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# Mech-Mind User's Manual

Mech-Mind

May 12, 2023

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This section introduces the process of loading the robot Master-Control program onto a Doosan robot.

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## Check Hardware and Software Versions

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- The robot belongs to the M-series, and the robot controller of this series is shown below.



- Controller firmware version: V2.8
- Mech-Mind Software Suite version: 1.6.0 or above

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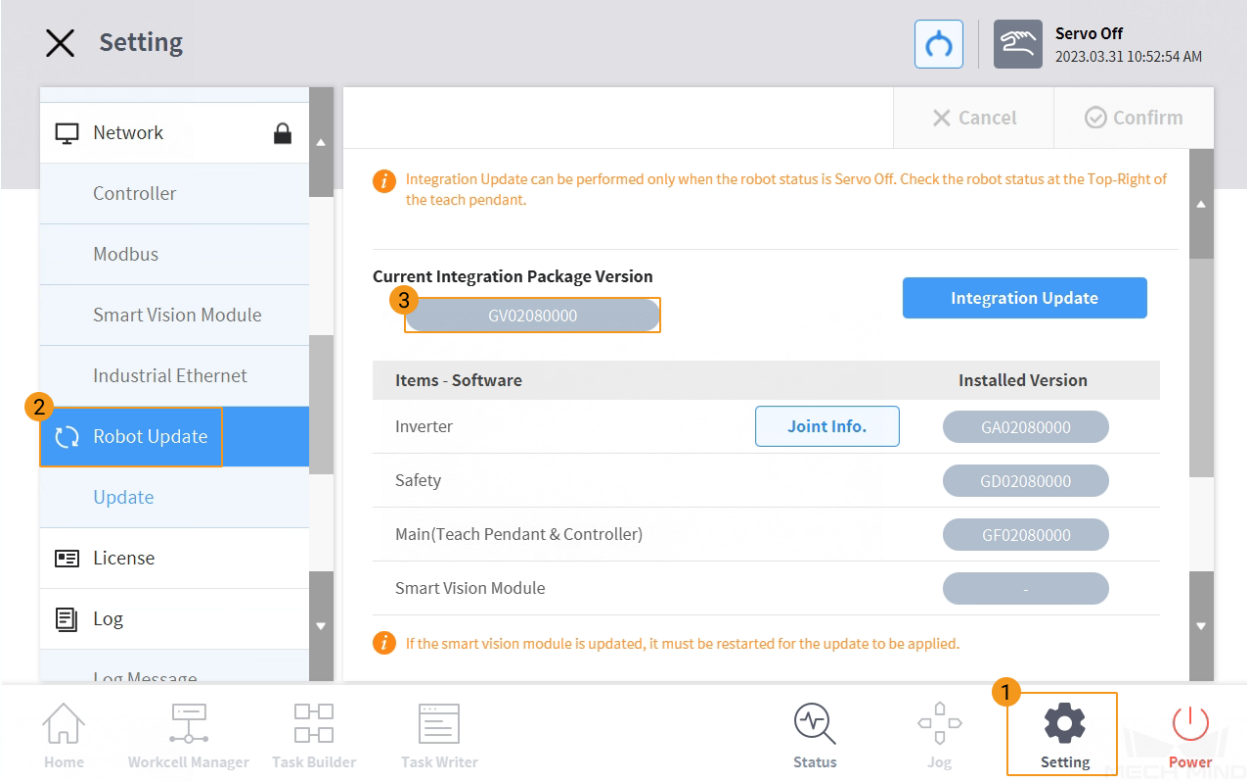
### Start the Robot and Teach Pendant

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1. Open the power switch under the controller.
2. Press the power button at the upper left corner of the teach pendant.

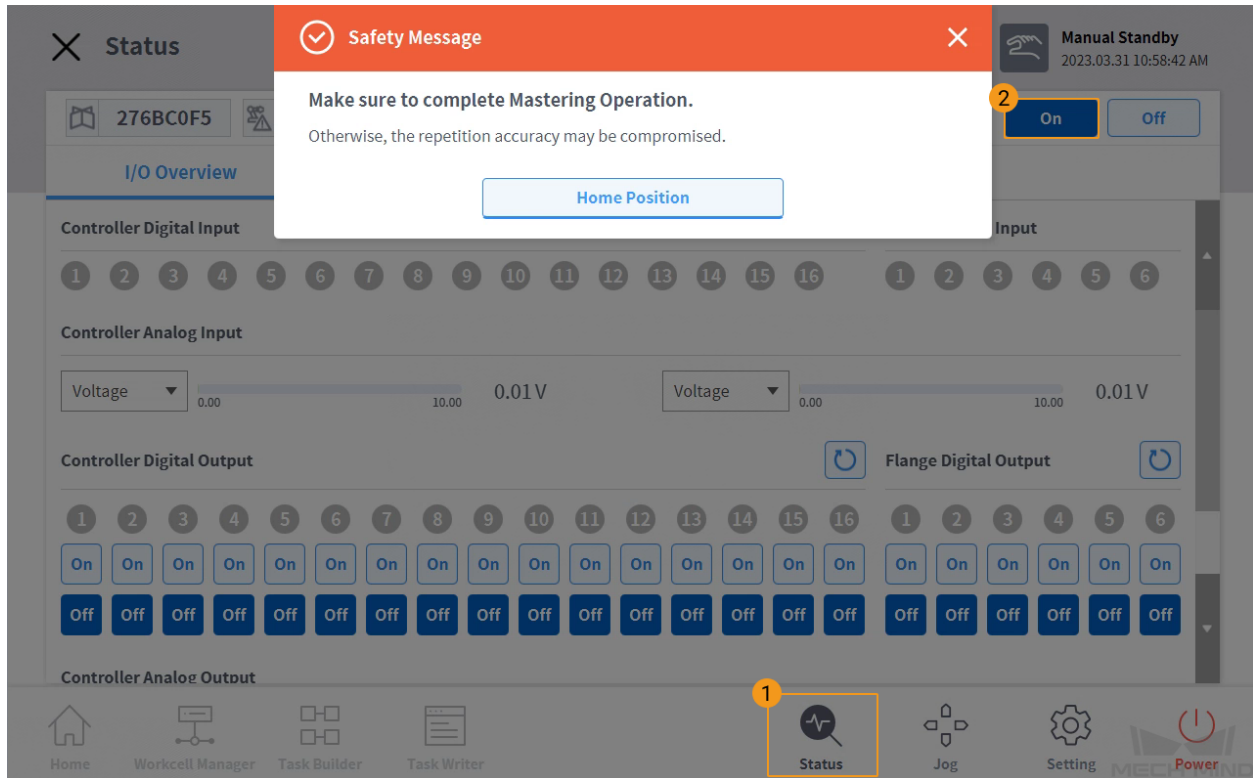


3. On the home screen of the teach pendant, press **Setting** in the bottom panel, and then press **Robot Update** to confirm whether the firmware, which is GV02080000 in the figure below, version is V2.8.



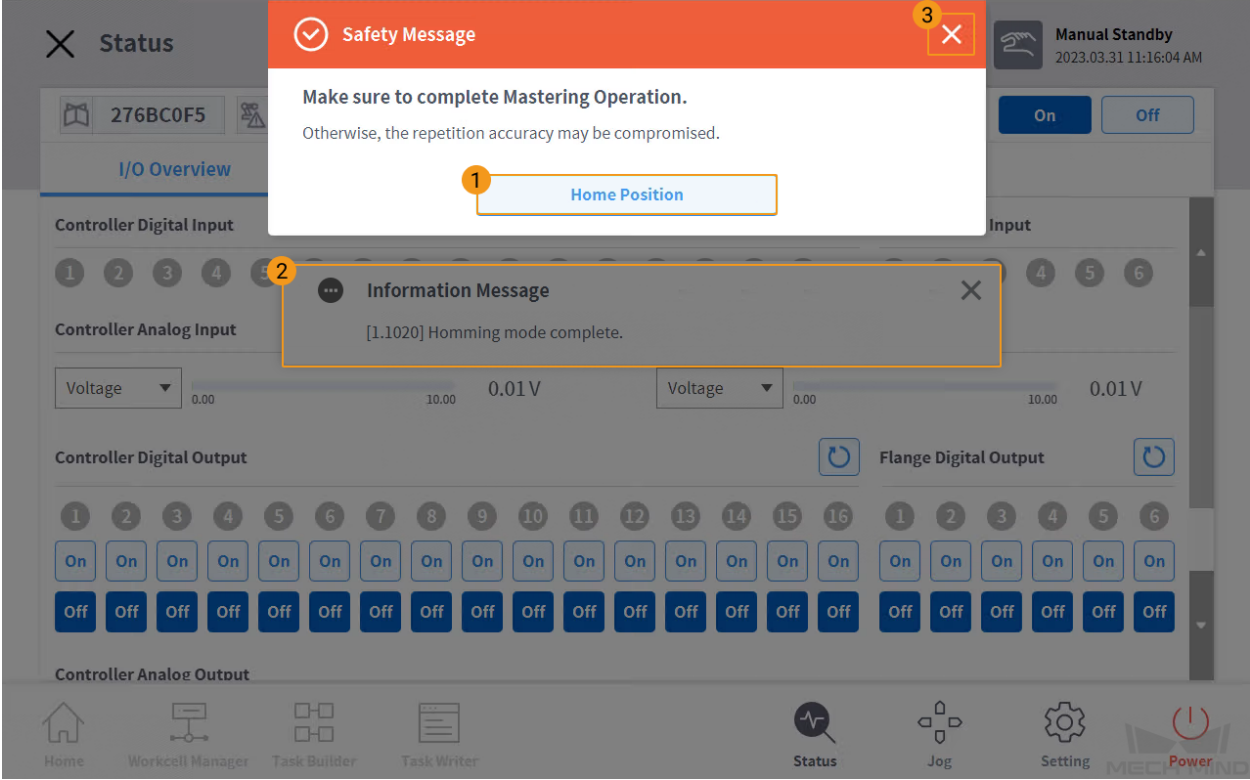
- 4. On the teach pendant, press **Status** in the bottom panel and then select **On**. A **Safety Message** window will pop up.

**Attention:** Before you press any options in the bottom panel, make sure you have closed windows of other options on the screen.



5. Press and hold the **Home Position** button until an **Information Message** window pops up. The pop-up window will disappear after a few seconds, which indicates that the robot has moved to the home position. Then press the exit button to close the **Safety Message** window.

**Attention:** Before performing this step, please make sure the safety of the personnel and robot to avoid collisions when the robot is moving.



After the above operations, the status light of **Servo** in the upper right corner becomes green.



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## Set up the Network Connection

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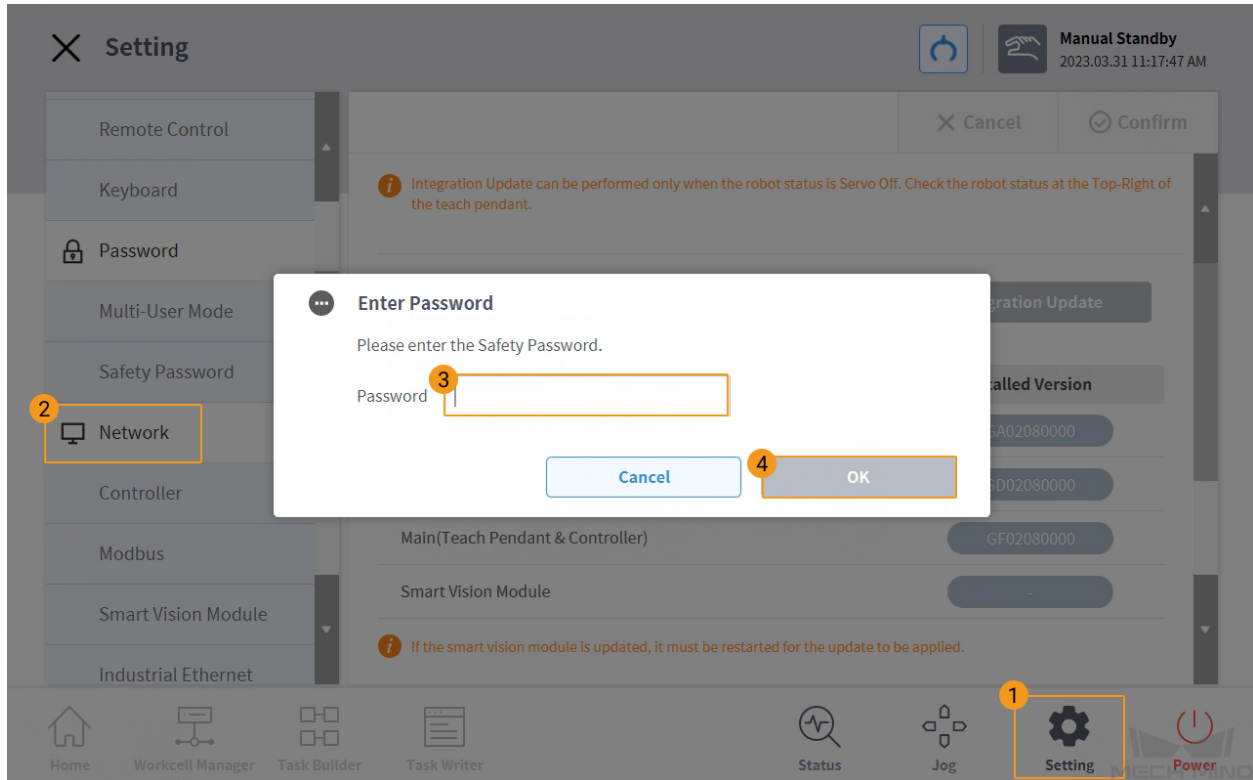
### 3.1 Hardware Connection

Use the Ethernet cable to connect the network ports of the IPC and the robot controller. All three network ports marked in the figure below can be used in TCP communication, and you can choose any one of them.

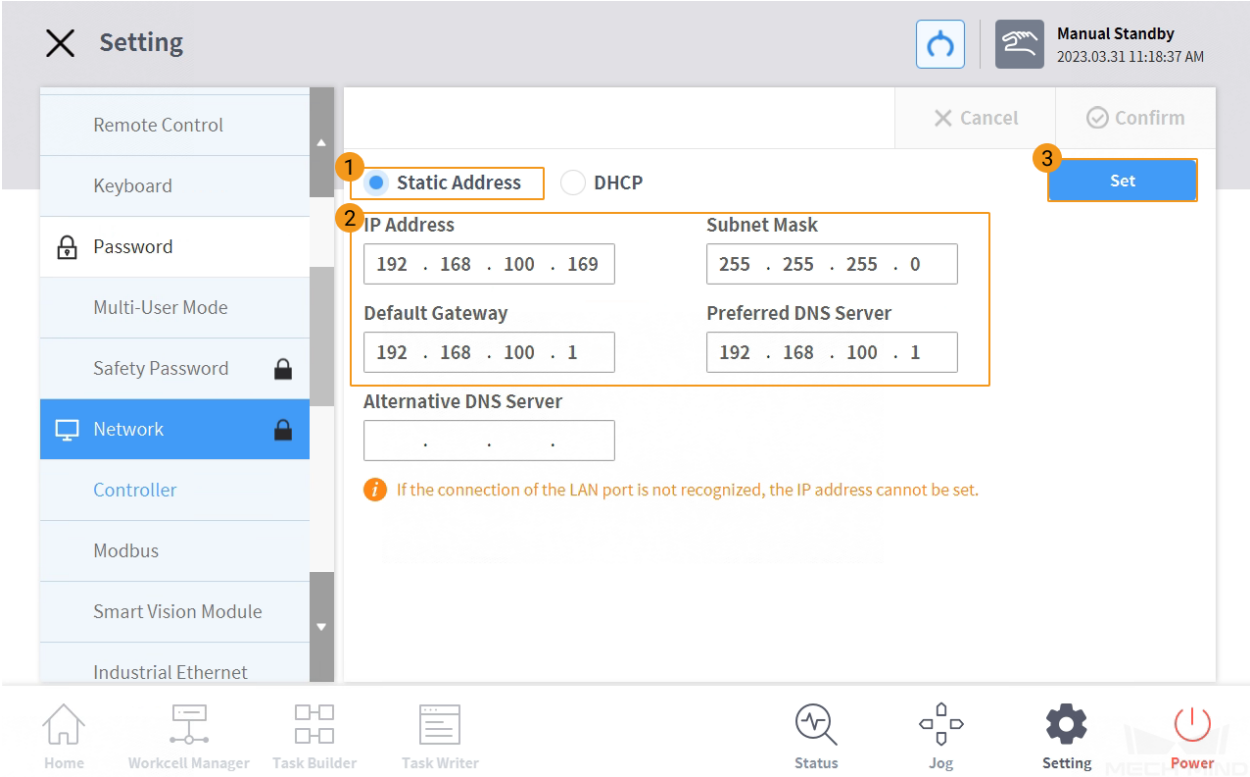


## 3.2 IP Address Configuration

1. On the teach pendant, press **Setting** in the bottom panel and then press **Network**. Then enter the password and press **OK**. The default password is *admin*.



2. Press **Static Address**, set the IP address of the robot, and then press **Set**.



3. Set the IP address of the IPC.

**Attention:** The IPC's network port connected to the robot controller should be in the same subnet as the robot. This means that the network portions and subnet masks of the IP addresses should be the same. For example, 192.168.100.169/255.255.255.0 and 192.168.100.170/255.255.255.0 are in the same subnet.

## CHAPTER 4

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### Prepare the Files

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1. On the IPC, open the `Mech-Center/Robot_Server/Robot_FullControl/doosan/Backup_Script` folder in the installation directory of Mech-Mind Software Suite.
2. Plug the USB flash drive into the USB port of the IPC. Copy the `MM_Server.txt` file in the **Backup\_Script** folder to the USB flash drive and then remove the USB flash drive safely.

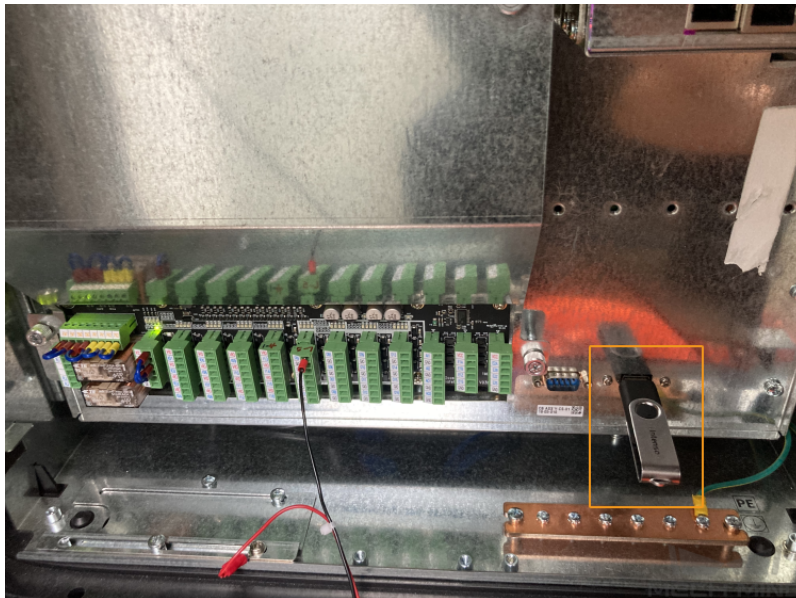
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### Load the Files to the Robot

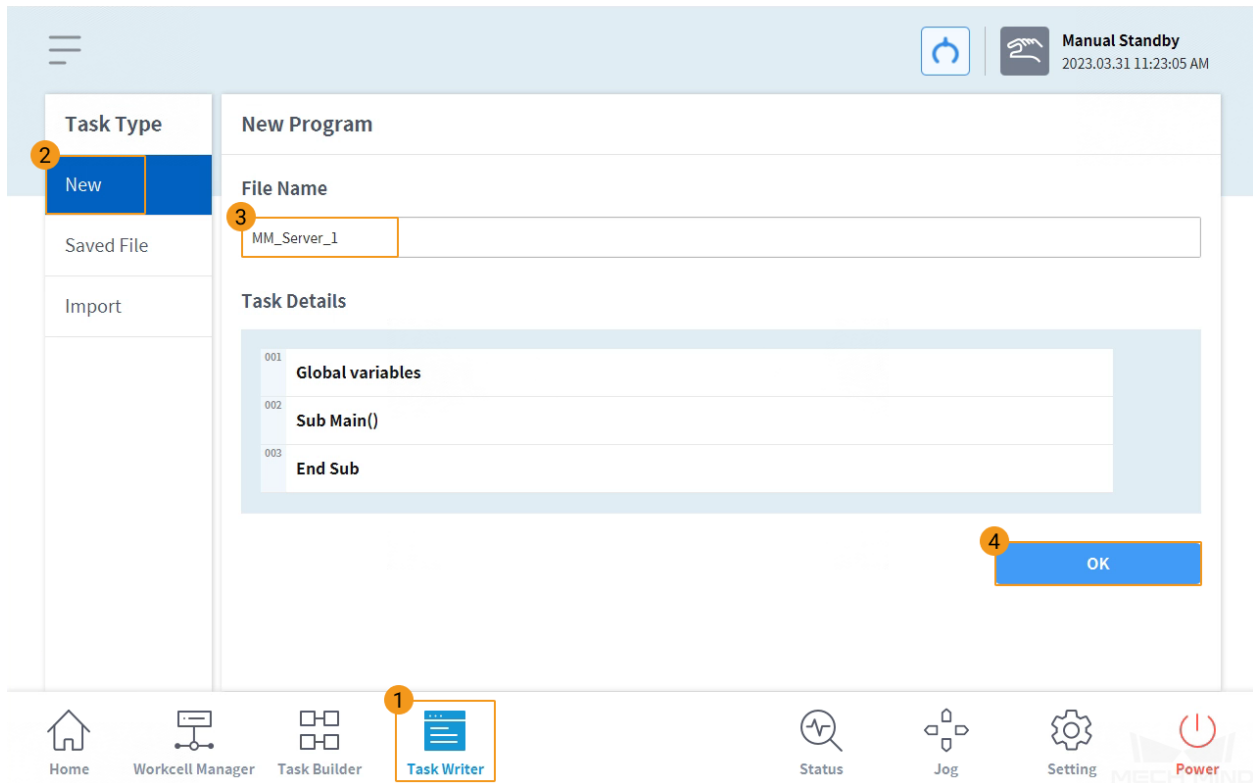
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**Attention:** It is recommended to back up robot system files before loading Master-Control program files to avoid system corruption that may be caused by the loading operation. In case any issue occurs, you can use the backup file to restore the robot system. Please refer to *Backup and Restore Robot Files* for detailed instructions.

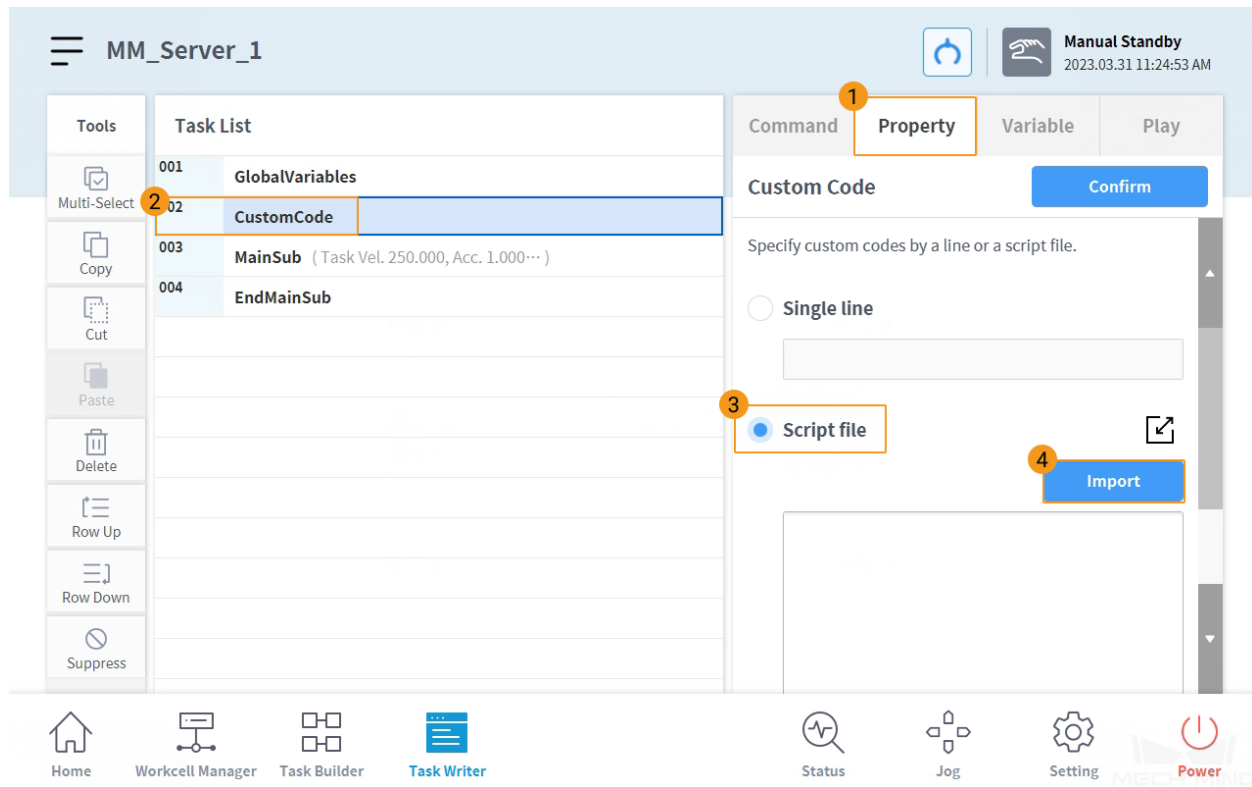
1. Plug the USB flash drive with the program file into the USB port of the robot controller.



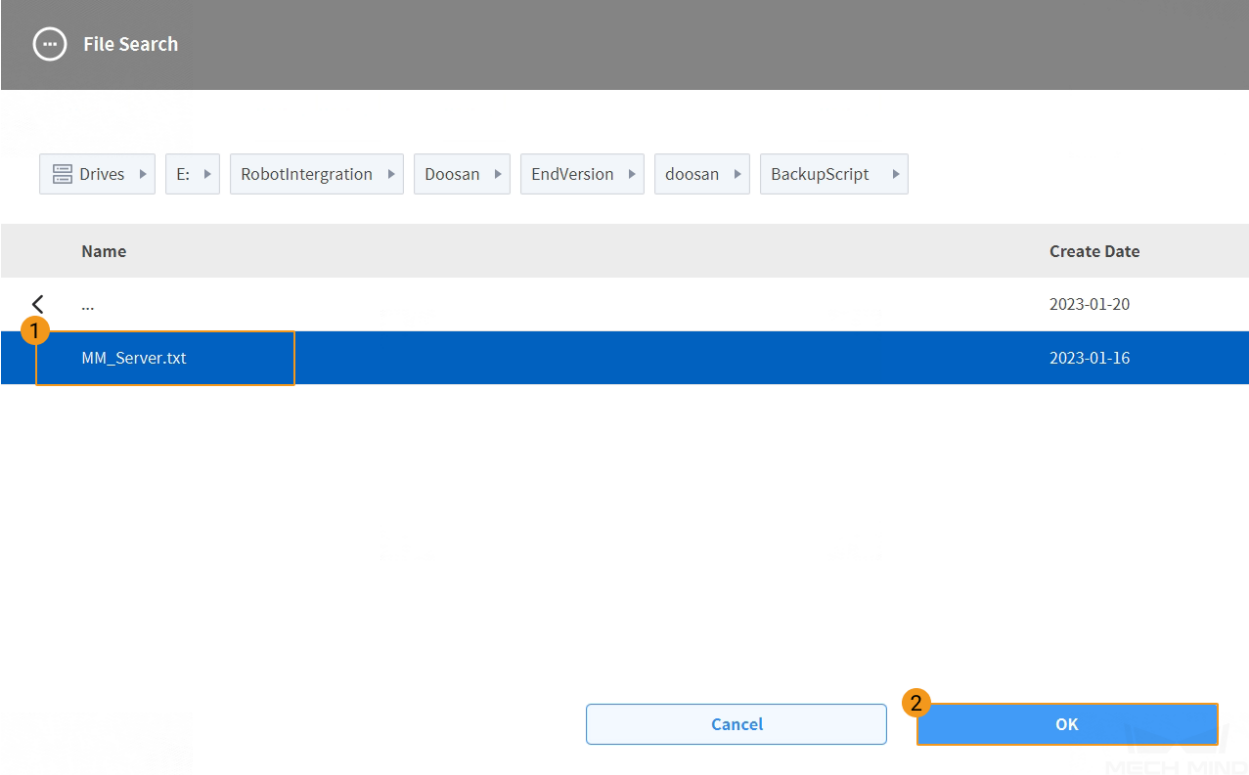
2. On the teach pendant, press **Task Writer** -> **New**, enter a file name (e.g., MM\_Server\_1), and then press **OK**.



3. Press **Property** and select **CustomCode**. Then press **Script file** and **Import** in turn.

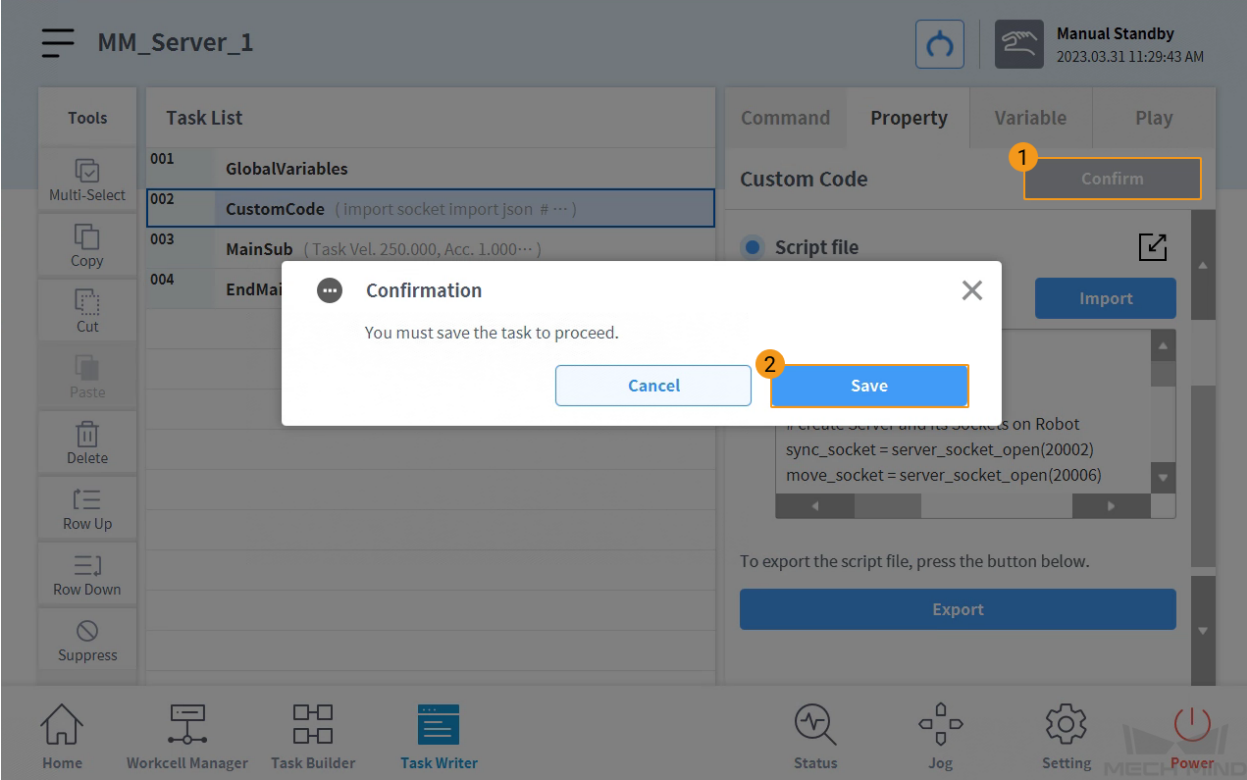


4. In the pop-up window, locate and select the **MM\_Server.txt** file, and press **OK** at the end.



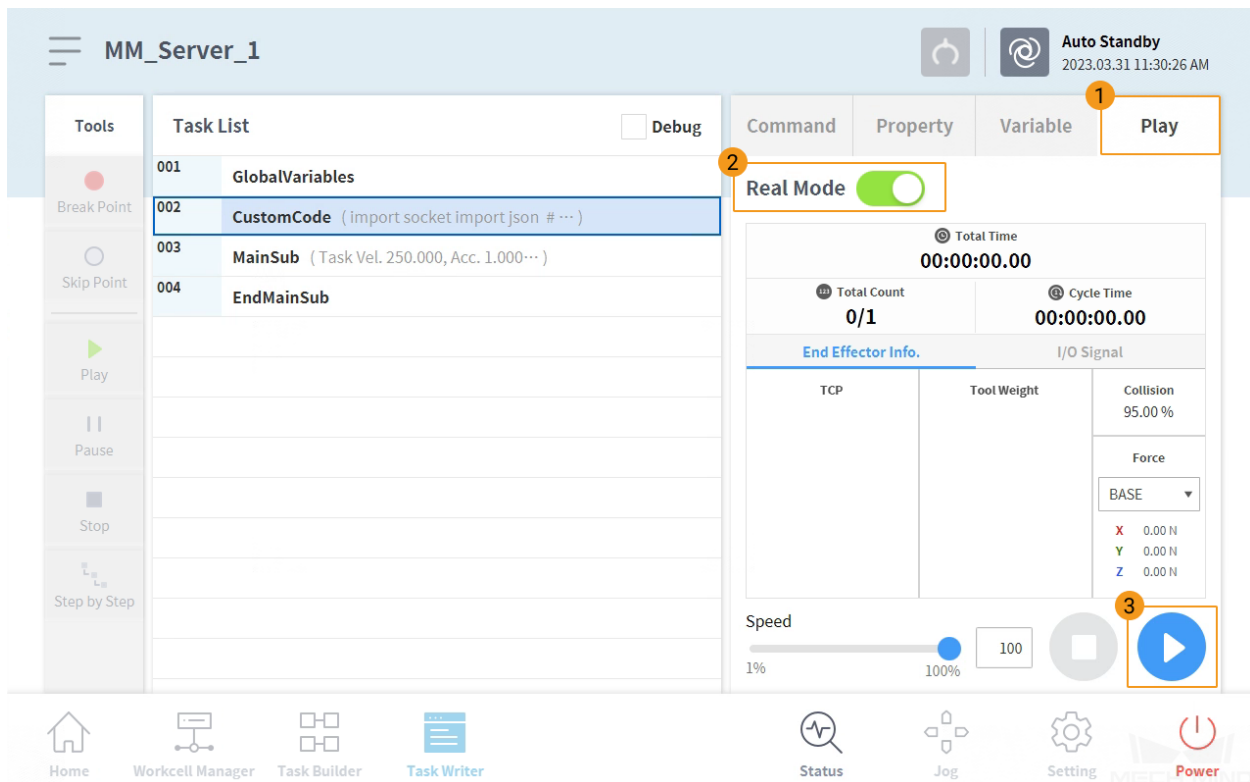
5. Press **Confirm** and then **Save**.



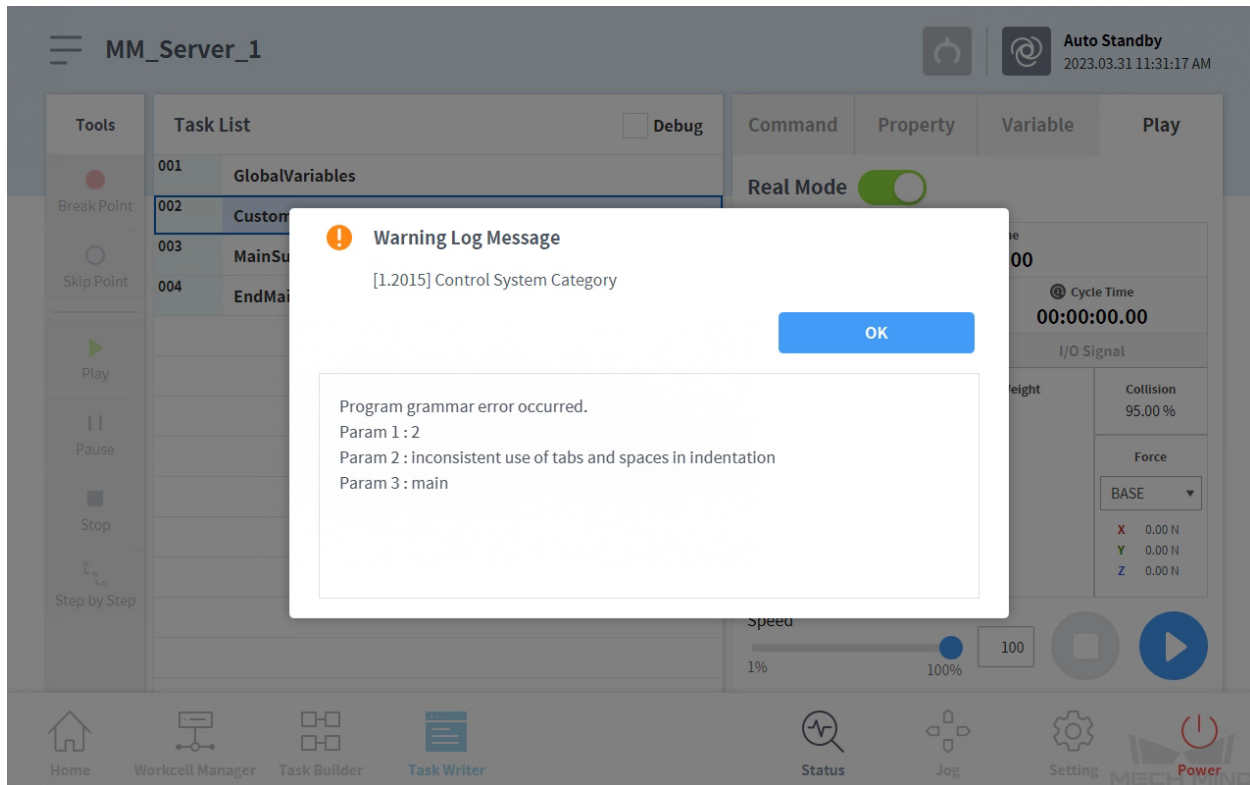


## Test Robot Connection

1. On the teach pendant, press **Play** and enable the **Real Mode**. Reduce the robot speed appropriately and press the run button to run the Master-Control program.



If a warning message as shown below pops up, please check if there is any inconsistent use of tabs and spaces in indentation in the MM\_Server\_1 Python script. Python uses indentation to distinguish different code blocks and therefore has a strict requirement for indentation.



Follow the steps as shown in the figure below to edit the script on the teach pendant. You can also modify the **MM\_Server.txt** file on your PC to fix the indentation problem and then re-import the file.

MM\_Server\_1 Manual Standby 2023.03.31 11:40:14 AM

Tools	Task List
	001 GlobalVariables
	002 CustomCode ( import socket import json # ... )
	003 MainSub ( Task Vel. 250.000, Acc. 1.000... )
	004 EndMainSub

Command Property Variable Play

Custom Code Confirm

Script file

Import

```
import socket
import json

# create Server and its Sockets on Robot
sync_socket = server_socket_open(20002)
move_socket = server_socket_open(20006)
```

To export the script file, press the button below.

Export

Home Workcell Manager Task Builder Task Writer Status Jog Setting Power

MM\_Server\_1 Manual Standby 2023.03.31 11:43:09 AM

Script file

View Mode Edit mode

```
101 di_value = 0
102 for i in range(0, 22):
103     if i <= 15:
104         di_value = di_value + (get_digital_input(i+1))*(2**i)
105         #di_value = di_value + get_digital_input(i+1)*(2**i)
106         #tp_log("di {} is: {}".format(i+1, get_tool_digital_input(i+1)))
107     else:
108         port_num = i - 15
109         di_value = di_value + (get_tool_digital_input(port_num))*(2**i)
110         #tp_log("hand-di {} is: {}".format(i-15, get_tool_digital_input(port_num)))
111 #tp_log("di-value is: {}".format(di_value))
```

Home Workcell Manager Task Builder Task Writer Status Jog Setting Power

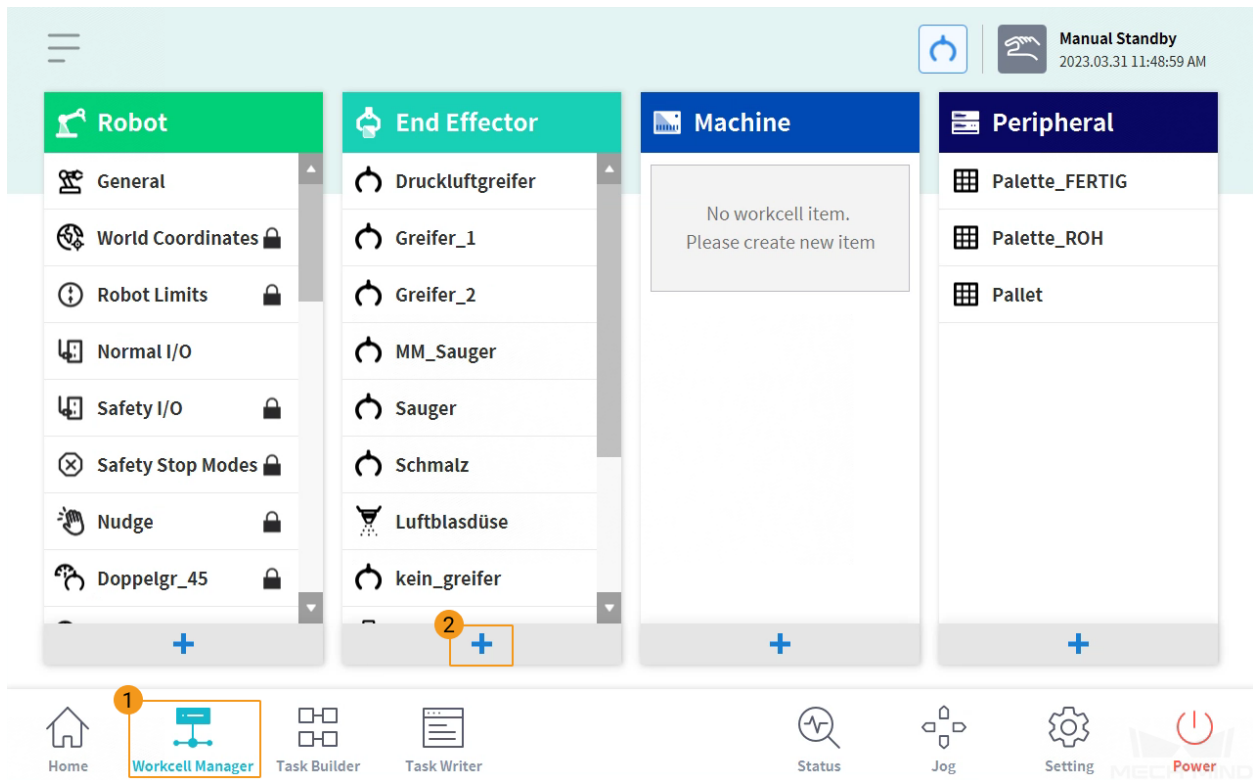
2. Refer to test\_robot\_connection to proceed with the following steps.

**Attention:** If Mech-Center is disconnected, the program on the robot end should be stopped as well, i.e., the above MM\_Server\_1 task should be stopped. If you want to reconnect and control the robot, please re-execute the program.

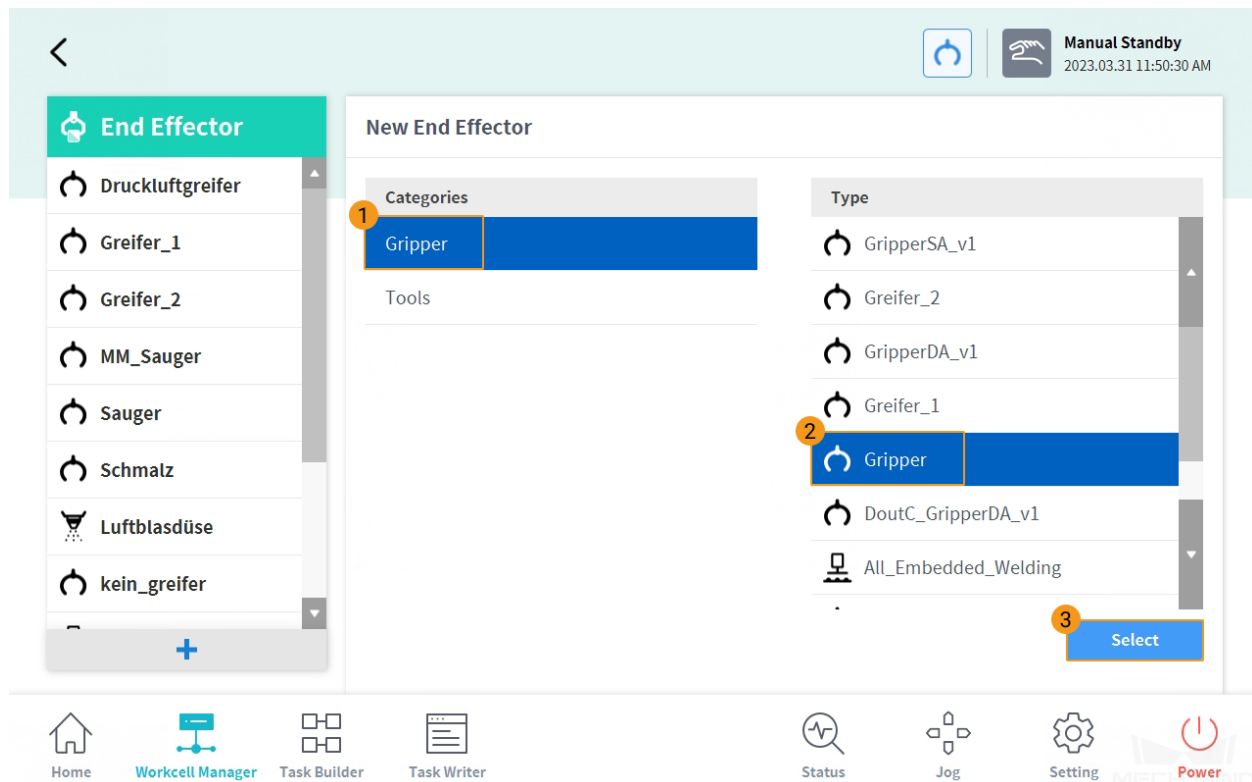
### 7.1 Set TCP

When an end tool is used in the Mech-Viz project, please set the **Tool Center Position** according to the following instructions. A gripper is used as an example in the following instructions.

1. On the teach pendant, press **Workcell Manager** in the bottom panel and then press +.



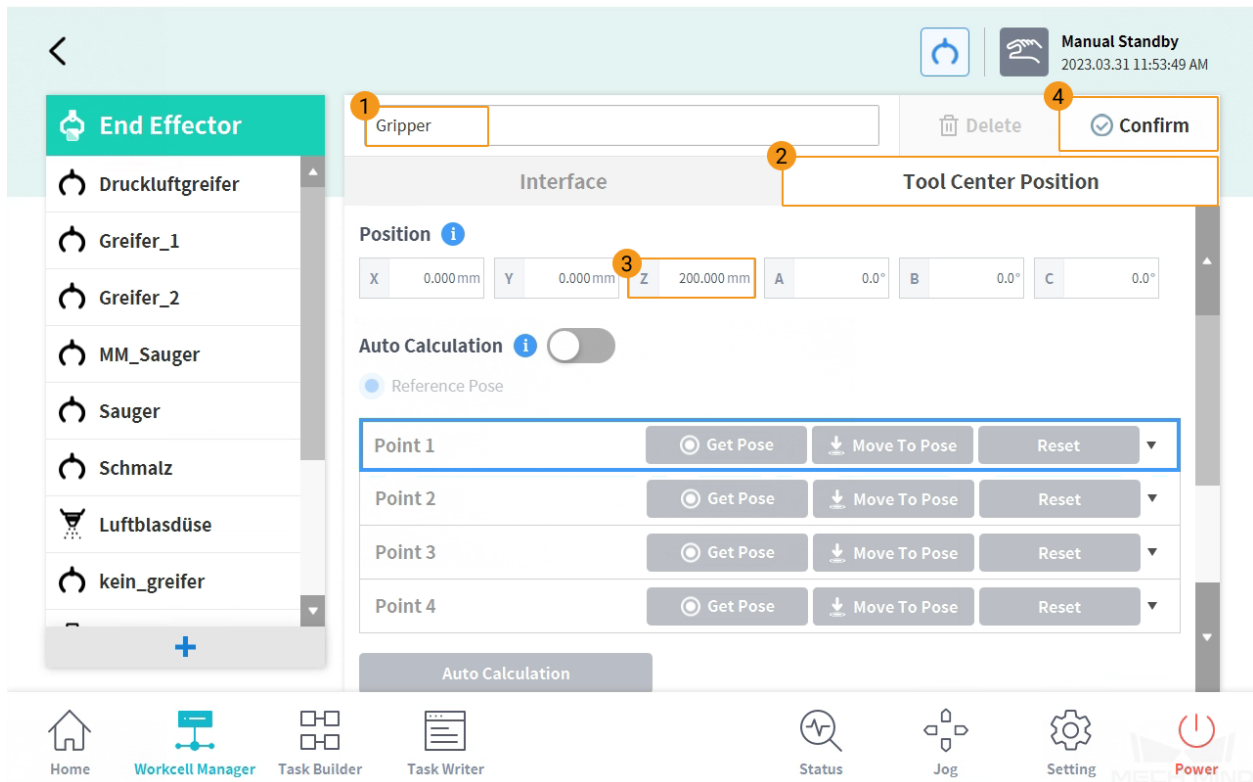
2. Select **Gripper** in Categories and **Gripper** as the Type, and then press **Select**.



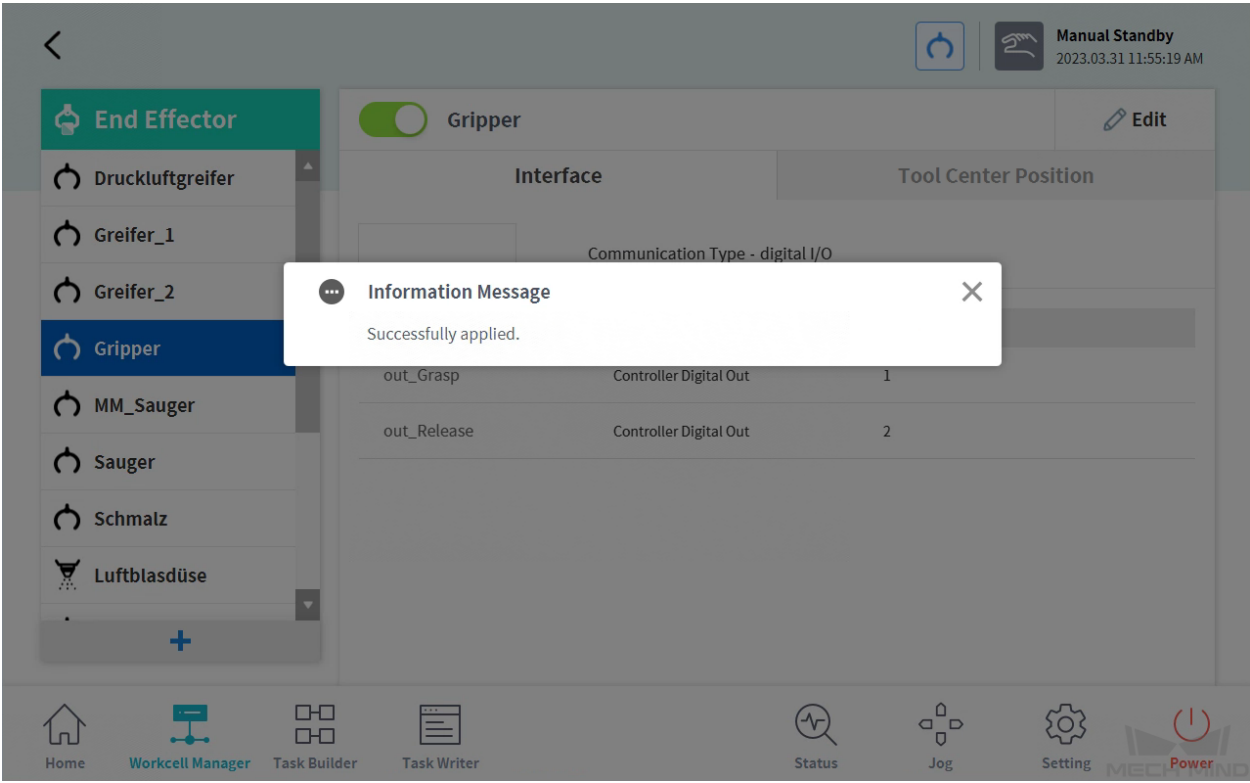
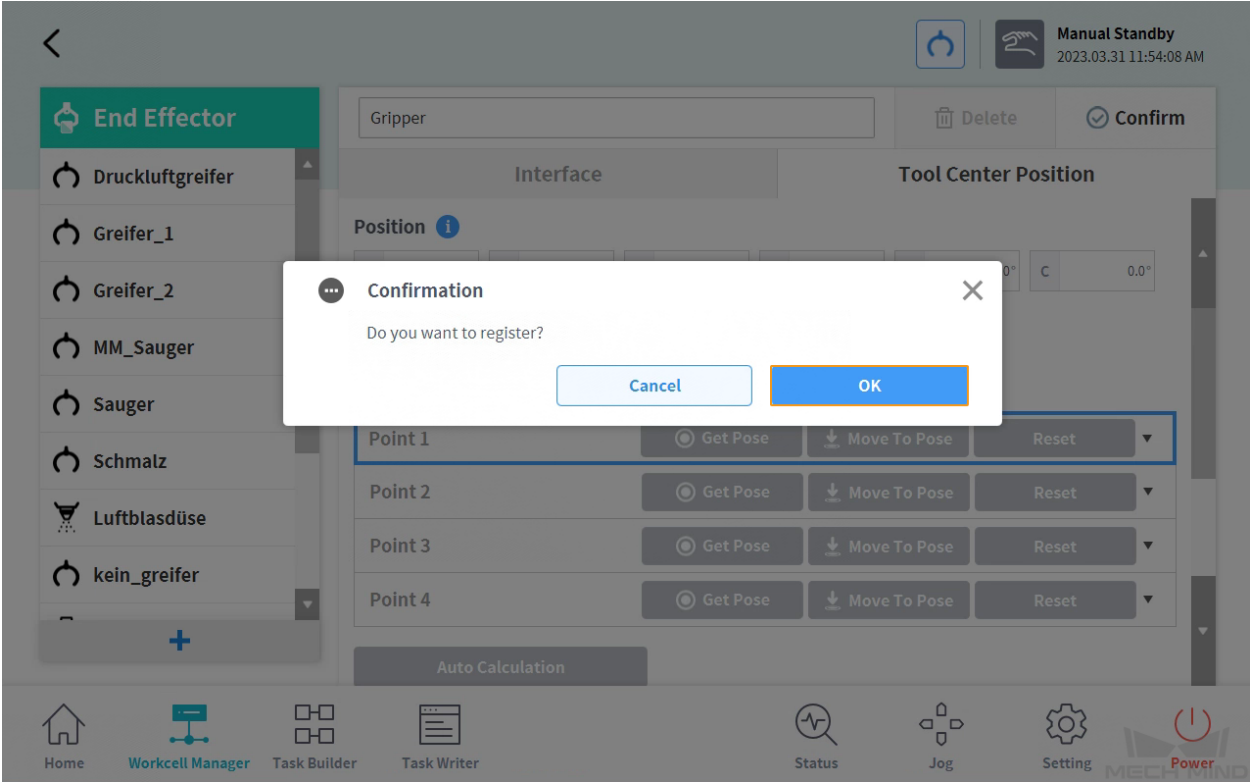
3. Name the gripper and press **Tool Center Position** to set **Position** parameters. Z value in this example is set to 200 mm. After finishing the settings, press **Confirm**.

**Attention:** Since the TCP in Mech-Viz cannot be synchronized to the teach pendant, please ensure the Position parameters set here are the same as the TCP values set in Mech-Viz. Otherwise, the robot' s linear motion will be problematic when there are special offsets and rotations of the end tool.





4. Press **OK** to save the settings, and a “Successfully applied” message will pop up.

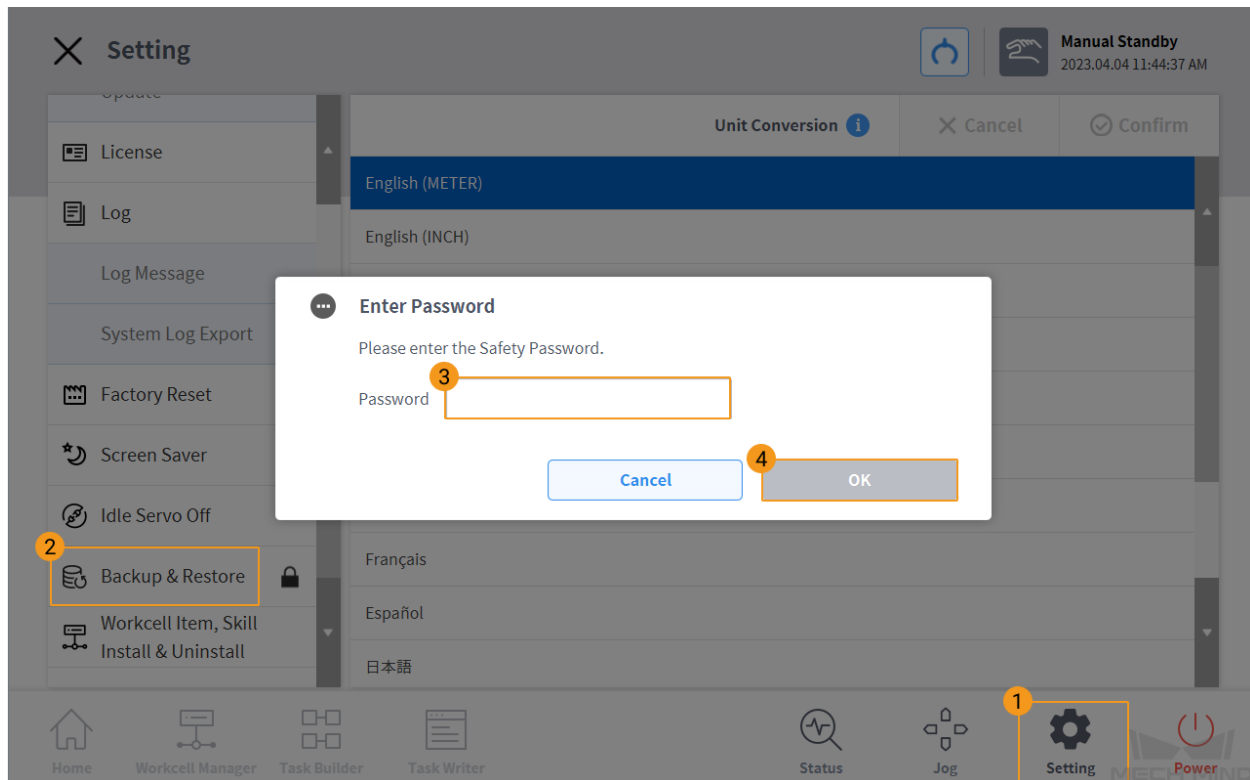


## 7.2 Backup and Restore Robot Files

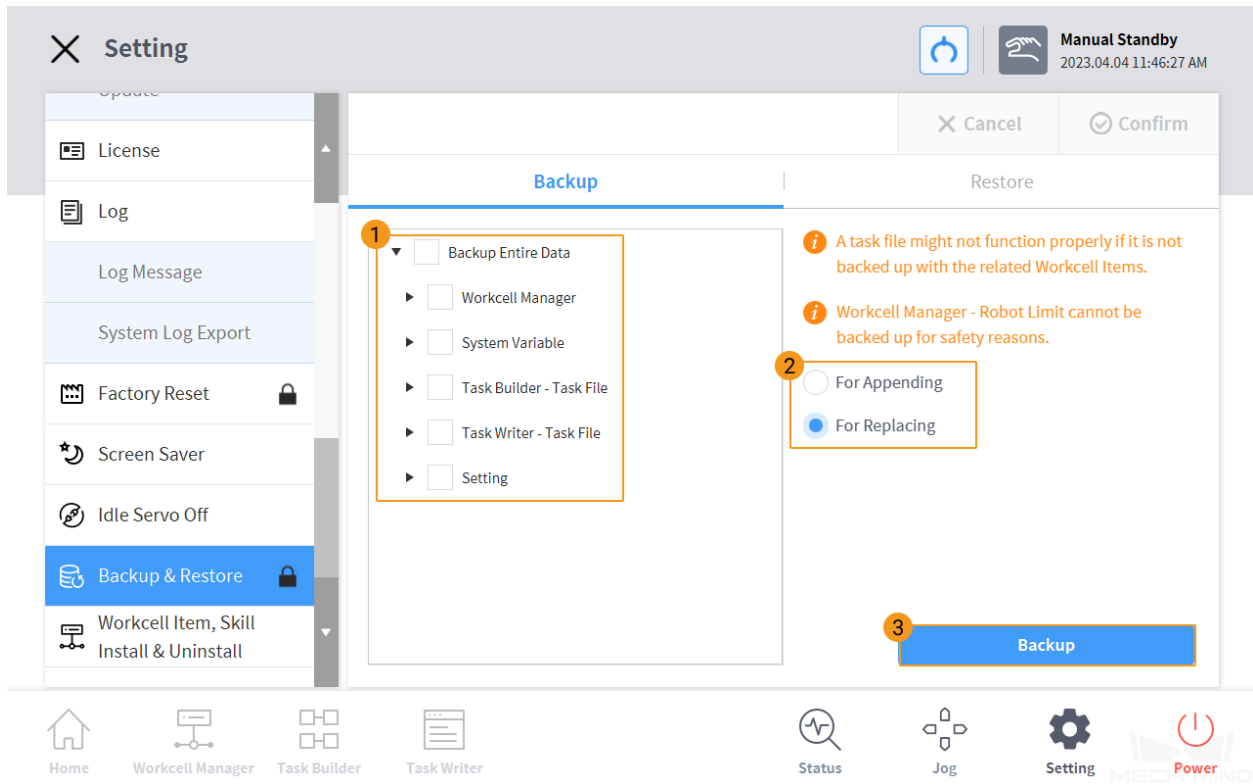
It is recommended to back up robot system files before loading Master-Control program files to avoid system corruption that may be caused by the loading operation. In case any issue occurs, you can use the backup file to restore the robot system.

### 7.2.1 Backup

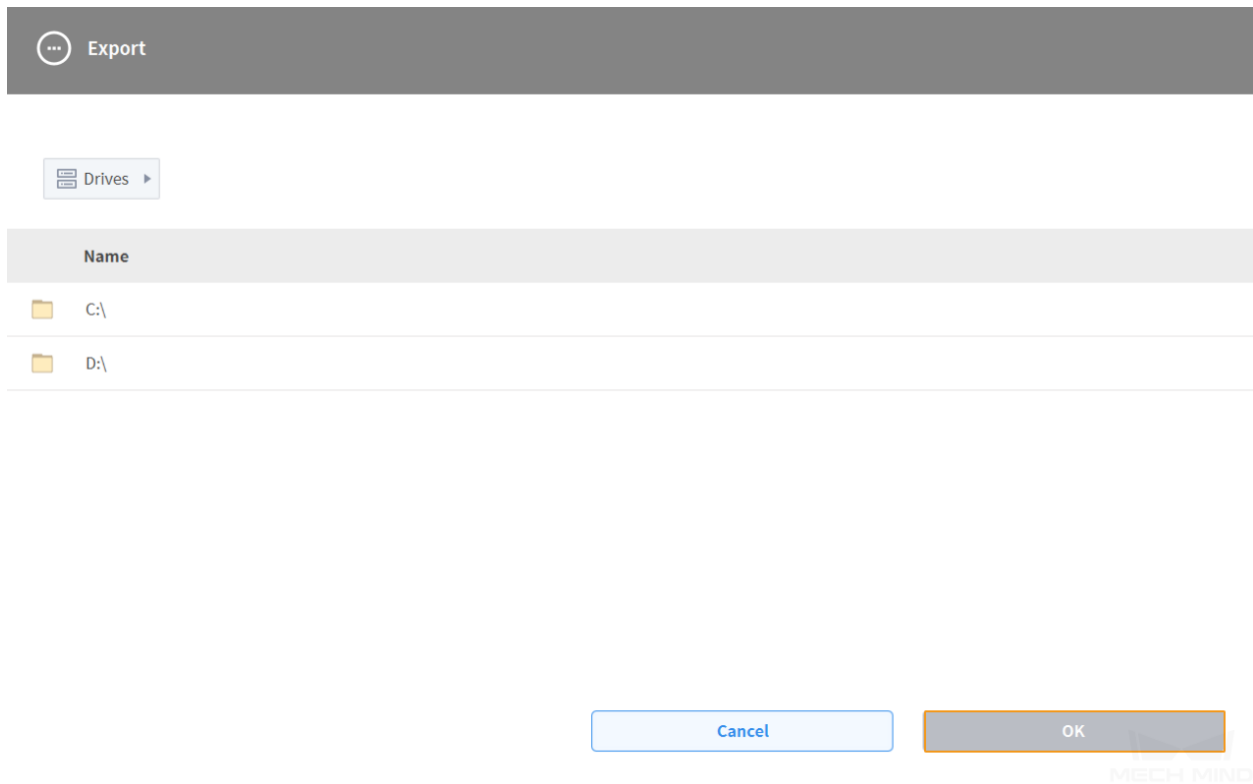
1. On the teach pendant, press **Setting** in the bottom panel, and select **Backup & Restore** on the left panel. An **Enter Password** window will pop up. Then enter the password and press **OK**. The default password is *admin*.



2. In the **Backup** tab, select the items you want to backup, select **For Replacing** or **For Appending**, and then press **Backup**.

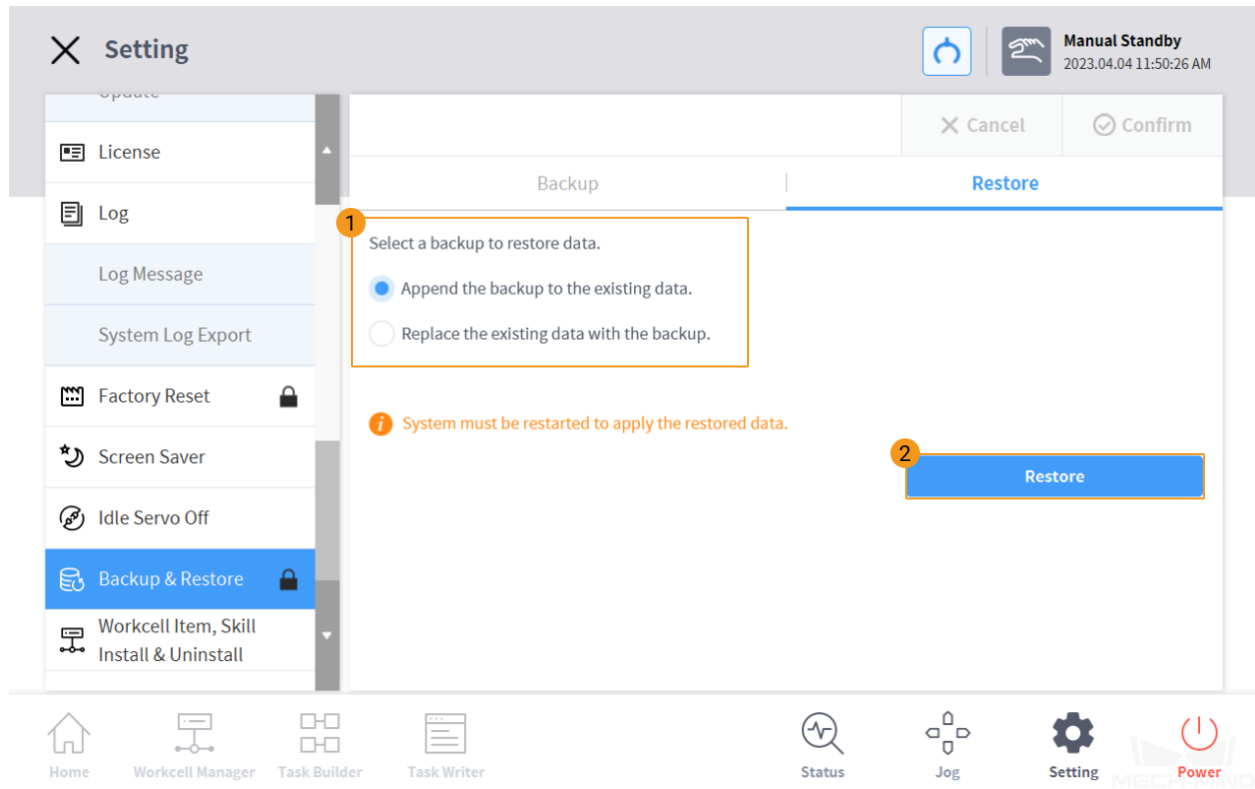


3. In the pop-up window, select the directory where you want to store the backup files, and press **OK**.



## 7.2.2 Restore

1. In the **Restore** tab, select a backup to restore data. Please ensure that the option you select corresponds to the backup option (**For Replacing** or **For Appending**) you have selected. Then press **Restore**.



2. Select the backup file in the pop-up window and press **OK**.

File Search

Drives ▶

Name	Create Date
C:\	2023-04-03
D:\	2023-04-03

Cancel

OK

MECH MIND