1. KH58 Ultra-high Resolution Incremental Optical Encoder (Through shaft)

1.1 Introduction:
This product is a through shaft rugged design, ultra-high resolution, compact and safe encoder commonly used in industrial automations.

1.2 Feature:
- Encoder external diameter Ø58mm、thickness 37mm、diameter of shaft up to Ø15mm, rugged type；
- Ring locking mounting structure;
- Adopt non-contact photoelectric principle;
- With short circuit protection;
- With zero position LED display;
- Various electrical interfaces available;
- Resolution per turn up to 24Bits.

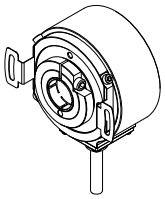
1.3 Application:
Motor, elevator, CNC and other automation control fields.

1.4 Connection:
- Radial socket (M12 8pin male connector)
- Radial socket (M23 12pin male connector)
- Radial cable (standard length 1000mm)

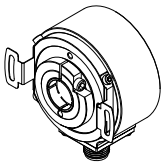
1.5 Protection:
IP65

1.6 Weight:
about 200g

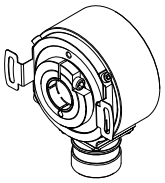
KH58-T



KH58-C



KH58-E



2. Model Selection Guide

2.1 Model composition(select parameters)

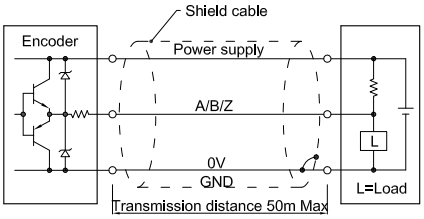
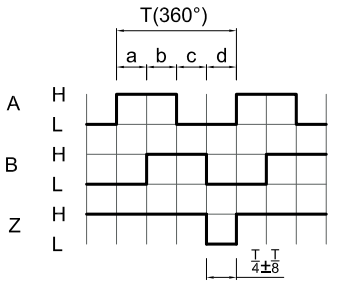
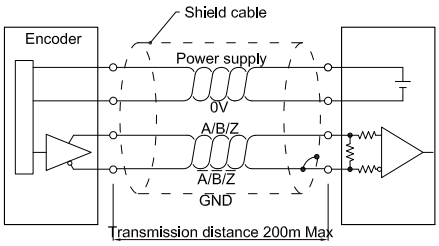
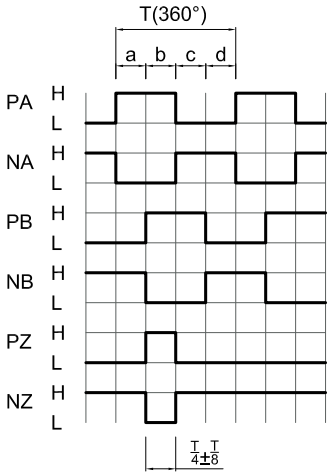
KH58- | **C** | **6** | **C** | **131072** | **Q15** | **[ ]**

Product model series	Connection method:	Output phase:	Electrical interface	Resolution PPR:	Diameter of shaft: (through)	Special: specifications
	C=Radial socket (M12 8pin male socket) E=Radial socket (M23 12pin male socket) T=Radial cable	1=A 2=A+B 3=A+B+Z 4=A+$\overline{A}$+B+$\overline{B}$ 6=A+$\overline{A}$+B+$\overline{B}$+Z+$\overline{Z}$	F=Push-pull C=TTL (DC5V,26LS31) E=HTL(DC8-30V) L=TTL (DC5V，26C31)	10000.....24Bits (Optional)	Q10=Ø10mm Q12=Ø12mm Q14=Ø14mm Q15=Ø15mm	No indication=①

2. 2 Note

⑪. None indicated for the 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 Method

Electrical interface	Output circuit	Output wave form
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 low level active
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			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	≤±20mA	≤±50mA
		Output	≤10mA		
	Output voltage	"H"	≥[（Supply voltage）-2.5V]	≥2.5V	≥Vcc-3 VDC
		"L"	≤0.4V(30mA)	≤0.5V	≤ 1V VDC
	Load voltage		—		
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%		
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 cable or GND permitted for max.30s.

5. Mechanical Characteristics

Diameter of shaft	Ø10mm；Ø12mm；Ø14mm；Ø15mm available
Shaft material	Stainless steel
Starting torque	≤1.0 Ncm (at 20°C)
Operating torque	≤0.8 Ncm (at 20°C)
Permissible movement static	±0.3mm (radial) ； ±0.5mm (axial)
Permissible movement dynamic	±0.05mm (radial) ； ±0.1mm (axial)
Max.angular acceleration	≤500,000 rad/s²
Operating speed	5000min^{-1} 1)
Bearing lifetime	3.6x10^{9} 2)
Housing material	Aluminum alloy
Weight	Approx.200g

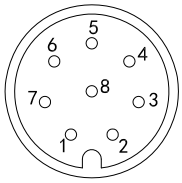
1) Allow for self-heating of approx.3.0K per 1000rpm regarding the permissible operating temperature.
2) At maximum speed and maximum temperature.

6. Environmental Parameters

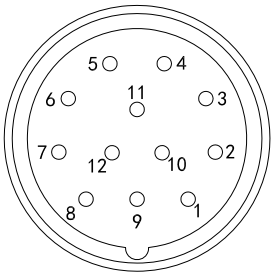
Environmental temperature	Operating:—20～+85°C(repeated cable bending: -10°C); Storage:—20～+90°C
Environmental humidity	Operating and storage：35～85％RH(noncondensing)
Vibration(Endurance)	Amplitude 0.75mm,5~55Hz,2h for X,Y,Z direction individually
Shock(Endurance)	490m/s² 11ms three times for X,Y,Z direction individually
Protection	IP65

7. Wiring Table

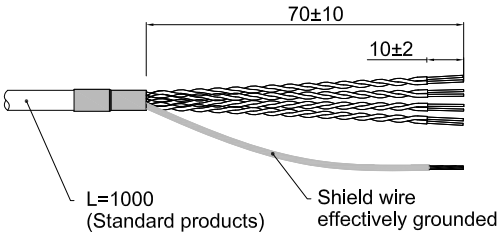
M12 8pin male connector pin distribution diagram



M23 12pin male connector pin distribution diagram



Cable connection



7.1 Push-pull (Wiring table for socket connection and cable connection)

	Supply voltage		Incremental signal					
Socket pin definition	1	2	3	4	5	6	7	8
Wire color	Red	Black	White	/	Green	/	Yellow	/
Function	Up	0V	A	/	B	/	Z	/

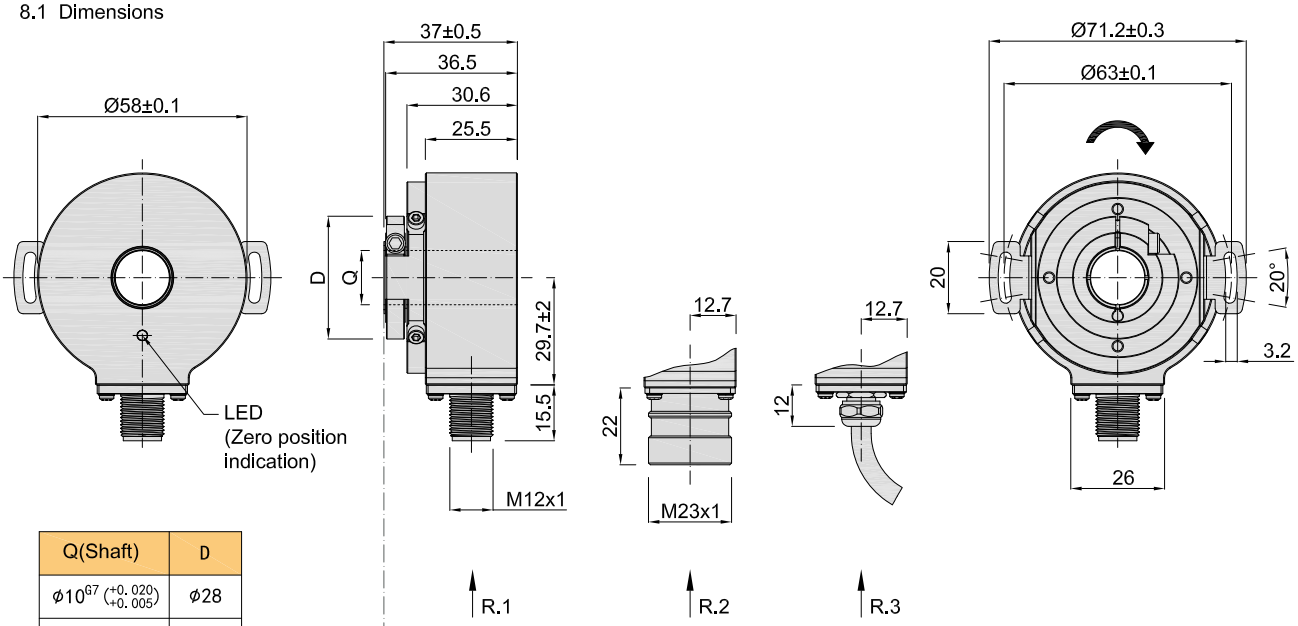
7.2 TTL/HTL (Wiring table for socket connection and cable connection)

	Supply voltage		Incremental signal					
Socket pin definition	1	2	3	4	5	6	7	8
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.

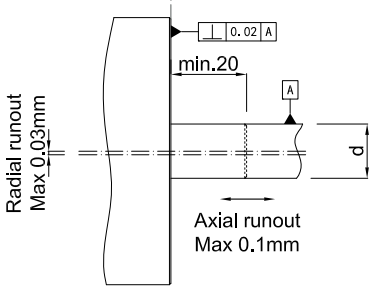
8. Basic Dimensions

8.1 Dimensions



Q(Shaft)	D
$\phi 10^{G7}\ (^{+0.020}_{+0.005})$	ϕ28
$\phi 12^{G7}\ (^{+0.024}_{+0.006})$	ϕ31
$\phi 14^{G7}\ (^{+0.024}_{+0.006})$	ϕ33
$\phi 15^{G7}\ (^{+0.024}_{+0.006})$	ϕ34

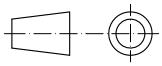
8.2 Mounting shaft requirements



d
$\phi 10_{g6}\ (^{-0.005}_{-0.014})$
$\phi 12_{g6}\ (^{-0.006}_{-0.017})$
$\phi 14_{g6}\ (^{-0.006}_{-0.017})$
$\phi 15_{g6}\ (^{-0.006}_{-0.017})$

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

Unit: mm



= Shaft rotation direction of incremental signal output

R.1 = Radial connector(M12x1 8pin male connector)

R.2 = Radial connector(M23x1 12pin male connector)

R.3 = Radial cable(Standard length 1000)

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.

9. Recommended Accessories

Plug and cable	Brief description	No.	Order No.
	C01=Connection type head A: M12, 8-pin female straight connector; Connection type head B: M12, 8-pin male straight connector; Cable length: 2M 8-core with shield,halogen-free PUR	K77C01	44400001
	C02=Connection type head A: M12, 8-pin female straight connector; Connection type head B: M12, 8-pin male straight connector; Cable length: 5M 8-core with shield,halogen-free PUR	K77C02	44400002
	C03=Connection type head A: M12, 8-pin female straight connector; Connection type head B: Bare wire end; Cable length: 1M 8-core with shield,halogen-free PUR	K77C03	44400003
	C04=Connection type head A: M12, 8-pin female straight connector; Connection type head B: Bare wire end; Cable length: 2M 8-core with shield,halogen-free PUR	K77C04	44400004
	C05=Connection type head A: M12, 8-pin female straight connector; Connection type head B: Bare wire end; Cable length: 5M 8-core with shield,halogen-free PUR	K77C05	44400005
	E01=Connection type head A: M23, 12-pin female straight connector; Connection type head B: Bare wire end; Cable length: 1M 8-core with shield,halogen-free PUR	KH58E01	44400014
	E02=Connection type head A: M23, 12-pin female straight connector; Connection type head B: Bare wire end; Cable length: 2M 8-core with shield,halogen-free PUR	KH58E02	44400015
	E03=Connection type head A: M23, 12-pin female straight connector; Connection type head B: Bare wire end; Cable length: 5M 8-core with shield,halogen-free PUR	KH58E03	44400016