



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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Compact fans for AC and DC

version 2011



The engineer's choice

ebmpapst

Trendsetter in fan technology

Uncompromising quality
made by ebm-papst



Among the best.

Trendsetting with innovative technologies. Listening to customers' needs. Developing new ideas to meet requirements and realising them with pioneering spirit. This philosophy has made ebm-papst the technological leader in the world of fans.

A brand which has very little real competition because every fan is a product of decades of application expertise gained from large-volume production and because we are in a position to produce highly efficient quality products. Our intelligent solutions for electronics cooling ensure that you are one step ahead of competitors thanks to innovative, reliable top-quality technology which is cost-favourable and in line with market requirements. And if required, tailor-made right down to the last detail. In other words, if you need fans which do not yet actually exist, contact us.

Insist on ebm-papst.

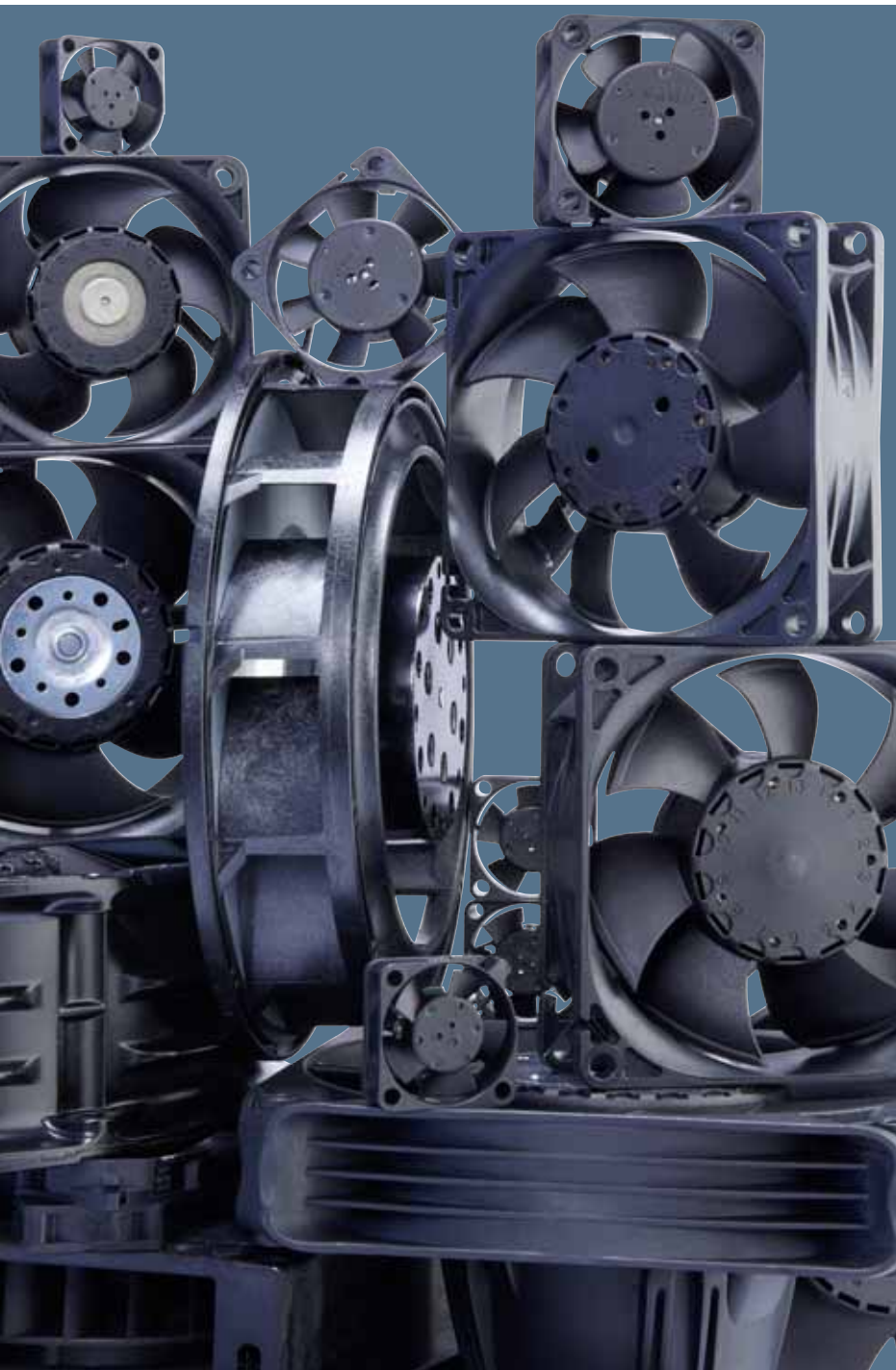


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Company profile: ebm-papst

The entire scope of ventilation and drive technology: this is the world of ebm-papst. More than 10,000 people – in Germany and throughout the world – develop, produce and sell our motors and fans. Our global presence and our unique range of products based on a quality standard that surpasses every other have made us what we are: world market leader in motors and fans. Expertly knowing what our customers need and incessantly striving to arrive at the perfect application solution for a wide variety of different industries is what determines our daily work. Those who know us know the high standards we apply to our work and know our creed: to be as close to our customers as possible and to simply be the best in terms of innovation and reliability.



Our location in St. Georgen



*Left:
Our headquarters in Mulfingen
Right:
Our location in Landshut*

Our history – Our drive

Rooted in ebm, PAPST and mvl, the three leading innovators in the development and production of motors and fans, ebm-papst has established itself as the world market leader. Now as ever, our legendary inventive spirit shines through in products that set standards in many segments of industry worldwide. We are proud to say that despite difficult competition, our performance has always been exemplary and outstanding – in business, in our personal relationship with our customers, and of course with respect to technology and engineering. For decades, we have contributed to the world of air technology and drive engineering with small revolutions and large milestones.

To maintain this advantage in skills and knowledge to get maximum quality and thus the highest degree of customer satisfaction, our employees around the world put their passion and dedication to work for you.

Passionately involved in R&D

Our catalogues just list the results of our incessant efforts in R&D: products of highest quality and reliability. After all, it is our passion to constantly try something new and improve what we have. In doing so, we take advantage of the latest development methods and state-of-the-art technology and invest quite heavily in R&D facilities. Best of all, though, we rely on excellently trained and skilled engineers and technicians to be at your service in R&D and Sales & Distribution.

Producing and safeguarding high-quality products and services

This is our promise without any compromise. Whether produced in one of our six factories in Germany or one of our eleven international production sites, our products always have the same high level of quality. This quality control is something you can definitely rely on! And this across all levels of production and throughout all processes: consulting customers, development, material selection through to picking certified, choice suppliers and on to the production of parts and final delivery. On top of this, our products have to pass the most rigorous tests under all realistic operating conditions: continuous stress test, salt spray test, vibration test, or precision noise measuring, just to mention a few. And the product gets

clearance for serial production only after all the desired characteristics have been determined to be just right.

Environmental care is another priority with ebm-papst. This is why we have developed our product line in EC technology, which makes for very low power consumption. Due to our manufacturing philosophy, there is absolute focus on environmental care in production, recycling, waste and wastewater disposal.

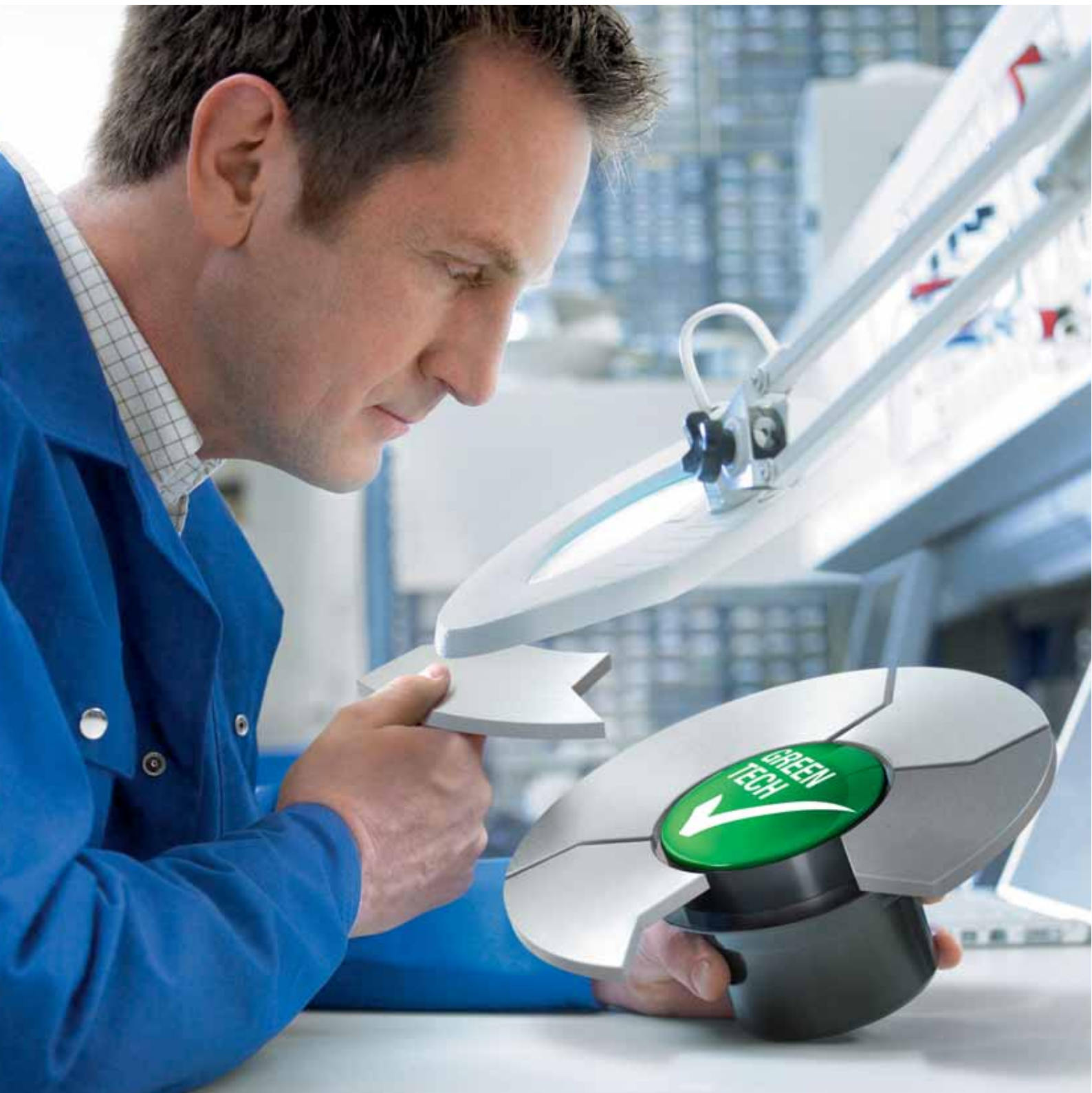
Global Domestic

In order to be specialist for customised solutions throughout the world, you need strong partners. Global Domestic – i.e. being present all over the world and being a national company in each individual country – is how we have established ourselves in all important markets on this globe with our successful subsidiaries. And so you will always find ebm-papst close to home, speaking your language, and knowing the demands of your markets. Besides, our worldwide production alliance serves as a basis for competitive pricing. Our global services and logistic outlets, i.e. IT networking, safeguard short reaction times and just-in-time delivery.

All our efforts are documented in a comprehensive quality management system, both for products and services. Being certified as complying with the tough requirements of the international standards DIN EN ISO 9001, ISO/TS 16949-2 and of standard DIN EN ISO 14001 is just one seal of approval we have received for our unceasing efforts to provide only the best quality products and services.

Sustainability is at the centre of our thoughts and actions. Out of conviction!

Eco-friendliness and sustainability have always been at the core of our thoughts and actions. For decades, we have worked according to the simple but strict creed of our co-founder Gerhard Sturm: "Each new product we develop has to be better than the last one in terms of economy and ecology." GreenTech is the ultimate expression of our corporate philosophy.





GreenTech is pro-active development.

Even in the design phase, the materials and processes we use are optimised for the greatest possible eco-friendliness, energy balance and – wherever possible – recyclability. We continually improve the material and performance of our products, as well as the flow and noise characteristics. At the same time, we significantly reduce energy consumption. Close co-operation with universities and scientific institutes and the professorship we endow in the area of power engineering and regenerative energies allows us to profit from the latest research findings in these fields – and at the same time ensure highly qualified young academics.

GreenTech is eco-friendly production.

GreenTech also stands for maximum energy efficiency in our production processes. There, the intelligent use of industrial waste heat and ground-water cooling, photovoltaics and, of course, our own cooling and ventilation technology are of the utmost importance. Our most modern plant, for instance, consumes 91% less energy than currently specified and required. In this way, our products contribute to protecting the environment, from their origin to their recyclable packaging.

GreenTech is acknowledged and certified.

Every step in our chain of production meets the stringent standards of environmental specialists and the public. The 2008 Environmental Prize of Baden-Wuerttemberg, the Green Award 2009, the Energy Efficiency Award 2009 of the dena – to give just a few examples – testify to this. The environmental advantage gained in the performance of the products developed from our GreenTech philosophy can also be measured in the fulfilment of the most stringent energy and environmental standards. In many instances, our products are already well below the thresholds energy legislation will impose a few years from now – several times over.

Our customers profit from this every day.

The heart of GreenTech is future-oriented EC technology from ebmpapst. The EC technology at the core of our most efficient motors and fans allows efficiency of up to 90%, saves energy at a very high level, significantly extends service life and makes our products maintenance-free. These values pay off not only for the environment, but every cent also pays off for the user! All ebmpapst products – even those for which GreenTech EC technology does not (yet) make sense from an application viewpoint – feature the greatest possible connection of economy and ecology.

Drive expertise

For the past 60 years, all conceivable types and applications of drive engineering have played an essential role at ebm-papst. A commitment that is the foundation for the development of optimum drive solutions – regardless of the type of fan and its usage. DC fans are generally equipped with electronically commutated external rotor motors; in order to save as much space as possible, commutation electronic components are integrated in the hub of the fan. Our AC fans are mostly driven by shaded-pole or capacitor motors based on the external rotor principle. In the 3900 and 9900 range of particularly slim fans, internal rotor motors are used.

Low-noise performance

Our aerodynamically optimised design and high mechanical precision produces outstanding noise properties in series production. So-called “soft” commutation electronics of the DC fans ensure an excellent noise performance. By avoiding steep switching edges when the individual coils are switched, this reduces the structure-borne noise from the motor. Computer-aided measurements and series of analyses performed in a state-of-the-art sound measuring chamber are conducted on each fan model from the very beginning.

Long service life

The bearing system plays a vital role both in the long life time and quietness of device fans. The SINTEC compact bearing provides most of the device fans with a proven bearing system. Constant low noise during the entire operating time and considerably lower shock sensitivity are the outstanding features of this bearing technology. In addition, with regard to temperature endurance, Sintec compact bearings can be used without problems in most applications. Despite the slightly higher noise and shock sensitivity of ball bearings, this bearing technology should be given preference for fans exposed to extreme thermal and adverse application conditions (e.g. extreme environmental conditions, critical installation position, etc.). The service life data provided in this catalogue is based on extensive service life tests and mathematically / scientifically proven service life calculations. Our product descriptions are continuously updated with all relevant data obtained from long-term tests.





Streamline: Aerodynamics

With the aid of state-of-the-art computer programs, we are able to optimise the fan impellers and the inner shape of the housing. Air output and available motor performance are exactly matched with the size of fan. This guarantees the low noise that is typical for ebm-papst, even at high back pressure.

Sturdy construction – in metal or plastic

Fans of all-metal construction: Sturdy and indestructible. The housing is made of an aluminium alloy whereas the metal surfaces that are subject to corrosion are permanently protected by an impact- and abrasion-resistant electrophoretic baked enamel. This particular version is highly recyclable. Fans with fibreglass-reinforced plastic housing and impeller: Excellent stability and low weight distinguish this highly efficient fan concept. Combinations of metal housing and plastic impeller unite the advantages of both types of design.

Product images

The dimensioned drawings and product photos that appear in the catalogue are for orientation purposes and may differ in some details from the actual product design.

Product liability

Motors and fans from ebm-papst are components intended for proper installation. The customer bears responsibility for the overall end product.

Safety is included

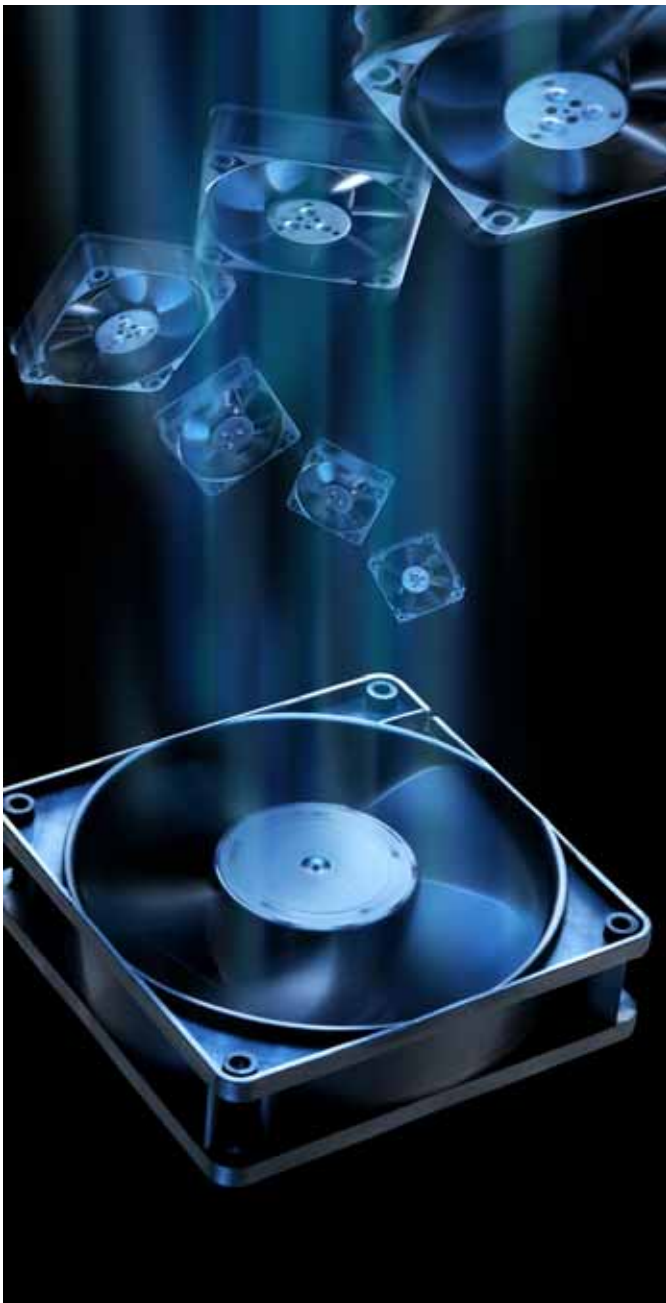
It goes without saying that all ebm-papst fans conform to the approval requirements of the VDE (Association of German Electrical Engineers) and the standards and regulations of UL and CSA. All fans conform to the European Standard EN 60335 or EN 60950 plus those of the UL (Underwriters Laboratories) and CSA (Canadian Standards Association).

With few exceptions, our DC fans are designed to meet the requirements of protection class 3 / protection class voltage. ACmaxx fans are protection class 2 / AC fans are protection class 1. ebm-papst fans meet the highest requirements of electrical safety. Depending on the type, they are either impedance protected or equipped with a temperature safety switch, electronic locked-rotor protection, alarm function or have speed monitoring and speed control.

Quality in detail

It is the seemingly trivial that makes the difference when a product is labelled 'made by ebm-papst': consistent maintenance of development and design engineering specifications; target-oriented design; and assured quality across the entire process chain are the reasons why running times of over 150,000 hours are not unusual. The no-compromise ebm-papst quality assurance spans over all process levels – from the choice of materials and the use of carefully selected, certified suppliers, from the production of parts up to final assembly. The sum of all these apparently minor details results in fan products with superior lifetimes and reliability.

Practice-oriented: Fans – customised and intelligent



ebm-papst has always developed customer-specific intelligent fans which meet the exact requirements of the application. We provide a wide range of standard fan types, in many sizes and designs; with intelligent motor features, monitoring and control functions as well as special designs for use under extreme conditions. They are all based on the standard type fans which you will find in this catalogue. Special fan types for your application can be produced in economical batch sizes. Our expert engineers will assist you in selecting the right configuration.

Innovation at its best:

Vario-Pro® with “intelligence inside”. Its programmed intelligence thanks to customer-specifically configured software modules makes the cooling of electronics even more economical and flexible. For example, temperature-dependent speed profiles are possible with a number of freely selectable interpolation points. External speed settings and a variety of combinable alarm and tachometer functions can also be programmed. The digital motor management achieves high control accuracy.

Higher protection class for every type of application

ebm-papst provides, on request, many fan series in versions which conform to the requirements of Protection Class IP 54: Their stator and all electrical components are fully encapsulated. Stainless steel ball bearings can be used for operation in particularly aggressive media and use under extreme environmental conditions, thus providing additional reliability.

Virtually everything is possible

Regardless of your cooling and ventilation tasks, we develop the right solution and what is more, the most economical one. Based on the fans listed in this catalogue, well over 4000 different versions are available.

Temperature-controlled fans

Fans with temperature-controlled speed have particularly quiet cooling characteristics. Thanks to integrated IC technology, they adapt their speed to the current cooling requirements, which results in a drastic reduction of noise in most operating modes. A temperature sensor provides the fan with thermal information: either externally via a single lead or integrated into the hub of the fan.

Speed setting via interfaces

With a wide range of DC fans with separate control input, ebm-papst provides an alternative to the NTC-controlled types of fans. They are especially suitable for systems and units which already have standard interfaces for varying speed via internal switching and control circuits. The main applications are units which demand load-dependent individual speed profiles or systems with stand-by minimum cooling requirements and varied speed increase at varying power peaks.

“Electronic tachometer” thanks to sensor signal

Do you wish to be informed about the current fan speed at all times? ebm-papst has fans with an integrated “electronic tachometer” which registers the actual value of the fan speed. Via an integrated sensor, the fan generates speed-dependent signals which can be directly utilised. Depending on the number of poles of the motor, 2, 3 or 6 pulses per revolution are generated.

Alarm signal for more safety

If your application requires monitored fan operation, in addition to speed monitoring, ebm-papst also provides a multitude of varying alarm signals. Depending on the type of fan in question, the signal is either static, already evaluated or interface-compatible. The alarm signal output provides reliable longterm monitoring and a status signal if critical operating conditions evolve.

S-Force

The new measure of things! When you need to provide extremely fast, powerful and efficient cooling for electronic components of all kinds, the generation of S-Force high-performance fans finishes first: in air performance, pressure build-up and technology. Extremely efficient drives and optimised aerodynamics form the core technology of the S-Force fans, which we offer in both an axial and brand-new centrifugal model.

Types of fans and their function



Axial fans:

High air flow with medium to relatively high pressure build-up

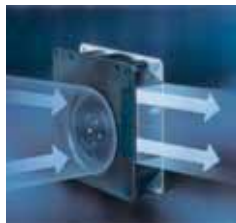
The air flow in axial fans, whose impeller is similar to that of a propeller, is conducted to a great extent parallel to the axis of rotation, in other words in the axial direction. Axial fans with free air delivery at zero static pressure have the lowest power input that rises with increasing back pressure. Axial fans for cooling of electronic equipment are mostly equipped with external housing and an electric motor integrated into the fan hub. This compact design allows space-saving accommodation of all devices; the flange is equipped with mounting holes.



Diagonal fans:

High flow rate at relatively high pressure build-up

At first glance diagonal fans only differ slightly from axial fans. Intake is axial, whereas exhaust is diagonal. Due to the conical shape of the wheel and housing, the air is pressurised more. In direct comparison with axial fans of the same size and comparable performance, these fans are distinguished by the lower operating noise at high pressures.



Centrifugal fans:

High pressure build-up at limited flow rate

Many of the cooling problems that occur can be optimally solved by axial and/or diagonal fans. If, for example, the required cooling air has to be conducted at an angle of 90° or if even high pressure is necessary, centrifugal fans are more effective. For your application, ebm-papst offers not only complete centrifugal fans but also motor/impeller combinations without external housing.



Tangential fans:

High flow rate at low pressure

Tangential fans are used above all-, for large-surface air flow in devices. The air flows through the roller-shaped impellers twice in the radial direction: in the intake area from the outside to the inside and in the outflow area from the inside to the outside. Whirls form in the roller due to the vanes which guarantee a steady flow of air through the impeller.

1. Dissipated energy

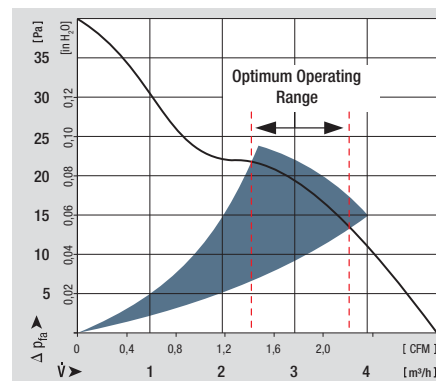
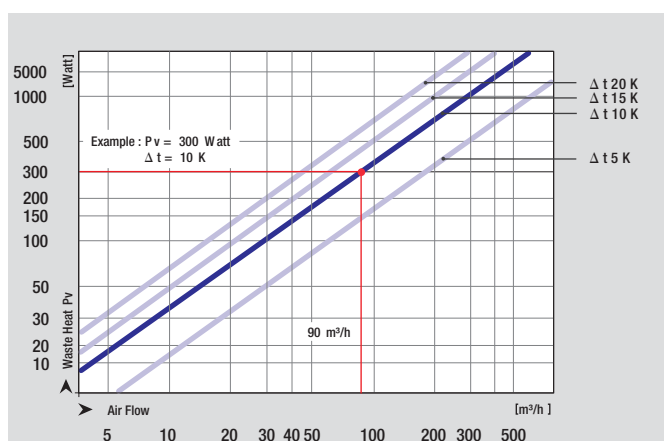
A large amount of the energy consumed by electrical and electronic devices is converted into heat. In selecting the correct fan, therefore, it is important to determine the dissipated energy that must be removed. The electrical power consumption of the unit to be cooled, often represents a suitable value for this purpose.

2. Permissible temperature rise

The air flow which the selected fan is required to generate, is determined by the dissipated energy and the permissible rise (ΔT) of the cooling air flow (from entry to exit of the device to be cooled). The max. allowable ΔT depends greatly on the temperature sensitivity of the individual device components. $\Delta T = 5K$ means e.g. that the average air flow leaving the device to be cooled may only be $5^{\circ}C$ warmer than the ambient temperature (a large volume of air is required for this purpose). A lower air flow rate is sufficient if a higher temperature difference (e.g. $\Delta T = 20K$), can be tolerated.

3. Required cooling air flow

- In the below diagram a horizontal line is drawn from the dissipated energy to intersect with the selected ΔT line.



- Read down from this point to obtain the required value for the cooling air flow.

The diagram is based on the following formula:

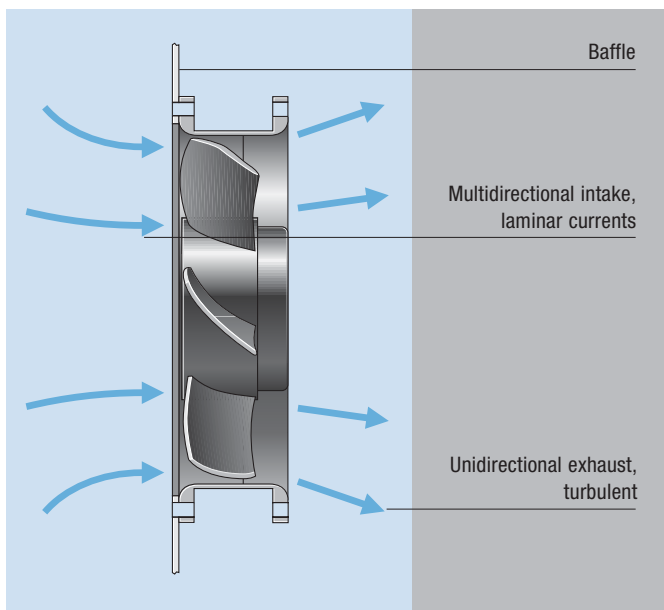
$$\dot{V} [\text{m}^3/\text{h}] \approx 3 \cdot \frac{P_v [\text{W}]}{\Delta T [\text{K}]}$$

4. Optimum operating range

The required fan, however, must also be able to deliver a suitable static pressure increase Δp_f , in order to force the cooling air through the device. A fan must therefore be selected that provides the required air flow performance within its optimum operating range (see also the air performance curves under technical data).

5. Fan selection

If the requirements of an application are fulfilled by more than one fan, the noise level, space requirements, economy and ambient conditions will assist in making the final choice.



Information on installation

When a fan is operated for the first time in an application, the user may have noticed that the flow rate in the device was lower than expected. What is the reason for this?

- The values stated in this catalogue were determined under optimum, constant and comparable measurement conditions.
- Ideal mounting conditions under which free air intake and exhaust are present are seldom feasible in practice. Quite frequently the fans must be mounted in close proximity to other components or cabinet panels. As a consequence, the intake and exhaust currents may be restricted, causing the air flow to diminish and the noise level to increase. Fans are particularly sensitive to obstructions which are positioned directly in front of the output cross section as they often cause an increase in tonal noise.

Our advice: The distance between the fan and adjacent components should be at least equal to the installation depth of the fan.

Intake or exhaust side installation

Under ideal conditions, the operating point is represented as the intersection between the fan and loss curves, regardless of whether the fan is positioned at the air intake or exhaust side of the device. In addition to ensuring the required flow rate, several additional aspects must be considered for determining an appropriate fan concept.

The intake air currents of a fan are mainly laminar, comprising nearly the entire suction area. By contrast, the exhaust air of a fan is generally turbulent, while it flows on a preferred direction, e.g. axial for an axial fan. The turbulences of the exhaust intensify the heat transfer from components within the air currents, so that mounting the fan at the air intake side of the device is recommended for cooling and heating. Mounting the fan at the device intake is also advantageous because the fan will not be subjected to the dissipated heat of the device. Therefore, it operates at low ambient temperatures and has a higher life expectancy.



Accident prevention



The turning rotor and the high speeds that are sometimes involved mean that our fan products carry an inherent risk of injury. They may only be operated after correct installation and with suitable protective facilities (e.g. with a guard grille). More information can be found in the internet at:

www.ebmpapst.com/safety

Service life data from ebm-papst St. Georgen

Our fans catalogue gives three different values for the service life of each product. The first column usually states the service life L_{10} at 40°C. the second column usually states the service life L_{10} at T_{max} . Exceptions are marked in the column headings. The third column states the new value , life expectancy $L_{10\Delta}$ (40°C).



Fans in an endurance test cabinet at ebm-papst St. Georgen. 1500 fans are operated in temperature cabinets until they fail.

Service life L_{10} (40°C) and L_{10} (T_{max})

The values given in the first two columns have been derived from intensive, in-house service life endurance tests, in which our products are operated in various positions at 40°C and 70°C until they fail. A fan is deemed to have failed when it deviates from its defined air flow and speed values, or when the operating noise becomes noticeable. Such tests can take several years before a representative number of failures have been registered, and even today, some fans are still in the process of endurance testing, even though they began tests in the 1980s. These fans are proof of the legendary reliability of fans from the Black Forest.

Test results are presented in a diagram and the service life of the product L_{10} at the temperature tested is determined on the basis of the Weibull distribution.

These tests have given us years of experience in the way various design parameters and temperatures can affect the service life of a product. Data for service life at various temperatures for new products can be stated with a very high degree of precision on the basis of tests, product specifications and of commonalities in the design of the product.

New: Life expectancy $L_{10\Delta}$ (40°C)

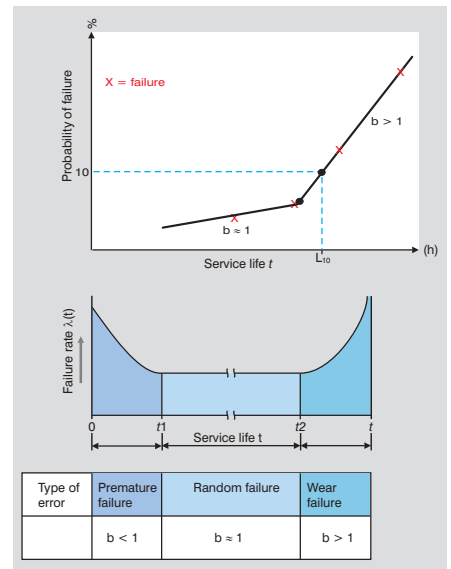
The new third service life column states the expected service life $L_{10\Delta}$. This value is based on the calculation methods conventionally applied in the compact fan market. Again here, the foundations for the service life values are our service life endurance tests at high ambient temperatures. The service life at temperatures below the test temperatures is calculated using fixed factors. This method produces much higher service life values, especially at room temperature (see diagram on right).

Summary:

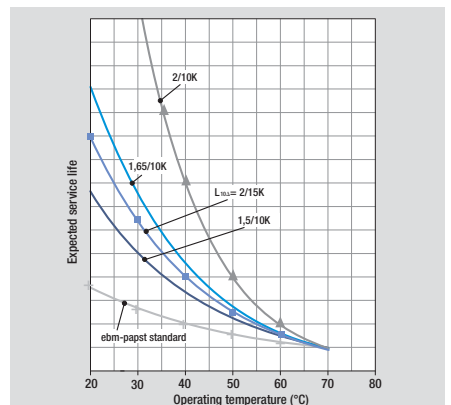
The life span calculations have been carried out to the best of our knowledge and are based on experience gained by ebm-papst. The specified L_{10} (40°C), L_{10} (T_{max}) and $L_{10\Delta}$ (40°C) values all allow statements to be made about the theoretical calculated service life under certain assumptions. The values determined here are extrapolations from our own service life tests and from statistical variables. In the respective customer applications, different influences may occur which cannot be included in the calculations due to their complexity. The service life information is explicitly not a guarantee of service life, but strictly a theoretical quality figure.

Bell(A)	Sound power level	Sleeve bearings	Ball bearings	Power input	Nominal speed	Temperature range	Hours	Hours	P. 110
5.0	2.5	2 700	-20...+70	87 900 / 35 000	1 80 000	1			
5.3	4.2	3 300	-20...+70	85 000 / 33 500	1 30 000	2			

Example of the service life figures on the page of the catalogue.



Bathtub curve and Weibull distribution.



Example of the influence of factors from various manufacturers on the expected service life.

Subject to technical alterations.

Our products are not designed for use in the aerospace industry!

German and international patents, registered designs and utility models.

ebm-papst is a registered trademark of ebm-papst Mulfingen GmbH & Co. KG.

PAPST, SINTEC, VARIOFAN and Vario-Pro are registered trademarks of ebm-papst St. Georgen GmbH & Co. KG.

Nominal voltage (Volts)

The voltage at which the nominal values (the tabular values listed in this catalogue) were determined. The fan operation for DC fans is not limited to the nominal voltage. Fan speed and fan performance can vary according to the permissible voltage range that is specified on the nameplate of each fan.

Frequency (Hz)

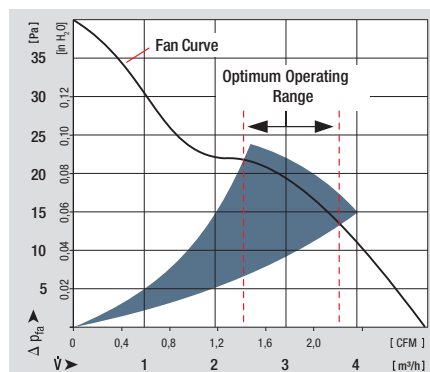
ebm-papst AC fans are made for operating frequencies of 50 Hz or 60 Hz. Their technical data alter accordingly.

Air flow (m³/h)

The air performance of the fan in free air operation, i.e. the fan blows into the free space without static pressure build-up.

Fan curves

The fan curves are determined in accordance with DIN 24 163 specifications on a dual-chamber test stand with intake-side measurement. This measurement technique closely approximates the operating conditions experienced in typical applications for fans and yields realistic performance curves. The curves apply to an air density of $\rho = 1.2 \text{ kg/m}^3$, corresponding to an air pressure of 1013 mbar at 20 °C. Variations in



air density affect pressure generation but not the flow rate. The pressure generated at other air densities may be estimated with the formula $\Delta p_2 = \Delta p_1 (\rho_2 / \rho_1)$.

The nominal speed values, air flow and power input listed in the table were measured in free air operation with horizontal shaft at an ambient temperature of 20 +5 °C, air density $\rho = 1.2 \text{ kg/m}^3$ after a warm-up period of 5 min.

Optimum operating range

During operation, fans are required to produce an air flow with a simultaneous increase of pressure. These operating conditions are described in the section "Optimum Operating Range". The optimum operating range is therefore always indicated in this catalogue in the shaded area. In this range the fans operate best with respect to efficiency and noise level. Within this optimum operating range the noise level only fluctuates insignificantly.

Noise [dB(A), Bel(A)]

1. Sound pressure level – dB(A)

Noise ratings of the fan in free air operation, i.e. at maximum flow rate.

2. Sound power level – Bel(A) / dB(A)

Extent of the overall sound radiation of the fan.

The sound power level is determined in the optimum operating range.

PAPST Sintec® sleeve bearings

A particularly efficient bearing system with excellent qualities:

- Very precise, large sintered bearings
- Low running noise
- High service life expectancy
- Insensitive to shock and vibration

Ball bearings

Precision ball bearings for particularly high ambient temperatures and high service life expectancy.

Power input (Watts)

Input performance of the fan motor when operating at nominal voltage. Depending on the operating condition in the application, the power input may be higher.

Temperature range (°C)

The permissible ambient temperature range within which the fan can be expected to run continuously.

Service life [h]

Service life L₁₀ at 40°C and T_{max}

Standard figures for service life at ebm-papst. These two temperatures are based on intensive, in-house endurance tests and on the experience more than 60 years developing fans.

Life expectancy L_{10Δ} (40°C)

Figures oriented towards the calculation methods employed by other fan manufacturers. Data based on the internal expected service life at 70°C, more optimistically extrapolated to 40°C.

We expressly state that none of the information or data in this catalogue is to be construed as a guarantee or warranty of properties.

Unit conversion

Air flow

1 cfm = 1,7 m³/h

1 l/s = 3,6 m³/h

1 l/min = 0,06 m³/h

Pressure

1 Pa = 1x10⁻⁵ bar

1 inch H₂O = 249 Pa

1 mm H₂O = 9,81 Pa

DC axial fans

DC axial fan overview

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DC axial fans / DC diagonal fans

23



Technical information



Range of fans

ebm-papst offers you the widest full product line of DC axial and diagonal fans: From 25 mm to 280 mm in size. Every single type of fan can be optimally integrated in the respective device concept. The highly economical brushless motor technology of these fans provides a unique variety of intelligent innovations that can be realised today at prices that would have been unthinkable just a few years ago.



Electronic protection against reverse polarity

ebm-papst DC fans have electronically commutated drives with electronic protection against reverse polarity. The electronics are conveniently located in the fan hub.



Product life expectancy

A distinctive feature of DC fan technology is the convincingly high product life expectancy. Thanks to the excellent efficiency of the brushless drives, the thermal load of the bearings is reduced, thus considerably increasing the life expectancy of the fans.

Protection class

DC fans with sleeve and ball bearings are powered by Class E insulated motors. All ebm-papst fans conform to the requirements of protection class IP 20. Fans conforming to IP 54 and special protection classes are also available.

Voltage range

Many of our DC fans can be operated on voltages that are up to 50% lower and 25% higher than their nominal voltage (see Voltage range in the technical tables). This enables the air performance to be adapted to the cooling requirements and allows the noise to be reduced, even if the fan does not have a control input.

Closed-loop speed control and monitoring

Closed-loop speed control and function monitoring are becoming increasingly important in many applications. ebm-papst offers many fans in the standard design with a control input and open collector speed signal.

S-Force

The new S-Force fans with their extremely high blower capacity of up to 950 m³/h and pressure build-up of up to 1200 pascals are capable of dealing with the extreme heat load. If needed, these fans can produce up to 100% more output under full load and they work with a much broader delivery bandwidth than current models. This makes them ideal for equipment and systems with a high density of components. Thanks to intelligent motor features, they can be individually adapted for any application. S-Force fans are available in 5 standard dimensions.

Optional special versions

Information on pictograms

On the pages of the catalogue and on the following overview pages, the pictograms illustrated below provide information about technically possible special versions in the fan line presented.

Please note that these special versions are not possible for all voltages and speeds, and not in all combinations.

The special versions are designed for specific customers and projects and are not usually available off the shelf.



Speed signal

The fan uses a separate wire to output information about its speed, and thus about the speed of the rotor. For technical details, please refer to page 110.



Go / No-go alarm

The fan uses a separate wire to output a static signal when it is stationary, thus providing information about whether or not the rotor is turning. For technical details, please refer to page 117.



Alarm with limit speed

If the speed drops below a certain level defined in the fan's electronics, the fan will emit a static signal, thus providing information about whether or not the rotor is turning. For technical details, please refer to page 114.



External temperature sensor

An NTC is connected to the fan via a separate wire and the fan changes its speed depending on the temperature at the NTC. For technical details, please refer to page 120.



Internal temperature sensor

In this case, the NTC is integrated into the fan and the fan changes its speed depending on the temperature at the NTC. For technical details, please refer to page 120.



PWM control input

The speed of the fan can be changed via a pulse-width-modulated signal. This signal is applied to a specially provided wire. For technical details, please refer to page 121.



Analogue control input

The speed of the fan can be changed via a control voltage. This control voltage is applied to a specially provided wire. For technical details, please refer to page 121.



Multi-option control input

The fan has a control input that the user can trigger either using a PWM signal, an analogue signal or a resistor. For technical details, please refer to page 122.



Protection against moisture

Protection for the fan's electronics against moisture and condensation. For technical details, please refer to page 123.



IP 54

Protection of motor and PCB board against splashed water and humidity. For technical details, please refer to page 123.



Protection against salt spray fog

Protection of fan against the damaging effects of salt spray fog. For technical details, please refer to page 123.

Axial fans for DC operation

Overview of technically feasible designs

Dimensions	VDE, UL, CSA	Sinter sleeve bearings/ball bearings	Sensor	Go / No-go alarm	Alarm with limit speed	External temperature sensor	Internal temperature sensor	PWM control input	Analogous control input	Multi-option control input	Humidity protection	IP >= IP54	Salt spray fog protection	Page
------------	--------------	--------------------------------------	--------	------------------	------------------------	-----------------------------	-----------------------------	-------------------	-------------------------	----------------------------	---------------------	------------	---------------------------	------

Axial fans		OPTIONAL											P.	
Series	mm													
250	25 x 25 x 8	yes	□	•	-	-	-	-	-	-	•	-	-	23
400 F	40 x 40 x 10	yes	□	•	•	-	-	-	-	-	•	-	-	24
400	40 x 40 x 20	yes	□	•	•	-	-	-	•	-	•	-	-	25
400 J	40 x 40 x 25	yes	■	•	•	-	-	-	-	-	•	•	-	26
500 F	50 x 50 x 15	yes	□	•	•	-	-	-	•	-	•	-	-	27
600 F	60 x 60 x 15	yes	□	•	•	-	-	-	•	-	•	-	-	28
620	60 x 60 x 25	yes	■	•	•	•	•	•	•	•	-	•	•	29
NEW 630	60 x 60 x 25	yes	■	•	•	•	•	•	•	•	-	•	•	30
600 N	60 x 60 x 25	yes	□/■	•	•	-	•	•	-	-	-	•	•	31
600 N VARIOFAN	60 x 60 x 25	yes	□/■	•	•	-	•	•	-	-	-	•	-	32
NEW 600 J	60 x 60 x 32	yes	■	•	•	-	-	-	-	-	•	-	-	33
700 F	70 x 70 x 15	yes	□	•	•	-	-	-	-	-	•	-	-	34
NEW 8450	80 x 80 x 25	yes	■	•	•	-	-	-	•	-	•	-	-	35
8400 N	80 x 80 x 25	yes	□/■	•	•	•	•	•	•	•	-	•	•	36
8400 N VARIOFAN	80 x 80 x 25	yes	□	•	•	-	•	•	-	-	-	•	-	37
8300	80 x 80 x 32	yes	□/■	•	•	•	•	•	•	•	-	•	•	38
8200 J S-Force	80 x 80 x 38	yes	■	•	•	•	•	•	•	•	-	•	-	39
3400 N	92 x 92 x 25	yes	□/■	•	•	•	•	•	•	•	-	•	•	40
3400 N VARIOFAN	92 x 92 x 25	yes	■	•	•	-	•	•	-	-	-	•	-	41
3300	92 x 92 x 32	yes	□/■	•	•	•	•	•	•	•	-	•	•	42
3200 J	92 x 92 x 38	yes	■	•	•	•	•	•	•	•	-	•	•	43
4400 F	119 x 119 x 25	yes	□/■	•	•	•	•	•	•	•	-	•	-	44
4400 FN	119 x 119 x 25	yes	■	•	•	•	•	•	•	•	-	•	-	45
4300	119 x 119 x 32	yes	□/■	•	•	•	•	•	•	•	-	•	•	46
4300 VARIOFAN	119 x 119 x 32	yes	■	•	•	•	•	•	•	•	-	•	-	47
4400	119 x 119 x 38	yes	■	•	•	•	•	•	•	•	-	•	-	48
4100 N	119 x 119 x 38	yes	□/■	•	•	•	•	•	•	•	-	•	•	49
4100 NH...NH6	119 x 119 x 38	yes	■	•	•	•	•	•	•	•	-	•	-	50
4100 NH7...NH8	119 x 119 x 38	yes	■	•	•	•	•	•	•	•	-	•	-	51
DV 4100	119 x 119 x 38	yes	■	•	•	•	•	•	•	•	-	•	•	52
5200 N	127 x 127 x 38	yes	■	•	•	•	•	•	•	•	-	•	•	53
DV 5200	127 x 127 x 38	yes	■	•	•	•	•	•	•	•	-	•	•	54
5100 N	135 x 135 x 38	yes	■	•	•	•	•	•	•	•	-	•	•	55
NEW 5300 S-Force	140 x 140 x 51	yes	■	•	•	•	•	•	•	•	-	•	•	56
5300 TDS-Force	140 x 140 x 51	yes	■	•	•	•	•	•	•	•	-	•	-	57
7100 N	150 Ø x 38	yes	■	•	•	•	•	•	•	•	-	•	•	58
7200 N	150 Ø x 55	yes	■	•	•	•	•	•	•	•	-	•	•	59
NEW 6100 N	172 x 160 x 51	yes	■	•	•	•	•	•	•	•	-	•	•	60
NEW 6300 S-Force	172 Ø x 51	yes	■	•	•	•	•	•	•	•	-	•	•	61
NEW 6300 TDS-Force	172 Ø x 51	yes	■	•	•	•	•	•	•	•	-	•	•	62
NEW 6300 TDS-Force	172 x 160 x 51	yes	■	•	•	•	•	•	•	•	-	•	•	63
DV 6200	172 Ø x 51	yes	■	•	•	•	•	•	•	•	-	•	•	64
DV 6200 TD	172 Ø x 51	yes	■	•	•	•	•	•	•	•	-	•	•	65
6400	172 x 150 x 51	yes	■	•	•	•	•	•	•	•	-	•	•	66
6400 TD	172 x 150 x 51	yes	■	•	•	•	•	•	•	•	-	•	•	67
DV 6400	172 x 160 x 51	yes	■	•	•	•	•	•	•	•	-	•	•	68
DV 6400 TD	172 x 160 x 51	yes	■	•	•	•	•	•	•	•	-	•	•	69
NEW 2200 FTD	200 Ø x 51	yes	■	•	•	•	•	•	•	•	-	•	•	70
W1G 200	225 x 225 x 80	UL/CSA	■	•	•	•	•	-	•	•	•	-	•	71
NEW K1G 200	225 x 225 x 80	yes	■	•	•	•	•	-	•	•	•	-	•	72
NEW K3G 200	225 x 225 x 89	yes	■	•	•	•	•	-	•	•	•	-	•	73
W1G 250	280 x 280 x 80	UL/CSA	■	•	•	•	•	-	•	•	•	-	•	74

Please note that these special versions are not possible for all voltages and speeds, and not in all combinations. The special versions are designed for specific customers and projects. As a rule they are not available off the shelf and are tied to minimum volumes. Please consult your customer support representative about the feasibility of your special variant.

* approvals applied for
 - not yet available
 • available
 □ Sleeve bearings
 ■ Ball bearings

Connection instructions for S-Force fans

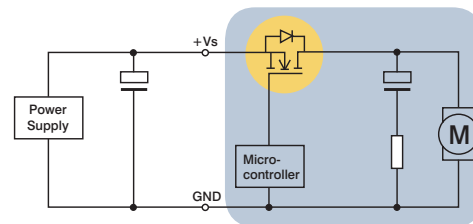
Special features of S-Force fans

The S-Force series is the most powerful product series on the market. S-Force stands for the highest innovation in motor technology, fluid mechanics and electronics. The one-of-a-kind power density of the products requires special attention to the application at the customer's facility.

Service life

Due to the high currents in the fans, the load on the electrolyte capacitors is greater, which reduces the service life of the capacitor. As a larger or additional capacitor cannot be housed in the fan, the capacitor must be housed in the supply line.

If the power pack of the application has a corresponding capacitor, in some cases it may be possible to omit the external capacitor.



Recommended measure: Additional external capacitor (thus must be installed as close to the fan as possible < 30 cm).

Fan	Capacitor required
S-Force axial	
8200 / 3200 JH3-JH4	no
4100 NH3 / NH4 / NH5 / NH6	no
4100 NH7 / NH8	yes
5300 / 5300 TD	no
6300 / 6300 TD	no
2200 FTD	no
S-Force centrifugal	
RET 97 TD	yes
RER 120 TD	yes
RER 133 TD	no
RER 160 NTDHH	yes
REF 175 TD	no
RER 175 TD	no
RER 190 TD / RG 190 TD	no
RER 220 TD / RG 220	no
RER 225 TDM / RG 225 TDM	no
RER 225 TD / RG 225 TD	yes

Recommended capacitors

We recommend using the following capacitors from Rubycon:

24 VDC:

50 ZL 680 μ F; 12,5 mm x 30 mm or

50 ZLH 680 μ F 12,5 mm x 30 mm

48 VDC:

100 YXG 470 μ F; 16 mm x 35,5 mm or

100 ZLH 470 μ F 16 mm x 31,5 mm

Other capacitors with equal or greater capacitance and equal or lower serial resistance can also be used.

ebm-papst St. Georgen offers the following capacitors ex stock:

24 VDC: 1000 μ F / 50 V, 16 mm x 25 mm

Art. No.: 992 0345 000 (LZ 354)

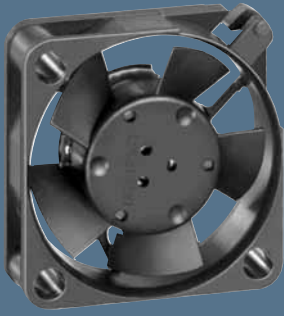
48 VDC: 680 μ F / 100 V, 18 mm x 40 mm

Art. No. : 992 0355 000 (LZ 355)

max. 4,5 m³/h

DC axial fans

Series 250 25 x 25 x 8 mm



Highlights:

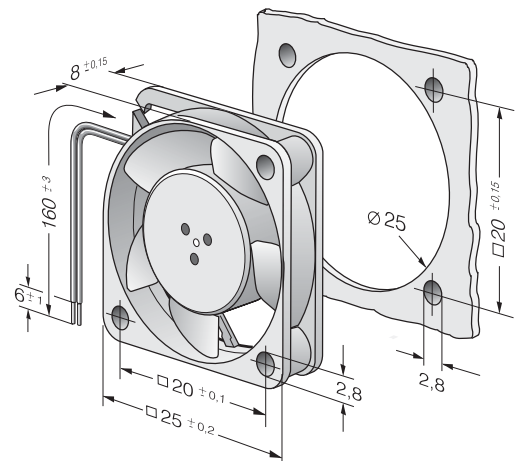
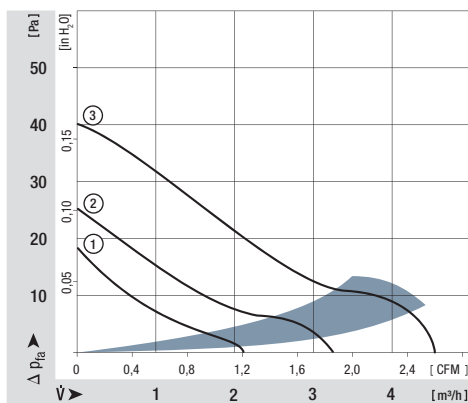
- Compact fan with low power consumption.

General characteristics:

- Material: fibreglass-reinforced plastic. Impeller PA, housing PBT.
- Fully integrated electronic commutation.
- Protected against reverse polarity and locking.
- Connection via single strands AWG 28, TR 64. Bared and tin-plated.
- Air exhaust over struts. Direction of rotation counter-clockwise, seen on rotor.
- Mass: 5 g.

Nominal data	Air flow		Nominal voltage	Voltage range	Sound pressure level	Sound power level	Sinter sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L ₁₀ (20 °C) ebm-papst Standard	Service life L ₁₀ (60 °C) ebm-papst Standard	Life expectancy L ₁₀ Δ (40 °C) see P. 15	Curve	Specials
	m ³ /h	CFM													
255 M	2,1	1,2	5	4,5...5,5	5	< 3	■	0,2	6 000	-10...+70	45 000 / 14 000	45 000	1		
255 N	3,2	1,9	5	4,5...5,5	16	< 3	■	0,4	9 600	-10...+70	40 000 / 12 000	40 000	2	/2	
255 H	4,5	2,6	5	4,5...5,5	23	4,4	■	0,6	12 000	-10...+55	35 000 / 12 000*	30 000	3	/2	
252 N	3,2	1,9	12	10...14	15	< 3	■	0,5	9 000	-10...+70	40 000 / 12 000	40 000	2	/2	
252 H	4,5	2,6	12	10...14	23	4,4	■	0,7	12 000	-10...+55	35 000 / 12 000*	30 000	3		

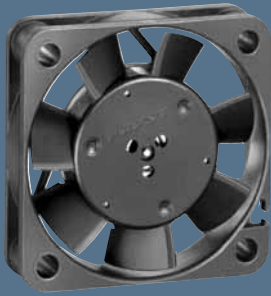
* at 55 °C



max. 9 m³/h

DC axial fans

Series 400 F 40 x 40 x 10 mm



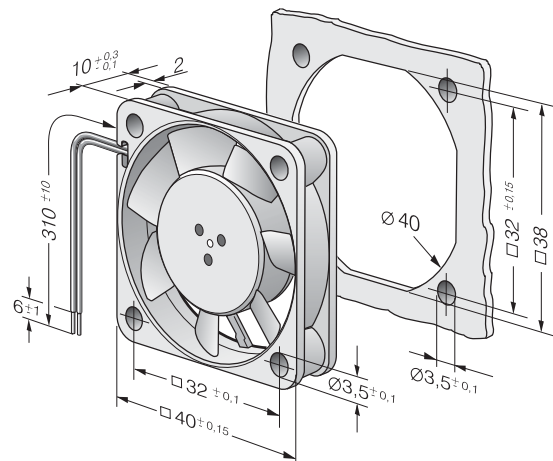
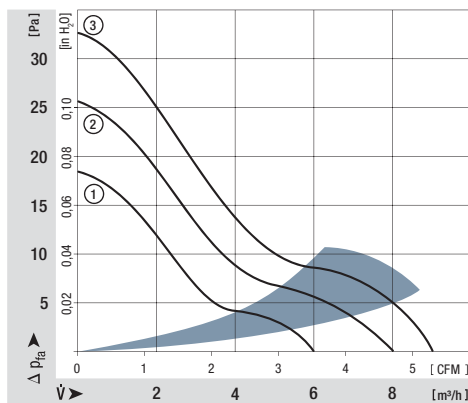
Highlights:

- Compact fan with low power consumption.
- Some models suitable for use at high ambient temperatures.

General characteristics:

- Material: fibreglass-reinforced plastic. impeller PA, housing PBT.
- Fully integrated electronic commutation.
- Protected against reverse polarity and locking.
- Connection via single strands AWG 28, TR 64. Bared and tin-plated.
- Air exhaust over struts. Direction of rotation counter-clockwise, seen on rotor.
- Mass: 17 g.

Nominal data	Air flow		Nominal voltage	Voltage range	Sound pressure level	Sound power level	Sinter sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L ₁₀ (20 °C) ebm-papst Standard	Service life (60 °C) ebm-papst Standard	Life expectancy L ₁₀ Δ (40 °C) see P. 15	Curve	Specials
	m ³ /h	CFM													
405 F	8	4,7	5	4,5...5,5	22,1	4,4	■	0,7	5 400	-20...+70	45 000 / 15 000		47 500	2	/2
405 FH	9	5,3	5	4,5...5,5	26,0	4,6	■	0,9	6 000	-20...+70	45 000 / 15 000		47 500	3	/2
412 FM	6	3,5	12	10...14	16,5	3,8	■	0,6	4 300	-20...+70	45 000 / 15 000		47 500	1	
412 F	8	4,7	12	10...14	22,1	4,4	■	0,7	5 400	-20...+70	45 000 / 15 000		47 500	2	
412 FH	9	5,3	12	10...14	26,0	4,6	■	0,8	6 000	-20...+70	45 000 / 15 000		47 500	3	/2
414 F	8	4,7	24	20...28	22,1	4,4	■	0,8	5 400	-20...+70	45 000 / 15 000		47 500	2	/2
414 FH	9	5,3	24	21,6...26,4	26,0	4,4	■	0,9	6 000	-20...+70	45 000 / 15 000		47 500	3	
Models with temperature range up to +85 °C.															
412 FM-074	6	3,5	12	10...14	16,5	3,8	■	0,4	4 300	-20...+85	45 000 / 15 000		47 500	1	/2
412 F-130	8	4,7	12	10...14	22,1	4,4	■	0,6	5 400	-20...+85	45 000 / 15 000		47 500	2	
412 FH-132	9	5,3	12	10...14	26,0	4,6	■	0,7	6 000	-20...+85	45 000 / 15 000		47 500	3	/2



max. 13,5 m³/h

DC axial fans

Series 400 40 x 40 x 20 mm



Highlights:

- Compact fan with low power consumption.
- Some models suitable for use at high ambient temperatures.

General characteristics:

- Material: fibreglass-reinforced plastic. Impeller PA, housing PBT.
- Fully integrated electronic commutation.
- Protected against reverse polarity and locking.
- Connection via single strands AWG 28, TR 64. Bared and tin-plated.
- Air exhaust over struts. Direction of rotation counter-clockwise, seen on rotor.
- Mass: 27 g.

Nominal data		Air flow		Nominal voltage	Voltage range	Sound pressure level	Sound power level	Sintec sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L ₁₀ (20 °C) ebm-papst Standard	Service life (60 °C) ebm-papst Standard	Life expectancy L ₁₀ Δ (40 °C) see P. 15	Curve	Specials
Type	m ³ /h	CFM	VDC	VDC	dB(A)	Bel(A)	□ / ■	Watts	RPM	°C	Hours	Hours	Hours	P. 110/118		
405	10,0	5,9	5	4,5...5,5	18	3,8	□	0,9	6 000	-20...+70	50 000 / 20 000	62 500	1	/2		
412	10,0	5,9	12	10...14	18	3,8	□	0,9	6 000	-20...+70	50 000 / 20 000	62 500	1	/2		
412 H	13,5	7,9	12	10...14	29	4,7	□	1,6	8 100	-20...+60	45 000 / 15 000	47 500	2	/39		
414	10,0	5,9	24	20...28	18	3,8	□	1,0	6 000	-20...+70	50 000 / 20 000	62 500	1	/2		
414 H	13,5	7,9	24	20...26,5	29	4,7	□	1,6	8 100	-20...+60	45 000 / 15 000	47 500	2	/2		
Model with temperature range up to +85 °C.																
412-099	10,0	5,9	12	10...14	18	3,8	□	0,8	6 000	-20...+85	50 000 / 20 000	62 500	1			

