

Autonics

ROTARY ENCODER(INCREMENTAL TYPE)

E30S4 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.
※△ symbol represents caution due to special circumstances in which hazards may occur.

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.

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 fire, personal injury, or economic loss.
- Install on a device panel to use.**
Failure to follow this instruction may result in fire.
- Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire.
- Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.

Caution

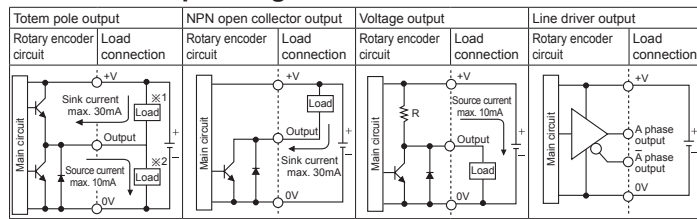
- Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
- Do not short the load.**
Failure to follow this instruction may result in product damage by fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
Failure to follow this instruction may result in fire or explosion.
- Do not use the unit near the place where there is the equipment which generates strong magnetic force or high frequency noise and strong alkaline, strong acidic exists.**
Failure to follow this instruction may result in product damage.

Ordering Information

E30S		4	3000	3	N	24	
Series	Shaft diameter	Pulses/revolution	Output phase	Control output	Power supply	Cable	
Ø30mm, shaft type	Ø4mm	100, 200, 360, 500, 1000, 1024, 3000	3: A, B, Z 6: A, A̅, B, B̅, Z, Z̅	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	

※The power of Line driver is only for 5VDC

Control Output Diagram



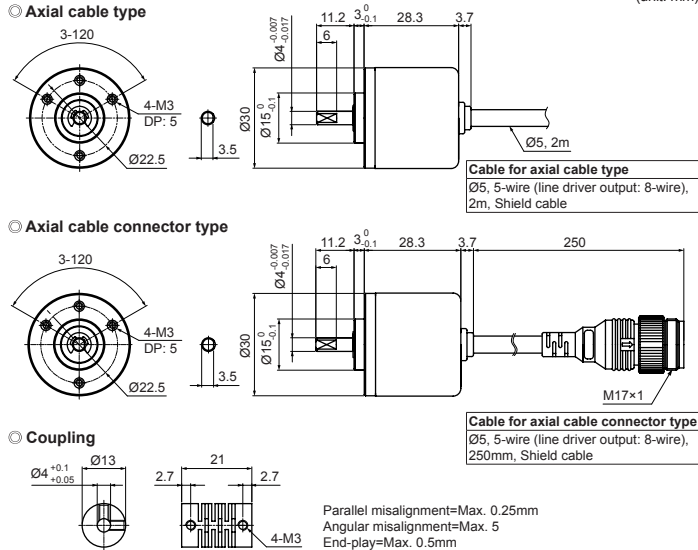
- The output circuit of A, B, Z phase are the same. (line driver output is A, A̅, B, B̅, Z, Z̅)
- Totem pole output type can be used for NPN open collector type (※1) or voltage output type (※2).
※The above specifications are subject to change and some models may be discontinued without notice.
※Be sure to follow cautions written in the instruction manual, and the technical descriptions (catalog, homepage).

Specifications

Item	Shaft type Ø30mm Incremental Rotary Encoder	
Resolution (PPR) ^{※1}	100, 200, 360, 500, 1000, 1024, 3000	
Output phase	A, B, Z phase (line driver: A, A̅, B, B̅, Z, Z̅ phase)	
Phase difference of output	Phase difference between A and B: $\frac{T}{4} \pm \frac{T}{8}$ (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 Load current: max. 30mA, residual voltage: max. 0.4VDC
	NPN open collector output	Load current: max. 10mA, residual voltage: max. 0.4VDC
	Voltage output	• [Low] - Load current: max. 20mA, residual voltage: max. 0.5VDC • [High] - Load current: max. -20mA, output voltage: min. 2.5VDC
	Line driver output	
Response time (rise/fall)		
Totem pole output	Max. 1µs (cable length: 2m, I sink = 20mA)	
NPN open collector output	Max. 1µs (5VDC: output resistance 820Ω), Max. 2µs (12-24VDC: output resistance 4.7kΩ) (cable length: 2m, I sink = 20mA)	
Voltage output		
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	
Mechanical specification	Starting torque	Max. 20gf cm (0.002N m)
	Moment of inertia	Max. 20g cm ² (2×10 ⁻⁶ kg m ²)
	Shaft loading	Radial: max. 2kgf, Thrust: max. 1kgf
	Max. allowable revolution ^{※2}	5,000rpm
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours	
Shock	Approx. max. 50G	
Environment	Ambient temp.	-10 to 70°C, storage: -25 to 85°C
	Ambient humidity	35 to 85%RH, storage: 35 to 90%RH
Protection structure	IP50 (IEC standard)	
Cable	Ø5mm, 5-wire (line driver: 8-wire), 2m, Shield cable (AWG24, core diameter: 0.08mm, number of cores: 40, insulator out diameter: Ø1mm)	
Accessory	Ø4mm coupling	
Approval	CE (except line driver output)	
Unit weight	Approx. 80g	

※1: Not indicated resolutions are customizable. ※Environment resistance is rated at no freezing or condensation.
※2: Make sure that max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.
[Max. response revolution (rpm)] = $\frac{\text{Max. response frequency} \times 60 \text{ sec}}{\text{Resolution}}$

Dimensions

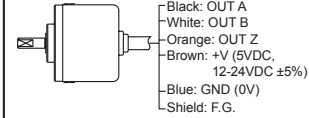


※It must not use larger shaft loading than specification.
※Do not put strong impact when insert a coupling into shaft.
Failure to follow this instruction may result in product damage.
※Fix the unit or a coupling by a wrench under 0.15 N·m of torque.
※When you install this unit, if eccentricity and deflection angle are larger, it may shorten the life cycle of this unit.

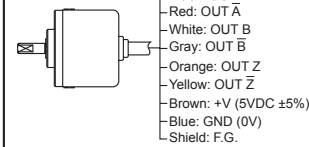
Connections

⊙ Axial cable type

• Totem pole output / NPN open collector output / Voltage output



• Line driver output



⊙ Axial cable connector type

• Totem pole output / NPN open collector output / Voltage output

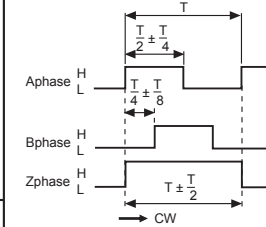


Totem pole output / NPN open collector output / Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT A̅	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G.	Shield	⑥	OUT B̅	Gray
			⑦	OUT Z	Orange
			⑧	OUT Z̅	Yellow
			⑨	F.G.	Shield

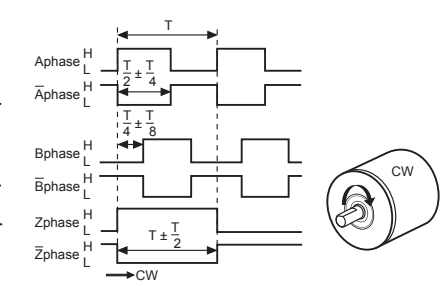
※The metal case and shield wire of encoder should be grounded (F.G.).
※Unused wires must be insulated.
※Do not apply tensile strength over 30N to the cable.

Output Waveform

⊙ Totem pole output / NPN open collector output / Voltage output



⊙ Line driver output



Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 5VDC, 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- For using the unit with the equipment which generates noise (switching regulator, inverter, servo motor, etc.), ground the shield wire to the F.G. terminal.
- Ground the shield wire to the F.G. terminal.
- When using switching mode power supply, frame ground (F.G.) terminal of power supply should be grounded.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
- For Line driver unit, use the twisted pair wire which is attached seal and use the receiver for RS-422A communication.
- Check the wire type and response frequency when extending wire because of distortion of waveform or residual voltage increment etc by line resistance or capacity between lines.
- This unit may be used in the following environments.
 - ⊙Indoors (in the environment condition rated in 'Specifications') ⊙Altitude max. 2,000m
 - ⊙Pollution degree 2 ⊙Installation category II

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, CO₂, Nd: YAG)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers