

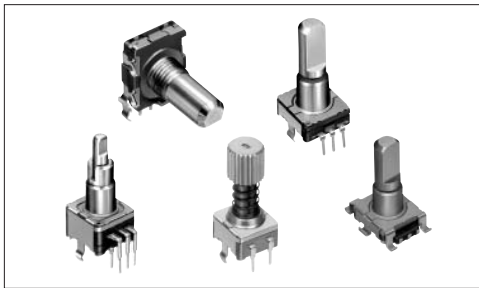
# Encoder 11mm Size Metal Shaft Type

EC11 Series



Compact and highly reliable type available in many varieties.

- Detector
- Push
- Slide
- Rotary
- Encoders**
- Power
- Dual-in-line Package Type
- Multi Control Devices
- TACT Switch™
- Custom-Products



## Features

- Compact and highly reliable, sliding contact type.
- 4.5mm-body height with a 1.5mm-travel push switch is available.
- Incremental type.

## Applications

- Controls for car audio and car navigation system. Various controls for devices in automotive
- Controls for image/sound devices, including DVD players, mini component stereos, CD players and portable audio players

## Typical Specifications

Items	Specifications
<b>Rating</b>	10mA 5V DC
<b>Operating life</b>	15,000 cycles

- Incremental Type**
- Absolute Type

## Products Line

Style	Operating section	Length of operating section (mm)	Torque (mN·m)	Number of detent	Resolution	Push-on switch	Travel of push-on switch (mm)	Minimum packing unit (pcs.)	Products No.	Drawing No.							
Horizontal			12±7	30	15	Without	—	700	EC11B15202AA	1							
						With	0.5		EC11B15242AE	2							
							1.5		EC11B15242AF	3							
Vertical	Flat	20	10±7	18	9	Without	—	1,200	EC11E09204A4	4							
				30	15				EC11E15204A3								
			7 <sup>+3</sup> <sub>-4</sub>	Without	15				EC11E1530401								
			10±7	36	18				EC11E1820402								
			7 <sup>+3</sup> <sub>-4</sub>	Without	18				EC11E1830401								
			Without	10±7	18				9	With	0.5	1,200	EC11E09244AW	5			
					30				15				EC11E15244C0				
				7 <sup>+3</sup> <sub>-4</sub>	Without				15				EC11E153440D				
				10±7	36				18				EC11E18244AE				
				7 <sup>+3</sup> <sub>-4</sub>	Without				18				EC11E1834404				
				With	10±7				18				9		1.5	1,200	EC11E09244AQ
									30				15				EC11E15244B2
					7 <sup>+3</sup> <sub>-4</sub>				Without				15				EC11E1534408
					10±7				36				18				EC11E18244A5
				7 <sup>+3</sup> <sub>-4</sub>	Without				18				EC11E1834403				

### Products Line

Style	Operating section	Length of operating section (mm)	Torque (mN·m)	Number of detent	Resolution	Push-on switch	Travel of push-on switch (mm)	Minimum packing unit (pcs.)	Products No.	Drawing No.
Less shaft wobble	20-tooth serration	18	10±7	30	15	With	1.5	1,200	EC11G1524402	6
			7 <sup>+3</sup> <sub>-4</sub>	Without					EC11G1534403	
Reflow	Flat	20	6±4	30	15	Without	—	1,600	EC11E1540503	7
						With	0.5		EC11E154450G	8
Push lock	20-tooth serration	25	10±7	30	15	Without	—	1,000	EC11E152T409	9
		26.4				With	8	800	EC11E152U402	10
Self-return switch	Flat	20	3 to 30	Without	Self-return switch	Without	—	1,200	EC1110120001	11
						With	0.5		EC1110120103	12
							1.5		EC1110120201	
Dual-shaft	Flat	Inner-shaft=25	10±7	30	15	Without	—	700	EC11EBB24C03	13
	Slotted	Outer-shaft=15								
	Flat	Inner-shaft=25								
	Slotted	Outer-shaft=15								

Detector

Push

Slide

Rotary

Encoders

Power

Dual-in-line Package Type

Multi Control Devices

TACT Switch™

Custom-Products

### Note


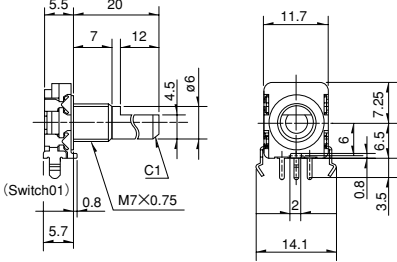
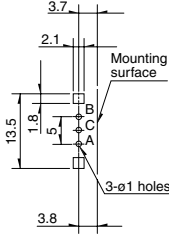

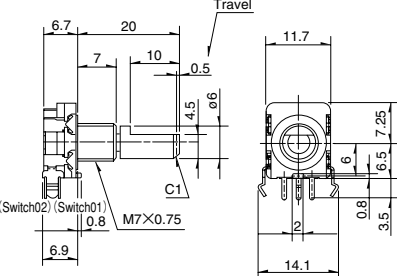
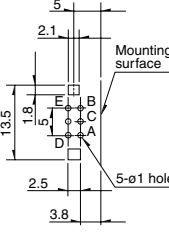
We have many other products in stock. Please contact our sales department if you are interested.

Incremental Type

Absolute Type

### Dimensions

Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
1			
2			

For other products, check varieties on P.189


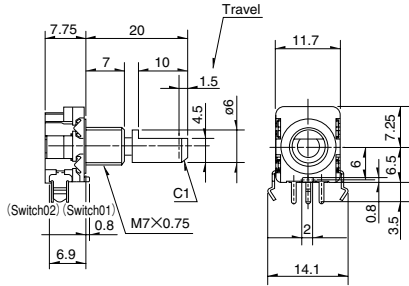
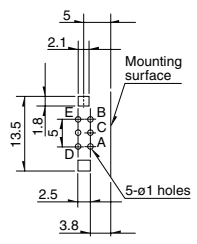

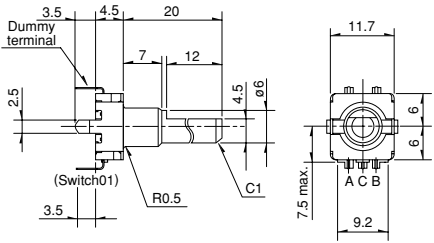
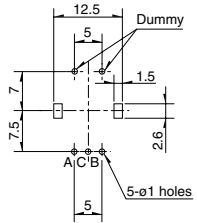

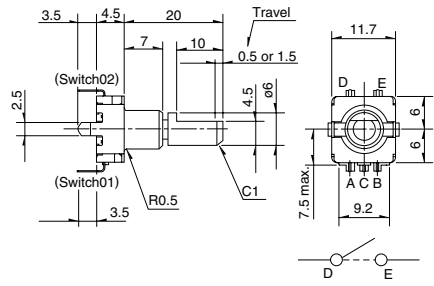
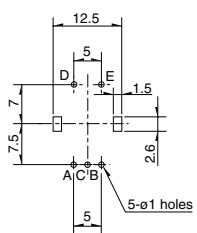

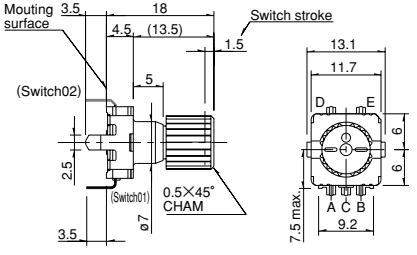
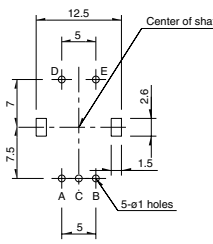
For other specifications, see P.192, 193

For attached parts, see P.233

### Dimensions

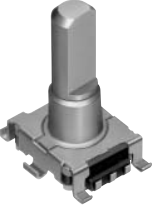
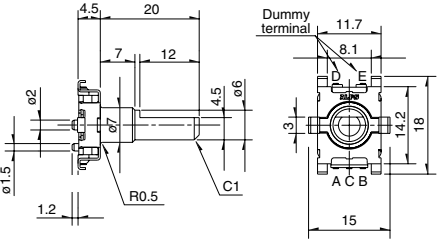
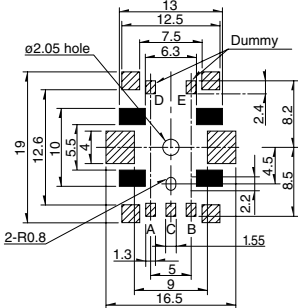

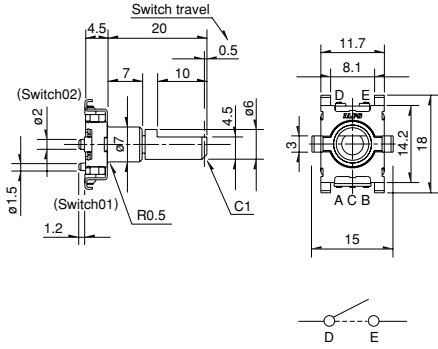
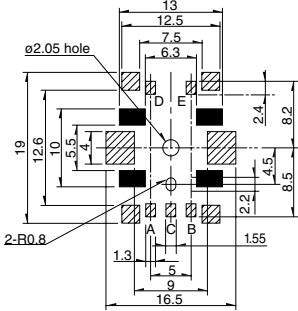

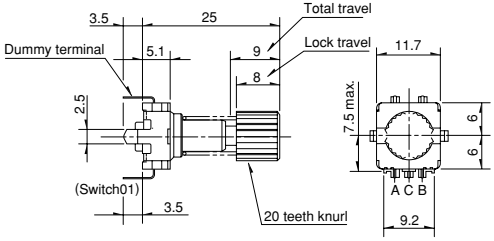
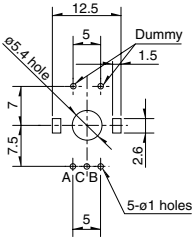

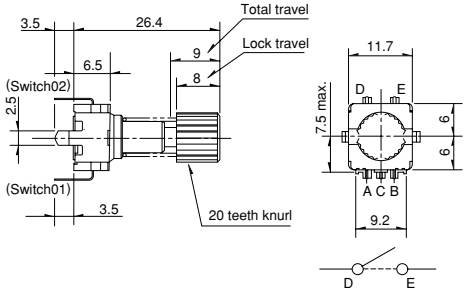
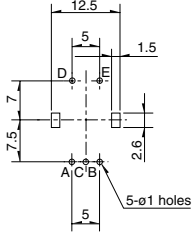
Unit:mm

- Detector
- Push
- Slide
- Rotary
- Encoders
- Power
- Dual-in-line Package Type
- Multi Control Devices
- TACT Switch™
- Custom-Products
- Incremental Type
- Absolute Type

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
3	 <p><b>Horizontal with push-on switch (travel 1.5mm)</b></p>		
4	 <p><b>Vertical</b></p>		
5	 <p><b>Vertical with push-on switch (travel 0.5/1.5mm)</b></p>		
6	 <p><b>Less shaft wobble</b></p>		

Dimensions

Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
7	<p>Reflow applicable parts</p> 		 <p>PC board Mounting detail A slant line part shows the solder land Black part: Do not solder and no wiring for electrical contact</p>
8	<p>Reflow applicable parts with push-on switch (travel 0.5mm)</p> 		 <p>PC board Mounting detail A slant line part shows the solder land Black part: Do not solder and no wiring for electrical contact</p>
9	<p>Push-lock mechanism</p> 		
10	<p>Push-lock mechanism with push-lock switch</p> 		

Detector

Push

Slide

Rotary

Encoders

Power

Dual-in-line  
Package Type

Multi Control  
Devices

TACT Switch™

Custom-  
Products


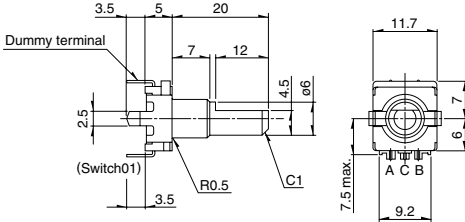
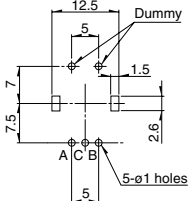

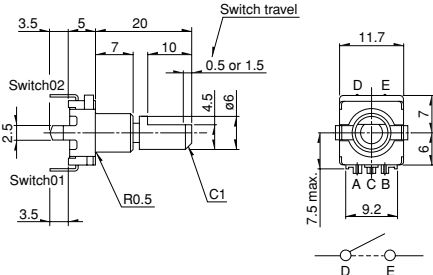
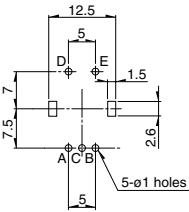
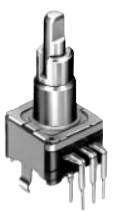
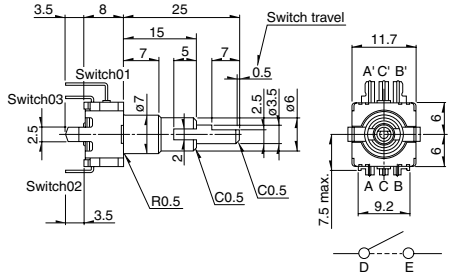
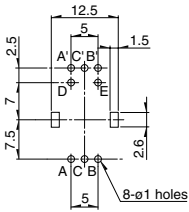
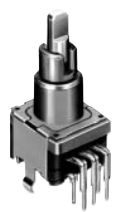
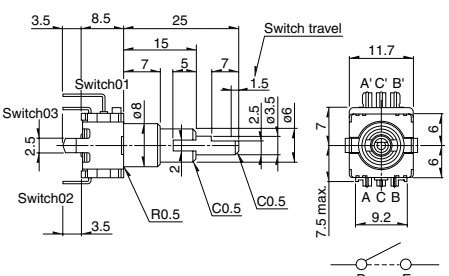
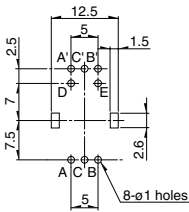
Incremental  
Type

Absolute  
Type

**Dimensions**

Unit:mm

- Detector
- Push
- Slide
- Rotary
- Encoders
- Power
- Dual-in-line  
Package Type
- Multi Control  
Devices
- TACT Switch™
- Custom-  
Products
- Incremental  
Type
- Absolute  
Type

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
11			
12			
13			
14			

# Variety

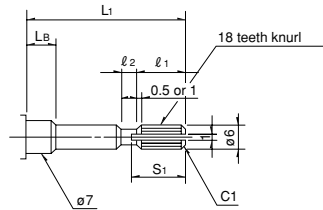
## Standard Dimensions of Shaft

### 1. Single-shaft Type

#### 1) Knurled Type

Unit:mm

Style (Shaft diameter :  $\phi 6$ )



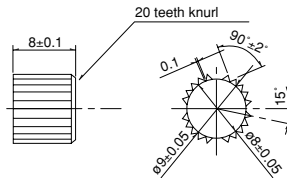
#### Detail dimensions

L <sub>1</sub>	L <sub>B</sub>	l <sub>1</sub>	l <sub>2</sub>	S <sub>1</sub>
15	5	6	1	7
15	7	4	1	5
20	7	6	1	7
25	7	10	2	11

※Except EC111

Style (Shaft diameter :  $\phi 9$ )

Applicable to models with a push lock mechanism and EC11G type.



Detector

Push

Slide

Rotary

Encoders

Power

Dual-in-line  
Package Type

Multi Control  
Devices

TACT Switch™

Custom-  
Products

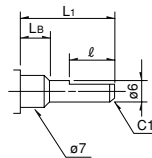
Incremental  
Type

Absolute  
Type

#### 2) Flat Type

Unit:mm

Style (Shaft diameter :  $\phi 6$ )



#### Detail dimensions

L <sub>1</sub>	L <sub>B</sub>	l
15	5	7
15	7	5 (6)
20	7	10 (12)
25	7	12

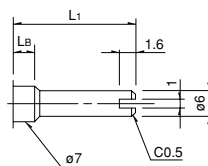
※Except EC111

Dimensions in parentheses ( ) are given for the type without a push-on switch.

#### 3) Slotted Type

Unit:mm

Style (Shaft diameter :  $\phi 6$ )



#### Detail dimensions

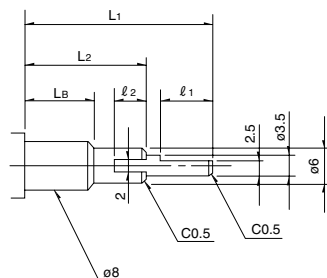
L <sub>1</sub>	L <sub>B</sub>
15	7
20	7
25	7

## 2. Standard Dimensions of Dual-shaft Type

### 1) Flat Type

Unit:mm

Style (Inner-shaft :  $\phi 3.5$  Outer-shaft :  $\phi 6$ )



#### Detail dimensions

L <sub>1</sub>	L <sub>2</sub>	L <sub>B</sub>	l <sub>1</sub>	l <sub>2</sub>
20	10	5	7	4
25	15	7	7	5
30	20	7	7	5

### Notes

- The [ ] parts in the shaft type are applied to the specifications for the product line described in p. 192 and 193.
- Additional switches not included in the above list are also available. Contact us for details.

## Products Specifications

Items	EC11B		EC11E/EC11G		EC111	EC20A		
	Horizontal type	Vertical type	Vertical type	Vertical type Reflow type	Vertical type Self-return switch			
Detector								
Push	Operating temperature range					-30 to +85°C		
Slide	Maximum operating current (Resistive load)					10mA		
Rotary	Electrical performance	Rating				10mA 5V DC	0.5mA 5V DC	
Encoders		Output signal				Output of A and B signals, proportionate to phase difference	Self-return switch	Output of A and B signals, proportionate to phase difference
Power		Insulation resistance				100MΩ min. 250V DC		
Dual-in-line Package Type		Voltage proof				300V AC		
Multi Control Devices	Mechanical performance	Rotational torque (without click feeling)		7 <sup>+3</sup> <sub>-4</sub> mN·m		3 to 30mN·m	—	
TACT Switch™		Detent torque		12±7mN·m	10±7mN·m	6±4mN·m	—	40±20mN·m
Custom-Products		Push-pull strength		100N				
Incremental Type		Resistance to soldering heat	Manual soldering		350°C max. 3s max.			
	Dip soldering		260±5°C, 5±1s		—	260±5°C, 5±1s		
	Reflow soldering		—		Please see P.212		—	
Absolute Type	Durability	Rotational life		15,000 cycles		30,000 cycles		
Environmental performance		Cold		-40±3°C for 240h				
		Dry heat		85±3°C for 240h				
		Damp heat		60±2°C, 90 to 95%RH for 240h				

### Push-on Switch Specifications

Items	EC11B		EC11E/EC111/EC11G		EC20A
Switch circuit · the number of contact	Single pole and single throw (Push-on)				
Travel of switch	0.5 <sup>+0.4</sup> <sub>-0.3</sub> mm	1.5±0.5mm	0.5±0.3mm	1.5±0.5mm	
Operating force of switch	6±3N	5±2N	6 <sup>+2.5</sup> <sub>-2</sub> N	4±2N	
Rating	DC 16V 0.5A (1mA 16V DC min. ratings)				
Contact resistance	100mΩ for initial period; 200mΩ after rotational life				
Operating life	25,000 times min.	20,000 times min.			

# Products Specifications

## Output Wave

EC11B	EC11E/EC11G		EC111	EC20A													
Horizontal type	Vertical type	Vertical type Reflow type	Vertical type Self-return switch														
<p>EC11B, EC11E, EC11G 30 detents, 15 pulse</p> <p>Detent stability point CW direction</p> <p>The stable detent position cannot be identified in phase B. EC11E 18 detents 9 pulse EC11E 36 detents 18 pulse</p> <p>Detent stability point CW direction</p> <p>Detent stability point CW direction</p>	<p>EC11B 20 detents, 20 pulse</p> <p>Detent stability point CW direction</p>			<table border="1"> <thead> <tr> <th>Shaft rotational Direction</th> <th>Signal</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Clockwise</td> <td>A (Terminal A-C)</td> <td></td> </tr> <tr> <td>B (Terminal B-C)</td> <td></td> </tr> <tr> <td rowspan="2">Counter-clockwise</td> <td>A (Terminal A-C)</td> <td></td> </tr> <tr> <td>B (Terminal B-C)</td> <td></td> </tr> </tbody> </table> <p>The broken line shows Detent stability position</p>	Shaft rotational Direction	Signal	Output	Clockwise	A (Terminal A-C)		B (Terminal B-C)		Counter-clockwise	A (Terminal A-C)		B (Terminal B-C)	
Shaft rotational Direction	Signal	Output															
Clockwise	A (Terminal A-C)																
	B (Terminal B-C)																
Counter-clockwise	A (Terminal A-C)																
	B (Terminal B-C)																

Detector

Push

Slide

Rotary

Encoders

Power

Dual-in-line Package Type

Multi Control Devices

TACT Switch™

Custom-Products

## Sliding Noise

EC11B	EC11E/EC11G		EC111	EC20A
Horizontal type	Vertical type	Vertical type Reflow type	Vertical type Self-return switch	
<p><math>V_1=V_2=1.5V</math> max.</p> <p>Measurement condition : Rotation speed 360°/s t : Masking time to avoid chattering</p> <p>At R = 5kΩ Chattering : 2ms max. Bounce : 2ms max.</p>	<p><math>V_1=V_2=1.5V</math> max.</p> <p>Measurement condition : Rotation speed 360°/s t : Masking time to avoid chattering</p> <p>At R = 5kΩ Chattering : 3ms max. Bounce : 2ms max.</p>		<p>—</p>	<p><math>V_1=V_2=1.5V</math> max.</p> <p>Measurement condition : Rotation speed 360°/s t : Masking time to avoid chattering</p> <p>At R = 5kΩ Chattering : 8ms max. Bounce : 5ms max.</p>

Incremental Type

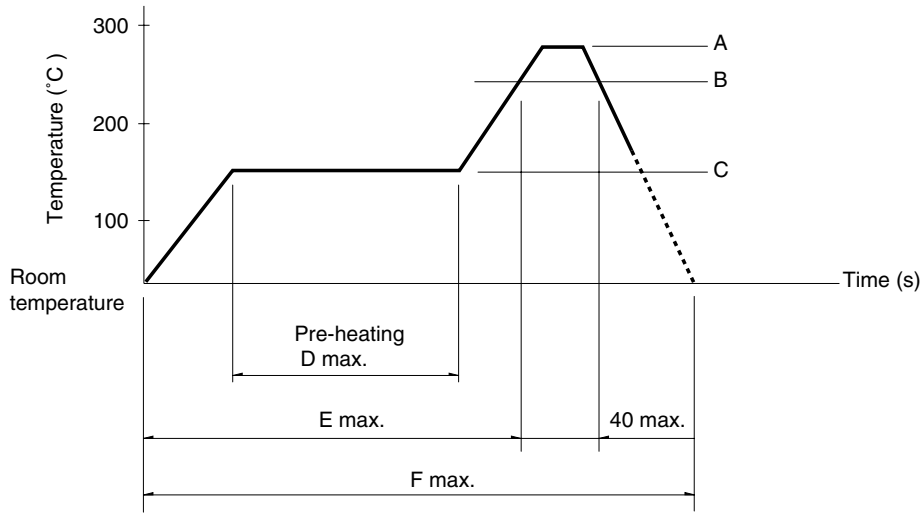
Absolute Type



## Soldering Condition

### Example of Reflow Soldering Condition

1. Heating method: Double heating method with infrared heater.
2. Temperature measurement: Thermocouple 0.1 to 0.2 φ CA (K) or CC (T) at soldering portion (copper foil surface). A heat resisting tape should be used for fixed measurement.
3. Temperature profile



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- Incremental Type
- Absolute Type

Series (Reflow type)	A (°C) 10s max.	B (°C)	C (°C)	D (s)	E (s)	F (s)
EC11E154□5	240±10	200	150	120	—	240

### Notes

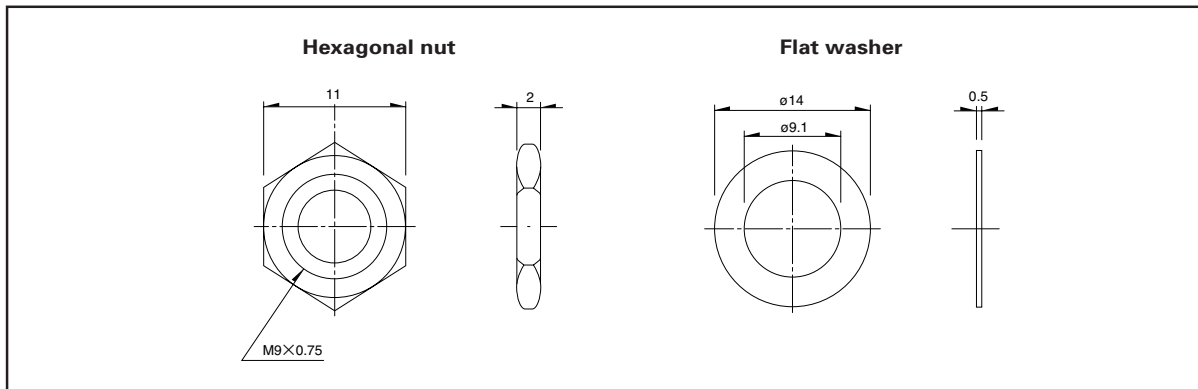
1. The condition mentioned above is the temperature on the mounting surface of a PC board. There are cases where the PC board's temperature greatly differs from that of the switch, depending on the PC board's material, size, thickness, etc. The above-stated conditions shall also apply to switch surface temperatures.
2. Soldering conditions differ depending on reflow soldering machines. You are requested to verify the soldering conditions thoroughly beforehand.

## Attached Parts

These parts are attached to the following products.

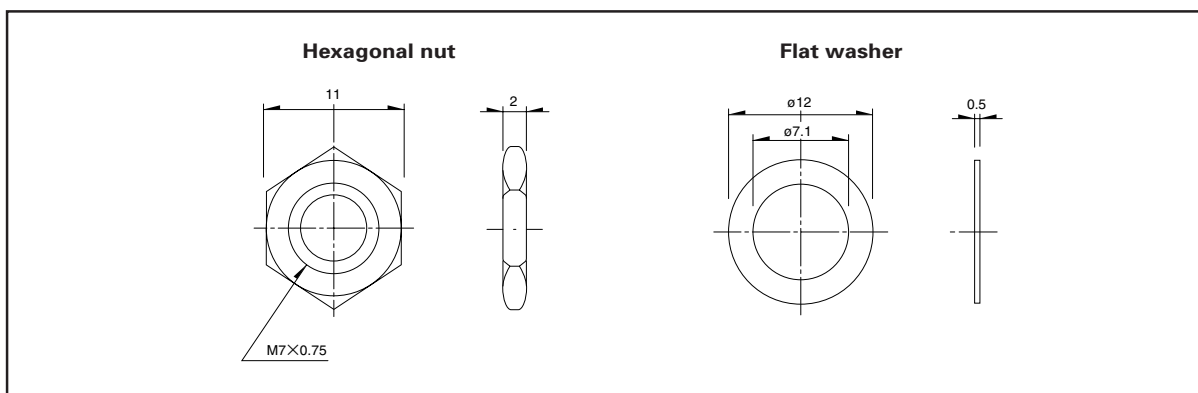
### SRGH Series

Unit:mm



### RK097, EC11B Series

Unit:mm



Detector

Push

Slide

Rotary

Encoders

Power

Dual-in-line  
Package Type

Multi Control  
Devices

TACT Switch™

Custom-  
Products

Incremental  
Type

Absolute  
Type