ROBUSTMOTION

PRODUCT USER MANUAL

RM-EGB

COMPACT ELECTRIC FINGER

Please read this MANUAL carefully before using the product.

Doc Code:EGBPUM2409

Preface

Overview

RM-EGB is a compact electric finger with high cost-performance and easy operation. It is equipped with an integrated servo controller for driving and control. It is compact in size, offers a wide range of force output, and has a fast opening and closing speed, exhibiting excellent motion performance. This compact electric finger can easily replace pneumatic grippers of the same specifications and is suitable for the rapid clamping and transportation of various lightweight products and components.

This quick start guide provides comprehensive information on the product, including an overview, installation considerations, instructions, application examples, communication and control methods, software debugging tools, troubleshooting, and maintenance. For first-time use, please be sure to read this manual carefully. If you have any questions or doubts regarding the content of the manual, please feel free to consult our RobustMotion for professional guidance.

Applicable Product Models

This Manual applies to all models of RM-EGB (Compact Electric Finger) series.

Features

- Miniature and compact in size, saving space
- Offers a larger range of force output compared to products of the same volume
- Adaptive gripping
- Can grip internally or externally with consistent force output
- 4 preset output force levels, I/O combination trigger without parameter adjustment
- 4 preset stroke levels , I/O combination trigger without parameter adjustment
- Clamp empty and drop detection function
- Can directly replace the pneumatic gripper of same specification

Application

- 3C Electronics Manufacturing
- Automated Production & Assembly
- Battery Manufacturing
- Automation Equipment
- Cosmetics Production
- Other Industries

Precautions

1. This manual serves as a general guide for a series of products. The diagrams provided in the manual are for illustrative purposes only and may differ from the product you have ordered.
2. Our company is committed to the continuous improvement of our products, with ongoing enhancements to product functionality. If you encounter any issues during use, please contact RobustMotion for assistance.

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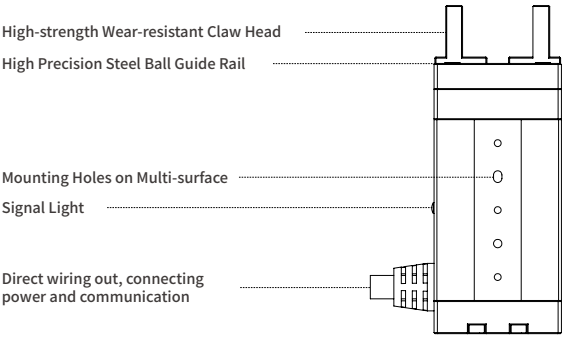
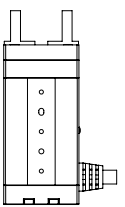
1 Product Information

1.1 Product Overview

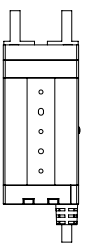


RM-EGB

This MANUAL applies to the following product models.



RM-EGB-06-6-ITG
RM-EGB-06H-16D-1



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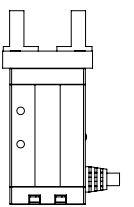
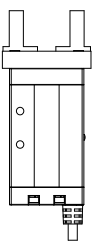


RM-EGB-06L-20D-1



RM-EGB-06L-20D-2

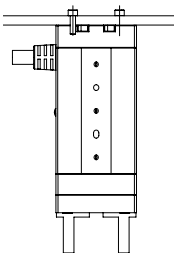
* "1" is the side outlet, "2" is the bottom outlet.

1.2 Installation Instructions

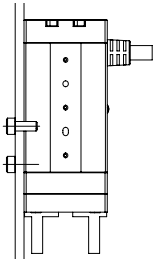
This actuator is equipped with multiple mounting surfaces, allowing users to choose the appropriate mounting surface according to their specific needs and secure it with bolts that match the diameter of the holes. Please follow these guidelines when performing the installation and fixing operation:

1) When securing the main body, please use all the threaded holes on the same mounting surface for fixation;

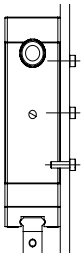
2) When tightening the bolts, do not exceed the depth of the threaded holes.



Bottom Mounting Surface

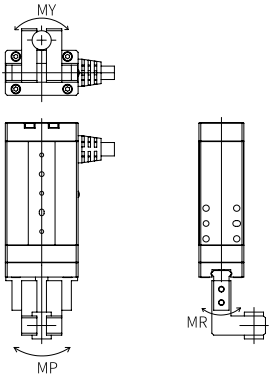


Side Mounting Surface



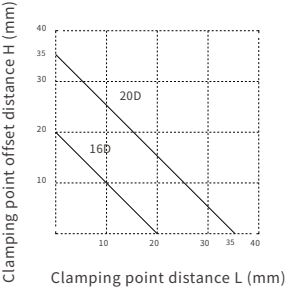
Front Mounting Surface

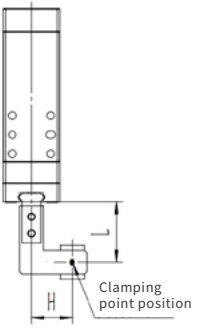
1.3 Allowable Static Moment Direction of Finger



1.4 Clamp's Clamping Point Distance and Tooling Fixture Design Suggestions

Clamp's clamping point distance:
Please use the distance (L, H) from the mounting surface to the clamping point within the following range. Exceeding the limit range may cause excessive load torquebeing applied to the slider and internal mechanism of the gripper, potentially reducing its service life.

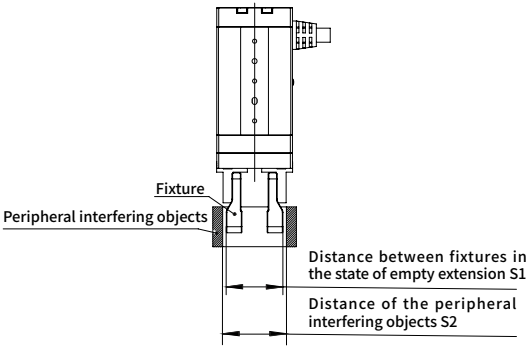




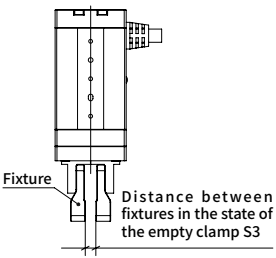
- Even if the gripping point is within the restricted range, choosing smaller and lighter fixtures is advisable whenever possible.
- When the clamp is too long, too large, or has excessive mass, the inertial force and bending load torque generated during the opening and closing operations can impact the mechanical body, potentially leading to a decrease in performance or adverse effects on the guide rail section.

1.5 Function Instructions for Clamping/Outer Support/Drop Detection

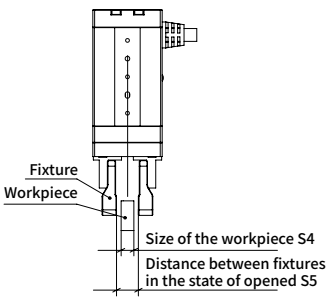
* Requirements for use of outer support/drop detection
S1+0.5mm < S2



* Clamp/drop detection function requires
S3 > 0.5mm



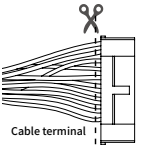
* Clamp/drop detection function requires
16D: S5-S4 < 6mm
20D: S5-S4 < 10mm



2 Cable Wiring and Use

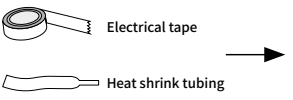
2.1 Wiring Instructions

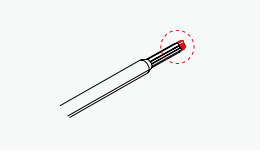
1. When using, there is no need to adapt the female connector to the plug, you can cut off the plug end yourself.
2. Just follow the wire markings on the cables or the following wire sequence instructions to wire the cables accordingly.



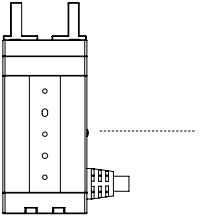
2.2 Insulation Protection of Loose Wire

Loose wires that are not in use must be insulated to prevent short circuits caused by accidental contact of the wires.





2.3 Instructions of Signal Light Indicator

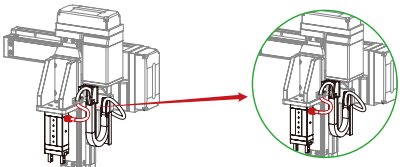


RM-EGB

- Green: Initializing upon power-on
- Blue: Indicates the EGB is in operable state
- Purple: Workpiece clamped (internally / externally) by IO

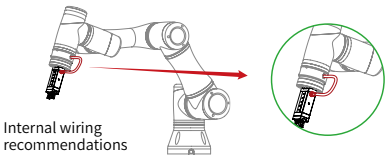
2.4 Cable Tying and Securing Protection for Installation

1. **Recommendations for tying cable on device modules**

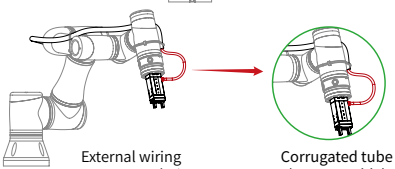


Tank chain (protect cable)

2. **Recommendations for tying cable when used on robotic arms**



Internal wiring recommendations



External wiring recommendations

Corrugated tube (protect cable)

The 20cm long part of the cable outlet from the gripper (the part shown in red) must be as static as possible with the gripper body to ensure effective fixation and prevent cable damage caused by bending/twisting below the minimum bending radius (56mm).

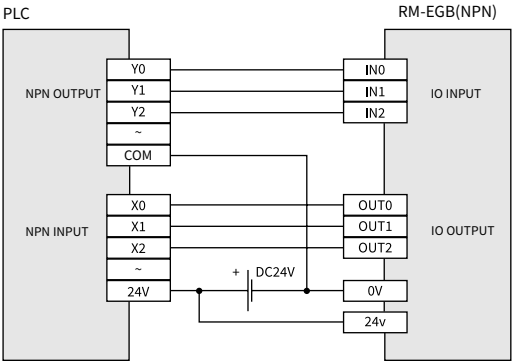
2.5 Wiring Sequence Instructions

		Group	Color	Definition	Description
A2008H-12	PIN1	I/O output	Red	OUT0	NPN output 0
	PIN2		Orange	OUT1	NPN output 1
	PIN3		Black	OUT2	NPN output 2
	PIN4	I/O input	Purple	IN0	NPN input 0
	PIN5		Grey	IN1	NPN input 1
	PIN6		White	IN2	NPN input 2
	PIN7	Main power supply	Brown	24V	Actuator power supply 24V
	PIN8		Blue	0V	Actuator power supply 0V
	PIN9	485	Yellow	DSW +	485 +
	PIN10		Green	DSW −	485 −

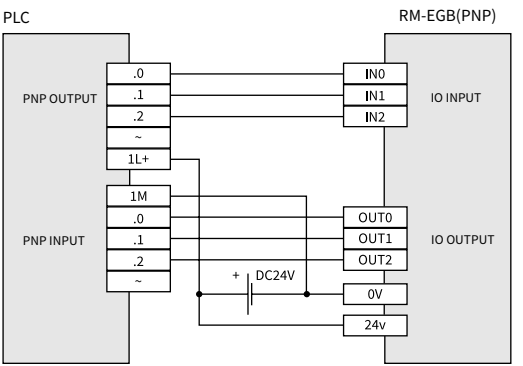
Note: Different batches of cables may cause slight differences in the color of the wire core. Please refer to the actual color of the cable for details.

2.6 Circuit Diagram Wiring Illustration

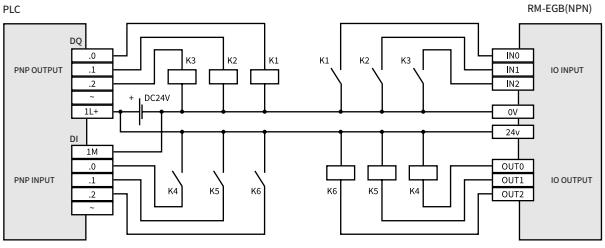
1. When both the PLC and RM-EGB feature NPN I/O types, the wiring method is as follows:



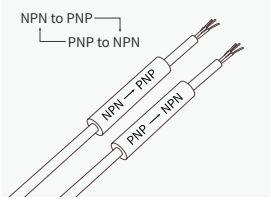
2.When both the PLC and RM-EGB feature PNP I/O types, the wiring method is as follows:



3. When the PLC I/O type is PNP, while the RM-EGB I/O type is NPN, indirect control can be achieved by using a relay wiring method, as follows:



It is also possible to use a PNP to NPN converter or an NPN to PNP converter (as shown in the following figure) to achieve a high-to-low or low-to-high level conversion.



Note: The PNP to NPN converter, or NPN to PNP converter, should be wired strictly following the wiring method provided by the cable manufacturer.

3 I/O Input and Output Signal Description

- 4 preset output force levels, I/O combination trigger without parameter adjustment
- 4 preset stroke levels , I/O combination trigger without parameter adjustment

3.1 Input Signal Description

No.	IN0	IN1	IN2	16D	20D
1				Open to limit, strength 100%	Open to limit, strength 100%
2		■		Position to 2mm, strength 100%	Position to 4mm, strength 100%
3			■	Position to 4mm, strength 100%	Position to 8mm, strength 100%
4		■	■	Open to limit, strength 50%	Open to limit, strength 50%
5	■			Clamp to limit, strength 100%	Clamp to limit, strength 100%
6	■	■		Clamp to limit, strength 75%	Clamp to limit, strength 75%
7	■		■	Clamp to limit, strength 50%	Clamp to limit, strength 50%
8	■	■	■	Clamp to limit, strength 25%	Clamp to limit, strength 25%

■: Indicates that the signal is in an ON state. If it is blank, it indicates an OFF state.

3.2 Output Signal Description

No.	OUT0	OUT1	OUT2	Description
1				In motion
2		●		Open in place (detection of workpiece without external support or workpiece with external support falling)/positioning movement in place.
3		●	●	Opened in place and the outer support detects the workpiece.
4	●			Clamp in place, detect no clamped workpiece/fall of clamped workpiece.
5	●	●		The clamp is in place and the clamp detects the workpiece.
6			●	The positioning movement is not in place and the strength reaches 100%.
7	●	●	●	Equipment abnormality

●: Indicates that the signal is in an ON state. If it is blank, it indicates an OFF state.

4 Modbus — Protocol Description

4.1 Command Overview

In the Modbus RTU protocol, the slave address 0 is the global broadcast signal. Sending control commands by using this address will cause all devices on the bus to receive the command.

Gripper RS485 Default Configuration:
Gripper station number: 1
Baud rate: 115200
Data bits: 8
Stop bits: 1
Parity bit: None

Function	Modbus Address	Function Code	Data Type	Description	Data Analysis
Initialization	17 (0x0011)	0x05	Coil Register	The gripper performs an initialization action and returns to the origin.	0x0000: Coil write 0; 0xFF00: Coil write 1; 0x0000 -> 0xFF00 triggers initialization on a rising edge.
Force Setting	4102 (0x1006)	0x10	Holding Register (32-bit integer)	Sets the gripper's output force.	25-100, percentage; Takes effect after a change in position setting.
Position Setting	4100 (0x1004)	0x10	Holding Register (32-bit integer)	Sets the target position of the gripper.	0-100, percentage; Takes effect immediately after sending.
Current Status	4104 (0x1008)	0x03	Holding Register (32-bit integer)	Obtain the current tooling status of the gripper.	The readable status includes: 1. Whether the movement is in place. 2. Whether the output is applied. 3. Whether initialization is complete.
Read Current Position	4112 (0x1010)	0x03	Holding Register (32-bit integer)	Obtain real-time position.	Actual current position = Read position value/100 Unit: mm
Station Number Setting	7002 (0x1B5A)	0x10	Holding Register (32-bit integer)	Set the gripper station number.	Range: 1 to 255
Baud Rate Setting	7000 (0x1B58)	0x10	Holding Register (32-bit integer)	Set the gripper baud rate.	Available settings: 9600, 19200, 38400, 57600, 115200; If the set baud rate is not within the provided range, it will default to 115200.
Save Parameters	9 (0x0009)	0x05	Coil Register	Save the set station number and baud rate.	0x0000: Coil write 0; 0xFF00: Coil write 1; 0x0000 -> 0xFF00 triggers saving parameters on a rising edge.

4.2 Detailed Description of the Command

1. The RM driver adopts the standard Modbus RTU protocol, supporting function codes 03, 04, 05, and 10. (Refer to Table 1.2)

Table 1.2 The usage of function code

Function Code	Usage
02	Read Input Coils
03	Read Holding Registers
04	Read Input Registers
05	Force Single Coil
10	Write to Holding Registers

2. When controlling, the RM driver generally uses function codes 05 and 10 for writing control. Code 05 is used for input signal control, while code 10 is for writing positional parameters.

3. When reading, the RM driver generally uses function codes 03 and 04 to read from the driver. Code 02 is used for reading output signals, while codes 03 and 04 are for reading gripper parameters.

Taking the initialization command 01 05 00 11 FF 00 DC 3F as an example, as shown in Table 1.3.

Table 1.3 Command Format

Address Code	Function Code	Register Address	Register Data	CRC Check Code
01	05	00 11	FF 00	DC 3F

Table 1.4 Description of Command

NO.	Description
Address Code	• Indicates the driver's station number, which can be modified in the device's station number, with the default being 1. • 01 represents the Modbus ID of the driver as 01.
Function Code	• • Indicates the read and write operations on the driver, both reading data from the driver and writing data to it. • The initialization command function code is 05, representing forcing a single coil.
Register Address	• The address corresponding to the driver's function, with the initialization command address being 17.
Register Data	• Writing data to a specific register address to control and read data. • The initialization command is FF 00 (coil positioning) representing initialization.
CRC Check Code	• Ensures that terminal devices do not respond to data that has changed during transmission, ensuring the safety and efficiency of the system. • CRC check uses a 16-bit cyclic redundancy method, which is transformed based on the previous data, and it is known that the CRC check code for the initialization command is DC 3F.

4.3 Detailed explanation of common functions

4.3.1 Initialization

RS485 control for initialization is used for gripper initialization; do not control during the gripper initialization process. Depending on the model of the gripper, the initialization time may vary; please control after the initialization is complete.

The initialization address is 0x0011, the function code is 05, and the trigger condition is a rising edge trigger.

Function	Modbus Address	Function Code	Data Type	Description	Data Analysis
Initialization	17（0x0011）	0x05	Coil Register	The gripper performs an initialization action and returns to the origin.	0x0000: Coil write 0xFF00: Coil write 1; 0x0000 –>0xFF00 Rising edge of the coil triggers initialization.

- **Before executing the initialization command, set Bit1 of the gripper's enable with 0x0011 to 0 (write operation):**
  Send：01 05 00 11 00 00 9D CF
  Return：01 05 00 11 00 00 9D CF

- **Execute the initialization command (write operation):**
  Send：01 05 00 11 FF 00 DC 3F
  Return: 01 05 00 11 FF 00 DC 3F

4.3.2 Force Setting

RS485 control is used for force setting, specifically for the gripper's force setting. The force setting address is 0x1006, the function code is 10, and the write type is a 32-bit integer. Therefore, the force setting command requires the high and low bytes to be swapped.

Function	Modbus Address	Function Code	Data Type	Description	Data Analysis
Force Setting	4102 (0x1006)	0x10	Holding Register (32-bit integer)	Sets the gripper's output force.	25-100, percentage; Takes effect after a change in position setting.

- **Write 25% force:**
  Send：01 10 10 06 00 02 04 00 19 00 00 6F 82
  Return：01 10 10 06 00 02 A5 09

- **Write 50% force:**
  Send：01 10 10 06 00 02 04 00 32 00 00 1F 8A
  Return：01 10 10 06 00 02 A5 09

- **Write 75% force:**
  Send：01 10 10 06 00 02 04 00 4B 00 00 CE 53
  Return：01 10 10 06 00 02 A5 09

- **Write 100% force:**
  Send：01 10 10 06 00 02 04 00 64 00 00 FF 9A
  Return：01 10 10 06 00 02 A5 09

4.3.3 Position Setting

RS485 control is used for position setting, specifically for the gripper's position setting. The position setting address is 0x1004, the function code is 10, and the write type is a 32-bit integer. Therefore, the position setting command requires the high and low bytes to be swapped.

Function	Modbus Address	Function Code	Data Type	Description	Data Analysis
Position Setting	4100 (0x1004)	0x10	Holding Register (32-bit integer)	Sets the target position of the gripper.	0-100, percentage; Takes effect immediately after sending.

- **Write 5% position:**
  Send：01 10 10 04 00 02 04 00 05 00 00 2F 9D
  Return：01 10 10 04 00 02 04 C9

- **Write 15% position:**
  Send：01 10 10 04 00 02 04 00 0F 00 00 0F 9F
  Return：01 10 10 04 00 02 04 C9

- **Write 25% position:**
  Send：01 10 10 04 00 02 04 00 19 00 00 EE 5B
  Return：01 10 10 04 00 02 04 C9

- **Write 50% position:**
  Send：01 10 10 04 00 02 04 00 32 00 00 9E 53
  Return：01 10 10 04 00 02 04 C9

- **Write 75% position:**
  Send：01 10 10 04 00 02 04 00 4B 00 00 4F 8A
  Return：01 10 10 04 00 02 04 C9

- **Write 100% position:**
  Send：01 10 10 04 00 02 04 00 64 00 00 7E 43
  Return：01 10 10 04 00 02 04 C9

4.3.4 Read Current Status

RS485 control is used to read the current status for determining the gripper's state. The current status address is 0x1008, the function code is 03, and the read type is a 32-bit integer. Therefore, the command to read the current status requires swapping the high and low bytes.

Function	Modbus Address	Function Code	Data Type	Description	Data Analysis
Current Status	4104 (0x1008)	0x03	Holding Register (32-bit integer)	Obtain the current tooling status of the gripper.	The readable status includes: 1. Whether the movement is in place. 2. Whether the output is applied. 3. Whether initialization is complete.

Current Status Data Parsing
The holding register of "Current Status" is bit status (binary).

- Bit0 is used to evaluate the motion completion status: 0 indicates the motion has not been executed, while 1 indicates the motion has been completed.
- Bit1 is used to ascertain whether the output force has reached the set value: 0 indicates the output force has not yet reached the set value, while 1 indicates the output force has reached the set value.
- Bit2 is used to check the initialization status of the gripper: 0 indicates the gripper has not completed initialization, while 1 indicates the gripper has completed initialization.

- **4:Initialization is complete. The gripper in motion.**
  Send：01 03 10 08 00 02 41 09
  Return：01 03 04 00 04 00 00 BB F2
  (The hexadecimal value 00 00 00 04 corresponds to the integer 4, which in binary is 100. According to the above rules, the gripper has been initialized, movement is not in place, and the output force has not reached the set value.)

- **5:Initialization is complete, the gripper movement is executed, but no workpiece has been detected.**
  Send：01 03 10 08 00 02 41 09
  Return：01 03 04 00 05 00 00 EA 32
  (The hexadecimal value 00 00 00 05 corresponds to the integer value 5, which in binary status is 110. According to the above rules, the gripper has been initialized, movement is in place, but the force output has not reached the set value.)

- **7:Initialization is complete, the gripper movement is executed, and the workpiece has been detected.**
  Send：01 03 10 08 00 02 41 09
  Return：01 03 04 00 07 00 00 4B F2
  (The hexadecimal value 00 00 00 07 corresponds to the integer value 7, which in binary is 111. According to the above rules, the gripper has been initialized, movement is in place, and the force output has reached the set value.)

4.3.5 Read Current Position

RS485 control is used to read the current position for the gripper's current location. The current position address is 0x1010, the function code is 03, and the read type is a 32-bit integer. Therefore, the command to write the input setting requires swapping the high and low bytes.

Function	Modbus Address	Function Code	Data Type	Description	Unit
Read Current Position	4112 (0x1010)	0x03	Holding Register (32-bit integer)	Obtain real-time position.	Unit: mm Actual Current Position = Read Position Value / 100

Send：01 03 10 10 00 02 C1 0E
Return：01 03 04 01 EC 00 00 3A 3A
(The hexadecimal value 0000 01EC corresponds to a 32-bit integer of 492, which means the actual position of the gripper is 4.92mm.)

4.3.6 Set Station Number

RS485 control is used to change the station number and baud rate for multi-slave communication. The initial default station number is 1, and the baud rate is 115200, with 8 data bits, 1 stop bit, and no parity check. The station number setting address is 0x1B5A, and the baud rate setting address is 0x1B58. The function code is 10, and the write type is a 32-bit integer, so the written values need to have their high and low bytes swapped.

After writing, you need to save the parameters. The address for saving parameters is 0x0009, the function code is 05, and the trigger condition is a rising edge trigger.

Function	Modbus Address	Function Code	Data Type	Description	Data Analysis
Station Number Setting	7002 (0x1B5A)	0x10	(32-bit holding register)	Set the gripper station number	1～255
Baud Rate Setting	7000 (0x1B58)	0x10	(32-bit holding register)	Set the gripper baud rate	Available settings: 9600, 19200, 38400, 57600, 115200; if the set baud rate is not within the provided range, it will default to 115200
Save Parameters	9 (0x0009)	0x05	Coil Register	Save the set station number and baud rate	0x0000: Coil write 0; 0xFF00: Coil write 1; 0x0000 –>0xFF00 coil rising edge triggers saving parameters

- **Change the baud rate to 9600:**
  Send：01 10 1B 58 00 02 04 25 80 00 00 43 21
  Return：01 10 1B 58 00 02 C6 FF

- **Change the baud rate to 19200:**
  Send：01 10 1B 58 00 02 04 4B 00 00 00 5E 21
  Return：01 10 1B 58 00 02 C6 FF

- **Change the baud rate to 38400:**
  Send：01 10 1B 58 00 02 04 96 00 00 00 64 4D
  Return：01 10 1B 58 00 02 C6 FF

- **Change the baud rate to 57600:**
  Send：01 10 1B 58 00 02 04 E1 00 00 00 7F F9
  Return：01 10 1B 58 00 02 C6 FF

- **Change the baud rate to 115200:**
  Send：01 10 1B 58 00 02 04 C2 00 00 01 B5 BD
  Return：01 10 1B 58 00 02 C6 FF

- **Change the station number to 1:**
  Send：01 10 1B 5A 00 02 04 00 01 00 00 99 DC
  Return：01 10 1B 5A 00 02 67 3F

- **Change the station number to 2:**
  Send：01 10 1B 5A 00 02 04 00 02 00 00 69 DC
  Return：01 10 1B 5A 00 02 67 3F

- **Change the station number to 3:**
  Send：01 10 1B 5A 00 02 04 00 03 00 00 38 1C
  Return：01 10 1B 5A 00 02 67 3F

- **Before executing the save parameters, set Bit1 of 0X0009 to 0（write operation）:**
  Send：01 05 00 09 00 00 1D C8
  Return：01 05 00 09 00 00 1D C8

- **Execute the save parameters (write operation):**
  Send：01 05 00 09 FF 00 5C 38
  Return：01 05 00 09 FF 00 5C 38

5 Maintenance

5.1 First Time Use/ Long Term Non-use

1. Before the initial use, please confirm whether the interval from the date of receipt to the first use exceeds half a month (reduce appropriately in winter). If it does, it is recommended to apply a small amount of WD-40 rust-preventing lubricant to the actuator's screw rod, guide rail, and other transmission components before use, and move back and forth 3-5 times to allow the lubricant to fully contact the transmission components, ensuring the actuator is in optimal condition.

2. If the actuator has not been used for more than half a month / has been left unused for an extended period: It is necessary to first apply a small amount of WD-40 rust-preventing lubricant before use, especially when accessing travel ranges that have not been utilized for a long time.

- WD-40 rust-preventing lubricant should only be used in the aforementioned situations.
- For regular daily maintenance, please use NSL grease.
- Please use lubricants that are compatible with the specified grease to avoid abnormal chemical reactions that could cause mechanical damage.

5.2 Maintenance Frequency

	Check transmission parts regularly	Regularly check the tightness of connecting screws	Regular grease replenishment
Put into service	○		
Run for 1 month	○	○	
Run for 6 month	○	○	○
Run for 1 Year	○	○	○
Later every half year	○	○	○

Note：the above is based on operation on 5 working days a week (8 hours/day).

If the actuator needs to run day and night or be used frequently, and/or the use environment is relatively harsh (such as high dust, high temperature, etc.), please shorten the inspection period relatively.

5.3 Key Maintenance Areas

	Grease replenishment cycle	Grease supply part
RM-EGB series of electric fingers	200W times per opening and closing or half a year	Guide

5.3.1 Regular External Cleaning and Lubrication

The guiding components such as the guide fingers in this type of product are typically exposed to the air, and during the regular maintenance cycle, these parts may accumulate dust or other dark-colored impurities. To maintain the performance of the product and extend its service life, it is recommended to regularly clean and lubricate the product itself as well as its surrounding environment. When severe dirt is present on the product's surface or after a certain period of use, the following steps should be taken for cleaning, and the specific cleaning frequency should be determined based on the specific working environment.

① Cleaning

First, spray WD-40 rust-preventing lubricant into the corners of the ball slot, then let it sit for about 10 minutes, as shown in Figure 1.

Next, use a specialized brush or rag to wipe away the main dust and impurities, as depicted in Figure 2.

Finally, manually open and close the fingers back and forth to clean the guide rail multiple times, as illustrated in Figure 3.

WD-40 Rust-Preventing Lubricant

Figure 1

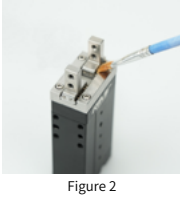
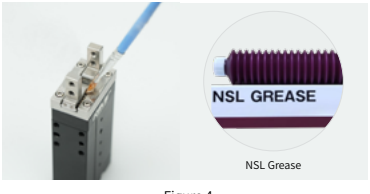


Figure 2

Figure 3

② Replace the Grease

After the previous step, the old lubricant should have been mostly cleaned off. Next, move the fingers to their maximum travel and use a specialized fine brush to apply NSL grease, filling all the narrow gaps of the balls with grease, as shown in Figure 4.



NSL Grease

Figure 4

③ **Remove Excess Grease**

After applying the grease, the product will generally be in the condition shown in Figure 5;

To maintain the overall aesthetic of the equipment, it is recommended to wipe off the excess grease with a clean cloth;

Figure 5

④ **Anti-Rust Treatment for Guide Fingers**

The anti-rust capability of guide fingers is related to the presence of an oil film on their surface. Therefore, when wiping off the excess lubricating grease, you can wipe the entire surface once to ensure that a layer of oil film adheres to the surface, as shown in Figure 6.

Figure 6

5.3.2 Regular Self-Inspection

- It is recommended to manually open and close the fingers for a complete stroke 3 to 5 times each time before powering on or changing the usage stroke. This practice helps to keep the clamps in optimal condition and prevents abnormal movement or alarms due to increased resistance introduced by the slider.
- If any of the aforementioned abnormalities are detected during the self-check process, please follow the cleaning and maintenance procedures outlined in [4.3.1: Regular external cleaning and lubrication]

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