

# 回轉式位元產生器規格書

## ROTATIONAL ENCODER SPECIFICATION

### 一,一般事項 General

#### 1~1 適用範圍 Application

適用於電子機器的微小電流回路用之12mm迴轉式位元產生器

Application: This specification applies to 12mm size rotary encoder (incremental) for microscopic current circuit used electronic equipment.

#### 1~2 標準狀態 Standard atmospheric conditions

若無特別規定,依下述狀態測定:

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows.

溫度 Ambient temperature : 15°C to 35°C

相對濕度 Relative humidity : 25% to 85%

氣壓 Air pressure : 86kpa to 106kpa

但如有疑問時,依下述基準狀態實施:

If there is any doubt about the results, measurements shall be made within the following limits:

溫度 Ambient temperature : 20±2°C

相對濕度 Relative humidity : 60% to 70%

氣壓 Air pressure : 86kpa to 106kpa

#### 1~3 使用溫度範圍

Operating temperature range : -10°C to +70°C

#### 1~4 保存溫度範圍

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

#### 1~5 構造,尺寸 Construction and dimensions 依組立圖 Refer to attached drawing

#### 1~6 額定 Rating : D.C 5V 0.5mA

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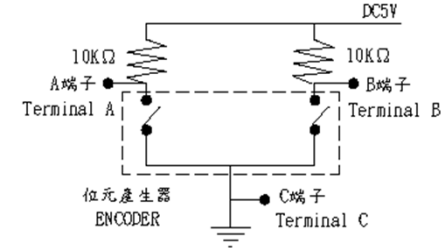
### 二. 電氣性能 Electrical Characteristics

NO.	項目 item	條件 conditions	規格 specifications		
2-1	輸出信號 output signal format	<圖一> <fig. 1>	A . B 二信號的輸出時間相位差, 詳細如<圖一>所示. (圖中虛線表示掣子點定位置) 2. Phase-different signals (Signal A. & signal B) Details shown in <fig.1 > (The broken line shows detent position of with detent type.)		
			軸回轉方向 Shaft rotational direction	信號 Signal	輸出波形 Output 定速旋轉 constant speed : 360°
			順時針方向 C. W.	A (A-C 端子間) A (Terminal A-C)	
				B (B-C 端子間) B (Terminal B-C)	
反時針方向 C. C. W.	A (A-C 端子間) A (Terminal A-C)				
	B (B-C 端子間) B (Terminal B-C)				
2-2	分解能 Resolution	旋轉一圈所產生脈波數目. Number of pulses in 360° rotation .	各相24脈波/360° 24 pulses / 360° for each phase 1掣子點1Pulse(1click 1 Pulse)		

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2-3	切 換 特 性 Switching characteristics	<p>切換測定回路如&lt;圖二&gt;所示, 以直流電壓5V, 軸回轉速度為每秒鐘回轉360°測定。 Measurement shall be made under the condition as follows.</p> <p>(1). Shaft rotational speed : 360° / S (2). Test circuit : &lt; fig. 2 &gt; .</p> <p style="text-align: center;">&lt; 圖 二 &gt; &lt; fig. 2 &gt;</p> 	
2-4	滑 動 雜 音 Sliding noise	<p>(1) 震顛雜音 Chattering 如&lt;圖三&gt;所示, 位元由狀態OFF→ON或ON→OFF變化時, 輸出電壓在1.5V~3.5V的切換時間稱之。 Details shown in &lt;fig.3&gt; Specified by the signal's passage time from 3.5V to 1.5V or from 1.5V to 3.5V of each switching position ( code OFF→ON or ON→OFF ).</p> <p>注意：針對震顛雜音(t1, t3)部分, 請於訊號抓取上加以遮蔽, 進行過濾雜訊。 建議追加過濾迴路, 如&lt;圖四&gt;所示。 Note : To avoid chattering( t1 , t3), please consider masking time and adding C/R filters on your circuit for pulse count design, as show in &lt;fig. 4&gt;.</p>	$t_1, t_3 \leq 3ms$

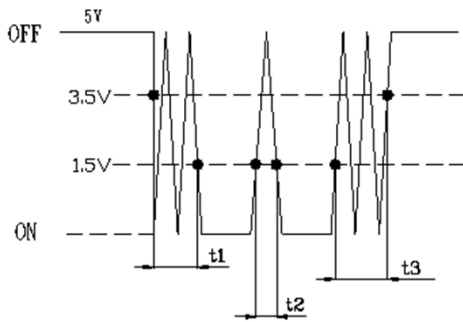
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		<p>(2) 跳躍雜音 Bounce            如&lt;圖三&gt;所示,位元在ON的狀態時,電壓超過1.5V以上的時間視為.當在位元ON狀態時,與震顛雜音(t<sub>1</sub>或t<sub>3</sub>)時間間隔小于1ms時,則該跳躍雜音視為震顛雜音的一部份.            當在位元ON狀態時,兩個跳躍雜音間的時間間隔小于1ms時,則視為同一跳躍雜音.            Details shown in &lt;fig.3&gt; .Specified by the time of voltage change exceed 1.5V in code - ON area .            When the bounce has code - ON time less than 1ms between chatterings ( t<sub>1</sub> or t<sub>3</sub> ), 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 .</p>	t <sub>2</sub> ≤ 2ms
		<p>(3) 滑動雜音 Sliding noise            位元OFF狀態時的電壓變動.            The voltage change in code-OFF area</p>	3.5V 以上 3.5V Min.

<圖三> <fig. 3>



(t<sub>1</sub>,t<sub>3</sub>)Masking time to avoid chattering.

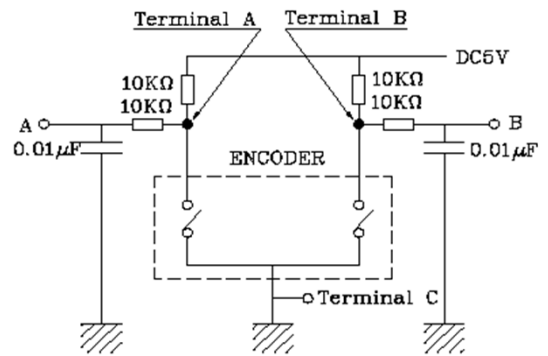
位元OFF狀態：輸出電壓3.5V以上的狀態稱之。

位元ON狀態：輸出電壓1.5V以下的狀態稱之。

Code - OFF area：The area which the voltage is 3.5V or more .

Code - ON area：The area which the voltage is 1.5 V or less .

<圖四> <fig. 4>



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NO.	項目 item	條件 conditions	規格 specifications
2-5	相位差 Phase-difference	<p>以定速每秒鐘旋轉360°測定之。 Measurement shall be made under the condition which the shaft is rotated in 360° /S (constant speed)</p> <p>&lt;圖五&gt; &lt;fig.5&gt;</p> <div style="text-align: center;"> </div>	<p>如圖五所示, in &lt; fig. 5&gt;</p> <p><math>\Delta T \geq 3.5 \text{ msec}</math></p>
<p>注意事項: ※2.4-2.5之規格, 為360°/秒等速下運轉檢測之, 與手動旋轉會有所不同。 ※與韌體程式之搭配性, 請實際使用測試確認之。</p> <p>Note: ※The test is conducted with equipment at constant speed: 360°/S according to Spec. Item 2.4 &amp; 2.5, and the test result could be different from the result by manual test.</p> <p>※In order to prove the interoperability between the firmware and the encoder, please test the part in real condition.</p>			
2-6	絕緣阻抗 Insulation resistance	<p>外加電壓250V D.C 於固定板與任一端子間。 Measurement shall be made under the condition which a voltage of 250V D.C is applied between individual terminals and attaching plate.</p>	<p>固定板與端子間100MΩ 以上。 Between individual terminals and bushing . Plate: 100MΩ MIN .</p>
2-7	耐電壓強度 Dielectric strength	<p>於固定板與任一端子間外加電壓300V A.C.1分鐘 或外加 A.C 360V 2 秒鐘測定 A voltage of 300V A.C. shall be applied for 1 min or a voltage of 360 VA.C. shall be applied for 2 sec between individual terminals and attaching plate. (Leak current : 1mA)</p>	<p>無損傷, 短路及絕緣破壞現象。 Without arcing or breakdown .</p>

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### 三. 機械性能 Mechanical characteristics

NO.	項目 item	條件 conditions	規格 specifications
3-1	全回轉角度 Total rotational angle		360° 回轉 360° ( Endless )
3-2	掣子點數及位置 Number and position of detents		24點掣子 24 detents 每點角度: 15° ± 3° Step angle : 15° ± 3°
3-3	掣子點轉距 Detent torque		30~200gf.cm
3-4	端子強度 Terminal strength	外加靜重300gf之力于端子前端之任意方向1分鐘。 A static load of 300gf shall be applied to the tip of terminals for 1 minute in any direction .	端子無損壞或顯著鬆動, 但是端子可允許彎曲 . Without excessive play in terminals or poor contact.
3-5	軸擠壓引張強度 Push - pull strength of shaft	在軸之方向加壓力或張力之靜負荷8Kgf 10秒 ( 實裝狀態 ) . Push and pull static load of 8Kgf shall be applied to the shaft in the axial direction for 10sec .( After installing )	不可有電氣或機械上的異常 Without damage to. or excessive play in shaft .No excessive abnormality in rotational feeling. And electrical characteristics shall be satisfied.
3-6	軸鬆動 Shaft wobble	軸前端5mm處加上500gf.cm之力矩 . A momentary load of 500gf.cm shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft .	1.0xL/30 mm p-p以下 (MAX) L : 軸的固定長度。 L : Shaft length.

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NO.	項目 item	條件 conditions	規格 specifications
3-7	軸垂直側壓強度 Side thrust Strength of shaft	軸前端5mm處,加上2Kgf的靜荷重10秒. A load of 2Kgf shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft.(After soldering of PC board)	不可有電氣或機械上的異常 Without excessive play or bending in shaft. No mechanical abnormality.
3-8	軸回轉方向間隙 Rotation Play at the click position	使用角度板測定之 Measure with jig for rotational angle.	4° 以內 4° MAX.

### 四. 耐久性能 Endurance characteristics

NO.	項目 item	條件 conditions	規格 specifications
4-1	回轉壽命 Rotational life	無任何電氣負荷下,軸以每小時600~1000回轉的速度下,持續進行30,000回轉. (1回轉為360°往返各一次) The shaft of encoder shall be rotated to 30,000cycles at a speed of 600~1000 cycles per hour without electrical load , after which measurement shall be made . (1 cycle : rotate 360°C.C.W. rotate 360° C.W.)	震顛雜音: $t_1, t_3 \leq 5mS$ 跳躍滑動雜音: $t_2 \leq 3mS$ 相位差: $\Delta T \geq 2.5msec$ 其它初期值亦需滿足。 Chattering: $t_1, t_3 \leq 5ms$ Bounce: $t_2 \leq 3ms$ Phase-difference: $\Delta T \geq 2.5msec$ Except above items. specifications in clause 2.1~7 and 3.1~8 shall be satisfied.

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### 五. 焊錫耐熱性 Soldering condition

NO.	項目 item	條件 conditions	規格 specifications
5-1	人工手焊 Manual Soldering	溫度350°C以下, 時間3秒鐘以內。 Bit temperature of soldering : 350°C or less Application time of soldering : 3sec. Max.	不可發生絕緣體變形, 破損以及感觸異常。 There shall be no deformation or cracks in molded part. No excessive abnormality in rotational feeling.
5-2	自動焊錫 Dip soldering	使用基板: t1.6兩面銅泊積層板。 Printed wiring board : Single-sided copper clad laminate board with thickness of 1.6mm . 助焊劑: 發泡式助焊機內置比重0.82以上的助焊劑發泡面高度為基板板厚之2/3。 Flux : * Specific gravity: 0.82 or more. * Flux shall be applied to the board using a bubble foaming type fluxed. * The board shall be soaked in the flux bubble only to the 2/3 of its thickness. 預熱條件: 基板表面溫度100°C以下, 時間2分鐘以內 Preheating : * Surface temperature of board : 100°C or less. * Preheating time: within 2 min. 焊錫爐條件: 溫度260±5°C, 時間5±1秒。 Soldering : * Solder temperature : 260±5°C * Immersion time : 5±1 sec. 以上工程以一次或兩次為宜。 Apply the above soldering process for 1 or 2 times.	

**ROHS COMPLIANCE**

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