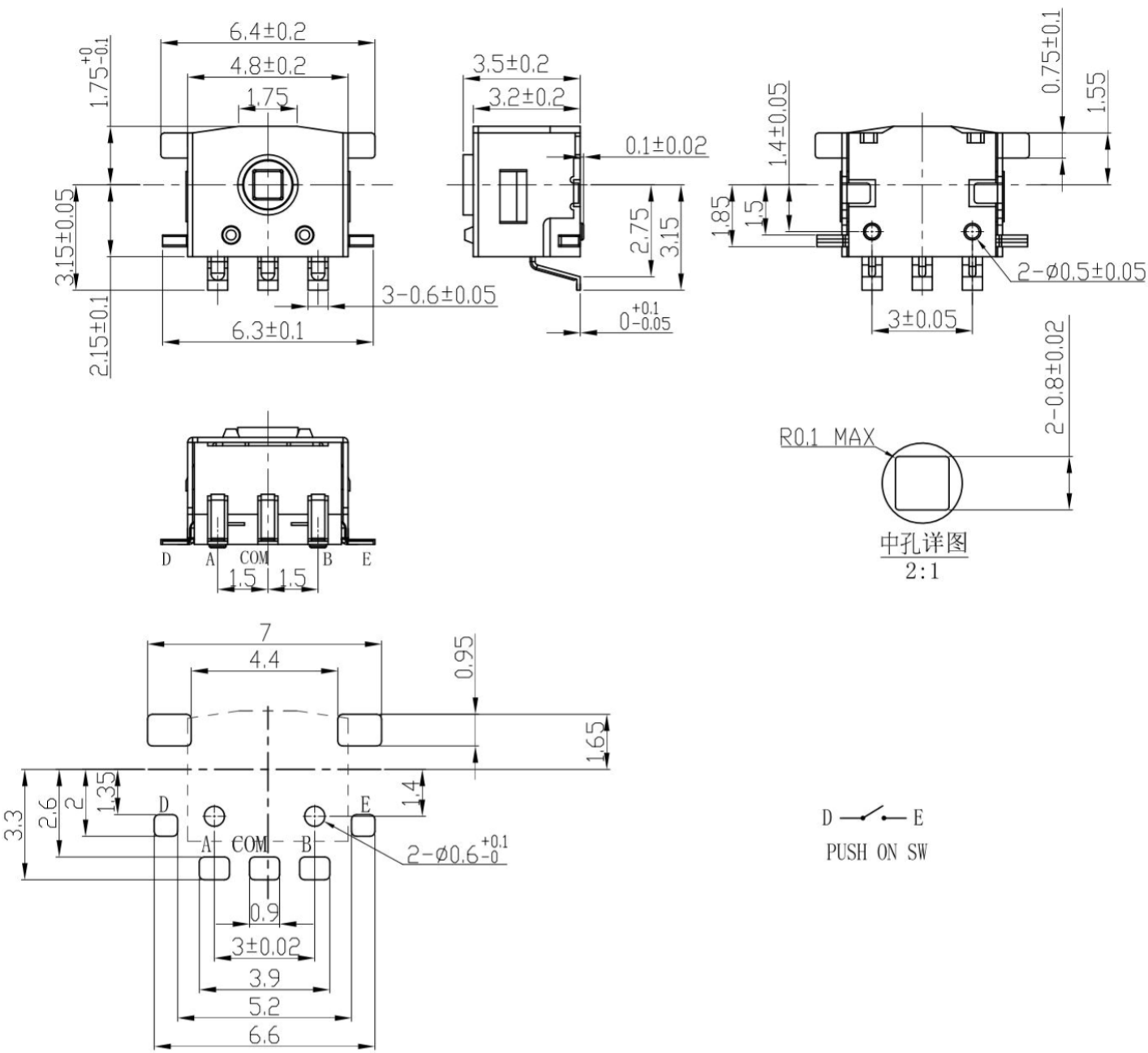




P. C. B thickness $t=0.3 \sim 0.5$
Tolerance: ± 0.1

03			深圳市金航标电子有限公司		
02					
01					
00			NAME	KH-EC04S3T122000	
NO	DATE	DESCRIPTION	DRAWING NO		
SCALE		TOLERANCE			
UNIT	mm	L ≤ 10 ± 0.3	DRAWN BY	CHECK BY	APPROVED BY
		10 < L ≤ 30 ± 0.5	Julie	Henry	Levin
		30 < L ≤ 100 ± 1.0			
		ANGLE ± 5°			



EC04 SERIES SPECIFICATION

EC04系列规格书

1. General Characteristics 一般特性:

1.1 Application: This specification is applied to rotary encoder used for general.

适用范围: 该承认书适于通用旋转编码器。

1.2 Operating Temperature Range: -40°C to +85°C

使用温度范围: -40°C to +85°C

1.3 Operating Relative Humidity: ≤85% RH

使用相对湿度: ≤85%RH

1.4 Test Conditions: Unless otherwise specified, the atmospheric conditions for making

measurements and tests are as follows:

试验条件: 除非另有规定, 进行测量和试验的大气条件如下:

Environment Temperature: 5~35°C 环境温度: 5~35°C

Relative Humidity: 45~85% 相对湿度: 45~85%

Atmospheric Pressure: 86~106Kpa (860~1060mbar)

大气压力: 86~106Kpa (860~1060mbar)

2. Appearance, Structure and Dimensions 外观, 结构和尺寸:

2.1 Appearance: The encoder shall have good finishing, and no rust, crack or plating defects.

外观: 产品外观良好, 无锈蚀、裂纹和镀层缺陷。

2.2 Structure & Dimensions: See Product Specifications.

结构及尺寸: 参见产品规格图。

2.3 Markings: See Product Specifications.

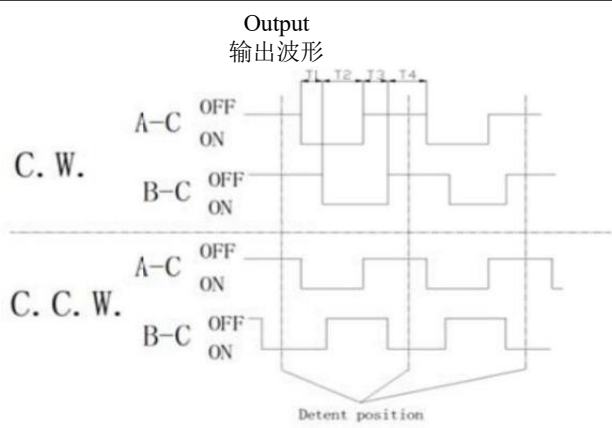
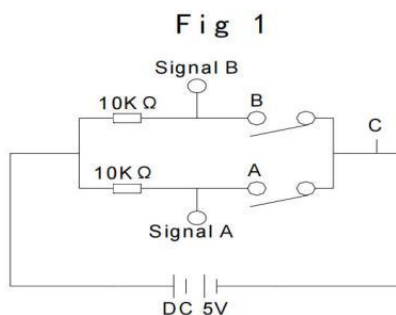
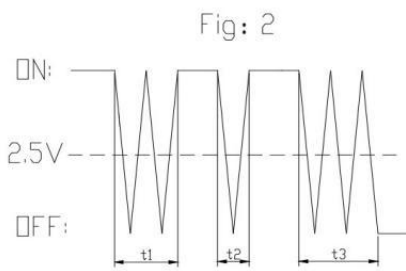
标识: 参见产品规格图。

3. Ratings 额定负荷: 5VDC 0.5mA

EC04 SERIES SPECIFICATION

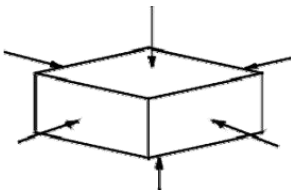
EC04系列规格书

4. Electrical Characteristics 电气特性:

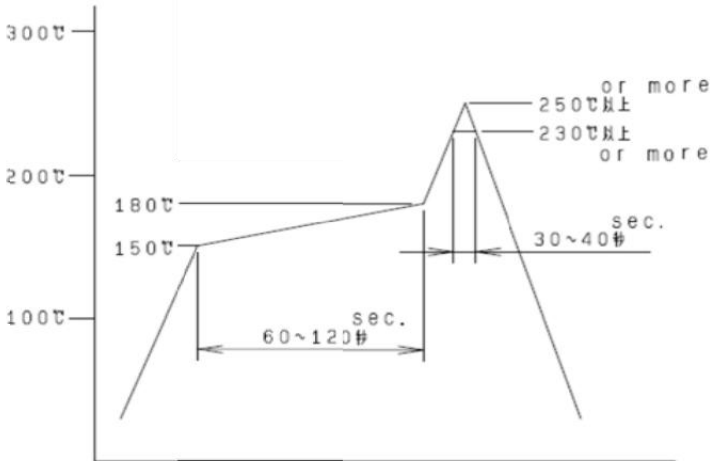
No.	Item 项目	Criteria 标准		Test Method 实验方法
4.1	Contact Resistance 接触电阻	200mΩ Max. (初始值 initial value)		Using the micro resistance tester with error less than 5%for testing. 使用误差小于 5%的微电阻测试仪进行测试。
4.2	Insulation Resistance 绝缘电阻	50MΩ Min.		Using the insulation resistance tester.setting parameters to DC50V, The insulation resistance between the terminal and the cover,the terminal and the terminal is test. 使用绝缘电阻测试仪, 设置参数为 DC50V,测试端子与外壳,端子与端子之间的绝缘阻抗,
4.3	Dielectric Voltage 抗电强度	AC50V test 60s, Nodielectric breakdown shall occur. AC50V 测试 60s无击穿现象发生。		Using the voltage resistance tester, set the parameters to the AC50V, test the voltage resistance between the terminal and cover or terminal and terminal,time is 60s. 使用耐电压测试仪, 设置参数为 AC50V , 测试端子和外壳或端子与端子之间的耐电压,时间 60s 。
4.4	Output signal format 输出信号	T1,T2,T3,T4≥4mS		The encoder rotates 360 degrees per second,2 Phase-different signals (signalA,signalB) Derails shown in (The broken line shows detent position.) 编码器每秒钟转动 360 度,A、B 两信号输出相位差, 输出波形详细见图, 卡点位置如下图所示 (虚线表示带卡点装置的上擎子处位置)
		Shaft rotational direction 轴回转方向	Signal(Between terminals) 信号 (端子之间)	
		C.W.	A(A~C)	
			B(B~C)	
		C.C.W.	A(A~C)	
			B(B~C)	
4.5	Switching characteristics 切换特性	Chattering 振动 Fig.2 t1 ,t3 <3ms	The encoder is connected to the circuit in Figure 1. The encoder rotates 360 degrees per second. When the circuit is switched from ON to OFF, At 2.5 v voltage ,test circuit generates vibration time,when every times. 将编码器按图1 的电路接在示波器上,编码器每秒钟转动360 度,当电路在 ON 区域时,测试电路产生跳动的的时间.跳动位置的获取应在 ON 区域, 电压在 2.5V 的位置。 在 ON 区域,电压在 2.5V 的现象出现2 次以上的,被认为是连续跳动。	
			 	

5. Mechanical Characteristics 机械特性

No.	Item 项目	Criteria 标准	Test Method 实验方法
5.1	Detent points 执子点数与位置	12 detent points each detent angle: $30^{\circ} \pm 5^{\circ}$ 12 点执子每点角度: $30^{\circ} \pm 5^{\circ}$	
5.2	Output waves 输出波形数	12pulse/360° 12 脉波/360°	Oscilloscope test available. 可使用示波器测试。
5.3	Rotational force 旋转力矩	10±5gf.cm	Use of torsion gauges , The test head is inserted into the rotating shaft , rotates according to the rotation direction of the shaft, and the experiment is carried out with the uniform rotation force , Read maximum. 使用扭力计, 把测试头插入转轴中, 沿轴的转动方向, 使用均匀的旋转力进行测试, 读取最大值。
5.4	Terminal Strength 端子强度	Shall be free from terminal looseness, damage and insulator breakage. The electrical performance requirements specified shall be satisfied. 端子无松动, 损坏及绝缘层的破裂。 电气性能应符合第 4 项要求。	A static load of 3N shall be applied to the tip of terminals for 10s in any direction. 任意方向施加 1N 作用力于接线端末端, 持续时间 10s.
5.5	Vibration Proof 振动	After test, Contact resistance: 5Ω Max. Insulation resistance: 10MΩ Min. The electrical performance requirements specified shall be satisfied. No abnormalities shall be recognized in appearance and construction. 实验后: 接触电阻: 5Ω Max. 绝缘电阻: 10MΩ Min. 电气性能应符合要求。表面及结构无明显变形。	Encoder shall be secured to a testing machine by a normal mounting device and method. Encoder shall be tested according to the following request:: (1)Vibration frequency range = 10~55 Hz (2)Total amplitude =1.5mm (3)Sweep ratio: 10~55~10Hz Approx. 1 min (4)Method of changing the sweep vibration frequency: linear (5)Direction of vibration: Three perpendicular directions including actuating direction. (6)Duration: 2 hours (6 hours in total) 编码器采用常规的安装方法牢固地安装在试验设备上, 并在下述参数条件下进行试验: (1) 振频=10-55Hz (2) 振幅 1.5mm (3) 振动变化速率: 10-55-10Hz 大约 1 分钟 (4) 变频方法: 线性型式 (5) 振动方向: 三个相互垂直的方向, 其中一个方向应是促动元件运动的方向。 (6) 时间: 每个方向 2 小时 (共 6 小时)。

5.6	Mechanical Shock 耐冲击	After test, Contact resistance: 5Ω Max. Insulation resistance: 10MΩ Min. The Electrical performance requirements specified shall be satisfied. Shall be free from mechanical abnormalities. 实验后: 接触电阻: 5ΩMax. 绝缘电阻: 10MΩ Min. 电气性能应符合要求。 表面无变形且操作无异常。	Encoder shall be tested according to the following request: (1) Mounting Method: Normal (2) Acceleration: 490m/s² (50G) (3) Duration: 11ms (4) Test Direction: 6 directions  (5) Number of shocks: 3 times per direction (18 times in total) 编码器在下述参数条件下进行试验: (1) 安装方法: 常规方法 (2) 加速度: 490m/s² (50G) (3) 时间: 11ms (4) 实验方向: 图示 6 方向 (5) 冲击次数: 每个方向 3 次 (总共 18 次)
-----	-------------------------	---	---

6. Soldering Characteristics 焊接性能

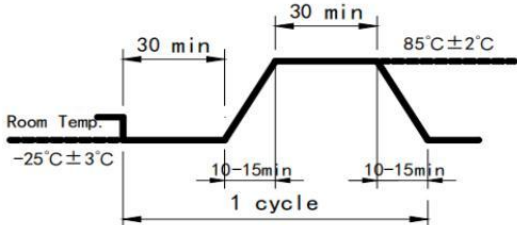
No.	Item 项目	Criteria 标准	Test Method 实验方法
6.1	Solder Ability 可焊性	Melting surface area should exceed 95% of the total 熔锡面面积应该超过 95%	The crucible is tested under the following parameters : (1) solder: tin paste containing more than 3% silver. (2) Welding temperature : 245°C min.; (3) Welding time : 3 s min. 编码器在下述参数条件下进行试验: (1) 焊料: 含银 3%以上锡膏。 (2) 焊接温度: 245°C Min。 (3) 熔焊时间: 3s Min.
6.2	Solder Heat Resistance 耐焊接热	No abnormalities shall be observed in appearance and operation. 无外观、熔胶变形不良, 扭力衰变 Max 10%。电讯性能符合第 4 项。	The filter is tested under the following parameters: e of welding: SMT ing temperature and time: g : 250°C above 3-5 S: 230°C above 30-40 S: nual welding : °CMax 3s Max 350 编码器在下述参数条件下进行试验: (1) 焊接方式: SMT (2) 焊接温度及时间: 自动焊接: 250°C 以上 3-5S: 230°C 以上 30-40S: (3) 手工焊接: 350°C Max 3s Max 

7. Durability characteristics 耐久性能

No.	Item 项目	Criteria 标准	Test Method 实验方法
7.1	Mechanical Life 机械寿命	After test Contact resistance: 5Ω Max. Insulation resistance: 10MΩ Min. The decay of the operating force should be within + 50%. The electrical performance requirements specified in item 4.3-4.5 shall be satisfied. 实验后: 接触电阻: 5Ω Max. 绝缘电阻: 10MΩ Min. 操作力衰变应在±30%以内。 机械性能应符合第 5.1、5.3 条的要求。	Under the condition of no load, the speed is 30 times per minute, and the life test equipment is continuously converted on the life test equipment. the working mode of the life test equipment is to rotate 360 degrees counterclockwise immediately after rotating 360 degrees clockwise for the test once.. 在不带负荷的条件下, 速度为 30 次/分钟, 在寿命试验设备上连续转换, 寿命试验设备工作方式是顺时针方向旋转 360 度后立即逆时针方向旋转 360 度为试验 1 次。
7.2	Electronics Life 电气寿命	After the experiment: Contact resistance :5ΩMax. Electrical resistance :10 MΩMin. No pulse number increases or decreases badly. The telecommunication performance shall meet the requirements of Sections 4.4 and 4.5 实验后: 接触电阻: 5Ω Max. 绝缘电阻: 10MΩ Min. 无脉冲数增加或减少不良。 电讯性能应符合第 4.4、4.5 条的要求。	Under the condition of the following load, the speed is 30 times / min, and the life test equipment is continuously converted on the life test equipment. The working mode of the life test equipment is to rotate 360 degrees counterclockwise immediately after the clockwise rotation 360 degrees for the test once. . Load :0.1 mA 5VDC. 在带以下负荷的条件下, 速度为 30 次/分, 在寿命试验设备上连续转换, 寿命试验设备工作方式是顺时针方向旋转 360 度后立即逆时针方向旋转 360 度为试验 1 次。. 负 载 : 0.05mA 5VDC

8. Weather Proof Characteristics 耐候性能:

8.1	Cold Proof 低温	After test, Contact resistance: 5ΩMax. Insulation resistance: 10MΩ Min. The Electrical performance requirements specified shall be satisfied. 实验后: 接触电阻: 5Ω Max. 绝缘电阻: 10MΩ Min. 电气性能应符合第 4 项要求。	The test piece shall remain free for 240 hours in a temperature control box of -40 ±2℃, and then recover for 1 hour at normal temperature and humidity. The test piece shall be measured within 1 hour thereafter. The water droplets shall disappear. 试件在 -40±2℃ 的温控箱内无工作静态保持 240 小时, 然后在正常温度和湿度下恢复 1 小时, 并在此后 1 小时内对试品进行测量, 水滴应消失。
8.2	Hot Proof 高温	After test, Contact resistance: 5ΩMax. Insulation resistance: 10MΩ Min. The Electrical performance requirements specified shall be satisfied. 实验后: 接触电阻: 5Ω Max. 绝缘电阻: 10MΩ Min. 电气性能应符合第 4 项要求。	The test piece is kept at 240 hours without working pressure in the temperature control box of 85±2℃, then recovered at normal temperature and humidity for 1 hour, and measured within 1 hour after that, the water droplets should disappear. 试件在 85±2℃ 的温控箱内无工作静态保持保持 240 小时, 然后在正常温度和湿度下恢复 1 小时, 并在此后 1 小时内对试品进行测量, 水滴应消失。

No.	Item 项目	Criteria 标准	Test Method 实验方法
8.3	Moisture Resistance 恒定湿热	After test, Contact resistance: 5Ω Max. Insulation resistance: $10M\Omega$ Min. The Electrical performance requirements specified in item 4.3-4.5 shall be satisfied. 实验后: 接触电阻: 5Ω Max. 绝缘电阻: $10M\Omega$ Min. 电气性能应符合第 4.3-4.5 条的要求。	After testing at $40\pm 2^{\circ}\text{C}$,90~95% RH for 240 hours, the encoder shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be eliminated. 试件在 $40\pm 2^{\circ}\text{C}$, 90-95%RH 的温控箱内无工作静态保持 240 小时, 然后在正常温度和湿度下恢复 1 小时, 并在此后 1 小时内对试品进行测量, 水滴应消失。
8.4	Temperature Cycling 温度转换	After test, Contact resistance: 5Ω Max. Insulation resistance: $10M\Omega$ Min. The electrical performance requirements specified in item 4.3-4.5 shall be satisfied. 实验后: 接触电阻: 5Ω Max. 绝缘电阻: $10M\Omega$ Min. 电气性能应符合第 4.3-4.5 条的要求。	After 5 cycles of following conditions, the encoder shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be eliminated. 试件按下述实验条件试验 5 次, 然后在正常温度和湿度下恢复 1 小时, 并在此后 1 小时内对试品进行测量, 水滴应消失。 
8.5	Salt Mist 盐雾实验	After the test is dried, there are no corrosion spots on the metal parts that affect the performance of the product, and the electrical properties should meet the requirements of Article 4. 试验干燥后, 在金属件上没有影响产品性能的腐蚀斑点, 电气性能应符合第 4 条的要求。	The encoder shall be checked after the following test: (1)Temperature: $35\pm 2^{\circ}\text{C}$ (2)Salt Solution: $5\pm 1\%$ (Solids by mass). (3)Salt deposit shall be removed by running water. (4)Duration: 48 hours 试件在下述实验后测量: (1) 温度: $35\pm 2^{\circ}\text{C}$ (2) 盐溶液浓度: $5\pm 1\%$ (质量百分比)。 (3) 盐沉积物用水冲掉。 (4) 时间: 48 小时
8.6	Vulcanization test 硫化试验	After the test is dried, there are no corrosion spots on the metal parts that affect the performance of the product, and the electrical properties should meet the requirements of Article 4. 试验干燥后, 在金属件上没有影响产品性能的腐蚀斑点, 电气性能应符合第 4 条的要求。	The specimens were tested under the following conditions: (1) Temperature : $35\pm 2^{\circ}\text{C}$ (2)Potassium sulfide solution concentration 2%(mass percentage). Time :2 minutes. 试件按下述条件实验: (1)温度: $35\pm 2^{\circ}\text{C}$ (2) 硫化钾溶液浓度: 2% (质量百分比)。 (3) 时间: 2 分钟。



EC04 SERIES SPECIFICATION

EC04系列规格书

推动开关部份 Push Switch Portion

Note:The following specification is only suitable for the one type with switch of E04 encoder series

备注：以下规格适用于E04编码器带开关系列

1. Rating 额定值

1-1: 额定负荷: 5VDC 0.5mA

2. 电气性能Electrical characteristics

No.	Item 项目	Criteria 标准	Test Method 实验方法
2-1	Contact resistance 接触电阻	Voltage test at DC 5V 0.5mA. 用DC 5V 0.5mA 电压测定	100mΩ Max 100mΩ 以下
2-2	Bouncing 振荡	shaft shall be Rotated at 1 cycles/sec(OFF-ON-OFF) 以1秒钟1往复(OFF-ON-OFF)回转运转	10ms Max 10ms 以下
2-3	Insulation resistance 绝缘电阻	Measurement shall be made under the Condition which a voltage 50V DC Is applied between individual Terminals and tracked 在端子与安装板间施加DC.50V	Between individual Terminals and bracket 50MΩ Min. 在端子安装板间50MΩ以上
2-4	Dielectric strength 耐电压	A voltage of 50V AC shall be applied for 1 minute between individual terminals and bushing and plank. 在端子和安装板间施加AC50V电压1分钟	Without arcing or Breakdown. 不得有绝缘破坏

3. 机械性能Mechanical characteristics

3-1	Switch circuit and Number of pulse 开关电路、接点数		Single pole and single throw(push on) 单极单投(推ON)
3-2	Travel of switch 开关移动量		0.15±0.5mm
3-3	Operating force of switch 开关动作力	Push static load to the shaft in the axial direction 在轴方向施加的按压力	200±50gf

4. 耐久性能 Endurance characteristics

4-1	Operating life 寿命特性	The encoder's shall shall be rotated to 20,000 cycles at a speed of 600/h without electrical load. (shaft push load: 200gf max.) 在无负荷条件下沿轴向施以200gf以下的力，以600次/小时的速度按压，连续运转20,000往复。	Contact resistance: 200mΩ Max. 接触电阻:200mΩ 以下 Operating force of switch:-30% +10% 开关动作力:-30%~+10%。
-----	------------------------	---	--



EC04 SERIES SPECIFICATION

EC04系列规格书

1. Management of environmental hazardous substances 环境有害物质管理

This product complies with the "√" hook under the environmental hazardous substances management standard selection.
本产品符合下方“√”勾选的环境有害物质管理标准。

√	本产品符合欧盟 ROHS 2.0 标准要求.
	本产品符合 HF 标准要求.
√	本产品符合 REACH 标准要求.

2.Storage condition 贮存条件:

- 2.1 In order to protect the switch performance and the soldering conditions, it should keep the switch under the following conditions:
为防止本产品的性能劣化和耐焊性等性能受到影响，请保管在以下的条件和环境下：
- 2.1.1. Temperature of-30℃ to +80℃, with humidity lower than 85%RH;
温度 -30℃ 以上，+80℃ 以下，湿度85% 以下的环境。
- 2.1.2. Avoid storing in the environment containing corrosive gas;
避免保存在含有腐蚀性气体等的空气中。
- 2.1.3. Avoid keeping it in the location with direct sunlight.
避免保存在日光能直射的场所。
- 2.1.4. Store using the standard packing without exerting force.
在不施加负重外力的包装状态下进行保管。
- 2.2 The standard storage period is 12 months before opening the package. Preferably to be used as soon as possible. After opening the package, you should put the remaining switches in a plastic bag to prevent from damp and corrosive gas with maximum up to 3 months.
产品未打开包装的保存标准期限为 12 个月。打开包装后有剩余品时，应将剩余部分以胶袋包装好以同外界隔离，请进行合适的防湿，防腐蚀气体等处理后进行保管，保存期限为 3 个月。