

Autonics

ROTARY ENCODER(INCREMENTAL TYPE) ENA/E50S8/ENC SERIES

M A N U A L



Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

Caution for your safety

- *Please keep these instructions and review them before using this unit.
- *Please observe the cautions that follow:
- Warning** Serious injury may result if instructions are not followed.
- Caution** Product may be damaged, or injury may result if instructions are not followed.
- *The following is an explanation of the symbols used in the operation manual.
- Injury or danger may occur under special conditions.**

Warning

- In case of using this unit with machinery (Medical equipment, vehicle, train, airplane, combustion apparatus, entertainment processing equipment, conveyor, elevator or safety device etc.), it is required to install fail-safe device, or contact us for information on type required. It may cause serious human injury or a fire, property.

Caution

- Do not drop water or oil on this unit. It may cause damage or miscontrol due to malfunction.
- Please observe voltage rating. It may shorten the life cycle or damage to the product.
- Please check the polarity of power and wrong wiring. It may result in damage to this unit.
- Do not short circuit the load. It may result in damage to this unit.

Outline

This unit is very useful to control length, angle and position by converting revolution value of shaft into number of pulse as an optical incremental Encoder.

Ordering information

ENA	-	5000	-	2	-	N	-	24
Series	Pulse/1Revolution	Output phase	Output	Power supply				
Shaft type to be mounted at the side (Shaft diameter ϕ 10mm)	See resolution	2: A, B 3: A, B, Z	T: Totem Pole output N: NPN open collector output V: Voltage output	5: 5VDC \pm 5% 24: 12-24VDC \pm 5%				

*Standard: ENA-[PULSE]-2-N-24 *Standard: A, B

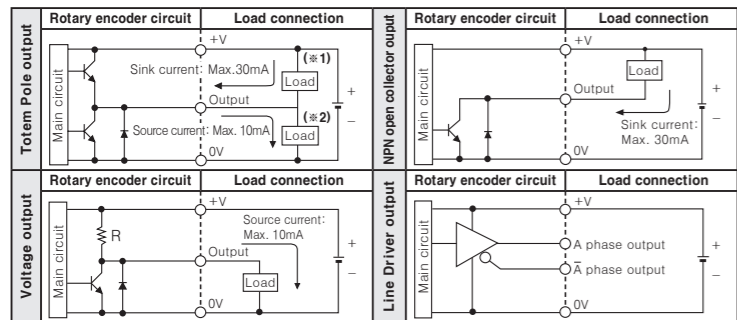
E50S	8	-	8000	-	3	-	N	-	24
Series	Shaft diameter	Pulse/1Revolution	Output phase	Output	Power supply	Cable			
Diameter ϕ 50mm shaft type	ϕ 8mm	See resolution	2: A, B 3: A, B, Z 4: A, \bar{A} , B, \bar{B} 6: A, \bar{A} , B, \bar{B} , Z, Z	T: Totem Pole output N: NPN open collector output V: Voltage output L: Line Driver output	5: 5VDC \pm 5% 24: 12-24VDC \pm 5%	No mark: Normal type (*C): Cable outgoing connector type			

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

ENC	1	-	1	-	N	-	24		
Series	Output phase	Min. measuring unit	Output	Power supply	Cable				
Wheel type	1: A, B	1: 1mm 3: 1m 5: 0.1yd	2: 1cm 4: 0.01yd 6: 1yd	T: Totem Pole output N: NPN open collector output V: Voltage output	5: 5VDC \pm 5% 24: 12-24VDC \pm 5%	No mark: Normal type (*C): Cable outgoing connector type			

*Cable length: 250mm

Control output diagram



* The output circuit of A, B, Z phase are the same. (Line Driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)
* Totem Pole output can be used for NPN open collector type(*1) or voltage output type(*2).

* The above specification are subject to change without notice.

Specifications

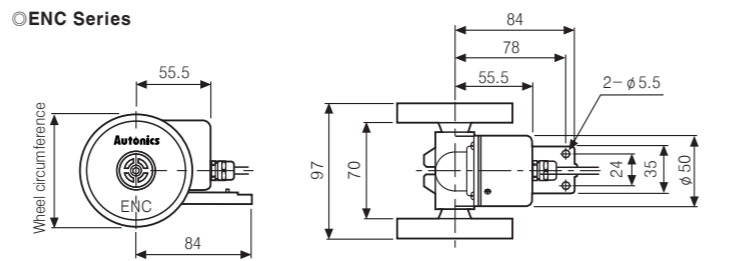
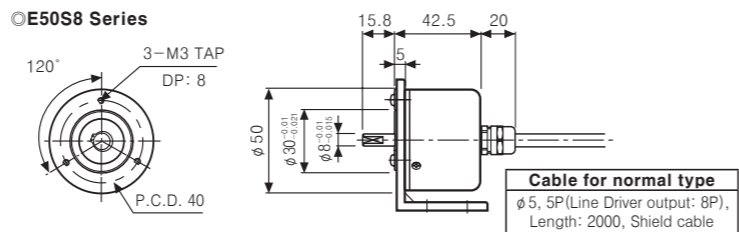
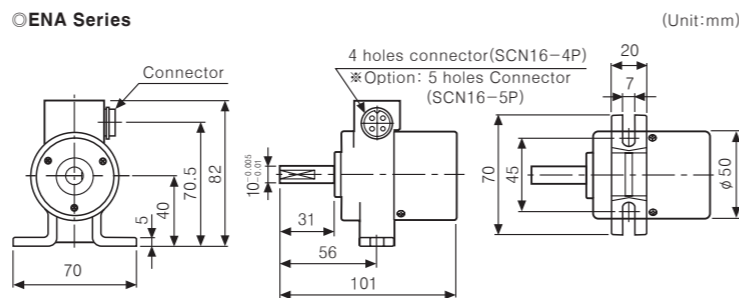
Incremental Rotary encoder	Shaft type encoder to be mounted at the side	ϕ 50mm Shaft type	Wheel type
Totem Pole output	ENA-□-3-T-□	E50S8-□-3-T-□	ENC-1-□-T-□
NPN open collector output	ENA-□-3-N-□	E50S8-□-3-N-□	ENC-1-□-N-□
Voltage output	ENA-□-3-V-□	E50S8-□-3-V-□	ENC-1-□-V-□
Line Driver output	—	E50S8-□-6-L-□	—
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, 5000, 6000, 8000	—	1mm/Pulse, 1cm/Pulse, 1m/Pulse, 0.01yd/Pulse, 0.1yd/Pulse, 1yd/Pulse
Output phase	A, B phase (Option: A, B, Z phase)	A, B, Z phase (Line driver output: A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	A, B 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	Totem Pole output	•Low φ Load current: Max. 30mA, Residual voltage: Max. 0.4VDC •High φ 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 φ Load current: Max. 20mA, Residual voltage: Max. 0.5VDC •High φ 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. 1 μ s (Cable length: 2m, I sink=20mA)	
	NPN open collector output	—	
	Voltage output	—	
	Line Driver output	Max. 0.5 μ s (Cable length: 2m, I sink=20mA)	
Max. Response frequency	300kHz	180kHz	—
Power supply	• 5VDC \pm 5% (Ripple P-P: Max. 5%) • 12-24VDC \pm 5% (Ripple P-P: Max. 5%)		
Current consumption	Max. 60mA (disconnection of the load), Line Driver output: Max. 50mA (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	Connector connection	Cable outgoing connection, 250mm	Cable outgoing connector connection
Mechanical specification	Starting torque	Max. 70gf·cm (0.007N·m)	
	Moment of inertia	Max. 80g·cm ² (8 \times 10 ⁻⁶ kg·m ²)	
	Shaft loading	Radial: 10kgf, Thrust: 2.5kgf	
Max. allowable revolution	(#2)	5,000rpm	—
Vibration	1.5mm amplitude at frequency of 10 ~ 55Hz (for 1 min.) in each X, Y, Z direction for 2 hours		
Shock	Max. 75G		
Environment	Ambient temperature	-10 ~ 70°C, Storage: -25 ~ 85°C	
	Ambient humidity	35 ~ 85% RH, Storage: 35 ~ 90% RH	
Protection	IP50 (IEC Standards)		
Cable	ϕ 5mm, 5P, Length: 2m, Shield cable (AWG 24, Core wire diameter: 0.08mm, No. of core wire: 40, Insulator out diameter: ϕ 1mm)	ϕ 5mm, 5P, Length: 2m, Shield cable (Line Driver output: ϕ 5mm, 8P) (AWG 24, Core wire diameter: 0.08mm, No. of core wire: 40, Insulator out diameter: ϕ 1mm)	ϕ 5mm, 5P, Length: 2m, Shield cable (AWG 24, Core wire diameter: 0.08mm, No. of core wire: 40, Insulator out diameter: ϕ 1mm)
Accessory	ϕ 10mm coupling	ϕ 8mm coupling, Bracket	—
Approval	CE (Except Line Driver output)		
Unit weight	Approx. 345g	Approx. 275g	Approx. 494g

* 1: 1, 2, 5, 12 P/R are output A, B phase only. (But Line Driver output: A, \bar{A} , B, \bar{B} phase)

* 2: Max. allowable revolution \geq Max. response revolution [Max. response revolution (rpm) = $\frac{\text{Max. response frequency} \times 60 \text{ sec.}}{\text{Resolution}}$] Please select the resolution to make lower max. revolution than max. allowable revolution.

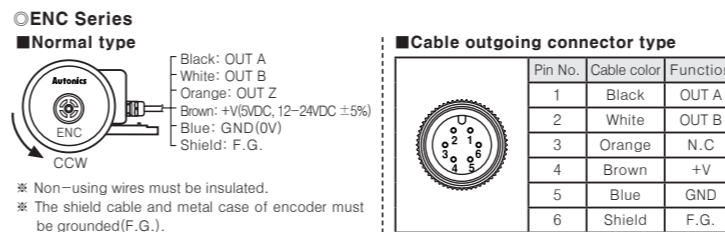
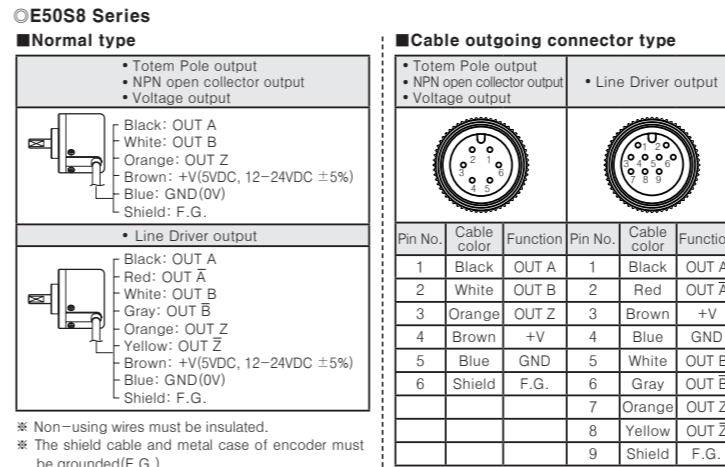
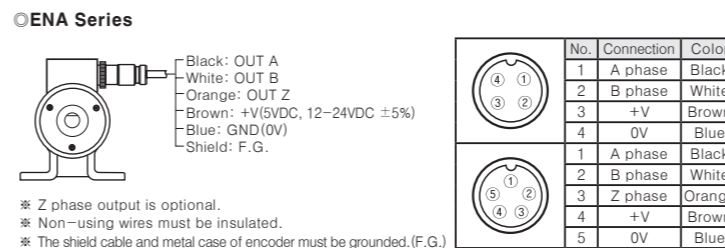
* Environment resistance is rated at no freezing or condensation.

Dimensions

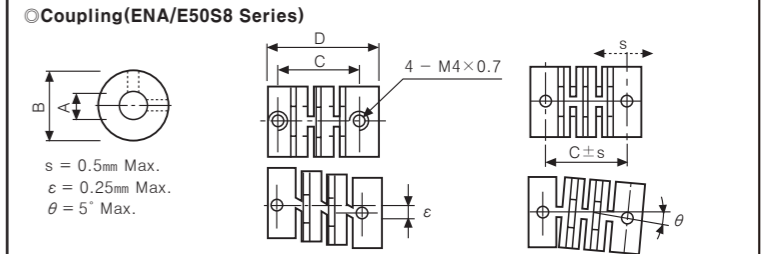
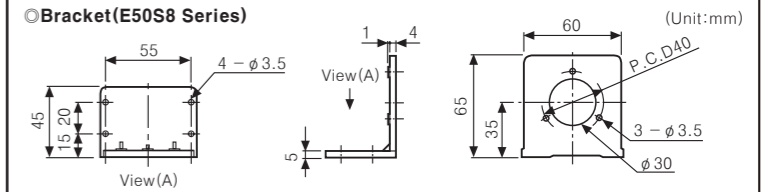


Cable for normal type	Wheel circumference	Min. measuring unit
ϕ 5, 5P, Length: 2000, Shield cable	250mm	1mm, 1cm, 1m
	228.6mm (0.25yd)	0.01yd, 0.1yd, 1yd

Connection

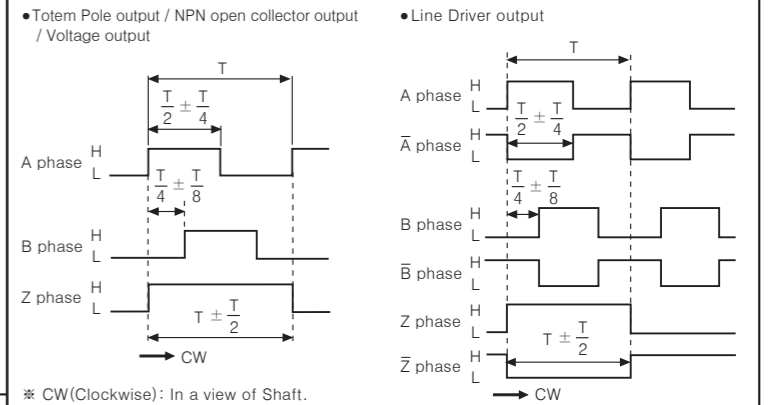


Accessory



Type	Item	A	B	C	D
ENA ϕ 10mm coupling	ϕ 10 ^{+0.1}	ϕ 22	18.2	25	
E50S8 ϕ 8mm coupling	ϕ 8 ^{+0.1}	ϕ 19	18.2	25	

Output waveform



Caution for using

- Installation**
 - This unit is consisted of precision components. Therefore please treat this product carefully.
 - When you install this unit, if eccentricity and deflection angle are larger, it may shorten the life cycle of this unit. (ENA, E50S8)
 - Please mount this unit on panel with lowest the coefficient of friction between rotating detection part and target. It may shorten the life cycle of this unit. (ENC)
 - Do not put strong impact when insert coupling into shaft. (ENA, E50S8)
- For using**
 - Please use attached SIL Twist pair wire and use proper receiver for RS-422A.
 - 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 power, please install the surge absorber in power line and wire should be shorter in order not to be influenced by noise.
- Environment**
 - Please do not use this unit with below environment, it results in malfunction.
 - Place where this unit or component may be damaged by strong vibration or impact.
 - Place where there are lots of flammable or corrosive gases.
 - Place where strong magnet field or electric noise are occurred.
 - Place where there is beyond of rating temperature or humidity
 - Place where strong acids or alkali near by.
 - Place where there is the direct ray of the sun.
- Vibration and Impact**
 - When the strong impact loads on this unit, the error pulse may occur as if the slit is revolving.
 - Encoder with high resolution can be easily affected by vibration, therefore fix the sub mounting metallic ball when install this unit.
- Wire connection**
 - Do not apply a tensile strength in excess of 30N to the cable.
 - When a high voltage or power line pass near by the encoder cable, be sure to wire the encoder cable in separated conduit to prevent malfunction.

*It may cause malfunction if above instructions are not followed.

Major products

- Proximity sensors
- Area sensors
- Photoelectric sensors
- Fiber optic sensors
- Door/Door side sensors
- Counters
- Graphic/Logic panels
- Temperature controllers
- Tachometer/Pulse(Rate) meters
- Temperature/Humidity transducers
- Switching power supplies
- Stepping motors/drivers/motion controllers
- Field network devices
- Laser marking system (CO₂, Nd:YAG)
- Laser welding/soldering system
- Timers
- Display units
- Panel meters
- Pressure sensors
- Rotary encoders
- Power controllers
- Sensor controllers

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