

Autonics

ROTARY ENCODER(INCREMENTAL TYPE) E40S/E40H/E40HB/E80H 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

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

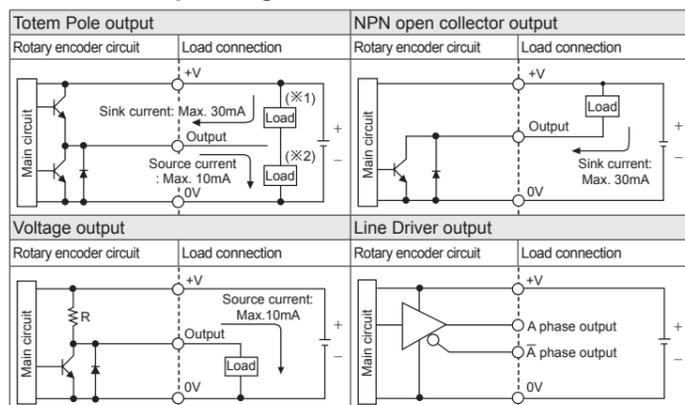
E40S - 6 - 5000 - 3 - N - 24

Series	Shaft diameter	Pulses / Revolution	Output phase	Output	Power supply	Cable
E40S	∅6mm	*1,2,5,10,12,15,20,23,25,30,35,40,45,50	2: A, B	T: Totem pole output	5: 5VDC ±5% 24: 12-24VDC ±5%	No mark Radial cable type C(※) Radial cable connector type
	∅8mm	60,75,100,120,125,150,192,200,240,250,256	3: A, B, Z			
E40H E40HB	∅6mm	300,360,400,500,512	4: A, Ā, B, B̄	N: NPN open collector output	5: 5VDC ±5% 24: 12-24VDC ±5%	No mark Radial cable type C(※) Radial cable connector type
	∅8mm	600,800,1000,1024,1200,1500,1800,2000,2048	6: A, Ā, B, B̄, Z, Z̄	V: Voltage output		
E80H	∅30mm	60,100,360,500	3: A, B, Z	L: Line Driver output	5: 5VDC ±5% 24: 12-24VDC ±5%	No mark Radial cable type C(※) Radial cable connector type
	∅32mm	512,1024,3200	6: A, Ā, B, B̄, Z, Z̄			

※ * indicates the standard specification of diameters.

※ Cable length : 250mm

■ Control Output Diagram



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

※ Totem Pole output can be used for NPN open collector 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

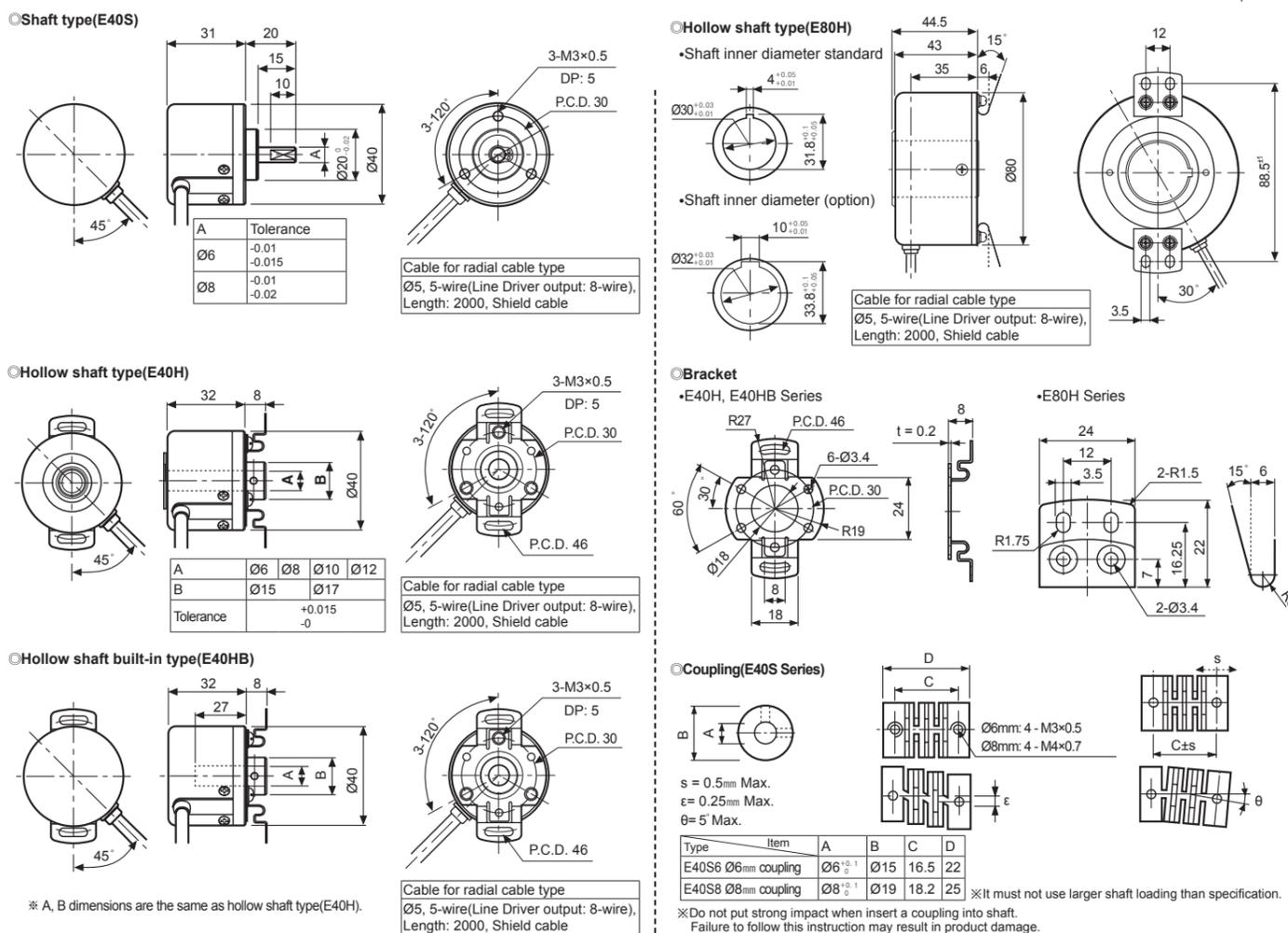
Model	∅40mm Shaft type	∅40mm Hollow shaft type	∅40mm Hollow shaft Built-in type	∅80mm Hollow shaft type
Totem Pole output	E40S	E40H	E40HB	E80H
NPN open collector output	E40S	E40H	E40HB	E80H
Voltage output	E40S	E40H	E40HB	E80H
Line Driver output	E40S	E40H	E40HB	E80H
Resolution(PPR)	*1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 5000 (Not indicated type is available to customize)			60, 100, 360, 500, 512, 1024, 3200
Output phase ^{※1}	A, B, Z phase(Line Driver output: A, Ā, B, B̄, Z, Z̄ phase)			
Phase difference between output	Output between A and B phase: $\frac{T}{4} \pm \frac{T}{8}$ (T = 1 cycle of A phase)			
Electrical specification	Control output			
	Totem Pole output	• Low ⇒ Load current: Max. 30mA, Residual voltage: Max. 0.4VDC=		
	NPN open collector output	• 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=		
	Voltage output	Load current: Max. 10mA, Residual voltage: Max. 0.4VDC=		
Electrical specification	Line Driver output			
	Totem Pole output	• Low ⇒ Load current: Max. 20mA, Residual voltage: Max. 0.5VDC =		
	NPN open collector output	• 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=		
	Voltage output	Max. 1/μs (Cable length: 2m, I sink=20mA)		
Electrical specification	Line Driver output			
	Totem Pole output	Max. 0.5/μs (Cable length: 2m, I sink=20mA)		
	NPN open collector output	Max. 1/μs (Cable length: 2m, I sink=20mA)		
	Voltage output	Max. 0.5/μs (Cable length: 2m, I sink=20mA)		
Electrical specification	Max. Response frequency			
	Totem Pole output	300kHz		
	NPN open collector output	200kHz		
	Voltage output	200kHz		
Electrical specification	Power supply			
	Totem Pole output	• 5VDC= ±5%(Ripple P-P: Max. 5%)		
	NPN open collector output	• 12-24VDC= ±5%(Ripple P-P: Max. 5%)		
	Voltage output	Max. 80mA (disconnection of the load), Line Driver output: Max. 50mA(disconnection of the load)		
Electrical specification	Current consumption			
	Totem Pole output	Min. 100mW(at 500VDC megger between all terminals and case)		
	NPN open collector output	750VAC 50/60Hz for 1 minute(Between all terminals and case)		
	Voltage output	Dielectric strength		
Electrical specification	Connection			
	Totem Pole output	Radial cable type, Radial cable connector type		
	NPN open collector output	Starting torque		
	Voltage output	Shaft Type: Max. 40gf·cm(0.004N·m), Hollow Type: Max. 50gf·cm(0.005N·m)		
Mechanical specification	Moment of inertia			
	Totem Pole output	Max. 40g·cm ² (4×10 ⁻⁶ kg·m ²)		
	NPN open collector output	Max. 200gf·cm(0.02N·m)		
	Voltage output	Max. 800g·cm ² (8×10 ⁻⁶ kg·m ²)		
Mechanical specification	Shaft loading			
	Totem Pole output	Radial: 2kgf, Thrust: 1kgf		
	NPN open collector output	Radial: 5kgf, Thrust: 2.5kgf		
	Voltage output	3,600rpm		
Mechanical specification	Max. allowable revolution ^{※2}			
	Totem Pole output	5,000rpm		
	NPN open collector output	1.5mm amplitude at frequency of 10 to 55Hz(for 1 min.) in each X, Y, Z direction for 2 hours		
	Voltage output	Max. 50G		
Mechanical specification	Shock			
	Totem Pole output	Max. 50G		
	NPN open collector output	Max. 75G		
	Voltage output	Max. 75G		
Mechanical specification	Environment			
	Totem Pole output	Ambient temp. -10 to 70°C, Storage: -25 to 85°C		
	NPN open collector output	Ambient humi. 35 to 85% RH, Storage: 35 to 90%RH		
	Voltage output	Protection structure		
Mechanical specification	IP50(IEC Standards)			
	Totem Pole output	Cable		
	NPN open collector output	∅5mm, 5-wire, Length: 2m, Shield cable(Line Driver output: ∅5mm, 8-wire) (AWG 24, Core wire diameter: 0.08mm, No. of core wire: 40, Insulator out diameter: ∅1mm)		
	Voltage output	Accessory		
Mechanical specification	∅6mm coupling(Standard)			
	Totem Pole output	Bracket		
	NPN open collector output	∅8mm coupling(Optional)		
	Voltage output	Approval		
Mechanical specification	C(Except for Line Driver output)			
	Totem Pole output	Unit weight		
	NPN open collector output	Approx. 120g		
	Voltage output	Approx. 560g		

※1: 1, 2, 5, 12 PPR are output A, B phase only.(But Line Driver output: A, Ā, B, B̄ phase)

※2: Max. allowable revolution ≥ 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.

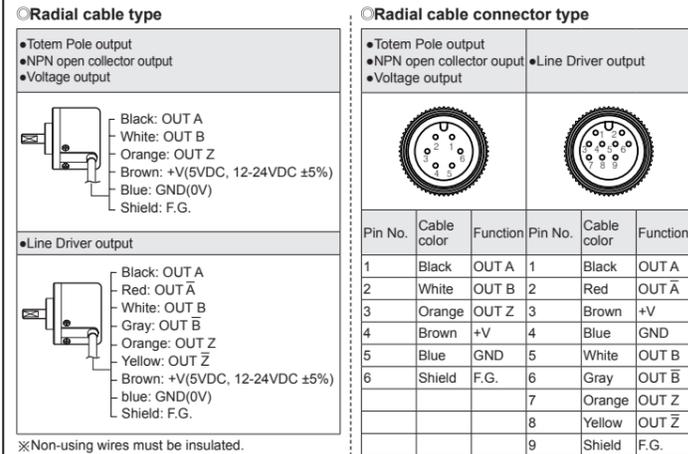
※ Environment resistance is rated at no freezing or condensation.

■ Dimensions



※ A, B dimensions are the same as hollow shaft type(E40H).

■ Connections

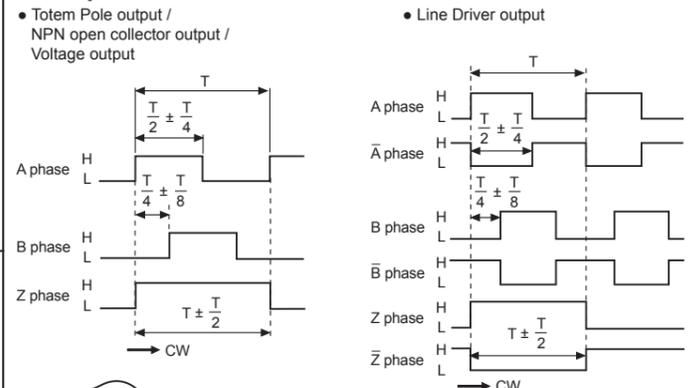


※ Non-using wires must be insulated.

※ The shield cable and metal case of encoder must be grounded(F.G.).

※ Do not apply tensile strength over 30N to the cable.

■ Output Waveform



■ Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
- 5VDC, 12-24VDC 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.
 - 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, CO₂, 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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