ENP Series

Diameter φ60mm shaft type ABSOLUTE Rotary encoder

▣Features
- ●Able to measure absolute variable angle with BCD code.
- ●Strong against external impact.
- ●Memorize the absolute position when power cut.

▣Application
- ●Precision numerical control machine for industrial plant.

> ⚠ **Please read "Caution for your safety" in operation manual before using.**

▣Ordering information

ENP	–	1	–	1	–	1	–	R	–	360	–	1

Series	Output code	Output	Power supply	Rotating direction	Pulse/1Revolution	Control output
Diameter φ60mm shaft type	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 016 : 16 division 008 : 8 division 024 : 24 division 012 : 12 division 360 : 360 division	1 : PNP open collector output 2 : NPN open collector output

※Since the output type is related with control output, please select the model name in specification when you order the item.

▣Specifications

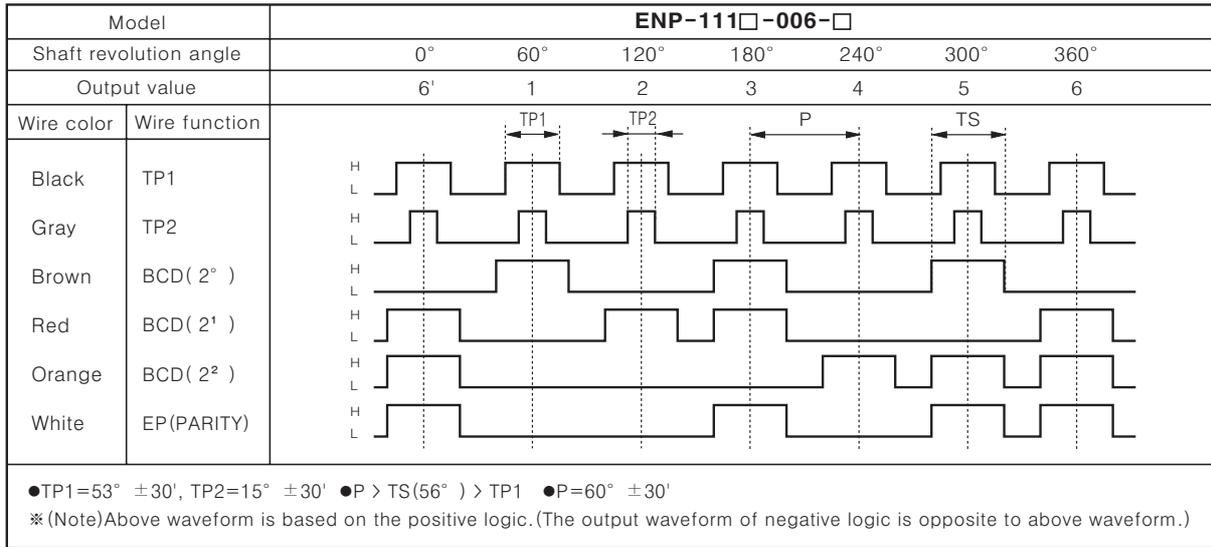| Item		Diameter φ60mm shaft type ABSOLUTE Rotary encoder					
Model	PNP open collector output	ENP-111□-006-1	ENP-111□-008-1	ENP-111□-012-1	ENP-111□-016-1	ENP-111□-024-1	ENP-110□-360-1
	NPN open collector output	ENP-101□-006-2	ENP-101□-008-2	ENP-101□-012-2	ENP-101□-016-2	ENP-101□-024-2	ENP-100□-360-2
Resolution		6 division	8 division	12 division	16 division	24 division	360 division
Electrical specification	Output phase	TP(Timing Pulse) : 2bit TS(Signal Pulse) : 4bit(BCD, EP)	TP(Timing Pulse) : 2bit TS(Signal Pulse) : 5bit(BCD, EP)	TP(Timing Pulse) : 2bit TS(Signal Pulse) : 6bit(BCD, EP)	TP(Timing Pulse) : 2bit TS(Signal Pulse) : 6bit(BCD, EP)	TP(Timing Pulse) : 2bit TS(Signal Pulse) : 7bit(BCD, EP)	TS(Signal Pulse) : 10bit(BCD)
	Output of phase differencs	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 voltage−1.5)VDC, Load current : Max. 32mA					
	Control output — NPN open collector output	Load current : Max. 32mA, Residual voltage : Max. 1VDC					
	Response time (Rise & Fall) — PNP open collector output	T_ON=500ns, T_OFF=Max. 2.5μs (Cable length:1m, I sink =32mA)					
	Response time (Rise & Fall) — NPN open collector output	T_ON=400ns, T_OFF=Max. 1.5μs (Cable length:1m, I sink =32mA)					
	Max. Response frequency	20kHz					
	Power supply	12−24VDC ±5% (Ripple P−P:Max. 5%)					5−12VDC ±5% (Ripple P−P:Max. 5%)
	Current consumption	Max. 150mA(disconnection of the load)					Max. 200mA (disconnection of the load)
	Insulation resistance	Min. 20MΩ (at 500VDC)					
	Dielectric strength	500VAC 50/60Hz for 1 minute (Between all terminals and case)					
	Connection	Cable outgoing connection					
Mechanical specification	Starting torque	Max. 500gf · cm(0.05N · m)					
	Moment of inertia	Max. 300g · cm² (3×10⁻⁵ kg · m²)					
	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf					
	Deviation of shaft position	Radial : Max. 0.1mm, Thrust : Max. 0.2mm					
	Mechanical revolution (★Note1)	3600rpm					
Vibration		1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours					
Shock		Max. 75G					
Ambient temperature		−10 ~ 60℃ (at non−freezing status), Storage:−25 ~ 85℃					
Ambient humidity		35~85%RH, Storage : 35~90%RH					
Protection		IP50(IEC specification)					
Cable		12P, φ8mm, Length : 1m, Double shield cable					
Accessory		Mounting bracket, Coupling					
Weight		Approx. 577g					Approx. 690g

※(★Note1)Max. allowable revolution ≧ Max. response revolution 【Max. response revolution(rpm) = $\dfrac{\text{Max. response frequency}}{\text{Resolution}}$ ×60 sec】

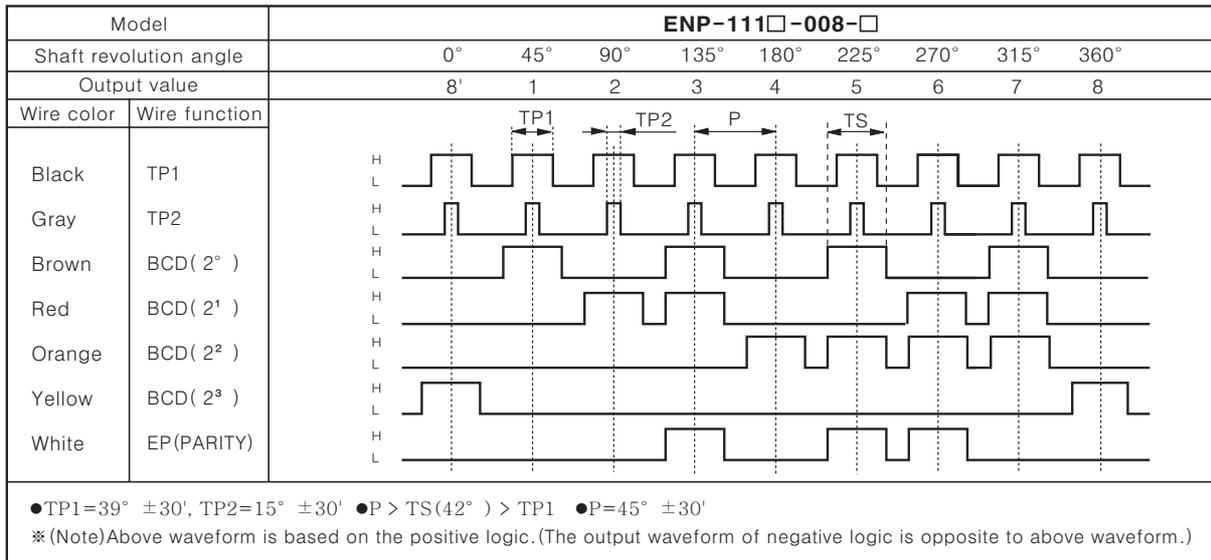Please select the resolution to make lower max. revolution than max. allowable revolution.
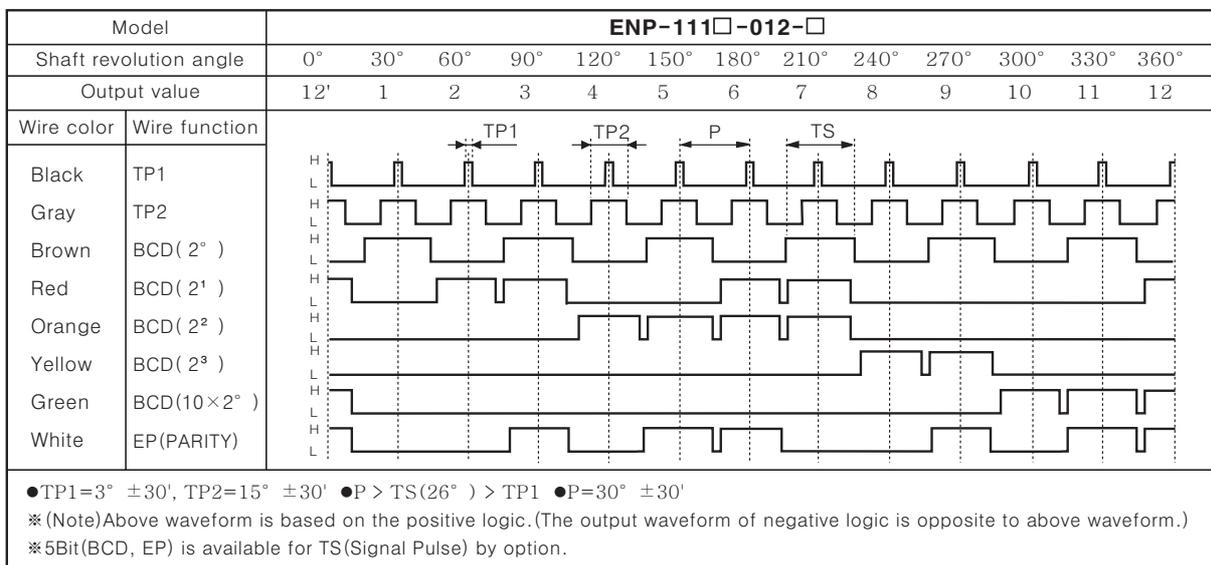
Absolute ⌀60 Standard Shaft Type

▣ Output waveform

● 6 division

Model	ENP-111□-006-□						
Shaft revolution angle	0°	60°	120°	180°	240°	300°	360°
Output value	6'	1	2	3	4	5	6

Wire color	Wire function							
Black	TP1							
Gray	TP2							
Brown	BCD(2°)							
Red	BCD(2¹)							
Orange	BCD(2²)							
White	EP(PARITY)							

● TP1=53° ±30', TP2=15° ±30' ● P > TS(56°) > TP1 ● P=60° ±30'

※ (Note) Above waveform is based on the positive logic. (The output waveform of negative logic is opposite to above waveform.)

● 8 division

Model	ENP-111□-008-□								
Shaft revolution angle	0°	45°	90°	135°	180°	225°	270°	315°	360°
Output value	8'	1	2	3	4	5	6	7	8

Wire color	Wire function
Black	TP1
Gray	TP2
Brown	BCD(2°)
Red	BCD(2¹)
Orange	BCD(2²)
Yellow	BCD(2³)
White	EP(PARITY)

● TP1=39° ±30', TP2=15° ±30' ● P > TS(42°) > TP1 ● P=45° ±30'

※ (Note) Above waveform is based on the positive logic. (The output waveform of negative logic is opposite to above waveform.)

● 12 division

Model	ENP-111□-012-□												
Shaft revolution angle	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
Output value	12'	1	2	3	4	5	6	7	8	9	10	11	12

Wire color	Wire function
Black	TP1
Gray	TP2
Brown	BCD(2°)
Red	BCD(2¹)
Orange	BCD(2²)
Yellow	BCD(2³)
Green	BCD(10×2°)
White	EP(PARITY)

● TP1=3° ±30', TP2=15° ±30' ● P > TS(26°) > TP1 ● P=30° ±30'

※ (Note) Above waveform is based on the positive logic. (The output waveform of negative logic is opposite to above waveform.)

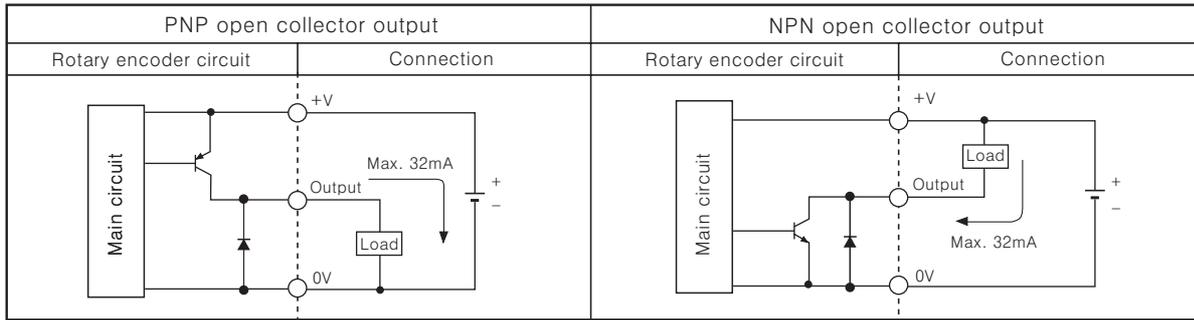※ 5Bit(BCD, EP) is available for TS(Signal Pulse) by option.

ENP Series

▣ Output waveform

● 16 divisiion

Model	ENP-111□-016-□															
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°)	
Red	BCD(2^1)	
Orange	BCD(2^2)	
Yellow	BCD(2^3)	
Green	BCD(10×2°)	
White	EP(PARITY)	

● TP1=2° ±30', TP2=11.25° ±30'   ● P > TS(19.5°) > TP1   ● P=22.5° ±30'

※ (Note)Above waveform is based on the positive logic.(The output waveform of negative logic is opposite to above waveform.)
※ 5Bit(BCD, EP) is available for TS(Signal Pulse) by option.

● 24 divisiion

Model	ENP-111□-024-□
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°)
Red	BCD(2^1)
Orange	BCD(2^2)
Yellow	BCD(2^3)
Green	BCD(2° × 10)
Blue	BCD(2^1 × 10)
White	EP(PARITY)

● TP1=8° ±30', TP2=3° ±30'   ● P > TS(11°) > TP1   ● P=15° ±30'

※ (Note)Above waveform is based on the positive logic.(The output waveform of negative logic is opposite to above waveform.)

● 360 divisiion

Model	ENP-100□-360-□
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 ・・・・・・・ 198 199 200 201 202 ・・・・・・・ 356 357 358 359 0

Wire color	Wire function
Black	BCD(2°)
Brown	BCD(2^1)
Red	BCD(2^2)
Orange	BCD(2^3)
Yellow	BCD(2° × 10)
Green	BCD(2^1 × 10)
Blue	BCD(2^2 × 10)
Purple	BCD(2^3 × 10)
Gray	BCD(2° × 100)
White	BCD(2^1 × 100)

● Ts=1° ±30'

※ (Note)Above waveform is based on the positive logic.(The output waveform of negative logic is opposite to above waveform.)

■Control output diagram

PNP open collector output		NPN open collector output	
Rotary encoder circuit	Connection	Rotary encoder circuit	Connection

※Output circuit of all pahses is the same.

■Connections

Shield cable

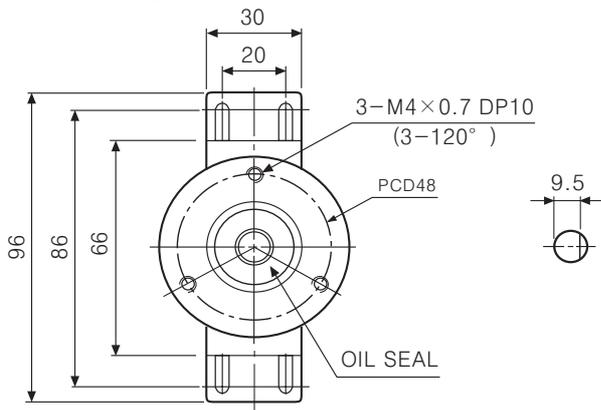| Cable color		6 division	8 division	12 division	16 division	24 division	360 division
1:White	Power wire	+V					
2:Black		0V					
3:Shield wire		F.G					
1:Black	Output wire	TP1					BCD CODE(2°)
2:Brown		BCD CODE(2°)	BCD CODE(2°)	BCD CODE(2°)	BCD CODE(2°)	BCD CODE(2°)	BCD CODE(2¹)
3:Red		BCD CODE(2¹)	BCD CODE(2¹)	BCD CODE(2¹)	BCD CODE(2¹)	BCD CODE(2¹)	BCD CODE(2²)
4:Orange		BCD CODE(2²)	BCD CODE(2²)	BCD CODE(2²)	BCD CODE(2²)	BCD CODE(2²)	BCD CODE(2³)
5:Yellow		NC	BCD CODE(2³)	BCD CODE(2³)	BCD CODE(2³)	BCD CODE(2³)	BCD CODE(2°×10)
6:Green		NC	NC	BCD CODE(2°×10)	BCD CODE(2°×10)	BCD CODE(2°×10)	BCD CODE(2¹×10)
7:Blue		NC	NC	NC	NC	BCD CODE(2¹×10)	BCD CODE(2²×10)
8:Purple		NC					BCD CODE(2³×10)
9:Gray		TP2					BCD CODE(2°×100)
10:White		EP(PARITY)					BCD CODE(2¹×100)
11:Shiled wire		F.G					

※Unused wires must be insulated.
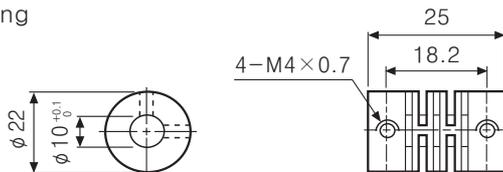※Encoder case and shield wire must be a good earth grounded.
※NC : Not Connected.
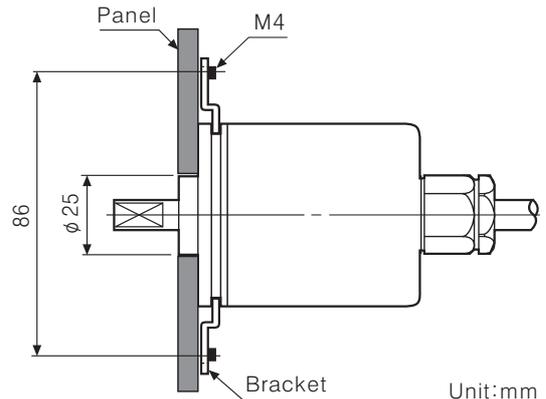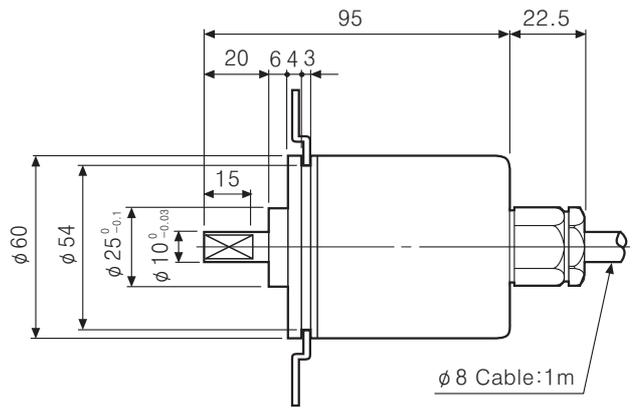※Output cable must not be short−circuited due to Driver IC is used in output circuit.

■Dimensions

●Coupling

●Bracket

Panel

●Bracket

Unit:mm

Side tab index