**Autonics**

ROTARY ENCODER(INCREMENTAL TYPE)

# ENA/ENC SERIES

**M A N U A L**

CE

**ENA**

**ENC**

Thank you very much for selecting Autonics products.
**For your safety, please read the following before using.**

## ▣ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the caution that follow;

⚠ **Warning** Serious injury may result if instructions are not followed.

⚠ **Caution** Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.

⚠ Caution: Injury or danger may occur under special conditions.

### ⚠Warning

**1. In case of using this unit with machinery(Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.**
It may cause a fire, human injury or damage to property.

### ⚠Caution

**1. Do not drop water or oil on this unit.**
It may cause damage or miscontrol due to malfunction.
**2. Please observe the rated voltage.**
It may shorten the life cycle or damage to the product.
**3. Please check the polarity of power and wrong wiring.**
It may result in damage to this unit.
**4. Do not short circuit the load.**
It may result in damage to this unit.

## ▣ Ordering information

**ENA - 5000 - 2 - N - 24**

| Series | Pulse/1Revolution | Output phase | Output | Power supply |
|---|---|---|---|---|
| Shaft type to be mounted at the side (Shaft diameter ø10mm) | See resolution | 2: A, B<br>3: A, B, Z | T: Totem Pole output<br>N: NPN open collector output<br>V: Voltage output | 5: 5VDC±5%<br>24: 12-24VDC±5% |

※Standard: ENA-[PULSE]-2-N-24

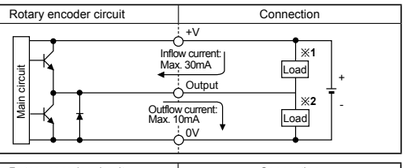
**ENC - 1 - 1 - N - 24 -**

| Series | Output phase | Min. measuring unit | | Output | Power supply | Cable |
|---|---|---|---|---|---|---|
| Wheel type | 1: A, B | 1: 1mm<br>3: 1m<br>5: 0.1yd | 2: 1cm<br>4: 0.01yd<br>6: 1yd | T: Totem Pole output<br>N: NPN open collector output<br>V: Voltage output | 5: 5VDC±5%<br>24: 12-24VDC±5% | No mark: Normal type<br>C: Cable outgoing connector type(※) |

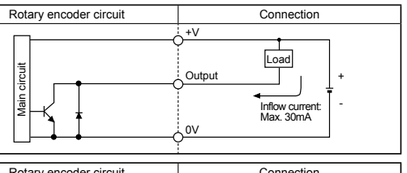
※Cable length: 250mm

## ▣ Control output diagram

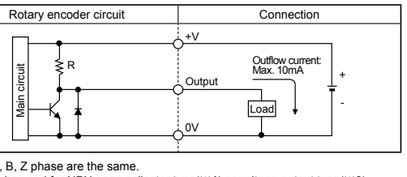
**Totem pole output**




**NPN open collector output**




**Voltage output**




※The output circuit of A, B, Z phase are the same.
※Totem pole output can be used for NPN open collector type(※**1**) or voltage output type(※**2**).

**※The above specifications are subject to change without notice.**

## ▣ Specifications

| Incremental Rotary encoder | | | Shaft type encoder to be mounted at the side | Wheel type |
|---|---|---|---|---|
| Model | Totem pole output | | **ENA-□-3-T-□** | **ENC-1-□-T-□** |
| | NPN open collector output | | **ENA-□-3-N-□** | **ENC-1-□-N-□** |
| | Voltage output | | **ENA-□-3-V-□** | **ENC-1-□-V-□** |
| Resolution(P/R)※1 | | | *1, *2, *5, 10, 12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 5000, 6000, 8000 | 1mm/Pulse, 1cm/Pulse, 1m/Pulse, 0.01yd/Pulse, 0.1yd/Pulse, 1yd/Pulse |
| Output phase | | | A, B phase(Option: A, B, Z phase) | A, B phase |
| Electrical specification | Phase difference of output | | Output between A and B phase: $\frac{T}{4} \pm \frac{T}{8}$ (T= 1cycle of A phase) | |
| | Control output | Totem pole output | •Low ☞ Load current: Max. 30mA, Residual voltage: Max. 0.4VDC<br>•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 | |
| | Response time (Rise/Fall) | Totem pole output | Max. 1μs (Cable length: 2m, l sink=20mA) | |
| | | NPN open collector output | | |
| | | Voltage output | | |
| | Max. Response frequency | | 300kHz | 180kHz |
| | 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) | |
| | Insulation resistance | | Min. 100MΩ(at 500VDC megger between all terminals and case) | |
| | Dielectric strength | | 750VAC 50/60Hz for 1 minute(Between all termials and case) | |
| | Connection | | Connector type | Cable outgoing type, Cable outgoing connector type |
| Mechanical specification | Starting torque | | Max. 70gf·cm(0.007N·m) | Dependent on the coefficient of friction |
| | Moment of inertia | | Max. 80g·cm²(8×10⁻⁶kg·m²) | - |
| | Shaft loading | | Radial: 10kgf, Thrust: 2.5kgf | |
| | 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 | | | Max. 75G | |
| Environment | Ambient temperature | | -10 to 70℃, Storage: -25 to 85℃ | |
| | Ambient humidity | | 35 to 85%RH, Storage: 35 to 90%RH | |
| Protection | | | IP50(IEC Standards) | |
| Cable | | | ø5mm, 5P, Length: 2m, Shield cable (AWG 24, Core wire diameter: 0.08mm, No. of core wire: 40, Insulator out diameter: ø1mm) | |
| Accessory | | | ø10mm coupling | - |
| Approval | | | CE | |
| Unit weight | | | Approx. 345g | Approx. 494g |

※**1:** 1, 2, 5 P/R are output A, B phase only.

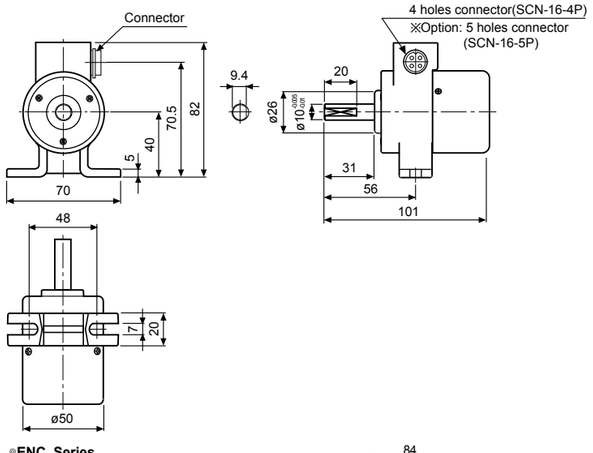
※**2:** Max. allowable revolution ≥ Max. response revolution [Max. response revolution(rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}}$ × 60 sec.] Please select the resolution to make lower max. revolution than max. allowable revolution.

※Environment resistance is rated at no freezing or condensation.

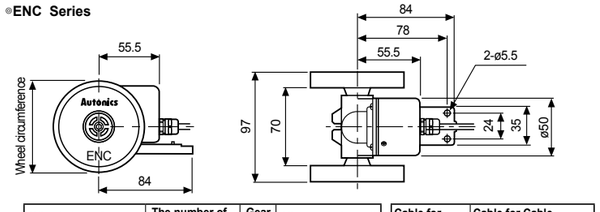
## ▣ Dimensions

(Unit: mm)

**◎ENA Series**




**◎ENC Series**



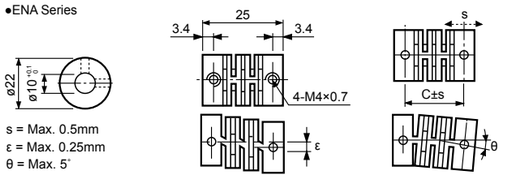

| Wheel circumference | The number of encorder pulse | Gear ratio | Min. measuring unit |
|---|---|---|---|
| 250mm | 250 Pulse | 1:1 | 1mm/1 Pulse |
| 250mm | 100 Pulse | 4:1 | 1cm/1 Pulse |
| 250mm | 1 Pulse | 4:1 | 1m/1 Pulse |
| 228.6mm(0.25yd) | 100 Pulse | 4:1 | 0.01yd/1 Pulse |
| 228.6mm(0.25yd) | 10 Pulse | 4:1 | 0.1yd/1 Pulse |
| 228.6mm(0.25yd) | 250 Pulse | 4:1 | 1yd/1 Pulse |

| Cable for normal type | Cable for Cable outgoing connector type |
|---|---|
| ø5, 5P, Length: 2000, Shield cable | ø5, 5P, Length: 250, Shield cable |

**◎Coupling**

(Unit: mm)

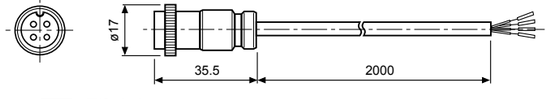
•ENA Series



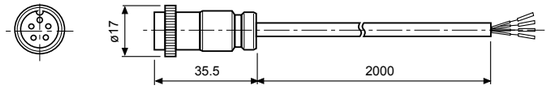

※When mounting the coupling to encoder shaft, if there is big eccentricity or declination between rotating encoder shaft and mate shaft, it may shorten life cycle of the encoder or the coupling.
※Do not load overweight on the shaft.

**◎Connector cable(Sold separately)**

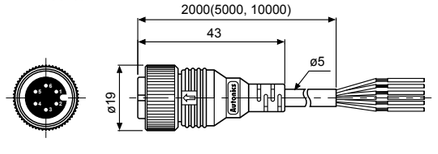
•ENA-□-2-□(Standard)



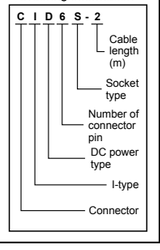

•ENA-□-3-□(Option)




•ENC Series

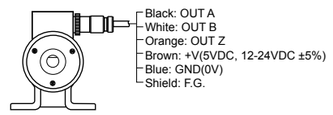



※Ordering information




## ▣ Connections

**◎ENA Series**



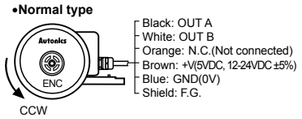

| Pin No. | Cable color | Function |
|---|---|---|
| 1 | Black | OUT A |
| 2 | White | OUT B |
| 3 | Brown | +V |
| 4 | Blue | GND |

| Pin No. | Cable color | Function |
|---|---|---|
| 1 | Black | OUT A |
| 2 | White | OUT B |
| 3 | Orange | OUT Z |
| 4 | Brown | +V |
| 5 | Blue | GND |

※Z phase output is option.
※Unused wires must be insulated.
※The shield cable and metal case of encoder must be grounded(F.G.).

**◎ENC Series**

**•Normal type**




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

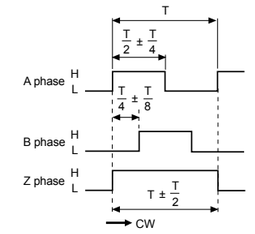
**•Cable outgoing connector type**

| Pin No. | Cable color | Function |
|---|---|---|
| 1 | Black | OUT A |
| 2 | White | OUT B |
| 3 | Orange | N.C. |
| 4 | Brown | +V |
| 5 | Blue | GND |
| 6 | Shield | F.G. |

※It must be isolation grounded.

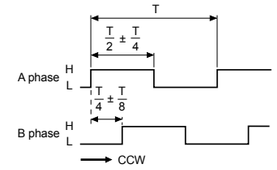
## ▣ Output waveform

**◎ENA Series**




※Z phase output is option.
※Clockwise(CW): Right turn as from the shaft

**◎ENC Series**




※Counterclockwise(CCW): Based on wheel rotation direction.

## ▣ Caution for using

**1. Installation**
①This unit consists of precision components. If you drop this unit, it may lose the function. Please treat this product carefully.
②When you install this unit, if eccentricity and deflection angle are larger, load is applied to the shaft. It may shorten the life cycle of this unit.(ENA)
③Please mount this unit on panel with lowest the coefficient of friction between rotating detection part and target. It may cause shorten the life of this product. (ENC)
④Do not put strong impact with hammer, etc when insert coupling into shaft.(ENA)

**2. For using**
①Do not cut or connect circuit when power is ON. It may cause damage to the unit.
②When the power source is Switching Power, it may cause surge. Install a surge absorber in power line. Wire should be shorter in order not to be influenced by noise.

**3. Environment**
Please do not use this unit with below environment, or it may cause malfunction.
①Place where this unit or component may be damaged by strong vibration or impact.
②Place where there is a lot of flammable or corrosive gases.
③Place where strong magnet field or electric noise occurs.
④Place where is beyond of the rated temperature or humidity.
⑤Place where strong acids or alkali near by.
⑥Place where there is the direct ray of the sun.

**4. Vibration and Impact**
①If a big impact or strong vibration applies to the product it may cause pulse errors. Be sure that when installing this unit.
②Encoder with high resolution can be easily affected by vibration, therefore tighten fixing bracket when installing this unit.

**5. Wire connection**
①Do not pull out the wire with over 30N strength after fixing the unit and wiring the cable.
②If wire encoder cable with high voltage line or power cable in the same conduit, it may cause a malfunction or mechanical problem. Please wire it separately or use separated conduit.

**※It may cause malfunction if above instructions are not followed.**

## ▣ Major products

- Proximity sensors
- Area sensors
- Display units
- Rotary encoders
- Power controllers
- Photoelectric sensors
- Door/Door side sensors
- Graphic/Logic panels
- Temperature controllers
- Tachometer/Pulse(Rate) meters
- Temperature/Humidity transducers
- Switching power supplies
- Stepping motors/drivers/motion controllers
- Field network devices
- Laser marking system($CO_2$, Nd:YAG)
- Laser welding/soldering system
- Counters
- Timers
- Panel meters
- Pressure sensors
- Fiber optic sensors
- Sensor controllers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