Autonics

ROTARY ENCODER (INCREMENTAL TYPE)
E60H SERIES
INSTRUCTION MANUAL

CE

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

1. **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.
2. **Install on a device panel to use.**
   Failure to follow this instruction may result in fire.
3. **Do not connect, repair, or inspect the unit while connected to a power source.**
   Failure to follow this instruction may result in fire.
4. **Check 'Connections' before wiring.**
   Failure to follow this instruction may result in fire.
5. **Do not disassemble or modify the unit.**
   Failure to follow this instruction may result in fire.

⚠ Caution

1. **Use the unit within the rated specifications.**
   Failure to follow this instruction may result in fire or product damage.
2. **Do not short the load.**
   Failure to follow this instruction may result in product damage by fire.
3. **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.
4. **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.

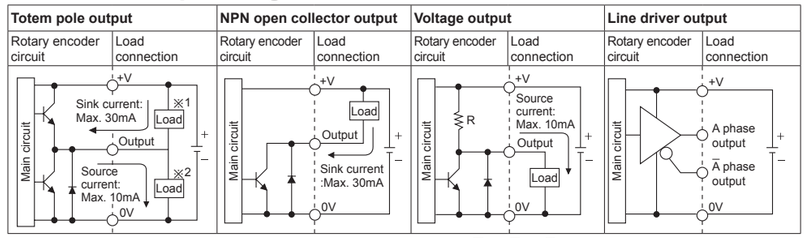
▣ Ordering Information

E60H	20	– 8192	– 3	– N	– 24	–

Series	Shaft inner diameter	Pulses/ Revolution	Output phase	Control output	Power supply	Cable
Diameter Ø60mm, hollow shaft type	Ø20mm	100,1024, 5000, 8192	3: A, B, Z 6: A, A, B, 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: Radial cable type C: Radial cable connector type (※)

※Cable length : 250mm

▣ Control Output Diagram



※All output circuits of A, B, Z phase are same. (line driver output is A, A̅, B, B̅, Z, Z̅)
※Totem pole output type can be used for NPN open collector output 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

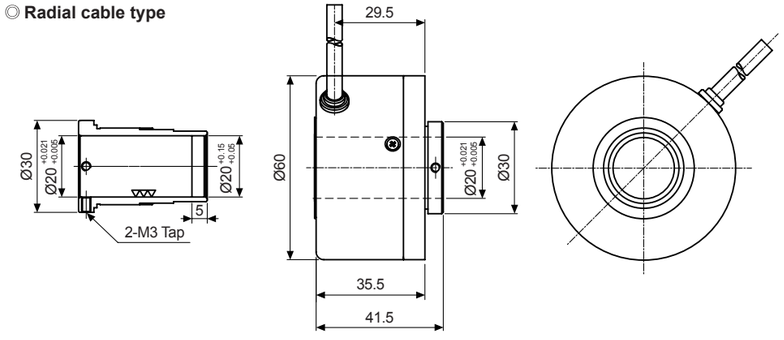
Item			Diameter Ø60mm hollow shaft type of incremental rotary encoder
Model	Totem pole output		**E60H20-□-3-T-□**
	NPN open collector output		**E60H20-□-3-N-□**
	Voltage output		**E60H20-□-3-V-□**
	Line driver output		**E60H20-□-6-L-□**
Resolution (PPR)※1			100, 1024, 5000, 8192
Electrical specification	Output phase		A, B, Z phase (line driver output: A, A̅, B, B̅, Z, Z̅ phase)
	Phase difference of output		Phase difference between A and B: T/4 ± T/8 (T=1cycle of A phase)
	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 NPN open collector output 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		Radial cable type, Radial cable connector type
Mechanical specification	Starting torque		Max. 150gf·cm (0.0147 N·m)
	Moment of inertia		Max. 110g·cm² (11×10⁻⁶ kg·m²)
	Shaft loading		Radial: 5kgf, Thrust: 2.5kgf
	Max. allowable revolution※2		6,000rpm
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. 100G
Environment	Ambient temperature		-10 to 70℃, Storage: -25 to 85℃
	Ambient humidity		35 to 85%RH, Storage: 35 to 90%RH
Protection structure			IP50 (IEC standards)
Cable			Ø5mm, 5-wire, Length: 2m, Shield cable (line driver output: Ø5mm, 8-wire) (AWG24, Core diameter: 0.08mm, Number of cores: 40, Insulator out diameter: Ø1mm)
Accessory			Bracket: 2
Approval			CE (except line driver output)
Weight※3			Approx. 397g (approx. 330g)

※1: Not indicated resolutions are customizable.
※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) = Max. response frequency / Resolution × 60 sec.]
※3: The weight includes packaging. The weight in parenthesis is for unit only.
※Environment resistance is rated at no freezing or condensation.

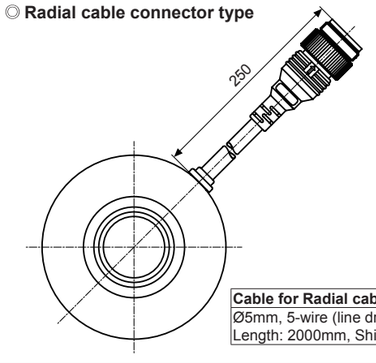
▣ Dimensions

(unit: mm)

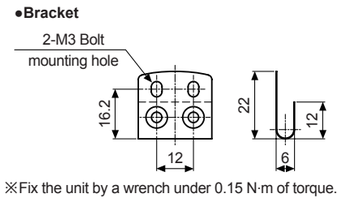
◎ **Radial cable type**



◎ **Radial cable connector type**



●**Bracket**



※Fix the unit by a wrench under 0.15 N·m of torque.

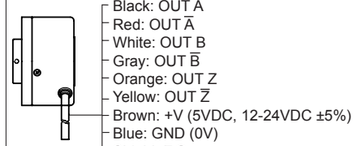
Cable for Radial cable type	Cable for Radial cable connector type
Ø5mm, 5-wire (line driver output: 8-wire), Length: 2000mm, Shield cable	Ø5mm, 5-wire (line driver output: 8-wire), Length: 250mm, Shield cable

▣ Connections

◎ **Radial cable type**

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

• Line driver output



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

◎ **Radial cable connector type**

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

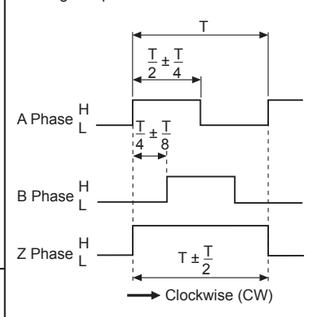
• Line driver output

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

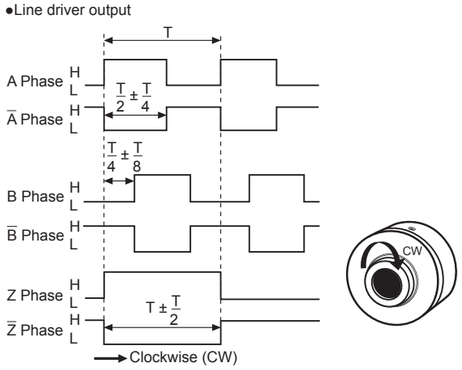
※F.G. (Field Ground): It should be grounded separately.

▣ Output Waveforms

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



●Line driver output



▣ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
2. 5VDC, 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. 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.
4. Ground the shield wire to the F.G. terminal.
5. When using switching mode power supply, frame ground (F.G.) terminal of power supply should be grounded.
6. Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
7. 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.
8. This unit may be used in the following environments.
   ①Indoors (in the environment condition rated in 'Specifications')
   ②Altitude max. 2,000m
   ③Pollution degree 2
   ④Installation category II

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▣ 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
- SSR/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

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