

Autonics

ROTARY ENCODER(INCREMENTAL TYPE) E60H 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.

Caution Injury or danger may occur under special conditions.

Warning

- When use this unit for controlling highly effective equipment to human or properties. (Medical instrument, Vehicles, Train, Airplane, combustion apparatus, entertainment etc.), it requires installing a fail safety device.
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.

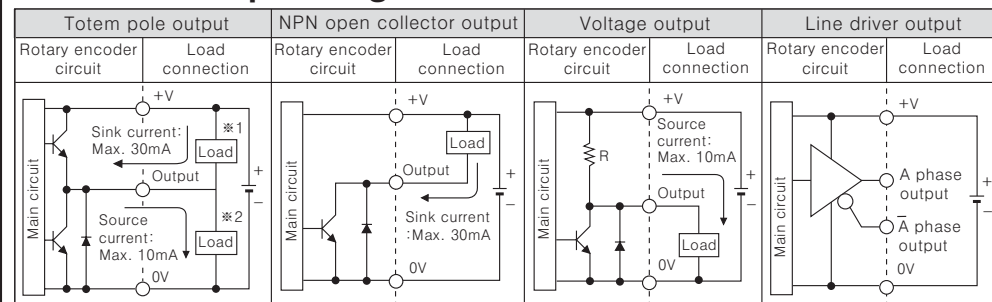
Outline

This Rotary Encoder is optical incremental type, these Encoder register position and angular speed determination by counting the number of pulses on the rotary shaft.

Ordering information

E60H	20	8192	3	N	24	
Series	Shaft inside diameter	Pulse/1Revolution	Output phase	Output type	Power supply	Cable
Diameter ϕ 60mm, Hollow shaft type	ϕ 20mm	5000, 8192	3 : A, B, Z 6 : A, \bar{A} , B, \bar{B} , Z, \bar{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
					※The power of Line driver is only for 5VDC	※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})
 ※ Totem pole output can be used for NPN open collector output type(※1) or voltage output type(※2).
 ※ The above specification is changeable without notice at anytime.

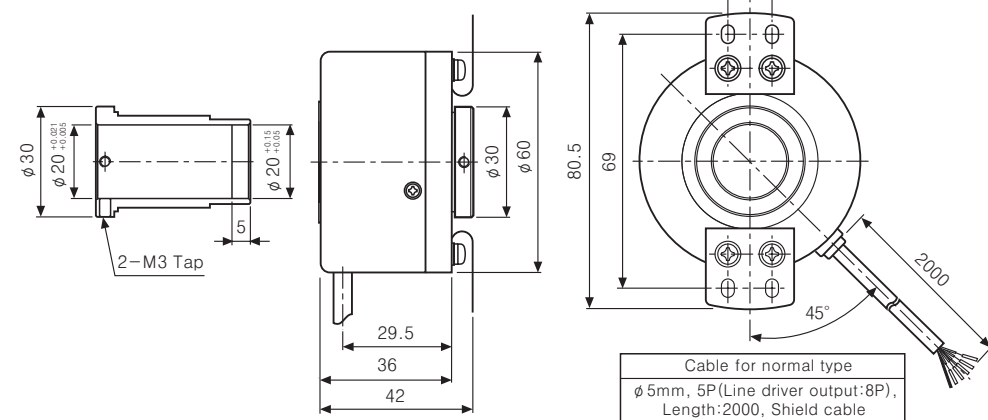
Specifications

Item	Diameter ϕ 60mm hollow shaft type Incremental Rotary encoder	
Model	E60H20-□-3-T-□ E60H20-□-3-N-□ E60H20-□-3-V-□ E60H20-□-6-L-5	
Revolution(P/R)	5000, 8192 (Not indicated pulse is available to customize)	
Output phase	A, B, Z phase (Line driver output A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	
Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)	
Electrical specification	Totem pole output	• Low \Rightarrow Load current: Max. 30mA, Residual voltage: Max. 0.4VDC • High \Rightarrow Load current: Max. 10mA, Output voltage(Power supply 5VDC): Min. (Power supply-2.0)VDC, Output voltage(Power supply 12-24VDC): Min. (Power supply-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 \Rightarrow Load current : Max. 20mA, Residual : Max. 0.5VDC • High \Rightarrow Load current : Max. -20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Totem pole output : Max. 1 μ s NPN open collector output : Max. 1 μ s Voltage output : Max. 1 μ s Line driver output : Max. 0.5 μ s
Max. Response frequency	300kHz	
Power supply	• 5VDC \pm 5% (Ripple P-P: Max. 5%) • 12-24VDC \pm 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	Min. 100M Ω (at 500VDC between all terminals and case)	
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)	
Connection	Cable outgoing type, 250mm cable outgoing connector type	
Mechanical specification	Starting torque	Max. 150gf \cdot cm (0.015N \cdot m)
	Moment of inertia	Max. 110g \cdot cm ² (11 \times 10 ⁻⁶ kg \cdot m ²)
	Shaft loading	Radial : 5kgf, Thrust : 2.5kgf
	Max. allowable revolution	(Note1) 6000rpm
	Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours
Shock	Max. 100G	
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	IP50 (IEC standard)	
Cable	ϕ 5mm, 5P, Length: 2m, Shield cable (Line driver output : ϕ 5mm, 8P)	
Accessory	Bracket 2EA	
Unit weight	Approx. 300g	

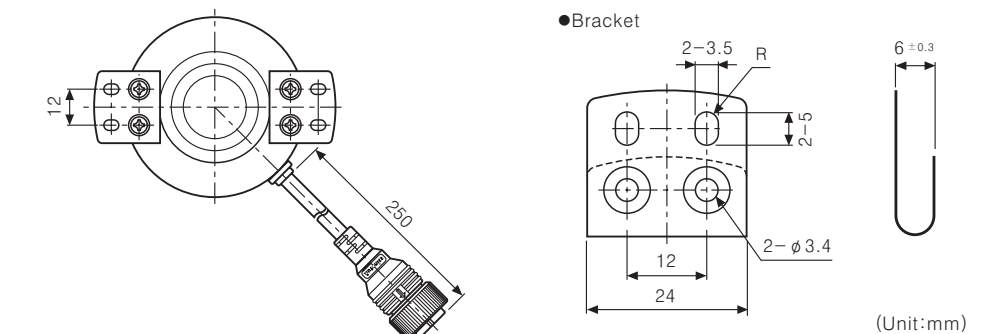
※ (Note1) Max. allowable revolution \geq Max. response revolution
 [Max. response revolution (rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$]
 Please select the resolution to make lower max. revolution than max. allowable revolution.

Dimension

Normal type



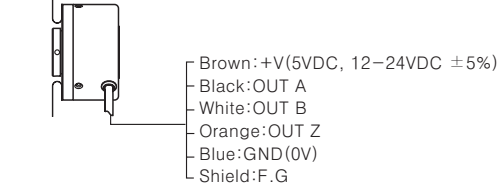
Cable outgoing connector type



Connections

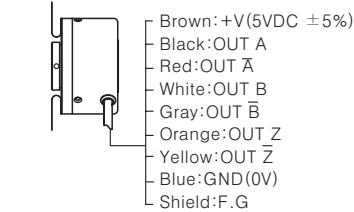
Normal type

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



※ Unused wires must be insulated.
 ※ The body of encoder is connected to a shield.

Line Driver output



Cable outgoing connector type

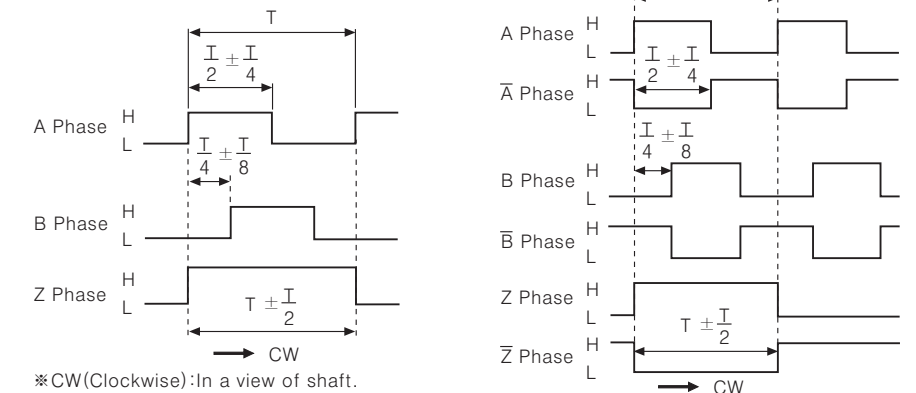
- Totem pole output / NPN open collector output / Voltage output
- Line driver output



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 \bar{A}	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 \bar{B}	Gray
			⑦	OUT Z	Orange
			⑧	OUT \bar{Z}	Yellow
			⑨	F.G	Shield

Output waveform

- Totem pole output/NPN open collector output / Voltage output
- Line driver output



Caution for using

- Installation
 - This unit is consisted of precision components. Therefore please treat this product carefully.
 - For the installation, please check the assembly dimension of counterpart, then try not to occur the offset between shaft hole and the object. It might shorten the life cycle of the product.
 - Do not put strong impact when insert coupling into shaft.
 - For using
 - Please connect shield wire to F.G terminal. (Encoder+Motor+Panel F.G.)
 - 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 short in order not to be influenced by noise.
 - Please apply 5VDC to encoder when use Line Driver type.
 - 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 is beyond of rating temperature or humidity.
 - Place where strong acids or alkali near by.
 - Vibration and Impact
 - When the strong impact loads on this unit, the error pulse may occur as if the slit is revolving.
 - Please fix this unit firmly when mount it in order to avoid malfunction by residual vibration.
 - Wire connection
 - If use the cable of encoder and high voltage line or power cable in the same conduit, it may cause a 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.
- ※ It may cause malfunction if above instructions are not followed.

Major products

- PROXIMITY SENSOR ■ PHOTOELECTRIC SENSOR
- AREA SENSOR ■ FIBER OPTIC SENSOR
- DOOR/DOOR SIDE SENSOR ■ PRESSURE SENSOR
- ROTARY ENCODER ■ COUNTER
- TIMER ■ TEMPERATURE CONTROLLER
- TEMPERATURE/HUMIDITY TRANSDUCER
- POWER CONTROLLER ■ PANEL METER
- TACHO/LINE SPEED/PULSE METER
- DISPLAY UNIT ■ SENSOR CONTROLLER
- SWITCHING POWER SUPPLY
- GRAPHIC PANEL
- 5-PHASE STEPPING MOTOR & DRIVER & CONTROLLER
- LASER MARKING SYSTEM(CO₂, Nd:YAG)

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