南华® WNM® 皖南电机®

皖南电机

# YZR、YZ 系列起重及冶金用
# 三相异步电动机
# YZR YZ SERIES MOTORS FOR CRANES AND METALLURGICAL APPLICATIONS

# 使 用 说 明 书
# Operation Manual

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

YZ、YZR 系列冶金及起重用三相异步电动机具有过载能力大和机械强度高的特点，适用于驱动各种类型的起重、冶金机械或其它类似设备。

## 1.1 电机使用环境

1.1.1 环境温度不超过 40℃（F 级绝缘电动机）或 60℃（H 级绝缘电动机）。

1.1.2 海拔不超过 1000m.。

1.1.3 经常、显著的机械振动与冲击。

## 1.2 工作制

电动机的工作制分为短时工作制及断续周期性工作制。对于不同的起动等级及负载持续率，电动机的工作制参见产品样本。

电动机的工作制通常分为 S2、S3、S4 和 S5 等四种，其基准工作制为 S3-40%，每个工作周期为 10 分钟。该工作制下的定额为电动机的基准定额。电动机的基准定额符合 JB/T10104-1999《YZ 系列起重及冶金用三相异步电动机技术条件》和 JB/T10105-1999《YZR 系列起重及冶金用三相异步电动机技术条件》标准规定。

## 1.3 起动等级

电动机的起动等级是指其每小时最大可能的等效全起动次数。起动等级分为 6，150，300 及 600 次 / 小时等四档。

当电动机在点动、电制动状态下工作时，应将这些状态按等效发热折算成等效全起动次数，其折算方法为：

点动一次（终了时电动机的转速不大于其额定转速的 1/4）相当于 1/4 次全起动。

电制动一次（制动到额定转速的 1/3），相当于 0.8 次全起动。

反转一次，相当于 1.8 次全起动。

每小时等效全起动次数典型示例如表 1。

**表 1**

| 工作方式 | 工　作　状　态 | | | | 每小时等效全起动次数 |
|---|---|---|---|---|---|
| | 每小时起动次数 | 每小时点动次数 | 每小时制动次数 | 每小时反接次数 | |
| S3 | 6 | 0 | 0 | 0 | 6 |
| S3 | 4 | 8 | 0 | 0 | |
| S3 | 2 | 8 | 2 | 0 | |
| S4 | 150 | 0 | 0 | 0 | 150 |
| S4 | 100 | 200 | 0 | 0 | |
| S5 | 80 | 0 | 80 | 0 | |
| S5 | 65 | 130 | 65 | 0 | |
| S5 | 30 | 160 | 30 | 30 | |
| S4 | 300 | 0 | 0 | 0 | 300 |
| S4 | 200 | 400 | 0 | 0 | |
| S5 | 160 | 0 | 150 | 0 | |
| S5 | 130 | 260 | 130 | 0 | |
| S5 | 60 | 320 | 60 | 60 | |
| S4 | 600 | 0 | 0 | 0 | 600 |
| S4 | 400 | 800 | 0 | 0 | |
| S5 | 320 | 0 | 320 | 0 | |
| S5 | 260 | 520 | 260 | 0 | |
| S5 | 120 | 640 | 120 | 120 | |

### 1.4 负载持续率（FC%）按下式确定：

$$FC=\frac{\text{工作时间}}{\text{一个工作周期时间}}\%$$

工作时间包括起动和制动时间。一个工作周期包括工作时间和断能或无载时间。

标准负载持续率分为 15%、25%、40% 和 60% 等四种。同一台电动机，在同一工作制中，不同负载持续率时的输出功率不同。

## 2. 结构

### 2.1 轴承与润滑

电动机所采用的轴承如表 2。

**表 2**

| 机座号 | 驱动端 | 非驱动端 |
|---|---|---|
| 112 | 6308 | 6308 |
| 132 | 6309 | 6309 |
| 160 | 6311 | 6311 |
| 180 | 6313 | 6313 |
| 200 | Nu315 | 6315 |
| 225 | Nu315 | 6315 |
| 250 | Nu316 | 6316 |
| 280 | Nu320 | 6320 |
| 315 | Nu316 | 6322 |
| 355 | Nu320 | 6326 |

电动机在运行过程中轴承应保证润滑良好，一般在电机运行 5000 小时左右，即应补充或更换润滑脂（封闭轴承在使用寿命内不必更换润滑脂）。另外，在运行中发现轴承过热或润滑脂变质时，应及时更换润滑脂或更换轴承。更换时应先清除陈脂，并将轴承、轴承盖、轴承室洗净，然后加入新润滑脂，以加到轴承内腔的 1/2~2/3 为宜。润滑脂推荐采用 ZL3# 锂基 1 润滑脂。

### 2.2 集电环与电刷装置

YZR 系列电机集电环有两种型式，112~250 机座号为 4330 塑料压铸结构，280 机座号为组装式结构。

电动机采用恒压刷握，在使用过程中不因电刷的磨损而改变铜环与电刷间压力。

每台电机有六块 J201 型带尾电刷。电刷尺寸如表 3。

**表 3**

| 机座号 | 电刷尺寸（mm） | 集电环直径（mm） | 机座号 | 电刷尺寸（mm） | 集电环直径（mm） |
|---|---|---|---|---|---|
| 112 | 20×8×32 | 100 | 225 | 32×12.5×50 | 140 |
| 132 | 20×8×32 | 100 | 250 | 40×12.5×50 | 160 |
| 160 | 25×10×40 | 112 | 280 | 40×20×60 | 200 |
| 180 | 25×10×40 | 125 | 315 | 40×20×60 | 225 |
| 200 | 32×12.5×50 | 140 |  | 40×20×60 | 250 |

## 3. 检查与安装

3.1 安装前应详细核对电动机铭牌上所载型号及各项数据，如额定功率、电压、频率、负载持续率等必需与实际要求相符。

3.2 新的或长期放置未用的电动机，在安装前首先应去除所有灰尘和包装物的残余，并检查各部件是否装配良好，紧固件应无松动。

3.3 轻轻转动电动机的转轴，其转动应灵活并无碰擦声。

3.4 各导电联接部分必需接触良好，无锈蚀情况；对绕线型电动机，还需检查电刷的弹簧压力大小是否适当，电刷和集电环的接触是否良好，电刷在刷握中是否梗阻。

3.5 长期放置不用的电动机，在使用前必须用 500 伏兆欧表测量其定转子绕组与机壳或与轴间的绝缘电阻，如低于 5 兆欧，电动机必须进行烘干处理，烘焙时绕组温度不得超过表 4 的规定

**表 4**

| 绝 缘 等 级 | F | H |
|---|---|---|
| 温 度 计 法 | 125℃ | 145℃ |

3.6 在安装时，应精确地校准轴线。轴线校准不良，将导致转轴的弯曲和轴承的损坏。

3.7 电动机可采用联轴器或正齿轮传动，在采用正齿轮转动时，齿轮节圆直径应不小于轴伸直径的 2 倍。

3.8 电动机轴伸配用平键的型号信尺寸如表 5 所示。

**表 5**

| 机座号 | 平键尺寸 b×h×l（毫米） | 机座号 | 平键尺寸 b×h×l（毫米） |
|---|---|---|---|
| 112 | B10×8×56 | 225 | A16×10×90 |
| 132 | B10×8×56 | 250 | A18×11×90 |
| 160 | B14×9×80 | 280 | A20×12×110 |
| 180 | A14×9×70 | 315 | B22×100 |
| 200 | A16×10×90 | 355 | B25×125 |

3.9 锥轴伸电机装上联轴器后应旋紧轴头螺母以产生足够的顶紧力；双轴伸电动机，对未使用的轴伸端，需拆下轴伸平键、轴头螺母及垫圈后，再开车运行。

3.10 电动机必需有良好的接地，接地线应妥善地接在出线盒中的接地螺栓上。

3.11 电动机接线后，应试接电源使其转动，检查旋转方向是否符合要求，不符合时可将任意两根电源线调换一下即可。

3.12 在彻底检查和安装完毕后，电动机应进行一次 30~40 分钟的空载运转，如空载运行正常，方可进行负载运转。

3.13 电动机的安装及外型尺寸参见产品样本或相关标准。

## 4. 运行及维护

4.1 YZ 系列电动机采用满压直接起动，但 YZR 系列电动机起动时须在转子回路中串入外接电阻，以限制起动电流。起动电流的限值应不大于相应工作制的额定电流的两倍。严禁将绕线转子电动机的

转子绕组直接短路后，作为笼型电动机使用。

4.2 所用变阻器和起动器或控制器的规格应与电动机的要求相符。

4.3 环境温度过高时，应减少电动机的输出或降低温度，以免电动机由于过热而受到损坏。

4.4 电动机不得用于含有易燃性气体、化学腐蚀气体或其它有害气体的环境中。

4.5 电动机必需保持清洁，进风口及风道必须畅通无阻。

4.6 运行中，集电环的视察窗和接线盒的盖板应盖好，不用的出线口应严密堵住以防潮气、油污、粉尘及其它异物进入电机内部。

4.7 电动机在运行中，如发现任何异常噪声、振动、过热或焦臭味等不正常现象时，应立即停机检查，在故障查明及排除前切勿继续使用。

4.8 YZR 系列电动机的集电环和电刷要经常检查。集电环表面应光滑、无油污。如发现有烧灼痕迹，应用细玻璃砂纸予以清除；如发现有明显的沟槽时，则应予以车光。刷架应牢靠地固定在端盖上，电刷应能在刷握中自由滑动而无梗阻。

4.9 电刷所需的压力平均为 200 克 / 厘米 2 左右，对碎裂或磨损已达原高度 2/3 的电刷应及时更换。在装入新电刷时，必须用玻璃砂纸对其进行研磨，直至刷面曲率与铜环的曲率相等且刷与环的实际接触面积不小于电刷截面的 1/3 时为止。

## 5. 贮存、运输

5.1 电机贮存中应保持干燥，避免周围环境温度急剧变化，以免电动机受潮、锈蚀。

5.2 电机贮存中不宜堆积太高，以免影响通风及损坏下层电动机的包装。

5.3 贮存及运输中，应防止电机的倾倒、侧置和倒置。

**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

The motors characterized with higher load capacity and mechanical strength. Therefore, they are specifically suitable for driving short time or intermittently operated equipment with frequent starting, overloading in braking, such as the crane and metallurgy equipments.

### 1.1 Circumstance for use

1.1.1 The ambient temperature not exceeding 40℃ (F insulation) or 60℃ (H insulation), and not less than -15℃ .

1.1.2 The altitude not exceeding 1000m.

1.1.3 Frequently and obviously mechanical vibration and crusher duty existed.

### 1.2 Duty

There two types: short time duty and intermittent periodic duty. The power rating, the starting grade and the load duration cycle related with the duty type of the motors refers to the catalogue.

Normally the duty type includes S2, S3, S4 and S5. And the rated duty type is S3-40%, 10 minutes for each duty cycle. All the performance data and the rating at S3-40% is the rated value. The rated duty type is settled according to the regulation of JB/T10104-1999《Specification for YZ Series Motors For Cranes And Metallurgical Applications》and JB/T10105-1999《Specification for YZR Series Motors For Cranes And Metallurgical Applications》.

### 1.3 Starting grade

The starting grade means the equivalent starts of the complete starting operations within one hour. It is including 6/hour, 150/hour, 300/hour and 600/hour.

The times of starts and electrical braking operations can be approximately converted into thermally equivalent starts of the complete starting operations. The converting method as follows:

Each Inching (final speed does not exceed 25% of rated speed) is thermally equivalent to 1/4 complete starting operation.

One electrical braking operation down to 1/3 rated speed is thermally equivalent to 80% of a complete starting.

Rotation reversed one time is equivalent to 1.8 complete starting operations.

Typical example of which are shown in Table 1.

### 1.4 Load Duration Ratio (FC%) is determined as the following formula:

$$FC = \frac{\text{Load time}}{\text{A duty circle}} \%$$

The load time includes the time of starting and braking.

The duty circle includes the time with load, power off time or the time without load.

The standard load duration ratio is 15%, 25%, 40% or 60%. For one motor, provided a specific duty type, the output rating is determined by the load duration ratio.

**Table 1**

| Duty | Working condition | | | | Equivalent complete starts/hour |
|---|---|---|---|---|---|
| | Starts/hour | Inching / hour | Brakes/hour | Reverse/hour | |
| S3 | 6 | 0 | 0 | 0 | 6 |
| S3 | 4 | 8 | 0 | 0 | |
| S3 | 2 | 8 | 2 | 0 | |
| S4 | 150 | 0 | 0 | 0 | 150 |
| S4 | 100 | 200 | 0 | 0 | |
| S5 | 80 | 0 | 80 | 0 | |
| S5 | 65 | 130 | 65 | 0 | |
| S5 | 30 | 160 | 30 | 30 | |
| S4 | 300 | 0 | 0 | 0 | 300 |
| S4 | 200 | 400 | 0 | 0 | |
| S5 | 160 | 0 | 150 | 0 | |
| S5 | 130 | 260 | 130 | 0 | |
| S5 | 60 | 320 | 60 | 60 | |
| S4 | 600 | 0 | 0 | 0 | 600 |
| S4 | 400 | 800 | 0 | 0 | |
| S5 | 320 | 0 | 320 | 0 | |
| S5 | 260 | 520 | 260 | 0 | |
| S5 | 120 | 640 | 120 | 120 | |

## 2.Structure

### 2.1 Bearing and lubricating

**Table 2**

| Frame size | Bearing type | |
|---|---|---|
| | Driven end | Non-driven end |
| 112 | 6308 | 6308 |
| 132 | 6309 | 6309 |
| 160 | 6311 | 6311 |
| 180 | 6313 | 6313 |
| 200 | NU315 | 6315 |
| 225 | NU315 | 6315 |
| 250 | NU316 | 6316 |
| 280 | NU320 | 6320 |
| 315 | NU316 | 6322 |
| 355 | NU320 | 6326 |

2.1.1Except close-type ball bearings, all other bearings are of open type so as to prevent from being over-greased by facilitating the injection and discharge of grease.

2.1.2After motors having started running (more than 5000h), bearings should be relubricated as

follows (recommended 3# lithium-based grease):

a. Stop the motor. Lock out the switch.

b. Thoroughly clean off and remove pipe plugs from bearing housing.

c. Remove hardened grease from grease from drains with stiff wire or rod.

d. Add grease to inlet with hand until small amount of new grease is forced out the drain.

e. Remove excess grease from ports, replace inlet plugs, and run motor 1/2 hour before replacing drain plug.

f. Put motor back in operation.

### 2.3 Slip-ring and brush rigging

YZR series motors have plastic fabricated slip ring.

The brush holder has constant pressure, which can ensure the pressure between the brush and the copper ring even after the wear out of the brush.

Each motor has six (6) J201 type brush, and the following table 3 is the specification of the brush.

**Table 3**

| Frame Size | Dimension of the Brush (mm) | Diameter of the Slip-ring (mm) |
|---|---|---|
| 112 | 20×8×32 | 100 |
| 132 | 20×8×32 | 100 |
| 160 | 25×10×40 | 112 |
| 180 | 25×10×40 | 125 |
| 200 | 32×12.5×50 | 140 |
| 225 | 32×12.5×50 | 140 |
| 250 | 40×12.5×50 | 160 |
| 280 | 40×20×60 | 200 |
| 315 | 40×20×60 | 225 |
| 355 | 40×20×60 | 250 |

## 3. Installation

3.1 Check and see whether the motors are damaged or dirtied; and make sure there is no parts or accessories missing.

3.2 Read carefully the rating on the main nameplate and other plates or attached pamphlets.

3.3 Rotate the shaft manually and make sure it rotates normally.

3.4 Check and make sure the wire connections are well fastened or welded, their insulation is in good condition, and the terminals are properly spaced from each other. Check and make sure the pressure of the brush spring is appropriate. Make sure the good contact between the brush and the slip ring. Make sure the brush can move smoothly.

3.5 Check the insulation resistance of the motor with a hand-cranked megger of not over 500 volts. Make sure the value not less than 5 MΩ. Otherwise the windings must be dried by hot air or by vacuum as the situation dictates.

The temperature for drying should not higher than the value in table 4.

**Table 4**

| Insulation Class | F | H |
|---|---|---|
| Thermometer Method | 125℃ | 145℃ |

3.6 Motors can drive machine equipment through coupling and spur gearing. When using the spur gearing, the pitch diameter of the gear should be 2 times that of the motor shaft.

3.7 When using coupling, the centerline of shaft shall be coincided with the centerline of load's shaft. Otherwise, the shaft will be bended and the bearing will be damaged.

3.8 The key of the motors showing as Table 5.

**Table 5**

| Frame Size | B×H×L (mm) | Frame Size | B×H×L (mm) |
|---|---|---|---|
| 112 | B10×8×56 | 225 | A16×10×90 |
| 132 | B10×8×56 | 250 | A18×11×90 |
| 160 | B14×9×80 | 280 | A20×12×110 |
| 180 | A14×9×70 | 315 | B22×14×100 |
| 200 | A16×10×90 | 355 | B25×14×125 |

3.9 Make sure the nut on the end of the cone-shaped shaft end tightened well after the connection with the coupling. If the motor has two shaft end, check and make sure the key, the washer and the nut on the non-working shaft end are taken off before put into operation.

3.10 Check and make sure the frame and the terminal box of the motor are grounded.

3.11 Make sure the direction of rotation is correct. Otherwise to interchange any 2 of the 3 connecting.

3.12 Start the motor without load for test running (at least 30~40 minutes).

3.13 The outline and mounting dimensions refer to the catalogue or the relative standard.

## 4. Running and Maintenance

4.1 YZ series motors start with full voltage directly. But for the starting of YZR series motors, there must have resistance in series with the rotor circuit to limit the starting current. Make sure the starting current not higher than 2 times of the rated value at the rated duty type. It is prohibited to use the slip-ring motor as the squirrel cage motor by connects the terminals of the rotor directly.

4.2 The rating of the resistor and the controller should capable for the motor's requirements.

4.3 If the environment temperature is too high, the output of the motor should be decreased or to reduce to environment temperature to avoid the damage of the motor.

4.4 Check and make sure there is no flammability, corrosive or other hurtfully gases in the operation environment.

4.5 Make sure the good ventilation of the motor.

4.6 The cover of inspection window and that of the terminal box should be fixed. Check and make

sure the spare connectors were plugged to avoid the entering of the moisture, oil, dust and other things into the motor during operation.

4.7 Check and make sure there is no abnormal phenomenon, such as abnormal noise, vibration, overheating, present during operation. Otherwise to power off the motor and remove the problems.

4.8 Check the slip ring and the brush periodically. Keep clean and smooth on the surface of the slip ring. If there is burn mark on the surface, clean out it with fine glass sand paper. If there is distinct groove, cut it immediately. Check and make sure the brush rocker is well fixed on the end cover.

4.9 The required average pressure of the brush is about 200g/cm2. If the brush is broken or the height is 2/3 of the original after wearing, it is needed to replace with a new one. The new brush needed to be lapped until the curvature of the brush surface same as that of the slip ring and the contract area between the brush and slip ring not less than 1/3 of the brush's intersection.

## 5. Storage and transportation

5.1 Motor shall be stored in dry place, and radical change of atmosphere temperature shall be avoided.

5.2 Motor shall be not stacked too high, otherwise the ventilation will be hindered and package of motors lower position will be damaged.

5.3 It is necessary to take measure to protect motor from declining down, side positioning or upside down positioning.

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**安徽皖南电机股份有限公司**

**Anhui Wannan Electric Machine Co.,Ltd**

**地址：**安徽省泾县泾川镇南华路 86 号

**Address:** No.86 Nanhua Road Jingxian County Anhui Province P.R.C

**销售处 Sales department:** 400-111-0563　　0563-5031908　5031988

**客户服务中心 Customer service center：**0563-5031953

**企业管理处 Enterprises management department：**0563-5031954

**质量检验处 Quality inspection department：**0563-5031910　5031985

**传真 Fax：**（0563）5029999　5023698

**网址 Website：**http://www.wnmotor.com

**E-mail:** wndjc@wnmotor.com

**邮编 Postal code：**242500


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