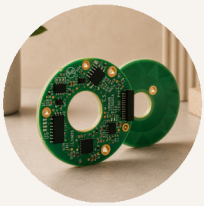
STIMITA
MOTION CONTROL

ENCODER

where accuracy matters

CATALOG

INTRODUCTION



STE 40

The STE Series Absolute Encoders are advanced non-contact inductive encoders designed for high-accuracy angular position sensing in defence, robotics, aerospace, and industrial motion-control applications. The encoder provides true absolute position feedback immediately at power-up without requiring homing or initialization movement.

Designed for harsh operating environments, the STE Series delivers high reliability, long operational life, and stable performance under shock, vibration, EMI/RFI exposure, and temperature variations. Its hollow-shaft, low-profile architecture enables compact integration with direct-drive motors, stabilized platforms, gimbals, robotic actuators, slip rings, and precision servo systems.

The encoder family features compact hollow-shaft and low-profile configurations for seamless integration into direct-drive servo systems, stabilized platforms, gimbals, robotic actuators, slip-ring assemblies, optical systems, autonomous platforms, and precision motion-control mechanisms. The lightweight structure and simplified mounting architecture reduce installation complexity while maintaining high mechanical tolerance capability.

The encoder family supports multiple communication interfaces including SSI, BiSS-C, RS-422, RS-485, UART, and Differential ABZ outputs for seamless integration with modern control systems.

More Information

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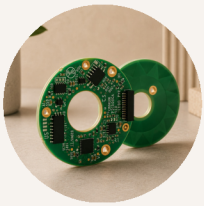
PRODUCT SUBCATEGORIES



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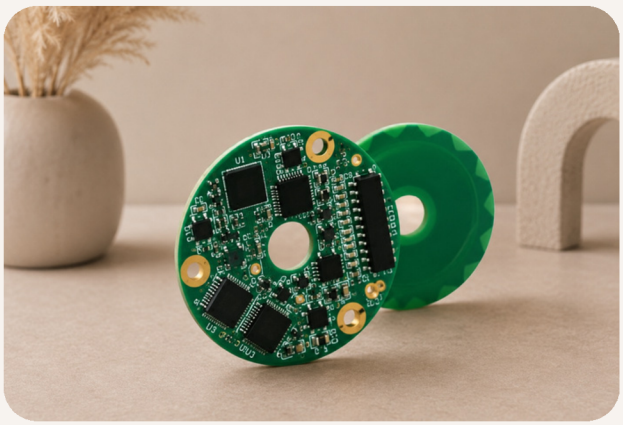
A STE 20



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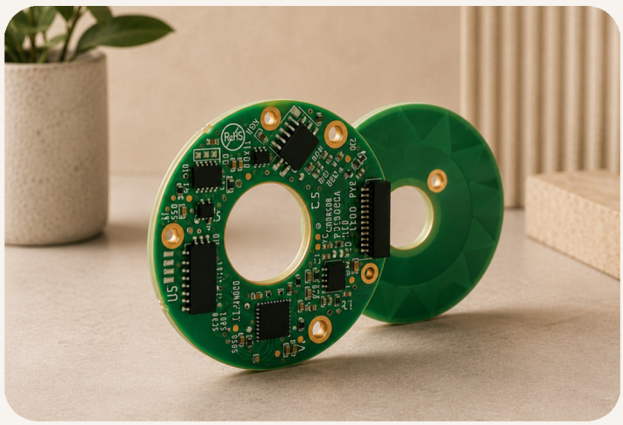

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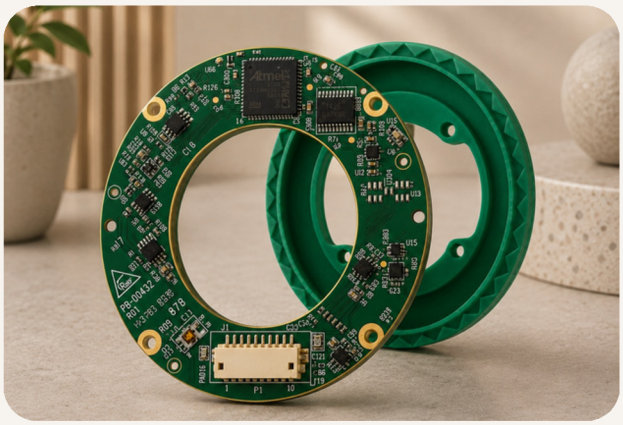

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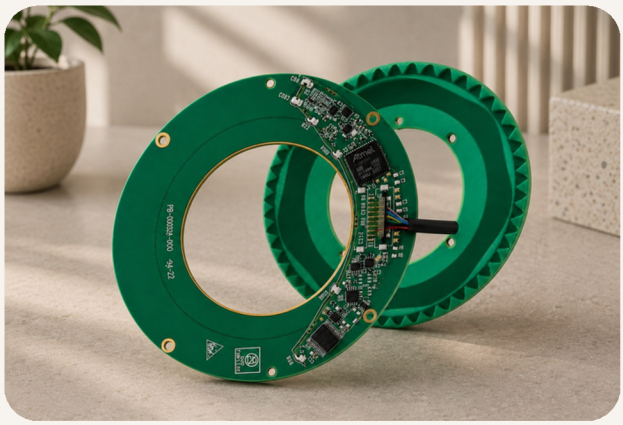

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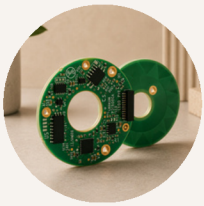
PRODUCT SPECIFICATIONS



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General

Resolution	17- 19 bit (21 bit extension)
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	40\10\8 mm
Allowable mounting eccentricity	±0.1 mm
Allowable axial mounting tolerance	0.6±0.1 mm
Rotor inertia	0.4 kg·mm2
W eight (stator/ rotor)	10 g
Material (stator/ rotor)	FR-4

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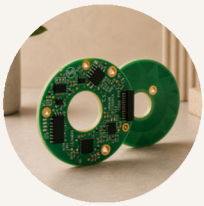

STE 40

Electrical

Supply voltage	5v - 30V
Current consumption	< 100 mA
Maximum operational speed	6/8-pin connector, 6/8-core cable
Communication	SSi, BiSS-C, RS-422, RS-485, Differential ABZ

Environmental

EMC	IEC 61000-6-2, IEC 61000-6-4
Operating temperature	-20°C - +60°C
Storage temperature	-50°C - + 100°C
Relative humidity	0 - 99%
Shock endurance/ functional	100 g / 11 ms
Vibration functional	20 g (10 - 2000 Hz)
Protection	IP 40

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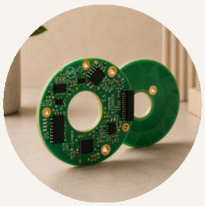

STE 40

HARDWARE INTERFACE

STE-40 encoder consists of a stator and a rotor, 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, BiSSC RS-422, RS-485, Differential ABZ.

Interface wire color code

No	SSI	RS422	BiSS-C	RS-485	ABZ	Colour
1	VCC					Red
2	GND					Black
3	CLK+	RX+	MA+	/	A+	Grey
4	CLK-	RX-	MA-	/	A-	Blue
5	DADT-	TX-	SLO-	B-	B-	Yellow
6	DADT+	TX+	SLO+	A+	B+	Green
7	/ (6-pin connector)				Z+	White
8	/ (6-pin connector)				Z-	Orange

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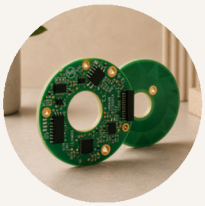
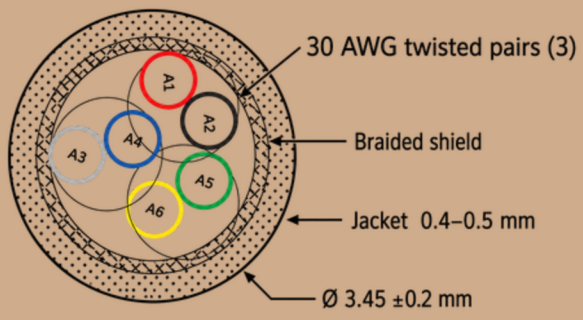


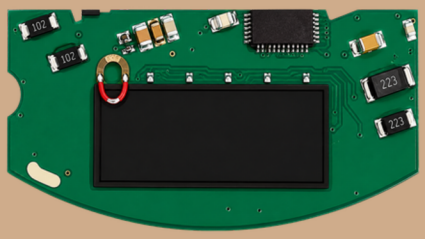
STE 40

4.1 SSI/BISS OUTPUT SIGNAL PARAMETERS

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

Cable: 30 AWG twisted 3 pairs
(30 AWG 25/0.05 tinned copper, Insulation: ETFE 0 0.12-0.15 to 0 0.6 ± 0.05 OD)
Temperature rating: -50° to +150° C
Braided shield: Thinned copper braided 95% min. coverage
Jacket: 0.4-0.5 silicon rubber 03.45 ±0.2 OD





6-pin thin plug: ZX-SH1.0-6PWT
Corresponding plug: ZX-SH1 .0-6PJK

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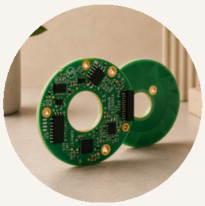
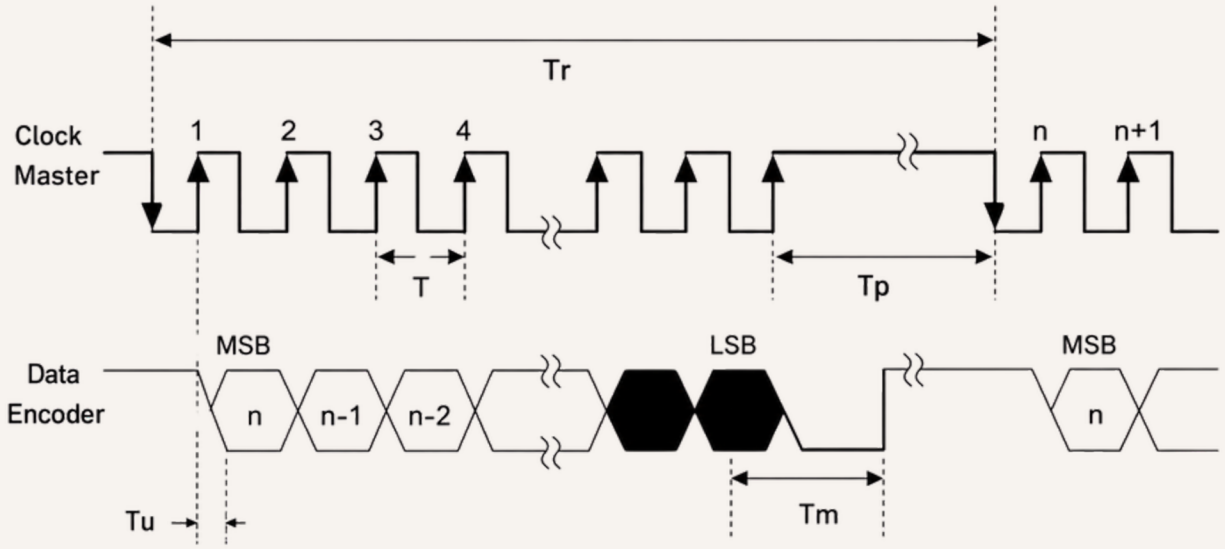


STE 40

4.2 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:



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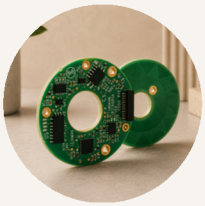
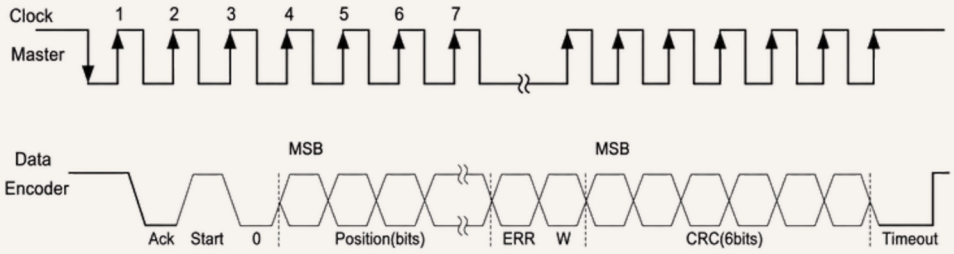


STE 40

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	> 25 us
Tr	Time between 2 adjacent requests	Tr > n*T +25 us
fr=1/Tr	Data request frequency	

4.3 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 highprecision 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:



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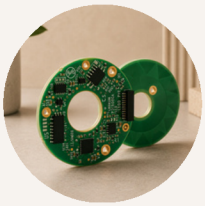

STE 40

Bit/n		Description	Default Length	Default Length
28	ARK	Period during which the encoder calculates the absolute position, one clock cycle	0	1 bit
27	Start	Encoder signal for "start" data	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
	Time Out	Elapse between the sequential "start" request cycle's		> 26 us

*The CRC polynomial for position, error and warning data is: x6 + x1 + x0 It is transmitted MSB first and inverted. The start bit and "0" bit are omitted from the CRC calculation.

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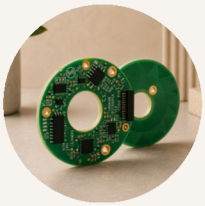

STE 40

4.4 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 3rd, 4th, 5th, 6th, and 7th, 8th bytes taking the lower 16 bits,
	10	Least Significant 8 Bits	

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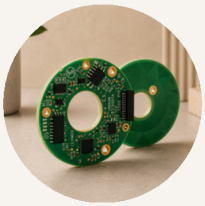
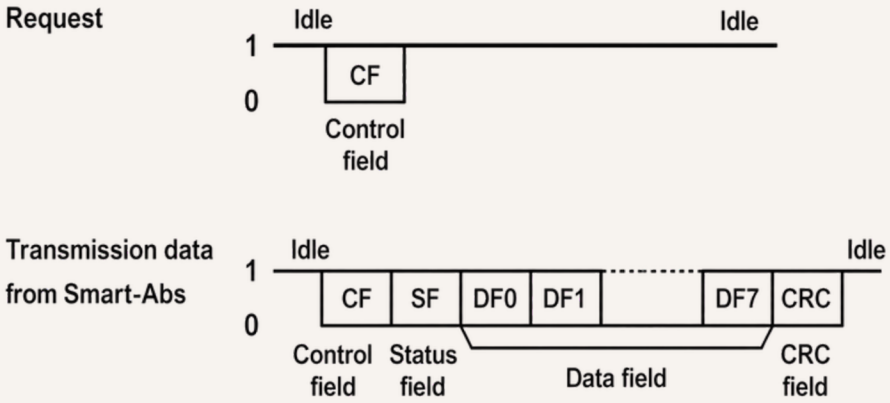


STE 40

4.5 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.SMbps, 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:



4.5.1 SINGLE TURN POSITION REQUEST COMMAND:

1.Master send command
Sent data CHEX): Ox02

2. The master receives data frames from the encoder
Received data CHEX): Ox02 Ox20 Ox03 Ox02 Ox01 Ox16
Ox02: CF return the same command
Ox20: SF defined as follows (LSB first)

Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
0	0	0	0	EA0	EA1	CA0	CA1

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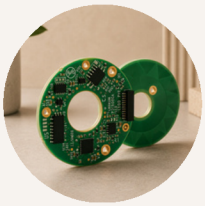
ELECTRICAL CONECTIONS



STE 40

EA0=1 Single turn counting error
EA 1 = 1 Overtemperature, multiturn counting error, battery alarm, or battery error
CAO= 1 Communication parity error
CA 1 = 1 Communication stop bit error
Ox03 Ox02 Ox01: DF single turn position < LSB first)
Ox16: CRC G(X) = X8 + 1, The code is calculated from all bits

4.5.2 ENCODER ID DATA REQUEST COMMAND

1. Master send command Sent data (HEX) : Ox92

2. The master receives data frames from the encoder:
Received data CH EX): Ox92 Ox20 Ox11 OxA3
Ox92: CF return the same command
Ox20: SF
Ox11: Encoder ID, fixed Ox11
0xA3: CRC G(X) = X8 + 1, The code is calculated from all bits

4.5.3 ENCODER ALL DATA REQUEST COMMAND

1. Master send command Sent data (HEX) : 0x1A

2. The master receives data frames from the encoder:
Received data CH EX): 0x1 A 0x20 0x03 0x02 0x01 0x11 0x0S 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
0x0S 0x04 0x00: DF multiturn position CLSB first) (0x0405 = 1029, Max.65535)
0x22: Encoder error, defined as follows (LSB first)

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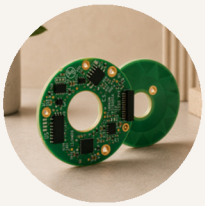
ELECTRICAL CONECTIONS



STE 40

Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Over speed	Full absolute status	Counting error	Counter overflow	0	Multiturn error	Battery error	Battery alarm

0x08: CRC G(X) = X8 + 1, The code is calculated from all bits

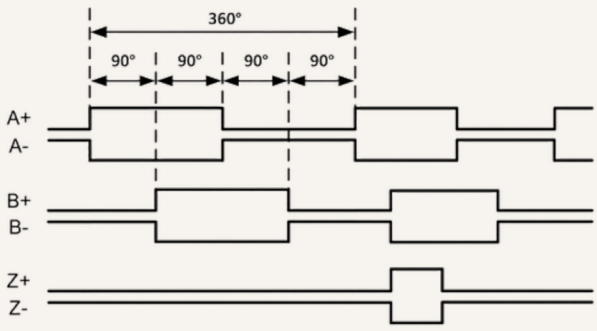
4.5.4 SINGLE TURN POSITION RESET REQUEST COMMAND:

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 CHEX): 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) = X8 + 1, The code is calculated from all bits

4.6 ABZ INCREMENTAL INTERFACE

The ABZ interface is a commonly used interface for angle encoders. In the A, B, and Z signals of the encoder, the signal pulse phases of channels A and B differ by 90 degrees. When the rotor rotates clockwise, the output pulse signal of channel A exceeds that of channel B. When the rotor rotates counterclockwise, the signal of channel A lags behind that of channel B. The encoder also outputs a Z pulse for each revolution, which is used to determine the zero position or the index position.

The product can choose differential or single ended ABZ interface output. The differential ABZ interface is compatible with RS422 interface level, and the protocol definition is shown in the above figure. The single ended ABZ interface adopts LVTTL interface level, and the protocol only retains the positive end of the differential interface.



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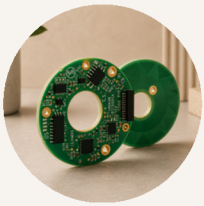

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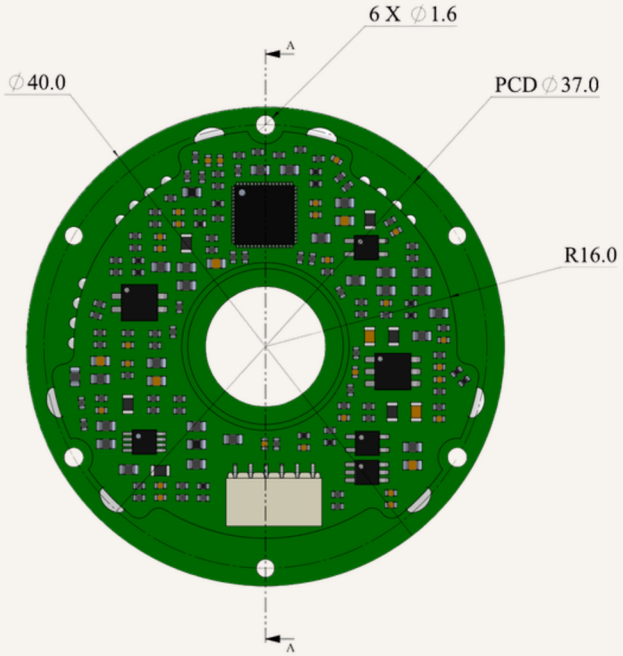

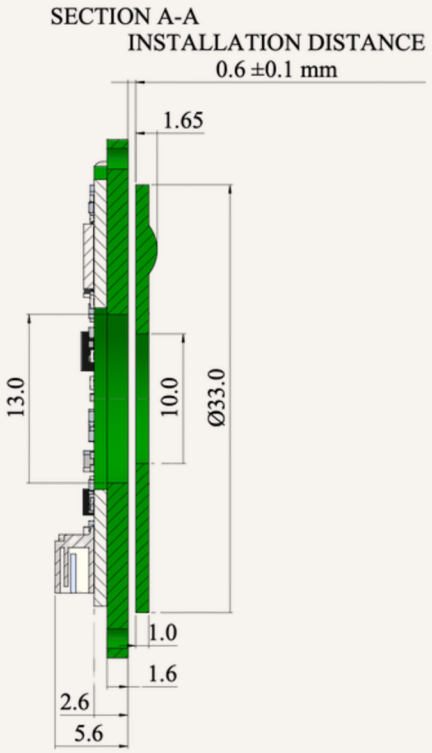

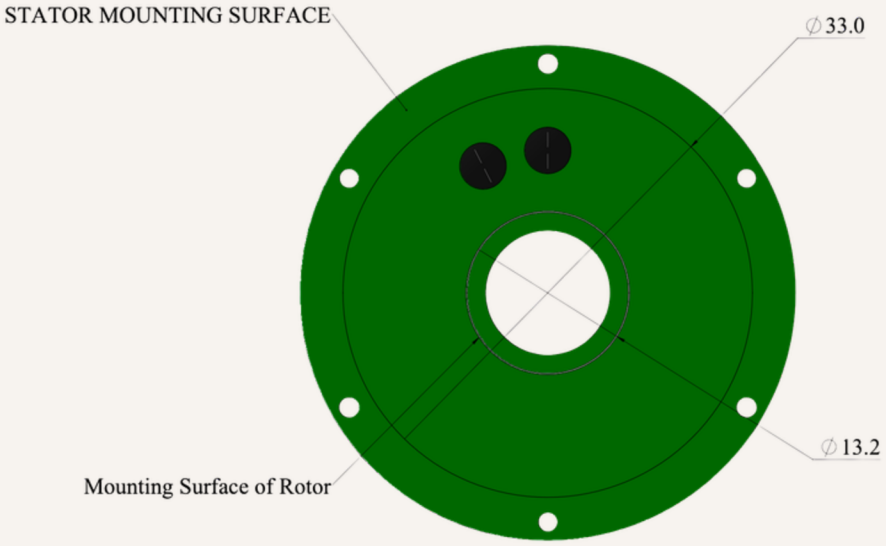

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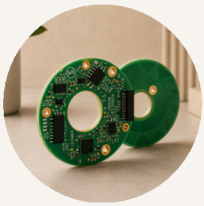

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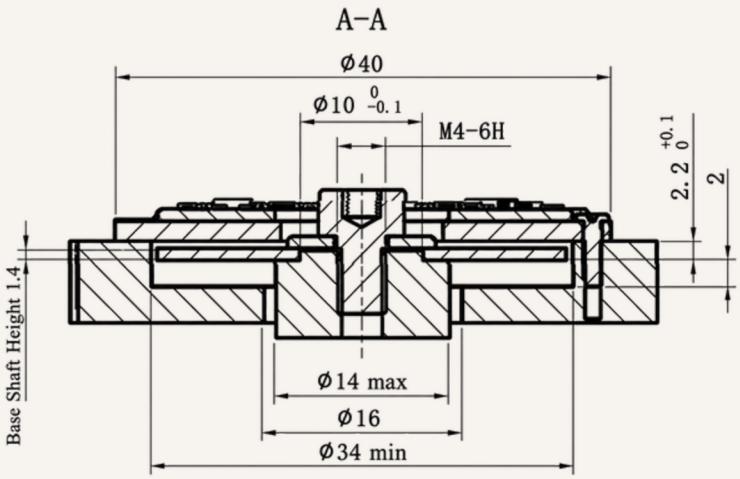

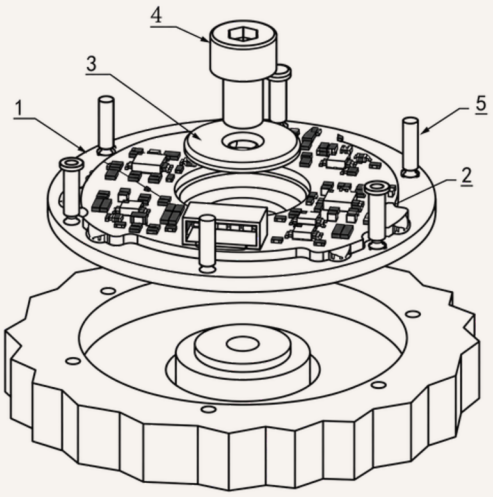

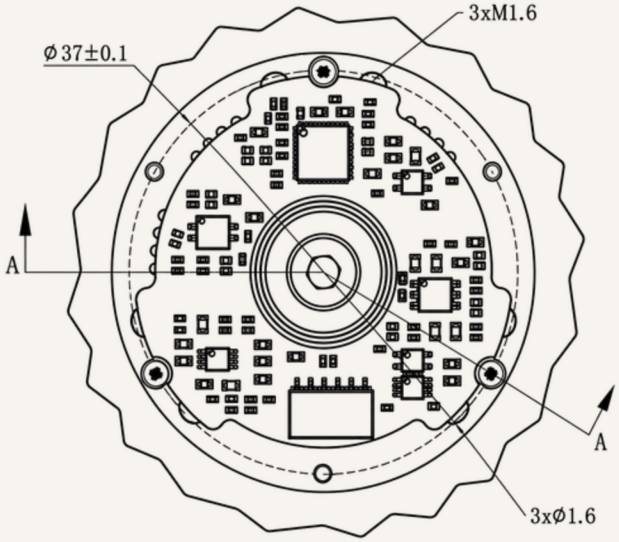

Tolerance	
0-50	±0.05mm
50～	±0.1mm

No	Description	Qty	Remark
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2	M1.6x5	3	Accessories
3	CAP/STE40	1	
4	M4x6	1	
5	Ø1.5x4	3	

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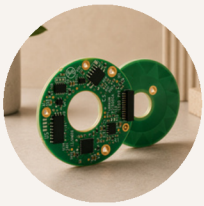
ORDERING INFO



STE 40

STE - 40 - 18 - SSI1 - 03 - 05

Product Line

Product Outer diameter

Resolution	
17	131,072
18	262,144
19	524,288

Communication	
ASI1	RS-422
SSI1	SSi
BIS1	BiSS-C
ASI2	RS-485
ABZ1	Differential ABZ

SHAPE & CONNECTOR	
01	Side flying leads 250mm
03	Side connector

supply Voltage	
05	5V
12	12V
24	24V

*Make sure to confirm all the product specifications before ordering any of our products product specifications may change with any prior notice

More Information

Marketing@stimitamc.com

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