


JG 系列行星减速机 安装使用维护说明书

Installation, Operation and Maintenance Manual for JG Series Planetary Gear unit



重慶齒輪箱有限公司
CHONGQING GEARBOX CO.,LTD

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		2025 Version: 001

安全事项

Safety particulars

1. 要求:

说明书是专门为减速机现场安装、使用、维修人员和相关设备操作人员编写配置的；为了您的人身安全和产品的正常使用，请安装使用和维护 JG 系列减速器的人员必须仔细阅读、理解和遵守本安装使用说明书。

1. Notes

This manual is especially prepared for people who install, operate and maintain the machine. It must be read through before operation.

危险:

Danger:

<p>警告</p> <p>本设备有危及生命的高速旋转裸露部件，疏忽下列限制将有生命危险：</p>	<p>Warning</p> <p>This machine is equipped with high-speed rotating bare parts endangering people`s life. Collission may be suffered if neglecting the following restrictions:</p>
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进入设备工作区必须穿戴相应的防滑、防碰撞的保护用具。


Wear antislipping and anticollission articles when entering into working area.

裸露运转部位（如输入万向联轴器等）必须加装防护罩。

Bare rotating parts(such as universal coupling, etc.) must be equipped with guard.

必须只能由经授权的、培训的和合格的人员对 JG 系列减速机进行操作、保养和维修。

Maintenance work is done only by authorized, trained and qualified workers.

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2. 重要性:**潜在危险:**

设备边缘 3 米内严禁有明火出现，设备附近应有干粉灭火器用于紧急灭火。

设备安装、运行、维护期间的废润滑油，应根据润滑油厂家所提供建议，妥善处置。

防护:

用户必须建立安全操作的规章制度，一定要按说明书的要求安装、使用、维护。

按要求安装各种互锁保护装置，否则可能造成严重的意外事故。

2. Significance:**Potential hazards:**

Naked fire is not allowed to appear within 3 meters from the equipment. CO₂ fire extinguisher for emergency must be provided nearby the machine.

Old used lubrication oil should be disposed properly according to the recommendations from the oil supplier.

Protection:

The customer must establish safety regulations. Installation, maintenance and operation must be performed in accordance with this manual.

Various interlocking devices should be fitted as required, otherwise severe accidents may be caused.

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3、重要申明

安装使用减速机之前，请务必仔细阅读本手册，对因不遵守本使用说明书而产生的质量事故，我公司不负责三包服务。

如未得到本公司的书面许可，减速机及配套部件不能露天安装使用；

使用环境、连锁、报警和保护条件与本手册不相符者，需本公司认可后，方能投入使用；

尽管在本使用说明书中提供了产品相关说明，但我们保留对产品进行改进的权利。如有变更，我公司不另行通知。


3. Important notes

Please read this manual carefully prior to installation and operation. We have no responsibility for any quality accident due to improper use of this manual (i.e. ineffective Three Warranty Clause).

The gear unit and associated components can not be installed in open area without receiving written approval from my company.

For application environment, interlocking, alarming and protection devices not corresponding to this manual, those can be accepted only after getting permission from my company.

My company preserves modification rights for this manual, which is subject to any change without prior notice.

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前 言**Preface**

JG 系列辊压机用减速机，由减速机、万向联轴器及稀油站三大部分组成。主要用于水泥工业辊压机的传动减速装置，也可用于其它机械作传动装置。（注：具体供货范围详见合同要求。）

JG series gear unit for roller press is operating with an integral part of gear unit, universal coupling and oil lubricating system, which is mainly used as driving reduction device for roller press in cement industry and other mechanical driving devices as well (Note: scope of supply refers to contract).

减速机及配套设备的现场安装工作应按本说明书规定和国家建材局颁布的“水泥机械设备安装工程施工及验收规范”《JCJ03-90》有关规定，还应执行现场指导工程师的意见和决定。

Installation of gear unit and associated equipments in the field shall be carried out in accordance with this manual and Construction of Installation Engineering for Cement Mechanical Equipment and Acceptance Criteria JCJ03-90 promulgated by the National Building and Material Administration. Meanwhile, the advices and comments from the field service engineers shall be considered.

减速机机房的建筑标准主要取决于当地情况和气候条件。要考虑出现最低的环境温度和整个粉磨车间所容许的最大噪音，特别要考虑防止粉尘直接沉积在减速机上，机房应有足够的检修场地，为的是方便日后的大修工作。

Gear unit house is constructed mainly depending on the local actual condition and climate condition. Consideration shall be given to the lowest ambient temperature and allowable maximum noise in the whole milling plant, particularly to the fact that dust shall not be directly accumulated on the gear unit. Sufficient space must be considered for maintenance and overhaul.

减速机及其配套部件在收到后应当及早安装，不能立即安装的应存放在防潮的仓库中，存放半年后应开箱进行防锈保养。开箱时应按装箱清单仔细查对零部件数量和完好状况。同时贮备必要的材料和工具以备安装需要。

Gear unit and associated parts shall be installed as soon as possible on receipt and those which can not be installed at the time shall be stored in the damp-proof warehouse and rust-resistant painted after six months' storage. During unpacking, you should check the number and condition of parts according to the packing list and prepare the materials and tools necessary for installation work.

为了使安装工作顺利进行，必须准备好所需要的各种工具和仪器，要有合适的运输和吊装设备，最好用移动式起重机来完成。

For the purpose of smooth installation progress, it is necessary to prepare all required tools and instruments, appropriate transportation and lifting equipments, preferably using mobile crane.



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安装前必须仔细阅读本说明书，看懂安装基础图、装配图及外形图，熟悉安装程序，仔细查看减速机和其它配套件的形状尺寸、重量以及数量。检查吊车的吊装能力是否符合安装工程的需要。清除灰尘、杂物，保证安装工程周围环境的整洁。

安装施工中，一定要注意安全；在吊运产品前要仔细检查吊装索具是否牢固；在吊运过程中，吊运物下面严禁站人。

Carefully read this manual before installation, particularly foundation drawing, assembly drawing and dimensional drawing and installation procedure. Check the size, dimension, weight and quantity of gear unit parts and relevant pieces. For installation, crane with sufficient capacity must be provided. Make sure that the surroundings for the installation field is clean, free of dust and foreign matters.

For lifting, carefully check whether the hoisting sling is tight or not. During transportation, nobody is allowed to stand under the crane.

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1 减速机的安装

1.1 概述

JG 系列减速机为一级平行轴加两级行星齿轮的三级减速传动装置，输入轴与输出轴为水平异心布置；

另一种结构为两级行星减速传动装置，输入轴与输出轴为同轴水平布置，如图 1。

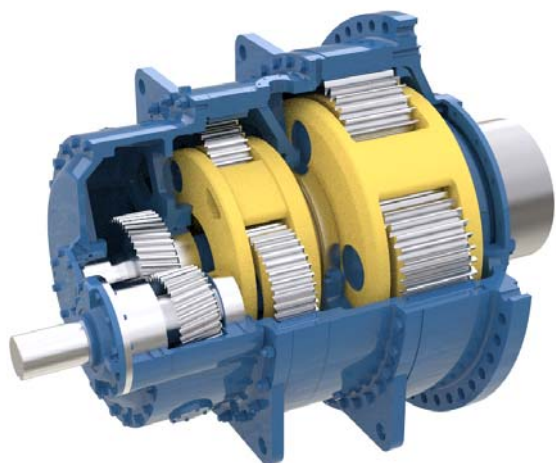


图 1 三维剖视图

减速机除内齿圈采用优质合金调质钢外,其余全部齿轮均采用优质合金渗碳钢。齿面均经渗碳、淬硬后磨齿，具有很高的齿轮精度和负荷容量。减速机中平行轴及行星齿轮支承采用滚动轴承支承。减速机箱体铸造结构，具有足够的强度和刚度，减振性能良好。

1 Installation of gear unit

1.1Generals

JG series gear unit is of three-stage reduction driving system (one-stage parallel shaft + two-stage planetary gears) with input shaft and output shaft horizontally off-set, shown as Fig.1.

Another structure is two-stage reduction driving unit, input shaft and output shaft are horizontally coaxial.



Fig.1 Vertical section

Except for high quality alloy quenched and tempered steel being applied to the annular gear, all other gears for the gear unit are made of high quality alloy case-hardened steel. Ground tooth face after carburization and case-hardening presents pretty high accuracy and load capacity. Rolling bearing is used for parallel shaft and planetary gear. The housing is of cast structure with sufficient strength and rigidity and good vibration absorbing performance.

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该系列减速机配备稀油站强制润滑。采用强制润滑与浸油润滑相结合，减速机箱体与润滑系统的油箱作为一个整体，润滑系统的油箱作为补充，保证减速器的可靠运行。

减速机的输入端和输出端采用机械密封结构（甩油盘式），确保设备无渗漏运行。

1.2 减速机的技术参数

电机功率: kW
 传递功率: kW
 输入转速: r/min
 输出转速: r/min
 传动比:
 稀油站型号: XRZ
 供油量: L/min
 冷却水用量: m³/h
 供油压力: 0.15-0.4MPa

详见合
同、技术
协议及外
形图

齿轮精度: 内齿圈 7 级, 其余齿轮 6 级 (GB/T10095)。

齿面硬度: 内齿圈 HB275-310, 其余 HRC60 ±2。

齿面接触斑点: 额定载荷时, 长度不少于 85%, 高度不少于 75%。

噪音: 空载时小于或等于 85dB (A)。

供油油温: 40±2℃。

润滑油牌号: 中负荷工业齿轮油 L-CKC320。

The gear unit adopts both forced lubrication and submerged lubrication. The housing and lubrication system's tank are regarded as a whole unit to ensure reliable operation.

The input and output sides are mechanically sealed (using oil thrower) for ensuring operation without any leakage.

1.2 Technical data

Motor power: kW
 Transmission power: kW
 Input speed: r/min
 Output speed: r/min
 Transmission ratio:
 Oil lubricating system type:XRZ
 Oil capacity: L/min
 Cooling water flow: m³/h
 Oil pressure: 0.15-0.4MPa

See technical
contract and
dimensional
drawing

Gear quality: grade 7 for annular gear, grade 6 for other gears (GB/T10095).


Surface hardness: HB275-310 for annular gear, HRC60±2 for other gears.

Contact patterns: at rated load, not less than 85% along tooth length, not less than 75% along tooth height.

Noise: ≤85dB (A) at no load.

Working oil temperature: 40±2℃.

Oil grade: medium-load industrial gear oil L-CKC320.

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1.3 减速机的安装程序

减速机安装内容和方法，推荐的安装程序如下：

1.3.1 设备验收

检查辊压机安装精度及辊压机输入轴和扭力支撑板连接尺寸是否符合减速机安装的要求。检测扭力支撑板的铰链孔与配合法兰面的垂直度，如果变形过大，须及时处理。

辊压机配套用万向联轴器的动平衡精度必须高于 G6.3 级，同时检查联接尺寸是否符合要求。联轴器合格证收集好存档备查。

检查辊压机动辊与定辊输入轴的径向、端面跳动及两轴轴系与减速机配合轴径的水平值，并做好记录存档备查。

1.3.2 减速机的吊运

减速机的体积较大、重量较重（减速机的具体重量和外形尺寸见随减速机附带的外形图），起吊过程中一定要注意安全，应缓慢起吊，小心安放。整机吊运必须使用箱体上的吊环孔，为安全起见，钢丝绳应配用卸扣和吊环。按图 3 所示进行吊装。

1.3 Installation procedure

The installation procedure of gear unit is recommended as follows:

1.3.1 Equipment acceptance

Check if the roller press's installation accuracy and connection dimension between input shaft and torsional support plate are properly sized for the installation drawing. Measure the perpendicularity between hinge hole of torsional support plate and fit flange face, if deformation exists, timely treatment is necessary.

The precision of dynamic equilibrium for universal coupling used for roller press must be higher than G6.3, meanwhile, check if the connection dimension is sized for requirement. Keep certificate of coupling for filing and reference.

Check the radial and face run-outs of input shafts of both dynamic roller and static roller. Both shaftings and the fit shaft of gear unit should be in the same level. Keep related record for reference.

1.3.2 Transportation

Since the gear unit is big and heavy (the weight and dimensions for gear unit seeing overall dimension drawing attached to gear unit), special attention is paid to lift and transport. For lifting the whole equipment, eye hole on the housing must be used. For safety, the steel wire must be provided with shackles. Lifting should be accordance with Fig 3.

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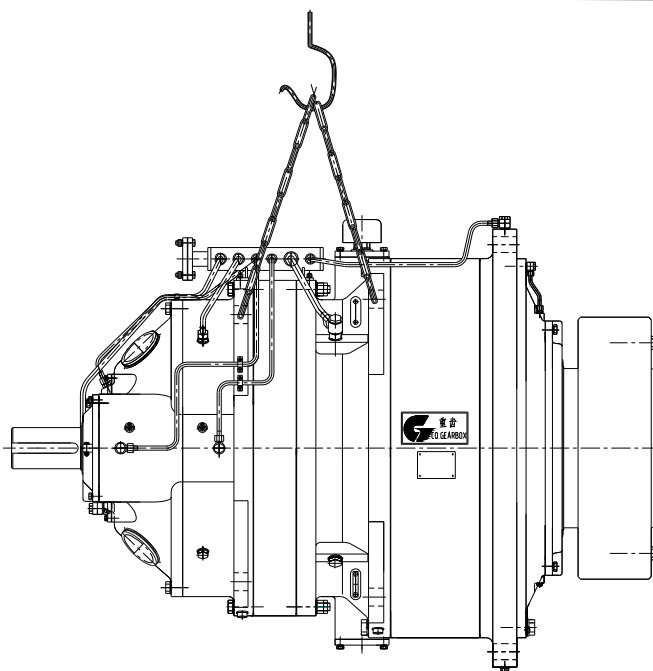


图 3 吊装示意图

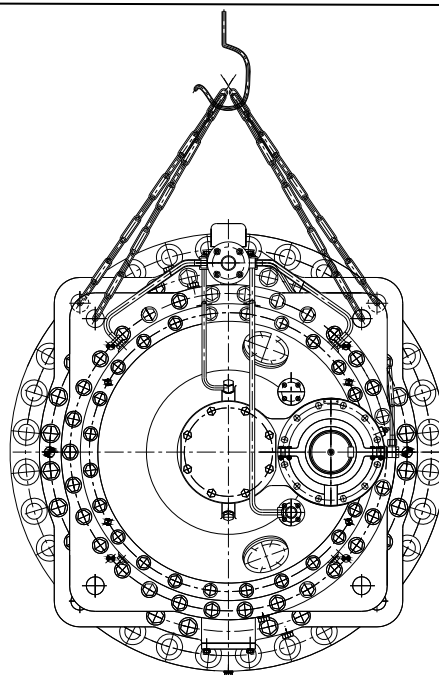


Fig.3 Lifting diagrammatic drawing

1.3.3 减速机安装

根据辊压机总图要求 **调整两辊轴中心线间距**，用千斤顶或其他辅助工具固定，保证两辊轴中心线尽量平行，两轴中心线平行度误差小于0.05mm。

根据辊压机总体布置图，将扭力支撑板装到减速机后箱体接口法兰上，装好螺栓与螺母。按附表 1 螺栓拧紧力矩要求，拧紧减速机与扭力支撑板联接螺栓。


检查锁紧盘锥面和联接螺栓是否涂抹二硫化钼。如果没有，需拆开锁紧盘，清洗干净内外锥面，在内锥面和联接螺栓上涂抹二硫化钼润滑脂（注意：如内锥有开槽，在开槽两侧 10~20mm 宽度范围不允许涂抹二硫化钼）。重新组装后清洗干净锁紧盘外表面。盘动减速机输入轴，使输

1.3.3 Installation

According to general layout diagram, **adjust the distance between center lines of two roll shafts** by using the jack or other auxiliary tool to fix to ensure the center line to be parallel as much as possible. The parallelism error of center line of two roll shafts shall be less than 0.05mm.

According to the Arrangement Diagram, install the torsional support plate onto the connecting flange on rear housing of gear unit. Then tighten the connecting bolts between gear unit and support plate with corresponding torques as listed in attached table 1.

Check if the internal tapered faces of shrink disc and connecting bolts coated with Molybdenum disulfide grease. If not, coat with grease after dismounting the shrink disc to clean thoroughly the internal and external tapered faces (Notes: in case of slotted internal tapered face, do not apply MoS2 to the band 10~20mm on both sides of the slot). Then After that, mount again the shrink disc to clean the external surface. Turn the input shaft of gear

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出轴开槽处于垂直方向。清理干净减速机输出轴轴孔与辊压机主轴的配合面，不允许有杂质、碰伤和油渍，严禁涂抹任何润滑脂及润滑油。用水平仪测量主轴水平读数。

将锁紧盘拧螺栓一侧朝外套于已清洗干净的减速机输出轴上，锁紧盘内套开口应置于水平位置，与减速机空心轴开口成 90° 错开。为保护减速机空心轴，请按警示标牌提示对锁紧盘进行预紧。为保证锁紧盘的传扭效果，锁紧盘外侧端面应控制套入减速机空心轴外端面的距离，建议 10~20mm。

起吊减速机，调整前后起吊点高度（用水平仪检测输入轴），使输出轴高度和水平仪读数与磨辊主轴轴线尽可能保持一致；将减速机缓慢，均匀地套于辊压机主轴轴颈上，将减速机推行到位。当无行车吊装减速机时，应在移动过程中不断根据监测调整输入轴水平。注意：**在加轴向力时，不能将力直接作用于减速机输入轴上。**

减速机安装到位后，调整减速机输入轴中心线使其在水平位置，用水平仪对减速机输入轴的水平进行校正，水平误差控制在 0.1mm/m 内。

unit to slot of output shaft in vertical position. Clean the fitting surface between the output shaft hole of gear unit and spindle of roller press to remove any foreign matter, damage or oil. It is forbidden to apply any lubrication grease or oil. Measure the main shaft levelness with a level.

Push the shrink disc (bolted side) onto the clean output shaft, while the internal opening of shrink disc shall be horizontal and have a 90° displacement with hollow shaft opening of gear unit. Please pretighten the shrink disc according to dataplate. For better torque transmitting capacity for the shrink disc, please observe the push distance of shrink disc external end face onto hollow shaft external. recommend to be 10~20mm.

Lift up the gear unit and adjust the lifting height (measure the input shaft with level) to keep output shaft height and level reading as consistent as possible with axes of roller press main shaft. Slowly mount gear unit onto the main shaft journal and fix in position. In case no crane available for lifting, carefully monitor and adjust the input shaft level value when mounting. Note: **when applying axial force, do not directly apply on input shaft of gear unit.**

After positioning the gear unit, adjust the center line of input shaft to horizontal position. Adjust the levelness of input shaft by using level to ensure the levelling error within 0.1mm/m.

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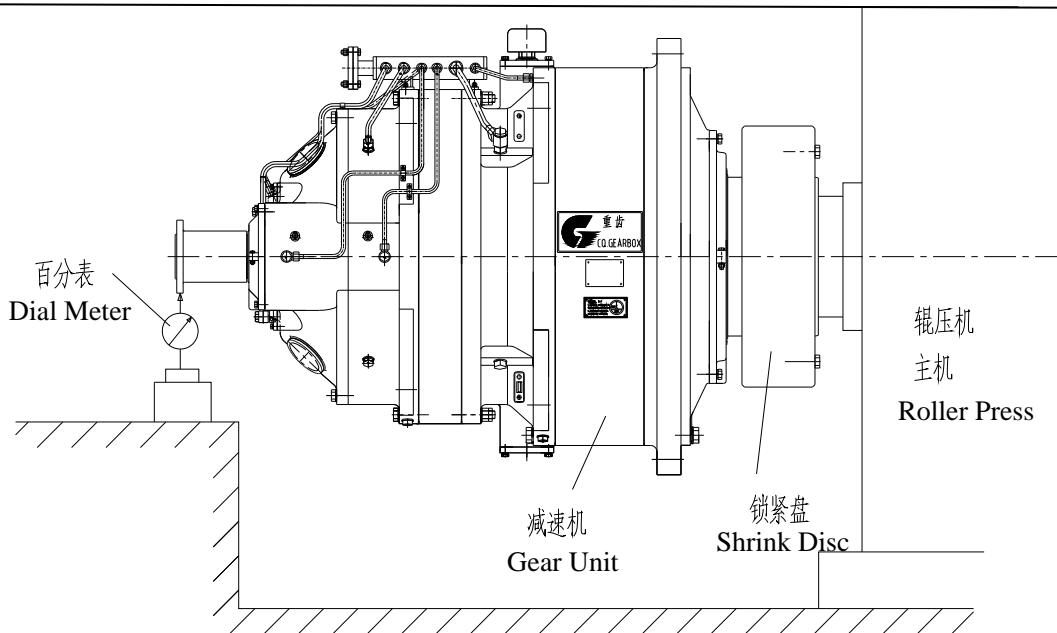


图 4 安装同轴度检验示意图

Fig.4 Co-axiality measuring sketch

用锁紧盘联接螺栓额定拧紧力矩的 1/4、1/2 分两次按对角、交叉、均匀的拧紧锁紧盘螺栓。拧完螺栓后应保证两外锥盘（双锥盘）或内锥端面与外锥端面（单锥盘）的圆周四点间距差小于 0.5mm。装上减速机输入法兰，按图 4 所示在输入法兰（半联轴器）下方的牢固基础上（不允许在减速机箱体上）架设百分表，松开减速机起吊绳，记录法兰下垂量。然后盘动输入轴直至输出轴转动一圈（可根据铭牌上速比确定），保证输入法兰（输入轴）径向跳动值小于 1mm。径向跳动值过大，说明减速机中心与辊压机主轴中心的交叉状态越严重，设备运转时会导致减速机晃动，同时产生较大附加力，造成减速机输出轴疲劳断裂。

Tighten the shrink disc bolts diagonally, crosswise and evenly with torques in such order: 0.25 rated torque, 0.5 rated torque. Make sure four circumferential points distance difference less than 0.5mm between both external tapered discs (for twin disc), or internal and external tapered discs (for single disc). Mount the input flange of gear unit, and then put a dial meter on the foundation (not allowed on gear housing) beneath input flange (half coupling), as shown in fig.4. Loosen the lifting rope on gear unit and record how much the flange dropping. Then turn the input shaft until a complete revolution of output shaft (refer to the ratio indicated on dataplate), ensuring radial runout less than 1mm for input flange(input shaft). **The larger the radial runout, more serious overlap between gear unit center and main shaft center of roller press, which may cause vibration of gear unit and additional force, and even fatigue break of output shaft for gear unit.**

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如径向跳动值不合格应重新调整。将输入法兰盘动至最低点，然后吊升减速机箱体输入端，使输入法兰上升，上升高度为记录的自重下垂量。松开锁紧盘螺栓，继续提升减速机箱体输入端，提升值为输入法兰径向跳动值的一半加上0.5mm。然后对箱体施加轴向力推力，用锁紧盘联接螺栓额定拧紧力矩的1/4、1/2分两次按对角、交叉、均匀的拧紧锁紧盘螺栓。重复前述找正操作，直至输入法兰跳动小于1mm。

调整好同轴度后，依次以锁紧盘联接螺栓额定拧紧力矩的1/2、3/4、1/1按对角、交叉、均匀地逐步拧紧锁紧盘螺栓。最后以额定力矩复查全部螺钉，至少需要以额定力矩复核10圈以上才能保证力矩达到要求，螺栓受力均匀。螺栓每拧一圈后，均应检查两外锥盘（双锥盘）或内锥端面与外锥端面（单锥盘）的距离，保证圆周四点间距差小于0.5mm。具体安装要求请同时仔细阅读锁紧盘的安装使用说明书。

锁紧盘装好后，应复查减速机输出轴与辊压机主轴中心线同轴度。要求减速机输出轴转一圈，输入法兰径向跳动小于1mm。

锁紧盘螺栓拧紧后，再将扭力支撑板和扭力支撑装置与相应基础联接牢固。（注意：扭力支撑装置装好后才能松开减速机起吊绳。）

2 输入联轴器的安装

2.1 概述

输入联轴器由万向联轴器（伸缩型）、半联轴器及紧固件组成。半联轴器分为电机端半联轴器和减速机端半联轴器两部分，分别装在主电机与减速机的轴伸端。万向联轴器特点是可联接不在同一轴线的两转动轴系，并可靠地传递转矩和运动。其动平衡精度必须高于G6.3级。

Make adjustment in case radial runout not acceptable. Turn the input flange to the lowest point, and then raise the input flange. The raising distance is gravity dropping. Loose the bolts of shrink disc to continue raising input flange. The raising distance is half the radial runout value plus 0.5mm. Apply axial force on gear housing, Tighten the shrink disc bolts diagonally, crosswise and evenly with torques in such order: 0.25 rated torque, 0.5 rated torque. Repeat these procedure until runout lower than 1mm for input flange.

After correct co-axiality, tighten the shrink disc bolts diagonally, crosswise and evenly with torques in such order: 0.5 rated torque, 0.75 rated torque and rated torque. Finally check with rated torque to see if all bolts correctly tightened. It may need more than ten revolution to ensure the torque meeting requirements and bolts evenly forced. After each revolution, please check the distance between both external tapered discs (for twin disc), or internal and external tapered discs (for single disc), ensuring four circumferential points distance difference less than 0.5mm. Detailed mounting instructions refer to Installation and Operation Manual for Shrink Disc.

At the end of shrink disc installation, check again the co-axiality for output shaft of gear unit and center line of roller press main shaft, ensuring radial runout less than 1mm for input flange within one complete revolution of gear unit output shaft.

After firmly bolts the shrink disc, tighten the connecting bolts between the torsional support plate and corresponding foundation (**Note: lift down the gear unit only after the torsional support plate is installed in position.**)

2 Installation of input coupling

2.1 Generals

The input coupling consists of universal coupling (elastic), half coupling and fastening pieces. The half coupling is used for both motor side and gear unit side, respectively mounted onto the main motor side and gear unit shaft extension side. The universal coupling is characterized by connecting two rotating shafts not on the same line and reliably transmitting

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为使万向联轴器能平稳地运转，各限制转速下的轴线折角 β 不得超过万向联轴器说明书中曲线图的要求。

2.2 安装程序

2.2.1 联轴器在出厂时为了方便运输，组装在一起发运，拆开包装箱后，吊出联轴器组件，拆开外圆上的螺栓后取下两端的半联轴器。主电机就位前，应将半联轴器分别装在主电机轴和减速机输入轴上。由于联轴器轴孔与主电机轴及减速机轴的配合是过盈或过度配合，装配前联轴节必须加热至一定温度，使轴与孔之间有 0.0005 D 以上的装配间隙，以避免联轴节装入轴上时敲击(严禁用铁锤敲击)，损坏减速机齿轮和轴承。

2.2.2 为保证安装精度，找正电机前，先用水平仪对减速机输入轴的水平进行校正，水平误差控制在 0.1mm/m 内。主电动机的找正以校正后的减速机输入轴线为基准（主电机的轴心线与减速机的中心线要求在同一水平面上），找正要求：法兰径向跳动 $\leq 0.15\text{mm}$ ，法兰端面跳动 $\leq 0.15\text{mm}$ 。

torque。Its dynamic equilibrium precision must be higher than G6.3.

For making sure that universal coupling can run smoothly, the deflection angle β of axis at each limitation speed can't exceed the requirement of curve in the manual.

2.2 Installation procedure

2.2.1 The coupling is delivered after assembling for transportation. After unpacking, lift up the coupling parts, take out the half couplings at both sides after removing the bolts. Before the motor is placed, the two half couplings are respectively assembled on the main motor shaft and gear unit's input shaft. Prior to assembly, the coupling must be heated up to such a temperature that the gap is made available between the shaft and hole for more than 0.0005D for assembly so as to avoid blowing on the coupling when installed (**no hammering!**) and subsequently to protect the gears and bearing.

2.2.2 For assuring installation accuracy, input shaft of gear unit should be aligned by gradienter before aligning motor, **and erroe is less than 0.1mm/m.** alignment for main motor should be based on the input axes of gear unit after alignment (axes of main motor and center line of gear unit must be on the same level), **align as required: flange radial run-out $\leq 0.15\text{mm}$, flange transverse run-out $\leq 0.15\text{mm}$.**

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2.2.3 万向联轴器的长度根据总体布置由用户确定。万向联轴器（伸缩型）安装要求的最短长度尺寸是用户根据总体布置安装要求确定。如主电机与减速机先定位安装，万向联轴器的最短安装长度应考虑到万向联轴器两端平键的高度。万向联轴器的最长长度不能超过说明书的要求。万向联轴器就位后，联接螺栓按联轴器说明书所要求的预紧力矩拧紧（用户要严格的按照安装使用维护说明书，对万向联轴器进行安装。）

2.2.4 主电机的转子有一定的轴向窜量，安装联轴器所要求的最短长度尺寸要能保证在该窜量下正常工作。

3 稀油站的安装与控制要求

3.1 概述

JG 系列减速机根据传递功率，配置有润滑稀油站。稀油站主要由油站、仪表盘、电控柜三部分组成（有的用户要求不带电控柜）。

每台减速机单独使用一台独立的稀油站，稀油站向减速机提供润滑油以润滑减速机各点轴承及齿轮啮合点；每台稀油站有两个油泵，一工作一备用，互为备用。

3.2 安装程序

稀油站的安装和使用，应严格按使用说明书要求进行，现将主要程序说明如下：

2.2.3 The length of universal coupling is decided by the customer. The minimum length required by universal coupling installation is decided by the customer according to general layout installation. If the main motor and gear unit are firstly positioned, when determining the minimum installation length of universal coupling, the height of the flat keys on the both sides should be considered. The maximum length of universal coupling doesn't exceed requirement in instruction. After the universal coupling's positioning, fasten the connecting bolts according to required tightening torque. (For installation, the customer must observe this manual strictly) .

2.2.4 Since the rotor of the main motor has certain axial float, therefore, the shortest length dimension for installing coupling should be able to run normally in this case.

3 Installation and control of oil lubricating system


3.1 Generals

According to transmitting power, JG series gear unit is equipped with oil lubricating system, which covers oil station, instrument panel and electrical control cabinet (some customers don't require electric control cabinet).

The oil lubricating system provides lubrication oil to gear unit and lubricate all bearings and gear meshing points. One of the two oil pumps is working, the other is standby, supplying oil for the whole system.

3.2 Installation procedure

Oil lubricating system shall be installed and operated as per the operation manual and the main procedure is described as follows:

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3.2.1 按总体安装布置要求将清洗干净的稀油站和控制柜安放在指定位置，基础要牢固可靠，安放应平稳，四周要考虑有足够的用于维护、保养和检修的空间。


3.2.2 安装稀油站与减速机的进、回油管及冷却水管（管通径见油站外形图和减速机外形图）。稀油站和减速机之间连接的进、回油管路之间必须用一段长度 $\geq 2\text{m}$ 、耐压 $\geq 1\text{MPa}$ 的相应管径的耐油软管连接。减速机回油口应高于稀油站油箱上表面至少 0.5m ，否则可能回油不畅（当回油管总长度大于 5m 时，高度差还应相应增加）。要求耐油软管布置位置靠近减速机。管路配用的钢管应进行酸洗磷化处理，保证管内清洁，外表面涂防锈漆。各管路连接要密封可靠，不得泄漏。各管应根据现场实际情况可靠固定。

3.2.3 按电控原理图规定，安装减速机（减速机输入轴承 1、2 测点各装一个双支三线铂热电阻，可接至现场控制柜和中控室）和主电机等电器设备的线路以及它们相互之间互锁控制线路，并确保互锁准确可靠。

3.2.1 Referring to general arrangement diagram, properly cleaned oil lubricating system and control cabinet should be placed in designated position, where it shall have solid foundation and sufficient space for maintenance and overhaul.

3.2.2 Install the oil feed line, return line and cooling water pipe(dimensions seeing oil station and gear unit's outline drawings.) An oil resistant hose with similar diameter and length $\geq 2\text{m}$, pressure $\geq 1\text{MPa}$ must be placed between the oil feed line and oil return line. The height difference between return openings of gear unit and upper surface of oil lubricating station is at least 0.5m ; otherwise oil return is not smoothly. In case oil return line larger than 5m in total, increase the height difference accordingly. The hose must be as close to the gear unit as possible. Matched steel pipes should be pickled to ensure the inside is clean and the outside surface must be protected with antirust paint. All pipelines must be connected tightly against leakage and fixed according to the site conditions.

3.2.3 According to the electric diagram, cables of gear unit(bearing 1 and 2 at input side shall be installed PT thermal resistance (3-line), which can be connected to the control cabinet and central control room at site) and main motor shall be connected properly, including its interlocking cables.

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3.3 稀油站的控制要求

稀油站的可靠性，直接关系到减速机的性能，因而稀油站联锁控制的可靠性是相当关键的。电气控制的主要功能是：控制油泵电机的启停、油箱加热器的开和关、检测润滑油的压力和油温。（不带电控柜时要根据下述 3.3.1-3.3.8 要求，在中央控制室中做联锁控制功能。）

3.3.1 稀油站油箱油温低于 25℃时，电加热自动开启（指示灯亮），油温升至 38℃时，电加热器自动关闭（指示灯灭）

3.3.2 当稀油站出口油温低于 25℃时，主电机不能启动。稀油站向减速机供油不少于 5 分钟后，主电机才允许启动。供油口油温高于 55℃ 时声光报警。

3.3.3 当稀油站出口油温高于 45℃时，开启电磁水阀；当稀油站出口油温低于 38℃时，关闭电磁水阀。

3.3.4 当稀油站出油口压力低于 0.12MPa 时，备用泵自动启动，当油压升至 0.3MPa 时，备用泵自动停车。

3.3 Control requirement

The oil lubricating system's reliability is directly related to the performance of gear unit, thus the reliability of interlock controlling is very important. The main function of electric control is defined as: to control starting and stopping of oil pump motor, switch-on and-off of oil heater and check oil pressure and temperature of lubrication oil(for system without electric control cabinet, clause 3.3.1-3.3.8 below shall be observed. Interlocking control is required at central control room).

3.3.1 When the oil temperature in the oil sump is below 25℃, electrical heater will automatically startup (indication lamp on). When the oil temperature increases to 38℃, electrical heater will automatically shutdown (indication lamp off)

3.3.2 The main motor cannot startup until oil outlet temperature is lower than 25℃. The main motor can startup after the the oil lubricating system supply oil to gear unit for more than 5 minutes. Alarm is activated when oil outlet temperature is above 55℃.

3.3.3 In case the oil outlet temperature is above 45℃, switch on the electric magnetic valve, if the oil temperature is below 38℃, switch off the valve.

3.3.4 When oil outlet pressure for the oil lubricating system is below 0.12MPa, standby pump will startup. When the oil pressure moves up to 0.3MPa, standby pump will stop.

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3.3.5 当稀油站出油口压力低于 0.12MPa 时，声光报警，低于 0.08MP 时，主机停车。出油口压力高于 0.45MPa 时，声光报警。

3.3.6 当过滤器过滤压差 $\geq 0.08\text{MPa}$ 时，声光报警，不停机，采用人工切换过滤器，并清洗堵塞过滤器。

3.3.7 减速机输入轴轴承（输入轴轴承 1 和 2）温度 $\geq 75^\circ\text{C}$ 时，声光报警；轴承温度 $\geq 80^\circ\text{C}$ 时，报警并主机停车。

3.3.8 主电机停机 5 分钟后，稀油站才允许停止运行。（注：稀油站的详细控制见所配稀油站的使用说明书。）

4 安装施工中的注意事项

4.1 减速机应存放在干燥、防晒、防潮的库房内。设备封存有效期为半年。封存超过有效期，应对减速机进行全面检查保养，特别是齿轮、轴、轴承等重要零部件，以防锈蚀。

4.2 按照工艺设备图、检查所有基础标高及位置是否相符，发现不符及时修正。

4.3 由于减速机是精密设备，为了保证安装质量，清洁防尘是重要环节，应特别加以重视。

5 试运转、使用及维护

减速机必须在主电机、联轴器、稀油润滑装置等按规定安装完毕，各种电器控制，互锁系统准确无误的情况下才能进行试运转。

3.3.5 When the oil outlet pressure is lower than 0.12MPa, acoustic-optic alarm will be activated. When lower than 0.08MP, main engine stops; if exceeding 0.45MPa, acoustic-optic alarm will be activated.

3.3.6 When the filter's differential pressure is $\geq 0.08\text{MPa}$, acoustic-optic alarm will be activated without motor stopping. Change the filter manually and clean it.

3.3.7 When the temperature of input shaft bearing of gear unit (input shaft bearings 1 and 2) $\geq 75^\circ\text{C}$, acoustic-optic alarm will be activated, if temperature $\geq 80^\circ\text{C}$, alarm will start and motor will stop.

3.3.8 The oil lubricating system can not shut down until the main motor stops for 5 minutes.

(Note: **For the control requirement of oil lubricating system, seeing its Operation Manual.**)

4 Special notes during installation

4.1 Gear unit shall be stored in a dry, sunshine shield, damp-proof warehouse. Grease seal for the equipment is valid for 6 months, beyond which gear unit shall be checked, particularly gears, shafts, bearings, etc. to prevent rust.

4.2 According to process diagram, check all foundation elevations, anchor bolt hole size, location and correct any findings.

4.3 Care shall be exercised on dust removal to guarantee the installation quality since the gear unit is a precise equipment.

5 Commission, operation and maintenance

Gear unit is not allowed to be commissioned until main motor, coupling, oil lubricating system are correctly installed and electronics controls, interlocking system are properly checked.



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5.1 串油清洗

减速机润滑系统的清洁度是十分重要的，运转前必须进行串油清洗。接好稀油站与减速机之间的进油管和回油管，向稀油站内注入其容积约60%的L-CKC320中负荷工业闭式齿轮油，在减速机进油口法兰处放置铜滤网。

清洗前，将清洗油加热到50℃（开通旁路阀并关闭出油口阀门，使油在油箱内自循环，以防加热时结碳），然后打开出油阀，关闭旁路阀，启动稀油站串油。

清洗过程中，每小时检查并清洗一次磁过滤器和双联过滤器滤网。串油>4小时并确认没有杂物后，暂停冲洗。拆下减速机进油口处放置的铜滤网并清洗干净后放回原处。拧紧螺栓，继续进行串油清洗，直到放置的铜滤网确认无杂物后，此项工作才可结束。

串油清洗结束后，取出进油口法兰处放置的铜滤网，排干油箱内清洗用油，彻底清除油箱内油泥杂物，必要时用面团将箱内砂粒粘贴干净。整个串油过程中仔细检查管路有无渗漏。

5.2 减速机试运转

5.2.1 试运转前的准备和检查项目

检查整个系统地脚螺栓和所有联接螺栓是否紧固，检查整个控制系统是否完备和准确可靠。特别是主电机、稀油站和减速机的互锁，以及要求的其它联锁。

5.1 Oil flushing

It is crucial to guarantee that the lubricating system is clean, thus apply oil to clean prior to operation. Properly install oil feed line and return line. Fill N320 industrial closed gear oil into the oil sump, up to 60% of its capacity. The copper strainer shall be placed at oil inlet flange.

Prior to cleaning, heat the cleaning oil to 50℃ (open bypass valve and shut off oil discharge valve so as to allow oil to self-circulate in the sump and to prevent carburization when heating), then open bleed valve, shut off bypass valve and startup oil station for oil flushing.

During cleaning, check and clean the magnetic filter and duplex filter screen every one hour. After oil flushing for more than four hours, check and confirm no impurity and then stop flushing. Remove the copper screen at oil discharge port of oil lubricating station for cleaning and then put it back. Tighten the bolts and continue oil flushing again till there is no impurity present at copper screen.

After oil flushing, remove the copper screen at oil discharge flange of oil lubricating station and empty oil sump to thoroughly remove all foreign matters in the sump. When necessary, absorb sand particles in the sump with flour dough before feeding required lubricating oil. During oil flushing, carefully check for any leakage from pipelines.

5.2 Commissioning of gear unit

5.2.1 Preparations and checks prior to commissioning

Check if all anchor bolts and connecting bolts and the whole control system in good condition, in particular the interlocking of main motor, oil lubricating station and gear unit and other necessary interlocks.

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运转前要向系统加润滑油，加油时按以下步骤进行：将稀油站回油截止阀关紧，将油箱充满油后使加热器工作，将润滑油加热到 40℃（注意加热时使油站自循环）时，稀油站向减速机内加油至减速机规定油位上限后，再一次向稀油站油箱补充加满油后，关闭油站放气阀及加油口，然后打开油站回油截止阀，至使在规定油位的润滑系统全充满油为止。

润滑系统充满油工作 30min 后，应检查确认管系各联接法兰，油站油压、油温及各系统是否工作正常后，停止稀油站工作，马上检查油位是否在规定刻度线上，否则再加油至规定油位。

检查主电机的转向是否符合工作转向要求。通过加长手柄(如：铁棍)用手盘动使电机与减速机联轴器慢转，确认运转灵活，无卡滞或撞击发生后，方可启动电机运转。运转前必须先启动稀油站工作，使之达到正常工作状态。

5.2.2 减速机空负荷（辊压机未进物料，液压缸未加压）运转时间为 360min，运行中每 30min 检查记录一次，检查记录内容如下：

- 环境温度（℃）；
- 主电机转速（r/min）；
- 主电机电压（V）；
- 主电机电流（A）；
- 减速机油站润滑油出口温度（℃）；
- 减速机油站润滑油出口压力（MPa）；
- 减速机回油口润滑油温度（℃）；
- 减速机各轴承处温度（℃）；

5.2.3 减速机负荷试运转按表 1 进行。

各工况运行时，每隔 1 小时除按 5.2.2 记录内容记录外，补充记录如下内容：

Prior to commissioning, apply oil to system as follows: switch off the check valve for oil return line, once the oil tank is full of oil, heating up the oil to 40℃(Note: make oil lubrication system self circulate during heating). After the oil in the gear unit reaches indicated upper limit, fill up the oil tank again, switch off the release valve and oil feed port, switch on the check valve for oil return line till the oil lubricating system is full of oil as required oil level.

After filling up oil and the lubrication system is running for 30 minutes, once confirming piping's each connection flange, oil pressure, oil temperature in normal condition, switch off the lubrication system and check if the oil level is in the required level; if not, fill oil to specified level.

Check the rotary direction of main motor. Slowly turn motor and gear unit coupling manually with extended handle (iron rod) and check for any block, impingement before motor startup. Prior to startup, switch on oil lubrication system to ensure its normal running.

5.2.2 Gear unit shall be running for 360 minutes with no load (both roller press and hydraulic cylinder are not loaded) and check and record the following items every 30 minutes:

- Ambient temperature（℃）:
- Speed of main motor (r/min)
- Voltage of main motor (V)
- Current of main motor (A)
- Lubricating oil outlet temperature（℃）:
- Lubricating oil outlet pressure（MPa）:
- Lubricating oil temperature in return line（℃）
- Each bearing temperature（℃）

5.2.3 Commissioning with load as per Table1

For operation under each load case, record following items every one hour besides records in 5.2.2

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冷却水流量 (m³/h);

冷却水进口温度 (°C);

冷却水出口温度 (°C);

表 1 负荷试运转各工况及运行时间

序号	电机转速 (r/min)	电机功率 (kW)	磨机额定负荷 (%)	运行时间 (h)
1	额定转速	1/4P	25	16
2	额定转速	1/2P	50	16
3	额定转速	3/4P	75	16
4	额定转速	P	100	48

备注: P: 电机额定功率各工况运行时间可根据辊压机试运行规定进行。

5.2.4 试运转的注意事项

每次主电机停止运行 5 分钟后, 方可关闭稀油站。

每次停主机后重新启动, 应在空载情况下启动 (辊压机未进物料, 液压缸不加压), 不允许带载荷启动。

进入辊压机辊缝的物料粒度, 必须控制在辊压机工艺要求的范围内, 否则会对减速机造成冲击振动而损坏减速机。

联接减速机的扭力支撑板, 偏转要灵活, 不允许有卡滞现象。

试运转期间操作人员应加强巡回检查, 作好运行记录, 发现异常声响或其它问题应立即停机检查。

每隔 4 小时检查一次稀油站过滤器滤网和减速机磁性堵头 (共两处, 检查时注意防漏), 如发现有金属碎屑或其它杂质, 应停机查明原因并确认故障完全排除后, 方可继续运转。

Cooling water flow rate (m³/h)

Cooling water inlet temperature (°C)

Cooling water outlet temperature (°C)

Table1 load cases and running time

No.	Motor speed (r/min)	Motor power (kW)	Roller press's rated load (%)	Running time (h)
1	Rated speed	1/4P	25	16
2	Rated speed	1/2P	50	16
3	Rated speed	3/4P	75	16
4	Rated speed	P	100	48

Note: P: motor's rated power. The operation time for each load case shall be defined according to commissioning of roller press.

5.2.4 Precautions for commissioning

Don't stop oil lubrication system until main motor stops 5 minutes.

It's forbidden to startup with load when restarting after main engine stops (both roller press and hydraulic cylinder are not loaded).

The material granularity which enter into gap of roller press must be in accordance with roller press requirement, otherwise gear unit may be damaged due to impact and vibration.

The torsional support plate which connects to gear unit must be flexible without any blocking.

During commissioning, the operator shall carefully monitor the operation and make records and stop the motor in case any abnormal operation or noise found.

Check the filter screen every 4 hours and stop the equipment and do troubleshooting whatever any metal scrap or impurity is spotted. Resume the operation when trouble is eliminated.

各轴承温度、滑油压力或其它系统超过额定整定值时，报警系统故障报警后应立即停机并查明原因予以排除，**不允许原因未查明或故障未排除前强行启动或拆除保险装置。**

5.2.5 检查和验收

试运转结束后检查并整理试运转的各项记录；检查各控制系统的准确可靠性；检查稀油站润滑油过滤器和减速机磁性堵头并清洗干净；检查整个运转系统各联接处是否松动。

5.3 使用维护

减速机是精密、重要的设备，必须加强管理和维护，操作人员应全面了解掌握各项设备的使用说明书的要求，并切实遵照执行。

设备管理人员应每天根据运行记录分析减速机的运行情况，必要时停机检查并及时排除故障，以防酿成严重后果。

5.3.1 启动前的准备和操作程序

每次启动主电机前，必须先检查减速机的油位在规定油位时，才能启动稀油站向减速机供油，并确认稀油站工作正常后，才能启动电机进行工作。

5.3.2 停机操作程序

因各种原因需停止减速机工作时，应先停主电机工作。由于惯性缘故，减速机还会运转，必须待减速机完全停止运转后，才能关闭稀油站停止供油，否则会烧损运动部件甚至损坏减速机。

In case of bearing temperature, lubricating oil pressure or other system higher than the rated settings, alarm system is activated and then stop the system immediately for troubleshooting. **It is not allowed to restart the system or remove safeguard before the cause of problem is found out or eliminated.**

5.2.5 Inspection and acceptance

After commissioning, check and make records. Check the correctness and reliability of control system; check the filter and clean it if dirty. And finally check all connecting bolts for looseness.

5.3 Operation and maintenance

Since gear unit is a precise and important equipment, careful control and maintenance is required. Operators shall get themselves familiarized with operation instruments on each equipment and abide by them in practice.

Equipment control people shall analyze the operation condition of gear unit against operation records. If necessary, stop the equipment for troubleshooting to avoid severe consequences.

5.3.1 Preparations before startup and operation procedure

Before main motor startup every time, firstly check the oil level, if in required level, start up the lubrication system. Once confirming the lubrication system is running properly, switch on the motor.

5.3.2 Shutdown procedure

For whatever reasons that gear unit has to be stopped, first stop main motor. Due to inertial property, gear unit has to continue running. Therefore, you cannot shutdown the oil lubrication system until the gear unit stops completely. Otherwise, rotating parts may be burned and even damaging the gear unit.

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5.3.3 每日检查内容

按 5.2.2 款检查记录内容每隔 60min 检查记录一次；检查各联接部位是否漏油；检查各紧固螺栓有否松动；检查各运动副处有否异常响声或振动。按油站规定进行维护保养。

5.3.3 Daily check

Check every 60 minutes and make record as per 5.2.2: check all connections for any leakage: check each bolt for looseness: check each rotating part for noise or vibration. Maintenance shall be performed as per oil lubrication system regulations.

5.3.4 每月检查内容

检查并清洗油站磁性过滤器和双联过滤器，以及减速机磁性堵头，如发现有金属碎屑等，应立即停机查明原因并加以排除；检查各联轴器及其它联接部位的情况，发现问题及时排除。按稀油站规定进行每月的维护保养。

5.3.4 Monthly check

Check and clean the magnetic filter and duplex filter. In case any metal scraps, etc. are found, stop the equipment for troubleshooting immediately. Check each coupling and other connecting points, remedy the trouble if necessary. Make monthly maintenance as per the lubrication system's operation manual.

5.3.5 半年的检查内容

检查润滑油的质量，发现变质，及时更换。换油时，减速机内部和油站油箱内的残油必须彻底排放干净，以利于新油的工作寿命。检查控制系统的准确可靠性。

5.3.5 Half-year check

Check the oil quality and replace it when deteriorated. For replacement, remaining oil must be fully emptied out of gear unit to ensure service life of new oil. Check if control system is in good condition.

5.3.6 定期检查及维护（详见表 2）

5.3.6 Regular check and maintenance (see table 2)

表 2 定期检查及维护

Table 2 --- Regular check and maintenance

检查部位 Checking points	检查项目及内容 Checking items	备注 Remarks
减速机内部和外部 Gear unit inside and outside	内部有否异常现象 If any abnormal phenomena inside of gear unit	
	减速机箱体磁性堵头是否有异常铁屑 If any metal scrap found at magnetic plug of the gear unit	
	减速机输出轴和辊压机主轴是否发生相对滑移 If relative movement happens between output shaft of the gear unit and roller press main shaft	
	各螺栓有否松动 If anchor bolts are loose	
	各密封面、管路 Each seal face and piping	是否漏油、漏水 If any oil leak or water leak
联轴器 coupling	有否异常响声及螺栓松动 If any abnormal noise or loose bolt	



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	检查锁紧盘螺栓是否松动 If bolts of lock disc become loose	
稀油润滑装置 Oil lubricating units	更换油时清洗油箱 Clean oil tank during oil replacement	
	油泵、油冷却器、电加热器 Oil pump, oil cooler, electrical heater	按说明书要求校验 Calibrated as per instructions
	磁过滤器、双联过滤器、阀门 Magnetic filter, duplex filter, valves	
	控制柜、仪表盘上仪表及电器元件 Control cabinet, instruments on the panel and electronics	

5.3.7 特别注意事项及建议

减速机首次使用的润滑油应半年进行更换，以后换油期为 10000-13000h。每 3-5 月对油品化验一次，如若变质，应提前及时更换油品。

减速机如长期停止运行（15 天以上）每周需启动油泵向其供油，同时启动主电机使其运行 10min 以上。

当主电机由于紧急跳闸而停车时，在跳闸原因没有查清和完全排除以前，不得重新启动主电机。

润滑油质量是减速机安全运行的重要保证条件之一，我们推荐选用 GB5903-1995 工业闭式齿轮油标准中的 L-CKD320 重负荷工业齿轮油。符合该类减速机安全运行要求油品厂家及其品号推荐详见附表 2，如选用不在附录表中的油品需征得卖方同意。

正确选用润滑油添加剂，可改善减速机的润滑条件和效果，延长齿轮和轴承的使用寿命。

所有电气仪表自出厂之日起，应每年检定一次。

5.3.7 Special precautions and proposals

The lubricating oil used for the gear unit for the first time shall be replaced after half a year and later the interval is 10000-13000h. Check oil quality if deteriorates every 3 to 5 months, and replace oil in time.

If the gear unit is placed stationary for a long time (above 15 days), it is required to startup oil pump for filling and meanwhile startup main motor to make it running for 10 minutes.

When the main motor trips on emergency, you are not allowed to re-startup the motor until the trip reason is found and eliminated.

Oil quality is one of the factors contributing to the safe operation of gear unit. We recommend L-CKD320 heavy-duty industrial gear oil as shown in GB5903-1995 Industrial Closed Type Gear Lubricating Oil (other recommended oil grades seeing attached table 2). For oil grades not specified in attached table 2, approval of customer must be required.

Correct choice of additive for lubricating oil can improve the lubricating condition of gear unit and extend the service life of gears and bearings.

All electrical instruments shall be calibrated once a year since the date of ex-work.

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附表 1: 减速机联接螺栓的拧紧力矩
(不包括锁紧盘)Attached table 1:
Tightening torque of connecting bolts of
gear unit (without shrink disc)

螺栓直径 Bolt dia.	力矩Torque	
	扭力扳手 Torque spanner	冲击扳手 Impact spanner
D (mm)	Dr (N.m)	Sch I(N.m)
M10	42	39
M12	74	68
M14	115	102
M16	176	167
M18	251	233
M20	480	441
M24	617	568
M27	902	843
M30	1215	1137

螺栓直径 bolt dia.	力矩Torque	
	扭力扳手 Torque spanner	冲击扳手 Impact spanner
D	Dr(N.m)	Sch I(N.m)
M33	1686	1539
M36	2127	1970
M39	2727	2489
M42	3391	3146
M45	4263	3936
M48	5145	4728
M52	6615	6174
M56	8232	7644
M60	9996	9310

注:

1. 表中所列拧紧力矩数值条件为: 螺栓强度为 8.8 级, 无润滑剂。

2. 力矩公差 $\pm 5\%$ 。

3. 螺栓级别见螺栓头部。头部无级别标记的为自制件, 级别全部为 8.8 级。

4. 对于其它条件和等级的螺栓所需拧紧力矩, 按机械设计手册要求计算。

Notes:

1. The torque values listed in table refer to that of bolts with a strength grade of 8.8 and without lubricant.

2. Tolerance of torque is $\pm 5\%$.

3. The bolt grade see the bolt head. Bolts without marks in the head are self-made parts and are all of grade 8.8.

4. The required tightening torque for bolts other than specified is calculated according to Mechanical Design Manual.

附表 2: 推荐润滑油

Attached table 2: Recommended lubricating oil

油品种类 Oil grade	粘度 ISO VG (40 °C, mm ² /s) viscosity	克鲁勃 Klüber	壳牌 Shell	美孚 Mobil	嘉实多 Castrol	长城 Great Wall
合成烃 PAO Composite hydrocarbon	VG 320	Kluebersynth GEM 4-320 N	Shell Omala HD 320	Mobilgear SHC XMP 320	Tribol 1510/320	AP-HD 320 Synthetical



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