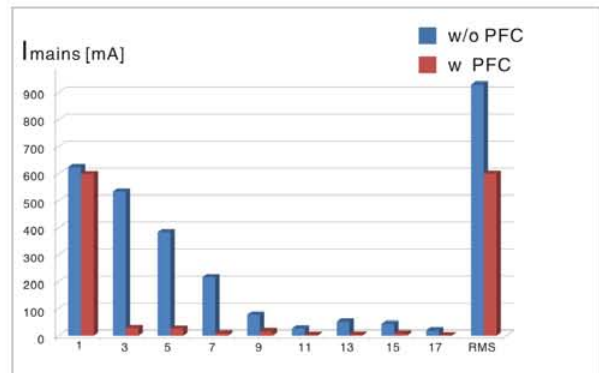


Active PFC

AAF Astrofan EC FFU PFC can recount power waveform to adjust to the sine wave, and with the 99% transfer efficiency.

Harmonic current consumption data sheet comparison chart

| Harmonic No | No PFC | Passive PFC | Active PFC |
|-------------|--------|-------------|------------|
| 1 | 100% | 100% | 100% |
| 3 | 86% | 82% | 5% |
| 5 | 61% | 54% | 4% |
| 7 | 35% | 28% | 1% |
| 9 | 13% | 11% | 3% |
| 11 | 4% | 4% | 1% |
| 13 | 8% | 1% | 1% |
| 15 | 7% | 2% | 1% |
| 17 | 3% | 3% | 0% |
| 19 | 1% | 2% | 1% |



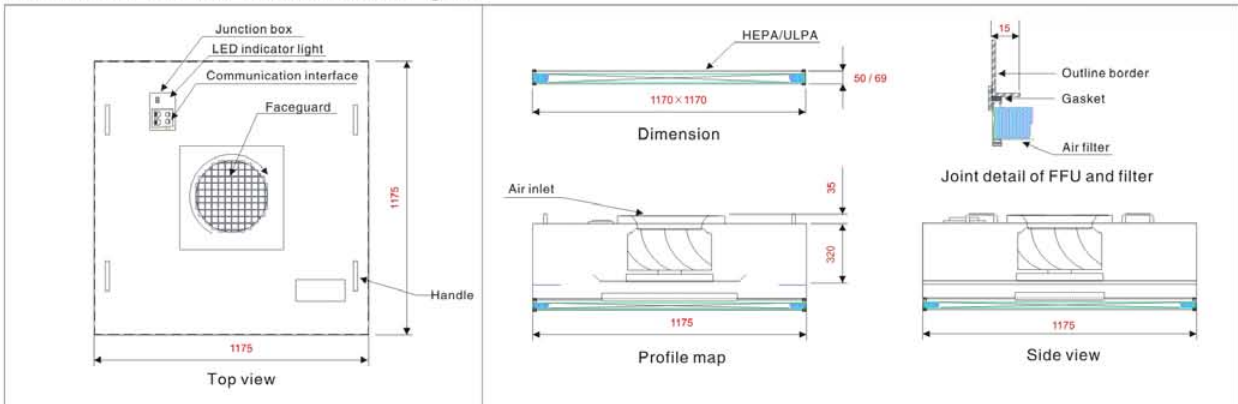
All of the odd time harmonic waves will cause energy consumption, apart from the first time. Initiative filtering system of AAF EC FFU can control the consumption to the minimum.

As the diagram shows, the blue cylinder stands for the current wave restless without filtering system. It comes to zero after the filtering of AAF EC FFU to reach the minimum consumption.

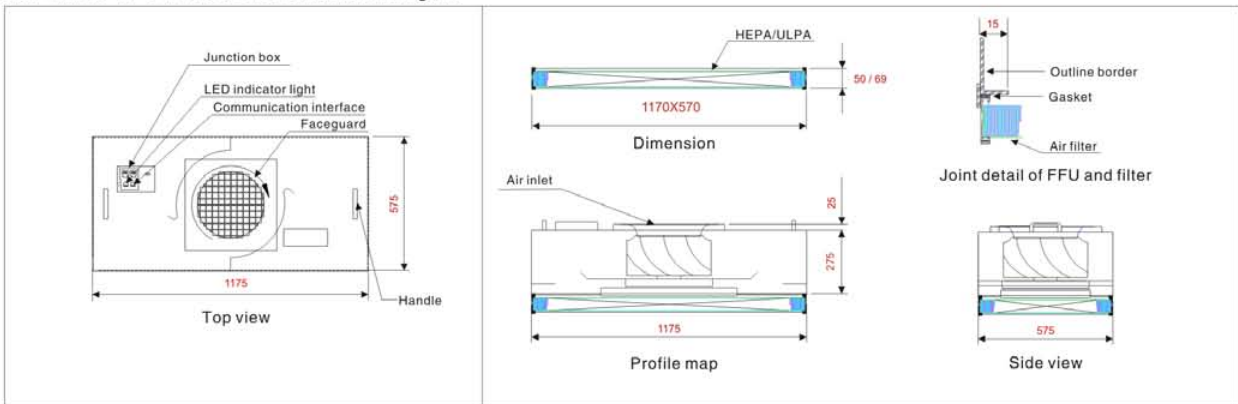


AstroFan EC FFU Dimension Figure (mm)

AstroFan EC FFU 1175 x 1175 Dimension Figure



AstroFan EC FFU 1175 x 575 Dimension Figure



Our Service and Technical Support

Advanced Technology, Quality First

AAF owns the world class technology and high-efficiency production capacity. With the worldwide professional R&D teams from USA, Europe, Asia and so on, we work hard together. Our international R&D ability stands the advanced level, and our products direct the developing trends at the same time.

To ensure the quality, AAF executes standard testing routine for every product to meet the performance. From the raw materials to the products.



FFU Expertise Team

Targeting on improving the performance, optimizing the system, and energy saving, FFU experts take knowledge of customers' actual demands to propose the best solution. Keeping in touch with the academic and industry filed, they are experienced with professional technology. Otherwise, to adapt to the changing marketing demands, our experts keep improving products and perfecting our service.

Customer Service At All Time

Our customer service purpose: To provide the most suitable solution. On our team are FFU specialists with years of experiences, they are available for consultation when problems arise, or at any time their advice are needed.

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