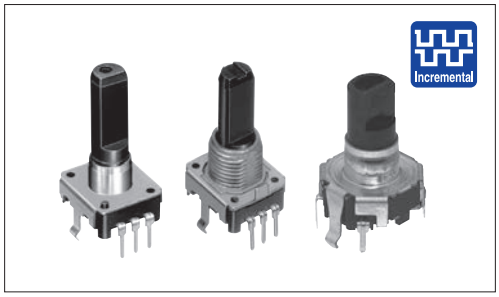
EC12E
EC12D

12mm Size Insulated Shaft Type

Insulated shaft type with a wide variety of applications



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℃ to +70℃ EC12D:−40℃ to +85℃

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.) Japan	Minimum order unit (pcs.) Export	Product No.	Drawing No.
15	Standard 3 to 20	12	12	Vertical	2,400	2,400	**EC12E1220407**	2
20							**EC12E1220406**	1
25							**EC12E1220405**	
8.5 (Hollow shaft)					3,000	3,000	**EC12E1220301**	3
20	Lightest (jog) 3±2				2,400	2,400	**EC12E1240405**	
25							**EC12E1240406**	1
8.5 (Hollow shaft)					3,000	3,000	**EC12E1240301**	3
15	Standard 3 to 20	24	24		2,400	2,400	**EC12E24204A2**	2
17.5							**EC12E24204A7**	1
20							**EC12E24204A8**	
25							**EC12E24204A9**	
8.5 (Hollow shaft)					3,000	3,000	**EC12E2420301**	3
20	Lightest (jog) 3±2				2,400	2,400	**EC12E24404A8**	1
25							**EC12E24404A6**	
8.5 (Hollow shaft)					3,000	3,000	**EC12E2440301**	3
20	Lightest (jog) 10 max.	Without			2,400	2,400	**EC12E24104A6**	1
	Standard 25±15						**EC12E2430404**	
25							**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.) Japan	Minimum order unit (pcs.) Export	Product No.	Drawing No.
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					**EC12E2430804**	
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.

EC12E EC12D 12mm Size Insulated Shaft Type

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.) Japan	Minimum order unit (pcs.) Export	Product No.	Drawing No.
17.5	5±3	30	15	Vertical	3	0.5	1,280	2,560	**EC12D1524403**	5
	10±5								**EC12D1564402**	
	5±3				6				**EC12D1524406**	
	10±5								**EC12D1564404**	

Notes

EC12D is suitable for automotive use.

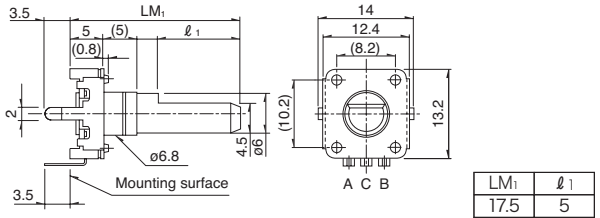
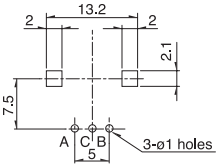
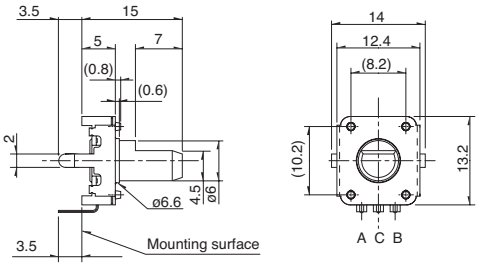
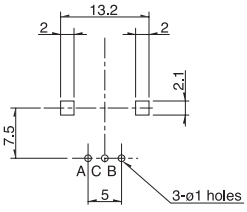
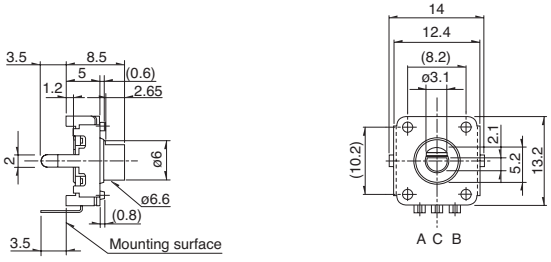
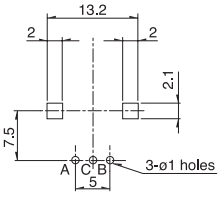
Packing Specifications

Tray

Product No.	Number of packages (pcs.) 1 case /Japan	Number of packages (pcs.) 1 case /export packing	Export package measurements (mm)
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

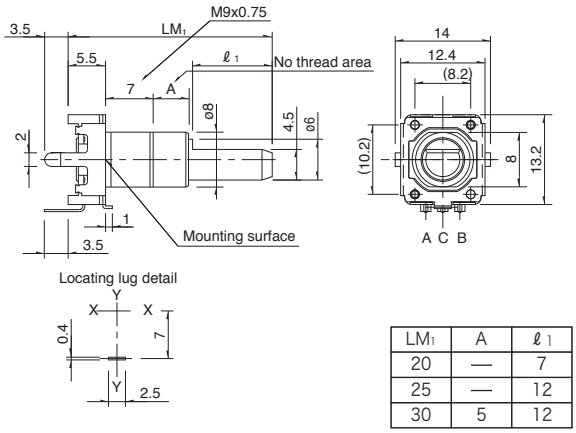
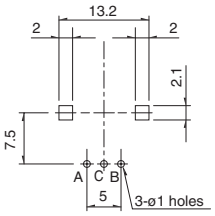
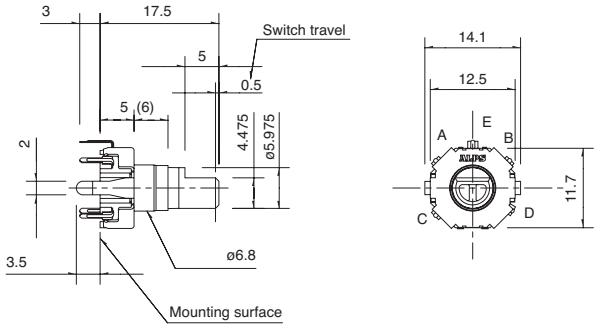
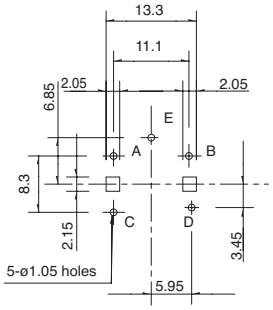
No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
1	**High collar type** 		
2	**Short shaft type** 		
3	**Hollow shaft type** 		

LM_1	ℓ_1
17.5	5
20	7
25	12

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

Dimensions

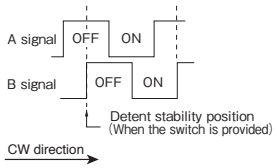
Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
4	**With bushing type** 		
5	**With push-on switch type** Car Use 		

LM1	A	ℓ1
20	—	7
25	—	12
30	5	12

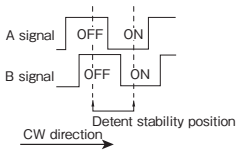
Output Wave

EC12E

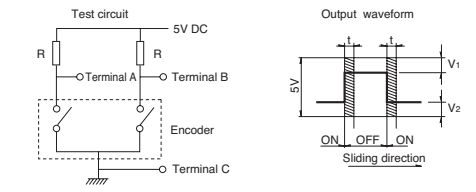


※Detent position cannot be specified for B signal.

EC12D



Sliding Noise



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

EC12E

$V_1 = V_2 = 1.5V$ max.
At R = 10k Ω
Chattering : 3ms max.
Bounce : 2ms max.

EC12D

$V_1 = V_2 = 2.5V$ max.
At R = 5k Ω
Chattering : 3ms max.
Bounce : 2ms max.

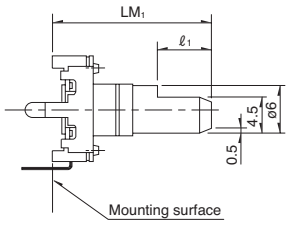
12mm Size Insulated Shaft Type/Product Varieties

Shaft Dimensions

Flat Type

Unit:mm

High collar type

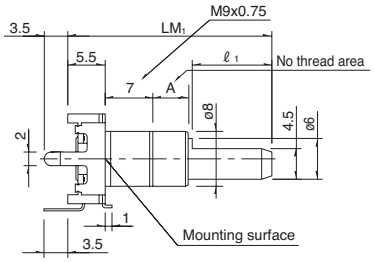


Detailed dimensions

	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



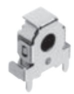
Detailed dimensions

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		$3^{+1.5}_{-1}$N, $6^{+2.5}_{-2}$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℃ to +70℃	−40℃ to +85℃	−20℃ to +60℃	−30℃ to + 85℃		−5℃ to +45℃ −40℃ to +85℃ (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

Notes

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

Reference for Manual Soldering

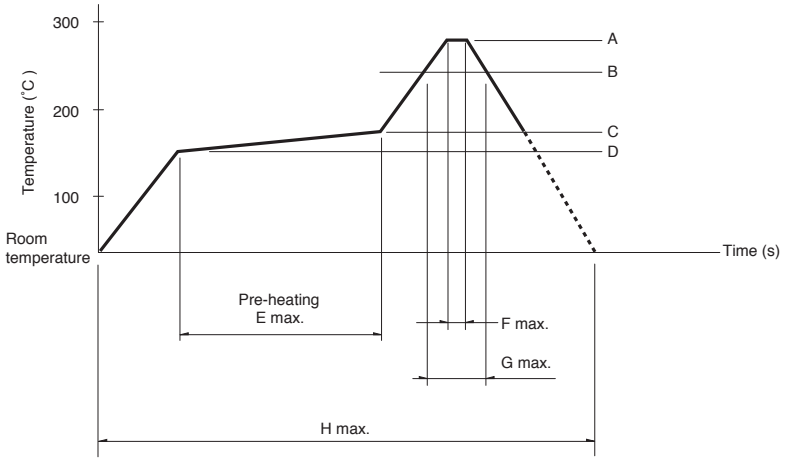
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC40A, EC45A, EC50A, EC60B, EM11B, EM20B, EC21C, EC28C, EC35CH	350℃ max.	3s max.	1 time
EC11J	350±10℃	3^{+1}_{0}s	2 times

Reference for Dip Soldering

Series	Preheating		Dip soldering		No. of solders
	Soldering surfacetemperature	Heating time	Soldering temperature	Soldering time	
EC09E, EC11B, EC111, EC11E, EC11G, EC11K, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC50A, EC60B	100℃ max.	2 min. max.	260±5℃	5±1s	2 times max.
EC10E, EC12D, EC12E, EM11B	100℃ max.	1 min. max.	260±5℃	3±1s	2 times max.
EC40A	110℃ max.	1 min. max.	260℃ max.	10s max.	1 time
EC45A	100℃ max.	2 min. max.	260℃ max.	5s max.	2 times max.
EM20B	80℃ max.	1 min. max.	260℃ 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℃	230℃	180℃	150℃	2 min. max.	3s	40s	4 min. max.	2 times max.
EC05E	250℃ min.	230℃ min.	180℃	150℃	60s to 120s	—	30s to 40s	—	2 times max.
EC21C	230℃ to 245℃	220℃	200℃	150℃	60s to 120s	—	25s to 60s	300s max.	1 time max.
EC28C, EC35CH	260℃	230℃	180℃	150℃	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℃ 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.