

EP50S Series

Diameter ϕ 50mm Shaft type Absolute Rotary encoder

■ Features

- Compact size of external diameter ϕ 50mm
- Various output code: BCD, Binary, Gray code (Customizable)
- Various and high resolution (720, 1024 divisions)
- Protection structure IP64 (Partial waterproof, Oil proof)



■ Applications

Precision machine tool, Fabric machinery, Robot, Parking system

⚠ Please read "Caution for your safety" in operation manual before using.



■ Ordering information

| | | | | | | | | | | | |
|---------------------------------|----------------|---------------------|--|---|--|---|---|---|---|---|----|
| EP50S | 8 | - | 1024 | - | 1 | - | R | - | P | - | 24 |
| Series | Shaft diameter | Pulse/1Revolution | Output code | Revolution direction | Control output | Power supply | | | | | |
| Diameter ϕ 50mm shaft type | ϕ 8mm | Refer to resolution | 1 : BCD Code 2 : Binary Code 3 : Gray Code | F : Output value increase at CW direction R : Output value increase at CCW direction | P : PNP open collector output N : NPN open collector output | 5 : 5VDC \pm 5% 24 : 12-24VDC \pm 5% | | | | | |

* Gray code is customizable.

■ Specifications

| Item | Diameter ϕ 50mm shaft type of absolute rotary encoder | | |
|--------------------------|--|--|---|
| Resolution | (Note1) 45, 64, 90, 128, 180, 256, 360, 512, 720, 1024 | | |
| Electrical specification | Output code/Output angle | Refer to "Output waveform" | |
| | Control output | PNP open collector output | Output voltage : Min. (Power supply-1.5)VDC, Load current : Max. 32mA |
| | | NPN open collector output | Load current : Max. 32mA, Residual voltage : Max. 1VDC |
| | Response time(Rise/Fall) | $T_{on}=800\text{nsec}$, $T_{off}=\text{Max. } 800\text{nsec}$ (Cable length : 2m, I sink=32mA) | |
| | Max. Response frequency | 35kHz | |
| | Power supply | • 5VDC \pm 5% (Ripple P-P : Max. 5%) • 12-24VDC \pm 5% (Ripple P-P : Max. 5%) | |
| | Current consumption | Max. 100mA (disconnection of the load) | |
| | Insulation resistance | Min. 100M Ω (at 500VDC megger between all terminals and case) | |
| | Dielectric strength | 750VAC 50/60Hz for 1 minute (Between all terminals and case) | |
| | Connection | Cable outgoing type (Cable gland) | |
| Mechanical specification | Starting torque | Max. 40gf \cdot cm (0.004N \cdot m) | |
| | Moment of inertia | Max. 40g \cdot cm ² (4×10^{-6} kg \cdot m ²) | |
| | Shaft loading | Radial : 10kgf, Thrust : 2.5kgf | |
| | Max. allowable revolution | (Note2) | 3000rpm |
| Vibration | 1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours | | |
| Shock | Max. 50G | | |
| Ambient temperature | -10 to 70 $^{\circ}$ C (at non-freezing status), Storage : -25 to 85 $^{\circ}$ C | | |
| Ambient humidity | 35 to 85%RH, Storage: 35 to 90%RH | | |
| Protection | IP64 (IEC standard) | | |
| Cable | ϕ 7mm, 15P, Length : 2m, Shield cable | | |
| Accessory | Fixing bracket, Coupling | | |
| Approval | CE | | |
| Unit weight | Approx. 380g | | |

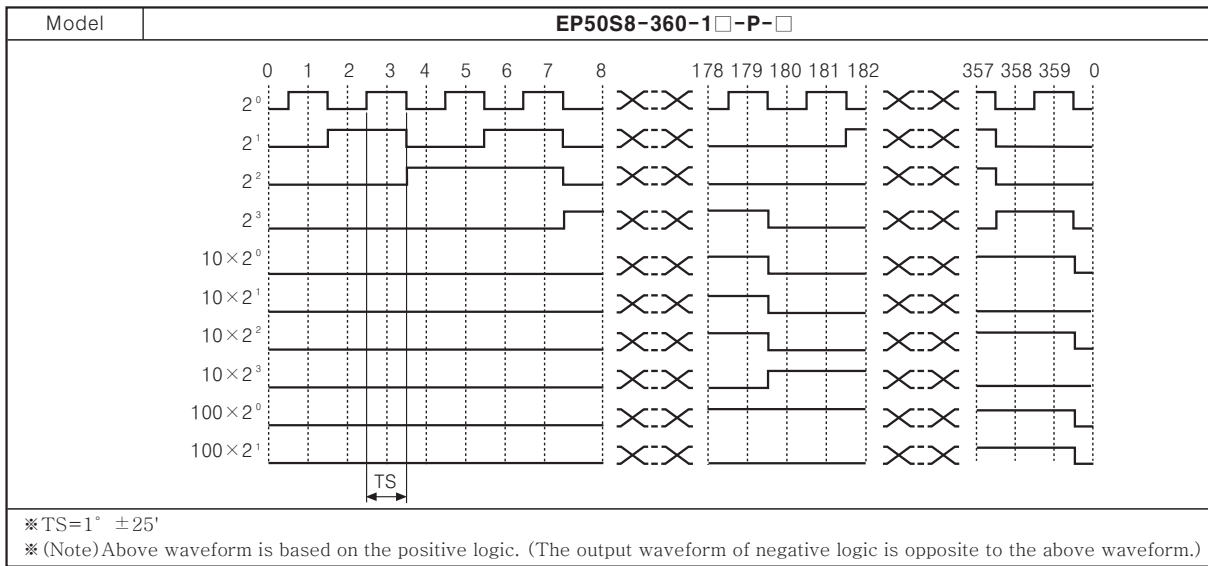
* **(Note1)** Not indicated type is customizable.

* **(Note2)** Max. allowable revolution \geq Max. response revolution **[**Max. response revolution (rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.}$ **]**
Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

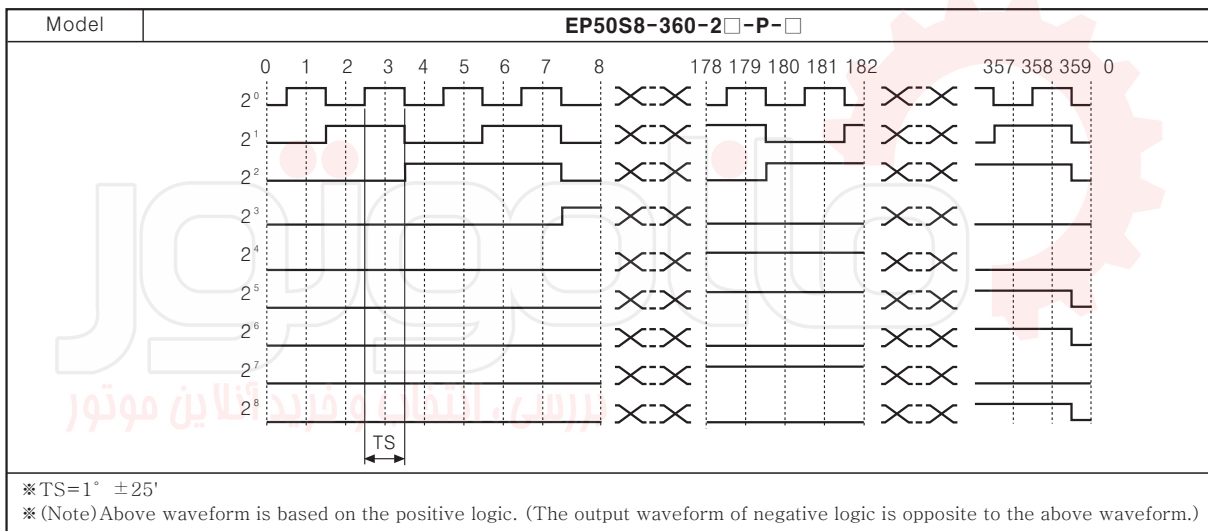
∅ 50mm Shaft Absolute Type

Output waveform

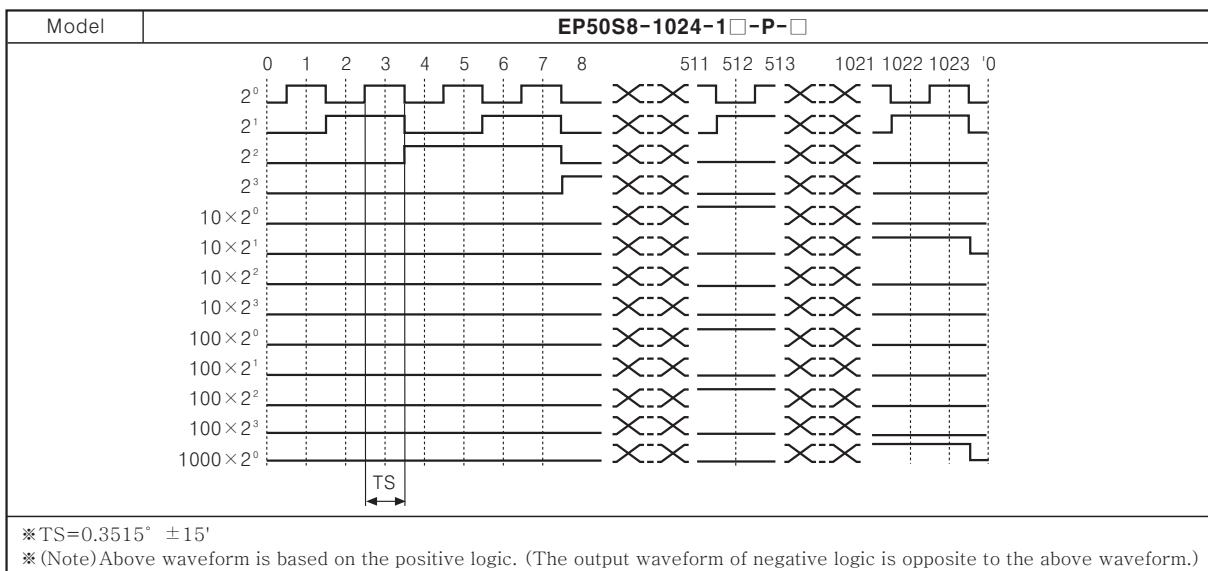
●360 division (BCD CODE output)



●360 division (BINARY CODE output)



●1024 division (BCD CODE output)

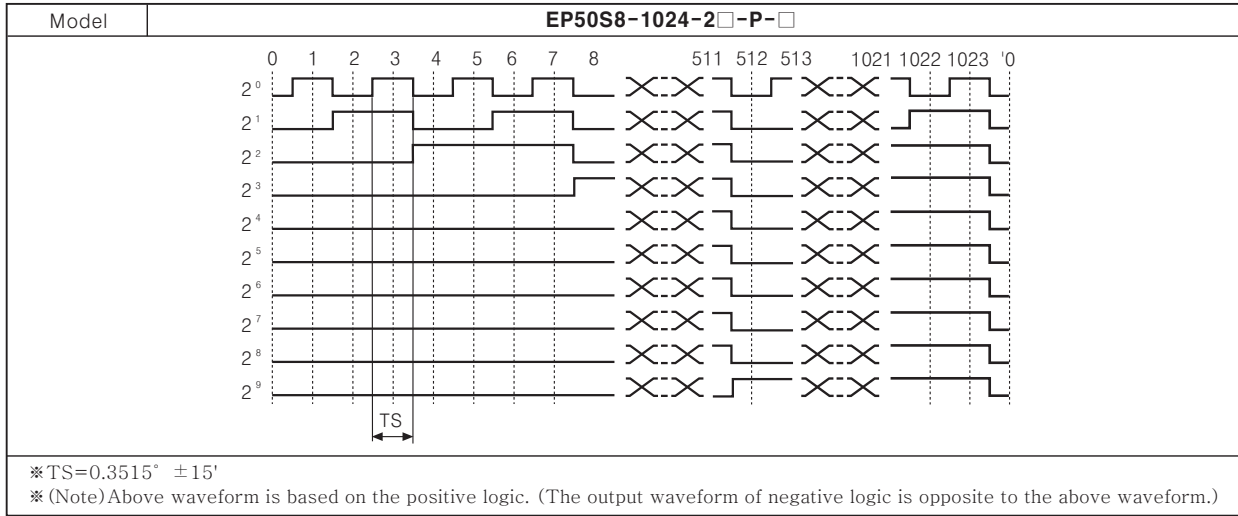


- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
- (I) SSR/Power controller
- (J) Counter
- (K) Timer
- (L) Panel meter
- (M) Tacho/Speed/Pulse meter
- (N) Display unit
- (O) Sensor controller
- (P) Switching power supply
- (Q) Stepping motor & Driver & Controller
- (R) Graphic/Logic panel
- (S) Field network device
- (T) Production stoppage models & replacement

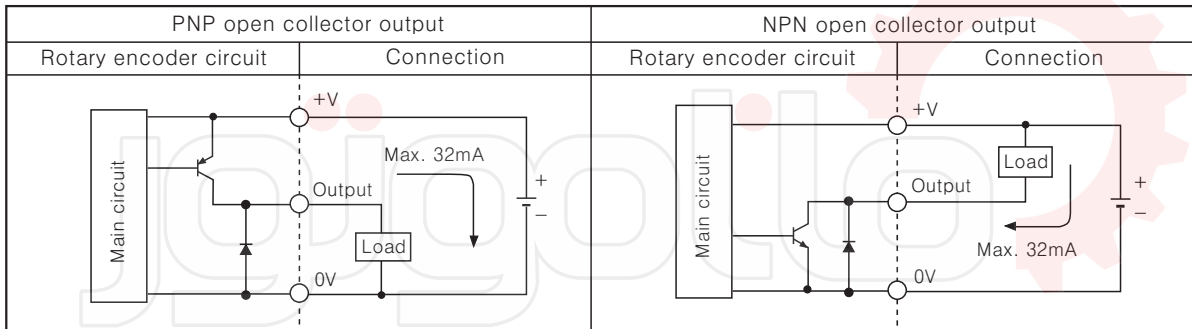
EP50S Series

Output waveform

1024 division (BINARY CODE output)



Control output diagram



*Output circuits of all phases are the same.

Connections

BCD Code

| Resolution | | 6 | 8 | 12 | 16 | 24 | 32 | 40 | 45 | 64 | 90 | 128 | 180 | 256 | 360 | 512 | 720 | 1024 |
|------------|---------------|----------|----------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|
| Color | | division | division | division | division | division | division | division | division | division | division | division | division | division | division | division | division | division |
| Power | White | +V | | | | | | | | | | | | | | | | |
| | Black | GND (0V) | | | | | | | | | | | | | | | | |
| Output | Brown | TP1 | TP1 | TP1 | TP1 | TP1 | TP1 | TP1 | 2^0 | 2^0 | 2^0 | 2^0 | 2^0 | 2^0 | 2^0 | 2^0 | 2^0 | 2^0 |
| | Red | TP2 | TP2 | TP2 | TP2 | TP2 | TP2 | TP2 | 2^1 | 2^1 | 2^1 | 2^1 | 2^1 | 2^1 | 2^1 | 2^1 | 2^1 | 2^1 |
| | Orange | 2^0 | 2^0 | 2^0 | 2^0 | 2^0 | 2^0 | 2^0 | 2^2 | 2^2 | 2^2 | 2^2 | 2^2 | 2^2 | 2^2 | 2^2 | 2^2 | 2^2 |
| | Yellow | 2^1 | 2^1 | 2^1 | 2^1 | 2^1 | 2^1 | 2^1 | 2^3 | 2^3 | 2^3 | 2^3 | 2^3 | 2^3 | 2^3 | 2^3 | 2^3 | 2^3 |
| | Blue | 2^2 | 2^2 | 2^2 | 2^2 | 2^2 | 2^2 | 2^2 | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ |
| | Purple | EP | | 2^3 | 2^3 | 2^3 | 2^3 | 2^3 | $(2^1 \times 10)$ | $(2^1 \times 10)$ | $(2^1 \times 10)$ | $(2^1 \times 10)$ | $(2^1 \times 10)$ | $(2^1 \times 10)$ | $(2^1 \times 10)$ | $(2^1 \times 10)$ | $(2^1 \times 10)$ | $(2^1 \times 10)$ |
| | Gray | N.C | | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^0 \times 10)$ | $(2^2 \times 10)$ | $(2^2 \times 10)$ | $(2^2 \times 10)$ | $(2^2 \times 10)$ | $(2^2 \times 10)$ | $(2^2 \times 10)$ | $(2^2 \times 10)$ | $(2^2 \times 10)$ | $(2^2 \times 10)$ | $(2^2 \times 10)$ |
| | White/Brown | N.C | | EP | EP | $(2^1 \times 10)$ | $(2^1 \times 10)$ | $(2^1 \times 10)$ | N.C | | $(2^3 \times 10)$ | $(2^3 \times 10)$ | $(2^3 \times 10)$ | $(2^3 \times 10)$ | $(2^3 \times 10)$ | $(2^3 \times 10)$ | $(2^3 \times 10)$ | $(2^3 \times 10)$ |
| | White/Red | N.C | | | | EP | EP | EP | N.C | | | $(2^0 \times 100)$ | $(2^0 \times 100)$ | $(2^0 \times 100)$ | $(2^0 \times 100)$ | $(2^0 \times 100)$ | $(2^0 \times 100)$ | $(2^0 \times 100)$ |
| | White/Orange | N.C | | | | | | | | | | | | $(2^1 \times 100)$ | $(2^1 \times 100)$ | $(2^1 \times 100)$ | $(2^1 \times 100)$ | $(2^1 \times 100)$ |
| | White/Yellow | N.C | | | | | | | | | | | | | | $(2^2 \times 100)$ | $(2^2 \times 100)$ | $(2^2 \times 100)$ |
| | White/Blue | N.C | | | | | | | | | | | | | | | | $(2^3 \times 100)$ |
| | White/Purple | N.C | | | | | | | | | | | | | | | | $(2^0 \times 1000)$ |
| | Shielded wire | F.G | | | | | | | | | | | | | | | | |

∅ 50mm Shaft Absolute Type

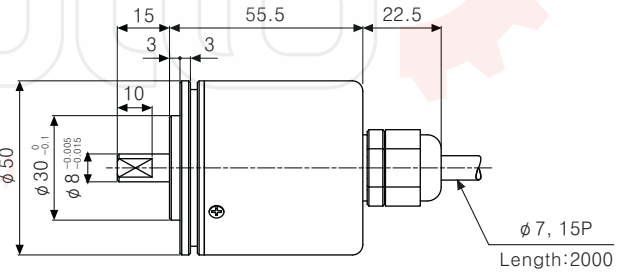
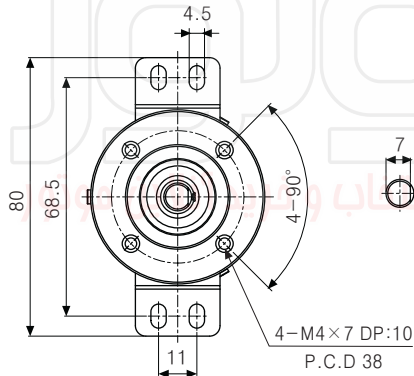
■ Connections

● Binary code

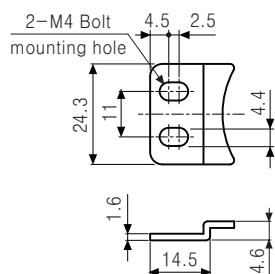
| Resolution | | 6 | 8 | 12 | 16 | 24 | 32 | 40 | 45 | 64 | 90 | 128 | 180 | 256 | 360 | 512 | 720 | 1024 |
|------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Color | | division | division | division | division | division | division | division | division | division | division | division | division | division | division | division | division | division |
| Power | White | +V | | | | | | | | | | | | | | | | |
| | Black | GND(0V) | | | | | | | | | | | | | | | | |
| Output | Brown | TP1 | TP1 | TP1 | TP1 | TP1 | TP1 | TP1 | 2° | 2° | 2° | 2° | 2° | 2° | 2° | 2° | 2° | 2° |
| | Red | TP2 | TP2 | TP2 | TP2 | TP2 | TP2 | TP2 | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ |
| | Orange | 2° | 2° | 2° | 2° | 2° | 2° | 2° | 2 ² | 2 ² | 2 ² | 2 ² | 2 ² | 2 ² | 2 ² | 2 ² | 2 ² | 2 ² |
| | Yellow | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ¹ | 2 ³ | 2 ³ | 2 ³ | 2 ³ | 2 ³ | 2 ³ | 2 ³ | 2 ³ | 2 ³ | 2 ³ |
| | Blue | 2 ² | 2 ² | 2 ² | 2 ² | 2 ² | 2 ² | 2 ² | 2 ⁴ | 2 ⁴ | 2 ⁴ | 2 ⁴ | 2 ⁴ | 2 ⁴ | 2 ⁴ | 2 ⁴ | 2 ⁴ | 2 ⁴ |
| | Purple | EP | EP | 2 ³ | 2 ³ | 2 ³ | 2 ³ | 2 ³ | 2 ⁵ | 2 ⁵ | 2 ⁵ | 2 ⁵ | 2 ⁵ | 2 ⁵ | 2 ⁵ | 2 ⁵ | 2 ⁵ | 2 ⁵ |
| | Gray | N.C | | EP | EP | 2 ⁴ | 2 ⁴ | 2 ⁴ | N.C | | 2 ⁶ | 2 ⁶ | 2 ⁶ | 2 ⁶ | 2 ⁶ | 2 ⁶ | 2 ⁶ | 2 ⁶ |
| | White/Brown | N.C | | | | EP | EP | 2 ⁵ | N.C | | | 2 ⁷ | 2 ⁷ | 2 ⁷ | 2 ⁷ | 2 ⁷ | 2 ⁷ | 2 ⁷ |
| | White/Red | N.C | | | | | | EP | N.C | | | | 2 ⁸ | 2 ⁸ | 2 ⁸ | 2 ⁸ | 2 ⁸ | 2 ⁸ |
| | White/Orange | N.C | | | | | | | | | | | | | | | | |
| | White/Yellow | N.C | | | | | | | | | | | | | | | | |
| | White/Blue | N.C | | | | | | | | | | | | | | | | |
| | White/Purple | N.C | | | | | | | | | | | | | | | | |
| | Shielded wire | F.G | | | | | | | | | | | | | | | | |

- * Unused wires must be insulated.
- * The metal case and shield wire of encoder should be grounded (F.G).
- * N.C : Not Connected.
- * TP1/TP2 : It is an enablement signal to decide signal recognition for output easily because, output signal cycle is long in low resolution model.
- * EP : It is a parity signal to be outputted as odd number of parity.
- * Output cable must not be short-circuited, because Driver IC is used in output circuit.

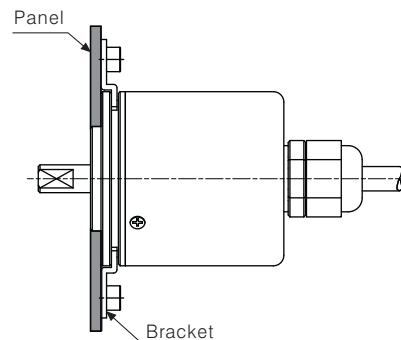
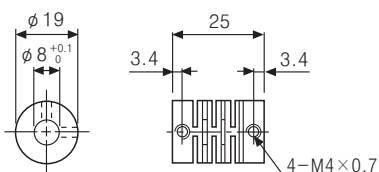
■ Dimensions



● Bracket



● Coupling (EP50S)



(Unit:mm)

- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
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