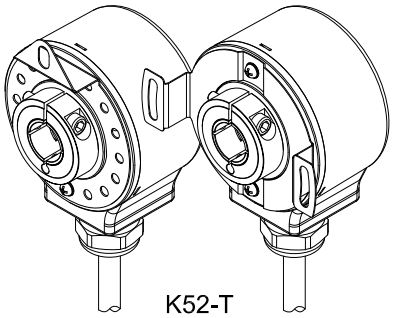
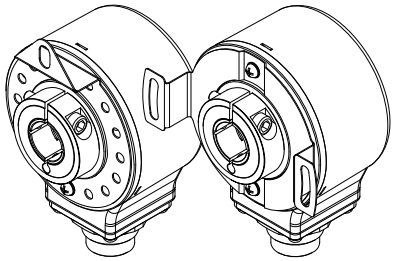
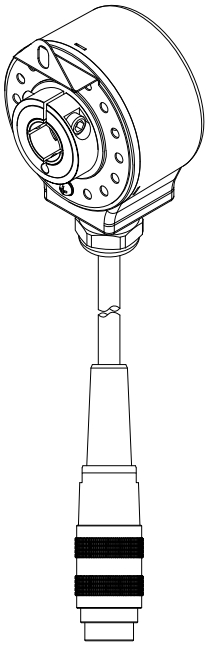
Incremental Type(Hollow Shaft)

- Feature: sturdy and durable,various circuit mode and cable connection available,easy to install
- Application: automation control like motor,CNC,textile machine, industrial assembly line,etc.
- External dimensions: external diameter Ø51mm，thickness 39mm， diameter of shaft Ø8mm;Ø10mm;Ø12mm; Ø14mm; Ø15mm
- Resolution: Max to 23040ppr
- Supply voltage: DC5V; DC8-30V
- Protection: IP50; IP65
- Cable length: 1000mm
- Weight: about 310g


K52-T


K52-C

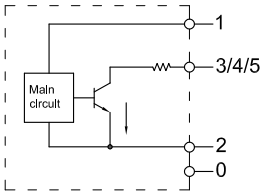
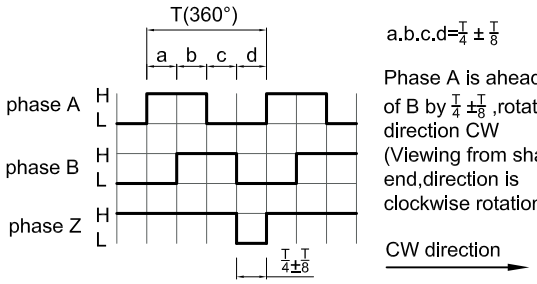
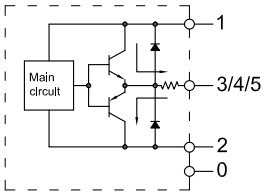
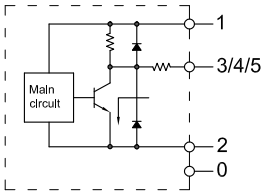
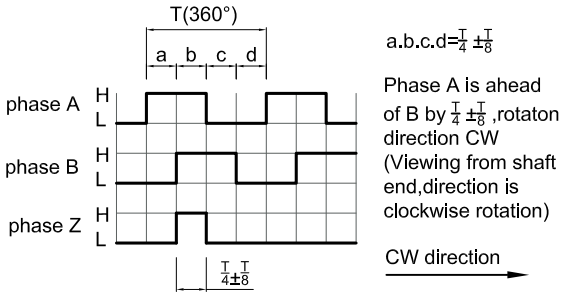
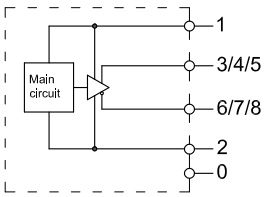
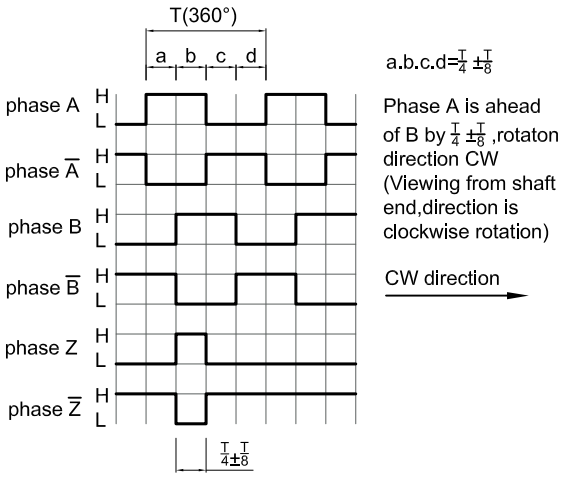

K52-TE

Model Guide

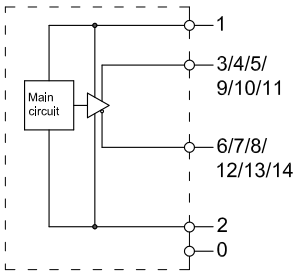
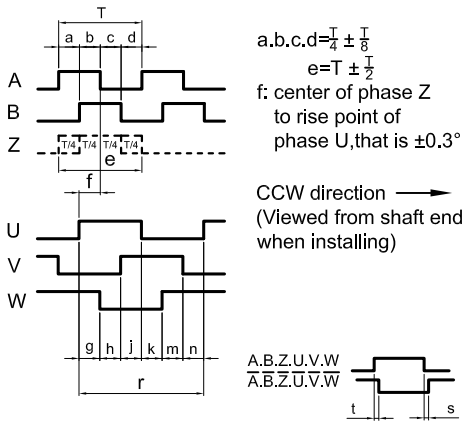
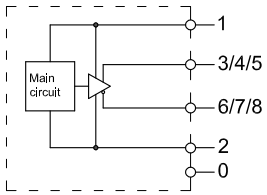
- Model form (filled required parameters in the box as following)
- Must choose supply voltage: DC5V； DC8-30V
- Leaf spring 50G55 & 50Z60 (Pls refer to specification on page 5/6)

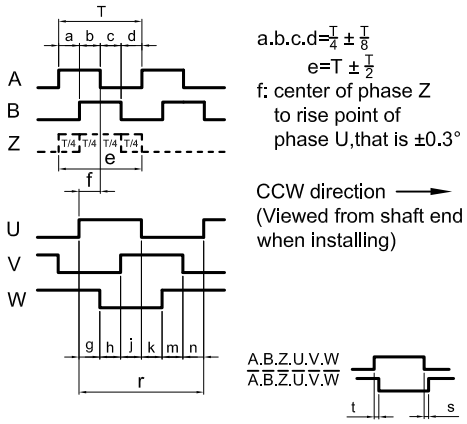
K52–	T	6	E	8192	B12		
Product model series	T=Radial cable C=Radial socket TE=Radial cable with plug	Output phase 1=A 2=A+B 3=A+B+Z 4=A+$\overline{A}$+B+$\overline{B}$ 6= A+$\overline{A}$+B+$\overline{B}$+Z+$\overline{Z}$ 12= A+$\overline{A}$+B+$\overline{B}$+Z+$\overline{Z}$ U+$\overline{U}$+V+$\overline{V}$+W+$\overline{W}$	N=OC V=Voltage F=Push-pull C=TTL(DC5V) 26LS31 E=HTL (DC8-30V) L=TTL(DC5V) 26C31 S=TTL(DC5V) (Phase A.B.Z are back of phase U.V.W)	Incremental: Resolution(P/R) 100; 200; 360; 512; 1000; 1024; 1200; 1250; 1440; 2000; 2048; 2500; 2880; 3000; 3600; 4096; 4500; 5000; 5760; 7200; 8192; 10000; 11520; 14400; 16384; 18000; 20000; 23040; Servo: Resolution/pole 1000/4; 1024/4; 1000/6; 1024/6; 1000/8; 1024/8; 2048/4; 2500/4; 2048/6; 2500/6; 2048/8; 2500/8; 4096/4; 8192/4; 4096/6; 8192/6; 4096/8; 8192/8	Shaft (B=blind hole) B15=Ø15mm B14=Ø14mm B12=Ø12mm B10=Ø10mm B8=Ø8mm (Q=through hole) Q14=Ø14mm Q12=Ø12mm Q10=Ø10mm Q8=Ø8mm	Special requirement Blank=cable length 1M; IP50 Special cable length=C+number Special protection IP65=D	Supply voltage: DC5V; DC8-30V

Output Mode

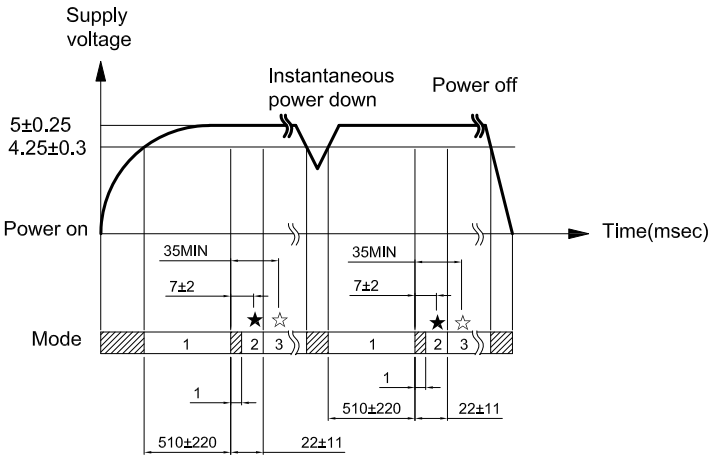
Output type	Output circuit	Output wave form	Connection
OC			0=GND 1=red=DC5V; DC8-30V 2=black=OV 3=white=A 4=green=B 5=yellow=Z
Push-Pull			
Voltage			
TTL HTL			0=shielding=GND 1=red=DC5V; DC8-30V 2=black=OV 3=white=A 4=green=B 5=yellow=Z 6=white/black=Ā 7=green/black=B̄ 8=yellow/black=Z̄

Output Mode

<table>
<tr><th>Output type</th><th>Output circuit</th><th>Output wave form</th><th>Connection</th></tr>
<tr><td>TTL</td><td> 
</td><td> 
</td><td>0=shielding=GND
1=A=red=DC5V
2=C=black=OV
3=E=white=A
4=G=green=B
5=J=yellow=Z
6=L=white/black=$\overline{A}$
7=M=green/black=$\overline{B}$
8=N=yellow/black=$\overline{Z}$
9=O=blue=U
10=P=grey=V
11=R=pink=W
12=S=blue/black=$\overline{U}$
13=T=grey/black=$\overline{V}$
14=U=pink/black=$\overline{W}$</td></tr>
<tr><td>TTL
(phase A.B.Z are back of phase U.V.W)</td><td> 

<table>
<tr><th>pole</th><th>g.h.j.k.m.n</th><th>r</th></tr>
<tr><td>4</td><td>30±1°</td><td>180°</td></tr>
<tr><td>6</td><td>20±1°</td><td>120°</td></tr>
<tr><td>8</td><td>15±1°</td><td>90°</td></tr>
</table></td><td> 
</td><td>
<table>
<tr><th rowspan="2">No.</th><th>Function</th><th colspan="3">Mode</th></tr>
<tr><th>Color</th><th>1</th><th>2</th><th>3</th></tr>
<tr><td>3</td><td>white</td><td>HZ</td><td>U</td><td>A</td></tr>
<tr><td>6</td><td>white/ black</td><td>HZ</td><td>$\overline{U}$</td><td>$\overline{A}$</td></tr>
<tr><td>4</td><td>green</td><td>HZ</td><td>V</td><td>B</td></tr>
<tr><td>7</td><td>green/ black</td><td>HZ</td><td>$\overline{V}$</td><td>$\overline{B}$</td></tr>
<tr><td>5</td><td>yellow</td><td>HZ</td><td>W</td><td>Z</td></tr>
<tr><td>8</td><td>yellow/ black</td><td>HZ</td><td>$\overline{W}$</td><td>$\overline{Z}$</td></tr>
<tr><td>1</td><td>red</td><td colspan="3">DC+5V</td></tr>
<tr><td>2</td><td>black</td><td colspan="3">OV</td></tr>
<tr><td>0</td><td>shielding</td><td colspan="3">GND</td></tr>
</table>
</td></tr>
</table>

Timing Chart



Symbol signification

★: indicate position of UVW channel
☆: position to start counting ABZ channel
▨: non-using zone
HZ: high impedance

■ Electrical Characteristics

Parameter / Output type / Item			OC	Voltage	Push-pull	TTL(26LS31)	TTL(26C31)	TTL(26C31) (Phase A.B.Z are back of phase U.V.W)	HTL(HD7)
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)			Less than 1us(Cable length：2m)			≤100ns
Insulation strength			AC500V 60s						
Insulation resistance			10MΩ						
Mark to space ratio			45% to 55%						
Phase shift between A & B			90°±10° (frequency in low speed)						
			90°±20° (frequency in high speed)						
Origin motion			Low level available	High level available	Low level available	—		Low level available	—
Delay motion time *			—					510±220ms	—
GND			not connect to encoder						

* Phase A.B.Z are back of phase U.V.W when power on。

■ Mechanical Characteristics

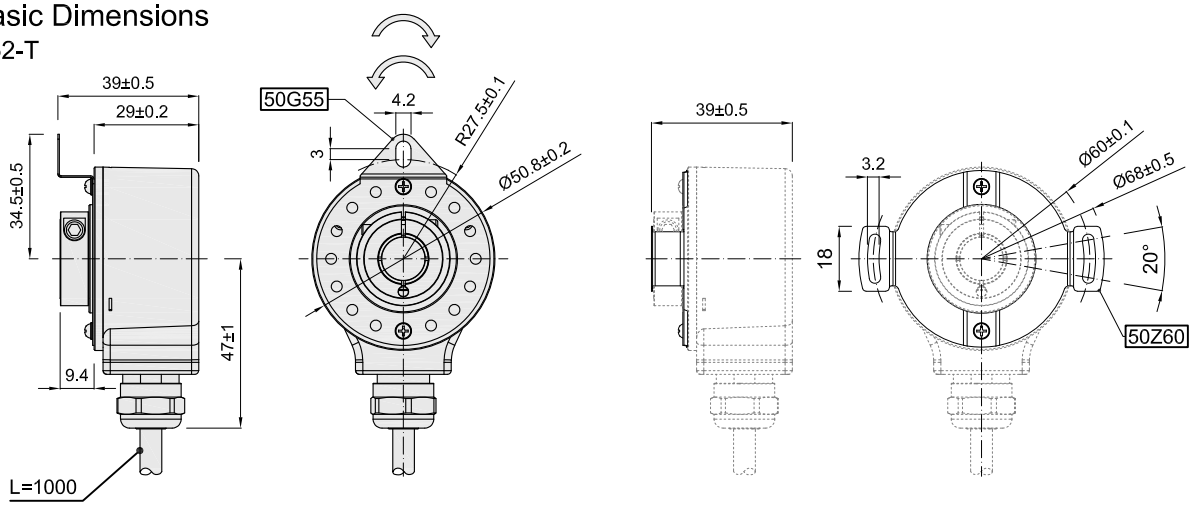
Shaft	Ø15mm(blind hole); Ø14mm(blind hole); Ø12mm; Ø10mm; Ø8mm(stainless steel)
Starting torque	Less than 9.8×10^{-3} N·m
Inertia moment	Less than 6.5×10^{-6} kg·m²
Shaft load	Radial 50N; Axial 30N
Slew speed	≤3000 rpm； IP65≤2000 rpm； IP65≤1500 rpm (Through hole)
Bearing Life	$1.5X10^{9}$ revs at rated load(100000hrs at 2500RPM)
Shell	Die cast aluminum
Weight	about 310g

■ Environmental Specifications

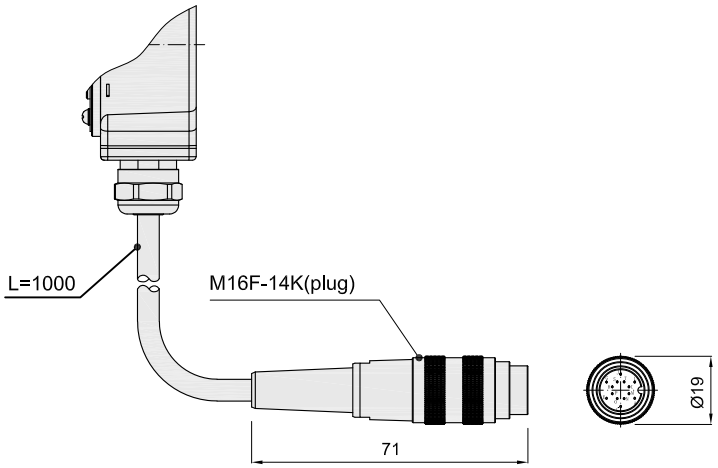
Environmental temperature	Operating:—20～+80°C(repeatable winding cable: -10°C); Storage:—25～+85°C
Environmental humidity	Operating and storage：35～85%RH(noncondensing)
Vibration(Endurance)	Amplitude 1.52mm,5~55Hz,2h for three axis individually
Shock(Endurance)	490m/s² 11ms three times for X,Y,Z direction individually
Protection	IP50; IP65

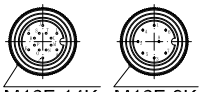
Basic Dimensions

- K52-T



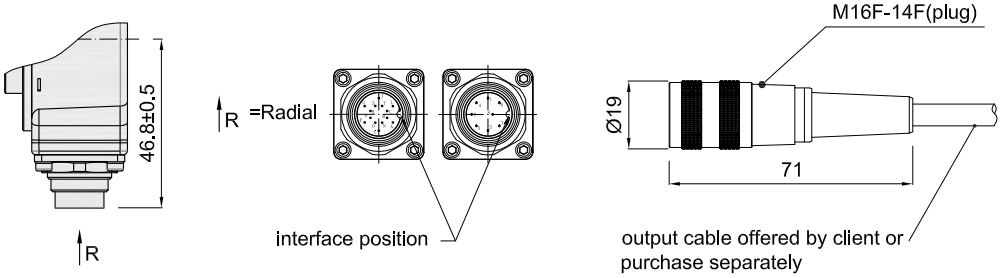
- K52-TE

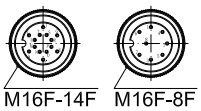




M16F-14K	M16F-8K
A=VCC	1=VCC
C=OVDC	2=OVDC
E=A+	3=A+
G=B+	4=B+
J=Z+	5=Z+
L=A-	6=A-
M=B-	7=B-
N=Z-	8=Z-
O=U+	
P=V+	
R=W+	
S=U-	
T=V-	
U=W-	

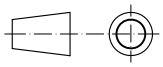
- K52-C





M16F-14F	M16F-8F
A=VCC	1=VCC
C=OVDC	2=OVDC
E=A+	3=A+
G=B+	4=B+
J=Z+	5=Z+
L=A-	6=A-
M=B-	7=B-
N=Z-	8=Z-
O=U+	
P=V+	
R=W+	
S=U-	
T=V-	
U=W-	

Unit: mm



50G55 = Leaf Spring (unavailable with UVW signal)

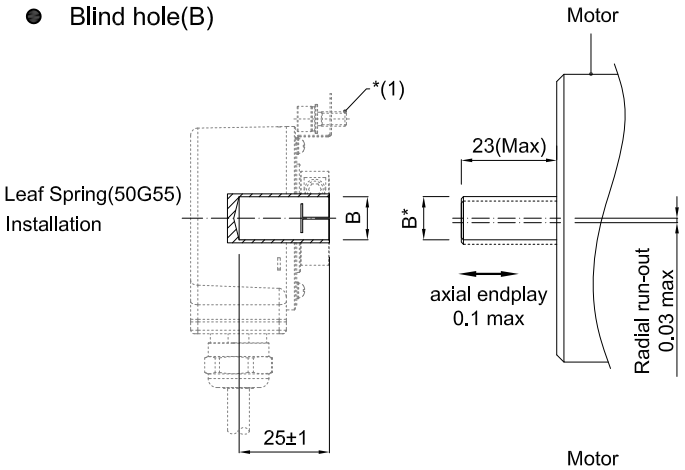
50Z60 = Leaf Spring

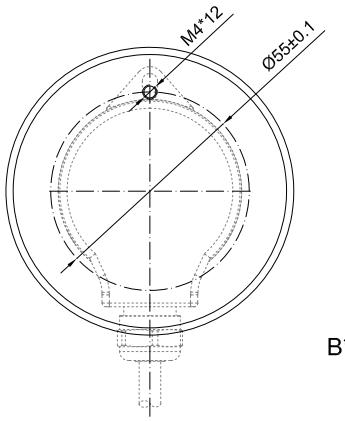
 = The shaft rotary dirrction for encoder without UVW signal

 = The shaft rotary dirrction for encoder with UVW signal

Assembling requirement

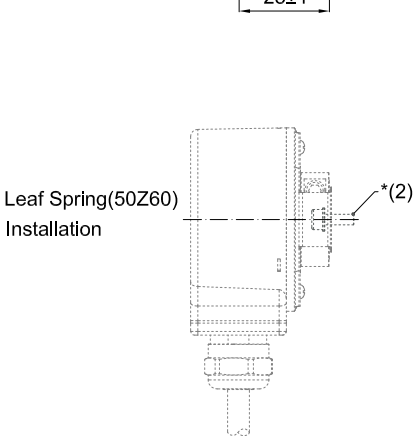
Blind hole(B)

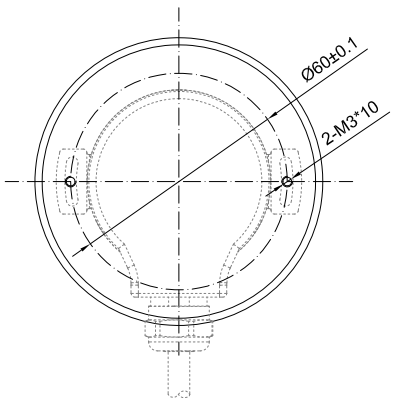




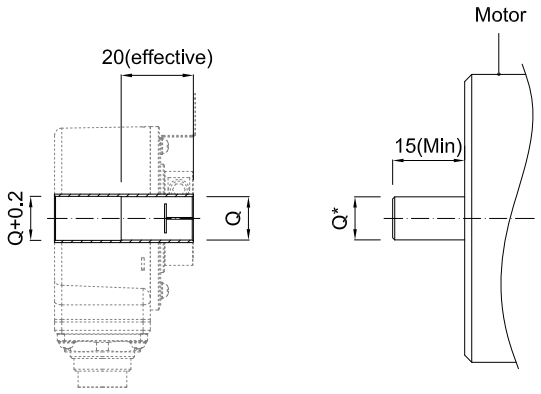
B	B*
$Ø8^{G7}_{(+0.005)}$	$Ø8_{g4}$
$Ø10^{G7}_{(+0.006)}$	$Ø10_{g4}$
$Ø12^{G7}_{(+0.006)}$	$Ø12_{g4}$
$Ø14^{G7}_{(+0.006)}$	$Ø14_{g4}$
$Ø15^{G7}_{(+0.006)}$	$Ø15_{g4}$

B* Motor shaft diameter tolerance





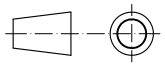
Through hole(Q)



Q	Q*
$Ø8^{G7}_{(+0.005)}$	$Ø8_{g4}$
$Ø10^{G7}_{(+0.006)}$	$Ø10_{g4}$
$Ø12^{G7}_{(+0.006)}$	$Ø12_{g4}$
$Ø14^{G7}_{(+0.006)}$	$Ø14_{g4}$

Q* Motor shaft diameter tolerance

Unit: mm



Note:
*(1): Inner hexagon screw M4*8 with flat gasket and spring ring is recommended to use
*(2): Inner hexagon screw M3*8 with flat gasket and spring ring is recommended to use

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.