Shaft Type Ø30mm Incremental Rotary Encoder

■ Features

- Ø30mm of miniature shaft type rotary encoder
- Easy installation at narrow space
- Low moment of inertia
- Power supply: 5VDC, 12-24VDC ±5%
- Various output types

Please read "Caution for your safety" in operation manual before using.

CE

■ Ordering Information

E30S — **4** — **3000** — **3** — **N** — **24** — ☐

Series	Shaft diameter	Pulses/revolution	Output phase	Control output	Power supply	Cable
Ø30mm, shaft type	Ø4mm	Refer to resolution	3: A, B, Z 6: A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$	T: Totem pole output N: NPN open collector output V: Voltage output L: Line driver output (※)	5 : 5VDC ±5% 24: 12-24VDC ±5%	No mark: Axial cable type C: Axial cable connector type

※The power of Line driver is only for 5VDC.

■ Specifications

Item			Shaft type Ø30mm Incremental Rotary Encoder
Resolution (PPR)※1			100, 200, 360, 500, 1000, 1024, 3000
Electrical specification	Output phase		A, B, Z phase (line driver: A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ phase)
	Phase difference of output		Phase difference between A and B: $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)
	Control output	Totem pole output	• [Low] - Load current: Max. 30mA, Residual voltage: Max. 0.4VDC • [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
		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 voltage: Max. 0.5VDC • [High] - Load current: Max. -20mA, Output voltage: Min. 2.5VDC
	Response time (rise/fall)	Totem pole output	Max. 1μs (cable length: 2m, I sink = 20mA)
		NPN open collector output	
		Voltage output	Max. 1μs (5VDC: output resistance 820Ω), Max. 2μs (12-24VDC: output resistance 4.7kΩ) (cable length: 2m, I sink = 20mA)
		Line driver output	Max. 0.5μs (cable length: 2m, I sink = 20mA)
	Max. Response frequency		300kHz
	Power supply		• 5VDC ±5% (ripple P-P: Max. 5%) • 12-24VDC ±5% (ripple P-P: Max. 5%)
	Current consumption		Max. 80mA (disconnection of the load), Line driver output: Max. 50mA (disconnection of the load)
	Insulation resistance		Over 100MΩ (at 500VDC megger between all terminals and case)
	Dielectric strength		750VAC 50/60Hz for 1 minute (between all terminals and case)
	Connection		Axial cable type, Axial cable connector type
Mechanical specification	Starting torque		Max. 20gf·cm (0.002N·m)
	Moment of inertia		Max. 20g·cm^2 (2×10^{-6} kg·m^2)
	Shaft loading		Radial: Max. 2kgf, Thrust: Max. 1kgf
	Max. allowable revolution※2		5,000rpm
Vibration			1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours
Shock			Approx. Max. 50G
Environment		Ambient temperature	-10 to 70℃, storage: -25 to 85℃
		Ambient humidity	35 to 85%RH, storage: 35 to 90%RH
Protection structure			IP50 (IEC standard)
Cable			Ø5mm, 5-wire (line driver: Ø5mm, 8-wire), 2m, Shield cable (AWG24, core diameter: 0.08mm, number of cores: 40, insulator out diameter: Ø1mm)
Accessory			Ø4mm coupling
Approval			CE (except line driver output)
Unit weight			Approx. 80g

※1: Not indicated resolutions are customizable.

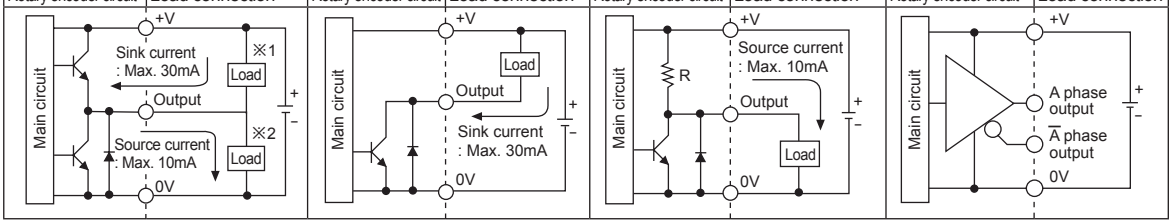
※Environment resistance is rated at no freezing or condensation.

※2: Make sure that max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.

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

■ Control Output Diagram

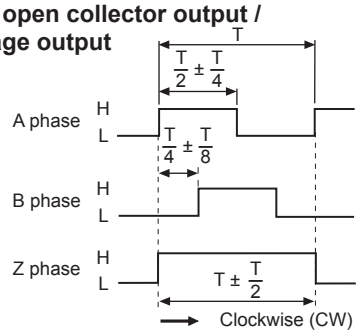
Totem pole output	NPN open collector output	Voltage output	Line driver output
Rotary encoder circuit / Load connection	Rotary encoder circuit / Load connection	Rotary encoder circuit / Load connection	Rotary encoder circuit / Load connection



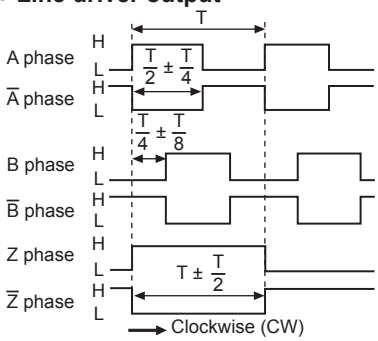
- Totem pole output type can be used for NPN open collector output type (※1) or Voltage output type (※2).
- All output circuits of A, B, Z phase are same. (line driver output is for A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$)

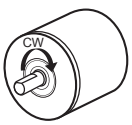
■ Output Waveform

● Totem pole output / NPN open collector output / Voltage output



● Line driver output

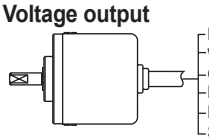




■ Connections

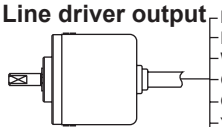
◎ Cable type

● Totem pole output / NPN open collector output / Voltage output



- Black: OUT A
- White: OUT B
- Orange: OUT Z
- Brown: +V (5VDC, 12-25VDC ±5%)
- Blue: GND (0V)
- Shield: F.G.

● Line driver output

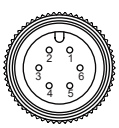


- Black: OUT A
- Red: OUT $\overline{A}$
- White: OUT B
- Gray: OUT $\overline{B}$
- Orange: OUT Z
- Yellow: OUT $\overline{Z}$
- Brown: +V (5VDC ±5%)
- Blue: GND (0V)
- Shield: F.G.

※Unused wires must be insulated.
※The metal case and shield wire of encoder should be grounded (F.G.).

◎ Connector cable type

• Totem pole output / NPN open collector output / Voltage output



Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT $\overline{A}$	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G.	Shield	⑥	OUT $\overline{B}$	Gray
—			⑦	OUT Z	Orange
			⑧	OUT $\overline{Z}$	Yellow
			⑨	F.G.	Shield

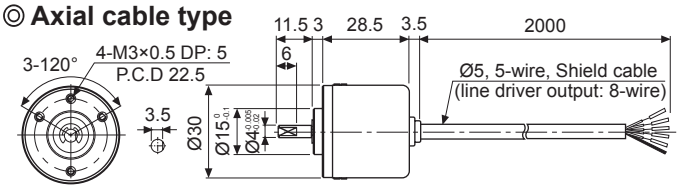
• Line driver output

※F.G. (field ground): It should be grounded separately.

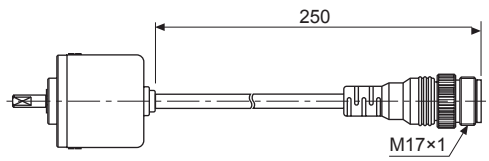
■ Dimensions

(unit: mm)

◎ Axial cable type

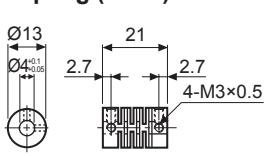


◎ Axial cable connector type



※Connector cable is sold separately and refer to page G-10 for specifications.

● Coupling (E30S)



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

※Do not load overweight on the shaft.
※For parallel misalignment, angular misalignment, end-play terms, refer to page F-87.
※For flexible coupling (ERB series) information, refer to page F-80.
※When mounting the coupling to the encoder shaft, if there is combined misalignment (parallel, angular misalignment) between rotating encoder shaft and mate shaft, it may cause encoder and coupling's life cycle to shorten.