
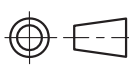


P.C.B MOUNTING HOLE DETAIL

注：(A) - (G) 为重点管控尺寸。

01				03	
00	ORIGINAL DRAWING		2020-03-06	02	
ISSU.	REVISION		DATE	ISSU.	
蓝庆金	HUNG KAM PIU	HUNG KAM PIU	TOL. UNLESS OTHERWISE SPEC.	 SOUNDWELL ELECTRONICS	
			BASIC DIMENSIONS	TOL.	TITLE: ENCODER
			$L \leq 10$	± 0.3	MODEL: EC121102X2B-HA1-116
DSGD.	CHKD.	APPD.	$10 < L$	± 0.5	
	SCALE		$100 \leq L$	± 0.8	SPECIFICATION: 24P5-FA200B120
	UNIT	mm	ANGLE	$\pm 5^\circ$	

EC12 SERIES SPECIFICATION

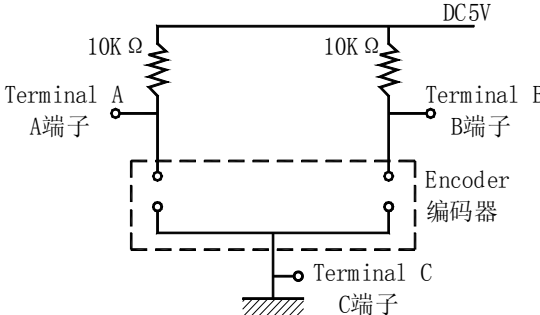
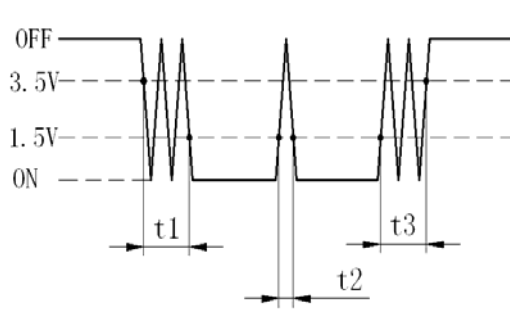
EC12系列规格书

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1、 General 一般事项
1-1、 Scope 适用规格 This specification applies to 12mm size low-profile thin rotary encoder (incremental type) for microscopic current circuits used in electronic equipment. 本规格书适用于电子设备用微小电流回路12型回转式编码器。
1-2、 Standard atmospheric conditions标准状态 Unless otherwise specified, the standard range of atmospheric conditions for making measurements and test is as follows: 除另有规定外，测量应在以下状态下进行： Ambient temperature温度： 15°C to 35°C Relative humidity相对湿度： 25% to 85% Air pressure气压 : 86kPa to 106kPa
1-3、 Operating temperature range 使用温度范围 : -40°C to 85°C
1-4、 Storage temperature range 保存温度范围 : -40°C to 85°C
2、 Construction 构造
2-1 Dimensions 尺寸 Refer to attached drawing 见所附成品图
3、 Rating 额定值
3-1、 Rated voltage 额定电压: DC 5V
3-2、 Maximum operating current (resistive load)最大额定电流（阻抗负载） Each lead 各相导线 : 0.5mA (MAX 5mA; MIN 0.5mA) Common lead 公共导线: 1mA (MAX 10mA; MIN 0.5mA)
4、 Application Notes 使用上的事项
4-1、 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. 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。
4-2、 The encoder pulses count method should be designed with taking operating speed ,sampling time and design of the microcomputer software into consideration. 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件等考虑进去。
4-3、 With this products ,detent positon will always be aligned with A-OFF phase. Therefore make the A phase the reference at the soft ware design stage. 此产品在定位点状态时A相波形是处于OFF状态, 因此在设计软体时请留意此现象。
4-4、 At design of the pulse count process. Using the C/R filter circuit is recommended. 在设计时要考虑到杂讯, 建议使用C/R滤波电路。
4-5、 Care must be taken not to expose this product to water or dew to prevent possible problem in pluses output wave form. 本产品请勿碰触到水, 可能会导致输出波形的异常。

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5、 ELECTRICAL CHARACTERISTICS 电气性能			
ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格	
5-1、 Output signal format 输出信号	<p>Note: Output signal is 1 pulse per 1 detents. And terminal A-C is pulse ON or OFF at detent positions. No specified output of terminal B-C at detent positions.</p> <p>注意事项：输出信号方式是1个定位1个脉冲。在定位点位置时A-C端子处于OFF状态，而B-C端子间不作特定要求。</p>	<p>Signals phase difference (Signal A, signal B) Details is shown in fig.1. (The broken line shows detent positions) A、B两信号输出相位差,输出波形详见(图1)。虚线表示带卡点装置的上攀子处位置。</p>	
	<p>Shaft rotational direction 轴回转方向</p>	<p>Signal 信号</p>	<p>Output (fig.1) 输出波形(图1)</p>
	<p>C.W. 顺时针方向</p>	<p>A(Terminal A-C) A(A-C端子间)</p>	<p>OFF </p> <p>ON </p>
	<p>C.C.W. 逆时针方向</p>	<p>B(Terminal B-C) B(B-C端子间)</p>	<p>OFF </p> <p>ON </p>
5-2、 Resolution 分解能力	<p>Number of pulses in 360° rotation. 回转360°的输出脉冲数。</p>	<p>12 <input type="checkbox"/> 18 <input type="checkbox"/> 24 <input checked="" type="checkbox"/> pulses/360° for each phase 12 <input type="checkbox"/> 18 <input type="checkbox"/> 24 <input checked="" type="checkbox"/> 个脉冲/360°</p>	
5-3、 Switching characteristics 开关特性	<p>Measurement shall be made under the condition as follows. 1) Shaft rotational speed : 360°/s 2) Test circuit : (fig.2) 下(图2)所示回路,轴以360°/秒的速度回转测定。</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Terminal A A端子</p> <p>Terminal B B端子</p> <p>Encoder 编码器</p> <p>Terminal C C端子</p> </div> <div style="text-align: center;"> <p>(fig.3) 图3</p>  </div> </div> <p>(Note) 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) 编码器OFF指输出电压3.5V以上的状态。 编码器ON指输出电压1.5V以下的状态。</p>		
5-3-1、 Chattering 振荡	<p>Specified by the signal's passage time from 1.5V to 3.5V of each switching position (code OFF→ON or ON→OFF) 编码从OFF→ON或ON→OFF时,输出1.5V~3.5V通过的时间应符合规定。</p>	<p>If the product is with detent, B signal will be irregular oscillation.带卡点时,在卡点位置上的B信号振荡无规定。 $t_1, t_3 \leq 3ms$</p>	
5-3-2、 Sliding noise (Bounce) 滑动杂音(突跳)	<p>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. 编码ON部分的1.5V以上的电压变动时间在振荡t1,t3之间会产生1毫秒以上1.5V以下的ON部分.另外,如果各突跳间1.5V以下的范围在1毫秒以上时,则判定为另一个突跳。</p>	<p>$t_2 \leq 2ms$</p>	

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5、ELECTRICAL CHARACTERISTICS 电气性能		
ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格
5-3-3、Sliding noise 滑动噪音	The voltage change in code - OFF area. 编码OFF部分的电压变动。	3.5V MIN 3.5V 以上
5-4、Phase difference 相位差	<p>Measurement shall be made under the condition which the shaft is rotated in contant speed.以固定的速度操作轴进行回转。 (Fig.4)图4</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>C W 顺时针方向 A信号(A~C间) Signal A</p> <p>B信号(B~C间) Signal B</p> </div> <div style="margin-left: 20px;"> <p>OFF</p> <p>ON</p> <p>OFF</p> <p>ON</p> </div> </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>C C W 逆时针方向 A信号(A~C间) Signal A</p> <p>B信号(B~C间) Signal B</p> </div> <div style="margin-left: 20px;"> <p>OFF</p> <p>ON</p> <p>OFF</p> <p>ON</p> </div> </div>	$\Delta T \geq 0.08T$ In(fig.4) 见图4
5-5、Insulation resistance 绝缘电阻	Measurement shall be made under the condition which a voltage of 250V DC 1min is applied between individual terminals and bracket. 在端子和安装板间施加电压 250V DC 1分钟。	Between individual terminals and bracket 10MΩ MIN. 端子安装板间电阻10MΩ以上。
5-6、Dielectric strength 耐电压	A voltage of 50V AC shall be applied for 1 minute between individual terminals and bracket. 在端子和安装板间施加 AC 50V电压1分钟。	Without arcing or breakdown. 不得有绝缘破坏。
6 Mechanical characteristics 机械性能		
6-1、Total ratational angle 全回转角度		360°(Endless) 360°(无止挡点)
6-2、Detent Torque 定位点力矩	Only suitable for C.C, equipment. 只适用于附卡点装置	$9 \pm 6 \text{ mNm}$ (90±60 gf.cm)
6-3、Number and position of detent 定位点数及位置	Only suitable for C.C, equipment. 只适用于附卡点装置	<input type="checkbox"/> 12 detents(Step angle:30°±3°) 12点定位 (间隔角度 30°±3°) <input type="checkbox"/> 18 detents(Step angle:20°±3°) 18点定位 (间隔角度 20°±3°) <input checked="" type="checkbox"/> 24 detents(Step angle: 15°±3°) 24点定位 (间隔角度 15°±3°)
6-4、Push-pull strength of shaft 轴推拉强度	<p>Push and pull static load of shall be applied to the shaft in the axial direction for 10s. (After soldering of the PC board) 在轴端,沿轴向施加的静负荷力推和拉各10秒钟 (焊锡固定在PCB上)。</p> <p><input type="checkbox"/> With switich 5.1kgf <input checked="" type="checkbox"/> On Without switch 10kgf <input type="checkbox"/> 带开关为5.1kgf <input checked="" type="checkbox"/> 不带开关为10kgf</p>	Without damage or excessive play in shaft No excessive abnormality in rotational feeling. And electrical characteristics shall be satisfied. 轴无破损,回转无异常;电气性能无异常。
6-5、Terminal strength 端子强度	A static load of 3N(0.31kgf) shall be applied to the tip of terminals for 10S in any direction. 端子前端的任意方向施加3N(0.31kgf)的静负荷力10秒钟。	Without excessive play in terminal or poor contact. 端子不得有明显松动及接触不良。
6-6、Shaft wobble 轴摆动	A momentary load of 5N(0.51Kg) shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft. 在轴前端5mm处,沿径向瞬间施加5N (0.51Kg)的力。	1.0x L / 30mm p-p MAX(L:shaft length) 1.0 x L / 30mm p-p 以下 (L:安装长度)
6-7、Nut tightening strength 螺母紧固强度	Nut tighten with 8.0kgf.cm 螺母紧固强度为8.0kgf. cm.	No excessive uneven rotation feeling occur 不可有回转发生 (打滑)。

此项不适用

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6 Mechanical characteristics 机械性能		
ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格
6-8、Side thrust strength of shaft 轴的垂直押引强度	A load of 20N(2.04Kgf) shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft for 10s. 在轴前端5mm处加20N(2.04Kgf)的静负荷力10秒钟.	Without excessive play of bending in shaft. No mechanical abnormally. 轴不得有明显松动及接触不良.
6-9、Shaft play in rotational wobble 轴的回转方向摆动	Testing by angle board. 用角度板测定.	4° MAX 4° 以下
7 Endurance characteristics 耐久性能		
7-1、Rotational life 回转寿命	The cycles that the shaft of encoder shall be rotated to at a speed of 600~1000 cycles/H without electrical load, after which measurements shall be made. 在无负荷条件下轴以600~1000周/小时速度回转的周数。 <input checked="" type="checkbox"/> Rotate Torque 旋转力矩 ≤100gf. cm 30,000cycles <input type="checkbox"/> Rotate Torque 旋转力矩 >100gf. cm 15,000cycles	Chattering t1,t3≤5ms 振荡 t1,t3≤5ms Bounce t2≤3ms 突跳 t2≤3ms Torque: Relative to the previously specified value: -50%~+10% 力矩: 为原始规格值的 -50%~+10%
7-2、Damp heat 耐湿性	The encoder shall be stored at temperature of 40°C±2°C with relative humidity of 90% to 95% for 96±4h in a thermostatic chamber. And the encoder shall be subjected to standard atmospheric conditions for 1.5h, after which measurements shall be made. 温度40°C±2°C,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.	Specifications in clause all items is shall be satisfied. 所有项应满足初期规格
7-3、Dry heat 耐热性	The encoder shall be stored at a temperature of 80°C±3°C for 240±10h in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5h, after which measurement shall be made. 温度80°C±3°C的恒温箱中放置240±10小时,常温、常湿放置1.5小时后测试.	Specifications in clause all items is shall be satisfied. 所有项应满足初期规格
7-4、Cold 低温特性	The encoder shall be stored at a temperature of -25°C±3°C for 96±4h in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5h, after which measurement shall be made. 温度-25°C±3°C的恒温箱中放置96±4小时,常温、常湿放置1.5小时后测试.	Specifications in clause all items is shall be satisfied. 所有项应满足初期规格
7-5、Solder ability 焊锡性	The terminals shall be immersed into solder bath at 260°C±5°C for 3s±0.5s in the same manner as para. 端子在260°C±5°C温度的焊锡槽内浸锡3秒±0.5秒。	A new uniform coating of solder shall cover 75% minimum of the surface being immersed. 浸渍面须有75%以上焊锡附着
7-6、Resistance to Soldering heat 耐焊接热	<input checked="" type="checkbox"/> Manual soldering 手工焊接 Bit temperature of soldering iron: below 350°C Application time of soldering iron: within 3 s. 温度350°C以下,时间3秒以内。 <input type="checkbox"/> Dip soldering 槽焊 1. Printed wiring board : copper clad laminate board with thickness of 1.6mm; 使用基板: t=1.6mm的覆铜板。 2. Solder flux: Specific gravity: 0.82 or more. Flux shall be applied to the board using a bubble foaming type fluxer. The board shall be soaked in the flux bubble only to the middle of its thickness. 助焊剂: 使用发泡式比重0.82以上的焊剂,发泡面高大致在基板厚度一半的位置,而且助焊剂不可流入基板表面上。 3. Preheating : Surface temperature of board: 100°C or less; Preheating time : within 2 min. 预热: 基板表面温度100°C以下,时间2分钟以内。 4. Soldering : Solder temperature : 260°C±5°C less Immersion time: within 5±1 s 焊接: 温度260°C±5°C,时间5±1 s。 Apply the above soldering process for 1 or 2 times. 以上工程适用1至2次。	Electrical characteristics shall be satisfied. No mechanical abnormality. 不得有绝缘体的破损、变形、接触无异常。

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Push switch portion 推动开关部分		此项不适用			
<p>Note: The following specification is only suitable for the EC12 encoder series with push-on switch. 注：以下规格只适用于此EC12编码器系列带开关结构。</p>					
1-1、Rated capacity (Resistance load) 额定容量 (电阻负荷)					
DC 5V 10mA (1mA MIN)					
1-2 Electrical characteristics 电气性能					
ITEM 项目	CONDITIONS 条件	SPECIFICATIONS 规格			
1-2-1、Contact resistance 接触电阻	Voltage step-down test at DC 5V 1mA 用DC 5V 1mA 电压降下法测定.	100mΩ MAX 100mΩ 以下			
1-2-2、Chattering 振荡	Switch is operated at the rate of 1 cycle 1 sec .The 1 cycle shall be OFF-ON-OFF 以1秒钟1往返 (OFF-ON-OFF) 操作开关.	10ms MAX 10ms 以下			
1-2-3、Insulation resistance 绝缘电阻	Measurement shall be made under the condition which a voltage 50V DC 1min±5s is applied between individual terminals and tracked 在端子与安装板间施加电压DC 50V 1分钟±5秒。	Between individual terminals and bracket 10MΩ MIN. 在端子安装板间10MΩ以上			
1-2-4 Dielectric strength 耐电压	A voltage of 50V AC /min or 60 V AC /2S(leak current 1mA) be applied between individual terminals and bracket.在端子与安装板间施加AC 50V 1分钟或AC 60V 2秒钟 (漏电流1mA)	Without arcing or breakdown. 不得有绝缘损坏。			
1-3 Mechanical characteristics 机械性能					
1-3-1、Switch circuit and number of pulse 开关电路、接点数		Single pole and single throw (push on) 单极单投 (推ON)			
1-3-2、Travel of switch 开关移动量		0.5 ^{+0.4} _{-0.3} mm			
1-3-3、Operating force of switch 开关作动力		4.5±2.5 N (450±250gf)			
1-4 Endurance characteristics 耐久性能					
Push operating life 寿命特性	The encoder's shall be pushed to 20,000 cycles at a speed of 1800±300/h without electrical load.(shaft push load: 1kgf max.) 在无负荷条件下,对轴以每小时1800±300次的速度推动20000次. (轴按压力1kgf以下).	Contact resistance : 200mΩ max. Specification in clause 1-2-2~4,1-3-1~2 shall be satisfied. Operating force: 80% of initial value. 接触电阻 : 200mΩ以下. 1-2-2~4,1-3-1~2 满足初期规格. 开关作动力为寿命前的80%.			
文控编号EC- 003	制定日期	 SOUNDWELL ELECTRONIC			
版本号: 06	2012-9-12				
变更记事	变更时间				
2.重新整理	2006-5-8	DSGD 主办	CHKD 审查	APPD. 核准	TITLE 标题: ENCODER 编码器
3.增加螺母强度规格	2006-12-2	技术部 20-06-06 李苗	技术部 20-06-06 欧阳昌雄	技术部 20-06-06 苏朝晖	
4.修改轴推拉强度	2008-9-8				DOCUMENT No.文号:
5.重新整理	2010-4-3				EC12-01
6.焊锡耐热性规格修改	2012-9-12				