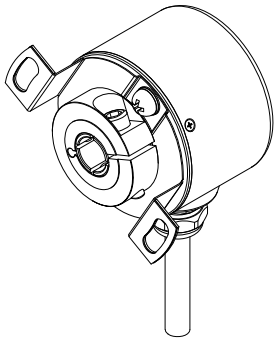
1. K38 Incremental Optical Encoder (Blind shaft/through shaft)

1.1 Introduction:
K38 is a small economic universal design, compact, sturdy, high safety, and commonly used in industrial automations.

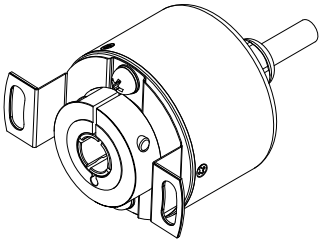
K38-T



1.2 Feature:
- Encoder external diameter Ø38mm、thickness 38mm、diameter of shaft up to Ø8mm, robust and miniaturized;
- Ring locking structure;
- 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.

K38-Q



1.4 Connection:
- Radial cable (standard length 1000mm)
- Axial cable (standard length 1000mm)

1.5 Protection:
IP50 & IP65

1.6 Weight:
about 140g

2. Model Selection Guide

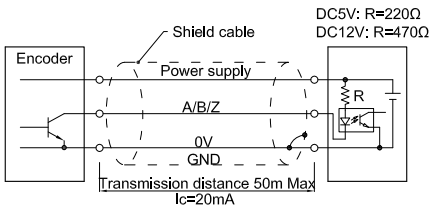
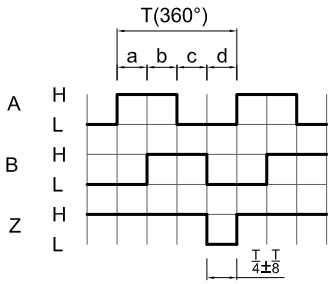
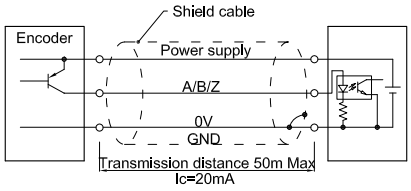
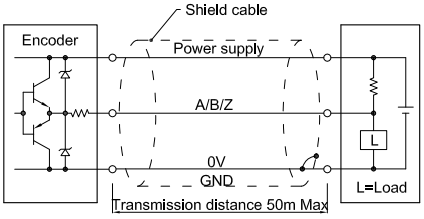
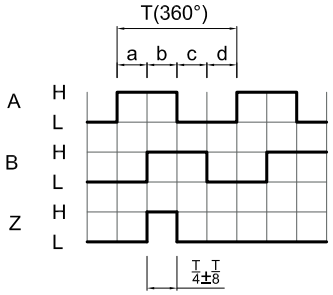
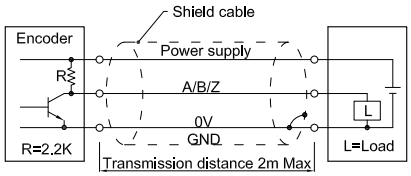
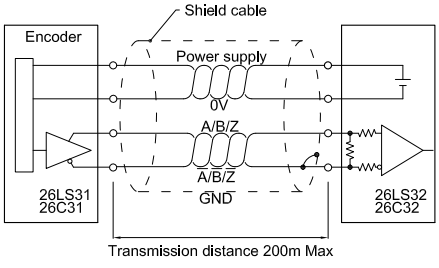
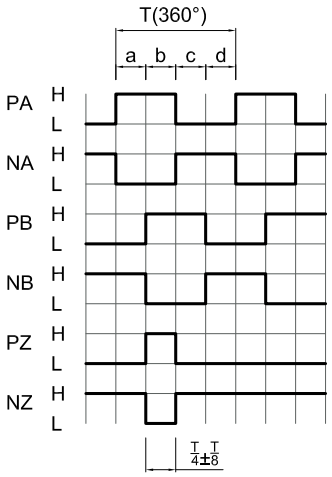
2.1 Model composition(select parameters)

K38- | **T** | **6** | **C** | **1024** | **B8** | **□**

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+$\overline{A}$+B+$\overline{B}$+Z+$\overline{Z}$	Electrical interface N=OC(NPN)① NH=OC(NPN)② P=OC(PNP)③ PH=OC(PNP)④ V=Voltage⑤ VL=Voltage⑥ F=Push-pull⑦ FH=Push-pull⑧ C=TTL (DC5V,26LS31) L=TTL (DC5V,26C31) E=HTL(DC8-30V)	Resolution PPR: 50; 60; 66; 100; 200; 250; 300; 360; 400; 450; 500; 512; 600; 720; 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: (blind hole): B5=Ø5mm B6=Ø6mm B6.35=Ø6.35mm B8=Ø8mm (through hole)⑨: Q6=Ø6mm Q6.35=Ø6.35mm	Special: specifications No indication=⑩ D=IP65

2. 2 Note
①③⑥⑦. Resolution selection is recommended below 5000PPR, Z signal is low level active.
②④⑤⑧. Resolution selection is recommended below 5000PPR, Z signal is high level active.
⑨. Axial cable connection is not an option.
⑩. IP=50；Cable length 1m，if you need to change the length C+number，max 100m(indicated by C100), please refer to page 2 for the specific length used for the output circuit.

3. Output mode

Electrical interface	Output circuit	Output wave form
OC NPN open collector circuit		 a.b.c.d=$\frac{T}{4}\pm\frac{T}{8}$ Phase A is ahead of B by $\frac{T}{4}\pm\frac{T}{8}$, 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=$\frac{T}{4}\pm\frac{T}{8}$ Phase A is ahead of B by $\frac{T}{4}\pm\frac{T}{8}$, 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=$\frac{T}{4}\pm\frac{T}{8}$ Phase A is ahead of B by $\frac{T}{4}\pm\frac{T}{8}$, 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	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			200KHz	300KHz
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			—		✔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 channel or GND permitted for max.30s.

5. Mechanical Characteristics

Diameter of shaft	Ø5mm; Ø6mm; Ø6.35mm; Ø8mm (optional)
Starting torque	Less than 9.8×10^{-3}N·m
Inertia moment	Less than 6.5×10^{-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 140g

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(endure)	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)

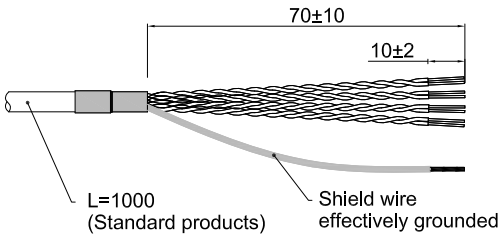
	Supply voltage		Incremental signal		
Wire color	Red	Black	White	Green	Yellow
Function	Up	0V	A	B	Z

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.

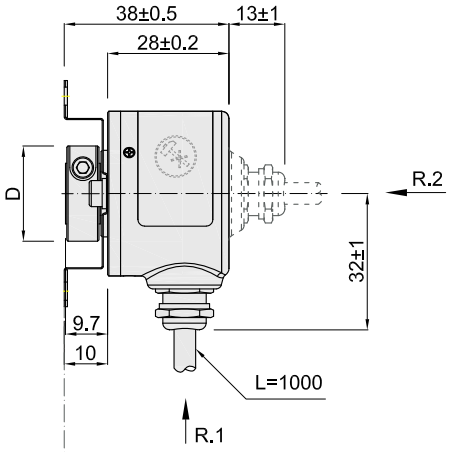
Cable connection

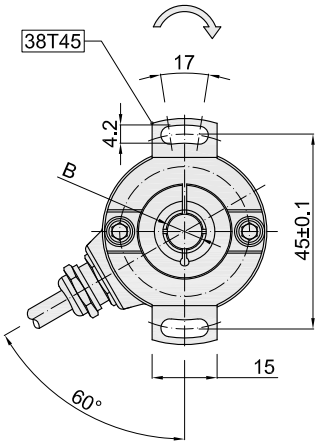


8. Basic Dimensions

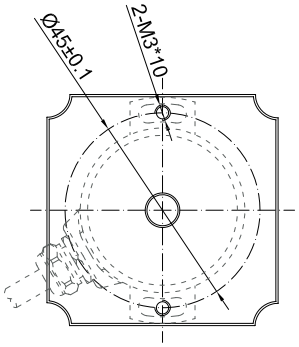
8.1 Dimensions

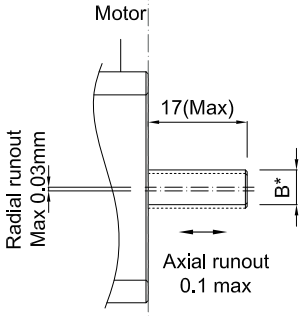
Q(Shaft)	Q(Through shaft)	D
Ø5$^{G7}_{(+0.004)}^{(+0.016)}$	-	Ø20
Ø6$^{G7}_{(+0.005)}^{(+0.020)}$	Ø6$^{G7}_{(+0.005)}^{(+0.020)}$	Ø20
Ø6.35$^{G7}_{(+0.005)}^{(+0.020)}$	Ø6.35$^{G7}_{(+0.005)}^{(+0.020)}$	Ø20
Ø8$^{G7}_{(+0.005)}^{(+0.020)}$	-	Ø22

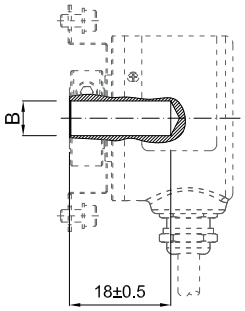




8.2 Mounting shaft requirements



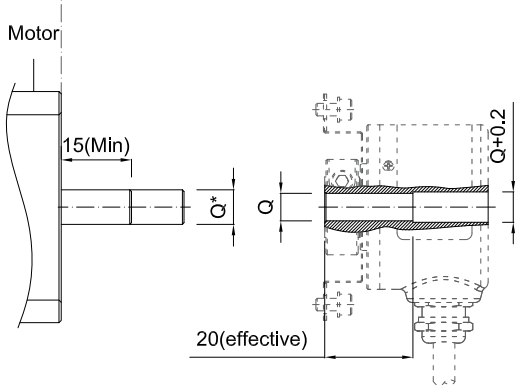




B (Blind shaft)	B*
Ø5$^{G7}_{(+0.004)}^{(+0.016)}$	Ø5$_{g5}^{(-0.004)}_{(-0.009)}$
Ø6$^{G7}_{(+0.005)}^{(+0.020)}$	Ø6$_{g5}^{(-0.005)}_{(-0.011)}$
Ø6.35$^{G7}_{(+0.005)}^{(+0.020)}$	Ø6.35$_{g5}^{(-0.005)}_{(-0.011)}$
Ø8$^{G7}_{(+0.005)}^{(+0.020)}$	Ø8$_{g5}^{(-0.005)}_{(-0.011)}$

B* Motor shaft diameter tolerance

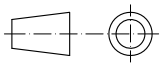
Mounting screws
Inner hexagon bolt +flat washer Specification: M3*6 Material: stainless steel Quantity: 2



Q (贯穿)	Q*
Ø6$^{G7}_{(+0.005)}^{(+0.020)}$	Ø6$_{g5}^{(-0.005)}_{(-0.011)}$
Ø6.35$^{G7}_{(+0.005)}^{(+0.020)}$	Ø6.35$_{g5}^{(-0.005)}_{(-0.011)}$

Q* Motor shaft diameter tolerance

Unit: mm



= Shaft rotation direction of the signal output

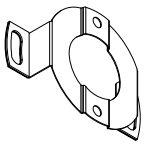
R.1 = Radial cable(standard length 1000)

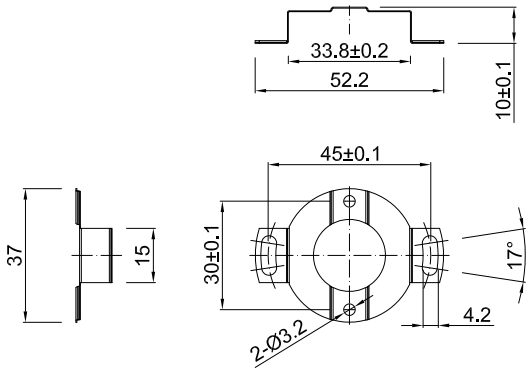
R.2 = Axial cable (standard length 1000, no through shaft option)

38T45 =Mounting spring plate model

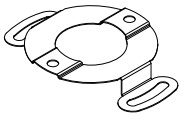
9. Accessories(Spring plate option)

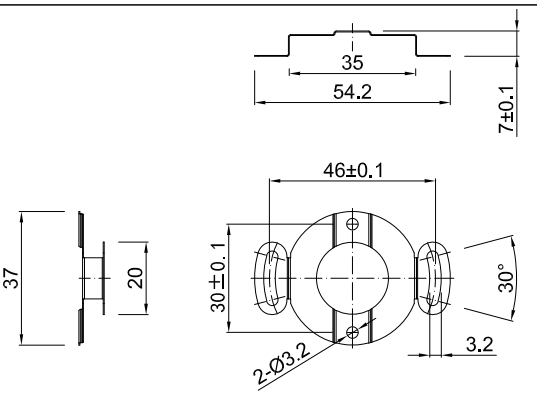
38T45 No:3700094A





38T46 No:3700077A





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.