

Compact and highly reliable type available in many varieties



Typical Specifications

Items	Specifications
Output signal	Two phase of A, B Self-return switch (EC111 / EC11E0B)
Rating	10mA 5V DC
Operating life	15,000 cycles 100,000 cycles (EC11K / EC11J)
Operating temperature range	-40°C to +85°C

Product Line

Structure	Shaft configuration	Length of the shaft (mm)	Torque (mN·m)	Number of detent	Number of pulse	Push-on switch	Travel of push-on switch (mm)	Operating life (cycles)	Minimum order unit (pcs.)		Product No.	Drawing No.				
									Japan	Export						
Horizontal	Flat	20	12±7	30	15	Without	—	15,000	700	1,400	EC11B15202AN	1				
Vertical						With	0.5				EC11B15242AZ	2				
							1.5				EC11B15242B1	3				
			10±7	18	9	Without	—		1,200	2,400	EC11E09204A4	4				
											30		15	EC11E15204A3		
											36		18	EC11E1820402		
				18	9	With	0.5				EC11E09244BS	5				
											30		15	EC11E15244G1		
			7 ⁺³ ₋₄	Without	EC11E153440D											
			10±7	36	EC11E18244AU											
			7 ⁺³ ₋₄	Without	EC11E183440C											
			10±7	18	9						EC11E09244AQ					
			30	15	EC11E15244B2											
					Without						EC11E1534408					
			10±7	36	EC11E18244A5											
			7 ⁺³ ₋₄	Without	EC11E1834403											
			15	10±7	30	15	Without				—	EC11N1520401	6			
							With				0.5	EC11N1524402	7			
									1.5	EC11N1525404						
			20	Without	—		EC11N1520402		6							
With	0.5	EC11N1524403			7											
	1.5	EC11N1525405														
Less shaft wobble	Serrated	25	12±7	30	15	Without	—		1,000	2,000	EC11G1560414	8				
			8.5±5			Without	EC11G1574402				9					
			12±7			With	1.5				EC11G1564411	10				
											EC11M1565403	9				
			8.5±5			Without	EC11M1575403				10					
Vertical	Flat	20	12±5	18	9	Without	—				100,000	1,000	2,000	EC11K0920404	11	
														30		15
				18	9	With	0.5							EC11K0924404	12	
								30						15		EC11K1524406
								18						9		EC11K0925416
								30	15	EC11K1525413						

Note

Other varieties are also available. Please inquire.

Refer to P.267 for attached parts.
Refer to P.268 for product varieties.
Refer to P.270 for switch specifications.
Refer to P.299 for soldering conditions.

EC11 1 1 mm Size Metal Shaft Type

Product Line

Structure	Shaft configuration	Length of the shaft (mm)	Torque (mN·m)	Number of detent	Number of pulse	Push-on switch	Travel of push-on switch (mm)	Operating life (cycles)	Minimum order unit (pcs.)		Product No.	Drawing No.
									Japan	Export		
Reflow	Flat	20	12±5 (Initial) 10±4 (After reflow)	18	9	Without	—	100,000	600	600	EC11J0920404	13
				30	15						EC11J152040F	
				18	9	With	0.5				14	EC11J0924411
				30	15							EC11J1524413
				18	9		1.5					EC11J0925403
												EC11J1525402
Push lock	20-tooth Serrated	25	10±7	30	15	Without	—	800	1,600	EC11E152T409		15
		26.4				With	8			EC11E152U402		16
Self-return switch	Flat	15	3 to 30	Without	Self-return switch	Without	—	15,000	1,200	2,400	EC1110120005	17
		20				With	0.5				18	EC111012010H
							1.5					EC1110120201
							0.5					
Dual-shaft	Slotted	Inner-shaft=25 Outer-shaft=15	10±7	30	15	Without	—	15,000	700	1,400	EC11EBB24C03	19
	Flat	Inner-shaft=25				With	1.5				EC11E0B2LB01	20
	Slotted	Outer-shaft=15				Without	—					

Note

Other varieties are also available. Please inquire.

Packing Specifications

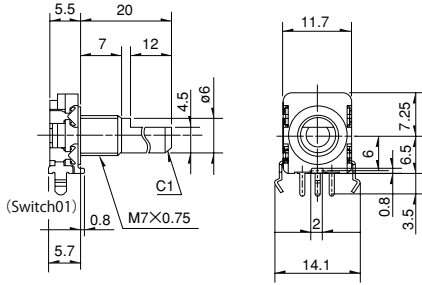
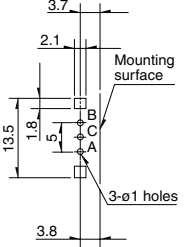
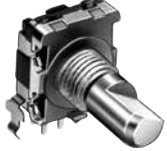
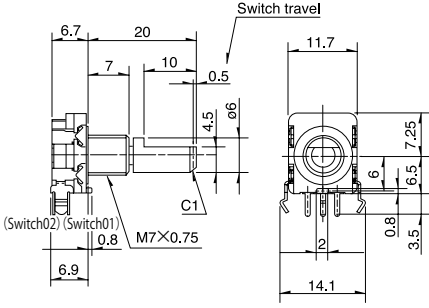
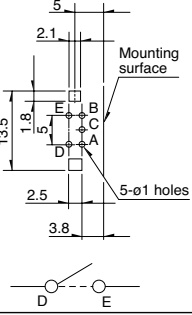
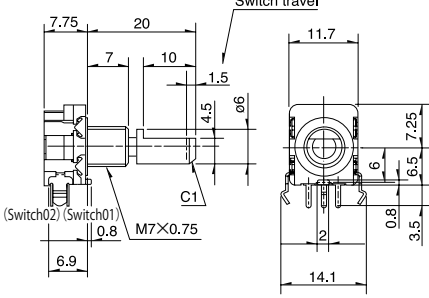
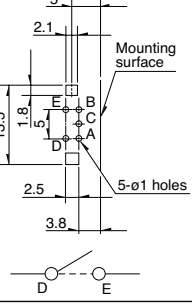
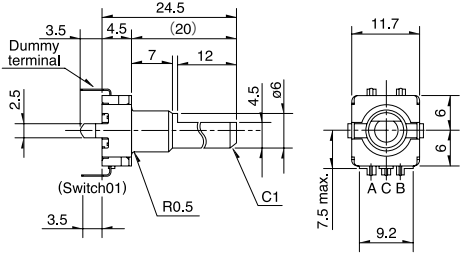
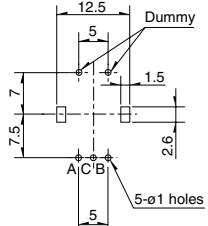
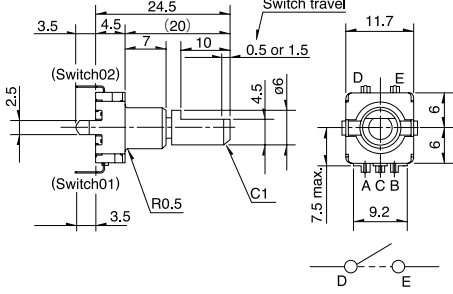
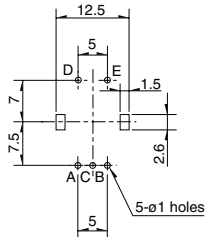
Tray

Product No.	Number of packages (pcs.)		Export package measurements (mm)
	1 case / Japan	1 case / export packing	
EC11B	700	1,400	524×374×201
EC11E09/15/18/EC11N	1,200	2,400	540×360×250
EC11G/EC11K/EC11M	1,000	2,000	
EC11J	600	600	369×283×263
EC11E152T/U	800	1,600	507×363×230
EC111	1,200	2,400	507×363×216
EC11E0B/BB	700	1,400	

Refer to P.267 for attached parts.
Refer to P.268 for product varieties.
Refer to P.270 for switch specifications.
Refer to P.299 for soldering conditions.

Dimensions

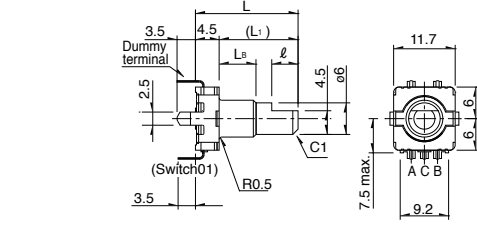
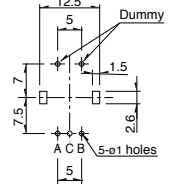
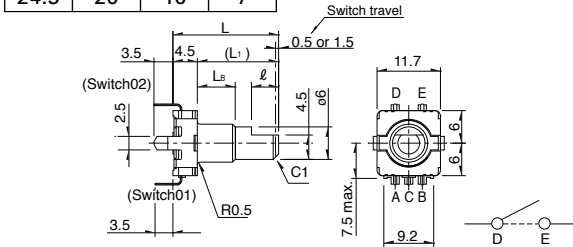
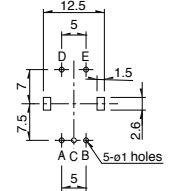
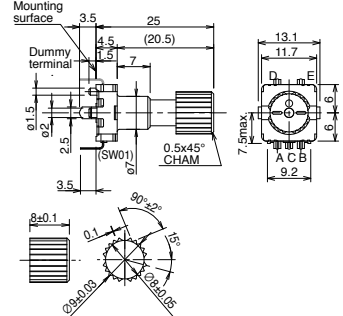
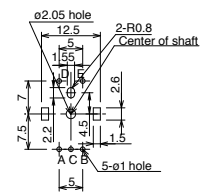
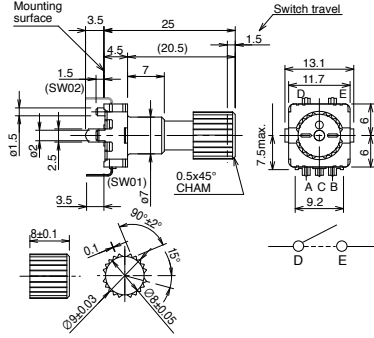
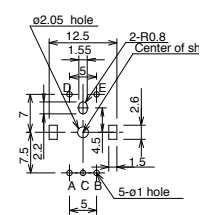
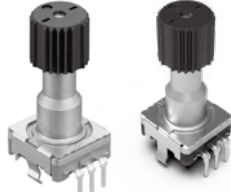
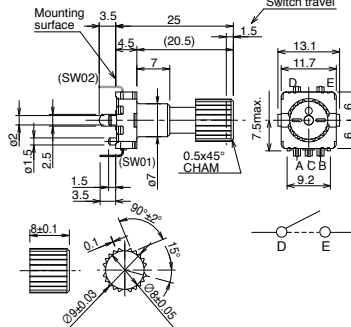
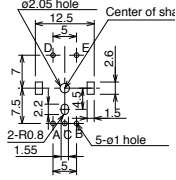
Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
1			
2			
3			
4			
5			

EC11 11 mm Size Metal Shaft Type

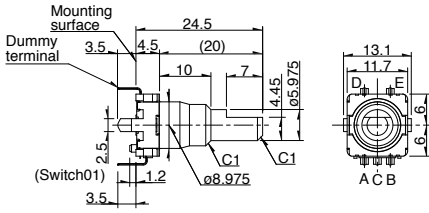
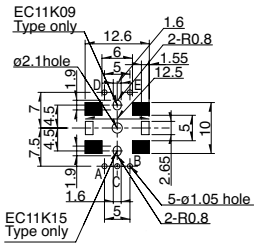
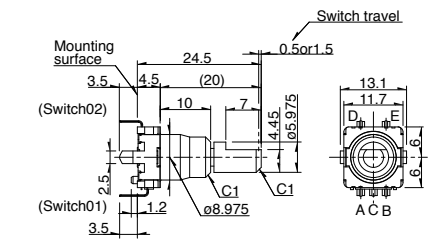
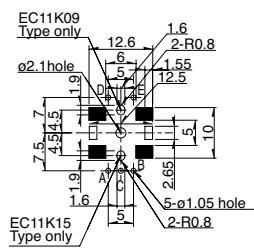
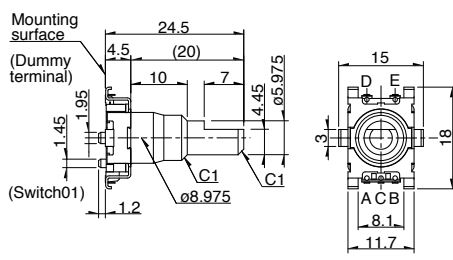
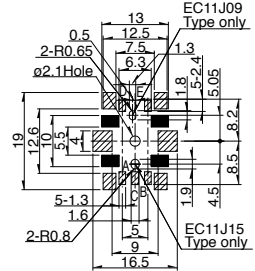
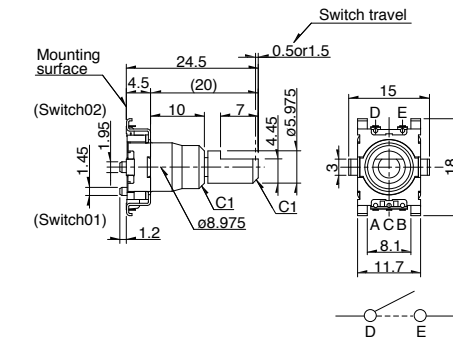
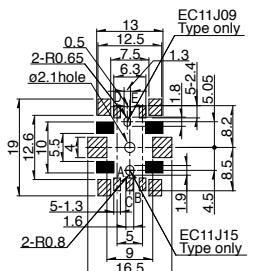
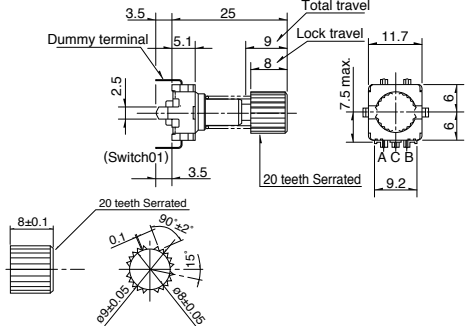
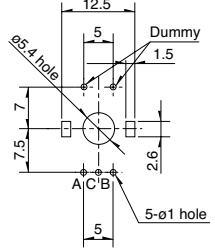
Dimensions

Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)												
6	EC11N Vertical 	<table border="1"> <thead> <tr> <th>L</th><th>L₁</th><th>L_B</th><th>ℓ</th></tr> </thead> <tbody> <tr> <td>19.5</td><td>15</td><td>7</td><td>5</td></tr> <tr> <td>24.5</td><td>20</td><td>10</td><td>7</td></tr> </tbody> </table> 	L	L ₁	L _B	ℓ	19.5	15	7	5	24.5	20	10	7	
L	L ₁	L _B	ℓ												
19.5	15	7	5												
24.5	20	10	7												
7	EC11N Vertical with push-on switch (travel 0.5mm / 1.5mm) 	<table border="1"> <thead> <tr> <th>L</th><th>L₁</th><th>L_B</th><th>ℓ</th></tr> </thead> <tbody> <tr> <td>19.5</td><td>15</td><td>7</td><td>5</td></tr> <tr> <td>24.5</td><td>20</td><td>10</td><td>7</td></tr> </tbody> </table> 	L	L ₁	L _B	ℓ	19.5	15	7	5	24.5	20	10	7	
L	L ₁	L _B	ℓ												
19.5	15	7	5												
24.5	20	10	7												
8	EC11G Vertical 														
9	EC11G, EC11M Vertical with push-on switch (travel 1.5mm)  EC11G EC11M														
10	EC11G, EC11M Vertical with push-on switch (travel 1.5mm)  EC11G EC11M														

■ Dimensions

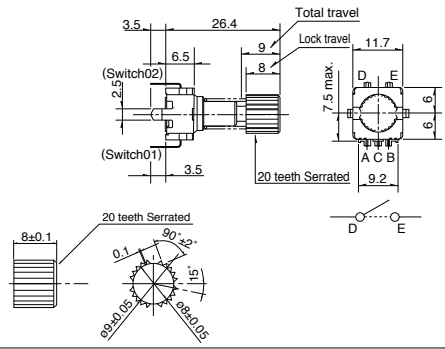
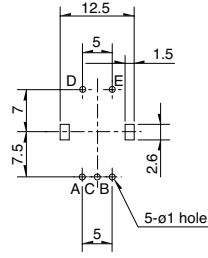
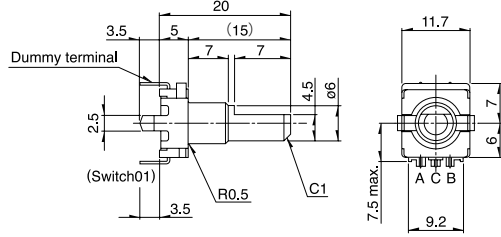
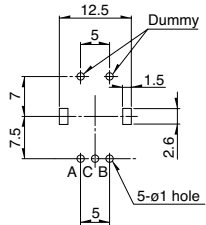
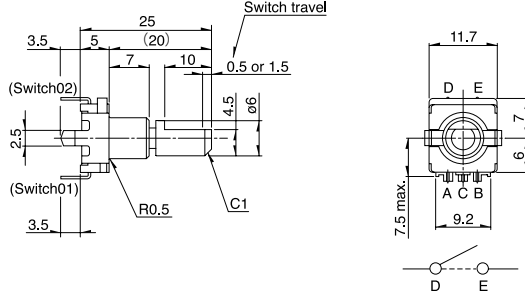
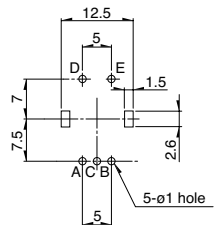
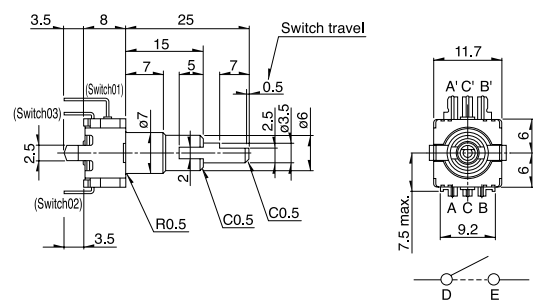
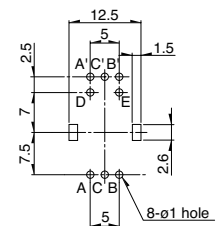
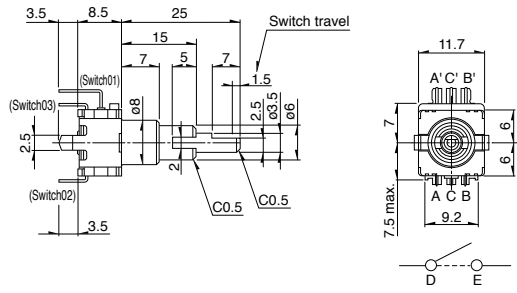
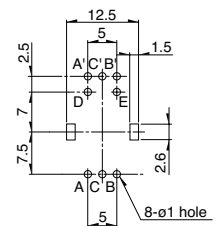
Unit:mm

No.	Photo	形状	PC board mounting hole dimensions (Viewed from mounting side)
11			 Black part : Do not solder and no wiring for electrical contact.
12			 Black part : Do not solder and no wiring for electrical contact.
13			 A slant line part: The solder land Black part: Do not solder and wiring for electrical contact
14			 A slant line part: The solder land Black part: Do not solder and wiring for electrical contact
15			

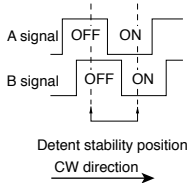
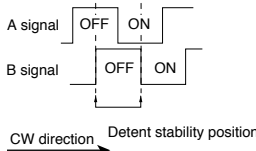
EC11 11 mm Size Metal Shaft Type

Dimensions

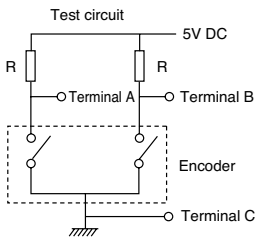
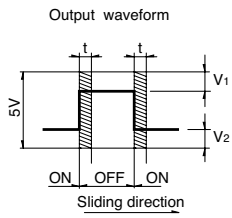
Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
16	EC11E152U Push-lock mechanism with push-lock switch 		
17	EC111 Self-return switch 		
18	EC111 Self-return switch with push-on switch (travel 0.5mm / 1.5mm) 		
19	EC11E Dual-shaft type with push-on switch (travel 0.5mm) Inner shaft: encoder Outer shaft: encoder 		
20	EC11E Dual-shaft type with push-on switch (travel 1.5mm) Inner shaft: encoder Outer shaft: self-return switch 		

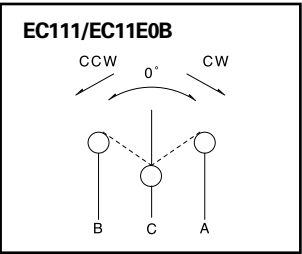
Output Wave

EC11B / EC11E / EC11G / EC11N / EC11M	EC11E / EC11J / EC11K
EC11B, EC11E, EC11G, EC11N, EC11M 30 detents, 15 pulse  Detent stability position CW direction	Detent stability position cannot be specified for B signal EC11E 18 detents 9 pulse EC11E 36 detents 18 pulse EC11J, EC11K  CW direction Detent stability position

Sliding Noise

 Test circuit 5V DC R Terminal A Terminal B Encoder Terminal C Measurement condition : Rotation speed 360°/s	 Output waveform 5V V1 V2 ON OFF ON Sliding direction t : Masking time to avoid chattering	<table><tr><td>EC11B</td><td>$V_1=V_2=1.5V$ max. At $R = 5k\Omega$ Chattering : 2ms max. Bounce : 2ms max.</td></tr><tr><td>EC11E/EC11G/ EC11N/EC11M</td><td>$V_1=V_2=1.5V$ max. At $R = 5k\Omega$ Chattering : 3ms max. Bounce : 2ms max.</td></tr><tr><td>EC11J / EC11K</td><td>$V_1=V_2=2.5V$ max. At $R = 5k\Omega$ Chattering : 3ms max. Bounce : 2ms max.</td></tr></table>	EC11B	$V_1=V_2=1.5V$ max. At $R = 5k\Omega$ Chattering : 2ms max. Bounce : 2ms max.	EC11E/EC11G/ EC11N/EC11M	$V_1=V_2=1.5V$ max. At $R = 5k\Omega$ Chattering : 3ms max. Bounce : 2ms max.	EC11J / EC11K	$V_1=V_2=2.5V$ max. At $R = 5k\Omega$ Chattering : 3ms max. Bounce : 2ms max.
EC11B	$V_1=V_2=1.5V$ max. At $R = 5k\Omega$ Chattering : 2ms max. Bounce : 2ms max.							
EC11E/EC11G/ EC11N/EC11M	$V_1=V_2=1.5V$ max. At $R = 5k\Omega$ Chattering : 3ms max. Bounce : 2ms max.							
EC11J / EC11K	$V_1=V_2=2.5V$ max. At $R = 5k\Omega$ Chattering : 3ms max. Bounce : 2ms max.							

Circuit Diagram

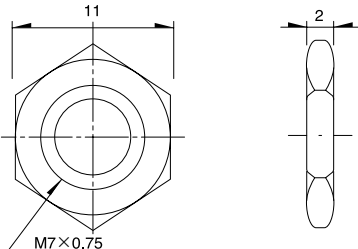
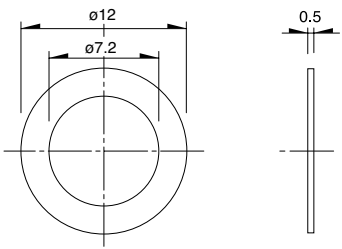


11mm Size Metal Shaft Type / Attached Parts

The following parts are included with the product.

EC11B Series

Unit:mm

Nut	Washer
 11 2 M7×0.75	 ø12 ø7.2 0.5

1 1 mm Size Metal Shaft Type / Product Varieties

■ Shaft Dimensions

1. Single-shaft Type

1) Serrated Type

Unit:mm

EC11
Style (Shaft diameter: $\phi 6$)
Not applicable for EC11E and EC11G
with push-lock mechanism

*M7 for EC11B.

● Detailed dimensions

L_1	L_B	l_1	l_2	S_1
20	7	6	1	7
25	10	10	2	11

※ $L_B=7$ for EC11B.

EC11K / EC11J
Style (Shaft diameter: $\phi 6$)

● Detailed dimensions

L_1	L_B	l_1
15	7	5
20	10	6

EC11G
Style (Shaft diameter: $\phi 9$)

● Detailed dimensions

L	L_1	L_B
18	13.5	5
25	20.5	7
28	23.5	10

2) Flat Type

Unit:mm

EC11 Style (Shaft diameter: $\phi 6$)	*M7 for EC11B.	● Detailed dimensions <table border="1"> <thead> <tr> <th>L_1</th><th>L_B</th><th>l</th></tr> </thead> <tbody> <tr> <td>15</td><td>5</td><td>7</td></tr> <tr> <td>15</td><td>7</td><td>5 (6)</td></tr> <tr> <td>20</td><td>7</td><td>10 (12)</td></tr> <tr> <td>25</td><td>10</td><td>12</td></tr> </tbody> </table> ※1 Does not comply with EC111 ※2 $L_B=7$ for EC11B. Values in parentheses apply to products without push-on switch.	L_1	L_B	l	15	5	7	15	7	5 (6)	20	7	10 (12)	25	10	12
L_1	L_B	l															
15	5	7															
15	7	5 (6)															
20	7	10 (12)															
25	10	12															
EC11K / EC11J Style (Shaft diameter: $\phi 5.975$)		● Detailed dimensions <table border="1"> <thead> <tr> <th>L_1</th><th>L_B</th><th>l</th></tr> </thead> <tbody> <tr> <td>15</td><td>7</td><td>5</td></tr> <tr> <td>20</td><td>10</td><td>7</td></tr> </tbody> </table>	L_1	L_B	l	15	7	5	20	10	7						
L_1	L_B	l															
15	7	5															
20	10	7															

Notes

- The highlighted figures in shaft types refer to Product Specifications in P.261 and P.262.
- Other varieties are also available. Please inquire.

1 1 mm Size Metal Shaft Type / Product Varieties

■ Shaft Dimensions

1. Single-shaft Type

3) Slotted Type

Unit:mm

EC11
Style (Shaft diameter: $\phi 6$)

Technical drawing of the EC11 style shaft assembly. The drawing shows a shaft with a diameter of $\phi 6$. The total length is L_1 , and the length of the mounting flange is L_B . The distance from the end of the shaft to the center of the mounting flange is 1.6. The distance from the center of the mounting flange to the center of the shaft is 1. The shaft has a thread of $\phi 7$ (indicated by a note) and a surface finish of C0.5.

※M7 for EC11B.

● Detailed dimensions

L_1	L_B
15	7
20	7
25	10

※

※ $L_B=7$ for EC11B

EC11K / EC11J
Style (Shaft diameter: $\phi 5.975$)

Technical drawing of the EC11K / EC11J style shaft assembly. The drawing shows a shaft with a diameter of $\phi 5.975$. The total length is L_1 , and the length of the mounting flange is L_B . The distance from the end of the shaft to the center of the mounting flange is 1.6. The distance from the center of the mounting flange to the center of the shaft is 1. The shaft has a thread of $\phi 8.975$ (indicated by a note) and a surface finish of C0.5.

● Detailed dimensions

L_1	L_B
15	7
20	10

2. Standard Dimensions and Configuration of Dual-shaft Type

Flat Type

Unit:mm

EC11E
Style (Inner-shaft : $\phi 3.5$ Outer-shaft : $\phi 6$)

The diagram is a side-view technical drawing of the EC11E encoder. It shows the internal shaft and the outer housing. Key dimensions are labeled: L_1 is the total length from the front face to the end of the outer shaft; L_2 is the length from the front face to the end of the inner shaft; L_B is the length of the body; l_1 and l_2 are the lengths of the inner and outer shafts respectively; 2.5 is a small offset dimension; 2 is the thickness of a component; $C0.5$ indicates chamfers on the shafts; $\phi 8^*$ is the diameter of the inner shaft; and $\phi 6$ is the diameter of the outer shaft.

● Detailed dimensions

L_1	L_2	L_B	l_1	l_2
20	10	5	7	4
25	15	7	7	5
30	20	10	7	5

※ $\phi 7$ for type with inner / outer shaft encoders (EC11EBB)

Notes

- The highlighted figures in shaft types refer to Product Specifications in P.261 and P.262.
- Other varieties are also available. Please inquire.

11 mm Size Metal Shaft Type / Switch Specifications

1. EC11B Series

Switch type		Momentary push switch	
Contact arrangement		Single pole and single throw (Push-on)	
Travel (mm)		$0.5 \pm_{-0.3}^{+0.4}$	1.5 ± 0.5
Operating force		$6 \pm 3\text{N}$	$5 \pm 2\text{N}$
Operating life		25,000 times	20,000 times
Electrical performance	Rating	0.1A 5V DC (500 μ A 5V DC min. ratings)	
	Contact resistance	100m Ω max. for initial period, 200m Ω max. after operating life.	
	Insulation resistance	100M Ω min. 250V DC	
	Voltage proof	300V AC for 1 minute or 360V AC for 2 second	

2. EC11E/EC11N/EC11I Series

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		$6 \pm_{-2}^{+2.5}\text{N}$	$4 \pm 2\text{N}$
Operating life		20,000 times	
Electrical performance	Rating	0.1A 5V DC (500 μ A 5V DC min. ratings)	
	Contact resistance	100m Ω max. for initial period, 200m Ω max. after operating life.	
	Insulation resistance	100M Ω min. 250V DC	
	Voltage proof	300V AC for 1 minute or 360V AC for 2 second	

3. EC11G/EC11M Series

Switch type		Momentary push switch	
Contact arrangement		Single pole and single throw (Push-on)	
Travel (mm)		1.5 ± 0.35	
Operating force		$5 \pm 2\text{N}$	
Operating life		20,000 times	
Electrical performance	Rating	0.15A 5V DC (500 μ A 5V DC min. ratings)	
	Contact resistance	100m Ω max. for initial period, 200m Ω max. after operating life.	
	Insulation resistance	100M Ω min. 250V DC	
	Voltage proof	300V AC for 1 minute or 360V AC for 2 second	

4. EC11K/EC11J Series

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		$5 \pm 2\text{N}$	$4 \pm 2\text{N}$
Operating life		1,000,000 times	100,000 times
Electrical performance	Rating	0.1A 5V DC (0.1mA 5V DC min. ratings)	
	Contact resistance	100m Ω max. for initial period, 200m Ω max. after operating life.	
	Insulation resistance	100M Ω min. 250V DC	
	Voltage proof	300V AC for 1 minute or 360V AC for 1 second	

5. EC11E152U Series

Switch type		Push lock mechanism switch	
Contact arrangement		Single pole and single throw (Push-on)	
Travel (mm)		8 ± 0.8	
Operating force		8N max.	
Operating life		10,000 times	
Electrical performance	Rating	0.1A 5V DC (500 μ A 5V DC min. ratings)	
	Contact resistance	100m Ω max. for initial period, 200m Ω max. after operating life.	
	Insulation resistance	100M Ω min. 250V DC	
	Voltage proof	300V AC for 1 minute or 360V AC for 2 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℃ to +85℃											
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 ± 0.4 0.3	1.5 ± 0.5	0.5 ± 0.3	1.5 ± 0.5	8 ± 0.8	0.5 ± 0.3	1.5 ± 0.5	0.5 ± 0.3	1.5 ± 0.5	
	Operating force (N)	6 ± 2.5 2	4 ± 2	6 ± 3	5 ± 2	6 ± 2.5 2	4 ± 2	8 max.	6 ± 2.5 2	4 ± 2	6 ± 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		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.

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 _{-2.5}	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
Page		261						271	

Encoders Soldering Conditions	299
Encoders Cautions	300

Note

- Indicates applicability to all products in the series.

Reference for Manual Soldering

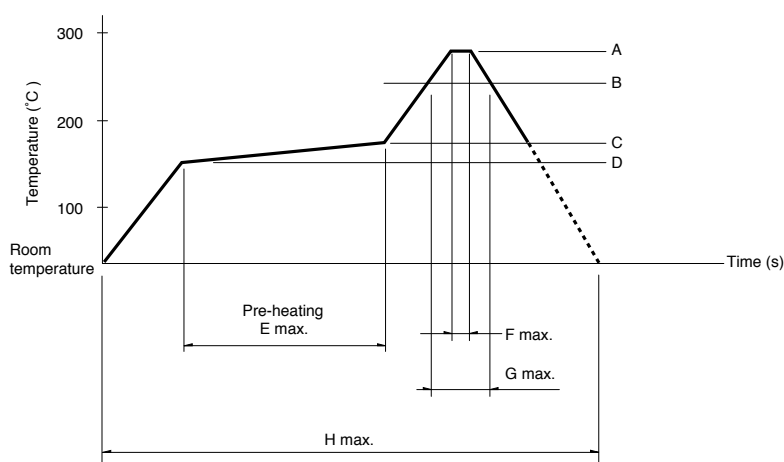
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC11M, EC11N, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC40A, EC45A, EC50A, EC60B, EM11B, EC21C, EC28C, EC35CH	350°C max.	3s max.	1 time
EC11J	350±10°C	3 ⁺¹ ₀ s	2 times

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.