





Encoders

- Metal shaft Encoder ————— 2
- Insulated shaft Encoder ————— 11
- Through shaft Encoder ————— 20
- Ring Encoder ————— 26

Encoders

Metal shaft Encoder

List of Varieties

Series		EC09E	EC111	EC11E	EC11M
Photo					
Dimensions		9mm size	11mm size		
Output		Incremental (Two phase A and B)	Self-return switch	Incremental (Two phase A and B)	
Actuator configuration		Flat			Serrated
Number of detent		30	Without	18 30 36	30 Without
Number of pulse		15	Self-return switch	9 15 18	15
Operating temperature range		-40°C to +85°C			
Operating life		15,000 cycles			
Electrical performance	Ratings	10mA 5V DC			
	Max./min. operating current (Resistive load)	10mA/1mA			
	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		
Mechanical performance	Rotational torque	—	3 ~ 30mN·m	—	8.5±5mN·m
	Detent torque	8±5mN·m	—	10±7mN·m	12±7mN·m
	Push-pull strength	100N			
Push-on switch specifications	Contact arrangement	Single pole single throw (Push-on)			
	Travel (mm)	0.5±0.3 1.5±0.5			1.5±0.35
	Operating force (N)	4±2 6(+2.5, -2)			5±2
	Rating	10mA 5V DC (1mA 5V DC min. ratings)	0.1A 5V DC (500μA 5V DC min. ratings)		
	Contact resistance (Initial performance/ After lifetime)	100mΩ max./200mΩ max.			
	Operating life (times)	10,000	20,000		
Automotive		●	●	●	●

 Note

● Indicates applicability to all products in the series, while ○ indicates applicability to some products in the series.

Encoders Metal shaft Encoder

9mm Size Metal Shaft Type
EC09E Series

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

Automotive



- 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

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

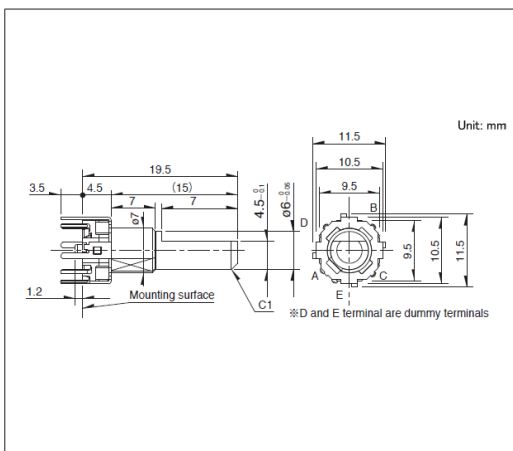
■ Packing Specifications

Tray

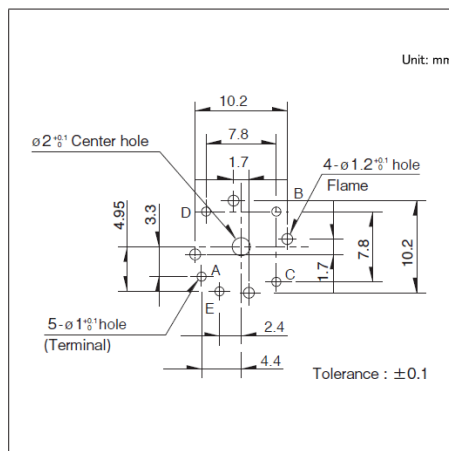
Number of packages (pcs.)		Export package measurements (mm)
1 case / Japan	1 case / export packing	
700	1,400	529 x 374 x 213

Drawing No. 1

■ Dimensions



■ Mounting Hole Dimensions

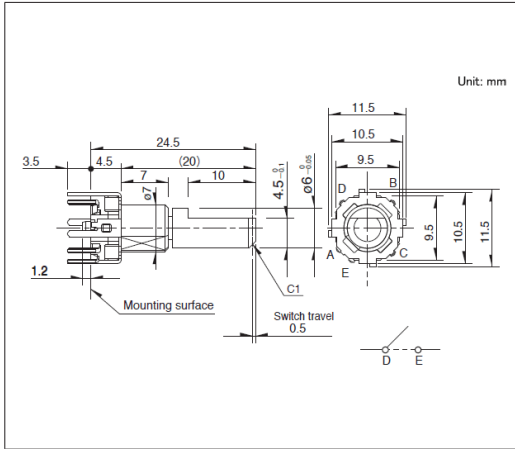


Viewed from mounting side.

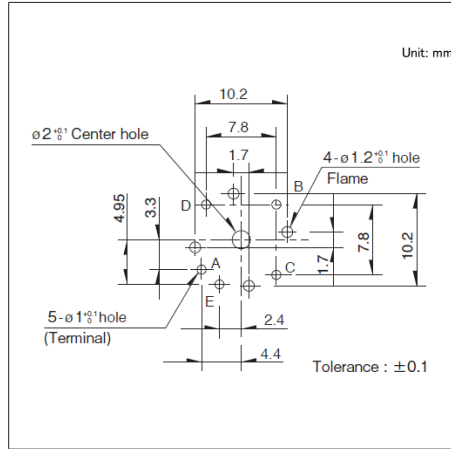
9mm Size Metal Shaft Type
EC09E Series

Drawing No.2

■ Dimensions



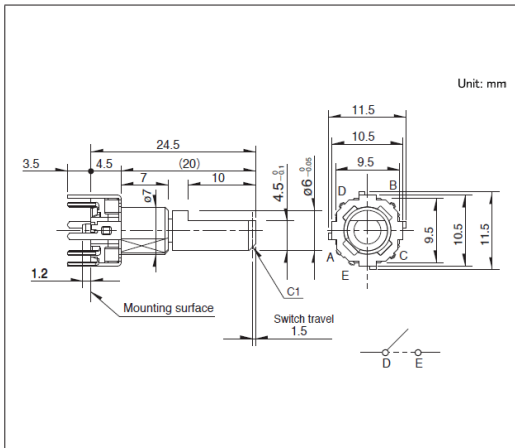
■ Mounting Hole Dimensions



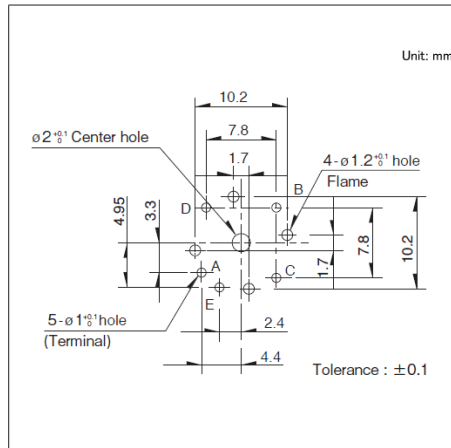
Viewed from mounting side.

Drawing No.3

■ Dimensions



■ Mounting Hole Dimensions



Viewed from mounting side.

Encoders Metal shaft Encoder

11mm Size Metal Shaft Type
EC111 Series

Compact and highly reliable with a diverse product variety.

Automotive



- 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.
EC1110120005	Vertical	Flat	15	3 ~ 30mN·m	Without	Self-return switch	Without	—	●	1
EC111012010H	Vertical	Flat	20	3 ~ 30mN·m	Without	Self-return switch	With	0.5	●	2
EC1110120201	Vertical	Flat	20	3 ~ 30mN·m	Without	Self-return switch	With	1.5	●	

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

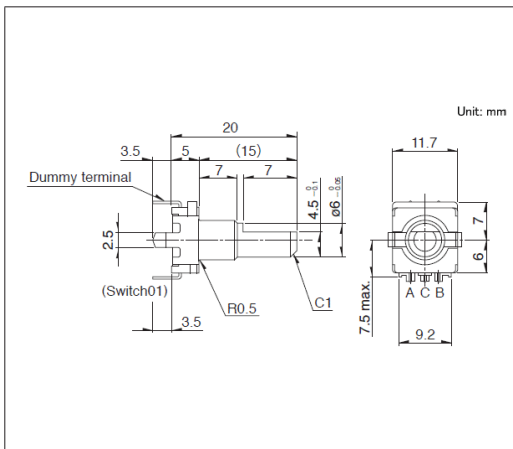
■ Packing Specifications

Tray

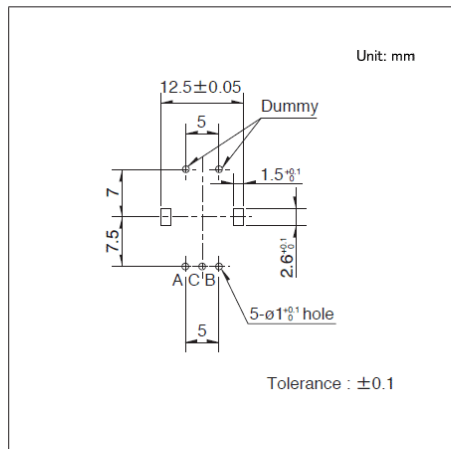
Number of packages (pcs.)		Export package measurements (mm)
1 case / Japan	1 case / export packing	
1,200	2,400	507 x 363 x 216

Drawing No.1

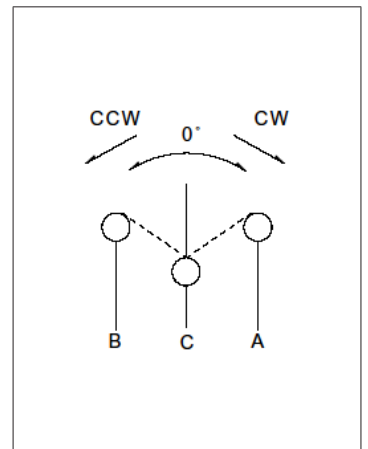
■ Dimensions



■ Mounting Hole Dimensions



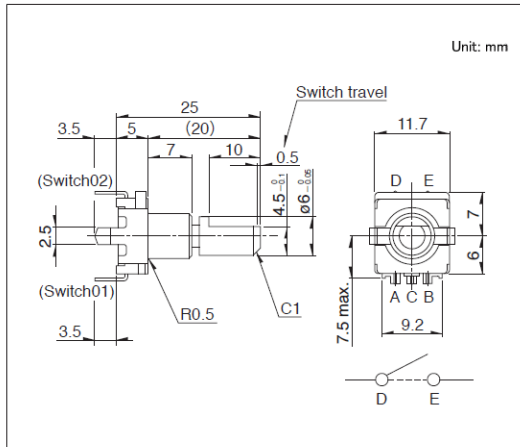
■ Circuit Diagram



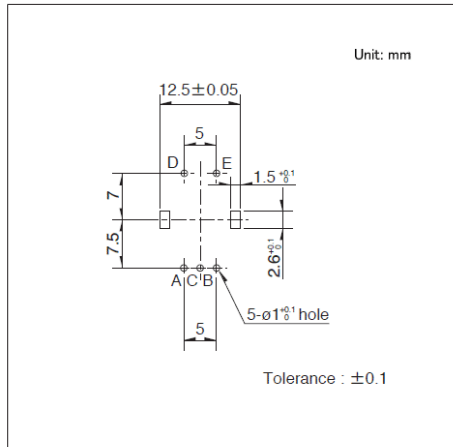
Viewed from mounting side.

Drawing No.2

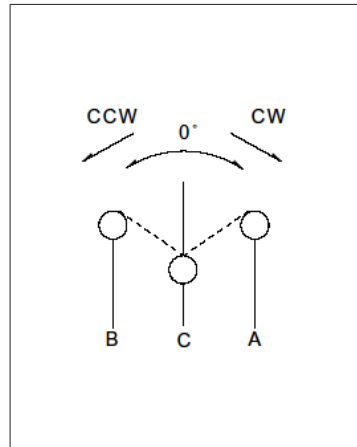
■ Dimensions



■ Mounting Hole Dimensions



■ Circuit Diagram



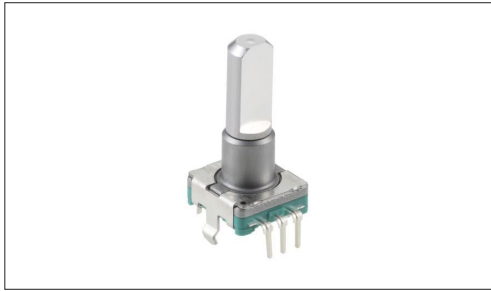
Viewed from mounting side.

Encoders

Metal shaft Encoder

11mm Size Metal Shaft Type
EC11E Series

Compact and highly reliable with a diverse product variety.


 Automotive

- 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	—	●	1
EC11E15204A3	Vertical	Flat	20	10±7mN·m	30	15	Without	—	●	
EC11E1820402	Vertical	Flat	20	10±7mN·m	36	18	Without	—	●	
EC11E09244BS	Vertical	Flat	20	10±7mN·m	18	9	With	0.5	●	2
EC11E15244G1	Vertical	Flat	20	10±7mN·m	30	15	With	0.5	●	
EC11E18244AU	Vertical	Flat	20	10±7mN·m	36	18	With	0.5	●	
EC11E09244AQ	Vertical	Flat	20	10±7mN·m	18	9	With	1.5	●	3
EC11E15244B2	Vertical	Flat	20	10±7mN·m	30	15	With	1.5	●	
EC11E18244A5	Vertical	Flat	20	10±7mN·m	36	18	With	1.5	●	

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

■ Packing Specifications

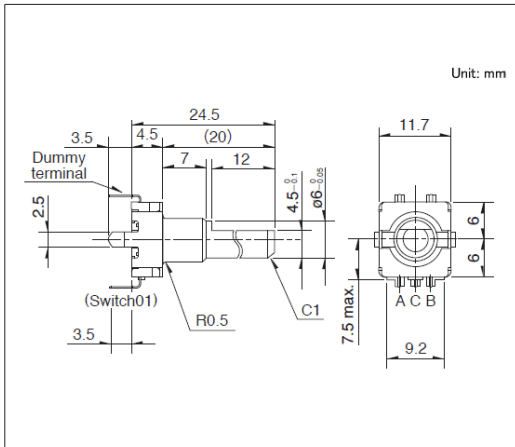
Tray

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

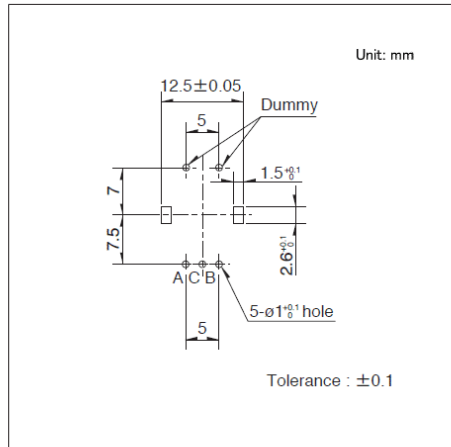
11 mm Size Metal Shaft Type
EC11E Series

Drawing No.1

■ Dimensions



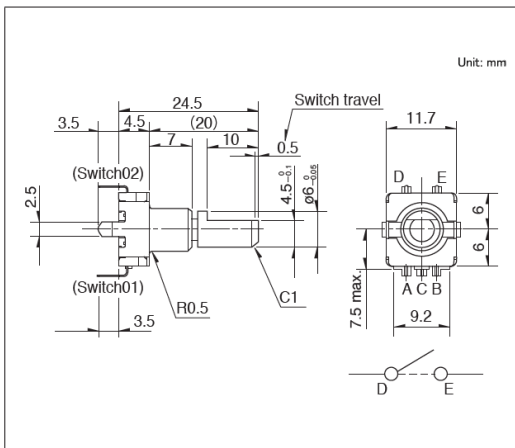
■ Mounting Hole Dimensions



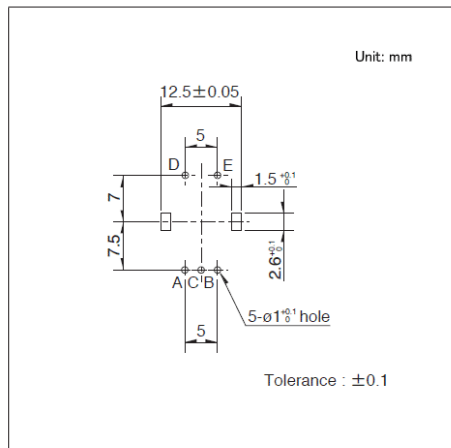
Viewed from mounting side.

Drawing No.2

■ Dimensions



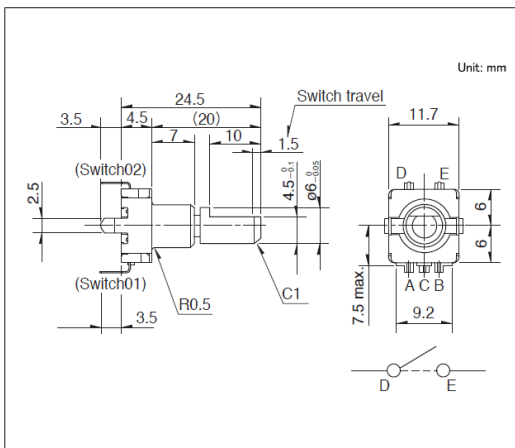
■ Mounting Hole Dimensions



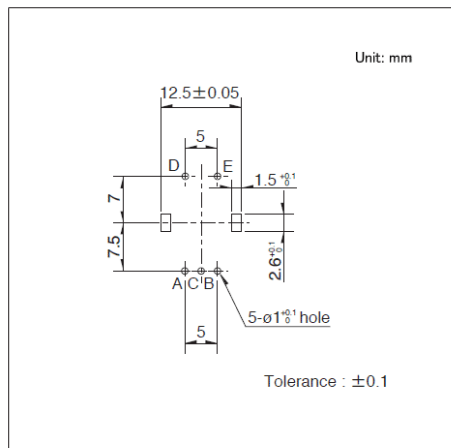
Viewed from mounting side.

Drawing No.3

■ Dimensions



■ Mounting Hole Dimensions



Viewed from mounting side.

Encoders Metal shaft Encoder

11mm Size Metal Shaft Type
EC11M Series

Compact and highly reliable with a diverse product variety.

 Automotive



- 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 torque	Detent torque	Number of detent	Number of pulse	Push-on switch	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

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

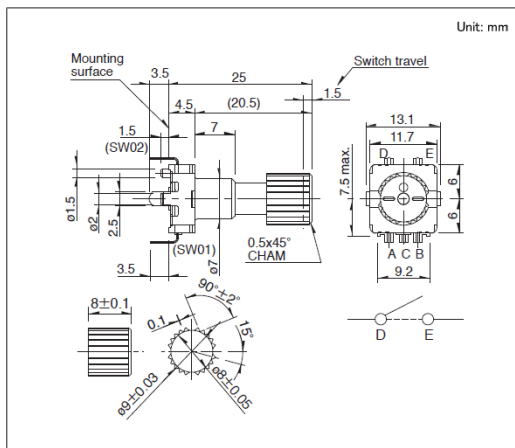
■ Packing Specifications

Tray

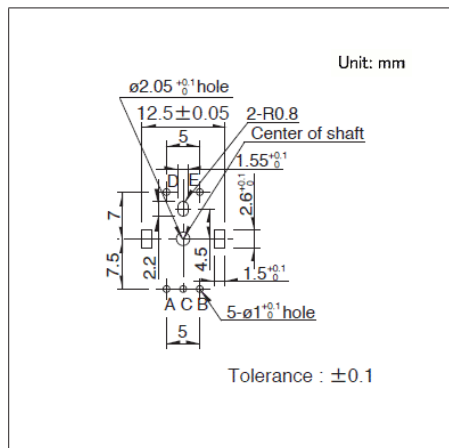
Number of packages (pcs.)		Export package measurements (mm)
1 case / Japan	1 case / export packing	
1,000	2,000	540 x 360 x 250

Drawing No.1

■ Dimensions



■ Mounting Hole Dimensions

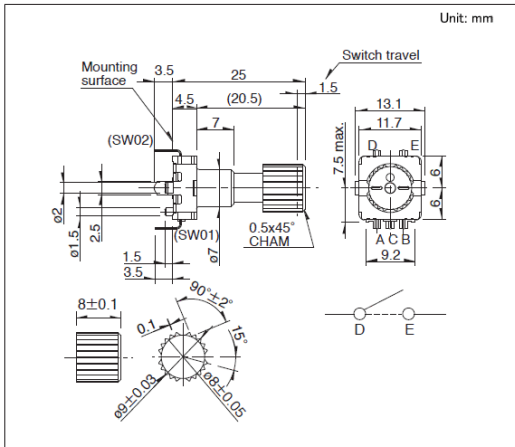


Viewed from mounting side.

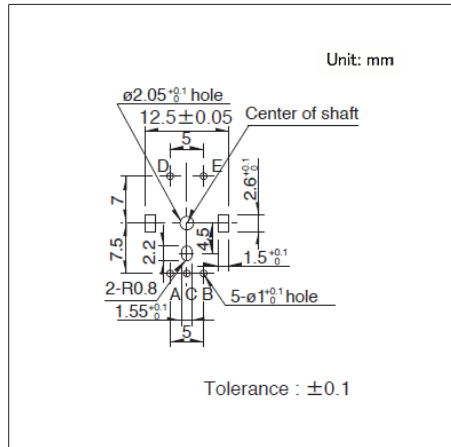
11 mm Size Metal Shaft Type
EC11M Series

Drawing No.2

■ Dimensions



■ Mounting Hole Dimensions






Viewed from mounting side.

Encoders

Insulated shaft Encoder

List of Varieties

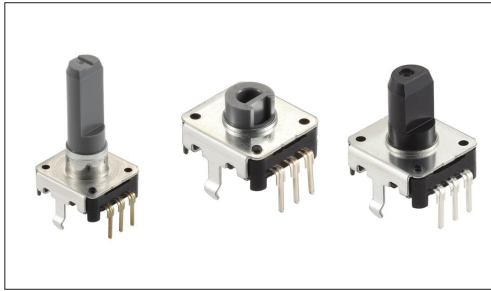
Series		EC12E	EC12D	EC18A
Photo				
Dimensions		12mm size		18mm size
Output		Incremental (Two phase A and B)		Absolute
Water-proof		—	—	●
Dust-proof		—	—	—
IP standard		—	—	IPX7 equivalent
Actuator configuration		—	—	Flat
Number of detent		12 24 Without	30	—
Detent torque		12 24	15	—
Operating temperature range		-10°C to +70°C	-40°C to +85°C	-20°C to +60°C
Operating life		30,000 cycles		
Electrical performance	Ratings	0.5mA 5V DC	1mA 5V DC	1mA 10V DC
	Max./min. operating current (Resistive load)	5mA/0.5mA	10mA/1mA	—
	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
Mechanical performance	Rotational torque	10mN·m max. 40±15mN·m	—	
	Detent torque	3 to 20mN·m 3±2mN·m	10±5mN·m 5±3mN·m	—
	Push-pull strength	80N	100N	Push 100N / Pull 50N
Push-on switch specifications	Contact arrangement	—	Single pole 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 (Initial performance/ After lifetime)	—	100mΩ max./200mΩ max.	—
	Operating life (times)	—	30,000	—
Automotive		—	●	—

 Note

● Indicates applicability to all products in the series, while ○ 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 DC
- Operating life: 30,000 cycles

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

■ Product List

Products No.	Type	Actuator length (mm)	Torque	Number of detent	Number of pulse	Automotive	Drawing No.	
EC12E1220407	Standard Type	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		15.0	Standard 3 to 20mN·m	24	24	—	1	
EC12E24204A7		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		With Bushing Type	25.0	Standard 3 to 20mN·m	12	12	—	6
EC12E2420802			20.0	Standard 3 to 20mN·m	24	24	—	7
EC12E2420801	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	—		

⚠ 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).
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.

12mm Size Insulated Shaft Type
EC12E Series

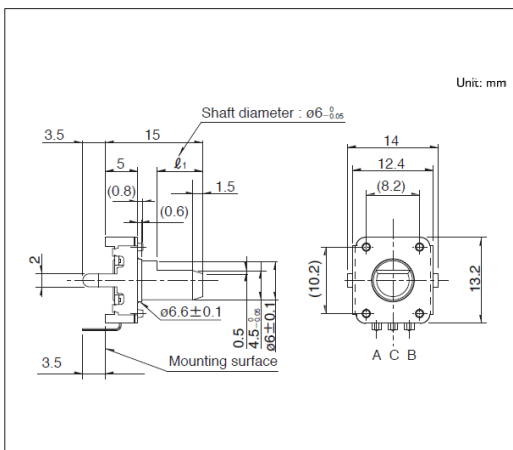
■ Packing Specifications

Tray

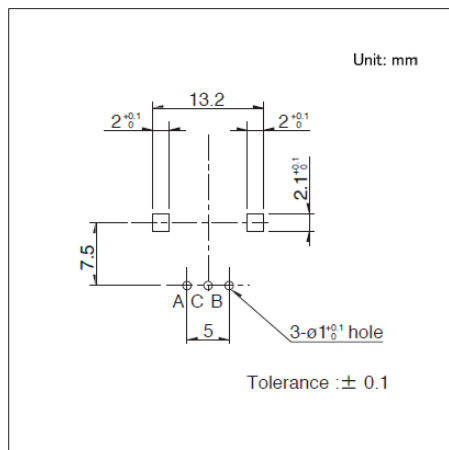
Products No.	Number of packages (pcs.)		Export package measurements (mm)
	1 case / Japan	1 case / export packing	
EC12E1220407 EC12E1220406 EC12E1220405 EC12E1240405 EC12E1240406 EC12E24204A2 EC12E24204A7 EC12E24204A8 EC12E24204A9 EC12E24404A8 EC12E24404A6 EC12E24104A6	2,400	2,400	525 x 369 x 204
EC12E1220301 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



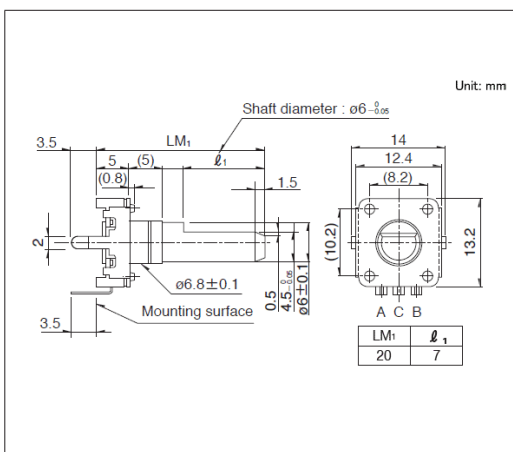
■ Mounting Hole Dimensions



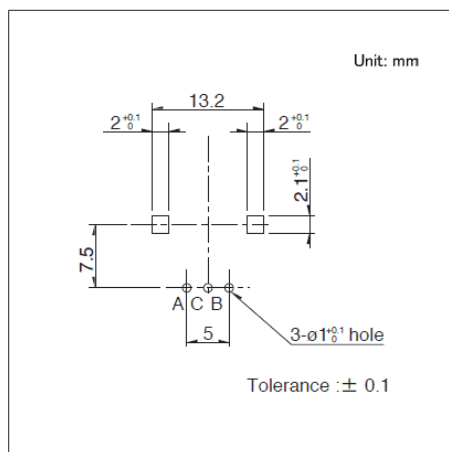
Viewed from mounting face.

Drawing No.2

■ Dimensions



■ Mounting Hole Dimensions

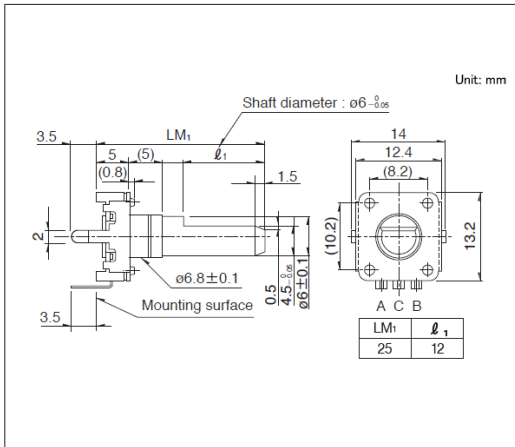


Viewed from mounting face.

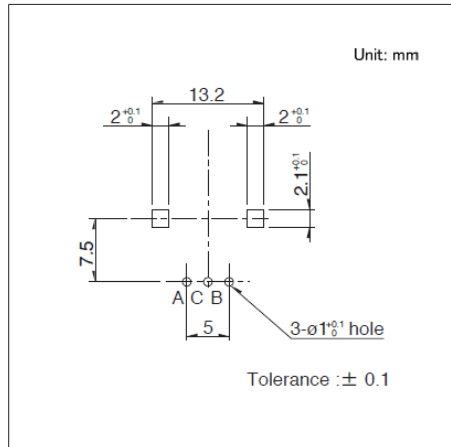
12mm Size Insulated Shaft Type
EC12E Series

Drawing No.3

■ Dimensions



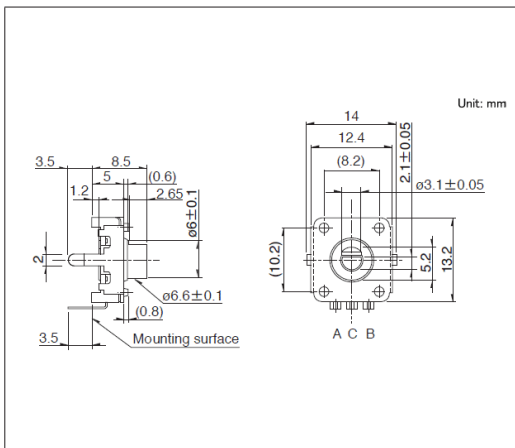
■ Mounting Hole Dimensions



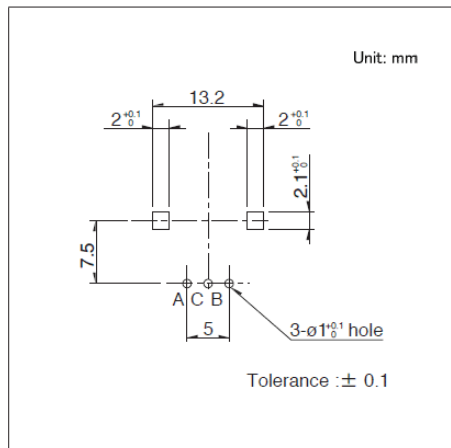
Viewed from mounting face.

Drawing No.4

■ Dimensions



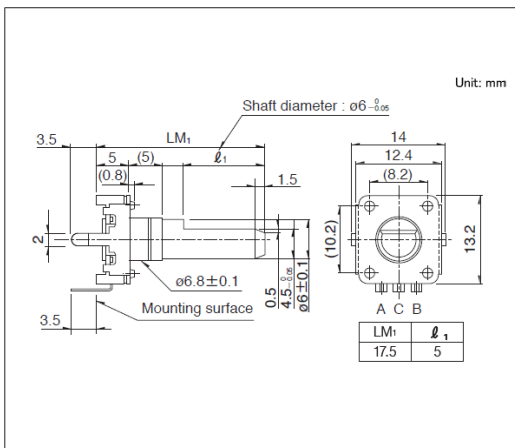
■ Mounting Hole Dimensions



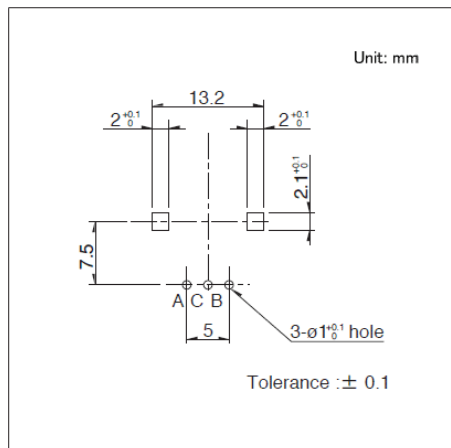
Viewed from mounting face.

Drawing No.5

■ Dimensions



■ Mounting Hole Dimensions

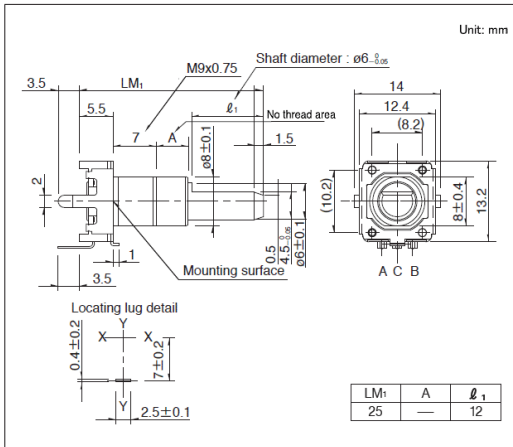


Viewed from mounting face.

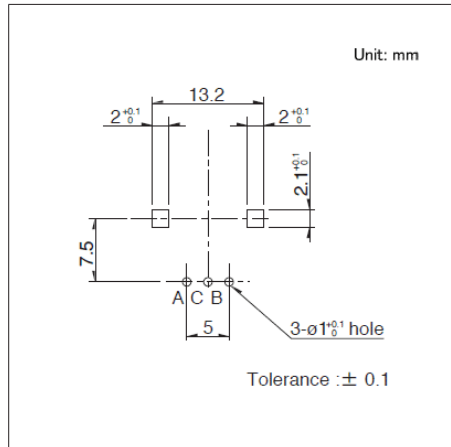
12mm Size Insulated Shaft Type
EC12E Series

Drawing No.6

■ Dimensions



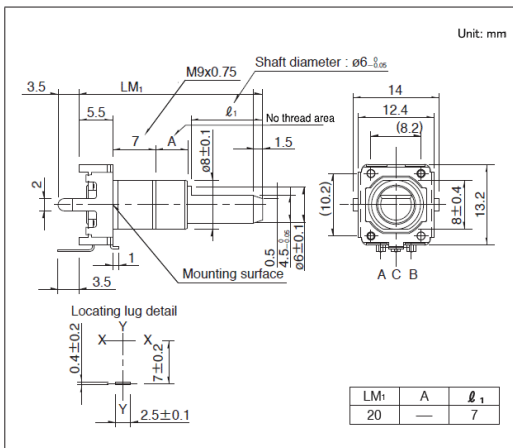
■ Mounting Hole Dimensions



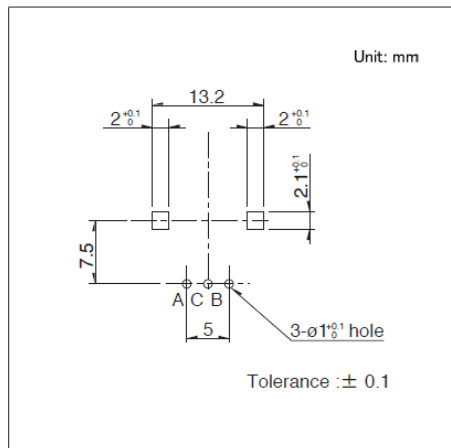
Viewed from mounting face.

Drawing No.7

■ Dimensions



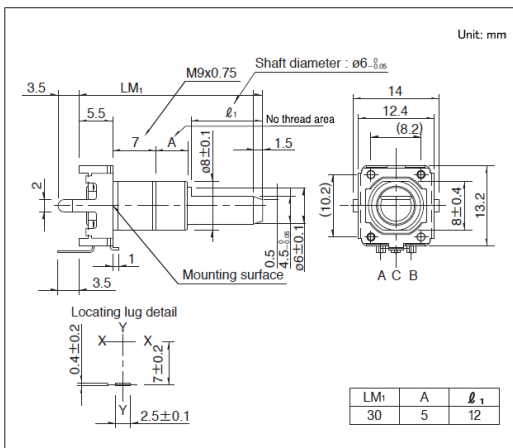
■ Mounting Hole Dimensions



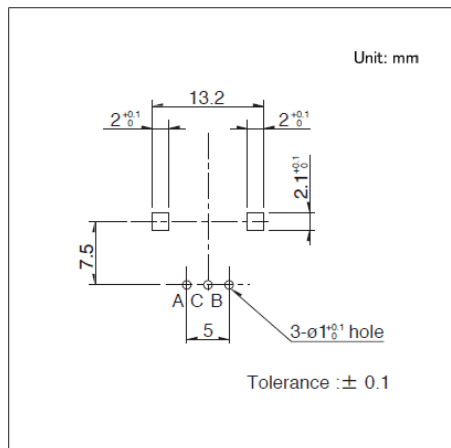
Viewed from mounting face.

Drawing No.8

■ Dimensions



■ Mounting Hole Dimensions



Viewed from mounting face.

Encoders Insulated shaft Encoder

18mm Size Insulated Shaft Type EC18A Series

Absolute type with high water resistance and heavy torque.



- Ratings: 1 mA 10V DC
- Operating life: 30,000 cycles

Applications: Home: Major home appliances

Product List

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

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).

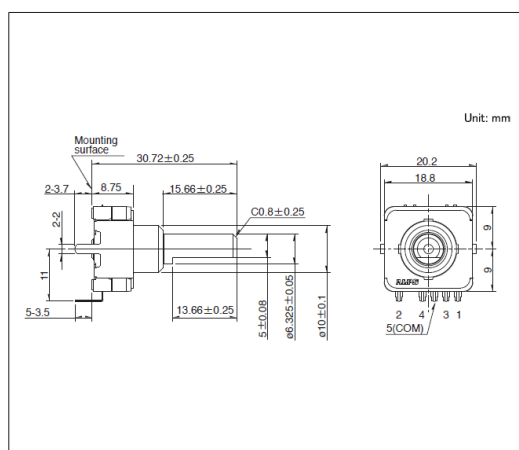
Packing Specifications

Tray

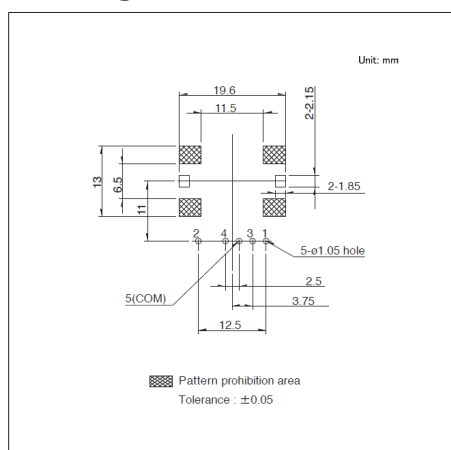
Number of packages (pcs.)		Export package measurements (mm)
1 case / Japan	1 case / export packing	
450	900	540 x 360 x 270

Drawing No.1

Dimensions



Mounting Hole Dimensions

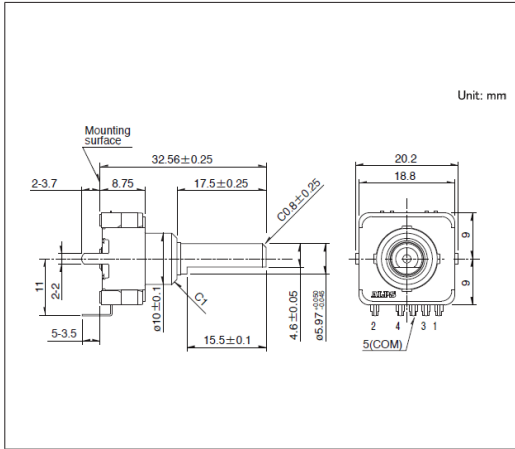


Viewed from mounting face.

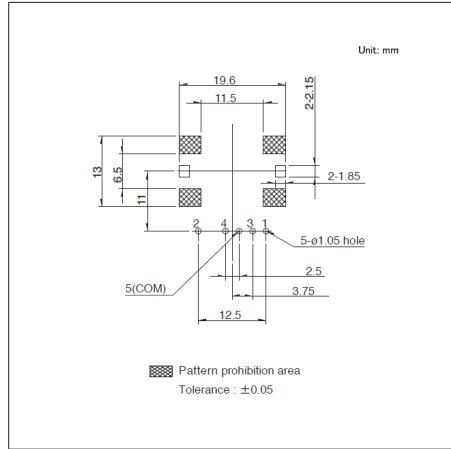
18mm Size Insulated Shaft Type
EC18A Series

Drawing No.2

■ Dimensions



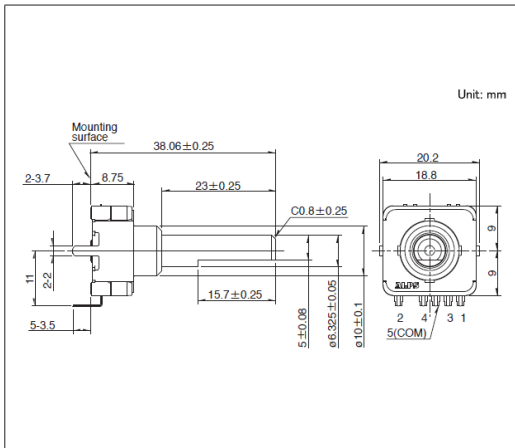
■ Mounting Hole Dimensions



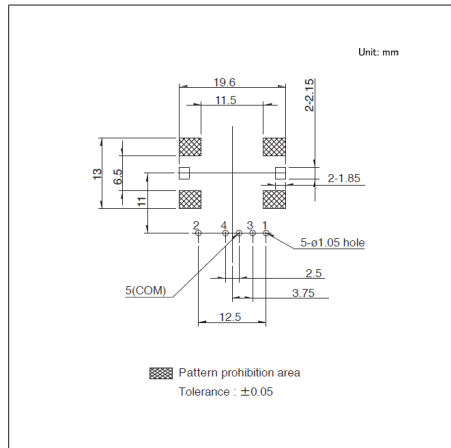
Viewed from mounting face.

Drawing No.3

■ Dimensions



■ Mounting Hole Dimensions



Viewed from mounting face.

EC18A /18mm Size Insulated Shaft Type

■ Standard Codes

EC18AGA

Position 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
TERMINAL NO.	1		●	●			●	●			●	●	
	2			●	●	●	●						
	3					●	●	●	●	●	●		
	4									●	●	●	●
	5 (COM)	●	●	●	●	●	●	●	●	●	●	●	●

EC18AGB20407

Position 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
TERMINAL NO.	1	●	●			●	●			●	●			●	●	
	2		●	●	●	●					●	●	●	●		
	3				●	●	●	●	●	●	●	●				
	4								●	●	●	●	●	●	●	●
	5 (COM)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

EC18AGB20401

Position 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
TERMINAL NO.	1		●	●			●	●			●	●			●	●	
	2			●	●	●	●					●	●	●	●		
	3					●	●	●	●	●	●	●	●				
	4									●	●	●	●	●	●	●	●
	5 (COM)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

1. The ● marks shows the ON position.

2. The ● marks:Connections between terminals and the 5(COM)are ON.



■ Water-proof Property

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

Encoders

Through shaft Encoder

List of Varieties

Series		EC05E	EC10E
Photo			
Dimensions		5mm size	10mm size
Output		Incremental (Two phase A and B)	
Number of detent		12	12 24
Number of pulse		12	
Operating temperature range		-30°C to +85°C	-5°C to +45°C -40°C to +85°C
Operating life		100,000 cycles	
Electrical performance	Ratings	0.55mA 5.5V DC	1mA 5V DC
	Max./min. operating current (Resistive load)	0.55mA/-	—
	Insulation resistance	50MΩ min. 50V DC	
	Voltage proof	50V AC for 1 minute	
Mechanical performance	Detent torque	1.6±1.3mN·m	—
Automotive		—	●

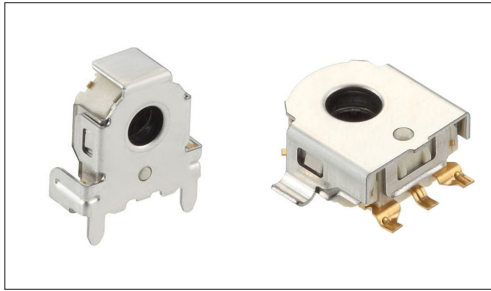
 Note

● Indicates applicability to all products in the series, while ○ indicates applicability to some products in the series.

Encoders Through shaft Encoder

5mm Size Hollow Shaft Type
EC05E Series

Compact design featuring Drum Cord™ technology.



- Output signal: Two phase A and B
- Ratings: 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

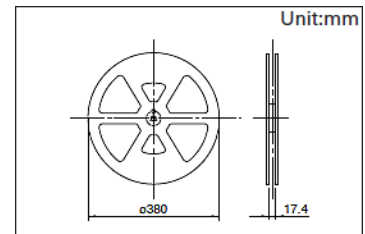
Note

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

■ Packing Specifications

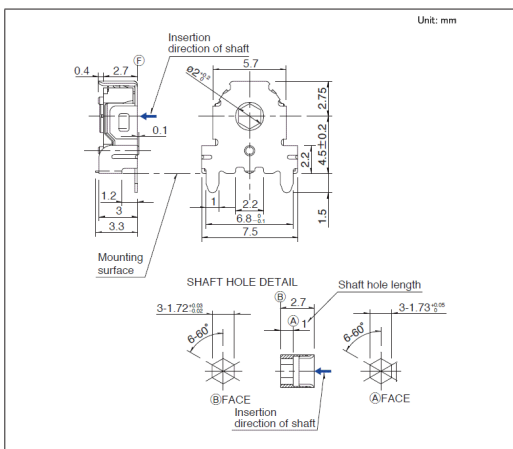
Taping

Products No.	Number of packages(pcs.)			Tape width (mm)	Export package measurements (mm)
	1 reel	1 case / Japan	1 case / export packing		
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

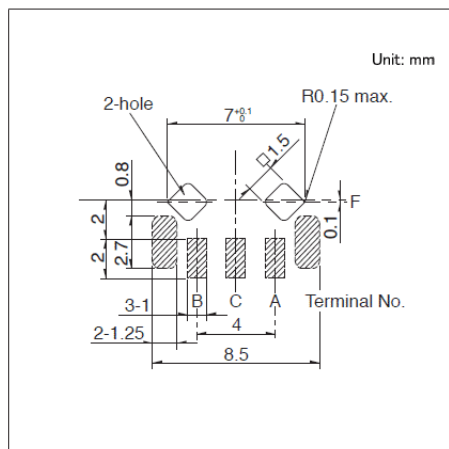


Drawing No. 1

■ Dimensions



■ Mounting Hole and Land Dimensions

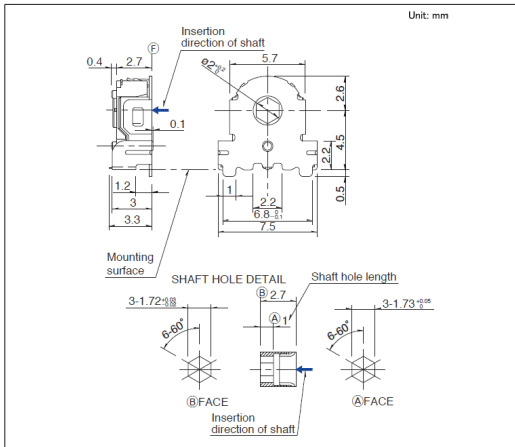


Viewed from mounting side.
 shaded area indicated soldering land.

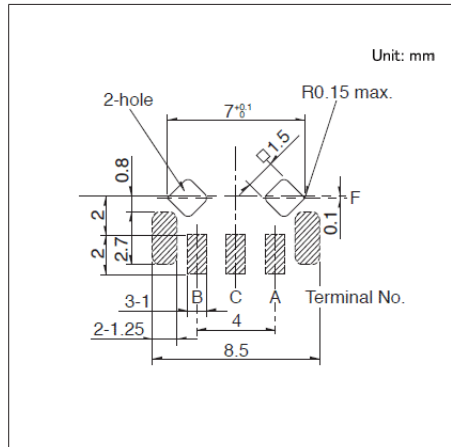
5mm Size Hollow Shaft Type
EC05E Series

Drawing No.2

■ Dimensions



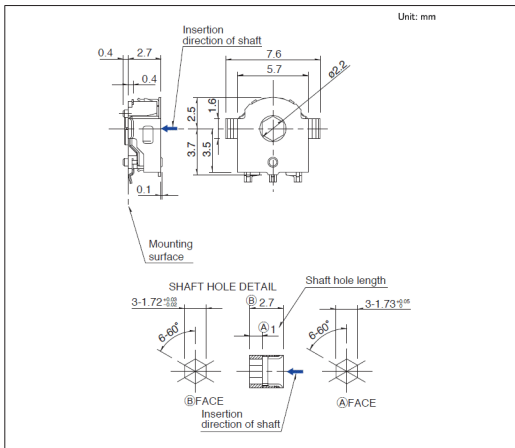
■ Mounting Hole and Land Dimensions



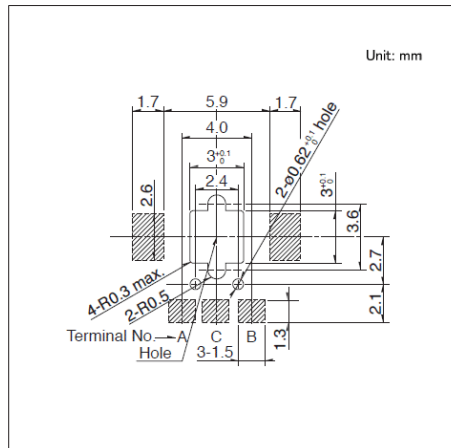
Viewed from mounting side,
 shaded area indicated soldering land.

Drawing No.3

■ Dimensions



■ Mounting Hole and Land Dimensions



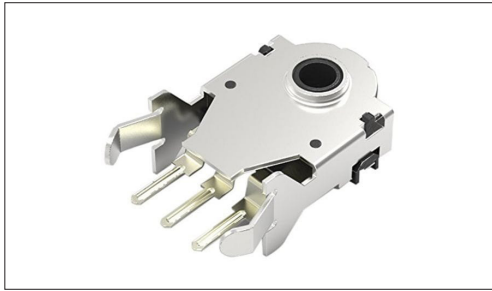
Viewed from mounting side,
 shaded area indicated soldering land.

Encoders Through shaft Encoder

10mm Size Hollow Shaft Type
EC10E Series

Unique through-shaft design achieving miniaturization and long life.

Automotive



- 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	11.0mm	24	12	●	3
EC10E1260502	Horizontal	6±3mN·m	7.0mm	12	12	●	4
EC10E1260507	Horizontal	6±3mN·m	11.0mm	24	12	●	5

Note

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).
3. Please contact us for automotive use products.

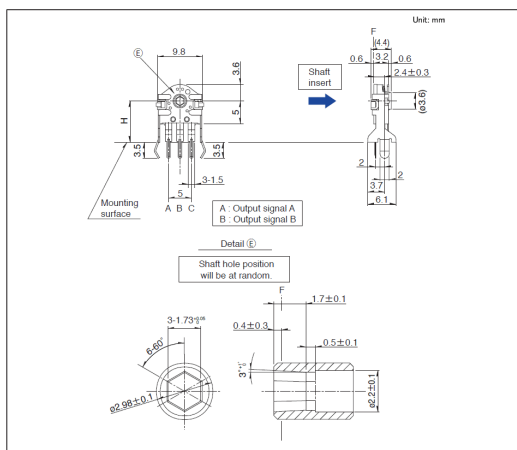
■ Packing Specifications

Bulk

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

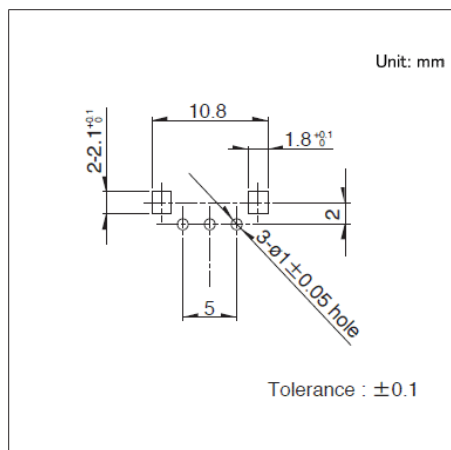
Drawing No.1

■ Dimensions



Mount height H = 7mm

■ Mounting Hole Dimensions

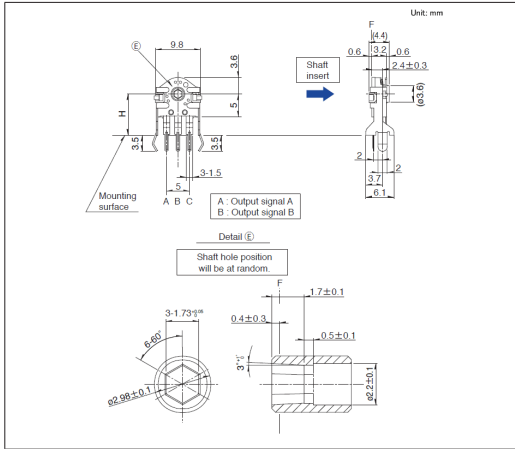


Viewed from mounting side

10mm Size Hollow Shaft Type
EC10E Series

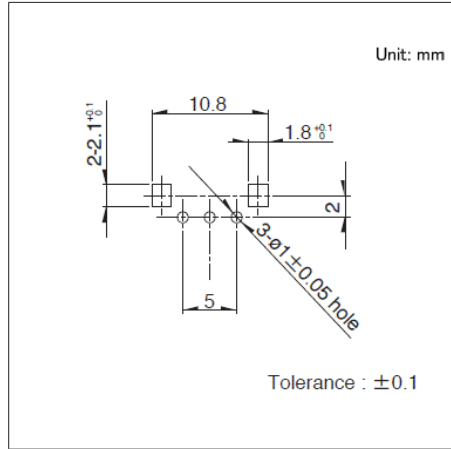
Drawing No.5

■ Dimensions



Mount height H = 11mm

■ Mounting Hole Dimensions









Viewed from mounting side

Encoders

Ring Encoder

List of Varieties

Series		EC21A/EC21C	EC28A/EC28C	EC35A	EC35AH/ EC35CH	EC40A	EC50A	
Photo								
Dimensions		21mm size	28mm size	35mm size		40mm size	50mm size	
Output		Incremental (Two phase A and B)			Incremental (Three phase A, B and C)	Incremental (Two phase A and B)		
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	
Number of detent		18 30				30	18	
Number of pulse		9 15	15 18	9 15	6 10	15	9	
Operating temperature range		-40°C to +85°C	-40°C to +85°C -40°C to +90°C	-40°C to +85°C	-40°C to +85°C -40°C to +90°C	-40°C to +85°C		
Operating life		50,000 cycles				30,000 cycles	40,000 cycles	
Electrical performance	Ratings	10mA 5V DC				0.5mA 5V DC	1mA 5V DC	
	Max./min. operating current (Resistive load)	10mA/1mA				—		
	Insulation resistance	100MΩ min. 250V DC				10MΩ min. 50V DC	10MΩ 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		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 performance	Actuator strength	Pushing direction	100N					
		Pulling direction	100N			50N		
Automotive		●	●	●	●	●	●	

 Note

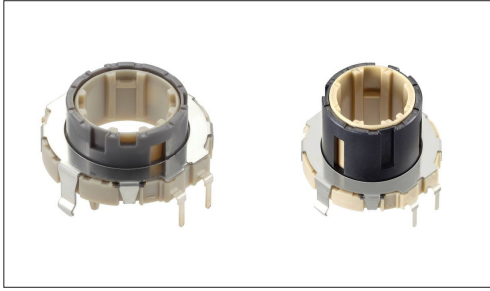
● Indicates applicability to all products in the series, while ○ indicates applicability to some products in the series.

21 mm Size Ring Type

EC21A/EC21C Series

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

 Automotive



- 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	●	
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

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

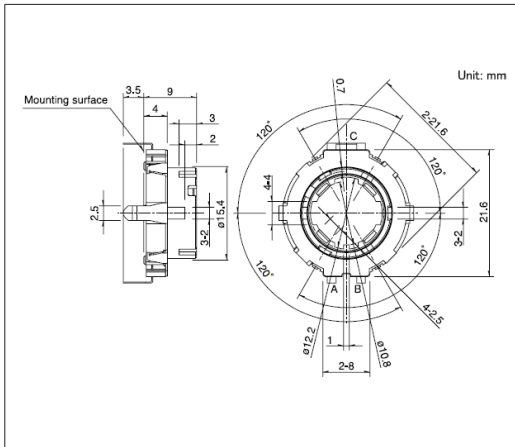
Tray

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

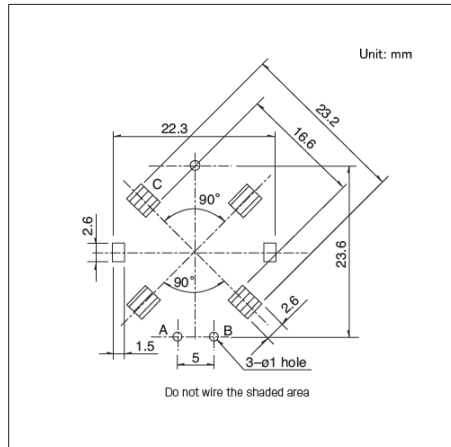
21 mm Size Ring Type
EC21A/EC21C Series

Drawing No.1

■ Dimensions



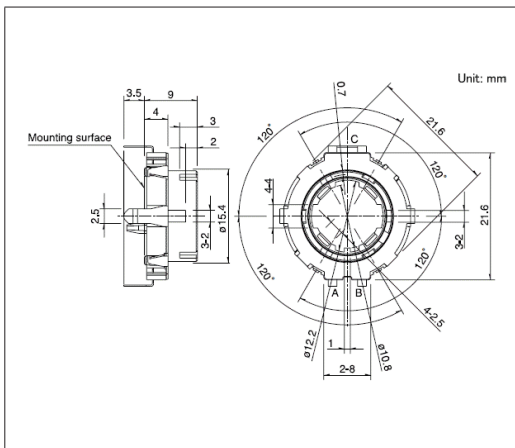
■ Mounting Hole Dimensions



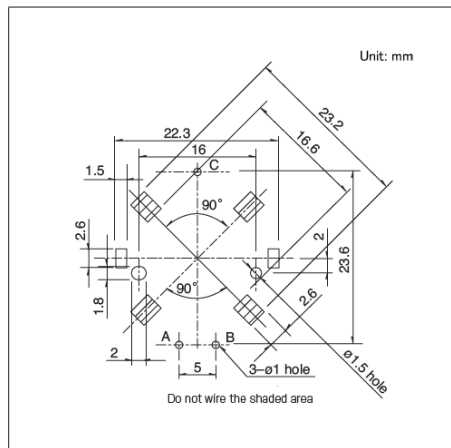
Viewed from mounting side

Drawing No.2

■ Dimensions



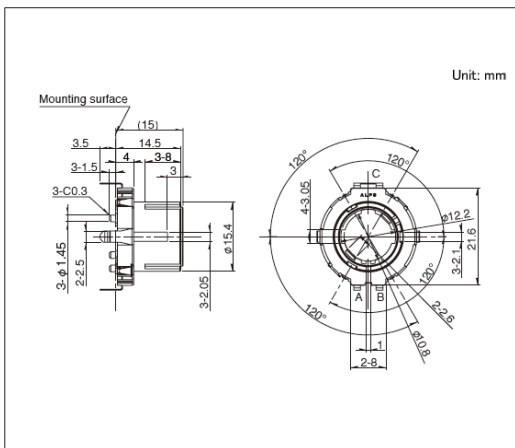
■ Mounting Hole Dimensions



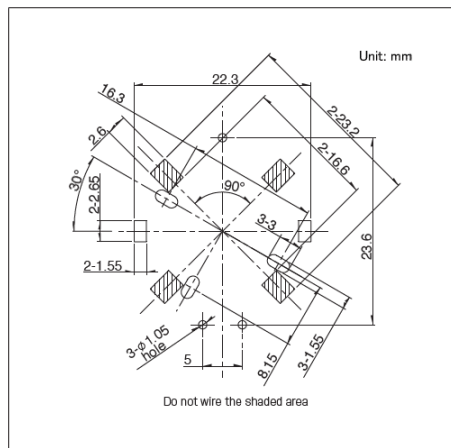
Viewed from mounting side

Drawing No.3

■ Dimensions



■ Mounting Hole Dimensions

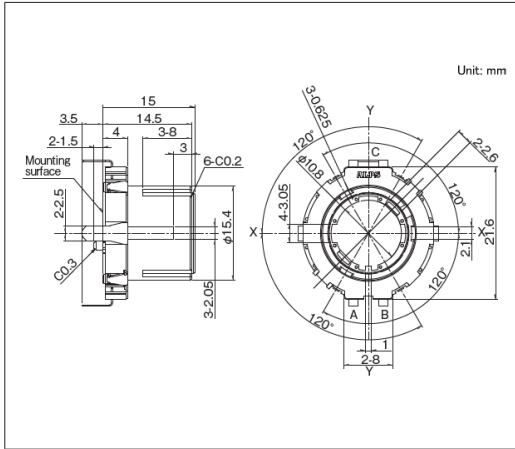


Viewed from mounting side

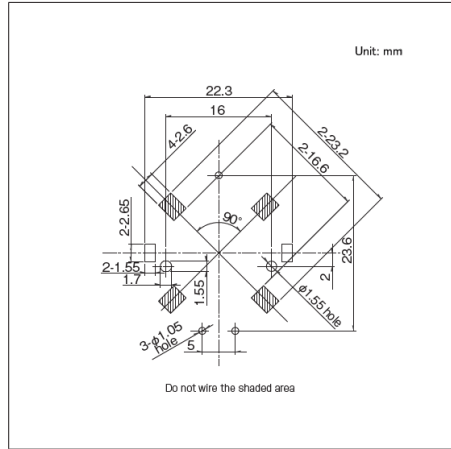
21mm Size Ring Type
EC21A/EC21C Series

Drawing No.4

■ Dimensions



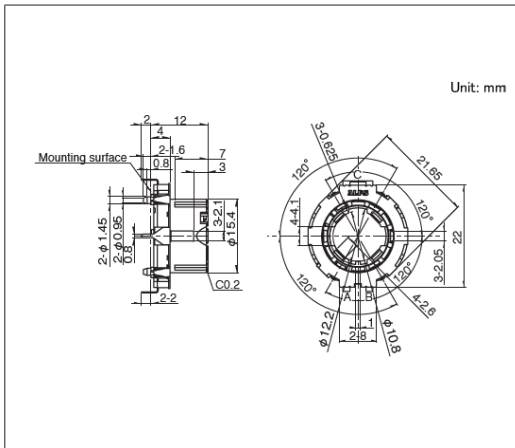
■ Mounting Hole Dimensions



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.


 Automotive

- 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	●	1
EC28A1550401	15.0	12±7mN·m	30	15	●	
EC28A1560401	15.0	20±10mN·m	30	15	●	
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

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

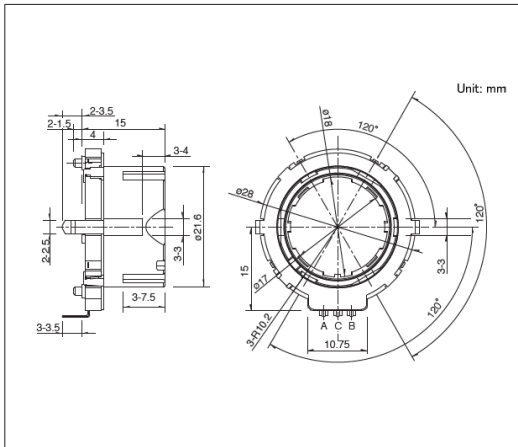
Tray

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

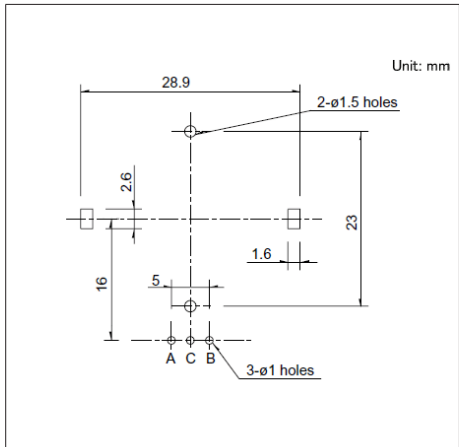
28mm Size Ring Type
EC28A/EC28C Series

Drawing No.1

■ Dimensions



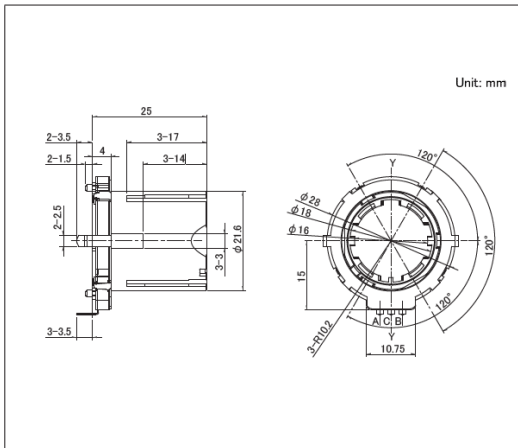
■ Mounting Hole Dimensions



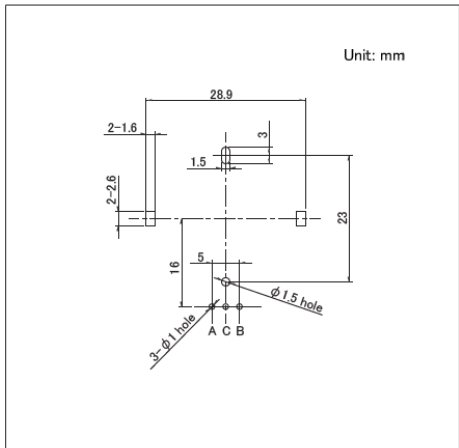
Viewed from mounting side

Drawing No.2

■ Dimensions



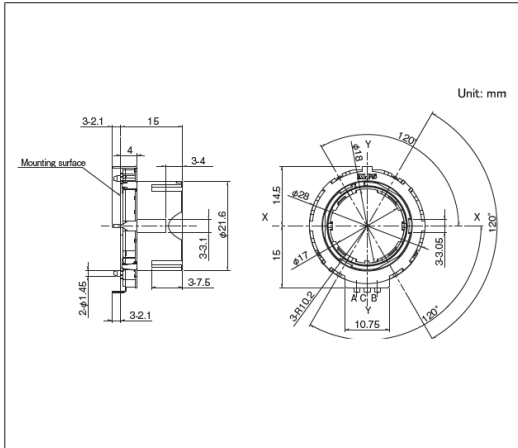
■ Mounting Hole Dimensions



Viewed from mounting side

Drawing No.3

■ Dimensions



Encoders Ring Encoder

35mm Size Ring Type
EC35A Series

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

 Automotive



- 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

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).

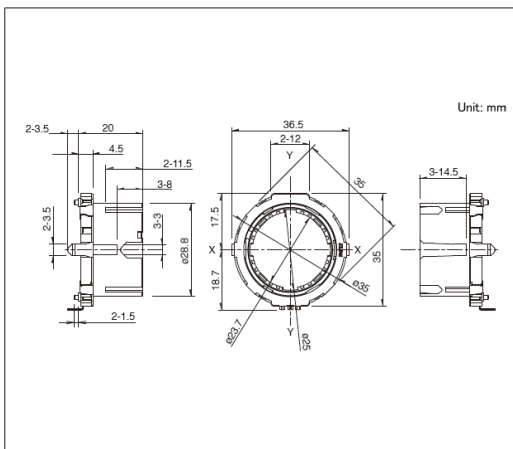
■ Packing Specifications

Tray

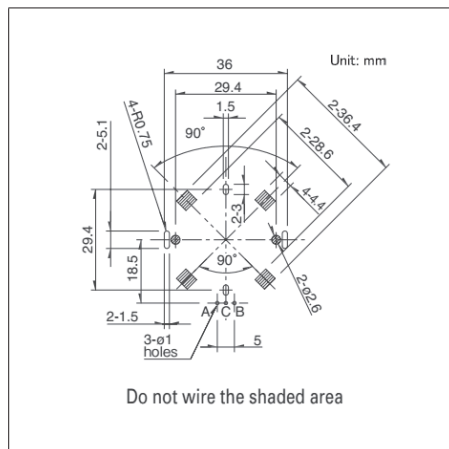
Products No.	Number of packages(pcs.)		Export package measurements (mm)
	1 case / Japan	1 case / export packing	
EC35A1520402 EC35A0930401	420	840	540 x 360 x 380
EC35A1550502	350	700	540 x 360 x 380

Drawing No.1

■ Dimensions



■ Mounting Hole Dimensions

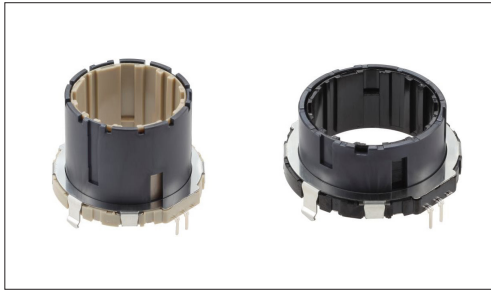


Viewed from mounting side

35mm Size ABC Switch Type

EC35AH/EC35CH Series

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


 Automotive

- 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	●	1
EC35AH220403	15.0	18±7mN·m	30	10	●	
EC35AH260403	15.0	30±15mN·m	30	10	●	
EC35AH240502	25.0	12±5mN·m	30	10	●	2
EC35AH220502	25.0	18±7mN·m	30	10	●	
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).

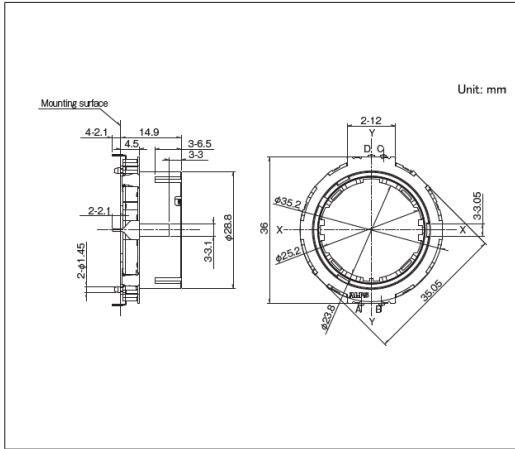
■ Packing Specifications

Tray

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

Drawing No.4

■ Dimensions



Encoders

Ring Encoder

40mm Size Ring Type
EC40A Series

Delivers excellent operation feel with minimized shaft play.

 Automotive



- 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

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).

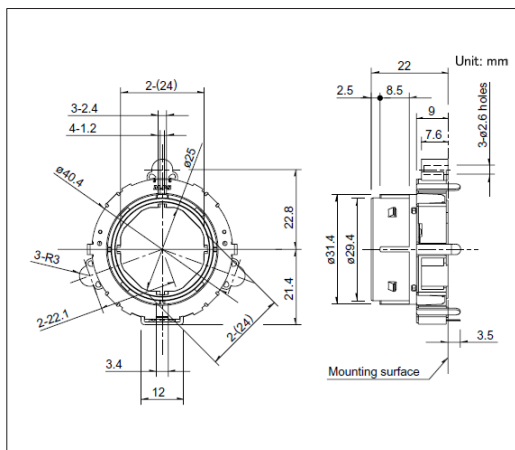
■ Packing Specifications

Tray

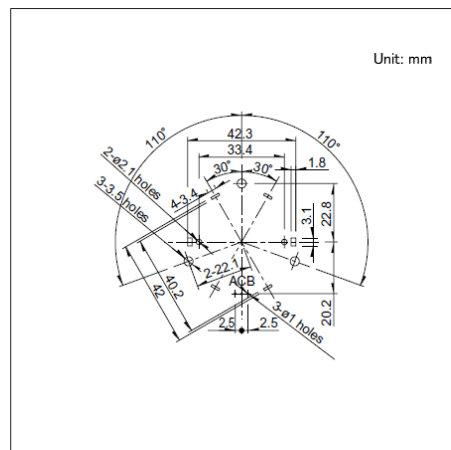
Number of packages (pcs.)		Export package measurements (mm)
1 case / Japan	1 case / export packing	
200	400	540 x 360 x 380

Drawing No. 1

■ Dimensions



■ Mounting Hole Dimensions



Viewed from mounting side

Encoders / Soldering Conditions

■ Reference for Manual Soldering

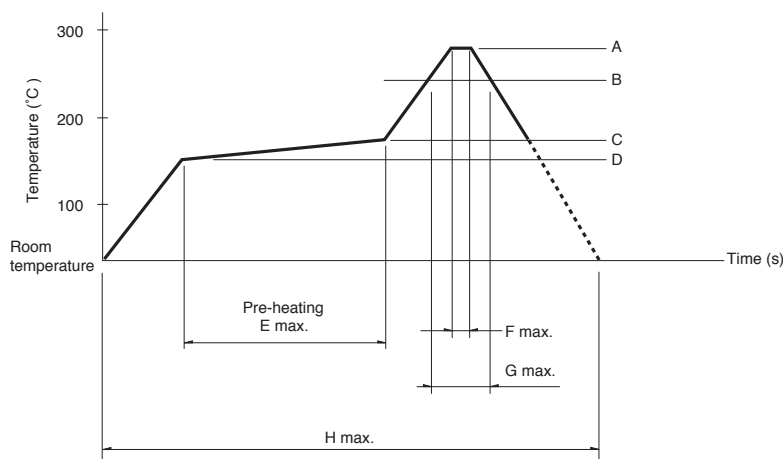
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11E, EC11M, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC40A, EC50A, EC21C, EC28C, EC35CH	350°C max.	3s max.	1 time

■ Reference for Dip Soldering

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

■ Example of Reflow Soldering Condition

Temperature profile



Series	A	B	C	D	E	F	G	H	No. of reflows
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.

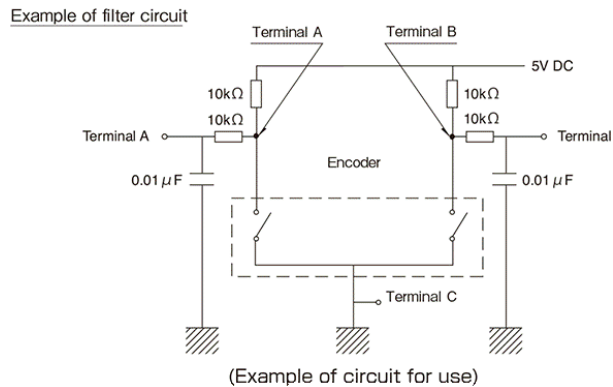
⚠ Note

- 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 / Cautions

Pulse count process

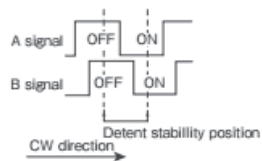
With respect to pulse count design of encoders, operational speed, sampling time, and masking time, etc. should be taken into consideration. Be sure to confirm these factors before using the encoder. For your pulse count design, consider adding C/R filters on your circuit as shown below.



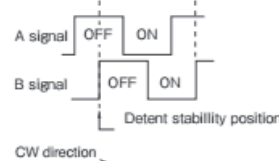
Output Specifications

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.

Example where both signal A and B output can be specified



Example where only signal A output can be specified



※ On / off status of signal B at detent stability point is not specified

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.

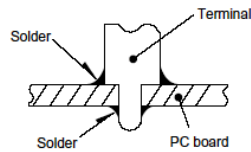
Installation

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

1. 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. Applying 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, there 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.