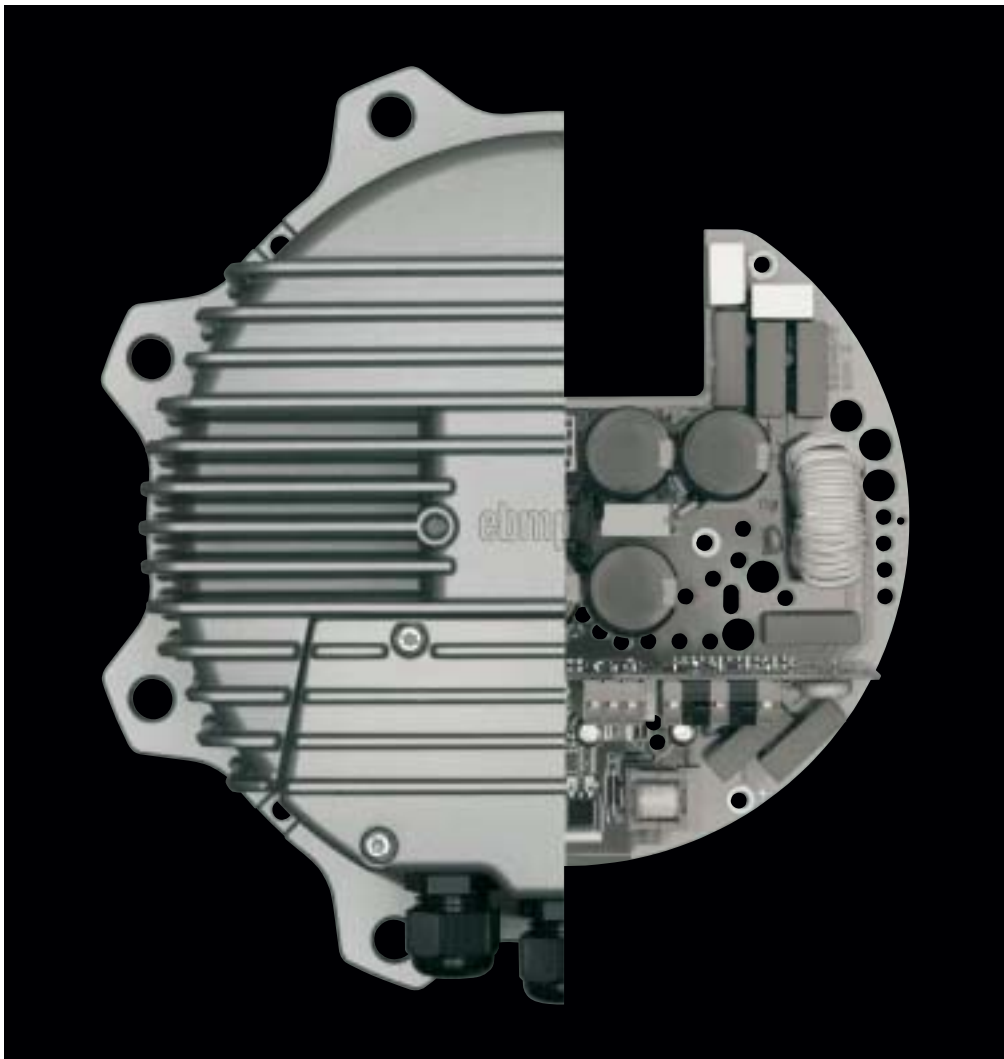


Energy-saving giants

Examples & design comparisons

04/2004



A comprehensive and stringent programme

As many individual applications and specifications – as many individual possibilities offered by our comprehensive range of products; axial fans for use in evaporators as well as centrifugal fans and blowers for condensers. There is no application in ventilation, air-conditioning and refrigeration that you could not realise with ebm-papst quality and reliability. And there is practically no individual R&D project that could not be successfully concluded on the basis of our products, our know-how and expertise and the experience we have gathered over decades. You can rely on this!



One principle, countless possibilities

ebm-papst axial fans are “space-saving miracles”, moving air for heat or negative heat exchange in various appliances and systems. Their minimal mounting depth, their low noise level and their excellent efficiency make them the perfect choice, especially when it comes to air flow in heat exchangers.

In EC design, they even turn into intelligent “energy-saving miracle workers” – for the most diverse applications, but especially in ventilation, air-conditioning and refrigeration, and in the automotive industry.



Centrifugal fans: powerful performance, quiet operation

ebm-papst centrifugal fans with backward curved blades have an excellent aerodynamic efficiency. Especially when used in computer trays, telecommunication systems, clean-room technology, roof ventilation systems, range hoods, automotive + rail applications etc., their dimensions and capacities make these fans the ideal choice.

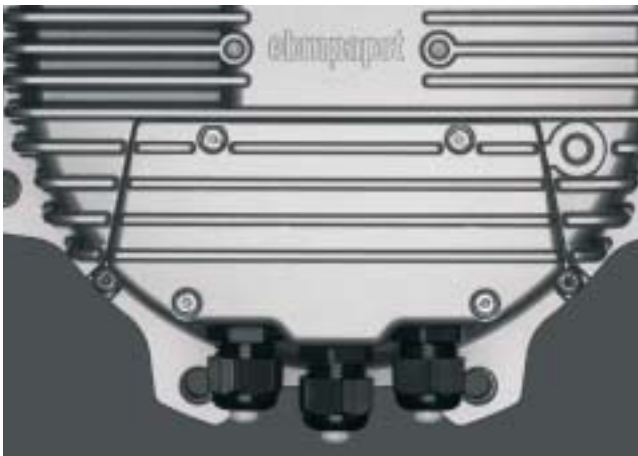
Table of content



■ Advantages of EC technology 4

■ EC axial fans 6

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Advantages of EC technology

High energy-saving potential

The EC motor has a high efficiency at every speed.

At nominal speed, there is a saving in energy of about 10 %. In the controlled range, both relative and absolute saving are substantially more pronounced.

Calculation of annual cost saving:

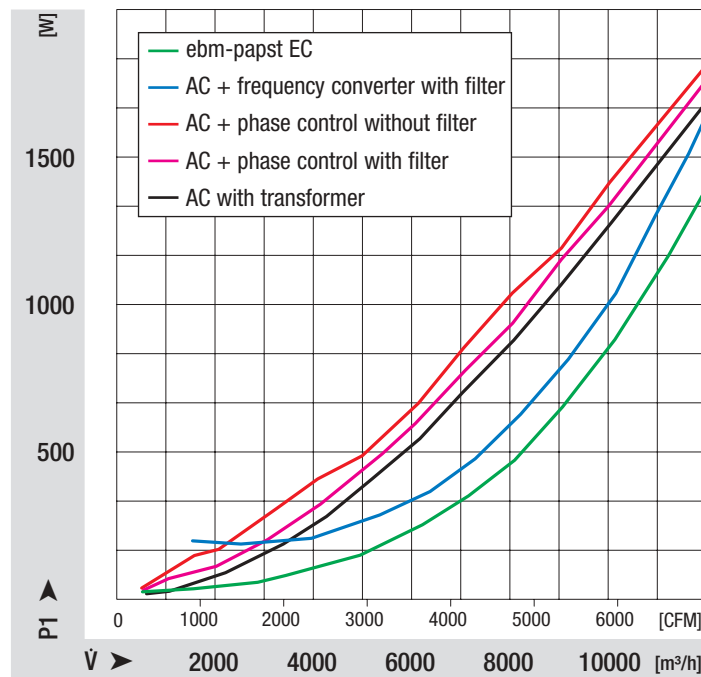
$$K_e = E_e \times E_k \times L_z$$

K_e = cost saving [€] per year

E_e = power saving [kW]

E_k = energy costs [€/kWh]

L_z = operation time [h/year]



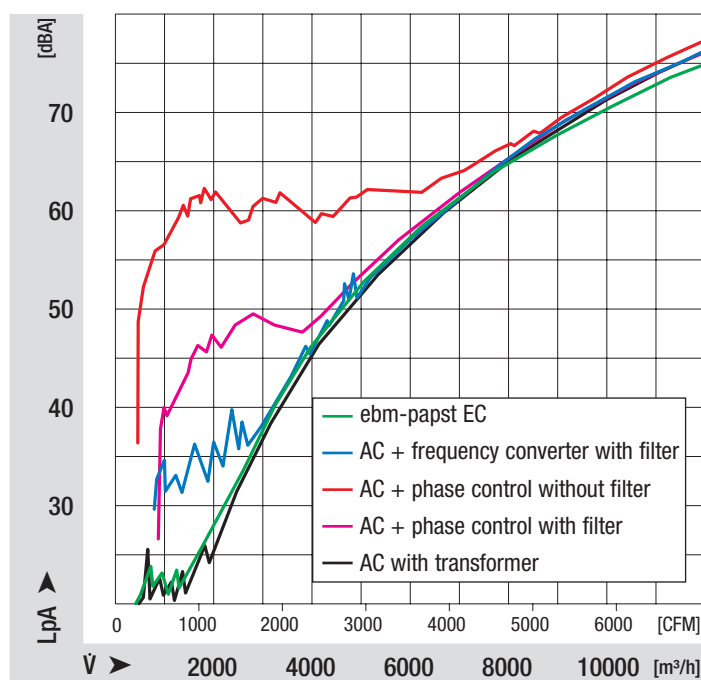
Extremely quiet

No motor noise across the entire speed range.

So, when there is high demand of negative heat, operation at peak load is easily possible.

With less cold needed, the option is to choose very low speeds for low-noise operation.

Due to the design principle, there are neither resonances typical for frequency converter operation nor any phase control humming noises.



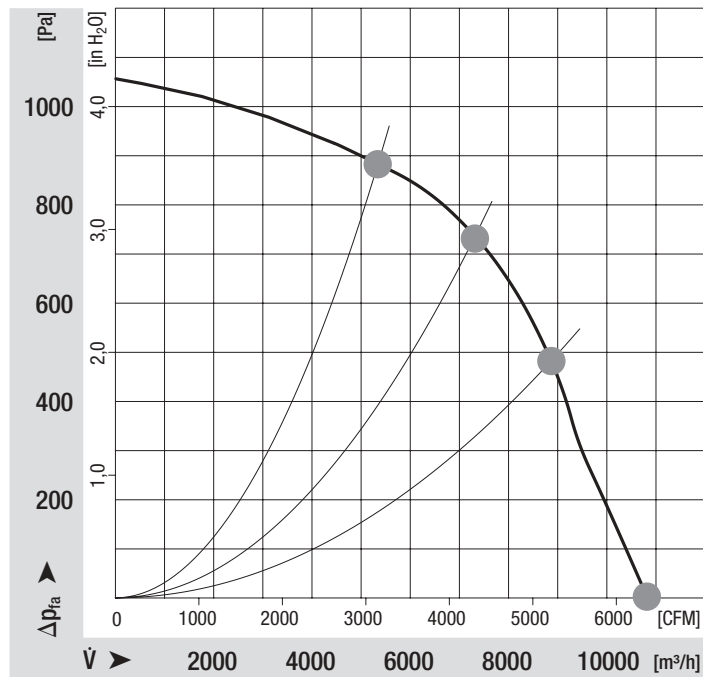
Reduction in types

Only one type for a wide voltage range of 380 - 480 VAC, 50/60 Hz at identical air performance.

One ebm-papst EC fan replaces 4 AC variants:

- 380 VAC, 50 Hz
- 380 VAC, 60 Hz
- 480 VAC, 60 Hz
- 400 VAC, 50 Hz

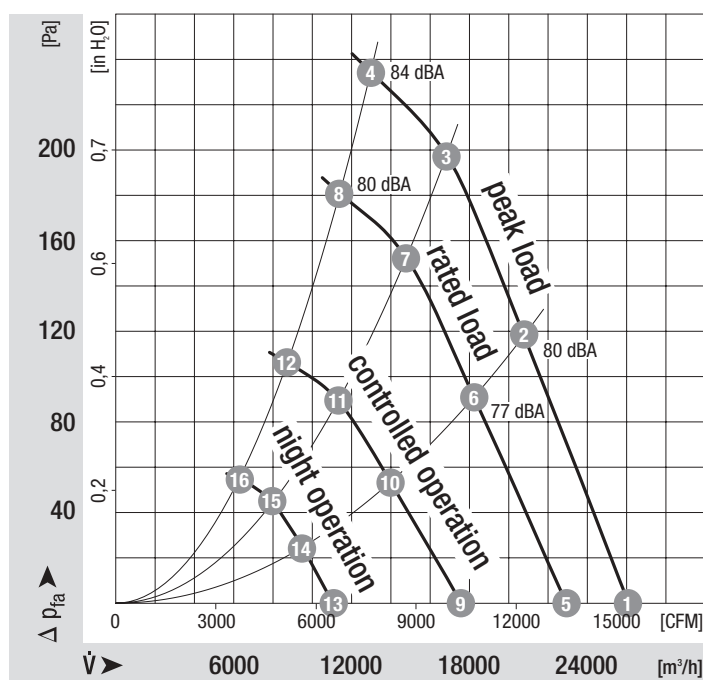
Identical air performance and characteristics for all listed voltage-frequency constellations.



Performance options

Whenever needed, operation at peak load can be realised. At night, operation at extremely low noise can be achieved.

ebm-papst EC fans can be operated independent from the number of poles.



EC axial fans



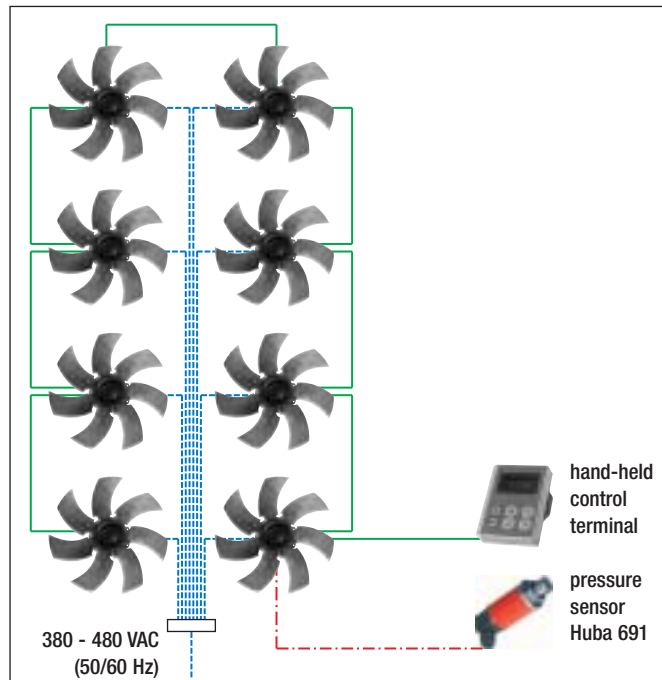
EC axial fans

Examples: condensation pressure control



EC

blue: supply main
green: Master-Slave,
0-10 VDC control
line
red: pressure sensor
line



ebm-papst EC technology with integrated electronics

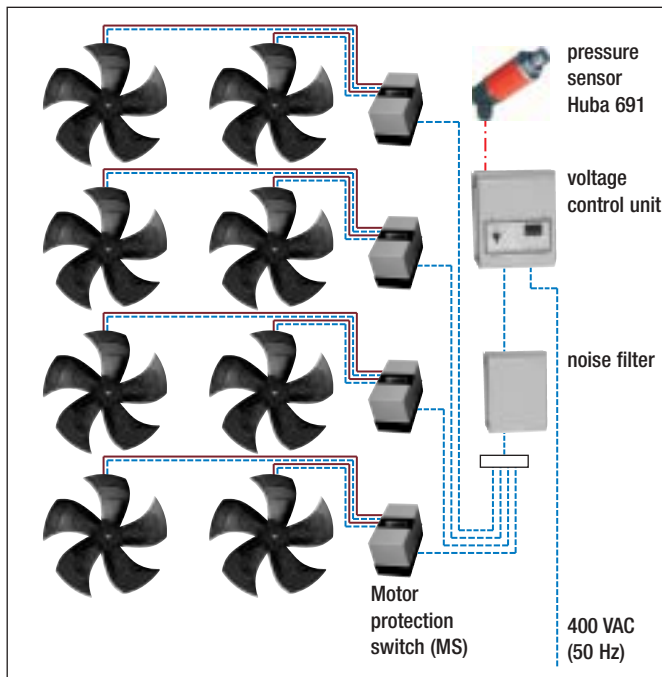
Control amplifier, EMC filter, passive PFC, power supply for pressure sensor, motor protection and alarm relay are integrated in the fan.

Master-Slave fan function as well as PID control can be programmed via Laptop or hand-held control terminal. Laptop and hand-held control terminal are only needed for actual programming.

The system is self-controlling. Status respectively alarm display is via relay.

AC

blue: supply main
brown: thermocontact
red: pressure sensor
line

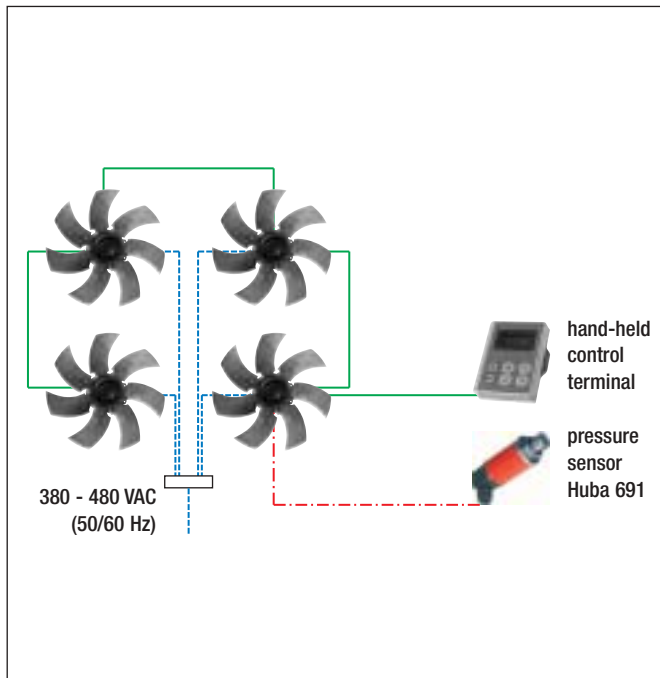


Condensation pressure control with phase control

Motor protection for individual fans or groups is done separately. With noise-critical systems, a separate noise filter has to be provided for.

EC

blue: supply main
 green: Master-Slave,
 0-10 VDC control
 line
 red: pressure sensor
 line



ebm-papst EC technology with integrated electronics

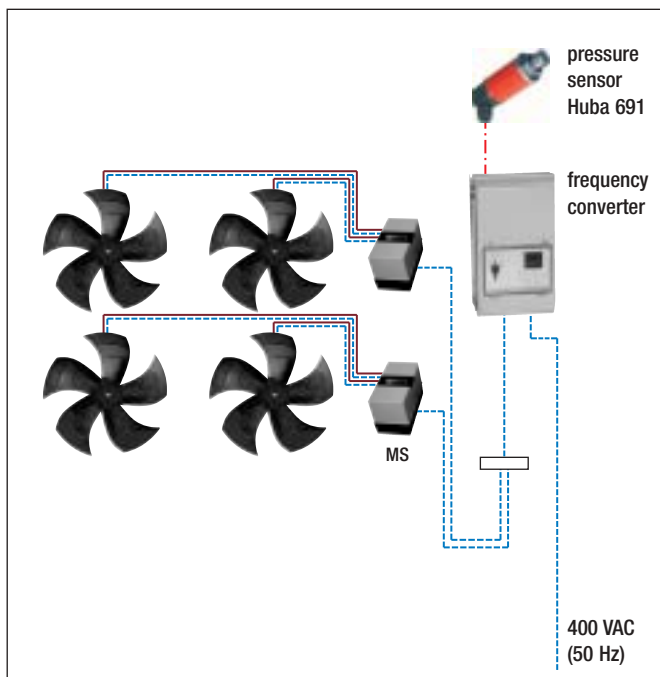
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AC

blue: supply main
 brown: thermocontact
 red: pressure sensor
 line



Condensation pressure control with frequency converter

EMC filter, PFC and sine filter are integrated. Motor protection for individual fans or groups is separate.

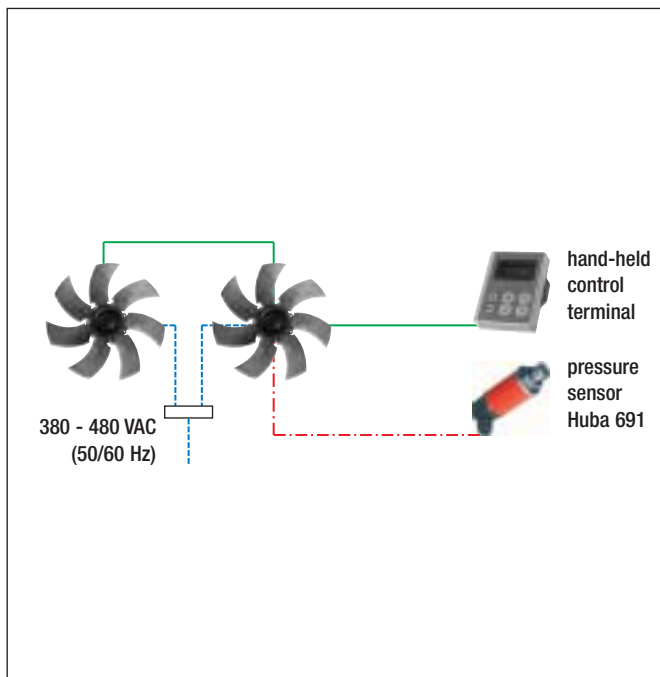
EC axial fans

Examples: condensation pressure control



EC

blue: supply main
green: Master-Slave,
0-10 VDC control
line
red: pressure sensor
line



ebm-papst EC technology with integrated electronics

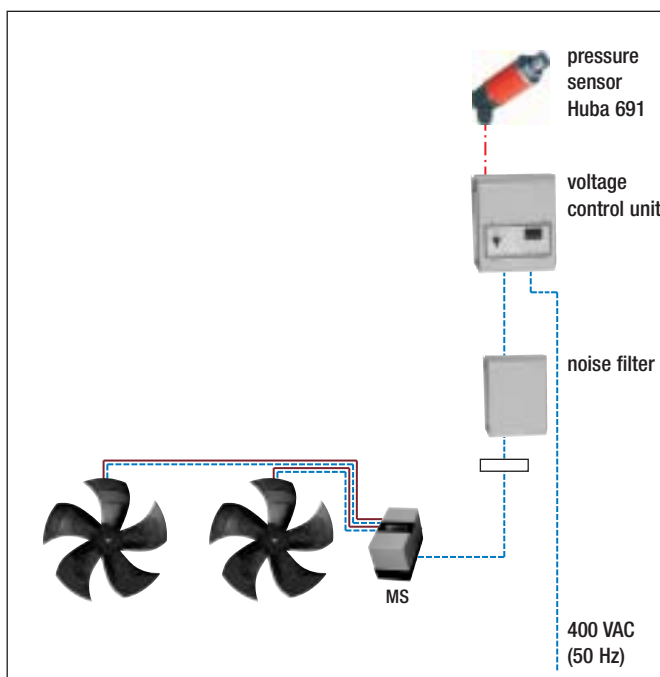
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blue: supply main
brown: thermocontact
red: pressure sensor
line

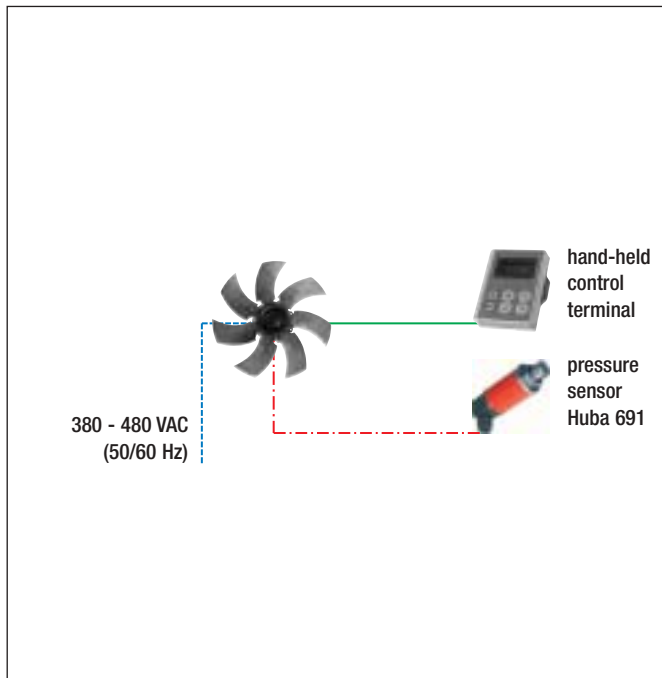


Condensation pressure control with phase control

Motor protection for individual fans or groups is done separately. With noise-critical systems, a separate noise filter has to be provided for.

EC

blue: supply main
 green: Master-Slave,
 0-10 VDC control
 line
 red: pressure sensor
 line



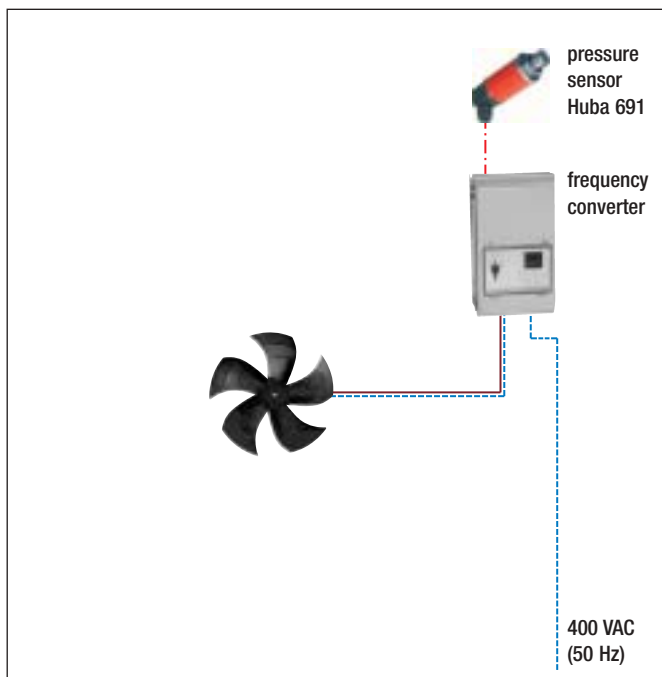
ebm-papst EC technology with integrated electronics

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Master-Slave fan function as well as PID control can be programmed via Laptop or hand-held control terminal. Laptop and hand-held control terminal are only needed for actual programming.

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Condensation pressure control with frequency converter

EMC filter, PFC and sine filter are integrated. Motor protection for individual fans or groups is separate.

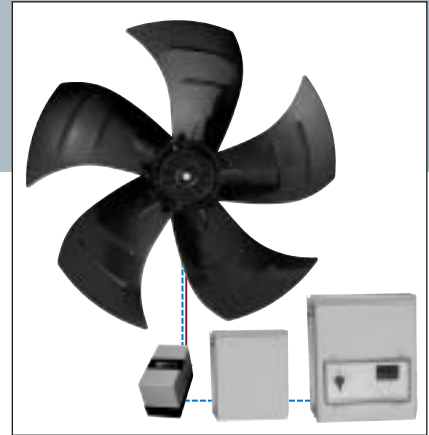
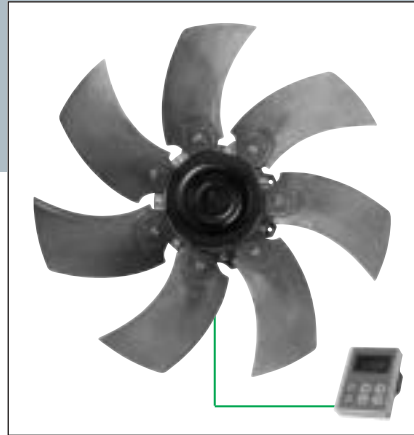
EC axial fans

Application check

Comparing pays off!

Do the application check! Check which additional components are necessary for rival products.

We have ticked all those components already integrated in an ebm-papst EC axial fan:



Components	ebm-papst EC axial fan	Your product
Axial fan		
PID control amplifier	✓	
PFC (Power Factor Controller)	✓	
Phase failure detection	✓	
Interference suppression filter	✓	
Motor protection	✓	
Motor & noise filter	✓	
Power supply sensor	✓	
Shielded leads	not necessary	
Total amount:		

All-inclusive price for handling air

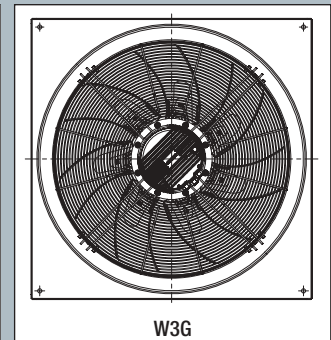
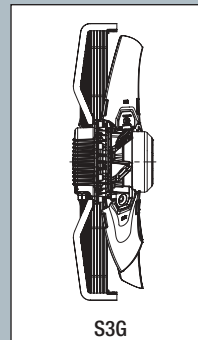
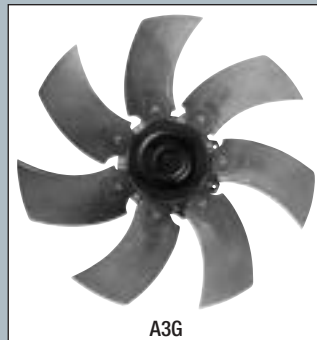
For a detailed cost calculation of your specific application, simply turn to us.

Nothing really compares to us – in performance, noiselessness or favourable price.

Axial fans with EC motor in size 150

A3G 650, A3G 710, A3G 800, A3G 910, A3G 990

Text for tenders



ebm-papst high performance axial fans

Direct drive; screwed-on impeller blades made of die-cast aluminium; mounted on an electronically commutated external-rotor motor with integrated electronics; complete unit statically and dynamically balanced in two planes according to DIN / ISO 1940 and to balancing quality G 6.3; EC external-rotor motor in protection type IP 54 with maintenance-free ball bearings and permanent lubrication; wide voltage input 380 - 480 V, 50/60 Hz; unit can be operated on all standard Electricity Board networks at identical air flow capacities; optimised motor technology; soft start; integrated current limitation; connected via easy-to-mount and robust integrated terminal box made of aluminium with spring loaded terminals; extremely compact electronics (70 mm in height); with adjustable PID controller; meets all necessary EMC directives and all requirements as to current reverse transfer; no complicated installation with shielded cables required; very low-noise communication logic; 100 % controllability.

Interfaces

- 0 - 10 V control input
- 4 - 20 mA sensor input
- 0 - 10 V control output
- +20 V sensor supply
- +10 V potentiometer supply
- ebmBUS interface via RS485

Protective features

- alarm relay with zero-potential change-over contact (250 V AC/2 A, $\cos \varphi = 1$)
- locked-rotor protection
- phase failure detection
- soft start of motors (current limitation)
- mains under-voltage detection
- over-temperature protection of electronics and motor
- short-circuit protection

Approvals

UL, CSA, VDE, CE, CCC and GOST

Technical data

- | | |
|-----------------------------|-----------------------------|
| - air flow | V = _____ m ³ /h |
| - static pressure | ΔP_F = _____ Pa |
| - voltage range | U = 380 - 480 V |
| - frequency | f = 50 / 60 Hz |
| - fan speed | n = _____ min ⁻¹ |
| - power input | P ₁ = _____ kW |
| - current input | I = _____ A |
| - noise level | L _p = _____ dBA |
| - perm. ambient temperature | t = -20 to +60 °C |
| - fan mass | = _____ kg |
| - direction of rotation | = clockwise |

Fan type

Design

S3G: Fan with mounted guard grille (material STZ, plastic coated)

W3G: Fan with mounted guard grille and wall ring (material STZ, plastic coated)

EC centrifugal fans backward curved



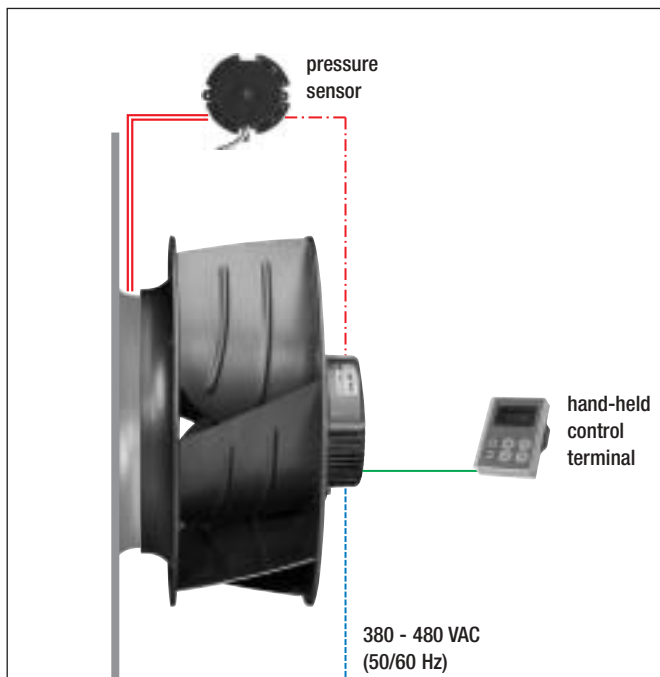
EC centrifugal fans backward curved

Example: roof fan



EC

blue: supply main
green: RS485 ebmBUS
red: pressure sensor line

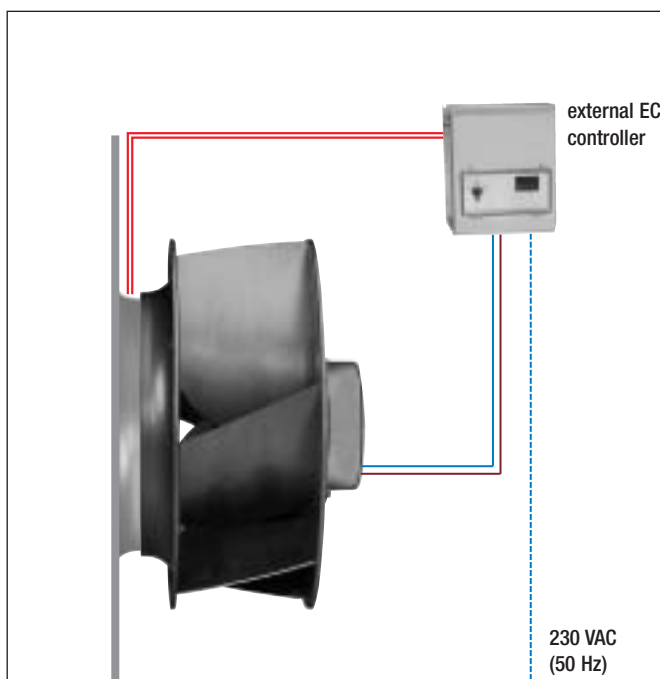


ebm-papst EC technology with integrated electronics

- constant air flow
 - PID controller and entering of set values via hand-held control terminal
- The hand-held control terminal is only needed for actual programming.

EC

blue: supply main
brown: thermocontact
red: pressure pipe



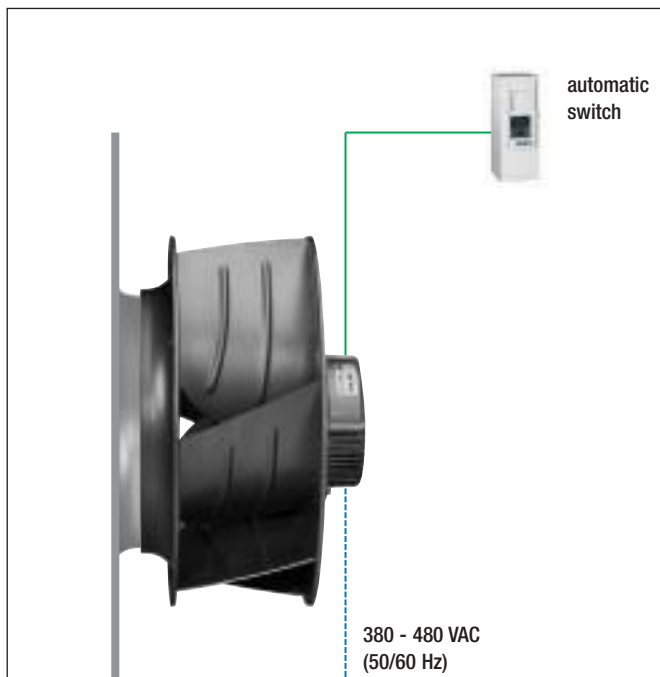
EC technology with separate electronics

Example: roof fan



EC

blue: supply main
green: 0-10 VDC control line

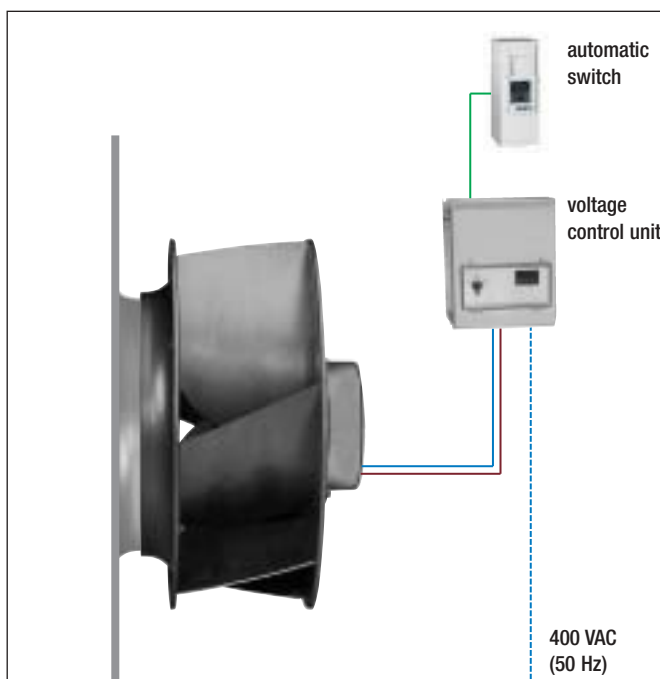


ebm-papst EC technology with integrated electronics

Day/night switch for high speeds during the day and low speed at night.

AC

blue: supply main
brown: thermocontact
green: 0-10 VDC control line



AC technology with separate electronics

Day/night switch

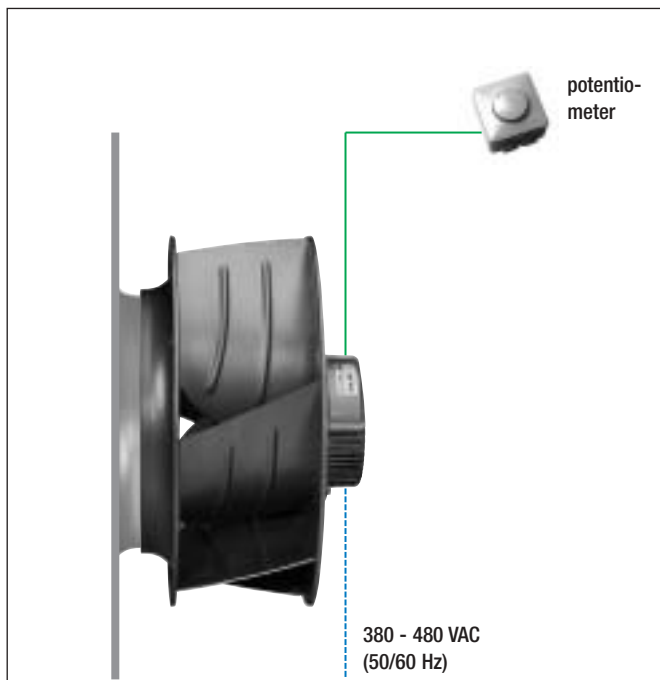
EC centrifugal fans backward curved

Example: roof fan



EC

blue: supply main
green: 0-10 VDC control line

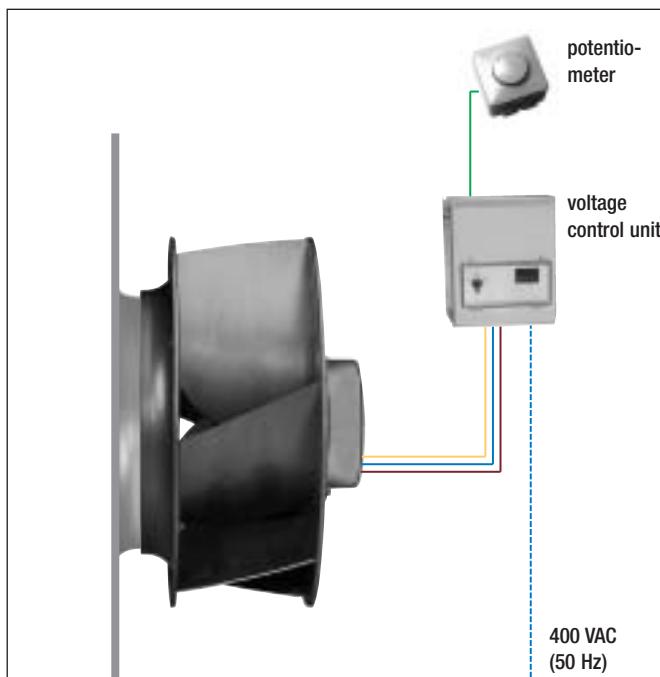


ebm-papst EC technology with integrated electronics

Control via potentiometer

AC

blue: supply main
brown: thermocontact
green: 0-10 VDC control line



AC technology with separate electronics

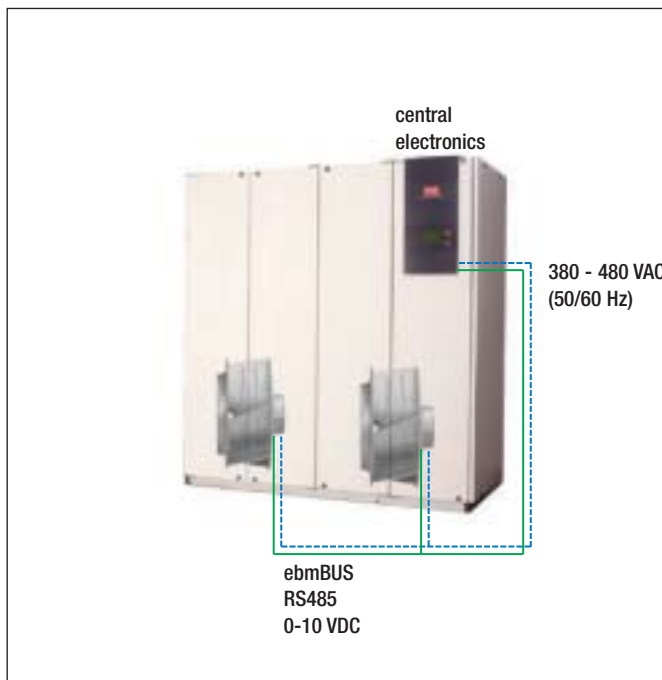
Control via potentiometer

Example: precision air-conditioning unit



EC

blue: supply main
green: 0-10 VDC control line,
RS485 ebmBUS



ebm-papst EC fan with integrated electronics

- external-rotor direct drive
- no V-belt wear-and-tear
- less maintenance
- 30 % saving in energy
- speed adjustment via hand-held control terminal or potentiometer
- 380 - 480 VAC (50/60 Hz)
- networkable

AC

blue: supply main



AC standard motor with V-belt-driven cylindrical rotor

- V-belt maintenance required at regular intervals
- speed adjustment by changing V-belt pulley

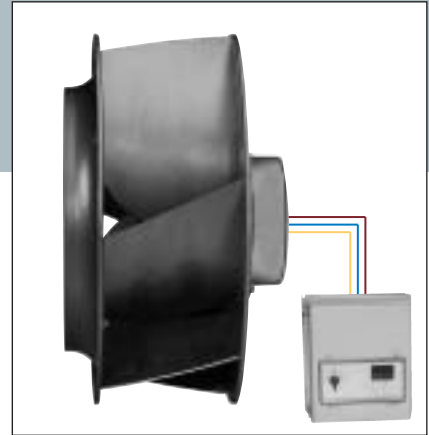
EC centrifugal fans backward curved

Application check

Comparing pays off!

Do the application check! Check which additional components are necessary for rival products.

We have ticked all those components already integrated in an ebm-papst EC centrifugal fan:



Components	ebm-papst EC centrifugal fan	Your product
Centrifugal fan		
PID control amplifier	✓	
PFC (Power Factor Controller)	✓	
Phase failure detection	✓	
Interference suppression filter	✓	
Motor protection	✓	
Motor & noise filter	✓	
Power supply sensor	✓	
Shielded leads	not necessary	
Total amount:		

All-inclusive price for handling air

For a detailed cost calculation of your specific application, simply turn to us.

Nothing really compares to us – in performance, noiselessness or favourable price.

Centrifugal fans with EC motor in size 150

R3G 500, R3G 560, R3G 630

Text for tenders



ebm-papst high performance centrifugal fans

Single inlet; direct drive; noise-optimised 3D centrifugal impeller made of aluminium; mounted on an electronically commutated external-rotor motor with integrated electronics; laser-welded impeller blades, two-fold backward curved; aerodynamically optimised inlet nozzle made of galvanised sheet-steel to reduce impeller rotation noise when fitted in; complete unit statically and dynamically balanced in two planes according to DIN / ISO 1940 and to balancing quality G 6.3; EC external-rotor motor in protection type IP 54 with maintenance-free ball bearings and permanent lubrication; wide voltage input 380 - 480 V, 50/60 Hz; unit can be operated on all standard Electricity Board networks at identical air flow capacities; optimised motor technology; soft start; integrated current limitation; connected via easy-to-mount and robust integrated terminal box made of aluminium with spring loaded terminals; extremely compact electronics (70 mm in height); with adjustable PID controller; meets all necessary EMC directives and all requirements as to current reverse transfer; no complicated installation with shielded cables required; very low-noise communication logic; 100 % controllability; with optional anti-vibration elements for non-structure-borne noise mounting of the units.

Interfaces

- 0 - 10 V control input
- 4 - 20 mA sensor input
- 0 - 10 V control output
- +20 V sensor supply
- +10 V potentiometer supply
- ebmBUS interface via RS485

Protective features

- alarm relay with zero-potential change-over contact (250 V AC/2 A, $\cos \varphi = 1$)
- locked-rotor protection
- phase failure detection
- soft start of motors (current limitation)
- mains under-voltage detection
- over-temperature protection of electronics and motor
- short-circuit protection

Approvals

UL, CSA, VDE, CE, CCC and GOST

Technical data

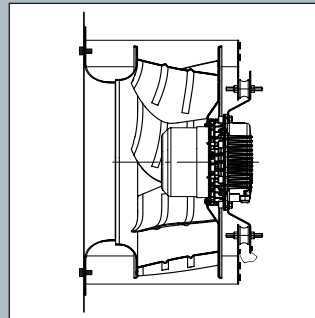
- | | |
|-----------------------------|-----------------------------|
| - air flow | V = _____ m ³ /h |
| - static pressure | ΔP_F = _____ Pa |
| - voltage range | U = 380 - 480 V |
| - frequency | f = 50 / 60 Hz |
| - fan speed | n = _____ min ⁻¹ |
| - power input | P ₁ = _____ kW |
| - current input | I = _____ A |
| - noise level | L _p = _____ dBA |
| - perm. ambient temperature | t = -20 to +60 °C |
| - fan mass | = _____ kg |
| - direction of rotation | = clockwise |

Fan type

Centrifugal fan modules with EC motor in size 150

K3G 500, K3G 560, K3G 630

Text for tenders



ebm-papst high performance centrifugal fan modules

Single inlet; direct drive; noise-optimised 3D centrifugal impeller made of aluminium; mounted on an electronically commutated external-rotor motor with integrated electronics; laser-welded impeller blades, two-fold backward curved; aerodynamically optimised inlet nozzle made of galvanised sheet-steel to reduce impeller rotation noise when fitted in; complete unit statically and dynamically balanced in two planes according to DIN / ISO 1940 and to balancing quality G 6.3; EC external-rotor motor in protection type IP 54 with maintenance-free ball bearings and permanent lubrication; wide voltage input 380 - 480 V, 50/60 Hz; unit can be operated on all standard Electricity Board networks at identical air flow capacities; optimised motor technology; soft start; integrated current limitation; connected via easy-to-mount and robust integrated terminal box made of aluminium with spring loaded terminals; extremely compact electronics (70 mm in height); with adjustable PID controller; meets all necessary EMC directives and all requirements as to current reverse transfer; no complicated installation with shielded cables required; very low-noise communication logic; 100 % controllability; with optional anti-vibration elements for non-structure-borne noise mounting of the units.

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