Autonics

ROTARY ENCODER(ABSOLUTE TYPE)
EP50S8 SERIES
M A N U A L

CE

Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

▣ Caution for your safety

※Please keep "Caution for your safety" to avoid accidents or damages as using it correctly.

※The meaning of 'Warning' and 'Caution' is as follows;
⚠ **Warning** In case a serious injury or dead may be occurred.
⚠ **Caution** In case a little injury or damage of this unit may be occurred.

※The meaning of the mark on the product and manual is as follows;
⚠ is a caution mark for danger in special condition.

⚠ Warning

1. **Please use it with double safety devices when it is used at the equipments which may cause damages to human life or assets(Ex: Nuclear power control, Medical equipment, Vehicle, Train, Air plane, Combustion apparatus, Entertainment or Safety device etc.)**
   It may cause a fire, human life or assets.

⚠ 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 cause damage to this unit.
4. **Do not short circuit the load.**
   It may cause damage to this unit.

▣ Outline

This is an absolute rotary encoder, it mainly convert angle of divided 360° to digital code(BCD, Binary, Gray code) then output digital code according to rotation axis of position(angle). Output for rotation angle of rotation axis is not changed, it will not affected by electric factor or starting point retention and also it is strong against electric noise.

▣ Features

- ●Compact size of external diameter φ50mm
- ●Various output code(BCD, Binary, Gray code)
- ●Realization of high resolution(720 division, 1024 division)
- ●Dust-proof, oil-proof by IP64

▣ Application

●Precision machine tool ●Fabric machinery ●Robot ●Parking system

▣ Ordering information

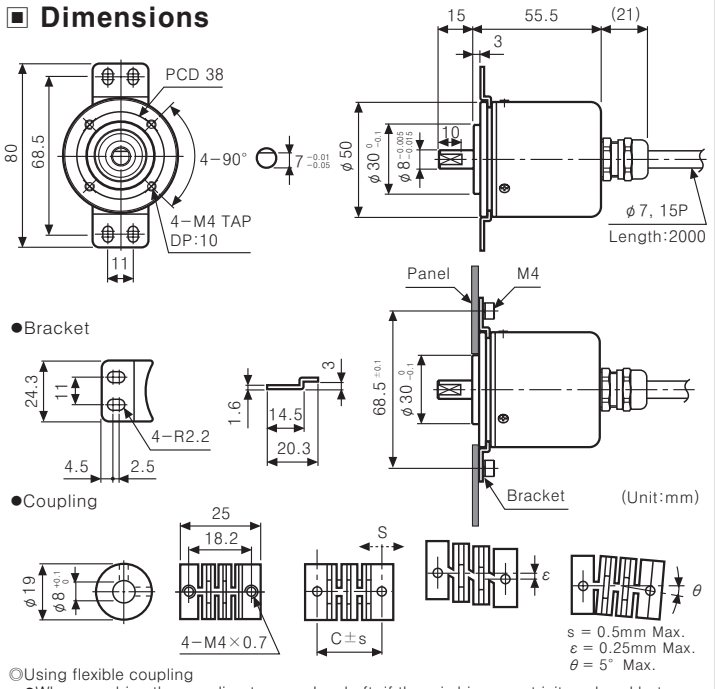
EP50S8	1024	1	R	P	24
Series	Resolution/ 1revolution	Output code	Rotating direction	Control output	Power supply
φ50mm axis type (Shaft diameter : φ8mm)	Consult resolution	1:BCD code 2:Binary code 3:Gray code	F:Output value increase at CW direction R:Output value increaseat CCW direction	P:PNP open collector output N:NPN open collector output	5:5VDC ±5% 24:12 -24VDC ±5%

※Low divisions are under developing(6, 8, 12, 16, 24, 32, 40 division)
※Gray code is optional.

▣ Speicifications

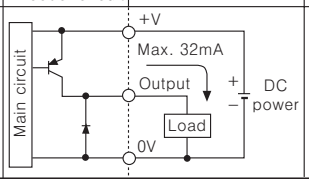
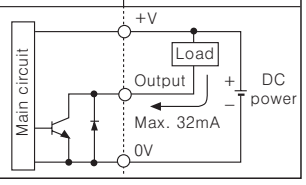
Type		Diameter φ50mm shaft type Absolute Rotary Encoder							
Model	PNP open collector output	**EP50S8-□□□□-□□-P-□**				**EP50S8-□□□□-□□-P-□**			
	NPN open collector output	**EP50S8-□□□□-□□-N-□**				**EP50S8-□□□□-□□-N-□**			
Resolution		720, 360, 180, 90, 45 division				1024, 512, 256, 128, 64 division			
Electrical specification	Output code		BCD Code	Binary Code	Gray Code		BCD Code	Binary Code	Gray Code
	Output phase/Output angle	720 division	TS:Signal Pulse(11bit) TS:0.5° ±25'	TS:Signal Pulse(10bit) TS:0.5° ±25'	TS:Signal Pulse(10bit) TS:1° ±25'	1024 division	TS:Signal Pulse(13bit) TS:0.3515° ±15'	TS:Signal Pulse(10bit) TS:0.3515° ±15'	TS:Signal Pulse(10bit) TS:0.703° ±15'
		360 division	TS:Signal Pulse(10bit) TS:1° ±25'	TS:Signal Pulse(9bit) TS:1° ±25'	TS:Signal Pulse(9bit) TS:2° ±25'	512 division	TS:Signal Pulse(11bit) TS:0.703° ±15'	TS:Signal Pulse(9bit) TS:0.703° ±15'	TS:Signal Pulse(9bit) TS:1.406° ±15'
		180 division	TS:Signal Pulse(9bit) TS:2° ±25'	TS:Signal Pulse(8bit) TS:2° ±25'	TS:Signal Pulse(8bit) TS:4° ±25'	256 division	TS:Signal Pulse(10bit) TS:1.406° ±15'	TS:Signal Pulse(8bit) TS:1.406° ±15'	TS:Signal Pulse(8bit) TS:2.8125° ±15'
		90 division	TS:Signal Pulse(8bit) TS:4° ±25'	TS:Signal Pulse(7bit) TS:4° ±25'	TS:Signal Pulse(7bit) TS:8° ±25'	128 division	TS : Signal Pulse(9bit) TS : 2.8125° ±15'	TS:Signal Pulse(7bit) TS:2.8125° ±15'	TS:Signal Pulse(7bit) TS:5.625° ±15'
		45 division	TS:Signal Pulse(7bit) TS:8° ±25'	TS:Signal Pulse(6bit) TS:8° ±25'	TS:Signal Pulse(6bit) TS:16° ±25'	64 division	TS : Signal Pulse(7bit) TS : 5.625° ±15'	TS:Signal Pulse(6bit) TS:5.625° ±15'	TS:Signal Pulse(6bit) TS:11.25° ±15'
	Control output: PNP open collector output	Output voltage : Min.(Power supply-1.5VDC), Load current : Max. 32mA							
	Control output: NPN open collector output	Sink current : Max. 32mA, Residual voltage : Max. 1VDC							
	Response time (Rising time, Falling time)	Ton=800nsec, Toff=Max. 800nsec(Cable : 2m, I sink = 32mA)							
	Max. Response frequency	35kHz							
	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)							
	Connection	Cable outgoing type(Cable gland)							
Mechanical specification	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf							
	Starting torque	Max. 40gf • cm(0.004N • m)							
	Moment of inertia	Max. 40g • cm² (4×10^{-6}kg • m²)							
	Max. revolution	3000rpm							
Insulation resistance		Min. 100MΩ(at 500VDC between all terminals and case)							
Dielectric strength		750VAC 50/60Hz for 1 minute(Between all terminals and case)							
Vibration		1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z direction for 2 hours							
Shock		Max. 50G							
Ambient temperature		-10 to 70℃(at non-freezing status), Storage:-25 to 85℃							
Ambient humidity		35 to 85%RH, Storage:35 to 90%RH							
Protection		IP64(IEC standard)							
Cable		φ7mm, 15P, Length:2m, Shield cable							
Accessories		Mounting bracket, coupling							
Weight		Approx. 380g							

▣ Dimensions



◎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 put larger shaft loading than specification.

▣ Control output circuit

Output type	PNP open collector output		NPN open collector output	
Sorting	Encoder circuit	Load connection	Encoder circuit	Load connection
Output circuit				

※Output circuit shall be changed if overload is applied at output terminal or short circuit.

▣ Connections

●**BCD Code**

Resolution / Color		6 division	8 division	12 division	16 division	24 division	32 division	40 division	45 division	64 division	90 division	128 division	180 division	256 division	360 division	512 division	720 division	1024 division
Power	White	+V																
	Black	GND(0V)																
Output wire	Brown	TP1																2^0
	Red	TP2																2^1
	Orange	2^0																2^2
	Yellow	2^1																2^3
	Blue	2^2																$(2^0\times10)$
	Purple	EP	2^3															$(2^1\times10)$
	Gray	N.C	$(2^0\times10)$															$(2^2\times10)$
	White/ Brown	N.C	EP	$(2^1\times10)$		N.C			$(2^3\times10)$									
	White/ Red	N.C		EP		N.C			$(2^0\times100)$									
	White/ Orange	N.C							$(2^1\times100)$									
	White/ Yellow	N.C								$(2^2\times100)$								
	White/ Blue	N.C															$(2^3\times100)$	
	White/ Purple	N.C															$(2^0\times1000)$	
	Shield wire	F.G																

※Non-using wires must insulated.
※Encoder case and shield wire must be a good earth grounded.
※N.C(Not Connected) : Not using.
※Please make sure that short is not occurred when wiring output lines because an exclusive driver IC is used at output circuit.

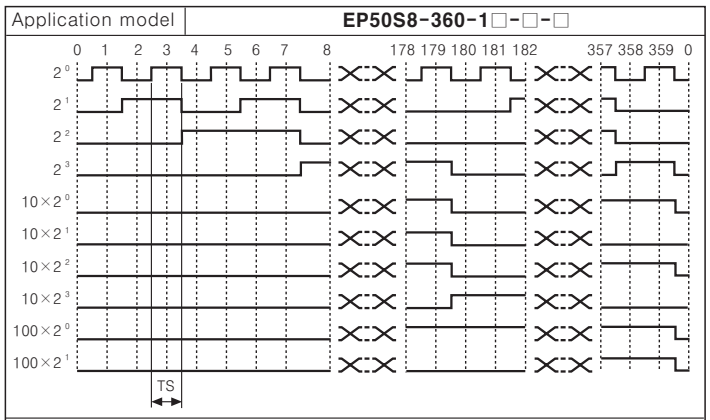
●**Binary Code/Gray Code**

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

※Non-using wires must insulated.
※Encoder case and shield wire must be a good earth grounded.
※N.C(Not Connected) : Not using.
※Please make sure that short is not occurred when wiring output lines because an exclusive driver IC is used at output circuit.

▣ 360division output waveform(BCD code output) : Representative model

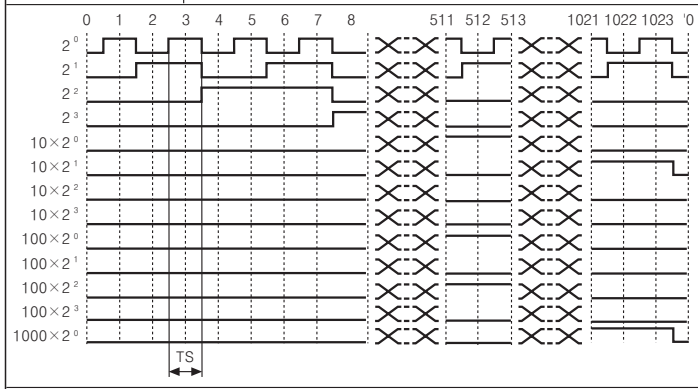
Application model: **EP50S8-360-1□-□-□**



※TS=1° ±25'
※Above waveform is based on the positive logic.
(The output waveform of negative logic is opposed to above waveform.)

▣ 1024division output waveform(BCD code output) : Representative model

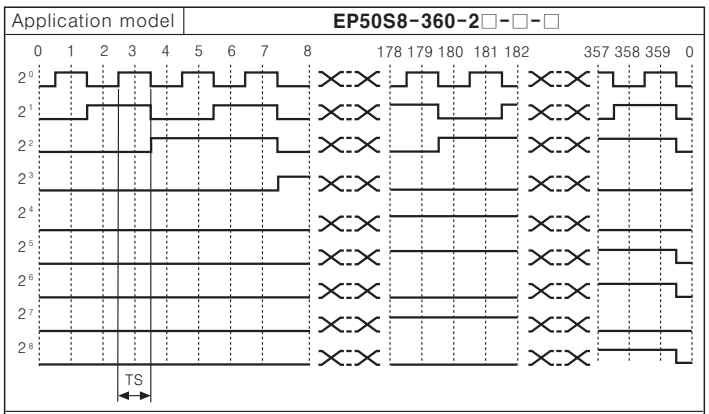
Application model: **EP50S8-1024-1□-□-□**



※TS=0.3515° ±15'
※Above waveform is based on the positive logic.
(The output waveform of negative logic is opposed to above waveform.)

▣ 360division output waveform(Binary code output) : Representative model

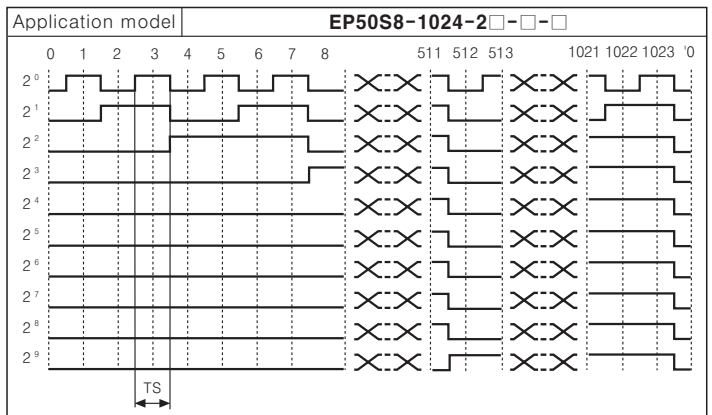
Application model: **EP50S8-360-2□-□-□**



※TS=1° ±25'
※Above waveform is based on the positive logic.
(The output waveform of negative logic is opposed to above waveform.)

▣ 1024division output waveform(Binary code output) : Representative model

Application model: **EP50S8-1024-2□-□-□**



※TS=0.3515° ±15'
※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.

▣ 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 or cause damage by overload on the shaft.
   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 shortt circuit during power on. It may cause 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 may cause 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 rated 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.
   ②Therefore please fix bracket firmly when mounting this unit, because rotary encoder with high resolution can be easily affected by impact.
   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.
   ②When a high voltage or power line pass near by the encoder cable, be sure to wire the encoder cable in separated conduit to prevent malfunction.

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

▣ Major 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)

Autonics Corporation
http://www.autonics.com
Global Partner for IA
■HEADQUARTERS :
41-5, Yongdang-ri, Ungsang-eup, Yangsan-si, Gyeongnam, 626-847, Korea
■OVERSEAS SALES :
Bldg. 402 3rd Fl., Bucheon Techno Park, 193, Yakdae-dong, Wonmi-gu, Bucheon-si, Gyeonggi-do, 420-734, Korea
TEL:82-32-610-2730 / FAX:82-32-329-0728
■E-mail : sales@autonics.com

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