Autonics

ROTARY ENCODER(INCREMENTAL TYPE))
E20 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.

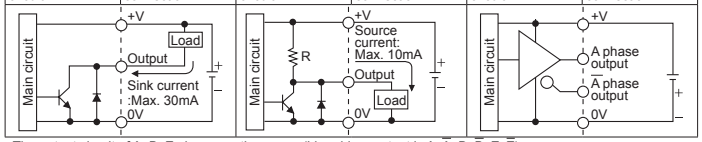
■ Ordering Information

E20S	2	– 360	– 3	– N	– 12	– R

Series	Shaft diameter	Pulses/ Revolution	Output phase	Output type	Power supply	Cable
E20S Diameter Ø20mm, Shaft type	Ø2mm	100, 200, 320, 360	3: A, B, Z 6: A, B, Z, Ā, B̄, Z̄	N: NPN open collector output V: Voltage output L: Line driver output ※The power of Line driver is only for 5VDC.	5 : 5VDC±5% 12 : 12VDC±5%	R : Axial cable type S : Radial cable type
E20HB Diameter Ø20mm, Built-in type	Ø2mm, Ø2.5mm, Ø3mm					

■ Control Output Diagram

NPN open collector output		Voltage output		Line driver output	
Rotary encoder circuit	Load connection	Rotary encoder circuit	Load connection	Rotary encoder circuit	Load connection



- The output circuit of A, B, Z phase are the same. (Line driver output is A, Ā, B, B̄, Z, Z̄)

※**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 Incremental Rotary Encoder	Ø20mm 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)			100, 200, 320, 360 (Not indicated pulse and output type is customzable.)	
Electrical specification	Output phase		A, B, Z phase (Line driver output A, Ā, B, B̄, Z, Z̄ phase)	
	Phase difference of output		Phase difference between A and B: $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)	
	Control output	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⎓	
	Response time (Rise/ Fall)	NPN open collector output	Max. 1μs	• Measuring condition - Cable length : 1m, I sink=Max. 20mA
		Voltage output	Max. 1μs	
		Line driver output	Max. 0.5μs	
	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		Min. 100MΩ(at 500VDC between all terminals and case)	
	Dielectric strength		500VAC 50/60Hz for 1 minute(Between all terminals and case)	
	Connection		Axial cable type, Radial cable type	
Mechanical specification	Starting torque		Max. 5gf·cm(5×10⁻⁴N·m)	
	Moment of inertia		Max. 0.5g·cm²(5×10⁻⁸kg·m²)	
	Shaft loading		Radial: 200gf, Thrust : 200gf	
	Max. allowable revolution※1		6000rpm	
Vibration			1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours	
Shock			Max. 50G	
Environment	Ambient temperature		-10 to 70℃(at non-freezing status), Storage : -20 to 80℃	
	Ambient humidity		35 to 85%RH, Storage : 35 to 90%RH	
Protection			IP50(IEC standard)	
Cable			Ø3mm, 5P(Line driver output : 8P), Length:1m, Shield cable	
Accessory			Ø2mm Coupling(Shaft type), Bracket(Built-in type)	
Approval			CE (Except Line driver output)	
Unit weight			Approx. 35g	

※1: Max. allowable revolution Max. response revolution

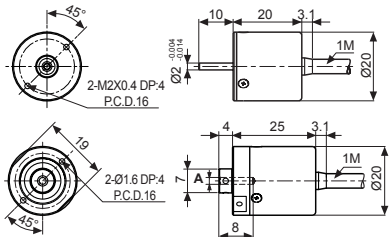
【Max. response revolution(rpm)= $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60$ sec】

Please select the resolution to make lower max. revolution than max. allowable revolution.

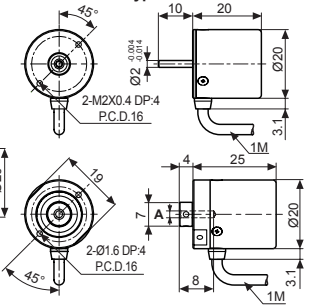
■ Dimension

(unit: mm)

◎ **Axial cable type**



◎ **Radial cable type**

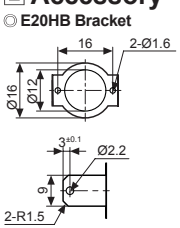


A	Ø2	Ø2.5	Ø3
Tolerance	+0.014 +0.004		

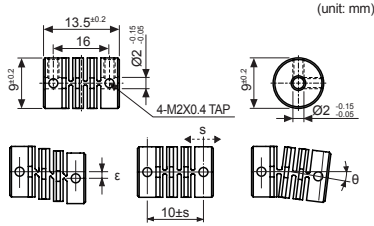
■ Accessory

(unit: mm)

◎ **E20HB Bracket**



◎ **Coupling**

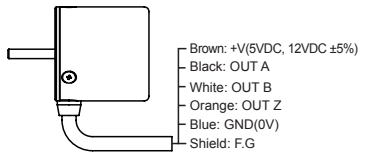


s = 0.2mm Max.
ε= 0.15mm Max.
θ= 2°Max.

※Do not add too much load on rotation axis.
※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.

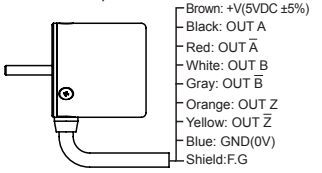
■ Connections

• NPN open collector output/Voltage output



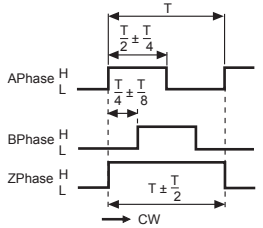
※Do not apply tensile strength over 15N to the cable.

• Line driver output

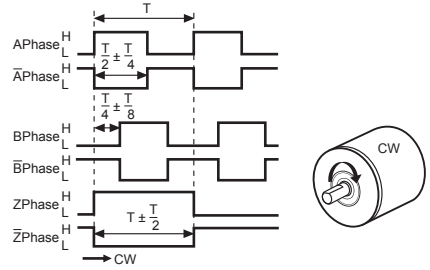


■ Output Waveform

• NPN open collector output / Voltage output



• Line driver output



■ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
2. 5VDC, 12VDC 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. For Line driver unit, use the twisted pair wire which is attached seal and use the receiver for RS-422A communication.
8. vCheck 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.
9. 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

■ 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, CO_2, 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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