



股票代码：002598

MAGNETIC SUSPENSION CENTRIFUGAL BLOWER

# 磁悬浮鼓风机

山东省章丘鼓风机股份有限公司  
Shandong Zhangqiu Blower Co., Ltd



一流的产品品质

Super-quality product

永不停止创新

Never-ending innovation

为社会和用户创造价值

Create value for society and clients

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## 公司简介

### COMPANY PROFILE

山东省章丘鼓风机股份有限公司（以下简称山东章鼓，股票代码002598）是国家重点风机生产企业，具有五十余年的风机设计、制造技术和经验，是国内值得信赖的鼓风机生产和销售厂家。公司先后成立了两家中日合资企业，并在美国设立了分公司，成为国内风机行业第一家在国外建立分公司的企业。目前公司已成为集罗茨鼓风机、罗茨真空泵、离心鼓风机，离心真空泵，工业泵、磨机、气力输送设备、电气控制设备、MVR装置、及系统工程等机械产品研发、设计生产、制造于一体的现代化企业。2011年公司在深交所成功上市。

山东章鼓拥有享受国务院特殊津贴的专家，享受省、市政府津贴的高级专业人才十余名，拥有国内一流的产品研发设计中心。有“泰山学者”、济南“5150”工程引进的日本专家博士，有享受省、市政府津贴的高级专业人才，先后与清华大学、西安交通大学、江苏大学、山东大学、山东科技大学等高等院校建立了产学研基地并保持着密切的合作关系。公司自主研发了多项具有国际领先和先进水平的新产品，拥有一流的产品研发设计中心，建有省级企业技术中心，具有雄厚的设计、科研、开发、试验、检测能力，处于国内机械行业领先地位。

山东章鼓先后荣获“中国机械500强企业”，通用设备制造业“自主创新能力十强”，风机行业“用户满意行业”，“山东省利税五十强企业”等多项荣誉，是国家高新技术企业。



Shandong Zhangqiu Blower Co.,Ltd is one of the most important blower manufacturers in China with over 50 years of experience in R&D and production of Roots type blower. It has invested to set up two Chinese-Japanese joint venture, one sub-company in USA which is the first overseas organization in domestic blowers industry. Now the company has become a large-scale modern producing and design enterprise with products of blowers, heavy-duty equipments, pneumatic conveying systems, industrial pumps and electric equipments.etc

There are experts who are awarded to enjoy special allowance from the State Council, the Province and the City government, Taishan Academician, and a professional talent from Japan with doctor's degree through Jinan City "5150" Talents Policy in the company. It also keeps a good and close cooperating relationship with domestic famous universities like Tsinghua University, Xi'an Jiaotong University, Zhejiang University, Jiangsu University, Shandong University and Shandong University of Science and Technology. The company has a provincial level R&D center with strong ability of research, design, test and inspection and positioning a leading status in domestic machinery industry.

The company is ranked among the top 500 enterprises in Chinese Machinery Industry, the top 10 innovation enterprises in the domestic blower, weighing apparatus, and packaging equipment industries, the top 50 enterprises in taxpaying in Shandong Province. The company is also recognized to be "The Client Satisfaction Enterprises in Blower Industry". "The Famous Brand in Shandong Province", "QILU" is appraised to be "The Most Competitive Power Brand in 2006" and "The Famous Brand in Shandong Province".

# 汗水成就梦想，荣誉见证辉煌

DREAMS WILL BE REALIZED FROM SWEAT,  
CERTIFICATES OF HONOR WITNESS THE BRILLIANCE.

荣誉，见证了价值实现的每一步印记。  
Honor, witnessed every step of value realization.

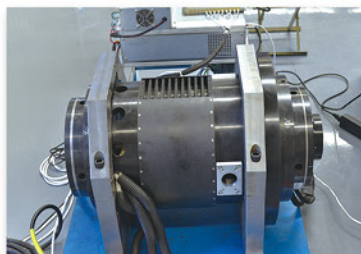




## 一流的精密制造及装配测试基地 First-class lean manufacturing and testing base

山东省章丘鼓风机股份有限公司建有实验室、研发大楼、加工车间等，拥有国际先进、国内领先的高精度加工设备。

Shandong Zhangqiu Blower Co., Ltd. has built laboratories, R & D buildings, processing workshops, etc., with internationally advanced and China leading high-precision processing equipment.



## 磁悬浮技术 Magnetic Suspension Technology

磁悬浮技术依托航天卫星领域的磁悬浮飞轮技术成果的转换。在航天卫星领域磁悬浮飞轮实现了卫星高性能姿态控制和高效能量转换,大幅提升了卫星的姿控和运行水平,有效解决采用的机械支撑传动系统效率低、寿命短、需要定期维护和润滑等问题。

Magnetic Suspension Technology is converted from the magnetic Suspension flywheel technology in the field of space satellite. The high performance attitude control and high efficiency energy conversion of the satellite are realized from magnetic Suspension flywheel technology, which greatly improves the attitude control and operation level of the satellite and effectively solves the problems of low efficiency, short service life, routine maintenance requirement and lubrication issues on mechanical support transmission system.

磁悬浮飞轮  
姿态控制



## 磁悬浮鼓风机 Magnetic Suspension Centrifugal Blower



磁悬浮鼓风机是一种高效、节能、环保产品，采用三元流离心叶轮和高速永磁同步电机集成直驱结构设计。它通过内置的位移传感器实时检测转轴的振动，将得到的信息传入磁悬浮轴承控制器进行调理、运算，产生控制电流，再将该电流输入磁轴承线圈，产生电磁力，从而实现转轴的悬浮。

Magnetic Suspension Centrifugal Blower is a product of high efficiency, energy saving and environment-friendly that is directly mounted by high-speed PMSM and ternary flow centrifugal impeller. The shaft vibration is timely supervised by build-in displacement sensor. The collected data will be input to the Magnetic Suspension Bearing Controller for computation to generate the control current. This current will be input to the windings of Magnetic Suspension Bearing to generate the magnetic force for suspension.

永磁同步电机通过变频器产生频率可控的电流，将此电流输入电机定子产生旋转磁场，带动转轴高速旋转。

PMSM generates frequency controllable current via inverter, this current will be input to the motor stator to generate rotation magnetic field to drive the shaft rotating at high speed.

随转轴高速旋转的叶轮带动空气从蜗壳进气口进入，通过叶轮做功和蜗壳导向成为具有一定流速和压力的气体，从蜗壳排风口排出，从而实现风机鼓风。

The impeller driven by high-speed rotating shaft will take the air from volute casing inlet, and will be forced by impeller and volute casing guidance to generate flow velocity and pressure.

Then will be discharged from volute casing outlet to complete the blowing process.

## ◎ 性能特点 Performance Features

### ■ 节能高效 Energy saving and High efficiency

- 高速永磁电机与高效三元流叶轮直接耦合驱动；  
Ternary flow Impeller is directly coupled with high-speed PMSM;
- 比传统罗茨风机节能30%以上；  
Save more than 30% energy than Roots Blower;
- 比多级离心鼓风机节能20%以上；  
Save more than 20% energy than Multi-stage Centrifugal Blower;
- 比单级高速离心鼓风机节能10%以上。  
Save more than 10% energy than Single Stage High Speed Centrifugal Blower;

### ■ 低噪音 Low Noise

采用自平衡技术，磁悬浮轴承振动量要比传统轴承小一个量级且无摩擦。同时采取主动减振设计，运转稳定，机体振动很小，风机噪声在80db左右。

With the self-balancing technology, the vibration level of Magnetic bearing is lower than traditional bearings, and there is no friction. Adopting the active vibration damping design, the blower can operate smoothly of less vibration.

### ■ 免维护 Maintenance Free

一体化设计，撬装结构，安装便捷，一键启停。日常运行，免机械维护，仅需更换过滤器。

Integrated design, skid mounted structure, convenient installation, one key to start and stop the blower. No need for mechanical maintenance during daily operation, only to replace the filter.

### ■ 智能控制 Intelligent Control

采用PLC+GPRS/3G/4G,可实时监控风机运行状态，实现风量、风压、转速等的智能调控及手动等模式控制。若出现故障，还可以远程维修、调试。

With PLC+GPRS/3G/4G, we can real time monitor the operation status of the Blower and control flow, air pressure and speed by intelligently or manually mode. In case of failure, it can also be repaired and debugged remotely.

## ◎ 应用范围 Application

适用于污水处理、食品药品、石油化工、皮革印染、冶金、纺织、水泥建材等。

It is suitable for sewage treatment industry, food and pharmacy, petrochemical industry, leather printing and dyeing industry, metallurgy, textile industry, cement and building materials industry, etc.



## 性能比较

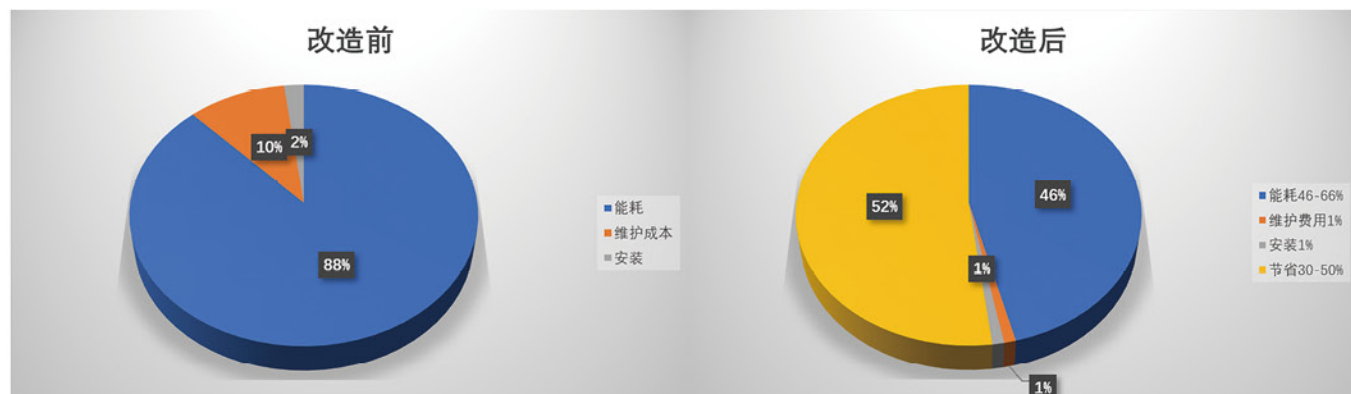
## Performance Comparison

性能比较		罗茨鼓风机	多级离心鼓风机	单级离心鼓风机	空气悬浮鼓风机	磁悬浮鼓风机
轴承	轴承	滚珠轴承	滚珠轴承	可倾瓦轴承	铂片轴承	自主国产磁轴承，国内最早研究成功，技术成熟，稳定性高
	技术来源	国产	国产	进口 / 国产	韩国	航天军工
	寿命	1-2 年	2-3 年	3-5 年	3-5 年	半永久性
	机械损失	轴承能耗 2%	轴承能耗 2%	滑动摩擦，能耗 3% 以上	低速干摩擦，能耗大	电磁感应，轴承能耗低
叶轮	形式	铸造二叶或三叶	焊接碳钢或铸铝	铝合金、不锈钢或钛合金三元流叶轮	铝合金三元流	铝合金或钛合金三元流叶轮
	寿命	5-8 年	10 年	15 年	20 年	20 年
	空气动力学效率	低	低	较高	高	高
高速电机	电动机类型	低速异步电动机	低速异步电动机	异步交流电机	高速永磁电机	自主研发高速永磁电机
	传动形式	皮带或联轴器	联轴器	联轴器	直连	直连
	电机效率	86%	87%	94%	95%	超过 97%
	控制转速	不能	不能	不能	调速精确	调速精确
	类型	没有调速系统，电机功率一定，转速一定，风量不变	没有调速系统，除非更换变频电机和增加变频控制器	导叶调节，机械损失	智能化直流调速系统改变轴的转速改变风量	智能化直流调速系统改变轴的转速改变风量
	工作范围	很小	很小，加变频可适当放宽	流量和压力调节幅度较小	流量和压力调节幅度比较大	流量和压力调节幅度大
安装	基础	需要	需要	需要	不需要	不需要
维护	润滑油	每班检查，定期添加，费用中等	每班检查，定期添加，费用中等	每班检查，定期添加，费用高	无需润滑油	无需润滑油
	易损件	轴承、齿轮	轴承、密封	轴承、齿轮、润滑油泵	轴承、过滤网	过滤网
	费用	低	中	高	高，国内无法维修	低，服务及时
运行	运行费用	最高	高	中	低	最低
	投资费用	最低	中	高	高	高
整机效率		57%	61%	68%	73%	77%
整机价格		低	较低	进口价格高	价格适中，技术封闭	价格适中，满足国内市场需求
售后维保		周期短，费用低，故障率高	周期短，费用高	维保周期长，费用很高	进口维保周期长，费用很高	维保及时，自主核心部件，维修周期短，费用低

# 节能减排

## Energy Saving

某污水处理厂改造项 Renovation project of a sewage treatment plant	
污水处理规模 Sewage treatment scale	20000m <sup>3</sup> /d
替代机型 Replacement models	400kW罗茨鼓风机
磁悬浮鼓风机 Magnetic Suspension Centrifugal Blower	GF 250
节能率 Energy saving rate	30%以上
年节电量 (kW.h) Annual power saving (kW.h)	约87.6万kW.h
碳减排量 (tCO <sub>2</sub> ) Carbon emission reduction (tCO <sub>2</sub> )	约7665 t/a
硫减排量 (tSO <sub>2</sub> ) Sulfur emission reduction (tSO <sub>2</sub> )	约230 t/a



注：在采用鼓风曝气工艺的污水处理厂，鼓风机的电耗约占到全厂电耗的50~60%，使用章鼓磁悬浮鼓风机后，可为其节省30%~50%的费用。

Note: In the sewage treatment plant using the blast aeration process, the power consumption of the blower accounts for about 50 ~ 60% of the whole plant. After using the Zhanggu magnetic suspension blower, it can save 30% ~ 50% of the cost.

3个月更换润滑油

Replace the lubrication oil every 3 months

2-3年左右更换轴承

Replace the bearing around 2-3 years

100KW大致维修费用为1万/年\*台

The maintenance cost for one 100kw motor is about RMB10000.

VS

磁悬浮鼓风机寿命20年

定期更换（清洁）过滤器

The service life of Magnetic Suspension Centrifugal Blower is 20 years, Replace the filter regularly.

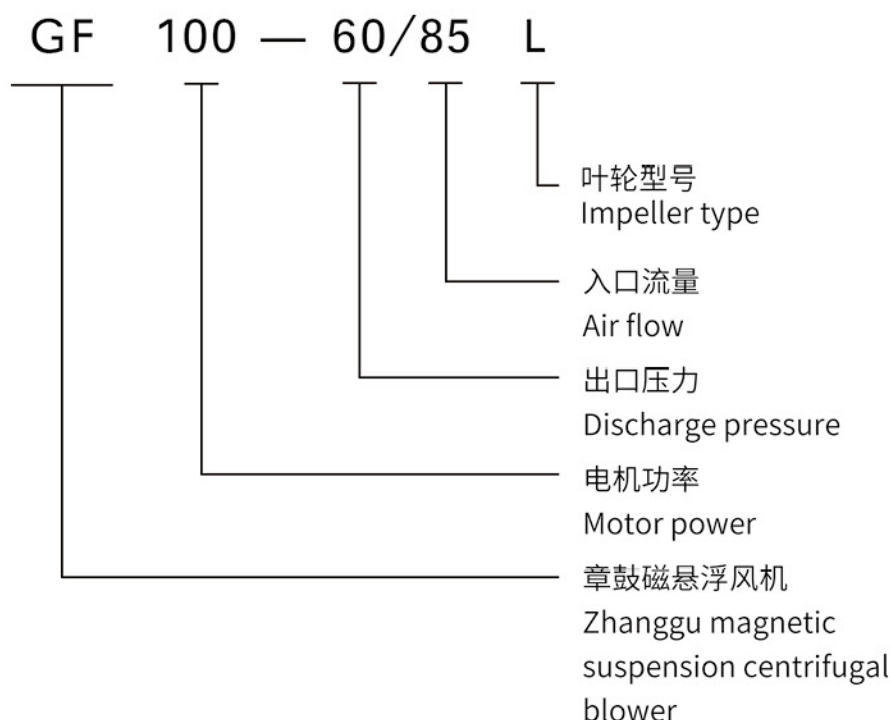
# 磁悬浮鼓风机系列选型

## Model Selection of Magnetic Suspension Centrifugal Blower

产品系列	GF 50	GF 75	GF 100	GF 150	GF 200	GF 250	GF 300	GF 400
电机功率 (kW)	50	75	100	150	200	250	300	400
升压 (kPa)	进口流量 (m³/min) 1atm 20℃							
40	61	91	121	182	235			
50	50	74	100	150	195	245	290	391
60	43	64	85	128	165	209	245	332
70	37	55	73	110	143	180	210	290
80	33	49	66	95	128	158	185	256
90	30	44	60	85	115	144	170	241
100			53	75	108	131	155	221
110					99	121	143	205
120					93	113	133	191
150						95	112	156

产品代号示例:

Product code example:



# 核心技术

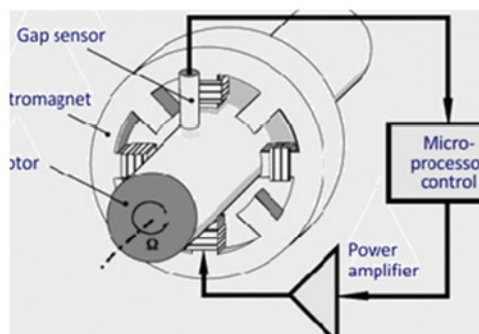
## CORE TECHNOLOGY

### 自主知识产权核心技术——磁轴承设计与控制技术

Core Technology with independent intellectual property right-Magnetic Bearing design and control technology

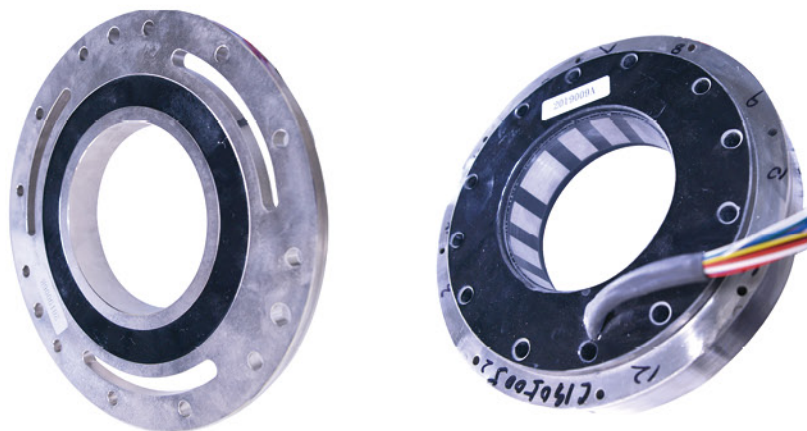
拥有自主知识产权的5自由度磁悬浮轴承技术，可保证设备在通电时，通过电磁力使转子系统悬浮。控制器保证每秒钟超过10000次的信号采集并同步给出实时校正信号，保证高速转子稳定悬浮。

具有冗余电源系统及保护轴承，实现多重保护，不会因突然停电或故障停机造成任何损坏。



Five-degree-of-freedom magnetic suspension bearing technology which have independent intellectual property rights can guarantee the rotor system is suspended by electromagnetic force when the equipment is powered on. The controller ensures that the signal is collected more than 10000 times per second and the stable suspension of high-speed rotor.

Redundant power systems and spare bearings could provide multiple protection to avoid any damage due to the sudden power failure or downtime.



磁悬浮轴承



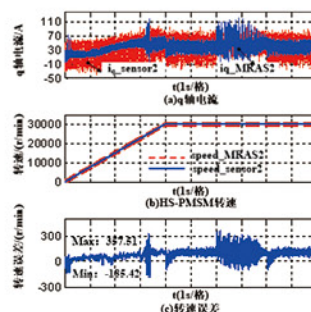
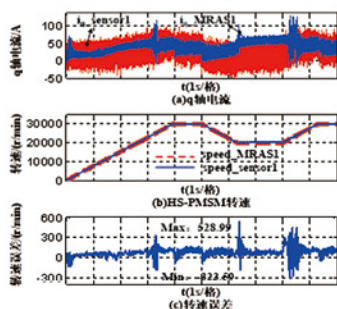
控制器

## 自主知识产权核心技术——大功率电机智能控制技术

Core Technology with independent intellectual property right-Intelligent control technology of High power motor

采用基于MRAS的HS-PMSM无位置传感器矢量控制算法，观测电机转速和转子角位置，并用于高速永磁同步电机(HS-PMSM)电流环和转速闭环控制(转频高达1000Hz)。

The HS-PMSM sensorless vector control algorithm based on MRAS is used to observe the motor speed and Rotor angular position, and it is used in the current loop and speed loop closed-loop control of High speed permanent magnetic synchronous Motor(the frequency conversion is up to 1000Hz).The HS-PMSM sensorless vector control algorithm based on MRAS is used to observe the motor speed and Rotor angular position, and it is used in the current loop and speed loop closed-loop control of High speed permanent magnetic synchronous Motor(the frequency conversion is up to 1000Hz).



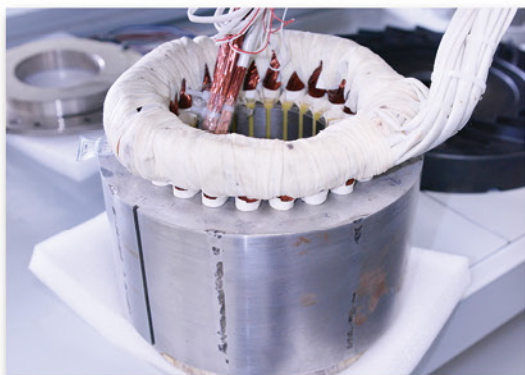
台达高频变频器



海利普高频变频器

## 自主知识产权核心技术-高效永磁同步电机技术

Core Technology with independent intellectual property right--- High efficiency PMSM



拥有自主知识产权的高效高功率密度高速永磁同步电机设计和制造技术, 转速最高可达60000r/min, 最大功率达到1000kW, 电机效率优于95%。

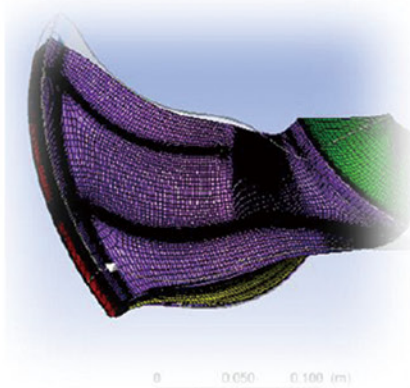
High speed PMSM (high efficiency, high power density) with the independent intellectual property right can achieve a maximum speed of 60000rpm and a max power of 1000kW, the motor efficiency is better than 95%.

## 自主知识产权核心技术-高效三元流叶轮设计及气动流场技术

Core Technology with independent intellectual property right--- Ternary flow theory Impeller design and Aerodynamic flow field technology

采用高效三元流叶轮的强度、气动、流场优化技术, 透平效率94.5%, 等熵效率高达81%, 处于国际先进水平。

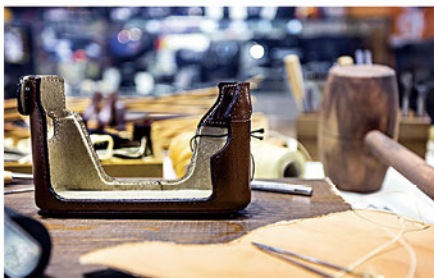
The ternary flow theory impeller (with the optimized technology on strength, aerodynamics and flow field) has the features of high efficiency (the turbine efficiency is 94.5%, the equal-entropy efficiency is as high as 81%) achieves the advanced International level.



## 应用领域 APPLICATION



污水处理业  
Sewage Treatment Industry



皮革制造业  
Leather manufacturing



石化工业  
Petrochemical Industry



纸浆及造纸业  
Pulp and paper industry



热电行业  
Thermoelectric industry



冶金行业  
Metallurgy Industry



制药行业  
Pharmaceutical Industry



煤化工行业  
Coal chemical industry



纺织行业  
Textile Industry



印染行业  
Printing and dyeing industry



食品行业  
Food industry



水泥建材行业  
Cement and Construction

## 市场分布 Market Distribution



我们在全国各地共设40个办事处，目前除台湾外全国33个省份行政区域均有完善的销售和服务网络。能够及时便捷的为您提供售前、售中和售后服务，从中了解您的需求，在满足客户定制化需求同时，不断完善服务及质量体系。

We have 40 offices throughout the country, in addition to Taiwan, 33 provinces in the country's administrative regions have a sound sales and service network. Can provide you with timely and convenient pre-sale, sale and after-sales service, from which to understand your needs, in order to meet customer customization needs at the same time, and constantly improve the service and quality system.



山东章鼓官方网站



山东章鼓微信公众平台

**山东省章丘鼓风机股份有限公司**  
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