

## 1. SH39 Ultra-high Resolution Incremental Optical Encoder (Solid shaft)

### 1.1 Introduction:

This product is an incremental high-resolution encoder, solid shaft miniaturization and sturdy, with two installation methods, protection grade IP65, easy to install, widely used in industrial automation fields with limited spaces.

### 1.2 Feature:

- Encoder diameter Ø39mm, Thickness 31.5mm, Solid shaft up to Ø10mm;
- Two installation methods;
- Adopt non-contact photoelectric principle;
- With short circuit protection;
- Various electrical interfaces available;
- Resolution per turn up to 20Bits.

### 1.3 Application:

Servo motor, robot, CNC and other automation control fields.

### 1.4 Connection:

- Cable connection (standard length 1000mm)

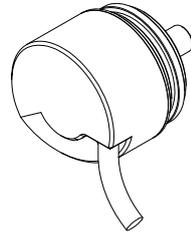
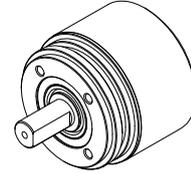
### 1.5 Protection:

IP50 & IP65

### 1.6 Weight:

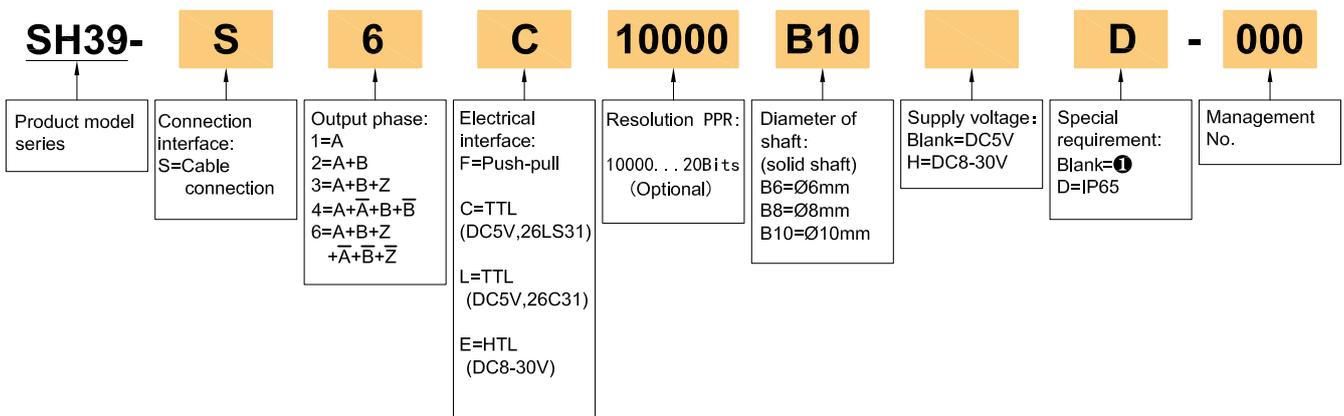
About 130g

SH39-S



## 2. Model Selection Guide

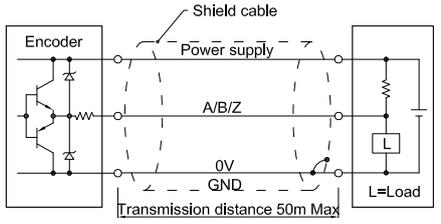
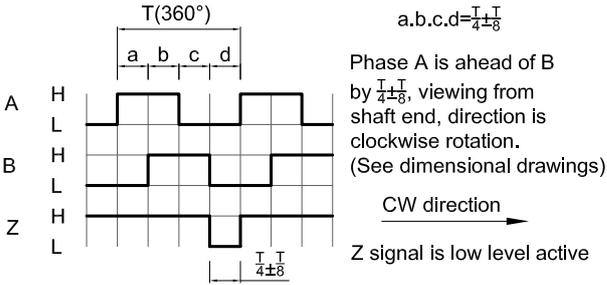
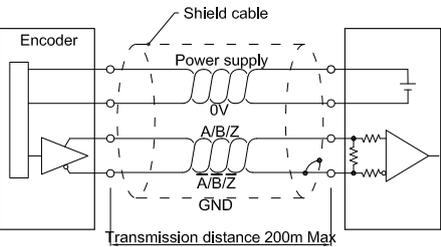
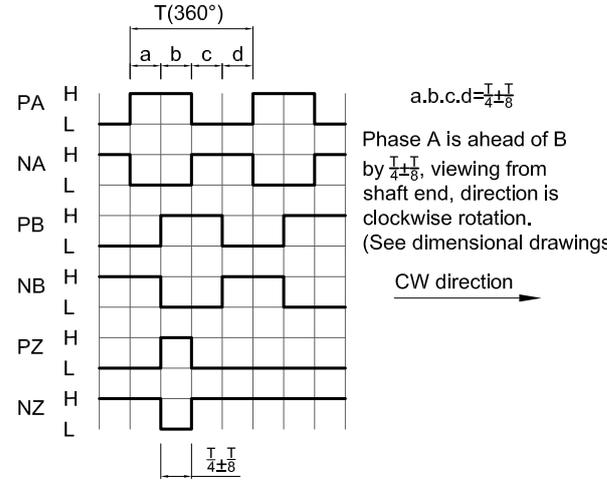
### 2.1 Model composition(select parameters)



Special requirement:

- ①. IP=50; cable length 1m, if need to change the length C+number, max 100m(indicated by C100).

3. Output Method

Electrical interface	Output circuit	Output wave form
<p>Push-pull</p>		 <p> <math>a.b.c.d = \frac{T}{4} \pm 8</math>              Phase A is ahead of B by <math>\frac{T}{4} \pm 8</math>, viewing from shaft end, direction is clockwise rotation. (See dimensional drawings)              CW direction →              Z signal is low level active         </p>
<p>TTL (DC5V)</p> <p>HTL (DC8-30V)</p>		 <p> <math>a.b.c.d = \frac{T}{4} \pm 8</math>              Phase A is ahead of B by <math>\frac{T}{4} \pm 8</math>, viewing from shaft end, direction is clockwise rotation. (See dimensional drawings)              CW direction →         </p>

## 4. Electrical Parameters

Parameter		Output type	Push-pull	TTL	HTL
Item					
Supply voltage			DC+5V±5%; DC8-30V±5%	DC+5V±5%	DC8-30V±5%
Consumption current			100mA Max	120mA Max	
Allowable ripple			≤3%rms		
Top response frequency			100KHz	500KHz	800KHz
Output capacity	Output current	Input	≤30mA		≤±50mA
		Output	≤10mA		
	Output voltage	"H"	≥[ (Supply voltage) -2.5V]	≥2.5V	≥V <sub>cc</sub> -3 V <sub>bc</sub>
		"L"	≤0.4V(30mA)	≤0.5V	≤ 1V V <sub>bc</sub>
Load voltage		—			
Rise & Fall time			Less than 2us(cable length: 2m)	Less than 1us(Cable length: 2m)	
Insulation strength		AC500V 60s			
Insulation resistance		10MΩ			
Mark to space ratio		45% to 55%			
Short-circuit protection		✔①			
Phase shift between A & B		90°±10° ( frequency in low speed)			
		90°±20° ( frequency in high speed)			
GND		Not connect to encoder			

① Short-circuit to another cable or GND permitted for max 30s.

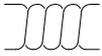
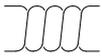
## 5. Mechanical Specifications

Diameter of shaft	Ø6mm; Ø8mm; Ø10mm (optional)
Starting torque	Less than $9.8 \times 10^{-3} \text{N}\cdot\text{m}$
Inertia moment	Less than $6.5 \times 10^{-6} \text{kg}\cdot\text{m}^2$
Shaft load	Radial 30N; Axial 20N
Slew speed	$\leq 6000 \text{ rpm}$
Bearing Life	$1.5 \times 10^9$ revs at rated load(100000hrs at 2500RPM)
Shell	Aluminium alloy
Weight	about 130g

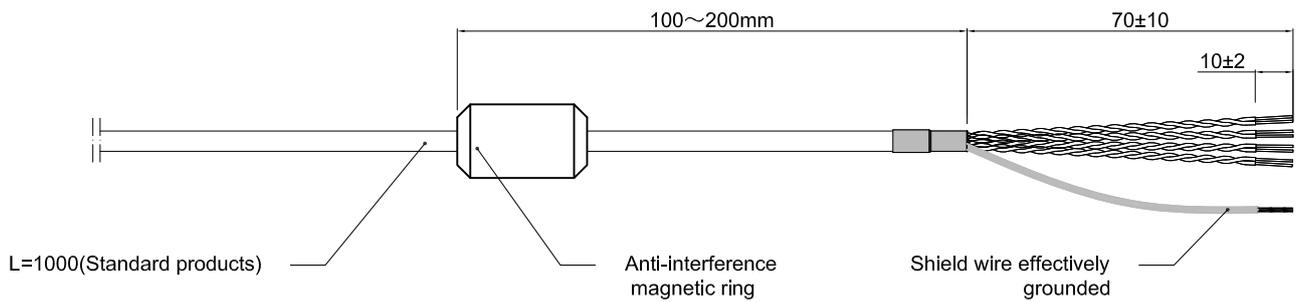
## 6. Environmental Parameters

Environmental temperature	Operating: $-40 \sim +95^\circ\text{C}$ (repeatable winding cable: $-10^\circ\text{C}$ ); Storage: $-40 \sim +95^\circ\text{C}$
Environmental humidity	Operating and storage: 35~85%RH(noncondensing)
Vibration(Endurance)	Amplitude 1.52mm,5~55Hz,2h for X,Y,Z direction individually
Shock(Endurance)	$980\text{m/s}^2$ 11ms three times for X,Y,Z direction individually
Protection	IP50 & IP65

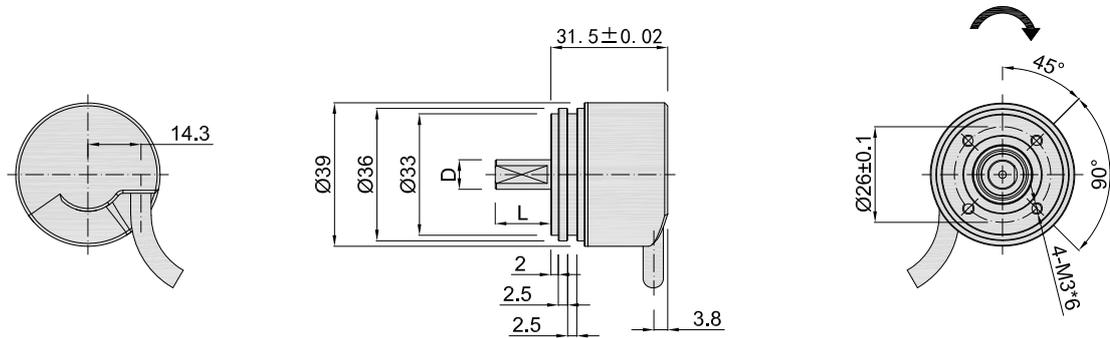
7. Wiring Table

Wire colors (cable connection)	Signal	Explanation	Twisted wire for differential
Red	Up	Power positive	
Black	Un	Power negative	
White	A	Signal wire	
White/BK	$\bar{A}$	Signal wire	
Green	B	Signal wire	
Green/BK	$\bar{B}$	Signal wire	
Yellow	Z	Signal wire	
Yellow/BK	$\bar{Z}$	Signal wire	
GND	No encoder body connected		

Radial cable wire diagram



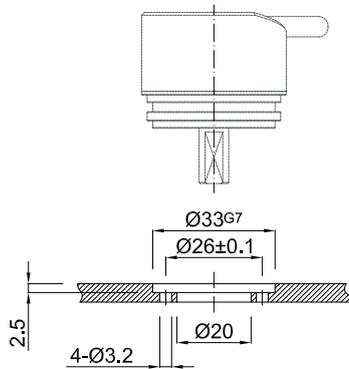
8. Basic Dimensions



D	L
Ø6 <sub>h7</sub> ( <sup>0</sup> <sub>-0.015</sub> )	15
Ø8 <sub>h7</sub> ( <sup>0</sup> <sub>-0.015</sub> )	15
Ø10 <sub>h7</sub> ( <sup>0</sup> <sub>-0.018</sub> )	20

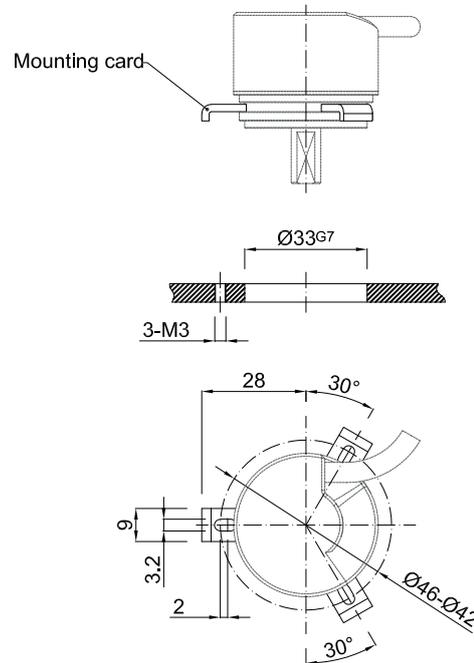
9. Installation Method

Installation method 1:

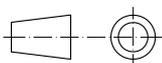


Mounting screws
Inner hexagon bolt +flat washer Specification: M3*10 Material: stainless steel Quantity: 4

Installation method 2:



Unit: mm



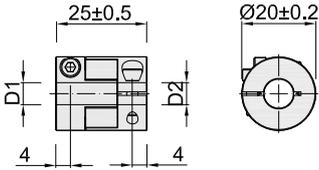
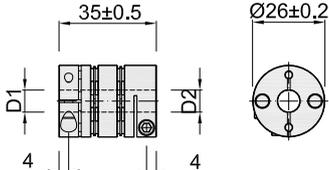
⤴ = Shaft rotation direction of the incremental signal output

About vibration

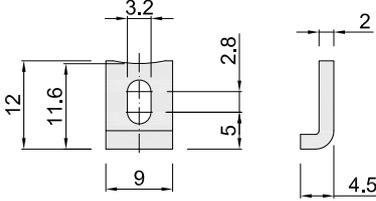
Vibration act on encoder always cause wrong pulse, so we should pay attention to working place. More pulse per revolution, narrower groovy spacing of grating, more effect to encoder by vibration, when rev is low or stop, vibration act on shaft or main body would cause grating vibrating, so encoder might make wrong pulse.

10. Recommended Accessories

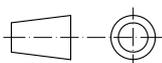
10.1 Coupler

Coupler	Dimensions	D1	D2	Model	Order No.
Cross type: M series 	 <p>Main body material: aluminum alloy</p>	Ø6 <sup>G8</sup>	Ø8 <sup>G8</sup>	6M8	08700038
		Ø8 <sup>G8</sup>	Ø8 <sup>G8</sup>	8M8	08700039
		Ø8 <sup>G8</sup>	Ø10 <sup>G8</sup>	8M10	08700040
Diaphragm type: W series 	 <p>Main body material: aluminum alloy</p>	Ø6 <sup>G8</sup>	Ø8 <sup>G8</sup>	6W8	08700042
		Ø8 <sup>G8</sup>	Ø8 <sup>G8</sup>	8W8	08700043
		Ø8 <sup>G8</sup>	Ø10 <sup>G8</sup>	8W10	08700044

10.2 Mounting card

Mounting card	Dimensions	Model	Order NO.
 3 pcs as a set	 <p>Material: stainless steel</p>	39K46	03700722

Unit: mm



## 11. Caution

### 11.1 Caution for operation

- The working temperature shall not exceed the storage temperature.
- The working humidity shall not exceed the storage humidity.
- Do not use where the temperature changes dramatically and have fog.
- Do not close to corrosive and flammable gas.
- Keep away from dust, salt and metal powder.
- Keep away from places where you will use water, oil, or medicine.
- Undue vibration and shock will impact the encoder.

### 11.2 Caution for Installation

- Electrical components should not be subjected to excessive pressure, etc., and electrostatic assessment of the installation environment should be conducted.
- Do not close the cable of the motor power to the encoder.
- The FG wire of the motor and mechanical device should be grounded.
- The shielding wire must be effectively grounded since the shielding is not connected to the encoder.

### 11.3 Caution for wiring

- Use the encoder under the specified supply voltage. Please note that the supply voltage range may drop due to the wiring length.
- Do not put the encoder wiring and other power lines through the same duct, and do not use them by bundling in parallel.
- Please use twisted pair wires for the signal and power wires of encoder.
- Please do not apply excessive force to the cable of encoder, or it will may be damaged.