MOTION CONTROLLER USER MANUAL MOC-03

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Table of Contents

1.	OVERVIEW	2
2.	TECHNICAL PARAMETERS	2
3.	OVERALL DIMENSIONS	2
3.1	Front Panel	2
3.2	Back Panel	3
3.3	Dimensions	4
4.	PIN DEFINITION	4
5.	HARDWARE CONNECTION AND SETUP	5
6.	SOFTWARE OPERATING	6
6.1	Introduction	6
6.2	Software & RS232-USB Converter Installation	6
6.3	Joystick Installation	9
6.4	Software Operation	0



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 $\pm 10\%/50$ Hz Ambient temperature: -10° C ~ 45° 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	В -
4	Null
5	Ζ-
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.



Internet 协议版本 4 (TCP/IPv4) Prop	perties X
General	
You can get IP settings assigned autor supports this capability. Otherwise, yo administrator for the appropriate IP se	matically if your network u need to ask your network ettings.
Obtain an IP address automatica	lly
Use the following IP address:	
IP address:	192.168.5.11
Subnet mask:	255.255.255.0
Default gateway:	196.168.5.0
Obtain DNS server address autor	matically
• Use the following DNS server add	dresses
Preferred DNS server:	· · ·
Alternate DNS server:	· · ·
Validate settings upon exit	Advanced
	OK Cancel

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	
NSCSCR for x64.msi	
😵 setup.exe	
TSCSCR motion control software - X	7SCSCR motion control software
Welcome to the 7SCSCR motion control software Setup Wizard	Select Installation Folder
The installer will guide you through the steps required to install 7SCSCR motion control software on your computer.	The installer will install 7SCSCR motion control software to the following folder. To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse". Eolder:
	C:\Program Files\SOFN\7SCSCR motion control software\ Browse
	Disk Cost
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil	Install 7SCSCR motion control software for yourself, or for anyone who uses this computer:
or criminal penalties, and will be prosecuted to the maximum extent possible under the law.	O Everyone
	O Just me
< Back Next > Cancel	< Back Next > Cancel
TSCSCR motion control software	7 75CSCP motion control offware
	Installing /SCSCR motion control software
The installer is ready to install 7SCSCR motion control software on your computer.	7SCSCR motion control software is being installed.
	Please wait
C Back Next > Cancel	
📮 7SCSCR motion control software – 🗆 🗙	📮 7SCSCR motion control software - 🛛 X
Installation Complete	Installation Complete
	· 驱动安装/卸载
7SCSCR motion control software has been successfully installed.	选择INF文件(1/1): CH341SER.INF ✓
Click "Close" to exit.	WCH.CN
	USB-SERIAL CH340 _ 02/11/2023, 3.8.2023.02
	卸载
	帮助
Please use Windows Update to check for any critical updates to the .NET Framework.	instant the driver of KS232-USB converter.
< Back Close Cancel	< Back Close Cancel



帰驱动安装(X64) - □	× 優 驱动安装(X64) - ロ ×
驱动安装/卸载	驱动安装/卸载
选择INF文件(1/1): CH341SER.INF	→ 选择INF文件(1/1): CH341SE
安装 WDriverSetup X 8.2023.02	安装 USB SENTIC CITCK to close the window.
卸载 道 驱动预安装成功!	卸载
帮助 确定	帮助
Click to complete the instal	lation.
27 SCSCR motion control software − □ >	×
Installation Complete	
7SCSCR motion control software has been successfully installed.	
Click "Close" to exit.	
	Shortcut on the desk.
Please use Windows Update to check for any critical updates to the .NET Framework.	
< Back Close Cancel	motion

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.



🚔 Device Manager
File Action View Help
🔶 🄿 📅 🗐 🗐 🛛 🖬 😣
✓ ▲ DESKTOP-1MH3JCK
> 4 Audio inputs and outputs
> 🦃 Batteries
> 💻 Computer
> 👝 Disk drives
V Ports (COM & LPT)
USB Serial Port(COM3)
MOXA Communication I
│ 增 通1台/新山 (COM1)

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'.



-			
Security	Details	Previous Ver	sions
General	Shortcut	Compat	ibility
If this program isn't try running the com	working correctly on patibility troubleshoo	this version of Win ter.	dows,
Run compatibility	y troubleshooter		
How do I choose c	ompatibility settings r	manually?	
Compatibility mod	e		
Run this progr	am in compatibility m	ode for:	
Windows 8		\sim	
Transcence o			
Settinas			
Reduced colo	ur mode		
8-bit (256) colour	· · ·		
Run in 640 x 4	480 screen resolutior	n	
Disable display	y scaling on high DP	l settings	
Run this progr	am as an administrat	tor	
L			
Change setti	ngs for all users		
• -	_		

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)

motion control softwar	e											_
Parameters Joys	- tick Langua	je										
) 🖉 🙆												
anual Operation												
Target Position	X-Axis	um	Y-Axis	um	Z-Axis	um	R-Axis	um	T1-Axis	um	T2-Axis	um
Feedback Position	000000000	um	000000000	um	000000000	um	000000000	um	000000000	um	000000000	um
Max Speed	00000	µm/s	00000	µm/s	00000	µm/s	00000	µm/s	00000	µm/s	00000	µm/s
Running Axis												
	🗹 X-Ax	is	Y-Axis		Z-Axis	R-Axis	🗌 T1-A:	cis	T2-Axis	🗆 S	imultaneously	Move
Decrease	0	∳ s	0 🔹 s	s 0	🜩 s 0	F	s 0	🗘 s	0 🔹 s		Increase	
T . D:				0							Dur	
Target Position	U	▼ S		5 0	Ţ S U		s U	Ţ S		' <u> </u>	Run	
	Ва	ckward	For	ward	Ret	urn to Ze	ro Re	turn to (GR Zero		Stop	

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.

OP'

Connect MOC-01/MOC-02	Series Motion Controller	 Connect MOC-03 Series Motion Controller 	
Connect MOC-04 Series M	otion Controller	○ Connect MOC-05 Series Motion Controller	
MOC-01/MOC-02 Series		MOC-03 Series	
Serial No.	COM5 Vot connected	Network Connection Not connect	ected
MOC-04 Series		○ 232 Serial Connection Serial No. COM4 ∨ Not connection	ected
Serial No.	COM6 V Not connected	◯ 485 Serial Connection Serial No. COM19 ∨ Not connection	ected
MOC-05 Series		Modify	
Serial No.	COM21 V Not connected	IP Address: 192.168.5.11 New Address 192.168.5.1 Set	
Joystick			
MOC-PS1	MOC-PS2		
		✓ Not connection	ected

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.

🕼 Set Parameters						×
	X-Axis	Y-Axis	Z-Axis	R-Axis	T1-Axis	T2-Axis
Stage Type	Translatio \sim	Rotary St $ \smallsetminus $	Goniomet ~	None ~	None ~	None \sim
Grating Ruler	Used \vee	Not Used $ \sim $	Not Used ${\scriptstyle\checkmark}$	Not Used $ \sim $	Not Used ${\scriptstyle\checkmark}$	Not Used $ \sim $
Zero Offset of GR	0 µm	0 s	0 s	0	0	0
Zero Offset	0 µm	0 s	0 s	0	0	0
Pulse Equivalent	0	0	0	0	0	0
Initial Speed	0 µm/s	0 s/s	0 s/s	0	0	0
Max Speed	0 µm/s	0 s/s	0 s/s	0	0	0
Travel Range	0 µm	0 s	0 s	0	0	0
Grating Ruler Accuracy	1	1	1	0	0	0
	Ok			Cance	I	

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.

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- **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

Manual Operation	X-Axis		Y-Axis		Z-Axis		R-Axis		T1-Axis		T2-Axis	
Target Position	00000000	µm 0	0000000	μm	000000000	μm	000000000	μm	00000000	μm	000000000	μm
Feedback Position	00000000	µm 0	0000000	μm	00000000	μm	00000000	μm	00000000	μm	00000000	μm
Max Speed	00000	µm/s	00000	µm/s	00000	µm/s	00000	µm/s	00000	µm/s	00000	µm/s
Running Axis	Z X-Axis		Y-Axis	🗆 Z	2-Axis	R-Axis	🗌 T1-A3	cis	T2-Axis	□ S	imultaneously	Move
Decrease	0	‡ s 0	s	0	s 0		s 0	÷ s	0 🔹 s	5	Increase	
Target Position	0	\$ 0	s	0	s 0		s 0	÷ s	0 🔹 s	5	Run	
	Back	ward	For	ward	Ret	urn to Zer	roRe	turn to C	GR Zero		Stop	

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

13



Decrease

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 Forward or Backward button, if the limit switches are not effective, the motorized positioning stage will move accordingly until one of limit switches is effective, or the Stop button is clicked.
- Increment Mode: After inputting or selecting a value and clicking the 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.

Return to GR Zero

Note: Please perform "return to zero of grating ruler" first after starting up, otherwise operation error may be caused by the incorrect feedback position.

Return to Zero

: The motorized positioning stage will move to the mechanical zero position.

(5)Auto Run

		CK Langua	ye											
90 J														
Auto Dun														
Currer	nt Position													
-		X-Axis	П., Г	Y-Axis	7	Z-Axis	1	R-Axis	1	T1-Axis	7	T2-A	kis	
la	rget Position	0.0000]µm []um []µm]um]µm]um]µm]um	L]µm]		µm	
Fee	JDACK Position								Jum/e					
	viax Speed	L					pinio		pinio		privs		µm/s	
Total C	vcles 1	Proiect Nam	ie:											
PI PI	rocedures Rur	nning Axis	Displaceme	nt Initial	Speed	Max Speed	Delay	(s) Repetit	ions	Wait for Input S	Signal	Wait for I	Input Time(s)	
					Add		ert	Delete	1	lew Project	Open F	Project	Save Project	
	Initial Positic				Add		sert	Delete	1	lew Project	Open I	Project	Save Project	
X-Axis	Initial Positio Return to Zero	n V Curre	nt Cycle		Add		sert	Delete	1	lew Project	Open F	Project	Save Project	
X-Axis Y-Axis	Initial Positio Return to Zero Return to Zero	n Curre	nt Cycle	0 = 0	Add		sert	Delete	1	lew Project	Open f	Project	Save Project	
X-Axis Y-Axis Z-Axis	Initial Positio Return to Zero Return to Zero Return to Zero	n Curre Curre	nt Cycle nt Procedur nt Repetitio	0 2 0 1 0	Add		sert	Delete	1	lew Project	Open F	Project	Save Project	
X-Axis Y-Axis Z-Axis R-Axis	Initial Positio Return to Zero Return to Zero Return to Zero Return to Zero Return to Zero		nt Cycle nt Procedur nt Repetitio	0 e 0 1 0	Add		sert	Delete	1	lew Project	Open I	Project	Save Project	
X-Axis Y-Axis Z-Axis R-Axis T1-Axis	Initial Positio Return to Zero Return to Zero Return to Zero Return to Zero Return to Zero		nt Cycle nt Procedur nt Repetitioi	0 e 0 1 0	Add		sert	Delete	1	lew Project	Open F	Project	Save Project	



- 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.
- Add : Click Add to add a new procedure.
- Insert : Click Insert to insert a new procedure before the current procedure.
- Delete
 Click
 Delete
 to delete the current procedure.
- New Project : Add a new project.
- Open 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.
- Save Project : Click Save Project to save the current project.
- Run
 : 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	- 0	×
Current Axis X Displacement 10 mm	Stop	
Speed		
Initial Speed 0 µm/s Max Speed 0 µm/s	Set speed	
Steps:1.Choose axis. 2.Set speed. 3.Set replacement.		1
COCIECT STAT		-
MOC-PS1 Slide your mouse over the button to view its	function.	



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



🕼 Joystick	- 0	×
Current Axis X Displacement 10 mm	Stop	
Speed		
Initial Speed 0 µm/s Max Speed 0 µm/s	Set speed	
Steps:1.Choose axis. 2.Set speed. 3.Set replacement.		
SELECT NODE		
Slide your mouse over the button to view its MOC-PS2	function.	



- Set Y 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