
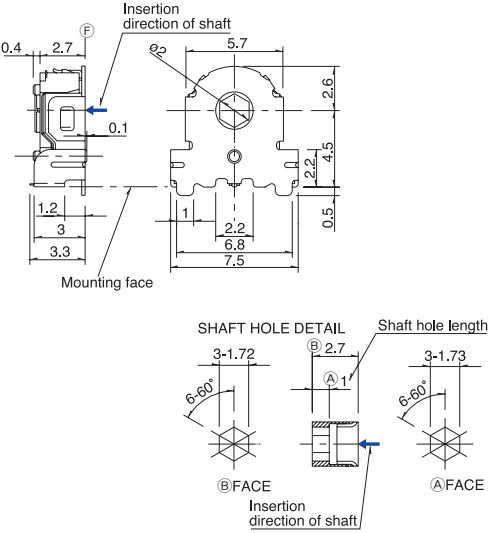
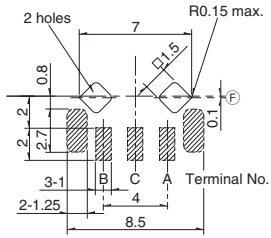

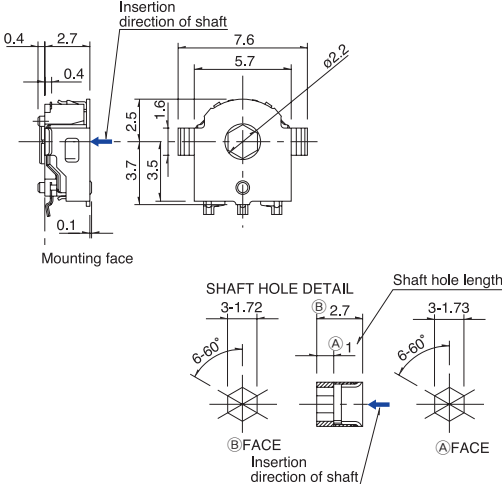
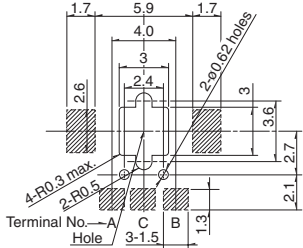
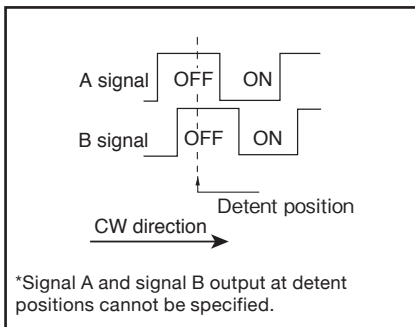


Dimensions

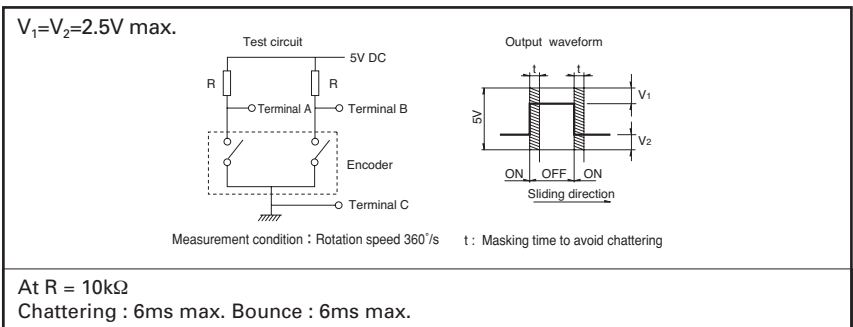
Unit:mm

| No. | Photo | Style | PC board mounting hole dimensions (Viewed from mounting side) |
|-----|---|---|---|
| 2 |  |  |  <p>Shaded areas are solder lands.</p> |
| 3 |  |  |  <p>Shaded areas are solder lands.</p> |




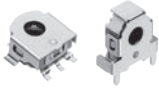






Output Wave



Sliding Noise



List of Varieties

| Type | Insulated Shaft Type | | | Hollow Shaft Type | | | |
|------------------------------------|---|---|---|---|---|------------------------|--------------------|
| | 12mm size | | 18mm size | 5mm size | 10mm size | | |
| Series | EC12E | EC12D | EC18A | EC05E | EC10E | | |
| Photo |  |  |  |  |  | | |
| Output | Incremental (Two phase A and B) | | Absolute type | Incremental (Two phase A and B) | | | |
| Shaft types | Single-shaft | | | Hollow shaft | | | |
| Operating direction | Vertical | | | Vertical | Horizontal | | |
| Number of pulse / Number of detent | 12 / 12 24 / 24 24 / Without | 15 / 30 | 12 positions 16 positions | 12 / 12 | 12 / 24 12 / 12 | | |
| Features | — | With push-on switch | Water Resisting Performance (IPX7) | Surface Mount Type | — | | |
| Dimensions (mm) | W | 12.4 | 12.5 | 20 | 5.7 | 7.5 | 9.8 |
| | D | 13.2 | 11.7 | 18 | 6 | 3.3 | 4.4 |
| | H | 5 | | 8.75 | 2.7 | 7.25 | 10.6 / 12.6 / 14.6 |
| Operating temperature range | -10°C to + 70°C | -40°C to + 85°C | - 20°C to + 60°C | - 30°C to + 85°C | - 5°C to + 45°C - 30°C to + 85°C (For Automotive) | | |
| Operating life | 15,000 cycles 30,000 cycles | 30,000 cycles | | 100,000 cycles | | | |
| Automotive use | — | ● | — | — | ○ | | |
| Life cycle (availability) |  |  |  |  |  | | |
| Electrical performance | Rating | 0.5mA 5V DC | 1mA 5V DC | 1mA 10V DC | 0.55mA 5.5V DC | 1mA 5V DC | |
| | Max./min. operating current (Resistive load) | 5mA / 0.5mA | 10mA / 1mA | — | 0.55mA / — | — | |
| | Insulation resistance | 10MΩ min. 50V DC | 100MΩ min. 250V DC | 10MΩ min. 250V DC | 50MΩ min. 50V 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 | 50V AC for 1 minute | | |
| Mechanical performance | Rotational torque (Without detent) | 10mN·m max. 25 ± 15mN·m 40 ± 15mN·m | — | — | — | — | |
| | Detent torque | 3 ± 2mN·m 3 to 20mN·m | 5 ± 3mN·m 10 ± 5mN·m | 60 ± 20mN·m | 1.6 ± 1.3mN·m | 5 ± 3mN·m 6 ± 3mN·m | |
| | Push-pull strength | 80N | 100N | Push 100N / pull 50N | — | | |
| Shaft configuration | Flat, Hollow Shaft | Flat | | Hollow shaft | | | |
| Terminal type | Insertion | | | Reflow | Insertion | | |
| Switch Specifications | Switch type | — | Push-on switch | — | — | — | |
| | Contact arrangement | — | Single pole and 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 | — | — | — | |
| | Contact resistance | — | 100mΩ max. for initial period; 200mΩ max. after operating life. | — | — | — | |
| | Operating life | — | 30,000times min. | — | — | — | |
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Notes

1. The operating temperature range for automotive applications can be raised upon request. Please contact us for details.
2. ● indicates applicability to all products in the series, while ○ indicates applicability to some products in the series.

Detector

Slide

Push

Rotary

Encoders

Power

Dual-in-line
Package Type

TACT Switch™

Metal
Shaft

Insulated
Shaft

Hollow
Shaft

Ring
Type

Encoders Soldering Conditions

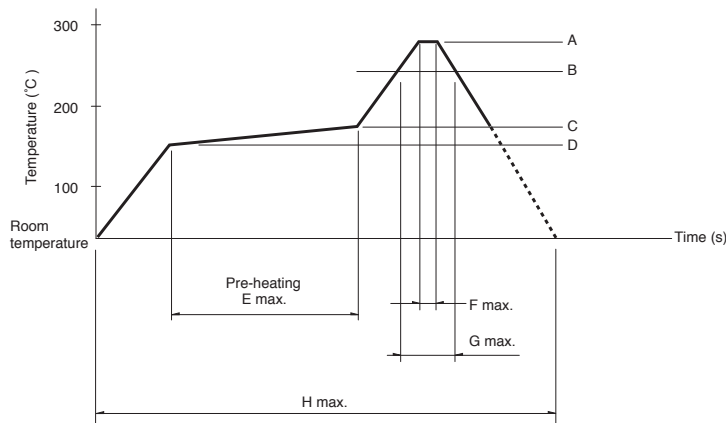
Reference for Hand Soldering

| Series | Tip temperature | Soldering time | No. of solders |
|---|-----------------|--------------------------------|----------------|
| EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC12D, EC12E, EC18A, EC20A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC40A, EC45A, EC50A, EC60A, EM20B | 350°C max. | 3s max. | 1 time |
| EC11J | 350 ± 10°C | 3 ⁺¹ ₀ s | 2 time |

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, EC18A, EC20A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC50A | 100°C max. | 2 min. max. | 260 ± 5°C | 5 ± 1s | 2 time max. |
| EC10E, EC12D, EC12E | 100°C max. | 1 min. max. | 260 ± 5°C | 3 ± 1s | 2 time max. |
| EC40A | 110°C max. | 1 min. max. | 260°C max. | 10s max. | 1 time |
| EC45A, EC60A | 100°C max. | 2 min. max. | 260°C max. | 5s max. | 2 time max. |
| EM20B | 80°C max. | 1 min. max. | 260°C max. | 3s max. | 2 time max. |

Condition for Reflow 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 time max. |
| EC05E | 250°C min. | 230°C min. | 180°C | 150°C | 60s to 120s | — | 30s to 40s | — | 2 time max. |

Notes

1. When using an infrared reflow oven, solder may sometimes not be applied. Be sure to use a hot air reflow oven or a type that uses infrared rays in combination with hot air.
2. The temperatures given above are the maximum temperatures at the terminals of the potentiometer when employing a hot air reflow method. The temperature of the PC board and the surface temperature of the potentiometer may vary greatly depending on the PC board material, its size and thickness. Ensure that the surface temperature of the potentiometer does not rise to 250°C or greater.
3. Conditions vary to some extent depending on the type of reflow bath used. Be sure to give due consideration to this prior to use.

Detector

Slide

Push

Rotary

Encoders

Power

Dual-in-line
Package Type

TACT Switch™

Metal
Shaft

Insulated
Shaft

Hollow
Shaft

Ring
Type