RBA 系列—雙吸後傾式離心風機

Series RBA, Double Inlet Centrifugal Fans, with Backward Wheels

Horus Air Moving Co. Ltd. certifies that the RBA series fans shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. All the Centrifugal Fans described herein are licensed to bear the AMCA Seal, and their certified ratings are shown on pages 7 through 21.

和旭機械股份有限公司特此證明，此處所示 RBA 系列離心風機獲得了有蓋 AMCA 印章的授權。所示額定值系依據 AMCA 出版物 211 和 AMCA 出版物 311 所進行測試和程序確定並符合 AMCA 認證額定值計劃的要求。這裡描述的所有離心風機都已經取得了 AMCA 印章，它們的認證數據見第 7 到 21 頁。
概述 Outline

本公司之風機採用後傾式離心葉輪，具有通
用性強、效率高、噪音低、耗能少等特點。
是各類中央空調機組及其它暖氣空調、淨化、
通風等最佳選擇。

產品型式 Type of Product

1. 旋向
此風機旋向可分為左旋（LG）和右旋（RD）
二種方式，以馬達一端正視，葉輪順時針旋
轉的稱為右旋風機，逆時針旋轉的稱為左旋
風機。皮帶輪可左右調向，因此不受左右方
向的限制。

2. 出風口方向
風機可如下圖所示製成 0°、90°、180°、270°
四種出風方向。

The ventilators are centrifugal fans with
backward curved impellers. Some of the
features and characteristics of these
ventilators are: backward impeller blading, a
wide range of applications, high efficiency,
low noise, and low power consumption.
These ventilators are ideal for use in central
air conditioning systems, heating and
ventilating air conditioning systems, and in
purifiers. They are also suitable for use in a
number of other ventilator applications.

1. Direction of Rotation
The ventilators can be applied with two
directions of rotation, left hand (LG) and right
hand (RD). If the impeller rotates in a
counterclockwise direction when viewed
from the drive motor side, it is designated as a
left hand ventilator. If it rotates clockwise
when viewed from the drive pulley can be
mounted on either side of the ventilator, so
there is no significant limitation on the
ventilator directionality.

2. Direction of Air Outlet
The following as shown, the ventilators can
be arranged to provide four different air outlet
directions, 0, 90, 180, and 270 degrees.
產品結構 Construction of Product

此風機主要由機殼、葉輪、框架、軸承、軸、出風口法蘭（常規配置不帶法蘭）構成。

1. 機殼
機殼基本採用鋼板烤漆製造，具有符合空氣動力的外形，蝸殼板採用焊接或“匹茲堡溝”咬合的方式與側板連接成一體。其它如不銹鋼材質或鍍鋅鋼板亦可採用。

2. 葉輪
葉輪採用高級鋼板烤漆製成，葉片設計符合空氣動力的特定形狀，使得效率最高、噪音最低。葉片用焊接固定在中盤板及葉輪蓋板上，葉輪蓋板採用油壓伸抽一體成型，在最大功率連續運轉時，葉輪具有足夠的剛度。葉輪依據 ISO1940-1 及 AMCA204 BV-4 的動平衡精度要求，按 G2.5 等級全檢合格。其它如不銹鋼材質或鍍鋅鋼板亦可採用。

3. 框架
框架由角鋼和扁鋼焊接製成，表面噴漆，以保證框架具有足夠的剛度和強度。

4. 軸承
此風機採用優質連座軸承，該軸承預先加潤滑油並有自動放正功能。

The major components of the ventilators include the scroll, impeller, frame, bearings, shaft, and outlet flange.

1. Scroll
The scroll is basic made of painted steel sheet, and it is designed to provide an aerodynamically efficient flow path. The inlet is formed in one piece. The scroll plate is connected to the side plate by using welding or a “Pittsburgh lock” type of system. In addition, the stainless or galvanized steel material is also provided.

2. Impeller
The impeller is made of high grade painted steel sheet, and it is configured to provide a highly efficient and low noise aerodynamic flow path. The blade is fixed to the central disk plate and shroud by welding. The shroud is made of hydraulic draw. The impeller strength is sufficient for it to operate continuously at maximum power. The impellers balance quality grades are G2.5 in accordance with ISO1940-1 and AMCA204, BV-4 application category. In addition, the stainless or galvanized steel material is also available.

3. Frame
The frames use sections of steel to assure sufficient frame rigidity and they are finished with painting.

4. Bearings
For the ventilators, self-aligning pillow block ball bearings are used, and these bearings are supplied with lubrication fittings.
5. **Shaft**

The shafts are made of C45 carbon steel bars. The shafts are rough machined and then stress relieved before final machining. The shaft diameters are machined to very accurate tolerance levels and they are fully checked to assure precision fits. They are coated after assembly in order to provide corrosion resistance.

6. **Outlet Flange (Option)**

The outlet flange is made of galvanized steel angle iron bars. The connections of the flange components to each other and to the scroll are made using rivet or self tapping screw. This maintains a good flange appearance while also providing sufficient strength and rigidity.
風機定律  The Fan Laws

1st law:
\[
\frac{Q_c}{Q} = \left( \frac{D_c}{D} \right)^3 \left( \frac{N_c}{N} \right) \left( \frac{K_p}{K_{pc}} \right)
\]

2nd law:
\[
\frac{P_{tc}}{P} = \left( \frac{D_c}{D} \right)^2 \left( \frac{N_c}{N} \right)^2 \left( \frac{K_p}{K_{pc}} \right) \left( \frac{\rho_c}{\rho} \right)
\]

3rd law:
\[
\frac{P_{tc}}{P} = \left( \frac{D_c}{D} \right)^2 \left( \frac{N_c}{N} \right)^2 \left( \frac{\rho_c}{\rho} \right)
\]

4th law:
\[
\frac{H_{tc}}{H} = \left( \frac{D_c}{D} \right)^5 \left( \frac{N_c}{N} \right)^3 \left( \frac{K_p}{K_{pc}} \right) \left( \frac{\rho_c}{\rho} \right)
\]

5th law:
\[
P_{sc} = P_{tc} - P_{vc}
\]
Where  \( P_{tc} \) and  \( P_{vc} \) are established per the 2nd and 3rd FAN LAW.

6th law:
\[
\eta_{sc} = \eta_{tc} \left[ \frac{P_{sc}}{P_{tc}} \right]
\]

Where  \( P_{sc} \) is established using the 5th FAN LAW and  \( P_{tc} \) is established using the 2th FAN LAW. In the above, subscript c denotes the new operating condition, and:

- \( D \) = Impeller diameter
- \( D_c \) = Impeller diameter, converted
- \( N \) = Impeller rotational speed
- \( N_c \) = Impeller rotational speed, converted
- \( K_p \) = Compressibility coefficient
- \( K_{pc} \) = Compressibility coefficient, converted
- \( Q \) = Volume airflow rate
- \( Q_c \) = Volume airflow rate, converted
- \( P_t \) = Pressure, total
- \( P_{tc} \) = Pressure, total, converted
- \( P_v \) = Pressure, velocity
- \( P_{vc} \) = Pressure, velocity, converted
- \( H \) = Power
- \( H_{tc} \) = Power, converted
- \( P_s \) = Pressure, static
- \( P_{sc} \) = Pressure, static, converted
- \( \eta \) = Efficiency
- \( \eta_{sc} \) = Efficiency, static, converted
- \( \eta_{tc} \) = Efficiency, total, converted
自由音場 Non-Directional Sound in a Free-Field

聲功率和聲壓之間的最簡單的關係為一個非方向性聲源的自由音場，其關係如下列方程式所示：
The simplest relation between sound power level and sound pressure level is found for a free-field, non-directional sound source, as given by the following equation:

\[ L_p = L_{wi} - 20 \log_{10}(r) - k + T \]

\( L_p \) = sound pressure level (dB) re 20 \( \mu \)Pa

\( L_{wi} \) = sound pressure level (dB) re 10\(^{-12}\) watts

\( r \) = distance from the source in meters or feet

\( k \) = 11.0 dB for metric units and 0.5 dB for English units

\( T \) = correction factor for atmospheric pressure and temperature (dB) (since most industrial noise problems are concerned with air at or near standard conditions, \( T \) is usually negligible and, therefore, equals 0)

Example:

計算在自由音場中 110 dB 的聲功率距離聲源 10 英尺時的聲壓：
Consider a point source having a \( L_{wi} \) of 110 dB for a free-field. The sound pressure level at a distance of 10 feet from the source would be calculated as follows (since the source is found for a free-field, the equation for hemispherical radiation from a point source is used):

\[ L_p = L_{wi} - 20 \log_{10}(r) - k \]

therefore:

\[ L_p = 110 \text{ dB} - 20 \log_{10}(10) = 89.5 \text{ dB} \]
Example Of Curve Reading

**風量**
Air Volume \( Q = 26500 \text{m}^3/\text{h} \)

**風速**
Outlet Velocity \( V = 11.55 \text{m/s} \)

**全壓**
Total Pressure \( P_t = 700 \text{ Pa} \)

**動壓**
Velocity Pressure \( P_v = 80 \text{ Pa} \)

**靜壓**
Static Pressure \( P_s = P_t - P_v = 620 \text{ Pa} \)

**轉速**
Fan Speed \( N = 1200 \text{ rpm} \)

**軸功率**
Shaft Power \( W = 7.6 \text{ kW} \)

**聲功率**
Sound Power \( L_{w1A} = 93 \text{dB(A)} \)

**總效率**
Total Efficiency \( \eta = 66.5\% \)

Performance certified is for installation type B, free inlet, ducted outlet. Power rating (kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for inlet LwiA sound power levels for Installation Type B: free inlet, ducted outlet.
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RBA 系列之外型尺寸 Overall Dimension - RBA Series

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Note: The data such as performance, dimension and etc. in this catalogue is subject to change without notice. Please contact with the manufacture for further information.