Centrifugal fans from ebm-papst are available with forward and backward-curved blades. The quiet-running centrifugal fans with forward-curved blades are supplied as motor-impeller combinations or with a scroll housing. The centrifugal fans with backward-curved blades have a free-running impeller and do not require a scroll housing. In the case of centrifugal fans with external rotor motors, the motor is positioned in the impeller, ensuring not just optimum cooling of the motor but also a particularly compact design. The entire range is available with both AC motor technology and GreenTech EC technology.

The facts at a glance:
- “RadiCal” AC and EC low-pressure fans
- “RadiPac” EC medium pressure fans
- “RadiFit” EC centrifugal fans with backward-curved blades and scroll housing
- EC centrifugal fans with backward-curved blades
- AC and EC centrifugal fans with forward-curved blades and scroll housing
- Compact design thanks to external rotor motor technology
- Comprehensive product ranges of fans with EC technology for all applications
- 100% speed control with analog or serial interface
- High efficiency through the use of GreenTech EC technology
- Quiet operation thanks to optimized flow control and sophisticated EC motor commutation
- Start-up made easy by perfectly matched components: Controller/motor/fan
- Wide range of accessories
Centrifugal fans
Performance ranges

**Operating ranges**

**Optimum usage range**

Optimum functioning of centrifugal fans with backward-curved blades is obtained when the operating point is close to the point of maximum efficiency. If consideration is also to be given to the economical aspect, it is best to ensure that the operating point of the fan selected is at or just to the right of the optimum point. Centrifugal fans with forward-curved blades have different operating characteristics. Here again it is important for the operating point to be close to or slightly to the right of the optimum point – but it should be remembered that the power required by centrifugal blowers increases significantly with decreasing back pressure. This can lead to overloading of the motor.

The “ebm-papst FanScout” selection software (see Page 13) presents the important factors, namely maximum efficiency and minimum noise, so you can always make the right choice.
Selection of fans

The product catalogs contain all the relevant information on

- **Product designation**
  The header defines the technology (AC or EC), the type (centrifugal, axial,...), the series (e.g. S series), the impeller diameter and other features of the product.

- **Product description**
  Depending on the product, the following items of information are presented here:
  Material, number of blades, airflow direction, direction of rotation, degree of protection, insulation class, installation position, condensation drainage holes, mode of operation, bearings, technical features, EMC, touch current, motor protection, electrical hookup, cable/terminal box design, protection class, capacitor, conformity with standards, approvals and options.

- **Nominal data**
  AC products (up to motor size 074) and EC products (with DC supply):
  Free air/with minimum back pressure AC products
  (as of motor size 094) and EC products (with AC supply):
  At the operating point with maximum load

- **Order designation/type**
  An explanation of the order designation and type is given under Type code.

- **Product drawing**

- **Operating points**
  The operating points with information on speed, power consumption, current draw, sound power level or sound pressure level and overall efficiency of the impeller are listed in the adjacent Operating point table.

- **Curves**
  The air performance curves for the product are shown in the graph.

- **Accessories**
  The appropriate accessories (e.g. inlet rings, guard grill, fan housings) and further information (e.g. the connection diagram) can be found on the page numbers given.
- Technical features: See connection diagram P. 92 f.
- EMC:
  - Interference emission according to EN 61000-6-4
  - Interference emission according to EN 61000-6-2, except EN 61000-3-2 for professionally used equipment with a total rated power greater than 1 kW
  - Immunity to interference according to EN 61000-6-2
- Touch current: \( \leq 3.5 \text{ mA} \) according to IEC 60990 (measuring circuit Fig. 4)
- Terminal box design: electrical connection via terminal strip
- Protection class: I (with customer connection of protective earth)
- Conformity with standards: EN 61800-5-1, CE
- Approvals: EAC, UL, CSA
- Efficiency: Ecodesign EU regulation EU 327/2011

### Technical Data

<table>
<thead>
<tr>
<th>Fans</th>
<th>Fans</th>
<th>Fans</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø 250</td>
<td>ø 710</td>
<td>ø 800</td>
</tr>
<tr>
<td>ø 900</td>
<td>ø 1250</td>
<td></td>
</tr>
</tbody>
</table>

### Weight

<table>
<thead>
<tr>
<th>Centrifugal fan</th>
<th>Weight centrifugal module with support bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>KG 500-PB33-01</td>
<td>32.0 kg</td>
</tr>
<tr>
<td>KG 500-PB33-01</td>
<td>48.0 kg</td>
</tr>
</tbody>
</table>

### Accessories

- Inlet ring with one pressure tap
- Centrifugal module with support bracket

### Drawings

- Connection diagram: P. 92 f.
- Inlet ring: P. 82 ff.
- FlowGrid air-inlet guard: P. 80 ff.

### Compact Design

- Technology

### Vertretungen

- EC centrifugal fans – RadiPac
  - Backward curved, Ø 500

### R3G 500-PB33-01

#### Pressure tap (k-factor: 281)

- Attachment for FlowGrid (4x)

### K3G 500-PB33-01

#### Pressure tap (k-factor: 281)

- Attachment for FlowGrid (4x)
Centrifugal fans with backward-curved blades

RadiCal ➤ One-piece impellers made of high-tech composite material, optimized flow control, combined with reliable asynchronous or high-efficiency GreenTech EC motors. These are the principal features of the new generation of backward-curved centrifugal fans for operation without scroll housing. They open up new perspectives, not just in ventilation and air conditioning technology: ebm-papst AC fans currently in use can be replaced with the latest fans featuring GreenTech EC technology without the need for expensive conversion work, for example.

RadiPac ➤ Stands for medium pressure centrifugal fans and identifies them as an independent product range alongside the RadiCal low-pressure product range. The name RadiPac is a reference to the term “packaged”, meaning that all the necessary functions are incorporated. This creates potential for further applications, not just in the air conditioning and ventilation industries. RadiPac fans are generally intended for operation without a scroll housing.

RadiFit ➤ Information on RadiFit centrifugal fans with backward-curved blades can be found in this section under “Centrifugal fans with scroll housing”
Product ranges

- **R series centrifugal fan**: Impeller with motor. Mounting on motor flange/stator bushing

- **K series centrifugal fan with support bracket**: Impeller with motor and support bracket. Mounting on support plate. Installation with vertical and horizontal motor shaft

- **K series centrifugal fan of cube design**: Impeller with motor and cube design. Mounting on support plate or cube structure. Installation with vertical and horizontal motor shaft

---

**R series**

**K series with support bracket**

**K series in cube design**
**Effects of changing the centrifugal air gap**

The centrifugal air gap between the inlet ring and impeller cover plate influences the air performance and efficiency of a centrifugal fan. A change in the inlet ring gap dimension influences the curve:

- ➀ $s / D = 0.4\%$
- ➁ $s / D = 1.0\%$
- ➂ $s / D = 1.4\%$

**Effects of changing the axial overlap**

The axial overlap between the inlet ring and impeller cover plate influences the air performance and efficiency of a centrifugal fan. A change in the overlap influences the curve:

- ➀ $x / D = 0.6\%$
- ➁ $x / D = 0\%$
- ➂ $x / D = -0.8\%$
Centrifugal fans
Effects of intake obstructions

Effects of intake obstructions
Intake and outlet side obstructions reduce the air performance of centrifugal fans.

\[
\text{Efficiency } \eta = \frac{P_{\text{out}}}{P_{\text{in}}} \\
\text{Sound pressure level } L_{\text{pA}} \quad \text{for } x/D = \infty, 40\%, 20\%
\]

Graph showing changes in efficiency and sound pressure level with different obstruction ratios.
Effects of installation space

Installation losses will occur if a centrifugal fan is fitted in a ventilation unit with too little space. The effect on the operating characteristics of the fan can be estimated from the curve shown. For boxes with a square cross-section, the hydraulic diameter is to be calculated from the width and height of the box and the value divided by the impeller diameter. The correction factor for the air flow can then be read off the graph on the basis of this value.

A FlowGrid helps to minimize the extra noise caused by a confined installation situation. There is then often less of a need for extensive secondary noise protection measures, if at all.

The FlowGrid is simply attached in the intake area of the centrifugal fan.

FlowGrid
Connection flange
The scroll housings are fitted with a connection flange as standard. The flange makes it easy to install pipes or attach the fan to corresponding walls. The design of the connection flanges differs depending on the fan product range.

Product ranges
- **RadiFit**: Centrifugal impeller with backward-curved blades, dual-inlet scroll housing, EC external rotor motor integrated into fan impeller, external electronics. With mounting bracket or mounting frame.
- **D product range**: Centrifugal impeller with forward-curved blades, dual-inlet scroll housing, AC or EC external rotor motor integrated into fan impeller, external electronics.
- **G product range**: Centrifugal impeller with forward-curved blades, single-inlet scroll housing, AC external rotor motor integrated into fan impeller.
- **K series (combinations)**: Centrifugal w with forward-curved blades, dual-inlet scroll housing, external rotor motor integrated into fan impeller. Available as combination in twin or triple design for example.
**Effects of intake obstructions**

Intake-side obstructions reduce the air performance of centrifugal blowers.

\[
\begin{align*}
1 \ x / D &= \infty \\
2 \ x / D &= 30\% \\
3 \ x / D &= 23\% \\
4 \ x / D &= 15\% \\
5 \ x / D &= 7.5\%
\end{align*}
\]

**Effects of intake obstructions with constant-volume operation**

A constant volume is only achieved if there are no inflow obstructions. Obstructed (e.g. asymmetrical or partially blocked) inflow can significantly affect the curve and produce considerable deviations from a constant-volume curve.

Notes on how to obtain a sufficiently unobstructed inflow:
The distance \( x \) between the blower intake and limiting walls or obstructions should be equal to at least 25\% of the impeller diameter. Inflow swirl or rotationally asymmetric inflow should be avoided. Intake-side resistances such as filters or grills even out the inflow.

On request we can supply calibrated blower versions optimized for specific installation situations.
**Effects of stepped diffuser**

A diffuser with connected outlet duct attached on the discharge side increases the air performance and efficiency of centrifugal blowers.

1. Without stepped diffuser
2. With stepped diffuser
We hope that this brochure was able to provide you with an in-depth insight into our technologies, our product applications and important basic principles. Please do not hesitate to contact us should you have any further questions on specific applications. Our specialists will be delighted to help.