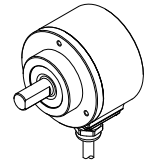


1. SM58 Multi-turn absolute encoder (Solid shaft)

1.1 Introduction

SM58 is a solid shaft rugged housing design, high precision electronic multi-turn absolute photoelectric encoder, capable of outputting 24Bits of single-turn position information, expandable up to 32Bits, and can read multi-turn position information up to 24Bits, four mounting flanges and collars sizes, the highest protection grade is IP65, the product structure are compact, high safely, suitable for high-intensity mechanical movement positioning field.

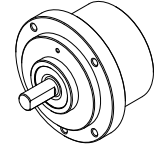
SM58-A



1.2 Feature:

- Encoder external diameter Ø58mm, thickness 36-40mm, diameter of shaft of Ø6mm, Ø8mm, Ø10mm available;
- Four sizes of mounting flanges available;
- Adopt non-contact photoelectric reflection principle M-code principle;
- Interface: BiSS_C or SSI.
- Accuracy: ±80".
- Single-turn resolution of 24Bits is expandable up to maximum 32Bits.
- Support multi-turn data recording without power failure, the maximum recording is 24 Bits.

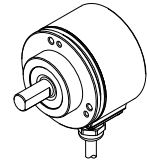
SM58-B



1.3 Application:

Motor, elevator, textile, packaging, CNC and other automation control fields.

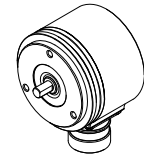
SM58-C



1.4 Connection:

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

SM58-D



1.5 Protection:

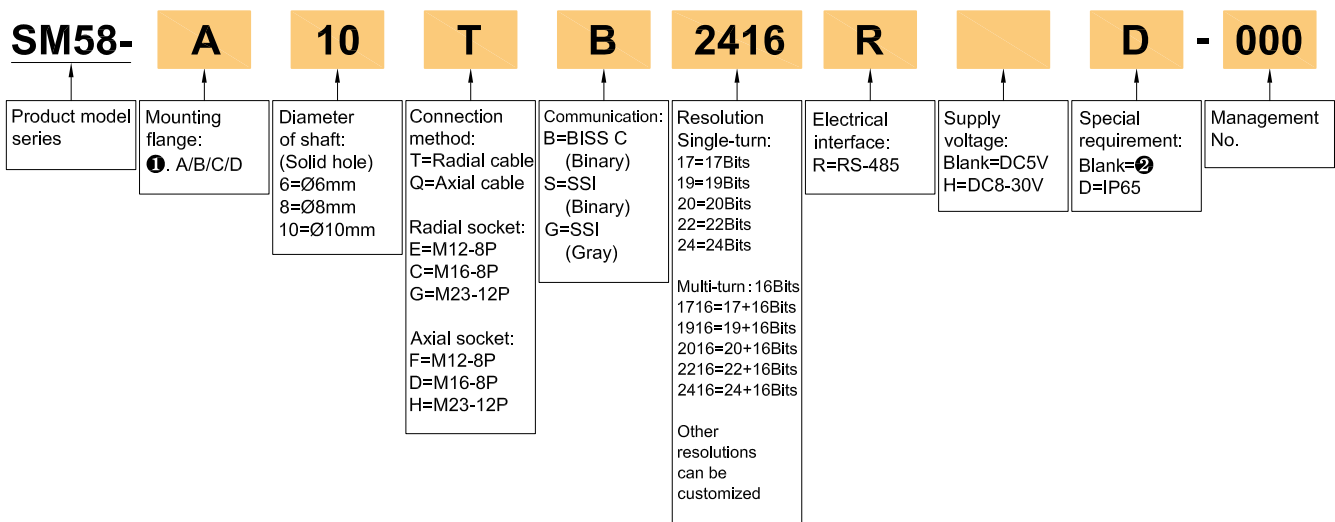
IP65 (Max)

1.6 Weight:

about 420g

2. Model Selection Guide

Model composition(select parameters)



Mounting flange:

- ①. 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:

- ②. IP=50; cable length 1m, if need to change the length C+number, max 100m(indicated by C100).

3. Basic specification

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 Parameter

Name	Parameter	Remark
Scanning principle	Photoelectric	
Accuracy	$\pm 80''$	
Response speed	Normal action: 6000min^{-1}	
position data jitter	$\pm 2 @ 18 \text{ Bits/r}$	
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 $\leq 5 \text{ MHz(SSI)}$	
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	Cable connection or socket connection (M12/M16/M23 male)	Pls refer to page 6
Cable	Differential twisted-paired cable	
Cable length	300mm - 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 specification

Name	Parameter	Remark
Mechanical Connection	Clamping flange or synchro flange	
Diameter of shaft	Ø6mm、Ø8mm、Ø10mm(D type, solid shaft)	Pls refer to page 5 for dimensions
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·m ²	
Shaft load	Radial 60N; Axial 40N	
Allowed speed	≤6000 rpm	
Shell material	Aluminium alloy	
Weight	about 420g	

3.4 Environmental specification

Name	Parameter
Environmental temperature	Operating: -40~95°C
	Storage: -40~+95°C
Environmental humidity	Operating and storage:35~85%RH (Noncondensing)
Vibration	Amplitude 1.52mm ,5~55HZ,2h for X,Y,Z direction individually
Shock	980m/s ² 11ms three times for X,Y,Z direction individually
Protection	IP50 & IP65

4. Electrical specification

4.1 Absolute Maximum Ratings

Symbol	Instructions	Minimum	Maximum	Unit
V _{CC}	Supply Voltage	-0.3	+6.0	V
V _{BAT}	Backup Voltage	-0.3	+6.0	V
T _{STG}	Storage Temperature	-40	+95	° C
T _J	Junction Temperature	-50	+125	° C

4.2 Recommended electrical specification

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

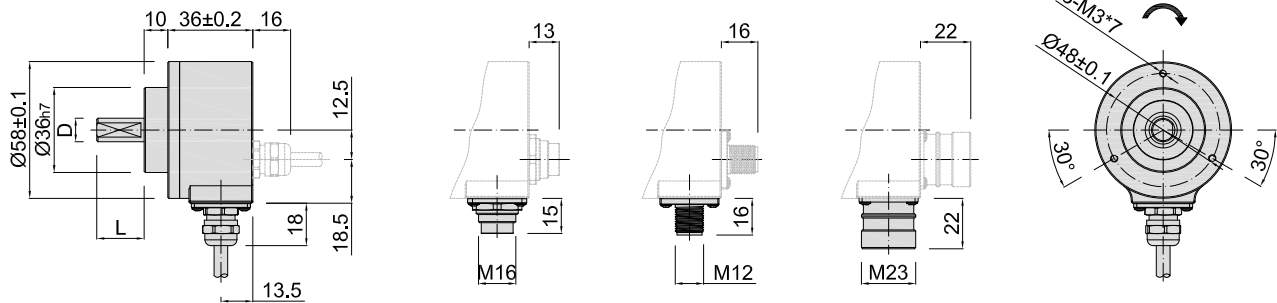
❶ For the power supply sequence of multi-turn absolute encoders, be sure to power on the system after the battery has been powered up.

❷ Pls refer to BiSS_C and SSI standards.

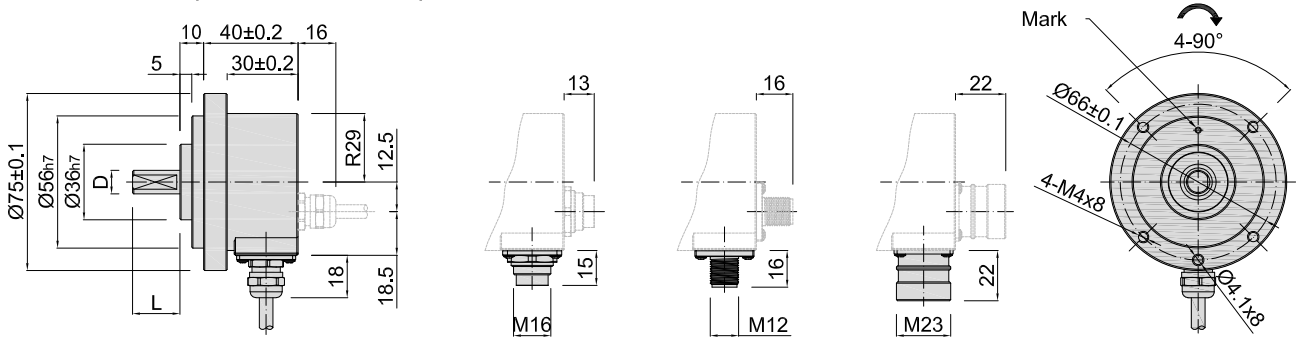
SM58 ABSOLUTE BISS/SSI

5. Basic Dimensions

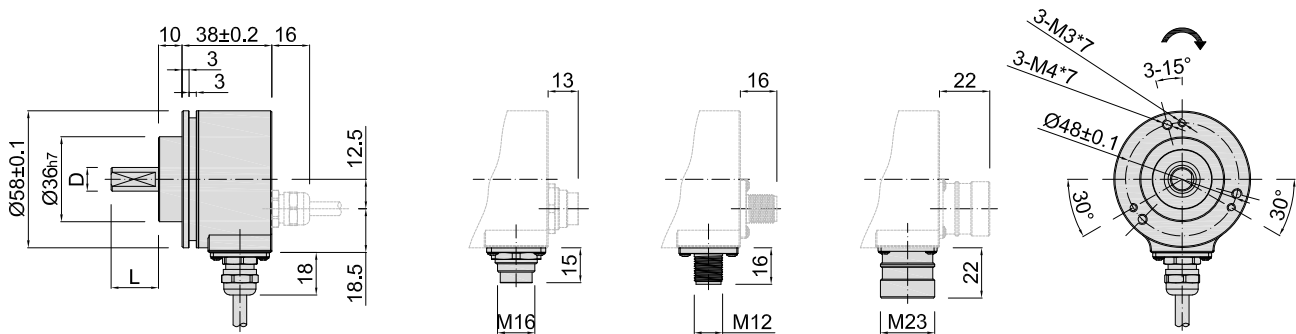
5.1 SM58-A (Basic dimensions)



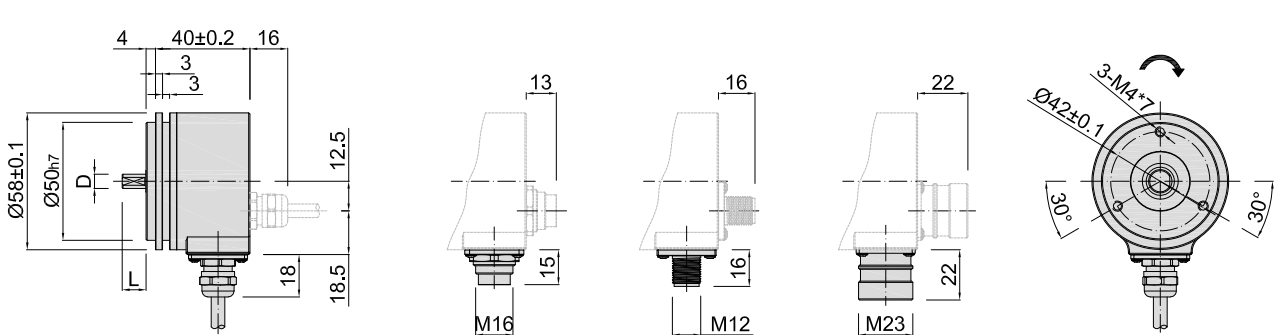
5.2 SM58-B (Basic dimensions)



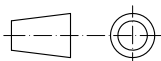
5.3 SM58-C (Basic dimensions)



5.4 SM58-D (Basic dimensions)



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

6. Interface Definition

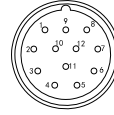
6.1 Functional definition of socket pins and wire colors BISS_C / SSI



Socket pin definition (M12 8-pin)



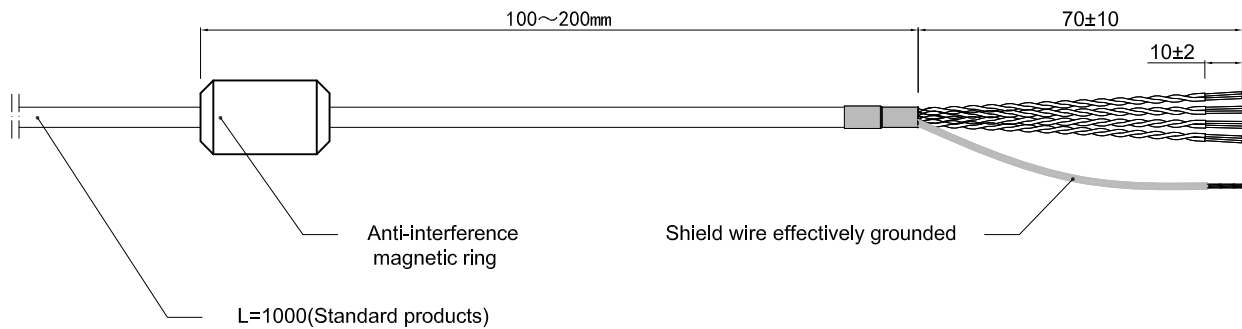
Socket pin definition (M16 8-pin)



Socket pin definition (M23 12-pin)

Wire color	Socket pin number	Signal				Function	Twisted-paired cable
		BISS_C ST	BISS_C MT	SSI ST	SSI MT		
Red	1	Up	Up	Up	Up	Power positive	
Black	2	Un	Un	Un	Un	Power negative	
White	3	SL-	SL-	DATA-	DATA-	Data signal	
White/BK	4	SL+	SL+	DATA+	DATA+	Data signal	
Green	5	MA-	MA-	CLOCK-	CLOCK-	Clock signal	
Green/BK	6	MA+	MA+	CLOCK+	CLOCK+	Clock signal	
Yellow	7	N.C.	Vbat	N.C.	Vbat	Backup power supply	
Yellow/BK	8	N.C.	0V	N.C.	0V	0V	
-	9	N.C.	N.C.	N.C.	N.C.	Unallocated	-
-	10	N.C.	N.C.	N.C.	N.C.	Unallocated	-
-	11	N.C.	N.C.	N.C.	N.C.	Unallocated	-
-	12	N.C.	N.C.	N.C.	N.C.	Unallocated	-
GND	No encoder body connected						

Schematic diagram of cable ends



Unit: mm

6.2 Electrical Connection

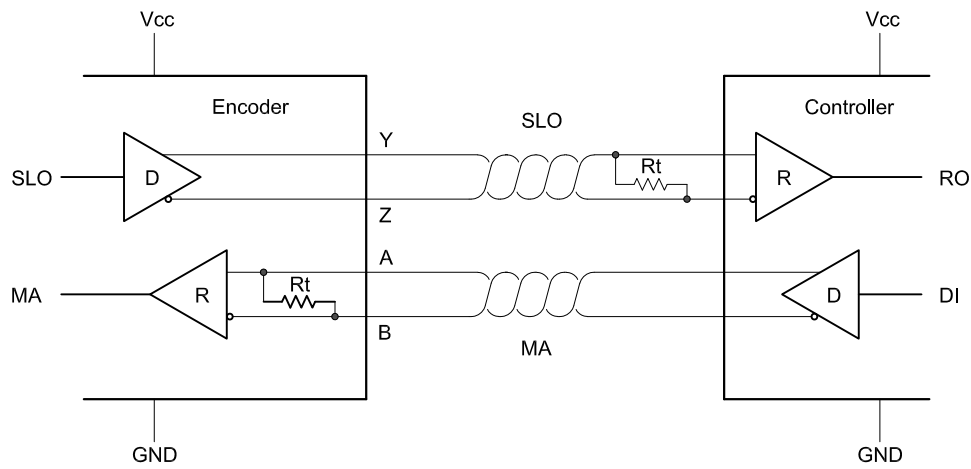


Figure 1: Point-to-point configuration

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

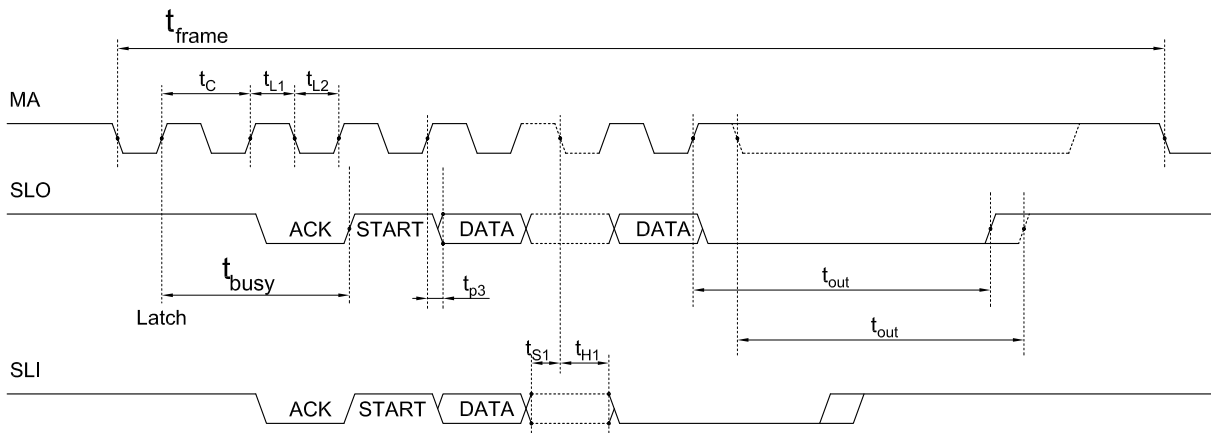


Figure 2: BiSS-C Timing

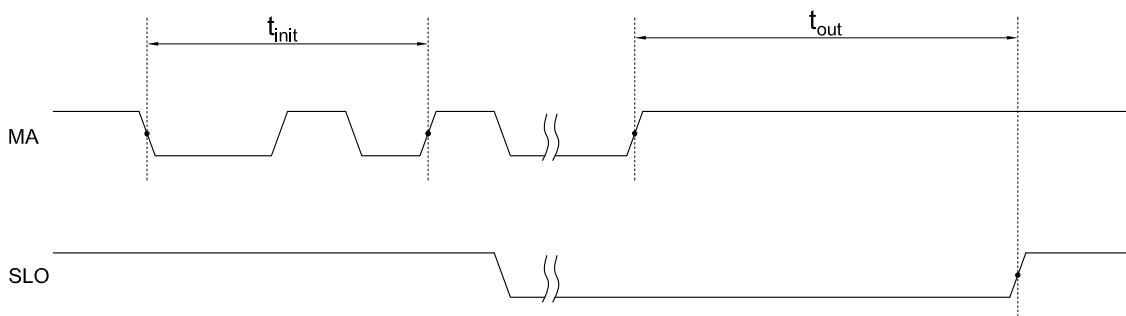


Figure 3: BiSS-C (SSI) Slave Timeout Sequence

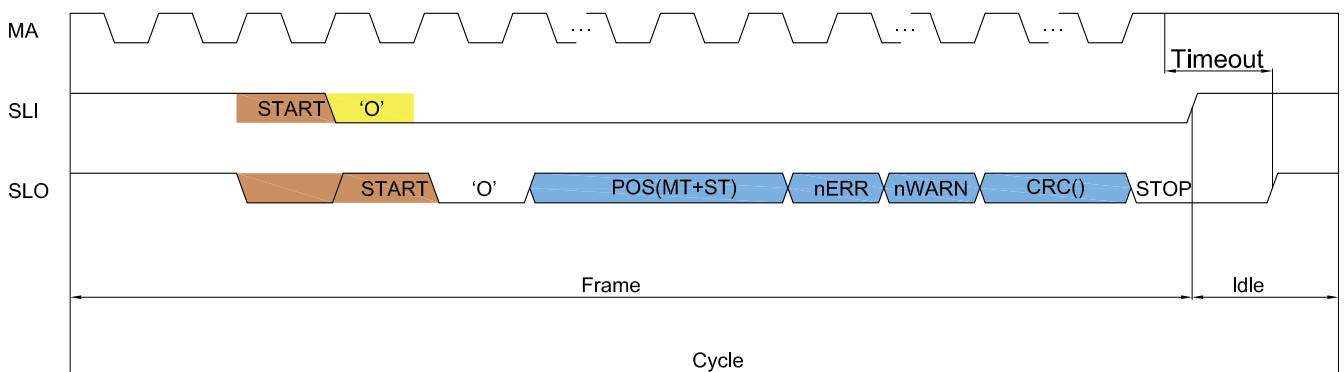


Figure 4: BiSS Frame Structure

6.4 SSI Communication

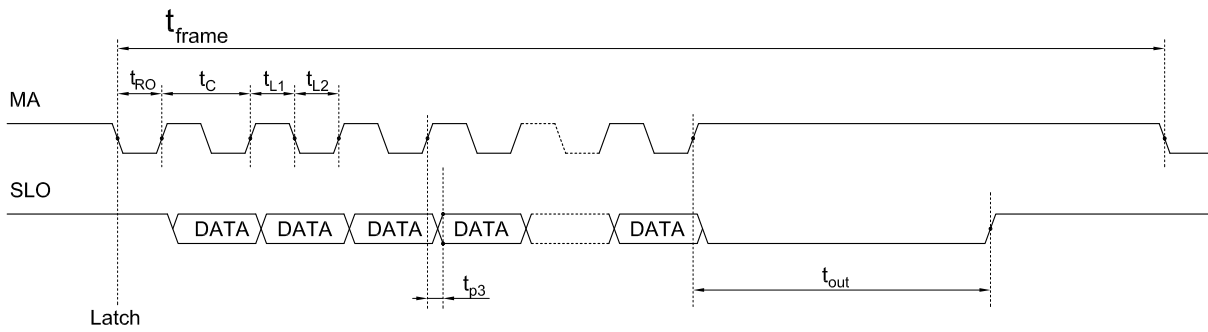


Figure 5: SSI Timing

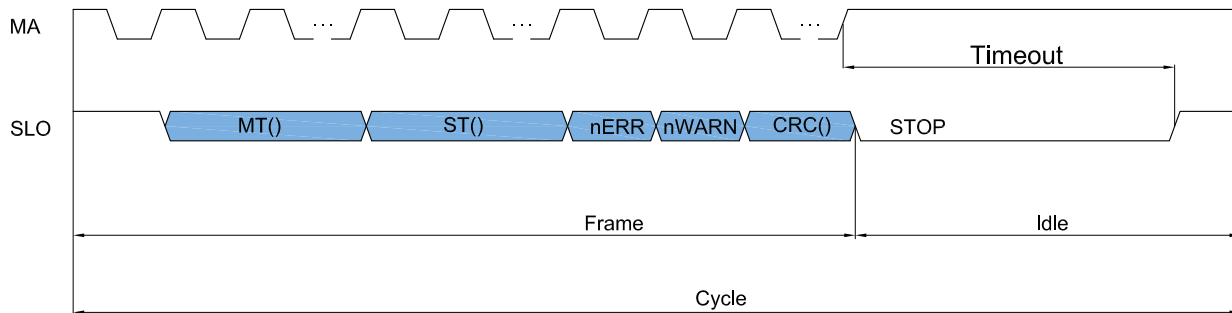


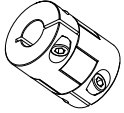
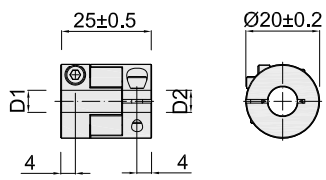

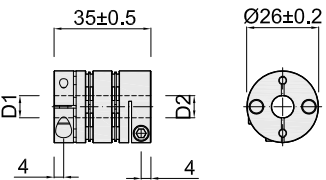
Figure 6: SSI Frame Structure

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:

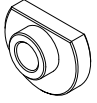
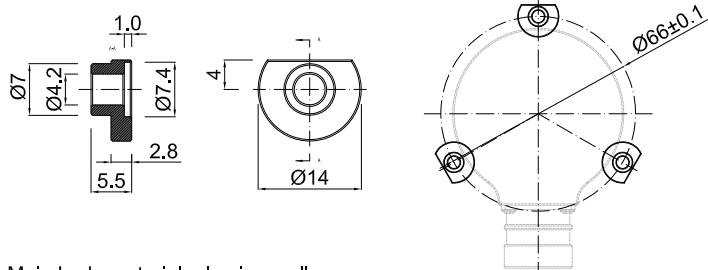
Bits No.	Data	Instructions
[55:32]	MT[23:0]	Recording the accumulative number of the encoder running after power on
[31:8]	ST[23:0]	Current data of absolute location
[7]	nERR	Error output, active low
[6]	nWARN	Warning output, active low
[5:0]	CRC[5:0]	Check bit CRC polynomial of 0x43 with a starting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

7. Recommended Accessories

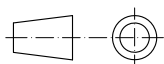
7.1 Coupler

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

7.2 Mounting cardboard

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

Unit: mm



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.