

## 1. 一般事項 General

## 1-1 適用範囲 Scope

この仕様書は主として電子機器に用いる微小電流回路用12形薄形ロータリーエンコーダに適用する。  
This specification applies to 12mm size low-profile rotary encoder (incremental type) for microscopic current circuits, used in electronic equipment.

## 1-2 標準状態 Standard atmospheric conditions

試験及び測定は特に指定のない限り、次の状態で行なう。

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 |

但し、疑義を生じた場合は、次の基準状態で行なう。

If there is any doubt about the results, measurements shall be made within the following limits;

|      |                     |                   |
|------|---------------------|-------------------|
| 温度   | Ambient temperature | : 20 ± 1°C        |
| 相対湿度 | Relative humidity   | : 63% to 67%      |
| 気圧   | Air pressure        | : 86kPa to 106kPa |

## 1-3 使用温度範囲

Operating temperature range : -10°C to +70°C

## 1-4 保存温度範囲

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

## 2. 構造 Construction

## 2-1 寸法 Dimensions

添付組立図による。

Refer to attached drawing.

## 3. 定格 Rating

## 3-1 定格電圧

Rated voltage : 5V DC

## 3-2 定格電流 (抵抗負荷)

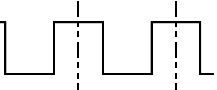
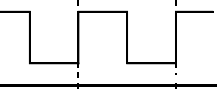
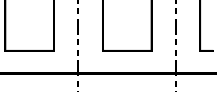
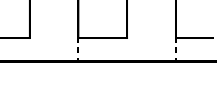
Operating current (resistive load)

|       |                 |                                |
|-------|-----------------|--------------------------------|
| 各端子   | Each terminal   | : 0.5mA (MAX. 5mA, MIN. 0.5mA) |
| コモン端子 | Common terminal | : 1mA (MAX. 10mA, MIN. 0.5mA)  |

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|       |      |       |       |       | K,Ito                       | Y,Kanzaki  | H,MIURA    | DOCUMENT No. 5LE212-56   |
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## 4. 電気的性能

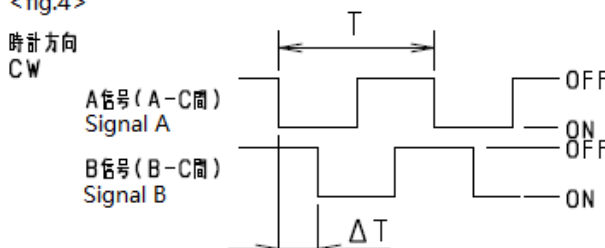
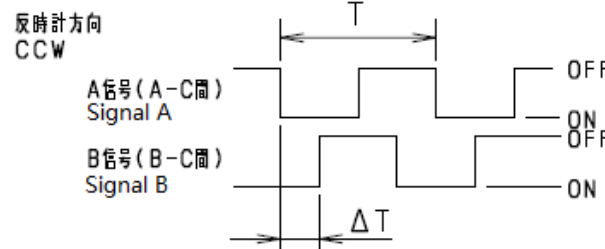
## Electrical characteristics

|                                | 項目<br>Item                                                                                      | 条件<br>Conditions                                     | 規格<br>Specifications                                                                                                                                                                                                                                                                                                                                   |                                                                                                 |
|--------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 4-1                            | 出力信号<br>Output signal<br>format                                                                 |                                                      | A、B 2信号の位相差出力とし、<br>詳細は<fig.1>の通りとする。<br>クリック位置にてA信号は出力<br>OFFの安定位置にあること。<br>B信号は規定せず<br>(破線はクリックの位置を示す。)<br>2 phase-different signals<br>(Signal A, Signal B)<br>Details shown in <fig.1>.<br>The detent position will<br>always be aligned with<br>Signal A but Signal B has<br>no specific position.<br>(The broken line shows<br>detent position.) |                                                                                                 |
|                                |                                                                                                 | <fig.1>                                              |                                                                                                                                                                                                                                                                                                                                                        |                                                                                                 |
|                                |                                                                                                 | 軸回転方向<br>Shaft rotational direction                  | 信号<br>Signal                                                                                                                                                                                                                                                                                                                                           | 出力波形<br>Output                                                                                  |
|                                |                                                                                                 | 時計方向<br>CW                                           | A (A-C端子間)<br>A (Terminal A-C)                                                                                                                                                                                                                                                                                                                         | OFF<br>ON    |
|                                |                                                                                                 |                                                      | B (B-C端子間)<br>B (Terminal B-C)                                                                                                                                                                                                                                                                                                                         | OFF<br>ON   |
|                                |                                                                                                 | 反時計方向<br>CCW                                         | A (A-C端子間)<br>A (Terminal A-C)                                                                                                                                                                                                                                                                                                                         | OFF<br>ON  |
| B (B-C端子間)<br>B (Terminal B-C) | OFF<br>ON  |                                                      |                                                                                                                                                                                                                                                                                                                                                        |                                                                                                 |
| 4-2                            | 分解能<br>Resolution                                                                               | 1回転にて出力されるパルス数<br>Number of pulses in 360° rotation. | 各相 12パルス/360°<br>12 pulses/360°<br>for each phase                                                                                                                                                                                                                                                                                                      |                                                                                                 |

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|     | 項目<br>Item                                   | 条件<br>Conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 規格<br>Specifications       |
|-----|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 4-3 | スイッチング特性<br>Switching characteristics        | <p>下記測定回路&lt;fig.2&gt;を用い、回転軸を360°/sの速さで回転し測定する。<br/>Measurement shall be made under the condition as follows.</p> <p>1) Shaft rotational speed : 360°/s<br/>2) Test circuit : &lt;fig.2&gt;</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>&lt;fig.2&gt;</p> </div> <div style="text-align: center;"> <p>&lt;fig.3&gt;</p> </div> </div> <p>(注記) コードON状態 : 出力電圧が1.5V以下の状態を言う。<br/>コードOFF状態 : 出力電圧が3.5V以上の状態を言う。<br/>(note) Code-ON area : The area which the voltage is 1.5V or less.<br/>Code-OFF area : The area which the voltage is 3.5V or more.</p> |                            |
| 1)  | チャタリング<br>Chattering                         | <p>コードのOFF→ON及びON→OFFの際の、出力1.5V～3.5Vの通過時間にて規定する。<br/>Specified 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).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                            | $t_1, t_3 \leq 3\text{ms}$ |
| 2)  | 摺動ノイズ<br>(バウンス)<br>Sliding noise<br>(Bounce) | <p>コードONの部分の1.5V以上の電圧変動時間とし、チャタリング<math>t_1</math>、<math>t_3</math>両者との間に1ms以上の1.5V以下のON部分を有するものとする。<br/>また、摺動ノイズ間に1.5V以下の範囲が1msある場合は、別の摺動ノイズと判断する。<br/>Specified by the time of voltage change exceed 1.5V in code-ON area.<br/>When the bounce has code-ON time less than 1ms between chatterings (<math>t_1</math> or <math>t_3</math>), the voltage change shall be regarded as a part of chattering.<br/>When the code-ON time between 2 bounces is less than 1ms, they are regarded as 1 linked bounce.</p>                                                                                                                         | $t_2 \leq 2\text{ms}$      |
| 3)  | 摺動ノイズ<br>Sliding noise                       | <p>コードOFFの部分の電圧変動<br/>The voltage change in code-OFF area.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3.5V以上<br>3.5V MIN.        |

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|     | 項目<br>Item                    | 条件<br>Conditions                                                                                                                                                                                                                                                                                                                                        | 規格<br>Specifications                                                                                                      |
|-----|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| 4-4 | 耐電圧<br>Dielectric strength    | 端子—取付板間に50V AC 1分間印加する。<br>(リーク電流1mA)<br>A voltage of 50V AC shall be applied for 1min between individual terminals and bracket. (Leak current 1mA)                                                                                                                                                                                                     | 絶縁破壊のないこと。<br>without arcing or breakdown.                                                                                |
| 4-5 | 絶縁抵抗<br>Insulation resistance | 端子—取付板間に50V DC 印加する。<br>Measurement shall be made under the condition which a voltage of 50V DC is applied between individual terminals and bracket.                                                                                                                                                                                                    | 端子—取付板間にて10MΩ以上<br>Between individual terminals and bracket: 10MΩ MIN.                                                    |
| 4-6 | 位相差<br>Phase-difference       | <p>定速で操作軸を回転する。<br/>Measurement shall be made under the condition which the shaft is rotated in constant speed.</p> <p>&lt;fig.4&gt;</p> <p>時計方向<br/>CW</p>  <p>反時計方向<br/>CCW</p>  | <p>&lt;fig.4&gt;において<br/><math>\Delta T = 0.08T</math> 以上<br/>in &lt;fig.4&gt;<br/><math>\Delta T = 0.08T</math> MIN.</p> |

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## 5. 機械的性能 Mechanical characteristics

|     | 項目<br>Item                                    | 条件<br>Conditions                                                                                                                                                                                               | 規格<br>Specifications                                                                                                                                                                                            |
|-----|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5-1 | 全回転角度<br>Total rotational angle               |                                                                                                                                                                                                                | 360°(エンドレス)<br>360°(Endless)                                                                                                                                                                                    |
| 5-2 | クリックトルク<br>Detent torque                      |                                                                                                                                                                                                                | 3~20mN・m<br><br>但し、-10℃~+5℃では、<br>軸が回転すること。<br>Shaft rotatable<br>at -10℃ to +5℃                                                                                                                                |
| 5-3 | クリック点数及び位置<br>Number and position of detents. |                                                                                                                                                                                                                | 12点クリック<br>12 detents<br>(ステップ角度 30° ± 3°)<br>(Step angle:30° ± 3°)                                                                                                                                             |
| 5-4 | 軸の押し引き強度<br>Push-pull strength of shaft       | 軸の押し及び引張り方向に80Nの静荷重を10秒間加える。<br>(ナット止め後)<br>Push and pull static load of 80N shall be applied to the shaft in the axial direction for 10s.<br>(After tightening of nut)                                        | 軸の破損、著しい回転ムラ、<br>ガタ等の異常がなく電氣的<br>性能を満足すること。<br>Without damage to, or<br>excessive play in shaft.<br>No excessive abnormality in<br>rotational feeling.<br>And electrical characteristics<br>shall be satisfied. |
| 5-5 | 端子強度<br>Terminal strength                     | 端子先端の任意の一方方向に3Nの静荷重を10秒間加える。<br>A static load of 3N shall be applied to the tip of terminals for 10s in any direction.                                                                                         | 著しいガタ及び接触不良を<br>生じないこと。<br>Without excessive play in<br>terminals or poor contact.                                                                                                                              |
| 5-6 | 軸ガタ<br>Shaft wobble                           | 軸先端から5mmの位置に50mN・mの曲げモーメントを<br>加える。<br>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以内<br>0.7xL/30mm p-p MAX.<br>(Lは取付長さで比例計算<br>する。)<br>(L:Shaft length)                                                                                                                             |
| 5-7 | 軸のスラスト方向ガタ<br>Shaft play in axial direction   | 軸に3Nの押し引き荷重を加える。<br>Push and pull static load of 3N shall be applied to the shaft in the axial directions.                                                                                                     | 0.4mm p-p 以内<br>0.4mm p-p MAX.                                                                                                                                                                                  |
| 5-8 | 軸の垂直押し強度<br>Side thrust strength of shaft     | 軸先端から5mmの位置に20Nの静荷重を10秒間加える。<br>(P.W.B. 半田付け後)<br>A load of 20N shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft. (After soldering of the P.W.B.) | 著しいガタ及び、曲がりの<br>ないこと。又、機械的に異常<br>のないこと。<br>Without excessive play or<br>bending in shaft.<br>No mechanical abnormality.                                                                                         |

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|      | 項目<br>Item                                  | 条件<br>Conditions                                                                                                                | 規格<br>Specifications                                                                                                                                                                                                                                                                  |
|------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5-9  | 軸の回転方向ガタ<br>Shaft play in rotational wobble | 角度板にて測定する。<br>Measure with jig for rotational angle                                                                             | 3°以内<br>3° MAX.                                                                                                                                                                                                                                                                       |
| 5-10 | はんだ耐熱<br>Resistance to soldering heat       | 7項の"はんだ付け条件"による。<br>Specified by the clause 7 "Soldering conditions".                                                           | はんだ付け後、電氣的性能を満足すること。また、著しいガタ等機械的に異常のないこと。<br>Electrical characteristics shall be satisfied.<br>No mechanical abnormality such as a excessive play.<br>電極部ははんだ浸漬面積の95%以上新しいはんだで濡れていること。<br>A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed. |
| 5-11 | 軸受ネジ締付強度<br>Bushing nut tightening strength | <fig.5>を満足するように締付る。<br>Tighten the nut according to <fig.5><br><br><div data-bbox="609 936 981 1146" data-label="Image"> </div> | 1N・m 以下にて使用の事。<br><br>Tightening torque to be no greater than 1N・m.                                                                                                                                                                                                                   |

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## 6. 耐久性能 Endurance characteristics.

|     | 項目<br>Item                  | 条件<br>Conditions                                                                                                                                                                                                                                                                                                                                                                          | 規格<br>Specifications                                                                                                                                                                                                  |
|-----|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6-1 | しゅう動寿命性能<br>Rotational life | 無負荷で軸を毎時600～1,000サイクルの速さで、30,000サイクル断続動作を行なう。(1サイクルは、360° 1往復)<br>The shaft of encoder shall be rotated to 30,000 cycles at a speed of 600 to 1,000 cycles per hour without electrical load, after which measurements shall be made.<br>(1 cycle: rotate 360° CCW rotate 360° CW)                                                                                                         | チャタリング $t_1, t_3 \leq 5\text{ms}$<br>バウンス $t_2 \leq 3\text{ms}$<br>Chattering $t_1, t_3 \leq 5\text{ms}$<br>Bounce $t_2 \leq 3\text{ms}$<br><br>クリック感が残っていること。<br>Detent feeling has to remain.                       |
| 6-2 | 耐湿性<br>Damp heat            | 温度 $40 \pm 2^\circ\text{C}$ 、湿度90%～95%の恒温湿槽中に $240 \pm 10$ 時間放置後、常温、常湿中に1.5時間放置する。<br>The encoder shall be stored at a temperature of $40 \pm 2^\circ\text{C}$ with relative humidity of 90% to 95% for $240 \pm 10$ hours in a thermostatic chamber.<br>And then the encoder shall be subjected to standard atmospheric conditions for 1.5 hours, after which measurement shall be made. | 初期規格を満足すること。<br>(4.1～4.5 and 5.1)<br>Specifications in clause 4.1 to 4.5 and 5.1 shall be satisfied.                                                                                                                  |
| 6-3 | 耐熱特性<br>Dry heat            | 温度 $85 \pm 3^\circ\text{C}$ の恒温槽中に $240 \pm 10$ 時間放置後、常温、常湿中に1.5時間放置する。<br>The encoder shall be stored at a temperature of $85 \pm 3^\circ\text{C}$ for $240 \pm 10$ hours in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5 hours, after which measurements shall be made.                                                   |                                                                                                                                                                                                                       |
| 6-4 | 低温特性<br>Cold                | 温度 $-40 \pm 3^\circ\text{C}$ の恒温槽中に $240 \pm 10$ 時間放置後、常温、常湿中に1.5時間放置する。<br>The encoder shall be stored at a temperature of $-40 \pm 3^\circ\text{C}$ for $240 \pm 10$ hours in a thermostatic chamber.<br>And then the encoder shall be subjected to standard atmospheric conditions for 1.5 hours, after which measurement shall be made.                                               |                                                                                                                                                                                                                       |
| 6-5 | 耐落下性<br>Free falling        | 60cmの高さより製品の任意の方向からビニタイルを張ったコンクリートの床上に自由に落下させる。<br>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.                                                                                                                                                                               | 著しい変形、破損等がなく<br>初期規格(4.1～4.5及び5.1)を満足すること。<br>(但し、端子部の変形は除く。)<br>No excessive deformation or damage.<br>(Except the deformation of terminals.)<br>And specifications in clause 4.1 to 4.5 and 5.1 shall be satisfied. |

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|     | 項目<br>Item       | 条件<br>Conditions                                                                                                                                                                                                                                                                                                                                                                                                                               | 規格<br>Specifications                                                                                             |
|-----|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| 6-6 | 耐振性<br>Vibration | <p>10～55～10Hzと変化する振動(1周期1分/振幅1.5mm)をX、Y、Z、各方向に2時間加える。</p> <p>The following vibration shall be applied to the encoder, after which measurement shall be made:</p> <p>The entire frequency range, from 10Hz to 55Hz and return to 10Hz, shall be transversed in 1 min.</p> <p>Amplitude (total excursion): 1.5mm.</p> <p>This motion shall be applied for a period of 2 hours in each of 3 mutually perpendicular axes (A total of 6 hours).</p> | <p>初期規格を満足すること。<br/>(4.1～4.5 and 5.1)</p> <p>Specifications in clause 4.1 to 4.5 and 5.1 shall be satisfied.</p> |

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| SYMB. | DATE | APPD. | CHKD. | DSGD. |                              |                                  |                                |                                                                                                |

## 7. はんだ付け条件 Soldering conditions

## 7-1 手はんだの場合 Manual soldering

温度350℃以下、時間3秒以内

Bit temperature of soldering iron : 350℃ or less.

Application time of soldering iron : within 3s.

## 7-2 ディップはんだの場合 Dip soldering

使用基板 : t1. 6片面銅張積層板

Printed wiring board : Single-sided copper clad laminate board with thickness of 1.6mm.

フラックス : 比重0.82以上のフラックスを用い発泡式フラクサーにて発泡面高さは、基板板厚の半分を目安とし、かつ基板表面にフラックスの流入がないこと。

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.

・Flux shall not come into contact with the component side surface.

プリヒート : 基板表面温度100℃以下、時間1分以内

Preheating :

・Surface temperature of board : 100℃ or less.

・Preheating time : within 1 min.

はんだ : 温度260℃ ± 5℃、時間3秒 ± 1秒以内

Soldering

・Solder temperature : 260℃ ± 5℃.

・Immersion time : within 3s ± 1s

以上の工程を1回または2回通過する。

Apply the above soldering process for 1 or 2 times.

|       |      |       |       |       |                             |            |            |                          |
|-------|------|-------|-------|-------|-----------------------------|------------|------------|--------------------------|
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|       |      |       |       |       | K,Ito                       | Y,Kanzaki  | H,MIURA    | DOCUMENT No. 5LE212-56   |
| SYMB. | DATE | APPD. | CHKD. | DSGD. |                             |            |            | 12E1220813 (9/13)        |

## 8. その他、取り扱い上のご注意      Precautions in use

## 8-1 保管は高温、多湿の場所及び腐食性ガス中を避けて下さい。

During operation, storage in high temperature and humidity, and in corrosive gas, should be avoided.

## 8-2 エンコーダのパルスカウント処理の設計においては動作スピード、サンプリングタイム、マスキングタイム等に注意し、実装確認の上御使用願います。

In case of pulse count process design, operational speed, sampling time, and masking time etc should be taken into the consideration.

Please check above matter at first on your circuit for the secure reason.

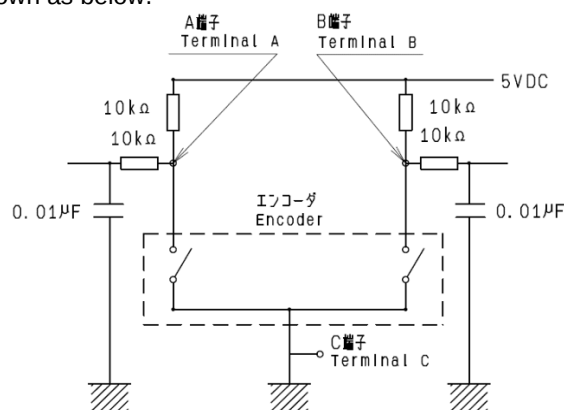
## 8-3 本製品はクリック位置にてA信号はOFF状態で安定となりますので、ソフト設計時A信号基準で設計願います。

Signal A should be design criterion prior to Signal B.

Because Signal A has steady off signal at detent position.

## 8-4 エンコーダのパルスカウント処理の回路は下図のフィルターをいれることを推奨します。

For your pulse count design, it should be considered to add C/R filter on your circuit shown as below.



## 8-5 本製品の本体に直接水分がかかると、パルス波形に異常が発生する可能性がありますので、製品に直接水分がかからないよう配慮願います。

Care must be taken not to expose this product to water or dew to prevent possible problem in pluse output wave form.

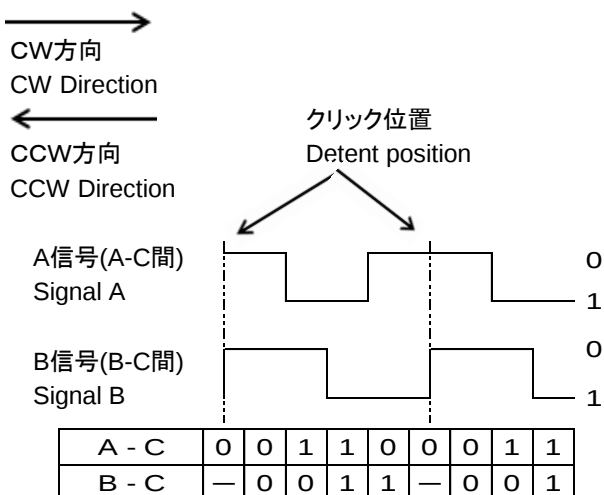
## 8-6 医療用機械、器具への本製品の御使用は御避け下さい。

Please avoid to medical instrument because this encoder is audio use.

|       |      |       |       |       |                             |            |            |                          |
|-------|------|-------|-------|-------|-----------------------------|------------|------------|--------------------------|
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|       |      |       |       |       | APPD.                       | CHKD.      | DSGD.      | TITLE 1 2 形回転形エンコーダ      |
|       |      |       |       |       | Apr.22.'99                  | Apr.22.'99 | Apr.22.'99 | 12mm Size Rotary encoder |
|       |      |       |       |       | K,Ito                       | Y,Kanzaki  | H,MIURA    | DOCUMENT No. 5LE212-56   |
| SYMB. | DATE | APPD. | CHKD. | DSGD. |                             |            |            | 12E1220813 (10/13)       |

- 1) エンコーダの回路処理は、下図の読取方法を推奨します。

For pules count. Recommendation is below.



|     | CW方向  | CCW方向 |
|-----|-------|-------|
| A-C | 0 → 1 | 0 → 1 |
| B-C | 0 → 1 | 1 → 0 |

A信号が0→1と変化した時、B信号の変化が0→1であればCW方向である。

When Signal A change is 0→1 and Signal B change is 0 → 1, means CW direction.

A信号が0→1と変化した時、B信号の変化が1→0であればCCW方向である。

When Signal A change is 0→1 and Signal B change is 1→0, means CCW direction.

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Apr.22.'99  
K,Ito

CHKD.  
Apr.22.'99  
Y,Kanzaki

DSGD.  
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H,MIURA

TITLE 1 2 形回転形エンコーダ  
12mm Size Rotary encoder

DOCUMENT No. 4LE-28

12E1220813

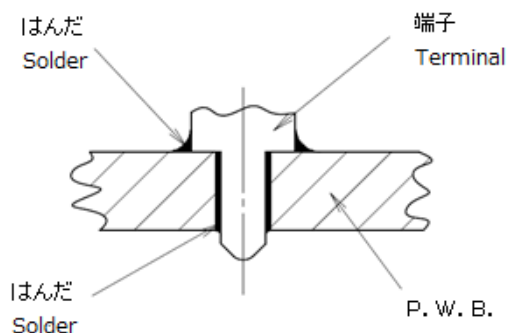
(11/13)

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## 1. はんだ付けに関するその他注意事項

Other precautions for soldering

- 1) 図のようにP.W.B. の上面にはんだ付けをする配線は、お避け下さい。  
Please avoid soldering on upper surface of P.W.B. as shown below.



- 2) 基板に挿入される金属足ははんだ付けしてご使用願います。  
Please solder all inserted metal terminals and bracket to P.W.B.
- 3) はんだ付け後、溶剤などで製品を洗淨しないで下さい。  
After soldering, please not to wash or clean products by liquid such as solvent or any similar.
- 4) Selective solderingの場合は、Dip solderingと条件が異なりますので  
事前に貴社設備で充分確認の上条件設定をお願いします。  
Please thoroughly test and decide appropriate parameters for soldering by your soldering equipment under actual condition of production. (for example, parameters for selective soldering can be different from for wave soldering.)
- 5) Spray fluxerの場合は、製品の実装側からfluxが侵入しないようにして下さい。  
If you use spray fluxer equipment, please prevent the flux from entering the inside of product from mounting side.

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|-------|------|-------|-------|-------|-----------------------------|-------------|-------------|------------------------------------------|
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|       |      |       |       |       | APPD.                       | CHKD.       | DSGD.       | TITLE その他注意事項 (DIP/手はんだ)                 |
|       |      |       |       |       | OCT,22,2015                 | OCT,22,2015 | OCT,22,2015 | Other precautions (DIP/Manual soldering) |
|       |      |       |       |       | S.Urushihara                | K.Sasaki    | Y.Ashida    | DOCUMENT No. C - 2                       |
| SYMB. | DATE | APPD. | CHKD. | DSGD. |                             |             |             | 12E1220813 (12/13)                       |

## 1. ご使用上の注意    Precautions in use

- 1) 当製品は密閉構造ではありませんので、使用環境によって外部ガスが製品内部に侵入し接点障害を起こす場合があります。

同一セット内に以下の様な部材を使用しないで下さい。

- ・硫化、酸化ガスを発生する部材 (例: ゴム材、接着剤、合板、潤滑剤、梱包材)
- ・低分子シロキサンガスを発生する部材 (例: シリコン系ゴム、潤滑剤、接着剤)

As this product does not have hermetical structure, it is possible gas from outside get inside of product and may cause contact failure depends on using environment.

Please avoid using following materials. If you have to use any of material in parentheses, please pay special attention and confirm it does not influence to products through tests under actual using conditions.

-materials which may generate sulfide gas or oxidized gas.

(rubber, glue, adhesive, plywood, packaging material)

-materials which may generate low-molecular-weight siloxane gas.

(silicone base rubber, lubricant, glue)

- 2) 高湿度環境下、又は結露する環境下、液体が製品にかかる環境下では、端子間の電流リークが発生する恐れがありますのでご使用にならないで下さい。

Please not to use this product under the atmosphere with high humidity, with possibility of dew condensation or of direct splash of liquid. Because it may cause leak between terminals.

- 3) ツマミを挿入する際に、軸に規定荷重以上の力や衝撃荷重が加わると製品が破壊する場合があります。ツマミの寸法や、挿入治具の圧力管理は、規定荷重以下で挿入できる設定の配慮をお願いします。

The product may have malfunction if excessive stress or impact than specified value is applied when insert knob to the shaft.

Please fix appropriate dimension for knob or fix insertion force of knob of mounting equipment which can avoid excessive stress to the product than specified value.

- 4) 使用温度範囲の上限、下限付近で長期間の連続使用はできません。

動作寿命の規定は常温15℃～35℃、常湿25%～85%の環境条件に限ります。

使用温度範囲の上限、下限付近で長期間の連続動作を行う場合は、機種毎に仕様規定が可能かどうか確認が必要になります。

This product can't be continuously used under high operating temperature or low operating temperature specified in this document.

Unless otherwise specified, the durability is specified only under normal conditions, temperature 15℃ to 35℃ and related humidity 25% to 85%.

When this product is operated at temperature near form upper or lower limit of operating temperature range, feasibility must be examined by each product specification.

- 5) 製品本体を規定の取付面まで挿入して水平になるように取付けて下さい。

水平にならないまま取付けますと、動作不良の要因となります。

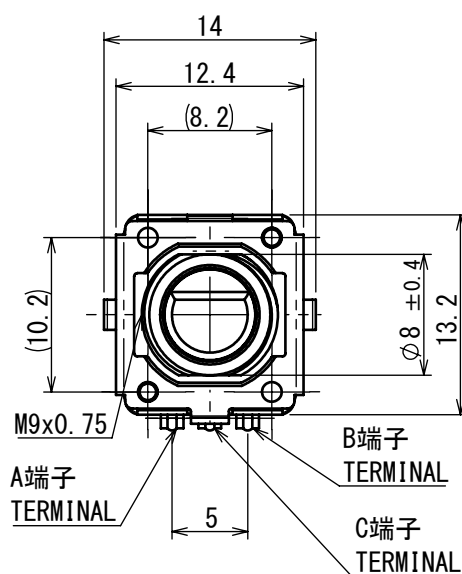
Insert these products to the specified mounting surface and mount them horizontally.

If not mounted horizontally, these products will malfunction.

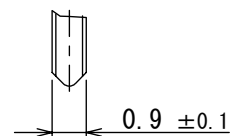
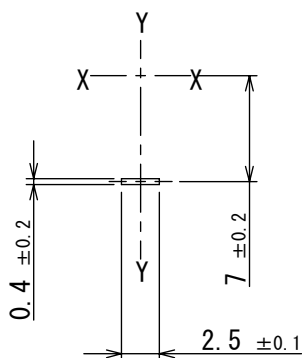
- 6) 塵埃が多い環境で使用されますと塵埃が開口部から入り出力不良や動作不良の原因となることがありますのでセット設計時に予めご配慮ください。

If this product is used under dusty conditions, dust or debris may get inside of product from openings and possible to cause output failure or malfunction. Please consider protections against dust when surrounding parts of the product are designed.

|       |      |       |       |       |                             |             |             |                             |
|-------|------|-------|-------|-------|-----------------------------|-------------|-------------|-----------------------------|
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|       |      |       |       |       | APPD.                       | CHKD.       | DSGD.       | TITLE                       |
|       |      |       |       |       | OCT,15,2015                 | OCT,15,2015 | OCT,15,2015 | ご使用上の注意 (共通)                |
|       |      |       |       |       | S.Urushihara                | K.Sasaki    | Y.Ashida    | Precautions in use (Common) |
| SYMB. | DATE | APPD. | CHKD. | DSGD. |                             |             |             | DOCUMENT No.                |
|       |      |       |       |       |                             |             |             | C - 4                       |
|       |      |       |       |       |                             |             |             | 12E1220813 (13/13)          |



端子先端詳細図(10:1)  
DETAIL OF TERMINALS



| 指定なき部分の許容差<br>TOLERANCES UNLESS OTHERWISE SPEC |               |
|------------------------------------------------|---------------|
| $L \leq 10$                                    | $\pm 0.3$     |
| $10 < L < 100$                                 | $\pm 0.5$     |
| $100 \leq L$                                   | $\pm 0.8$     |
| 角度<br>ANGULAR DIMENSION                        | $\pm 5^\circ$ |

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