大寰机器人

Product operation manual

Industrial flat claw PGHL series

Revised the resume

date	edition	revise content	Application of soft, piece version
20220624	V 1.0	First edition, write the hardware wiring and instructions related instructions	1.1.1
20220822	V1.1	Change line order	1.1.1
20220905	V 1.2	Change the line order and replace the related pictures	1.1.1
20220929	V 1.3	Add the register function and update the function introduction	1.2.13
20221011	V 1.4	Fixed the IO mode setting with the parameter register address of the IO mode setting	1.2.13

[Note: Software version is obtained on the upper computer software]

catalogue

1. The clip claw clamp profile

.11 indicator light definition

The indicator light can feedback the state of the claw in real time, which can be read by instructions, or judged on the color of the indicator light. There is an indicator light on the claw to indicate the running state of the claw:

Description of the indicator light color

Not zero: red light flashing, other lights are not on.

Back to zero complete state: the blue light is always on, indicating entering the operational state.

Command status is received: the red light flashes once, indicating the executed command.

Blocking the object state: the green light is always on, other lights are not on

.21 Line order definition

The line order definition on the claw body is shown in Figure 1.1:

针脚编号	线缆颜色	定义	说明
1	绿	485_A	通讯线正，T/R+
2	蓝	485_B	通讯线负，T/R-
3	橙	OUTPUT1	IO模式数字输出1
4	黄	OUTPUT2	IO模式数字输出2
5	红	24V	电源直流24V正极
6	棕	INPUT2	IO模式数字输入2
7	白	INPUT1	IO模式数字输入1
8	黑	GND	电源直流GND负极

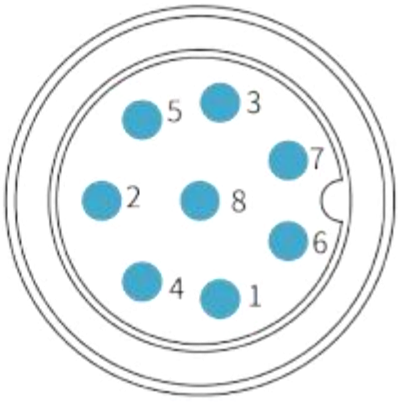


Figure 1.1 Cable map

[Note: Please distinguish the line order according to the line mark. If there is any loss, shedding, forgetting, etc., please contact our staff to cooperate to determine the line order. If we do not contact our staff, the claw is damaged due to the wrong line order, the consequences shall be borne.]

2. RS 485 control

Catch-on command using standard Modbus-RTU to control Modbus-RTU instructions please refer to 2.3.1 command format (Modbus-RTU is the standard communication format on the market, widely used in the industrial field, details on the network); specific connection mode please see 2.1.1 debugging software installation and wiring; specific communication register address, please refer to 2.3.3 command details.

2.1 RS 485 The debug software description

The debugging software is designed to control the claw on the computer side and set the debugging parameters. Since there is generally no RS485 interface on the computer end, it is necessary to use USB to 485 module to convert the interface into USB interface, which is easy to debug and control the claw on the computer end.

2.1.1 Installation and wiring of debugging software

Connect by debugging software, it is essentially controlled by RS485 interface. The specific connection needs to connect 4 wires of 24V, GND, 485_A (T / R +, 485 +), 485_B (T / R-, 485-). The power supply is 24V DC regulator power supply, and the USB socket of the module is inserted into the USB interface of the computer.

Different series have different wiring, according to the specific claw instructions, as shown in the following example:

485A access 485 to USB module T / R +;
485B access 485 to USB module T / R-;
24V access to the 24V DC voltage stabilized power supply positive electrode;
The GND is connected to the 24V DC voltage stabilizing power supply anode.

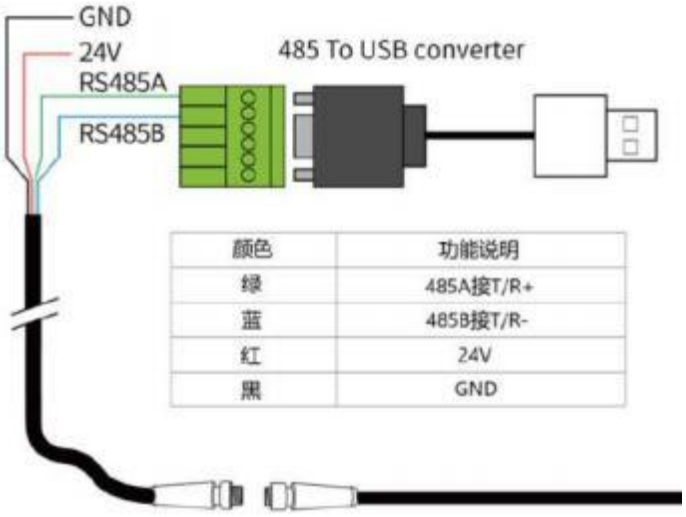


Figure 2.1 RS 485 connection mode diagram

The software can be downloaded on the official website, and the software installation process is integrated with the software and the driver, and the two are installed together. It is recommended to check the creation shortcut during the installation process.

Figure 2.2 (a) Software installation interface

Figure 2.2 (b) Drive and installation interface

2.1.2 Commissibug software and instructions for use

Before use, the corresponding cables should be connected according to the use instructions (see 2.1.1 debugging software installation and wiring).

Open the software, the software will automatically identify the serial port, automatically identify the port rate of the clip claw, ID number and other information for automatic connection. As shown in the following figure:

Figure 2.3 Main control interface

The specific interface description is as follows:

Interface description

① Return to zero: return to zero before running.
② Control interface: it can control the position, speed, addition / deceleration, push pressure section and push pressure value of the clamp claw.
③ Cclaw state: display the push state of the claw in real time.
④ Real-time diagram of position and current: real-time display of position and current. The current represents the current of the internal motor, not the current actually consumed by the claw. Current real-time diagram can reflect the stability of the pushing pressure.
⑤ Parameter setting: the parameters can be configured for Modbus-RTU,

Communication using Modbus-RTU, can read and write data inside register, and read and write data at view- [register], including control, feedback, user parameters and I / O parameters as shown in the following figure:

Figure 2.4 Register control

If there are multiple 485 devices, sometimes the wave rate and ID number must be modified, and the parameters can be modified in the ModbusRTU parameter, as shown in Figure 2.5 (a):

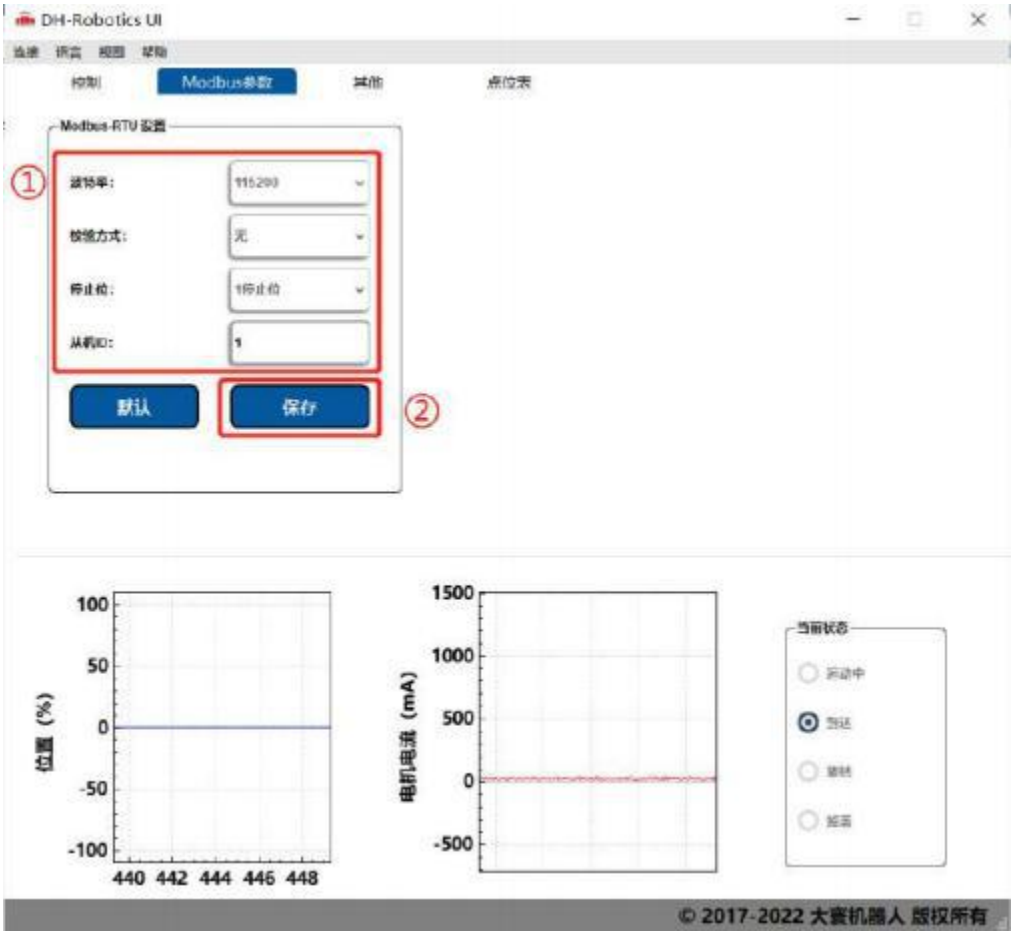


Figure 2.5 (a) Modified ID and Porter rate

You can set and configure the I / O parameter at [I / O parameter]. After modifying the parameter, please click the save button to save. The following figure shows the operation of opening the IO mode:

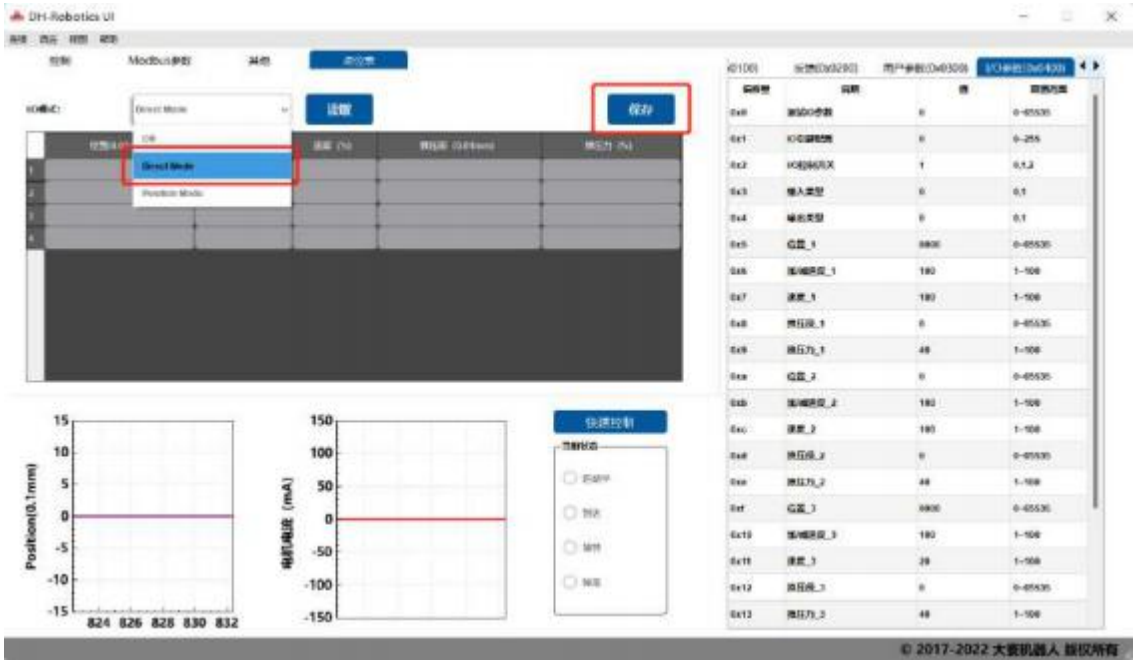


Figure 2.5 (b) Open the IO mode

The switching IO switching step is as follows:

Switch IO mode step:

① Turn on IO mode: select direct mode (Direct Mode) first.(Point location mode (Position Mod e) Please consult the technician).

② Configure 4 sets of IO parameters: set the 4 sets of parameters, including position, addition / deceleration, speed, push section, push pressure, push pressure and push speed.

③ Save: Click the save button to write the parameters to the Flash internal register, and control.

pay attention to:

① IO mode and 485 mode control conflict.

② In this software, after opening the IO mode, the 485 mode is limited, and the operation control claw cannot be controlled on the software.

③ After the IO mode is opened, it does not affect the 485 communication function.

④ IO and 485 communication, can be controlled at the same time, follow the

2.2 RS 485 default configuration

Claw ID: 1

Baud rate: 1,15,200

Data bit: 8

Stop position: 1

Check bit: no check bit

2.3 Instructions struction

2.3.1 Command format

The clamp uses the standard Modbus-RTU protocol with 03,04,06 and 10 functional codes.

During control, 03 and 06 function codes are generally used to read the claw control.03 function code and 06 function code are read written to a single register, control command by address code (1 byte), function code (1 byte), starting address (2 bytes), data (2 bytes), check code (2 bytes) consists of five parts. We take the

back to zero instruction 01 06 01 00 00 01 49 F6 as an example, as shown in Table 2.1.

address code	FC	Register address	Register data	CRC check code
01	06	01 00	00 01	49 F6

Table 2.1 Command Format

Address code: the ID of the claw. Can be modified in the device ID, and the default is 1. The ModbusID of 01 representing the clip claw is 01.

Function code: describes the read and write operation of the claw, whether to read the data or write the data to the claw. The common function codes are 03 (read hold register) and 06 (write hold register). Return zero instruction function code 06 represents ready to write.

Register address: claw clip function corresponding address. Return to zero command address is 0x0100.

Register data: Write the data to a specific register address to control the read data. The return zero instruction represents the return zero to write 01.

CRC verification code: to ensure that the terminal equipment does not respond to the data that changes during the transmission process, to ensure the security and efficiency of the system. The CRC verification adopts the 16-bit cyclic redundancy verification method, which transforms according to the previous data, which shows that the CRC verification code of the return zero instruction is 49 F6.

CRC (cyclic redundancy check) can calculate _ip33.co m online

2.3.2 Overview of the commands

The command consists of a base control address table and a parameter configuration address table.

Basic control address table: including zero, force value, position and its corresponding feedback command, is the main control command. As shown in Table 2.2.

Parameter configuration table: contains parameter configurations for clip claws, including related configurations that can be written to Modbus-RTU and IO related configurations. It should be noted that after configthe required parameters, 01 writes to Flash saved at 0x0300 address. As shown in Table 2.3.

function	Modbus Address (10 / 16 MILINTER)	explain	write in	fetch
Back to	256(0x0100)	Back to zero	Write 1: go back to the zero bit	Read the current settings and set them to 0 after receiving

zero			(Find a one-way position);	the initialization command
pushing force	257(0x0101)	Percent segment current	20 – 100, and the percentage of vs	Read the currently set percent of the push-pressure segment current
Push-pressure segment length	258(0x0102)	Total length of the push section	0-65535, unit 0.01mm	Read the current set push length
target location	259(0x0103)	Move up to the specified location	0-65535, unit 0.01mm	Read from the current, specified location
maximum velocity	260(0x0104)	Sports segment maximum speed	50 – 100, and the percentage of vs	Read the current Setpoint
Plus / minus velocity	261(0x0105)	Increase and deceleration are set simultaneously	1-100, and the percentage of vs	Read the current Setpoint

function	Modbus Address (10 / 16 MILINTER)	explain	write in	fetch
opposite position	262(0x0106)	Relative to the current position, the position control of the	-32767-32767	0
crawl	263(0x0107)	Jog pattern	-1 Closed, 0 stop, 1 open, dot movement speed using 0x0104 value	Read the current Setpoint
Back to zero state	512(0x0200)	Feedback current Origin state	This Modbus address is read only	0: not initialized; 1: successful initialization, 2: in initialization
Running status feedback	513(0x0201)	Feedback the current claw, movement state	This Modbus address is read only	0: movement; 1: reach position; 2: clamp, 3: drop, -1: Non-push-pressure segment collision object
position feedback	514(0x0202)	Feedback current position information	This Modbus address is read only	Read the current value; Unit: 0.01mm
current feedback	516(0x0204)	Feedback current Current information	This Modbus address is read only	Read the current value

Table 2.2 Basic Control Address Table

function	Modbus Address (16 Input)	explain	write in	fetch
write in preserve	768(0x0300)	write in flash	0: Default, 1: Write all the parameters to the fl ash	Write to the flash operation, and the default read returns 0
Back to zero directi	769(0x0301)	Configure the direction when	0: Default open return zero; 1: closed return zero (default: 1)	Read the current Setpoint

on		back to the zero bit		
equipment ID	770(0x0302)	Configure claw Modbus ID	1-247 (default: 1)	Read the current Setpoint
Baud rate	771(0x0303)	Configure the Modbus port rate	0-5:115200,57600,38400,19200,9600,4800 (default: 0)	Read the current Setpoint
stop bit	772(0x0304)	Configure the Modbus stop bits	0:1 Stop bits; 1:2 stop bits (default: 0)	Read the current Setpoint
check bit	773(0x0305)	Configure the Modbus check bit	0: no check; 1: odd check; 2: even check (default: 0)	Read the current Setpoint
Low travel limit	774(0x0306)	Configure the trip in 0.01mm	0-65535, unit 0.01mm	Read the current Setpoint
origin configure	776(0x0308)	Configure the origin offset stroke in 0.01mm	0-65535, unit 0.01mm	Read the current Setpoint
Push pressure velocity	777(0x0309)	Configure the push segment speed, percentage	10 – 40, and the percentage of vs	Read the current Setpoint

Push pressure direction	778(0x030A)	Configure the push direction	0: open, 1: closed, 2: two-way	Read the current Setpoint
IO control	1024(0x0400)	transfer temporarily for a specific task IO Parameter control	0-3: Use Group 0 parameters- Group 3 parameters	Read the current Setpoint
The IO mode switch	1026(0x0402)	Turn on and select the IO function	0: Close, 1:4 point IO mode, 2:32 point IO mode	Read the current Setpoint
The IO parameter configuration	1031-1058 (0x0407-0422)	Four sets of IO parameters	Position, acceleration, speed, push pressure section, push pressure push pressure speed, standby sequence	Read the current Setpoint

Table 2.3 Parameter configuration address table

2.3.3 Command command

2.3.3.1 claw back to zero

This command is a zero-related command, and the address is 0x 0100. The specific return to zero command is detailed in Table 2.4 below.

function	address	explain	write in	fetch
Back to zero	0x0100	Back to zero	Write to 0x01: go back to the zero bit (Find a one-way position)	Read the current set point and receive the initialization command to complete The rear is 0

Table 2.4 Return zero instruction

RS 485 Before connection control, it is necessary to return to zero for the claw back to zero, and do not control during the claw back to zero. According to the

different claw model, the zero time is about 0.5-3 seconds, please control after the zero time.

0x 01: Write 01 will perform a single direction zero according to the value of 2.3.3.13 to find the maximum or minimum position (i. e. the single direction limit). If the direction of zero is open, the current position of the claw is also open, the visual claw back to zero no action.

Return to zero success (write operation):

Sent: 01 06 01 00 00 01 49 F6

Return: 01 06 01 00 00 01 49 F6

.3.3.22 Push pressure value

This command is the pressure value, the address is 0x0101. The strength command are detailed in Table 2.5 below.

function	address	explain	write in	fetch
Push pressure value	0x0101	Push pressure section Percentage of current	20 – 100, and the percentage of vs	Read the currently set percent of the push-pressure segment current

Table 2.5 Push pressure value instruction

The values of the force range from 20 to 100 (%), corresponding to a 16 decimal data of 00 14 00 64. When you set the force value, the claw will move in the position to set the force value.

Set up and read the 30% force value as an example:

Set the 30% force value (write operation):

Sent: 01 06 01 01 00 1E 59 FE

Return: 01 06 01 01 00 1E 59 FE

Read the current setting force (read the operation):

Sent: 01 03 01 01 00 01 D4 36

Return: 01 03 02 xx xx crc1 crc2

2.3.3.3 Length of the push and pressure section

This command sets the relevant command for the clip length at 0x0102. The specific location command is detailed in Table 2.6 below.

function	address	explain	write in	fetch
The length of the push section	0x0102	Set the push section of the claw Total length, with the default settings It is 80mm	0-65536, unit 0.01mm	Read the current set of The length of the push section

Table 2.6 Push section length command

The push section refers to the second section of the push stroke of the first leg. See 2.3.3.20 for the setting value of the push section, it is recommended to set it to L + 10mm, as shown in Figure 2.6. The settvalue corresponds to 16 decimal data of 00 00 00 01 00 00 and can be read at the 0x0102 address. Set up and read the 500 position as an example:

Set 500, push length (write operation):

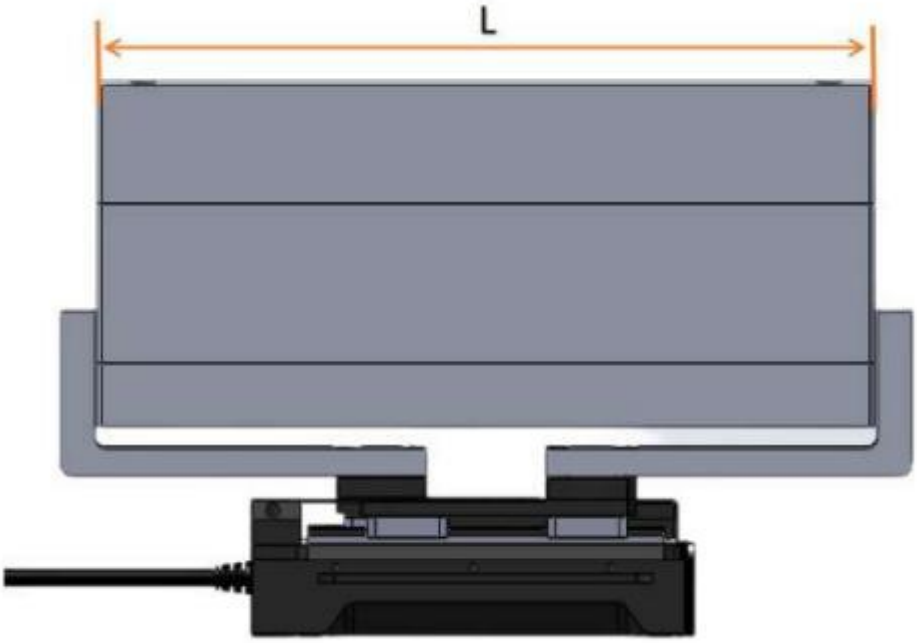
Sent: 01 06 01 02 01 F4 29 E1

Returns: 01 06 01 02 01 F4 29 E1

Read the current set push length (read operation):

Sent: 01 03 01 02 00 01 24 36

Return: 01 03 02 xx xx crc1 crc2



graph 2.6

.3.3.42 Target location

This command sets the position related command for the claw at 0x0103. The specific location command is detailed in Table 2.7 below.

function	address	explain	write in	fetch
target location	0x0103	Set the claw target position	0-65536, unit 0.01mm	Read the current set position

Table 2.7 Position Instruction

Position value range is 0-65536, corresponding 16 decimal data is 00 00 10000, the real-time position can be read at 0x0202 address. 3.3.9 position. Feedback. Set up and read the 50 position as an example:

Set the 500 position (write operation):

Sent: 01 06 01 03 01 F4 78 21
Returns: 01 06 01 03 01 F4 78 21

Read the current set position (read the operation):
Sent: 01 03 01 03 00 01 75 F6
Return: 01 03 02 xx xx crc1 crc2
Read the current live location (read operation):
Sent: 01 03 02 02 00 01 24 72
Return: 01 03 02 xx xx crc1 crc2

2.3.3.5 Maximum speed

This command sets the maximum speed related command for the claw at 0x0104. The specific speed command is detailed in Table 2.8 below.

function	address	explain	write in	fetch
maximum speed	0x0104	The maximum velocity of the moving segment	50 – 100, and the percentage of vs	Read out the current set speed

Table 2.8, the maximum speed

The speed values range from 50 to 100 (%), which is the non-push section speed, and the set value corresponds to the 16 decimal data of 00 32 00 64. Take setting and reading the 50 (%) speed as an example:

Set the 50% speed (write operation):

Sent: 01 06 01 04 00 32 48 22
Return: 01 06 01 04 00 32 48 22

Read the current speed (read operation):

Sent: 01 03 01 04 00 01 C4 37
Return: 01 03 02 xx xx crc1 crc2

.3.3.62 Plus / acceleration

This command sets additive / deceleration related commands for claw clip with address 0x 0105. The specific speed command is detailed in Table 2.9 below.

function	address	explain	write in	fetch
Plus / minus speed	0x0105	Run to set the add / reduce speed	1-100, and the percentage of vs	Read out the current set speed

Table 2.9, acceleration / deceleration instruction

Add / acceleration values range from 1-100 (%), corresponding to 00 01 00 64. Take setting and reading the 50 (%) speed as an example:

Set the 50% speed (write operation):

Sent: 01 06 01 05 00 32 19 E2
Returns: 01 06 01 05 00 32 19 E2

Read the current speed (read operation):

Sent: 01 03 01 05 00 01 95 F7

Return: 01 03 02 xx xx crc1 crc2

.3.3.72 Relative position

This command sets the relevant command for the claw relative position setting, and the address is 0x 0106. The specific speed command is detailed in Table 2.10 below.

function	address	explain	write in	fetch
relative position	0x0106	Relative to the current position, the position control of the	-32767-32767 units are: 0.01mm	0

Table 2.10 Relative Position Instructions

The values for the relative positions ranged from-32767-32767, corresponding to a 16 decimal data of 80 01 7F F F. The actual input of this register is in 0.01mm and is limited by the actual stroke of the claw. If the input range value is greater than the maximum or minimum stroke of the claw, the claw will run to the maximum / minimum stroke and then stops.

Set and open the relative position of 100mm as an example:

Setting the 100mm position requires write 10000 (write):

Sent: 01 06 01 06 27 10 72 0B

Return: 01 06 01 06 27 10 72 0B

Read the relative position (read operation):

Sent: 01 03 01 06 00 01 65 F7

Return: 01 03 02 00 00 B8 44

.3.3.82 point moving JOG

This command is the relevant command, and the address is 0x0107. The specific speed command is detailed in Table 2.11 below.

function	address	explain	write in	fetch
crawl	(0x 0107)	Jog pattern	-1 Closed, 0 stop, 1 open, dot movement speed using 0x0104 value	Read the current Setpoint

Table 2.11 Plus / deceleration instruction

The write value of point movement is-1 negative point movement, 0 point movement stop, 1 open point movement, corresponding to 16 decimal data is FFFF, 0,1. Take setting and reading the tension movement as an example:

Set the opening point movement (write operation):

Sent: 01 06 01 07 00 01 F8 37
Return: 01 06 01 07 00 01 F8 37

Read the current settings (read operation):

Sent: 01 03 01 07 00 01 34 37
Return: 01 03 02 xx xx crc1 crc2

2.3.3.9 Feedback to zero feedback

This command is the claw read back zero state feedback related command, the address is 0x0200. The detailed feedback back to zero state is detailed in Table 2.12 below.

function	address	explain	write in	fetch
Back to the zero-state feedback	0x0200	Feedback the current claw, the zero state	Can't write	0: not initialized; 1: successful initialization, 2: in initialization

Table 2.12 Back zero, state feedback

The back zero state feedback can be used to obtain whether the back zero occurred. The specific reading instructions are shown as follows:
Read back to the zero state (read operation):
Sent: 01 03 02 00 00 01 85 B2
Return: 01 03 02 00 00 B8 44 (current not zero)

.3.102.3 Operation status feedback

This command is related to the clip claw operation state feedback command, and the address is 0x0201. The detailed operating status feedback is shown in Table 2.13 below.

function	address	explain	write in	fetch
Running status feedback	0x0201	0: in the movement, 1: reach the position; 2: blocking the rotation; 3: drop, -1: non-push pressure section collision object	Can't write	00; 01; 02 03; -1

Table 2.13 Operation status feedback

Operating state feedback is used to read the current claw state, which can be divided into 3 states as follows:

Feedback status description

Different returned instruction data represent the different states of the clamp claw. The specific states are as follows:

· 00: The claw clamp is in motion.

· 01: The claw stops moving and the claw reaches the specified position.

· 02: The claw stops movement, and the claw is detected in the push section.

· 03: When going to the designated position, the object drop is detected in the push pressure section.

· -1: When going to the designated position, it will be detected as the non-push section collision object when the distance from the push section is blocked

Read the run status feedback (read the operation):

Sent: 01 03 02 01 00 01 D4 72

Return: 01 03 02 00 02 39 85 (return to 02, blocking)

2.3.3.11 Position feedback

This command is the real-time feedback command of the claw position, and the address is 0x0202. The detailed location feedback is shown in Table 2.14 below.

function	address	explain	write in	fetch
position feedback	0x0202	Feedback on the live position of the current clip claw	Can't write	Read the current live location

Table 2.14 Position Feedback

Position feedback can be used to read the current claw real-time position. The specific reading instructions are shown as follows:
Read the position status (read operation):

Sent: 01 03 02 02 00 01 24 72
Return: 01 03 02 xx xx crc1 crc2

2.3.3.12 Current feedback

This command is the real-time feedback command of the claw clip current, and the address is 0x0204. The specific current feedback is detailed in Table 2.15 below.

function	address	explain	write in	fetch
current feedback	0x0204	Feedback the current claw real-time current	Can't write	Read the current real-time current

Table 2.15 Current feedback

Current feedback can be used to read the current claw real-time current. The specific reading instructions are shown as follows:
Read the current state (read the operation):

Send: 01 03 02 04 00 01 C4 73
Return: 01 03 02 xx xx crc1 crc2

.3.3.132 Write to save

This command writes the save configuration parameter at 0x0300. The detailed write and save description is shown in Table 2.16 below.

function	address	explain	write in	fetch
Write to save	0x0300	Save manual Configuration of parameters	0: Default, 1: Write all the parameters to the fl ash	Return to 0 by default

Table 2.16, write to save

Write save can be used to save the IO configuration and the parameter configuration of RS485. The specific setting instructions are as follows: Write and save (write operation):
Sent: 01 06 03 00 00 01 48 4E
Returns: 01 06 03 00 00 01 48 4E

2.3.3.14 Return to the zero direction

This command sets the claw back to zero direction related command for the claw, the address is 0x 0301. The specific setting back to zero direction command is detailed in Table 2.17 below.

function	address	explain	write in	fetch
Back to zero direction	0x0301	Configure back to the zero direction	0: Open; 1: Close; (Default: 0)	Read the current setpoint

Table 2.17, return to zero direction

It can be used to configure the claw back to zero direction to open or closed, the default is 0 open.

When writing to 0, the claw runs to the maximum forward position and serves as the initial starting point.

When writing 1, the claw runs to the minimum backward position and serves as the initial starting point.

Set back to zero direction as back (write operation):

Sent: 01 06 03 01 00 01 19 8E

Returns: 01 06 03 01 00 01 19 8E

Write to save (write operation):

Sent: 01 06 03 00 00 01 48 4E

Returns: 01 06 03 00 00 01 48 4E

2.3.3.15 Equipment ID

This command is to set the claw device ID related command, the address is 0x0302. The specific setup device ID command is detailed in Table 2.18 below.

function	address	explain	write in	fetch
equipment ID	0x0302	Configure the claw Modbus ID	1-247 (Default: 1)	Read the clip claw Modbus ID

Table 2.18 Equipment ID

The device ID address can be used to configure the claw Modbus ID with default to 1. When there are multiple devices using Modbus-RTU protocol, multiple devices can be controlled simultaneously by changing the ID, and the specific claw ID command is set as follows:

Set the device ID to 1 (write operation):

Sent: 01 06 03 02 00 01 E9 8E
Return: 01 06 03 02 00 01 E9 8E

2.3.3.16 Baud rate

This command configured a port rate related command for the claw with an address of 0x0303. The specific baud rate configuration is detailed in Table 2.19 below.

function	address	explain	write in	fetch
Baud rate	0x0303	0-5: 115200, 57600, 38400, 19200, 9600, 4800 (0: the default)	0; 1; 2; 3; 4; 5	Read the Porter rate

Table 2.19 Baud rate Settings

The baud rate command can be used to modify the baud rate size with a default of 115200 and a recommended default. The specific wave rate instruction is as follows: Set the claw port rate to 115200 (write operation):
Sent: 01 06 03 03 00 00 79 8E
Returns: 01 06 03 03 00 00 79 8E
Write to save (write operation):
Sent: 01 06 03 00 00 01 48 4E
Returns: 01 06 03 00 00 01 48 4E

2.3.3.17 Stop bit

This command configured stop bit related command for clip claw with address 0x0304. The detailed setting of the stop bit is shown in Table 2.20 below.

function	address	explain	write in	fetch
stop bit	0x0304	Configure the clamp Modbus stop bit	0:1 Stop bit; 1:2 Stop position	Read the stop bit

Table 2.20 Stop-bit settings

Stop bit command can be used to modify stop bit digits, default is 1 stop bit and recommended default. The specific setting stop bit command is as follows: Set the clip claw stop bit to 1 (write operation):
Sent: 01 06 03 04 00 00 C8 4F
Return: 01 06 03 04 00 00 C8 4F
Write to save (write operation):
Sent: 01 06 03 00 00 01 48 4E

Returns: 01 06 03 00 00 01 48 4E

2.3.3.18 Check bit

This command configthe check bit related command for the address of 0x0305. As shown in Table 2.21 below.

function	address	explain	write in	fetch
check bit	0x0305	Configure the claw Modbus check bit	0: no check; 1: odd check; 2: even check	Read the check bit

Table 2.21 Check bit setting

The check bit command can be used to modify the check bit. The default is no check bit and the recommended default. The specific setting check bit instructions are as follows: Set the claw check bit to no check bit (write operation):
Sent: 01 06 03 05 00 00 99 8F
Return: 01 06 03 05 00 00 99 8F
Write to save (write operation):
Sent: 01 06 03 00 00 01 48 4E
Returns: 01 06 03 00 00 01 48 4E

.3.192.3 Travel limit configuration

This command configthe commands for the travel limit address 0x0306. The specific setting origin is detailed in Table 2.22 below.

function	address	explain	write in	fetch
Schedule restriction configuration	0x0306	Configure the claw clip travel in 0.01mm	0-65536	Read the current Setpoint

Table 2.22 Origin setting

Note: Do not set a value greater than the clip travel

The command configured with stroke limit can be used to modify the soft limit of the maximum stroke, default to the maximum stroke and recommended default. The specific setting setting instructions are as follows:

Set the clip travel limit to 10mm example (write operation):

Sent: 01 06 03 06 03 E8 69 31

Returns: 01 06 03 06 03 E8 69 31
Read the clip claw travel limit (read operation):
Sent: 01 03 03 06 00 01 64 4F
Return: 01 03 02 xx xx crc1 crc2

.3.3.202 Origin bias

This command is the origin related command, and the address is 0x0308. The specific setting origin is detailed in Table 2.23 below.

function	address	explain	write in	fetch
Origin bias	0x0308	Configure the origin offset stroke in 0.01mm	0-65536	Read the origin offset value

Table 2.23 Origin setting

The origin bias command can be used to modify the origin location, with a default of 0 and a recommended default. The specific setting of the origin location instructions are as follows:

Set claw origin to 10mm (write):
Sent: 01 06 03 08 03 E8 08 F2
Returns: 01 06 03 08 03 E8 08 F2
Write to save (write operation):
Sent: 01 06 03 00 00 01 48 4E
Returns: 01 06 03 00 00 01 48 4E
[Note: If the origin is set too large, change the bias value with low stroke limit. If the stroke is larger, the maximum stroke will be blocked.]

.3.3.212 Push speed

This command is the maximum speed of the clip segment at 0x0309. The specific speed command is detailed in Table 2.24 below.

function	address	explain	write in	fetch
Push pressure speed	0x0309	Push the pressure section maximum speed	10 – 40, with the percentage being the default to 40	Read out the current set speed

Table 2.24 Maximum Speed

The speed values range from 10 to 40 (%), corresponding to a 16 decimal data of 00 0A 00 28, with a default to 40%. Take setting and reading the 10 (%) speed as an example:

Set the 10% speed (write operation):

Sent: 01 06 03 09 00 0A D8 59
Return: 01 06 03 09 00 0A D8 59

Read the current speed (read operation):

Sent: 01 03 03 09 00 01 54 4C
Return: 01 03 02 xx xx crc1 crc2

.3.3.222 Push direction

This command is the command related to the push direction of the pinch claw press segment at 0x030A. The specific push direction is shown in Table 2.25 below.

function	address	explain	write in	fetch
Push the direction	0x030A	Configure the push direction	0: open, 1: closed, 2: positive and negative direction	Read the current Setpoint

Table 2.25 Maximum speed

The push pressure direction input is 0,1,2, corresponding to 16 decimal data is 00 00 00 02, the default is 0. Take setting and reading the closing direction for example:

Set the opening direction (write operation):

Sent: 01 06 03 0A 00 01 68 4C
Return: 01 06 03 0A 00 01 68 4C

Read the current orientation setting (read the operation):
Send to: 01 03 03 0A 00 01 A4 4C
Return: 01 03 02 00 01 39 85

.3.3.232 The IO parameter test

This command is the set IO parameter for 4 sets of the claw claw control through the Modbus-RTU protocol, with the address 0x0400. The specific IO control is detailed in Table 2.26 below.

function	address	explain	write in	fetch
IO parameter testing	0x0400	Send data to control 4 groups of IO	0; 1; 2; 3;	Read the IO control

Table 2.26 IO control

IO parameter test can be used to run the four sets of IO parameters set by the IO parameters directly. Even if the power is off, the force value, position and speed of the four sets of IO parameters will not change, so the equipment can be

executed to the running state as soon as possible. The specific IO control instructions are shown as follows:

Set the claw to the first set of IO state (write):

Sent: 01 06 04 00 00 00 49 3A

Return: 01 06 04 00 00 00 49 3A

.3.3.24 The 2 IO mode switch

This command is related to setting the IO mode switch, and the address is 0x0402. The specific IO mode switch is detailed in Table 2.27 below.

function	address	explain	write in	fetch
The IO mode switch	0x0402	Turn the IO function on	0: Close, 1:4 point IO mode, 2:32 point IO mode	Read the set value

Table 2.27 IO Mode Switch

The IO mode switch is a switch used to turn on the IO mode, with three states. The corresponding control ranges for the three states are shown in Table 2.28 below.

Front-end switch status	corresponding states	The Modbus-RTU control	IO control
0	The IO mode is turned off	can	cannot
1	IO mode opens	can	can
2	The 32-point IO mode is open	can	can

Table 2.28 IO mode switch, corresponding range

Set the IO mode switch to be off (write operation):
Sent: 01 06 04 02 00 00 29 3A
Return: 01 06 04 02 00 00 29 3A
Write to save (write operation):
Sent: 01 06 03 00 00 01 48 4E
Returns: 01 06 03 00 00 01 48 4E

.3.3.252 The IO parameter configuration

This command configured 4 groups of IO parameter related commands with address 0x0405-0x0418. The specific IO parameter configuration is detailed in Table 2.29 below.

function	high byte	lower byte	explain	write in	fetch
		0x07	Group 1 location	Unit: 0.01mm	
		0x08	Group 1	1-100, and the	

Group 1 IO parameter setting	0x04			percentage of vs	Read the current value
		0x09	Group 1 speed	1-100, and the percentage of vs	
		0x0A	Group 1 push segment	Unit: 0.01mm	
		0x0B	Push pressure in group 1	1-100, and the percentage of vs	
		0x0C	Group 1	10 – 40, and the percentage of vs	

Group 2 IO parameter setting	0x04	0x0E	Group 2 location	Unit: 0.01mm	Read the current value
		0x0F	Group 2	1-100, and the percentage of vs	
		0x10	Group 2 speed	1-100, and the percentage of vs	
		0x11	Group 2 push segment	Unit: 0.01mm	
		0x12	Group 2 of the push pressure	1-100, and the percentage of vs	
		0x13	Group 2	10 – 40, and the percentage of vs	
Group 3 IO parameter setting		0x15	Group 3 location	Unit: 0.01mm	
		0x16	Group 3 acceleration in group 3	1-100, and the percentage of vs	
		0x17	Group 3 speed	1-100, and the percentage of vs	
		0x18	Group 3	Unit: 0.01mm	
		0x19	Group 3: the push pressure	1-100, and the percentage of vs	
		0x1A	Group 3	10 – 40, and the percentage of vs	
Group 4 IO parameter setting		0x1C	Group 4 position	Unit: 0.01mm	
		0x1D	Group 4	1-100, and the percentage of vs	
		0x1E	Group 4 speed	1-100, and the percentage of vs	
		0x1F	Group 4	Unit: 0.01mm	
		0x20	Group 4th push pressure	1-100, and the percentage of vs	
		0x21	Group 4	10 – 40, and the percentage of vs	

Table 2.29 IO parameter configuration

The IO parameter configuration can be used to configure the IO parameters. Set the first set of target position is 3mm (input 300), target acceleration is 30%, target speed is 30%, push section is 1mm (input 100), push pressure is 30%, and push speed is 10%:

Set the first set of status in I / O mode (write operation):

Send to: 01 06 04 07 01 2C 98 B6 (target location 300 / 3mm)
Return: 01 06 04 07 01 2C 98 B6

Send: 01 06 04 08 00 1E E8 F3 (target acceleration of 30%)
Return: 01 06 04 08 00 1E E8 F3

Send: 01 06 04 09 00 1E B9 33 (target speed 30%)

Return: 01 06 04 09 00 1E B9 33

Send to: 01 06 04 0A 01 2C 09 75 (Target Push Section 300 / 3mm)
Return: 01 06 04 0A 01 2C 09 75

Send: 01 06 04 0B 00 1E D8 F0 (target push pressure 30%)

Return: 01 06 04 0B 00 1E D8 F0

Send: 01 06 04 0C 00 1A C8 FE (target push speed 10%)
Return: 01 06 04 0C 00 1A C8 FE

3. IO control

IO mode is a common control mode in industry, controlling the clamp claw in the form of hardware wiring. When using IO control, you need to set the clip claw to IO direct mode in advance, and set the clip claw 4 group IO state.

3.1 IO configuration

The four states of IO mode can be configured by serial port software, or the parameters of clip claw are configured through our debugging software. Please refer to the following figure for specific wiring methods and configuration methods:

Cpper signals are defined	control equipment
Input 1	DO /D-Out / Digital Outpu t
Input 2	DO /D-Out / Digital Outpu t
Outout	DI /D-In / Digital Inpu t
Outout 2	DI /D-In / Digital Inpu t
24V	24V/24V+
0 V	0V/24V-/GND

After the four sets of parameters are configured, the claw can be controlled by setting INPUT 1 and INPUT 2 pin states, and can be obtained by detecting the output pins OUTPUT 1 and OUTPUT 2.

The specific configuration is shown in the figure below:

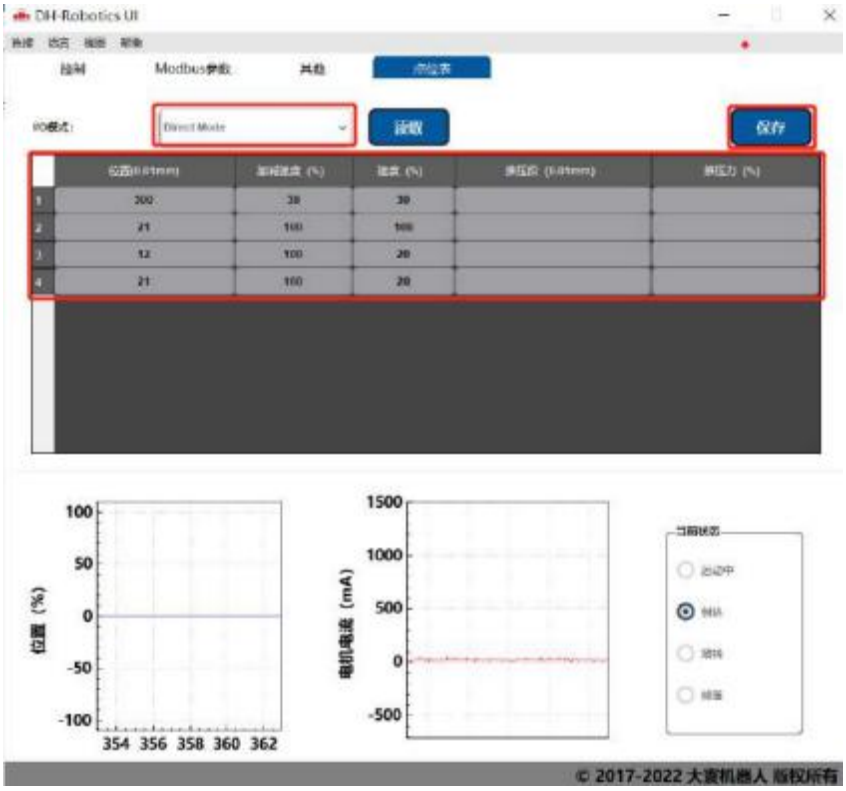


Figure 3.1 The IO Settings

Switch over the IO mode step

① Open IO mode: open IO mode first.

② Configure 4 sets of IO parameters: set for 4 sets of parameters, including position, addition / deceleration, speed, push pressure section, and push pressure.

③ Save: Click the save button to write the parameters to the Flash internal register, and control.

④ Restart: After restart, the switch to IO mode is successful. You can control the clamp claw according to the INPUT signal, and the running

Control the claw by setting the INPUT 1 and INPUT 2 pin states (0V and high resistance (off) states). Since each INPUT pin recognizes two input states, it can be set to four claw states (00 10 01 11). The specific pin status correspondence is shown in Table 3.1.

INPUT 1	INPUT 2	Feet state	I/O state	Execute the action
High resistance (off)	High resistance (off)	0 0	Group 1 status	Target position 1, target acceleration 1, target speed 1, target push segment 1, target push pressure 1, target push speed 1
0V	High resistance (off)	1 0	Group 2 status	Target position 2, target acceleration 2, target speed 2, target push section 2, target push pressure 2, target push speed 2
High resistance (off)	0V	0 1	Group 3 status	Target position 3, target acceleration 3, target speed 3, target push section 3, target push pressure 3, target push speed 3
0V	0V	1 1	Group 4 status	Target position 4, target acceleration 4, target speed 4, target push segment 4, target push pressure 4, target push speed 4

Table 3.1 INPUT 1 INPUT2 Corresponding to the IO status table

Note: the high resistance state is the state of maximum resistance value, corresponding to the state when the claw is not connected, the same below.

The current state of the claw can be obtained by detecting the output pins OUTPUT 1 and OUTPUT 2, and four states can be read during operation. The details are shown in Table 3.2.

OUTPUT 1	OUTPUT 2	Feet state	Directive content
High resistance (off)	High resistance (off)	0 0	The claw is in motion
0V	High resistance (off)	1 0	The clip claw is in place
High resistance (off)	0V	0 1	The claw claw detected the blocking state
0V	0V	1 1	Claw clamp detected object drop

pay attention to

· The default input and output of digital IO is NPN, and the input and output are 0V.(The low level is effectively prohibited from connecting 24V, resulting in the damage to the claw)
· In IO mode, when the push segment is blocked, IO will have no state output, so clamping in the non-push segment is prohibited

3.2 IO use

When the parameters are configured, 24V, GND, INPUT 1, INPUT 2, OUTPUT 1, and OUTPUT 2 shall be connected on the hardware.

Connect INPUT and OUPUT to the corresponding equipment, and restart after confirming the wiring, the claw will be automatically initialized. The clamp claws were then controlled according to the INPUT signal. Run status is feedback via OUTPUT.

4. Detailed explanation of the claw clip communication format and IO

4.1 Cpper wiring mode

The claw adopts standard MODBUS-RTU communication protocol and RS-485 interface communication.

The wiring mode is half-duplex wiring, as shown in Figure 4.1.

Figure 4.1 Wiring

USB turn 485 module front up, USB turn 485 module powered on after the power indicator light red;

The 2 interfaces on the right side of the upper interface are the 485A / B line. The demonstration claw color is green A and blue B. Refer to the color definition of the claw signal line.

.24 Cclaw communication format

The default communication format is 115200 brate; data length 8; stop bit 1, no parity test. The upper computer and the clamp claw communication format should be consistent. If the communication does not agree, please modify the upper computer or claw clamp communication format. After modifying the claw clamp communication format, restart. **Please refer to the corresponding instruction manual for modifying the communication format.**

4.2.1 485 instruction 03 function code details

The hardware adopts RS-485, master-slave semi-duplex communication, master station call slave station and slave station response communication.

Note: All 485 instructions are 16 bases; refer to the command overview for register address

The common function code is 03; 06 two function codes. Table 4.1 below is the use introduction of 03 function code.

Example instruction: 0103 01 03 00 01 75F6 03 function code: read the register value

1	2	3	4	5	6	7	8
I D	FC	Start register, high bytes	Start register is low for bytes	Register number of high bytes	Register number low bytes	CRC check code Low bytes	CRC check code high bytes
01	03	01	03	00	01	75	F6

Table 4.1 Introduction of function code

The first byte is the slave station ID

The second byte is the function code 03H

The 3rd and 4th bytes are the starting registers

Bytes 5 and 6 are the number of registers to be read and bytes 7 and 8 are CRC check codes

Range (1~254);

Read the register;

To read the start address of the register;

00 01 represents to read only the current 0103 register;

Calculate the CR C 16 checksum for 1 to 6 bytes.

Example instruction: The main station reads the value of 0001 registers starting from the station ID of 1,0103 register to return to the main station.

matters need attention:

If the number of read registers is changed to 0002, it is read 0103,0103 and 0104. Note that the number of reads is read down in order and cannot be jumped through. For example, register 0104 and register 0106 need to pass through two reading instructions. Or change the number of reads to 0003

Return return instruction: 0103 02 03 E8 B8F A

1	2	3	4	5	6	7
I D	FC	return Total number of bytes	The register is currently Data 1	The register is currently Data 2	CRC check code Low bytes	CRC check code high bytes
01	03	02	03	E 8	B8	F A

Table 4.2 Introduction to the use of function codes

The first byte is the slave station ID	Range (1~254);
The second byte is the function code 03H	Main station read value is returned;
The third byte is the return data length	Returns 2-byte length data;
Bytes 4 and 5 return data content	The returned data content is 03E8;
Bytes 6 and 7 are CRC check codes	Calculate the 1-to 6-byte CRC 16 checksum.

Return instruction description:

The main station sends the read instruction 0103 0103 0001 75F6 to the slave station, and the slave station returns the instruction 0103 02 03E 8 B8FA to the main station.

Explanation: The slave station with ID 1 returns data 03E8 (16 mins) from 10 mins to 1000. 0 103 The register address represents the position register in the claw setting. The data returned represents the current claw

4.2.2 485 instruction 06 function code details

06 Function code: Write a single register value

Example instruction: 0106 0103 03E8 7888

1	2	3	4	5	6	7	8
I D	FC	Register address high byte	Register address low byte	Write to the data, high bytes	Write the data to low bytes	CRC check code Low bytes	CRC check code high bytes
01	06	01	03	03	E 8	78	88

Table 4.3 Introduction to the use of function codes

The first byte is the slave station ID	Range (1~254);
byte 2 is function code 06H byte 3 and 4 are register address byte 5 and 6 are written data byte 7 and 8 are CRC check codes	Master station write value to slave register; The single register address of the data; 03E8 is converted to 10 decimal system to 1000; Calculate the CR C 16 checksum for 1 to 6 bytes.

Example of instruction description:

The master station writes data into a single slave register 0103 with ID 1. The written data is 03E8. 0103 is a position register which indicates the control claw to move to the 1000 (10m m) position.

Note: Use the 06 function code to write the data. When the slave station accepts it correctly, the same instruction and check code will be returned, indicating that the instruction correctly accepts the write. For example, the

5. Precautions

.15 anti-clamclaw mechanical card and mechanical card after the treatment

When there is no push section set, it may be mechanically stuck after hitting the object. It is necessary to set the push section according to the actual position of the object, and clamp the object with push pressure when close to the object. If the mechanical jamming occurs, it can be manually unlocked through the screws on the side. When clamping, rotate the screw in the O direction clockwise, and rotate the screw counterclockwise in the S direction when the machine opens.

Figure 5.1 Unlocking the screw

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