



产品规格书

PRODUCT SPECIFICATION

客户名称Buyer Name	
客户料号Buyer Part No.	
客户承认签章 Buyers Approval & Signatures	

文件编号Spec No.		版本	A/0
品名描述 Product Description	圆柱直流马达 Cylindrical DC motor		
型号Part No.	VZ7AV2K0760001L		
送样日期Date			
设计Designed by	审核Checked by	批准Approved by	
2023.04.17	2023.04.17	2023.04.17	

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更改记录/ Revision History

版本 Rev. No.	日期 Rev. Date	页码 Page No.	修改项目 Revised Item	更改原因 Reason
A/0	2023.04.17	/	初期规格/Preliminary spec	

1. 结构形式/Construction Form

NO.	项目/Item	规格/Specifications
1-1	电机结构 Motor construction	Φ7 圆柱形无铁芯直流电机 Φ7 cylindrical DC coreless motor
1-2	换向片数 Number of phases	5 组换向片 5-phases
1-3	磁极数 Number of magnet poles	两极 (内置磁极型式) 2-poles (Inner magnet type)
1-4	线圈 Coil construction	空心杯式线圈 Columnar coil
1-5	整流技术 Rectifying method	采用高精度电刷和换向器 Precious brush and commutator

2. 使用条件/Standard operating condition

NO.	项目/Item	规格/Specifications
2-1	额定电压 Rated voltage	DC5.0V
2-2	使用电压范围 Operating voltage range	DC 3.0~5V
2-3	旋转方向 Rotating direction	C.W.
2-4	使用温度范围 Operating temperature range	-40°C~+110°C

3.测试条件/Testing condition

NO.	项目/Item	规格/Specifications
3-1	温度 Temperature	20°C±5
3-2	湿度 Humidity	45% ~85%RH
3-3	电源电压 Supply voltage	直流电源或电池 5.0V DC power supply or battery 5.0V
3-4	电机安放状态 Posture of motor	水平/竖直 Horizontal / Vertical

4.贮存环境/Storage environment

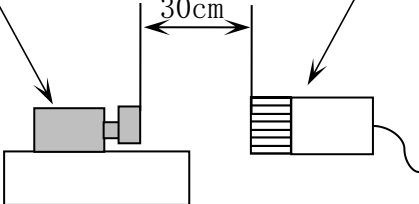
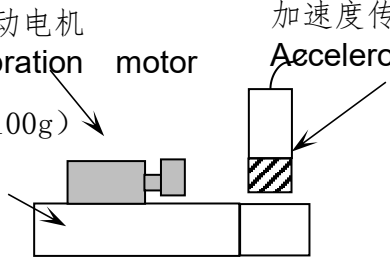
NO.	项目/Item	规格/Specifications
4-1	贮存温度 Storage temp	-40°C~+110°C
4-2	相对湿度 Relative humidity	45%~85% RH

5.电气特性/Electrical characteristic

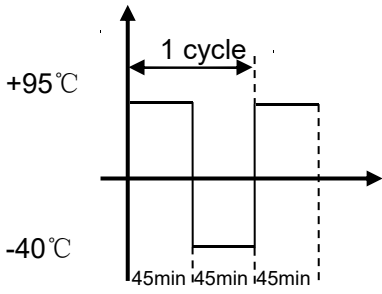
NO.	项目/Item	单位 /Unit	规格/Spec	条件/Condition
5-1	额定转速 Rated speed	rpm	7000±1750	额定电压/Rated voltage: DC 5.0V
5-2	额定电流 Rated current	mA	100Max	额定电压/Rated voltage: DC 5.0V
5-3	启动电流 Starting current	mA	170Max	在额定电压下锁定振动轮，测 电机电流/Measure current at locked counterweight in rated voltage

5-5	端子阻抗 Terminal resistance	Ω	35 (1+20%) Ω	正极和负极之间/ Between positive and negative
5-6	绝缘电阻 Insulation resistance	MΩ	10Min	测量机壳和引线之间,测试电压直流100V。/ Measuring between case and lead wire.Test voltage DC 100V .
5-7	耐电压 Dielectric voltage	mA	1Max	在电机的机壳和引线间施加交流电 110V, 历时 1 分钟。/ Supply with AC 110V between a lead wire and motor case during 1 minute.

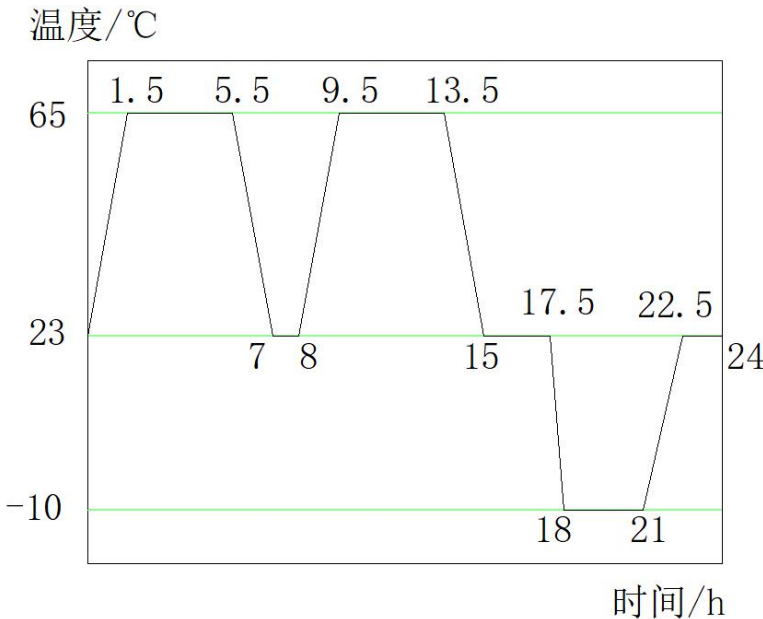
6. 机械特性/Mechanical characteristics

NO	项目/Item	单位/Unit	规格/Spec	条件/Condition
6-1	外观 Appearance	/	无划痕、 锈蚀、污 迹等不良现象 /No scar, rust, stain and dent	目测/Visual
6-2	尺寸 Size	mm	详见外 形 图 /See outline drawing	使用游标卡尺和千分尺测量/ Use vernier caliper and micrometer to measure
6-3	电机重量 Motor Weight	g	4.7±10%	用天平测量/Use scale
6-4	机械噪音 Mechanical Noise	dB	45 Max	振动电机 Vibration motor  拾音器 Microphone 30cm 额定电压/Rated voltage : DC 5.0V 背景噪音/Back ground noise: 28dB Max. 拾音器沿轴向正对电机平面/Microphone faces the plane of motor along the shaft
6-5	振动量 Vibration Strength	Grms Gp	2.5Min 3.5 Min	振动电机 Vibration motor  加速度传感器 Accelerometer 测试夹具 (100g) Test Fixture (100g) 额定电压/Rated voltage : DC 5.0V

7. 环境试验/Environmental test

NO	项目/Item	条件/Condition
7-1	高温贮存试验 High temperature storage test	在 $110\pm 2^{\circ}\text{C}$ 的环境下放置48小时，然后在常温常湿下恢复2小时后测试。/Exposed at $110\pm 2^{\circ}\text{C}$ for 96hours, then return to normal temperature and humidity for 2 hours before test.
7-2	低温贮存试验 Low temperature storage test	在 $-40\pm 2^{\circ}\text{C}$ 的环境下放置48小时，然后在常温常湿下恢复2小时后测试。/Exposed at $-40\pm 2^{\circ}\text{C}$ for 96 hours, then return to normal temperature and humidity for 2 hours before test.
7-4	高低温试验 Heat cycle test	确保电机在下图所示的条件下放置 100 个周期，在室温下恢复 2 小时后，进行测试。/ Assure the motor be placed under below testing conditions for 20 cycles, and then put the motor at normal temperature and humidity for 2 hours until further test. <div style="text-align: center;">  </div>
7-5	振动试验 Vibration test	将电机固定在100g的塑料夹具上，按以下要求进行试验/Fix the motor on a 100g jig (plastic housing),and then make test according to below requirements: 1)振频范围/Vibration frequency range:10-55Hz 2)全振幅/Total amplitude:1.5mm 3)振频变化/Sweep ratio:10~55~10Hz 约2分钟/approximate 2 min 4)振动方向/Direction of vibration:三个垂直方向/Three perpendicular directions 5)持续时间/Duration:每个方向2小时（共6小时）/ 2 hours in each direction (6H in total)

7-6	跌落试验 Drop test	电机放在大约100g（包括电机）重的物体上自由落下到混凝土地板上。/Set the motor on the heavy block about 100g weight（include the motor） and drop the motor onto the concrete floor. 高度/Height: 1.0m 方向/Direction: ±X, ±Y, ±Z 次数/Times: 每一平面下落1次, 共计6次。/Two drops per plane for a total of 12 drops.
7-7	温度变化试验 emperature variation	初始环境20℃转换为低温-40℃, 转换速度2-10℃/min, 达到低温后中保持1.5H, 再由低温转换为高温高湿80℃, 转换速度2-10℃/min, 达到高温高湿后保持2H, 再由高温高湿转换回初始环境, 转换速度2-10℃/min, 此为一个循环, 测试60个循环。温度上升及高温时产品处于工作阶段/The initial environment is changed from 20℃ to -40℃, and the conversion speed is 2-10℃/min. After reaching the low temperature, maintain for 1.5H. Then the low temperature is converted to high temperature and high humidity 80℃, and the conversion speed is 2-10℃/min, after reaching high temperature and high humidity, maintain for 2H,and then convert from high temperature and high humidity back to the initial environment, conversion speed 2-10℃/min, this whole process is a cycle, test 60 cycles. The product is in the working stage when the temperature is rising and high.

<p>7-8</p>	<p>湿热循环 Humid heat cycle</p>	<p>试验应将电机安装在工装上进行。The test shall be carried out with the motor mounted on the tooling.</p> <p>(1) 试验时间：10个周期，每个周期为24H; Test time: 10 cycles, each cycle is 24H;</p> <p>(2) 试验条件：温度变化如下图所示，23℃以下不控制湿度，升温即恒温段湿度(93±3)%RH，降温阶段≥80%RH Test conditions: Temperature changes are shown in the figure below. If the humidity is not controlled below 23℃, the temperature increase means that the humidity in the constant temperature section is (93 ±3)% RH, and the temperature decrease stage is ≥80%RH.</p> 
<p>7-9</p>	<p>堵转实验 Locked-rotor test</p>	<p>将电机固定在工装上，试验电压5V,分别在低温-40℃、室温、高温85℃条件下，使振动轮堵转，持续运行1H The motor was fixed on the tooling, the test voltage was 5V, and the vibration wheel was blocked under the conditions of low temperature -40℃, room temperature and high temperature 85℃ respectively, and the operation lasted for 1H</p>

► 判定标准/Judgment standard

① 试验后，测试数据必须符合以下规格：

After test, measured data must be satisfied as following specifications;

- 启动电压/Starting voltage: DC 3.5V Max.
- 额定转速/Rated speed: 变化率在初始值的+50%~-30%以内/ Changing rate must be within +50%~-30% of initial value.
- 额定电流/Rated current: 变化率在初始值的+50%~-30%以内。/Changing rate must be within +50%~-30% of initial value.
- 端子阻抗/Terminal resistance: 变化率在初始值的±15%以内。/Changing rate must be within ±15% of initial value.

② 外形结构无异常。/There should be no abnormalities in appearance and structure

8. 寿命试验/Life test

NO	项目/Item	条件/Condition
8-1	常温寿命试验 Life test	在 $23\pm 3^{\circ}\text{C}$ 、45%-65%R.H.环境下，将 DC 5.0V 不断地施加在电机的正负极上，按照如下模式进行寿命实验（如下图所示）。 /Under the environment of $23\pm 3^{\circ}\text{C}$ and 45% - 65% R.H., DC 5.0V is continuously applied to the positive and negative grades of the motor, and the life test is carried out according to the following mode (as shown in the figure below). 模式/mode 0.1s(开)、1.0s(关) 次数/Cycle T=100,0000
8-2	高温寿命试验 Life test	在 $110\pm 3^{\circ}\text{C}$ 、45%-65%R.H.环境下，将 DC 5.0V 不断地施加在电机的正负极上，按照如下模式进行寿命实验（如下图所示）。 /Under the environment of $110\pm 3^{\circ}\text{C}$ and 45% - 65% R.H., DC 5.0V is continuously applied to the positive and negative grades of the motor, and the life test is carried out according to the following mode (as shown in the figure below). 模式/mode 0.5s(开)、0.5s(关) 小时/ hour 24H
8-3	低温寿命试验 Life test	在 $-40\pm 3^{\circ}\text{C}$ 、45%-65%R.H.环境下，将 DC 5.0V 不断地施加在电机的正负极上，按照如下模式进行寿命实验（如下图所示）。 /Under the environment of $-40\pm 3^{\circ}\text{C}$ and 45% - 65% R.H., DC 5.0V is continuously applied to the positive and negative grades of the motor, and the life test is carried out according to the following mode (as shown in the figure below). 模式/mode 0.5s(开)、0.5s(关) 小时/ hour 24H

► 判定标准/Judgment standard

②试验后，测试数据必须符合以下规格：

After test, measured data must be satisfied as following specifications;

- 启动电压/Starting voltage: DC 3.5V Max.
- 额定转速/Rated speed: 变化率在初始值的+60%~-30%以内/ Changing rate must be within +60%~-30% of initial value.
- 额定电流/Rated current: 变化率在初始值的+60%~-30%以内。/Changing rate must be within +60%~-30% of initial value.
- 噪音/Noise: 电机应能正常启动，无异常机械噪音。/Should not fail in starting, Should not be unusual mechanical noise.

9. 环保要求/Environment Protections

本产品所有零部件符合欧盟RoHS指令(2011/65/EU,(EU)2015/863)/无卤/REACH指令要求,具体环境有害物质管控限制如下/This product conforms to the EU ROHS (2011/65/EU,(EU)2015/863), Halogen-Free and REACH certification, Specific content as follows;

铅及其化合物最大允许含量为1000ppm/Lead and Lead compounds \leq 1000ppm

镉及其化合物最大允许含量为100ppm/Cadmium and cadmium compounds \leq 100ppm

汞及其化合物最大允许含量为1000ppm/Mercury and Mercury compounds \leq 1000ppm

六价铬化物最大允许含量为1000ppm/Hexavalent chromium compounds \leq 1000ppm

多溴联苯(PBB)最大允许含量为1000ppm/Polybrominated biphenylethers \leq 1000ppm

多溴联苯醚(PBDE)最大允许含量为1000ppm/Polybrominated

diphenylethers \leq 1000ppm

邻苯二甲酸二异丁酯(DIBP)最大允许含量为1000ppm /DIBP \leq 1000ppm

邻苯二甲酸二丁酯(DBP)最大允许含量为1000ppm /DBP \leq 1000ppm

邻苯二甲酸苄酯(BBP)最大允许含量为1000ppm/BBP \leq 1000ppm

邻苯二甲酸二(2-乙基己基)酯(DEHP)最大允许含量为1000ppm/DEHP \leq 1000ppm

六溴环十二烷(HBCDD)最大允许含量为1000ppm/HBCDD \leq 1000ppm

溴Br最大允许含量为900ppm/Br \leq 900ppm

氯Cl最大允许含量为900ppm/Cl \leq 900ppm

溴加氯之和最大允许含量 为1500ppm/Br+Cl \leq 1500ppm

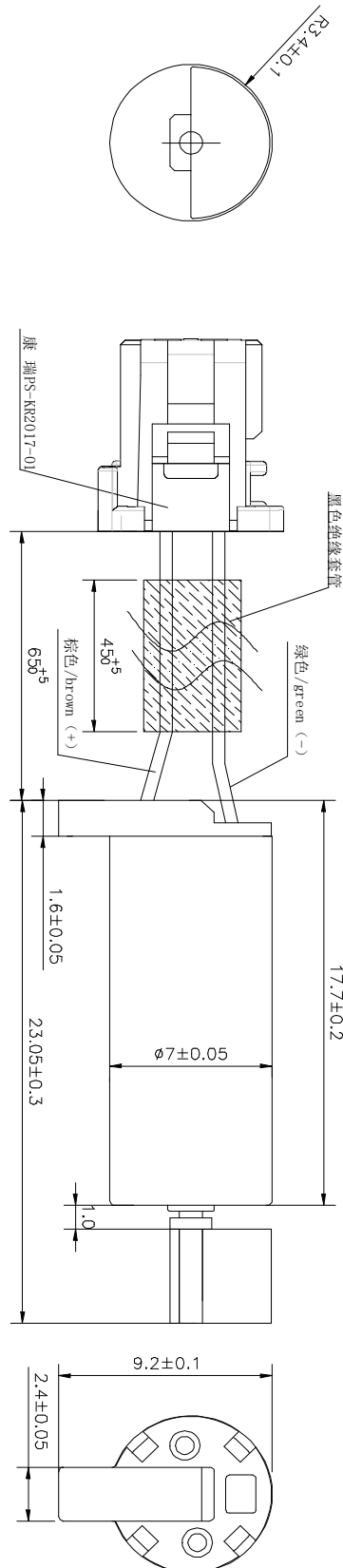
REACH 指令按最新法规内容管控执行/The instructions are subject to the latest regulations

包装材料环保管控要求/Environmental control requirements for packaging

materials: Pb+Cd+Hg+Cr6 < 100ppm (其中, Cd<50ppm)

10. 注意事项/Caution

- (1) 该马达是微型精密产品，在运输过程中不要承受超过0.5 kgf的力，否则会引起外形或性能的变化。/As this motor is small and precise, do not press it over 0.5kgf force or while transportation, otherwise it will cause the transformation of performance or external appearance.
- (2) 请注意马达不要接触到液体性物质（比如：水，酒精等）。/ Please keep the motor away from liquid substance (such as water, alcohol, etc.)
- (3) 不要在高温下长时间放置，否则有可能导致电机的性能下降。/Do not expose the motor to high temperature for long time,it may cause a decline in performance.
- (4) 马达不要在以下环境中使用。/Avoid using the motor in the following environment:
 - 高温和高湿的场所/High temperature and high humidity area.
 - 腐蚀性气体如H₂S、SO₂、NO₂等/Corrosive gas such as H₂S、SO₂、NO₂ etc.
- (5) 请不要在靠近磁铁或带有磁场的仪器旁边使用或存放马达。/Please do not operate or store the motor adjacent to magnet or apparatus which has a magnetic field.
- (6) 请注意底盖的表面存在漏磁通量。/Please be careful that there exists a leaking magnetic flux on the surface of bracket.
- (7) 电刷和换向器的相互作用，有可能产生轻微的电噪音。/Due to interaction between brush and commutator, there is a possibility to occur electrical noise slightly.
- (8) 因测试设备有误差，允许有±5%偏差。/ Due to the measurement equipment error, there is a ± 5 % difference tolerance.
- (9) 马达通过ROHS认证。/This motor pass the system of ROHS certification.

11.外形图/Outside view

技术要求/skills requirement

1. 额定电压/Rated voltage:DC 5.0V
2. 额定电流/Rated current:100mA Max
3. 额定转速/Rated speed:7000±1750rpm
4. 启动电压/Starting voltage:3.0V Max
5. 启动电流/Starting current:170mA Max
6. 端子阻抗/Terminal resistance:35 (1±20%) Ω
7. 轴向间隙/Axial clearance:0.3mm Max
8. 电源线规格/Wire Spec.: 0.35mm²紫/绿色线, FLR-13V 汽车电线, 耐高温线-40°~+150°
9. 电机总长不包括轴向窜动间隙/The total length of the motor does not include the axial movement gap
10. 绝缘套管/insulating housing: ∅3mm_PVC_黑色
11. 连接器规格/Connector Specifications: 锁片 (PBT-GF15)、2pin护套 (PBT-GF15)、端子 (高导电)
12. 端盖和机壳脱出力≥40N

12. 包装要求/Packaging requirement

- (1) 每个吸塑盒里放50个电机。/50 vibrators in each plastic capsule.
- (2) 每10个吸塑盒上盖一个吸塑盒盖，用胶带捆做一捆。/Every 10 capsules as a group put a plastic cover on the group and wrap it in tape.
- (3) 每4捆按图中的叠放方式放入一个外包箱（400×200×185）。/Every 4 bundle are put into an outer case with a size of（400×200×185） by the ways stipulated as the drawing.
- (4) 数量、生产批号均写在外包装箱上。/Quantity and batch number are written on the surface of the outer case.

