

# 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>EC09E1520407</b>	1
	20					With	0.5			<b>EC09E1524417</b>	
						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 face)
1		<p>D and E terminals are dummy terminals</p>	
2		<p>Switch travel 0.5 or 1.5</p>	

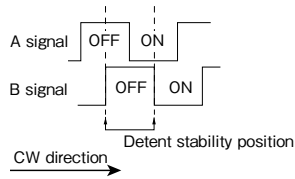
Refer to P.260 for switch specifications.  
Refer to P.299 for soldering conditions.

Encoders  
Metal Shaft  
Insulated Shaft  
Through Shaft Type  
Ring Type

# EC09E 9mm Size Metal Shaft Type

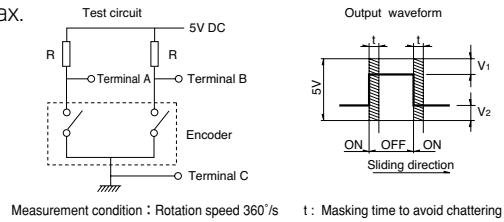
## Output Wave

Detent stability position cannot be specified for B signal.



## Sliding Noise

$V_1=V_2=2.5V$  max.













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	$6 \pm \frac{2}{5} N$	$4 \pm 2 N$
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 1 second

# Encoders

## List of Varieties

Type		Metal shaft																			
		9mm size			11mm size																
Series		EC09E			EC11B		EC11E				EC11N										
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										
Features		—			—		Without detent Push-lock mechanism			—			—								
Dimensions (mm)		W		9.5			11.7														
		D					13.75			12											
		H		4.5			5.5/6.7/7.75			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 ± 3mN·m		—			—							
		Detent torque		8 ± 5mN·m			12 ± 7mN·m			10 ± 7mN·m											
		Push-pull strength		100N																	
Shaft configuration		Flat			Flat, Slotted, Serrated				Inner-shaft : Flat Outer-shaft : Slotted			Flat									
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 ± 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)		6 ± 2.5		4 ± 2		6 ± 3		5 ± 2		6 ± 2.5		4 ± 2		8 max.		6 ± 2.5		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			25,000 times		20,000 times			10,000 times		20,000 times							
Page		259			261																

Encoders Soldering Conditions	299
Encoders Cautions	300

### Notes

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

## Reference for Manual Soldering

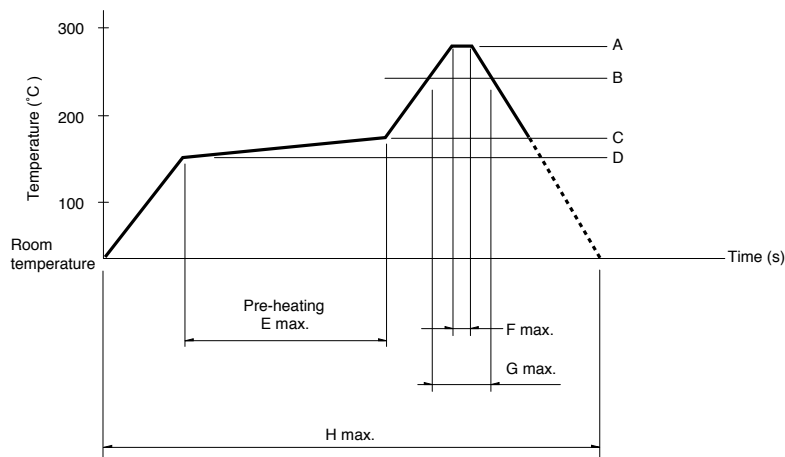
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC11M, EC11N, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC40A, EC45A, EC50A, EC60B, EM11B, EC21C, EC28C, EC35CH	350°C max.	3s max.	1 time
EC11J	350±10°C	3 <sup>+1</sup> <sub>0</sub> s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

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.