

RE12系列规格书

RE12 SERIES SPECIFICATION

1. 一般事项General

1-1. 适用规格 Scope

本规格书适用于微小电流回路的电子设备, 属12型回转型编码器.

This specification applies to 12mm size low-profile rotary encoder (incremental type) for microscopic current circuits, used in electronic equipment.

1-2. 标准状态Standard atmospheric conditions

除另有规定外, 测量应在以下状态下进行:

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and test is as following limits:

温度 Ambient temperature: 15°C to 35°C

相对湿度 Relative humidity: 25% to 85%

气压 Air pressure: 86kpa to 106kpa

如果对在上述所提到的条件中所做的实测值有疑问的话, 应使用以下条件进行测量:

If doubt arises on the decision based on the measured values under the above-mentioned conditions, the following conditions shall be employed:

温度 Ambient temperature: 20±1°C

相对湿度 Relative humidity: 63% to 67%

气压 Air pressure: 86kpa to 106kpa

1-3. 使用温度范围

Operating temperature range: -30°C to +80°C

1-4. 保存温度范围

Storage temperature range: -40°C to +85°C

2. 构造Construction

2-1. 尺寸 Dimensions

见所附成品图 Refer to attached drawing

3. 额定值 Rating

3-1. 额定电压

Rated voltage: DC 5V

3-2. 最大额定电流 (阻抗负载)

Maximum operating current (resistive load)

各相导线 Each lead: 0.5mA (Max 5mA; Min 0.5mA)

公共导线 Common lead: 1mA (Max 10mA; Min 0.5mA)

4. 使用上的事项Application Notes

4-1. 避免储藏于高温潮湿及腐蚀的场所. 产品购入后尽可能在6个月内使用完. 拆包装后未使用完的剩余产品需储藏于防潮防毒的环境下.

Avoid storing the products in a place at high temperature, high humidity and in Corrosive gases. Please use this product as soon as possible with 6 months limitation. If any remainder left after packing is opened, please store it with proper moistureproofing, gasproofing etc.

4-2. 编码器信号的计算方法应将操作的速度, 信号的取样时间及电子回路中的微电脑软体等考虑进去.

The encoder pulses count method should be designed with taking operating speed, sampling time and design of the microcomputer software into consideration.

4-3. 此产品在定位点的输出波形参照 (5-1), 因此在设计软体时请留意其状态, 推荐以A相位为参考基准.

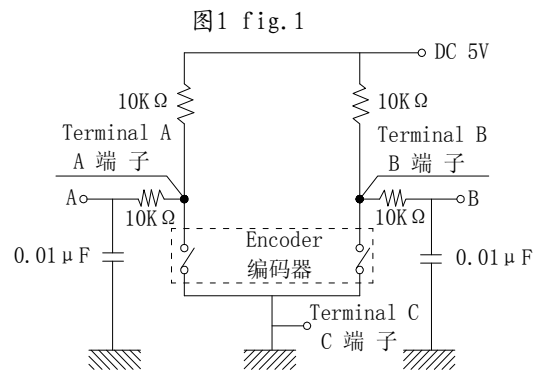
With this products the detent position output consult fig. 5-1. Therefore make the A phase the reference at the software design stage. Recommended that use A output signal for the reference.

4-4. 在设计时要考虑到杂讯, 建议使用R/C滤波电路, (图1)

At design of the pulse count process. Using the C/R filter circuit is Recommended. (fig. 1)

4-5. 本产品请勿碰触到水, 可能会导致输出波形的异常.

Care must be taken not to expose this product to water or dew to prevent possible problem in pluses output waveform.



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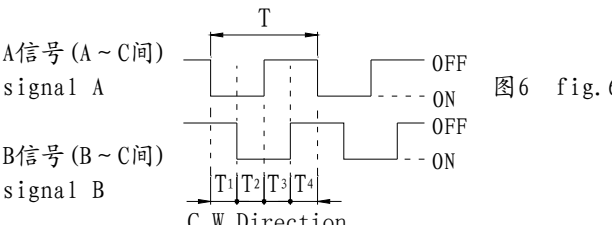
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5. 电气性能 Electrical Characteristics

| 项目 ITEM | 条件 CONDITIONS | 规格 SPECIFICATIONS |
|--|---|---|
| 5-1. 输出信号 Output signal format | A、B两信号输出相位差，输出波形详细见（图2/3）（虚线表示带卡点装置的上犴子处位置） 2 Phase-different signals (signal A, signal B) Details shown in<fig.2/3> (The broken line shows detent position.) | |
| | 轴回转方向 Shaft rotational direction | 信号 Signal |
| | 顺时针方向 C. W | A (A-C端子间) A (Terminal A-C) B (B-C端子间) B (Terminal B-C) |
| | 逆时针方向 C. C. W | A (A-C端子间) A (Terminal A-C) B (B-C端子间) B (Terminal B-C) |
| | | 输出波形 Output |
| | | 图2 fig.2 图3 fig.3 |
| | | |
| 5-2. 分解能力 Resolution | 回转360° 的输出脉冲数。 Number of pulses in 360° rotation. | <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">□ 12 个脉冲/360° (图2) 12pulses/360° (fig.2)</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">□ 12 个脉冲/360° (图3) 12pulses/360° (fig.3)</div> <div style="border: 1px solid black; padding: 2px;">■ 24个脉冲/360° (图3) 24pulses/360° (fig.3)</div> |
| 5-3. 开关特性 Switching characteristics | 下（图4）所示回路，轴以360° /S的速度转动测定。 Measurement shall be made under the condition as follows. Shaft rotational speed : 360° /S Test circuit : (fig.4) | |
| | | 图4 <fig.4> 图5 <fig.5> |
| | | |
| | | |
| | | （注）编码OFF指输出电压3.5V以上的状态 (fig.5). Code-OFF area : The area which the voltage is 3.5V or more (fig.5). 编码ON指输出电压1.5V以下的状态 (fig.5). Code-ON area : The area which the voltage is 1.5V or less (fig.5). |
| 5-3-1. 振荡 Chattering | 编码从OFF→ON或ON→OFF时，输出1.5V~3.5V的通过时间。应符合规定Specified by the signal's passage time from 1.5V to 3.5V of each switching position (code OFF~ON or ON~OFF) | $t_1, t_3 \leq 3mS$ |
| 5-3-2. 滑动杂讯 (突跳) Sliding noise (Bounce) | 编码ON部份的1.5V以上的电压变动时间在振荡t1,t3之间会产生1mS以上, 1.5V以下的ON部份. 另外, 如果各突跳1.5V以下的范围在1mS以上时, 则判定为另一个突跳. Specified by the time of voltage change exceed 1.5V in code-ON area . When the bounce has code-ON time less than 1mS between chattering (t1 or t3) the voltage change shall be regarded as a part of chattering. When the code-ON time between 2 bounces is less than 1mS. they are regarded as 1 linked bounce. | $t_2 \leq 2mS$ |

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|--|--|--|
| 5-3-3. 滑动噪音 Sliding noise | 编码OFF部份的电压变动。 The voltage change in code-OFF area. | 3.5V以上 3.5Vmin |
| 5-4. 相差位 Phase difference | 下(图6)所示回路,轴以 $360^{\circ}/S$ 的速度转动测定。 Measurement shall be made under the condition which the shaft is rotated at 60r/min  图6 fig.6 | $T_1, T_2, T_3, T_4 \geq 0.08T$ 见图6 (fig.6) |
| 5-5. 绝缘阻抗 Insulation resistance | 在端子和支架间施加电压 250V DC。 Measurement shall be made under the condition which a voltage of 250V DC is applied between individual terminals and frame. | 100M Ω 以上 100M Ω Min |
| 5-6. 耐电压 Dielectric strength | 在端子和支架间施加AC300V电压1分钟 A voltage of 300V AC shall be applied for 1 minute between individual terminals and frame. | 不得有绝缘破坏 Without arcing or breakdown. |
| 5-7. 端子间接触阻抗 Contact resistance | 出力信号处于ON时安定状态条件下测定。 Measurement shall be stable condition which a output signal is ON. | 1 Ω 以下 1 Ω Max |
| 6. 机械性能 Mechanical Characteristics | | |
| 6-1. 全回转角度 Total rotational angle | | 360 $^{\circ}$ (无止档点) 360 $^{\circ}$ (Endless) |
| 6-2. 定位点力矩 Detent torque | 只适用于附卡点装置 Only suitable for C.C, equipment. | 2~15mN.m. (20~150gf.cm) |
| 6-3. 定位点数及位置 Number and position of detent | 只适用于附卡点装置 Only suitable for C.C, equipment. | □12点定位间隔角度 $30^{\circ} \pm 2^{\circ}$ 12detents Step angle: $30^{\circ} \pm 2^{\circ}$ ■24点定位间隔角度 $15^{\circ} \pm 2^{\circ}$ 24detents Step angle: $15^{\circ} \pm 2^{\circ}$ |
| 6-4. 轴的推拉强度 Push-pull strength of shaft | 在轴端,沿轴向施加 8Kg 的静负荷力推和拉各10秒钟 (产品焊锡固定在PCB上。) Push and pull static load of 8Kg shall be applied to the shaft in the axial direction for 10s. (After soldering of the PC board) | 轴向虚位间隙0.4以内 Shaft play in axial direction 0.4 Max |
| 6-5. 端子强度 Terminal strength | 在端子的先端施加5N (500g) 的力1分钟。 A static load of 5N(500g) be applied to the tip of terminals for 1 minute in any direction. | 端子无损坏,无过度的松动.允许变形。 Without damage or excessive looseness of terminals. terminal bend is permitted. |
| 6-6. 轴套螺纹紧固强度 Bushing Nut Tighten Strength | | 7.0kgf.cm以上 7.0kgf.cm Min |
| 6-7. 轴向间隙 Shaft play in axial direction | | 0.4mm 以下 0.4mm Max |
| 6-8. 轴摆动 Shaft wobble | 在距离轴顶端5MM处,沿径向瞬间施加50mN.m (500gf.cm) 的力测试 A momentary load of 500gf.cm should be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft. | 0.7*L/30mm p-p 以下 (L: 指安装平面到轴的柄端的距离。) 0.7*L/30mm p-p Max L: Distance between mounting surface and measuring point on the shaft |
| 6-9. 轴的回转方向摆动 Shaft play in rotational wobble | 用角度板测定。 Testing by angle board. | 5 $^{\circ}$ 以下 5 $^{\circ}$ Max |

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7 耐久性能 Endurance Characteristics

| 项目 ITEM | 条件 CONDITIONS | 规格 SPECIFICATIONS |
|--|---|--|
| 7-1. 回转寿命 Rotational life | 在无负荷条件下轴以600~1000周/小时速度回转(顺时针旋转360°,再逆时针旋转360°为一周),一日连续5000~8000次。 The shaft of encoder shall be rotated at a speed of 600~1000cycles/H(clockwise for 360°, and then counter-clockwise for 360° as one cycle),without electrical load, after with measurements shall be made. (5000 to 8000 continuous cycles for 24 hours.) | ■在力矩≤100gf.cm时30,000±200周 30,000±200cycles per below 100gf.cm. □在力矩>100gf.cm时15,000±200周。 15,000±200cycles per above 100gf.cm. 振荡 t1, t3 ≤ 5mS. 突跳 t2 ≤ 3mS. 尚余有轻微定位感。 端子间接触阻抗200Ω以下 Chattering t1, t3 ≤ 5mS. Bounce t2 ≤ 3mS. Detent feeling has to remains Contact resistance 200ΩMax |
| 7-2. 耐湿性 Damp heat | 温度40±2℃,湿度90~95%的恒温恒湿槽中放置96±4小时后,在常温、常湿中放置1.5小时后测试。 The encoder shall be stored at temperature of40 ±2℃ with relative humidity of 90% to95% for96 ±4H in a thermostatic chamber.And the encoder shall be subjected to standard atmospheric conditions for 1.5H,After which measurements shall be made. | 所有项应满足初期规格 Specifications in clause all items is shall be satisfied. |
| 7-3. 耐热性 Dry heat | 温度85±3℃的恒温箱中放置96±4小时,常温、常湿放置1.5小时后测试。 The encoder shall be stored at a temperature of 85 ±3℃for 96 ±4H in a thermostatic chamber.And then the encoder.shall be subjected to standard atmospheric conditions for 1.5H,After which measurements shall be made. | 所有项应满足初期规格。 Specifications in clause all items is shall be satisfied. |
| 7-4. 低温特性 Cold | 温度-40±3℃的恒温箱中放置96±4小时,常温、常湿放置1.5小时后测试。 The encoder shall be stored at a temperature of -40 ±3℃for 96 ±4H in a thermostatic chamber.And then the encoder.shall be subjected to standard atmospheric conditions for 1.5H,After which measurements shall be made. | 所有项应满足初期规格。 Specifications in clause all items is shall be satisfied. |
| 7-5. 焊锡耐热性 Resistance to Soldering heat | 槽焊 Dip soldering. 使用基板: t=1.6mm的单面覆铜板。 Printed wiring board: single-sided copper clad laminate board with thickness of 1.6mm. 预热: 基板表面温度100℃以下,时间1分钟以内。 Preheating: 1. Surface temperature of board: 100℃ or less 2. Preheating time: within 1 minute. 焊接: 温度260±5℃或以下,时间3秒以内。 Soldering: Solder temperature: 260 ± 5℃ or less Immersion time: within 3S 手焊 Manual soldering. 温度300℃以下,时间3秒以内。 Bit temperature of soldering iron: 300℃less than Application time of soldering iron: within 3S. | 不得有绝缘体的破损、变形、接触无异常。 Electrical characteristics shall be satisfied No mechanical abnormality. |
| 7-6. 焊锡性 Solderability | 端子在260℃±5℃温度的焊锡槽内浸锡3秒±0.5秒。 The terminals shall be immersed into solder bath at 260℃for 3S ± 0.5S. | 浸渍面须有75%以上焊锡附着 A new uniform coating of solder shall cover75% minimum of the surface being immersed. |

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推动开关部分 Push Switch Portion

备注：以下规格适用于RE12编码器带开关系列。

Note: The following specification is only suitable for the one type with switch construction of RE12 encoder series.

1. 额定值 Rating

1-1. 额定电压

Rated voltage: DC 5V

1-2. 最大额定电流 (阻抗负载)

Maximum operating current (resistive load): 10mA Max

2. 电气性能 Electrical Characteristics

| 项目 ITEM | 条件 CONDITIONS | 规格 SPECIFICATIONS |
|------------------------------------|--|---|
| 2-1. 接触电阻 Contact resistance | 用DC 5V 1mA 电压测定。 Voltage test at DC 5V 1mA. | ≤ 100mΩ 100mΩ or less |
| 2-2. 绝缘阻抗 Insulation resistance | 在端子和安装板间施加电压 250V DC. Measurement shall be made under the condition which a voltage of 250V DC is applied between individual terminals and bushing and plank. | 100MΩ 以上 100MΩ Min |
| 2-3. 振荡 Bouncing | 以1秒钟1往返 (OFF-ON-OFF) 按压动作。 Shaft shall be push at 1 cycles/s (OFF-ON-OFF) | ≤ 10mS 10mS or less |
| 2-4. 耐电压 Dielectric strength | 在端子和安装板间施加AC300V电压1分钟 A voltage of 300V AC shall be applied for 1 minute between individual terminals and bushing and plank. | 不得有绝缘破坏 Without arcing or breakdown. |

3 机械性能 Mechanical Characteristics

| | | |
|--|---|---|
| 3-1. 开关电路 接点数 Switch circuit and number of pulse | | 单极单投 (按压ON) Single pole and single throw (push ON) |
| 3-2. 开关动作力 Operation force of switch | 在轴端, 沿轴向施加的按压力。 Push static load to the shaft in the axial direction | 200 ~ 1000gf |
| 3-3. 开关移动量 Travel of switch | | 0.5 ± 0.2 mm |

4 耐久性能 Endurance Characteristics

| | | |
|------------------------|---|--|
| 4-1. 按压寿命 Push-life | 在无负荷条件下沿轴向施以1Kgf以下的力, 以600次/小时的速度按压。 Push 1Kgf to the shaft of encoder in the axial direction under non-load conditions, and with a speed of 600 times/hour. | 20,000 ± 200次。 20,000 ± 200cycles. 接触电阻: ≤ 200mΩ. 其它应满足初期规格。 Contact resistance: 200mΩ or less. Specification in clause shall be satisfied. |
|------------------------|---|--|

包装部分 Packing Portion

| 项目 ITEM | 条件 CONDITIONS | 规格 SPECIFICATIONS |
|----------------------|---|--|
| 1-1. 包装方式 Packing | 使用泡沫盒和纸箱包装。 Packed in foamed plastic plate and carton. | 每盒250PCS, 每箱8盒。 共计: 2000PCS/箱 Put 250PCS products into foamed plastic plate, then pack 8 plates into a carton, total 2000PCS/carton. |
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