

Autonics

ROTARY ENCODER (INCREMENTAL TYPE) E50S SERIES

INSTRUCTION MANUAL



Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

■ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.

※Safety considerations are categorized as follows.

⚠ Warning Failure to follow these instructions may result in serious injury or death.

⚠ Caution Failure to follow these instructions may result in personal injury or product damage.

※The symbols used on the product and instruction manual represent the following

⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, fire, or economic loss.

⚠ Caution

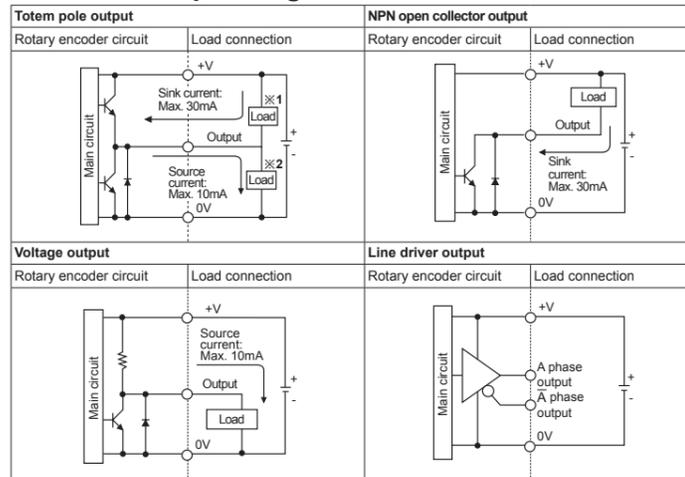
- Do not drop water or oil on this unit.**
Failure to follow this instruction may result in product damage or miscontrol due to malfunction.
- Do not use loads beyond the rated voltage range.**
Failure to follow this instruction may result in shortening the life cycle of the unit, burn out due to breaking.
- Check the polarity of the power before wiring the unit.**
Failure to follow this instruction may result in product damage or burn-out.
- Do not short circuit the load.**
Failure to follow this instruction may result in product damage or burn-out.

■ Ordering Information

E50S	8	8000	3	N	24	
Series	Shaft diameter	Pulse/1Revolution	Output phase	Control output	Power supply	Cable
Diameter Ø50mm, shaft type	Ø8mm	Refer to resolution	2: A, B 3: A, B, Z 4: A, \bar{A} , B, \bar{B} 6: A, \bar{A} , B, \bar{B} , Z, Z	T: Totem pole output N: NPN open collector output V: Voltage output L: Line driver output	5: 5VDC±5% 24: 12-24VDC±5%	No mark: Axial cable type C: Axial cable connector type (※) CR: Axial connector type CS: Radial connector type

※Standard: E50S8-[PULSE]-3-N-24 ※Cable length: 250mm

■ Control Output Diagram



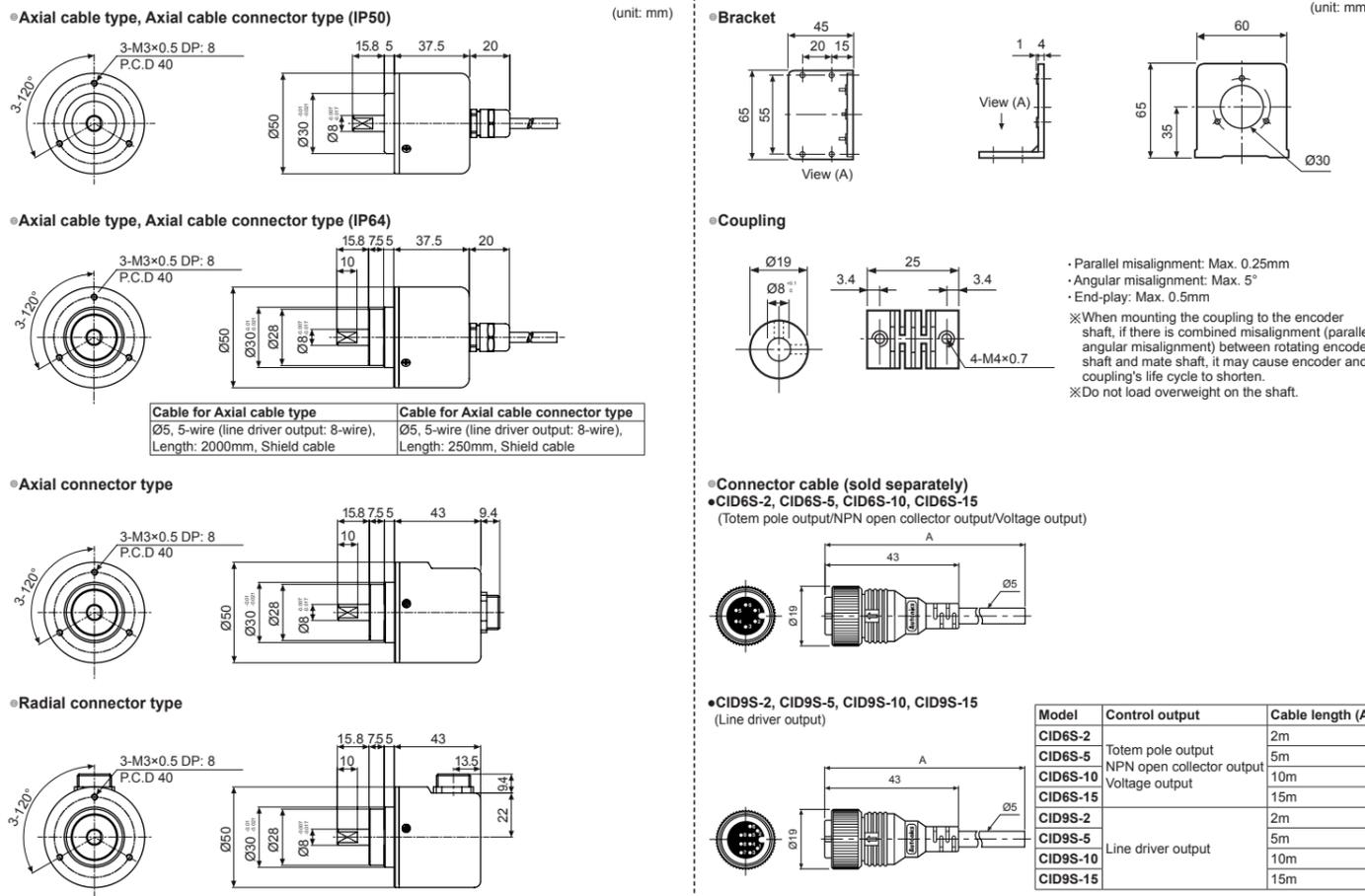
※All output circuits of A, B, Z phase are the same. (line driver output is A, \bar{A} , B, \bar{B} , Z, Z)
※Totem pole output type can be used for NPN open collector type (※1) or voltage output type (※2).
※The above specifications are subject to change and some models may be discontinued without notice.

■ Specifications

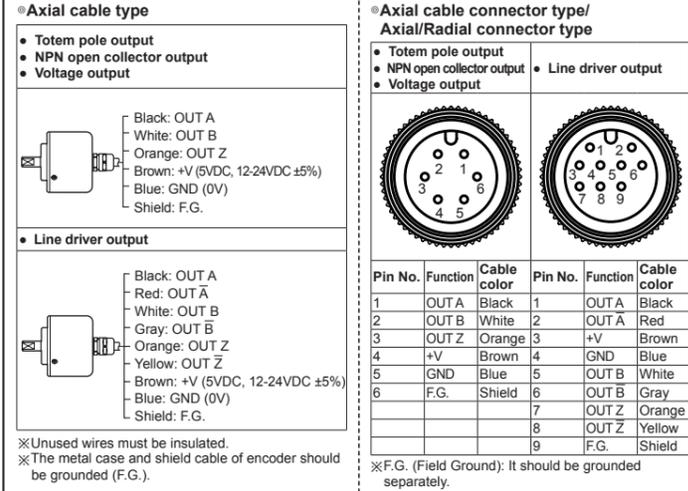
Item	Diameter Ø50mm shaft type of incremental rotary encoder	
Model	Totem pole output	E50S8-□-3-T-□
	NPN open collector output	E50S8-□-3-N-□
	Voltage output	E50S8-□-3-V-□
	Line driver output	E50S8-□-6-L-□
Resolution (P/R) ^{※1}	*1, *2, *5, 10, 12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 4000, 5000, 6000, 8000	
Output phase	A, B, Z phase (line driver output: A, \bar{A} , B, \bar{B} , Z, Z phase)	
Phase difference of output	Output between A and B phase: $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)	
Electrical specification	Control output	Totem pole output • [Low] - Load current: Max. 30mA, Residual voltage: Max. 0.4VDC • [High] - Load current: Max. 10mA, Output voltage (power voltage 5VDC): Min. (power voltage-2.0)VDC, Output voltage (power voltage 12-24VDC): Min. (power voltage-3.0)VDC
	NPN open collector output	Load current: Max. 30mA, Residual voltage: Max. 0.4VDC
	Voltage output	Load current: Max. 10mA, Residual voltage: Max. 0.4VDC
	Line driver output	• [Low] - Load current: Max. 20mA, Residual voltage: Max. 0.5VDC • [High] - Load current: Max. -20mA, Output voltage (power voltage 5VDC): Min. 2.5VDC, Output voltage (power voltage 12-24VDC): Min. (power voltage-3.0)VDC
Response time (rise/fall)	Totem pole output	Max. 1µs (cable length: 2m, I sink=20mA)
	NPN open collector output	Max. 1µs (cable length: 2m, I sink=20mA)
	Voltage output	Max. 1µs (cable length: 2m, I sink=20mA)
	Line driver output	Max. 0.5µs (cable length: 2m, I sink=20mA)
Max. response frequency	300kHz	
Power supply	• 5VDC ±5% (ripple P-P: Max. 5%) • 12-24VDC ±5% (ripple P-P: Max. 5%)	
Current consumption	Max. 80mA (disconnection of the load), Line driver output: Max. 50mA (disconnection of the load)	
Insulation resistance	Over. 100MΩ (at 500VDC megger between all terminals and case)	
Dielectric strength	750VAC 50/60Hz for 1 minute (between all terminals and case)	
Connection	Axial cable type, Axial cable connector type, Axial/Radial connector type	
Mechanical specification	Starting torque	Max. 70gf·cm (0.007N·m) ^{※2} , Max. 800gf·cm (0.078N·m) ^{※3}
	Moment of inertia	Max. 80g·cm ² (8×10 ⁻⁶ kg·m ²) ^{※2} , Max. 400g·cm ² (4×10 ⁻⁵ kg·m ²) ^{※3}
	Shaft loading	Radial: Max. 10kgf, Thrust: Max. 2.5kgf
	Max. allowable revolution ^{※4}	5,000rpm
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours	
Shock	Approx. Max. 75G	
Environment	Ambient temperature	-10 to 70°C, Storage: -25 to 85°C
	Ambient humidity	35 to 85% RH, Storage: 35 to 90%RH
Protection structure	Axial cable type, Axial cable connector type: IP50 (IEC standards) ^{※5} , Axial/Radial connector type: IP65 (IEC standards)	
Cable	Ø5mm, 5-wire, Length: 2m, Shield cable (line driver output: Ø5mm, 8-wire) (AWG 24, Core diameter: 0.08mm, Number of cores: 40, Insulator diameter: Ø11mm)	
Accessory	Ø8mm coupling, Bracket	
Approval	CE (except line driver output)	
Weight ^{※6}	Approx. 363g (approx. 275g), Axial/Radial connector type: Approx. 268g (approx. 180g)	

- ※1: " " pulse is only for A, B phase. (but Line driver output: A, \bar{A} , B, \bar{B} phase) Not indicated resolutions are customizable.
 ※2: This value is for Axial cable type, Axial cable connector type (protection structure: IP50).
 ※3: This value is for Axial cable type, Axial cable connector type (protection structure: IP64), Axial/Radial connector type (protection structure: IP65).
 ※4: Make sure that Max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.
 [Max. response revolution (rpm)] = $\frac{\text{Max. response frequency} \times 60 \text{ sec}}{\text{Resolution}}$
 ※5: In case of axial cable type, axial cable connector type, they are available to order the option protection structure IP64.
 ※6: The weight includes packaging. The weight in parentheses is for unit only.
 ※Environment resistance is rated at no freezing or condensation.

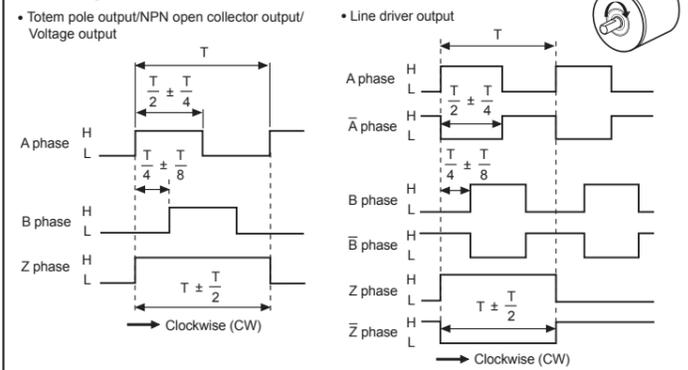
■ Dimensions



■ Connections



■ Output Waveforms



■ Cautions During Use

- Installation**
 - This unit is consists of precision components. Therefore please treat this product carefully.
 - Do not put strong impact when inserting coupling into shaft.
 - When use coupling to encoder shaft, if there is big eccentricity or declination, it might shortening life cycle of the encoder or the coupling.
- For using**
 - Please use attached Sil Twist pair wire and use proper receiver for RS-422A communication.
 - Do not connect and cut circuit off during power on. It may result in damage to this unit.
 - When the power source is a Switching Mode Power Supply, please install the surge absorber in power line and wire should be shorter in order not to be influenced by noise. And F.G. terminals of the Switching Mode Power Supply must be grounded.
- Environment**

Please do not use this unit with below environment, or it may cause malfunction.

 - Place where this unit or component may be damaged by strong vibration or impact.
 - Place where there is a lot of flammable or corrosive gases.
 - Place where strong magnet field or electric noise occurs.
 - Place where is beyond of the rated temperature or humidity.
 - Place where strong acids or alkali near by.
 - Place where there is the direct ray of the sun.
- Vibration and Impact**
 - If a big impact or strong vibration applies to the product it may cause pulse errors. Be sure that when installing this unit.
 - Encoder with high resolution can be easily affected by vibration, therefore tighten fixing bracket when installing this unit.
 - Please use metallic coupling when the application needs severe acceleration or deceleration frequently.
 - Please fit this unit firmly when mount this unit in order to avoid malfunction by residual vibration.
- Wire connection**
 - Do not draw the wire with over 30N strength after wiring.
 - If using the cable of encoder and high voltage line or power cable in the same conduit, it may cause malfunction or mechanical trouble. Please wire separately or use separated conduit.
 - Please check wire and response frequency when extend wire because of distortion of waveform or residual voltage increment etc. by line resistance or capacity between lines.

※Failure to follow these instructions may result in product damage.

■ Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connector/Sockets
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System (Fiber, Co., Nd: YAG)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometers/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

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<http://www.autonics.com>
 Trusted Partner in Industrial Automation

■ HEADQUARTERS:
 18, Bansong-ro 513beon-gil, Haeundae-gu, Busan, South Korea, 48002

■ OVERSEAS SALES:
 #402-303, Bucheon Techno Park, 655, Pyeongcheon-ro, Wonmi-gu, Bucheon, Gyeonggi-do, South Korea, 14502
 TEL: 82-32-610-2730 / FAX: 82-32-329-0728
 E-mail: sales@autonics.com