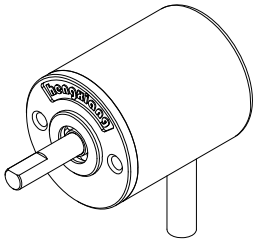
1. S25 Incremental Optical Encoder (Solid shaft)

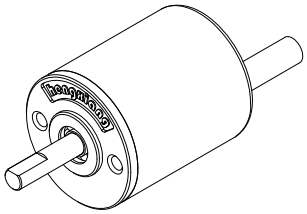
1.1 Introduction:

S25 is a solid shaft miniaturized design with a variety of electrical interfaces and resolutions available.
The highest protection grade is IP50. It has a compact structure, small size and high safety, widely used in field of industrial automation in small spaces.

S25-J



S25-L



1.2 Feature:

- Encoder external diameter Ø25mm、thickness 30mm、diameter of shaft Ø4mm (D type);
- Adopt non-contact photoelectric principle;
- Reverse polarity protection;
- Short circuit protection;
- Multiple electrical interfaces available;
- Resolution per turn up to 20000PPR.

1.3 Application:

Micro motors, small instruments and other automation control fields.

1.4 Connection:

Cable connection (standard length 1M)

1.5 Protection:

IP50

1.6 Weight:

About 50g

2. Model Selection Guide

2.1 Model composition(select parameters)

S25-	J	6	C	1024	B4			-	000
Product model series	Connection method: J=Radial cable L=Axial cable	Output phase: 1=A 2=A+B 3=A+B+Z 4=A+$\overline{A}$+B+$\overline{B}$ 6=A+B+Z +$\overline{A}$+$\overline{B}$+$\overline{Z}$	Electrical interface: N=OC(NPN)❶ NH=OC(NPN)❷ P=OC(PNP)❶ PH=OC(PNP)❷ V=Voltage❷ VL=Voltage❶ F=Push-pull❶ FH=Push-pull❷ C=TTL (DC5V,26LS31) E=HTL (DC8-30V) L=TTL (DC5V, 26C31)	Resolution PPR: 36; 50; 60; 100; 200; 250; 300; 360; 400; 500; 625; 720; 800; 1000; 1024; 1440; 1600; 2000; 2048; 2500; 2880; 3200; 4000; 4096; 5000; 5760; 6400; 8000; 8192; 10000; 11520; 12800; 16000; 16384; 20000	Diameter of shaft: (solid shaft) B4=Ø4mm (D type)	Supply voltage: Blank=DC5V H=DC8-30V	Special requirement: Blank=❸	Management No.

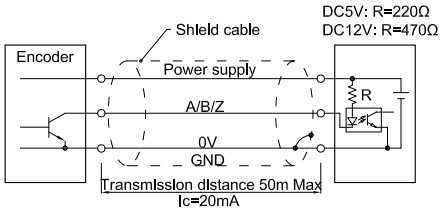
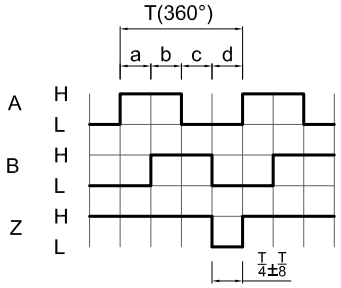
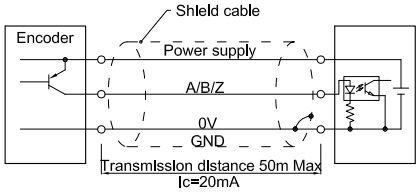
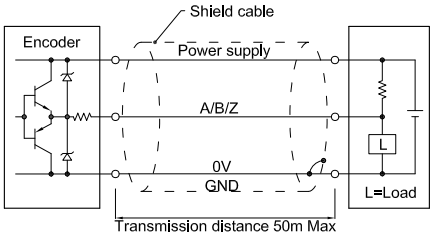
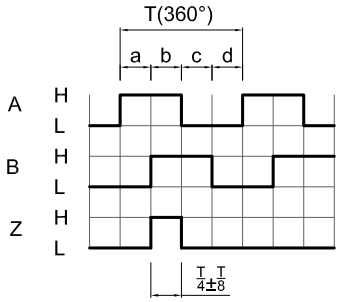
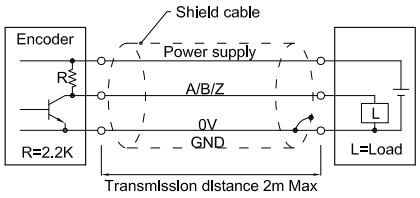
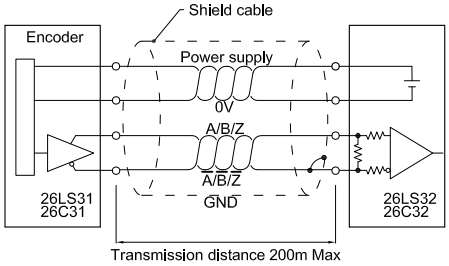
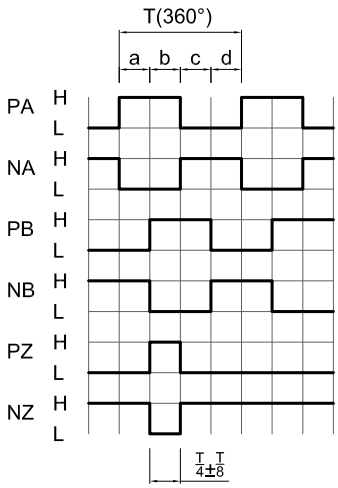
2. 2 Note

❶. Z signal is low level active.

❷. Z signal is high level active.

❸. None indicated for IP50, 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 Mode

Electrical interface	Output circuit	Output wave form
OC NPN open collector circuit		 a.b.c.d=T/4±T/8 Phase A is ahead of B by T/4±T/8, viewing from shaft end, direction is clockwise rotation. (See dimensional drawings) CW direction Z signal is low level active
OC PNP open collector circuit		
Push-pull		 a.b.c.d=T/4±T/8 Phase A is ahead of B by T/4±T/8, viewing from shaft end, direction is clockwise rotation. (See dimensional drawings) CW direction Z signal is high level active
Voltage		
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 shaft end, direction is clockwise rotation. (See dimensional drawings) CW direction

4. Electrical Parameters

Parameter / Output type / Item			OC	Voltage	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			300KHz	500KHz
Output capacity	Output current	Input	≤30mA	Load resistance 2.2K	≤30mA	≤±20mA	≤±50mA
		Output	—		≤10mA		
	Output voltage	"H"	—	—	≥[(Supply voltage)-2.5V]	≥2.5V	≥Vcc-3 VDC
		"L"	≤0.4V	≤0.7V(less than 20mA)	≤0.4V(30mA)	≤0.5V	≤ 1V VDC
	Load voltage		≤DC30V	—		—	
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 channel or GND permitted for max.30s.

5. Mechanical Specifications

Diameter of shaft	Ø4mm(D type, Stainless steel)
Starting torque	Less than 1m N·m
Inertia moment	Less than 1×10^{-7} kg·m²
Shaft load	Radial 10N; Axial 5N
Slew speed	≤6000 rpm
Bearing Life	$1.5X10^{9}$ revs at rated load(100000hrs at 2500RPM)
Shell	Die cast aluminum alloy
Weight	About 50g

6. Environmental Parameters

Environmental temperature	Operating:—20～+80°C(repeatable winding cable: -10°C); Storage:—20～+85°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 OC / Voltage / Push-pull

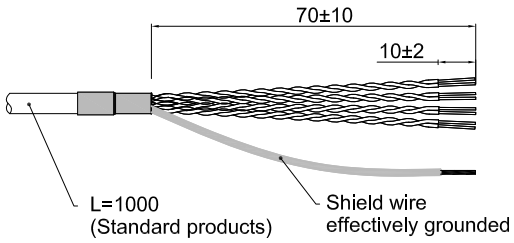
	Supply voltage		Incremental signal		
Wire color	Red	Black	White	Green	Yellow
Function	Up	Un	A	B	Z

7.2 TTL / HTL

	Supply voltage		Incremental signal					
Wire color	Red	Black	White	White/BK	Green	Green/BK	Yellow	Yellow/BK
Function	Up	Un	A+	A-	B+	B-	Z+	Z-
Twisted-paired cable								

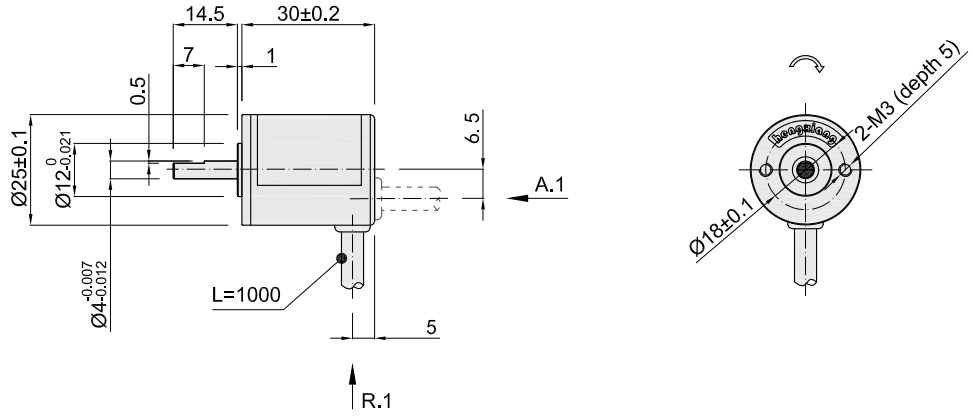
Up=Supply voltage.
Shield wire is not connected to the internal circuit of encoder.

Cable connection



8. Basic Dimension

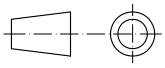
8.1 Dimension



8.2 Installation method

Notice : The radial runout of motor shaft should be less than 0.03mm, and the angle shoud be less than 1.0°.

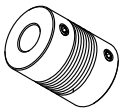
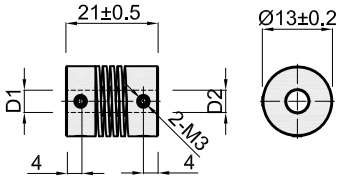
Unit: mm



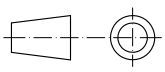
= Shaft rotation direction of the incremental signal output
R.1 = Radial cable(standard length 1M)
A.1 = Axial cable（standard length 1M）

9. Recommended Accessories

9.1 Coupler

Coupler	Dimension	D1	D2	Model	Order No.
Oldham coupling: H series 	 Main body material: aluminum alloy	Ø4^{G8}	Ø4^{G8}	4H4	08700013
		Ø4^{G8}	Ø6^{G8}	4H6	08700006

Unit: mm



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.

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