

# EC09E 9mm Size Metal Shaft Type

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



## 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	Operating direction	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	Vertical	Without	—	700	1,400	<b>EC09E1520406</b>	1
	20					With	0.5			<b>EC09E1524405</b>	2
						1.5	<b>EC09E1524404</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	374×529×213

## Dimensions

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

Refer to P.268 for switches.  
Refer to P.307 for soldering conditions.

# EC09E 9mm Size Metal Shaft Type

Encoders

Metal Shaft

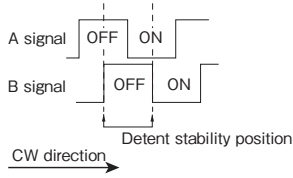
Insulated Shaft

Hollow Shaft

Ring Type

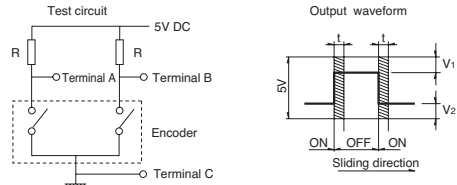
## Output Wave

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)	$0.5 \pm 0.3$	$1.5 \pm 0.5$
Operating force	$6 \pm \frac{2}{2}^5$ N	$4 \pm 2$ N
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 1s

# Encoders

## List of Varieties

Type		Metal shaft																					
		9mm size		11mm size																			
Series		EC09E		EC11B		EC11E				EC11G													
Photo																							
Output		Incremental (Two phase A and B )																					
Shaft types		Single-shaft						Dual-shaft		Single-shaft													
Operating direction		Vertical		Horizontal		Vertical																	
Number of pulse / Number of detent		15 / 30				9 / 18 15 / 30 or without 18 / 36 or without				15 / 30 or without													
Features		—		—		Without detent Push-lock mechanism		—		Less shaft wobble													
Dimensions (mm)		W		9.5		11.7																	
		D		13.8		12																	
		H		4.5		5.5		4.5		8 / 8.5		4.5											
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)		—		7 <sup>+3</sup> <sub>-4</sub> mN·m		—		8.5±5mN·m													
		Detent torque		8±5mN·m		12±7mN·m		10±7mN·m		12±7mN·m													
		Push-pull strength		100N																			
Shaft configuration		Flat		Flat, Slotted, Serrated				Inner-shaft : Flat Outer-shaft : Slotted		Serrated													
Terminal type		Insertion																					
Switch Specifications		Switch type		Push-on switch				Push-lock mechanism switch ※		Push-on switch													
		Contact arrangement		Single pole and single throw (Push-on)																			
		Travel (mm)		0.5±0.3		1.5±0.5		0.5 <sup>+0.4</sup> <sub>-0.3</sub>		1.5±0.5		0.5±0.3		1.5±0.5		1.5±0.35							
		Operating force (N)		6 <sup>+2.5</sup> <sub>-2</sub>		4±2		6±3		5±2		6 <sup>+2.5</sup> <sub>-2</sub>		4±2		8 max.		6 <sup>+2.5</sup> <sub>-2</sub>		4±2		5±2	
		Rating		10mA 5V DC (500μA 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		25,000 times		20,000 times				10,000 times		20,000 times											
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### Notes

- ※marked specification is only applicable to EC11E152U402.
- Indicates applicability to all products in the series.

## Reference for Manual Soldering

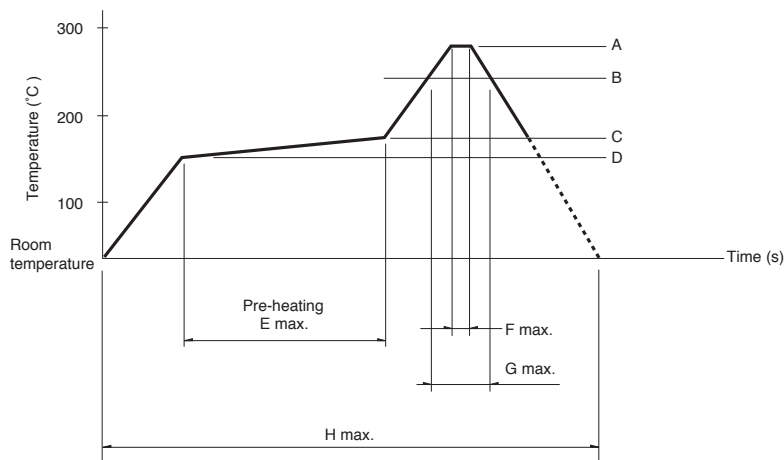
Series	Tip temperature	Soldering time	No. of solders
<b>EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC40A, EC45A, EC50A, EC60B, EM11B, EM20B, EC21C</b>	350°C max.	3s max.	1 time
<b>EC11J</b>	350±10°C	3 <sup>+1</sup> <sub>0</sub> s	2 time

## Reference for Dip Soldering

Series	Preheating		Dip soldering		No. of solders
	Soldering surface temperature	Heating time	Soldering temperature	Soldering time	
<b>EC09E, EC11B, EC111, EC11E, EC11G, EC11K, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC50A, EC60B</b>	100°C max.	2 min. max.	260±5°C	5±1s	2 time max.
<b>EC10E, EC12D, EC12E, EM11B</b>	100°C max.	1 min. max.	260±5°C	3±1s	2 time max.
<b>EC40A</b>	110°C max.	1 min. max.	260°C max.	10s max.	1 time
<b>EC45A</b>	100°C max.	2 min. max.	260°C max.	5s max.	2 time max.
<b>EM20B</b>	80°C max.	1 min. max.	260°C max.	3s max.	2 time max.

## Example of Reflow Soldering Condition

Temperature profile



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

### 注記

- 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.