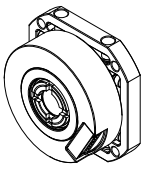
1. KH35 Ultra-high Resolution Incremental Optical Encoder (Through shaft)

1.1 Introduction:

This product is an incremental high-resolution through-shaft miniaturized ultra-thin encoder with embedded flexible spring plate for flange mounting, with Hengxiang's exclusive concentric shaft locking structure and easy installation, and is commonly used in industrial automation fields where space is tight.

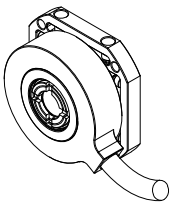
KH35-E



1.2 Feature:

- Encoder diameter Ø35mm (Mounting flange diameter Ø44.2mm), Thickness 16.2mm, Hollow shaft up to Ø8mm;
- Concentric shaft locking mounting structure;
- Adopt non-contact photoelectric principle;
- With short circuit protection;
- Various electrical interfaces available;
- Resolution per turn up to 19Bits.

KH35-J



1.3 Application:

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

1.4 Connection:

- Radial socket (8P SM08B-GHS-TB)
- Radial cable (standard length 1000mm)

1.5 Protection:

IP50

1.6 Weight:

about 70g

2. Model Selection Guide

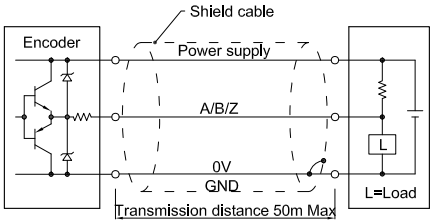
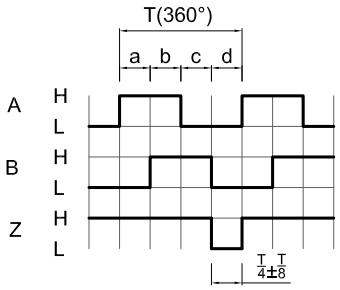
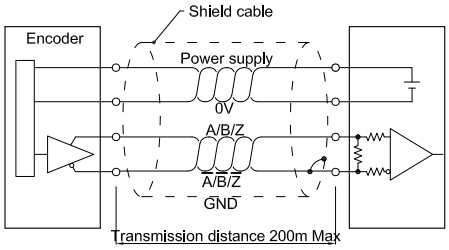
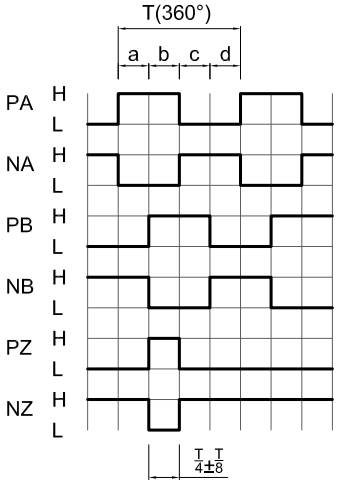
2.1 Model composition(select parameters)

KH35-	E	6	C	50000	Q8			-	000
Product model series	Connection interface: E=radial socket (SM08B-GHS-TB) J=radial cable	Output phase: 1=A 2=A+B 3=A+B+Z 4=A+$\overline{A}$+B+$\overline{B}$ 6=A+$\overline{A}$+B+$\overline{B}$+Z+$\overline{Z}$	Electrical interface: F=Push-pull C=TTL (DC5V,26LS31) E=HTL(DC8-30V) L=TTL (DC5V, 26C31)	Resolution PPR: 1000. . . 19Bits (Optional)	Hollow shaft: Q6=Ø6mm Q8=Ø8mm	Supply voltage: Blank=DC5V H=DC8-30V	Special requirement: Blank=⓫		Customer No.

2. 2 Note

⓫. None indicated for the cable length of 1m, if need to change the length C+number, the longest is 100m (expressed by C100). For the specific length of use, pls refer to page 2 of the provision of output circuit.

3. Output Method

Electrical interface	Output circuit	Output wave form
Push-pull		 a.b.c.d=T/4±T/8 Phase A is ahead of B by T/4±T/8, viewing from encoder front side, direction is counterclockwise rotation. (See dimensional drawings) CCW direction Z signal is low level active
TTL (DC5V) HTL (DC8-30V)		 a.b.c.d=T/4±T/8 Phase A is ahead of B by T/4±T/8, viewing from encoder front side, direction is counterclockwise rotation. (See dimensional drawings) CCW direction

4. Electrical Parameters

Parameter / Output type / Item			Push-pull	TTL	HTL
Supply voltage			DC+5V±5%；DC8V-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	≤±20mA	≤±50mA
		Output	≤10mA		
	Output voltage	"H"	≥[（Supply voltage）-2.5V]	≥2.5V	≥Vcc-3 VDC
		"L"	≤0.4V(30mA)	≤0.5V	≤ 1V VDC
	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%		
Reverse polarity protection			✔		
Short-circuit protection			-	✔❶	
Phase shift between A & B			90°±10° (frequency in low speed)		
			90°±20° (frequency in high speed)		
GND			Not connect to encoder		

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

5. Mechanical Characteristics

Diameter of shaft	Ø6mm；Ø8mm available
Shaft material	Stainless steel
Starting torque	5×10^{-3} N·m 以下
Operating torque	≤0.5 Ncm (at 20°C)
Permissible movement static	±0.2mm (radial)； ±0.3mm (axial)
Permissible movement dynamic	±0.05mm (radial)； ±0.1mm (axial)
Max.angular acceleration	≤500,000 rad/s²
Operating speed	≤6000 rpm
Bearing life	Rated load $1.5X10^9$,100000 hours at 2500RPM ❶
Housing material	Aluminum alloy
Weight	Approx.70g

❶ At maximum speed and maximum temperature.

6. Environmental Parameters

Environmental temperature	Operating:—40～+85°C(repeated cable bending: -10°C); Storage:—40～+90°C
Environmental humidity	Operating and storage：35～85%RH(noncondensing)
Vibration(Endurance)	Amplitude 0.75mm,5~55Hz,2h for X,Y,Z direction individually
Shock(Endurance)	490m/s² 11ms three times for X,Y,Z direction individually
Protection	IP50

7. Wiring Table

7.1 Push-pull (Wiring table for socket connection and cable connection)

	Incremental signal						Supply voltage	
Socket pin definition	1	2	3	4	5	6	7	8
Wire color	White	/	Green	/	Yellow	/	Red	Black
Function	A	/	B	/	Z	/	Up	0V

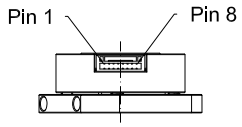
7.2 TTL/HTL (Wiring table for socket connection and cable connection)

	Incremental signal						Supply voltage	
Socket pin definition	1	2	3	4	5	6	7	8
Wire color	White	White/BK	Green	Green/BK	Yellow	Yellow/BK	Red	Black
Function	A+	A-	B+	B-	Z+	Z-	Up	0V
Twisted-paired cable								

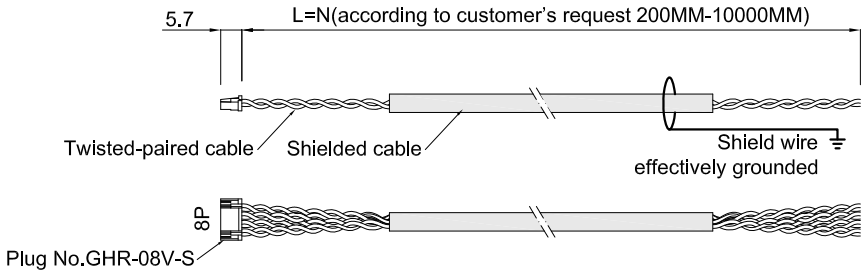
Up=Supply voltage.
Shield wire is not connected to the internal circuit of encoder.

7. 3 Socket definition and cable

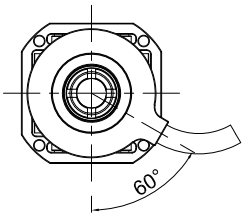
Socket No: SM08B-GHS-TB



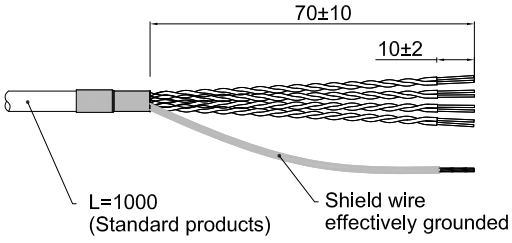
Plug+Shielding cable (order additionally)



Cable connection

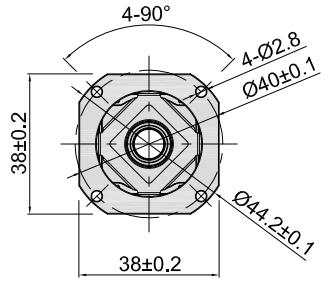


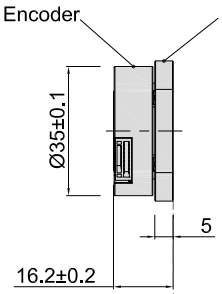
Connector size for cable connection

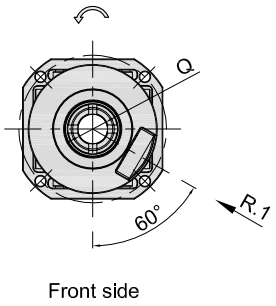


8. Basic dimensions

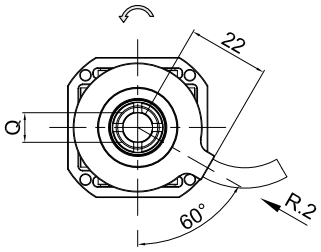
8. 1 Dimensions







Front side

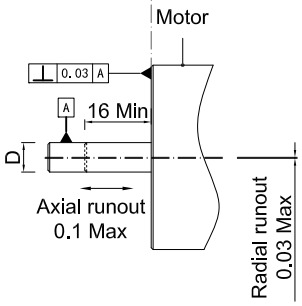


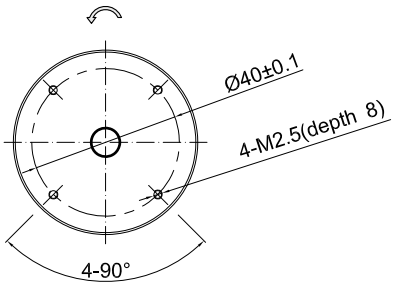
Q (Hollow shaft)
$Ø6^{H7}_{0}^{+0.015}$
$Ø8^{H7}_{0}^{+0.015}$

8. 2 Specification for mounting shaft

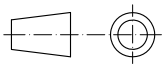
Mounting screws
Inner hexagon bolt +flat washer Specification: M2.5*12 Material: stainless steel Quantity: 4

D(Motor shaft)
$Ø6_{g6}^{-0.005}_{-0.014}$
$Ø8_{g6}^{-0.005}_{-0.014}$





Unit: mm



= Shaft rotation direction of incremental signal output

R. 1 = Radial socket(8P SM08B-GHS-TB)

R. 2 = Radial cable (standard length 1000)

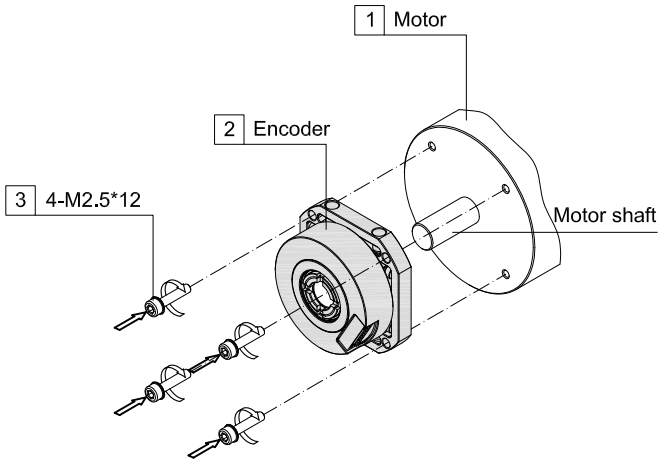
9. Installation Steps

First Step

a. Put the encoder(2) directly on the motor shaft and gently push it to the motor platform by hand.

b. Tighten four M2.5*12 bolts (3) at the same time, but do not tighten them too tightly.When the shaft sleeve and the motor shaft are tightened, fasten the four bolts.

Note: Please refer to page 6 for the fit tolerances of the encoder bushing and the motor shaft.

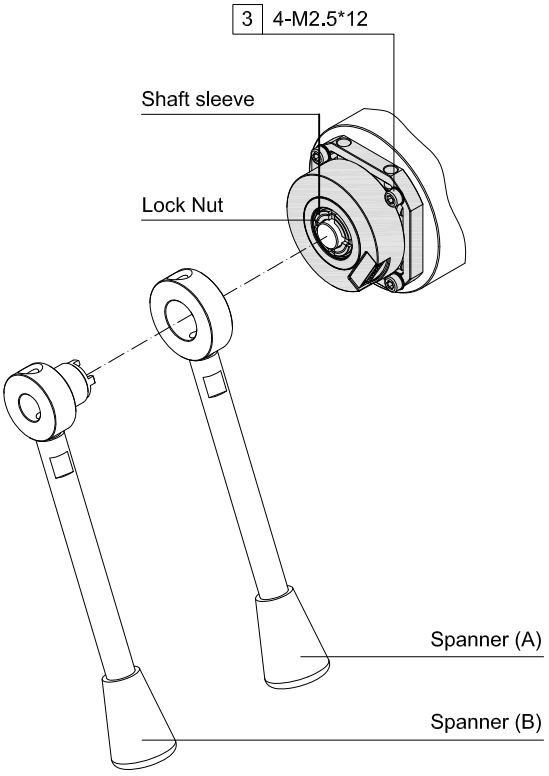


Second Step

Fix the spanner (A) on the slot of the encoder shaft sleeve, tighten the lock nut with the spanner (B). (the recommended tightening force is 7-10 N.m), and then tighten the four M2.5*12 lock bolts (3).

Note:

To avoid loosening of the lock nut during use, which can cause displacement and slippage between the encoder shaft and motor shaft, it is necessary to apply thread adhesive to the threaded surface of the lock nut during installation and then tighten it.



10. Caution

10. 1 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. 2 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.