Autonics

ROTARY ENCODER(INCREMENTAL TYPE)
E40S/E40H/E40H-B/E80H SERIES
M A N U A L

E40S E40H E40H-B E80H

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

This unit is very useful to control length, angle and position by converting revolution value of shaft into number of pulse as an optical incremental Encoder.

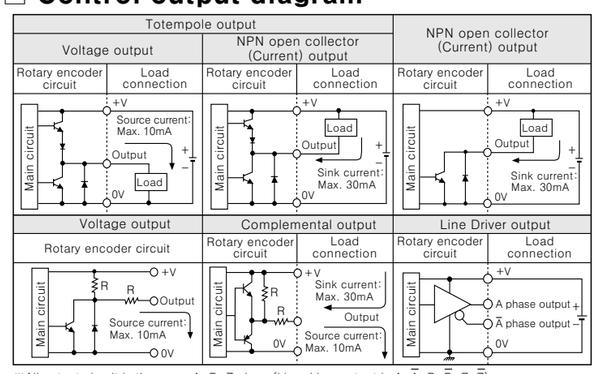
▣ Ordering information

E40S	8	3600	3	1	B

Series	Shaft diameter	Pulse/1 Revolution	Output phase	Output	Item	Power supply
E40S	* ϕ6mm ϕ8mm	*1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600	2:A, B 3:A, B, Z 4:A, $\overline{A}$, B, $\overline{B}$ 6:A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$	1:Totempole output 2:NPN open collector output 3:Voltage output 4:Complemental output L:Line Driver output	——	1, 2, 4:5-24VDC ±5% 3 :5VDC, 12VDC, 24VDC ±5% L :5VDC ±5%
E40H	Inside diameter ϕ6mm * ϕ8mm ϕ10mm ϕ12mm				:Hollow type B:Built-in type	
E80H	* ϕ30mm ϕ32mm	60, 100, 360, 500, 512, 1024			——	

※"*" indicates the standard specification of diameters. (ϕ6mm is standard type of shaft, so there is no 6 for dimension in model name.)
※Built-in type is E40H-Series only.
※1, 2, 5, 12 P/R are output A and B phase only. (But Line Driver output A, $\overline{A}$, B, $\overline{B}$ phase)

▣ Control output diagram



※All output circuit is the same A, B, Z phase(Line driver output is A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$)

※The above specification are changeable without notice anytime.

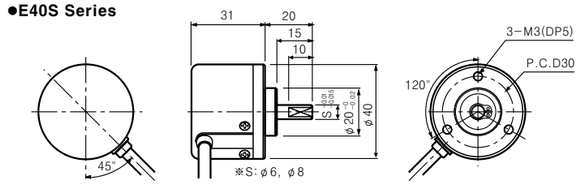
▣ Specification

Item			ϕ40mm/Shaft type Encoder (Incremental Type)	ϕ40mm/Hollow type Encoder (Incremental Type)	ϕ40mm/Built-in type Encoder (Incremental Type)	ϕ80mm/Hollow type Encoder (Incremental Type)
Model		Totempole output	E40S□-□-□-1	E40H□-□-□-1	E40H□-□-□-1-B	E80H□-□-3-1
		NPN open collector output	E40S□-□-□-2	E40H□-□-□-2	E40H□-□-□-2-B	E80H□-□-3-2
		Voltage output	E40S□-□-□-3	E40H□-□-□-3	E40H□-□-□-3-B	E80H□-□-3-3
		Complemental output	——	——	——	E80H□-□-3-4
		Line Driver output□	E40S□-□-□-L	E40H□-□-□-L	E40H□-□-□-L-B	E80H□-□-6-L
Resolution(P/R)			*1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600			60, 100, 360, 500, 512, 1024
Output phase			(Note1)A phase, B phase, Z phase(Line Driver : A phase, $\overline{A}$ phase, B phase, $\overline{B}$ phase, Z phase, $\overline{Z}$ phase)			
Phase difference of output			Output between A and B phase: $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)			
Electrical specification	Control output	Totempole output	Low ☞ Load current:Max. 30mA, Residual voltage:Max. 0.4V / High ☞ Load current:Max. 10mA, Output voltage:Min. (power supply-1.5)V			
		Complemental output	——			Residual voltage:Max. 1V(The other specification is same as Totem pole output)
		NPN open collector output	Load voltage:Max. 30V, Load current:Max. 30mA, Residual voltage:Max. 0.4V			
		Line Driver output□	Low ☞ Load current:Max. 20mA, Residual:Max. 0.5V / High ☞ Load current:Max. -20mA, Output voltage:Min. 2.5V			
	Response time (Rise & Fall)	Totempole output	Max. 0.5㎲(Cable:1m, at sink current=10mA)			Max. 0.5㎲(Cable:2m, at sink current=10mA)
		NPN open collector output	Max. 0.5㎲(Cable:1m, at sink current=30mA)			Max. 0.5㎲(Cable:2m, at sink current=30mA)
		Line Driver output□	Max. 0.1㎲(Cable:1m, at sink current=20mA)			Max. 0.1㎲(Cable:2m, at sink current=20mA)
	Max. Response frequency		180kHz			100kHz
	Power supply		5-24VDC ±5%, Line Driver output:5VDC ±5%, Voltage output:5V, 12V, 24V ±5%(Ripple P-P:Max. 5%)			
	Current consumption		Max. 80mA(disconnection of the load), Line Driver output:Max. 100mA(disconnection of the load)			
	Connection		Cable connection			
Mechanical specification	Starting torque		Max. 40gf • cm(3,920μN • m)	Max. 50gf • cm(4,900μN • m)		Max. 200gf • cm(19600μN • m)
	Moment of inertia		Max. 40g • cm²(4×10⁻⁶kg • m²)	Max. 70g • cm²(7×10⁻⁶kg • m)		Max. 800g • cm²(8×10⁻⁵kg • m²)
	Shaft loading		Radial:2kg, Thrust:1kg	Radial:3kg, Thrust:0.5kg		Radial:5kg, Thrust:2.5kg
	Deviation of shaft position		Radial:Max. 0.1mm, Thrust:Max. 0.2mm			
	Mechanical revolution(rpm)		(Note2)5000rpm			(Note2)3600rpm
Insulation resistance			100MΩ Min.(at 500VDC) between power, signal output and encoder body			
Dielectric strength			750VAC 50/60Hz for 1 minute between power, signal output and encoder body			
Vibration			1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours			
Shock			Max. 50G			Max. 75G
Ambient temperature			-10 to 70℃(Line Driver:0 to 70℃) (non-freezing condition), Storage:-25 to 85℃			
Ambient humidity			Operation:35 to 85%RH, Storage:35 to 90%RH			
Protection			IP50(IEC specification)			
Cable			5P, (Line Driver:8P) ϕ5mm, Length:1m, Shield cable			5P, (Line Driver:8P) ϕ5mm, Length:2m, Shield cable
Weight			Approx. 120g	Approx. 125g	Approx. 130g	Approx. 560g
Accessory			ϕ6mm, ϕ8mm coupling	Spring bracket		
Approval			(Note3) CE			

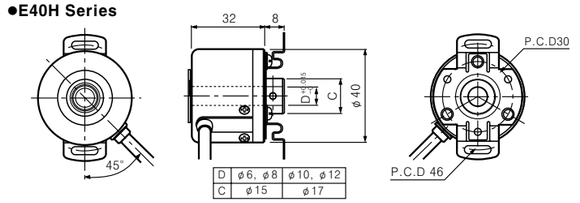
※(Note1)1, 2, 5 12 P/R are output A and B phase only. (But Line Driver output:A, $\overline{A}$, B, $\overline{B}$ phase)
※(Note2)Max. response revolution(rpm)= $\frac{\text{Max. response frequency}}{\text{Resolution}}$ X 60sec(But max. response revolution ≦ max. allowable revolution)
※(Note3)The type of Line Driver output is not certified by CE approval.

▣ Dimensions

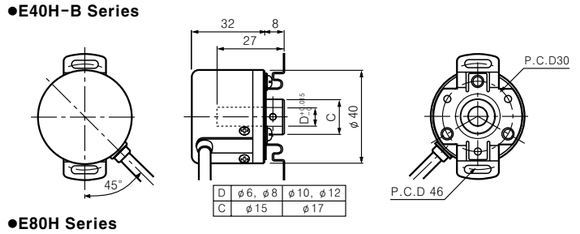
●E40S Series



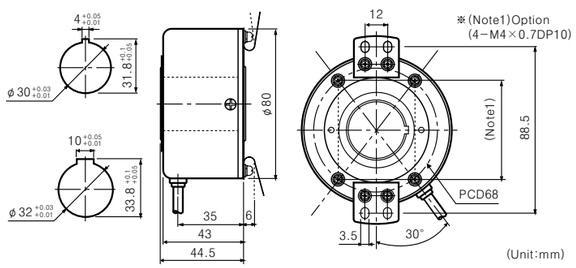
●E40H Series



●E40H-B Series



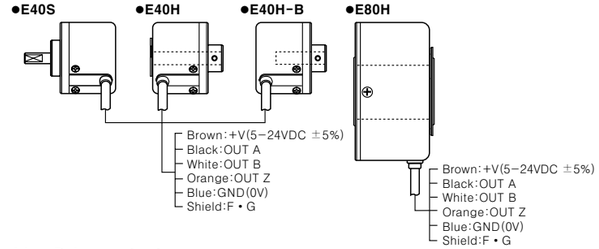
●E80H Series



▣ Connection

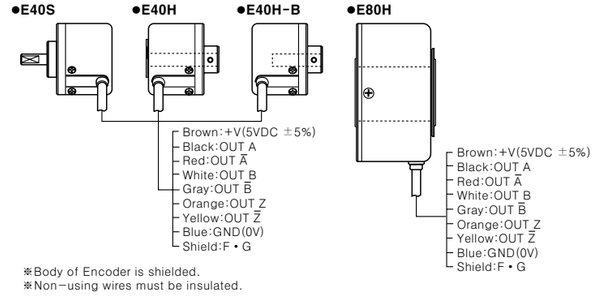
●Totem Pole, NPN open collector, Voltage, Complemental output

●E40S ●E40H ●E40H-B ●E80H



●Line Driver output

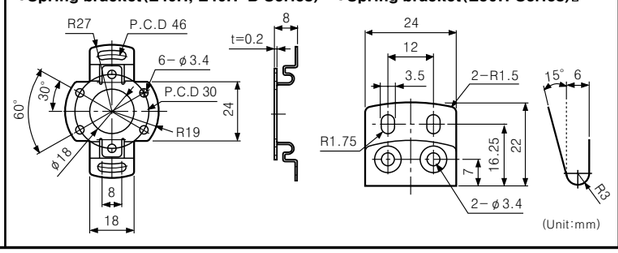
●E40S ●E40H ●E40H-B ●E80H



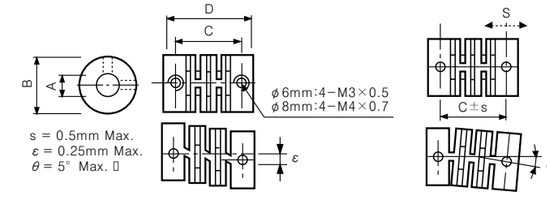
※Body of Encoder is shielded.
※Non-using wires must be insulated.

▣ Accessory dimension

●Spring bracket(E40H, E40H-B Series) **●Spring bracket(E80H Series)□**



●Coupling(E40S Series)



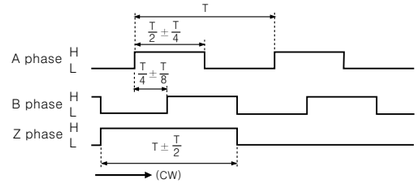
(Unit:mm)

Type \ Item	A	B	C	D
E40S ϕ6mm coupling	ϕ6 $^{+0.1}_{0}$	ϕ15	16.5	22
E40S8 ϕ8mm coupling	ϕ8 $^{+0.1}_{0}$	ϕ19	18.2	25

●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.

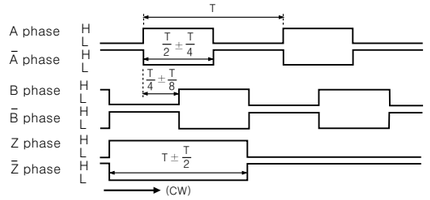
▣ Output waveform

●Totempole, NPN open collector, Voltage, Complemental output



※The output waveform of E40 Series, NPN open collector is opposed to above waveform.

●Line Driver output



※Rotating direction:CW

▣ 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.
2. 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.
 ⑥Place where there is the direct ray of the sun.
3. Vibration and Impact
 ①When the strong impact loads on this unit, the error pulse may occur as if the slit is revolving.
 ②Therefore please fix bracket firmly when mount this unit, because rotary encoder with high resolution can be easily affected by impact.
4. 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.
 ③When extend the cable, please use it after checking the cable and response frequency due to increment of residual voltage or distortion of waveform can be easily occurred. (Preferable shortest distance for operating)
 ④Shield wire must be connected to F.G terminal.

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

▣ Main products

■ COUNTER
■ TIMER
■ TEMPERATURE CONTROLLER
■ PANEL METER
■ TACHOMETER
■ LINE SPEED METER
■ DISPLAY UNIT
■ PROXIMITY SWITCH
■ PHOTOELECTRIC SENSOR
■ FIBER OPTIC SENSOR
■ PRESSURE SENSOR
■ ROTARY ENCODER
■ SENSOR CONTROLLER
■ POWER CONTROLLER
■ STEPPING MOTOR & DRIVER & CONTROLLER

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