Encoders

Metal shaft Encoder	— 2
• Lea lated the first state	4.4
Insulated shaft Encoder	– 11
Through shaft Encoder	– 20
Ring Encoder	– 26

Metal shaft Encoder

List of Varieties

5	Series	EC09E	EC111	EC11E	EC11M			
	Photo							
Dir	nensions	9mm size		11mm size				
(Dutput	Incremental (Two phase A and B)						
Actuato	configuration		Flat		Serrated			
Numb	er of detent	30	Without	18 30 36	30 Without			
Numb	per of pulse	15	Self-return switch	9 15 18	15			
Operating t	emperature range		-40℃ to) +85℃				
Ope	rating life		15,000	cycles				
	Ratings		10mA	5V DC				
Electrical	Max./min. operating current (Resistive load)	10mA/1mA						
performance	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						
	Rotational torque	-	3 ∼ 30mN·m	-	8.5±5mN·m			
Mechanical performance	Detent torque	8±5mN·m	-	10±7mN·m	12±7mN·m			
	Push-pull strength		10	ON				
	Contact arrangement		Single pole single	throw (Push-on)				
	Travel (mm)		0.5±0.3 1.5±0.5		1.5±0.35			
Duch on awitah	Operating force (N)		4±2 6(+2.5, -2)		5±2			
Push-on switch specifications	Rating	10mA 5V DC (1mA 5V DC min. ratings)	O.1A	5V DC (500μA 5V DC min. rat	ings)			
	Contact resistance (Initial performance/ After lifetime)	100mΩ max./200mΩ max.						
	Operating life (times)	10,000	20,000					
Au	tomotive	•	•	•	•			

⚠ Note

• Indicates applicability to all products in the series, while O indicates applicability to some products in the series.

9mm Size Metal Shaft Type **ECO9E Series**

Compact, round type with a 9.5mm body size, contributing to reduced mounting area.





Output signal: Two phase A and B

■ Ratings: 10mA 5V DC

Operating life: 15,000 cycles

Applications: Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Control part orientation	Actuator configuration	Actuator length (mm)	Detent torque	Number of detent	Number of pulse	Push-on switch	Travel of push-on switch (mm)	Automotive	Drawing No.
EC09E1520407	Vertical	Flat	15	8±5mN·m	30	15	Without	_	•	1
EC09E1524417	Vertical	Flat	20	8±5mN·m	30	15	With	0.5	•	2
EC09E1524418	Vertical	Flat	20	8±5mN·m	30	15	With	1.5	•	3

⚠Note

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- 3. Products other than those listed in the above chart are also available. Please contact us for details.

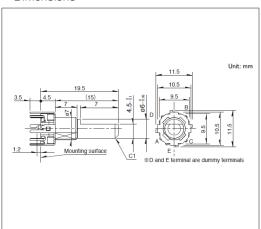
■ Packing Specifications

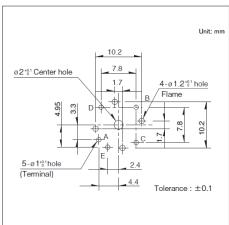
Tray

Number of pa	ckages(pcs.)	Export package	
1 case / Japan	measurements (mm)		
700	1,400	529 x 374 x 213	

Drawing No.1

Dimensions





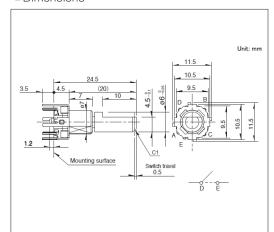
Viewed from mounting side.

9mm Size Metal Shaft Type

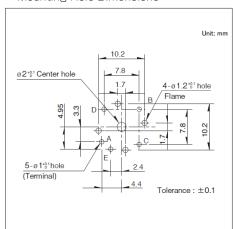
ECO9E Series

Drawing No.2

■ Dimensions



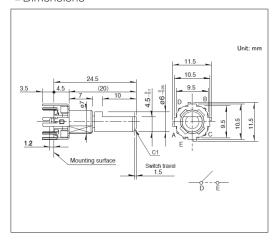
■ Mounting Hole Dimensions

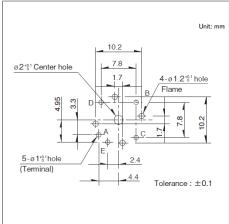


Viewed from mounting side.

Drawing No.3

■ Dimensions





Viewed from mounting side.

11mm Size Metal Shaft Type **EC111 Series**

Compact and highly reliable with a diverse product variety.





Output signal: Self-return switch

■ Ratings: 10mA 5V DC

Operating life: 15,000 cycles

Applications: Energy_Industrial: Industrial equipment, Converters

Home: Major home appliances

Audio_TV: Visual, Audio

Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Control part orientation	Actuator configuration	Actuator length (mm)	Rotational torque	Number of detent	Number of pulse	Push-on switch	Travel of push-on switch (mm)	Automotive	Drawing No.
EC111012000	5 Vertical	Flat	15	3 ~ 30mN⋅m	Without	Self-return switch	Without	_	•	1
EC111012010	H Vertical	Flat	20	3 ~ 30mN·m	Without	Self-return switch	With	0.5	•	. ,
EC111012020	1 Vertical	Flat	20	3 ~ 30mN·m	Without	Self-return switch	With	1.5	•	<u> </u>

⚠Note

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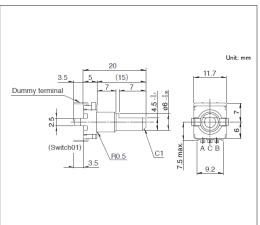
■ Packing Specifications

Tray

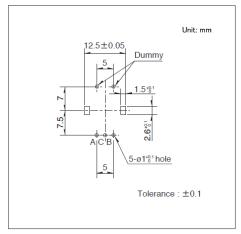
Number of pa	Number of packages(pcs.)					
1 case / Japan	measurements (mm)					
1,200	2,400	507 x 363 x 216				

Drawing No.1

Dimensions

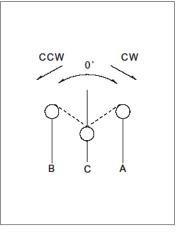


■ Mounting Hole Dimensions



Viewed from mounting side.

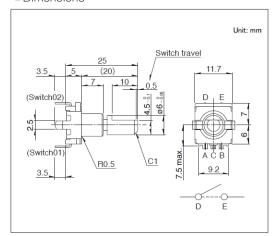
■ Circuit Diagram



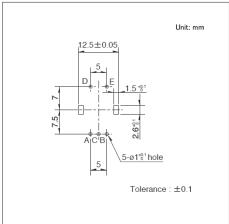
11mm Size Metal Shaft Type EC111 Series

Drawing No.2

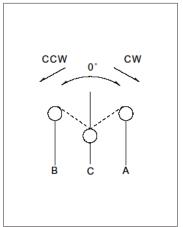
■ Dimensions



■ Mounting Hole Dimensions



■ Circuit Diagram



Viewed from mounting side.

11mm Size Metal Shaft Type **EC11E Series**

Compact and highly reliable with a diverse product variety.





Output signal: Two phase A and B

■ Ratings: 10mA 5V DC

Operating life: 15,000 cycles

Applications: Energy_Industrial: Industrial equipment, Converters

Home: Major home appliances

Audio_TV: Visual, Audio

Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Control part orientation	Actuator configuration	Actuator length (mm)	Detent torque	Number of detent	Number of pulse	Push-on switch	Travel of push-on switch (mm)	Automotive	Drawing No.
EC11E09204A4	Vertical	Flat	20	10±7mN·m	18	9	Without	-	•	
EC11E15204A3	Vertical	Flat	20	10±7mN·m	30	15	Without	-	•	1
EC11E1820402	Vertical	Flat	20	10±7mN·m	36	18	Without	_	•	
EC11E09244BS	Vertical	Flat	20	10±7mN·m	18	9	With	0.5	•	
EC11E15244G1	Vertical	Flat	20	10±7mN·m	30	15	With	0.5	•	2
EC11E18244AU	Vertical	Flat	20	10±7mN·m	36	18	With	0.5	•	
EC11E09244AQ	Vertical	Flat	20	10±7mN·m	18	9	With	1.5	•	
EC11E15244B2	Vertical	Flat	20	10±7mN·m	30	15	With	1.5	•	3
EC11E18244A5	Vertical	Flat	20	10±7mN·m	36	18	With	1.5	•	



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- 3. Products other than those listed in the above chart are also available. Please contact us for details.

■ Packing Specifications

Tray

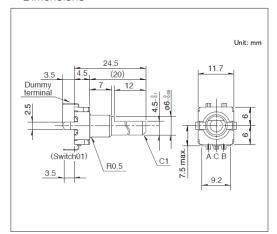
Number of pa	ckages(pcs.)	Export package measurements
1 case / Japan	1 case / export packing	(mm)
1,200	2,400	540 x 360 x 250

11mm Size Metal Shaft Type

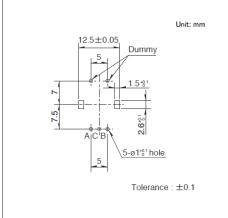
EC11E Series

Drawing No.1

■ Dimensions



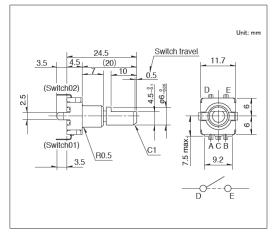
■ Mounting Hole Dimensions



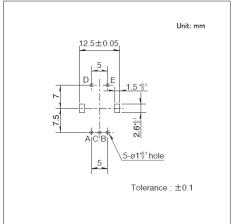
Viewed from mounting side.

Drawing No.2

■ Dimensions



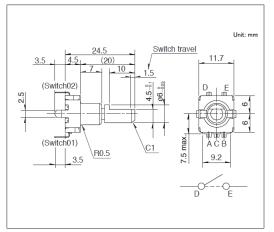
■ Mounting Hole Dimensions

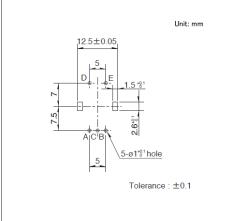


Viewed from mounting side.

Drawing No.3

■ Dimensions





Viewed from mounting side.

11mm Size Metal Shaft Type

EC11M Series

Compact and highly reliable with a diverse product variety.





Output signal: Two phase A and B

■ Ratings: 10mA 5V DC

Operating life: 15,000 cycles

Applications: Energy_Industrial: Industrial equipment, Converters

Home: Major home appliances Audio_TV: Visual, Audio

Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Control part orientation	Actuator configuration	Actuator length (mm)	Rotational Detent Number of Number of Push-on switch Travel of push-on switch (mm)		Travel of push-on switch (mm)	Automotive	Drawing No.			
EC11M1565403	Vertical	Serrated	25	_	12±7mN·m	30	15	With	1.5	•	1
EC11M1575403	Vertical	Serrated	25	8.5±5mN·m	_	Without	15	With	1.5	•	2

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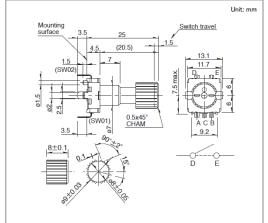
■ Packing Specifications

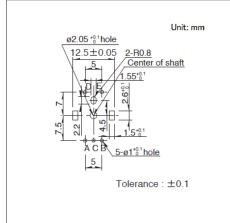
Tray

Number of pa	Number of packages(pcs.)					
1 case / Japan	measurements (mm)					
1,000	2,000	540 x 360 x 250				

Drawing No.1

■ Dimensions



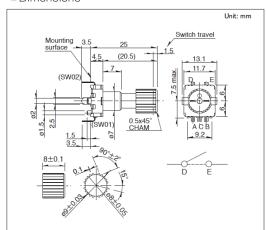


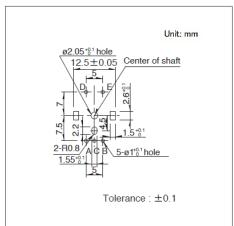
Viewed from mounting side.

11mm Size Metal Shaft Type **EC11M Series**

Drawing No.2

■ Dimensions





Viewed from mounting side.

Insulated shaft Encoder

List of Varieties

Ş	Series	EC12E	EC12D	EC18A		
	Photo					
Dir	mensions	12mr	n size	18mm size		
(Output	Incremental (Tw	o phase A and B)	Absolute		
Wa	ater-proof	-	_	•		
Du	ust-proof	-	-	-		
IP	standard	-	-	IPX7 equivalent		
Actuato	r configuration	_	-	Flat		
Numb	er of detent	12 24 Without	30	-		
Dete	ent torque	12 24	15	-		
Operating t	emperature range	-10℃ to +70℃	-40°C to +85°C	-20°C to +60°C		
Оре	erating life		30,000 cycles			
	Ratings	0.5mA 5V DC	1mA 5V DC	1mA 10V DC		
Electrical	Max./min. operating current (Resistive load)	5mA/0.5mA	10mA/1mA	_		
performance	Insulation resistance	10MΩ min. 50V DC	100MΩ min. 250V DC	10MΩ min. 250V 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		
	Rotational torque	10mN·m max. 40±15mN·m	_			
Mechanical performance	Detent torque	3 to 20mN·m 3±2mN·m	10±5mN·m 5±3mN·m	-		
	Push-pull strength	80N	100N	Push 100N / Pull 50N		
	Contact arrangement	-	Single pole single throw (Push-on)	-		
	Travel (mm)	-	0.5±0.3	-		
Duch or suit !	Operating force (N)	-	3(+1.5, -1) 6(+2.5, -2)	_		
Push-on switch specifications	Rating	-	1mA 5V DC (10mA 5V DC max. ratings)	-		
	Contact resistance (Initial performance/ After lifetime)	-	100mΩ max./200mΩ max.	-		
	Operating life (times)	-	30,000	_		
Au	tomotive	-	•	-		

⚠ Note

[•] Indicates applicability to all products in the series, while O indicates applicability to some products in the series.

12mm Size Insulated Shaft Type **EC12E Series**

Insulated shaft type with a diverse product variety.



Output signal: Two phase A and B

Ratings: 0.5mA 5V DCOperating life: 30,000 cycles

Applications:Energy_Industrial: Converters
Home:Major home appliances
Audio_TV:Visual,Audio,Pro audio

■ Product List

■ Product List						1	
Products No.	Туре	Actuator length (mm)	Torque	Number of detent	Number of pulse	Automotive	Drawing No.
EC12E1220407		15.0	Standard 3 to 20mN·m	12	12	_	1
EC12E1220406		20.0	Standard 3 to 20mN·m	12	12	_	2
EC12E1220405		25.0	Standard 3 to 20mN·m	12	12	_	3
EC12E1220301		8.5 (Hollow shaft)	Standard 3 to 20mN·m	12	12	_	4
EC12E1240405		20.0	Lightest (jog) 3±2mN·m	12	12	_	2
EC12E1240406		25.0	Lightest (jog) 3±2mN·m	12	12	_	3
EC12E1240301		8.5 (Hollow shaft)	Lightest (jog) 3±2mN·m	12	12	_	4
EC12E24204A2	Standard Type	15.0	Standard 3 to 20mN·m	24	24	_	1
EC12E24204A7	Standard Type	17.5	Standard 3 to 20mN·m	24	24	_	5
EC12E24204A8		20.0	Standard 3 to 20mN·m	24	24	_	2
EC12E24204A9		25.0	Standard 3 to 20mN·m	24	24	_	3
EC12E2420301		8.5 (Hollow shaft)	Standard 3 to 20mN·m	24	24	_	4
EC12E24404A8		20.0	Lightest (jog) 3±2mN·m	24	24	_	2
EC12E24404A6		25.0	Lightest (jog) 3±2mN·m	24	24	_	3
EC12E2440301		8.5 (Hollow shaft)	Lightest (jog) 3±2mN·m	24	24	_	4
EC12E24104A6		20.0	Lightest (jog) 10mN·m max	Without	24	_	2
EC12E1220813		25.0	Standard 3 to 20mN·m	12	12	_	6
EC12E2420802		20.0	Standard 3 to 20mN·m	24	24	_	7
EC12E2420801	With Bushing Type	25.0	Standard 3 to 20mN·m	24	24	_	6
EC12E2420803		30.0	Standard 3 to 20mN·m	24	24	_	. 8
EC12E2460802		30.0	Heavy 40±15mN·m	Without	24	_	0

⚠Note

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- 3. Products other than those listed in the above chart are also available. Please contact us for details.
- 4. Nuts and washers are not included. If required, please contact us.

EC12E Series

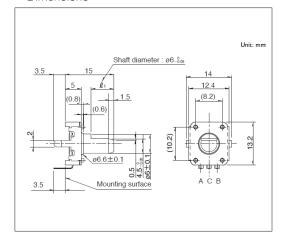
■ Packing Specifications

Tray

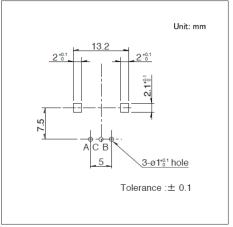
Desducts No.	Number of pa	ackages(pcs.)	Export package
Products No.	1 case / Japan	1 case / export packing	measurements (mm)
EC12E1220407 EC12E1220406 EC12E1220405 EC12E1240405 EC12E1240466 EC12E24204A2 EC12E24204A7 EC12E24204A8 EC12E24204A9 EC12E24404A8 EC12E24404A8 EC12E24404A6	2,400	2,400	525 x 369 x 204
EC12E1220301 EC12E1240301 EC12E2420301 EC12E2440301	3,000	3,000	525 x 369 x 204
EC12E1220813 EC12E2420802 EC12E2420801 EC12E2420803 EC12E2460802	1,900	1,900	525 x 369 x 204

Drawing No.1

■ Dimensions



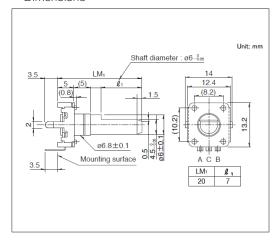
■ Mounting Hole Dimensions

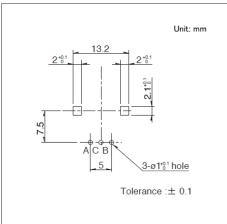


Viewed from mounting face.

Drawing No.2

■ Dimensions



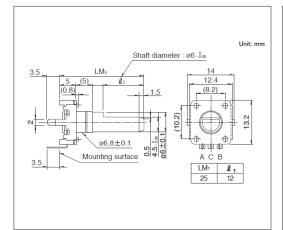


Viewed from mounting face.

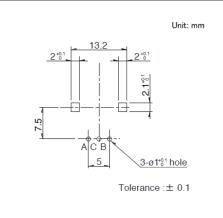
EC12E Series

Drawing No.3

■ Dimensions



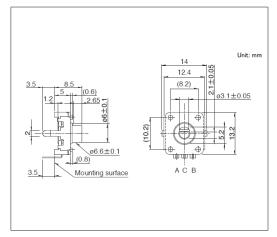
■ Mounting Hole Dimensions



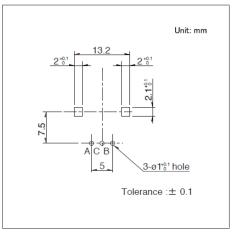
Viewed from mounting face.

Drawing No.4

■ Dimensions



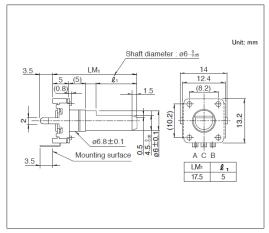
■ Mounting Hole Dimensions

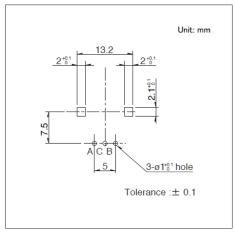


Viewed from mounting face.

Drawing No.5

■ Dimensions



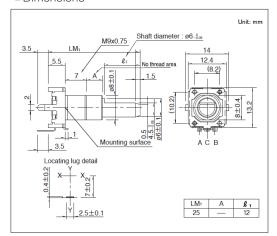


Viewed from mounting face.

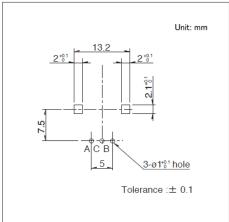
EC12E Series

Drawing No.6

■ Dimensions



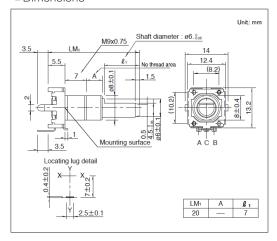
■ Mounting Hole Dimensions



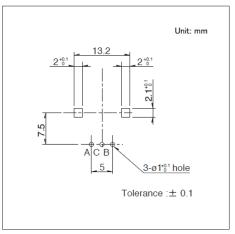
Viewed from mounting face.

Drawing No.7

■ Dimensions



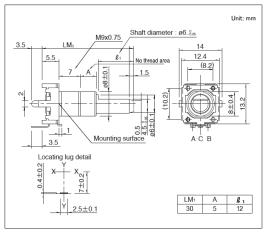
■ Mounting Hole Dimensions

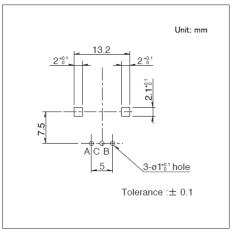


Viewed from mounting face.

Drawing No.8

■ Dimensions





Viewed from mounting face.

12mm Size Insulated Shaft Type **EC12D Series**

Automotive-compatible with push-on feature.





Output signal: Two phase A and B

■ Ratings: 1 mA 5V DC

■ Operating life: 30,000 cycles

Applications: Energy_Industrial: Converters
Home: Major home appliances
Audio_TV: Visual, Audio, Pro audio

Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Туре	Actuator length (mm)	Detent torque	Number of detent	Number of pulse	Automotive	Drawing No.
EC12D1524403		17.5	5±3mN·m	30	15	•	
EC12D1564402	With Switch Type	17.5	10±5mN·m	30	15	•	1
EC12D1524406	With Switch Type	17.5	5±3mN·m	30	15	•	ı
EC12D1564404		17.5	10±5mN·m	30	15	•	

Note

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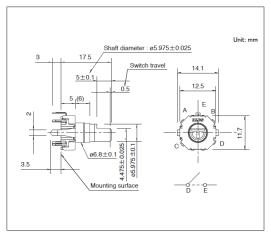
■ Packing Specifications

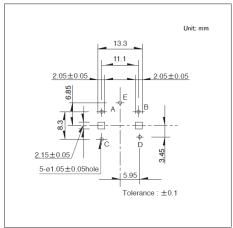
Tray

Number of pa	ckages(pcs.)	Export package measurements
1 case / Japan	1 case / export packing	(mm)
1,280	2,560	540 x 360 x 290

Drawing No.1

■ Dimensions





Viewed from mounting face.

EC18A Series

Absolute type with high water resistance and heavy torque.



Ratings: 1mA 10V DCOperating life: 30,000 cycles

Applications: Home: Major home appliances

■ Product List

=1 Toddot Elot					
Products No.	Actuator length (mm)	Detent torque	Positions	Automotive	Drawing No.
EC18AGA20402	30.72	60±20mN·m	12	_	1
EC18AGB20407	32.56	60±20mN·m	15	_	2
EC18AGB20401	38.06	60±20mN·m	16	_	3

⚠Note

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- 2. Please place purchase orders per minimum order unit (integer).

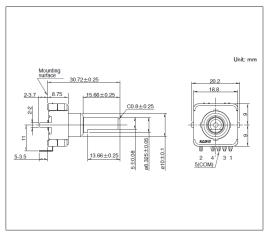
■ Packing Specifications

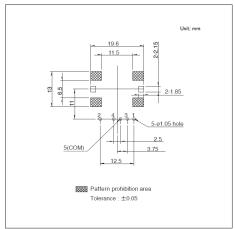
Tray

Number of pa	ckages(pcs.)	Export package measurements
1 case / Japan	1 case / export packing	(mm)
450	900	540 x 360 x 270

Drawing No.1

■ Dimensions



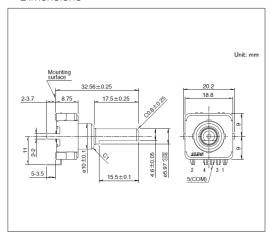


Viewed from mounting face.

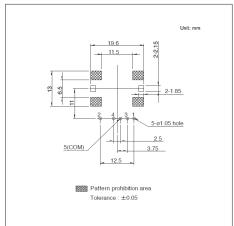
EC18A Series

Drawing No.2

■ Dimensions



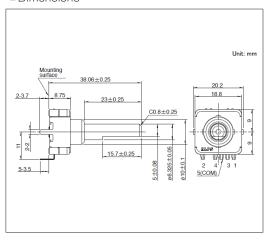
■ Mounting Hole Dimensions

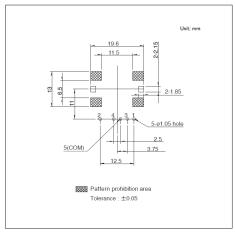


Viewed from mounting face.

Drawing No.3

■ Dimensions





Viewed from mounting face.

EC18A / 18mm Size Insulated Shaft Type

■ Standard Codes

EC18AGA

Positi	on No.	1	2	3	4	5	6	7	8	9	10	11	12
Rotation angle (°)		0	30	60	90	120	150	180	210	240	270	300	330
	1		•	•			•	•			•	•	
Š	2			•	•	•	•						
TERMINAL	3					•	•	•	•	•	•		
TER	4									•	•	•	•
	5 (COM)	•	•	•	•	•	•	•	•	•	•	•	•

EC18AGB20407

LOTOAODZO-	+07															
Positi	on No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Rotation	angle (°)	0	24	48	72	96	120	144	168	192	216	240	264	288	312	336
	1	•	•			•	•			•	•			•	•	
Ö	2		•	•	•	•					•	•	•	•		
TERMINAL	3				•	•	•	•	•	•	•	•				
TER	4								•	•	•	•	•	•	•	•
	5 (COM)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

EC18AGB20401

Position	on No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Rotation	angle (°)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
	1		•	•			•	•			•	•			•	•	
Ö.	2			•	•	•	•					•	•	•	•		
TERMINAL	3					•	•	•	•	•	•	•	•				
TER	4									•	•	•	•	•	•	•	•
	5 (COM)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

^{1.} The
marks shows the ON position.

■ Water-proof Property

Immersion of encoder, not in operation, in water at depth of 1m at normal temperature for 30 minutes.

^{2.} The • marks:Connections between terminals and the 5(COM)are ON.

Through shaft Encoder

List of Varieties

5	Series	EC05E	EC10E
	Photo		Post P
Dir	nensions	5mm size	10mm size
(Dutput	Incremental (Two	phase A and B)
Numb	er of detent	12	12 24
Numb	per of pulse	1.	2
Operating t	emperature range	-30℃ to +85℃	-5℃ to +45℃ -40℃ to +85℃
Ope	rating life	100,000	O cycles
	Ratings	0.55mA 5.5V DC	1mA 5V DC
Electrical performance	Max./min. operating current (Resistive load)	0.55mA/-	-
periormance	Insulation resistance	50MΩ mir	n. 50V DC
	Voltage proof	50V AC fo	or 1 minute
Mechanical performance	Detent torque	1.6±1.3mN·m	_
Au	tomotive	_	•



• Indicates applicability to all products in the series, while () indicates applicability to some products in the series.

ECO5E Series

Compact design featuring Drum Cord™ technology.



Output signal:Two phase A and BRatings:0.55mA 5.5V DC

Operating life: 100,000 cycles

Applications: Mobile: Headsets, wearables, Notebooks, peripherals

Energy_Industrial:Robots, drones

Game: Home handheld consoles, Virtual/augmented reality Healthcare: Healthcare equipment, Nursing care equipment,

Analysis, test equipment

■ Product List

Products No.	Control part orientation	Detent torque	Mount height	Number of detent	Number of pulse	Automotive	Drawing No.
EC05E1220202	Horizontal	1.6±1.3mN·m	4.5mm	12	12	_	1
EC05E1220203	Horizontal	1.6±1.3mN·m	4.5mm	12	12	_	2
EC05E1220401	Vertical	1.6±1.3mN·m	_	12	12	_	3

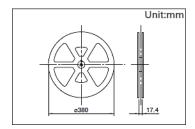
⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
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■ Packing Specifications

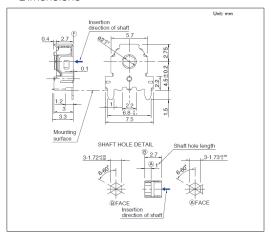
Taping

	Numb	per of packages	(pcs.)	Tape width	Export package
Products No.	1 reel	1 case / Japan	1 case / export packing	(mm)	measurements (mm)
EC05E1220202 EC05E1220203	1,000	4,000	8,000	16	485 x 410 x 246
EC05E1220401	2,000	8,000	16,000	16	485 x 410 x 246

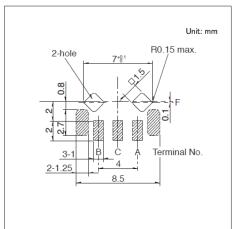


Drawing No.1

Dimensions



■ Mounting Hole and Land Dimensions

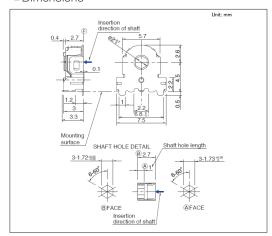


Viewed from mounting side, shaded area indicated soldering land.

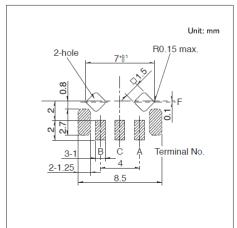
EC05E Series

Drawing No.2

■ Dimensions



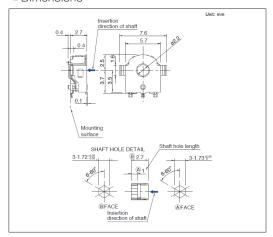
■ Mounting Hole and Land Dimensions



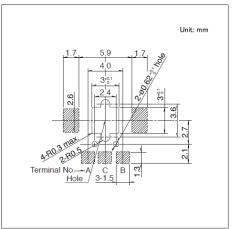
Viewed from mounting side, shaded area indicated soldering land.

Drawing No.3

■ Dimensions



■ Mounting Hole and Land Dimensions



Viewed from mounting side, shaded area indicated soldering land.

EC10E Series

Unique through-shaft design achieving miniaturization and long life.





Output signal: Two phase A and B

■ Ratings: 1 mA 5V DC

Operating life: 100,000 cycles

Applications: Mobile: Notebooks, peripherals

Energy_Industrial:Robots, drones Game:Home handheld consoles

Automotive: Navigation/audio systems, HVAC, Steering

■ Product List

Products No.	Control part orientation	Detent torque	Mount height	Number of detent	Number of pulse	Automotive	Drawing No.
EC10E1220505	Horizontal	5±3mN·m	7.0mm	24	12	•	1
EC10E1220501	Horizontal	5±3mN·m	9.0mm	24	12	•	2
EC10E1220503	Horizontal	5±3mN·m	1 1.0mm	24	12	•	3
EC10E1260502	Horizontal	6±3mN·m	7.0mm	12	12	•	4
EC10E1260507	Horizontal	6±3mN·m	11.0mm	24	12	•	5

⚠Note

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- 2. Please place purchase orders per minimum order unit (integer).
- 3. Please contact us for automotive use products.

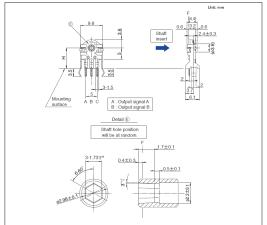
■ Packing Specifications

Bulk

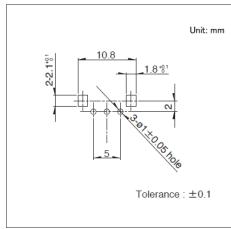
Number of pa	Export package measurements	
1 case / Japan	1 case / export packing	(mm)
3,200	3,200	374 x 254 x 166

Drawing No.1

Dimensions



Mount height H = 7mm

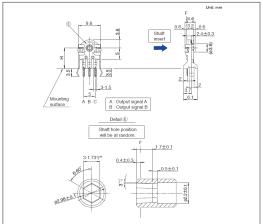


Viewed from mounting side

EC10E Series

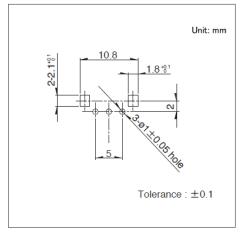
Drawing No.2

■ Dimensions



Mount height H = 9mm

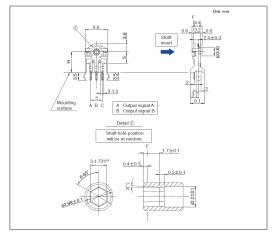
■ Mounting Hole Dimensions



Viewed from mounting side

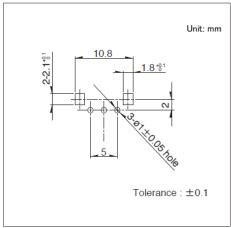
Drawing No.3

■ Dimensions



Mount height H = 11mm

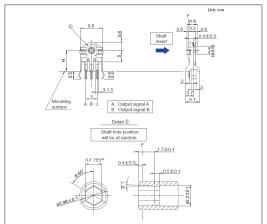
■ Mounting Hole Dimensions



Viewed from mounting side

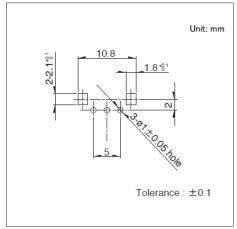
Drawing No.4

■ Dimensions



Mount height H = 7 mm

■ Mounting Hole Dimensions

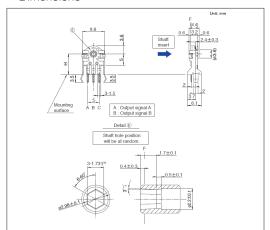


Viewed from mounting side

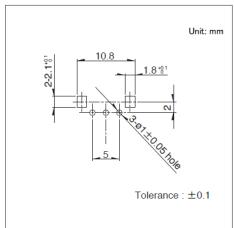
10mm Size Hollow Shaft Type **EC10E Series**

Drawing No.5

Dimensions



Mount height H = 11mm



Viewed from mounting side

Ring Encoder

List of Varieties

	Series		EC21A/EC21C	EC28A/EC28C	EC35A	EC35AH/ EC35CH	EC40A	EC50A	
	Photo								
Dir	mensions	S	21mm size	28mm size	35mr	n size	40mm size	50mm size	
	Output		Incren	nental (Two phase A a	and B)	Incremental (Three phase A, B and C)	Incremental (Two	phase A and B)	
Det	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 22±11mN·m (Initial) 16±7mN·m (After reflow)	18±7mN·m 22±8mN·m 30±15mN·m	12±5mN·m 18±7mN·m 22±11mN·m (Initial) 18±7mN·m (After reflow) 30±15mN·m	20±11mN·m 40±16mN·m	40±14mN·m	
Numb	er of det	ent			8 0		30	18	
Num	ber of pu	lse	9 15	15 18	9 15	6 10	15	9	
Operating temperature range			-40℃ to +85℃	-40℃ to +85℃ -40℃ to +90℃	-40°C to +85°C	-40℃ to +85℃ -40℃ to +90℃	-40℃ to +85℃		
Оре	erating lif	e		50,000 cycles			30,000 cycles	40,000 cycles	
	Rati	ings		10mA	5V DC		0.5mA 5V DC 1mA 5V D		
	operating	/min. g current ve load)		10mA/1mA			_		
Electrical performance		ation tance		100MΩ min. 250V DC			10MΩ min. 50V DC	10MΩ min. 250V DC	
	Voltage proof			te or 360V AC for 1s te or 360V AC for 2s	300V AC for 1 minute or 360V AC for 2s	300V AC for 1 minute or 360V AC for 1s 300V AC for 1 minute or 360V AC for 2s	50V AC for 1 minute	50V AC for 1 minute or 60V AC for 2s	
Mechanical	Actuator	Pushing direction		100N					
performance			100N			50N			
AL	itomotive)	•	•	•	•	•	•	

Note

• Indicates applicability to all products in the series, while \bigcirc indicates applicability to some products in the series.

21mm Size Ring Type EC21A/EC21C Series

Hollow type suited for multifunctionality, offering a thin 4.0mm thickness for space savings.







Output signal: Two phase A and B

■ Ratings: 10mA 5V DC

Operating life: 50,000 cycles

Applications: Home: Major home appliances, Office equipment

Audio_TV:Visual

Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Actuator length (mm)	Detent torque	Number of detent	Number of pulse	Automotive	Drawing No.
EC21A1540401	9.0	7±5mN·m	30	15	•	1
EC21A1520401	9.0	16±7mN·m	30	15	•	1
EC21A0920401	9.0	16±7mN·m	18	9	•	2
EC21A1520407	15.0	16±7mN·m	30	15	•	3
EC21A0950402	15.0	12±5mN·m	18	9	•	4
EC21C1520402	12.0	17±8mN·m (Initial) 12(+7, -4)mN·m (After reflow)	30	15	•	5

⚠Note

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■ Packing Specifications

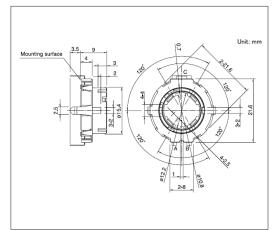
Tray

Products No.	Number of pa	ckages(pcs.)	Export package measurements
Floudets No.	1 case / Japan	1 case / export packing	(mm)
EC21A1540401 EC21A1520401	600	1,200	508 x 364 x 192
EC21A0920401	240	480	375 x 285 x 223
EC21A1520407 EC21A0950402	600	1,200	540 x 360 x 290
EC21C1520402	640	640	400 x 310 x 185

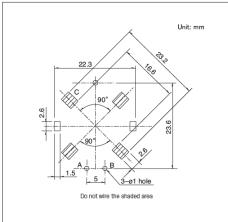
21mm Size Ring Type EC21A/EC21C Series

Drawing No.1

■ Dimensions



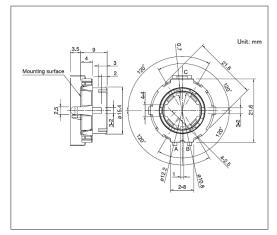
■ Mounting Hole Dimensions



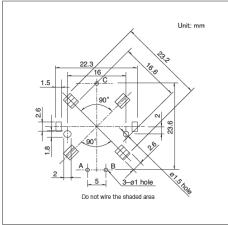
Viewed from mounting side

Drawing No.2

■ Dimensions



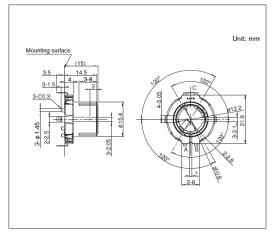
■ Mounting Hole Dimensions

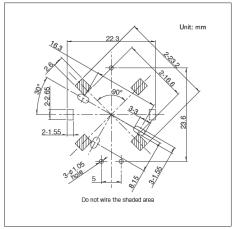


Viewed from mounting side

Drawing No.3

■ Dimensions



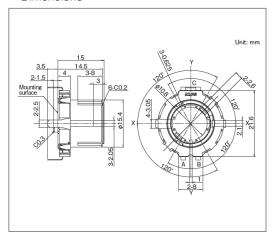


Viewed from mounting side

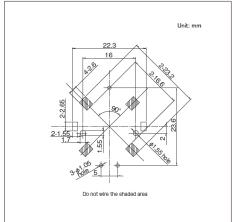
21mm Size Ring Type EC21A/EC21C Series

Drawing No.4

Dimensions



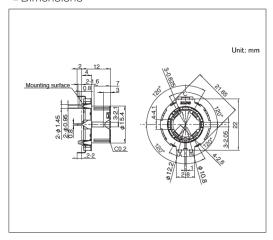
■ Mounting Hole Dimensions



Viewed from mounting side

Drawing No.5

■ Dimensions



28mm Size Ring Type

EC28A/EC28C Series

Thin-profile design with a 4.0mm body thickness and excellent operation feel.





Output signal: Two phase A and B

■ Ratings: 10mA 5V DC

■ Operating life: 50,000 cycles

Applications: Home: Major home appliances, Office equipment

Audio_TV:Visual

Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Actuator length (mm)	Detent torque	Number of detent	Number of pulse	Automotive	Drawing No.
EC28A1520401	15.0	7±5mN·m	30	15	•	
EC28A1550401	15.0	12±7mN·m	30	15	•	
EC28A1560401	15.0	20±10mN·m	30	15	•	1
EC28A1850402	15.0	12±7mN·m	18	18	•	
EC28A1870401	15.0	20±10mN·m	18	18	•	
EC28A1560501	25.0	20±10mN·m	30	15	•	2
EC28C1540403	15.0	22±11mN·m (Initial) 16±7mN·m (After reflow)	30	15	•	3

⚠Note

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■ Packing Specifications

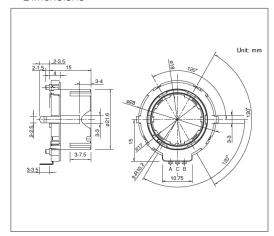
Tray

Products No.	Number of pa	ackages(pcs.)	Export package measurements
Flouucts No.	1 case / Japan	1 case / export packing	(mm)
EC28A1520401 EC28A1550401 EC28A1560401 EC28A1850402 EC28A1870401	400	800	509 x 366 x 287
EC28A1560501	420	840	540 x 360 x 380
EC28C1540403	480	480	440 x 290 x 205

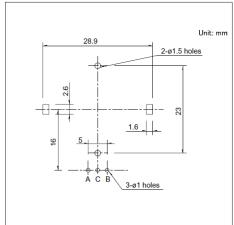
28mm Size Ring Type EC28A/EC28C Series

Drawing No.1

■ Dimensions



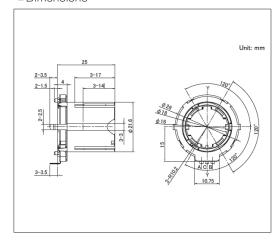
■ Mounting Hole Dimensions



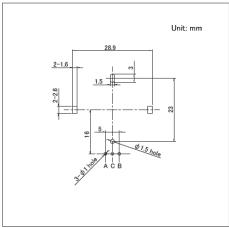
Viewed from mounting side

Drawing No.2

■ Dimensions



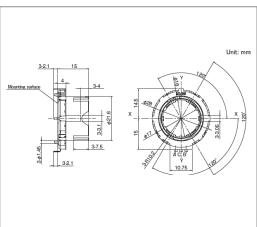
■ Mounting Hole Dimensions



Viewed from mounting side

Drawing No.3

■ Dimensions



35mm Size Ring Type **EC35A Series**

Thin-profile design with a 4.5mm body thickness and excellent operation feel.





Output signal: Two phase A and B

■ Ratings: 10mA 5V DC

Operating life: 50,000 cycles

Applications: Home: Office equipment

Audio_TV:Visual

Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Actuator length (mm)	Detent torque	Number of detent	Number of pulse	Automotive	Drawing No.
EC35A1520402	20.0	18±7mN·m	30	15	•	1
EC35A0930401	20.0	22±8mN·m	18	9	•	2
EC35A1550502	25.0	30±15mN·m	30	15	•	3

⚠Note

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- 2. Please place purchase orders per minimum order unit (integer).

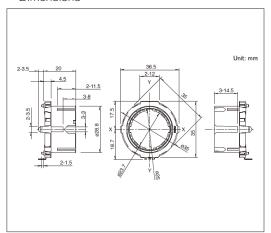
■ Packing Specifications

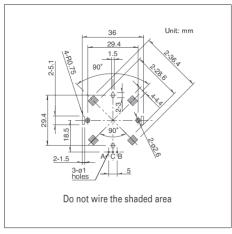
Tray

Products No.	Number of pa	ackages(pcs.)	Export package measurements
Floudota No.	1 case / Japan	1 case / export packing	(mm)
EC35A1520402 EC35A0930401	420	840	540 x 360 x 380
EC35A1550502	350	700	540 x 360 x 380

Drawing No.1

■ Dimensions



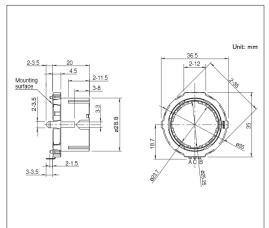


Viewed from mounting side

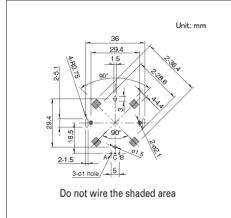
35mm Size Ring Type **EC35A Series**

Drawing No.2

■ Dimensions



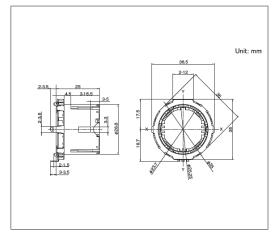
■ Mounting Hole Dimensions

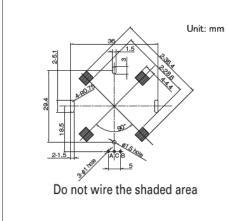


Viewed from mounting side

Drawing No.3

■ Dimensions





Viewed from mounting side

Encoders Ring Encoder

35mm Size ABC Switch Type

EC35AH/EC35CH Series

Hollow-shaft encoder capable of three-phase output for composite applications.







Output signal: Three phase A, B and C

■ Ratings: 10mA 5V DC

■ Operating life: 50,000 cycles

Applications: Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Actuator length (mm)	Detent torque	Number of detent	Number of pulse	Automotive	Drawing No.
EC35AH240403	15.0	12±5mN·m	30	10	•	
EC35AH220403	15.0	18±7mN·m	30	10	•	1
EC35AH260403	15.0	30±15mN·m	30	10	•	
EC35AH240502	25.0	12±5mN·m	30	10	•	
EC35AH220502	25.0	18±7mN·m	30	10	•	2
EC35AH260502	25.0	30±15mN·m	30	10	•	
EC35AH120401	15.0	18±7mN·m	18	6	•	3
EC35CH120401	14.9	22±11mN·m (Initial) 18±7mN·m (After reflow)	18	6	•	4

⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders per minimum order unit (integer).

■ Packing Specifications

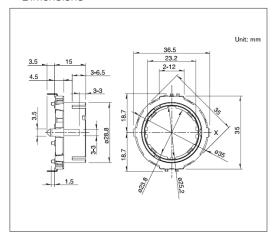
Tray

Products No.	Number of pa	ackages(pcs.)	Export package measurements
Flouucts No.	1 case / Japan	1 case / export packing	(mm)
EC35AH240403 EC35AH220403 EC35AH260403 EC35AH120401	800	800	540 x 360 x 290
EC35AH240502 EC35AH220502 EC35AH260502	350	700	540 x 360 x 380
EC35CH120401	384	384	440 x 290 x 205

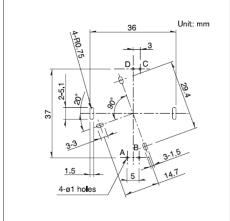
35mm Size ABC Switch Type EC35AH/EC35CH Series

Drawing No.1

■ Dimensions



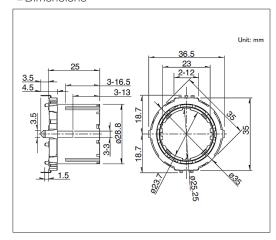
■ Mounting Hole Dimensions



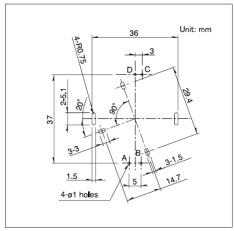
Viewed from mounting side

Drawing No.2

■ Dimensions



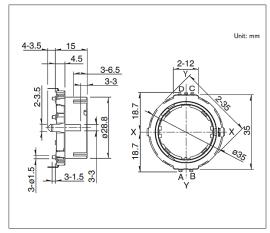
■ Mounting Hole Dimensions

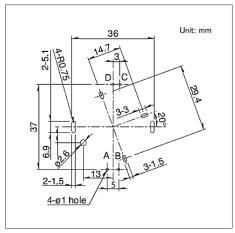


Viewed from mounting side

Drawing No.3

■ Dimensions



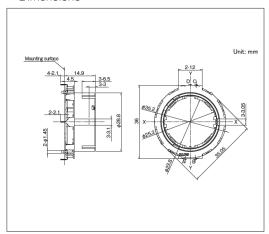


Viewed from mounting side

35mm Size ABC Switch Type EC35AH/EC35CH Series

Drawing No.4

■ Dimensions



40mm Size Ring Type **EC40A Series**

Delivers excellent operation feel with minimized shaft play.





Output signal: Two phase A and B

■ Ratings: 0.5mA 5V DC

Operating life: 30,000 cycles

Applications: Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Actuator length (mm)	Detent torque	Number of detent	Number of pulse	Automotive	Drawing No.
EC40A1520403	22.0	20±11mN·m	30	15	•	1
EC40A1520405	22.0	40±16mN·m	30	15	•	

⚠Note

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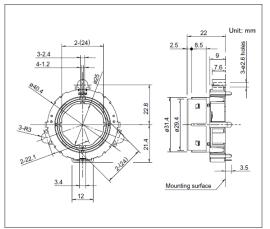
■ Packing Specifications

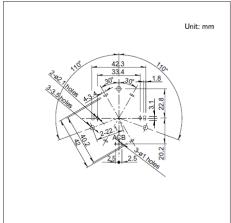
Tray

Number of pa	Export package measurements	
1 case / Japan	1 case / export packing	(mm)
200	400	540 x 360 x 380

Drawing No.1

■ Dimensions





Viewed from mounting side

50mm Size Ring Type **EC50A Series**

Large design with an inner diameter of ϕ 37mm, capable of housing a small LCD.





Output signal: Two phase A and B

■ Ratings: 1mA 5V DC

■ Operating life: 40,000 cycles

Applications: Automotive: Navigation/audio systems, HVAC

■ Product List

Products No.	Actuator length (mm)	Detent torque	Number of detent	Number of pulse	Automotive	Drawing No.
EC50A0920404	14.5	40±14mN·m	18	9	•	1

⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders per minimum order unit (integer).

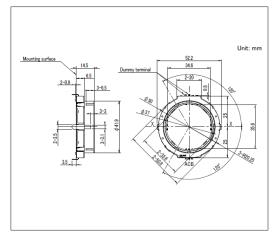
■ Packing Specifications

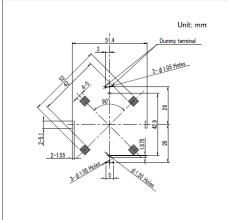
Tray

Number of pa	Export package measurements		
1 case / Japan	1 case / export packing	(mm)	
200	400	540 x 360 x 290	

Drawing No.1

Dimensions





Viewed from mounting side Wiring prohibited on hatched area

Encoders / Soldering Conditions

■ Reference for Manual Soldering

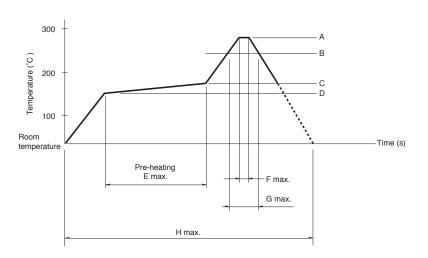
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11E, EC11M, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC40A, EC50A, EC21C, EC28C, EC35CH	350℃ max.	3s max.	1 time

■ Reference for Dip Soldering

Series	Prehe	ating	Dip soldering		No. of solders	
Series	Soldering surfacetemperature	Heating time	Soldering temperature	Soldering time	No. or solders	
EC09E, EC111, EC11E, EC11M, EC18A, EC21A, EC28A, EC35A, EC35AH, EC50A	100°C max.	2 min. max.	260±5℃	5±ls	2 times max.	
EC10E, EC12D, EC12E	100°C max.	1 min. max.	260±5℃	3±1s	2 times max.	
EC40A	110℃ max.	1 min. max.	260℃ max.	10s max.	1 time	

■ Example of Reflow Soldering Condition

Temperature profile



Series	А	В	С	D	Е	F	G	н	No. of reflows
EC05E	250℃ min.	230°C 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.

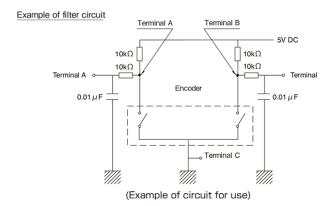


- 1. When using an infrared reflow oven, solder may sometimes not be applied. Be sure to use a hot air reflow oven or a type that uses infrared rays in combination with hot air.
- 2. The temperatures given above are the maximum temperatures at the terminals of the encoder when employing a hot air reflow 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.

Encoders / Cautions

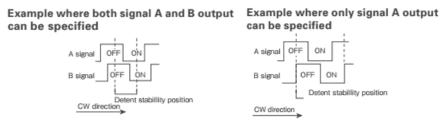
Pulse count process

With respect to pulse count design of encoders, operational speed, sampling time, and masking time, etc. should be taken into consideration. Be sure to confirm these factors before using the encoder. For your pulse count design, consider adding C/R filters on your circuit as shown below.



Output Specifications

Depending on the product, output at encoder detent positions can be specified either for both signals A and B, or for signal A only. Specifications vary according to the number of detents and other factors.



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Dew Condensation

Do not use this product where dew or water drops might occur on the pattern surface of the encoder, etc. Insulation deterioration or shorting may occur.

Usage Environment

Use of the encoders in a dusty environment may lead the dusts entering through the openings and cause imperfect contact or malfunction. Take this into account for set design. Corrosive gas if generated by peripheral parts of a set, malfunction such as imperfect contact may occur. Thorough investigation shall be required before hand.

Operation

The encoders will be break if you apply a greater stress than that specified. Take great care not to let the encoders be subject to greater stress than specified.

Looseness of the Shaft

When long shafts are being employed, the looseness (deviation) tends to grow in proportion to the shaft length. Checking shaft looseness under actual operational conditions is recommended.

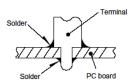
Installation

Insert these encoders to the specified mounting surface and mount them horizontally. If not mounted horizontally, these encoders will malfunction. Tighten the mounting screws by applying the specified torque. Tightening with larger torque than the specified one will result in malfunction or breakage of screws. Protect small and thin encoders from external forces in the set mounting process.

Encoders / Cautions

Soldering

 To avoid potential contact issues, please do not solder wires to the top surface of the printed circuit board as shown in the diagram.
 Solder all metal lugs into a substrate before use.



- 2. Appling load to terminals during soldering under certain conditions may cause deformation and electrical property degradation.
- 3. Avoid use of water-soluble soldering flux, since it may corrode the switches.
- 4. Check and conform to soldering requirements under actual mass production conditions.
- 5. When soldering twice, wait until the first soldered portion cools to normal temperature. Continuous heating will deform the external portions, loosen or dislodge terminals, or may deteriorate their electrical characteristics.
- 6. Flux from around and above the PC board should not adhere to the switches.
- 7. After mounting the switches, if you intend to put the board into an oven in order to harden adhesive for other parts, please consult with Alps Alpine.
- 8. If you use a through-hole PC board or a PC board thinner or thicker than the recommendation, here may be greater heat stress. Verify the soldering conditions thoroughly before use.
- 9. Solder the switches with detent at the detent position. Soldering switches fixed at the center of the detent may deform the detent mechanisms.
- 10. No washing.

Use of Chemicals

Since synthetic resins such as polycarbonate are being used as the material for the insulated type shafts, avoid using this product under gassy environments containing such chemicals as ammonia, amines, alkaline water solutions, aromatic hydrocarbons, ketones, esters and halogenated hydrocarbons, especially under intensive gas environments.

Operation at Low Temperature

When these products are expected to be used under low temperature environments such as applications for car radios and car stereos, we can customize them for easier and more smooth rotary movements. When placing orders, indicate whether the low temperature specification is necessary or not.

Storage

- 1. Store the products as delivered, at a normal temperature and humidity, without direct sunshine and corrosive gas ambient. Use them at an earliest possible timing, not later than six months upon receipt.
- 2. After breaking the seal, keep the products in a plastic bag to shut out ambient air, store them in the same environment as above, and use them up as soon as possible.
- 3. Do not stack too many switches.