Autonics

ROTARY ENCODER (INCREMENTAL TYPE) E40 SERIES

INSTRUCTION MANUAL

E40S E40H E40HB







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.

- 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 personal injury, economic loss or fire.
- 2. 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
- 3. Install on a device panel to use.
- Failure to follow this instruction may result in fire.
- 4. Do not connect, repair, or inspect the unit while connected to a power source.
- Failure to follow this instruction may result in fire
- 5. Check 'Connections' before wiring.
- Failure to follow this instruction may result in fire 6. 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 fire.
- 3. 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 dia	meter	Pulses / revolution	Output phase	Control output	Power supply	Cable
Ø40mm Shaft type	External	6: Ø6mm 8: Ø8mm		3: A, B, Z 4: A, Ā, B, B	T: Totem pole output		No mark
Ø40mm Hollow shaft type, Hollow built-in type	Inside	6: Ø6mm 8: Ø8mm 10: Ø10mm 12: Ø12mm	Refer to resolution		collector output	5: 5VDC ±5% 24: 12-24VDC ±5%	: Radial cable type C : Radial cable connector type

Control Output Diagram

Totem pole outp	ut	NPN open colle	ctor output	Voltage output		Line driver outp	out
Rotary encoder circuit	Load connection	Rotary encoder circuit	Load connection	Rotary encoder circuit	Load connection	Rotary encoder circuit	Load connection
Sink of : max. Source Source : max.	Output +	Main circuit	Output + Sink current : max. 30mA	Main circuit	Source current : max. 10mA Output	Main circuit	A phase output +

 \times All output circuits of A, B, Z phase are same. (line driver output is A, \overline{A} , B, \overline{B} , Z, \overline{Z})

- stThe 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)

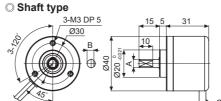
Specifications

Ite				llow shaft type/hollow built-in typ					
_	Ioter	m pole output	E40SD-D-T-D-D	E40H	E40HB				
NPN open collector output Voltage output			E40S	E40HN	E40HBN				
⊠ Voltage output			E40S	E40H	E40HB::				
	Line	driver output	E40S	E40H	E40HB				
Re	solut	tion (PPR) ^{*1}		30, 35, 40, 45, 50, 60, 75, 100, 120, 0, 1000, 1024, 1200, 1500, 1800, 20					
Ou	tput	phase ^{*2}	A, B, Z phase (line driver output:	A, \overline{A} , B, \overline{B} , Z, \overline{Z} phase)					
Phase difference between output			Output between A and B phase:	$\frac{T}{4} \pm \frac{T}{8}$ (T= 1cycle of A phase)					
	Totem pole output		•[High] - Load current: max. 10mA Output voltage (power vo	n, residual voltage: max. 0.4VDC== A, oltage 5VDC==): min. (power voltage oltage 12-24VDC==): min. (power vo	,				
	2	NPN open collector output	Load current: max. 30mA, residua	al voltage: max. 0.4VDC==					
딞	tro	Voltage output	Load current: max. 10mA, residua						
specification	Control output	Line driver output	•[High] - Load current: max20m. Output voltage (power vo	ow] - Load current: max. 20mA, residual voltage: max. 0.5VDC== ligh] - Load current: max20mA,					
Electrical	al)	Totem pole output							
댦	ons se/f	NPN open collector outpu	Max. 1μs (cable length: 2m, I sink=20mA)						
ě	gs (ris	Voltage output	1						
۳	2,2	Line driver output	Max. 0.5μs (cable length: 2m, I sink=20mA)						
Ì		response frequency	300kHz	,					
Ì	Pow	er supply	•5VDC= ±5% (ripple P-P: max. 5	i%) •12-24VDC= ±5% (ripple	P-P: max. 5%)				
Ì	Curre	ent consumption	Max. 80mA (disconnection of the load), Line driver output: max. 50mA (disconnection of the load)						
Ì	Insul	lation resistance	Over 100MΩ (at 500VDC megger	between all terminals and case)	,				
Ì	Diele	ectric strength	750VAC 50/60Hz for 1 minute (be	etween all termials and case)					
Ì	Conr	nection	Radial cable type, radial cable connector type						
ā	₽ St	tarting torque		I·m), hollow shaft/hollow built-in type	e: max. 50gf-cm (0.005N-m)				
Ë	Mg	loment of inertia	Max. 40g·cm² (4×10 ⁻⁶ kg·m²)	7.	, ,				
cha	SI SI	tarting torque loment of inertia haft loading ax. allowable revolution [®]	Radial: 2kgf, Thrust: 1kgf						
ğ	g M	ax. allowable revolution ⁸	³ 5,000rpm						
Vib	ratio	n	1.5mm amplitude at frequency of	10 to 55Hz (for 1 min) in each X, Y,	Z direction for 2 hours				
_	ock		Approx. max. 50G	,					
		. Ambient temp.	-10 to 70°C, storage: -25 to 85°C						
En	viron	Ambient humi.	35 to 85%RH, storage: 35 to 90%						
Pro	ntecti	ion structure	IP50 (IEC standard)						
		ion on dotal o	Ø5mm, 5-wire (line driver output:	8-wire) 2m Shield cable					
Ca	ble			n, number of cores: 40, insulator out	diameter: Ø1mm)				
Acı	cesso	orv	Ø6mm coupling, Ø8mm coupling		,				
_	prova		C € (except for line driver output)	1=					
_	it we		Approx. 120g						
		0	1 11 0	se is only for A, B phase. (line driver					

[Max. response revolution (rpm) = $\frac{\text{Max. response frequency}}{\text{Peopletica}} \times 60 \text{ sec.}$] Resolution

XEnvironment resistance is rated at no freezing or condensation

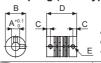
Dimensions



Α	Ø6 ^{-0.004}	Ø8 -0.005 -0.02
В	5	7

Ŭ Ø5 Cable for radial cable type Ø5, 5-wire (Line driver output: 8-wire) Length: 2m, Shield cable Cable for radial cable connector type Ø5, 5-wire (Line driver output: 8-wire), Length: 250mm, Shield cable

Coupling (shaft type)



- Parallel misalignment: max. 0.25mr • Angular misalignment: max. 5°
- End-play: max. 0.5mm

	Α	В	C	D	E
E40S6 Ø6mm coupling	Ø6	Ø15	2.8	22	4-M3
E40S8 Ø8mm coupling	Ø8	Ø19	3.4	25	4-M4

XIt 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

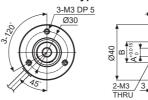
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Torque

* *When you install this unit, if eccentricity and deflection angle are

larger, it may shorten the life cycle of this unit.

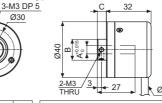
□ ○ Hollow shaft type



Α	Ø6 Ø8		Ø10	Ø12	
В	Ø15		Ø17		
С	6.5		6.3		

Cable for radial cable type Ø5, 5-wire (Line driver output: 8-wire) Length: 2m, Shield cable Cable for radial cable connector type Ø5, 5-wire (Line driver output: 8-wire)

O Hollow built-in type



Length: 250mm, Shield cable

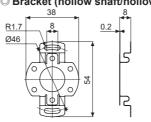
(unit: mm)

	!	Α	Ø6	Ø8	Ø10	Ø12
	!	В	Ø15		Ø17	
Э.	i	С	6.5		6.3	
	1					

Cable for radial cable type Ø5, 5-wire (Line driver output: 8-wire) Length: 2m, Shield cable

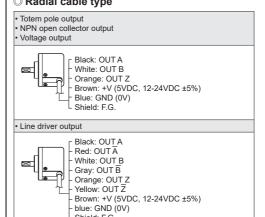
Cable for radial cable connector type Ø5, 5-wire (Line driver output: 8-wire). Length: 250mm. Shield cable

O Bracket (hollow shaft/hollow built-in type)



Connections

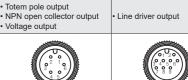
Radial cable type



XNon-using wires must be insulated.

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

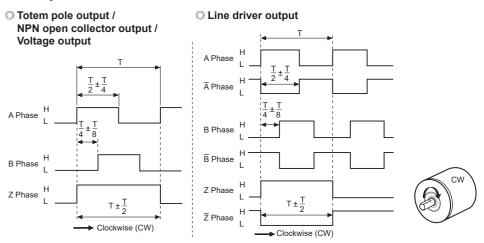
O Radial cable connector type





n No.	Cable color	Function	Pin No.	Cable color	Function
	Black	OUTA	1	Black	OUTA
	White	OUT B	2	Red	OUTĀ
	Orange	OUT Z	3	Brown	+V
	Brown	+V	4	Blue	GND
	Blue	GND	5	White	OUT B
	Shield	F.G.	6	Gray	OUT B
			7	Orange	OUT Z
_			8	Yellow	OUT Z
			9	Shield	F.G.

Output Waveforms



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
- 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. 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.
- (1) Indoors (in the environment condition rated in 'Specifications')

■ Temperature Controller

SSR/Power Controllers

■ Counters

■ Panel Meters

■ Display Units

Sensor Controllers

■ Temperature/Humidity Transducers

■ Tachometer/Pulse (Rate) Meters

- ②Altitude max. 2.000m
- ③Pollution degree 2
- (4) Installation category II

Major Products

- Fiber Optic 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

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