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|---|-------------------------|------------------|---|
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天瑞重工  
精益求精

**Industry Leader**  
Independent Core Technology  
Independent Research and Development  
Authoritative Institution Certification

Magnetically suspended future  
Wind drum world

Magnetically suspended future  
Wind drum world



**磁 悬 浮 鼓 风 机**  
MAGLEV TURBO BLOWER



天瑞重工  
精益求精

**山东天瑞重工有限公司**

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**山东天瑞重工有限公司**  
SHANDONG TIANRUI HEAVY INDUSTRY CO.,LTD.



## Enterprise Spirit

### R & D concept:

Develop and provide practical, dedicated, safe, products and services;  
Be enthusiastic about users, partners and new technologies, and maintain sustainable development.  
Continuous integration of internal and external resources, better create value for customers, shape the competitive advantage of the entire industrial chain.

## Core Competence

### Quality advantage

The products are manufactured and constructed in strict accordance with national standards and international testing requirements.

### Technical advantages

High-quality expert-level R&D team, enlarged capital investment and protection, focusing on technical exchanges with the industry and technical cooperation in the industry.

### Material advantage

With the continuous development and growth of the company, we are now signing perennial cooperation contracts with a number of powerful manufacturers. Provide a stable supply of materials for the company.

### Construction advantage

High quality, high efficiency and strict prohibition of professional construction team, with strong practical experience and technology and good industry quality, to win the lasting trust of customers.

## CONTENTS

Magnetically suspended future  
Wind drum world

|                             |    |
|-----------------------------|----|
| Company profile             | 01 |
| Corporate culture           | 02 |
| Qualification and honor     | 03 |
| Production workshop         | 04 |
| Product introduction        | 05 |
| Performance characteristics | 06 |
| Industry application        | 07 |
| Working principle           | 08 |
| Host structure              | 09 |
| Overall structure           | 10 |
| Five Core Technologies      | 11 |
| Performance comparison      | 12 |
| Five advantages             | 13 |
| Specification type          | 14 |
| Outline size                | 14 |
| Product selection           | 15 |
| Energy saving case          | 15 |
| Engineering case            | 16 |

## Industry Leader

Independent Core Technology

Independent Research and Development

Authoritative Institution Certification





Chairman and Researcher of the Company, Li Yongsheng



- ◇ Experts on Special Allowances of the State Council
- ◇ Leading Talents of the National "Ten Thousands Plan"
- ◇ Shandong Province "Taishan Industry" Leading Talents
- ◇ High-end Talents in Shandong Think Tank
- ◇ Doctoral Tutor of Shandong University
- ◇ Doctoral Tutor, Ocean University of China
- ◇ Postgraduate Tutor of China University of Petroleum
- ◇ Member of National Technical Committee for Heat Treatment Standardization Deputy
- ◇ Director of Shandong Materials Society

### Company mission

Magnetic floating force, green world.

### Company vision

To be a first-class product in the industry and to create world-famous brands.

### Core values

Unity, Progress, Struggle and Innovation  
Integrity, Green, Cooperation and Win-win

## Corporate Culture

## Company Profile

Shandong Tianrui Heavy Industry Co., Ltd. was founded in 2008, located in Weifang High-tech Zone. It is a high-tech enterprise engaged in research and development of magnetic levitation technology and rock drilling machinery. It is the single champion of manufacturing industry of the Ministry of Industry and Information Technology of China, the gazelle enterprise of the national high-tech zone, the single champion of manufacturing industry of Shandong Province, the invisible champion enterprise of Shandong Province, and the intellectual property brand unit of 100 key technologies of Shandong Province. The State Intellectual Property Advantage Enterprises are the key project support units of the Ministry of Science and Technology, the Development and Reform Commission, the Ministry of Industry and Information Technology and the Marine and Fisheries Administration. The company has five provincial innovation platforms.

Tianrui Heavy Industries has a leading R&D team in the industry. The company has 167 patents authorized by the state and 3 famous brand products in Shandong. The company has passed ISO 9001:2008 international quality system, environmental system, occupational health system, measurement, intellectual property management system certification, CE certification and MA coal safety certification. It has successively won the national advanced machinery industry quality-benefit enterprises, Ministry of Industry and Information Technology industrial brand cultivation pilot enterprises, Shandong AAA-level standardized good behavior enterprises, Shandong intellectual property rights enterprises. Demonstration enterprises, Weifang Mayor Quality Award and other honorary titles.

After 6 years of research and development, market promotion, Tianrui Heavy Industries' magnetic suspension blower has been rapidly applied in municipal sewage treatment, paper making, chemical industry, cement and other industries, and has been highly recognized by users. Compared with the traditional Roots blower, the power-saving rate is 30-40%, and the noise is reduced to less than 80 dB. It provides a high-quality solution for the upgrading and upgrading of customers, and has outstanding economic and social benefits. Shandong Development Investment Holding Group Co., Ltd. has invested in Shandong Tianrui Maglev Blower Industry, which will provide strong financial and policy support to promote the development of Maglev emerging industries. According to the evaluation of China Hi-tech Industrialization Research Association, it is concluded that the energy-saving and noise-reducing effect of the magnetic suspension blower developed by international cooperation has reached the international advanced level.

Adhering to the tenet of "excellence, professional focus, exceeding expectations and creating success", the company makes first-class products in the industry and creates world-renowned brands.





## Qualification and honor

### Innovation platform

The company is a national high-tech enterprise with five provincial innovation platforms and six municipal innovation platforms:

1. Shandong Rock Drilling Machinery Engineering Laboratory
2. Shandong Rock Drilling Machinery Demonstration Engineering Technology Research Center
3. Shandong Enterprise Technology Center
4. Shandong Marine Engineering Technology Co-innovation Center
5. Shandong Rock Drilling Machinery Research and Development Center

- **Authorized patents:** 167 national patents are authorized;
- **Science and technology awards:** 12 provincial and ministerial science and technology progress awards; 45 prefectural science and technology progress awards;
- **Formulating standards:** formulating three national standards;
- **Product Honour:** 3 famous brand products in Shandong Province, 3 satisfied products for China's machinery industry users;



## New Maglev Production Base - China Maglev Town



The first phase invests 300 million yuan and covers an area of 67.8 mu, forming an annual production capacity of 1500 magnetic levitation products.

## Production workshop





## Brief Introduction of Maglev Blower

### Product introduction

The magnetic suspension blower produced by Tianrui Heavy Industries is a high-tech green energy-saving environmental protection product. Advanced magnetic bearing, three-dimensional flow turbine, high-speed permanent magnet synchronous motor, high-speed variable frequency speed regulation, intelligent monitoring and control technology are adopted. When starting, it is suspended and rotated first, without friction, without lubrication, direct connection between turbine and rotor, and zero transmission loss. Compared with Roots blower, it can save 30%-40% energy and reduce noise to less than 80 dB. It is widely used in sewage treatment, aquaculture, steel, cement, food, brewing, textile, petrochemical, thermoelectric and other fields.



### Performance characteristics



THERE'S NOTHING WRONG WITH CHOOSING US.

## Industry application



### Maglev blower can be used in many industries

#### Material gas transportation

Cement plant, chemical industry, food and other industries: used in industrial raw materials, dust, food raw materials and other pneumatic conveying.

#### Sewage treatment (municipal, industrial)

It is mainly used to aerate the sewage tank, so that the biological active substances in the sewage tank can fully contact with the substances in the sewage, so as to achieve the purpose of decontamination.

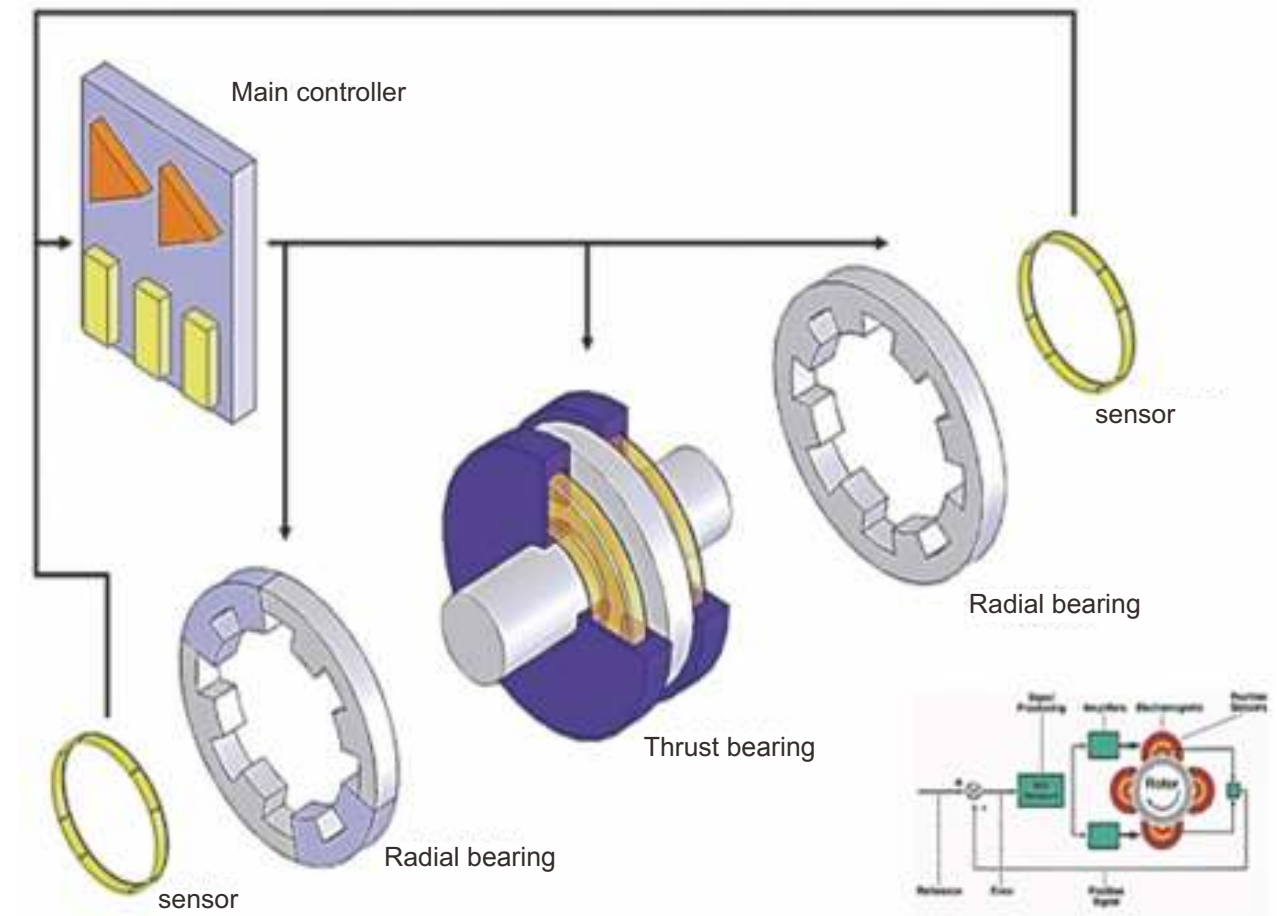
#### Aquaculture

Air was injected into the bottom of aquaculture pond to increase the oxygen content in the pond and increase the survival rate of aquatic products.

#### Other required industries

Paper mill, brewing industry, textile industry, dairy processing industry, thermoelectric industry, etc.

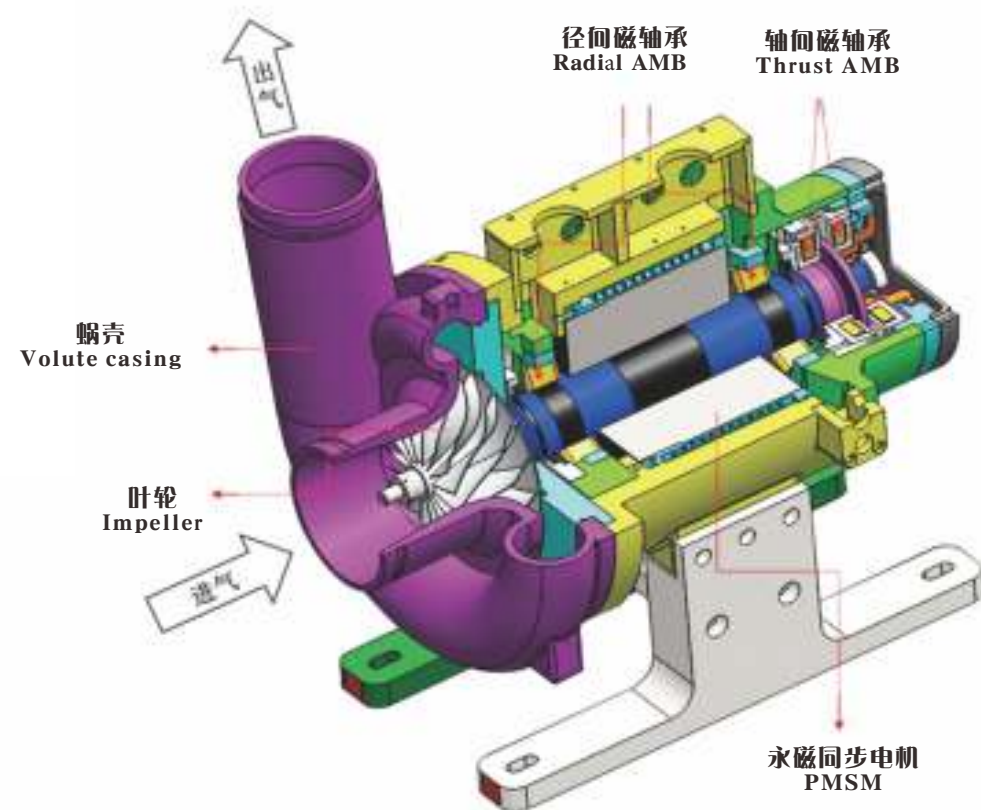
## Working principle



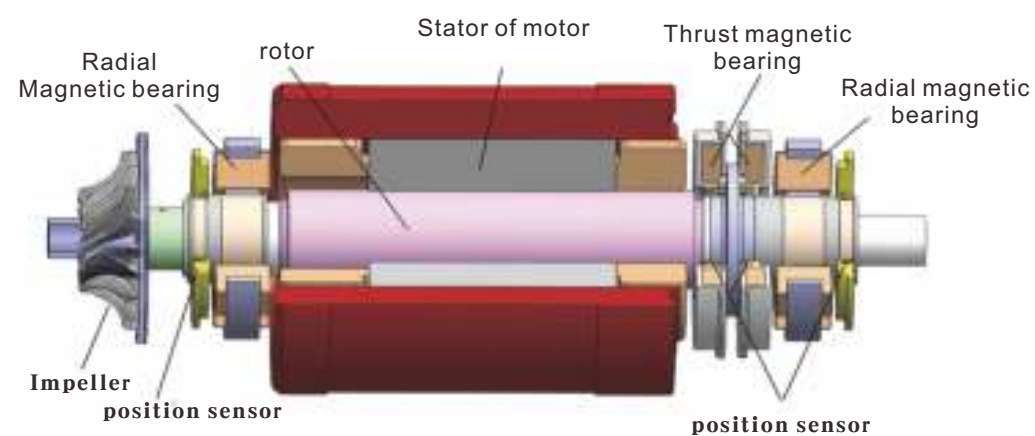
Active magnetic suspension bearing system is the core system of magnetic suspension blower. The motor rotor is fixed between two radial actuators and two axial actuators. The position of the rotor is detected by position sensor, and the position signal is reflected to the actuator controller in real time. When the rotor is offset, the controller will adjust the magnetic force of the degree of freedom of the magnetic bearing according to the offset of the rotor, so that the rotor can return to the correct position.



## Host Structure

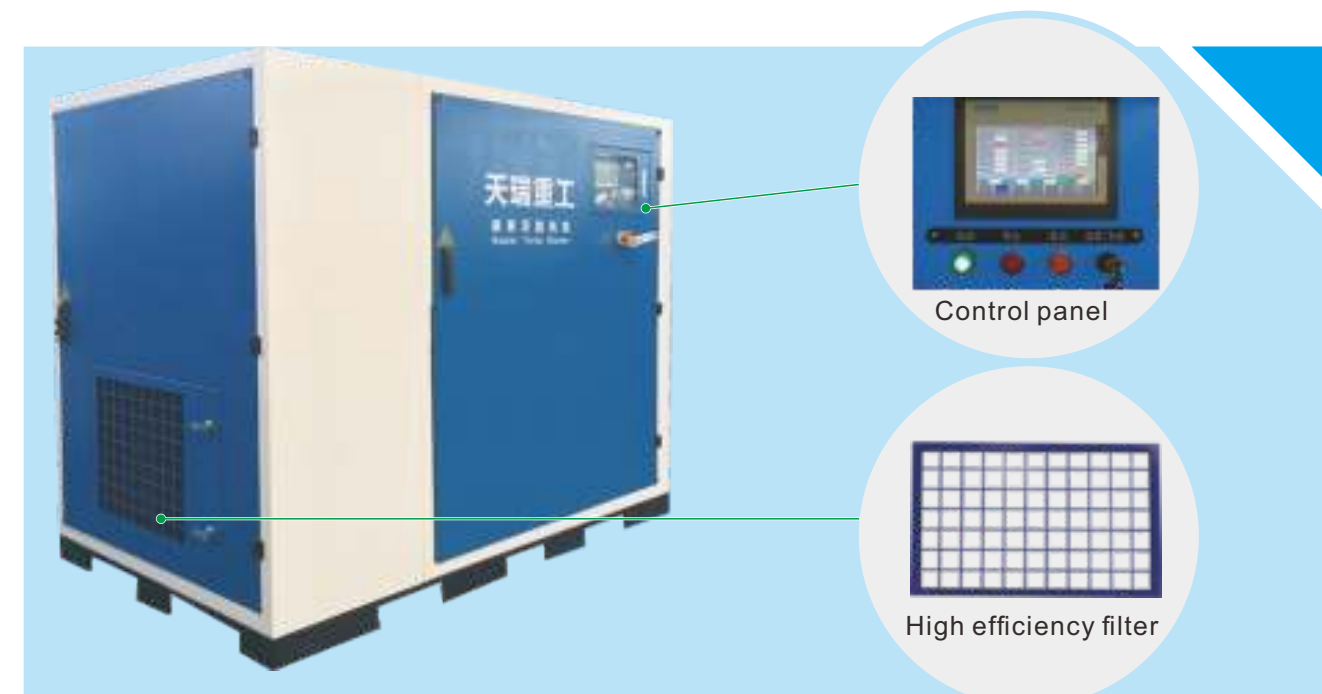


### Maglev Motor Horizontal Placement- Structural Leadership in the World

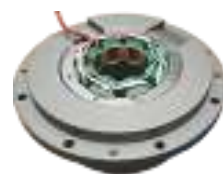


Rotor and impeller directly connected, no redundant transmission link - **energy saving and consumption reduction**

## Overall structure



## Five Core Technologies



### AMB

Controllable electromagnetic force is used to suspend the blower shaft without contact and wear. It has the characteristics of no mechanical wear, low noise and no lubrication.



### Hydrodynamic impeller

The centrifugal impeller of high strength aluminium alloy processed by 5-axis precision machine tools is designed by three-dimensional flow method, which maximizes the efficiency of centrifugal impeller and has high service life.



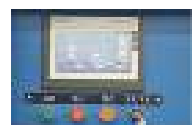
### High Efficiency Inverter

Frequency regulation of high-speed permanent magnet motor is carried out by using frequency converter. All of these can be monitored by integrated HMI.



### Stator of motor

Compact stator and filling permanent magnet rotor structure are adopted. It has the characteristics of high speed, high efficiency and long service life.



### Control system

It uses 256-bit LCD-TFT touch screen and 800\*480 DPI high resolution wide screen to provide users with a variety of communication interfaces. It has anti-surge (SURGE) protection function and maximizes product safety. Provide a variety of modes of operation.

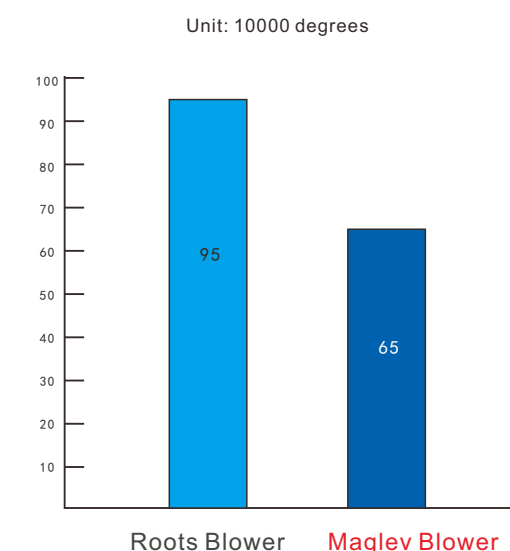
## Performance comparison

| Type                      | Roots blower                                 | Single stage centrifugal blower              | Air suspension blower                        | Maglev Blower                                |
|---------------------------|--|--|--|--|
| Air volume regulation     | Installation of Frequency Converter          | 50-100%                                      | 65-100%                                      | 30-100%                                      |
| friction                  | Yes  | Yes  | Yes  | No   |
| Frequent start up         | Yes  | Yes  | No   | Yes  |
| Noise                     | More than 100 decibels                       | 90-100DB                                     | 75-85DB                                      | 75-85DB                                      |
| Shock                     | Very large                                   | middle-sized and small                       | Very small                                   | Very small                                   |
| Maintain                  | Need lubrication                             | Complex lubrication systems are required     | No need to lubricate                         | No need to lubricate                         |
| Maintenance mode          | Regular maintenance                          | Regular maintenance by special personnel     | Regular replacement of filters               | Regular replacement of filters               |
| Service life              | 5-8 years                                    | 10years                                      | 10 years (2 years later, frequent faults)    | More than 20 years                           |
| Size                      | Larger volume                                | Larger volume                                | Small volume                                 | Small volume                                 |
| Installation requirements | Fixed to the groundSound insulation measures | Fixed to the groundSound insulation measures | No need to fix and sound insulation measures | No need to fix and sound insulation measures |
| Price                     | low  | Similar price                                |  |  |

## Comparison between Maglev Blower and Roots Blower

| Comparison item  | Maglev Blower | Roots Blower |
|--|---------------|--------------|
| Fan input power  | 75kW          | 110kW        |
| Daily running time   | 24h           | 24h          |
| Annual power consumption   | 648,000kW/h   | 950,400kW/h  |
| A single magnetic suspension blower can save 300,000 kilowatt-hours of electricity per year. |               |              |

Note: The calculation is based on 8640 h/year and 0.8 yuan/kwh.





## Five advantages Help you choose more competitive products

### Environmental Protection

The magnetic suspension blower does not need lubrication, and the air conveyed is clean and pollution-free.

Magnetically suspended bearings are completely friction-free, and the noise of blower is low, which will not affect the surrounding office and living environment.

According to the calculation of 100 kW magnetic suspension blower, each blower can reduce about 275 tons of carbon dioxide emissions per year.

### Cutting-edge technology

Active magnetic bearing system, no wear, no need for lubrication, maintenance.

High-performance frequency converter is used to control the speed, and a variety of control modes can be selected.

Using advanced control system, the operation status can be monitored and controlled remotely, without on-site attendance of personnel.

The fully enclosed air cooling system is used to heat the motor to ensure that the fan is in a stable and efficient operation state. Modular design, convenient and fast maintenance.

### Industrial Big Data Platform

Remote service based on industrial Internet of Things can provide fault warning and online debugging experience for customer equipment throughout its life cycle.

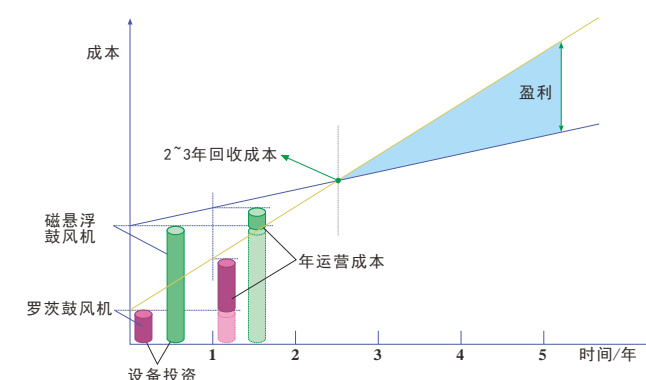
Unique industrial big data platform provides rich algorithmic models to help users improve production links from multiple perspectives.



### Energy conservation

Compared with Roots blower, the efficiency of magnetic suspension blower is improved by more than 30%. Take 100 kW magnetic suspension blower as an example.

Compared with Roots blower, each magnetic suspension blower can save more than 300,000 degrees of electricity and 200,000 yuan of electricity per year.



### Low operating costs

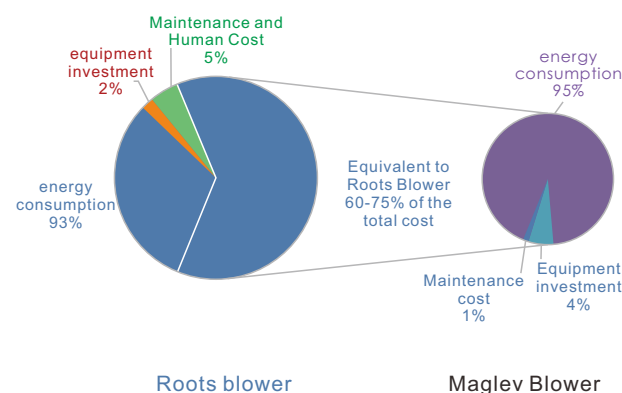
Magnetically suspended bearings are completely friction-free, reducing the probability of product damage, and the service life of blowers can reach more than 20 years.

The maintenance of magnetic suspension blower is simple, only need to change the filter regularly.

Maglev blower does not need lubrication system, which saves the cost of lubricating oil and cleaning.

The motor is driven by direct connection. It is small in size, light in weight and saves space.

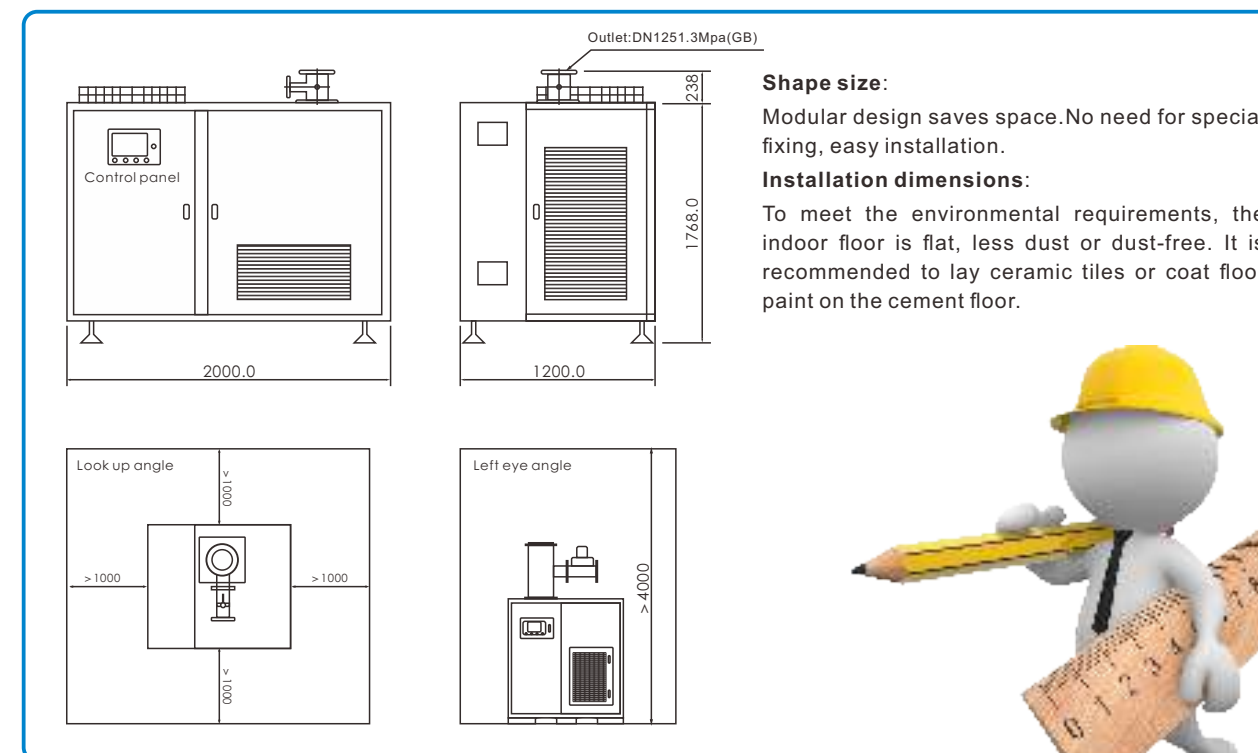
Domestic production can ensure the timely supply of spare parts.



## Specification type

| Model        | Product specification  |                |                  |              |
|--------------|--|----------------|------------------|--------------|
|              | Flow/(m³/min)  | Pressure/(KPa) | Motor power/(kW) | Cooling mode |
| TR055 SERIES | 20~75  | 20~80          | 55               | Air          |
| TR075 SERIES | 25~100   | 20~80          | 75               | Air          |
| TR110 SERIES | 40~150   | 20~80          | 110              | Air          |
| TR150 SERIES | 50~205   | 20~80          | 150              | Air          |
| TR220 SERIES | 75~310   | 20~80          | 220              | Air          |
| TR300 SERIES | 100~410  | 20~80          | 300              | Air          |
| Remarks      | 1. Model meaning: brand-horsepower-maximum pressure. Example: TR05506, TR brand, 55kW, maximum pressure 60KPa.<br>2. Pressure in the range of 90-140 KPa belongs to the unconventional model, and the supply cycle is prolonged. |                |                  |              |

## Outline size



## Product selection

| Product line  | TR10006                  | TR10008 | TR12004 | TR15008 | TR20007 | TR25007 | TR25010 | TR40008 |
|---------------|--------------------------|---------|---------|---------|---------|---------|---------|---------|
| Pressure(KPa) | Flow m <sup>3</sup> /min |         |         |         |         |         |         |         |
| 30            | 60~70                    | 67~75   | 65~105  | 83~90   | 135~165 | 138~170 |         | 285~295 |
| 40            | 55~67                    | 55~75   | 20~96   | 73~95   | 115~150 | 115~165 |         | 280~295 |
| 50            | 35~66                    | 34~75   | 20~85   | 40~95   | 70~138  | 70~135  |         | 260~290 |
| 60            | 38~61                    | 35~75   |         | 45~95   | 70~110  | 75~105  | 56~136  | 225~280 |
| 70            | 42~45                    | 38~66   |         | 47~90   | 70~80   |         | 62~128  | 110~255 |
| 80            |                          | 40~55   |         | 48~75   |         |         | 68~120  | 120~190 |
| 90            |                          |         |         |         |         |         | 73~114  |         |
| 100           |                          |         |         |         |         |         | 78~106  |         |

Note: The data in the table above are reference data. Consult professionals for specific selection.

## Energy saving case

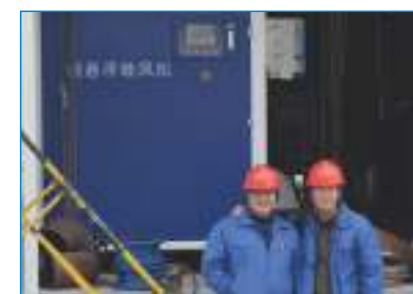
| Name             | Fan Reform Project of a Paper Mill  |               |
|------------------|---|---------------|
|                  | Before  | After         |
| Model            | Roots Blower  | Maglev Blower |
| power            | 132kW   | 100kW         |
| Number           | 1   | 1             |
| noise            | 130dB   | Around 70dB   |
| Maintenance cost | 10%   | 1%            |
| Remarks          | 1. Power saving 37.7%, vibration amplitude 0.08-1.2mm/s, lower than other manufacturers in the same industry products.<br>2. Simple maintenance, easy installation, no need to fix. |               |

## Save more than 30% of electricity

100 kW fan, power saving: 350,000 degrees per year; carbon dioxide emission reduction: 270 tons per year (1 kilowatt-hour = 0.766 kilograms of carbon dioxide).



## Engineering case



A Cement Plant in Weifang



A Sewage Treatment Plant in Shouguang



A Paper Mill in Linyi



A Cement Plant in Shanxi Province



A Chemical Plant in Penglai



A Sewage Treatment Plant in Chongqing



A Thermal Power Plant in Gaomi



Shouguang Chemical Plant



A Power Plant in Weifang



A Sewage Treatment Plant in Chongqing A Chemical Plant in Weifang



A Pharmaceutical Factory in Jining, Shandong Province