

JL 系列减速机安装使用维护说明书

JL Series Gear Reducer

Manual for Installation, Operation and Maintenance

(2025 版)



CSSC

重庆齿轮箱有限责任公司

CHONGQING GEARBOX CO.,LTD

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安全事项 Safety particulars

1. 要求 Notes

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，请安装使用和维护减速机的人员必须仔细阅读、理解和遵守本安装使用说明书。

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

危险 Danger:

警告	Warning
<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>设备局部可产生高温，可能发生高温烫伤的危险。</p>	<p>This machine is equipped with high-speed rotating bare parts endangering people's life. Collision may be suffered if neglecting the following restrictions ; High temperature may happen for partial places of the equipment, burn risk from high temperature is possible.</p>



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 anticollision 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。防护装置应满足 GB 23821（ISO 13857）的要求。

Bare rotating parts (such as universal coupling, etc.) must be equipped with guard. The protection device shall be in accordance with GB 23821 (ISO 13857) .

必须只能由经授权的、培训的和合格的人员对减速机进行操作、保养和维修。

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

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FAX : 02347211011 47211230			

2. 重要性 Significance:

潜在危险 Potential hazards:

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。

Open fire is forbidden within 3 meters from the equipment. CO2 fire extinguisher must be available readily near the machine for emergency case.

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。

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



防护: Protection:

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。

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

减速机所使用的易燃液体如润滑油，液压油其闪点不得低于 50℃。

Any inflammable liquid used in the gear unit, such as the lube oil, shall be forbidden to be less than 50℃ in term of its flash point.

减速机在额定工况下噪声值：80~85 dB(A)，靠近时需做好防护。


At rated operating condition, the noise level of gear unit shall be 80~85 dB(A). When approaching the gear unit, relate protective measures shall be taken.

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。

Various interlocked protective devices shall be fitted as required; otherwise, severe accidents may be caused.

3. 相关人员 Relevant personnel

设备的安装，操作，维修应该由有专业资格的人员担任，这些人员必须具有安装，操作，维修这些设备的专业技术，熟悉所有的安全资料和应知的安全惯例。

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The installation, operating and maintenance work should be performed by qualified persons, who must possess related professional techniques and know all safety particulars and practices.


4. 重要申明 Important notes

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。（详见第 8 章）

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 (Refer to Chapter 8 Warranty declaration).

尽管在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，恕不另行通知。

CQG preserves modification rights of this manual, which is subject to any change without prior notice.

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	FAX : 02347211011 47211230		

前言 Preface

JL 系列立式磨机减速机由减速机、膜片联轴器（或弹性柱销联轴器）和高低压稀油润滑装置三大部分组成。主要用于水泥工业的立式磨机传动减速装置，也可用于其它机械作传动装置。

JL series gear unit driving the vertical mill is operating in an integral part consisting of gear unit, diaphragm coupling and oil supply unit, which is mainly used as transmission and speed-reduction unit for vertical mill in cement industry and other mechanical driving unit as well.

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》有关规定进行，还应执行现场指导工程师的意见和决定。


Installation of gear unit and auxiliary equipment's in the field shall be carried out in accordance with the manual herein and Code for Equipment Installing and Acceptance of Cement Mechanical Equipment JCJ03-90 stimulated 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 hall is constructed mainly on the basis of the local actual condition and climate condition, taking the possible lowest ambient temperature and permissible max. noise in the whole milling plant into consideration, especially the fact that dust shall not be directly accumulated on the gear unit. Sufficient room should be left in the hall to facilitate the expected overhaul.

减速机及其配套部件在收到后应当及早安装，不能立即安装的须存放在温度 $-20^{\circ}\text{C}\sim+50^{\circ}\text{C}$ 、湿度 $90\%RH$ 以下及酸碱为中性的仓库中，存放半年（6 个月）后应开包装箱进行防锈保养。开箱时应按照装箱清单或零件目录、图纸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。如因特殊原因未能及时安装使用，须用包装胶布密封输出法兰与箱体、输入轴与箱体，以及透气帽孔等处的所有与空气相通的地方，通过箱体中部透气帽孔加入 NP-20 气相防锈油（或同类型产品），迅速将灌注口密封，做好保养记录并明确下一次保养时间，避免内部零件锈蚀。具体见“6 储存和保养”。

The gear unit and auxiliary parts shall be installed as soon as possible upon receipt and be stored in the damp-proof warehouse with temperature between $-25^{\circ}\text{C}\sim+50^{\circ}\text{C}$, humidity below 90% if it cannot be installed imminently. Parts shall be subject to rust-resistant painting after 6-month storage. When opening its packaging casing for this purpose, check the amount and condition of parts against the packing list or part catalog or drawings. Prepare the materials and tools necessary for installation. If the unit cannot be

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installed timely due to special reason, seal with adhesive tapes the output flange and casing, input shaft and casing and vent cap holes etc., where is open to air. Volatile corrosion inhibitor NP-20 (Or products of the same type) should be applied through the vent cap hole at the mid of housing to protect inner parts against corrosion, and then, the openings shall be sealed. Record the maintenance details and determine the date of next maintenance. For details, please refer to "6 Storage and preservation".

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。


In order to facilitate the installation, it is necessary to prepare all required tools and instruments, and proper transportation and lifting equipment as well, preferably using mobile crane.

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, 仔细查看减速机各部件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。

Carefully read the manual before installation, particularly make oneself familiarized with the erection foundation drawing, assembly drawing and dimensional drawing, and erection procedure as well. Check the size, dimension, weight and quantity of gear unit parts and relevant pieces. Make sure that the crane is suitable to the required condition in its load capability. Keep the surroundings clean and free of dust and foreign matters for the installation.

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。

During erection, particular attention should be paid to safety. Prior to lifting, check the lifting ropes or articles secure enough. No one is allowed under crane when lifting.

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1. 减速机的安装 Installation of gear unit

1.1 概述 General

JL 系列减速机为锥齿轮--行星齿轮减速传动的结构形式(详见: 装配图和外形图)。

JL series gear unit is working with bevel gear - planetary gear (Please refer to assembly drawing and dimensional drawing.).

主电机通过高速膜片(或弹性柱销)联轴器联接输入主动锥齿轮轴, 行星架带动输出法兰将扭矩输出。

Main motor is coupled with input shaft via high speed diaphragm coupling, thus torque output can take place on output flange driven by the planetary carrier.

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。


Except for the internal gear rim, which is made of quality quenched & tempered alloy steel being applied to, all other gears for the unit are made of quality alloy case-hardened steel. Ground tooth face after case-hardened and quench-hardening process presents considerably high accuracy and load bearing capacity.

减速机中,锥齿轮部分和行星齿轮部分采用滚动轴承,行星架与输出法兰直接通过螺栓与剪切销进行联接,行星架的一端采用径向滑动轴承,限制了行星架与输出法兰整体沿径向方向的移动。输出法兰的支承根据承受的垂直载荷大小采用了静压推力轴承。

Roller bearing is applied for the bevel gear and planetary gear while planetary carrier and output flange are bolted to shear pins. Radial sliding bearing is used on one end of planetary carrier, which limits radial movement for carrier and output flange. Depending on sustained vertical loading, the support of output flange is working on the static pressure thrust bearing.

箱体为焊接结构。具有足够的强度和刚度,并且推力轴承、下箱体的平均直径设计一致,能承受很大的垂直负荷以及齿轮传动所产生的轴向和径向力。在上箱体上设计有蓄油池,推力轴承能得到很好的润滑(浸泡在油池中)。推力轴承用的高压油及油池的润滑油通过油池的溢流后,润滑内齿圈,很好的解决了行星传动中内齿圈的润滑问题。

The casing is structured as welded with high strength and rigidity and the average diameter for the thrust bearing, lower casing is kept the same, which is able to withstand very high vertical load and axial/radial forces arising from gear driving. Oil reservoir is such designed at the upper casing that ensures good lubrication of thrust bearings (dipped in the reservoir). Lubrication of the annular gear is successfully

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realized by overflowing of high pressure oil for thrust bearing and lube oil to the reservoir.

1.2 减速机的技术参数 Specifications for the gear unit

输入功率: kW	详 见 合 同、 技 术 协 议 和 外 形 图	Input Power: kW	Refer to the Contract, Agreement and dimensional drawing.
输入转速: r/min		Input rpm: r/min	
输出转速: r/min		Output rpm: r/min	
传动比:		Ratio of transmission:	
垂直静负荷: kN		Vertical static load: kN	
垂直动负荷: kN		Vertical dynamic load: kN	
高低压稀油站型号: XGD-C 系列		Type of lube oil station: XGD-C series:	
高压、总供油量: ***/***/min		Oil flow: ***/***/min	

齿轮精度:内齿圈 7 级,其余齿轮 6 级 GB10095 Accuracy of gear: GB10095 Grade 7 for annular gear and grade 6 for others

齿面硬度:内齿圈 HB275-310 其余齿轮 HRC60±2,

Face hardness: HB275-310 for annular gear and HRC60±2 for other gears

额定载荷时齿面接触斑点:对圆柱齿轮,要求接触斑点长度≥70%、高度≥50%;对圆锥齿轮,要求接触斑点长度≥50~70%,高度≥55~75%。

Contact pattern for gears at rating load: required length ≥ 70% and height ≥ 50% for cylindrical gear pair, length ≥ 50~70% and height ≥ 55~75% for bevel gear pair.

噪音:空载时小于或等于 85dB (A) (距离减速机 1m 处)

Noise: no more than 85dB(A) at no load (measured aside from unit 1 meter)

工作油温: 40±3℃

Working oil temp.: 40±3℃

润滑油牌号:重负荷工业齿轮油 L-CKD320 GB5903 标准中合成油。(建议品牌厂家详见“附表二”)

Brand of lube oil: heavy duty industrial closed gear oil L-CKD 320 acc. To GB5903 (details seeing Attached Table 2)


旋向:

Sense of rotation

输入轴旋向 : (面对输入轴) 详见合同、技术协议和外形图。

Rotation direction of input: (Facing the input shaft) Refer to the Contract, Agreement and dimensional drawing.

输出法兰旋向: (从上向下看) 详见合同、技术协议和外形图。

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Rotation direction of output flange: (Viewing upward) Refer to the Contract, Agreement and dimensional drawing.

1.3 减速机的安装程序 Installation procedure for the gear unit

大型减速机安装，因其结构形式不同而安装内容和方法存在较大差别。由于受到整个车间的安装计划和厂房条件的影响，实际安装程序并不总是一成不变的。从技术上看，可以采用不同的分步安装程序，然而作为减速机制造公司推荐的安装程序如下。

Installation of big gear unit greatly varies in installation content and method due to different structure. Limited by the installation plan for the whole workshop and its condition, the actual installation procedure is not always unchanged. Technically, it is possible to carry out the installation based on phased means. However, the installation procedure is recommended as follows by the gear unit maker:


1.3.1 输出法兰的安装（输出法兰与箱体拆开分解发运） Installation of output flange (if delivered separately)

有时为了运输的方便，降低产品的重心以便于运输，减速机的输出法兰从减速机中拆出单独运输。减速机箱体部分及输出法兰运到现场后，安装减速机前，必须先把输出法兰安装完成后才能安装减速机。

In some case, for the convenience of transportation and to lower the gravity center of products, output flange is disassembled for separate delivery for some gear units prior to transportation. In this case, when the unit casing and flange arrives, it is required to assemble the gear unit after mounting the output flange on the gear unit first.

在现场拆开减速机箱体与输出法兰的包装，按装箱清单清点装箱内容，并检查箱体与法兰有无损伤。清洗干净输出法兰上的防护油，检查并除去推力面上的锈迹(清洗要求见第 4.6 条)。翻转输出法兰（出厂时，输出法兰的推力面向上放置的）让推力面向下；清洗干净减速机内部的静压推力轴承及油池后，吊入输出法兰。让输出法兰的推力面与静压轴承的合金表面接触；吊起行星架让两零件（行星架与输出法兰）的**配合表面没有缝隙**，对准输出法兰与行星架的**同钻铰对位标记**，清洗干净联接螺栓及螺纹孔并涂防松胶，装入内螺纹圆柱销；拧紧输出法兰与行星架的联接螺栓，用 0.05mm 塞尺检查行星架与输出法兰的接触面，不允许塞进塞尺长度的 1/3，螺栓穿铁丝防松。

After unpacking in the field, check packing contents according to packing list, then check the casing and output flange for damage or not. Clean away the preservation oil on the flange and check rust stains on thrust surface (rinsing acc. to Item 4.6). Turn over the flange so that the thrust surface is bottom up (this side is up at delivery). Clean the static pressure thrust bearings inside for the gear unit and oil reservoir. Then lift in the output flange so that thrust surface of flange is on the alloy surface of static pre. Bearing.

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Lift up the planet carrier **making no gap in the fitting face between the parts** (i.e. carrier and output flange). **Align the flange and carrier to make proper marks.** Clean down the bolts and screw, sizing the anaerobic glue-water. Fix in parallel pin with internal thread; tighten the bolt connecting the flange and carrier ,check the face with 0.05 millimeter not allowed slip one-third, then wire the bolt to avoid loosing.

1.3.2 设备基础的验收 Acceptance of equipment foundation


按 JCJ03-90 标准中第 1.3.1 条有关规定验收基础，检查立式辊磨的基础底板安装在基础上是否牢固。在基础底板上划出磨机中心线的位置,并检查基础底板上地脚螺栓孔的位置尺寸是否符合减速机外形和基础安装图的要求并存档备查。清理并检查基础底板。找正基础底板的水平度,水平度允差 0.08mm/m，平面度要求不大于 0.1mm/m，以保证齿轮的啮合精度和静压推力轴承受载均匀。

Based on Clause 1.3.1 of JCJ03-90 standard on the acceptance of foundation, check that the soleplate for the base of vertical roller mill is properly secured. Mark on the soleplate the location of central line for the mill and check that anchor bolt hole is properly sized for the gear unit installation as per the drawing. Clean and inspect the base plate. Carry out the parallel alignment for the base soleplate and enable it to meet 0.08mm/m, the flatness requirement shall not exceed 0.1mm/m, to guarantee gear pair contact accuracy and static thrust bearings loaded stably.

1.3.3 减速机的安装就位 Installation of gear unit in place

减速机体积较大、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），在起吊时或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。起吊过程时钢丝绳与箱体接触的地方垫上硬木块如图 1 所示，不允许钢丝绳直接与箱体接触。要求对称两支钢丝绳的起吊夹角不得大于 60°。

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. During transportation, place hard wood blocks to prevent from direct contact between the steel ropes and casing, as shown in Fig1. The angle is recommended less than 60° between both symmetric steel ropes.

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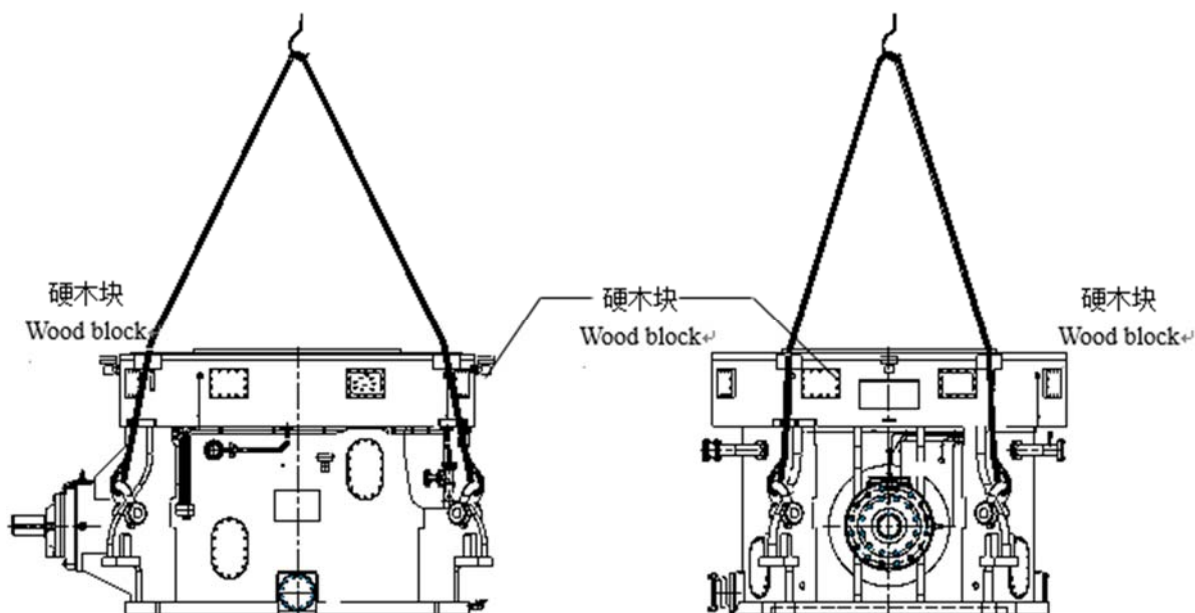


图 1 Fig. 1

清理并检查磨机磨盘与减速机联接表面，平面度要求不大于 0.1 mm/m。

Clean and inspect the connection surface between the grinding disc of the mill and the reducer. The flatness requirement is no more than 0.1mm /m.

初步对正减速机的位置。用汽油或其它溶剂清洗减速机底板，在加工面上涂一层薄薄的机油。将减速机推拉（吊）到已划好中心线的立式辊磨基础底板上，在减速机底板处布置千斤顶（参考图 2），顶住减速机底板，前后左右移动减速机，使减速机底板四周上刻划的中心线与基础底板的中心线对齐（参考图 3），误差在 1mm 内，检查减速机底板上地脚孔与基础底板孔的位置是否重合，螺栓是否干涉；同时检查减速机输入轴线与电机基础中心线是否重合；否则查找原因，重调减速机位置，使之达到要求。

Initially align the position of the reducer. Clean the base plate of the reducer with gasoline or other solvents and apply a thin layer of engine oil on the machined surface. Push and pull (hoist) the reducer onto the vertical roller ground foundation base plate with the center line marked. Arrange jacks at the reducer base plate (refer to Figure 2), hold the reducer base plate, and move the reducer forward, backward, left and right to align the center line marked on the periphery of the reducer base plate with the center line of the foundation base plate (refer to Figure 3), with an error of no more than 1mm Check whether the positions of the anchor holes on the reducer base plate coincide with those of the foundation base plate and whether the bolts interfere. At the same time, check whether the input shaft line of the reducer coincides with the center line of the motor foundation. Otherwise, find out the cause and readjust the position of the reducer to meet the requirements.

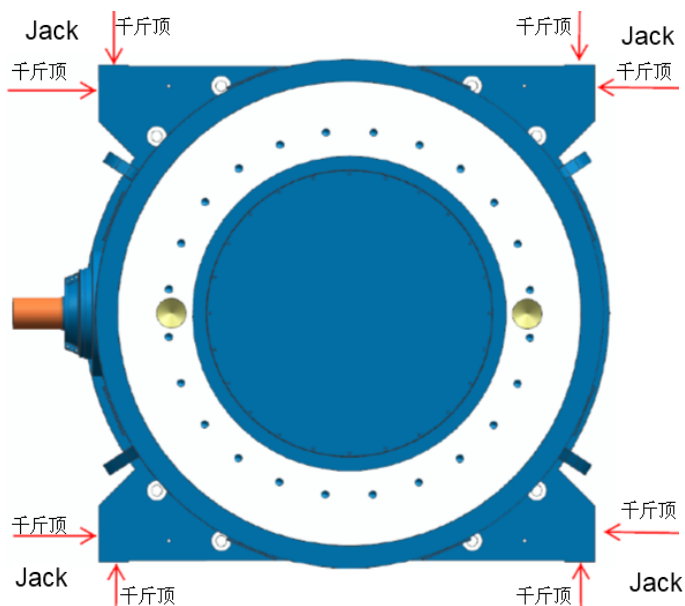


图 2 Fig. 2

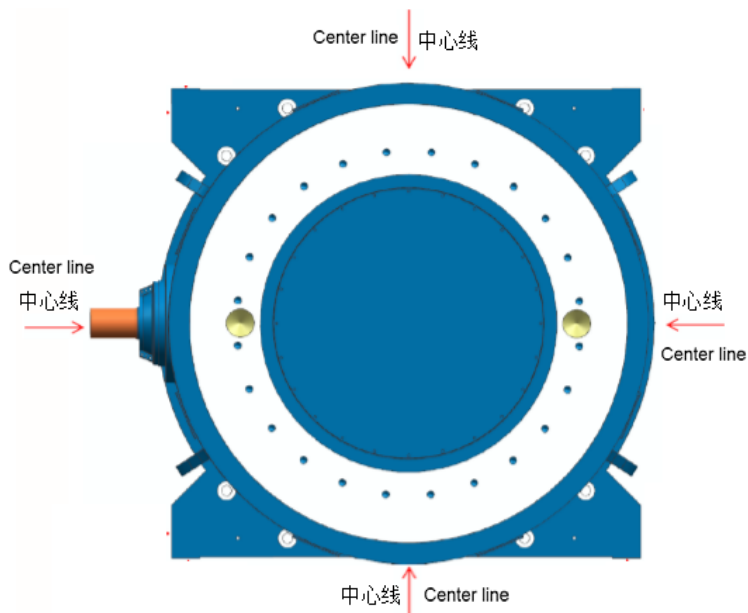



图 3 Fig. 3

清理并检查减速机输出法兰，检查输出法兰联接螺孔并清洗干净，结合面涂少量的油脂。安装连接拱键在输出法兰上（若有）。

Clean and inspect the output flange of the reducer, check the connection screw holes of the output flange and clean them thoroughly. Apply a small amount of grease to the mating surface. Install the connecting arch key on the output flange (if any).

慢速旋转减速机输入轴，对正减速机输出法兰与磨机磨盘的位置。先将磨机磨盘慢慢下落，使其与减速机输出法兰的止口相配合，输出法兰已安装拱键进入磨机磨盘（若有），然后用塞尺在均匀分布在圆周上的

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四个方向检测齿轮箱输出法兰止口与磨盘安装孔之间的间隙（参考图 4）。四个方向的间隙值应保证一致，误差应不大于 0.05 mm。如果检测的间隙误差超过上述要求，应采用布置在齿轮箱底板四周的千斤顶对齿轮箱位置进行调整（参考图 2），直至满足要求。

Slowly rotate the input shaft of the reducer to align the position of the output flange of the reducer and the grinding disc of the mill. First, slowly lower the grinding disc of the mill to fit it with the stop mouth of the output flange of the reducer. The output flange is already equipped with an arch key and enters the grinding disc of the mill (if any). Then, use a feeler gauge to check the gap between the stop mouth of the output flange of the gearbox and the installation hole of the grinding disc in four evenly distributed directions on the circumference (refer to Figure 4). The gap values in the four directions should be consistent, and the error should not exceed 0.05mm. If the detected clearance error exceeds the above requirements, the position of the gearbox should be adjusted by using jacks arranged around the bottom plate of the gearbox (refer to Figure 2) until the requirements are met.

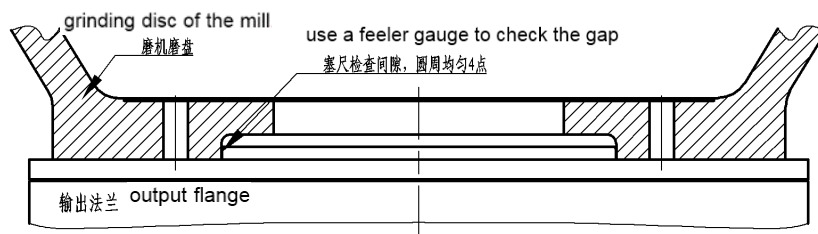


图 4 Fig. 4

减速机与磨盘磨盘的对正结果应详细记录。

The alignment result between the reducer and the grinding disc of the mill should be recorded in detail.


减速机与磨盘磨盘的位置对正后，务必不要移动或松开千斤顶。通过减速机箱体底板上预钻的定位销孔，与立磨基础底板同钻较定位销孔并装好定位销（若有）。采用定位块将减速机的位置固定（若有）。然后安装好全部的底板和磨盘紧固螺栓并拧紧。

After the position of the reducer and the grinding disc of the mill is aligned, it is essential not to move or loosen the jack. Through the positioning pin holes pre-drilled on the bottom plate of the reducer housing, drill and reaming the positioning pin holes with the bottom plate of the vertical mill foundation and install the positioning pins (if any). Fix the position of the reducer with positioning blocks (if any). Then install all the base plates and grinding plate fastening bolts and tighten them.

⚠ 注意 Attention!

减速机底板联接螺栓紧固后，应检查减速机底板与基础底板接触面之间的间隙，要求 0.05mm 的塞尺可塞入深度不大于有效接触面宽度的 1/3。

After the connecting bolts of the reducer base plate are tightened, the gap between the reducer base plate and the contact surface of the foundation base plate should be checked. It is required that a 0.05mm


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feeler gauge can be inserted to a depth not exceeding one-third of the width of the effective contact surface.

1.4 安装注意事项 Notes in erection

减速机底板底面、输出法兰联接位置清理干净并涂抹一层很薄的轻油。如果在安装磨机过程中需转动减速机输出法兰时，必须在减速机上部油池中注入一定量的齿轮油，达到油标规定油位，以防止转动时损坏减速机内推力瓦和轴承。减速机地脚螺栓及销的安装拧紧，需按磨机安装要求进行。

Before mounting the unit in proper position, the bottom of the base plate and the connecting place of output flange must be cleaned and coated with very thin light oil. If rotation of output flange during installation of mill is necessary, the upper oil sump of unit must fill gear oil to required level for protecting the thrust pad and bearing inside the unit against damage. The tightening of foundation bolts and pins must be done after ensuring the mill is installed in good condition.

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2. 联轴器的安装 Installation of coupling

2.1 概述 General

根据用户要求，配用膜片(或弹性柱销)联轴器。膜片联轴器由膜片组、传动轴、联轴节及紧固件组成(弹性柱销联轴器由联轴节、弹性圈、柱销及紧固件组成)。联轴节分为电机端联轴节和减速机端联轴节两部分，分别装在主电机与减速机的轴伸端。膜片(弹性柱销)联轴器除减少扭转振动和齿轮冲击，延长减速机的使用寿命外；膜片联轴器还可以拉开主减速机与主电机间的距离，避免主电机与磨机筒体发生干涉。

Diaphragm (elastic pin) couplings are used as customer required. The diaphragm coupling is consisted of diaphragm sets, driven shaft, coupling and tightening pieces (elastic pin coupling is consisted of coupling, elastic rings, pin and tightening pieces). The couplings have two parts, i.e. coupling on motor side and coupling on unit side, locating on main motor and shaft extension respectively. The diaphragm coupling is used to decrease torque vibration and impact, and to longer the unit life. Moreover, diaphragm couplings can expand distance between main unit and motor so as to avoid interference between motor and mill body.

2.2 安装程序 Installation procedure


2.2.1 膜片(弹性柱销)联轴器 Diaphragm(elastic pin) coupling

在出厂时为了方便运输，所有的零件组装在一起，拆开包装箱后，吊出联轴器组件，拆开取下两端的联轴节。主电机就位前，应将联轴器的左、右半联轴节分别装在主电机轴和减速机输入轴上。联轴节轴孔与主电机轴及减速机轴的配合是 H7/m6 或 H7/n6（装配前复核轴和孔的尺寸），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（D 为轴直径，mm），以避免联轴节装入轴上时敲击(严禁用铁锤敲击)，使齿轮和轴承得以保护。

For the convenience of transportation, all parts of the couplings are mounted together for delivery. So it is needed to lift out the coupling assemblies and take out two half coupling as said above. Prior to the installation of main motor, it is required to install the left and right half of the coupling onto main motor and input shaft of gear unit respectively, making sure the fitting tolerance to be H7/m6 or H7/n6 (check the shaft and hole size again before assembly). Prior to assembly, the coupling must be heated up to such a temperature that a gap more than 0.0005D(D: shaft diameter, in mm) is available between the shaft and hole for assembly so as to avoid hammering on the coupling when installed (no hammering) and subsequently to protect the gears and bearings.

2.2.2 膜片联轴器的安装 Installation of diaphragm coupling

- (1) 主电机的转子一般有一定的轴向窜量，在留轴向尺寸时应把主电机的转子置于中间位置 M 如图 5。

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Generally axial float is left for motor rotor. When considering the axial float, keep

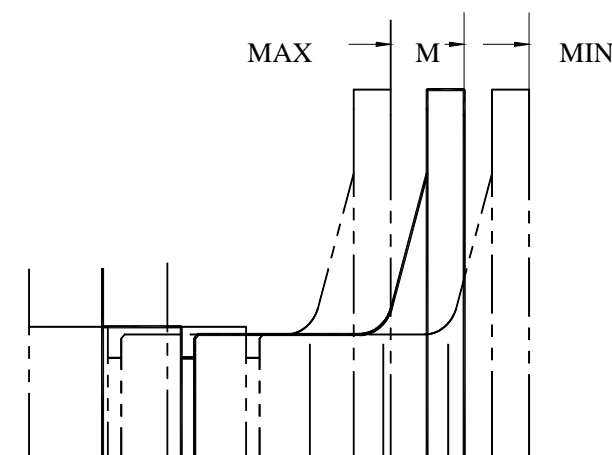


图 5 Fig.5

- (2) 将传动轴水平地放在支架上（如图 6 所示），测量 L 的实际长度。


Horizontally put the driven shaft on the support (as shown in Fig.6) and measure the actual length.

将装好半联轴节的电机就位前，应按减速机外形及安装示意图中联轴器的轴向总长尺寸（轴向总长尺寸由用户确定）留足空档 $L_0^{+0.25}$ （如图 7），以便膜片联轴器的顺利安装。

Before operating the motor with half coupling ready, a space $L_0^{+0.25}$ of should be left for overall axial length (decided by the customer) for the coupling for the installation of diaphragm coupling (Fig.7). Please see the unit's outline & installation drawing.

- (3) 主电机轴线和减速机轴线的对中找正（如图 7），两端半联轴节径向和端面都须按表 1 精度进行找正。找正不良将引起振动,发热,噪声，影响轴承的寿命和齿轮的正常啮合，严重时损坏减速机。

For the axis alignment of main motor and unit (Fig.7), the radial and end of double coupling must alignment accurate as table 1. Poor alignment will result in vibration, heating and noise, which has an effect on the bearing life and correct tooth contact and even damage the unit.

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- (4) 测出实际尺寸，按图 8 方式吊入膜片组件，就位后拧紧螺栓，拧紧前在螺纹上涂抹厌氧胶防松。复查主电机轴是否处于中间位置。

Measure the actual dimension. Lift in the diaphragm as shown in Fig.8 and tighten the bolts (remember first to apply anaerobic glue on the thread). After alignment, check the main motor shaft in middle position.

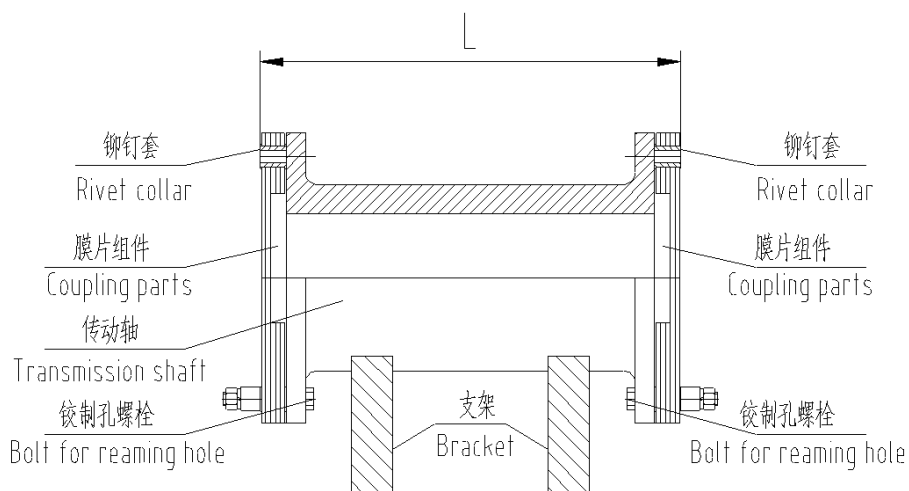


图 6 Fig.6

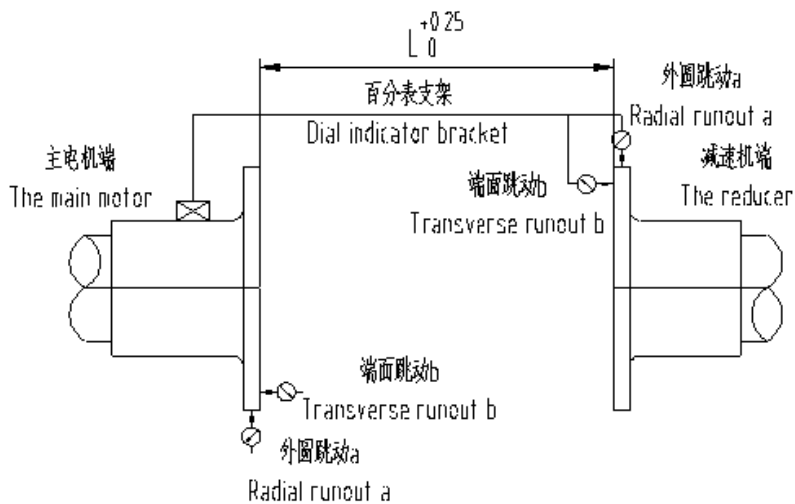


图 7 Fig.7

表 1 Table.1

	弹性联接 elastic connection
外圆径向跳动 a radial runout for outer circle a	≤0.15 mm
法兰端面跳动 b transverse runout for the flange butt b	≤ 0.08/100 mm

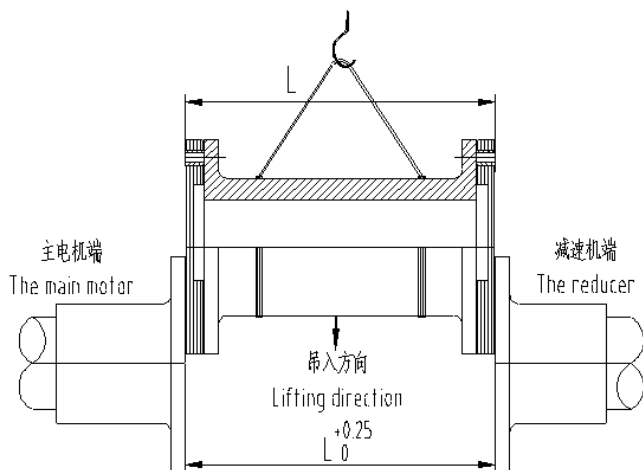


图 8 Fig.8

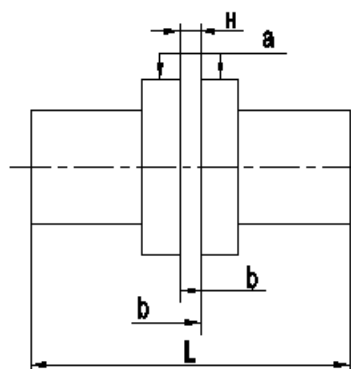


图 9 Fig.9

2.2.3 弹性柱销联轴器的安装 Installation of elastic pin coupling

(1) 主电机的转子一般有一定的轴向窜量，在留轴向尺寸时应把电机的转子置于中间位置 M 如图 5。

Generally axial float is left for motor rotor. When considering the axial float, keep the rotor in the middle position M as shown in Fig.5.

(2) 将装好半联轴节的电机就位前，应按减速机外形及安装示意图中联轴器的总长 L(图 9)尺寸（总长 L 尺寸是由用户确定），留足轴向 L 尺寸。并保证联轴器的法兰间的间隙尺寸 H=10~15mm，该尺寸在联轴器装配图和减速机外形图标注有（如未标注，该尺寸为 H=10mm）。

Before operating the motor with half coupling, sufficient space should be left (decided by the customer) for the coupling dimension L (see Fig.9) according to

the unit's outline & installation drawing. Meanwhile a clearance of H=10~15mm must be ensured between coupling flanges. H is indicated in coupling assembly drawing and outline drawing of unit (In case no indication, H=10mm).

- (3) 主电机轴线和减速机轴线的对中找正（如图 9）。其精度推荐按表 1 进行找正好后，固定主电机并按以上要求复查合格后，安装弹性销部件。

For the axis alignment of main motor and unit (Fig.9), the accuracy is recommended as table 1. After proper alignment, secure the motor and review again according to the above-said requirements. Then install the elastic pin assemblies.

2.3 安装注意事项 Notes in installation

对膜片联轴器，吊装传动轴和膜片组件应按图 8 所示起吊，并注意在钢丝绳与轴之间垫上软物，以防钢丝绳将轴拉伤，不得挂吊膜片处，以防膜片变形。


For the diaphragm coupling, the driven shaft and diaphragm assemblies should be lifted as Fig.8. Pay attention to place some soft mater between the steel rope and shafts to protect shafts from stretching by ropes. The diaphragm is not allowed to lift to avoid from distortion.

在预留膜片联轴器中间轴长度时，一定要使主电机的法兰在中间位置。

When preconsidering the intermediate shaft length for diaphragm coupling, make sure that the flange of main motor in the middle position.

联接螺栓拧紧力矩优先按相应的外购件使用说明书执行，未提及的按附表一所示，按对称交叉顺序，分别按 0.5M、0.75M、0.9M、M 力矩进行拧紧，并涂胶进行防松。

Connected bolts are preferred to be tightened with corresponding torques specified in Instructions. Otherwise attached Table 1 can be referred to. Tighten in a symmetrical cross order with torques 0.5M, 0.75M, 0.9M and M respectively, and coated with anaerobic adhesive for tightness.

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3. 稀油润滑装置的安装及控制要求 Installation and control of oil supply unit

3.1 概述 General

JL 系列减速机根据传递功率和垂直负荷的大小以及考虑减速机推力轴承的结构形式及使用要求，配置有高低压稀油润滑装置。高低压稀油润滑装置主要由油箱、仪表盘、电控柜和温度巡检仪四部分组成。根据用户的需求实际订货中可不带电控柜及温度巡检仪（中控系统进行操作控制、显示各轴承点的温度）。


High & low pressure oil supply units are equipped for JL series based on the transmitted power and vertical load, also considering unit's thrust bearing configuration and operation requirements. The oil supply unit is mainly consisted of oil tank, instrument panel, electric cabinet and temperature monitoring device. While the electric cabinet and temp. monitoring device (for controlling, indicating bearing point temp.) may not be included in the order, depending on the customer.

高低压稀油润滑装置的润滑由低压润滑和高压润滑两部分组成。低压润滑部分提供整个系统的润滑油，润滑各点轴承（包括静压推力轴承）及齿轮啮合点；两个油泵一工作一备用，互为备用，向整个系统供油。高压润滑油通过四个高压油泵从低压油管上吸油形成高压，通过高压补偿装置，让高压油均匀的分配到各静压推力轴承点，形成均衡的压力，达到补偿磨盘不均载荷的目的，以及在静压轴承表面形成油膜，避免出现边界摩擦，提高减速机静压轴承的使用寿命。

The oil supply unit is composed by two parts: low pressure lubrication and high pressure lubrication. While the low part provides lubricant for the whole system, i.e. each bearing point (static pressure thrust bearing included) and meshing points; two oil pumps, i.e. one for working the other for stand-by, are supplementary to each other and supply oil to the system. The high pressure lubricant is distributed evenly to each static pressure bearings by means of high pressure compensation device via the high pressure resulted from oil suction from low pressure oil pipes by four high pressure pumps. In this way, the pressure is balance to compensate unequal load of mill disc and form oil film on the surface of static pressure bearings, thus avoiding boundary friction and improving the static bearing life.

减速机上高压进油口的布置（如图 10），高压进油口与油站高压泵出油口管路相对应联接（箱体上均打有钢印，按编号进行联接）。图中所示为部分布置形式，具体布置以外形图为准。减速机内部对应静压轴承分布需与重齿技术员联系获取。

High pressure oil inlet configuration (see Fig.10): the oil inlets are corresponding to the outlet pipes of high pressure pumps. The partial layout is shown in the figure. The specific layout shall be subject to the outline drawing. The distribution of the static bearing inside the reducer needs to be obtained by contacting the CQG technician.

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另减速机提供 16（或 12）根软管总成及安装在箱体（或分流阀板）上进油口端直通接头，用于减速机进油口和高压供油钢管间的联接。高压供油钢管与软管总成联接的锥密封焊接接头由厂家随机提供。

Also we provide randomly normally 16（or 12）hoses assemblies and straight joints (on oil inlet of dividing valve) for connection between oil inlet of unit and high pressure oil supply steel pipes. The taper welded joint between steel pipes and hoses is supplied randomly by manufacturer.

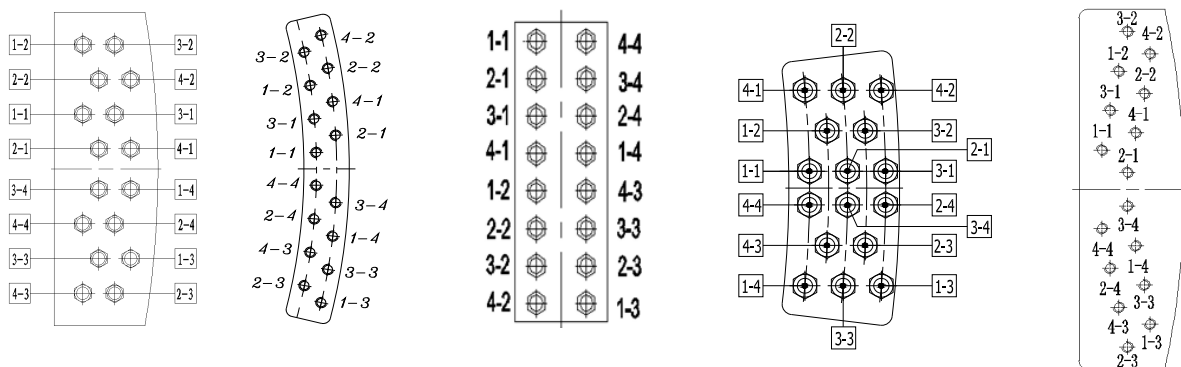


图 10 Fig. 10

3.2 安装程序 Installation procedure

高低压稀油润滑装置的安装按使用说明书要求进行，现将主要程序说明如下：


The installation of oil supply units should be as per this Manual. Major steps are as follows:

- (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（按总体布置图要求，把油站就位）。

According to the overall arrangement, put the clean oil station and control cabinet at specified position, making sure the foundation reliable and stable. Sufficient room should be left around for maintenance or repair.

- (2) 用户现场安装稀油站与减速机间的高、低压进油管和回油管。高低压供油管和回油管的规格见各减速机外形图。回油管的斜度应保证油回流通畅;配制好的管路应进行酸洗，彻底清除氧化皮、砂尘和焊渣。清洗并用压缩空气吹干后,内壁涂润滑油，外表面涂防锈漆,管与管的法兰联接处用无石棉垫片防漏。

The installation for high, low oil inlet pipes and oil return pipes between unit and oil station with clients at site. The specifications for high, low pressure oil supply pipes and oil return pipes see outline drawings of units. The return line shall be properly sloped to allow smooth return of oil. Properly fitup lines shall be pickled to thoroughly get rid of oxidization, dust and welding slag. After cleaning and purging, apply the lubricating oil to the wall and anti-rusting paint to the surface. Flange connections

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of pipes shall be treated with non asbestos backup plate against leak.

- (3) 按多路温度巡检仪使用说明书要求,联接与稀油站仪表盘和电控柜的输出报警触点信号。用户需用计算机控制的,可通过该巡检仪中 4--20 mA 电信号与中控室计算机相联。注意所有联接序号要一一对应,切勿接错,布线要整洁美观,并用塑料管或其它材料对线路加以保护(如果用户要求不带巡检仪的,直接通过减速机上的接线盒把热电阻的线引到中央控制室的 DCS 系统中,进行集中显示,并报警)。

As per the operation manual of multiplex temperature sensor, run wiring of signal on output alarm contact for oil lubricating station instrument panel and electrically controlled cabinet. In case of computer control required by users, carry out connection to the central control room through 4-20mA electrical signal from the detector. Make sure that all connection noise must be properly matched. Cables shall be run in such way that plastic tube or other materials shall be used for protection.

- (4) 按油站的使用说明书要求,联接油流分配器上的电接点压力表的线路,并与电控柜 PLC 相联(不带电控柜时,与中控室相联),注意所有相联的序号要一一对应,切勿接错。布线要整洁美观,并用塑料管或其它材料对线路加以保护。

As per the operation manual of oil station, run wiring of contact pressure gauge on oil distributor, and carry out connection to the electric cabinet PLC (without electric cabinet, carry out connection to the central control room) . Make sure that all connection noise must be properly matched. Cables shall be run in such way that plastic tube or other materials shall be used for protection.


- (5) 按电控原理图纸规定,安装减速机和主电动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。

The circuitries of unit and main engine and the interlocking control circuitries between them should be installed as per electric controlling theory drawings.

3.3 稀油润滑装置的控制要求 Requirements on controls of oil lubricating device

高低压润滑装置的可靠性,直接关系到减速机的性能,因而高低压润滑装置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、检测油箱油位、检测高低压润滑装置润滑油的流量、压力和油温。

Because the reliability of high low lubricating device has a bearing on function of unit, the reliability of interlocking control for high low lubricating device is very important. The main functions of electric control is: control start/stop of oil pump engine and oil box heater, check oil level for oil box, and check oil flow, pressure and oil temperature of lubricating oil of high low lubricating device.

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	FAX : 02347211011 47211230	E-mail:cngpower@CQG.com	

3.3.1 确认减速机连锁保护系统可以可靠工作，并按表 2 要求设置。（本表仅适用于减速机工作油温 $40 \pm 3^{\circ}\text{C}$ 时）

Confirm that the interlock protection system of the reducer can work reliably and set it up as required in Table 2.(This table is only applicable when the working oil temperature of the reducer is $40 \pm 3^{\circ}\text{C}$).

表 2 Table.2

减速机 Reducer	
测点名称 Measurement point name	连锁保护要求 Interlocking protection requirements
静压推力轴承温度（如有） Temperature of hydrostatic thrust bearing (if any)	$T \geq 70^{\circ}\text{C}$ ，报警 Alarm; $T \geq 75^{\circ}\text{C}$ ，停主电机 Stop the main motor。
箱体上部油池温度（如有） The temperature of the oil pool at the top of the box (if any)	$T \geq 65^{\circ}\text{C}$ ，报警 Alarm; $T \geq 70^{\circ}\text{C}$ ，停主电机 Stop the main motor。
径向滑动轴承温度（如有） Radial sliding bearing temperature (if any)	$T \geq 70^{\circ}\text{C}$ ，报警 Alarm; $T \geq 75^{\circ}\text{C}$ ，停主电机 Stop the main motor。
输入轴承等滚动轴承温度（如有） Input the temperature of the rolling bearing such as the bearing (if any)	$T \geq 80^{\circ}\text{C}$ ，报警 Alarm; $T \geq 85^{\circ}\text{C}$ ，停主电机 Stop the main motor。
减速机回油口温度（如有） Temperature of the return oil port of the reducer (if any)	$T \geq 65^{\circ}\text{C}$ ，报警 Alarm; $T \geq 75^{\circ}\text{C}$ ，停主电机 Stop the main motor。
稀油站 Oil lubricating device	
测点名称 Measurement point name	连锁保护要求 Interlocking protection requirements
油箱温度（如有） Fuel tank temperature (if any)	$T \leq 25^{\circ}\text{C}$ ，不允许油泵电机启动 The oil pump motor is not allowed to start。 $T \leq 25^{\circ}\text{C}$ ，加热器自动启动（指示灯亮） The heater starts automatically (the indicator light is on)。 $T > 25^{\circ}\text{C}$ ，油泵电机启动 Start of the oil pump motor。 $T \geq 38^{\circ}\text{C}$ ，加热器自动关闭（指示灯灭） The heater automatically shuts off (the indicator light goes out)。
油箱液位（如有） Fuel tank level (if any)	根据油站使用说明书要求设置 Set it up in accordance with the requirements of the gas station's user manual
粗（精）过滤器压差（如有） Pressure difference	$\Delta P \geq 0.15\text{MPa}$,报警 Alarm。



重庆齿轮箱有限责任公司
CN GPOWER GEAR UNIT CO., LTD

TEL : 02347211101
47211231

http: www.cngower.com

FAX : 02347211011
47211230

E-mail:cngpower@CQG.com

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of coarse (fine) filter (if any)	$\Delta P \geq 0.15\text{MPa}$ (持续 180 分钟以上), 停主电机 (For more than 180 minutes), stop the main motor.
低压供油口温度 (如有) Low-pressure oil supply port temperature (if any)	<p>$T \leq 25^\circ\text{C}$, 不允许减速机主电机启动 The main motor of the reducer is not allowed to start.</p> <p>$T \geq 45^\circ\text{C}$, 报警 Alarm, 开启冷却器供水开关 Turn on the water supply switch of the cooler.</p> <p>$T \geq 45^\circ\text{C}$ (持续 60 分钟以上), 停主电机 (For more than 60 minutes), stop the main motor.</p> <p>$T \leq 38^\circ\text{C}$, 关闭冷却器供水开关 Turn off the water supply switch of the cooler.</p> <p>$T \geq 55^\circ\text{C}$, 停主电机 Stop the main motor.</p>
低压供油口压力 (如有) Low-pressure fuel supply port pressure (if any)	<p>$P \geq 0.6\text{MPa}$ (持续 10 秒以上), 停主电机 (For more than 10 seconds), stop the main motor;</p> <p>$P \geq 0.15\text{MPa}$, 停止备用泵 Stop the standby pump;</p> <p>$P \leq 0.15\text{MPa}$, 报警 Alarm;</p> <p>$P \leq 0.12\text{MPa}$, 启动备用泵 Start the standby pump;</p> <p>$P \leq 0.1\text{MPa}$ (持续 10 秒以上), 停主电机 (For more than 10 seconds), stop the main motor.</p>
<p>低压供油口流量 (如有) Low-pressure oil supply port flow rate (if any)</p> <p>和低压供油口温度有极大的关联, 如遇特殊使用场景需要重新进行标定设置。It is highly related to the temperature of the low-pressure oil supply port. In case of special usage scenarios, recalibration and setting are required.</p>	<p>$F \leq 90\%$ 公称流量 Nominal flow, 报警 alarm;</p> <p>$F \leq 80\%$ 公称流量 Nominal flow (持续 5 分钟以上), 停主电机 (For more than 5 minutes), stop the main motor.</p> <p>$F \leq 75\%$ 公称流量 Nominal flow, 停主电机 Stop the main motor.</p>
油站回油口温度 (如有) Temperature of the oil return port at the gas station (if any)	$T \geq 65^\circ\text{C}$, 报警 Alarm; $T \geq 75^\circ\text{C}$, 停主电机 Stop the main motor.
高压吸油口压力 (如有) High-pressure oil suction port pressure (if any)	<p>$P \geq 0.3\text{MPa}$, 报警 Alarm;</p> <p>$P \leq 0.08\text{MPa}$, 报警 Alarm;</p> <p>$P \leq 0.05\text{MPa}$, 停主电机, 高压油泵停止 When the main motor is stopped, the high-pressure oil pump stops.</p>
高压供油口压力 (如有) High-pressure oil supply port pressure (if any)	1) 磨辊空载时 When the grinding roller is unloaded:

	<p>任意 1 路 $P \geq 8\text{MPa}$, 报警。 Any one way $P \geq 8\text{MPa}$, Alarm.</p> <p>2) 磨辊负载时 When the grinding roller is under load:</p> <p>a) 高压油的 16 (或 12) 路供油口中任意 4 个 (或 3) 口同时压力 $P \leq 1.5\text{MPa}$, 声光报警并停主电机; When the pressure of any 4 (or 3) of 16 (or 12) oil supply ports for high pressure oil is $P \leq 1.5\text{MPa}$, acousto-optic alarm will be activated and main motor stops.</p> <p>b) 相邻 2 路同时压力 $P \leq 1.5\text{MPa}$, 声光报警并停主电机。 When the pressure of 2 neighboring ones of 16 (or 12) oil supply ports for high pressure oil is $P \leq 1.5\text{MPa}$, acousto-optic alarm will be activated and main motor stops.</p> <p>c) 任意 1 路压力 $P \geq 20\text{MPa}$ (持续 30 秒以上), 声光报警。 When the pressure of any one channel is $P \geq 20\text{MPa}$ (lasting for more than 30 seconds), acousto-optic alarm will be activated .</p> <p>d) 任意 1 路压力 $P \geq 24.5\text{MPa}$ (持续 2 秒以上), 声光报警并停主电机。 When the pressure of any one channel is $P \geq 24.5\text{MPa}$ (lasting for more than 2 seconds), acousto-optic alarm will be activated and main motor stops.</p>
<p>高压油泵供油口压力 (如有) Pressure at the oil supply port of the high-pressure oil pump (if any)</p>	<p>$P \geq 22\text{MPa}$, 停主电机 Stop the main motor; 磨辊空载时: $P \geq$ 标定值 (方法见 3.3.2), 启动主电机; When the grinding roller is unloaded: $P \geq$ the calibrated value (for the method, see 3.3.2), start the main motor;</p>
<p>其他 Other</p>	
<p>必须在稀油站稳定运行 20 分钟后, 才允许启动减速机主电机。 The main motor of the reducer can only be started after it has been stably running at the thin oil station for 20 minutes.</p>	

主电机停止 10 分钟后，稀油站才允许停止运行。
 After 10 minutes' stop of main engine, it's allowed that oil station stops.

当低压油泵供油口压力达到 0.15 MPa 时,高压油泵才能启动。
 High pressure oil pump will not startup until the pressure of oil supply port for low pressure reaches 0.15MPa.

测点以配置为准，具体见减速机接线图和稀油站原理图。

The measurement points are subject to the configuration. For specific details, please refer to the wiring diagram of the reducer and the principle diagram of the thin oil station.

3.3.2 当高压油泵供油口压力达到一定值（工作台浮起大于 0.1 mm 时），主电机才能启动。

工作台浮起量测量方法如下：高压泵关闭状态下，减速机圆周选取均布 4 点，在箱体上吸附百分表，表针对准法兰面或与法兰相接触磨盘面，表针归零；打开高压泵，记录 4 点显示值后取平均值作为空载浮起量。（如图 11）

Main engine will not startup until the pressure of oil supply port for high pressure oil pump reaches certain value (worktable floats higher than 0.1mm) .

The method for measuring the floating amount of workbench is as follows: when the high-pressure pump is closed, 4 points are uniformly distributed on the circumference of the unit, the dial indicator is adsorbed on the unit housing, the indicator needle is aligned with the flange surface or the surface of the grinding wheel in contact with the flange, and the indicator needle returns to zero; the high-pressure pump is opened, the display values of the 4 points are recorded, and the average value is taken as the no-load floating amount. (see Fig.11)

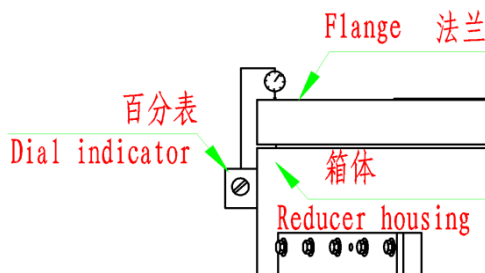



图 11 Fig. 11

3.3.3 运转时高压油的的压力显示一般为 1.5--20 MPa（与所加研磨压力、物料易磨性有关）。

During operation, high pressure oil always shows 1.5-20MPa on pressure (The pressure value is related at grinding pressure and material grind ability) .


3.3.4 以上控制要求是为保证减速机性能而必须的控制要求，油站的详细控制要求见所配油站的电控原理与使用说明书。

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The requirement of control above is necessary for ensuring the unit The detail electric control and principle of oil station sees specifications of mating oil station.

3.3.5 减速机及稀油站系统控制点超出表 2 范围或特殊设计时，应与重齿取得联系，以索取专用的连锁保护要求清单并按其执行。

When the control points of the reducer and the thin oil station system exceed the range in Table 2 or are specially designed, contact the CQG to obtain a dedicated list of interlock protection requirements and follow it.

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4. 安装施工中的注意事项 Precautions in installation

4.1 减速机应存放在干燥、防晒、防潮的库房内。齿轮箱出厂时已进行防锈处理，在 ISO12944-2 标准规定的大气腐蚀性不高于 C3 等级且齿轮箱出厂防护措施完好的条件下，存放半年（6 个月）后应对减速机进行检查保养，特别是齿轮、轴、轴承等重要零部件，以防锈蚀。如订货合同中有另行约定，按合同相关条款执行。存放期超过允许的防锈期时应重新进行防锈处理，具体存放要求和操作见“6 储存和保养”。

Gear unit shall be stored in a dry, sunshine shield, damp-proof warehouse. The gearbox has undergone anti-rust treatment before leaving the factory. Under the conditions that the atmospheric corrosiveness as stipulated by ISO12944-2 standard does not exceed C3 grade and the protective measures of the gearbox at the factory are in good condition, the reducer should be inspected and maintained after being stored for half a year (6 months), especially the important components such as gears, shafts and bearings, to prevent rust. If there are any separate agreements in the purchase contract, the relevant terms of the contract shall prevail. When the storage period exceeds the allowable rust prevention period, rust prevention treatment should be carried out again. For specific storage requirements and operations, please refer to "6 Storage and preservation".

4.2 齿轮箱安装使用前，需进行锈蚀检查，按表 3 规定等级进行鉴别。

Before the gearbox is installed and used, a rust inspection should be carried out and it should be identified according to the grades specified in Table 3.

表 3 锈蚀等级表

Table 3 Rust grade table

锈蚀等级 Rusting grade	名称 Name	表面征状 Surface symptoms	锈蚀度 Degree of rust
0	无锈 no rust	保持原有光泽 Maintain the original luster	0%
1	初锈 Initial rust	金属光泽略暗，呈现灰暗迹象，使用工业擦拭纸手工擦拭后可恢复原有光泽。 The metallic luster is slightly dull, showing signs of dullness. After manual wiping with industrial wiping paper, the original luster can be restored.	1-4%
2	浮锈 rust	呈现淡黄色、暗淡色的细粉末或针孔状的锈迹，使用工业擦拭纸手工擦拭后可去除锈迹，部分恢复光泽。 Fine powder or pinhole-like rust that appears pale yellow or dull can be removed and partially restored to its luster by manual wiping with industrial wiping paper.	5%
3	迹锈	呈现黄色或红褐色，为粉末堆状，工业擦拭纸擦拭无法去除。	10%

	Rust stains	It appears yellow or reddish-brown, in the form of powder piles, and cannot be removed by industrial wiping paper.	
4	层锈 Layer of rust	呈现褐色、片状锈层或凸起锈斑，工业擦拭纸无法去除。 Brown, flaky rust layers or raised rust spots appear, which cannot be removed by industrial wiping paper.	15%

规定凡是超过表 4 中对应类别的允许锈蚀程度，且不直接影响产品性能时，使用工业擦拭纸恢复光泽后，均可视为合格。若超过规范要求等级，联系重齿售后服务中心。

It is stipulated that any rust that exceeds the allowable degree of rust for the corresponding category in Table 3 and does not directly affect the performance of the product can be regarded as qualified after restoring the luster with industrial wiping paper. If the grade exceeds the specification requirements, please contact the after-sales service center of CQG.

表 4 不同零件的锈蚀质量分类

Table 4 Classification of Rust Quality of Different Parts

类别 Classes	表面粗糙度与工作状态 Surface roughness and working condition	锈蚀等级 Rusting grade	适用范围 Range of application
1	Ra0.8~Ra1.6; 高速运动配合面 High-speed motion mating surfaces	0	轴承、6 级以上精度齿面等 Bearings, tooth surfaces with precision of grade 6 or above, etc
2	Ra1.6~Ra3.2; 中速运动配合面 Medium-speed movement coordination surface	1	油封套、轴颈、7 级以下精度齿面等 Oil seal sleeves, journal, tooth surfaces with precision below grade 7, etc
3	Ra1.6~Ra3.2; 精密接触配合面 Precision contact mating surface	1	密封面、齿轮内孔、箱体基准面、中分面等 Sealing surface, inner hole of gear, reference surface of box body, middle parting surface, etc
4	Ra1.6~Ra3.2; 无相对运动配合面 There is no relative motion mating surface	2	联轴器、法兰、油管 Couplings, flanges, oil pipes
5	>Ra3.2	2	一般接触面、地脚面 General contact surface, ground foot surface

当零件出现锈蚀，可按表 5 进行机械除锈处理，零件除锈后，必须及时进行清洗、干燥、防锈的处理，避免零件二次生锈。

When rust appears on the parts, mechanical rust removal treatment can be carried out according to Table xx. After rust removal, the parts must be cleaned, dried and treated for rust prevention in a timely manner to avoid secondary rusting of the parts.


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表 5 Table 5 Mechanical rust removal methods

方法 Method	材料及工具 Materials and Tools	应用范围 Applied range	备注 Remark
刮削 Skiving	非金属刮刀 Non-metallic scraper 金属刮刀 Metal scraper	(1) 非金属刮刀适用于精密加工面。 Non-metallic scrapers are suitable for precision machining surfaces. (2) 金属刮刀适用于一般加工面和非加工面。 Metal scrapers are suitable for both general processing surfaces and non-processing surfaces.	金属刮刀根据生锈金属的硬度来选择硬度, 避免刮刀划伤表面。 The hardness of the metal scraper should be selected based on the hardness of the rusted metal to avoid scratching the surface. 刮削时, 使用煤油配合。 When scraping, use kerosene in combination.
砂纸打磨 Sanding	不同粒度、磨料的砂纸 Sandpapers of different particle sizes and abrasives	(1) 粗砂纸用于非加工面; Coarse sandpaper is used for non-processing surfaces. (2) 细砂纸用于非配合加工面; Fine sandpaper is used for non-mating processing surfaces. (3) 轴承不得使用砂纸打磨; Bearings must not be sanded with sandpaper. (4) 砂纸除锈会影响尺寸精度 Sandpaper rust removal can affect dimensional accuracy	润滑油配合可打磨较精密表面。 Lubricating oil, when used in combination, can polish relatively precise surfaces
刷除 Brush out	钢丝刷、铜丝刷等 Wire brushes, copper wire brushes, etc	适用于非加工面除锈, 去除较厚的锈层。 It is suitable for rust removal on non-machined surfaces and can remove thicker rust layers.	除锈前使用溶剂型清洗剂进行润湿, 然后粘上滑石粉刷除。 Before rust removal, moisten with a solvent-based cleaner and then apply a talc brush to remove the rust.
抛光 Polishing	抛光机、布轮 Polishing machine, cloth wheel	抛光后一般不影响零件光洁度和尺寸精度。 Polishing generally does not affect the surface finish and dimensional accuracy of the parts.	抛光后立即清洗、防锈。 Clean and prevent rust immediately after polishing.
高压水喷射 High-pressure water jet	高压喷水设备, 压力 9.8MPa 以上 High-pressure water spraying	适用铸件箱体。 Applicable to casting box bodies.	

	equipment, with a pressure of over 9.8MPa		
研 磨 Abrasive grinding	研磨膏、绒布、棉布 Grinding paste, flannel, cotton cloth	研磨后一般不影响零件光洁度和尺寸精度，适合加工面的除锈。After grinding, it generally does not affect the surface finish and dimensional accuracy of the parts, and is suitable for rust removal on the machined surface.	用布沾取研磨剂用力往复摩擦零件，清除锈蚀后及时清洗、防锈。Use a cloth dipped in abrasive to rub the parts back and forth forcefully. After removing the rust, clean and prevent rust in time.

4.3 减速机放在磨机底部后，拆掉输入轴处保护膜,拆掉输出端迷宫处保护膜，拆掉空气过滤器保护膜，打开空气过滤器取出内部密封垫后还原。

After the reducer is placed at the bottom of the mill, remove the protective film at the input shaft, the protective film at the labyrinth of the output end, and the protective film of the air filter. Open the air filter, take out the internal sealing gasket, and then restore it.

4.4 按照工艺设备图、土建图，以立磨中心线为基础，检查所有基础标高及地脚螺栓孔尺寸，位置是否相符，发现不符及时修正。

According to process equipment diagram, civil construction drawing and with central line of vertical mill as a basis, check all foundation elevations, anchor bolt hole size, location and correct any findings.

4.5 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。


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

4.6 为保证减速机精确定位及保证安装后的长期使用，防止减速机底面与基础底板锈蚀在一起,应在基础底板表面上均匀涂以一层薄薄的 MoS2 润滑脂。

In order to assure the accurate positioning of gear unit and prevent the possibility that gear unit base may bond with soleplate due to rust after long-term operation, it is required to uniformly apply a thin film of MoS2 grease on base soleplate.

4.7 减速机在找正测量时，应注意避免损坏减速机内零件，特别是润滑管系和测温用的 PT100 铂热电阻。

Try to avoid damaging gear unit internals during alignment, particularly PT100 platinum thermal resistance used for lubricating pipe set and temperature measurement.


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4.8 减速机零部件的清洗，应使用煤油。清洗时禁用棉纱擦抹，以防粘附在零部件影响安装质量。应采用绸、棉毛衫等为好。

Kerosene oil or gasoline oil could be used to clean critical components of gear unit. No cleaning with cotton to avoid cohesion on shaft, gear, bearing bush, which may impact erection quality. It is better to use silk, jumper, etc.

4.9 在安装磨机过程中需转动减速机输出法兰时，必须在减速机上部油池中注入一定量的齿轮油，达到油标规定油位，以防止转动时损坏减速机内推力瓦和轴承。

If rotation of output flange during installation of mill is necessary, the upper oil sump of unit must fill gear oil to required level for protecting the thrust pad and bearing inside the unit against damage.

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5. 试运转、使用及维护 Commissioning, operation and maintenance

减速机必须在主电机、膜片（或弹性柱销）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。上部油池和下箱体相连截止阀，工作时必须关闭（若有，位置参考见图 12，具体位置见外形图）。

Gear unit is not allowed to be commissioned until main motor, diaphragm coupling, oil lubricating device are installed to the standard and electronics controls, interlocking system are properly checked. The upper oil tank and the lower box body are connected by a stop valve. It must be closed during operation (if there is one, the position can be referred to in the figure 12, and the specific position can be seen in the external shape drawing).

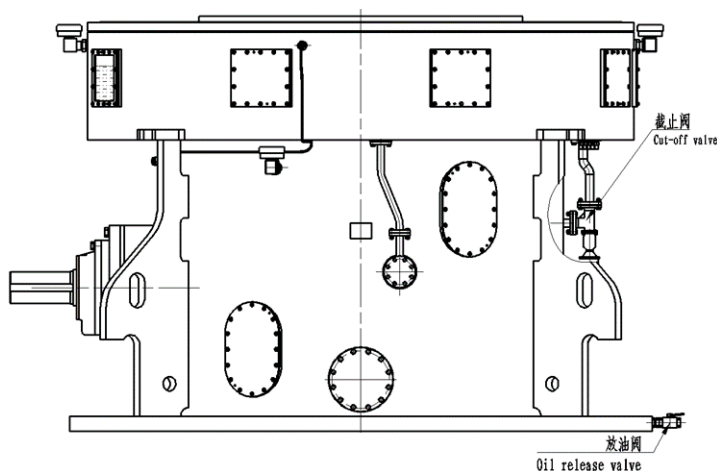


图 12 Fig.12

测量输出法兰与减速机壳体迷宫的距离 X，见图 13，圆周 4 点均布测量取平均值，标定为初始值并记录（标记为 X）。

Measure the distance X between the output flange and the labyrinth of the unit housing, as shown in the figure 9. Measure the average value at 4 points on the circumference as the initial value and record it. (marked as X)

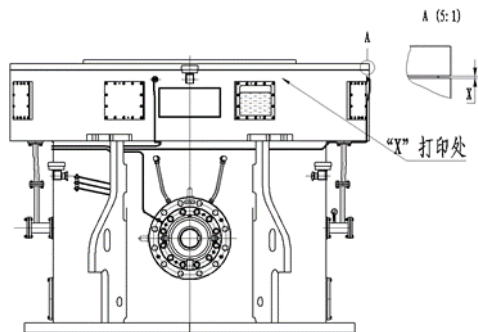



图 13 Fig. 13

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5.1 串油清洗 Oil batching cleaning

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，向油箱内注入其容积约 70% 的 L-CKD320 重负荷工业齿轮油，在稀油站低压出油口法兰处放置铜滤网。

It is crucial to guarantee that the lubricating system for the gear unit is clean, thus oil batching cleaning must be carried out prior to operation. Properly get connected oil feed line and return line connecting oil lubricating station and gear unit so as to feed L-CKD320 gear oil of industrial closed type into the oil sump up to 70% of its capacity. Install copper strainer between LP and HP discharge flange for oil lubricating station.

清洗前，将清洗油加热到 45℃（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，启动油站串油。

Prior to cleaning, heat the cleaning oil to 45℃ (open bypass valve and shut 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 bypass valve and startup oil station for oil batching operation.

串油时先将连接在减速机进油口的高压软管一端（12 根）拆下，串油冲洗高压管路，检查无杂物后，把管路连接好，继续进行系统串油。（注：在拆下冲洗高压管路时要用油桶接油或将减速机下箱体观察孔盖拆下将油接在箱体内。冲洗时要注意安全！）


Remove one end of high pressure soft pipes (12) connected with oil supply port of unit prior to oil batching, then flush high pressure soft pipes by oil batching, connect pipes after clean impurity and keep doing oil batching operation. (Note: when removing high pressure pipelines, catch oil by barrel or remove observing hole cover of bottom housing of unit. Be careful when flushing)

串油清洗过程中，开始每小时检查并清洗一次磁过滤器和双联过滤器滤网。4 小时后每隔两小时检查一次，串油 12 小时并确认没有杂物后，停止冲洗。拆下稀油站出油口处安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，直到安置的铜滤网确认无杂物后，此项工作才可结束。

During cleaning, check and clean magnetic filter and duplex filter screen every 1 hour in the beginning and every 2hr 4hr later. After oil batching operation for 12hr, check and confirm no impurity and then stop flushing. Remove the copper screen at oil discharge of oil lubricating station for cleaning and then put back. Tighten the bolts and continue batching operation again until there is no impurity present at copper screen..

串油清洗结束后，取出稀油站出油口法兰处安置的铜滤网，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后灌入规定的润滑油。

After oil batching operation, remove the copper screen at oil discharge flange of oil lubricating station and empty oil sump to thoroughly get rid of any foreign matters in the sump. When necessary, absorb sand

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particles in the sump with flour dough before feeding required lubricating oil.

整个串油过程中仔细检查管路有无渗漏，特别是各法兰联接处，同时通过箱体上各观察孔，察看各润滑点是否有油润滑。

During the oil batching operation, carefully check for any leak from lines, particularly connections of each flange. In the meanwhile, check each lubricating point for oil through sight glass in the casing.

5.2 减速机试运转 Commissioning of gear unit

5.2.1 试运转前的准备和检查项目 Preparations and checks prior to commissioning

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。


Check all anchor bolts and attachment 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.

运转前使油站加热器工作，将润滑油加热到 38°C（注意加热时使油站自循环），才可向减速机供油。供油 30min 后，检查上箱体蓄油池是否充满油(可通过油标观察油位)，并检查确认管系各联接法兰，油站油压、油温及各系统工作正常后，停止稀油站工作,马上检查稀油站油箱油位是否在规定刻度线范围内，不够时加油至规定油位。

Prior to commissioning, startup the heater in the oil station so that the lubricating oil shall be heated up to 38°C (note: make oil station self circulate during heating) before feeding oil to gear unit. After feeding oil for 30min, check oil reservoir in the upper casing for full (via oil gauge hole). After checking and confirming that piping, each connection flange, oil pressure for oil station, oil temperature and each system are working properly, stop oil lubricating station and immediately check that oil sump level for oil lubricating station is above the specified scale, otherwise continue feeding until the specified oil level.

检查主电机的转向是否符合工作转向要求。通过加长手柄(铁棍)使电机与减速机联轴器用手盘动慢转，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。

Check the direction of rotation of main motor. Slowly turn motor and gear unit coupling manually with extended handle (iron rod) and check for any seize, impingement before motor startup. Prior to startup, put oil lubricating station in operation first.

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5.2.2 减速机空负荷 No load

(磨机未装物料,磨辊脱离磨盘) 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:

Gear unit shall be working for 360min with no load (the mill is not loaded and grinding roller is not in contact with grinding disc) and check and record the following items every 30min:

- | | |
|----------------------------------|---|
| 主电机转速 (r/min) : | 低压供油口压力 (MPa) : |
| Main motor rpm (r/min) | LP oil supply port pressure (MPa) |
| 主电机电压 (V) : | 高压供油口压力 16 (或 12) (MPa) : |
| Main motor voltage (V) | HP oil supply port pressure 16 (或 12) (MPa) |
| 主电机电流 (A) : | 低压供油口流量 (L/min) : |
| Main motor current (A) | LP oil supply port flow (L/min) |
| 环境温度 (°C) : | 低压供油口温度 (°C) : |
| Ambient temperature (°C) | LP oil supply port temperature (°C) |
| 各轴承处温度 (°C) : | |
| Temperature at each bearing (°C) | |

5.2.3 负荷试运转 Commissioning with load

减速机负荷试运转按表 6 进行。

Commissioning with load as per Table 6

表 6 负荷试运转各工况及运行时间


Table 6 Commissioning with load and operation time

序号 No.	电机转速 Motor rpm (r/min)	电机功率 Motor power (kW)	磨机额定负荷 Rated load for roller mill (%)	运行时间 Operation time length (H)	备注 Remark
1	额定转速 (Rated speed)		75	1	P: 电机额定功率各工况运行时间可根据磨机试运行规定进行。P: motor's rated power. The operation time for each duty shall be defined according to commissioning of roller mill.
2	额定转速 (Rated speed)		85	20	
3	额定转速 (Rated speed)		90	24	
4	额定转速 (Rated speed)		95	24	
54	额定转速 (Rated speed)		100	48	

各工况运行时, 每隔 60min 除按 5.2.2 记录内容记录外, 补充记录如下内容:

For operation under each duty, record every 60min additional information plus those in 5.2.2:

冷却水流量 (m³/h) ;

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Cooling water flowrate (m³/h)

冷却水出口温度 (°C) ;

Cooling water outlet temperature (°C)

冷却水进口温度 (°C) ;

Cooling water inlet temperature (°C)

减速机噪音及振动;

Gear unit vibration and noise

5.2.4 试运转的注意事项 Precautions for commissioning

每次主电机停止运行后, 在 10 分钟后, 方可关闭稀油站。

Stop oil lubricating station 10min after main motor stops each time.

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。隔 4 小时检查一次过滤器滤网, 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。


During commissioning, the operators shall carefully monitor the operation and make records and stop motor in case any abnormal operation or noise take place. Check the filter screen every 4hr 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设定值时, 报警系统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。

In case of bearing temperature, lubricating oil pressure or other system higher than the rated settings, alarm system is activated and 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.

试运转期间, 安排人员现场使用点温枪测量输入轴前轴承位置附近温度和输出法兰迷宫温度, 发现异常升高立即停机检查。试运转期间, 每次负荷改变前 10 分钟内, 每隔 2 分钟测一次, 后续 30 分钟测一次, 测后需记录。

During the trial operation period, personnel were arranged to measure the temperature near the front bearing position of the input shaft and the temperature of the labyrinth of the output flange on site using a point thermometer. If any abnormal increase was found, the machine was immediately shut down for inspection. During the trial operation period, within the first 10 minutes of each load change, measure every 2 minutes, and then measure every 30 minutes thereafter. Records should be kept after each measurement.

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各个磨辊的加载装置必须同时进行加载工作，应避免加载不均的情况。

The loading devices of each grinding roller must carry out loading work simultaneously, and uneven loading should be avoided.

磨机在调试、使用时请务必改善偏载、振动过大和原料入磨粒度超标的问题，以免对齿轮箱造成不良影响。

When the mill is being debugged and used, it is essential to improve the problems of uneven loading, excessive vibration and the particle size of raw materials entering the mill exceeding the standard, so as to avoid adverse effects on the gearbox.

在冬季冷却水容易结冰时，冷却水不应完全关断，或者把水全部放空以防结冰。必须注意冬季油箱内润滑油必需在液态状况下才能启动主电机，浆糊状润滑油不易建立油膜，容易损坏推力轴承。

When the cooling water is prone to freezing in winter, it should not be completely cut off or all the water should be drained to prevent freezing. It must be noted that in winter, the lubricating oil in the oil tank must be in a liquid state before starting the main motor. Paste-like lubricating oil is not easy to form an oil film and is prone to damage the thrust bearing.

5.2.5 检查和验收 Inspection and acceptance

试运转结束后，进行详细检查，检查并记录各齿轮副齿面接触印痕情况；


After commissioning, carry out careful inspection, recording impression of supplementary tooth face of each gear:

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；检查滑油过滤器并清洗干净；检查整个运转系统各联接处是否松动；检查基础底板的平面度和水平度；检查各联轴器同轴度误差及轴向间隙。

Check and compile each record on commissioning: check each control system in good condition: check grease filter and clean it: check each connection of the whole driving system for any loose condition. Check the flatness and levelness of the base plate. Check the coaxiality error and axial clearance of each coupling.

5.2.6 X、Y 方向测振点的控制要求 Control requirements of vibration-measuring point X and Y

测振仪探头安装在减速机输入端的箱体轴承座上（如图 14），现场要根据探头的螺纹尺寸钻孔攻丝。X、Y 的安装位置根据现场安装要求，面对输入端，水平测振仪安装在左、右都可以。安装时注意区分水平与垂直测振探头的安装方向，不允许互换。

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Install the detector of vibration meter on housing bearing support of input end of unit (see drawing 8) , drill and tap according to thread size of detector at site. Installation positions of X and Y required by site installation is to face input end, either right side or left side is appropriate.

振动值 $\geq 4.5\text{mm/s}$ 报警；振动值 $\geq 7\text{mm/s}$ 时在 2 秒钟内必须停主电机。

Vibration value $\geq 4.5\text{mm/s}$, alarm will be activated; vibration value $\geq 7\text{mm/s}$, stop main engine within 2 seconds.

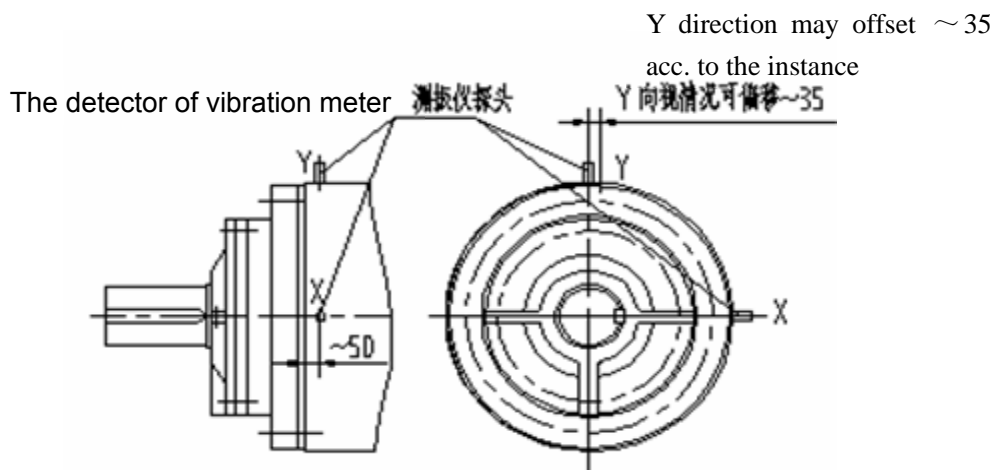


图 14 Fig. 14

5.2.7 记录 Records

整理一份运转记录寄给重齿售后服务中心：包括高压油各点油压（16 点（或 12 点）），磨辊压力，静压推力轴承温度，输入轴承温度及齿轮啮合情况等。

Send a running record to service center of CQG, including: oil pressure on each point of high pressure oil (16 points (or 12 points)) , grinding roll pressure, the temperature of static pressure thrust bearing, input bearing temperature and engaging of gears.

上述检查内容应作全面文字记录和图片记载，并作为验收的依据。


The above checks shall be properly documented and pictured as basis for acceptance.

重齿售后服务中心人员需将运转相关记录作为服务报告附件上传保存。

The personnel of the after-sales service center of Heavy Gear need to upload and save the relevant operation records as attachments to the service report.

5.3 使用维护 Operation and maintenance

JL 系列减速机是精密、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

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查并及时排除故障，以防酿成严重后果。

JL series gear unit is a precise and important equipment, requiring careful management and maintenance. Operators shall get them familiarized with operation requirements on each equipment and abide by them in practice. Equipment management people shall analyze the operation condition of gear unit against operation records. If necessary, stop the equipment for troubleshooting to avoid bad consequences.

报警系统报警后应立即查明原因予以排除，不允许原因未查明或故障未排除前长时间运转超过 1 小时或拆除保险装置。设备跳停后应立即查明原因予以排除，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。

After the alarm system sounds the alarm, the cause should be immediately identified and eliminated. It is not allowed to operate for more than one hour or remove the safety device before the cause is identified or the fault is eliminated. After the equipment trips, the cause should be immediately identified and eliminated. It is not allowed to forcibly start or remove the safety device before the cause is identified or the fault is eliminated.

5.3.1 启动前的准备和操作系统 Preparations before startup and operation procedure

每次启动主电机前，必须先启动稀油站向减速机供油，高低压油站先启动低压油泵 3 分钟后，再启动高压油泵，确认供油压力达到规定值，并且减速机上箱体蓄油池装满润滑油后才能启动主电机进行工作。


Before main motor startup each time, it is required to startup oil lubricating station first to feed oil to gear unit. High/low pressure oil station shall be first started to operate LP oil pump for 3min, and then startup HP oil pump to confirm that oil supply pressure is up to the required value. Motor cannot be started until oil reservoir in the upper casing of gear unit is filled with lubricating oil.



注意 Attention!

针对寒冷地区和冬季，停机一段时间再次使用减速机，由于上部油池存油较多且温度低，建议打开上部油池与下箱体相连截止阀将油池里的油放入下箱体后立即关闭。避免前期运行输出端迷宫渗油。（若有截止阀按此进行操作，具体位置见外形图）

For cold regions and winter, when the reducer is used again after being shut down for a period of time, since there is a large amount of oil in the upper oil pool and the temperature is low, it is recommended to open the stop valve connecting the upper oil pool to the lower box, put the oil in the oil pool into the lower box, and then immediately close it. Avoid oil leakage from the labyrinth at the output end during the early operation. (If there is a stop valve, operate it according to this. For the specific position, please refer to the

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external diagram.)

5.3.2 停机操作程序 Shutdown procedure

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，5 分钟后才能关闭油站停止供油，否则会烧损轴瓦甚至损坏减速机。

For whatever reasons that gear unit has to be stopped, first stop main motor. Due to inertial reason, gear unit has to continue rotation. Therefore, five minute later could shut oil supply from oil lubricating station until gear unit comes to a full stop. Otherwise, bearing bush may be burned or gear unit is damaged.

5.3.3 运行中的检查 Checks during operation

5.3.3.1 每日检查内容 Daily checks

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。

Check every 60min and make record as per 5.2.2: check each connection for leak: check each bolt for loose: check each traveling part for noise or vibration. Maintenance shall be exercised as per oil station regulations.

检查和记录现场各处压力表，温度计或其他显示的数据。并将记录的数据与第三章中的要求进行比较，发现任何不正常情况应查明原因，必要时停机检查，与重齿售后服务中心联系。


Check and record the data displayed by pressure gauges, thermometers or other indicators at all locations on site. Compare the recorded data with the requirements in Chapter Three. If any abnormal situation is found, the cause should be identified. If necessary, stop the machine for inspection and contact the after-sales service center of Chongqing Gear.

5.3.3.2 每月检查内容 Monthly checks

检查并清洗油站磁性过滤器和双联过滤器，如发现有铁屑、巴氏合金的碎屑，塑料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。按油站规定进行每月的维护保养内容进行。

Check and clean magnetic filter and duplex filter in the oil station and stop the equipment for troubleshooting whenever iron chips, Babbitt alloy scrap, plastic scrap, etc. are spotted. Check each coupling and other connection locations. Get rid of problems identified. Maintenance shall be exercised every month as per oil station regulations.

5.3.3.3 半年的检查内容 Checks every half a year

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减速机在满负荷运行 2 个月后，打开减速机观察孔盖板按 1.2 条要求检查齿轮的接触斑点，若没有达到该要求请及时与我公司联系。经过半年满负荷运转后，均能满足 1.2 条齿轮着色斑点的要求，减速机运行良好，可放心进行使用。

After the initial full load running for two months of the unit, open the inspection window, Check the contact pattern of gears as Item 1.2, If not, please contact CQG immediately. After the initial full load running for two months of the unit, if the contact pattern of gears is reached as Item 1.2 required, the unit runs well. It can be used safely.

减速机运行半年后，检查减速机与主电机、减速机与磨机中心线的同轴度等（减速机与磨机中心线的同轴度按磨机说明书要求检查）。

After the running for half a year of the unit, check the coaxiality of the center line for the unit and the main motor between the unit and the mill(Check the coaxiality of the center line for the unit and the mill according to the mill manual).

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，同时将冷却器、过滤器中的杂质等清除彻底，以利于新油的工作寿命；必须换入同一牌号的润滑油，不能混用不同牌号的润滑油。

Check the quality of oil and replace when deteriorated. When changing the oil, the residual oil inside the reducer and in the oil tank at the gas station must be completely drained. At the same time, impurities in the cooler and filter should be thoroughly removed to facilitate the working life of the new oil. Don't admixture different brand lubricant.

检查控制系统的准确可靠性。


Check control systems in good condition.

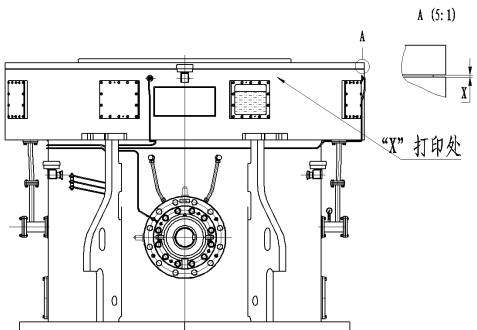
5.3.3.4 定期检查及维护（详见表 7） Regular check and maintenance (see table 7)

表 7 定期检查及维护

Table 7 Regular check and maintenance

检查部位 Check location	检查项目及内容 Check content	备注 Remark
基础 Foundation	基础沉降，电机与减速机中心线对中 Foundation settlement and alignment of central line of motor and gear unit	每年检查一次 Check every year

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减速机 内部 Gear unit inside	齿轮表面损伤及接触印痕 Tooth face damage or contact impression	每月检查一次 Check every month
	内部各零件联接螺栓是否松动 Check whether the connecting bolt of each internal part are loose.	每月检查一次 Check every month
	测量输出法兰与减速机壳体迷宫的距离 X，见附图，圆周 4 点均布测量取平均值，并与初始值（标记为 X）进行比较。 Measure the distance X between the output flange and the labyrinth of the unit housing, as shown in the attached figure. Measure the average value at 4 points on the circumference and compare it with the initial value (marked as X) .	每月检查一次 Check every month
		
	有否其它异常现象 Any other abnormal condition	每月检查一次 Check every month
	静压推力轴承铂热电阻连接情况 The connection condition of the platinum resistance thermometer of the hydrostatic thrust bearing	每月检查一次 Check every month
	上箱体底部有无异物 Check if there are any foreign objects at the bottom of the upper box	每月检查一次 Check every month
减速机 外部 Gear unit outside	箱体本体损坏的一般性目测检查 General visual inspection of damage to the box body	每周检查一次 Check every week
	各联轴器同轴度误差及轴向间隙 Error of each coupling co-axial level and axial clearance	每半年检查一次 Check every half year
	地脚螺栓有否松动 Anchor bolt is loose?	每月检查一次 Check every month
	检查各密封面、管路和透气帽是否漏油 Check whether there is any oil leakage from each sealing surface, pipeline and vent cap.	每月检查一次 Check every month

	多路温度巡检仪 Multiplex temperature sensor	按说明书要求校验 Calibrated as per instruction
	上箱体截止阀是否关闭（若有）Is the stop valve on the upper box closed (if so)?	每月检查一次 Check every month
	有否其它异常的噪音、温度 Are there any other abnormal noises or temperatures	每月检查一次 Check every month
	检查进油、回油管路及管路中的阀类等是否存在漏油现象 Check whether there is any oil leakage in the oil inlet and return pipelines as well as the valves and other components within the pipelines	每月检查一次 Check every month
配套件	联轴器、链轮及其它配套件（如提供）（每半年检查一次） Couplings, sprockets and other accessories (if provided) (Check every half year)	按说明书 要求校验 Calibrated as per instruction
稀油润滑装置 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	
	磁过滤器、双联过滤器、阀门（每月检查一次） Magnetic filter, duplex filter, valve (Check every month)	
	控制柜、仪表盘上仪表及电器元件 Control cabinet, instruments on the panel and electronics	
	检查减速机（存油形式）或稀油润滑装置的油箱油位（每周检查一次） Check the oil level in the oil tank of the reducer (oil storage form) or the thin oil lubrication device (Check every week)	

5.3.3.5 特别注意事项及建议 Special precautions and proposals


减速机检查后，应对拆过的零件重新密封处理，防止渗漏油。

After the reducer is inspected, the disassembled parts should be resealed to prevent oil leakage.

每次测量的“X”值需要与上次数据作比较，如有较大变化应及时查清楚原因，与重齿售后服务中心联系。

Each measured "X" value needs to be compared with the previous data. If there is a significant change, the cause should be identified promptly and contact the after-sales service center of CQG.

每半个月用黄油枪通过注脂孔将多用途润滑脂均匀压入迷宫（输入端）的缝隙中，直到润滑脂从迷宫溢出即可。（若有，见图 15）

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Every two weeks, use a grease gun to evenly press the multi-purpose grease into the gaps of the maze (input end) through the grease injection hole until the grease overflows from the maze. (If any, Fig 15)

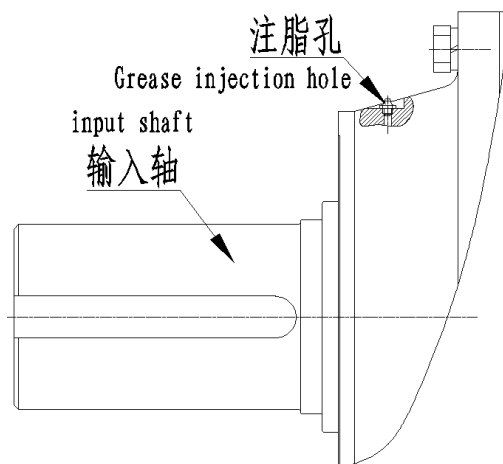


图 15 Fig.15

每月检查空气过滤器时，如发现堵塞现象，应及时清洗；如有严重损坏，则应立即更换。请使用专门的清洗剂进行清洗，并佩戴护目镜。重新使用前，必须将其烘干。

When inspecting the air filter every month, if any blockage is found, it should be cleaned in time. If there is severe damage, it should be replaced immediately. Please clean with a special cleaning agent and wear goggles. It must be dried before reuse.

减速机运转时要特别注意安全，裸露运转部件（如联轴器等）应加防护罩。


Special care is taken on machine running. Bare rotating parts(such as coupling, etc.) must be equipped with guard.

减速机运行一年后，应重新对减速机与主电机、减速机与磨机中心线的同轴度进行复查如有超差，应查明原因（如基础下沉），并按 1.3.3 和 2 的规定重新调整。

After the gear unit is working for a year, it is required to recheck co-axial alignment for roller mill and gear unit central line and for motor and gear unit central line. Find out the reason why the limit is exceeded (such as foundation settlement). Carry out alignment as per Item 1.3.3 and 2 once again.

减速机首次使用的润滑油应半年进行更换，或首次运行 2000 小时进行更换，以先到为准。以后换油期为 7000-10000h（根据油品分析检验结果定）。

The lubricating oil used for the reducer for the first time should be replaced every six months, or after

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the first 2,000 hours of operation, whichever comes first. The subsequent oil change period is 7,000 to 10,000 hours (according to oil analysis result).

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

When the main motor trips on emergency, you are not allowed to restart up the motor until the trip reason is spotted and eliminated.

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 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“附表二”，如选用不在附录表中的油品需征得卖方同意。

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 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.

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。

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


所有电气仪表自出厂之日起,应每年检定一次。

All electrical instruments shall be calibrated once a year since the date of leave factory.

减速机与油站高压油流分配器相联的高压软管及减速机本体上（内部及外部）的高压软管使用年限为 **五年**，请用户及时准备备件，并及时更换高压软管（达到使用年限后必须进行更换，否则将影响减速机的整体使用寿命）。

The service life is **five years** for high pressure hoses connecting unit and high pressure oil distributor of oil station and hoses on the body of unit (both internal and external). Thus, please make sure the spare parts always available for replacement (The hoses must be replaced when reaching the service life limit. Otherwise, the whole unit life will be affected.).

减速机在运行过程中，**一般每 200 小时清洗一次油站过滤器**，在清洗时应注意过滤器上的杂质来源与类别；如果过滤器压差变送器报警，应立即切换并清洗过滤器。对润滑油的化验必须是有资质的检查机构。润滑油品必须符合不低于 GB5903 工业闭式齿轮油标准中的 L-CKD320 重负荷工业齿轮油的性能要求，换油指标必须按《工业闭式齿轮油换油指标 NB/SH/T 0586》中要求执行。

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During the operation of the reducer, the oil station filter is generally cleaned once every 200 hours. When cleaning, attention should be paid to the source and type of impurities on the filter. If the differential pressure transmitter of the filter alarms, the filter should be switched immediately and cleaned. The testing of lubricating oil must be conducted by qualified inspection institutions. The lubricating oil must meet the performance requirements of no less than L-CKD320 heavy-duty industrial gear oil in the GB5903 Industrial Closed Gear oil standard. The oil change index must be carried out in accordance with the requirements of 《Industrial Closed Gear Oil Oil Change Index NB/SH/T 0586》.

X 光线检测出的各项元素含量值须符合油品出厂时的规定；金属含量反映了齿面及轴承的磨损情况，对前后两期检验结果进行比较，如某种或几种金属含量变化明显且较大，请咨询相关人员，并查找原因。

The content values of each element detected by X-ray must comply with the regulations at the time of the oil product leaving the factory. The metal content reflects the wear condition of the tooth surface and the bearing. By comparing the inspection results of the previous and subsequent periods, if the content of one or several metals changes significantly and greatly, please consult the relevant personnel and find out the cause.

为了得到真实可靠的结果，将使用过的润滑油送至检验机构的同时，建议提供一份未使用过的同品牌同型号的润滑油品作为参考的样本。样本必须采用一个清洁、便于运输、密封的容器存储。

To obtain accurate and reliable test results, when sending used lubricating oil to the testing laboratory, it is recommended to provide an unused sample of the same brand and model as a reference. The sample must be stored in a clean, transport-friendly, and sealed container.

如需提供清洗减速机服务，请与重齿售后服务中心联系，必须由专业人员指导完成相关工作。

If gearbox cleaning service is required, please contact the CQG After-sales Service Center. The relevant work must be carried out under the guidance of professional personnel.




注意 Attention!

如果润滑油的化验指标超标，必须立即更换润滑油，否则重齿将不承担此台减速机的相关责任。

If the test results of the lubricating oil exceed the specified standards, the lubricating oil must be replaced immediately. Otherwise, CQG will not assume any responsibility for this reducer.

更换润滑油时，如果现场温度较低，需要对润滑油预先加热，并在润滑油降温前及时完成。在此过程中，要特别注意防止被流出的热油烫伤，需要佩戴专用手套进行操作。

When changing lubricating oil, if the on-site temperature is low, the lubricating oil needs to be

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preheated and the replacement should be completed promptly before the oil cools down. During this process, special attention must be paid to prevent burns from the hot oil. Special gloves should be worn when operating.

旧润滑油的排放及处理要符合当地环保部门的相关要求。

The discharge and treatment of used lubricating oil must comply with relevant requirements of local environmental protection authorities.

减速机首次使用的润滑油应半年进行更换，或首次运行 2000 小时进行更换，以先到为准。以后换油期为 7000-10000h（根据油品分析检验结果定）。

The lubricating oil used for the first time in the reducer should be replaced after half a year, or after the first 2000 hours of operation, whichever comes first. The subsequent oil change period is 7000-10000 hours (determined based on oil analysis and inspection results).

第一次化验一般为减速机使用后 400 小时，之后至少每季度须对润滑油进行油品检测化验。

The first oil analysis should generally be conducted after 400 hours of reducer operation, and thereafter, oil quality testing and analysis should be performed at least quarterly.

5.3.3.6 运行保养 Maintenance during operation

1 级保养


当减速机首次投入运行后：

- (1) 减速机首次使用的润滑油应半年进行更换，或首次运行 2000 小时进行更换，以先到为准（根据油品分析检验结果定）。以后换油期为 7000-10000h（根据油品分析检验结果定）。每次换油需要清洗过滤器，必要时更换过滤器。
- (2) 第一次化验一般为减速机使用后 400 小时，之后至少每季度须对润滑油进行油品检测化验。换油指标必须按 SH/T0586 中要求执行。
- (3) 重齿为用户提供免费的远程咨询和服务。用户应向重齿售后服务部门提供运行振动、温度等参数，运行照片和视频，以便重齿售后服务人员及早识别故障隐患。
- (4) 减速机投入运行后第三年，重齿提供一次免费现场巡检和服务。巡检内容包括漏油情况、各齿轮的啮合、减速机的振动噪声和温度检查和记录。

First-class maintenance

After the gear unit is put into operation for the first time:

- (1) The lubricating oil used for the first time in the reducer should be replaced after half a year, or after the first 2000 hours of operation, whichever comes first (determined by oil analysis and

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inspection results). The subsequent oil change period is 7000-10000 hours (determined by oil analysis and inspection results). The filter should be cleaned each time the oil is changed, and the filter should be replaced if necessary.

- (2) The first oil analysis should be conducted generally after 400 hours of operation of the gear reducer, and thereafter, oil quality testing and analysis should be performed at least quarterly. The oil change indicators must comply with the requirements specified in SH/T0586.
- (3) CQG provides free remote consultation and service to users. Users should provide operational parameters such as vibration and temperature, as well as operation photos and videos to CQG after-sales service department, so that after-sales service personnel can identify potential faults early.
- (4) CQG will provide a patrol inspection and service on the site in the third year, free of charge, after the gear unit is put into operation. The patrol inspection involves in leakage, mesh between gears, as well as the data of vibration, noise and temperature.

2 级保养


当减速机运行三年后:

- (1) 换油期为 7000-10000h (根据油品分析检验结果定)。每次换油需要清洗过滤器, 必要时应更换过滤器。
- (2) 至少每季度须对润滑油进行油品检测化验。换油指标必须按 SH/T0586 中要求执行。
- (3) 重齿为用户提供免费的远程咨询和服务。用户应向重齿售后服务部门提供运行振动、温度等参数, 运行照片和视频, 以便重齿售后服务人员及早识别故障隐患。
- (4) 重齿原则上于第五年提供一次免费的现场巡检和服务。巡检内容包括漏油情况、各齿轮的啮合、减速机的振动噪声和温度检查和记录。

Second-class maintenance

After the gear unit is put into operation for three years:

- (1) The oil change period is 7000-10000 hours (determined by oil analysis and inspection results). Clean the filter during each oil change, and replace the filter if necessary.
- (2) Oil quality testing and analysis of lubricating oil must be conducted at least quarterly. The oil change indicators must comply with the requirements specified in SH/T0586.
- (3) CQG will provide remote diagnosis and service for the user, free of charge; therefore, the user shall supply data of vibration, temperature, etc., and relevant photos and videos, during operation, to facilitate CQG after-sales Department identifying the hidden trouble as early as possible.

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- (4) CQG will provide, in principle, a patrol inspection and service on the site in the fifth year, free of charge, after the gear unit is put into operation. The patrol inspection involves in leakage, mesh between gears, as well as the data of vibration, noise and temperature.

3 级保养


当减速机投入运行五年后:

- (1) 换油期为 7000-10000h (根据油品分析检验结果定)。每次换油需要清洗过滤器, 必要时应更换过滤器。
- (2) 至少每季度须对润滑油进行油品检测化验。换油指标必须按 SH/T0586 中要求执行。
- (3) 减速机原则上应更换全套滚动轴承 (用户自备)。
- (4) 减速机应更换全套减速机与油站高压油流分配器相联的高压软管及减速机本体上 (内部及外部) 的高压软管 (用户自备)。
- (5) 重齿为用户提供免费的远程咨询和服务。用户应向重齿售后服务部门提供运行振动、温度等参数, 运行照片和视频, 以便重齿售后服务人员及早识别故障隐患。
- (6) 重齿原则上于第七年提供一次现场巡检和服务。巡检内容包括漏油情况、各齿轮的啮合和磨损等, 特别是三件套的磨损情况, 必要时更换 (用户自备)。收费标准按合同要求。

Third-class maintenance

After the gear unit is put into operation for five years:

- (1) The oil change period is 7000-10000 hours (determined by oil analysis and inspection results). Clean the filter during each oil change, and replace the filter if necessary.
- (2) Oil quality testing and analysis of lubricating oil must be conducted at least quarterly. The oil change indicators must be followed according to the requirements in SH/T0586.
- (3) All of bearings in the gear unit shall be replaced with the spare ones prepared by the user in advanced, in principle.
- (4) All of the high-pressure hose between the gear unit and the high-pressure oil flow distributor on the oil supply unit, as well as those on the gear unit (inside and outside) shall be replaced by the spare ones prepared by the user in advance.
- (5) CQG will provide remote diagnosis and service for the user, free of charge; therefore, the user shall supply data of vibration, temperature, etc., and relevant photos and videos, during operation, to facilitate CQG Aftersales Department identifying the hidden trouble as early as possible.
- (6) CQG will provide, in principle, a patrol inspection and service on the site in the seventh year, after the gear unit is put into operation. The patrol inspection involves in leakage, mesh between

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gears, as well as the data of vibration, noise and temperature, especially the state of sun gear, inner gear sleeve and intermediate shaft, which shall be replaced with the spare ones prepared by the user in advance, if necessary. The charge is specified in the contract or agreement.

4 级保养

当减速机投入运行十年后, 除重复 3 级保养中的全部内容外, 还应根据运行情况更换各级齿轮或齿轴。

Fourth-class maintenance

After the gear unit is put into operation for ten years, in addition to the items specified in third-class maintenance, the user shall replace the gears or pinion shaft according to the actual state.

6 储存和保养 Storage and preservation

6.1 轴承 Bearing

由于运输和存储造成的物质损坏!

Material damage due to transport and storage!

如果未遵守包装单元上的标签/信息以及运输单据/本文件的信息, 减速机系统的部件/组件组可能会发生物质损坏。必须遵守包装单元上的标记/信息和运输单据/本文件的信息。

If the labels/information on the packaging unit and the shipping documents/this documentation are not observed, material damage to the parts/component groups of the gear unit system may be incurred. The marking/information on the packaging units and in the shipping documents/this documentation must be observed.

在 CQC 的包装单元中存放减速机系统时, 请根据包装等级遵守关于存储期限和存储地点的规定。

When storing the gear unit system in the packaging units of CQC, observe the specifications for duration of storage and storage place according to the packaging level.

如果减速机系统需要在室外存放或包装等级到期后存放, 则必须执行保养程序(参见“保养”部分)。

If the gear unit system is to be stored outside or after expiration of the packaging level, it is necessary to carry out a preservation routine (cf. section "Preservation").


6.2 保养 Preservation

在存储时, 必须确保减速机系统得到持续的保养。

In case of storage, continuous preservation of the gear unit system must be ensured.

保养类型的定义:

Definition of preservation types:

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Preservation type 保养类型	Execution 执行	Corrosion protection 防腐
Long-term preservation VCI长期保养VCI	Inside preservation内部保养	12 months 12月
	External preservation外部保养	12 months 12月
Long-term preservation RK5 长期保养RK5	Inside preservation内部保养	Up to 5 years 不超过5年
	External preservation外部保养	12 months 12月

表9 Table 9

只有当 CQG，服务人员执行了长期保养后，才能承担保养持久性的保修责任。

Warranty for the durability of preservation can only be assumed if long- term preservation was carried out by CQG, service personnel.

6.2.1 安全信息 Information on safety

在减速机系统上工作时可能存在的风险！

Possible risks when working on/with the gear unit system!

如果在减速机系统上工作时忽视“基本安全信息”章节中的安全信息和约定的事故预防规定，将会对相关人员的生命和健康造成直接危险。

Ignoring of safety information in the chapter "Basic safety information" and of the agreed accident prevention regulations when working on and with the gear unit system will result in imminent danger for life and health of the persons concerned.

在减速机系统上工作之前和过程中，请务必阅读并遵守“基本安全信息”章节中的安全信息和约定的事故预防规定。


Read and observe the safety information in the chapter "Basic safety information" and the agreed accident prevention regulations before and while working on and with the gear unit system.

处理危险物质时的危险！

处理润滑油、防腐剂及操作用品时，会对相关人员的生命和健康造成危险（例如：窒息危险、四肢酸烧伤）。

必须遵守以下指示：

- 遵守所用产品安全数据表中的所有安全信息和指示。

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- 穿戴个人防护装备，例如：防护服、防护手套和贴合紧密的防护眼镜。
- 确保通风充足，不要吸入烟雾。如果无法确保充足通风，请佩戴呼吸防护装备。
- 确保没有火源。

Danger when handling hazardous substances!

When handling lubrication oils, preservatives and operating supplies danger for life and health of the persons concerned arises(e.g. suffocating hazard, acid burns on limbs).

The following instructions must be observed:

- Observe all the safety information and instructions in the safety data sheets of the products used.
- Wear your personal protective equipment, e.g. protective clothing, protective gloves, and tight-fitting protective goggles.
- Ensure sufficient ventilation and do not inhale fumes. If sufficient ventilation is not possible, wear breathing protection.
- Ensure that there are no sources of ignition.

6.2.2 长期保养 VCI Long-term preservation VCI

6.2.2.1 推荐保养剂 Recommended preservatives

混合或污染润滑油、保养剂或消耗品会导致物质损坏的风险!

如果混合或污染了不同种类的润滑油、保养剂或消耗品，可能会导致减速机系统的润滑油回路中出现损坏、故障或起泡现象。

- 不同种类的润滑油、保养剂或消耗品的兼容性只能由相应的润滑剂供应商确定。
- 始终使用新的、纯净的润滑油、保养剂或消耗品。
- 避免减速机系统的润滑油回路受到污染。


CQG 对因此导致的损坏、故障、污染的润滑油或起泡的润滑油不承担任何责任或提供保修。

Risk of material damage from mixing or contamination of lubricating oils, preservatives or consumables!

Damage, faults or foam formation may result in the lubricating oil circuit of the gear unit system if differing lubricating oils, preservatives or consumables are mixed or contaminated.

- The compatibility of different types of lubricating oils, preservatives or consumables can only be specified by the respective lubricant supplier.
- Always use new and pure lubricating oils, preservatives or consumables.
- Avoid contamination in the lubricating oil circuit of the gear unit system.

CQG shall not assume liability or provide warranty for damage, faults, contaminated lubricating oil or foaming lubricating oil resulting from this.

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Type	Required quantity / stated consumption 要求用量/指定用量
Type 1	Ca. 5-10 litres for spraying, 喷油, 5-10升
Type 2	30 litres 30升
Type 3	Ca. 5 kg, consumption = 0.06 kg/m ² 约5kg, 消耗量约0.06 kg/m ²
Type 4	ca. 5 kg 约5kg

表10 Table 10

Type 类型	Preservation 保养	Purpose 目的	Recommended preservative 推荐的保养剂
Type 1	Inside preservation 内部保养	Highly fluid, wetting and water-repelling DFW corrosion protection oil (de-watering fluid) for spraying all components of the inside area. 高度流动、润湿且防水的DFW防腐蚀油（脱水剂），用于喷涂内部区域的所有组件。	FUCHS Anticorit DFW 9301
Type 2	Inside preservation 内部保养	Due to the VCI corrosion protection oil (Volatile Corrosion Inhibitor), designated for spraying into the gear unit, a permanent protective atmosphere is created in the closed interior. 由于使用了专为减速机喷涂设计的VCI防腐蚀油（挥发性腐蚀抑制剂），在封闭的内部形成了永久性的保护气氛。	FUCHS Anticorit VCI UNI IP 30 (or NP-20)
Type 3	Outside preservation 外部保养	Corrosion protection of the outside unfinished parts 外部未完工部件的防腐蚀保护	FUCHS Anticorit BW366
Type 4	Outside preservation 外部保养	Protection of the shaft seals 轴封的保护	Multi-purpose grease


表11 Table 11

操作用品的不当使用和处置会造成环境污染！

所有润滑剂、保养剂或操作用品必须收集在合适的容器中，并以环保的方式处置或回收。请始终遵守公司和所在地区有效的废物处理规定。

Environmental pollution caused by improper use and disposal of operating supplies!

All lubricants, preservatives or operating supplies must be collected in a suitable vessel and disposed of in an environmentally responsible way or recycled. Always observe the regulations for waste disposal

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that are valid in the company and in the region.


6.2.2.2 进行长期保养 Long-term preservation

进行长期保养必须满足以下条件：

- 确保减速机已停止运行并已锁定，防止启动。
- 确保已安装在减速机系统上的部件以以下方式固定：
 - 不受机械力影响。
 - 不受振动影响。
- 确保减速机上的连接管道未安装（出厂状态）。
- 确保在运输和存储过程中，减速机系统不会受到个别/持续的冲击或振动。
- 确保在进行保养工作时，减速机系统被设置在封闭、干燥、无霜的建筑物内，并免受自然元素的影响。
- 确保在存储期间，减速机系统在有屋顶或覆盖帆布的保护下，免受自然元素的影响。
- 确保减速机系统不与水直接接触。
- 确保减速机系统以水平且稳定的方式存放。
- 确保所使用的防腐剂与减速机系统中使用的润滑油兼容。为此，请咨询所用润滑油的制造商。
- 必须阅读并理解以下文件：
 - 减速机系统的操作手册。
 - 润滑油、保养剂和消耗品的相关安全数据表。
 - 这些关于长期保养的说明。
- 防腐剂必须由经过培训的专业人员涂敷。
- 按照内部保养操作说明，然后按照外部保养操作说明进行操作。
- 在进行长期保养工作时，请穿戴个人防护装备，如安全护目镜、防护手套、防油安全鞋和安全服。

The following conditions for long-term preservation must be met:

- Ensure that the gear unit has been taken out of operation and is secured against starting up.
- Ensure that components already mounted on the gear unit system are secured in a way that
 - That no mechanical forces affect the gear unit.
 - That no vibrations affect the gear unit.
- Ensure that the connecting pipes on the gear unit are not mounted (delivered condition).
- Ensure that during transport and storage the gear unit system is not subjected to individual / continuous impacts or vibrations.
- Make sure that the gear unit system is set up and stored during preservation work in an enclosed, dry and frost-free building with protection from the elements.
- Make sure that the gear unit system is set up and stored in the storage period protected from the

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- elements under a roof or with a covering tarpaulin.
- Make sure that the gear unit system does not come into direct contact with water.
- Make sure that the gear unit system is stored in a horizontal and stable position.
- Make sure that the corrosion protection agent used is compatible with the lubricating oil used in the gear unit system. To do this, consult the manufacturer of the lubricating oil in use.
- The following documents must have been read and understood:
 - the operating manual for the gear unit system.
 - the relevant safety data sheets for the lubricating oils, preservatives and consumables.
 - these instructions on long-term preservation.
- The preservative agent must be applied by trained specialist staff.
- Follow the instructions for actions for internal preservation and then the instructions for external preservation.
- When carrying out work for long-term preservation, wear your personal protective equipment, such as safety goggles, protective gloves, oil-resistant safety shoes and safety clothing.


内部保养 Inside preservation

处理危险物质时存在危险！

处理润滑油、保养剂和操作用品时，会对相关人员的生命和健康造成危险（例如，窒息危险、四肢酸烧伤）。

必须遵守以下说明：

- 遵守所用产品安全数据表中的所有安全信息和说明。
- 穿戴个人防护装备，例如防护服、防护手套和贴合紧密的防护眼镜。
- 确保通风良好，不要吸入烟雾。如果通风不足，请佩戴呼吸防护装备。
- 确保没有火源。
- 允许减速机内部的所有多余残留油通过截止阀和放油阀流入合适的收集容器中。
- 然后封闭开口，防止进油。
- 按照当地规定处理废油。
- 打开轴承区域的所有“小”观察窗和齿轮箱壳体上的所有“大”观察窗。
- 通过检查孔吸出减速机内部剩余的任何油。
- 通过检查孔用高流动性的防腐蚀油（类型 1）喷涂齿面、齿轮、轴和内壁。
- 所有组件组都必须涂上一层薄膜。
- 在两个相对位置的“小”检查孔中各加入 5 升 VCI 防腐蚀油（类型 2）。
- 总共 10 升 VCI 防腐蚀油（类型 2）。

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- 在减速机油池的两个相对位置的“大”检查孔中各加入 10 升 VCI 防腐蚀油（类型 2）。
- 总共 20 升 VCI 防腐蚀油（类型 2）。
- 关闭并螺栓固定齿轮箱壳体的开放检查孔。安装时，确保密封位置正确且所有螺钉齐备。损坏的密封件必须更换。
- 关闭减速机上所有检查孔和齿轮箱开口，确保其气密和油密。

机壳内部的气密和油密密封可确保防腐蚀油释放出的 VCI 活性剂留在减速机内部的大气中。VCI 活性剂作为防腐剂沉淀在裸露的金属表面上。

Danger when handling hazardous substances!

When handling lubrication oils, preservatives and operating supplies danger for life and health of the persons concerned arises (e.g. suffocating hazard, acid burns on limbs).

The following instructions must be observed:

- Observe all the safety information and instructions in the safety data sheets of the products used.
- Wear your personal protective equipment, e.g. protective clothing, protective gloves, and tight-fitting protective goggles.
- Ensure sufficient ventilation and do not inhale fumes. If sufficient ventilation is not possible, wear breathing protection.
- Ensure that there are no sources of ignition.
- Allow any excess residual oil inside the gear unit to drain through the Cut-off valve and Oil release valve into a suitable collection vessel.
- Then close the openings again oil-tight.
- Dispose of the oil according to the local regulations.
- Dispose of the oil according to the local regulations.
- Suction out any oil remaining inside the gear unit.
- Spray the tooth flanks, the gearwheels, the shafts and the interior walls with highly fluid, corrosion protection oil (type 1) through the inspection holes.
- All component groups must be coated with a thin film.
- Fill 5 litres of VCI corrosion protection oil (type 2) into each of the two oppositely positioned "small" inspection holes at the axial bearing area.
- 10 litre total volume of VCI corrosion protection oil (type 2).
- Fill 10 litres of VCI corrosion protection oil (type 2) into each of the two oppositely positioned "large" inspection holes on the gear unit sump.
- 20 litre total volume of VCI corrosion protection oil (type 2).
- Close and bolt the open inspection holes on the gear unit housing. When installing, ensure that the position of the seal is correct and that all screws are available. Damaged seals must be

replaced.

- Close all inspection holes and gear unit openings on the gear unit air- and oil-tight.

Air and oil-tight sealing of the inside of the casing ensures that the outgassed VCI active agents of the corrosion protection oil remain in the atmosphere inside the gear unit. The VCI active agents precipitate as an anti-corrosion agent onto the blank metal surfaces.

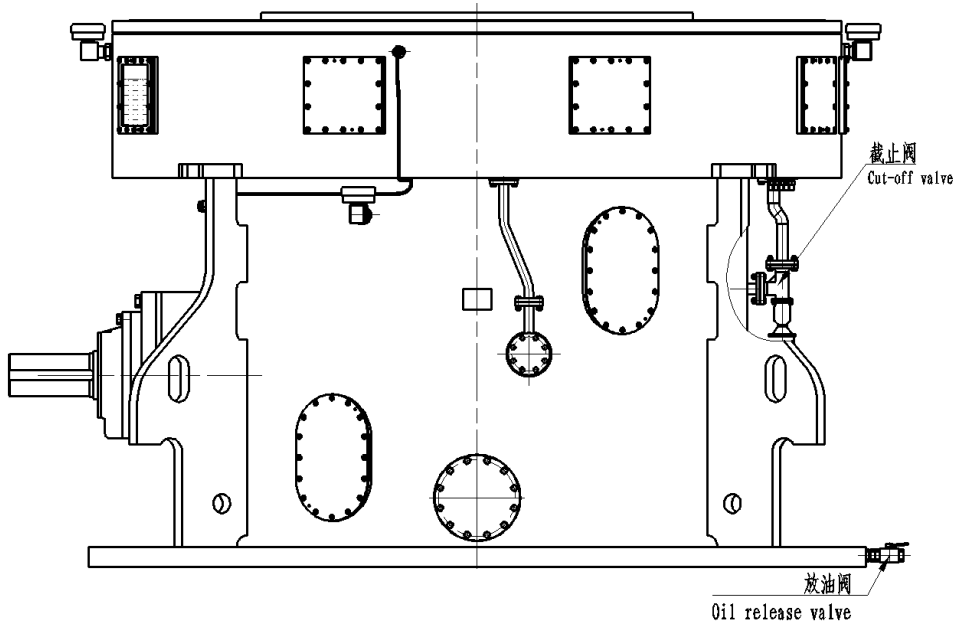


图 16 Fig. 16

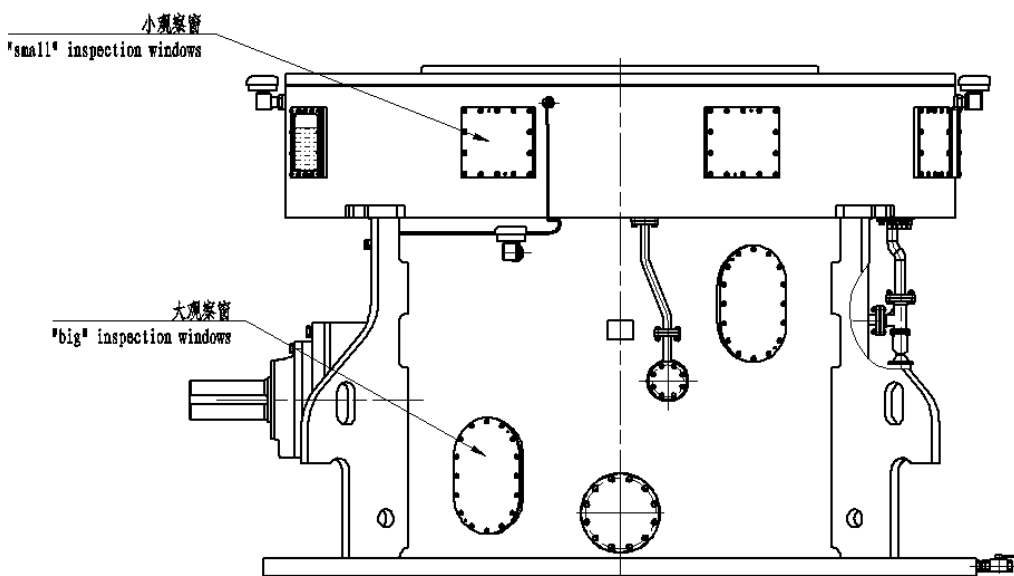



图 17 Fig. 17

外部保养 External preservation

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减速机或成品部件上因清洗溶剂造成的损坏。

用于清洗的清洗溶剂仅可用于外部未完成的部件。清洗溶剂绝不能进入减速机或接触成品部件。


- 使用清洗溶剂清除所有外部裸露部件（例如轴）上的污垢和油脂。
- 用刷子在所有外部裸露部件上涂抹防腐蚀蜡（类型 3），使它们被覆盖（推力环、联轴器轴等）。
- 让蜡层干燥 2 至 5 小时。
- 干燥时间过后，检查所有裸露部件上的蜡层是否完全覆盖且涂层厚度正确。
- 用油纸覆盖所有涂有蜡的表面。
- 用黄油枪将多用途润滑脂（类型 4）均匀压入迷宫（输出端）的清洁干燥缝隙中。
- 用黄油枪通过注脂孔或缝隙将多用途润滑脂（类型 4）均匀压入迷宫（输入端）的清洁干燥缝隙中。
- 用箔纸或包装胶布覆盖迷宫（输入端和输出端）的缝隙。
- 关闭减速机上所有空气过滤器（透气帽），用箔纸或包装胶布覆盖，确保气密和油密。

机壳内部的气密和油密密封可确保防腐蚀油释放出的 VCI 活性剂留在减速机内部的大气中。VCI 活性剂作为防腐剂沉淀在裸露的金属表面上。

Damage due to cleaning solvent in the gear unit or on finished parts.

The cleaning solvent used for cleaning may only be used on the exterior unfinished parts. Cleaning solvent must never enter the gear unit or touch finished parts.

- Use cleaning solvent to remove dirt and grease from all outside bare parts (e.g. shafts).
- Apply corrosion protection wax (type 3) with a brush on all outside bare parts so that they are covered (thrust ring, coupling shafts etc.).
- Allow a drying time of 2 – 5 hours.
- After the drying time check the applied wax layer for full coverage and correct layer thickness on all bare parts.
- Cover all coated surfaces with oil paper.
- Press multi-purpose grease (type 4) all around into the clean and dry gap of the labyrinth (output side) with a grease gun.

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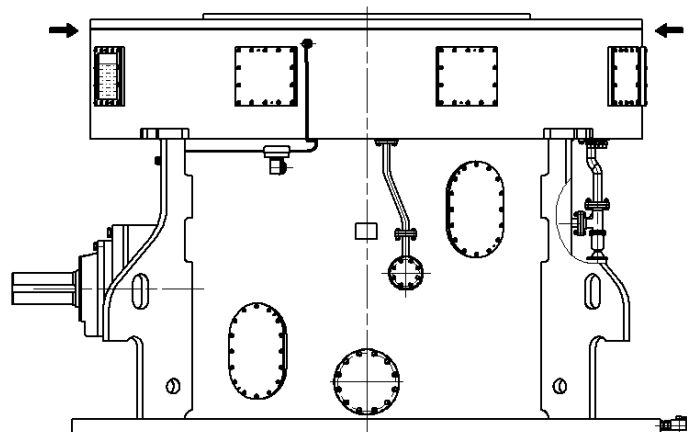


图 18 Fig. 18

- Use a grease gun to evenly press multi-purpose grease (Type 4) into the clean and dry gaps of the labyrinth (input end) through the grease fitting hole or gaps.
- Cover the gaps of the maze (input and output ends) with foil paper or packaging tape.
- Close all air filters (breather caps) on the reducer, cover them with foil or packing tape to ensure air and oil tightness.

Air and oil-tight sealing of the inside of the casing ensures that the outgassed VCI active agents of the corrosion protection oil remain in the atmosphere inside the gear unit. The VCI active agents precipitate as an anti-corrosion agent onto the blank metal surfaces.

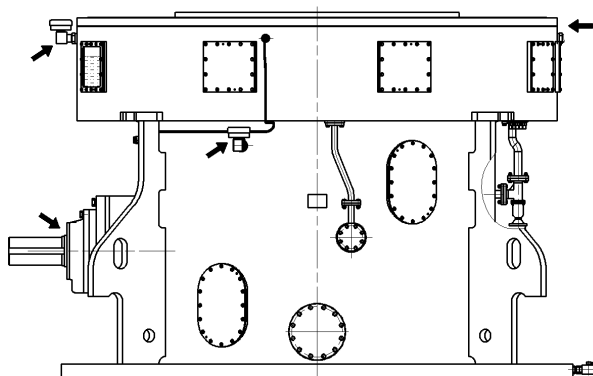



图 19 Fig. 19

如果需要通过包装保护减速机系统免受外部机械损伤，则必须考虑机械要求和现场天气条件：

- 木箱，用于保护轴、推力环和仪表
- 收缩膜
- 油布

If the gear unit system is to be protected from external mechanical damage by means of packaging the mechanical requirements and the weather conditions on site must be considered:

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- Wooden crate for protection of shafts, thrust ring and instrumentation
- Shrink film
- Tarpaulins

6.2.2.3 检查防护情况 Checking preservation

为了检查长期保存情况，必须按照计划执行以下活动，并做好记录：

To check long-term preservation, the following activities must be carried out according to schedule and documented:

防护失效 Loss of the preservation

如果防护的耐久性期限结束，或者机壳上的一个或多个检查孔或开口被打开，则必须重新进行长期防护。

在进行长期防护期间，请勿打开机壳上的检查孔或开口。

If the durability period of preservation ends or if one or several inspection holes or openings in the casing are opened, the long-term preservation must be renewed.

Do not open inspection holes or openings in the casing during long-term preservation.

Place 位置	Activity 活动	Interval 间隔	
	Notes / consumables / references 备注/消耗品/参考资料	Days 天数	OH
Inside 内部防护	Check the gear unit for leaks, in particular at the pipe connection points and inspection holes 检查减速机是否有泄漏，特别是管道连接点和检查孔。	30	--
	Re-establish tightness and dispose of the discharged oil according to local regulations. If the quantity of leaked oil is suspicious in relation to the quantity of the VCI corrosion protection oil (type 2) filled into the gear unit, long-term preservation must be renewed. 重新建立密封性，并根据当地规定处理泄漏的油。如果泄漏的油量与减速机中填充的 VCI 防腐蚀油（类型 2）的量相比可疑，则必须重新进行长期防护。		
Outside 外部防护	Check the applied corrosion protection layer for full coverage and for correct layer thickness on all uncoated surfaces. 检查所有未涂覆表面上的防腐蚀涂层是否完全覆盖且涂层厚度正确。	30	--
	If the corrosion protection layer (type 3) is damaged, outside preservation must be renewed on the unfinished surfaces where necessary. 如果防腐蚀涂层（类型 3）受损，则必须在必要时在未完成的表面上重新进行外部防护。		

Renew preservation 更换防护剂	Carry out visual inspection for possible corrosion damage of the entire gear unit (inside and outside area).	365	---
	Thoroughly remove any corrosion damage. Carry out another long-time preservation VCI according to this documentation. 对整个减速机（内部和外部区域）进行目视检查，看是否有可能的腐蚀损坏。		
	彻底清除任何腐蚀损坏。根据本文件，再次进行长期 VCI 防护。		
	When carrying out the work, observe the relevant safety information and dispose of the preservation material according to the local environmental regulations. 执行工作时，请遵守相关的安全信息，并根据当地环保规定处理防护材料。		

表 12 Table 12

6.2.3 解除防护 De-preservation

处理危险物质时存在危险！

处理润滑油、防护剂和操作用品时，会对相关人员的生命和健康造成危险（例如，窒息危险、四肢上的酸烧伤）。

必须遵守以下说明：

- 遵守所用产品安全数据表中的所有安全信息和说明。
- 穿戴个人防护装备，例如防护服、防护手套和紧身防护眼镜。
- 确保通风充足，不要吸入烟雾。如果无法确保充足通风，请佩戴呼吸防护装备。
- 确保没有火源。

Danger when handling hazardous substances!

When handling lubrication oils, preservatives and operating supplies danger for life and health of the persons concerned arises (e.g. suffocating hazard, acid burns on limbs).


The following instructions must be observed:

- Observe all the safety information and instructions in the safety data sheets of the products used.
- Wear your personal protective equipment, e.g. protective clothing, protective gloves, and tight-fitting protective goggles.
- Ensure sufficient ventilation and do not inhale fumes. If sufficient ventilation is not possible, wear breathing protection.
- Ensure that there are no sources of ignition.

混合或污染润滑油、防护剂或消耗品可能导致设备损坏！

如果将不同的润滑油、防护剂或消耗品混合或污染，减速机系统的润滑油回路可能会出现损坏、故障或产生泡沫。

- 不同种类的润滑油、防护剂或消耗品的兼容性只能由相应的润滑剂供应商指定。

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- 始终使用全新且纯净的润滑油、防护剂或消耗品。
- 避免减速机系统润滑油回路受到污染。

因此产生的损坏、故障、污染的润滑油或产生泡沫的润滑油，CQG 不承担任何责任或提供任何保证。

Risk of material damage from mixing or contamination of lubricating oils, preservatives or consumables!

Damage, faults or foam formation may result in the lubricating oil circuit of the gear unit system if differing lubricating oils, preservatives or consumables are mixed or contaminated.

- The compatibility of different types of lubricating oils, preservatives or consumables can only be specified by the respective lubricant supplier.
- Always use new and pure lubricating oils, preservatives or consumables.
- Avoid contamination in the lubricating oil circuit of the gear unit system.

CQG shall not assume liability or provide warranty for damage, faults, contaminated lubricating oil or foaming lubricating oil resulting from this.

6.2.3.1 包装 Packaging level

减速机

Gear unit


- 允许减速机内部的任何多余残留防腐蚀油通过截止阀和放油阀流入合适的收集容器中。
- 再次紧密关闭截止阀和放油阀。
- 根据当地规定处理这些油。
- Allow any residual corrosion inhibiting oil inside the gear unit to drain through the Cut-off valve and Oil release valve into a suitable collection vessel.
- Close the Cut-off valve and Oil release valve again oil-tight.
- Dispose of the oil according to the local regulations.

在包装阶段，减速机中残留的少量油与“推荐润滑剂”表中的润滑剂相兼容，并在试运行完全被润滑油吸收。

- 使用清洁溶剂去除轴上用于外部防护的防腐蚀剂。

Minor residual quantities of oil remaining in the gear unit from the packing stage are compatible with the lubricants, and is fully absorbed in the lubricating oil during commissioning.

- Remove the corrosion protection agent used for external preservation on the shafts with cleaning solvent.

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油站

Oil supply unit

- 将油站放置在平坦且均匀的表面，以便油站中剩余的油可以收集到油箱的放油阀处。
- 等待至少 60 分钟，让剩余的油收集到放油阀处。
- 允许前油箱中的防腐油通过球阀排入一个合适的收集容器（50-100 升）。
- 从油站上取下盲板法兰，并用吸油器吸出油站后油箱底部的油。
- 按照当地规定处理这些油。
- Place the oil supply unit on a level and even surface so that the remaining oil in the oil supply unit can collect at the tank's draining valve.
- Wait at least 60 minutes for the remaining oil to collect at the draining valve.
- Allow the corrosion inhibiting oil in the front oil tank to drain off through the ball cock into a suitable collection vessel (50-100 litres).
- Remove the blank flange from the oil supply unit and suction the bottom of the back tank of the oil supply unit with an oil vacuum cleaner.
- Dispose of the oil according to the local regulations.

包装阶段减速机中残留的少量油与“推荐润滑剂”表中的润滑剂相兼容，并在试运行完全被润滑油吸收。

- 使用清洁溶剂去除轴上用于外部保护的防腐蚀剂。

Minor residual quantities of oil remaining in the gear unit from the packing stage are compatible with the lubricants from the table "Recommended lubricants" is fully absorbed in the lubricating oil during commissioning.


- Remove the corrosion protection agent used for external preservation on the shafts with cleaning solvent

6.2.3.2 长期保存 VCI Long term preservation VCI

减速机

Gear unit

- 允许减速机内部任何多余残留防腐油通过截止阀和放油阀流入合适的收集容器中。
- 再次紧密关闭截止阀和放油阀。
- 从减速机机壳上拆下盲板法兰。
- 使用吸油设备从减速机集油槽中提取任何多余的残留油。
- 将盲板法兰紧密安装在减速机机壳上。
- 根据当地规定处理这些油。
- Allow any residual corrosion inhibiting oil inside the gear unit to drain through the Cut-off valve

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and Oil release valve into a suitable collection vessel.

- Close the Cut-off valve and Oil release valve again oil-tight.
- Remove the blank flange from the gear unit housing.
- Use an oil suction device to extract any excess residual oil from the gear unit sump.
- Attach the blank flange oil-tight to the gear unit housing.
- Dispose of the oil according to the local regulations.

包装阶段减速机中残留的少量油与“推荐润滑剂”表中的润滑剂相兼容，并在试运行时完全被润滑油吸收。

- 使用清洁溶剂去除轴上用于外部保护的防腐蚀剂。

Minor residual quantities of oil remaining in the gear unit from the packing stage are compatible with the lubricants and is fully absorbed in the lubricating oil during commissioning.

- Remove the corrosion protection agent used for external preservation on the shafts with cleaning solvent.

油站


Oil supply unit

- 将油站放置在平坦且均匀的表面上，以便油站中剩余的油能够聚集在油箱的放油阀处。
- 至少等待 60 分钟，让剩余的油完全聚集在放油阀处。
- 允许前油箱中的防腐蚀油通过球阀排入一个合适的收集容器（50-100 升）。
- 从油站上拆下盲板法兰，并使用吸油器吸出油站后油箱底部的油。
- 根据当地规定处理这些油。
- Place the oil supply unit on a level and even surface so that the remaining oil in the oil supply unit can collect at the tank's draining valve.
- Wait at least 60 minutes for the remaining oil to collect at the draining valve.
- Allow the corrosion inhibiting oil in the front oil tank to drain off through the ball cock into a suitable collection vessel (50-100 litres).
- Remove the blank flange from the oil supply unit and suction the bottom of the back tank of the oil supply unit with an oil vacuum cleaner.
- Dispose of the oil according to the local regulations.

从包装阶段开始，减速机中残留的少量油与“推荐润滑剂”表中的润滑剂兼容，在试运行期间会完全被润滑油吸收。

- 使用清洁溶剂去除轴上用于外部保护的防腐蚀剂。

Minor residual quantities of oil remaining in the gear unit from the packing stage are compatible with

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the lubricants and is fully absorbed in the lubricating oil during commissioning.

- Remove the corrosion protection agent used for external preservation on the shafts with cleaning solvent.

6.2.4 长期保存 RK5 Long-term preservation RK5

对于长期保存 RK5 所需的设备和相关文档，可以选择从 CQG 获取。

The required equipment with documentation for long-term preservation RK5 can be optionally obtained from CQG.

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7 停机 commissioning

停机 10 小时

Shut-down up to 10Hours

减速机系统因腐蚀造成的损坏!

如果减速机系统长时间停机 (>14 天), 可能会发生腐蚀损坏。

如果减速机系统长时间停机, 必须遵守“停机”部分中描述的处理说明。

系统停机时间长达 10 小时时, 必须遵守以下说明:

- 使用整体工厂的停机程序使减速机系统停机。
- 不要关闭供油系统, 以便可以轻松重新启动减速机系统。
- 保持供油系统的温度不低于约 25° C。

Damage on the gear unit system due to corrosion!

In case of longer periods of standstill (> 14 days) corrosion damage may occur on the gear unit system.

In case of longer periods of standstill the instructions for handling described in the section "Decommissioning" must be observed.

The following instructions must be observed when the system is shut down up to 10 hours:

- Bring the gear unit to a standstill using a shut-down routine for the overall plant.
- Do not switch off the oil supply system so that the gear unit system can be started up again easily.
- The oil supply system is kept at a minimum temperature of approx. 25°C.

停机超过 2 周

Shut-down longer than 2 weeks


减速机系统因腐蚀造成的损坏!

如果减速机系统长时间停机 (超过 2 周), 可能会发生腐蚀损坏。

在减速机系统长时间停机的情况下, 必须采取适当的措施防止可能的腐蚀。

当系统停机时间超过 2 周时, 必须遵守以下说明:

- 使用整体工厂的停机程序使减速机系统停机。
- 等待 30 分钟后关闭供油系统。这样, 齿轮和轴承的润滑得以保持, 齿轮箱外壳内不会产生余热。
- 每两周按照以下说明启动减速机系统:
 - ◆ 开启供油系统, 等待直至达到最低温度。
 - ◆ 通过减速机系统泵送润滑油约 3~4 小时。
 - ◆ 这样, 所有润滑点都能获得充足的润滑油。

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- ◆ 在润滑油供给装置运行时，在无负载条件下运行减速机 5~10 分钟。
- ◆ 这样，所有齿轮和滑动表面都能获得充足的润滑油。
- ◆ 使用整体工厂的停机程序再次使减速机系统停机。
- ◆ 等待 30 分钟后关闭供油系统。
- ◆ 这样，齿轮和轴承的润滑得以保持，齿轮箱外壳内不会产生余热。


Damage on the gear unit system due to corrosion!

In case of longer periods of standstill (> 2 weeks) corrosion damage may occur on the gear unit system.

In case of longer periods of standstill suitable measures must be taken to protect against possible corrosion.

The following instructions must be observed when the system is shut down longer than 2 weeks:

- Bring the gear unit to a standstill using a shut-down routine for the overall plant.
- Switch off the oil supply system after a waiting time of 30 minutes.
- This way, lubrication of the gearing and of the bearings is maintained and backup heat does not develop in the gear unit housing.
- Start the gear unit system every 2 weeks in accordance with the following instructions:
 - ◆ Switch on the oil supply system and wait until the minimum temperature has been reached.
 - ◆ Pump the lubricating oil through the gear unit system for approx. 3...4 hours.
 - ◆ This supplies all lubrication points with an adequate amount of lubricating oil.
 - ◆ Run the gear unit under no load conditions for 5...10 minutes while the lubricating oil supply unit is operating.
 - ◆ This wets all gearing and sliding surfaces with an adequate amount of lubricating oil.
 - ◆ Bring the gear unit to a standstill again using a shut-down routine for the overall plant.
 - ◆ Switch off the oil supply system after a waiting time of 30 minutes.
 - ◆ This way, lubrication of the gearing and of the bearings is maintained and backup heat does not develop in the gear unit housing.

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8. 质保声明 Warranty declaration

本公司承诺在产品投入使用后对产品进行免费或有偿收费的维修、更换或退换（视情况而定），以解决由于产品本身质量问题引发的故障。如果用户违反下述要求，或者未严格执行第 5.3.3 节的例行检查，本质保责任中止。

1. 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。
2. 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。
3. 本减速机只能用于规定用途，且只能在其技术状态良好的情况下投入使用。
4. 必须严格遵守本使用说明书中安全信息和操作说明，并按节点计划执行。
5. 在减速机的使用寿命中，应遵守技术参数、规定容量限值及运行物资等要求。
6. 只能由具备资质的人员来正确执行安装、调试、运行、维修和故障排除等活动。
7. 任何故障或报警都必须及时排查和纠正。
8. 必须在磨机整体装置都处于安全状态且符合当地法规时，方可运行减速机。减速机的正确操作应由磨机整体装置经销商负责。
9. 减速机系统在持续运行时，其频率应避开扭转振动固有频率。
10. 实施焊接时，应设立合适的接地线，防止因电流穿过减速机而造成损坏。
11. 启动和运行减速机系统时，所有润滑点必须保证充分润滑。
12. 从减速机开始运行到质保期结束前所有连锁报警跳停数据曲线必须保存。


We hereby establish a commitment to make repair, replacement or return with or without charge, as the case may be, for the gear unit and hereof the components, to remedy the fault caused by the defect in its quality, after the gear unit is put into operation. However, the warranty will be void if the user violates any one of following requirements, or if the user fails to carry out the scheduled maintenance specified in Section 5.3.3.

1. The gear unit and associated components shall not be installed in open area without prior written approval from CQG.
2. Operating environment, interlocking, alarming and protection devices differing from those specified in this manual are not permitted without prior written approval from CQG.
3. The gear unit system must only be used for the purpose to which it is intended and only when it is in perfect technical condition.
4. The safety information and operating instructions in this documentation must be observed and carried out in specified schedule.
5. The requirements of the technical data, of the specified capacity limits and operating supplies shall be observed during all of the gear unit system's life cycles.
6. Activities during installation, commissioning, operation, service and fault clearance shall be

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carried out properly and by personnel qualified to do so.

7. Any fault or alarm must be promptly investigated and corrected.
8. The gear unit system shall be operated in a safe overall plant that complies with the local regulations. The distributing company of the overall plant is responsible for correct operation of the gear unit system.
9. The gear unit system must be operated continuously outside the natural frequency of torsional vibration.
10. A suitable earth shall be established before welding work to prevent damage due to electric current passing through the gear unit.
11. The gear unit system may be switched on or operated only with a sufficient lube oil supply at all points of lubrication.
12. All data curves of interlocked alarms and shutdowns must be saved from the start of reducer operation until the end of the warranty period.

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9. 建议备件清单 List of recommended spare parts

为了减少您的减速机停机时间，一般备件范围建议：

两年期备件：滚动轴承，减速机内部鼓型齿联轴器；

三年期备件：滑动轴承，推力瓦等；

四年期备件：轴、齿轮等主要传动类零件；

易损件：油封、胶绳、垫圈等密封件、测温电阻等电气元件和空气过滤器等。

To minimize downtime of your gear reducer, the recommended spare parts inventory periods are as follows:

Two-year spare parts: Rolling bearings, internal drum gear couplings, etc.

Three-year spare parts: Sliding bearings, thrust pads, etc.

Four-year spare parts: Shafts, gears, and other major transmission components

Wear parts: Oil seals, rubber cords, gaskets, temperature sensors, electrical components, air filters, etc.



注意 Attention!

易损件的使用寿命容易受多方面因素影响，无法享受和减速机同样的质保周期，如发生磨损或提前老化失效应立即更换。


The service life of vulnerable parts is easily affected by various factors, and cannot enjoy the same warranty period as the reducer. If wear or premature aging occurs, they should be replaced immediately.



警告 Attention!

重齿明确提醒：重齿减速机必须且仅允许使用重齿提供或认可的备件，安装或者使用非重齿提供或认可的备件产品会改变减速机的性能，并且会因此造成产品运行可靠性和安全性风险，这种情况下重齿将不再承担此减速机的任何相关责任。

CQG hereby clearly reminds: CQG reducers must and are only allowed to use spare parts provided or approved by CQG. Installing or using spare parts not provided or approved by CQG will alter the performance of the reducer and may cause risks to product operation reliability and safety. In such cases, CQG shall no longer bear any related responsibilities for this reducer.


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附表一 联接螺栓的拧紧力矩 Attached table 1:Tightening torque connected to bolts

螺栓直径 Dia. Of bolts	扭力扳手力矩 Torsion wrench torque	螺栓直径 Dia. Of bolts	扭力扳手力矩 Torsion wrench torque	螺栓直径 Dia. Of bolts	扭力扳手力矩 Torsion wrench torque
D (mm)	Dr (N*m)	D (mm)	Dr (N*m)	D (mm)	Dr (N*m)
M6	7	M30	1004	M80×6	20368
M8	18	M36	1749	M90×6	29492
M10	35	M42	2806	M100×6	41122
M12	61	M48	4236	M110×6	54799
M16	149	M56	6791	M125×6	80284
M20	290	M64	10147	M140×6	113326
M24	500	M72×6	14689	M160×6	171027

注 Notes:

- 表中所列拧紧力矩数值为: 螺栓强度为 8.8 级的拧紧力矩。
The torque values listed in table above refer to that of bolts with a strength grade of 8.8
- 力矩公差±5%。
Tolerance of torque is ±5%.
- 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。
The bolt grade see the bolt head. Bolts without marks in the head are self-made parts and are all of grade 8.8.
- 对于其它等级的螺栓所需拧紧力矩, 按机械设计手册要求计算。
The required tightening torque for bolts of other grades is calculated according to Mechanical Design Manual.
- 所给数值为使用润滑剂的螺栓, 对于无润滑剂的螺栓的拧紧力矩应为表中值的 133%。
The torque values are for using anti-friction material bolts, for non anti-friction material bolts, the torque values are 133% of table's value.

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附表二：推荐润滑油 Attached table 2: Recommended lubricating oil

ISO VG320 40 °C mm²/s viscosity

工业闭式齿轮油符合以下规格：

Industrial Closed Gear Oil meets the following specifications:

GB 5903-2011 (L-CKD)

ISO 12925-1 (L-CKD)

ANSI(US Steel) No.224


AGMA 9005-E02 EP

建议润滑油清洁度为 ISO4406-/15/12 或 NAS1638 6 级。

如果要使用表中未列出的不同润滑剂，请联系 CQG 服务部门。CQG 不对因使用不适合的润滑剂而造成的任何损坏承担责任。

The recommended cleanliness level for lubricating oil should be ISO 4406-/15/12 or NAS 1638 Class 6.

If different lubricants than the ones listed in the table are to be used, please contact the CQG service. CQG does not assume liability for any damage caused by unsuitable lubricants.

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