电机使用说明书

Operating Manual

概述

本说明书适用于我公司生产的YX3、YET、Y2、YVP、YD系列低压三相异步电动机及其派生系列产品

Overview

The manual serves YX3、YET、Y2、YVP、YD Series low voltage asynchronous motors and it's derivative products as well.

开始使用

Putting into use (starting)

收货检查

Reception check

收到电机后立即检查是否有损坏，如发现请立即拨打电话：0086-21-6463-1777，或发传真至0086-21-6463-7180，检查铭牌数据特别是额定电压、接线方式（星形或三角形）是否与合同订货要求相符，用手转动电机轴检查轴转动是否灵活。

Immediately check the motor for external damage upon receipt and if found, please inform us by telephone or fax without delay (Tel:0086-21-6463-1777, Fax:0086-21-6463-7180). Check all rating plate data, especially voltage and winding connection (star or delta). Turn shaft by hand to check for free rotation.

绝缘电阻检查

Insulation resistance check

在电机调试前或怀疑线圈受潮时要测量电机的绝缘电阻，在25℃时的绝缘电阻值应超过以下表达式的值，表达式中：

Measure the motor's insulation resistance before commissioning or when winding dampness is suspected. insulation Resistance, measured at 25° C, shall exceed the following reference value, i.e. where:

R：单位兆欧（用500V绝缘电阻表测量）

U表示电压，单位V

P表示功率，单位kW

$$R=\frac{U}{1000+\frac{P}{100}}$$

R: MΩ(measured with 500 V dc Megger)

U = voltage, Volts;

P = output power, kW.

警告：

测量完绝缘电阻后应立即将测量线从电机上断开，以免线圈再次受到高电压冲击。环境温度每升高20℃，绝缘电阻将降低一半，如果绝缘电阻值达不到计算值，表明线圈已经

受潮需进行烘干处理。先在90℃温度下烘12-16小时再在105℃下烘6-8小时。
WARNING
Windings should be discharged immediately after measurement to avoid risk for electric shock. Insulation resistance reference value is halved for each 20 ° C rise in ambient temperature. If the reference resistance value is not attained, the winding is too damp and must be oven dried. Oven temperature should be 90° C for 12-16 hours followed by 105° C for 6-8 hours.

电机启动

Motor starting

① 单速电机启动（直接或Y/△ 启动）

标准单速三相异步电动机的出线盒内有6个接线头和至少1个接地接头，接地须根据操作规程在电机接上电源前进行，接线方式和电压应根据接线指示牌及铭牌指示。

Start of single speed motor (Direct-on-line or star/delta starting)
The terminal box on standard single speed motors normally contains 6 winding terminals and at least one earth terminal. Earthing shall be carried out according to local regulations before the machine is connected to the power supply . The voltage and connection are stamped on the nameplate.

出线与旋转方向

电机的旋转方向：当相序为L1、L2、L3时，在电机拖动端面对轴伸视为顺时针旋转。如要改变转向，只需改变任意两根电源电缆的相序，如果单向旋转的电机，需检查电机转向是否与指示牌上的方向一致。（接线应严格按照接线盒中示意图）

Terminals and direction of rotation
Direction of rotation is clockwise when viewing the shaft face at the motor drive end, when the line phase sequence L1, L2, L3 is connected to the terminals as shown in the figure. To alter the direction of rotation, interchange the connection of any two-line cables. For the unidirectional motor, check that the direction of rotation is according to the arrow marked on the direction board. (The terminals shall be connected in strict accordance with the terminal box drawing.)

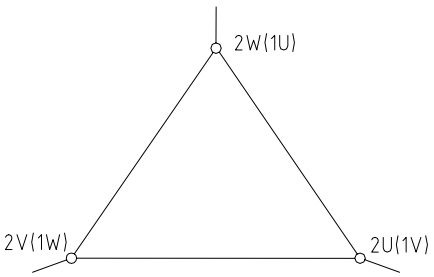
②多速电机启动

多速电机一般应低速档启动后切换到高速，对多套绕组的变速电机在不同转速档切换时，应在一绕组断电后才能向另一绕组送电。

Start-up of multi-speed motor
The multispeed motor should start at low-speed then shifted to high-speed. For multispeed motors that with many separate windings the speed shift shall be fulfilled when one winding has to be lost power.

示意图1:定速电机（△/Y）

Fig 1: Fixed motor （△/Y）



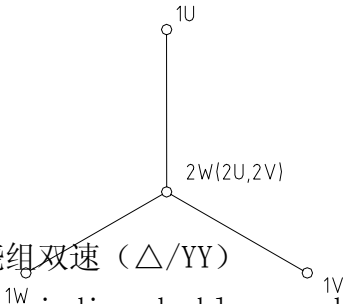
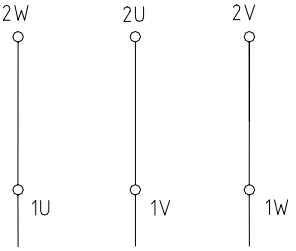
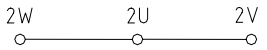


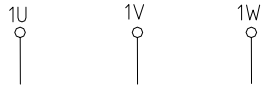
示意图2：单绕组双速（△/YY）

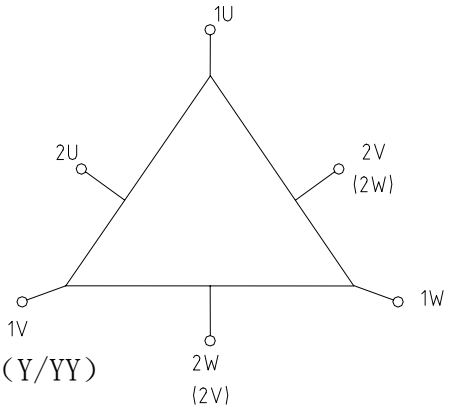
Fig 2: Single-winding double speed

应为U1 V1 W1 U2 V2 W2









速（Y/YY）

Fig 3: Single-winding double speed

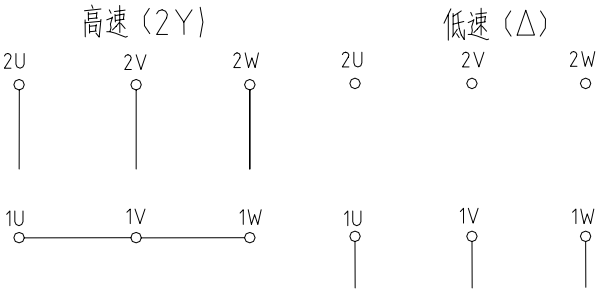
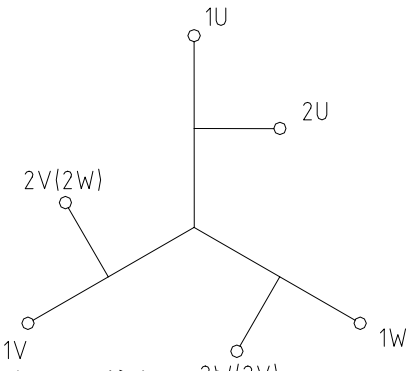


示意图3:单绕组双



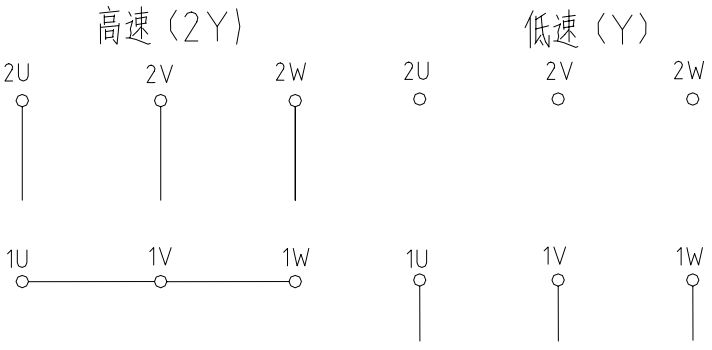
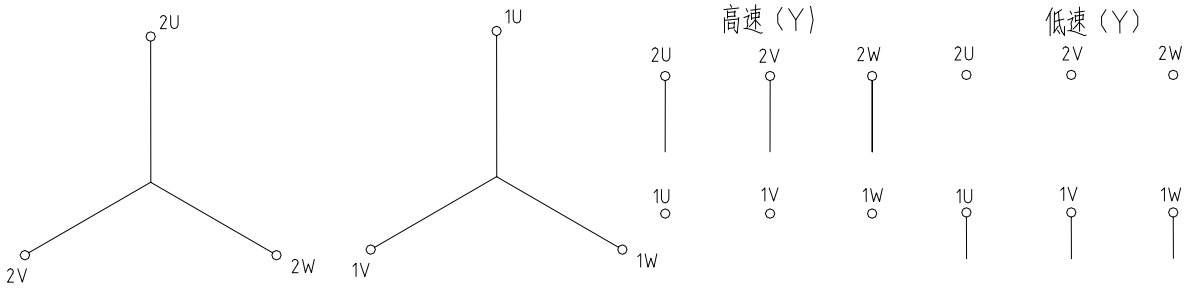


示意图4：双绕组双速（Y/Y）

Fig4: Double-winding double speed



③变频电机启动

变频电机启动时，电机冷却风机也必须同时启动。冷却风机应接工频电源，其转向必须与风机外壳上的指示矢方向一致.VVVF变频器可以转矩提升以提高启动转矩，提升电压的幅度应不大于10%，且起动电流不大于额定电流的1.5倍。变频器的开关频率设置应不小于1.5kHz。

Start-up of variable frequency motor

When the variable frequency motor starts, the cooling blower shall starts simultaneously. The cooling blower must be connected to the power frequency supply, and the rotating direction shall be as specified in the nameplate of blower. Adjust the value of v/f, the motor can obtain different start performance, but if over compensate of voltage will cause overload.

使用

运行条件

电机是用来驱动其他机械，通常环境温度为-25° C 到 +40° C，海拔高度为1000米以下。（当环境温度与海拔高度不符合上述规定时，铭牌上会注明）

Use

Operating conditions

The motors are intended for use in industrial drive applications. Normal ambient temperature limits -25° C to +40° C. Maximum altitude 1000 m above sea level. When ambient temperature and altitude are not same as
the requirement said above, the special note will be showed on the nameplate.

处理

储存

所有电机应储存于干燥,通风以及干净的室内，裸露的表面如轴伸和法兰面应涂以防锈脂。建议定期用手转动电机轴，以免润滑脂流掉，带有加热器的应接通加热器。

Handling

Storage

All motors should be stored indoors, in dry, well ventilation and dust free conditions. Unprotected machined surfaces (shaft-ends and flanges) should be given anti-corrosion coatings. It is recommended that shafts be rotated periodically by hand to prevent grease migration. Anti condensation heaters, if fitted, should preferably be energized.

3.4 储存超过一年的，须检查润滑脂，如润滑脂已变质干涸或弄脏，应先用煤油清洗，然后用汽油清洗轴承后再加入新的润滑脂。每个轴承应加新脂的重量 W 可参考如下公式：

W=D·B/K（g）　　式中：D为轴承外径（mm），B为轴承宽度（mm）

系数K=100~200按工作状况选取。（工作状况恶劣应取较大值）。

一般情况，2极电机加润滑脂量为轴承室空腔容积的1/2，4极以上为轴承室的2/3。

3.4 Storage over one year: The check should be made for grease, if it is dried or dirty, it should be washed by kerosene first, then gasoline, then put new grease on bearings. The weight of the grease added can be set by the following formula: W=D·B/K（g）

D: OD of the bearing（mm）, B: Width of the bearing （mm）

K: 100-200 based on work conditions.

In general, the grease should be filled into 1/2 of bearing room for 2 poles motor, and 2/3 for 4 poles and above.

安装

基础

买方要准备好电机的基础,金属结构的基础应涂以防锈漆防止被腐蚀。电机基础应平整，并有足够的刚度承受突然短路产生的应力，要计算其尺寸以避免因共振引起基础振动。

Installation

Foundation

The purchaser bears full responsibility for preparation of the foundation. Metal foundations should be painted to avoid corrosion. Foundations shall be even, and sufficiently rigid to withstand possible short circuit forces. They shall be dimensioned as to avoid the occurrence of vibration due to resonance.

联接

电动机可以用联轴器、正齿轮及皮带轮传动，对于功率大转速较高的电动机应尽量避免采用皮带传动方式，如必须采用皮带传动方式的应在订货时注明，皮带传动时应防止预拉力过大发生断轴。联轴器、正齿轮及皮带轮安装时应采用热套方法，严禁重力敲击方法冷装传动件。

校正中心

校正电机安装中心有利于避免轴承发生故障、振动和可能发生的轴伸断裂事故。采用联轴器传动时，通常两联轴器的水平偏差不大于0.05～0.1mm，轴向偏差不大于0.1mm。采用皮带传动时，要求皮带轮轴向中心与电机轴伸的轴向中心重合，且皮带中心线与轴中

心线垂直。

Alignment

Correct alignment is essential to avoid bearing failures, vibrations and possible fractured shaft extensions.

接线

通常出线盒在电机的顶部，还有其他位置可供样本选择（在电机拖动端面对轴伸视）。除了绕组和接地，出线盒还可以接停机加热器、双金属温度开关或PT100测温元件等。

Connection

The normal motor design is with terminal box on the top, when viewing the shaft at the motor drive end. Availability of these solutions is described in the product catalogues. Besides the main winding and earthing terminals, the terminal box can also contain connections for standstill heating elements, bimetallic switches, or PT 100 resistance elements.

装配与拆卸

概述

装配与拆卸工作必须有资格的专业人员使用专用工具和合适的工作方法来进行。并参考电机总装标准图。

Assembly and dismantling

General

Dismantling and assembly of motors must be carried out by qualified personnel using only suitable tools and working methods and refer to the motor assembly standard drawings.

轴承

拆卸轴承时必须特别注意，应该使用轴承拉脚并加热或使用专用工具。

Bearings

Special care shall be taken with the bearings. Bearings shall be removed using pullers and fitted by heating or the use of specialized tools for the purpose.

平衡

电机出厂前已经进行了转子动平衡

Balancing

The rotor of the motor is dynamically balanced.

维护与更换润滑油

一般检查

- 在计划停机时检查
- 保持电机清洁，确保良好通风

- 检查轴承密封状态，如有必要即进行更换。
- 检查各连接、地脚及装配螺栓。
- 通过听声音、测量振动、轴承温度以及检查润滑油是否过期来检测轴承的状态。

Maintenance and lubrication

General inspection

- Inspect the machine at regular intervals.
- Keep the machine clean and ensure free ventilation air-flow.
- Check the condition of shaft seals and replace if necessary.
- Check the condition of connections and mounting and assembly bolts.
- Check the bearing condition by listening for unusual noise, vibration measurement, bearing temperature, inspection of spent grease.

更换润滑油

装有密封轴承的电机

中心高在160mm以下的电机装有密封轴承，装有密封轴承的电机在运行期间不必加油。

Lubrication

Motors with sealed bearings

Motors which the center height is less than 160 mm are normally fitted with sealed bearings. It doesn't need regreased during operation

带加油口的电机

中心高180~355的电机轴承通常配有加油口，可以在电机运行时加润滑脂。一般勤加脂，每次加少量。

Motors fitted with grease nipples

Motors with center height from 180 to 355 mm is normally fitted with grease nipples. Lubricate it by grease frequently while running, but once a little.

更换润滑脂时间间隔如下：

Guidelines for re-greasing intervals are as below:

电机中心高 mm	补充润滑脂量（克g）	电机转速r/min			
		3000	1500	1000	500-900
轴承补充润滑脂时间间隔					
180	20	3500	5500	6500	8500
200,225	25	3100	5000	6000	7000
250,280	35	2000	5000	6000	7000
315	50	2000	3000	3500	4500
355	60	1000	2000	3000	4000

Centerline Height mm	Amount of grease (g)	Speed r/min			
		3000	1500	1000	500-900
Bearings' Lubrication intervals in duty hours					
180	20	3500	5500	6500	8500
200,225	25	3100	5000	6000	7000
250,280	35	2000	5000	6000	7000
315	50	2000	3000	3500	4500
355	60	1000	2000	3000	4000

表格中的数据适合于卧式安装的电机，对于立式安装的电机，其时间间隔为相应表格中的一半，如果按照上述时间间隔加油，加油量可以参照表格内的数据。如果电机装有放油孔，更换润滑油时要等到原来的油全部被挤出后才算完成。对于使用于较高环境温度及轴承温度达80℃以上，则应相应缩短加油时间。

The table is prepared for horizontally mounted motors. Lubrication intervals for vertical motors are half of the above values. The grease amount in the table is used if according to the regular intervals as above. As an alternative, when the machine is fitted with grease escape valves, fresh grease may be pressed into the bearings until the old grease is totally replaced. The motor, which is running under high ambient temperature or the bearing temperature is more than 80° C, should shorten the re-greasing intervals correspondingly.

故障分析及处理 Trouble shooting

电气故障见表1。Normal electrical failure, see table 1.

表1 Table 1

A Can not be started
B Hard to accelerate
C Abnormal noise (buzz) when starting
D Abnormal noise (buzz) when running
E Double frequency slip buzz noise
F Over heat without loading
G Over heat with loading
H Over heat for individual winding

A 电机起动	B 电机加速	C 起动时发	D 运行中发	E 双倍频转	F 无载运行	G 有载绕组	H 个别绕组	可能出现的原因 Possible cause	处理方法 Treatment

失灵	困难	嗡嗡声	嗡嗡声	差嗡嗡声	时温度过高	运行时温度过高	截面过热		
△	△		△			△		过载 Overload	降低负载 Reduce load
△								一相电源断路 Open circuit of one phase	检查配电设备和馈电电路 Check power supply circuit and controller switching equipment.
	△	△	△			△		接通后一相电源开路 Open circuit of one phase after power on	改善供电系统条件 Correct the power supply system （单元格问题）
	△					△		电源网电压低，或频率高 Network voltage too low, or frequency too high	
					△	△		电源网电压高，或频率低 Network voltage too high, or frequency too low	
							△	定子绕组联接错误 Stator winding wrong connection	改正绕组的联接 Correct the connection of winding
	△	△	△			△	△	定子绕组匝间或相间短路 Stator winding interturn or phase short circuit	检查绕组的绝缘电阻，询问制造公司后修理 Check winding's insulation resistance and repair after inquiring about the manufacturer
				△				鼠笼导条细条、断条 Thin cage conducting bar broken	询问制造公司后修理 Repair after inquiring about the manufacturer
			△	△				变频电源谐波所致 Caused by harmonic of inverter power supply	询问变频器厂商 Inquiring the inverter manufacturer

机械故障见表 2。Normal mechanical troubles, see table 2.

表2 Table 2

A Frictional noise
B Overheat
C Over runout in radius
D Over runout in axis

机械故障 Mechanical failure				故障产生的原因 Possible cause	处理的方法 Treatment
A 摩擦噪声	B 温度过高	C 径向跳动	D 轴向跳动		
	△			风路受阻，旋转方向不对 Poor ventilation, or wrong rotation	检查风道，调换转向 Check ventilation duct and Correct it
△				转动零件受到磨擦 Moving parts worn out	查明原因，重新找正 Check and correct it
		△		转子不平衡 Rotor imbalance	卸下转子，重新找正 Disassembly the rotor and correct it
		△		耦合机械不平衡 Coupler imbalance	重新平衡耦合机械 Correct it
		△		转子部分不正，轴弯曲 Rotor problem, or bending	和制造厂研究决定 Call factory
		△	△	装配和调整不当 Incorrect assembly and adjustment	查明原因，重新校正电机，检查耦合件 Check and recalibrate motor ,and check coupler
		△	△	传动机构的干扰 Interference of drive mechanism	检查传动机构Check and correct it
		△	△	地基振动 Foundation vibration	加固基础 Reinforce foundation.
		△	△	地基变形 Foundation distortion	查清原因，重新调整电机 Find out the reason and readjust motor
			△	来自耦合机械的冲击 Impact from coupled mechanical	检查耦合机械 Check coupled mechanical
	△			过载 Overload	减低负载 Reduce load

轴承故障见表 3 Normal bearing troubles, see table 3

表3 Table 3

A Overheat
B With squeal noise
C With knock noise

轴承故障现象 Bearing trouble			故障产生的原因 Possible cause	故障处理方法 Treatment
A 轴承过热	B 轴承有尖叫声	C 轴承有磕碰声		
△			滚珠（柱）的油膜耗尽，润滑中断 No grease	补充润滑脂 Refill it.
△			联轴器传来的应力 Stress from coupler	调整电机的同心度 Adjust motor concentricity
△			轴承弄脏或润滑脂过多 Dirty, or over greased	清理或更换润滑脂，检查密封零件 Clean or replace grease and check seal part
△	△		内盖研轴或润滑方法不当 Inner cover contact shaft, or wrong lubrication	停机修理，检查轴承或润滑，按说明书润滑 Stop and check bearing or lubrication, and lubricate according to the instructions
△	△		轴承安装不正 Wrong bearing installation	检查装配情况是否正确，调整安装 Check installation and correct it.
△	△		轴承游隙太小 Too small back lash bearing	换大游隙轴承 Change a bearing with big back lash
		△	轴承游隙过大 Too big back lash bearing	换小游隙轴承 Change a bearing with small back lash
△			进油温度高、油量小、压力小 Inlet oil with higher temp, less quantity and pressure.	检查油路系统，使其达到说明书要求 Check the oil-way and correct it to meet instructions' requirement
		△	轴承磨损 Bearing worn out	换新轴承，停机状态避免振动 Replace new bearing, avoid vibration in down state

△	△		轴承腐蚀 Bearing corrosion	换新轴承，检查密封状态 Replace new bearing, and check sealing
△			皮带压力过大 Over high pressure on belt	减小皮带的压力 Reduce belt's pressure
△			环境温度高于40℃ Ambient temperature over 40℃	采用耐高温润滑脂 Use heat resisting grease
		△	电磁中心不对齐 Wrong electromagnetic center	调整铁心位置 Adjust motor core's position