

# 回轉式位元產生器規格書

## ROTATIONAL ENCODER SPECIFICATION

### 一般事項 General

#### 1~1 適用範圍 Application

此規範適用於一般電子機器之微小電流回路用之迴轉式位元產生器

This specification applies to size rotary encoder for microscopic current circuit, used in electronic equipment.

#### 1~2 標準範圍 Standard atmospheric conditions

如無特別規定限制,測試時需標準狀態範圍下,此範圍如下:

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 : 45% to 85%

氣壓 Air pressure : 86kPa to 106kPa

但對此標準狀態之測定值發生判定疑問或有特別要求則以基準狀態為準測定,此範圍如下:

If there is any doubt the results, measurement shall be made within the follow limits:

溫度 Ambient temperature : 20 ±2°C

相對濕度 Relative humidity : 65% to 5%

氣壓 Air pressure : 86kPa to 106kPa

#### 1~3 使用溫度範圍

Operating temperature range : -10° to +65°C

### 二,構造尺寸 dimensions Construction

依組立圖 Refer to attached drawing

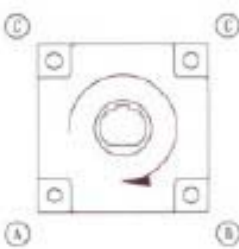




### 三, 定格電壓 Rated voltage :D.C. 5V

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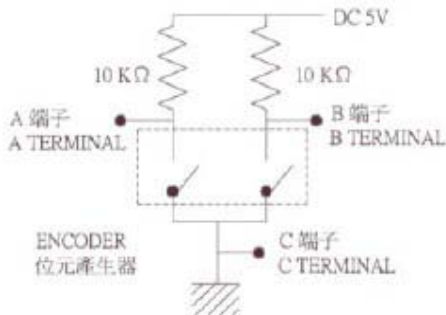
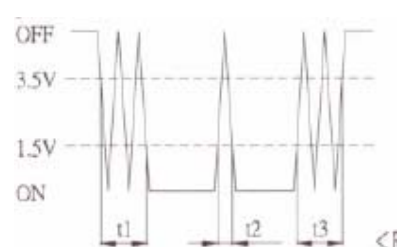
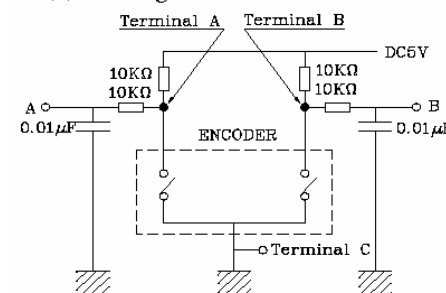
### 一. 電氣性能 Electrical Characteristics

NO.	項目 item	條件 conditions	規格 specifications		
1-1	輸出信號 output signal format	 <p>&lt;表一&gt; &lt;TABLE.1&gt;</p>	A. B 二信號的輸出時間相位差, 詳細如<表一>所示. 2. Phase-different signals ( Signal A. & signal B ) Details shown in < TABLE.1 >		
			軸回轉方向 Shaft rotational direction	信號 Signal	輸出波形 Output
			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 )					
1-2	分解能 Resolution	旋轉一圈所產生脈波數目. Number of pulses in 360° rotation .	各相3脈波/360° 3 pulses / 360° for each phase		

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NO.	項目 item	條件 conditions	規格 specifications
1-3	切換特性 Switching characteristics	切換測定回路如<圖二>所示,測定時軸回轉速度為每秒鐘回轉360°. Measurement shall be made under the condition as follows. (1). Shaft rotational speed : 360°/S (2). Test circuit : < fig. 2 > . < 圖二> < fig. 2 > 	
1)	震顛雜音 Chattering	如<圖三>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. As < fig. 3> 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 ).  <圖三> <fig. 3> 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 1.5V or less. 注意: 針對震顛雜音 (t <sub>1</sub> ,t <sub>3</sub> )兩部分,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<圖四>所示 Note: To avoid chattering (t <sub>1</sub> ,t <sub>3</sub> ),please consider masking time and adding C/R filters on your circuit for pulse count design ,as show in <fig.4> <圖四> <fig. 4> 	t <sub>1</sub> ,t <sub>3</sub> ≤ 3ms

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NO.	項目 item	條件 conditions	規格 specifications
2)	跳躍 旋轉雜音 Rotational noise ( Bounce )	<p>如&lt;圖三&gt; 位元在ON的狀態時,電壓超過1.5V以上的時間. 當在位元ON狀態時,與震顛雜音(<math>t_1</math>或<math>t_3</math>)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,兩個跳躍雜音間的間隔小于 1ms時,則視為同一跳躍雜音.</p> <p>As &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 chattering ( <math>t_1</math> or <math>t_3</math> ), 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>	$t_2 \leq 2ms$
3)	旋轉雜音 Rotational noise	<p>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.
1-4	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). &lt;圖四&gt; &lt;fig.4&gt;</p> <div style="text-align: center;"> <p style="font-size: small;">A信號(A-C間) Signal A OFF B信號(B-C間) Signal B ON</p> </div> <p>注意事項:手動操作者,輸出波形會隨旋鈕大小 及回轉速度變化,回路設計時請實裝確認. Note : Above specification is changeable . When operate by manual , please check performance using actual circuit and knob . *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. *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. *In order to prove the interoperability between the firmware and the encoder ,please test the part in real condition.</p>	<p>如圖四所示, <math>\Delta T \geq 14 ms</math> As &lt;fig.4&gt;</p>

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NO.	項目 item	條件 conditions	規格 specifications
1-5	絕緣阻抗 Insulation resistance	外加電壓DC250V于上蓋與任一端子間。 Measurement shall be made under the condition which a voltage of 250VD.C. 1mA is applied between individual terminals and case .	上蓋與端子間100MΩ以上。 Between individual terminals and case . 100MΩ MIN .
1-6	耐電壓強度 Dielectric strength	於上蓋與任一端子間外加電壓A.C. 50V 1分鐘。 A voltage of 50V A.C. shall be applied for 1 min between individual terminals and case.	無損傷,短路及絕緣破壞 現象。 Without arcing or breakdown .

### 二. 機械性能 Mechanical characteristics

2-1	全回轉角度 Total rotational angle		360° 回轉 360° ( Endless )
2-2	迴轉轉距 Rotational torque		10±5gf-cm
2-3	鉸合強度 Strength of rivet	在貫穿軸之方向加壓力或張力之靜負荷50N ( 5Kgf)10秒 Push or pull static load of 50N ( 5Kgf) shall be applied to the hollow shaft in the axial direction for 10S.	不可有電氣或機械上的異常 Appearance without damage . No excessive abnormality in rotational feeling. And electrical charcteristics shall be satisfied.

### 三. 耐久性能 Endurance characteristics

NO.	項目 item	條件 conditions	規格 specifications
3-1	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 30,000 cycles at a speed of 600-1000 cycles per hour without electrical load , after which measurement shall be made . ( 1 cycles : rotate 360°CCW rotate 360°CW )	迴轉轉距 : 10±5gf-cm 相位差 : 14msec 以上 震顛雜音 : 3msec 以下 絕緣阻抗 : 50MΩ以上 耐電壓 : AC 50V 1分鐘 Rotational torque: 10±5gf-cm Phase-difference: 14msec MIN. Chattering: 3msec MAX. Insulation resistance: 50MΩ MIN. Dielectric strength : AC 50V for 1 min. 其它滿足試前規定 Other shall be satisfied initial specification.

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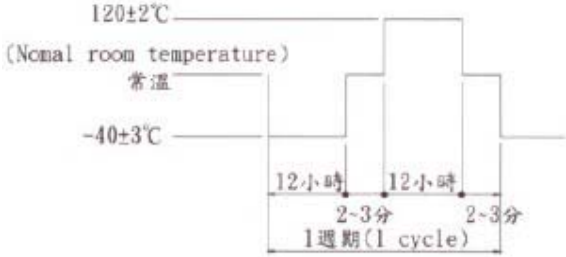
### 四. 耐候環境性 Environmental test

項目 Property	試驗條件 Test conditions	判定基準 Performance
4-1 耐寒性 Cold proof	-40±2℃放置96小時試驗後,置于常溫常濕中1小時,除去水滴後,在1小時內測定之. After testing being at -40±2℃ in temperature for 96 hours, the sensor shall be allowed to stand under normal temperature and humidity conditions for 1 hours, and then measurement shall be made within 1 hour. Water drops shall be removed.	迴轉轉距: 10±5gf-cm 相位差: 14msec 以上
4-2 耐熱性	85±2℃放置96小時試驗後,置于常溫常濕中1小時,在1小時內測定之. After testing being at 85±2℃ in temperature for 96 hours, the sensor shall be allowed to stand under normal room temperature and humidity conditions for 1 hours, and then measurement shall be made within 1 hour.	震顛雜音: 3msec 以下 絕緣阻抗: 50MΩ以上 耐電壓: AC 50V 1分鐘 Rotational torque: 10±5gf-cm Phase-difference: 14msec MIN. Chattering: 3msec MAX. Insulation resistance: 50MΩ MIN. Dielectric strength : AC 50V
4-3 耐濕性能 Moisture resistance	在溫度40±2℃,相對濕度95%放置96小時試驗後,置于常溫常濕中1小時,除去水滴後在1小時內測定之. After testing being at 40±2℃ and 95%RH for 96 hours, the sensor shall be allowed to stand under normal room temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour. Water drops shall be removed.	for 1 min. 其它滿足試前規定 Other shall be satisfied initial specification.

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項目 Property	試驗條件 Test conditions	判定基準 Performance
4-4 溫度循環試驗 Change of Temperature	<p>以下記條件做5個周期的試驗後放置1小時以內測試之, 但是水珠必須去除 .</p> <p>After 5 cycles of following conditions , the switch shall be allowed to stand under room temperature and humidity conditions for 1 hour and measurement shall be made within 1 hour after that . Water drops shall be removed .</p> 	<p>迴轉轉距 : 10±5gf-cm</p> <p>相位差 : 14msec 以上</p> <p>震顛雜音 : 3msec 以下</p> <p>絕緣阻抗 : 50MΩ以上</p> <p>耐電壓 : AC 50V 1分鐘</p> <p>Rotational torque: 10±5gf-cm</p> <p>Phase-difference: 14msec MIN.</p> <p>Chattering: 3msec MAX.</p> <p>Insulation resistance: 50MΩ MIN.</p>
4-5 鉍錫耐熱性 Resistance of soldering heat	<p>依下列條件試驗後測定之</p> <p>置於150±2°C之高溫槽2分鐘後再放置260±2°C的高溫槽1分鐘, 然後回到常溫測試。</p> <p>The test shall be conducted under the for follwing conditions .</p> <p>Re-flow soldering Re-flow</p> <p>The sensor shall be stored in a chamber at 150±2°C for 2 min. Then the sensor shall be kept in a chamber at 260±2°C for 1 min. The measurement shall be made after going back to normal room temperature.</p>	<p>Dielectric strength : AC 50V for 1 min.</p> <p>其它滿足試前規定</p> <p>Other shall be satisfied initial specification.</p>

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### 五. 焊錫使用注意事項 Precaution in Soldering.

◎焊錫條件 Reflow soldering condition Reflow

Reflow 焊錫方式參考例 Example of re-flow soldering condition (reference)

加熱方式：以遠距離紅外線上下加熱之

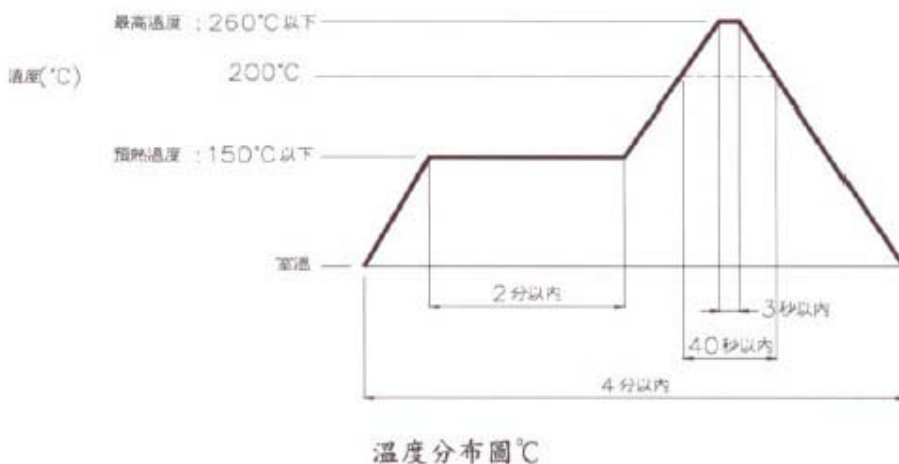
Heating method : Double heating method with infrared heater.

(1)上述條件為P.C.B組裝表面溫度，部分基板因材質，大小及厚度等引起基板溫度與sensor表面溫度很大差異，Encoder 表面溫度勿超過260°C請確認。

The condition mentioned above is the temperature on the P.C board surface on which parts are mounted. There are cases where board's temperature greatly differs from sensor's surface temperature. Depending on the board's material size thickness etc. Care therefore should be taken to prevent the Encoder's surface temperature from exceeding 260°C.

(2)因REFLOW 爐的種類不同，條件設定上亦有所差異，使用前詳加確認。

As the conditions vary some how depending on the kind of reflow soldering equipment please make sure you have the right one before use



◎人工焊錫 Manual soldering

若以人工焊錫實施焊錫時，必須附帶下列條件：

In case an manual soldering apparatus is used for soldering adhere to the following conditions.

項目 Item	焊錫條件 Soldering condition
焊錫溫度 Soldering temperature	350°C以下 350°C max.
連續焊錫時間 Continuous soldering time	3 秒以下 3 sec max.

### 其它注意事項 Other precautions :

(1). 在焊錫過程中，不可用溶劑或類似品清洗感測器。

Following the soldering process do not try to clean the switch with a solvent or the like .

(2). 焊錫時請注意防止助焊劑從頂部滲入。

Safeguard the switch assembly against flux penetration from its top side .

(3). 為了避免保管場所的環境引起變化，未及使用之前，請勿拆封，位元產生器的保存期限出貨後3個月內。

Please have the products keep in close status and the storage time is 90 days guaranty agter delivering the goods at most .

### ROHS COMPLIANCE

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