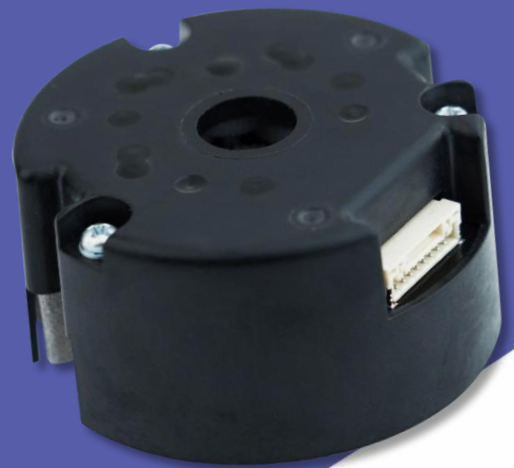


# Integral Gear Multi-turn Absolute Encoder

SROA48-G12S □Bit □C-C-5V □

## SPECIFICATION

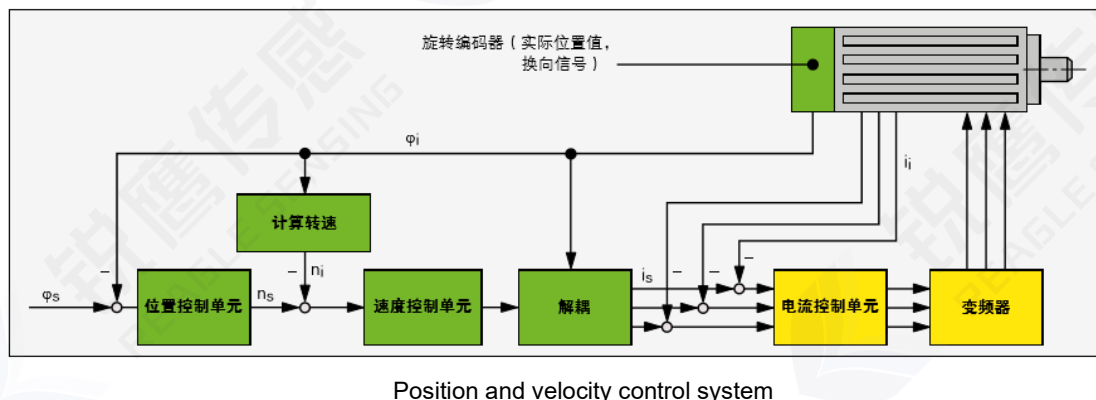


# Contents

1. Summary Info.....	2
2. Naming Rules .....	2
3. Technical Specifications.....	3
4. Electrical Parameters.....	4
5. Cable Definition .....	5
6. Mechanical Specifications .....	5
6.1 Product Overall Structural Dimension Diagram .....	5
6.2 Reference Diagram for Cone Shaft Motor Design .....	6
7. Communication Specifications .....	7
7.1 Installation diagram .....	7
7.2 Installation accessories .....	7
7.3 Installation sequence.....	8
8. Communication Specifications .....	9

## 1. Summary Info

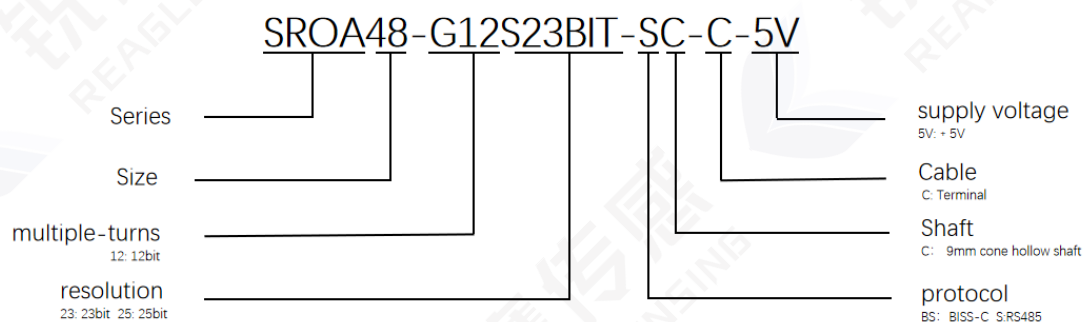
This manual primarily describes how to use the SROA48 integrated gear multi-turn absolute encoder from Reagle Sensing. This product is designed to serve servo-driven control systems, providing the necessary feedback information for accurate position and velocity control units within the system.



The performance of the encoder has a decisive impact on the essential characteristics of the motor, such as:

- Positioning accuracy
- Speed stability
- Bandwidth, determining the response speed to drive command signals and resistance to interference
- Motor size
- Noise

## 2. Naming Rules



**SROA** ---- series designation, this product is a servo-class optical rotary absolute encoder.

**48** ---- product size, this product has an outer diameter size of  $\Phi 48\text{mm}$ .

**G12** ---- multi-turn mode and resolution, this product is a gear multi-turn, with a resolution of 12 bits.

**S□** ---- Single-turn mode and its resolution, the product is a rotary single-turn device, and there are currently two published models with different resolutions, 23 bits and 25 bits, represented by S23 and S25, respectively.

**Bit** ---- units for single-turn and multi-turn measurement range.

□ ---- Serial communication methods, the product has two serial communication methods available, RS485 and BISS-C, which are indicated by the characters S and BS, respectively.

**C** ---- Mechanical connection method: This product uses a taper shaft connection.

**C** ---- Cable outlet method: This product features terminal-type horizontal output.

**5V** ---- The typical supply voltage for this product is 5VDC.

□ ---- Detent type: For models with a single-turn resolution of 23 bits among the current releases, the factory default does not include a detent type; this information is omitted by default. For models with a single-turn resolution of 25 bits, there are two detent types available, denoted as A and B.

### 3. Technical Specifications

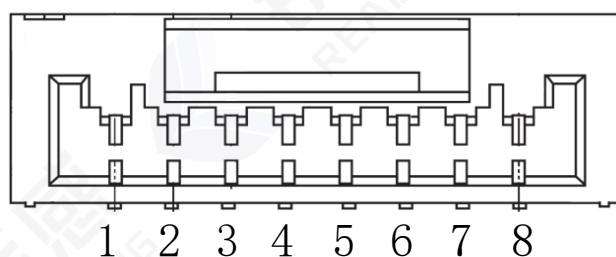
<b>Model</b>	SROA48-G12S23Bit-SC-C-5V SROA48-G12S23Bit-BSC-C-5V SROA48-G12S25Bit-SC-C-5V-A SROA48-G12S25Bit-SC-C-5V-B	
<b>Resolution</b>	Single-turn: 23bit / 25bit; Multi-turn: 12bit	
<b>Single-turn absolute positioning accuracy</b>	23bit: $< \pm 50$ Arc seconds	25bit: $< \pm 15$ Arc seconds
<b>Single-turn repeat positioning accuracy</b>	23bit: $< \pm 3$ Arc seconds	25bit: $< \pm 1$ Arc seconds
<b>Auxiliary Functions</b>	Fault Warning * Electromagnetic Environment Warning	
<b>Communication Interface</b>	RS485 (SC)	BISS-C (BSC)
<b>Communication frequency</b>	RS485: $\leq 16\text{KHz}$	BISS-C: $\leq 32\text{KHz}$
<b>Baud rate</b>	RS485: 2.5Mbps	BISS-C: Max 10Mbps

Input shaft allowable deviation	Axial: $\pm 0.5\text{mm}$ (23bit) $\pm 0.2\text{mm}$ (25bit) Radial: $\pm 0.1\text{mm}$ Tilt: $< 0.1^\circ$	Axial play: $< 0.1\text{mm}$ Radial play: $< 0.01\text{mm}$
Main shaft speed	$\leq 6000\text{rpm}$	
Moment of inertia	$\approx 0.68\text{kg} \cdot \text{mm}^2$	
Starting torque (20°C)	$\leq 0.005\text{Nm}$	
Weight	$\approx 0.07\text{kg}$ (excluding cables)	
Rotor angular acceleration	$\leq 80000\text{rad/s}^2$ (During work)	
Vibration	Between 10 and 55Hz, maintain amplitude of 1.5mm. Between 55 and 2000Hz, acceleration is $98\text{m/s}^2$ . 2 hours per axis for XYZ, totaling 6 hours.	
Mechanical shock	Shock acceleration of $980\text{m/s}^2$ , 11 milliseconds. 3 impacts per direction, totaling 18 impacts.	
Operating Temperature	$-20^\circ\text{C} \sim 105^\circ\text{C}$	
Storage Temperature	$-40^\circ\text{C} \sim 120^\circ\text{C}$	
Relative Humidity	$\leq 90\%$ ( $40^\circ\text{C}/21$ days, based on EN 60068-2-78); No condensation	
Enclosure Protection Rating	IP40	

#### 4. Electrical Parameters

Items		T=25°C		
		Min.	Typ.	Max.
Main power supply voltage		4.75 V	5V	5.25V
Main power supply Current (Typ)		--	RS485:130mA BISS-C:160mA	--
Differential Level	High	3.5V	--	--
	Low	--	--	1.7V
Edge Change Time		--	--	100ns
Insulation resistance		50MΩ	--	--

## 5. Cable Definition

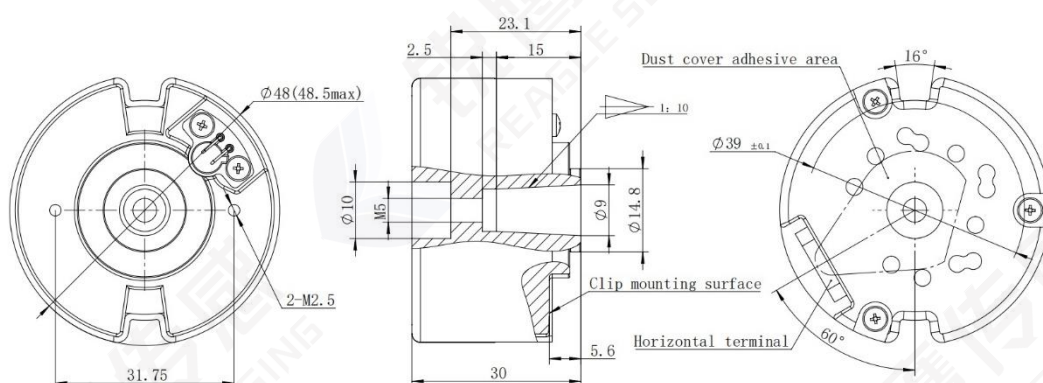


Terminal Numbering	1	2	3	4	5	6	7	8
RS485 Definition	5V	GND	485+	485-	NC	NC	NC	PE
BISS-C Definition	5V	GND	MA+	MA-	SLO+	SLO-	NC	PE

## 6. Mechanical Specifications

### 6.1 Product Overall Structural Dimension Diagram

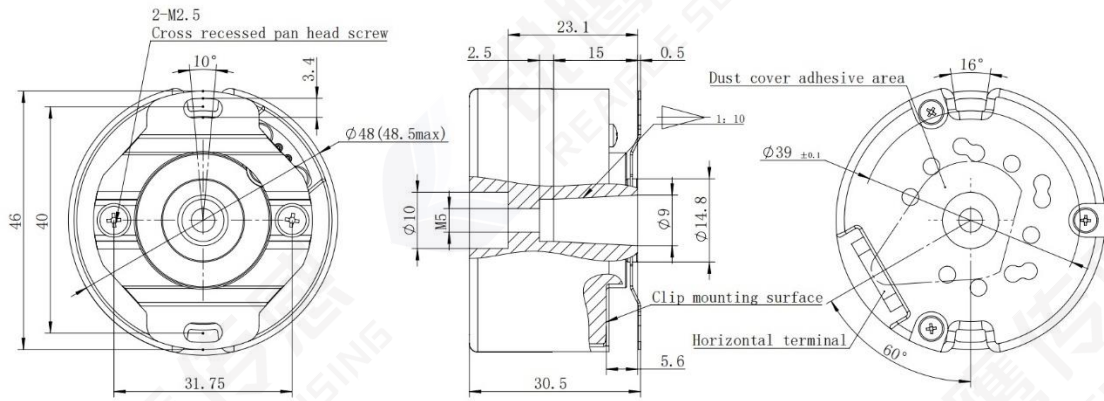
◇ SROA48-G12S23Bit-SC-C-5V-A



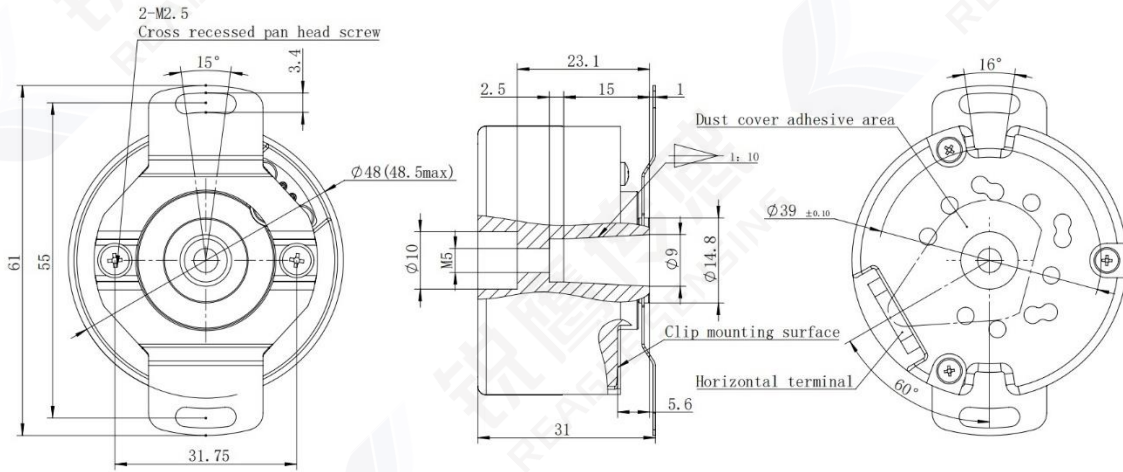
[Note]: 1. This model product does not come with default accessories. Please refer to the ordering instructions for optional accessories.

2. The illustrated dust cover is a component of the whole machine and is not adhered by default at the factory. According to the installation diagram below, please adhere it to the specified area yourself.

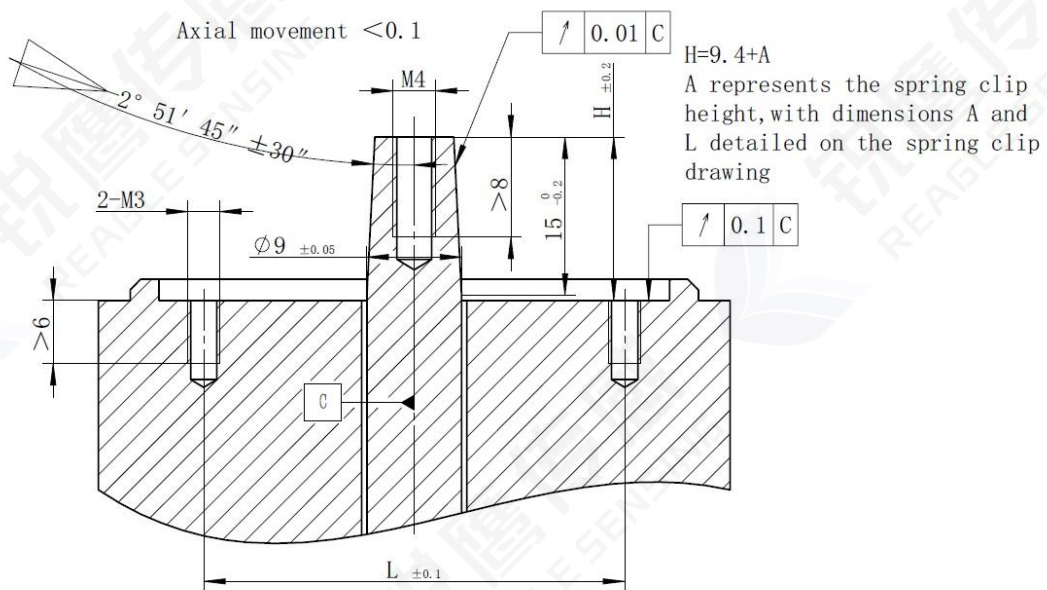
◇ SROA48-G12S25Bit-SC-C-5V-A



◇ SROA48-G12S25Bit-SC-C-5V-B



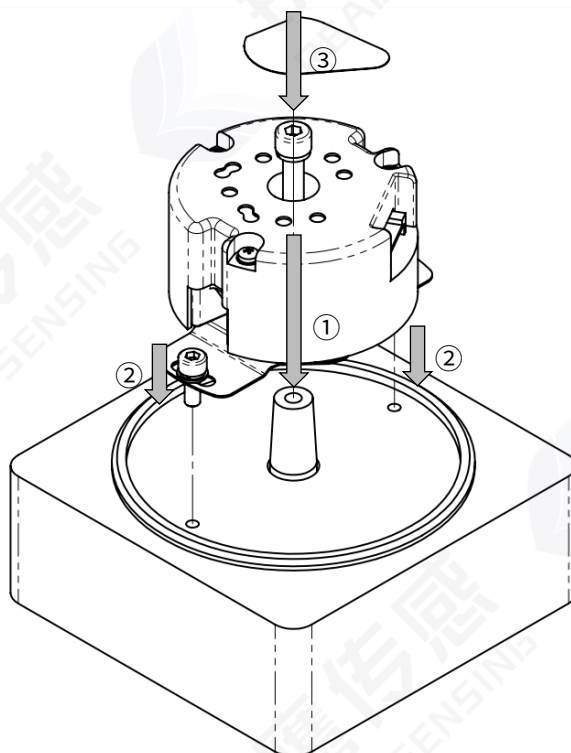
6.2 Reference Diagram for Cone Shaft Motor Design



## 7. Communication Specifications

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### 7.1 Installation diagram



- [Note]: 1. The model of the product demonstrated in the illustration is "SROA48-G12S25Bit-SC-C-5V-B".  
2. Installation steps for other models are consistent; therefore, they are not repeated here.

### 7.2 Installation accessories

- Metric opposite side 2.5mm hexagon socket torque wrench
- Metric opposite side 3mm hexagon socket torque wrench
- 2 - M3 Metric Hex Combination Screws, M4 Metric Hex Combination Screws, lengths can be chosen according to thread depth requirements.

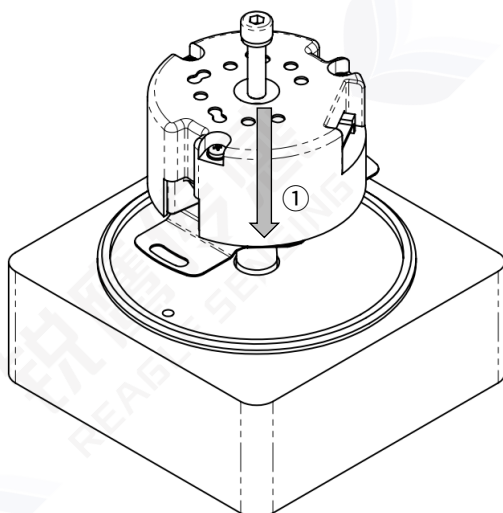


### 7.3 Installation sequence

#### ① Fit the Encoder onto the Motor

##### Tapered Shaft:

- a. Fit the encoder assembly onto the motor tapered shaft.
- b. Insert 1 M4 metric hex combination screw through the housing hole.
- c. Tighten the screw using a Metric opposite side 3mm hexagon socket torque wrench until the encoder assembly completely fits onto the motor tapered shaft.



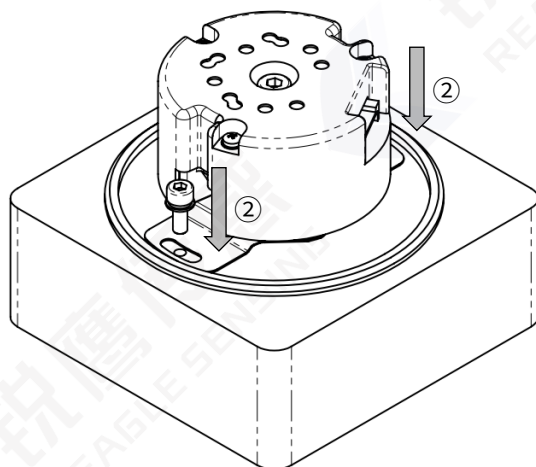
[Note]: 1. When properly fitted, the encoder's inner taper hole should snugly align with the motor tapered shaft without misalignment or looseness.

2. During the fitting process, avoid pressing the encoder down forcefully or tapping it to inspect the motor dimensions or check for any signs of compression damage or foreign objects.

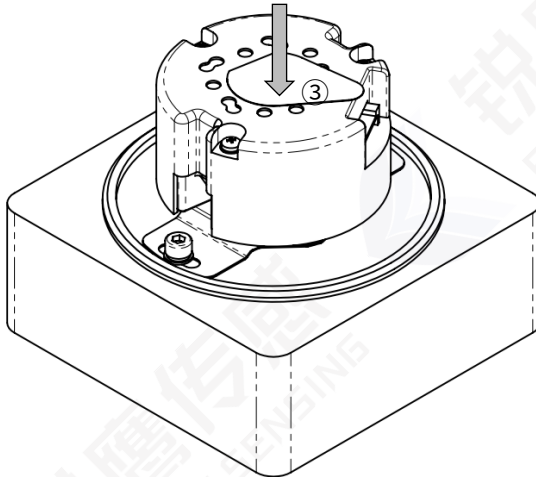
3. It is recommended to tighten the M4 screws to a torque of 16~20 kgf·cm.

#### ② Secure the Encoder:

- a. Insert 2 M3 metric hex combination screws through the waist grooves on both sides of the encoder.
- b. Tighten these screws sequentially using a Metric opposite side 2.5mm hexagon socket torque wrench until the encoder is fully secured.



[Note]: 1. It is recommended to tighten the M3 screws to a torque of 8~10 kgf·cm.



③ **Apply Dust Seal on the Encoder Surface:**

- a. Adhere a dust seal onto the surface of the encoder.
- b. Flatten the dust seal to ensure it completely covers the housing hole, preventing any dust from entering.

## 8. Communication Specifications

- SROA48-G12S23Bit-SC-C-5V
- SROA48-G12S25Bit-SC-C-5V-A
- SROA48-G12S25Bit-SC-C-5V-B

Table 1: RS485 Protocol Parameters

1	Single-turn position resolution	8388608 (23bit, ENID = 0x17) 33554432 (25bit, ENID = 0x19)
2	Multi-turn position resolution	$[-2048, 2047]^{<1>}$ (12bit)
3	Overspeed alarm threshold	7200rpm

[Note]: The actual number of turns is represented in 12 bits, but the output format is 16 bits. Therefore, the actual output range is from 0xF800 to 0xFFFF and from 0x0000 to 0x07FF. When the turns count is 0x07FF, advancing one full turn results in an output of 0xF800. Conversely, when the turns count is 0xF800, reversing one full turn results in an output of 0x07FF.

The specific content of the 《 Reagle Communication Protocol Specification (TAMA-STD) [Public] 》 can be found in the document itself.

- SROA48-G12S23Bit-BSC-C-5V

Table 2: BiSS-C Protocol Parameters

1	Single-turn position resolution	8388608 (23bit, ENID = 0x17)
2	Multi-turn position resolution	4096 (12bit)
3	Overspeed alarm threshold	7200rpm

The specific content of the 《 Reagle Communication Protocol Specification (BiSS-C) [Public] 》 can be found in the document itself.

### Revision History

Date	Version Number	Modification Details or Changes	
		Location	Content
20240415	V1.0	/	New Version

*Service hotline: 400-636-1110*

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