FMC4030 Three-axis motion controller
Instructions for use

Project：FMC4030 Three-axis motion controller

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Version：1016

contents

一 Overview

The FMC4030 controller is a pulse-type controller, using a 32-bit ARM chip as the main control of the controller, the output frequency of each axis is up to 200KHz, and the internal integrated pulse counting function can realize precise stepper motor or servo motor position control and speed control.

This controller has 232, 485, EtherNet and other communication functions, and can interact with the host computer, touch screen, and other equipment to achieve the purpose of control.

This controller has 4 digital inputs and 4 digital outputs, which can be used to control conventional external equipment. Support three-axis positive and negative limit switch (NPN-NO).

This controller supports: single-axis control, two-axis linear interpolation, three-axis linear interpolation, two-axis arc and other motion control functions. Support Chinese script programming, support secondary development, provide DLL, Lib and other development libraries, support Windows, Linux system programming。

二 Hardware Configuration

1、Hardware interface

Type	Illustrate	Quantity
Power	24VDC	1
LimitSwitch	24V NPN-NO	6
Control signal 5V power supply	Power supplied to the drive	3
Pulse signal	Pulse	3
Direction signal	Dir	3
Input	24VInput, active low	4
Output	24VOpen drain output	4
EtherNet	Used for host computer communication	1
232（DB9）	Used for touch screen or host computer communication	1
232（RJ45）	Used for serial port debugging	1
485（RJ45）	Used for other device interaction	1

All the above interfaces are subjected to electrostatic test, which can pass the 8KV electrostatic level test, and the maximum carrying current of the output port is 300mA。

2、Hardware wiring

FMC4030-controller hardware wiring diagram is as follows

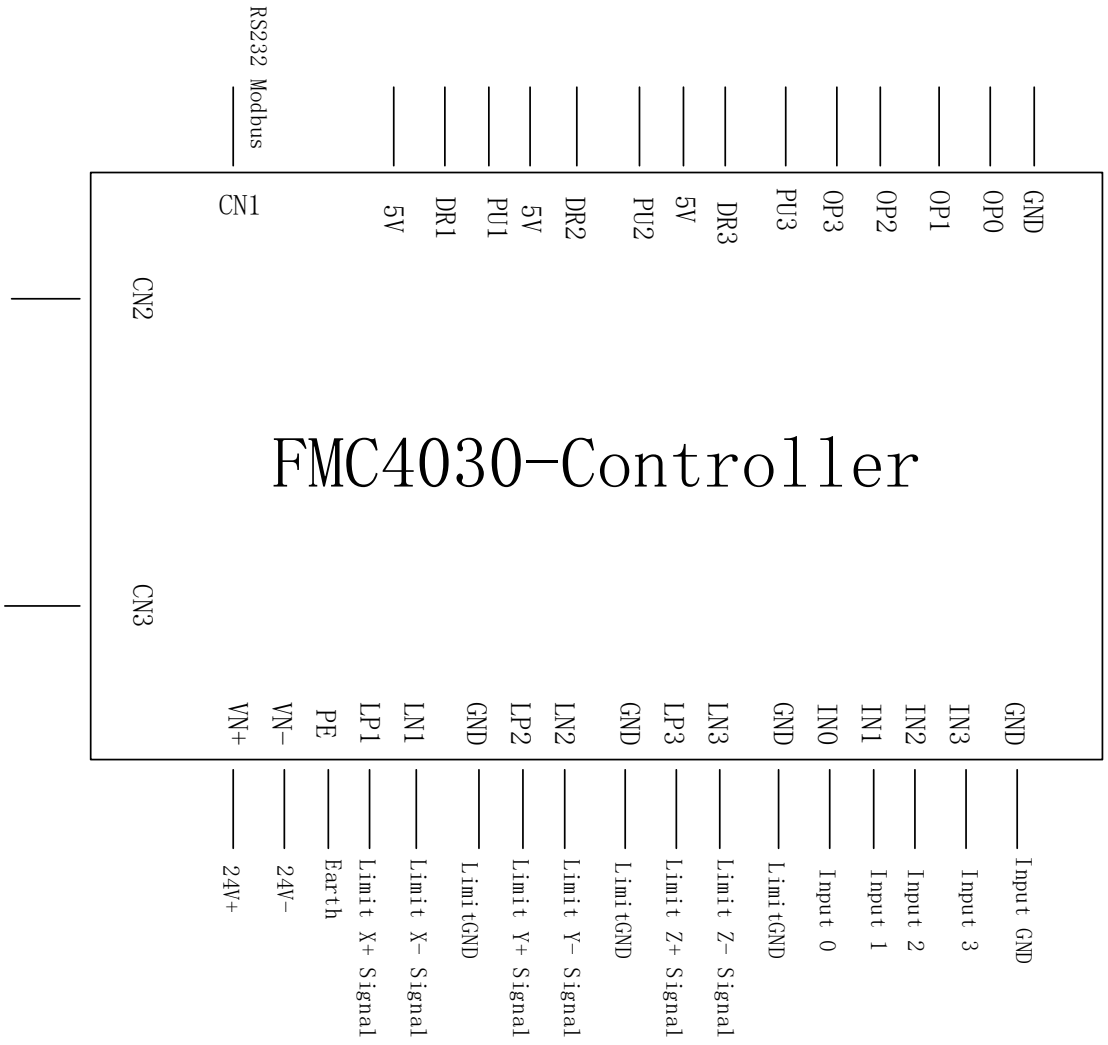
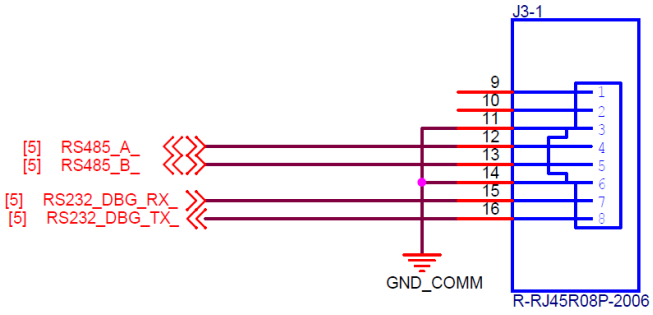


Figure1 FMC4030 Interface diagram

CN1 interface uses DB9 interface for connection, among which pin 2 is sending and pin 3 is receiving。

The CN2 interface is connected with a standard RJ45 network



cable, and the pin definitions are as follows：

图 2 CN2 Interface diagram

The CN3 interface uses a standard RJ45 network cable to connect to a computer or router. The default IP address of the controller is: 192.168.0.30, and the default port number is: 8088。

The wiring diagram of pulse signal and limit signal is as follows：

Take the X axis as an example：

（1）Pulse signal wiring

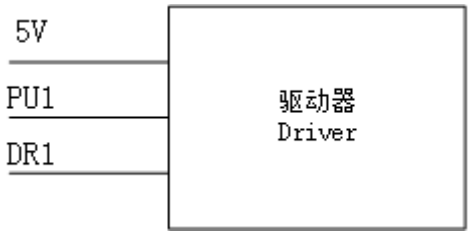


Figure3 Pulse signal wiring

（2）Positive limit switch wiring

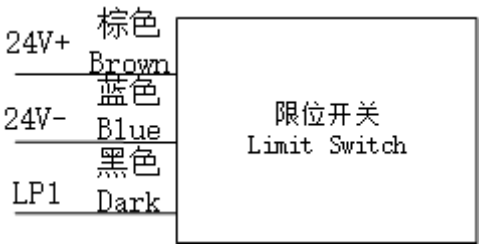


Figure4 Positive limit switch wiring

Negative limit and other axis limit switches and so on。

（3）Input port wiring, take Input0 as an example

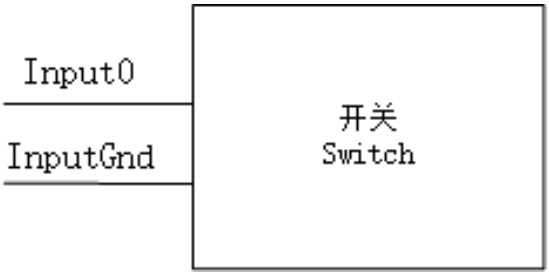


Figure5 Input port wiring

（4）Output port wiring, take OP0 as an example

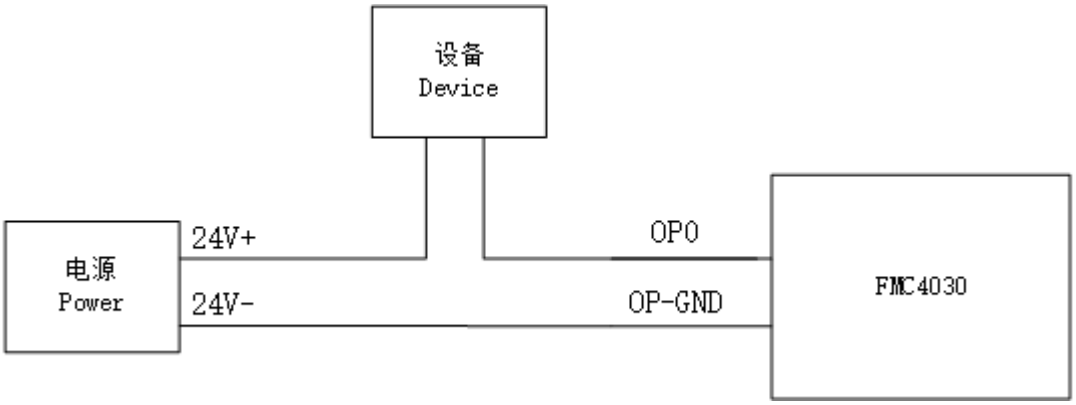


Figure6 Output port wiring

三 Features

1、Communication connection

（1）Ethernet communication

This communication method is the main communication method of the controller. The CN3 interface of the controller is connected to the computer network card, router, and switch through a network cable. The default IP address of the controller is 192.168.0.30. The PING tool can be used for communication test. Before the communication test, ensure that the computer network card and the controller are in the same network segment. Set the computer as shown below。

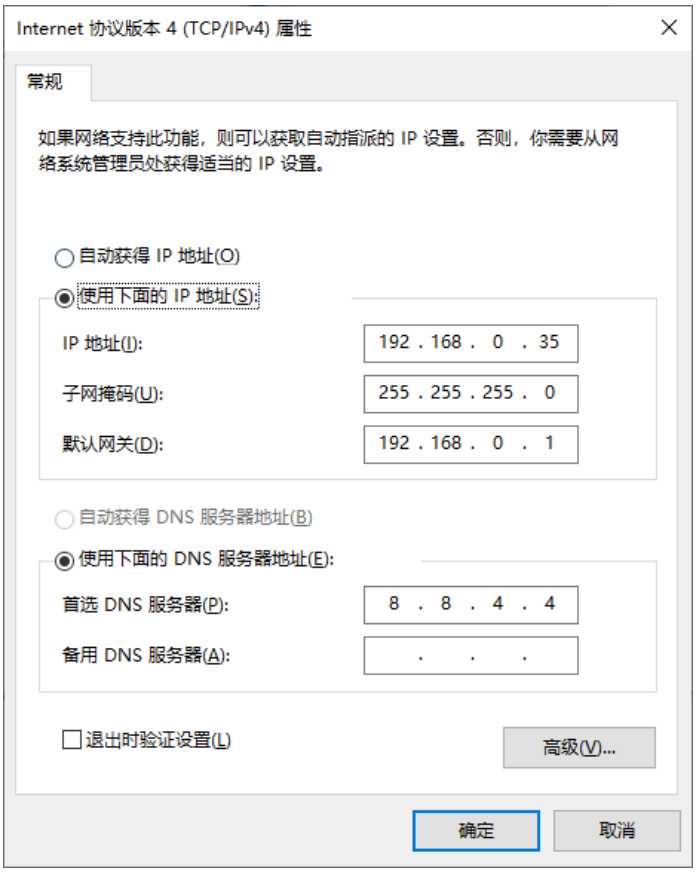


Figure7 Computer network segment settings

After the setting is completed, you can use the CMD tool to enter the following commands to test

ping 192.168.0.30 -t

Figure8 pingTool testing

If the above information appears, it means that the communication between the controller and the computer is normal. Next, use the host computer software provided by the company for connection control。（Fuyu-Controller-WorkStudio.exe）

（2）232 Debug serial communication

This method is an auxiliary communication method. When the IP address or port number of the controller is forgotten and the Ethernet method cannot be used for communication, this interface can be used to set and control the parameters of the controller。

This interface is located in the CN2 interface. Connect lines 7 and 8 to the sending and receiving interfaces of the USB to 232 device to communicate. The default baud rate is 115200. The upper computer can

use Putty serial port debugging software, and you can connect after setting the serial port number and baud rate。

After connecting, use shell commands to control, enter the help command to view all supported commands。

The controller IP address and port number can be restored by the command setip 192.168.0.30 and command setport 8088。

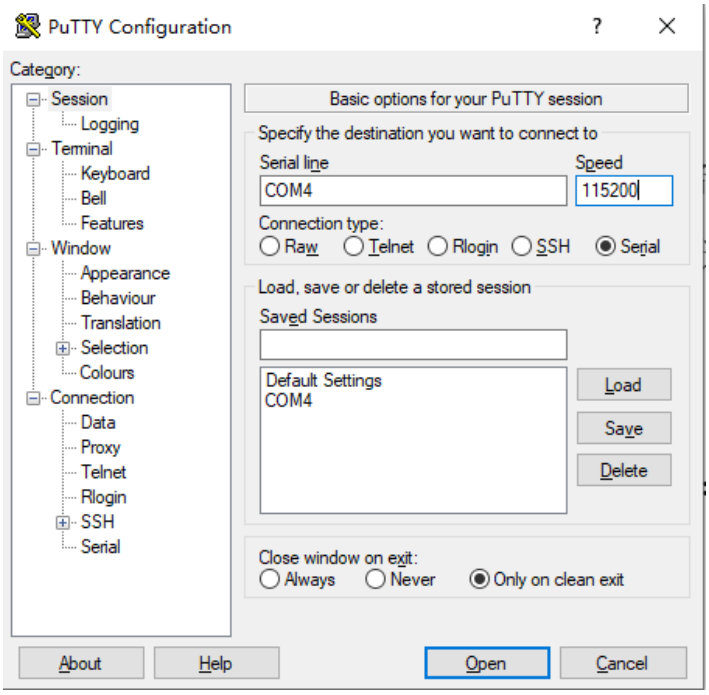


Figure9 Serial debugging tool

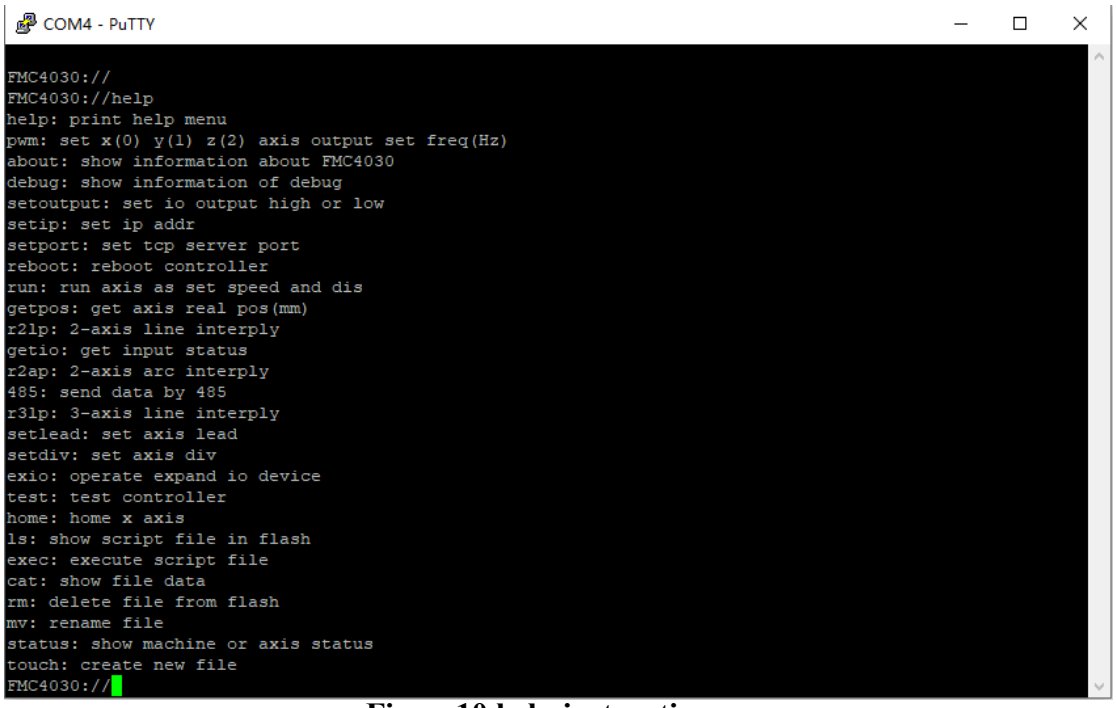


Figure10 help instruction

（3）232（DB9 interface）Communication

This interface adopts DB9 female interface, it should be connected with DB9 male 2 and 3 non-crossing data lines。

This interface is generally used for the connection of configuration screens and other equipment, using Modbus communication protocol, or USB to 232 data cable for communication with the computer for secondary development。

（4）485 communication

This interface is located on the 4th and 5th data lines of CN2, and can be used to control the company's FSC-2A single-axis controller and other equipment with 485 communication. Generally not used as a communication interface for secondary development。

2、PC software introduction

This controller provides the host computer controller software. This software runs on the Windows operating system. The software is 32-bit. The VC++2012 runtime library is used, so you need to install the VC++2012 runtime library before use (included in the software package) middle).

This software does not need to be installed, just run it directly in the software package folder, please do not move the exe file to other places, otherwise there will be a problem that the library cannot be found。

（1）connect

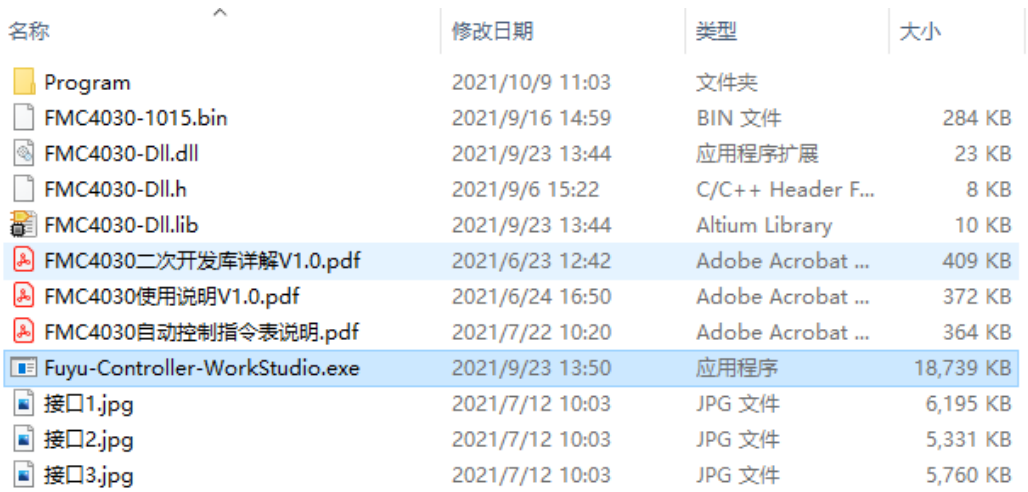


Figure11 Folder content schematic

（1）Connect the controller

Double-click to open the software and enter the main interface. Since the IP address of the computer network card has been set before, it needs to be kept in the same network segment as the controller。

After opening the software, find the controller option in the menu bar and select the connected controller to start

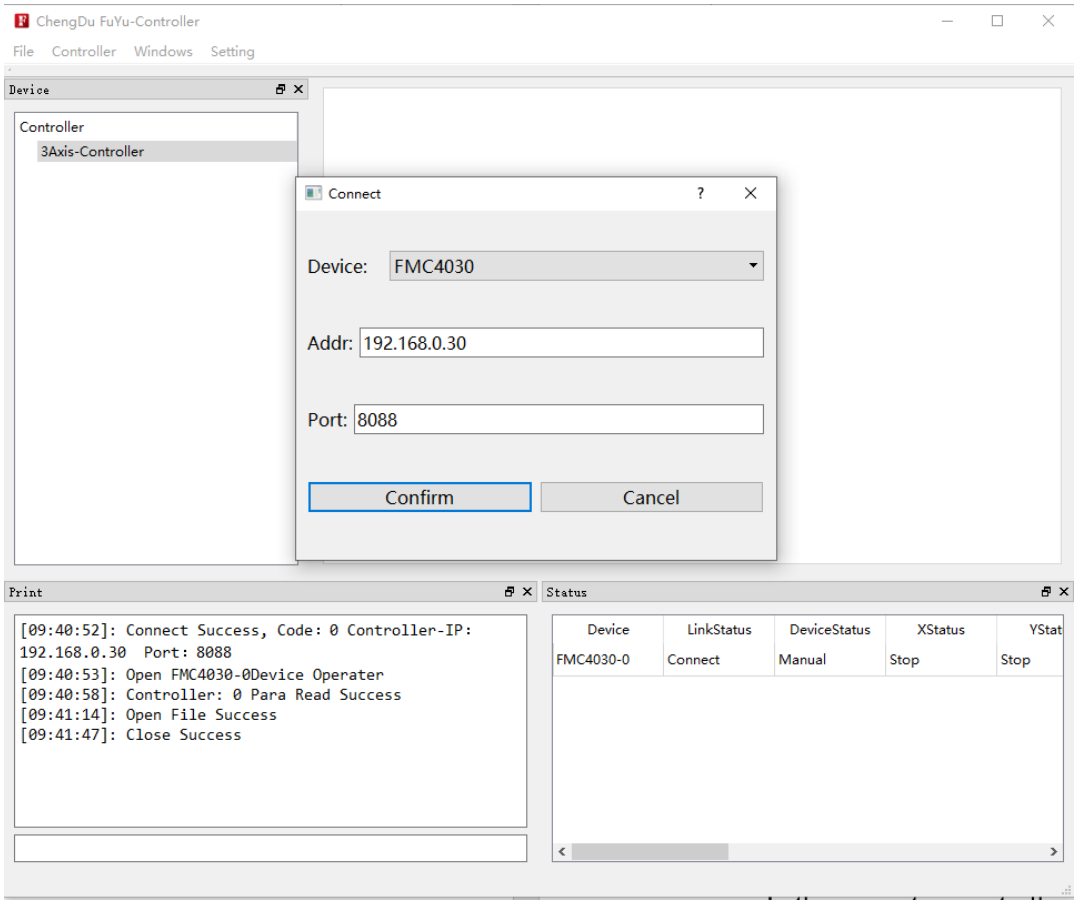


Figure12 Connect the controller

In the connection controller interface in the above figure, just follow the default parameters. If the controller IP and port parameters have been modified, set them according to the modified parameters. Click OK to connect to the controller。

After connecting to the controller, it will be displayed under the three-axis controller item in the device list on the left: FMC4030-0-192.168.0.30-8088. This software can be connected to multiple controllers, and the information includes the number, IP address, and port number of each controller to distinguish。

Double-click FMC4030-0-192.168.0.30-8088 to open the operation

interface of FMC4030 controller。

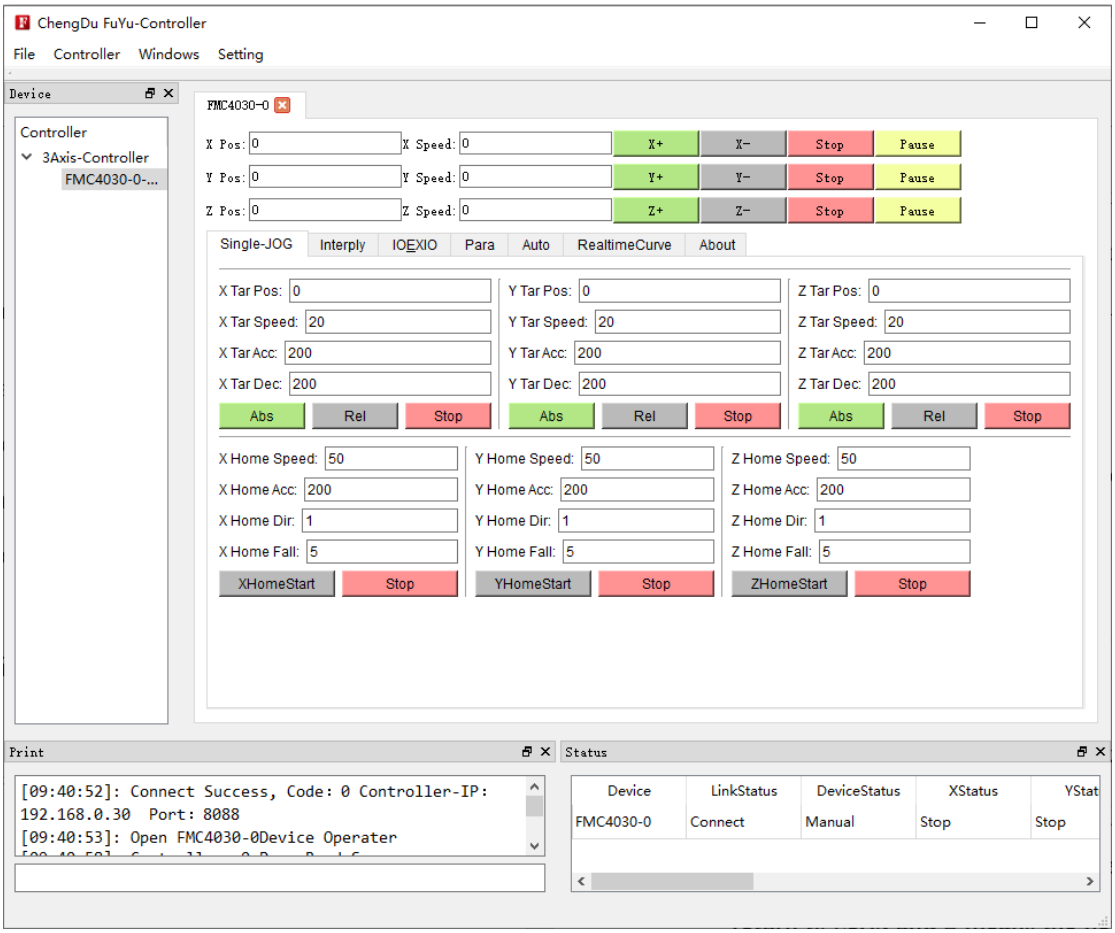


Figure13 Controller interface

In the above interface, there are four large areas, including：

Device list: display the currently connected controller and open the operation interface of the corresponding controller

Operation interface: perform a series of operations on the selected controller。

Print output: output current operation information and error prompts。

Status monitoring: monitor the connection status of each controller

and the motion status of each axis。

（2）Controller operation

In the controller operation interface, it is mainly divided into two parts, one is the real-time display of the position and speed of each axis, and the other is the operation of the controller

1、Single axis JOG

In this sub-page, you can control the motion of each axis separately, including: relative motion, absolute motion, and zero return motion

Take the X axis as an example：

Relative motion: set target position, speed, acceleration, deceleration and other parameters, the unit is mm/s. Click on the relative movement, it will move with the current position, the positive and negative of the target position can control the positive and negative of the axis, if the set target position exceeds the software limit, it will be limited by the software to the set value。

Absolute motion: set the target position, speed, acceleration and other parameters, click on absolute motion, the distance and direction of movement will be calculated according to the set target position and 0 point。

Zero return movement: After setting the zero return speed, zero return acceleration/deceleration, zero return direction, zero return drop distance and other parameters, click X to start the zero return, and then

the zero return will begin. In the zero return movement, the zero return direction 1 means that the positive limit is used as the trigger switch to return to zero, and 2 means the negative limit is used as the trigger switch to return to zero. The positive limit is located far away from the motor end, and the negative limit is close to the motor end. The zero return drop distance indicates the distance of the slider away from the limit switch after the zero return is completed. It is recommended not to be 0 to avoid the interference of the slider position when the limit switch is limited by hardware. During the zero return process, if the limit switch is not triggered for a long time, the zero return will be terminated. This is to protect the module from continuous impact. The zero return time can be set in the parameter setting to ensure the safety of the zero return. , Unit ms。

2、Interpolation motion

This controller supports two-axis linear interpolation, three-axis linear interpolation, and two-axis circular interpolation motion。

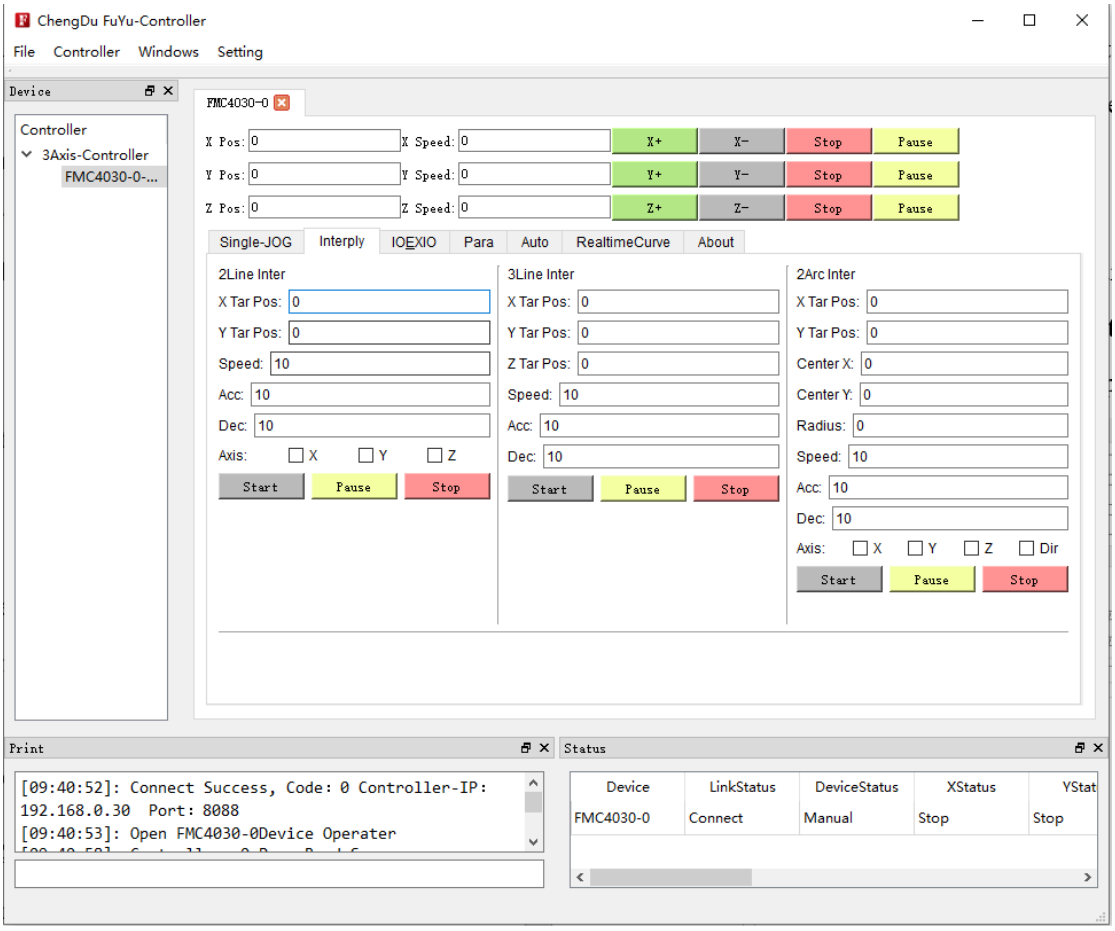


Figure14 Interpolation motion sub-interface

Two-axis linear interpolation: Set the X-axis target position and Y-axis target position. At this time, X and Y are not the actual X and Y axes. Set parameters such as interpolation speed, interpolation acceleration, and interpolation deceleration. In the interpolation axis options, select the two axes that actually need to be moved, and then click Start to start two-axis linear interpolation。

Three-axis linear interpolation: The parameters are the same as the two-axis linear interpolation, but there is no need to select the interpolation axis。

Two-axis circular interpolation: set X-axis target position, Y-axis

target position, center X coordinate, center Y coordinate, radius and other parameters. After selecting the interpolation axis, click start to perform circular interpolation movement。

3、IO and IO expansion

In this sub-interface, you can control the input and output IO ports of the controller, and also control the external expansion IO, 485 bus driver and control integrated equipment, etc。

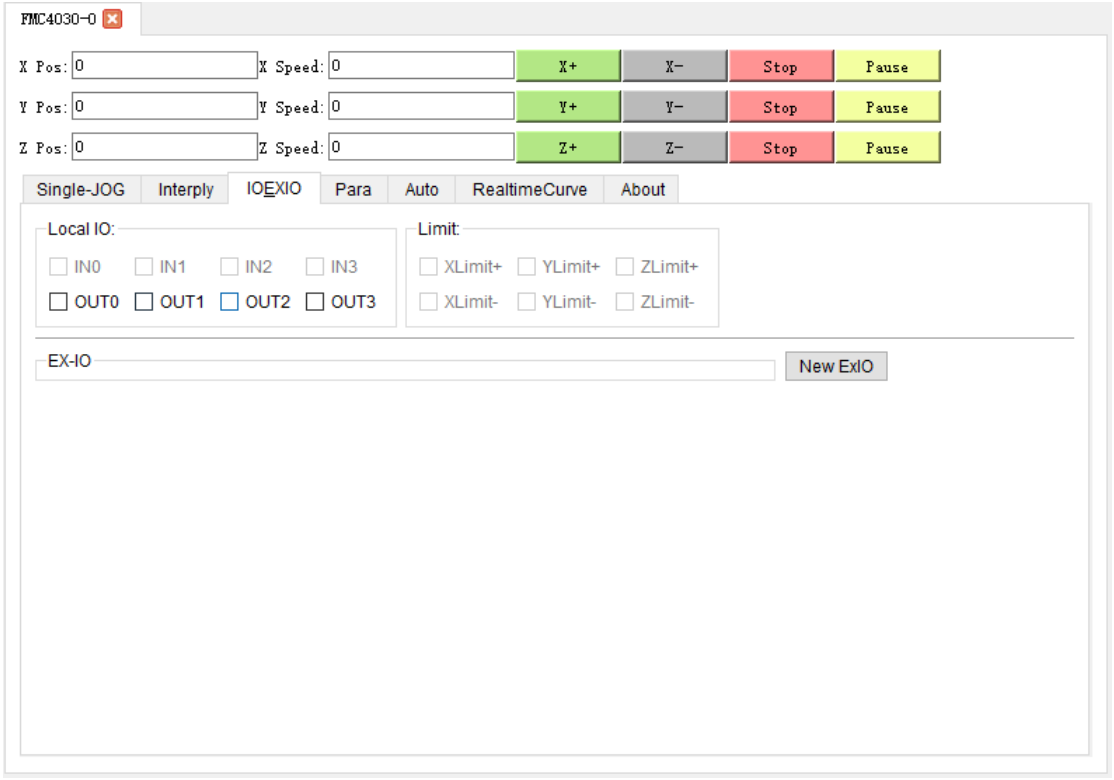


Figure15 IO and extended IO sub-interface

Local IO means to operate the four-way input and four-way output of the controller. IN0-IN3 indicate the state of the input. If selected, it means that the input port is low and is a valid input. The input port status can only be viewed, not selected. The output port can be selected. When selected, the corresponding output port outputs low level, the

corresponding output loop is turned on, and the external device circuit is also turned on to achieve the purpose of controlling the external device。

The limit signal indicates the positive and negative limit trigger status of each axis. Each axis has two hardware limit switches, plus and minus. If the limit switch is triggered, this status box will be selected。

In the extended IO, there is no content in the default interface. You need to click on the new IO device and set it according to the configuration before the corresponding device will be displayed. (No such function temporarily)。

4、parameter

In the parameter interface, you can adjust each parameter of the controller。

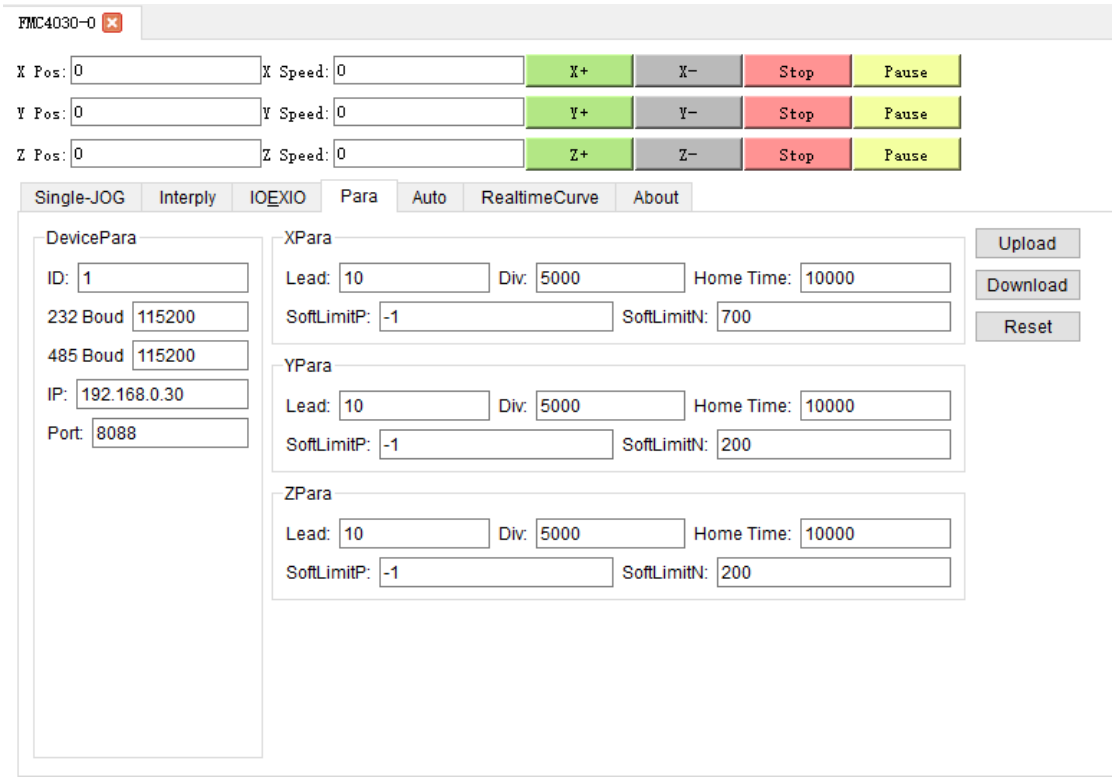


Figure16 Parameters sub-interface

The first time you enter this interface, there are no parameters by default. After you need to manually click to upload the parameters, the interface will display the internal parameters of the controller. After modifying the parameters, click to download the parameters, the internal parameters of the controller will be modified, and the power will not be lost。

Device parameters include: ID, 232 baud rate, 485 baud rate, IP address, and Port port number. The ID is used for 232 communication. The hardware interface corresponding to 232 baud rate is CN1 (DB9) interface

Axis parameters include: lead, subdivision, zero return timeout time, soft limit positive limit, soft limit negative limit, etc。

The zero return timeout time is used to stop returning to zero without triggering the limit switch for a long time when returning to zero. The unit is ms。

The software limit default is: software positive limit 200, software negative limit 200. If you want to cancel the software limit, set any one of the positive and negative software limits to a negative number。

5、Automatic control

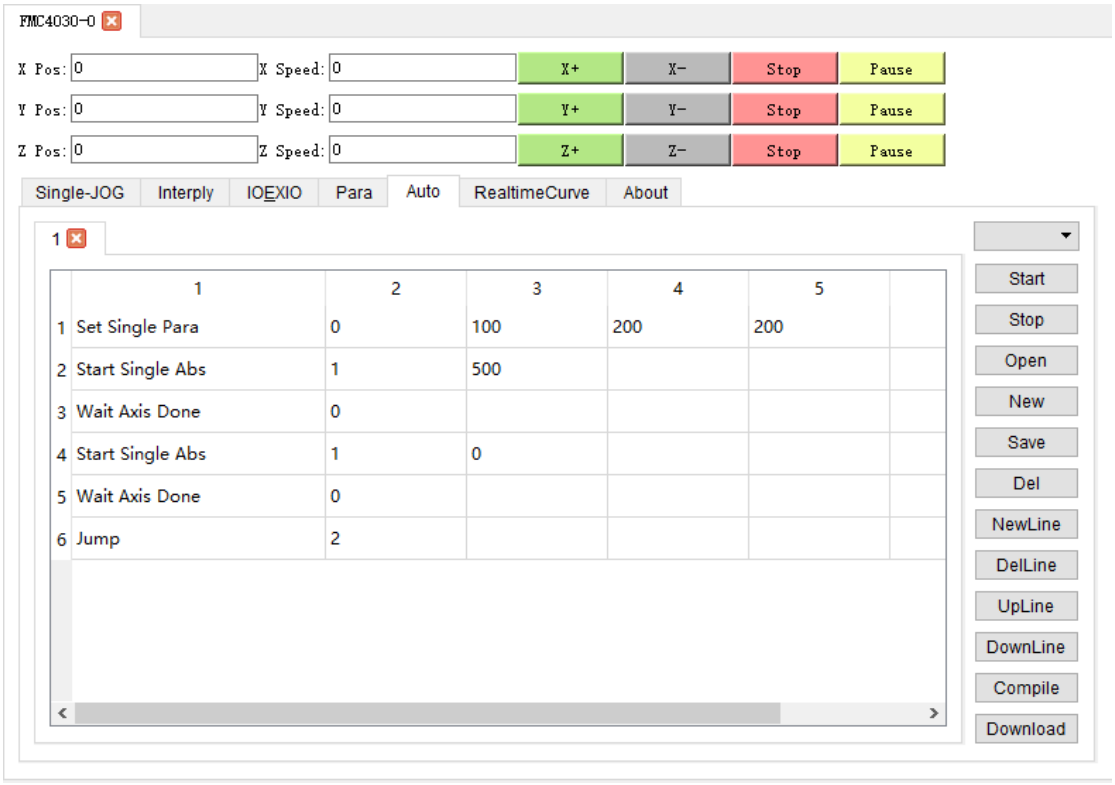


Figure17 Automatic control sub-interface

Script programs can be written in this interface to realize the automatic operation of the controller. First, you need to "create a new file", the file name cannot be in Chinese, and the length of the file name cannot exceed 8 characters。

Then in the above interface, select New Program Line, and a new line will be created in the table. The first step is to select the instruction in the first column. The instruction does not need to be entered manually. Double-click the corresponding input box and a drop-down box will pop up. Select the desired in the drop-down box. Instructions used. Columns 2, 3, 4, and 5 are all parameter columns, and the 6th column is a remark, not involved in the operation of the program。

Please refer to the manual of "FMC4030 Automatic Control Instruction List" for specific instructions and various instruction

parameters。

After writing the file, first save the file and select the saving path. There can be no Chinese in the saving path. Try to choose the subfolder under the folder where the software is located for easy management. After saving, click to compile the program, prompting that the compilation is complete, you can download the program。

After the download is successful, there will be corresponding information in the printout window. At this time, select the downloaded file in the drop-down box above the "Start Run" button, and then click "Start Run". Need to stop running, just click "stop running"。

6、Real-time curve

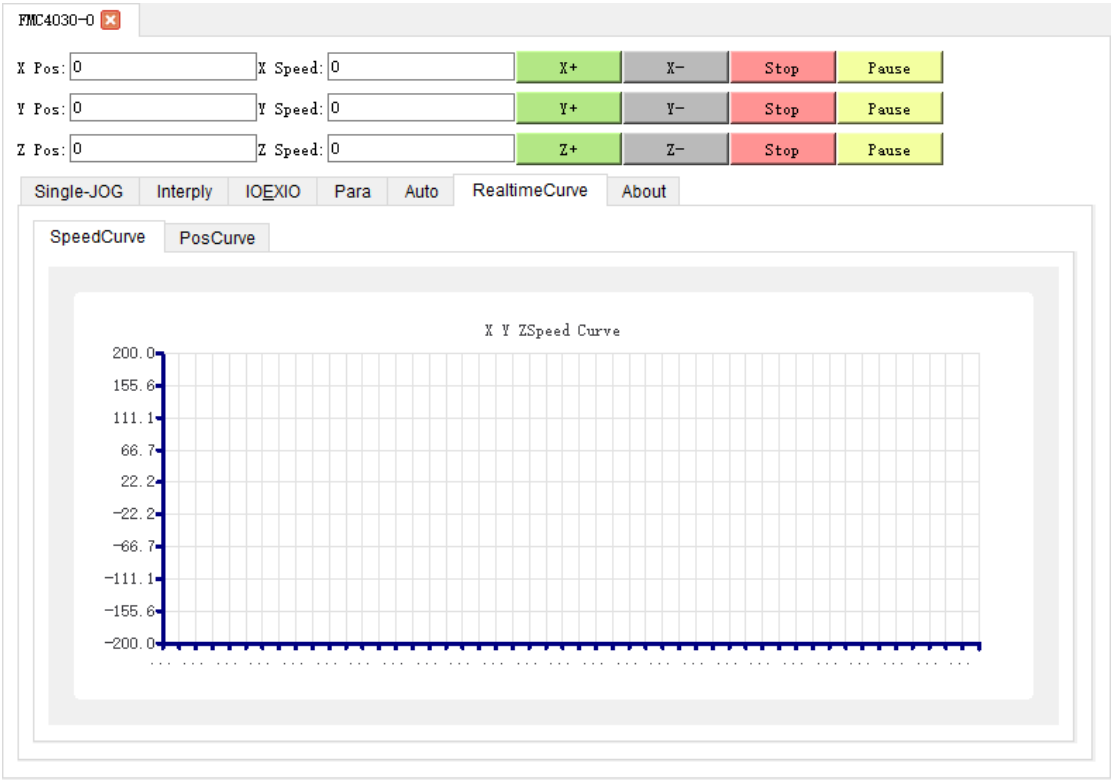


Figure18 Real-time curve sub-interface

This interface is used to display the actual running speed of each

axis in the form of a graph. (Not yet open to use)。

7、about

This interface displays data about the version and version information of the controller, and the controller can also be upgraded online on this interface.

About the interface includes: host computer version, firmware version, dynamic library version, controller serial number and other information。

PC version：Refers to the software version information

Firmware version：Refers to the internal program version number of the controller

Dynamic library version：Refers to the version number of the secondary development library. Since the software is also developed based on the dynamic library, the corresponding version number will also be displayed

Controller serial number：A unique serial number will be assigned

to mark this controller after passing the factory production test

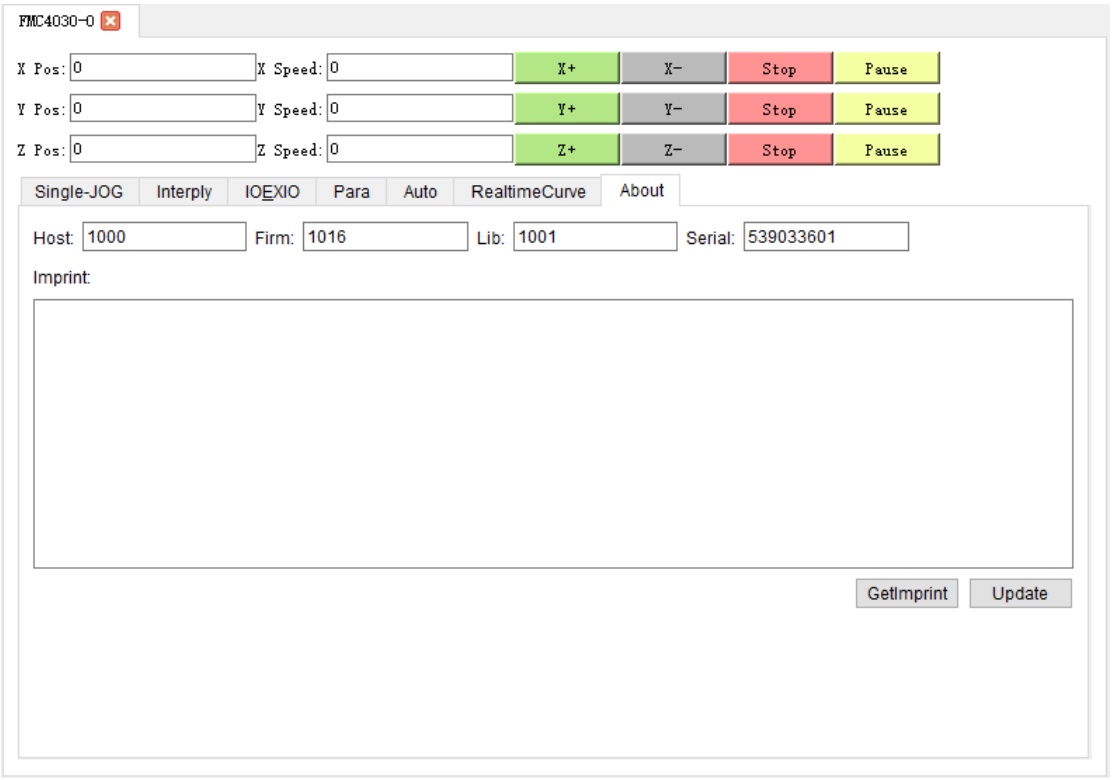


Figure19 About the sub-interface

Get version description button: After you need to connect to the server, the data will be downloaded and displayed from the server。

Online upgrade. After clicking, the upgrade file selection will be performed. This is to upgrade the internal program of the controller. The upgrade file is generally in the format of "FMC4030-1015.bin". 1015 represents the firmware version, which should be consistent with the firmware version in the software about interface。

8、Graphics drawing

(Not yet open)