Diameter ø60mm Hollow shaft type Incremental Rotary Encoder

■ Features

- Diameter ø60mm, Inner diameter of shaft ø20mm
- Easy installation at narrow space
- Suitable for measuring angle, position, revolution, speed, acceleration and distance
- Power supply : 5VDC, 12-24VDC ±5%
- Various output types

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

■ Ordering information

E60H | **20** | – **8192** | – **3** | – **N** | – **24** | –

Series	Shaft diameter	Pulse/1Revolution	Output phase	Output	Power supply	Cable
Diameter ø60mm, hollow shaft type	ø20mm	100, 1024, 500, 8192	3 : A, B, Z 6: A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$	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: Cable type C: Connector cable type(※)

※Standard : E60H20-PULSE-3-N-24

※Cable length : 250mm

■ Specifications

Item			Diameter ø60mm hollow shaft type of incremental rotary encoder	
Resolution(P/R)※1			100, 1024, 5000, 8192	
Electrical specification	Output phase		A, B, Z phase (Line driver output A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ 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 - Load current:Max. 30mA, Residual voltage : Max. 0.4VDC • High - Load current:Max. 10mA, Output voltage(Power voltage 5VDC):Min. (Power voltage-2.0)VDC, Output voltage(Power voltage 12-24VDC):Min. (Power voltage-3.0)VDC	
		NPN open collector output	Load current : Max. 30mA, Residual voltage : Max. 0.4VDC	
		Voltage output	Load current : Max. 10mA, Residual voltage : Max. 0.4VDC	
		Line driver output	• Low - Load current : Max. 20mA, Residual voltage : Max. 0.5VDC • High - Load current : Max. -20mA, Output voltage(Power voltage 5VDC):Min. 2.5VDC, Output voltage(Power voltage 12-24VDC):Min. (Power voltage-3.0)VDC	
	Response time (Rise/Fall)	Totem pole output	Max. 1μs	• Measuring condition - Cable length : 2m, I sink = 20mA
		NPN open collector output		
		Voltage output		
		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 megger between all terminals and case)	
	Dielectric strength		750VAC 50/60Hz for 1 minute(between all terminals and case)	
	Connection		Cable type, 250mm connector cable type	
Mechanical specification	Starting torque		Max. 150gf·cm(0.015N·m)	
	Moment of inertia		Max. 110g·cm²(11×10^{-6} kg·m²)	
	Shaft loading		Radial : 5kgf, Thrust : 2.5kgf	
	Max. allowable revolution※2		6000rpm	
Vibration			1.5mm amplitude at frequency of 10 to 55Hz(for 1 min.) in each of X, Y, Z directions for 2 hours	
Shock			Approx. Max. 100G	
Environment	Ambient temperature		-10 to 70℃, storage : -25 to 85℃	
	Ambient humidity		35 to 85%RH, storage : 35 to 90%RH	
Protection			IP50(IEC standard)	
Cable			ø5mm, 5-wire, Length : 2m, Shield cable(Line driver output : ø5mm, 8-wire) (AWG24, Core diameter : 0.08mm, Number of cores : 40, Insulator out diameter : ø1mm)	
Accessory			Bracket 2EA	
Weight※3			Approx. 397g(approx. 330g)	

※1: Not indicated type is customizable.

※2: Make sure that. Max response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.

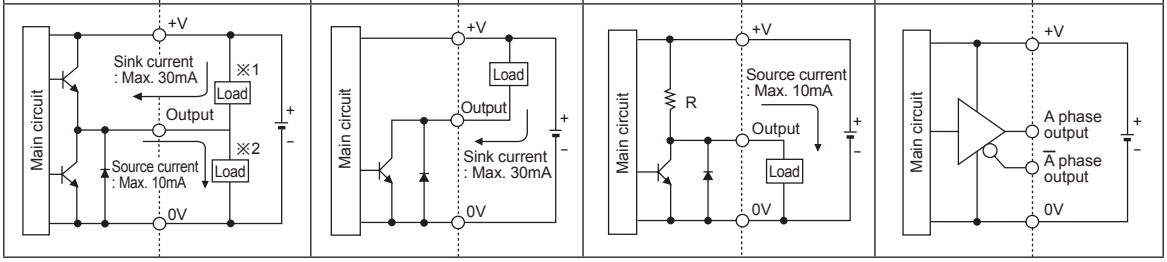
[Max. response revolution(rpm)= $\frac{\text{Max. response frequency}}{\text{Resolution}}$ × 60 sec]

※3: The weight with packaging and the weight in parentheses is only unit weight.

※Environment resistance is rated at no freezing or condensation.

■ Control output diagram

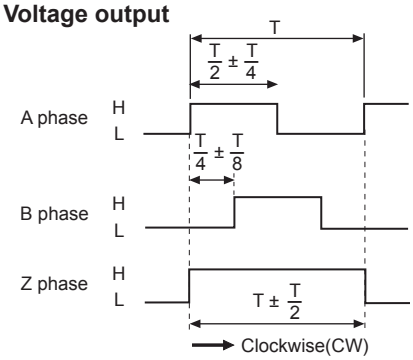
Totem pole output		NPN open collector output		Voltage output		Line driver output	
Rotary encoder circuit	Load Connection	Rotary encoder circuit	Load Connection	Rotary encoder circuit	Load Connection	Rotary encoder circuit	Load Connection



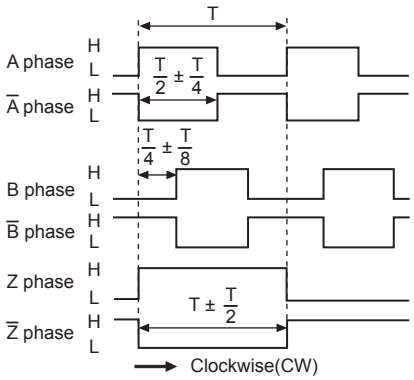
- Totem pole output type can be used for NPN open collector output type(※1) or Voltage output type(※2).
- All output circuits of A, B, Z phase are the same. (Line driver output is A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$)

■ Output waveform

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



● Line driver output

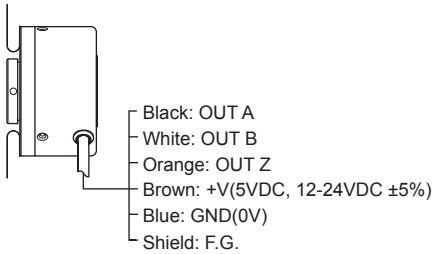


※CW : Right turn as from the shaft

■ Connections

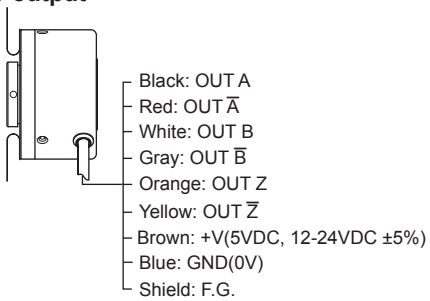
◎ Cable type

● 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



◎ Connector cable type

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

● Line driver output

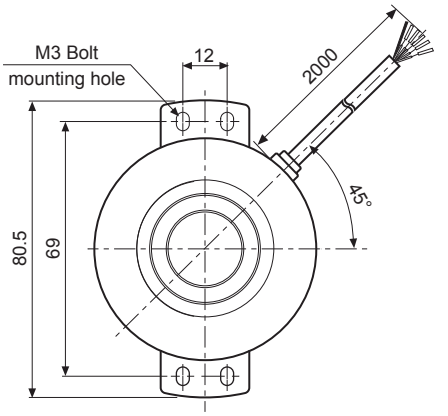
Totem pole output/ NPN open collector output/ Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT $\overline{A}$	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G.	Shield	⑥	OUT $\overline{B}$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

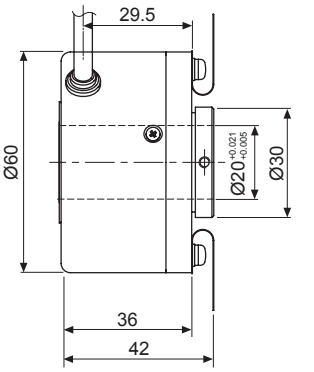
※F.G.(Field Ground) : It should be grounded separately.

▣ Dimension

◎ Cable type

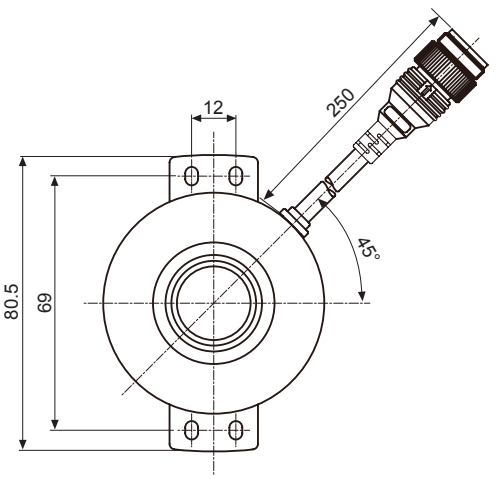
(unit: mm)





Cable
ø5mm, 5-wire(Line driver output : 8-wire), Length : 2000m, Shield cable

◎ Connector cable type



※Connector cable is customizable and refer to the G-10 for specifications.

● **Bracket**