efesotomasyon.com - Autonics Encoder,sensor

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 cautions 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. When use this unit for controlling highly affective equipment to human or properties. (Medical instrument, Vehicles, Train, Airplane, combustion apparatus, entertainment etc.), it requires installing a fail safety device.
It may cause serious human injury or a fire, property.

⚠ Caution

1. Do not drop water or oil on this unit.
It may cause damage or miscontrol due to malfunction.
2. Please observe voltage rating.
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.

▣ Outline

Absolute type, which is dividing revolution angle as regular rate from 0° to 360° and is specifing electrical code(BCD, Binary, Gray, Index Code) for the divided angle is the sensor detecting revolving posiotion of the shaft by the specified digital angle is the sensor detecting revolving position of the shaft by the specified disital code.
It is no need memory retention circuit against power fallure and has feature against strong noise because the output value for revolving angle of the shaft does not change by any electric characteristic.

▣ Features

- ●Measurement of displacement angle by 'BCD' code signals.
- ●Memory retention against power failure.

▣ Application

- ●Precision numerical control machine for industrial plant.

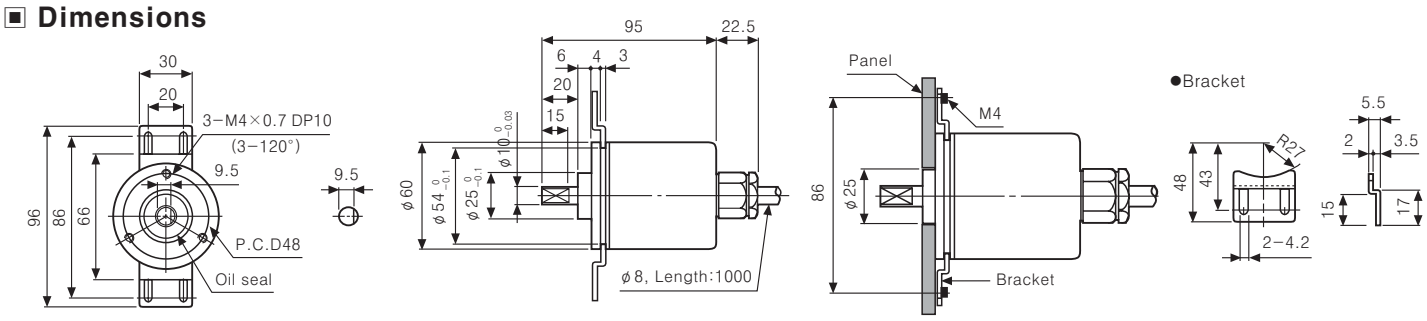
▣ Ordering information

ENP	–	1	1	1	R	–	360	–	P
Series		Output code	Output method	Power supply	Rotating direction		Resolution / 1 revolution		Control output
Diameter ø60mm 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 008:8 division 012:12 division 016:16 division 024:24 division 360:360 division		P:PNP open collector output N:NPN open collector output

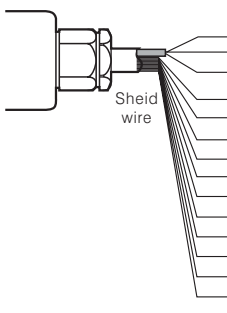
▣ Specifications

Type			Diameter ø60mm 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-110□-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-100□-360-N
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 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'
	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	TON=500ns, TOFF=Max. 2.5μs (Cable length:1m, I sink =32mA)					
		NPN open collector output	TON=400ns, TOFF=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		Max. 20MΩ(at 500VDC between all terminals and case)					
	Dielectric strength		500VAC 50/60Hz for 1 minute(between all terminals and case)					
	Connection		Cable outgoing type					
Mechanical spec.	Starting torque		Max. 500gf • cm(49000μN • m)					
	Moment of inertia		Max. 300g • cm² (3×10⁻⁵kg • m²)					
	Shaft loading		Radial:10kgf, Thrust:Max. 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					
Ambient temperature			–10 to 60℃(non–freezing condition), storage:–25 to 85℃					
Ambient humidity			35 to 85%RH, storage:35 to 90%RH					
Protection			IP50(IEC standard)					
Cable			ø8mm, 12P, Lengh:1m, Double shield cable					
Weight			Mounting bracket, coupling					
Accessory			Approx. 577g					Approx. 690g

▣ Dimensions



▣ Connections



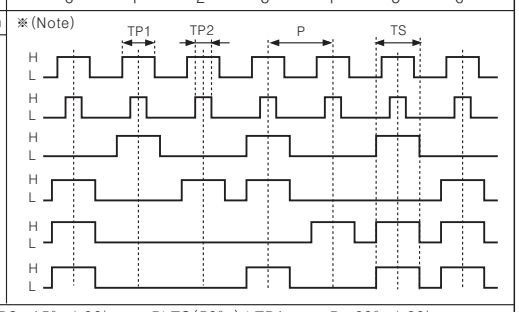
Wire cable		6 division	8 division	12 division	16 division	24 division	360 division
1:White 2:Black 3:Shield wire	Power wire	+V					
		GND(0V)					
		F.G					
1:Black	Output wire	TP1					BCD Code(2^0)
2:Brown		BCD Code(2^0)	BCD Code(2^0)	BCD Code(2^0)	BCD Code(2^0)	BCD Code(2^0)	BCD Code(2^1)
3:Red		BCD Code(2^1)	BCD Code(2^1)	BCD Code(2^1)	BCD Code(2^1)	BCD Code(2^1)	BCD Code(2^2)
4:Orange		BCD Code(2^2)	BCD Code(2^2)	BCD Code(2^2)	BCD Code(2^2)	BCD Code(2^2)	BCD Code(2^3)
5:Yellow		N.C	BCD Code(2^3)	BCD Code(2^3)	BCD Code(2^3)	BCD Code(2^3)	BCD Code(2^0 ×10)
6:Green		N.C	N.C	BCD Code(2^0 ×10)	BCD Code(2^0 ×10)	BCD Code(2^1 ×10)	BCD Code(2^1 ×10)
7:Blue		N.C	N.C	N.C	N.C	BCD Code(2^1 ×10)	BCD Code(2^2 ×10)
8:Purple		N.C					BCD Code(2^3 ×10)
9:Gray		TP2					BCD Code(2^0 ×100)
10:White		EP(Parity)					BCD Code(2^1 ×100)
11:Shield wire		F.G					

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

▣ 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(2^0)
Red	BCD(2^1)
Orange	BCD(2^2)
White	EP(Parity)

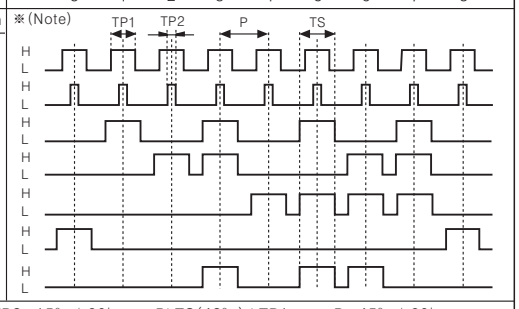


●TP1=53° ±30', TP2=15° ±30' ●P>TS(56°) >TP1 ●P=60° ±30'
※(Note)Above waveform is based on the positive logic.
(The output waveform of negative logic is opposed to above waveform.)

▣ Output 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(2^0)
Red	BCD(2^1)
Orange	BCD(2^2)
Yellow	BCD(2^3)
White	EP(Parity)

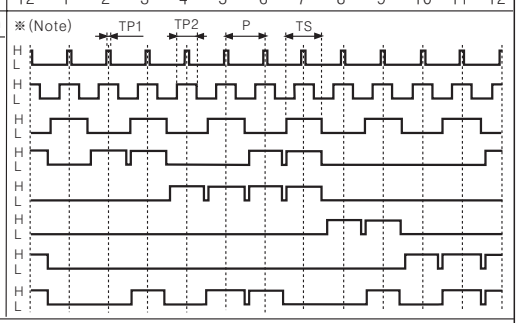


●TP1=39° ±30', TP2=15° ±30' ●P>TS(42°) >TP1 ●P=45° ±30'
※(Note)Above waveform is based on the positive logic.
(The output waveform of negative logic is opposed to above waveform.)

▣ Output 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(2^0)
Red	BCD(2^1)
Orange	BCD(2^2)
Yellow	BCD(2^3)
Green	BCD(2×10^0)
White	EP(Parity)



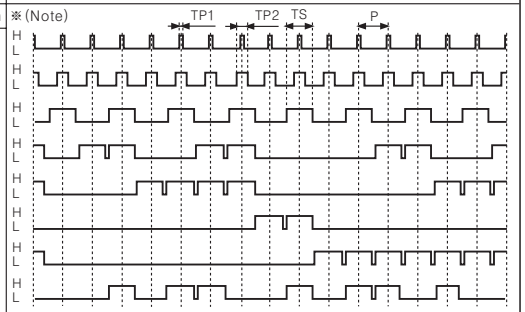
●TP1=3° ±30', TP2=15° ±30' ●P>TS(26°) >TP1 ●P=30° ±30'
※(Note)Above waveform is based on the positive logic.
(The output waveform of negative logic is opposed to above waveform.)

※The above specification are changeable without notice anytime.

▣ Output waveform(16 division)

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(2^0)
Red	BCD(2^1)
Orange	BCD(2^2)
Yellow	BCD(2^3)
Green	BCD(2×10^0)
White	EP(Parity)

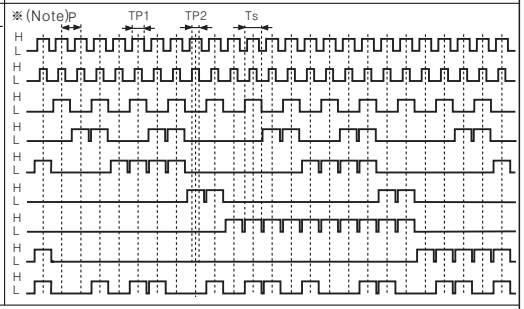


●TP1=2° ±30', TP2=11.25° ±30' ●P>TS(19.5°) >TP1 ●P=22.5° ±30'
※(Note)Above waveform is based on the positive logic.
(The output waveform of negative logic is opposed to above waveform.)

▣ Output waveform(24 division)

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(2^0)
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)

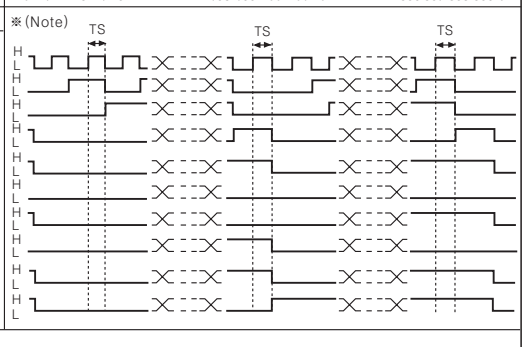


●TP1=8° ±30', TP2=3° ±30' ●P>TS(11°) >TP1 ●P=15° ±30'
※(Note)Above waveform is based on the positive logic.
(The output waveform of negative logic is opposed to above waveform.)

▣ Output waveform(360 division)

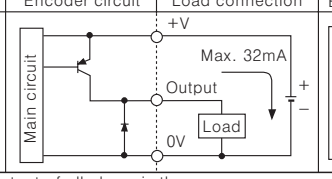
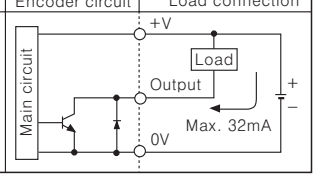
Model	ENP-100□-360-□																								
Shaft revolution angle(°)	0	1	2	3	4	5	• • • • •	198	199	200	201	202	• • • • •	356	357	358	359	360
Output value	0'	1	2	3	4	5	• • • • •	198	199	200	201	202	• • • • •	356	357	358	359	0

Wire color	Wire function
Black	BCD(2^0)
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)



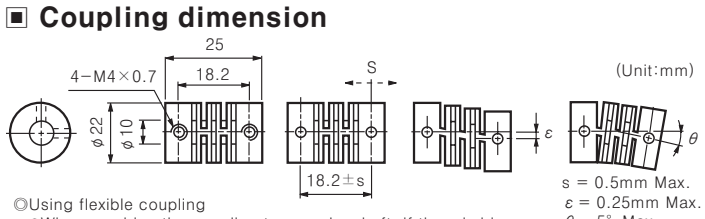
●TS=1° ±30'
※(Note)Above waveform is based on the positive logic.
(The output waveform of negative logic is opposed to above waveform.)

▣ Control output diagram

Output	PNP open collector output		NPN open collector output	
Model	ENP–□□□□–□□□–P		ENP–□□□□–□□□–N	
Item	Encoder circuit	Load connection	Encoder circuit	Load connection
Output circuit				

※The output of all phase is the same.

▣ Coupling dimension



s = 0.5mm Max.
ε = 0.25mm Max.
θ = 5° Max.

◎Using flexible coupling
- ●When combine the coupling to encoder shaft, if there is big eccentricity or bend between rotating encoder shaft and mate shaft, it will make the life cycle of encoder and coupling shorten.
- ●It must not use larger shaft loading than specification.

▣ Caution for using

1. Installation
   ①This unit is consisted of precision components. Therefore please treat this product carefully.
   ②When you install this unit, if eccentricity and deflection angle are larger, it may shorten the life cycle of this unit.
   ③Do not put strong impact when insert coupling into shaft.
   ④Please set Z.P with metallic ball for sub–mounting, then use this unit.
2. For using
   ①Please connect shield wire to F.G terminal.
   ②Do not connect and cut circuit off during power on. It may result in damage to this unit.
   ③When 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.
3. Environment
   Please do not use this unit with below environment, it results in malfunction.
   ①Place where this unit or component may be damaged by strong vibration or impact.
   ②Place where there are lots of flammable or corrosive gases.
   ③Place where strong magnet field or electric noise are occurred.
   ④Place where is beyond of rating temperature or humidity.
   ⑤Place where strong acids or alkali near by.
4. Vibration and Impact
   ①When the strong impact loads on this unit, the error pulse may occur as if the slit is revolving.
   ②Encoder with high resolution can be easily affected by vibration, therefore fix the sub mounting metallic ball when install this unit.
   ③Please use metallic coupling when the application needs severe acceleration or deceleration frequently.
5. Wire connection
   ①Do not draw the wire with over 30N strength after wiring.
   ②If use the cable of encoder and high voltage line or power cable in the same conduit, it may cause a malfunction or mechanical trouble. Please wire separately or use separated conduit.

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

▣ Main products

■ PROXIMITY SENSOR ■ PHOTOELECTRIC SENSOR ■ AREA SENSOR
■ FIBER OPTIC SENSOR
■ DOOR/DOOR SIDE SENSOR
■ PRESSURE SENSOR
■ ROTARY ENCODER ■ COUNTER
■ TIMER ■ TEMPERATURE CONTROLLER
■ TEMPERATURE/HUMIDITY TRANSDUCER
■ POWER CONTROLLER ■ PANEL METER
■ TACHO/LINE SPEED/PULSE METER
■ DISPLAY UNIT ■ SENSOR CONTROLLER
■ SWITCHING POWER SUPPLY
■ GRAPHIC PANEL
■ 5–PHASE STEPPING MOTOR & DRIVER & CONTROLLER
■ LASER MARKING SYSTEM(CO_2, Nd:YAG)

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