18 mm Diameter Sine Wave Incremental Rotary Encoders

E18-A Series

INSTRUCTION MANUAL

TCD210016AB

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.
- ⚠ 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.)
Failure 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 source.
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.
Failure 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.
- 5 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.
- When supplying power with SMPS, ground the F.G. terminal and connect the noise canceling capacitor between the 0 V and F.G. terminals.
- 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 10 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.

E18 ❶ ❷ - ❸ - ❹ - ❺ - ❻ - ❼

❶ Shaft type
S: Shaft type

❷ Shaft outer diameter
2: Ø 2 mm
2.5: Ø 2.5 mm

❸ Resolution
Number: Refer to resolution in 'Specifications'

❹ Output phase
1: A

❺ Control output
A: Quasi-sinusoidal (No Amp. output)

❻ Power supply
5: 5 VDC⎓ ±5%

❼ Connection
R: Axial cable type
S: Radial cable type

Product Components

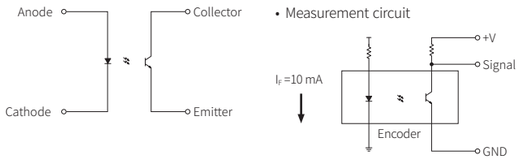
Shaft Outer Diameter	Ø 2 mm	Ø 2.5 mm
Product Components	Product, Instruction manual	
Bolt	× 4	-
Coupling	× 1	-

Connections

- Unused wires must be insulated.
- The metal case and shield cable of encoders must be grounded (F.G.).

Color	Function
Black	Collector
White	Emitter
Brown	Anode
Blue	Cathode

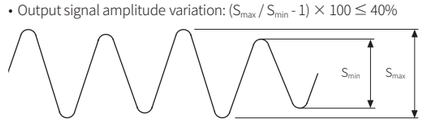
Inner Circuit



- Measurement circuit

Output Waveform

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



Specifications

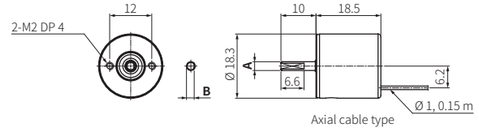
Model	E18S□-□-1-A-5-□
Resolution	200 / 300 PPR model
Control output	Quasi-sinusoidal (No Amp. output)
Output phase	A
Output waveform	Quasi-sinusoidal
Output signal amplitude	≥ 150 mV_{P-P}
Output signal amplitude variation	≤ 40%
Max. response freq.	10 kHz
Max. allowable revolution 01)	3,000 rpm
LED optical elements	Current I_F: ≤ 50 mA Reverse voltage V_R: ≤ 5 VDC⎓ Power consumption P_D: ≤ 95 mW
Photo transistor optical elements	C-E voltage V_{CEO}: ≤ 30 VDC⎓ E-C voltage V_{ECO}: ≤ 5 VDC⎓ C current I_C: ≤ 20 mA C power consumption P_C: ≤ 75 mW
Starting torque	≤ 10×10^{-4} N m
Inertia moment	≤ 0.5 g·cm^2 (5 × 10^{-8} kg·m^2)
Allowable shaft load	Radial: ≤ 200 gf, Thrust: ≤ 200 gf
Unit weight (packaged)	Shaft outer diameter Ø 2 mm model: ≈ 10.1 g (≈ 33.5 g) Shaft outer diameter Ø 2.5 mm model: ≈ 10.1 g (≈ 32.3 g)
Approval	CE cULus EAC

01) Select resolution to satisfy Max. allowable revolution ≥ Max. response revolution
[max. response revolution (rpm) = $\frac{\text{max. response frequency}}{\text{resolution}} \times 60$ sec]

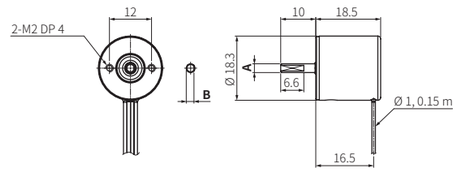
Power supply	5 VDC⎓ ± 5% (ripple P-P: ≤ 5%)
Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)
Dielectric strength	Between the charging part and the case: 500 VAC~ 50 / 60 Hz for 1 min.
Vibration	1 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	≤ 50 G
Ambient temperature	-10 to 50 °C, storage: -20 to 80 °C (no freezing or condensation)
Ambient humidity	35 to 85%RH, storage: 35 to 90%RH (no freezing or condensation)
Protection rating	IP50 (IEC standard)
Connection	Axial / Radial cable type model
Cable spec.	Ø 1 mm, 4-wire, 150 mm, flat ribbon cable
Wire spec.	AWG26 (0.16 mm, 7-core), insulator diameter: Ø 0.98 mm

Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.



Axial cable type



Radial cable type

	A	B
E18S2	Ø 2.0 $^{-0.01}_{-0.02}$	1.8 $^{0}_{-0.1}$
E18S2.5	Ø 2.5 $^{-0.01}_{-0.02}$	2.3 $^{0}_{-0.1}$

■ Coupling

- Parallel misalignment: ≤ 0.15 mm
- Angular misalignment: ≤ 2°
- End-play: ≤ 0.2 mm

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