1. SS58 Sin/Cos Optical Encoder (Solid shaft)

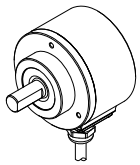
1.1 Introduction：

SS58 features rugged enclosure with a solid shaft design, capable of outputting 1Vpp or 0.5Vpp Sin/Cos period signals with 1000 to 2500 cycles per revolution.

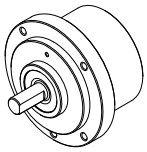
It offers a variety of mounting flanges and collar sizes, with an IP65 protecting rating.

Boasting a compact structure and high safety performance, it is ideal for applications involving high-intensity mechanical motion and high-resolution subdivision.

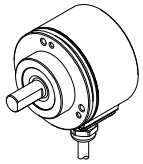
SS58-A



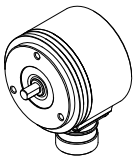
SS58-B



SS58-C



SS58-D



1.2 Feature：

- Encoder external diameter Ø58mm、thickness 36-40mm、diameter of shaft of Ø6mm、Ø8mm、Ø10mm available；
- Utilizes a non-contact photoelectric sensing principle;
- Offers multiple waveform options with output amplitudes of 1Vpp or 0.5Vpp;
- Available Sin/Cos cycle resolutions per revolution: 1000, 1024, 2048, 2500;
- Reverse polarity protection ;
- Short circuit protection.

1.3 Application：

Motor,elevator,CNC and other automation control fields.

1.4 Connection：

- Cable connection (Standard length 1000mm)
- Socket connection (M12/M16/M23 male socket)

1.5 Protection：

IP65 (Max)

1.6 Weight：

About 420g

2. Model Selection Guide

Model composition(select parameters)

SS58-	A	10	T	AS	2048		D	-	000
Product model series	Mounting flange：❶. A/B/C/D	Diameter of shaft：(Solid hole) 6=Ø6mm 8=Ø8mm 10=Ø10mm	Connection method：T=Radial cable Q=Axial cable Radial socket: E=M12-8P G=M23-12P K=M23-16P Axial socket: F=M12-8P H=M23-12P W=M23-16P	Output signal: 1. Analog signal:∿ AD=1Vpp (A+B+Z+C+D) BD=0.5Vpp (A+B+Z+C+D) Don't support socket below 14pin 2. Analog signal:∿ AZ=1Vpp (A+B+Z) BZ=0.5Vpp (A+B+Z) 3. Analog+ Digital signal: ∿+⎍ AS=1Vpp (A+B+Z) BS=0.5Vpp (A+B+Z)	Resolution PPR AD/ BD: ∿ 2048 AZ / BZ: ∿ 1000； 1024； 2048； 2500 AS / BS:∿+⎍ 1024； 2048	Supply voltage: Blank=DC5V H=DC8-30V	Special specification Blank=❷ D=IP65		Management No.

Mounting flange：

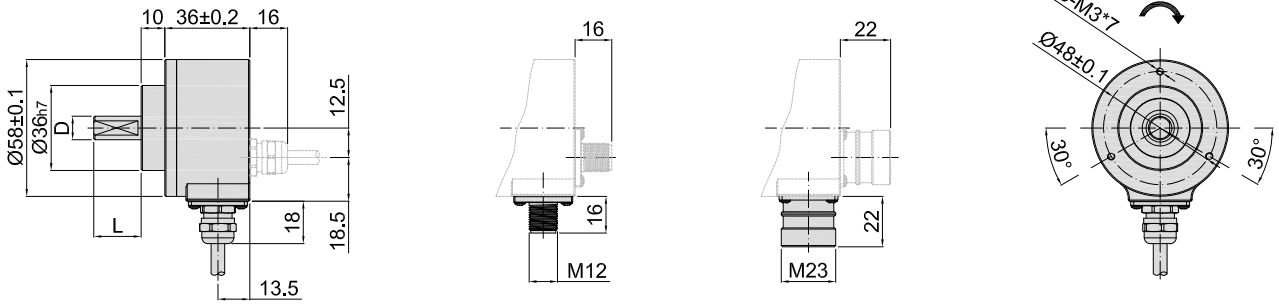
❶. A=Clamping flange，collar Ø36mm，3-M3 PCDØ48mm；
B=Clamping flange，collar Ø56mm，4-M4 PCDØ66mm；
C=Synchro flange，collar Ø36mm，3-M3 & 3-M4 PCDØ48mm；
D=Synchro flange，collar Ø50mm，3-M4 PCD42mm.

Special requirement：

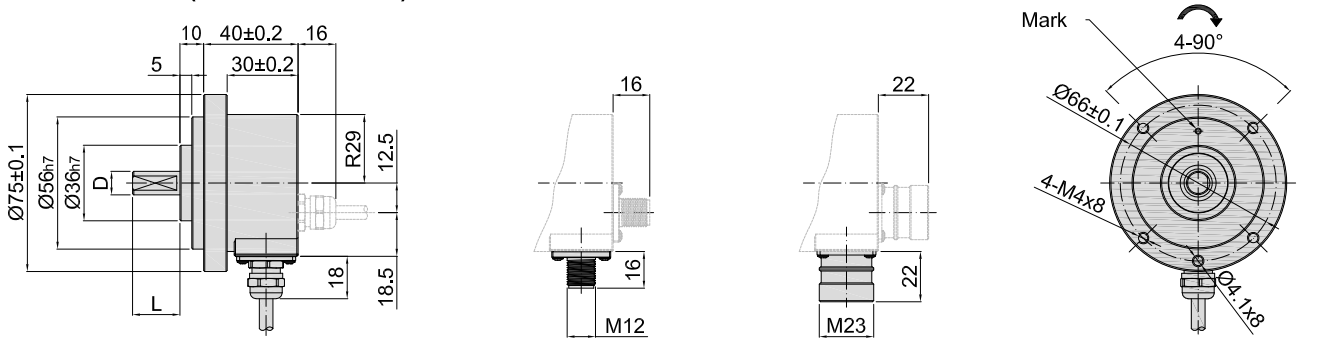
❷. IP=50；cable length 1m，if need to change the length C+number，max 100m(indicated by C100).

3. Basic Dimension

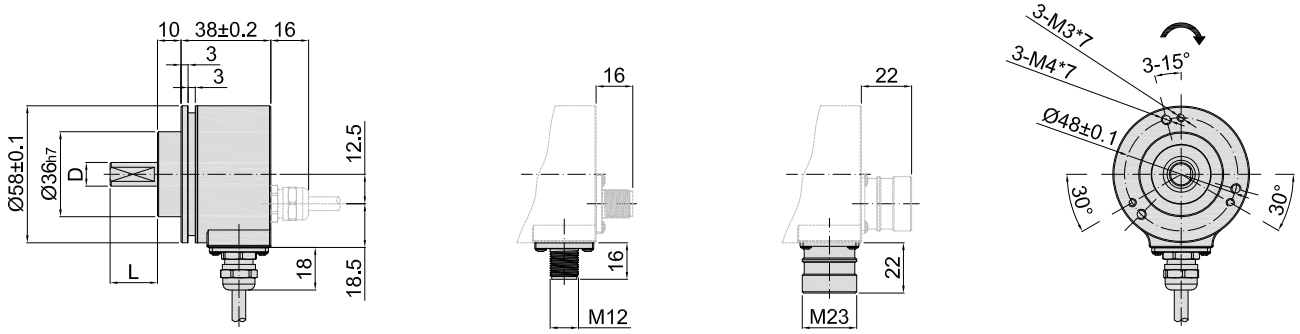
3.1 SS58-A (Basic dimension)



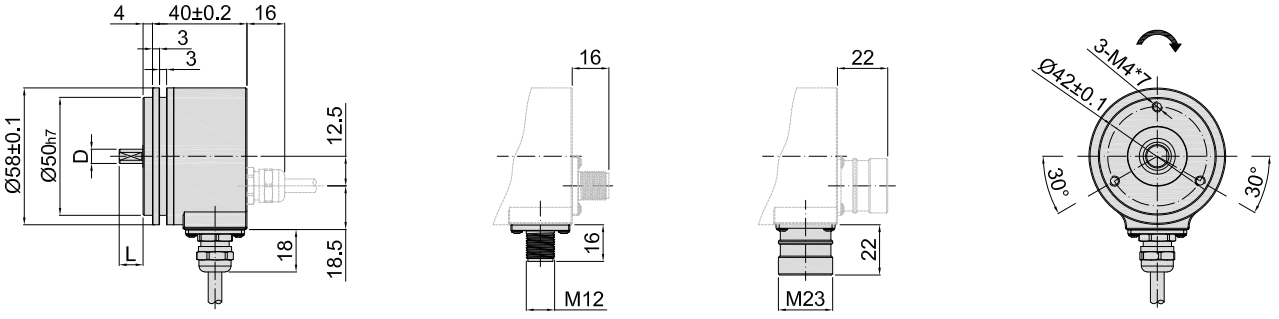
3.2 SS58-B (Basic dimension)



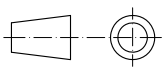
3.3 SS58-C (Basic dimension)



3.4 SS58-D (Basic dimension)



Unit：mm



= Direction of shaft rotation for signal output

D(Shaft)	$Ø6_{h7}(^{0}_{-0.015})$	$Ø8_{h7}(^{0}_{-0.015})$	$Ø10_{h7}(^{0}_{-0.018})$
L	10	20	20

4. Technical Parameter

4.1 Performance

Sine/cosine periods per revolution	1000、1024、2048、2500
Measuring step	0.3 " Sin/Cos signals are subdivided by 12 bits ❶
Initialization time	50ms ❷
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

❶. Not safety-related.
❷. Valid signals can be read thereafter.

4.2 Electrical Parameter

Communication interface	Incremental
Communication interface detail	Sin/Cos
Connection type	M12 8pin male socket； M23 12pin male socket；M23 16pin male socket； Cable connection (Four connection options available)
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 grade	IP50 & IP65
Short-circuit protection	✔ ❶

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

4.3 Mechanical Parameter

Diameter of shaft	Ø6mm；Ø8mm；Ø10mm available
Shaft material	Stainless steel
Starting torque	at +20°C IP50＜0.05 Nm; IP65＜0.1 Nm
Inertia moment	Less than 3×10^{-6} kg·m²
Shaft load	Radial 60N; Axial 40N
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	$6000min^{-1}$ ❶
Bearing lifetime	$3.6x10^{9}$ ❷
Housing material	Aluminum alloy
Weight	Approx.420g

❶. Allow for self-heating of approx.3.0K per 1000rpm regarding the permissible operating temperature.
❷. On maximum operating speed and temperature.

4.4 Environmental Parameter

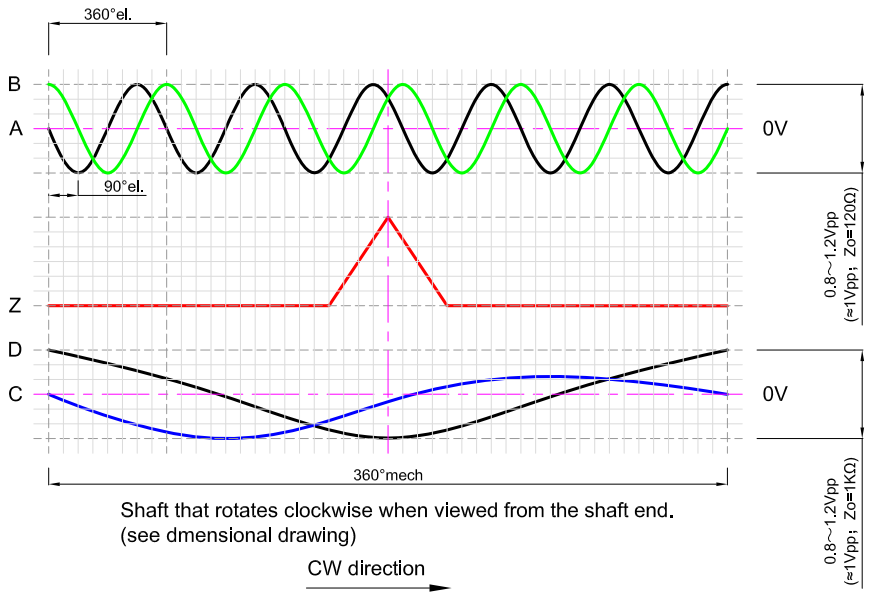
Shell protection grade	IP65 (Max)
Permissible relative humidity	90°,Condensation not permitted
Operating temperature range	-40°C...+95°C
Storage temperature range	-40°C...+95°C
Resistance to shocks	100g，6ms(EN60068-2-27) ❶
Frequency range of resistance to vibrations	30g，10Hz...1,000Hz(EN60068-2-6) ❷

❶. Checked during operation using vector length monitoring.
❷. Checked during operation using vector length monitoring, including matching plug.

5. Output Waveform

5.1 Analog signal： ∿ 1Vpp (A+B+Z+C+D)

Incremental signals A and B , and the zero signal Z, are differential signals with a level of 1Vpp.
The zero signal occurs once per revolution and reaches its maximum value at the angle where the amplitudes of the A and B signals are equal.
Coarse tracks C and D provide one sine and cosine cycle per revolution, which is used to determine the absolute rotor position for starting commutation of the brushless DC motor.
All signals have a DC offset of 0V.

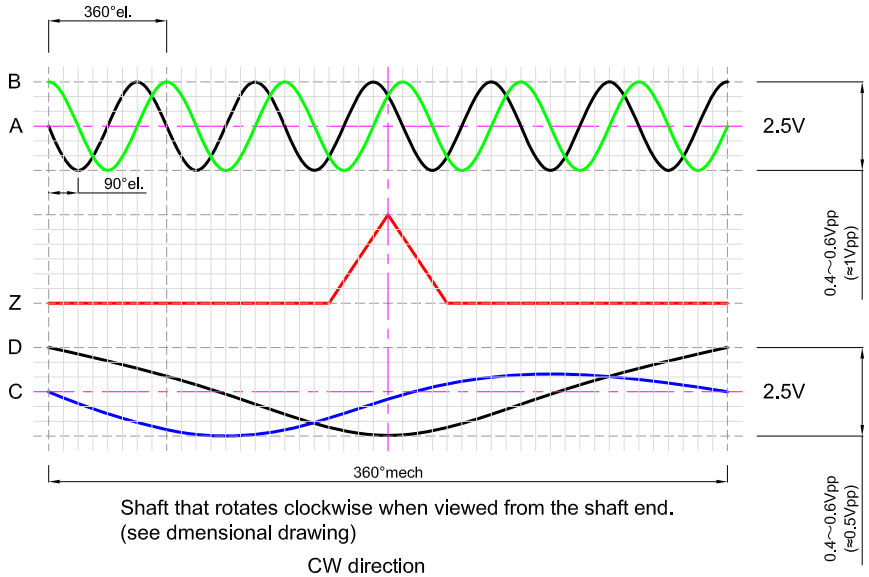


Shaft that rotates clockwise when viewed from the shaft end.
(see dmensional drawing)

CW direction

5.2 Analog signal： ∿ 0.5Vpp (A+B+Z+C+D)

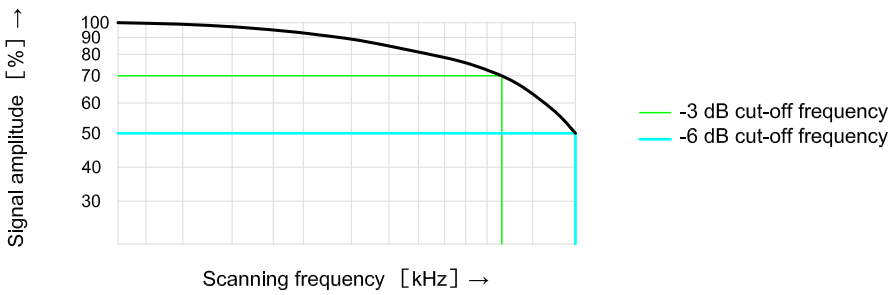
Incremental signals A and B , as well as the zero signal Z, are differential signals with a level of 0.5 Vpp.
The zero signal occurs once per revolution and reaches its maximum value at the angle where the amplitudes of the A and B signals are equal.
Coarse tracks C and D provide one sine and cosine cycle per revolution, which is used to determine the absolute rotor position for starting commutation of the brushless DC motor.
All signals have a DC offset of 2.5 V.



Shaft that rotates clockwise when viewed from the shaft end.
(see dmensional drawing)

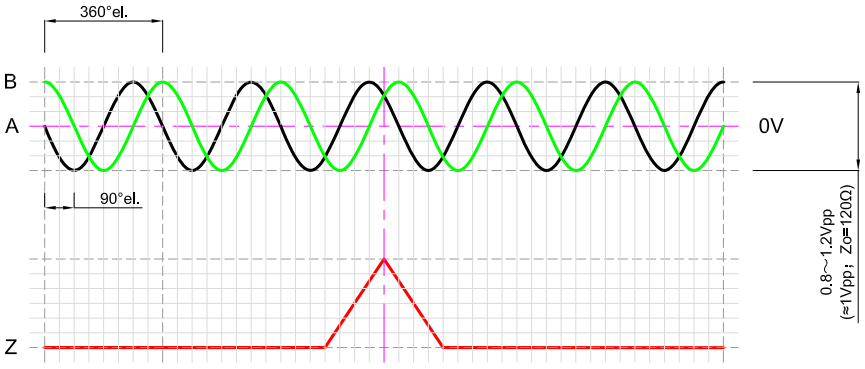
CW direction

Cut-off frequency: Typical signal amplitude and scanning frequency relationship curve



5. 3 Analog signal： ∿ 1Vpp (A+B+Z)

Incremental signals A and B , as well as the zero signal Z, are differential signals with a level of 0.5 Vpp.
The zero signal occurs once per revolution and reaches its maximum value at the angle where the amplitudes of the A and B signals are equal.
All signals have a DC offset of 0V.

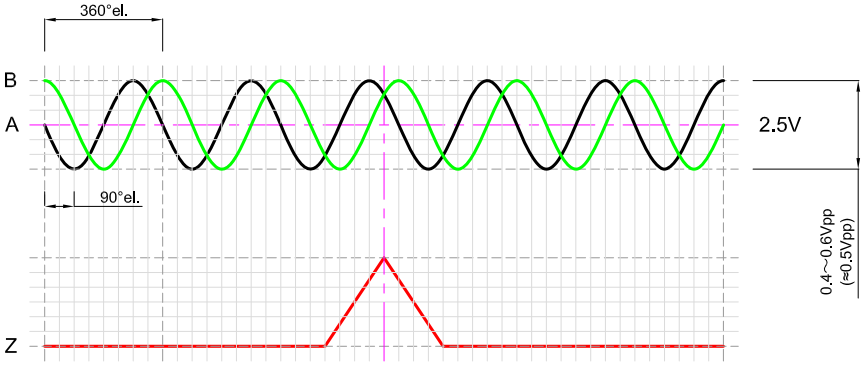


Shaft that rotates clockwise when viewed from the shaft end.
(see dmensional drawing)

CW direction

5. 4 Analog signal： ∿ 0.5Vpp (A+B+Z)

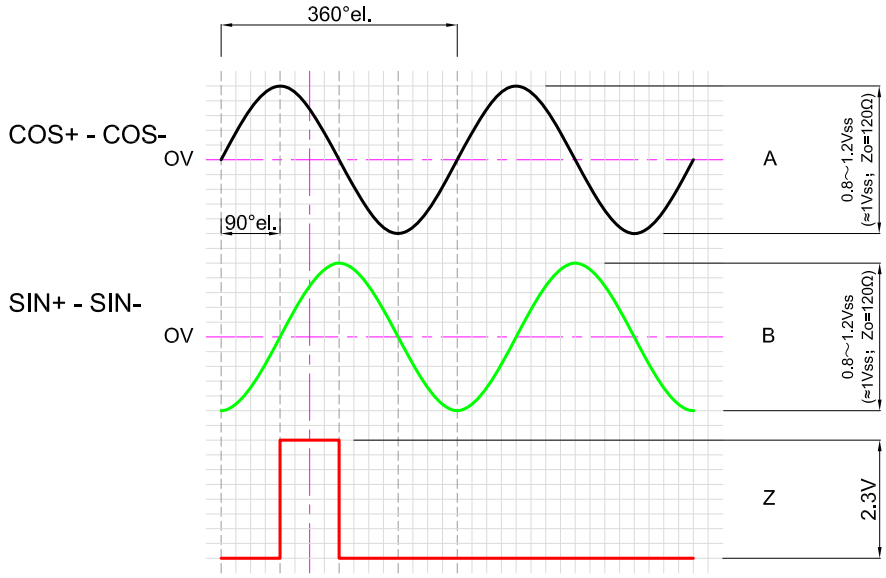
Incremental signals A and B , as well as the zero signal Z, are differential signals with a level of 0.5 Vpp.
The zero signal occurs once per revolution and reaches its max value at the angle where the amplitudes of the A and B signals are equal.
All signals have a DC offset of 2.5 V.



Shaft that rotates clockwise when viewed from the shaft end.
(see dmensional drawing)

CW direction

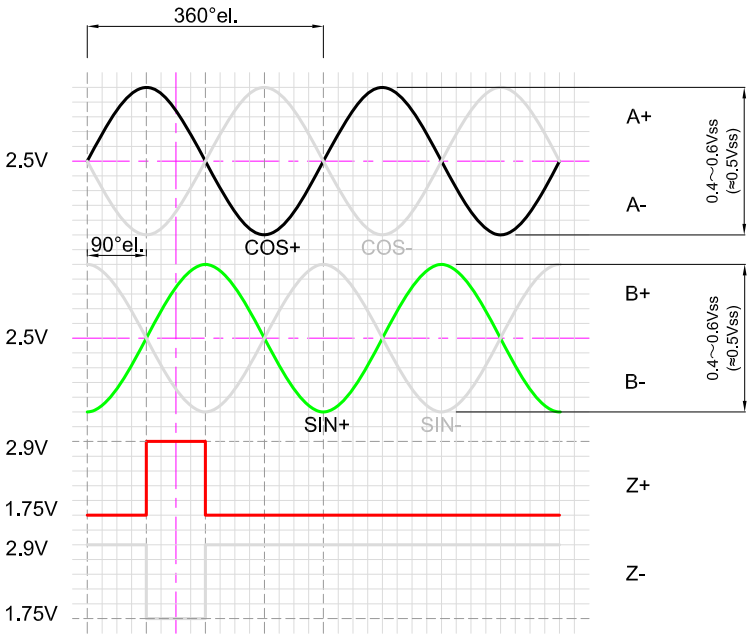
5.5 Analog + digital signal：∿+⎍ 1Vpp (A+B+Z)



Clockwise rotation of the shaft as viewed from the shaft end (see dmensional drawing)

CW direction

5. 6 Analog + digital signal：∿+⎍ 0. 5Vpp （A+B+Z）



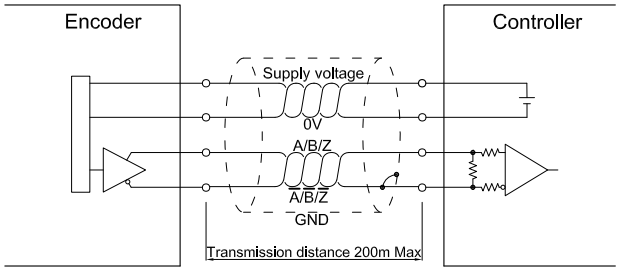
Clockwise rotation of the shaft as viewed from the shaft end (see dmensional drawing)

CW direction

Analog + Digital Signal⎍ 0.5Vpp / 1Vpp Basic Parameter Table

Supply voltage	Signal	Interface signals	Interface signals after differential generation		Interface signals before differential generation	
			Output	Signal offset	Output	Signal offset
DC5V; DC8V...30V	A+ A- B+ B-	Analog,differential	SIN/COS 1.0 Vss	0V±10%	0.5Vss±20%	2.5V±10%
	Z+ Z-	Digital,differential	High:1.15V±15%, Low:-1.15V±15%		High:2.9V±15%, Low:1.75V±15%	

6. Electrical Interface



7. Connection Definition Table

7.1 M12-8P pin definition(analog signal A+B+Z)： 0.5Vpp / 1Vpp

	Signal						Supply voltage	
Socket pin definition (M12 8pin male socket)	1	2	3	4	5	6	7	8
Function	A−	A+	B−	B+	Z−	Z+	0V	Up

7.2 M23-12P pin definition(analog signal A+B+Z) ：0.5Vpp / 1Vpp

	Supply voltage				Signal							
Socket pin definition (M23 12pin male socket)	12	11	10	9	5	6	8	1	3	4	2	7
Function	Up	Sensor Up	0V	Sensor 0V	A+	A−	B+	B−	Z+	Z−	/	/

7.3 M23-16P pin definition(analog signal A+B+Z+C+D)： 0.5Vpp / 1Vpp

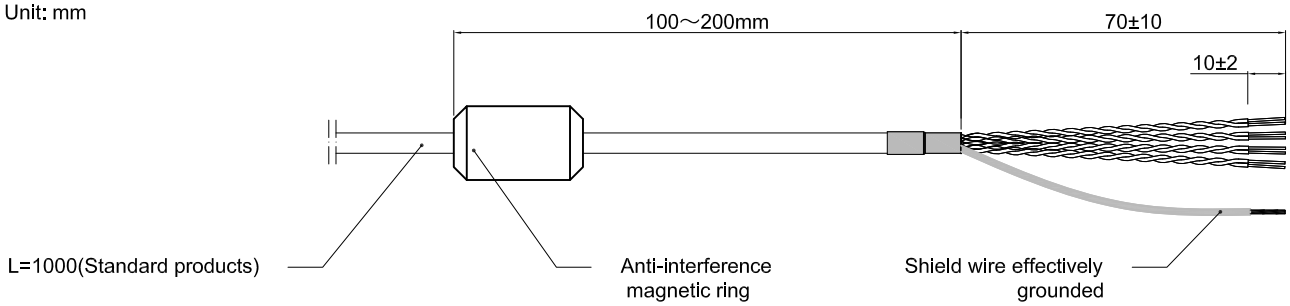
	Supply voltage				Signal											
Socket pin definition (M23 16pin male socket)	1	9	2	15	4	10	5	11	6	12	7	13	8	14	3	16
Function	Up	Sensor Up	0V	Sensor 0V	A+	A−	B+	B−	Z+	Z−	C+	C−	D+	D−	/	/

7.4 Cable wire-wire color definition(analog signal：0.5Vpp / 1Vpp)

	Supply voltage				Signal									
Wire color	Red	Pink	Black	PK/BK	White	WH/BK	Green	GN/BK	Yellow	YL/BK	Blue	BL/BK	Gray	GY/BK
Function	Up	Sensor Up	0V	Sensor 0V	A+	A−	B+	B−	Z+	Z−	C+	C−	D+	D−

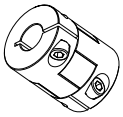
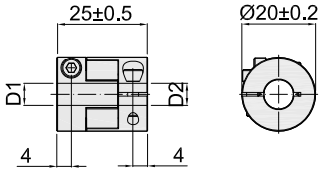
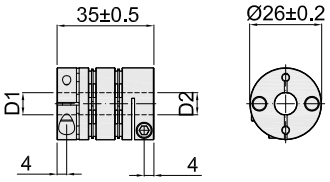
Up=Power supply voltage positive.
The shielded wire is not connected to the internal circuit of the encoder.

Radial cable wire diagram
Unit: mm

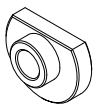
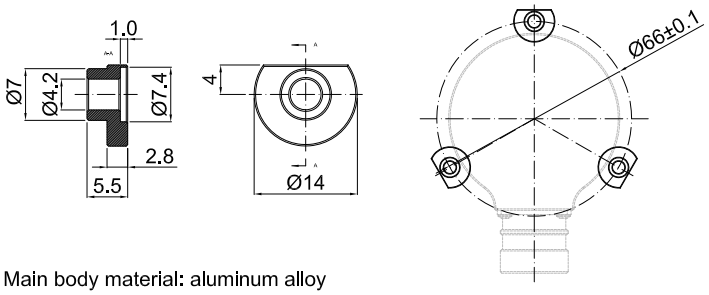


8. Recommended Accessories

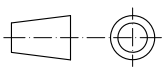
8.1 Coupler（Sold separately）

Coupler	Dimensions	D1	D2	Model	Order No.
Cross type: M series 	 Main body material: aluminum alloy	Ø6^{G8}	Ø8^{G8}	6M8	08700038
		Ø8^{G8}	Ø8^{G8}	8M8	08700039
		Ø8^{G8}	Ø10^{G8}	8M10	08700040
Diaphragm type: W series 	 Main body material: aluminum alloy	Ø6^{G8}	Ø8^{G8}	6W8	08700042
		Ø8^{G8}	Ø8^{G8}	8W8	08700043
		Ø8^{G8}	Ø10^{G8}	8W10	08700044

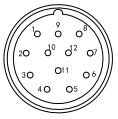
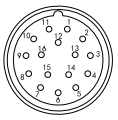
8.2 Mounting cardboard（Sold separately）

Mounting cardboard	Dimensions	Model	Order NO.
 3 pcs as a set	 Main body material: aluminum alloy	58C66	03700733

Unit: mm



8.3 Connection Accessories (Sold Separately)

Plug and cable	Connection function definition	Brief description	No.	Purchase No.
	 M12 8P 1=WH/BK=A- 2=WH=A+ 3=GN/BK=B- 4=GN=B+ 5=YL/BK=Z- 6=YL=Z+ 7=BK=0V 8=RD=Up	C2C=Connection type A head：M12,8-pin female straight connector； Connection type B head：M12,8-pin male straight connector； Cable length： 2M, 8-core with shield, (0.14mm²), Ø6mm.	KS60C2C	44400006
		C5C=Connection type A head：M12,8-pin female straight connector； Connection type B head：M12,8-pin male straight connector； Cable length： 5M, 8-core with shield, (0.14mm²), Ø6mm.	KS60C5C	44400007
	 M12 8P 1=WH/BK=A- 2=WH=A+ 3=GN/BK=B- 4=GN=B+ 5=YL/BK=Z- 6=YL=Z+ 7=BK=0V 8=RD=Up	C1=Connection type A head： M12,8-pin female straight connector； Connection type B head： Bare wire end； Cable length： 1M,8-core with shield, (0.14mm²), Ø6mm.	KS60C1	44400008
		C2=Connection type A head： M12,8-pin female straight connector； Connection type B head： Bare wire end； Cable length： 2M,8-core with shield, (0.14mm²), Ø6mm.	KS60C2	44400009
		C5=Connection type A head： M12,8-pin female straight connector； Connection type B head： Bare wire end； Cable length： 5M,8-core with shield, (0.14mm²), Ø6mm.	KS60C5	44400010
	 M23 12P 6=WH/BK=A- 5=WH=A+ 1=GN/BK=B- 8=GN=B+ 4=YL/BK=Z- 3=YL=Z+ 12=RD=Up 11=PK=Sensor(Up) 10=BK=0V 9=PK/BK=Sensor(0V) 2=Suspened 7=Suspened	E1=Connection type A head： M23,12-pin female straight connector； Connection type B head： Bare wire end； Cable length： 1M,10-core with shield, (0.14mm²), Ø6mm.	KS60E1	44400011
		E2=Connection type A head： M23,12-pin female straight connector； Connection type B head： Bare wire end； Cable length： 2M,10-core with shield, (0.14mm²), Ø6mm.	KS60E2	44400012
		E5=Connection type A head： M23,12-pin female straight connector； Connection type B head： Bare wire end； Cable length： 5M,10-core with shield, (0.14mm²), Ø6mm.	KS60E5	44400013
	 M23 16P 1=RD=Up 9=PK=Sensor(Up) 2=BK=0V 15=PK/BK=Sensor(0V) 4=WH=A+ 10=WH/BK=A- 5=GN=B+ 11=GN/BK=B- 6=YL=Z+ 12=YL/BK=Z- 7=BL=C+ 13=BL/BK=C- 8=GY=D+ 14=GY/BK=D- 3=Suspened 16=Suspened	F1=Connection type A head：M23,16-pin female straight connector； Connection type B head： Bare wire end； Cable length： 1M,14-core with shield, (0.14mm²), Ø6mm.	KS60F1	44400057
		F2=Connection type A head：M23,16-pin female straight connector； Connection type B head： Bare wire end； Cable length： 2M,14-core with shield, (0.14mm²), Ø6mm.	KS60F2	44400058
		F5=Connection type A head：M23,16-pin female straight connector； Connection type B head： Bare wire end； Cable length： 5M,14-core with shield, (0.14mm²), Ø6mm.	KS60F5	44400059

9. Caution

9.1 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 go near corrosive and flammable gases.
- 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.

9.2 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.

9.3 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 may be damaged.

www.shhxgd.com fang@shhxgd.com Tel: 86-21-54613487 We reserve the final interpretation right of this specifications,subject to change without notice .