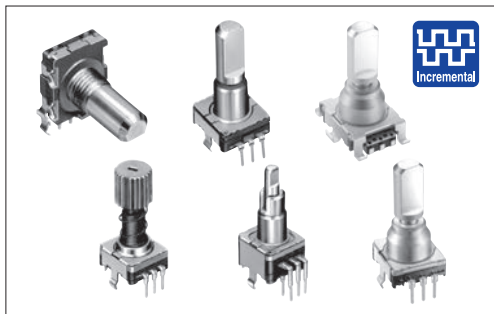


Compact and highly reliable type available in many varieties



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 L _s (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			12±7	30	15	Without	—		700	1,400	EC11B15202AA	1			
						With	0.5				EC11B15242AE	2			
							1.5				EC11B15242AF	3			
Vertical	Flat	20	10±7	18	9	Without	—	15,000	1,200	2,400	EC11E09204A4	4			
				30	15						EC11E15204A3				
				36	18						EC11E1820402				
			7 ⁺³ / ₋₄	Without	18	9	With				0.5		EC11E09244BS	5	
					30	15							EC11E15244G1		
					36	18							EC11E153440D		
				10±7	18	9					1.5		EC11E18244AU		
					30	15							EC11E183440C		
					36	18							EC11E09244AQ		
				7 ⁺³ / ₋₄	Without	18					9				EC11E15244B2
						30					15				EC11E1534408
						36					18				EC11E18244A5
7 ⁺³ / ₋₄	Without	18	9			EC11E1834403									
		30	15												
		36	18												
Less shaft wobble	Serrated	25	12±7	30	15	Without	—				EC11G1560414	6			
			8.5±5	Without		1.5	EC11G1574402				7				
				30			EC11G1564411				8				
Vertical	Flat	20	12±5	18	9	Without	—	100,000	1,000	2,000	EC11K0920401	9			
				30	15						EC11K1520401				
				36	18						EC11K0924401				
				18	9	With	0.5					EC11K1524402	10		
												30		15	EC11K0925401
												30		15	EC11K1525401

Note

Other varieties are also available. Please inquire.

Refer to P.275 for product specifications.
 Refer to P.276 for attached parts.
 Refer to P.278 for product varieties.
 Refer to P.307 for soldering conditions.

EC11 1 1 mm Size Metal Shaft Type

Product Line

Structure	Shaft configuration	Length of the shaft L ₁ , L ₂ (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	18	9	Without	—	100,000	300	600	EC11J0920404	11
											EC11J152040F	
											12	EC11J0924411
												EC11J1524413
												EC11J0925403
												EC11J1525402
Push lock	20-tooth Serrated	25	10±7	30	15	Without	—	15,000	800	1,600	EC11E152T409	13
		26.4				With	8		EC11E152U402	14		
Self-return switch	Flat	15	3 to 30	Without	Self-return switch	Without	—	15,000	1,200	2,400	EC1110120005	15
		20				With	0.5				EC111012010H	16
						1.5	EC1110120201					
Dual-shaft	Slotted	Inner-shaft=25	10±7	30	15	Without	—	15,000	700	1,400	EC11EBB24C03	17
		Outer-shaft=15				With	1.5				EC11E0B2LB01	18
	Flat	Inner-shaft=25	Without	—	EC11E0B2LB01							
	Outer-shaft=15	With	1.5									
Slotted	Outer-shaft=15	3 to 30	Without	Self-return switch	Without	—						

Note

Other varieties are also available. Please inquire.

Packing Specifications


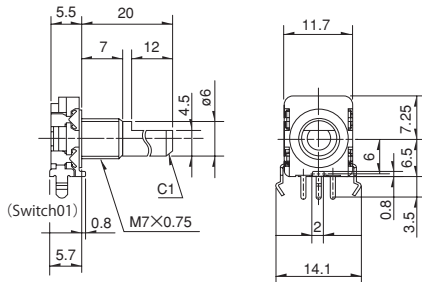
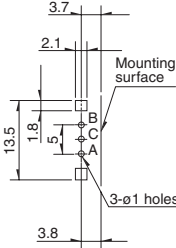

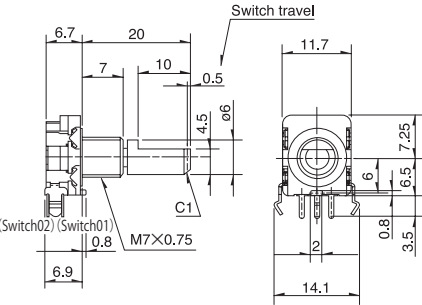
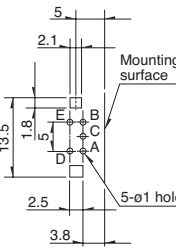

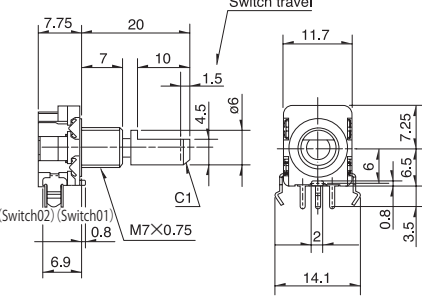
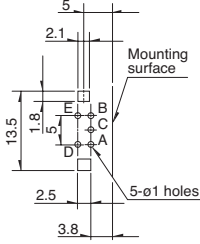

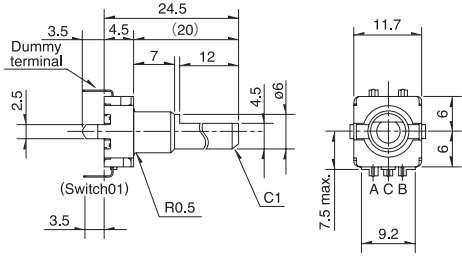
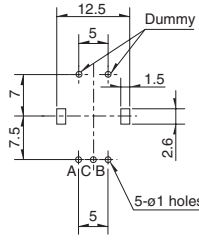

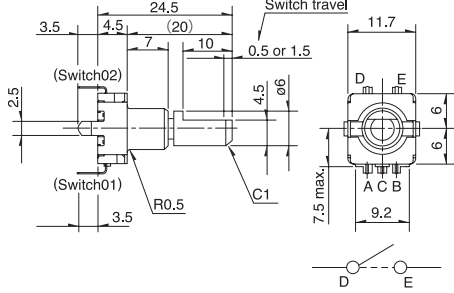
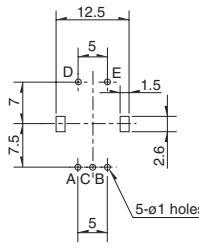
Tray

Product No.	Number of packages (pcs.)		Export package measurements (mm)
	1 case / Japan	1 case / export packing	
EC11B	700	1,400	370×520×201
EC11E09 / 15 / 18	1,200	2,400	540×360×250
EC11G / EC11K	1,000	2,000	
EC11J	300	600	369×283×263
EC11E152T / U	800	1,600	363×507×230
EC111	1,200	2,400	363×507×216
EC11E0B / BB	700	1,400	

Refer to P.275 for product specifications.
 Refer to P.276 for attached parts.
 Refer to P.278 for product varieties.
 Refer to P.307 for soldering conditions.

■ Dimensions

Unit:mm


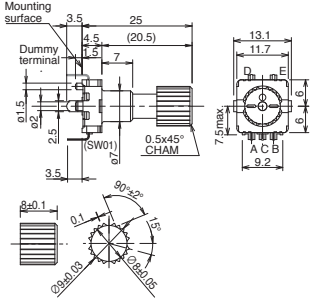
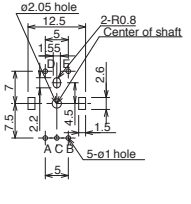

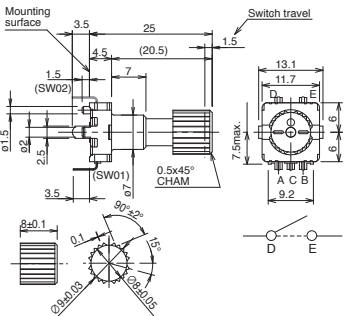
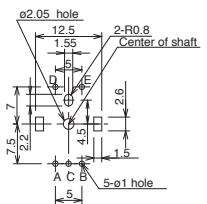

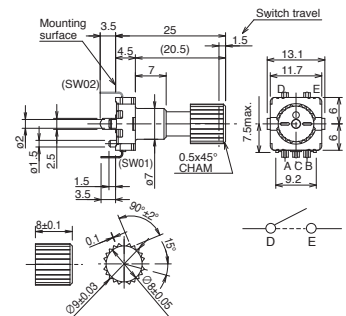
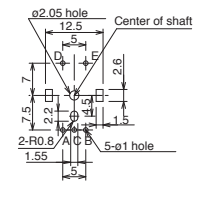

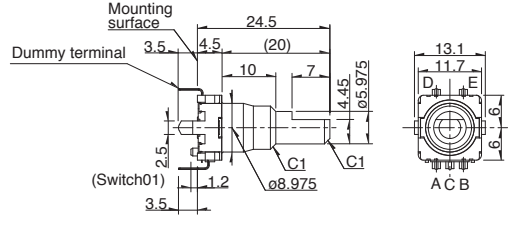
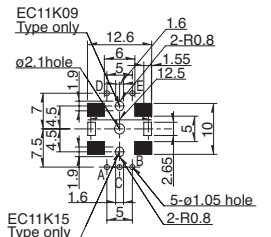

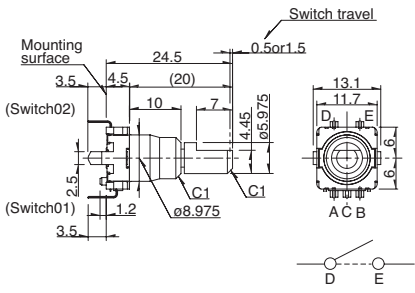
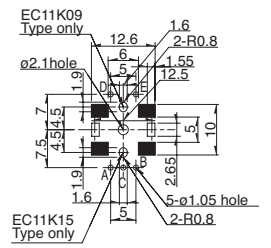
No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
1	 <p>EC11B Horizontal</p>	 <p>5.5 20 7 12 4.5 0.6 11.7 14.1 11.7 6 6.5 7.25 0.8 M7X0.75 C1 0.8 5.7 3.5 3.8</p>	 <p>3.7 2.1 13.5 1.8 5 5 3 4 3 2 1.8 3.8 3-ø1 holes Mounting surface</p>
2	 <p>EC11B Horizontal with push-on switch (travel 0.5mm)</p>	 <p>6.7 20 7 10 0.5 0.6 11.7 14.1 11.7 6 6.5 7.25 0.8 M7X0.75 C1 0.8 6.9 3.5 3.8 Switch travel</p>	 <p>5 2.1 13.5 1.8 5 5 3 4 3 2 1.8 3.8 5-ø1 holes Mounting surface</p>
3	 <p>EC11B Horizontal with push-on switch (travel 1.5mm)</p>	 <p>7.75 20 7 10 1.5 0.6 11.7 14.1 11.7 6 6.5 7.25 0.8 M7X0.75 C1 0.8 6.9 3.5 3.8 Switch travel</p>	 <p>5 2.1 13.5 1.8 5 5 3 4 3 2 1.8 3.8 5-ø1 holes Mounting surface</p>
4	 <p>EC11E Vertical</p>	 <p>3.5 4.5 24.5 (20) 7 12 4.5 0.6 11.7 14.1 11.7 6 6 7.5 max. 9.2 3.5 3.5 2.5 3.5 R0.5 C1 (Switch01)</p>	 <p>12.5 5 7.5 7 1.5 2.6 5 5-ø1 holes Dummy A C B</p>
5	 <p>EC11E Vertical with push-on switch (travel 0.5 / 1.5mm)</p>	 <p>3.5 4.5 24.5 (20) 7 10 0.5 or 1.5 0.6 11.7 14.1 11.7 6 6 7.5 max. 9.2 3.5 3.5 2.5 3.5 R0.5 C1 (Switch02) (Switch01) D E</p>	 <p>12.5 5 7.5 7 1.5 2.6 5 5-ø1 holes D E A C B</p>

Encoders
Metal Shaft
Insulated Shaft
Hollow Shaft
Ring Type

EC11 11 mm Size Metal Shaft Type


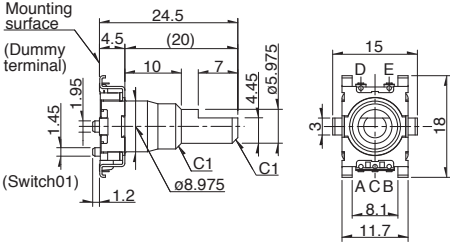
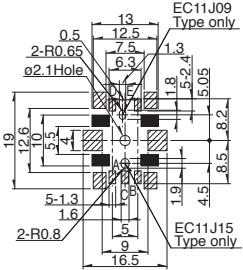

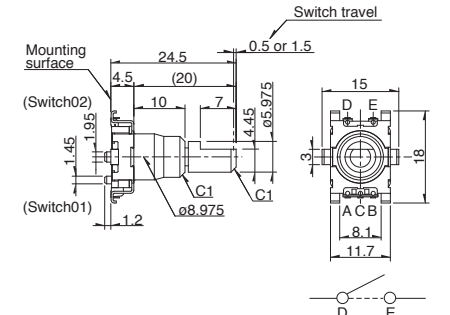
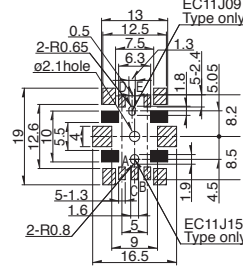

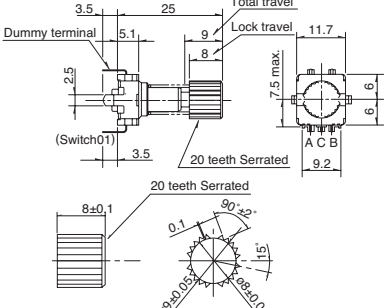
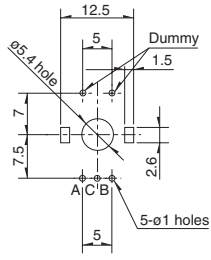

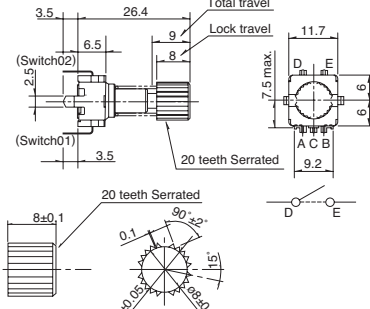
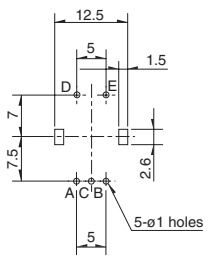

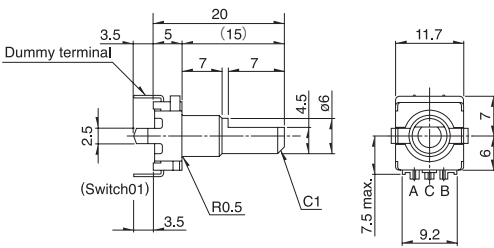
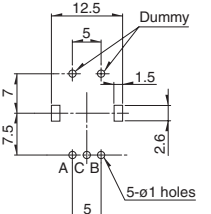
Dimensions

Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
6	 <p>EC11G Vertical</p>	 <p>Mounting surface 3.5 25 4.5 (20.5) 7 13.1 11.7 6 6 7.5max. 0.5x45° CHAM A C B 9.2 0.15 0.2 2.5 0.1 0.15 8±0.1 0.1 90°±2° 1.5 2.6±0.05</p>	 <p>ø2.05 hole 12.5 1.55 2-R0.8 Center of shaft 7.5 7 2.2 4.5 1.5 5 A C B 5-ø1 hole</p>
7	 <p>EC11G Vertical with push-on switch (travel 1.5mm)</p>	 <p>Mounting surface 3.5 25 4.5 (20.5) 1.5 19.1 11.7 6 6 7.5max. 0.5x45° CHAM A C B 9.2 0.15 0.2 2.5 0.1 0.15 8±0.1 0.1 90°±2° 1.5 2.6±0.05 Switch travel D E</p>	 <p>ø2.05 hole 12.5 1.55 2-R0.8 Center of shaft 7.5 7 2.2 4.5 1.5 5 A C B 5-ø1 hole</p>
8	 <p>EC11G Vertical with push-on switch (travel 1.5mm)</p>	 <p>Mounting surface 3.5 25 4.5 (20.5) 1.5 19.1 11.7 6 6 7.5max. 0.5x45° CHAM A C B 9.2 0.15 0.2 2.5 0.1 0.15 8±0.1 0.1 90°±2° 1.5 2.6±0.05 Switch travel D E</p>	 <p>ø2.05 hole 12.5 1.55 2-R0.8 Center of shaft 7.5 7 2.2 4.5 1.5 5 A C B 5-ø1 hole</p>
9	 <p>EC11K Vertical</p>	 <p>Mounting surface 24.5 3.5 4.5 (20) 10 7 4.45 0.5.975 13.1 11.7 6 6 1.2 ø8.975 C1 C1 A C B Dummy terminal (Switch01)</p>	 <p>EC11K09 Type only 1.6 12.6 2-R0.8 1.55 12.5 ø2.1hole 1.9 7 4.5 1.9 5 10 A C B 5-ø1.05 hole 2-R0.8 EC11K15 Type only</p> <p>Black part : Do not solder and no wiring for electrical contact.</p>
10	 <p>EC11K Vertical with push-on switch (travel 0.5mm / 1.5mm)</p>	 <p>Mounting surface 24.5 3.5 4.5 (20) 10 7 4.45 0.5.975 13.1 11.7 6 6 1.2 ø8.975 C1 C1 A C B Switch travel 0.5or1.5 (Switch02) (Switch01) D E</p>	 <p>EC11K09 Type only 1.6 12.6 2-R0.8 1.55 12.5 ø2.1hole 1.9 7 4.5 1.9 5 10 A C B 5-ø1.05 hole 2-R0.8 EC11K15 Type only</p> <p>Black part : Do not solder and no wiring for electrical contact.</p>

Dimensions

Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
11	 <p>EC11J Reflow</p>	 <p>Mounting surface (Dummy terminal) (Switch01) 24.5 (20) 4.5 10 7 4.45 0.5 0.5 1.95 1.45 1.2 0.8.975 15 D E 18 A C B 8.1 11.7</p>	 <p>EC11J09 Type only EC11J15 Type only 0.5 13 12.5 7.5 6.3 1.3 1.8 5.2 5.05 19 12.6 10 5-1.3 1.6 2-R0.8 5 9 16.5 1.9 4.5 8.5 8.2</p> <p>A slant line part: The solder land Black part: Do not solder and wiring for electrical contact</p>
12	 <p>EC11J Reflow with push-on switch (travel 0.5mm / 1.5mm)</p>	 <p>Switch travel 0.5 or 1.5 Mounting surface (Switch02) (Switch01) 24.5 (20) 4.5 10 7 4.45 0.5 0.5 1.95 1.45 1.2 0.8.975 15 D E 18 A C B 8.1 11.7</p>	 <p>EC11J09 Type only EC11J15 Type only 0.5 13 12.5 7.5 6.3 1.3 1.8 5.2 5.05 19 12.6 10 5-1.3 1.6 2-R0.8 5 9 16.5 1.9 4.5 8.5 8.2</p> <p>A slant line part: The solder land Black part: Do not solder and wiring for electrical contact</p>
13	 <p>EC11E152T Push-lock mechanism</p>	 <p>Dummy terminal (Switch01) 3.5 5.1 2.5 3.5 25 9 11.7 7.5 max. 6 6 9.2 20 teeth Serrated 8±0.1 0.1 90°±2° 15° 0.8±0.05 0.8±0.05</p>	 <p>EC11J09 Type only EC11J15 Type only 12.5 5 1.5 Dummy 7.5 7 2.6 5 5-ø1 holes A C B</p>
14	 <p>EC11E152U Push-lock mechanism with push-lock switch</p>	 <p>(Switch02) (Switch01) 3.5 6.5 2.5 3.5 26.4 9 11.7 7.5 max. 6 6 9.2 20 teeth Serrated 8±0.1 0.1 90°±2° 15° 0.8±0.05 0.8±0.05</p>	 <p>12.5 5 1.5 Dummy 7.5 7 2.6 5 5-ø1 holes A C B</p>
15	 <p>EC111 Self-return switch</p>	 <p>Dummy terminal (Switch01) 3.5 5 7 7 20 (15) 4.5 0.6 R0.5 C1 11.7 7.5 max. 6 7 9.2 A C B</p>	 <p>12.5 5 1.5 Dummy 7.5 7 2.6 5 5-ø1 holes A C B</p>

Encoders

Metal Shaft

Insulated Shaft


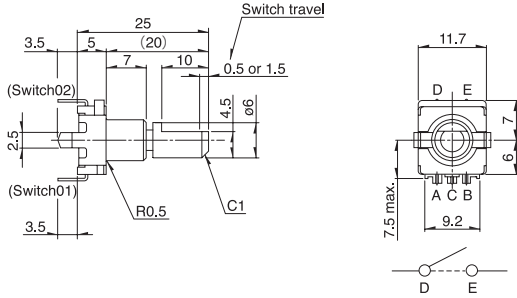
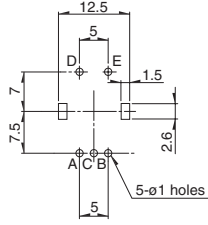
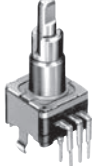
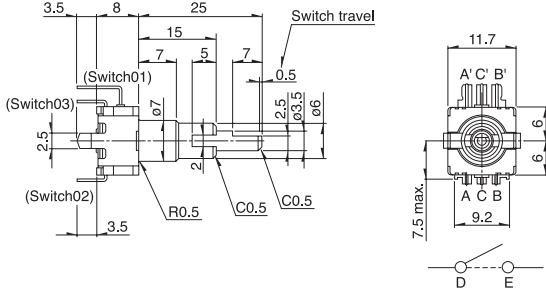
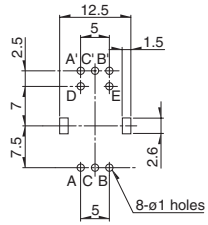

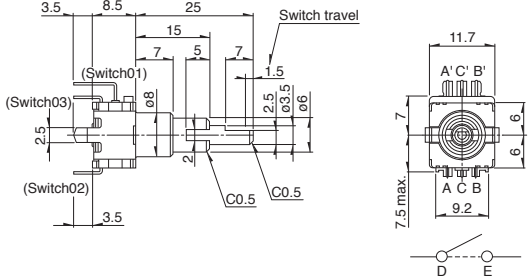
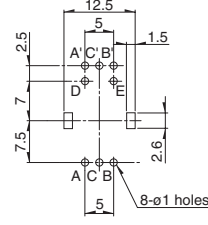
Hollow Shaft

Ring Type

EC11 11 mm Size Metal Shaft Type

Dimensions

Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
16	 <p>EC111 Self-return switch with push-on switch (travel 0.5mm / 1.5mm)</p>		
17	 <p>EC111E Dual-shaft type with push-on switch (travel 0.5mm) Inner shaft: encoder Outer shaft: encoder</p>		
18	 <p>EC111E Dual-shaft type with push-on switch (travel 1.5mm) Inner shaft: encoder Outer shaft: self-return switch</p>		

Encoders

Metal Shaft

Insulated Shaft

Hollow Shaft

Flange Type

Output Wave

EC11B / EC11E / EC11G	EC11E / EC11J / EC11K
<p>EC11B, EC11E, EC11G 30 detents, 15 pulse</p> <p>A signal OFF ON</p> <p>B signal OFF ON</p> <p>Detent stability position CW direction</p>	<p>Detent stability position cannot be specified for B signal.</p> <p>EC11E 18 detents 9 pulse EC11E 36 detents 18 pulse EC11J, EC11K</p> <p>A signal OFF ON</p> <p>B signal OFF ON</p> <p>CW direction Detent stability position</p>

Sliding Noise

Test circuit

5V DC

R Terminal A Terminal B

Encoder

Terminal C

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

Output waveform

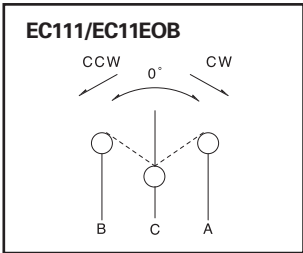
5V

ON OFF ON

Sliding direction

EC11B	$V_1=V_2=1.5V$ max. At $R = 5k\Omega$ Chattering : 2ms max. Bounce : 2ms max.
EC11E / EC11G	$V_1=V_2=1.5V$ 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



11 mm Size Metal Shaft Type / Attached Parts

The following parts are included with the product.

EC11B Series

Unit:mm

Nut	Washer
<p>11</p> <p>2</p> <p>M7×0.75</p>	<p>12</p> <p>7.2</p> <p>0.5</p>

Encoders
Metal Shaft
Insulated Shaft
Hollow Shaft
Ring Type

1 1 mm Size Metal Shaft Type / Product Varieties

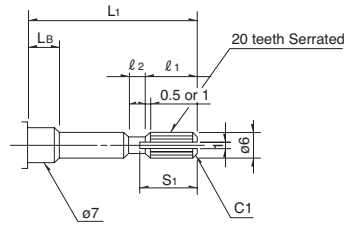
Shaft Dimensions

1. Single-shaft Type

1) Serrated Type

Unit:mm

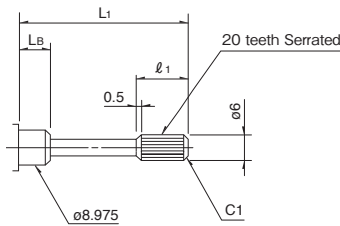
EC11
Configuration (Shaft diameter: $\phi 6$)
Not applicable for EC11E
and EC11G with push-lock
mechanism



Detailed dimensions

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

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



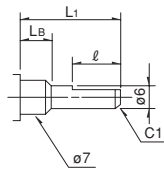
Detailed dimensions

L_1	L_B	l_1
15	7	5
20	10	6

2) Flat Type

Unit:mm

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



Detailed dimensions

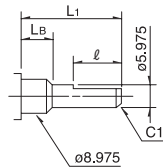
	L_1	L_B	l
*1	15	5	7
	15	7	5 (6)
	20	7	10 (12)
*2	25	10	12

*1 Does not comply with EC111

*2 $L_B=7$ for EC11B.

Values in parentheses apply to products without push-on switch.

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



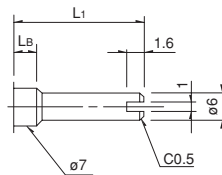
Detailed dimensions

L_1	L_B	l
15	7	5
20	10	7

3) Slotted Type

Unit:mm

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

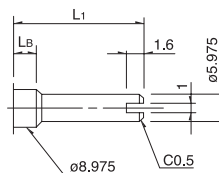


Detailed dimensions

L_1	L_B	
15	7	
20	7	
*	25	10

* $L_B=7$ for EC11B.

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



Detailed dimensions

L_1	L_B
15	7
20	10

Notes

- The highlighted figures in shaft types refer to Product Specifications in P.269 and P.270.
- Other varieties are also available. Please inquire.

Encoders
Metal Shaft
Insulated Shaft
Hollow Shaft
Flange Type

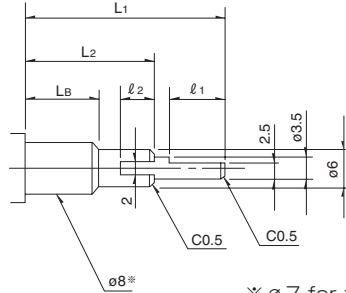
1 1 mm Size Metal Shaft Type / Product Varieties

2. Standard Dimensions and Configuration of Dual-shaft Type

1) Flat Type

Unit:mm

Configuration (Inner-shaft : ϕ 3.5 Outer-shaft : ϕ 6)



● Detailed dimensions

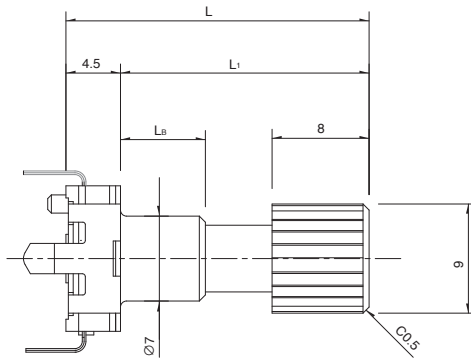
L_1	L_2	L_B	l_1	l_2
20	10		7	4
25	15	7	7	5
30	20	10	7	5

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

■ Type of Shaft Length

Unit:mm

EC11G



● Detailed dimensions

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

Notes

1. The highlighted figures in shaft types refer to Product Specifications in P.270.
2. Other varieties are also available. Please inquire.

Encoders

Metal Shaft

Insulated Shaft

Hollow Shaft

Ring Type

1 1 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)		$0.5 \begin{smallmatrix} +0.4 \\ -0.3 \end{smallmatrix}$	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 2s	

2. EC11E/EC111 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		$6 \begin{smallmatrix} +2.5 \\ -2 \end{smallmatrix} \text{N}$	$4 \pm 2\text{N}$
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 2s	

3. EC11G 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 2s	

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±2N	4±2N
Operating life		1,000,000 times	100,000 times
Electrical performance	Rating	0.1A 5V DC (0.1mA 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	

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 (500μA 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 2s	

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 ± 0.4 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 ± 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	1.5±0.35	
	Operating force (N)	6 ± 2.5	4±2	6±3	5±2	6 ± 2.5	4±2	8 max.	6 ± 2.5	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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Encoders Cautions	308

Notes

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

Type		Metal shaft											
		11mm size					20mm size						
Series		EC111		EC11K		EC11J		EM11B	EC20A/RK203		EM20B		
Photo													
Output		Self-return switch			Incremental (Two phase A and B)								
Shaft types		Single-shaft											
Operating direction		Vertical											
Number of pulse / Number of detent		—		9/18 15/30			16/16		18/18		40/40		
Features		—		—		Surface Mount type		Magnetic type	—		Magnetic type		
Dimensions (mm)		W		11.7					10.8	20.2	20		
		D		13	12	14.2		11	19.2	22.25			
		H		5	4.5			7.5	10	13			
Operating temperature range		-40°C to +85°C						-30°C to +85°C	-30°C to +80°C	-10°C to +70°C			
Operating life		15,000 cycles		100,000 cycles			1,000,000 cycles		30,000 cycles	500,000 cycles			
Automotive use		●	●	●	●	●	●	●	—				
Life cycle (availability)													
Electrical performance		Rating		10mA 5V DC				10mA 5V±5% DC		1mA 5V DC	10mA 5V±5% DC		
		Max./min. operating current (Resistive load)		10mA / 1mA				15mA / —		—	15mA / —		
		Insulation resistance		100MΩ min. 250V DC						100MΩ min.100V DC	10MΩ min. 50V DC	100MΩ min. 250V 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	50V AC for 1 minute or 60V AC for 2s	300V AC for 1 minute or 360V AC for 2s		
Mechanical performance		Rotational torque (Without detent)		3 to 30mN·m		—		—	—	7mN·m max.			
		Detent torque		—	12±5mN·m		12±5mN·m (Initial) 12±4mN·m (After reflow)		10±5mN·m	40±20mN·m	8±5mN·m		
		Push-pull strength		100N									
Shaft configuration		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)		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} / _{0.2}	1.5±0.5	0.5 ± ^{0.4} / _{0.3}	
		Operating force (N)		6 ± ^{2.5} / ₂	4±2	5±2	4±2	5±2	4±2	5.5±3	4±2	6±3	
		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)		0.5A 16V DC (1mA 16V DC min. ratings)	3A 16V DC (10mA 16V DC min. ratings)	
		Contact resistance		100mΩ max. for initial period, 200mΩ max. after operating life.						500mΩ max. for initial period, 5mΩ max. after operating life.		100mΩ max. for initial period, 200mΩ 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	20,000 times	25,000 times		
Page		269						280		282	285		

Encoders

Metal Shaft

Insulated Shaft

Hollow Shaft

Ring Type

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Note

● Indicates applicability to all products in the series.

Reference for Manual Soldering

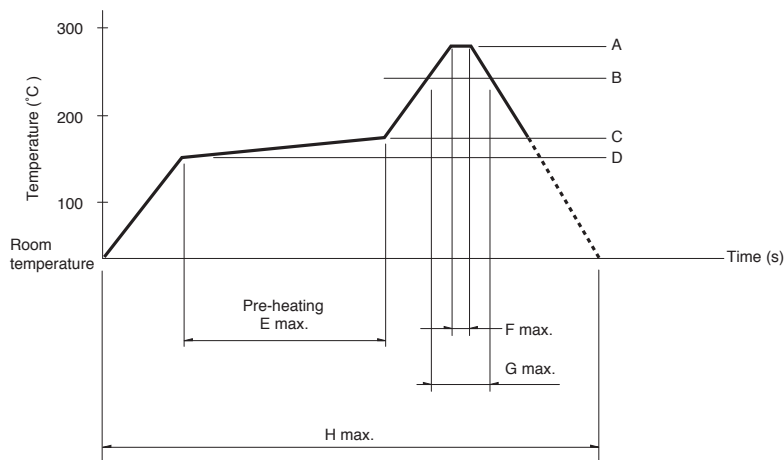
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC40A, EC45A, EC50A, EC60B, EM11B, EM20B, EC21C	350°C max.	3s max.	1 time
EC11J	350±10°C	3 ⁺¹ ₀ s	2 time

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, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC50A, EC60B	100°C max.	2 min. max.	260±5°C	5±1s	2 time max.
EC10E, EC12D, EC12E, EM11B	100°C max.	1 min. max.	260±5°C	3±1s	2 time 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 time max.
EM20B	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
EC11J	260°C	230°C	180°C	150°C	2 min. max.	3s	40s	4 min. max.	2 time max.
EC05E	250°C min.	230°C min.	180°C	150°C	60s to 120s	—	30s to 40s	—	2 time max.
EC21C	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.

Encoders
Metal Shaft
Insulated Shaft
Hollow Shaft
Ring Type