



**MOTION CONTROLLER
USER MANUAL**
MOC-03

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1. Overview

The MOC-03 series motion controller is a closed-loop controller that is controlled via computer software. It is mainly used to connect to motorized positioning stages and control their movement.

Features:

- The grating ruler or encoder can be connected to realize closed-loop control
- Built-in fixed high subdivision drivers constitute a multidimensional high precision position control system or speed control system
- 1.69A and 3A stepper motors can be driven, and displacement adjustment automation can be realized by cooperating with our motorized positioning stages.
- Multi-axis linkage and any single-axis motion can be realized
- The software has three modes of manual operation, target operation, and incremental operation.

2. Technical Parameters

Operating voltage: AC220V/AC110V $\pm 10\%$ /50Hz

Ambient temperature: $-10^{\circ}\text{C} \sim 45^{\circ}\text{C}$

Relative humidity: $\leq 85\%$

Maximum number of axes: 6

3. Overall Dimensions

3.1 Front Panel

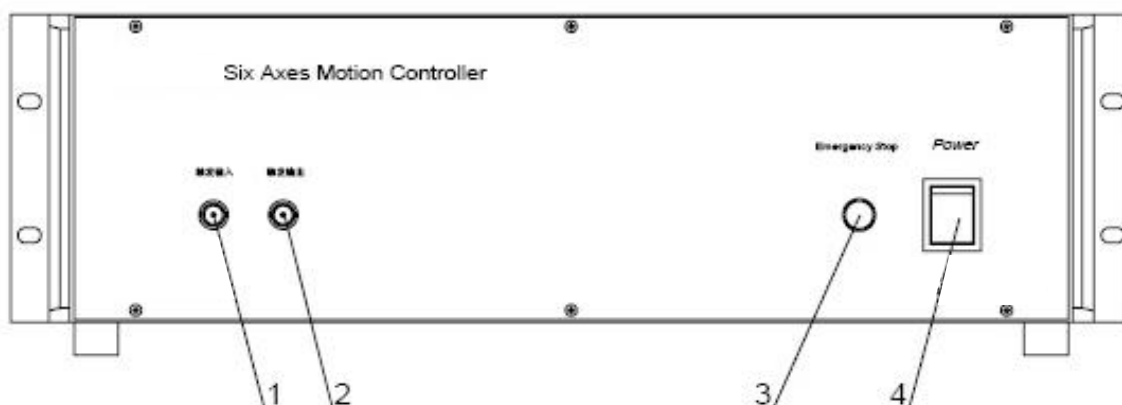


Figure 1 Front panel diagram

- (1) Trigger input: Used for synchronizing pulse signal input.
- (2) Trigger output: Used for synchronizing pulse signal output.
- (3) Emergency stop button. When this button is pressed, all the motorized positioning stages will stop running at the same time, but will be continuously charged for safety braking.
- (4) Power switch

3.2 Back Panel

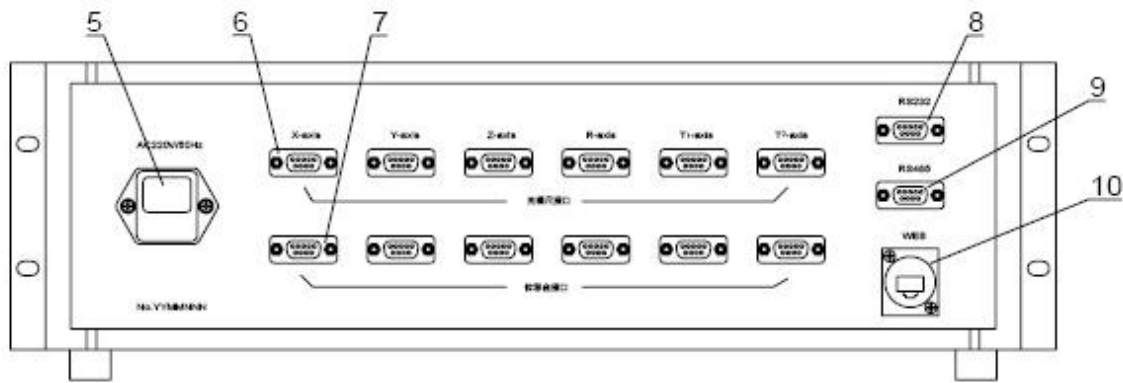


Figure 2 Back panel diagram

Interface description:

- (5) AC220V / AC110V power socket
- (6) Connecting interface of grating ruler for each axis
- (7) Connecting interface of each axis
- (8) RS232 interface
- (9) RS485 interface
- (10) Ethernet interface

Note: This picture takes the rear panel of 6-axis motion controller as an example. Other models are subject to the real object.

For more information about the interface of the motorized positioning stages, please refer to the section 4.

Note: Please ensure that the motion controller is powered off prior to connecting it to the motorized positioning stages.

3.3 Dimensions

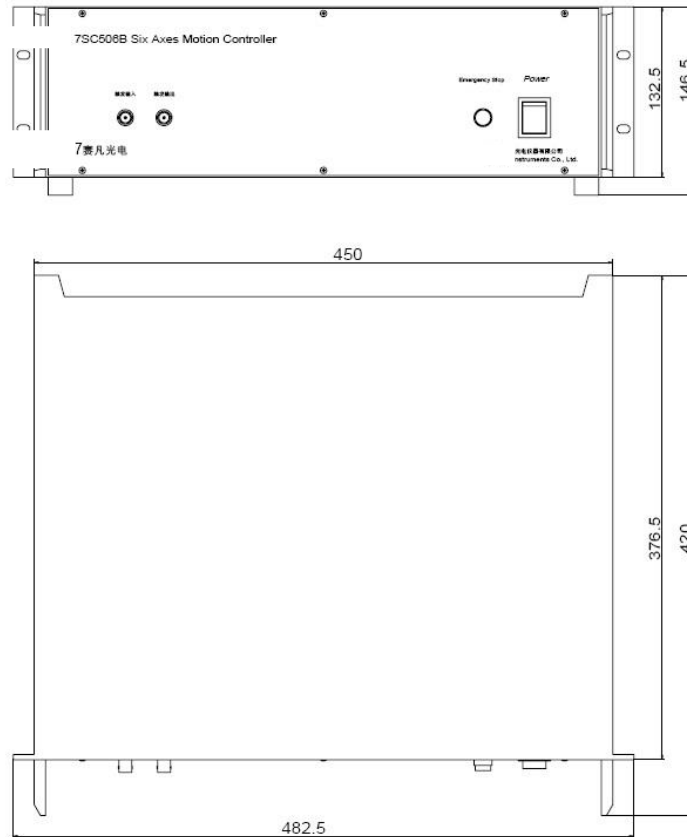


Figure 3 Dimensions

4. Pin Definition

The following table lists the connection information between the motion controller and the motorized positioning stages. When users need to connect with the motorized positioning stages of other company, please refer to this table.

Pin	Signal
1	24 V
2	The limit switch on opposite side of motor.
3	The limit switch near the motor.
4	The limit switch signal loop.
5	Photoelectric signal input
6	Positive end of A phase winding (A+).
7	Negative end of A phase winding (A-).
8	Positive end of B phase winding (B+).
9	Negative end of B phase winding (B-).

Table 1 Interface definition of motorized positioning stage

Pin	Signal
1	A -
2	Ground
3	B -
4	Null
5	Z -
6	A +
7	Power supply + 5 v
8	B +
9	Z +

Table 2 Interface definition of grating ruler

5. Hardware Connection and Setup

There are three ways to connect the controller and computer, namely Ethernet, RS232, and RS485. When the MOC-03 series motion controller uses an Ethernet communication interface, connect the controller and the computer via a cross-over Ethernet cable. The default factory IP address of the controller is: 192.168.5.11. Before starting the software, you need to set the IP address of the PC.

The steps to set the PC IP address are as follows. Taking Windows 11 as an example, open the "Control Panel" window, click "View network status and tasks", then click the text next to "Connect" in the "View active networks" box. In the pop-up window, click "Properties". In the properties window, scroll the vertical scroll bar, click "Internet Protocol Version 4 (TCP/IPv4)", and then click the "Properties" button to open the window as shown in the following figure.

The first three fields of the IP address set on the PC should be the same as those of the controller, and the fourth field should be different. As shown in the figure, set the IP address of the PC to 192.168.5.6. The default value of the subnet mask will appear after clicking and does not need to be modified. The default gateway can be set to 192.168.5.0, and then click "OK".

Note: Please ensure that the motion controller is powered off prior to connecting it to the computer.

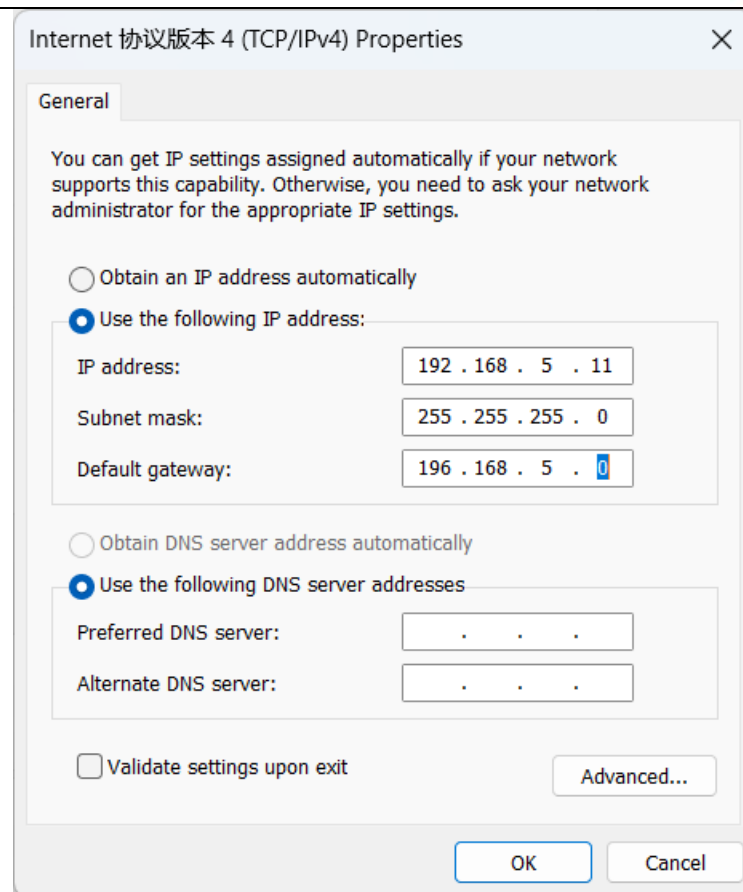


Figure 4 IP address setting

6. Software Operating

6.1 Introduction

The motion control software is mainly combined with the MOC-03 series motion controllers to achieve complex and accurate control of the motorized positioning stages:

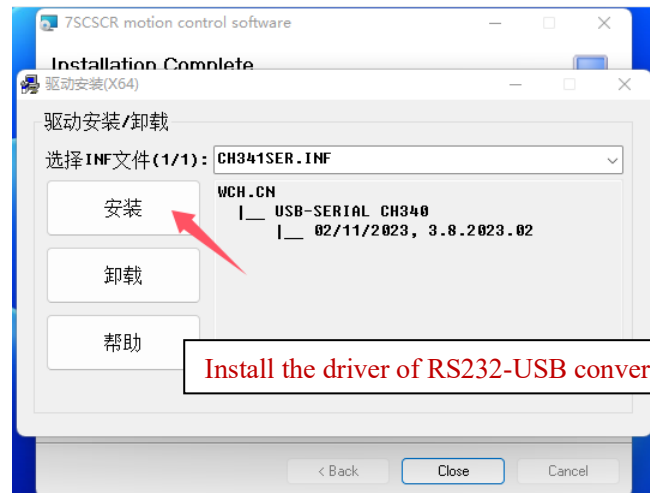
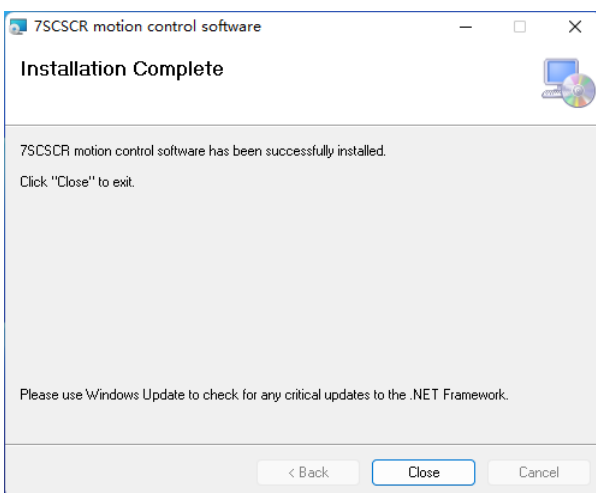
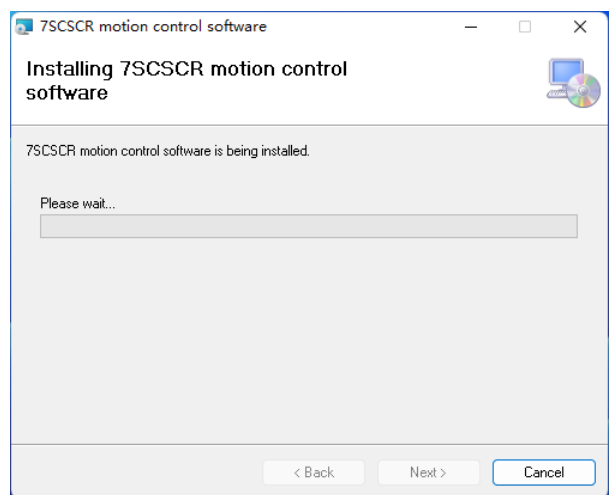
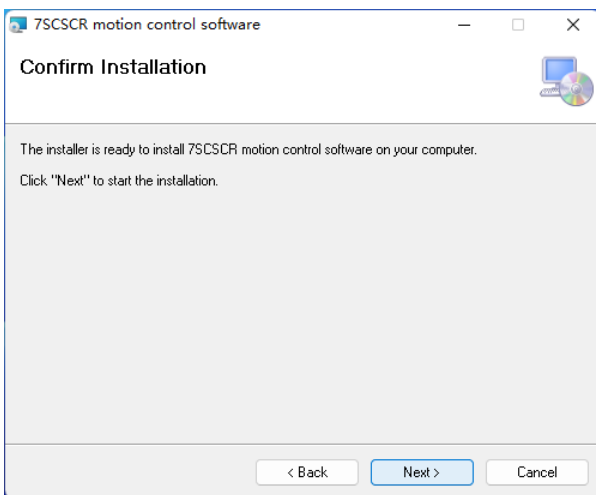
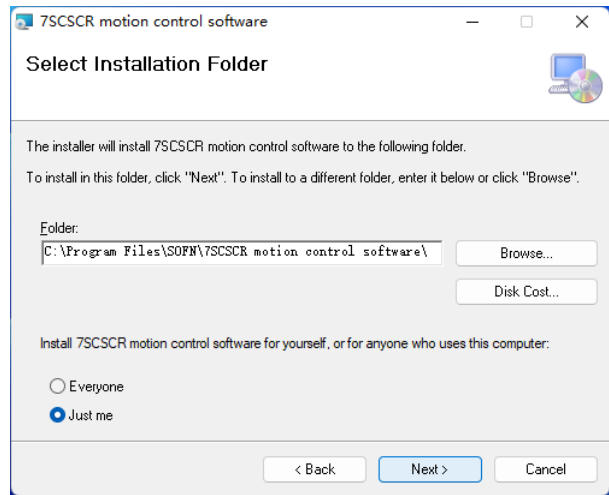
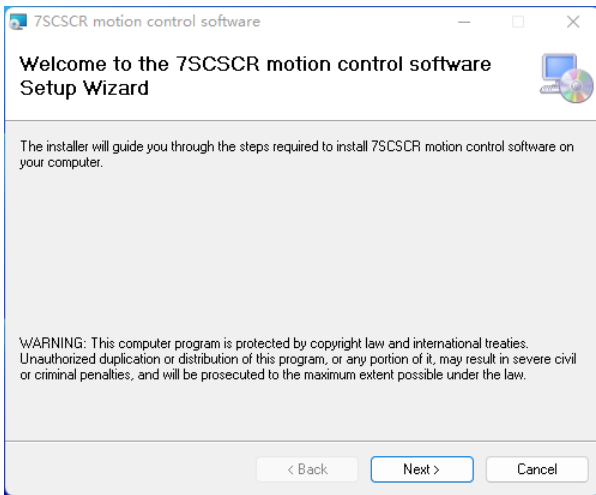
- Free mode: free to increase or decrease position.
- Increment mode: increase or decrease position precisely.
- Target mode: quickly and accurately run to a certain location.

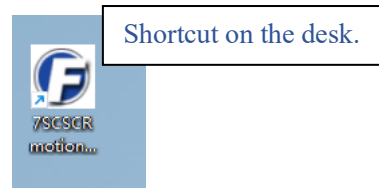
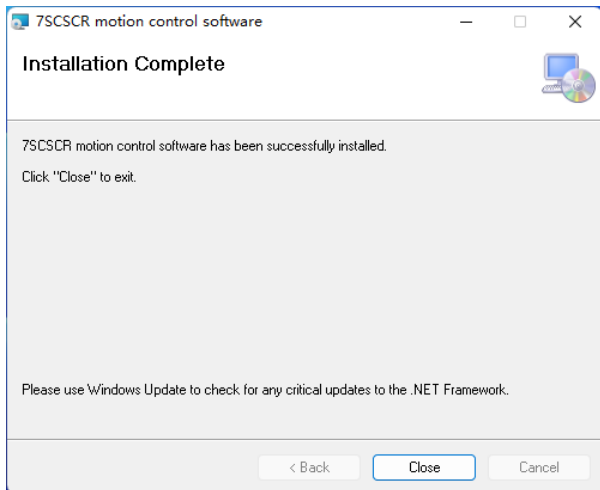
The parameters in the software can be changed to match the hardware parameters, which can flexibly adapt to the control of all kinds of motorized positioning stages.

6.2 Software & RS232-USB Converter Installation

Please download the motion control software 7SCSCR for X64 from our website. Double-click the setup.exe file to install our software 7SCSCR and the driver of the RS232-USB converter. The small CD along with the controller includes the driver of the RS232-USB converter. It doesn't need to install the driver on the small CD.

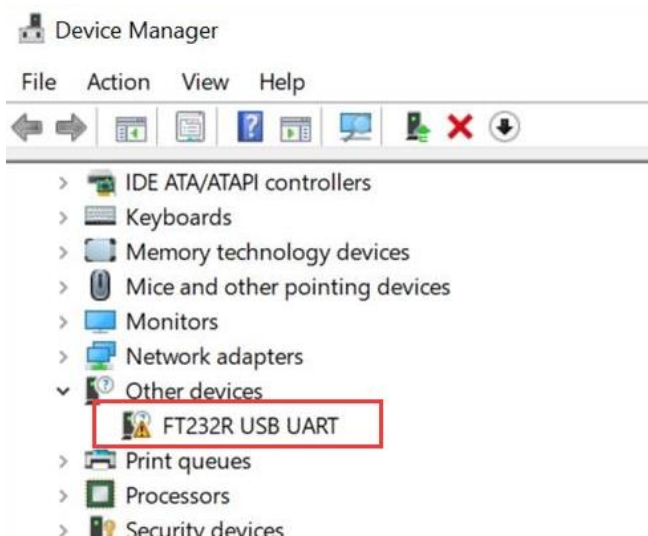
- DotNetFX40Client
- WindowsInstaller3_1
- 7SCSCR for x64.msi
- setup.exe



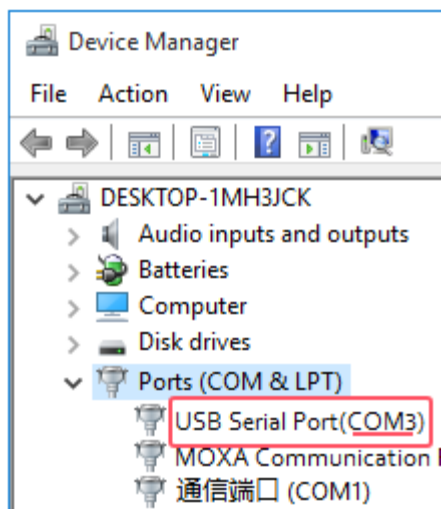


The RS232-USB converter driver will be installed when you install the 7SCSCR motion controller software. However, if the driver doesn't install successfully, please download it from our website and install it separately.

The unrecognized RS232-USB converter will be listed in the Device Manager as follows.

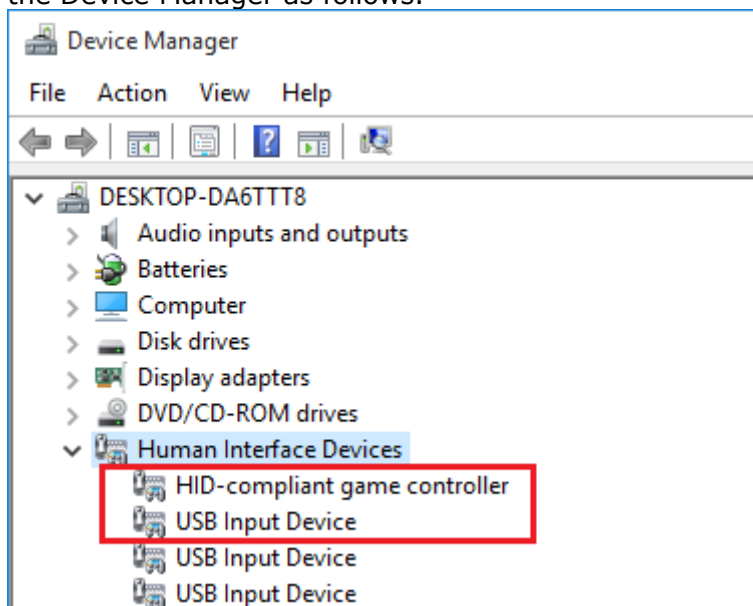


If you connect the motion controller to computer via the RS232-USB converter, please get the port number assigned for the USB Serial Port in the Device Manager and then select the same serial port in our software to connect to the controller.

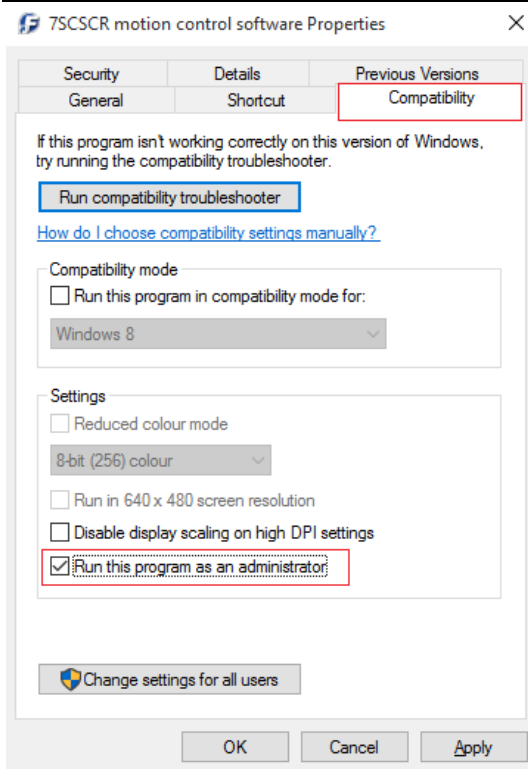


6.3 Joystick Installation

If you also bought our joystick, the joystick driver will be installed automatically when you connect it to the computer. After the joystick driver is installed successfully, these devices will be listed in the Device Manager as follows.



Before using the software, right-click on the desktop icon of the 7SCSCR motion control software, select 'Properties' from the dropdown menu, then switch to the 'Compatibility' tab, check 'Run this program as an administrator', and click 'OK'.



6.4 Software Operation

Start the software after turning on the controller for about half a minute.

Note: Since the identification of network interface power supply takes a certain time, it is necessary to wait for at least half a minute after starting up to ensure correct port identification, otherwise the controller may not be found, at this time, please restart the software to reconnect the controller.

(1) Main Interface (Manual Operation)

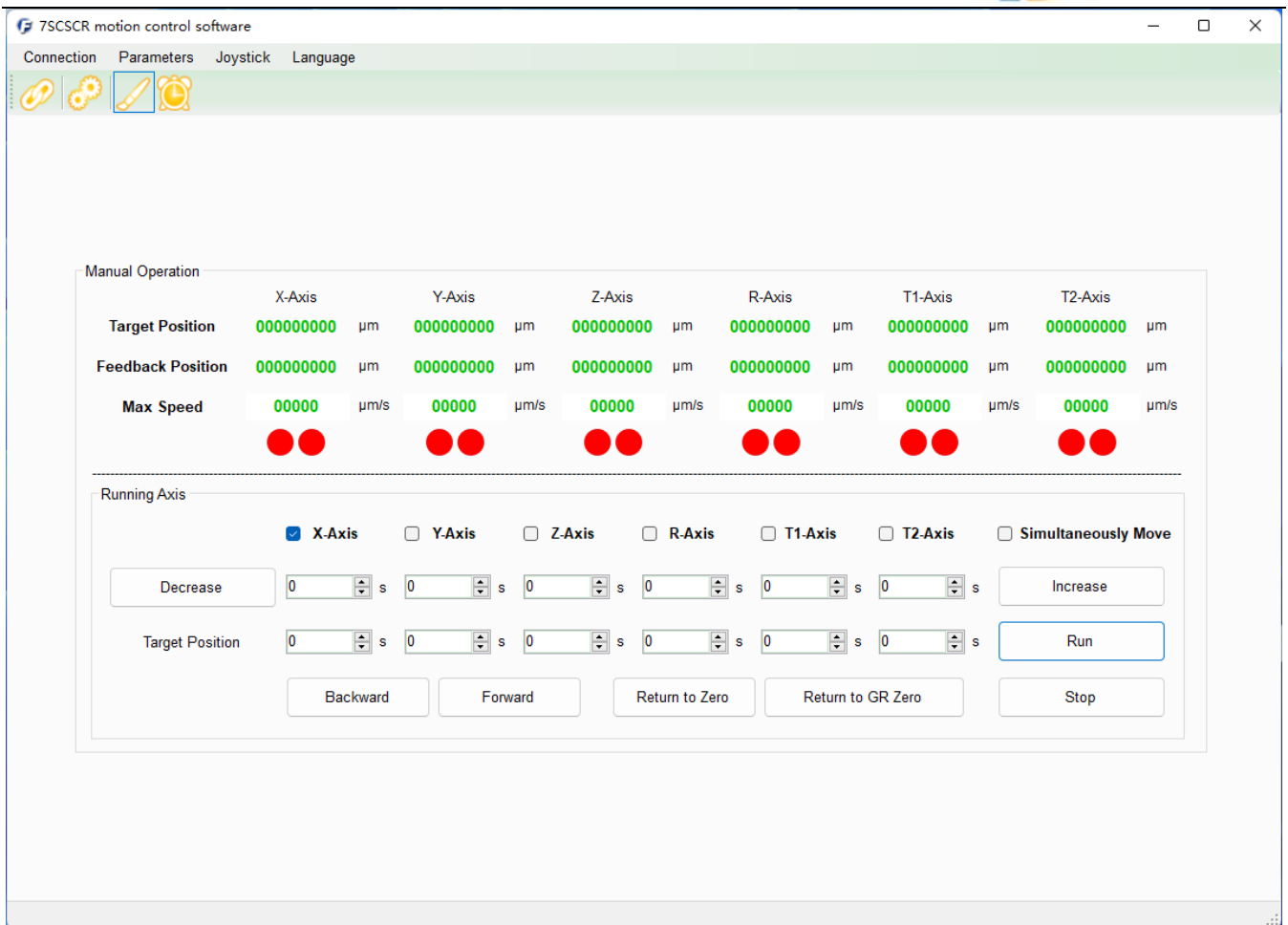
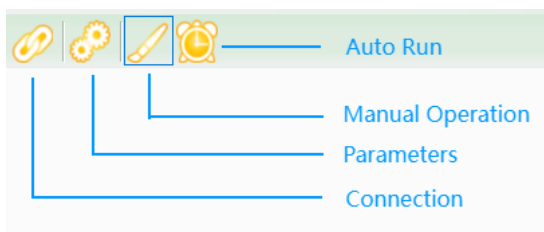


Figure 5 Main interface

The main menu includes 'Connection', 'Parameters', and 'Joystick'; the toolbar contains the corresponding shortcut buttons. Please click "Connection" to connect with the controller first, then click "Parameters" to set the parameters for all the stages before use.



(2)Connection

Please click connection menu to set up the connection parameters. Please choose the controller type and the connection method according to the real situation. Please get the correct port number in Device Manager before choosing the serial port. If you also have our joystick, please select the corresponding model number. Click the "Connect" button to connect to the controller.

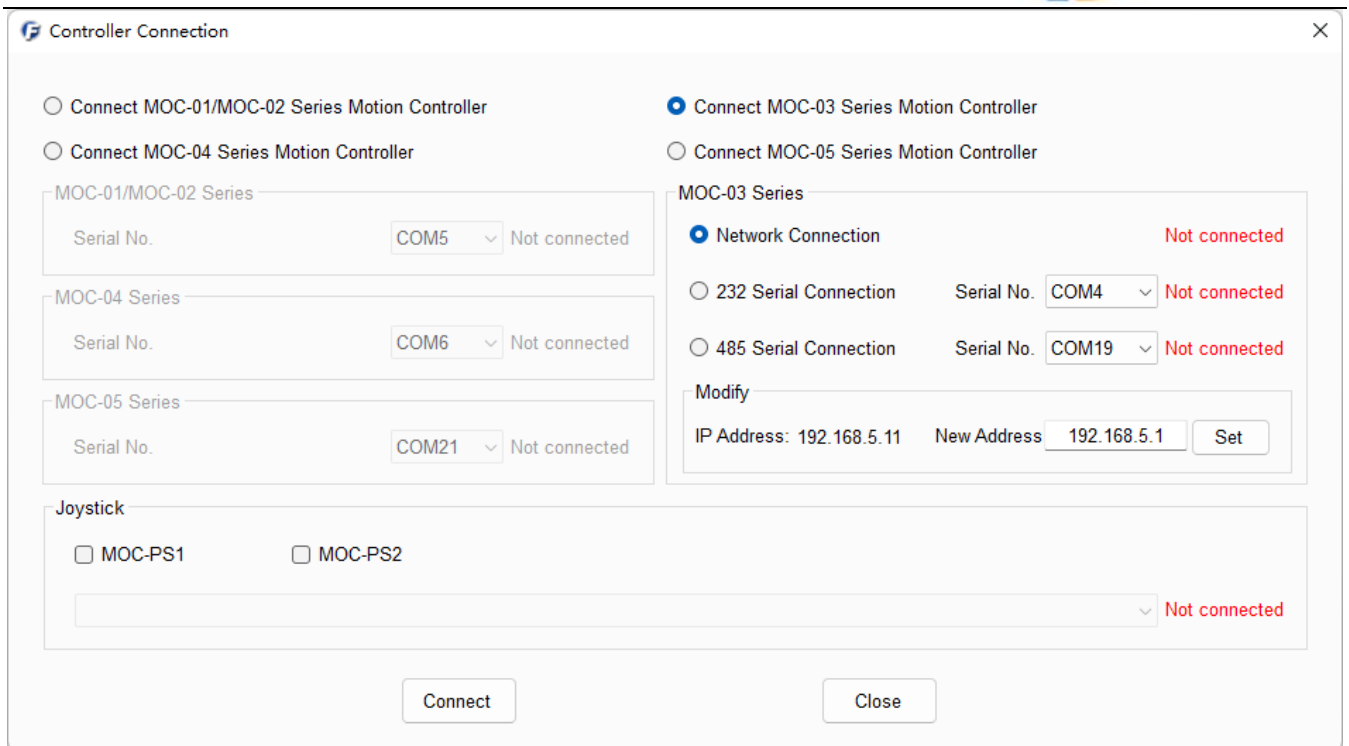


Figure 6 Connection Setting

(3)Parameters Settings

The parameters for all the motorized positioning stages will be set according to the stages you purchased and be saved in the controller before the shipment. Please contact us in case of lack of parameters.

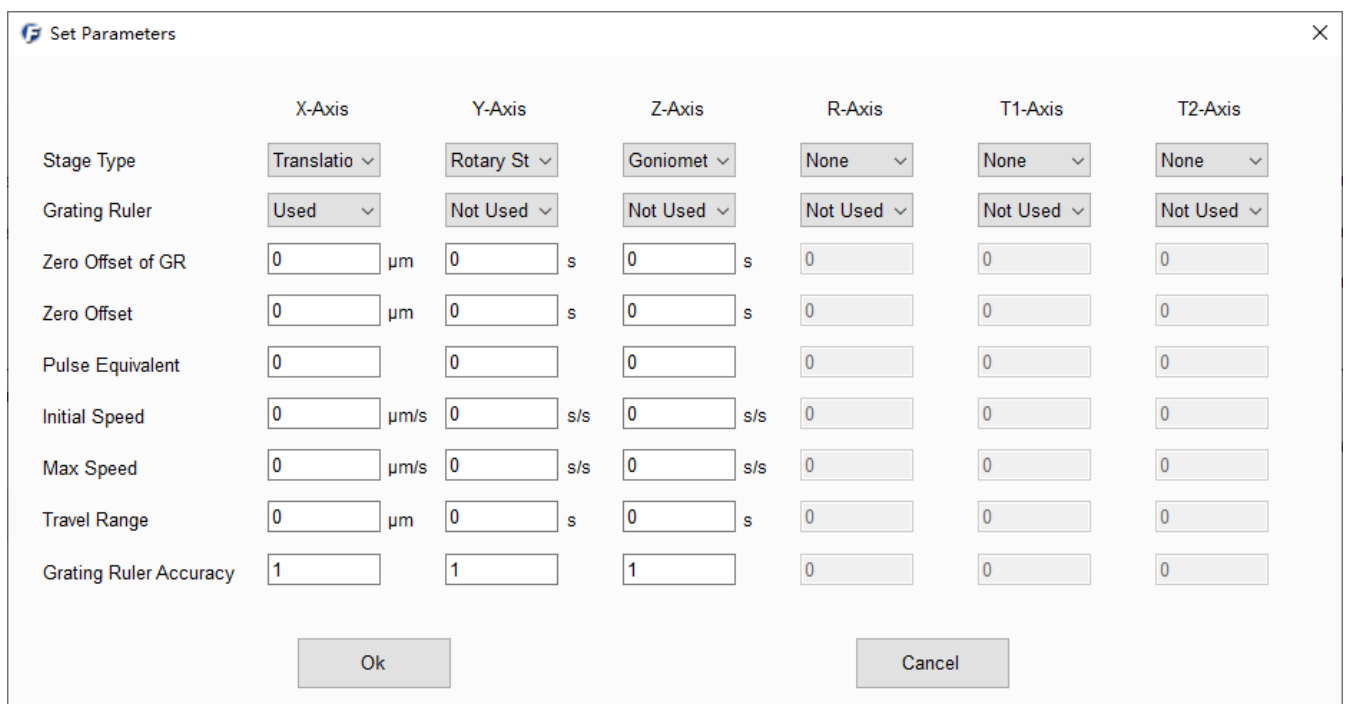


Figure 7 Set Parameters

- Stage Type:** Select the stage type according to the actual situation. There are four types: None, Translation Stage, Rotary Stage, and Goniometer Stage.

- **Grating Ruler:** Whether the grating ruler is used.
- **Zero offset of GR:** The amount of displacement that the grating ruler will run after returning to zero, and use it as the new zero position. (This function is only available for closed-loop motorized positioning stages with grating rulers)
- **Zero Offset:** The amount of displacement to run after the stage is returned to zero, and use it as the new zero position. (This function is used for closed-loop motorized positioning stages without grating rulers)
- **Pulse Equivalent:** It will be calculated according to the positioning stage's parameters and saved in the controller.
- **Initial Speed:** The speed at which the motor begins to move.
- **Max Speed:** The maximum speed at which the motor runs.
- **Travel Range:** The max distance that the stage can move.
- **Grating Ruler Accuracy:** Generally set to 1.

(4) Manual Operation

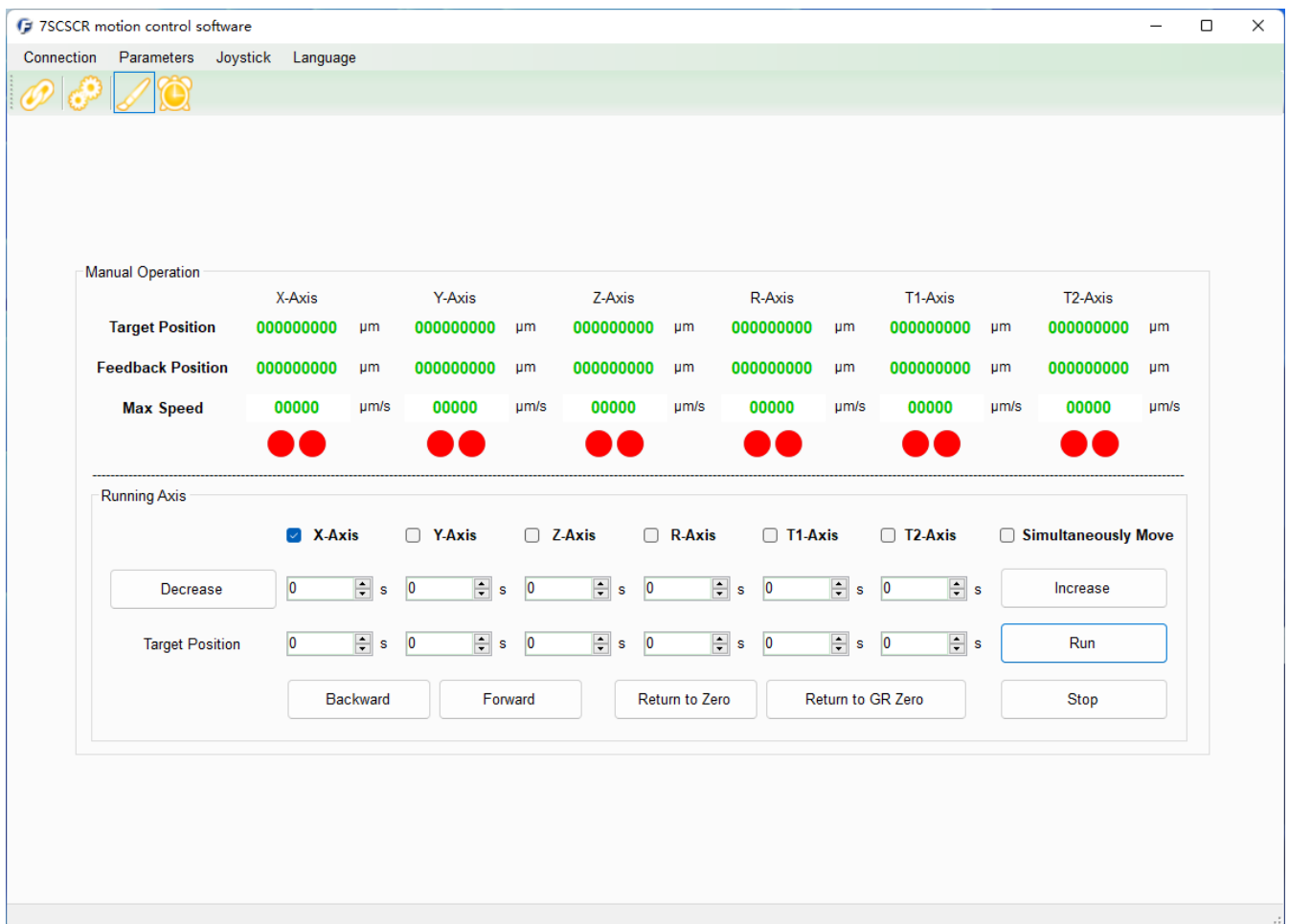


Figure 8 Manual Operation Interface

- **Target Position:** Pulse * Pulse equivalent, i.e. theoretical position.
- **Feedback Position:** The feedback position of the grating ruler.
- **Max speed:** Displays the max speed in real time during movement.
- The two dots indicate the limit switches status. Green means the limit switches are not effective

and red means the limit switches has been effective.

- **Simultaneously Move:** Multiple motion axes can be selected and moved simultaneously.
- **Free Mode:** When pressing the or button, if the limit switches are not effective, the motorized positioning stage will move accordingly until one of limit switches is effective, or the button is clicked.
- **Increment Mode:** After inputting or selecting a value and clicking the or button, the motorized positioning stage will move forward or backward.
- **Target Mode:** After inputting or selecting a value and clicking the button, the motorized positioning stage will move to the position specified.
- : The motorized positioning stages will move to the zero position of grating ruler, that is, the feedback position is zero position.
Note: Please perform "return to zero of grating ruler" first after starting up, otherwise operation error may be caused by the incorrect feedback position.
- : The motorized positioning stage will move to the mechanical zero position.

(5)Auto Run

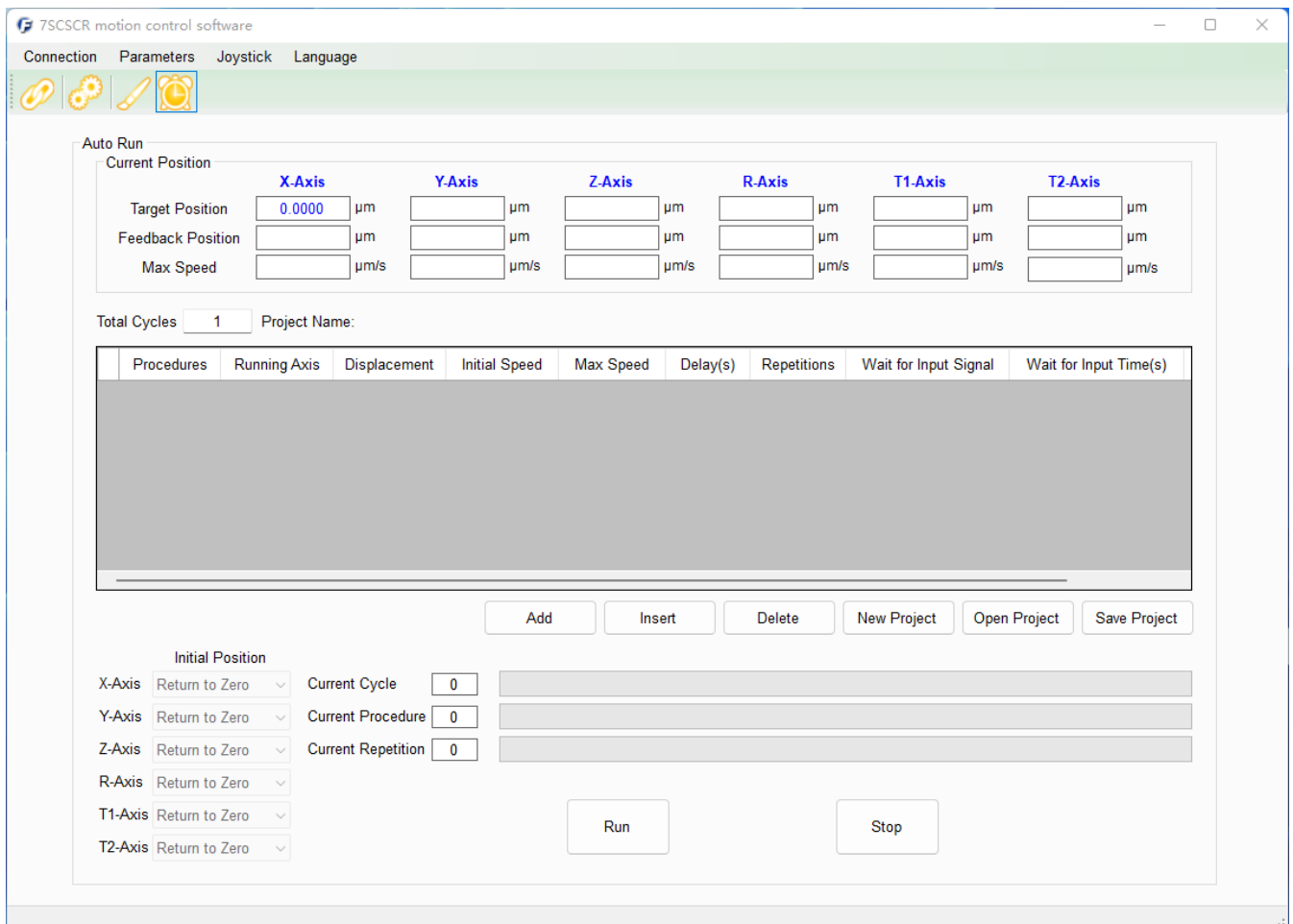


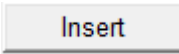
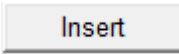


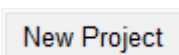
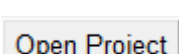

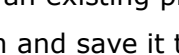
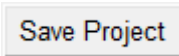
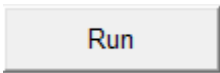


Figure 9 Auto run interface

- **Total Cycles:** One cycle means all procedures run once. Total Cycles means repetitions of a cycle.
- **Running Axis:** Select the axis which needs to run. For example, you can select x, y, z axis to perform moving.
- **Displacement:** Input the displacement of corresponding axis. If you input a negative value, the stage will move to the negative direction.
- **Initial Speed:** Input the initial speed of corresponding axis.
- **Max Speed:** Input the running speed of corresponding axis.
- **Delay:** Input the interval value between current procedure and next procedure. The unit is second.
- **Repetitions:** It's the repetitions of current procedure.
- **Wait for Input Signal:** Select whether to enter the low state of waiting for the input signal. When "Yes" is selected, after all movements of the current procedure are completed, a trigger signal is output and wait for the specified input time.
- **Wati for Input Time(s):** The time to wait for the low level of the input signal. When setting to 0, it will wait indefinitely until the low-level signal is received to enter the next procedure; when setting to other values, it will wait for the maximum time of this value, and if the low-level signal is received during this period, it will exit the wait and enter the next procedure; if the level signal is not waited, it will automatically enter the next procedure after timeout.
- **Display Prompt:** Whether to pop up a prompt to wait for user confirmation before proceeding to the next procedure.
- **Initial Position:** The stage will move to the initial position before running the project.
-  : Click  to add a new procedure.
-  : Click  to insert a new procedure before the current procedure.
-  : Click  to delete the current procedure.
-  : Add a new project.
-  : Open an existing program. It's very useful to avoid repeated operation. You can also edit the program and save it to a new project.
-  : Click  to save the current project.
-  : When you open a project or add a new project, you can click , the stages will move according to the procedures in the project.

At the top of the interface, it will display the position of each axis. At the bottom of the interface, there're three progress bars to display the progress of the program.

(6) Joystick Operation

Click "Joystick" menu to use the joystick to operate the positioning stages.

Joystick

Current Axis **X** Displacement mm Stop

Speed

Initial Speed $\mu\text{m/s}$ Max Speed $\mu\text{m/s}$ Set speed

Steps: 1. Choose axis. 2. Set speed. 3. Set replacement.

MOC-PS1

Slide your mouse over the button to view its function.

- 1 — Set X axis as the current axis
- 2 — Set Y axis as the current axis
- 3 — Set Z axis as the current axis
- 4 — Set R axis as the current axis

- 1 — Set T1 axis as the current axis
- 2 — Set T2 axis as the current axis

- Up — Move the current axis forward freely
- Right — Move the current axis by positive Displacement
- Left — Move the current axis backward freely
- Down — Move the current axis by negative Displacement

- SELECT — Return the current axis to zero
- START — Stop moving the current axis

Joystick

Current Axis **X** Displacement mm Stop

Speed


Initial Speed $\mu\text{m/s}$ Max Speed $\mu\text{m/s}$ Set speed

Steps:1.Choose axis. 2.Set speed. 3.Set replacement.




MOC-PS2


Slide your mouse over the button to view its function.




- Set Y axis as the current axis
- Set R axis as the current axis
- Set Z axis as the current axis
- Set X axis as the current axis



- Set T1 axis as the current axis
- Set T2 axis as the current axis



- Move the current axis forward freely
- Move the current axis by positive Displacement
- Move the current axis backward freely
- Move the current axis by negative Displacement



- Return the current axis to zero
- Stop moving the current axis