# 中型低压三相异步电动机使用手册

# Medium-low-voltage three-phase asynchronous motor instruction manual

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# 目录

# Catalogue

## 1、概述

中型低压三相异步电动机作为动力机械，随着经济和技术的发展，在冶金、供水、油田、港口、矿山、船用、造纸等行业存在巨大的市场需求，尤其随着高效的变频调速传动系统的应用越来越广泛，市场需求进一步扩大。我们参照国外先进技术，根据相关行业标准，开发设计了中型低压三相异步电动机。本系列电动机具有效率高、噪声低、运行安全可靠、安装维护方便等特点。绝缘等级为F级，额定电压为380V（也可根据用户要求设计）。

## 2、结构简介

中型低压三相异步电动机按结构分为箱式结构和紧凑型结构,按防护等级分开启式和封闭式两种。

箱式结构有Y系列和YKK系列两种。Y系列为开启式，电动机防护等级为IP23，冷却方式为自通风冷却，YKK系列为封闭式，电动机防护等级为IP44或IP54，带空-空冷却器。定子采用VPI真空压力浸漆，具有良好的电气性能和防潮能力。转子采用坚固的铸铝转子或铜条焊接，其端环采用纯铜料，且转子导条与端环之间采用银焊焊接，增加了电机的运行可靠性，提高了电动机效率。

Y3系列电动机采用紧凑型结构，为全封闭的设计，防护等级为IP54,该系列电机采用带散热筋的高牌号铸铁机座和端盖，具有很高的机械强度和刚性。采用坚固的铸铝转子，保证了电机运行的可靠性。电机具有两套独立的冷却风路：内冷却风路和外冷却风路，具有良好的冷却效果。

电机出线盒加大了内部空间，符合电气安全要求。本系列电动机共有6根接线头(U1、V1、W1，U2、V2、W2)，电机出线按U1、V1、W1相序接电源为顺时针旋转方向，两极电机只能按指示牌单向旋转，四极以上电动机允许反时针方向旋转（从轴伸端看）。接线盒内有专用接地螺栓，使用时应可靠接地。

## 3、电动机安全运行条件

电动机应符合下列运行条件才能正常运行。

3.1 使用地点海拔不超过1000m

3.2 运行地点的环境温度随着季节变化不超过40℃。超过规定条件应与制造厂联系对温升进行修正。

3.3 电动机运行期间，电源电压与额定值的偏差为±5%，电源频率与额定值的偏差为±1%；当电压与频率同时发生变化时（两者变化分别不超过±5%和±1%），若两者变化都是正值，则两者之和不超过6%；若两者变化都是负值或分别为正与负值，则两者绝对值之和不超过5%。

3.4 最湿月月平均最高相对湿度为90%，同时该月月平均最低温度不高于25℃。

3.5 最低环境空气温度对采用滚动轴承的电动机为-15℃，对采用滑动轴承的电

动机为 5℃。

## 4、电动机的吊装、运输、储存

箱式结构电机在起吊时避免绳挤压机座顶部防护罩，允许将防护罩卸开分别起吊，但起吊电机时必须要用四个吊钩同时起吊，钩牢机座上的四个吊孔。注意防止异物掉进机座内腔砸坏绕组等部件。

电动机在制造厂经检查、试验、合格后装箱发运。近途运输可不用包装，但须防潮。装箱时将电机可靠地固定在箱底梁上，防止途中损坏电机。木箱内用薄膜罩住电机既防尘又防潮，电机运到后开箱首先检查在途中有无损坏，遗失附件和随机文件（后附随机提供的资料名称）。检查电动机铭牌上数据是否符合使用要求。

储存：储存地点须干燥，通风良好，无白蚁、烟雾及腐蚀性气体，以免损坏绝缘和裸露之导电部分。不允许与易燃易爆之物存放在一起。出线盒的进线孔和空-空冷却器（YKK 型）的进、出风孔要堵塞，防止小动物进入内部。

## 5、电动机起动前的检查

5.1 用 500V 兆欧计测量绕组的绝缘电阻，在冷状态时所测得的绝缘电阻值不得低于 1MΩ。绝缘电阻过低应进行干燥处理。

5.2 电动机与被拖动电机之间只允许用联轴器连接，若用户需要采用皮带连接，事先应与制造厂协商。

5.3 检查各部位螺栓是否拧紧，安全防护罩是否牢固

5.4 检查电动机与被拖动机械的轴中心线是否重合。扳动电动机转轴是否能自由旋转。滑动轴承转子的轴向游动量每边约 2-3mm。

5.5 检查出线盒中接线头与引出线端的相序 U、V、W 是否相对应，接地线连接是否牢固，接地情况是否良好。

5.6 检查保护用仪表及信号仪表是否正常。

经上述检查后，方可起动电动机，起动后应让电动机空转一段时间，注意轴承温度不得超过规定值（滚动轴承为 95℃，滑动轴承为 80℃），还应注意电动机是否有不正常的响动、振动、局部发热等情况。发现有异常的现象，应立即停车检查，直至消除为止。

## 6、电动机的使用与保养

6.1 电动机降压起动或通过变频器起动，在变压器容量足够的情况下，可以满压起动。

6.2 电动机施以电压后即开始旋转，并达到额定转速，达到额定转速所需的时间与电动机在起动过程中所产生的转矩及轴上负载转矩有关。启动过程大约 10～20秒之间。

6.3 为延长电动机使用寿命、启动次数在冷态下最多连续启动两次，每次时隔5min。热态下最多启动一次。

6.4 电动机使用期间，定子线圈的内外表面不许灰尘堆集，更不允许水或油落入电机内部，定期检查清除内部污物，导线也要保持清洁。

6.5 轴承运转时应无异常响声。滑动轴承油环是否均匀而寂静地运转，过慢恶化润滑作用，过快且伴有轻度响声表示油量不足。定期取样试验，色发暗，含有水份，轴承污脏或发热需要更换润滑油。更换时轴承用煤油冲洗，并擦干。滚动轴承按机座上加油标牌所示时间可不停机更换润滑脂。

6.6 对空-空冷却器的风管内处，外风罩内的沉积灰尘和异物要进行清理，否则影响散热通风，降低冷却效果。

6.7 电动机运行过程中应定期、准确的记录电源电压、频率、负载电源，定时记录定子线圈、轴承、加热器加热后电机内部温度、环境温度、环境相对湿度。电动机起动时间、次数、停机时间也要详细记录。

## 7、常见故障原因及消除办法（见下表）

| 故障 | 原因 | 消除办法 |
|---|---|---|
| 滑动轴承过热 | 1.油量不足，油不清洁，油的品质降低<br>2.油环卡住<br>3.转轴或轴衬表面有故障 | 更换润滑油<br>修理油环<br>查找原因进行修理 |
| 滚珠及滚柱轴承过热 | 1.润滑脂不足或过多或有杂质<br>2.轴承钢珠损坏 | 更换或填充润滑脂<br>更换轴承 |
| 电动机的振动 | 1.机组的轴线没有重合<br>2.底板刚度不够产生共振 | 调整机组使轴线重合<br>更换底板 |
| 转轴断裂 | 1.机组轴线没有重合<br>2.冲击负载超过了允许的最大转矩<br>3.电动机突然逆转 | 更换转轴 |

| | | |
|---|---|---|
| 电机无法起动 | 1. 接线错误，线路断路<br>2. 工作电压不对<br>3.负载力矩过高或静力矩过大<br>4.起动设备有故障等。 | 查找线路故障；<br>调整电压达到要求；<br>采取措施消除之<br>查找故障原因 |
| 电机过热 | 1. 电压高于或低于额定值，<br>2.负载电流过大<br>3.冷却器有堵塞风量不够 | 调整电压额定值<br>降低负载<br>清理冷却器内灰尘或异物 |

## 8、随机提供的技术资料

1、外型图样

2、使用维护说明书一份。

3、产品合格证明书一份。

用户须知：用户按照使用说明书正确使用与存放的情况下，制造厂保证电机在使用一年内（自制造日期两年以内）良好的运行。如在此规定的时间内，电动机制造质量不良而发生损坏或不能正常工作，制造厂应无偿的为用户修理或更换零件或电动机。

## 1、 Outlines

Medium-low-voltage three-phase asynchronous motor is power machinery, with the economic and technological development, in metallurgy, water, oil, ports, mining, marine, paper and other industries there is enormous market demand, especially in the wake of highly efficient frequency transfer speed drive system of the increasing application of a wide range of further expansion of market demand. We refer to advanced foreign technology, in accordance with relevant industry standards, development and design of medium-sized low-voltage three-phase asynchronous motor. This series motor has high efficiency, low noise, safe and reliable operation, easy installation and maintenance. F-class insulation rating, rated voltage of 380.

## 2、Introduction of the Structure

Medium-low-voltage three-phase asynchronous motor according to the structure is divided into box-type structure and compact structure, in accordance with sub-level of protection to open and closed two.

Box-type structure has Y series and YKK series. Y series open-type, motor protection rating of IP23, cooling method for self-ventilation cooling; YKK series is closed, motor protection rating of IP44 or IP54, with empty-empty cooler. Stator using VPI Vacuum Pressure Impregnation with good electrical properties and moisture-proof ability. Rotor, be used in copper, using copper end ring material, and Article Rotor end ring welding between

the use of silver, an increase of motor reliability, improve the efficiency of the motor.

Y2 series motor using compact structure, closed for the whole design, protection rating of IP54, the series motor with a heat iron bars of the high-grade base and end caps, a high mechanical strength and rigidity. The use of solid cast aluminum rotor, and ensure the reliability of the motor is running. Motor has two sets of independent cooling wind path: the road within the cooling wind and outer wind cooling Road, has a good cooling effect.

Motor round box increased internal space, in line with the electrical safety requirements. This series motor wiring a total of 6 first (U1, V1, W1, U2, V2, W2), motor round by U1, V1, W1 phase sequence received power for clockwise rotation direction, the polarization can only sign a one-way motor rotation, quadrupole above permit the anti-clockwise direction of motor rotation (axis stretching from the end of watch). Wiring inside the box has a dedicated grounding bolts, use to be a reliable grounding.

## 3、 Conditions for the safe operation of motor

Motor shall meet the following operating conditions in order to operate.

3.1 The use of locations not more than 1000m above sea level.

3.2 Environment to run the location with the seasonal variation of temperature does not exceed 40 ℃. Exceed the specified conditions should be

linked with the factory to carry out amendments to the temperature rise.

3.3 Motor during operation, power supply voltage and rating of the deviation of ± 5%, frequency and power rating of the deviation of ± 1%; When simultaneous voltage and frequency changes (both changes were not more than ± 5%and ± 1%), if both changes are positive, then the total does not exceed 6%; If both changes are negative or positive and negative, respectively, then the absolute value of the two and not more than 5%.

3.4 Most wet month average maximum relative humidity of 90 percent, while the monthly mean minimum temperature is not higher than 25 ℃.

3.5 The minimum ambient air temperature on the use of rolling bearings of the motors for -15 ℃, the use of a sliding bearing on the motor for 5 ℃.

## 4、 Motor hoisting, transportation and storage

Box-type structure to avoid motor in lifting rope extruder at the top of Shield Block, shield disposal permit will be open, respectively, lifting, but lifting motor must use the four lifting hook at the same time, hook the four prison machine pedestal cranes hole. Attention to prevent foreign bodies falling into the base cavity and damaged windings and other components.

Motor in the factory after inspection, testing, packing shipped after passing. Passers-by near the packaging there is no need for transportation, subject to moisture. Packing will be reliable electric beam fixed at the bottom to prevent damage to motor his way. Wooden box with a motor and dust hooded film also moisture, the electrical box to the first inspection after the

way the availability of damaged, lost attachment and random documents (annexed to the information provided by a random name). Check the motor nameplate data with the use requirements.

Storage: storage locations to be dry, well-ventilated, no termites, smoke and corrosive gases, so as not to damage the insulation and the exposed conductive parts. And does not allow storage of flammable and explosive objects together. Round box into the line hole, and air - air cooler (YKK type) of the Jin, the wind is to plug holes to prevent small animals to enter the internal.

## 5、 Inspection before the motor starting

5.1 Megohm measured with 500V. Winding insulation resistance, in the cold state when the measured value of insulation resistance shall not be less than 1 Mn. Insulation resistance is too low should have been dried.

5.2 Motor and the drag between the electrical permit is only used to connect coupling, if necessary using a belt to connect the user, prior consultation with the factory.

5.3 Check the various parts of the bolt is tightened, the safety shield is strong.

5.4 Check the motor and the mechanical drag of the shaft centerline is coincidence. Pulled the motor shaft can rotate freely. Bearing rotor axial swimming volume on each side about 2-3mm.

5.5 Check box round head and pinout wiring terminal sequence of U, V,

W is the corresponding, earthing connection is strong, whether the situation is a good grounding .

5.6 Inspection protection instrumentation and signal meters arc normal. Following the above examination only after the starter motor, starter motor should be allowed to idle after a certain period of time, pay attention to bearing temperature shall not exceed the· established value (rolling bearing for 95 ℃, sliding bearing for 80C), should also pay attention to whether the motor does not have a normal ring, vibration, local heat and so on. Unusual phenomenon, should be immediately stopped and inspection, until eliminated.

## 6、Use and maintenance of motors

6.1Motor starter or step-down converter starter, transformer capacity enough in the circumstances, it can be full pressure start-up.

6.2 Motor voltage imposed after the beginning of rotation, and achieve rated speed to rated speed and the time required to start the process of motor generated torque and load torque on the shaft. Start the process of around 10 ~ 20 seconds.

6.3 Motor for extended life, the number in the cold start up to start a row twice, each time after 5min. Hot start time under the maximum.

6.4 Motor in use, both inside and outside the surface of the stator coil stacking not allowed to dust, but also does not allow water or oil from falling into the motor itself, periodic inspection of internal dirt removal, wire should be kept clean.

6.5 Bearings should be no abnormal noise operation. Bearing oil ring is uniform and quiet in operation, too slow deterioration of lubrication, excessive noise and accompanied by mild express insufficient fuel. Periodic sampling tests, dark color, containing water, fouling bearings or lubricants fever need to be replaced. Bearing replacement kerosene wash and dry. Rolling bearing pedestal by the machine shown signs come on from time to time to replace grease downtime.

6.6 Pairs of empty - empty cooler wind pipe, the outer wind sedimentary cover within the dust and foreign matter to be cleared, otherwise the impact of heat ventilation and reduce cooling effect.

6. 7 Motor is running should be regular and accurate records of the supply voltage, frequency, load power, timing Record stator windings, bearings, electric heater heated the internal temperature, ambient temperature, relative humidity environment. Motor start-up time, frequency, downtime should be a detailed record.

## 7、Common fault causes and the elimination method (see table below)

| fault | Reasons | Elimination method |
|---|---|---|
| Bearing overheating | 1. Fuel shortage, dirty oil, oil of lower quality<br>2. Oil ring locked | Replacement of lubricants<br>Repair oil ring<br>Search the cause of the |

| | | |
|---|---|---|
| | 3. Shaft or bushing surface fault | repair |
| Ball and roller bearing overheating | 1. Greases have inadequate or excessive or impurities<br>2.Stell ball in the bearing broken | To replace or fill grease<br>Replacement of bearings |
| Motor vibration | 1.Units of the axis does not coincide<br>2. Backplane rigidity enough to resonate | Adjust so that the axis of coincidence unit<br>Replacement of floor |
| Shaft fracture | 1. Unit axis does not coincide<br>2. The impact of the load exceeded the maximum allowable torque<br>3.Motor reverse | Replacing bearing |
| Motor can not start | I. Wiring error, circuit breaker<br>2. Working voltage is wrong<br>3. Load torque is too high or too much static torque<br>4. Has faults, such as start-up equipment | Search line fault<br>Adjust voltages to meet the requirement<br>Take measures to eliminate Search the cause of the malfunction |

| | | |
|---|---|---|
| Motor overheating | 1. Voltage is higher or lower than the rating<br>2. load electricity is bigness<br>3. Cooler blocking | Adjust voltage rating<br>Reduce the load<br>Clean up dust or foreign bodies inside the cooler |

## 8、Accompany documents

1, Appearance design

2, The use of the maintenance of a specification

3, The product of a certificate.

User Notes: Users in accordance with the instructions to use the proper use and storage of the circumstances, the manufacturing plant, to ensure that motor in the use of one year (from date of manufacture within two years) a good run. Such as the provisions in this period of time, poor manufacturing quality motor damage or should not happen to work, the manufacturing plant should be free for users to repair or replace parts or motor.

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