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Mosrac motor

DP SERIES ABSOLUTE ROTARY ENCODERS

Indigenous R&D, secure and controllable

Product Ordering Instructions

DP – 20 – 50 – A – 19 – 01 – 05 – S

Product Series

DP: Inner/outer dual absolute encoder

Product inner diameter

25: Inner diameter 25mm

Product outer diameter

60: Outer diameter 60mm

Output type

A: Single-turn absolute

Encoder output resolution

15：15-bit（32768 ）
17：17-bit（131072）
18：18-bit（262144）
19：19-bit（524288）
20：20-bit（1048576）
21：21-bit（2097152）
22：22-bit（4194304）

Communication protocol

B: BiSS-C interface
S: SSI interface
R: RS-422 serial interface
E: RS-485

Power supply voltage

05: 5V (default)
12: 12V
24: 24V

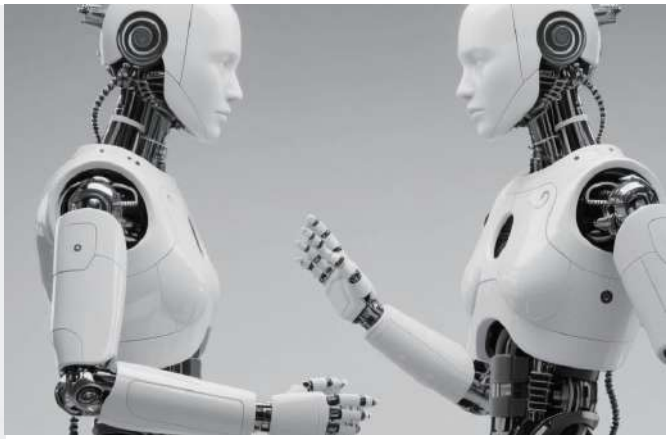
Operating temperature

01: -30℃ ~ +85℃ (default)
02: -40℃ ~ +125℃

Illustrated by example

DP–20–50–A–19–02–05–E indicates a DP-series absolute dual encoder with a 20 mm bore diameter and 50 mm outer diameter. “19” denotes 19-bit single-turn absolute resolution. The operating temperature range is −40 °C ~ +125 °C, the power supply is 5 V, and the output communication protocol is RS-485.

DP Series Single-Sided Dual Encoder



DP Dual-Encoder, Inner & Outer Ring, Ultra-Slim

The product consists of a stator and a rotor with inner and outer dual code discs. Utilizing electromagnetic field stacking and recognition technology, it achieves a single-sided dual-encoder design in an ultra-thin, ultra-narrow form factor. It features high precision, low power consumption, and an extremely compact structure.
The DP single-sided dual-encoder also incorporates two independent position detection and signal output mechanisms, making it ideal for space-constrained applications such as robotic joints or multi-axis automation equipment. Customizable options are available to perfectly meet specific customer requirements.

Industry Applications

- Humanoid robot
- Logistics automation
- New energy equipment
- Medical equipment

Product Model	Outer diameter / Inner diameter / Thickness	Weight (approx.)	Resolution	Accuracy	Maximum rotational speed	Moment of inertia (inner/outer)
DP1025	25\9-14.4\4.5mm	2g	17bit	±0.03°	6000 rpm	0.006\0.018kg· mm²
DP1530	30\14-19.4\4.5mm	3g	17bit	±0.03°	6000 rpm	0.019\0.039kg· mm²
DP2035	35\19-24.4\4.5mm	4g	17bit	±0.03°	6000 rpm	0.041 \0.073kg· mm²
DP2540	40\24-29.4\4.5mm	5g	17bit	±0.03°	6000 rpm	0.077\0.122kg· mm²
DP3045	45\29-34.4\4.5mm	5g	17bit	±0.03°	6000 rpm	0.129\0.189kg· mm²
DP1038	38/10/3.8mm	10g	17~19 bit	±0.015°	6000 rpm	0.05\0.16kg· mm²
DP1646	46/16/3.6mm	12g	17~19 bit	±0.015°	6000 rpm	0.17\0.4kg· mm²
DP2055	55/20/3.6mm	16g	17~19 bit	±0.015°	6000 rpm	0.36\1.0kg· mm²
DP3065	65/30/3.6mm	20g	18~20 bit	±0.01°	6000 rpm	0.88\2.06kg· mm²
DP3575	75/35/3.6mm	25g	18~20 bit	±0.01°	6000 rpm	1.84\3.95kg· mm²
DP4585	85/45/3.6 mm	30 g	18~20 bit	±0.01°	6000 rpm	3.4/6.33 kg·mm²
DP55100	100/55/4 mm	45 g	19~21 bit	±0.01°	6000 rpm	6.54/13.5 kg·mm²
DP85130	130/85/4 mm	60 g	19~21 bit	±0.01°	6000 rpm	20.62 /34.34kg·mm²

Power supply voltage	Electrical interface	Output protocol	Operating temperature	Highest level of protection
5V	＜ 80 mA	SSi、BiSS-C、RS-422、RS-485	-40℃ - +125℃	IP 40

DP1025

Thin-type Same-side Dual Encoder

Specifications

1-Basic Encoder Performance Parameters

Angular Resolution	17bit
Maximum Static Error	±0.03°
Repeatability Error	±2 LSB
Maximum Operating Speed	6000rpm
Measurement Range	Single-turn + Pseudo-Multiturn
Rotation Direction	Default: Clockwise Increasing (Adjustable)

2-Mechanical Dimensions and Installation

Outer Diameter / Inner Diameter (Rotor Inner/ Outer Ring) / Thickness	25\9-14.4\4.5mm Thickness does not include connectors or mounting components.
Allowable Installation Eccentricity	±0.05mm
Allowable Installation Axial Tolerance	±0.1mm
Rotor Inertia (Inner/Outer Ring)	0.006\0.018kg· mm^2
Weight (Approx.)	2g
Rotor and Stator Material Flammability Rating	FR-4、SUS304

3-Electrical and Interface

Supply Voltage	5v±5%
Current	≤80mA
Electrical Interface	Connector
Output Protocol	SSI、BISSC、RS-422、RS-485

4. Environmental Adaptability

EMC	IEC61000-6-2、IEC61000-6-4
Operating Temperature	-30°C~+105°C
Storage Temperature	-55°C~+ 125°C
Relative Humidity	0~99%
Shock	100g, 6ms; 3 times each in the ±X, ±Y, and ±Z axes (18 cycles total);
Vibration	10–55 Hz, amplitude 1.5 mm; 55–2000 Hz, acceleration 10g; 2 hours each in the X, Y, and Z axes (6 hours total)
Maximum Protection Rating	IP40

Electrical Interface

- Hardware Interface

The Model DP1025 inductive encoder consists of two components: a stator and a rotor. The stator integrates both the angle resolution circuitry and the encoder output circuitry. The encoder utilizes a connector-based output interface (as illustrated in the figure below), and supports SSI, BiSS-C, RS-422, and RS-485 serial protocols for angle output.

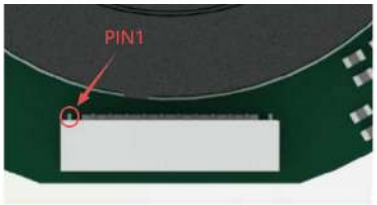
5-Communication Interface Cable Pin Definitions

No.	RS-422	SSI	BISS-C	RS-485	Remarks
1	TX-	DATA-	SLO-	\	Outer Encoder
2	TX+	DATA+	SLO+	\	
3	RX-	CLK-	MA-	B-	
4	RX+	CLK+	MA+	A+	
5	TX-	DATA-	SLO-	\	Inner Encoder
6	TX+	DATA+	SLO+	\	
7	RX-	CLK-	MA-	B-	
8	RX+	CLK+	MA+	A+	
9	GND				Ground
10	5V				Power Supply

6 - SSI/BISS/RS-485 Digital Output Parameters

Digital Output Parameters	
Signal Delay	<50us
Output Code Format	Binary
Maximum Data Update Rate	20kHz
Interface Levels	DifferentialRS-422/RS-485

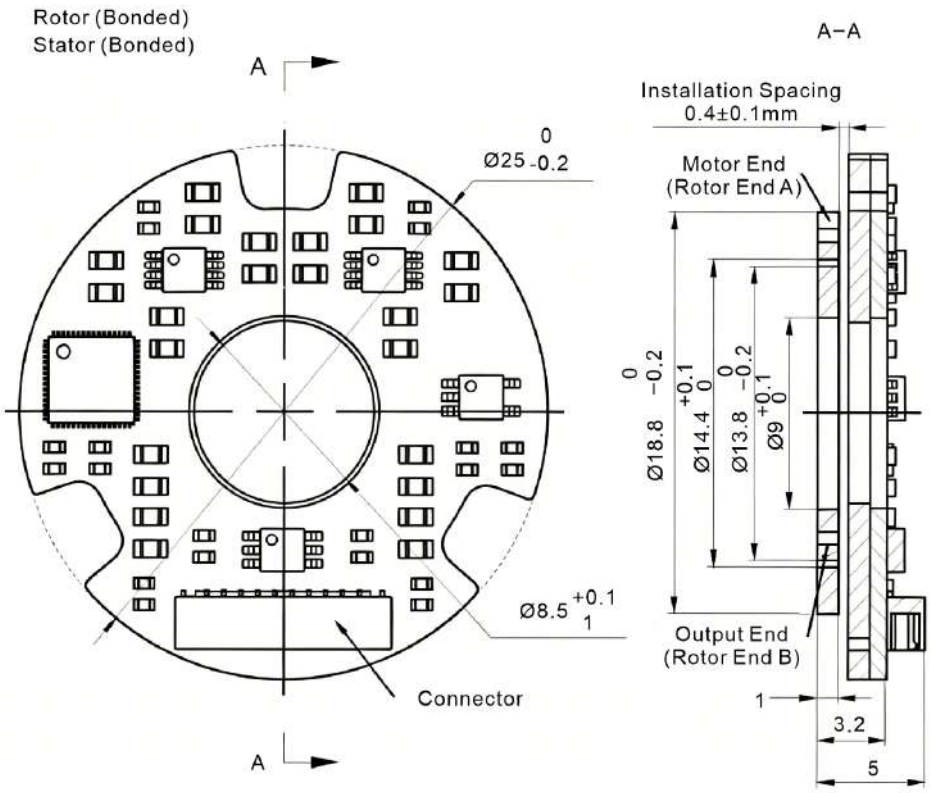
When utilizing digital signal acquisition, the sampling rate and clock frequency depend on the communication protocol selected by the user.Connector and Pin 1 Definitions Connector Model

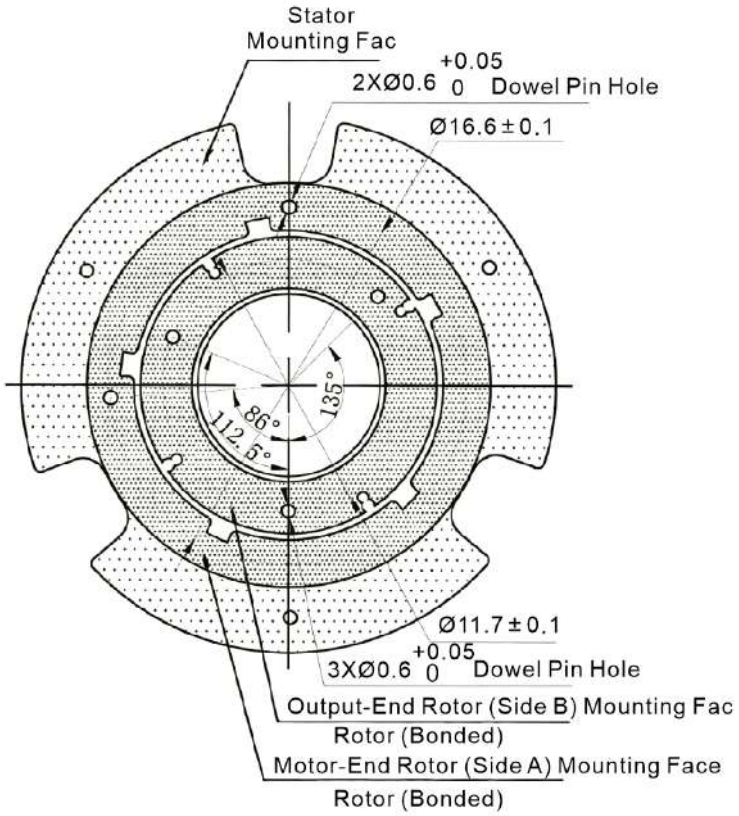


- Connector and Pin Definitions
- Connector Model SM10B-SU RS-TF

Mechanical Interface

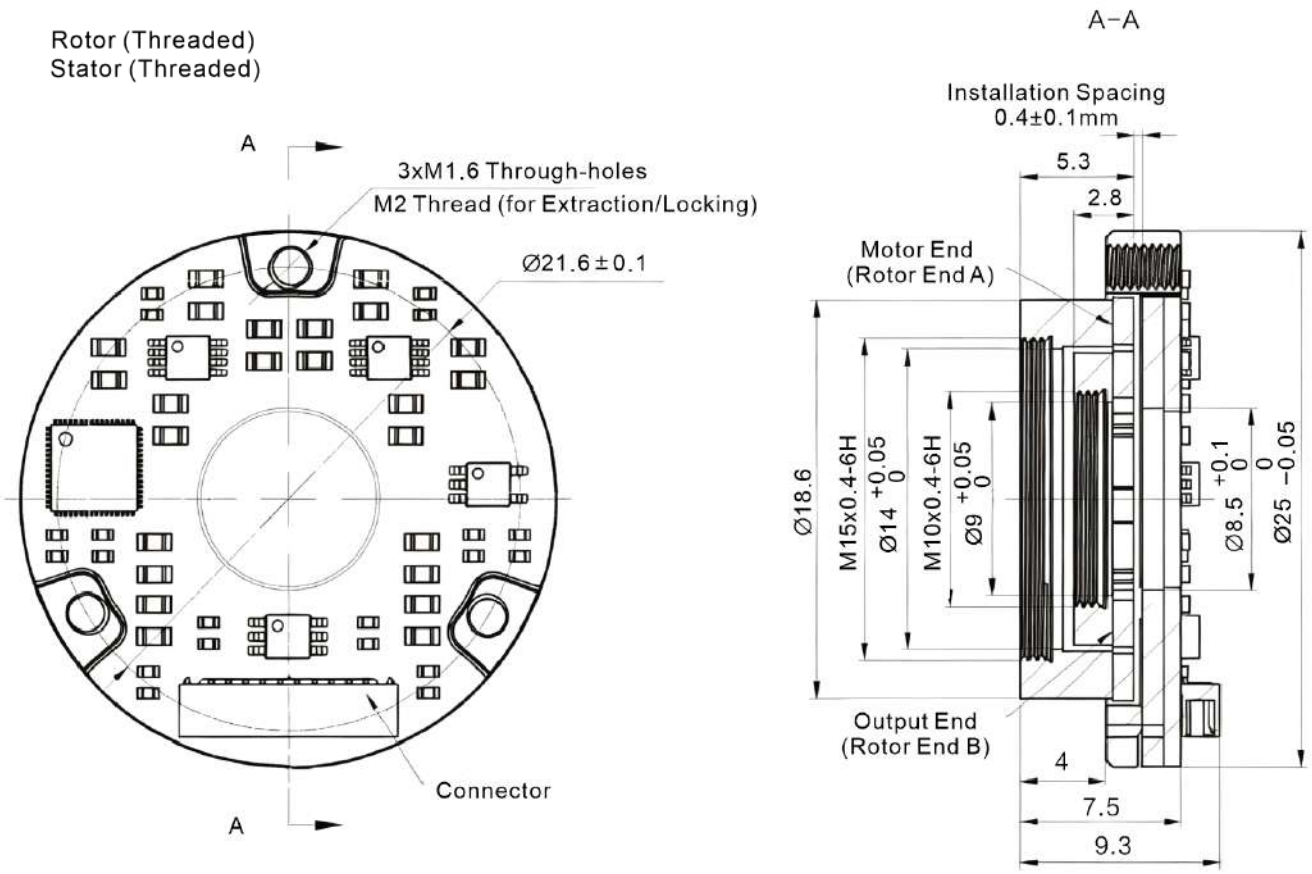
- Product Dimensions

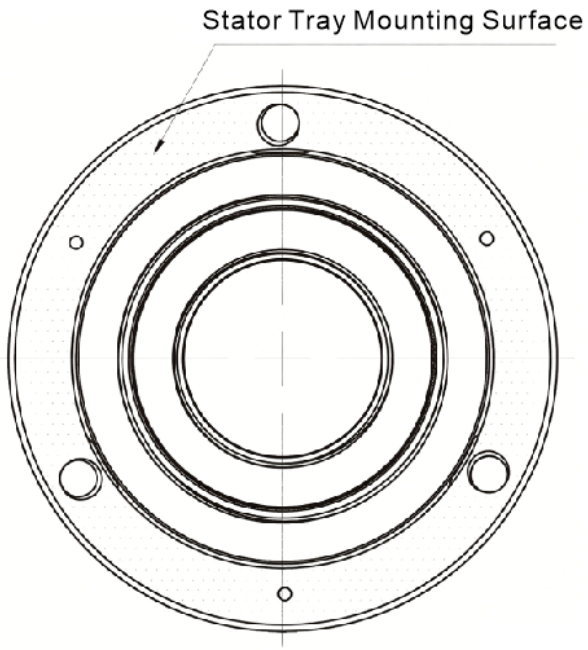




Mechanical Interface

- Product Dimensions





DP1530

Thin-type Same-side Dual Encoder

Specifications

1-Basic Encoder Performance Parameters

Angular Resolution	17bit
Maximum Static Error	±0.03°
Repeatability Error	±2 LSB
Maximum Operating Speed	6000rpm
Measurement Range	Single-turn + Pseudo-Multiturn
Rotation Direction	Default: Clockwise Increasing (Adjustable)

2-Mechanical Dimensions and Installation

Outer Diameter / Inner Diameter (Rotor Inner/ Outer Ring) / Thickness	30\14-19.4\4.5mm Thickness does not include connectors or mounting components.
Allowable Installation Eccentricity	±0.05mm
Allowable Installation Axial Tolerance	±0.1mm
Rotor Inertia (Inner/Outer Ring)	0.019\0.039kg· mm^2
Weight (Approx.)	3g
Rotor and Stator Material Flammability Rating	FR-4、SUS304

3-Electrical and Interface

Supply Voltage	5v±5%
Current	≤80mA
Electrical Interface	Connector
Output Protocol	SSI、BISS-C、RS-422、RS-485

4. Environmental Adaptability

EMC	IEC61000-6-2、IEC61000-6-4
Operating Temperature	-30°C~+105°C
Storage Temperature	-55°C~+ 125°C
Relative Humidity	0~99%
Shock	100g, 6ms; 3 times each in the ±X, ±Y, and ±Z axes (18 cycles total);
Vibration	10–55 Hz, amplitude 1.5 mm; 55–2000 Hz, acceleration 10g; 2 hours each in the X, Y, and Z axes (6 hours total)
Maximum Protection Rating	IP40

Electrical Interface

- Hardware Interface

The Model DP1530 inductive encoder consists of two components: a stator and a rotor. The stator integrates both the angle resolution circuitry and the encoder output circuitry. The encoder utilizes a connector-based output interface (as illustrated in the figure below), and supports SSI, BiSS-C, RS-422, and RS-485 serial protocols for angle output.

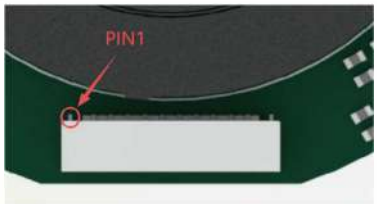
5-Communication Interface Cable Pin Definitions

No.	RS-422	SSI	BISS-C	RS-485	Remarks
1	TX-	DATA-	SLO-	\	Outer Encoder
2	TX+	DATA+	SLO+	\	
3	RX-	CLK-	MA-	B-	
4	RX+	CLK+	MA+	A+	
5	TX-	DATA-	SLO-	\	Inner Encoder
6	TX+	DATA+	SLO+	\	
7	RX-	CLK-	MA-	B-	
8	RX+	CLK+	MA+	A+	
9	GND				Ground
10	5V				Power Supply

6 - SSI/BISS/RS-485 Digital Output Parameters

Digital Output Parameters	
Signal Delay	<50us
Output Code Format	Binary
Maximum Data Update Rate	20kHz
Interface Levels	Differential RS-422/RS-485

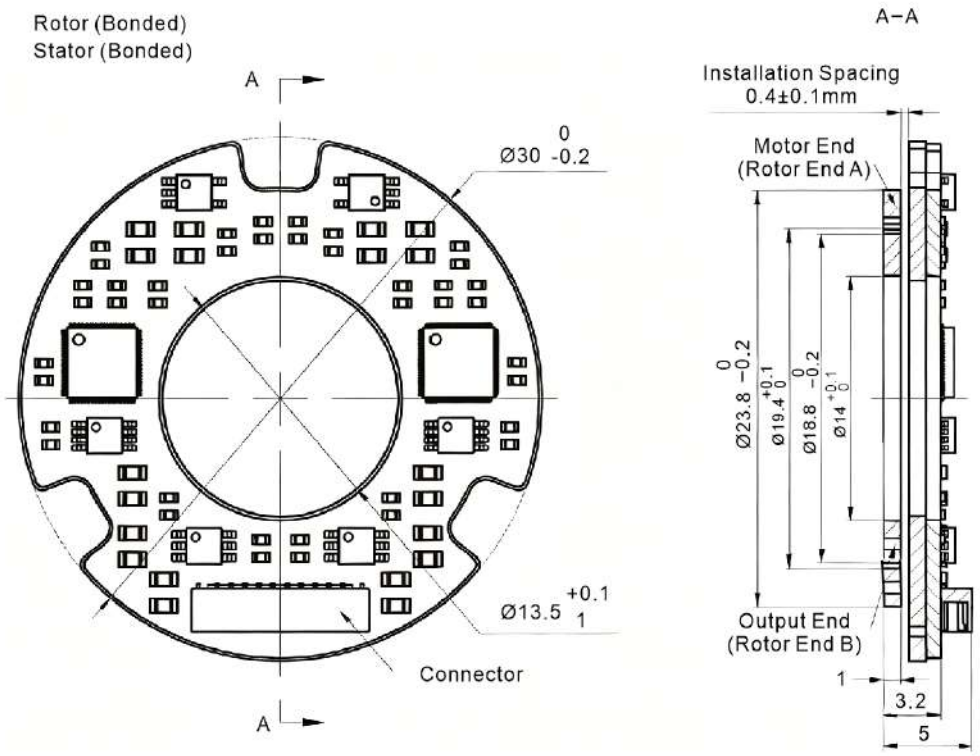
When utilizing digital signal acquisition, the sampling rate and clock frequency depend on the communication protocol selected by the user.Connector and Pin 1 Definitions Connector Model

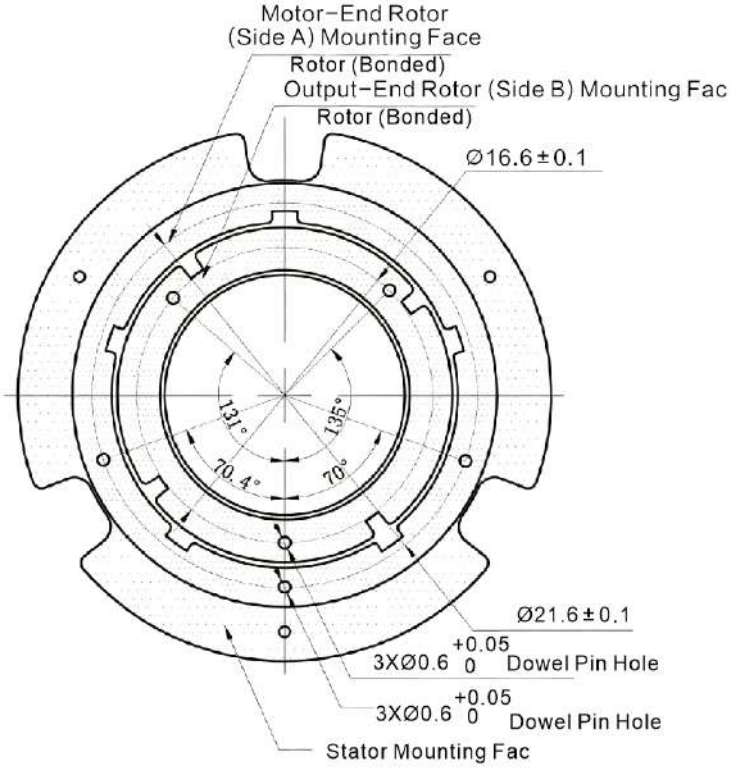


- Connector and Pin Definitions
- Connector Model SM10B-SU RS-TF

Mechanical Interface

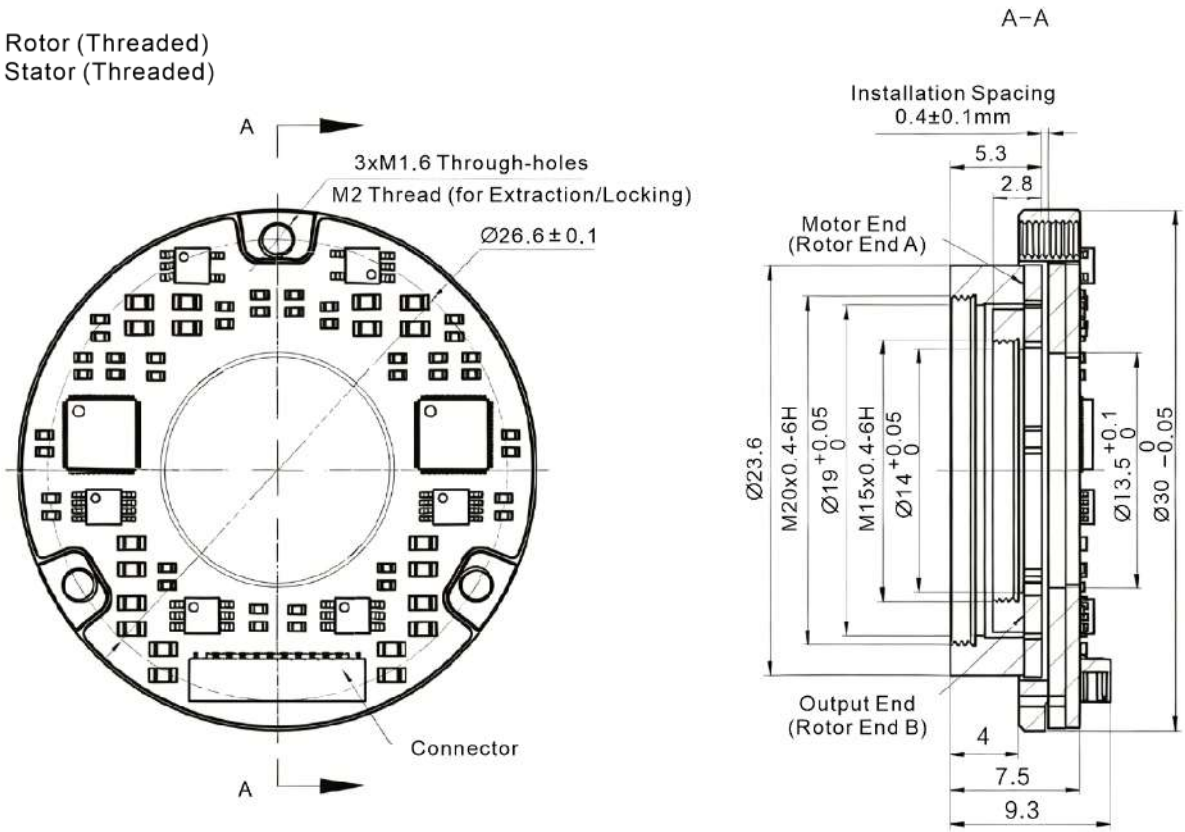
- Product Dimensions

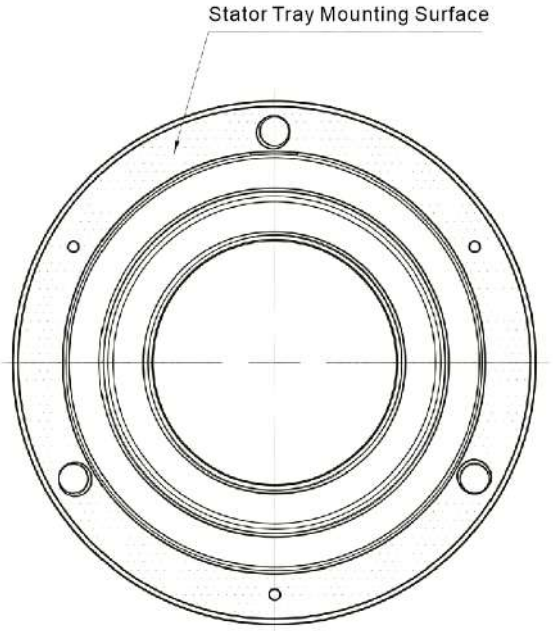




Mechanical Interface

- Product Dimensions





DP2035

Thin-type Same-side Dual Encoder

Specifications

1-Basic Encoder Performance Parameters

Angular Resolution	17bit
Maximum Static Error	±0.03°
Repeatability Error	±2 LSB
Maximum Operating Speed	6000rpm
Measurement Range	Single-turn + Pseudo-Multiturn
Rotation Direction	Default: Clockwise Increasing (Adjustable)

2-Mechanical Dimensions and Installation

Outer Diameter / Inner Diameter (Rotor Inner/ Outer Ring) / Thickness	35\19-24.4\4.5mm Thickness does not include connectors or mounting components.
Allowable Installation Eccentricity	±0.05mm
Allowable Installation Axial Tolerance	±0.1mm
Rotor Inertia (Inner/Outer Ring)	0.041\0.073kg·mm²
Weight (Approx.)	4g
Rotor and Stator Material Flammability Rating	FR-4、SUS304

3-Electrical and Interface

Supply Voltage	5v±5%
Current	≤80mA
Electrical Interface	Connector
Output Protocol	SSI、BISS-C、RS-422、RS-485

4. Environmental Adaptability

EMC	IEC61000-6-2、IEC61000-6-4
Operating Temperature	-30°C~+105°C
Storage Temperature	-55°C~+ 125°C
Relative Humidity	0~99%
Shock	100g, 6ms; 3 times each in the ±X, ±Y, and ±Z axes (18 cycles total);
Vibration	10–55 Hz, amplitude 1.5 mm; 55–2000 Hz, acceleration 10g; 2 hours each in the X, Y, and Z axes (6 hours total)
Maximum Protection Rating	IP40

Electrical Interface

- Hardware Interface

The Model DP2035 inductive encoder consists of two components: a stator and a rotor. The stator integrates both the angle resolution circuitry and the encoder output circuitry. The encoder utilizes a connector-based output interface (as illustrated in the figure below), and supports SSI, BiSS-C, RS-422, and RS-485 serial protocols for angle output.

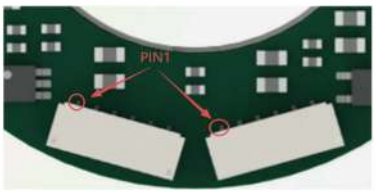
5-Communication Interface Cable Pin Definitions

No.	RS-422	SSI	BISS-C	RS-485	Remarks
1	TX-	DATA-	SLO-	\	\
2	TX+	DATA+	SLO+	\	
3	RX-	CLK-	MA-	B-	
4	RX+	CLK+	MA+	A+	
5	GND				Ground
6	5V				Power Supply

6 - SSI/BISS/RS-485 Digital Output Parameters

Digital Output Parameters	
Signal Delay	<50us
Output Code Format	Binary
Maximum Data Update Rate	20kHz
Interface Levels	DifferentialRS-422/RS-485

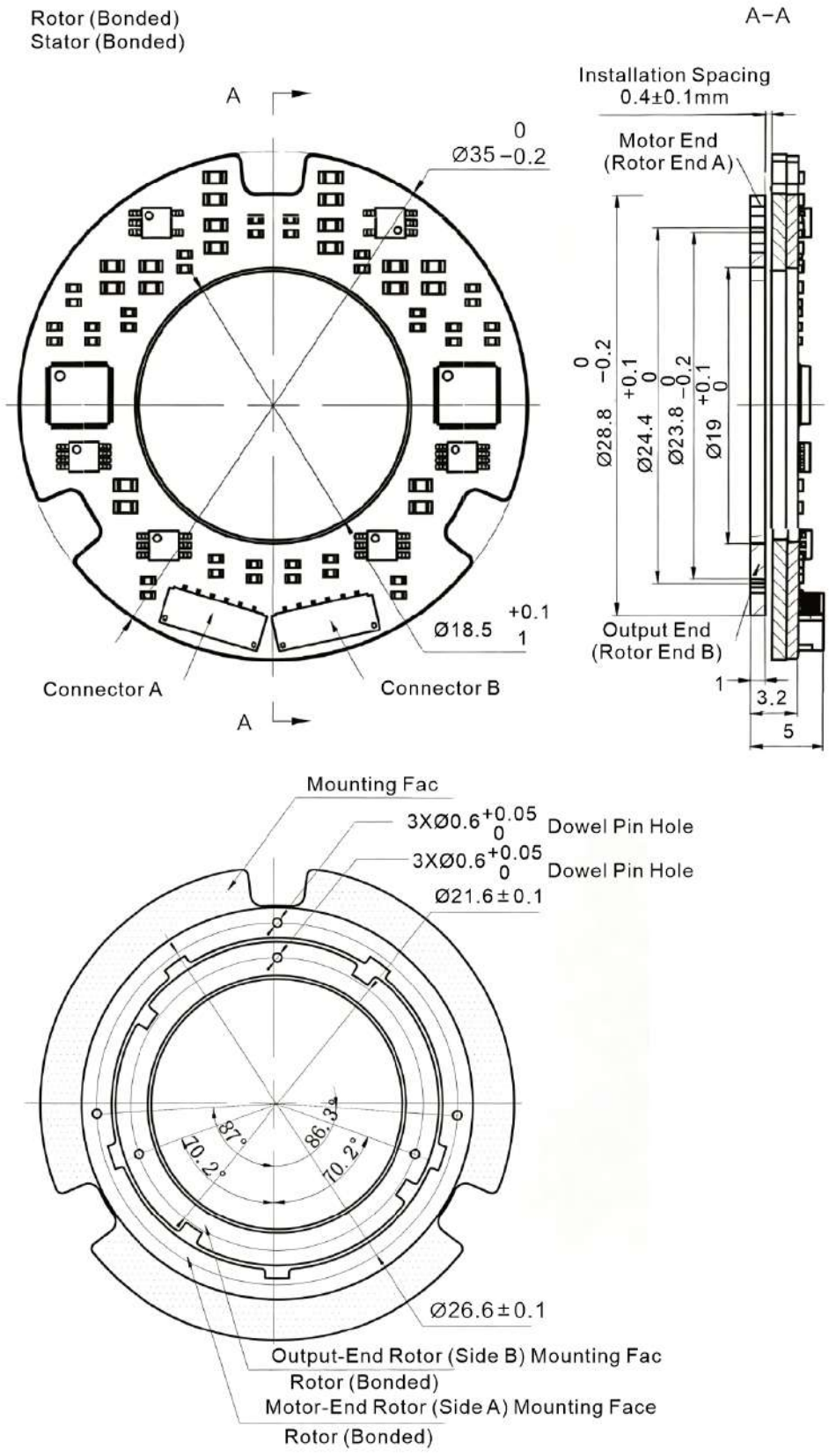
When utilizing digital signal acquisition, the sampling rate and clock frequency depend on the communication protocol selected by the user.Connector and Pin 1 Definitions Connector Model



- Connector and Pin Definitions (Left: Outer Ring; Right: Inner Ring)
- Connector Model : SM06B-SURS-TF

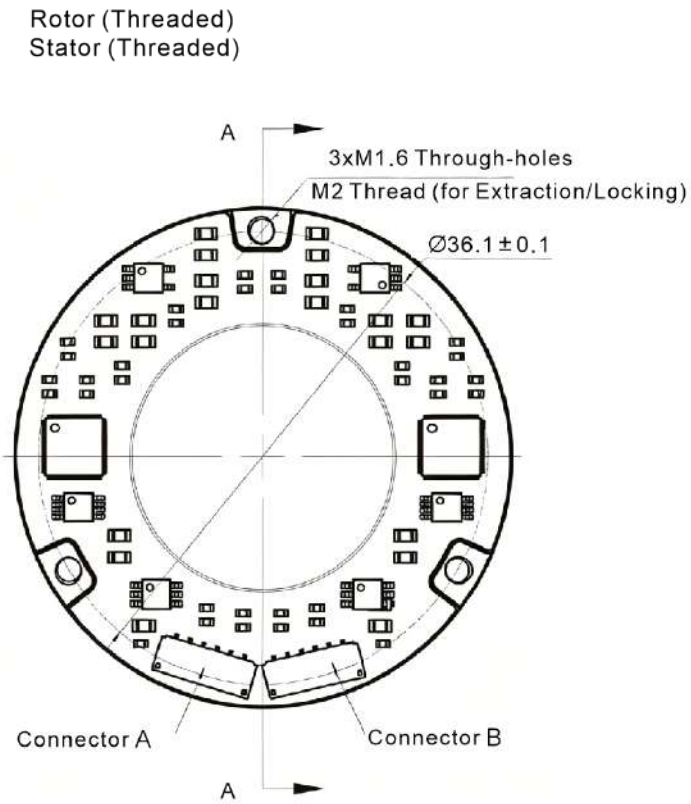
Mechanical Interface

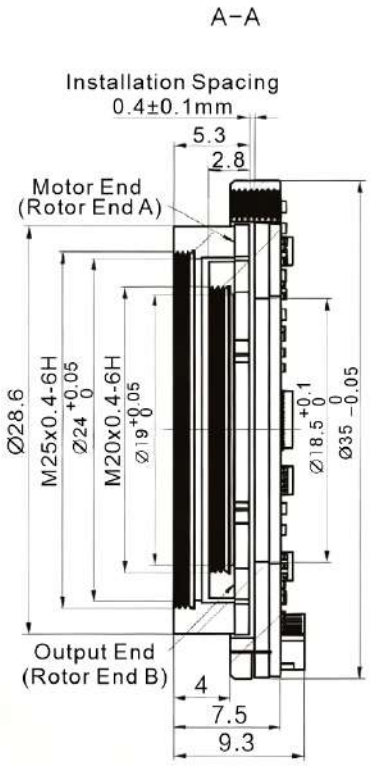
- Product Dimensions

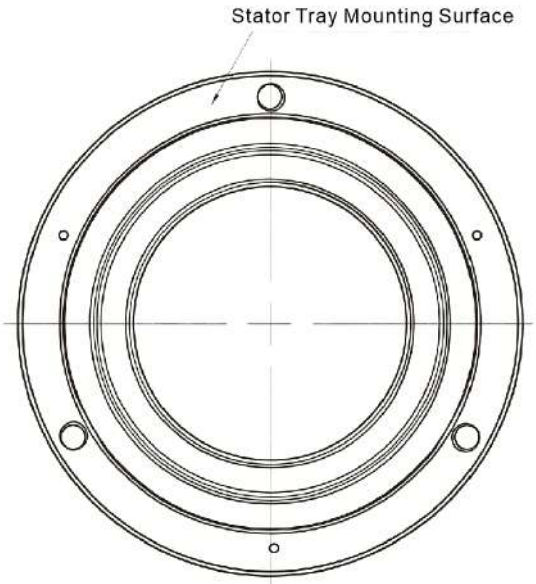


Mechanical Interface

- Product Dimensions







DP2540

Thin-type Same-side Dual Encoder

Specifications

1-Basic Encoder Performance Parameters

Angular Resolution	17bit
Maximum Static Error	±0.03°
Repeatability Error	±2 LSB
Maximum Operating Speed	6000rpm
Measurement Range	Single-turn + Pseudo-Multiturn
Rotation Direction	Default: Clockwise Increasing (Adjustable)

2-Mechanical Dimensions and Installation

Outer Diameter / Inner Diameter (Rotor Inner/ Outer Ring) / Thickness	40\24-29.4\4.5mm Thickness does not include connectors or mounting components.
Allowable Installation Eccentricity	±0.05mm
Allowable Installation Axial Tolerance	±0.1mm
Rotor Inertia (Inner/Outer Ring)	0.077\0.122kg· mm^2
Weight (Approx.)	5g
Rotor and Stator Material Flammability Rating	FR-4、SUS304

3-Electrical and Interface

Supply Voltage	5v±5%
Current	≤80mA
Electrical Interface	Connector
Output Protocol	SSI、BISS-C、RS-422、RS-485

4. Environmental Adaptability

EMC	IEC61000-6-2、IEC61000-6-4
Operating Temperature	-30°C~+105°C
Storage Temperature	-55°C~+ 125°C
Relative Humidity	0~99%
Shock	100g, 6ms; 3 times each in the ±X, ±Y, and ±Z axes (18 cycles total);
Vibration	10–55 Hz, amplitude 1.5 mm; 55–2000 Hz, acceleration 10g; 2 hours each in the X, Y, and Z axes (6 hours total)
Maximum Protection Rating	IP40

Electrical Interface

- Hardware Interface

The Model DP2540 inductive encoder consists of two components: a stator and a rotor. The stator integrates both the angle resolution circuitry and the encoder output circuitry. The encoder utilizes a connector-based output interface (as illustrated in the figure below), and supports SSI, BiSS-C, RS-422, and RS-485 serial protocols for angle output.

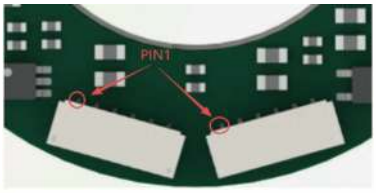
5-Communication Interface Cable Pin Definitions

No.	RS-422	SSI	BISS-C	RS-485	Remarks
1	TX-	DATA-	SLO-	\	\
2	TX+	DATA+	SLO+	\	
3	RX-	CLK-	MA-	B-	
4	RX+	CLK+	MA+	A+	
5	GND				Ground
6	5V				Power Supply

6 - SSI/BISS/RS-485 Digital Output Parameters

Digital Output Parameters	
Signal Delay	<50us
Output Code Format	Binary
Maximum Data Update Rate	20kHz
Interface Levels	DifferentialRS-422/RS-485

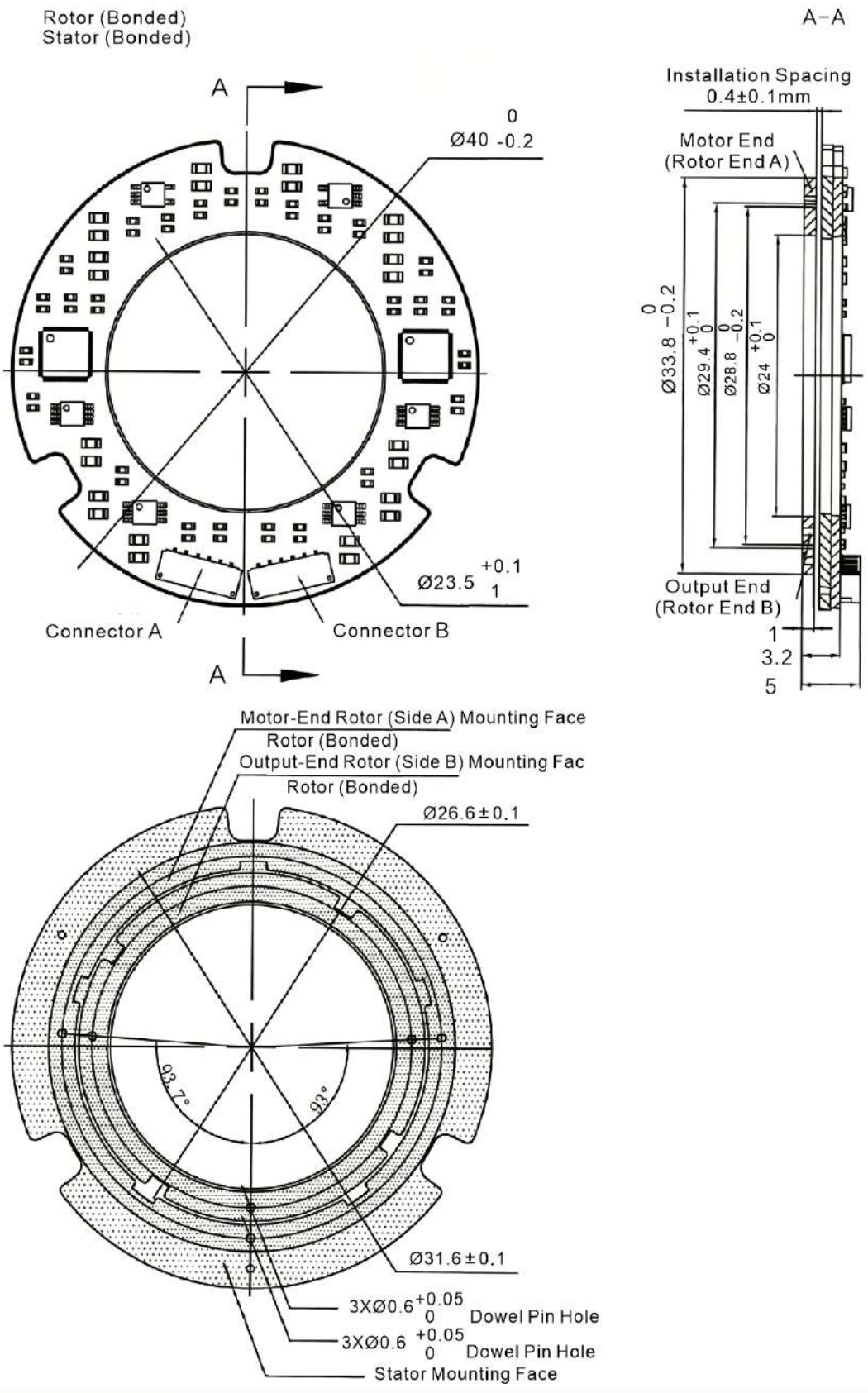
When utilizing digital signal acquisition, the sampling rate and clock frequency depend on the communication protocol selected by the user.Connector and Pin 1 Definitions Connector Model



- Connector and Pin Definitions (Left: Outer Ring; Right: Inner Ring)
- Connector Model : SM06B-SURS-TF

Mechanical Interface

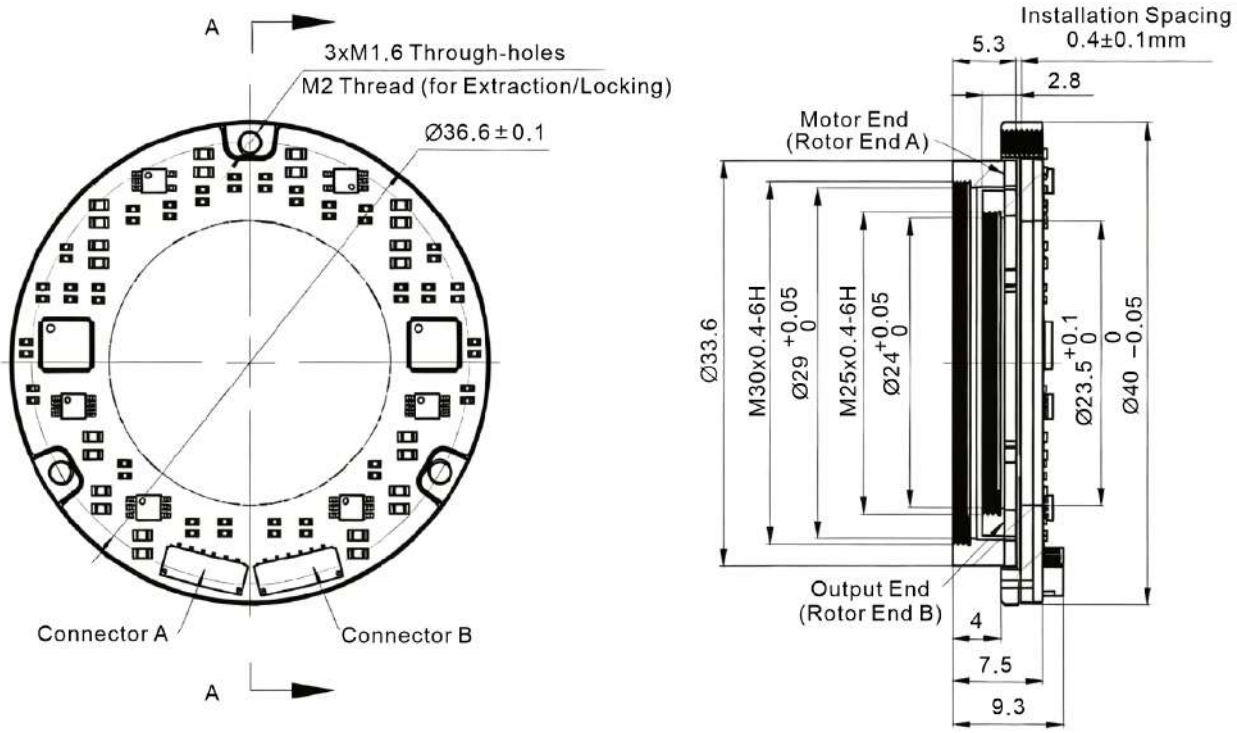
- Product Dimensions

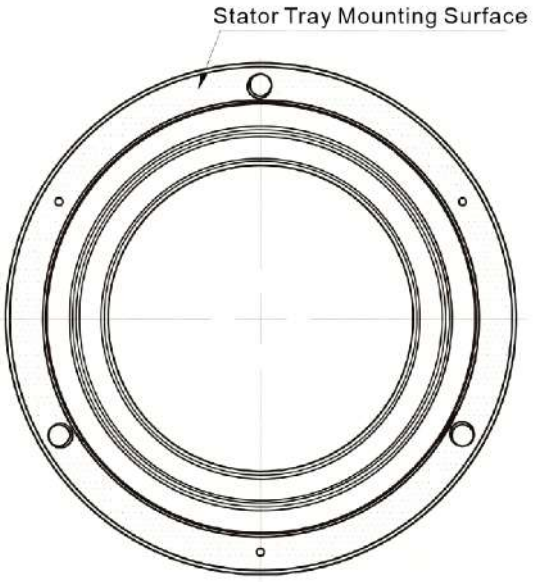


Mechanical Interface

- Product Dimensions

Rotor (Threaded)
Stator (Threaded)





DP3045

Thin-type Same-side Dual Encoder

Specifications

1-Basic Encoder Performance Parameters

Angular Resolution	17bit
Maximum Static Error	±0.03°
Repeatability Error	±2 LSB
Maximum Operating Speed	6000rpm
Measurement Range	Single-turn + Pseudo-Multiturn
Rotation Direction	Default: Clockwise Increasing (Adjustable)

2-Mechanical Dimensions and Installation

Outer Diameter / Inner Diameter (Rotor Inner/ Outer Ring) / Thickness	45\29-34.4\4.5mm Thickness does not include connectors or mounting components.
Allowable Installation Eccentricity	±0.05mm
Allowable Installation Axial Tolerance	±0.1mm
Rotor Inertia (Inner/Outer Ring)	0.129\0.189kg· mm^2
Weight (Approx.)	5g
Rotor and Stator Material Flammability Rating	FR-4、SUS304

3-Electrical and Interface

Supply Voltage	5v±5%
Current	≤80mA
Electrical Interface	Connector
Output Protocol	SSI、BISS-C、RS-422、RS-485

4. Environmental Adaptability

EMC	IEC61000-6-2、IEC61000-6-4
Operating Temperature	-30°C~+105°C
Storage Temperature	-55°C~+ 125°C
Relative Humidity	0~99%
Shock	100g, 6ms; 3 times each in the ±X, ±Y, and ±Z axes (18 cycles total);
Vibration	10–55 Hz, amplitude 1.5 mm; 55–2000 Hz, acceleration 10g; 2 hours each in the X, Y, and Z axes (6 hours total)
Maximum Protection Rating	IP40

Electrical Interface

- Hardware Interface

The Model DP3045 inductive encoder consists of two components: a stator and a rotor. The stator integrates both the angle resolution circuitry and the encoder output circuitry. The encoder utilizes a connector-based output interface (as illustrated in the figure below), and supports SSI, BiSS-C, RS-422, and RS-485 serial protocols for angle output.

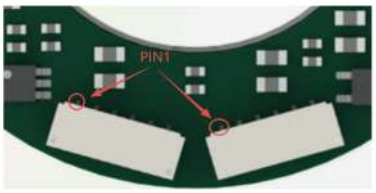
5-Communication Interface Cable Pin Definitions

No.	RS-422	SSI	BISS-C	RS-485	Remarks
1	TX-	DATA-	SLO-	\	\
2	TX+	DATA+	SLO+	\	
3	RX-	CLK-	MA-	B-	
4	RX+	CLK+	MA+	A+	
5	GND				Ground
6	5V				Power Supply

6 - SSI/BISS/RS-485 Digital Output Parameters

Digital Output Parameters	
Signal Delay	<50us
Output Code Format	Binary
Maximum Data Update Rate	20kHz
Interface Levels	DifferentialRS-422/RS-485

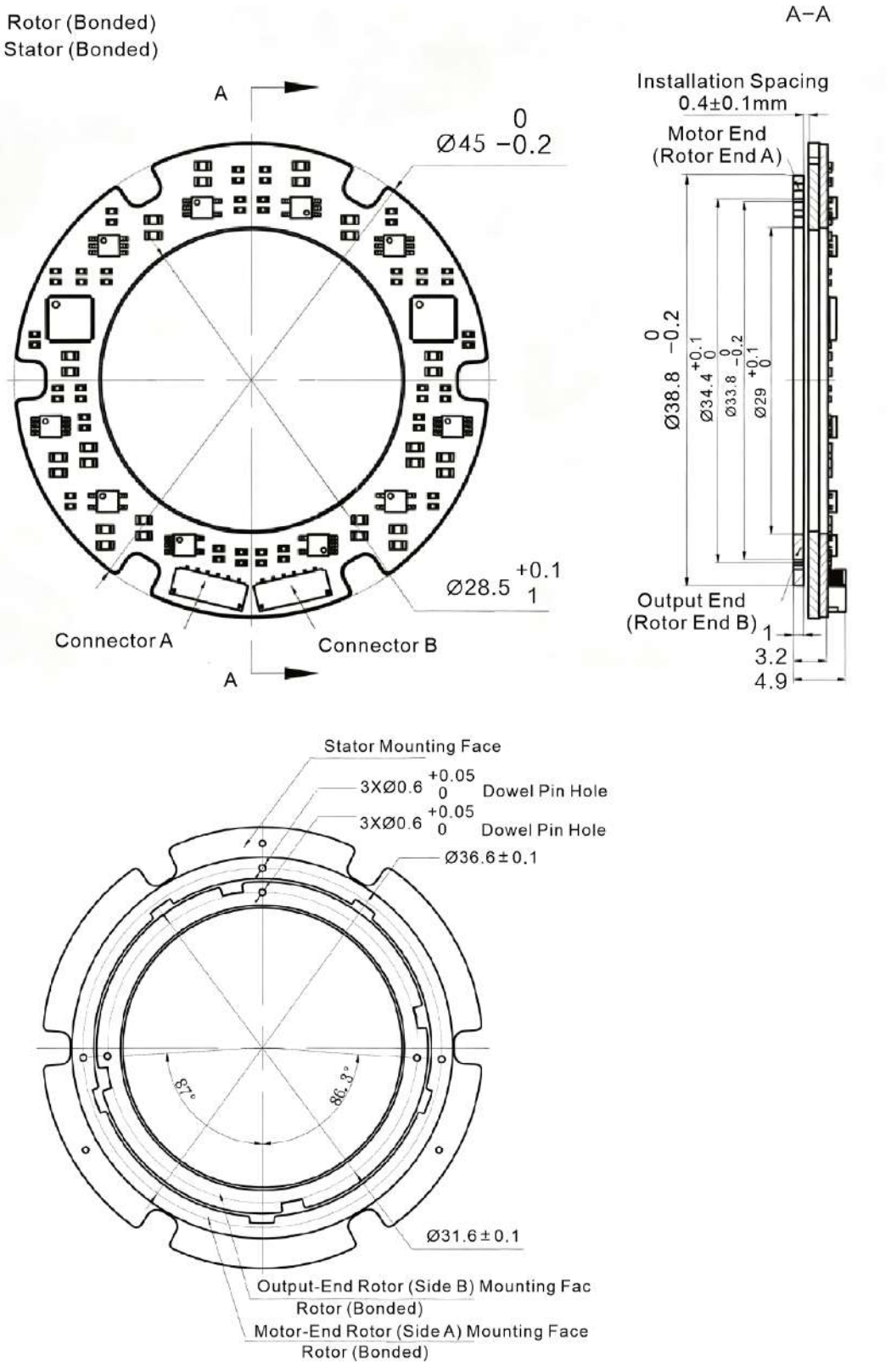
When utilizing digital signal acquisition, the sampling rate and clock frequency depend on the communication protocol selected by the user.Connector and Pin 1 Definitions Connector Model



- Connector and Pin Definitions (Left: Outer Ring; Right: Inner Ring)
- Connector Model : SM06B-SURS-TF

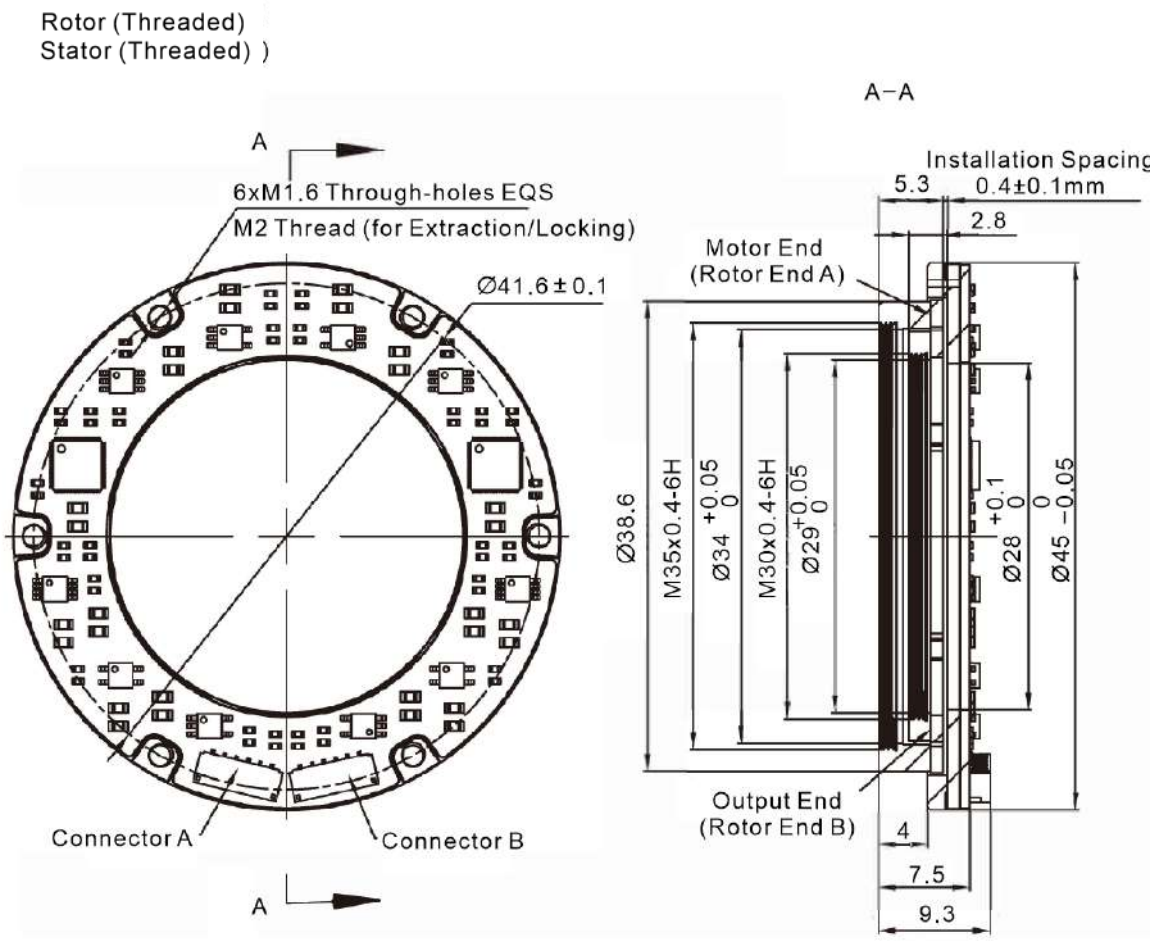
Mechanical Interface

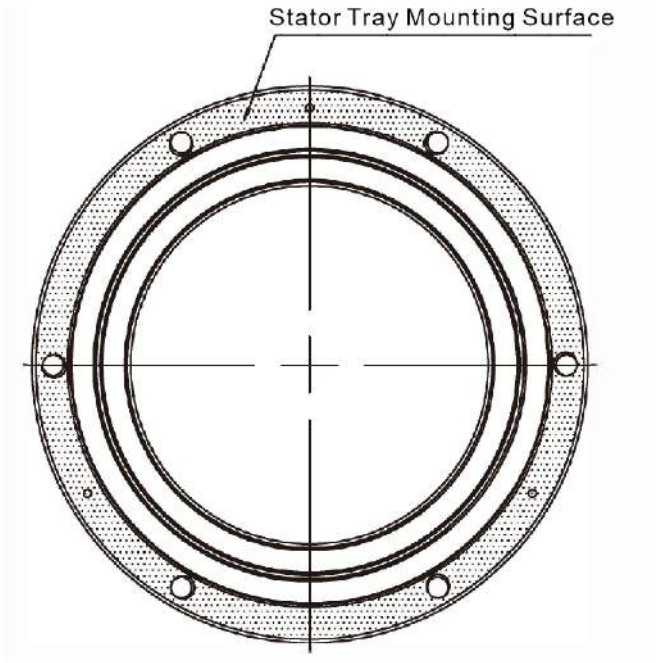
- Product Dimensions



Mechanical Interface

- Product Dimensions





2、Technical Specifications

General

Resolution	17-19bit
Maximum static error	±0.015°
Repetitive error	±2 LSB
Maximum operational speed	6000 rpm
Measurement range	Single turn
Rotation direction	Adjustable CW/CCW

Mechanical

Outer\Inner\Height	38\10\3.8mm
Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	0.6±0.2 mm
Rotor inertia	0.05/0.16kg·mm²
Weight (stator / rotor)	10 g
Material (stator / rotor)	FR-4

Electrical

Supply voltage	5 V
Current consumption	< 80 mA
Communication	SSi、BiSS-C、UART

Environmental

EMC	IEC 61000-6-2、IEC 61000-6-4
Operating temperature	-40℃~ +125℃
Storage temperature	-50℃ ~ +100℃
Relative humidity	0 - 99%
Shock endurance / functional	100 g / 11 ms
Vibration functional	20 g（10 - 2000 Hz）
Protection	IP 40

3、Electrical Connection

3.1 Hardware Interface

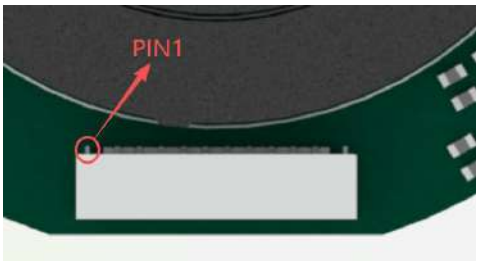
DP1038 encoder consists of a stator and two rotors, the stator integrates an angle calculation circuit and an encoding output circuit. The encoder uses a multi-core connector for output (connector interface as shown in the figure below), with the output connector located on the outer edge of the stator. The angle output uses two connectors, and can choose to output interface protocols such as SSi、BiSS-C、RS-422、RS-485.

Interface definition

序号	RS-422	SSi	BiSS-C	RS-485
1	VCC			
2	GND			
3	RX+	CLK+	MA+	\
4	RX-	CLK-	MA-	\
5	TX-	DATA-	SLO-	B-
6	TX+	DATA+	SLO+	A+
7	RX1+	CLK1+	MA1+	\
8	RX1-	CLK1-	MA1-	\
9	TX1-	DATA1-	SLO1-	B1-
10	TX1+	DATA1+	SLO1+	A1+

SSi/BiSS output signal parameters

Signal delay	< 50 us
Output code	Binary
Maximum data request rate	25 kHz
Clock/ Serial output	Differential RS-422

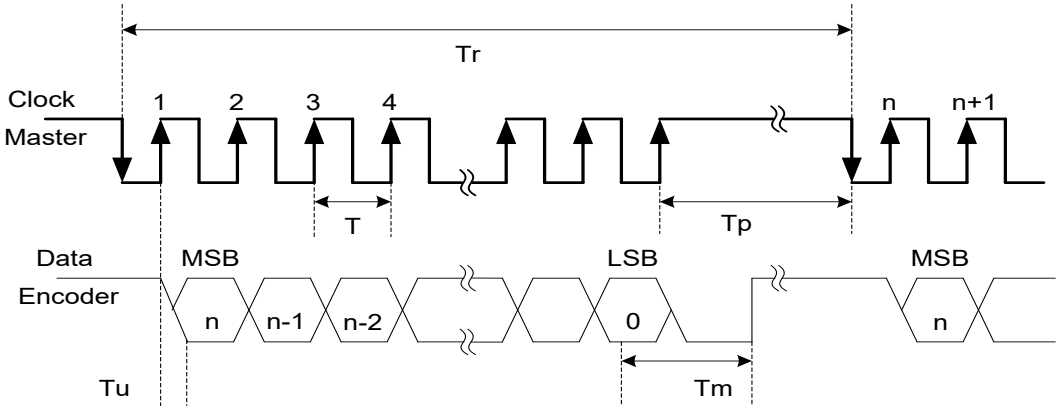


Connectors and Pins 1 Definitions

10-pin thin needle：HC-0.8-10PWT

3.2 SSi Interface

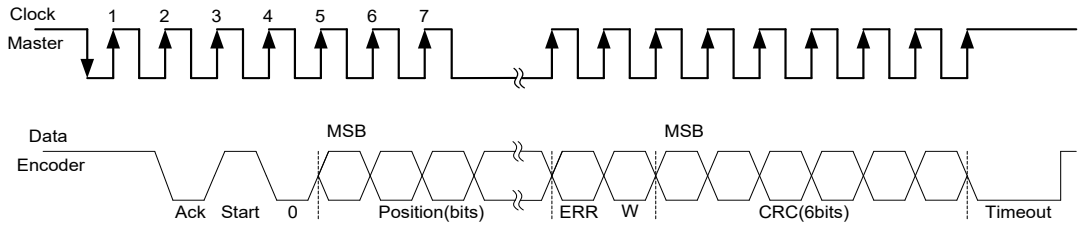
SSi (Synchronous Serial Interface) is based on the RS-422 hardware standard and is a commonly used interface for angle encoders. The master sends clock and angle encoder synchronized output data. The default clock is high level. The first low level starts data transmission, and the angle encoder transmits the angle data to the master in sequence according to the clock. The timing diagram is as follows:



n	Position resolution	12 - 21
f（T）	Clock frequency (Clock period)	0.5 - 5.0 MHz
Tu	Bit update time	50 ns
Tp	Pause time	＞ 25 us
Tm	Monoflop time	＞ 3 us
Tr	Time between 2 adjacent requests	Tr ＞ n*T +25 us
fr=1/Tr	Data request frequency	

3.3 BiSS-C Interface

The BiSS-C communication protocol is a full duplex, bidirectional, high-speed, synchronous serial communication protocol. This interface is also based on the RS-422 hardware standard and is compatible with the SSi interface. It is widely used in high-precision position control absolute encoders. The product uses BiSS-C as a point-to-point configured unidirectional interface, which can serve as one or more slaves connecting to the master, meeting the requirements of BiSS-C unidirectional interface. The timing diagram is as follows:



Bit/n		Description	Default Length	Default Length
28	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1 bit
27	Start	Encoder signal for "start" data transmit	1	1 bit
26	"0"	"Start" bit follower	0	1 bit
8-25	Position	Absolute Position encoder data		Per resolution
7	Error	BIT (Built In Test option)	1	1 bit
6	Warn	Warning (non active)	1	1 bit
0-5	CRC	*The CRC polynomial		6 bit
--	Timeout	Elapse between the sequential "start" request cycle's		> 30 us

*The CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$. It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.

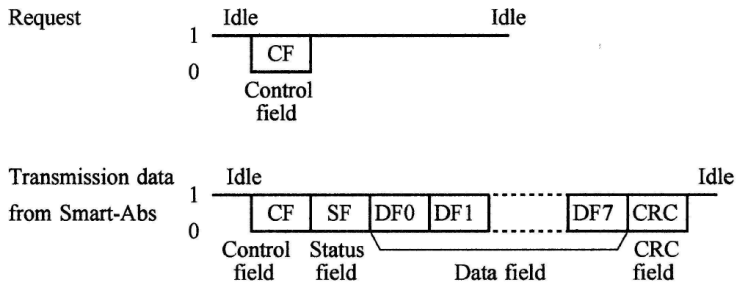
3.4 RS-422 UART Interface

Asynchronous serial communication interface over RS422 (UART), by default, the master does not need to send requests, and the encoder automatically outputs data to the master. The update rate of the encoder data is 2000Hz, the baud rate is 460800bps, and the data format is 1 start bit, 8 data bits, 1 even check bit, and 1 stop bit. Each frame of data contains 10 bytes, and the format is shown in the table below.

	BIT	Description	Note
Header	1	5E	Defined Header
	2	AD	
Protocol Flag Bit	3	01	Single byte
Position	4	Most Significant 8 Bits	LSB effective, MSB padding 0
	5	Middle Significant 8 Bits	
	6	Least Significant 8 Bits	
Frame Count	7	Most Significant 8 Bits	0-65535 Accumulate
	8	Least Significant 8 Bits	
Check	9	Most Significant 8 Bits	Accumulate the 3th4th, 5th6th, and 7th8th bytes, taking the lower 16 bits
	10	Least Significant 8 Bits	

3.5 RS-485 UART Interface

RS-485 serial interface, half duplex communication protocol, requires the master to send commands to get the angle position. The data update rate is related to the master request rate. The baud rate is 2.5Mbps, and the data format is 1 start bit, 8 data bits, 0 even check bits, and 1 stop bit. Frame format for reading-out data is as follows:



3.5.1 Single turn position request command:

1.Master send command

Sent data（HEX）：0x02

2. The master receives data frames from the encoder

Received data（HEX）：0x02 0x20 0x03 0x02 0x01 0x16

0x02: CF return the same command

0x20: SF defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
0	0	0	0	EA0	EA1	CA0	CA1

EA0=1 Single turn counting error

EA1=1 Overtemperature, multiturn counting error, battery alarm, or battery error

CA0=1 Communication parity error

CA1=1 Communication stop bit error

0x03 0x02 0x01: DF single turn position（LSB first）

0x16: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.2 Encoder ID data request command

1. Master send command Sent data（HEX）: 0x92

2. The master receives data frames from the encoder：

Received data（HEX）：0x92 0x20 0x11 0xA3

0x92: CF return the same command

0x20: SF

0x11: Encoder ID, fixed 0x11

0xA3: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.3 Encoder all data request command

1. Master send command Sent data（HEX）: 0x1A
2. The master receives data frames from the encoder：
   Received data（HEX）：0x1A 0x20 0x03 0x02 0x01 0x11 0x05 0x04 0x00 0x22 0x08
   0x1A: CF return the same command
   0x20: SF
   0x03 0x02 0x01: DF single turn position（LSB first）
   0x11: Encoder ID, fixed 0x11
   0x05 0x04 0x00: DF multiturn position（LSB first）（0x0405 = 1029, Max.65535）
   0x22: Encoder error, defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Overspeed	Full absolute status	Counting error	Counter overflow	"0"	Multiturn error	Battery error	Battery alarm

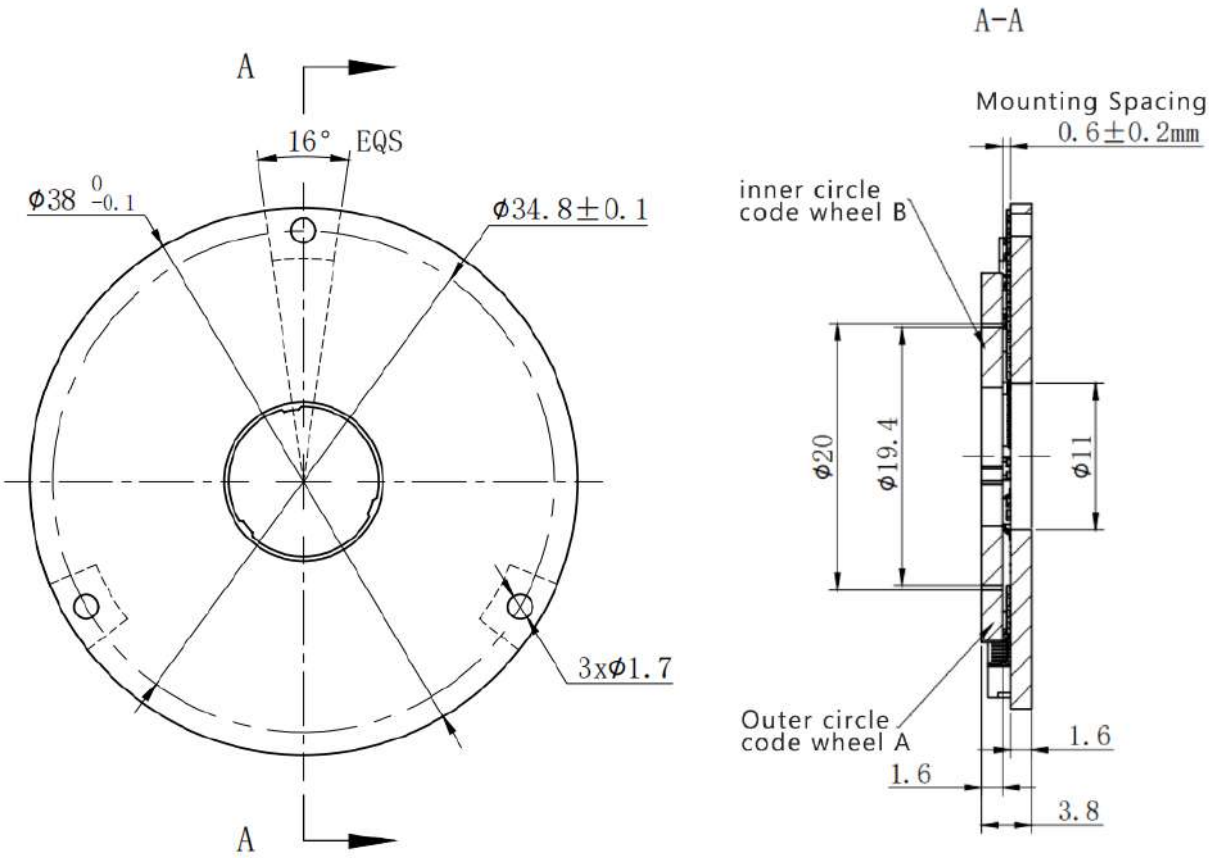
0x08: CRC G(X) = X^8 + 1, The code is calculated from all bits

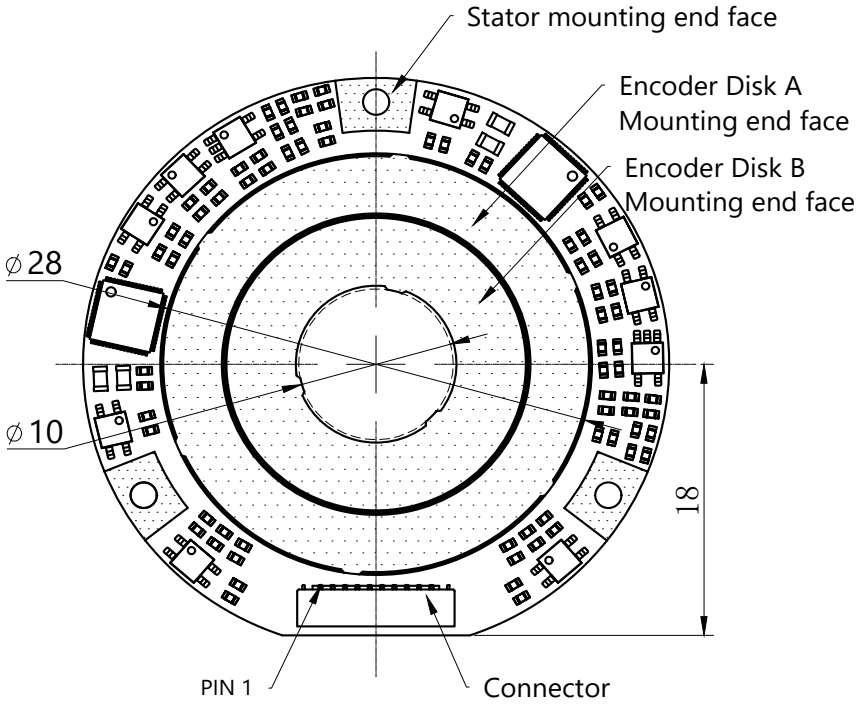
3.5.4 Single turn position reset request command:

1. Master send command Sent data（HEX）: 0xC2
   The reset command should be repeated at least 10 times with a 40us interval to reset the single turn position.
2. The master receives data frames from the encoder:
   Received data（HEX）：0xC2 0x20 0x00 0x00 0x00 0xE2
   0xC2: CF return the same command
   0x20: SF
   0x00 0x00 0x00: DF single turn position（LSB first）
   0xE2: CRC G(X) = X^8 + 1, The code is calculated from all bits

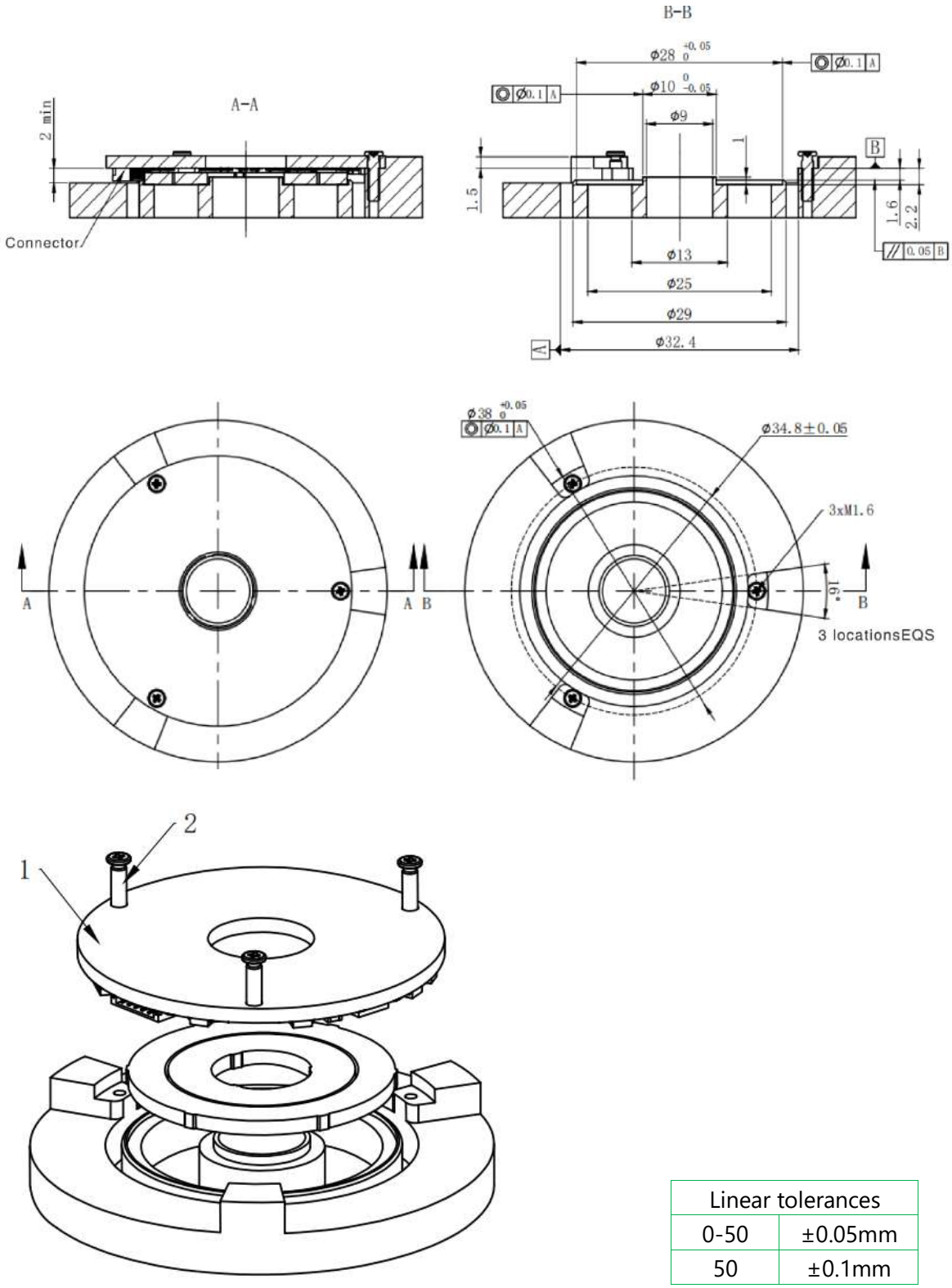
4、Mechanical Mounting

4.1 Dimensions





4.2 Installation Diagram



Linear tolerances	
0-50	±0.05mm
50	±0.1mm

NO.		QTY	Description
1	DP1038	1	Product
2	M1.6x6 round head cross screw	3	Install accessories

2、Technical Specifications

General

Resolution	17-19bit
Maximum static error	±0.015°
Repetitive error	±2 LSB
Maximum operational speed	6000 rpm
Measurement range	Single turn
Rotation direction	Adjustable CW/CCW

Mechanical

Outer\Inner\Height	46\16\3.6mm
Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	0.8±0.2 mm
Rotor inertia	0.17/0.4kg·mm²
Weight (stator / rotor)	12 g
Material (stator / rotor)	FR-4

Electrical

Supply voltage	5 V
Current consumption	< 80 mA
Communication	SSi、BiSS-C、UART

Environmental

EMC	IEC 61000-6-2、IEC 61000-6-4
Operating temperature	-40℃~+125℃
Storage temperature	-50℃ - +100℃
Relative humidity	0 - 99%
Shock endurance / functional	100 g / 11 ms
Vibration functional	20 g（10 - 2000 Hz）
Protection	IP 40

3、Electrical Connection

3.1 Hardware Interface

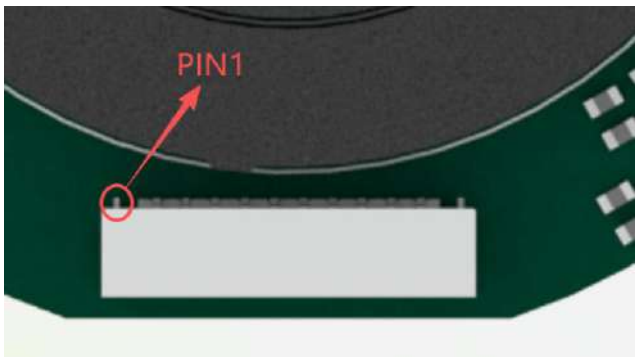
DP1646 encoder consists of a stator and two rotors, the stator integrates an angle calculation circuit and an encoding output circuit. The encoder uses a multi-core connector for output (connector interface as shown in the figure below), with the output connector located on the outer edge of the stator. The angle output uses two connectors, and can choose to output interface protocols such as SSi、BiSS-C、RS-422、RS-485.

Interface definition

序号	RS-422	SSi	BiSS-C	RS-485
1	VCC			
2	GND			
3	RX+	CLK+	MA+	\
4	RX-	CLK-	MA-	\
5	TX-	DATA-	SLO-	B-
6	TX+	DATA+	SLO+	A+
7	RX1+	CLK1+	MA1+	\
8	RX1-	CLK1-	MA1-	\
9	TX1-	DATA1-	SLO1-	B1-
10	TX1+	DATA1+	SLO1+	A1+

SSi/BiSS output signal parameters

Signal delay	< 50 us
Output code	Binary
Maximum data request rate	25 kHz
Clock/ Serial output	Differential RS-422

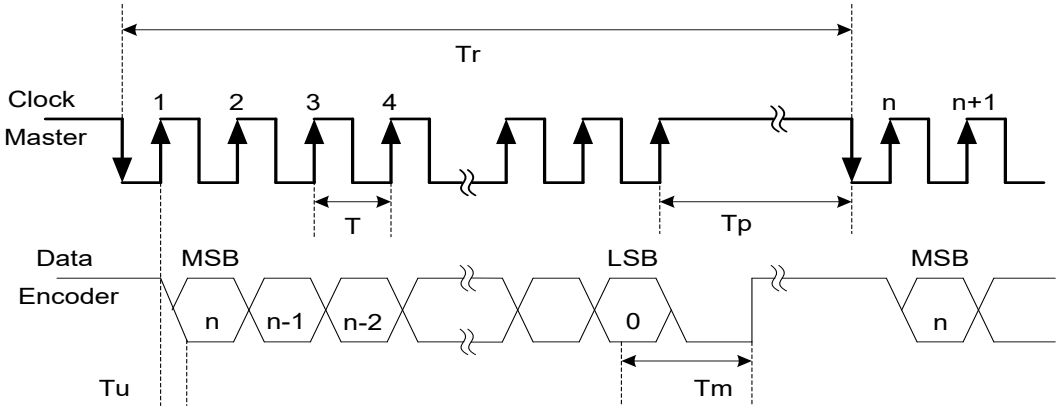


Connectors and Pins 1 Definitions

10-pin thin needle：HC-0.8-10PWT

3.2 SSi Interface

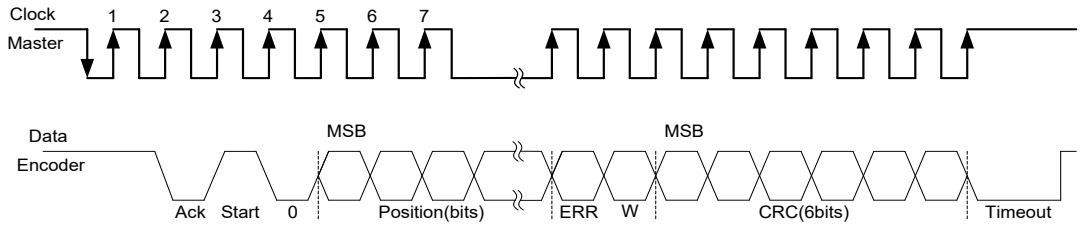
SSi (Synchronous Serial Interface) is based on the RS-422 hardware standard and is a commonly used interface for angle encoders. The master sends clock and angle encoder synchronized output data. The default clock is high level. The first low level starts data transmission, and the angle encoder transmits the angle data to the master in sequence according to the clock. The timing diagram is as follows:



n	Position resolution	12 - 21
f（T）	Clock frequency (Clock period)	0.5 - 5.0 MHz
Tu	Bit update time	50 ns
Tp	Pause time	＞ 25 us
Tm	Monoflop time	＞ 3 us
Tr	Time between 2 adjacent requests	Tr ＞ n*T +25 us
fr=1/Tr	Data request frequency	

3.3 BiSS-C Interface

The BiSS-C communication protocol is a full duplex, bidirectional, high-speed, synchronous serial communication protocol. This interface is also based on the RS-422 hardware standard and is compatible with the SSi interface. It is widely used in high-precision position control absolute encoders. The product uses BiSS-C as a point-to-point configured unidirectional interface, which can serve as one or more slaves connecting to the master, meeting the requirements of BiSS-C unidirectional interface. The timing diagram is as follows:



Bit/n		Description	Default Length	Default Length
28	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1 bit
27	Start	Encoder signal for "start" data transmit	1	1 bit
26	"0"	"Start" bit follower	0	1 bit
8-25	Position	Absolute Position encoder data		Per resolution
7	Error	BIT (Built In Test option)	1	1 bit
6	Warn	Warning (non active)	1	1 bit
0-5	CRC	*The CRC polynomial		6 bit
--	Timeout	Elapse between the sequential "start" request cycle's		> 30 us

*The CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$. It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.

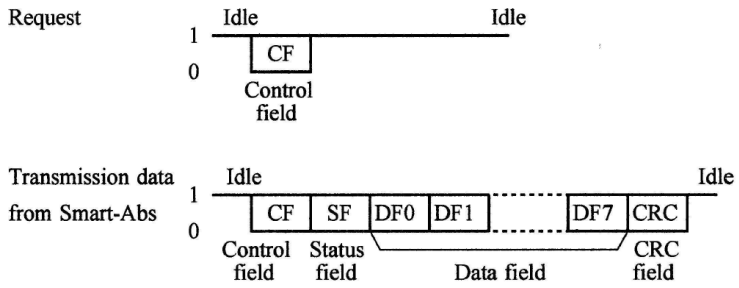
3.4 RS-422 UART Interface

Asynchronous serial communication interface over RS422 (UART), by default, the master does not need to send requests, and the encoder automatically outputs data to the master. The update rate of the encoder data is 2000Hz, the baud rate is 460800bps, and the data format is 1 start bit, 8 data bits, 1 even check bit, and 1 stop bit. Each frame of data contains 10 bytes, and the format is shown in the table below.

	BIT	Description	Note
Header	1	5E	Defined Header
	2	AD	
Protocol Flag Bit	3	01	Single byte
Position	4	Most Significant 8 Bits	LSB effective, MSB padding 0
	5	Middle Significant 8 Bits	
	6	Least Significant 8 Bits	
Frame Count	7	Most Significant 8 Bits	0-65535 Accumulate
	8	Least Significant 8 Bits	
Check	9	Most Significant 8 Bits	Accumulate the 3th4th, 5th6th, and 7th8th bytes, taking the lower 16 bits
	10	Least Significant 8 Bits	

3.5 RS-485 UART Interface

RS-485 serial interface, half duplex communication protocol, requires the master to send commands to get the angle position. The data update rate is related to the master request rate. The baud rate is 2.5Mbps, and the data format is 1 start bit, 8 data bits, 0 even check bits, and 1 stop bit. Frame format for reading-out data is as follows:



3.5.1 Single turn position request command:

1.Master send command

Sent data（HEX）：0x02

2. The master receives data frames from the encoder

Received data（HEX）：0x02 0x20 0x03 0x02 0x01 0x16

0x02: CF return the same command

0x20: SF defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
0	0	0	0	EA0	EA1	CA0	CA1

EA0=1 Single turn counting error

EA1=1 Overtemperature, multiturn counting error, battery alarm, or battery error

CA0=1 Communication parity error

CA1=1 Communication stop bit error

0x03 0x02 0x01: DF single turn position（LSB first）

0x16: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.2 Encoder ID data request command

1. Master send command Sent data（HEX）: 0x92

2. The master receives data frames from the encoder：

Received data（HEX）：0x92 0x20 0x11 0xA3

0x92: CF return the same command

0x20: SF

0x11: Encoder ID, fixed 0x11

0xA3: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.3 Encoder all data request command

1. Master send command Sent data（HEX）: 0x1A
2. The master receives data frames from the encoder：
   Received data（HEX）：0x1A 0x20 0x03 0x02 0x01 0x11 0x05 0x04 0x00 0x22 0x08
   0x1A: CF return the same command
   0x20: SF
   0x03 0x02 0x01: DF single turn position（LSB first）
   0x11: Encoder ID, fixed 0x11
   0x05 0x04 0x00: DF multiturn position（LSB first）（0x0405 = 1029, Max.65535）
   0x22: Encoder error, defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Overspeed	Full absolute status	Counting error	Counter overflow	“0”	Multiturn error	Battery error	Battery alarm

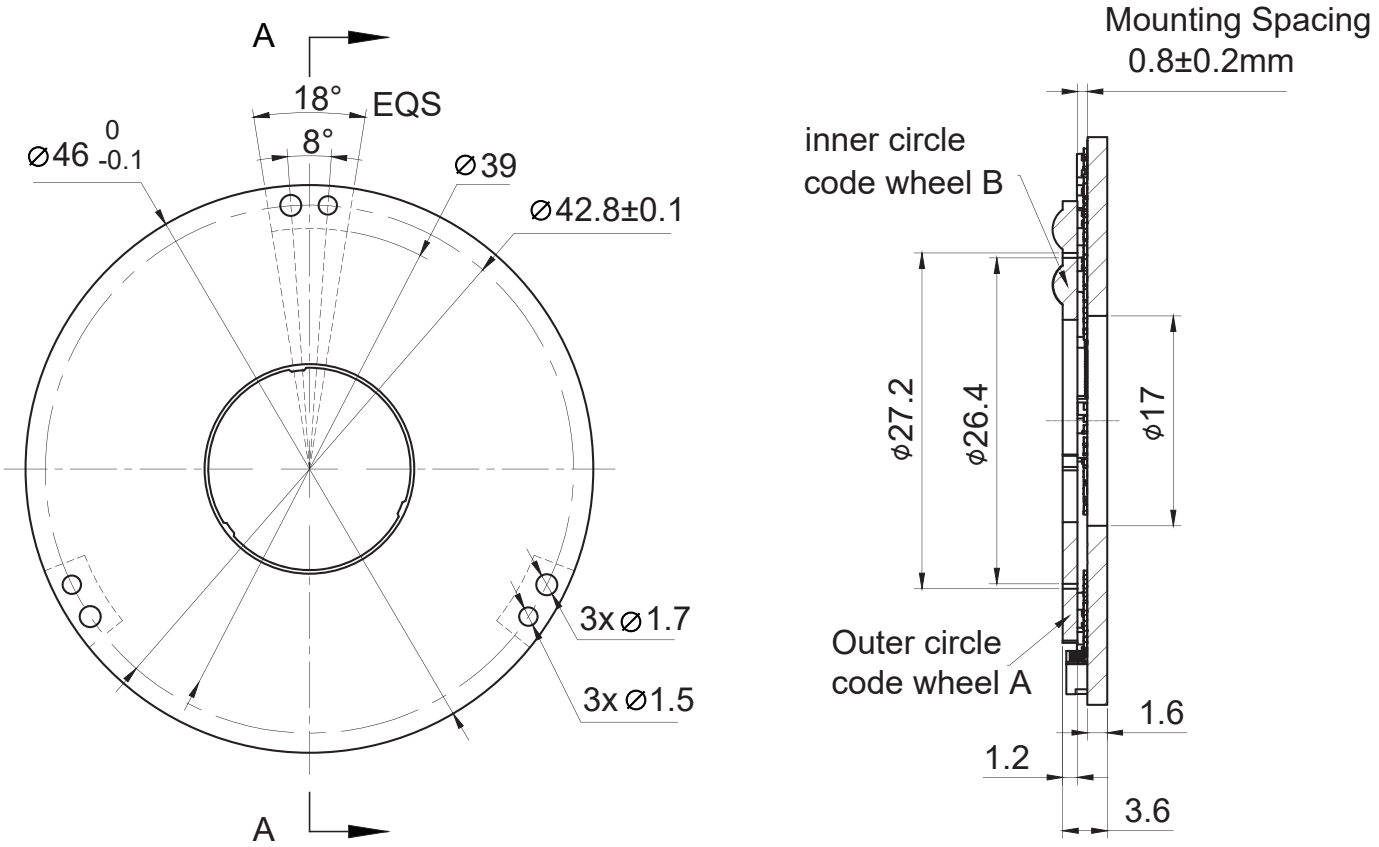
0x08: CRC G(X) = X^8 + 1, The code is calculated from all bits

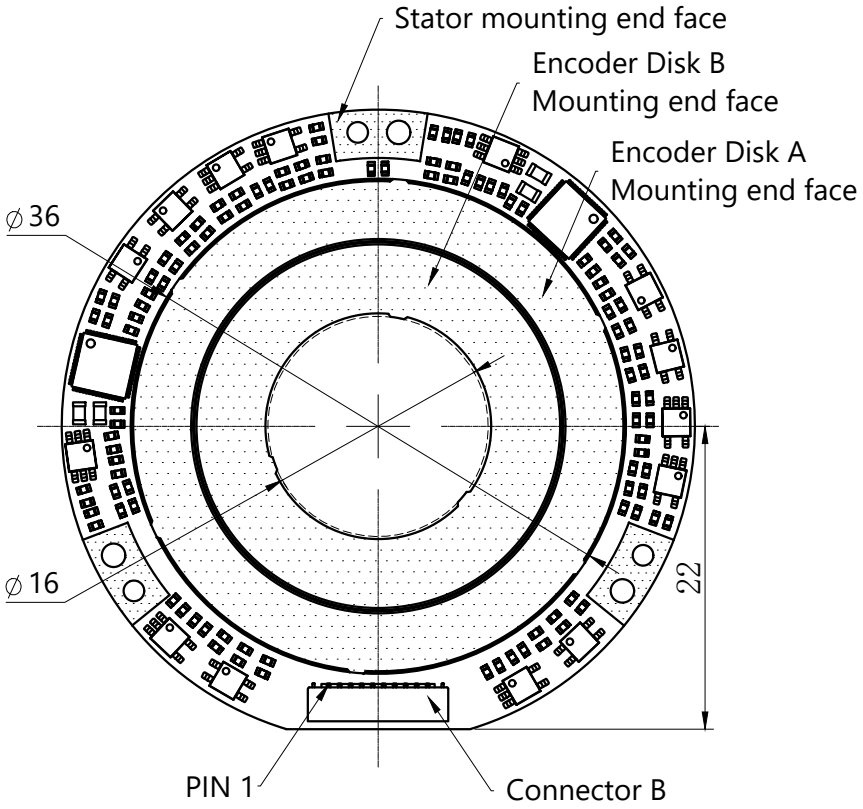
3.5.4 Single turn position reset request command:

1. Master send command Sent data（HEX）: 0xC2
   The reset command should be repeated at least 10 times with a 40us interval to reset the single turn position.
2. The master receives data frames from the encoder:
   Received data（HEX）：0xC2 0x20 0x00 0x00 0x00 0xE2
   0xC2: CF return the same command
   0x20: SF
   0x00 0x00 0x00: DF single turn position（LSB first）
   0xE2: CRC G(X) = X^8 + 1, The code is calculated from all bits

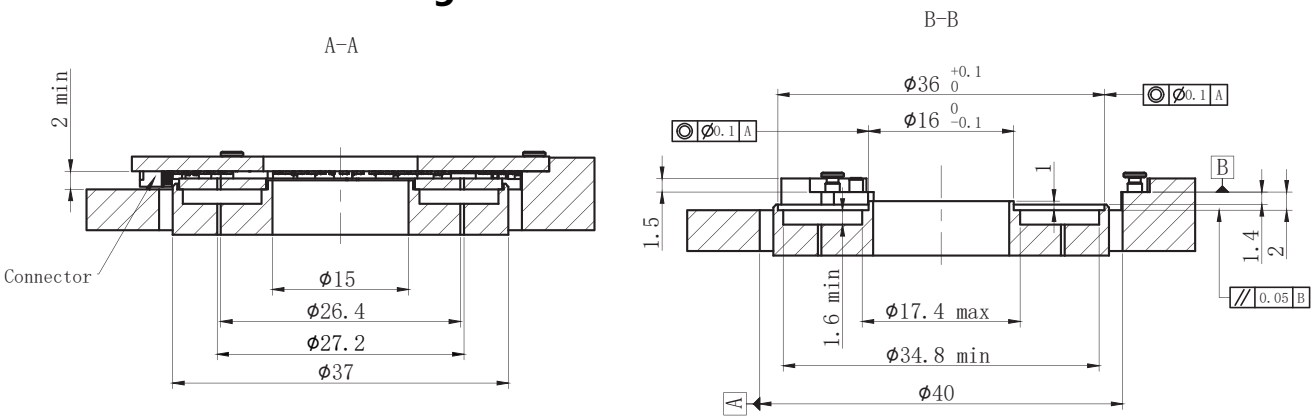
4、Mechanical Mounting

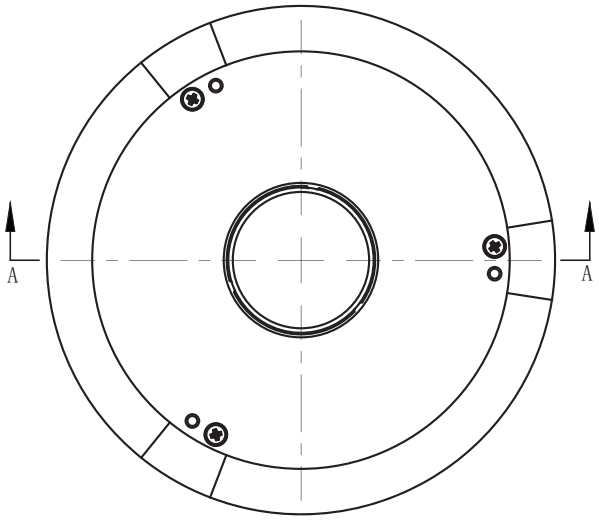
4.1 Dimensions

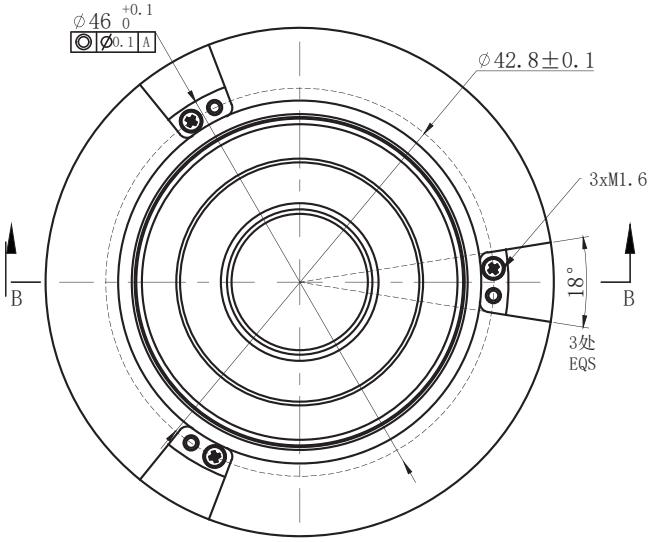


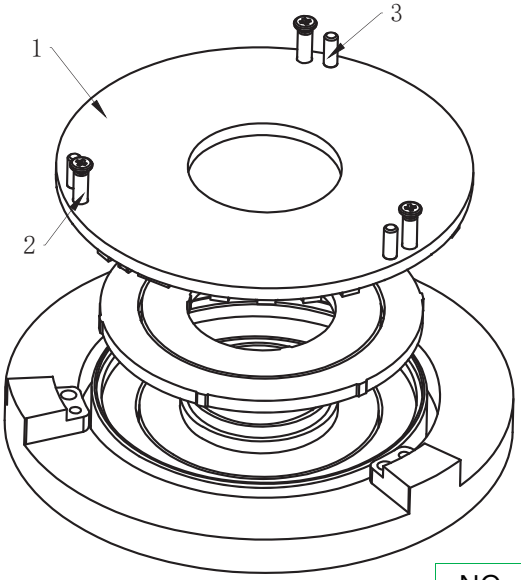


4.2 Installation Diagram









Linear tolerances	
0-50	±0.05mm
50	±0.1mm

NO.		QTY	Description
1	DP1646	1	Product
2	M1.6x6 round head cross screw	3	Install accessories

2、Technical Specifications

General

Resolution	17-19bit
Maximum static error	±0.015°
Repetitive error	±2 LSB
Maximum operational speed	6000 rpm
Measurement range	Single turn
Rotation direction	Adjustable CW/CCW

Mechanical

Outer\Inner\Height	55\20\3.6mm
Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	0.8±0.2 mm
Rotor inertia	0.36/1.0kg·mm²
Weight (stator / rotor)	16 g
Material (stator / rotor)	FR-4

Electrical

Supply voltage	5 V
Current consumption	< 80 mA
Communication	SSi、BiSS-C、UART

Environmental

EMC	IEC 61000-6-2、IEC 61000-6-4
Operating temperature	-40℃~+125℃
Storage temperature	-50℃ - +100℃
Relative humidity	0 - 99%
Shock endurance / functional	100 g / 11 ms
Vibration functional	20 g（10 - 2000 Hz）
Protection	IP 40

3、Electrical Connection

3.1 Hardware Interface

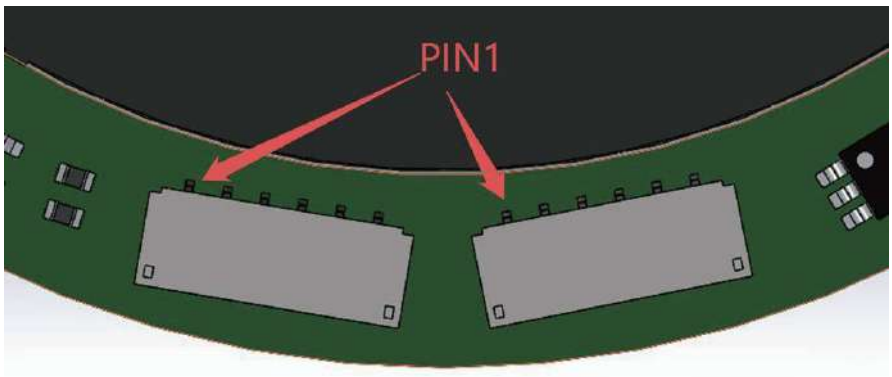
DP2055 encoder consists of a stator and two rotors, the stator integrates an angle calculation circuit and an encoding output circuit. The encoder uses a multi-core connector for output (connector interface as shown in the figure below), with the output connector located on the outer edge of the stator. The angle output uses two connectors, and can choose to output interface protocols such as SSi、BiSS-C、RS-422、RS-485.

Interface definition

No.	SSI	RS-422	BiSS-C	RS-485
1	VCC			
2	GND			
3	CLK+	RX+	MA+	/
4	CLK-	RX-	MA-	/
5	DADT-	TX-	SLO-	B-
6	DADT+	TX+	SLO+	A+

SSi/BiSS output signal parameters

Signal delay	< 50 us
Output code	Binary
Maximum data request rate	25 kHz
Clock/ Serial output	Differential RS-422

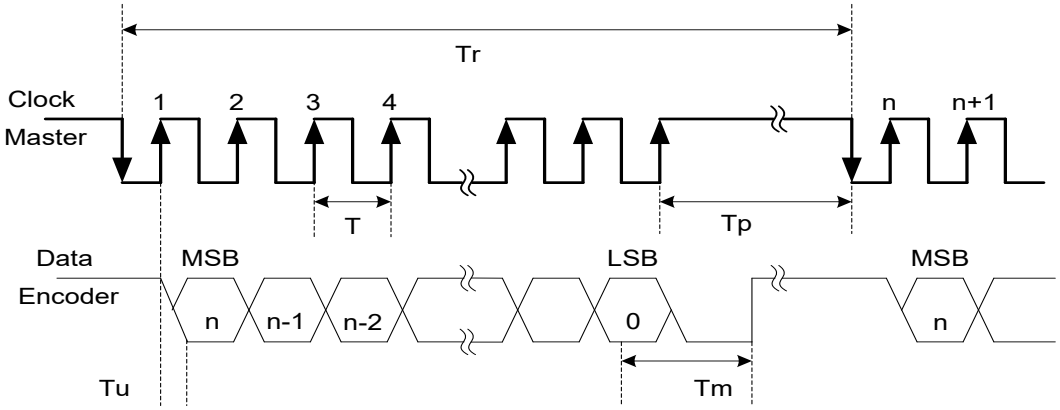


Connector and pin1 position

6-pin Connector: M0611RS-06-GB X0600HI-06G-LPHF（Standard）

3.2 SSi Interface

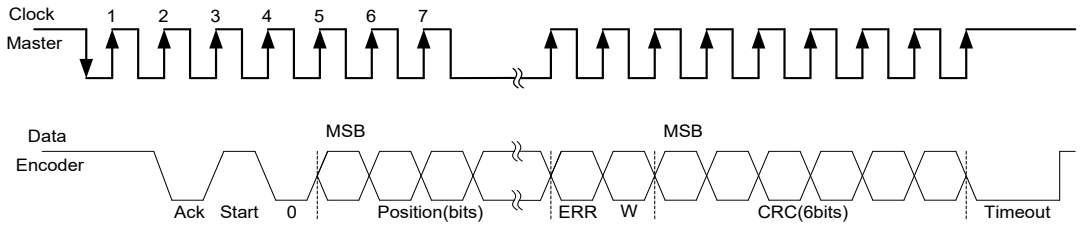
SSi (Synchronous Serial Interface) is based on the RS-422 hardware standard and is a commonly used interface for angle encoders. The master sends clock and angle encoder synchronized output data. The default clock is high level. The first low level starts data transmission, and the angle encoder transmits the angle data to the master in sequence according to the clock. The timing diagram is as follows:



n	Position resolution	12 - 21
f（T）	Clock frequency (Clock period)	0.5 - 5.0 MHz
Tu	Bit update time	50 ns
Tp	Pause time	＞ 25 us
Tm	Monoflop time	＞ 3 us
Tr	Time between 2 adjacent requests	Tr ＞ n*T +25 us
fr=1/Tr	Data request frequency	

3.3 BiSS-C Interface

The BiSS-C communication protocol is a full duplex, bidirectional, high-speed, synchronous serial communication protocol. This interface is also based on the RS-422 hardware standard and is compatible with the SSi interface. It is widely used in high-precision position control absolute encoders. The product uses BiSS-C as a point-to-point configured unidirectional interface, which can serve as one or more slaves connecting to the master, meeting the requirements of BiSS-C unidirectional interface. The timing diagram is as follows:



Bit/n		Description	Default Length	Default Length
28	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1 bit
27	Start	Encoder signal for "start" data transmit	1	1 bit
26	"0"	"Start" bit follower	0	1 bit
8-25	Position	Absolute Position encoder data		Per resolution
7	Error	BIT (Built In Test option)	1	1 bit
6	Warn	Warning (non active)	1	1 bit
0-5	CRC	*The CRC polynomial		6 bit
--	Timeout	Elapse between the sequential "start" request cycle's		> 30 us

*The CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$. It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.

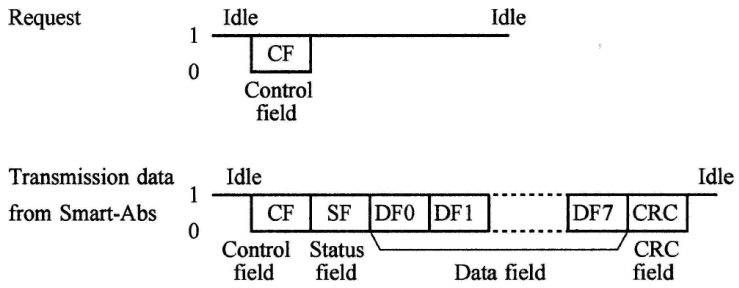
3.4 RS-422 UART Interface

Asynchronous serial communication interface over RS422 (UART), by default, the master does not need to send requests, and the encoder automatically outputs data to the master. The update rate of the encoder data is 2000Hz, the baud rate is 460800bps, and the data format is 1 start bit, 8 data bits, 1 even check bit, and 1 stop bit. Each frame of data contains 10 bytes, and the format is shown in the table below.

	BIT	Description	Note
Header	1	5E	Defined Header
	2	AD	
Protocol Flag Bit	3	01	Single byte
Position	4	Most Significant 8 Bits	LSB effective, MSB padding 0
	5	Middle Significant 8 Bits	
	6	Least Significant 8 Bits	
Frame Count	7	Most Significant 8 Bits	0-65535 Accumulate
	8	Least Significant 8 Bits	
Check	9	Most Significant 8 Bits	Accumulate the 3th4th, 5th6th, and 7th8th bytes, taking the lower 16 bits
	10	Least Significant 8 Bits	

3.5 RS-485 UART Interface

RS-485 serial interface, half duplex communication protocol, requires the master to send commands to get the angle position. The data update rate is related to the master request rate. The baud rate is 2.5Mbps, and the data format is 1 start bit, 8 data bits, 0 even check bits, and 1 stop bit. Frame format for reading-out data is as follows:



3.5.1 Single turn position request command:

1.Master send command
Sent data（HEX）：0x02
2. The master receives data frames from the encoder
Received data（HEX）：0x02 0x20 0x03 0x02 0x01 0x16
0x02: CF return the same command
0x20: SF defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
0	0	0	0	EA0	EA1	CA0	CA1

EA0=1 Single turn counting error
EA1=1 Overtemperature, multiturn counting error, battery alarm, or battery error
CA0=1 Communication parity error
CA1=1 Communication stop bit error
0x03 0x02 0x01: DF single turn position（LSB first）
0x16: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.2 Encoder ID data request command

1. Master send command Sent data（HEX）: 0x92
2. The master receives data frames from the encoder：
Received data（HEX）：0x92 0x20 0x11 0xA3
0x92: CF return the same command
0x20: SF
0x11: Encoder ID, fixed 0x11

0xA3: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.3 Encoder all data request command

1. Master send command Sent data（HEX）: 0x1A
2. The master receives data frames from the encoder：
   Received data（HEX）：0x1A 0x20 0x03 0x02 0x01 0x11 0x05 0x04 0x00 0x22 0x08
   0x1A: CF return the same command
   0x20: SF
   0x03 0x02 0x01: DF single turn position（LSB first）
   0x11: Encoder ID, fixed 0x11
   0x05 0x04 0x00: DF multiturn position（LSB first）（0x0405 = 1029, Max.65535）
   0x22: Encoder error, defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Overspeed	Full absolute status	Counting error	Counter overflow	"0"	Multiturn error	Battery error	Battery alarm

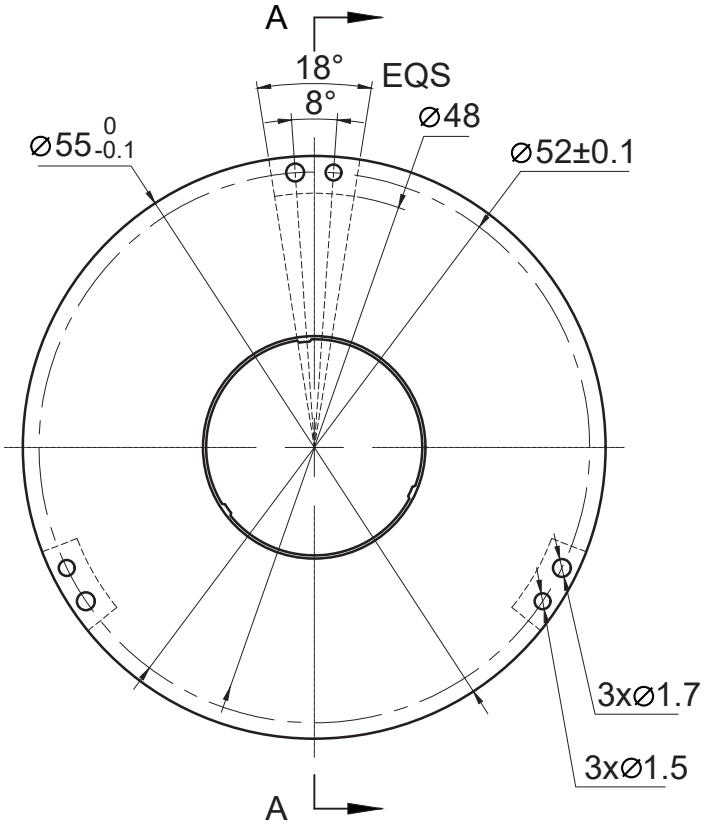
0x08: CRC G(X) = X^8 + 1, The code is calculated from all bits

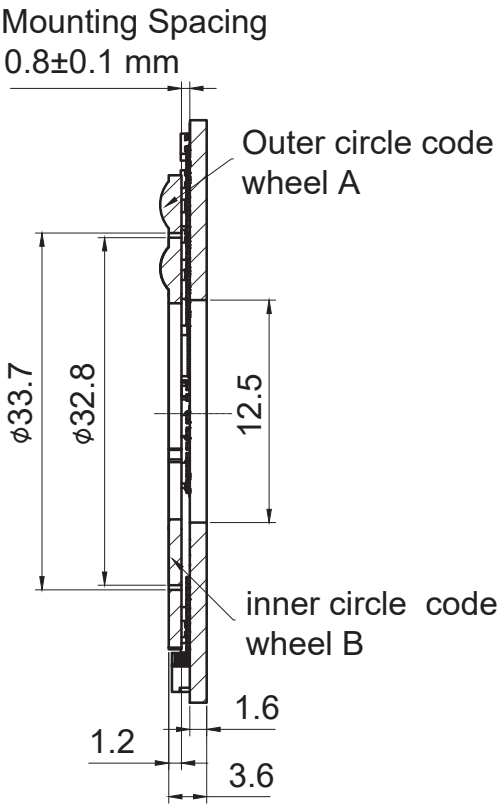
3.5.4 Single turn position reset request command:

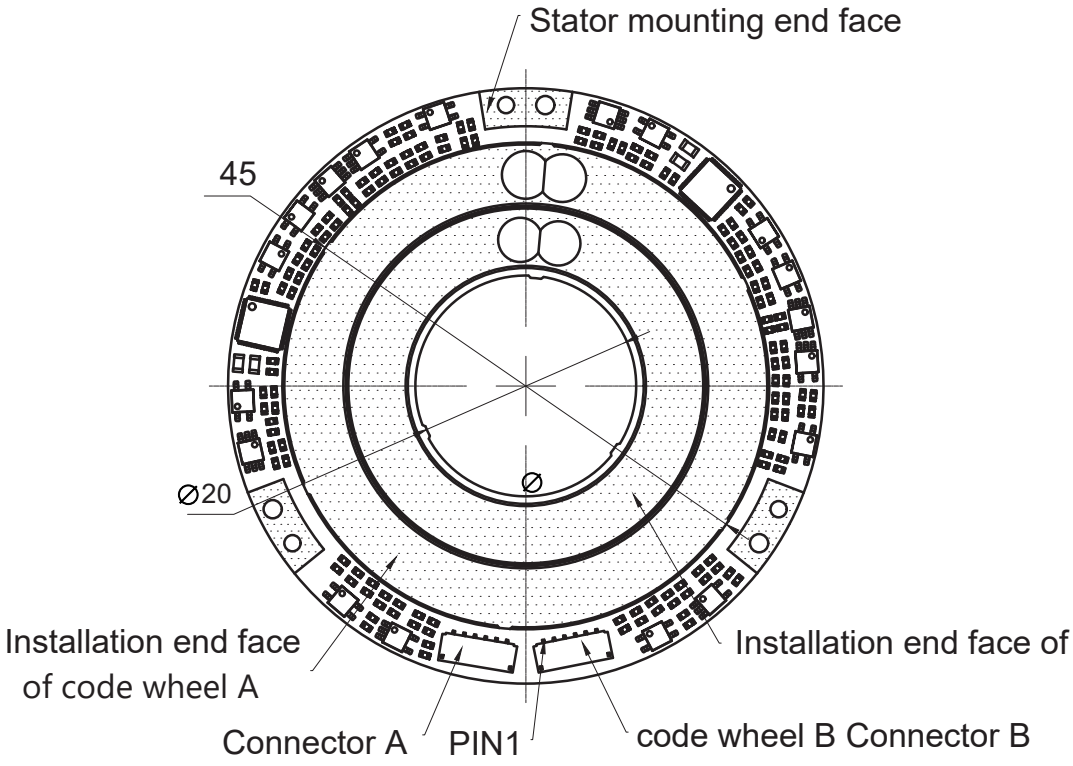
1. Master send command Sent data（HEX）: 0xC2
   The reset command should be repeated at least 10 times with a 40us interval to reset the single turn position.
2. The master receives data frames from the encoder:
   Received data（HEX）：0xC2 0x20 0x00 0x00 0x00 0xE2
   0xC2: CF return the same command
   0x20: SF
   0x00 0x00 0x00: DF single turn position（LSB first）
   0xE2: CRC G(X) = X^8 + 1, The code is calculated from all bits

4、Mechanical Mounting

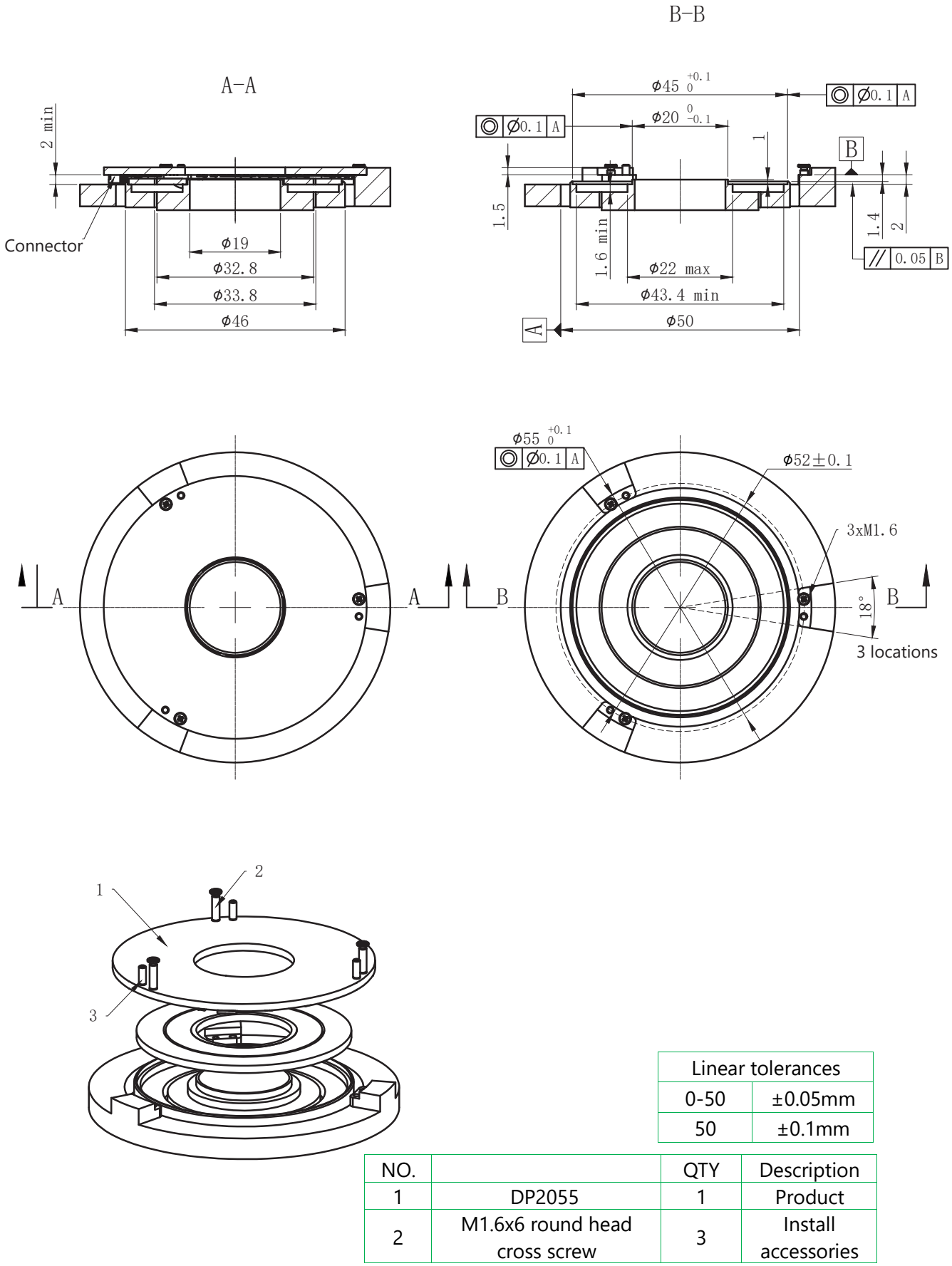
4.1 Dimensions







4.2 Installation Diagram



Linear tolerances	
0-50	±0.05mm
50	±0.1mm

NO.		QTY	Description
1	DP2055	1	Product
2	M1.6x6 round head cross screw	3	Install accessories

2、Technical Specifications

General

Resolution	18~20bit
Maximum static error	±0.01°
Repetitive error	±2 LSB
Maximum operational speed	6000 rpm
Measurement range	Single turn
Rotation direction	Adjustable CW/CCW

Mechanical

Outer\Inner\Height	65\30\3.6mm
Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	0.8±0.2 mm
Rotor inertia	0.88/2.06kg·mm²
Weight (stator / rotor)	20 g
Material (stator / rotor)	FR-4

Electrical

Supply voltage	5 V
Current consumption	< 80 mA
Communication	SSi、BiSS-C、UART

Environmental

EMC	IEC 61000-6-2、IEC 61000-6-4
Operating temperature	-40℃~+125℃
Storage temperature	-50℃ - +100℃
Relative humidity	0 - 99%
Shock endurance / functional	100 g / 11 ms
Vibration functional	20 g（10 - 2000 Hz）
Protection	IP 40

3、Electrical Connection

3.1 Hardware Interface

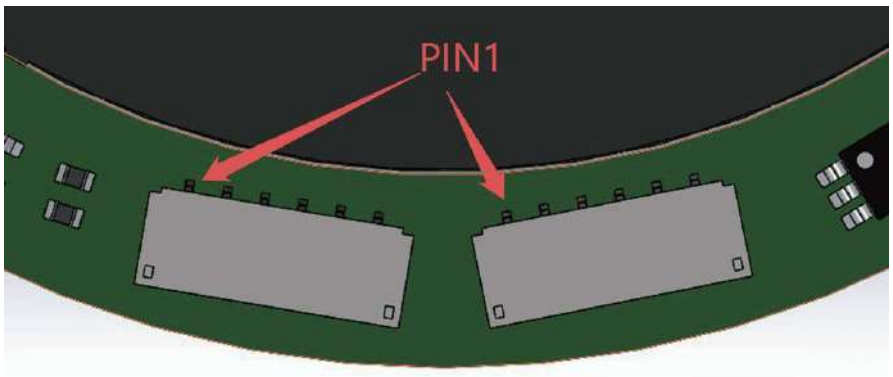
DP3065 encoder consists of a stator and two rotors, the stator integrates an angle calculation circuit and an encoding output circuit. The encoder uses a multi-core connector for output (connector interface as shown in the figure below), with the output connector located on the outer edge of the stator. The angle output uses two connectors, and can choose to output interface protocols such as SSi、BiSS-C、RS-422、RS-485.

Interface definition

No.	SSI	RS-422	BiSS-C	RS-485
1	VCC			
2	GND			
3	CLK+	RX+	MA+	/
4	CLK-	RX-	MA-	/
5	DADT-	TX-	SLO-	B-
6	DADT+	TX+	SLO+	A+

SSi/BiSS output signal parameters

Signal delay	< 50 us
Output code	Binary
Maximum data request rate	25 kHz
Clock/ Serial output	Differential RS-422

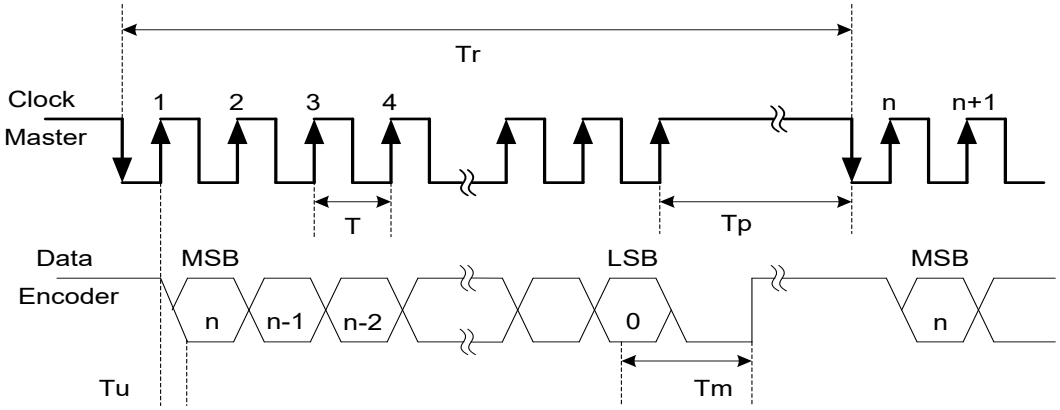


Connector and pin1 position

6-pin Connector: M0611RS-06-GB X0600HI-06G-LPHF（Standard）

3.2 SSi Interface

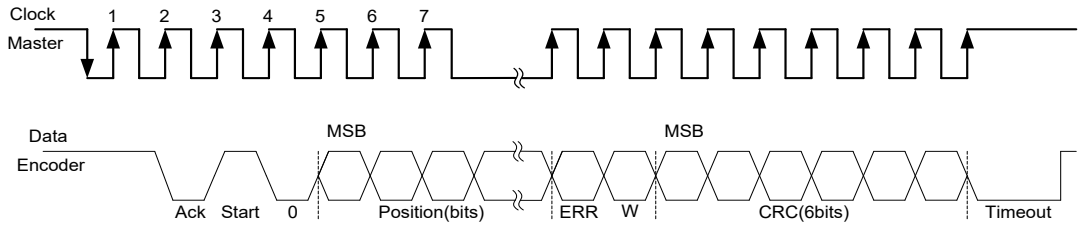
SSi (Synchronous Serial Interface) is based on the RS-422 hardware standard and is a commonly used interface for angle encoders. The master sends clock and angle encoder synchronized output data. The default clock is high level. The first low level starts data transmission, and the angle encoder transmits the angle data to the master in sequence according to the clock. The timing diagram is as follows:



n	Position resolution	12 - 21
f（T）	Clock frequency (Clock period)	0.5 - 5.0 MHz
Tu	Bit update time	50 ns
Tp	Pause time	＞ 25 us
Tm	Monoflop time	＞ 3 us
Tr	Time between 2 adjacent requests	Tr ＞ n*T +25 us
fr=1/Tr	Data request frequency	

3.3 BiSS-C Interface

The BiSS-C communication protocol is a full duplex, bidirectional, high-speed, synchronous serial communication protocol. This interface is also based on the RS-422 hardware standard and is compatible with the SSi interface. It is widely used in high-precision position control absolute encoders. The product uses BiSS-C as a point-to-point configured unidirectional interface, which can serve as one or more slaves connecting to the master, meeting the requirements of BiSS-C unidirectional interface. The timing diagram is as follows:



Bit/n		Description	Default Length	Default Length
28	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1 bit
27	Start	Encoder signal for "start" data transmit	1	1 bit
26	"0"	"Start" bit follower	0	1 bit
8-25	Position	Absolute Position encoder data		Per resolution
7	Error	BIT (Built In Test option)	1	1 bit
6	Warn	Warning (non active)	1	1 bit
0-5	CRC	*The CRC polynomial		6 bit
--	Timeout	Elapse between the sequential "start" request cycle's		> 30 us

*The CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$. It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.

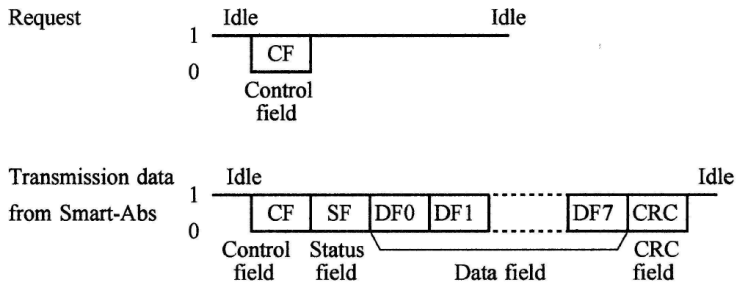
3.4 RS-422 UART Interface

Asynchronous serial communication interface over RS422 (UART), by default, the master does not need to send requests, and the encoder automatically outputs data to the master. The update rate of the encoder data is 2000Hz, the baud rate is 460800bps, and the data format is 1 start bit, 8 data bits, 1 even check bit, and 1 stop bit. Each frame of data contains 10 bytes, and the format is shown in the table below.

	BIT	Description	Note
Header	1	5E	Defined Header
	2	AD	
Protocol Flag Bit	3	01	Single byte
Position	4	Most Significant 8 Bits	LSB effective, MSB padding 0
	5	Middle Significant 8 Bits	
	6	Least Significant 8 Bits	
Frame Count	7	Most Significant 8 Bits	0-65535 Accumulate
	8	Least Significant 8 Bits	
Check	9	Most Significant 8 Bits	Accumulate the 3th4th, 5th6th, and 7th8th bytes, taking the lower 16 bits
	10	Least Significant 8 Bits	

3.5 RS-485 UART Interface

RS-485 serial interface, half duplex communication protocol, requires the master to send commands to get the angle position. The data update rate is related to the master request rate. The baud rate is 2.5Mbps, and the data format is 1 start bit, 8 data bits, 0 even check bits, and 1 stop bit. Frame format for reading-out data is as follows:



3.5.1 Single turn position request command:

1.Master send command

Sent data（HEX）：0x02

2. The master receives data frames from the encoder

Received data（HEX）：0x02 0x20 0x03 0x02 0x01 0x16

0x02: CF return the same command

0x20: SF defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
0	0	0	0	EA0	EA1	CA0	CA1

EA0=1 Single turn counting error

EA1=1 Overtemperature, multiturn counting error, battery alarm, or battery error

CA0=1 Communication parity error

CA1=1 Communication stop bit error

0x03 0x02 0x01: DF single turn position（LSB first）

0x16: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.2 Encoder ID data request command

1. Master send command Sent data（HEX）: 0x92

2. The master receives data frames from the encoder：

Received data（HEX）：0x92 0x20 0x11 0xA3

0x92: CF return the same command

0x20: SF

0x11: Encoder ID, fixed 0x11

0xA3: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.3 Encoder all data request command

1. Master send command Sent data（HEX）: 0x1A
2. The master receives data frames from the encoder：
   Received data（HEX）：0x1A 0x20 0x03 0x02 0x01 0x11 0x05 0x04 0x00 0x22 0x08
   0x1A: CF return the same command
   0x20: SF
   0x03 0x02 0x01: DF single turn position（LSB first）
   0x11: Encoder ID, fixed 0x11
   0x05 0x04 0x00: DF multiturn position（LSB first）（0x0405 = 1029, Max.65535）
   0x22: Encoder error, defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Overspeed	Full absolute status	Counting error	Counter overflow	"0"	Multiturn error	Battery error	Battery alarm

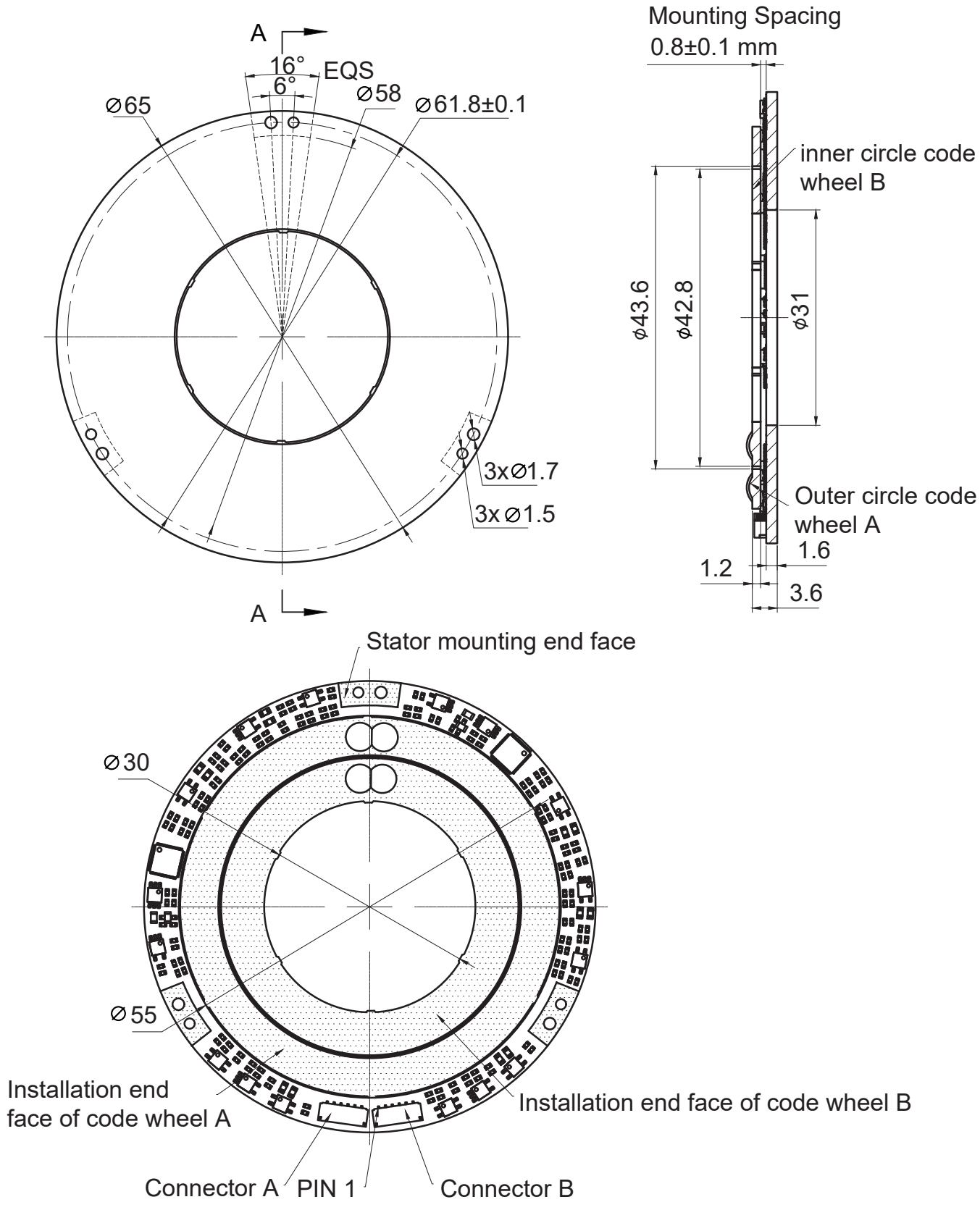
0x08: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.4 Single turn position reset request command:

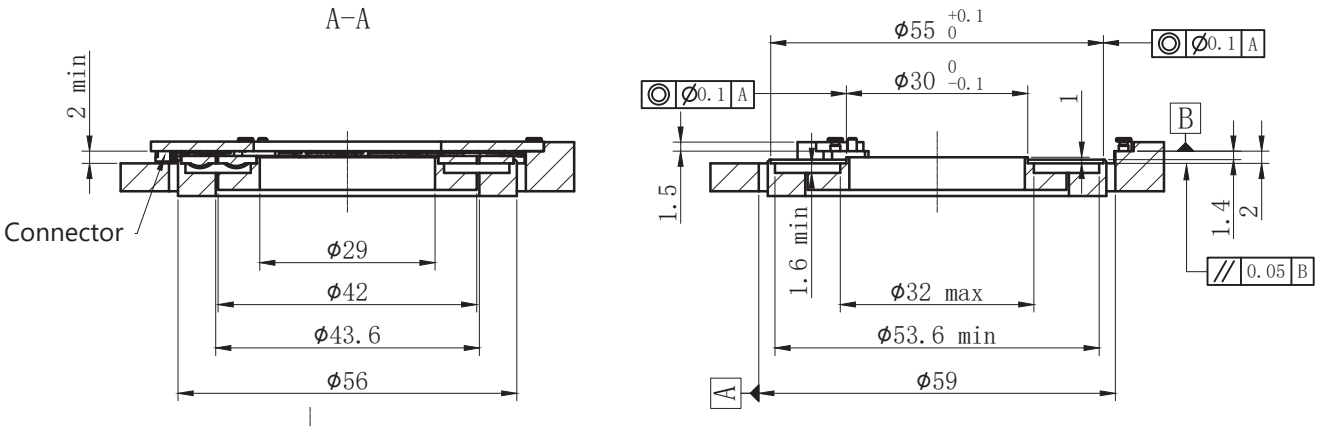
1. Master send command Sent data（HEX）: 0xC2
   The reset command should be repeated at least 10 times with a 40us interval to reset the single turn position.
2. The master receives data frames from the encoder:
   Received data（HEX）：0xC2 0x20 0x00 0x00 0x00 0xE2
   0xC2: CF return the same command
   0x20: SF
   0x00 0x00 0x00: DF single turn position（LSB first）
   0xE2: CRC G(X) = X^8 + 1, The code is calculated from all bits

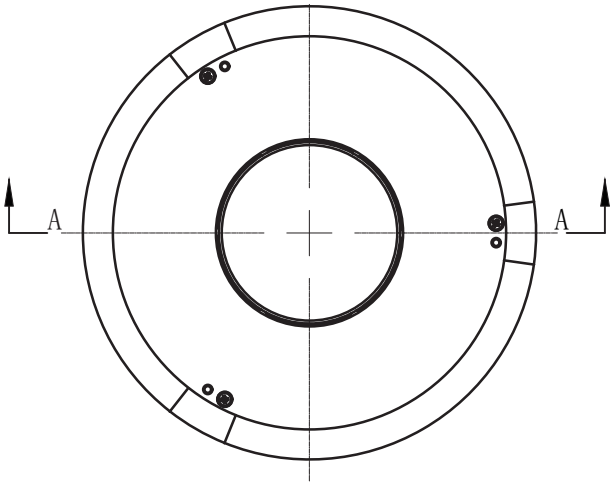
4、Mechanical Mounting

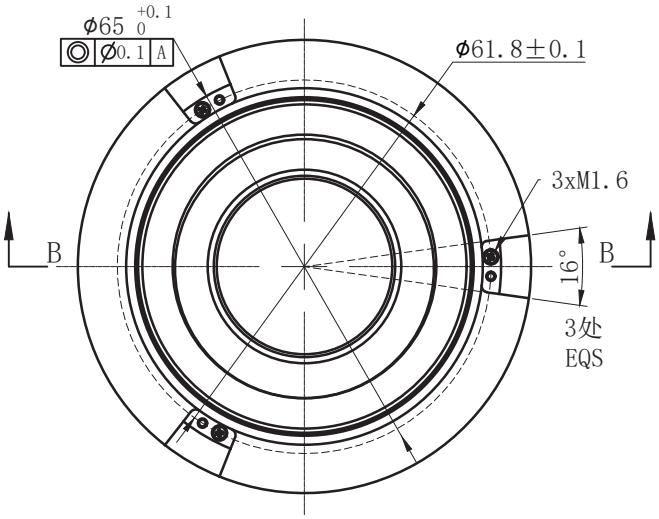
4.1 Dimensions

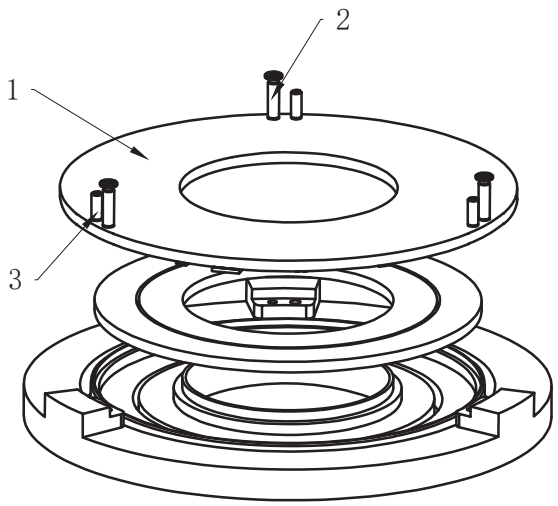


4.2 Installation Diagram









Linear tolerances	
0-50	±0.05mm
50	±0.1mm

NO.		QTY	Description
1	DP3065	1	Product
2	M1.6x6 round head cross screw	3	Install accessories

2、Technical Specifications

General

Resolution	18~20bit
Maximum static error	±0.01°
Repetitive error	±2 LSB
Maximum operational speed	6000 rpm
Measurement range	Single turn
Rotation direction	Adjustable CW/CCW

Mechanical

Outer\Inner\Height	75\35\3.6mm
Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	0.8±0.2 mm
Rotor inertia	1.84/3.95kg·mm²
Weight (stator / rotor)	25 g
Material (stator / rotor)	FR-4

Electrical

Supply voltage	5 V
Current consumption	< 80 mA
Communication	SSi、BiSS-C、UART

Environmental

EMC	IEC 61000-6-2、IEC 61000-6-4
Operating temperature	-40℃~+125℃
Storage temperature	-50℃ - +100℃
Relative humidity	0 - 99%
Shock endurance / functional	100 g / 11 ms
Vibration functional	20 g（10 - 2000 Hz）
Protection	IP 40

3、Electrical Connection

3.1 Hardware Interface

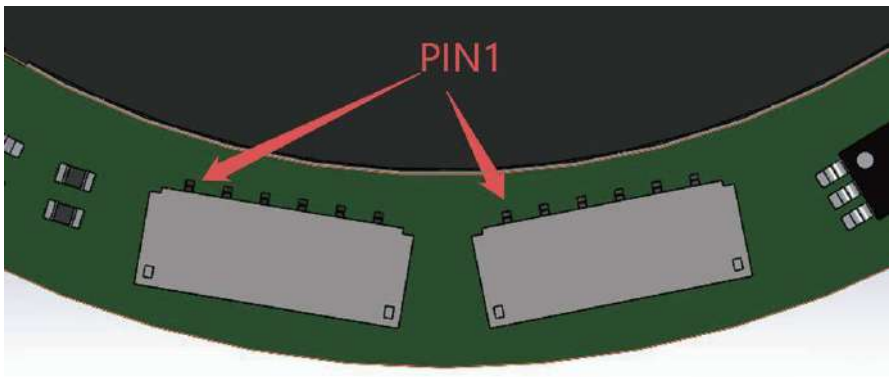
DP3575 encoder consists of a stator and two rotors, the stator integrates an angle calculation circuit and an encoding output circuit. The encoder uses a multi-core connector for output (connector interface as shown in the figure below), with the output connector located on the outer edge of the stator. The angle output uses two connectors, and can choose to output interface protocols such as SSi、BiSS-C、RS-422、RS-485.

Interface definition

No.	SSI	RS-422	BiSS-C	RS-485
1	VCC			
2	GND			
3	CLK+	RX+	MA+	/
4	CLK-	RX-	MA-	/
5	DADT-	TX-	SLO-	B-
6	DADT+	TX+	SLO+	A+

SSi/BiSS output signal parameters

Signal delay	< 50 us
Output code	Binary
Maximum data request rate	25 kHz
Clock/ Serial output	Differential RS-422

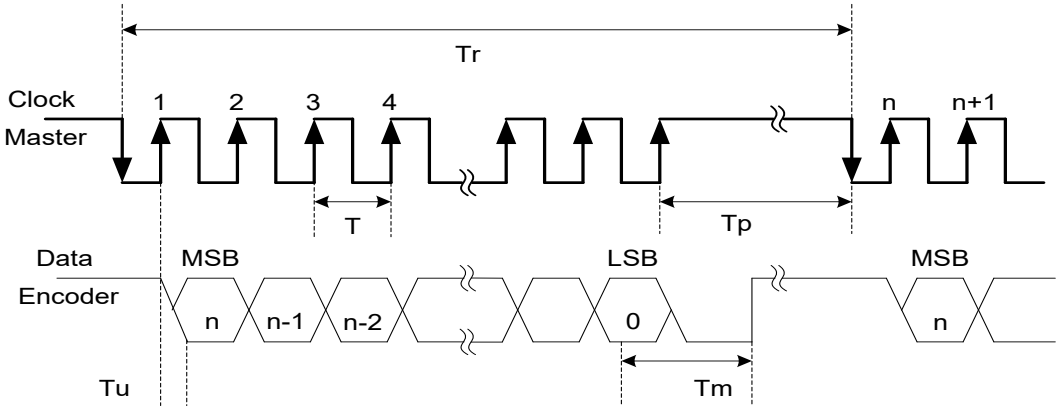


Connector and pin1 position

6-pin Connector: M0611RS-06-GB X0600HI-06G-LPHF（Standard）

3.2 SSi Interface

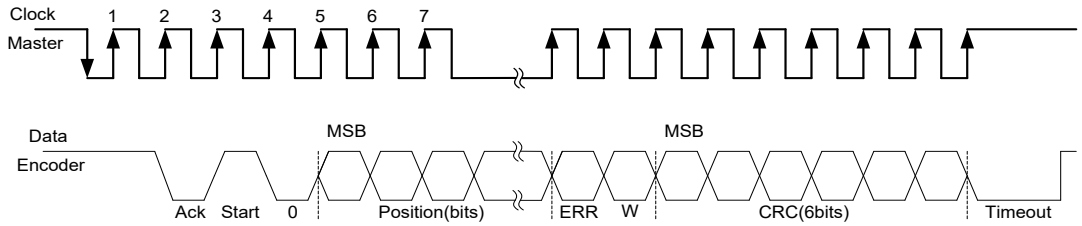
SSi (Synchronous Serial Interface) is based on the RS-422 hardware standard and is a commonly used interface for angle encoders. The master sends clock and angle encoder synchronized output data. The default clock is high level. The first low level starts data transmission, and the angle encoder transmits the angle data to the master in sequence according to the clock. The timing diagram is as follows:



n	Position resolution	12 - 21
f（T）	Clock frequency (Clock period)	0.5 - 5.0 MHz
Tu	Bit update time	50 ns
Tp	Pause time	＞ 25 us
Tm	Monoflop time	＞ 3 us
Tr	Time between 2 adjacent requests	Tr ＞ n*T +25 us
fr=1/Tr	Data request frequency	

3.3 BiSS-C Interface

The BiSS-C communication protocol is a full duplex, bidirectional, high-speed, synchronous serial communication protocol. This interface is also based on the RS-422 hardware standard and is compatible with the SSi interface. It is widely used in high-precision position control absolute encoders. The product uses BiSS-C as a point-to-point configured unidirectional interface, which can serve as one or more slaves connecting to the master, meeting the requirements of BiSS-C unidirectional interface. The timing diagram is as follows:



Bit/n		Description	Default Length	Default Length
28	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1 bit
27	Start	Encoder signal for "start" data transmit	1	1 bit
26	"0"	"Start" bit follower	0	1 bit
8-25	Position	Absolute Position encoder data		Per resolution
7	Error	BIT (Built In Test option)	1	1 bit
6	Warn	Warning (non active)	1	1 bit
0-5	CRC	*The CRC polynomial		6 bit
--	Timeout	Elapse between the sequential "start" request cycle's		> 30 us

*The CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$. It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.

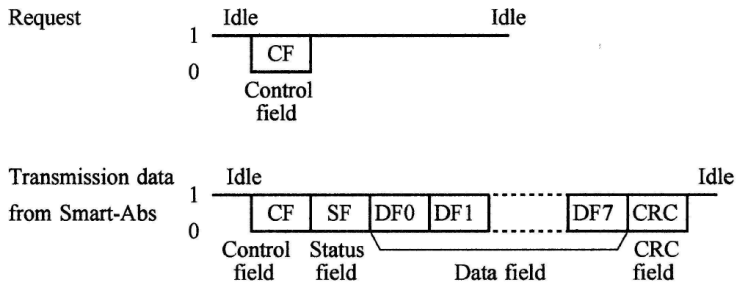
3.4 RS-422 UART Interface

Asynchronous serial communication interface over RS422 (UART), by default, the master does not need to send requests, and the encoder automatically outputs data to the master. The update rate of the encoder data is 2000Hz, the baud rate is 460800bps, and the data format is 1 start bit, 8 data bits, 1 even check bit, and 1 stop bit. Each frame of data contains 10 bytes, and the format is shown in the table below.

	BIT	Description	Note
Header	1	5E	Defined Header
	2	AD	
Protocol Flag Bit	3	01	Single byte
Position	4	Most Significant 8 Bits	LSB effective, MSB padding 0
	5	Middle Significant 8 Bits	
	6	Least Significant 8 Bits	
Frame Count	7	Most Significant 8 Bits	0-65535 Accumulate
	8	Least Significant 8 Bits	
Check	9	Most Significant 8 Bits	Accumulate the 3th4th, 5th6th, and 7th8th bytes, taking the lower 16 bits
	10	Least Significant 8 Bits	

3.5 RS-485 UART Interface

RS-485 serial interface, half duplex communication protocol, requires the master to send commands to get the angle position. The data update rate is related to the master request rate. The baud rate is 2.5Mbps, and the data format is 1 start bit, 8 data bits, 0 even check bits, and 1 stop bit. Frame format for reading-out data is as follows:



3.5.1 Single turn position request command:

1.Master send command

Sent data（HEX）：0x02

2. The master receives data frames from the encoder

Received data（HEX）：0x02 0x20 0x03 0x02 0x01 0x16

0x02: CF return the same command

0x20: SF defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
0	0	0	0	EA0	EA1	CA0	CA1

EA0=1 Single turn counting error

EA1=1 Overtemperature, multiturn counting error, battery alarm, or battery error

CA0=1 Communication parity error

CA1=1 Communication stop bit error

0x03 0x02 0x01: DF single turn position（LSB first）

0x16: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.2 Encoder ID data request command

1. Master send command　　Sent data（HEX）: 0x92

2. The master receives data frames from the encoder：

Received data（HEX）：0x92 0x20 0x11 0xA3

0x92: CF return the same command

0x20: SF

0x11: Encoder ID, fixed 0x11

0xA3: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.3 Encoder all data request command

1. Master send command Sent data（HEX）: 0x1A
2. The master receives data frames from the encoder：
   Received data（HEX）：0x1A 0x20 0x03 0x02 0x01 0x11 0x05 0x04 0x00 0x22 0x08
   0x1A: CF return the same command
   0x20: SF
   0x03 0x02 0x01: DF single turn position（LSB first）
   0x11: Encoder ID, fixed 0x11
   0x05 0x04 0x00: DF multiturn position（LSB first）（0x0405 = 1029, Max.65535）
   0x22: Encoder error, defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Overspeed	Full absolute status	Counting error	Counter overflow	"0"	Multiturn error	Battery error	Battery alarm

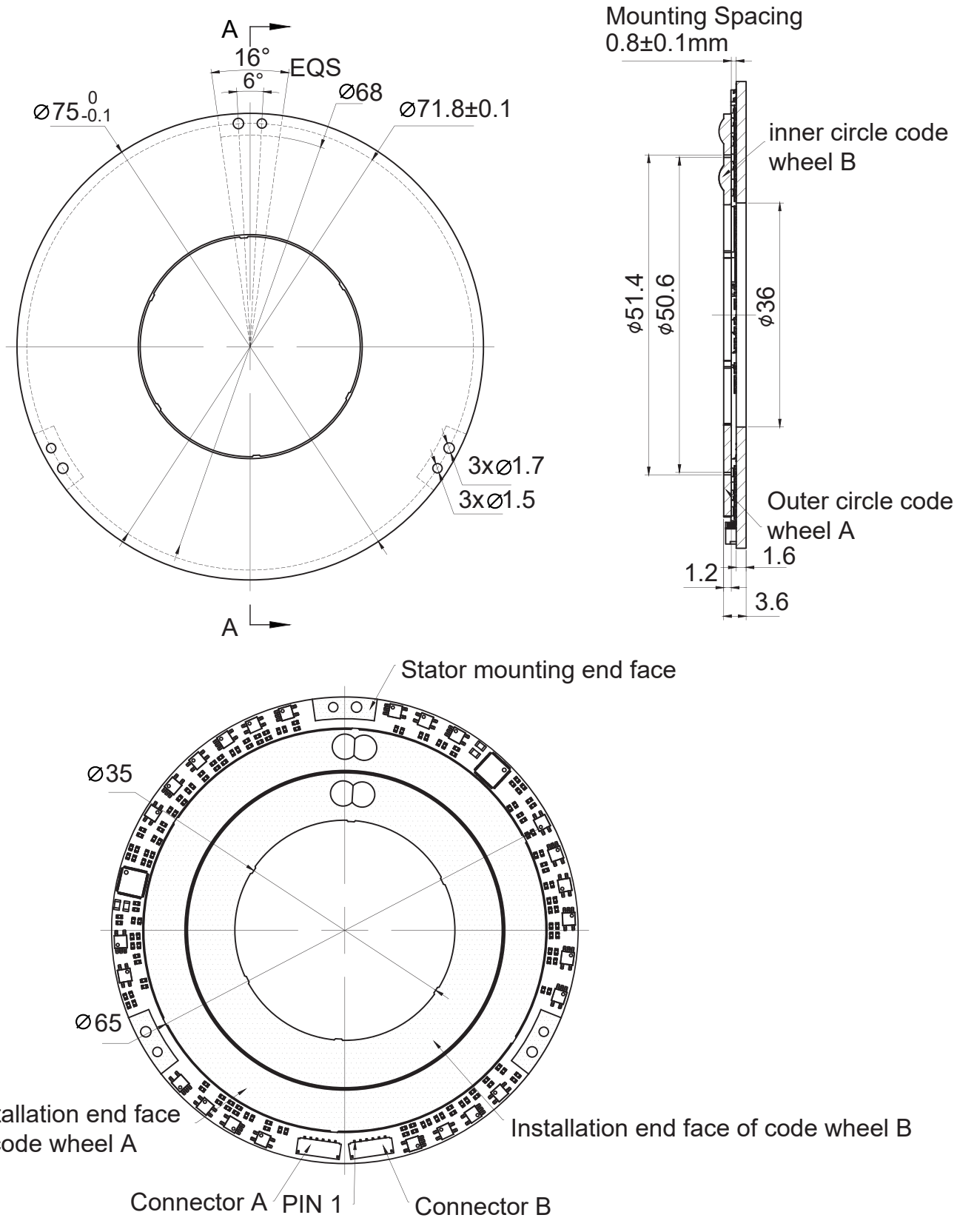
0x08: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.4 Single turn position reset request command:

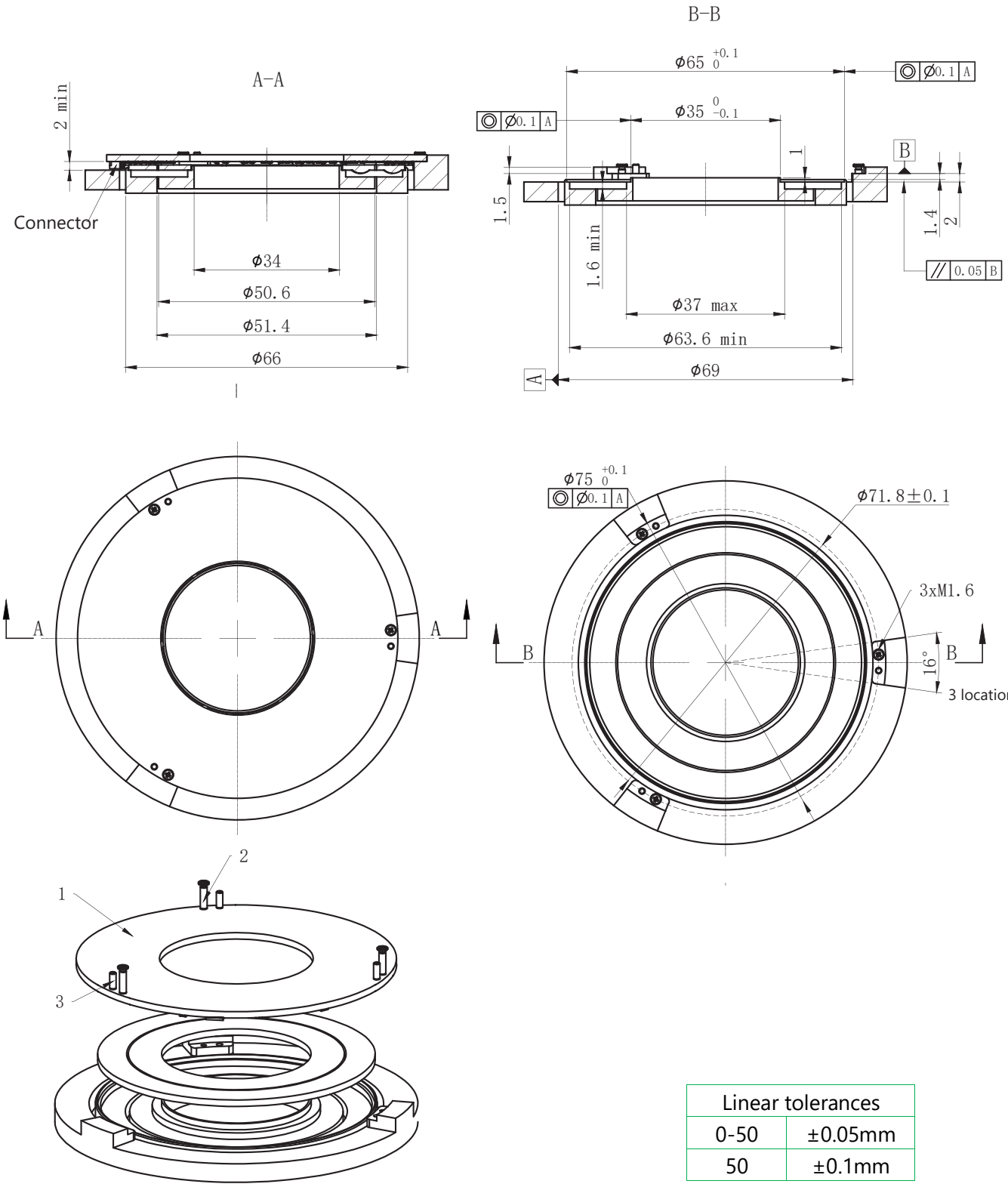
1. Master send command Sent data（HEX）: 0xC2
   The reset command should be repeated at least 10 times with a 40us interval to reset the single turn position.
2. The master receives data frames from the encoder:
   Received data（HEX）：0xC2 0x20 0x00 0x00 0x00 0xE2
   0xC2: CF return the same command
   0x20: SF
   0x00 0x00 0x00: DF single turn position（LSB first）
   0xE2: CRC G(X) = X^8 + 1, The code is calculated from all bits

4、Mechanical Mounting

4.1 Dimensions



4.2 Installation Diagram



Linear tolerances	
0-50	±0.05mm
50	±0.1mm

NO.		QTY	Description
1	DP3575	1	Product
2	M1.6x6 round head cross screw	3	Install accessories

2、Technical Specifications

General

Resolution	18~20bit
Maximum static error	±0.01°
Repetitive error	±2 LSB
Maximum operational speed	6000 rpm
Measurement range	Single turn
Rotation direction	Adjustable CW/CCW

Mechanical

Outer\Inner\Height	85\45\3.6mm
Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	0.8±0.2 mm
Rotor inertia	3.4/6.33kg·mm²
Weight (stator / rotor)	30 g
Material (stator / rotor)	FR-4

Electrical

Supply voltage	5 V
Current consumption	< 80 mA
Communication	SSi、BiSS-C、UART

Environmental

EMC	IEC 61000-6-2、IEC 61000-6-4
Operating temperature	-40℃~+125℃
Storage temperature	-50℃ - +100℃
Relative humidity	0 - 99%
Shock endurance / functional	100 g / 11 ms
Vibration functional	20 g（10 - 2000 Hz）
Protection	IP 40

3、Electrical Connection

3.1 Hardware Interface

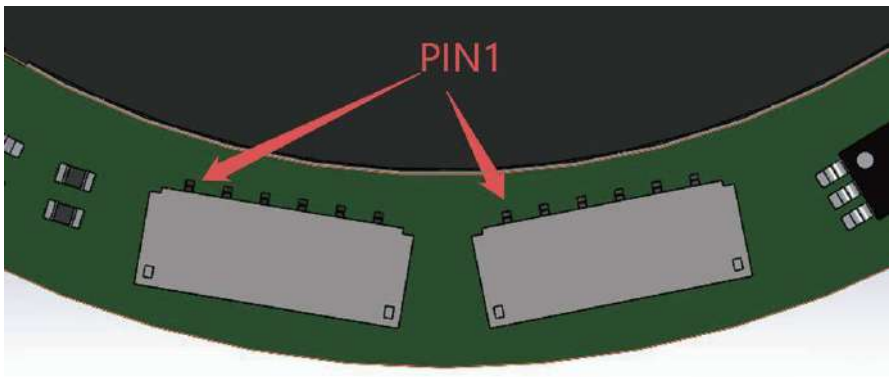
DP4585 encoder consists of a stator and two rotors, the stator integrates an angle calculation circuit and an encoding output circuit. The encoder uses a multi-core connector for output (connector interface as shown in the figure below), with the output connector located on the outer edge of the stator. The angle output uses two connectors, and can choose to output interface protocols such as SSi、BiSS-C、RS-422、RS-485.

Interface definition

No.	SSI	RS-422	BiSS-C	RS-485
1	VCC			
2	GND			
3	CLK+	RX+	MA+	/
4	CLK-	RX-	MA-	/
5	DADT-	TX-	SLO-	B-
6	DADT+	TX+	SLO+	A+

SSi/BiSS output signal parameters

Signal delay	< 50 us
Output code	Binary
Maximum data request rate	25 kHz
Clock/ Serial output	Differential RS-422

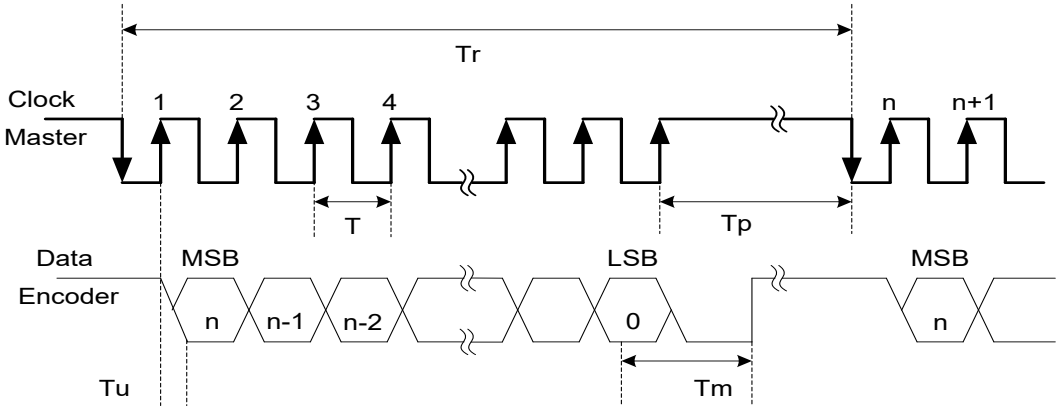


Connector and pin1 position

6-pin Connector: M0611RS-06-GB X0600HI-06G-LPHF（Standard）

3.2 SSi Interface

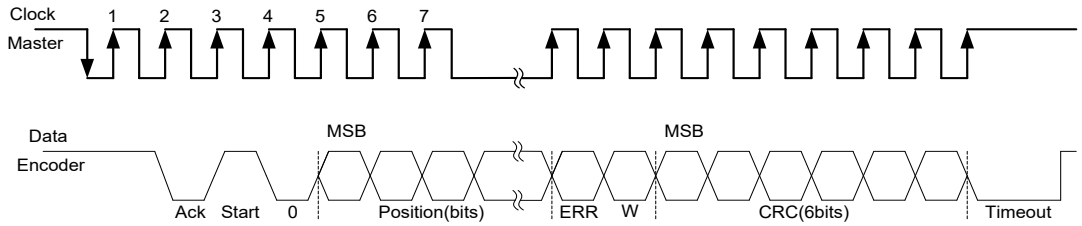
SSi (Synchronous Serial Interface) is based on the RS-422 hardware standard and is a commonly used interface for angle encoders. The master sends clock and angle encoder synchronized output data. The default clock is high level. The first low level starts data transmission, and the angle encoder transmits the angle data to the master in sequence according to the clock. The timing diagram is as follows:



n	Position resolution	12 - 21
f（T）	Clock frequency (Clock period)	0.5 - 5.0 MHz
Tu	Bit update time	50 ns
Tp	Pause time	＞ 25 us
Tm	Monoflop time	＞ 3 us
Tr	Time between 2 adjacent requests	Tr ＞ n*T +25 us
fr=1/Tr	Data request frequency	

3.3 BiSS-C Interface

The BiSS-C communication protocol is a full duplex, bidirectional, high-speed, synchronous serial communication protocol. This interface is also based on the RS-422 hardware standard and is compatible with the SSi interface. It is widely used in high-precision position control absolute encoders. The product uses BiSS-C as a point-to-point configured unidirectional interface, which can serve as one or more slaves connecting to the master, meeting the requirements of BiSS-C unidirectional interface. The timing diagram is as follows:



Bit/n		Description	Default Length	Default Length
28	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1 bit
27	Start	Encoder signal for "start" data transmit	1	1 bit
26	"0"	"Start" bit follower	0	1 bit
8-25	Position	Absolute Position encoder data		Per resolution
7	Error	BIT (Built In Test option)	1	1 bit
6	Warn	Warning (non active)	1	1 bit
0-5	CRC	*The CRC polynomial		6 bit
--	Timeout	Elapse between the sequential "start" request cycle's		> 30 us

*The CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$. It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.

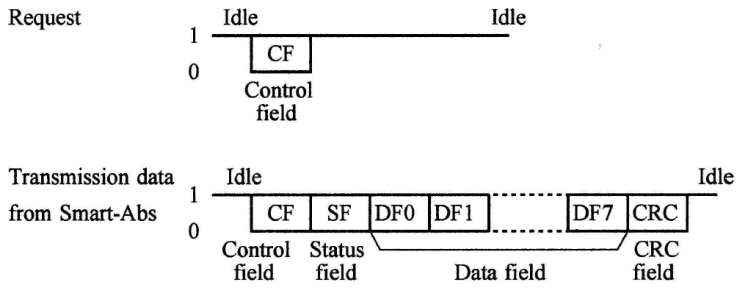
3.4 RS-422 UART Interface

Asynchronous serial communication interface over RS422 (UART), by default, the master does not need to send requests, and the encoder automatically outputs data to the master. The update rate of the encoder data is 2000Hz, the baud rate is 460800bps, and the data format is 1 start bit, 8 data bits, 1 even check bit, and 1 stop bit. Each frame of data contains 10 bytes, and the format is shown in the table below.

	BIT	Description	Note
Header	1	5E	Defined Header
	2	AD	
Protocol Flag Bit	3	01	Single byte
Position	4	Most Significant 8 Bits	LSB effective, MSB padding 0
	5	Middle Significant 8 Bits	
	6	Least Significant 8 Bits	
Frame Count	7	Most Significant 8 Bits	0-65535 Accumulate
	8	Least Significant 8 Bits	
Check	9	Most Significant 8 Bits	Accumulate the 3th4th, 5th6th, and 7th8th bytes, taking the lower 16 bits
	10	Least Significant 8 Bits	

3.5 RS-485 UART Interface

RS-485 serial interface, half duplex communication protocol, requires the master to send commands to get the angle position. The data update rate is related to the master request rate. The baud rate is 2.5Mbps, and the data format is 1 start bit, 8 data bits, 0 even check bits, and 1 stop bit. Frame format for reading-out data is as follows:



3.5.1 Single turn position request command:

1.Master send command

Sent data（HEX）：0x02

2. The master receives data frames from the encoder

Received data（HEX）：0x02 0x20 0x03 0x02 0x01 0x16

0x02: CF return the same command

0x20: SF defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
0	0	0	0	EA0	EA1	CA0	CA1

EA0=1 Single turn counting error

EA1=1 Overtemperature, multiturn counting error, battery alarm, or battery error

CA0=1 Communication parity error

CA1=1 Communication stop bit error

0x03 0x02 0x01: DF single turn position（LSB first）

0x16: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.2 Encoder ID data request command

1. Master send command Sent data（HEX）: 0x92

2. The master receives data frames from the encoder：

Received data（HEX）：0x92 0x20 0x11 0xA3

0x92: CF return the same command

0x20: SF

0x11: Encoder ID, fixed 0x11

0xA3: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.3 Encoder all data request command

1. Master send command Sent data（HEX）: 0x1A
2. The master receives data frames from the encoder：
   Received data（HEX）：0x1A 0x20 0x03 0x02 0x01 0x11 0x05 0x04 0x00 0x22 0x08
   0x1A: CF return the same command
   0x20: SF
   0x03 0x02 0x01: DF single turn position（LSB first）
   0x11: Encoder ID, fixed 0x11
   0x05 0x04 0x00: DF multiturn position（LSB first）（0x0405 = 1029, Max.65535）
   0x22: Encoder error, defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Overspeed	Full absolute status	Counting error	Counter overflow	"0"	Multiturn error	Battery error	Battery alarm

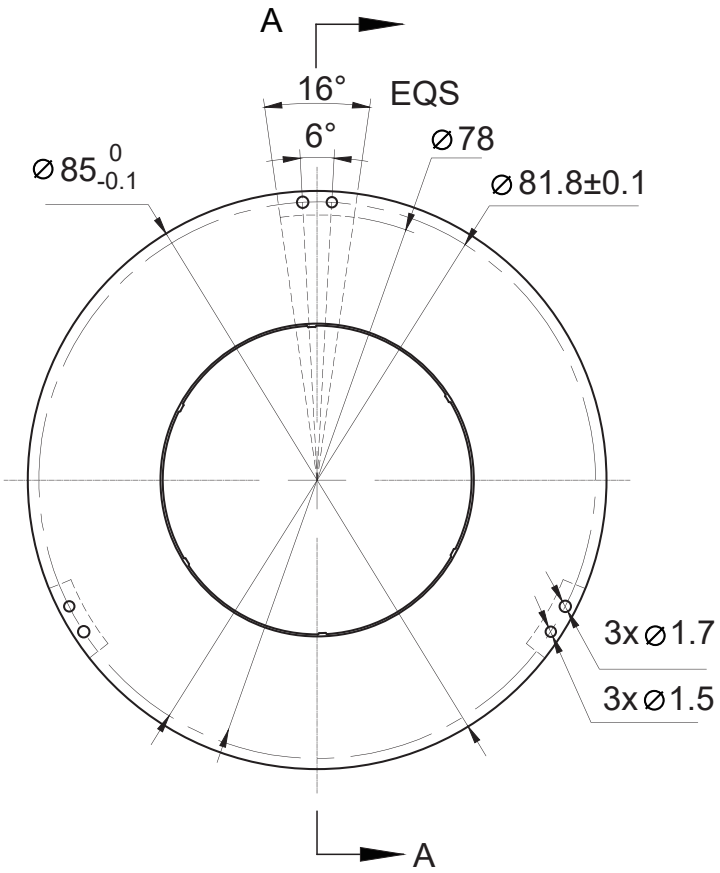
0x08: CRC G(X) = X^8 + 1, The code is calculated from all bits

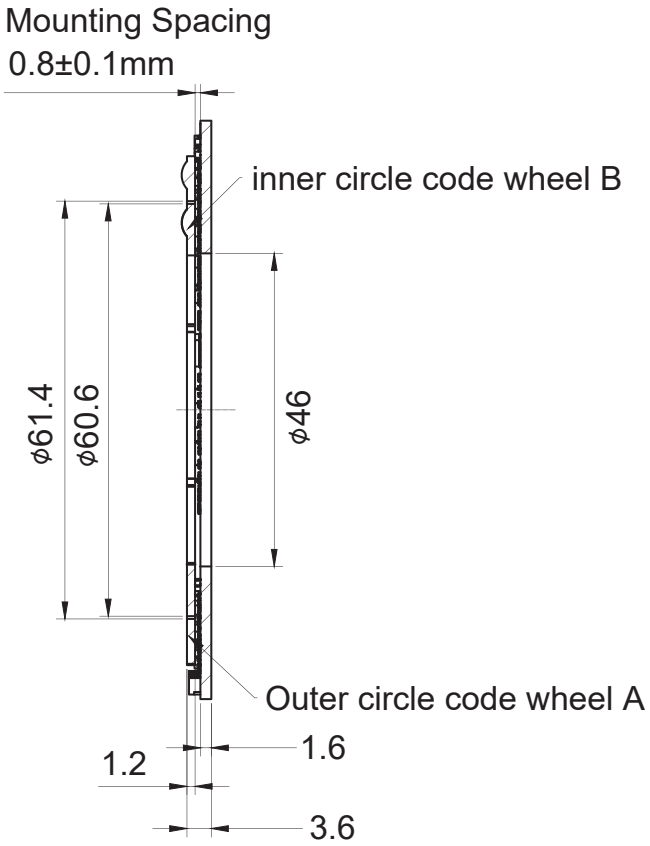
3.5.4 Single turn position reset request command:

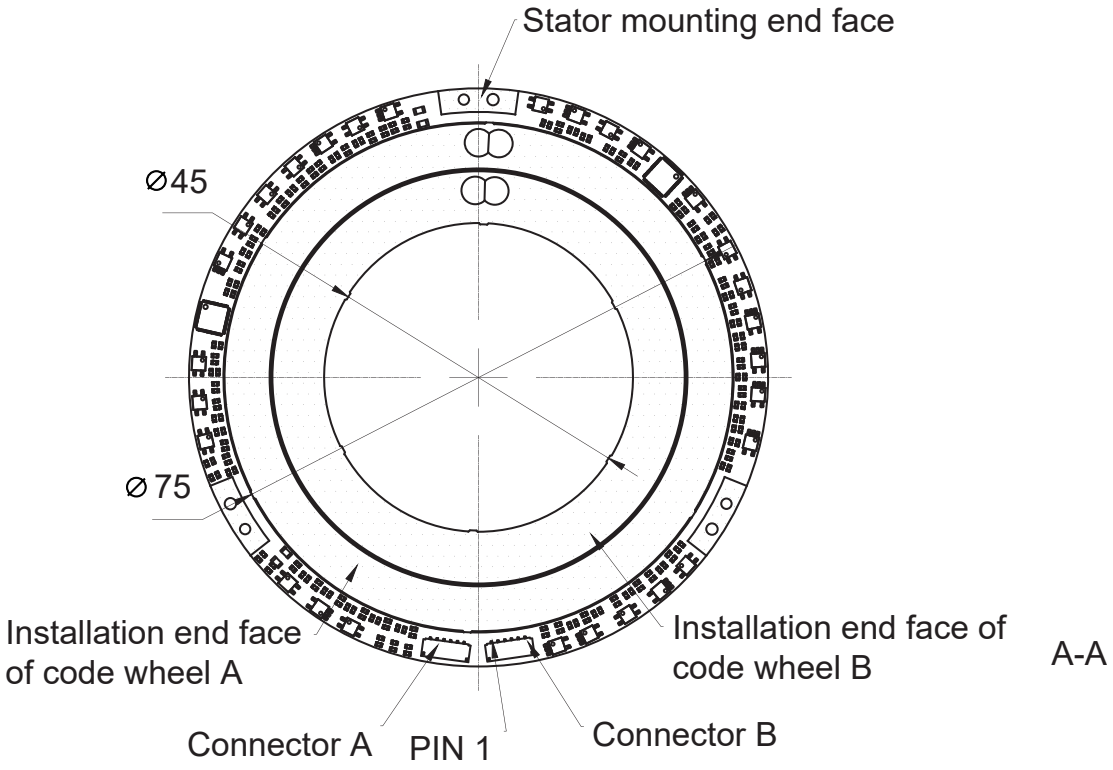
1. Master send command Sent data（HEX）: 0xC2
   The reset command should be repeated at least 10 times with a 40us interval to reset the single turn position.
2. The master receives data frames from the encoder:
   Received data（HEX）：0xC2 0x20 0x00 0x00 0x00 0xE2
   0xC2: CF return the same command
   0x20: SF
   0x00 0x00 0x00: DF single turn position（LSB first）
   0xE2: CRC G(X) = X^8 + 1, The code is calculated from all bits

4、Mechanical Mounting

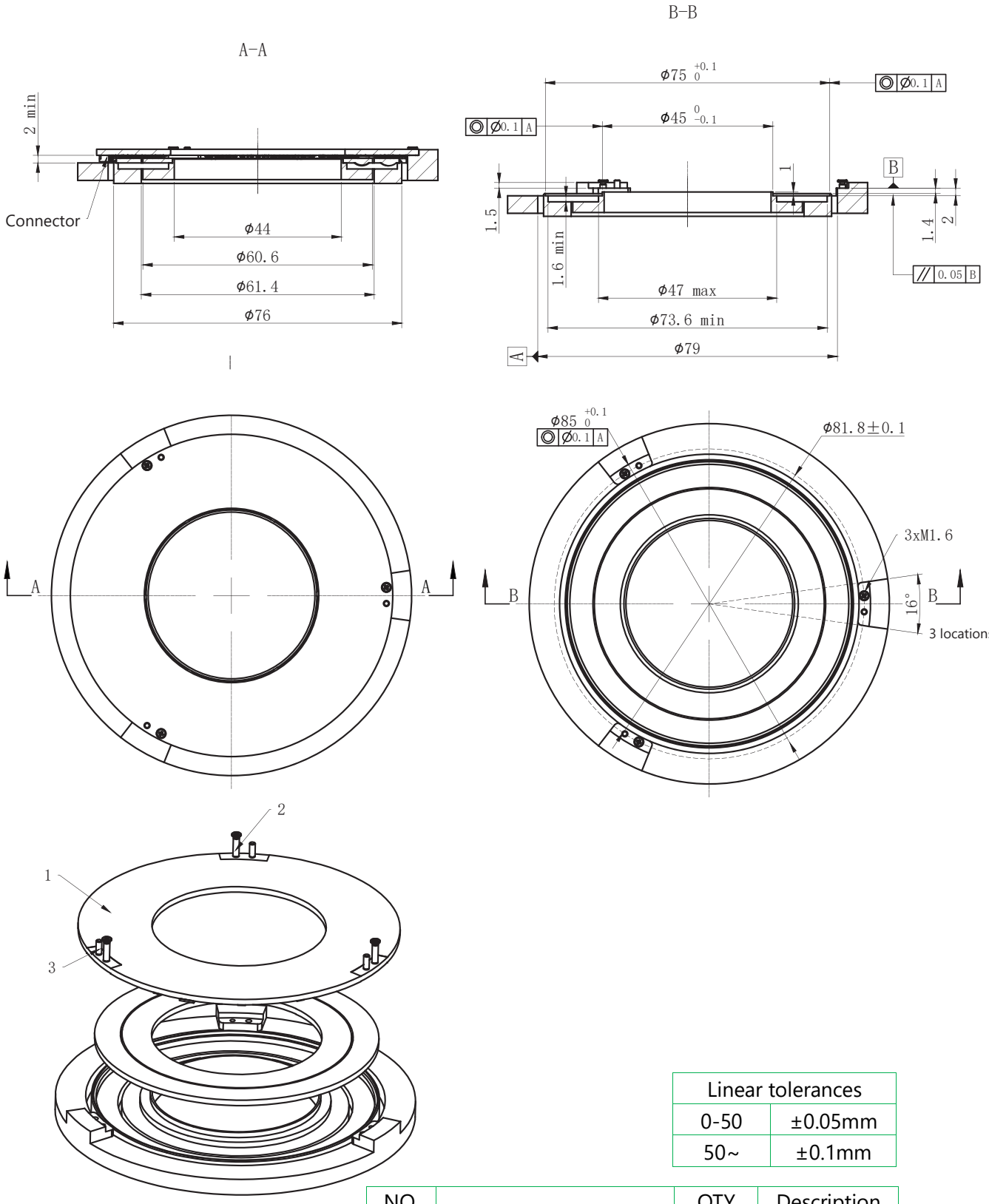
4.1 Dimensions







4.2 Installation Diagram



Linear tolerances	
0-50	±0.05mm
50~	±0.1mm

NO.		QTY	Description
1	DP4585	1	Product
2	M1.6x6 round head cross screw	3	Install accessories

2、Technical Specifications

General

Resolution	19~21bit
Maximum static error	±0.01°
Repetitive error	±2 LSB
Maximum operational speed	6000 rpm
Measurement range	Single turn
Rotation direction	Adjustable CW/CCW

Mechanical

Outer\Inner\Height	100\55\4mm
Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	0.8±0.2 mm
Rotor inertia	6.54/13.5kg·mm²
Weight (stator / rotor)	45 g
Material (stator / rotor)	FR-4

Electrical

Supply voltage	5 V
Current consumption	< 80 mA
Communication	SSi、BiSS-C、UART

Environmental

EMC	IEC 61000-6-2、IEC 61000-6-4
Operating temperature	-40℃~+125℃
Storage temperature	-50℃ - +100℃
Relative humidity	0 - 99%
Shock endurance / functional	100 g / 11 ms
Vibration functional	20 g（10 - 2000 Hz）
Protection	IP 40

3、Electrical Connection

3.1 Hardware Interface

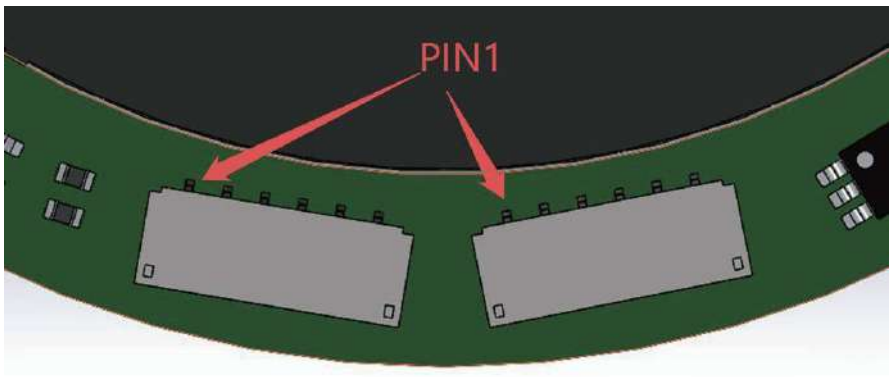
DP55100 encoder consists of a stator and two rotors, the stator integrates an angle calculation circuit and an encoding output circuit. The encoder uses a multi-core connector for output (connector interface as shown in the figure below), with the output connector located on the outer edge of the stator. The angle output uses two connectors, and can choose to output interface protocols such as SSi、BiSS-C、RS-422、RS-485.

Interface definition

No.	SSI	RS-422	BiSS-C	RS-485
1	VCC			
2	GND			
3	CLK+	RX+	MA+	/
4	CLK-	RX-	MA-	/
5	DADT-	TX-	SLO-	B-
6	DADT+	TX+	SLO+	A+

SSi/BiSS output signal parameters

Signal delay	< 50 us
Output code	Binary
Maximum data request rate	25 kHz
Clock/ Serial output	Differential RS-422

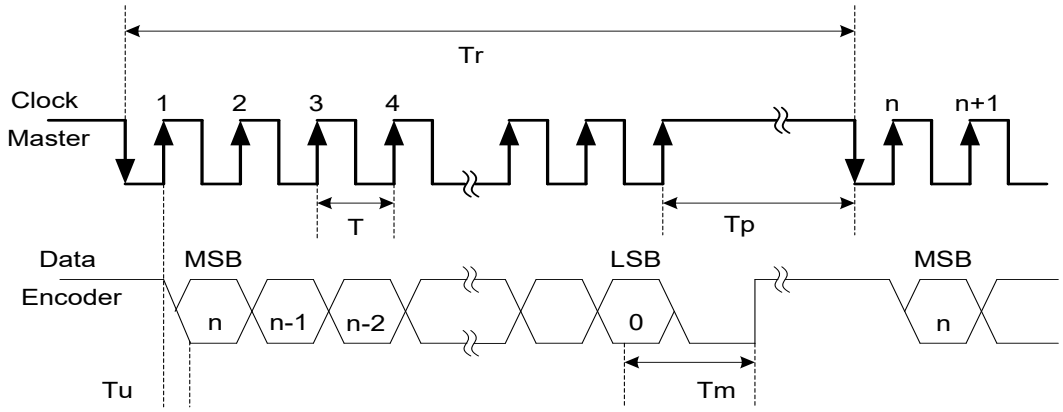


Connector and pin1 position

6-pin Connector: M0611RS-06-GB X0600HI-06G-LPHF（Standard）

3.2 SSi Interface

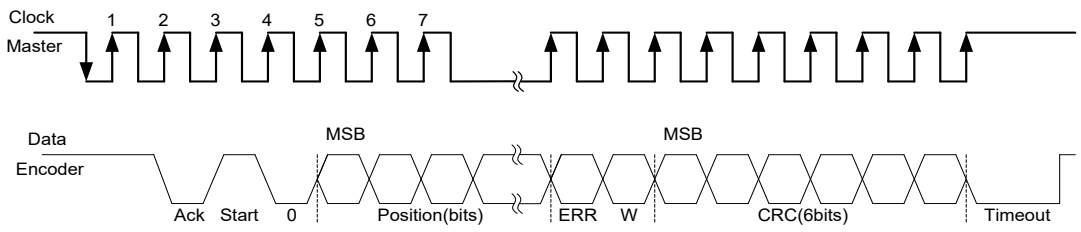
SSi (Synchronous Serial Interface) is based on the RS-422 hardware standard and is a commonly used interface for angle encoders. The master sends clock and angle encoder synchronized output data. The default clock is high level. The first low level starts data transmission, and the angle encoder transmits the angle data to the master in sequence according to the clock. The timing diagram is as follows:



n	Position resolution	12 - 21
f（T）	Clock frequency (Clock period)	0.5 - 5.0 MHz
Tu	Bit update time	50 ns
Tp	Pause time	＞ 25 us
Tm	Monoflop time	＞ 3 us
Tr	Time between 2 adjacent requests	Tr ＞ n*T +25 us
fr=1/Tr	Data request frequency	

3.3 BiSS-C Interface

The BiSS-C communication protocol is a full duplex, bidirectional, high-speed, synchronous serial communication protocol. This interface is also based on the RS-422 hardware standard and is compatible with the SSi interface. It is widely used in high-precision position control absolute encoders. The product uses BiSS-C as a point-to-point configured unidirectional interface, which can serve as one or more slaves connecting to the master, meeting the requirements of BiSS-C unidirectional interface. The timing diagram is as follows:



Bit/n		Description	Default Length	Default Length
28	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1 bit
27	Start	Encoder signal for "start" data transmit	1	1 bit
26	"0"	"Start" bit follower	0	1 bit
8-25	Position	Absolute Position encoder data		Per resolution
7	Error	BIT (Built In Test option)	1	1 bit
6	Warn	Warning (non active)	1	1 bit
0-5	CRC	*The CRC polynomial		6 bit
--	Timeout	Elapse between the sequential "start" request cycle's		> 30 us

*The CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$. It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.

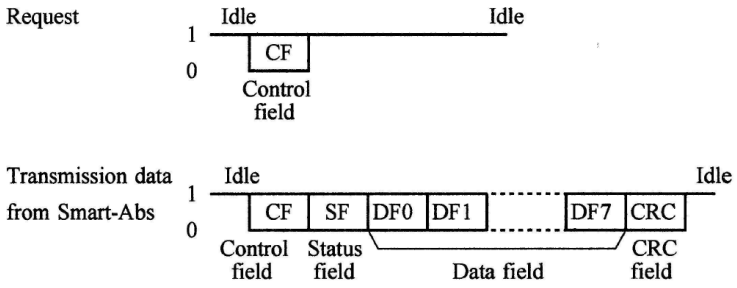
3.4 RS-422 UART Interface

Asynchronous serial communication interface over RS422 (UART), by default, the master does not need to send requests, and the encoder automatically outputs data to the master. The update rate of the encoder data is 2000Hz, the baud rate is 460800bps, and the data format is 1 start bit, 8 data bits, 1 even check bit, and 1 stop bit. Each frame of data contains 10 bytes, and the format is shown in the table below.

	BIT	Description	Note
Header	1	5E	Defined Header
	2	AD	
Protocol Flag Bit	3	01	Single byte
Position	4	Most Significant 8 Bits	LSB effective, MSB padding 0
	5	Middle Significant 8 Bits	
	6	Least Significant 8 Bits	
Frame Count	7	Most Significant 8 Bits	0-65535 Accumulate
	8	Least Significant 8 Bits	
Check	9	Most Significant 8 Bits	Accumulate the 3th4th, 5th6th, and 7th8th bytes, taking the lower 16 bits
	10	Least Significant 8 Bits	

3.5 RS-485 UART Interface

RS-485 serial interface, half duplex communication protocol, requires the master to send commands to get the angle position. The data update rate is related to the master request rate. The baud rate is 2.5Mbps, and the data format is 1 start bit, 8 data bits, 0 even check bits, and 1 stop bit. Frame format for reading-out data is as follows:



3.5.1 Single turn position request command:

1.Master send command

Sent data（HEX）：0x02

2. The master receives data frames from the encoder

Received data（HEX）：0x02 0x20 0x03 0x02 0x01 0x16

0x02: CF return the same command

0x20: SF defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
0	0	0	0	EA0	EA1	CA0	CA1

EA0=1 Single turn counting error

EA1=1 Overtemperature, multiturn counting error, battery alarm, or battery error

CA0=1 Communication parity error

CA1=1 Communication stop bit error

0x03 0x02 0x01: DF single turn position（LSB first）

0x16: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.2 Encoder ID data request command

1. Master send command　　Sent data（HEX）: 0x92

2. The master receives data frames from the encoder：

Received data（HEX）：0x92 0x20 0x11 0xA3

0x92: CF return the same command

0x20: SF
0x11: Encoder ID, fixed 0x11
0xA3: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.3 Encoder all data request command

1. Master send command Sent data（HEX）: 0x1A
2. The master receives data frames from the encoder：
   Received data（HEX）：0x1A 0x20 0x03 0x02 0x01 0x11 0x05 0x04 0x00 0x22 0x08
   0x1A: CF return the same command
   0x20: SF
   0x03 0x02 0x01: DF single turn position（LSB first）
   0x11: Encoder ID, fixed 0x11
   0x05 0x04 0x00: DF multiturn position（LSB first）（0x0405 = 1029, Max.65535）
   0x22: Encoder error, defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Overspeed	Full absolute status	Counting error	Counter overflow	“0”	Multiturn error	Battery error	Battery alarm

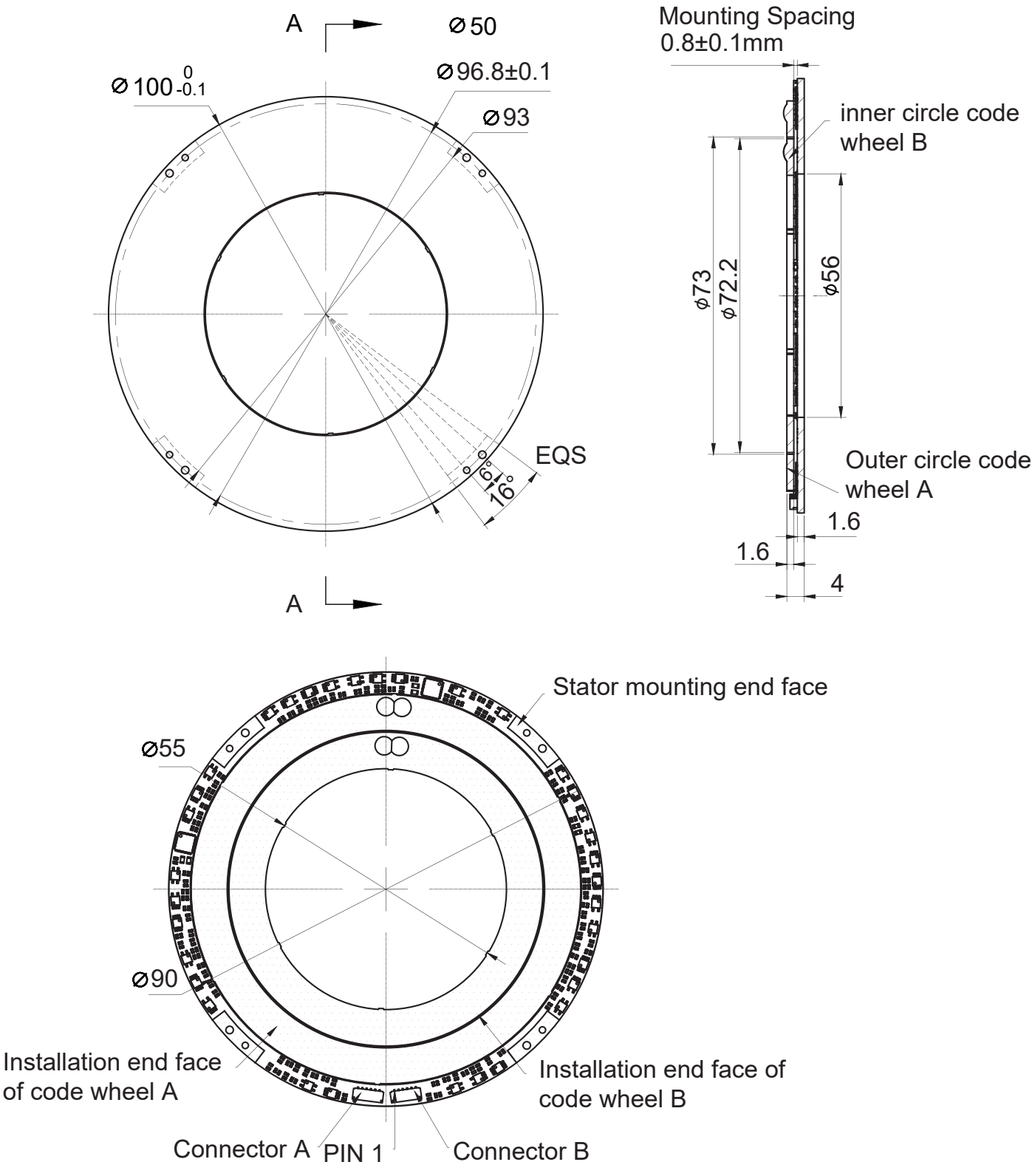
0x08: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.4 Single turn position reset request command:

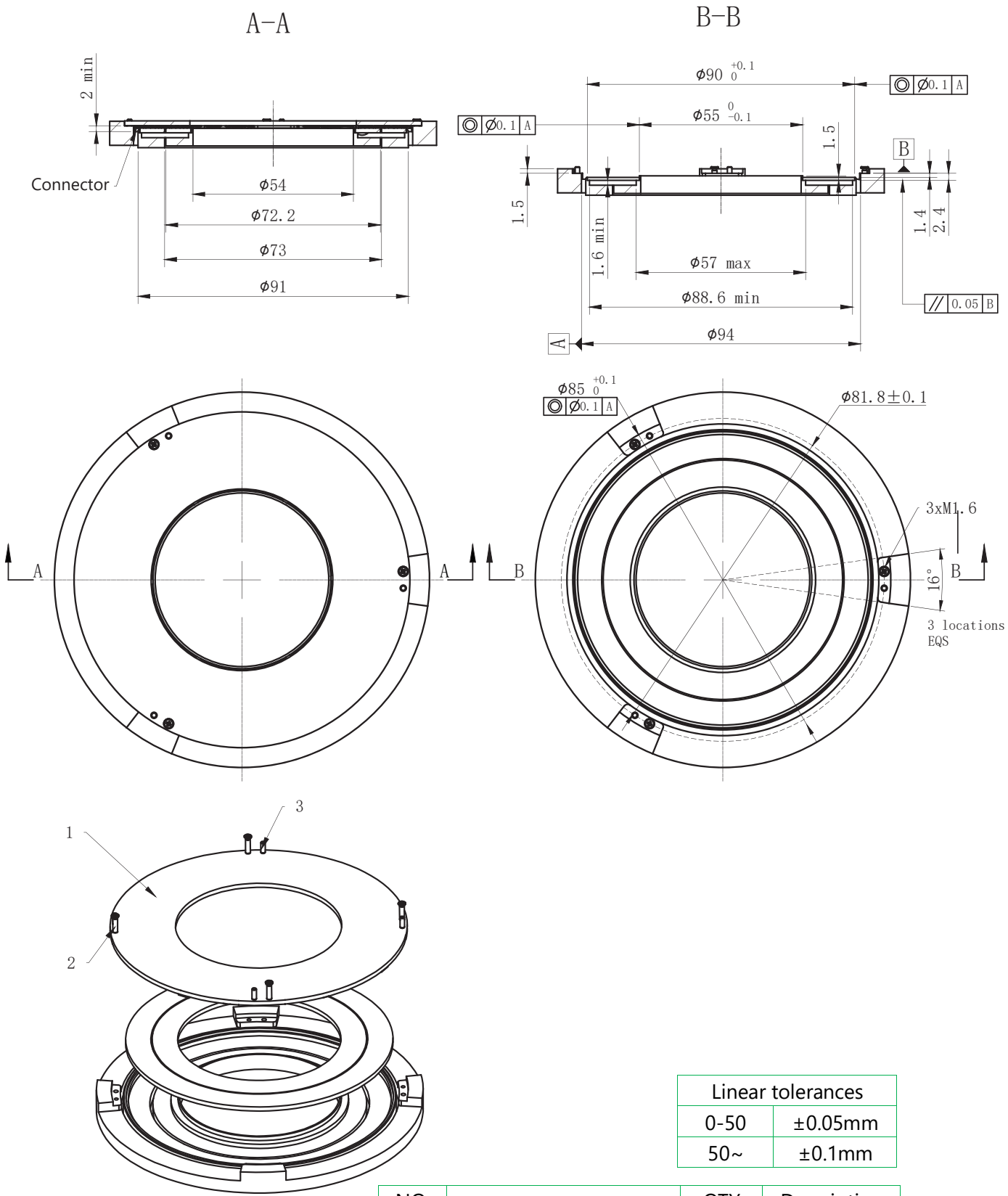
1. Master send command Sent data（HEX）: 0xC2
   The reset command should be repeated at least 10 times with a 40us interval to reset the single turn position.
2. The master receives data frames from the encoder:
   Received data（HEX）：0xC2 0x20 0x00 0x00 0x00 0xE2
   0xC2: CF return the same command
   0x20: SF
   0x00 0x00 0x00: DF single turn position（LSB first）
   0xE2: CRC G(X) = X^8 + 1, The code is calculated from all bits

4、Mechanical Mounting

4.1 Dimensions



4.2 Installation Diagram



Linear tolerances	
0-50	±0.05mm
50~	±0.1mm

NO.		QTY	Description
1	DP55100	1	Product
2	M1.6x6 round head cross screw	4	Install accessories

2、Technical Specifications

General

Resolution	19~21bit
Maximum static error	±0.01°
Repetitive error	±2 LSB
Maximum operational speed	6000 rpm
Measurement range	Single turn
Rotation direction	Adjustable CW/CCW

Mechanical

Outer\Inner\Height	130\85\4mm
Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	0.8±0.2 mm
Rotor inertia	20.62/34.34kg·mm²
Weight (stator / rotor)	60 g
Material (stator / rotor)	FR-4

Electrical

Supply voltage	5 V
Current consumption	< 80 mA
Communication	SSi、BiSS-C、UART

Environmental

EMC	IEC 61000-6-2、IEC 61000-6-4
Operating temperature	-40℃~+125℃
Storage temperature	-50℃ - +100℃
Relative humidity	0 - 99%
Shock endurance / functional	100 g / 11 ms
Vibration functional	20 g（10 - 2000 Hz）
Protection	IP 40

3、Electrical Connection

3.1 Hardware Interface

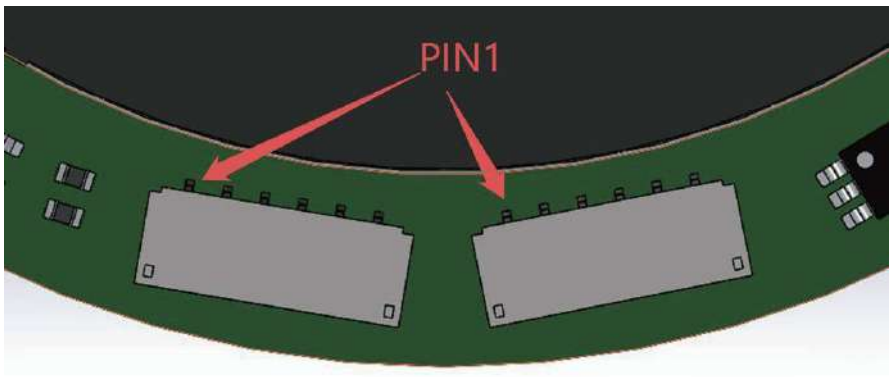
DP85130 encoder consists of a stator and two rotors, the stator integrates an angle calculation circuit and an encoding output circuit. The encoder uses a multi-core connector for output (connector interface as shown in the figure below), with the output connector located on the outer edge of the stator. The angle output uses two connectors, and can choose to output interface protocols such as SSi、BiSS-C、RS-422、RS-485.

Interface definition

No.	SSI	RS-422	BiSS-C	RS-485
1	VCC			
2	GND			
3	CLK+	RX+	MA+	/
4	CLK-	RX-	MA-	/
5	DADT-	TX-	SLO-	B-
6	DADT+	TX+	SLO+	A+

SSi/BiSS output signal parameters

Signal delay	< 50 us
Output code	Binary
Maximum data request rate	25 kHz
Clock/ Serial output	Differential RS-422

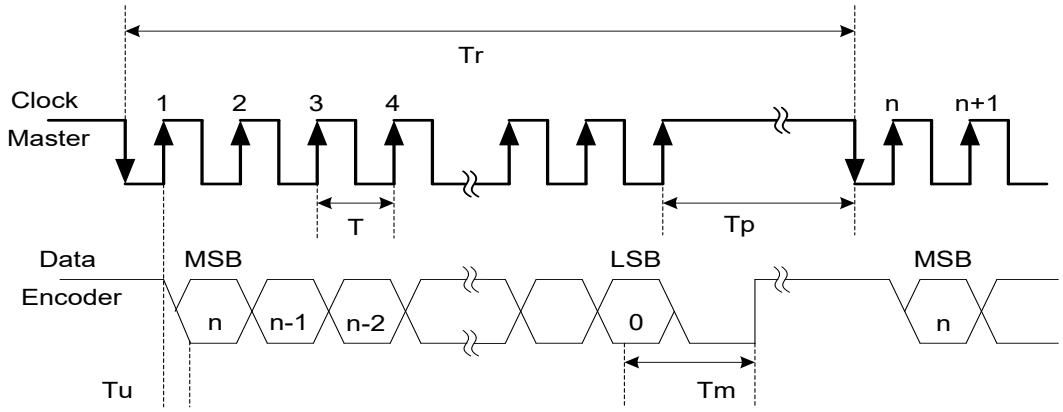


Connector and pin1 position

6-pin Connector: M0611RS-06-GB X0600HI-06G-LPHF（Standard）

3.2 SSi Interface

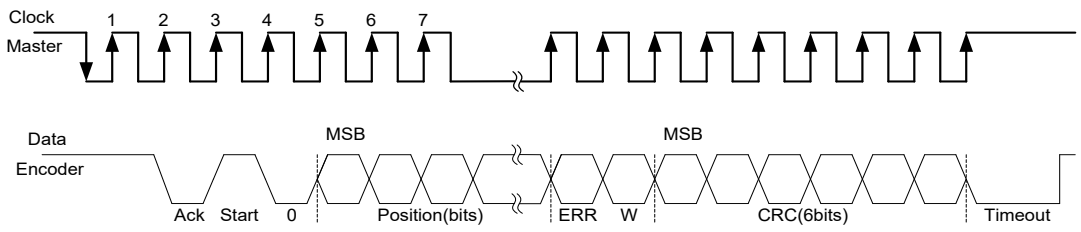
SSi (Synchronous Serial Interface) is based on the RS-422 hardware standard and is a commonly used interface for angle encoders. The master sends clock and angle encoder synchronized output data. The default clock is high level. The first low level starts data transmission, and the angle encoder transmits the angle data to the master in sequence according to the clock. The timing diagram is as follows:



n	Position resolution	12 - 21
f（T）	Clock frequency (Clock period)	0.5 - 5.0 MHz
Tu	Bit update time	50 ns
Tp	Pause time	＞ 25 us
Tm	Monoflop time	＞ 3 us
Tr	Time between 2 adjacent requests	Tr ＞ n*T +25 us
fr=1/Tr	Data request frequency	

3.3 BiSS-C Interface

The BiSS-C communication protocol is a full duplex, bidirectional, high-speed, synchronous serial communication protocol. This interface is also based on the RS-422 hardware standard and is compatible with the SSi interface. It is widely used in high-precision position control absolute encoders. The product uses BiSS-C as a point-to-point configured unidirectional interface, which can serve as one or more slaves connecting to the master, meeting the requirements of BiSS-C unidirectional interface. The timing diagram is as follows:



Bit/n		Description	Default Length	Default Length
28	Ack	Period during which the encoder calculates the absolute position, one clock cycle	0	1 bit
27	Start	Encoder signal for "start" data transmit	1	1 bit
26	"0"	"Start" bit follower	0	1 bit
8-25	Position	Absolute Position encoder data		Per resolution
7	Error	BIT (Built In Test option)	1	1 bit
6	Warn	Warning (non active)	1	1 bit
0-5	CRC	*The CRC polynomial		6 bit
--	Timeout	Elapse between the sequential "start" request cycle's		> 30 us

*The CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$. It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.

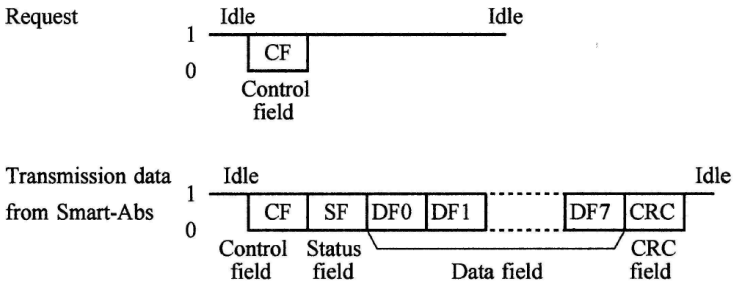
3.4 RS-422 UART Interface

Asynchronous serial communication interface over RS422 (UART), by default, the master does not need to send requests, and the encoder automatically outputs data to the master. The update rate of the encoder data is 2000Hz, the baud rate is 460800bps, and the data format is 1 start bit, 8 data bits, 1 even check bit, and 1 stop bit. Each frame of data contains 10 bytes, and the format is shown in the table below.

	BIT	Description	Note
Header	1	5E	Defined Header
	2	AD	
Protocol Flag Bit	3	01	Single byte
Position	4	Most Significant 8 Bits	LSB effective, MSB padding 0
	5	Middle Significant 8 Bits	
	6	Least Significant 8 Bits	
Frame Count	7	Most Significant 8 Bits	0-65535 Accumulate
	8	Least Significant 8 Bits	
Check	9	Most Significant 8 Bits	Accumulate the 3th4th, 5th6th, and 7th8th bytes, taking the lower 16 bits
	10	Least Significant 8 Bits	

3.5 RS-485 UART Interface

RS-485 serial interface, half duplex communication protocol, requires the master to send commands to get the angle position. The data update rate is related to the master request rate. The baud rate is 2.5Mbps, and the data format is 1 start bit, 8 data bits, 0 even check bits, and 1 stop bit. Frame format for reading-out data is as follows:



3.5.1 Single turn position request command:

1.Master send command

Sent data（HEX）：0x02

2. The master receives data frames from the encoder

Received data（HEX）：0x02 0x20 0x03 0x02 0x01 0x16

0x02: CF return the same command

0x20: SF defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
0	0	0	0	EA0	EA1	CA0	CA1

EA0=1 Single turn counting error

EA1=1 Overtemperature, multiturn counting error, battery alarm, or battery error

CA0=1 Communication parity error

CA1=1 Communication stop bit error

0x03 0x02 0x01: DF single turn position（LSB first）

0x16: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.2 Encoder ID data request command

1. Master send command　　Sent data（HEX）: 0x92

2. The master receives data frames from the encoder：

Received data（HEX）：0x92 0x20 0x11 0xA3

0x92: CF return the same command
0x20: SF
0x11: Encoder ID, fixed 0x11
0xA3: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.3 Encoder all data request command

1. Master send command Sent data（HEX）: 0x1A
2. The master receives data frames from the encoder：
   Received data（HEX）：0x1A 0x20 0x03 0x02 0x01 0x11 0x05 0x04 0x00 0x22 0x08
   0x1A: CF return the same command
   0x20: SF
   0x03 0x02 0x01: DF single turn position（LSB first）
   0x11: Encoder ID, fixed 0x11
   0x05 0x04 0x00: DF multiturn position（LSB first）（0x0405 = 1029, Max.65535）
   0x22: Encoder error, defined as follows (LSB first)

Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
Overspeed	Full absolute status	Counting error	Counter overflow	"0"	Multiturn error	Battery error	Battery alarm

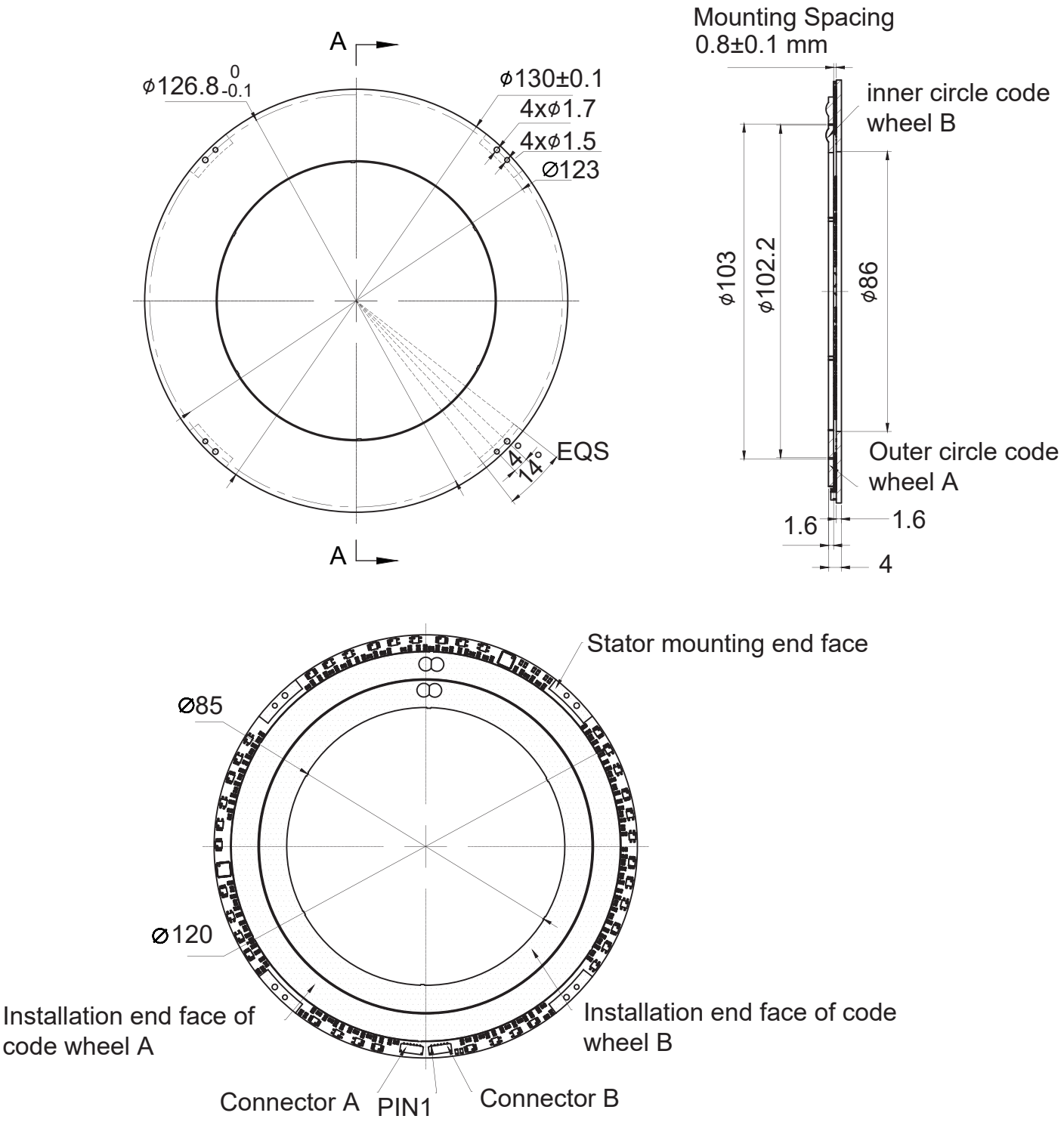
0x08: CRC G(X) = X^8 + 1, The code is calculated from all bits

3.5.4 Single turn position reset request command:

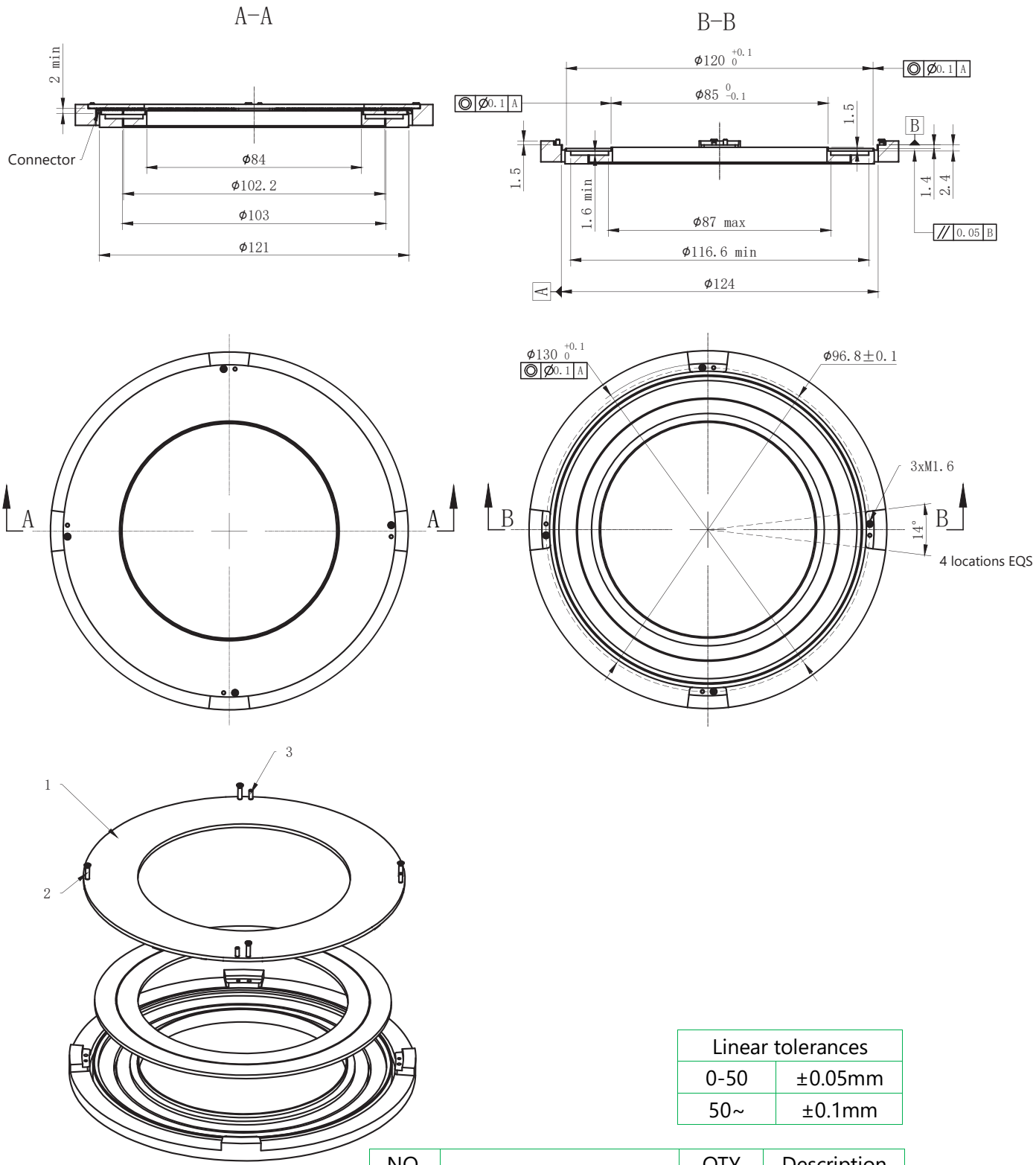
1. Master send command Sent data（HEX）: 0xC2
   The reset command should be repeated at least 10 times with a 40us interval to reset the single turn position.
2. The master receives data frames from the encoder:
   Received data（HEX）：0xC2 0x20 0x00 0x00 0x00 0xE2
   0xC2: CF return the same command
   0x20: SF
   0x00 0x00 0x00: DF single turn position（LSB first）
   0xE2: CRC G(X) = X^8 + 1, The code is calculated from all bits

4、Mechanical Mounting

4.1 Dimensions



4.2 Installation Diagram



Linear tolerances	
0-50	±0.05mm
50~	±0.1mm

NO.		QTY	Description
1	DP85130	1	Product
2	M1.6x6 round head cross screw	4	Install accessories

5、Software Tool

The encoder of the SSi/BiSS-C/RS-422 interface can use the Encoder Test Calibration software for position data readout and installation calibration. The Encoder Test Calibration software owns functions such as position data readout, installation verification, calibration, and user zero position setting.

Domestic website

International website

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