

# EM11B 1 1 mm Size Metal Shaft Magnetic Type

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



Encoders

Metal Shaft

Insulated Shaft

Through Shaft Type

Ring Type



## 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	Push-on switch	Response time	Minimum order unit (pcs.)		Product No.
						Japan	Export	
15	10±5	16	16	With	1.3μs. (typ)	1,000	2,000	<b>EM11B16140AE</b>

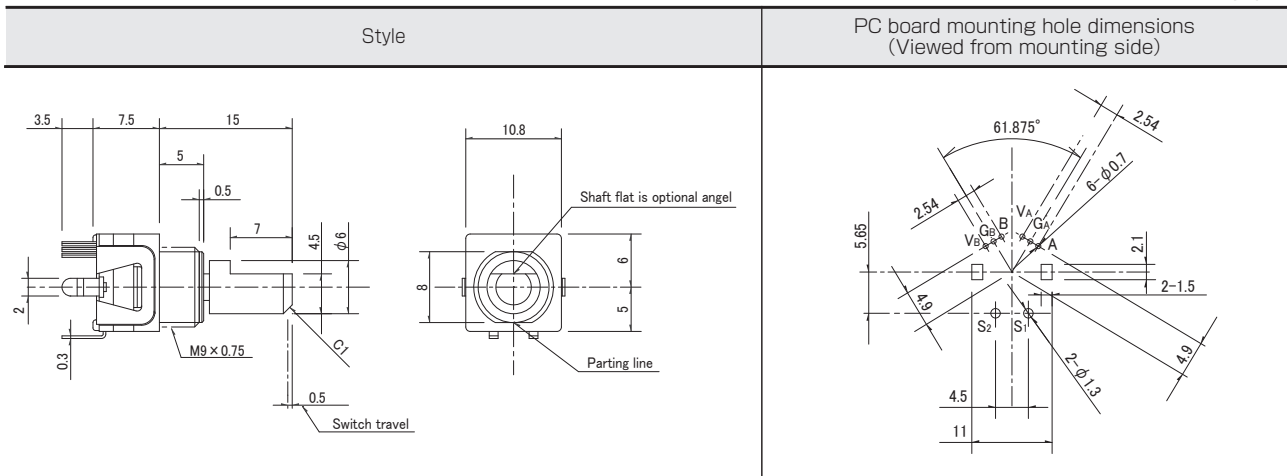
## Packing Specifications

Tray

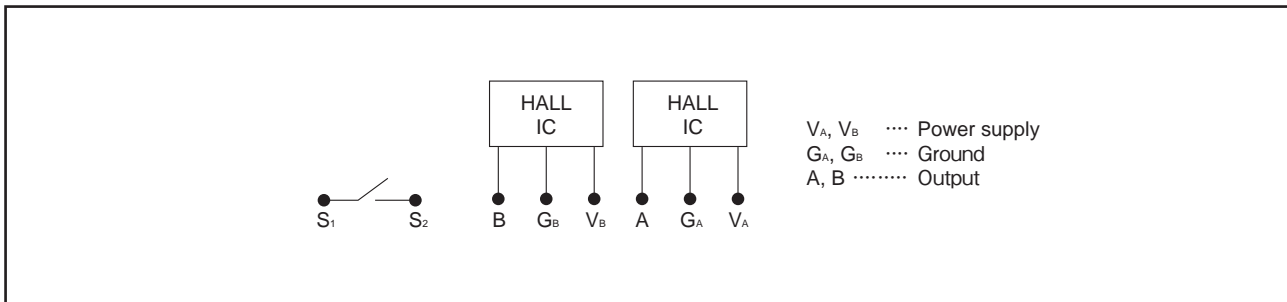
Number of packages (pcs.)		Export package measurements (mm)
1 case /Japan	1 case /export packing	
1,000	2,000	526×370×191

## Dimensions

Unit:mm



## Block Diagram



## Notes

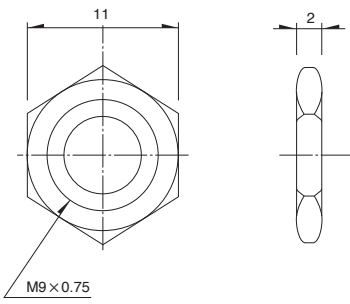
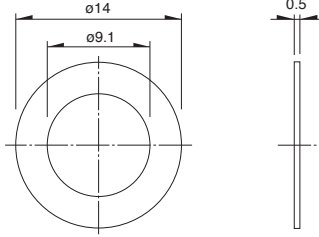
1. This products uses a Hall IC. Be aware of ESD damages.
2. Custom design for shaft configuration and mount height are available upon request.

Attached Parts ▶ P.253  
 Refer to P.253 for switch specifications.  
 Refer to P.275 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	$5.5 \pm 3N$	
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

Metal Shaft









Insulated Shaft

Through Shaft Type

Ring Type

# Encoders

## List of Varieties

Type		Metal shaft	Insulated shaft		
		11mm size	12mm size		18mm size
Series		<b>EM11B</b>	<b>EC12E</b>	<b>EC12D</b>	<b>EC18A</b>
Photo					
Output		Incremental (Two phase A and B)			Absolute type
Shaft types		Single-shaft			
Control part orientation		Vertical			
Number of pulse / Number of detent		16/16	12/12 24/24 24/without	15/30	12 positions 15 positions 16 positions
Features		Magnetic type	—	With push-on switch	Water resisting performance (IPX7)
Dimensions (mm)	W	10.8	12.4	12.5	18.8
	D	11	13.2	11.7	18
	H	7.5	5		8.75
Operating temperature range		-30°C to +85°C	-10°C to +70°C	-40°C to +85°C	-20°C to +60°C
Operating life		1,000,000 cycles	15,000 cycles 30,000 cycles	30,000 cycles	
Automotive use		●	—	●	—
Life cycle (availability)					
Electrical performance	Rating	10mA 5V±5% DC	0.5mA 5V DC	1mA 5V DC	1mA 10V DC
	Max./min. operating current (Resistive load)	15mA / —	5mA / 0.5mA	10mA / 1mA	—
	Insulation resistance	100MΩ min. 100V DC	10MΩ min. 50V DC	100MΩ min. 250V DC	10MΩ min. 250V DC
	Voltage proof	250V AC for 1 minute or 300V AC for 2s	50V AC for 1 minute	300V AC for 1 minute or 360V AC for 1s	50V AC for 1 minute or 60V AC for 2s
Mechanical performance	Rotational torque (Without detent)	—	10mN·m max. 25±15mN·m 40±15mN·m	—	—
	Detent torque	10±5mN·m	3±2mN·m 3 to 20mN·m	5±3mN·m 10±5mN·m	60±20mN·m
	Push-pull strength	100N	80N	100N	Push 100N / Pull 50N
Shaft configuration		Flat	Flat, Through shaft	Flat	
Terminal type		Insertion			
Switch Specifications	Switch type	Push-on switch	—	Push-on switch	—
	Contact arrangement	Single pole and single throw (Push-on)	—	Single pole and single throw (Push-on)	—
	Travel (mm)	0.5 ± <sub>0.2</sub> <sup>0.3</sup>	—	0.5±0.3	—
	Operating force (N)	5.5±3	—	3 <sub>-1</sub> <sup>+1.5</sup>   6 <sub>-2</sub> <sup>+2.5</sup>	—
	Rating	5mA 5V DC (50mA 12V DC max. ratings)	—	1mA 5V DC (10mA 5V DC max. ratings)	—
	Contact resistance	500mΩ max. for initial period, 5mΩ max. after operating life.	—	100mΩ max. for initial period; 200mΩ max. after operating life.	—
	Operating life	1,000,000 times	—	30,000 times	—
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### Notes

● Indicates applicability to all products in the series.

## Reference for Manual Soldering

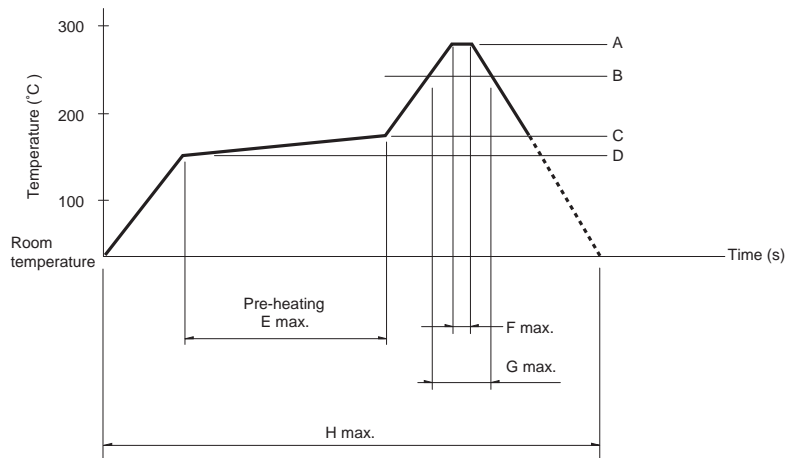
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11E, EC11M, EC11N, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC40A, EC50A, EM11B, EC21C, EC28C, EC35CH	350°C max.	3s max.	1 time

## Reference for Dip Soldering

Series	Preheating		Dip soldering		No. of solders
	Soldering surface temperature	Heating time	Soldering temperature	Soldering time	
EC09E, EC111, EC11E, EC11M, EC11N, EC18A, EC21A, EC28A, EC35A, EC35AH, EC50A	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

## Example of Reflow Soldering Condition

Temperature profile



Series	A	B	C	D	E	F	G	H	No. of reflows
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

1. 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.
2. 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.
3. Conditions vary to some extent depending on the type of reflow bath used. Be sure to give due consideration to this prior to use.