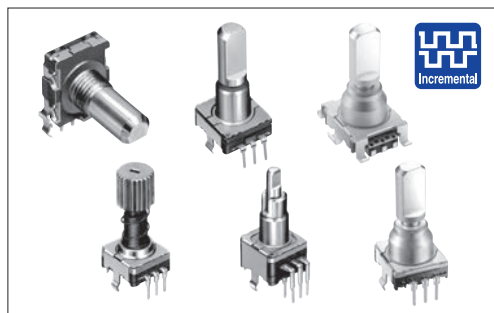


Compact and highly reliable type available in many varieties



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 onfiguration	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 uni t(pcs.)		Product No.	Drawin No.	
									Japan	Export			
Horizontal	Flat	20	12±7	30	15	Without	—	15,000	700	1,400	EC11B15202AA	1	
						With	0.5				EC11B15242AE	2	
							1.5				EC11B15242AF	3	
Vertical			10±7	18	9	Without	—		15,000	1,200	2,400	EC11E09204A4	4
				30	15							EC11E15204A3	
				36	18							EC11E1820402	
			10±7	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		1.5					EC11E09244AQ	
			30	15	EC11E15244B2								
			7 ⁺³ ₋₄	Without	EC11E1534408								
			10±7	36	EC11E18244A5								
			7 ⁺³ ₋₄	Without	EC11E1834403								
Less shaft wobble	Serrated	25	12±7	30	15	Without	—	100,000		1,000	2,000	EC11G1560414	6
			8.5±5	Without		With	1.5					EC11G1574402	7
			12±7	30								EC11G1564411	8
Vertical	Flat	20	12±5	18	9	Without	—		100,000	1,000	2,000	EC11K0920401	9
				30	15							EC11K1520401	
				18	9	With	0.5					EC11K0924401	10
				30	15							EC11K1524402	
				18	9							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 11 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
				30	15						EC11J152040F	
				18	9	With	0.5				EC11J0924411	12
				30	15						EC11J1524413	
				18	9		1.5				EC11J0925403	
											EC11J1525402	
				Push lock	20-tooth Serrated	25	10±7				30	15
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						Inner-shaft=25	10±7	30	15		0.5	15,000
	Slotted	Outer-shaft=15	Without	—	EC11E0B2LB01	18						
	Flat	Inner-shaft=25	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

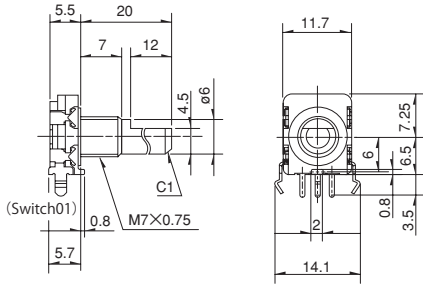
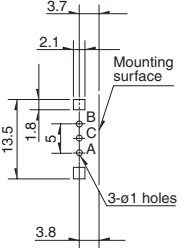
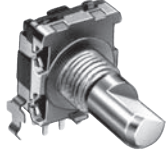
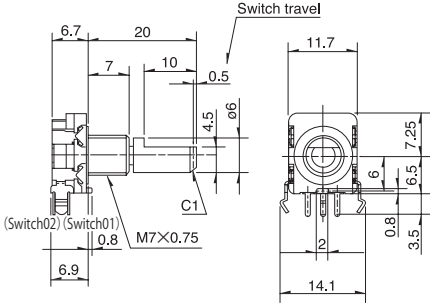
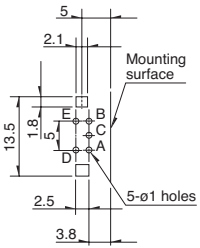
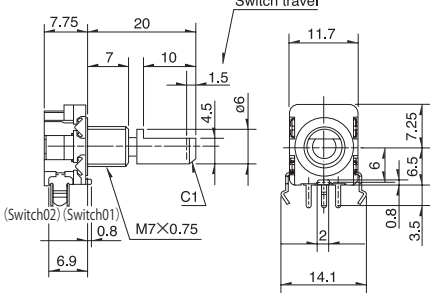
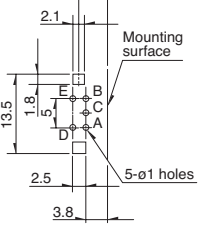
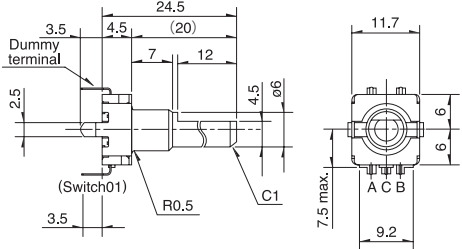
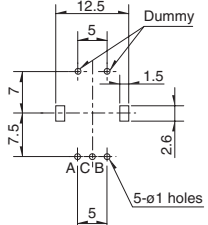
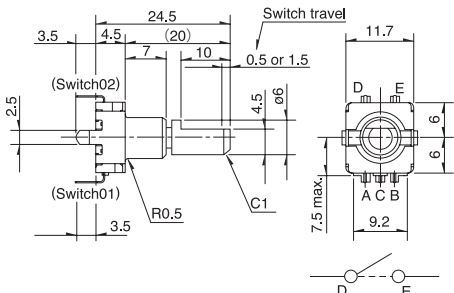
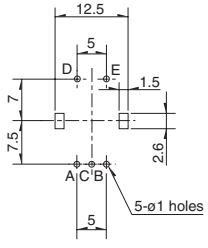
Tray

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	EC11B Horizontal 		
2	EC11B Horizontal with push-on switch (travel 0.5mm) 		
3	EC11B Horizontal with push-on switch (travel 1.5mm) 		
4	EC11E Vertical 		
5	EC11E Vertical with push-on switch (travel 0.5 / 1.5mm) 		

Encoders

Metal
ShaftInsulated
ShaftHollow
ShaftRing
Type

Unit:mm

No

Photo

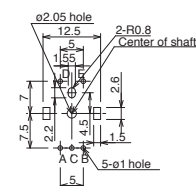
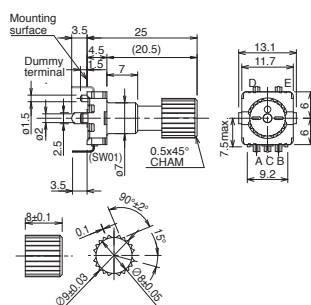
Style

PC board mounting hole dimensions
(Viewed from mounting side)

EC11G
Vertical



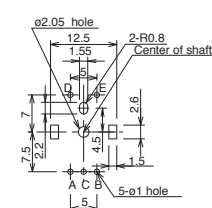
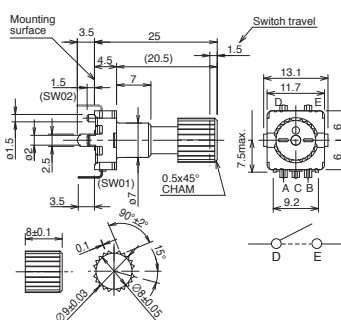
6



EC11G
Vertical
with push-on switch
(travel 1.5mm)



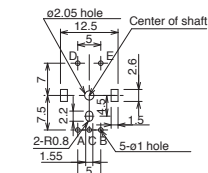
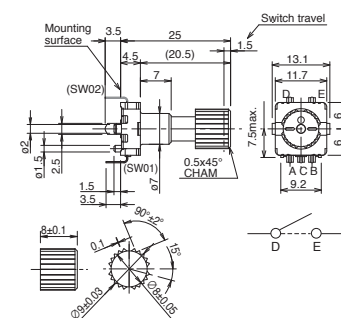
7



EC11G
Vertical
with push-on switch
(travel 1.5mm)



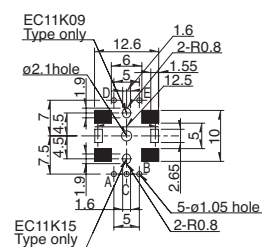
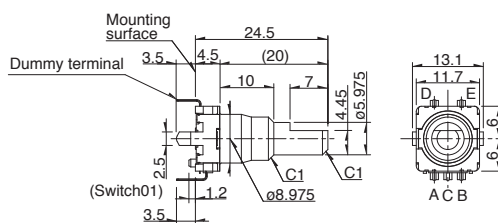
8



EC11K
Vertical



9

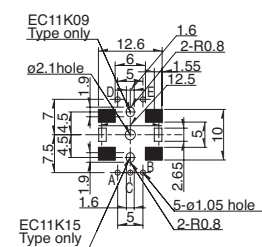
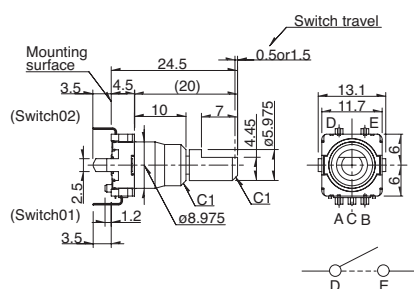


Black part : Do not solder and no wiring for electrical contact.

EC11K
Vertical
with push-on switch
(travel 0.5mm /
1.5mm)



10



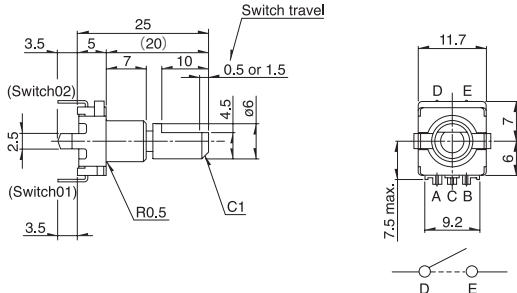
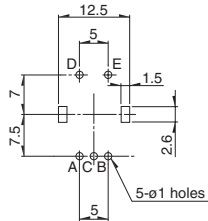
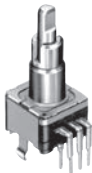
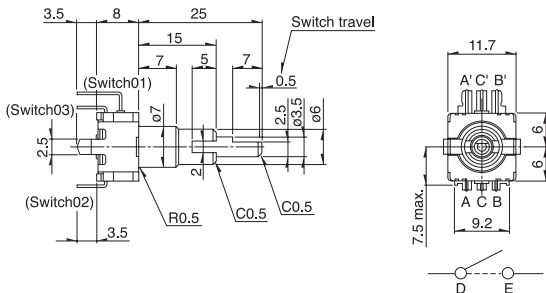
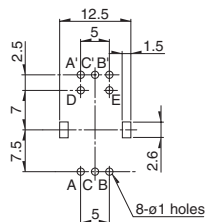
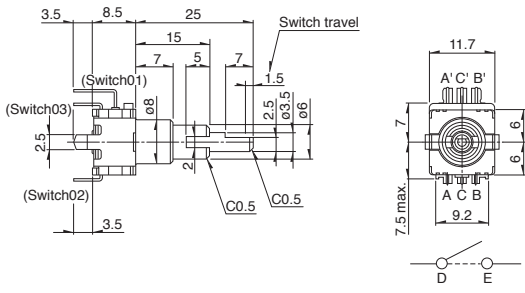
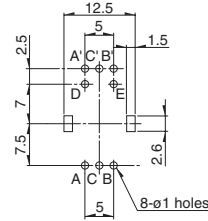
Black part : Do not solder and
no wiring for electrical contact

Unit:mm

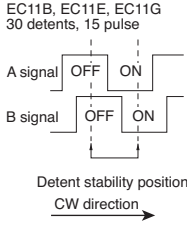
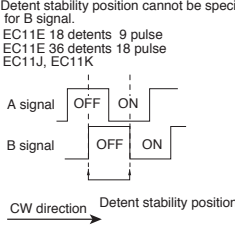
EC11 11 mm Size Metal Shaft Type

Dimensions

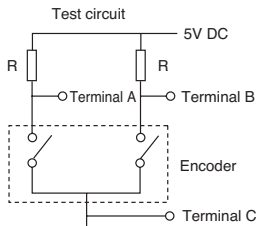
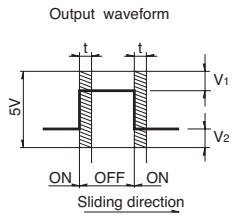
Unit:mm

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

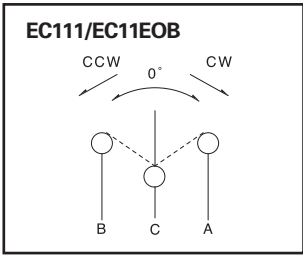
Output Wave

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

Sliding Noise

 Measurement condition : Rotation speed 360°/s	 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</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	$V_1=V_2=1.5V$ 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	$V_1=V_2=1.5V$ 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

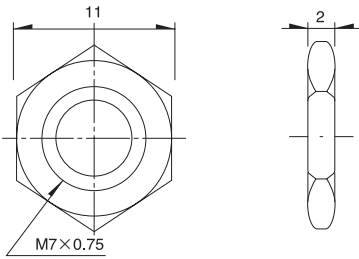
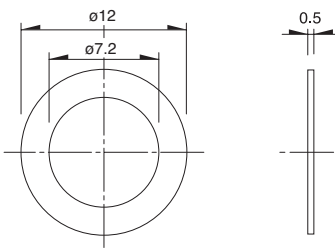


11 mm Size Metal Shaft Type / Attached Parts

The following parts are included with the product.

EC11B Series

Unit:mm

Nut	Washer
	

1 1 mm Size Metal Shaft Type / Product Varieties

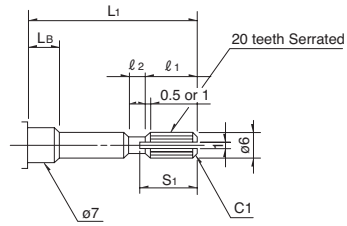
■ Shaft Dimensions

1. Single-shaft Type

1) Serrated Type

Unit:mm

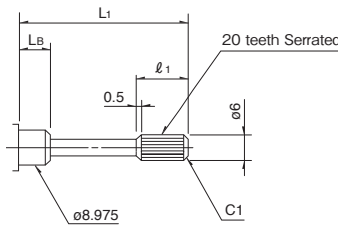
EC11
Configuration (Shaft diameter: $\phi 6$)
Not applicable for EC11E
and EC11G with push-lock
mechanism



● 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: $\phi 6$)



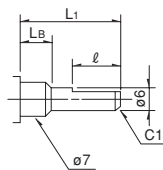
● Detailed dimensions

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

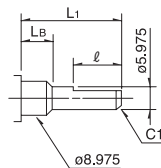
L_1	L_B	l
*1 15	5	7
15	7	5 (6)
20	7	10 (12)
*2 25	10	12

*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: $\phi 5.975$)



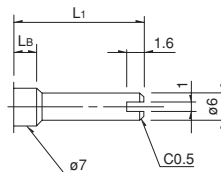
● Detailed dimensions

L_1	L_B	l
15	7	5
20	10	7

3) Slotted Type

Unit:mm

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

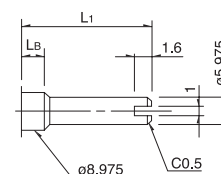


● Detailed dimensions

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

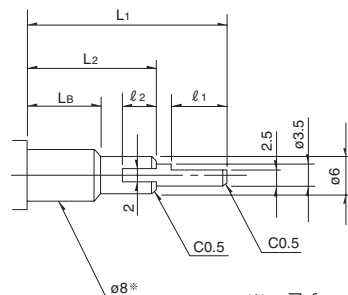
1. The highlighted figures in shaft types refer to Product Specifications in P.269 and P.270.
2. Other varieties are also available. Please inquire.

2. Standard Dimensions and Configuration of Dual-shaft Type

1) Flat Type

Unit:mm

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



● Detailed dimensions

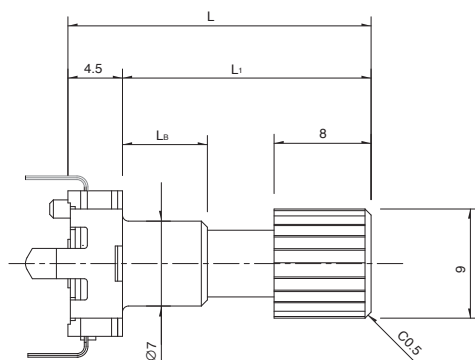
L_1	L_2	L_B	l_1	l_2
20	10		7	4
25	15	7	7	5
30	20	10	7	5

※ $\phi 7$ 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.

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)		$0.5 \pm_{-0.3}^{+0.4}$	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 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		$6 \pm_{-2}^{+2.5}\text{N}$	$4 \pm 2\text{N}$
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 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℃ 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 ± $\frac{3}{4}$ 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 ± $\frac{0.4}{0.3}$	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 ± $\frac{2.5}{2}$	4±2	6±3	5±2	6 ± $\frac{2.5}{2}$	4±2	8 max.	6 ± $\frac{2.5}{2}$	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.

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℃ to +85℃						−30℃ to +85℃		−30℃ to +80℃		−10℃ to +70℃	
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	
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Note

- Indicates applicability to all products in the series.

Reference for Manual Soldering

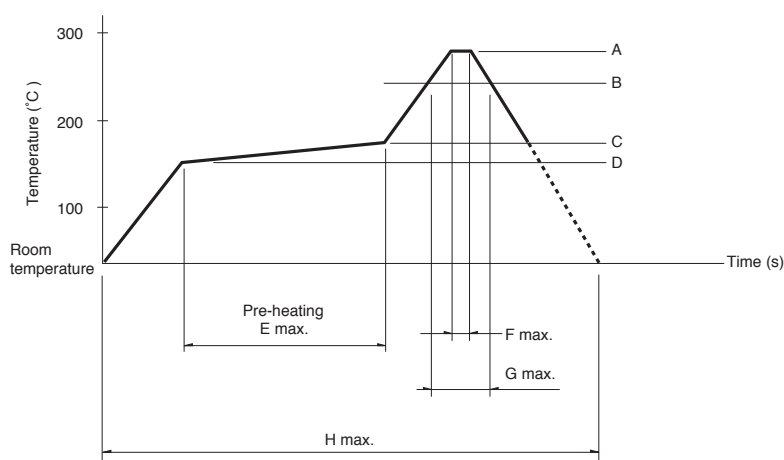
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC40A, EC45A, EC50A, EC60B, EM11B, EM20B, EC21C	350°C max.	3s max.	1 time
EC11J	350±10°C	3 ⁺¹ ₀ s	2 time

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.

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