

■ Typical Specifications

Items		Specifications
Rating		0.5mA 5V DC 1mA 5V DC
Operating life	Without detent	15,000 cycles 30,000 cycles (Lightest (jog))
	With detent	30,000 cycles
Operating temperature range		EC12E: -10°C to +70°C EC12D: -40°C to +85°C

■ Product Line

Standard Type

Length of the shaft LM ₁ (mm)	Detent torque (mN·m)	Number of detent	Number of pulse	Operating direction	Minimum order unit (pcs.)		Product No.	Drawing No.
					Japan	Export		
15	Standard 3 to 20	12	12	Vertical	2,400	2,400	EC12E1220407	2
20							EC12E1220406	1
25							EC12E1220405	
8.5 (Hollow shaft)	Lightest (jog) 3±2				3,000	3,000	EC12E1220301	3
20							EC12E1240405	1
25							EC12E1240406	
8.5 (Hollow shaft)	Standard 3 to 20	24	24		2,400	2,400	EC12E1240301	3
15							EC12E24204A2	2
17.5							EC12E24204A7	
20	Lightest (jog) 3±2				2,400	2,400	EC12E24204A8	1
25							EC12E24204A9	
8.5 (Hollow shaft)							Lightest (jog) 10 max.	3,000
20	Without	2,400	2,400	EC12E24404A8	1			
25				EC12E24404A6				
8.5 (Hollow shaft)	Standard 25±15	Without	Without	3,000	3,000	EC12E2440301	3	
20						EC12E24104A6	1	
25						EC12E2430404		
							EC12E2430401	

With Bushing Type

Length of the shaft LM ₁ (mm)	Detent torque (mN·m)	Number of detent	Number of pulse	Operating direction	Minimum order unit (pcs.)		Product No.	Drawing No.	
					Japan	Export			
25	Standard 3 to 20	12	12	Vertical	1,900	1,900	EC12E1220813	4	
20		24	24				EC12E2420802		
25							EC12E2420801		
30	EC12E2420803								
20	Standard 25±15	Without	Without				EC12E2430804		1
25							EC12E2430803		
30				Heavy 40±15	EC12E2460802				

Note

Nuts and washers are not included. If required, please contact us.

Refer to P.296 for product varieties.
Refer to P.315 for soldering conditions.

Product Line
With Switch Type

Length of the shaft LM ₁ (mm)	Detent torque (mN·m)	Number of detent	Number of pulse	Operating direction	Operating force of switch (N)	Travel of push-on switch (mm)	Minimum order unit (pcs.)		Product No.	Drawing No.
							Japan	Export		
175	5±3	30	15	Vertical	3	0.5	1,280	2,560	EC12D1524403	5
	10±5								EC12D1564402	
	5±3				EC12D1524406					
	10±5				EC12D1564404					

Notes

EC12D is suitable for automotive use.


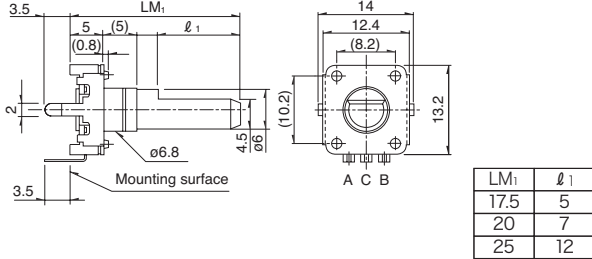
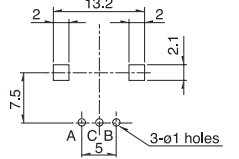

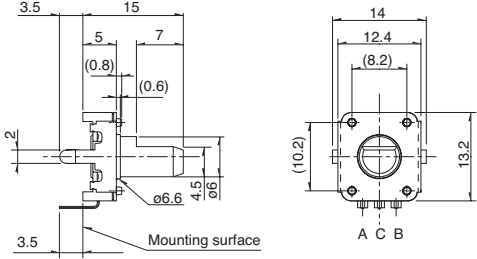
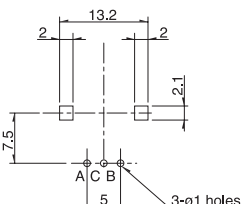

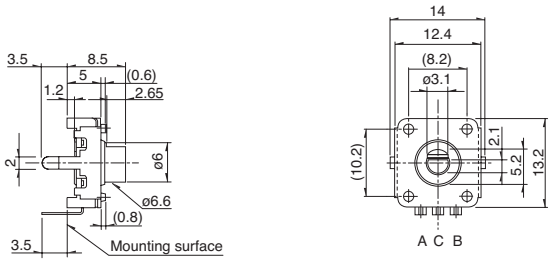
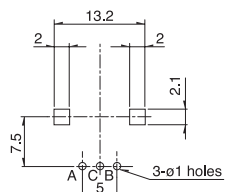
Packing Specifications

Tray

Product No.	Number of packages (pcs.)		Export package measurements (mm)
	1 case /Japan	1 case /export packing	
EC12E □□□ 03	3,000	3,000	369×525×204
EC12E □□□ 04	2,400	2,400	
EC12E □□□ 08	1,900	1,900	
EC12D	1,280	2,560	360×540×290

Dimensions


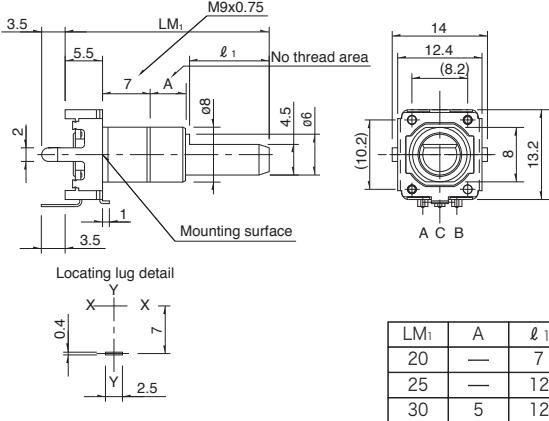
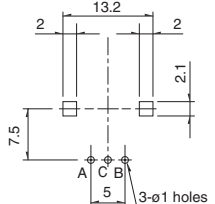

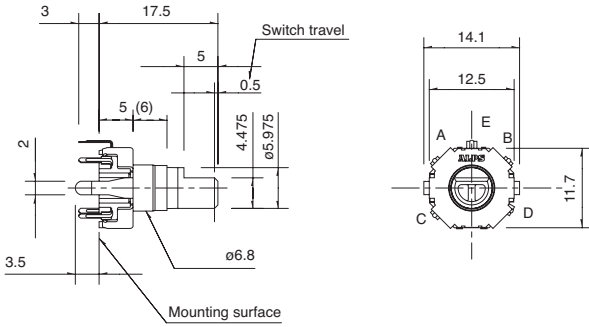
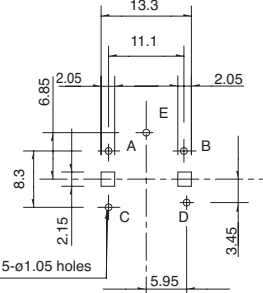
Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)								
1		 <table border="1" data-bbox="981 1339 1101 1433"> <thead> <tr> <th>LM₁</th> <th>ℓ₁</th> </tr> </thead> <tbody> <tr> <td>17.5</td> <td>5</td> </tr> <tr> <td>20</td> <td>7</td> </tr> <tr> <td>25</td> <td>12</td> </tr> </tbody> </table>	LM ₁	ℓ ₁	17.5	5	20	7	25	12	
LM ₁	ℓ ₁										
17.5	5										
20	7										
25	12										
2											
3											

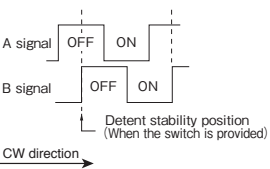
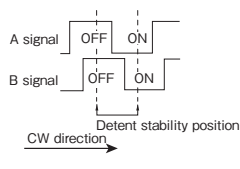
Refer to P.296 for product varieties.
Refer to P.296 for switches.
Refer to P.315 for soldering conditions.

Dimensions

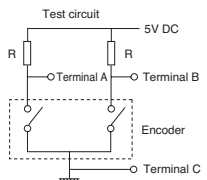
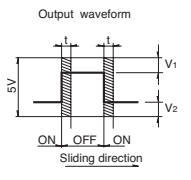
Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)												
4		 <table border="1" data-bbox="922 654 1104 750"> <thead> <tr> <th>LM₁</th> <th>A</th> <th>l₁</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>—</td> <td>7</td> </tr> <tr> <td>25</td> <td>—</td> <td>12</td> </tr> <tr> <td>30</td> <td>5</td> <td>12</td> </tr> </tbody> </table>	LM ₁	A	l ₁	20	—	7	25	—	12	30	5	12	
LM ₁	A	l ₁													
20	—	7													
25	—	12													
30	5	12													
5															

Output Wave

EC12E	EC12D
 <p>Detent stability position (When the switch is provided)</p> <p>CW direction →</p> <p>*Detent position cannot be specified for B signal.</p>	 <p>Detent stability position</p> <p>CW direction →</p>

Sliding Noise

 <p>Test circuit</p> <p>5V DC</p> <p>Terminal A</p> <p>Terminal B</p> <p>Encoder</p> <p>Terminal C</p> <p>Measurement condition : Rotation speed 360°/s</p>	 <p>Output waveform</p> <p>5V</p> <p>V₁</p> <p>V₂</p> <p>ON OFF ON</p> <p>Sliding direction</p> <p>t : Masking time to avoid chattering</p>	<p>EC12E</p> <p>V₁ = V₂ = 1.5V max.</p> <p>At R = 10k Ω</p> <p>Chattering : 3ms max.</p> <p>Bounce : 2ms max.</p> <p>EC12D</p> <p>V₁ = V₂ = 2.5V max.</p> <p>At R = 5k Ω</p> <p>Chattering : 3ms max.</p> <p>Bounce : 2ms max.</p>
--	--	--

Encoders

Metal Shaft

Insulated Shaft

Hollow Shaft

Ring Type

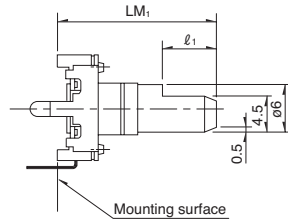
12mm Size Insulated Shaft Type/Product Varieties

■ Shaft Dimensions

Flat Type

Unit:mm

High collar type

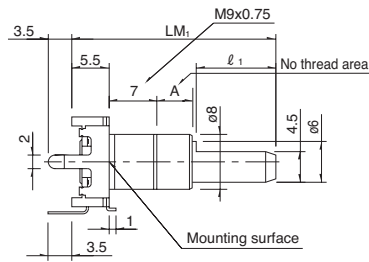


Detailed dimensions

	LM_1	l_1
※	17.5	5
	20	7
※	22.5	7
	25	12
	30	12

※ Not available for types without detents

With bushing type






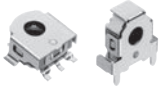






Detailed dimensions

LM_1	A	l_1
20	—	7
25	—	12
30	5	12
35	5	12

Excluding the 12 detent type

12mm Size Insulated Shaft Type / Switch Specifications

Switch type	Momentary push switch	
Contact arrangement	Single pole and single throw (Push-on)	
Travel (mm)	0.5±0.3	
Operating force	3 ± 1.5 N, 6 ± 2.5 N	
Operating life	30,000 times	
Electrical performance	Rating	1mA 5V DC (10mA 5V DC max. 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

Type		Insulated shaft			Hollow shaft				
		12mm size		18mm size	5mm size		10mm size		
Series		EC12E	EC12D	EC18A	EC05E		EC10E		
Photo									
Output		Incremental (Two phase A and B)			Absolute type	Incremental (Two phase A and B)			
Shaft types		Single-shaft			Hollow shaft				
Operating direction		Vertical			Vertical	Horizontal	Horizontal		
Number of pulse / Number of detent		12 / 12 24 / 24 24 / Without	15 / 30	12 positions 16 positions	12 / 12		12 / 24 12 / 12		
Features		—	With push-on switch	Water resisting performance (IPX7)	Surface mount type		—		
Dimensions (mm)	W	12.4	12.5	18.8	5.7	7.5	9.8		
	D	13.2	11.7	18	6	3.3	4.4		
	H	5			8.75	2.7	7.25	10.6 / 12.6 / 14.6	
Operating temperature range		-10°C to +70°C	-40°C to +85°C	-20°C to +60°C	-30°C to +85°C		-5°C to +45°C -40°C to +85°C (For Automotive)		
Operating life		15,000 cycles 30,000 cycles	30,000 cycles			100,000 cycles			
Automotive use		—	●	—	—	—	○		
Life cycle (availability)									
Electrical performance	Rating	0.5mA 5V DC	1mA 5V DC	1mA 10V DC	0.55mA 5.5V DC		1mA 5V DC		
	Max./min. operating current (Resistive load)	5mA / 0.5mA	10mA / 1mA	—	0.55mA / —		—		
	Insulation resistance	10MΩ min. 50V DC	100MΩ min. 250V DC	10MΩ min. 250V DC	50MΩ min. 50V DC				
	Voltage proof	50V AC for 1 minute	300V AC for 1 minute or 360V AC for 1s	50V AC for 1 minute or 60V AC for 2s	50V AC for 1 minute				
Mechanical performance	Rotational torque (Without detent)	10mN·m max. 25±15mN·m 40±15mN·m	—	—	—		—		
	Detent torque	3±2mN·m 3 to 20mN·m	5±3mN·m 10±5mN·m	60±20mN·m	1.6±1.3mN·m		5±3mN·m 6±3mN·m		
	Push-pull strength	80N	100N	Push 100N / pull 50N	—				
Shaft configuration		Flat, Hollow Shaft	Flat			Hollow shaft			
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	—	—		—		
	Operating force (N)	—	3 ^{+1.5} ₋₁	6 ^{+2.5} ₋₂	—		—		
	Rating	—	1mA 5V DC (10mA 5V DC max. ratings)		—		—		
	Contact resistance	—	100mΩ max. for initial period; 200mΩ max. after operating life.		—		—		
	Operating life	—	30,000 times		—		—		
Page		293			297	299		301	

Encoders Soldering Conditions 315
 Encoders Cautions 316

Notes

- The operating temperature range for automotive applications can be raised upon request. Please contact us for details.
- Indicates applicability to all products in the series, while ○ indicates applicability to some products in the series.

Reference for Manual Soldering

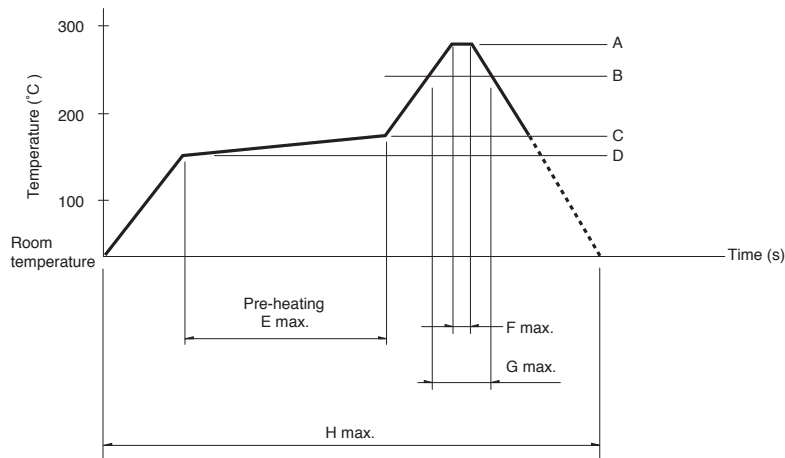
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC40A, EC45A, EC50A, EC60B, EM11B, EM20B, EC21C, EC28C, EC35CH	350°C max.	3s max.	1 time
EC11J	350±10°C	3 ⁺¹ ₀ s	2 times

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, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC50A, EC60B	100°C max.	2 min. max.	260±5°C	5±1s	2 times max.
EC10E, EC12D, EC12E, EM11B	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.
EM20B	80°C max.	1 min. max.	260°C max.	3s 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.

注記

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.