

# **SJ602-A Robot Arm Manual**



**RobotAnno (Shenzhen) Co., Ltd**

**2021.1**

This manual is the operating instructions for users of SJ602-A manipulator.  
Revision date: 2021

For sales and technical support, please contact RobotAnno (Shenzhen) Co., Ltd.

E-mail : sales@robotanno.com

## Statement

Respected users:

Thank you for purchasing and using RobotAnno products. For your safety and benefit, please read the user manual and all the random information before using the product. If you do not operate and use the product in accordance with the user's use manual, resulting in any personal injury, property or other loss, RobotAnno (Shenzhen) Co., Ltd. will not be liable.

Manual on User Use of this Product (hereinafter referred to as "Manual ")

- The copyright belongs to RobotAnno (Shenzhen) Co., Ltd;
- The trademarks and names mentioned in the manual belong to their respective rights holders;
- The contents of the manual are inconsistent with the actual product, and the actual product shall prevail.

If you have any unclear or objection to the contents or terms of the manual, please submit a written objection to RobotAnno (Shenzhen) Co., Ltd within seven days after the purchase of the machine, otherwise you are deemed to have agreed, understood and accepted the full contents of this manual.

If you have any problems, please call +86 0755-36950696.

RobotAnno (shenzhen) co., ltd reserves the right to explain and modify the user's manual. the revision, update and explanation of the manual will be published on the RobotAnno website (<http://www.robotanno.com/>), please note.

Thank you!

RobotAnno(Shenzhen) Co., Ltd  
2,021

RobotAnno (Shenzhen) Co., Ltd

Address :1 Building 705, Nanchang No.1 Industrial Zone, Xixiang Garrison Community, Baoan District, ShenZhen,GuangDong,China

Tel :+86 0755-36950696

E-mail: robotanno@robotanno.com

Official website: [www.robotanno.com](http://www.robotanno.com)

After-sales service : support@robotanno.com



A comprehensive description of the use of RobotAnno 602 arm is given in this specification. Be sure to operate the arm on the basis of careful reading and full understanding.



The drawings and photos in the instructions are representative examples and may differ from the products purchased.

- Specifications are sometimes modified appropriately for reasons such as product improvements, specification changes and easier use of the specifications themselves. the revised instruction manual will update the version number below the cover and issue in a revised version.

Please contact our sales department to order the instructions for breakage and loss.

Customer unauthorized product transformation, not within the scope of our warranty, the company is not responsible.

## Directory

I. Safety precautions.....	5
1. symbols and their meanings.....	5
2. hazardous matters.....	6
3. Notes.....	7
4. use of the environment.....	7
5. safety operating procedures.....	8
6. routine maintenance and storage.....	9
II. Install USB TO RS232 driver.....	10
III. Zero calibration.....	14
IV. RobotannoV2.0 instructions.....	15
V. I/O and Encoder Hardware Interface Definition.....	22
1. master port definition.....	23
2. master wiring diagram:.....	24
Circuit diagram of relay wiring in 3. control box.....	24
4. control box relay wiring diagram.....	26
VI. 602 parameters.....	27
1. Dimensional Parameters.....	27
VII. Case cases.....	28
VIII. Functional mode and programming.....	29
1. Documents Classification.....	29
2. programming rules.....	30
3. instruction list:.....	31
4. Memory Use.....	33
5. modules.....	35

# I. Safety precautions

thank you for purchasing our RobotAnno manipulator. For your safety and prevent damage to the manipulator, please read and master this manual and other ancillary materials before using the RobotAnno manipulator, and start using it after you are familiar with all equipment knowledge, safety knowledge and precautions, and pay special attention to the following safety signs.

## 1. symbols and their meanings



危險

Misoperation is dangerous and may result in



注意

Misoperation is dangerous and may result in moderate injury, minor injury or damage to objects.



强制

Compliance in manuals and documents



禁止

Matters expressly prohibited in manuals

Even matters belonging to the category of "attention" will have serious consequences because of different circumstances, so any "attention" matters are extremely important, please strictly abide by.



Although not in accordance with "attention" or "danger", in order to ensure safe and effective operation, the user must also comply with the matter, will be described in the relevant place.

## 2. hazardous matters



(1) In case of emergency, press the emergency stop button immediately, if the brake arm can not be timely, it may cause personal injury or equipment damage accident.



Stop button

(2) When the servo power supply is switched on after the emergency stop is lifted, the emergency stop key should be started after the accident causing the emergency stop.



Release from emergency

(3) When moving within the range of the manipulator, observe the following:

- 1) consider the strain scheme when the manipulator suddenly moves to its position.
- 2) make sure to set up a shelter, just in case.



The mechanical arm action caused by misoperation may cause personal injury accident.

(4) Make sure that no one is within the range of the action of the manipulator and that the operator is operating in a safe position when:

- 1) RobotAnno the arm is connected to the power supply.
  - 2) use G code to operate the manipulator.
  - 3) trial run time.
  - 4) show again.
- (5) Please do not move and maintain the arm while the arm is in operation. If you want to move and maintain, please turn off the power of the arm before doing this operation.



Accidental entry into the manipulator action range or contact with the manipulator may cause personal injury. If you find an exception, press the stop button

immediately.

Emergency stop key is located on the right side of the front of the SJ602-A manipulator electrical control box.

### 3. Notes

(1) The following shall be checked in front of the RobotAnno arm and, if any, repaired or other necessary measures shall be taken in a timely manner.

- 1) electrical cables are properly connected;
- 2) electrical cable skin damage;
- 3) the emergency stop switch is in the state of release;
- 4) arm movement is abnormal, abnormal noise.

(2) The owner and operator of the RobotAnno arm must be responsible for their own safety. Ano robot reminds users to wear safety protection equipment and comply with safety regulations when using manipulator products.

(3) Do not modify the mechanical arm

Do not rebuild the mechanical arm, due to unauthorized product transformation caused by accidents or failures, not within the scope of our warranty, the company is not responsible.

(4) Do not approach the running arm

Do not approach the running arm to prevent accidental injury or damage to the arm.

(5) Please specify those responsible for oversight

In order to prevent manual adjustment errors or accidents caused by inadequate safety confirmation, when more than two people operate, please specify the supervisor.

(6) Use the RobotAnno arm on the basis of an understanding of the "warning sign" of the instruction manual for the use of the arm.

### 4. use of the environment

(1) Do not place the mechanical arms in harsh conditions. Soil, scrap, high temperature will

damage internal devices.

(2) After using the mechanical arm, the power cord plug shall be unplugged and the mechanical arm shall be placed at a dry and normal temperature. High temperature and harsh environment damage the internal devices of the manipulator.

(3) RobotAnno arm may not be used in:

- 1) close to flammable substances
- 2) an explosion
- 4) water or other liquid
- 5) the presence of corrosive, flammable gases
- Environment 6) temperatures above 40 degrees Celsius
- 7) other harsh environment

## **5. safety operating procedures**

### **(1) Control the movement of the manipulator**

1) the movement of the manipulator should be adjusted at a lower rate in front of the operating manipulator to increase the effective control of the manipulator.

2) consider the movement trend of the manipulator before pressing the power key.

3) should consider the trajectory of the manipulator in advance and confirm that the line is not interfered.

4) the area around the arm must be clean, free of oil, water and impurities.

### **(2) Production and operation**

Before 1) boot, you must know all the tasks the manipulator will perform according to the program.

2) shall know the position and status of all switches, sensors and control signals that will affect the movement of the manipulator.

3) must know the position of the emergency stop buttons on the manipulator control

device, ready to press these buttons in case of emergency.

4) never think that the robot arm has been completed without moving its program.

Because the arm is probably waiting for the input signal to move on.

## 6. routine maintenance and storage

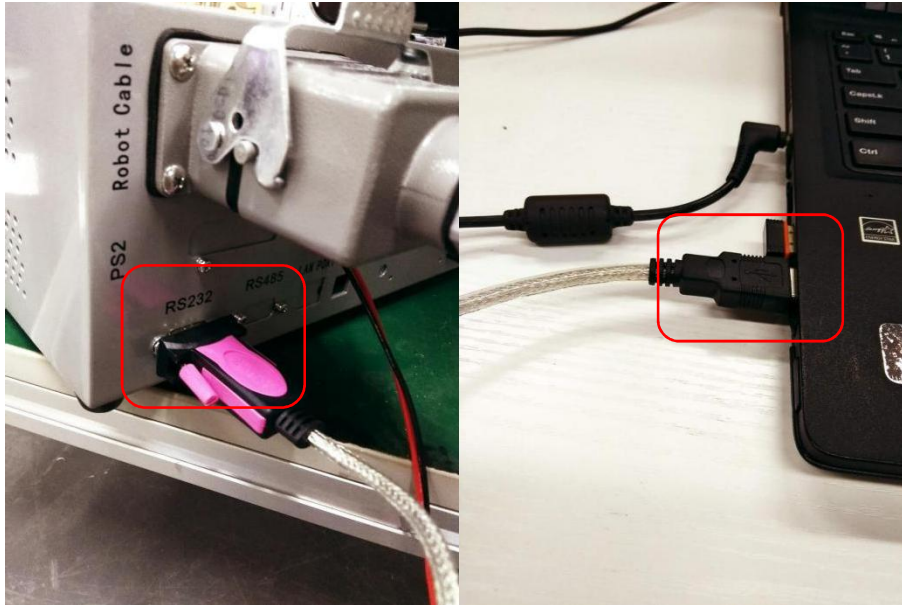
RobotAnno the arm is safe to use and can adapt to the environment to the maximum extent. Please follow the instructions. Please be sure to follow the precautions in this manual.



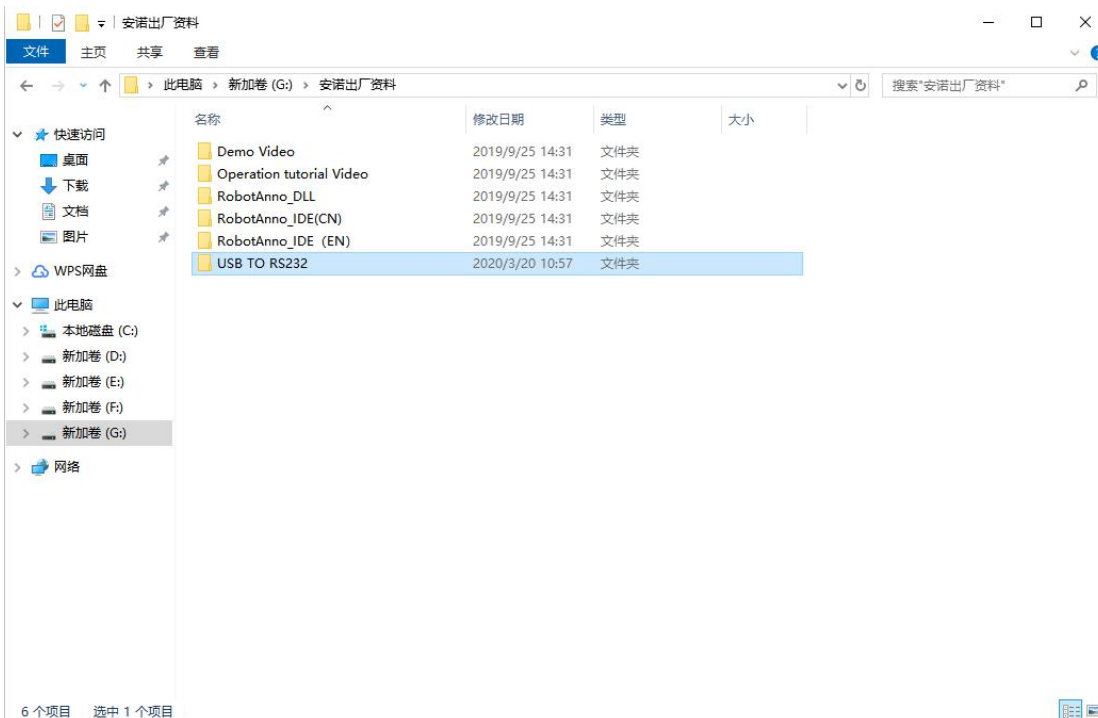
- (1) Never force the shaft of the mechanical arm, or it may cause personal injury and equipment damage.
- (2) Avoid temperatures below or above 20 degrees Celsius;
- (3) Avoid long-term placement in direct sunlight;
- (4) Avoid dirt and dusty environments;
- (5) Stay away from strong vibration environments;

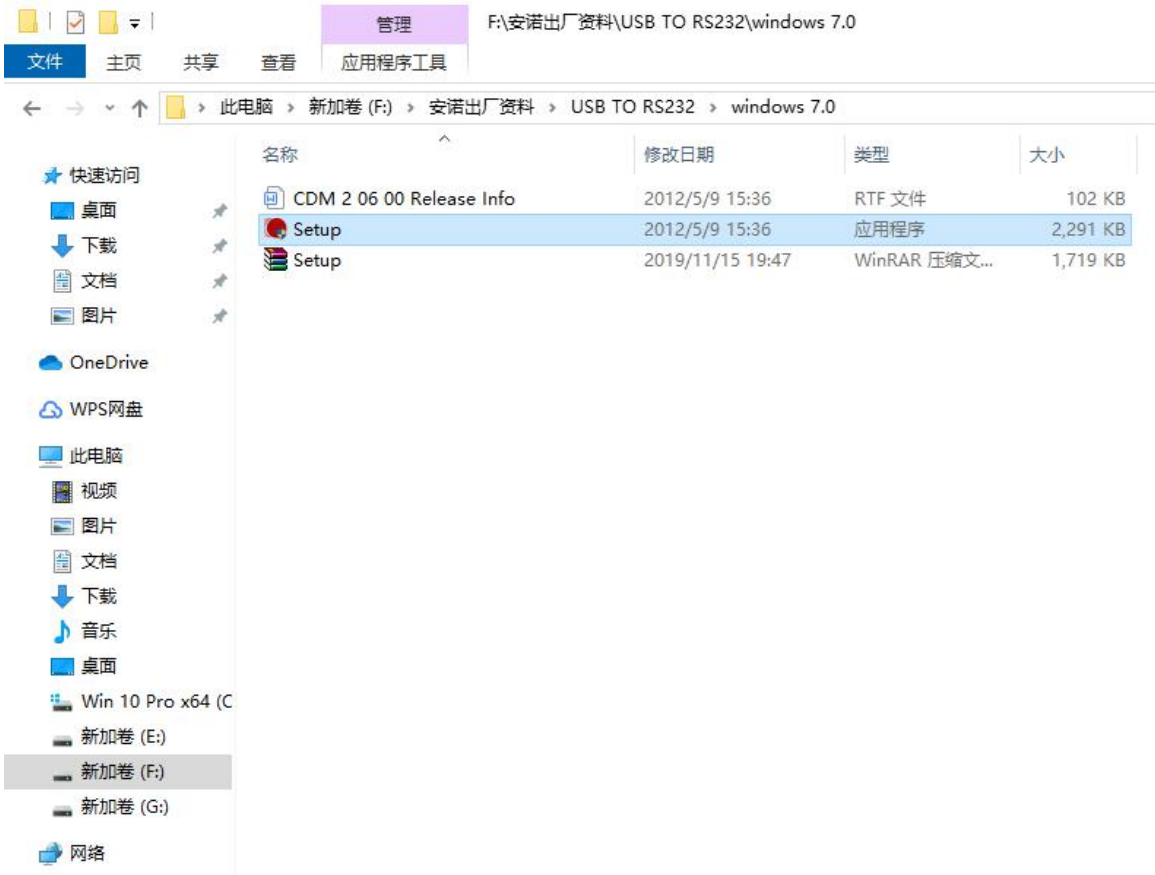
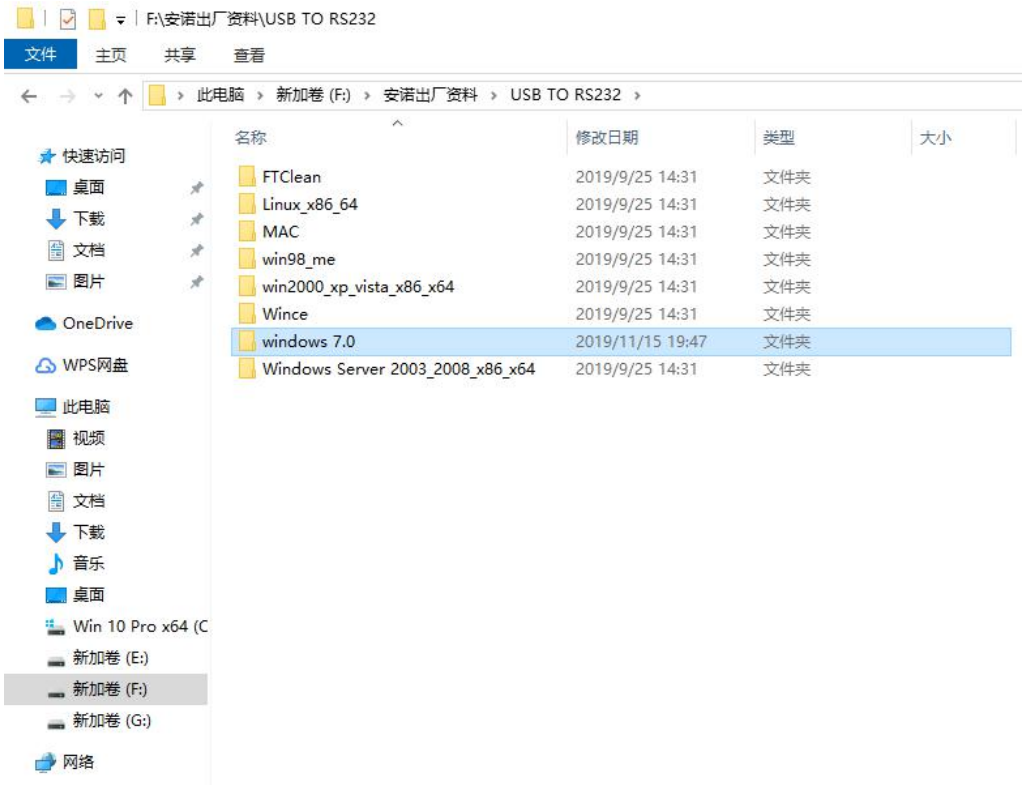
## II. Install USB TO RS232 driver

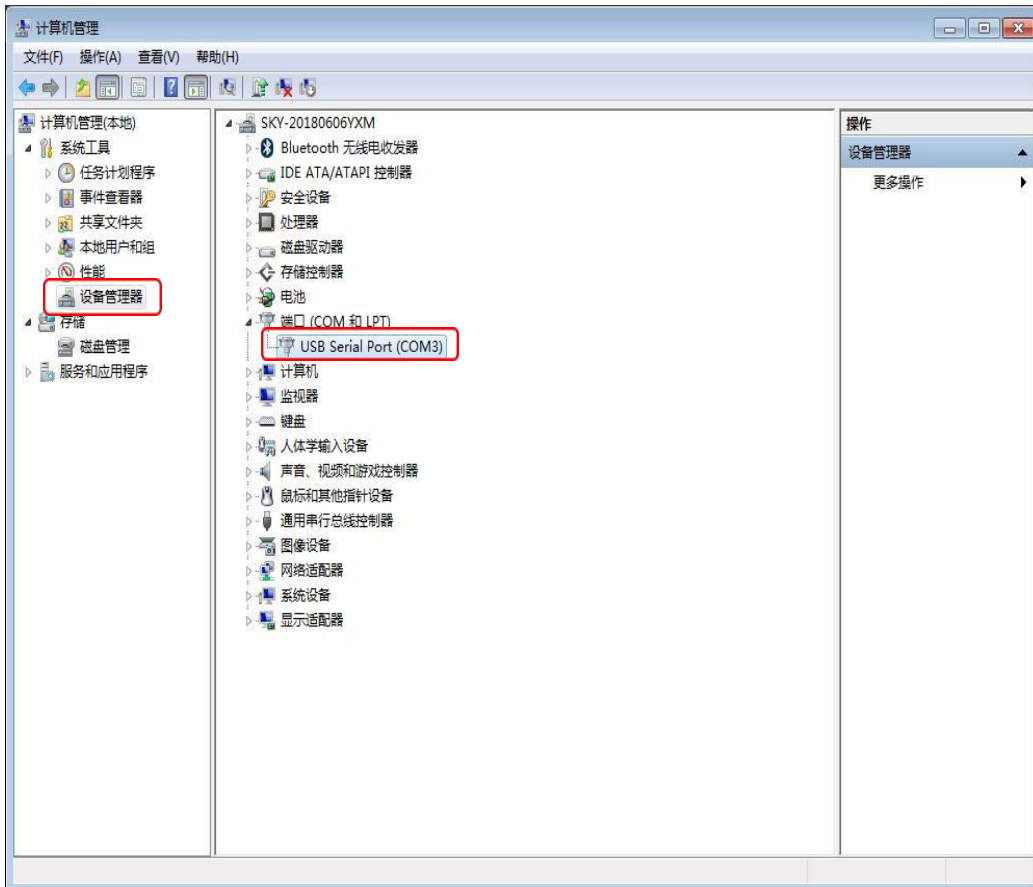
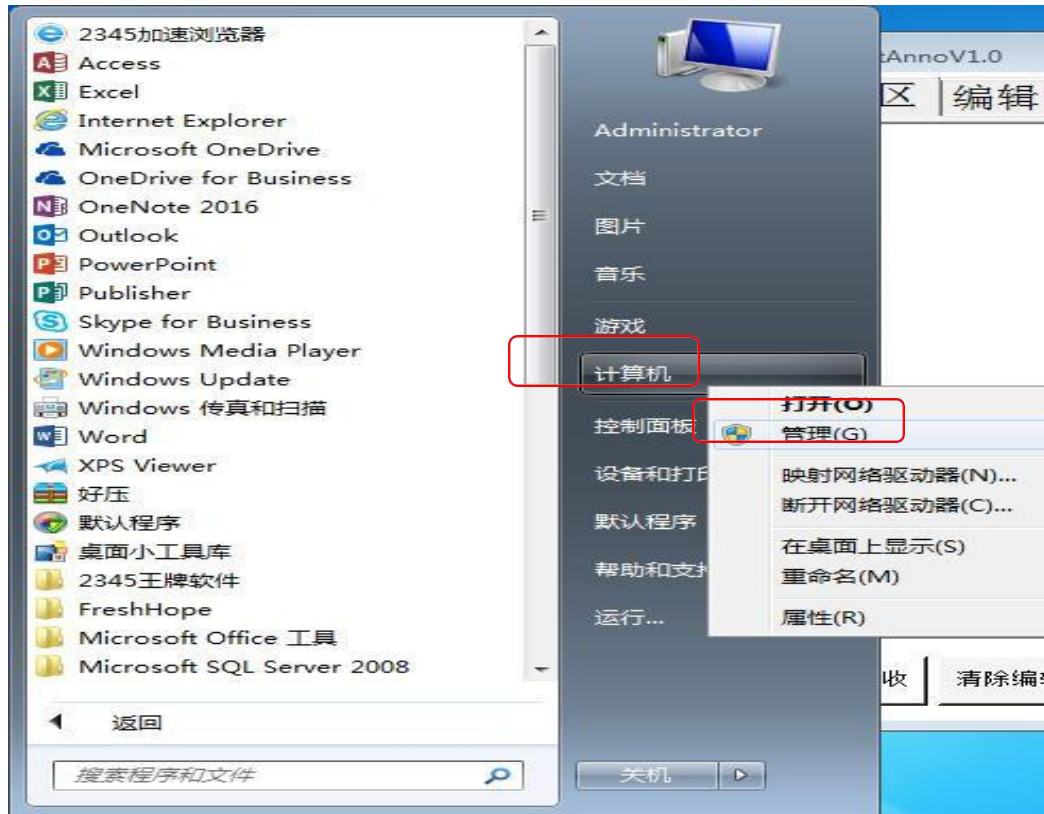
First, connect the computer to the controller through the data line, as shown in the figure:

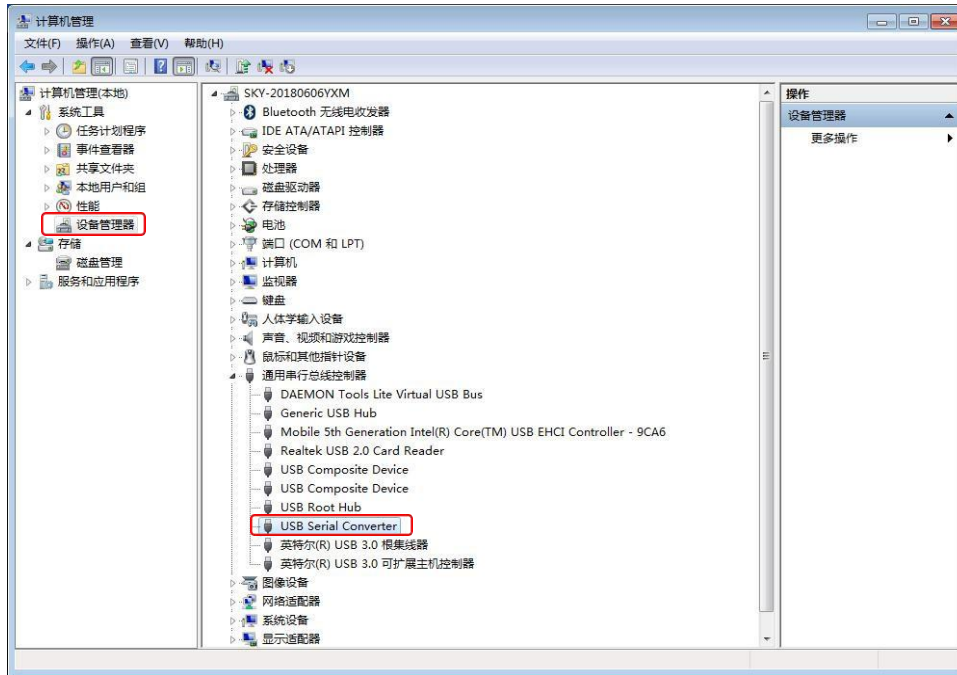


Open Anno factory data package, open USB TO RS232 folder, according to the use of computer systems to selectively install, here take the Win7/Win7 system as an example, as shown in the figure:



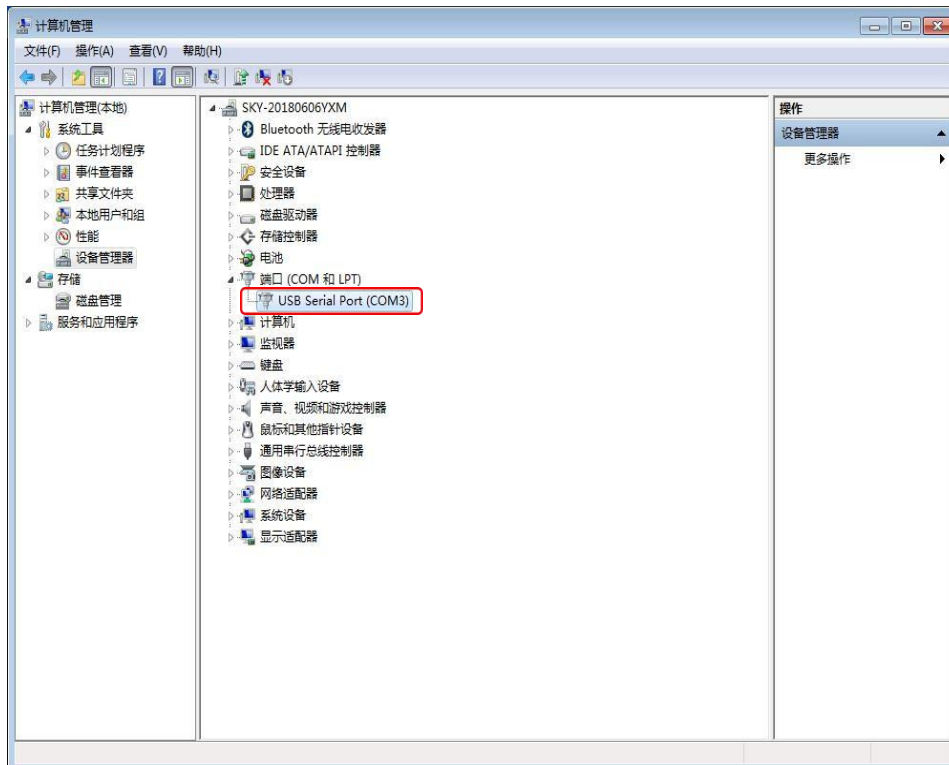






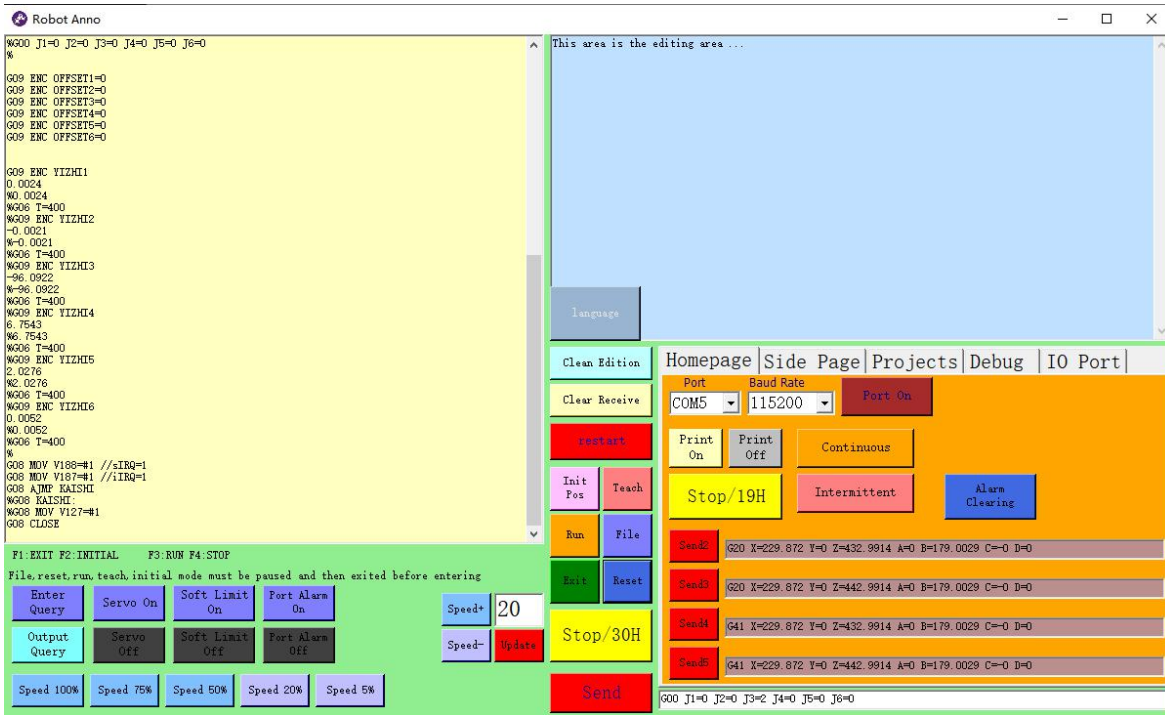
When the USB Serial Converter is seen in the universal serial bus controller, the USB TO RS232 driver installation is successful.

Select the port installed just now, the port number of each machine may be different, whichever is the actual port.

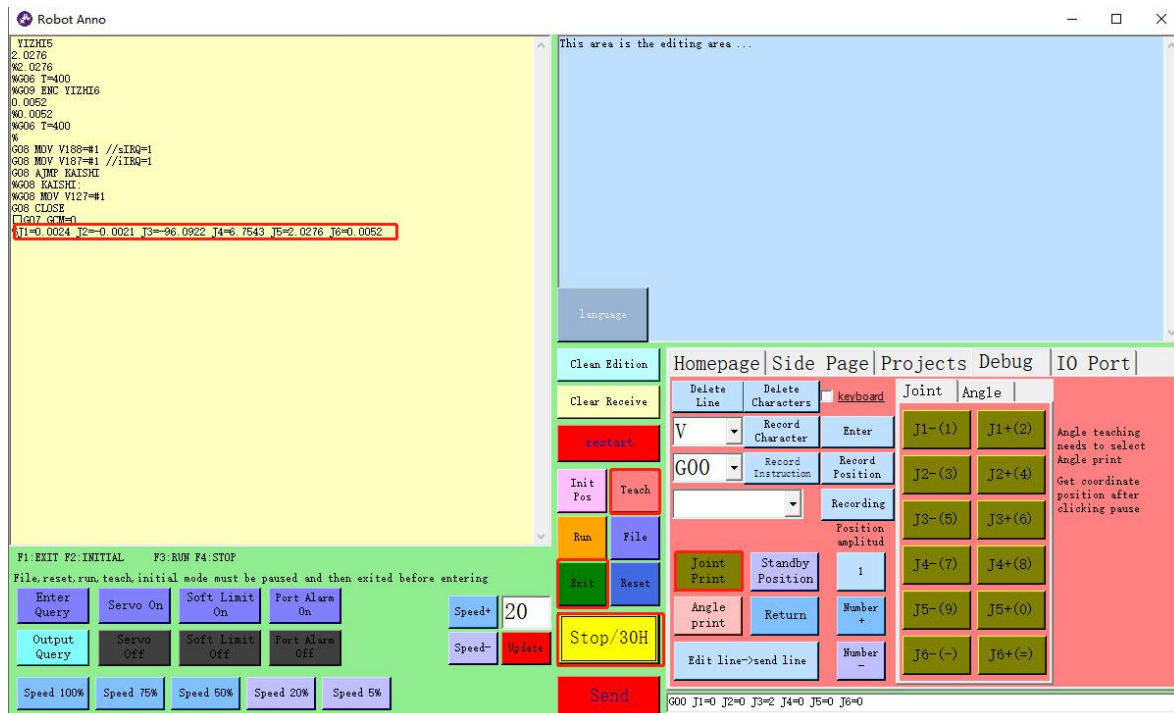


### 三. Zero calibration

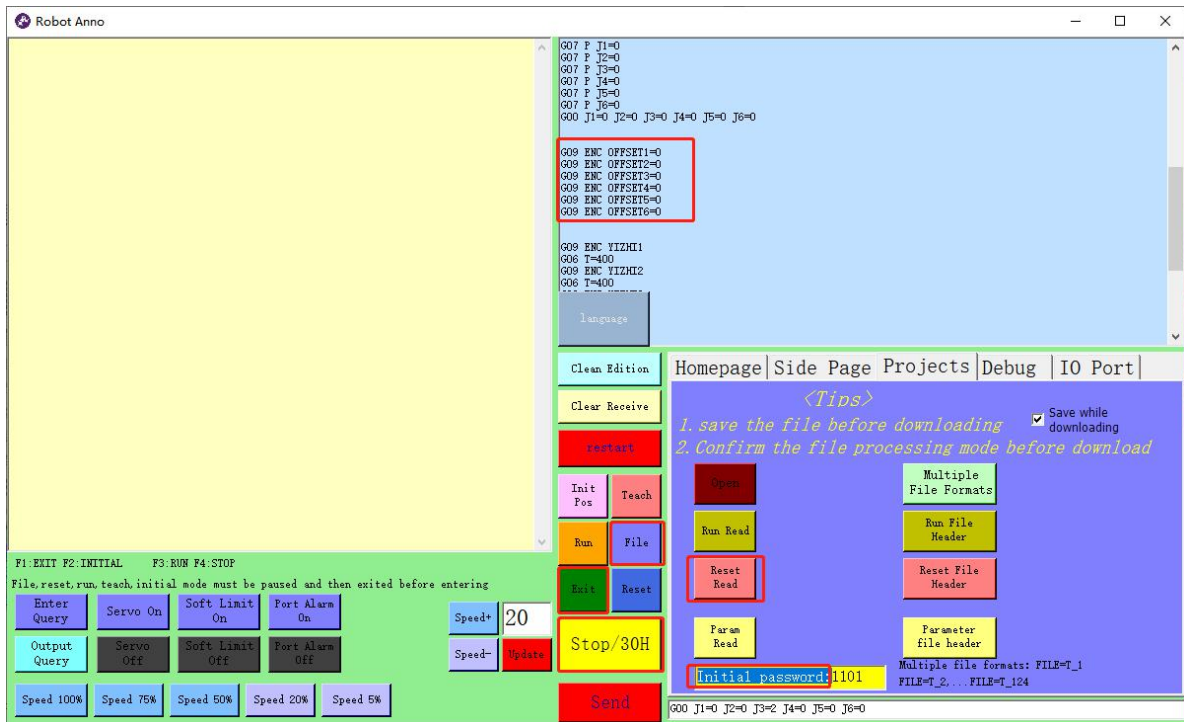
2. power on reset (open host, connect serial port, then click pause, exit and reset)



3. read joint position (click, pause, exit, teach, joint print, pause) in turn.



4. reset read (click pause, exit, file, reset read in turn)



5.

The value of joint printing J1=0.0024 J2J1=-0.0021 J3J1=-96.0922 J4J1=6.7543 J5J1=2.0276 0.0052 compensation reset file

G09ENC OFFSET1=-0.0024

G09ENC OFFSET2=0.0021

G09ENC OFFSET3=96.0922

G09ENC OFFSET4=-67543

G09ENC OFFSET5=-2.0276

G09ENC OFFSET6=-0.00525. Delete initial password: keep 1101 and download the reset file.

## IV. RobotannoV2.0 instructions

When the computer opens the robotanno2.0 software for the first time and the serial port

is connected, a prompt window pops up to automatically create a folder in the root directory of the robotanno2.0's current software disk



Selection determination



Then select OK, and then restart the software.

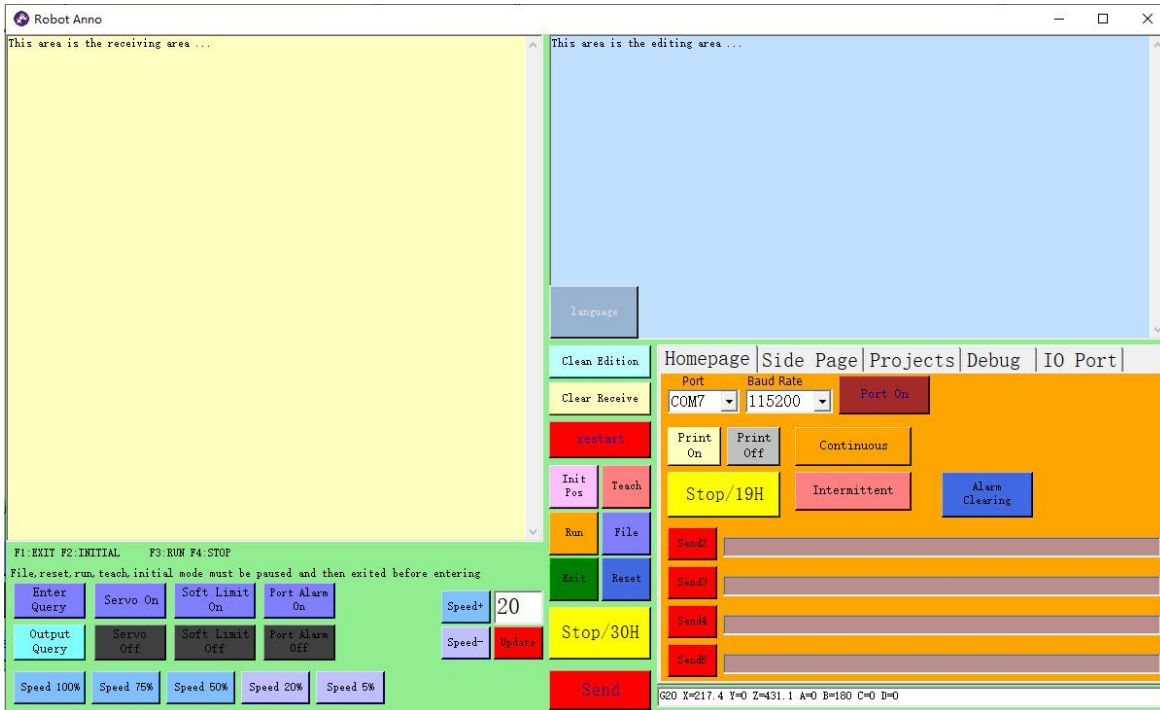


When the serial port is connected, the port number will be displayed automatically. If the serial port is not connected, the port number will appear blank

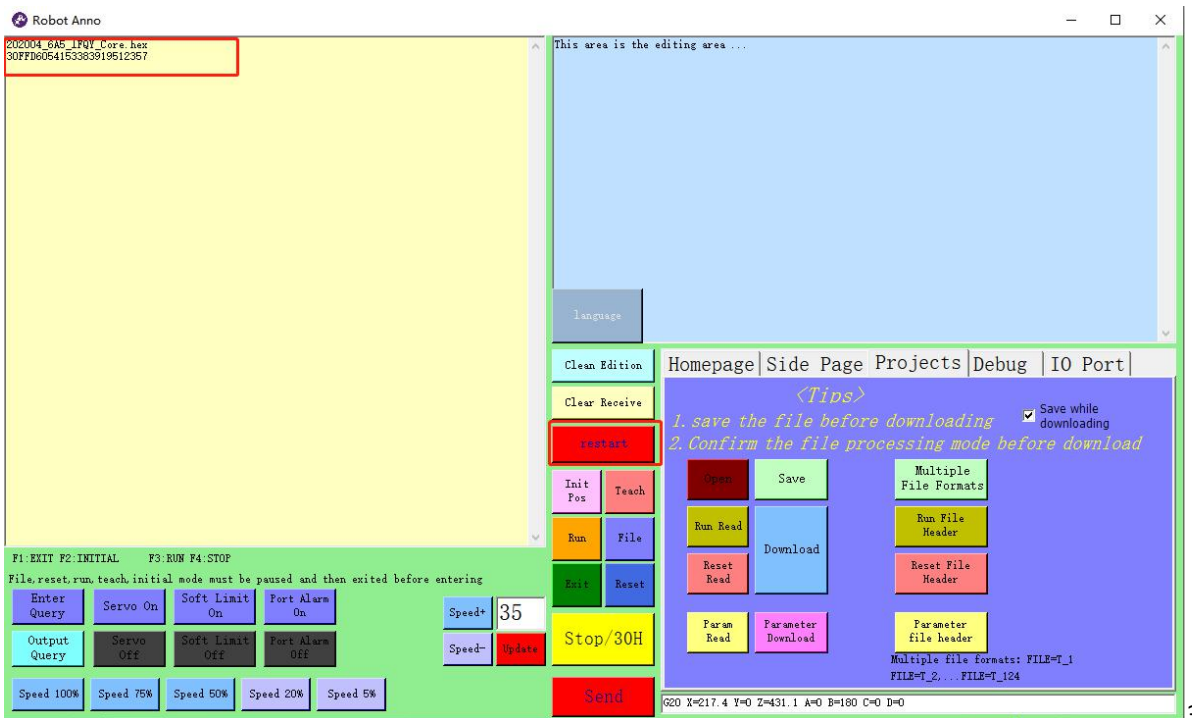
If the serial port is not connected, the serial port connection needs to be detected



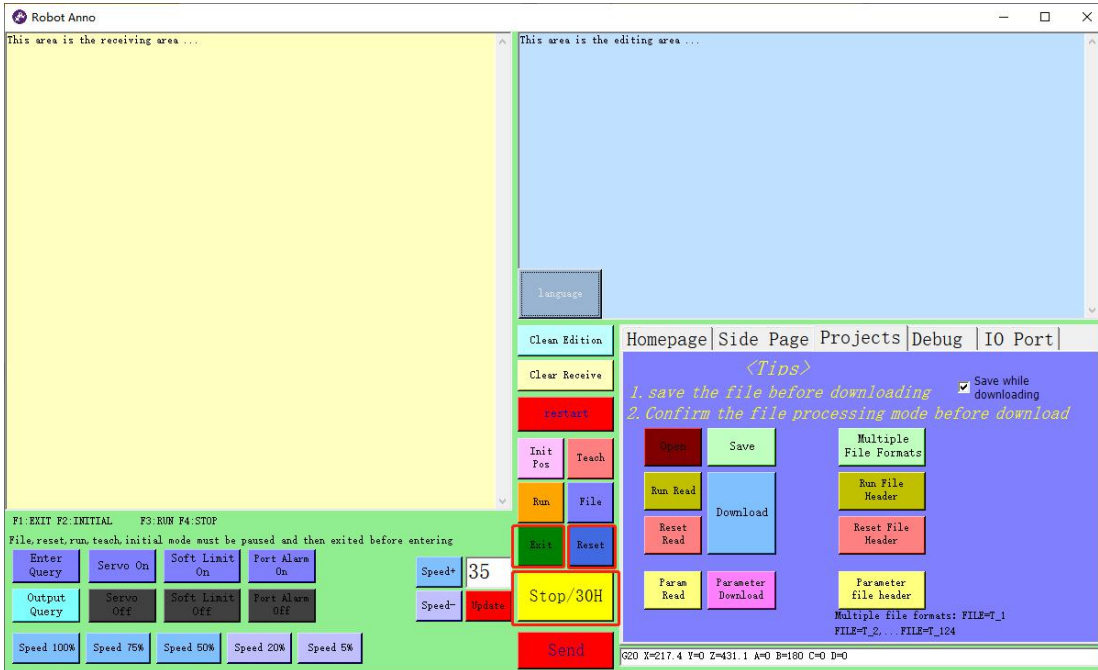
## 2 Open the software interface



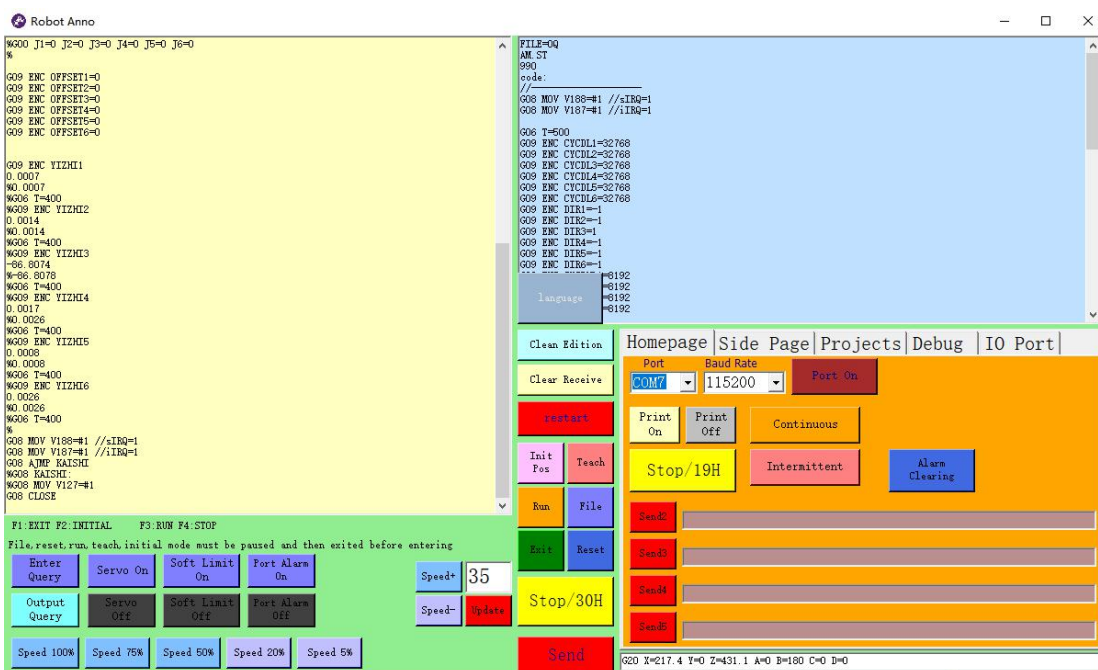
Click Restart, the beige receiving area will receive the system version information



Enter reset mode, click pause, exit, reset



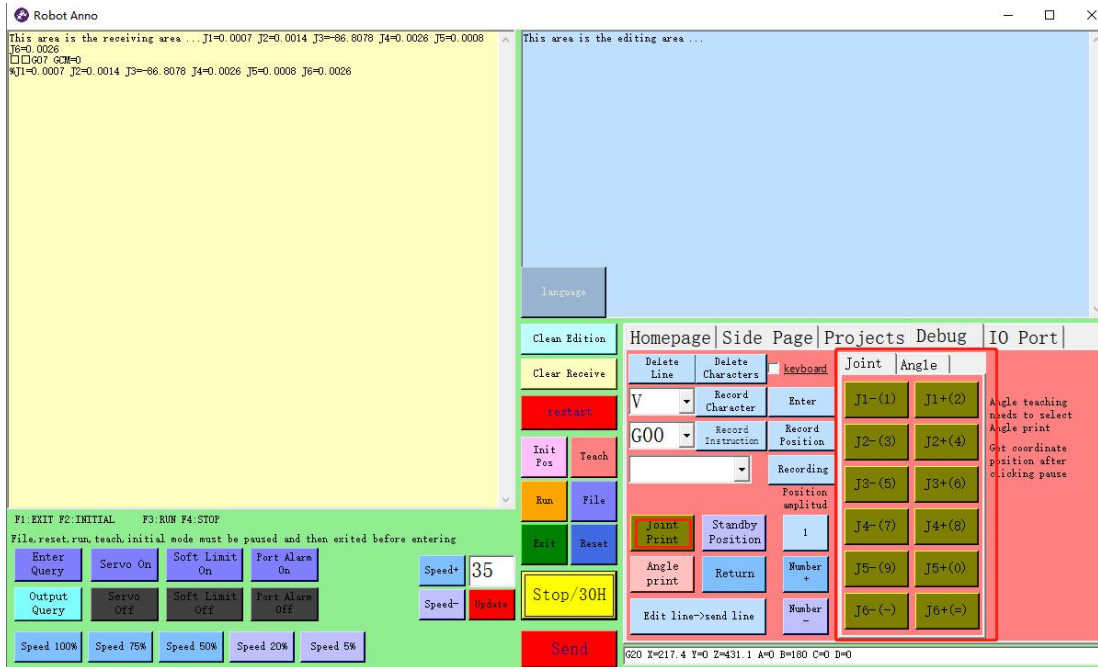
The stepper motor finds the origin sensor and resets it. Before operation, the parameter file of the controller is required.



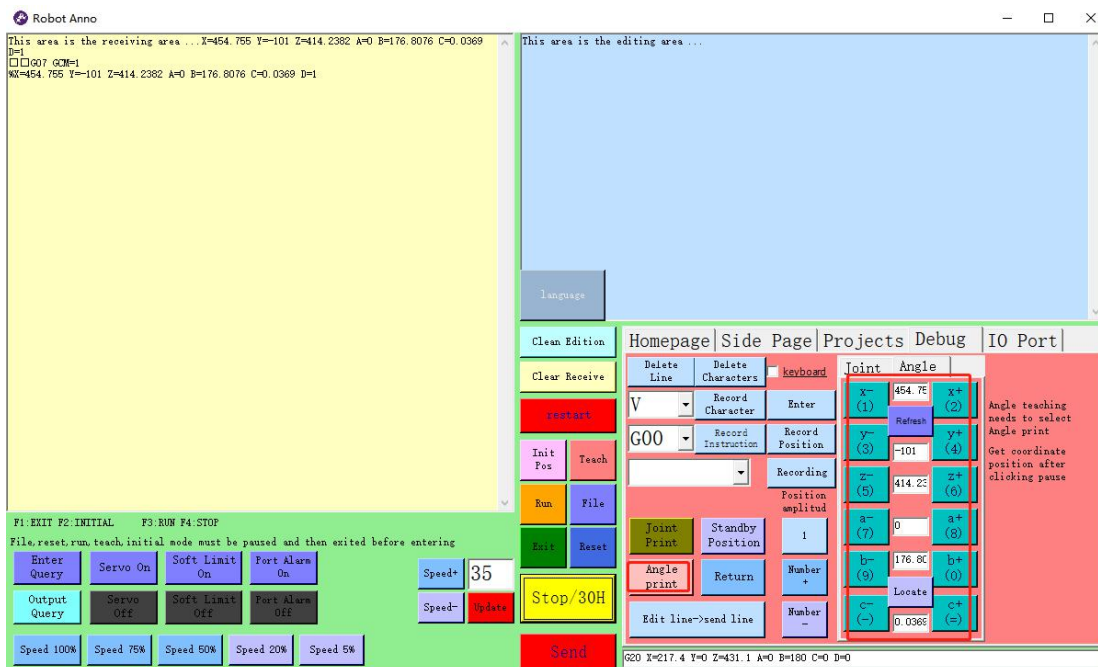
The servo motor reads the absolute encoder position. Before operation, the parameter file of the controller is required, and the zero return file is configured correctly.

4 Enter teaching mode, click pause (30H), exit (10H), teaching (14H)

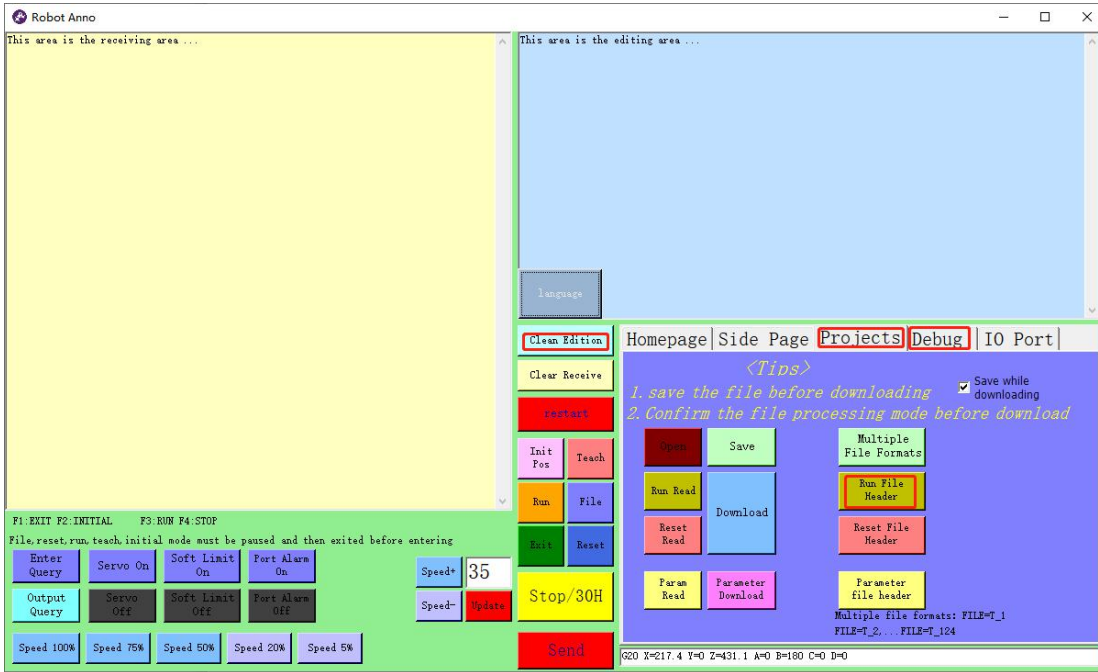
Click Pause, the receiving area receives the current position of the robot (joint position or rectangular coordinate position). When you click the joint to print, press Pause again, the joint angle is printed, and the joint debugging controls (J1 +, J1-, J2 +, J2-, J3 +, J3-, J4 +, J4-, J5 +, J5-, J6 +, J6-,) The brackets in the control are 1234567890- = on the keyboard after selecting the keyboard.



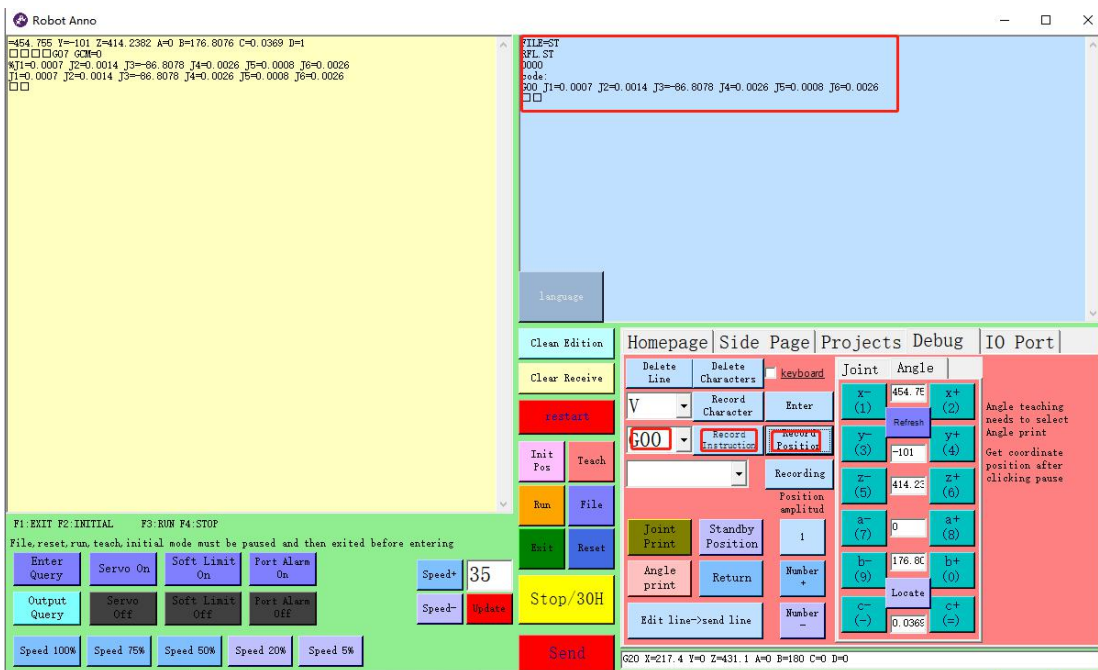
When you click rectangular printing, press Refresh to print the rectangular coordinate teaching position and posture, you can operate the joint debugging controls (x +, x-, y +, y-, z +, z-, a +, a-, b +, b-, c +, c-,) Control brackets are corresponding to the selected keyboard after ticking



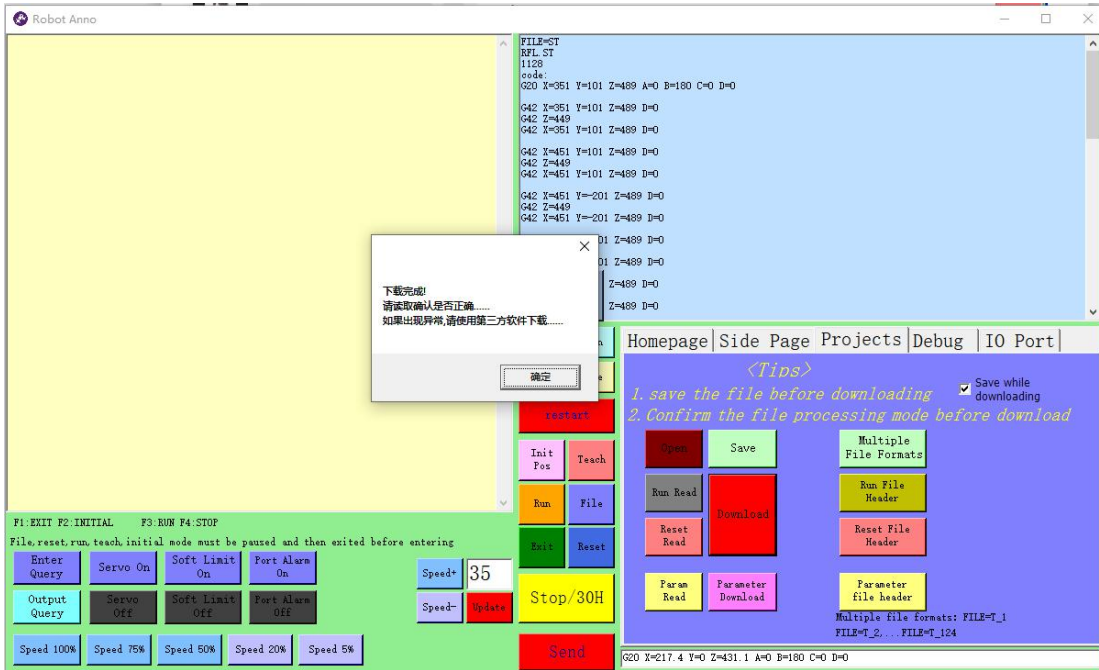
5 Programming, in the teaching mode, click on the project, click to clear edit, click to run the file header, then click debug to return to the debug interface



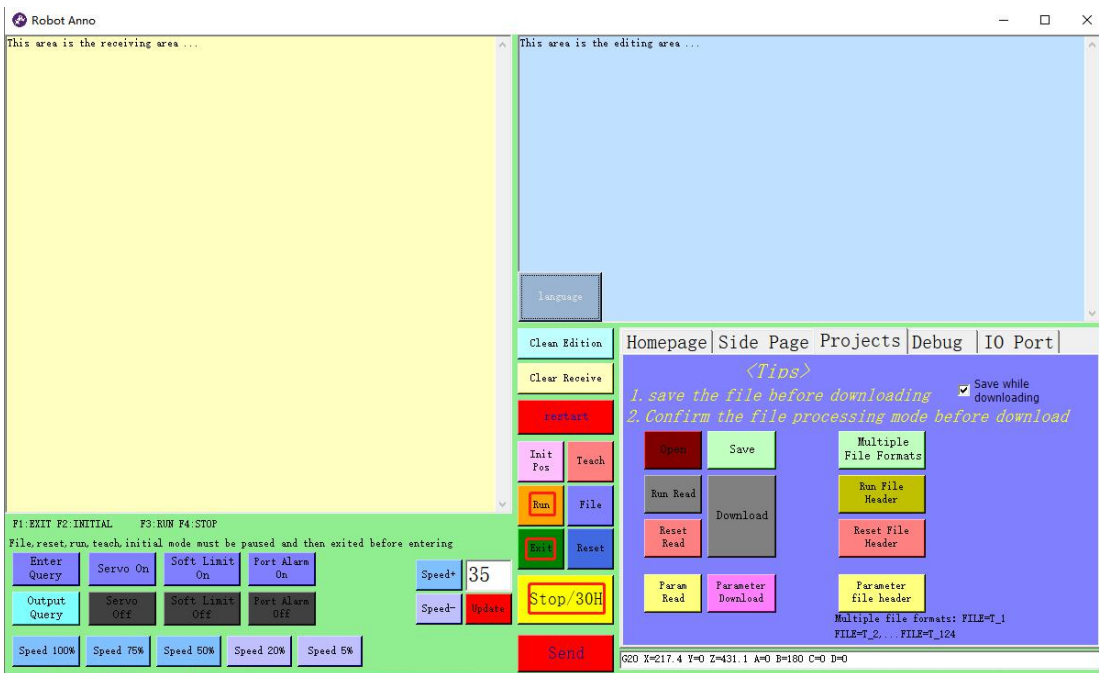
Click the cursor line in the editing area, select the instruction head, click record instruction, record position



6 File download, click pause, exit, file, download; (the download control needs to enter the correct password, the initial password is 1101)



### 7 Run, click pause, exit, run

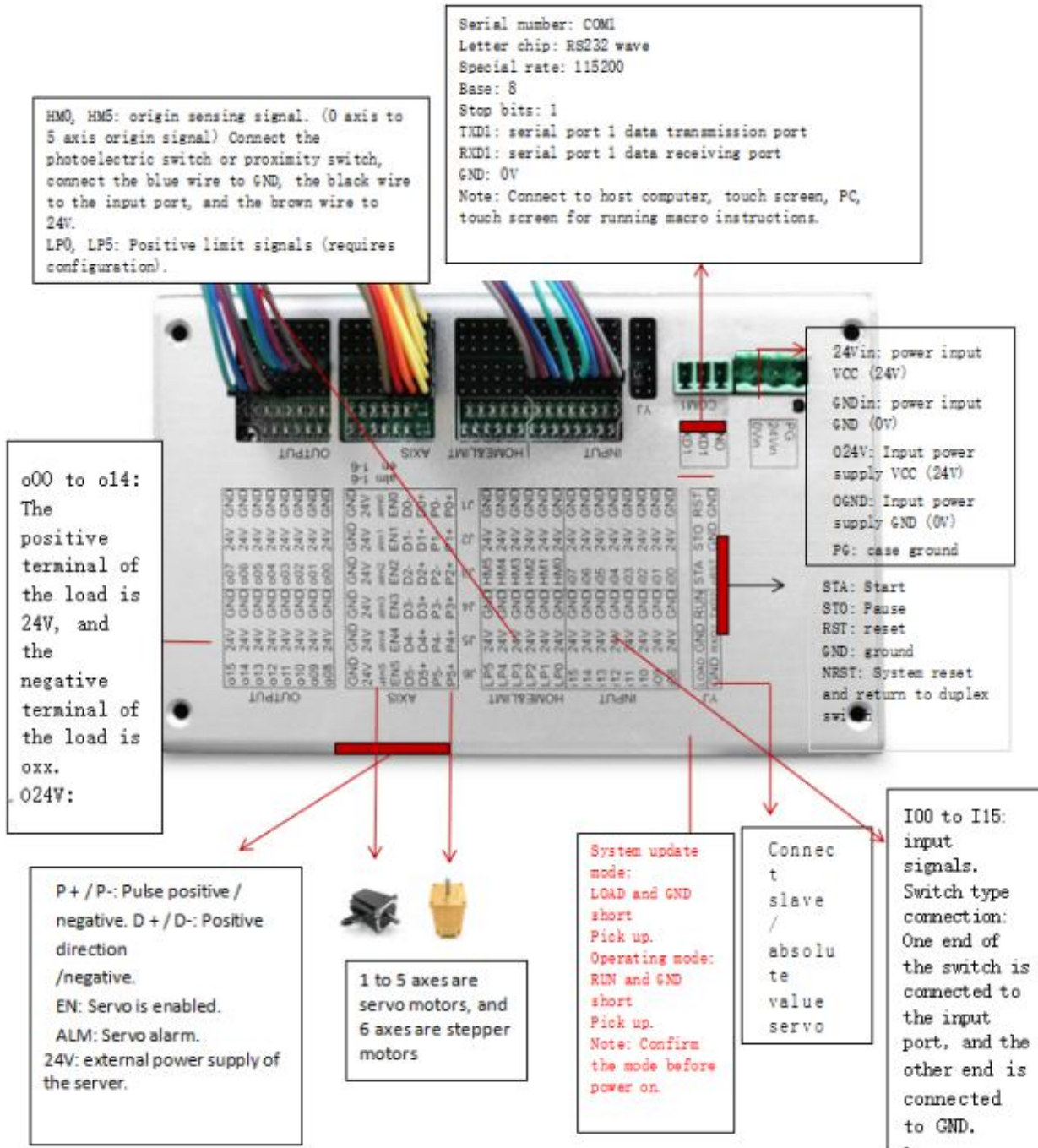


## V. Aviation plug interface definition

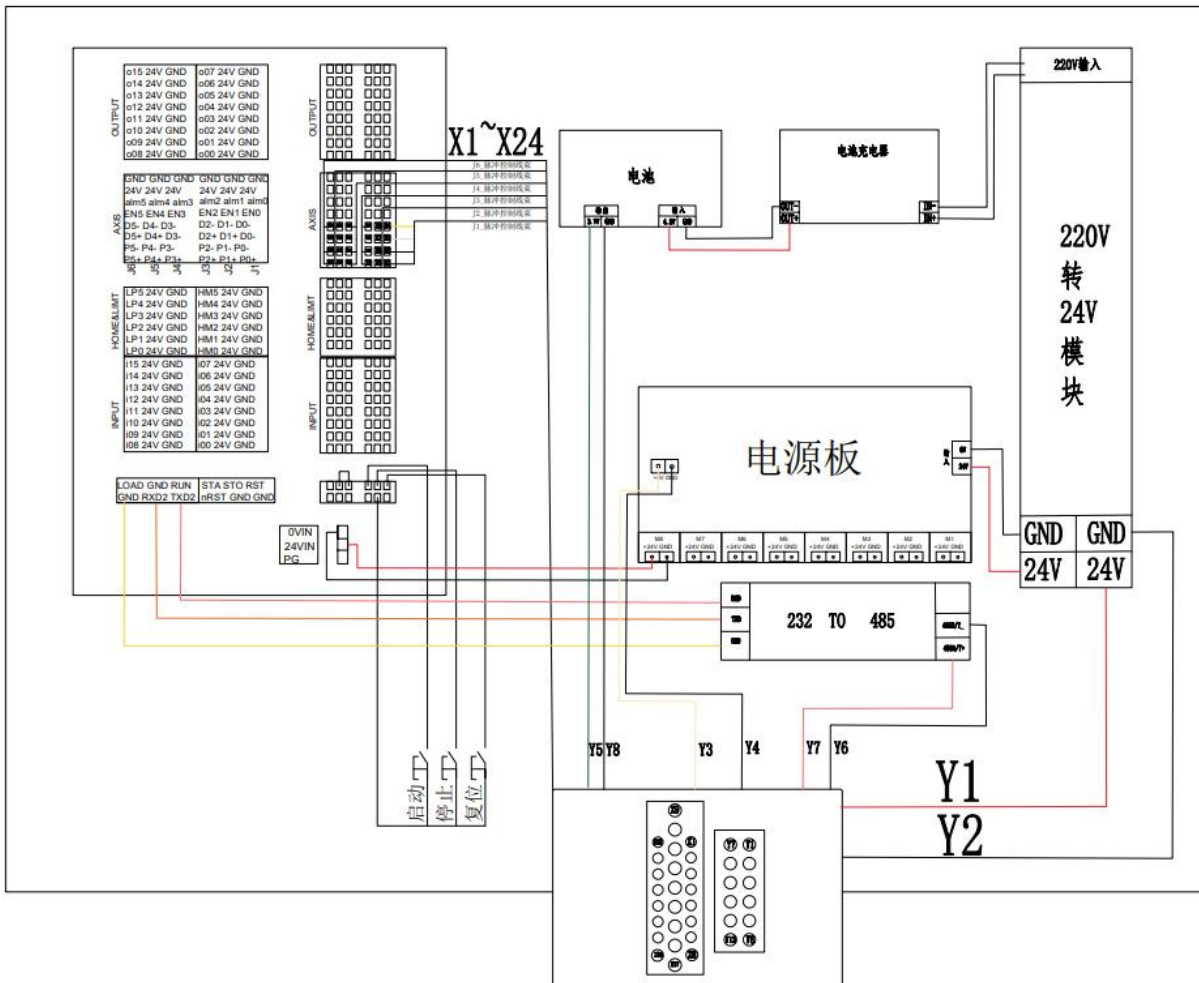
<b>interface definition</b>		
Pin number	definition	Note
Y1	24V	
Y2	0V	
Y3	5V	
Y4	COM	
Y5	BAT+	
Y6	485B	
Y7	485A	
Y8	GND	
Y9		
<b>interface definition</b>		
Pin number	definition	Note
X1	J1_P+	
X2	J1_P-	
X3	J1_D+	
X4	J1_D-	
X5	J2_P+	
X6	J2_P-	
X7	J2_D+	
X8	J2_D-	
X9	J3_P+	
X10	J3_P-	
X11	J3_D+	
X12	J3_D-	
X13	J4_P+	
X14	J4_P-	
X15	J4_D+	
X16	J4_D-	
X17	J5_P+	
X18	J5_P-	
X19	J5_D+	
X20	J5_D-	
X21	J6_P+	
X22	J6_P-	
X23	J6_D+	

X24	J6_D-	
-----	-------	--

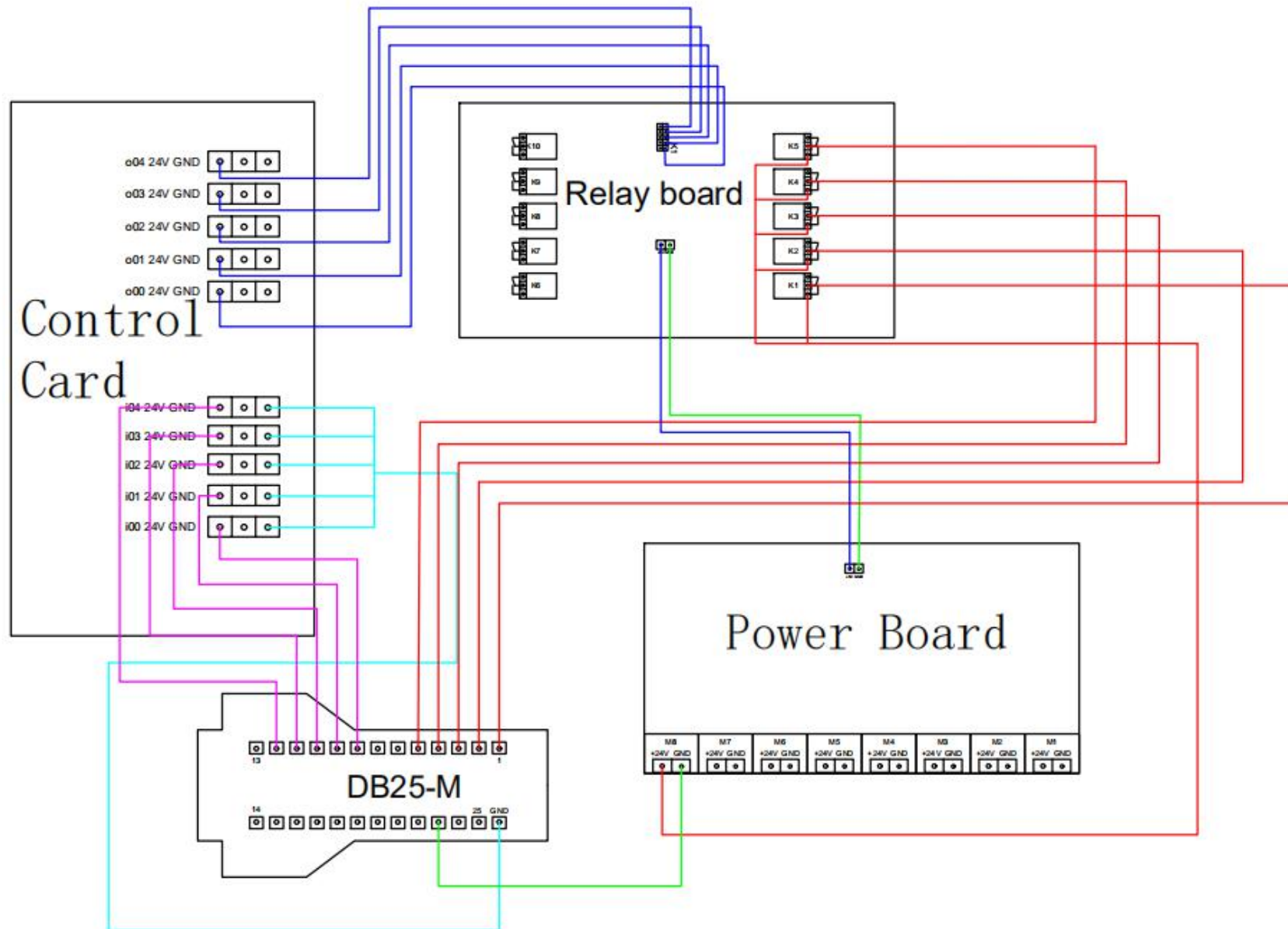
# 1. master port definition



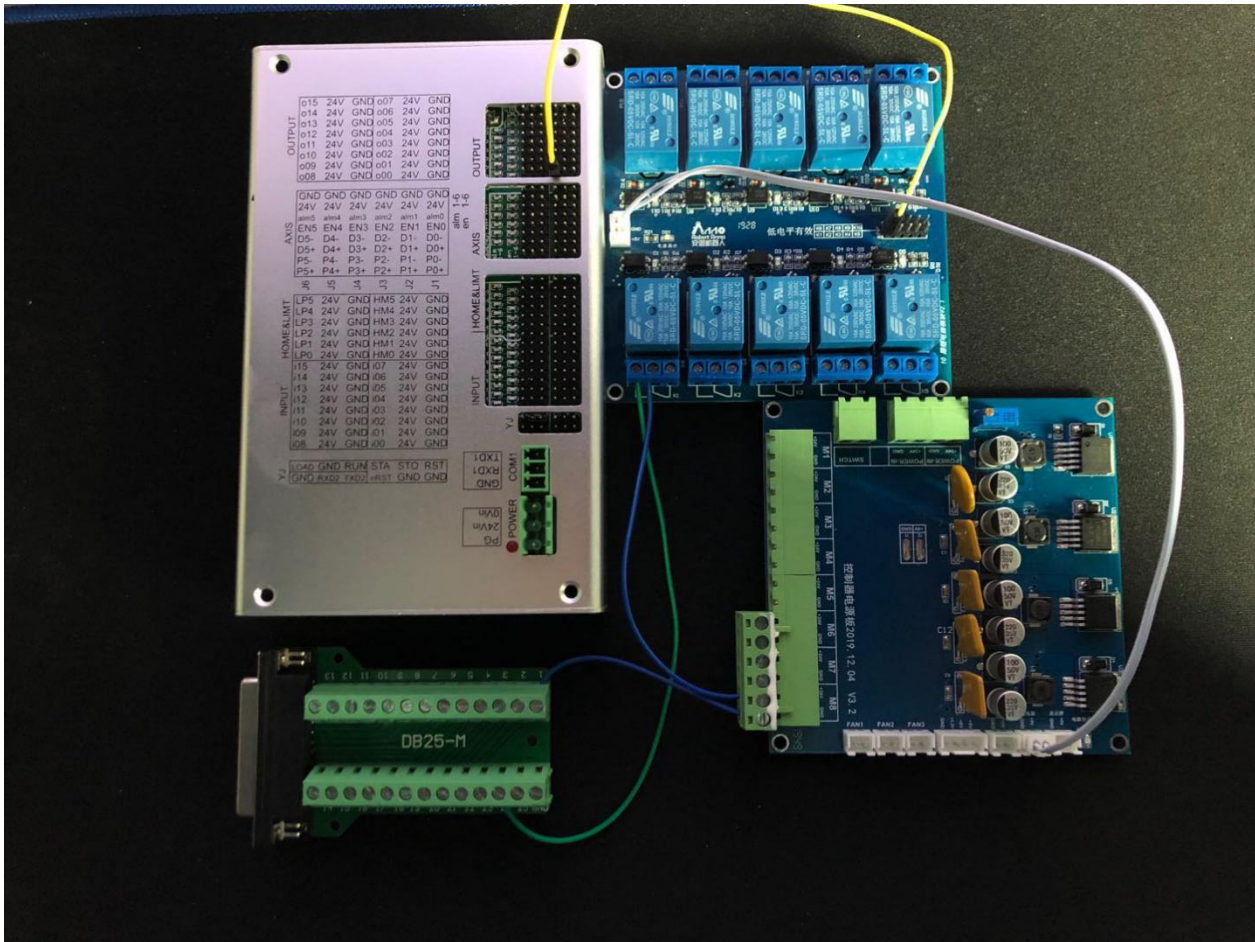
## 2. master wiring diagram:



## Circuit diagram of relay wiring in 3. control box:



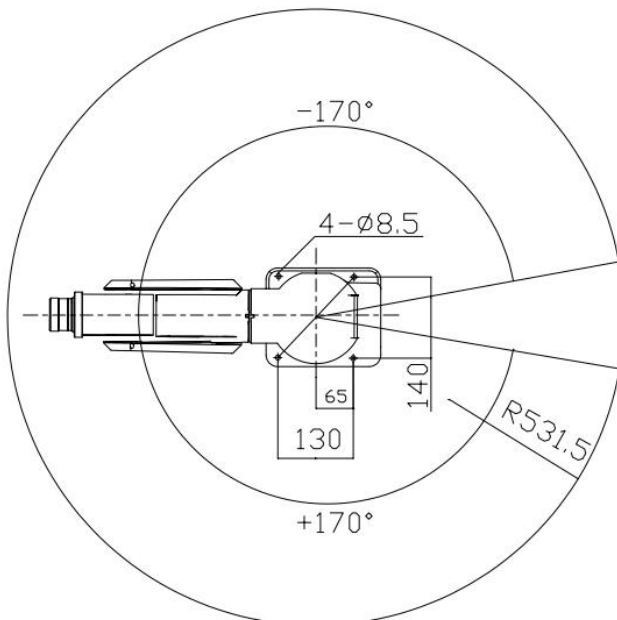
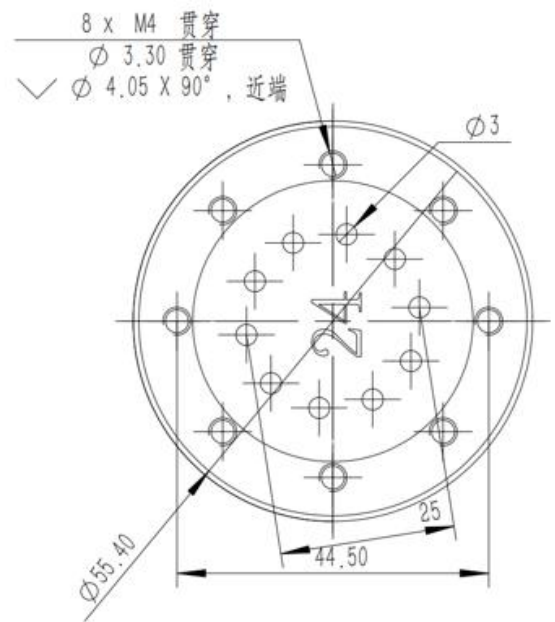
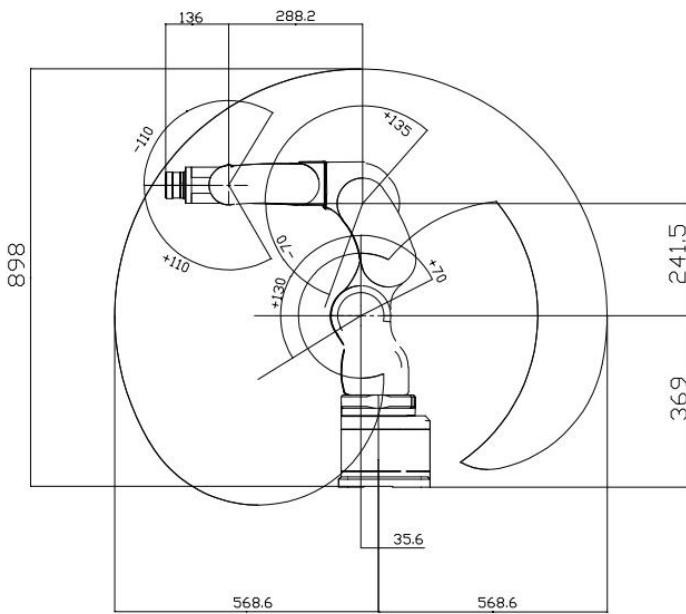
#### 4. control box internal relay wiring physical diagram (only one set of output in the diagram):



When multiple outputs are needed, the positive pole is connected to pin 1~5(controlled by O00~O04 respectively) and the negative pole to pin 23(shared).

# VI. 602 parameters

## 1. Dimensional parameters



## VII. Case cases

Suction cup handling cases:

FILE=ST // file type

AM.ST // file name

771/byte

code:

// Operational instructions

G07VP=50/speed

G20X=300 YG20X=131 ZG20X=55 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G06O=P0.1// open the suction

G20X=300 YG20X=131 ZG20X=47.5 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=131 ZG20X=60 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=42.5 ZG20X=60 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=42.5 ZG20X=20 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G06O=P0.0// shut off suction

G06T=1000/ wait a second

G20X=300 YG20X=42.5 ZG20X=47 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=131 ZG20X=47 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G06O=P0.1

G20X=300 YG20X=131 ZG20X=38 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=131 ZG20X=51 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=-46 ZG20X=51 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=-46 ZG20X=20 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G06O=P0.0

G06T=1000

G20X=300 YG20X=-46 ZG20X=38 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=131 ZG20X=38 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=131 ZG20X=29 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G06O=P0.1

G20X=300 YG20X=131 ZG20X=42 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=300 YG20X=134 ZG20X=42 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G20X=298 YG20X=134 ZG20X=22 AG20X=0 BG20X=180 CG20X=0 DG20X=0

G06O=P0.0

G06T=1000

G20X=300 YG20X=134 ZG20X=42 AG20X=0 BG20X=180 CG20X=0 DG20X=0

# VIII. Functional mode and programming

## 1. Documents Classification

Running files	Reset file	Parameter file
<p>Functions:</p> <p>Rules:</p> <p><b>FILE=ST</b> RFL.ST file type // Document name 604 code: number of bytes // Document starting location</p> <p>Enter newline // program terminator enter newline // program terminator</p> <p><b>Comment: FILE=ST. ST "</b> Represents a running file. <b>RFL.ST is the file name.</b> Naming rule: XXX+ English ". " <b>+ST (XXX. ST).XXX</b> can be letters (uppercase and lowercase), numbers Words. 604: Number of bytes. The number of bytes between the start of the file and the end of the program. code : file start position. English colon.</p>	<p>Function: after the device is re-energized, each axis is assigned.</p> <p>Rules:</p> <p><b>FILE=OQ</b> RFL.ST file type // Document name 604 code: number of bytes // Document starting location</p> <p>Enter newline // program terminator enter newline // program terminator</p> <p><b>Comment: F I L E =0 Q. "0 Q"</b> represents the return origin file. <b>RFL.ST is the file name.</b> Naming rule: XXX+ English ". " <b>+S T (S T).X X X</b> can be letters (uppercase and lowercase), numbers. 604: Number of bytes. The number of bytes between the start of the file and the end</p>	<p>Function: set the parameters D H parameters, direction, subdivision, soft limit, waiting position, pulse width, speed, servo enable, lock.</p>

## 2. programming rules

Instruction writing:

Name of 1. constant :# XX. // XX specific values. Example :#2,#1000,#5

Name of 2. variable: VXX. // XX controller's universal storage unit. Example: V150 V150. of variables

3. instruction rules: function instruction + space + operation instruction. Example:

G06T=200 // Delay 200 milliseconds.  
 G07VE=2000/ set speed to 2000 pulses per second. G08STO // program automatically suspended

4.位置指令: 功能指令(G 代码)+空格+位置信息例: G20X=270Y=0Z=300A=0B=180C=0D=0//

Fixed points

G21X=270 YG21X=0 ZG21X=300 AG21X=0 BG21X=180 CG21X=0 DG21X=0 // Straight  
 line G00J1=20 J2G00J1=70 J3G00J1=2 J4G00J1=0,7 J6G00J1=0 // Joint  
 coordinates

5. call instruction: G08+ space G08+ACALL G08+ subroutine name

Example: G08ACALL ZAINA

6. jump instruction: G08+ space G08+AJMPG08+ subroutine name

Example: G08AJMP XXX // Jump to program XXX execution.

7. judgment instruction: G08+ space +IF+ judgment condition + statement true: execute statement A false: skip statement A, execute down.

judgment character (<,>==,!=、<=、>=. less than, greater than, equal to, not equal to, less than equal to, greater than equal to).

ACALL XXX G08IF #2<#0

G08IF #2>#0 ACALL XXX G08IF #2==#0 ACALL XXX G08IF #2ACALL  
 XXX G08IF #2===#0 ACALL XXX #0

8. loop instruction: for (assignment statement, judgment statement, statement B)

{segment}

for (V0=2, V0V0=V1,V0=V0+3){ program segment

9. subroutine programming:

G08+ space + subroutine name + English colon / subroutine start (no comment statement)

---- process content

G08+END G08+ space // subroutine end sign.

Subprogram naming rules: case letters, numbers.

note :"/,\*,+,-,%,//(divide, multiply, add, subtract, seek, annotate)" monocular operation has no priority.

### 3. instruction list:

Position Instruct	
Fixed point	G00J1=0 J2G00J1=0 J4G00J1=0 0 0/0/ J6G00J1= joint coordinates.
	G20X=270 YG20X=0 ZG20X=300 0 BG20X=180 0/0/0/ rectangular coordinates
Straight line	G01J1=10 J2G01J1=20 J3G01J1=40,10 J5G01J1=2/20/ joint coordinates.
	G21X=300 YG21X=100 ZG21X=500 AG21X=0 BG21X=180 0/0/ without acceleration or deceleration
	G41X=300 YG41X=100 ZG41X=500 AG41X=0 BG41X=180 0 DG41X=0/
Arc	<p>current point: G21X=200 YG21X=0 ZG21X=200 AG21X=-180 BG21X=150,0 DG21X=0</p> <p>Second: G22X=300 YG22X=100 ZG22X=200 AG22X=-180,150 CG22X=90 and 0 third:</p> <p>G23X=400Y=0Z=200A=-180B=150C=300D=0 圆弧</p> <p>运行: G06DEGREE=300 或者 G06DEGREE=ARC</p> <p>Comment: G06DEGREE= radians.</p> <p>G06DEGREE=ARC three - point arc.</p>

G06		G07		G08	
Instr uction	Function	Instruct ion	Function	Instructi on	Function
T=XX	Delay XX milliseconds.	VE=XX	Velocity XX pulse per	XXXX:	Subprogram Name (English colon)
I=PA. 1	waiting A port is high level. 1 is high and 0 is low.	AC=XX	Acceleration is XX pulse squared per second	ACALL XXXX	Call XXXX tag to G08 END
O=PA .0	A port output high level. 1 is high and 0 is low.	DE=XX	Deprivation speed XX pulse squared per second	END	Call End
I=STA 0	Hold STA button low	VPP=XX	Maximum speed XX pulse per second	AJMP XXXX	Jump to XXXX run
SCAN =I	Read the input port value. Return string "1111 1111 1111 1111"	VP=XX	VE speed is the highest speed $XX\% VF=VPP*VP*0.01$	FLTAB=#	File jump to file T_# Operation;
SCAN =O	Read the output port value. Return string "0000 0000 0000 0000"	h0=xx _	Height change	IFF	Floating point comparison
SCAN =RTC	Read the system clock value.	RCM=1	1 Print run instruction ,0 do not type	IF_ELSEF	Floating point comparison
DEGR EE=A RC	The robot walks a three-point arc.	GCM=1	Output in Cartesian coordinates, 0 output of joint coordinates	XX MOV VXX=#	Integer assignment.
DEGR EE=3 5	The robot walks 35.2 degrees.	Z-ADJ=xx	Z shaft height adjustment	XX MOVF VXX=#	Integer assignment.
REPO S=J#	The J# axis HOME# in the direction of increasing angle Sensor (back to low level)	UCS=FCS	Restoration of original coordinates *	PRINT VXX	Print VXX value, integer Type.
REPO S=- J#	The J# axis HOME# in the direction of angle reduction inductor (back to low level).	UCS=NO W	Sixth shaft end flange center For XOY* purposes	PRINTF VXX ADD	Print VXX value, floating point Formula integer addition
REPO S=JH #	The J# axis HOME# in the direction of increasing angle Sensor (back to high	ABSPOS	Update Cartesian coordinates data (XYZ add Quantity (s)	INT VXX SUBB	Converts floating point to integer integer subtraction
REPO S=- JH	The J# axis HOME# in the direction of angle reduction Sensor (back to high level)	P J#=XXXX	Calibration of J# axis angle	FLOAT VXX STO	Converts an integer to a floating point Automatic pause
REPO S=Z#	The J# axis increases Z# sense Receiver (back to low level)	G07MARKPOS_HERE X1=0 Y1G07MARKPOS_HERE X1=0 X2G07MARKPOS_HERE X1=100 Y2=100 template MARK points G07MARKPOS X1=10		NRST EXIT	Restart Exit run into idle mode

**Note:**

G09 instruction function: lower computer communication.  
 YN of G09COPYRIGHT inquiry system  
 Send XXXX characters G09COM2=XXXX COM2 port  
 G09COM2=G00J1=10      J2G09COM2=G00J1=10      J3G09COM2=G00J1=-90,0  
 J5G09COM2=G00J1=0

An instruction is issued by this controller COM1,G09COM2 another  
 controller 10H serial port 2 X10H 0  
 G09COM2 12H serial port 2 X12H 0  
 G09COM2 13H serial port 2 X13H G09COM2 0  
 14H serial port 2 X14H G09COM2 0 15H serial  
 port 2 X15H G09COM2 0 18H serial port 2 X18H  
 0

G09ENC.... connection with absolute servo motor is a special instruction, refer to zero file example;

## 4. Memory Use

Naming rules: VXX //xx unit.

# XX // Constant.

V0-V127,V400-V511 of user computing units

Port number type	Porto	Software port number	Register	Port number type	Porto	Software port number	Register
Input signal	<b>i00</b>	<b>P0</b>	<b>v144</b>	Output signal	<b>O00</b>	<b>P0</b>	<b>V160</b>
	<b>i01</b>	<b>P1</b>	<b>v145</b>		<b>O01</b>	<b>P1</b>	<b>v161</b>
	<b>i02</b>	<b>P2</b>	<b>v146</b>		<b>O02</b>	<b>P2</b>	<b>v162</b>
	<b>i03</b>	<b>P3</b>	<b>v147</b>		<b>O03</b>	<b>P3</b>	<b>v163</b>
	<b>i04</b>	<b>P4</b>	<b>v148</b>		<b>O04</b>	<b>P4</b>	<b>v164</b>
	<b>i05</b>	<b>P5</b>	<b>v149</b>		<b>O05</b>	<b>P5</b>	<b>v165</b>
	<b>i06</b>	<b>P6</b>	<b>v150</b>		<b>O06</b>	<b>P6</b>	<b>v166</b>
	<b>i07</b>	<b>P7</b>	<b>v151</b>		<b>O07</b>	<b>P7</b>	<b>v167</b>
	<b>i08</b>	<b>P8</b>	<b>v152</b>		<b>O08</b>	<b>P8</b>	<b>v168</b>
	<b>i09</b>	<b>P9</b>	<b>v153</b>		<b>O09</b>	<b>P9</b>	<b>v169</b>
	<b>i10</b>	<b>P10</b>	<b>v154</b>		<b>O10</b>	<b>P10</b>	<b>v170</b>
	<b>i11</b>	<b>P11</b>	<b>v155</b>		<b>O11</b>	<b>P11</b>	<b>v171</b>
	<b>i12</b>	<b>P12</b>	<b>v156</b>		<b>O12</b>	<b>P12</b>	<b>v172</b>
	<b>i13</b>	<b>P13</b>	<b>v157</b>		<b>O13</b>	<b>P13</b>	<b>v173</b>
	<b>i14</b>	<b>P14</b>	<b>v158</b>		<b>O14</b>	<b>P14</b>	<b>v174</b>
	<b>i15</b>	<b>P15</b>	<b>v159</b>		<b>O15</b>	<b>P15</b>	<b>v175</b>
Note: light value is 0, light out value is 1				Note: the light value is 1, the light out value is 0			

Port number type	Porto	Software port number	Register	Port number type	Porto	Software port number	Register
Origin signal	<b>HM0</b>	<b>P16</b>	<b>V192</b>	Limit position signal	<b>LP0</b>	<b>P22</b>	<b>V198</b>
	<b>HM1</b>	<b>P17</b>	<b>V193</b>		<b>LP1</b>	<b>P23</b>	<b>V199</b>
	<b>HM2</b>	<b>P18</b>	<b>V194</b>		<b>LP2</b>	<b>P24</b>	<b>V200</b>
	<b>HM3</b>	<b>P19</b>	<b>V195</b>		<b>LP3</b>	<b>P25</b>	<b>V201</b>
	<b>HM4</b>	<b>P20</b>	<b>V196</b>		<b>LP4</b>	<b>P26</b>	<b>V202</b>
	<b>HM5</b>	<b>P21</b>	<b>V197</b>		<b>LP5</b>	<b>P27</b>	<b>V203</b>
Servo alarm	<b>ALM0</b>	<b>P28</b>	<b>V204</b>				
	<b>ALM1</b>	<b>P29</b>	<b>V205</b>				
	<b>ALM2</b>	<b>P30</b>	<b>V206</b>				
	<b>ALM3</b>	<b>P31</b>	<b>V207</b>				
<b>V256~V271:</b> Value 1 capture enable open, <b>V189=0</b> Effect	<b>ENi00</b>	<b>p0</b>	<b>V256</b>	<b>V288~V303:</b> Capture time-length value, in milliseconds, required software zero	<b>FLAGi00</b>	<b>p0</b>	<b>V288</b>
	<b>ENi01</b>	<b>P1</b>	<b>V257</b>		<b>FLAGi01</b>	<b>P1</b>	<b>V289</b>
	<b>ENi02</b>	<b>P2</b>	<b>V258</b>		<b>FLAGi02</b>	<b>P2</b>	<b>V290</b>
	<b>ENi03</b>	<b>P3</b>	<b>V259</b>		<b>FLAGi03</b>	<b>P3</b>	<b>V291</b>
	<b>ENi04</b>	<b>P4</b>	<b>V260</b>		<b>FLAGi04</b>	<b>P4</b>	<b>V292</b>
	<b>ENi05</b>	<b>P5</b>	<b>V261</b>		<b>FLAGi05</b>	<b>P5</b>	<b>V293</b>
	<b>ENi06</b>	<b>P6</b>	<b>V262</b>		<b>FLAGi06</b>	<b>P6</b>	<b>V294</b>
	<b>ENi07</b>	<b>P7</b>	<b>V263</b>		<b>FLAGi07</b>	<b>P7</b>	<b>V295</b>
	<b>ENi08</b>	<b>P8</b>	<b>V264</b>		<b>FLAGi08</b>	<b>P8</b>	<b>V296</b>
	<b>ENi09</b>	<b>P9</b>	<b>V265</b>		<b>FLAGi09</b>	<b>P9</b>	<b>V297</b>
	<b>ENi10</b>	<b>P10</b>	<b>V266</b>		<b>FLAGi10</b>	<b>P10</b>	<b>V298</b>
	<b>ENi11</b>	<b>P11</b>	<b>V267</b>		<b>FLAGi11</b>	<b>P11</b>	<b>V299</b>
	<b>ENi12</b>	<b>P12</b>	<b>V268</b>		<b>FLAGi12</b>	<b>P12</b>	<b>V300</b>
	<b>ENi13</b>	<b>P13</b>	<b>V269</b>		<b>FLAGi13</b>	<b>P13</b>	<b>V301</b>
	<b>ENi14</b>	<b>P14</b>	<b>V270</b>		<b>FLAGi14</b>	<b>P14</b>	<b>V302</b>
<b>ENi15</b>	<b>P15</b>	<b>V271</b>	<b>FLAGi15</b>	<b>P15</b>	<b>V303</b>		

Note: light value is 0, light out value is 1

Query input signal:

G06SCAN=I // Scan ports.

G08IF v144== ACALL XXX #0 // If the I00 port signal is 0, call the program

XXX. G06I=P0.0 or // Waiting for I00 input.

G06 O=P0.1 // Enable O00 output.

## 5. modules

