

ENP Series

Shaft Type Ø60mm Absolute Rotary Encoder

■ Features

- Allows to measure absolute variable angle with BCD code
- Strong against external impact
- Memorizing the absolute position when power is cut off

■ Applications

Precision numerical control machine for industrial plant

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



■ Ordering Information

ENP	-	1	1	-	R	-	360	-	P
Series	Output code	Output	Power supply	Revolution direction	Steps/revolution	Control output			
Ø60mm shaft type (external shaft diameter: Ø10mm)	1: 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 016:16-division 008: 8-division 024: 24-division 012: 12-division 360: 360-division	P: PNP open collector output N: NPN open collector output			

■ Specifications

Item		Shaft Type Ø60mm 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	24-division	360-division	
Electrical specification	Output phase	TP (timing pulse) : 2-bit	TP (timing pulse) : 2-bit	TP (timing pulse) : 2-bit	TP (timing pulse) : 2-bit	TP (timing pulse) : 2-bit	TS (signal pulse) : 10-bit (BCD)	
		TS (signal pulse) : 4-bit (BCD, EP)	TS (signal pulse) : 5-bit (BCD, EP)	TS (signal pulse) : 6-bit (BCD, EP)	TS (signal pulse) : 6-bit (BCD, EP)	TS (signal pulse) : 7-bit (BCD, EP)		
	Output of phase differences	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'	
		Control output	PNP open collector output	Output voltage: min. (power supply-1.5V)VDC, Load current: max. 32mA				
		NPN open collector output	Load current: max. 32mA, Residual voltage: max. 1VDC=					
	Response time (rise/fall)	PNP open collector output	Ton=800ns, Toff=Max. 800ns (cable length: 1m, I sink=32mA)					
		NPN open collector output	Ton=800ns, Toff=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 ⁻⁶ kg·m ²)					
	Shaft loading		Radial: 10kgf, Thrust: 2.5kgf					
	Mechanical revolution ^{*1}		3,600rpm					
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. 75G						
Environment	Ambient temperature	-10 to 70°C, storage: -25 to 85°C						
	Ambient humidity	35 to 85%RH, storage: 35 to 90%RH						
Protection structure		IP50 (IEC standard)						
Cable		Ø8mm, 12-wire, 1m, Double shield cable (AWG24, core diameter: 0.08mm, number of cores: 40, insulator diameter: Ø1mm)						
Accessory		Mounting bracket, coupling						
Weight ^{*2}		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.

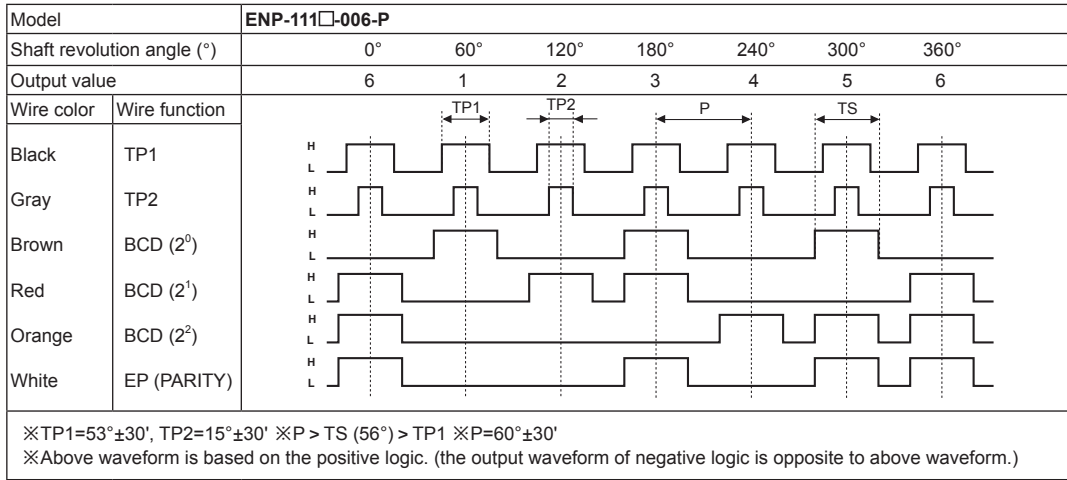
$$[\text{Max. response revolution (rpm)}] = \frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$$

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

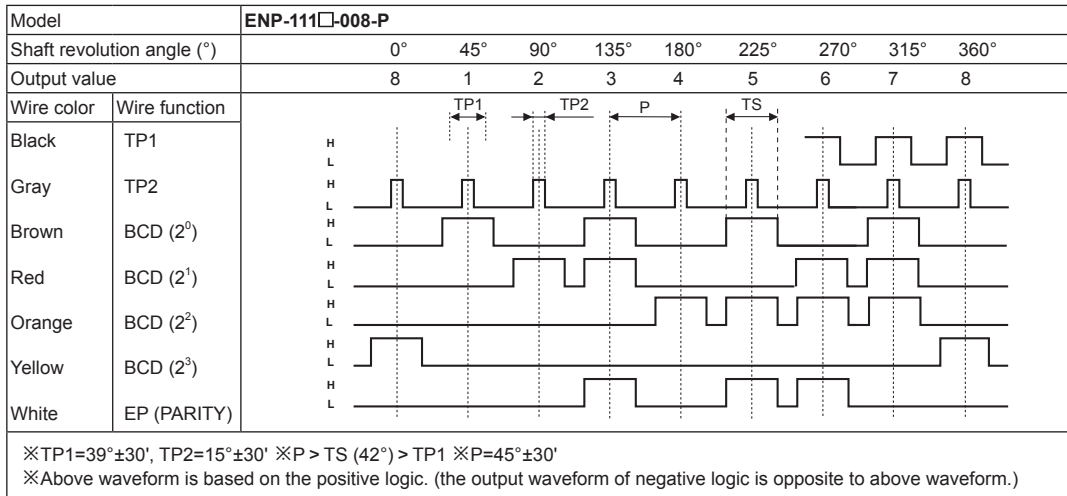
※ Environment resistance is rated at no freezing or condensation.

Output Waveform

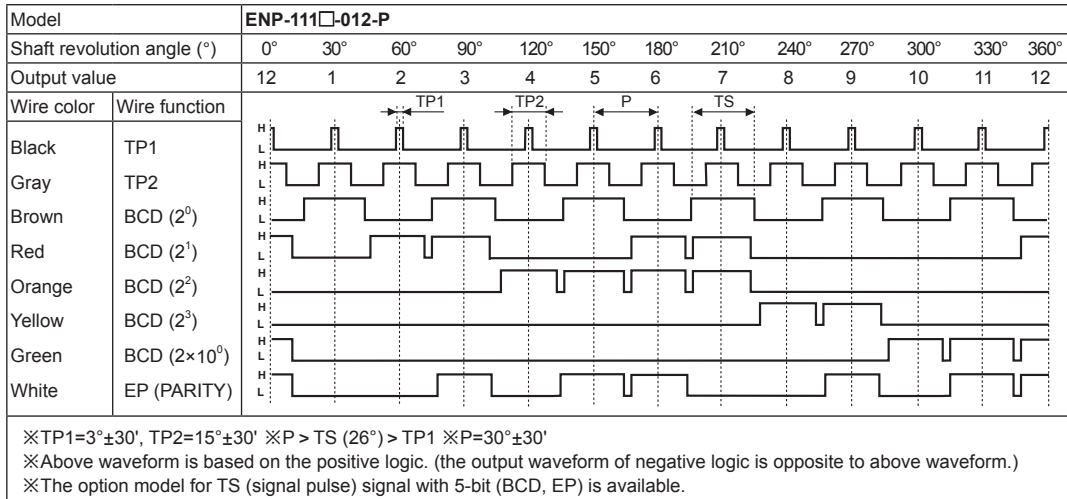
• 6-division



• 8-division



• 12-division



(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

(D) Proximity Sensors

(E) Pressure Sensors

(F) Rotary Encoders

(G) Connectors/ Connector Cables/ Sensor Distribution Boxes/Sockets

(H) Temperature Controllers

(I) SSRs / Power Controllers

(J) Counters

(K) Timers

(L) Panel Meters

(M) Tacho / Speed / Pulse Meters

(N) Display Units

(O) Sensor Controllers

(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

(R) Graphic/ Logic Panels

(S) Field Network Devices

(T) Software

ENP Series

Output Waveform

• 16-division

Model		ENP-111□-016-P																
Shaft revolution angle (°)		0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°	360°
Output value		16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Wire color	Wire function																	
Black	TP1																	
Gray	TP2																	
Brown	BCD (2 ⁰)																	
Red	BCD (2 ¹)																	
Orange	BCD (2 ²)																	
Yellow	BCD (2 ³)																	
Green	BCD (2×10 ⁰)																	
White	EP (PARITY)																	

※TP1=2°±30', TP2=11.25°±30' ※P > TS (19.5°) > TP1 ※P=22.5°±30'
 ※Above waveform is based on the positive logic. (the output waveform of negative logic is opposite to above waveform.)
 ※The option model for TS (signal pulse) signal with 5-bit (BCD, EP) is available.

• 24-division

Model		ENP-111□-024-P																								
Shaft revolution angle (°)		0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°	360°
Output value		24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Wire color	Wire function																									
Black	TP1																									
Gray	TP2																									
Brown	BCD (2 ⁰)																									
Red	BCD (2 ¹)																									
Orange	BCD (2 ²)																									
Yellow	BCD (2 ³)																									
Green	BCD (2 ⁰ ×10)																									
Blue	BCD (2 ¹ ×10)																									
White	EP (PARITY)																									

※TP1=8°±30', TP2=3°±30' ※P > TS (11°) > TP1 ※P=15°±30'
 ※Above waveform is based on the positive logic. (the output waveform of negative logic is opposite to above waveform.)

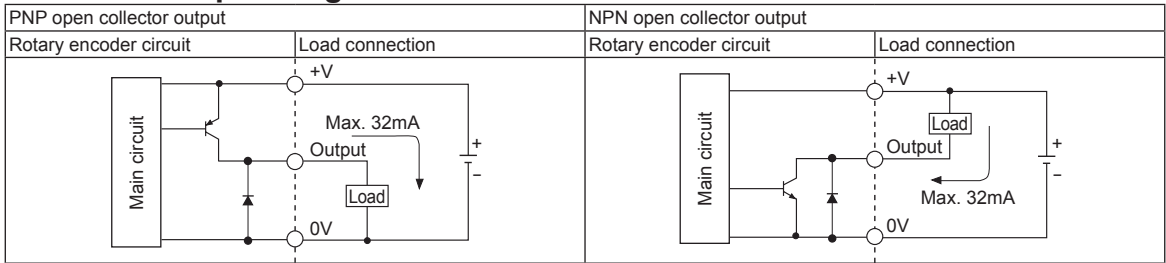
• 360-division

Model		ENP-111□□-360-P																																			
Shaft revolution angle (°)		0°	1°	2°	3°	4°	5°	198°	199°	200°	201°	202°	356°	357°	358°	359°	360°																		
Output value		0	1	2	3	4	5	198	199	200	201	200	356	357	358	359	0																		
Wire color	Wire function																																				
Black	BCD (2 ⁰)																																				
Brown	BCD (2 ¹)																																				
Red	BCD (2 ²)																																				
Orange	BCD (2 ³)																																				
Yellow	BCD (2 ⁰ ×10)																																				
Green	BCD (2 ¹ ×10)																																				
Blue	BCD (2 ² ×10)																																				
Violet	BCD (2 ³ ×10)																																				
Gray	BCD (2 ⁰ ×100)																																				
White	BCD (2 ¹ ×100)																																				

※TS=1°±30'
 ※Above waveform is based on the positive logic. (the output waveform of negative logic is opposite to above waveform.)

Absolute Ø60mm Shaft Type

Control Output Diagram



※Output circuit of each output signal is same.

Connections

Wire color	Resolution	6-division	8-division	12-division	16-division	24-division	360-division
	Power wire	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 ¹
	Red		2 ¹	2 ¹	2 ¹	2 ¹	2 ²
	Orange		2 ²	2 ²	2 ²	2 ²	2 ³
	Yellow	N-C	2 ³	2 ³	2 ³	2 ³	2 ⁰ ×10
	Green	N-C	N-C	N-C	2 ⁰ ×10	2 ⁰ ×10	2 ¹ ×10
	Blue	N-C	N-C	N-C	N-C	N-C	2 ¹ ×10
	Purple	N-C					2 ² ×10
	Gray	TP2 ※ ²					2 ⁰ ×100
	White	EP (PARITY) ※ ³					2 ¹ ×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.

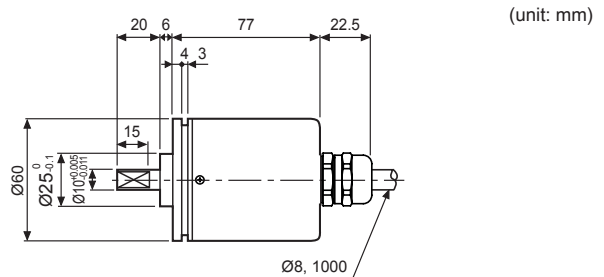
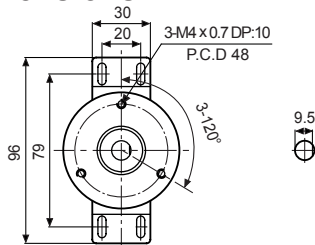
※Unused wire must be insulated.

※Encoder case and shield wire must be grounded.

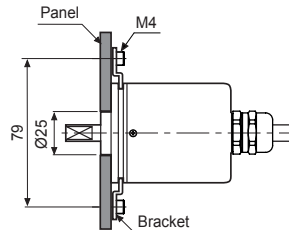
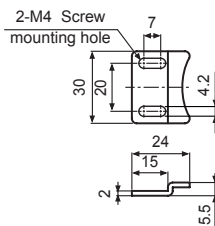
※N-C: Not connected.

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

Dimensions

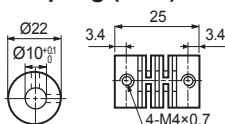


Bracket



※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.

Coupling (ENP)



• Parallel misalignment: max. 0.25mm

• Angular misalignment: max. 5°

• 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.

(A)	Photoelectric Sensors
(B)	Fiber Optic Sensors
(C)	Door/Area Sensors
(D)	Proximity Sensors
(E)	Pressure Sensors
(F)	Rotary Encoders
(G)	Connectors/ Connector Cables/ Sensor Distribution Boxes/Sockets
(H)	Temperature Controllers
(I)	SSRs / Power Controllers
(J)	Counters
(K)	Timers
(L)	Panel Meters
(M)	Tacho / Speed / Pulse Meters
(N)	Display Units
(O)	Sensor Controllers
(P)	Switching Mode Power Supplies
(Q)	Stepper Motors & Drivers & Controllers
(R)	Graphic/ Logic Panels
(S)	Field Network Devices
(T)	Software