



金龙机电股份有限公司
JINLONG MACHINERY & ELECTRONICS CO., LTD.

产 品 规 格 书
PRODUCT SPECIFICATION

| | |
|---|--|
| 客户名称/Customer | |
| 客户料号/Part No. | |
| 客户承认签章 Customer Approved Signatures | |

| | | |
|-----------------|---|----------------|
| 品名/Description | 水平线性振动电机 Horizontal linear vibration motor | |
| 型号/Part No. | LV063131(AM9) | |
| 设计/ Designed by | 审核/Verified by | 批准/Approved by |
| Zhuhuang Ge | Leon | Sean |

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Add: JinLong Science and Technology Park, Baiye Road No7,
LiaoBu, DongGuan, GuanZhou , China

1. 适用范围/Application

本说明书适用于线性电机LV063131-AM9

This specification applies to Haptics LV063131-AM9

2. 结构/Configuration

| 序号 NO. | 项目 Item | 内容 Contents |
|-----------|-------------------------|--|
| 2-1 | 外形尺寸 Motor structure | 29mm×6mm×3.11mm (长×宽×高) 29mm×6mm×3.11mm (Length × Width × Height) |
| 2-2 | 重量 Weight | 约 4.45 克 4.45g (Approx.) |

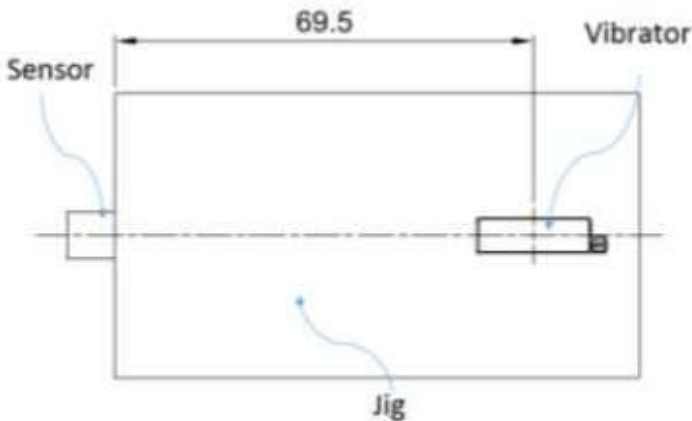
3. 基本规格/Basic Specifications

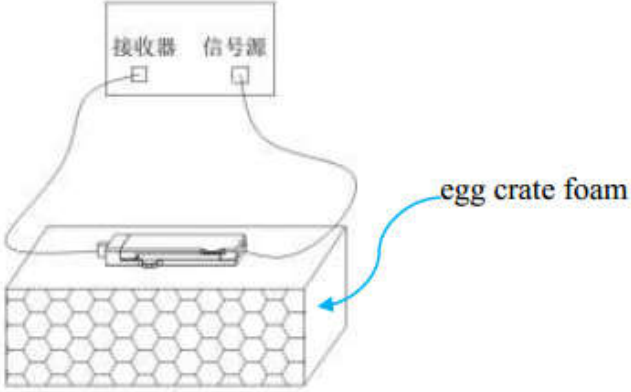
| 序号 NO. | 项目 Item | 规格 Specification | 条件/备注 Condition / Remark |
|-----------|-------------------------------|---------------------------|---|
| 3-1 | 操作驱动 Operation driver | 信号发生器 signal generator | 频率为F0 点共振频率频率震动 @ F0, refer to resonant frequency |
| 3-2 | 额定电压 Rated voltage | 2 Vrms | 正弦波 Sinewave |
| 3-3 | 额定电流 Rated current | 200mA Max | 输入额定电压 2Vrms With rated voltage |
| 3-4 | 内阻 Internal resistances | $16 \pm 1.5 \Omega$ | |
| 3-5 | Insulation resistance 绝缘阻值 | 1 M Ω | 在端子和外壳之间通 100V DC 100V DC between terminal and housing |
| 3-6 | Operating conditions 使用环境 | -10℃~40℃ | 常规湿度, 无水汽凝结 ordinary humidity ,no condensation of moisture |
| 3-7 | Storage conditions 贮存环境 | -20℃~70℃ | 常规湿度, 无水汽凝结 ordinary humidity ,no condensation of moisture |

4. 性能/Performance

| 序号 NO. | 项目 Item | 规格 Specification | 条件/备注 Condition / Remark |
|-----------|----------------------------|--|--|
| 4-1 | 共振频率 Resonant frequency | $169 \pm 10\text{HZ}$ | 参考性能测试条件 Refer to test conditions |
| 4-2 | 振动量 Acceleration | $\geq 1.1\text{Grms @ } 100\text{g Jig}$ | 参考性能测试条件,在F0 点的振动量 Refer to test conditions Acceleration @ F0 |
| 4-3 | 启动时间 Rise Time | 90 ms Max | 振动量从 0 上升至 90%的时间 From 0 to 90% acceleration |
| 4-5 | 停止时间 Fall Time | 90 ms Max | 振动量从 100%下降至 10%的时间 Fall from 100% to 10% acceleration |
| 4-6 | 噪音 Noise | $\leq 50\text{dBA}$ | 距离电机 10cm处测量 10cm from vibrator |

5. Test Conditions/性能测试条件

| 序号 NO. | 项目 Item | 测试条件 Test Conditions |
|-----------|---|--|
| 5-1 | 温度 Temperature | 25±2°C |
| 5-2 | 湿度 Humidity | 65±20% RH |
| 5-3 | 驱动信号 Test Driver | 信号发生器, 以F0 频率驱动 Signal generator frequency @ F0 |
| 5-4 | 驱动电压 Input Voltage Range | 2.2Vrms |
| 5-5 | 测试工装材质及重量 Material & weight of jig | 铝合金 100 克 Aluminum 100g |
| 5-6 | 电机及传感器相对测试 工装的位置 Position of vibrator and sensor in test jig | <p>传感器在测试工装的左侧壁上, 并使其位于测试工装的中心轴线上。 The sensor is on the left wall of the testing jig, also is at the center axis.</p> <p>电机在测试工装中的位置需与传感器在同一轴线上, 电机中心与传感器的距离为 69.5mm。 The location of the motor in test jig should be at the same axis with sensor, and the distance between motor center and sensor is 69.5mm.</p>  |
| 5-7 | 固定方式 Fix method | <p>传感器/Sensor: 通过石蜡粘结 Bonding with paraffin</p> <p>电机/ Motor: 电机通过定位支架固定在工装。 Fixing the motor through the positioning bracket on the jig. 通过电机上方和工装间的泡棉, 压紧电机。泡棉型号为: 3M 467MP Tighten the motor with the foam between motor and jig. (Model of the foam: 3M 467MP)</p> |

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| 5-8 | <p>测试方法 Test method</p> | <p>将测试工装置于鸡蛋棉表面的正中间。信号源输出信号使电机振动，传感器接受振感，并将信号传至接收器 Place the testing jig at the right center of eggs cotton. Signal from the signal source vibrates motor, and sensor receive the vibration and send the signal to receiver.</p>  <p>鸡蛋棉规格为: 20cm×20cm×6.5cm (长度×宽度×高度) Size of the egg crate foam: 20cm×20cm×6.5cm (L×W×H)</p> |
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6. Reliability Test/可靠性试验

每项试验测试 16 只电机，可靠性试验后，所有样品必须符合以下标准：

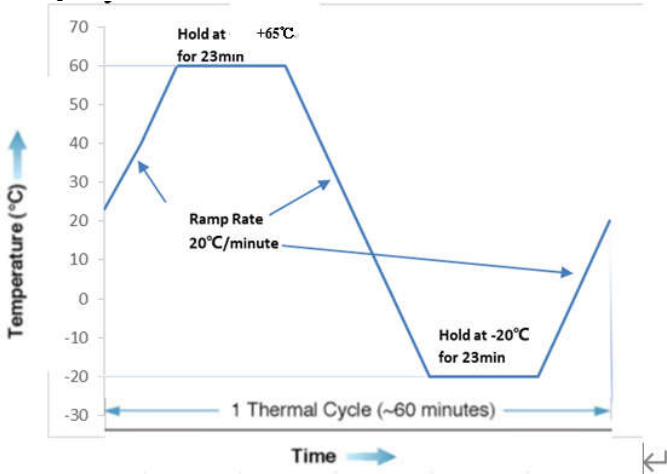
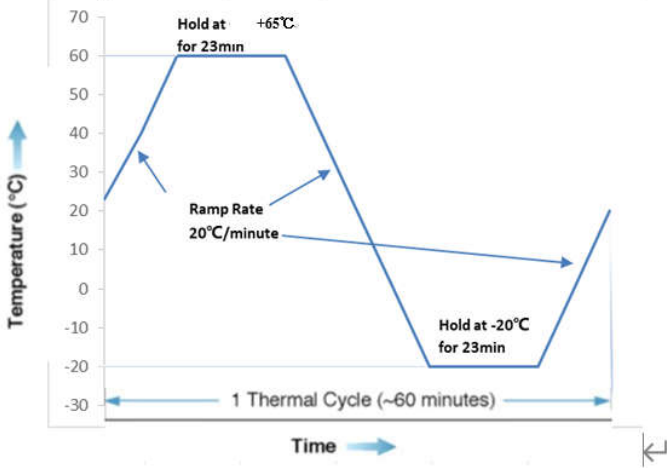
Test 16 pcs for each test. After reliability test, all sample must be meet the requirement as below:

- 频率变化量在原始频率±5%以内/Resonant frequency: within ±5% of original
- 加速度/Acceleration: $\geq 1.1 \text{ Grms}@2\text{Vrms}$
- 噪音/Noise: $\leq 50\text{dBA}$

备注：试验后，需常温下至少放置四小时后测试电机性能。

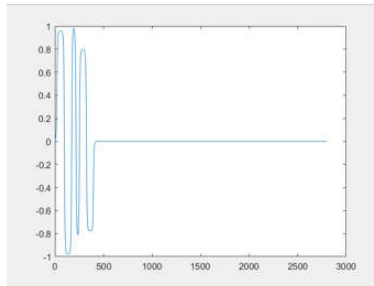
NOTE: Test the function after at least 4 hours exposure in ordinary temperature.

| 序号 NO. | 项目 Item | 测试条件 Test Conditions |
|-----------|-------------------------------------|--|
| 6-1 | 高温存储 Non Operational HTS | <p>要求快速升温到 85℃,20%RH,存储时间 6H.</p> <ul style="list-style-type: none"> • Ramp Rate: fast • Dwell Temperature: 85℃ • Dwell Humidity: 20% RH • Soak Time: 6hrs |
| 6-2 | 高温高湿存储 Non Operational Heat Soak | <p>要求快速升温到 65℃,90%RH,存储时间 500H.</p> <ul style="list-style-type: none"> • Ramp Rate: fast • Dwell Temperature: 65℃ • Dwell Humidity: 90% RH • Soak Time: 504hrs |

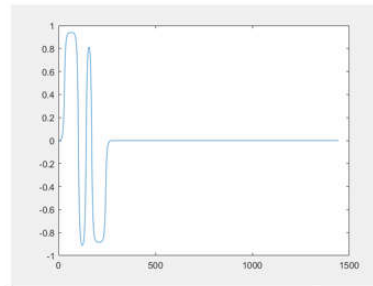
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| 6-3 | 冷热冲击 Non Operational Thermal Cycling | <p>从-20℃65℃，循环 14 次，100 次循环，每次 1 小时 100 Cycles, -20℃ /URC RH to 65℃. Each cycle is 1 hour.</p>  <p>电机在测试过程中不通电。 The motor should be not powered during the test.</p> |
| 6-4 | 温湿度循环 Non Operational Temp Humidity Cycling | <p>从-20℃/环境湿度到 65℃/90%RH，循环 14 次，湿度 90%RH，每次循环 1 个小时。 Cycle 240 times from -20℃/URH to 65°/90%RH. Each cycle is 1 hour.</p>  <p>电机在测试过程中不通电。 The motor should be not powered during the test.</p> |
| 6-5 | 常温寿命 Room Temperature Life | <p>常温环境下，振动时间 144 小时，驱动信号：Signal 2 Room Temperature, Time 144h, Drive Signal: Signal 2</p> |
| 6-6 | 高温高湿存储+1 米 HS + Drop | <p>温度 65℃，湿度 90%RH，72H；1 米跌落，测试点：T0，T72，1m后</p> <ul style="list-style-type: none"> • Non-Op Heat Soak: 65C 90% RH 72hrs • 18 orientation drops with 1m drop height, 1 drop per orientation • Read points: T0, after 72Hrs HS and after Drop |
| 6-7 | 冷热冲击 +1 米 THC + Drop | <p>65C/90%RH, -20C/UNC RH ， 12小时/循环，共6个循环；1米跌落。测试点：T0，Cyc6，1m后6 cycles</p> <ul style="list-style-type: none"> • 1m Drop with 18 orientation drops with 1 drop per orientation • Read points: T0, 6 cycles and after drop |

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|------|---------------------------|--|
| 6-8 | 微跌 Non Operational HSD | 前后左右上下共 6 个方向，3750 次/方向，高度 1.5cm。 测试点：每个方向跌落后测试 •1.5 inch drop on particle board in proper sequence as specified by rounds •Read points: Before test and after each orientation |
| 6-9 | 随机振动 Random Vibration | XYZ 共 3 个方向，400 分钟/方向，此为一个循环，共 3 个循环。测试点：T0, Cyc1, Cyc3 • Orientation: X, Y, Z •Duration: 400 min/axis per cycle •Cycles: 3 •Intervals: 0, 1Cyc, 3Cyc |
| 6-10 | 高温寿命 OP 40°C/90%RH | 温度 40°C，湿度 90%RH，马达振动 168 小时，驱动信号为 Signal 2 • 40C/90%RH Drive Signal: Signal 2, 168hrs. |

Signal 1: Tap 20 cycles, MiniTap 40 cycles (total time per super cycle: 5.3S)



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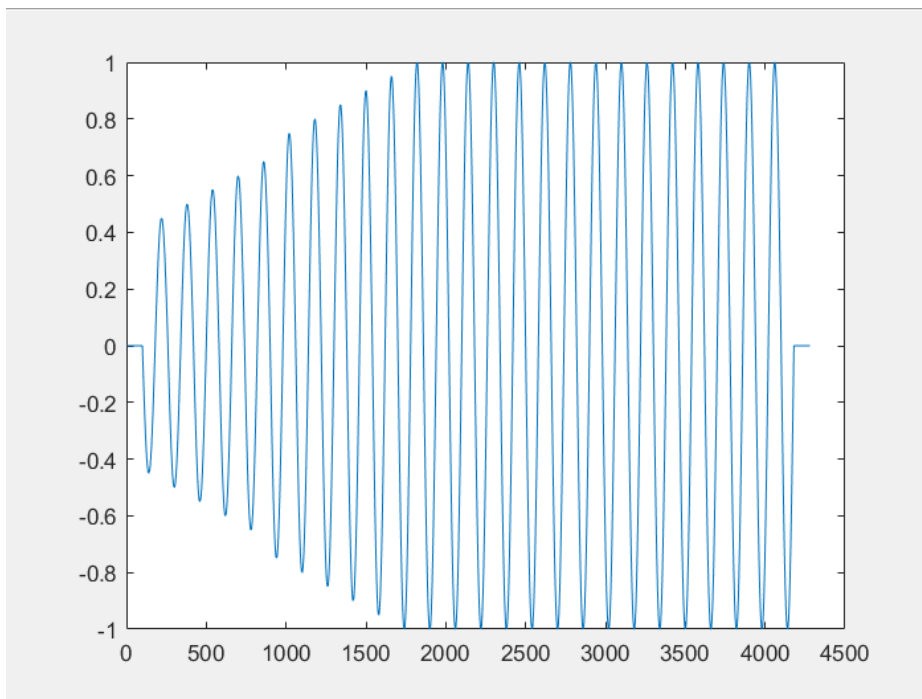


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Tap: 20cycles (Each signal is 0.12s) drive voltage 3.9Vp

Minitap : 40cycles (Each signal is 0.06s) drive voltage 3.12Vp

Signal 2: 0.5S on, 2S off, 驱动频率: F0*95%, 驱动电压: 2.4Vp



NOTE:● **跌落治具/Drop buck:**

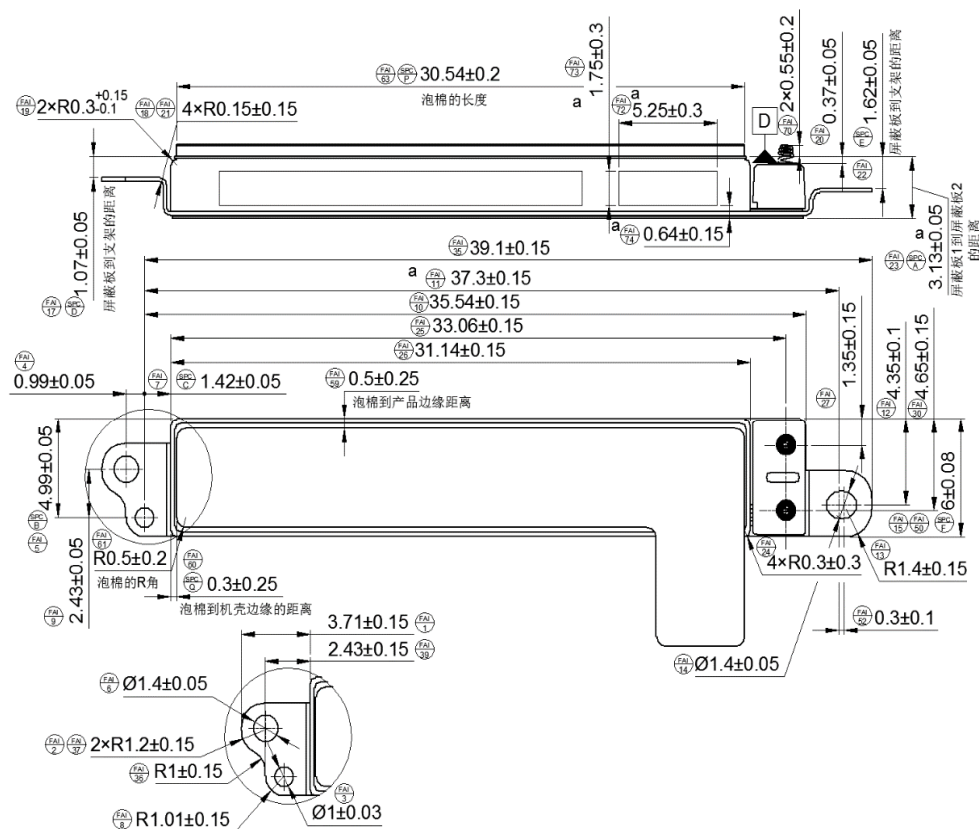
使用 6000 系列铝合金制成跌落治具，总重量为 124 ± 5 g(包括振动电机和装配螺钉)。

Drop buck should be made from 6000 series aluminum with a total mass of 124 ± 5 g including the motor and assembly screws.

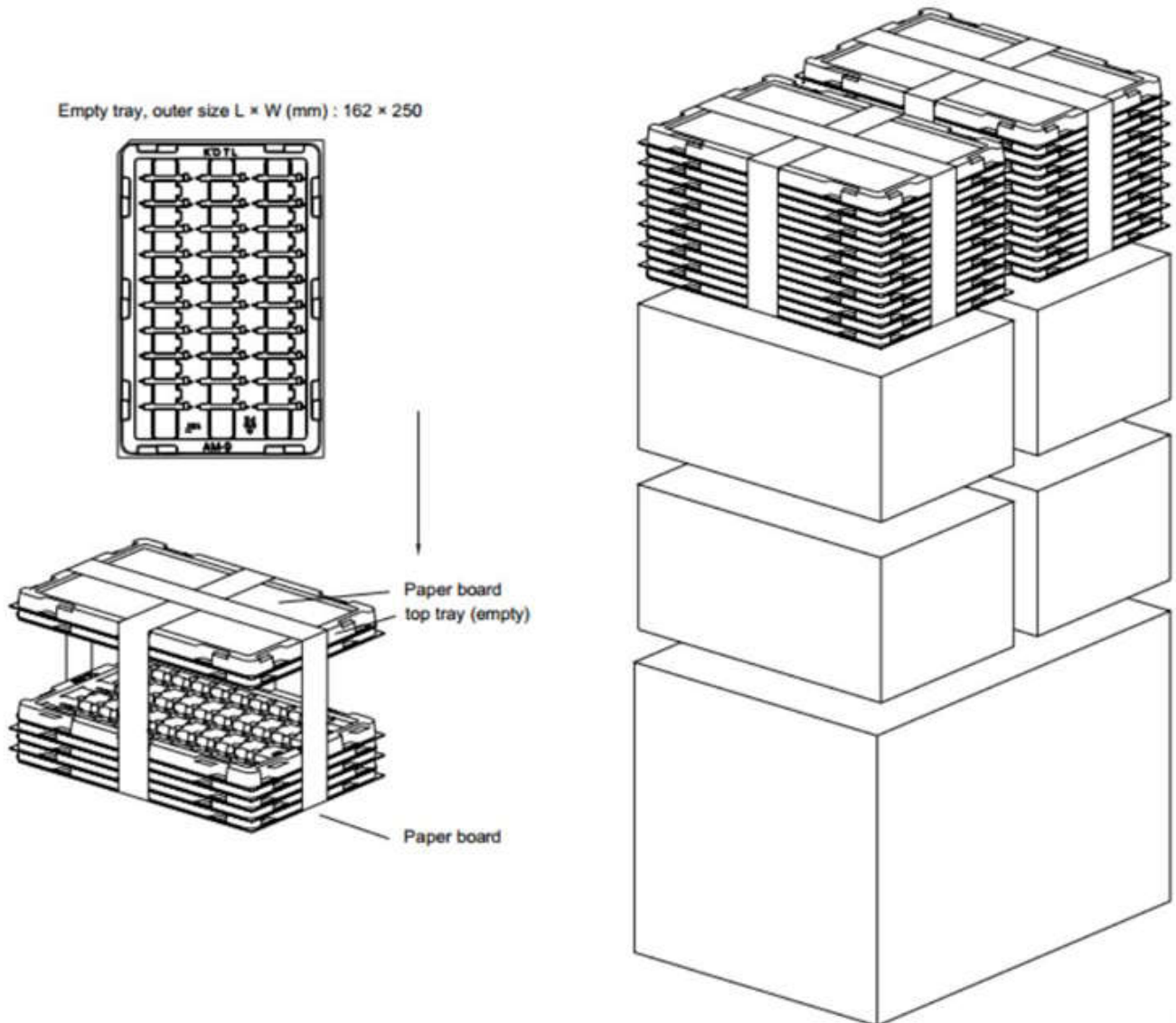
● **测试顺序/Test order :**

- a) 顶面/Top Surface
- b) 左面/Left Surface
- c) 底面/Bottom Surface
- d) 右面/Right Surface
- e) 顶面上盖外壳 45° 落地/
Top Surface 45 degree Angle, Housing landing
- f) 底部/Bottom Face
- g) 右上角: 27 ± 5 度/Upper Right Corner: 27 ± 5 degrees
- h) 左上角: 27 ± 5 度/Upper Left Corner: 27 ± 5 degrees
- i) 左下角: 27 ± 5 度/Lower Left Corner: 27 ± 5 degrees
- j) 右下角: 27 ± 5 度/Lower Right Corner: 27 ± 5 degrees

7. 序列号/Serial Number**8.外观图/Outline Drawing**



9.包装/Packaging



10.注意事项/Cautions

1) 使用容差/Allowable Range for Use

注意电压及电流的使用范围，并且在本标准规定情况下使用电机，否则将相应降低电机的使用寿命和性能。

Pay attention to voltage and current ranges applied, and use the vibration motor according to captioned specifications, or the motor life and performance would be considerably reduced.

2) 移动电机/Move Motor

拿电机时，应轻拿轻放，应尽可能地利用外壳部分

请勿将其跌落或加以超过 0.5 公斤的压力。否则会引起电机的外部形态和电气特性的改变

Please take the motor gently by holding its case as possible.

Do not press the motor with more than 0.5 kgf or drop it. Otherwise, motor characteristics or external appearance could be affected.

电机在运输过程中应小心轻放，避免严重碰撞敲击引起的电机机身和性能受损。

Please lay the motors carefully in transportation to avoid any damage to the motor body or its

characteristic caused by serious collision.

3) 储存/Storage

储存温度/Storage temperature: $-40^{\circ}\text{C}\sim 85^{\circ}\text{C}$

储存湿度/Storage relative humidity: 0%RH~95%RH

避免放置在高温、潮湿的环境中

Avoids storing under high temperature and high humidity

电机应适当的操作、储存和运转环境中均不可存在腐蚀性气体。例如: H_2S 、 SO_2 、 NO_2 、 CL_2 等。另外存储环境中不可有诸如硅、氰、甲醛水和苯酚等能放射出腐蚀性气体的物质, 在电机的机械构造或装置中, 如果存在腐蚀性气体, 那么这会引起电机不运转。

For proper operation, storage and operating environment must not contain corrosive gases such as H_2S , SO_2 , NO_2 , CL_2 , etc. In addition storage environment must not have such emit corrosive gases as silicon, cyanic, formalin and phenol group. In the motor mechanical structure or device, existence of corrosive gases may cause no rotation of motor.

4) 使用电机/Attentions for Using Motor

小心拿取、使用。

Take and use motor carefully.

避免放置在磁性物体附近或接触其表面, 这将影响其功效。

Do not place motor on or near magnetic object or contact the surface, or it will affect the motor performance.

避免电机叠放在一起。

Do not stack up motor.

注意操作环境, 尤其注意若铁粉被磁铁吸附, 将出现噪音问题, 降低使用寿命。

Pay attention to operating environment, especially magnet would absorb iron power and cause noise problem reducing service life.

请勿靠近磁体或有磁场的装置存放或运行电机。

Please do not operate or store the motor near magnet or magnetic devices.

请在 6 个月内使用, 请不要在高温、低温、高湿环境下存储。在使用和打开电机外包装时请避免水气凝结。

Make arrangement to limit the storage period within 6 months or less. Please do not store motor in high and low temperature and high humidity. Condensation of atmosphere must be avoided in using or opening the package of the motor.

5) 危险环境/Hazardous Environments

我司电机在正常环境中的抗腐蚀能力是符合要求的, 但机壳上有少许区域存在的裸露金属对腐蚀比较敏感, 因此未经咨询请不要在腐蚀环境中储存或使用电机。

The anti-corrosion of **KOTL** motors is qualified in normal environments. Otherwise the bare metal on the case is easily being corroded and please do not store or use motors in corrosive environment without consultation with **KOTL**.

6) 其它说明/Others

电机轴向间隙处不应有杂物 (如颗粒、纤维物、头发、胶带、胶水等)

There should be no sundries (such as grain, fiber, hair, adhesive tape, glue etc.) in the shaft end play.

7) 请谨记/Attention

金龙机电股份有限公司拥有一支专业的技术支持团队, 致力于解决我们的电机在新的产品或新的应用中出现的问题, 我们乐意与您建立良好的合作关系, 我们乐意为您解决使用中遇到的各种问题。

KOTL owns a professional technical team committing to solve the problems in new motor products and new application. We are so glad to build good cooperation with you and always be ready to solve any problems you encounter in application.

————— END —————