Surene 硕能科技

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低压三相异步电动机

LOW VOLTAGE THREE PHASE INDUCTION MOTOR

使用说明书

OPERATION INSTRUCTION

青岛硕能科技有限公司
Qingdao Surene Technology Co., Ltd.

目 录 Catalogue

1. 前言 PREFACE

本系列三相异步电动机为一般用途全封闭、自扇冷式、鼠笼型低压三相异步电动机，其功率等级和安装尺寸符合国际电工委员会 IEC 标准，具有效率高、噪声小、震动小、结构合理、外形美观等特点。适用于驱动各种无特殊要求的机械设备，如机床、水泵、风机、压缩机及运输机械等。

The motors of this series are normal totally enclosed fan cooled squirrel cage induction motor. Its power and mounting dimension conforms to IEC standard, and have the advantage of high efficiency, low noise, low vibration, rational structure and nice appearance. The motors are suitable for driving all kinds of machines without special requirements, such as machine tools, pumps, fans, compressors and transportation machineries.

本公司产品对用户实行三包，在按照使用维护说明书规定的情况下，电动机使用一年内或自本公司起运日期两年内，如因电动机制造质量不良而发生损坏或不能正常运行时，本公司无偿予以处理，更换零件或电动机。

Consumer should use motor according to specification, the motor run in one year or production date in two years, in such as our motor implement three responsibilities to consumers, our company will change the part or motor for free, if the motor can't work well because of motor quality.

本系列电动机按照如下标准设计并制造：

The motors of this series are designed and manufactured according to the below standards:

标准名称 Standard	IEC 标准 IEC Standard	国内标准 National Standard
定额性能 Rating and Performance	IEC60034-1	GB755
三相异步电动机实验方法 Test method for three phase induction motor	IEC60034-2	GB/T1032
防护等级 Degree of Protection	IEC60034-5	GB/T 1993
冷却方法 Methods of cooling	IEC60034-6	GB/ T4942
安装形式 Mounting Arrangement	IEC60034-7	GB/ T 977
线端标志与旋转方向 Terminal Marking and Direction of Rotation	IEC60034-8	GB/ T 1971
噪声测定方法及限值 Measurement and Limits of Noise	IEC 60034-9	GB/ T 10069
热保护 Thermal Protection	IEC 60034-11	GB/ T 13002
起动性能 Starting Performance	IEC 60034-12	JB/ T 8158
振动测量方法及限值 Measurement and Limits of Vibration	IEC 60034-14	GB/ T 10068
安全要求 Safety Requirements		GB 14711
尺寸和输出功率等级 Dimension and Output of Power	IEC 60072	GB/ T 4772

2. 新品检验 PRODUCT INSPECTION

用户在收到电动机时，请进行以下项目检查：

Please check the below item when you receive the motors:

2.1 包装箱及电动机是否完好无损。

Check whether both of the package and motors are in good condition.

2.2 打开包装后，请检查产品使用说明书、合格证等附件是否齐全。

Check whether the documents are complete, such as product manual, certificates and others.

2.3 请核对电动机铭牌内容是否符合订货要求。

Check whether the data on the nameplate is consistent with actual order requirements.

2.4 如对漆色、转向、安装尺寸等有特殊要求，请按订货要求进行检查。

Please check the special requirements, like colors, the rotation and the mounting dimension according to the order.

2.5 用 500V 兆欧表测量绝缘电阻，25℃时其值不低于 10 兆欧，环境温度每升高 20℃，绝缘电阻参考参考值减小一半。否则应对定子绕组进行干燥处理：

Measure the insulation resistance with a 500V megohmmeter. The measured value should not be less than 10MΩ， and the reference value shall be reduced by half if the environment temperature rise every 25℃. Otherwise, the stator winding shall be dried.

2.5.1 利用预装的加热器按规定电压进行加热。

Use the pre-positioned heater to conduct the heating process with specified voltage.

2.5.2 利用外部热源(如烘箱等)进行加热，干燥处理温度不允许超过 100℃，干燥时间一般为 4 小时左右。加热过程中应均匀加热，防止局部温度过高造成绝缘系统损伤。

Heat with external source (like oven), the temperature is not allowed to exceed 100℃, and drying around 4 hours. Please assure the heating process as evenly as possible to protect the insulation system from damage due to partly over high temperature.

2.5.3 输入直流电(例如使用电焊机)对绕组通电加热，加热前将三相绕组进行串联，输入电流的大小不得超过 20%的额定电流。

Heat the winding with DC input (e.g. use the electric welder), and with a current less than 20% of the rated value. Please remember to connect the three phase windings in series.

2.5.4 对海水打湿的电动机，必须重新进行绕线。

If the motors are wet by sea water, it must be re-winding.

3. 存放 STORAGE

电动机检验合格后，如不马上使用，请在固定仓库进行存放。在存放过程中，请注意以下几点：

If the motors are tested qualified and are not going to be operated at once, they shall be stored in a specified warehouse, and take care of the below matters:

3.1 应保持周围环境干燥、通风良好，避免环境温度的急剧变化。

Store in dry area with good performance of ventilation, and avoid rapid changes in surrounding environment temperature.

3.2 电动机不宜堆积太高，以免影响通风及损坏下层电动机。

Please don't pile up too many motors, in case cause damage to the lower motors.

3.3 电动机长期存放时， 应每 3 个月检查一次电动机绝缘电阻，检验方法、判定标准及处理方法见 2.5.

If the motors are stored for a long time, please check the insulation resistance every three months. The test method, the criterion and the disposal solution are described in chapter 2.5.

3.4 轴承保护 Bearing Protection

3.4.1 部分电动机轴伸端装有轴伸固定挡板， 以避免因转子轴向移位造成轴承损坏。安装此类电机时，请先将电机按要求吊起至正常位置，然后将轴伸挡板拆除，最后将电机进行安装及运转。

Some motors are equipped with a fixed dam at the drive end, to prevent damages to the bearing caused by axial displacement of rotor. When install such motors, you must hang the motor to a

suitable position as required, and remove the dam first. And then mount the motor and put into running.

3.4.2 对于使用滚动轴承的电机，在出产前已进行良好润滑并助有润滑脂。在电动机长期存放期间请定期将转子旋转数周，这样可以对轴承更好进行润滑并达到防锈效果。

The motors with rolling bearings must be greased and assure good lubrication before they leave the factory. Please rotate the rotor for several turns regularly when motors are not used for a long time to guarantee a better lubrication and rust-proof.

3.5 防锈处理 Rust Prevention

电动机在出厂前已经进行防锈处理。如需长期存放，请及时对轴伸、键、中心孔、各装配面等部位做好防锈处理。

The motors shall be handled with rust-proof process before leave factory. Please take rust prevention measures for shaft, key, center hole and all other assembling surface.

4. 搬运 TRANSPORTATION

4.1 电动机装有的调换只能承受电动机本身的重量，搬运过程中请勿连接其他设备一起吊运，以防止意外发生。

The rings attached to the motors can only afford the motor weight, please do not hang other equipments to prevent in case any accidents during the transportation.

4.2 搬运过程中请轻拿轻放，避免剧烈撞击造成电动机底脚断裂、轴承损坏等事故发生。

Please keep careful operation when carry the motors, to avoid damage to the motor footing or bearing due to intense crash

accident.

4.3 搬运过程中请勿一次吊运多台电机，防止电动机互相撞击造成散热片断裂、风罩变形、轴伸磕碰等事故发生。

Please do not hang several motors at one time, to prevent damages from crash into each other, like fracture of cooling fin, fan cover deformation, and shaft collodes.

4.4 立式电机在拆除轴伸固定挡板后请保持直立搬运。

Keep the motor up straight during transportation after removed the fixed dam at the drive end when handling the vertical motors.

5. 安装 INSTALLATION

5.1 标准电动机适合如下工况：环境温度-15℃~40℃；空气相对湿度 95%以下；海拔 1000 米以下；户内使用，周围无有害气体、液体及粉尘；应保证电动机有良好的通风条件，风罩进风端空间 H180 及以下机座号不小于 30mm,H200 及以上机座号不小于 50mm。

The standard motor is suitable to work under the following conditions: A minimum and maximum ambient temperature of -15℃~40℃; Relative humidity less than 90%; Maximum height of 1000m above sea level; In indoor use, without any harmful gas, liquid or dust in the surrounding area; Be well-ventilated, the inlet air space of the fan cover shall not be less than 30mm for motors with frames 180 and smaller; The space not less than 50mm for frames 200 and bigger.

5.2 安装基础 Mounting Base

5.2.1 安装基础必须平整、坚固，能够承受电动机启动时产生

的冲击力。还应避免基础和电机产生共振。

The base shall be flat and firm, which can bear the motor start impact force. And also prevent resonance effect between the base and the motor.

5.2.2 安装电机前应将电机底脚及安装基础的油漆等杂质进行清理。

Please clear away the dust like paint on the motor footing and the mounting base before install the motor.

5.2.3 电机两底脚水平高度偏差不得大于 0.1mm， 否则请用调整垫片进行调整。

The level tolerance of two footings shall not exceed 0.1mm, otherwise, it has to be adjusted with shims.

5.2.4 请确保电动机轴心和负载轴心在同一直线上，否则容易造成轴及轴承损坏。必要时请用调整垫片进行调整。

Please assure that the motor axis must be aligned with the load axis, otherwise the shaft and the bearings maybe destroyed. Please adjust with the shim if necessary.

5.3 联轴器及皮带轮 Shaft Coupling and Belt Pulley

5.3.1 安装联轴器或皮带轮时不要将它们敲打到位， 也不要用杠杆抵住机体拆下它们，必须用合适的设备和工具安装联轴器和皮带轮，以免损坏轴承，必要时可将联轴器或皮带轮加热膨胀后安装。如果电机是双轴伸，第二轴伸必须采用联轴器连接，电机连接安装必须采用加热安装方式，以免硬性按安装损坏轴承。

Please use suitable equipment and tools to install the coupling and belt pulley, instead of physically knocking in place or remove by leveraging against the body, to avoid damage to the bearing. If

Necessary, please install the coupling and belt pulley after thermal expansion. If the motor has two shafts, the coupling should be heated in order to avoid damage bearing.

5.3.2 采用 V 型皮带轮传动时，轮大径和小径比不可大于 8:1. 皮带速度请勿超过 25 米/分钟，否则皮带的磨损和震动会增大。

If you use V-TYPE pulley drive, the diameter value of large: small shall not bigger than 8:1. Please keep the pulley speed less than 25m/min, to reduce the influence of vibration and wear of the belt.

5.3.3 选择合适的皮带轮张力。 张力过大时会造成轴这段和轴承损伤；张力过小时，皮带容易产生滑动，造成皮带及皮带轮磨损。

Choose appropriate belt tension. If too big, the tension will lead axle fracture and bearing damage; if too small, the belt may slide easily, which will cause belt and belt pulley wearing.

6.接线 CONNECTION

6.1 电动机装有接线盒，打开接线盒盖后，将电源线穿过填料涵橡皮圈，然后按照对应相序接好电源线，并将压紧螺母拧紧，达到防水、防振的要求。 不使用的填料函请不要进行穿孔，以继续保持密封状态。

Open the terminal box on the motor, put the power line through the stuffing rubber band, and connect the power supply wire according to corresponding phase sequence, then tighten the gland nut to assure performance of water-proof and vibration-proof. Do not punch those unused stuffing box to keep the sealing status.

6.2 电动机应妥善接地，接线盒内右下方及机座外部有接地装置。

The motors must be adequately grounded, the earth connections shall be provided to the right-bottom of the inner terminal box and the outside of the base.

6.3 请务必在电动机断电后使用电动机加热器。否则，容易导致电动机过热甚至烧毁。

Please remember to cut off the power before you use the motor heater. Otherwise, the motor will be overheating and burn down.

7. 运行步骤 RUNNING STEPS

7.1 电动机独立运行 Running Independently

接好电源检查无误后，将轴伸固定挡板、轴伸保护套、键等取下后，通电进行电动机独立运行。检查电动机转向是否正确，是否工作正常。

Connect and check the power supply, dismount the fixed dam and protective sleeve of the shaft extension, and also the key, so the motor can be run stand-alone. Please check whether the motor is working well, and the rotation is correct.

7.2 与负载连接后，进行电动机轻载运行，检查是否工作正常。

Check the motor with light load running after connection.
Check if the working condition is good.

7.3 逐步加至满载，检查是否工作正常。

Check if the motor is working properly with gradually loaded to full capacity.

7.4 电源 Current Supply

7.4.1 额定频率时，允许的工作电压波动率为±5%。

Allowable working voltage fluctuation ± 5% under rated frequency.

7.4.2 额定电压时，允许的工作频率波动率为±2%。

Allowable working frequency fluctuation ± 2% under rated voltage.

7.4.3 工作电压、频率同时波动时，两者波动率之和不超过

±5%。

If both the voltage and frequency fluctuation , the sum of the rate shall not exceed 5%.

7.4.4 工作电流不应超过额定电流，否则容易造成电机发热甚至烧毁。

The working current shall not exceed rated current, otherwise the motors will be burned due to the heating.

7.5 起动次数和起动时间 Starting Time

因起动电流通常为额定电流的 5-8 倍，频繁起动会造成电机过热甚至烧毁。必须重新起动时，应遵循以下规则：

As starting current is usual five to eight times of the rated current, if you start frequently, the motors will be heated up and burned down. If really in need, please follow the below rules:

7.5.1 电动机在冷态或空载时，两次起动时间间隔不小于 30 分钟。

The time interval of two starting shall not less than 30 minutes under cold state or no-load condition.

7.5.2 电动机在热态或满载时，两次起动时间间隔不小于 60 分钟。

If the motors are under hot state or full load, the time interval of two starting shall not less than 60 minutes.

7.5.3 电动机直接起动时间不应超过 10 秒，采用星角起动时间不应超过 30 秒。

The direct starting time of the motor shall not exceed 10 seconds, if from star connection to delta connection, the time shall not exceed 30 seconds.

7.5.4 如电动机无法起动，请断电检查并排除故障后方可投入使用。

If the motor fails to start, please cut off the power, and eliminate the fault, and then go into running process.

7.6 旋转方向 Direction of Rotation

标准电动机的旋转方向为从轴伸端视之为顺时针方向。无特殊说明时，可根据需要将电动机调整为反向旋转，方法是将电源线任意两相进行交换。

The rotation of standard motor is clockwise from D.E. side. Unless stated, it can be a reversed direction as needed. The method is to exchange the two phase of the power line.

7.7 润滑脂 Grease

对长期存放的带有注油装置的电动机，使用前请适量补充润滑脂。对于第一次加入润滑脂的电动机，轴承温度会有所增加，10 至 20 小时后温度会恢复正常。

Motors with oiling system should be filled with grease before use, especially after long-term storage. The temperature of the bearings will be increasing if the grease is first filled to the motor, but it will back to normal after 10-20 hours.

7.8 温度 Temperature

7.8.1 滚动轴承允许的温度为 95℃。

轴承型号及润滑周期一览表

Bearing Type and Lubrication Interval Table

机座号 Frame Size	轴承型号 Bearing Type		润滑油量 Greasing Amount(g)	润滑周期（小时） Interval(Hour)		
	D	N		＜3600 rpm	＜1800 rpm	＜1000 rpm
160	6309	6309	30	3000	4000	5000
180	6311	6311	50	3000	4000	5000
200	6312	6312	60	3000	4000	5000
225	6313	6313	80	3000	4000	5000
250	6314	6314	80	2000	4000	5000
250(V1)	6314	7314	80	1000	2000	2000
280-2P	6314	6314	80	2000	--	--
280-2P(V1)	6314	6314	80	1000	--	--
280-4-8P	6317	6317	120	--	4000	5000
280-4-8P(V1)	6317	6317	120	--	4000	5000
315-2P	6316	6316	100	2000	--	--
315-2P(V1)	6316	7316	100	1000	--	--
315-4-10P	6319	6319	120	--	2000	4000
315-4-10P(V1)	6319	7319	120	--	1000	2000
315-2P	6319	6319	120	1000	--	--
355-2P(V1)	6319	7319	120	500	--	--
355-4-10P	6322	6322	220	--	2000	4000
355-4-10P(V1)	6322	7322	220	--	1000	2000
400-2	6220	6220	100	1000	--	--
400-2(V1)	6220	7220	100	500	--	--
400-4.6.8P	NU224	6224	120	--	2000	4000
400-4.6.8P(V1)	NU224	7224	120	--	1000	2000

说明：除 H80-132 电动机使用封闭轴承不用再加润滑脂外，H160 以上电动机均设有轴承润滑脂注入及排除装置。

未标明的立式电机的润滑脂周期为上述数值的一半。润滑周期基于轴承温度 80℃、环境温度+25℃。环境温度变化会影响到轴承温度。轴承温度升高 15℃时应将润滑周期减半；当轴承温度降低 15℃时，可将润滑周期增加一倍。

标准电机使用长城 HTHS 润滑脂。为避免不同润滑脂不相容造成轴承损坏，请勿混用其他品牌的其他型号的润滑脂。

Note: Motors H80-132 with sealed bearings need not to grease, motors whose frames dimensions are greater than H160 are equipped with grease filling and draining devices.

For vertical motors, if unspecified, the interval is half of the above value. The above value is based on bearing temperature of 80℃ and environment temperature changes will affect the bearing temperature. The interval shall be half every 15℃ increased of the bearing temperature, while double the interval every 15℃ reduced of bearing temperature.

The standard motor use HTHS grease. Please do not mix other brand and type of grease to avoid damage to the bearing which can be caused by incompatible of different grease.

8. 维护保养 MAINTENANCE

8.1 电动机应严格按铭牌所载的额定值使用，如额定电压、额定频率、额定电流等。

The motors must be operated according to the rated value on the nameplate, such as voltage, frequency and current.

8.2 电动机运转时，应记录有关仪表及温度计的读数及运行期间的检修情况和故障处理。

The readings of relevant instruments, thermometers and maintenance situation should be always noted during operation. The handling of troubles should also kept.

8.3 当电动机的热保护及短路保护连续发生动作时，应立即停机检查，消除故障后方可投入运行。

If the motor thermal or short-circuit protection is detected continuous action, please check and clarify the trouble source before operating. Check the possibility of overload, or setting value of protection devices, or troubles from the motor itself.

8.4 应保证电动机在运行过程中良好的润滑，应定期补充或更换润滑脂。运行中如发现轴承过热或润滑脂变质时，应及时更换润滑脂。更换润滑脂时，应清除旧的润滑脂，并用汽油清洗轴承及轴承盖的油槽，然后按要求的型号及用量进行更换。补充或更换润滑脂时应防止灰尘杂质进入。

The motor must work in a good lubrication condition, the grease must be refreshed or replaced regularly. If it is found the bearing heated up, or the grease deteriorated, the grease must be replaced. When changing, the used grease must be cleaned away, the bearing and its cover must be cleaned with gasoline, and filled with required

grease type and quantity. Please do not mix any dust when you refresh or change the grease.

8.5 为了消除电动机的事故隐患，电动机应定期进行检修，一般 3 个月小检修一次，12 个月大检修一次。

In order to eliminate the possibility of accident, the maintenance should be done periodically, generally every three months and an overhaul every year.

8.5.1 小检修时，应清除机体外的积尘、污垢，保持接线板清洁，以免积尘受潮，产生爬电现象，检查电动机线圈的绝缘电阻、接头、接地线、各紧固零件及传动机构的连接等有无松动，消除所发现的缺陷。

For ordinary maintenance, the dust and dirt must be cleaned away from the external body, and the connecting plate should keep clean to avoid dampness due to gathered dust which can cause creeping. Check the connections of insulation resistance of windings, check the connection of terminals, grounding cables, and see if the joints of the fixing parts and drive mechanism have loosed. Every found fault must be eliminated.

8.5.2 大检修时，除进行小检修的项目外，应将电动机拆开，检查线圈是否完好，端部绑扎是否损坏，检查轴承磨损情况并更换润滑脂，更换轴承请参考轴承型号表。

For an overhaul, the motor must be disassembled. Besides the items which must be done in the maintenance, you should notice the windings if they are in condition, and if the end windings are damaged, you should also observe if the motor bearing are worn out, and refresh the grease as required. When you change the bearing, please refer to the bearing type table.

9. 故障及处理

FAULTS AND HANDLING

故障 Faults	原因 Cause	处理方法 Solutions
轴承发热 Bearing Overheating	轴承损坏 Bearing Damage	更换轴承 Change Bearing
	轴弯曲或扭曲 Shaft Bend or Distorted	矫正或更换转子 Straightening or Change Motor Rotor
		减小张力 Reduce Belt Tension
	皮带轮偏离 Belt Pulley Deviated	重新装皮带轮 Re-mount the Pulley
	皮带轮直径过小 Diameter of belt Pulley too small	更换较大的皮带轮 Change with Big Diameter
	电机轴和负载轴不同心 Motor Shaft and Load Shaft not Aligned	调整至同心 Adjust and Keep Aligned
	润滑脂不足或过多 Grease in bearing is too much or little	添加或排除适量润滑脂 Fill or Discharge Appropriate Grease
	润滑脂变质或脏污 Grease Deteriorated or Dirt	更换新的润滑脂 Change New Grease
振动 Vibration	底座不稳 The stiffness of foundation is too low	加固底座 Reinstall the foundation and fix

振动 Vibration	电机转子、联轴器或从动设备不平衡 Motor Rotor, Coupling or Driven Machine Imbalance	重新校平衡 Readjust to Balance
	轴承缺陷 Bearings Damage	更换轴承 Change Bearing
	电源缺相 Power Phase Fault	检查电源电压 Check the Power Voltage
	轴向间隙过大 Shaft clearance is too large	增加垫片调整 Increase the shim adjust the clearance
	风扇和风罩相擦 Fan and Cover Clash	消除障碍 Eliminate Obstacle
	转子与绝缘材料相擦 Rotor and Insulation Material Clash	消除障碍 Eliminate Obstacle
	电机底座松动 The Foundation of the Motor Loose	拧紧螺栓 Tighten the Bolt
噪音 Noise	部分螺栓松动 Parts of Bolt Loose	拧紧螺栓 Tighten the Bolt
	过载电磁噪音 Overload Electromagnetic Noise	减轻负载 Reduce the Load
	转子不平衡 Rotor Imbalance	重新平衡转子 Re-balancing the Rotor

绝缘电阻过低 Insulation Resistance too low	绕组脏污或受潮 Winding is dirty or damped.	清理并干燥处理 Clean Motor and Dry the Winding
电机无法启动或启动困难 Fails or Hard to Start	保险丝熔断 Blown Fuse	按要求更换保险丝 Change Fuse as Requires
	过载跳闸 Overload Trip	降低负载 Reduce the Load
	接线错误 Wrong Connection	重新接线 Reconnect
	机械故障 Mechanical Breakdown	检查修复 Check and Repair
	定子短路 Stator Short Circuit	重新绕线 Rewinding
	转子断条或脱轴 Broken Rotor Bar or	更换转子 Change the Rotor
	输入电压过低 Low or High Input Voltage	检查电源电压是否过低，电源引线是否过细或过长 Check whether the supply voltage is too slow, and the supply lead maybe too fine or too long
	启动负载过高 Over Starting Load	降低启动负载 Reduce Starting Load
	电源缺相 Lack of one Phase	检查电源并重新接好 Check the Power and Reconnect

转速过低 Speed Too Low	选型不当 Unsuitable Type	重新选择合适规格电机 Choose Suitable Type of Motor
	输入电压过低 Low or High Input Voltage	检查电源电压是否过低，电源引线是否过细或过长 Check whether the supply voltage is too slow, and the supply lead maybe too fine or too long
	转子断条或脱轴 Broken Rotor Bar or	更换转子 Change the Rotor
转动方向错误 Wrong Rotation Direction	相序错误 Wrong Phase Sequence	对调任意两引线 Exchange Any Two Leads
电机发热 Motor Overheated	过载 Overload	减小负载 Reduce the Load
	通风不畅 Bad Ventilation	疏通通风道及风罩孔 Check the Ventilation Channel and Fan Cowl
	电压过高或过低 Low or High Voltage	检查电源电压 Check the Power Voltage
	定转子擦心 Stator and Rotor Clash	送工厂返修 Return Factory for Repair
	线圈对地 Winding Over the Ground	找到触地位置并进行维修 Find the Earth Position and Repair
	三相电压不平衡 Three Phase Voltage Unbalance	检查电源电压 Check the Power Voltage

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技术参数更改，恕不另行通知

Technical parameters are subject to change without notice

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