Autonics

ROTARY ENCODER(INCREMENTAL TYPE)
ENA, ENB, ENC SERIES
M A N U A L

ENA

ENB

ENC

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;

⚠ Waring 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.

⚠ Waring

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

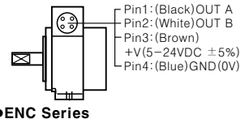
ENB	3600	3	1	
●Series	●Pulses/1 revolution	●Output phase	●Output method	●Power supply
ENA ENB	⋆1, ⋆2, ⋆5, 10, ⋆12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600	2:A, B phase 3:A, B, Z phase (Standard) 4:A, B, $\overline{A}$, $\overline{B}$ phase 6:A, B, Z, $\overline{A}$, $\overline{B}$, $\overline{Z}$ phase	1:Totempole output 2:NPN open collector output 3:Voltage output L:Line Driver output	1, 2:5-24VDC ±5% 3:5VDC, 12VDC, 24VDC ±5% L:5VDC ±5%

※Zero point output(Z phase) is ENB series only.
※1, 2, 5, 12 P/R is A, B phase.(Kine Driver output is A, $\overline{A}$, B, $\overline{B}$)

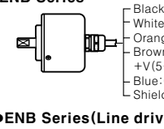
ENC	1	1	1
●Series	●Output phase	●Min. measuring unit	●Output type
ENC (Wheel Type)	1:A, B phase	1:1mm 2:1cm 3:1m 4:0.01yd 5:0.1yd 6:1yd	1:Totempole output 2:NPN open collector output 3:Voltage output

▣ Connection

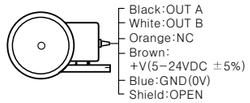
●ENA Series



●ENB Series

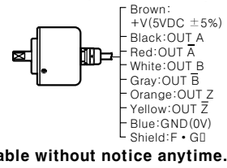


●ENC Series



※Body of Encoder is shielded.
(ENC Series is not certified)
※Non-using wires must be insulated.

●ENB Series(Line driver output)



※The above specification are changeable without notice anytime.

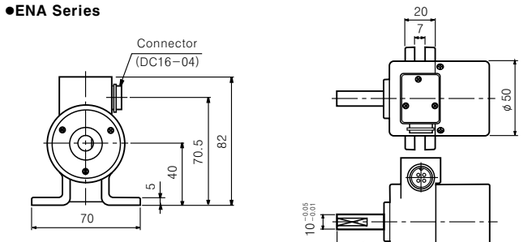
▣ Specification

Item		Shaft type the Encoder to be mounted at the side (Incremental Type)	ø50mm Shaft type the Encoder (Incremental Type)	Wheel type the Encoder (Incremental Type)
Model	Totempole output	ENA-□□□-2-1, (ENA-□□□-3-1)	ENB-□□□-2-1, ENB-□□□-3-1	ENC-1-1-1, ENC-1-2-1, ENC-1-3-1, ENC-1-4-1, ENC-1-5-1, ENC-1-6-1
	NPN open colletor output	ENA-□□□-2-2, (ENA-□□□-3-2)	ENB-□□□-2-2, ENB-□□□-3-2	ENC-1-1-2, ENC-1-2-2, ENC-1-3-2, ENC-1-4-2, ENC-1-5-2, ENC-1-6-2
	Voltage output	ENA-□□□-2-3, (ENA-□□□-3-3)	ENB-□□□-2-3, ENB-□□□-3-3	ENC-1-1-3, ENC-1-2-3, ENC-1-3-3, ENC-1-4-3, ENC-1-5-3, ENC-1-6-3
	Line Driver output	————	ENB-□□□-4-L, ENB-□□□-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		1mm/Pulse, 1cm/Pulse, 1m/Pluse, 0.01yd/Pluse, 0.1yd/Pluse, 1yd/Pulse
Electrical specification	Output phase	A phase, B phase(Z phase-Option)	A phase, B phase, Z phase (Line Driver:A, B, Z, $\overline{A}$, $\overline{B}$, $\overline{Z}$ phase) ※1, 2, 5, 12 are output A and B phase only	A phase, B phase
	Output of phase difference	Phase difference between A and B phase: $\frac{T}{4} \pm \frac{T}{8}$ (1cycle=T of A phase)		
	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		
	Control output: NPN open collector output	Load voltage:Max. 30V, Load current:Max. 30mA, Residual voltage:Max. 0.4V		
	Control output: Line Driver output	• Low ☞ Load current:Max. 20mA, Residual voltage:Max. 0.4V • High ☞ Load current : Max. -20mA, Output voltage:Min. 2.5V		
	Response time (Rise & Fall): Totempole output	Max. 0.5㎲(Cable:2m, at sink current=10mA)		
	Response time (Rise & Fall): NPN open collector output	Max. 0.5㎲(Cable:2m, at sink current=30mA)		
	Response time (Rise & Fall): Line Driver output	Max. 0.1㎲(Cable:2m, at sink current=20mA)		
	Max. Response frequency	180kHz		
	Power supply	5-24VDC ±5%(Ripple P-P:Max. 5%), Line Driver output:5VDC ±5%(Ripple P-P:Max. 5%), Voltage output:5VDC, 12VDC, 24VDC ±5%(Ripple P-P:Max. 5%)		
	Current consumption	Max. 80mA(Disconnection of the load), Line Driver output:Max. 100mA(Disconnection of the load)		
	Connection	Connector connection/Cable connection(Option)	Cable connection	
Mechanical specification	Starting torque	Max. 70gf • cm(6,860μN • m)		It is different from coefficient of friction
	Moment of inertia	Max. 80g • cm² (8×10⁻⁶ kg • m²)		————
	Shaft loading	Radial:10kg, Thrust:2.5kg		
	Deviation of shaft position	Radial:Max. 0.1mm, Thrust:Max. 0.2mm		
	Mechanical revolution(rpm)	5000rpm		
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. 75G		
Ambient temperature		-10 to 70℃〈Line Driver:0 to 70℃〉(Non-freezing condition), Storage:-25 to 85℃		
Ambient humidity		Operating : 35 to 85%RH, Storage:35 to 90%RH		
Protection		IP50(IEC specification)		
Cable		4P, ø5mm, Length:2m, Shield cable	5P(Line Driver:8P) ø5mm, Length:2m, Shield cable	
Weight		Approx. 345g	Approx. 275g	Approx. 494g
Accessory		ø10mm coupling	ø8mm coupling, bracket	————
Approval		(Note1) CE		

※(Note1)The type of Line Driver output is not certified by CE approval.

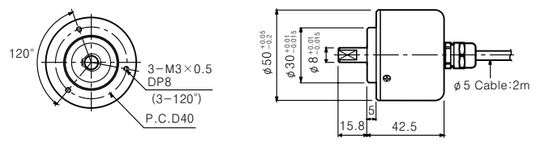
▣ Dimension

●ENA Series

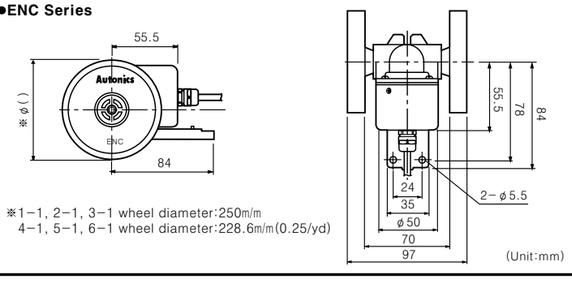


※In case of Z phase(option):Connector(DC6-05)
Pin1:(Black)OUT A, Pin2:(White)OUT B
Pin3:(Orange)OUT Z, Pin4:(Brown)+V
Pin5:(Blue)0V

●ENB Series



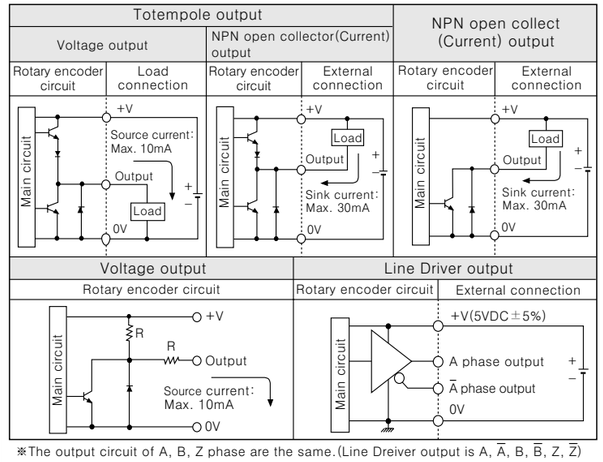
●ENC Series



※1-1, 2-1, 3-1 wheel diameter:250㎜
4-1, 5-1, 6-1 wheel diameter:228.6㎜(0.25/yd)

(Unit:mm)

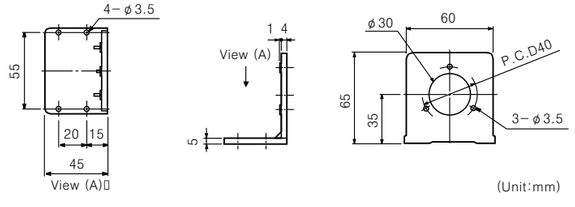
▣ Control output diagram



※The output circuit of A, B, Z phase are the same.(Line Dreiver output is A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$)

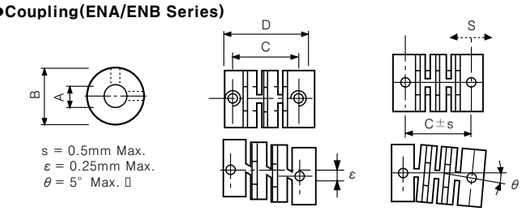
▣ Accessary

●Bracket(ENB Series)



(Unit:mm)

●Coupling(ENA/ENB Series)



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

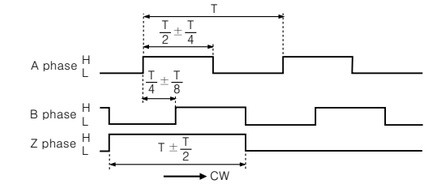
(Unit:mm)

Item / Type	A	B	C	D
ENA ø10mm coupling	ø10 +0.1 0	ø22	18.2	25
ENB ø8mm coupling	ø8 +0.1 0	ø19	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

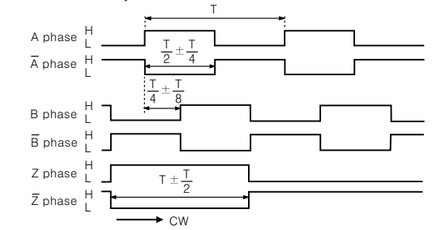
▣ Output waveform

●NPN open collector, Totem Pole Voltage output



※Zero point output(Z phase):ENB series only. (ENA is option)

●Line Driver output



※Rotating direction at insert position of the shaft: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.(ENA, ENB)
 ③Please mount this unit on panel with lowest the coefficient of friction between rotating detection part and target. It may shorten the life cycle of this unit.(ENC)
 ④Do not put strong impact when insert coupling into shaft.(ENA, ENB)
2. For using
 ①Please use attached SIL Twist pair wire and use proper receiver for RS-422A communication.
 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.
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.

▣ 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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