



YBGVF160L-2 隔爆型超高速变频
三相异步电动机

YBGVF-160L-2 flameproof
high-speed
Frequency variable
asynchronous motor

使用说明书

Maintenance Instruction

安徽皖南电机股份有限公司
Anhui Wannan Electric Machine Co.,Ltd

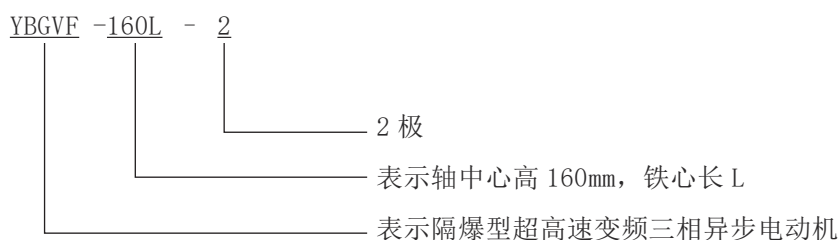
衷心感谢您选购、使用皖南电机。

在使用电动机之前，请扫码仔细阅读本说明书，以便您正确的使用和维护。

1 产品概述

YBGVF-160L-2 隔爆型超高速变频三相异步电动机(以下简称电动机)符合 Q/WNM. 1101-2022《YBGVF 系列隔爆型超高速变频三相异步电动机技术条件 (机座号 160)》要求，按照 GB 3836.1-2021《爆炸性环境 第 1 部分：设备 通用要求》和 GB 3836.2-2021《爆炸性环境 第 2 部分：由隔爆外壳“d”保护的 设备》的要求，制成隔爆型。其防爆标志为 EX db II AT4 Gb，适用于户内 EX db II A 级，温度组别为 T1 ~ T4 组的可燃气体和蒸汽与空气形成的爆炸性混合物的场所。

2 电动机型号代表的意义



3 使用范围

3.1 电动机的使用场所为：实验室内 II A 级、T4 组别的隔爆场所。

3.2 使用条件

- a 冷却水温度随季节变化，但在 5 ~ 30℃ 之间。
- b 冷却水源的供水能力应不小于 18 L/min。
- c 冷却水的水质应符合城市自来水标准。
- d 使用时用户要有断水保护装置。
- e 海拔不超过 1000m。
- f 电机允许恒转矩调频范围为：30 ~ 160Hz。
- g 电动机工作方式为 S1（不允许在电网下直接运行）。
- h 电动机定子绕组温升限值（电阻法）为 95K。
- i 电动机轴承允许温度限值为 95℃。
- j 使用时应有 PT100 传感器或 PTC 热敏电阻对电动机绕组和轴承进行保护。

4 电动机结构说明

- 4.1 电动机的安装方式为 IMB35。
- 4.2 电动机的安装尺寸和外型尺寸符合外形图的规定。
- 4.3 电动机的外壳防护等级 IP54。
- 4.4 电动机的冷却方式为 IC8A1W7。
- 4.5 电动机的机座和端盖采用钢板制成。

- 4.6 电动机的转轴采用 42CrMo 合金钢制成。
- 4.7 电动机的定子绕组采用 Q(ZY/XY)-2/200 导线制成。
- 4.8 电动机采用的轴承牌号为：轴伸端 6209 ，非轴伸端 6209；轴承油脂牌号：LGHP2。
- 4.9 电动机设有一个接线盒，适用于橡胶和塑料电缆。接线盒内还设有一个接地螺栓供用户接地使用，电动机的接线方式为 Y 接，接线方法如图 1。

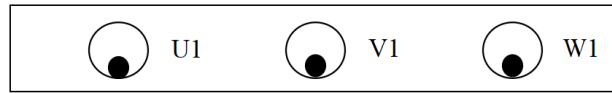


图 1 (Y 接)


- 4.10 电动机从轴伸端看为逆时针方向旋转。
- 4.11 电动机主体结构见图 1

5 隔爆要点

- 5.1 电动机内部的爆炸性混合物产生爆炸时，隔爆外壳应不损坏，且内部火焰不能通过隔爆外壳接合面，引起外部爆炸性混合物爆炸。
 - a 组成隔爆外壳的零件均按 GB3836.1 的规定作了水压试验。
 - b 各零件的隔爆配合面(长度、间隙、表面粗糙度)足以保证内部火焰不能通过隔爆面传到外部。
 - c 连接隔爆外壳的螺栓装有弹簧垫圈以防止螺栓自行松脱。
 - d 机座、端盖、轴、轴承内盖、接线盒、接线螺栓、端子套、橡皮垫圈均属隔爆零件。
- 5.2 在额定工作状态下，电动机外壳表面温度不超过 135℃。
- 5.3 进线口处的温度不得高于所用电缆的允许温度，以保证电缆正常使用。

6 本电机安装与试车前的准备

警告!



搬运电动机时，应小心谨慎！
 强烈的摔、碰、震会严重损坏轴承及隔爆元件。
 吊装带有吊攀的电机时，一定要将吊攀旋紧。

- 6.1 仔细检查电动机外观是否完好、核对电动机铭牌内容是否与实际需求相符。
- 6.2 用兆欧表检查电动机是否受潮，如受潮应采用下列方法之一进行干燥；
 - a 短路电流干燥法：把电动机安装在固定底座上，将转子堵住，在定子绕组上施以一定的电压，使此时的定子电流逐渐达到额定值的 40 ~ 60%，利用电动机的铜耗来加热干燥，干燥时电动机要可靠接地以确保安全。
 - b 鼓风机干燥法：将电动机端盖拆开，让鼓风机吹出的热风从电动机的一端吹入，从另一端排出，热风在进入电动机前需进行滤尘处理，以防尘土和杂物吹入电动机内部，热风的温度应控制在 90℃左右。

无论使用何种干燥方法，在干燥过程中，必须使电动机绕组的温度逐渐升高，且不超过绕组规定的最高温度值（若使用温度计法测量时，温度值应较电阻法降低 20℃），在干燥时应绘制绝缘电阻—

时间及绕组温度—时间曲线，以便正确判断绕组的干燥情况。

6.3 电动机安装时，允许采用刚性联轴器连接，两连接轴的同轴度应保证小于 0.03mm。若负载有轴向游动量，应使联轴器的串动间隙 = 最大游动量 + 2mm。

6.4 电动机与负载连接后，应进行手动盘车试验以确保连接的正确性。

6.5 当电动机直联负载的工作温度较高（高于 60℃）时，应在电动机和负载之间采取隔热措施，以防止电动机的轴承和绕组散热发生困难。

6.6 检查水源是否符合 3.2 条的要求，并应设置停水的报警系统。

6.7 电动机首次使用前，应在空载下试运行 1 ~ 2h，此间应注意：

警告！



- 1、电源电压的波动不得超过额定电压的 95% ~ 105%。
- 2、必须接好接地线。
- 3、电机运行若有异常立即停机。
- 4、保持身体、衣物远离电动机运转部分。

- a 轴承与电动机内部有无异常的摩擦声和杂音。
- b 电动机轴承温度的稳定值是否符合有关规定。
- c 电动机的振动速度有效值是否超过有关标准。

6.8 电动机故障及排除方法见表 1。

表 1

| 故障 | 可能原因 | 排除方法 |
|---------|--|--|
| 电动机不能起动 | a. 短路。 b. 终点电压低。 c. 电动机转动件与固定件相碰。 d. 变频器起动参数设置不当。 | 1) 用万用表查找线路故障点，排除后重新起动。 1) 更换大容量的变压器。 2) 增加中间调压器。 3) 从变压器输出端直接引出电源。 4) 检查电路是否有虚接或受潮现象，若受潮应做干燥处理。 1) 检查电动机内是否有异物进入，如确有异物，排除。 2) 检查电动机的轴承是否损坏，若已损坏，需更换新轴承。 1) 调整变频器的设置。 |
| 异常噪声 | a. 电动机轴承损伤。 b. 电动机平衡垫片松脱。 c. 电源电压或电流不平衡。 | 1) 更换新轴承。 1) 更换平衡垫片，并重新做转子平衡。 1) 消除造成不平衡因素。 |
| 振动异常 | a. 电动机与负载的同轴度超差。 b. 电动机转子或负载转动部分不平衡。 c. 电动机轴承损坏。 | 1) 重新找正。 2) 检查地基是否有不平或下沉。 1) 重新做动平衡。 1) 更换新轴承。 |

表 1 (续)

| 故障 | 可能原因 | 排除方法 |
|-----------|--|---|
| 轴承温度高 | a. 轴承室内润滑油太多或太少。 b. 轴承受到来自负载的径向力。 c. 因负载温度较高使散热发生困难。 | 1) 打开轴承外盖, 按规定减少或增加润滑脂。 1) 设法减小负载径向力。 1) 在电动机和负载之间采取隔热措施。 |
| 机壳或绕组温度过高 | a. 电动机过载。 b. 因负载温度较高使散热发生困难。 c. 电源电压过低或过高。 d. 电源电压或电流不平衡。 e. 冷却水温度过高。 f. 变频器运行参数设置不当。 g. 供水系统故障。 | 1) 消除负载故障。 1) 在电动机和负载间采取隔热措施。 1) 消除电源故障。 2) 采取稳压措施。 1) 查找并消除不平衡因素。 1) 排除冷却水故障, 降低水温度。 1) 重新设置变频器运行参数。 1) 排除故障。 |
| 电动机机壳带电 | a. 接地不良。 b. 绕组受潮。 c. 引接线绝缘或绕组绝缘破损。 | 1) 将接地线用螺栓可靠接地。 1) 对绕组进行干燥处理。 1) 修复绝缘。 |

7 本电动机的维护

7.1 电动机如不立即使用。请勿将包装箱拆开, 并存放在空气干燥, 通风良好, 温度在 3℃ 以上的库房或室内。对久置不用的电动机应进行临时涂封处理, 并每隔半年检查一次。

7.2 电动机非轴伸端轴承, 在每高速运行 500h 后需添加润滑脂, 每次添脂量约为 16g。

7.3 电动机非轴伸端轴承添加润滑脂地操作步骤:

- a 拆掉编码器和编码器的支架;
- b 在不转动电机轴的前提下, 将轴承外盖上 3 个 M6 的螺栓卸出;
- c 使用 M6 的螺栓和外盖上的螺孔将外盖顶出;
- d 使用 M6 的螺栓将端盖和轴承内盖固定后即可开始从油嘴处加油;
- e 当有新油从轴承中溢出时加油完成;
- f 按以上步骤逆向将电机安装好。

7.4 电动机的润滑脂应定期更换, 至少每年应检查一次并彻底更换润滑脂, 更换前轴承必须用汽油清洗干净, 添脂量为轴承室净空间的 1/3 ~ 1/2 (注: 电动机前轴承采用的是双面带防尘盖的轴承, 因此在 5000h、但不超过一年的保用期内无需加油)。

7.5 电动机冷却水保持清洁, 水中不得有直径大于 1mm 颗粒物以免堵塞冷却水道, 每隔一年需采用高压水 (水压 < 0.2MPa) 将水道彻底冲洗一次。

7.6 在电动机吊装时, 应正确的使用电动机或包装箱上的吊攀, 避免磕碰损伤。

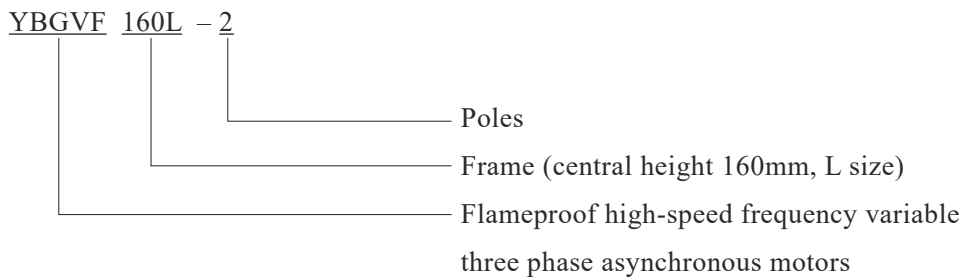
7.7 电动机重量为 225kg (充水实测值), 电动机转动惯量约为 0.4kgm²。

We are truly grateful for your purchasing of Wannan Motors. Before using the motor, please scan the QR code to read the manual so as to use and maintain the motor in a right way.

1. Summary

YBGVF-160L-2 flameproof high-speed frequency variable asynchronous motor is produced in conforming to Q/WNM.1101-2022 “Specification for flameproof high-speed frequency variable three phase asynchronous motors (frame 160)”、 GB 3836.1-2021 “Part 1 of Electrical equipment used in explosive environment: General Requirement” 、 GB3836.2-2021 “Part 2 of Electrical equipment used in explosive environment: The Apparatus with the flameproof enclosure “d” GB3836.2-2021 “Part 2 of Electrical equipment used in explosive environment: The Apparatus with the flameproof enclosure “d”. With Ex-marking “Ex db II AT4 Gb, this series motors are suitable for workshop where Category II Class A flammable gas or the flammable mixture with air and steam of Temperature Group T1~T4 exists in.

2. Designation and types



3. Operating atmosphere

3.1 Explosive proof atmosphere of Class II A、 Team T4.

3.2 Operation condition

- a. Cooling water temperature varies as seasonal variation, but the temperature shall not beyond the range 5℃ ~+30℃ .
- b. Cooling water supply capacity larger than 18L/min
- c. Cooling water conforms to tap water supply standard.
- d Fitted with water cut-off protection device.
- e. Not exceed 1000m above the sea level.
- f. Constant torque frequency range: 30~160Hz
- g. Motor S1 duty (Not allow to directly start under state power grid)
- h. Motor stator temperature rise limit (by resistance method) 95K
- i. Motor bearing allowable temperature limit 95℃
- j. Motor wiring/bearing shall fitted with PTC or PT100 for protection.

4 Structure instruction

4.1 Motor mounting type IM35

4.2 Installation and outline dimension refer to relevant drawings or technical specification.

4.3 Motor casing IP54 protection grade

4.4 Motor cooling method IC8A1W7

4.5 Motor frame and end cover are made of steel plate

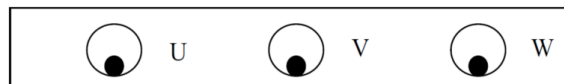
4.6 Motor shaft is made of ally 42CrMo

4.7 Motor stator wiring is made of Q(ZY/XY)-2/200 copper conductor.

4.8 Motor are fitted with 6209 bearing for DE/NDE. Bearing grease type: LGHP2.

4.9 One terminal box for every motor. This series motor is of rubber-sheathed cable (or plastic cable) wiring type. One grounding terminal in each connection box. Connect the cable as Y connection.

Diagram is as following:



4.10 Shaft rotates clockwise from the view of DE

4.11 Subject structure of the motor see figure 1.

5 Explosion-proof highlight

5.1 The series motor highlights its explosion-proof feature. If the explosive mixture inside the motor explodes, the motor shall not be damaged or deformed to the extent that may affect its explosion-proof performance. The flame inside should not pass through conjunction surface to explode the flammable mixture outside the motor.

- a. Each component of the flameproof casing shall be tested as qualified in pressure test as stipulation of GB3836.1
- b. The flameproof conjunction surface between each component, specifically their length, gap, and roughness, is able to cut off outside from flame source inside.
- c. Spring washer on fastening bolt can prevent the bolts releasing down from explosion-proof casing.
- d. Frame, end closure, shaft, bearing inner cover, terminal box cover, terminal box body, connection bolt, axial flow fan, terminal lug, bearing, rubber seal ring all are explosion-proof components.

5.2 The maximum temperature on its casing is 135 °C (by thermometer method) in rating power operation

5.3 Temperature at cable inlet shall be no higher than the cable allowable temperature.

6. Installation and trial-operation

Warning!



Motor cover is forbidden to open with power on.

Handle the motor with care.

Strong fall, impact, vibration will heavily damage bearing or explosion proof components.

Fasten onto the lifting hook tightly if the motor is moved by the crane.

6.1 Check the appearance of the motor to see whether it is in good condition, and check the nameplate to see whether the data is conform to actual requirement.

6.2 Check the insulation resistance with Megger. If the motor is found to be dampened, it must be dried either by means of short-circuit current or air-blower.

- a. By short-circuit current: Fix the motor and lock the shaft, supply with a certain voltage which is less than rating till motor current reaches 40~60% the rated value. By this the motor will be died by its own heat. Grounding bolts must be well-connected when drying for the consideration of safety.
- b. By air blower: Remove motor end covers, and blow hot air against one end, then the air will go through motor and leave from the other end. The blowing air is recommended to kept around 90℃ and must be purified firstly so as the dust or sundries will not get into motors.。

By whichever method the wiring temperature shall slowly get higher and not exceed max allowable temperature(the measurement by resistance method is 20 ℃ higher than by thermometer method). Insulation resistance-timing/wiring temperature curve is favorable for wiring drying judgment.

6.3 Rigid coupling is allowable to connect with motor. Concentricity of two coupling is surely to be less than 0.03mm. Coupling clearance shall be kept equal to max axial momentum+2mm, if the axial momentum exists in the motor load

6.4 Rotate the rotor by hand for trial running when the motor has been connected with the driven machine.

6.5 Add the heat insulation for motor when the driven equipment's operation temperature is higher than 60℃ . Otherwise motor's bearing and wiring may get overheat and even affect its performance.

6.6 Guarantee water supply meets the requirement of 3.2 and set water break alarming system.

6.7 For new machine, no-load trial operation of 1~2h is needed before routine running, during which following matters shall be concerned

Warning!



1. Supply voltage fluctuation should not go beyond the range±5% the rated voltage.
2. Ground wire must be connected
3. Turn off the motor when abnormal problem occurs.
4. Keep the person and clothe away from the rotation part.

- a. Whether there is abnormal friction sound or other noise about bearing
- b. Whether the bearing temperature stable value is conforming to the standard.
- c. Whether the vibration limits are conforming to the standard

6.8 Motor common faults and solutions see table 1

Table 1

| Error | Possible cause | Solution |
|---------------------------|--|--|
| Start failure | a. Short current b. Low voltage c. Motor rotation parts failure d. Inverter setting improper | 1) detect the failure with AVO meter and restart. 1) change larger voltage transformer 2) add intermediate voltage regulator 3) Draw out power supply from voltage transformer. 4) Inspect circuit to detect if it gets dampened or has virtual connection. 1) Remove the sundries in motors, if any. 2) Replace a new bearing if the old one is found to be broken. 1) Reset inverter. |
| Noise | a. Bearing broken b. Balancing gaskets get loosed c. Unbalanced voltage or current | 1) Replace new bearing 1) Replace balancing gaskets and rotor re-balanced 1) Remove unbalancing factors. |
| Vibration | a. Poor coaxiality between motor and driven equipment b. Motor rotor or driven parts unbalanced. c. Bearing broken | 1) Adjust 2) Check the base or support 1) Rebalancing 1) Replace new bearing |
| Bearing overhear | a. Too much or less grease b. Radial force from load on bearing c. Poor cooling caused by heat from driven equipment. | 1) Open external bearing cover to add or reduce grease 1) Reduce radial force 1) Add heat insulation between motor and load. |
| Casing or wiring overhear | a. Over load b. Poor cooling caused by heat from driven equipment. c. High or low supply voltage d. Unbalanced voltage or current f. Inverter improper setting g. Water supply system failure | 1) Correct load 1) Add heat insulation between motor and load. 1) Eliminate supply erro 2) Add voltage stabilizing device 1) Detect and remover unbalancing 1) Reset inverter data 1) Eliminate system failure |
| Casing charged | a. Poor grounding b. Wiring get dampened c. Broken insulation in cable or wiring | 1) Ground bolts well connected 1) Drying wiring 1) Mend insulation |

7. Maintenance

7.1 Motor shall be stored in dry, ventilated place and keep the ambient temperature above 3°C . Do not unwrap the package until the motor is to be put into application. For the spare motors, it need to be sealed with coating and inspected every half-year.

7.2 Motor bearing shall be re-greased every 500-hour operation for about 16g lubrication grease.

7.3 Re-grease steps for NDE bearing:

- a. Dismantle encoder and its bracket
- b. Dismantle 3*M6 bolts on bearing external cover but not rotor motor shaft.
- c. Push bearing external cover out with M6 bolts and screw hole
- d. Fix end cover with bearing internal cover by M6 bolts, then add grease with nipple.
- e. Fill bearing with fresh grease till it overflows.
- f. Assemble motor as above steps in reverse order

7.4 Inspect bearing and replace grease thoroughly every half-year operation. Fill the lubrication grease of LGHP2 with 1/3~1/2 volume of bearing chamber after the chamber is completely cleaned with gasoline. (Note: DE bearing is free from refilling within 5000- hour operation and one-year warranty period as it is fitted with double-sided dust-free cover.)

7.5 Purify cooling water and remove the particles (diameter \geq 1mm) to avoid water channels blockage. Thoroughly clean channels with high pressure water (pressure <0.2 MPa).

7.6 Fasten onto the lifting hook tightly if the motor is moved by the crane.

7.7 Motor weight is measured as 225kg (including cooling water). Moment of inertia 0.4 kgm²

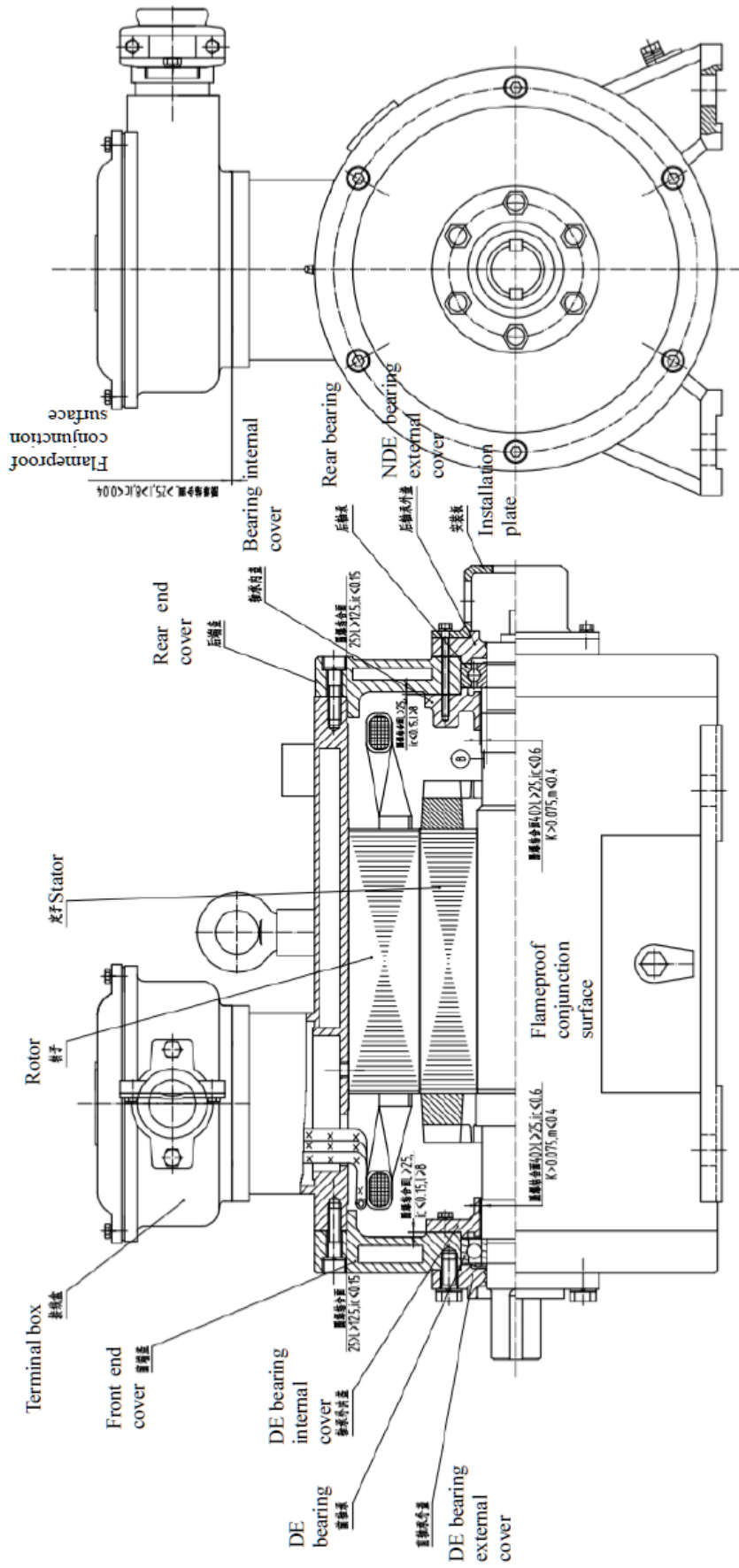


图 1 Fig 1

敬告用户：

请您按照本使用说明书的规定，正确地使用和储存电动机，我们将为您提供优质、快捷的服务。

在电动机使用过程中，您如有什么疑惑请与我们联系，我们将及时给予您满意的解答；您有什么良好的建议请向我们提出，以便我们改进，为您提供优质、快捷的服务。

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Dear user,

Please use and store the motor right following the instruction of the manual. We will make our effort to provide you with high-quality and prompt service. Contact us if you had any questions in application, and we will offer you timely and effective resolution; let us know if you had any advices or suggestions, with which we can improve ourselves and make service better. Anhui Wannan Motor Co., Ltd. reserves the right of final interpretation of the user manual. No copy, disclosing or using of the content of this user manual to third parties prior to written permission from Anhui Wannan Motor Co., Ltd.

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