



标准&定制开关连接器产品制造商
DONG GUAN XI BANG ELECTRONICS CO., LTD.

规格书

SPECIFICATION

CUSTOMER NAME	客户名称:	_____
CUSTOMER NO.	客户编号:	_____
SERIES	系列:	编码开关/电位器XB-EC11
MODEL NO.	型号:	XB-EC-11-0041XXseries
DRAWING NO.	图形号:	ENCODER W/I SWITCH

If specification of this product meets your request, please confirm all the items of it and return to us with signature and stamp, it will be basis of our production and record. Thanks your cooperation in advance!

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并签名和盖章后回传给我司, 以作我司产品制作之
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Quality core! Afterburner for Made in China!

EC11 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 11 型薄型回转式编码器。

This specification applies to 11mm 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°C to 35°C
 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 : -40 °C to +70 °C

1-4 保存温度范围

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

2. 构造 Construction

2-1 尺寸 Dimensions

见所附成品图 Refer to attached drawing

3. 额定值 Rating

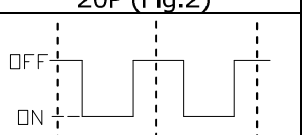
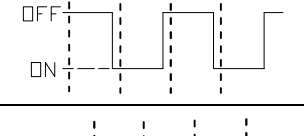
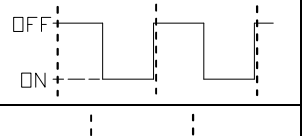
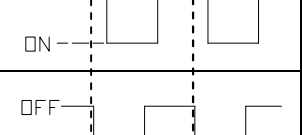
3-1 额定电压

Rated voltage : DC 5V

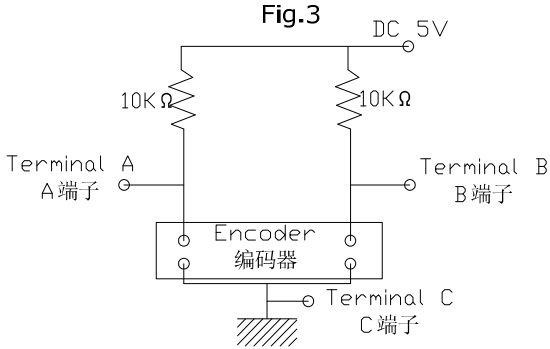
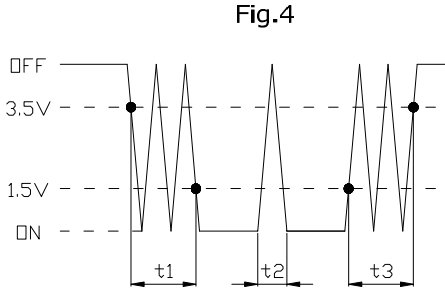
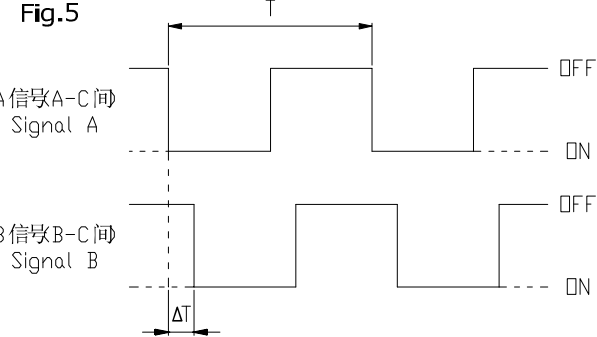
3-2 最大额定电流（阻抗负载）

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)

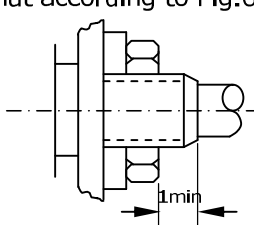
4. 电气性能 Electrical characteristics

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
	输出波形 Output	
	15P (Fig.1)	
	20P (Fig.2)	
	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)	
	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)	
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 □ 20 个脉冲/360°(Fig.2) 20 pulses/360°for each phase

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4-3	开关特性 Switching Characteristics	<p>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</p> <div style="text-align: center;">  </div> <p>(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)</p>	<div style="text-align: center;">  </div>
4-3-1	振荡 Chattering	<p>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)</p>	<p>$t_1, t_3 \leq 3\text{mS}$ 带卡点时,在卡点位置上的 B 信号振荡无规定。 On the case within detent, B Signal will be irregular oscillation.</p>
4-3-2	滑动杂音 (突跳) Sliding noise (Bounce)	<p>编码 ON 部份的 1.5V 以上的电压变动时间在振荡 t_1, t_3 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 (t_1 or t_3), 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>	$t_2 \leq 2\text{mS}$
4-3-3	滑动杂音 Sliding noise	<p>编码 OFF 部份的电压变动。 The voltage change in code-OFF area.</p>	3.5V 以上 3.5V MIN
4-4	相位差 Phase difference	<p>以固定的速度(360°/s)操作轴进行回转。 Measurement shaft be made under the condition which the shaft is rotated in constant speed. Fig.5</p> <div style="text-align: center;">  </div>	见(Fig.5) in (Fig.5) MIN $\Delta T = 0.08T$
4-5	耐电压 Dielectric strength	<p>在端子和轴套间施加 AC 300V 电压 1 分钟。 A voltage of 300V AC shaft be applied for 1min between individual terminals and bushing.</p>	不得有绝缘破坏 Without arcing or breakdown.
4-6	绝缘阻抗 Insulation resistance	<p>在端子和轴套间施加 DC 250V 1mA Measurement shaft be made under the condition which a voltage of 250V DC is applied between individual terminals and bushing.</p>	端子和轴间电阻 100MΩ 以上 Between individual terminals and bushing: 100MΩ MIN.

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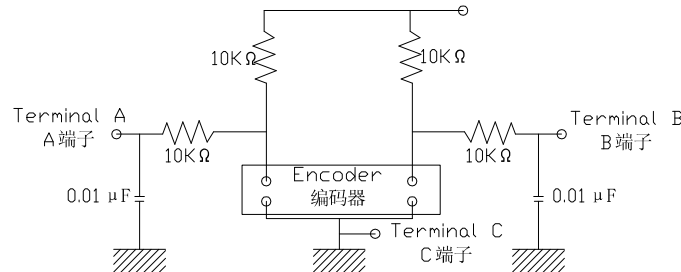
5. 机械性能 Mechanical characteristics			
项目 Item	条件 Conditions		规格 Specifications
5-1	全回转角度 Total rotational angle		360°(无止挡点) 360°(Endless)
5-2	卡点出脱力矩 Detent torque	只适用于附卡点装置 Only suitable for C.C, equipment.	3~20mN.m(30~200gf.cm)
5-3	定位点数及位置 Number and Position of detent	只适用于附卡点装置 Only suitable for C.C, equipment.	<input checked="" type="checkbox"/> 30 点定位(间隔角度 $12^{\circ}\pm 2^{\circ}$) 30 detents(Step angle: $12^{\circ}\pm 2^{\circ}$) <input type="checkbox"/> 20 点定位(间隔角度 $18^{\circ}\pm 2^{\circ}$) 20 detents(Step angle: $18^{\circ}\pm 2^{\circ}$)
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 5N(0.5Kgf.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	轴摆动 Shaft wobble	在轴前端 5mm 处,沿径向瞬间施加 50mN.m (0.5 Kgf.cm)的力。 A momentary load of 50mN.m shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft.	0.7xL/30mm p-p 以下 (L 是安装长度,按比例计算) 0.7xL/30mm p-p MAX (L: shaft length)
5-7	轴的回转方向摆动 Shaft play in rotational wobble	用角度板测定 Testing by angle board.	5°以下 5°MAX
5-8	轴套锁紧强度 Bushing nut Tightening strength	依下图(Fig.6)安装方式。 Tighten the nut according to Fig.6 	1 N.m(10Kgf.cm)以下之力使用。 Tightening torqu to be no greater than 1 N.m
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: $t_1, t_2 \cong 3mS$ Chattering $t_1, t_2 \cong 3mS$ 卡点出脱力矩 -30%~+10% Detent torque -30%~+10%
6-2	耐湿性 Damp heat	温度 $40\pm 2^{\circ}C$ 、湿度 90~95% 的恒温恒湿槽中放置 240 ± 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 $40\pm 2^{\circ}C$ 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 $80\pm 3^{\circ}C$ 的恒温箱中放置 240 ± 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 $80\pm 3^{\circ}C$ for $240\pm 10h$ in a thermostatic chamber. And then the encoder shall be subjected to standard	应满足初期规格。 Specifications in clause

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		atmospheric conditions for 1.5h. After witch measurement shaft be made.	
6-4	低温特性 Cold	<p>温度$-40\pm 3^{\circ}\text{C}$的恒温箱中放置240 ± 10小时，常温、常湿放置1.5小时后测量。</p> <p>The encoder shall be stored at a temperature Of $-40\pm 3^{\circ}\text{C}$ for $240\pm 10\text{h}$ in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5h. After witch measurement shall be made.</p>	应满足初期规格。 Specifications in clause 4.1~4.6 and 5.1~5.3 shall be satisfied.
6-5	耐振性 Vibration	<p>10~55~10Hz 变振动(1 开闭 1 分钟/振幅 1.5mm)，在 X.Y.Z.方向上各 2 小时。</p> <p>The following vibration shall be applied to the encoder, after which measurement shall be made: The entire frequency range. from 10Hz to 55Hz and return to 10Hz. shall be transversed in 1 min. Amplitude (total excursion): 1.5mm This motion shall be applied for a period of 2h in each of 3 mutually perpendicular axes .</p>	应满足初期规格。 Specifications in clause

7. 其它、面的注意事项 Precautions in use.

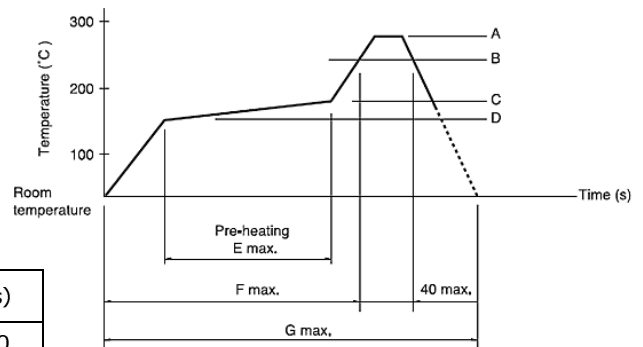
- 7-1 不要在高温、多湿及腐蚀性气体环境中保管。
During operation storage in high temperature and in corrosive gas.should be avoided.
- 7-2 对编码器脉冲数的处理、设计时，要充分考虑速度、脉冲调制时间和杂音干扰等因素。
As design of the pulse count process. Care should be taken with operational speed.
- 7-3 本制品在卡点上使 A 相在 OFF 状态下比较安定,软件设计时以 A 相为标准。
With this part 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

回流焊 Reflow soldering

- (1) 下述条件，为印刷电路板的零部件贴装面上的温度。根据回路板的材质，大小，厚度等，回路板温度和开关表面温度会有很大的不同，请注意不要使开关表面温度达到 250°C 以上。
- (2) 根据回流槽的种类，条件稍有不同，请事先充分进行确认之后使用



A(°C) 3s max.	B(°C)	C(°C)	D(°C)	E(s)	F(s)	G(s)
260	230	180	150	120	-	240

推动开关部份 Push Switch Portion

1. 额定值 Rating



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- 1-1 额定电压
Rated voltage : DC 5V
- 1-2 最大额定电流 (阻抗负载)
Maximum operating current (resistive load) : 10 mA Max

2. 电气性能 Electrical characteristics

项目 Item	条件 Conditions	规格 Specifications
2-1 接触电阻 Contact resistance	用 DC 5V 1mA 电压降下法测定 Voltage step-down test at DC 5V 10ma	100mΩmax.
2-2 振荡 Bouncing	以 1 秒钟 1 往复(OFF-ON-OFF)回转运转 shaft shall be Rotated at 1 cycles/sec(OFF-ON-OFF)	10ms 以下
2-3 绝缘电阻 Insulation resistance	在端子与安装板间施加 DC 250V 1mA Measurement shall be made under the Condition which a voltage 250V DC 1mA Is applied between individual Terminals and tracked	在端子安装板间 100MΩ 以上 Between individual Terminals and bracket 100MΩ MIN.
2-4 耐电压 Dielectric strength	在端子与安装板间施加 AC 300V 1 分钟或 AC 60V 2 秒钟 (漏电流 1mA) A voltage of 300V AC/min or 60VAC/2 Second (leak current 1mA) be applied Between individual terminals and bracket	不得有绝缘破坏。 Without arcing or Breakdown.

3. 机械性能 Mechanical characteristics

项目 Item	条件 Conditions	规格 Specifications
3-1 开关电路、接点数 Switch circuit and Number of pulse		单极单投(推 ON) Single pole and single throw(push on)
3-2 开关移动量 Travel of switch		■0.5±0.2mm □1.5±0.5mm
3-3 开关动作力 Operating force of switch	在轴方向施加的按压力 Push static load to the shaft in the axial direction	5±2N (500±200gf)

4. 耐久性能 Endurance characteristics

项目 Item	条件 Conditions	规格 Specifications
4-1 寿命特性 Operating life	在无负荷条件下,对轴以每小时 500 往复速度连续运转 20,000 往复。在 5000 个往复时进行中间测定。(轴按压力.1kgf.cm 以下) The encoder's shall be rotated to 20,000 cycles at a speed of 500/h without electrical load. The measurement is done at 5000 cycles(shaft push load:1kgf.cm Max)	接触电阻:200mΩ 以下 Contact resistance: 200mΩ MAX. 开关动作力:-30%~+10%。 Operating force of switch:-30% +10%

		承 办	审 核	核 准	TITLE: EC11 规格书
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