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.

1.2 Feature:
- Encoder external diameter Ø38mm、thickness 38mm、diameter of shaft up to Ø10mm;
- The shaft has two installation options: encircling locking and top screw locking;
- Adopt non-contact photoelectric principle;
- Reverse polarity protection;
- Short circuit protection;
- Multiple electrical interfaces available;
- Resolution per turn up to 32768PPR.

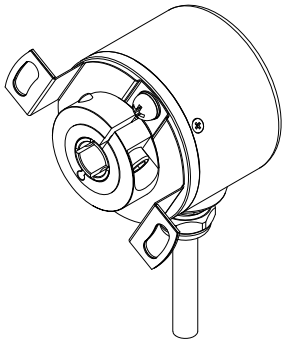
1.3 Application:
Textile, packaging, motor, elevator, CNC and other automation control fields.

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

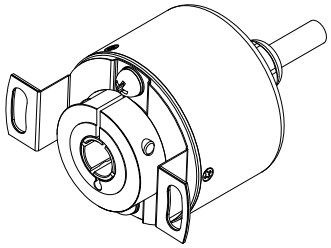
1.5 Protection:
IP50 & IP65

1.6 Weight:
About 140g

K38-T



K38-Q



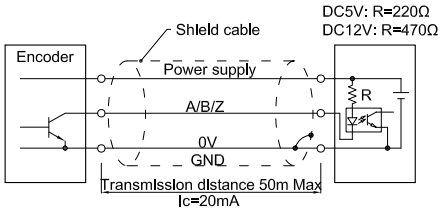
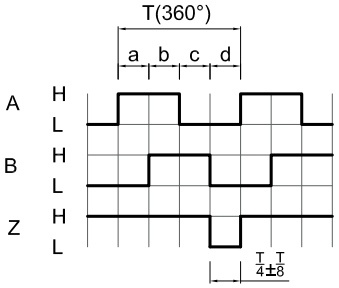
2. Model Selection Guide

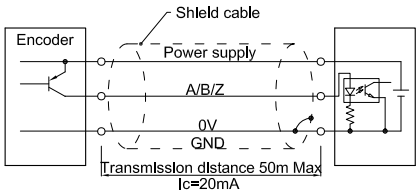
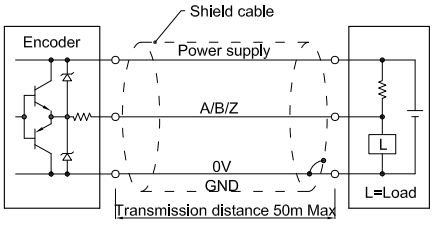
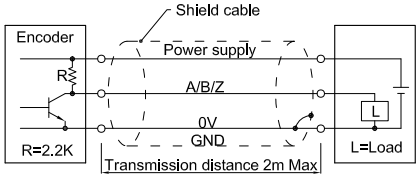
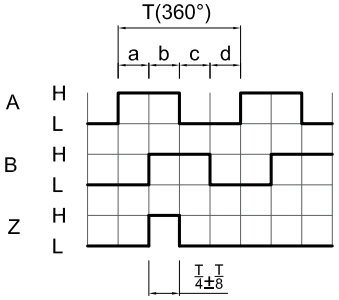
2.1 Model composition(select parameters)

K38-	T	6	C	1024	B8			-	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: blind hole: B5=Ø5mm B6=Ø6mm B6.35=Ø6.35mm B8=Ø8mm M5=Ø5mm M6=Ø6mm M6.35=Ø6.35mm M8=Ø8mm U6=Ø6mm U8=Ø8mm U10=Ø10mm through hole:❸ Q5=Ø5mm Q6=Ø6mm Q6.35=Ø6.35mm Q8=Ø8mm G6=Ø6mm G6.35=Ø6.35mm	Supply voltage: Blank=DC5V H=DC8-30V	Special requirement: Blank=❹ D=IP65	Management No.

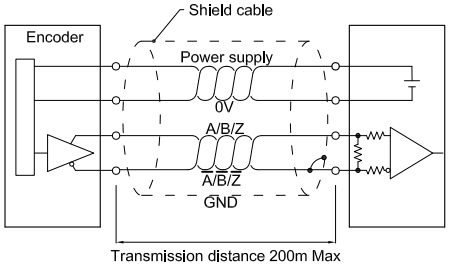
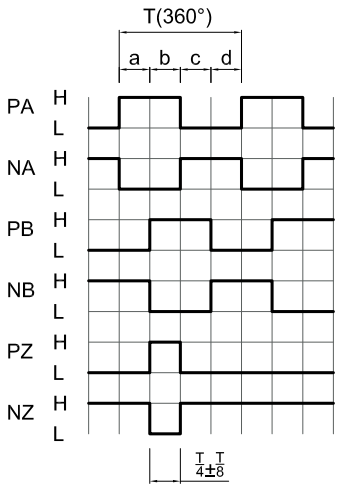
2. 2 Note
❶. Z signal is low level active.
❷. Z signal is high level active.
❸. Axial cable connection not available.
❹. None indicated for IP50 and cable length of 1M, if need to change the length C+number, the longest is 100M (expressed by C100). For the specific length of use, pls refer to page 2 of the provision of output circuit.

3. Output Mode

<table>
<tr><th>Electrical interface</th><th>Output circuit</th><th>Output wave form</th></tr>
<tr><td>OC
NPN
open collector circuit</td><td> 
</td><td rowspan="3"> 

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</td></tr>
<tr><td>OC
PNP
open collector circuit</td><td> 
</td></tr>
<tr><td>Push-pull</td><td> 
</td></tr>
<tr><td>Voltage</td><td> 
</td><td> 

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</td></tr>
<tr><td>TTL
(DC5V)

HTL
(DC8-30V)</td><td> 
</td><td> 

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</td></tr>
</table>

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; 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 Parameters

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)

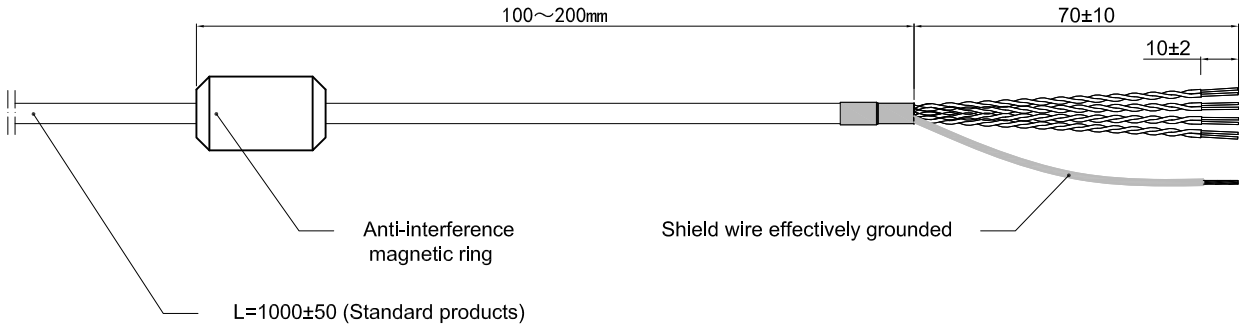
	Supply voltage		Incremental signal		
Wire color	Red	Black	White	Green	Yellow
Function	Up	0V	A	B	Z

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.

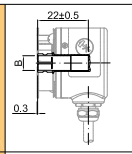
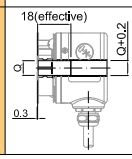
7. 3 Cable connection

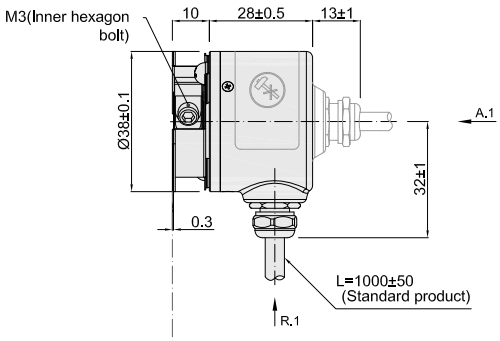


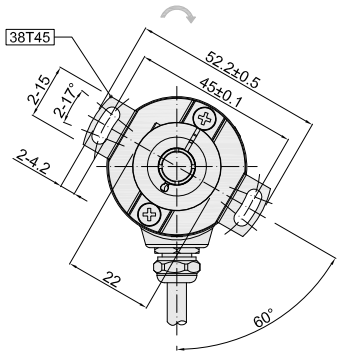
Unit: mm

8. Basic Dimension

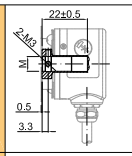
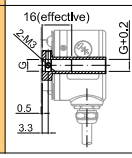
8.1 Clamp locking（B shaft-blind hole/Q shaft-through hole）

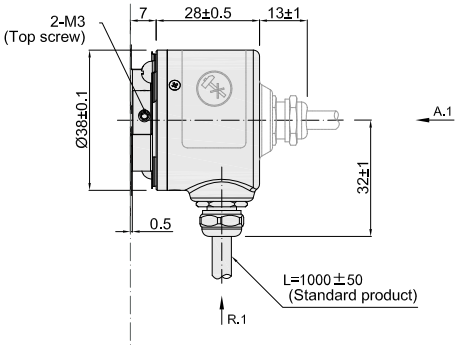
B Blind shaft		Ø5$^{G7}_{(+0.004)}^{(+0.016)}$
		Ø6$^{G7}_{(+0.005)}^{(+0.020)}$
		Ø6.35$^{G7}_{(+0.005)}^{(+0.020)}$
		Ø8$^{G7}_{(+0.005)}^{(+0.020)}$
Q Through shaft		Ø5$^{G7}_{(+0.004)}^{(+0.016)}$
		Ø6$^{G7}_{(+0.005)}^{(+0.020)}$
		Ø6.35$^{G7}_{(+0.005)}^{(+0.020)}$
		Ø8$^{G7}_{(+0.005)}^{(+0.020)}$

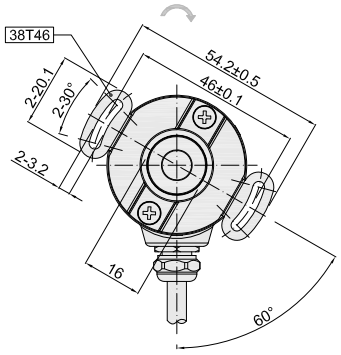




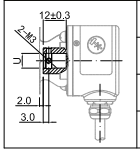
8.2 Set screw locking type （M shaft-blind hole/G shaft-through hole）

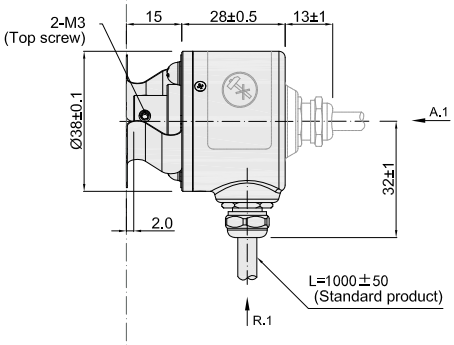
M Blind shaft		Ø5$^{G7}_{(+0.004)}^{(+0.016)}$
		Ø6$^{G7}_{(+0.005)}^{(+0.020)}$
		Ø6.35$^{G7}_{(+0.005)}^{(+0.020)}$
		Ø8$^{G7}_{(+0.005)}^{(+0.020)}$
G Through shaft		Ø6$^{G7}_{(+0.005)}^{(+0.020)}$
		Ø6.35$^{G7}_{(+0.005)}^{(+0.020)}$
		–
		–

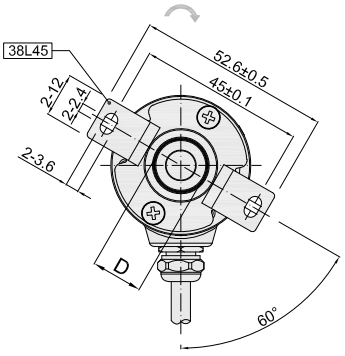




8.3 Set screw locking type（U shaft-blind hole）

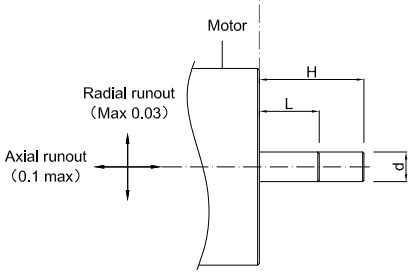
U through shaft	Shaft diameter & tolerance	D
	Ø6$^{G7}_{(+0.004)}^{(+0.016)}$	Ø14
	Ø8$^{G7}_{(+0.005)}^{(+0.020)}$	Ø14
	Ø10$^{G7}_{(+0.006)}^{(+0.024)}$	Ø17
	–	–





8.4 Mounting shaft requirements

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



d
Ø5$_{g5}^{(-0.004)}_{(-0.009)}$
Ø6$_{g5}^{(-0.005)}_{(-0.011)}$
Ø6.35$_{g5}^{(-0.005)}_{(-0.011)}$
Ø8$_{g5}^{(-0.005)}_{(-0.011)}$
Ø10$_{g5}^{(-0.006)}_{(-0.014)}$

	L(Min)	H(Max)
B shaft-blind hole	16	22
Q shaft-through hole	16	–
M shaft-blind hole	16	22
G shaft-through hole	16	–
U shaft-blind hole	10	12

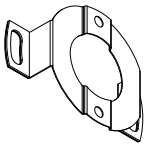
Unit: mm

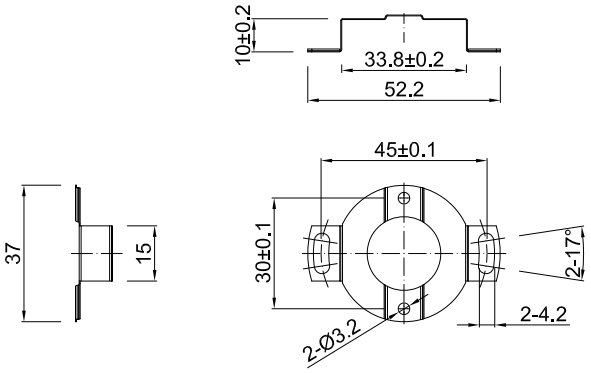
= Shaft rotation direction of the signal output
R.1 = Radial cable(standard length 1M)
A.1 = Axial cable (standard length 1M, no through shaft option)

38T45 / 38T46 / 38L45 = Three spring plate mounting models （See P7 for specific dimensions）

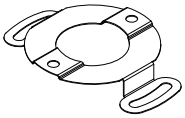
9. Accessories(Spring plate options)

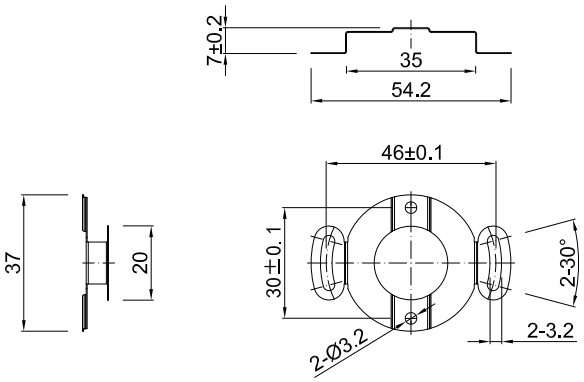
38T45 No:3700094A



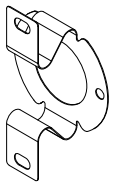


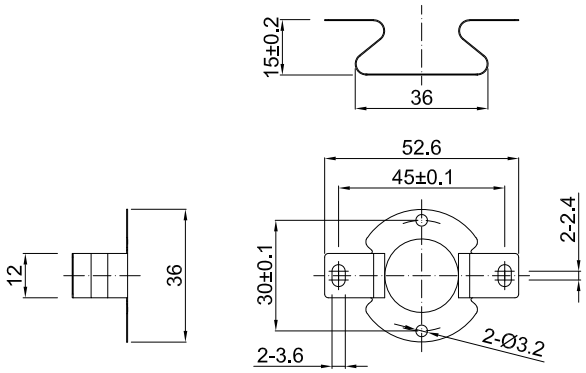
38T46 No:3700077A





38L45 No:3700003A





Unit: mm

10. Caution

10.1 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.

10.2 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.

10.3 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.

10.4 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.

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