

Compact and highly reliable type available in many varieties



Typical Specifications

| Items | Specifications |
|-----------------------------|--|
| Output signal | Two phase of A, B Self-return switch (EC111 / EC11E0B) |
| Rating | 10mA 5V DC |
| Operating life | 15,000 cycles 100,000 cycles (EC11K / EC11J) |
| Operating temperature range | -40°C to +85°C |

Product Line

| Structure | Shaft configuration | Length of the shaft (mm) | Torque (mN·m) | Number of detent | Number of pulse | Push-on switch | Travel of push-on switch (mm) | Operating life (cycles) | Minimum order unit (pcs.) | | Product No. | Drawing No. | | | | | | |
|------------|---------------------|--------------------------------|---------------|--------------------------------|-----------------|----------------|-------------------------------|-------------------------|---------------------------|--------|--------------|--------------|--------------|--------------|-------|--------------|--------------|----|
| | | | | | | | | | Japan | Export | | | | | | | | |
| Horizontal | Flat | 20 | 12±7 | 30 | 15 | Without | — | 15,000 | 700 | 1,400 | EC11B15202AN | 1 | | | | | | |
| | | | | | | With | 0.5 | | | | EC11B15242AZ | 2 | | | | | | |
| | | | | | | | 1.5 | | | | EC11B15242B1 | 3 | | | | | | |
| Vertical | Flat | 20 | 10±7 | 18 | 9 | Without | — | 15,000 | 1,200 | 2,400 | EC11E09204A4 | 4 | | | | | | |
| | | | | 30 | 15 | | | | | | EC11E15204A3 | | | | | | | |
| | | | | 36 | 18 | | | | | | EC11E1820402 | | | | | | | |
| | | | | 18 | 9 | | | | | | EC11E09244BS | | | | | | | |
| | | | | 30 | 15 | | | | | | EC11E15244G1 | | | | | | | |
| | | | | 7 ± ₋₄ ³ | | | | | | | Without | EC11E153440D | | | | | | |
| | | 10±7 | 36 | 18 | | EC11E18244AU | | | | | | | | | | | | |
| | | 7 ± ₋₄ ³ | Without | 18 | With | 0.5 | EC11E183440C | | | | 5 | | | | | | | |
| | | | | | | | 10±7 | | | | | 18 | 9 | EC11E09244AQ | | | | |
| | | | | | | | 30 | | | | | 15 | EC11E15244B2 | | | | | |
| | | 7 ± ₋₄ ³ | Without | 15 | EC11E1534408 | | | | | | | | | | | | | |
| | | 10±7 | 36 | 18 | EC11E18244A5 | | | | | | | | | | | | | |
| | | 7 ± ₋₄ ³ | Without | 18 | EC11E1834403 | | | | | | | | | | | | | |
| | | Less shaft wobble | Serrated | 25 | 10±7 | 30 | 15 | | | | Without | — | 100,000 | 1,000 | 2,000 | EC11N1520401 | 6 | |
| | | | | | | | | | | | With | 0.5 | | | | EC11N1524402 | | |
| 1.5 | EC11N1525404 | | | | | | | | | | | | | | | | | |
| Without | — | | | | | | | EC11N1520402 | 6 | | | | | | | | | |
| | 0.5 | | | | | | | EC11N1524403 | 7 | | | | | | | | | |
| 1.5 | EC11N1525405 | | | | | | | 7 | | | | | | | | | | |
| Vertical | Flat | 20 | 12±5 | 18 | 9 | Without | — | 100,000 | 1,000 | 2,000 | EC11G1560414 | 8 | | | | | | |
| | | | | 30 | 15 | | | | | | EC11G1574402 | 9 | | | | | | |
| | | | | 18 | 9 | | | | | | EC11G1564411 | 10 | | | | | | |
| | | | | 30 | 15 | | | | | | EC11M1565403 | 9 | | | | | | |
| Vertical | Flat | 20 | 12±5 | 18 | 9 | With | 0.5 | | | | 100,000 | 1,000 | | | | 2,000 | EC11M1575403 | 10 |
| | | | | 30 | 15 | | | | | | | | | | | | EC11K0920404 | 11 |
| | | | | 18 | 9 | | | | | | | | | | | | EC11K1520406 | |
| | | | | 30 | 15 | | | | | | | | | | | | EC11K0924404 | |
| | | | | 18 | 9 | | | | | | | | | | | | EC11K1524406 | 12 |
| 30 | 15 | EC11K0925416 | | | | | | | | | | | | | | | | |
| | | EC11K1525413 | | | | | | | | | | | | | | | | |

Note

Other varieties are also available. Please inquire.

Refer to P.267 for attached parts.
Refer to P.268 for product varieties.
Refer to P.270 for switch specifications.
Refer to P.299 for soldering conditions.

Product Line

| Structure | Shaft configuration | Length of the shaft (mm) | Torque (mN·m) | Number of detent | Number of pulse | Push-on switch | Travel of push-on switch (mm) | Operating life (cycles) | Minimum order unit (pcs.) | | Product No. | Drawing No. |
|--------------------|---------------------|--------------------------|---------------------------------------|------------------|--------------------|----------------|-------------------------------|-------------------------|---------------------------|--------|---------------------|-------------|
| | | | | | | | | | Japan | Export | | |
| Reflow | Flat | 20 | 12±5 (Initial) 10±4 (After reflow) | 18 | 9 | Without | — | 100,000 | 600 | 600 | EC11J0920404 | 13 |
| | | | | | | | | | | | EC11J152040F | |
| | | | | | | With | 0.5 | | | | EC11J0924411 | 14 |
| | | | | | | | | | | | EC11J1524413 | |
| | | | | | | | 1.5 | | | | EC11J0925403 | |
| | | | | | | | | | | | EC11J1525402 | |
| Push lock | 20-tooth Serrated | 25 | 10±7 | 30 | 15 | Without | — | 15,000 | 800 | 1,600 | EC11E152T409 | 15 |
| | | 26.4 | | | | With | 8 | | EC11E152U402 | 16 | | |
| Self-return switch | Flat | 15 | 3 to 30 | Without | Self-return switch | Without | — | 15,000 | 1,200 | 2,400 | EC1110120005 | 17 |
| | | 20 | | | | With | 0.5 | | | | EC111012010H | 18 |
| | | | | | | 1.5 | EC1110120201 | | | | | |
| Dual-shaft | Slotted | Inner-shaft=25 | 10±7 | 30 | 15 | Without | — | 15,000 | 700 | 1,400 | EC11EBB24C03 | 19 |
| | | Outer-shaft=15 | | | | With | 1.5 | | | | EC11E0B2LB01 | 20 |
| | Flat | Inner-shaft=25 | Without | — | | | | | | | | |
| | Slotted | Outer-shaft=15 | 3 to 30 | Without | Self-return switch | Without | — | | | | | |

Note

Other varieties are also available. Please inquire.


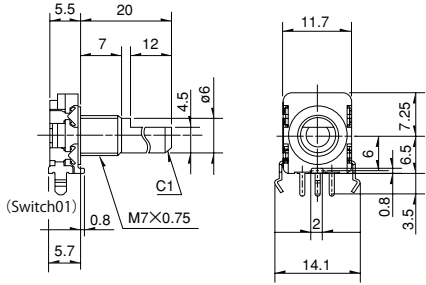
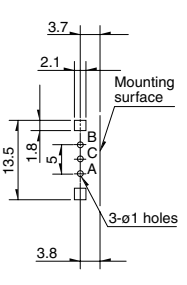

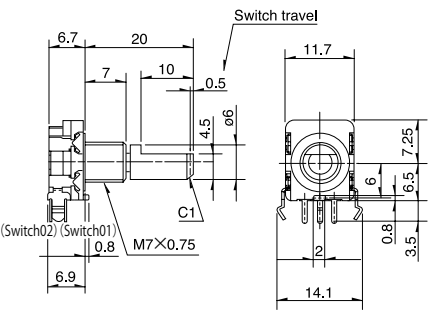
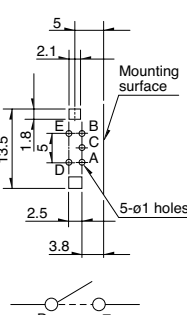

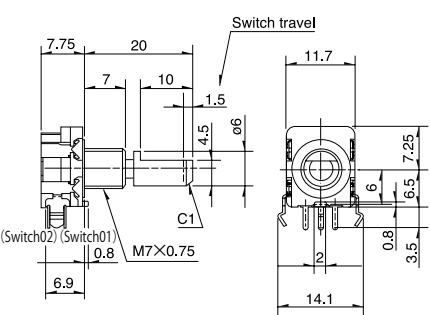
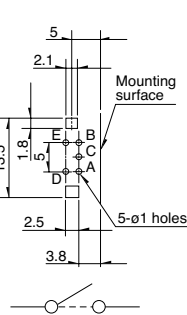

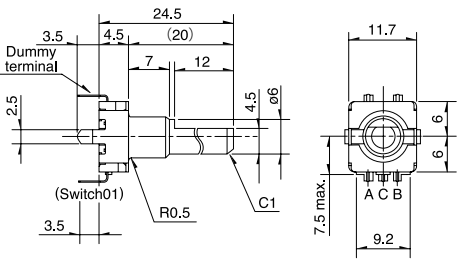
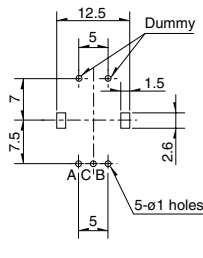

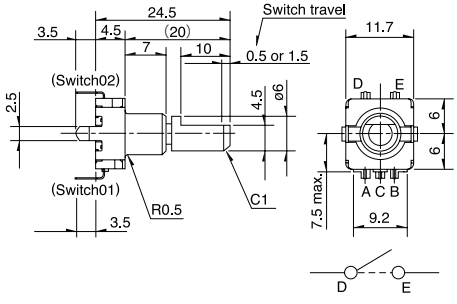
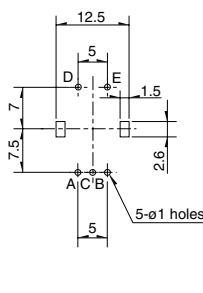
Packing Specifications

Tray

| Product No. | Number of packages (pcs.) | | Export package measurements (mm) |
|----------------------------|---------------------------|------------------------|----------------------------------|
| | 1 case /Japan | 1 case /export packing | |
| EC11B | 700 | 1,400 | 524×374×201 |
| EC11E09/15/18/EC11N | 1,200 | 2,400 | 540×360×250 |
| EC11G/EC11K/EC11M | 1,000 | 2,000 | |
| EC11J | 600 | 600 | 369×283×263 |
| EC11E152T/U | 800 | 1,600 | 507×363×230 |
| EC111 | 1,200 | 2,400 | 507×363×216 |
| EC11E0B/BB | 700 | 1,400 | |

Refer to P.267 for attached parts.
 Refer to P.268 for product varieties.
 Refer to P.270 for switch specifications.
 Refer to P.299 for soldering conditions.

Dimensions

| No. | Photo | Style | PC board mounting hole dimensions (Viewed from mounting side) |
|-----|---|--|---|
| 1 | <p>EC11B Horizontal</p>  |  |  |
| 2 | <p>EC11B Horizontal with push-on switch (travel 0.5mm)</p>  |  |  |
| 3 | <p>EC11B Horizontal with push-on switch (travel 1.5mm)</p>  |  |  |
| 4 | <p>EC11E Vertical</p>  |  |  |
| 5 | <p>EC11E Vertical with push-on switch (travel 0.5mm / 1.5mm)</p>  |  |  |

Encoders

Metal Shaft

Insulated Shaft


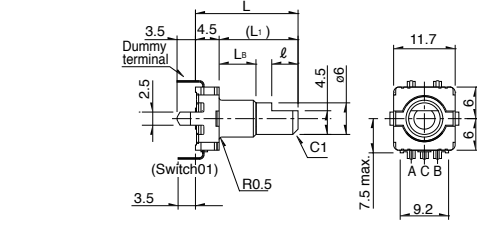
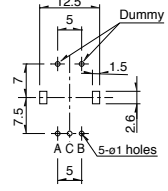

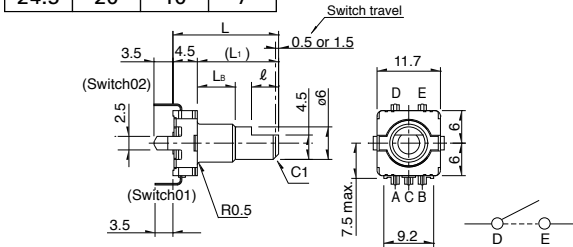
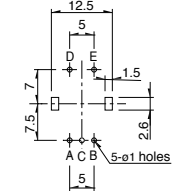

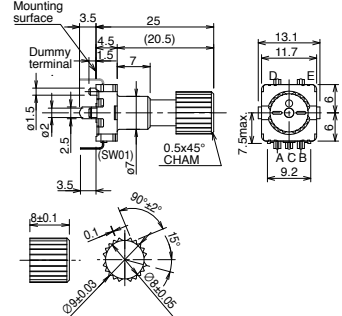
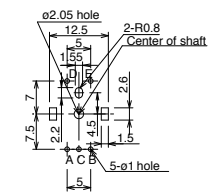

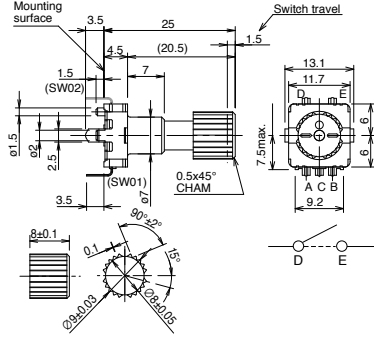
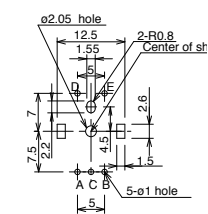

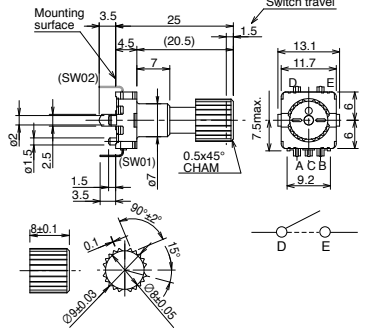
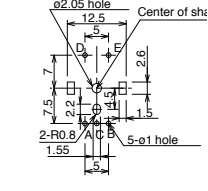
Through Shaft Type

Ring Type

EC11 1.1 mm Size Metal Shaft Type

Dimensions


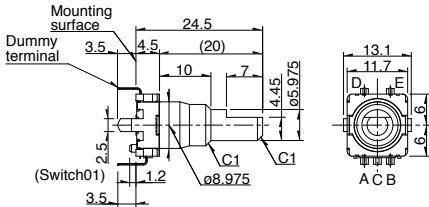
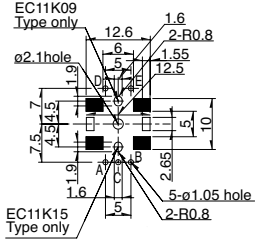

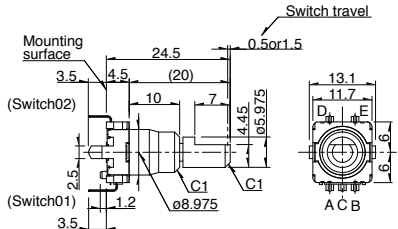
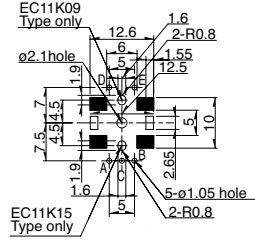

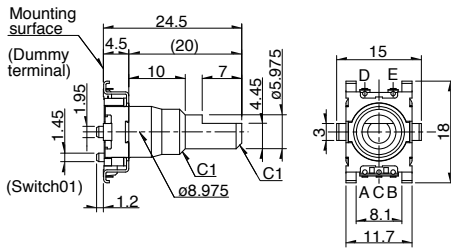
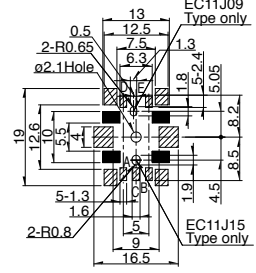

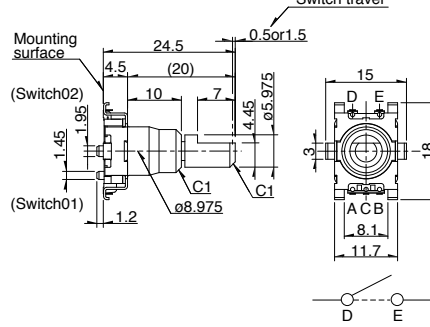
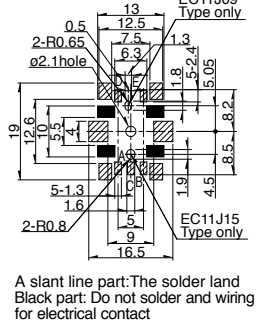

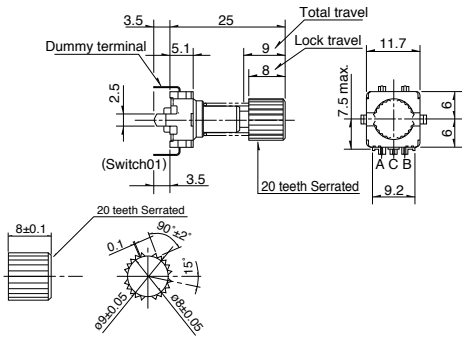
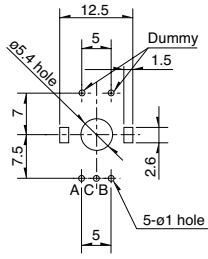
Unit:mm

| No. | Photo | Style | PC board mounting hole dimensions (Viewed from mounting side) | | | | | | | | | | | | |
|------|--|---|---|----------------|----------------|---|------|----|---|---|------|----|----|---|---|
| 6 | <p>EC11N Vertical</p>  | <table border="1"> <thead> <tr> <th>L</th> <th>L₁</th> <th>L_B</th> <th>ℓ</th> </tr> </thead> <tbody> <tr> <td>19.5</td> <td>15</td> <td>7</td> <td>5</td> </tr> <tr> <td>24.5</td> <td>20</td> <td>10</td> <td>7</td> </tr> </tbody> </table>  | L | L ₁ | L _B | ℓ | 19.5 | 15 | 7 | 5 | 24.5 | 20 | 10 | 7 |  |
| L | L ₁ | L _B | ℓ | | | | | | | | | | | | |
| 19.5 | 15 | 7 | 5 | | | | | | | | | | | | |
| 24.5 | 20 | 10 | 7 | | | | | | | | | | | | |
| 7 | <p>EC11N Vertical with push-on switch (travel 0.5mm / 1.5mm)</p>  | <table border="1"> <thead> <tr> <th>L</th> <th>L₁</th> <th>L_B</th> <th>ℓ</th> </tr> </thead> <tbody> <tr> <td>19.5</td> <td>15</td> <td>7</td> <td>5</td> </tr> <tr> <td>24.5</td> <td>20</td> <td>10</td> <td>7</td> </tr> </tbody> </table>  | L | L ₁ | L _B | ℓ | 19.5 | 15 | 7 | 5 | 24.5 | 20 | 10 | 7 |  |
| L | L ₁ | L _B | ℓ | | | | | | | | | | | | |
| 19.5 | 15 | 7 | 5 | | | | | | | | | | | | |
| 24.5 | 20 | 10 | 7 | | | | | | | | | | | | |
| 8 | <p>EC11G Vertical</p>  |  |  | | | | | | | | | | | | |
| 9 | <p>EC11G, EC11M Vertical with push-on switch (travel 1.5mm)</p>  <p>EC11G EC11M</p> |  |  | | | | | | | | | | | | |
| 10 | <p>EC11G, EC11M Vertical with push-on switch (travel 1.5mm)</p>  <p>EC11G EC11M</p> |  |  | | | | | | | | | | | | |

Encoders
Metal Shaft
Insulated Shaft
Through Shaft Type
Ring Type

Dimensions

Unit:mm


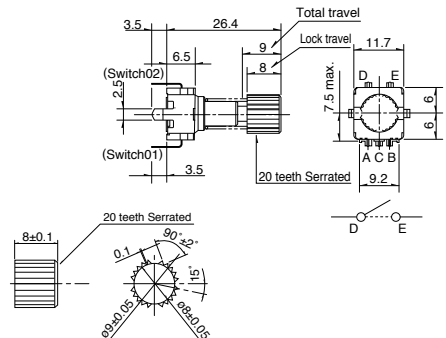
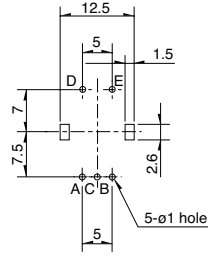

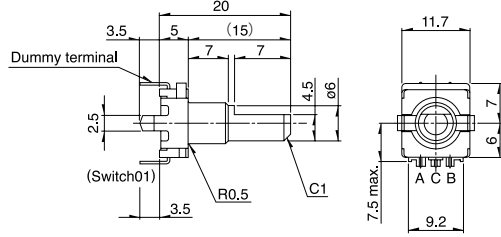
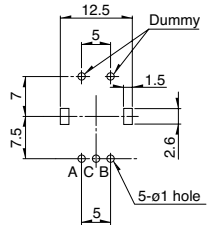

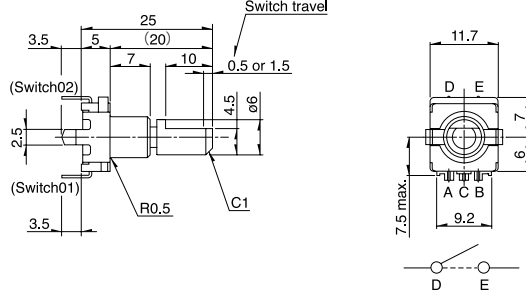
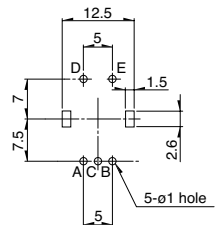

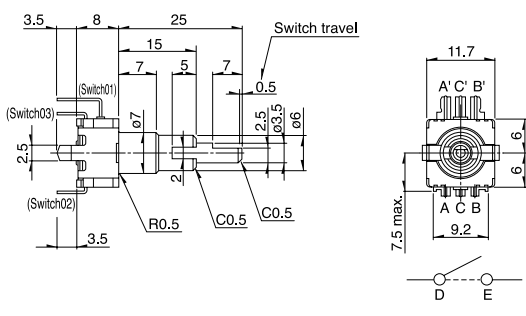
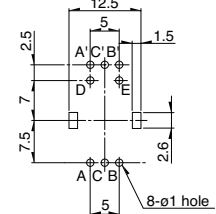

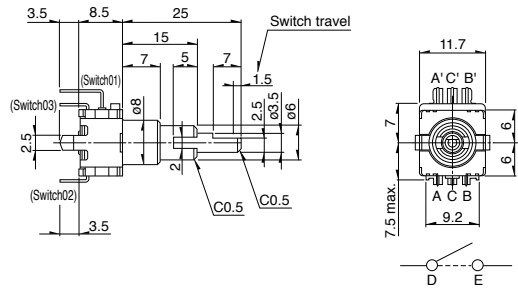
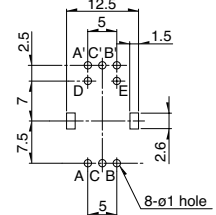
| No. | Photo | 形状 | PC board mounting hole dimensions (Viewed from mounting side) |
|-----|---|--|---|
| 11 |  |  |  <p>EC11K09 Type only</p> <p>EC11K15 Type only</p> <p>Black part : Do not solder and no wiring for electrical contact.</p> |
| 12 |  |  |  <p>EC11K09 Type only</p> <p>EC11K15 Type only</p> <p>Black part : Do not solder and no wiring for electrical contact.</p> |
| 13 |  |  |  <p>EC11J09 Type only</p> <p>EC11J15 Type only</p> <p>A slant line part: The solder land Black part: Do not solder and wiring for electrical contact</p> |
| 14 |  |  |  <p>EC11J09 Type only</p> <p>EC11J15 Type only</p> <p>A slant line part: The solder land Black part: Do not solder and wiring for electrical contact</p> |
| 15 |  |  |  <p>Dummy</p> <p>5-ø1 hole</p> |

Encoders
Metal Shaft
Insulated Shaft
Through Shaft Type
Ring Type

EC11 1.1 mm Size Metal Shaft Type

Dimensions

Unit:mm

| No. | Photo | Style | PC board mounting hole dimensions (Viewed from mounting side) |
|-----|---|--|---|
| 16 | <p>EC11E152U Push-lock mechanism with push-lock switch</p>  |  |  |
| 17 | <p>EC111 Self-return switch</p>  |  |  |
| 18 | <p>EC111 Self-return switch with push-on switch (travel 0.5mm / 1.5mm)</p>  |  |  |
| 19 | <p>EC11E Dual-shaft type with push-on switch (travel 0.5mm) Inner shaft: encoder Outer shaft: encoder</p>  |  |  |
| 20 | <p>EC11E Dual-shaft type with push-on switch (travel 1.5mm) Inner shaft: encoder Outer shaft: self-return switch</p>  |  |  |

Encoders

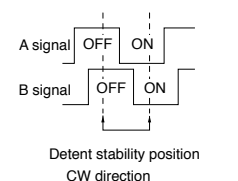
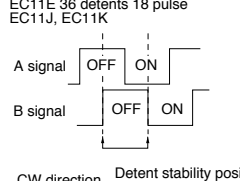
Metal Shaft

Insulated Shaft

Through Shaft Type

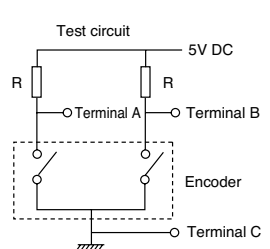
Ring Type

Output Wave

| EC11B / EC11E / EC11G / EC11N / EC11M | EC11E / EC11J / EC11K |
|---|---|
| <p>EC11B, EC11E, EC11G, EC11N, EC11M 30 detents, 15 pulse</p>  | <p>Detent stability position cannot be specified for B signal</p> <p>EC11E 18 detents 9 pulse EC11E 36 detents 18 pulse EC11J, EC11K</p>  |

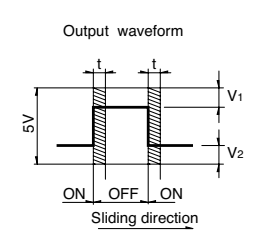
Sliding Noise

Test circuit



Measurement condition : Rotation speed 360°/s

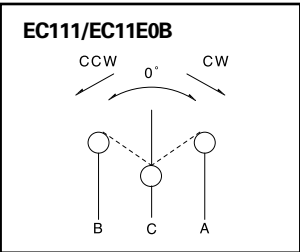
Output waveform



t : Masking time to avoid chattering

| | |
|--------------------------------|---|
| EC11B | V ₁ =V ₂ =1.5V max. At R = 5kΩ Chattering : 2ms max. Bounce : 2ms max. |
| EC11E/EC11G/EC11N/EC11M | V ₁ =V ₂ =1.5V max. At R = 5kΩ Chattering : 3ms max. Bounce : 2ms max. |
| EC11J / EC11K | V ₁ =V ₂ =2.5V max. At R = 5kΩ Chattering : 3ms max. Bounce : 2ms max. |

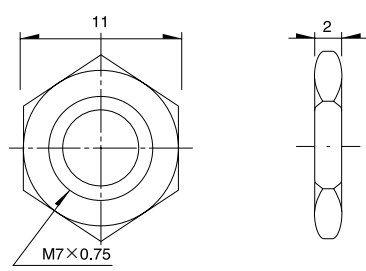
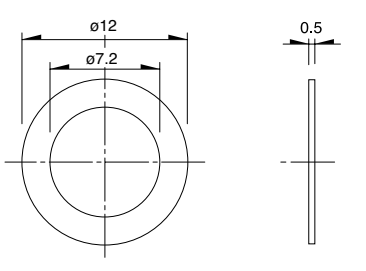
Circuit Diagram



11mm Size Metal Shaft Type / Attached Parts

The following parts are included with the product.

EC11B Series

| Nut | Washer |
|---|--|
|  |  |

Encoders
 Metal Shaft
 Insulated Shaft
 Through Shaft Type
 Ring Type

1 1 mm Size Metal Shaft Type / Product Varieties

Shaft Dimensions

1. Single-shaft Type

1) Serrated Type

Unit:mm

| <p>EC11 Style (Shaft diameter: $\phi 6$) Not applicable for EC11E and EC11G with push-lock mechanism</p> | <p>$\phi 7$※ *M7 for EC11B.</p> | <p>● Detailed dimensions</p> <table border="1"> <thead> <tr> <th>L_1</th> <th>L_B</th> <th>l_1</th> <th>l_2</th> <th>S_1</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>7</td> <td>6</td> <td>1</td> <td>7</td> </tr> <tr> <td>25</td> <td>10</td> <td>10</td> <td>2</td> <td>11</td> </tr> </tbody> </table> <p>※ *$L_B=7$ for EC11B.</p> | L_1 | L_B | l_1 | l_2 | S_1 | 20 | 7 | 6 | 1 | 7 | 25 | 10 | 10 | 2 | 11 |
|--|--|--|-------|-------|-------|-------|-------|----|----|------|---|----|------|----|----|---|----|
| L_1 | L_B | l_1 | l_2 | S_1 | | | | | | | | | | | | | |
| 20 | 7 | 6 | 1 | 7 | | | | | | | | | | | | | |
| 25 | 10 | 10 | 2 | 11 | | | | | | | | | | | | | |
| <p>EC11K / EC11J Style (Shaft diameter: $\phi 6$)</p> | <p>$\phi 6.975$</p> | <p>● Detailed dimensions</p> <table border="1"> <thead> <tr> <th>L_1</th> <th>L_B</th> <th>l_1</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>7</td> <td>5</td> </tr> <tr> <td>20</td> <td>10</td> <td>6</td> </tr> </tbody> </table> | L_1 | L_B | l_1 | 15 | 7 | 5 | 20 | 10 | 6 | | | | | | |
| L_1 | L_B | l_1 | | | | | | | | | | | | | | | |
| 15 | 7 | 5 | | | | | | | | | | | | | | | |
| 20 | 10 | 6 | | | | | | | | | | | | | | | |
| <p>EC11G Style (Shaft diameter: $\phi 9$)</p> | <p>$\phi 7$</p> | <p>● Detailed dimensions</p> <table border="1"> <thead> <tr> <th>L</th> <th>L_1</th> <th>L_B</th> </tr> </thead> <tbody> <tr> <td>18</td> <td>13.5</td> <td>5</td> </tr> <tr> <td>25</td> <td>20.5</td> <td>7</td> </tr> <tr> <td>28</td> <td>23.5</td> <td>10</td> </tr> </tbody> </table> | L | L_1 | L_B | 18 | 13.5 | 5 | 25 | 20.5 | 7 | 28 | 23.5 | 10 | | | |
| L | L_1 | L_B | | | | | | | | | | | | | | | |
| 18 | 13.5 | 5 | | | | | | | | | | | | | | | |
| 25 | 20.5 | 7 | | | | | | | | | | | | | | | |
| 28 | 23.5 | 10 | | | | | | | | | | | | | | | |

2) Flat Type

Unit:mm

| <p>EC11 Style (Shaft diameter: $\phi 6$)</p> | <p>$\phi 7$</p> <p>*M7 for EC11B.</p> | <p>● Detailed dimensions</p> <table border="1"> <thead> <tr> <th>L_1</th> <th>L_B</th> <th>l</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>5</td> <td>7</td> </tr> <tr> <td>15</td> <td>7</td> <td>5 (6)</td> </tr> <tr> <td>20</td> <td>7</td> <td>10 (12)</td> </tr> <tr> <td>25</td> <td>10</td> <td>12</td> </tr> </tbody> </table> <p>※1 ※2 ※1 Does not comply with EC111 ※2 $L_B=7$ for EC11B. Values in parentheses apply to products without push-on switch.</p> | L_1 | L_B | l | 15 | 5 | 7 | 15 | 7 | 5 (6) | 20 | 7 | 10 (12) | 25 | 10 | 12 |
|---|---|---|-------|-------|-----|----|---|---|----|----|-------|----|---|---------|----|----|----|
| L_1 | L_B | l | | | | | | | | | | | | | | | |
| 15 | 5 | 7 | | | | | | | | | | | | | | | |
| 15 | 7 | 5 (6) | | | | | | | | | | | | | | | |
| 20 | 7 | 10 (12) | | | | | | | | | | | | | | | |
| 25 | 10 | 12 | | | | | | | | | | | | | | | |
| <p>EC11K / EC11J Style (Shaft diameter: $\phi 5.975$)</p> | <p>$\phi 5.975$</p> <p>$\phi 8.975$</p> | <p>● Detailed dimensions</p> <table border="1"> <thead> <tr> <th>L_1</th> <th>L_B</th> <th>l</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>7</td> <td>5</td> </tr> <tr> <td>20</td> <td>10</td> <td>7</td> </tr> </tbody> </table> | L_1 | L_B | l | 15 | 7 | 5 | 20 | 10 | 7 | | | | | | |
| L_1 | L_B | l | | | | | | | | | | | | | | | |
| 15 | 7 | 5 | | | | | | | | | | | | | | | |
| 20 | 10 | 7 | | | | | | | | | | | | | | | |

Notes

- The highlighted figures in shaft types refer to Product Specifications in P.261 and P.262.
- Other varieties are also available. Please inquire.

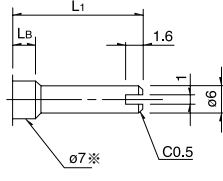
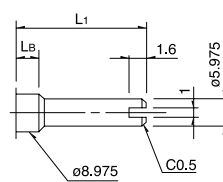
1 1 mm Size Metal Shaft Type / Product Varieties

Shaft Dimensions

1. Single-shaft Type

3) Slotted Type

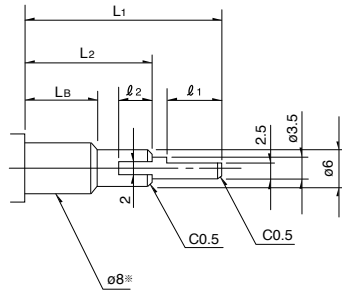
Unit:mm

| <p>EC11 Style (Shaft diameter : $\phi 6$)</p>  <p>$\phi 7$※ C0.5 ※M7 for EC11B.</p> | <p>● Detailed dimensions</p> <table border="1"> <thead> <tr> <th>L_1</th> <th>L_B</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>7</td> </tr> <tr> <td>20</td> <td>7</td> </tr> <tr> <td>25</td> <td>10</td> </tr> </tbody> </table> <p>※ ※$L_B=7$ for EC11B</p> | L_1 | L_B | 15 | 7 | 20 | 7 | 25 | 10 |
|---|---|-------|-------|----|---|----|----|----|----|
| L_1 | L_B | | | | | | | | |
| 15 | 7 | | | | | | | | |
| 20 | 7 | | | | | | | | |
| 25 | 10 | | | | | | | | |
| <p>EC11K / EC11J Style (Shaft diameter : $\phi 5.975$)</p>  <p>$\phi 8.975$ C0.5 ※M7 for EC11B.</p> | <p>● Detailed dimensions</p> <table border="1"> <thead> <tr> <th>L_1</th> <th>L_B</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>7</td> </tr> <tr> <td>20</td> <td>10</td> </tr> </tbody> </table> | L_1 | L_B | 15 | 7 | 20 | 10 | | |
| L_1 | L_B | | | | | | | | |
| 15 | 7 | | | | | | | | |
| 20 | 10 | | | | | | | | |

2. Standard Dimensions and Configuration of Dual-shaft Type

Flat Type

Unit:mm

| <p>EC11E Style (Inner-shaft : $\phi 3.5$ Outer-shaft : $\phi 6$)</p>  <p>$\phi 8$※ C0.5 C0.5 ※ $\phi 7$ for type with inner / outer shaft encoders (EC11EBB)</p> | <p>● Detailed dimensions</p> <table border="1"> <thead> <tr> <th>L_1</th> <th>L_2</th> <th>L_B</th> <th>l_1</th> <th>l_2</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>10</td> <td>5</td> <td>7</td> <td>4</td> </tr> <tr> <td>25</td> <td>15</td> <td>7</td> <td>7</td> <td>5</td> </tr> <tr> <td>30</td> <td>20</td> <td>10</td> <td>7</td> <td>5</td> </tr> </tbody> </table> | L_1 | L_2 | L_B | l_1 | l_2 | 20 | 10 | 5 | 7 | 4 | 25 | 15 | 7 | 7 | 5 | 30 | 20 | 10 | 7 | 5 |
|---|--|-------|-------|-------|-------|-------|----|----|---|---|---|----|----|---|---|---|----|----|----|---|---|
| L_1 | L_2 | L_B | l_1 | l_2 | | | | | | | | | | | | | | | | | |
| 20 | 10 | 5 | 7 | 4 | | | | | | | | | | | | | | | | | |
| 25 | 15 | 7 | 7 | 5 | | | | | | | | | | | | | | | | | |
| 30 | 20 | 10 | 7 | 5 | | | | | | | | | | | | | | | | | |

Notes

- The highlighted figures in shaft types refer to Product Specifications in P.261 and P.262.
- Other varieties are also available. Please inquire.

11 mm Size Metal Shaft Type / Switch Specifications

1. EC11B Series

| | | | |
|------------------------|-----------------------|---|-------------------|
| Switch type | | Momentary push switch | |
| Contact arrangement | | Single pole and single throw (Push-on) | |
| Travel (mm) | | $0.5^{+0.4}_{-0.3}$ | 1.5 ± 0.5 |
| Operating force | | $6 \pm 3\text{N}$ | $5 \pm 2\text{N}$ |
| Operating life | | 25,000 times | 20,000 times |
| Electrical performance | Rating | 0.1A 5V DC (500 μ A 5V DC min. ratings) | |
| | Contact resistance | 100m Ω max. for initial period, 200m Ω max. after operating life. | |
| | Insulation resistance | 100M Ω min. 250V DC | |
| | Voltage proof | 300V AC for 1 minute or 360V AC for 2 second | |

2. EC11E/EC11N/EC11I Series

| | | | |
|------------------------|-----------------------|---|-------------------|
| Switch type | | Momentary push switch | |
| Contact arrangement | | Single pole and single throw (Push-on) | |
| Travel (mm) | | 0.5 ± 0.3 | 1.5 ± 0.5 |
| Operating force | | $6^{+2.5}_{-2}\text{N}$ | $4 \pm 2\text{N}$ |
| Operating life | | 20,000 times | |
| Electrical performance | Rating | 0.1A 5V DC (500 μ A 5V DC min. ratings) | |
| | Contact resistance | 100m Ω max. for initial period, 200m Ω max. after operating life. | |
| | Insulation resistance | 100M Ω min. 250V DC | |
| | Voltage proof | 300V AC for 1 minute or 360V AC for 2 second | |

3. EC11G/EC11M Series

| | | | |
|------------------------|-----------------------|---|--|
| Switch type | | Momentary push switch | |
| Contact arrangement | | Single pole and single throw (Push-on) | |
| Travel (mm) | | 1.5 ± 0.35 | |
| Operating force | | $5 \pm 2\text{N}$ | |
| Operating life | | 20,000 times | |
| Electrical performance | Rating | 0.15A 5V DC (500 μ A 5V DC min. ratings) | |
| | Contact resistance | 100m Ω max. for initial period, 200m Ω max. after operating life. | |
| | Insulation resistance | 100M Ω min. 250V DC | |
| | Voltage proof | 300V AC for 1 minute or 360V AC for 2 second | |

4. EC11K/EC11J Series









| | | | |
|------------------------|-----------------------|---|-------------------|
| Switch type | | Momentary push switch | |
| Contact arrangement | | Single pole and single throw (Push-on) | |
| Travel (mm) | | 0.5 ± 0.3 | 1.5 ± 0.5 |
| Operating force | | $5 \pm 2\text{N}$ | $4 \pm 2\text{N}$ |
| Operating life | | 1,000,000 times | 100,000 times |
| Electrical performance | Rating | 0.1A 5V DC (0.1mA 5V DC min. ratings) | |
| | Contact resistance | 100m Ω max. for initial period, 200m Ω max. after operating life. | |
| | Insulation resistance | 100M Ω min. 250V DC | |
| | Voltage proof | 300V AC for 1 minute or 360V AC for 1 second | |

5. EC11E152U Series

| | | | |
|------------------------|-----------------------|---|--|
| Switch type | | Push lock mechanism switch | |
| Contact arrangement | | Single pole and single throw (Push-on) | |
| Travel (mm) | | 8 ± 0.8 | |
| Operating force | | 8N max. | |
| Operating life | | 10,000 times | |
| Electrical performance | Rating | 0.1A 5V DC (500 μ A 5V DC min. ratings) | |
| | Contact resistance | 100m Ω max. for initial period, 200m Ω max. after operating life. | |
| | Insulation resistance | 100M Ω min. 250V DC | |
| | Voltage proof | 300V AC for 1 minute or 360V AC for 2 second | |

Encoders

List of Varieties

| Type | | Metal shaft | | | | | | | | | | | | | | | | | | | |
|------------------------------------|--|---|--|---|---|-----------|--|---|--|------------------------------|---|-----------|--------------|-----------|--------------|-----------|--|-----------|--|-------|--|
| | | 9mm size | | | 11mm size | | | | | | | | | | | | | | | | |
| Series | | EC09E | | | EC11B | | | EC11E | | | EC11N | | | | | | | | | | |
| Photo | |  | | |  | | |  | | |  | | | | | | | | | | |
| Output | | Incremental (Two phase A and B) | | | | | | | | | | | | | | | | | | | |
| Shaft types | | Single-shaft | | | | | | Dual-shaft | | | Single-shaft | | | | | | | | | | |
| Operating direction | | Vertical | | | Horizontal | | | Vertical | | | | | | | | | | | | | |
| Number of pulse / Number of detent | | 15/30 | | | | | | 9/18 15/30 or without 18/36 or without | | | 15/30 | | | | | | | | | | |
| Features | | — | | | — | | | Without detent Push-lock mechanism | | | — | | | | | | | | | | |
| Dimensions (mm) | | W | | 9.5 | | | 11.7 | | | | | | | | | | | | | | |
| | | D | | | | | 13.75 | | | 12 | | | | | | | | | | | |
| | | H | | 4.5 | | | 5.5/6.7/7.75 | | | 4.5 | | | 8/8.5 | | 4.5 | | | | | | |
| Operating temperature range | | -40°C to +85°C | | | | | | | | | | | | | | | | | | | |
| Operating life | | 15,000 cycles | | | | | | | | | | | | | | | | | | | |
| Automotive use | | ● | | | ● | | | ● | | | ● | | | | | | | | | | |
| Life cycle (availability) | |  | | |  | | |  | | |  | | | | | | | | | | |
| Electrical performance | | Rating | | 10mA 5V DC | | | | | | | | | | | | | | | | | |
| | | Max./min. operating current (Resistive load) | | 10mA /1mA | | | | | | | | | | | | | | | | | |
| | | Insulation resistance | | 100MΩ min. 250V DC | | | | | | | | | | | | | | | | | |
| | | Voltage proof | | 300V AC for 1 minute or 360V AC for 1s | | | 300V AC for 1 minute or 360V AC for 2s | | | | | | | | | | | | | | |
| Mechanical performance | | Rotational torque (Without detent) | | — | | | — | | | 7 ± 3mN·m | | | — | | | | | | | | |
| | | Detent torque | | 8 ± 5mN·m | | | 12 ± 7mN·m | | | 10 ± 7mN·m | | | | | | | | | | | |
| | | Push-pull strength | | 100N | | | | | | | | | | | | | | | | | |
| Shaft configuration | | Flat | | | Flat, Slotted, Serrated | | | | | | Inner-shaft : Flat Outer-shaft : Slotted | | Flat | | | | | | | | |
| Terminal type | | Insertion | | | | | | | | | | | | | | | | | | | |
| Switch Specifications | | Switch type | | Push-on switch | | | | | | Push-lock mechanism switch * | Push-on switch | | | | | | | | | | |
| | | Contact arrangement | | Single pole and single throw (Push-on) | | | | | | | | | | | | | | | | | |
| | | Travel (mm) | | 0.5 ± 0.3 | | 1.5 ± 0.5 | | 0.5 ± 0.3 | | 1.5 ± 0.5 | | 0.5 ± 0.3 | | 1.5 ± 0.5 | | 0.5 ± 0.3 | | 1.5 ± 0.5 | | | |
| | | Operating force (N) | | 6 ± 2.5 | | 4 ± 2 | | 6 ± 3 | | 5 ± 2 | | 6 ± 2.5 | | 4 ± 2 | | 8 max. | | 6 ± 2.5 | | 4 ± 2 | |
| | | Rating | | 10mA 5V DC (1mA 5V DC min. ratings) | | | 0.1A 5V DC (500μA 5V DC min. ratings) | | | | | | | | | | | | | | |
| | | Contact resistance | | 100mΩ max. for initial period; 200mΩ max. after operating life. | | | | | | | | | | | | | | | | | |
| | | Operating life | | 10,000 times | | | 25,000 times | | | 20,000 times | | | 10,000 times | | 20,000 times | | | | | | |
| Page | | 259 | | | 261 | | | | | | | | | | | | | | | | |













| | |
|-------------------------------|-----|
| Encoders Soldering Conditions | 299 |
| Encoders Cautions | 300 |

Notes

- *marked specification is only applicable to EC11E152U402.
- Indicates applicability to all products in the series.

Encoders

List of Varieties

| Type | | Metal shaft | | | | | | | | |
|------------------------------------|--|---|---|---|--|---|---|--|-----------------|-------------------------------------|
| | | 11mm size | | | | | | | | |
| Series | | EC11G | EC11M | EC111 | EC11K | EC11J | EM11B | | | |
| Photo | |  |  |  |  |  |  | | | |
| Output | | Incremental (Two phase A and B) | | Self-return switch | Incremental (Two phase A and B) | | | | | |
| Shaft types | | Single-shaft | | | | | | | | |
| Operating direction | | Vertical | | | | | | | | |
| Number of pulse / Number of detent | | 15/30 15/without | | — | 9/18 15/30 | | 16/16 | | | |
| Features | | Less shaft wobble | | — | — | Surface Mount type | | Magnetic type | | |
| Dimensions (mm) | W | 11.7 | | | | | | 10.8 | | |
| | D | 12 | 13 | 12 | 15.3 | | 11 | | | |
| | H | 4.5 | 5 | 4.5 | | 7.5 | | | | |
| Operating temperature range | | -40°C to +85°C | | | | | | -30°C to +85°C | | |
| Operating life | | 15,000 cycles | | | 100,000 cycles | | | 1,000,000 cycles | | |
| Automotive use | | ● | ● | ● | ● | ● | ● | ● | | |
| Life cycle (availability) | |  |  |  |  |  |  | | | |
| Electrical performance | Rating | 10mA 5V DC | | | | | | 10mA 5V±5% DC | | |
| | Max./min. operating current (Resistive load) | 10mA / 1mA | | | | | | 15mA / — | | |
| | Insulation resistance | 100MΩ min. 250V DC | | | | | | 100MΩ min. 100V DC | | |
| | Voltage proof | 300V AC for 1 minute or 360V AC for 2s | | | 300V AC for 1 minute or 360V AC for 1s | | | 250V AC for 1 minute or 300V AC for 2s | | |
| Mechanical performance | Rotational torque (Without detent) | 8.5±5mN·m | | 3 to 30mN·m | | — | — | — | | |
| | Detent torque | 12±7mN·m | | — | 12±5mN·m | | 12±5mN·m (Initial) 10±4mN·m (After reflow) | | 10±5mN·m | |
| | Push-pull strength | 100N | | | | | | | | |
| Shaft configuration | | Serrated | | Flat, Slotted, Serrated | | | | Flat | | |
| Terminal type | | Insertion | | | | | Reflow | | Insertion | |
| Switch Specifications | Switch type | Push-on switch | | | | | | | | |
| | Contact arrangement | Single pole and single throw (Push-on) | | | | | | | | |
| | Travel (mm) | 1.5±0.35 | | 0.5±0.3 | 1.5±0.5 | 0.5±0.3 | 1.5±0.5 | 0.5±0.3 | 1.5±0.5 | 0.5 ± _{0.2} ^{0.3} |
| | Operating force (N) | 5±2 | | 6 ± ₂ ^{2.5} | 4±2 | 5±2 | 4±2 | 5±2 | 4±2 | 5.5±3 |
| | Rating | 0.1A 5V DC (500μA 5V DC min. ratings) | | | 0.1A 5V DC (0.1mA 5V DC min. ratings) | | | 5mA 5V DC (50mA 12V DC max. ratings) | | |
| | Contact resistance | 100mΩ max. for initial period, 200mΩ max. after operating life. | | | | | | 500mΩ max. for initial period, 5mΩ max. after operating life. | | |
| | Operating life | 20,000 times | | | 1,000,000 times | 100,000 times | 1,000,000 times | 100,000 times | 1,000,000 times | |
| Page | | 261 | | | | | | 271 | | |

| | |
|-------------------------------|-----|
| Encoders Soldering Conditions | 299 |
| Encoders Cautions | 300 |

Note

- Indicates applicability to all products in the series.

Reference for Manual Soldering

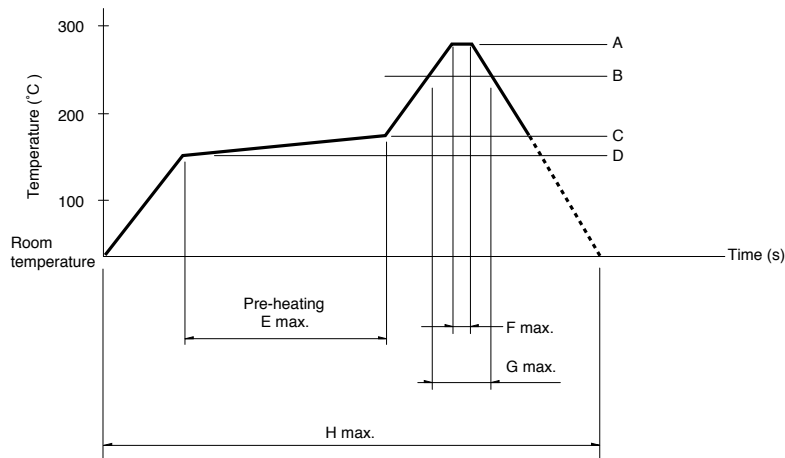
| Series | Tip temperature | Soldering time | No. of solders |
|---|-----------------|--------------------------------|----------------|
| EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC11M, EC11N, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC40A, EC45A, EC50A, EC60B, EM11B, EC21C, EC28C, EC35CH | 350°C max. | 3s max. | 1 time |
| EC11J | 350±10°C | 3 ⁺¹ ₀ s | 2 times |

Reference for Dip Soldering

| Series | Preheating | | Dip soldering | | No. of solders |
|--|-------------------------------|--------------|-----------------------|----------------|----------------|
| | Soldering surface temperature | Heating time | Soldering temperature | Soldering time | |
| EC09E, EC11B, EC111, EC11E, EC11G, EC11K, EC11M, EC11N, EC18A, EC21A, EC28A, EC35A, EC35AH, EC50A, EC60B | 100°C max. | 2 min. max. | 260±5°C | 5±1s | 2 times max. |
| EM11B | 100°C max. | 1 min. max. | 260°C max. | 3s max. | 2 times max. |
| EC10E, EC12D, EC12E | 100°C max. | 1 min. max. | 260±5°C | 3±1s | 2 times max. |
| EC40A | 110°C max. | 1 min. max. | 260°C max. | 10s max. | 1 time |
| EC45A | 100°C max. | 2 min. max. | 260°C max. | 5s max. | 2 times max. |

Example of Reflow Soldering Condition

Temperature profile



| Series | A | B | C | D | E | F | G | H | No. of reflows |
|---------------|----------------|------------|-------|-------|-------------|----|------------|-------------|----------------|
| EC11J | 260°C | 230°C | 180°C | 150°C | 2 min. max. | 3s | 40s | 4 min. max. | 2 times max. |
| 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. |

Notes

- 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.

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