

## 1. KM58 Multi-turn Absolute Encoder (Through Shaft)

### 1.1 Introduction

KM58 is a through shaft rugged design with IP65 protection, high precision photoelectric absolute encoder, capable of outputting 24Bits of single-turn position information, expandable up to 32Bits, can read up to 24Bits of multi-turn position information. The structure is sturdy and durable.

### 1.2 Feature:

- External diameter Ø58mm, thickness 30mm, diameter of shaft up to Ø25mm.
- Ring locking with shaft, flexible spring plate mounting.
- Adopt non-contact photoelectric reflection principle.
- Interface: BiSS\_C or SSI.
- Accuracy: ±80".
- Single-turn resolution of 24Bits is expandable up to max 32Bits.
- Support multi-turn data recording without power failure, the maximum recording is 24 Bits.

### 1.3 Application:

CNC, servo motor, robot and other industrial automations.

### 1.4 Connection:

- Radial socket (M12x1 8pin male connector)
- Radial cable (standard length 1M)

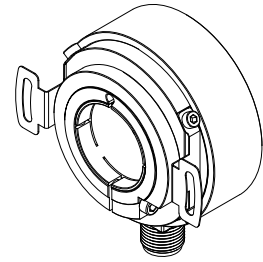
### 1.5 Protection:

IP65

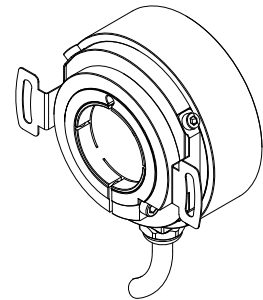
### 1.6 Weight:

about 180g

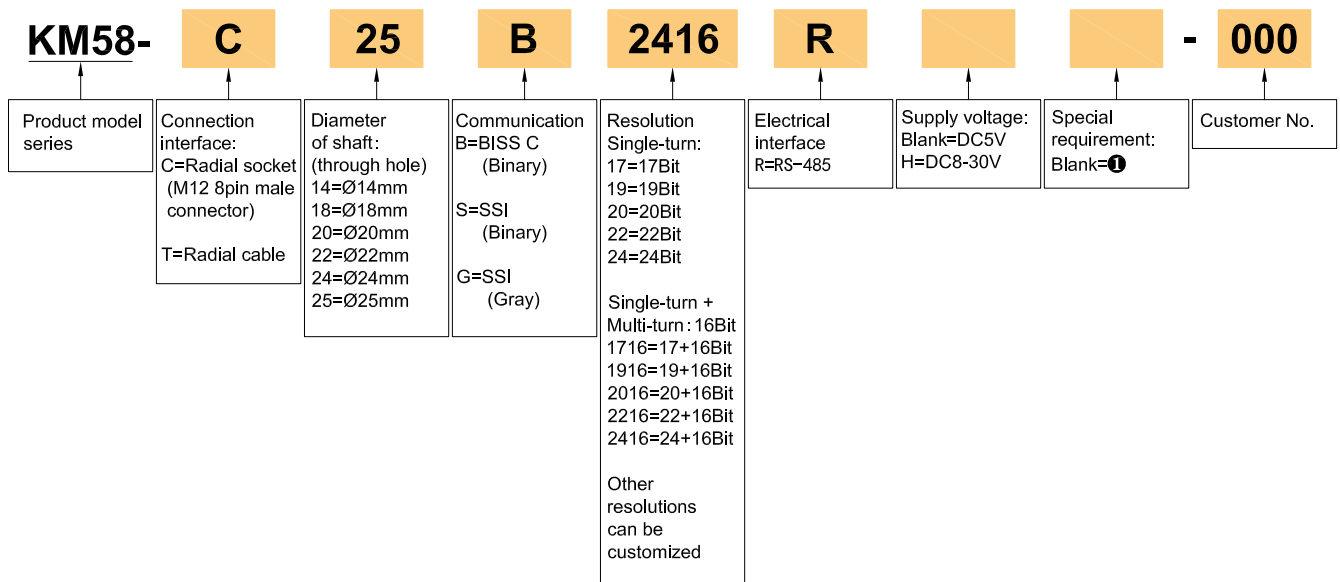
KM58-C



KM58-T



## 2. Model composition (select parameters)



Special requirement:

- ❶. IP=50; cable length 1m, if need to change the length C+number, max 10M(indicated by C10).

### 3. Basic specifications

#### 3.1 Resolution

Single-turn(ST)		Multi-turn(MT)	
17Bits	$2^{17}(0\sim+131071)$	16Bits	$2^{16}(65536 \text{ turn})$
19Bits	$2^{19}(0\sim+524287)$	16Bits	$2^{16}(65536 \text{ turn})$
20Bits	$2^{20}(0\sim+1048575)$	16Bits	$2^{16}(65536 \text{ turn})$
22Bits	$2^{22}(0\sim+4194303)$	16Bits	$2^{16}(65536 \text{ turn})$
24Bits	$2^{24}(0\sim+16777215)$	16Bits	$2^{16}(65536 \text{ turn})$

Under 24Bits as standard, expandable up to Max 32Bits

16Bits is the standard product, others can be customized, Max 24Bits

#### 3.2 Specifications

Name	Parameter	Remark
Scanning principle	Photoelectric	
Accuracy	$\pm 80''$	
Response speed	Normal action: $6000\text{min}^{-1}$	
RMS position signal noise	$\pm 2 @ 18 \text{ Bits/r}$	
Communication	BiSS_C (Binary)	Pls refer to BiSS_C standards
	SSI (Binary / Gray code)	Pls refer to SSI standards
Communication clock frequency	$\leq 10 \text{ MHz(BiSS)}$ or $\leq 5 \text{ MHz(SSI)}$	
Max resolution	24 Bits expandable up to Max 32 Bits	For frame information, please refer to P8 & P9 (data frames)
Starting time	Typical value: 13 ms	
Absolute position sampling period	$\leq 75 \text{ ns}$	
Allowable speed	$\leq 32200 \text{ r/min}$	Restricted by mechanical speed limit
Electrical connection	Radial socket & Cable connection	Pls refer to page 6
Cable	Twisted-paired cable	
Cable length	200mm - 10000mm	
Internal single-turn position update rate	15000kHz	Access rate is limited by communication frequency
Internal multi-turn position update rate	11.5kHz	
Temperature alarm limit value	$-40^{\circ}\text{C} \sim 95^{\circ}\text{C}$	

## 3.3 Mechanical specifications

Name	Parameter	Remark
Mechanical connection	Ring locking with shaft, flexible spring plate fixed connection	
Diameter of shaft	Ø14mm、Ø18mm、Ø20mm、Ø22mm、Ø24mm、Ø25mm (through)	Pls refer to page 5 for dimensions
Shaft material	Stainless steel	
Starting torque	Less than $12 \times 10^{-3}$ N·m	
Inertia moment	Less than $11 \times 10^{-6}$ kg·m <sup>2</sup>	
Shaft load	Radial 30N; Axial 20N	
Allowed speed	≤3000 rpm	
Shell material	Aluminium alloy	
Weight	About 180g	

## 3.4 Environmental parameters

Name	Parameter
Environmental temperature	Operating: -40~95°C
	Storage: -40~+95°C
Environmental humidity	Operating and storage:35~85%RH (Noncondensing)
Vibration (Endurance)	Amplitude 1.52mm ,5~55HZ,2h for X,Y,Z direction individually
Shock (Endurance)	980m/s <sup>2</sup> 11ms three times for X,Y,Z direction individually
Protection	IP65

## 4. Electrical Characteristics

### 4.1 Absolute maximum ratings

Symbol	Instructions	Minimum	Maximum	Unit
V <sub>CC</sub>	Supply Voltage	-0.3	+6.0	V
V <sub>BAT</sub>	Backup Voltage	-0.3	+6.0	V
T <sub>STG</sub>	Storage Temperature	-40	+95	° C
T <sub>J</sub>	Junction Temperature	-50	+125	° C

### 4.2 Electrical specification

Symbol	Instructions	Minimum	Typical value	Maximum	Unit
V <sub>CC</sub>	Supply Voltage DC5V	4.75	5.0	5.5	V
	Supply Voltage DC8-30V	7.75	30	32	V
I <sub>DD</sub>	Supply Current	-	-	120	mA
V <sub>BAT</sub>	Backup Voltage ❶	3.0	3.6	4.2	V
I <sub>(BAT)</sub>	Backup Current	-	-	35	uA
f <sub>BISS</sub> ❷	BISS Communication clock frequency	-	-	10	MHz
	SSI Communication clock frequency	-	-	5.0	MHz
T <sub>a</sub>	Operating temperature	-40		+95	° C

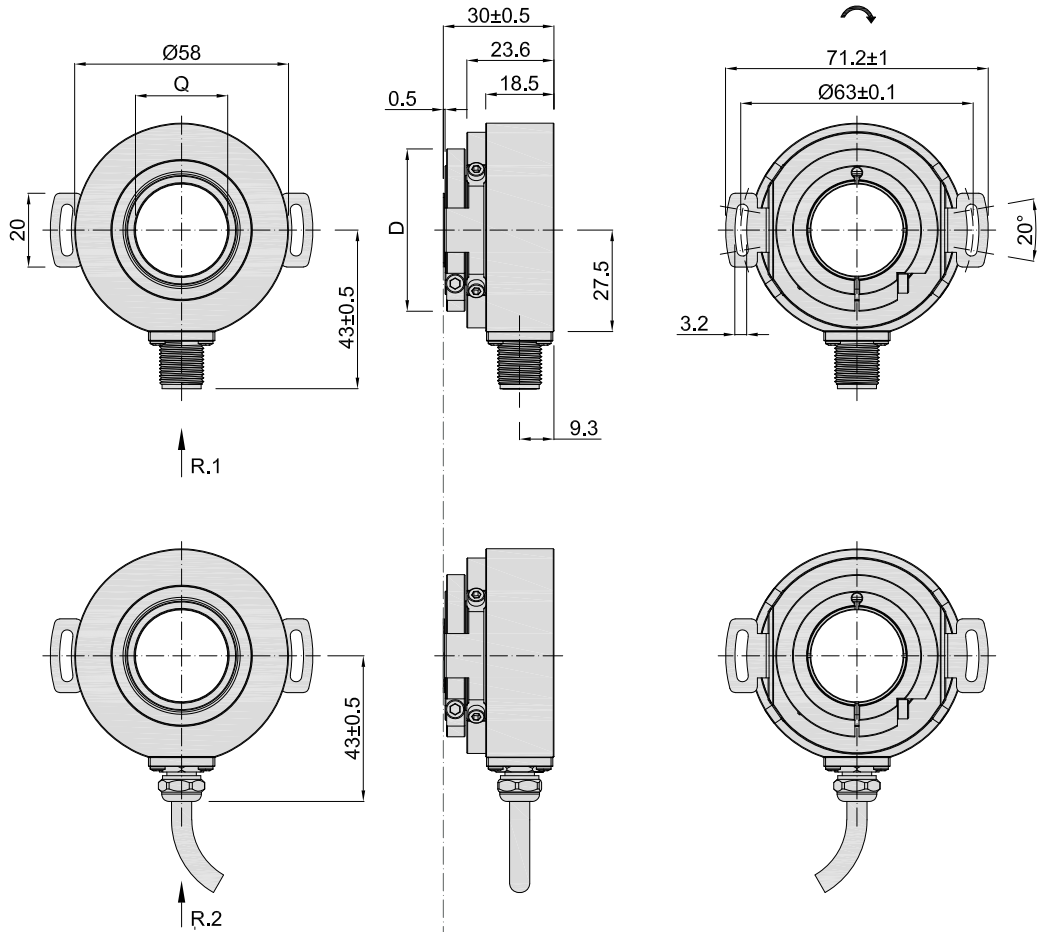
❶ For the power supply sequence of multi-turn absolute encoders, be sure to power on the system after the battery has been powered up.

❷ Pls refer to BiSS\_C and SSI standards.

5. Basic Dimensions

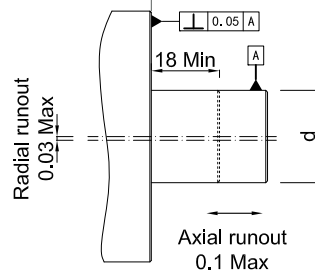
5.1 Dimensions

Q(Shaft)	D
Ø14 <sup>G7</sup> (+0.024/+0.006)	Ø35
Ø18 <sup>G7</sup> (+0.028/+0.007)	Ø37
Ø20 <sup>G7</sup> (+0.028/+0.007)	Ø41
Ø22 <sup>G7</sup> (+0.028/+0.007)	Ø41
Ø24 <sup>G7</sup> (+0.028/+0.007)	Ø44
Ø25 <sup>G7</sup> (+0.028/+0.007)	Ø44



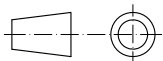
5.2 Specification for mounting shaft

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



d
Ø14 <sub>g6</sub> (-0.006/-0.017)
Ø18 <sub>g6</sub> (-0.007/-0.020)
Ø20 <sub>g6</sub> (-0.007/-0.020)
Ø22 <sub>g6</sub> (-0.007/-0.020)
Ø24 <sub>g6</sub> (-0.007/-0.020)
Ø25 <sub>g6</sub> (-0.007/-0.020)

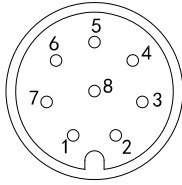
Unit: mm



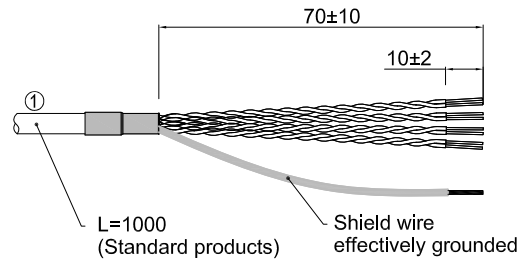
- ↻ = Shaft rotation direction of the signal output
- R. 1 = Radial socket(M12x1 8pin male connector)
- R. 2 = Radial cable (standard length 1000)

6. Interface Definition

6.1 Functional definition of socket pin number and wire color BISS\_C / SSI



M12 8pin male connector pin distribution diagram



Cable connection

Pin No. / Wire color		Signal				Function	Twisted-paired cable
M12 8pin	Wire color	BISS_C ST	BISS_C MT	SSI ST	SSI MT		
1	Red	Up	Up	Up	Up	Power positive	
2	Black	Un	Un	Un	Un	Power negative	
3	White	SL-	SL-	DATA-	DATA-	Data signal	
4	White/BK	SL+	SL+	DATA+	DATA+	Data signal	
5	Green	MA-	MA-	CLOCK-	CLOCK-	Clock signal	
6	Green/BK	MA+	MA+	CLOCK+	CLOCK+	Clock signal	
7	Yellow	N.C.	Vbat	N.C.	Vbat	Backup power supply	
8	Yellow/BK	N.C.	0V	N.C.	0V	0V	

① Cable length 1M is our factory standard, the longest can be purchased up to 10M.

Unit: mm

6.2 Electrical Connection

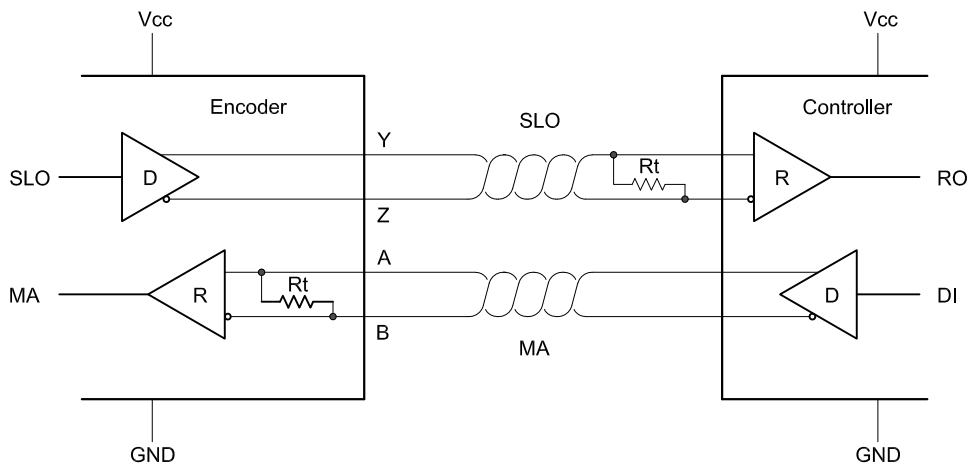


Figure 1: Point-to-point configuration

Note: Both the MA and SLQ lines are differential twisted-paired cable transmission, compatible with RS422.  
The terminal resistor of the MA transmission line has been integrated inside the encoder.

6.3 BiSS\_C Communication

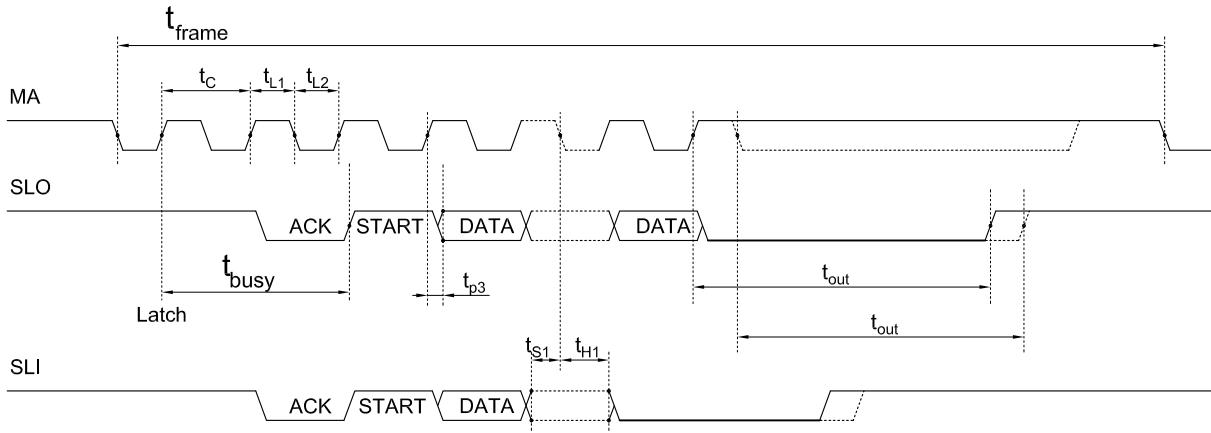


Figure 2: BiSS-C Timing

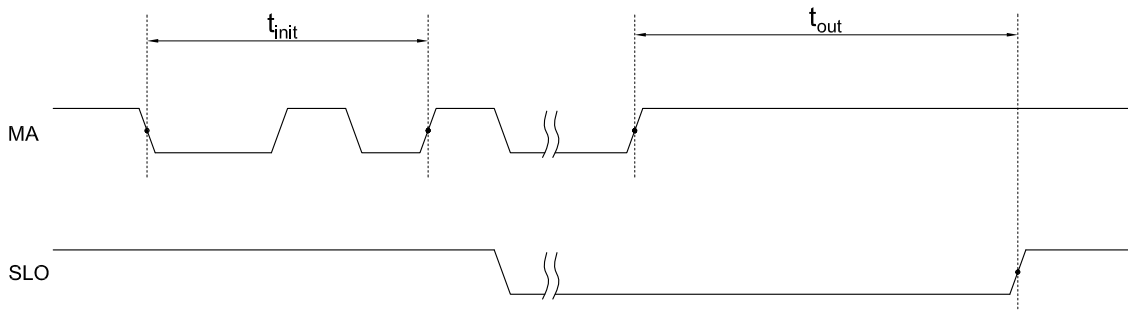


Figure 3: BiSS-C (SSI) Slave Timeout Sequence

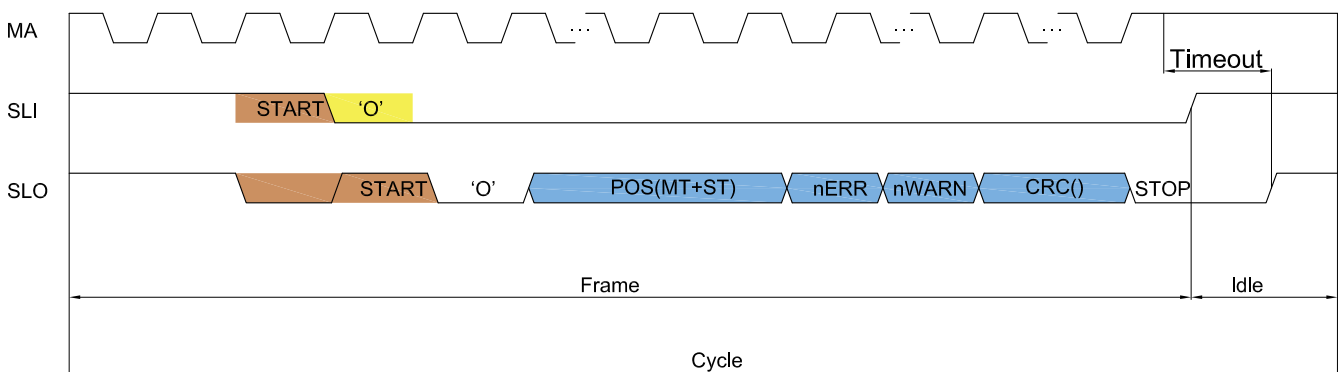


Figure 4: BiSS Frame Structure



6.4 SSI Communication

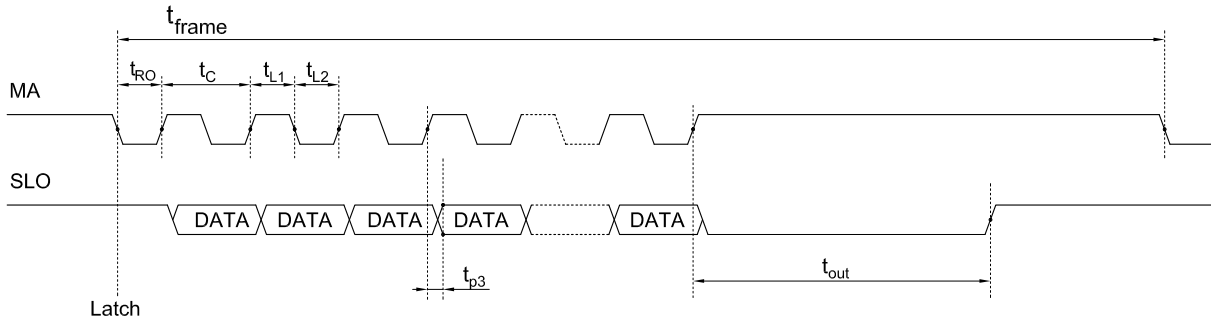


Figure 5: SSI Timing

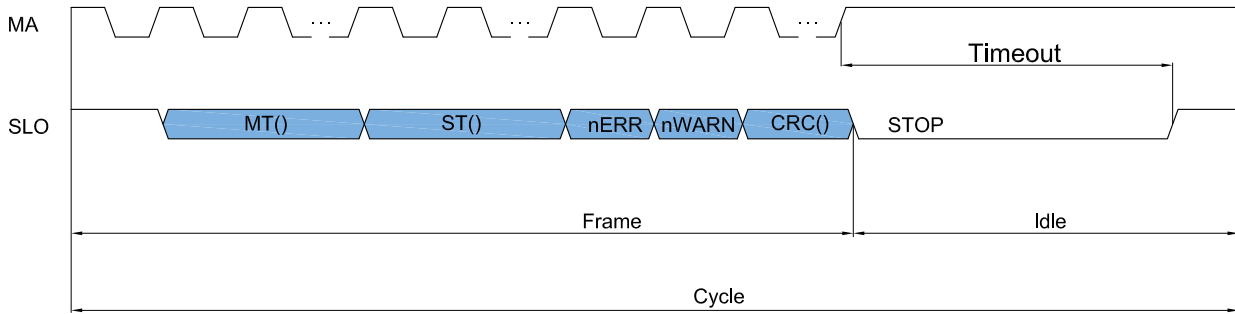




Figure 6: SSI Frame Structure

The frame is composed of frame structure and data to be transmitted. The sequence of data transmission first is MSB, error bit and alarm bit are low effective, cyclic redundancy check transmitted inverted. The specific data composition is shown in the below table:

Bits No.	Data	Instructions
[55:32]	MT[23:0]	Recording the accumulative number of the encoder running after power on
[31:8]	ST[23:0]	Current data of absolute location
[7]	nERR	Error output, active low
[6]	nWARN	Warning output, active low
[5:0]	CRC[5:0]	Check bit CRC polynomial of 0x43 with a starting value of 0 (output at flip level)

7. Recommended Accessories

Plug and cable	Brief description	No.	Order No.
	C2C=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	KM60C2C	44400014
	C5C=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	KM60C5C	44400015
	C1=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	KM60C1	44400016
	C2=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	KM60C2	44400017
	C5=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	KM60C5	44400018

## 8. Caution

### 8.1 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.

### 8.2 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.

### 8.3 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.