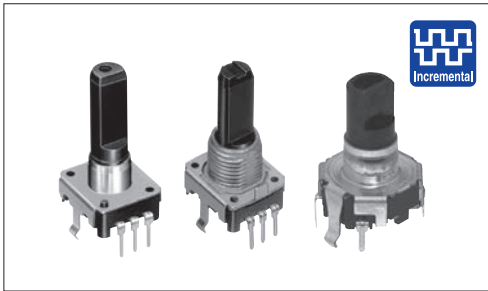




■ Typical Specifications



Items		Specifications
Rating		0.5mA 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 <sub>1</sub> (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	<b>EC12E1220407</b>	2
20							<b>EC12E1220406</b>	1
25							<b>EC12E1220405</b>	
8.5 (Hollow shaft)	Lightest (jog) 3±2				3,000	3,000	<b>EC12E1220301</b>	3
20							<b>EC12E1240405</b>	
25							<b>EC12E1240406</b>	1
8.5 (Hollow shaft)	Standard 3 to 20	24	24		2,400	2,400	<b>EC12E1240301</b>	3
15							<b>EC12E24204A2</b>	1
17.5							<b>EC12E24204A7</b>	
20	Lightest (jog) 3±2				2,400	2,400	<b>EC12E24204A8</b>	1
25							<b>EC12E24204A9</b>	
8.5 (Hollow shaft)							Lightest (jog)10 max.	3,000
20	Without	2,400	2,400	<b>EC12E24404A8</b>	1			
25				<b>EC12E24404A6</b>				
8.5 (Hollow shaft)				Standard 25±15	3,000	3,000	<b>EC12E2440301</b>	3
20	<b>EC12E24104A6</b>	1						
25	<b>EC12E2430404</b>							
							<b>EC12E2430401</b>	

With Bushing Type

Length of the shaft LM <sub>1</sub> (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	<b>EC12E1220813</b>	4
20		24	24				<b>EC12E2420802</b>	
25							<b>EC12E2420801</b>	
30		<b>EC12E2420803</b>						
20	Standard 25±15	Without	24		<b>EC12E2430804</b>			
25					<b>EC12E2430803</b>			
30					Heavy 40±15	<b>EC12E2460802</b>		

Note

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

Refer to P.290 for product varieties.  
Refer to P.290 for switches.  
Refer to P.307 for soldering conditions.

**Product Line**

With Switch Type

Length of the shaft LM <sub>1</sub> (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	<b>EC12D1524403</b>	5	
	10±5										6
	5±3				<b>EC12D1524406</b>						
	10±5										<b>EC12D1564404</b>

**Notes**

EC12D is suitable for automotive use.


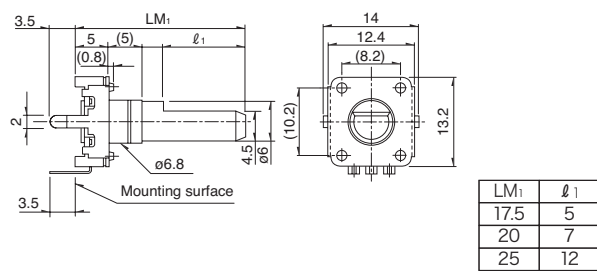
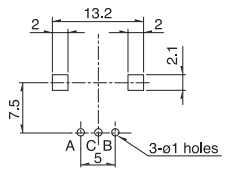

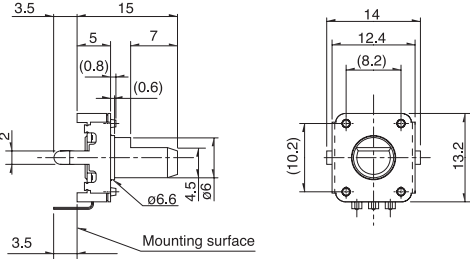
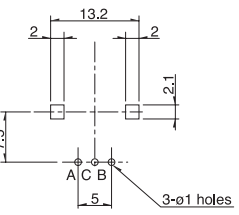

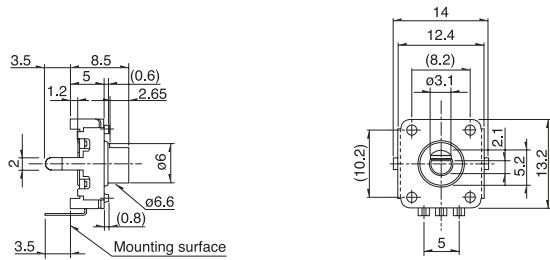
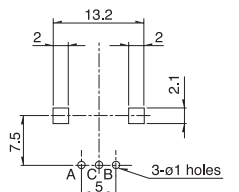
**Packing Specifications**

Tray

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


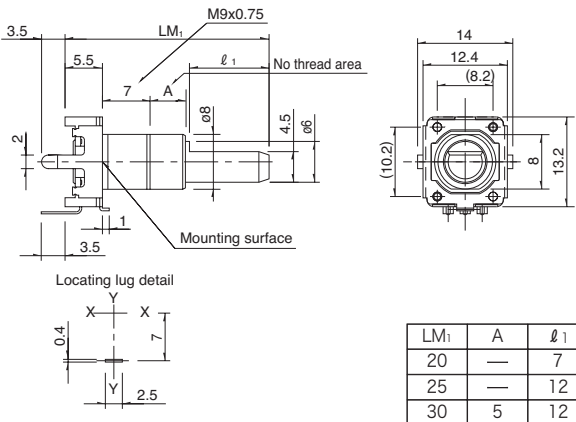
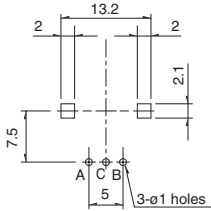


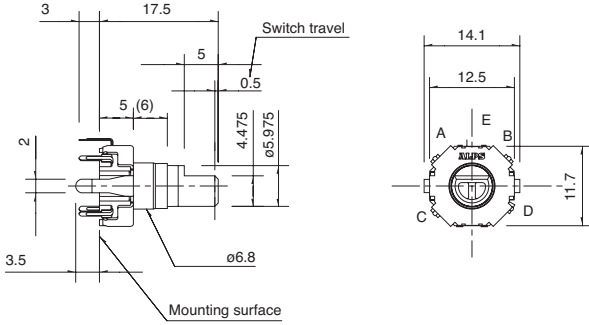
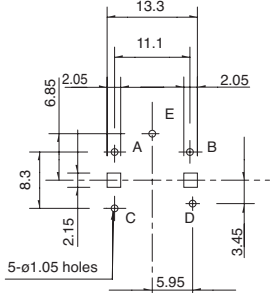
**Dimensions**

Unit:mm

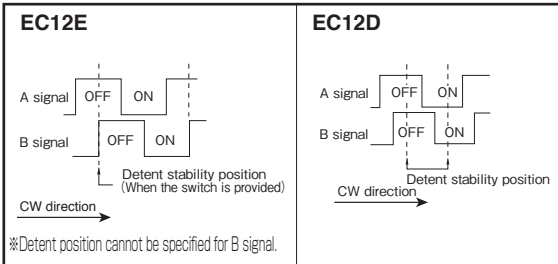
No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)								
1		 <table border="1" data-bbox="981 1332 1101 1433"> <thead> <tr> <th>LM<sub>1</sub></th> <th>ℓ<sub>1</sub></th> </tr> </thead> <tbody> <tr> <td>17.5</td> <td>5</td> </tr> <tr> <td>20</td> <td>7</td> </tr> <tr> <td>25</td> <td>12</td> </tr> </tbody> </table>	LM <sub>1</sub>	ℓ <sub>1</sub>	17.5	5	20	7	25	12	
LM <sub>1</sub>	ℓ <sub>1</sub>										
17.5	5										
20	7										
25	12										
2											
3											

Refer to P.290 for product varieties.  
Refer to P.290 for switches.  
Refer to P.307 for soldering conditions.

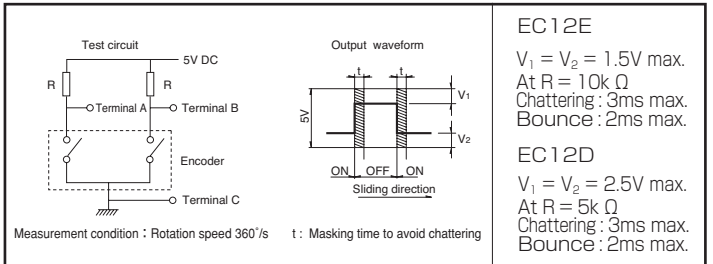
■ Dimensions

			Unit:mm												
No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)												
4	 <p><b>With bushing type</b></p>	 <table border="1" data-bbox="922 651 1102 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>	LM1	A	l1	20	—	7	25	—	12	30	5	12	
LM1	A	l1													
20	—	7													
25	—	12													
30	5	12													
5	 <p><b>With push-on switch type</b></p> <p> Car Use</p>														

■ Output Wave



■ Sliding Noise



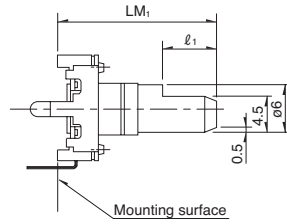
# 12mm Size Insulated Shaft Type/Product Varieties

## Shaft Dimensions

Flat Type

Unit:mm

### High collar type

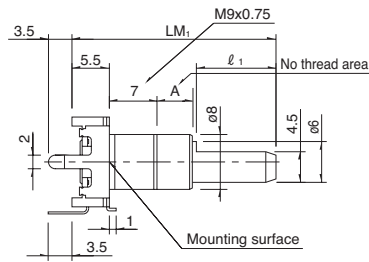


### Detailed dimensions

	LM <sub>1</sub>	l <sub>1</sub>
※	17.5	5
	20	7
※	22.5	7
	25	12
	30	12

※ Not available for types without detents

### With bushing type



### Detailed dimensions

LM <sub>1</sub>	A	l <sub>1</sub>
20	—	7
25	—	12
30	5	12
35	5	12




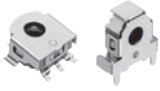






Excluding the 12 detent type

## 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 <sup>5</sup> N, 6 ± 2 <sup>5</sup> 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 1s

# Encoders

## List of Varieties

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 -30°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 <sup>+1.5</sup> <sub>-1</sub>	6 <sup>+2.5</sup> <sub>-2</sub>	—	—		—
		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		—	—		—
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Encoders Cautions	308

### 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

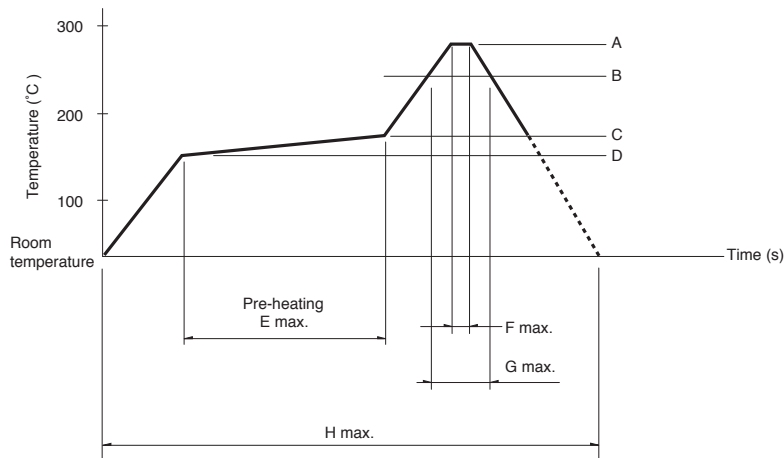
Series	Tip temperature	Soldering time	No. of solders
<b>EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC40A, EC45A, EC50A, EC60B, EM11B, EM20B, EC21C</b>	350°C max.	3s max.	1 time
<b>EC11J</b>	350±10°C	3 <sup>+1</sup> <sub>0</sub> s	2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

## Reference for Dip Soldering

Series	Preheating		Dip soldering		No. of solders
	Soldering surface temperature	Heating time	Soldering temperature	Soldering time	
<b>EC09E, EC11B, EC111, EC11E, EC11G, EC11K, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC50A, EC60B</b>	100°C max.	2 min. max.	260±5°C	5±1s	2 time max.
<b>EC10E, EC12D, EC12E, EM11B</b>	100°C max.	1 min. max.	260±5°C	3±1s	2 time max.
<b>EC40A</b>	110°C max.	1 min. max.	260°C max.	10s max.	1 time
<b>EC45A</b>	100°C max.	2 min. max.	260°C max.	5s max.	2 time max.
<b>EM20B</b>	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
<b>EC11J</b>	260°C	230°C	180°C	150°C	2 min. max.	3s	40s	4 min. max.	2 time max.
<b>EC05E</b>	250°C min.	230°C min.	180°C	150°C	60s to 120s	—	30s to 40s	—	2 time max.
<b>EC21C</b>	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