

# Autonics ROTARY ENCODER (SINE WAVE INCREMENTAL TYPE) E60H SERIES

## INSTRUCTION MANUAL



[Axial cable type] [Radial cable type]

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 personal injury, economic loss or fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**  
Failure to follow this instruction may result in explosion or fire.
- 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.

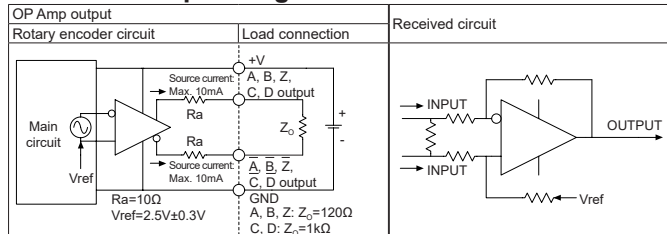
#### ⚠ Caution

- 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 fire.
- 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

E60H	20	2048	10	A	5	R
Series	Shaft inner diameter	Pulses/revolution	Output phase	Control output	Power supply	Cable
Ø60mm, hollow shaft type	Ø20mm	2048	10: A, Ā, B, B̄, Z, Z̄, C, C̄, D, D̄	A: Analog sine wave OP Amp output	5: 5VDC ±5%	R: Axial cable type S: Radial cable type

### ■ Control Output Diagram



※ All output circuits of A, Ā, B, B̄, Z, Z̄, C, C̄, D, D̄ phase are the same.  
 ※ 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.

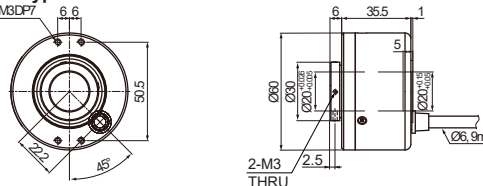
### ■ Specifications

Item	Hollow Shaft Type Ø60mm SINE WAVE INCREMENTAL Rotary Encoder	
Model	E60H20-2048-10-A-5-R	E60H20-2048-10-A-5-S
Revolution (PPR)	2,048	
Output phase	A, Ā, B, B̄, Z, Z̄, C, C̄, D, D̄ phase	
Phase difference of output	Phase difference between A and B: $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase) Phase difference between C and D: 90°	
Electrical specification	Control output	Output type OP Amp output
	Output	Output current Max. 10mA
		Output voltage $V_{p-p} = 0.5V \pm 0.1V$
		DC OFFSET $V_{DC} = 2.5V \pm 0.3V$
	Max. response frequency 200kHz	
	Power supply 5VDC ±5% (ripple P-P: max. 5%)	
	Current consumption Max. 120mA (disconnection of the load)	
Mechanical specification	Insulation resistance Over 100MΩ (at 500VDC between all terminals and case)	
	Dielectric strength 750VAC 50/60Hz for 1 minute (between all terminals and case)	
	Connection Axial cable type   Radial cable type	
Mechanical specification	Starting torque Max. 200gf·cm (0.02N·m)	
	Moment of inertia Max. 110g·cm <sup>2</sup> (11×10 <sup>-6</sup> kg·m <sup>2</sup> )	
	Shaft loading Radial: 5kgf, Thrust: 2.5kgf	
Max. allowable revolution 6000rpm		
Vibration 1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours		
Shock Max. 100G		
Environment	Ambient temp. -20 to 100°C, storage: -25 to 100°C	
	Ambient humi. 35 to 85%RH, storage: 35 to 90%RH	
Protection structure IP40 (IEC standard)		
Cable Ø6mm, 17-wire, 9m <sup>※1</sup> , Shield cable (AWG28, core diameter: 0.08mm, number of cores: 17, insulator out diameter: Ø0.8mm)		
Accessory Bracket: 2		
Approval CE		
Weight <sup>※2</sup> Approx. 750g (approx. 720g)		

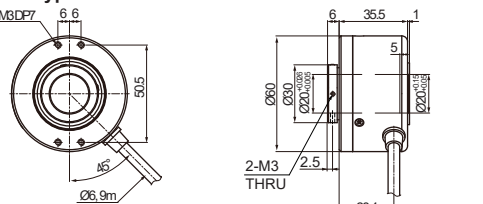
※1: Option is 7m, 15m.  
 ※2: The weight includes packaging. The weight in parenthesis in for unit only.  
 ※ Environment resistance is rated at no freezing or condensation.

### ■ Dimensions

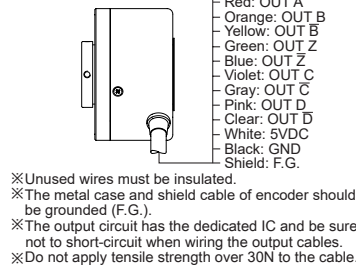
#### ○ Axial cable type



#### ○ Radial cable type

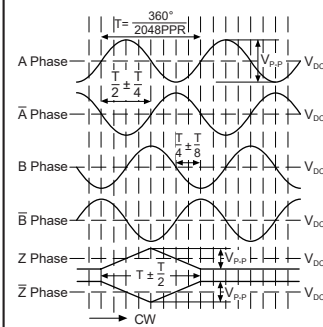


### ■ Connections

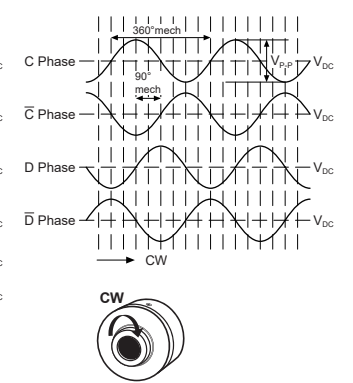


### ■ Output Waveforms

#### ○ A, Ā, B, B̄, Z, Z̄ phase



#### ○ C, C̄, D, D̄ phase



### ■ Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
- 5VDC 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.
- 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
- Connectors/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
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

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