锐鹰传感
REAGLE SENSING

Split-Gear Multi-Turn Absolute Encoder

WIN48-G12S17□□-HA6C0V5

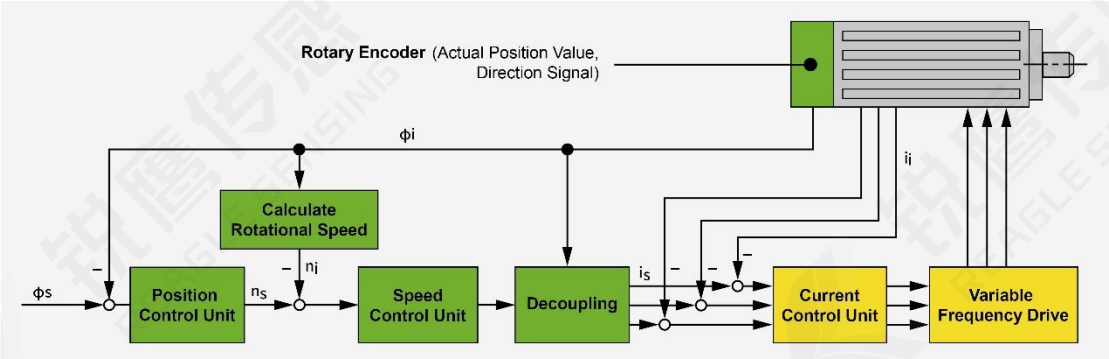
SPECIFICATION

浙江锐鹰传感技术股份有限公司
ZHEJIANG REAGLE SENSING TECHNOLOGY INCORPORATED

Contents

1. Summary Info

This manual primarily describes how to use the WIN48 split-type gear multi-turn absolute encoder from Reagle Sensing. This product mainly serves servo-driven control systems, providing the accurate positional and speed control feedback required by the system.

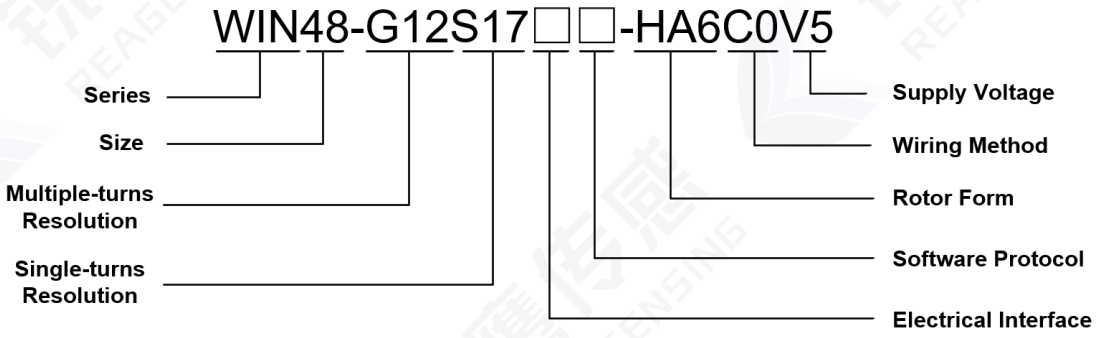


Position and velocity control system

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



WIN——Series code; this product is a split-type gear multi-turn absolute encoder;
48——Product size; the external dimensions of this product are Φ48mm;

G12——Multi-turn mode and resolution; this product is a gear multi-turn with a resolution of 12 bits;

S17——Single-turn mode and resolution; this product rotates for a single turn with a resolution of 17 bits;

□——Electrical interface; the current models of this product feature two types of electrical interfaces: RS485 and BISS-C, represented by ST and BS respectively;

□——Software protocol; the current models of this product feature two types of software protocols: the RS485 interface corresponds to the 2.5Mbps standard Tamagawa protocol, represented by 00, and the BISS-C interface corresponds to the standard BISS-C protocol, represented by 20;

HA6——Rotor mounting style; the rotor of this product is mounted axially through a hole with a diameter of Φ6mm;

C0——Wiring method; this product features terminal-style horizontal output;

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

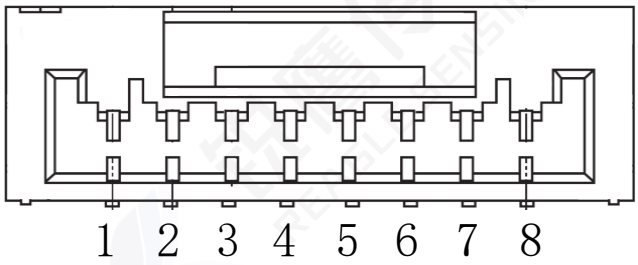
3．Technical Specifications

Model	**WIN48-G12S17ST00-HA6C0V5 WIN48-G12S17BS20-HA6C0V5**	
Resolution	Single-turn:17bit; Multi-turn:12bit	
Repeat positioning accuracy	＜±5 Arc seconds	
Auxiliary functions	Fault Warning * Electromagnetic Environment Warning	
Communication interface	RS485（ST）	BISS-C（BS）
Communication frequency	≤16KHz	
Baud rate	RS485：2.5Mbps	BISS-C：最大支持 10Mbps
Input shaft allowable deviation	Axial：±0.1mm Radial：±0.1mm	Axial play：＜±0.05mm Axial play：＜0.02mm
Main shaft speed	≤6000rpm	
Moment of inertia	≈0.08kg·mm²	
Weight	≈0.04kg（不含线缆）	
Vibration	Between 10 and 55Hz, maintain amplitude of 1.5mm. Between 55 and 2000Hz, acceleration is 98m/s². 2 hours per axis for XYZ, totaling 6 hours.	
Mechanical shock	Shock acceleration of 980m/s², 11 milliseconds. 3 impacts per direction, totaling 18 impacts.	
External dimensions	Diameter: φ48.2mm max; Height: 15.5mm max.	
Operating temperature	-40°C~105°C	
Storage temperature	-40°C~120°C	
Relative Humidity	≤90% (40°C/21 days, based on EN 60068-2-78); No condensation	
Enclosure Protection Rating	IP40	

4. Electrical Parameters

Items		T=25℃		
		Min.	Typ.	Max.
Main power supply voltage		4.75 V	5V	5.25V
Main power supply Current (Typ)		--	150mA	--
Differential Level	High	3.5V	--	--
	Low	--	--	1.7V
Edge Change Time		--	--	100ns
Insulation resistance		50MΩ	--	--

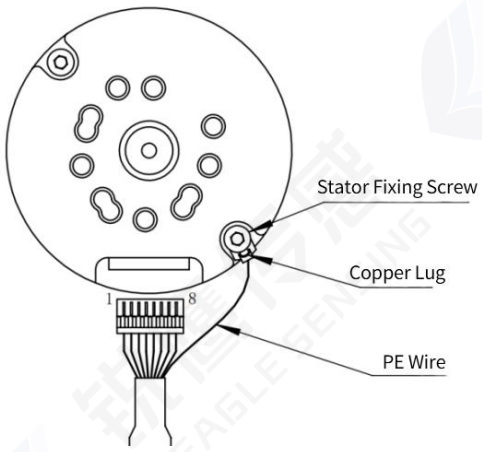
5. Cable Definition



[Note]: The illustration shows the encoder end (board end) terminal, model "SM08B-GHS-TB"

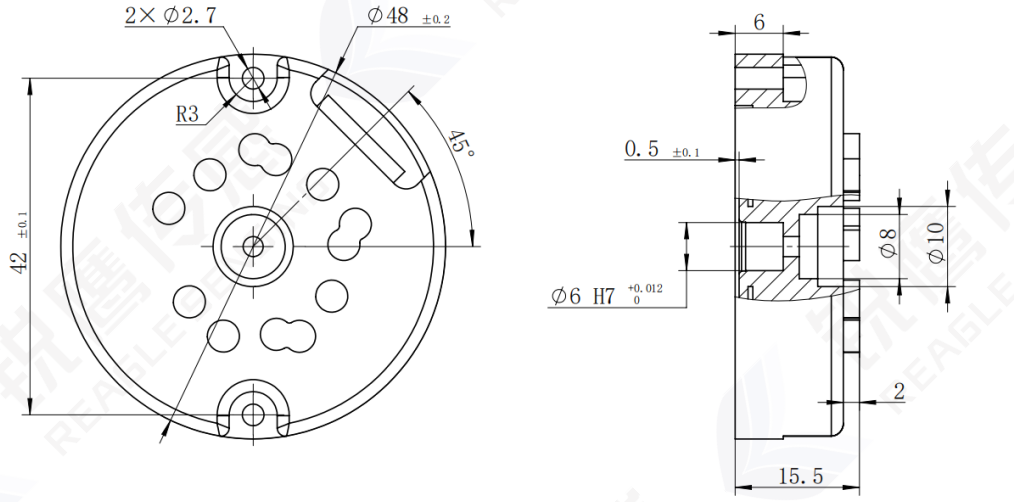
Terminal Numbering	1	2	3	4	5	6	7	8
RS485 Definition	5V	GND	485+	485-	NC	NC	NC	NC
BISS-C Definition	5V	GND	MA+	MA-	SLO+	SLO-	NC	NC

[Note]: PE wire installation diagram

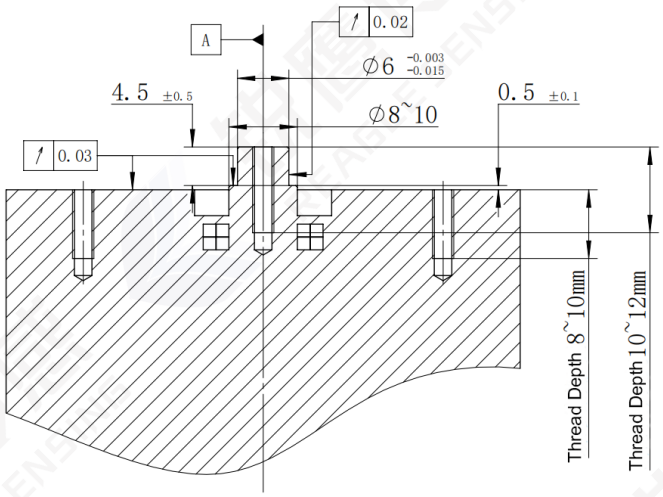


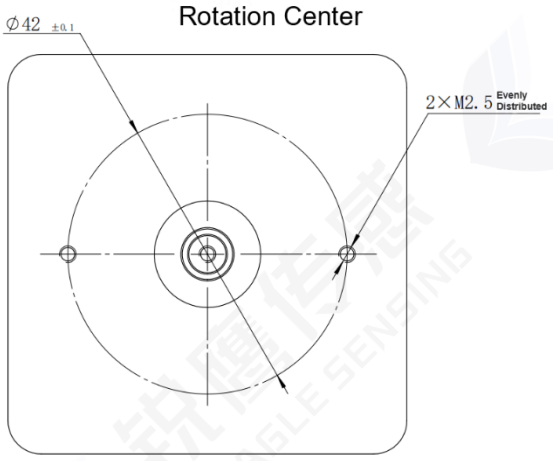
6. Mechanical Specifications

✧ Overall Structural Dimension Diagram



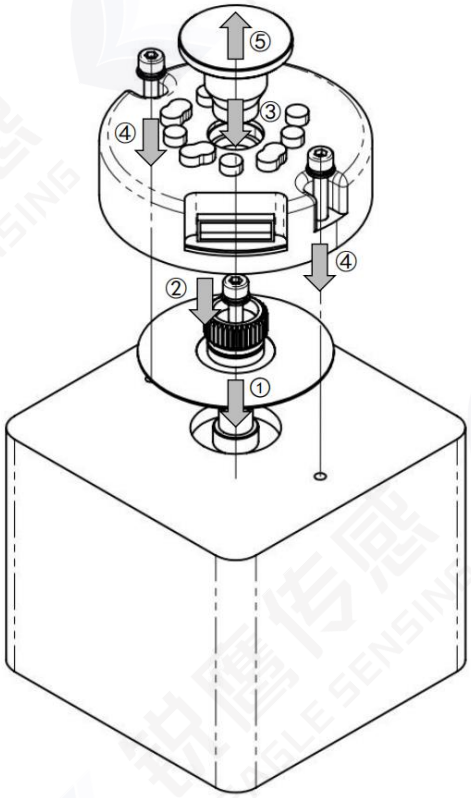
✧ Recommended Motor Installation Dimensions





7．Mounting Procedure

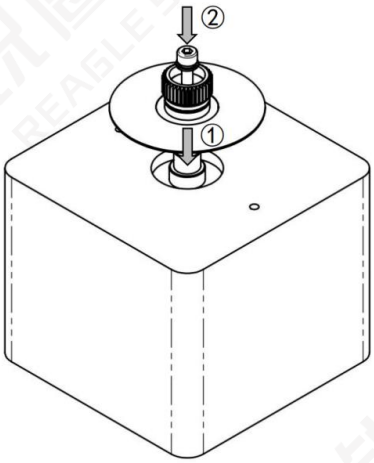
7.1 Installation diagram



7.2 Installation accessories

- 3x M2.5 hex socket head cap screws, length can be chosen based on thread depth, recommended size M2.5×12mm.
- Metric 2mm hex key torque wrench.

7.3 Installation sequence

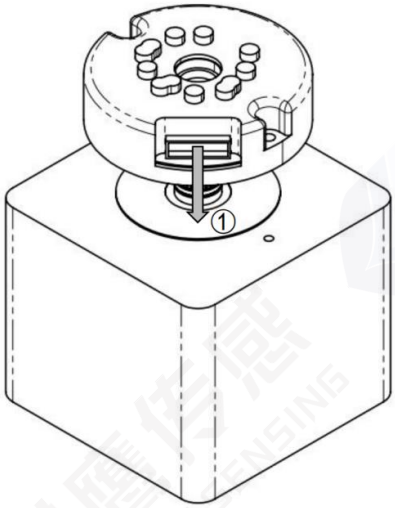


Rotor Installation：

① Fit the rotor onto the motor shaft, ensuring it is properly seated against the stop.

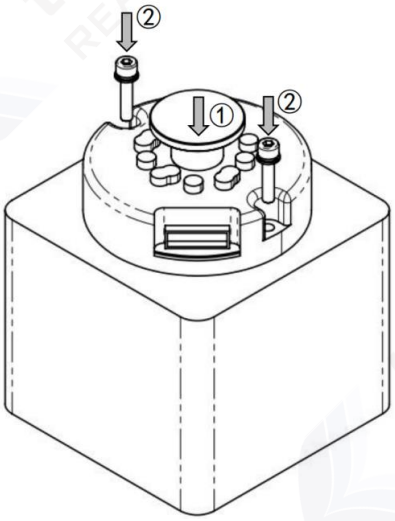
② Insert one M2.5 hex socket head cap screw at the center of the rotor and tighten with a metric 2mm hex key torque wrench.

[Note]: To prevent the screw from loosening, apply thread locker to the screw hole or use pre-coated thread locker screws. Recommended tightening torque is 5.5±0.2 kgf·cm.



Stator Installation：

① Mount the stator to the motor end face, aligning it with the screw holes.

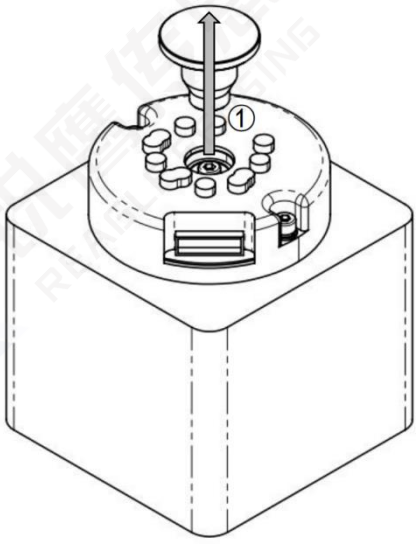


Aligning Stator and Rotor for Concentricity：

① Insert the alignment tool through the through holes of the stator housing, pushing it down until it mates with the rotor, and maintain this position.

② Insert two M2.5 hex socket head cap screws through the through holes on both sides of the stator, and sequentially tighten them using a metric 2mm hex key torque wrench.

[Note]: 1. As shown in the PE wire installation diagram, slide the PE wire ferrule onto the screw before inserting the M2.5 hex socket head cap screw.
2. To prevent the screws from loosening, apply thread locker to the screw holes or use pre-coated thread locker screws. Recommended tightening torque is 5.5±0.2 kgf·cm.



Removal of Alignment Tool：

① Once the screws are fully tightened, remove the alignment tool.

[Note]: During removal, do not strike, damage the rear cover, or excessively grip the tool and encoder.

8．Communication Specifications

✧ WIN48-G12S17ST00-HA6C0V5：

Table 1: Standard Tamagawa (TAMA) Protocol Parameters

1	Single-turn position resolution	131072（17bit，ENID = 0x11）
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.

✧ WIN48-G12S17BS20-HA6C0V5：

Table 2: BISS-C Protocol Parameters

1	Single-turn position resolution	131072（17bit）
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.

9．Calibration Methods

9.1 Calibration via MCU or Driver

✧ **Standard Tamagawa (TAMA) Protocol:**

① Connect the encoder to the MCU or driver.

② Send the command 32 7F 07 (with CRC) to access page 7 for read/write, then send 32 06 01 (with CRC) to initiate offline calibration.

③ Rotate the rotor in the same direction (more than 4 turns), send the command EA 07 (with CRC) until a 0x01 is returned, indicating successful calibration. If no data is returned, calibration is still in progress, and the operation can be repeated. Any other outcome indicates calibration failure.

✧ **BISS-C Protocol：**

① Connect the encoder to the MCU or driver.

② Write 0x01 into 0x4A to initiate offline calibration.

③ Rotate the rotor in the same direction (more than 4 turns), continuously read from 0x4B without powering down, until a 0x01 is returned, indicating successful calibration. If no data is returned, calibration is still in progress, and the operation can be repeated. Any other outcome indicates calibration failure.。

9.2 PC Calibration Operation (Recommended)

① Install the encoder onto a tri-axial workstation with rigid connections. Ensure to connect both signal and power cables, as the workstation must support speeds up to 6000 rpm.

② Open the PC software ReagleETP, load the specification Reagle-STD-WIN48-OfflineCali-MultiCali-V1.2, then double-click ‘ ’ to start the process.

③ Upon completion of the specification run, a "PASS" message indicates successful calibration. If the calibration fails, the PC will show an error message.

④ If an "Offline Calibration Failed" message appears, simply power cycle the encoder and repeat the above steps to retry offline calibration.

Revision History

Date	Version Number	Modification Details or Changes	
		Location	Content
20240604	V1.0	/	New Version

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www.reagles.cn sales@reagles.cn 400-636-1110

Fourth Floor, Block B, Building 9, Intelligence Industry