Shaft Type Ø18mm Incremental Rotary Encoder

▣ Features

- **Ultra-compact (Ø18mm) and ultra-lightweight (12g)**
- Easy installation in tight or limited spaces
- Low moment of inertia
- Power supply: 5VDC ±5%

Line-up

[Axial cable type]

[Radial cable type]

▣ Applications

- Suitable for office machine such as ATMs, bill counting machines, copy machines

Please read "Safety Considerations" in operation manual before using.

※Except for No Amp. output type.

▣ Ordering Information

E18S — 2.5 — 200 — 1 — N — 5 — R

Series	Shaft diameter	Pulses/revolution	Output phase	Control output	Power supply	Cable
Ø18mm, shaft type	2: Ø2mm 2.5: Ø2.5mm	100, 200, 300, 400	1: A	N: NPN open collector output V: Voltage output	5: 5VDC ±5%	R: Axial cable type S: Radial cable type
Ø18mm, shaft type	2: Ø2mm 2.5: Ø2.5mm	200, 300	1: A	A: No Amp.	5: 5VDC ±5%	R: Axial cable type S: Radial cable type

▣ Specifications

◎ NPN open collector output / Voltage output type

Item			Shaft Type Ø18mm Incremental Rotary Encoder
Resolution (PPR)※1			100, 200, 300, 400
Electrical specification	Output phase		A phase
	Control output	NPN open collector output	Load current: max. 30mA, Residual voltage: max. 0.4VDC⎓
		Voltage output	Load current: max. 10mA, Residual voltage: max. 0.4VDC⎓
	Response time (rise/fall)	NPN open collector output	Max. 1μs (cable length: 1m, I sink = 20mA)
		Voltage output	
	Max. response frequency		25kHz
	Power supply		5VDC⎓±5% (ripple P-P: max. 5%)
	Current consumption		Max. 50mA (disconnection of the load)
	Insulation resistance		Over 100MΩ (at 500VDC megger between all terminals and case)
	Dielectric strength		500VAC 50/60Hz for 1 min (between all terminals and case)
	Connection		Axial/Radial cable type
Mechanical specification	Starting torque		Max. 10gf·cm (9.8×10^{-4} N·m)
	Moment of inertia		Max. 0.5g·cm^2 (5×10^{-8} kg·m^2)
	Shaft loading		Radial: 200gf, Thrust: 200gf
	Max. allowable revolution※2		6,000rpm
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: -20 to 80℃
		Ambient humidity	35 to 85%RH, storage: 35 to 90%RH
Protection structure			IP50 (IEC standard)
Cable			Ø0.98mm, 4-wire, 150mm, Flat ribbon cable (AWG26, core diameter: 0.16mm, number of cores: 7, insulator diameter: Ø0.98mm)
Accessory			Ø2mm coupling (supplied only for Ø2mm shaft diameter model)
Approval			
Weight※3			Ø2mm Shaft diameter model: Approx. 35.4g (approx. 12g) Ø2.5mm Shaft diameter model: Approx. 34.2g (approx. 12g)

※1: Not indicated resolutions are customizable.

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

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

※3: The weight includes packaging. The weight in parenthesis is for unit only.

※Environment resistance is rated at no freezing or condensation.

▣ Specifications

◎ No Amp. output type

Item			Shaft Type Ø18mm Incremental Rotary Encoder
Resolution (PPR)※1			200, 300
Electrical specification	Output phase		A phase
	Output waveform		Quasi-sinusoidal (No Amp.)
	Output signal amplitude		Min. 150mV$_{P-P}$
	Output amplitude variation		Max. 40%
	Max. response frequency		10kHz
	Power supply		5VDC⎓±5% (ripple P-P: max. 5%)
	Insulation resistance		Over 100MΩ (at 500VDC megger between all terminals and case)
	Dielectric strength		500VAC 50/60Hz for 1 min (between all terminals and case)
	Connection		Axial/Radial cable type
Optical elements specifications	LED	Current flow	I_F: max. 50mA
		Reverse voltage	V_R: max. 5V
		Current consumption	P_D: max. 95mW
	Photo transis-tor	Collector-Emitter voltage	V_{CEO}: max. 30V
		Emitter-Collector voltage	V_{ECO}: max. 5V
		Collector current	I_C: max. 20mA
		Collector Current consumption	P_C: max. 75mW
Mechanical specification	Starting torque		Max. 10gf·cm (9.8×10^{-4}N·m)
	Moment of inertia		Max. 0.5g·cm² (5×10^{-8}kg·m²)
	Shaft loading		Radial: 200gf, Thrust: 200gf
	Max. allowable revolution※2		3,000rpm
Vibration			1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each of X, Y, Z directions for 2 hours
Shock			Approx. Max. 50G
Environment		Ambient temperature	-10 to 70℃, storage: -20 to 80℃
		Ambient humidity	35 to 85%RH, storage: 35 to 90%RH
Protection			IP50 (IEC standard)
Cable			Ø0.98mm, 4-wire, 150mm, Flat ribbon cable (AWG26, core diameter: 0.16mm, number of cores: 7, insulator diameter: Ø0.98mm)
Accessory			Ø2mm Coupling (only for the Ø2mm Shaft diameter model)
Weight※3			Approx. 33.5g (approx. 10g)

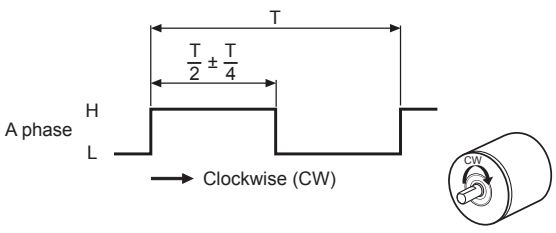
※1: Not indicated resolutions are customizable.
※2: Make sure that max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.

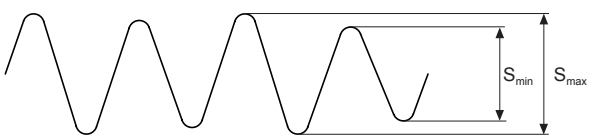
$$[\text{Max. response revolution (rpm)} = \frac{\text{Max. response frequency}}{\text{Resolution}} \times 60\ \text{sec}]$$

※3: The weight includes packaging. The weight in parenthesis is for unit only.
※Environment resistance is rated at no freezing or condensation.

▣ Output Waveform

◎ NPN open collector output / Voltage output ◎ No Amp. output type



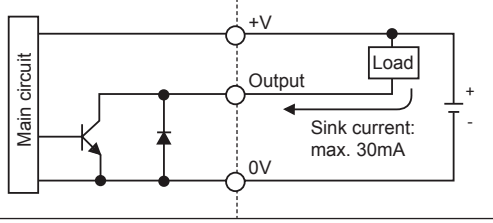


※Output signal amplitude
$S_{min} \geq 150mV_{P-P}$
Output amplitude variation
$(S_{max}/S_{min}-1)\times 100 \leq 40\%$

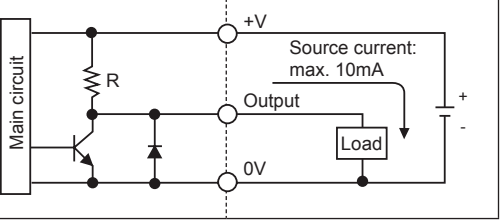
▣ Control Output Diagram

◎ NPN open collector output / Voltage output

NPN open collector output	
Rotary encoder circuit	Load connection

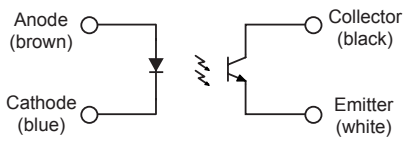


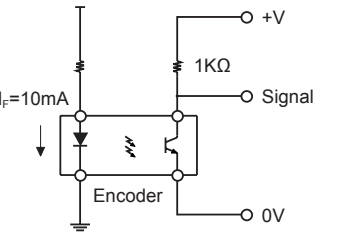
Voltage output	
Rotary encoder circuit	Load connection



◎ No Amp. output type

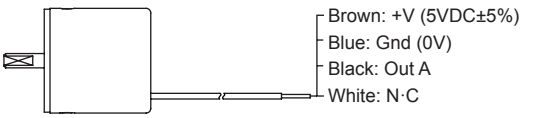
Internal circuit	Measurement circuit

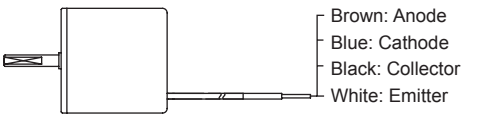




▣ Connections

◎ NPN open collector output / Voltage output ◎ No Amp. output type



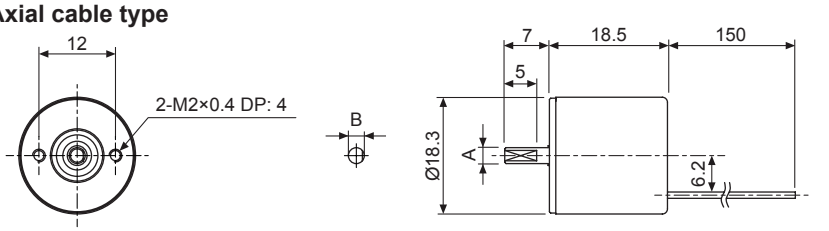


▣ Dimensions

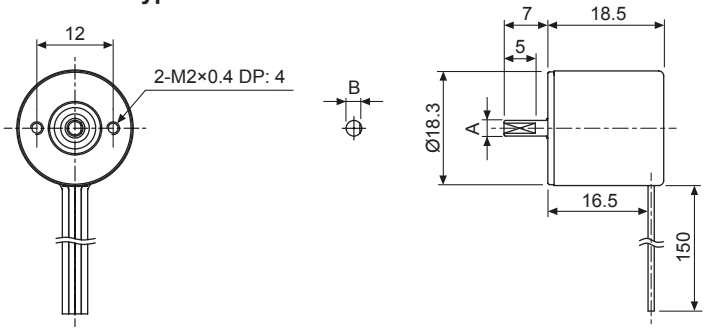
(unit: mm)

◎ NPN open collector output / Voltage output

• Axial cable type



• Radial cable type



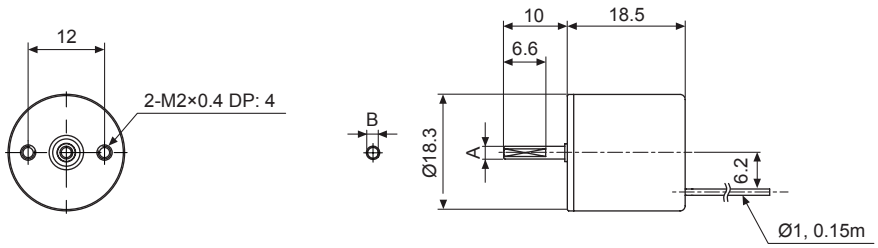
Model	A	B
E18S2	Ø2.0 $^{-0.004}_{-0.02}$	1.7 $^{0}_{-0.1}$
E18S2.5	Ø2.5 $^{-0.004}_{-0.02}$	2.2 $^{0}_{-0.1}$

▣ Dimensions

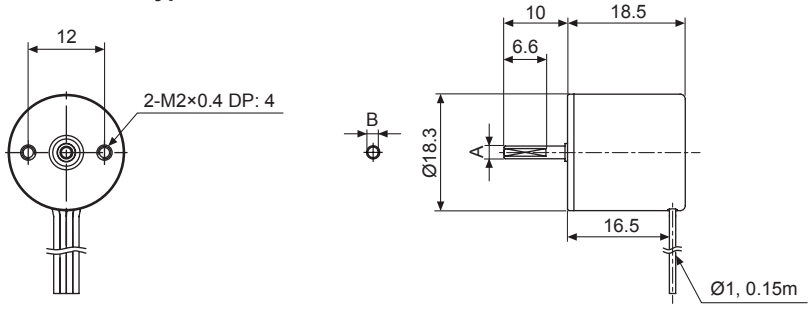
◎ No Amp. output type

(unit: mm)

● Axial cable type

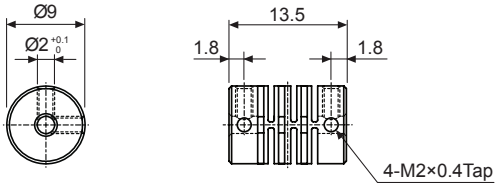


● Radial cable type



Model	A	B
E18S2	Ø2.0 $^{-0.01}_{-0.02}$	1.8 $^{0}_{-0.1}$
E18S2.5	Ø2.5 $^{-0.01}_{-0.02}$	2.3 $^{0}_{-0.1}$

● Coupling (E18S)



- Parallel misalignment: max. 0.15mm
- Angular misalignment: max. 2°
- End-play: max. 0.5mm

※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.
※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.