



## (旋轉式)傳感器規格書

編號 NO. SE16-01-026

公司名稱 CO. Name

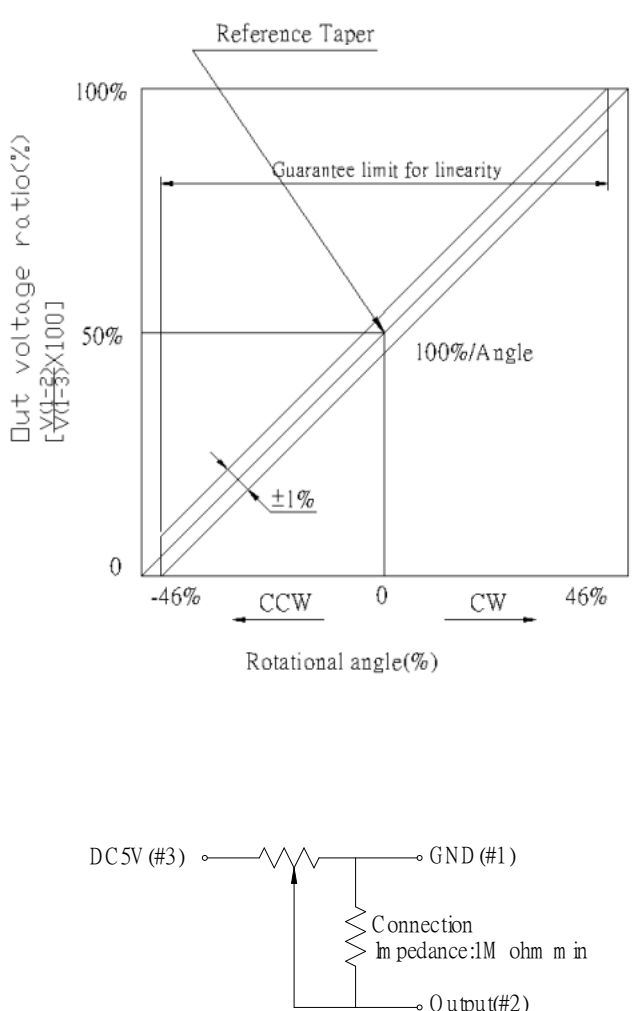
型號名稱 Model Name : SE16-01 B4K7

### 一. ELECTRICAL CHARACTERISTICS 電氣特性

日期 (DATE): 2023 年 10 月 28 日

序號 NO	項目 ITEM	性能 PERFORMANCE	測試條件 TEST CONDITIONS
1.1	Total resistance 全阻值	4.7 K±20%	Between terminal 1 and terminal 3. 1-3 端子間.
1.2	Rated power 額定功率	Single unit: ■ Linear taper B:0.25W 單聯 : ■ B 型 : 0.25W	The rated power is a max. power which is applied between terminal 1 and 2. 額定功率最大時是指施加於端子 1 和 2 的功率。

江苏国科新昌科技有限公司

1.3	Line error 線性誤差	Variation line shall be within $\pm 1.5\%$ . 線性變化為 $\pm 1.5\%$	<p>Measured with the angle and the circuit as below (Figure 1) 測試的角度及電路如圖 1</p>  <p>Figure-1</p>
1.4	Rated voltage 額定電壓	DC 5 $\pm$ 0.5V	<p><math>E = \sqrt{PR}</math>  E:額定電壓 Rated voltage(V)  P:額定電力 Rated power(W)  R:公稱阻值 Normal total resistance(<math>\Omega</math>)  The rated voltage is calculated by above formula. When the rated voltage exceeds the maximum operating voltage, the maximum operating voltage should be the rated voltage.  額定電壓按以上公式計算，當額定電壓超過最大工作電壓時，最大工作電壓即為額定電壓。</p>

## 二. MECHANICAL CHARACTERISTICS 機械特性

序號 NO	項目 ITEM	性能 PERFORMANCE	測試條件 TEST CONDITIONS
----------	------------	-------------------	-------------------------

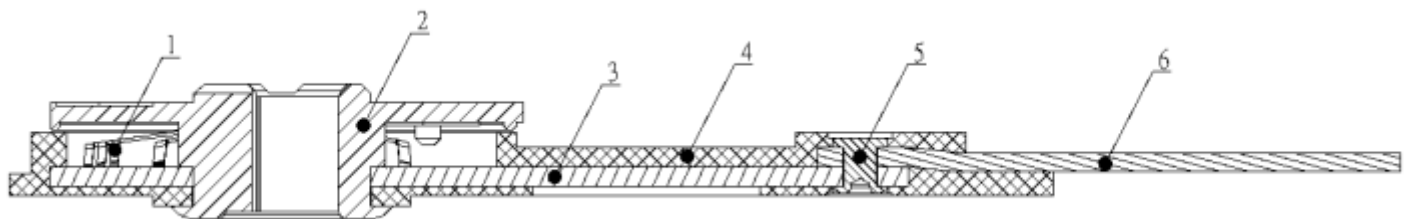
2.1	Angle of effective rotation 有效回轉角度	340°±3°	
2.2	Rotational Torque 旋轉力矩	0~100gf.cm	Rotational torque shall be measured according to JIS C5261 (issued in1993)para.6.2. 旋轉力矩測量方式參照 JIS C5261(1993 發行)參數 6.2
2.3	Terminal strength 端子強度	There shall be neither remarkable shaft wobble nor intermittence. The terminal bent, however, is allowed. 軸心無明顯的晃動及間斷感,端子可變形。	The tensile static load of 0.6kgf shall be applied to the terminal in the axial direction for 10±1s,and then the static load of 0.3kgf in a perpendicular direction for 10±1s. 施加靜止的負載 0.6kgf 於端子的軸向的方向 10 ±1 秒, 以及在端子的垂直方向上施加靜止的負荷 0.3kgf 10±1 秒。
2.4	Solder ability 可焊性	With no less than 90%, the surface immersed into solder shall be covered with new solder, expect for cutting surface. 浸入的表面的新焊料所覆蓋不少於 90%, 切斷表面除外。	Specimen shall be immersed into solution of rosin ethanol for 3~5 seconds, and specimen shall be put in the laminated board (1.6 mm thick),and then specimen shall be immersed into solder bath on to the bottom surface of board for 3+/-0.5 seconds. As follows: 1)In case of Pb free solder (Sn-3Ag-0.5Cu) Solder Temp.:245+0/-3°C 2)In case of Pb solder(Sn-37Pb) Solder Temp.:235+0/-3°C 將樣品浸入調好松香酒精的溶液 3~5 秒, 並且將樣品裝入積層薄板(1.6 毫米厚), 然後將樣品浸入焊液沖洗端面 3+0/-0.5 秒。如下: 1)如果為無鉛焊料(Sn-3Ag-0.5Cu) 焊接溫度 :245 +0 /-3°C 2)如果有鉛焊料(Sn-37Pb) 焊接溫度:235 +0 /-3°C
2.5	Resistance to soldering heat 焊錫耐熱性	Variation rate of total resistance shall be within ±5%.There are no any loosened terminal which may cause intermittence. 全阻值變化在±5%以內, 端子不能鬆動及引起斷路。	The following soldering shall be applied. The measurement is conducted after 1~2h left in standard condition. The specimen shall be put in laminated board(single copper foil board) with 1.0mm thick. Each terminal shall be soldered with iron tip of 360+0/-10°C for 3+1/-0 seconds. Wattage of iron 30W max. 焊接方式如下, 測量是在放置標準狀態 1~2 小時之后進行將樣品安裝到 1.0 毫米厚沖好的積層薄板(單面銅箔板),每個端子將被的 360+0 /-10°C 的鉻鐵焊接 3+1/-0 秒。 鉻鐵功率最大為 30 瓦。

### 三. ENDURANCE CHARACTERISTICS 耐久性能

序號 NO	項目 ITEM	性能 PERFORMANCE	測試條件 TEST CONDITIONS
3.1	Cold 耐寒性	The total resistance change should be within $\pm 20\%$ . Variation line shall be within $\pm 3\%$ . 全阻值變化要在 $\pm 20\%$ 以內， 線性變化為 $\pm 3\%$	Temperature: $-40 \pm 3^\circ\text{C}$ Time: $168 \pm 4$ hours surface moisture shall be removed, and then the controller shall be subjected to standard atmospheric conditions for $24+8/-0$ hours after which measurement shall be made 溫度在 $-40 \pm 3^\circ\text{C}$ 放置 $168 \pm 4$ 小時，表面水份攝取后 $24+8/-0$ 小時正常狀態下測試。
3.2	Dry heat 耐熱性	The total resistance change should be within $\pm 20\%$ . Variation line shall be within $\pm 3\%$ . 全阻值變化要在 $\pm 20\%$ 以內， 線性變化為 $\pm 3\%$	Temperature: $+95 \pm 3^\circ\text{C}$ Time: $168 \pm 4$ hours The controller shall be subjected to standard atmospheric conditions for $24+8/-0$ hours after which measurement shall be made. 溫度在 $95 \pm 3^\circ\text{C}$ 放置 $168 \pm 4$ 小時， $24+8/-0$ 小時后正常狀態下測試。
3.3	Humidity (Steady state) 耐濕(穩定狀態)	The total resistance change should be within $\pm 20\%$ . Variation line shall be within $\pm 3\%$ . 全阻值變化要在 $\pm 20\%$ 以內， 線性變化為 $\pm 3\%$	The specimen shall be subjected in a test chamber at $85 \pm 2^\circ\text{C}$ , $90 \sim 95\% \text{r.h}$ at no load for $250 \pm 8$ hours and then left in the standard conditions for 24 to 32 hours. 溫度 $85 \pm 2^\circ\text{C}$ ，濕度 $90 \sim 95\%$ 之槽內，無負載放置 $250 \pm 8$ 小時后，在常溫常濕放置 $24 \sim 32$ 小時后測量。
3.4	Vibration 震動試驗	The total resistance change should be within $\pm 20\%$ . Variation line shall be within $\pm 3\%$ . 全阻值變化要在 $\pm 20\%$ 以內， 線性變化為 $\pm 3\%$	The rotary position sensor should be rested under the condition of the acceleration of gravity $2.2\text{G}$ and the frequency $4000\text{cpm}$ , shocked for 4 hours in each of 3 mutually perpendicular directions. Then the rotary position sensor should be kept in the dry box for 1~2 hours. 產品被放置在重力加速度為 $2.2\text{G}$ 振動頻率為 $4000\text{cpm}$ 的狀態下，在3個相互垂直的方向中，每個方向振動4小時後，產品放在乾燥箱1~2hrs后測試。
3.5	Humidity Load Life 耐濕負載壽命	The total resistance change should be within $\pm 20\%$ . Variation line shall be within $\pm 3\%$ . 全阻值變化要在 $\pm 20\%$ 以內， 線性變化為 $\pm 3\%$	The specimen shall be subjected in a test chamber at $85 \pm 2^\circ\text{C}$ , $90 \sim 95\% \text{r.h}$ with a riced DC voltage applied across terminals 1 and 3 for $96 \pm 4$ hours at a cycle consisting of an "ON" time 1.5 hours and on "OFF" time 0.5 hours under the condition .That it shall be left in the standard conditions for 24 to 32 hours. 樣品在溫度 $85 \pm 2^\circ\text{C}$ ，濕度 $90 \sim 95\%$ 之槽內，1 和 3 腳加載直流定格電壓 1.5 小時 ON、0.5 小時 OFF。 如此循環連續負載測試 $96 \pm 4$ 小時，放置在常溫常濕室內 $24 \sim 32$ 小時后測試。

3.6	Rotational Life 旋轉壽命	Variation rate of total resistance should be within $\pm 20\%$ . Variation line shall be within $\pm 3\%$ . 全阻值變化要在 $\pm 20\%$ 以內，線性變化為 $\pm 3\%$	Test temperature: standard condition; Operating angle: $-46\% \sim +46\%$ of effective rotation ; Rotation angle: 6 rpm; Operating cycles: 500,000 cycles min.; Power supply: Rated voltage; Incline of the hollow shaft: $1^\circ$ Max. 常溫下壽命 500,000 Min., 測試速度 6rpm, 測試電壓為額定電壓，測試時軸心偏移角度最大 $1^\circ$ 。 (測試範圍為有效電氣角度的 $-46\%$ 到 $+46\%$ )									
3.7	Heat shock 溫度沖擊	The total resistance change should be within $\pm 20\%$ . Variation line shall be within $\pm 3\%$ . 全阻值變化要在 $\pm 20\%$ 以內，線性變化為 $\pm 3\%$	The potentiometer shall be subjected to 100 successive changes of temperature cycles, each as shown in table below. Then its surface moisture shall be removed. And then the potentiometer shall be subjected to standard atmospheric conditions: 1~2 hours, after which measurements shall be made. 下表所示连续进行 100 次温度衝擊，擦除表面水分于常溫常濕中放置 1~2 小时測定。 <table border="1" data-bbox="783 786 1552 1001"> <thead> <tr> <th>Step 階段</th> <th>Temperature 溫度</th> <th>Duration 放置时间</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>85 \pm 3^\circ\text{C}</math></td> <td>2 hours</td> </tr> <tr> <td>2</td> <td><math>-40 \pm 3^\circ\text{C}</math></td> <td>2 hours</td> </tr> </tbody> </table>	Step 階段	Temperature 溫度	Duration 放置时间	1	$85 \pm 3^\circ\text{C}$	2 hours	2	$-40 \pm 3^\circ\text{C}$	2 hours
Step 階段	Temperature 溫度	Duration 放置时间										
1	$85 \pm 3^\circ\text{C}$	2 hours										
2	$-40 \pm 3^\circ\text{C}$	2 hours										

#### 四、產品結構圖 Parts List



序號 Item	零件名稱 Parts name	材質 Material	表面處理 Surface treatment
1	折動子 Slider	C5210R-SH 磷青銅 0.1t	鍍銀 (料帶) Silver-plated
2	檔片 Stop plate	PA66+30%GF	/
3	電阻片 Element	玻璃纖維板 FR4	碳素銀漿
4	本體 Base	PBT+30%GF	/
5	鉚釘 Rivet	C1020 無氧紅銅	鍍鎳 Ni-plated
6	端子 Terminal	C2680R-H 黃銅	鍍霧錫 Sn-plated

## 五.General 一般事項

序 號 NO	項 目 ITEM	
5.1	Application 適用範圍 This Specification is applied to the FSE28 types mainly used for consumer products.	
	Operating temperature range 使用溫度範圍	-40°C~+85°C
	Storage temperature range 保存溫度範圍	-40°C ~+95°C
	Test Conditions 試驗狀態	Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows: 除另有規定外，量測應在標準狀態下進行： 溫度 Ambient temperature: 5°C ~35°C 濕度 Relative humidity: 45~85%RH 氣壓 Air pressure: 86~106kPa  If there is any doubt about the results, tests shall be conducted at the following conditions : 遇有疑慮時，則測試應在以下狀態下進行： 溫度 Ambient temperature: 20°C±2°C 濕度 Relative humidity: 60~70%RH 氣壓 Air pressure: 86~106KPa
5.2	Appearance, Style and Dimensions 外觀、形狀、尺寸	
	Appearance 外觀	FSE16 shall be no defects that affect the serviceability of the product. FSE16 不可有影響產品服務性的暇疵存在。
	Style and Dimensions 形狀和尺寸	Refer to the assembly drawings. 參考成品圖
	Type of actuating 動作形式	Rotation 旋轉
	Contact arrangement 回路形式	Refer to the assembly drawings. 參考成品圖
<b>六 Notice on usage 使用注意事項</b>		
6.1	Due to the material used such as poly-carbonate and/or ABS of non-crystalline polymer, the unit may be damaged when it will touch some kinds of organic solvents , grease or inorganic chemicals. 由于材質用是塑膠類，故當產品接觸到有机溶劑、潤滑油或無機化學物會受到破壞。	

6.2	<p>Strafe under being packed 去除包裝的損害</p> <p>After being received, the products packed shall be stored under 85% max. r.h. at 5 to 35°C shall not be stored in the place where dew and /or harmful gas are not to deserved. Please use the products within 3 months after the receipt.</p> <p>在收到之后，包裝的產品應儲存在最大濕度 85%以下，溫度在 5~35°C，在儲存地方內不應在那裡露或者有害氣體的環境下請收到產品 3 月內使用。</p>	
<p style="text-align: center;">核 準</p> <p style="text-align: center;">Approved by</p>	<p style="text-align: center;">審 查</p> <p style="text-align: center;">Checked by</p>	<p style="text-align: center;">經 辦 者</p> <p style="text-align: center;">Designed by</p>