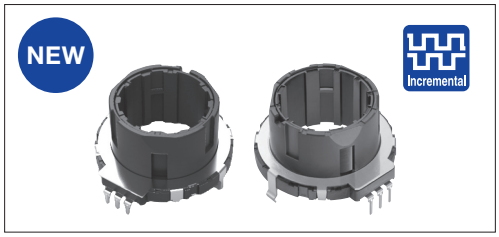
EC28A EC28C

28mm Size Ring Type

A low-profile unit with 4mm height and good operation feel



Typical Specifications

Items	Specifications
Rating	10mA 5V DC
Operating life	50,000 cycles
Operating temperature range	−40℃ to +85℃ −40℃ to +90℃ (EC28C)

Product Line

Structure	Actuator length (mm)	Detent torque (mN·m)	Number of detent	Number of pulse	Minimum order unit (pcs.) Japan	Minimum order unit (pcs.) Export	Product No.	Drawing No.
DIP	15	7±5	30	15	400	800	**EC28A1520401**	1
		12±7					**EC28A1550401**	
		20±10					**EC28A1560401**	
		12±7	18	18			**EC28A1850402**	
		20±10					**EC28A1870401**	
	25	20±10	30	15	420	840	**EC28A1560501**	2
Reflow	15	30±15 (Initial) 20±10 (After reflow)	30	15	480	480	**EC28C1520401**	3

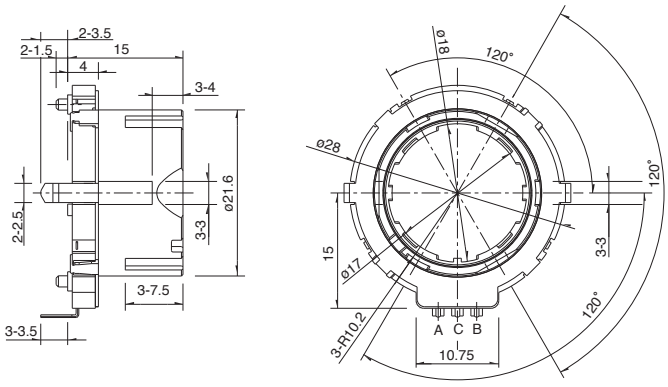
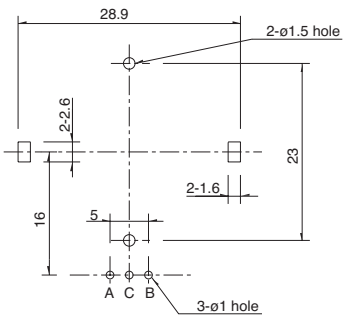
Packing Specifications

Tray

Product No.	Number of packages (pcs.) 1 case /Japan	Number of packages (pcs.) 1 case /export packing	Export package measurements (mm)
EC28A15, EC28A18	400	800	366×509×287
EC28A1560501	420	840	360×540×380
EC28C1520401	480	480	290×440×205

Dimensions

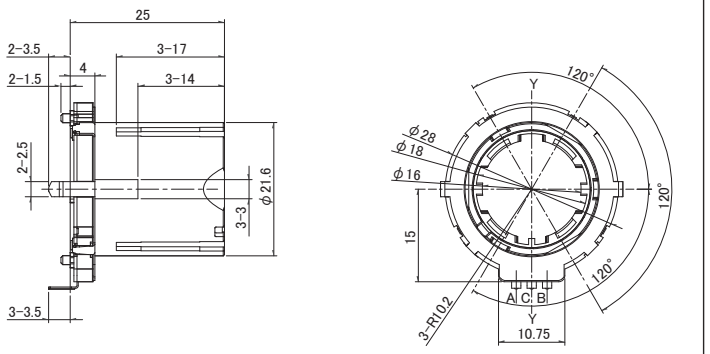
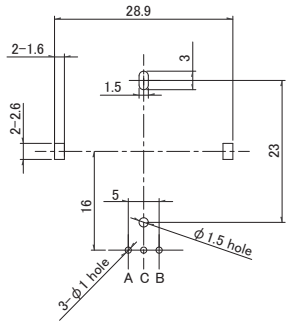
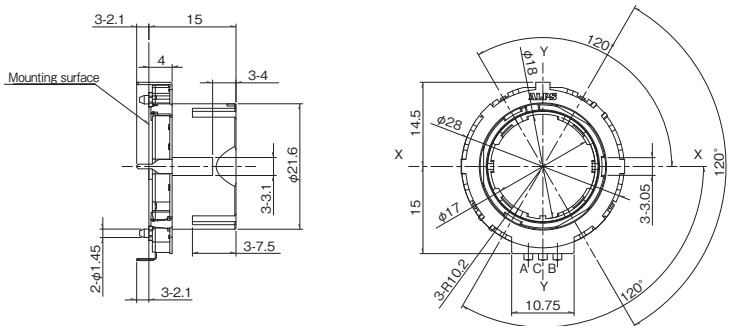
Unit:mm

No.	Style	PC board mounting hole dimensions (Viewed from mounting side)
1		

Refer to P.315 for soldering conditions.

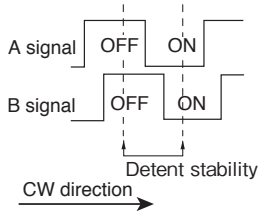
Dimensions

Unit:mm

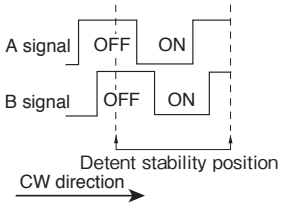
No.	Style	PC board mounting hole dimensions (Viewed from mounting side)
2		
3		

Output Wave

EC28A15
EC28C15



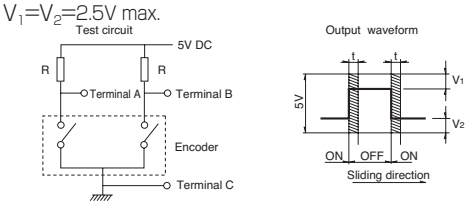
EC28A18



*Signal A and signal B output at detent positions cannot be specified.

Sliding Noise

$V_1=V_2=2.5V$ max.



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

At R = 5kΩ
Chattering : 5ms max. Bounce : 5ms max.

List of Varieties

Type			Ring type					
			21mm size		28mm size		35mm size	
Series			**EC21A**	**EC21C**	**EC28A**	**EC28C**	**EC35A**	**EC35AH**
Photo						NEW 		
Output			Incremental (Two phase A and B)					Incremental (Three phase A, B and C)
Shaft types			Ring type					
Number of pulse / Number of detent			9/18 15/30	15/30	15/30 18/18	15/30		6×ABC/18 10×ABC/30
Dimensions (mm)		W	21.6	22	28	28	35	
		D		21.6	29	29.5		
		H	4				4.5	
Operating temperature range			−40℃ to +85℃			−40℃ to +90℃	−40℃ to +85℃	
Operating life			50,000 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 1minute or 360V AC for 2s	300V AC for 1minute or 360V AC for 1s	300V AC for 1minute or 360V AC for 2s	300V AC for 1minute or 360V AC for 1s	300V AC for 1minute or 360V AC for 2s	
Mechanical performance	Detent torque		7±5mN·m 12±5mN·m 16±7mN·m	17±8mN·m (Initial) 12$^{+7}_{-4}$ mN·m (After reflow)	7±5mN·m 12±7mN·m 20±10mN·m	30±15mN·m (Initial) 20±10mN·m (After reflow)	18±7mN·m 30±15mN·m	12±5mN·m 18±7mN·m 30±15mN·m
	Push-pull strength	Push	100N					
		Pull	100N					
Shaft configuration			Ring type					
Terminal type			Insertion					
Switch Specifications	Switch type		—	—	—	—	—	—
	Contact arrangement		—	—	—	—	—	—
	Travel (mm)		—	—	—	—	—	—
	Operating force (N)		—	—	—	—	—	—
	Switch ON position		—	—	—	—	—	—
	Rotational torque		—	—	—	—	—	—
	Rating		—	—	—	—	—	—
	Contact resistance		—	—	—	—	—	—
	Operating life		—	—	—	—	—	—
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Note

● Indicates applicability to all products in the series.

Reference for Manual Soldering

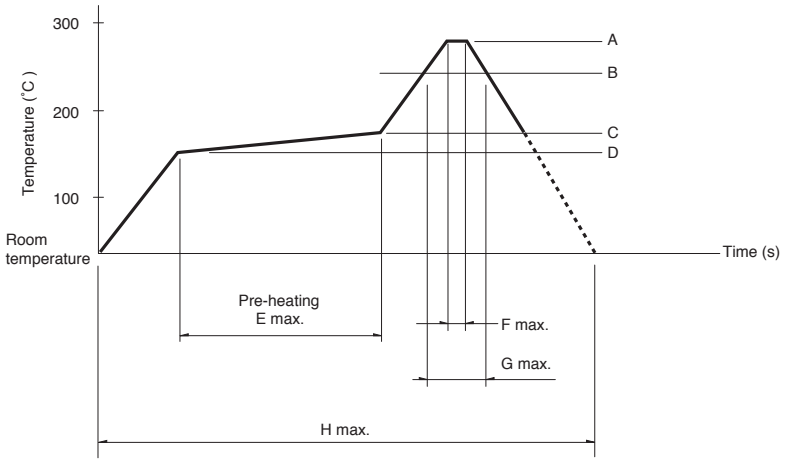
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC40A, EC45A, EC50A, EC60B, EM11B, EM20B, EC21C, EC28C, EC35CH	350℃ max.	3s max.	1 time
EC11J	350±10℃	3^{+1}_{0}s	2 times

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.