FINGER CNC

Open Designs Customize The Future

B05 Truss Robotic System User Manual

Guangzhou Finger Technology Co., Ltd

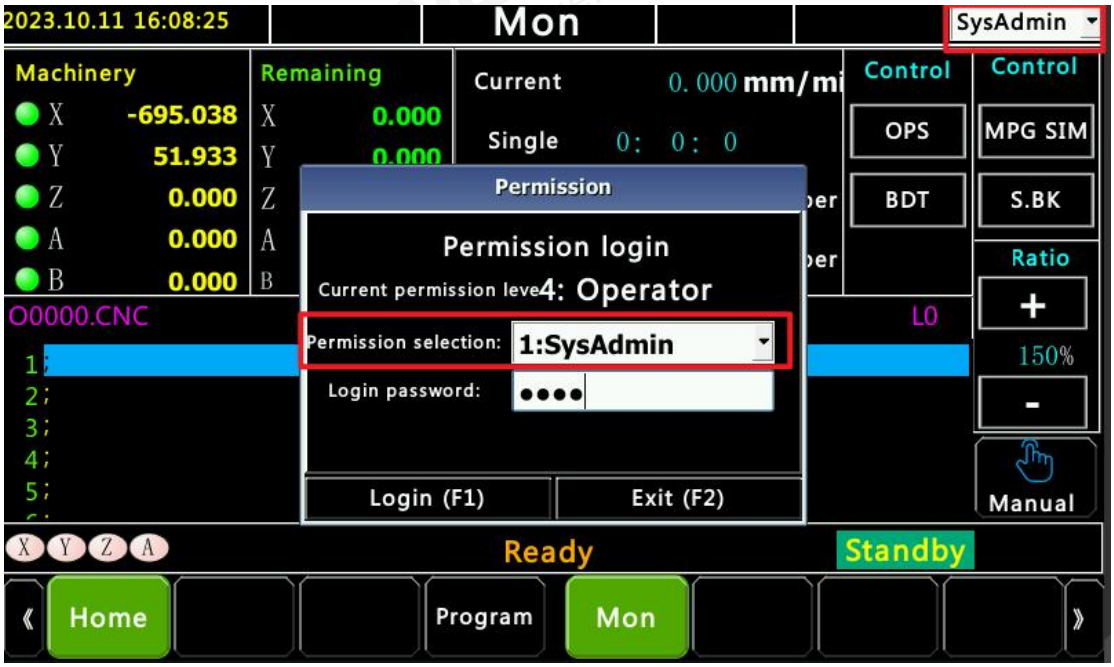
Version No: F202309RU-EN

CONTENTS

Part 1.System Functionality Usage

1.1 System Authorization Management

Upon entering the system, limited functions are available. To access specific functions, login with corresponding authorization is required. The authorization login can be found in the top right corner of the homepage.



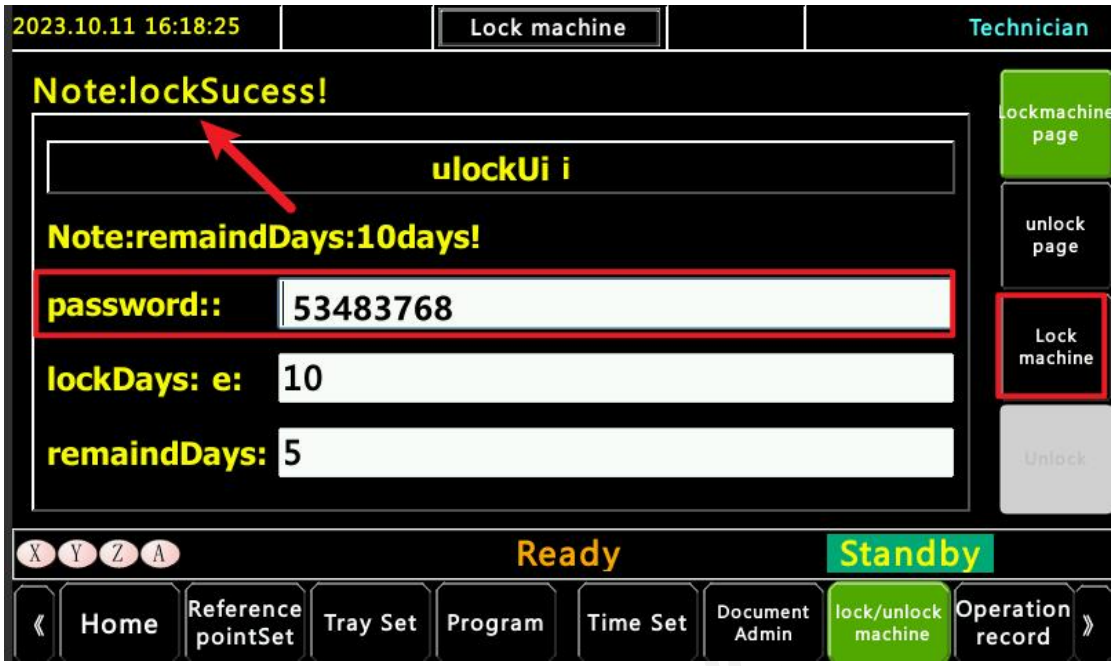
1.2 Controller Lock/Unlock Application

Locking the Machine:

A. After logging in with the appropriate authorization, navigate to the Help section on the homepage and access the Lock/Unlock Machine option.

B. Enter the user password (provided by the engineer).

C. Set the lock duration and remaining reminder days, then click on "Lock Machine." A successful lock message will be displayed.



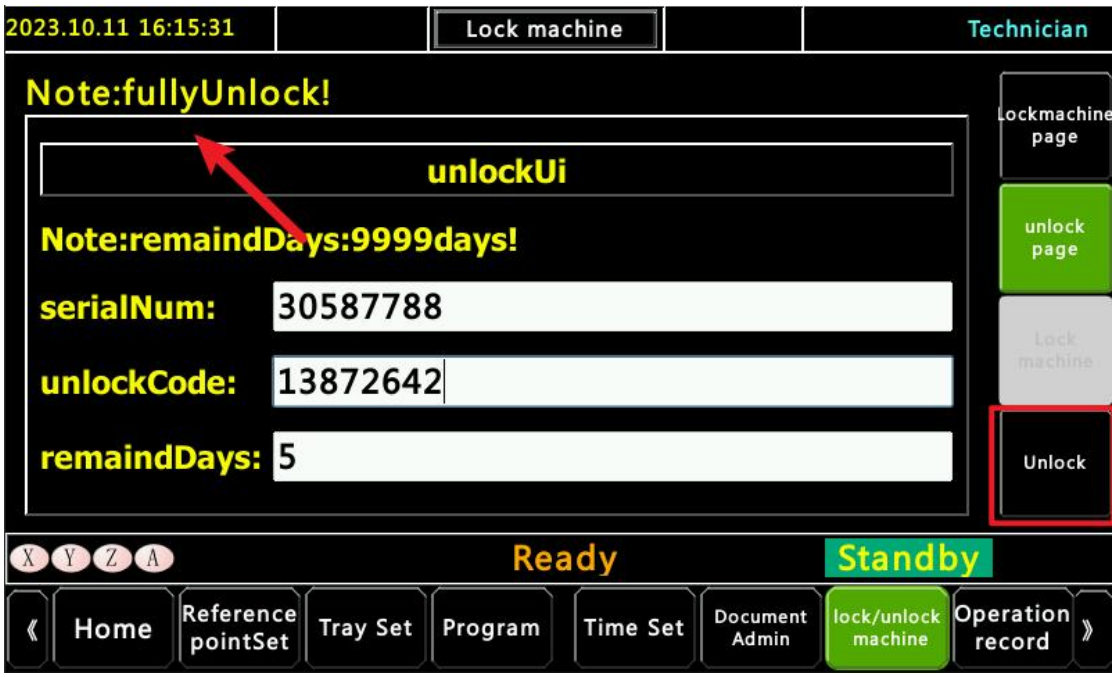
Unlock Steps:

A. On the unlock machine interface, click on the unlock page.

B. Provide the controller serial number on the page to the engineer and indicate whether it is a complete unlock or a temporary unlock for a certain number of days.

C. Enter the unlock code provided by the engineer.

D. Click on the "Unlock" button to complete the unlocking process.



1.3 Controller Language Switching

Next to the lock machine button, there is a language switch button. The language options include Simplified Chinese, English, and Traditional Chinese.

1.4 Controller Data Backup and Update

Backup:

A. Go to the "Help" interface - "Data Management" - "Data Backup" / "Data Update" / "Backup Package Management".

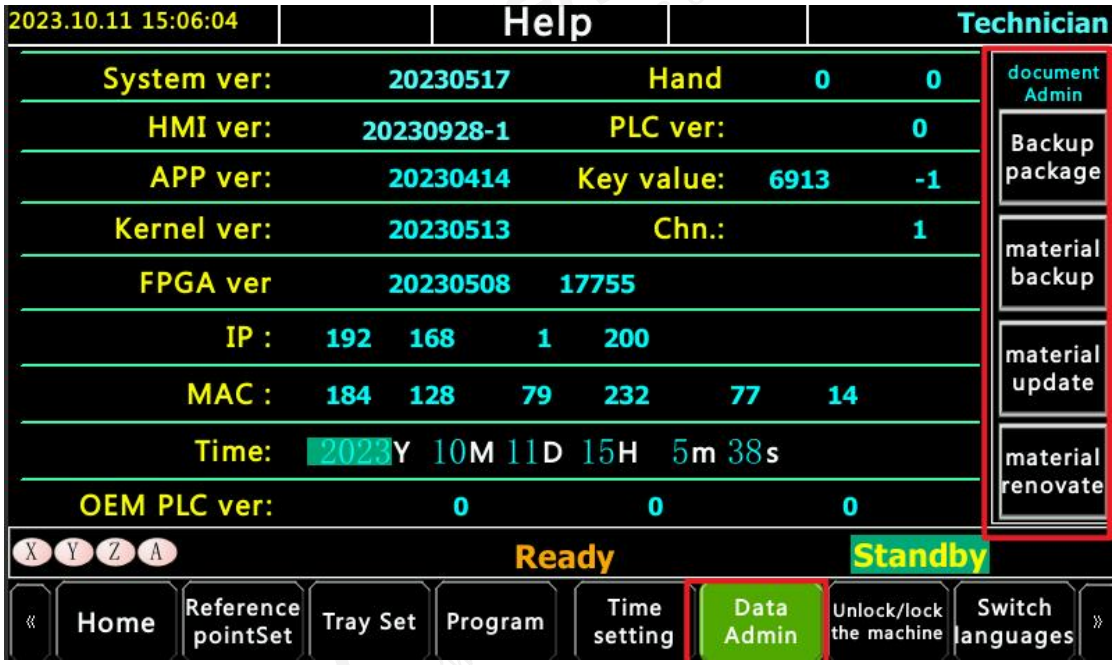
B. Click on "Data Backup".

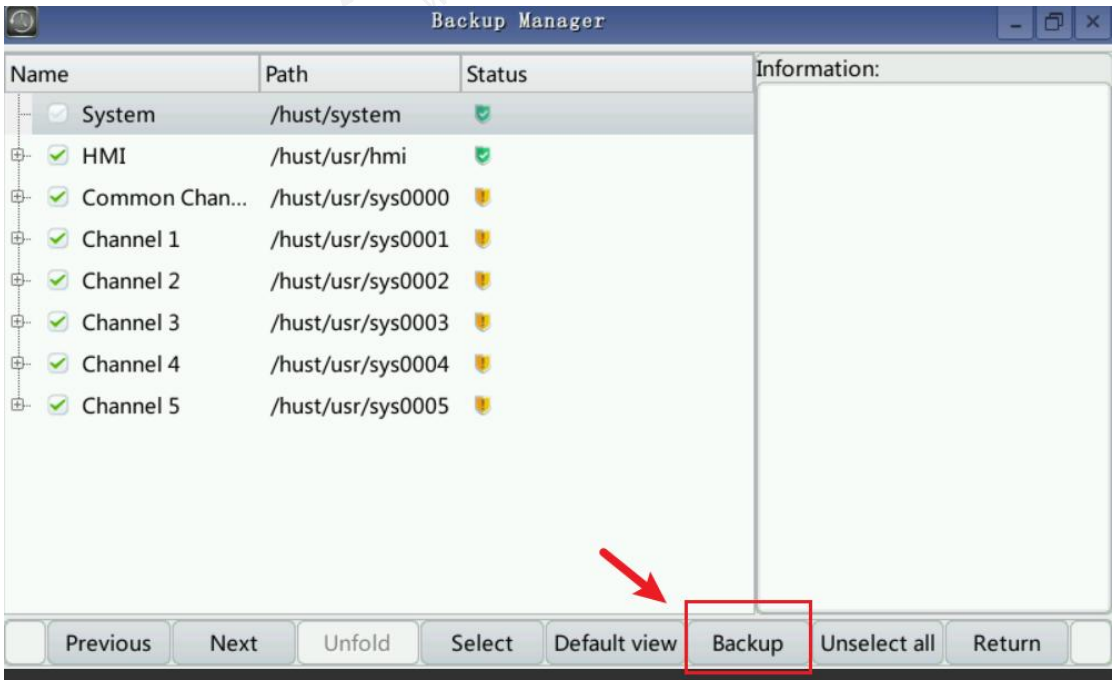
C. Click on the "Deselect All" button below and wait for it to change to the "Select All" button, then click on it.

D. After the backup is complete, insert a USB flash drive and load the data into the USB flash drive.

E. If you need to update the data, simply insert the USB flash drive into the USB port and the update interface will appear. Select the data to be updated and click on "Update".

F. Load the backup package from the system into the USB flash drive. Click on "Backup Package Management" and insert the USB flash drive to load it.

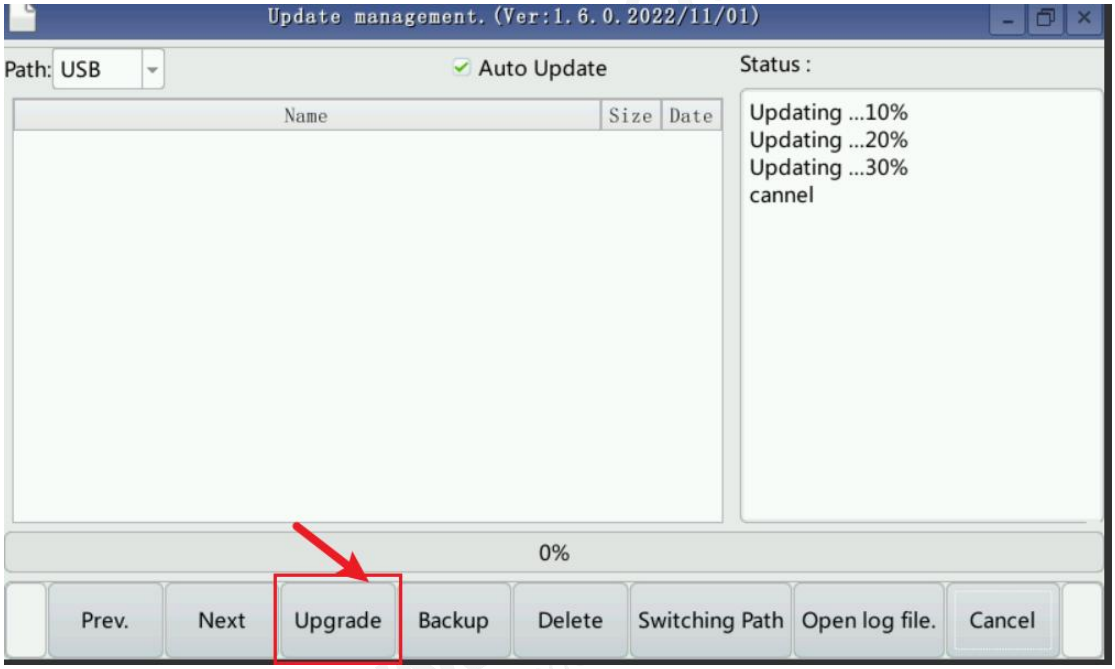




Updated version:

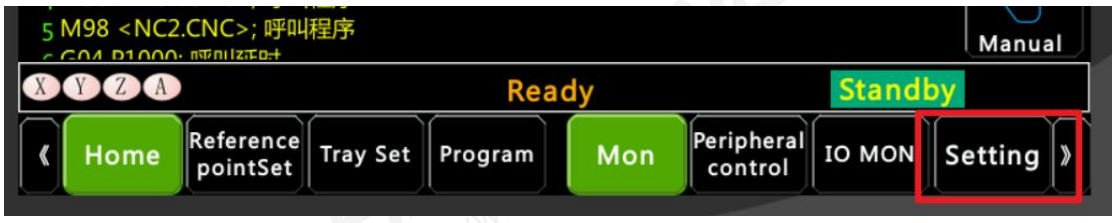
A. Place the files on a USB flash drive. Make sure the equipment has stopped processing, then insert the USB flash drive into the USB port of the handheld pendant and wait for the update interface to appear.

B. Select the corresponding file and click on "Update".



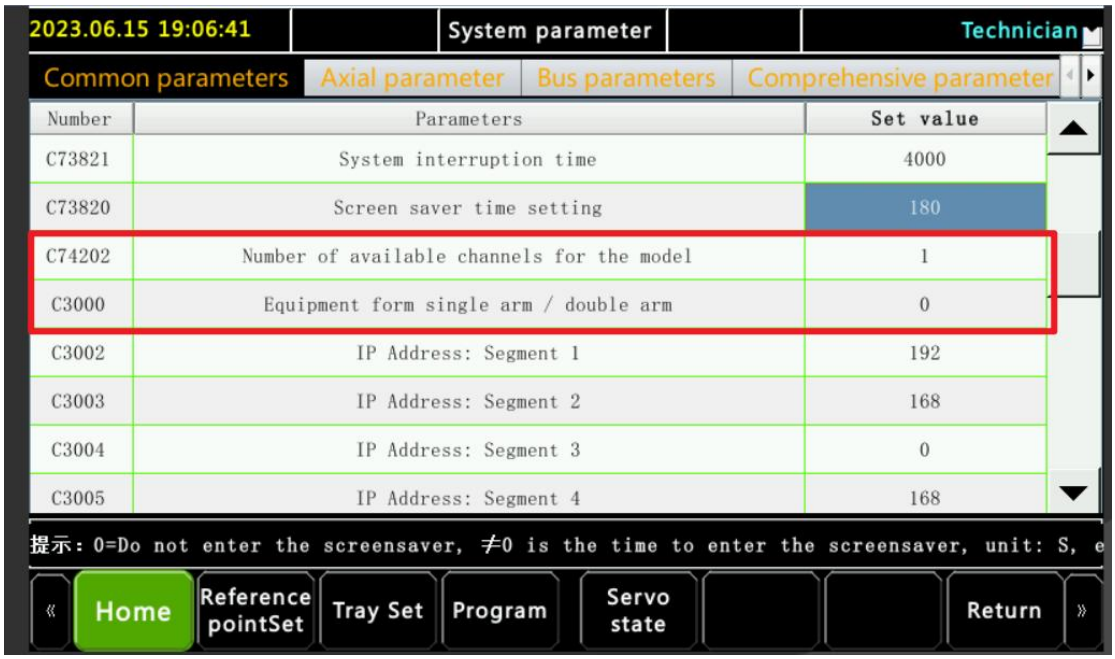
1.5 Enabling Dual Channel on the Controller

A. On the home page, click on the "Settings" button.



B. In the settings interface, click on the "Front Added Parameters" button.

C. In the parameter interface, locate the available number of channels for the machine model and enable it based on the equipment configuration.



1.6 Panel Button Introduction

Figure 2.1.1.1 Emergency

Figure 2.1.1.2 Enable Device

Side view of the handheld pendant

1.6.1 Emergency Stop Button (Figure 2.1.1.1)

The red emergency stop button is used in case of an emergency situation on the machine, such as the arm colliding with the machine or unexpected behavior of the arm. Pressing

this emergency stop button immediately will prevent accidents from happening.

1.6.2 Enable Device (Figure 2.1.1.2)

The enable device is designed to ensure that the arm starts its operation process or performs axial movements as intended by the operator, rather than unintended movements caused by accidental button presses. It requires a two-stage press: the first stage is for starting or initiating axial movements, and the second stage is a safety feature to prevent accidental activation.

1.6.3 Function Buttons - Physical Keys

Users can utilize the physical function buttons to send motion commands to the robotic arm. These buttons are categorized into three main areas: Function Key Area, Axis Movement Key Area, and Custom Key Area.

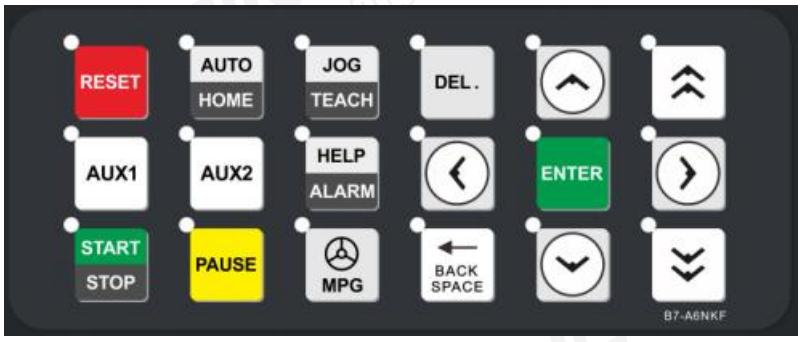


Figure 2.1.3 Function Buttons - Physical Keys

Function Key Area:

1.RESET: Press this button to reset the system to its initial state.

2.START/STOP: Executes the pre-programmed arm movements.

3.PAUSE: Pressing this button during program execution will pause the program. Pressing it again will resume.

4.AUTO: Switches the system mode to automatic execution mode. The indicator light

above the button will illuminate.

5.HOME: Double-pressing this button switches the system mode to home mode. The indicator light above the button will flash.

6.JOG: Switches the system mode to jog mode. The indicator light above the button will illuminate.

7.TEACH: Double-pressing this button switches the system mode to teach mode. The indicator light above the button will flash.

8.HELP: Press this button to access the help interface. The indicator light above the button will illuminate when activated.

9.ALARM: Switches to the alarm interface to view current and historical alarms.

10.MPG: Enables or disables the MPG mode, based on user parameter settings.

11.DEL.: Delete row button.

12.BACK SPACE: Delete button.

13.< >∧ ∨: Cursor movement buttons for left, right, up, and down. Can be customized as O-point output buttons.

14.ENTER: Enter button.

15.≪ ≫: Axis movement buttons for up and down. Can be customized as O-point output buttons.

16.Custom Buttons (AUX1, AUX2): System-defined buttons with customizable functions, configurable in user parameters.

1.6.4 Chinese Function Buttons - Physical Keys

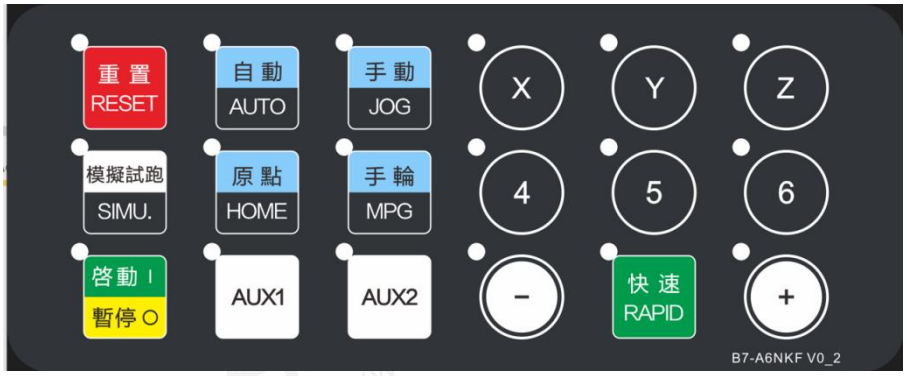


Figure 2.1.4 Chinese Version of Physical Function Buttons

Function Key Area:

1.RESET: Reset button, restores the system to its initial state.

2.SIMU: In MPG simulation mode, when combined with the enable button on the pendant, pressing and holding this button allows program execution.

3.Start/Pause button. In automatic mode, pressing it once starts the execution of the loaded program, and pressing it again triggers program pause.

4.AUTO: Switches the system mode to automatic execution mode. The indicator light above the button will illuminate.

5.HOME: Switches the system mode to home mode. The indicator light above the button will flash.

6.AUX1/AUX2: System-defined buttons with customizable functions, configurable in user parameters.

7.JOG: Switches the system mode to jog mode. The indicator light above the button will illuminate. The option to enable the jog keyboard can be configured in user parameters.

8.MPG: MPG mode button. The option to enable the MPG keyboard can be configured in user parameters.

9.X/Y/Z/4/5/6: Axis selection buttons. In manual and MPG mode, these buttons select the corresponding axis. They are customizable buttons that can output O-point signals.

10.+/-: Axis movement buttons.

11.RAPID: Enables rapid movement mode for manual axis movement.

1.7 Enabling Software and Hardware Limits

1.7.1 Enabling Software Limits

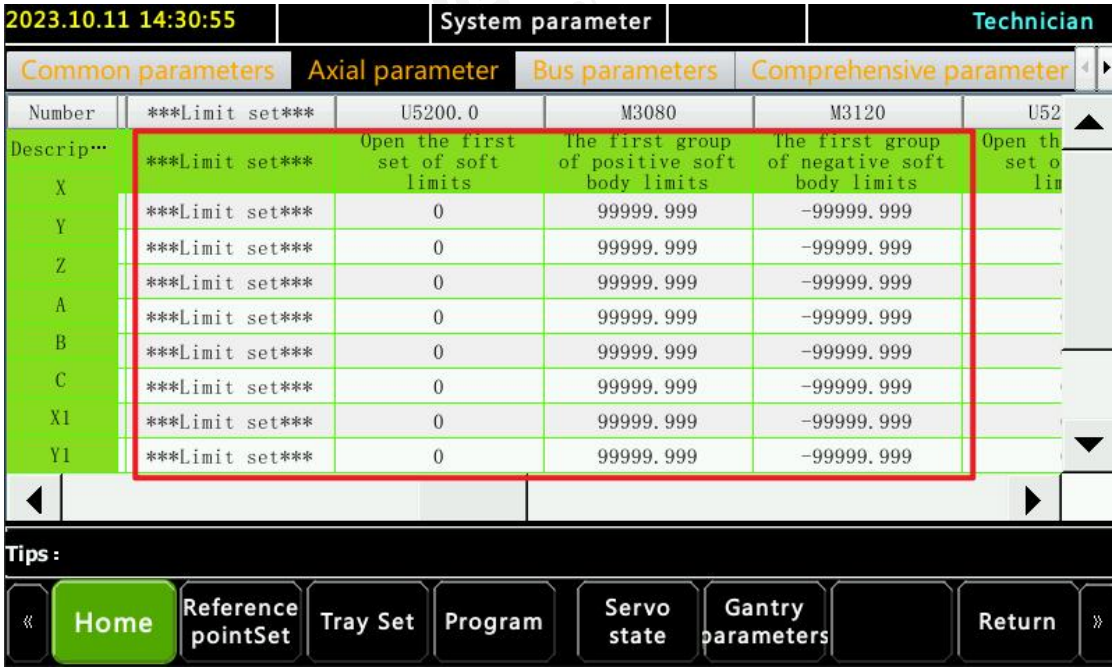
This feature applies to all robotic arms.

In the parameter setting interface, navigate to the axis parameters and locate the first set of software limit switches, which are initially set to 0 (enabled). Follow these steps to set the negative and positive limit positions for the axis:

A. Use the MPG to move the axis to the negative extreme position on the mechanical arm. Take note of the position and write it as the negative limit.

B. Similarly, move the MPG to the positive extreme position on the mechanical arm. Take note of the position and write it as the positive limit.

C. Click the reset button to confirm.



1.7.2 Enabling Dynamic Software Limits

This feature applies to dual-channel dual-arm robotic systems where both arms operate on the same track and their motion paths may overlap.

To enable dynamic software limits, follow these steps:

First, access the settings interface and select the safety zone button to enter the safety zone settings interface.

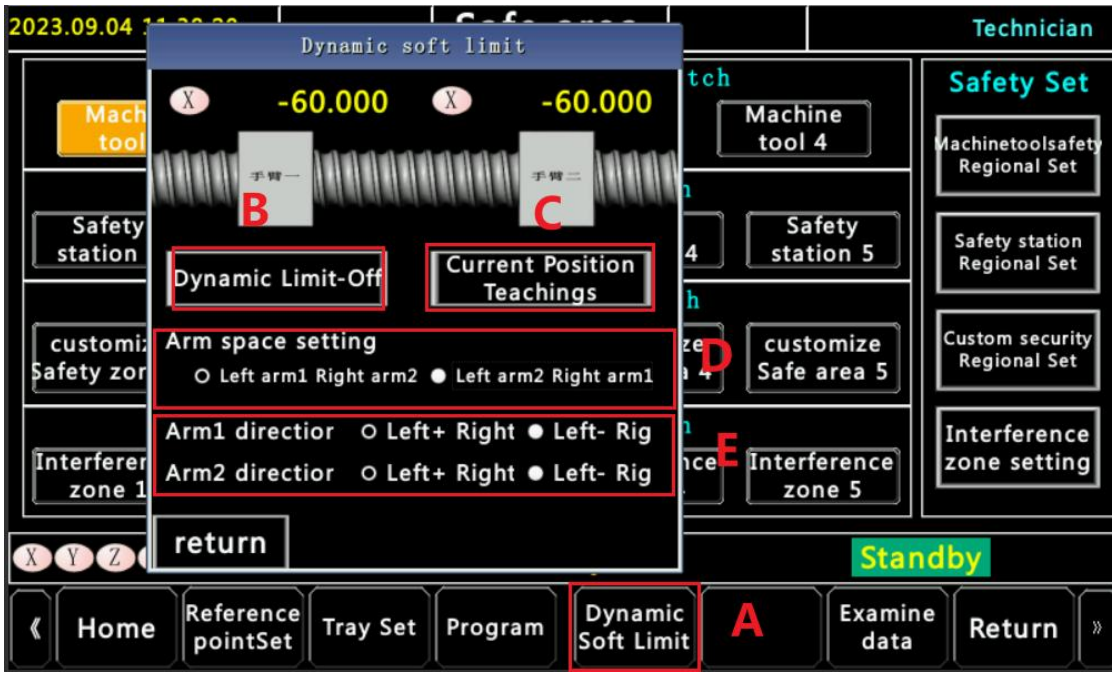
A. Move both arms to positions where they are about to collide and set the current position as the zero point for the X-axis of both arms.

B. In the settings, enable the safety zone option and select dynamic software limits, which will prompt a dialog box.

C. Choose to enable dynamic software limits and select the current position as the teaching position.

D. Facing the robotic arms, differentiate between the position of arm one corresponding to channel one and arm two corresponding to channel two. If channel one is on the left and channel two is on the right, select the left option in the arm space setting.

E. Confirm the motor direction for the X-axis of the dual-arm robotic system. For example, if arm one moves to the left as positive and to the right as negative, and arm two moves to the left as positive and to the right as negative, choose the appropriate options below.

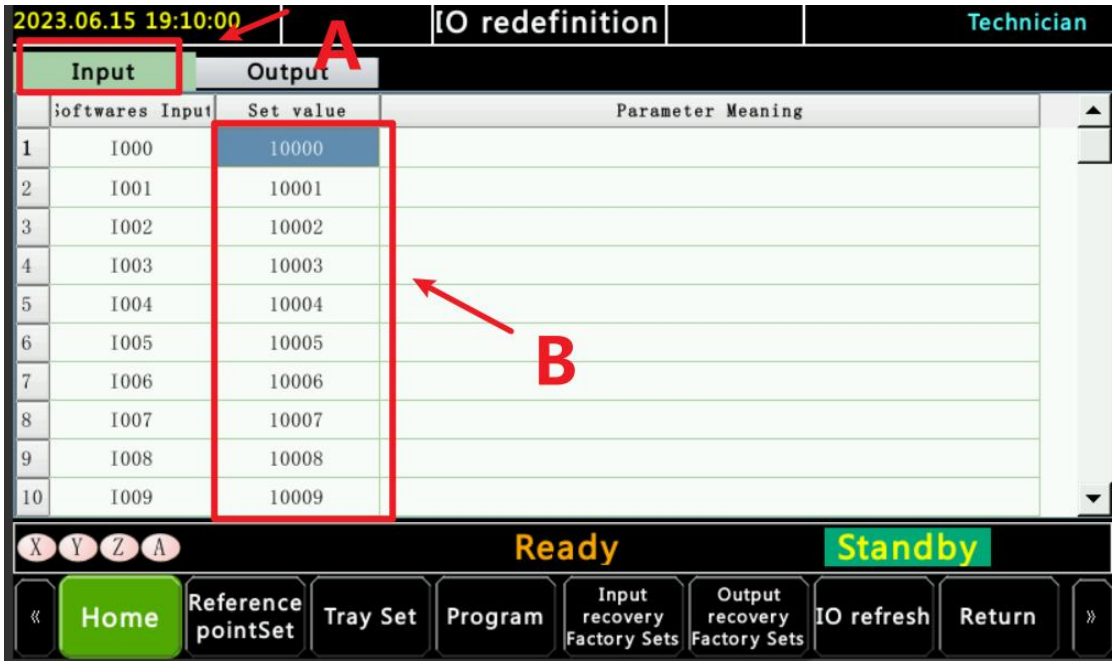


1.7.3 Enabling Hardware Limits

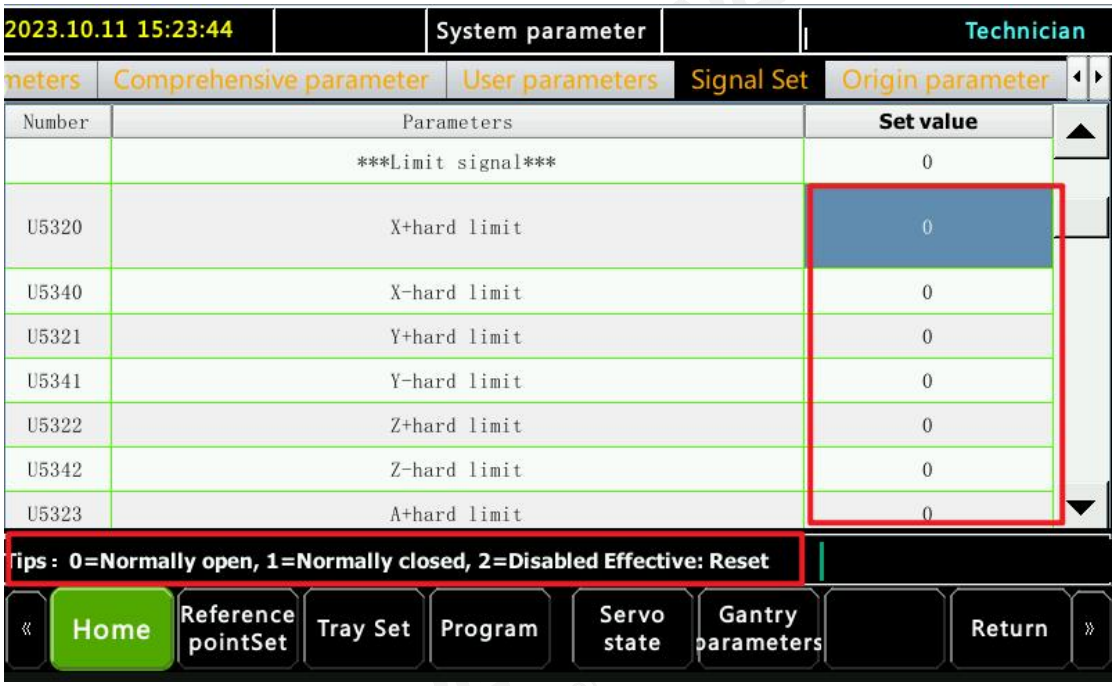
A. Access the settings interface and navigate to the IO redefinition parameter group.

B. Scroll to the limit signal section, where you will find X± limit signals. For example, if the X+ limit corresponds to signal point I36, you can set the value as 10036. If it corresponds to signal point I1, set the value as 10001.

C. After setting the values, click on the reset button and then click the IO refresh button below. A pop-up window will appear, and you need to select "Confirm."



Note: If you need to set signals as normally open or normally closed, please navigate to the settings interface, select signal configuration, and choose the required signal format.



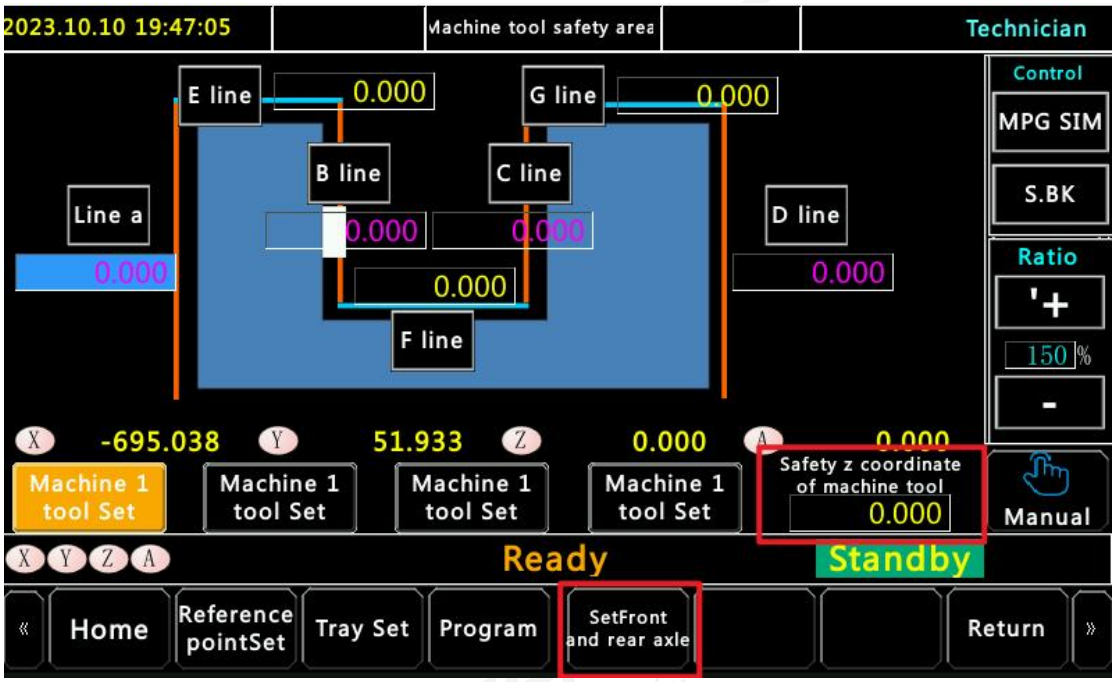
1.8 Safety Area Configuration

1.8.1 In situations where it is necessary to shield irregular-shaped limits of a lathe to

prevent direct collision of the robotic arm, the following steps can be taken to avoid property damage. Taking a three-axis Cartesian robotic arm (Model 3+0) as an example, the safety area configuration will be explained. By clicking the "Settings" button below the Safety Configuration on the right side, you can access the point setting page. The setting methods for the machine tool, safety station, and custom safety area will be explained separately.

Setting Machine Tool Safety Area ：

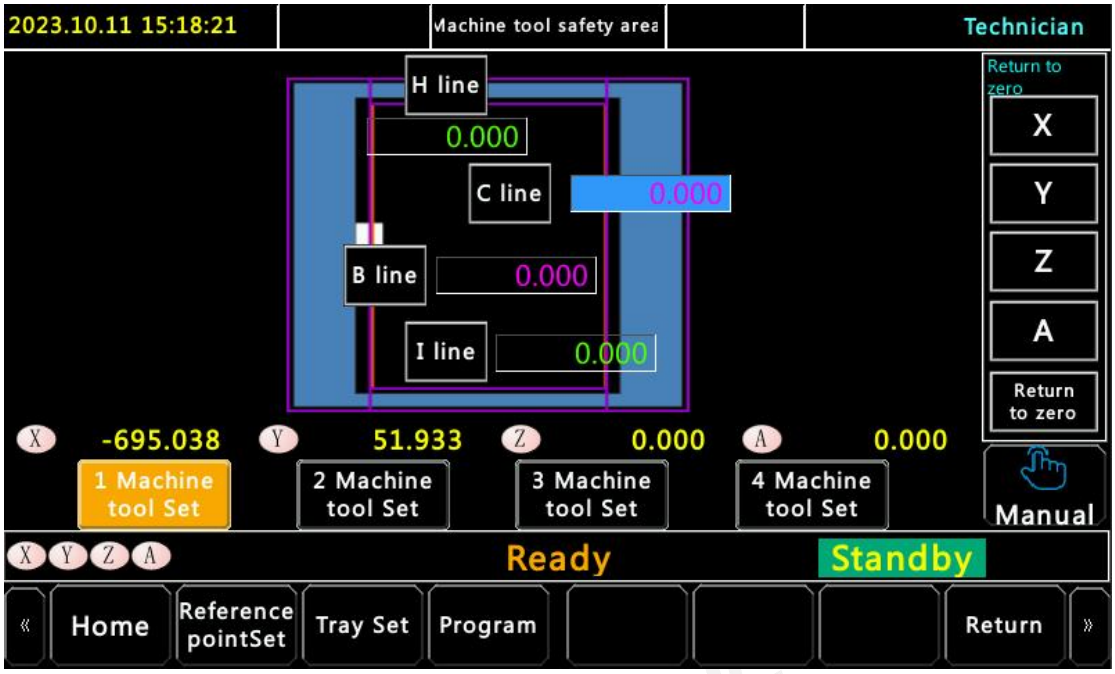
Step 1: After entering the "Machine Tool Safety Area Setting" page, as shown in the diagram, the front view of a lathe's three views is displayed. The teach pendant utilizes lines A, B, C, D, E, F, G to divide the lathe space into two major regions: "Accessible" and "Non-Accessible", with the blue area representing "Non-Accessible".



Step 2: Move the robotic arm above line E of the lathe and click the "E Line" button. The current Z-axis coordinate of the arm will be immediately filled in the field and take effect. Repeat this step, jog the robotic arm to move its position above other lines, and proceed with the point setting and modification of the safety area.

Step 3: If fine-tuning of values is required, click the corresponding coordinate input box to make numerical adjustments. Pay attention to the setting of positive and negative signs.

Step 4: Click "Set Front and Rear Axes" to display the top view of the lathe's three views. In this view, set the safe position in the Y direction. Click "Back" when you need to return.



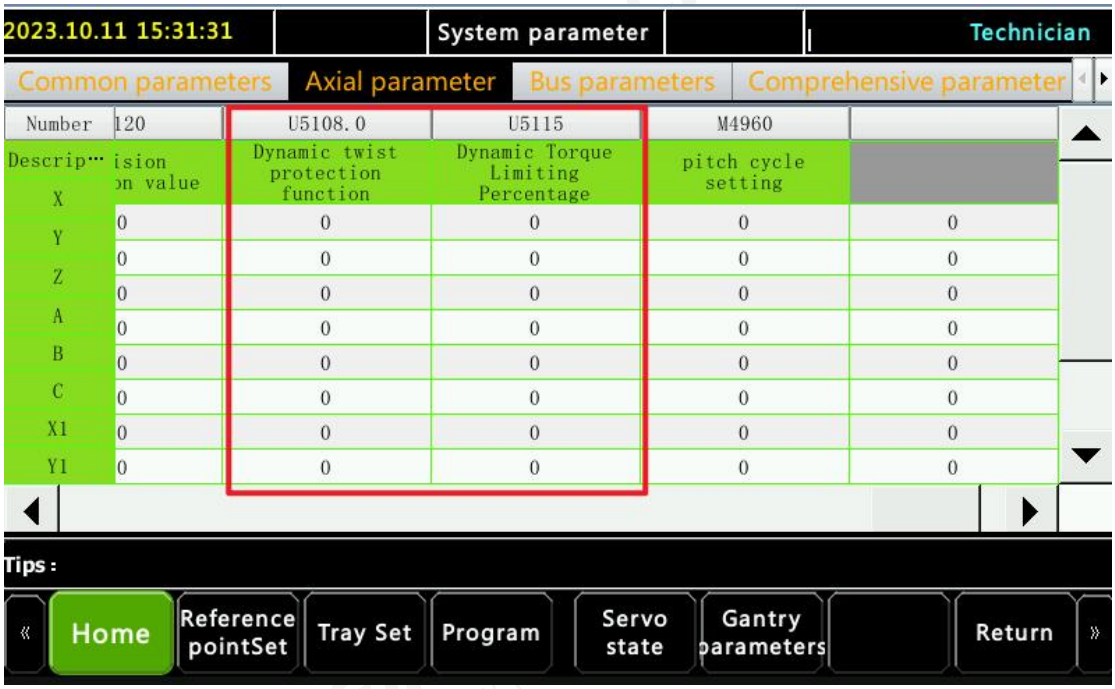
Step 5: Note that there are four sets of lathe numbers for coordinate setting. After completing the coordinate setting, return to the main interface and enable the corresponding lathe number.

Note: If there are specific requirements where the robotic arm needs to send signals to the lathe to restrict its operation when entering the lathe, please set the safe Z coordinate of the machine tool as indicated in the diagram. The output O point can be set in O Point Redefinition. Set the output O point as shown in the following diagram, assigning the actual O point to O196 (Lathe 1) - O199 (Lathe 2).

1.9 Dynamic Torque Protection

- Torque protection is implemented based on the real-time torque of the motor to provide protection. This feature is useful to prevent collisions during equipment movement, prevent deviations when lowering the Z-axis and coming into contact with the workpiece, and avoid motor, spindle, and workpiece damage.

- The dynamic torque protection effectively limits the motor's torque and stops the movement when the torque exceeds the protection value. It also provides an alarm to indicate overload. The setting is as follows:Dynamic Torque Limit Percentage: Normally, the load does not exceed 120%. If the workpiece or mechanism is heavier, the value can be appropriately increased but should not exceed 200%.



1.10 Dynamic Tracking Error Protection

- The dynamic tracking error protection is a mechanism that detects the difference between the motor encoder feedback value and the actual commanded value. It provides protection based on the error value. The setting is based on the resolution denominator. For example, if the resolution is set to 10000/10000, it means that 10,000 pulses correspond to a movement of 10mm by the motor. When the error value is set to 10000, an alarm will be triggered and the device operation will be stopped if the difference between the commanded position and the encoder feedback exceeds 10,000.
- This feature effectively protects the device from being jammed due to external factors,

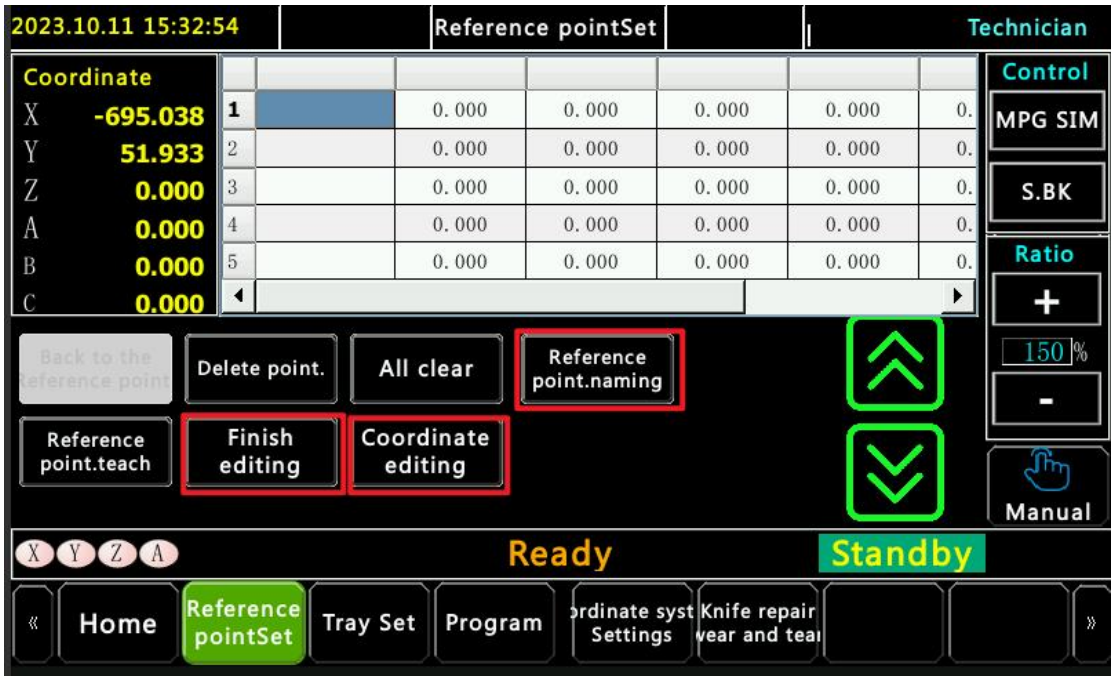
causing the mechanism to lock up while the program continues to run. It can be used in conjunction with the dynamic torque protection feature to ensure the safe operation of the equipment.

Part 2.Reference Point Usage

Reference points are used to store the mechanical coordinates of different working positions. Before programming, you need to physically teach and record the coordinates of all relevant positions. During programming, you can call these reference points based on the actual machining locations, which reduces the complexity of programming. When modifications to the program are required, you don't need to physically teach the points again, saving time and effort.

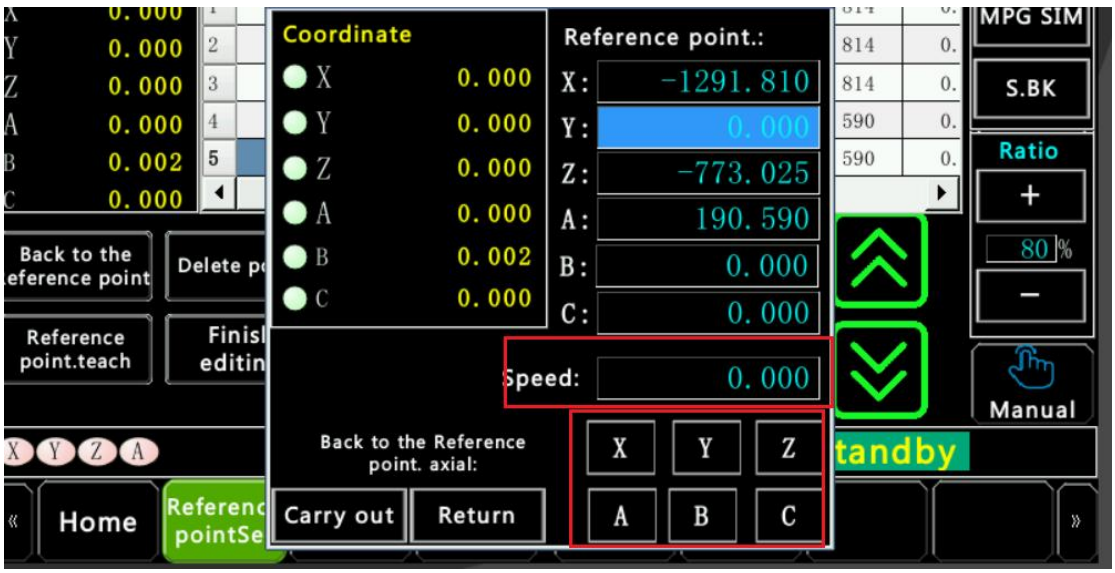
2.1 Reference Point Naming and Teaching

Teaching Reference Points: On the software homepage, navigate to the reference points section. Move the robotic arm to the desired position and click on "Teach Reference Point" to complete the teaching action. After teaching is done, click "Save" to store the point. Naming is a method to distinguish the purpose of each point. After teaching a point, it's necessary to name it for differentiation. The following image illustrates three functional buttons: Teach Reference Point, Save Reference Point, and Name Reference Point.



2.2 Return to Reference Point Action

If you need to verify if the reference point position has changed or return to a specific reference point, you can select the manual mode and choose the option on the auxiliary panel. Clicking on "Return to Reference Point" allows you to input the speed and motion axis to perform the movement. Please ensure safety precautions are taken.



2.3 Rules for Channel and Language Switching

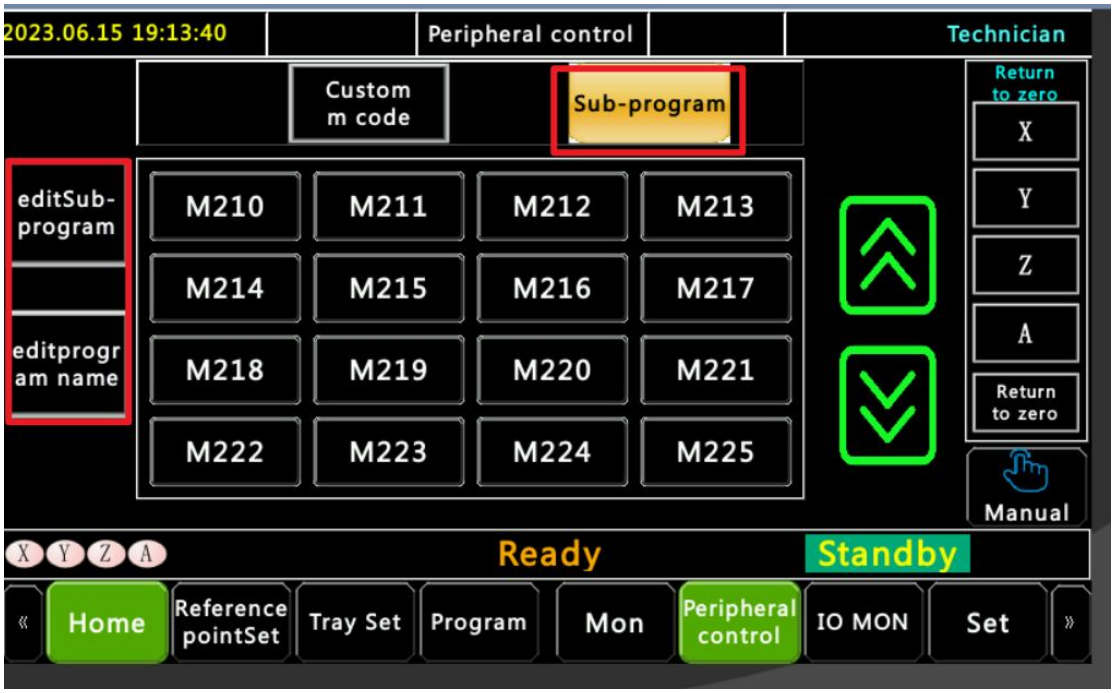
Currently, the reference point system operates as follows:Reference point files are independently categorized based on different channels.Regardless of the language being used, reference points are still differentiated.Different language settings correspond to different reference point files. Therefore, each channel has reference point files availablein three different languages.

Part 3.Subprograms and Custom M-Code Usage

- The purpose of subprograms is to facilitate the calling of functions within a program. We also provide parallel subprogram functionality. Independent subprograms run alongside the main program and can replace many PLC actions, enabling customized development of different functions for device manufacturers and customers.
- Custom M-codes allow for the implementation of function detection using different M-codes. It is a standard feature provided by the Yida handheld pendant for customers.

3.1 Naming and Modification

- In the peripheral control menu, you can select and edit the subprograms and custom M codes. When naming, it is important to first click on "Edit Program Name" on the left side, and then click on the corresponding module to modify the name.
- Similarly, if you need to modify a program within a specific module, first select "Edit Subprogram" on the left side, and then click on the module that needs to be modified. This will take you to the editing interface, where you can modify the content.



3.2 Subprogram Setup Methods

Subprograms provide the following programming functionalities:

A. Axis motion

B. External I-point signal detection

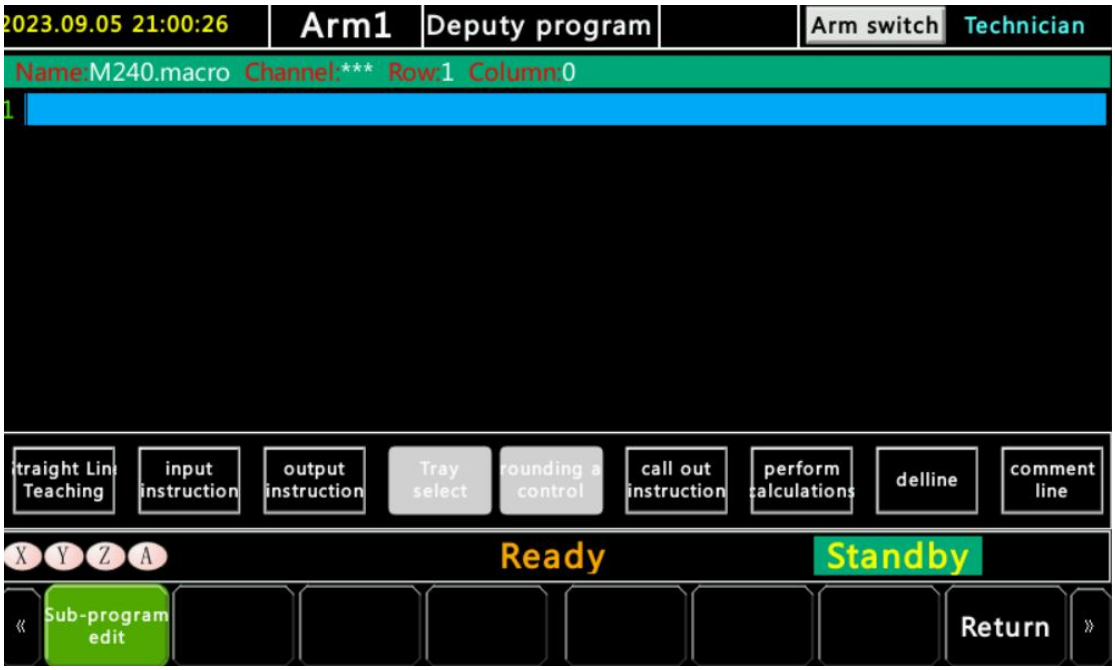
C. Output O-point actions

D. Calling various instructions and subprograms

E. Providing MACRO B programming statements

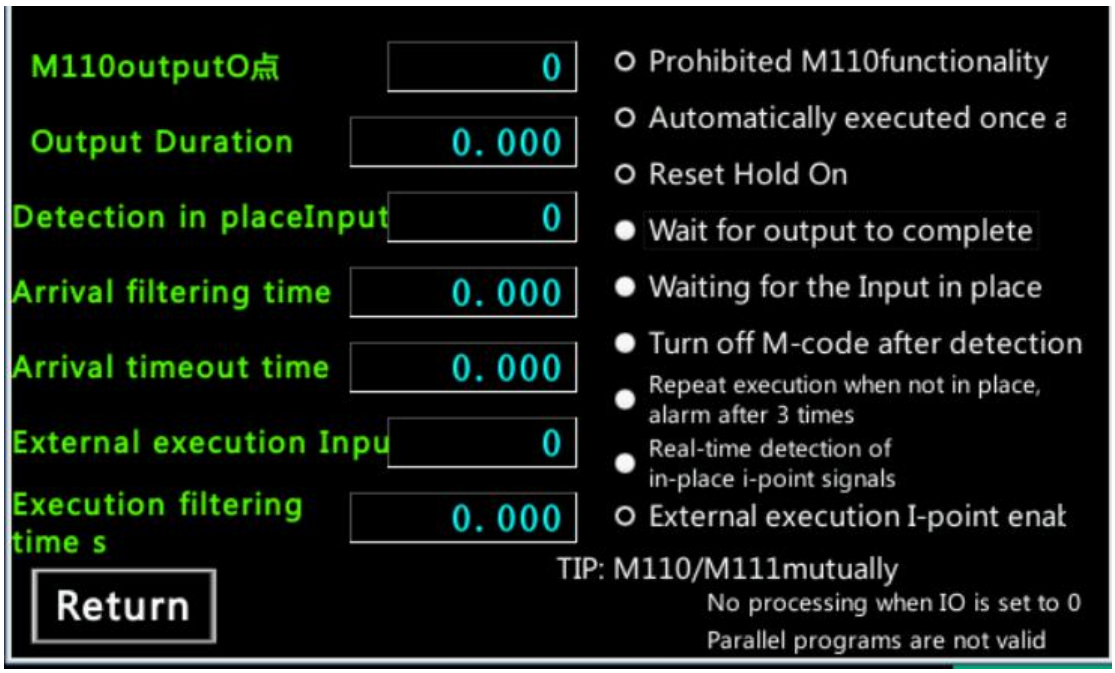
F. Deleting lines

G. Commenting lines.



3.3 Custom M-Code Setup Methods

- To set up custom M-codes, select "Custom M-Code Setup" on the left side. Choose the desired M-code and configure its settings. The purpose of M-codes is to perform actions such as outputting O-points, detecting I-points, and generating alarms. These are standard functionalities.
- The right section provides optional settings. Enable the desired actions by selecting them.
- To execute an M-code, go to the Custom M-Code interface and either remove the M-code's name and edit it or simply click on the M-code. This will trigger the desired output. Alternatively, you can press and hold the red enable button on the back of the handheld pendant and click on the M-code to activate it.

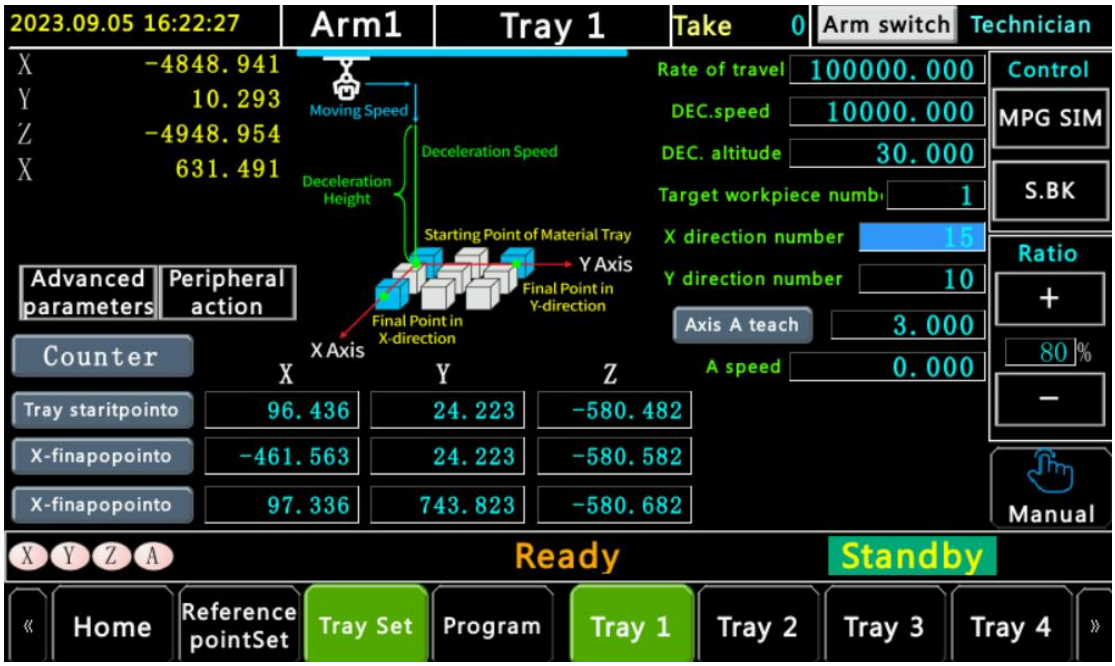


Part 4.Tray Usage

4.1 Application of Tray Retrieval and Placement

To access the tray parameter editing page, use the handheld box to click on "Home" and then "Tray Settings." The following image shows the interface:

Interface 1: Home



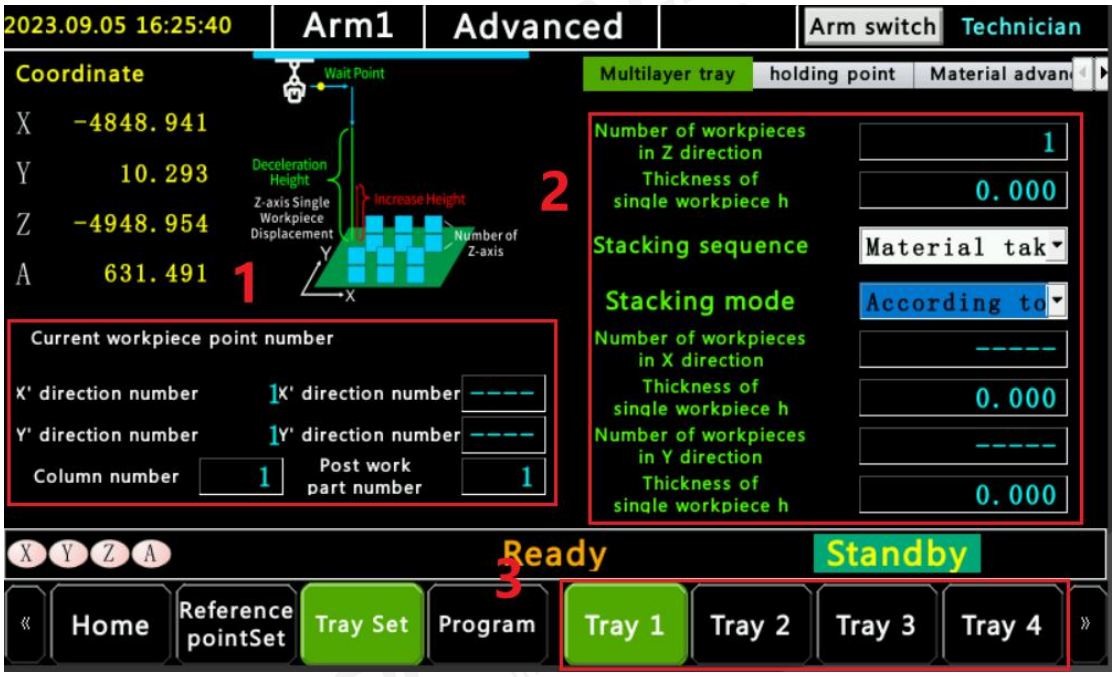
The homepage of the tray interface is the first page accessed after clicking on "Tray Settings." Below are the descriptions of the corresponding functionalities on the homepage:

1. Tray A and Tray B Status: Tray A represents the status of Tray 1 (retrieval) and Tray 2 (placement) in the standard dual tray system. "Has Material" indicates that Tray 1 and 2 have unfinished materials and can continue processing, while "No Material" indicates that processing is complete and new blanks need to be added. Tray B represents Tray 3 (retrieval) and Tray 4 (placement) in the standard dual tray system.
2. Advanced Parameters and Peripheral Actions: The Advanced Parameters section allows modification of specific parameters and enables advanced functionalities. The Peripheral Actions section provides three programs for supplementary actions, including the action flow when the robot reaches the waiting point, the action performed when the robot reaches the workpiece position, and the action executed after tray processing is complete.
3. Tray Calculator: This feature allows for overall offset adjustment of the tray and expansion of the tray rows and columns.
4. Tray Teaching Position Area: This area demonstrates the taught grid points of the tray.
5. Tray Basic Parameter Area: This includes parameters such as speed, descent speed,

descent distance, target number, X: total number of rows in the tray, and Y: total number of columns in the tray.

6. Tray Selection Area: This area allows switching between different trays.

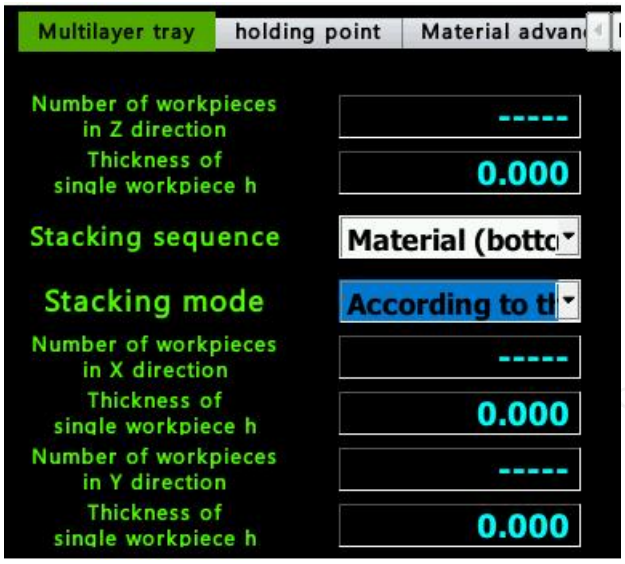
Interface 2: Advanced Parameters



1. Workpiece Number Display Area: Displays the current target workpiece number, including position and layer.

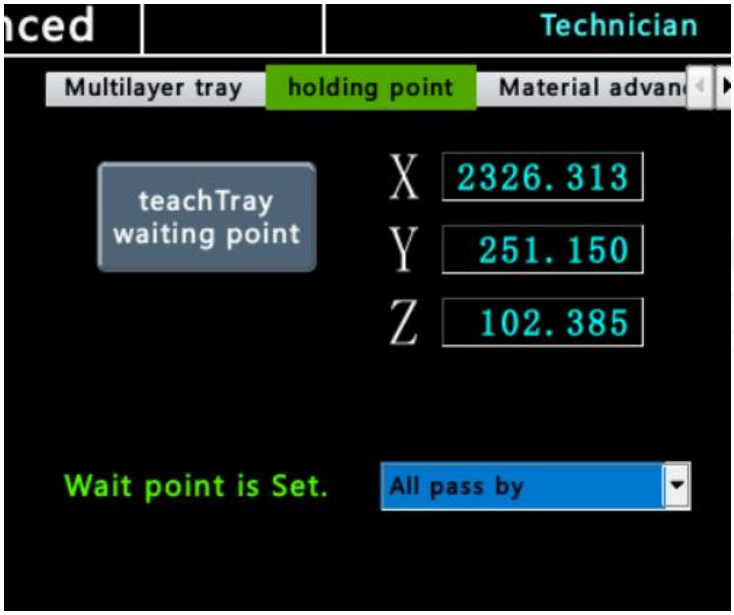
2. Advanced Parameter Selection Area:

A. Multi-Layer Tray



- Multi-layer tray refers to a stacking-type tray where multiple workpieces are placed on each tray position.
- Number of Workpieces in the Z-direction: For stacking trays, it indicates the number of workpieces stacked at each position.
- Single Workpiece Thickness (H): Thickness of a single workpiece.
- Stacking Order: Determines the order of retrieval or placement based on the tray's purpose.
- Stacking Method: There are two options, "Stacked" or "Staggered," for retrieving workpieces.

B. Wait Point



- The wait point refers to a specific position that can be optionally passed through by the robotic arm before and after picking up or placing the workpieces in the tray program.
- Teach Tray Wait Point: Used for teaching the position of the wait point with a single command.
- Wait Point Passage Setting: Used to select whether the wait point should be passed through or not.

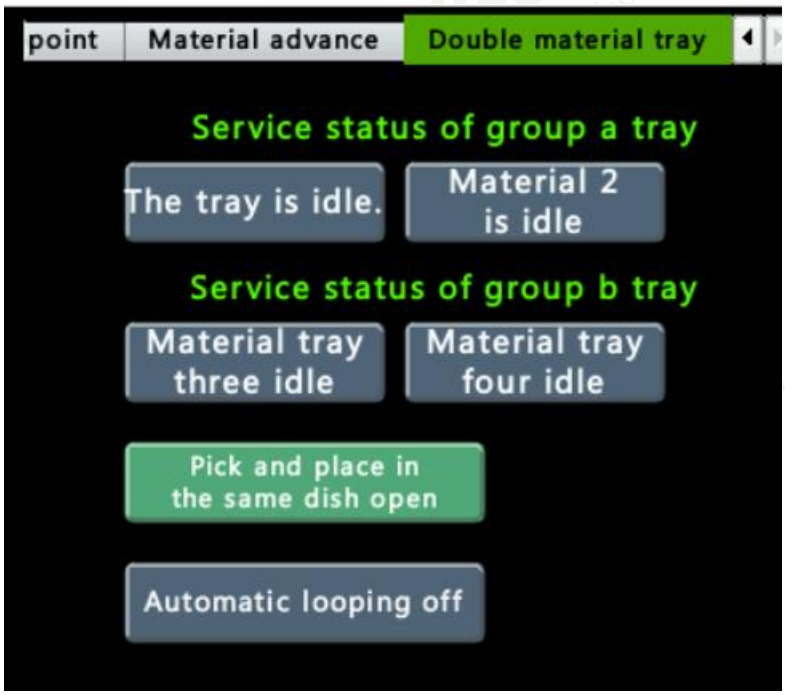
C. Tray Advanced

- Tray Advanced is an advanced parameter within the tray settings, and it is not

necessary to modify this content again unless debugging is completed.

- Increase Speed: The speed at which the robotic arm lifts after picking up or placing the workpieces.
- Raise Height: Used in conjunction with the increase speed to adjust the lifting height.
- Tray Replacement Timing: Choose whether to receive an alarm prompt or automatically execute the tray replacement program after processing the workpieces in the tray.
- Tray Pick-and-Place Sequence: Choose the order in which the workpieces are picked up from the tray, either horizontally or vertically.
- Tray Shielded Positions: These are positions within the tray that are occupied and should be skipped during processing.
- Work Point Coordinate Offset: Allows for offsetting the specified distance from the tray's designated work points, typically used to avoid re-teaching the positions.

D. Dual Tray



- This page is mainly used to observe the usage status of the trays, whether they are in operation or locked.
- A/B Tray Usage Status: Used to observe the usage status of the trays and whether

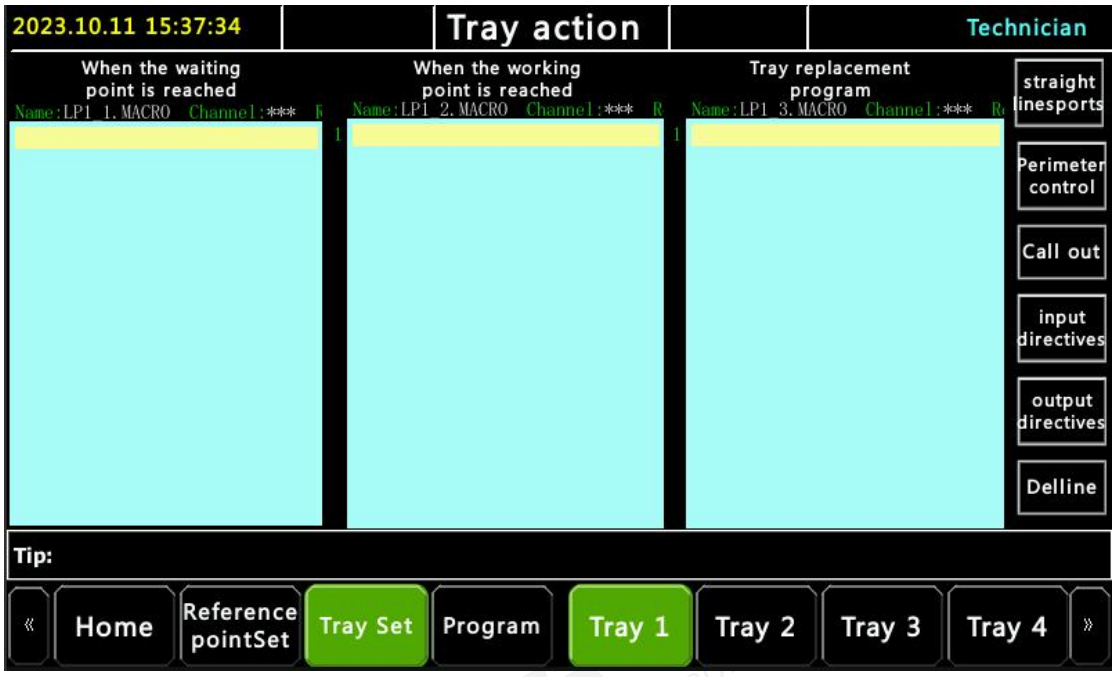
they are currently in operation.

- Same Tray Pick-and-Place: When Tray 1 and Tray 2 are set as the same tray, the workpieces picked from Tray 1 are placed in Tray 2, and the finished products from Tray 3 are placed in Tray 4.
- Automatic Cycle: Enables continuous operation without stopping or generating alarms. It requires operator intervention to manually remove finished products from the trays and add new workpieces.

3. Tray Switching Area

In this section, you can switch the parameters of different trays.

Interface 3: Peripheral Actions



1. At Wait Point: Program executed when the robot reaches the waiting point.

2. At Work Point: Program executed after the robot gripper reaches the workpiece position.

3. Change Tray Program: When machining of blanks in the tray is complete, the tray needs to be replaced. If there's an automated loading/unloading device, it can be included in the program.

4. Program Editing Section:

A. Linear Motion: Executes interpolation commands.

B. Peripheral Control: Calls subprograms.

C. Call: Uses different editing instructions.

D. Input Command: Takes input signals.

E. Output Command: Activates solenoids.

F. Delete Row: Deletes the instruction on the cursor's line.

5. Tray Switching Area.

4.2 Initial Tray Setup

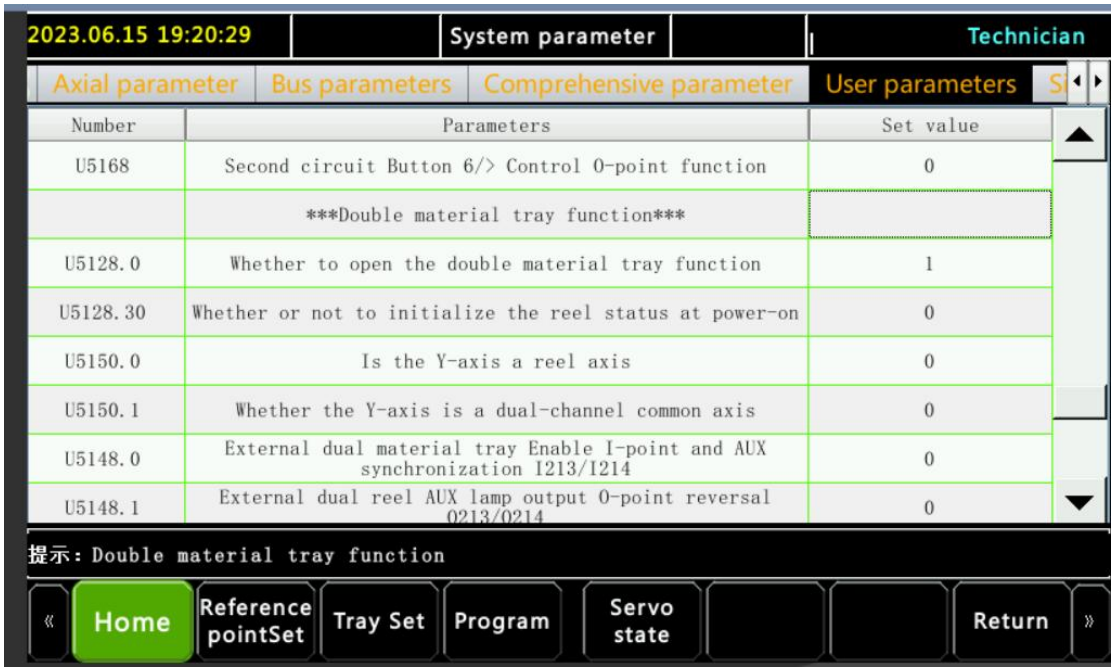
1. Basic Parameter Setup

A. Step 1: Enabling Dual Tray Parameters.

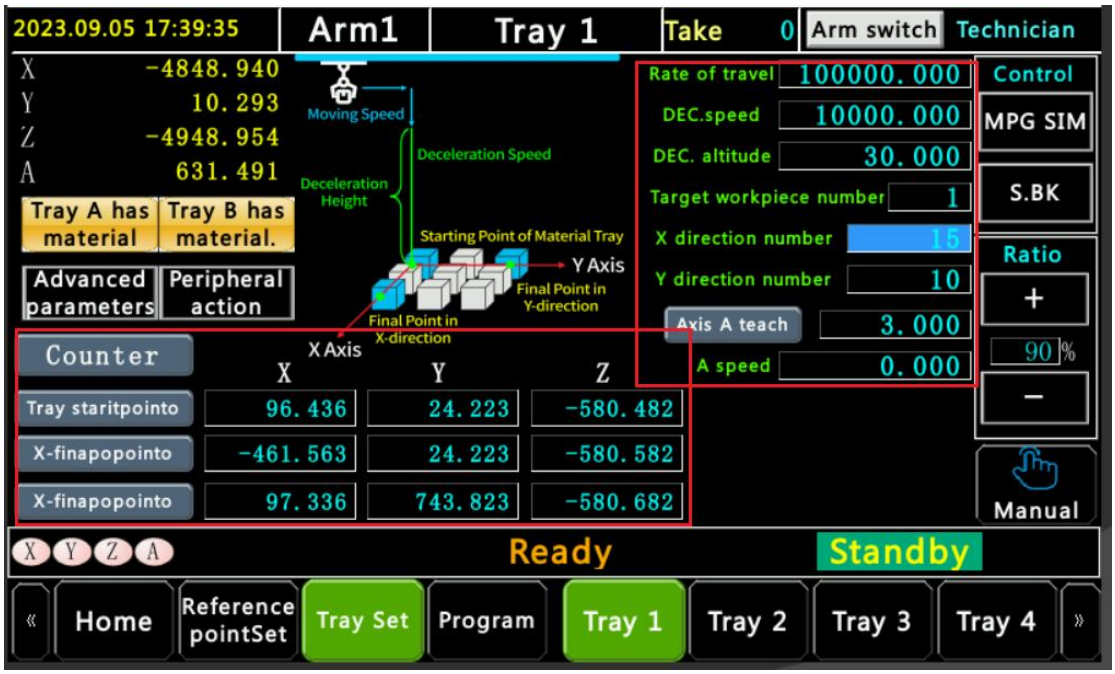
(1) Enter the manufacturer's password and log in with higher-level permissions to access the settings.

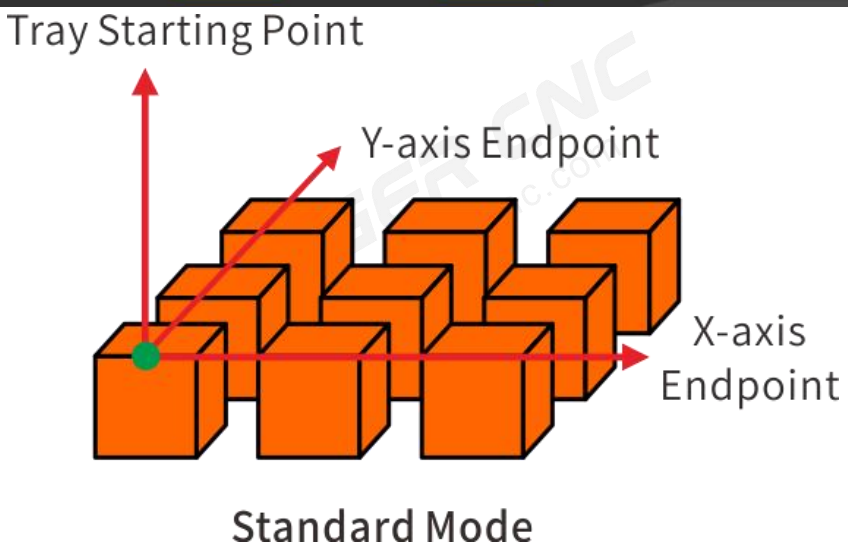
(2) Choose user parameters.

(3) Locate the Dual Tray Function and enable it.



B. Step 2: Basic Parameter Setup in Tray Interface





(1) Move the robot gripper to one of the corner positions within the tray, defining it as the starting point. Click on "Set Tray Start Point" to set the initial point. From the starting point, identify the last chip in the X-direction, and designate it as the X-axis endpoint. Teach this position into the tray program. Similarly, identify the last chip in the Y-direction and designate it as the Y-axis endpoint, then teach this position into the program.

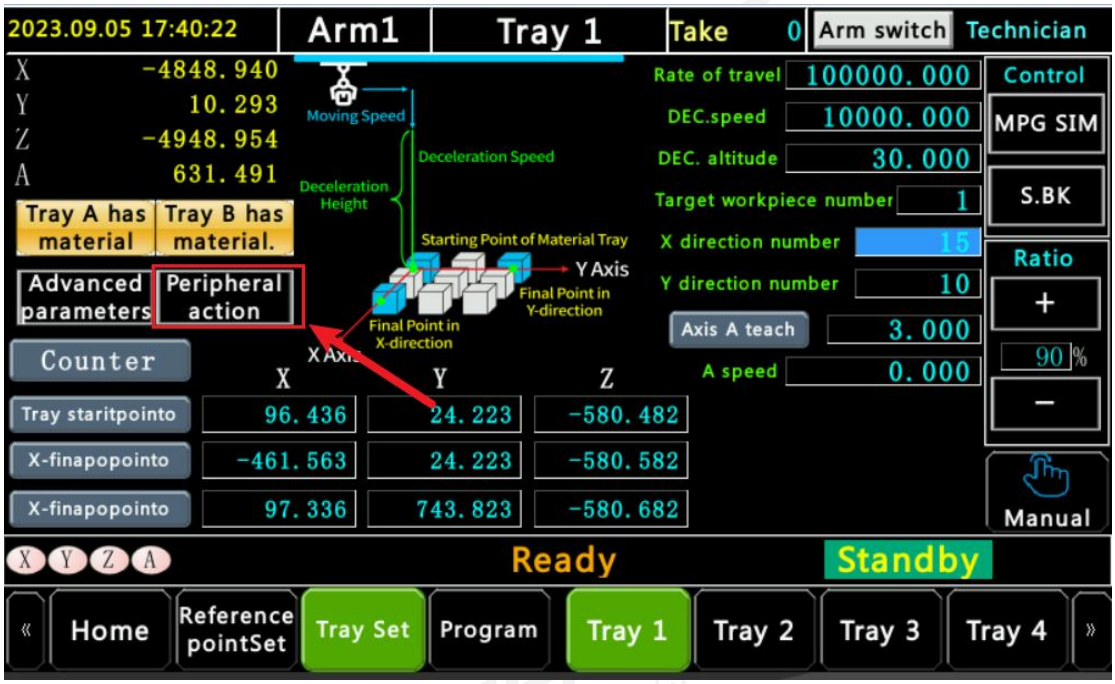
(2) Move Speed refers to the velocity value of the G01 command when the robot enters the tray program. It can be increased based on the device's tolerance for impact force. If instability occurs, refer to the Gain Setting Manual for the Handheld Box to adjust the gain first.

(3) Deceleration Speed and Deceleration Height are determined by the picking process. As the robot arm descends to retrieve or place a part, it slows down as it approaches a certain height near the tray. It descends at a slower rate to reach the final position. This corresponds to the deceleration speed and deceleration height. In the example provided, the robot descends at 100000mm/min until it reaches -450 height, then it slows down to 20000mm/min to reach the final position at -500 height.

(4) This section is used to set the distribution of the tray. In the example shown, the tray has a 13x14 array configuration, and the target part number is 1.

2. Advanced Parameter Setting

3. Adding Peripheral Actions



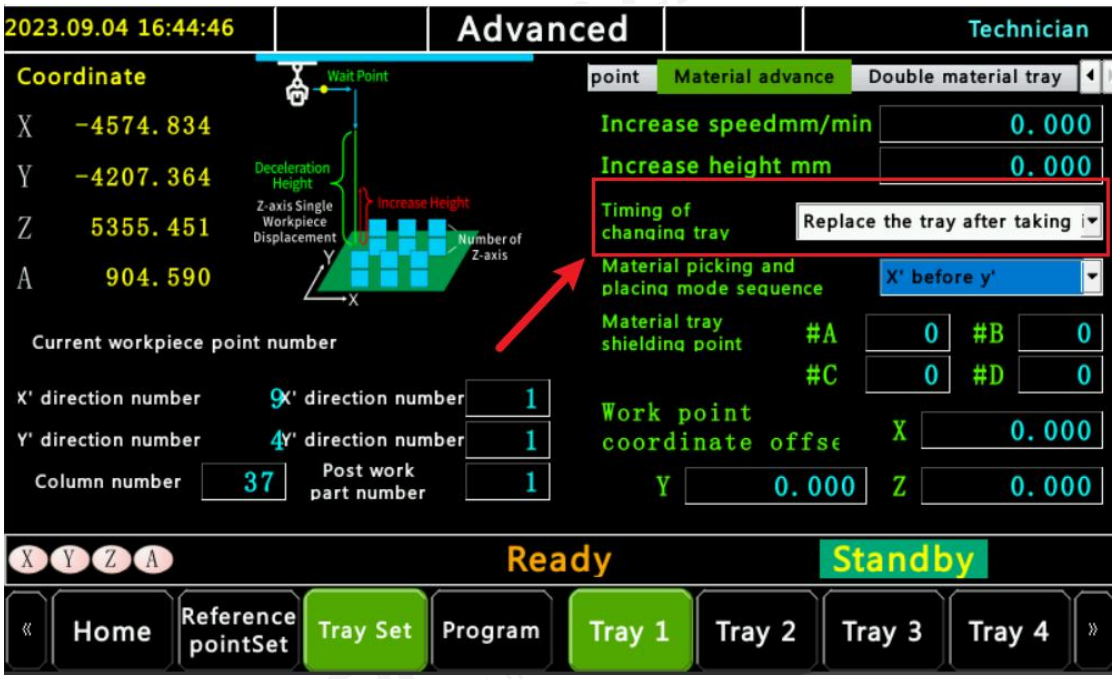
This step is essential to add. The matrix tray program is bundled together, including the actions of the robotic arm upon reaching the waiting point and the work point. It's necessary to add actions to the specified positions.

4. Advanced Tray Configuration

(1)Standard Tray Configuration

A. Set the advanced step for the tray, specifying when the tray replacement occurs. Set trays 1/2/3 to perform tray replacement after pickup and placement. Set tray 4 to trigger an alarm after pickup and placement completion.

B. Define a waiting point, which can be any random point above the pickup tray. You can choose whether to execute an action at the waiting point.



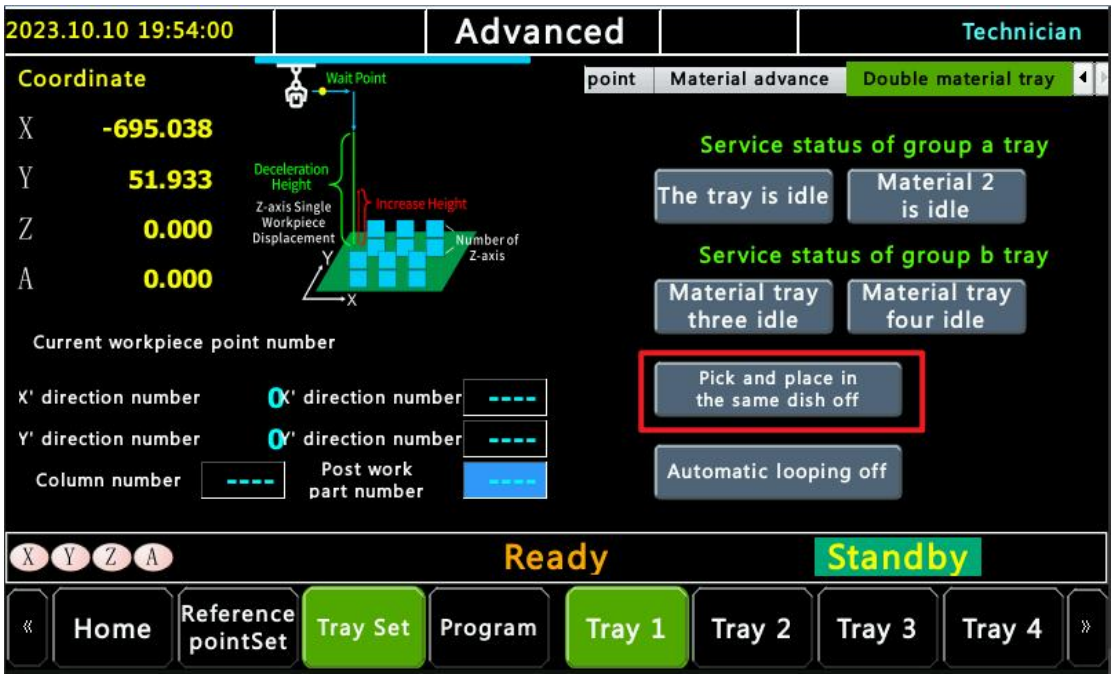
2. Same-Tray Pickup and Placement

The same-tray pickup and placement function is built upon the standard tray configuration. Therefore, follow steps A and B as mentioned in the standard tray configuration.

A. Same as in standard tray configuration.

B. Same as in standard tray configuration.

C. In the dual-tray mode, select the same-tray pickup and placement function.



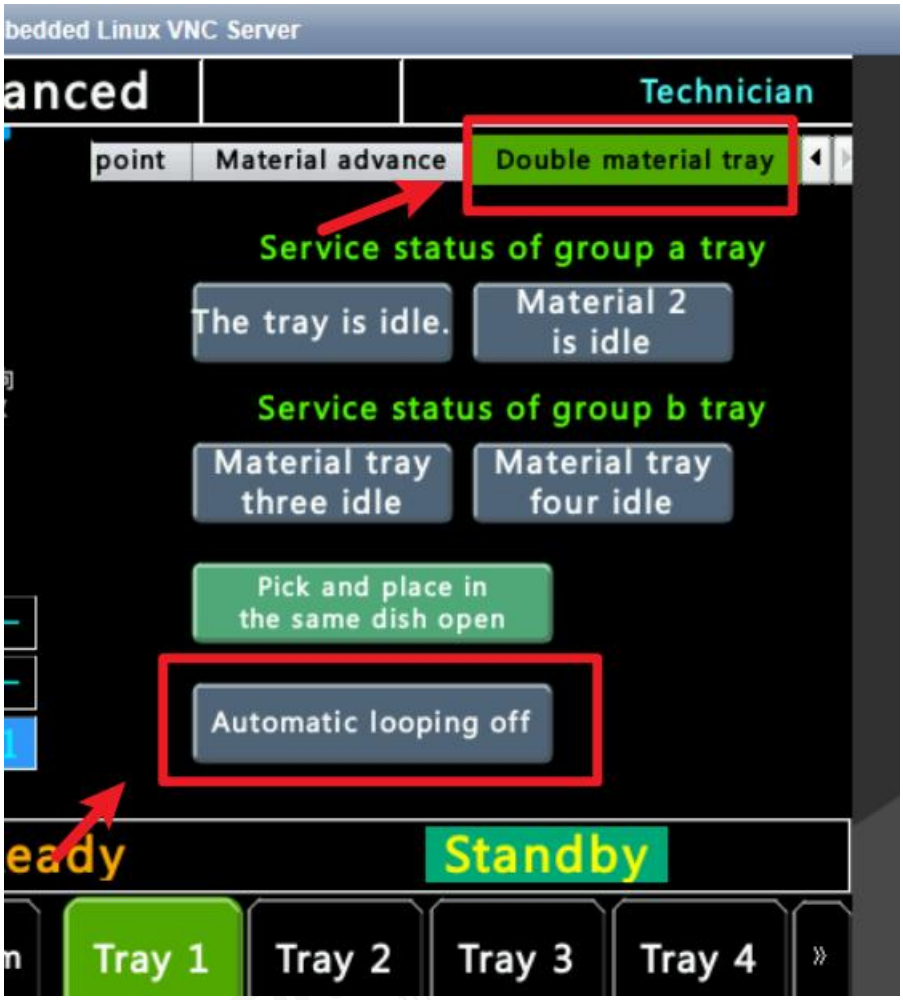
2. Advanced Same-Tray Pickup and Placement with Looping

This mode is an advanced version of the same-tray pickup and placement function. It allows continuous operation without calling the tray replacement program or issuing alarms. Prior to using this mode, please ensure that there is always personnel near the equipment to retrieve finished products and place raw materials back into the original position.

A. For all trays, change the tray replacement setting to "Replace tray after pickup and placement."

B. Set up the waiting point function following the steps mentioned earlier.

C. Activate the automatic looping feature for the dual-tray configuration.



3. Fixed-Position Tray Pickup and Placement / Tray Pickup to Fixed Position

In this mode, the dual-tray function is still enabled, but tray settings only need to be configured for tray 2 and tray 4. No need to configure tray 1 and tray 3. Follow the steps mentioned earlier for specific configuration.

4. Shielded Tray Position Settings

Building upon the standard tray setup:

A. In the advanced parameters section, locate the tray shielded positions. Input the numbers of the tray positions you want to shield. The number 1 corresponds to the starting point of the workpiece you've set, and so on. Input the desired shielded position numbers.

5. Palletizing Tray Pickup and Placement Configuration

A. First complete the standard tray setup as mentioned above.

B. Find the advanced parameters section and access the multi-layer tray settings.

C. Input the number of items that need to be stacked at a single position and the thickness of a single workpiece.

D. Configure the stacking sequence. By default, trays 1 and 3 are for picking, so set them for picking from top to bottom. Trays 2 and 4 are for placement, so set them for placement from bottom to top.

E. Stacking method can be kept default.

F. Set the shielded tray positions. Since the workpiece tray (for picking) needs to have a workpiece placed after processing, the first position cannot have a workpiece. Thus, set the shielded position for trays 1 and 3 as 1. For the finished product tray, as one workpiece is always missing, start placing from the first position, which results in the last position being empty. Hence, shield the last position for trays 2 and 4.

4.3 Application of Continuous Operation for Pick-and-Place with the Same Tray

- Double Tray 1 to Tray 3: This function is used for picking from packed trays. By

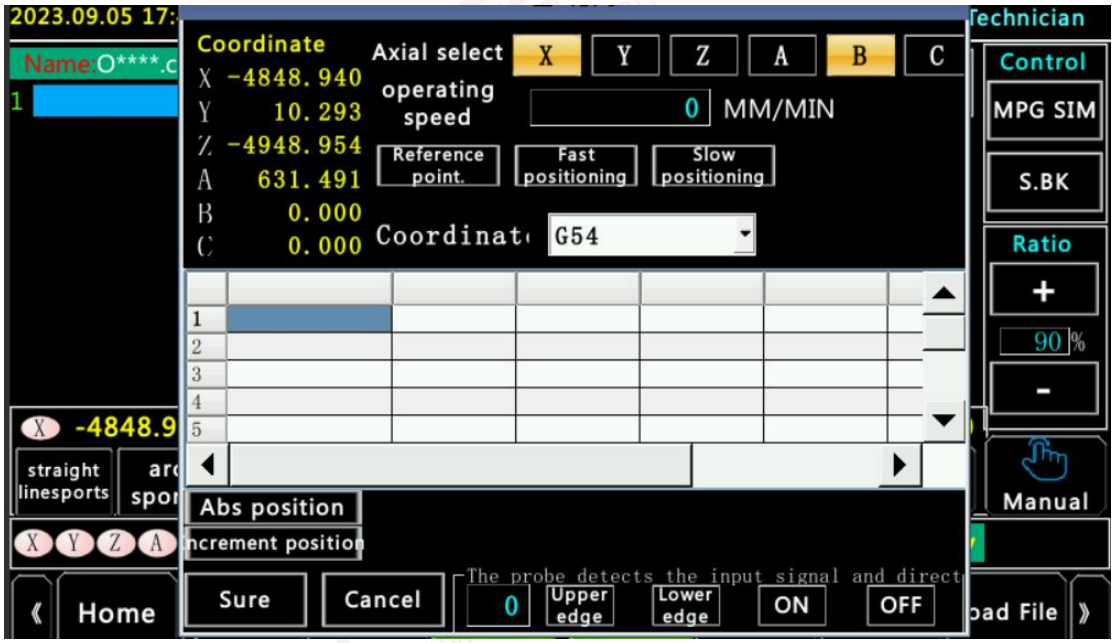
default, Tray 1 and Tray 3 are designated as picking trays. When Tray 1 is emptied, the program automatically switches to Tray 3 for picking.

- Double Tray 2 to Tray 4: This function is used for placing onto packed trays. By default, Tray 2 and Tray 4 are designated as placement trays. When Tray 2 is filled, the program automatically switches to Tray 4 for placement.
- Therefore, when picking is required, the Double Tray 1 to Tray 3 function is called, and when placement is required, the Double Tray 2 to Tray 4 function is called.

Part 5.Program Editing Usage

5.1 Motion Instruction Teaching

By pressing the "Linear Motion" button on the handheld pendant, the following window will pop up：



1. Linear Motion Instruction: There are two types of motion instructions, "Fast Motion" and "Slow Motion".
2. Motion Target: Select the target position to which the current step will move.
3. Axis Single Movement: Used to set whether the current target position is a single-axis

movement or a multi-axis interpolated movement.

4. Reference Point: Point information from the current reference point file, which can be set using the teaching function at the bottom of the page.

5. Speed: Set the speed for circular/slow motion, in units of MM/MIN. Fast motion does not require this parameter to be set.

Operating Steps:

1. Select "Fast Motion" or "Slow Motion" in the motion instruction.
2. Click on "Reference Point" and then select a point from the table below.
3. Click "Confirm" to complete the teaching of fast motion.

5.2 Input Signal Detection Instruction Teaching

To write an input instruction for I-point (0-511), when reaching that instruction, the program will wait until the specified signal is met before proceeding to the next step.

Input Instruction Teaching

Using the example of teaching the waiting for Input 1:

A. Enter the Input Instruction window and select the I-point signal, for example, choose I01, or directly enter the number.

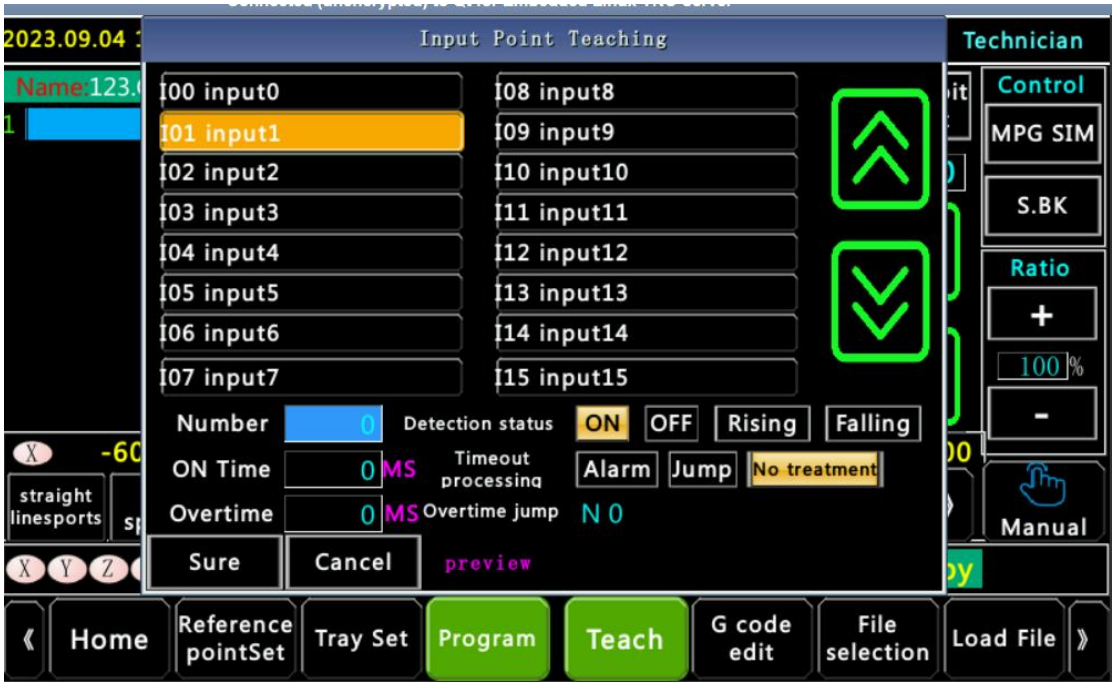
B. Signal Duration: Click on the Duration (ms) input box. This parameter represents how long the signal should be sustained to be considered a valid input (unit: ms, only positive integers can be entered).

C. Detection State: Choose from four states: ON, OFF, Rising Edge, Falling Edge.

D. Alarm: Decide whether to trigger an alarm.

E. Alarm Waiting Time: Specify the time interval for triggering an alarm if the I-point signal is not detected.

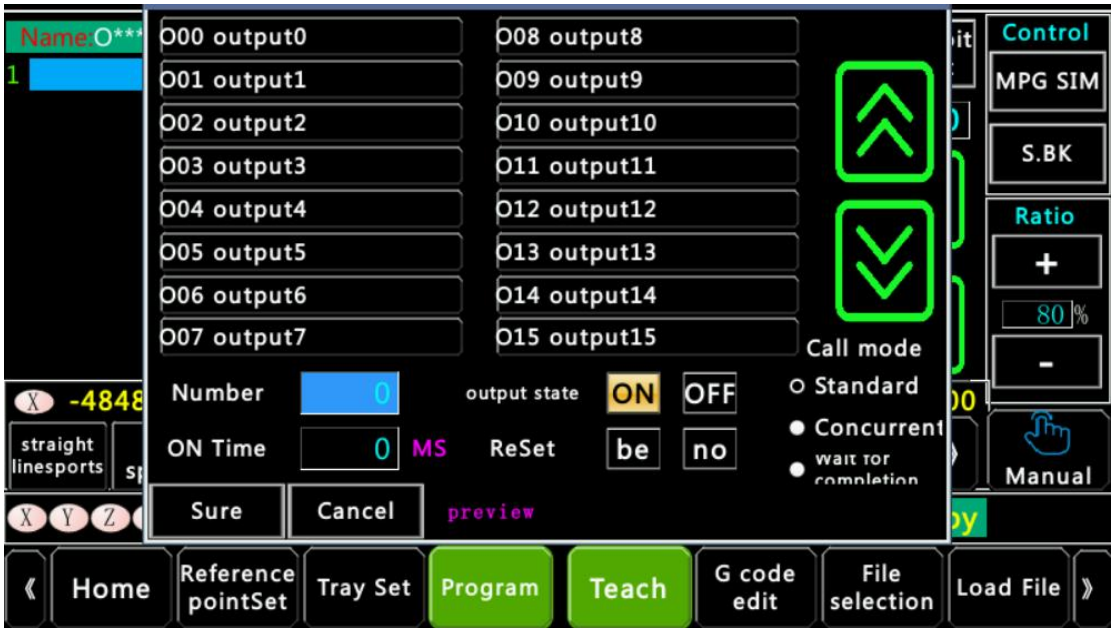
F. After setting the conditions, click "Confirm" to complete the teaching.



5.3 Output Instruction Teaching

A. Click on the desired O-point that you want to output.

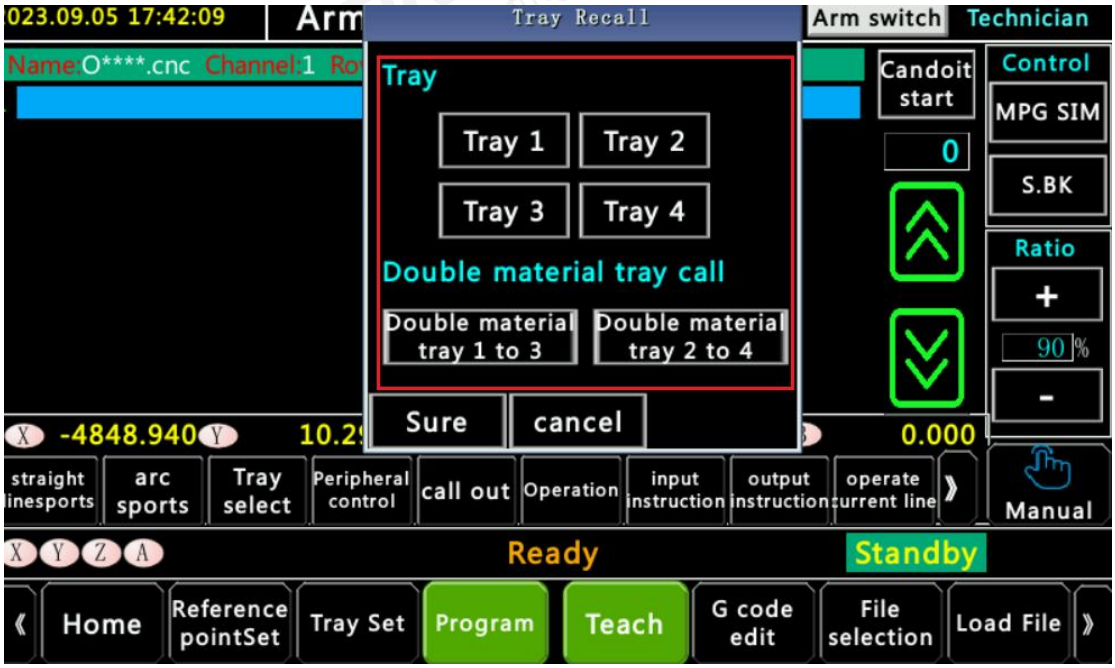
B. Select whether to "Hold" or "Reset" the output. It's important to choose the same output state for all selected O-points. Either select "Hold" for all or "Reset" for all.



5.4 Tray Calling Rules

A. When using a single tray, you can only select one of the four options available in the tray calling menu: Tray 1, Tray 2, Tray 3, or Tray 4.

B. If you are using a dual tray setup, please select the appropriate option in the dual tray calling menu: Dual Tray 1 to Tray 3 or Dual Tray 2 to Tray 4.



5.5 Calling Subroutines and M-Codes

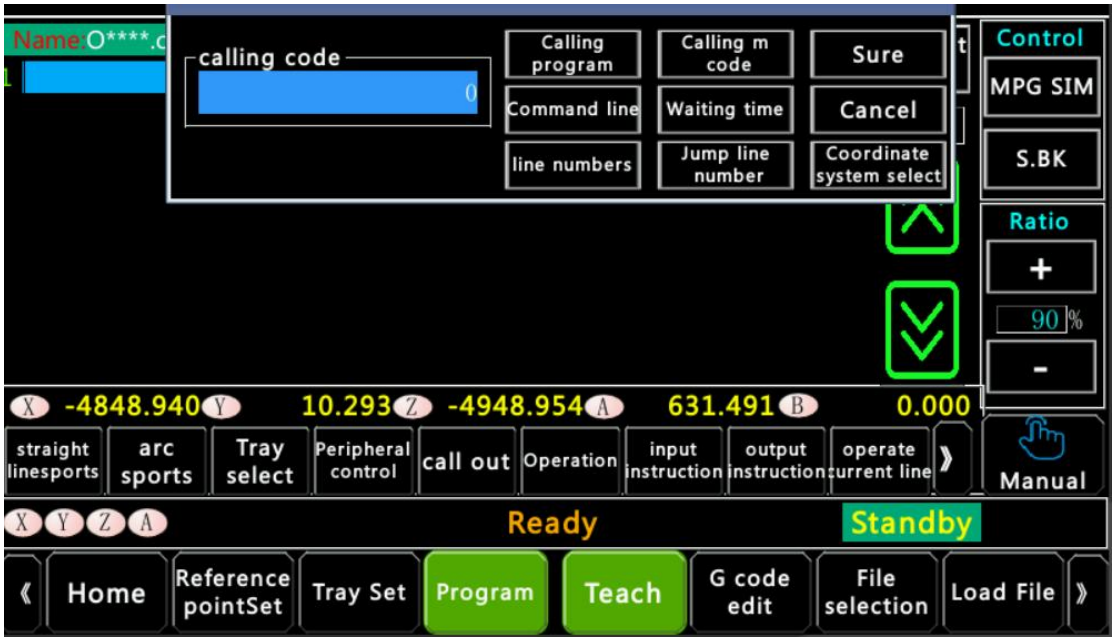
A. M-Codes and custom subroutines can be called using the up and down page keys on the control panel.

B. The calling method can be selected as parallel programs, which run independently of the main program, enabling you to achieve effects similar to those possible with a PLC (Programmable Logic Controller).

5.6 Call: Timer and Other Functions Explanation

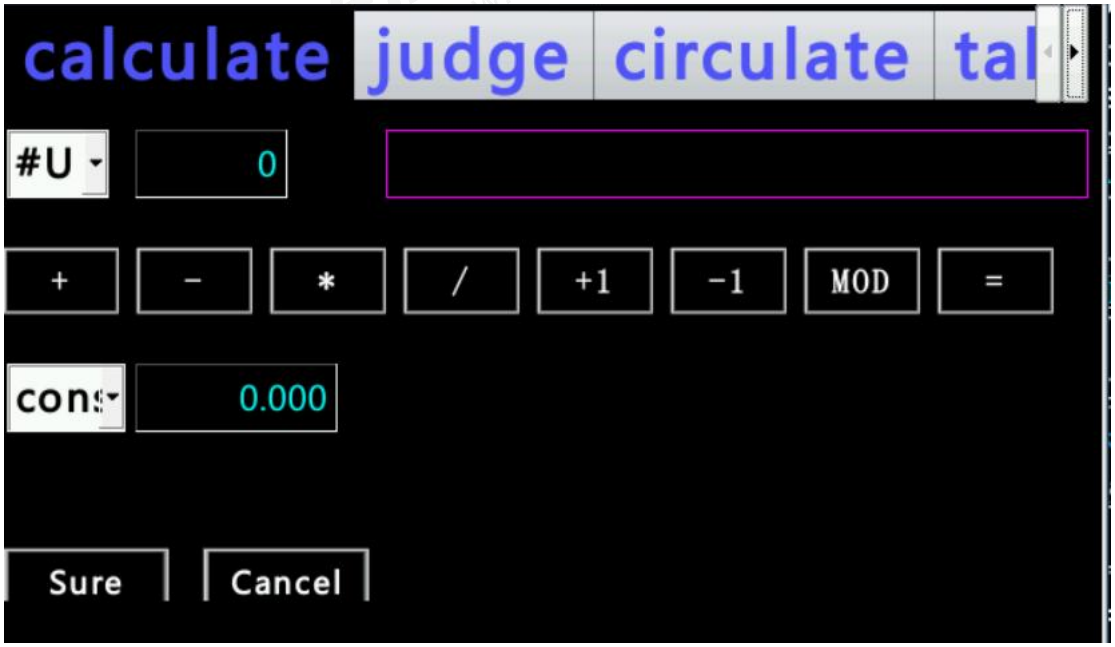
A. The system provides operational optimization, allowing for convenient calling of programs, M-Codes, jump line numbers, and timing functions.

B. It offers different coordinate system options for direct calling, catering to complex program editing requirements.



5.7 IF/WHILE Syntax Teaching

A. The system provides easy-to-use MACRO B syntax, including IF...GOTO statements, allowing for Chinese-language editing.



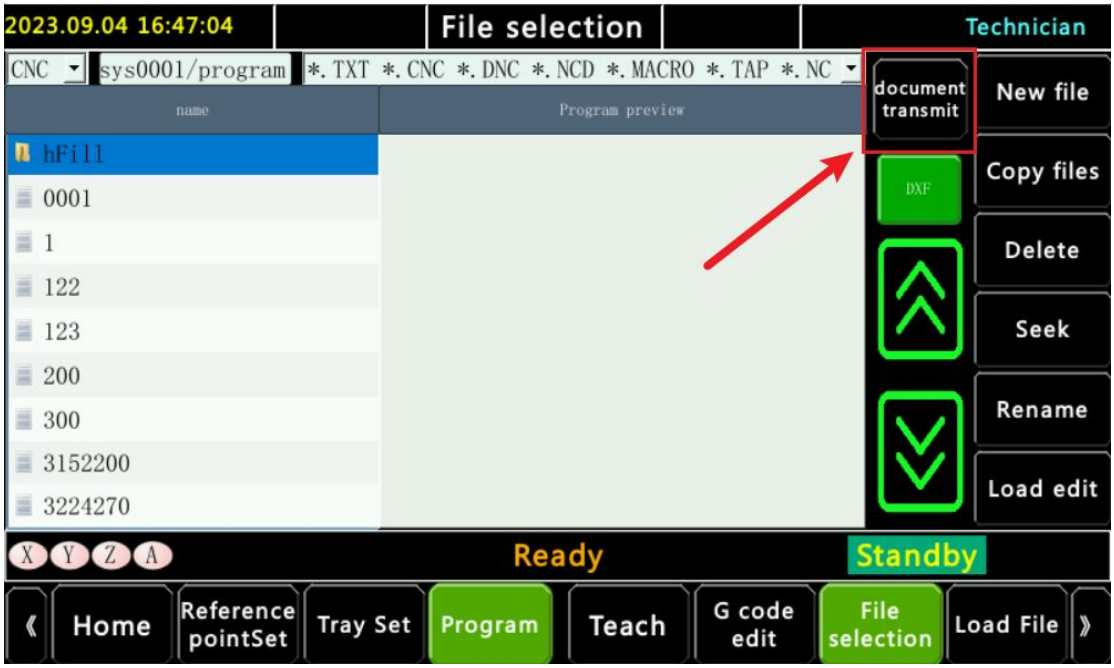
5.8 Modifying Current Line Instruction

When a line of automatically generated code needs to be modified, the option to edit the current line can be used to change the values of specified code.

5.9 Program Selection Operation

A. In the program selection interface, different folders can be selected or created.

B. File transfer is available, allowing programs to be copied to the controller using a USB flash drive.



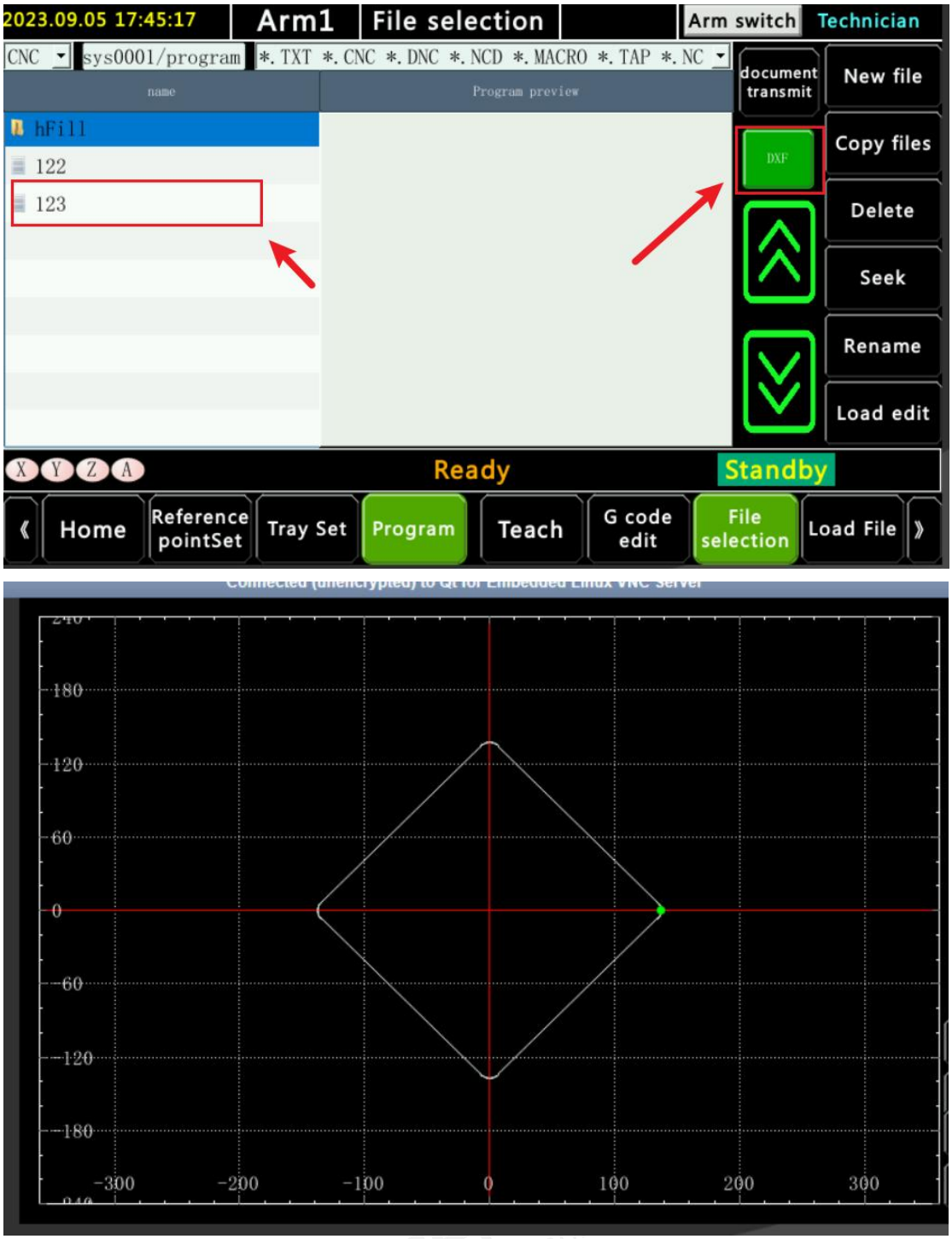
Part 6.CAM Plugin Usage

6.1 Drawing Import Function

A. In the program interface, import the DXF file into the program file by selecting the file.

B. Click on DXF to enter the drawing import interface.

C. Set the program parameters and configure the leads by selecting the appropriate axis.



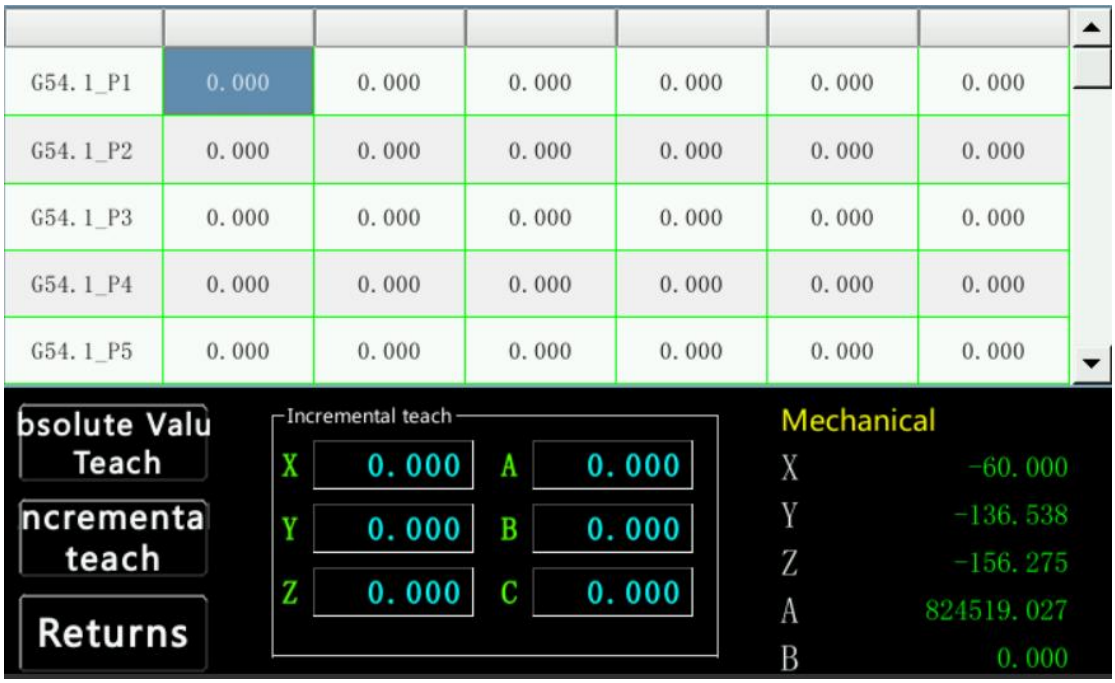
6.2 Tool Compensation Setting

Tool compensation coordinate system is set in the reference point. Tool compensation is used in the G12 polar coordinate system. In most cases, the tool compensation value is

set to 100, and the corresponding axis position in the coordinate system is adjusted accordingly by adding 100 to the position in the tool direction.

6.3 Coordinate System Setting

Different workpieces correspond to different origin points in the coordinate system. Currently, G54.1 P1 to G54.1 P48 are available for setting coordinate systems, totaling 48 coordinate systems.



6.4 Program Example

- G54: Switch to coordinate system
- G01 Y-10 F6000:Slowly move to the starting safe position
- G17 Y0 A0:Set Y/A axis to arc motion coordinate system
- G54.1 P1:Switch to coordinate system
- G12.1:Enable polar coordinate function
- G41 D1:Enable tool compensation
- M98 <TTT.CNC>: Call a program generated by CAM

- G40:Disable tool compensation
- G13.1: Disable polar coordinate system.

Part 7.Drive Parameter Settings

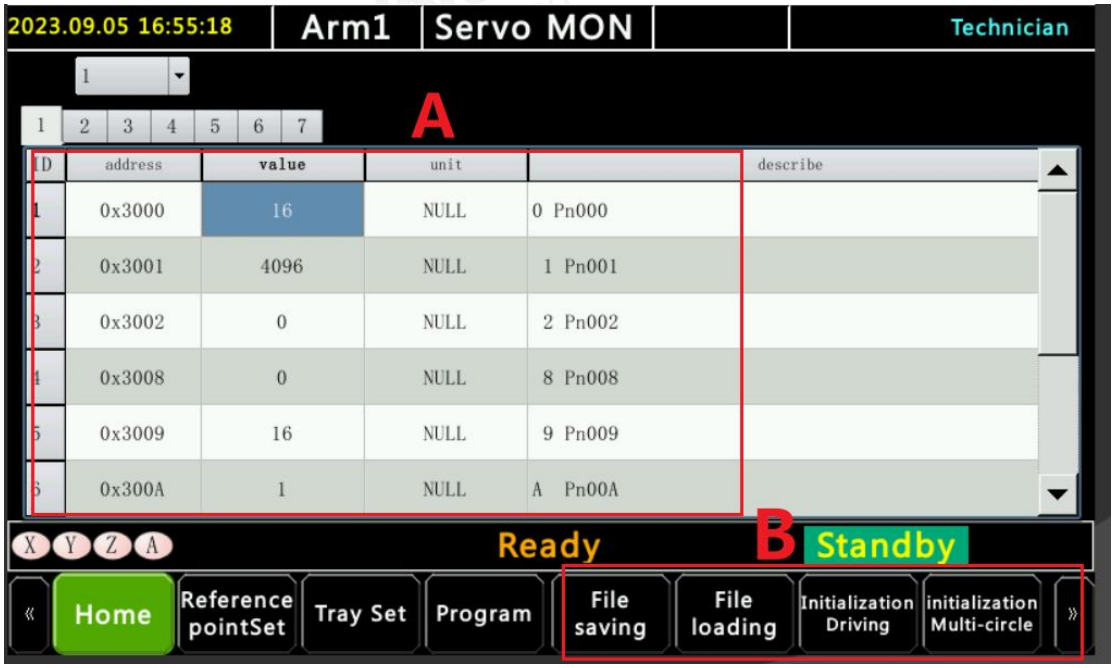
7.1 Modifying Drive Gain Parameters

A. Go to 【Settings】--【Drive Settings】--Select the corresponding axis.

B. Select the second set of parameters, PA100 group.

C. Make appropriate modifications. The default values after the machine is delivered are: PA100=40.0/PA102=80.0/PA103=400. If you notice abnormal motor noise, gradually reduce PA102 and PA103 by 10% each time until the motor no longer makes noise.

D. If you find that the motor is struggling and cannot keep up with the operating speed, increase these three values appropriately, increasing them by 10% each time until the desired performance is achieved.



7.2 Drive Parameter Import

To reduce debugging time after replacing a drive, after setting the station number on the drive side, enter the drive settings, select the corresponding axis, and click on "File Load" to overwrite the drive parameters.

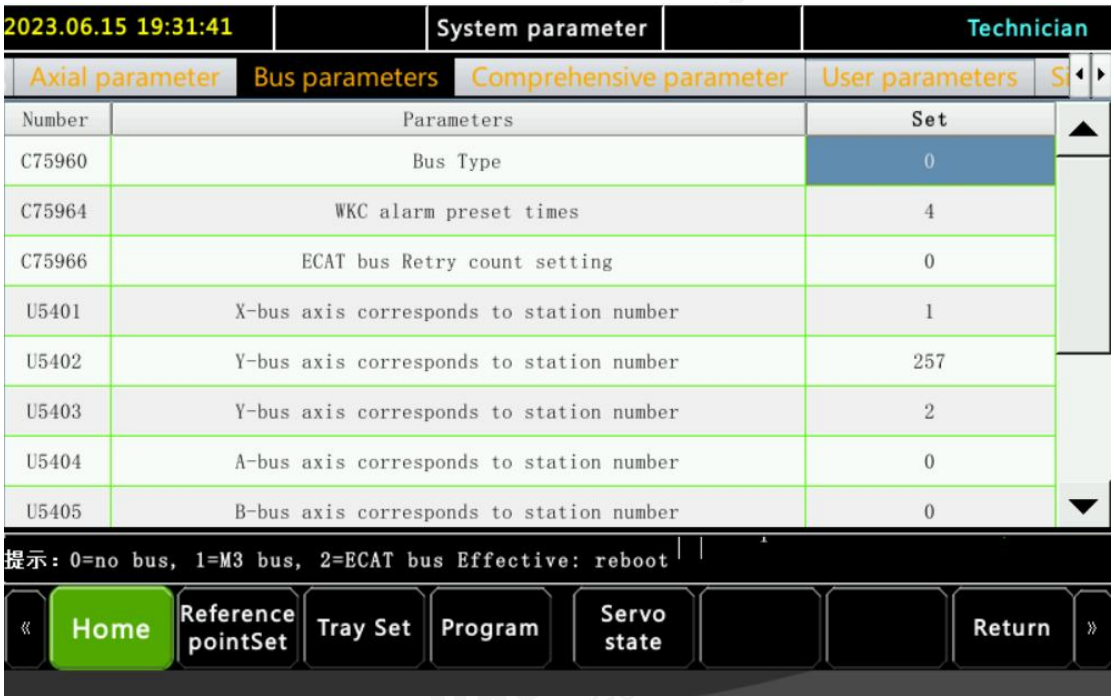
7.3 Drive Parameter Setup for New Machine Debugging

A. To reduce debugging time, for devices with the same configuration, after setting the same drive station number, you can update the complete backup package into the new teach pendant.

B. Enter the drive settings, select the corresponding axis, and load the parameter file from the controller into the drive.

Part 8.Axis Parameter Settings

8.1 Station Number and Hardware Axis Setup



A. Set the current bus type to 2.

B. Set the bus axis station number. The station number on the drive side is in hexadecimal, while the input value on the teach pendant is in decimal. Therefore, conversion is required. Please refer to the corresponding station number table for drive parameters when setting.

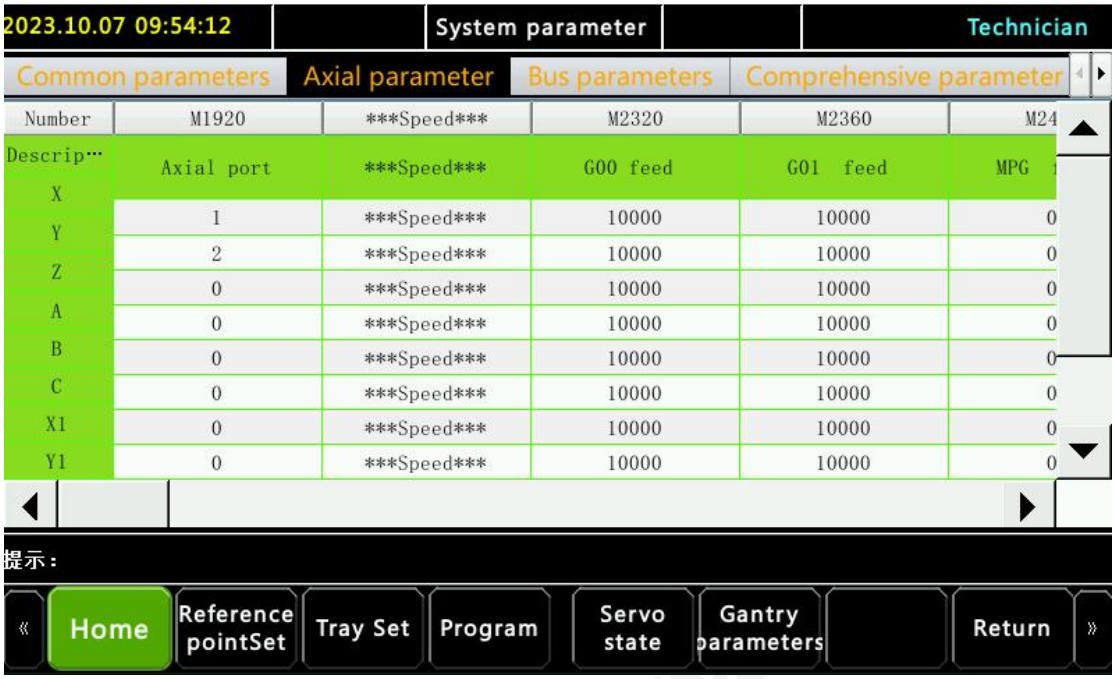
8.2 Resolution Setting

Please note that the drive gear ratio should be set to 8388608/10000, which means the motor receives 10000 pulses or commands to complete one revolution. The value on the teach pendant should be set based on the actual reduction ratio during assembly. For example, if the motor has 10000 pulses per revolution and the reduction ratio is 5:1, resulting in the actual movement of 15 mm per revolution of the gear, you can set it as 50000/150000.

8.3 Speed Setting and Limitations

A. Axis parameter speed includes G00 speed, G01 speed, and manual running speed. This setting refers to the speed for G00 and manual running, while the value for G01 represents the maximum allowable speed.

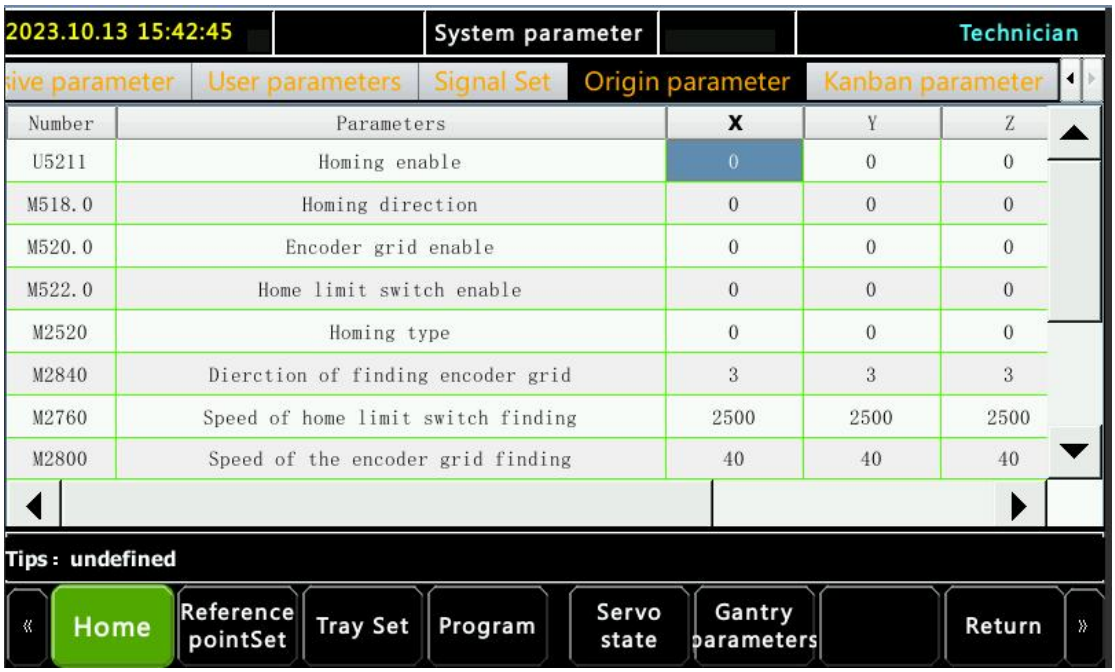
B. Maximum speed calculation algorithm: Consider an example where the motor's rated speed is 3000 RPM, and the motor has a reduction ratio of 5:1. If the gear completes one revolution and the actual travel distance is 15 mm, the calculation is: (3000/5) * 15 = 9000 mm/min.



8.4 Axis Home Return

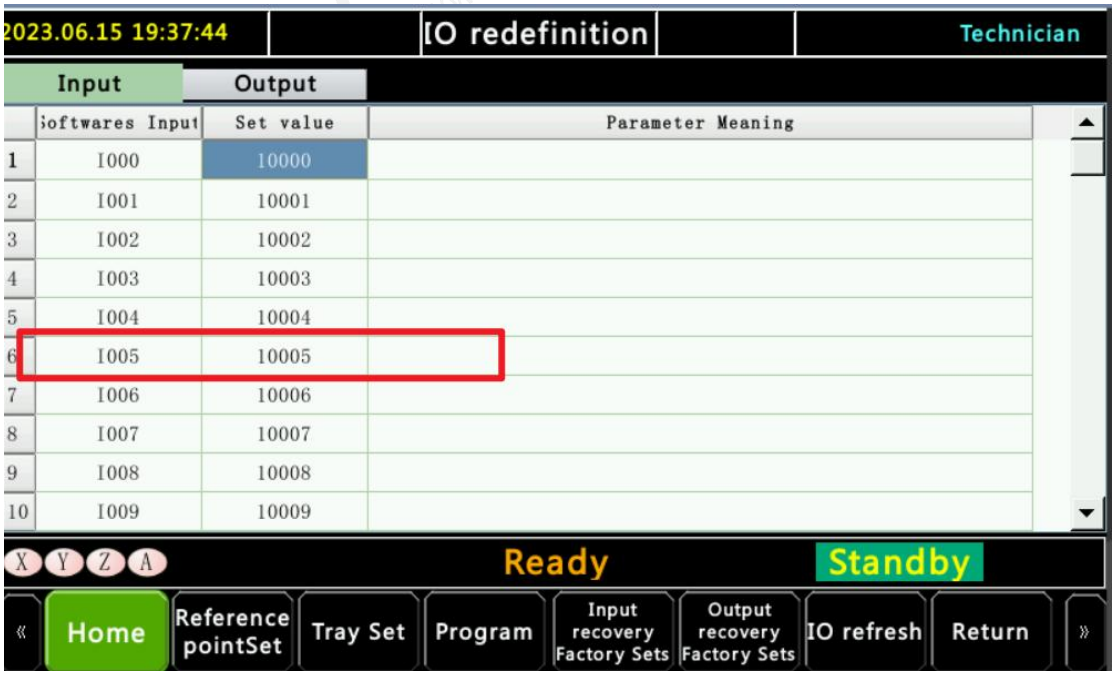
A. Go to【Settings】--【Axis Parameters】--【Home Parameters】and enable the parameter for whether homing is required.

B. Go to【Settings】--【Home Setup】and select the steps for each axis to home. Typically, the Z-axis is homed as the first step, followed by the XY axes.

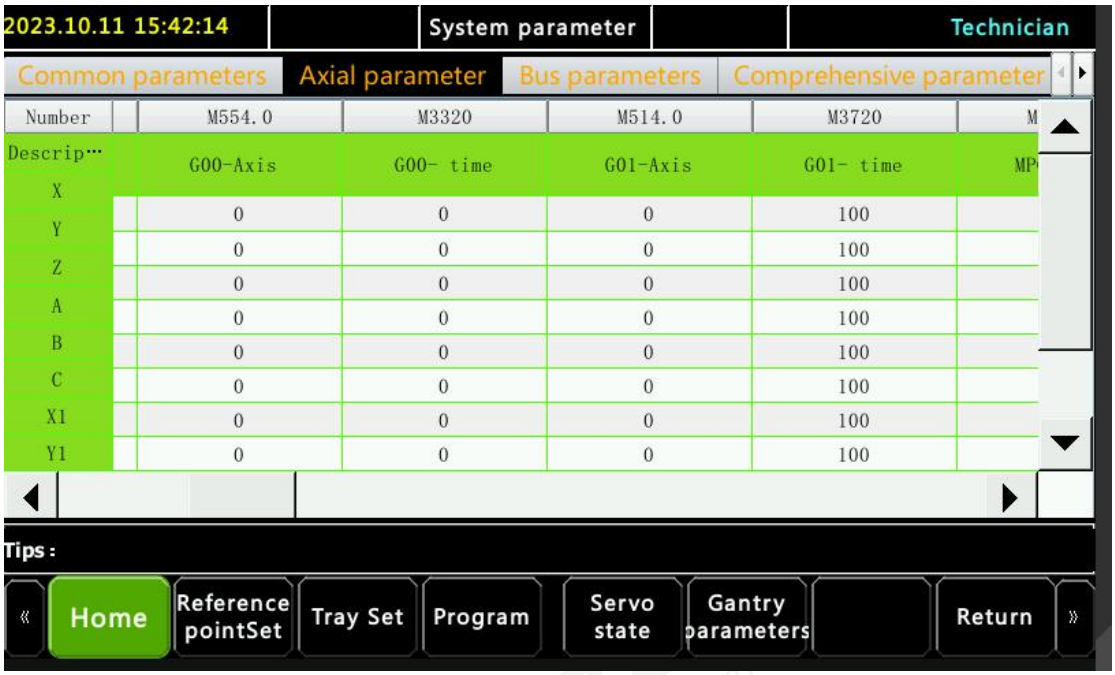


C. Go to 【Settings】--【IO Redefinition】-- Find the home signal parameter and assign the corresponding I point. For example, if the external actual home signal for the X-axis is I10, set the external I point corresponding to I32 as 10010.

D. Go to 【Settings】--【Signal Setup】-- Set the home signal format based on the actual external signals.



8.5 Acceleration, Deceleration, and Smoothing Time Settings

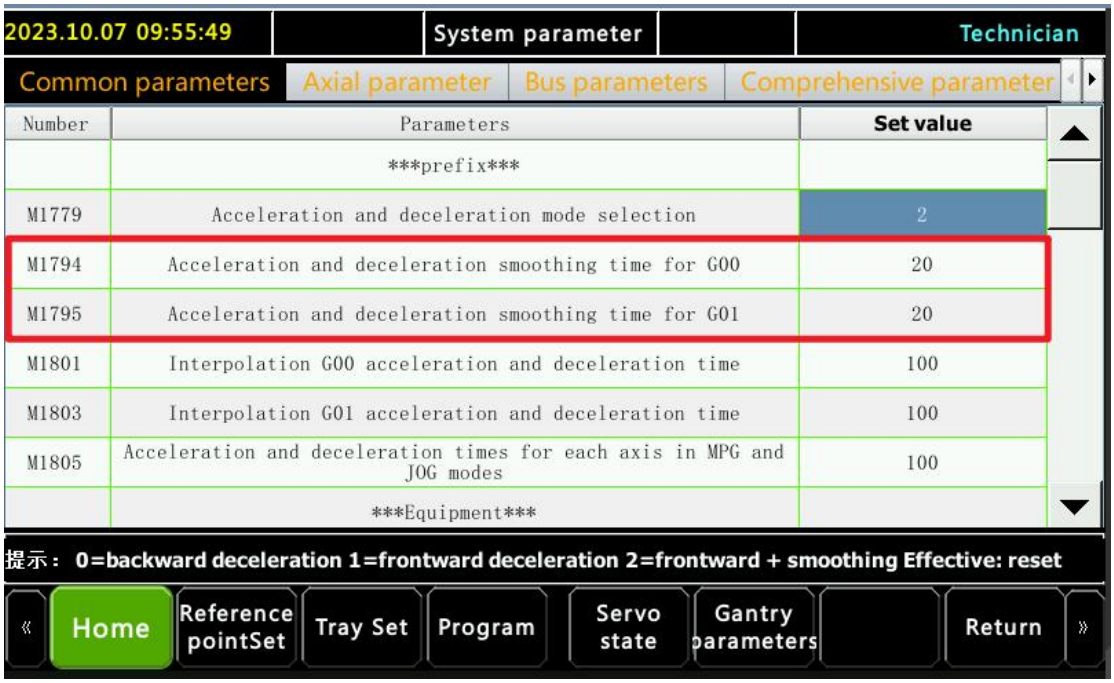


A. Acceleration and deceleration time setting: Go to 【 Settings 】 -- 【 Axis Parameters】.

- It is recommended to enable independent acceleration and deceleration time for each axis. Set reasonable acceleration and deceleration times based on the load of each axis. Generally, the acceleration and deceleration times should not exceed 500, and should not be less than 100 to ensure smooth starting and stopping without excessive shaking. Choose appropriate acceleration and deceleration times for the following:
- G00 acceleration time: Recommended value is around 300.
- G01 acceleration time: Recommended value is around 200-300.
- MPG acceleration time can be appropriately increased to around 300.

B. Smooth time setting: Go to 【Settings】--【Pre-addition Parameters】.

Set the smooth time according to your specific requirements. This helps achieve smooth motion of the axis. The unit is in milliseconds (ms).



FINGER CNC

Guangzhou Finger Technology Co.,Ltd

Hotline：020-39389901
Repair Helpline：18127931302
Fax：020-39389903
Postal Code：511495
E-mail：finger@fingercnc.com
Website：www.finger-cnc.com
Address：201,No. 8, Chengding Street, Zhongcun Street, Panyu District, Guangzhou City, Guangdong Province

Official Website

Official Wechat