

# EC09E 9mm Size Metal Shaft Type

A compact 9.5mm size and round shape contribute to save space



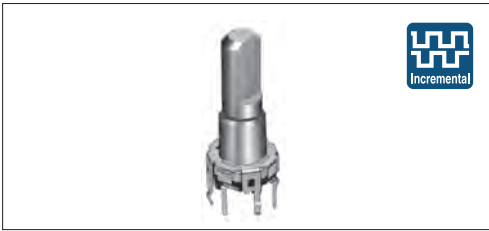
Encoders

Metal Shaft

Insulated Shaft

Through Shaft Type

Ring Type



## Typical Specifications

Items	Specifications
Rating	10mA 5V DC
Operating life	15,000 cycles
Operating temperature range	-40°C to +85°C

## Product Line

Shaft configuration	Length of the shaft (mm)	Detent torque (mN·m)	Number of detent	Number of pulse	Push-on switch	Travel of push-on switch (mm)	Minimum order unit (pcs.)		Product No.	Drawing No.
							Japan	Export		
Flat	15	8±5	30	15	Without	—	700	1,400	<b>EC09E1520407</b>	1
	20				With	0.5			<b>EC09E1524417</b>	2
					1.5	<b>EC09E1524418</b>				

### Note

Shaft design and other features are customizable.

## Packing Specifications

Tray

Number of packages (pcs.)		Export package measurements (mm)
1 case /Japan	1 case /export packing	
700	1,400	529×374×213

## Dimensions

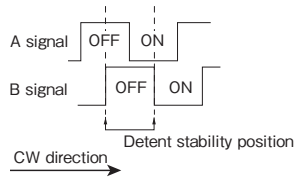
Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
1			
2			

Refer to P.245 for switch specifications.  
Refer to P.275 for soldering conditions.

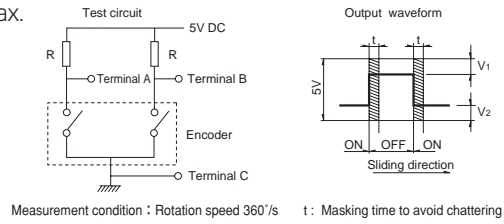
**Output Wave**

Detent stability position cannot be specified for B signal.



**Sliding Noise**

$V_1=V_2=2.5V$  max.



Measurement condition : Rotation speed 360°/s t : Masking time to avoid chattering

At  $R = 5k\Omega$   
Chattering : 5ms max. Bounce : 2ms max.

**9mm Size Metal Shaft Type / Switch Specifications**

Switch type	Momentary push switch	
Contact arrangement	Single pole and single throw (Push-on)	
Travel (mm)	0.5±0.3	1.5±0.5
Operating force	6 ± 2 <sup>5</sup> N	4±2N
Operating life	10,000 times	
Electrical performance	Rating	10mA 5V DC (1mA 5V DC min. ratings)
	Contact resistance	100mΩ max. for initial period, 200mΩ max. after operating life.
	Insulation resistance	100MΩ min. 250V DC
	Voltage proof	300V AC for 1 minute or 360V AC for 1 second

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Metal Shaft











Insulated Shaft

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# Encoders

## List of Varieties

Type		Metal shaft											
		9mm size		11mm size									
Series		EC09E		EC11E		EC11N		EC11M		EC111			
Photo													
Output		Incremental (Two phase A and B )								Self-return switch			
Shaft types		Single-shaft											
Control part orientation		Vertical											
Number of pulse / Number of detent		15/30		9/18 15/30 18/36		15/30		15/30 15/without		—			
Features		—		—		—		Less shaft wobble		—			
Dimensions (mm)		W		9.5		11.7							
		D		12						13			
		H		4.5						5			
Operating temperature range		-40°C to +85°C											
Operating life		15,000 cycles											
Automotive use		●		●		●		●		●			
Life cycle (availability)													
Electrical performance		Rating		10mA 5V DC									
		Max./min. operating current (Resistive load)		10mA /1mA									
		Insulation resistance		100MΩ min. 250V DC									
		Voltage proof		300V AC for 1 minute or 360V AC for 1s		300V AC for 1 minute or 360V AC for 2s							
Mechanical performance		Rotational torque (Without detent)		—		—		8.5±5mN·m		3 to 30mN·m			
		Detent torque		8±5mN·m		10±7mN·m		12±7mN·m		—			
		Push-pull strength		100N									
Shaft configuration		Flat		Flat, Slotted, Serrated		Flat		Serrated		Flat, Slotted, Serrated			
Terminal type		Insertion											
Switch Specifications		Switch type		Push-on switch									
		Contact arrangement		Single pole and single throw (Push-on)									
		Travel (mm)		0.5±0.3	1.5±0.5	0.5±0.3	1.5±0.5	0.5±0.3	1.5±0.5	1.5±0.35	0.5±0.3	1.5±0.5	
		Operating force (N)		6 $\pm$ $\frac{2.5}{2}$	4±2	6 $\pm$ $\frac{2.5}{2}$	4±2	6 $\pm$ $\frac{2.5}{2}$	4±2	5±2	6 $\pm$ $\frac{2.5}{2}$	4±2	
		Rating		10mA 5V DC (1mA 5V DC min. ratings)		0.1A 5V DC (500μA 5V DC min. ratings)							
		Contact resistance		100mΩ max. for initial period; 200mΩ max. after operating life.									
		Operating life		10,000 times		20,000 times							
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### Notes

- Indicates applicability to all products in the series.

## Reference for Manual Soldering

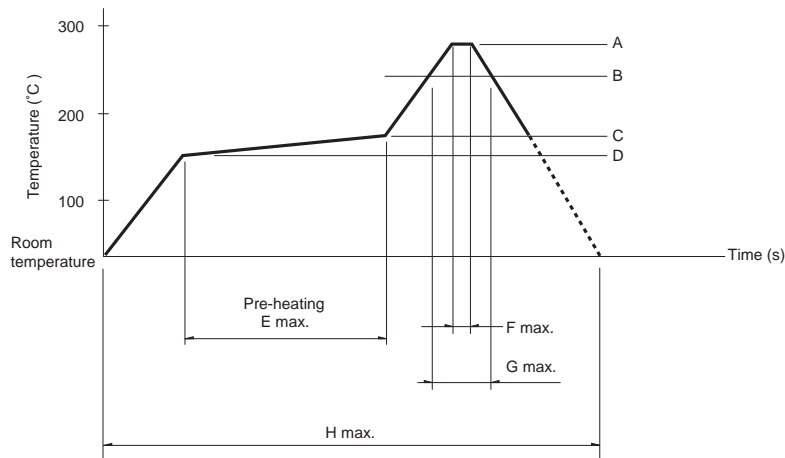
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11E, EC11M, EC11N, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC40A, EC50A, EM11B, EC21C, EC28C, EC35CH	350°C max.	3s max.	1 time

## 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.

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