

16mm Rotary Type Encoders

General

(1) Scope

This specification applies to 16mm size low-profile rotary encoder (incremental type) for microscopic current circuits used in electronic equipment.

(2) Standard atmospheric conditions

Unless otherwise specified, the range of atmospheric conditions for making measurements and test is as following limits:

Ambient temperature	:	15	35
Relative humidity	:	25 %	85 %
Air pressure	:	86k Pa	106k Pa

If there is any objection, the inspection should be preceded as following:

Ambient temperature	:	20±1	
Relative humidity	:	63 %	67 %
Air pressure	:	86k Pa	106k Pa

(3) Operating temperature range : - 10 + 70

(4) Storage temperature range : - 40 + 80

(1) Scope

This specification applies to 12mm size low-profile rotary encoder (incremental type) for microscopic current circuits used in electronic equipment.

(2) Standard atmospheric conditions

Unless otherwise specified, the range of atmospheric conditions for making measurements and test is as following limits:

Ambient temperature	:	15	35
Relative humidity	:	25 %	85 %
Air pressure	:	86k Pa	106k Pa

If there is any objection, the inspection should be preceded as following:

Ambient temperature	:	20±1	
Relative humidity	:	63 %	67 %
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(3) Operating temperature range : - 10 + 70

(4) Storage temperature range : - 40 + 85

Rating

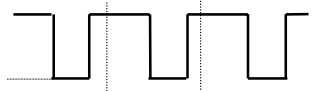
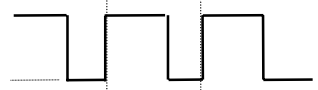
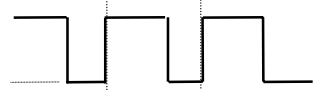
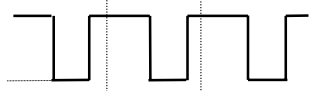
- (1) **Rated Voltage:** D.C. 5V.10mA (1 mA / min.)
- (2) **Maximum operating current (resistive load)**
 Each lead: 0.5 mA (Max: 5mA; Min: 0.5 mA)
 Common lead: 1.0 mA (Max: 10mA; Min: 0.5 mA)

Mechanical characteristics

- (1) **Total rotational** 360°(Endless)
- (2) **Detent torque** 3 ~ 20 mN. (30.6 ~ 204 gf. cm.) Shaft rotational at -10 ~ +5
- (3) **Number and Position of detents** 12 detents (Step angle : $30 \pm 3^\circ$)
 24 detents (Step angle : $15 \pm 3^\circ$)
- (4) **Terminal strength** A static load of 3N (0.31Kgf) shall be applied to the tip of terminals for 10 Sin any direction.
- (5) **Push-pull Strength of shaft** Push and pull static load of 80 N (8.16 Kgf) shall be to the shaft in the axial direction for 10S. (After installing)
- (6) **Shaft wobble** $0.7 \times L / 30$ mm p-p MAX.(L : shaft length) Under Conditions as below. A momentary load of 50mN shall be applied at the point 5 mm form the tip of the shaft in a direction perpendicular to the axis of shaft.
- (7) **Shaft play in axial direction** 0.4 mm p-p MAX. Under Conditions as below, push and pull static load of 5N shall be applied to the shaft in the axial direction.
- (8) **Side thrust strength of shaft** A load of 30N(3.06 Kgf)shall be applied at the point 5mm form the tip of the shaft in a direction perpendicular to the axis of shaft.

Electrical characteristics

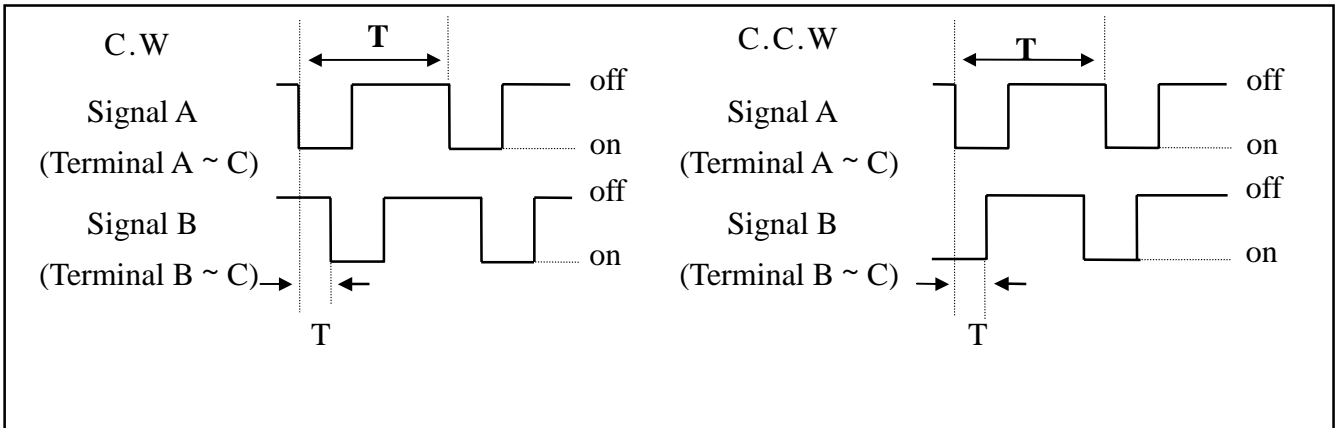
- (1) **Output signal format** 2 phase - different signals (signal A signal B) Details shown in < PH 1 > (The broken line shows detente position)

Shaft rotational Direction	Signal	Output
C . W .	A (Terminal A ~ C)	OFF  ON
	B (Terminal B ~ C)	OFF  ON
C . C . W .	A (Terminal A ~ C)	OFF  ON
	B (Terminal B ~ C)	OFF  ON

PH 1 .

- (2) **Resolution** 24 pulses / 360° for each phase or 12 pulses / 360° for each phase. Under Conditions as below , number of pulses in 360° rotation.

- (3) **Dielectric strength** A voltage of 50V A.C. shaft be applied for 1min between individual terminals and bushing.
- (4) **Insulation resistance** Between individual terminals and bushing ; 10M MIN. Under conditions as bushing, Measurement shaft be made under the condition which a voltage 50V D.C. is applied between individual terminals and bushing.
- (5) **Phase-difference** Measurement shaft be made under the condition which the shaft is rotated in constant speed. In < PH2 >



MIN. $T = 0.15T \pm 0.1T$

『 PH2. 』

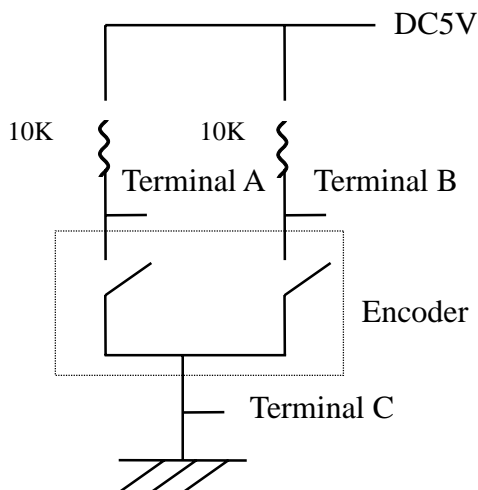
- (6) **Switching Characteristics** Measurement shall be made under the condition as follows.

① Shaft rotational speed : $360^\circ \cdot S^{-1}$

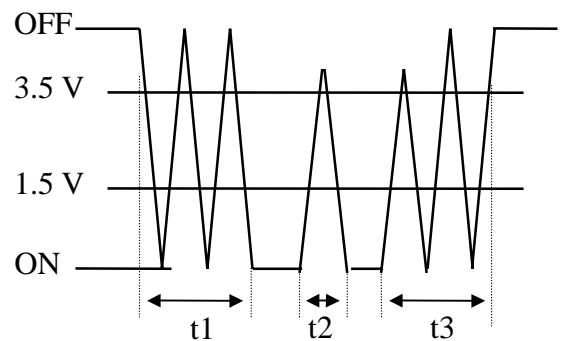
② Test circuit : < PH3 >

(note) Code - ON area : The area which the voltage is 1.5V or less

Code -OFF area : The area which the voltage is 3.5V or more



『 PH3. 』



『 PH4. 』

- (6-1) **Chattering** Conditions : Specified by the signals' passage time form 1.5V to 3.5V of each switching position (code OFF \Rightarrow ON or ON \Rightarrow OFF)
 Specifications : $t_1, t_2 \leq 3 \text{ mS}$

(6-2) Sliding noise (Bounce) Conditions: Specified by the time of voltage change exceed 1.5V in code-ON area. When the bounce has code-ON time Less than 1 mS 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 1 mS , they are regarded as 1 linked bounce. Specifications : t2 2 mS

(6-3) Sliding noise Conditions : The voltage change in code-OFF area.
Specifications : 3.5V MIN.

Endurance characteristics

(1) Rotational life Conditions : The shaft of encoder shall be rotated to 100,000 cycles at a speed of $360^{\circ} \cdot S^{-1}$ without electrical load, after which measurements shall be made.

Specifications : Chattering t1 , t3 5 mS
Bounce t2 3 mS

(2) Damp heat The encoder shall be stored at temperature of 40 ± 2 with relative humidity of 90 % to 95 % for 240 ± 10 in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5 H. After which measurements shall be made.

(3) Dry heat The encoder shall be stored at a temperature of 80 ± 3 for 240 ± 10 H in a thermostatic chamber . And then the encoder shall be subjected to standard atmospheric conditions for 1.5H. After witch measurement shaft be made.

(4) Cold The encoder shall be stored at a temperature of -40 ± 3 for 240 ± 10 H in a thermostatic chamber . And then the encoder shall be subjected to standard atmospheric conditions for 1.5 H. After witch measurement shall be made.

(5) Free falling The encoder shall be fallen freely at any posture from 60 cm. height to the concrete floor covered with vinyl - tile. After which measurement shall be made.

(6) Vibration 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 transverse in 1 min. Amplitude (total excursion): 1.5 mm

This motion shall be applied for a period of 2H in each of 3 mutually perpendicular axes (A total of 6 H).

Soldering conditions

(1) Manual soldering Bit temperature of soldering iron : 300 or less.
Application time of soldering iron : within 3s.

(2) Dip soldering Printed-wiring board: Single-sided copper clad laminate board with thickness of 1.6mm. Flex : ① Specific gravity : 0.82 or more.

② Flux shall be applied to the board using a bubble foaming type fluxer.

③ The board shall be soaked in the flux bubble only to the middle of its thickness.

④ Flux shall not come into contact with the component side surface.

Preheating : ① Surface temperature of board : 100 or less.

② Preheating time : Within 2 min.

Soldering : ① Solder temperature : 260 or less.

② Immersion time : Within 3 s.

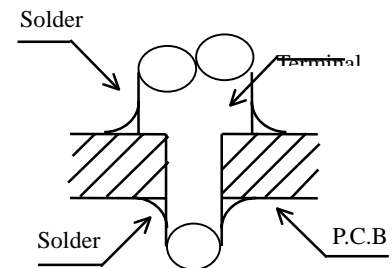
Maintaining : ① The encoder has to maintain temperature between at 25 ± 2 in the house , and the relative humidity should be within at 35 %

85 %RH. Keep out of humidity and sun.

② Apply the above soldering process for 1 or 2 times.

(3) Note for soldering method

Avoid wiring and soldering that causes solder to flow out to the top of P.C. Board as shown. A contact failure may occur in the terminal section.



Other

(1) To assure smooth rotation of a potentiometer at extremely low temperature, dry and no silicon or cyanogen base gas atmosphere.

(2) The process and design of encoder switch numbers of pulse. Please be considered speed, time and noise of pules. After all confirmation then using the encoder switch.

(3) The detent stability on A signal is standard. A signal with OFF position is more stability.

(4) Avoid contacting dew or water drops with base body might occur extraordinary on the output wherefrom.

Abroad Agent



Supertech