Autonics TCD210021AB

58 mm Diameter Incremental Rotary Encoders



E58 Series

PRODUCT MANUAL

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

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- Ø 58 mm flange incremental rotary encoders
- Accurate measurement of angle, position, revolution, speed, acceleration, and
- · Shaft, hollow shaft, blind hollow shaft models available
- Cable type, cable connector type, axial / radial connector types available
- Various resolutions: 1 to 8000 pulses per revolution
- Various control output options
- Power supply: 5 VDC= \pm 5%, 12 24 VDC= \pm 5%

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ▲ 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.) ilure 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.

Failure 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

Failure to follow this instruction may result in fire.

05. Check 'Connections' before wiring.

Failure 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.

Failure 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.
 5VDC==, 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.
- 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. 2,000 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.











Shaft type

SC: Shaft clamping type SS: Shaft synchro type H: Hollow type HB: Hollow Built-in type

2 Shaft outer diameter / Shaft inner diameter

6: Ø 6 mm 10: Ø 10 mm 12: Ø 12 mm

Resolution

Number: Refer to resolution in 'Specifications'

Output phase

3: A, B, Z 4: A, A, B, B 6: A, A, B, B, Z, Z

Control output

T: Totem pole output N: NPN open collector output V: Voltage output L: Line driver output

O Power supply

5: 5 VDC== ±5% 24: 12 - 24 VDC== ±5%

7 Connection

Shaft type, Hollow Built-in type

No mark: Axial cable type C: Axial cable connector type CR: Axial connector type CS: Radial connector type

Hollow type

No mark: Radial cable type C: Radial cable connector type

Product Components

Shaft type	Shaft Clamping type	Shaft Synchro Hollo		Hollow Built- in type	
Product Components	Product, Instruct	ion manual	Product (+ bracket), Instruction manual		
Bolt	× 10	× 8	× 4	× 4	
Coupling	×1 ×1		-	-	
Bracket	× 1	× 2	-	-	

Sold Separately

M17 connector cable: CID6S-□, CID9S-□

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.

■ Totem pole / NPN open collector / Voltage output

Pin	Color	Function	Pin	Color	Function
1	Black	OUTA	4	Brown	+V
2	White	OUT B	5	Blue	GND
3	Orange	OUT Z	6	Shield	F.G.



■ Line driver output

Pin	Color	Function	Pin	Color	Function
1	Black	OUTA	5	White	OUT B
2	Red	OUTĀ	6	Gray	OUT B
3	Brown	+V	7	Orange	OUT Z
4	Blue	GND	8	Yellow	OUT Z
			9	Shield	FG

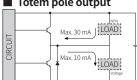




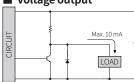
Inner Circuit

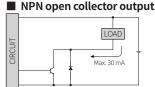
Output circuits are identical for all output phase

■ Totem pole output

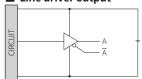


■ Voltage output





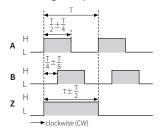
■ Line driver output

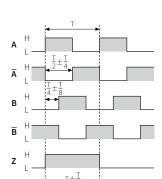


Output Waveform

- \bullet The rotation direction is based on facing the shaft, and it is clockwise (CW) when rotating to the right.
- Phase difference between A and B: $\frac{T}{4} \pm \frac{T}{8}$ (T = 1 cycle of A)

■ Totem pole / NPN open collector / Voltage output





■ Line driver output

Specifications

Model	E58	E58□-□- □-N-□-□	E58	E58		
Resolution	1/2/5/12 PPR ⁽¹⁾ 10 to 8,000 PPR model					
Control output	Totem pole output	NPN open collector output	Voltage output	Line driver output		
Output phase	A, B, Z	A, B, Z	A, B, Z	$A, \overline{A}, B, \overline{B}, Z, \overline{Z}$		
Inflow current	≤ 30 mA	≤ 30 mA	-	≤ 20 mA		
Residual voltage	≤ 0.4 VDC=	≤ 0.4 VDC==	≤ 0.4 VDC==	≤ 0.5 VDC==		
Outflow current	≤ 10 mA	-	≤ 10 mA	≤ -20 mA		
Output voltage (5 VDC==)	≥ (power supply -2.0) VDC=	-	-	≥ 2.5 VDC==		
Output voltage (12 - 24 VDC==)	≥ (power supply -3.0) VDC=	-	-	≥ (power supply -3.0) VDC=		
Response speed 02)	≤1μs ≤0.5μs					
Max. response freq.	300 kHz					
Max. allowable revolution (33)	5,000 rpm					
Approval	C€ FR EUC C€ FR EUC EUC					

- 01) Depending on the control output, only A, B or A, \overline{A} , B, \overline{B} are output.
- 02) Based on cable length: 2 m, 1 sink: 20 mA
 03) Select resolution to satisfy Max. allowable revolution ≥ Max. response revolution.
- [max. response revolution (rpm) = $\frac{\text{max. response frequency}}{\text{resolution}} \times 60 \text{ sec}$]

Shaft type	Shaft clamping type	Shaft synchro type	Hollow type	Hollow Built-in type	
Starting torque	\leq 0.004 N m		≤ 0.009 N m		
Inertia moment	$\leq 15 \mathrm{g\cdot cm^2} (1.5 \mathrm{m}^2)$	< 10 ⁻⁶ kg·m²)	$\leq 20 \mathrm{g} \cdot \mathrm{cm}^2 (2 \times 10^{-6} \mathrm{kg} \cdot \mathrm{m}^2)$		
Allowable shaft load	Radial: ≤ 10 kgf, 7	hrust: ≤ 2.5 kgf	Radial: ≤ 2 kgf, Thrust: ≤ 1 kgf		
Unit weight (packaged)	Varies according to connection type				
Cable type, cable connector type	\approx 310 g (\approx 420 g)	≈ 285 g (≈ 395 g)	≈ 270 g (≈ 380 g)	≈ 270 g (≈ 380 g)	
Connector type	\approx 230 g (\approx 340 g)	\approx 205 g (\approx 315 g)	-	≈ 200 g (≈ 310 g)	

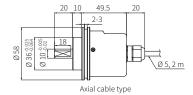
cable connector type							
Connector type	\approx 230 g (\approx 340 g)	\approx 205 g (\approx 315 g)	-	≈ 200 g (≈ 310 g)			
Power supply	5 VDC== ± 5% (ripple P-P: ≤ 5%) / 12 - 24 VDC== ± 5% (ripple P-P: ≤ 5%) model						
Current consumption	Totempole, NPN open collector, Voltage output: \leq 80 mA (no load) Line driver output: \leq 50 mA (no load)						
Insulation resistance	$\geq 100~\mathrm{M}\Omega~(500~\mathrm{V}\mathrm{I})$	C== megger)					
Dielectric strength	Between the char	ging part and the c	ase: 750 VAC∼ 50 /	60 Hz for 1 min.			
Vibration	$1~\mathrm{mm}$ double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours						
Shock	≲75 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	Shaft type, Hollow Built-in type : Axial cable type / Axial cable connector type / Axial connector type / Radial connector type model Hollow type: Radial cable type / Radial cable connector type model						
Cable spec.	Ø 5 mm, 5-wire (Line driver output: 8-wire), shield cable cable type: 2 m, cable connector type: 250 mm						
Wire spec.	AWG24 (0.08 mm, 40-core), insulator diameter: Ø 1 mm						
Connector spec.	Totempole, NPN open collector, Voltage output: M17 6-pin plug type Line driver output: M17 9-pin plug type						

Dimensions

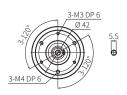
- Unit: mm, For the detailed drawings, follow the Autonics website.
- Following items are based on cable type. Refer to 'Specifications' for detailed specifications of cable, wire and connector.

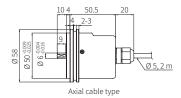
■ Shaft clamping type



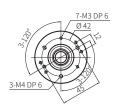


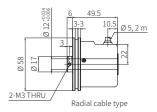
■ Shaft synchro type



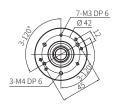


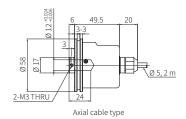
■ Hollow type



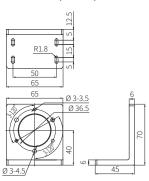


■ Hollow Built-in type





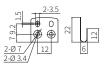
■ Bracket (E58SC)



■ Bracket (E58SS)

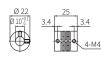


■ Bracket (E58H / HB)



■ Coupling





- Parallel misalignment: ≤ 0.25 mm
 Angular misalignment: ≤ 5°
 End-play: ≤ 0.5 mm

Sold Separately: M17 Connector Cable

 \bullet For more information, refer to the M17 Connector Cable Product Manual.

Appearance	Power supply	Connector 1	Connector 2	Length	Model
	M17 (Socket- DC Female) 6-pin			2 m	CID6S-2
			Cudro	5 m	CID6S-5
		6-wire	10 m	CID6S-10	
			15 m	CID6S-15	

Appearance	Power supply	Connector 1	Connector 2	Length	Model
-	DC M17 (Socket- Female) 9-pin	, .		2 m	CID9S-2
		9-wire	5 m	CID9S-5	
			10 m	CID9S-10	