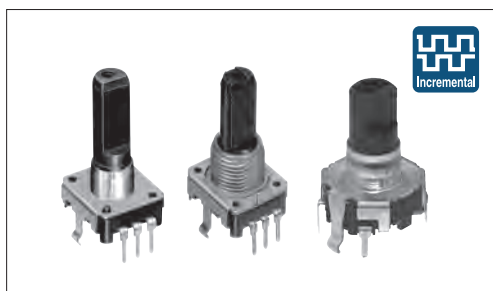




■ Typical Specifications



| Items                       |                | Specifications                                   |
|-----------------------------|----------------|--|
| Rating                      |                | Each lead 0.5mA 5V DC<br>Common lead 1mA 5V DC   |
| Operating life              | Without detent | Heavy: 15,000 cycles,<br>Standard: 30,000 cycles |
|                             | With detent    | 30,000 cycles                                    |
| Operating temperature range |                | EC12E: -10°C to +70°C<br>EC12D: -40°C to +85°C   |

■ Product Line

Standard Type

| Length of the shaft<br>LM <sub>1</sub> (mm) | Torque<br>(mN·m)      | Number of detent    | Number of pulse | Minimum order unit (pcs.) |         | Product No.         | Drawing No. |                     |                     |
|---|-----------------------|---------------------|-----------------|---------------------------|---------|---------------------|-------------|---------------------|---------------------|
|   |                       |                     |                 | Japan                     | Export  |                     |             |                     |                     |
| 15  | Standard<br>3 to 20   | 12                  | 12              | 2,400                     | 2,400   | <b>EC12E1220407</b> | 2           |                     |                     |
| 20  |                       |                     |                 |                           |         | <b>EC12E1220406</b> | 1           |                     |                     |
| 25  |                       |                     |                 |                           |         | <b>EC12E1220405</b> | 1           |                     |                     |
| 8.5<br>(Through shaft)                      | Lightest (jog)<br>3±2 |                     |                 | 24                        | 24      | 3,000               | 3,000       | <b>EC12E1220301</b> | 3                   |
| 20  |                       |                     |                 |                           |         |                     |             | <b>EC12E1240405</b> | 1                   |
| 25  |                       |                     |                 |                           |         |                     |             | <b>EC12E1240406</b> | 1                   |
| 8.5<br>(Through shaft)                      | Standard 3 to 20      | 24                  | 24              |                           |         | 2,400               | 2,400       | <b>EC12E1240301</b> | 3                   |
| 15  |                       |                     |                 |                           |         |                     |             | <b>EC12E24204A2</b> | 2                   |
| 17.5  |                       |                     |                 |                           |         |                     |             | <b>EC12E24204A7</b> | 1                   |
| 20  | <b>EC12E24204A8</b>   |                     |                 |                           |         |                     |             |                     |                     |
| 25  | <b>EC12E24204A9</b>   |                     |                 | 3                         |         |                     |             |                     |                     |
| 8.5<br>(Through shaft)                      | Lightest (jog)<br>3±2 |                     |                 |                           | 24      | 24                  | 3,000       | 3,000               | <b>EC12E2420301</b> |
| 20  |                       | <b>EC12E24404A8</b> | 1               |                           |         |                     |             |                     |                     |
| 25  |                       | <b>EC12E24404A6</b> | 1               |                           |         |                     |             |                     |                     |
| 8.5<br>(Through shaft)                      | Standard 10 max.      | Without             | Without         | 2,400                     |         |                     | 2,400       | <b>EC12E2440301</b> | 3                   |
| 20  |                       |                     |                 |                           |         |                     |             | <b>EC12E24104A6</b> | 1                   |
| 25  |                       |                     |                 |                           |         |                     |             | <b>EC12E2430404</b> |                     |
| 25  | Heavy 25±15           |                     |                 | Without                   | Without | 2,400               | 2,400       | <b>EC12E2430401</b> | 1                   |
| 25  | Heavy 25±15           |                     |                 |                           |         |                     |             |                     |                     |

With Bushing Type

| Length of the shaft<br>LM <sub>1</sub> (mm) | Torque<br>(mN·m)    | Number of detent    | Number of pulse     | Minimum order unit (pcs.) |                     | Product No.         | Drawing No. |
|---|---------------------|---------------------|---------------------|---------------------------|---------------------|---------------------|-------------|
|   |                     |                     |                     | Japan                     | Export              |                     |             |
| 25  | Standard<br>3 to 20 | 12                  | 12                  | 1,900                     | 1,900               | <b>EC12E1220813</b> | 4           |
| 20  |                     | 24                  | 24                  |                           |                     | <b>EC12E2420802</b> |             |
| 25  |                     |                     |                     |                           |                     | <b>EC12E2420801</b> |             |
| 30  |                     | <b>EC12E2420803</b> |                     |                           |                     |                     |             |
| 20  | Heavy 25±15         | Without             |                     | Without                   | <b>EC12E2430804</b> |                     |             |
| 25  |                     |                     | <b>EC12E2430803</b> |                           |                     |                     |             |
| 30  |                     |                     | Heavy 40±15         |                           | <b>EC12E2460802</b> |                     |             |

Nuts and washers are not included. If required, please contact us.

Refer to P.257 for product varieties.  
Refer to P.275 for soldering conditions.

Product Line

With Switch Type

| Length of the shaft LM <sub>1</sub> (mm) | Detent torque (mN·m) | Number of detent | Number of pulse | Operating force of switch (N) | Travel of push-on switch (mm) | Minimum order unit (pcs.) |        | Product No.  | Drawing No. |
|--|----------------------|------------------|-----------------|-------------------------------|-------------------------------|---------------------------|--------|--------------|-------------|
|  |                      |                  |                 |                               |                               | Japan                     | Export |              |             |
| 175                                      | 5±3                  | 30               | 15              | 3                             | 0.5                           | 1,280                     | 2,560  | EC12D1524403 | 5           |
|  | 10±5                 |                  |                 |                               |                               |                           |        | EC12D1564402 |             |
|  | 5±3                  |                  |                 | EC12D1524406                  |                               |                           |        |              |             |
|  | 10±5                 |                  |                 | EC12D1564404                  |                               |                           |        |              |             |

Notes

EC12D is suitable for automotive use.


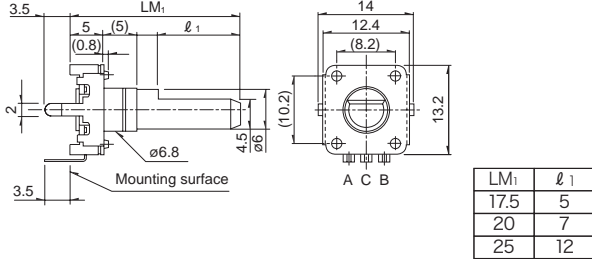
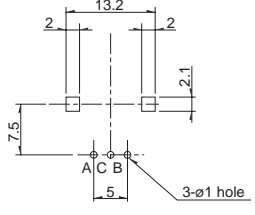

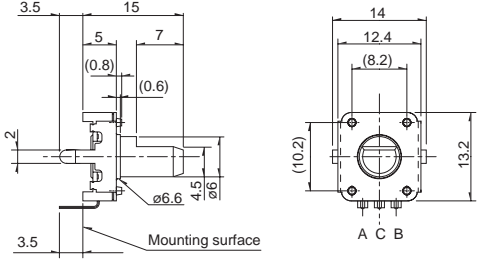
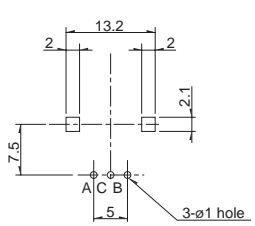

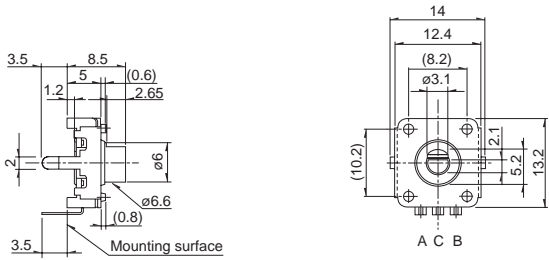
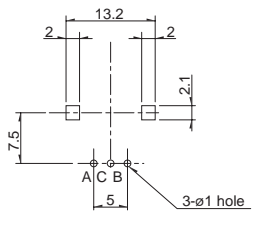
Packing Specifications

Tray

| Product No.  | Number of packages (pcs.) |                        | Export package measurements (mm) |
|--------------|---------------------------|------------------------|----------------------------------|
|              | 1 case /Japan             | 1 case /export packing |                                  |
| EC12E □□□ 03 | 3,000                     | 3,000                  | 525×369×204                      |
| EC12E □□□ 04 | 2,400                     | 2,400                  |                                  |
| EC12E □□□ 08 | 1,900                     | 1,900                  |                                  |
| EC12D        | 1,280                     | 2,560                  | 540×360×290                      |

Dimensions

Unit:mm

| No.             | Photo   | Style  | PC board mounting hole dimensions (Viewed from mounting side)                         |                |      |   |    |   |    |    |   |
|-----------------|---|--|---|----------------|------|---|----|---|----|----|---|
| 1               |  |  <table border="1" data-bbox="981 1339 1101 1433"> <thead> <tr> <th>LM<sub>1</sub></th> <th>ℓ<sub>1</sub></th> </tr> </thead> <tbody> <tr> <td>17.5</td> <td>5</td> </tr> <tr> <td>20</td> <td>7</td> </tr> <tr> <td>25</td> <td>12</td> </tr> </tbody> </table> | LM <sub>1</sub>   | ℓ <sub>1</sub> | 17.5 | 5 | 20 | 7 | 25 | 12 |  |
| LM <sub>1</sub> | ℓ <sub>1</sub>  |  |   |                |      |   |    |   |    |    |   |
| 17.5            | 5   |  |   |                |      |   |    |   |    |    |   |
| 20              | 7   |  |   |                |      |   |    |   |    |    |   |
| 25              | 12  |  |   |                |      |   |    |   |    |    |   |
| 2               |  |   |  |                |      |   |    |   |    |    |   |
| 3               |  |    |  |                |      |   |    |   |    |    |   |


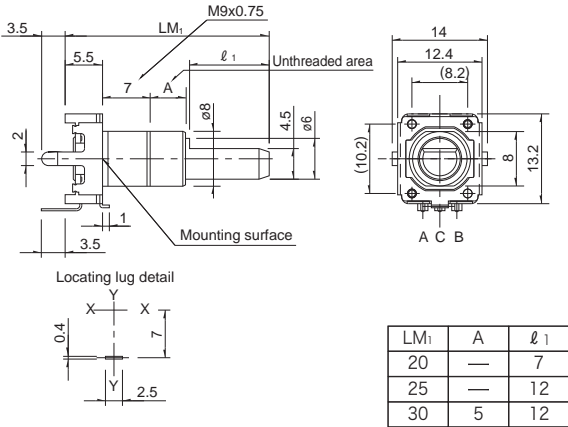
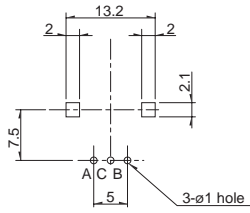

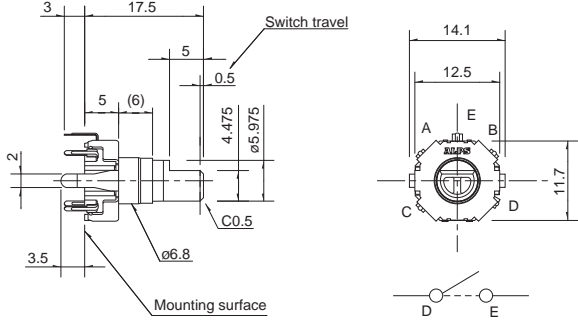
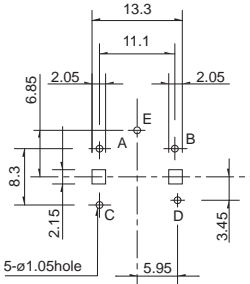
Refer to P.257 for switch specifications.  
Refer to P.275 for soldering conditions.

# EC12E EC12D

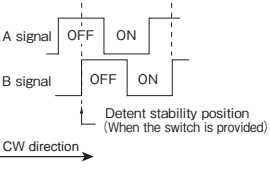
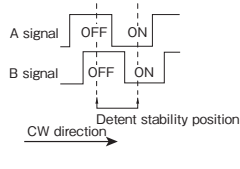
## 12mm Size Insulated Shaft Type

### Dimensions

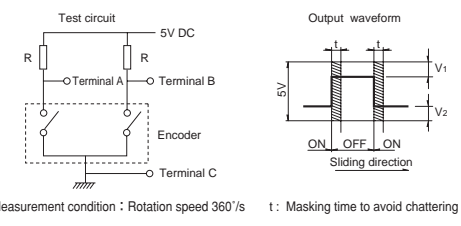
Unit:mm

| No.             | Photo  | Style   | PC board mounting hole dimensions<br>(Viewed from mounting side)                     |   |                |    |   |   |    |   |    |    |   |    |   |
|-----------------|--|---|--|---|----------------|----|---|---|----|---|----|----|---|----|---|
| 4               |   |  <table border="1" data-bbox="922 698 1104 801"> <thead> <tr> <th>LM<sub>1</sub></th> <th>A</th> <th>l<sub>1</sub></th> </tr> </thead> <tbody> <tr> <td>20</td> <td>—</td> <td>7</td> </tr> <tr> <td>25</td> <td>—</td> <td>12</td> </tr> <tr> <td>30</td> <td>5</td> <td>12</td> </tr> </tbody> </table> | LM <sub>1</sub>  | A | l <sub>1</sub> | 20 | — | 7 | 25 | — | 12 | 30 | 5 | 12 |  |
| LM <sub>1</sub> | A  | l <sub>1</sub>  |  |   |                |    |   |   |    |   |    |    |   |    |   |
| 20              | —  | 7   |  |   |                |    |   |   |    |   |    |    |   |    |   |
| 25              | —  | 12  |  |   |                |    |   |   |    |   |    |    |   |    |   |
| 30              | 5  | 12  |  |   |                |    |   |   |    |   |    |    |   |    |   |
| 5               |  |    |  |   |                |    |   |   |    |   |    |    |   |    |   |

### Output Wave

| EC12E   | EC12D   |
|---|---|
|  <p>CW direction →</p> <p>*Detent position cannot be specified for B signal.</p> |  <p>CW direction →</p> |

### Sliding Noise

| EC12E  | EC12D  |
|--|--|
|  <p>Measurement condition : Rotation speed 360°/s t : Masking time to avoid chattering</p> | <p><math>V_1 = V_2 = 1.5V</math> max.<br/>At <math>R = 10k \Omega</math><br/>Chattering : 3ms max.<br/>Bounce : 2ms max.</p> |
|  | <p><math>V_1 = V_2 = 2.5V</math> max.<br/>At <math>R = 5k \Omega</math><br/>Chattering : 3ms max.<br/>Bounce : 2ms max.</p>  |

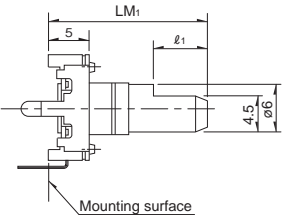
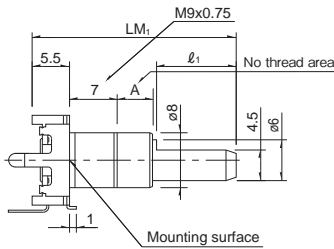
# 12mm Size Insulated Shaft Type / Product Varieties

In addition to the Product Line, we accommodate the following specifications. Combinations not included in the Product Line are treated as semi-standard products.

## ■ Shaft Dimensions

Flat Type: EC12E

Unit:mm

| <p><b>High collar type</b></p>   | <p>Detailed dimensions</p> <table border="1" data-bbox="1061 369 1289 548"> <thead> <tr> <th><math>LM_1</math></th> <th><math>l_1</math></th> </tr> </thead> <tbody> <tr> <td>17.5</td> <td>5</td> </tr> <tr> <td>20</td> <td>7</td> </tr> <tr> <td>22.5</td> <td>7</td> </tr> <tr> <td>25</td> <td>12</td> </tr> <tr> <td>30</td> <td>12</td> </tr> </tbody> </table> <p>※ Not available for types without detents</p>      | $LM_1$ | $l_1$ | 17.5  | 5  | 20 | 7 | 22.5 | 7 | 25 | 12 | 30 | 12 |    |   |    |
|---|--|--------|-------|-------|----|----|---|------|---|----|----|----|----|----|---|----|
| $LM_1$  | $l_1$  |        |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| 17.5  | 5  |        |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| 20  | 7  |        |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| 22.5  | 7  |        |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| 25  | 12   |        |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| 30  | 12   |        |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| <p><b>With bushing type</b></p>  | <p>Detailed dimensions</p> <table border="1" data-bbox="1061 660 1359 806"> <thead> <tr> <th><math>LM_1</math></th> <th>A</th> <th><math>l_1</math></th> </tr> </thead> <tbody> <tr> <td>20</td> <td>—</td> <td>7</td> </tr> <tr> <td>25</td> <td>—</td> <td>12</td> </tr> <tr> <td>30</td> <td>5</td> <td>12</td> </tr> <tr> <td>35</td> <td>5</td> <td>12</td> </tr> </tbody> </table> <p>Excluding the 12 detent type</p> | $LM_1$ | A     | $l_1$ | 20 | —  | 7 | 25   | — | 12 | 30 | 5  | 12 | 35 | 5 | 12 |
| $LM_1$  | A  | $l_1$  |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| 20  | —  | 7      |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| 25  | —  | 12     |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| 30  | 5  | 12     |       |       |    |    |   |      |   |    |    |    |    |    |   |    |
| 35  | 5  | 12     |       |       |    |    |   |      |   |    |    |    |    |    |   |    |

Encoders

Metal Shaft

Insulated Shaft

Through Shaft Type









Ring Type

# 12mm Size Insulated Shaft Type / Switch Specifications

|                        |  |   |
|------------------------|--|---|
| Switch type            | Momentary push switch                  |   |
| Contact arrangement    | Single pole and single throw (Push-on) |   |
| Travel (mm)            | 0.5±0.3                                |   |
| Operating force        | 3 ± 1.5 N, 6 ± 2.5 N                   |   |
| Operating life         | 30,000 times                           |   |
| Electrical performance | Rating                                 | 1mA 5V DC (10mA 5V DC max. ratings)                             |
|                        | Contact resistance                     | 100mΩ max. for initial period, 200mΩ max. after operating life. |
|                        | Insulation resistance                  | 100MΩ min. 250V DC  |
|                        | Voltage proof                          | 300V AC for 1 minute or 360V AC for 1 second                    |

# Encoders

## List of Varieties

| Type                               |  | Metal shaft   | Insulated shaft   |   |   |
|------------------------------------|--|---|---|---|---|
|                                    |  | 11mm size   | 12mm size   |   | 18mm size   |
| Series                             |  | <b>EM11B</b>  | <b>EC12E</b>  | <b>EC12D</b>  | <b>EC18A</b>  |
| Photo                              |  |  |  |  |  |
| Output                             |  | Incremental (Two phase A and B)   |   |   | Absolute type   |
| Shaft types                        |  | Single-shaft  |   |   |   |
| Control part orientation           |  | Vertical  |   |   |   |
| Number of pulse / Number of detent |  | 16/16   | 12/12<br>24/24<br>24/without  | 15/30   | 12 positions<br>15 positions<br>16 positions  |
| Features                           |  | Magnetic type   | —   | With push-on switch   | Water resisting performance (IPX7)  |
| Dimensions (mm)                    | W  | 10.8  | 12.4  | 12.5  | 18.8  |
|                                    | D  | 11  | 13.2  | 11.7  | 18  |
|                                    | H  | 7.5   | 5   |   | 8.75  |
| Operating temperature range        |  | -30°C to +85°C  | -10°C to +70°C  | -40°C to +85°C  | -20°C to +60°C  |
| Operating life                     |  | 1,000,000 cycles  | 15,000 cycles<br>30,000 cycles  | 30,000 cycles   |   |
| Automotive use                     |  | ●   | —   | ●   | —   |
| Life cycle (availability)          |  |  |  |  |  |
| Electrical performance             | Rating                                       | 10mA 5V±5% DC   | 0.5mA 5V DC   | 1mA 5V DC   | 1mA 10V DC  |
|                                    | Max./min. operating current (Resistive load) | 15mA / —  | 5mA / 0.5mA   | 10mA / 1mA  | —   |
|                                    | Insulation resistance                        | 100MΩ min. 100V DC  | 10MΩ min. 50V DC  | 100MΩ min. 250V DC  | 10MΩ min. 250V DC   |
|                                    | Voltage proof                                | 250V AC for 1 minute or 300V AC for 2s  | 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 (Without detent)           | —   | 10mN·m max.<br>25±15mN·m<br>40±15mN·m   | —   | —   |
|                                    | Detent torque                                | 10±5mN·m  | 3±2mN·m<br>3 to 20mN·m  | 5±3mN·m<br>10±5mN·m   | 60±20mN·m   |
|                                    | Push-pull strength                           | 100N  | 80N   | 100N  | Push 100N / Pull 50N  |
| Shaft configuration                |  | Flat  | Flat, Through shaft   | Flat  |   |
| Terminal type                      |  | Insertion   |   |   |   |
| Switch Specifications              | Switch type                                  | Push-on switch  | —   | Push-on switch  | —   |
|                                    | Contact arrangement                          | Single pole and single throw (Push-on)  | —   | Single pole and single throw (Push-on)  | —   |
|                                    | Travel (mm)                                  | 0.5 ± <sub>0.2</sub> <sup>0.3</sup>   | —   | 0.5±0.3   | —   |
|                                    | Operating force (N)                          | 5.5±3   | —   | 3 <sub>-1</sub> <sup>+1.5</sup>   6 <sub>-2</sub> <sup>+2.5</sup>                   | —   |
|                                    | Rating                                       | 5mA 5V DC<br>(50mA 12V DC max. ratings)   | —   | 1mA 5V DC<br>(10mA 5V DC max. ratings)  | —   |
|                                    | Contact resistance                           | 500mΩ max. for initial period,<br>5mΩ max. after operating life.                  | —   | 100mΩ max. for initial period;<br>200mΩ max. after operating life.                  | —   |
|                                    | Operating life                               | 1,000,000 times   | —   | 30,000 times  | —   |
| Page                               |  | 252   | 254   | 255   | 258   |

|                               |     |
|-------------------------------|-----|
| Encoders Soldering Conditions | 275 |
| Encoders Cautions             | 276 |

### Notes

● Indicates applicability to all products in the series.