

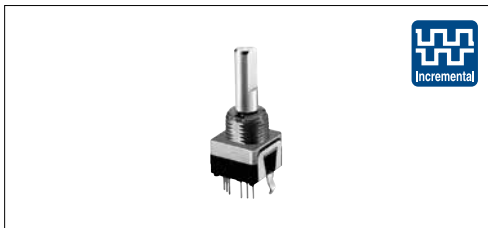
EM11B

1 1 mm Size Metal Shaft Magnetic Type

Compact 10.8 × 11 mm (W×D) encoder with long life of 1 million cycles



Typical Specifications



Items	Items
Rating	10mA 5V±5% DC
Operating life	1,000,000 cycles
Operating temperature range	-30°C to +85°C

Product Line

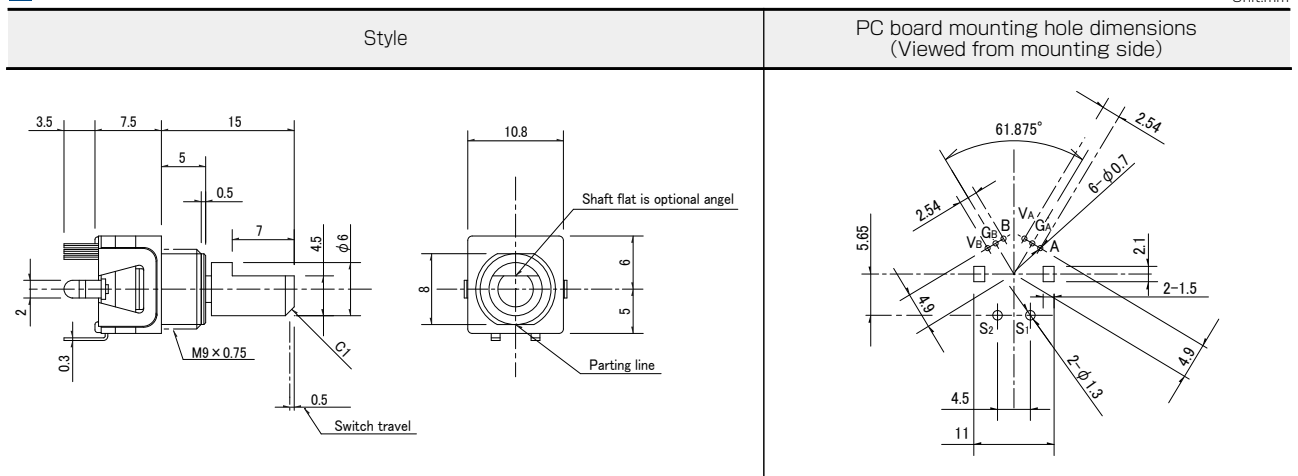
Actuator length (mm)	Detent torque (mN·m)	Number of detent	Number of pulse	Operating direction	Push-on switch	Response time	Minimum order unit (pcs.)		Product No.
							Japan	Export	
15	10±5	16	16	Vertical	With	1.3μs. (typ)	1,000	2,000	EM11B16140AE

Packing Specifications

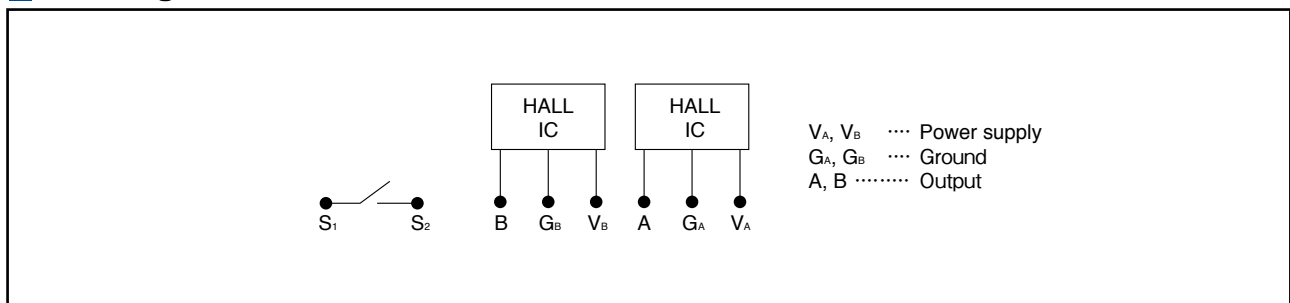
Tray

Number of packages (pcs.)		Export package measurements (mm)
1 case /Japan	1 case /export packing	
1,000	2,000	526×370×191

Dimensions



Block Diagram



Notes

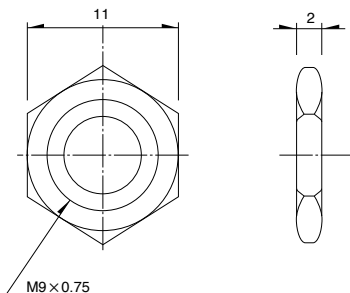
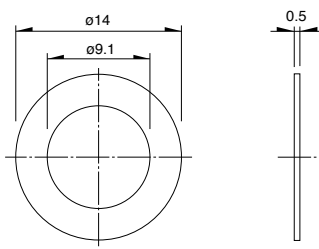
1. This products uses a Hall IC. Be aware of ESD damages.
2. Custom design for shaft configuration and mount height are available upon request.

Refer to P.272 for switch specifications.
Refer to P.299 for soldering conditions.

1 1 mm Size Metal Shaft Magnetic Type / Attached Parts

The following parts are included with the product.

Unit:mm



















Nut	Washer
	

1 1 mm Size Metal Shaft Magnetic Type / Switch Specifications

Switch type		Momentary push switch
Contact arrangement		Single pole and single throw (Push-on)
Travel (mm)		$0.5 + \begin{smallmatrix} 0.3 \\ -0.2 \end{smallmatrix}$
Operating force		$5.5 \pm 3\text{N}$
Operating life		1,000,000 times
Electrical performance	Rating	5mA 5V DC (50mA 12V DC max. ratings)
	Contact resistance	500mΩ max. for initial period, 5Ω max. after operating life.
	Insulation resistance	100MΩ min. 100V DC
	Voltage proof	250V AC for 1 minute or 300V AC for 2 second

Encoders

List of Varieties

Type		Metal shaft							
		11 mm size							
Series		EC11G	EC11M	EC111	EC11K	EC11J	EM11B		
Photo									
Output		Incremental (Two phase A and B)		Self-return switch	Incremental (Two phase A and B)				
Shaft types		Single-shaft							
Operating direction		Vertical							
Number of pulse / Number of detent		15/30 15/without		—	9/18 15/30			16/16	
Features		Less shaft wobble		—	—	Surface Mount type		Magnetic type	
Dimensions (mm)	W	11.7						10.8	
	D	12		13	12	15.3		11	
	H	4.5		5	4.5			7.5	
Operating temperature range		−40℃ to +85℃						−30℃ to +85℃	
Operating life		15,000 cycles			100,000 cycles			1,000,000 cycles	
Automotive use									
Life cycle (availability)									
Electrical performance	Rating	10mA 5V DC						10mA 5V±5% DC	
	Max./min. operating current (Resistive load)	10mA / 1mA						15mA / —	
	Insulation resistance	100MΩ min. 250V DC						100MΩ min.100V DC	
	Voltage proof	300V AC for 1 minute or 360V AC for 2s			300V AC for 1 minute or 360V AC for 1s			250V AC for 1 minute or 300V AC for 2s	
Mechanical performance	Rotational torque (Without detent)	8.5±5mN·m		3 to 30mN·m		—		—	
	Detent torque	12±7mN·m		—		12±5mN·m		12±5mN·m (Initial) 10±4mN·m (After reflow)	
	Push-pull strength	100N							
Shaft configuration		Serrated		Flat, Slotted, Serrated				Flat	
Terminal type		Insertion				Reflow		Insertion	
Switch Specifications	Switch type	Push-on switch							
	Contact arrangement	Single pole and single throw (Push-on)							
	Travel (mm)	1.5±0.35		0.5±0.3	1.5±0.5	0.5±0.3	1.5±0.5	0.5±0.3	1.5±0.5
	Operating force (N)	5±2		6 ^{+2.5} _{−2}	4±2	5±2	4±2	5±2	4±2
	Rating	0.1A 5V DC (500μA 5V DC min. ratings)			0.1A 5V DC (0.1mA 5V DC min. ratings)			5mA 5V DC (50mA 12V DC max. ratings)	
	Contact resistance	100mΩ max. for initial period, 200mΩ max. after operating life.						500mΩ max. for initial period, 5mΩ max. after operating life.	
	Operating life	20,000 times			1,000,000 times	100,000 times	1,000,000 times	100,000 times	1,000,000 times
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Note

- Indicates applicability to all products in the series.

Reference for Manual Soldering

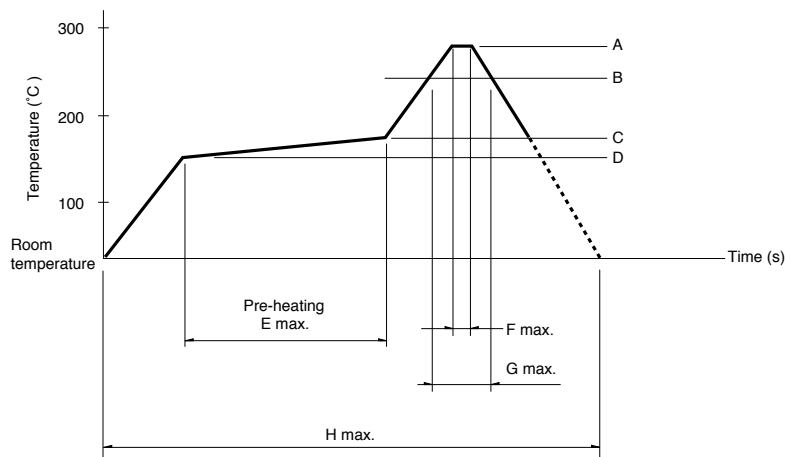
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC11M, EC11N, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC40A, EC45A, EC50A, EC60B, EM11B, EC21C, EC28C, EC35CH	350°C max.	3s max.	1 time
EC11J	350±10°C	3 ⁺¹ ₀ s	2 times

Reference for Dip Soldering

Series	Preheating		Dip soldering		No. of solders
	Soldering surface temperature	Heating time	Soldering temperature	Soldering time	
EC09E, EC11B, EC111, EC11E, EC11G, EC11K, EC11M, EC11N, EC18A, EC21A, EC28A, EC35A, EC35AH, EC50A, EC60B	100°C max.	2 min. max.	260±5°C	5±1s	2 times max.
EM11B	100°C max.	1 min. max.	260°C max.	3s max.	2 times max.
EC10E, EC12D, EC12E	100°C max.	1 min. max.	260±5°C	3±1s	2 times max.
EC40A	110°C max.	1 min. max.	260°C max.	10s max.	1 time
EC45A	100°C max.	2 min. max.	260°C max.	5s max.	2 times max.

Example of Reflow Soldering Condition

Temperature profile



Series	A	B	C	D	E	F	G	H	No. of reflows
EC11J	260°C	230°C	180°C	150°C	2 min. max.	3s	40s	4 min. max.	2 times max.
EC05E	250°C min.	230°C min.	180°C	150°C	60s to 120s	—	30s to 40s	—	2 times max.
EC21C	230°C to 245°C	220°C	200°C	150°C	60s to 120s	—	25s to 60s	300s max.	1 time max.
EC28C, EC35CH	260°C	230°C	180°C	150°C	2 min. min.	3s	40s	230s max.	1 time max.

Notes

- When using an infrared reflow oven, solder may sometimes not be applied. Be sure to use a hot air reflow oven or a type that uses infrared rays in combination with hot air.
- The temperatures given above are the maximum temperatures at the terminals of the encoder when employing a hot air reflow method. The temperature of the PC board and the surface temperature of the encoder may vary greatly depending on the PC board material, its size and thickness. Ensure that the surface temperature of the encoder does not rise to 250°C or greater.
- Conditions vary to some extent depending on the type of reflow bath used. Be sure to give due consideration to this prior to use.