# **Mech-Mind User's Manual**

**Mech-Mind** 

Mar 06, 2023

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This section introduces the process of loading the robot master-control program onto an NACHI robot. The process consists of the following steps:

- Check Controller and Software Compatibility
- Setup the Network Connection
- Load the Program Files
- Test Robot Connection

Please have a flash drive ready at hand.

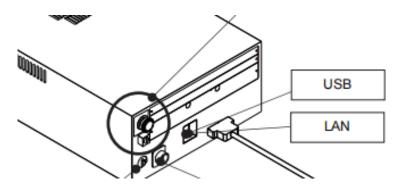
# CHECK CONTROLLER AND SOFTWARE COMPATIBILITY

- There is no specific requirements on the version of robot controller.
- It is recommended to use Mech-Mind Software Suite of the lastest version.

## SETUP THE NETWORK CONNECTION

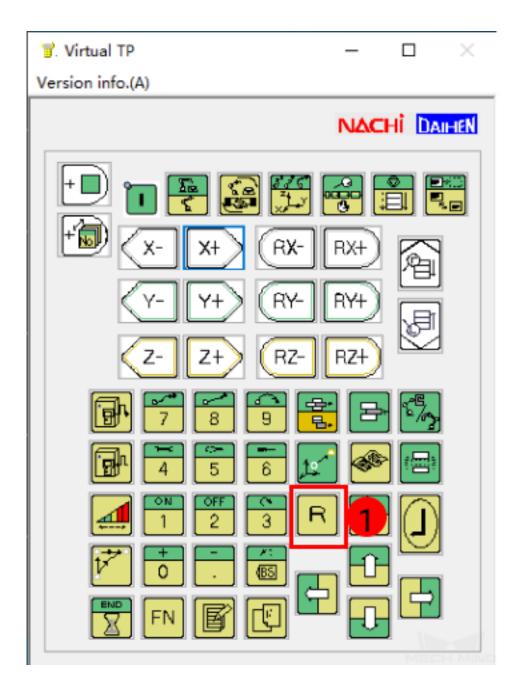
## 2.1 Hardware Connection

Plug the Ethernet cable into the LAN port of the robot controller to connect it with the IPC.



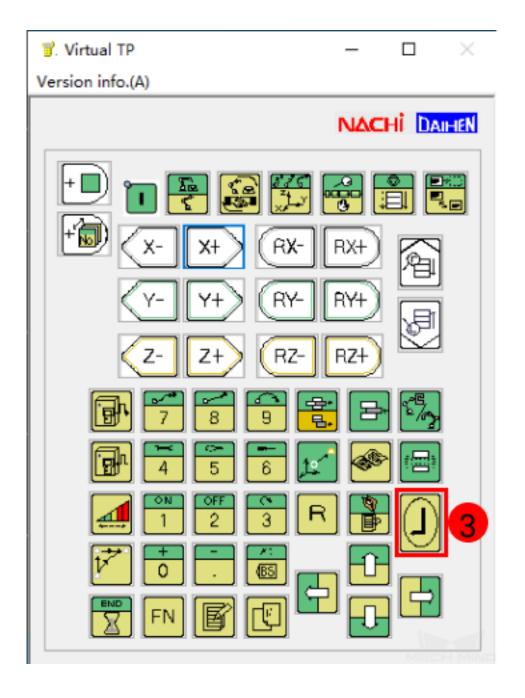
# 2.2 Change the Protecting Level

1. Open the teach pendant and press the key, as shown below.

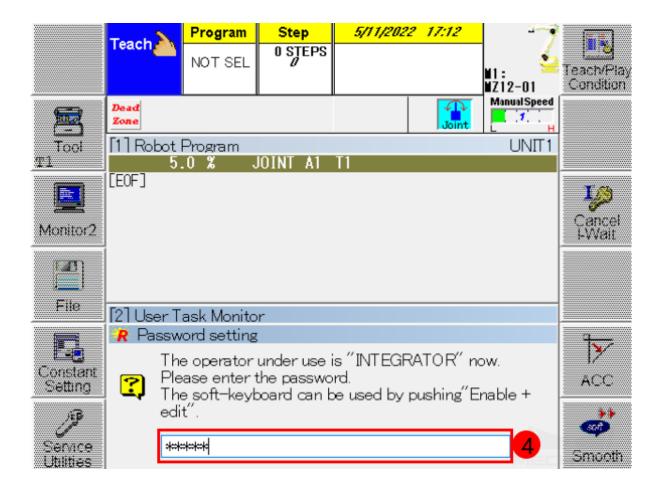


2. Enter **314** in the box as shown below, and then press 🕑 (Enter key) on the teach pendant.

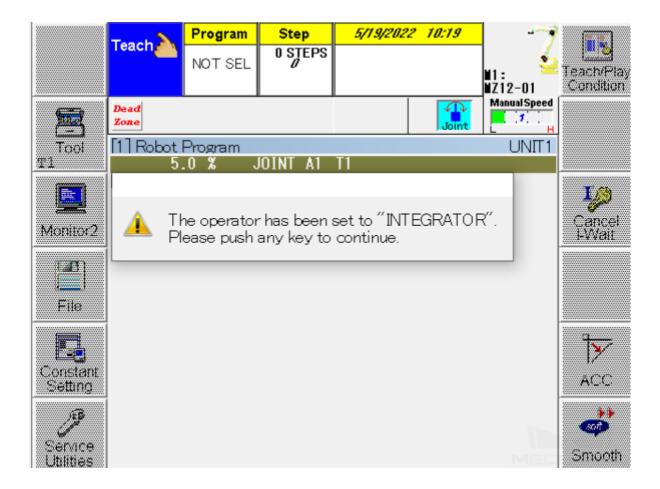
	Teach	Program NOT SEL	Step 0 STEPS Ø	5/11/2022	17:11	11: 1212-01	Teach/Play Condition
	Dead Zone				Joint	Manual Speed	
Tool T1		cut R code t function li				UNIT1	
E Monitor2	R314 R316 R317	TP LO		ting level ord(TP LOCK)		^	Cancel
	R335 R348 R354	Step C Change	ору	ring language			-Wait
File	R355 R356 R372 R400	Interf. Oscillos	detect. sam detect. sam scope measi Overlap An	ple end urement			×
Constant Setting	R401	Selctio	n manual co	operation Med Or locate curs		<b>v</b> ress	ACC
Service Utilities	3	14					Smooth



3. Enter the default password 12345 in the box, and then press key on the teach pendant to change into SPECIALIST level.

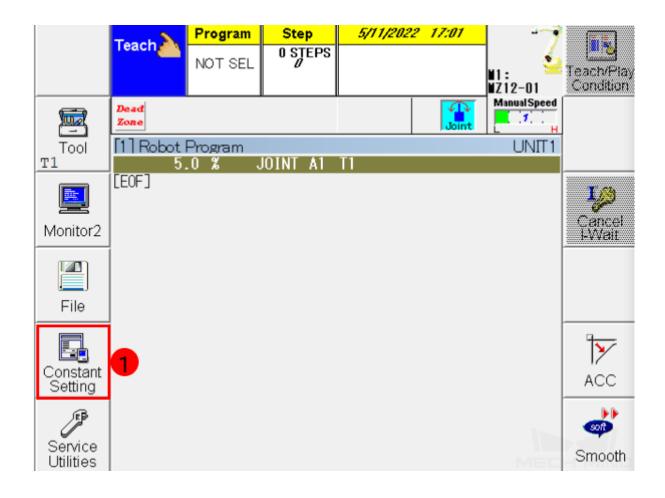


4. A pop-up window as shown below suggests that you have successfully changed the protecting level and all functions can be used from now on.



## 2.3 IP Configuration

1. Go to Constant Setting  $\rightarrow$  8 Communication  $\rightarrow$  2 Ethernet  $\rightarrow$  1 TCP/IP to configure TCP/IP Settings.



	Constant Setting	UNIT1
1	Control Constants	33 Fail Safe
2	Screen Constants	38 User Help
З	Machine Constants	44 Direct Teach
4	Accuracy and Smoothness	45 External Tracking
5	Operation Constants	46 Circle interpolation condition
6	Signals	
7	f-Keys	
8	Communication	2
9	Territory Definition	
12	Format and Configuration	
22	I/F Panel on Touch Screen	
24	Logging Data	
25	Function Grouping	
26	Mechanism Change	
29	Multi drive reference position	
31	Vision sensor	
?	Used to set Communication relate Ethernet.	ed constants such as

2. Enter the robot IP address in the IP Address box.

Hint: The robot IP should be in the same subnet as the IPC. If you need to set the static IP, please contact the network administrator.

CHAPTER THREE

## LOAD THE PROGRAM FILES

#### 3.1 Prepare the Files

Copy the master-control program files of NACHI robot with an USB flash drive.

The Center	files Robot_Se	are rver\Rob	stored pot_FullConti	in: rol\nachi	xxx\Mech-Mind	Software	Suite-x.x.x\Mech-
Center			MZ12	2-01-A.12			
			USER	TASK-A.(	)22		

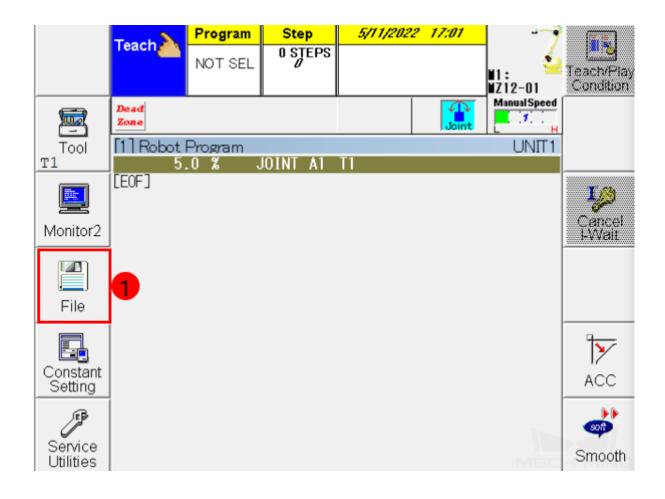
**Attention:** Please rename the MZ12-01-A.120 file according to the actual robot model name. For example, when loading the file to the SRA166-1 robot, rename the file as SRA166-1-A.120, and then copy and paste it into your flash drive.

## **3.2 Load the File to the Robot**

1. Plug the USB flash drive into the USB port on the back of the teach pendant, as shown below.



2. Select  $File \rightarrow File \ copy$  on the touch panel.



S= File Manager
1 File Copy
2 Directory
3 File Delete
4 File Protect
5 Verify
6 Format IC card/Floppy disk
8 File transfer(Ethernet FTP)
10 File Backup
11 File Restore
12 Automatic Backup
14 File copy restriction
Used to copy files between various memory devices.
MECH MIND

3. Device (src) is the folder of the USB flash drive. Select the folder where the program files are stored under Device (src) and the **PROGRAM** folder under Device (dest) and then press on *Select All File* 

Se File Copy Device(src)	Method File ~		UNIT1	A Name
mmind MMwork System Vol	Name 1 MZ12-01-A.120 1 USERTASK-A 1 USERTASK-A	Att Size 401 1431 1339		Ascending
116.119.704 K bvtes Device(dest)	free			Make Folder
Memory PLCEngine WORK MORK AAPPLI AUTOCA	Name 1 MZ12-01-A.120 1 MZ12-01.120 1 USERTASK-A 1 USERTASK-A	Att Size 401 531 1431 1339	Modified 05/10/21 16:52 05/11/22 18:00 09/29/21 17:02 09/29/21 17:02	Select All File
29.209.500 K bvtes fr	'ee			Quit

4. Press on *Execute* to import files.

Se File Copy Device(src)	Method File ~			UNIT1	A Name
<pre>mmind ^ mmind ^ MMwork nachi System Vol </pre>	Name MZ12-01-A.120 USERTASK-A USERTASK-A	Att	Size 401 1431 1339	Modified 05/10/21 16:52 09/29/21 17:02 09/29/21 17:02	Ascending
116.119.704 K bytes Device(dest)	free				Make Folder
Memory PLCEngine WORK A_APPLI AUTOCA ~	Name MZ12-01-A.120 MZ12-01.120 USERTASK-A USERTASK-A	Att	Size 401 531 1431 1339	Modified 05/10/21 16:52 05/11/22 18:00 09/29/21 17:02 09/29/21 17:02	Select All File
29.209.500 K bytes f	ree				Quit 4 Execute

5. If the following messages appear on the screen, the program files have been loaded successfully.

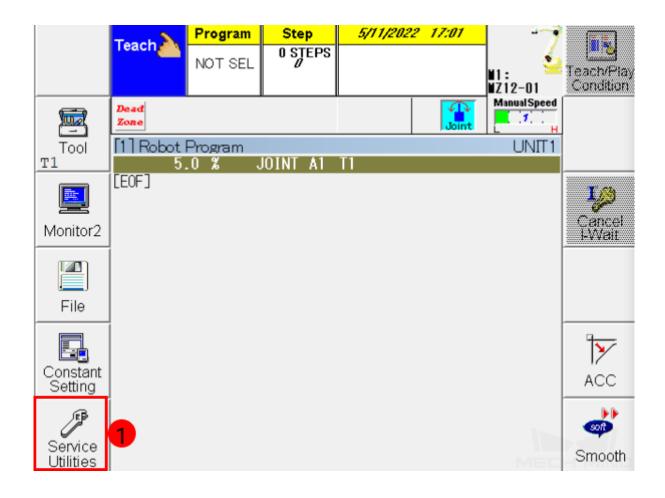
S <sup>-</sup> File Copy		UNIT1	E
Device(src)	Method		A
Hard Disk	Ç File ~		Name
● ● mmind ● ● MMwork ● ● Achi System	······································	d 21 16:52 21 17:02 02	L23 Ascending
< 116.119.704 K Device(dest) Memory	It Will copy the following location. Method : File Source folder : Hard Disk¥nachi Destination folder : Memory¥WORK¥PROGR	AM	Make Folder
Memory Memory PLCEngi WORK B A AP	Number of files : 3	52 00	Select All File
а́. 4 29.208.976 К ы	YES NO	02 02	<b>Q</b> uit
Robot Langua	ge file	MEC	Execute

S File Copy UNIT1	
Device(src) Method	
Hard Disk	Name
mmind         ied           MMwork         0/21 16:52           nachi         0/21 17:02           System Vol         Hit any key.	123 Ascending
MZ12-01-A.120 : OK           116.119.704 K bvtes           Device(dest)           Memory	Make Folder
Memory         ied           PLCEngine         D/21 16:52           WORK         1/22 18:00           PLOENDING         D/21 16:52	Select All File
→ AUTOC/ → → /21 17:02	8
29.208.784 K bytes free	Quit
Robot Language file	Execute

Attention: Please reboot the robot after exiting the program.

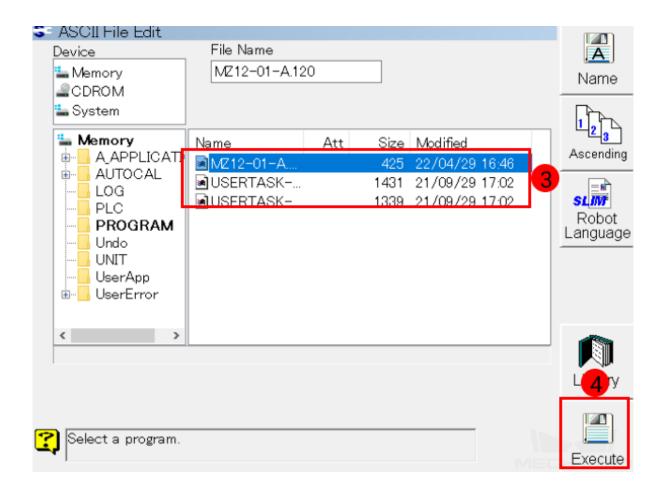
## 3.3 Convert the Program File

1. Go back to the main interface, press on Service Utilities  $\rightarrow$  ASCII File Edit to edit the ASCII files.

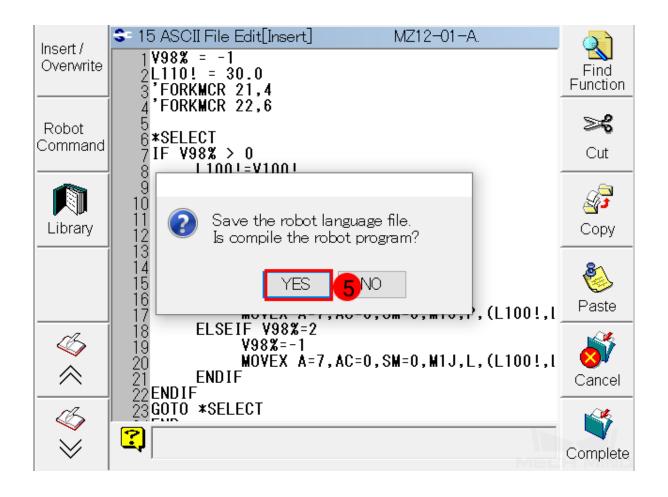


💲 Service		UNIT1
1 Teach/Playback	Condition 25	Robot Diagnosis
2 Select Monitor W	/indow Layout 26	Torque sampling for Interferen
3 Monitor 1	30	Auto.moment of inertia Setting
4 Monitor 2	34	Circle locus correction
5 Monitor 3	36	User Application entry
6 Monitor 4	37	Operation history disp.
7 File Manager	39	Collision detection
8 Text Out		
9 Program Convers	sion	
10 User Coord. Defi	nition	
12 UserTask		
13 System Version		
14 PLC Program Ed	it	
15 ASCII File Edit		2
18 Troubleshooting		
19 Automatic COG	Setting	
Select Monitor Wi	ndow Layout, Vertica	al, horizontal, Piling

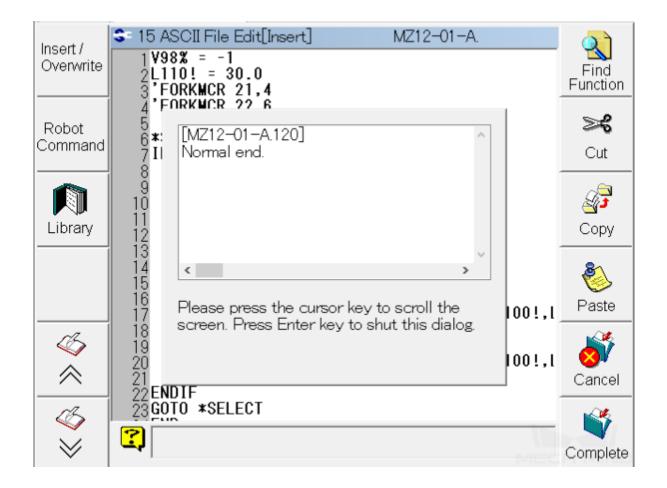
2. Select the file and press on *Execute*. Please perform the same operation on all three files in turn, and you can only start executing after the previous execution is completed.



3. After pressing on *Execute*, a window as below will pop up, and then select Yes.

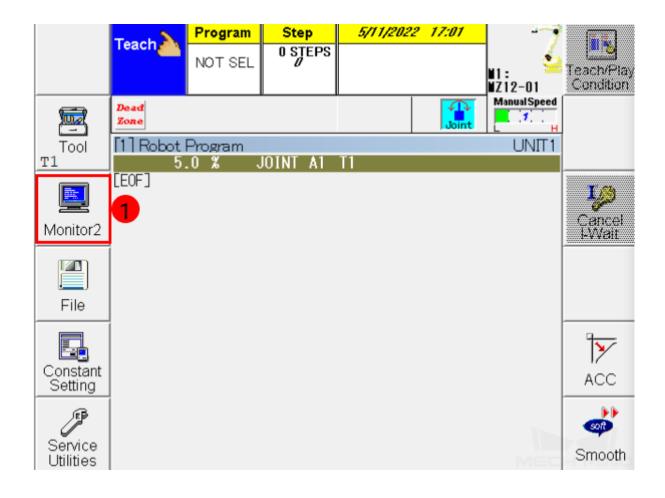


4. After converting the program file to the robot language, a message as shown below will appear.



# 3.4 Designate the Program

1. Return to the main interface, go to Monitor2-> User Task-> User Task Monitor.



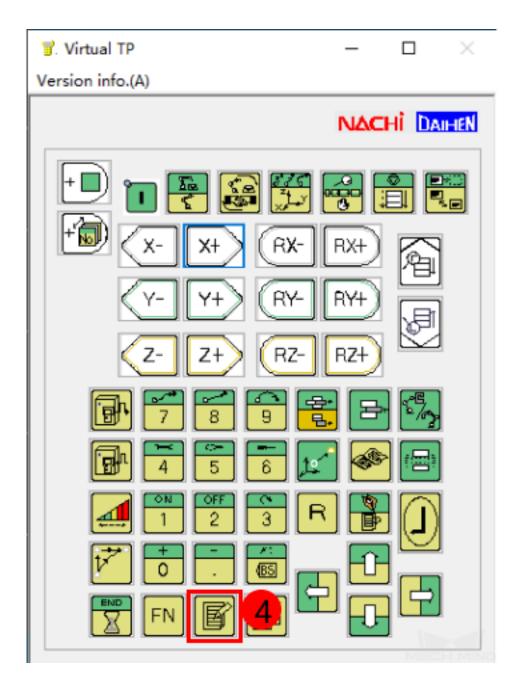
S= Monitor 2	
0 Monitor OFF	24 Servo Analog Output
1 Robot Program	25 Servo
2 Axis Position	26 Motion
3 Controller Status	27 Stopwatch
4 Failure Logging	28 Operation Time
5 Fixed Inputs	31 Stop Logging
6 Fixed Outputs	37 User Task 🔁 🛛 🎸
7 User Inputs	38 Fieldbus monitor 🔗
8 UserOutputs	44 Failure Monitor
11 Analog I/O	46 Playback Logging 🦾
12 Program Queue	48 WI/F Status 🛛 📈
17 Any valiable monitor	50 Servo ON/OFF
18 Integer Variables	55 Gravity Revise Bend Monitor
19 Real Variables	57 Serial Communication
20 Strings Variables	60 Disturbance Torque Monitor
21 Local Variables	61 Program editor logging
Used to turn the monitor screen of	off.

S= User Task
1 User Task Monitor 3
2 Local Integer Variables
3 Local Real Variables
4 Local Strings Variables
Used to display the condition of user task.
MECH MIND

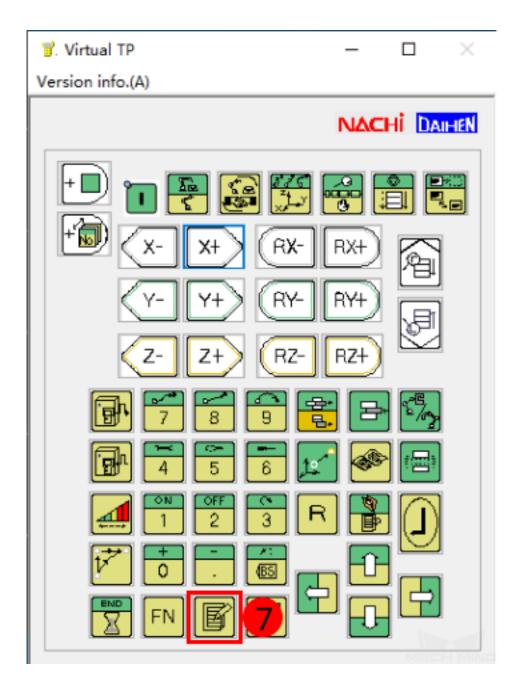
2. Now you can see the User Task Monitor as shown below. Press the key on the teach pendant, and then the User Task Monitor (II) line will turn orange, suggesting that it is editable now. Enter 21

in the first line in the Program column, and enter 22 in the second line. Then, press key.

	Teach	Program	Step	5/11/2022	17:08		
	reach	NOT SEL	0 STEPS			N1: NZ12-01	Teach/Play Condition
	Dead Zone				Joint	Manual Speed	
Tool T1	[1] Robot 5		OINT A1	T1		UNIT1	
	[EOF]						<b>1</b> /2
Monitor2							Cancel I-Wait
File	[2] User T	ask Monito	r				
	Prog.	Priority	Com	ment	Status	Error	₩
Constant	1 0	4			Stop		1/
Setting	2 0	3			Stop		ACC
<u>∫</u> ¶	3 0	3			Stop		
Service	4 0	3			Stop		soft
Utilities	Load leve	1 3%	Priori	ity:1(Low)-6(	High)	ME	Smooth



	Teach	Program	Step	5/11/2022	17:08		
	reach	NOT SEL	0 STEPS			¥1: ¥212-01	Teach/Play Condition
	Dead Zone				Joint	Manual Speed	
Tool T1	[1] Robot		OINT A1	T1		UNIT1	
	[EOF]						Jø.
Monitor2							Cancel I-Wait
File	[2] User Ti	ask Monito	r				5
	Prog.	Priority	Com	ment	Status	Error	1
Constant	1 0	6 4			Stop		
Setting	2 0	3			Stop		ACC
) E B	3 0	3			Stop		
Service	4 0	3			Stop		soft
Utilities	Load level	3%	Prior	ity:1(Low)-6	(High)	MEC	Smooth

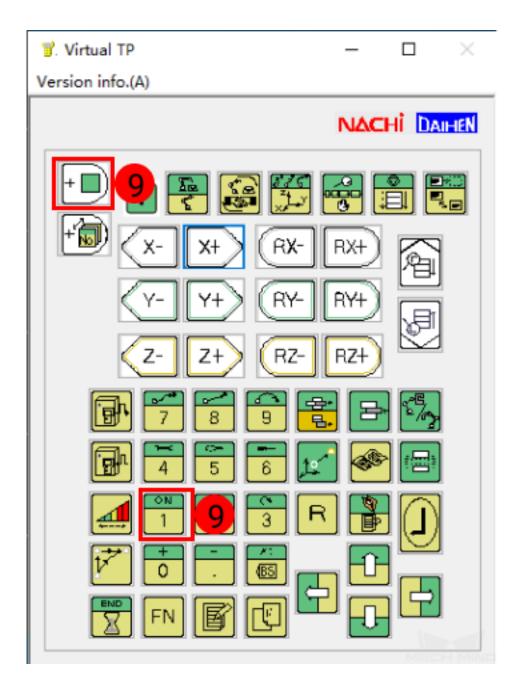


Hint: If the robot cannot move in a smooth way, please change the priority level of the program 21 from 4 to 5.



keys at the same time.

	Teach	Program	Step	<u> </u>	? 17:08		
	reach	NOT SEL	0 STEPS			¥1: ¥Z12-01	Teach/Play Condition
	Dead Zone				Joint	Manual Speed	
Tool T1	[1] Robot   5.		OINT A1	T1		UNIT1	
	[EOF]						
Monitor2							Cancel I-Wait
File	[2] User T	ask Monito	r				
	Prog.	Priority	Com	ment	Status	Error	1
Constant	1 0	4			Stop		ACC
Setting	2 0	3			Stop	8—	ACC
(F)	3 0	3			Stop		soft
Service	4 0	3			Stop		
Utilities	Load level	3%	Priori	ty:1(Low)-6	ö(High)	MEC	Smooth

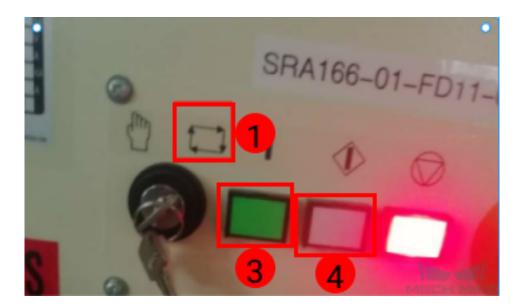


4. Go to  $Program \rightarrow Designated Program$ , enter **120** in the box, and then press key. The designated program will appear in the Program panel and User Task Monitor.

		tep <u>5/11/2022</u> STEPS <i>0</i>		₩1: ¥1: ¥Z12-01	Teach/Play Condition
Tool T1 Monitor2	Dead       Program S         Zone       Current program         [1] Robot I       Designated program         5       Edit         [E0F]       Directory         Copy       Delete         Program S       Directory         Copy       Delete		Joint	Manual Speed	Cancel I-Wait
File	[2] User Task Monitor				
Constant Setting	Prog. Priority 1 0 4 2 0 3	Comment	Status Stop Stop	Error	Ĩ <b>≻</b> ACC
Service Utilities	3 0 3 4 0 3 Load level 0%	Priority:1(Low)-6(	Stop Stop	MED	Smooth

# 3.5 Start the robot

1. Turn the key on the controller and orientate it to the location 1.



2. Turn the selector switch as shown below. Press the green button and white button in turn to start the robot.



Hint: After running the master-control program successfully, you can open Mech-Center to connect the robot.

#### **TEST ROBOT CONNECTION**

#### 4.1 Configure Robot in Mech-Viz

- 1. Open Mech-Viz, click New project to create a new project.
- 2. Select the robot model in use in the next page.
- 3. Save the project by pressing Ctrl + S.
- 4. In the toolbar, change the Vel. (velocity) and Acc. (acceleration) parameters to 5%.
- 5. Right-click the project name in Resources and select Autoload Project.

#### 4.2 Configure Settings in Mech-Center

- 1. Open Mech-Center and click on Deployment Settings.
- 2. Go to Robot Server, and make sure Use robot server is checked.
- 3. Check if the robot model displayed next to Robot type in Mech-Viz project matches the one in use.
- 4. Set the Robot IP address, and click Save.

#### 4.3 Connect to Robot in Mech-Center

- 1. Click Connect Robot in the Toolbar.
- 2. The robot is successfully connected if:
  - A message saying Robot: server connected to the robot shows up in the Log panel, and
  - A robot icon with the robot model shows up in the Service Status panel.

## 4.4 Move the Robot

- 1. In Mech-Viz, click *Sync Robot* in the toolbar to synchronize the pose of the real robot to the simulated robot. Then, click *Sync Robot* again to disable the synchronization.
- 2. Click the **Robot** tab in the lower right, and change the joint position of J1 slightly (for example, from 0° to 3°). The simulated robot will move accordingly.
- 3. Click *Move real robot*, the real robot should move accordingly.

Attention: When moving the robot, please pay attention to safety hazards. In the case of an emergency, press the emergency stop button on the teach pendant!