

(F) Rotary Encoder

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Absolute type

(Single-turn)

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(Multi-turn)

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ϕ 20mm Shaft type
/Hollow shaft type
E20 Series



ϕ 58mm Shaft type
/Hollow shaft type/
Hollow shaft built-in type
E58 Series



NEW

ϕ 50mm Shaft type
(Multi-turn)
EPM50 Series



(A)
Photo
electric
sensor

(B)
Fiber
optic
sensor

(C)
Door/Area
sensor

(D)
Proximity
sensor

(E)
Pressure
sensor

**(F)
Rotary
encoder**

(G)
Connector/
Socket

(H)
Temp.
controller

(I)
SSR/
Power
controller

(J)
Counter

(K)
Timer

(L)
Panel
meter

(M)
Tacho/
Speed/
Pulse
meter

(N)
Display
unit

(O)
Sensor
controller

(P)
Switching
power
supply

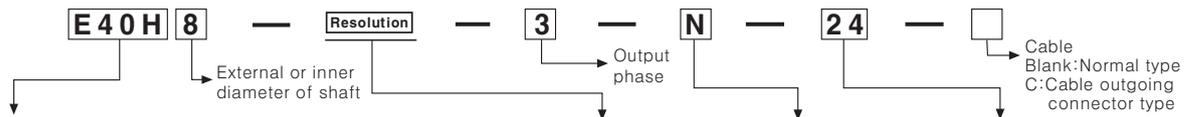
(Q)
Stepping
motor &
Driver &
Controller

(R)
Graphic/
Logic
panel

(S)
Field
network
device

(T)
Production
stoppage
models &
replacement

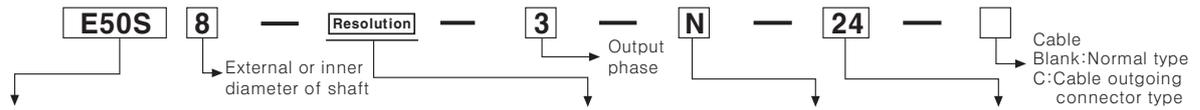
Product Overview(Incremental Type)



Appearances	Model	Resolution	Control output	Power supply	Page
 CE	E20S2 - Resolution - 3 - T - 5, 12 N *Cable R:Rear side outgoing cable type V 6-L-5 S:Side outgoing cable type	100P/R 200P/R 320P/R 360P/R	T (1) : Totem pole output	5 : 5VDC ±5% 12 : 12VDC ±5% (Ripple P-P : Max. 5%) (Note) The output of Line driver is only for 5VDC.	F-5 to 6
	 CE				
 CE	E30S4 - Resolution - 3 - T - 5, 24 N V 6-L-5	100P/R 1000P/R 200P/R 1024P/R 360P/R 3000P/R 500P/R	N (2): NPN open collector output	5 : 5VDC ±5%	F-7 to 8
 CE Line-up	E40S6 - Resolution - 2 - T - 5, 24 (Standard item) N E40S8 (Customizable) 3 - T - 5, 24 N V 4-L-5 6	*1P/R 1000P/R *2P/R 1024P/R *5P/R 1200P/R 10P/R 1500P/R *12P/R 1800P/R 15P/R 2000P/R 20P/R 2048P/R 23P/R 2500P/R 25P/R 3000P/R 30P/R 3600P/R 35P/R 5000P/R 40P/R			
 CE Line-up	E40H8 - Resolution - 2 - T - 5, 24 (Standard item) N E40H6 E40H10 E40H12 (Customizable) V 3 - T - 5, 24 N V 4-L-5 6	40P/R 45P/R 50P/R 60P/R 75P/R 100P/R 120P/R 125P/R 150P/R 192P/R 200P/R 240P/R 250P/R 256P/R 300P/R 360P/R 400P/R 500P/R 512P/R 600P/R 800P/R	V (3): Voltage output	24 : 12-24VDC ±5% (Ripple P-P : Max. 5%)	F-9 to 11
 CE Line-up	E40HB8 - Resolution - 2 - T - 5, 24 (Standard item) N E40HB6 E40HB10 E40HB12 (Customizable) V 3 - T - 5, 24 N V 4-L-5 6				
	E40HB8P - Resolution - 2 - T - 5, 24 N V 3 - T - 5, 24 N V 4-L-5 6 ※Plastic structure	*1P/R 100P/R *2P/R 120P/R *5P/R 125P/R 10P/R 150P/R *12P/R 192P/R 15P/R 200P/R 20P/R 240P/R 23P/R 250P/R 25P/R 256P/R 30P/R 300P/R 35P/R 360P/R 40P/R 400P/R 45P/R 400P/R 50P/R 500P/R 60P/R 512P/R 75P/R 600P/R	L : Line driver output (Not included in CE certification)	5 : 5VDC ±5% 24 : 12-24VDC ±5% (Ripple P-P : Max. 5%) (Note) The output of Line driver is only for 5VDC.	F-12 to 14

※The '*' marked pulse is only for A, B phase in resolution. (Line Driver output is for A, \bar{A} , B, \bar{B} phase.)
 ※Not indicated pulse in this chart is customizable.

Product Overview(Incremental Type)

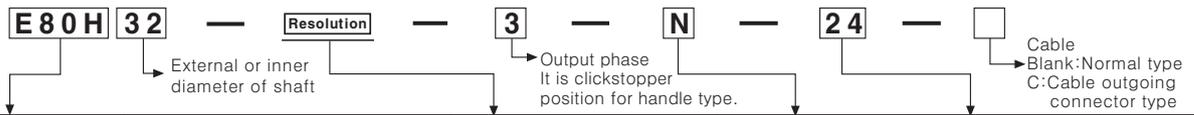


Appearances	Model	Resolution	Control output	Power supply	Page
φ 50mm Shaft type  CE Line-up	E50S8 - [Resolution] - 2-T-5, 24 (Former name : ENB) N V 3-T-5, 24 N V 4-L-5 6 *Cable CR: Axial connector integrated type CS: Radial connector integrated type	*1P/R 75P/R 600P/R *2P/R 100P/R 800P/R *5P/R 120P/R 1000P/R 10P/R 125P/R 1024P/R *12P/R 150P/R 1200P/R 15P/R 192P/R 1500P/R 20P/R 200P/R 1800P/R 23P/R 240P/R 2000P/R 25P/R 250P/R 2048P/R 30P/R 256P/R 2500P/R 35P/R 300P/R 3000P/R 40P/R 360P/R 3600P/R 45P/R 400P/R 5000P/R 50P/R 500P/R 6000P/R 60P/R 512P/R 8000P/R	T (1) : Totem pole output	5 : 5VDC ±5% 24 : 12-24VDC ±5% (Ripple P-P : Max. 5%)	F-15 to 17
φ 50mm Shaft type  CE	E50S8P - [Resolution] - 2-T-5, 24 (Standard item) E50S6P (Customizable) N V 3-T-5, 24 N V 4-L-5 6 *Plastic structure	*1P/R 40P/R 200P/R *2P/R 45P/R 240P/R *5P/R 50P/R 250P/R 10P/R 60P/R 256P/R *12P/R 75P/R 300P/R 15P/R 100P/R 360P/R 20P/R 120P/R 400P/R 23P/R 125P/R 500P/R 25P/R 150P/R 512P/R 30P/R 192P/R 600P/R 35P/R			
φ 58mm Shaft type  CE	E58SC10 - [Resolution] - 2-T-5, 24 (Shaft Clamping) E58SC6 (Shaft Synchro) N V 3-T-5, 24 N V 4-L-5 6 *Cable CR: Axial connector integrated type CS: Radial connector integrated type	*1P/R 250P/R *2P/R 256P/R *5P/R 300P/R 10P/R 360P/R *12P/R 400P/R 15P/R 500P/R 20P/R 512P/R 23P/R 600P/R 25P/R 800P/R 30P/R 1000P/R 35P/R 1024P/R 40P/R 1200P/R 45P/R 1500P/R 50P/R 1800P/R 60P/R 2000P/R 75P/R 2048P/R 100P/R 2500P/R 120P/R 3000P/R 125P/R 3600P/R 150P/R 5000P/R 192P/R 6000P/R 200P/R 8000P/R 240P/R	V (3): Voltage output	24 : 12-24VDC ±5% (Ripple P-P : Max. 5%)	F-21 to 24
φ 58mm Hollow shaft type  CE	E58H12 - [Resolution] - 2-T-5, 24 N V 3-T-5, 24 N V 4-L-5 6	75P/R 2048P/R 100P/R 2500P/R 120P/R 3000P/R 125P/R 3600P/R 150P/R 5000P/R 192P/R 6000P/R 200P/R 8000P/R 240P/R			
φ 58mm Hollow shaft built-in type  CE	E58HB12 - [Resolution] - 2-T-5, 24 N V 3-T-5, 24 N V 4-L-5 6 *Cable CR: Axial connector integrated type CS: Radial connector integrated type	100P/R 1024P/R 5000P/R 8192P/R	*The number of () is former name.	(Note) The output of Line driver is only for 5VDC.	F-25 to 27
φ 60mm Hollow shaft type  CE Line-up	E60H20 - [Resolution] - 3-T-5, 24 N V 6-L-5	100P/R 1024P/R 5000P/R 8192P/R			

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

※The '*' marked pulse is only for A, B phase in resolution. (Line Driver output is for A, \bar{A} , B, \bar{B} phase.)
 ※Not indicated pulse in this chart is customizable.

Product Overview(Incremental Type)



Appearances	Model	Resolution	Control output	Power supply	Page
φ 68mm Shaft type 	E68S15-1024-6-L-5	1024P/R *Not indicated pulse in this chart is customizable.	T (1) : Totem pole output N (2): NPN open collector output V (3): Voltage output L : Line driver output (Not included in CE certification) *The number of () is former name.	5 : 5VDC ±5% 24 : 12-24VDC ±5% (Ripple P-P : Max. 5%)	F-28 to 29
φ 80mm Hollow shaft type 	E80H30-Resolution-3-T-5, 24 (Standard item) N E80H32 V (Customizable) 6-L-5	60P/R 100P/R 360P/R 500P/R 512P/R 1024P/R 3200P/R			F-30 to 32
φ 100mm Hollow shaft type 	E100H35-Resolution-3-T-5, 24 N V 6-L-5	512P/R 1024P/R 10000P/R			F-33 to 35
Side-mounting type 	ENA -Resolution- 2-T-5, 24 N V 3-T-5, 24 N V *Standard : Output the A, B phase *Customizable : Output the A, B, Z phase	*1P/R 60P/R 500P/R *2P/R 75P/R 512P/R *5P/R 100P/R 600P/R 10P/R 120P/R 800P/R *12P/R 125P/R 1000P/R 15P/R 150P/R 1024P/R 20P/R 192P/R 1200P/R 23P/R 200P/R 1500P/R 25P/R 240P/R 1800P/R 30P/R 250P/R 2000P/R 35P/R 256P/R 2048P/R 40P/R 300P/R 2500P/R 45P/R 360P/R 3000P/R 50P/R 400P/R 3600P/R 5000P/R			F-36 to 38
Measuring wheel type 	ENC-1-Measurement unit-T-5, 24 N V	1 : 1mm/1Pulse 2 : 1cm/1Pulse 3 : 1m/1Pulse 4 : 0.01yd/1Pulse 5 : 0.1yd/1Pulse 6 : 1yd/1Pulse			F-39 to 40
Manual handle type 	ENH-Resolution-1-T-5, 24 2 1-V-5, 24 2 1-L-5 2	25P/R 100P/R			F-41 to 42
Portable encoder with handle 	ENHP-Resolution-1-L-5 2	100P/R			F-43 to 44

The '' marked pulse is only for A, B phase in resolution. (Line Driver output is for A, \bar{A} , B, \bar{B} phase.)
 *Not indicated pulse in this chart is customizable.

Product Overview(Absolute Type)

EP50S **8** — **Resolution** — **1** **R** — **P** — **5**

External or inner diameter of shaft → **8**
 Revolution direction(*) → **R**
 → **5**

Appearances	Model	Resolution	Output code	Control output	Power supply	Page
φ 50mm Shaft type  CE	EP50S8-Resolution-1R-N(P)-5, 24 2R 3R 1F 2F 3F	45P/R 360P/R 64P/R 512P/R 90P/R 720P/R 128P/R 1024P/R 180P/R 256P/R				F-45 to 48
φ 58mm Shaft type  CE	EP58SC10-Resolution-1R-N(P)-5,24 (Shaft Clamping) 2R EP58SC6 (Shaft Synchro) 3R 1F 2F 3F	45P/R 64P/R 90P/R 128P/R 180P/R 256P/R 360P/R 512P/R 720P/R 1024P/R	1 : BCD 2 : BINARY 3 : GRAY (customizable)	P (1) : PNP open collector output N (2) : NPN open collector output	5 : 5VDC ±5% 24 : 12-24VDC ±5% (Ripple P-P : Max. 5%)	F-49 to 52
φ 58mm Hollow shaft built-in type  CE	EP58HB8-Resolution-1R-N(P)-5,24 2R 3R 1F 2F 3F	45P/R 64P/R 90P/R 128P/R 180P/R 256P/R 360P/R 512P/R 720P/R 1024P/R				

※Not indicated number of division in this chart is customizable.
 ※Revolution direction **R** : CCW as from the shaft, **F** : CW as from the shaft
 ※The number of () is former name in control output.

ENP — **1** **1** **1** **R** — **P**

Output(*) → **1** **1** **1**
 Revolution direction(*) → **R**

Appearances	Model	Output code	Power supply	Resolution	Control output	Page
φ 60mm Shaft type  CE	ENP-111R-Resolution-P 111F ENP-101R-Resolution-N 101F ENP-110R-360-P 110F ENP-100R-360-N 100F	1 : BCD Code 0 :	1 : 12-24VDC ±5% (Ripple P-P : Max. 5%) 0 : 5-12VDC ±5% (Ripple P-P : Max. 5%)	6P/R 8P/R 12P/R 16P/R 24P/R 360P/R	P (1) : PNP open collector output N (2) : NPN open collector output P (1) : PNP open collector output N (2) : NPN open collector output	F-53 to 56

※Output **0** : Negative logic, **1** : Positive logic
 ※Revolution direction **R** : CCW as from the shaft, **F** : CW as from the shaft
 ※The number of () is former name in control output.

Multi-turn

EPM50S **8** — **10** **13** — **B** — **PN** — **24**

Shaft diameter → **8**
 → **10** **13**
 → **B**
 → **PN**
 → **24**

Appearances	Single-turn	Multi-turn	Output code	Control output	Power supply	Page
φ 50mm Shaft type  CE NEW	10bit (1024 division)	13bit (8192 division)	Binary code	PN : Parallel NPN open collector output S : SSI	12-24VDC ±5% (Ripple P-P : Max. 5%)	F-57 to 61

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

E20 Series

Diameter ϕ 20mm Shaft type/Hollow shaft built-in type Incremental Rotary encoder

Features

- Diameter ϕ 20mm of miniature rotary encoder
- Easy installation at narrow space
- Small moment of inertia
- Power supply : 5VDC, 12VDC \pm 5%
- Various output types

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



E20S SERIES



E20HB SERIES

Ordering information

E20	S	2	360	3	N	12	R
Series	Shaft type	Hollow type	Pulse/1Revolution	Output phase	Output	Power supply	Cable
Diameter ϕ 20mm, S:Shaft type HB:Hollow shaft built-in type	External 2 : ϕ 2mm	Inner 2 : ϕ 2mm 2.5 : ϕ 2.5mm 3 : ϕ 3mm	100, 200, 320, 360	3 : A, B, Z 6 : A, \bar{A} , B, \bar{B} , Z, \bar{Z}	N:NPN open collector output V:Voltage output L:Line driver output(※)	5 : 5VDC \pm 5% 12 : 12VDC \pm 5%	R:Rear side outgoing cable type S:Side outgoing cable type

※Standard : E20S2-[PULSE]-3-N-12-R
E20HB2-[PULSE]-3-N-12-R

※Standard : A, B, Z ※The power of Line driver is only for 5VDC

Specifications

Item	Diameter ϕ 20mm shaft/hollow shaft built-in type incremental rotary encoder		
Resolution(P/R)	100, 200, 320, 360 (Not indicated pulse and output type is customizable.)		
Electrical specification	Output phase	A, B, Z phase (Line driver output A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)	
	Control output	NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
		Line driver output	• Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5VDC • High \Rightarrow Load current : Max. -20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	NPN open collector output	Max. 1 μ s
		Voltage output	Max. 1 μ s
		Line driver output	Max. 0.5 μ s
	Max. Response frequency	100kHz	
	Power supply	• 5VDC \pm 5% (Ripple P-P : Max. 5%) • 12VDC \pm 5% (Ripple P-P : Max. 5%)	
Current consumption	Max. 60mA (disconnection of the load), Line driver output : Max. 50mA (disconnection of the load)		
Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)		
Dielectric strength	500VAC 50/60Hz for 1 minute (Between all terminals and case)		
Connection	Cable outgoing type (Rear / Side)		
Mechanical specification	Starting torque	Max. 5gf \cdot cm (5×10^{-4} N \cdot m)	
	Moment of inertia	Max. 0.5g \cdot cm ² (5×10^{-8} kg \cdot m ²)	
	Shaft loading	Radial : 200gf, Thrust : 200gf	
	Max. allowable revolution	(Note1) 6000rpm	
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock	Max. 50G		
Ambient temperature	-10 to 70 $^{\circ}$ C (at non-freezing status), Storage : -20 to 80 $^{\circ}$ C		
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH		
Protection	IP50 (IEC standard)		
Cable	ϕ 3mm, 5P (Line driver output : 8P), Length : 1m, Shield cable		
Accessory	ϕ 2mm Coupling (Shaft type), Bracket (Hollow shaft built-in type)		
Approval	CE (Except line driver output)		
Unit weight	Approx. 35g		

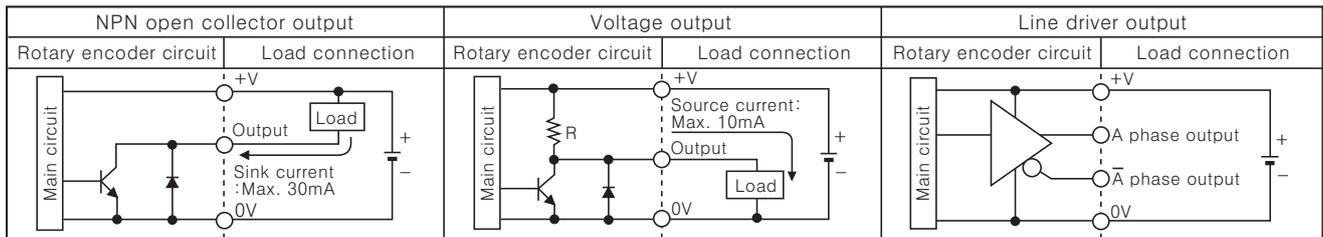
※(Note1) Max. allowable revolution \geq Max. response revolution

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

Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

Incremental ϕ 20mm Shaft/Hollow shaft built-in Type

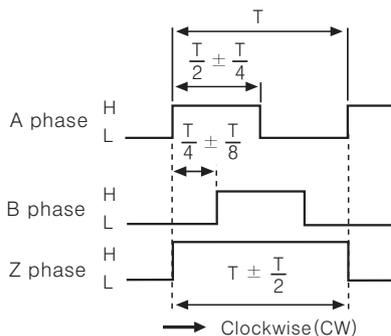
Control output diagram



●The output circuit of A, B, Z phase are the same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

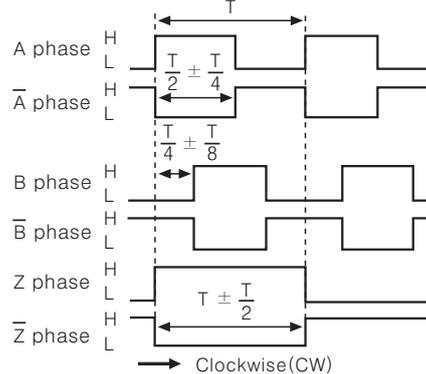
Output waveform

●NPN open collector output / Voltage output



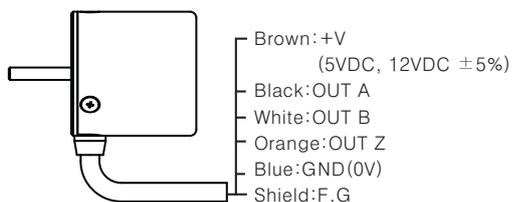
※CW : Right turn as from the shaft

●Line driver output

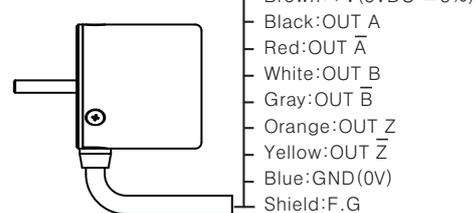


Connections

●NPN open collector output / Voltage output

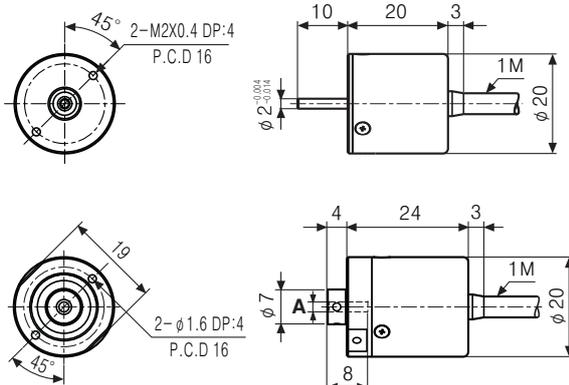


●Line driver output



Dimensions

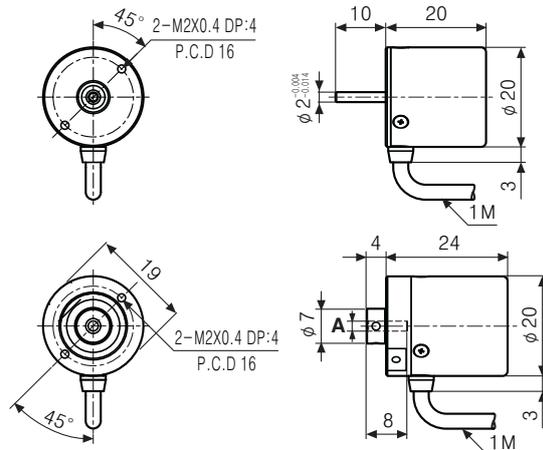
■Rear side outgoing cable type



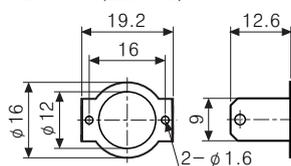
A	ϕ 2	ϕ 2.5	ϕ 3
Tolerance		+0.014	+0.004

■Side outgoing cable type

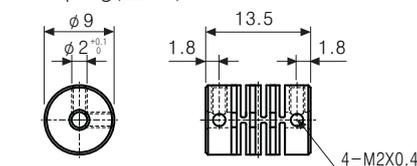
(Unit:mm)



●Bracket (E20HB)



●Coupling (E20S)



(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

E30S Series

Diameter ϕ 30mm Shaft type Incremental Rotary encoder

Features

- Diameter ϕ 30mm of miniature shaft type rotary encoder
- Easy installation at narrow space
- Small moment of inertia
- Power supply : 5VDC, 12–24VDC \pm 5%
- Various output types

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



Ordering information

E30S **4** – **1024** – **3** – **N** – **24** –

Series	Shaft diameter	Pulse/1Revolution	Output phase	Output	Power supply	Cable
Diameter ϕ 30mm, shaft type	ϕ 4mm	Refer to resolution	3:A, B, Z 6:A, \bar{A} , B, \bar{B} , Z, \bar{Z}	T:Totem pole output N:NPN open collector output V:Voltage output L:Line driver output(*)	5 :5VDC \pm 5% 24:12–24VDC \pm 5%	Blank:Normal type (*) C:Cable outgoing connector type

*Standard:E30S4–**PULSE**–3–N–24

*Standard:A, B, Z

*The power of Line driver is only for 5VDC

*Cable length:250mm

Specifications

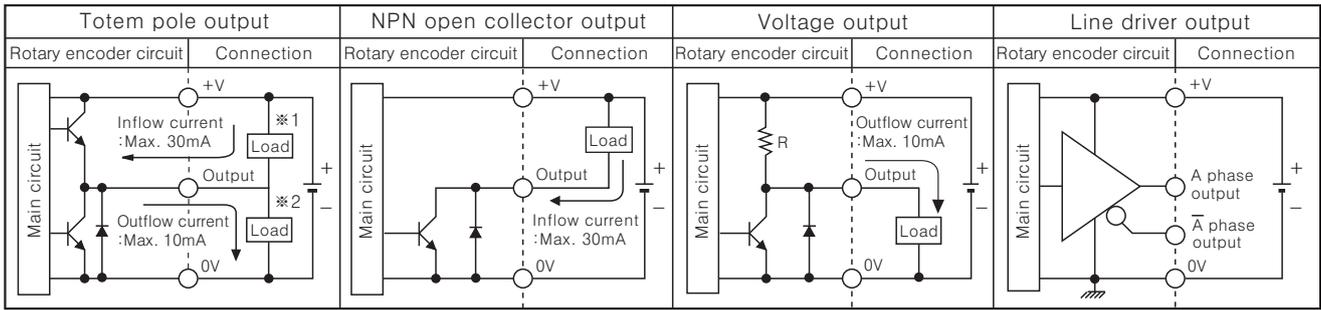
Item	Diameter ϕ 30mm shaft type of incremental rotary encoder		
Resolution (P/R)	100, 200, 360, 500, 1000, 1024, 3000 (Not indicated resolution is customizable.)		
Electrical specification	Output phase	A, B, Z phase (Line driver : A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)	
	Control output	Totem pole output	<ul style="list-style-type: none"> • Low \Rightarrow Load current : Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current : Max. 10mA, Output voltage (Power supply 5VDC) : Min. (Power supply–2.0)VDC, Output voltage (Power supply 12–24VDC) : Min. (Power supply–3.0)VDC
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
		Line driver output	<ul style="list-style-type: none"> • Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5VDC • High \Rightarrow Load current : Max. –20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s
		NPN open collector output	Max. 1 μ s
		Voltage output	Max. 1 μ s (5VDC:Output resistance 820 Ω), Max. 2 μ s (12–24VDC:Output resistance 4.7k Ω)
		Line driver output	Max. 0.5 μ s
	Max. Response frequency	300kHz	
	Power supply	<ul style="list-style-type: none"> • 5VDC \pm5% (Ripple P–P : Max. 5%) • 12–24VDC \pm5% (Ripple P–P : Max. 5%) 	
	Current consumption	Max. 80mA (disconnection of the load), Line driver output : Max. 50mA (disconnection of the load)	
Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)		
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)		
Connection	Cable outgoing type, 250mm cable outgoing connector type		
Mechanical specification	Starting torque	Max. 20gf \cdot cm (0.002N \cdot m)	
	Moment of inertia	Max. 20g \cdot cm ² (2×10^{-6} kg \cdot m ²)	
	Shaft loading	Radial : Max. 2kgf, Thrust : Max. 1kgf	
	Max. allowable revolution	(★Note1) 5000rpm	
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock	Max. 50G		
Ambient temperature	–10 to 70 $^{\circ}$ C (at non–freezing status), Storage : –25 to 85 $^{\circ}$ C		
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH		
Protection	IP50 (IEC standard)		
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable (Line driver : ϕ 5mm, 8P)		
Accessory	ϕ 4mm coupling		
Approval	CE (Except for line driver output)		
Unit weight	Approx. 80g		

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

Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

Incremental ϕ 30mm Shaft Type

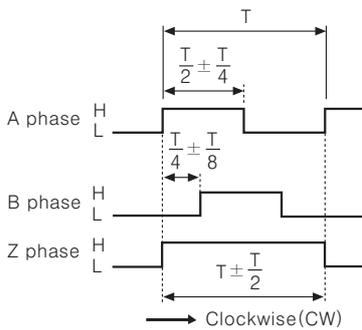
Control output diagram



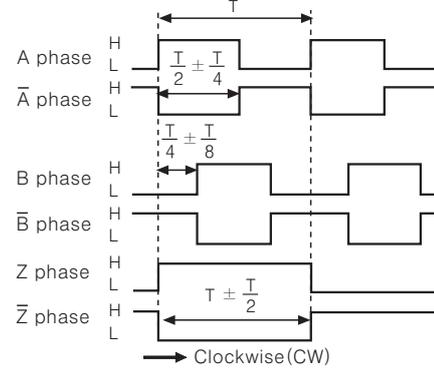
- Totem pole output type can be used for NPN open collector output type(*1) or Voltage output type(*2).
- All output circuits of A, B, Z phase are the same. (Line driver output is for A, \bar{A} , B, \bar{B} , Z, \bar{Z})

Output waveform

- Totem pole output / NPN open collector output / Voltage output
- Line driver output



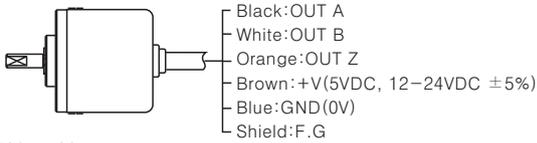
*CW : Right turn as from the shaft



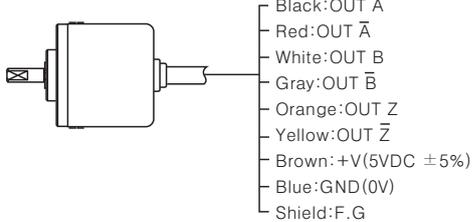
Connections

Normal type

- Totem pole output / NPN open collector output / Voltage output



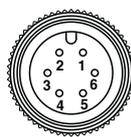
- Line driver output



- * Unused wires must be insulated.
- * The metal case and shield wire of encoder should be grounded (F.G).

Cable outgoing connector type

- Totem pole output / NPN open collector output / Voltage output



- Line driver output

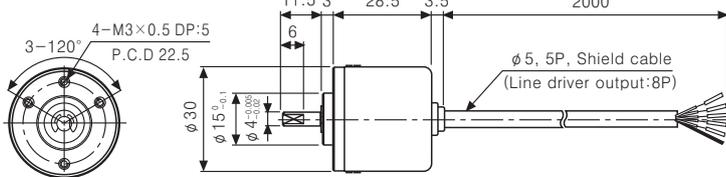


Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT \bar{A}	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT \bar{B}	Gray
			⑦	OUT Z	Orange
			⑧	OUT \bar{Z}	Yellow
			⑨	F.G	Shield

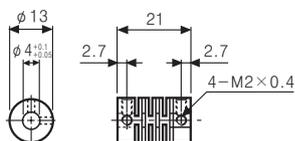
* F.G(Field Ground):It should be grounded separately.

Dimensions

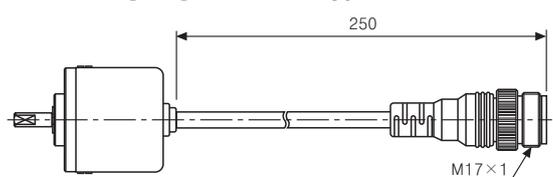
Normal type



- Coupling(E30S)



Cable outgoing connector type



* Connector cable is customizable and see G-6 for specifications.

(Unit:mm)

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

E40 Series

Diameter ϕ 40mm Shaft type/Hollow type/Built-in type Incremental Rotary encoder

Features

- 12-24VDC power supply of line driver output (Line-up)
- Easy installation at narrow space
- Small moment of inertia
- Power supply : 5VDC, 12-24VDC \pm 5%
- Various output types

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



Ordering information

E40 **H** **8** **5000** **3** **N** **24**

Series	Shaft type	Hollow type	Pulse/1 Revolution	Output phase	Output	Power supply	Cable
S: Shaft type H: Hollow type HB: Hollow built-in type	External 6: ϕ 6mm 8: ϕ 8mm	Inner 6: ϕ 6mm 8: ϕ 8mm 10: ϕ 10mm 12: ϕ 12mm	Refer to resolution	2: A, B 3: A, B, Z 4: A, \bar{A} , B, \bar{B} 6: A, \bar{A} , B, \bar{B} , Z, \bar{Z}	T: Totem pole output N: NPN open collector output V: Voltage output L: Line driver output	5 : 5VDC \pm 5% 24: 12-24VDC \pm 5%	Blank: Normal type (*) C: Cable outgoing connector type

* Standard : E40S6-[PULSE]-3-N-24
E40H8-[PULSE]-3-N-24
E40HB8-[PULSE]-3-N-24

* Standard: A, B, Z

* Cable length : 250mm

Specifications

Item	Diameter ϕ 40mm shaft/hollow shaft/hollow built-in type of incremental rotary encoder		
Resolution(P/R)	(Note1) *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, 5000 (Not indicated resolution is customizable.)		
Electrical specification	Output phase	A, B, Z phase (Line driver : A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)	
	Control output	Totem pole output	• Low \Rightarrow Load current: Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current: Max. 10mA, Output voltage (Power supply 5VDC): Min. (Power supply -2.0)VDC, Output voltage (Power supply 12-24VDC): Min. (Power supply -3.0)VDC
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
		Line driver output	Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5VDC High \Rightarrow Load current : Max. -20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s
		NPN open collector output	Max. 1 μ s
		Voltage output	Max. 1 μ s
		Line driver output	Max. 0.5 μ s
	Max. Response frequency	300kHz	
	Power supply	• 5VDC \pm 5% (Ripple P-P : Max. 5%) • 12-24VDC \pm 5% (Ripple P-P : Max. 5%)	
	Current consumption	Max. 80mA (disconnection of the load), Line driver output : Max. 50mA (disconnection of the load)	
Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)		
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)		
Connection	Cable outgoing type, 250mm cable outgoing connector type		
Mechanical specification	Starting torque	Shaft Type : Max. 40gf \cdot cm (0.004N \cdot m), Hole Type : Max. 50gf \cdot cm (0.005N \cdot m)	
	Moment of inertia	Max. 40g \cdot cm ² (4×10^{-6} kg \cdot m ²)	
	Shaft loading	Radial : Max. 2kgf, Thrust : Max. 1kgf	
	Max. allowable revolution	(Note2) 5000rpm	
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock	Max. 50G		
Ambient temperature	-10 to 70 $^{\circ}$ C (at non-freezing status), Storage : -25 to 85 $^{\circ}$ C		
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH		
Protection	IP50 (IEC standard)		
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable (Line driver output : ϕ 5mm, 8P)		
Accessory	• Shaft type : ϕ 6mm coupling standard, ϕ 8mm coupling (Sold separately) • Hole type : Bracket		
Approval	CE (Except for line driver output)		
Unit weight	Approx. 160g		

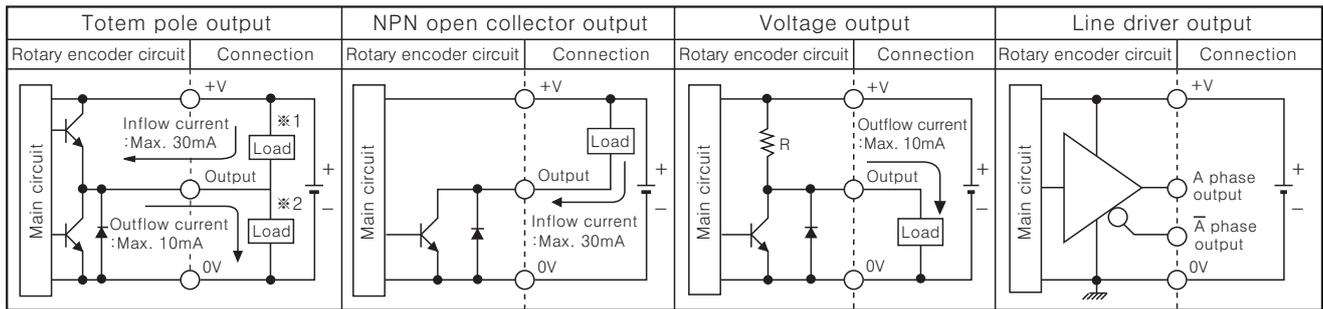
* **(Note1)** '*' pulse is only for A, B phase (Line Driver output is for A, \bar{A} , B, \bar{B} phase)

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

Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

Incremental ϕ 40mm Shaft/Hollow Shaft/Built-in Type

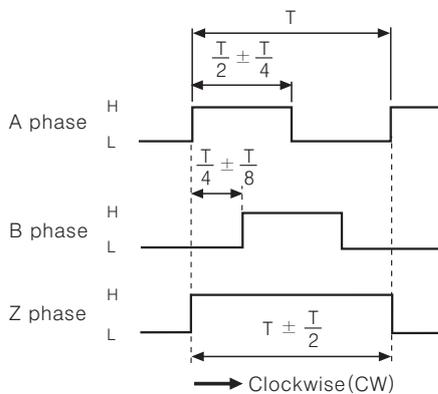
Control output diagram



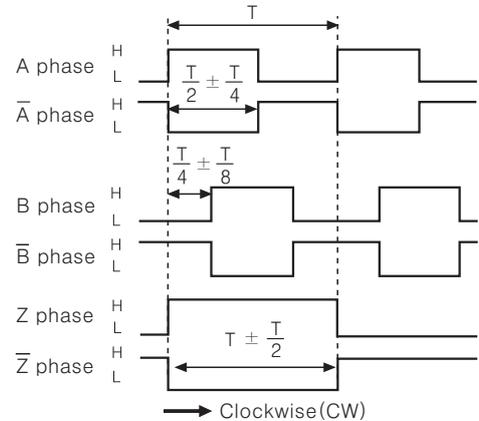
- Totem pole output type can be used for NPN open collector output type (*1) or Voltage output type (*2).
- All output circuits of A, B, Z phase are the same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

Output waveform

- Totem pole output / NPN open collector output / Voltage output
- Line driver output



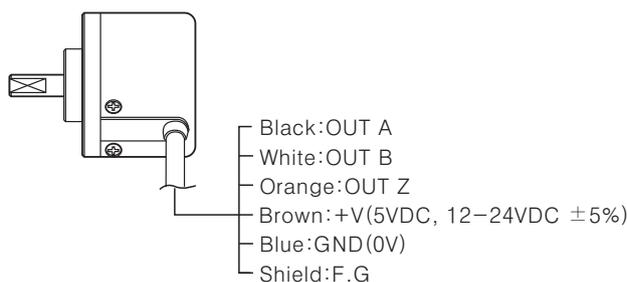
*CW : Right turn as from the shaft



Connections

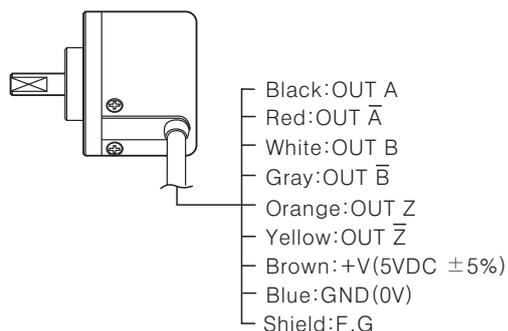
Normal type

- Totem pole output / NPN open collector output / Voltage output



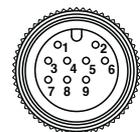
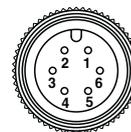
- *Unused wires must be insulated.
- *The metal case and shield wire of encoder should be grounded (F.G).

Line driver output



Cable outgoing connector type

- Totem pole output
- Line driver output
- NPN open collector output
- Voltage output



Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT \bar{A}	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT \bar{B}	Gray
			⑦	OUT Z	Orange
			⑧	OUT \bar{Z}	Yellow
			⑨	F.G	Shield

*F.G(Field Ground):It should be grounded separately.

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

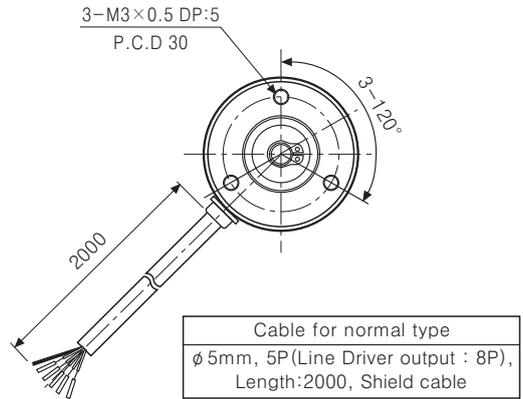
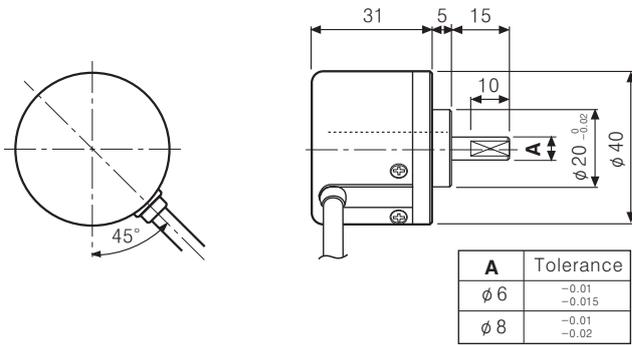
E40 Series

Dimensions

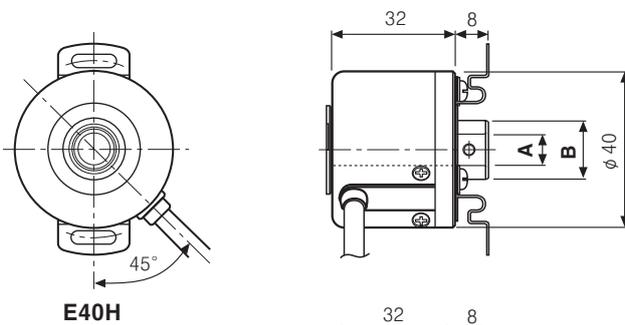
Normal type

Shaft type

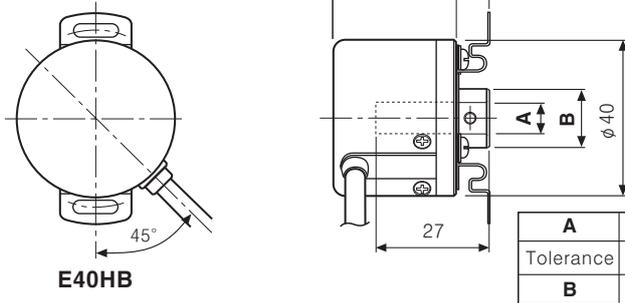
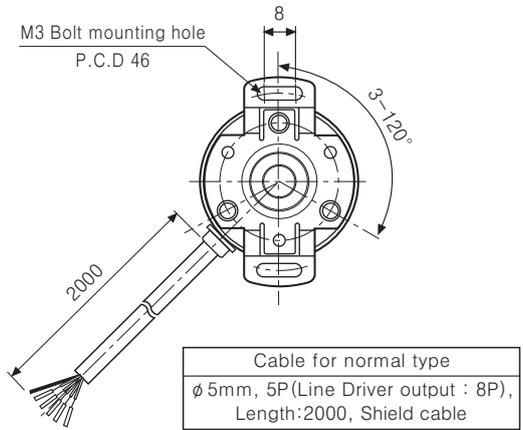
(Unit:mm)



Hollow shaft / Hollow shaft built-in type

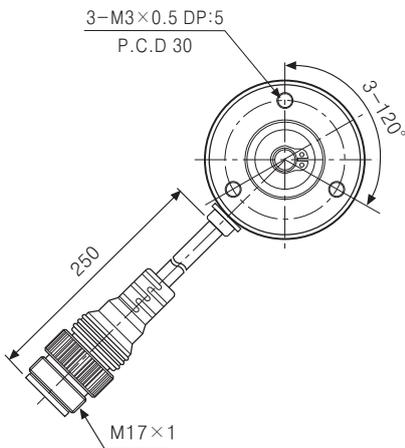


E40H

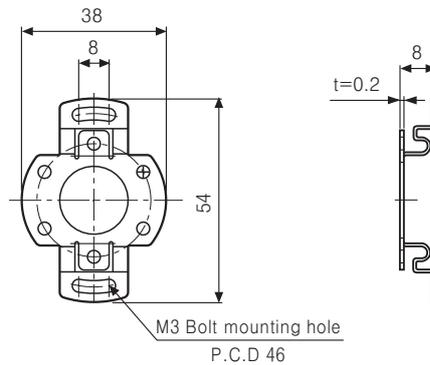


E40HB

Cable outgoing connector type

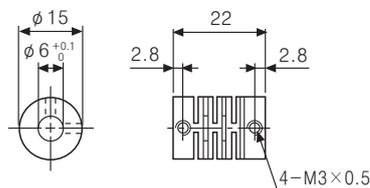


Bracket (E40H, E40HB)

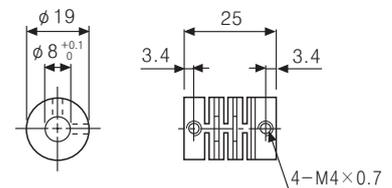


Coupling (E40S)

φ 6 Coupling



φ 8 Coupling



*Connector cable is customizable and see G-6 for specifications.

Incremental ϕ 40mm Hollow Shaft/Built-in Type

Diameter ϕ 40mm Hollow shaft built-in type Incremental Rotary encoder

■ Features

- Light plastic body
- Easy installation at narrow space
- Small moment of inertia
- Power supply : 5VDC, 12-24VDC \pm 5%
- Various output types

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



■ Ordering information

E40HB	8	P	600	3	N	24	
Series	Shaft diameter	External material	Pulse/1Revolution	Output phase	Control output	Power supply	Cable
Diameter ϕ 40mm HB : Hollow shaft built-in type	ϕ 8mm	Plastic	Refer to resolution	2 : A, B 3 : A, \bar{B} , Z 4 : A, \bar{A} , \bar{B} , \bar{B} 6 : A, \bar{A} , B, \bar{B} , Z, \bar{Z}	T:Totem pole output N:NPN open collector output V:Voltage output L:Line driver output(*)	5 : 5VDC \pm 5% 24 : 12-24VDC \pm 5%	Blank:Normal type (*) C:Cable outgoing connector type

*Standard:E40HB8P-PULSE-3-N-24

*Standard:A, B, Z

*The power of Line driver is only for 5VDC

*Cable length:250mm

■ Specifications

Item	Diameter ϕ 40mm hollow shaft built-in type of incremental rotary encoder		
Resolution(P/R)	(Note1) *1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600		
Electrical specification	Output phase	A, B, Z phase (Line driver : A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)	
	Control output	Totem pole output	• Low \Rightarrow Load current:Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current:Max. 10mA, Output voltage (Power supply 5VDC):Min. (Power supply-2.0)VDC, Output voltage (Power supply 12-24VDC):Min. (Power supply-3.0)VDC
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
		Line driver output	Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5VDC High \Rightarrow Load current : Max. -20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s
		NPN open collector output	Max. 1 μ s
		Voltage output	Max. 1 μ s
		Line driver output	Max. 0.5 μ s
	Max. response frequency	180kHz	
	Power supply	• 5VDC \pm 5% (Ripple P-P : Max. 5%) • 12-24VDC \pm 5% (Ripple P-P : Max. 5%)	
	Current consumption	Max. 80mA (disconnection of the load)	
	Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)	
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)		
Connection	Cable outgoing type, 200mm cable outgoing connector type		
Mechanical specification	Starting torque	Max. 50gf \cdot cm (0.005N \cdot m)	
	Moment of inertia	Max. 40g \cdot cm ² (4×10^{-6} kg \cdot m ²)	
	Shaft loading	Radial : Max. 3kgf, Thrust : Max. 0.5kgf	
	Max. allowable revolution	(Note2) 3000rpm	
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock	Max. 50G		
Ambient temperature	-10 to 70 $^{\circ}$ C (at non-freezing status), Storage : -25 to 85 $^{\circ}$ C		
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH		
Protection	IP50 (IEC standard)		
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable (Line driver output : ϕ 5mm, 8P)		
Accessory	Bracket		
Unit weight	Approx. 130g		

* **(Note1)** '* pulse is only for A, B phase (Line Driver output is for A, \bar{A} , B, \bar{B} phase)

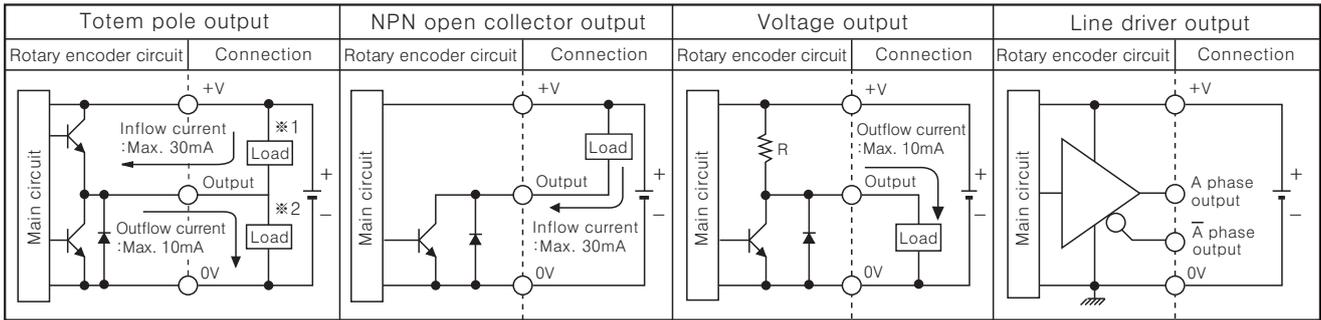
* **(Note2)** Max. allowable revolution \geq Max. response revolution [Max. response revolution (rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.}$]

Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

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

E40HBP Series

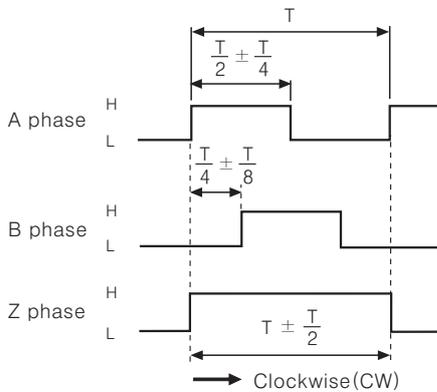
Control output diagram



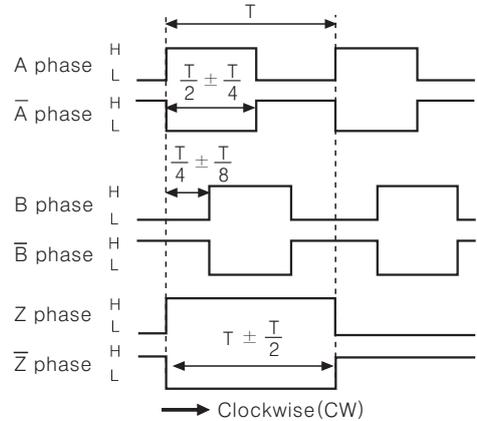
- Totem pole output type can be used for NPN open collector output type (※1) or Voltage output type (※2).
- All output circuits of A, B, Z phase are the same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

Output waveform

- Totem pole output / NPN open collector output / Voltage output
- Line driver output



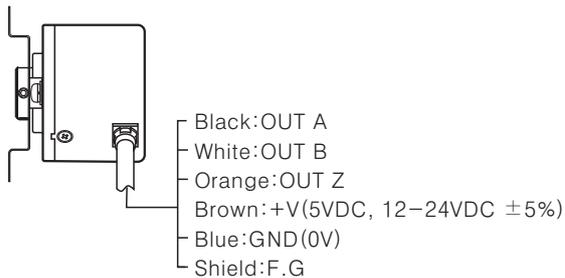
※CW : Right turn as from the shaft



Connections

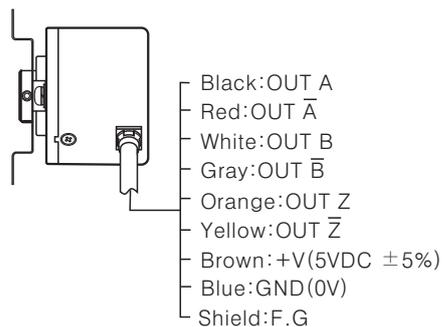
Normal type

- Totem pole output / NPN open collector output / Voltage output



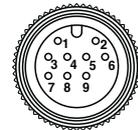
※Unused wires must be insulated.

- Line driver output



Cable outgoing connector type

- Totem pole output
- NPN open collector output
- Voltage output
- Line driver output



Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT \bar{A}	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT \bar{B}	Gray
			⑦	OUT Z	Orange
			⑧	OUT \bar{Z}	Yellow
			⑨	F.G	Shield

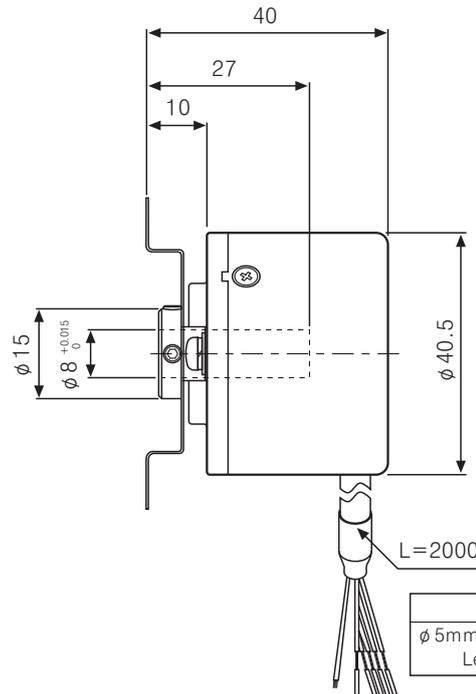
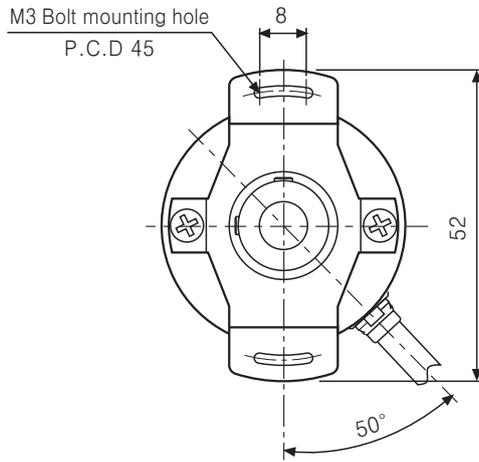
※F.G(Field Ground):It should be grounded separately .

Incremental ϕ 40mm Hollow Shaft/Built-in Type

■ Dimensions

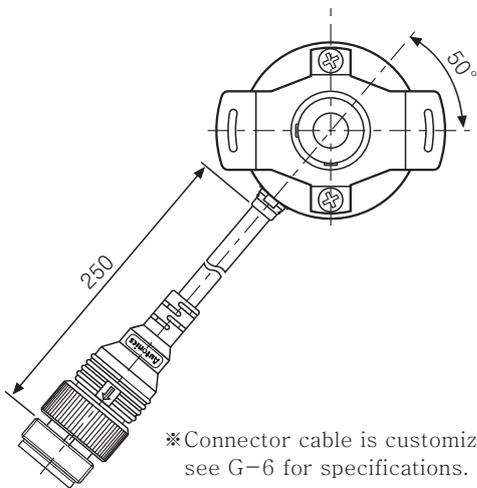
■ Normal type

(Unit:mm)

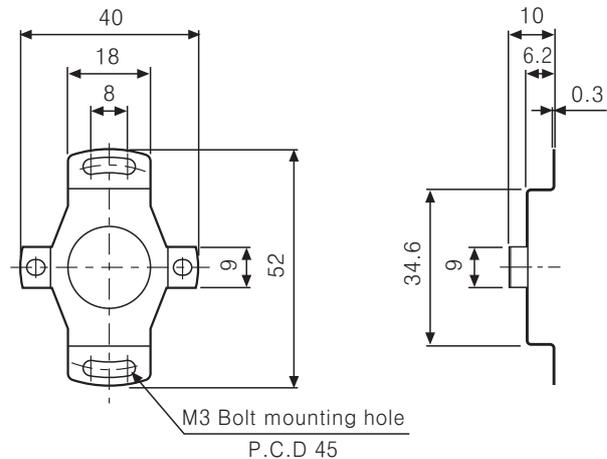


Cable for normal type
 ϕ 5mm, 5P (Line Driver output : 8P),
Length:2000, Shield cable

■ Cable outgoing connector type



● Bracket



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

E50S Series

Diameter ϕ 50mm Shaft type Incremental Rotary encoder

Line-up

■ Features

- 12–24VDC power supply of line driver output(Line-up)
- Suitable for measuring angle, position, revolution, speed, acceleration and distance
- Power supply : 5VDC, 12–24VDC \pm 5%

■ Applications

- Various tooling machinery, packing machine and general industrial machinery etc.

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



■ Ordering information (Former name : ENB)

E50S	8	–	5000	–	3	–	N	–	24	–	
Series	Shaft diameter	Pulse/1Revolution	Output phase	Output	Power supply	Cable					
Diameter ϕ 50mm, shaft type	ϕ 8mm	Refer to resolution	2:A, B 3:A, B, Z 4:A, \bar{A} , B, \bar{B} 6:A, A, B, B, Z, \bar{Z}	T:Totem pole output N:NPN open collector output V:Voltage output L:Line driver output	5 :5VDC \pm 5% 24:12–24VDC \pm 5%	Blank:Normal type C:Cable outgoing connector type(*) CR:Rear side outgoing connector integrated type CS:Side outgoing connector integrated type					

*Standard:E50S8–PULSE–3–N–24

*Standard:A, B, Z

*Cable length:250mm

■ Specifications

Item		Diameter ϕ 50mm shaft type of incremental rotary encoder		
Resolution(P/R)		(Note1) *1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 5000, 6000, 8000 (Not indicated resolution is customizable.)		
Electrical specification	Output phase	A, B, Z phase (Line driver : A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)		
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)		
	Control output	Totem pole output	<ul style="list-style-type: none"> • Low \Rightarrow Load current:Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current:Max. 10mA, Output voltage(Power supply 5VDC):Min. (Power supply–2.0)VDC, Output voltage(Power supply 12–24VDC):Min. (Power supply–3.0)VDC 	
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC	
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC	
	Response time (Rise/Fall)	Line driver output	<ul style="list-style-type: none"> • Low \Rightarrow Load current : Max. 20mA, Residual : Max. 0.5VDC • High \Rightarrow Load current : Max. –20mA, Output voltage (Power supply 5VDC) : Min. 2.5VDC, Output voltage (Power supply 12–24VDC) : Min. (Power supply–3.0)VDC 	
		Totem pole output	Max. 1 μ s	
		NPN open collector output	Max. 1 μ s	
		Voltage output	Max. 1 μ s	
	Max. Response frequency	300kHz		• Measuring condition \Rightarrow Cable length : 2m, I sink = Max. 20mA
	Power supply	• 5VDC \pm 5% (Ripple P–P : Max. 5%) • 12–24VDC \pm 5% (Ripple P–P : Max. 5%)		
Current consumption	Max. 80mA (disconnection of the load), Line driver output : Max. 50mA (disconnection of the load)			
Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)			
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)			
Connection	Cable outgoing type, 200mm cable outgoing connector type, Connector integrated type (Rear, Side)			
Mechanical specification	Starting torque	(Note2) Max. 70gf \cdot cm (0.007N \cdot m)/Connector Type : Max. 800gf \cdot cm (0.08N \cdot m)		
	Moment of inertia	Max. 80g \cdot cm ² (8×10^{-6} kg \cdot m ²)/Connector Type : Max. 400gf \cdot cm ² (4×10^{-5} kg \cdot m ²)		
	Shaft loading	Radial : Max. 10kgf, Thrust : Max. 2.5kgf		
	Max. allowable revolution	(Note3) 5000rpm		
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 $^{\circ}$ C (at non–freezing status), Storage : –25 to 85 $^{\circ}$ C			
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH			
Protection	IP50, Customizable as IP64, Connector integrated type : IP65 (IEC standard)			
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable (Line driver output : ϕ 5mm, 8P)			
Accessory	ϕ 8mm coupling, bracket			
Approval	CE (Except for line driver output)			
Unit weight	Approx. 275g, Connector integrated type : 180g			

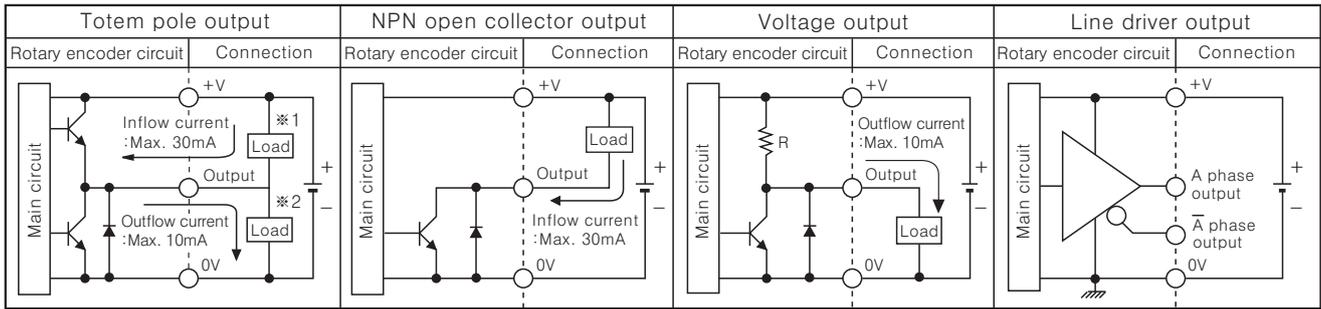
* **(Note1)** * pulse is only for A, B phase (Line driver output is for A, \bar{A} , B, \bar{B} phase).

* **(Note2)** Lower torque than the rated value, it can be customizable.

* **(Note3)** Max. allowable revolution \geq Max. response revolution $\left[\text{Max. response resolution (rpm)} = \frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.} \right]$

Incremental ϕ 50mm Shaft Type

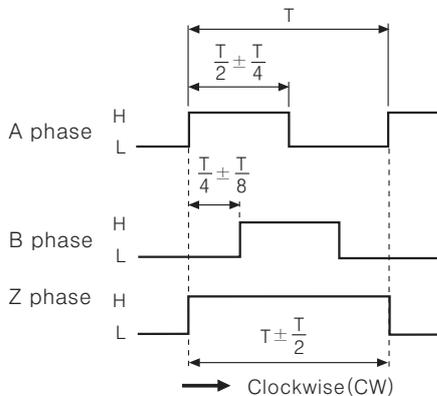
Control output diagram



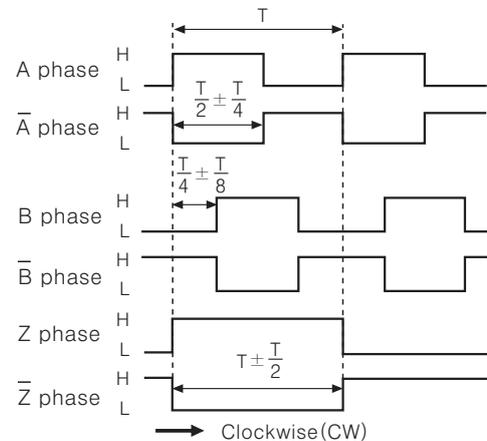
- Totem pole output type can be used for NPN open collector output type(*1) or Voltage output type(*2).
- All output circuits of A, B, Z phase are the same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

Output waveform

- Totem pole output / NPN open collector output / Voltage output
- Line driver output



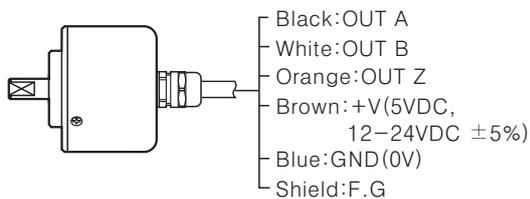
*CW : Right turn as from the shaft



Connections

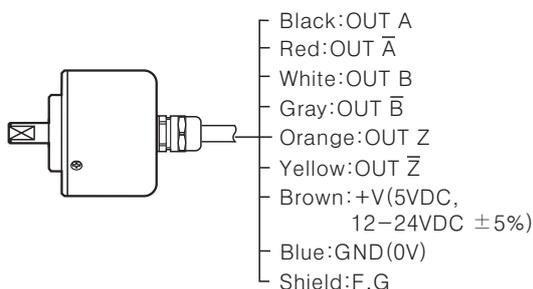
Normal type

- Totem pole output / NPN open collector output / Voltage output



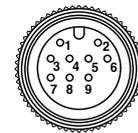
- *Unused wires must be insulated.
- *The metal and shield cable of encoder should be grounded(F,G)

- Line driver output



Cable outgoing connector/ Connector integrated type

- Totem pole output
- NPN open collector output
- Voltage output
- Line driver output



Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT \bar{A}	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT \bar{B}	Gray
			⑦	OUT Z	Orange
			⑧	OUT \bar{Z}	Yellow
			⑨	F.G	Shield

*F.G(Field Ground) : It should be grounded separately.

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

E50SP Series Incremental ϕ 50mm Shaft Type

Diameter ϕ 50mm Shaft type Incremental Rotary encoder

Features

- Light plastic body
- Suitable for measuring angle, position, revolution, speed, acceleration and sensing distance
- Power supply : 5VDC, 12–24VDC \pm 5%

Applications

- Various tooling machinery, packing machine and general industrial machinery etc.

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



Ordering information (Former name : ENB)

E50S	8	P	600	3	N	24	
Series	Shaft diameter	External material	Pulse/1Revolution	Output phase	Control output	Power supply	Cable
Diameter ϕ 50mm, shaft type	6 : ϕ 6mm 8 : ϕ 8mm	Plastic	Refer to resolution	2:A, B 3:A, B, Z 4:A, \bar{A} , B, \bar{B} 6:A, \bar{A} , B, \bar{B} , Z, \bar{Z}	T:Totem pole output N:NPN open collector output V:Voltage output L:Line driver output(*)	5 :5VDC \pm 5% 24:12–24VDC \pm 5%	Blank:Normal type (*) C:Cable outgoing connector type

※Standard: E50S8P-**PULSE**-3-N-24

※Standard : A, B, Z
※The power of Line driver is only for 5VDC

※Cable length : 250mm

Specifications

Item		Diameter ϕ 50mm shaft type of incremental rotary encoder		
Resolution(P/R)		(Note1) *1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600		
Electrical specification	Output phase	A, B, Z phase (Line driver : A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)		
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)		
	Control output	Totem pole output	• Low \Rightarrow Load current:Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current:Max. 10mA, Output voltage(Power supply 5VDC):Min. (Power supply-2.0)VDC, Output voltage(Power supply 12-24VDC):Min. (Power supply-3.0)VDC	
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC	
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC	
	Response time (Rise/Fall)	Line driver output	• Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5VDC • High \Rightarrow Load current : Max. -20mA, Output voltage : Min. 2.5VDC	
		Totem pole output	Max. 1 μ s	
		NPN open collector output	Max. 1 μ s	
		Voltage output	Max. 1 μ s	
	Mechanical specification	Line driver output	Max. 0.5 μ s	
Max. Response frequency		180kHz		
Power supply		• 5VDC \pm 5% (Ripple P-P : Max. 5%) • 12-24VDC \pm 5% (Ripple P-P : Max. 5%)		
Current consumption		Max. 80mA (disconnection of the load), Line driver output : Max. 50mA (disconnection of the load)		
Insulation resistance		Min. 100M Ω (at 500VDC megger between all terminals and case)		
Dielectric strength		750VAC 50/60Hz for 1 minute (Between all terminals and case)		
Connection		Cable outgoing type, 250mm cable outgoing connector type		
Starting torque		Max. 100gf \cdot cm (0.01N \cdot m)		
Moment of inertia		Max. 40g \cdot cm ² (4 \times 10 ⁻⁶ kg \cdot m ²)		
Shaft loading		Radial : Max. 2kgf, Thrust : Max. 1kgf		
Max. allowable revolution	(Note2) 5000rpm			
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 $^{\circ}$ C (at non-freezing status), Storage : -25 to 85 $^{\circ}$ C			
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH			
Protection	IP50 (IEC standard)			
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable (Line driver output : ϕ 5mm, 8P)			
Accessory	ϕ 8mm coupling standard, ϕ 6mm coupling (Customizable), Bracket			
Unit weight	Approx. 235g			

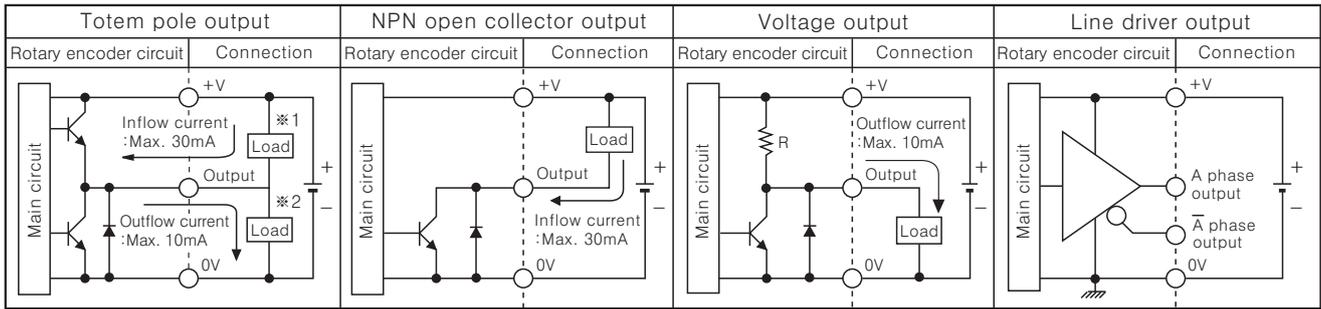
※ **(Note1)** * pulse is only for A, B phase (Line Driver output is for A, \bar{A} , B, \bar{B} phase)

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

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

E50SP Series

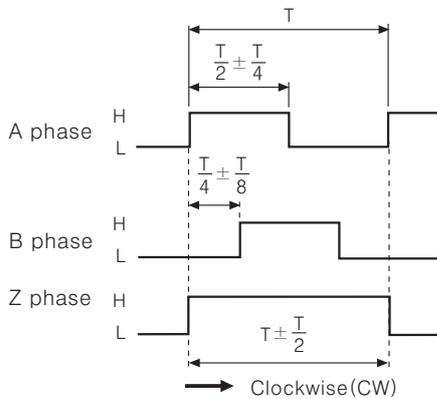
Control output diagram



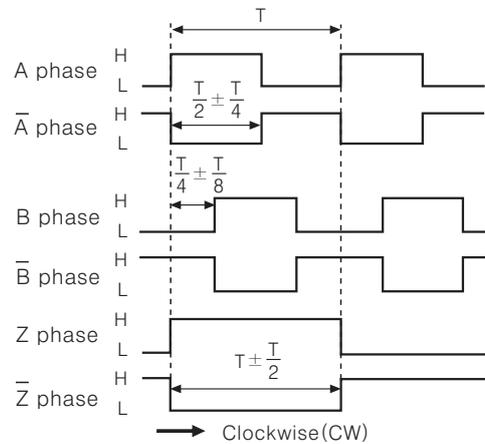
- Totem pole output type can be used for NPN open collector output type(*1) or Voltage output type(*2).
- All output circuits of A, B, Z phase are the same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

Output waveform

- Totem pole output / NPN open collector output / Voltage output
- Line driver output



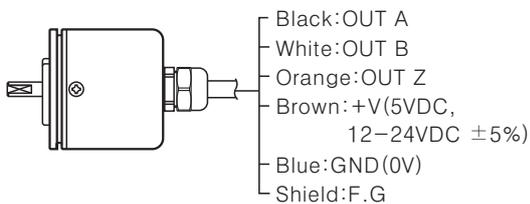
*CW : Right turn as from the shaft



Connections

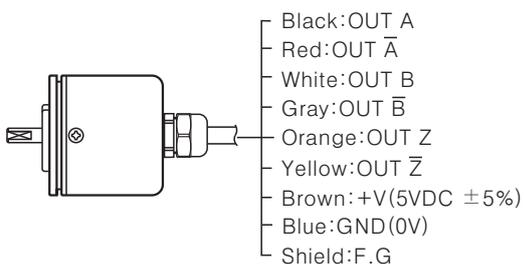
Normal type

- Totem pole output / NPN open collector output / Voltage output



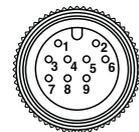
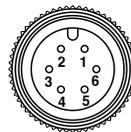
*Unused wires must be insulated.

- Line driver output



Cable outgoing connector type

- Totem pole output
- Line driver output
- NPN open collector output
- Voltage output



Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT \bar{A}	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT \bar{B}	Gray
			⑦	OUT Z	Orange
			⑧	OUT \bar{Z}	Yellow
			⑨	F.G	Shield

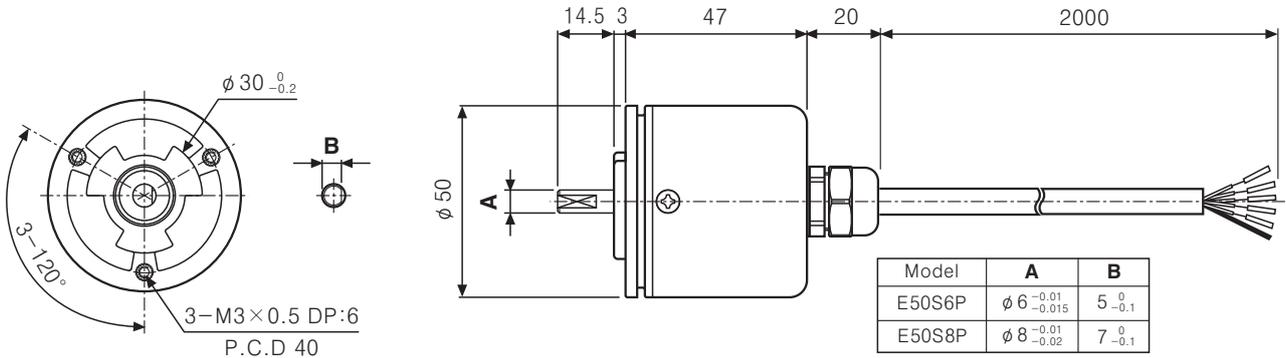
*F.G(Field Ground) : It should be grounded separately.

Incremental $\phi 50\text{mm}$ Shaft Type

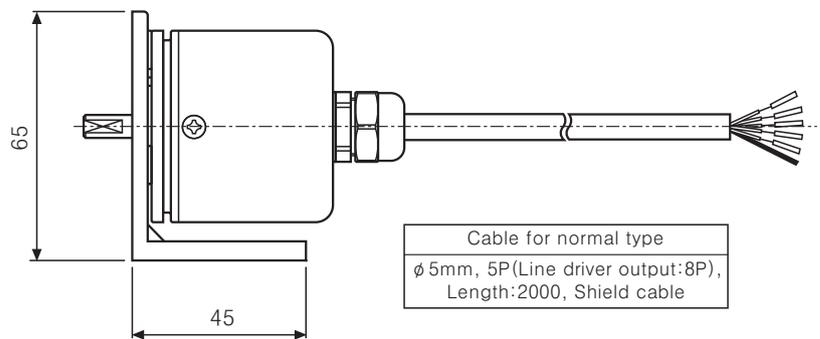
Dimensions

Normal type

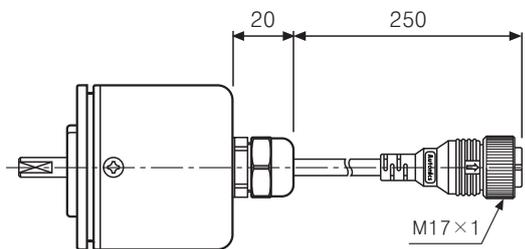
(Unit:mm)



◎Connect the bracket

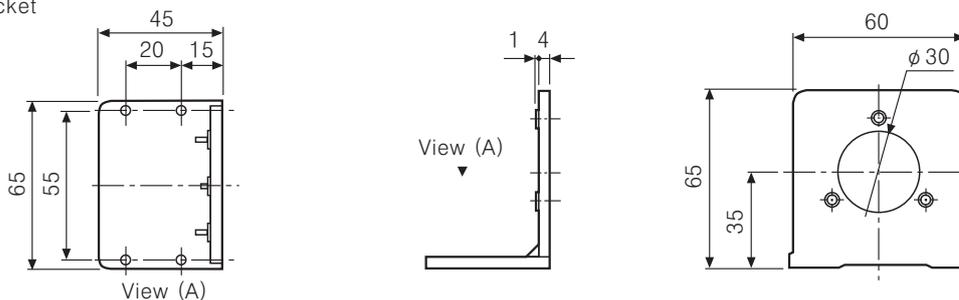


Cable outgoing connector type



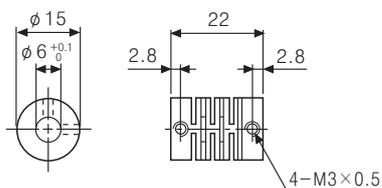
*Connector cable is customizable and see G-6 for specifications.

◎Bracket

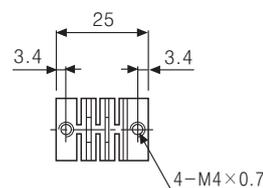


◎Coupling(E50S)

● $\phi 6$ Coupling



● $\phi 8$ Coupling



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

E58 Series

Diameter ϕ 58mm Shaft type/Hollow type/Built-in type Incremental Rotary encoder

Features

- Diameter ϕ 58mm flange type
- Suitable for measuring angle, position, revolution, speed, acceleration and distance
- Power supply : 5VDC, 12–24VDC \pm 5%

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



Ordering information

E58SC	10	8000	3	N	24		
Series Diameter ϕ 58mm	Shaft diameter		Pulse/ 1 Revolution	Output phase	Output	Power supply	Cable
SC: Shaft Clamping	External	10 ϕ 10mm	Refer to resolution	2:A, B 3:A, B, Z (Standard) 4:A, \bar{A} , B, \bar{B} 6:A, \bar{A} , B, \bar{B} , Z, \bar{Z}	T: Totem pole output N: NPN open collector output V: Voltage output L: Line driver output (The power of Line driver is only for 5VDC.)	5: 5VDC \pm 5% 24: 12–24VDC \pm 5%	Blank: Normal type C: Cable outgoing connector type (250mm) CR: Axial connector integrated type CS: Radial connector integrated type
SS: Shaft Synchro		6 ϕ 6mm					
H: Hollow	Inner	12 ϕ 12mm					
HB: Hollow Built-in							

*Standard: E58SC10-PULSE-3-N-24 *Customizable model specifications are available.

*Standard cable for shaft/built-in encoder is axial connector type cable.
Standard cable for hollow shaft encoder is radial connector type cable.

Specifications

Item	Diameter ϕ 58mm incremental rotary encoder	
Resolution (P/R)	(Note1) *1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 5000, 6000, 8000	
Output phase	A, B, Z phase (Line driver output : A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	
Phase difference of output	Phase difference between A and B phase : $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)	
Control output	Totem pole output	• Low \Rightarrow Load current : Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current : Max. 10mA, Output voltage (Power voltage 5VDC) : Min. (Power voltage-2.0)VDC, Output voltage (Power voltage 12–24VDC) : Min. (Power voltage-3.0)VDC
	NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC
	Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
	Line driver output	• Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5VDC • High \Rightarrow Load current : Max. -20mA, Output voltage : Min. 2.5VDC
Res- ponse time (Rise/ Fall)	Totem pole output	Max. 1 μ s (Cable length: 2m, I sink=20mA)
	NPN open collector output	
	Voltage output	
Line driver output	Max. 0.5 μ s (Cable length: 2m, I sink=20mA)	
Max. Response frequency	300kHz	
Power supply	• 5VDC \pm 5% (Ripple P-P : Max. 5%) • 2–24VDC \pm 5% (Ripple P-P : Max. 5%)	
Current consumption	Max. 80mA (disconnection of the load), Line driver output : Max. 50mA (disconnection of the load)	
Insulation resistance	Min. 100M Ω (at 500VDC mega for all terminals and case)	
Dielectric strength	750VAC 50/60Hz for 1 minute (all terminals and case)	
Connection	Cable outgoing type, Cable outgoing connector type, Connector integrated type (axial, radial)	
Mechanical specification	Starting torque	• SC/SS type : Max. 40gf \cdot cm (0.004N \cdot m) • HB/H type : Max. 90gf \cdot cm (0.009N \cdot m)
	Moment of inertia	• SC/SS type : Max. 15g \cdot cm ² (1.5 \times 10 ⁻⁶ kg \cdot m ²) • HB/H type : Max. 20g \cdot cm ² (2 \times 10 ⁻⁶ kg \cdot m ²)
	Shaft loading	• SC/SS type \Rightarrow Max. Radial : 10kg \cdot f, Thrust : Max. 2.5kg \cdot f • HB/H type \Rightarrow Max. Radial : 2kg \cdot f, Thrust : Max. 1kg \cdot f
	Max. allowable revolution	(Note2) 5000rpm
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for one minute cycle) in each of X, Y, Z directions for 2 hours	
Shock	Max. 75G	
Ambient temperature	-10 to 70 $^{\circ}$ C (at non-freezing status), Storage : -25 to 85 $^{\circ}$ C	
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH	
Protection	IP50 (IEC standard)	
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable (Line driver output : ϕ 5mm, 8P)	
Accessory	ϕ 10mm (SC type) / ϕ 6mm (SS type) coupling, Fixing bracket	
Approval	CE (Except Line driver output)	
Unit weight	• SC-CS/CR type: Approx. 230g, SS-CS/CR type: Approx. 205g, HB-CS/CR type: Approx. 200g • SC type: Approx. 310g, SS type: Approx. 285g, HB type: Approx. 270g, H type: Approx. 270g	

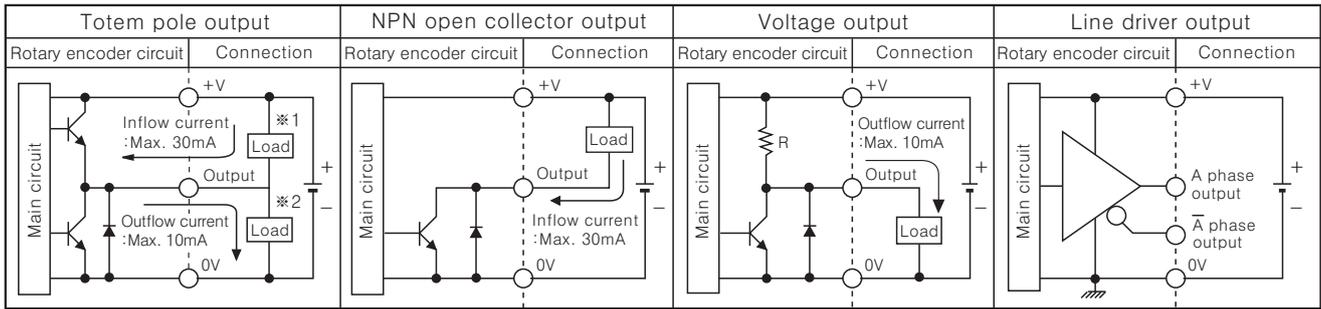
***(Note1)** 1, 2, 5 12 P/R output A and B phase only. (But Line driver output : A, \bar{A} , B, \bar{B} phase) [In case of hollow shaft type, 6000, 8000 P/R excluded]

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

Please select the resolution to make max. revolution lower than max. allowable revolution.

Incremental ϕ 58mm Shaft/Hollow Shaft/Built-in Type

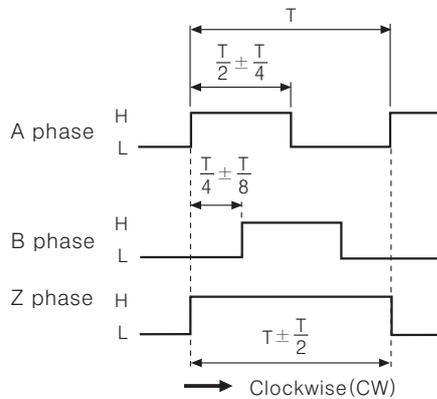
Control output diagram



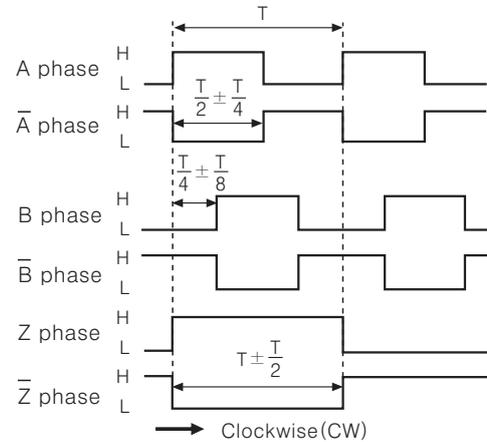
- Totem pole output type can be used for NPN open collector output type (*1) or Voltage output type (*2).
- All output circuits of A, B, Z phase are the same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

Output waveform

- Totem pole output / NPN open collector output / Voltage output
- Line driver output



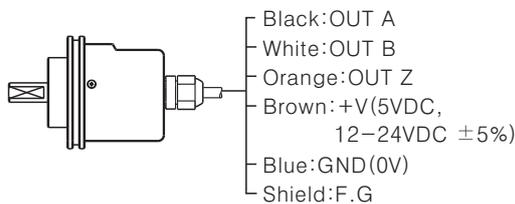
*CW : Right turn as from the shaft



Connections

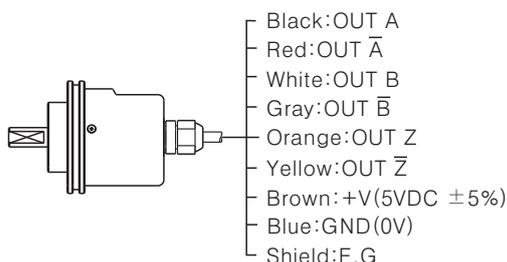
Normal type

- Totem pole output / NPN open collector output / Voltage output



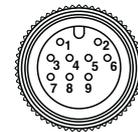
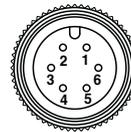
- Unused wires must be insulated.
- The metal and shield cable of encoder should be grounded(F.G)

- Line driver output



Cable outgoing connector/ Connector integrated type

- Totem pole output
- Line driver output
- NPN open collector output
- Voltage output



Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT \bar{A}	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT \bar{B}	Gray
			⑦	OUT Z	Orange
			⑧	OUT \bar{Z}	Yellow
			⑨	F.G	Shield

*F.G(Field Ground) : It should be grounded separately.

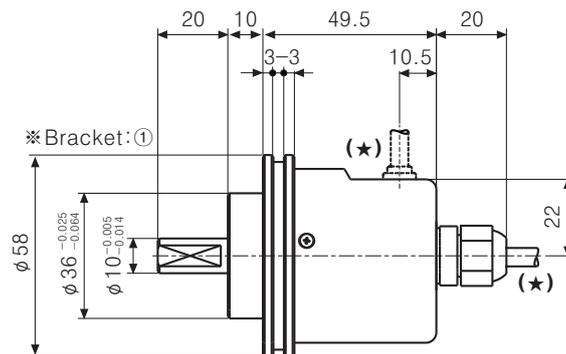
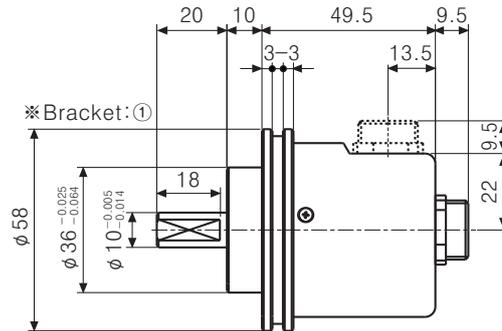
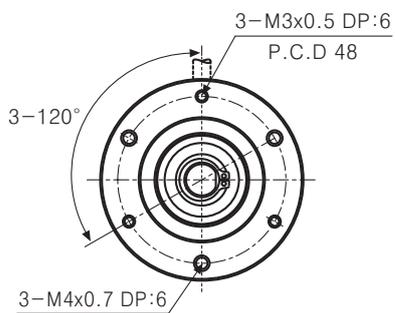
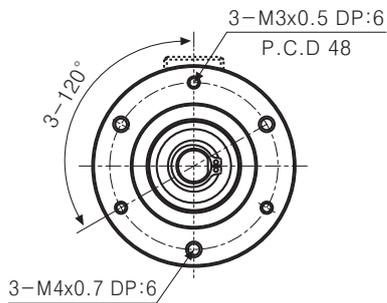
- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
- (I) SSR/Power controller
- (J) Counter
- (K) Timer
- (L) Panel meter
- (M) Tacho/Speed/Pulse meter
- (N) Display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

E58 Series

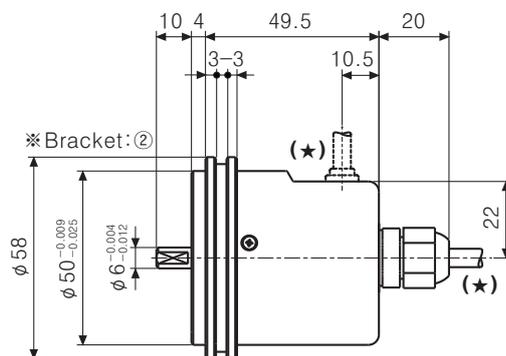
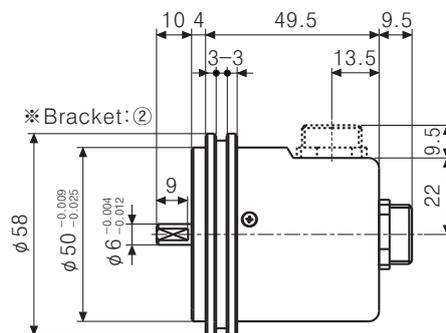
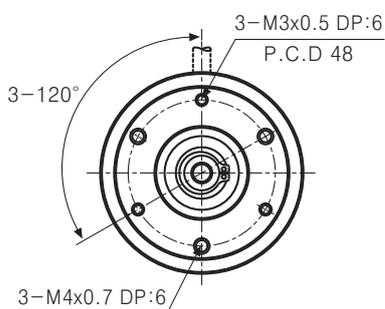
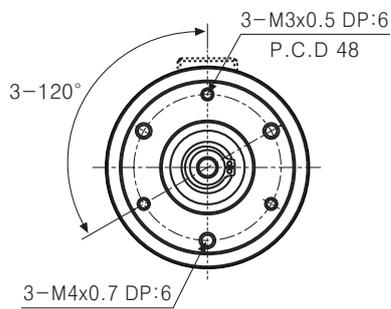
■ Dimensions

(Unit:mm)

■ Shaft clamping type

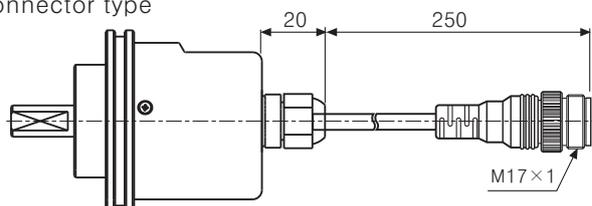


■ Shaft synchro type



※ (★) Cable for normal type
 ϕ 5mm, 5P (Line driver output: 8P),
 Length: 2000, Shield cable

● Cable outgoing connector type

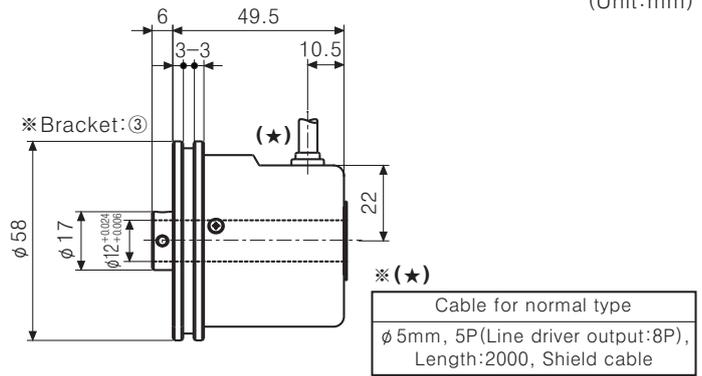
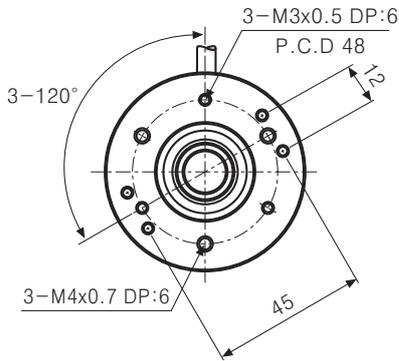


※ Connector cable is customizable and see G-6 for specifications.

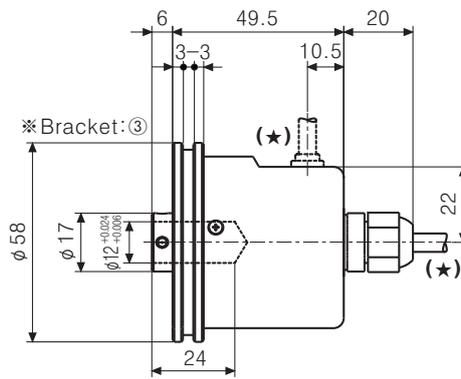
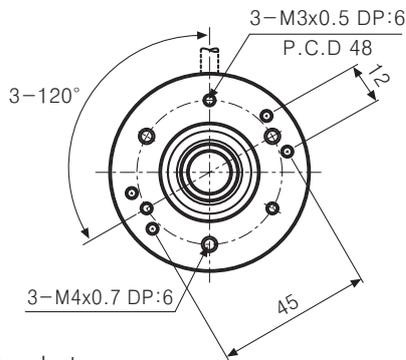
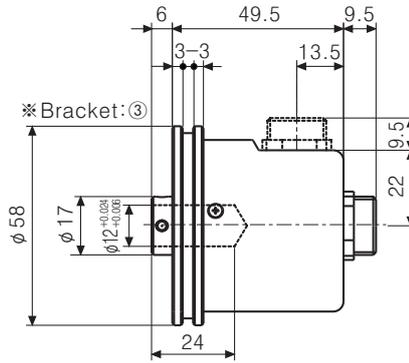
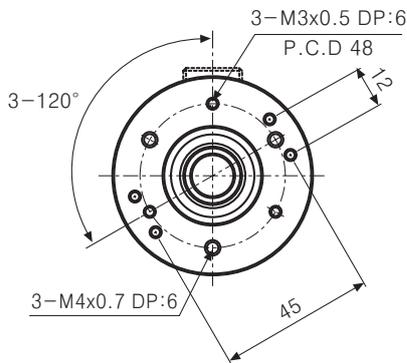
Incremental $\phi 58\text{mm}$ Shaft/Hollow Shaft/Built-in Type

Dimensions

Hollow type

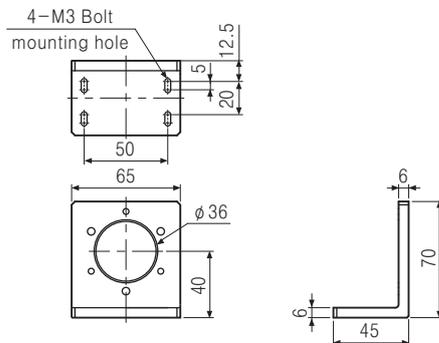


Hollow built-in type

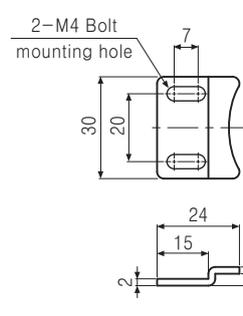


Bracket

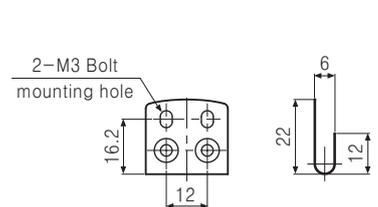
*SC type:①



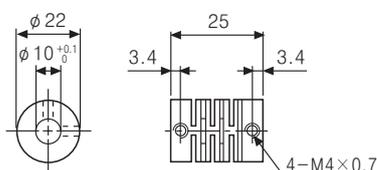
*SS type:②



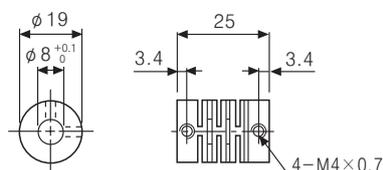
*HB/H type:③



$\phi 10$ Coupling(E58SC10 Series)



$\phi 8$ Coupling(E58SS6 Series)



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

E60H Series

Diameter ϕ 60mm Hollow shaft type Incremental Rotary encoder

Line-up

Features

- Diameter ϕ 60mm, Inner diameter of shaft ϕ 20mm
- Easy installation at narrow space
- Suitable for measuring angle, position, revolution, speed, acceleration and distance
- Power supply : 5VDC, 12–24VDC \pm 5%
- Various output types



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

Ordering information

E60H	20	–	8192	–	3	–	N	–	24	–	
Series	Shaft diameter	Pulse/1Revolution	Output phase	Output	Power supply	Cable					
Diameter ϕ 60mm, hollow shaft type	ϕ 20mm	100, 1024, 5000, 8192	3 : A, B, Z 6 : A, \bar{A} , B, \bar{B} , Z, \bar{Z}	T : Totem pole output N : NPN open collector output V : Voltage output L : Line driver output(*)	5 : 5VDC \pm 5% 24 : 12–24VDC \pm 5%	Blank: Normal type (*) C: Cable outgoing connector type					

*Standard : E60H20–[PULSE]–3–N–24

*The power of Line driver is only for 5VDC

*Cable length : 250mm

Specifications

Item	Diameter ϕ 60mm hollow shaft type of incremental rotary encoder		
Resolution(P/R)	(Note1) 100, 1024, 5000, 8192		
Electrical specification	Output phase	A, B, Z phase (Line driver output A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)	
	Control output	Totem pole output	• Low \Rightarrow Load current:Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current:Max. 10mA, Output voltage(Power supply 5VDC):Min. (Power supply–2.0)VDC, Output voltage(Power supply 12–24VDC):Min. (Power supply–3.0)VDC
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
		Line driver output	• Low \Rightarrow Load current : Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current : Max. 10mA, Output voltage(Power supply 5VDC) : Min. (Power voltage–2.0)VDC, Output voltage(Power voltage 12–24VDC) : Min. (Power voltage–3.0)VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s
		NPN open collector output	Max. 1 μ s
		Voltage output	Max. 1 μ s
		Line driver output	Max. 0.5 μ s
	Max. Response frequency	300kHz	
	Power supply	• 5VDC \pm 5%(Ripple P–P:Max. 5%) • 12–24VDC \pm 5%(Ripple P–P:Max. 5%)	
	Current consumption	Max. 80mA(disconnection of the load), Line driver output : Max. 50mA(disconnection of the load)	
	Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)	
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)		
Connection	Cable outgoing type, 250mm cable outgoing connector type		
Mechanical specification	Starting torque	Max. 150gf · cm (0.015N · m)	
	Moment of inertia	Max. 110g · cm ² (11 \times 10 ^{–5} kg · m ²)	
	Shaft loading	Radial : 5kgf, Thrust : 2.5kgf	
	Max. allowable revolution	(Note2) 6000rpm	
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock	Max. 100G		
Ambient temperature	–10 to 70 $^{\circ}$ C (at non–freezing status), Storage : –25 to 85 $^{\circ}$ C		
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH		
Protection	IP50(IEC standard)		
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable (Line driver output : ϕ 5mm, 8P)		
Accessory	Bracket		
Unit weight	Approx. 300g		

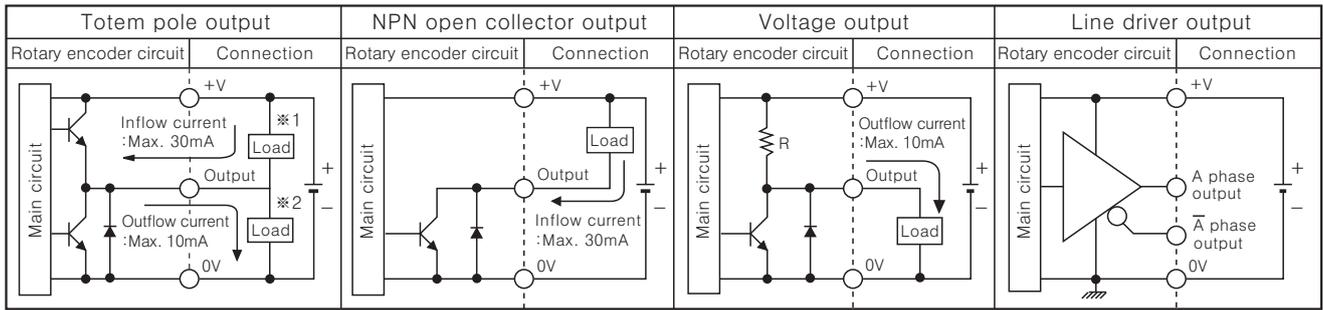
* **(Note1)** Not indicated type is customizable.

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

Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

Incremental ϕ 60mm Hollow Shaft Type

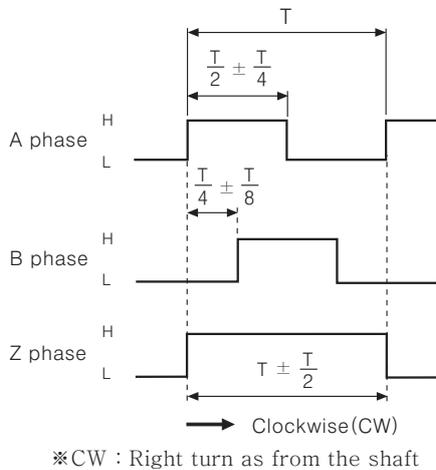
Control output diagram



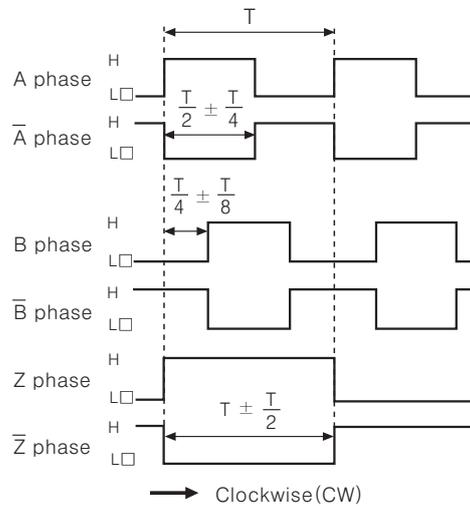
- Totem pole output type can be used for NPN open collector output type(*1) or Voltage output type(*2).
- All output circuits of A, B, Z phase are the same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

Output waveform

- Totem pole output / NPN open collector output / Voltage output



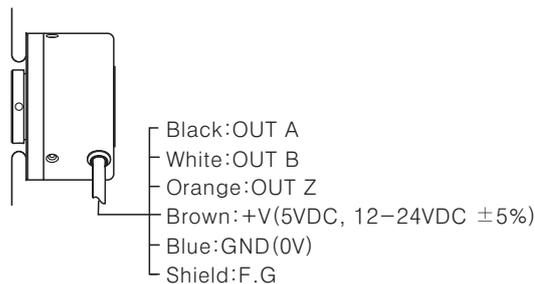
- Line driver output



Connections

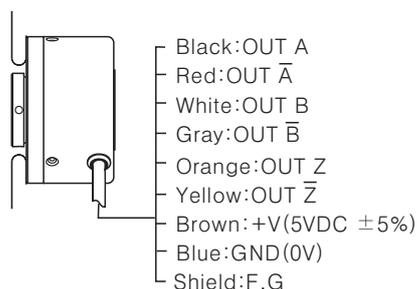
Normal type

- Totem pole output / NPN open collector output / Voltage output



- *Unused wires must be insulated.
- *The metal case and shield cable of encoder should be grounded(F.G).

- Line driver output



Cable outgoing connector type

- Totem pole output / NPN open collector output / Voltage output
- Line driver output



Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT \bar{A}	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT \bar{B}	Gray
			⑦	OUT Z	Orange
			⑧	OUT \bar{Z}	Yellow
			⑨	F.G	Shield

*F.G(Field Ground) : It should be grounded separately.

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

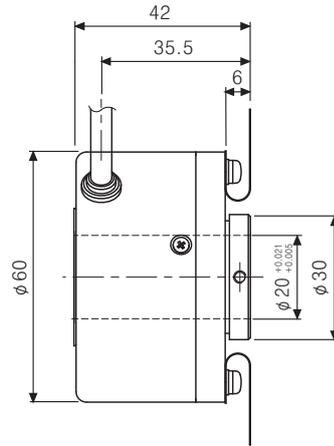
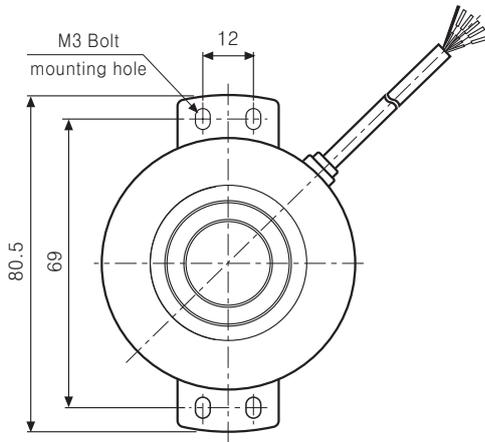
(T) Production stoppage models & replacement

E60H Series

Dimension

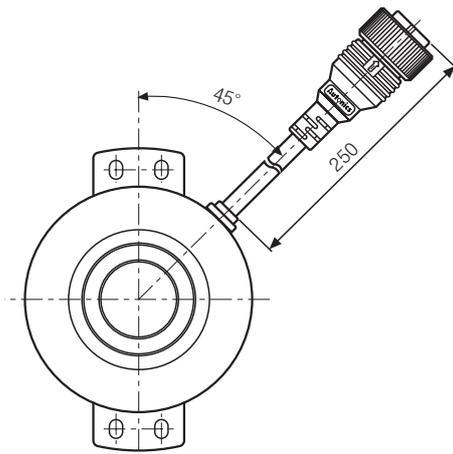
(Unit:mm)

Normal type

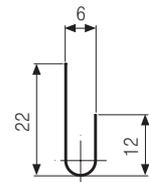
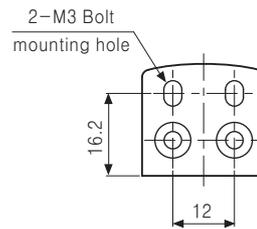


Cable for normal type φ 5mm, 5P(Line driver output:8P), Length:2000m, Shield cable
--

Cable outgoing connector type



Bracket



※Connector cable is customizable and see G-6 for specifications.

E68S Series Incremental ϕ 68mm Shaft Type

Diameter ϕ 68mm Shaft type Incremental Rotary encoder

■ Features

- Diameter ϕ 68mm, shaft diameter ϕ 15mm
- High speed response frequency : 180kHz
- Connector type
- Suitable for tooling machinery
- Protection structure IP64 (Partial waterproof, Oil proof)
- High shaft loading capabilities (Allowable load weight is 10kgf)



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

■ Ordering information

E68S	15	1024	6	L	5
Series	Shaft diameter	Pulse/1 Revolution	Output phase	Output	Power supply
Diameter ϕ 68mm, shaft type	ϕ 15mm	1024	6 : A, \bar{A} , B, \bar{B} , Z, \bar{Z}	L : Line driver output	5VDC \pm 5%

■ Specifications

Item		Diameter ϕ 68mm shaft type of incremental rotary encoder
Resolution (P/R)		(Note1) 1024
Electrical specification	Output phase	A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)
	Output Duty ratio	• A, B phase Duty ratio : $\frac{T}{2} \pm \frac{T}{8}$ • Z phase Duty ratio : $T \pm \frac{T}{4}$
	Control output	• Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5VDC • High \Rightarrow Load current : Max. -20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Max. 0.5 μ s (Cable : 1m, I sink = 20mA)
	Power supply	5VDC \pm 5% (Ripple P-P : Max. 5%)
	Max. Response frequency	180kHz
	Current consumption	Max. 50mA
	Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)
	Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)
Connection	Connector type (MS3102A20-29P)	
Mechanical specification	Starting torque	1.5kgf \cdot cm (Max. 0.15N \cdot m)
	Shaft loading	Radial : 20kgf, Thrust : 10kgf
	Max. allowable revolution	(Note2) 6,500rpm
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours	
Shock	Max. 50G	
Ambient temperature	-10 to 70 $^{\circ}$ C (at non-freezing status), Storage : -25 to 85 $^{\circ}$ C	
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH	
Protection	IP64 (IEC standard)	
Unit weight	Approx. 550g	

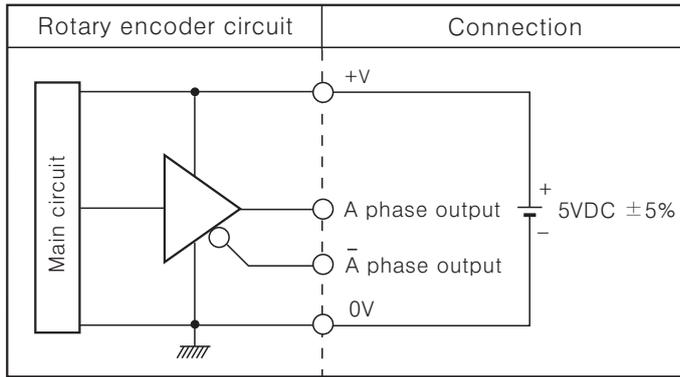
※ **(Note1)** Not indicated type is customizable.

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

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

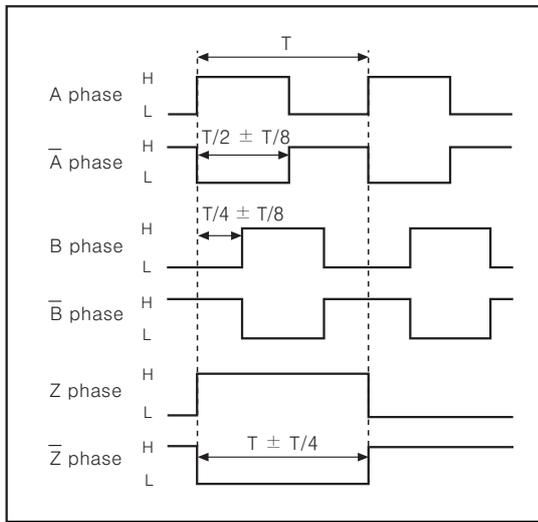
E68S Series

Control output diagram



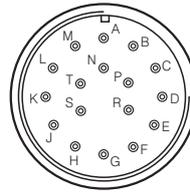
*All output circuits of A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase are the same.

Output waveform



*CW : Right turn as from the shaft

Connections



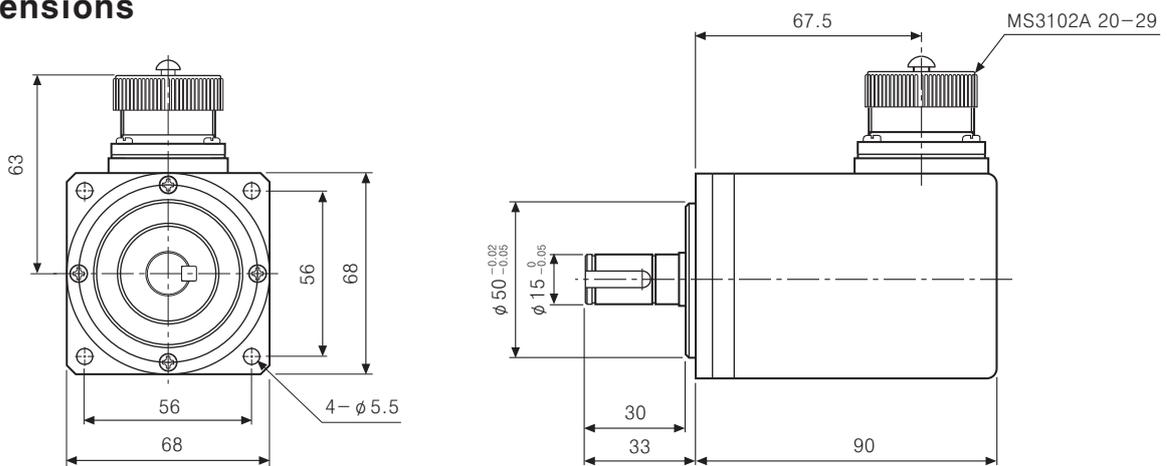
Pin No.	Cable color	Pin No.	Cable color
A	A phase	K	0V
B	Z phase	L	NC
C	B phase	M	0V
D	NC	N	\bar{A} phase
E	5VDC	P	\bar{Z} phase
F	NC	R	\bar{B} phase
G	NC	S	NC
H	5VDC	T	Shield(F.G)
J	NC	—	—

*N.C : Not Connected.

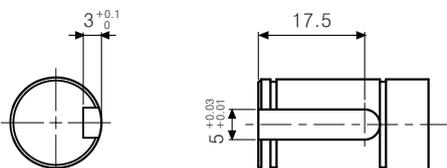
*Terminals E and H, K and M are connected internally.

*Cable sold separately.

Dimensions



●Shaft dimension



(Unit:mm)

Incremental ϕ 80mm Hollow Shaft Type

Diameter ϕ 80mm Hollow shaft type Incremental Rotary encoder

■ Features

- Diameter ϕ 80mm, Inner diameter of shaft ϕ 30mm, ϕ 32mm (Customizable)
- Allows to install directly at motor or machinery without coupling
- Power supply : 5VDC, 12–24VDC \pm 5%
- Various output types

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



■ Ordering information

E80H	30	3200	3	N	24	
Series	Shaft diameter	Pulse/1 Revolution	Output phase	Output	Power supply	Cable
Diameter ϕ 80mm, hollow shaft type	ϕ 30mm ϕ 32mm	60, 100, 360, 500, 512, 1024, 3200	3 : A, B, Z 6 : A, \bar{A} , B, \bar{B} , Z, \bar{Z}	T : Totem pole output N : NPN open collector output V : Voltage output L : Line driver output(*)	5 : 5VDC \pm 5% 24 : 12–24VDC \pm 5%	Blank : Normal type (*) C : Cable outgoing connector type

☞ Shaft inner diameter ϕ 32mm is customizable.

*The power of Line driver is only for 5VDC

*Cable length : 250mm

■ Specifications

Item	Diameter ϕ 80mm hollow shaft type of incremental rotary encoder		
Resolution (P/R)	(Note1) 60, 100, 360, 500, 512, 1024, 3200		
Electrical specification	Output phase	A, B, Z phase (Line driver output A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)	
	Control output	Totem pole output	• Low ☞ Load current: Max. 30mA, Residual voltage : Max. 0.4VDC • High ☞ Load current: Max. 10mA, Output voltage (Power supply 5VDC): Min. (Power supply–2.0)VDC, Output voltage (Power supply 12–24VDC): Min. (Power supply–3.0)VDC
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
		Line driver output	• Low ☞ Load current : Max. 20mA, Residual voltage : Max. 0.5VDC • High ☞ Load current : Max. –20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s
		NPN open collector output	Max. 1 μ s
		Voltage output	Max. 1 μ s
		Line driver output	Max. 0.5 μ s
	Max. Response frequency	200kHz	
	Power supply	• 5VDC \pm 5% (Ripple P–P: Max. 5%) • 12–24VDC \pm 5% (Ripple P–P: Max. 5%)	
	Current consumption	Max. 80mA (disconnection of the load), Line driver output: Max. 50mA (disconnection of the load)	
	Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)	
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)		
Connection	Cable outgoing type, 250mm cable outgoing connector type		
Mechanical specification	Starting torque	Max. 200gf · cm (0.02N · m)	
	Moment of inertia	Max. 800g · cm ² (8 × 10 ^{–5} kg · m ²)	
	Shaft loading	Radial : 5kgf, Thrust : 2.5kgf	
	Max. allowable revolution	(Note2) 3600rpm	
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°C (at non-freezing status), Storage : –25 to 85°C		
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH		
Protection	IP50 (IEC standard)		
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable (Line driver output : ϕ 5mm, 8P)		
Accessory	Spring bracket		
Unit weight	Approx. 560g		
Approval	CE (Except for line driver output)		

* **(Note1)** Not indicated type is customizable.

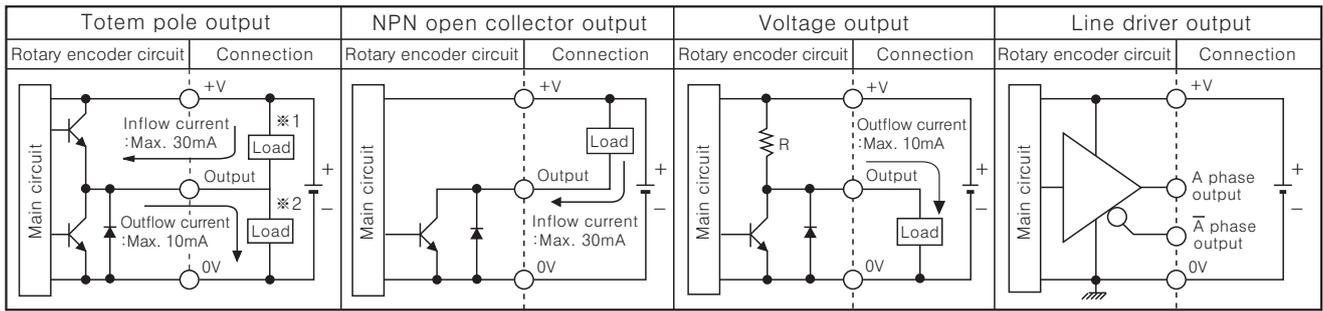
* **(Note2)** Max. allowable revolution \geq Max. response revolution **[Max. response revolution (rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.}$]**

Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

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

E80H Series

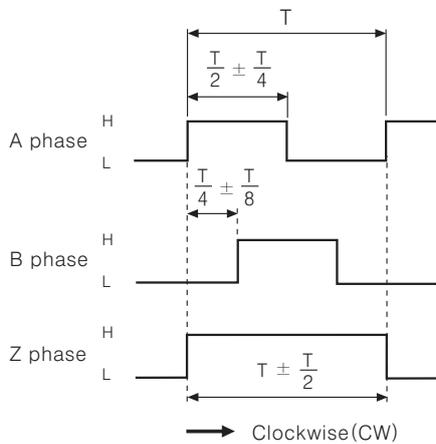
Control output diagram



- Totem pole output type can be used for NPN open collector output type(※1) or Voltage output type(※2).
- All output circuits of A, B, Z phase are the same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

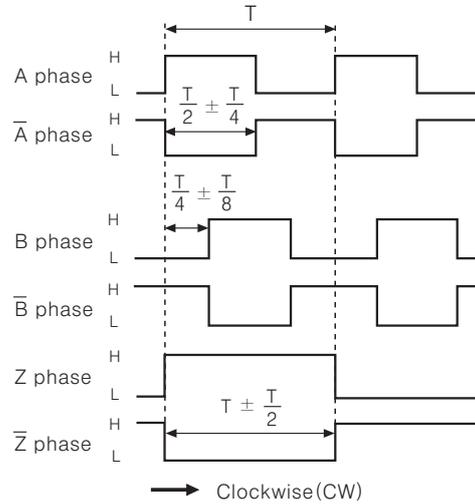
Output waveform

- Totem pole output / NPN open collector output / Voltage output



※CW : Right turn as from the shaft

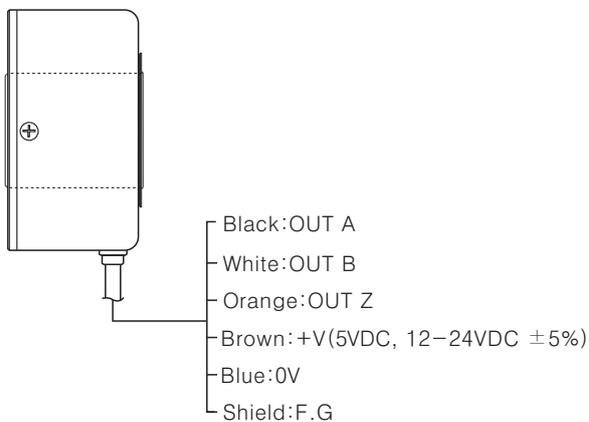
- Line driver output



Connections

Normal type

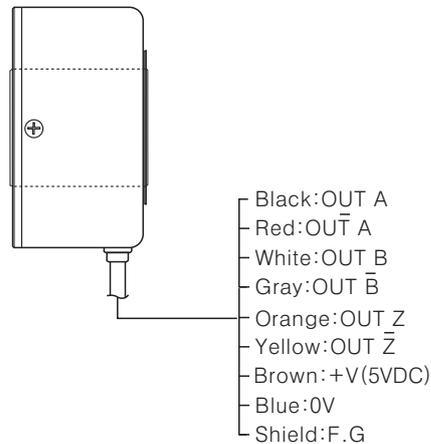
- Totem pole output / NPN open collector output / Voltage output



※ Unused wires must be insulated.

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

- Line driver output

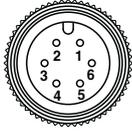


Incremental ϕ 80mm Hollow Shaft Type

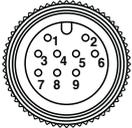
■ Connection

■ Cable outgoing connector type

- Totem pole output / NPN open collector output / Voltage output



- Line driver output



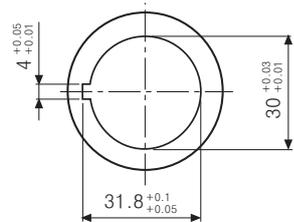
Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT \bar{A}	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT \bar{B}	Gray
			⑦	OUT Z	Orange
			⑧	OUT \bar{Z}	Yellow
			⑨	F.G	Shield

※F.G(Field Ground) : It should be grounded separately.

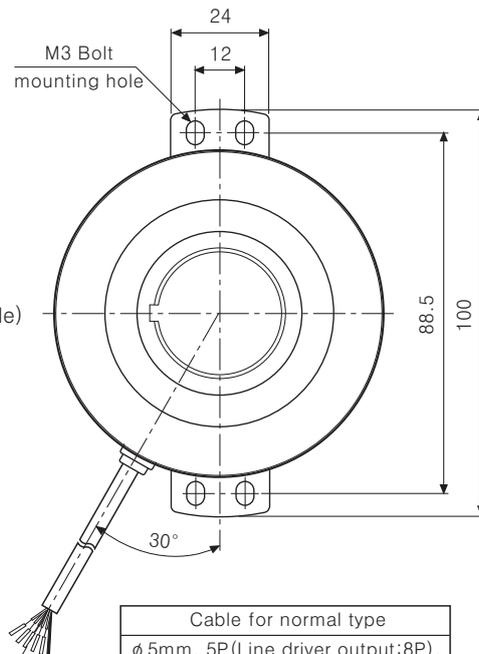
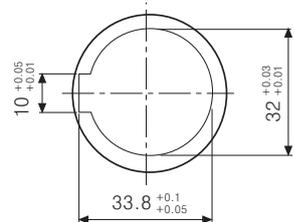
■ Dimensions

■ Normal type

- Inner diameter of shaft(Standard)

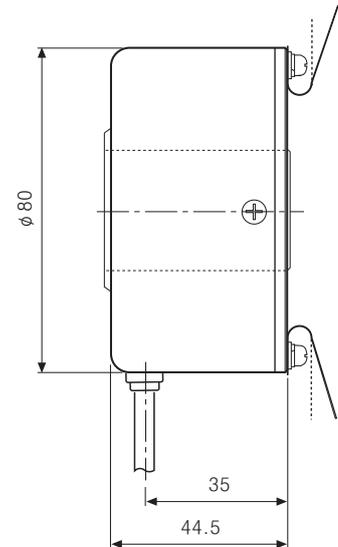


- Inner diameter of shaft(Customizable)

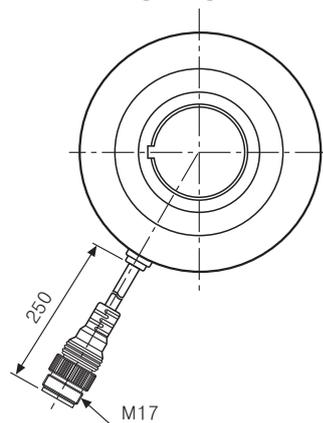


(Unit:mm)

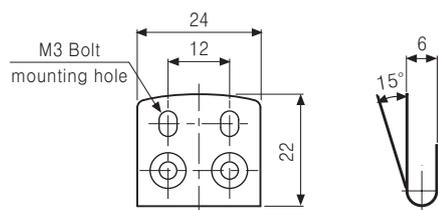
Cable for normal type
 ϕ 5mm, 5P(Line driver output:8P),
 Length:2000m, Shield cable



■ Cable outgoing connector type



● Bracket



※Connector cable is customizable and see G-6 for specifications.

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

E100H Series

Diameter ϕ 100mm Hollow shaft type Incremental Rotary encoder

■ Features

- Great environmental resistance
- High stability of output
- Exclusive for Elevator

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



■ Ordering information

E100H	35	10000	6	N	5
Series	Shaft diameter	Pulse/1Revolution	Output phase	Output	Power supply
Diameter ϕ 100mm hollow shaft type	ϕ 35mm	512 1024 10000	3 : A, B, Z 6 : A, \bar{A} , B, \bar{B} , Z, \bar{Z}	T : Totem pole output N : NPN open collector output V : Voltage output L : Line driver output(※)	5 : 5VDC \pm 5% 24 : 12-24VDC \pm 5%

※The power of Line driver is only for 5VDC

■ Specifications

Item	Diameter ϕ 100mm hollow shaft type of incremental rotary encoder		
Resolution(P/R)	(Note1) 512, 1024, 10000		
Electrical specification	Output phase	A, B, Z phase (Line driver output A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase)	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)	
	Control output	Totem pole output	• Low \Rightarrow Load current:Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current:Max. 10mA, Output voltage(Power supply 5VDC):Min. (Power supply-2.0)VDC, Output voltage(Power supply 12-24VDC):Min. (Power supply-3.0)VDC
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
		Line driver output	• Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5VDC • High \Rightarrow Load current : Max. -20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s
		NPN open collector output	Max. 1 μ s
		Voltage output	Max. 1 μ s
		Line driver output	Max. 0.5 μ s
	Max. Response frequency	300kHz	
	Power supply	• 5VDC \pm 5% (Ripple P-P : Max. 5%) • 12-24VDC \pm 5% (Ripple P-P : Max. 5%)	
	Current consumption	Max. 80mA (disconnection of the load), Line driver output : Max. 50mA (disconnection of the load)	
	Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)	
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)		
Connection	Connector type		
Mechanical specification	Starting torque	Max. 300gf \cdot cm (0.03N \cdot m)	
	Moment of inertia	Max. 800g \cdot cm ² (8 \times 10 ⁻⁵ kg \cdot m ²)	
	Shaft loading	Radial : 5kgf, Thrust : 2.5kgf	
	Max. allowable revolution	(Note2) 3600rpm	
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 $^{\circ}$ C (at non-freezing status), Storage : -25 to 85 $^{\circ}$ C		
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH		
Protection	IP50 (IEC standard)		
Cable	ϕ 5mm, 5P, Length : 5m, Shield cable (Line driver output : ϕ 6mm, 8P)		
Accessory	Spring bracket 2EA		
Approval	CE (Except for line driver output)		
Unit weight	Approx. 1200g		

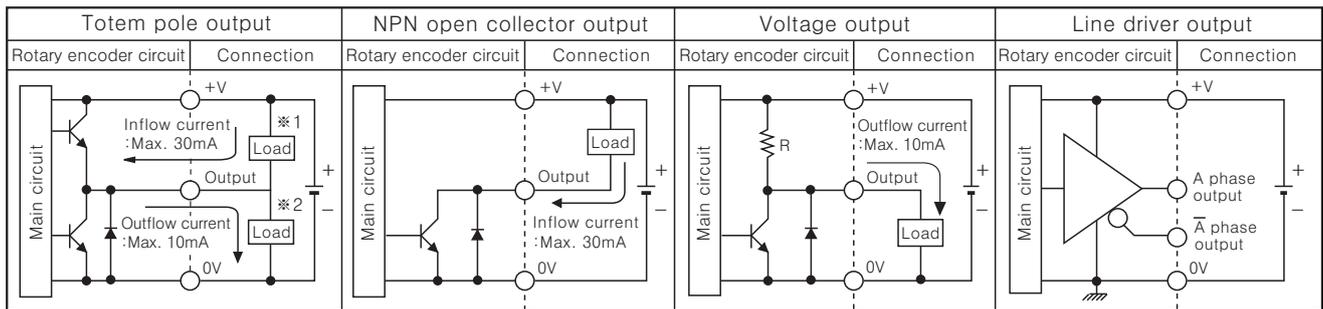
※(★Note1) Not indicated type is customizable.

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

Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

Incremental ϕ 100mm Hollow Shaft Type

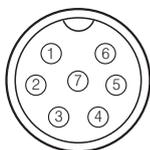
Control output diagram



- Totem pole output type can be used for NPN open collector output type(*1) or Voltage output type(*2).
- All output circuits of A, B, Z phase are same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

Connections

- Totem pole output / NPN open collector output / Voltage output



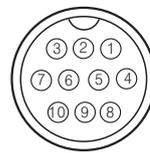
SCN-16-7P

Pin No.	Function	Cable color
①	+V	Brown
②	GND	Blue
③	OUT A	Black
④	OUT B	White
⑤	OUT Z	Orange
⑥	F.G	Shield
⑦	N.C	N.C

* Unused wires must be insulated.

* The metal case and shield cable should be grounded(F.G).

- Line driver output



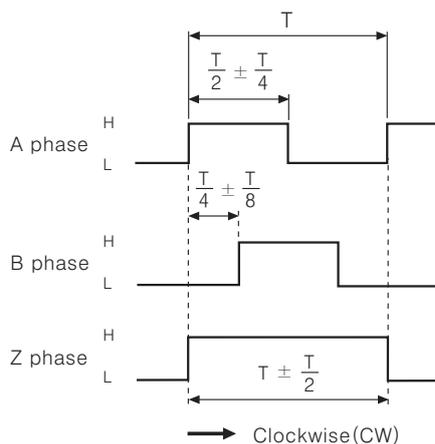
SCN-20-10P

Pin No.	Function	Cable color
①	+V	Brown
②	GND	Blue
③	OUT A	Black
④	OUT \bar{A}	Red
⑤	F.G	Shield
⑥	OUT B	White
⑦	OUT \bar{B}	Gray
⑧	OUT Z	Orange
⑨	OUT \bar{Z}	Yellow
⑩	N.C	N.C

* N.C(Not Connected)

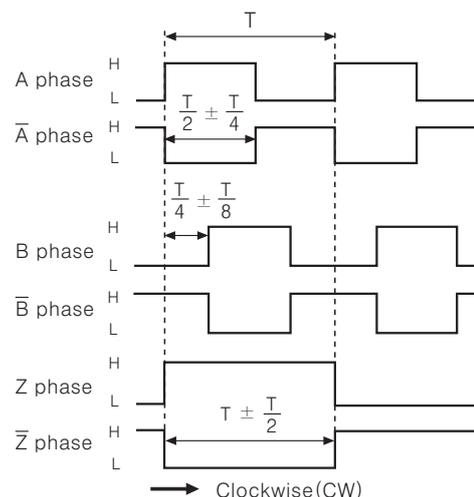
Output waveform

- Totem pole output / NPN open collector output / Voltage output



* CW : Right turn as from the shaft

- Line driver output



(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

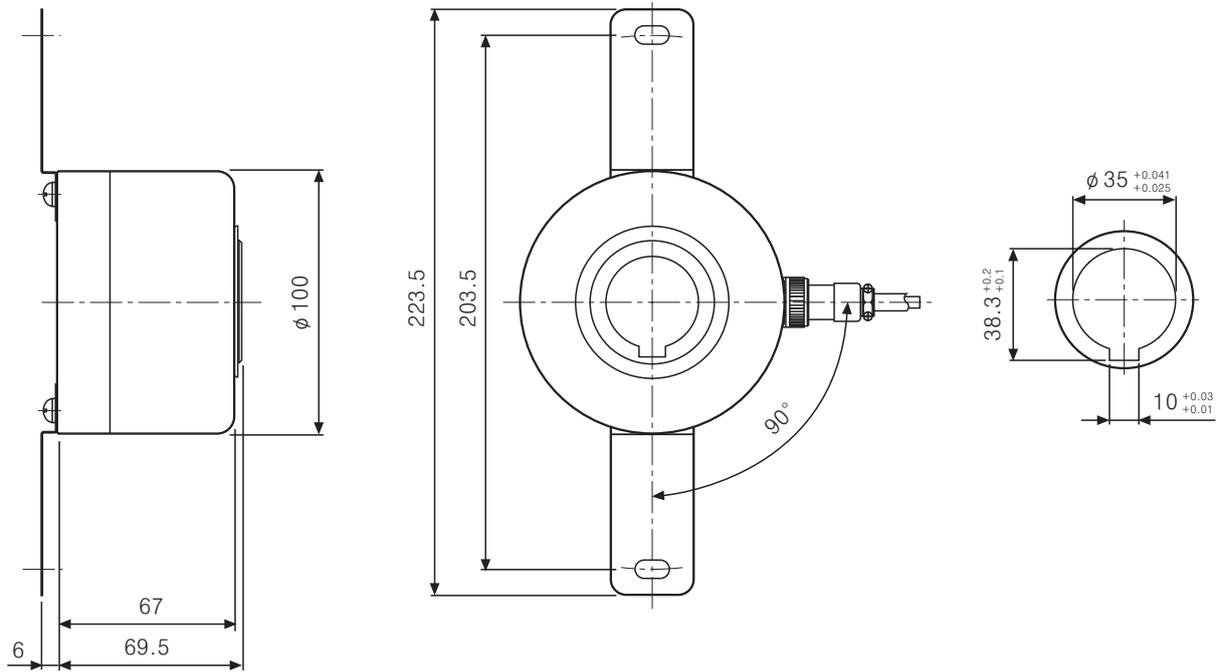
(S) Field network device

(T) Production stoppage models & replacement

E100H Series

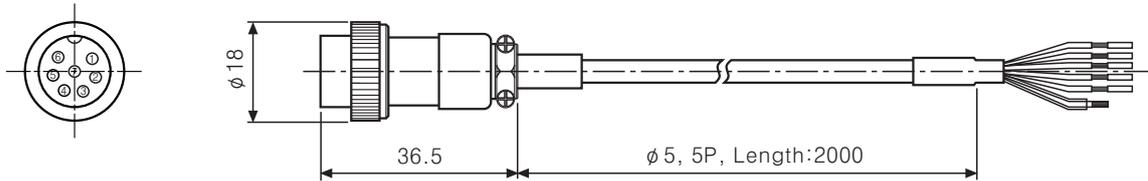
■ Dimensions

(Unit:mm)

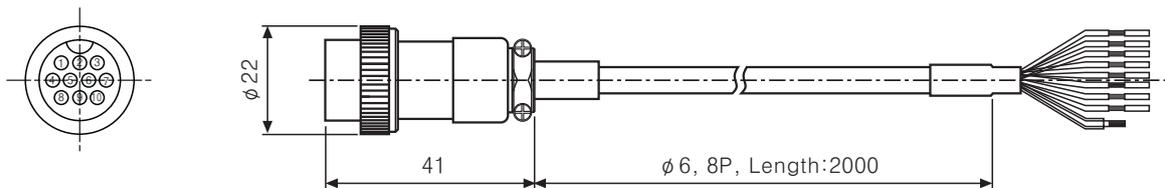


◎ Connector cable

- Totem pole output / NPN open collector output / Voltage output



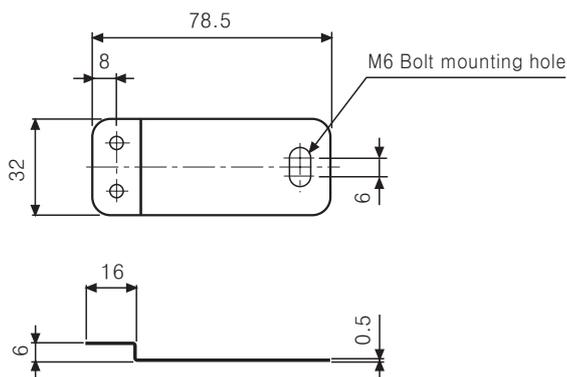
- Line driver output



※10m connector cable is customizable.

※Cable outgoing type is customizable.

- Bracket



ENA Series Incremental Side-Mounting Type

Side-mounting Shaft type Incremental Rotary encoder

Features

- Strong die cast structure against external impact
- Convenient structure for direct mounting on the frame
- Connector type
- Power supply : 5VDC, 12-24VDC ±5%



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



Ordering information

ENA	5000	2	N	24
Series	Pulse/1Revolution	Output phase	Output	Power supply
Shaft type to be mounted at the side (External diameter of shaft : ϕ 10mm)	Refer to resolution	2 : A, B 3 : A, B, Z	T : Totem pole output N : NPN open collector output V : Voltage output	5 : 5VDC ±5% 24 : 12-24VDC ±5%

*Standard : ENA-□-2-N-24

*Standard : A, B

Specifications

Item		Shaft type of encoder to be mounted at the side(Incremental)		
Resolution(P/R)		(★Note1) *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, 5000		
Electrical specification	Output phase	A, B phase(Option : A, B, Z phase)		
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)		
	Control output	Totem pole output	• Low \Rightarrow Load current:Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current:Max. 10mA, Output voltage(Power supply 5VDC):Min. (Power supply-2.0)VDC, Output voltage(Power supply 12-24VDC):Min. (Power supply-3.0)VDC	
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC	
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC	
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s	• Measuring condition \Rightarrow Cable length : 2m, I sink = Max. 20mA
		NPN open collector output	Max. 1 μ s	
		Voltage output	Max. 1 μ s	
	Max. Response frequency	300kHz		
	Power supply	• 5VDC ±5% (Ripple P-P : Max. 5%) • 12-24VDC ±5% (Ripple P-P : Max. 5%)		
Current consumption	Max. 80mA(disconnection of the load)			
Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)			
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)			
Connection	Connector type			
Mechanical specification	Starting torque	Max. 70gf · cm(0.007N · m)		
	Moment of inertia	Max. 80g · cm ² (8 × 10 ⁻⁶ kg · m ²)		
	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf		
	Max. allowable revolution	(★Note2)	5000rpm	
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°C (at non-freezing status), Storage : -25 to 85°C			
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH			
Protection	IP50 (IEC standard)			
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable			
Accessory	ϕ 10mm coupling			
Approval	CE (Except for line driver output)			
Unit weight	Approx. 345g			

※ **(★Note1)** '* pulse is only for A, B phase

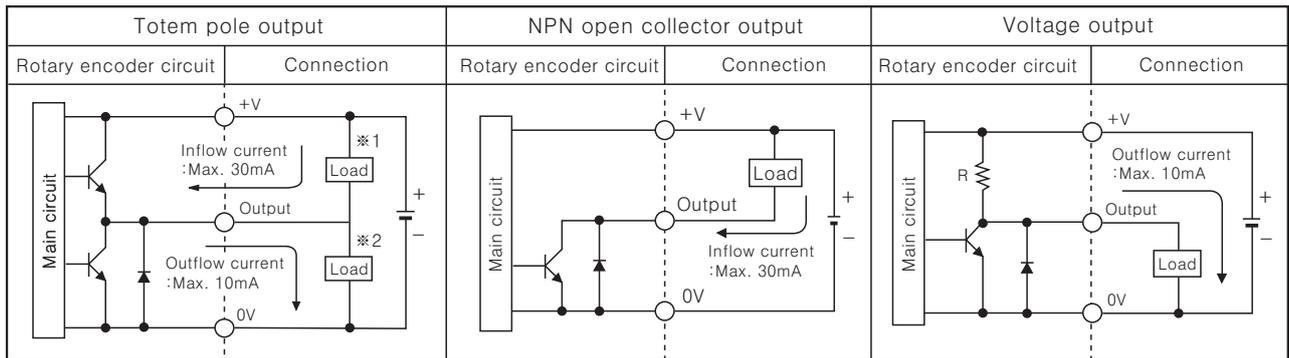
※ **(★Note2)** Max. allowable revolution \geq Max. response revolution **[**Max. response revolution(rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.}$ **]**

Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

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

ENA Series

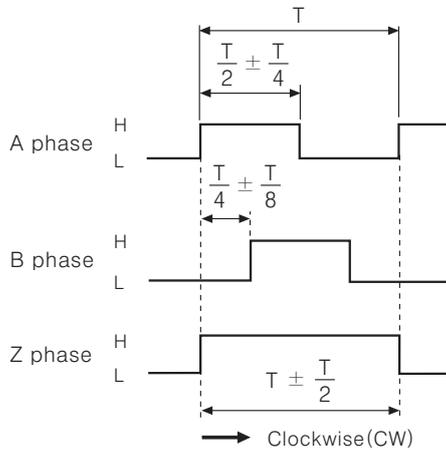
Control output diagram



- The output circuits of A, B phase (Option : A, B, Z phase) are the same.
- Totem pole output can be used for NPN open collector type (*1) or voltage output type (*2).

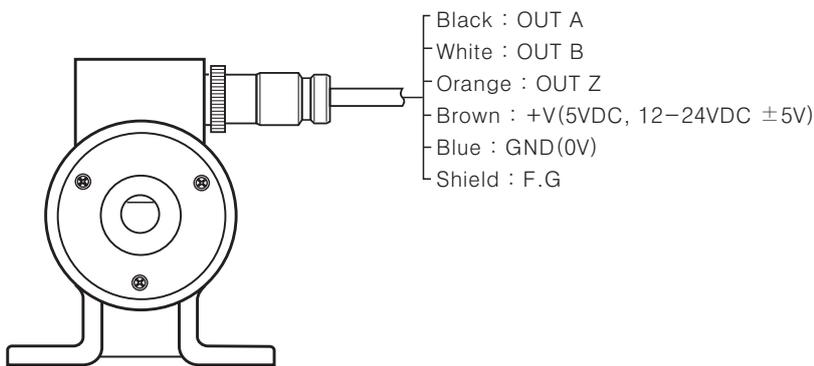
Output waveform

- Totem pole output / NPN open collector output / Voltage output



- *Z phase output is customizable.
- *CW : Right turn as from the shaft

Connections

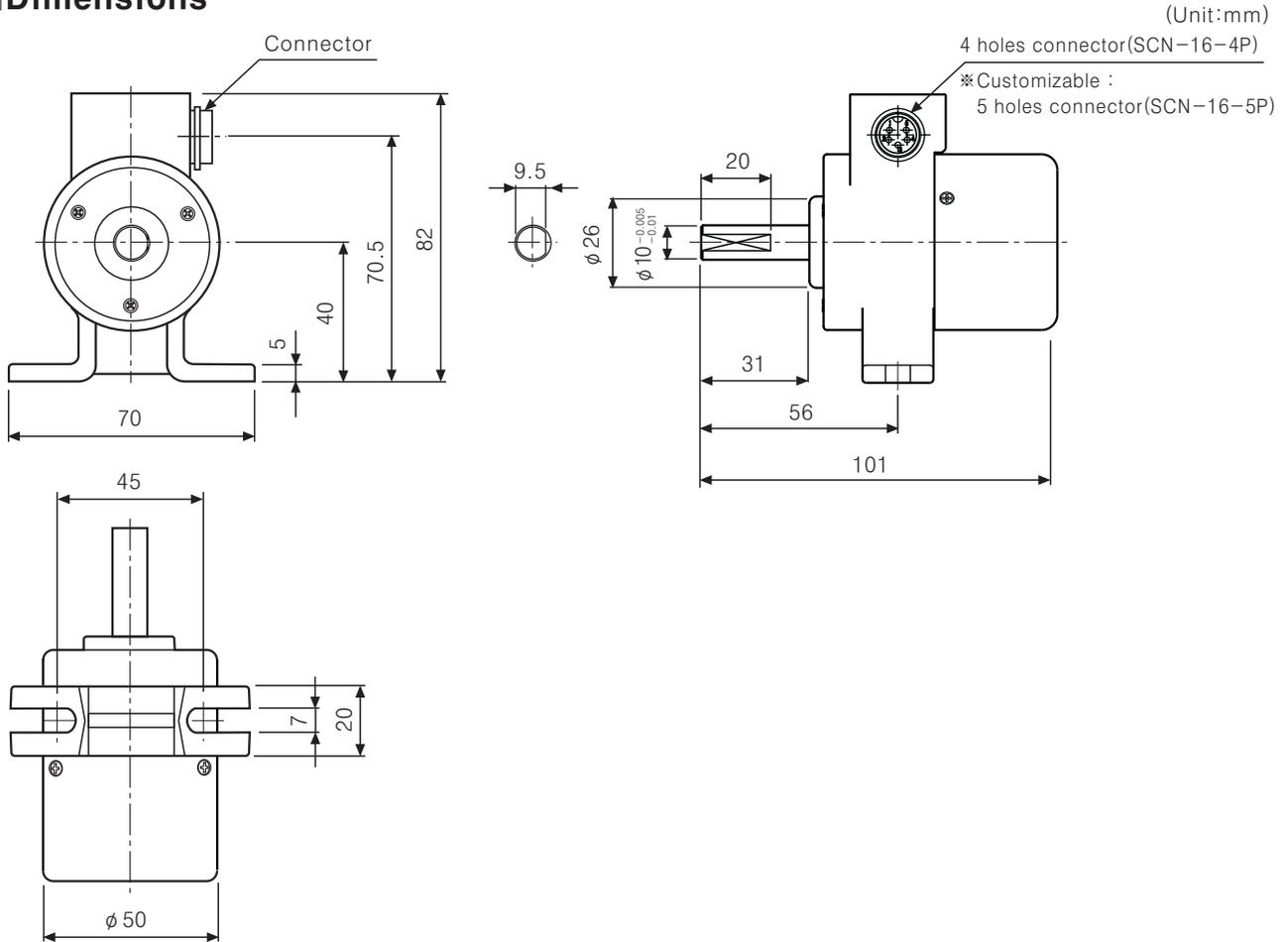


Pin No	Function	Cable color
①	A phase	Black
②	B phase	White
③	+V	Brown
④	0V	Blue
①	A phase	Black
②	B phase	White
③	Z phase	Orange
④	+V	Brown
⑤	0V	Blue

- *Z phase output is customizable.
- *Unused wires must be insulated.
- *The metal case and shield cable of encoder should be grounded (F.G).

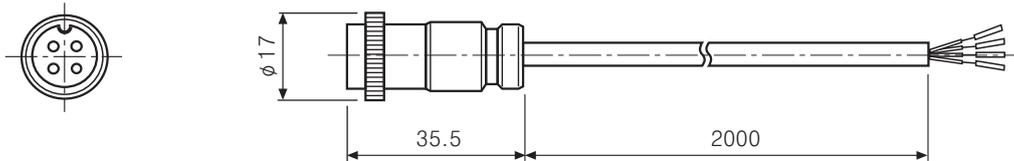
Incremental Side-Mounting Type

■ Dimensions

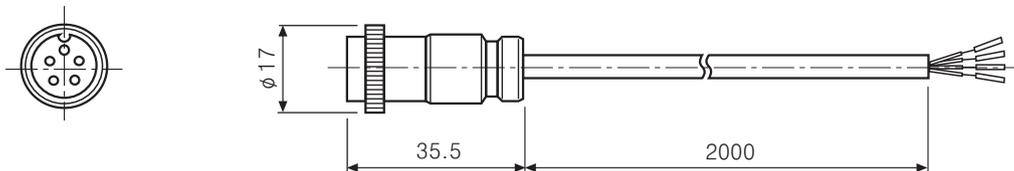


◎ Connector cable

- ENA-□ - 2 - □ (Standard)

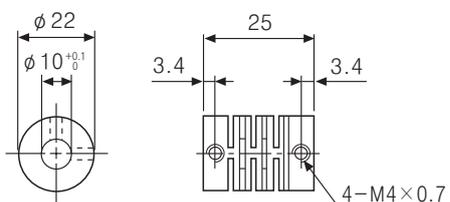


- ENA-□ - 3 - □ (Customizable)



*Connector cable is customizable and see G-6 for specifications.

◎ Coupling



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

ENC Series

Incremental measuring wheel type Rotary encoder

■ Features

- Suitable for measuring the length or speed of target moving successively by wheel type
- The output waveform is proportional to the unit of International Measurement type (Meter or inch)
- Power supply : 5VDC, 12–24VDC ±5%



■ Application

- Packing machine, Sheet manufacturing, Textile machinery, and General industrial plants.

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



■ Ordering information

ENC	1	1	N	24	
Series	Output phase	Min. measuring unit	Output	Power supply	Cable
Wheel type	1 : A, B phase	1 : 1mm 2 : 1cm 3 : 1m 4 : 0.01yd 5 : 0.1yd 6 : 1yd	T : Totem pole output N : NPN open collector output V : Voltage output	5 : 5VDC ±5% 24 : 12–24VDC ±5%	Blank:Normal type (*) C:Cable outgoing connector type

*Cable length:250mm

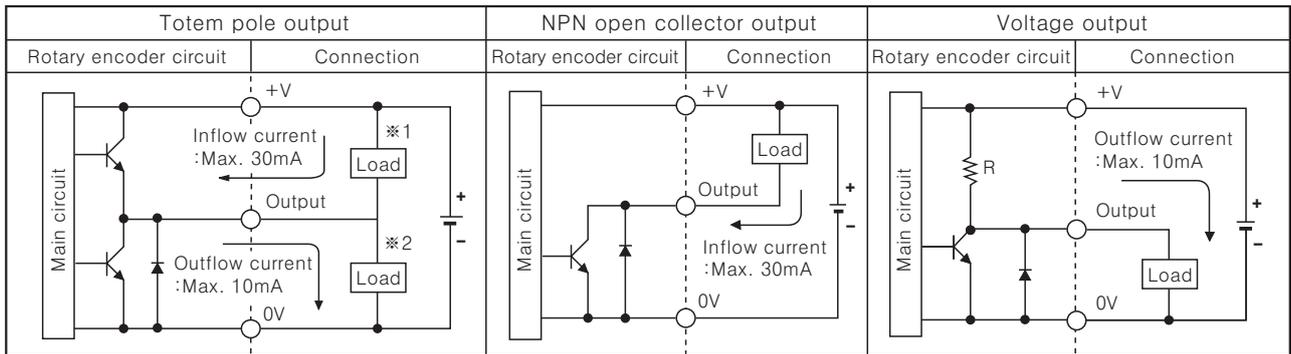
■ Specifications

Item	Incremental measuring wheel type of rotary encoder		
Resolution (P/R)	Refer to resolution (Next page)		
Electrical specification	Output phase	A, B phase	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)	
	Control output	Totem pole output	<ul style="list-style-type: none"> • Low \Rightarrow Load current : Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current : Max. 10mA, Output voltage (Power supply 5VDC) : Min. (Power supply–2.0)VDC, Output voltage (Power supply 12–24VDC) : Min. (Power supply–3.0)VDC
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s
		NPN open collector output	Max. 1 μ s
		Voltage output	Max. 1 μ s
	Max. Response frequency	180kHz	
	Power supply	5VDC ±5% (Ripple P–P : Max. 5%), 12–24VDC ±5% (Ripple P–P : Max. 5%)	
	Current consumption	Max. 80mA (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, 250mm cable outgoing connector type		
Mechanical specification	Starting torque	Depend on coefficient of friction	
	Max. allowable revolution	(Note1) 5000rpm	
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°C (at non–freezing status), Storage : –25 to 85°C		
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH		
Cable	ϕ 5mm, 5P, Length : 2m, Shield cable		
Protection	IP50 (IEC standard)		
Approval	CE		
Unit weight	Approx. 494g		

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

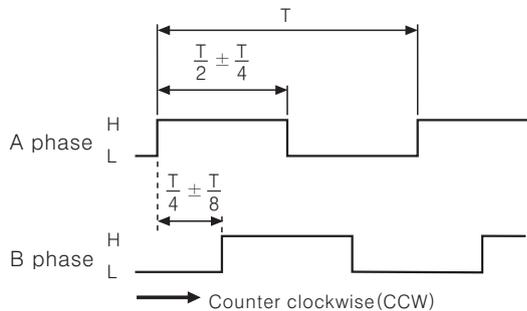
Incremental Measuring Wheel Type

Control output diagram



- The output circuits of A, B phase (Option : A, B, Z phase) are the same.
- Totem pole output can be used for NPN open collector type(*1) or voltage output type(*2).

Output waveform



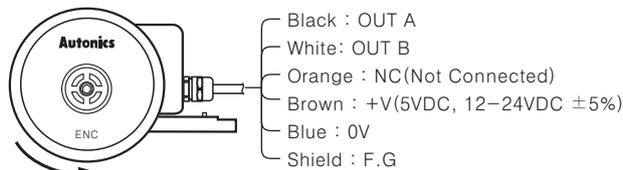
*CCW: Same revolution direction with connection F,G as below.

Resolution

No	Min. measuring unit	Moving distance per 1pulse	Gear ratio	Wheel circumference	SLIT(P/R)
1	1mm	1mm/Pulse	1 : 1	250mm	250Pulse
2	1cm	1cm/Pulse	4 : 1	250mm	100Pulse
3	1m	1m/Pulse	4 : 1	250mm	1Pulse
4	0.01yd	0.01yd/Pulse	4 : 1	228.6mm (0.25/yd)	100Pulse
5	0.1yd	0.1yd/Pulse	4 : 1	228.6mm (0.25/yd)	10Pulse
6	1yd	1yd/Pulse	4 : 1	228.6mm (0.25/yd)	1Pulse

Connections

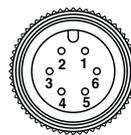
Normal type



Counter clockwise (CCW)

- *Unused wires must be insulated.
- *The metal case and shield wire of encoder should be grounded (F.G)

Cable outgoing connector type

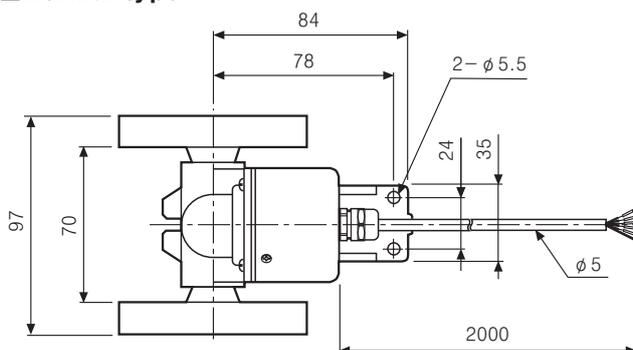


Pin No	Function	Cable color
①	OUT A	Black
②	OUT B	White
③	NC	Orange
④	+V	Brown
⑤	GND	Blue
⑥	F.G	Shield

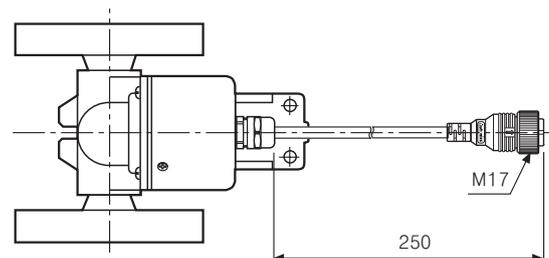
*F.G (Field Ground) : It should be grounded separately.

Dimensions

Normal type



Cable outgoing connector type



- *The wheel circumference is changed according to model(φ), please refer to resolution chart.
- *Connector cable is customizable and see G-6 for specifications.

(Unit:mm)

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

ENH Series

Incremental manual handle type Rotary encoder

■ Features

- Suitable for manual pulse input type such as numerically controlled or milling machinery
- Terminal connection type
- Power supply : 5VDC $\pm 5\%$, 12–24VDC $\pm 5\%$



■ Application

- Industrial tooling machinery

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

■ Ordering information

ENH	–	100	–	1	–	T	–	24
Series		Pulse/1Revolution		Clickstopper position		Control output		Power supply
Handle type		25 100		1 : Normal "H" 2 : Normal "L"		T : Totem pole output V : Voltage output L : Line driver output(※)		5 : 5VDC $\pm 5\%$ 24 : 12–24VDC $\pm 5\%$

※The power of Line driver is only for 5VDC

■ Specifications

Item	Incremental manual handle type of rotary encoder		
Resolution(P/R)	(Note1) 25, 100		
Electrical specification	Output phase	A, B phase (Line driver output A, \bar{A} , B, \bar{B} phase)	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)	
	Control output	Totem pole output	<ul style="list-style-type: none"> • Low \Rightarrow Load current : Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current : Max. 10mA, Output voltage (Power supply 5VDC) : Min. (Power supply–2.0)VDC, Output voltage (Power supply 12–24VDC) : Min. (Power supply–3.0)VDC
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC
		Line driver output	<ul style="list-style-type: none"> • Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5VDC • High \Rightarrow Load current : Max. –20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s
		Voltage output	Max. 1 μ s
		Line driver output	Max. 0.2 μ s
	Power supply	<ul style="list-style-type: none"> • 5VDC $\pm 5\%$ (Ripple P–P : Max. 5%) • 12–24VDC $\pm 5\%$ (Ripple P–P : Max. 5%) 	
	Current consumption	Max. 40mA (disconnection of the load), Line driver output : Max. 50mA (disconnection of the load)	
	Max. Response frequency	10kHz	
	Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)	
	Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)	
Connection	Terminal block type		
Mechanical specification	Starting torque	Max. 1kgf · cm (0.098N · m)	
	Shaft loading	Radial : 2kgf, Thrust : 1kgf	
	Max. allowable revolution	(Note2) Max. 200rpm (Normal), 600rpm (Peak)	
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock	Max. 50G		
Ambient temperature	–10 ~ 70°C (at non–freezing status), Storage : –25 to 85°C		
Ambient humidity	35 to 85%RH, Storage : 35 to 90%RH		
Protection	IP50 (IEC standard)		
Unit weight	Approx. 300g		

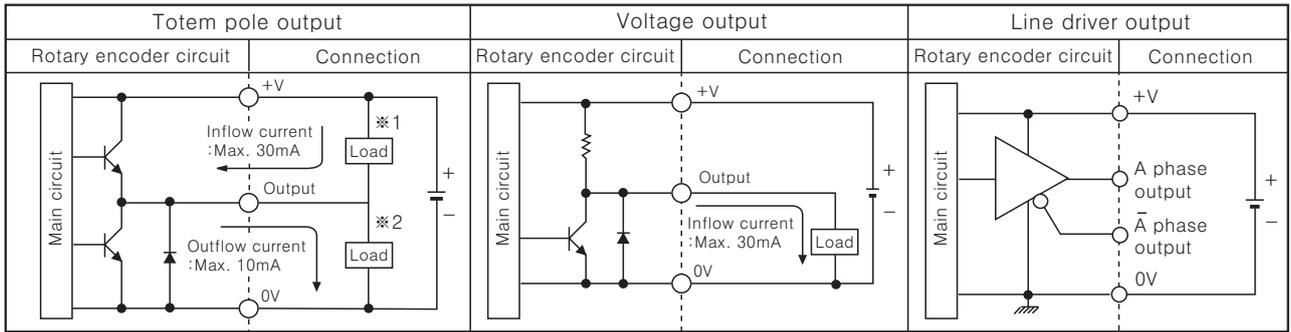
※ **(Note1)** Not indicated type is customizable.

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

Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

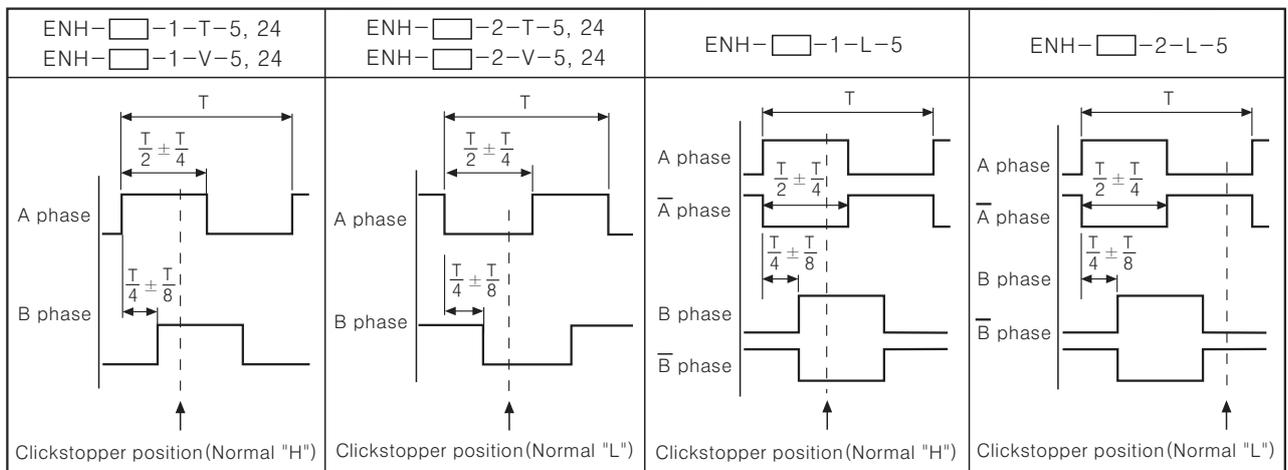
Incremental Manual Handle Type

Control output diagram



- The output circuits of A, B phase (Line driver output is A, \bar{A} , B, \bar{B} phase) are the same.
- Totem pole output can be used for NPN open collector type (*1) or voltage output type (*2).

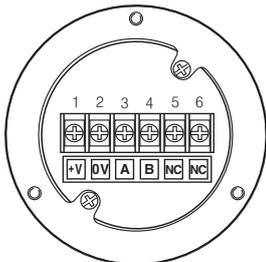
Output waveform



*Clickstopper position Normal "H" or Normal "L": It shows the waveform when the handle is not stopped.

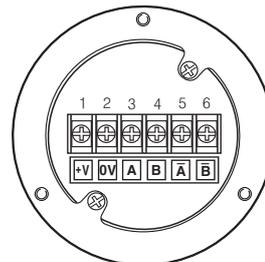
Connections

•Totem pole output / Voltage output

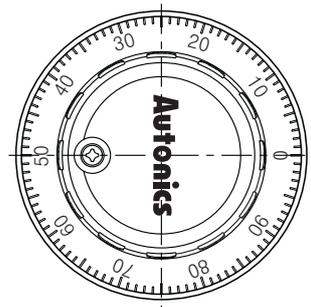
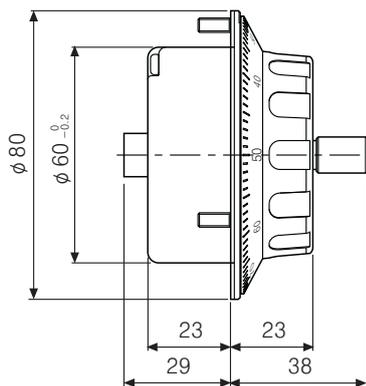
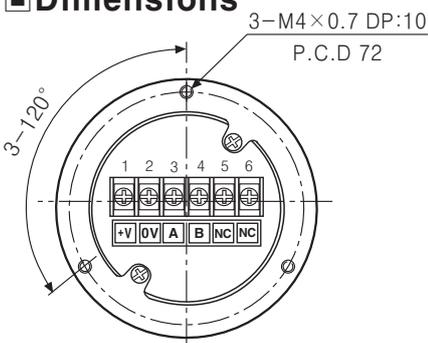


*Do not use terminal No. 5, 6.

•Line driver output



Dimensions



(Unit:mm)

* ϕ 70mm PCD mounting hole type is customizable.

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

ENHP Series

Portable incremental type of Rotary encoder with handle

■ Features

- Suitable for manual pulse input type such as numerically controlled or milling machinery
- Emergency stop switch, enable switch are available
- Rotary switch for 6 Position, 4 Position

■ Application

- Industrial tooling machinery

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



■ Ordering information

ENHP	100	1	L	5
Series	Pulse/1Revolution	Clickstopper position	Control output	Power supply
Portable encoder with handle	100	1 : Normal "H" 2 : Normal "L"	L : Line driver output	5 : 5VDC ±5%

■ Specifications

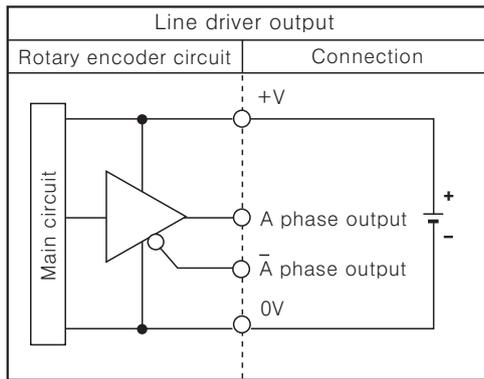
Item		Portable incremental type of rotary encoder with handle
Resolution (P/R)		(Note1) 100P/R
Electrical specification	Output phase	A, \bar{A} , B, \bar{B}
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)
	Rotary switch output	BCD Code output • Axis (X, Y, Z, A, B) • Rate (R ₁ , R ₂ , R ₃)
	Control output	• Low \Rightarrow Load current : Max. 20mA, Residual voltage : Max. 0.5V • High \Rightarrow Load current : Max. -20mA, Output voltage : Min. 2.5V
	Line driver output	
	Response time (Rise/Fall)	Max. 0.5 μ s (Measuring condition \Rightarrow I sink=Max. 20mA)
	Power supply	5VDC \pm 5% (Ripple P-P : Max. 5%)
	Current consumption	Max. 50mA (disconnection of the load)
	Max. Response frequency	10kHz
	Insulation resistance	Min. 100M Ω (at 500VDC megger between all terminals and case)
Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)	
Connection	25Pin D-SUB of connector type	
Mechanical specification	Starting torque	Max. 1kgf · cm (0.098N · m)
	Shaft loading	Radial : 2kgf, Thrust : 1kgf
	Max. allowable revolution	(Note2) Max. 200rpm (Normal), 600rpm (Peak)
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours	
Shock	Max. 50G	
Ambient temperature	-10 to 70°C (at non-freezing status), Storage : -25 to 85°C	
Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH	
Cable	ϕ 5mm, 18P, Length : 8m, Spring code cable	
Protection	IP67 (IEC standard)	
Unit weight	Approx. 730g	

※ **(Note1)** Not indicated type is customizable.

※ **(Note2)** Max. allowable revolution \geq Max. response revolution 【Max. response revolution (rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.}$ 】
Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

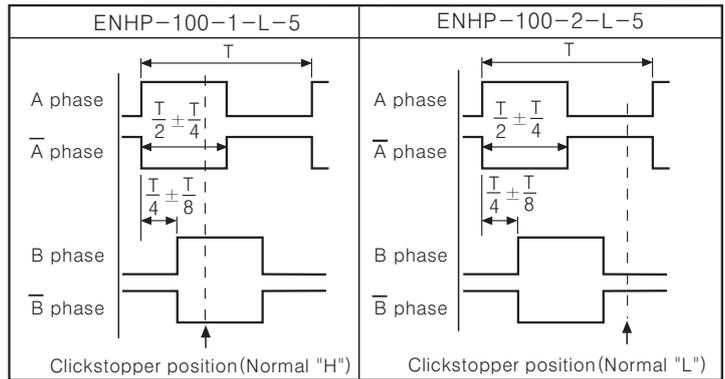
Portable Incremental Type with Handle

Control output diagram



※ The output circuits of A, \bar{A} , B, \bar{B} phase are the same.

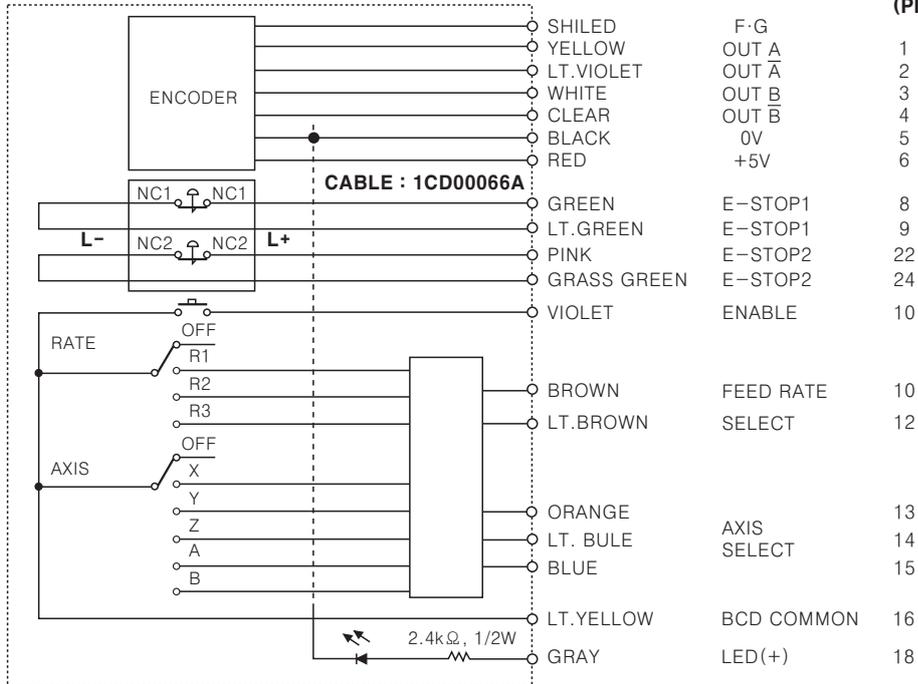
Output waveform



※ Clickstopper position Normal "H" or Normal "L"
: It shows the waveform when the handles is stopped.

Connections

HANDY PULSE GENERATOR



24P CONNECTOR (PIN NO.)

SIGNAL	PIN NO.
F-G	1
OUT A	2
OUT \bar{A}	3
OUT B	4
OUT \bar{B}	5
0V	6
+5V	7
E-STOP1	8
E-STOP1	9
E-STOP2	22
E-STOP2	24
ENABLE	10
FEED RATE	10
SELECT	12
AXIS SELECT	13
AXIS SELECT	14
AXIS SELECT	15
BCD COMMON	16
LED(+)	18

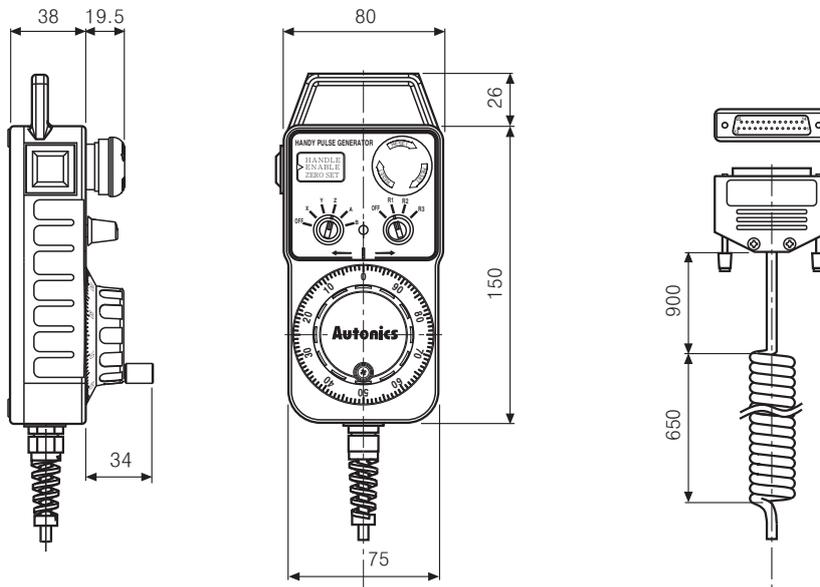
● AXIS SELECT

AXIS	OUTPUT		
	15	14	13
OFF	0	0	0
X axis	0	0	1
Y axis	0	1	0
Z axis	0	1	1
A axis	1	0	0
B axis	1	0	1

● FEED RATE SELECT

RATE	OUTPUT	
	12	11
OFF	0	0
R1	0	1
R2	1	0
R3	1	1

Dimensions



(Unit:mm)

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

EP50S Series

Diameter ϕ 50mm Shaft type Absolute Rotary encoder

■ Features

- Compact size of external diameter ϕ 50mm
- Various output code: BCD, Binary, Gray code (Customizable)
- Various and high resolution (720, 1024 divisions)
- Protection structure 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	Shaft diameter	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) 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)	T _{on} =800nsec, T _{off} =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 megger 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)	
	Moment of 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 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock	Max. 50G		
Ambient temperature	-10 to 70 $^{\circ}$ C (at non-freezing status), Storage : -25 to 85 $^{\circ}$ C		
Ambient humidity	35 to 85%RH, Storage: 35 to 90%RH		
Protection	IP64 (IEC standard)		
Cable	ϕ 7mm, 15P, Length : 2m, Shield cable		
Accessory	Fixing bracket, Coupling		
Approval	CE		
Unit weight	Approx. 380g		

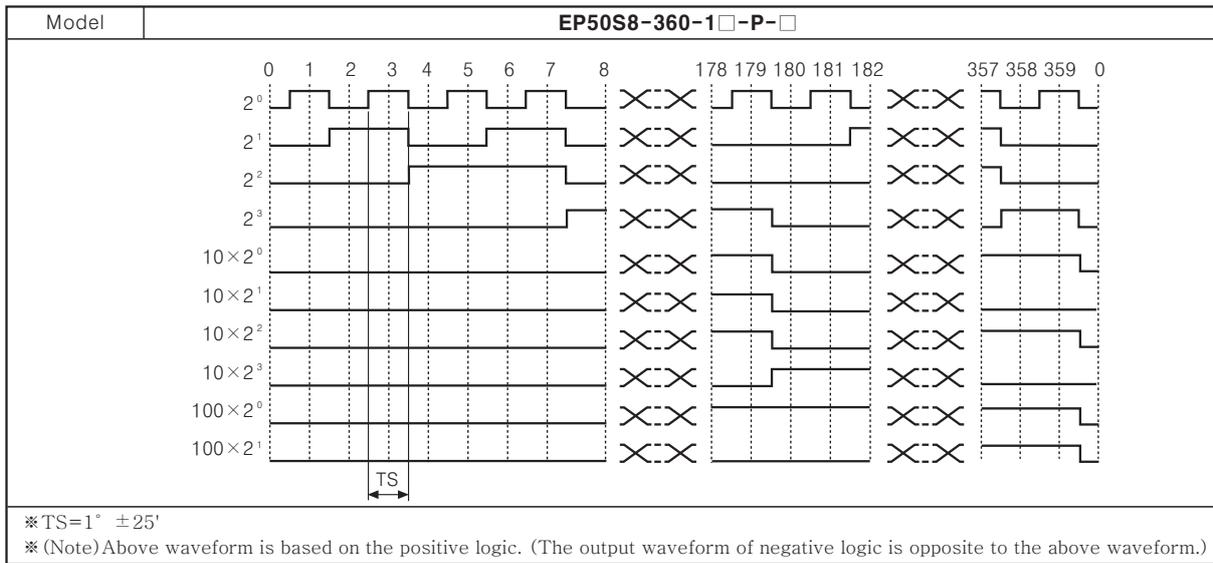
* **(Note1)** Not indicated type is customizable.

* **(Note2)** Max. allowable revolution \geq Max. response revolution **[**Max. response revolution (rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.}$ **]**
Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

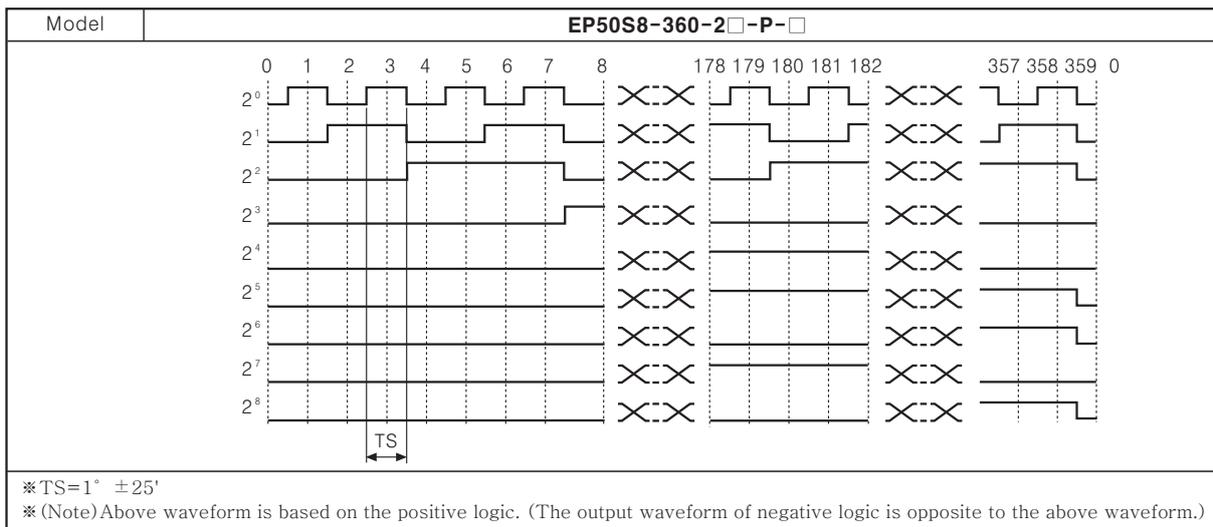
∅ 50mm Shaft Absolute Type

Output waveform

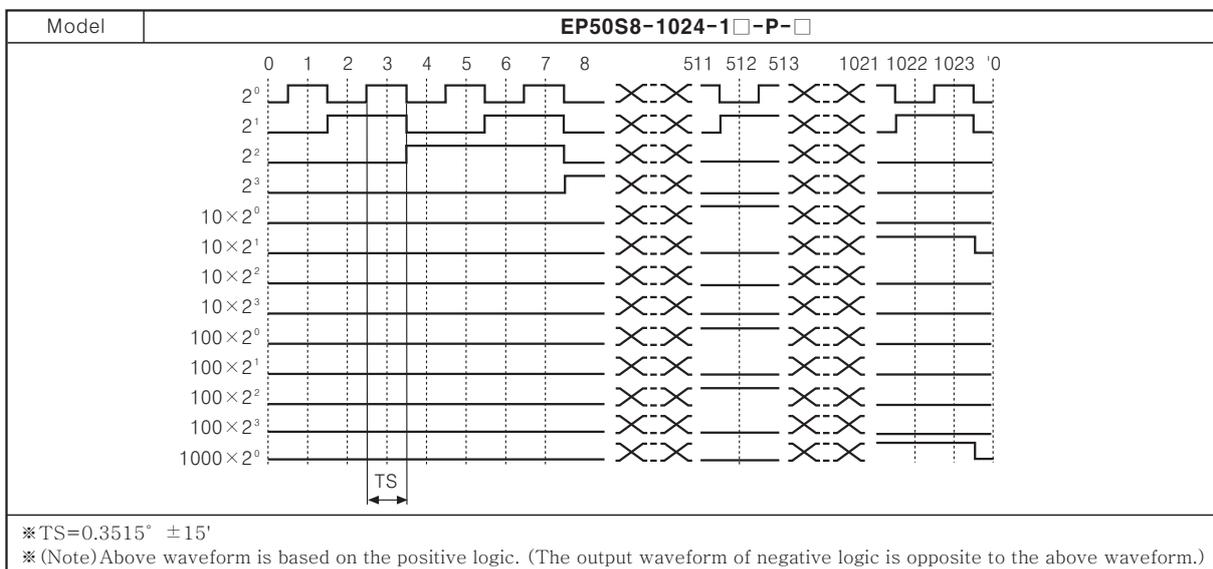
●360 division (BCD CODE output)



●360 division (BINARY CODE output)



●1024 division (BCD CODE output)

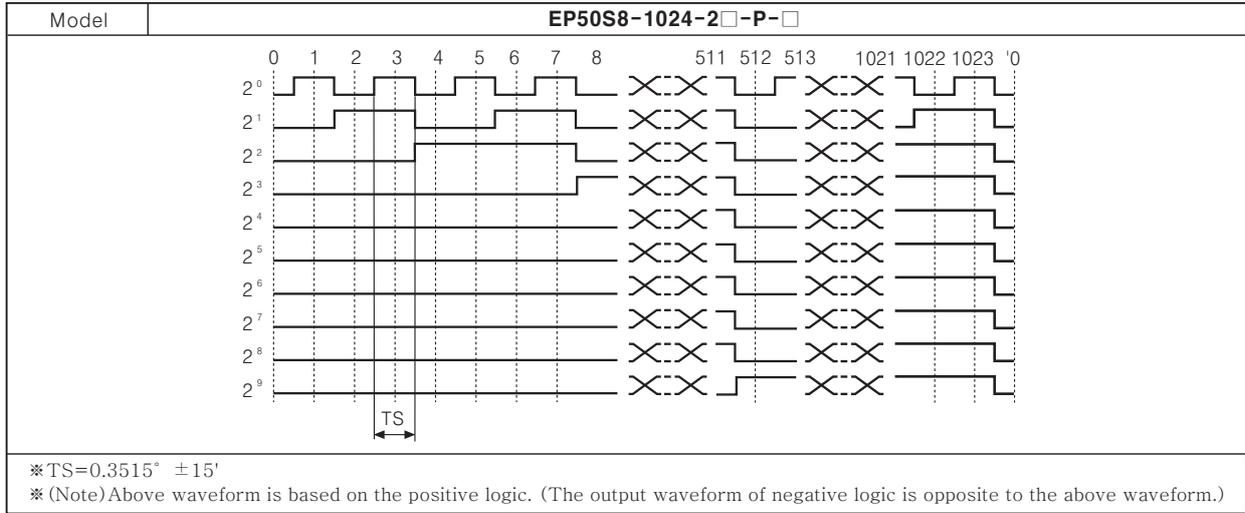


- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
- (I) SSR/Power controller
- (J) Counter
- (K) Timer
- (L) Panel meter
- (M) Tacho/Speed/Pulse meter
- (N) Display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

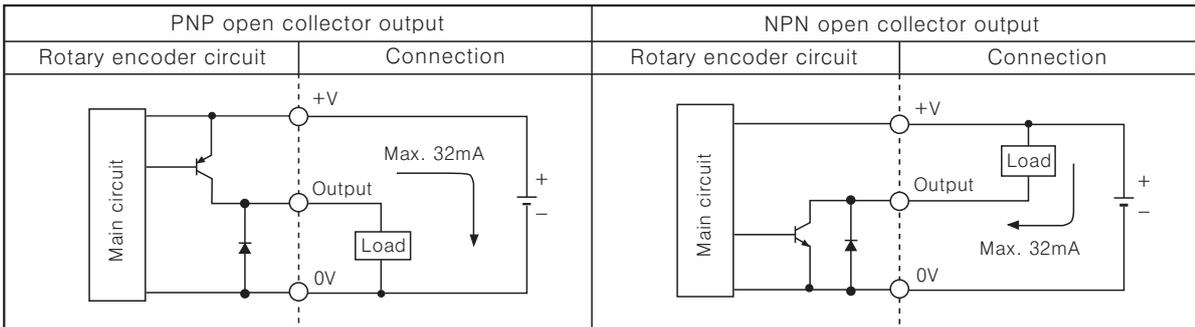
EP50S Series

Output waveform

1024 division (BINARY CODE output)



Control output diagram



※Output circuits of all phases are the 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°	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				
	Orange	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				
	Blue	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	2 ²	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)
	Purple	EP	2 ³	2 ³	2 ³	2 ³	2 ³	2 ³	(2 ¹ ×10)	(2 ¹ ×10)	(2 ¹ ×10)	(2 ¹ ×10)	(2 ¹ ×10)	(2 ¹ ×10)				
	Gray	N.C	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)
	White/Brown	N.C	EP	EP	(2 ¹ ×10)	(2 ¹ ×10)	(2 ¹ ×10)	N.C	(2 ³ ×10)	(2 ³ ×10)	(2 ³ ×10)	(2 ³ ×10)	(2 ³ ×10)					
	White/Red	N.C			EP	EP	EP	N.C			(2°×100)	(2°×100)	(2°×100)	(2°×100)	(2°×100)	(2°×100)	(2°×100)	
	White/Orange	N.C											(2 ¹ ×100)	(2 ¹ ×100)	(2 ¹ ×100)	(2 ¹ ×100)		
	White/Yellow	N.C														(2 ² ×100)	(2 ² ×100)	
	White/Blue	N.C																
	White/Purple	N.C																
	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																	
Power	White	+V																	
	Black	GND(0V)																	
Output	Brown	TP1	2°	2°	2°	2°	2°	2°	2°	2°	2°	2°							
	Red	TP2	2 ¹																
	Orange	2°	2°	2°	2°	2°	2°	2°	2 ²										
	Yellow	2 ¹	2 ³																
	Blue	2 ²	2 ⁴																
	Purple	EP	EP	2 ³	2 ⁵														
	Gray	N.C		EP	EP	2 ⁴	2 ⁴	2 ⁴	N.C		2 ⁶								
	White/Brown	N.C				EP	EP	2 ⁵	N.C			2 ⁷							
	White/Red	N.C						EP	N.C				2 ⁸						
	White/Orange	N.C																2 ⁹	2 ⁹
	White/Yellow	N.C																	
	White/Blue	N.C																	
	White/Purple	N.C																	
	Shielded wire	F.G																	

* Unused wires must be insulated.

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

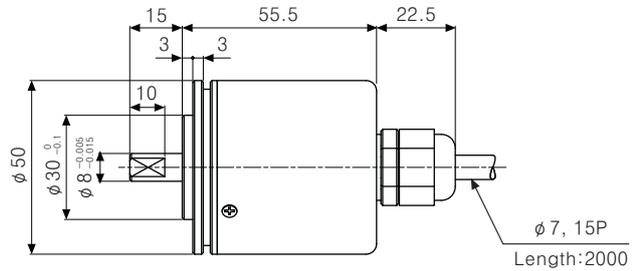
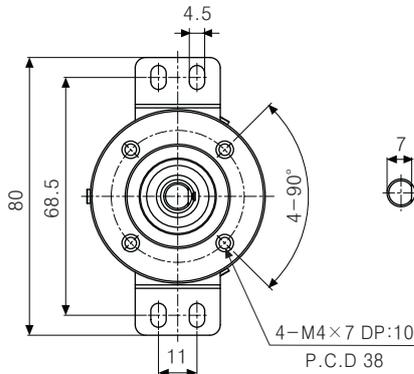
* N.C : Not Connected.

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

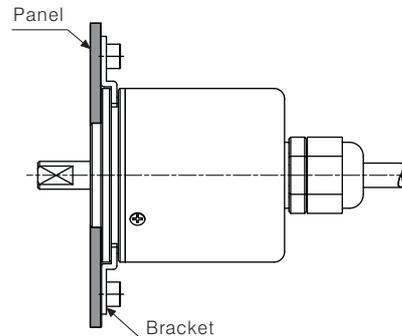
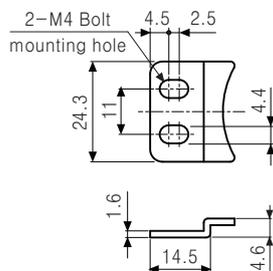
* EP : It is a parity signal to be outputted as odd number of parity.

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

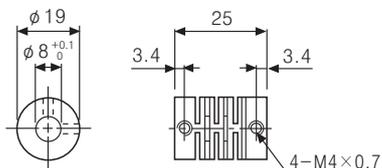
■ Dimensions



● Bracket



● Coupling (EP50S)



(Unit:mm)

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

EP58 Series

Diameter ϕ 58mm Shaft/Hollow Built-in type Absolute Rotary encoder

NEW

Features

- Diameter ϕ 58mm flange type
- Applicable to various mounting environments
- Various output code: BCD, Binary, Gray code (Customizable)
- Various and high resolution (720, 1024 divisions)



Applications

Precision machine tool, Fabric machinery, Robot, Parking system

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



Ordering information

EP58SC		10		1024		1		R		P		24	
Series Diameter ϕ 58mm		Shaft diameter		Resolution/1revolution		Output code		Rotating direction		Control output		Power supply	
SC: Shaft clamping	External	10	ϕ 10mm	Refer to resolution	1: BCD Code 2: Binary Code 3: Gray Code	F: Output value increases at CW direction R: Output value increases at CCW direction * Shaft based	P: PNP open collector output N: NPN open collector output	5: 5VDC \pm 5% 24: 12-24VDC \pm 5%					
SS: Shaft synchro		6	ϕ 6mm										
HB: Hollow built-in	Inner	8	ϕ 8mm										

* Gray code is customizable.

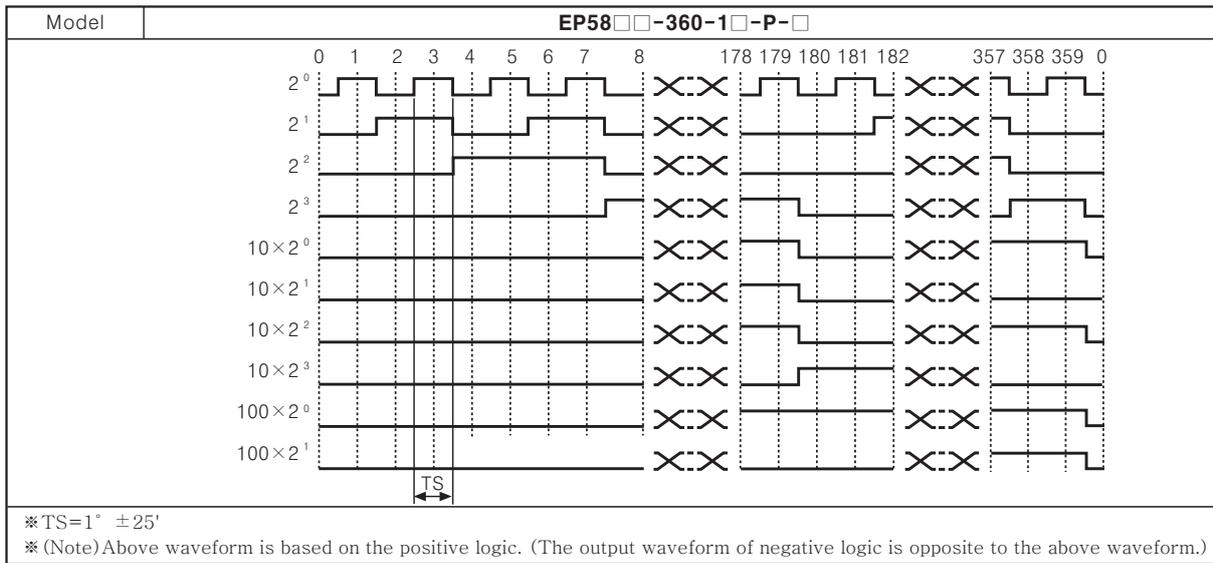
Specifications

Type		Diameter ϕ 58mm absolute rotary encoder							
Resolution		720, 360, 180, 90, 45 division			1024, 512, 256, 128, 64 division				
Output code		BCD Code	Binary Code	Gray Code		BCD Code	Binary Code	Gray Code	
Electrical specification	Output phase/ Output angle	720 division	TS: Signal Pulse (11bit) TS: 0.5° \pm 25'	TS: Signal Pulse (10bit) TS: 0.5° \pm 25'	TS: Signal Pulse (10bit) TS: 1° \pm 25'	1024 division	TS: Signal Pulse (13bit) TS: 0.3515° \pm 15'	TS: Signal Pulse (10bit) TS: 0.3515° \pm 15'	TS: Signal Pulse (10bit) TS: 0.703° \pm 15'
		360 division	TS: Signal Pulse (10bit) TS: 1° \pm 25'	TS: Signal Pulse (9bit) TS: 1° \pm 25'	TS: Signal Pulse (9bit) TS: 2° \pm 25'	512 division	TS: Signal Pulse (11bit) TS: 0.703° \pm 15'	TS: Signal Pulse (9bit) TS: 0.703° \pm 15'	TS: Signal Pulse (9bit) TS: 1.406° \pm 15'
		180 division	TS: Signal Pulse (9bit) TS: 2° \pm 25'	TS: Signal Pulse (8bit) TS: 2° \pm 25'	TS: Signal Pulse (8bit) TS: 4° \pm 25'	256 division	TS: Signal Pulse (10bit) TS: 1.406° \pm 15'	TS: Signal Pulse (8bit) TS: 1.406° \pm 15'	TS: Signal Pulse (8bit) TS: 2.8125° \pm 15'
		90 division	TS: Signal Pulse (8bit) TS: 4° \pm 25'	TS: Signal Pulse (7bit) TS: 4° \pm 25'	TS: Signal Pulse (7bit) TS: 8° \pm 25'	128 division	TS: Signal Pulse (9bit) TS: 2.8125° \pm 15'	TS: Signal Pulse (7bit) TS: 2.8125° \pm 15'	TS: Signal Pulse (7bit) TS: 5.625° \pm 15'
		45 division	TS: Signal Pulse (7bit) TS: 8° \pm 25'	TS: Signal Pulse (6bit) TS: 8° \pm 25'	TS: Signal Pulse (6bit) TS: 16° \pm 25'	64 division	TS: Signal Pulse (7bit) TS: 5.625° \pm 15'	TS: Signal Pulse (6bit) TS: 5.625° \pm 15'	TS: Signal Pulse (6bit) TS: 11.25° \pm 15'
Control output	PNP open collector output	Output voltage : Min. (Power supply - 1.5VDC), Load current : Max. 32mA							
	NPN open collector output	Load 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 \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 megger 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	• SC/SS type : Max. 40gf \cdot cm (0.004N \cdot m)			• HB type : Max. 90gf \cdot cm (0.009N \cdot m)				
	Moment of inertia	• SC/SS type : Max. 15g \cdot cm ² (1.5 \times 10 ⁻⁸ kg \cdot m ²)			• HB type : Max. 20g \cdot cm ² (2.0 \times 10 ⁻⁶ kg \cdot m ²)				
	Shaft loading	• SC/SS type : Radial : 10kg \cdot f, Thrust : 2.5kg \cdot f			• HB type : Radial : 2kg \cdot f, Thrust : 1kg \cdot f				
	Max. allowable revolution	3000rpm							
Vibration		1.5mm amplitude at frequency of 10 to 55Hz (for one minute cycle) in each of X, Y, Z direction for 2 hours							
Shock		Max. 50G							
Ambient temperature		-10 to 70°C (at non-freezing status), Storage : -25 to 85°C							
Ambient humidity		35 to 85%RH, Storage : 35 to 90%RH							
Protection		IP50 (IEC standard)							
Cable		ϕ 7mm, 15P, Length : 2m, Shield cable							
Accessories		ϕ 10mm (SC type) / ϕ 6mm (SS type) coupling, Fixing bracket							
Unit weight		• Clamping : Approx. 435g		• Synchro : Approx. 415g		• Built-in : Approx. 410g			
Approval		CE							

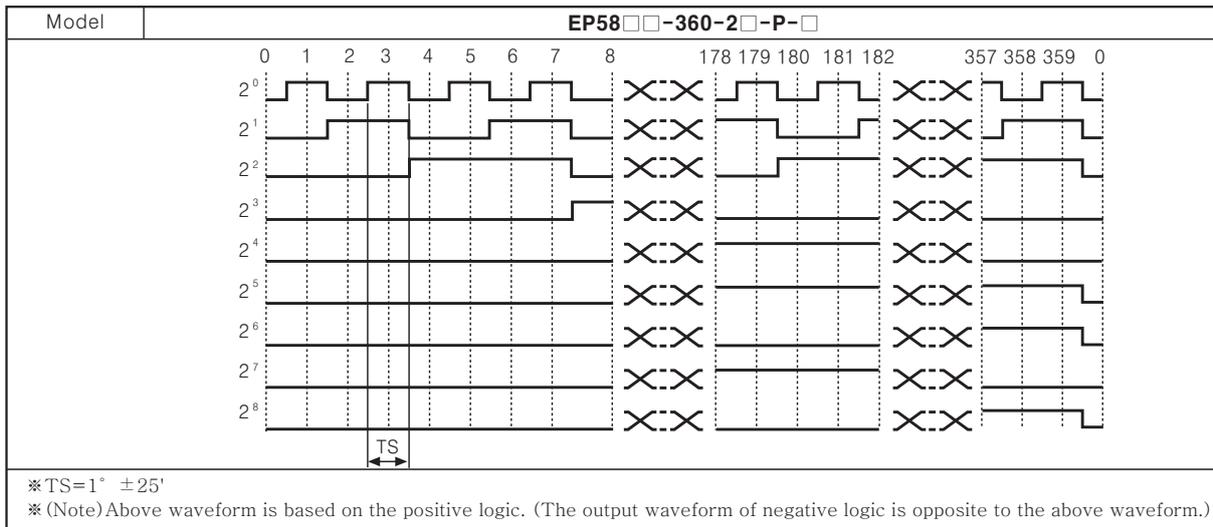
∅ 58mm Shaft/Hollow Built-in Absolute Type

Output waveform

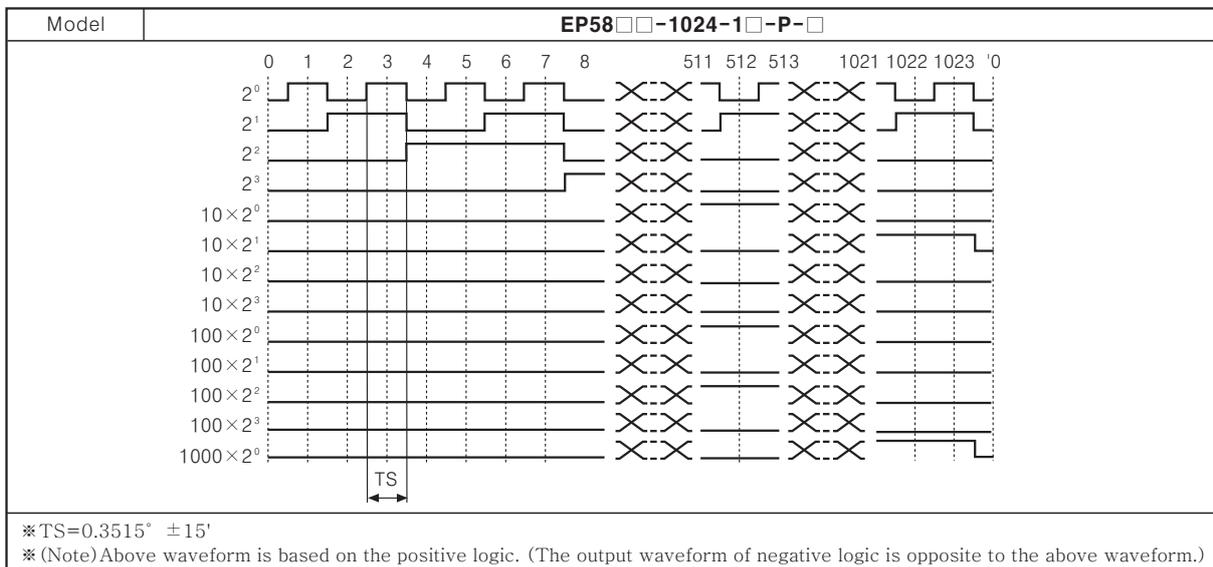
●360 division (BCD CODE output)



●360 division (BINARY CODE output)



●1024 division (BCD CODE output)

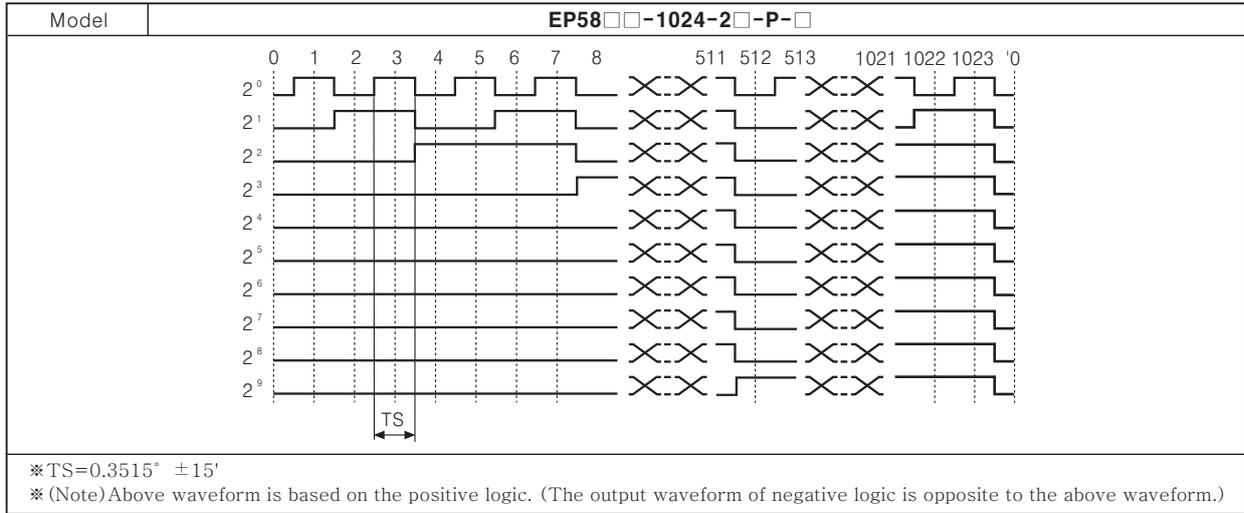


- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder**
- (G) Connector/Socket
- (H) Temp. controller
- (I) SSR/Power controller
- (J) Counter
- (K) Timer
- (L) Panel meter
- (M) Tacho/Speed/Pulse meter
- (N) Display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

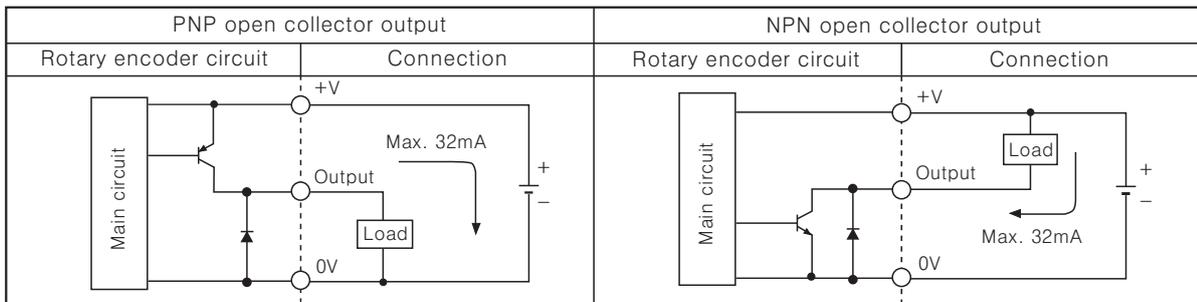
EP58 Series

Output waveform

1024 division (BINARY CODE output)



Control output diagram



*Output circuits of all phase are the same.

Connections

BCD code

Resolution (Division)	45	64	90	128	180	256	360	512	720	1024	
Color											
Power	White	+V									
	Black	GND(0V)									
Output wire	Brown	2^0									
	Red	2^1									
	Orange	2^2									
	Yellow	2^3									
	Blue	$(2^9 \times 10)$									
	Purple	$(2^1 \times 10)$									
	Gray	$(2^2 \times 10)$									
	White/Brown	N.C	$(2^3 \times 10)$								
	White/Red	N.C	$(2^0 \times 100)$								
	White/Orange	N.C			$(2^1 \times 100)$						
	White/Yellow	N.C						$(2^2 \times 100)$			
	White/Blue	N.C								$(2^3 \times 100)$	
	White/Purple	N.C								$(2^0 \times 1000)$	
Shield wire	F.G										

Binary code / Gray code

Resolution (Division)	45	64	90	128	180	256	360	512	720	1024	
Color											
Power	White	+V									
	Black	GND(0V)									
Output wire	Brown	2^0									
	Red	2^1									
	Orange	2^2									
	Yellow	2^3									
	Blue	2^4									
	Purple	2^5									
	Gray	N.C	2^6								
	White/Brown	N.C			2^7						
	White/Red	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										

*Unused wires must be insulated.

*Encoder case and shield wire must be grounded (F.G).

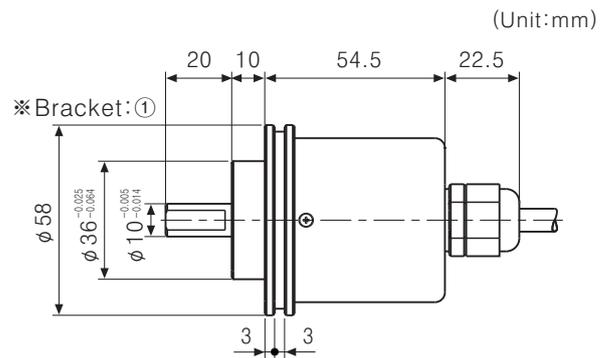
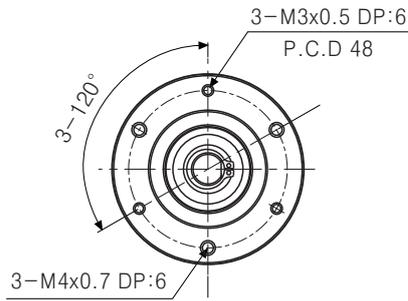
*N.C : Not connected.

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

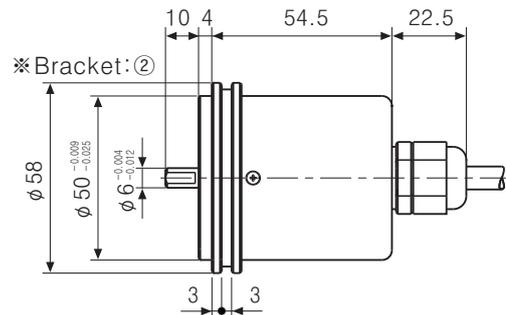
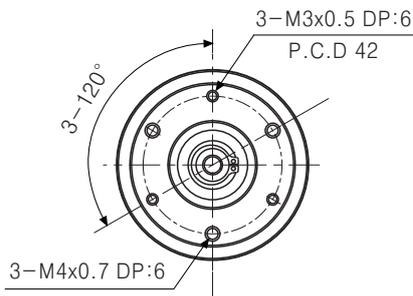
∅ 58mm Shaft/Hollow Built-in Absolute Type

■ Dimensions

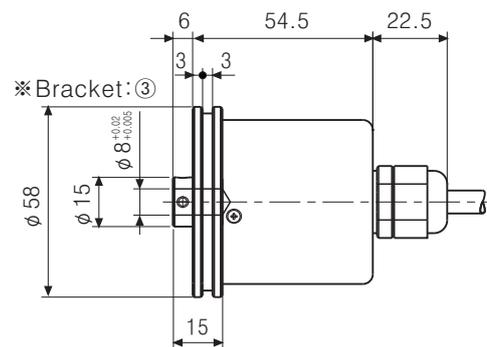
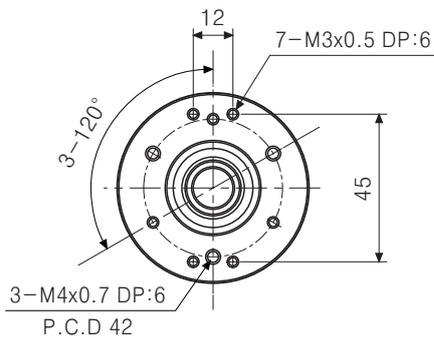
■ Shaft clamping type



■ Shaft synchro type

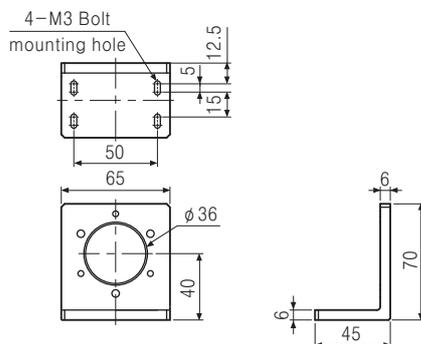


■ Hollow built-in type

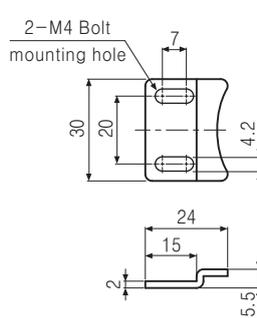


● Bracket

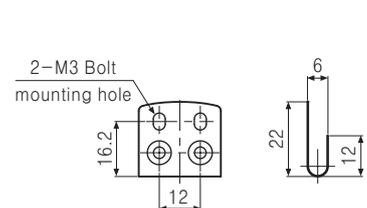
※SC type:①



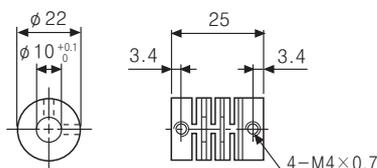
※SS type:②



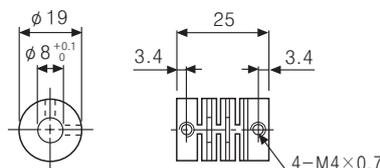
※HB/H type:③



● ∅ 10 Coupling(EP58SC10 Series)



● ∅ 8 Coupling(EP58SS6 Series)



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

ENP Series

Diameter ϕ 60mm Shaft type Absolute Rotary encoder

Line-up

Features

- 12-24VDC power supply of 360 division(Line-up)
- Allows 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 - P

Series	Output code	Output	Power supply	Revolution direction	Revolution/1Pulse	Control output
Diameter ϕ 60mm shaft type (External shaft 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 016:16 division 008:8 division 024:24 division 012:12 division 360:360 division	P:PNP open collector output N:NPN open collector output

*Only 360 division

Specifications

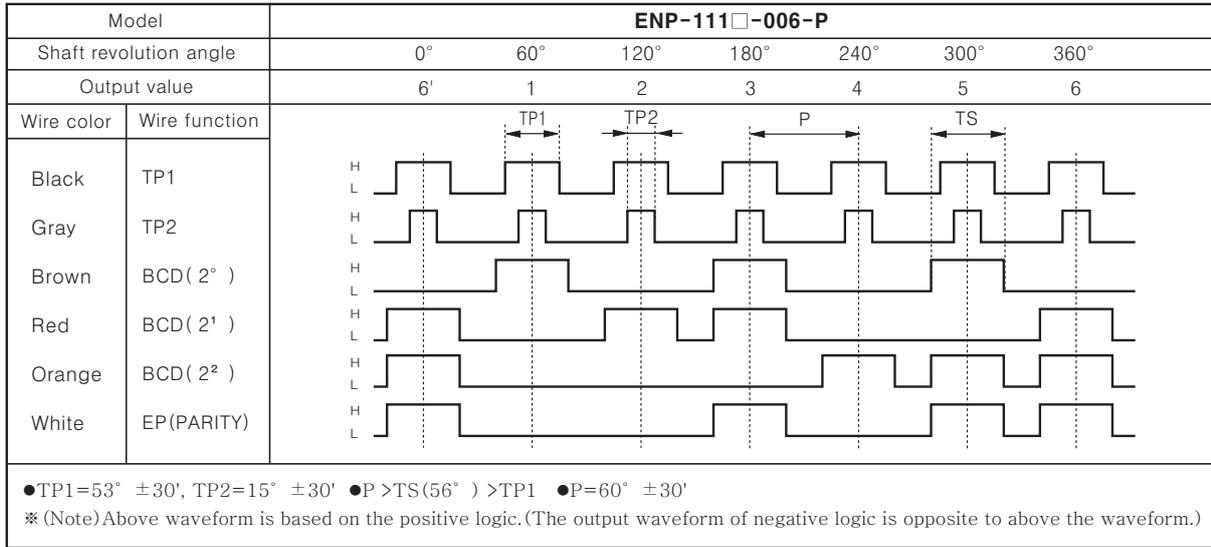
Item		Diameter ϕ 60mm shaft type of absolute rotary encoder						
Model	PNP open collector output	ENP-111□-006-P	ENP-111□-008-P	ENP-111□-012-P	ENP-111□-016-P	ENP-111□-024-P	ENP-110□-360-P	
	NPN open collector output	ENP-101□-006-N	ENP-101□-008-N	ENP-101□-012-N	ENP-101□-016-N	ENP-101□-024-N	ENP-100□-360-N	
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 megger 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)						
	Moment of 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 to 55Hz in each of X, Y, Z directions for 2 hours						
Shock		Max. 75G						
Ambient temperature		-10 to 60°C (at non-freezing status), Storage : -25 to 85°C						
Ambient humidity		35 to 85%RH, Storage : 35 to 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) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.}$ 】
Make sure that max. response revolution should be lower than max. allowable revolution when selecting the resolution.

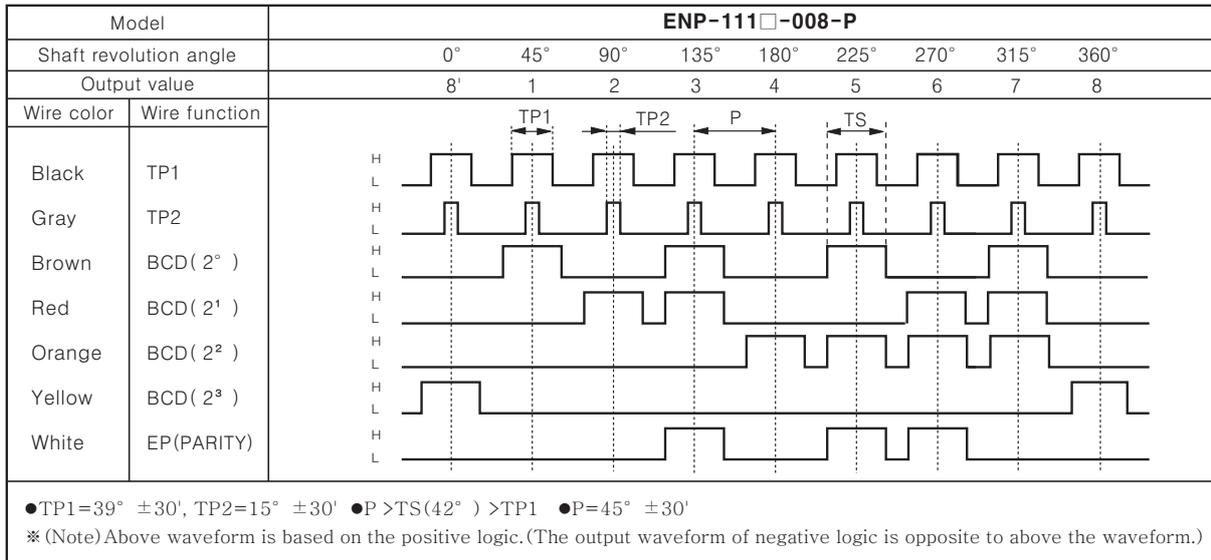
∅ 60mm Shaft AbsoluteType

Output waveform

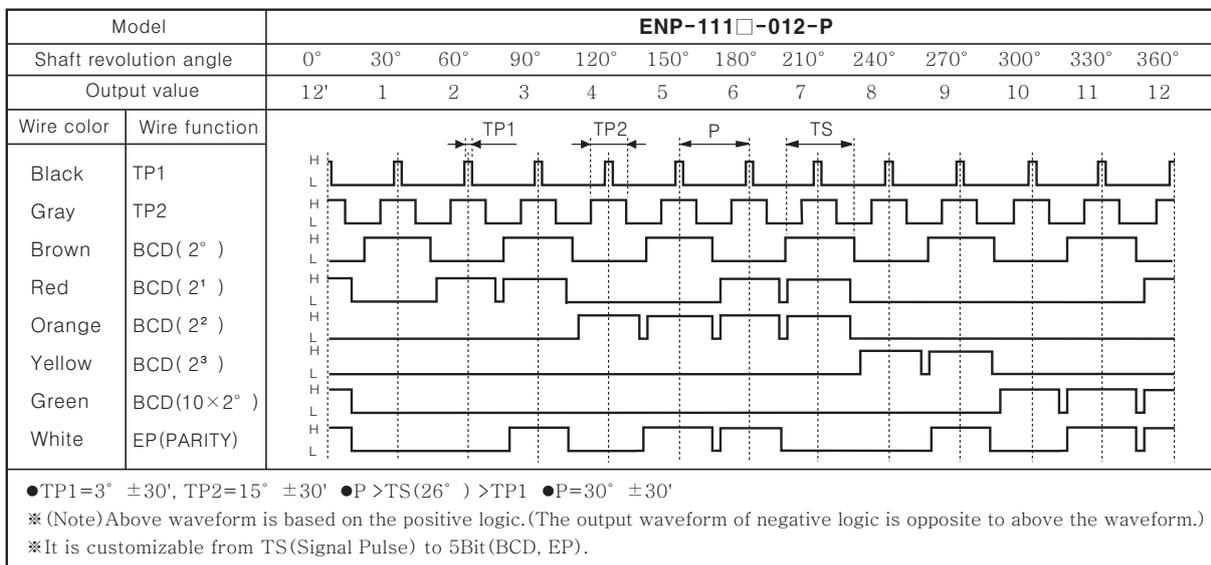
● 6 division



● 8 division



● 12 division



(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) 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

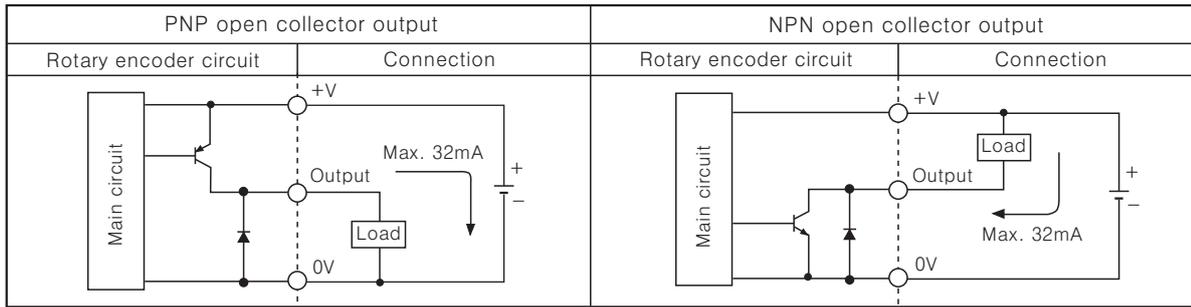
Model		ENP-111□-024-P																									
Shaft revolution angle		0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°	360°	
Output value		24'	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Wire color	Wire function																										
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 each output signal 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 ⁶)
1:Black	BCD CODE(2 ⁰)	BCD CODE(2 ¹)	BCD CODE(2 ²)	BCD CODE(2 ³)	BCD CODE(2 ⁴)	BCD CODE(2 ⁵)
2:Brown	BCD CODE(2 ¹)	BCD CODE(2 ²)	BCD CODE(2 ³)	BCD CODE(2 ⁴)	BCD CODE(2 ⁵)	BCD CODE(2 ⁶)
3:Red	BCD CODE(2 ²)	BCD CODE(2 ³)	BCD CODE(2 ⁴)	BCD CODE(2 ⁵)	BCD CODE(2 ⁶)	BCD CODE(2 ⁷)
4:Orange	BCD CODE(2 ³)	BCD CODE(2 ⁴)	BCD CODE(2 ⁵)	BCD CODE(2 ⁶)	BCD CODE(2 ⁷)	BCD CODE(2 ⁸)
5:Yellow	N.C	BCD CODE(2 ⁸)	BCD CODE(2 ⁹)	BCD CODE(2 ¹⁰)	BCD CODE(2 ¹¹)	BCD CODE(2 ¹²)
6:Green	N.C	N.C	BCD CODE(2 ¹² × 10)	BCD CODE(2 ¹³ × 10)	BCD CODE(2 ¹⁴ × 10)	BCD CODE(2 ¹⁵ × 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 ¹ × 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).

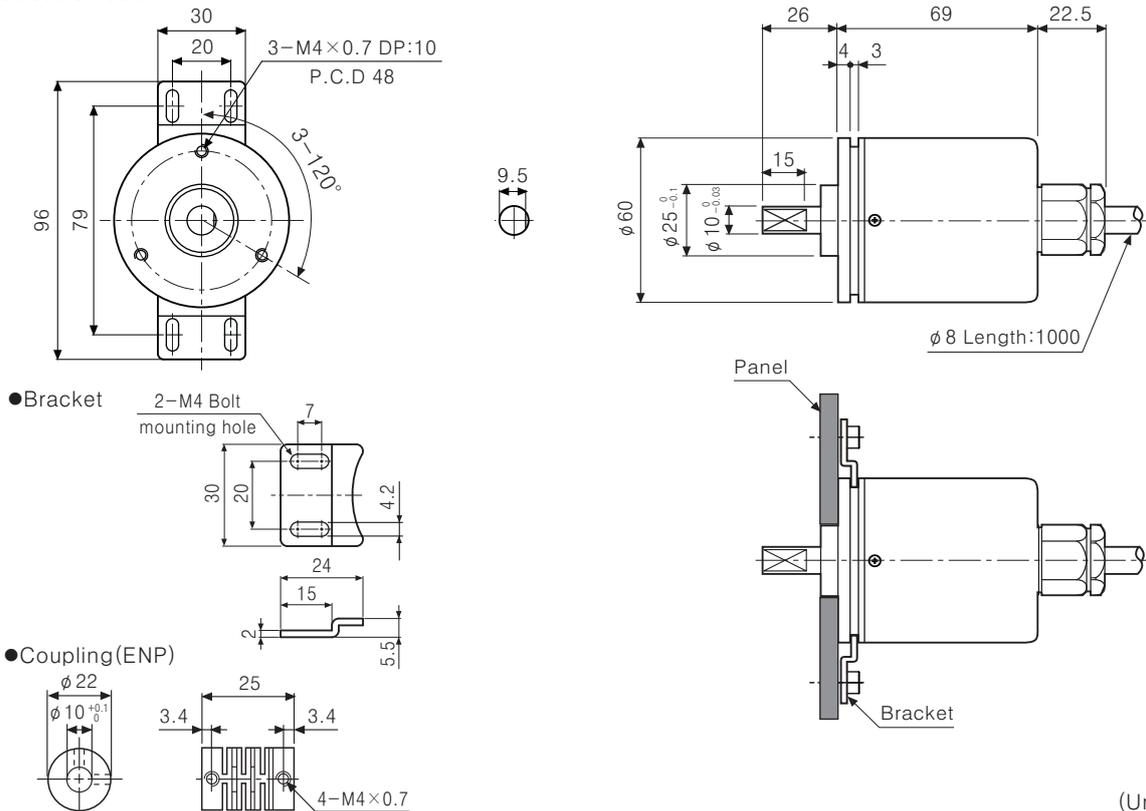
※N.C : Not Connected.

※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



(Unit:mm)

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

EPM50 SERIES

Diameter ϕ 50mm Shaft type Absolute Multi-turn Rotary encoders

NEW

Features

- Compact size of diameter ϕ 50mm
- Parallel data / SSI data transmission type
- **Total 23bit resolution(8388608 divisions) of 10bit single-turn(1024 divisions) and 13bit multi-turn (8192 divisions)**
- Easy zero adjustment using single-turn / multi-turn data separated reset function
- Memorizing revolution data up to $\pm 90^\circ$ after blackout without memory back up function
- Possible CW/CCW direction setting with direction function
- Maximizing users convenience with lclear, overflow alarm (OVF) function
- Protection structure IP64 (Partial waterproof, Oil proof)
- Provides Latch fuction (Parallel output model only)



Applications

Precision machine tool, Fabric machinery, Robot, Parking system

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



Ordering information

EPM50S	8	-	10	13	-	B	-	PN	-	24
Series	Shaft diameter	Single-turn	Multi-turn	Output code	Control output				Power supply	
Diameter ϕ 50mm	ϕ 8mm	10bit (1024 division)	13bit (8192 division)	Binary Code	PN: Parallel NPN open collector output S : SSI				12-24VDC \pm 5%	

Specifications

Type		ϕ 50mm Multi-turn absolute encoder			
Model		EPM50S8-1013-B-S-24	EPM50S8-1013-B-PN-24		
Resolution	Single-turn	1024 division (10Bit)			
	Multi-turn	8192 revolution (13Bit)			
Rotation limit when power is off		(★1) $\pm 90^\circ$			
Electrical specification	Output	Output code	24bit, Binary 2 code	Binary 2 code	
		Output Interface	SSI (Synchronous Serial Interface)	Parallel	
		Output type	Line driver	NPN open collector output	
		Output signal	Single-turn data, Multi-turn count, (★2) OVF alarm		
		Line driver output	• Low: Sink current - max. 20mA, Residual voltage - max. 0.5VDC • High: Sink current - max. -20mA, Output voltage - max. 2.5VDC		—
		NPN open collector output	—	Sink current : Max. 32mA, Residual voltage : Max. 1VDC	
		Logic	—	Negative logic output	
		Response time	—	Max. 1 μ s (Cable: 2m, I sink = 32mA)	
Input	Input signal	(★3) Single-turn data reset, (★4) Multi-turn count reset, Direction, Clear			
		—	Latch		
	Input level	High : 5-24VDC, Low : 0-1.2VDC			
	Input logic	(★5) Low active, HIGH or OPEN for common use			
	Input time	Direction : Over 100ms			
		Single-turn data reset : Over 100ms			
Multi-turn count reset : Over 100ms					
SSI Clock Input Frequency	100kHz to 1MHz		—		
		Clear : Over 100ms		Latch : Over 500 μ s	

※ **(★1)** It calibrates the multi-turn counts by comparing single-turn data before/after power off without counting multi-turn counts when power is off. It shall be used on the condition that no over-rated revolution occurred since proper multi-turn data may not be available if any revolutions occurred over $\pm 90^\circ$ from the position when power is off.

※ **(★2)** OVF alarm is ON when multi-turn count is out of counting range (0 to 8191 revolution).

It shall be initialized by changing the setting of direction or applying multi-turn count reset or clear signals.

※ **(★3)** Single-turn data shall be initialized as 「0」 when single-turn data reset is input.

※ **(★4)** Multi-turn count shall be initialized as 「0 revolution」 when multi-turn count reset is input.

※ **(★5)** High active is customizable.

∅ 50mm Shaft Multi-turn Absolute Type

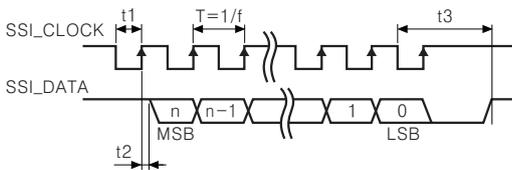
Specifications

Type	∅ 50mm Multi-turn absolute encoder		
Model	EPM50S8-1013-B-S-24	EPM50S8-1013-B-PN-24	
Electrical specification	Max. Response frequency	50kHz	
	Power supply	12-24VDC, ±5% (Ripple P-P : Max. 5%)	
	Current consumption	Max. 150mA (Disconnection of the load)	Max. 100mA (Disconnection of the load)
	Insulation resistance	Min. 100MΩ (At 500VDC 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 · cm (0.004N · m)	
	Moment of inertia	Max. 40g · cm ² (4 × 10 ⁻⁶ kg · m ²)	
	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf	
	Max. revolution	(★6) 3000rpm	
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for one minute cycle) in each of X, Y, Z direction for 2 hours		
Shock	Max. 50G		
Ambient temperature	-10 to 70°C (At non-freezing status), Storage : -25 to 85°C		
Ambient humidity	35 to 85%RH		
Protection	IP64 (IEC standard)		
Cable	∅ 6mm 10P, Length : 2m, Shield cable	∅ 6mm 17P × 2, Length : 2m, Shield cable	
Accessory	Mounting bracket, Coupling		
Approval	CE		
Unit weight	Approx. 322g	Approx. 475g	

※ (★6) In case of Parallel type model, select the resolution to make max. response revolution is lower than max. allowable revolution.

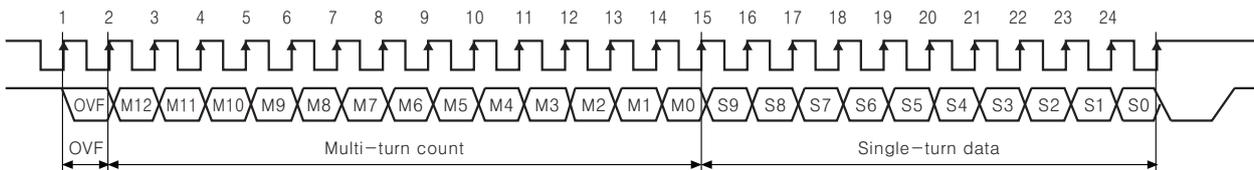
$$\text{【Max. Response Revolution (rpm) = } \frac{\text{Max. Allowable Revolution}}{\text{Resolution}} \times 60 \text{ sec.】}$$

Synchronous serial interface (SSI) Output Timing diagram



Clock Frequency f	100kHz to 1MHz
T	T : 1 to 10μs
	0.5μs < t1 < 5μs
Time lag t2	t2 < 0.3μs
Monoflop Time t3	15μs < t3 < 30μs

Synchronous serial interface (SSI) Data Output

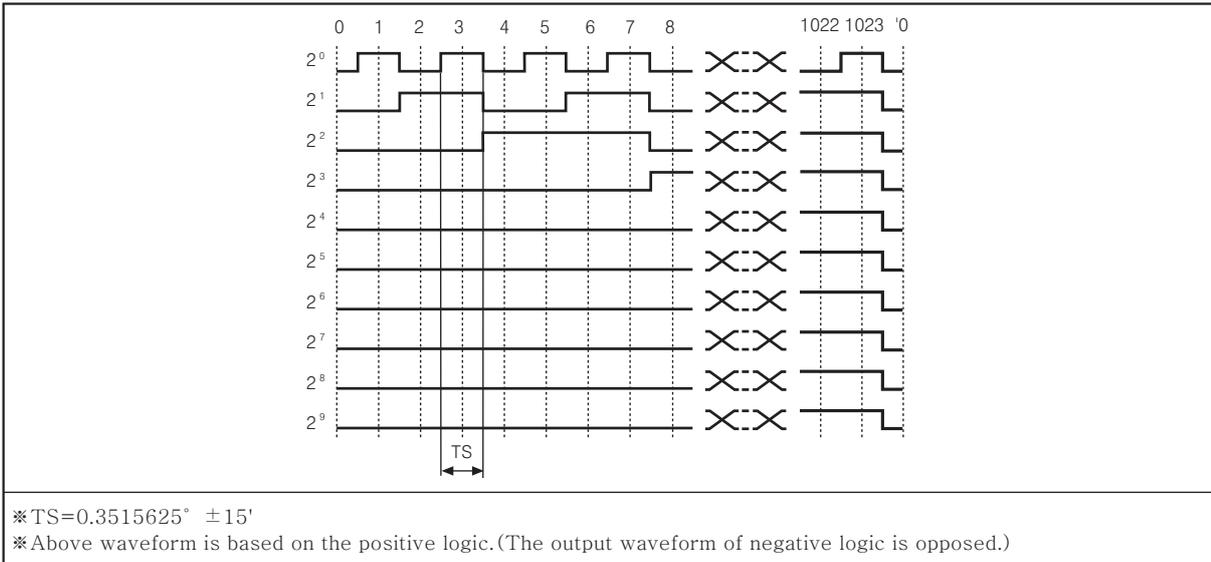


Clock input bit	Data output name	Data output bit	Clock input bit	Data output name	Data output bit
1	Over flow error bit	0 bit	15	Single-turn data	9 bit (MSB)
2	Multi-turn count	12 bit (MSB)	16		8 bit
3		11 bit	17		7 bit
4		10 bit	18		6 bit
5		9 bit	19		5 bit
6		8 bit	20		4 bit
7		7 bit	21		3 bit
8		6 bit	22		2 bit
9		5 bit	23		1 bit
10		4 bit	24		0 bit (LSB)
11		3 bit			
12	2 bit				
13	1 bit				
14	0 bit (LSB)				

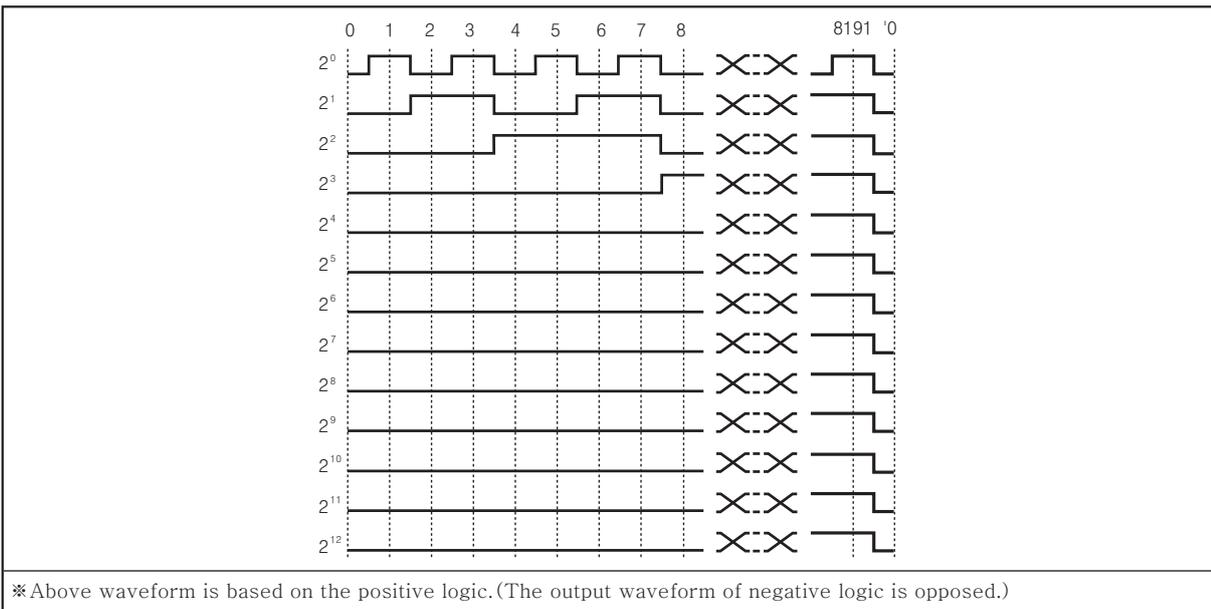
- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
- (I) SSR/Power controller
- (J) Counter
- (K) Timer
- (L) Panel meter
- (M) Tacho/Speed/Pulse meter
- (N) Display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

EPM50 SERIES

Parallel Interface 1024 division single-turn data output waveform (Binary code)

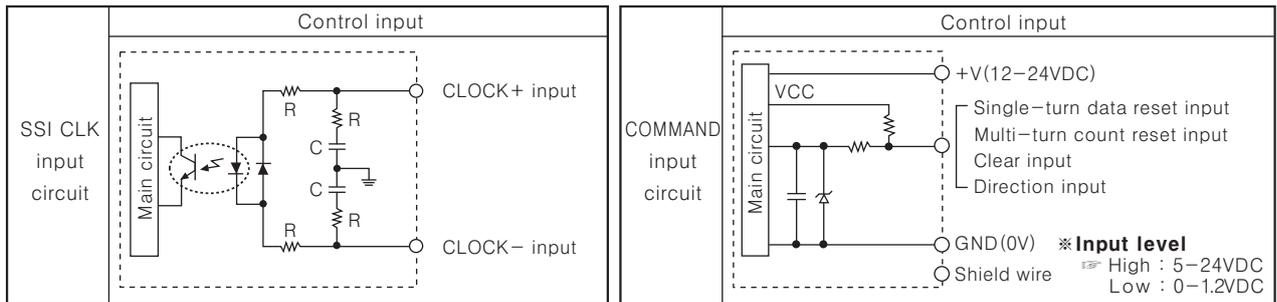


Parallel Interface 8192 revolution multi-turn count data output waveform (Binary code)



Control output I/O circuit

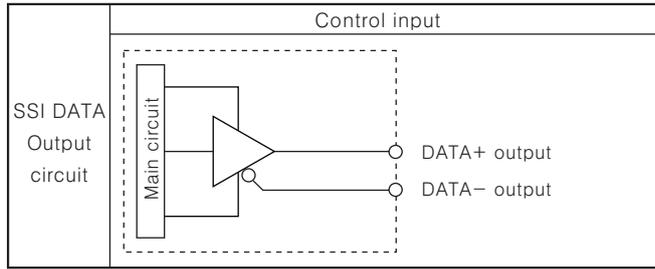
- SSI input • output



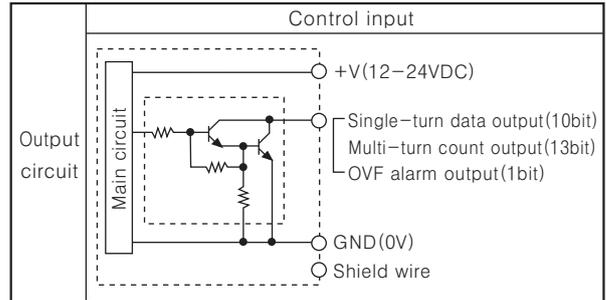
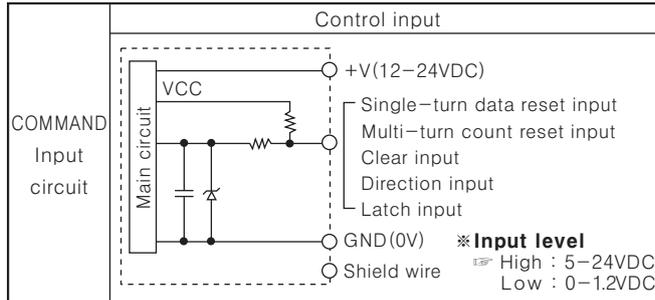
∅ 50mm Shaft Multi-turn Absolute Type

Control output I/O circuit

● SSI output



● Parallel input • output



- * Output of each bit is the same circuit.
- * Overload or short may cause circuit break.

Connections

● SSI output

Cable			
Cable color	Description	Cable color	Description
Brown	CLOCK +	Gray	Single-turn data reset
Red	CLOCK -	Blue	Multi-turn count reset
Orange	DATA +	Purple	Clear
Yellow	DATA -	Green	Direction
White	+V (12-24VDC)		
Black	GND (0V)		
Shield wire	Signal shield cable(F.G)		

● Parallel output

Multi-turn count cable (Sheath color : Black)			Single-turn data cable (Sheath color : Gray)		
Cable color	Description		Cable color	Description	
Brown	Multi-turn count	2 ⁰	Brown	Single-turn data	2 ⁰
Red		2 ¹	Red		2 ¹
Orange		2 ²	Orange		2 ²
Yellow		2 ³	Yellow		2 ³
Green		2 ⁴	Green		2 ⁴
Blue		2 ⁵	Blue		2 ⁵
Purple		2 ⁶	Purple		2 ⁶
Gray		2 ⁷	Gray		2 ⁷
Pink		2 ⁸	Pink		2 ⁸
Clear		2 ⁹	Clear		2 ⁹
Light brown		2 ¹⁰	Light brown	NC	
Light yellow		2 ¹¹	Light yellow	Direction	
Light green	2 ¹²	Light green	Latch		
Light blue	OVF		Light blue	Clear	
Light purple	Multi-turn count reset		Light purple	Single-turn data reset	
White	+V(12-24VDC)		White	+V(12-24VDC)	
Black	GND(0V)		Black	GND(0V)	
Shield wire	Signal shield cable(F.G)		Shield wire	Signal shield cable(F.G)	

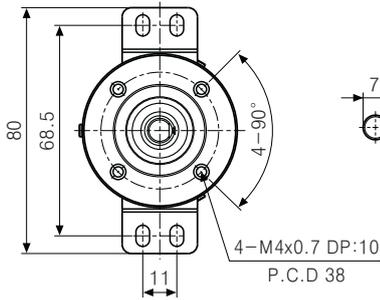
- * Please wire properly.
- * As for parallel output, it is recommended to connect +V and GND of both multi-turn count cable and single-turn data cable.
- * The metal case and shield wire of encoder should be grounded (F.G).
- * Input/Output cable must not be short-circuited, because Driver IC is used in output circuit.

- (A) Photo electric sensor
- (B) Fiber optic sensor
- (C) Door/Area sensor
- (D) Proximity sensor
- (E) Pressure sensor
- (F) Rotary encoder
- (G) Connector/Socket
- (H) Temp. controller
- (I) SSR/Power controller
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- (L) Panel meter
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- (T) Production stoppage models & replacement

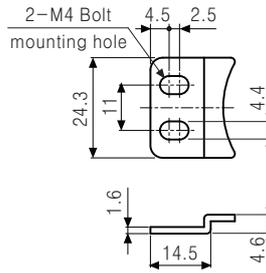
EPM50 SERIES

Dimensions

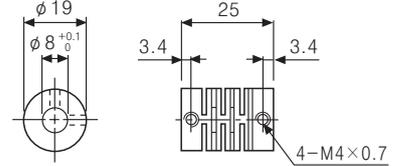
(Unit:mm)



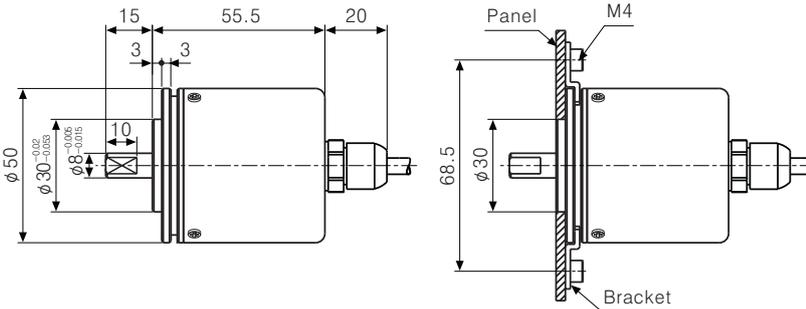
●Bracket



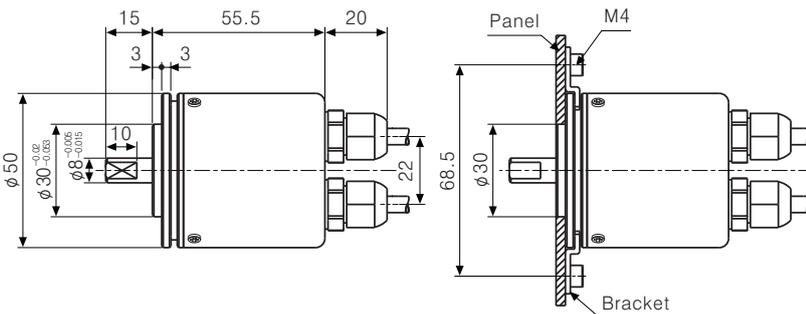
●Coupling(EPM50)



●SSI output



●Parallel output



Functions

◎Single-turn data reset

Single-turn data will be initialized as 「0」 when GND (low level) is input over 100ms on single-turn data reset line. In case of not using single-turn data reset line, connect the line to OPEN or +V (High level).

◎Multi-turn count reset

Multi-turn data will be initialized as 「revolution 0」 when GND(Low level) is input over 100ms on multi-count reset line. In case of not using multi-turn count reset line, connect the line to OPEN or +V (High level). OVF alarm will be initialized with multi-turn count reset input.

◎Clear

Single-turn data will be initialized as 「0」 and multi-count will be also initialized as 「revolution 0」 when GND (Low level) is input over 100ms on Clear line. In case of not using clear line, connect the line to OPEN or +V (High level). OVF alarm will be initialized with clear input.

◎Direction

Connect Direction line to OPEN or +V (High level) and turn on the power. Output will increase when rotation direction is CW from shaft axis. In case of connecting to GND(Low level), output will increase when rotation direction is CCW. If direction setting is reset, single-turn data, multi-turn count and OVF will be reset together since direction setting is initial setting which is set with Power ON.

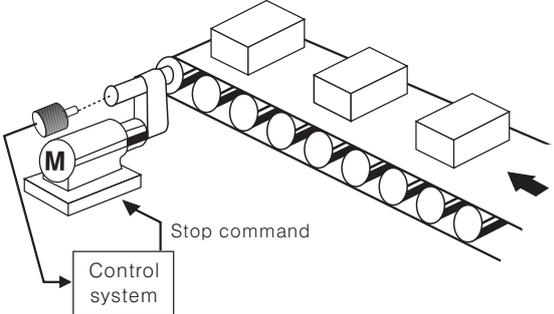
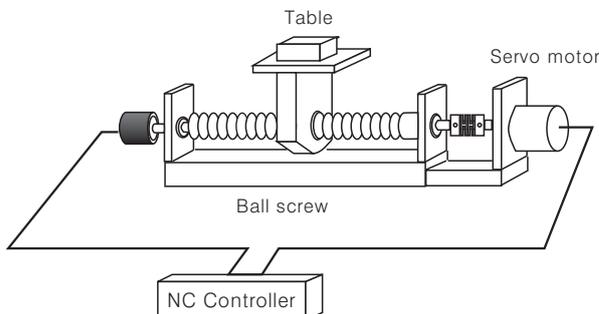
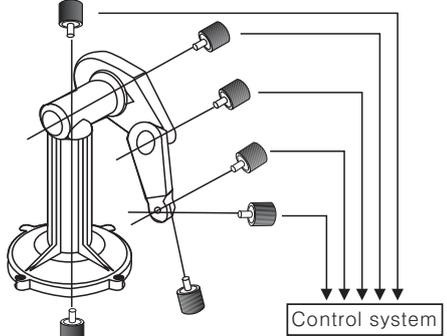
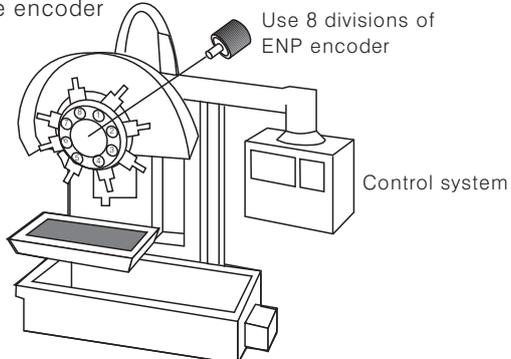
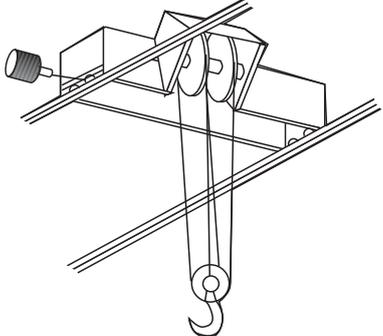
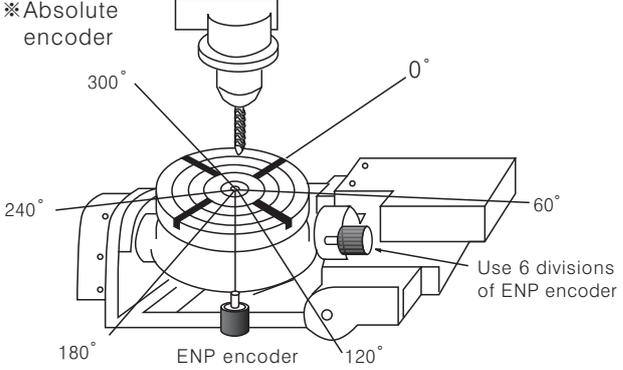
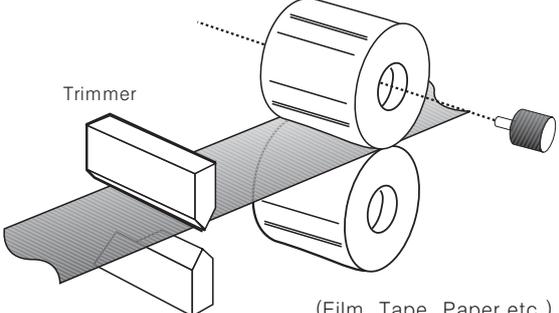
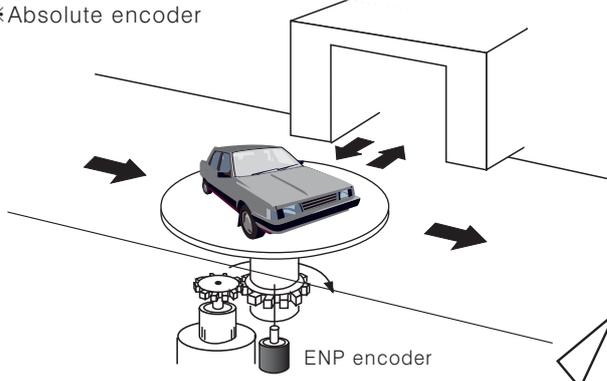
◎Latch(Parallel output model only)

When connecting latch line to GND(Low level) over 500 μ s, outputs for single-turn data, multi-turn count and OVF at latch point will be remained. When latch line is connected to OPEN or +V (High level), output will be returned to operating mode output.

◎OVF

It is an alarm function providing output when multi-turn count is out of rotation ranges(0 to 8191 revolutions). OVF will be initialized through direction setting change, multi-turn count reset or clear input.

■ 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> 
<p>Measuring of Robot arm angle and position</p> <p>※ Incremental encoder</p> 	<p>Controlling drill position of NC machine</p> <p>※ Absolute encoder</p> <p>Use 8 divisions of ENP encoder</p> 
<p>Controlling position of moving crane</p> <p>※ Incremental encoder</p> 	<p>Controlling table angle of NC machine</p> <p>※ Absolute encoder</p> <p>Use 6 divisions of ENP encoder</p> 
<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> 

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

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(H) Temp. controller

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(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

Technical Description

Overview

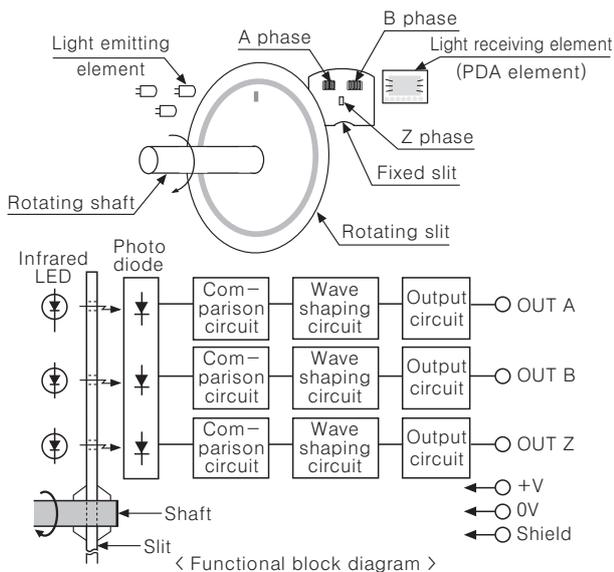
It is being digitalized and accelerated with built-in micro processor because of development of computer. It is widely used in industrial NC, ROBOT, servo motors and OA equipments in order to detect accurate location and operating speed and to provide some feedback.

Rotary encoder is a device that converts shaft's rotation angle into electrical signals(pulse) and provides an output.

Principle of operation

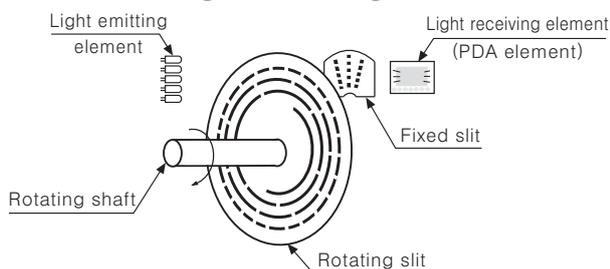
Incremental rotary encoder

Incremental rotary encoder consists of a rotating slit which is painted black pattern and a fixed slit between light emitting elements and light receiving elements. By rotating encoder's shaft, light from the light emitting elements passes through these slits, or is blocked. The passing light is converted as current signal by light receiving element. This current signal outputs square wave pulse through a wave shaping circuit and an output circuit. Incremental output phases are A phase, B phase which have phase difference at 90°, and Z phase, zero-reference phase.



Absolute rotary encoder

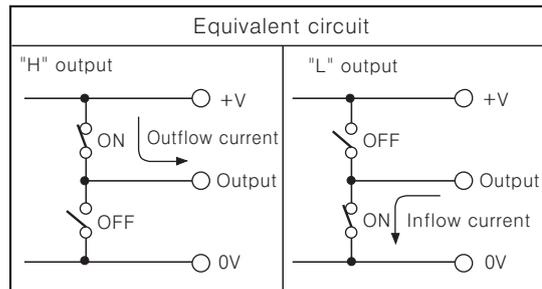
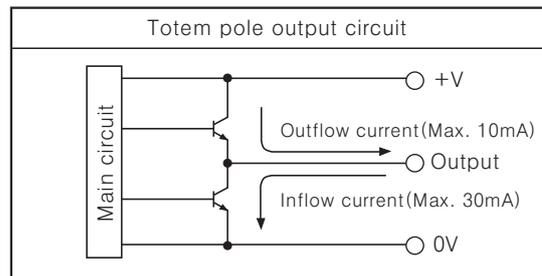
The absolute rotary encoder divides from 0° to 360° as certain rate and specifies electrical digital code (BCD, Binary, Gray code) to the each divided angle position. The absolute rotary encoder as the absolute angle sensor outputs the specified digital code according to the rotational shaft position. Due to no impact on the electric characteristics, this encoder does not need memory retention circuit against power failure and has high noise strength.



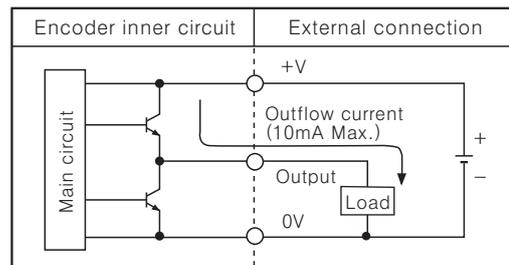
Connection example and output types of rotary encoder

Totem pole output

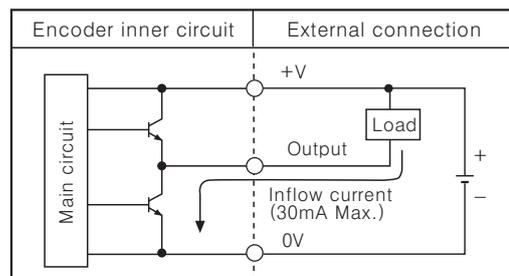
A totem pole output is a type of electronic circuit that consist of two transistors between +V and 0V as shown in the figure below. When output signal is "H", upper transistor will be ON and lower transistor will be OFF. When output signal is "L", upper transistor will be OFF and lower transistor will be ON. Totem pole output features low output impedance because the circuit is designed to be capable of flowing current in both directions. In addition, it has little influence of waveform distortion and noise, and is used for longer encoder line.



In case of voltage output type



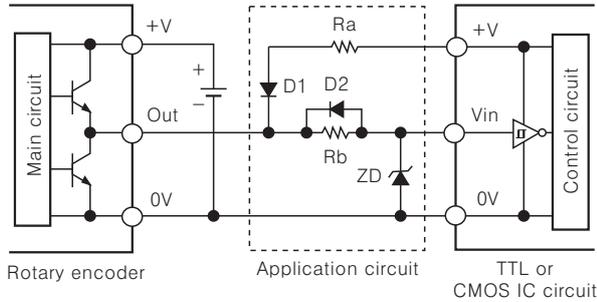
In case of NPN open collector output type



Technical Description

● Connection example totem pole output type and IC circuit

If certain deviation occurs between encoder's max. output signal voltage (V_{out}) and max. allowable input voltage of logic IC (V_{in}), it is required to adjust circuit's voltage level as shown in the figure below.

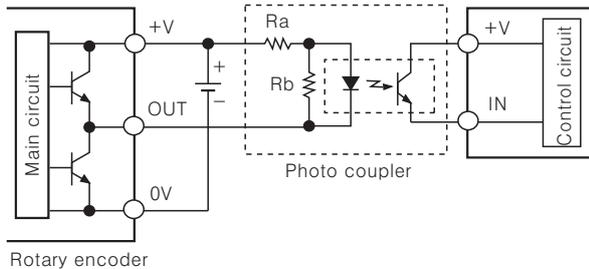


※ If input voltage of control circuit is lower than applied voltage of encoder,

- 1) Make sure that zener voltage on ZD should be the same with max. allowable input voltage (V_{in}) of logic IC circuit.
- 2) Make sure that R_a and R_b should be adjusted to stable input signal level when designing application circuit.
- 3) In case cable length between encoders and control circuit is short, it is fine to design the circuit without R_a and D_1 .

● Connection example totem pole output type and Coupler

Encoder's output circuit can be isolated by using photo coupler as shown in the figure below.



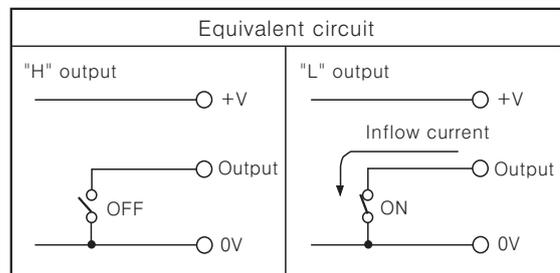
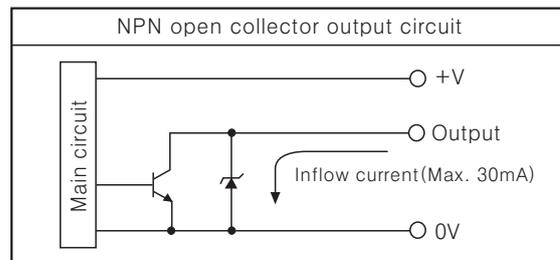
Note 1) All components applied to application circuits shall be connected adjacent to photo coupler.

Note 2) Make sure to select the photo coupler having higher response speed than encoder's max. response frequency.

◎ NPN open collector output

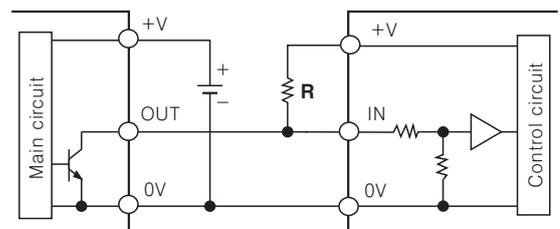
As shown below, it is one of various output types using NPN transistor to connect emitter with "0V" terminal, and to open "+V" terminal with collector so that collector terminal can be used as an output terminal.

It is useful when encoder's power voltage and controller's power voltage are not matched.



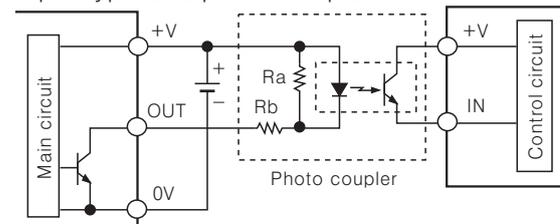
● Connection example of NPN open collector output type collector and counter.

When connect to a counter which is voltage input type, please connect to pull-up resistance between +V and output (transistor's collector) from external.



Note) Make the value of pull up resistance under 1/5 of input impedance of a counter.

● Connection example of NPN open collector output type and photo coupler



Note 1) R_a value should be a high resistance within the stable operating range of photo coupler.

Note 2) R_b value should be within the stable operating range of photo coupler. This value is not exceeded the rated load current of rotary encoder.

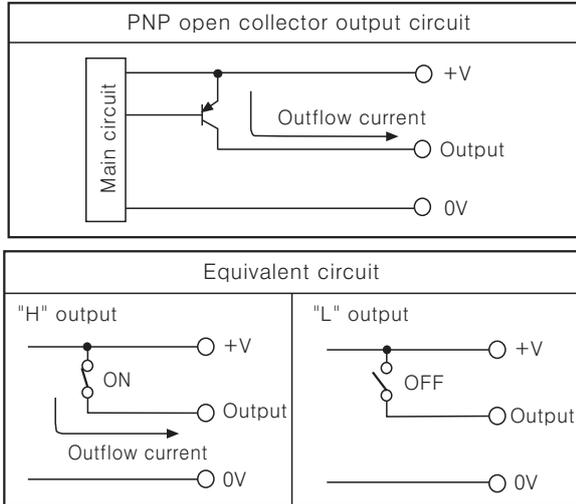
(A)	Photo electric sensor
(B)	Fiber optic sensor
(C)	Door/Area sensor
(D)	Proximity sensor
(E)	Pressure sensor
(F)	Rotary encoder
(G)	Connector/Socket
(H)	Temp. controller
(I)	SSR/Power controller
(J)	Counter
(K)	Timer
(L)	Panel meter
(M)	Tacho/Speed/Pulse meter
(N)	Display unit
(O)	Sensor controller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

Technical Description

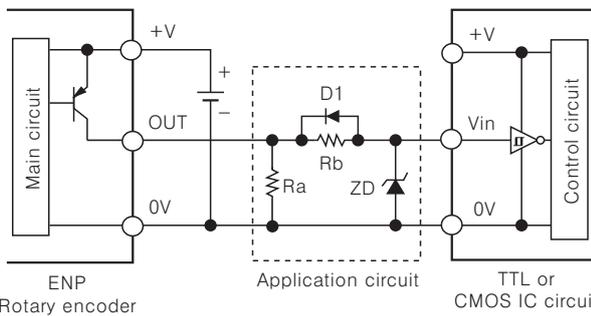
◎PNP open collector output (Only for absolute type)

As shown below, it is one of various output types using PNP transistor to connect emitter with "+V" terminal, and to open "0V" terminal with collector so that collector terminal can be used as an output terminal.

It is useful when encoder's power voltage and controller's power voltage are not matched.



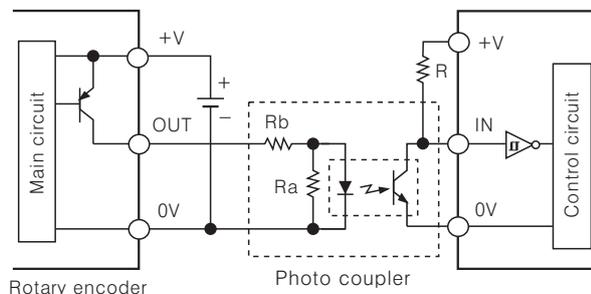
●Connection example of PNP open collector output type and external application circuit



Note 1) Please use low resistance that does not exceed the rated load current of rotary encoder.

Note 2) Select components that make zener voltage of ZD the same as maximum allowable input voltage of logic IC.

●Connection example of PNP open collector output type and photo coupler



Note) Ra and Rb values should be within the stable operating range of photo coupler. These values are not exceeded the rated load current of rotary encoder.

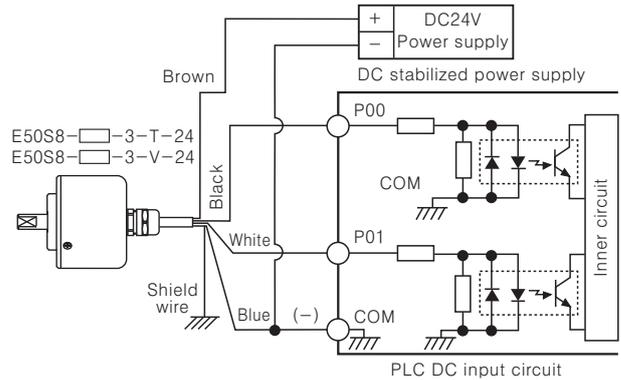
※Only absolute rotary encoder has PNP open collector output type.

◎Connection example of rotary encoder and PLC

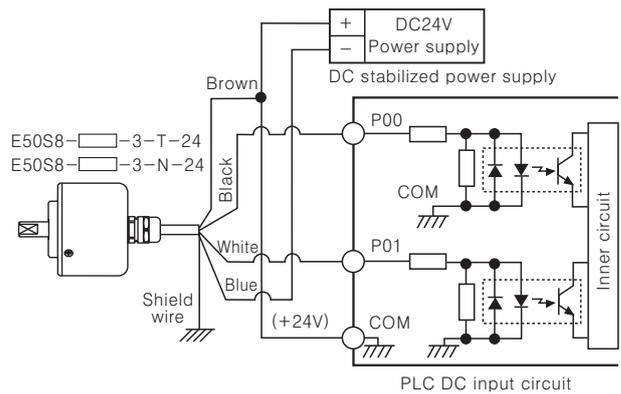
Rotary encoder output is able to connect PLC which is DC type input module. Be sure to set the output pulse of rotary encoder longer enough (more than 10 times) than scan time of PLC. (Either make rpm lower or use a low pulse encoder.)

Because DC power of PLC is not stabilized, please supply stable power to rotary encoder.

●Common terminal is "0V"



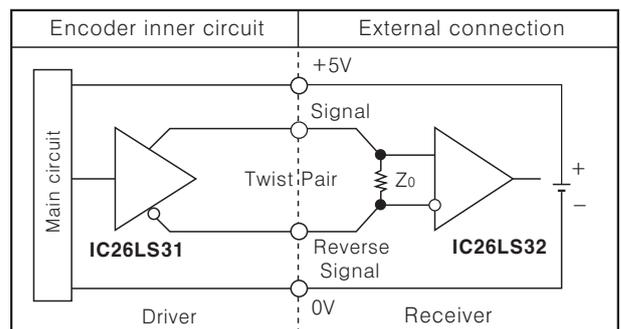
●Common terminal is "+24V"



◎Line driver output

Line Drive output uses Line Drive exclusive IC (26LS31) on output circuit as shown below. That exclusive IC has high speed response. So, it is proper for long-distance transmission and is strong on noise. However, use IC (26LS32) corresponded to RS422A on response side.

Also, in case of extending wiring length, use twist pair line. If make output line, it is able to get a characteristic to eliminate normal mode noises as offsetting electromotive force occurred in line. (Terminating resistance of receiver (Zo): Approx. 200Ω)



■ Glossary

● Resolution

Resolution is number of output pulse while rotary encoder shaft revolves once.

For incremental rotary encoder, resolution means number of graduations on a silt, and for absolute rotary encoder, resolution means number of divisions.

● Starting torque

The torque needed to rotate the shaft of the rotary encoder at startup. The torque during rotation is normally lower than the starting torque.

● Maximum response frequency

The max. number of pulses that rotary encoder could respond electronically in a sec. And it also can be the shaft speed when the device in which the encoder is used is in operation.

$$\text{Max. response frequency} = \frac{\text{Revolutions}}{60} \times \text{Resolution}$$

Note) Max. revolutions should be within max. allowable revolutions. Resolution should not be exceeded max. response frequency.

● Maximum allowable revolution (rpm) – Mechanical specification

It means the mechanical maximum allowable revolution of rotary encoder, and has an impact on the lifetime of the encoder.

So, please do not exceed the rated values listed in.

● Maximum response revolution (rpm) – Electronic specification

The maximum revolution speed for rotary encoder to output electric signal ordinarily. It is decided by max. response frequency and resolution.

$$\text{Max. response revolution (rpm)} = \frac{\text{Max. response frequency}}{\text{Resolution}} \times 60$$

Set resolution that makes max. response revolution not to exceed max. allowable revolution.

● CW (Clockwise)

The clockwise direction of rotation from the shaft, the shaft. (A phase precedes B phase at 90° in our company's standard feature.)

● CCW (Counterclockwise)

The counterclockwise direction of rotation from encoder's shaft. (B phase precedes A phase at 90° in our company's standard feature.)

● A, B phase

Digital signals of which phase difference is 90°, and that is to determine the direction of rotation.

● Z phase

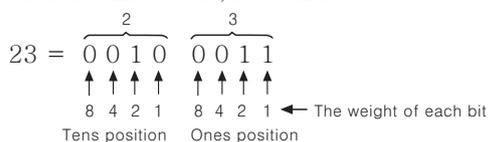
Signal that is generated once a revolution and is called zero-reference phase.

● BCD Code (Binary-Coded Decimal code)

It is a binary-coded decimal system.

Because it is easy to change a decimal code to binary code with the '8 4 2 1' that indicates the weight of each bit, it is widely used with controllers and counters.

Ex) In case of converting decimal digit 23 to binary-coded decimal code, it would be:



● Binary code

The most basic code expressed in combination of 0 and 1.

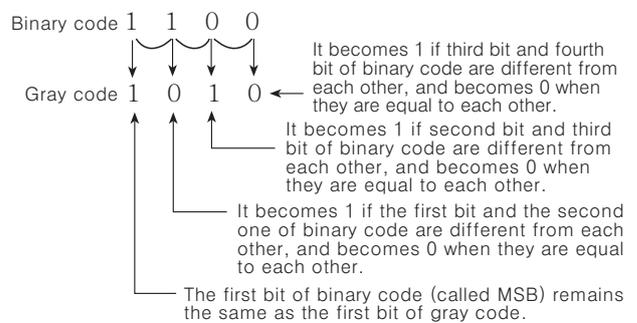
Ex) In case of converting decimal digit 27 to binary code, it would be 11011.



● Gray code

Gray code is made to complement the defects of binary code. Only one bit changes state from one position to another so that it prevents errors occurring.

Ex) In case of converting decimal digit 12 (1100 in binary code) to gray code, it would be 1010.



< Absolute code table >

Decimal	Gray Code	Binary Code	BCD Code			
			× 10		× 1	
	2 ⁴ 2 ³ 2 ² 2 ¹ 2 ⁰	2 ⁴ 2 ³ 2 ² 2 ¹ 2 ⁰	2 ³ 2 ² 2 ¹ 2 ⁰	2 ³ 2 ² 2 ¹ 2 ⁰	2 ³ 2 ² 2 ¹ 2 ⁰	2 ³ 2 ² 2 ¹ 2 ⁰
0	0 0 0 0 0	0 0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
1	0 0 0 0 1	0 0 0 0 1	0 0 0 0	0 0 0 0	0 0 0 1	0 0 0 1
2	0 0 0 1 1	0 0 0 1 0	0 0 0 0	0 0 0 0	0 0 1 0	0 0 1 0
3	0 0 0 1 0	0 0 0 1 1	0 0 0 0	0 0 0 0	0 0 1 1	0 0 1 1
4	0 0 1 1 0	0 0 1 0 0	0 0 0 0	0 0 0 0	0 1 0 0	0 1 0 0
5	0 0 1 1 1	0 0 1 0 1	0 0 0 0	0 0 0 0	0 1 0 1	0 1 0 1
6	0 0 1 0 1	0 0 1 1 0	0 0 0 0	0 0 0 0	0 1 1 0	0 1 1 0
7	0 0 1 0 0	0 0 1 1 1	0 0 0 0	0 0 0 0	0 1 1 1	0 1 1 1
8	0 1 1 0 0	0 1 0 0 0	0 0 0 0	0 0 0 0	1 0 0 0	1 0 0 0
9	0 1 1 0 1	0 1 0 0 1	0 0 0 0	0 0 0 0	1 0 0 1	1 0 0 1
10	0 1 1 1 1	0 1 0 1 0	0 0 0 1	0 0 0 0	0 0 0 0	0 0 0 0
11	0 1 1 1 0	0 1 0 1 1	0 0 0 1	0 0 0 0	0 0 0 1	0 0 0 1
12	0 1 0 1 0	0 1 1 0 0	0 0 0 1	0 0 0 0	0 0 1 0	0 0 1 0
13	0 1 0 1 1	0 1 1 0 1	0 0 0 1	0 0 0 0	0 0 1 1	0 0 1 1
14	0 1 0 0 1	0 1 1 1 0	0 0 0 1	0 0 0 0	0 1 0 0	0 1 0 0
15	0 1 0 0 0	0 1 1 1 1	0 0 0 1	0 0 0 0	0 1 0 1	0 1 0 1
16	1 1 0 0 0	1 0 0 0 0	0 0 0 1	0 0 0 0	0 1 1 0	0 1 1 0
17	1 1 0 0 1	1 0 0 0 1	0 0 0 1	0 0 0 0	0 1 1 1	0 1 1 1
18	1 1 0 1 1	1 0 0 1 0	0 0 0 1	0 0 0 0	1 0 0 0	1 0 0 0
19	1 1 0 1 0	1 0 0 1 1	0 0 0 1	0 0 0 0	1 0 0 1	1 0 0 1
20	1 1 1 1 0	1 0 1 0 0	0 0 1 0	0 0 0 0	0 0 0 0	0 0 0 0
21	1 1 1 1 1	1 0 1 0 1	0 0 1 0	0 0 0 0	0 0 0 1	0 0 0 1
22	1 1 1 0 1	1 0 1 1 0	0 0 1 0	0 0 0 0	0 0 1 0	0 0 1 0
23	1 1 1 0 0	1 0 1 1 1	0 0 1 0	0 0 0 0	0 0 1 1	0 0 1 1
24	1 0 1 0 0	1 1 0 0 0	0 0 1 0	0 0 0 0	0 1 0 0	0 1 0 0
25	1 0 1 0 1	1 1 0 0 1	0 0 1 0	0 0 0 0	0 1 0 1	0 1 0 1

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor & Driver & Controller

(R) Graphic/Logic panel

(S) Field network device

(T) Production stoppage models & replacement

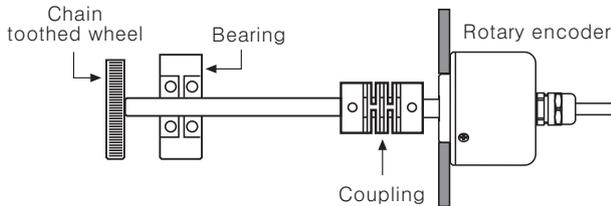
Technical Description

■ Proper usage

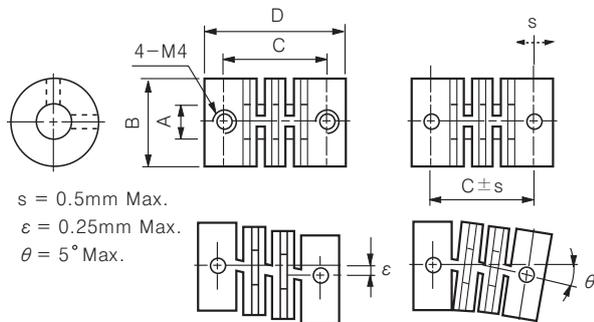
◎ Caution for using

Because rotary encoder consist of precision parts, excessive force can cause internal slit damaged. So, please be careful when using it.

- When combine to chains, timing belts, toothed wheels, use the coupling so that the axis of encoder is not impacted by an excessive force.



- If there is a huge combining error among the axis of rotation when combining encoder to coupling, the life time of the encoder can be reduced.



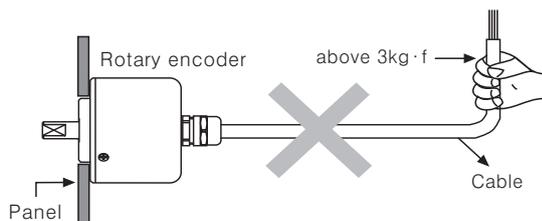
(Unit:mm)

Provision	A	B	C	D
Division				
φ 4mm coupling	φ 4	φ 13	15.6	21
φ 6mm coupling	φ 6	φ 15	16.4	22
φ 8mm coupling	φ 8	φ 19	18.2	25
φ 10mm coupling	φ 10	φ 22	18.2	25

- Do not apply excessive loads to the axis of rotation.



- Be sure not to inflict more than 3kg·f of the tensile on Rotary encoder wiring.

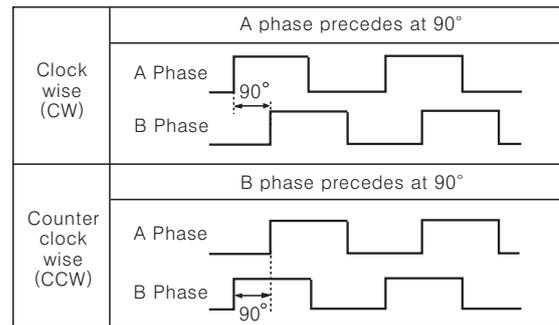


- Do not drop water or oil on the rotary encoder. Otherwise, it may cause malfunction.

- Do not hammer when combining either hollow shaft or built-in type encoder with a body of revolution. Especially be careful with high-pulse encoder that has fragile glass slit.

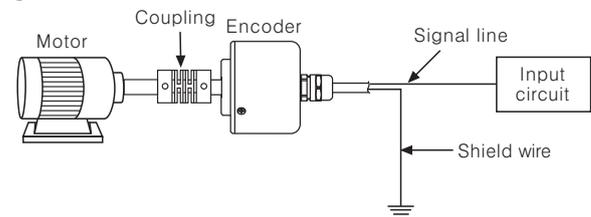
- Pulse phase of encoder varies depending on the direction of rotation. If the shaft rotates right when see it from the end of the shaft, it is Clockwise(CW). And if it rotates left, it is Counterclockwise(CCW).

A phase precedes B phase when it is on CW.



◎ Wiring cautions

- Cable shield line of rotary encoder is directly connected to the case, so please ground the metal parts of encoder case to prevent from malfunction caused by external noises. Also make sure shield line of encoder cable to be grounded, not to be opened.



- Work on the wiring when power is turned off. And wrap it with pipe separately from other wires like power line, otherwise malfunction or internal circuit failure can be caused.

- It is better to shorten the wire length otherwise, the fall and rise time of wave form gets as long as the wire extended. Because which make it impossible to get an wanted output wave, please use it after standardizing the wave form using Schmidt trigger circuit.

◎ Vibration

- If vibration is inflicted to rotary encoder, pulses can be caused in wrong way. Thus, please place it in vibrationless area.

- The more pulses in one revolution, the narrower the gradations on resolution curve, and in which condition, operation vibration can be transmitted and that may cause uncommon pulses.