

EP50S Series


Diameter ϕ 50mm Shaft type Absolute Rotary encoder

Features

- Compact size of external diameter 50mm
- Various output code: BCD, Binary, Gray Code (Customizable)
- Various and high resolution (720, 1024 divisions)
- IP64 (Partial waterproof, Oil proof)

Applications

Precision machine tool, Fabric machinery, Robot, Parking system

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



Ordering information

EP50S	8	-	1024	-	1	-	R	-	P	-	24
Series	Inside	Pulse/1Revolution	Output code	Revolution direction	Control output	Power supply					
Diameter ϕ 50mm shaft type	ϕ 8mm	Refer to resolution	1 : BCD Code 2 : Binary Code 3 : Gray Code	F : Output value increase at CW direction R : Output value increase at CCW direction	P : PNP open collector output N : NPN open collector output	5 : 5VDC \pm 5% 24 : 12-24VDC \pm 5%					

* Gray code is customizable.

Specifications

Item	Diameter ϕ 50mm shaft type of Absolute rotary encoder		
Resolution	(Note1) *6, *8, *12, *16, *24, *32, *40, 45, 64, 90, 128, 180, 256, 360, 512, 720, 1024		
Electrical specification	Output code/Output angle	Refer to "Output waveform"	
	Control output	PNP open collector output	Output voltage : Min. (Power supply-1.5)VDC, Load current : Max. 32mA
		NPN open collector output	Load current : Max. 32mA, Residual voltage : Max. 1VDC
	Response time(Rise/Fall)	Ton=800nsec, Toff=Max. 800nsec(Cable length:2m, I sink=32mA)	
	Max. Response frequency	35kHz	
	Power supply	• 5VDC \pm 5% (Ripple P-P : Max. 5%) • 12-24VDC \pm 5% (Ripple P-P : Max. 5%)	
	Current consumption	Max. 100mA (disconnection of the load)	
	Insulation resistance	Min. 100M Ω (at 500VDC mega between all terminals and case)	
	Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)	
	Connection	Cable outgoing type (Cable gland)	
Mechanical specification	Starting torque	Max. 40gf \cdot cm (0.004N \cdot m)	
	Rotor inertia	Max. 40g \cdot cm ² (4×10^{-6} kg \cdot m ²)	
	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf	
	Max. allowable revolution	(Note2)	3000rpm
Vibration	1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours		
Shock	Max. 50G		
Ambient temperature	-10 ~ 70 $^{\circ}$ C (at non-freezing status), Storage: -25 ~ 85 $^{\circ}$ C		
Ambient humidity	35~85%RH, Storage: 35~90%RH		
Protection	IP64 (IEC standard)		
Cable	ϕ 7mm, 15P, Length : 2m, Shield cable		
Accessory	Fixing bracket, Coupling		
Unit weight	Approx. 380g		
Approval	CE		

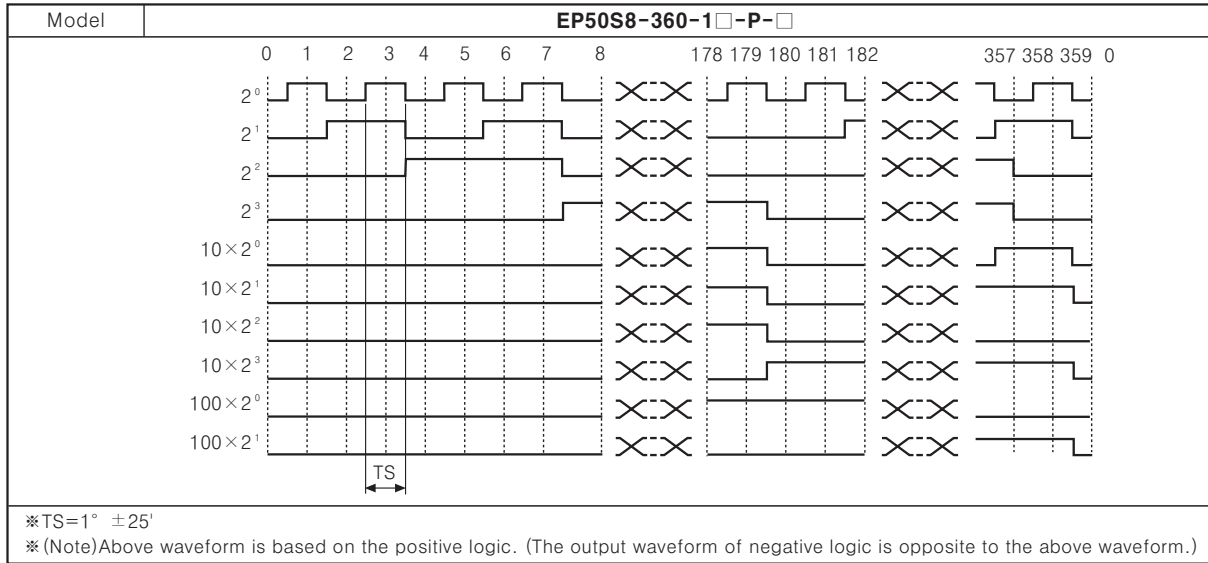
* **(Note1)** "*" Marked division in resolution is being developed. Not indicated type is customizable.

* **(Note2)** Max. allowable revolution \geq Max. response revolution **[Max. response revolution (rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$]**

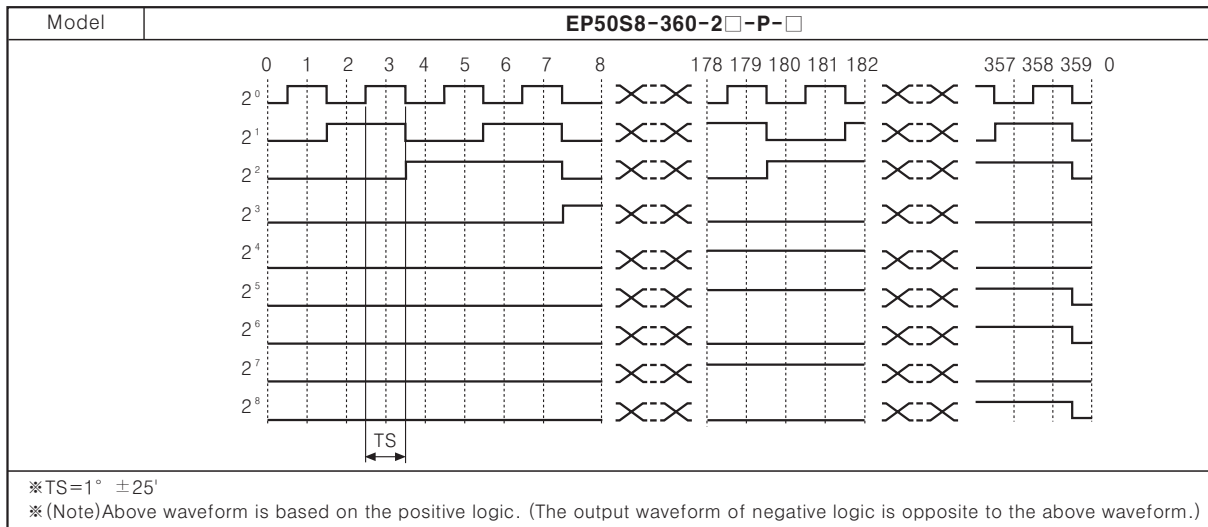
∅ 50mm Shaft Absolute Type

Output waveform

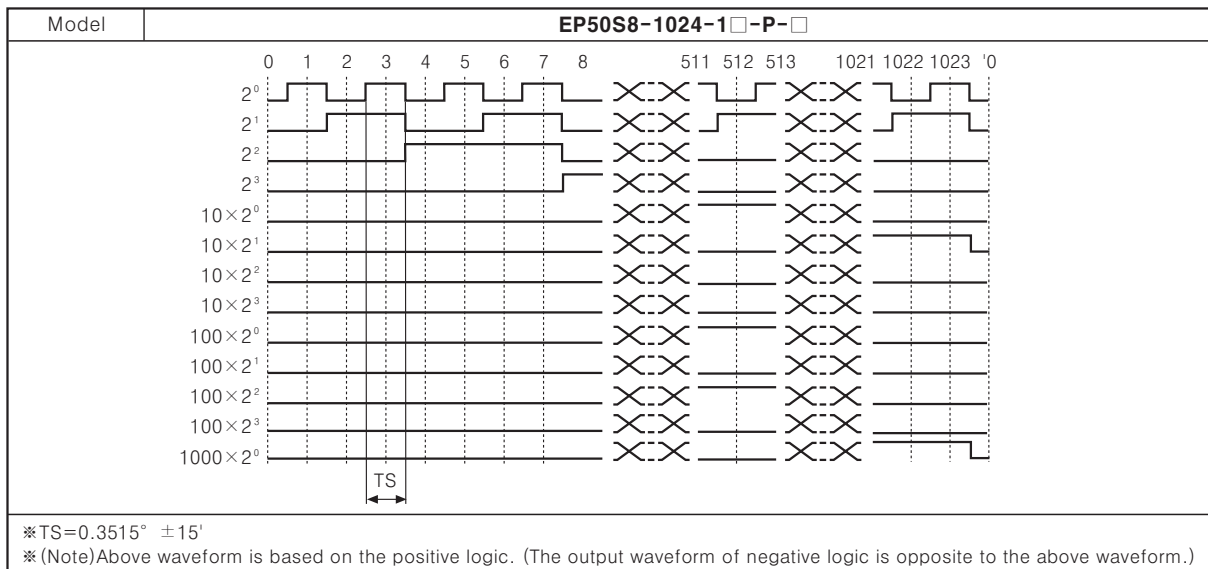
●360 division (BCD CODE output)



●360 division (BINARY CODE output)



●1024 division (BCD CODE output)



(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

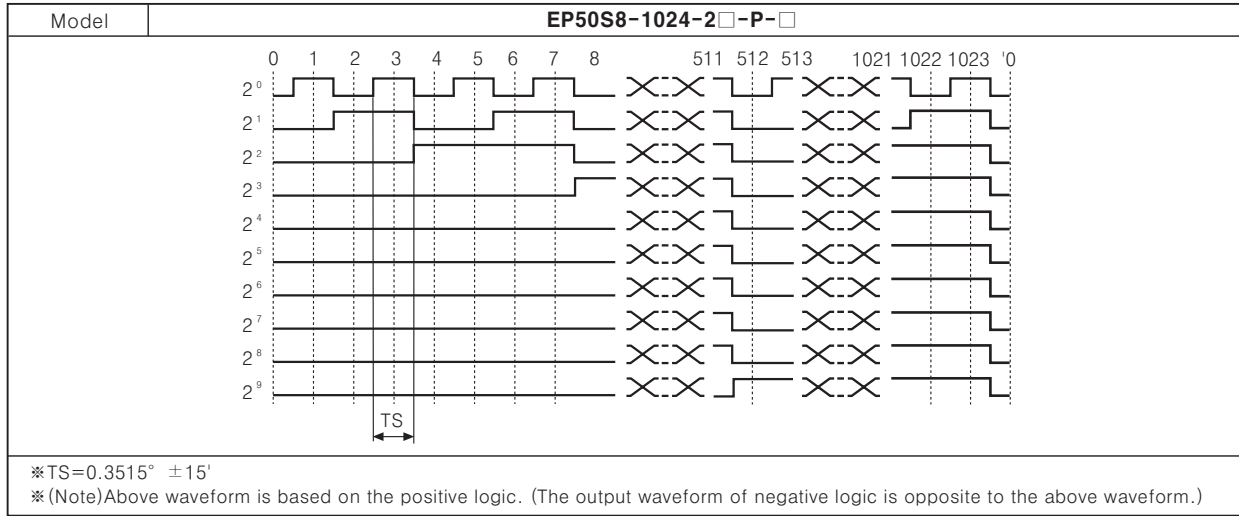
(P) Field network device

(Q) Production stoppage models & replacement

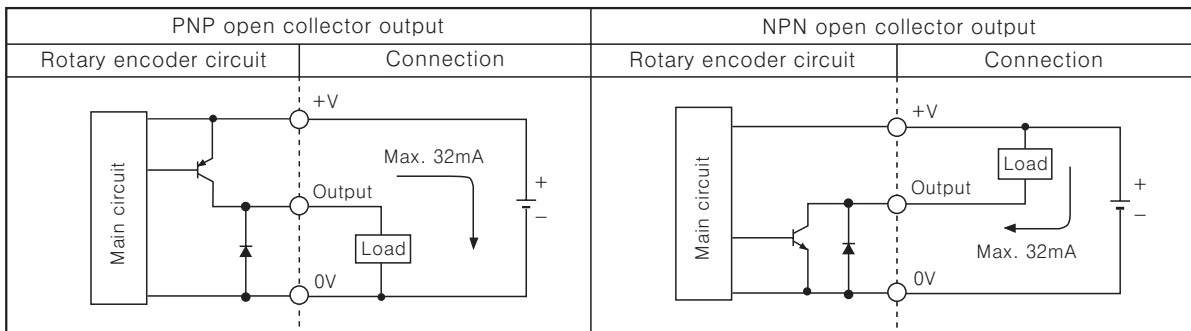
EP50S Series

Output waveform

1024 division (BINARY CODE output)



Control output diagram



※Output circuit of all phases is same.

Connections

BCD Code

Resolution		6	8	12	16	24	32	40	45	64	90	128	180	256	360	512	720	1024
Color		division	division	division	division	division	division	division	division	division	division	division	division	division	division	division	division	division
Power	White	+V																
	Black	GND(0V)																
Output	Brown	TP1	TP1	TP1	TP1	TP1	TP1	TP1	2 ⁰	2 ⁰	2 ⁰	2 ⁰	2 ⁰	2 ⁰	2 ⁰	2 ⁰	2 ⁰	2 ⁰
	Red	TP2	TP2	TP2	TP2	TP2	TP2	TP2	2 ¹	2 ¹	2 ¹	2 ¹	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	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²
	Yellow	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³
	Blue	2 ⁴	2 ⁴	2 ⁴	2 ⁴	2 ⁴	2 ⁴	2 ⁴	(2 ⁴ ×10)	(2 ⁴ ×10)	(2 ⁴ ×10)	(2 ⁴ ×10)	(2 ⁴ ×10)	(2 ⁴ ×10)	(2 ⁴ ×10)	(2 ⁴ ×10)	(2 ⁴ ×10)	(2 ⁴ ×10)
	Purple	EP	2 ⁵	2 ⁵	2 ⁵	2 ⁵	2 ⁵	2 ⁵	(2 ⁵ ×10)	(2 ⁵ ×10)	(2 ⁵ ×10)	(2 ⁵ ×10)	(2 ⁵ ×10)	(2 ⁵ ×10)	(2 ⁵ ×10)	(2 ⁵ ×10)	(2 ⁵ ×10)	(2 ⁵ ×10)
	Gray	NC	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)	(2 ⁶ ×10)
	White/Brown	NC	EP	EP	(2 ⁷ ×10)	(2 ⁷ ×10)	(2 ⁷ ×10)	NC	(2 ⁷ ×10)	(2 ⁷ ×10)	(2 ⁷ ×10)	(2 ⁷ ×10)	(2 ⁷ ×10)	(2 ⁷ ×10)	(2 ⁷ ×10)	(2 ⁷ ×10)	(2 ⁷ ×10)	(2 ⁷ ×10)
	White/Red	NC			EP	EP	EP	NC			(2 ⁸ ×100)	(2 ⁸ ×100)	(2 ⁸ ×100)	(2 ⁸ ×100)	(2 ⁸ ×100)	(2 ⁸ ×100)	(2 ⁸ ×100)	(2 ⁸ ×100)
	White/Orange	NC											(2 ⁸ ×100)	(2 ⁸ ×100)	(2 ⁸ ×100)	(2 ⁸ ×100)	(2 ⁸ ×100)	
	White/Yellow	NC														(2 ⁹ ×1000)	(2 ⁹ ×1000)	(2 ⁹ ×1000)
	White/Blue	NC																(2 ⁹ ×1000)
	White/Purple	NC																(2 ⁹ ×1000)
	Shielded wire	F.G																

∅ 50mm Shaft Absolute Type

■ Connections

● Binary code

Resolution		6	8	12	16	24	32	40	45	64	90	128	180	256	360	512	720	1024
Color		division	division	division	division	division	division	division	division	division	division	division	division	division	division	division	division	division
Power	White	+V																
	Black	GND(0V)																
Output	Brown	TP1	TP1	TP1	TP1	TP1	TP1	TP1	2°	2°	2°	2°	2°	2°	2°	2°	2°	2°
	Red	TP2	TP2	TP2	TP2	TP2	TP2	TP2	2 ¹	2 ¹	2 ¹	2 ¹	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 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²
	Yellow	2 ¹	2 ¹	2 ¹	2 ¹	2 ¹	2 ¹	2 ¹	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³
	Blue	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ⁴	2 ⁴	2 ⁴	2 ⁴	2 ⁴	2 ⁴	2 ⁴	2 ⁴	2 ⁴	2 ⁴
	Purple	EP	EP	2 ³	2 ³	2 ³	2 ³	2 ³	2 ⁵	2 ⁵	2 ⁵	2 ⁵	2 ⁵	2 ⁵	2 ⁵	2 ⁵	2 ⁵	2 ⁵
	Gray	NC		EP	EP	2 ⁴	2 ⁴	2 ⁴	NC		2 ⁶	2 ⁶	2 ⁶	2 ⁶	2 ⁶	2 ⁶	2 ⁶	2 ⁶
	White/Brown	NC			EP	EP	2 ⁵	NC				2 ⁷	2 ⁷	2 ⁷	2 ⁷	2 ⁷	2 ⁷	
	White/Red	NC					EP	NC					2 ⁸	2 ⁸	2 ⁸	2 ⁸		
	White/Orange	NC																
	White/Yellow	NC																
	White/Blue	NC																
	White/Purple	NC																
	Shielded wire	F.G																

* Unused wires must be insulated.

* The metal case and shield wire of encoder should be grounded (F.G).

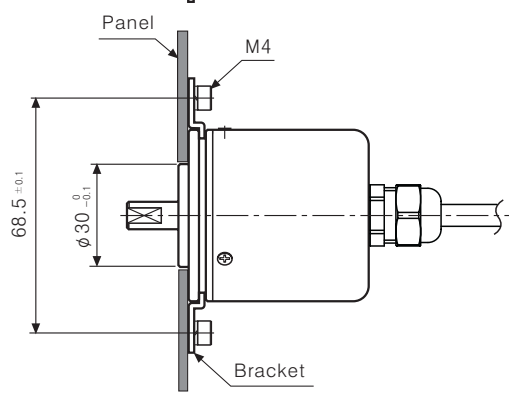
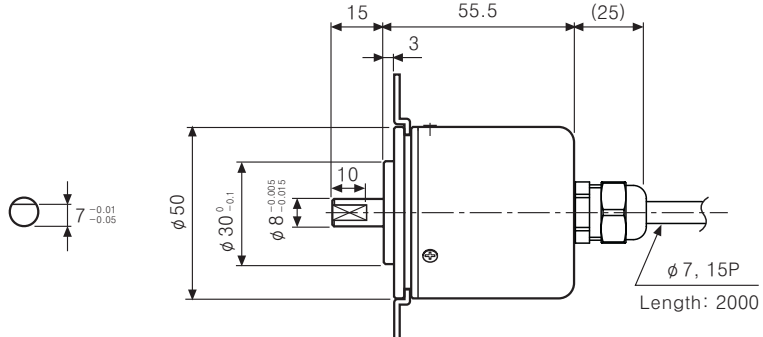
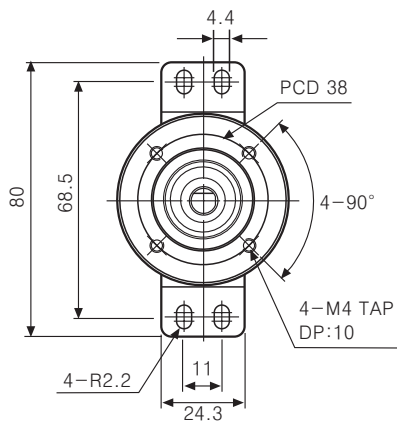
* NC : Not Connected.

* TP1/TP2 : It is an enablement signal to decide signal recognition for output easily because, output signal cycle is long in low resolution model.

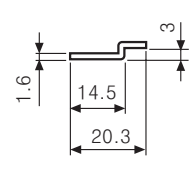
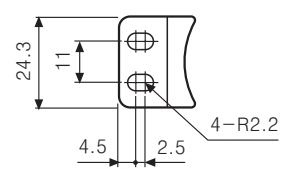
* Ep : It is a parity signal to be outputted as odd number of parity.

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

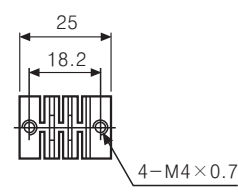
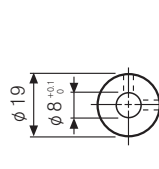
■ Dimensions



● Bracket



● Coupling



(Unit:mm)

- (A) Counter
- (B) Timer
- (C) Temp. controller
- (D) Power controller
- (E) Panel meter
- (F) Tacho/Speed/Pulse meter
- (G) Display unit
- (H) Sensor controller
- (I) Switching power supply
- (J) Proximity sensor
- (K) Photo electric sensor
- (L) Pressure sensor
- (M) Rotary encoder
- (N) Stepping motor & Driver & Controller
- (O) Graphic panel
- (P) Field network device
- (Q) Production stoppage models & replacement

ENP Series

Diameter ϕ 60mm Shaft type Absolute Rotary encoder

Features

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

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	Revolution direction	Revolution/1Pulse		Control output					
Diameter ϕ 60mm shaft type (External diameter : ϕ 10mm)	1:BCD code	0:Negative logic 1:Positive logic	0:5-12VDC \pm 5% 1:12-24VDC \pm 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					

*Since the output type is related with control output, please select the model name in specification when ordering the item.
*PNP output is not available in negative logic.

Specifications

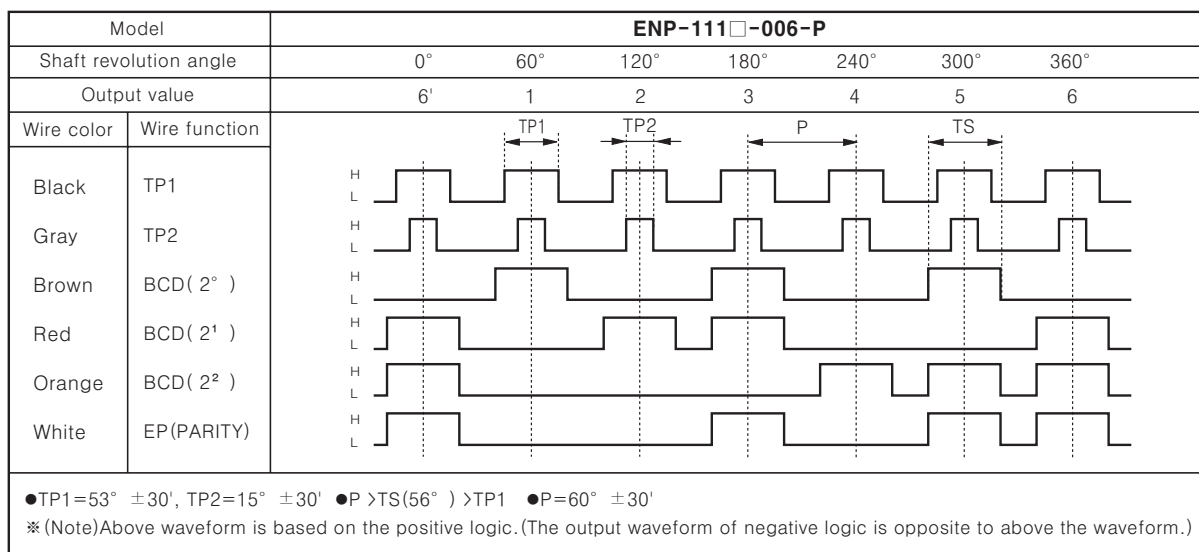
Item		Diameter ϕ 60mm shaft type of Absolute rotary encoder							
Model	PNP open collector output	ENP-111□-006-P	ENP-111□-008-P	ENP-111□-012-P	ENP-111□-016-P	ENP-111□-024-P	ENP-110□-360-P		
	NPN open collector output	ENP-101□-006-N	ENP-101□-008-N	ENP-101□-012-N	ENP-101□-016-N	ENP-101□-024-N	ENP-100□-360-N		
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 of phase differences	TP1:53° \pm 30' TP2:15° \pm 30' P:60° \pm 30' TS:56° \pm 30'	TP1:39° \pm 30' TP2:15° \pm 30' P:45° \pm 30' TS:42° \pm 30'	TP1:3° \pm 30' TP2:15° \pm 30' P:30° \pm 30' TS:26° \pm 30'	TP1:2° \pm 30' TP2:11.25° \pm 30' P:22.5° \pm 30' TS:19.5° \pm 30'	TP1:8° \pm 30' TP2:3° \pm 30' P:15° \pm 30' TS:11° \pm 30'	TS:1° \pm 30'		
	Control output	PNP open collector output	Output voltage : Min. (Power supply-1.5)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=500ns, TOFF=Max. 2.5 μ s (Cable length:1m, I sink =32mA)						
		NPN open collector output	TON=400ns, TOFF=Max. 1.5 μ s (Cable length:1m, I sink =32mA)						
	Max. Response frequency		20kHz						
	Power supply		12-24VDC \pm 5% (Ripple P-P:Max. 5%)					5-12VDC \pm 5% (Ripple P-P:Max. 5%)	
	Current consumption		Max. 150mA (disconnection of the load)				Max. 200mA (disconnection of the load)		
	Insulation resistance		Min. 20M Ω (at 500VDC mega between all terminals and case)						
Dielectric strength		500VAC 50/60Hz for 1 minute (Between all terminals and case)							
Connection		Cable outgoing type							
Mechanical specification	Starting torque	Max. 500gf \cdot cm (0.05N \cdot m)							
	Rotor inertia	Max. 300g \cdot cm ² (3 \times 10 ⁻⁵ kg \cdot m ²)							
	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf							
	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°C (at non-freezing status), Storage:-25 ~ 85°C							
Ambient humidity		35~85%RH, Storage : 35~90%RH							
Protection		IP50(IEC standard)							
Cable		ϕ 8mm, 12P, Length : 1m, Double shield cable							
Accessory		Fixing bracket, Coupling							
Unit weight		Approx. 577g						Approx. 690g	

***(★Note1)**Max. allowable revolution \geq Max. response revolution 【Max. response revolution(rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$ 】

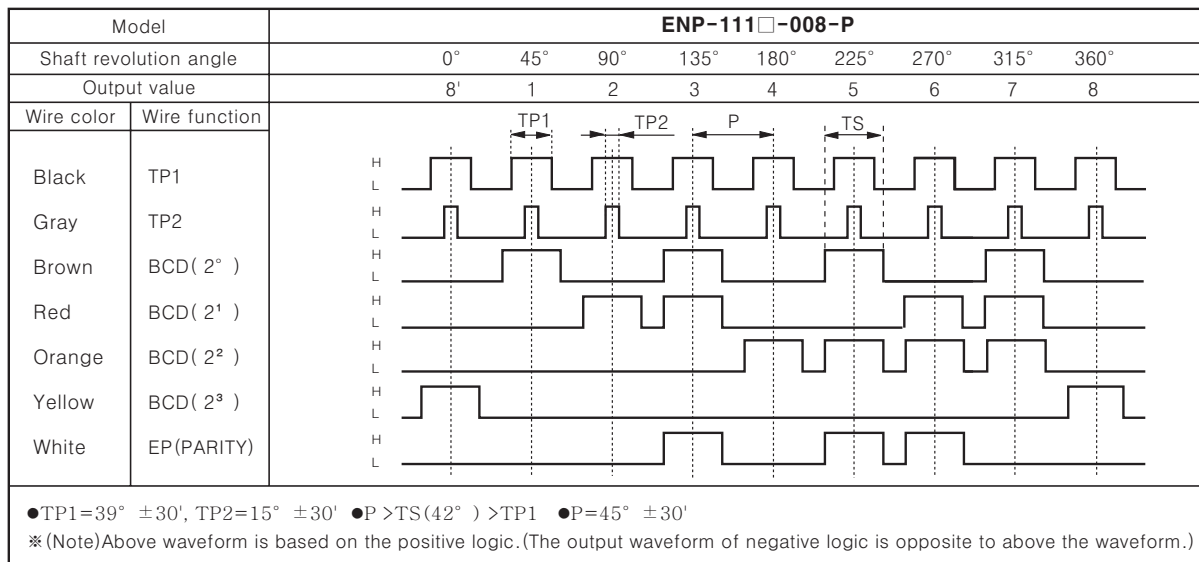
∅ 60mm Shaft AbsoluteType

Output waveform

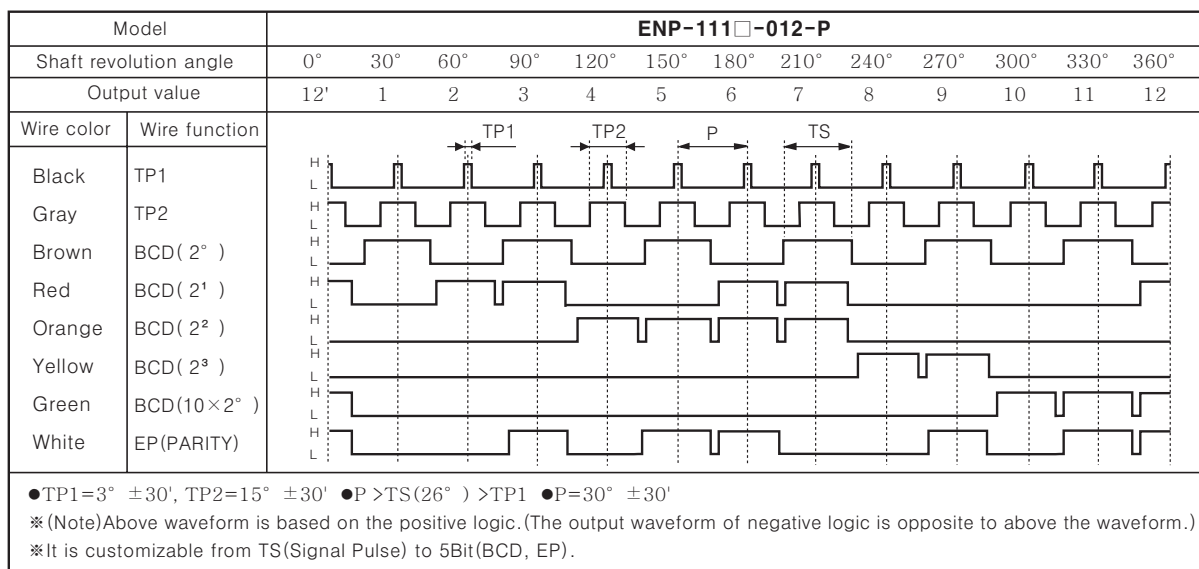
● 6 division



●8 division



●12 division



(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Field
network
device

(Q)
Production
stoppage
models &
replacement

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°)																	
Red	BCD(2 ¹)																	
Orange	BCD(2 ²)																	
Yellow	BCD(2 ³)																	
Green	BCD(10×2°)																	
White	EP(PARITY)																	
<p>●TP1=2° ±30', TP2=11.25° ±30' ●P>TS(19.5°)>TP1 ●P=22.5° ±30'</p> <p>※(Note)Above waveform is based on the positive logic.(The output waveform of negative logic is opposite to above the waveform.)</p> <p>※It is customizable from TS(Signal Pulse) to 5Bit(BCD, EP).</p>																		

●24 division

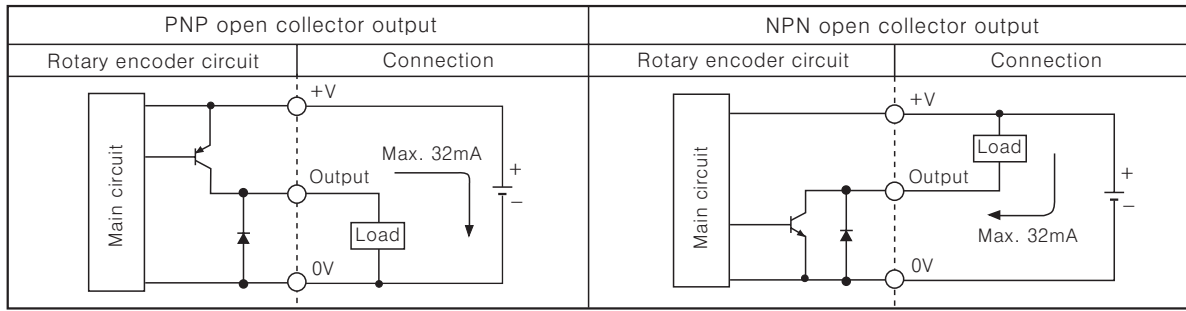
Model		ENP-111□-024-P																								
Shaft revolution angle		0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°	360°
Output value		24'	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Wire color	Wire function																									
Black	TP1																									
Gray	TP2																									
Brown	BCD(2°)																									
Red	BCD(2 ¹)																									
Orange	BCD(2 ²)																									
Yellow	BCD(2 ³)																									
Green	BCD(2° × 10)																									
Blue	BCD(2 ¹ × 10)																									
White	EP(PARITY)																									
<p>●TP1=8° ±30', TP2=3° ±30' ●P>TS(11°)>TP1 ●P=15° ±30'</p> <p>※(Note)Above waveform is based on the positive logic.(The output waveform of negative logic is opposite to above the waveform.)</p>																										

●360 division

Model		ENP-100□-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	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)																		
<p>●Ts=1° ±30'</p> <p>※(Note)Above waveform is based on the positive logic.(The output waveform of negative logic is opposite to above the waveform.)</p>																			

∅ 60mm Shaft Absolute Type

Control output diagram



※Output circuit of all phases is same.

Connections

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

※Unused wires must be insulated.

※The metal case and shield wire should be grounded(F.G).

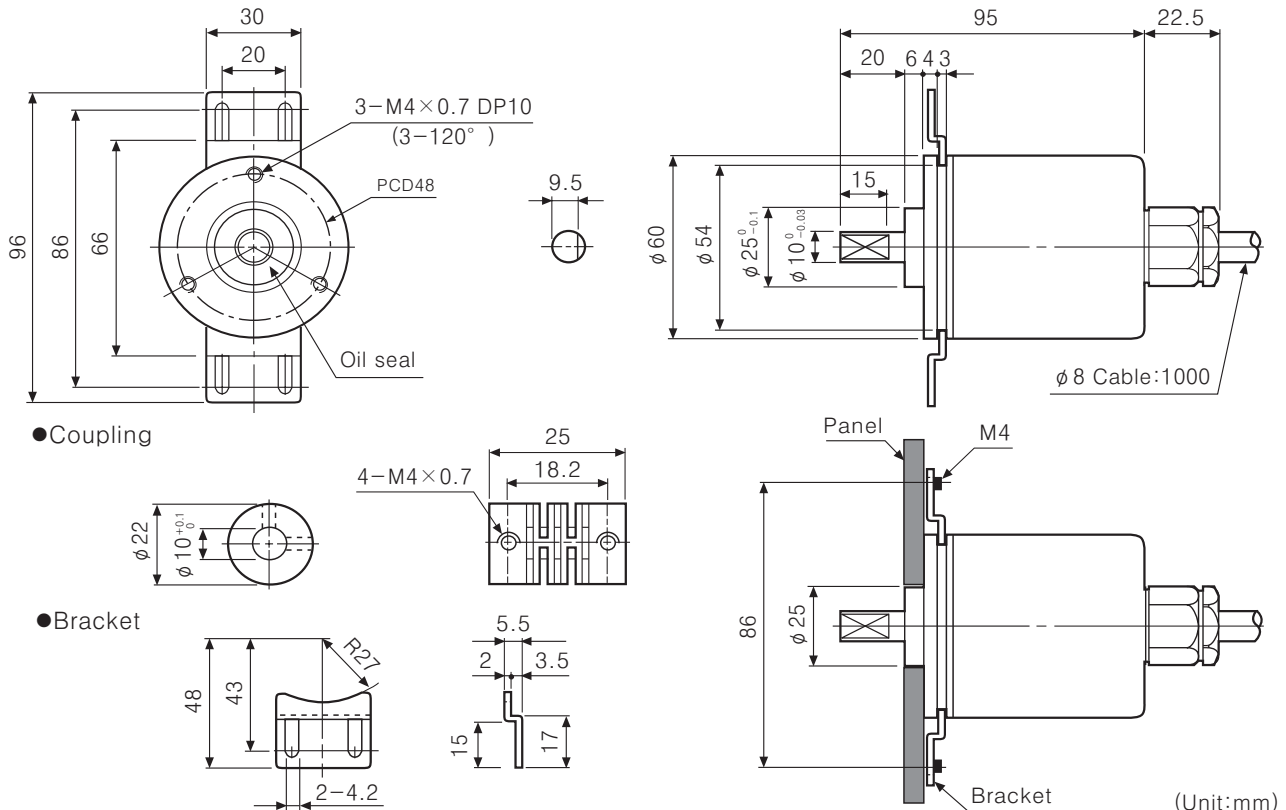
※NC : Not Connected.

※TP1/TP2 : It is an enablement signal to decide signal recognition for output easily because, output signal cycle is long in low resolution model.

※Ep : It is a parity signal to be outputted as odd number of parity.

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

Dimensions



(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

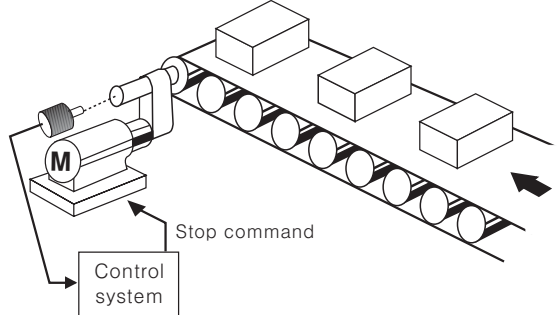
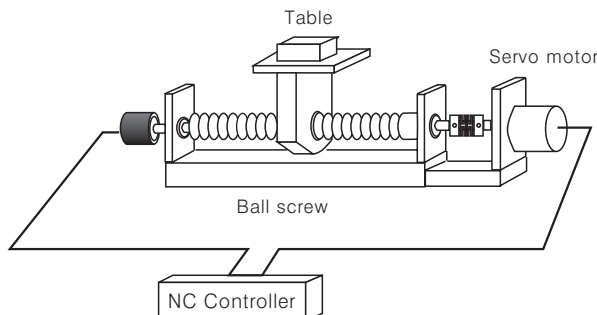
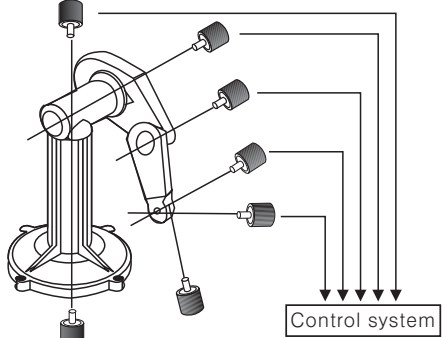
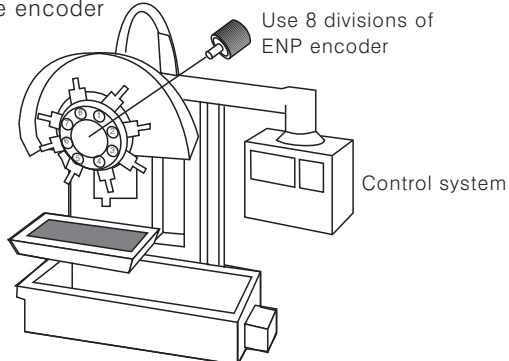
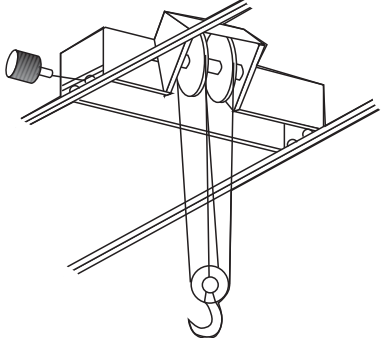
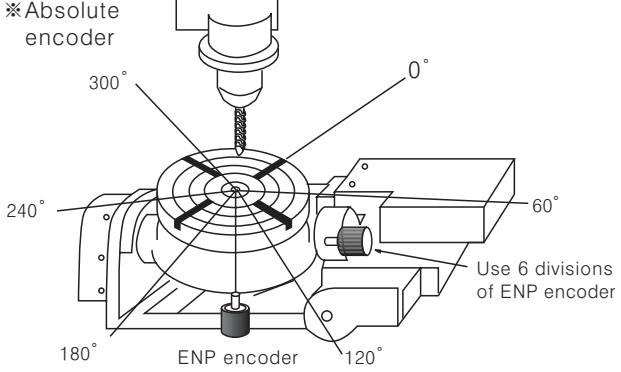
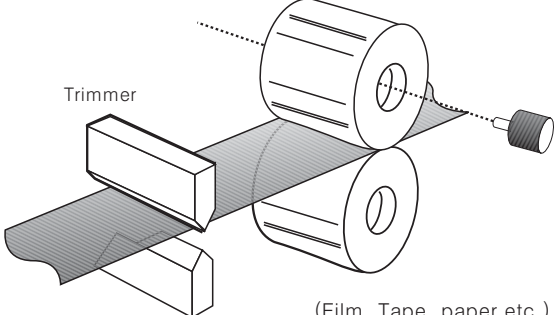
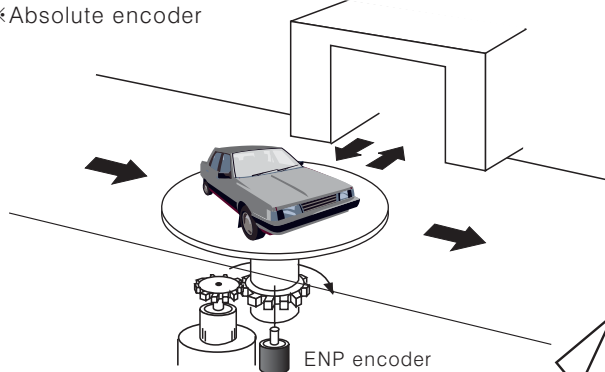
(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

■ Applications

<p>Stopping the motor at right position</p> <p>※ Incremental encoder</p> 	<p>X, Y table positioning of NC tooling machine</p> <p>※ Incremental encoder</p> 	(A) Counter
<p>Measuring of Robot arm's angle and position</p> <p>※ Incremental encoder</p> 	<p>Controlling drill's position of NC machine</p> <p>※ Absolute encoder</p> <p>Use 8 divisions of ENP encoder</p> 	(B) Timer
<p>Controlling position of moving crane</p> <p>※ Incremental encoder</p> 	<p>Controlling table's angle of NC machine</p> <p>※ Absolute encoder</p> <p>Use 6 divisions of ENP encoder</p> 	(C) Temp. controller
<p>Measuring the length of sheet</p> <p>※ Incremental encoder</p> <p>Trimmer</p>  <p>(Film, Tape, paper etc.)</p>	<p>Controlling entrance and exit of car</p> <p>※ Absolute encoder</p> 	(D) Power controller
		(E) Panel meter
		(F) Tacho/Speed/Pulse meter
		(G) Display unit
		(H) Sensor controller
		(I) Switching power supply
		(J) Proximity sensor
		(K) Photo electric sensor
		(L) Pressure sensor
		(M) Rotary encoder
		(N) Stepping motor & Driver & Controller
		(O) Graphic panel
		(P) Field network device
		(Q) Production stoppage models & replacement