1. S38 Incremental Optical Encoder (Solid shaft)

1.1 Introduction:
S38 is a small economic universal design, compact, sturdy, high safety, and commonly used in industrial automations.

1.2 Feature:
- Encoder external diameter Ø38mm、thickness 28mm、diameter of shaft up to Ø6mm;
- Adopt non-contact photoelectric principle;
- Reverse polarity protection;
- Short circuit protection;
- Multiple electrical interfaces available;
- Resolution per turn up to 32768PPR.

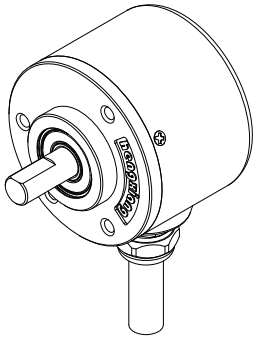
1.3 Application:
Textile, packaging, motor, elevator, CNC and other automation control fields.

1.4 Connection:
- Radial cable (standard length 1M)
- Axial cable (standard length 1M)

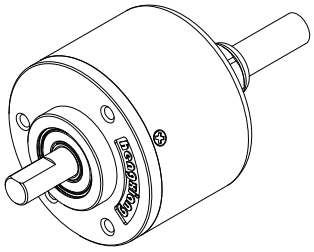
1.5 Protection:
IP50 & IP65

1.6 Weight:
about 120g

S38-T



S38-Q



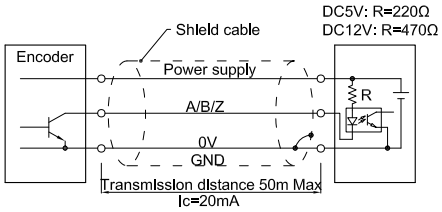
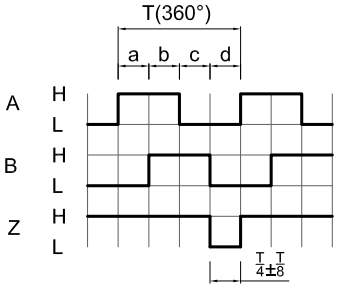
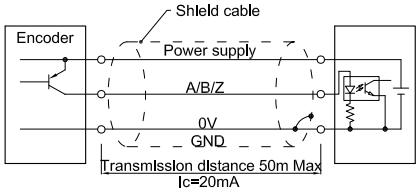
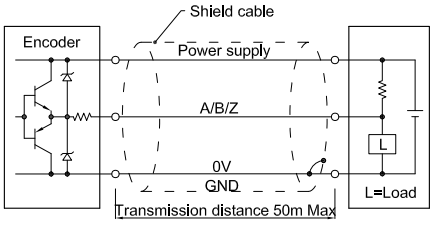
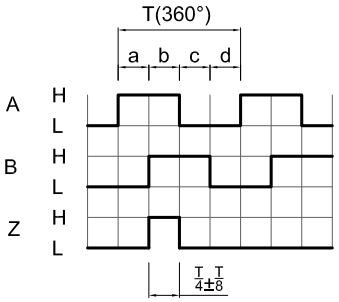
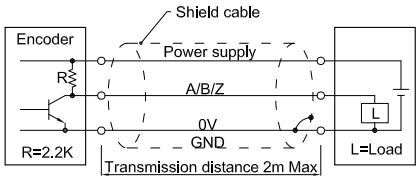
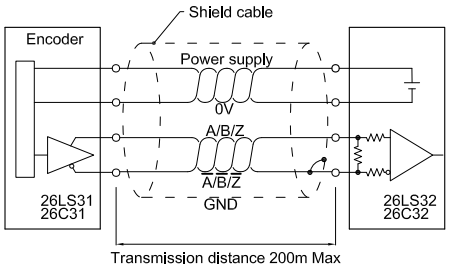
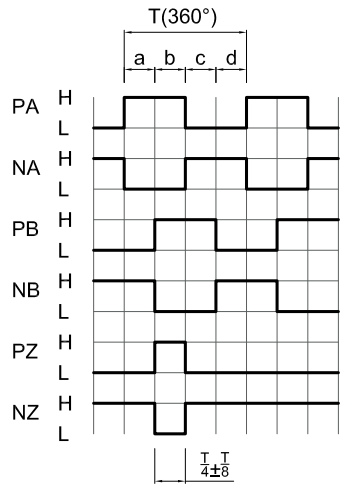
2. Model Selection Guide

2.1 Model composition(select parameters)

S38-	T	6	C	1024	B6			-	000
Product model series	Connection interface: T=Radial cable Q=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) R=TTL (DC8-30V；output 5V)	Resolution PPR: 50; 60; 66; 100; 200; 250; 300; 360; 400; 450; 500; 512; 600; 720; 750; 800; 900; 1000; 1024; 1200; 1800; 2000; 2048; 2400; 2500; 3000; 3600; 4000; 4096; 4800; 5000; 7200; 8192; 10000; 14400; 16000; 16384; 20000; 28800; 32000; 32768	Diameter of shaft: (D type) B5=Ø5mm B6=Ø6mm B8=Ø8mm	Supply voltage: Blank=DC5V H=DC8-30V	Special requirement: Blank=❸ D=IP65	Management No.

2. 2 Note
❶. Z signal is low level active.
❷. Z signal is high level active.
❸. None indicated for IP50 and 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 Characteristics

Parameter / Output type / Item			OC	Voltage	Push-pull	TTL	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)			≤100ns 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	Ø5mm; Ø6mm; Ø8mm (D type, stainless steel material)
Starting torque	Less than 4.4×10^{-3}N·m
Inertia moment	Less than 1.5×10^{-6} kg·m²
Shaft load	Radial 30N; Axial 20N
Slew speed	≤6000 rpm(IP50); ≤4000 rpm(IP65)
Bearing Life	$1.5X10^{9}$ revs at rated load(100000hrs at 2500RPM)
Shell	Aluminium alloy
Weight	about 120g

6. Environmental Specifications

Environmental temperature	Operating:—20～+90°C(repeatable winding cable: -10°C); Storage:—25～+95°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 & IP65

7. Wiring table

7.1 OC/Voltage/Push-pull (Wiring table for cable connection)

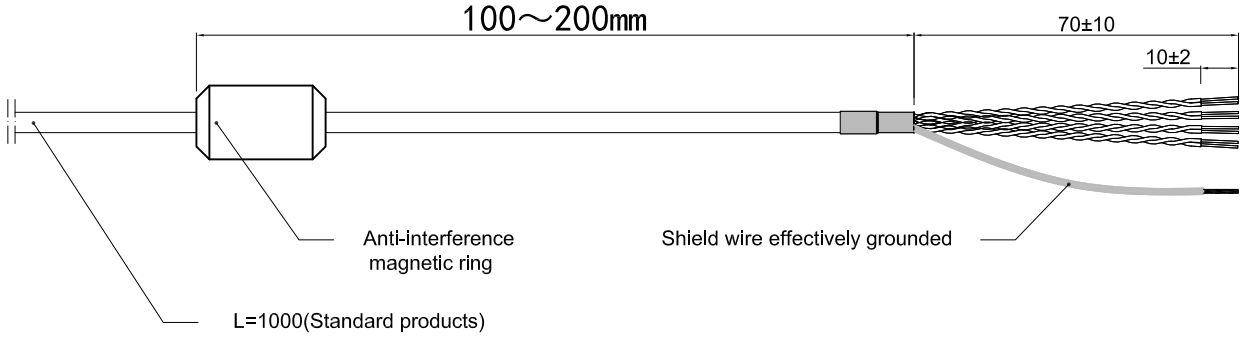
	Supply voltage		Incremental signal		
Wire color	Red	Black	White	Green	Yellow
Function	Up	0V	A	B	Z

7.2 TTL/HTL (Wiring table for cable connection)

	Supply voltage		Incremental signal					
Wire color	Red	Black	White	White/BK	Green	Green/BK	Yellow	Yellow/BK
Function	Up	0V	A+	A-	B+	B-	Z+	Z-
Twisted-paired cable								

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

7. 3 Cable connection

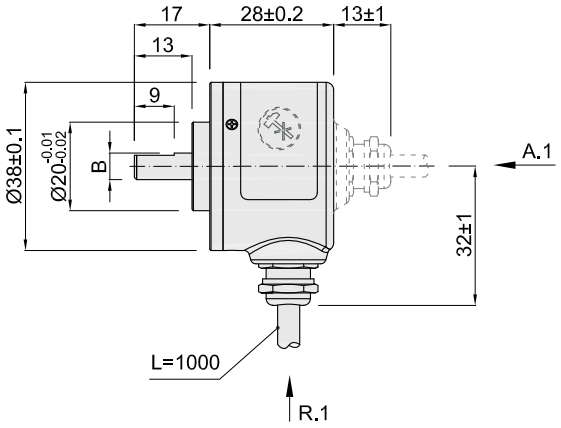


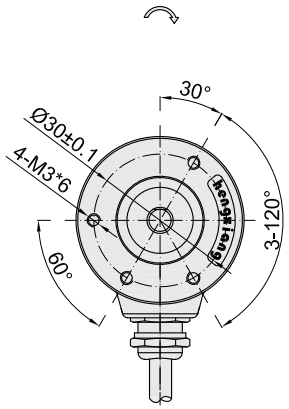
Unit: mm

8. Basic Dimensions

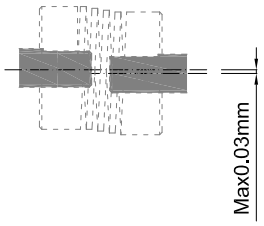
8.1 Dimensions

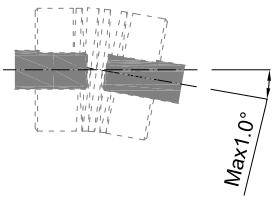
B(D type，solid shaft)
$Ø5_{g4}(^{-0.004}_{-0.008})$
$Ø6_{g4}(^{-0.005}_{-0.009})$
$Ø8_{g4}(^{-0.005}_{-0.009})$





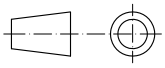
8.2 Assembling requirement





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 signal output
R.1 = Radial cable(standard length 1M)
A.1 = Axial cable（standard length 1M，no through shaft option）

9. Accessories(Recommended purchase)

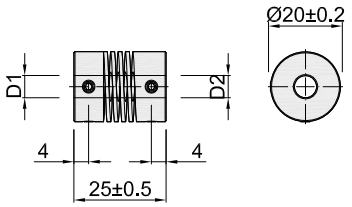
Spring type H series coupling

(general accuracy, or choose M series for higher accuracy)

6H6 No: 08700021

6H8 No: 08700022

8H8 No: 08700023



Model	D1	D2
6H6	$Ø6^{+0.03}_{+0.01}$	$Ø6^{+0.03}_{+0.01}$
6H8		$Ø8^{+0.03}_{+0.01}$
8H8	$Ø8^{+0.03}_{+0.01}$	$Ø8^{+0.03}_{+0.01}$

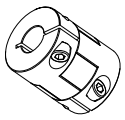
material:
aluminium alloy

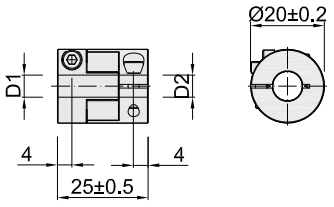
Crossover type M series coupling

6M6 No: 08700037

6M8 No: 08700038

8M8 No: 08700039





Model	D1	D2
6M6	$Ø6^{+0.03}_{+0.01}$	$Ø6^{+0.03}_{+0.01}$
6M8		$Ø8^{+0.03}_{+0.01}$
8M8	$Ø8^{+0.03}_{+0.01}$	$Ø8^{+0.03}_{+0.01}$

material:
aluminium alloy

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.