

# Autonics

## ROTARY ENCODER (INCREMENTAL TYPE))

# E20 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 personal injury, economic loss or 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 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

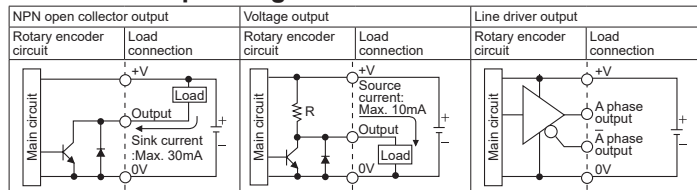
- Use the unit within the rated specifications.**  
Failure to follow this instruction may result in fire or product damage.
- Do not short the load.**  
Failure to follow this instruction may result in fire.
- Do not use the unit near the place where there is the equipment which generates strong magnetic force or high frequency noise and strong alkaline, strong acidic exists.**  
Failure to follow this instruction may result in product damage.

### ■ Ordering Information

E20[S]	2	360	3	N	12	R
Series	Shaft diameter	Pulses/revolution	Output phase	Control output	Power supply	Cable
Ø20mm Shaft type	External 2: Ø2mm	100, 200, 320, 360	3: A, B, Z	N: NPN open collector output	5: 5VDC ±5%	R: Axial cable type
Ø20mm hollow built-in type	Inside 2: Ø2mm, 2.5: Ø2.5mm, 3: Ø3mm		6: A, B, Z, A, B, Z	V: Voltage output L: Line driver output	12: 12VDC ±5%	S: Radial cable 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,  $\bar{A}$ , B,  $\bar{B}$ , Z,  $\bar{Z}$ )

※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	Ø20mm Shaft type/Hollow built-in type Incremental Rotary Encoder	
Model	E20S2-□-3-N-□□ E20S2-□-3-V-□□ E20S2-□-6-L-5-□	E20HB: □-3-N-□□ E20HB: □-3-V-□□ E20HB: □-6-L-5-□
Resolution (PPR) <sup>※1</sup>	100, 200, 320, 360	
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: $T \pm \frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)	
Electrical specification	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: max. 0.5VDC= • [High] - Load current: max. -20mA, output voltage: min. 2.5VDC=
	NPN open collector output	Max. 1μs (cable length: 1m, I sink=20mA)
	Voltage output	
	Line driver output	Max. 0.5μs (cable length: 1m, I sink=20mA)
	Max. response frequency	100kHz
	Power supply	• 5VDC= ±5%    • 12VDC= ±5%
	Current consumption	Max. 60mA (disconnection of the load), Line driver output: max. 50mA (disconnection of the load)
	Insulation resistance	Over 100MΩ (at 500VDC between all terminals and case)
Mechanical specification	Dielectric strength	500VAC 50/60Hz for 1 minute (between all terminals and case)
	Connection	Axial cable type, radial cable type
	Starting torque	Max. 5gf·cm (5×10 <sup>-4</sup> N·m)
	Moment of inertia	Max. 0.5g·cm <sup>2</sup> (5×10 <sup>-8</sup> kg·m <sup>2</sup> )
	Shaft loading	Radial: 200gf, Thrust : 200gf
	Max. allowable revolution <sup>※2</sup>	6,000rpm
	Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours
	Shock	Approx. max. 50G
	Environment	Ambient temp. -10 to 70°C, storage: -20 to 80°C Ambient humi. 35 to 85%RH, storage: 35 to 90%RH
	Protection structure	IP50 (IEC standard)
Cable	Ø3mm, 5-wire (line driver output: 8-wire), 1m, Shield cable	
	Accessories	
	Approval	
Unit weight	Approx. 35g	

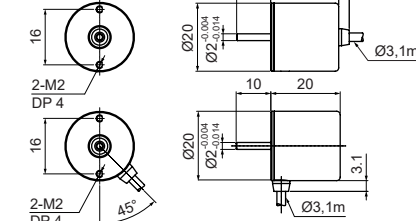
※1: Not indicated resolutions are customizable.

※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)] =  $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.}$

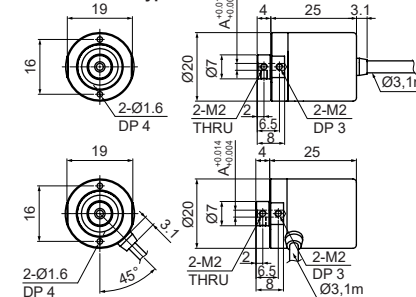
※Environment resistance is rated at no freezing or condensation.

### ■ Dimension

#### ○ Shaft type

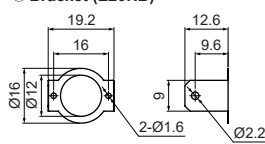


#### ○ Hollow built-in type

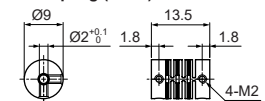


Model	E20HB2	E20HB2.5	E20HB3
A	Ø2	Ø2.5	Ø3

#### ○ Bracket (E20HB)



#### ○ Coupling (E20S)

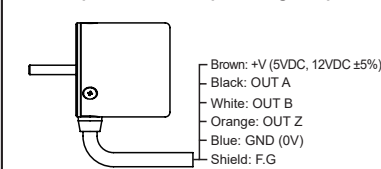


- Parallel misalignment: max. 0.15mm
- Angular misalignment: max. 2°
- End-play: max. 0.2mm

- ※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.

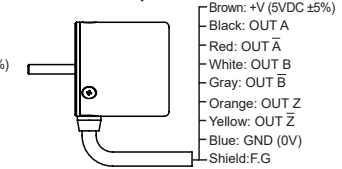
### ■ Connections

#### ○ NPN open collector output/Voltage output



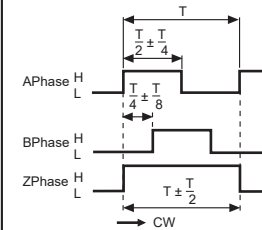
※Do not apply tensile strength over 15N to the cable.

#### ○ Line driver output

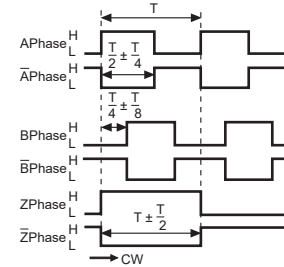


### ■ Output Waveform

#### ○ 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, 12VDC 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/Socket
- 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<sub>2</sub>, 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

**Autonics Corporation**  
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