

EC09E 9mm Size Metal Shaft Type

A compact 9.5mm size and round shape contribute to save space



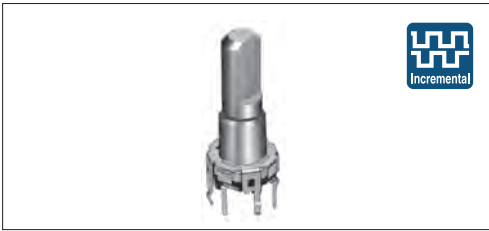
Encoders

Metal Shaft

Insulated Shaft

Through Shaft Type

Ring Type



Typical Specifications

| Items | Specifications |
|-----------------------------|----------------|
| Rating | 10mA 5V DC |
| Operating life | 15,000 cycles |
| Operating temperature range | -40°C to +85°C |

Product Line

| Shaft configuration | Length of the shaft (mm) | Detent torque (mN·m) | Number of detent | Number of pulse | Push-on switch | Travel of push-on switch (mm) | Minimum order unit (pcs.) | | Product No. | Drawing No. |
|---------------------|--------------------------|----------------------|------------------|-----------------|----------------|-------------------------------|---------------------------|--------|---------------------|-------------|
| | | | | | | | Japan | Export | | |
| Flat | 15 | 8±5 | 30 | 15 | Without | — | 700 | 1,400 | EC09E1520407 | 1 |
| | 20 | | | | With | 0.5 | | | EC09E1524417 | 2 |
| | | | | | 1.5 | EC09E1524418 | | | | |

Note

Shaft design and other features are customizable.

Packing Specifications

Tray

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

Dimensions

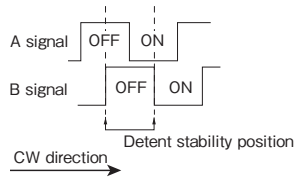
Unit:mm

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

Refer to P.245 for switch specifications.
Refer to P.275 for soldering conditions.

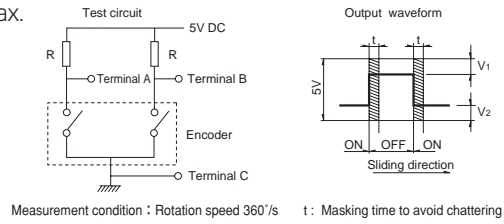
Output Wave

Detent stability position cannot be specified for B signal.



Sliding Noise

$V_1 = V_2 = 2.5V$ max.



Measurement condition : Rotation speed 360°/s t : Masking time to avoid chattering

At $R = 5k\Omega$
Chattering : 5ms max. Bounce : 2ms max.

9mm Size Metal Shaft Type / Switch Specifications

| | | |
|------------------------|--|---|
| 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 N | 4±2N |
| Operating life | 10,000 times | |
| Electrical performance | Rating | 10mA 5V DC (1mA 5V DC min. 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

Metal Shaft











Insulated Shaft

Through Shaft Type

Ring Type

Encoders

List of Varieties

| Type | | Metal shaft | | | | | | | | | | | | | | | |
|------------------------------------|--|---|--|---|--|---|--|---|--|---|--|---------|--|---------------------|--|-----|--|
| | | 9mm size | | 11mm size | | | | | | | | | | | | | |
| Series | | EC09E | | EC11E | | EC11N | | EC11M | | EC111 | | | | | | | |
| Photo | |  | |  | |  | |  | |  | | | | | | | |
| Output | | Incremental (Two phase A and B) | | | | | | | | Self-return switch | | | | | | | |
| Shaft types | | Single-shaft | | | | | | | | | | | | | | | |
| Control part orientation | | Vertical | | | | | | | | | | | | | | | |
| Number of pulse / Number of detent | | 15/30 | | 9/18 15/30 18/36 | | 15/30 | | 15/30 15/without | | — | | | | | | | |
| Features | | — | | — | | — | | Less shaft wobble | | — | | | | | | | |
| Dimensions (mm) | | W | | 9.5 | | 11.7 | | | | | | | | | | | |
| | | D | | 12 | | | | | | 13 | | | | | | | |
| | | H | | 4.5 | | | | | | | | 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) | | — | | — | | 8.5±5mN·m | | 3 to 30mN·m | | | | | | | |
| | | Detent torque | | 8±5mN·m | | 10±7mN·m | | | | 12±7mN·m | | — | | | | | |
| | | Push-pull strength | | 100N | | | | | | | | | | | | | |
| Shaft configuration | | Flat | | Flat, Slotted, Serrated | | Flat | | Serrated | | Flat, Slotted, Serrated | | | | | | | |
| Terminal type | | Insertion | | | | | | | | | | | | | | | |
| Switch Specifications | | Switch type | | 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 | | | |
| | | Operating force (N) | | 6 $\pm_{-2}^{+2.5}$ | | 4±2 | | 6 $\pm_{-2}^{+2.5}$ | | 4±2 | | 5±2 | | 6 $\pm_{-2}^{+2.5}$ | | 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 | | | | 20,000 times | | | | | | | | | |
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| Encoders Cautions | 276 |

Notes

- Indicates applicability to all products in the series.

Reference for Manual Soldering

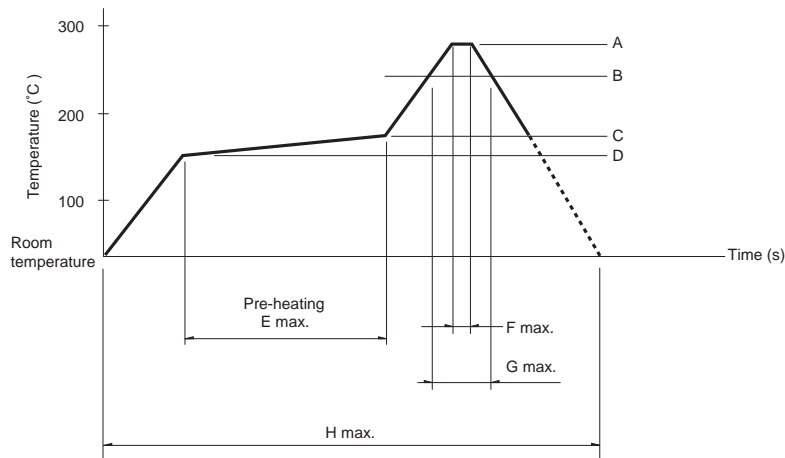
| Series | Tip temperature | Soldering time | No. of solders |
|--|-----------------|----------------|----------------|
| EC05E, EC09E, EC10E, EC111, EC11E, EC11M, EC11N, EC12D, EC12E, EC18A, EC21A, EC28A, EC35A, EC35AH, EC40A, EC50A, EM11B, EC21C, EC28C, EC35CH | 350°C max. | 3s max. | 1 time |

Reference for Dip Soldering

| Series | Preheating | | Dip soldering | | No. of solders |
|--|-------------------------------|--------------|-----------------------|----------------|----------------|
| | Soldering surface temperature | Heating time | Soldering temperature | Soldering time | |
| EC09E, EC111, EC11E, EC11M, EC11N, EC18A, EC21A, EC28A, EC35A, EC35AH, EC50A | 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 |

Example of Reflow Soldering Condition

Temperature profile



| Series | A | B | C | D | E | F | G | H | No. of reflows |
|---------------|----------------|------------|-------|-------|-------------|----|------------|-----------|----------------|
| EC05E | 250°C min. | 230°C min. | 180°C | 150°C | 60s to 120s | — | 30s to 40s | — | 2 times max. |
| EC21C | 230°C to 245°C | 220°C | 200°C | 150°C | 60s to 120s | — | 25s to 60s | 300s max. | 1 time max. |
| EC28C, EC35CH | 260°C | 230°C | 180°C | 150°C | 2 min. min. | 3s | 40s | 230s max. | 1 time max. |

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.