

1. KS60 Sin/Cos Optical Encoder (Through hole)

1.1 Introduction:

This product is a through-hole shaft spring plate soft connection design, the product structure is compact, high security, can solve the user in the high subdivision of the field of use.

1.2 Feature:

- Encoder external diameter Ø60mm, thickness 39.8mm, diameter of shaft up to Ø15mm, achieved robust miniaturization.
- Ring locking mounting structure.
- Adopt non-contact photoelectric principle.
- Resolution per turn Sin/Cos period 1024.

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)

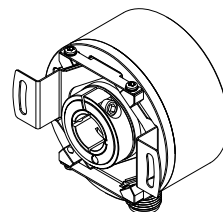
1.5 Protection:

IP65

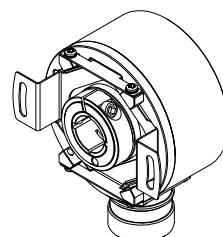
1.6 Weight:

about 350g

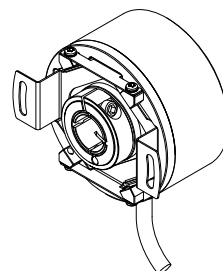
KS60-C



KS60-E

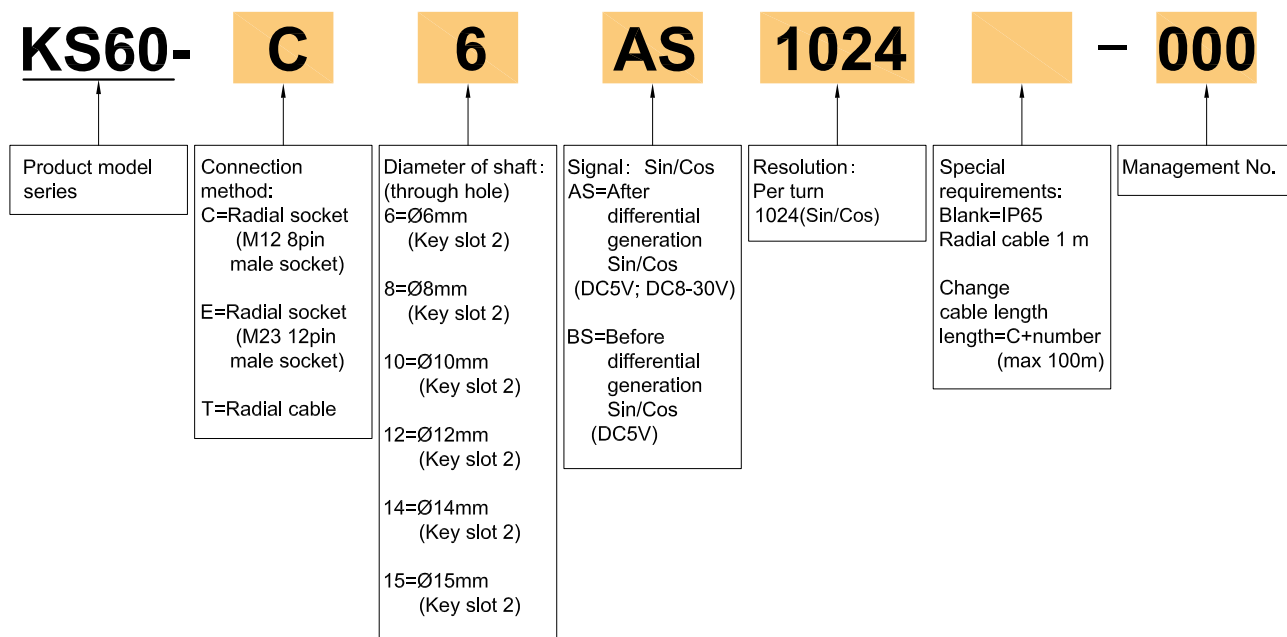


KS60-T



2. Model Selection Guide

2.1 Model composition(select parameters)



3. Technical parameters

3.1 Performance

Sine/cosine periods per revolution	1024
Measuring step	0.3 " For interpolation of the sine/cosine signals with e.g.12 bits ¹⁾
Initialization time	50ms ²⁾
Integral non-linearity	Typ.±45 Winkelsekunden(Loose stator coupling)
Differential non-linearity	±7 Winkelsekunden
Reference signal, number	1
Reference signal, position	90°, electrically,gated with Sinus and Cosinus

¹⁾ Not safety-related.

²⁾ Valid signals can be read thereafter.

3.2 Electrical Characteristics

Communication Interface	Incremental
Communication interface detail	Sin/Cos ¹⁾
Connection type	Male connector, M12 8-pin; Male connector M23 12-pin; Radial cable
Supply voltage	DC4.5V...5.5V; DC8V...30V
Maximum output frequency	≤200 kHz
Load resistance	≥120Ω
Power consumption max.(without load)	≤0.7 W
Power consumption	Without load
Reverse polarity protection	✓
Protection class	III (according to DIN EN 61140)
Short-circuit protection	✓ ²⁾

¹⁾ 1.0 Vss (Differential)

²⁾ Short-circuit to another channel or GND permitted for max.30s.

3.3 Mechanical Characteristics

Diameter of shaft	Ø6mm; Ø8mm; 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/s ²
Operating speed	6000min ⁻¹ ¹⁾
Bearing lifetime	3.6x10 ⁹ ²⁾
Housing material	Aluminum alloy
Weight	Approx.350g

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

²⁾ On maximum operating speed and temperature.

3.4 Environmental Specifications

Shell protection grade	IP65(IEC60529) ¹⁾
Permissible relative humidity	90°,Condensation not permitted
Operating temperature range	-30°C...+95°C
Storage temperature range	-30°C...+95°C
Resistance to shocks	100g, 6ms(EN60068-2-27) ²⁾
Frequency range of resistance to vibrations	30g, 10Hz...1,000Hz(EN60068-2-6) ³⁾

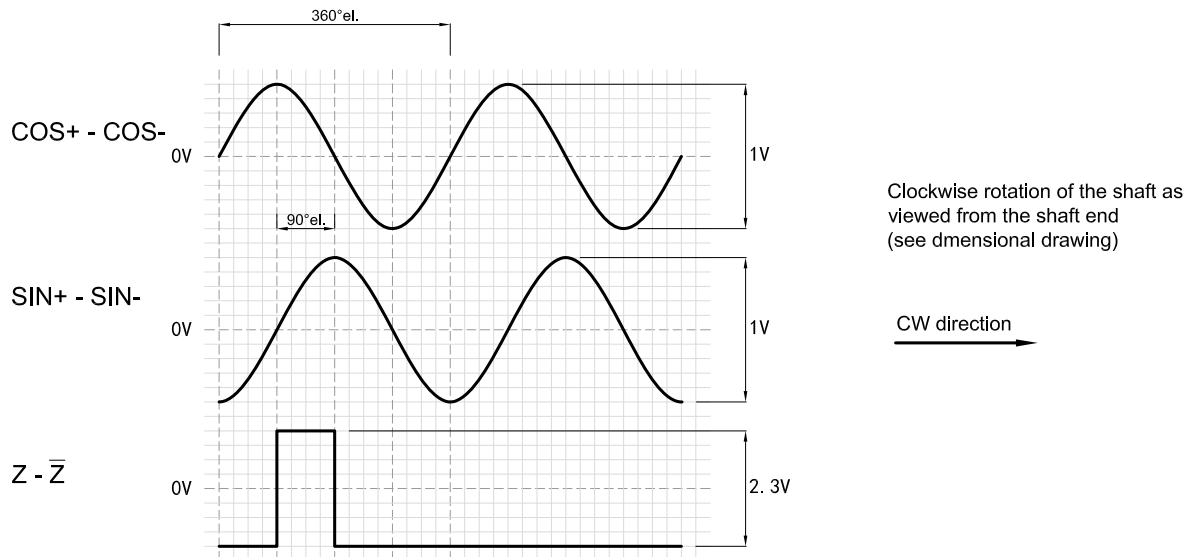
¹⁾ Plug in the matching plug, which has a protection class of at least IP65.

²⁾ Checked during operation using vector length monitoring.

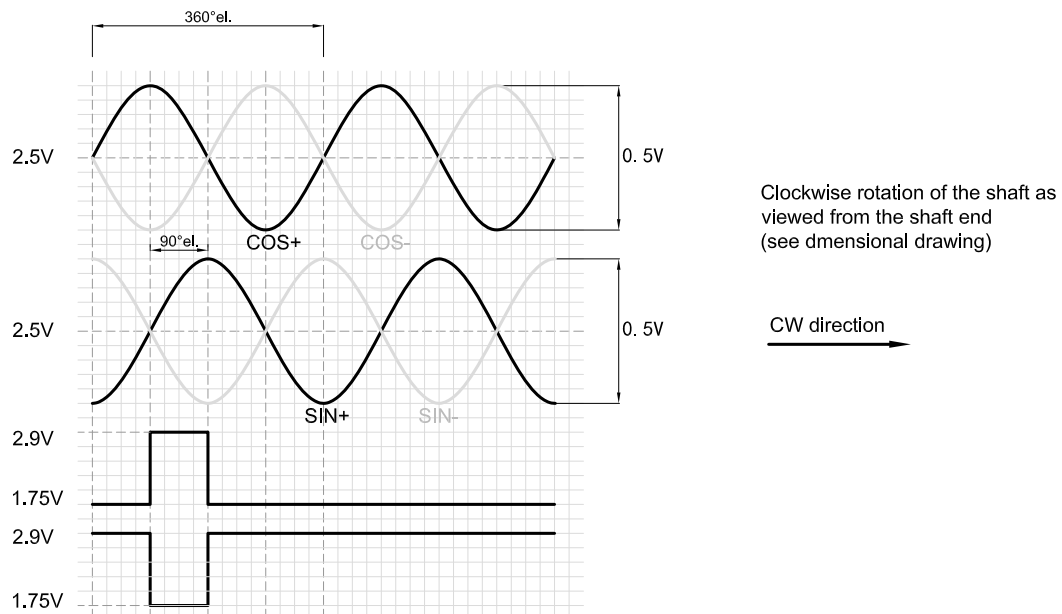
³⁾ Checked during operation using vector length monitoring, including matching plug.

4. Output wave form

4.1 Signal SIN/COS after differential generation

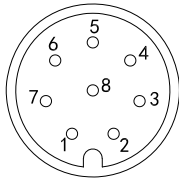
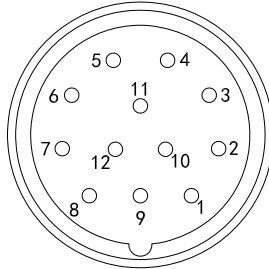


4.2 Signal SIN/COS before differential generation

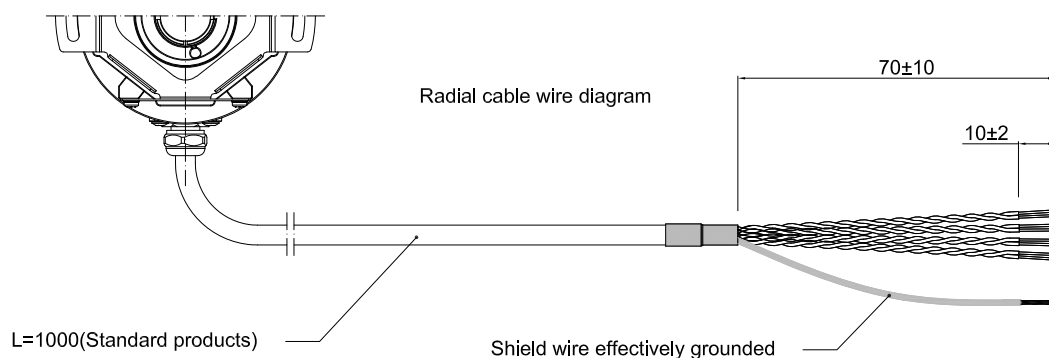


Supply voltage	Output	Signal	Interface signals	Signals before differential generation	Signal offset
4.5V...5.5V	SIN/COS 1.0 Vss	+SIN -SIN +COS -COS	Analog,differential	0.5Vss±20%	2.5V±10%
		Z Z̄	Digital differential	Low:1.75V±15%, High:2.9V±15%	

5. Wiring table

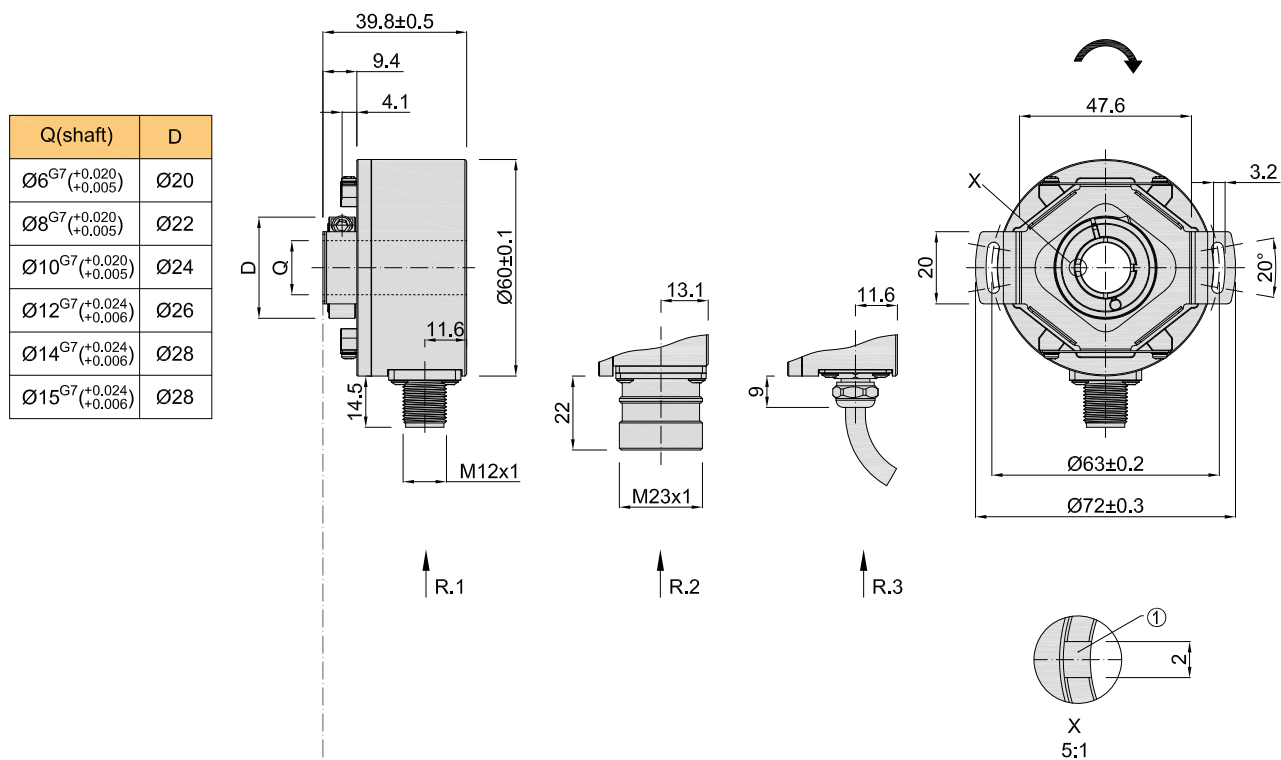
M12 8pin male connector
pin distribution diagramM23 12pin male connector
pin distribution diagram

Pin Mals connector M12 8-pin	Pin Mals connector M23 12-pin	Wire colors (cable connection)	Signal	Explanation
1	6	White/BK	-COS	Signal wire
2	5	White	+COS	Signal wire
3	1	Green/BK	-SIN	Signal wire
4	8	Green	+SIN	Signal wire
5	4	Yellow/BK	\bar{Z}	Signal wire
6	3	Yellow	Z	Signal wire
7	10	Black	Un	Power negative
8	12	Red	Up	Power positive
-	9	-	N.C.	Unallocated
-	2	-	N.C.	Unallocated
-	11	-	N.C.	Unallocated
-	7	-	N.C.	Unallocated
GND	GND	GND	GND	No encoder body connected

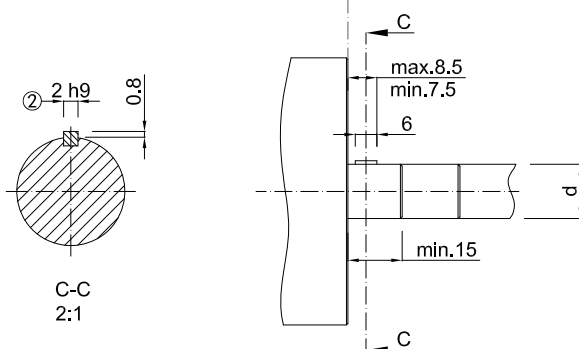


6. Basic Dimensions

6.1 Dimensions



6.2 Mounting shaft requirements

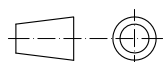


d
$\varnothing 6_{g6}^{(-0.005)}_{(-0.014)}$
$\varnothing 8_{g6}^{(-0.005)}_{(-0.014)}$
$\varnothing 10_{g6}^{(-0.005)}_{(-0.014)}$
$\varnothing 12_{g6}^{(-0.006)}_{(-0.017)}$
$\varnothing 14_{g6}^{(-0.006)}_{(-0.017)}$
$\varnothing 15_{g6}^{(-0.006)}_{(-0.017)}$

Mounting screws

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

Unit: mm



- = Shaft rotation direction of the 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)
 ① = Key slot
 ② = Based on the feather key DIN 6885-A 2x2x6

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.

7. 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	KS60C01	44400006
	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	KS60C02	44400007
	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	KS60C03	44400008
	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	KS60C04	44400009
	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	KS60C05	44400010
	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	KS60E01	44400011
	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	KS60E02	44400012
	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	KS60E03	44400013