

Incremental ϕ 100mm Hollow Shaft Type

Diameter ϕ 100mm Hollow shaft type Incremental Rotary encoder

■ Features

- Great environmental resistance
- High stability of output
- Specially using in Elevator

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



■ Ordering information

E100H	35	10000	6	2	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 : 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 mega between all terminals and case)	
	Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)	
	Connection	Cable outgoing type	
Mechanical specification	Starting torque	Max. 300gf $\cdot$ cm (0.03N $\cdot$ m)	
	Rotor inertia.	Max. 800g $\cdot$ cm ² (8×10^{-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 ~ 55Hz in each of X, Y, Z directions for 2 hours	
Shock		Max. 75G	
Ambient temperature		–10 ~ 70 $^{\circ}$ C (at non–freezing status), Storage:–25 ~ 85 $^{\circ}$ C	
Ambient humidity		35~85%RH, Storage:35~90%RH	
Protection		IP50 (IEC standard)	
Cable		ϕ 5mm, 5P, Length:5m, Shield cable (Line driver output: ϕ 6mm, 8P)	
Accessory		Spring bracket 2EA	
Unit weight		Approx. 1200g	
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) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$ 】

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

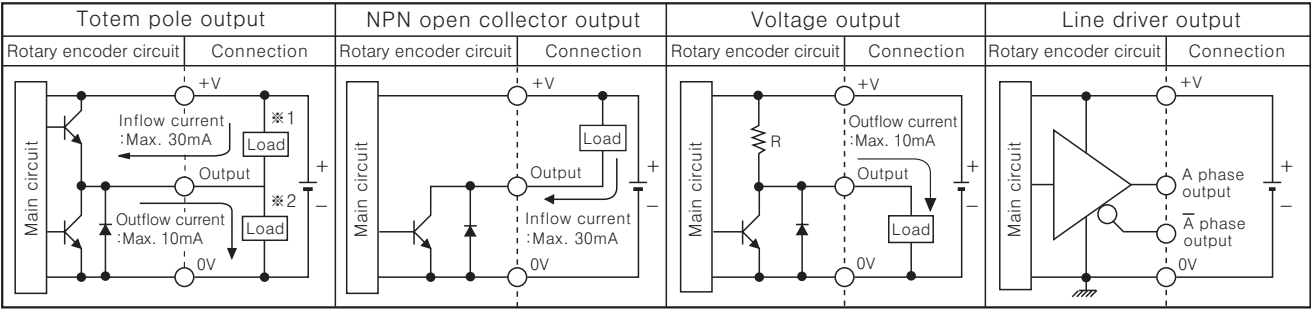
(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

E100H 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 is same. (Line driver output is for A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$)

Connections

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

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).

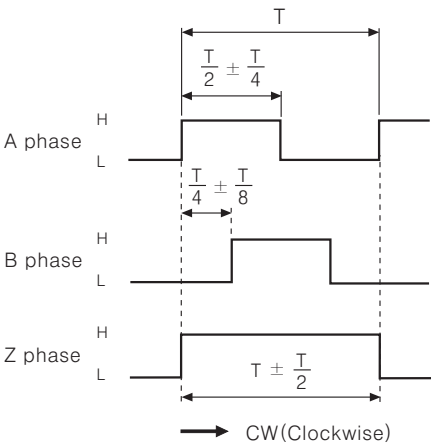
- Line driver output

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)

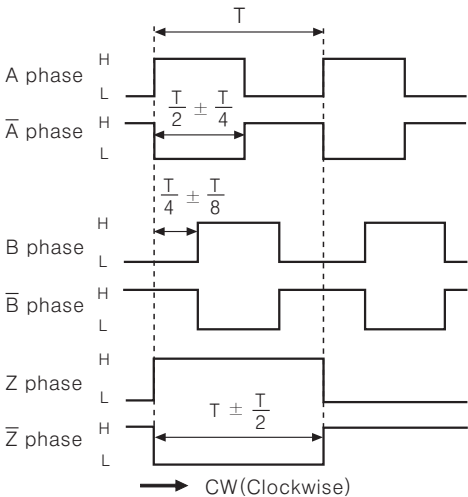
Output waveform

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



※ CW : As viewed from the shaft

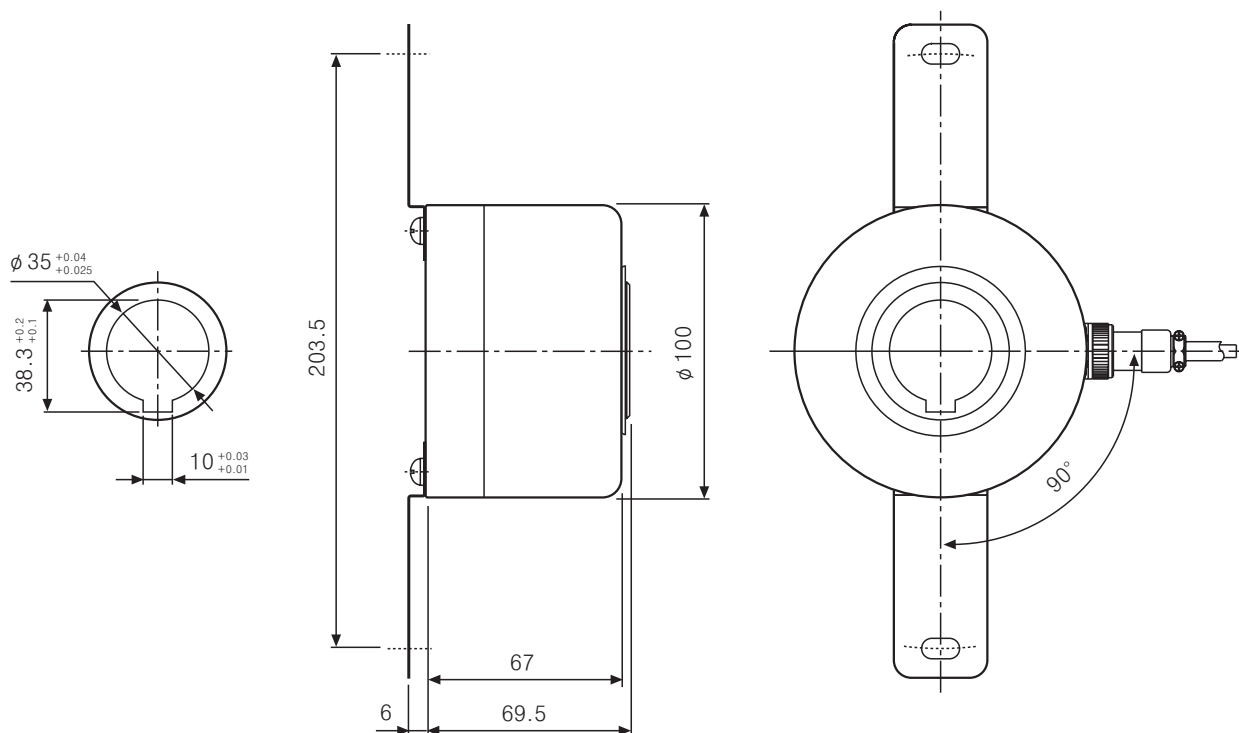
- Line driver output



Incremental $\phi 100\text{mm}$ Hollow Shaft Type

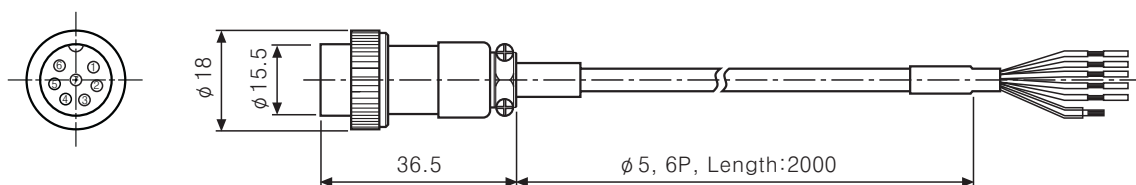
■ Dimensions

(Unit:mm)

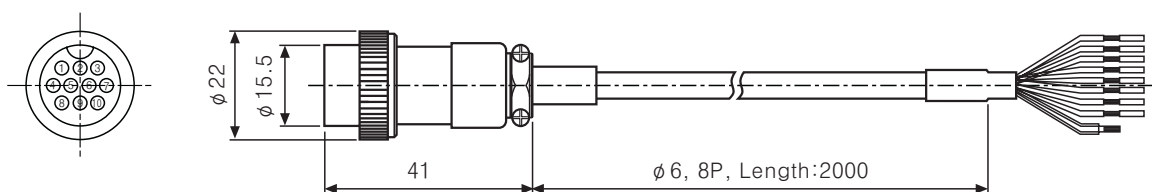


◎ Connector cable

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



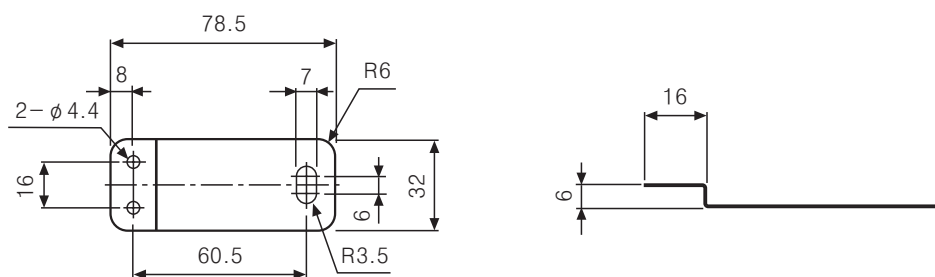
- Line driver output



※10m Connector cable is customizable.

※Cable outgoing type is customizable.

- Bracket



(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
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Display
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Production
stoppage
models &
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Incremental ϕ 20mm Shaft/Hollow shaft built-in Type

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

■ Features

- Miniature ϕ 20mm shaft type rotary encoder
- Easy installation at narrow space
- Small inertia moment
- Power supply : 5VDC, 12-24VDC $\pm$ 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, 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, 360 (Not indicated pulse and output type is customzable.)	
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	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 : 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% • 12VDC $\pm$ 5%	
Mechanical specification	Current consumption	Max. 60mA(disconnection of the load), Line driver output: Max. 50mA(disconnection of the load)	
	Insulation resistance	Min. 100M Ω (at 500VDC between all terminals and case)	
	Dielectric strength	500VAC 50/60Hz for 1 minute(Between all terminals and case)	
	Connection	Outgoing cable type(Rear / Side)	
	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(Built-in type)	
Approval		CE	
Unit weight		Approx. 35g	

* (Note1) Max. allowable revolution $\geq$ Max. response revolution

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

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

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

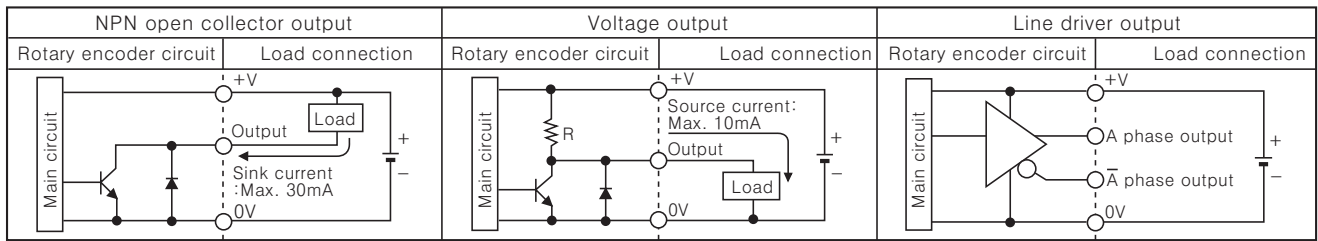
(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

E20 Series

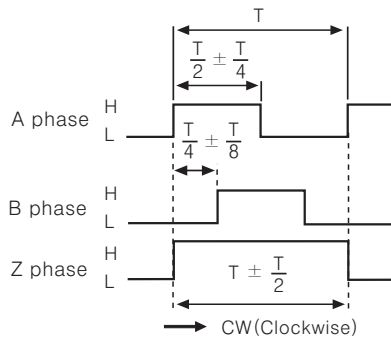
Control output diagram



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

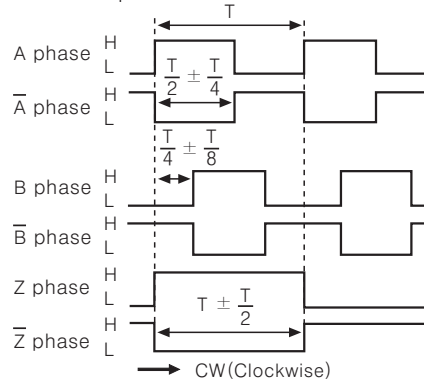
Output waveform

●NPN open collector output / Voltage output



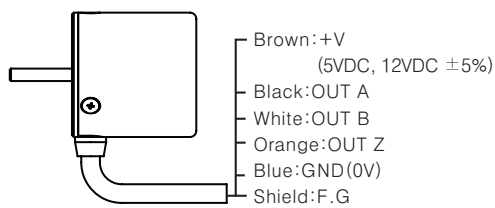
※CW : As viewed from the shaft

●Line driver output

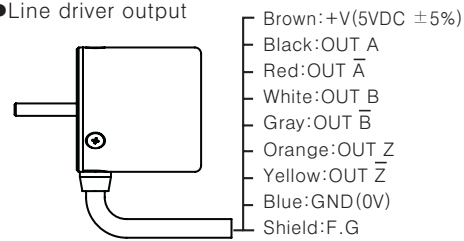


Connections

●NPN open collector output / Voltage output

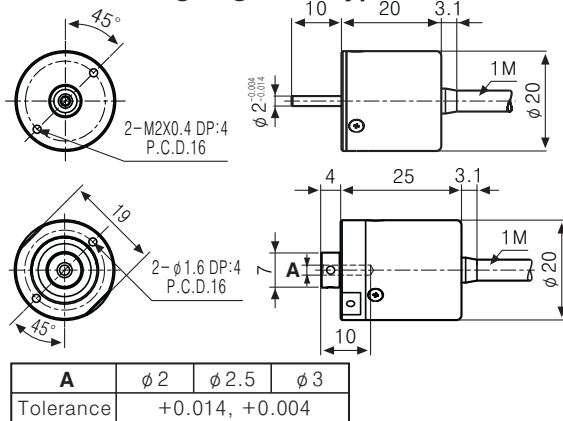


●Line driver output



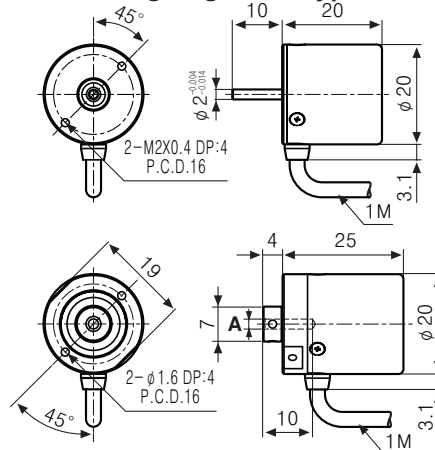
Dimensions

■Rear side outgoing cable type

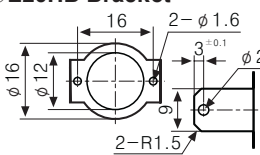


■Side outgoing cable type

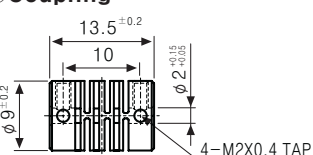
(Unit:mm)



◎E20HB Bracket



◎Coupling



※ When combine the coupling to encoder shaft, if there is big eccentricity or bend between rotating encoder shaft and mate shaft, it will make the life cycle of encoder and coupling shorten.
※ Do not add too much load on rotation axis.

$s = 0.2\text{mm Max.}$
 $\epsilon = 0.15\text{mm Max.}$
 $\theta = 2^\circ \text{ Max.}$

Incremental ø 30mm Shaft Type

Diameter ø 30mm Shaft type Incremental Rotary encoder

■ Features

- Miniature ø 30mm shaft type rotary encoder
- Easy installation at narrow space
- Small inertia moment
- Power supply : 5VDC, 12–24VDC ±5%
- Various output types

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



■ Ordering information

E30S	4	—	1024	—	3	—	2	—	24	—	
Series	Shaft diameter	Pulse/1 Revolution	Output phase	Output	Power supply	Cable					
Diameter ø 30mm, shaft type	ø 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 ±5% 24:12–24VDC ±5%	No mark: Normal type (*) 2C: 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 ø 30mm shaft type of Incremental rotary encoder		
Resolution(P/R)			100, 200, 360, 500, 1000, 1024, 3000 (Not indicated type is available to customize)		
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		
		Line driver output	• Low $\Rightarrow$ Load current : Max. 20mA, Residual : 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		• Measuring condition $\Rightarrow$ Cable length:2m, I sink=Max. 20mA
		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		• 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)		
	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 • cm(0.002N • m)		
	Rotor inertia		Max. 20g • cm ² (2 $\times$ 10 ⁻⁶ kg • m ²)		
	Shaft loading		Radial : Max. 2kgf, Thrust : Max. 1kgf		
	Max. allowable revolution		(★Note1) 5000rpm		
Vibration			1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours		
Shock			Max. 50G		
Ambient temperature			-10 ~ 70℃ (at non-freezing status), Storage:-25 ~ 85℃		
Ambient humidity			35~85%RH, Storage: 35~90%RH		
Protection			IP50 (IEC standard)		
Cable			ø 5mm, 5P, Length:2m, Shield cable (Line driver: ø 5mm, 8P)		
Accessory			ø 4mm coupling		
Unit weight			Approx. 80g		
Approval			CE (Except for Line driver output)		

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

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

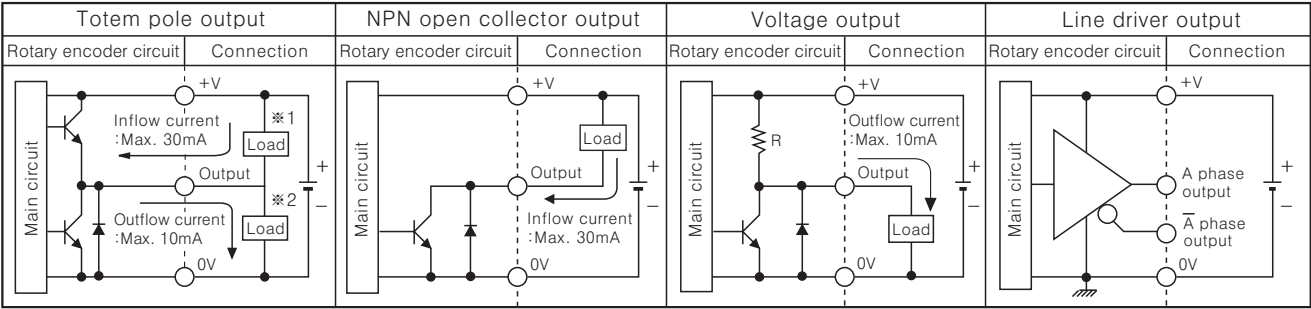
(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

E30S Series

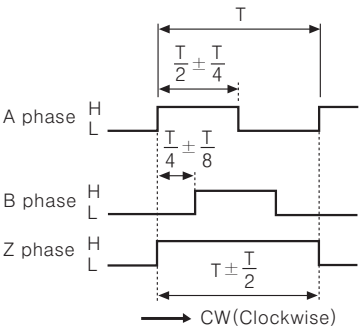
Control output diagram



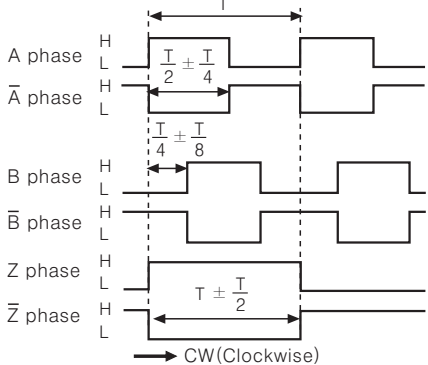
- Totem pole output type can be used for NPN open collector output type (※1) or Voltage output type (※2).
- All output circuits of A, B, Z phase is same. (Line driver output is for A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$)

Output waveform

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



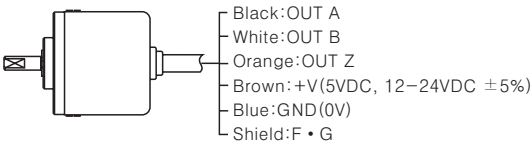
※ CW : As viewed from the shaft



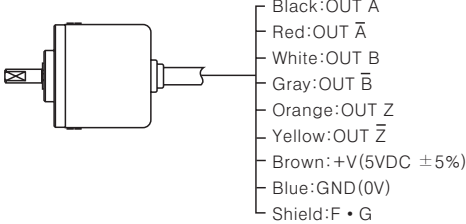
Connections

Normal type

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



- Line driver output



※ Unused wires must be insulated.

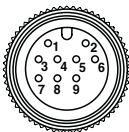
※ The metal case and shield wire of encoder should be grounded (F.G.).

Cable outgoing connector type

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



- Line driver output

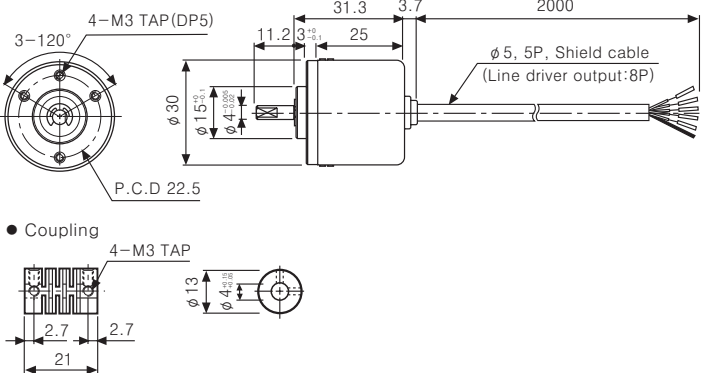


Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT $\bar{A}$	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT $\bar{B}$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

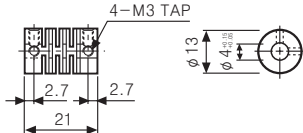
※ F.G (Field Ground) : It should be grounded separately.

Dimensions

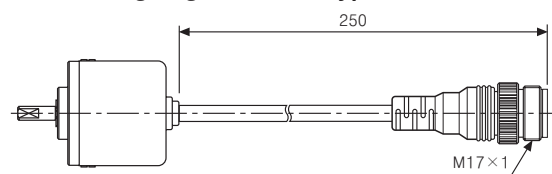
Normal type



- Coupling



Cable outgoing connector type



※ Connector cable is customizable and see M-48 for specifications.

(Unit:mm)

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

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

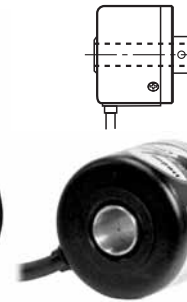
■ Features

- Easy installation at narrow space
- Small rotor inertia
- Power supply :
5VDC, 12–24VDC $\pm 5\%$
- Various output types

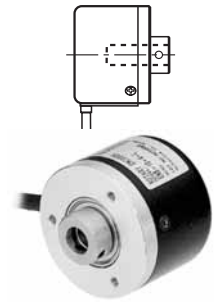
⚠ Please read "Caution for your safety" in operation manual before using.



CE



E40H SERIES



E40HB SERIES

■ Ordering information

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 $\pm 5\%$	No mark: 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 *The power of Line driver is only for 5VDC
*Option: A, B
*As for option models, ask before making a purchase.

*Cable length : 250mm

■ Specifications

Item		Diameter ϕ 40mm shaft/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, 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 type is available to customize)	
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 : 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 mega)	
	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	Shaft Type : Max. 40gf $\cdot$ cm (0.004N $\cdot$ m), Hole Type : Max. 50gf $\cdot$ cm (0.005N $\cdot$ m)	
	Rotor 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 ~ 55Hz in each of X, Y, Z directions for 2 hours	
Shock		Max. 50G	
Ambient temperature		–10 ~ 70 $^{\circ}$ C (at non-freezing status), Storage: –25 ~ 85 $^{\circ}$ C	
Ambient humidity		35~85%RH, Storage: 35~90%RH	
Protection		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	
Unit weight		Approx. 160g	
Approval		CE (Except for Line driver output)	

* **(Note1)** '1' 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) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$ **]**

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

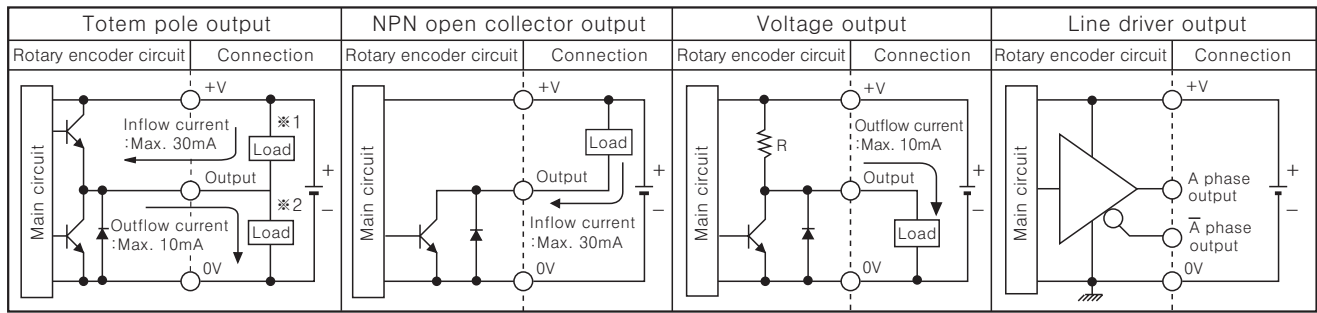
(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

E40 Series

Control output diagram

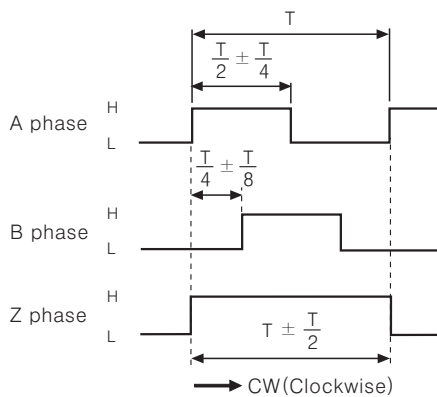


※ Totem pole output type can be used for NPN open collector output type(※1) or Voltage output type(※2).

※ All output circuits of A, B, Z phase is same. (Line driver output is A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$)

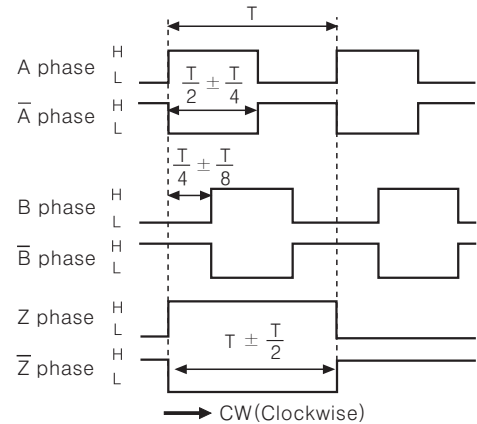
Output waveform

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



※ CW : As viewed from the shaft

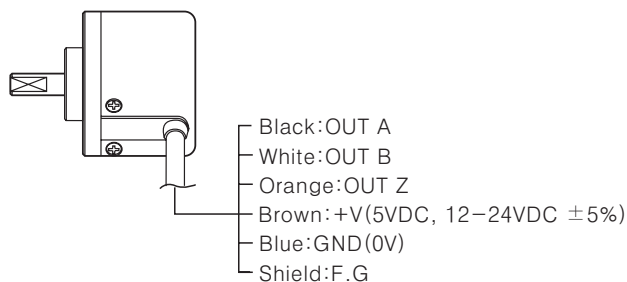
● Line driver output



Connections

Normal type

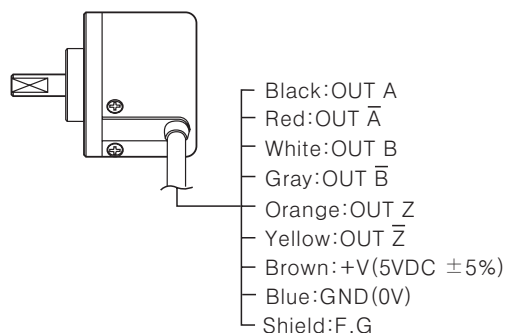
● Totem pole output / NPN open collector output / Voltage output



※ Unused wires must be insulated.

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

● Line driver output

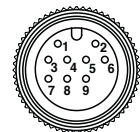


Cable outgoing connector type

● 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.

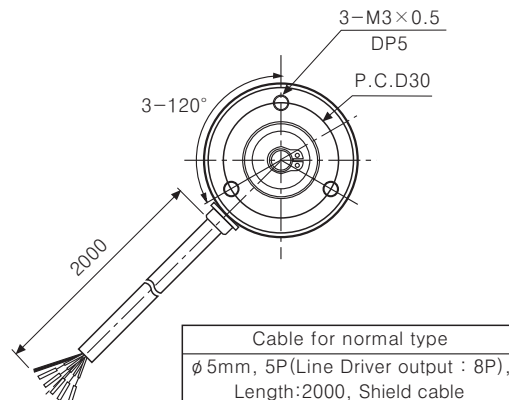
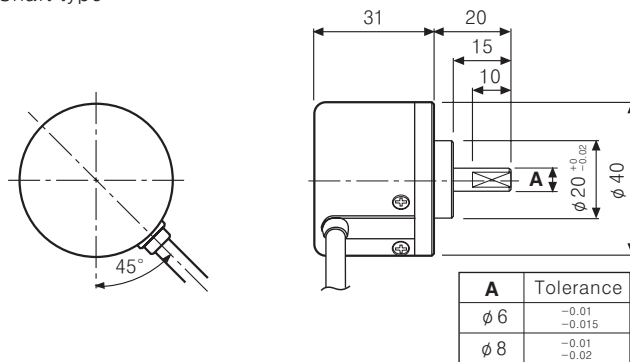
Incremental ϕ 40mm Shaft/Hollow Shaft/Built-in Type

■ Dimensions

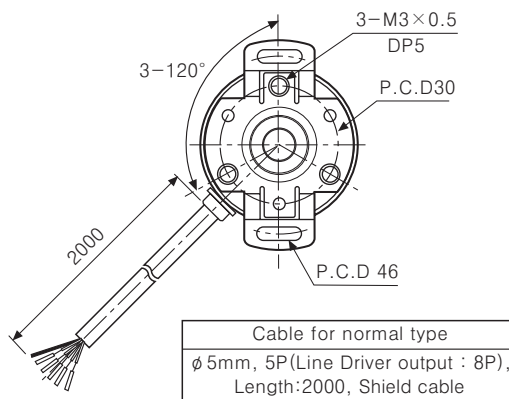
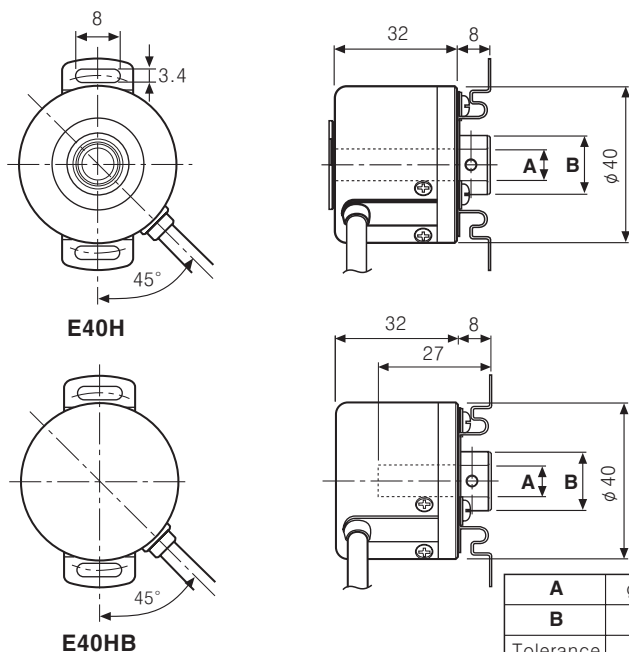
■ Normal type

● Shaft type

(Unit:mm)

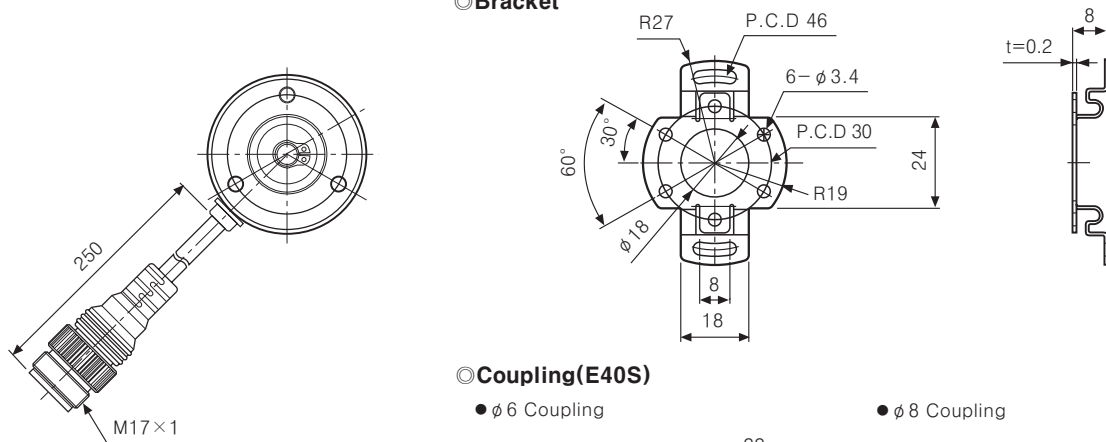


● Hollow shaft / Hollow shaft built-in type



■ Cable outgoing connector type

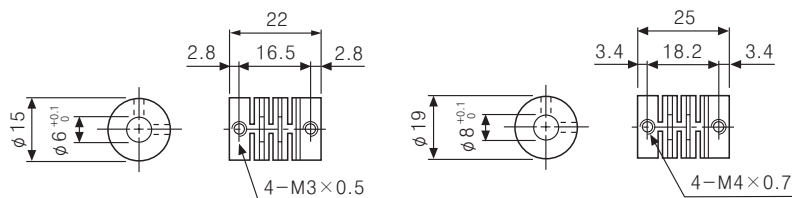
◎ Bracket



◎ Coupling (E40S)

● ϕ 6 Coupling

● ϕ 8 Coupling



※Connector cable is customizable and see M-48 for specifications.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

E40HBP Series

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

■ Features

- Light plastic body
- Easy installation at narrow space
- Small rotor 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	Inside	External material		Pulse/1 Revolution		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, $\bar{A}$, 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%		No mark: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

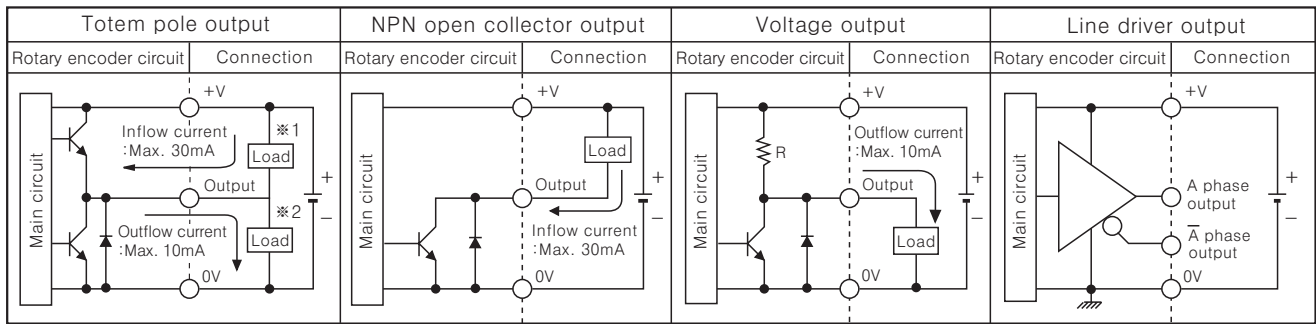
Item		Diameter ϕ 40mm Hollow shaft built-in type of Incremental rotary encoder	
Resolution(P/R)		(Note1) *1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600	
Electrical specification	Output phase	A, B, Z phase(Line 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=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 : 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%)	
Mechanical specification	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, 200mm cable outgoing connector type	
	Starting torque	Max. 50gf • cm(0.005N • m)	
	Rotor inertia	Max. 40g • cm ² (4 $\times$ 10 ^{–6} kg • m ²)	
	Shaft loading	Radial : Max. 3kgf, Thrust : Max. 0.5kgf	
	Max. allowable revolution	(Note2)	3000rpm
	Vibration	1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours	
	Shock	Max. 50G	
Ambient temperature		–10 ~ 70 $^{\circ}$ C (at non–freezing status), Storage:–25 ~ 85 $^{\circ}$ C	
Ambient humidity		35~85%RH, Storage: 35~90%RH	
Protection		IP50(IEC standard)	
Cable		ϕ 5mm, 5P, Length : 2m, Shield cable(Line driver output : ϕ 5mm, 8P)	
Accessory		Bracket	
Unit weight		Approx. 130g	

* **(Note1)** '1' 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) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$ 】

Incremental ϕ 40mm Hollow Shaft/Built-in Type

Control output diagram

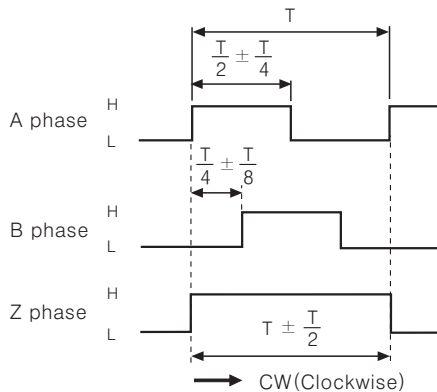


※ Totem pole output type can be used for NPN open collector output type(※1) or Voltage output type(※2).

※ All output circuits of A, B, Z phase is same. (Line driver output is for A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$)

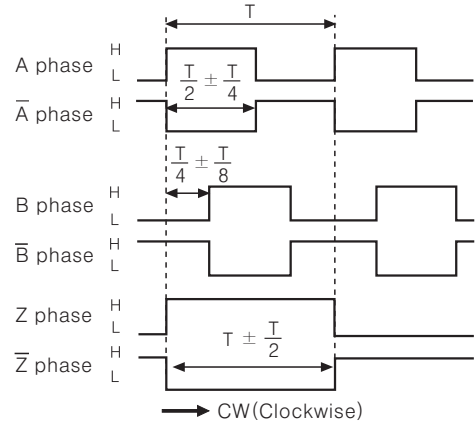
Output waveform

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



※ CW : As viewed from the shaft

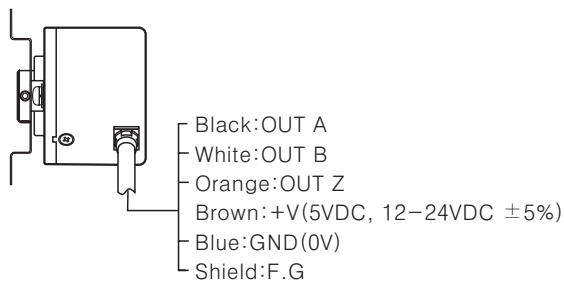
● Line driver output



Connections

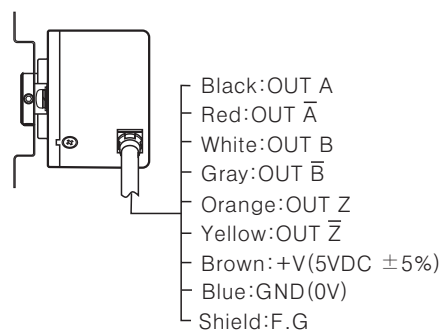
Normal type

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



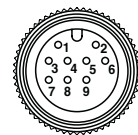
※ Unused wires must be insulated.

● Line driver output



Cable outgoing connector type

● Totem pole output
NPN open collector output
Voltage output



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) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

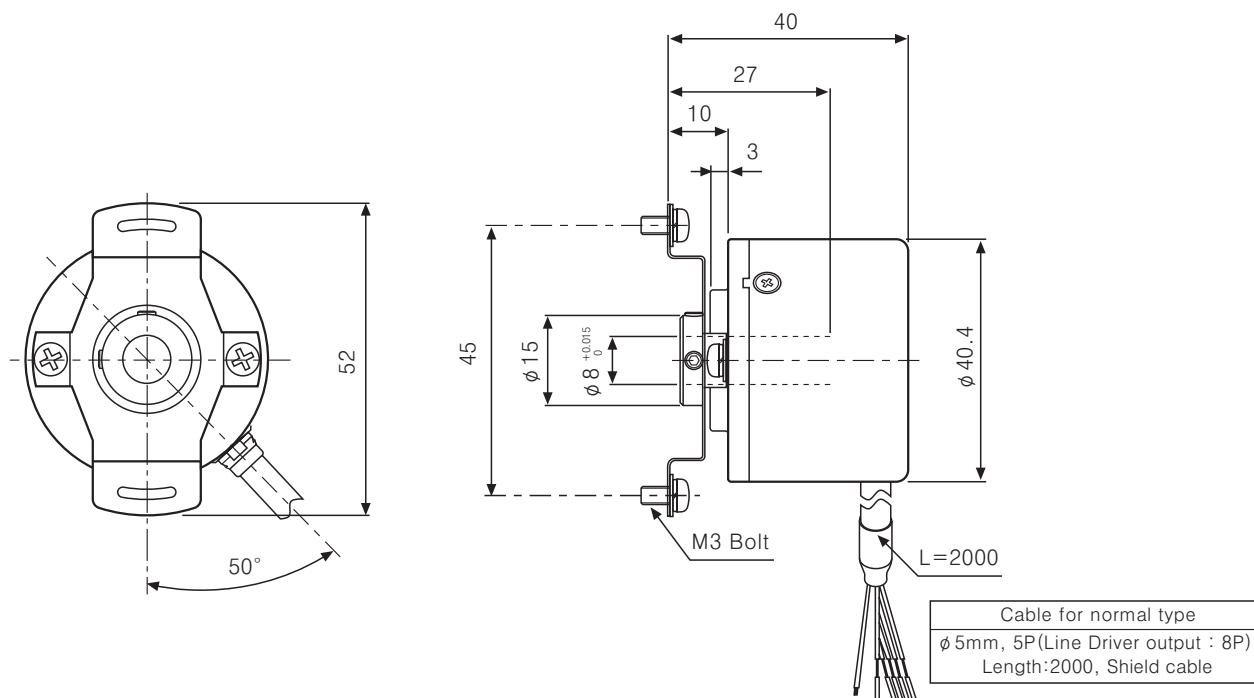
(P) Production stoppage models & replacement

E40HBP Series

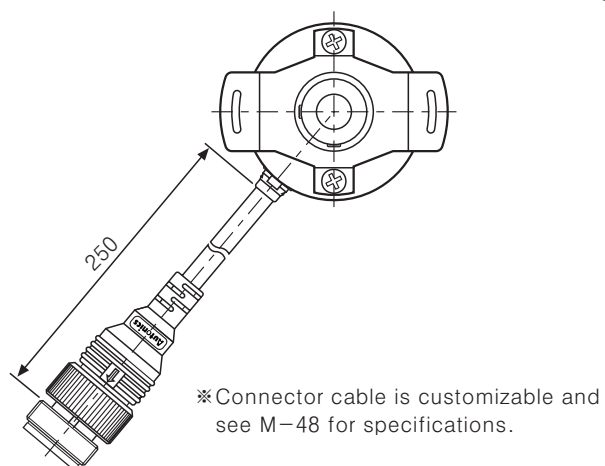
■ Dimensions

■ Normal type

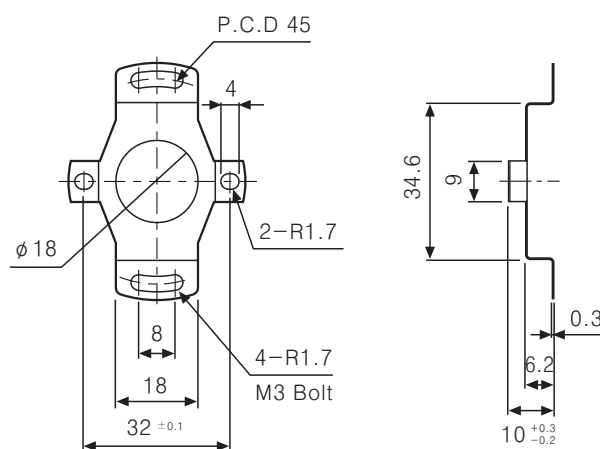
(Unit:mm)



■ Cable outgoing connector type



○ Bracket



Incremental ø 50mm Shaft Type

Diameter ø 50mm Shaft type Incremental Rotary encoder

■ Features

- Suitable for measuring Angle, Position, Revolution, Speed, Acceleration and Distance
- Power supply : 5VDC, 12~24VDC ±5%
- Cost-effective

■ 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	2	24	
Series	Shaft diameter	Pulse/1 Revolution	Output phase	Output	Power supply	Cable
Diameter ø 50mm, shaft type	ø 8mm	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 ±5% 24:12~24VDC ±5%	No mark: 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
※Option: A, B
※As for option models, ask before making a purchase.

※The power of Line driver is only for 5VDC

※Cable length: 250mm

■ Specifications

Item		Diameter ø 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 type is available to customize)	
Electrical specification	Output phase	A, B, Z phase (Line driver : A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase)	
	Phase difference of output	Output 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 : Max. 0.5VDC • High $\Rightarrow$ Load current : Max. -20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1μs
		NPN open collector output	Max. 1μs
		Voltage output	Max. 1μs
		Line driver output	Max. 0.5μs
	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), Line driver output: Max. 50mA (disconnection of the load)	
	Insulation resistance	Min. 100MΩ (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, 200mm cable outgoing connector type, Connector integrated type (Rear, Side)	
Mechanical specification	Starting torque	(Note2) Max. 70gf • cm (0.007N • m) / Connector Type : Max. 800gf • cm (0.008N • A)	
	Rotor inertia	Max. 80g • cm ² (8×10 ⁻⁶ kg • m ²) / Connector Type : Max. 400gf • cm ² (4×10 ⁻⁵ kg • m ²)	
	Shaft loading	Radial : Max. 10kgf, Thrust : Max. 2.5kgf	
	Max. allowable revolution	(Note3) 5000rpm	
Vibration		1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours	
Shock		Max. 75G	
Ambient temperature		-10 ~ 70℃ (at non-freezing status), Storage: -25 ~ 85℃	
Ambient humidity		35~85%RH, Storage: 35~90%RH	
Protection		IP50, Customizable as IP64, Connector integrated type: IP65 (IEC standard)	
Cable		ø 5mm, 5P, Length : 2m, Shield cable (Line driver output : ø 5mm, 8P)	
Accessory		ø 8mm coupling bracket	
Unit weight		Approx. 275g, Connector integrated type: 180g	
Approval		CE (Except for Line driver output)	

※ **(Note1)** * pulse is only for A, B phase (Line Driver output is for A, $\bar{A}$, B, $\bar{B}$ phase). It can be produced under 1000P/R for connector integrated type.

※ **(Note1)** Lower torque than the rated value, it can be customizable.

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

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

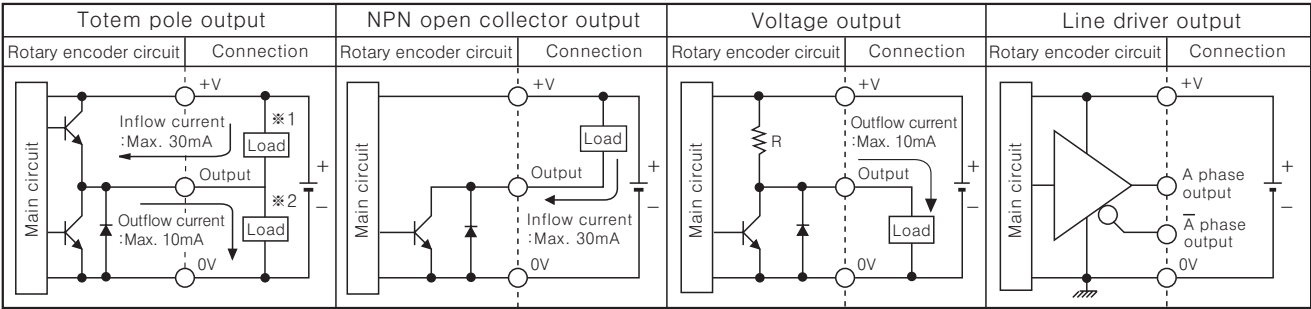
(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

E50S Series

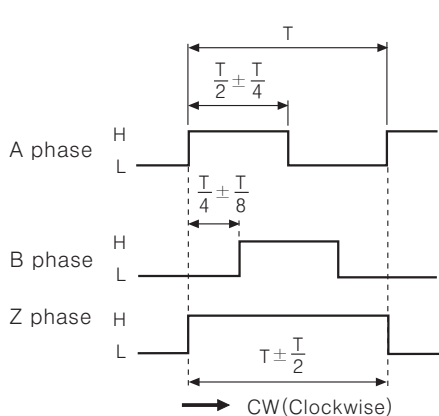
Control output diagram



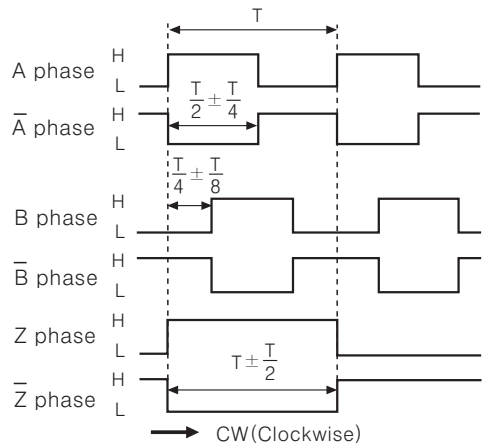
※ Totem pole output type can be used for NPN open collector output type(※1) or Voltage output type(※2).
※ All output circuits of A, B, Z phase is same. (Line driver output is for A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$)

Output waveform

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



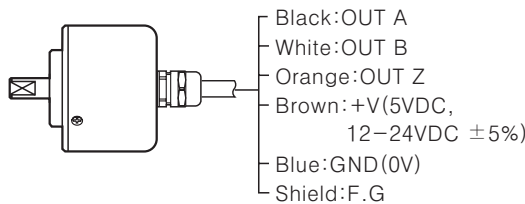
※ CW : As viewed from the shaft



Connections

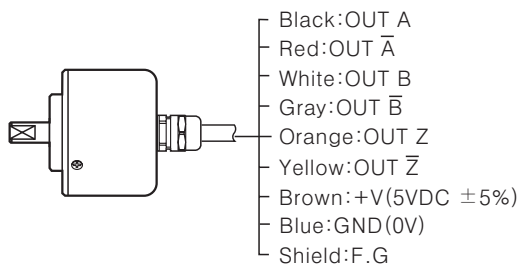
Normal type

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



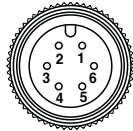
※ Unused wires must be insulated.
※ The metal and shield cable of encoder should be grounded(F.G)

- Line driver output



Cable outgoing connector/ Connector integrated type

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



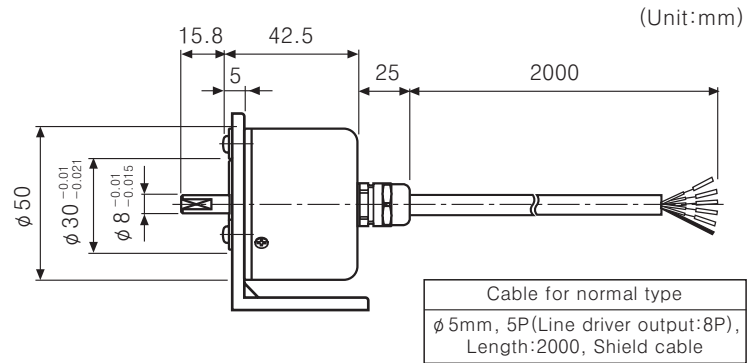
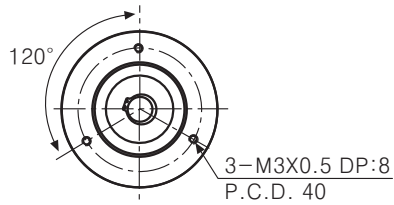
Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT $\bar{A}$	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT $\bar{B}$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

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

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

■ Dimensions

■ Normal type



(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

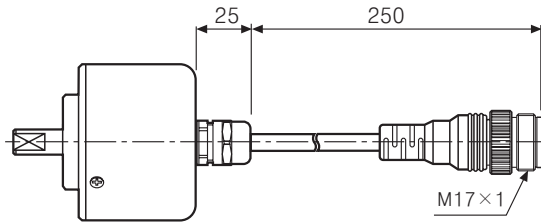
(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

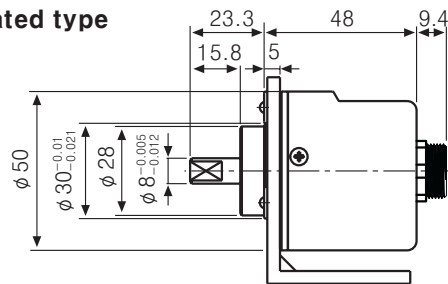
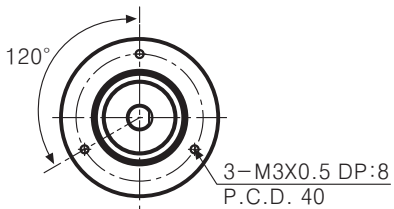
(P) Production stoppage models & replacement

■ Cable outgoing connector type

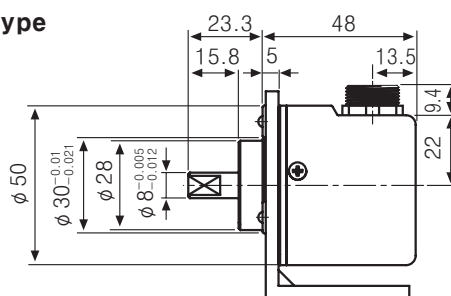
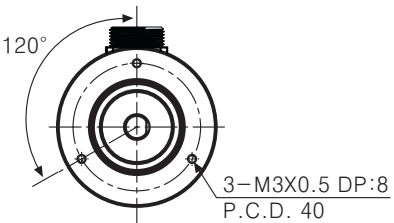


*Connector cable is customizable and see M-48 for specifications.

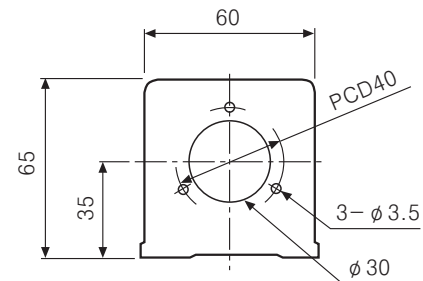
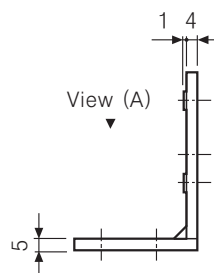
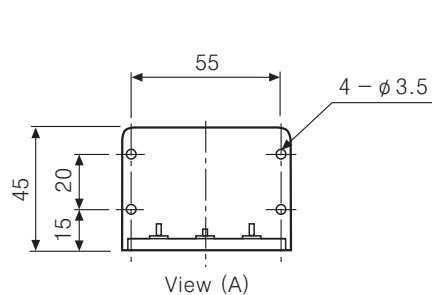
■ Rear side outgoing connector integrated type



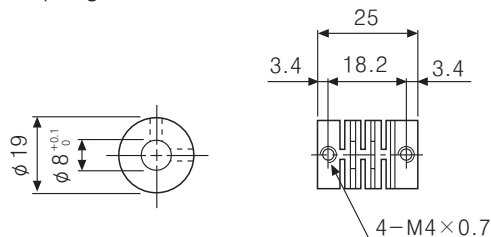
■ Side outgoing connector integrated type



● Bracket



● Coupling



Incremental ø 50mm Shaft Type

Diameter ø 50mm Shaft type Incremental Rotary encoder

■ Features

- Suitable for measuring Angle, Position, Revolution, Speed, Acceleration and Distance
- Power supply : 5VDC, 12~24VDC ±5%
- Cost-effective

■ 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	—	2	—	24	—	
------	---	---	------	---	---	---	---	---	----	---	--

Series	Shaft diameter	Pulse/1 Revolution	Output phase	Output	Power supply	Cable
Diameter ø 50mm, shaft type	ø 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 ±5% 24:12~24VDC ±5%	No mark: 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

*The power of Line driver is only for 5VDC

*Cable length: 250mm

■ Specifications

Item		Diameter ø 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 type is available to customize)	
Electrical specification	Output phase	A, B, Z phase (Line driver : A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase)	
	Phase difference of output	Output 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 : Max. 0.5VDC • High $\Rightarrow$ Load current : Max. -20mA, Output voltage : Min. 2.5VDC
	Response time (Rise/Fall)	Totem pole output	Max. 1μs
		NPN open collector output	Max. 1μs
		Voltage output	Max. 1μs
		Line driver output	Max. 0.5μs
	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), Line driver output: Max. 50mA (disconnection of the load)	
	Insulation resistance	Min. 100MΩ (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, 200mm cable outgoing connector type, Connector integrated type (Rear, Side)	
Mechanical specification	Starting torque	(Note2)	Max. 70gf • cm (0.007N • m)
	Rotor inertia		Max. 80g • cm ² (8 × 10 ⁻⁶ kg • m ²)
	Shaft loading		Radial : Max. 10kgf, Thrust : Max. 2.5kgf
	Max. allowable revolution	(Note3)	5000rpm
Vibration		1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours	
Shock		Max. 75G	
Ambient temperature		-10 ~ 70℃ (at non-freezing status), Storage: -25 ~ 85℃	
Ambient humidity		35~85%RH, Storage: 35~90%RH	
Protection		IP50, Customizable as IP64, Connector integrated type: IP65 (IEC standard)	
Cable		ø 5mm, 5P, Length : 2m, Shield cable (Line driver output : ø 5mm, 8P)	
Accessory		ø 8mm coupling bracket	
Unit weight		Approx. 275g, Connector integrated type: 180g	
Approval		CE (Except for Line driver output)	

* **(Note1)** * pulse is only for A, B phase (Line Driver output is for A, $\bar{A}$, B, $\bar{B}$ phase). It can be produced under 1000P/R for connector integrated type.

* **(Note1)** Lower torque than the rated value, it can be customizable.

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

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

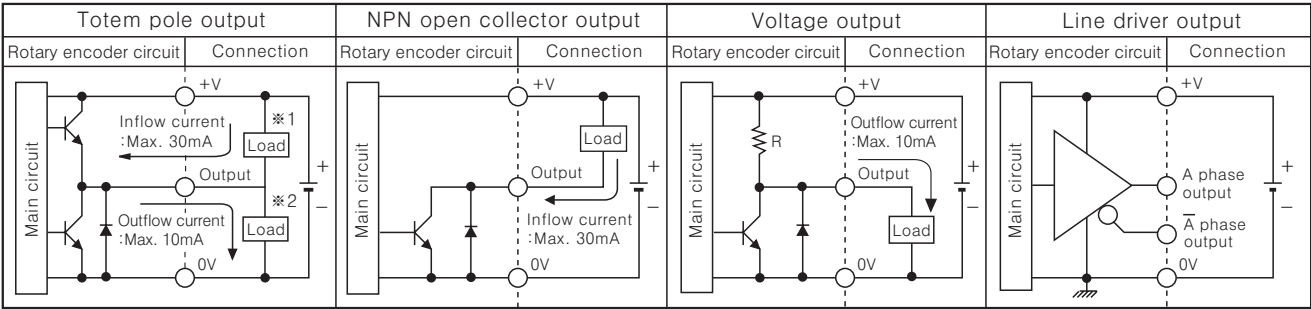
(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

E50S Series

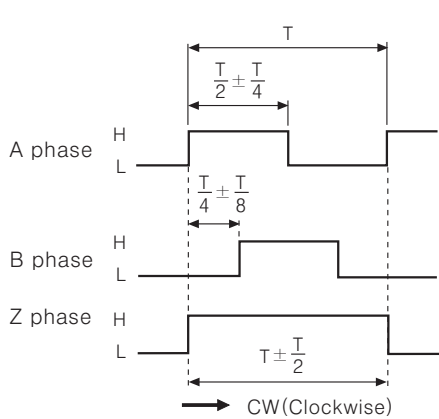
Control output diagram



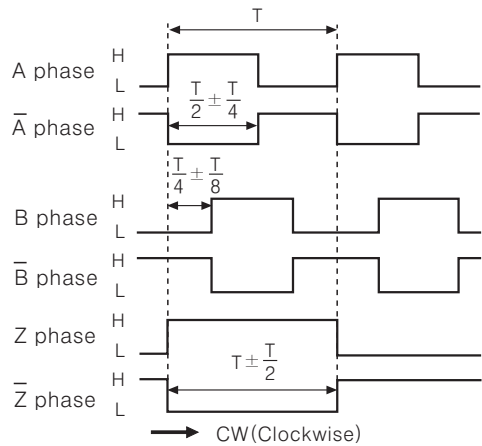
※ Totem pole output type can be used for NPN open collector output type(※1) or Voltage output type(※2).
※ All output circuits of A, B, Z phase is same. (Line driver output is for A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$)

Output waveform

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



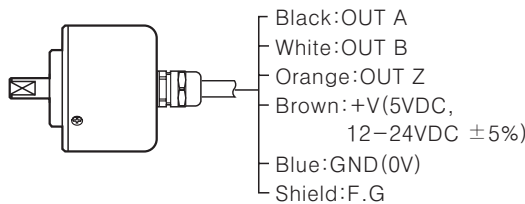
※ CW : As viewed from the shaft



Connections

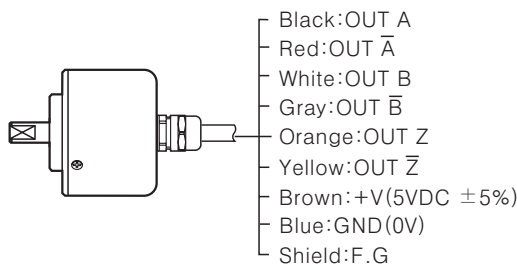
Normal type

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



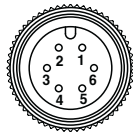
※ Unused wires must be insulated.
※ The metal and shield cable of encoder should be grounded(F.G)

- Line driver output



Cable outgoing connector/ Connector integrated type

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



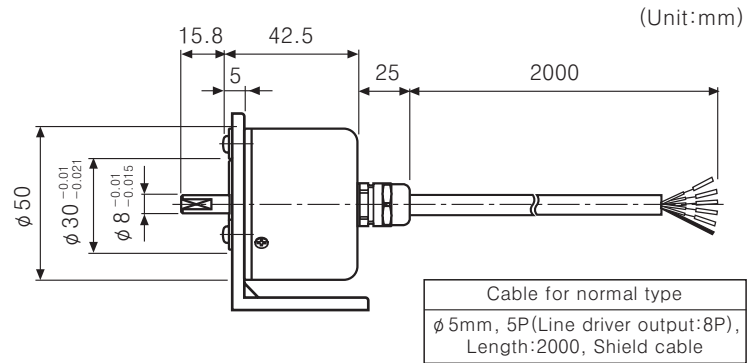
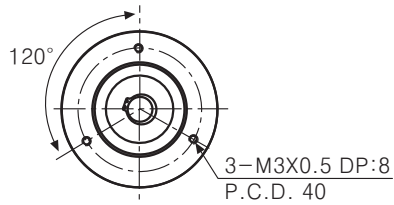
Totem pole output NPN open collector output Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT A-bar	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G	Shield	⑥	OUT B-bar	Gray
	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

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

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

■ Dimensions

■ Normal type



(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

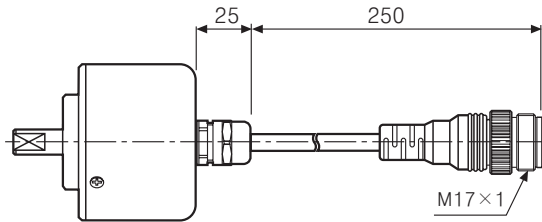
(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

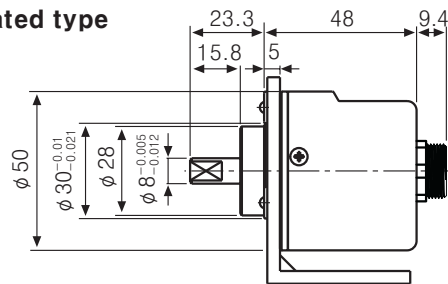
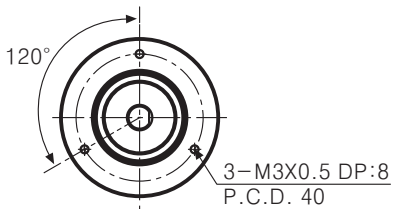
(P) Production stoppage models & replacement

■ Cable outgoing connector type

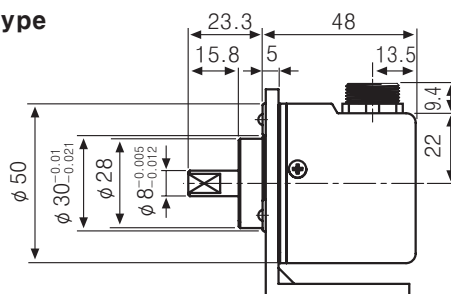
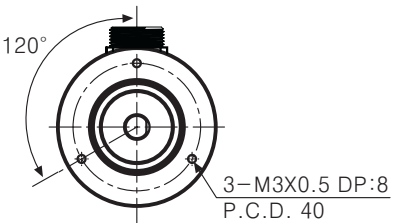


*Connector cable is customizable and see M-46 for specifications.

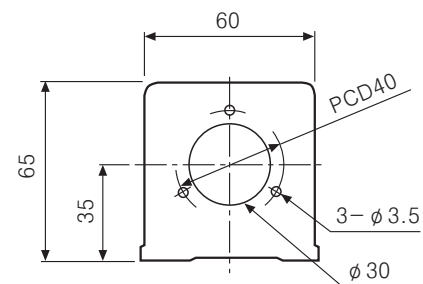
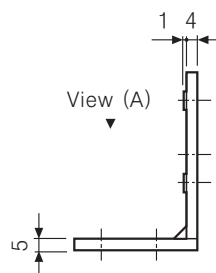
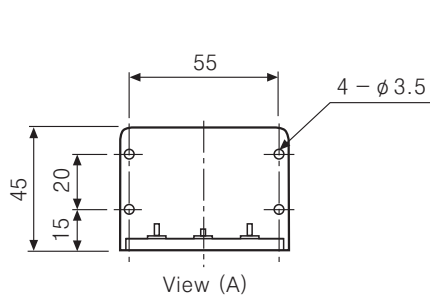
■ Rear side outgoing connector integrated type



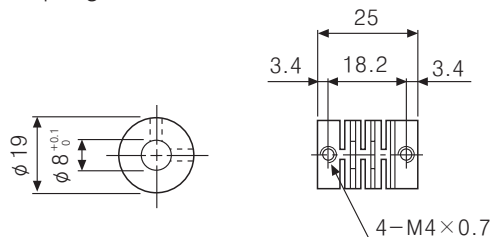
■ Side outgoing connector integrated type



● Bracket



● Coupling



E50SP Series

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%
- Cost-effective

■ 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%		No mark: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

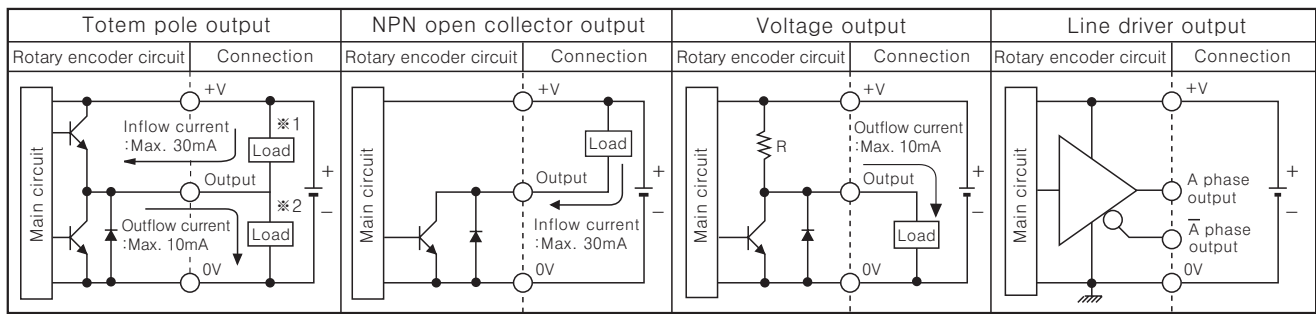
Item		Diameter ϕ 50mm shaft type of Incremental rotary encoder	
Resolution(P/R)		(Note1)	*1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600
Electrical specification	Output phase	A, B, Z phase(Line driver : A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase)	
	Phase difference of output	Output 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 : 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), Line driver output:Max. 50mA(disconnection of the load)	
Mechanical specification	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, 200mm cable outgoing connector type	
	Starting torque	Max. 100gf $\cdot$ cm (0.01N $\cdot$ m)	
	Rotor 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 ~ 55Hz in each of X, Y, Z directions for 2 hours	
Shock		Max. 75G	
Ambient temperature		–10 ~ 70℃ (at non-freezing status), Storage:–25 ~ 85℃	
Ambient humidity		35~85%RH, Storage: 35~90%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 (Sold separately), 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 $\left[\text{Max. response resolution (rpm)} = \frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec} \right]$

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

Control output diagram



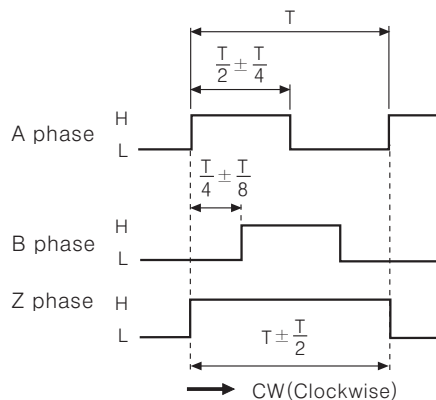
※ Totem pole output type can be used for NPN open collector output type(※1) or Voltage output type(※2).

※ All output circuits of A, B, Z phase is same. (Line driver output is for A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$)

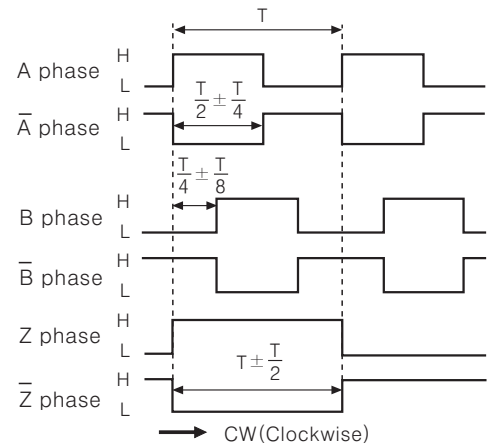
Output waveform

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

● Line driver output



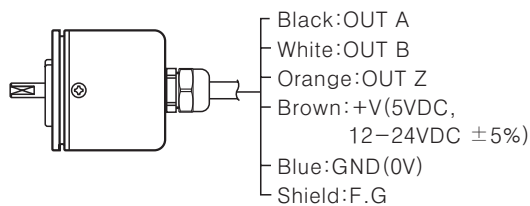
※ CW : As viewed from the shaft



Connections

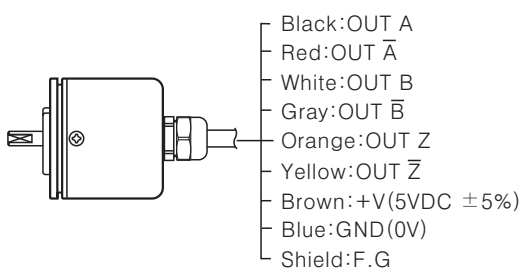
Normal type

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



※ Unused wires must be insulated.

● Line driver output



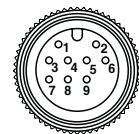
Cable outgoing connector type

● 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.

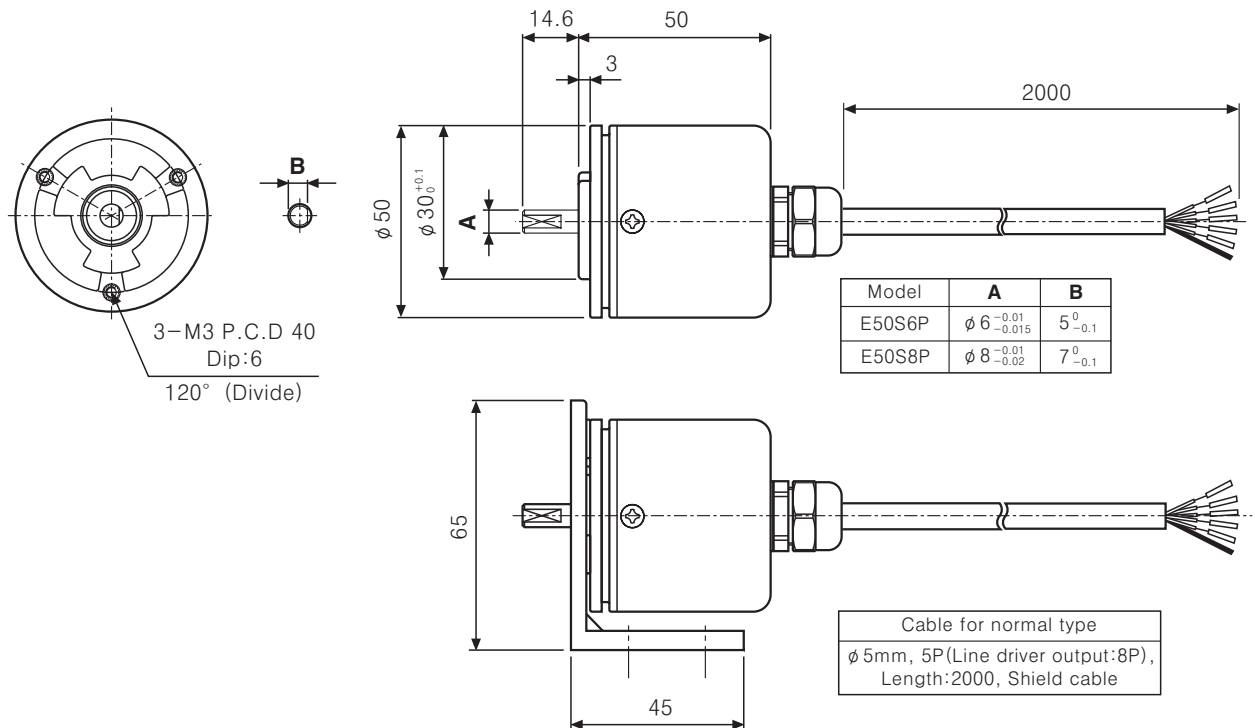
(A) Counter
(B) Timer
(C) Temp. controller
(D) Power controller
(E) Panel meter
(F) Tacho/ Speed/ Pulse meter
(G) Display unit
(H) Sensor controller
(I) Switching power supply
(J) Proximity sensor
(K) Photo electric sensor
(L) Pressure sensor
(M) Rotary encoder
(N) Stepping motor & Driver & Controller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

E50SP Series

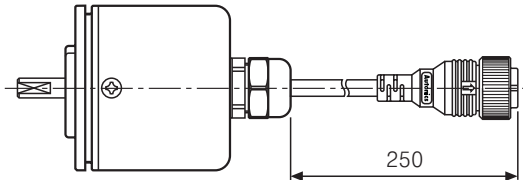
■ Dimensions

■ Normal type

(Unit:mm)

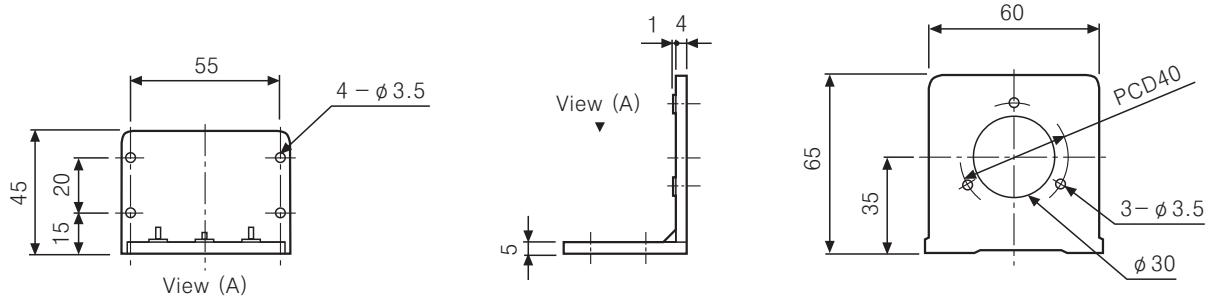


■ Cable outgoing connector type



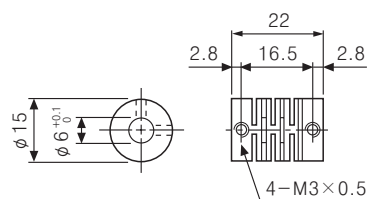
※Connector cable is customizable and see M-48 for specifications.

◎Bracket

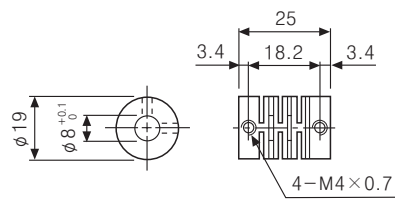


◎Coupling

● $\phi 6$ coupling



● $\phi 8$ coupling



Incremental ϕ 60mm Hollow Shaft Type

Diameter ϕ 60mm Hollow shaft type Incremental Rotary encoder

■ Features

- External 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/1 Revolution	Output phase	Output	Power supply	Cable					
Diameter ϕ 60mm, hollow shaft type	ϕ 20mm	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%	No mark: 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)		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. 20mA, Residual : 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 mega 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. 150gf $\cdot$ cm (0.015N $\cdot$ m)	
	Rotor inertia	Max. 110g $\cdot$ cm ² (11 $\times$ 10 ^{–5} kg $\cdot$ m ²)	
	Shaft loading	Radial : 5kgf, Thrust : 2.5kgf	
	Max. allowable revolution	(Note1)	6000rpm
Vibration		1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours	
Shock		Max. 100G	
Ambient temperature		–10 ~ 70 $^{\circ}$ C (at non-freezing status), Storage : –25 ~ 85 $^{\circ}$ C	
Ambient humidity		35–85%RH, Storage : 35–90%RH	
Protection		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) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$ 】

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

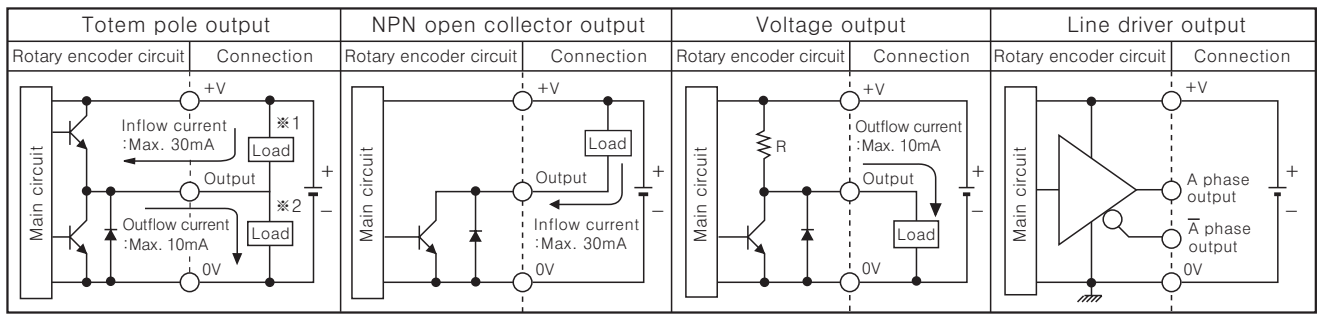
(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

E60H Series

Control output diagram

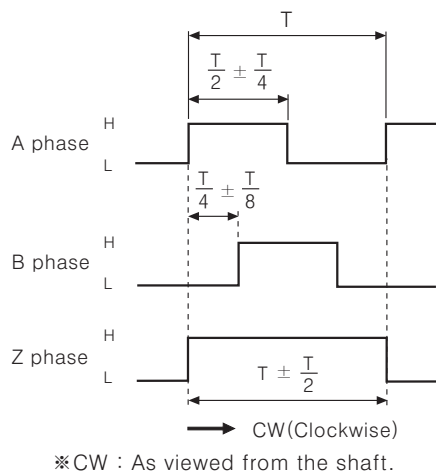


※ Totem pole output type can be used for NPN open collector output type(※1) or Voltage output type(※2).

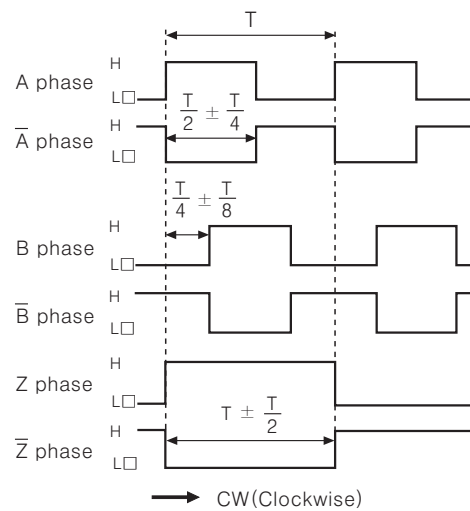
※ All output circuits of A, B, Z phase is same. (Line driver output is A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$)

Output waveform

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



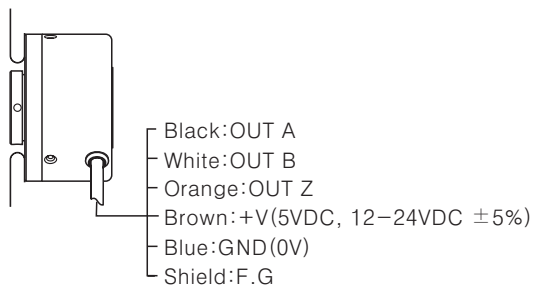
- Line driver output



Connections

Normal type

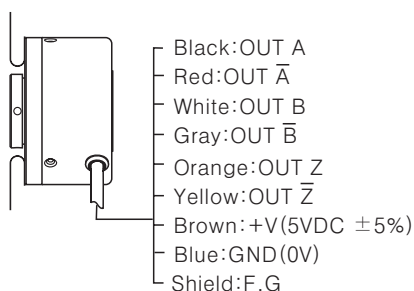
- Totem pole output / NPN open collector output / Voltage output



※ Unused wires must be insulated.

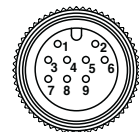
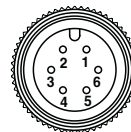
※ The metal case and shield cable of encoder should be grounded (F.G).

- 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

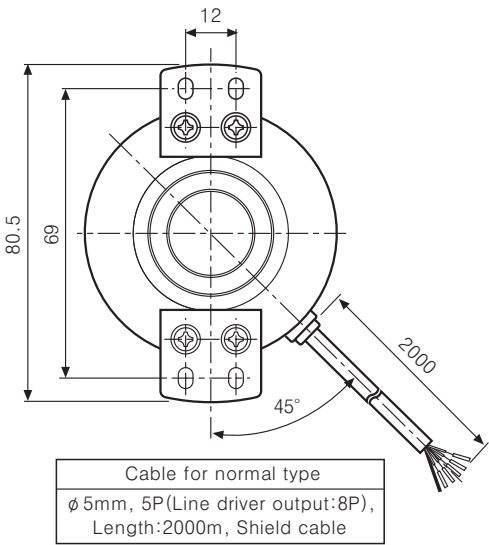
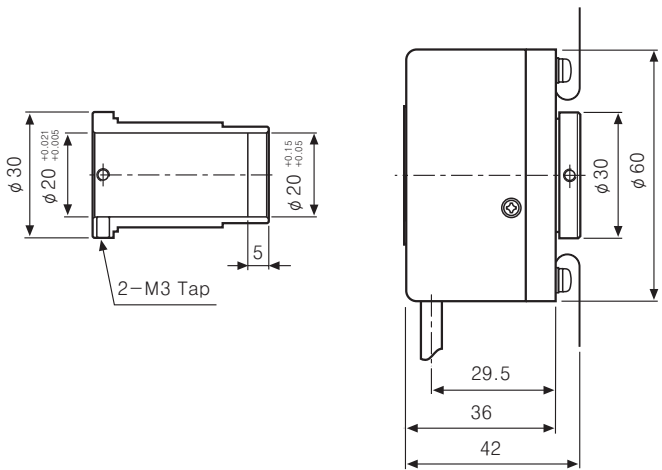
※ F.G (Field Ground): It should be grounded separately.

Incremental $\phi 60\text{mm}$ Hollow Shaft Type

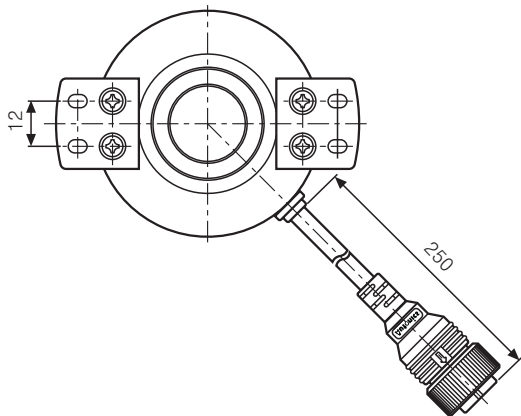
Dimension

Normal type

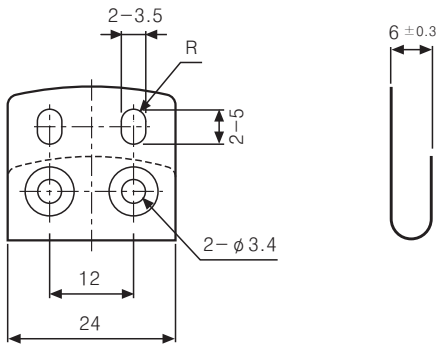
(Unit:mm)



Cable outgoing connector type



Bracket



※ Connector cable is customizable and see M-48 for specifications.

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

E68S Series

Diameter ϕ 68mm Shaft type Incremental Rotary encoder

■ Features

- Diameter ϕ 68mm, Shaft ϕ 15mm
- High speed response frequency : 180kHz
- Connector type
- Suitable for tooling machinery
- IP64 structure (Partial waterproof, Oil proof)
- High shaft loading capabilities (Allowable load weight 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 P/R	6 : A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$	L : Line driver output	5VDC $\pm$ 5%

■ Specifications

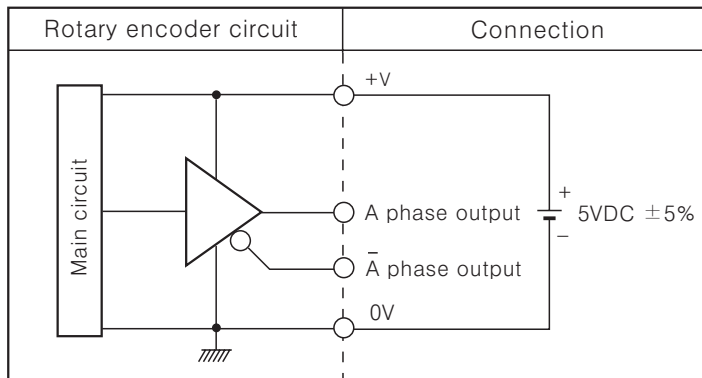
Item		Diameter ϕ 68mm shaft type of Incremental rotary encoder	
Resolution (P/R)		(Note1)	1024
Electrical specification	Output phase	A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1cycle of A phase)	
	Output 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 mega 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 ~ 55Hz in each of X, Y, Z directions for 2 hours	
Shock		Max. 50G	
Ambient temperature		-10 ~ 70 $^{\circ}$ C (at non-freezing status), Storage: -25 ~ 85 $^{\circ}$ C	
Ambient humidity		35~85%RH, Storage: 35~90%RH	
Protection		IP64 (IEC standard)	
Unit weight		Approx. 550g	

※ (Note1) Not indicated type is customizable.

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

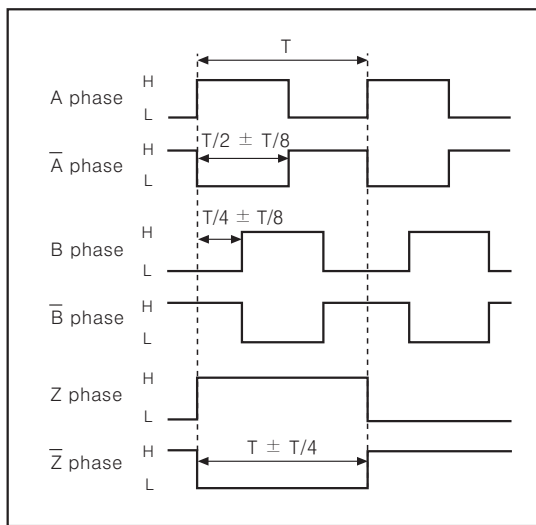
Incremental ϕ 68mm Shaft Type

Control output diagram



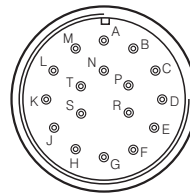
※All output circuit of A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase is the same.

Output waveform



※CW : As viewed from the shaft

Connections



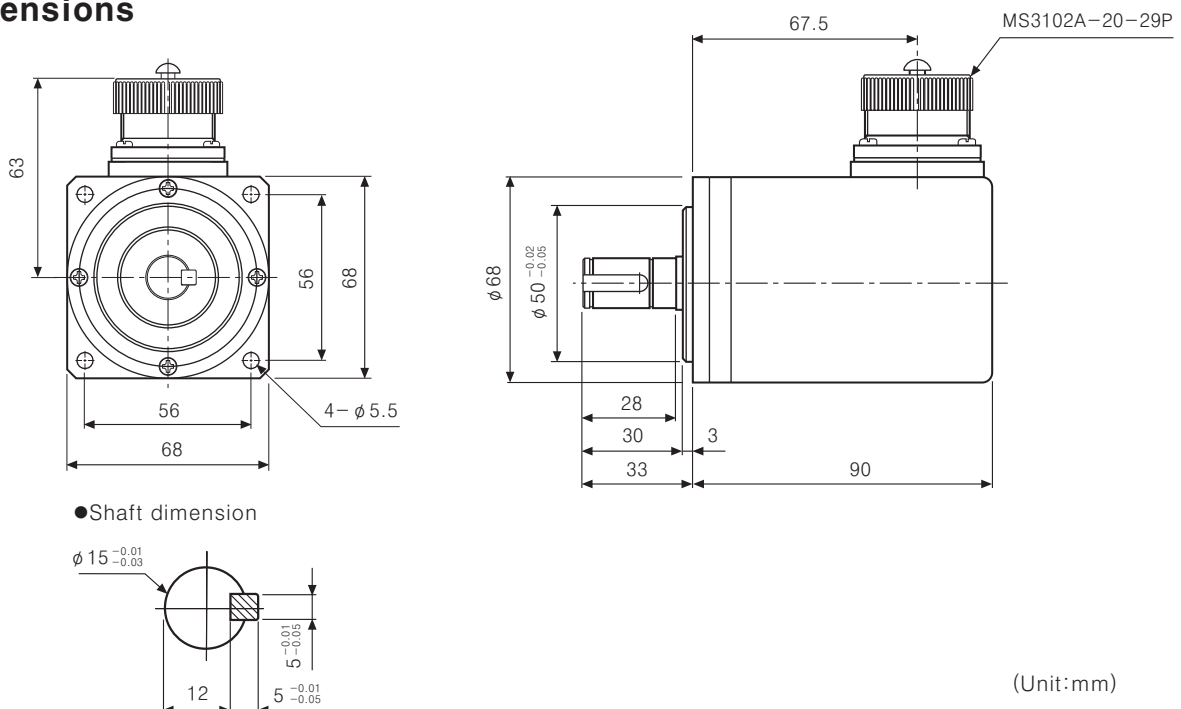
Pin No.	Cable color	Pin No.	Cable color
A	A phase	K	0V
B	Z phase	L	NC
C	B phase	M	0V
D	NC	N	$\bar{A}$ phase
E	5VDC	P	$\bar{Z}$ phase
F	NC	R	$\bar{B}$ phase
G	NC	S	NC
H	5VDC	T	Shield(F.G)
J	NC	—	—

※N.C : Not Connected.

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

※Cable sold separately.

Dimensions



(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

E80H Series

Diameter ϕ 80mm Hollow shaft type Incremental Rotary encoder

■ Features

- External diameter ϕ 80mm, Inner diameter of shaft ϕ 30mm, ϕ 32mm (Customizable)
- Able 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 $\pm 5\%$	No mark: Normal type (*) C: Cable outgoing connector type

☞ Shaft inside diameter ϕ 32mm is customizable.

*The power of Line driver is only for 5VDC

*Cable length : 250mm

■ Specifications

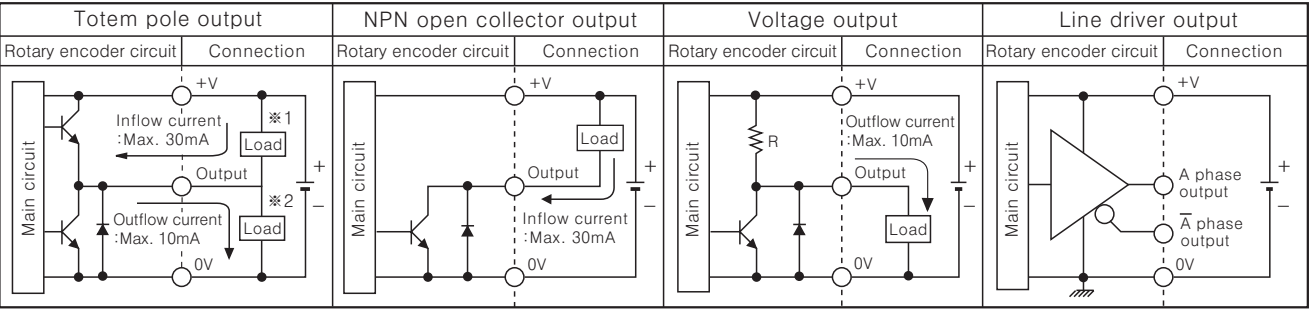
Item		Diameter ϕ 80mm hollow shaft type of Incremental rotary encoder	
Resolution (P/R)		(Note1)	60, 100, 360, 500, 512, 1024, 3200
Electrical specification	Output phase	A, B, Z phase (Line driver output A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase)	
	Phase difference of output	Phase difference between A and B : $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)	
	Control output	Totem pole output	• Low $\Rightarrow$ 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 : 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	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 mega 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. 200gf $\cdot$ cm (0.02N $\cdot$ m)	
	Rotor inertia	Max. 800g $\cdot$ cm ² (8×10^{-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 ~ 55Hz in each of X, Y, Z directions for 2 hours	
Shock		Max. 75G	
Ambient temperature		–10 ~ 70 $^{\circ}$ C (at non-freezing status), Storage : –25 ~ 85 $^{\circ}$ C	
Ambient humidity		35~85%RH, Storage : 35~90%RH	
Protection		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 $\left[\text{Max. response revolution (rpm)} = \frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec} \right]$

Incremental ϕ 80mm Hollow Shaft Type

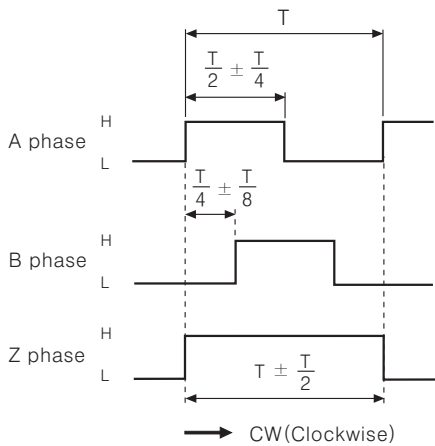
Control output diagram



※ 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 is same. (Line driver output is for A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$)

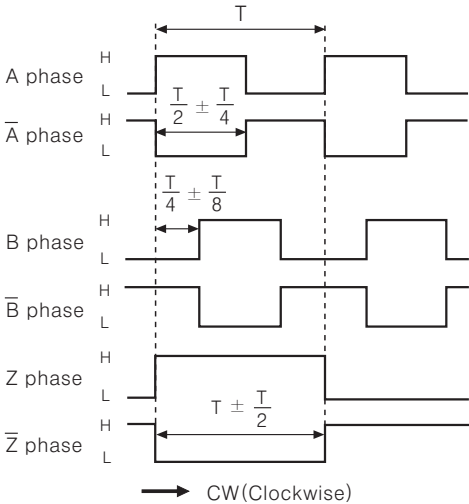
Output waveform

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



※ CW : As viewed from the shaft

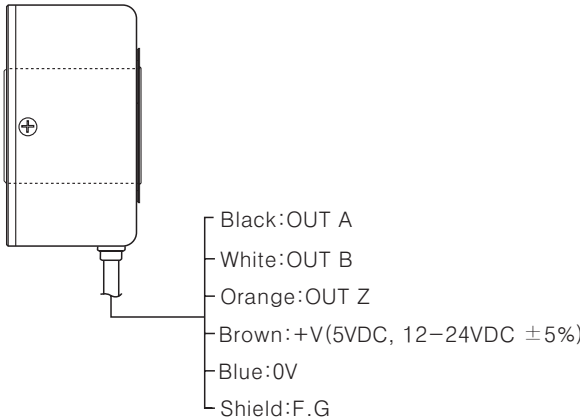
● Line driver output



Connections

Normal type

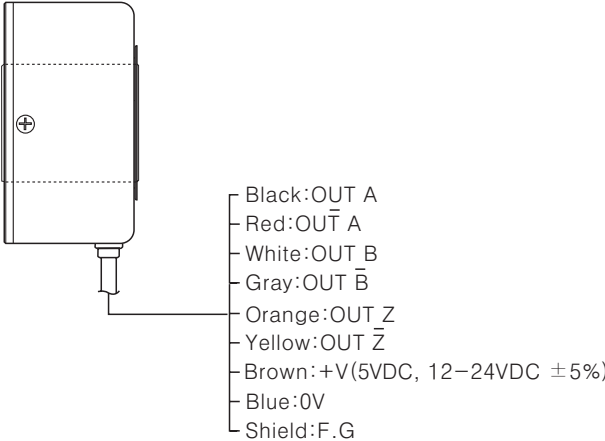
● Totem pole output / NPN open collector output / Voltage output



※ Unused wires must be insulated.

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

● Line driver output



(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

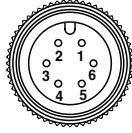
(P) Production stoppage models & replacement

E80H Series

■ 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

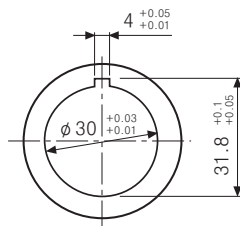
※F.G(Field Ground):It should be grounded separately.

■ Dimensions

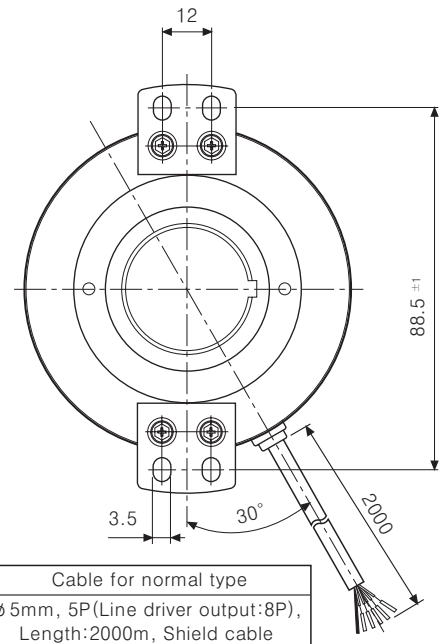
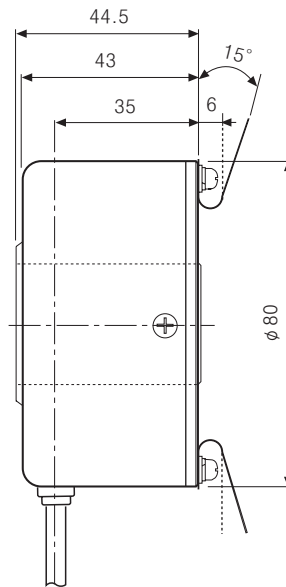
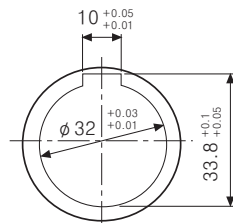
■ Normal type

(Unit:mm)

- Inner diameter of shaft(Standard)

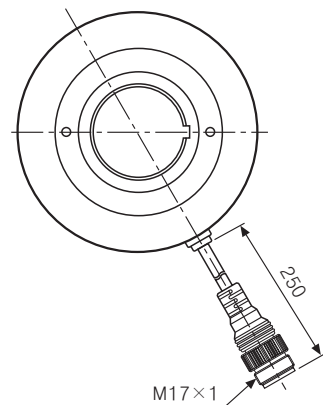


- Inner diameter of shaft(Customizable)

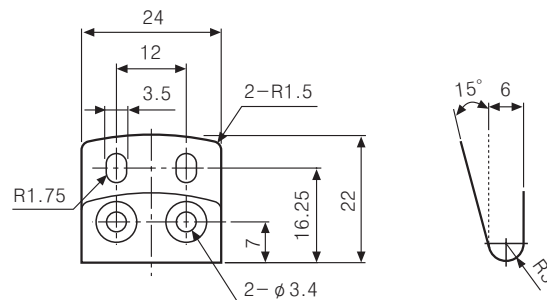


Cable for normal type
 ϕ 5mm, 5P(Line driver output:8P),
 Length:2000m, Shield cable

■ Cable outgoing connector type



- Bracket



※Connector cable is customizable and see M-48 for specifications.

ENA Series

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 $\pm 5\%$

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



■ Ordering information

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

*Standard : ENA-□-2-N-24

*Standard : A, B

■ Specifications

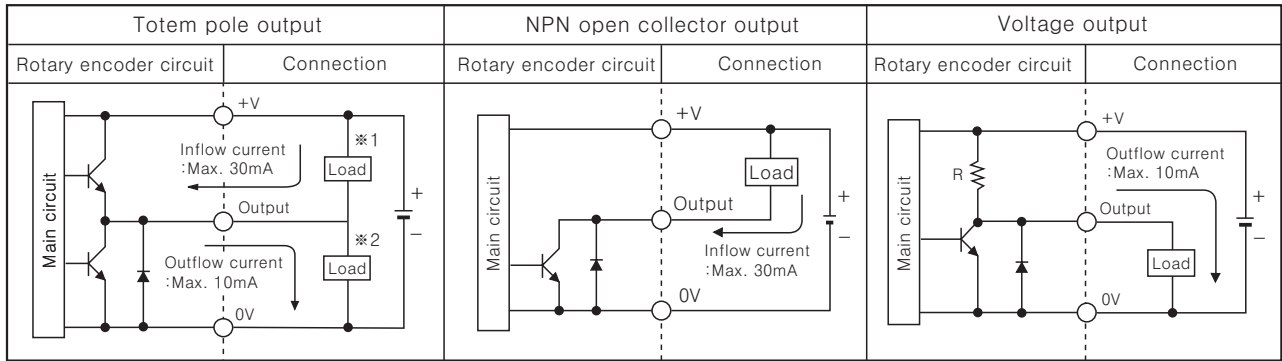
Item		Shaft type of encoder to be mounted at the side(Incremental)	
Resolution(P/R)		(Note1) *1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 5000	
Electrical 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 μs
		NPN open collector output	Max. 1 μs
		Voltage output	Max. 1 μs
	Max. Response frequency	300kHz	
	Power supply	• 5VDC $\pm 5\%$ (Ripple P-P:Max. 5%) • 12–24VDC $\pm 5\%$ (Ripple P-P:Max. 5%)	
Mechanical specification	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	Connector type	
	Starting torque	Max. 70gf $\cdot$ cm (0.007N $\cdot$ m)	
	Rotor inertia	Max. 80g $\cdot$ cm ² (8×10^{-6} kg $\cdot$ m ²)	
	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf	
	Max. allowable revolution	(Note2)	5000rpm
	Vibration	1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours	
	Shock	Max. 75G	
Ambient temperature		-10 ~ 70 $^{\circ}\text{C}$ (at non-freezing status), Storage : -25 ~ 85 $^{\circ}\text{C}$	
Ambient humidity		35~85%RH, Storage : 35~90%RH	
Protection		IP50 (IEC standard)	
Cable		$\phi 5\text{mm}$, 5P, Length : 2m, Shield cable	
Accessory		$\phi 10\text{mm}$ coupling	
Unit weight		Approx. 345g	
Approval		 (Except for Line driver output)	

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

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

Incremental Side-Mounting Type

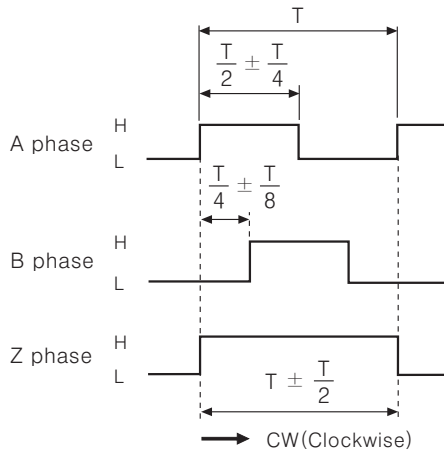
Control output diagram



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

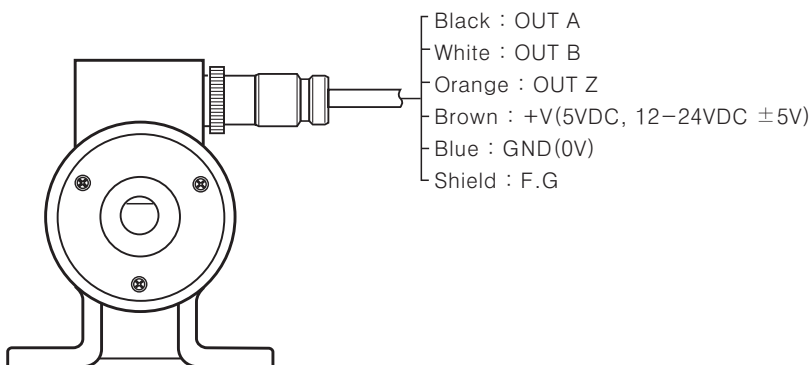
Output waveform

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



- ※Z phase output is customizable.
- ※CW : As viewed 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).

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

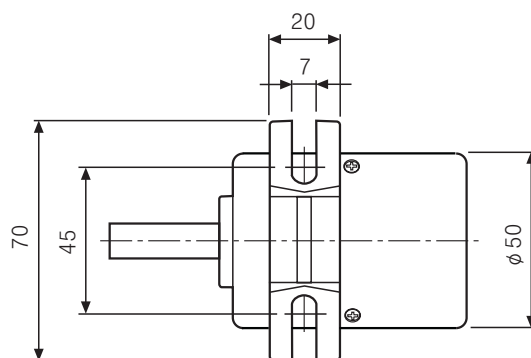
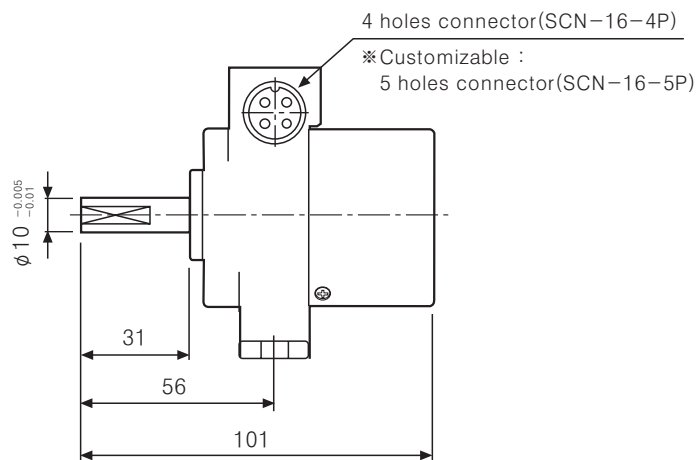
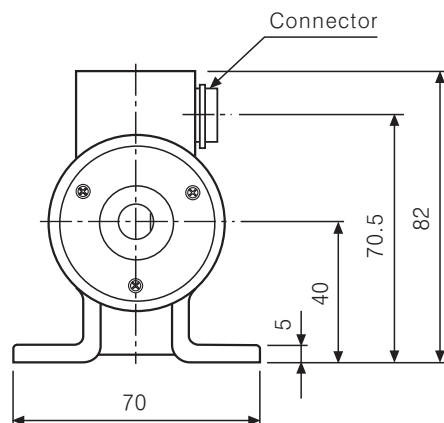
(O) Graphic panel

(P) Production stoppage models & replacement

ENA Series

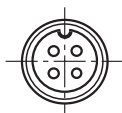
Dimension

(Unit:mm)

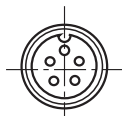


Connector cable (Sold separately)

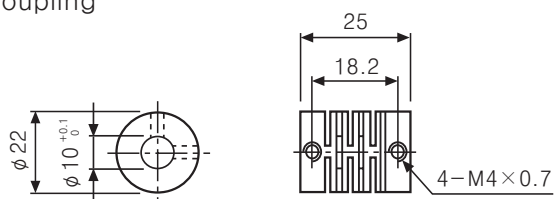
- ENA-□ - 2 - □ (Standard)



- ENA-□ - 3 - □ (Customizable)



Coupling



Incremental Measuring Wheel Type

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 $\pm 5\%$

■ 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	2C
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 $\pm 5\%$ 24 : 12–24VDC $\pm 5\%$	No mark: 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=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
	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 $\pm 5\%$ (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 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 ~ 55Hz in each of X, Y, Z directions for 2 hours	
Shock		Max. 75G	
Ambient temperature		–10 ~ 70℃ (at non-freezing status), Storage: –25 ~ 85℃	
Ambient humidity		35~85%RH, Storage: 35~90%RH	
Cable		ϕ 5mm, 5P, Length: 2m, Shield cable	
Protection		IP50 (IEC standard)	
Unit weight		Approx. 495g	
Approval		CE	

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

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

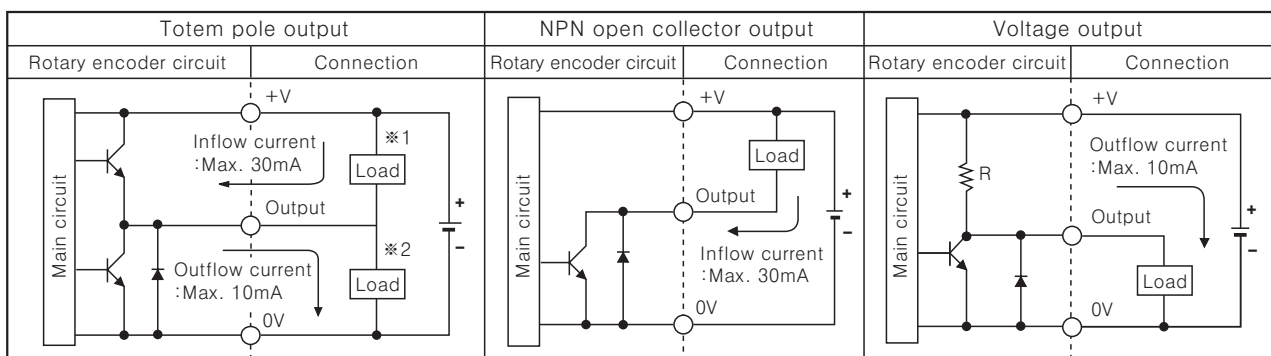
(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

ENC Series

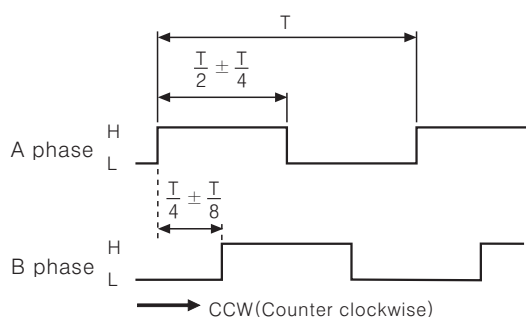
Control output diagram



☞ The output circuit of A, B phase are same.

☞ Totem pole output can be used for NPN open collector type(※1) or voltage output type(※2).

Output waveform



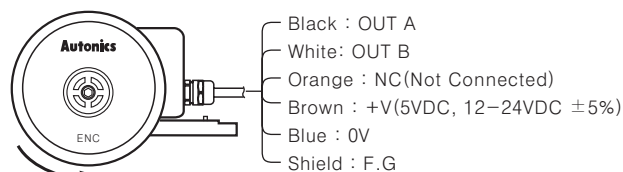
※CCW: Same revolution direction with connection F.G as below.

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

Connector type

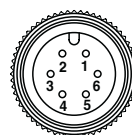


CCW(Counter clockwise)

※Unused wires must be insulated.

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

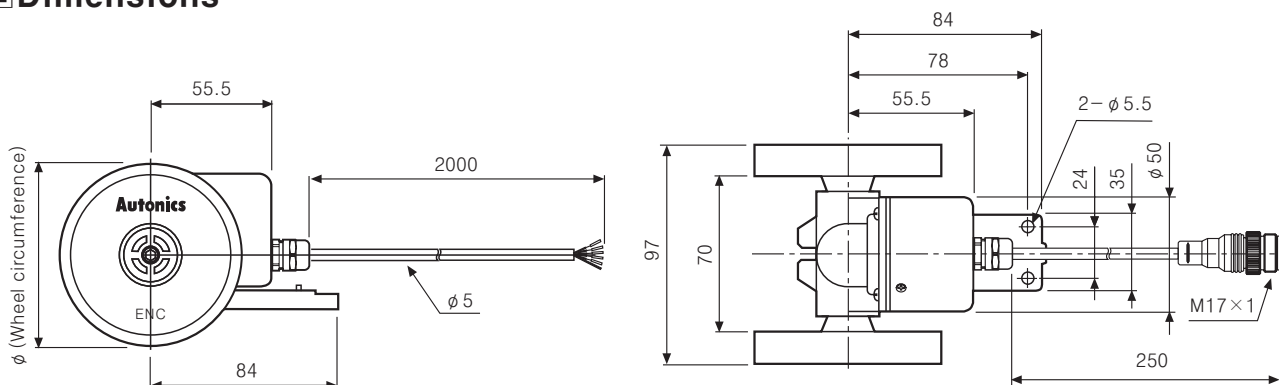
Cable outgoing connector type



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



※The wheel circumference is changed according to model(φ), please refer to resolution chart.

※Connector cable is customizable and see M-48 for specifications.

(Unit:mm)

Incremental Manual Handle Type

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	1	24
Series	Pulse/1 Revolution	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, $\overline{A}$, B, $\overline{B}$ 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	• 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	• Low $\Rightarrow$ Load current : Max. 20mA, Residual : Max. 0.5V • High $\Rightarrow$ Load current : Max. -20mA, Output voltage : Min. 2.5V	
	Response time (Rise/Fall)	Totem pole output	Max. 1 μ s	• Measuring condition $\Rightarrow$ I sink = Max. 20mA
		Voltage output	Max. 1 μ s	
		Line driver output	Max. 0.2 μ s	
	Power supply		• 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 mega 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 ~ 55Hz in each of X, Y, Z directions for 2 hours		
Shock		Max. 50G		
Ambient temperature		-10 ~ 70℃ (at non-freezing status), Storage:-25 ~ 85℃		
Ambient humidity		35~85%RH, Storage: 35~90%RH		
Unit weight		Approx. 300g		

※ (Note1) Not indicated type is customizable.

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



(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

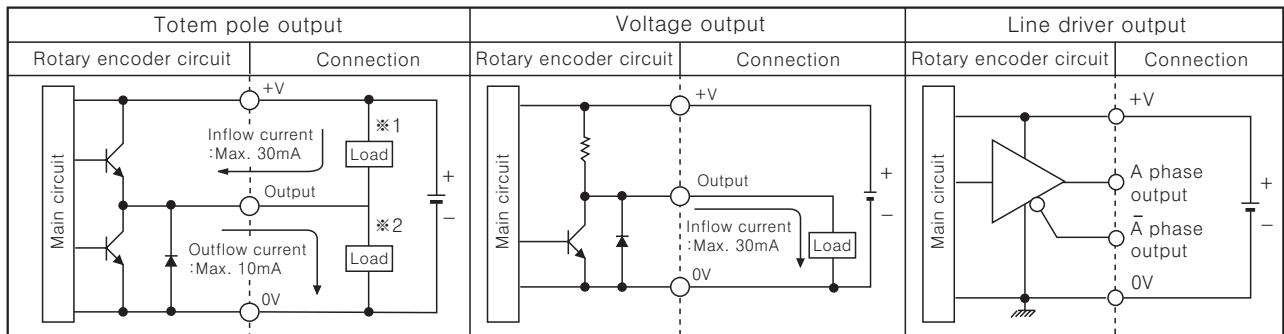
(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Production stoppage models & replacement

ENH Series

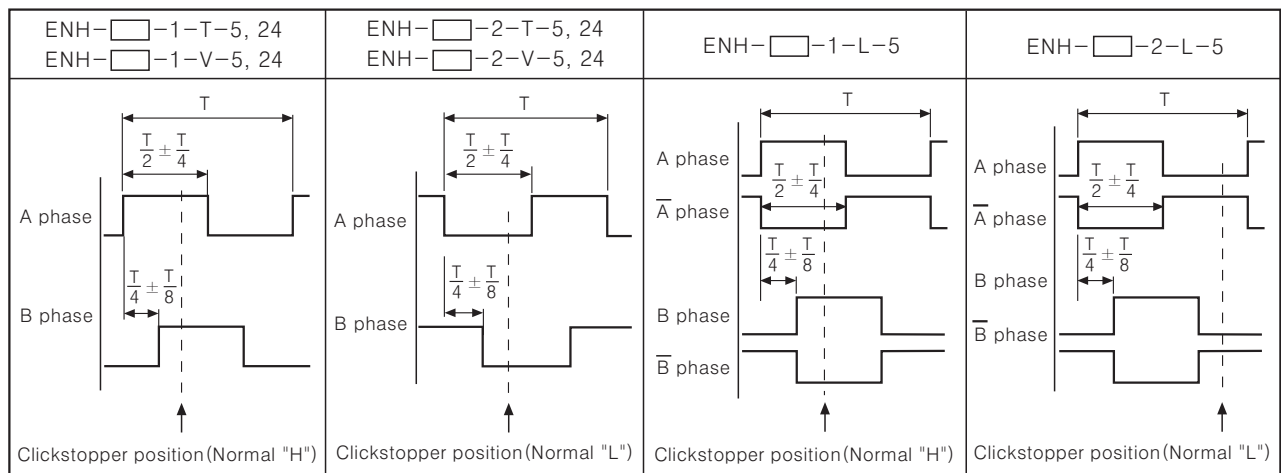
Control output diagram



The output circuit of A, B phase (Line driver output) is A, $\bar{A}$, B, $\bar{B}$ phase.

Totem pole output can be used for NPN open collector type (※1) or voltage output type (※2).

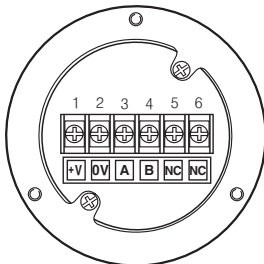
Output waveform



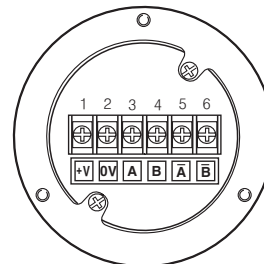
※Clickstopper position Normal "H" or Normal "L": It shows the waveform when the handle is not stopped.

Connections

●Totem pole output / Voltage output

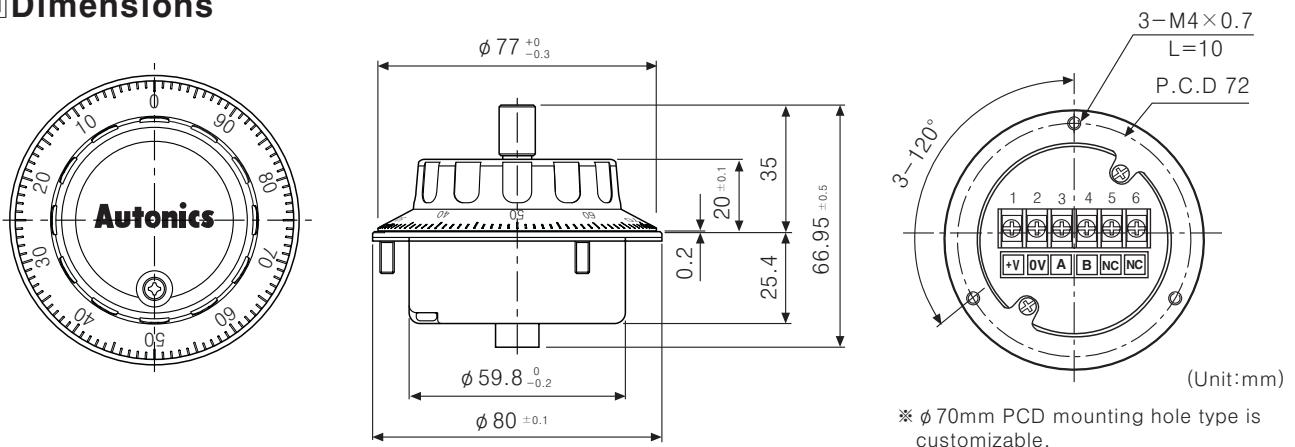


●Line driver output



※Do not use terminal No. 5, 6.

Dimensions



Portable Incremental Type with Handle

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/1 Revolution	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 (R1, R2, R3)	
	Control output	• Low $\Rightarrow$ Load current : Max. 20mA, Residual : 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 ±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 mega between all terminals and case)	
Mechanical specification	Dielectric strength	750VAC 50/60Hz for 1 minute (Between all terminals and case)	
	Connection	25Pin D-SUB of connector type	
	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 ~ 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 ~ 85°C	
Ambient humidity		35~85%RH, Storage: 35~85%RH	
Protection		IP67 (IEC standard)	
Cable		ϕ 5mm, 18P, Length : 8m, Spring code cable	
Unit weight		Approx. 730g	

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

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

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

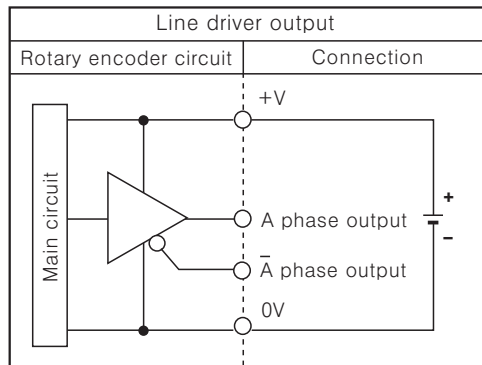
(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

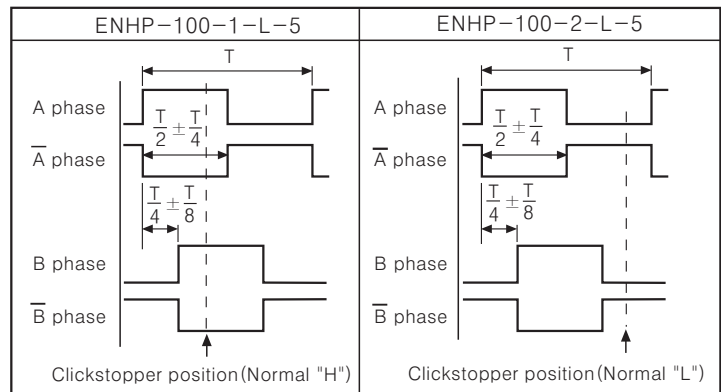
ENHP Series

Control output diagram



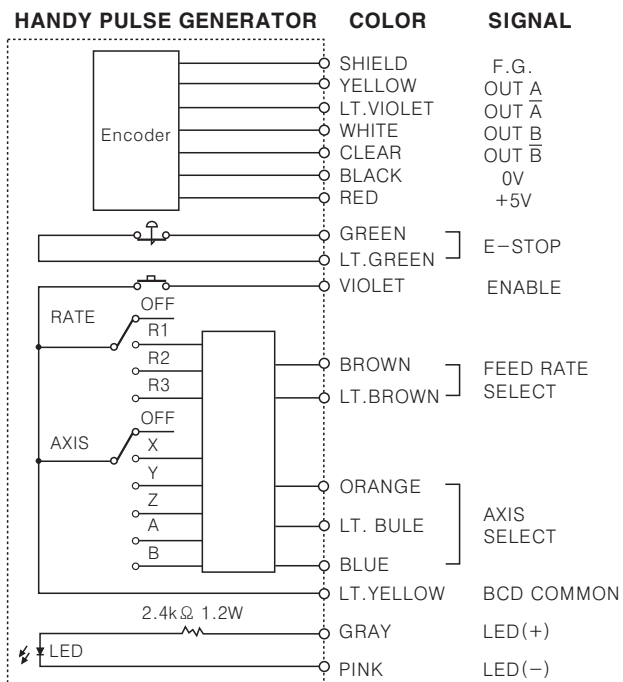
※The output circuit of A, $\bar{A}$, B, $\bar{B}$ phase is same.

Output waveform



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

Connections



Pin No.	Function
1	OUT A
2	OUT $\bar{A}$
3	OUT B
4	OUT $\bar{B}$
5	GND
6	+V
7	N.C
8	E-STOP(L+)
9	E-STOP(L-)
10	ENABLE
11	FEED RATE
12	SELSECT
13	AXIS SELECT
14	
15	
16	BCD COMMON
17	N.C
18	LED(+)
19	LED(-)
20	N.C
21	N.C
22	N.C
23	N.C
24	N.C
25	N.C

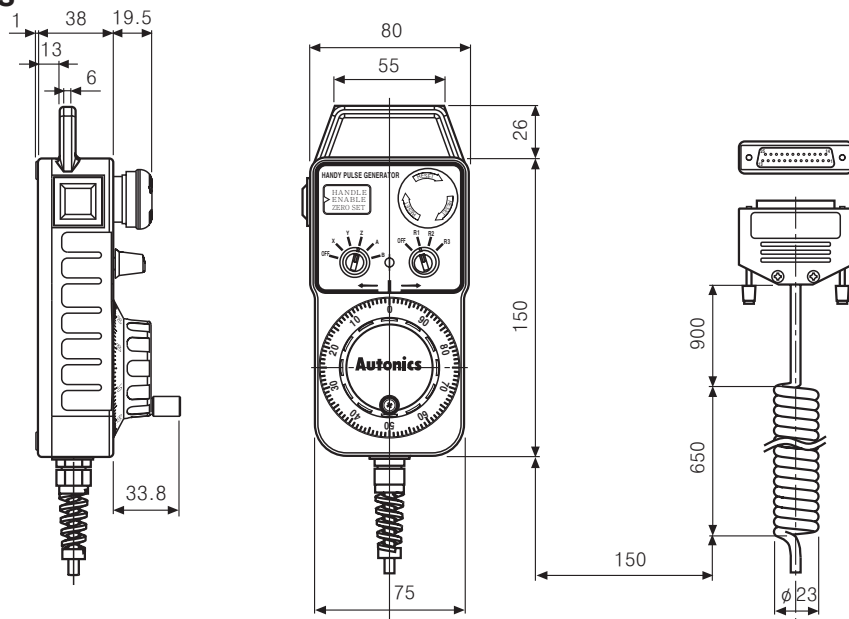
AXIS SELECT

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

FREE RATE SELECT

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

Dimensions



(Unit:mm)

ϕ 60mm Shaft AbsoluteType

Diameter ϕ 60mm Shaft type Absolute Rotary encoder

■ Features

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

■ Application

- Precision numerical control machine for industrial plant.

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

■ Ordering information

Series	Output code	Output	Power supply	Revolution direction	Revolution/1Pulse	Control output
ENP	1	1	1	R	360	1
Diameter ϕ 60mm shaft type (External diameter : ϕ 8mm)	1:BCD code	0:Negative logic 1:Positive logic	0:5–12VDC $\pm$ 5% 1:12–24VDC $\pm$ 5%	F:Output value increase at CW direction R:Output value increase at CCW direction	006:6 division 008:8 division 012:12 division 016:16 division 024:24 division 360:360 division	P:PNP open collector output N:NPN open collector output

* Since the output type is related with control output, please select the model name in specification when ordering the item.

■ 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° ± 30' TP2:15° ± 30' P:60° ± 30' TS:56° ± 30'	TP1:39° ± 30' TP2:15° ± 30' P:45° ± 30' TS:42° ± 30'	TP1:3° ± 30' TP2:15° ± 30' P:30° ± 30' TS:26° ± 30'	TP1:2° ± 30' TP2:11.25° ± 30' P:22.5° ± 30' TS:19.5° ± 30'	TP1:8° ± 30' TP2:3° ± 30' P:15° ± 30' TS:11° ± 30'	TS:1° ± 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 ± 5% (Ripple P–P:Max. 5%)						5–12VDC ± 5% (Ripple P–P: Max. 5%)
	Current consumption		Max. 150mA(disconnection of the load)					Max. 200mA(disconnection of the load)	
	Insulation resistance		Min. 20M Ω (at 500VDC mega between all terminals and case)						
Dielectric strength		500VAC 50/60Hz for 1 minute (Between all terminals and case)							
Connection		Cable outgoing type							
Mechanical specification	Starting torque	Max. 500gf · cm(0.05N · m)							
	Rotor inertia	Max. 300g · cm ² (3×10 ^{–5} kg · m ²)							
	Shaft loading	Radial : 10kgf, Thrust : 2.5kgf							
	Mechanical revolution	(Note1)	3600rpm						
Vibration		1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours							
Shock		Max. 75G							
Ambient temperature		–10 ~ 60℃ (at non–freezing status), Storage:–25 ~ 85℃							
Ambient humidity		35~85%RH, Storage : 35~90%RH							
Protection		IP50(IEC standard)							
Cable		ϕ 8mm, 12P, Length : 1m, Double shield cable							
Accessory		Fixing bracket, Coupling							
Unit weight		Approx. 577g						Approx. 690g	

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

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

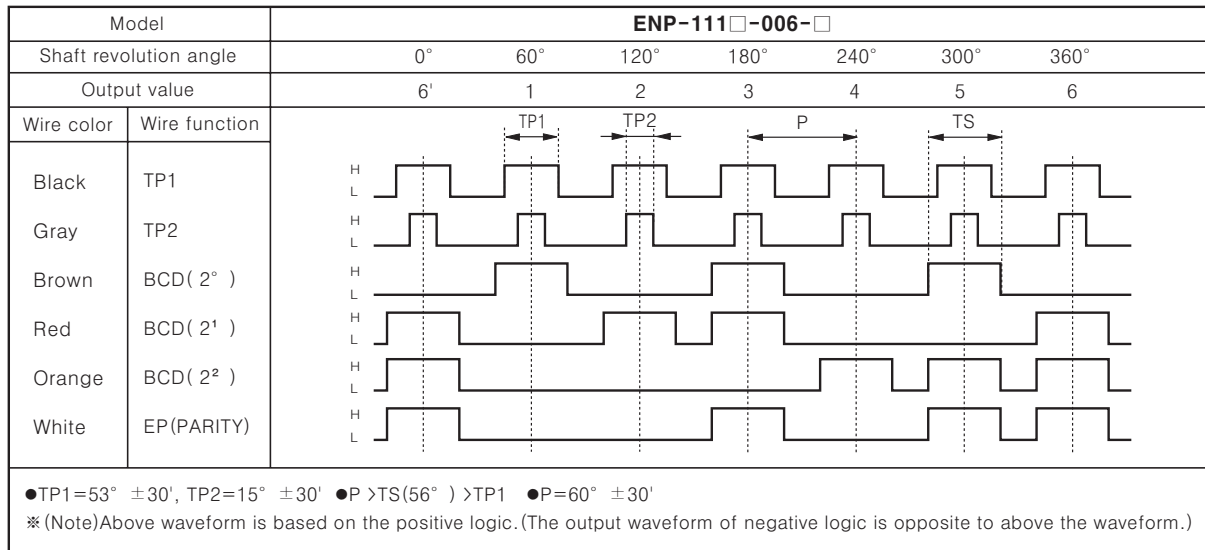
(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

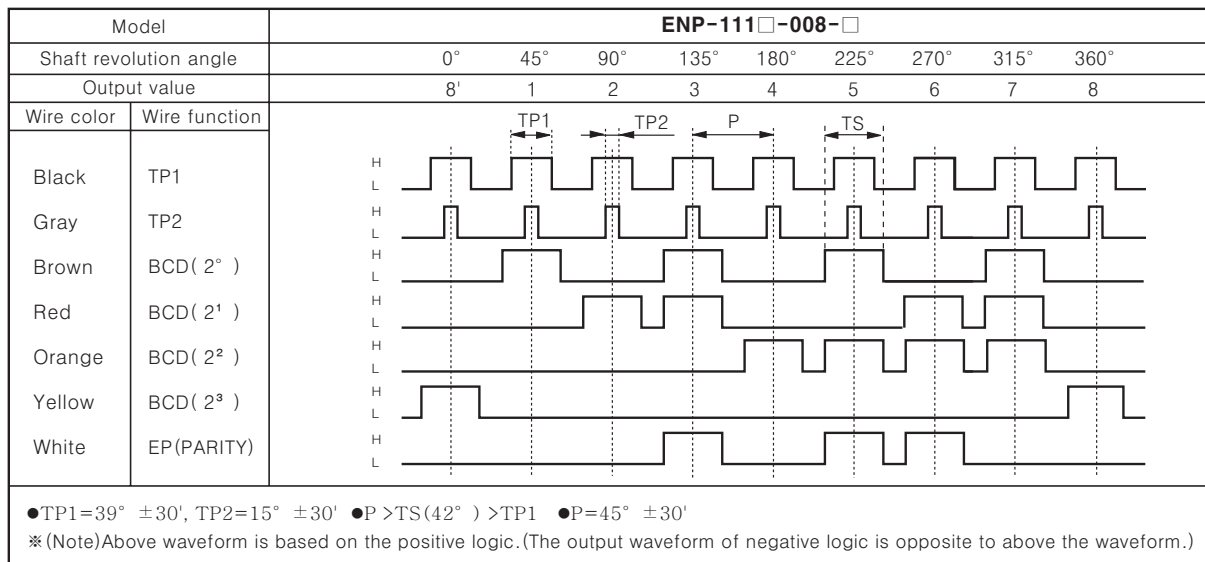
ENP Series

■ Output waveform

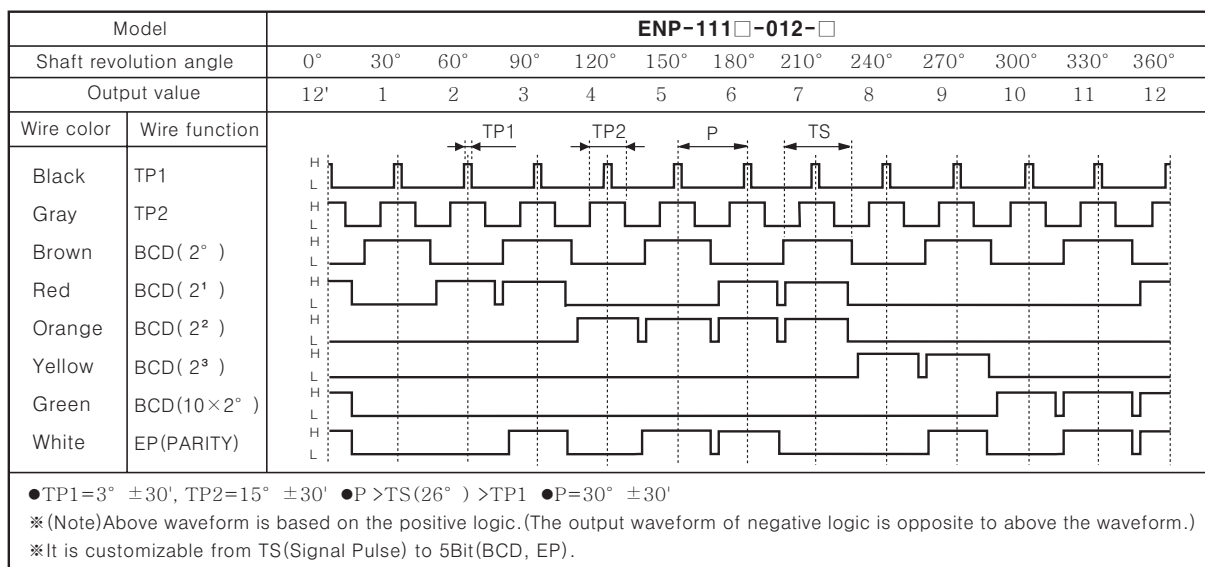
● 6 division



●8 division



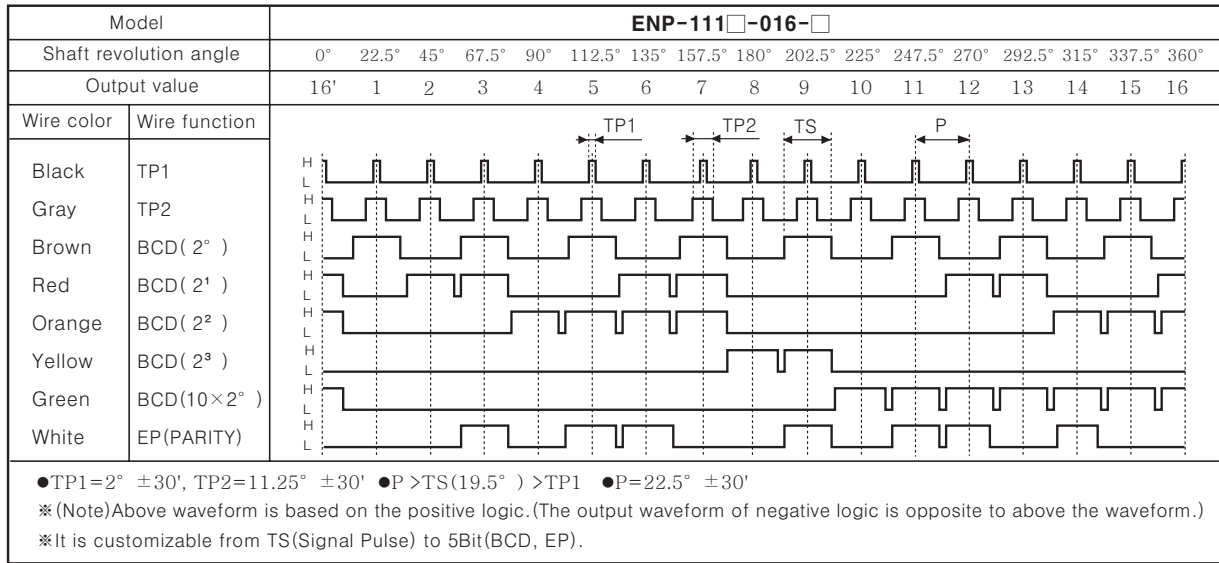
●12 division



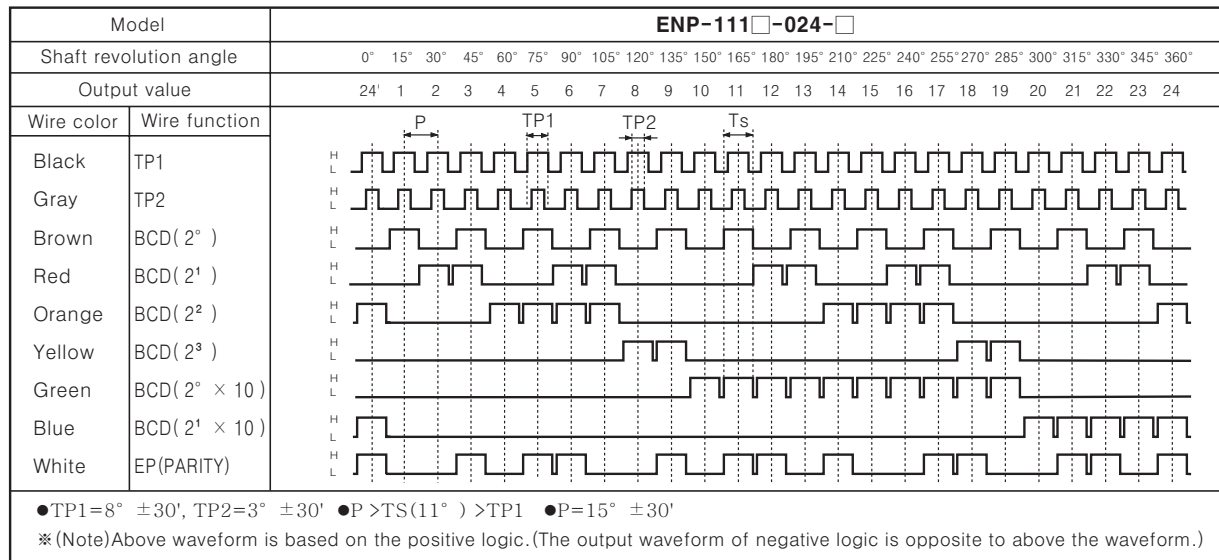
ϕ 60mm Shaft Absolute Type

■ Output waveform

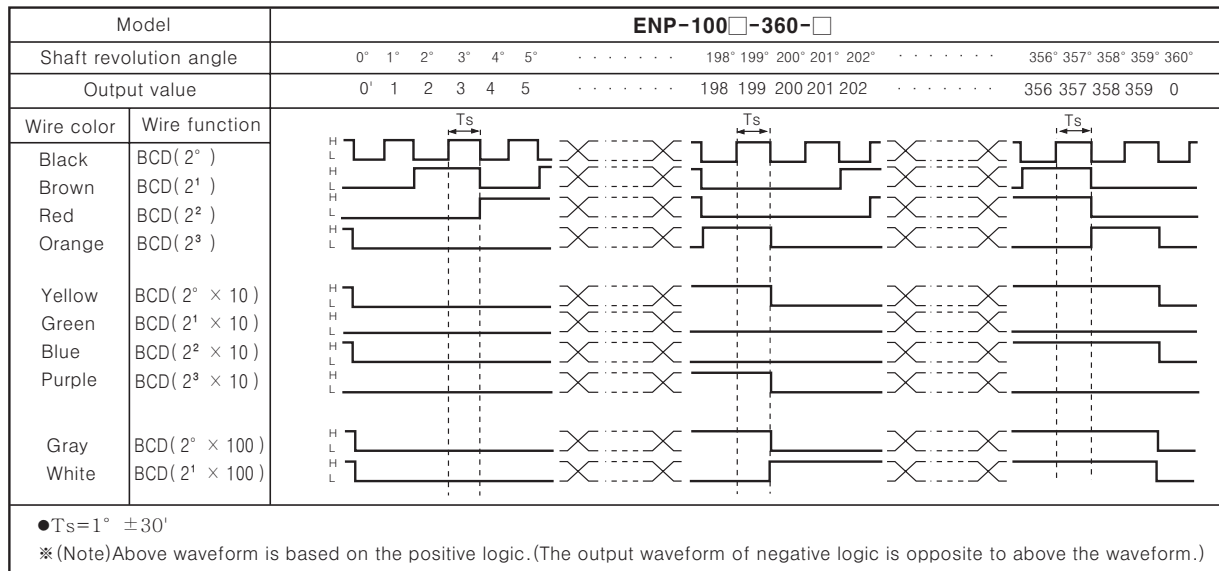
● 16 division



● 24 division



● 360 division



(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

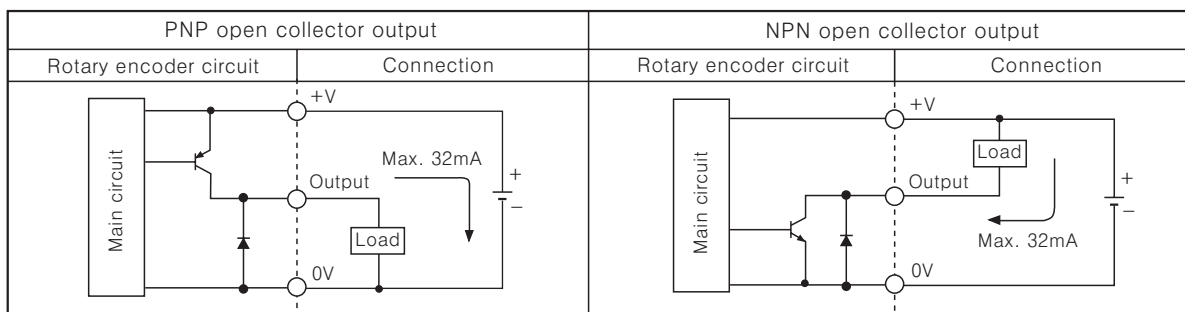
(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

ENP Series

Control output diagram



※Output circuit of all phases is same.

Connections

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

※Unused wires must be insulated.

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

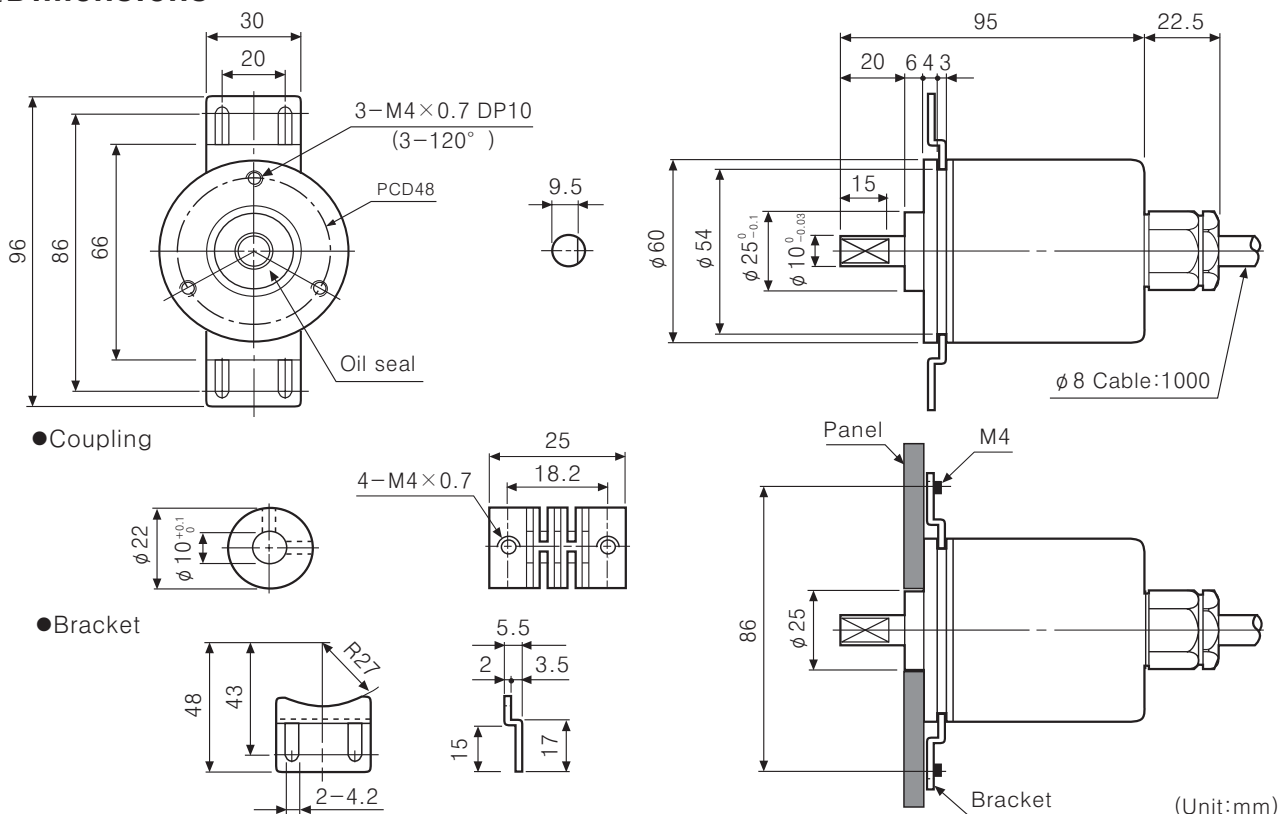
※NC : Not Connected.

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

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

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

Dimensions



ϕ 50mm Shaft Absolute Type

Diameter ϕ 50mm Shaft type Absolute Rotary encoder

■ Features

- Compact size of external diameter 50mm
- Various output code: BCD, Binary, Gray Code (Customizable)
- Various and high resolution (720, 1024 divisions)
- IP 64 (Partial waterproof, Oil proof)

■ Applications

Precision machine tool, Fabric machinery, Robot, Parking system

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



■ Ordering information

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

* Gray code is customizable.

■ Specifications

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

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

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

(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

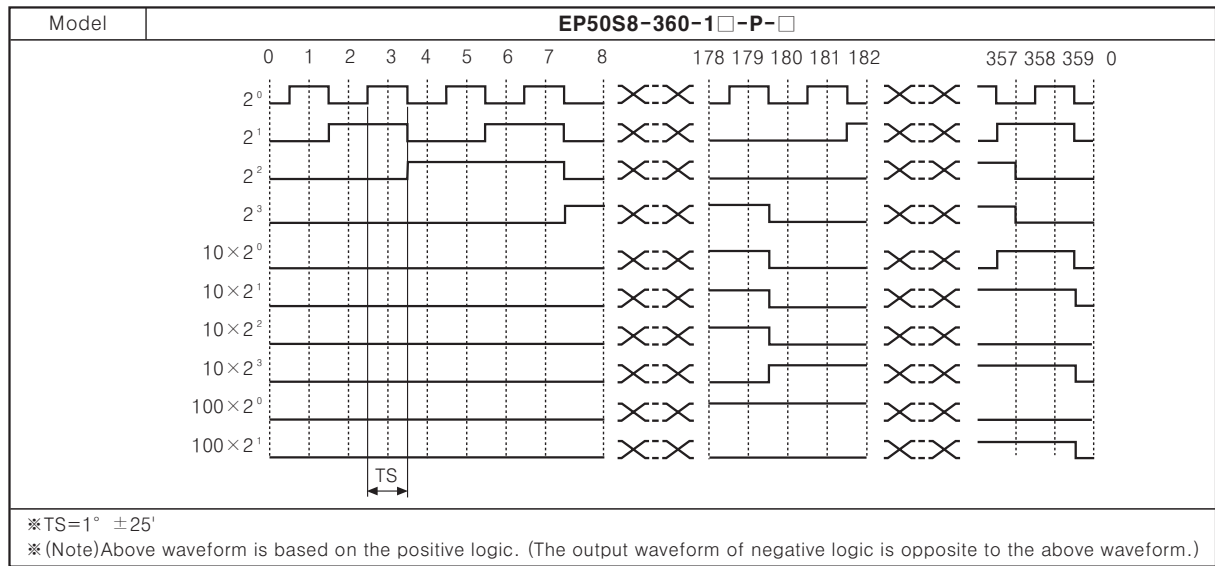
(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement

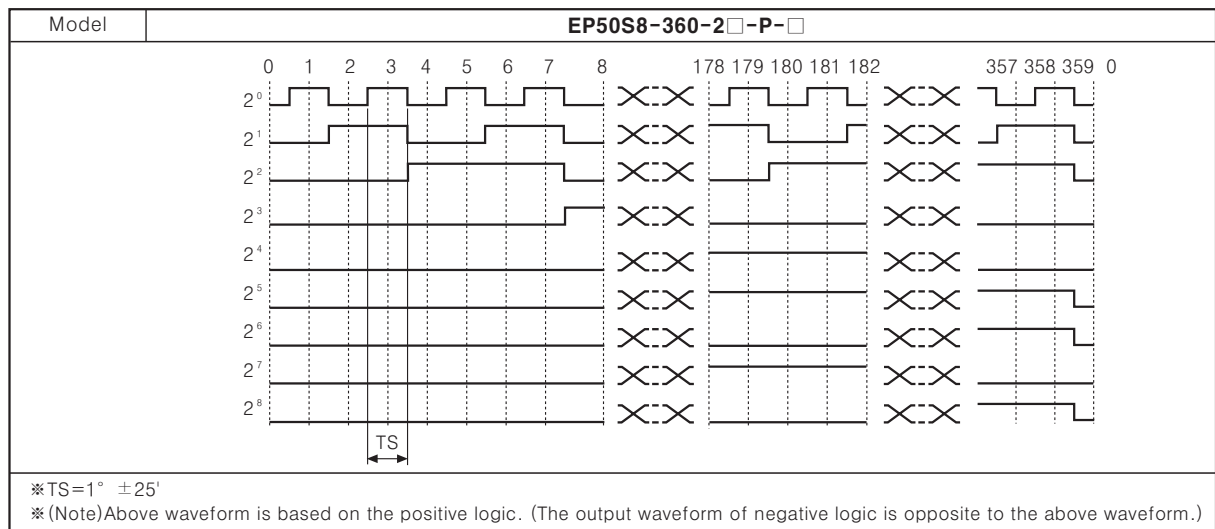
EP50S Series

■ Output waveform

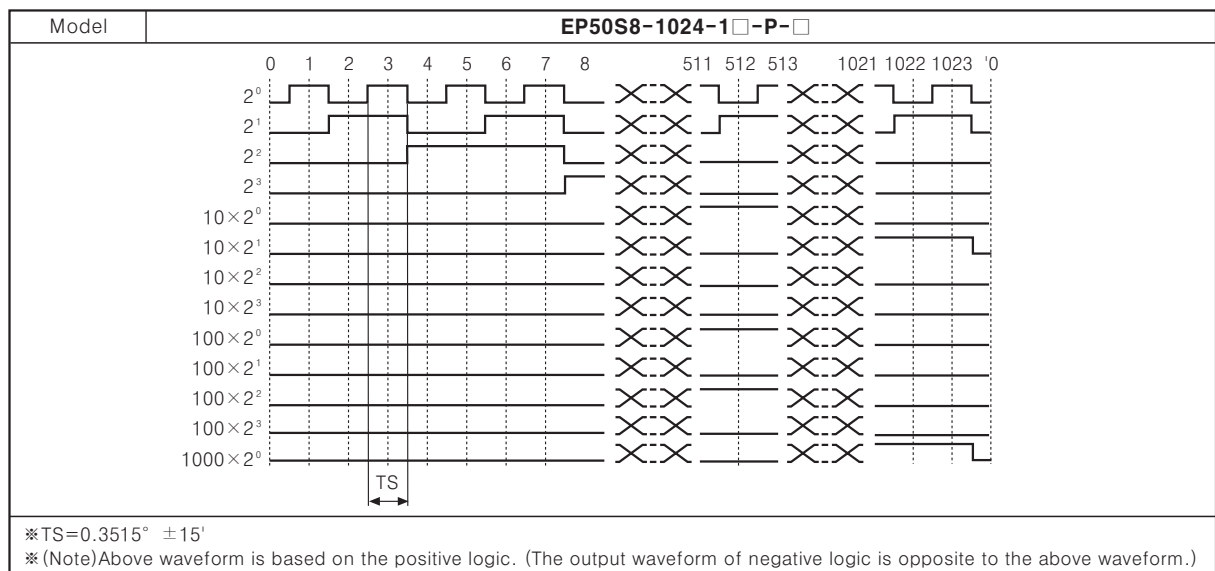
● 360 division (BCD CODE output)



● 360 division (BINARY CODE output)



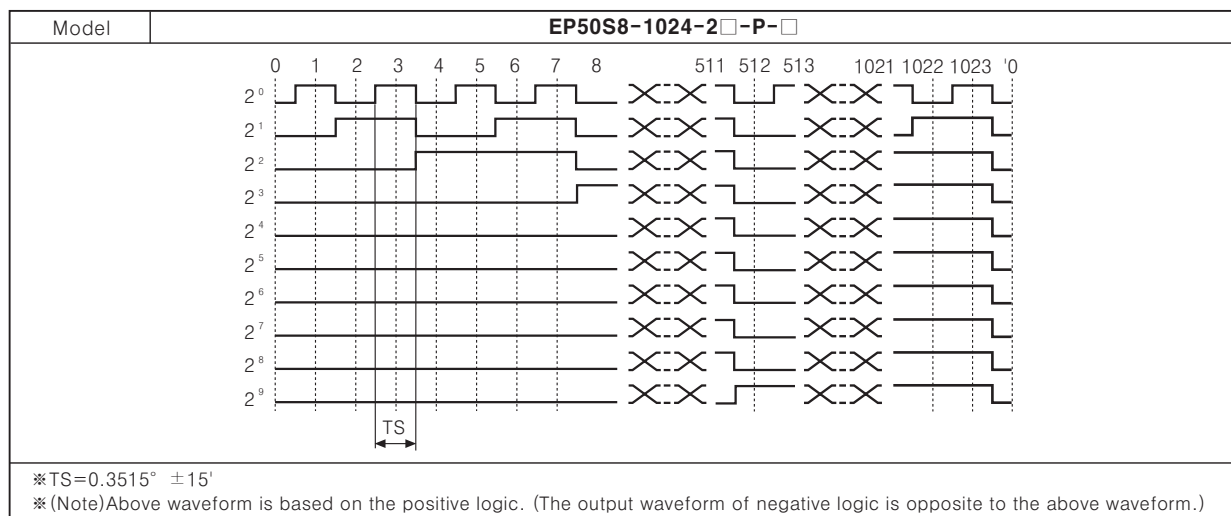
● 1024 division (BCD CODE output)



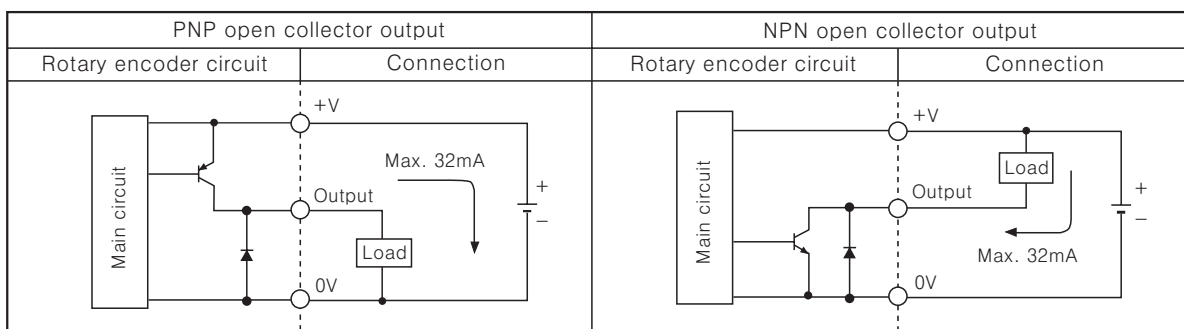
∅ 50mm Shaft Absolute Type

■ Output waveform

● 1024 division (BINARY CODE output)



■ Control output diagram



※Output circuit of all phases is same.

■ Connections

● BCD Code

Resolution	6	8	12	16	24	32	40	45	60	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	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	2¹	2¹	2¹	2¹	2¹	2¹	2¹	2¹	2¹	2¹
	Orange	2°	2°	2°	2°	2°	2°	2°	2²	2²	2²	2²	2²	2²	2²	2²	2²	2²
	Yellow	2¹	2¹	2¹	2¹	2¹	2¹	2¹	2³	2³	2³	2³	2³	2³	2³	2³	2³	2³
	Blue	2²	2²	2²	2²	2²	2²	2²	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)
	Purple	EP		2³	2³	2³	2³	2³	(2¹×10)	(2¹×10)	(2¹×10)	(2¹×10)	(2¹×10)	(2¹×10)	(2¹×10)	(2¹×10)	(2¹×10)	(2¹×10)
	Gray	NC		(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2°×10)	(2²×10)	(2²×10)	(2²×10)	(2²×10)	(2²×10)	(2²×10)	(2²×10)	(2²×10)	(2²×10)	(2²×10)
	White/Brown	NC		EP	EP	(2¹×10)	(2¹×10)	(2¹×10)	NC			(2³×10)	(2³×10)	(2³×10)	(2³×10)	(2³×10)	(2³×10)	(2³×10)
	White/Red	NC				EP	EP	EP	NC				(2²×100)	(2²×100)	(2²×100)	(2²×100)	(2²×100)	(2²×100)
	White/Orange	NC												(2¹×100)	(2¹×100)	(2¹×100)	(2¹×100)	(2¹×100)
	White/Yellow	NC														(2²×100)	(2²×100)	(2²×100)
	White/Blue	NC																(2³×100)
	White/Purple	NC																(2²×1000)
	Shielded wire	F.G																

■ Connections

- Binary code

Resolution		6 division	8 division	12 division	16 division	24 division	32 division	40 division	45 division	60 division	64 division	90 division	128 division	180 division	256 division	360 division	512 division	720 division	1024 division	
Color																				
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°	2°	
	Red	TP2	TP2	TP2	TP2	TP2	TP2	TP2	2¹	2¹	2¹	2¹	2¹	2¹	2¹	2¹	2¹	2¹	2¹	
	Orange	2°	2°	2°	2°	2°	2°	2°	2²	2²	2²	2²	2²	2²	2²	2²	2²	2²	2²	
	Yellow	2¹	2¹	2¹	2¹	2¹	2¹	2¹	2³	2³	2³	2³	2³	2³	2³	2³	2³	2³	2³	
	Blue	2²	2²	2²	2²	2²	2²	2²	2⁴	2⁴	2⁴	2⁴	2⁴	2⁴	2⁴	2⁴	2⁴	2⁴	2⁴	
	Purple	EP	EP	2³	2³	2³	2³	2³	2⁵	2⁵	2⁵	2⁵	2⁵	2⁵	2⁵	2⁵	2⁵	2⁵	2⁵	
	Gray	NC		EP	EP	2⁴	2⁴	2⁴	NC			2⁶	2⁶	2⁶	2⁶	2⁶	2⁶	2⁶	2⁶	
	White/Brown	NC				EP	EP	2⁵	NC					2⁷	2⁷	2⁷	2⁷	2⁷	2⁷	
	White/Red	NC						EP	NC							2⁸	2⁸	2⁸	2⁸	
	White/Orange	NC																2⁹		2⁹
	White/Yellow	NC																		
	White/Blue	NC																		
	White/Purple	NC																		
	Shiled wire	F.G																		

※ Unused wires must be insulated.

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

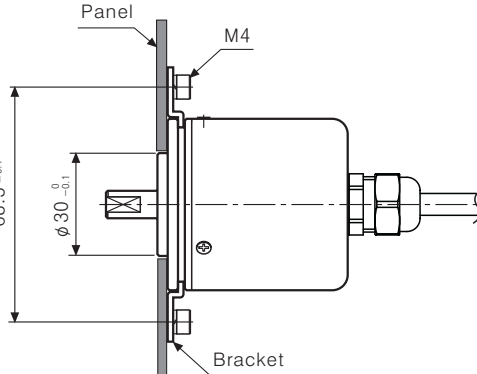
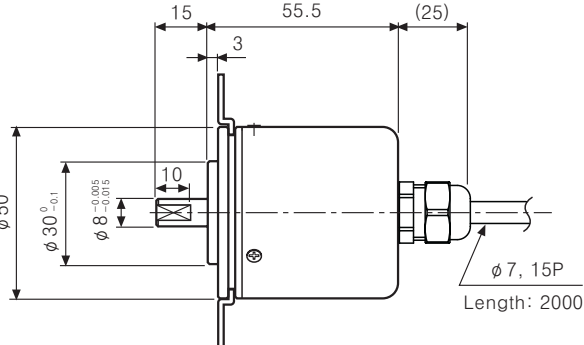
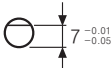
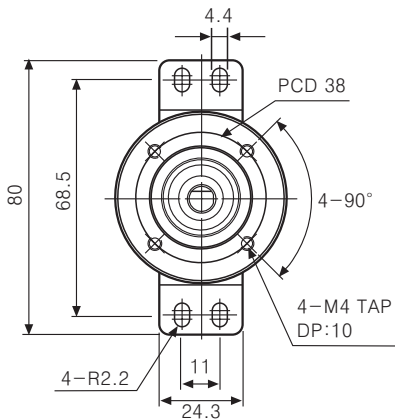
※NC : Not Connected.

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

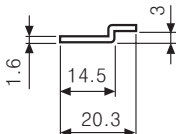
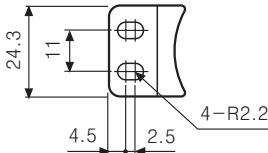
※Ep : It is a parity signal to be outputted as odd number of parity.

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

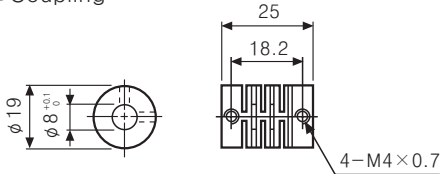
■ Dimensions



- Bracket



- Coupling

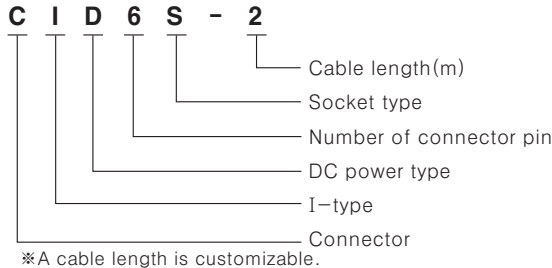


(Unit:mm)

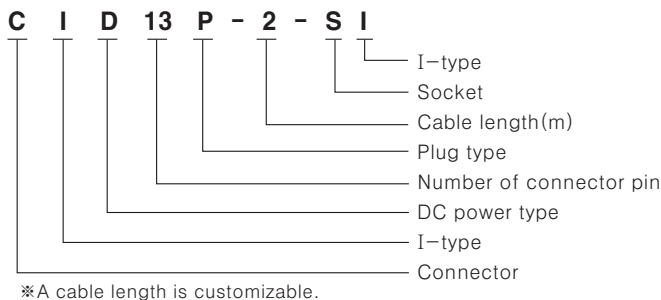
Encoder Connector Cable / General connector cable

■ Ordering information

◎Socket type



◎Plug-socket type

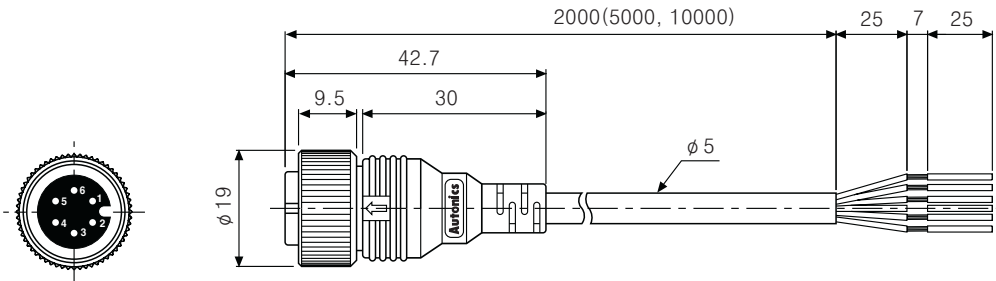


■ Dimensions

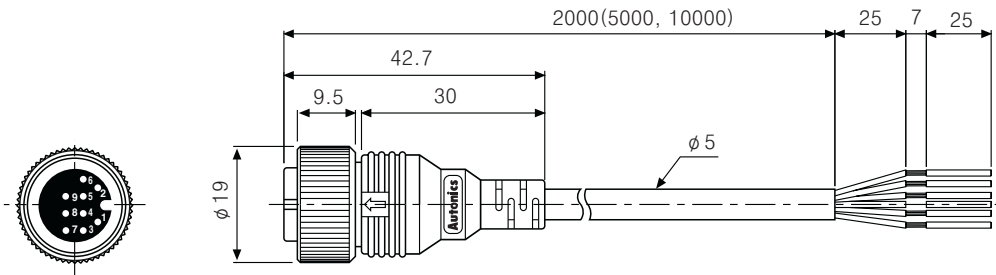
◎Socket type

(Unit:mm)

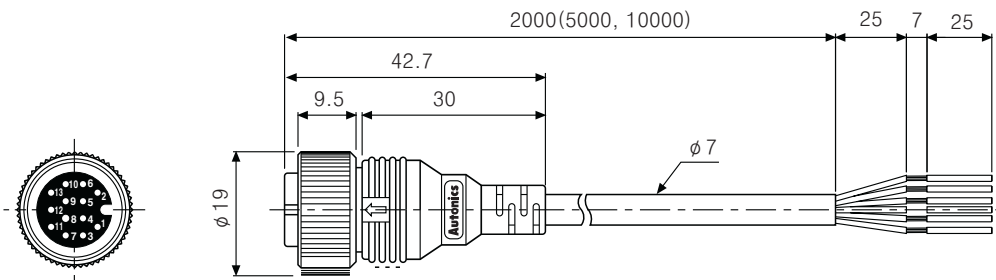
●CID6S-2, CID6S-5, CID6S-10 (Totem pole output / NPN open collector output / Voltage output)



●CID9S-2, CID9S-5, CID9S-10 (Line driver output)

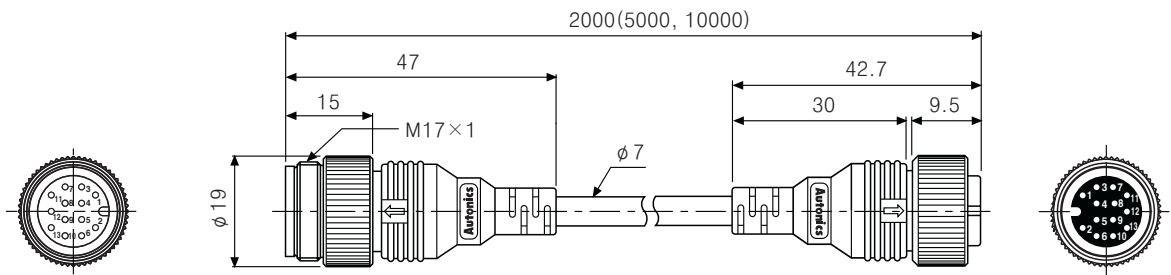


●CID13S-2, CID13S-5, CID13S-10 (For cam positioner)



◎Plug-socket type

●CID13P-2-SI, CID13P-5-SI, CID13P-10-SI (For cam positioner)



(A)
Counter

(B)
Timer

(C)
Temp.
controller

(D)
Power
controller

(E)
Panel
meter

(F)
Tacho/
Speed/
Pulse
meter

(G)
Display
unit

(H)
Sensor
controller

(I)
Switching
power
supply

(J)
Proximity
sensor

(K)
Photo
electric
sensor

(L)
Pressure
sensor

(M)
Rotary
encoder

(N)
Stepping
motor &
Driver &
Controller

(O)
Graphic
panel

(P)
Production
stoppage
models &
replacement