

Customer: ALPS EUROPE DISTRIBUTION

No. 12E2006-3026

Date: Nov. 06, 2006

Attention:

Your ref. No.:

Your Part No.: EC12E1224201

## SPECIFICATIONS

ALPS' ;

MODEL: EC12E1224201

Spec. No.:

Sample No.: F 3 5 1 7 2 1 3 M

RECEIPT STATUS

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By Date

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Title

**ALPS**<sup>®</sup>  
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ENG. DEPT. DIVISION

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B6523

Q1003#03A (EA)

# S P E C I F I C A T I O N S

1. THIS SPECIFICATIONS APPLY TO EC12E1224201 ROTARY ENCODERS.

2. CONTENTS OF THIS SPECIFICATIONS.

F3517213M

LE21240L

3. MARKING

- MARKING ON ALL UNITS  
DATE CODE

## • CAUTION

Regardless of the suggested applications of these products being introduced in the specifications, when using them for equipment and devices requiring a high degree of safety, respective manufacturers will please preserve safety of the planned equipment and devices by providing necessary protective circuits and redundancy circuits and reconfirm if safety is being duly preserved.

Products being introduced in the specifications have been designed and manufactured for applications to ordinary electronic equipment and devices such as the AV equipment, electric home appliances, office machines and communications equipment. Consequently, when employing these products for applications requiring a high degree of safety and reliability such as the medical equipment, aviation and aircraft equipment, space equipment and burglar alarm equipment, the using manufacturers will please thoroughly study the proprieties of these products for the planned applications.

Although we are exerting our best efforts to maintain the quality of these products, we cannot guarantee that they will never cause short circuiting and open circuitry. Therefore, when designing an equipment or device with which the priority is given to the safety, you will please carefully study the influences to the whole equipment of a single function failure of Potentiometers and Encoders in advance to make out a fail-safe design providing.

4. 電気的仕様 Electrical characteristics

項目 Item	条件 Conditions	規格 Specifications
4-1 出力信号 Output signal format		<p>A, B 2信号の位相差は、図1に示す通り、<math>&lt;1/4 \times 1&gt;</math>の範囲とする。</p> <p>A 信号は出力OFFの状態を意味する。</p> <p>B 信号は出力ONの状態を意味する。(位相はクリック信号の立ち上がり時に一致する)</p> <p>2 Phase-different signals (Signal, signal B) Details shown in &lt;fig. 1&gt; always be aligned with the phase of the pulse. (The pulse is the phase, output position of with-casent type)</p>
4-2 分解度 Resolution	回転方向 Shaft rotational direction	<p>1 回転で出力されるパルス数 Number of pulses in 360° rotation</p> <p>2 下位ビットは、図1に示す通り、<math>360^\circ \times S^{-1}</math>の範囲とする。 Measurement shall be made under the condition as follows. 1) Shaft rotational speed : 360°/S 2) Test circuit : &lt;fig. 2&gt;</p>
4-3 スイッチング特性 Switching characteristics	<p>回転方向 C. W.</p> <p>出力信号 A(A-C端子) A(Terminal A-C)</p> <p>B(B-C端子) B(Terminal B-C)</p> <p>A(A-C端子) A(Terminal A-C)</p> <p>B(B-C端子) B(Terminal B-C)</p>	<p>&lt;fig. 2&gt; DC5V</p> <p>10kΩ</p> <p>10kΩ</p> <p>Terminal A</p> <p>Terminal B</p> <p>Terminal C</p> <p>Encoder</p> <p>出力電圧 1.5V以上の電圧を付与。 3.5V OFF状態 : 出力電圧が3.5V以上の電圧を付与。 (note) ON-OFF area : The area which the voltage is 1.5V or less. code-OFF area : The area which the voltage is 3.5V or more.</p> <p>出力電圧 1.5V以上の電圧を付与。 3.5V OFF状態 : 出力電圧が3.5V以上の電圧を付与。 (note) ON-OFF area : The area which the voltage is 1.5V or less. code-OFF area : The area which the voltage is 3.5V or more.</p> <p>出力電圧 1.5V以上の電圧を付与。 3.5V OFF状態 : 出力電圧が3.5V以上の電圧を付与。 (note) ON-OFF area : The area which the voltage is 1.5V or less. code-OFF area : The area which the voltage is 3.5V or more.</p>
1) チラツキノイズ Chattering		<p>出力電圧 1.5V以上の電圧を付与。 3.5V OFF状態 : 出力電圧が3.5V以上の電圧を付与。 (note) ON-OFF area : The area which the voltage is 1.5V or less. code-OFF area : The area which the voltage is 3.5V or more.</p>

**ALPS ELECTRIC CO., LTD.**

APPD.	CHKD.	DSGD.	TITLE		
Apr. 22, '99	Apr. 22, '99	Apr. 22, '99	1.2 形回転スイッチ		
K. ITO	Y. KANZAKI	H. MIURA	12mm SIZE ROTARY ENCODER		
SYMB	DATE	APPD	CHKD	DSGD	DOCUMENT NO.
					F 3517213M (2/9)

1. 一般事項 General

1-1 適用範囲 Scope  
この仕様は主として電子機器用1.2形ロープロファイル回転エンコーダ(増設型)の増設型に適用する。  
This specification applies to 12mm size low-profile rotary encoder (Incremental type) for microscopical current circuits, used in electronic equipment.

1-2 標準状態 Standard atmospheric conditions  
測定は標準状態(20°C, 65%RH)で行う。  
Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:  
温度 Ambient temperature : 15°C to 35°C  
相対湿度 Relative humidity : 25% to 85%  
気圧 Air pressure : 86kPa to 106kPa

1-3 動作温度範囲 Operating temperature range  
測定は標準状態(20°C, 65%RH)で行う。  
Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:  
温度 Ambient temperature : 20 ± 1°C  
相対湿度 Relative humidity : 63% to 67%  
気圧 Air pressure : 86kPa to 106kPa

1-4 保存温度範囲 Storage temperature range  
測定は標準状態(20°C, 65%RH)で行う。  
Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:  
温度 Ambient temperature : -10°C to +70°C  
相対湿度 Relative humidity : -40°C to +85°C

2. 構造 Construction

2-1 寸法 Dimensions  
図面に準じて寸法を測定する。  
Refer to attached drawing.

3. 電圧 Rating

3-1 定格電圧 Rated voltage : D. C. 5V

3-2 動作電流 (抵抗負荷) Operating current (resistive load)  
各端子ごとの電流制限値は、以下の通りである。  
Each lead current limit is as follows.  
共通端子 Common lead : 0.5mA (MAX 5mA, MIN 0.5mA)  
各端子 Each lead : 1mA (MAX 10mA, MIN 0.5mA)

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K. ITO	Y. KANZAKI	H. MIURA	12mm SIZE ROTARY ENCODER		
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5. 機械的性質 Mechanical characteristics

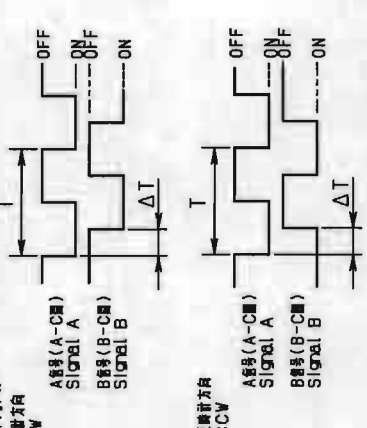
項目 Item	条件 Conditions	規格 Specifications
5-1 全回転角度 Total rotational angle		360° (インレス) 360° (Enfless)
5-2 クリックトルク Click torque	(クリック特許の非適用) (Applied for with-detent type)	3-20mN·m
5-3 クリック角度及び位置 Number and position of detents		12位クリック 12 detents (ステップ角 30° ± 3°) (Step angle: 30° ± 3°)
5-4 軸の押し引き強度 Push-pull strength of shaft	軸の押し及び引き方向に50Nの静荷重を10秒間加える。(PCB実用条件) Push and pull static load of 50N shall be applied to the shaft in the axial direction for 10s. (After soldering of the PC board)	軸の破損、著しい回転力、及び軸の 変形等(電機的性質を悪化させること、 Without damage to or excessive play in shaft No excessive abnormality in rotational feeling. And electrical characteristics shall be satisfied.
5-5 端子強度 Terminal strength	端子強度の任意の方向に3Nの静荷重を10秒間加える。 A static load of 3N shall be applied to the tip of terminals for 10s in any direction.	著しい引及び脱落等を生じないこと。 Without excessive play in terminals or poor contact.
5-6 軸のクリック Click wobble	軸を長さ55mmの位置に50mN・mの軸荷モーメントを加える。 A momentary load of 50mN·m shall be applied at the point 55mm from the tip of the shaft in a direction perpendicular to the axis of shaft.	1. 0xL/30mmD-D以内 1. 0xL/30mmD-D MAX (Lは軸長に代り軸長とする。) (L: Shaft length)
5-7 軸の側面押し強度 Side thrust strength of shaft	軸を長さ55mmの位置に20Nの静荷重を10秒間加える。(PCB実用条件) A load of 20N shall be applied at the point 55mm from the tip of the shaft in a direction perpendicular to the axis of shaft. (After soldering of the PC board)	著しい引及び、軸の引かないこと。 又、著しい脱落等を生じないこと。 Without excessive play or bending in shaft. No mechanical abnormality.
5-8 軸の回転方向の Shaft play in rotational wobble	角度板にて測定する。 Measure with jig for rotational angle	4° 以内。 4° MAX

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		Apr. 22, '99	Apr. 22, '99	Apr. 22, '99
		TITLE 12 位回転エンコーダ 12mm Size Rotary encoder		
		DOCUMENT NO. F3517213M		
		K. ITO Y. KANZAKI H. MIURA		
		(4/9)		

6. 電気的性質 Electrical characteristics

項目 Item	条件 Conditions	規格 Specifications
2) 音響ノイズ (ノイズ) Sliding noise (Bounce)	コ-FOONの静電容量0.1. 5V以上の電圧を供給し、チャタリングなし、t <sub>1</sub> 、t <sub>2</sub> の両方が1ms以上の 1. 5V以上の電圧を供給し、チャタリングなし、t <sub>1</sub> 、t <sub>2</sub> の両方が1ms以上の は、音響ノイズを発生させる。また、音響ノイズ電圧は1.5V以下の電圧が1ms未満の場合 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>2</sub> ), the voltage change shall be recorded as a part of chatter ing. When the code-ON time between 2 bounces is less than 1ms they are recorded as 1 linked bounce.	規格 Spec. Conditions t <sub>2</sub> ≤ 2ms
3) 音響ノイズ Sliding noise	コ-FOFFの静電容量 The voltage change in code-OFF area.	3. 5V以上 3. 5V MIN
4-4 絶縁抵抗 Dielectric strength	端子-接地間電圧0.5V、50V/1分間加える。(リーク電流1mA) A voltage of 50V.D.C. shall be applied for 1min between individual terminals and bracket (Leak current 1mA)	絶縁破壊のないこと。 Without arcing or breakdown.
4-5 絶縁抵抗 Insulation resistance	端子-端子間電圧0.5V、50V/1分間加える。 Measurement shall be made under the condition which a voltage of 50V.D.C. is applied between individual terminals and bracket.	端子-端子間電圧0.5V以上の Between individual terminals and bracket: 10MΩ MIN.
4-6 位相差 Phase-difference	定速で動作する状態にて測定する。 Measurement shall be made under the condition which the shaft is rotated in constant speed. <Fig. 4> A: 時計方向 CW B: 逆時計方向 CCW	ΔT=0.08T ± 1% MIN In<Fig. 4>



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		TITLE 12 位回転エンコーダ 12mm Size Rotary Encoder		
		DOCUMENT NO. F3517213M		
		K. ITO Y. KANZAKI H. MIURA		
		(3/9)		

項目 Item	条件 Conditions	基準 Specifications
6-9 溶接抵抗 Resistance to soldering heat	7頁の「溶接抵抗条件」による。 Specified by the clause 7 'soldering conditions'.	<p>はんだ付位置、電気的性質を満足すること。また、著しい溶接抵抗の異常のないこと。</p> <p>Electrical characteristics shall be satisfied.</p> <p>No mechanical abnormality such as a excessive play.</p> <p>電圧差ははんだ溶接面の95%以上高い状態に達してはならないこと。</p> <p>A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.</p>

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TITLE	12形回転式エンコーダ 12mm Size Rotary Encoder
APPD.	K. ITO
CHKD.	Y. KANZAKI
DSGD.	H. MIURA
SYMB	DATE
APPD	CHKD
DSGD	
DOCUMENT NO. F3517213M (5/9)	

6. 耐久試験 Endurance characteristics.

項目 Item	条件 Conditions	基準 Specifications
6-1 回転寿命試験 Rotational life	<p>負荷で毎分600~1000/回転で、30,000回往復回転動作を行う。 The shaft of encoder shall be rotated to 30,000 cycles at a speed of 600-1000/H without electrical load, after which measurements shall be made.</p>	<p>チャタリング t<sub>1</sub>, t<sub>2</sub> ≤ 5ms ガウンス t<sub>3</sub> ≤ 3ms Chattering t<sub>1</sub>, t<sub>2</sub> ≤ 5ms Bounce t<sub>3</sub> ≤ 3ms</p> <p>クリッチ感が残っていないこと。 Detent feeling has to remains.</p>
6-2 湿熱 Damp heat	<p>湿度40±2°C、湿度90~95%の恒温恒湿槽中240±10時間放置後、常温、常温中1.5時間放置する。 The encoder shall be stored at a temperature of 40±2°C with relative humidity of 90% to 95% 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.</p>	<p>振動係数(4.1~4.5及び5.1)を満足すること。 Specifications in clause 4.1-4.5 and 5.1 shall be satisfied.</p>
6-3 乾燥熱 Dry heat	<p>湿度85±3°Cの恒温槽中240±10時間放置後、常温、常温中1.5時間放置する。 The encoder shall be stored at a temperature of 85±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 measurements shall be made.</p>	
6-4 低温熱 Cold	<p>湿度-40±3°Cの恒温槽中240±10時間放置後、常温、常温中1.5時間放置する。 The encoder shall be stored at a temperature of -40±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.</p>	
6-5 落下試験 Free falling	<p>60cmの高さより製品の任意の方向が50mm×50mm×50mmのコンクリート床に自由落下させる。 The encoder shall be fallen freely at any posture from 60cm height to the concrete floor covered with vinyl-tile, after which measurement shall be made.</p>	<p>著しい変形、破損等がないこと。 (4.1~4.5及び5.1)を満足すること。 No excessive deformation or damage. (Except the deformation of terminals.)</p>
6-6 振動 Vibration	<p>10~55~10Hzと変化する振動(1時間1分/高周波1.5mm)をX, Y, Z, 各方向2時間行う。 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 6 period of 2H in each of 3 mutually perpendicular axes (A total of 6H).</p>	<p>振動係数(4.1~4.5及び5.1)を満足すること。 Specifications in clause 4.1-4.5 and 5.1 shall be satisfied.</p>

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TITLE	12形回転式エンコーダ 12mm Size Rotary Encoder
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CHKD.	Y. KANZAKI
DSGD.	H. MIURA
SYMB	DATE
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1. 定格電流 (定格負荷) D.C. 5V10mA (1mA MIN)

2. 電気的性質 Electrical characteristics

項目 Item	条件 Conditions	規格 Specifications
2-1 接触抵抗 Contact resistance	D.C. 5V10mA電圧降下法にて測定する。 Measured by the 1mA 5V D.C. voltage drop method.	100mA MAX.
2-2 チャタリング Chattering	1サイクル (OFF-ON-OFF) 1秒で動作させる。 Switch is operated at the rate of 1 cycle 1 sec. The 1 cycle shall be OFF-ON-OFF.	10mSEC以下 Less than 10msec
2-3 絶縁抵抗 Insulation resistance	端子-取付面間D.C. 50V10mAの電圧をかける。 Measurement shall be made under the condition which a voltage of 50V D.C. 10mA is applied between individual terminals and bracket.	端子-取付面間にて10MΩ以上 Between individual terminals and bracket: 10MΩ MIN.
2-4 耐電圧 Dielectric strength	端子-取付面間A.C. 50V1秒間又は、A.C. 60V2秒間印加する。 (リーク電流:1mA) A voltage of 50V A.C. shall be applied for 1min or a voltage of 60V A.C. shall be applied for 2sec between individual terminals and bracket. (Leak current: 1mA)	飛塵・アーク・絶縁破壊がないこと。 Without damage to parts, arcing or breakdown.

注記:  
Note: シャフト端子間絶縁されています。  
Shaft is insulated from switch terminal.

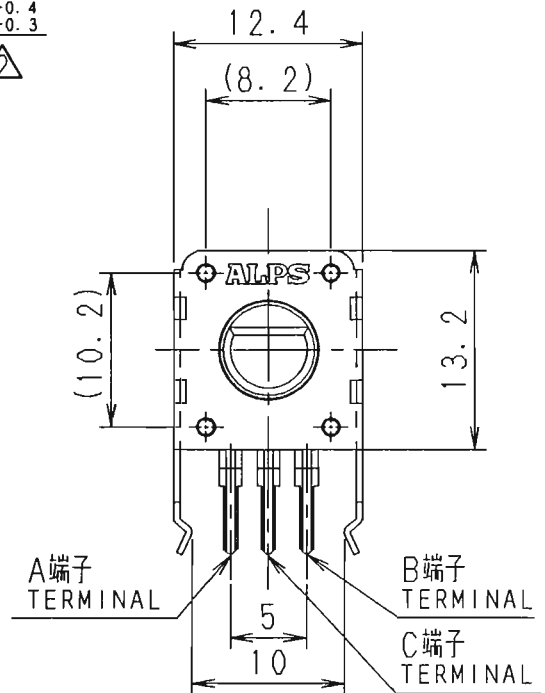
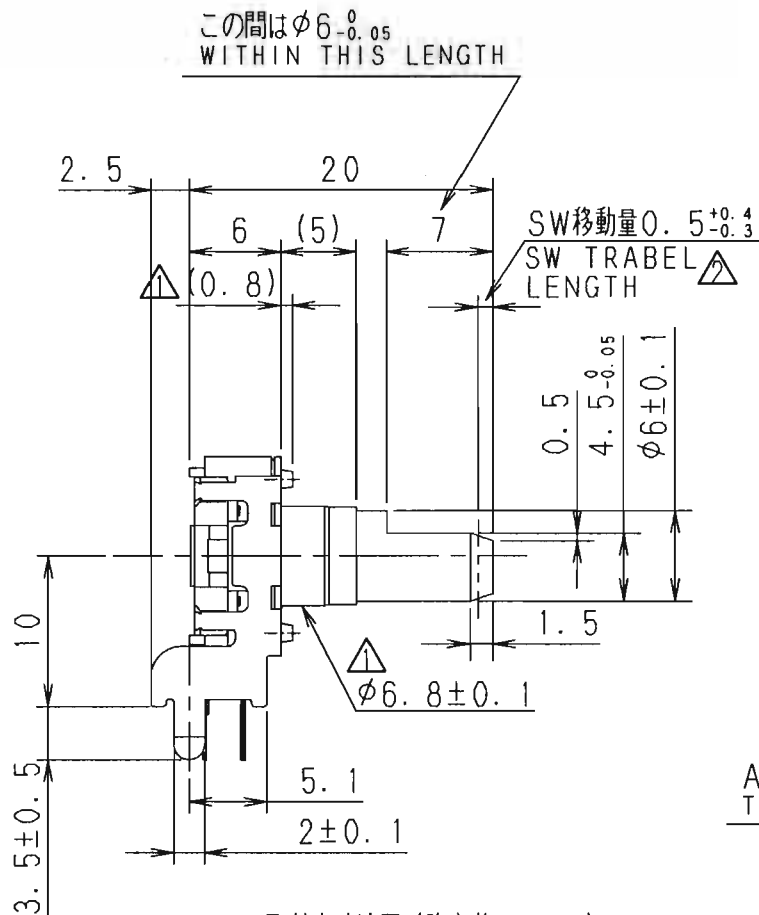
3. 機械的性質 Mechanical characteristics

項目 Item	条件 Conditions	規格 Specifications
3-1 アイソメータ・巻線 Contact arrangement		標準構造 (Push ON) S. P. S. T. (Push on)
3-2 スイッチ行程量 Switching		0.5 <sup>+0.1</sup> <sub>-0.1</sub> mm
3-3 スイッチ作動力 Switch operation force		3 <sup>+1.5</sup> <sub>-1</sub> N

4. 耐久性能 Endurance characteristics.

項目 Item	条件 Conditions	規格 Specifications
4-1 寿命特性 Operating life	負荷印加時500回または20,000回連続動作を行う。 The shaft of switch shall be 20,000 times at a speed of 500 times per hour without electrical load. However, an interim measurement shall be made immediately after 5,000 times. (Strength of shaft 10N max.)	寿命特性: 2000回以下 その他、信頼性を満足すること。 Switch contact resistance: 200mΩ MAX. Except above items, specifications in clause 2.2-4, and 3.1-3 shall be satisfied.

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TITLE 12 形回転スイッチコーダ 12mm SIZE ROTARY ENCODER	
DOCUMENT NO. F3517213M (9/9)	

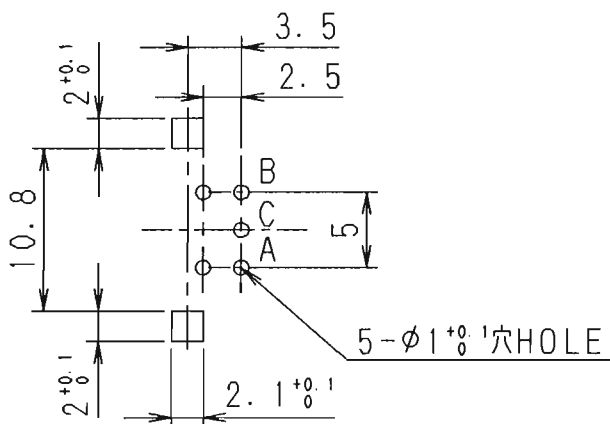


取付穴寸法図 (許容差±0.1)

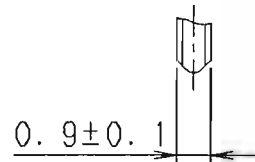
※挿入側より見た図  
P. W. B. MOUNTING DETAIL  
(TOLERANCE±0.1)  
VIEWED FROM MOUNTING SIDE

端子先端詳細図 (10:1)

△DETAIL OF TERMINALS



基板板厚 t = 1.6mm  
P. C. B.



指定なき部分の許容差 TOLERANCES UNLESS OTHERWISE SPEC	
L ≤ 10	±0.3
10 < L < 100	±0.5
100 ≤ L	±0.8
角度 ANGULAR DIMENSION	±5°

			12パルス 12PLUSE SHAFT COLOR:BLACK		L=20 立形 クリック付
PART NO.	NAME	MATERIAL NAME / CODE	FINISH		
<b>ALPS ALPS ELECTRIC CO., LTD.</b>					
DSGD. ツツケイ2-8501351 H. Shimomura98-01-29			SCALE 2:1	NO. _____	
CHKD. S. Inoue 98-02-02			TITLE 12形薄形エンコーダ -	DOCUMENT NO.	
APPD. K. Kawasaki 98-02-02				UNIT mm	LE21240L
SYMB	DATE	APPD	CHKD	DSGD	