



EC28 系列规格书

1. 一般事项 General

1-1 适用规格 Scope

本规格书适用于电子设备用微小电流回路 28 型薄型回转式编码器。

This specification applies to 28mm size low-profile thin 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℃ to 35℃

相对湿度 Relative humidity : 25 % to 85%

气压 Air pressure : 86KPa to 106 KPa

1-3 使用温度范围

Operating temperature range : -35 ℃ to +80 ℃

1-4 保存温度范围

Storage temperature range : -40 ℃ to +85 ℃

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 : D.C. 5V

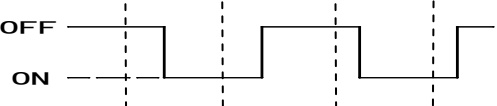
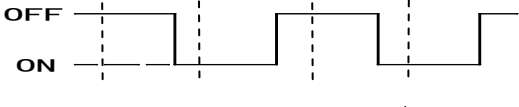
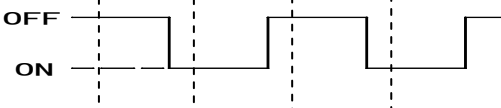
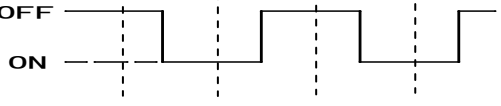
3-2 最大额定电流（阻抗负载）

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 1mA)

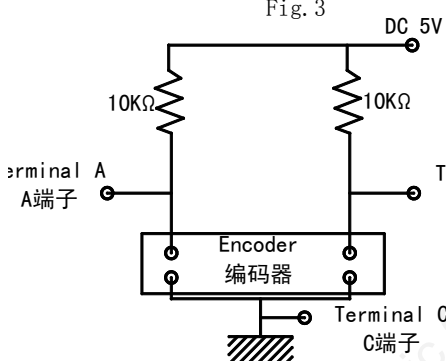
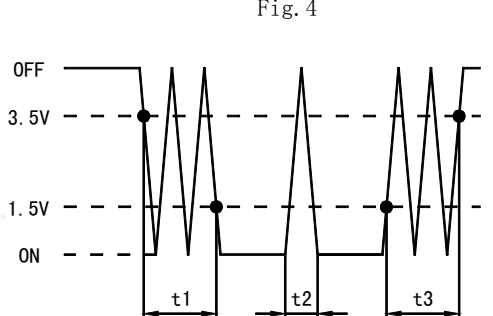
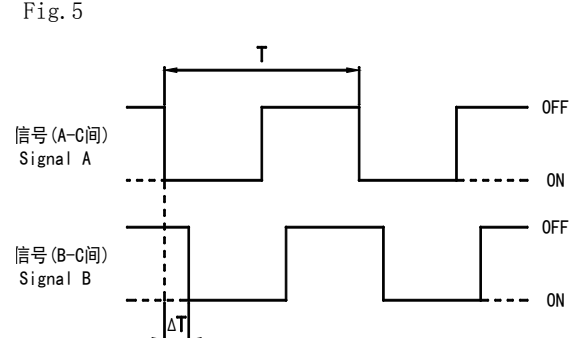
4. 电气性能 Electrical characteristics

项 目 Item		条 件 Conditions		规 格 Specifications	
4-1	输出信号 Output signal format	AB 两个信号的相位差输出波形详见 Fig. 1 (2); 虚线表示带卡点装置的上擎子处位置 2 phase-different signals (signal A, signal B)Details shown in fig. 1 (2);The broken line shows detent position			
		轴的回转方向 Shaft rotational direction	信 号 Signal	输 出 波 型 Output	
				15P (Fig.1)	
		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)		





EC28 系列规格书

4-2	分解能力 Resolution	回转一周的输出脉冲数 Number of pulses in 360° rotation	15 个脉冲/360° (Fig. 1) 15 pulses/360° for each phase
4-3	开关特性 Switching Characteristics	下 Fig. 3 所示回路, 轴以 360° /s 的速度回转测定。 Measurement shall be made under the condition as follows. Shaft rotational speed: 360° /s Test circuit: Fig. 3 Fig. 3  Fig. 4  (注) 编码器 ON 指输出电压 1.5V 以下的状态。 Code-ON area :The area which the voltage is 1.5V or less (Fig. 4) 编码器 OFF 指输出电压 3.5V 以上的状态。 Code-OFF area :The area which the voltage is 3.5V or more (Fig. 4)	
4-3-1	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)	$t1, t3 \leq 3ms$ 带卡点时, 在卡点位置上的 A 信号振荡无规定。 On the case within detent, B Signal will be irregular oscillation.
4-3-2	滑动杂音 (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, 如果各突跳间 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.	$t2 \leq 2ms$
4-3-3	滑动杂音 Sliding noise	编码 OFF 部份的电压变动。 The voltage change in code-OFF area.	3.5V 以上 3.5V MIN
4-4	相位差 Phase difference	以固定的速度 (360° /s) 操作轴进行回转。 Measurement shall be made under the condition which the shaft is rotated in constant speed. Fig. 5 	见 (Fig. 5) in (Fig. 5) $\Delta T \geq 5ms$
4-5	耐电压 Dielectric strength	在端子和轴套间施加 A.C 110V 电压 1 分钟。 A voltage of 110V A.C. shaft be applied for 1min between individual terminals and bushing.	不得有绝缘破坏 Without arcing or breakdown.





EC28 系列规格书

4-6	绝缘阻抗 Insulation resistance	在端子和安装板间施加电压 110V DC 1 分钟。Measurement shall be made under the condition which a voltage of. 110V DC 1min is applied between individual terminals and bushing.	端子和轴间电阻 10M Ω 以上 Between individual terminals and bushing:10M Ω MIN.
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5. 机械性能 Mechanical characteristics

项 目 Item		条 件 Conditions	规 格 Specifications
5-1	全回转角度 Total rotational angle		360° (无止挡点) 360° (Endless)
5-2	卡点出脱力矩 Detent torque	只适用于附卡点装置 Only suitable for C.C. equipment.	☐ 12 $\pm$ 7mN.m(120 $\pm$ 70gf.cm) ☐ 20 $\pm$ 10mN.m(200 $\pm$ 100gf.cm)
5-3	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.	30 点定位(间隔角度 12° $\pm$ 2°) 30 detents(Step angle: 12° $\pm$ 2°)
5-4	轴的推拉强度 Push-pull strength of shaft	在轴端, 沿轴向施加 100N(10kg)的推力和拉力各 10 秒钟。 (在 PCB 焊锡后) Push and pull static load of 100N shall be applied to the shaft in the axial direction for 10s. (After installing)	轴不得有明显松动。电气性能无异常。 Excessive play in shaft no excessive abnormality in rotational feeling. And electrical characteristics shaft be satisfied.
5-5	端子强度 Terminal strength	端子前端的任意方向施加 3N(0.3Kgf.cm)的静负荷力 1 分钟。 A static load of 3N shall be applied to the tip of terminals for 1 min in any direction.	端子不得有明显松动及接触不良, 但允许变形。 Without excessive play in terminal or poor contact.
5-6	轴的回转方向摆动 Shaft play in rotational wobble	用角度板测定 Testing by angle board.	4° 以下 4° MAX

6. 耐久性能 Endurance characteristics

项 目 Item		条 件 Conditions	规 格 Specifications
6-1	回转寿命 Rotational life	在无负荷条件下轴以 600~1000/h 速度回转 30,000 周。 The shaft of encoder shall be rotated to 15,000 cycles at a speed of 600~1000/h without electrical load, after which measurements shall be made.	振荡: t ₁ , t ₂ $\leq$ 3mS Chattering t ₁ , t ₂ $\leq$ 3mS 卡点出脱力矩 -50%~+10% Detent torque -50%~+10%
6-2	耐湿性 Damp heat	温度 40 $\pm$ 2℃、湿度 90~95% 的恒温恒湿槽中放置 240 $\pm$ 10 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 of 40 $\pm$ 2℃ with relative humidity of 90% to 95% for 240 $\pm$ 10h in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5h. After which measurements shall be made.	应满足初期规格。 Specifications in clause
6-3	耐热性 Dry heat	温度 80 $\pm$ 3℃ 的恒温箱中放置 240 $\pm$ 10 小时, 常温、常湿放置 1.5 小时后测量。 The encoder shall be stored at a temperature of 80 $\pm$ 3℃ for 240 $\pm$ 10h in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5h. After witch measurement shaft be made.	应满足初期规格。 Specifications in clause
6-4	低温特性 Cold	温度 -40 $\pm$ 3℃ 的恒温箱中放置 240 $\pm$ 10 小时, 常温、常湿放置 1.5 小时后测量。 The encoder shall be stored at a temperature Of -40 $\pm$ 3℃ for 240 $\pm$ 10h in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5h. After witch measurement shall be made.	应满足初期规格。 Specifications in clause





EC28 系列规格书

7. 其它、面的注意事项 Precautions in use.

7-1 不要在高温、多湿及腐蚀性气体环境中保管。

During operation storage in high temperature and in corrosive gas. should be avoided.

7-2 对编码器脉冲数的处理、设计时，要充分考虑速度、脉冲调制时间和杂音干扰等因素。

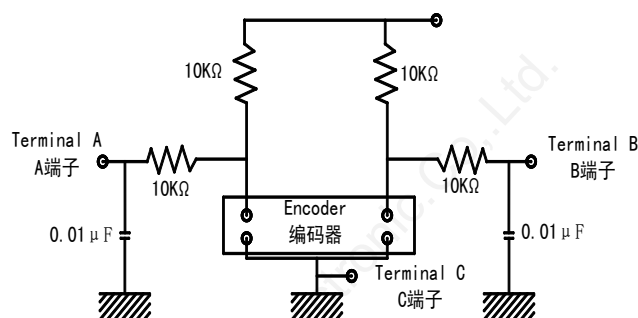
As design of the pulse count process. Care should be taken with operational speed.

7-3 本制品在卡点上使 A 相在 OFF 状态下比较安定，软件设计时以 A 相为标准。

With this part detent positions we always be aligned with a-off phase. Therefore Make the a phase the reference at the soft ware design stage.

7-4 编码器的脉冲数处理电路希望按下图附加滤波器。

The circuit of the pulsecount process should be adding filter as figure.



7-5 本制品本体若接触水分则对脉冲波形能产生异常影响，避免直接接触水分。

This product when touching wet or water can be influence the pulse wave.

7-6 本制品对轴不能施加横压力，为避免制品机能损伤，应事先设置旋钮方向。

The shaft can't be over pressure. For avoided damaged the function, pleasePre-setting the button direction.

7-7 本制品对轴不要施加过大的冲击力，以免使产品机能受损。

Please don't shocking the shaft. To avoided damaged the function.

7-8 焊接注意事项 Note for soldering method

手工焊接 Manual soldering

温度 350℃ 以下，时间 3 秒以内。

• Bit temperature of soldering iron : 350℃ or less.

• Application time of soldering iron : within 3s.

槽 焊 Dip soldering

预热：基板表面温度 100℃ 以下，时间 2 分钟以内。

Preheating:

• Surface temperature of board : 100℃ or less.

• Preheating time : Within 2 min.

焊接：温度 260℃ ± 5℃ 以下，时间 3 ± 1 秒以内。

Soldering:

• Solder temperature : 260℃ or less.

• Immersion time : Within 3s.

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