Metro/Tunnel Axial & Jet Fan

HERCULES SERIES

- High efficiency and liability, low noise
- General supply and exhaust ventilation, Heating exhaust, fire smoke exhaust
It is the first AMCA certified air performance and noise testing laboratory in mainland China.

INFINAIR laboratory has successfully obtained the CNAS Laboratory Accreditation Certificate and has been enlisted in the Chinese National Accredited Laboratory Directory.

All testing procedures at INFINAIR's air performance and noise testing laboratory are done according to the following standards:

1. All design, fabrication and testing procedures are strictly follow the guidelines per AMCA-210, AMCA-300, ISO5807, GB/T1236, ISO13350, GB/T10178 standard.

2. The INFINAIR lab has replaced the simple "cardboard shielding method" duct test with a new generation of precise-flow nozzle matrix systems.

3. Advanced and sophisticated testing equipment are used in the laboratory.

4. All equipment used in the laboratory are calibrated and inspected regularly.

5. When comparing the results of same-sample inter-lab tests, the INFINAIR lab test results' margins of error are within the precision and error requirements specified by relevant international/national standards.

INFINAIR's laboratory has also built a high temperature furnace under the EN12101-3 and UL793 standard guidelines for fire resistant testing. It is an important platform for applying certification from international certification bodies such as UL and TUV.

>> Introduction of INFINAIR's Laboratory

Standard Air Chamber (Block 1)

Supersize Air Chamber (Block 2)

Large Vibration Test Area (10m x 18m x 40m)

Testing on fan performance, startup and motor direction switching

Thrust test for jet fan

Testing being carried out for Metro/Tunnel Axial Fan
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**Intelligent Adaption:**
We can quickly adapt to changes in the business environment.

**Intelligent Adjustment:**
The combined use of Inverter and permanent magnet synchronous technologies can achieve best results with the use of logic controller.

**Intelligent Real-time Information:**
Individual workstations are linked to the central control system through internet or local area network

**Intelligent Detection system:**
Reliable sensors can detect early symptoms and notify the user. Ensuring stable operation.

**INFINAIR’s Intelligent Ventilation Technology**

- **Intelligent Adaption:**
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**INFINAIR’s After-sales Service**

- **Joint Research & Develop**
  The Joint R&D can provide customers the necessary support and guidance during the initial research progress.
- **Customization**
  Our products are fully customizable. We are able to satisfy customer requirements on an individual basis.
- **Adequate After-sales Service**

**Green Smart Technology**

- **CFD Simulation & Analysis**
  A computer-aided air movement simulation model which can calculate the efficiency of the fan based on the number of blades, blade angle, width, and noise level.
- **Finite Element Analysis Technology**
  To analyze and provide an accurate prediction of how material is likely to respond when subjected to structural and/or thermal loads.

**INFINAIR’s Intelligent Fabrication**

- **Intelligent fabrication process**
- **Capable to carry out online performance, balance level and communication testing**
- **Ensuring reliable quality**
- **Robotic welding technology**
- **Agile Manufacturing, responds quickly to customer desires**
- **6S Systems**

**INFINAIR’s Intelligent Energy Conservation**
We develop energy saving products by observing behaviors from the animal kingdom. For example, birds can glide for thousands of kilometers without flapping.

**INFINAIR’s Bionic Noise Reduction**
Why Owls can fly so silently? Even mice are not being able to detect their approach?

**The research and development of INFINAIR’s products are heavily inspired by the animal evolution over the past millennia. We have learnt how energy and sound are being able to conserve from their amazing changes.**

**INFINAIR’s Certifications and Testing**

- **Most of the products are certificated by:** CCCf, AMCA, TUV, UL, RoSH and Erp2015
- **Performance and Reliability Testing:** Air Volume, Air Pressure, Power, Noise Level, Temperature Deviation, Corrosion and Water Proof Test, etc.
INFINAIR is an innovative company which provides environmental and intelligence solutions for all aspects of ventilation systems in both private and public sector. They have been INFINAIR’s core values and commitments to our customers over the years.

Established: September, 2003
Area : 33,000m²
Company Address: 55 Qingneng Road, Waigang Town, Jiading District, Shanghai, China PRC.

Sales & Service Office: Our sales and after-sale service network promise easy access to customers anywhere in mainland China. They are located in various locations: Shanghai, Beijing, Shenzhen, Jilin, Liaoning, Tianjin, Shanxi, Henan, Shaanxi, Shandong, Jiangsu, Anhui, Zhejiang, Fujian, Chongqing, Sichuan, Hunan, Hubei, Guangdong, Guangxi, Hainan, Guizhou and XinJiang.

Company Vision: To be the most trusted brand in ventilation industry.

Company Mission: Provide reliable, convenient air movement controls, operations and services.

Awards and Achievements:
High-tech Enterprises
Renowned Shanghai trademark: INFINAIR
Famous Shanghai brand name
SGS ISO9001, ISO14001, OHSAS18001 Management Certificates

Technological Strength:
INFINAIR’s Air Movement & Sound Laboratory is the first Air Movement and Control Association (AMCA) accredited Laboratory in mainland China. It is also certified by Chinese National Accreditation Service for Conformity Assessment (CNAS). Most of the INFINAIR’s products are tested and certified by many international certification bodies such as AMCA, TUV, CE, CCC, CNEX, etc.

Company Info

INFINAIR’s Intelligent Ventilation Technology
- Intelligent Adaption: We can quickly adapt to changes in the business environment.
- Intelligent Adjustment: The combined use of Inverter and permanent magnet synchronous technologies can achieve best results with the use of logic controller.
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- CFD Simulation & Analysis: A computer-aided air movement simulation model which can calculate the efficiency of the fan based on the number of blades, blade angle, width, and noise level.
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Overview

The YFMRT Metro/Tunnel Axial & Jet fan is created based on overseas experience and advanced technologies. It has become one of the leading products for tunnel and metro ventilation system during the last decade. This was achieved by continuous research and development of jet fans & large axial fans.

The unidirectional 1500-2800 YFMRT series axial fan can achieve a maximum air volume of 98,000m³/h with total air pressure up to 2,800 Pa. The blades are adjustable to cover various working conditions. Our YFMRT fans have been accredited by ICAS which is a Chinese national certification body. In contrast, the fan will remain operational for an hour under the temperature of 280℃.

Advanced FEA technology has been repeatedly used during the designing and experimental stages. Thermal expansion and strength have also been considered, ensuring continuous operation under 300℃ for an hour.

The aluminum alloy casted blades have undergone advanced welding process and X-ray metal inspection, ensuring the quality and the safety of the fan.

Each wheel is dynamically balanced to G2.5.

A series of tests such as overspeed test, mechanical performance, vibration, and pneumatic performance are performed on each wheel before leaving the factory.

Heavy duty bolts are being used between the blades and the hub, ensuring durability.

Each fan housing is formed by superior thick steel plate and welded to the highest structural quality.

High Temperature Operation

High temperature resistant motor is being used for metro/tunnel ventilation system. It is designed to maintain the fan in operation for at least an hour under 280℃. The function is to create sufficient time for escape or rescue in case of a fire.

Anti-surge Design

When trains pass through the tunnel, the air pressure in the tunnel may change and the fan needs to work against high pressure. In order to prevent fan from surge, anti-surge equipment is designed for this scenario. The anti-surge equipment ensures good fan performance without surging.

Compact Design

Compact structural design enhances the flexibility of the fan while maintaining the performance and reliability.

Direct driven, no wear parts, low maintenance.

The motor lubricant can be added/released through the lubricant tube to/from the outside of the fan.

Vibration isolators are professionally selected to fulfill the special conditions in Metro/tunnel environment.

YFMRT Product Features

Designed for High Reliability

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High Performance, Low Noise

- Our engineers have repeatedly optimized the wheel with countless CFD simulations together with the latest aerodynamic design technology. Air and sound performance are guaranteed to have reached the optimum level.
- Streamlined air deflector and rear guiding vanes can improve fan air performance efficiency and decrease sound level.
- The angle of the blades is adjustable while the fan is stationary.
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Compact Design

The fan consists of wheel, motor, housing, anti-surge device, supports and vibration isolators. It can either be installed horizontally or vertically.

- The wheel: Consists of the hub and the blades. The aluminum alloy casted blades have undergone advanced welding process, X-ray metal inspection, and then dynamically balanced. The angle of the blades can be adjusted for different working conditions. Adjust the blades by undoing the bolts of the blades when the fan is powered off.
- Motor: The motor is IP55 dust & water protection class, insulation class H. Reliable shaft (brand like SKF, NSK) is used to match the motor. Lubricant refill/release hole, shaft temperature alarm and wiring box are installed on the outside of the housing.
- Fan Housing: High quality steel casted housing is designed to meet its compact requirement.
- Air guiding Vane: Minimize noise effectively.
- Fan installation support: Light weight and easy to install.
- Anti-surge device: Prevent the fan to stall and surge.
- Ease of Maintenance/Repair: The fan is design for easy maintenance/repair. Disconnect the flexible connectors from both ends, then undo the bolts on the ground.

YFMRT Axial Fan Structure

YFMRT Model Number Naming Code

YFMRT — 2000D6

Productname: Vane Axial Fan For Metro and Tunnel

Drive modes:
D: Direct drive
S: 6-pole motor

Fan diameter: 2000mm

YFMRT Axial Fan Structure

Horizontal Mount:

Vertical Mount:

Ceiling Hung:

Sidewall Mount:
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www.infinair.com

YFMRT Axial Fan Structure
YFMRT Dimensional Diagrams

YFMRT Dimensional diagram for Ground Mount installation

YFMRT Dimensional Diagram for Vertical Mount Installation

YFMRT Axial Fan Installation Dimension (Horizontal Mount)

<table>
<thead>
<tr>
<th>Model</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
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<th>H</th>
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<td>3250</td>
<td>3800</td>
<td>3280</td>
<td>3290</td>
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</table>

Note: The maximum length of the fan is for reference only; actual length may vary according to the motor power.
Where D4, ØD5, L, L4 is the length after the airflow collector is added. It can be added as an accessory.

YFMRT Axial Fan Installation Dimension (Vertical Mount)

<table>
<thead>
<tr>
<th>Model</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>H</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>n-Ød1</th>
<th>n2-Ød2</th>
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<td>2600</td>
<td>1250</td>
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<td>1550</td>
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<td>1820</td>
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<tr>
<td>YFMRT-2400</td>
<td>2410</td>
<td>2530</td>
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<td>1390</td>
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</tr>
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<td>250</td>
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<td>1840</td>
<td>250</td>
<td>320</td>
<td>2710</td>
<td>2420</td>
</tr>
</tbody>
</table>

Note: The maximum length of the fan is for reference only; actual length may vary according to the motor power. Where φD4, φD5, L, L4 is the length after the airflow collector is added. It can be added as an accessory.

YFMRT Axial Fan Installation Dimension (Vertical Mount)

<table>
<thead>
<tr>
<th>Model</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>L</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>n1-φd1</th>
<th>n2-φd2</th>
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<td>1620</td>
<td>1850</td>
<td>770</td>
<td>1990</td>
<td>2140</td>
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<td>4-φ14</td>
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<tr>
<td>YFMRT-1600</td>
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<td>1700</td>
<td>1970</td>
<td>870</td>
<td>2160</td>
<td>2360</td>
<td>24-φ14</td>
<td>4-φ14</td>
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<td>1900</td>
<td>2160</td>
<td>1070</td>
<td>2460</td>
<td>2600</td>
<td>24-φ14</td>
<td>4-φ14</td>
<td></td>
</tr>
<tr>
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<td>2090</td>
<td>2360</td>
<td>1100</td>
<td>2700</td>
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<td>4-φ14</td>
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</tr>
<tr>
<td>YFMRT-2200</td>
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<td>1150</td>
<td>3080</td>
<td>3380</td>
<td>24-φ14</td>
<td>4-φ14</td>
<td></td>
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<td>2416</td>
<td>2530</td>
<td>2810</td>
<td>1200</td>
<td>3480</td>
<td>3780</td>
<td>24-φ14</td>
<td>4-φ14</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>YFMRT-2800</td>
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<td>3040</td>
<td>3310</td>
<td>1380</td>
<td>3980</td>
<td>4280</td>
<td>36-φ18</td>
<td>6-φ14</td>
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</tr>
</tbody>
</table>

Note: The maximum length of the fan is for reference only; actual length may vary according to the motor power.
YFMRT(R) Reversible Axial Fan Model Selection Reference Guide

YFMR Model Selection

1. Appropriate model can be selected by matching the required values to the performance curve provided in this booklet. INFINAIR can provide assistance for any special requirements.

2. The default performance parameters used in the booklet are as follows: Atmospheric Pressure: P = 1.013×10^5 Pa; Atmospheric Temperature: t = 20°C (293 k); Relative Humidity: μ = 50%; Air Density: ρ = 1.2 kg/m³. If the temperature changes from t(k) to t(k)₀, then the density is ρ = ρ(t(k₀) / t(k)).

3. Please refer to the conversion table below to calculate the performance parameters should the working condition and requirements are different from standard.

4. User can select the relative model according to the fan curve provided. The performance parameters of the selected model are also available for reference.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed value</th>
<th>Air flow</th>
<th>Total pressure</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>D, ρ</td>
<td>Qₘ = Qnₘ/n</td>
<td>Rₘ = Pnₘ²/n</td>
<td>Nₘ = Nₘ³/n</td>
</tr>
<tr>
<td>ρ</td>
<td>D, n</td>
<td>Qₘ = Q</td>
<td>Rₘ = Pₐₘρ/ρ</td>
<td>Nₘ = Nₘρ/M</td>
</tr>
<tr>
<td>D</td>
<td>ρ, n</td>
<td>Qₘ = QDₘ³/D</td>
<td>Rₘ = PDₘ²/D</td>
<td>Nₘ = NₘDₘ⁵/D</td>
</tr>
<tr>
<td>n, ρ</td>
<td>D</td>
<td>Qₘ = Qnₘ/n</td>
<td>Rₘ = Pₐₘρ(nₘ/ρ)²</td>
<td>Nₘ = Nₘ³(nₘ/ρ)³</td>
</tr>
<tr>
<td>n, D</td>
<td>ρ</td>
<td>Qₘ = Qnₘ(Dₘ/D)³</td>
<td>Rₘ = Pnₘ²(Dₘ/D)²</td>
<td>Nₘ = Nₘ³(Dₘ/D)⁵</td>
</tr>
<tr>
<td>ρ, n</td>
<td>n</td>
<td>Qₘ = QDₘ³/D</td>
<td>Rₘ = Pₐₘρ(Dₘ/D)²</td>
<td>Nₘ = Nₘρ(Dₘ/D)⁵</td>
</tr>
</tbody>
</table>

Reference: Q (Air Volume); P (Total Pressure); ρ (Air Density); n (RPM); D (Fan Diameter).
YFMR Model Selection

1. Appropriate model can be selected by matching the required values to the performance curve provided in this booklet. INFINAIR can provide assistance for any special requirements.

2. The default performance parameters used in the booklet are as follows: Atmospheric Pressure: $P = 1.013 \times 10^5 \text{Pa}$; Atmospheric Temperature: $t = 20 \degree C = 293 \text{k}$; Relative Humidity: $\tau = 50\%$; Air Density: $\rho = 1.2 \text{kg/m}^3$. If the temperature changes from $t(k)$ to $t(\ell)$, then the density is $\rho = \frac{\rho(k)}{\frac{t(\ell)}{t(k)}}$.

3. Please refer to the conversion table below to calculate the performance parameters should the working condition and requirements are different from standard.

4. User can select the relative model according to the fan curve provided. The performance parameters of the selected model are also available for reference.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed value</th>
<th>Air flow</th>
<th>Total pressure</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n$</td>
<td>$D, \rho$</td>
<td>$Q_M = \frac{n_M}{n}$</td>
<td>$R_M = \frac{n_M}{n}^2$</td>
<td>$N_M = \frac{n_M}{n}^{\frac{3}{2}}$</td>
</tr>
<tr>
<td>$\rho$</td>
<td>$D, n$</td>
<td>$Q_M = Q$</td>
<td>$R_M = \frac{\rho}{\rho}M$</td>
<td>$N_M = \frac{\rho}{\rho}M$</td>
</tr>
<tr>
<td>$D$</td>
<td>$\rho, n$</td>
<td>$Q_M = \frac{D_M}{D}^3$</td>
<td>$R_M = \frac{D_M}{D}^2$</td>
<td>$N_M = \frac{D_M}{D}^5$</td>
</tr>
<tr>
<td>$n, \rho$</td>
<td>$D$</td>
<td>$Q_M = \frac{n_M}{n}$</td>
<td>$R_M = \frac{n_M}{n}^2$</td>
<td>$N_M = \frac{n_M}{n}^{\frac{3}{2}}$</td>
</tr>
<tr>
<td>$n, D$</td>
<td>$\rho$</td>
<td>$Q_M = \frac{n_M}{n}\frac{D_M}{D}^3$</td>
<td>$R_M = \frac{n_M}{n}\frac{D_M}{D}^2$</td>
<td>$N_M = \frac{n_M}{n}\frac{D_M}{D}^5$</td>
</tr>
<tr>
<td>$\rho, n$</td>
<td>$n$</td>
<td>$Q_M = \frac{D_M}{D}^3$</td>
<td>$R_M = \frac{D_M}{D}^2$</td>
<td>$N_M = \frac{D_M}{D}^5$</td>
</tr>
</tbody>
</table>

Reference: $Q$ (Air Volume), $P$ (Total Pressure), $\rho$ (Air Density), $n$ (RPM), $D$ (Fan Diameter).
Overview

The YFMRT Reversible Axial & Jet fan is created based on overseas experience and advanced technologies. It has become one of the leading products for tunnel and metro ventilation system during the last decade. This was achieved by continuous development of jet fans & large axial fans.

The single direction 1250-2800 YFMRT series fan can achieve a maximum air volume of 750,000m³/h with total air pressure up to 2,000 Pa. The blades are adjustable to cover various working conditions. Our YFMRT fans have been accredited by ICAS which is a Chinese national certification body. In contrast, the fan will remain operational for 1 hour under the surrounding temperature of 280°C.

High Performance, Low Noise

- Our engineers have repeatedly optimized the wheel with countless CFD simulations together with the latest aerodynamic design technology. Air and sound performance are guaranteed to have reached the optimum level.
- Streamlined air deflector and rear guiding vanes can improve fan air performance efficiency and decrease sound level.
- The angle of the blades is adjustable while the fan is stationary.
- Every wheel is professionally balanced to ensure quite and stable operation.

Symmetric Design, Short Switching Time

- The symmetric design allows flexible airflow direction, developed with the same efficiency as the standard asymmetric one.
- Low inertia load, starting and stopping time.
- The starting and stopping time is less than 45 sec.

High Temperature Operation

- High temperature resistant motor is being used for metro/tunnel ventilation system. It is designed to maintain the fan in operation for at least an hour under 280°C. The function is to create sufficient time for escape or rescue in case of a fire.

Anti-surge Design

- When trains pass through the tunnel, the air pressure in the tunnel may change and the fan needs to work against high pressure. In order to prevent fan from surge, anti-surge equipment is designed for this scenario. The anti-surge equipment ensures good fan performance without surging.

Compact Design

- Compact structural design enhances the flexibility of the fan while maintaining the performance and reliability.
- Direct driven, no wear parts, low maintenance.
- The motor lubricant can be added/released through the lubricant tube to/from the outside of the fan.
- Vibration isolators are professionally selected to fulfill the special conditions in Metro/Tunnel environment.
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Designed for High Reliability

- Advanced FEA technology has been repeatedly used during the designing and experimental stages. Thermal expansion and strength are have also been considered, ensuring continuous operation under 300°C.
- The aluminum alloy casted blades have undergone advanced welding process and X-ray metal inspection, ensuring the quality and the safety of the fan.
- Each wheel has been dynamically balanced to G2.5, reducing vibrations.
- A series of tests such as overspeed test, mechanical performance, vibration, and pneumatic performance are performed on each wheel before leaving the factory.
- Heavy duty bolts are being used between the blades and the hub, ensuring durability.
- Each fan housing is formed by superior thick steel plate and welded to the highest structural quality.

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- The motor lubricant can be added/released through the lubricant tube from the outside of the fan.
- Vibration isolators are professionally selected to fulfill the special conditions in Metro/tunnel environment.
Compact Design

The fan consists of wheel, motor, housing, anti-surge device, supports and vibration isolators. It can either be installed horizontally or vertically.

YFMRT(R) Model Number Naming Code

YFMRT (R)  2000D6

- Productname: Vane Axial Fan For Metro and Tunnel
- (R): Truly Symmetrical

Drive modes:
- D: Direct drive
- E: 6-pole motor

Fan diameter: 2000mm

YFMRT(R) Reversible Axial Fan Structure

Compact Design

The fan consists of wheel, motor, housing, anti-surge device, supports and vibration isolators. It can either be installed horizontally or vertically.

- The wheel: Consists of the hub and the blades. The aluminum alloy casted blades have undergone advanced welding process, X-ray metal inspection, and then dynamically balanced. The angle of the blades can be adjusted for different working conditions. Adjust the blades by undoing the bolts of the blades when the fan is powered off.
- Motor: The motor is IP55 dust & water protection class, insulation class H. Reliable shaft (brand like SKF, NSK) is used to match the motor. Lubricant refill/release hole, shaft temperature alarm and wiring box are installed on the outside of the housing.
- Fan Housing: High quality steel casted housing is designed to meet its compact requirement.
- Air guiding Vane: Minimize noise effectively.
- Fan installation support: Light weight and easy to install.
- Anti-surge device: Prevent the fan to stall and surge.
- Ease of Maintenance/ Repair: The fan is design for easy maintenance/ repair. Disconnect the flexible connectors from both ends, then undo the bolts on the ground.
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### YFMRT(R) Reversible Axial Fan Installation Diagram

#### YFMRT Dimensional diagram for Ground Mount installation

![Diagram](image)

#### YFMRT Dimensional Diagram for Vertical Mount Installation

![Diagram](image)

#### YFMRT(R) Axial Fan Installation Dimension (Horizontal Mount)

<table>
<thead>
<tr>
<th>Model</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>H</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
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<th>d</th>
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</thead>
<tbody>
<tr>
<td>YFMRT(R)-1250</td>
<td>1260</td>
<td>1330</td>
<td>1380</td>
<td>760</td>
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<td>1140</td>
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<td>1160</td>
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<td>800</td>
<td>250</td>
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<td>840</td>
<td>250</td>
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<td>2160</td>
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<td>900</td>
<td>250</td>
<td>1350</td>
<td>1740</td>
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<td>2160</td>
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<td>100</td>
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<td>1830</td>
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<td>250</td>
<td>1930</td>
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<td>250</td>
<td>2010</td>
<td>2620</td>
</tr>
</tbody>
</table>

Note: The maximum length of the fan is for reference only; actual length may vary according to the motor power.

#### YFMRT(R) Axial Fan Installation Dimension (Vertical Mount)

<table>
<thead>
<tr>
<th>Model</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>H</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>n-φd1</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>YFMRT(R)-1250</td>
<td>1260</td>
<td>1330</td>
<td>1380</td>
<td>760</td>
<td>400</td>
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<td>20-φ14</td>
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<tr>
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<td>1410</td>
<td>1480</td>
<td>1550</td>
<td>825</td>
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<td>2200</td>
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<td>2370</td>
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<td>18</td>
</tr>
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<td>2160</td>
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<td>24-φ14</td>
<td>18</td>
</tr>
<tr>
<td>YFMRT(R)-2100</td>
<td>2112</td>
<td>2240</td>
<td>2340</td>
<td>1215</td>
<td>600</td>
<td>2400</td>
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<td>24-φ14</td>
<td>18</td>
</tr>
<tr>
<td>YFMRT(R)-2200</td>
<td>2214</td>
<td>2330</td>
<td>2410</td>
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<td>24-φ14</td>
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<tr>
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<td>24-φ14</td>
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<tr>
<td>YFMRT(R)-2500</td>
<td>2516</td>
<td>2630</td>
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<td>36-φ18</td>
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<td>3480</td>
<td>36-φ18</td>
<td>18</td>
</tr>
</tbody>
</table>

Note: The maximum length of the fan is for reference only; actual length may vary according to the motor power.
### YFMRT(R) Reversible Axial Fan Installation Diagram

#### YFMRT Dimensional Diagram for Ground Mount Installation

![Diagram showing the dimensions for a Ground Mount installation of the YFMRT(R) fan.]

#### YFMRT Dimensional Diagram for Vertical Mount Installation

![Diagram showing the dimensions for a Vertical Mount installation of the YFMRT(R) fan.]

#### YFMRT Dimensional Diagram for Horizontal Mount Installation

![Diagram showing the dimensions for a Horizontal Mount installation of the YFMRT(R) fan.]

### YFMRT(R) Axial Fan Installation Dimension (Horizontal Mount)

<table>
<thead>
<tr>
<th>Model</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>M</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L</th>
<th>B1</th>
<th>B2</th>
<th>n-φd1</th>
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<td>760</td>
<td>80</td>
<td>700</td>
<td>250</td>
<td>1110</td>
<td>1000</td>
<td>1140</td>
<td>20-φ14</td>
</tr>
<tr>
<td>YFMRT(R)-1400</td>
<td>1410</td>
<td>1480</td>
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<td>250</td>
<td>1350</td>
<td>1090</td>
<td>1250</td>
<td>20-φ14</td>
</tr>
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<td>YFMRT(R)-1500</td>
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<td>1580</td>
<td>1650</td>
<td>860</td>
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<td>800</td>
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<td>800</td>
<td>250</td>
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<td>2520</td>
<td>2720</td>
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### YFMRT(R) Axial Fan Installation Dimension (Vertical Mount)

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<th>D3</th>
<th>M</th>
<th>L1</th>
<th>L2</th>
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<th>L</th>
<th>B1</th>
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<th>n-φd1</th>
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</thead>
<tbody>
<tr>
<td>YFMRT(R)-1250</td>
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<td>1330</td>
<td>1380</td>
<td>760</td>
<td>80</td>
<td>700</td>
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<td>1110</td>
<td>1000</td>
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<td>20-φ14</td>
</tr>
<tr>
<td>YFMRT(R)-1400</td>
<td>1410</td>
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<td>740</td>
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<td>1090</td>
<td>1250</td>
<td>20-φ14</td>
</tr>
<tr>
<td>YFMRT(R)-1500</td>
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<td>1580</td>
<td>1650</td>
<td>860</td>
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<td>24-φ14</td>
</tr>
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<td>1690</td>
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<tr>
<td>YFMRT(R)-2000</td>
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<td>1210</td>
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<td>960</td>
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</tr>
<tr>
<td>YFMRT(R)-2100</td>
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<td>24-φ14</td>
</tr>
<tr>
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<td>2440</td>
<td>1610</td>
<td>100</td>
<td>1000</td>
<td>250</td>
<td>3630</td>
<td>3180</td>
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</tr>
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<td>100</td>
<td>1000</td>
<td>250</td>
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<td>4880</td>
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<td>1000</td>
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<td>5480</td>
<td>36-φ18</td>
</tr>
</tbody>
</table>

Note: The maximum length of the fan is for reference only; actual length may vary according to the motor power.

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### YFMRT(R) Reversible Axial Fan Installation Diagram

- **Model**: YFMRT(R)
- **Type**: Reversible Axial Fan
- **Size**: Dimensions (mm)
- **Orientation**: Ground Mount, Vertical Mount, Horizontal Mount

![Diagram showing the dimensions and orientation of the YFMRT(R) fan.]

Note: The maximum length of the fan is for reference only; actual length may vary according to the motor power.
YFMRT(R) Reversible Axial Fan Model Selection

1. Appropriate model can be selected by matching the required values to the performance curve provided in this booklet. INFINAIR can provide assistance for any special requirements.
2. The default performance parameters used in the booklet are as follows: Atmospheric Pressure: P = 1.013x10^5 Pa; Atmospheric Temperature: t = 20℃ (293K); Relative Humidity: r=50%; Air Density: ρ=1.2 kg/m³. If the temperature changes from t(k) to t'(k), then the density is ρ = ρ(k)/[1 + (t(k)-t'(k))/273].
3. Please refer to the conversion table below to calculate the performance parameters should the working condition and requirements are different from standard.
4. User can select the relative model according to the fan curve provided. The performance parameters of the selected model are also available for reference.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed value</th>
<th>Air flow</th>
<th>Total pressure</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>n, ρ</td>
<td>Q= QₙM/n</td>
<td>Rₘ= PₙM/n²</td>
<td>Nₘ= NₙM/n³</td>
<td></td>
</tr>
<tr>
<td>ρ, n</td>
<td>Q= Q</td>
<td>Rₘ= PρₙM/n</td>
<td>Nₘ= NρₙM/n</td>
<td></td>
</tr>
<tr>
<td>D, ρ, n</td>
<td>Q= QDₜ/D⁵</td>
<td>Rₘ= PρₙM/n (Dₜ/n)²</td>
<td>Nₘ= NρₙM/n (Dₜ/n)³</td>
<td></td>
</tr>
<tr>
<td>n, ρ, D</td>
<td>Q= Qnₙ/nD</td>
<td>Rₘ= PρₙM/n (nₙ/D)²</td>
<td>Nₘ= NρₙM/n (nₙ/D)³</td>
<td></td>
</tr>
<tr>
<td>ρ, n</td>
<td>Q= QDₜ/D⁵</td>
<td>Rₘ= PρₙM/n (Dₜ/n)²</td>
<td>Nₘ= NρₙM/n (Dₜ/n)³</td>
<td></td>
</tr>
</tbody>
</table>

Reference: Q (Air Volume), P (Total Pressure), ρ (Air Density), n (RPM), D (Fan Diameter).

![YFMRT(R)-D4(50Hz) Performance Curve](image1)

![YFMRT(R)-D6(50Hz) Performance Curve](image2)
YFMRT(R) Reversible Axial Fan Model Selection

1. Appropriate model can be selected by matching the required values to the performance curve provided in this booklet. INFINAIR can provide assistance for any special requirements.

2. The default performance parameters used in the booklet are as follows: Atmospheric Pressure: $P = 1.013 \times 10^5$ Pa; Atmospheric Temperature: $t = 20 ^\circ C (293k)$; Relative Humidity: $r=50$%; Air Density: $\rho = 1.2$ kg/m³. If the temperature changes from $t_k$ to $t_k'$, then the density is $\rho = p \left( \frac{t_k'}{t_k} \right)$.

3. Please refer to the conversion table below to calculate the performance parameters should the working condition and requirements are different from standard.

4. User can select the relative model according to the fan curve provided. The performance parameters of the selected model are also available for reference.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed value</th>
<th>Air flow</th>
<th>Total pressure</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n$</td>
<td>$D, \rho$</td>
<td>$Q_M = \frac{Q}{n}$</td>
<td>$R_M = \frac{P_M}{n}$</td>
<td>$N_M = \frac{N}{n^2}$</td>
</tr>
<tr>
<td>$\rho$</td>
<td>$D, n$</td>
<td>$Q_M = Q$</td>
<td>$R_M = \frac{P_M}{\rho}$</td>
<td>$N_M = \frac{N}{\rho}$</td>
</tr>
<tr>
<td>$D$</td>
<td>$\rho, n$</td>
<td>$Q_M = \frac{Q}{D^3}$</td>
<td>$R_M = \frac{P_M}{D^2}$</td>
<td>$N_M = \frac{N}{D}$</td>
</tr>
<tr>
<td>$n, \rho$</td>
<td>$D$</td>
<td>$Q_M = \frac{Q}{n}$</td>
<td>$R_M = \frac{P_M}{\rho} \left( \frac{n}{n} \right)^2$</td>
<td>$N_M = \frac{N}{\rho} \left( \frac{n}{n} \right)^3$</td>
</tr>
<tr>
<td>$n, D$</td>
<td>$\rho$</td>
<td>$Q_M = \frac{Q}{n^3}$</td>
<td>$R_M = \frac{P_M}{D^2} \left( \frac{n}{n} \right)^2$</td>
<td>$N_M = \frac{N}{D} \left( \frac{n}{n} \right)^5$</td>
</tr>
<tr>
<td>$\rho, n$</td>
<td>$n$</td>
<td>$Q_M = \frac{Q}{D^3}$</td>
<td>$R_M = \frac{P_M}{\rho} \left( \frac{D}{D} \right)^2$</td>
<td>$N_M = \frac{N}{\rho} \left( \frac{D}{D} \right)^5$</td>
</tr>
</tbody>
</table>

Reference: $Q$ (Air Volume), $P$ (Total Pressure), $\rho$ (Air Density), $n$ (RPM), $D$ (Fan Diameter).
The YFTNV/YFTNV(R) series fan is combined with wheel, motor, hub, guiding cover, silencer and installation supports. Unidirectional and reversible model are available.

YFTNV/ YFTNV (R) Jet Fan Structure

The YFTNV/YFTNV(R) series fan is combined with wheel, motor, hub, guiding cover, silencer and installation supports. Unidirectional and reversible model are available.
Performance Curve YFMRT(R)-2800

Due to the resolution of the graphs, please contact one of our sales representatives for high quality version if required.
The email address is intservice@infinair.com.
The wheel: Consists of the hub and the blades. The aluminum alloy casted blades have undergone advanced welding process, X-ray metal inspection, and then dynamically balanced. The angle of the blades can be adjusted for different working conditions. Adjust the blades by undoing the bolts of the blades when the fan is powered off.

Motor: The motor is IP55 dust & water protection class, insulation class H. Reliable shaft (brand like SKF, NSK) is used to match the motor. Lubricant refill/release hole, shaft temperature alarm and wiring box are installed on the outside of the housing.

Fan Housing: High quality steel casted housing is designed to meet its compact requirement.

Silencer: Silencers are installed on both ends fan. The length of the silencer is normally twice the diameter of the fan (1D). It can go up 3 times the diameter if high noise reduction level is required.

The YFTNV series Jet fan has already passed the fire resistant tests and has been accredited by the national certification body. It shall maintain the fan in operation for at least an hour under 280°C. Hence, create sufficient time for escape or rescue in case of fire.

The airflow direction is reversible to discharge smoke in both directions if necessary. Airflow direction can be changed within 30 seconds.

Easy to install and maintain.

YFTNV/YFTNV(R) Jet Fan Testing

• Trust Test: The jet fan has been tested on the trust testing device according to the guidelines set out in ISO13350.

• Fire & Smoke Test: The test was carried out at the Tianjin Fire inspection center in China.

• Noise Test: Two jet fans were tested for noise performance, one with silencers installed on both ends and one without (control sample). The testing devices were positioned at 45 degree above and 10 m away.

• Fan Performance: The units use for thrust and input power are N and kW respectively.

Air volume test, mechanical test, vibration test, airflow direction switching time are performed at the INFINAIR’s AMCA accredited laboratory.

YFTNV/YFTNV(R) Model Number Naming Code

YFTNV (R) — 1120 D4/d — 37

- Product name
- Jet Fan
- (R) Truly symmetrical
- NO: Uni-Directional
- Fan diameter
- Unit: mm

Motor power
- Unit: kW

Wheel angle (a/b/c/d/e/f)

Drive modes
- D: Direct drive
- 4: 4-polic motor

YFTNV/YFTNV(R) Jet Fan Dimensional Diagrams

Dimensional Diagram for YFTNV/YFTNV(R) Jet Fan w/ silencer

<table>
<thead>
<tr>
<th>Model</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>E</th>
<th>N×B</th>
<th>L1</th>
<th>L2</th>
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<td>640</td>
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<td>710</td>
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<td>2560</td>
<td>4360</td>
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</table>
The wheel: Consists of the hub and the blades. The aluminum alloy casted blades have undergone advanced welding process, X-ray metal inspection, and then dynamically balanced. The angle of the blades can be adjusted for different working conditions. Adjust the blades by undoing the bolts of the blades when the fan is powered off.

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Silencer: Silencers are installed on both ends fan. The length of the silencer is normally twice the diameter of the fan (1D). It can go up 3 times the diameter if high noise reduction level is required.

The YFTNV series Jet fan has already passed the fire resistant tests and has been accredited by the national certification body. It shall maintain the fan in operation for at least an hour under 280°C. Hence, create sufficient time for escape or rescue in case of fire.

The airflow direction is reversible to discharge smoke in both directions if necessary. Airflow direction can be changed within 30 seconds.

Easy to install and maintain.

YFTNV/YFTNV(R) Jet Fan Testing

- Trust Test: The jet fan has been tested on the trust testing device according to the guidelines set out in ISO13350.
- Fire & Smoke Test: The test was carried out at the Tianjin Fire inspection center in China.
- Noise Test: Two jet fans were tested for noise performance, one with silencers installed on both ends and one without (control sample). The testing devices were positioned at 45 degree above and 10 m away.
- Fan Performance: The units use for thrust and input power are N and kW respectively.
- Air volume test, mechanical test, vibration test, airflow direction switching time are performed at the INFINAIR’s AMCA accredited laboratory.

YFTNV/YFTNV(R) Model Number Naming Code

<table>
<thead>
<tr>
<th>Product name</th>
<th>Motor power</th>
<th>Wheel angle</th>
<th>Drive modes</th>
</tr>
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<tbody>
<tr>
<td>YFTNV (R)</td>
<td>kW</td>
<td>(a/b/c/d/e/f)</td>
<td>D: Direct drive</td>
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<tr>
<td>D4/d</td>
<td></td>
<td></td>
<td>4: 4-pole motor</td>
</tr>
<tr>
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YFTNV/YFTNV(R) Jet Fan Dimensional Diagrams

Dimensional Diagram for YFTNV/YFTNV(R) Jet Fan w/ silencer

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<thead>
<tr>
<th>Model</th>
<th>D1</th>
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<th>D3</th>
<th>E</th>
<th>N×B</th>
<th>L1</th>
<th>L2</th>
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<td>200</td>
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The air quality inside the tunnel, metro and road tunnel relied heavily by ventilation system within. The chart above illustrated the effects of polluted air to the human body.

How Carbon Monoxide affects the human body:

The primary air pollutants emitted by motor vehicles are carbon monoxide (CO), nitrogen oxides (NOx, including NO and NO2), hydrocarbons (HCs) and particulate matter (PM). Vehicular exhaust has become a main source of air pollution. Inadequate ventilation in the tunnels combined with high traffic volume can result in elevated concentrations of vehicle-induced air pollutants. Therefore, the efficiency of discharging polluted air while bringing in fresh air is a crucial part in designing an effective tunnel ventilation system.

According to the recommendations from the WHO, the amount of Nitrogen oxides (NOx) has become the indicator in measuring the efficiency of the ventilation system. Minimum visibility is also required inside the tunnel. Emergency exits have to be well indicated and visible. Thus, the tunnel ventilation system is required to remain operational in the event of fire or other accident.

Our YFTNV/YFTNV(R) series are designed to perform according to the recommendations from the WHO. It has been tested and certified to remain operational under 280 degree C for one hour which is higher than the Chinese national standard of 250 degree C for one hour. All of our products have undergone tough quality inspection prior delivery.

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Tunnel Ventilation System Design Factors:

1. Traffic tunnels are used for metro, road and railway.

2. Reliability and safety are important to the tunnel ventilation system. Ensure all the interconnecting parts (see below) within the system are functioning properly under normal or emergency operation:
   - A. Mechanical System: ventilation, fire/smoke, drainage.
   - B. Power System: Power supply, power grid, auxiliary power.
   - C. Lighting System: Tunnel, illuminant.
   - D. Communication System: Phone, radio, computer server.
   - E. Transport System: Light, signal, signage, monitoring.
   - F. Control System: Traffic status, equipment status.

3. Tunnel ventilation system can be operated by the below methodologies. They can be operated individually or combined together:
   - I. Vertical System: This is the most basic installation method. This exhausts polluted air through the top of the tunnel.
   - II. Horizontal System: This system exhausts polluted air inside a tunnel through a shaft and/or a duct and supplies external fresh air into the tunnel by using fans installed in a ventilation section or a ventilation tower.
   - III. Semi-horizontal System: The exhaust and the delivery of air can be operated separately. The delivering method is similar to the horizontal system.

4. Factors to be considered:
   - A) Investment Cost.
   - B) Power Capacity
   - C) Operational Cost.
   - D) Air Quality.
   - E) Safety Issues.
   - F) Emergency Procedures.

5. Factors to determine the number of fan units and model selection:
   - A) The density of CO, NOx and smoke.
   - B) Traffic volume and speed.
   - C) Wind loading.
   - D) Vehicular exhaust (no. of vehicle, age of vehicles)
   - E) Emergency procedures in the event of fire.

6. Calculations of thrust required in the tunnel ventilation system:

   1. Factors to be considered for thrust calculation:
      - Loss at outlet/inlet
      - Surface friction
      - Airflow velocity outside the entrance/exit under poor conditions.
      - Geographic location of the tunnel such as latitude, slope degree, etc.
      - Thrust required in the event of fire (temperature, pressure, time).

   2. Conversation of tunnel pressure into the thrust requires for the jet fan:
      - The thrust requires for the jet fan is the air volume difference between the outlet and the inlet:
        \[ \text{Ns} = \text{C1} \times \text{mass flow} \times \text{airflow velocity} \]
        Where, \( \text{Ns} = \text{C1} \times \text{mass flow} \times \text{airflow velocity} \)
        \( \text{C1} = \text{Empirical correction factor} \)
        \( \text{mass flow} = \text{Air Density} \times \text{Volume} \)
      - The airflow velocity between the jet fan and outside is affected by the friction and the airflow loss between the positions of the fan. Therefore, the thrust should be:
        \[ \text{Ne} = \frac{\text{Nfan}}{\text{(1-Vj/Vt)}} \times \text{C2 X C3} \]
        Where, \( \text{Nfan} \) = fan’s thrust (N)
        \( \text{Vj} = \text{Jet Velocity (m/s)} \)
        \( \text{Vt} = \text{Airflow velocity inside the tunnel (m/s)} \)
        \( \text{C2} = \text{Friction inside the tunnel} \)
        \( \text{C3} = \text{Airflow loss between the position of the fan} \)

        (It can be ignored if the space interval between each fan is more than 100 times of the diameter of the fan).
HERCULES SERIES
PRODUCTS

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P.C.: 201806
Tel.: 86 21 39185688
Http: //www.infinair.com
Catalog YFMRT(R) & YFTNV(R) Version: 2017-1

Metro/Tunnel Axial & Jet Fan

HERCULES SERIES PRODUCTS

- High efficiency and liability, low noise
- General supply and exhaust ventilation, heating exhaust, fire smoke exhaust

YFMRT(R) & YFTNV(R)