

Autonics Ø60mm Shaft type Single-turn Absolut Rotart Encoder ENP SERIES

INSTRUCTION MANUAL



Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

■ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.
※ symbol represents caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow these instructions may result in serious injury or death.

⚠ Caution Failure to follow these instructions may result in personal injury or product damage.

⚠ Warning

- 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.
- 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.
- Install on a device panel to use.**
Failure to follow this instruction may result in fire.
- Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire.
- Check "Connections" before wiring.**
Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.

⚠ Caution

- Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
- Do not short the load.**
Failure to follow this instruction may result in product damage by fire.
- 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.

■ Ordering Information

ENP	-	1	1	1	R	-	360	-	P
Series	Output code	Output method	Power supply	Rotating direction	Resolutions/revolution	Control output			
Ø60mm (Shaft diameter: Ø10mm)	BCD code	0 : Negative logic 1 : Positive logic	0: 5VDC ±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

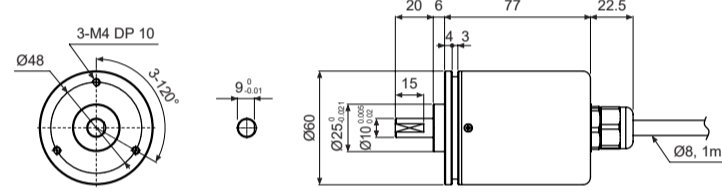
Type	Ø60mm shaft type Single-turn Absolute Rotary encoder							
Model	PNP open collector output	ENP-111□-006-P	ENP-111□-008-P	ENP-111□-012-P	ENP-111□-016-P	ENP-111□-024-P	ENP-111□-360-P	
	NPN open collector output	ENP-101□-006-N	ENP-101□-008-N	ENP-101□-012-N	ENP-101□-016-N	ENP-101□-024-N	ENP-101□-360-N	
Resolution	6 division		8 division		12 division		16 division	
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)	
	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'	
Output angle	TP1: 8 ±30' TP2: 3 ±30' P: 15 ±30' TS: 11 ±30'		TS: 1 ±30'					
	TP1: 8 ±30' TP2: 3 ±30' P: 15 ±30' TS: 11 ±30'		TS: 1 ±30'					
Control output	PNP open collector output	Output voltage: min. (Power voltage-1.5)VDC=, load current: max. 32mA						
	NPN open collector output	Load current: max. 32mA, residual voltage: max. 1VDC=						
Response time	PNP open collector output	T _{ON} =800ns, T _{OFF} =max. 800ns (Cable length: 1m, I sink = 32mA)						
	NPN open collector output	T _{ON} =800ns, T _{OFF} =max. 800ns (Cable length: 1m, I sink = 32mA)						
Max. response frequency	20kHz							
Power supply	5VDC ±5% (ripple P-P: max. 5%), 12-24VDC ±5% (ripple P-P: max. 5%)							
Current consumption	Max. 100mA (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							
Mechanical specification	Starting torque	Max. 500gf·cm (0.05N·m)						
	Moment of inertia	Max. 300g·cm ² (3×10 ⁻⁵ kg·m ²)						
	Shaft loading	Radial: 10kgf, Thrust: 2.5kgf						
Mechanical revolution	3,600rpm							
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours							
Shock	Approx. max. 75G							
Environment	Ambient temp.	-10 to 70°C, storage: -25 to 85°C						
	Ambient humi.	35 to 85%RH, storage: 35 to 90%RH						
Protection structure	IP50 (EC standard)							
Cable	Ø8mm, 12-wire, 1m, Double shield cable (AWG 24, core wire diameter: 0.08mm, number of cores: 40, insulator diameter: Ø1mm)							
Accessory	Mounting bracket, coupling							
Weight	Approx. 478g (Approx. 400g)							

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

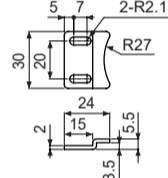
$$[\text{Max. response revolution (rpm)}] = \frac{\text{Max. response frequency} \times 60 \text{ sec}}{\text{Resolution}}$$

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

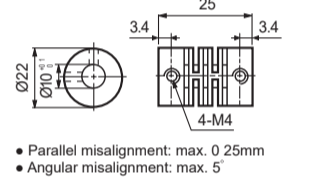
■ Dimensions



○ Bracket



○ Coupling



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

※Do not load overweight on the shaft.
※Do not put strong impact when insert a coupling into shaft.
※Fix the unit or a coupling by a wrench under 0.15 N·m of torque.
※When you install this unit, if eccentricity and deflection angle are larger, it may shorten the life cycle of this unit.

■ Connections

Wire color	Resolution	6 division	8 division	12 division	16 division	24 division	360 division
	Wire function	White*1: +V Black*1: GND(0V) Shield wire: F.G.					
Output wire	Black	TP1*2					2 ⁰
	Brown	2 ⁰	2 ⁰	2 ⁰	2 ⁰	2 ⁰	2 ⁰
	Red	2 ¹	2 ¹	2 ¹	2 ¹	2 ¹	2 ¹
	Orange	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²
	Yellow	N-C	2 ³	2 ³	2 ³	2 ³	2 ³ ×10
	Green	N-C	N-C	2 ³ ×10	2 ³ ×10	2 ³ ×10	2 ³ ×10
	Blue	N-C	N-C	N-C	N-C	2 ³ ×10	2 ³ ×10
	Purple	N-C					2 ³ ×10
	Gray	TP2*2					2 ³ ×100
	White	EP(Parity)*3					2 ³ ×100
Shield wire	F.G.						

※1: Insulator external diameter is Ø1.5mm.

※2: TP1/TP2

Because low resolution model has long output signal period, this signal for enable is easy to determine signal recognition point about output.

※3: EP

Parity signal. It outputs odd parity.

※Unused wire must be insulated.

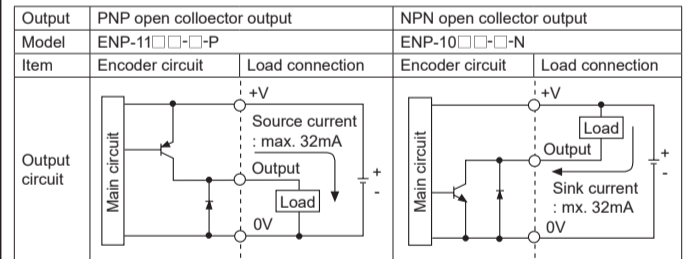
※Encoder case and shield wire must be grounded.

※N-C: Not Connected.

※Output cable must not be short-circuited, because Driver IC is used in output circuit.

※Do not apply tensile strength over 30N to the cable.

■ Control Output Diagram

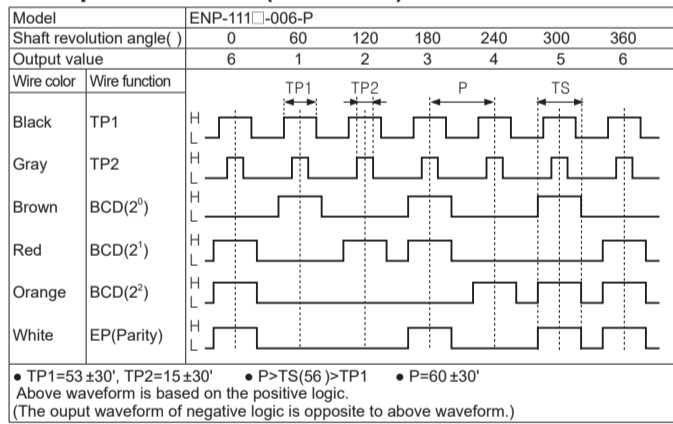


※The output circuit of each output signal is the same.

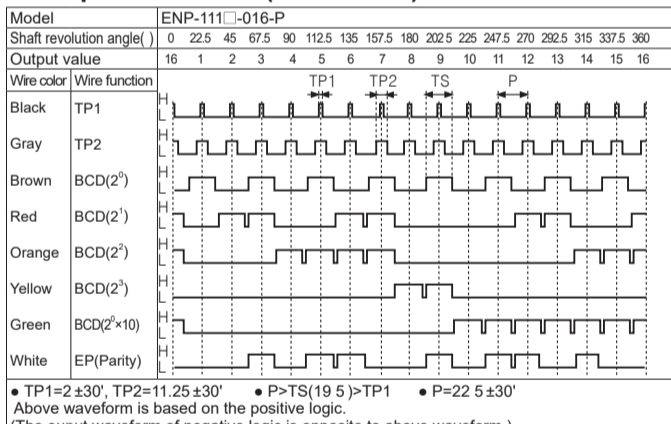
■ Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 5VDC, 12-24VDC 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.
- Ground the shield wire to the F.G. terminal.
- When using switching mode power supply, frame ground (F.G.) terminal of power supply should be grounded.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
- 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.
 - ①Indoors (in the environment condition rated in 'Specifications')
 - ②Altitude max. 2,000m
 - ③Pollution degree 2
 - ④Installation category II

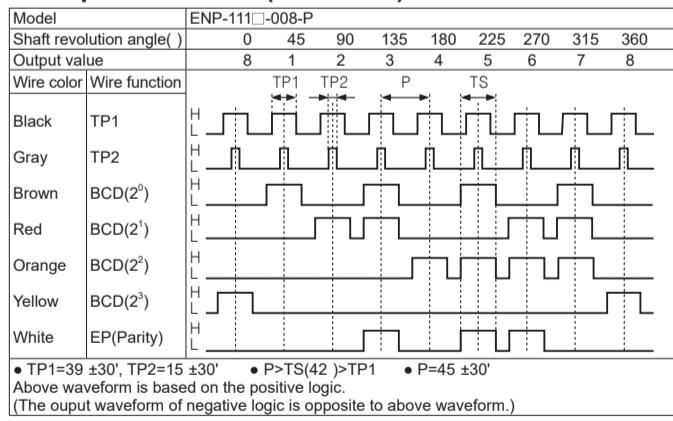
■ Output Waveform (6 division)



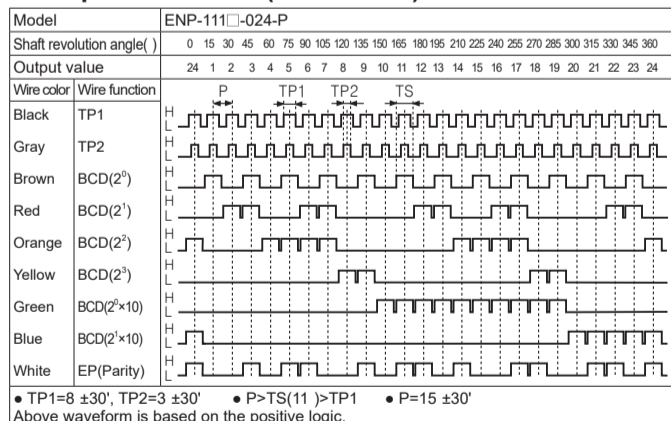
■ Output Waveform (16 division)



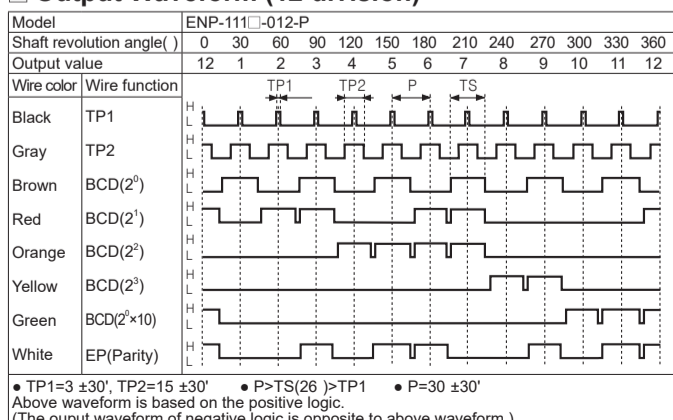
■ Output Waveform (8 division)



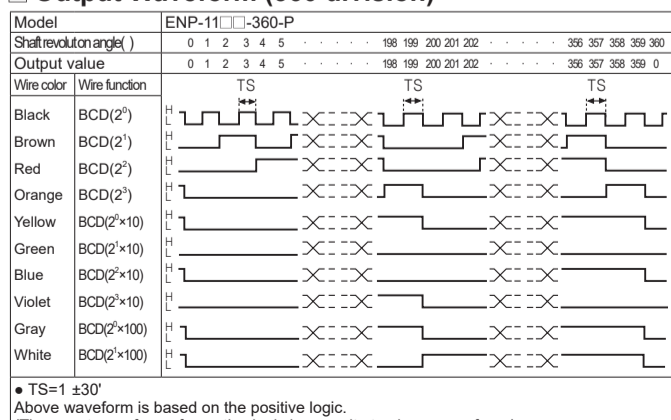
■ Output Waveform (24 division)



■ Output Waveform (12 division)



■ Output Waveform (360 division)



※The above specifications are subject to change and some models may be discontinued without notice.
※Be sure to follow cautions written in the instruction manual, and the technical descriptions (catalog, website).

■ Main Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connector/Sockets
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System (Fiber, CO₂, Nd: YAG)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers