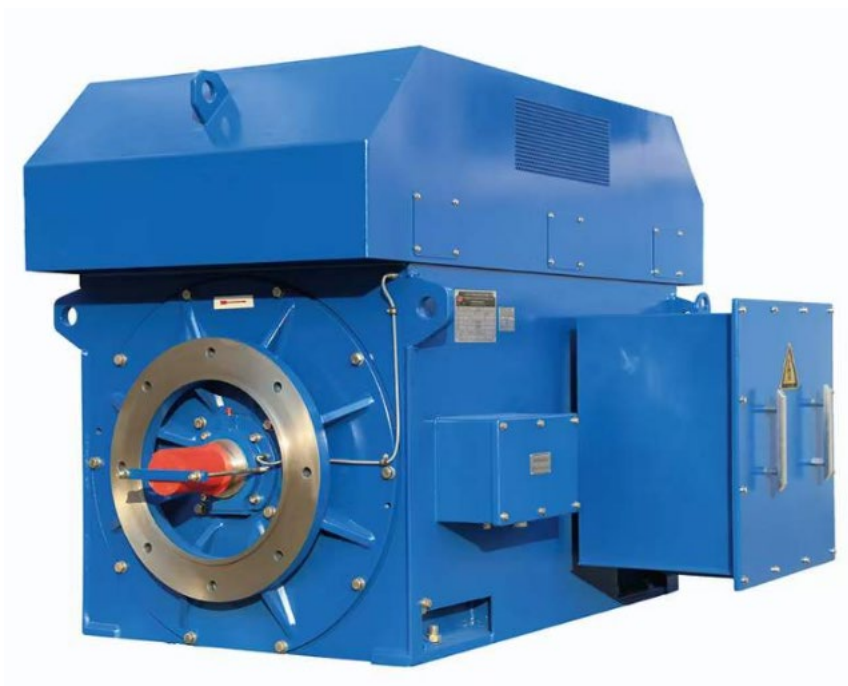


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# 高压三相异步电动机使用维护说明书

## Operation and Maintenance Manual of High-voltage three-phase asynchronous motor

(版本/ Ver: A-1, 2025)



山东华力电机集团股份有限公司

**Shan Dong HuaLi Electric Motor Group CO., LTD**

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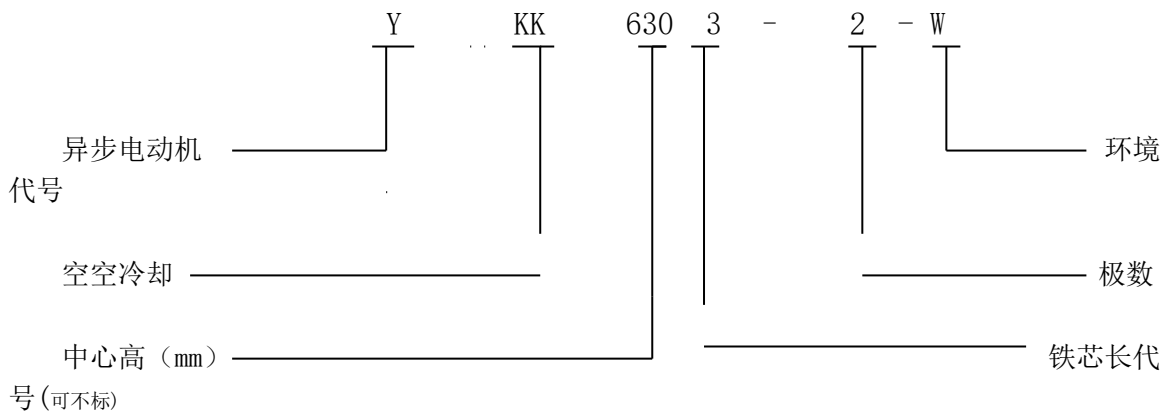
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# 高压三相异步电动机使用维护说明书

## 1. 适用范围

本说明书适用于Y系列高压三相异步电动机及其派生的系列产品，如：YKK、YKS、YR、YRKS、YRKK、Y、Y2等系列产品。

## 2. 电动机型号的定义



2: 环境代号: W—户外; TH—湿热带; TA—干热带; H—船用; F (F1—中防腐、F2—强防腐)。

### 2.1 电动机适用于下列工作条件

2.1.1 海拔不超过 1000 m。

2.1.2 环境空气温度最高+40℃，最低-15℃（但对于带滑动轴承或YKS、YRKS系列电动机，环境空气温度应不低于0℃）。

2.1.3 相对湿度不超过90%（环境温度25℃时），当环境空气温度与海拔不符合上述规定时，电动机温升可按GB 755-2008的规定予以修正。

2.1.4 本系列电动机适用于S1连续工作方式及满压下直接起动的电动机。

2.1.5 电动机额定电压为3kV、6kV、10kV。也可按用户要求确定额定电压值。

2.1.6 电动机额定频率为50Hz、60Hz。

### 3. 结构特点

3.1 高压三相异步电动机基本结构及安装型式为 IMB3、IMV1、IMB35。

3.2 高压三相异步电动机防护等级为 IP23~IP55。Y、YR 系列电机为径向通风，进出口处设有通风百叶窗及能防止固体异物进入电机内部的防护网。YKK、YKS、YRKK、YRKS 系列电机顶部装有空空冷却器和空水冷却器（YRKK 亦可带强冷风机），Y2 系列电机尾部按有冷却风扇，YVF、YPKK 电机顶部装有强冷风机。防护等级及冷却方式（见表 1）。根据使用环境的不同，电机可按 JB/T9537 制成户外（W）型、干热（TA）型、湿热带（TH）型、及船用（H）型和防腐（F）型等。

表 1

系列	型式	冷却方式	防护等级	冷却结构
Y、YR	开启式	IC01	IP23	带通风顶罩和不带顶罩在机座侧板开通风口两种型式
YKS、YRKS	空/水冷却 封闭式	IC81W/IC86W	IP44、IP54或IP55	机座顶部带空水冷却器
YKK、YRKK	空/空冷却 封闭式	IC611/IC666	IP44、IP54或IP55	机座顶部带空空冷却器或强冷风机
Y2	封闭式	IC411	IP55	电机尾部带冷却风扇
YRKK、YVF、YPKK	强冷风机 封闭式	IC666	IP44、IP54或IP55	机座顶部带强冷风机或空空冷却器

3.3 电动机定子绕组采用 F 级绝缘扁铜线绕包少胶云母带后嵌入定子铁芯，经真空压力浸渍无溶剂漆（VPI 处理工艺），铁芯采用高导磁低损耗硅钢片叠压而成。定子绕组中埋置 Pt100 铂热电阻测温元件。

3.4 轴承采用滚动轴承或滑动轴承，润滑分自润滑和强迫润滑两种。根据用户要求可加轴承测温装置，强迫润滑须保证进油压力为 0.01MPa~0.05MPa，进油温度

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15℃～40℃。回油无油压，回油油箱的液面需低于滑动轴承油标的油面高度。其具体高度标准以能保证轴承油池内的润滑油能通畅地流回油箱为准。

注：因为涉及油路长短及管阻大小，所以无法确定具体液位差。

3.5 根据使用环境的要求也可加防冷凝空间加热装置，电动机停机时使用。

**注意：**电动机工作时，应切断加热器电源，使其停止工作。否则将使电机过热，损坏电机绝缘甚至烧毁电机。

3.6 YR/YRKK 系列电机非轴伸端装有碳刷装置、集电环。

3.7 电动机主接线盒位于电机侧面，内设三个接线端子和一个接地保护装置。

## 4. 电机的检查

4.1 请按照电动机外形图（或电动机装箱单）确定收货项目，并核对是否已经全部收到，检查包装或者电动机是否有损伤的痕迹。如果发现确实有损伤或者存在缺陷，请及时通知我公司。在给我公司的函件中，一定要写明电动机铭牌上列出的所有数据，包括型号和出厂编号。最好在运输部门的代表在场的情况下将电动机包装打开，如果在开箱以后发现电动机受损，则立即通知运输部门。

4.2 在基础上确定电动机安装位置标记以便找出机组的中心线和基础面的标高。

4.3 按外形图核对基础以确定地坑（如果需要的话）、电缆、电缆管道、汇流排以及所需的通风管道都已备齐并放置在适当的位置上，在电动机的周围应该留有足够的空间，便于电动机和附件的安装。

4.4 电动机在冬夏温差较大地区使用时存放期超过6个月，应拆开接线盒或轴承外盖等零部件进行检查，若发现冷凝水应整机拆检，并按规定处理。

4.5 经长途运输或长时间搁置不用的电动机（半年及以上），使用前应测量定子绕组的绝缘电阻。在常温状态下（冷态），其最低值应不小于50MΩ，否则应进行干燥处理直到绝缘电阻合格为止（干燥方法参照8.6）。

## 5. 电动机安装

5.1 起吊整台电动机时，要用吊索以使重量均匀分配，并在顶罩（如果有的话）上方用撑杆以免顶罩变形。

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**特别注意** 严禁使用顶罩或者冷却器上的吊环起吊整台电动机，如果电动机带有比较重的联轴器或其他附件使得起吊不平衡，则应另加吊索以防倾斜。

5.2 准备好足够数量的垫板和垫片，垫板的厚度大概8毫米左右、宽度和长度应大于电动机的底脚平面。在校平电动机时确保底板和底架不会变形。

5.3 电动机安放在钢基础上，并接近于最终轴线对准位置，应使底脚螺栓穿过电动机底脚螺孔并对准，确认转子固定托架已经拆除。高度方向调整对准以前，任一底脚与钢基础之间有间隙存在时，则用塞尺测量此间隙精确到0.05毫米以内。记录间隙值、位置及塞尺从每个底脚外边插入的深度，按以上测得所需垫片厚度初步制作一套垫片，其长度比所测得塞尺片插入的深度大12-15毫米。在适当的位置插入垫片，对于垫片伸出电动机底脚外边的部分沿底脚外边将其弯曲，可以永久性的标志出垫片插入的深度，同时使垫片容易操作。初步使用的垫片制成并装好以后，可以进行电动机轴线对准的调节。应保持这些垫片总是处于原来的位置并且放在所有新加垫片的上面。最后轴线对准所加的垫片应尽可能用数量少的厚垫片，而不用数量多的薄垫片（一般要求是厚度1.0毫米以下的几张垫片就要以单张相等厚度的垫片替代），基础的刚性以及电动机底脚与基础面接触的精确程度将直接影响电动机使用时的振动特性。

5.4 将垫圈、橡皮圈套在电缆上（铠装电缆需去掉钢带），然后处理电缆头（包封或罐封）。

5.5 接线盒的橡胶密封圈有几个同心圆槽，根据电缆直径的大小可去掉不需要的同心圆圈。使密封圈的孔径与电缆外径相符，以保证安装出线斗后，橡皮密封圈与接线盒口间能紧紧压牢密封。

5.6 接线盒空腔接好线后安装接线盒盖时，应检查接线盒空腔内有无杂物和灰尘等。

5.7 电动机机座、接线盒内分别设有接地保护螺栓，接线时应将接地线用螺母或螺栓压紧，以保证电动机可靠接地。

5.8 对于滑动轴承电机的转子应放置于磁中心位置或转子轴向游动的中点位置（机械中心）。应严格按照我公司磁中心位置指示牌所提供的数据安装电动机。如果无法确定磁中心的位置或者没有提供磁中心位置的标示，则把转子放置在机械中心（注意某些情况下轴的热膨胀）。

5.9 当电动机的定位已满足轴向游动的要求时，则装上并拧紧底脚螺栓，电动机进行角度及位置是否对准的检查。角度的对准是通过测量联轴器平面间间隙的方法来

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核实的，用塞尺在联轴器顶部、底部及二侧的位置上测量。所有读数均应取自从轴中心算起的相同半径处，并在尽可能大的直径位置处，然后二根轴一起旋转180度，再在每个90度位置处测量。保证精确核对轴线之间的角度关系而不受任何轴向位置突出的影响。

5.10 电动机应有热过载保护、短路保护、断相保护、漏电保护等装置，并应根据电动机铭

牌数据调整保护装置的额定值。

5.11 滑动轴承电动机与主机对轮前应先找电机轴向磁中心，磁中心在电机出厂前已调整好并作了标记。找磁中心时应以轴承铭牌为准，轴承铭牌会准确地告诉你“轴伸台肩到轴承盖外沿轴向距离为多少毫米”。

5.12 采用滚动轴承的电动机，若滚动轴承原来的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。每个轴承应加新的润滑脂量。一般情况下，2极电机加润滑脂量为轴承空腔容积的1/2。4极及以上为轴承室的2/3。注油时，轴应转动，以便使新润滑脂均匀分布于轴承上。重加润滑脂后可能会使轴承温度升高一些，当运转一段时间多余润滑脂从轴承中甩出来，轴承会恢复正常温度。一般应勤加脂，少加脂，重新装配轴承时，切勿使轴承受强力打击。电动机正常工作时应定期用油枪通过油杯加入新的润滑脂，注入新的润滑脂量及时间见轴承铭牌或参考如下公式：

$$W=D \cdot B/K$$

式中：

W——注入新的润滑脂量（g）；

D——轴承外径（mm）；

B——轴承宽度（mm）；

K——系数，100～200（按工作情况选取，工作状况恶劣时选取较小值）。

5.13 安装时应注意电动机轴线中心与被拖动设备轴线中心保持一致，偏差为0.02mm，否则会引起电动机振动、轴承损坏或断轴现象。

5.14 电动机与被拖动机械间只允许采用联轴器连接。（如需皮带轮连接需在订货时通知制造厂）

5.15 扳动电动机的转轴，检查其是否能自由转动，对于滑动轴承的电动机应多转动几圈，以使润滑油与轴充分润滑之后再开动，否则开机瞬间便会严重灼伤轴瓦。



进行外部机械检查，检查之后各零部件应无缺损，螺栓是否拧紧等异常情况。

5.16 经上述检查合格后，方可起动电动机，空转一段时间，检查、测量是否有不正常的噪声、振动、局部过热以及旋转方向是否正确，油路是否畅通，是否漏油等。如有不正常现象，应立即停机检查并予以排除。

## 6. 电动机的起动及停车

### 6.1 YR 绕线型电动机起动操作程序

YR绕线型电动机起动时应该把起动变阻器接入转子线路中，起动的接线图（见图1a）及（见图1b）所示，起动的步骤如下：

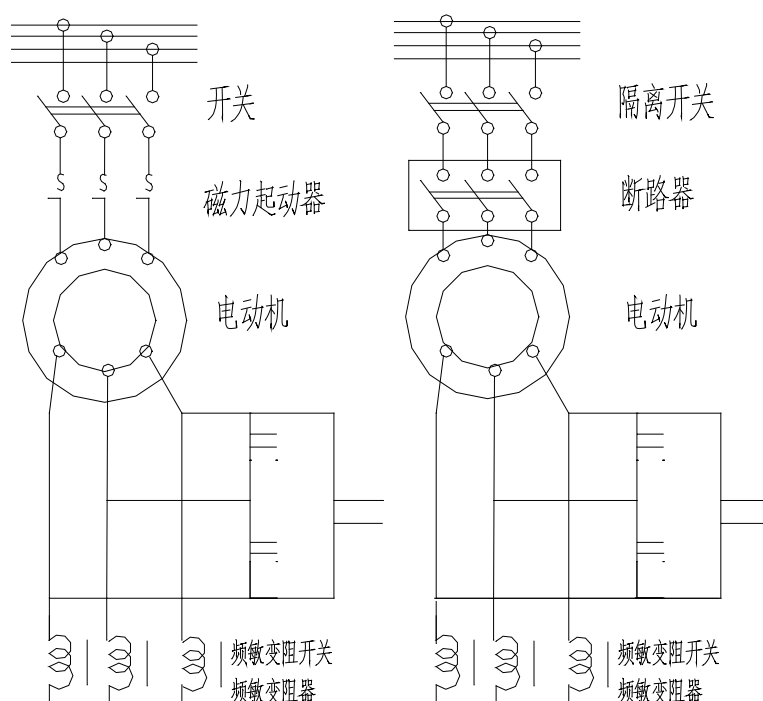


图 1a

图 1b

图 1 绕线型异步电动机的起动线路图

- 先闭合定子线路开关或隔离开关，再闭合磁力起动器或断路器；
- 当电动机达到额定转速之后，短接频敏变阻器的开关，将频敏变阻器切除。

### 6.2 YR 绕线型电动机的停车操作程序

6.2.1 先断开磁力起动器或断路器，再断开开关或隔离开关。

6.2.2 断开频敏变阻器的开关。

### 6.3 笼型电动机起动操作程序

笼型电动机是以线路全电压或者通过自耦变压器、电抗器起动的，用全电压启动时，可以采用磁力起动器（见图2a）或断路器（见图2b）。启动时应先接通开关或隔离开关，再接通磁力起动器或断路器。

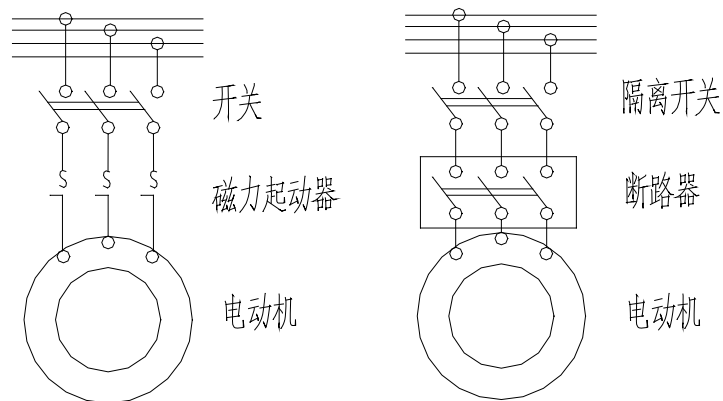


图 2a

图 2b

图2 笼型异步电动机直接启动接线图

#### 6.4 笼型电动机的停车操作程序

电动机停机时，先断开磁力起动器或断路器，再断开开关或隔离开关，在受到电网容量的限制时，为了不影响电网的稳定性，在电动机与供电线路之间接入电抗器或自耦变压器以限制其启动电流，此时电动机的电流与端电压成正比，起动力矩则与端电压的平方成正比。降压启动时的启动电压，应根据电机的启动性能确定，以免启动时间过长，使电机产生过热现象。

6.5 笼型电动机能在满足以下a) ~c)时直接启动，启动次数应符合以下d)、e)所述的任一方式。如不满足以下条件，应按协议确定电动机的额定参数和特殊启动条件：

- a) 在启动过程中，电动机的端电压应不低于额定电压的85%；
- b) 负载为风机和泵类特性，阻转矩值按协议；
- c) 折算到电动机转速后的负载转动惯量J, 对2极电动机不大于标准规定的数值，对4极~12极电动机按协议；
- d) 当电动机初始温度为环境温度时，允许连续启动2次，在2次启动之间，应自然停机；
- e) 当电动机初始温度为额定负载的运行温度时，允许启动1次。

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## 7. 注意事项

7.1 电机试运行时，轴承温度可能升至约100℃左右，比正常温度高，在运行一段时间后，轴承温度可降至正常温度。如果轴承温度仍较高，请通知供货厂家售后服务。

7.2 电动机不允许超过铭牌额定值长期运行。

7.3 电动机长期过电流或过电压（按 GB 755 考虑容差后）导致超过铭牌上的额定值，这是不允许的。

7.4 对于滚动轴承电动机根据运行情况运转约 700 小时~2000 小时（工作时间，高转速时取小值，低转速时取大值）补充或更换润滑脂一次，或按注油铭牌进行。用于多灰尘或潮湿环境的电机轴承应经常地补充或更换润滑脂，一般宜勤加少加，同时清理排油装置，清除废油。在起动长期不用的电动机时，必须先检查滚动轴承的润滑状态，倘若原来的润滑脂已脏或已硬化，应按规定要求处理。

7.5 滚动轴承的温度设定为报警90℃停机95℃，滑动轴承油温度设定为报警75℃停机80℃。滑动轴承在初次启动以前必须人工将油加到储油室。定子温度设定为报警135℃停机140℃。

7.6 电动机不允许在运行中反接电源逆转或制动，对同步转速为3000 r/min的电动机不允许在停机后逆转，对同步转速为1500r/min以下的电动机则可停机后逆转。

## 8. 电机维护

### 8.1 电动机的清理

电动机在使用时间内，应注意它的清洁，特别是线圈及轴承的清洁，无论电机的内部和外部，都不允许弄脏，也不允许有水和油落入电机内。

根据现场的情况，电动机应定期（至少一年一次）检查电动机内部及轴承。用手风箱或者以带有木头或橡皮喷嘴的软管（为了防止线圈损坏，不可用金属喷嘴）用压缩空气吹净尘土，灰尘要从电动机内部吹出，不可由一部分吹到另一部分。集电环、电刷和导线都应很清洁。细小的金属物品、拉断的导线等，不要堆放在电机旁边，以免落入电机内部。

电刷与集电环应有良好的磨光表面。而且电刷应紧贴集电环。必要时对于石墨电刷应用玻璃砂纸研磨，对于铜石墨电刷可用砂纸研磨。研磨时将砂纸或

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玻璃砂纸裁成窄条，放在集电环表面和电刷之间，沿集电环表面贴紧（弧形），并应沿电动机的旋转方向拉动，同时电刷只能依靠刷握上弹簧来压紧，不允许用手来压紧。

在电刷下发生火花时，尤其是装在固定装置上的电刷，必须检查电刷是否在刷盒内卡住，电刷是否歪斜，是否全部表面贴紧集电环，压力是否过低或过高。发现故障时应立即消除。

对于固定装置的电刷应注意它们的温度，过热时应检查压力，检查电刷在刷盒中的位置是否正确，检查电刷与集电环是否贴紧以及电刷与刷架上连接线间的接触是否紧密。如果没有问题，那么缺陷可能就是电刷本身，根据电刷磨损的情况需逐步以相同尺寸的电刷更换，必须既保证电刷紧密地插在盒内，又能使其自由地滑动。刷盒到集电环表面距离应为两毫米，每隔半年须更换滑环罩内的吸附炭灰无纺布。

## 8.2 检查气隙

对于采用滑动轴承的电动机，为了避免转子碰到定子，必须定期检查气隙（在电动机两端进行检查）。

## 8.3 螺栓

必须经常检查所有螺栓拧紧程度，特别注意固定绝缘部分与旋转部分的螺栓必须处于紧固状态。

## 8.4 通风

冷却空气应该清洁干燥（对一般电机，环境相对湿度不大于90%，对TH型电机相对湿度不大于95%）因为灰尘会堵塞风道和沾污绕组，导致减少风量和降低绝缘电阻，使电机过热而降低电机工作安全性。

机房内空气（或者冷却空气）温度对一般电机要求不得高于40℃。在温度低的情况下需要用暖气装置。如温度大于上面所述的值，那么必须设法降低冷却空气温度，或者降低电动机的负荷，使电机绕组或铁芯的温度不超出规定的数值。

在额定的工作条件下（额定电流、额定电压等），如定子绕组或铁芯温升高于规定的数值时，电动机应停车，检查通风系统，尤其是定子的通风状况，采用强迫通风系统时，吹入电动机空气量，应不小于制造厂的规定。如电动机不接管道使用，防止出风口的热空气重新进入电机内部。

对于封闭式电动机，允许使用于灰尘较多的环境，但也应经常进行电机内部的清理工作。

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## 8.5 油路系统

对滑动轴承应检查油路系统是否畅通，有无漏油之处，油量是否达到油标线位置，起动油泵循环是否正常（对于自设油站系统），对于强迫润滑的电动机，其供油系统的油箱液面应低于滑动轴承油标的油面高度。其具体标准高度以能保证轴承油池内的润滑油能通畅地流回油箱为准。

注：因为涉及油路长短及管阻大小，所以无法确定具体液位差。

## 8.6 绝缘电阻

必须经常检查线圈的绝缘电阻，任何一相线圈的绝缘电阻降低时，应仔细清除污物和灰尘，可用汽油或甲苯擦洗，最后烘干后再涂漆。

如果电动机的绝缘电阻低于最低值，建议按下列方法之一进行处理：

- (1) 具有加热器的电动机，给加热器通电，直至绝缘电阻稳定不变。
- (2) 用接近 80° C 的热空气对静止、不通电的电动机进行干燥。
- (3) 用接近电动机额定电流 50% 的直流电焊机干燥电动机。
- (4) 堵住电动机转子，用 10% 额定电压使电流通过定子绕组进行干燥。

上述方法中，允许逐渐增加电流直至定子绕组温度达到 90° C，不允许增加电压到足以使电动机转子旋转。在转子堵转下的加热过程中极其小心以免损伤转子，维持温度为 90° C 直至绝缘电阻稳定不变。

**注意：**开始时应慢慢加热，这样使得水蒸气能自然地通过绝缘而溢出，过快的加热容易使局部的蒸汽压力足以使水蒸气强行通过绝缘而溢出，这样使绝缘遭到永久性的损害。一般需要 15-20 小时而使温度上升到使需要的数值，经过 2-3 小时，重新测量绝缘电阻，如果考虑温度影响而绝缘电阻已经达到最低允许值，电动机的干燥过程即可结束。

## 8.8 水路系统

冷却用水应为软化循环水，进水温度不得超过 33℃，但不得低于 5℃。应定期检查冷却器，松开上罩与机座之间的紧固螺母，打开冷却器的前后水箱盖，对冷却水管进行检查清理，如果堵塞严重无法清理或漏水，应更换冷却器。检查完毕重新装配冷却器时应注意前后水箱的密封，以免造成冷却水短路，致使冷却效果降低。

8.9 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。

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8.10 对于水冷的电机,电机内设有漏水保护装置,使用时应注意是否出现漏水现象。

8.11 排放、清洗并重新给轴承加润滑油,如果发现轴承有异常情况,则检查轴承,如发现损坏应该立即更换。

8.12 拆除端盖和顶罩,检查是否有凝露、积水、铁锈或腐蚀。

8.13 检查零部件,特别是绝缘是否有过热的现象,其表现为气泡、变色或碳化。

8.14 检查所有绝缘的电气连接,是否有绝缘的磨损、漆的开裂或者线圈的移动。

8.15 检查所有不绝缘的电气连接,是否有接触不紧密,是否有过热、飞弧或腐蚀的迹象。

8.16 检查主引出线,是否有过热或电晕的现象。

8.17 运行记录

电动机使用时,应备有一个记录本,有系统地记录仪表(伏特计、安培计、瓦特表)的读数,更换轴承及润滑脂(油)的时间和各保护装置的整定值。

记录的内容还应包括:电动机起动及停车、停车原因、轴承温度、室温、热电偶读数以及电动机和传动装置在工作中的不正常现象,还应记录检查及日常修理情况等。

## 9. 运行中故障及其主要原因

9.1 在运行中,应经常检查电动机以便及时发现各种故障并及时排除,否则可能引起事故。

### 9.1.1 机械故障

滚动轴承的过热:可能是由于润滑脂不足或过多,转轴弯斜,转轴磨擦过大,润滑脂内有杂质或外来物品以及钢珠损坏等引起的。

漏油及电机内积油:是由于轴承内油量过多、油压过高、回油不畅、回油有压力(应保持无压回油)、供油系统液面高于滑动轴承液面、浮动迷宫环损坏、轴承所用油质不良或粘度不够等所引起。也可能是由于轴承槽内压力和轴承盖外压力不均匀所致。

电动机的振动:机组的轴线没有对准,电动机在底板上的位置不正,转轴弯曲或轴颈振动。联轴器配合不良,转子皮带盘及联轴器平衡不良,轴颈与轴衬间的间隙过大,鼠笼转子铜排或短路环断路,转子铁芯振动,底板不均匀的下沉,底板钢

度不够，底板的振动周期与电动机（机组）的振动周期相同或接近，皮带轮粗糙或装置不正，传动机构工作不良及有碰撞现象等引起的。

转子偏心：可能是由于轴衬松掉，轴位移，转子及定子铁芯变形，转子弯曲及转子平衡不良等引起的。

### 9.1.2 电气的故障

起动时的故障：由于接线错误、线路断路、工作电压错误、负载力矩过高或静力矩过大、起动设备有故障等引起的。

过热的原因：由于线路电压高于或低于额定值、过负荷、冷却空气量不足、冷却空气温度过高、匝间短路及电机不清洁等所引起的。

绝缘损坏：可能是由于工作电压过高、酸性、碱性、氯气等腐蚀性气体造成的损坏、太脏过热、机械碰伤、温度过高、在温度小于0℃下保藏和水分浸入等所引起的。

集电环烧坏及电刷跳火：是由于电刷磨得不好、电刷在刷盒内卡住、集电环及电刷有污垢、集电环不圆而跳动、电刷压力过低、电刷牌号不对，在刷握和导电路内接触不良、电刷数量不足或截面太小等所引起的。

集电环间的跨起电晕：是由于集电环及刷握机件落上铜石墨粉末、潮湿或酸性或碱性气体的侵蚀，转子和起动变阻器本身断路所引起的。

常见故障问题及处理方法：

故障现象	可能的原因	处理方法
绝缘电阻低	检查是否潮湿、灰尘、导电微粒或其他污染物 温度过高 机械及化学损伤	清洁电动机并干燥 检查是否过载、通风不足、积灰过多、电压不平衡或不合适 检查线圈支撑及槽楔，检查是否有外物或振动过大
电动机空转，但不能带负载	起动后一相断开	检查电源进线
电动机完全不动	至少有二根电源引线开路或无电压	检查熔丝、电源进线和引接线
电动机不能带负载起动，但发出正常的电磁噪声	负载转矩过大 电源电压太低 转子开路	修理传动装置的故障，不对接电动机并检查空载运转 检查电源电压 检查转子电路

定子局部过热	定子匝间短路	拆下电动机检查定子线圈
电动机有交流声但不能启动	定转子有一相开路	检查电源进线或修理熔断器
电动机空载时过热	定子连接错误 电源电压太高 通风道堵塞 风扇旋转方向错误	改正接法 检查电源电压及空载电流 清理通风道，将堵塞物清除 校对风扇和旋转方向
振动和噪声异常	转子不平衡 基础差或安装不牢固 联轴器不平衡轴中心未对准 转子笼条断裂 轴颈不圆 零件擦轴 电动机支撑结构产生共振	将电动机与负载脱开检查 重新紧固螺栓检查垫片和基础 检查是否已平衡 重新对中基础回复到正确平面 振幅随时间而变化，一般发生在负载运行 振动频率是旋转频率的整倍数 振动相位角随时间而变化 在电动机底脚处振动大而随速度改变或者断电后迅速消失
电动机负载时过热	电动机过载 电动机缺相 定转子摩擦	检查电压和电流是否正确 检查缺相原因，查出断线处 检查气隙和转子跳动

## 10. 电动机的包装及运输

电动机由制造厂装入坚固的木箱或用塑料袋包装后发运。在运输途中不得拆除包装，电动机在拆除包装后即行清除尘污，并将露出之表面擦净（如经涂封之轴伸端及集电环等），清除原来涂上的临时性涂料以及表面之潮气及锈渍等。如用煤油或汽油擦洗而仍有锈渍时，则可用00号细砂布加油轻轻擦光。

电动机运到后如不立即安装，也应拆箱清理并检查。并应以防锈油脂或临时性涂封材料将裸露的金属表面重新涂封。为了防止集电环的工作表面形成斑点，在集电环与电刷间应垫以绝缘纸。

在检查涂封后，可在清洁而干燥的地方将电动机重新装箱封固。装箱地点环境空气不应有酸碱等腐蚀性气体存在，以免损坏绝缘及裸露的导电部分。仓库内环境



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温度应经常保持在+3℃以上，空气应干燥，通风良好，每年应开箱检查一次，检查临时性涂封是否变质以便及时改进电动机保存状况。

运输时必须防止电动机倒置，以免损坏电动机。中型电动机应在装配完整后运输，不可在拆开情况下运输（除超高超宽外），因为电动机在制造厂运出前已经检查、试验及装箱，在装箱及运输时，电动机必须牢固地固定在箱底滑木上，木箱内部有防潮纸，油毛毡等衬垫。

## **11. 随机文件**

- a) 使用说明书
- b) 产品合格证
- c) 外形图

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。

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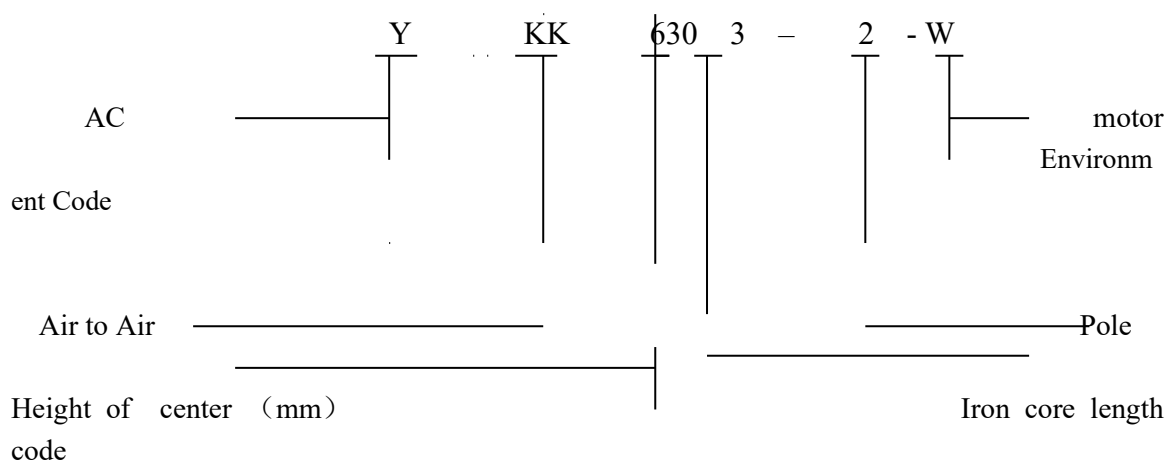
山东华力电机集团股份有限公司  
地址：山东省荣成市荣昌路9号  
邮编(P. C.):264300  
办公室(Office):0631-7551153  
经营计划部(Tel): 0631-7551307  
传真(Fax): 0631-7553744  
产品开发部（总部）：0631-7587026 7587027  
售后服务部：0631-7555999  
[Http://www.hualimotor.com.cn](http://www.hualimotor.com.cn)  
E-mail:info@hualimotor.com.cn

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## 1. Scope of application

This Operating instruction is apply to Y series High Voltage Three-Phase Asynchronous Motor and Its derivative series of products,such as YKK、YKS、YR、YRKS、YRKK、Y、Y2 and other series of products

## 2. Motor Type meaning



2: Enviroment code : w-outdoor;TH- Humid tropics;TA- Dry tropical; H - Marine;F(F1- medium anticorrosion, F2- strong anticorrosion).

### 2.1 The motor Site conditions

2.1.1 The altitude is less than 1000 m

2.1.2 environment temperatures form -15℃ to +40℃ (For the sliding bearing or YKS, YRKS series motor, ambient air temperature should not below 0 ℃)

2.1.3 Relative humidity is not more than 90% (when the environment temperature 25 ℃), when the ambient air temperature and elevation does not

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conform to the stipulations of the above, the motor temperature rise can be corrected according to provisions of GB 755-2008.

2.1.4 This series of motors are suitable for S1 continuous working mode and direct starting under full pressure.

2.1.5 The motors are rated at 3 kV, 6kV and 10kV. Rated voltage can also be determined according to user requirements.

2.1.6 The rated frequency of the motor is 50Hz and 60Hz.

### **3. Structural characteristics**

**3.1** Basic structure and installation type of high voltage three-phase asynchronous motor are IMB3, IMV1 and IMB35.

**3.2** The level of production for the high voltage three-phase asynchronous motor is IP23~IP55, Y and YR series motors are radially ventilated, and the inlet and outlet are equipped with ventilation shutters and a protective net to prevent solid foreign matter from entering the motor. YKK, YKS, YRKK and YRKS series motors are equipped with air to air cooler and air water cooler on the top (YRKK can also bring strong cooling fan). Y2 series motors is equipped with cooling fan, and the top of YVF and YPKK motors is equipped with strong cooling fan. Protection level and cooling mode (see table 1) According to the different environment, the motor can be made into outdoor (W) type, dry heat (TA) type, wet heat zone (TH) type, Marine (H) type and anticorrosion (F) type according to JB/T9537

SHEET 1

Motor series	Type	Cooling Type	Level of protection	Cooling structure
Y、YR	Open type	IC01	IP23	There are two types of opening air vents on the side plate of the machine base with and without top cover
YKS、YRKS	Air/water Closed	IC81W	IP44、IP54、IP55	Empty water cooler on top of Frame
YKK、YRKK	Air/Air Closed	IC611\IC666	IP44、IP54、IP55	Air to air cooler or strong cooling fan on top of stand
Y2	Closed	IC411	IP55	Motor tail with cooling fan
YRKK、YVF、YPPK	Force Fan Closed	IC666	IP44、IP54、IP55	Top of the frame with a strong cooling fan or air - to - air cooler

**3.3** The stator windings of the motor are made of F-grade insulated flat copper wire wrapped with mica tape and embedded into the stator core. After being impregnated with solvent-free paint under vacuum pressure (VPI treatment process), the core is made of high-permeability and low-loss

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silicon steel laminated. Pt100 resistance temperature measuring element is embedded in the stator winding.

**3.4** The bearing adopt the rolling bearing or the sliding bearing, the lubrication divides the self-lubrication and the forced lubrication two kinds. According to user requirements can add bearing temperature measuring device, forced lubrication shall ensure that the oil pressure of 0.01 MPa to 0.05 MPa, the oil temperature 15 °C to 40 °C. There is no oil pressure in the return oil, and the liquid level of the return oil tank shall be lower than the oil level of the sliding bearing oil mark. Its specific height standard to ensure that the bearing oil tank lubricating oil can flow back to the oil tank.

Note: because of the length of oil circuit and the size of pipe resistance are involved, the specific liquid level difference cannot be determined.

**3.5** According to the requirements of the environment can also add anti-condensation space heating device, when the motor is shut down.

Note: when the motor is working, cut off the power of heater to make it stop working. Otherwise will make the motor overheating, damage the motor insulation and even burn the motor.

**3.6** YR/YRKK series motors are equipped with carbon brush device and collector ring at the non-axial extension end.

**3.7** The main terminal box of is located on the side of the motor, with three terminals and a grounding protection device.

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## **4. Inspection of motor**

**4.1** Please confirm the receiving items according to the motor outline drawing (or motor packing list), check whether all the items have been received, and check the package or motor for any marks of damage.

If any damage or defect is found, please inform our company in time. In the letter to our company, all the data listed on the motor nameplate must be clearly indicated, including model number and factory number.

It is better to unpack the motor in the presence of the representative of the transport department. If the motor is found damaged after unpacking, the transport department shall be informed immediately.

**4.2** In order to find out the center line of the unit and the elevation of the base plane, the installation position mark of the motor is determined on the basis.

**4.3** Check basis against contour drawing to outline drawing that pit (if required), cables, cable ducts, bus-bar and required ventilation ducts are in place and in place, sufficient space should be left around the motor to facilitate the installation of the motor and accessories.

**4.4** When the motor is used in areas with large temperature difference between winter and summer, the storage period more than 6 months, the terminal box or the outer bearing cap and other parts should be disassembled for inspection. If condensate water is found, the whole machine should be disassembled for inspection and handled according to regulations.

**4.5** The insulation resistance of stator windings shall be measured before use for motors that are transported for long distance or are not used for a long time (more than half a year). Under the normal temperature state (cold), the lowest shall be not less than 50m $\Omega$ , otherwise should be dry processing until

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qualified insulation resistance (dry method refer to 8.6).

## **5. Installation of motor**

**5.1** When hoisting the entire motor, the sling shall be used to evenly distribute the weight, and the pole shall be used above the top cowl (if any) to avoid deformation of the top cowl.

Particular attention: It is strictly prohibited to use the eyebolts on the top cowl or the cooler to lift the whole motor. If the motor has a heavy coupling or other accessories, which makes the lifting unbalanced, the sling shall be added to prevent tilting.

**5.2** A sufficient number of washers and gaskets shall be prepared, the thickness of the washers shall be about 8 mm, and the width and length shall be greater than the feet plane of the motor. Make sure that the base plate and frame will not deform when leveling the motor.

**5.3** The motor should be placed on the steel foundation and close to the alignment position of the final axis. The feet bolt should be passed through the screw hole of the motor's feet and aligned to ensure that the rotor fixing bracket has been removed. Before adjust the alignment height direction, if there is a gap between any feet and the steel foundation, the gap can be measured within 0.05mm with a feeler gauge. Record the clearance value, position and the depth of the feeler gauge inserted from the outside of each foot. Make a set of gasket according to the thickness of the gasket measured



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above, the length is 12-15 mm greater than the depth at which the measured feeler pieces are inserted. Insert the gasket in the proper position, and bend the part of the gasket extending from the outside of the motor feet along the outside of the feet to permanently mark the insertion depth of the gasket and make the gasket easy to operate. After the initial gasket is made and installed, the motor axis alignment can be adjusted. These gaskets should always be in their original position and placed on top of all new gaskets. Finally, the axial alignment of the added gaskets should be as much as possible with a small number of thick gaskets, and not a large number of thin gaskets (the general requirement is the thickness of 1.0 mm below a few gaskets to be replaced by a single gasket of the same thickness), the rigidity of the foundation and the precision of the contact between the motor feet and the foundation surface will directly affect the vibration characteristics of the motor in use.

**5.4** Cover the cable with washer and rubber band (the armored cable needs to remove the steel belt), and then deal with the cable head (wrap or can seal).

**5.5** The rubber sealing ring of the terminal box has several concentric grooves, which can remove unnecessary concentric circles according to the size of cable diameter. Make sure that the aperture of the sealing ring is consistent with the outer diameter of the cable to ensure that the rubber sealing ring and the terminal box edge can be tightly pressed and sealed after installing the cable hopper.

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**5.6** When installing the terminal box cover, check whether there are sundries and dust in the terminal box lid.

**5.7** The grounding protection bolts are respectively installed in the motor frame and terminal box. When wiring, the grounding wires shall be tightened with nuts or bolts to ensure the reliable grounding of the motor.

**5.8** For the sliding bearing motor rotor should be placed in the magnetic center position or rotor axial swimming in the middle of the position (mechanical center). The motor shall be installed in strict accordance with the data provided by the position indicator of the magnetic center of our company. If the position of the magnetic center cannot be determined or is not marked, place the rotor in the mechanical center (note the thermal expansion of the shaft in some cases).

**5.9** When the positioning of the motor meets the requirement of axial movement, the feet bolt should be installed and tightened to check whether the Angle and position of the motor are aligned. The alignment of the Angle is verified by measuring the clearance between the two surfaces of the coupling, with a feeler gauge at the top, bottom and two sides of the coupling. All readings should be taken at the same radius from the center of the shaft and at the largest possible diameter. The two shafts are then rotated 180 degrees together and measured at each 90 degree position. Make sure that the Angle relation between axes is accurately checked without being affected by any prominent axial position.

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**5.10** The motor shall have thermal overload protection, short circuit protection, phase break protection, leakage protection and other devices, and the rating of the protective device shall be adjusted according to the data of the electric nameplate.

**5.11** The axial magnetic center of the motor should be found before the sliding bearing motor is matched with the main engine. The magnetic center has been adjusted and marked before the motor leaves the factory. When looking for the magnetic center, the bearing nameplate shall prevail. The bearing nameplate will tell you exactly "how many millimeters is the axial distance from the shaft extension shoulder to the bearing cap".

**5.12** For motors with rolling bearings, if the original grease of the rolling bearings has deteriorated, dried up or become dirty, it shall be cleaned with kerosene first, and then the bearings shall be cleaned with gasoline before adding a new grease. Each bearing should be added with a new amount of grease. In general, the amount of grease for 2-pole motor is  $\frac{1}{2}$  of the volume of the bearing cavity. Pole 4 and above is  $\frac{2}{3}$  of the bearing chamber. When oiling, the shaft should be rotated so that the new grease is evenly distributed on the bearing. Heavy lubricating grease may raise the bearing temperature a little. When the excess grease is thrown out of the bearing after a period of operation, the bearing will return to normal temperature. Should add grease frequently commonly, add grease less, when reassembling bearing, do not make bearing suffers strong blow. When the motor is

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working normally, new grease should be added with the oil gun through the oil cup on a regular basis, and the amount and time of new grease should be injected, see bearing nameplate or refer to the following formula:

$$W=D \cdot B / K$$

In the formula:

W-- add new grease (g);

D -- bearing outer diameter (mm);

B -- bearing width (mm);

K--coefficient (select according to the working condition, select a small value when the working condition is bad).

**5.13** During installation, the motor axis should be consistent with the axis of the dragged device with a deviation of 0.02mm, otherwise it will cause vibration, bearing damage or shaft breakage.

**5.14** Only coupling is allowed between the motor and the towed machine.(if belt pulley connection is needed, please inform the manufacturer when ordering)

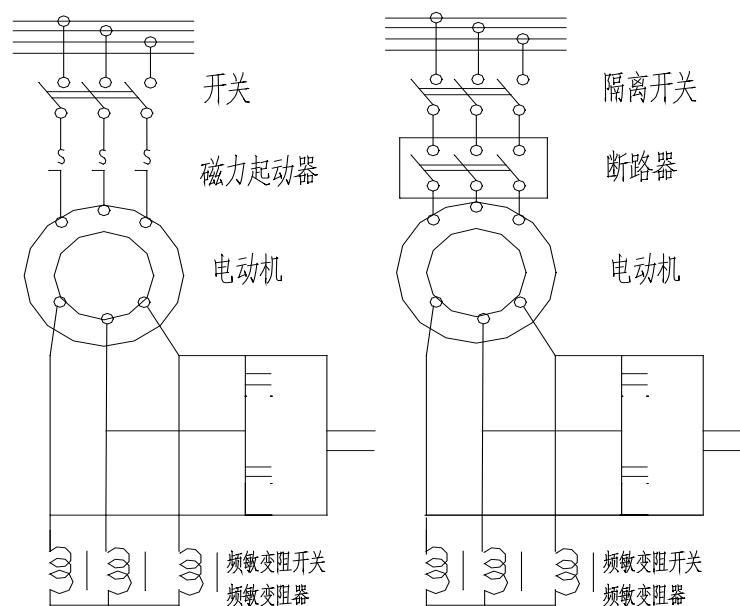
**5.15** Pull the shaft of the motor to check whether it can rotate freely. For the motor of sliding bearing, rotate several more turns to make the lubricating oil and shaft fully lubricated before starting. Otherwise, it will seriously burn the bearing bush at the moment of starting. Carry out external mechanical inspection. After the inspection, all parts should be free from defects and bolts should be tightened.

**5.16** After passing the above inspection, the motor can be started, idling for a period of time, checking and measuring whether there is abnormal noise, vibration, local overheating and whether the rotation direction is correct, whether the oil circuit is unblocked, whether there is oil leakage, etc.. If there is any abnormal phenomenon, the machine should be stopped immediately for inspection and elimination.

## 6. Start and stop of motor

### 6.1 YR winding motor starting operation procedure

When starting YR wound motor, the starting rheostat shall be connected to the rotor line. The starting wiring diagram (see figure 1a) and (see figure 1b) are shown. The starting steps are as follows:



Drawing 1a

Drawing 1b

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ON-OFF	DISCONNECTOR
MAGNETIC STARTER	CIRCUIT INTERRUPTER
MOTOR	MOTOR
Frequency sensitive resistance switch	Frequency sensitive resistance switch
Frequency sensitive rheostat	Frequency sensitive rheostat

Drawing. 1 starting circuit diagram of wound induction motor

- a) Close the stator line switch or isolation switch before closing the magnetic starter or circuit breaker;
- b) When the motor reaches the rated speed, the short frequency sensitive rheostat switch will remove the frequency sensitive rheostat.

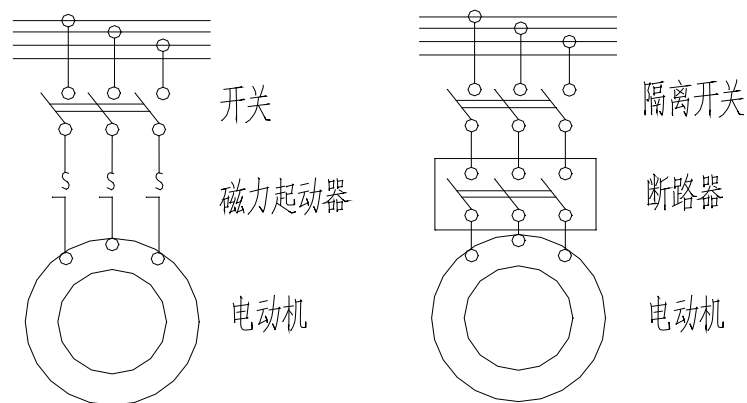
## 6.2 Stopping operation procedure of YR wound motor.

6.2.1 First disconnect the magnetic starter or circuit breaker, and then disconnect the switch or isolation switch.

6.2.2 Disconnect the switch of the frequency sensitive rheostat.

## 6.3 Cage motor starting operation procedure

The cage motor is started at full line voltage or through autotransformer or reactor, When starting at full voltage, a magnetic starter (see figure 2a) or a circuit breaker (see figure 2b) may be used. When starting, switch on or disconnecting switch first, and then switch on magnetic starter or circuit breaker.



Drawing 2a

Drawing 2b

Drawing2 The cage asynchronous motor starts the wiring diagram directly

#### 6.4 Stop operation procedure of cage motor

Motor when stop, first disconnect magnetic starter or circuit breakers, disconnect switches or disconnecting switch, when is limited by grid capacity, in order not to affect the stability of the power grid, between the motor and the power supply line connected to the reactor or autotransformer to limit the starting current, the current is proportional to the voltage of motor, starting torque is proportional to the square of the voltage across. The starting voltage during the step-down starting shall be determined according to the starting performance of the motor, so as to avoid excessive starting time and overheating of the motor.

**6.5** The cage type electric function shall be started directly when it meets the following a) ~ c), and the starting times shall conform to any of the methods described in d) and e) below. If the following conditions are not met, the rated parameters and special starting conditions of the motor shall be

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determined according to the agreement

A) During starting, the terminal voltage of the motor shall not be lower than 85% of the rated voltage;

B) The load is the characteristics of fans and pumps, and the resistance torque value is in accordance with the agreement;

C) The load moment of inertia J after converting to the motor speed, for 2-pole motor is not greater than the value specified in the standard, for 4-pole ~ 12-pole motor according to the agreement;

D) When the initial temperature of the motor is the ambient temperature, continuous starting is allowed for two times, and the motor should be stopped naturally between the two starts;

E) When the initial temperature of the motor is the operating temperature of rated load, it is allowed to start once

## **7. precautions**

**7.1** Machine commissioning, might rise to about 100 °C or so, bearing temperature higher than the normal temperature, after running for a period of time, bearing temperature can drop to normal temperature. If the bearing temperature is still high, please inform the supplier of after-sales service.

**7.2** The motor is not allowed to operate for a long time beyond the nameplate rating.

**7.3** It is not allowed for the motor to exceed the rating on the nameplate due



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to its long-term overcurrent or overvoltage (after taking the tolerance into account according to GB 755).

**7.4** For the rolling bearing motor, it shall operate for about 700 hours ~ 2000 hours (working time, take a small value at a high speed and a large value at a low speed) according to the operating condition. Grease shall be supplemented or replaced once, or according to the oil filling nameplate. Motor bearings used in dusty or humid environment should often supplement or replace grease, generally should be added less frequently, at the same time clean up the oil discharge device, remove waste oil. When starting the motor that is not used for a long time, the lubrication state of the rolling bearing must be checked first. If the original grease is dirty or hardened, it should be handled according to the requirements.

**7.5** The rolling bearing temperature is set to alarm 90.C stop 95.C. The temperature of the sliding bearing oil is set to alarm 75.C stop 80.C. The sliding bearing must be manually oiled into the oil chamber prior to initial start-up. Stator temperature is set to alarm 135.C stop 140.C.

**7.6** The motor is not allowed to reverse or brake the reverse power supply in operation. The motor with a synchronous speed of 3000 r/min is not allowed to reverse after shutdown. The motor with a synchronous speed of 1500r/min or less can reverse after shutdown.

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## **8. motor maintenance**

### **8.1 Cleaning of motors**

The motor in the use of time, should pay attention to its clean, especially the coil and bearing clean, no matter the motor's internal and external, do not allow dirty, also do not allow water and oil into the motor.

According to the situation on site, the motor should be regularly (at least once a year) to check the motor internal and bearing. Use a hand bellows or a hose with a wood or rubber nozzle (metal nozzles are not used to prevent coil damage) to blow the dust off with compressed air. Dust must be blown out of the motor and not from one part to the other. The collector ring, brush and lead should be clean. Small metal items, broken wire, etc., do not pile next to the motor, so as not to fall into the motor.

The brush and collector ring shall have a good polished surface. And the brush should be close to the collector ring. If necessary, sand paper can be used to grind the graphite brush, and sand paper can be used to grind the copper graphite brush. During grinding, cut the sandpaper or glass sandpaper into narrow strips and place them between the surface of the collector ring and the brush. Stick them tightly (arc) along the surface of the collector ring and pull them along the rotation direction of the motor. At the same time, the brush can only be pressed by the spring held by the brush.

When sparks occur under the brush, especially the brush mounted on the fixed device, it is necessary to check whether the brush is stuck in the brush

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box, whether the brush is skewed, whether all surfaces are attached to the collector ring, and whether the pressure is too low or too high. When faults are found, they should be eliminated immediately.

Pay attention to the temperature of the brushes of the fixing device, check the pressure when overheating, check whether the position of the brush in the brush box is correct, check whether the brush and the collector ring are tight and whether the contact between the brush and the wire on the brush rack is tight. If there is no problem, then the defect may be the brush itself, according to the brush wear situation needs to be gradually replaced with the same size of brush, must ensure that the brush is tightly inserted in the box, but also free to slide. The distance from the brush box to the surface of the collector ring shall be 2 mm.

## **8.2 Check air gap**

For motors with sliding bearings, air gaps must be checked periodically (at both ends of the motor) to avoid rotor contact with the stator.

## **8.3 Bolt**

All bolts must be checked regularly for tightness, especially the bolts fixing the insulation and rotating parts must be tightened.

## **8.4 ventilation**

The cooling air should be clean and dry (for general motors, the environmental relative humidity shall not be more than 90%, and for TH type motors the relative humidity shall not be more than 95%), because dust

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will clog the air duct and the stained windings, leading to the reduction of air volume and insulation resistance, making the motor overheat and reducing the safety of the motor.

Air in the room or cooling air temperature requirement of general motor shall not be higher than 40 °C. Heating is needed in low temperatures. If the temperature is greater than the value stated above, efforts must be made to reduce the temperature of the cooling air or to reduce the load on the motor so that the temperature of the motor windings or the iron core does not exceed the specified value.

Under rated working conditions (rated current, rated voltage, etc. If the motor is not connected to the pipe, prevent the hot air from the outlet from re-entering the motor.

For the enclosed motor, it is allowed to be used in dusty environment, but the motor should be cleaned regularly.

### **8.5 Oil circuit system**

For the sliding bearing, check whether the oil system is unblocked, whether there is any oil leakage, whether the oil quantity reaches the oil mark position, whether the starting pump circulation is normal (for the self-set oil station system), and whether the oil level of the oil supply system for the motor with forced lubrication should be lower than the oil level of the oil mark of the sliding bearing. The specific standard height shall be subject to the lubricating oil in the bearing oil tank flowing back to the oil tank

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smoothly.

Note: since the length of oil circuit and the size of pipe resistance are involved, the specific liquid level difference cannot be determined.

## **8.6 Insulation resistance**

The insulation resistance of the coil must be checked frequently. When the insulation resistance of any phase coil is reduced, dirt and dust should be carefully removed. It can be swabbed with gasoline or toluene.

If the insulation resistance of the motor is lower than the minimum value, it is recommended to follow one of the following methods:

- (1) For the motor with heater, energize the heater until the insulation resistance is stable.
- (2) Use close to 80.C's hot air is used to dry the static and unenergized motor.
- (3) Dry the motor with a dc welder close to 50% of the motor's rated current.
- (4) By the motor rotor, with 10% of the rated voltage to make the current through the stator winding for drying.

In the above method, it is allowed to gradually increase the current until the stator winding temperature reaches 90.C. The voltage is not allowed to increase enough to make the motor rotor rotate. Under the rotor blocked very carefully to avoid damage to the rotor in the process of heating, insulation resistance at temperature of 90 ° C until stable.

Note: it should be heated slowly at the beginning, so that water vapor can

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naturally escape through the insulation. Excessive heating may easily cause partial steam pressure to force water vapor to escape through the insulation, thus causing permanent damage to the insulation. Generally, it takes 15-20 hours for the temperature to rise to the required value. After 2-3 hours, the insulation resistance is measured again. If the insulation resistance has reached the minimum allowable value considering the influence of temperature, the motor's drying process can be completed.

### **8.8 Waterway system**

Cooling water should be softened water, water temperature shall not be more than 33 °C, but shall not be lower than 5 °C. The cooler shall be inspected regularly, the fastening nut between the upper cover and the stand shall be loosened, the front and rear water tank covers of the cooler shall be opened, and the cooling water pipes shall be inspected and cleaned. If the blockage is serious and cannot be cleaned or the water leakage occurs, the cooler shall be replaced. When the cooler is reassembled after inspection, attention should be paid to the sealing of the front and rear water tanks, so as not to cause short circuit of cooling water and reduce the cooling effect.

**8.9** Dust and foreign matters deposited in the air duct of the air-air cooler and the outer air cover shall be cleaned, otherwise it will affect heat dissipation and ventilation and reduce the cooling effect.

**8.10** For water-cooled motor, water leakage protection device is set inside the motor. Please pay attention to whether water leakage occurs during use.

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**8.11** Drain, clean and refill the bearing with lubricating oil. If abnormal conditions are found in the bearing, check the bearing and replace it immediately if any damage is found.

**8.12** Remove the end cover and top cover, and check whether there is condensation, water, rust or corrosion.

**8.13** Check parts, especially insulation, for signs of overheating, such as bubbles, discoloration or carbonization.

**8.14** Check all insulated electrical connections for insulation wear, paint cracking or coil movement.

**8.15** Check all uninsulated electrical connections for loose contact, signs of overheating, flashover or corrosion.

**8.16** Check the main outlet line for overheating or corona.

**8.17** Operation records

When the motor is in use, a record book should be kept to systematically record the reading of the instrument (voltmeter, ammeter and wattmeter), the time for replacing the bearing and grease (oil) and the setting value of each protective device.

The records shall also include: starting and stopping of the motor, reasons for stopping, bearing temperature, room temperature, thermocouple readings, abnormal phenomena of the motor and transmission device in operation, and records of inspection and daily repair, etc.

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## **9. In the operation of the fault and the main reasons**

**9.1** In the run, often should check the motor so as to find all kinds of faults and promptly eliminate in a timely manner, Otherwise may cause accident。

### **9.1.1 Mechanical failure**

Rolling bearing overheating: May be due to insufficient or too much grease, shaft Bend inclined, shaft friction is too large, Grease contains impurities or foreign goods as well as the damage of steel ball and so on。

The inner product of oil and electric motor oil: Be attributed to the oil bearing too much、High oil pressure, oil and oil return back pressure (should maintain no pressure oil return)、Oil supply system level is higher than sliding bearing surface、Floating labyrinth ring damage、Used oil bearing bad or viscosity is not enough。Also may be due to the bearing groove caused by uneven pressure and bearing cover

The vibration of the motor: Motor position on the bottom is not straight, Shaft bending vibration or journal。Coupling with the bad, The rotor pulley and bad coupling balance, Between the journal and bush clearance is too large, Squirrel cage rotor copper platoon or short circuit, The rotor iron core vibration, bottom uneven subsidence, Floor stiffness is insufficient, floor vibration period and the vibration period of the motor of the same or close, Pulley rough or device, driving mechanism caused by bad work and have a collision phenomenon。



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The rotor eccentricity: may be due to the axial displacement, The rotor and stator core deformation, caused by rotor and rotor balance is bad.

#### 9.1.2 Electrical failure

Starting at the time of failure: as a result of wrong wiring, circuit breakers, working voltage error, load torque too high or too much static moment, starting equipment is faulty, etc.

The cause of the overheating: as the line voltage higher or lower than rating, overload, cooling air quantity insufficiency, the cooling air temperature is too high, turn-to-turn short circuit and motor is not clean.

Insulation damage: may be due to the high working voltage, acid, alkali, chlorine and other corrosive gas, too dirty for the damage caused overheating, mechanical bruising, preservation under high temperature, the temperature is less than 0 °C, and water immersion, etc.

Collector ring and brush fire burn out: Is because the brush wear well、Brush brush stuck inside the box、Collector ring and brush dirt, collector ring is not round and beating, brush pressure too low, Brush number is wrong, poor contact within the brush and conductive lines, brush shortage or cross section is too small, etc. Across the corona between the collector ring: Is due to the collector ring and brush part falls on copper graphite powder, damp or acidic or alkaline gas erosion, caused by the rotor circuit and starting rheostat itself.

### Common failure problems and solutions:

The fault phenomenon	The possible reasons	Processing method
Low insulation resistance	Check whether the moisture, dust, conductive particles or other contaminants The temperature is too high Mechanical and chemical injury	Clean the motor and dry Check whether the overload, inadequate ventilation, dust too much, voltage imbalance or inappropriate Check the coil support and slot wedge, check whether there is a foreign object or vibration
Motor idling, but can't load	After starting, one- phase disconnect	Check the power supply into line
Motor does not move	There are at least two power connection open or no voltage	Check the fuse, power into the line and the lead wire
The motor does not start on load, but a normal electromagnetic noise	The load torque is too big The power supply voltage is too low Rotor open	Repair transmission failure, and check the no-load running Check the power supply voltage Check the rotor circuit
Local overheating of the stator	The stator turn-to-turn short circuit	Remove the check motor stator coil
Motor has hum but can't start	Stator, rotor, a phase to open circuit	Check the power cord or repair fuse
When no-load motor overheating	The stator connection error The power supply voltage is too high Ventilation blocked Fan rotation wrong	Correct connection Check the power supply voltage and no-load current Clean up the air shaft, clear the blockage Check the fan and the direction of rotation
Abnormal vibration and noise	Unbalanced coupling shaft center misalignment, Installation is not strong, Shaft with coupling imbalance, Rotor stripe burst Shaft body is not round is not round, Other components of shaft friction, A motor support structure	Check the motor, check the load, The bolt to check the gasket Check whether have balance, Back on the right plane to find center, Amplitude change with time , Generally occur in load operation, The vibration frequency is twice as large as the rotation frequency, Vibration phase Angle change with

		time, Foot motor vibration is very large Along with the speed change or Rapidly disappearing or switched off
When the motor load is overheating	Motor overload Lack of motor phase The stator rotor friction	Check the voltage and current is correct Reasons of lack of phase or check out break line Check the air gap and the rotor

## 10. Packaging and shipping of motor

Motor in strong wooden case or packed in plastic bags by manufacturers after shipment. Shall not dismantle the packing in transit, Motor immediately after the demolition of packaging to remove the dirt away, And will wipe the surface (Such as D.E and collector ring) , Remove surface rust-proof oil and moisture, rust stains, etc。 If use kerosene or gasoline scrub and still have rust stains, Usable 00 # emery cloth oil gently wipe the light。

If you don't immediately after the motor shipped to the installation, Clean and check should also be split open a case。 It shall be antirust grease or temporary sealing material for will bare metal surface coating sealing again。 In order to prevent the collector ring work surface spots, Between collector ring and brush should pad with insulation paper。

After checking with sealing, Can be in clean and dry place will motor to the packing sealing。 Vanning ambient air should not have such as acid

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and alkali corrosive gas, So as not to damage the insulation and the exposed conductive parts。 Warehouse environment temperature should often keep in + 3 °C and above, Air shall be dry, well ventilated, Should be checked out once a year, Check whether temporary coating sealing metamorphism so as to improve condition in a timely manner。

Shipment must prevent motor side down, In order to avoid damage to the motor 。 Medium-sized motor should be after assembling complete transportation, Not in the case of open transport (except super high wide), Because the motor factory have inspection before shipped、 Testing and packing, When the packing and transportation, The motor must be firmly fixed on the bottom slide wood, The cases with moistureproof paper, Felt such as liner。

## **11. Random file**

- a) Instruction for use;
- b) Product certificate;
- c) Appearance drawing.

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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