58 mm Diameter Absolute Single-Turn **Rotary Encoders (Optical)**

EP58 Series INSTRUCTION MANUAL

TCD210035AB

Autonics

Thank you for choosing our Autonics product.

Read and understand the instruction manual and manual thoroughly before using the product.

For your safety, read and follow the below safety considerations before using. For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

Keep this instruction manual in a place where you can find easily.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice. Follow Autonics website for the latest information.

Safety Considerations

• Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.

• Λ symbol indicates caution due to special circumstances in which hazards may occur.

Warning Failure to follow instructions may result in serious injury or death.

- 01. 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.) ailure to follow this instruction may result in personal injury, economic loss or fire.
- 02. Do not use the unit in the place where flammable / explosive / corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present. ure to follow this instruction may result in explosion or fire.

03. Install on a device panel to use.

Failure to follow this instruction may result in fire. 04. Do not connect, repair, or inspect the unit while connected to a power source.

Failure to follow this instruction may result in fire. 05. Check 'Connections' before wiring. ailure to follow this instruction may result in fire

06. Do not disassemble or modify the unit. Failure to follow this instruction may result in fire

▲ Caution Failure to follow instructions may result in injury or product damage.

- 01. Use the unit within the rated specifications.
- ailure to follow this instruction may result in fire or product damage. 02. Do not short the load. ailure to follow this instruction may result in fire
- 03. 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.

Cautions during Use

• Follow instructions in 'Cautions during Use'.

- Otherwise, It may cause unexpected accidents • 5 VDC==, 12 - 24 VDC== 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 supplying power with SMPS, ground the F.G. terminal and connect the noise canceling capacitor between the 0 V and F.G. terminals.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
- · 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. 2.000 m
- Pollution degree 2
- Installation category II

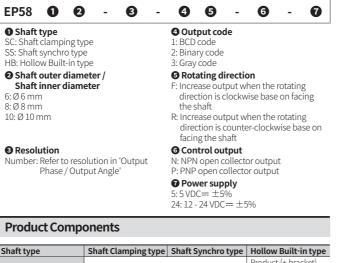
Cautions during Installation

- · Install the unit correctly with the usage environment, location, and the designated specifications. • Do not load overweight on the shaft.
- Do not put strong impact when insert a coupling into shaft.
- Failure to follow this instruction may result in product damage.
- When fixing the product or coupling with a wrench, tighten under 0.15 N m. If the coupling error (parallel misalignment, angular misalignment) between the shaft
 increases while installation, the life cycle of the coupling and the encoder can be shorten.

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

Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.



Snaft type	Shaft Clamping type	Shaft Synchro type	Hollow Built-In type
Product Components	Product, Instruction m	anual	Product (+ bracket), Instruction manual
Bolt	× 10	× 8	× 4
Coupling	×1	×1	-
Bracket	×1	×1	-

Connections

• Unused wires must be insulated.

• The metal case and shield cable of encoders must be grounded (F.G.).

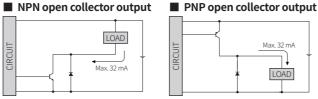
F.G. (Frame Ground) must be grounded separately.

• Since exclusive driver IC is used for output circuit, be aware of short circuits when wiring each output wires.

 N · C: not connecte 	d
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BCD code			Binary / Gray code		
Color	Function	Refer	Color	Function	Refer
White	+V		White	+V	
Black	GND	power	Black	GND	power
Brown	2°		Brown	2 ⁰	
Red	2 ¹		Red	2 ¹	
Orange	2 ²		Orange	2 ²	
Yellow	2 ³		Yellow	2 ³	
Blue	$2^{\circ} \times 10$		Blue	2 ⁴	
Purple	$2^{1} \times 10$		Purple	2 ⁵	
Gray	$2^{2} \times 10$		Gray	2 ⁶	
White / Brown	$2^{3} \times 10$		White / Brown	27	
White / Red	$2^{0} \times 10^{2}$		White / Red	2 ⁸	
White / Orange	$2^{1} \times 10^{2}$		White / Orange	2 ⁹	
White / Yellow	$2^{2} \times 10^{2}$		White / Yellow	N·C	
White / Blue	$2^{3} \times 10^{2}$		White / Blue	N·C	
White / Purple	$2^{0} \times 10^{3}$		White / Purple	N·C	
Shield	F.G.	signal shield	Shield	F.G.	signal shield

• The output circuit is identical for each output bit.



Output Waveform

• Following waveform is based on the positive logic.

(In case of negative logic, the waveform is opposite to corresponding waveform.)

BCD code output

(0 1 2 3 4	5 6	789	1020 1021	1022 1023 0'
2°		ήĻ	ĽΓX	ХĻ	
2 ¹		<u> </u>	ЪĽХ	:ХЦ	÷.
2 ²			ιx	X	
2 ³			ĽХ	X	
:					
$2^{3} \times 10^{2}$			ЦX	:X	++
$2^{\circ} imes 10^{3}$				X	لينت

Binary code output

0 1		5 7 8 9		021 1022 1023
2°	ļήψ	ĻГ.	XX	ήĻή
2 ¹			X:X_	
2²			XX	
23			XX	
2 ⁸			<u></u>	
2 ⁹			X.X	

	Gray code output					
3 0'						
l						
l	2 ² X X					
L	2 ³ XX					
-	2 ⁸ X ⁻ X					
	2° X.X. 2° X X					
L2						

Specifications

Model	EP58	EP58		
Resolution 01)	\leq 1024 division			
Output code	BCD / Binary / Gray code model			
Control output	NPN open collector output	PNP open collector output		
Inflow current	\leq 32 mA	-		
Residual voltage	\leq 1 VDC==	-		
Outflow current	-	\leq 32 mA		
Output voltage	- ≥ (power supply - 1.5) VDC==			
Response speed 02)	d ⁰²⁾ $T_{ON} \le 800$ nsec, $T_{OFF} \le 800$ nsec			
Max. response freq.	35 kHz	35 kHz		
Max. allowable revolution ⁰³⁾	3,000 rpm			
Approval	C E 监 E M			

02) Based on cable length: 2 m, I sink = 32 mA

03) Select resolution to satisfy Max. allowable revolution \geq Max. response revolution

[max. response revolution (rpm) = resolution × 60 sec]

Shaft type	Shaft clamping type	Shaft synchro type	Hollow Built-in type	
Starting torque	\leq 0.004 N m		\leq 0.009 N m	
Inertia moment	\leq 15 g \cdot cm ² (1.5 ×	10 ⁻⁶ kg · m ²)	\leq 20 g \cdot cm ² (2 \times 10 ⁻⁶ kg \cdot m ²)	
Allowable shaft load	Radial: ≤ 10 kgf, T	hrust: \leq 2.5 kgf	$\text{Radial:} \leq 2 \text{ kgf, Thrust:} \leq 1 \text{ kgf}$	
Unit weight (packaged)	≈ 435 g (≈ 545 g)	pprox 415 g ($pprox$ 525 g)	pprox 410 g ($pprox$ 520 g)	
Power supply	5 VDC== ± 5% (ripple P-P: ≤ 5%) / 12 - 24 VDC== ± 5% (ripple P-P: ≤ 5%) model			
Current consumption	\leq 100 mA (no load)			
Insulation resistance	\geq 100 MΩ (500 VDC= megger)			
Dielectric strength	Between the charging part and the case: 750 VAC ~ 50 / 60 Hz for 1 min.			
Vibration	1 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours			
Shock	$\lesssim 50~{ m G}$	\lesssim 50 G		
Ambient temp.	-10 to 70 °C, storage: -25 to 85 °C (no freezing or condensation)			
Ambient humi.	35 to 85%RH, storage: 35 to 90%RH (no freezing or condensation)			
Protection rating	IP50 (IEC standard)			
Connection	Axial cable type (cable gland)			
Cable spec.	Ø 7 mm, 15-wire, 2 m, shield cable			

Inner Circuit

· Be aware of circuit break in case of overload or short beyond the specifications

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AD 	CIRCUIT	{	Max. 32 m/

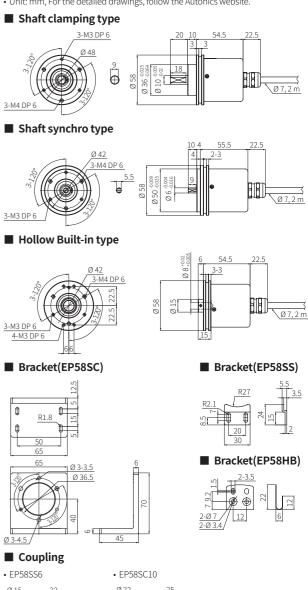
Output Phase / Output Angle

• TS = Signal Pulse

Resolution	BCD code	Binary code	Gray code
1024	TS: 0.3515° ±15' (13 bit)	TS: 0.3515° ±15' (10 bit)	TS: 0.703° ±15' (10 bit)
720	TS: 0.5° ±25' (11 bit)	TS: 0.5° ±25' (10 bit)	TS: 1° ±25' (10 bit)
512	TS: 0.703° ±15' (11 bit)	TS: 0.703° ±15' (9 bit)	TS: 1.406° ±15' (9 bit)
360	TS: 1° ±25' (10 bit)	TS: 1° ±25' (9 bit)	TS: 2° ±25' (9 bit)
256	TS: 1.406° ±15' (10 bit)	TS: 1.406° ±15' (8 bit)	TS: 2.8125° ±15' (8 bit)
180	TS: 2° ±25' (9 bit)	TS: 2° ±25' (8 bit)	TS: 4° ±25' (8 bit)
128	TS: 2.8125° ±15' (9 bit)	TS: 2.8125° ±15' (7 bit)	TS: 5.625° ±15' (7 bit)
90	TS: 4° ±25' (8 bit)	TS: 4° ±25' (7 bit)	TS: 8° ±25' (7 bit)
64	TS: 5.625° ±15' (7 bit)	TS: 5.625° ±15' (6 bit)	TS: 11.25° ±15' (6 bit)
45	TS: 8° ±25' (7 bit)	TS: 8° ±25' (6 bit)	TS: 16° ±25' (6 bit)

Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website



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4-M4

Angular misalignment: ≤ 5°
 End-play: ≤ 0.5 mm

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