

Autonics

ROTARY ENCODER(Absolute Type) ENP SERIES

M A N U A L



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

- In case of using this unit with machinery (medical instrument, vehicles, train, airplane, combustion apparatus, entertainment, etc.), it is required to install fail-safe device. It may cause a fire, human injury or property loss.

Caution

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

Outline

This absolute rotary encoder divides from 0° of the revolution shaft to 360° as certain rate and specifies electrical digital code (BCD Code) to the each divided angle position. The absolute rotary encoder acting as the absolute revolution angle sensor gives output the specified digital code at the rotational shaft position. Due to no impact on the electric characteristics, this encoder does not need memory retention circuit against power failure and has high strength against noise.

Features

- Measurement of displacement angle by BCD Code signals
- High strength against external impact
- Memory retention against power failure

Application

- Precision numerical control machine for industrial plant

Ordering information

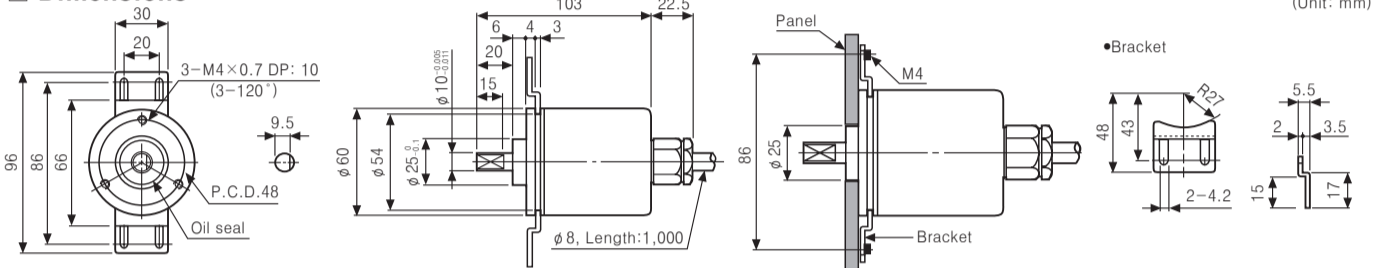
ENP	-	1	1	1	R	-	360	-	P
Series	Output code	Output method	Power supply	Rotating direction	Resolution/revolution	Control output			
φ60mm (Shaft diameter: φ10mm)	1: BCD code	0: Negative logic 1: Positive logic	0: 5-12VDC ±5% 1: 12-24VDC ±5%	F: Output value increase at CW direction R: Output value increase at CCW direction	006: 6 division 008: 8 division 012: 12 division 016: 16 division 024: 24 division 360: 360 division	N: NPN open collector output P: PNP open collector output			

Specifications

Type	Diameter φ 60mm shaft type Absolute Rotary encoder						
Model	PNP open collector output	ENP-111□-006-P	ENP-111□-008-P	ENP-111□-012-P	ENP-111□-016-P	ENP-111□-024-P	ENP-111□-360-P
Resolution	NPN open collector output	ENP-101□-006-N	ENP-101□-008-N	ENP-101□-012-N	ENP-101□-016-N	ENP-101□-024-N	ENP-101□-360-N
Output phase	TP(Timing Pulse): 2 bit TS(Signal Pulse): 4 bit (BCD, EP)	TP(Timing Pulse): 2 bit TS(Signal Pulse): 5 bit (BCD, EP)	TP(Timing Pulse): 2 bit TS(Signal Pulse): 6 bit (BCD, EP)	TP(Timing Pulse): 2 bit TS(Signal Pulse): 6 bit (BCD, EP)	TP(Timing Pulse): 2 bit TS(Signal Pulse): 7 bit (BCD, EP)	TP(Timing Pulse): 2 bit TS(Signal Pulse): 7 bit (BCD, EP)	TS(Signal Pulse): 10 bit (BCD)
Output angle	TP1: 53° ±30' TP2: 15° ±30' P: 60° ±30' TS: 56° ±30'	TP1: 39° ±30' TP2: 15° ±30' P: 45° ±30' TS: 42° ±30'	TP1: 3° ±30' TP2: 15° ±30' P: 30° ±30' TS: 26° ±30'	TP1: 2° ±30' TP2: 11.25° ±30' P: 22.5° ±30' TS: 19.5° ±30'	TP1: 8° ±30' TP2: 3° ±30' P: 15° ±30' TS: 11° ±30'	TS: 1° ±30'	
Electrical specification	Output voltage: Min. (Power voltage - 1.5)VDC, Load current: Max. 32mA						
Control output	Load current: Max. 32mA, Residual voltage: Max. 1VDC						
Response time	TON=500ns, TOFF=Max. 2.5µs (Cable length: 1m, I sink = 32mA)						
PNP open collector output	TON=400ns, TOFF=Max. 1.5µs (Cable length: 1m, I sink = 32mA)						
NPN open collector output	20kHz						
Max. Response frequency	12-24VDC ±5% (Ripple P-P: Max. 5%)						
Power supply	5-12VDC ±5%, 12-24VDC ±5% (Ripple P-P: Max. 5%)						
Current consumption	Max. 150mA (Disconnection of the load) Max. 200mA (Disconnection of the load)						
Insulation resistance	Max. 20MΩ (at 500VDC megger between all terminals and case)						
Dielectric strength	500VAC 50/60Hz for 1 minute (between all terminals and case)						
Connection	Cable outgoing type						
Starting torque	Max. 500gf·cm (0.05N·m)						
Mechanical spec.	Moment of inertia						
Moment of inertia	Max. 300g·cm² (3×10⁻⁴kg·m²)						
Shaft loading	Radial: 10kgf, Thrust: 2.5kgf						
Mechanical revolution	3600rpm						
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z direction for 2 hours						
Shock	Max. 75G						
Environment	Ambient temperature: -10 to 60°C, Storage: -25 to 85°C						
Ambient humidity	35 to 85%RH, Storage: 35 to 90%RH						
Protection	IP50 (IEC standards)						
Cable	φ8mm, 12P, Length: 1m, Double shield cable (AWG 24, Core wire diameter: 0.08mm, No. of core wire: 40, Insulator out diameter: φ1)						
Accessory	Mounting bracket, Coupling						
Unit weight	Approx. 577g Approx. 690g						

* Environment resistance is rated at no freezing or condensation.

Dimensions

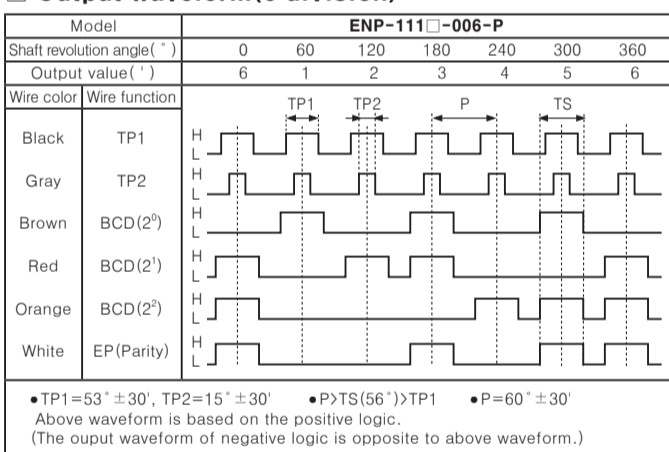


Connections

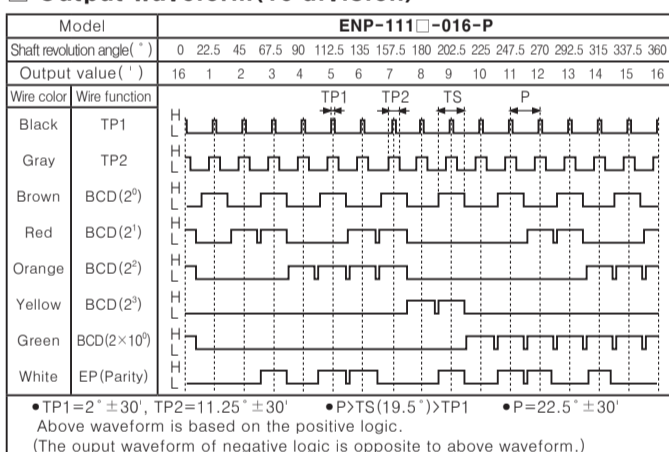
Wire color	6 division	8 division	12 division	16 division	24 division	360 division
White				+V		
Black				GND(0V)		
Shield wire				F.G.		
Black				TP1		
Brown	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})
Red	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})
Orange	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})
Yellow	N.C	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits})	BCD Code(2 ^{bits} × 10)
Green	N.C	N.C	BCD Code(2 ^{bits} × 10)	BCD Code(2 ^{bits} × 10)	BCD Code(2 ^{bits} × 10)	BCD Code(2 ^{bits} × 10)
Blue	N.C	N.C	N.C	BCD Code(2 ^{bits} × 10)	BCD Code(2 ^{bits} × 10)	BCD Code(2 ^{bits} × 10)
Purple				N.C		
Gray				TP2		
White				EP (Parity)		
Shield wire				F.G.		

* Unused wire must be insulated.
* Encoder case and shield wire must be a good earth grounded.
* N.C: Not Connected.
* Dedicated Driver IC is used for output circuit. Be careful to prevent short from occurring when wiring output lines.

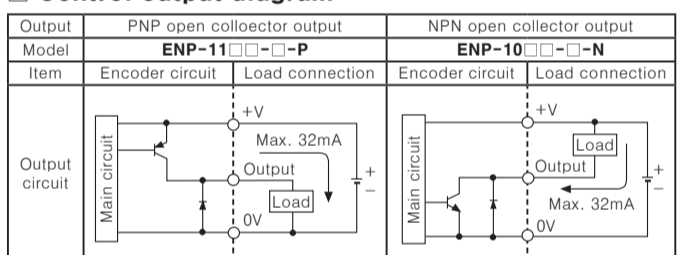
Output waveform(6 division)



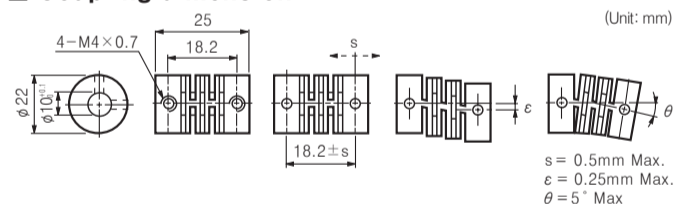
Output waveform(16 division)



Control output diagram



Coupling dimension



Caution for using

- Installation
 - This unit is comprised in of precision components. Therefore please treat this product carefully.
 - When combine the coupling to encoder shaft, if there is big eccentricity or declination, it might shorten life cycle of the encoder or the coupling.
 - Do not put strong impact when insert coupling into shaft.
 - Please set zero point with metallic ball for sub-mounting, then use this unit.
 - For using
 - Please connect shield wire to F.G. terminal.
 - Do not wire during power on. If not, it might cause damage to the product.
 - When the power source is a Switching power, please install the surge absorber in power line and wire should be shorter in order not to be influenced by noise. And F.G. terminals of the switching power must be grounded.
 - Environment
 - Do not use this unit with below environment, it causes malfunction.
 - Place where this unit or component may be damaged by strong vibration or impact.
 - Place where there is lots of flammable or corrosive gas.
 - Place where strong magnet field or electric noise are occurred.
 - Place where is beyond of the rated temperature or humidity.
 - Place where strong acids or alkali exists nearby.
 - Vibration and Impact
 - When the strong impact loads on this unit, the error pulse may occur as if the slit is revolving.
 - Encoder with high resolution can be easily affected by vibration, therefore fix the mounting bracket when install this unit.
 - Please use metallic coupling when the application needs severe acceleration or deceleration frequently.
 - Wire connection
 - Do not draw the wire with over 30N strength after wiring.
 - If use the cable of encoder and high voltage line or power cable in the same conduit, it may cause malfunction or mechanical trouble. Please wire separately or use separated conduit.
- * It may cause malfunction if above instructions are not followed.

Main products

- Proximity sensors
- Area sensors
- Photoelectric sensors
- Fiber optic sensors
- Door/Door side sensors
- Rotary encoders
- Sensor controllers
- 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(CO₂, Nd:YAG)
- Laser welding/soldering system
- Counters
- Timers
- Display units
- Panel meters
- Pressure sensors
- Power controllers

Autonics Corporation
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Satisfiable Partner For Factory Automation

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* The above specifications are subject to change without notice.

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