



11mm Rotary type Encoders-With Switch

ED1112S

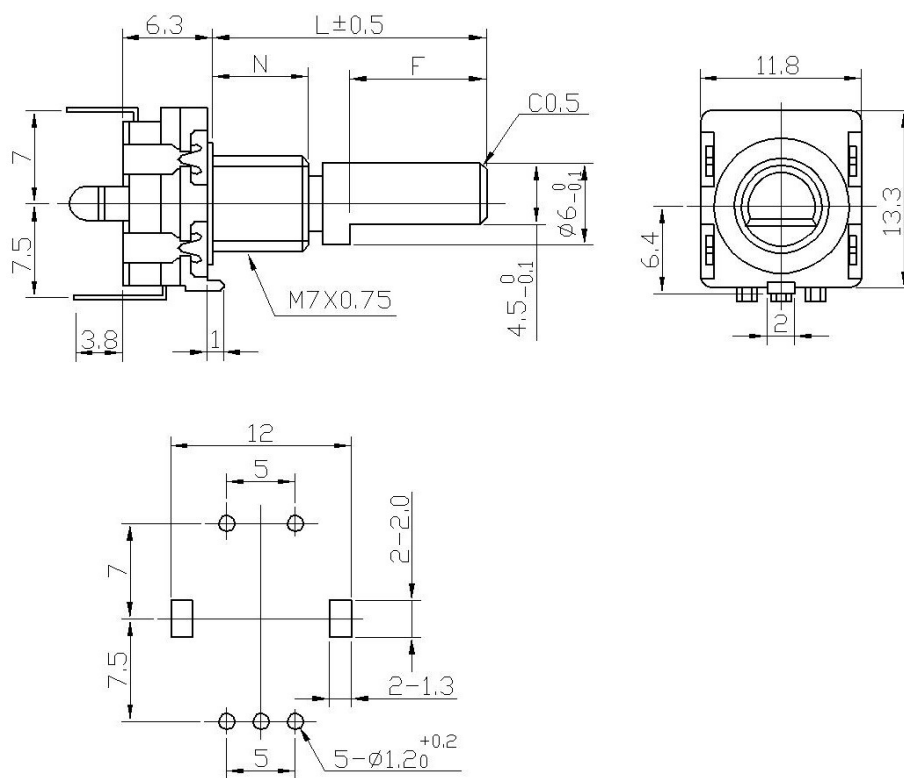


Part Number

ED1112S – **20** –L **20** **F**

20 clicks Shaft Length Shaft Type

Dimensions



L	15	20	25
N	5	7	7
F	7	10	12



11mm Rotary type Encoders-With Switch

General

(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°C ~ 35°C
Relative humidity	: 25 % ~ 85 %
Air pressure	: 86k Pa ~ 106k Pa

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

Ambient temperature	
Relative humidity	: 63 % ~ 67 %
Air pressure	: 86k Pa ~ 106k Pa

(3) Operating temperature range : -10°C ~ +70°C

(4) Storage temperature range : -40°C ~ +85°C

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 5 ~ 19 mN. (51.0 ~ 193.8 gf. cm.) Shaft rotational at -10°C ~ +5°C

(3) Number and Position of detents 20 detents (Step angle : 18±3°)

(4) Terminal strength A static load of 5N (0.51Kgf) shall be applied to the tip of terminals for 1 min any direction.

(5) Push-pull Strength of shaft Push and pull static load of 10 N (10.2 Kgf) shall be to the shaft in the axial direction for 10S. (After installing)

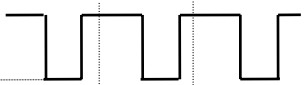
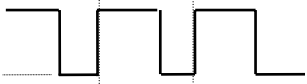
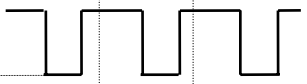
(6) Shaft wobble 0.7 xL/30 mm p-p MAX.(L : shaft length) Under Conditions as below.
A momentary load of 50mN · m shall be applied at the point 5 mm from the tip of the shaft in a direction perpendicular to the axis of shaft.

(7) Side thrust strength of shaft Static load of 20 N (2.04 Kg) shall be to the shaft in the axial direction for 10S. (After installing)

(8) Using angle of rotary shaft 5MAX.

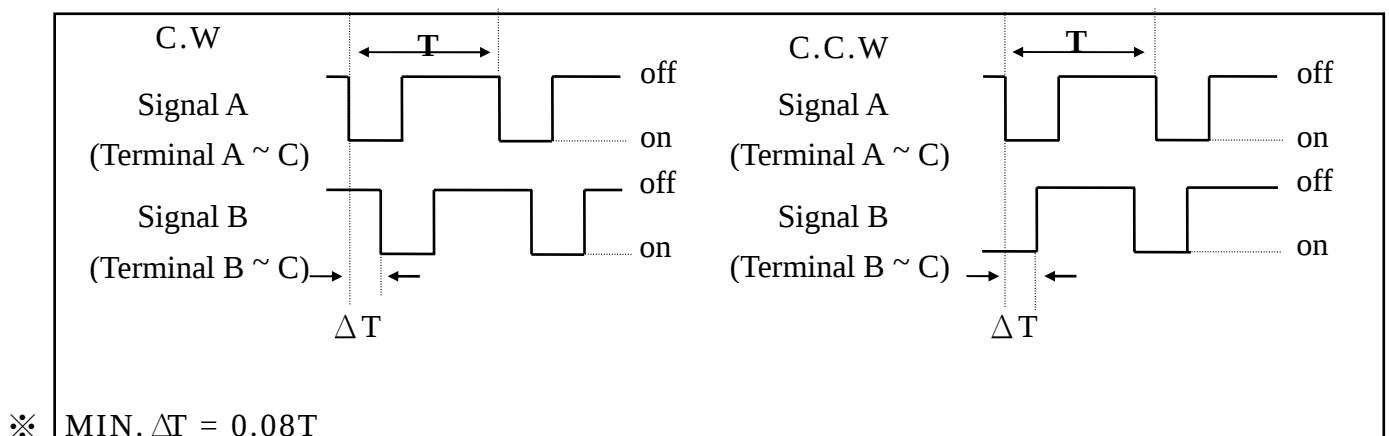
Electrical characteristics

- (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** 20 pulses /360°for each phase . Under Conditions as below, number of pulses in 360°rotation.
- (3) Withstand Voltage** A voltage of 300V A.C. shaft be applied for 1min between individual terminals and bushing.
- (4) Insulation resistance** Between individual terminals and bushing ; 100 MΩ min.
Under conditions as bushing, Measurement shaft be made under the condition which a voltage 250V 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 >

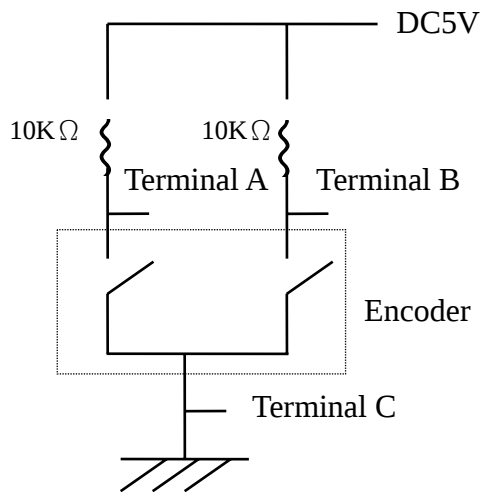


- (6) Switching Characteristics** Measurement shall be made under the condition as follows.
- ① Shaft rotational speed : 360°/S

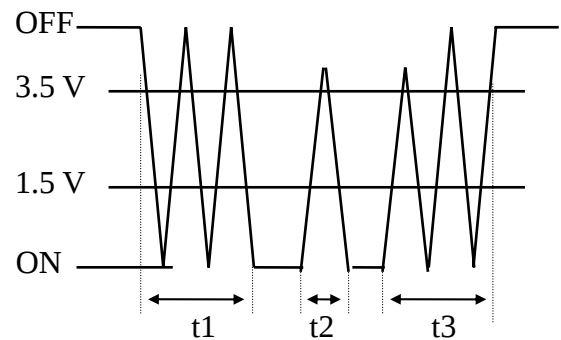
② Test circuit : < PH3 >

(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 signal's passage time from 1.5V to 3.5V of each switching position (code OFF $\Rightarrow$ ON or ON $\Rightarrow$ OFF)

Specifications : $t_1, t_3 \leq 2 \text{ mS}$

(6-2) 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 (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 1 mS , hey are regarded as 1 linked bounce.

Specifications : $t_2 \leq 2 \text{ mS}$

(6-3) 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 30,000 cycles at a speed of 600~1000H without electrical load, after which measurements shall be made.

Specifications : Chattering $t_1, t_2 \leq 3 \text{ mS}$

Detent Toque -30% ~ +10%

(2) Damp heat

The encoder shall be stored at temperature of $40 \pm 2^\circ\text{C}$ 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 $80^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 240 ± 10 H in a thermostatic chamber . And then the encoder shall be subjected to standard atmospheric conditions for 1.5H. After which measurement shall be made.

(4) Cold

The encoder shall be stored at a temperature of $-40^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 240 ± 10 H in a thermostatic chamber . And then the encoder shall be subjected to standard atmospheric conditions for 1.5 H. After which 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.

Soldering conditions

(1) Manual soldering

Bit temperature of soldering iron : 300°C 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°C or less.

② Preheating time : Within 2 min.

Soldering : ① Solder temperature : 260°C or less.

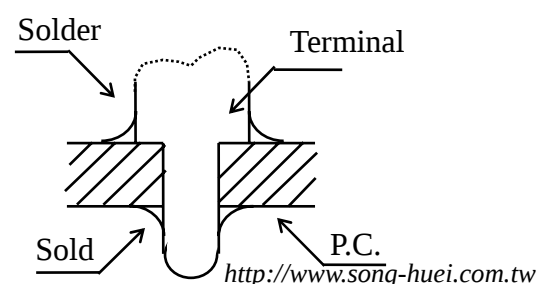
② Immersion time : Within 3 ± 1 s.

Maintaining : ① The encoder has to maintain temperature between at $25 \pm 2^{\circ}\text{C}$ in the house , and the relative humidity should be within at 35% ~85% PH. 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.

Push Switch part

1. Rating D.C. 5V 10mA (1 mA min.)

2. Electrical Characteristics

- | | |
|----------------------------------|--|
| (1) Contact Resistance | Conditions : Testing method under DC 5V 1mA min.
Specifications : First period $\Rightarrow 100M\Omega$; $200M\Omega$ after the end of useful life is reached. |
| (2) Sliding Noise | Conditions : specified by the signal's passage time from 1 second for each time rotation.(OFF $\Rightarrow$ ON $\Rightarrow$ OFF) Specifications: 10ms max. |
| (3) Insulation Resistance | Between terminal and installment board has DC50V 1mA. Insulation resistance $10M\Omega$ max. |
| (4) Withstand Voltage | Between terminal and installment board has AC50V / 1 minute. |
| (5) Remark | Between shaft and terminal of switch are insulated. |

3. Mechanical characteristics

- | | | | |
|--|-------------------------------|--------------------------------------|--------|
| (1) Switch circuit, the number of contact | Single pole and single throw. | | |
| (2) Travel of switch | 0.5 mm | (3) Operating Force of Switch | 360 gf |

4. Reliability

The shaft of encoder shall be rotated to 20,000 cycles at a speed of 500 cycles per hour without electrical load, after which measurements should be made. However, an interim measurement should be made immediately after 5,000 cycles. The contact resistance should be $200\ m\Omega$ max. (Shaft push-pull strength shall be 1 kgf.cm max.)