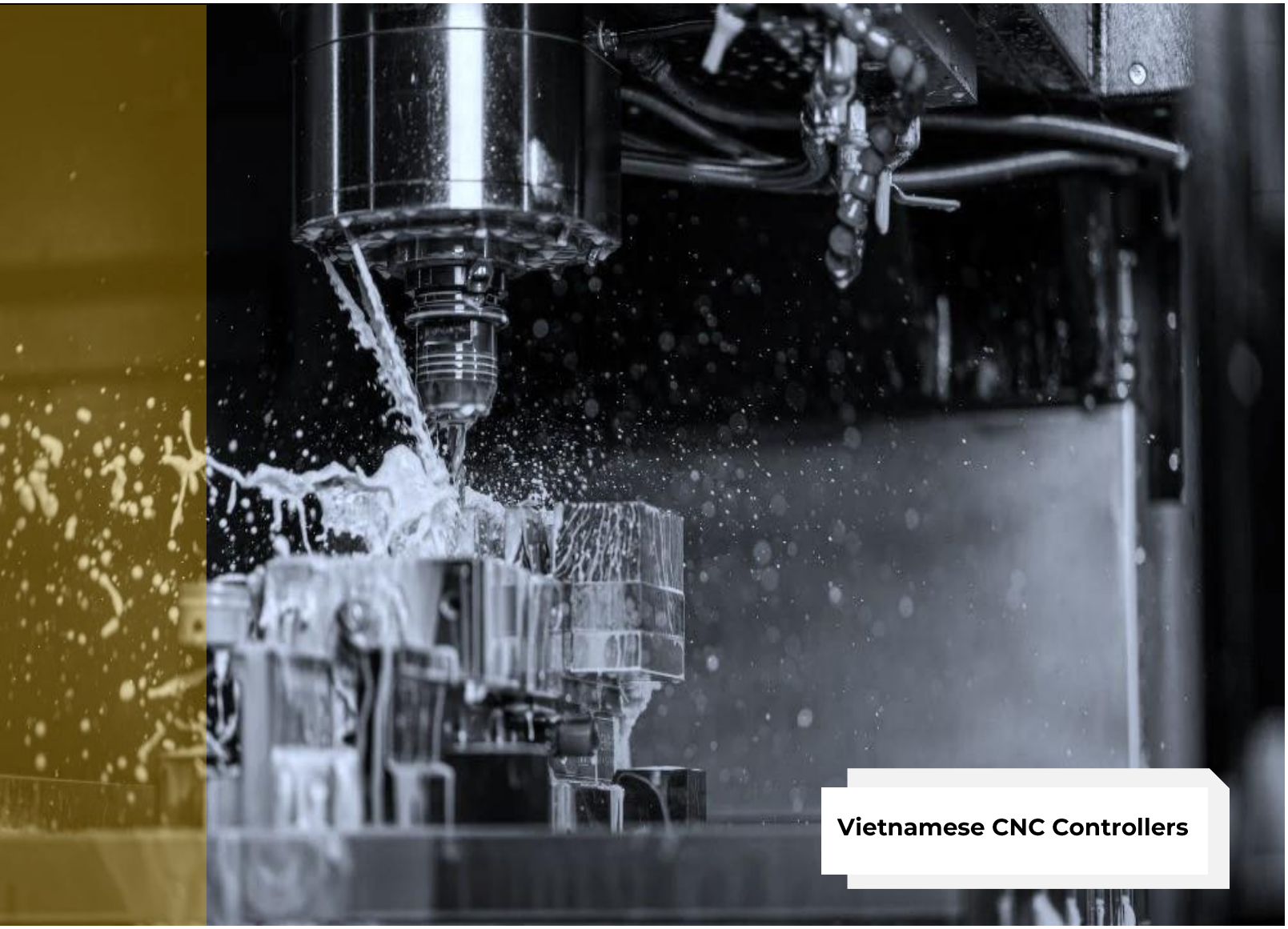
QS TECHNOLOGY

Controller features

F54 CONTROLLER

Operation Manual

Modified Date: 05-09-2024



www.qstcnc.com

INTRODUCTIONS:

Thank you for your interest and choose our motion controller. QS Technology Co.,LTD provide controllers with a modern design also with operation interface. The F54 controller was designed for multi applications. This controller can support a wide range of applications thanks to the flexible integration of the main core (Motion control), PLC and Macro.

This user guide provides you with an overview of the range of functions of QS Technology milling controllers and gives you a good experience for your daily work.

QS Technology Co., Ltd. We are proud to be a pioneer in developing, applying, and marketing CNC controller products "Made by Vietnam." After many years of development, products under the QS Technology brand have increasingly gained the trust and interest of customers both domestically and internationally. Additionally, with strengths and experience accumulated over many years in machine manufacturing, automation systems, and electronic circuit boards, we are confident in our mastery of the technology and our ability to meet our customers' needs.

OUR WEBSITE

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CHAPTER 1.

CONTROLLER OVERVIEW

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1.1 APPERANCE

Figure 1-1. F54 controller

Figure 1-2. F54 controller outside box

1.2 DIMENSION

Figure 1-3. Front view of F54 controller

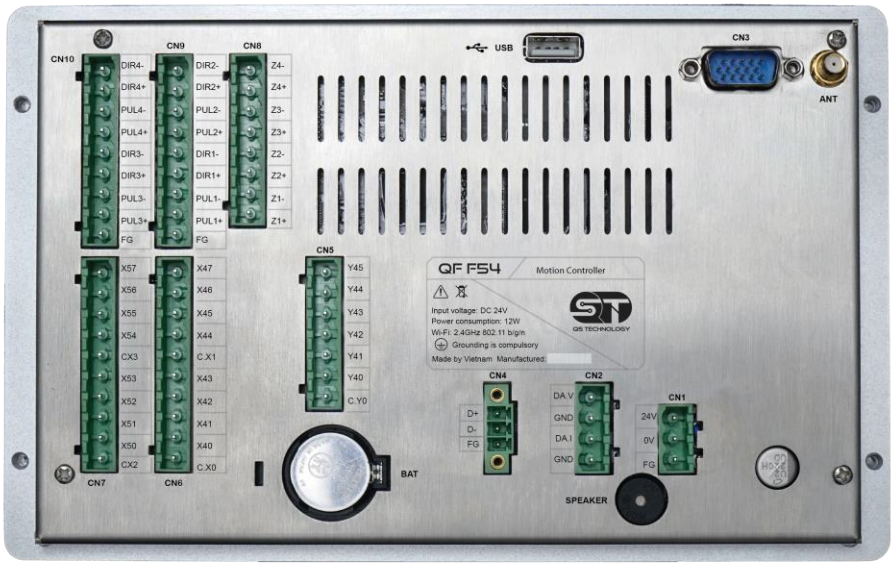

Figure 1-4. Back view of F54 controller

Figure 1-5. Side view of F54 controller

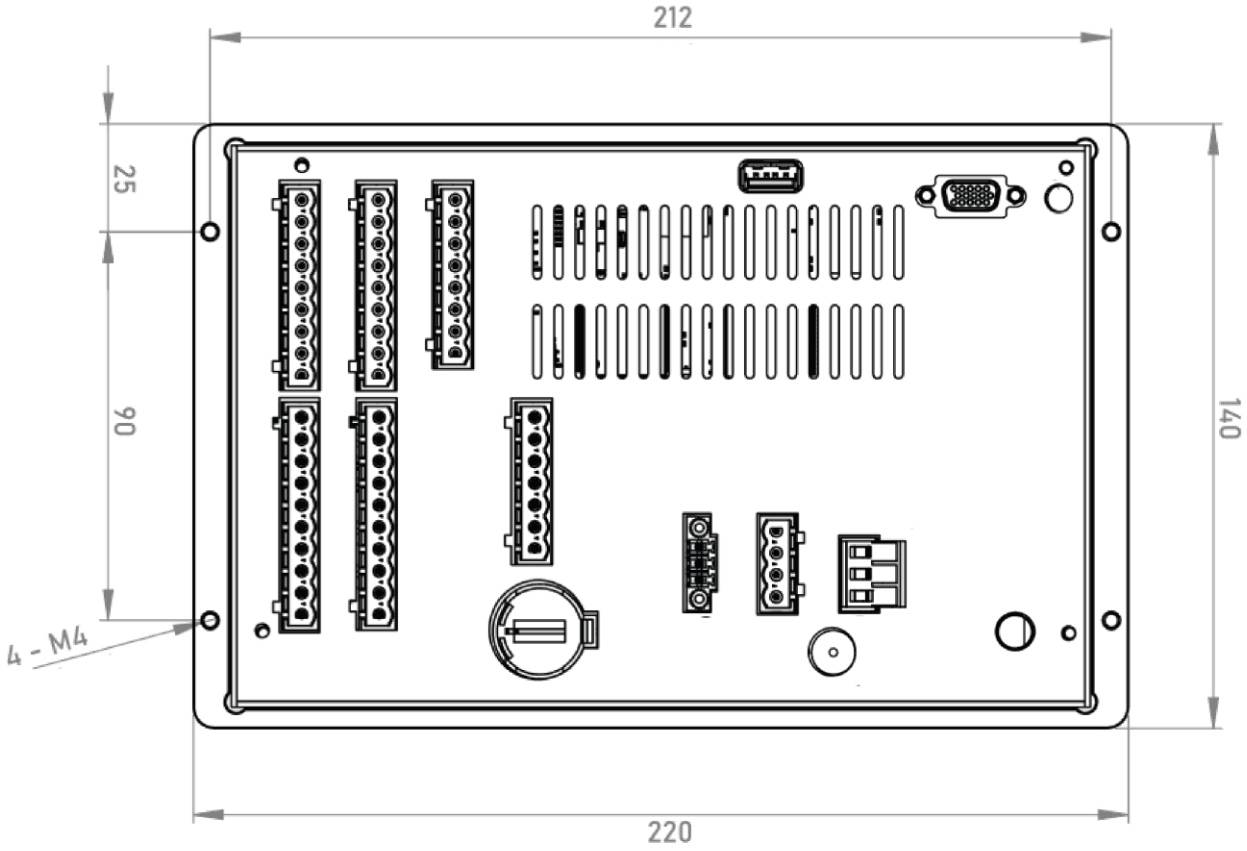

Figure 1-6. Details dimension of F54 controller

1.3 SOFTWARE STRUCTURE

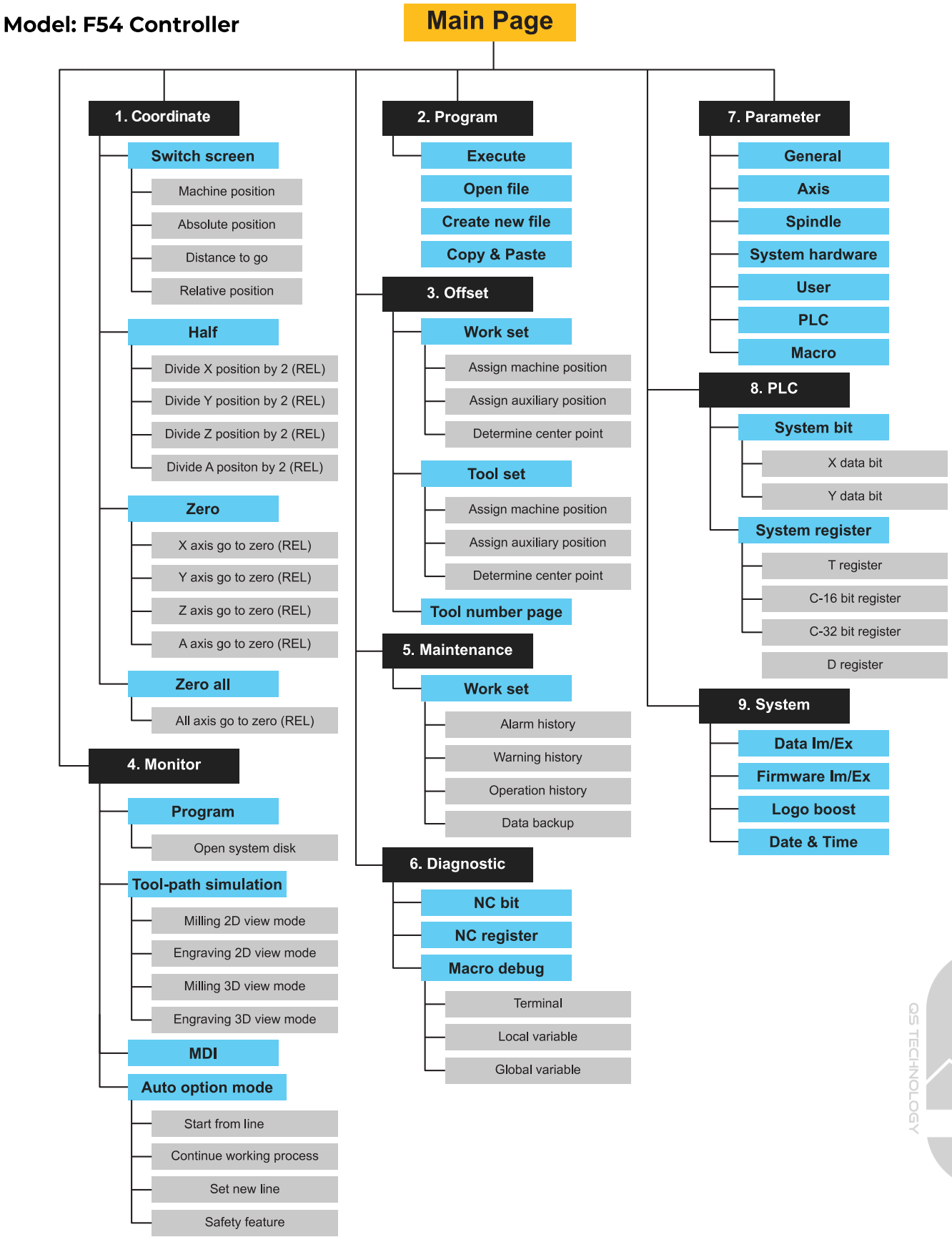

Figure 1-7. F54 controller software structure

CHAPTER 2.

WIRING - CONNECTION

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2.1 POWER SUPPLY

Figure 2-1. Power supply widely use

Note:

- Using switching power supply is better than voltage transformer
- Voltage input forced to connect FG pin to against the noise signal for controller

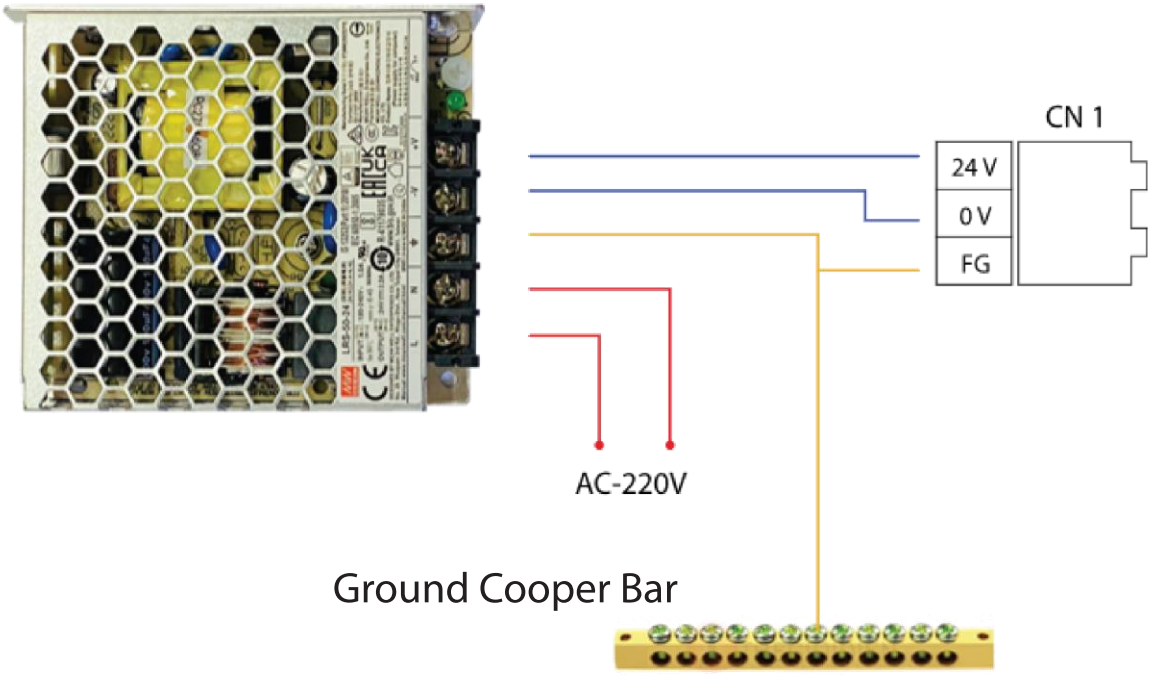

Figure 2-2 Power connection diagram

2.2 SENSOR CONNECTION PORT

There are 2 type of sensor that is widely used is high input (PNP) and low input (NPN).

Notice:

- High input (PNP): When we connect CX pin to 0V and using high input sensor type (PNP). This signal will lead to the input signal of controller
- Low input (NPN): When we connect CX pin to 24V and using low input sensor type (NPN). This signal will lead to the input signal of controller

2.2.1 HIGH INPUT VOLTAGE

User can choose 1 of 2 port CN6, CN7 to connect the high input voltage to controller

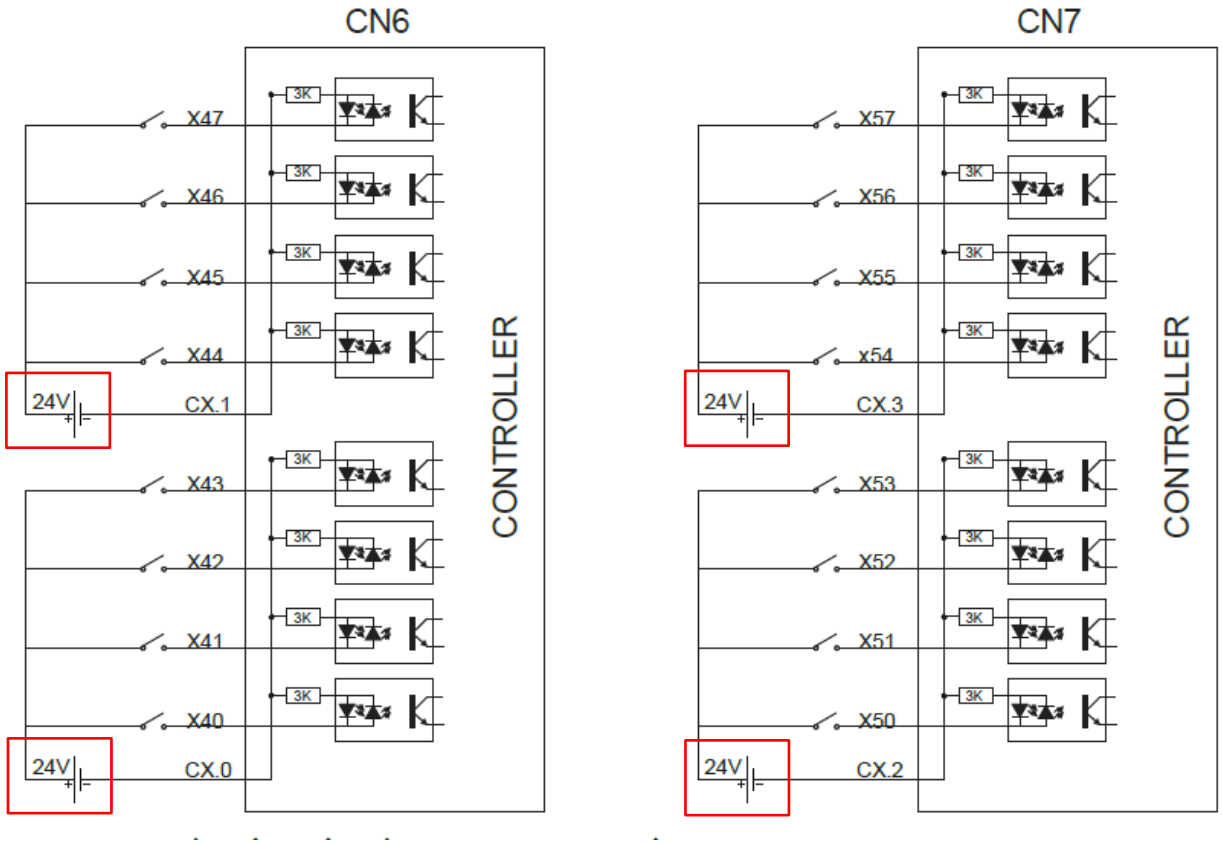

Figure 2-3. High input voltage of CN6, CN7 port

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2.2.2 LOW INPUT VOLTAGE

User can choose 1 of 2 port CN6, CN7 to connect the high input voltage to controller

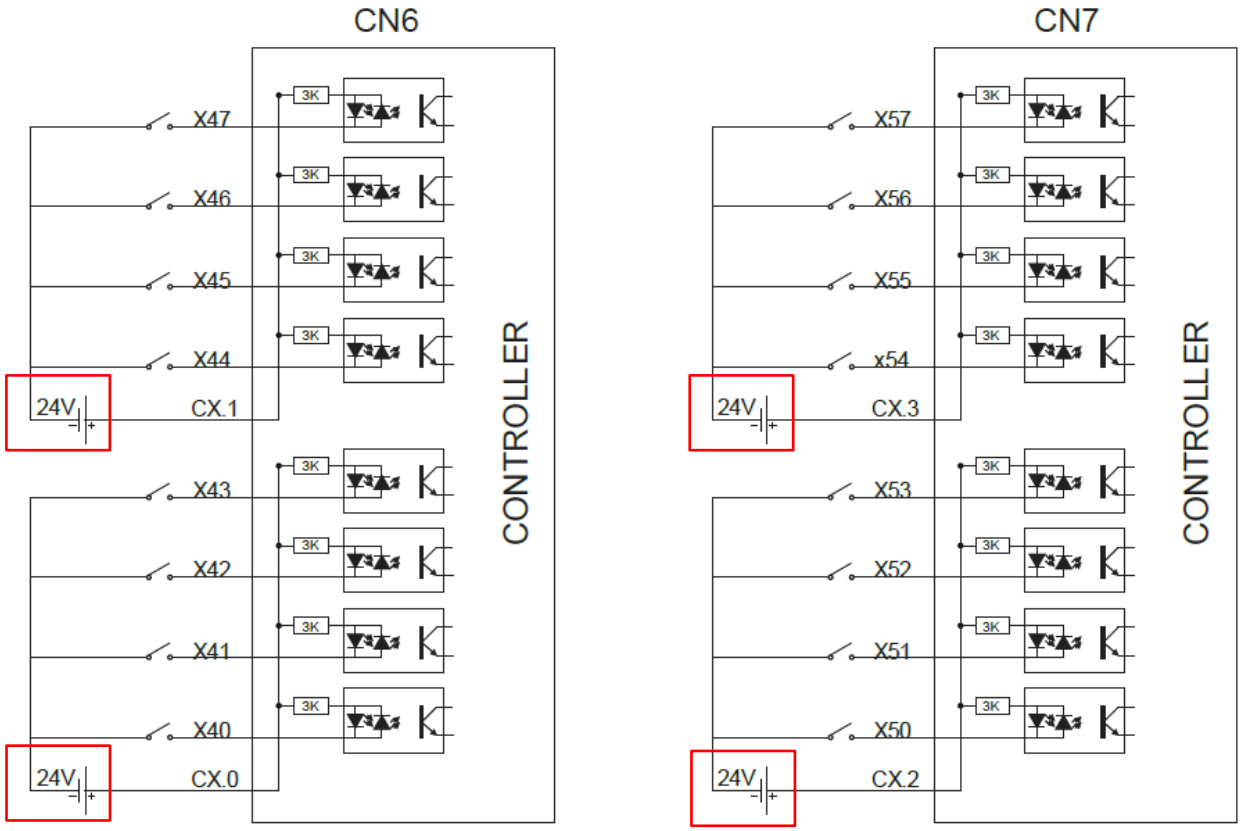

Figure 2-4. Low input voltage of CN6, CN7 port

Note:

- CX.0, CX.1, CX.2, CX.3 is a COM separate input signal pins
- Recommend the operators to wire the input signal at the same type
- **DO NOT wire 2 difference type of voltage input signal at the same time to the controller**

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2.2.3 F54 CONTROLLER INPUT CONNECTION TABLE

Refer the reference connection table of F54 controller at **(2.9)** below to avoid connecting wrong signal cause damage to device.

2.3 TOOL LENGTH SENSOR

Tool length sensor is a device to measure the length, wear of cutting tools and these values will be calculated to determine the tool ware compensation. And the controller will able to adjust suitable working value achieve the desired dimensions and tolerances of machined parts.

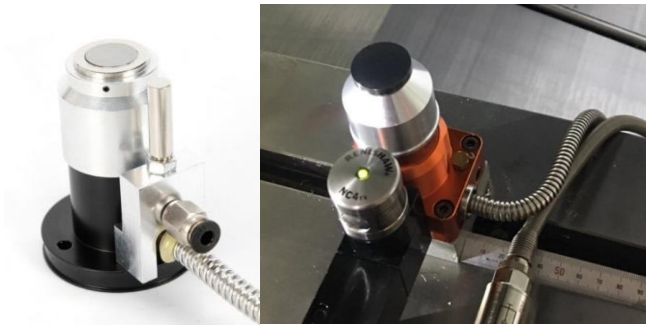

Figure 2-6. Tool length sensor

2.3.1 3 WIRES TYPE

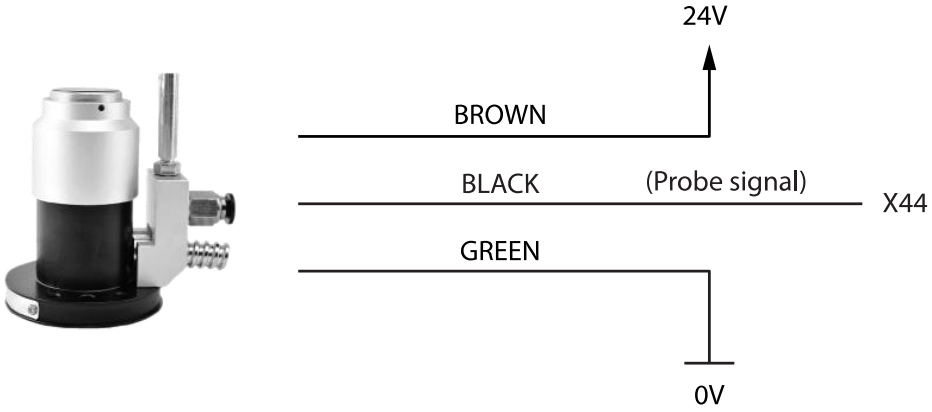

Figure 2-7. Tool length sensor wiring diagram (3 wires type)

2.3.2 4 WIRES TYPE-NPN OUPUT SIGNAL

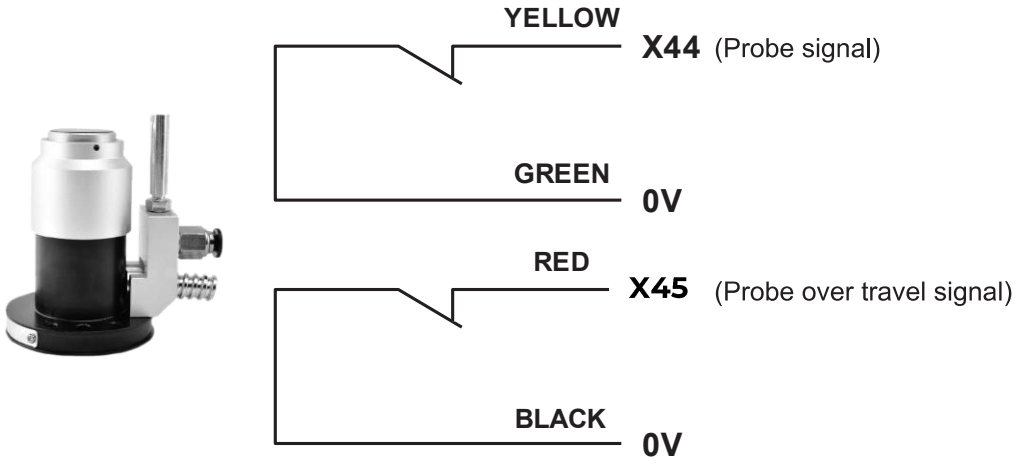

Figure 2-8. Tool length sensor (4 wires-NPN)

2.3.2 4-WIRES TYPE-PNP OUTPUT SIGNAL

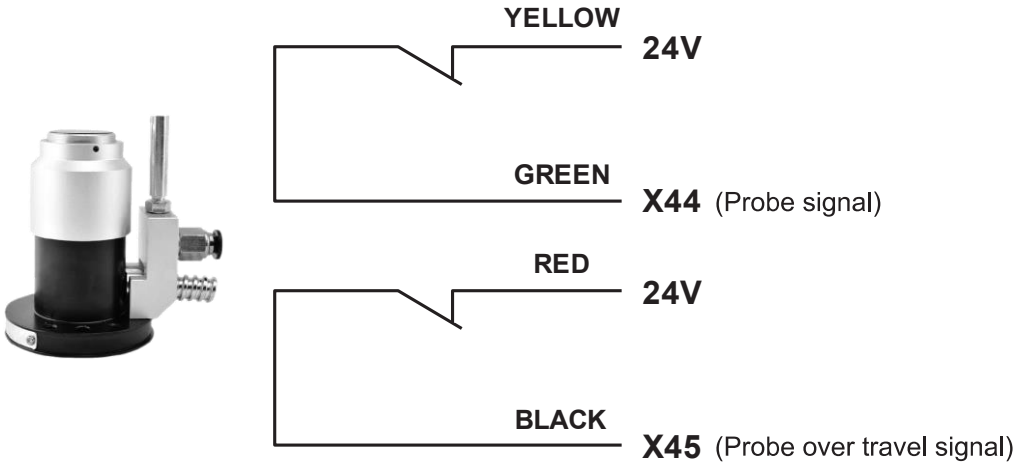

Figure 2-9. Tool length sensor (4 wires-PNP)

2.3.3 6 WIRES TYPE-NPN OUTPUT SIGNAL

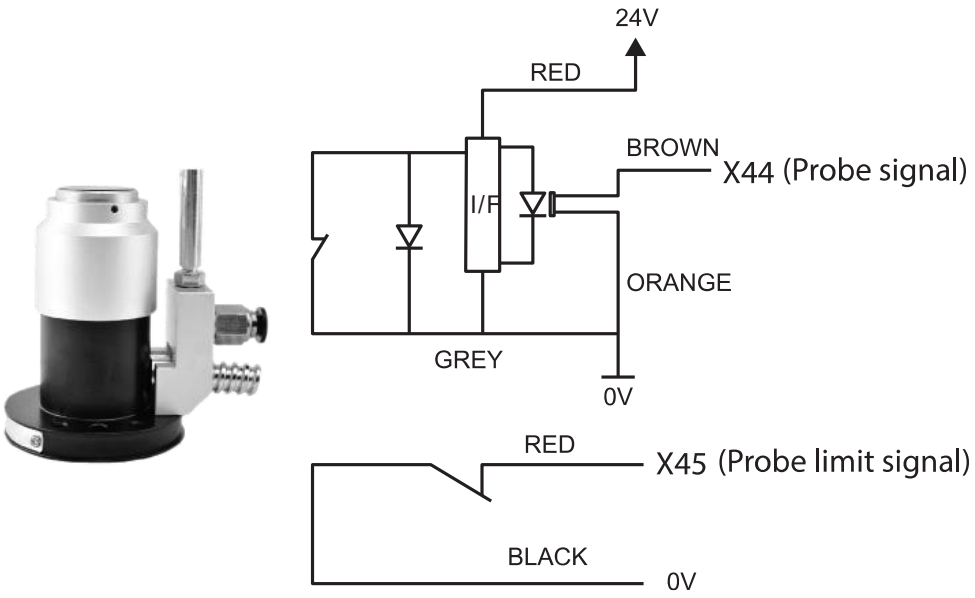

Figure 2-10. Tool length sensor (6 wires-NPN)

2.3.4 6 WIRES TYPE-PNP OUTPUT SIGNAL

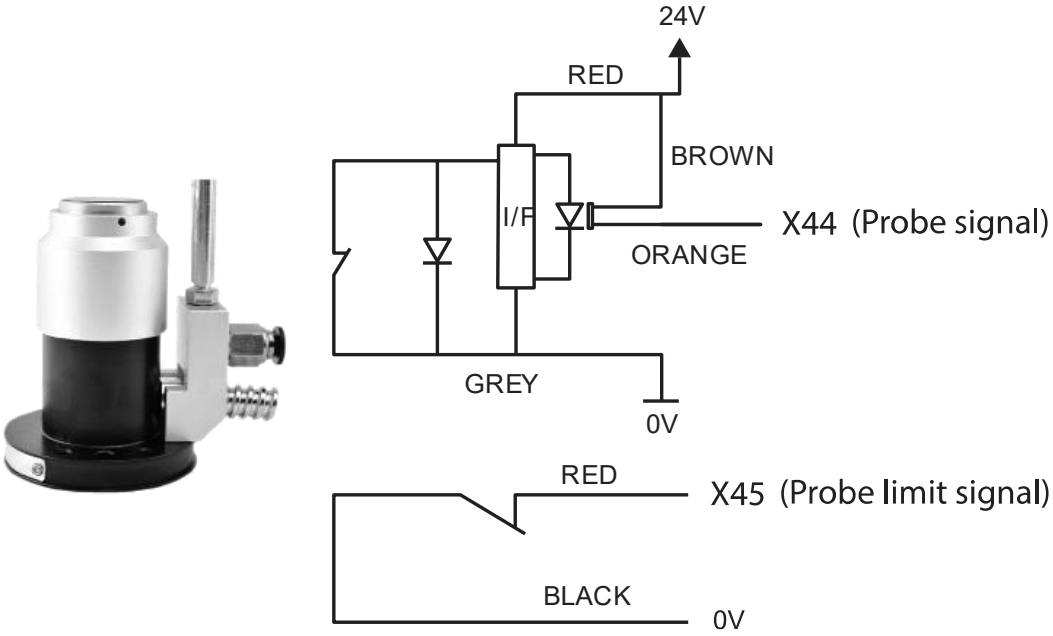

Figure 2-11. Tool length sensor (6 wires-PNP)

2.4 AXIS WIRING DIAGRAM

2.4.1 WIRING DIAGRAM X-Y AXIS (PUL/DIR)

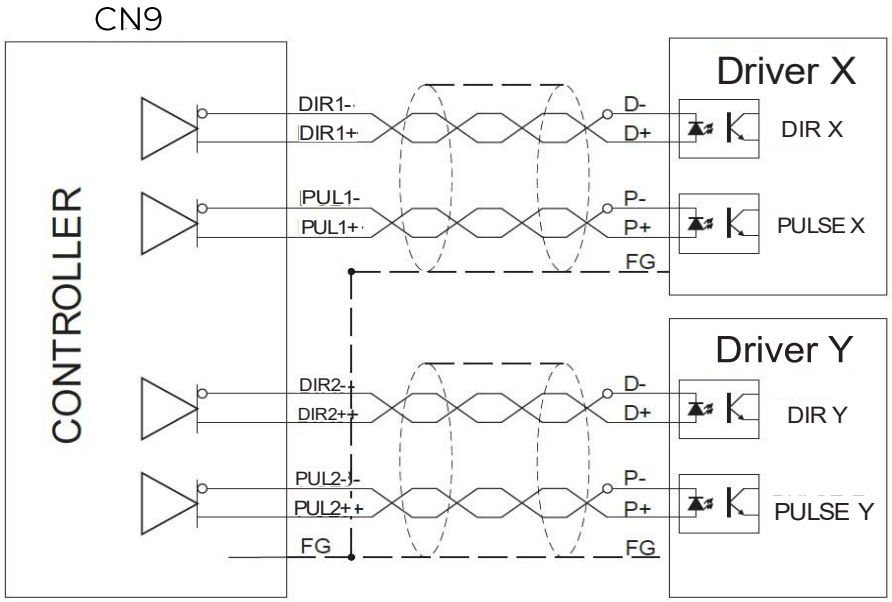

Figure 2-12. X,Y axis pulse/direction wiring diagram

2.4.2 WIRING DIAGRAM Z-A AXIS (PUL/DIR)

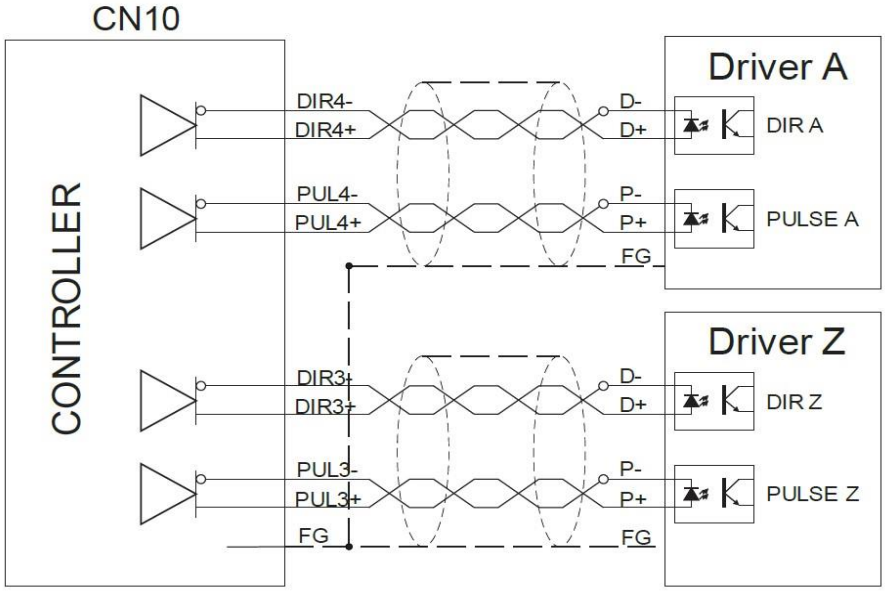

Figure 2-13. Z,A axis pulse/direction wiring diagram

2.4.3 PULSE FEEDBACK OF Z PHASE FROM X,Y,Z,A SERVO DRIVE

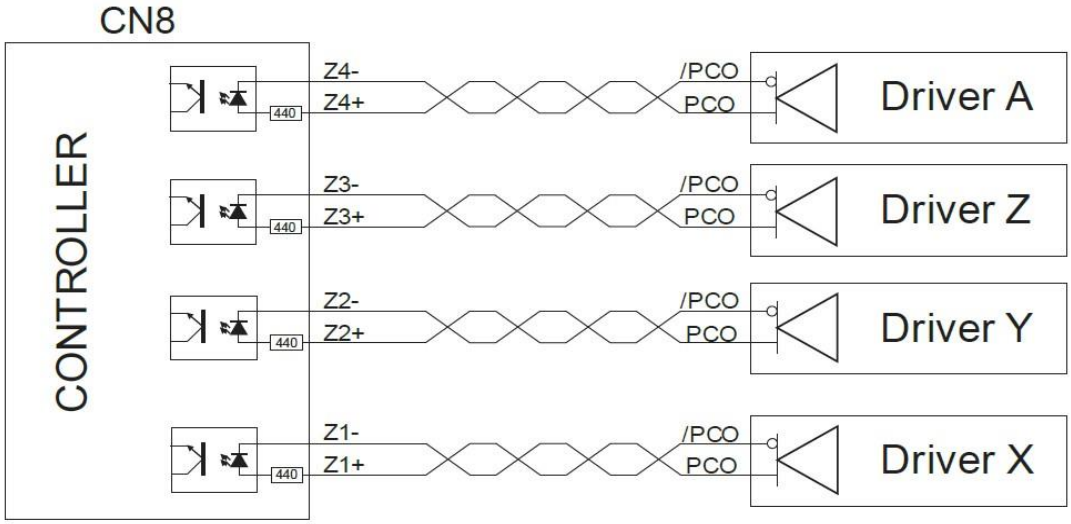

Figure 2-14. Z phase pulse feedback from X,Y,Z,A servo drive wiring diagram

Note:

- Control cable must have a shield wire and be soldered to the connector to against the noise signal (Refer image below)

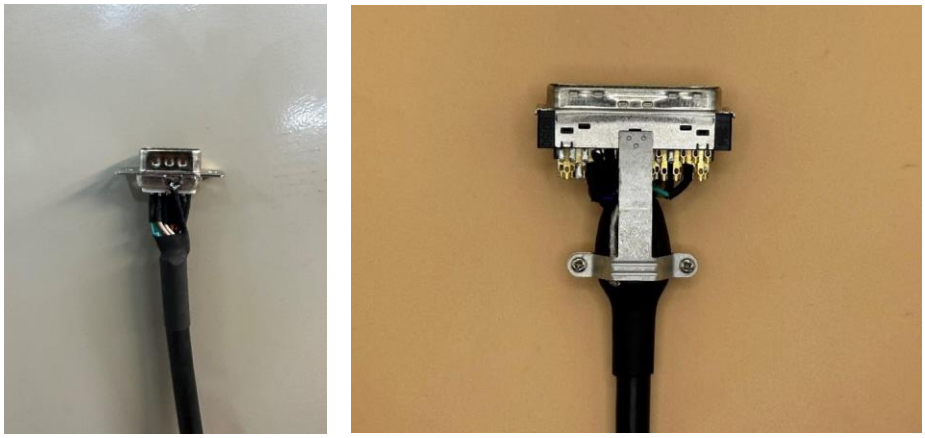

Figure 2-17. Control cable shield wire be soldered to the connector

2.5 CONNECT ANALOG SIGNAL TO INVERTER

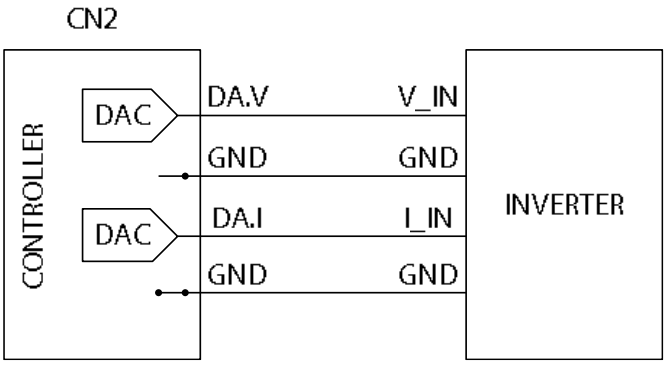

Figure 2-18. Analog signal wiring diagram to inverter

2.5.1 CONNECT ANALOG SIGNAL TO INVERTER USING 0-10V (INVT brand)

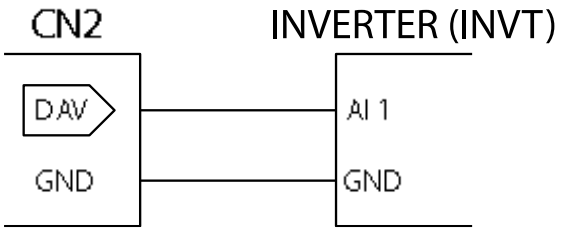

Figure 2-19. 0-10V analog wiring diagram to inverter (INVT brand)

2.5.2 CONNECT ANALOG SIGNAL TO INVERTER USING CURRENT 0-20mA (INVT brand)

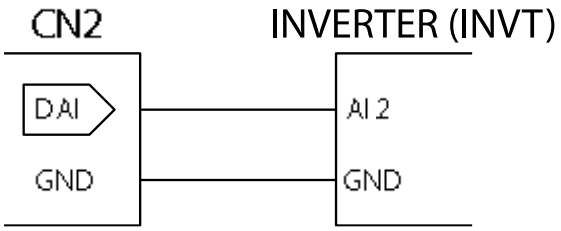

Figure 2-20. 0-20mA analog wiring diagram to inverter (INVT brand)

2.6 I/O LINK BOARD CONNECTION

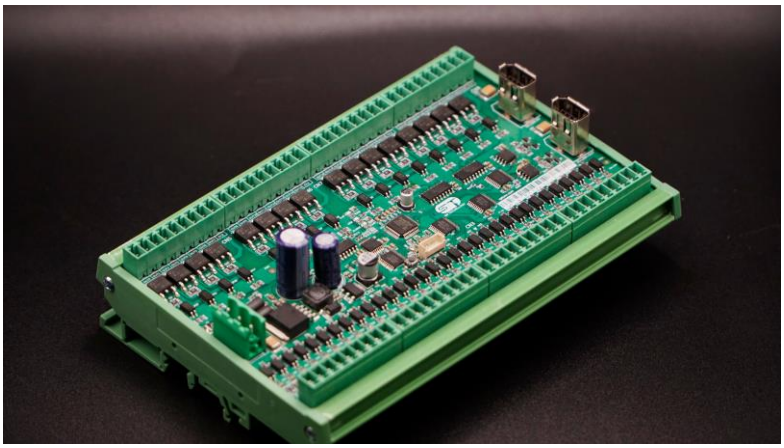

Figure 2-21. I/O link 32_V1.1_0722 board

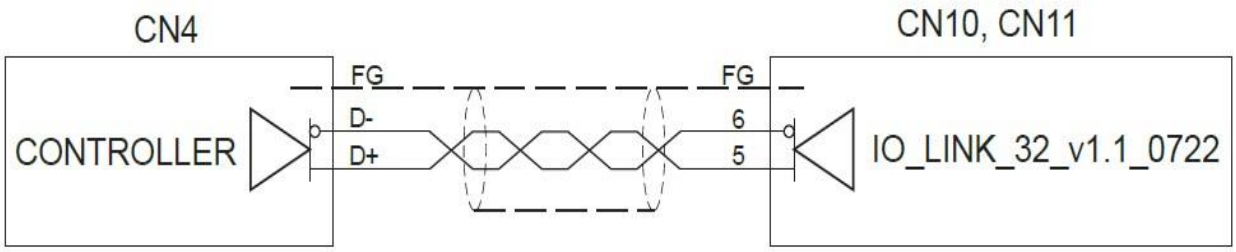

Figure 2-22. I/O link board wiring diagram

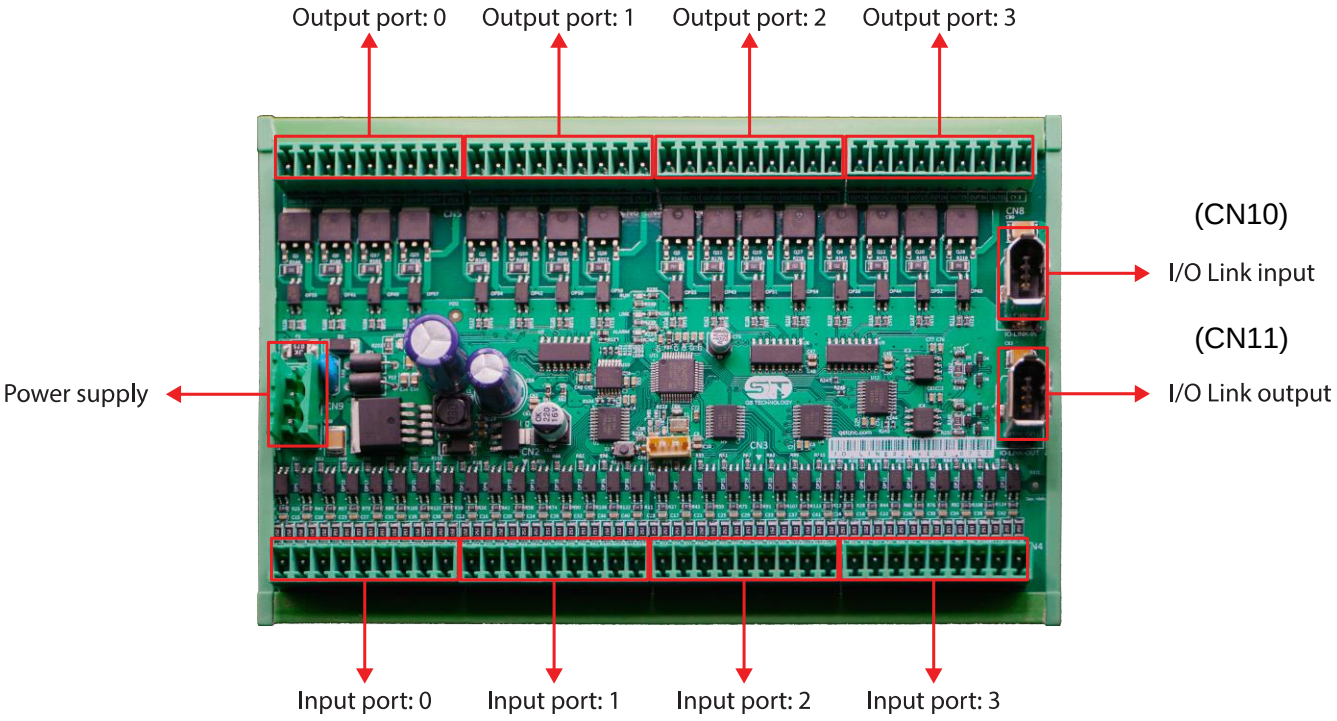

Figure 2-23. I/O link 32_V1.1_0722 board connection port

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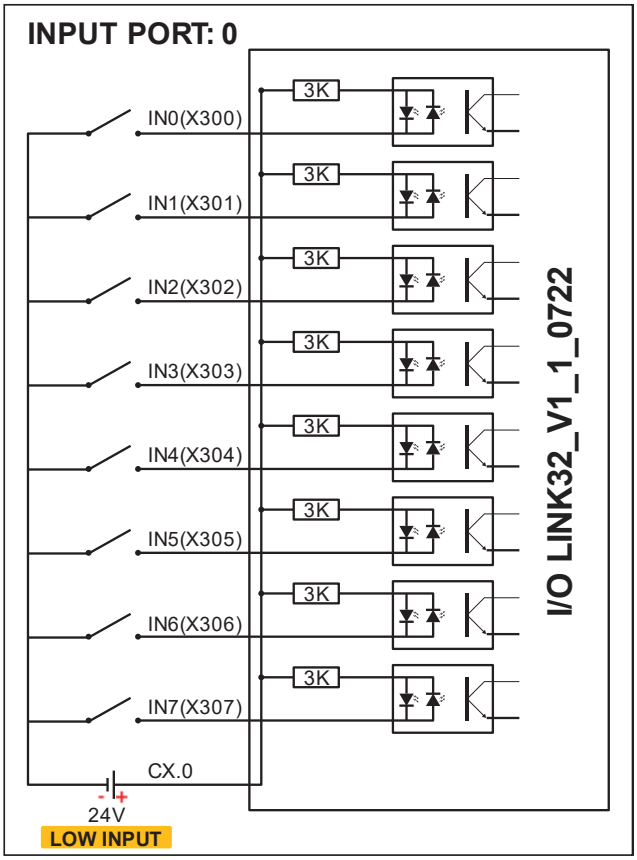
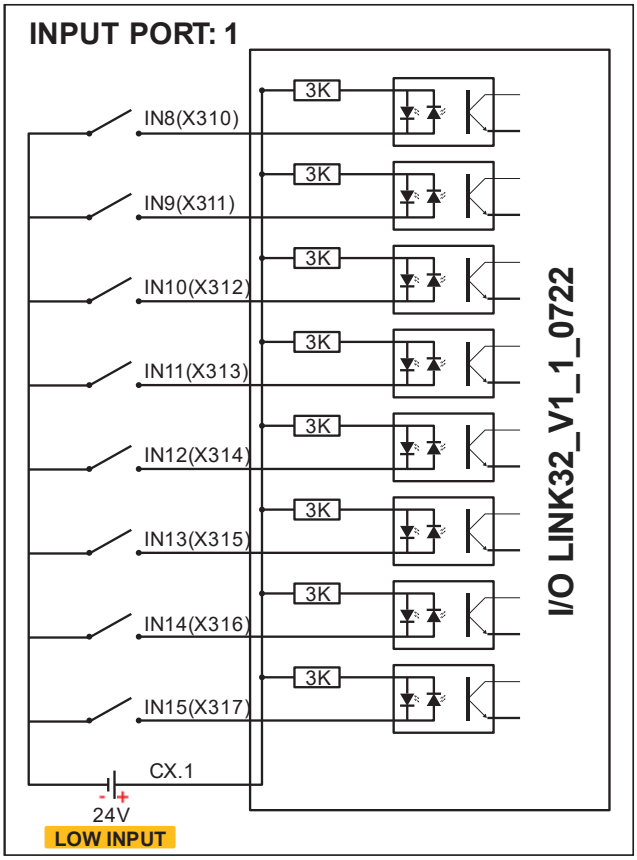
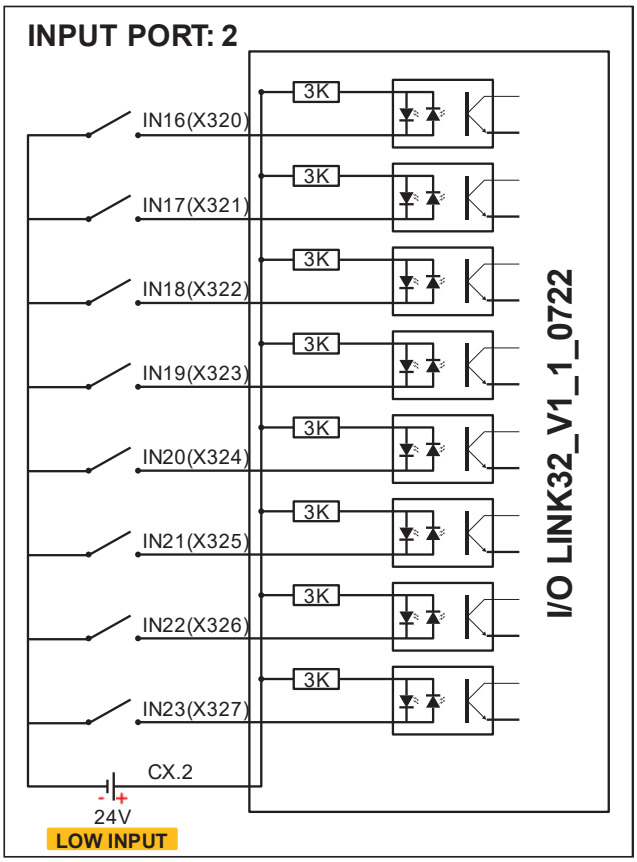
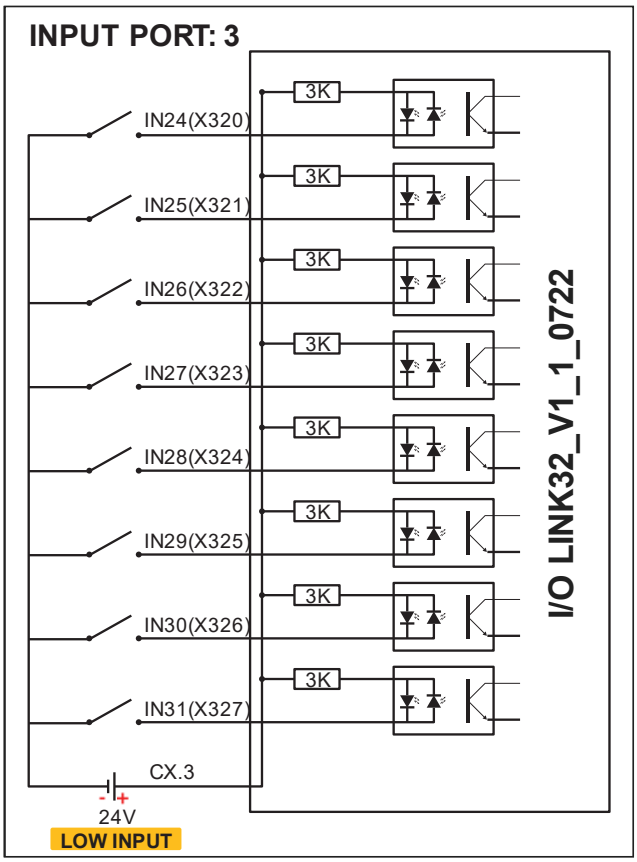
2.6.1 I/O LINK BOARD - INPUT PORT (LOW INPUT)

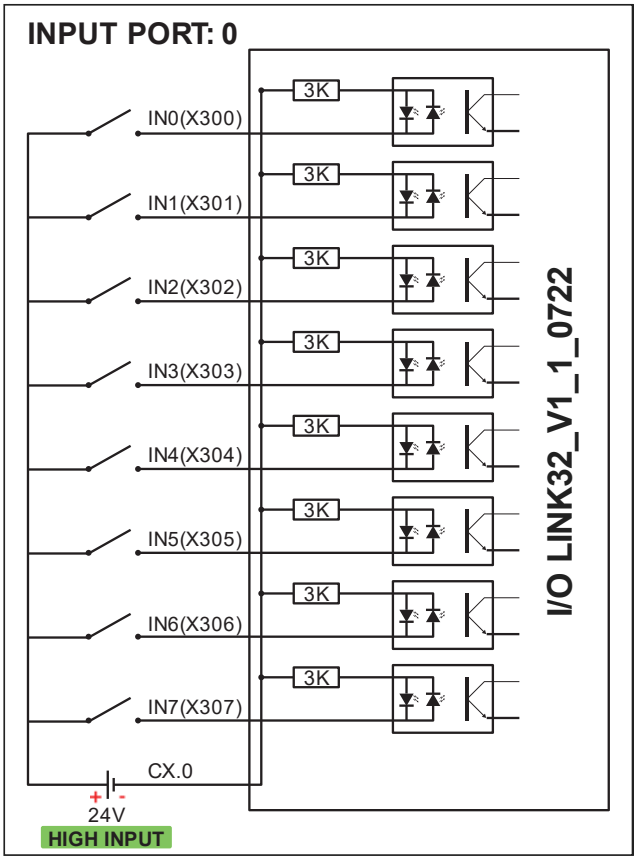


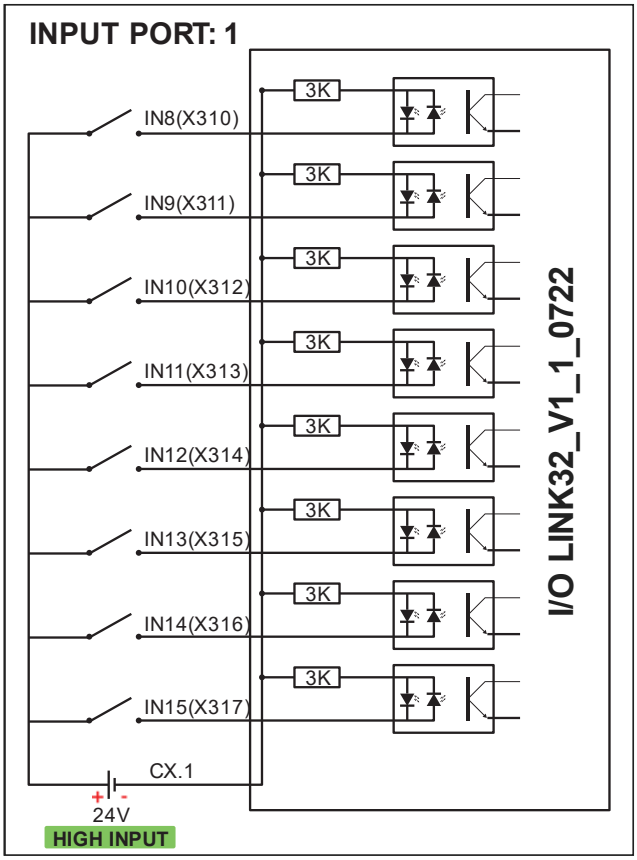


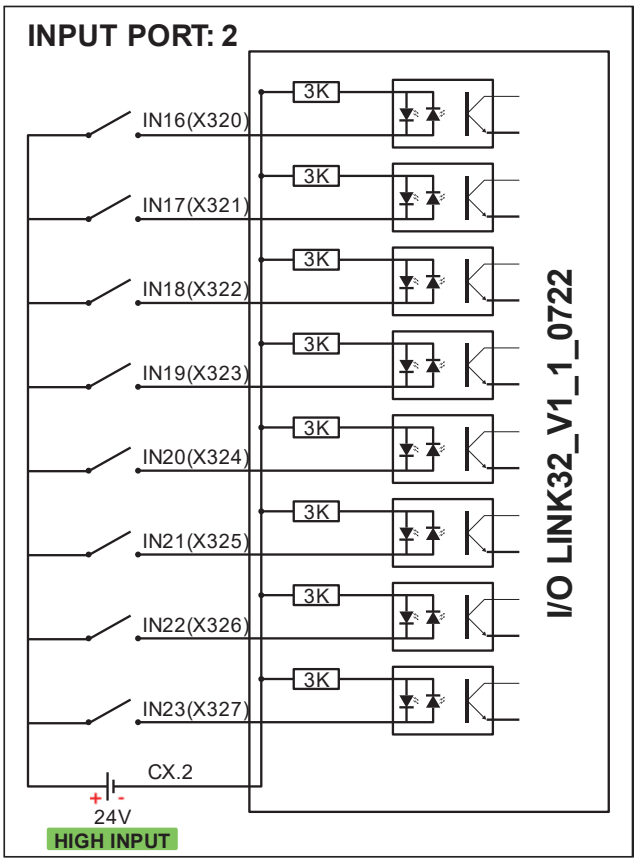


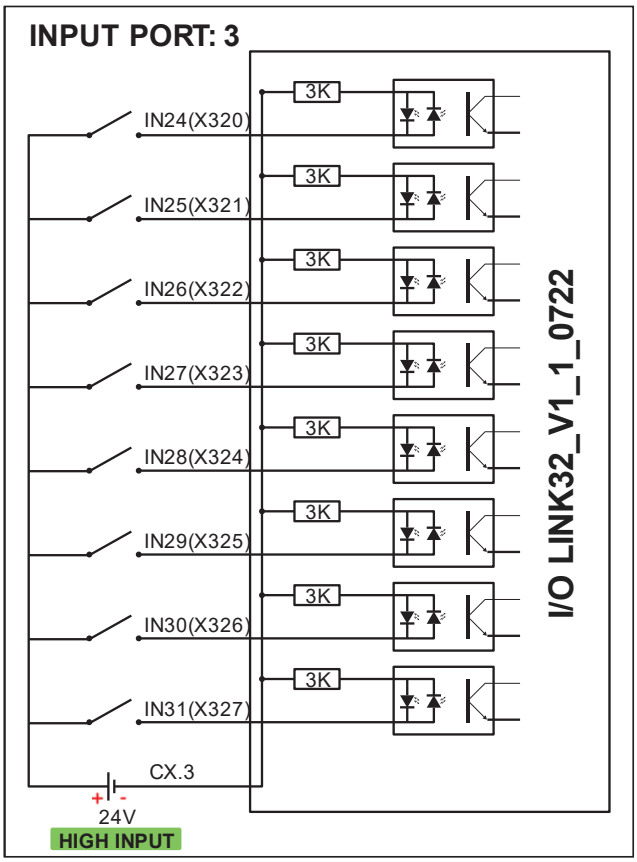


2.6.2 I/O LINK BOARD – INPUT PORT (HIGH INPUT)

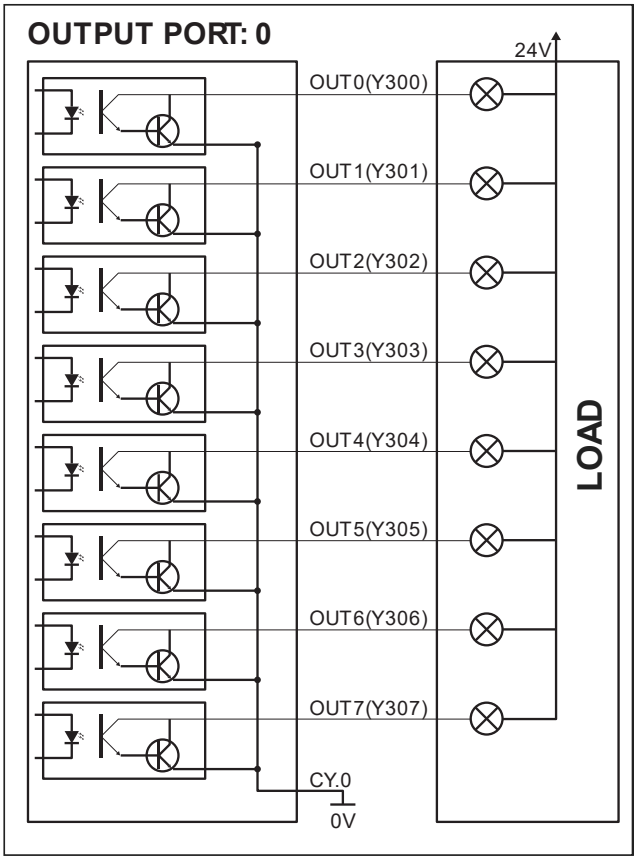


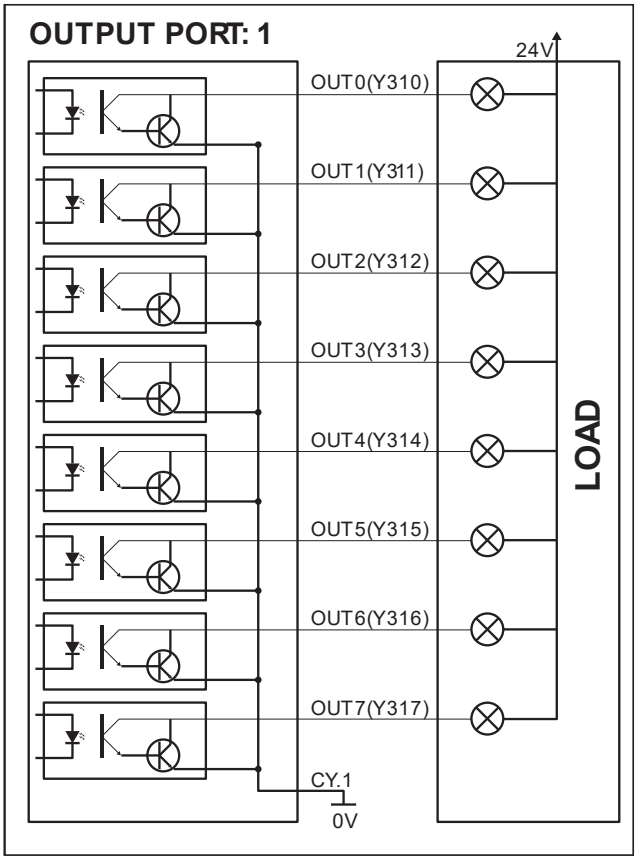


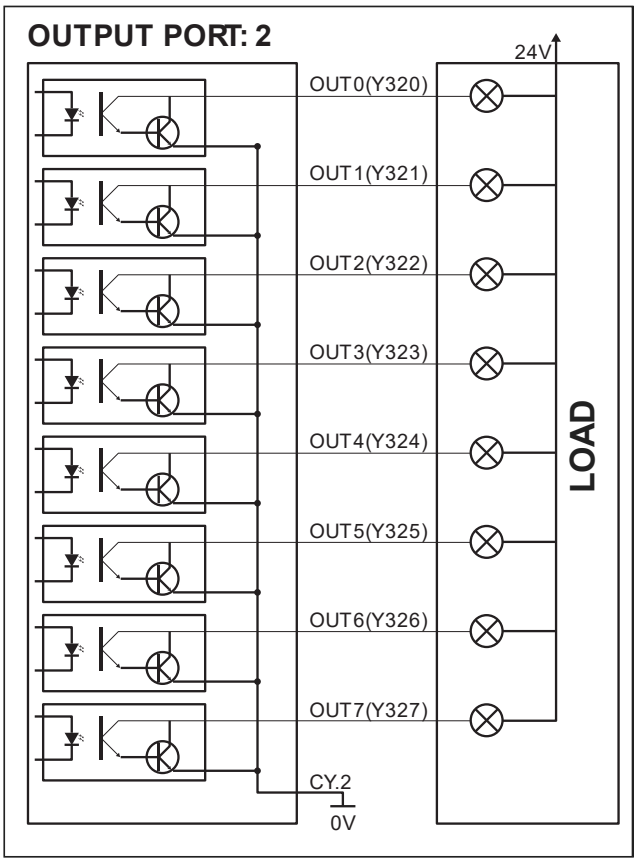


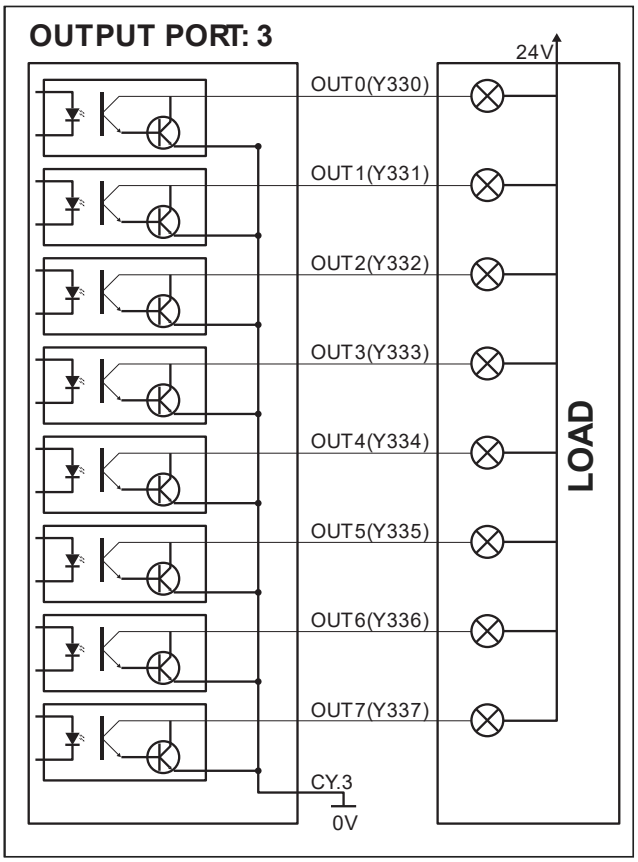


2.6.3 I/O LINK BOARD - OUTPUT PORT









Note:

- RS485/IO Link cable recommend using the cable have shield wire to against noise signals (Refer the image below)

Figure 2-24. I/O link cable using shield wire and be soldered to the controller

2.7 MPG HANDWHEEL

2.7.1 4 AXIS TYPE – DIFFERENTIAL OUTPUT SIGNAL

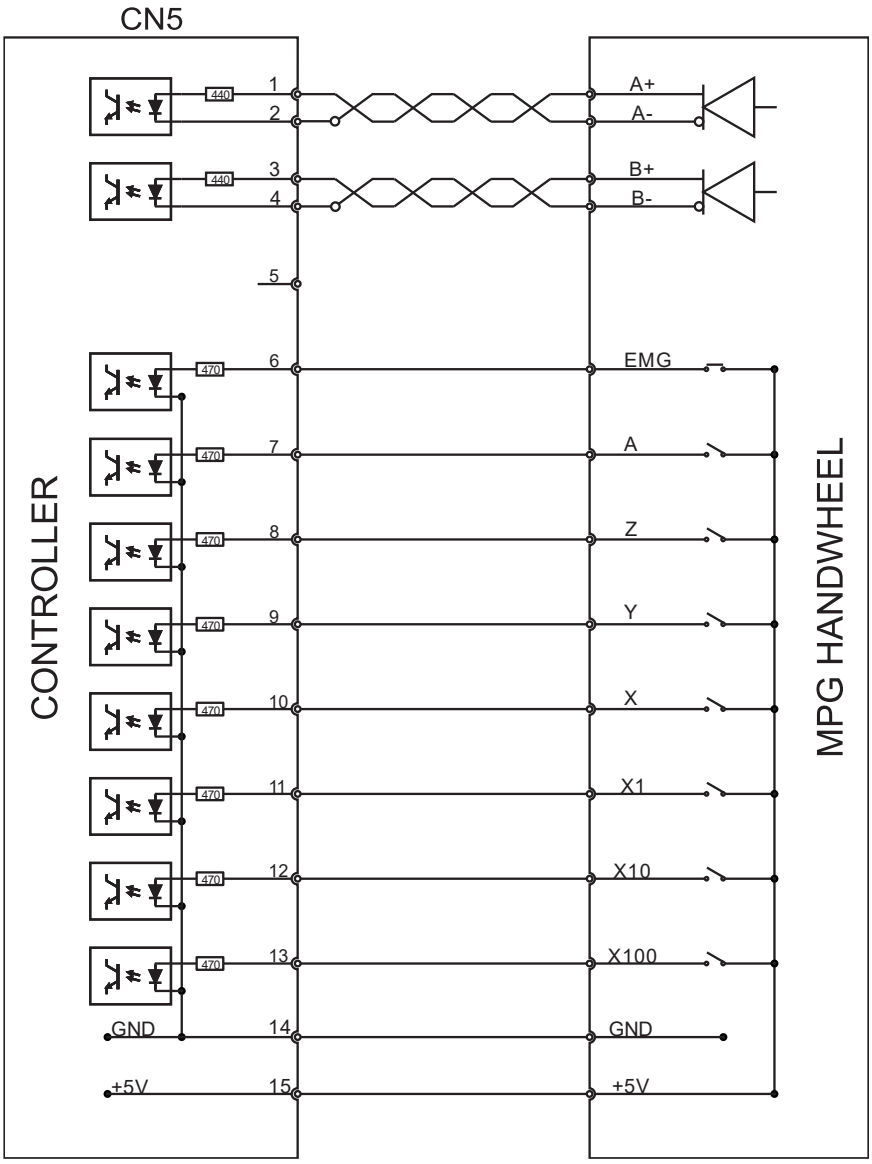


Figure 2-21. 4 axis MPG handwheel with differential output signal & EMG button

2.7.2 6 AXIS TYPE – DIFFERENTIAL OUTPUT SIGNAL

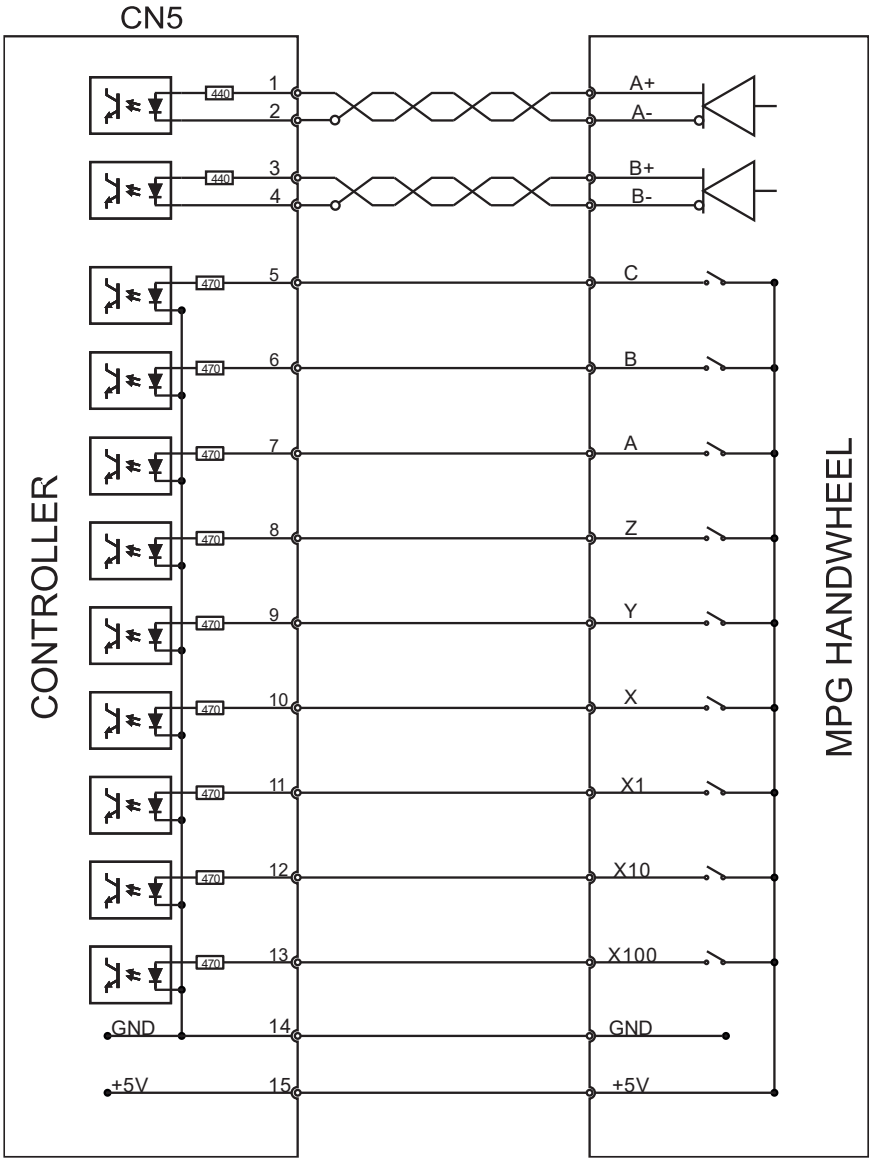


Figure 2-22. 6 axis MPG handwheel with differential output signal & EMG button

2.7.3 4 AXIS TYPE – NPN OUTPUT SIGNAL

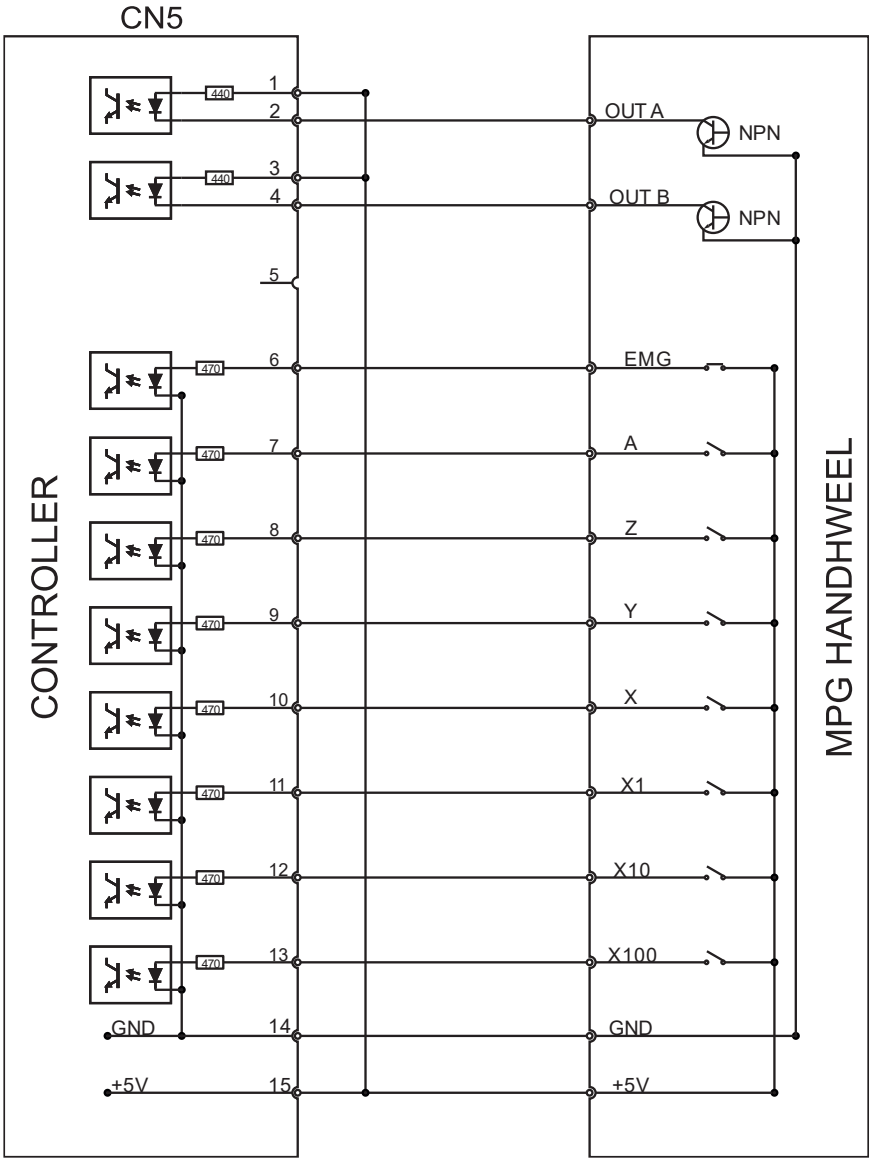


Figure 2-23. 4 axis MPG handwheel with NPN output signal

2.7.4 6 AXIS TYPE – NPN OUTPUT SIGNAL

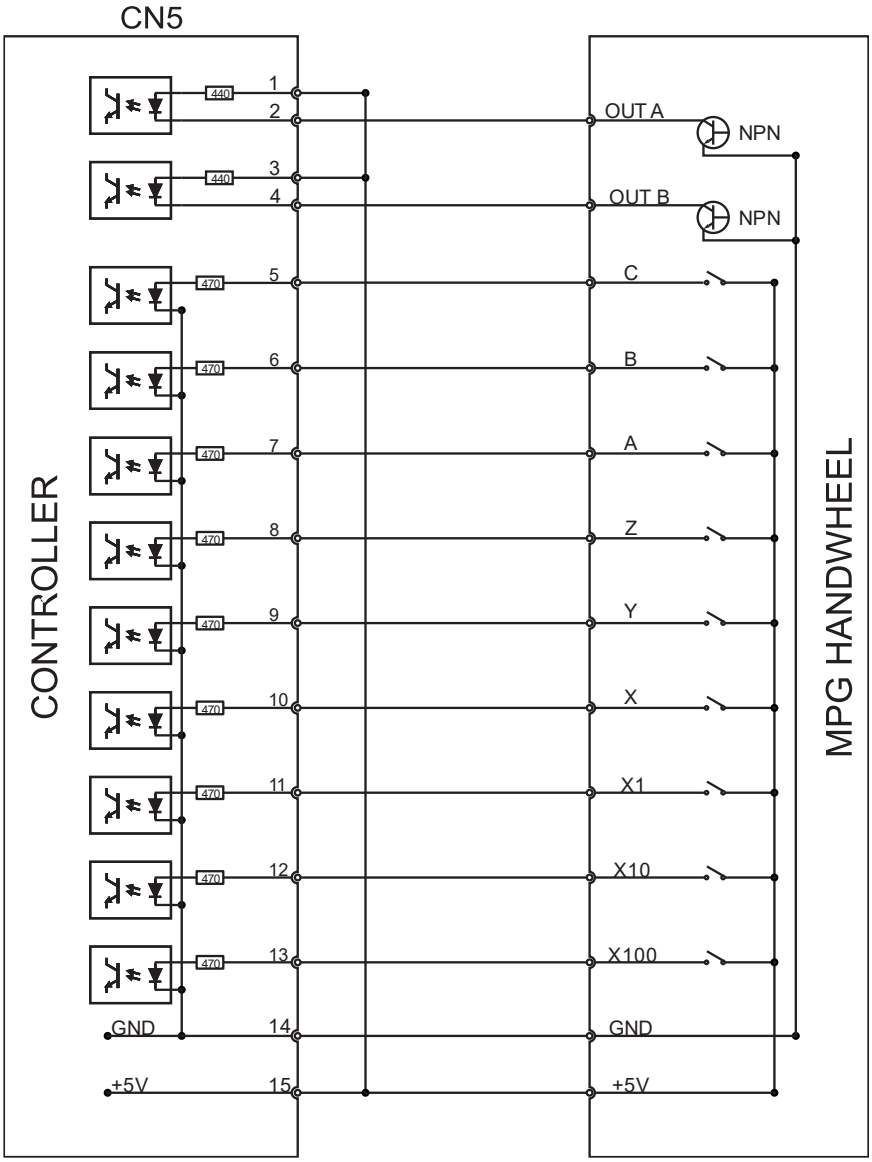


Figure 2-24. 6 axis MPG handwheel with NPN output signal

2.7.5 4 AXIS TYPE – PNP OUTPUT TYPE

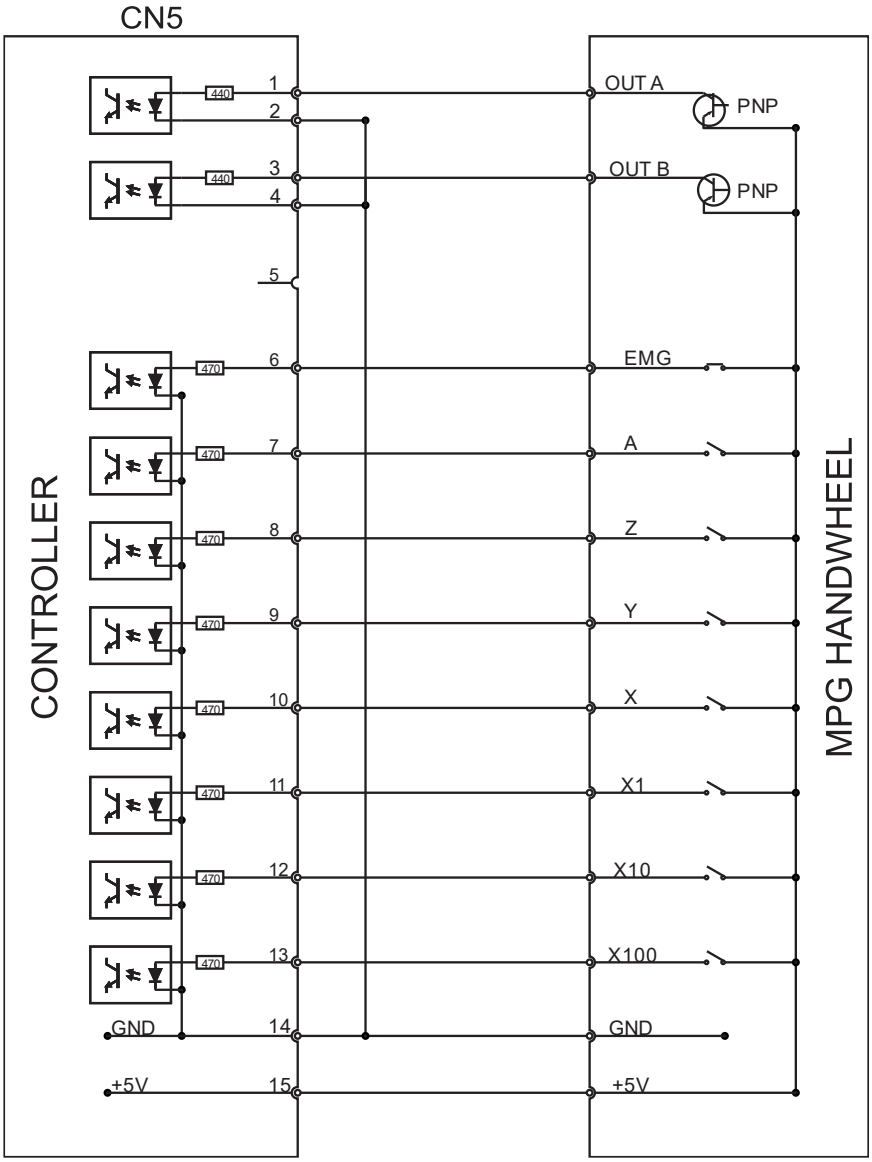


Figure 2-25. 4 axis MPG handwheel with PNP output signal

2.7.6 6 AXIS TYPE – PNP OUTPUT TYPE

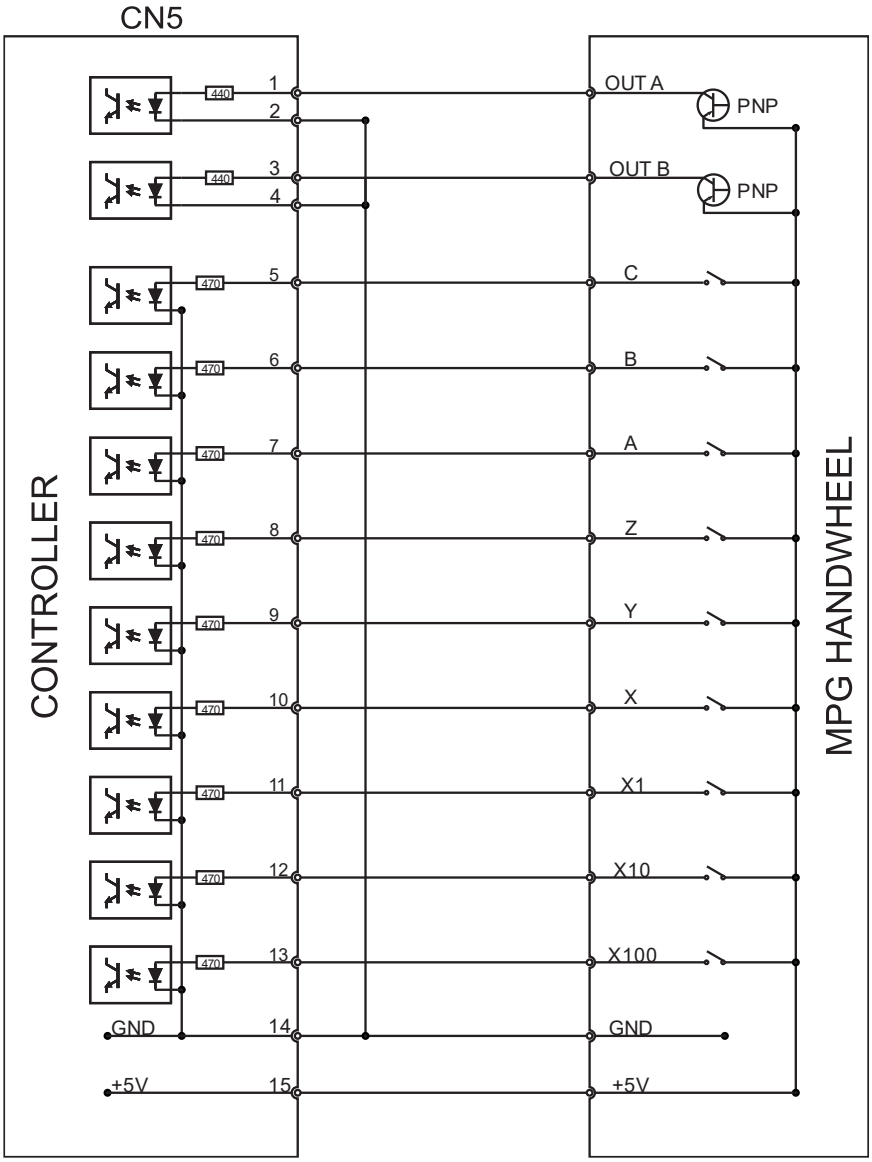


Figure 2-26. 6 axis MPG handwheel with PNP output signal

2.8 HOME SWITCH WIRING DIAGRAM

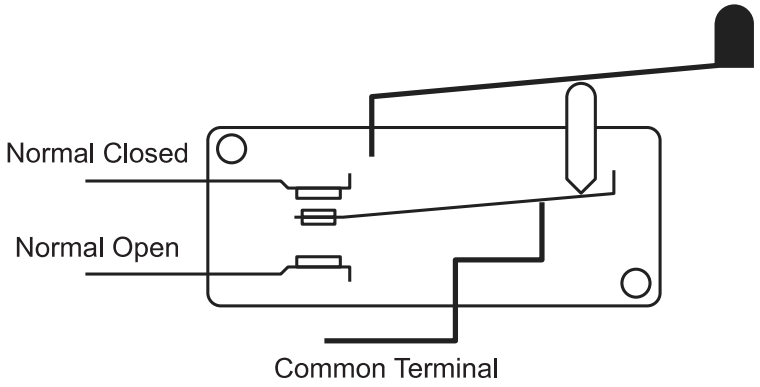


Figure 2-27. Home switch structure

2.8.1 PNP WIRING

2.8.2 NPN WIRING

QS TECHNOLOGY

2.9 REFERENCE CONNECTION PORT

2.9.1 AXIS CONTROL

DESCRIPTION	TERMINAL
X axis	PUL (1+) PUL (1-) DIR (1+) DIR (1-)
Y axis	PUL (2+) PUL (2-) DIR (2+) DIR (2-)
Z axis	PUL (3+) PUL (3-) DIR (3+) DIR (3-)
A axis	PUL (4+) PUL (4-) DIR (4+) DIR (4-)

2.9.2 INPUT SIGNAL

DESCRIPTION	TERMINAL
Home switch (X axis)	X40
Home switch (Y axis)	X41
Home switch (Z axis)	X42
Home switch (A axis)	X43
Tool length sensor	X44 (Probe signal) X45 (Probe limit)
Start button	X46
Hold button	X47
Emergency switch	X50
Alarm X driver	X51
Alarm Y driver	X52
Alarm Z driver	X53
Alarm A driver	X54
Spindle alarm	X55
Coolant alarm	X56
Empty Input	X57

2.9.3 OUTPUT SIGNAL

DESCRIPTION	TERMINAL
Servo-ON	Y40
Spindle forward	Y41
Coolant-ON	Y42
Air pressure	Y43
Indicator light	Y44
Alarm light	Y45

2.9.4 OTHER DEVICES

DESCRIPTION	TERMINAL
Power supply	CN1
Inverter	CN2
I/O link board Communication	CN4
MPG handwheel	CN3

QS TECHNOLOGY

CHAPTER 3.

OPERATION INTERFACE

QS TECHNOLOGY

3.1 MAIN PAGE

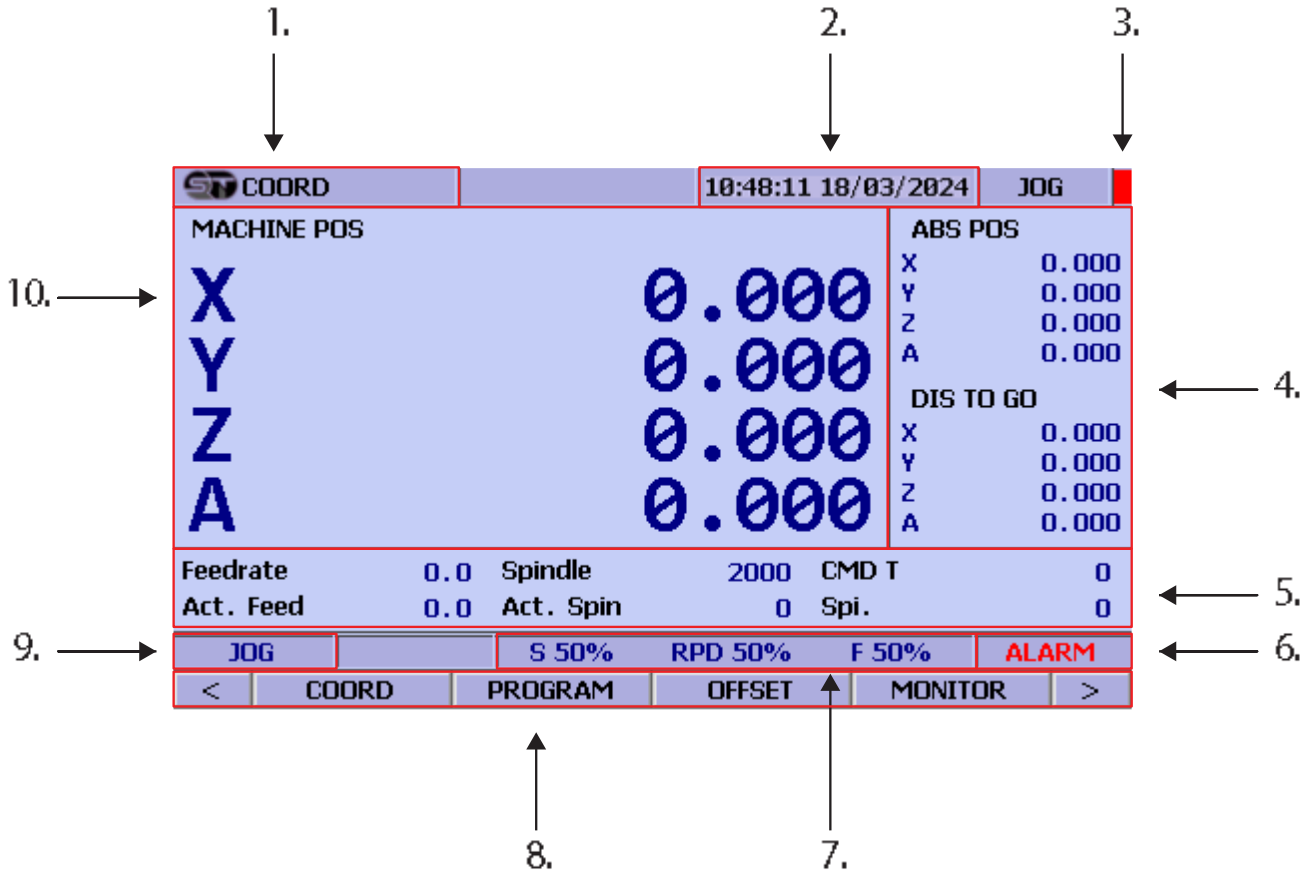


Figure 3-1. F54 controller main screen

MODEL	F54
1	Screen name
2	Date & Time information
3	Status light
4	Absolute coordinate system and Distance to go
5	Feedrate, Spindle speed in program and in actual, current tool in spindle
6	Status (Alarm/Busy/Warning)
7	Spindle, Rapid, Feedrate speed percent
8	Functions bar
9	Operation mode
10	Machine coordinates system

Note:

- **Distance to go:** The remaining distance that the machine needs to move to complete a command or machining program.
- **Absolute coordinate system:** It is a coordinate system used to determine the position of the cutting tool based on a fixed reference point.

3.2 COORDINATE PAGE

On the coordinate page, the users can view and get the information of machine and coordinate systems. Including: Absolute coordinate systems, Relative coordinate systems and Distance to go values.

Coordinate features:

- **Switch screen:** Switching coordinate system display screen
- **Half:** Divide the Specified axis in relative coordinate system by 2
- **Zero:** Return the Specified axis to 0 position in relative coordinate system
- **Zero all:** Return all axis to 0 position in relative coordinate system

Model: F54 controller

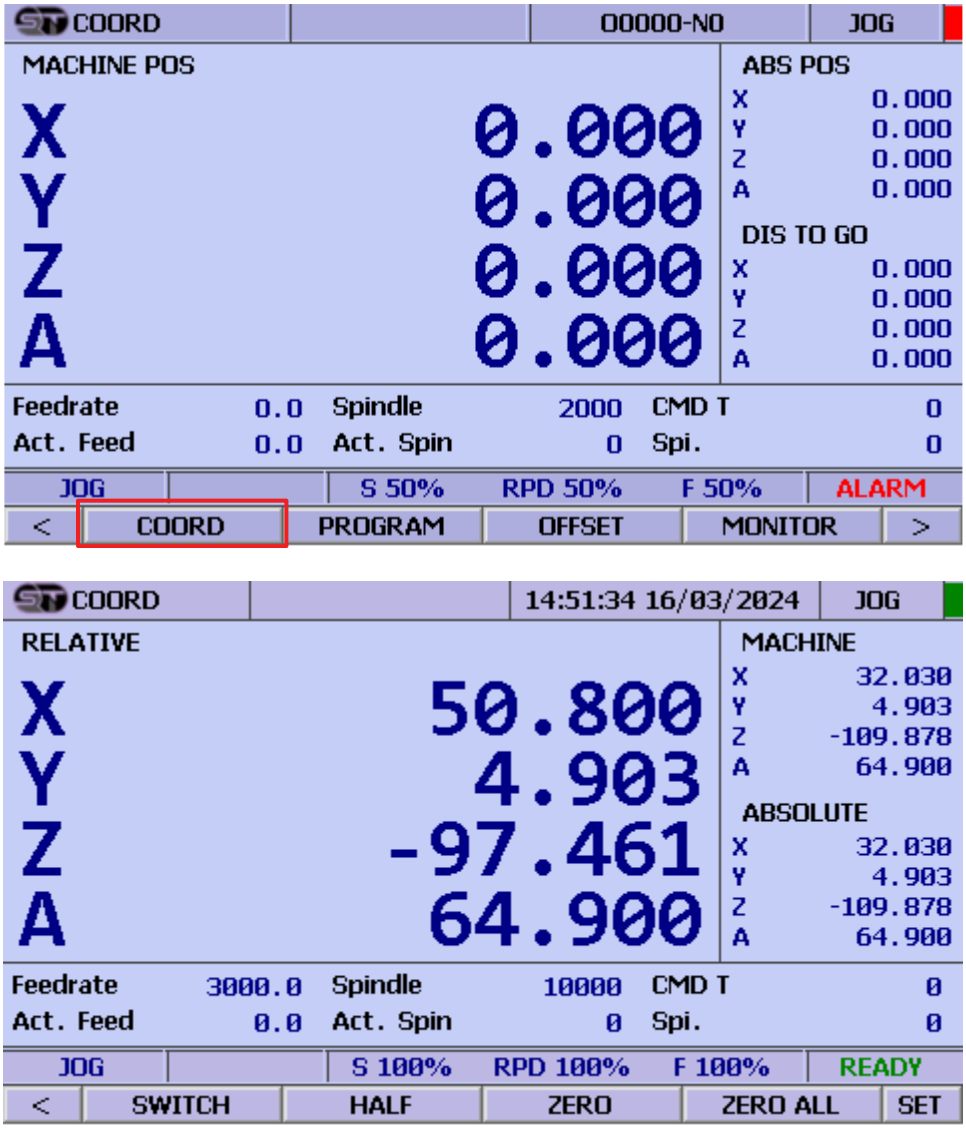
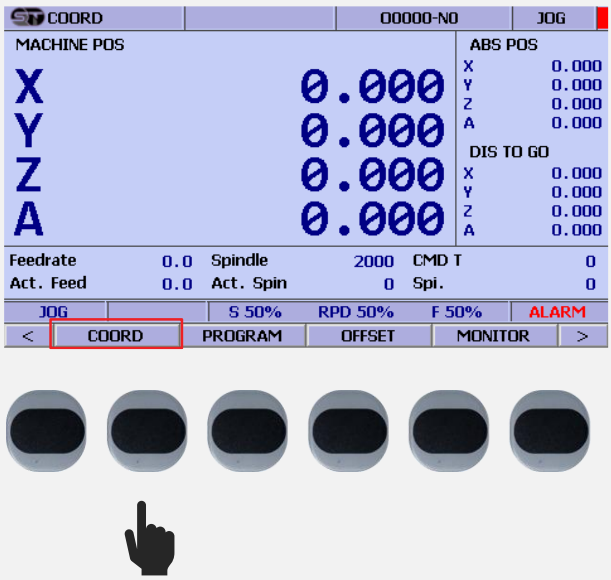
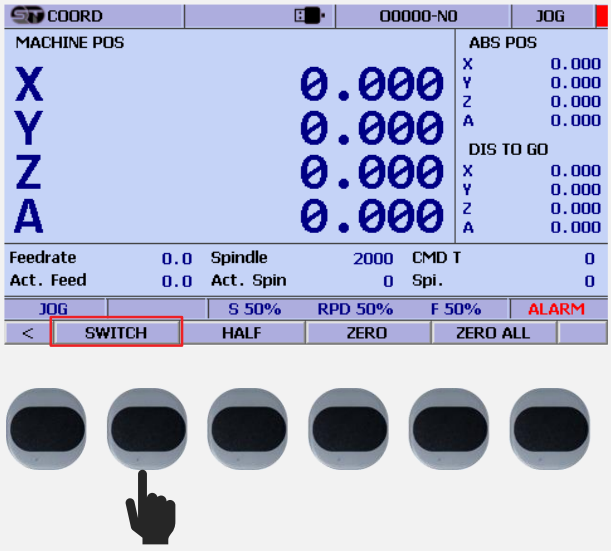


Figure 3-2. Coordinate page

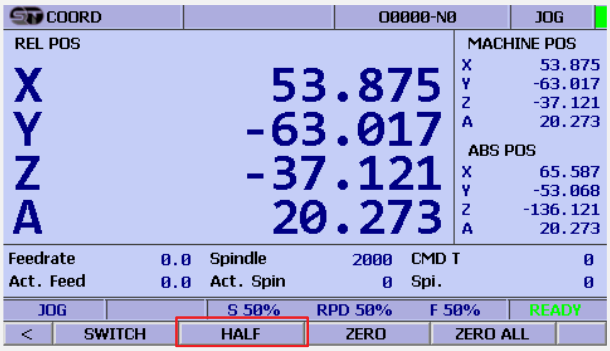
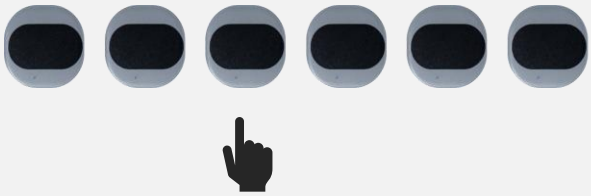
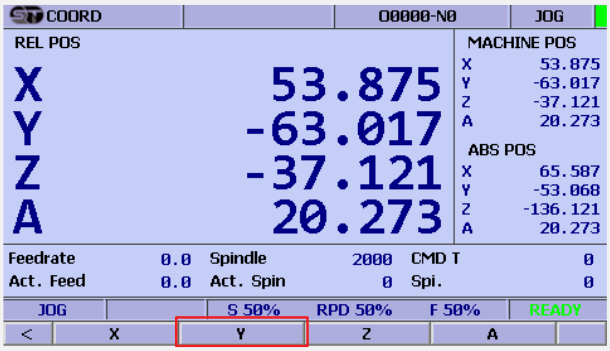
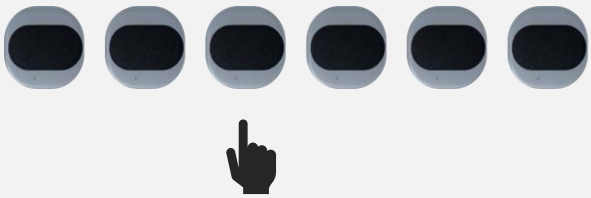
Coordinate page instruction parts:

- Switching display coordinate systems **(3.2.1)**
- Divide the coordinate of Specified axis in relative position by 2 **(3.2.2)**
- Returns Specified axis in relative position to 0 position **(3.2.3)**

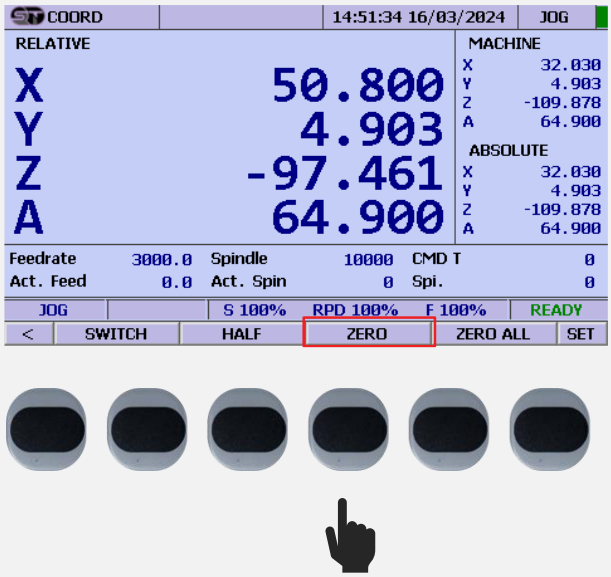
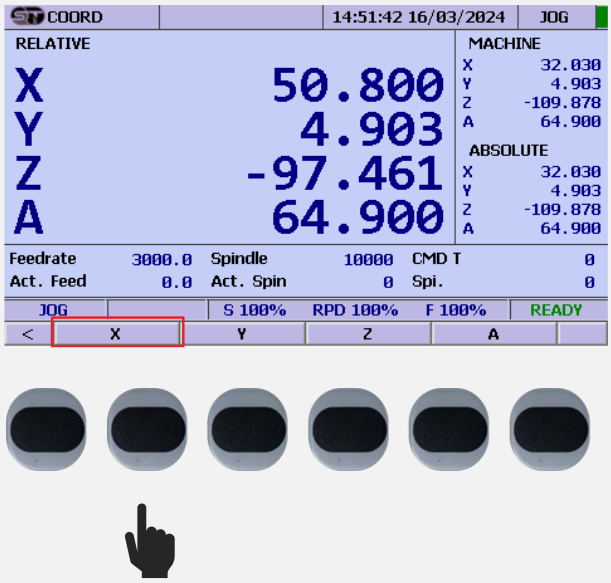
3.2.1 SWITCH SCREEN

Description Images Model: F54	Memo Model: F54
 	**Step 1:** From the main screen, select COORD button.
 	**Step 2:** Press SWITCH button. **Note:** Coordinate systems arrangement: Machine→Absolute→DIS→Relative

3.2.2 HALF

Description Images Model: F54	Memo Model: F54
 	**Step 1:** Press HALF button.
 	**Step 2:** Select the axis you want to divide the coordinate by 2 in relative coordinate system.

3.2.3 ZERO-ZERO ALL

Description Images Model: F54	Memo Model: F54
 	**Step 1:** Press ZERO button.
 	**Step 2:** Select axis you want to return to 0 position.

3.3 PROGRAM PAGE

On this page allows the users to store, edit and execute program

Program features:

- **Execute:** Execute program
- **New file:** Create a new file
- **Open file:** Open a file
- **Go to line:** Go to Specified line of program
- **Search:** Search for an object in program
- **Replace:** Replace an existing object with another object
- **Delete line:** Clear code line
- **Copy from:** Select object at current location to duplicate
- **Copy to:** Specified the location where to paste file
- **Paste:** confirm and duplicate the file

Model: F54 controller

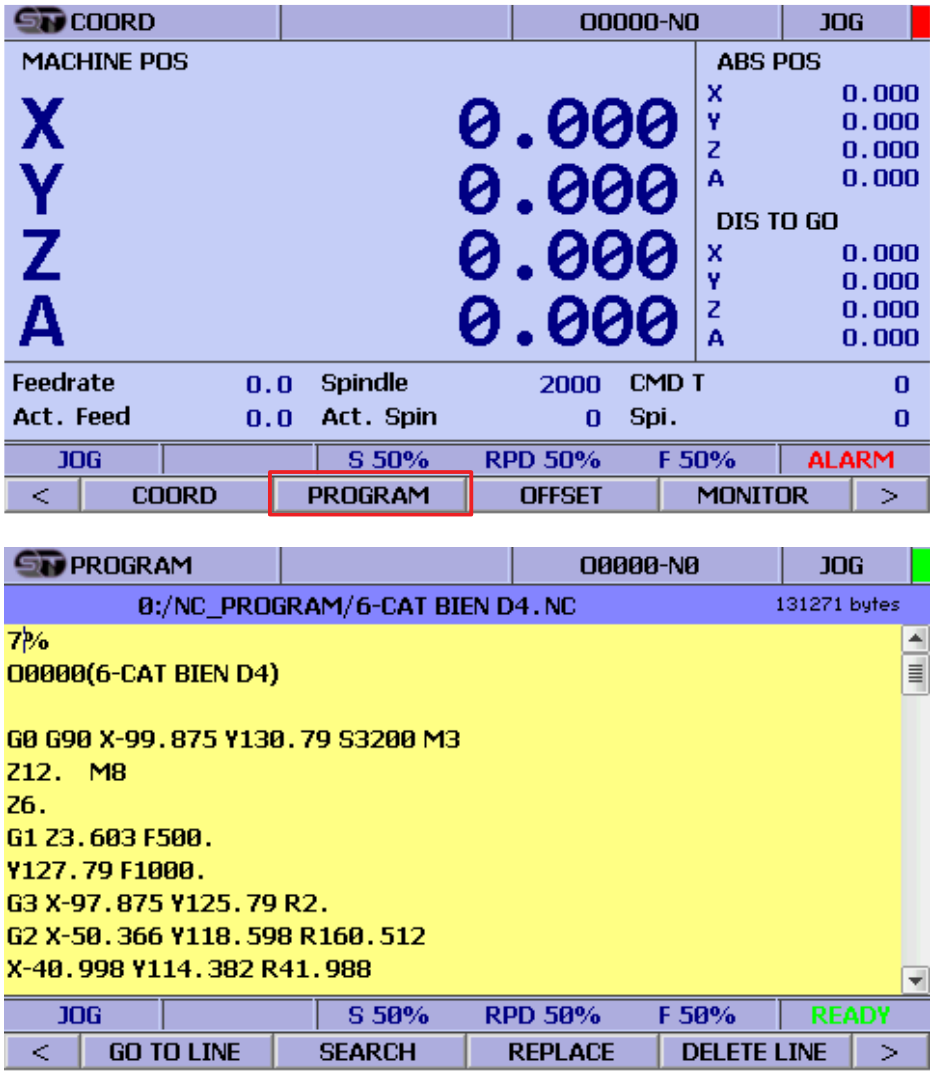
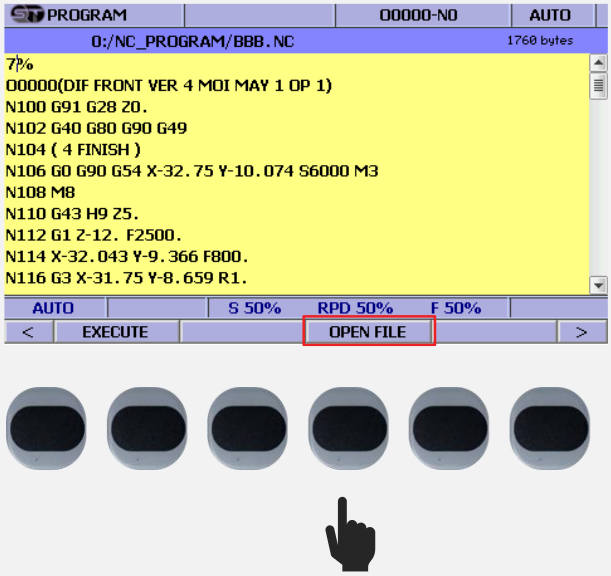
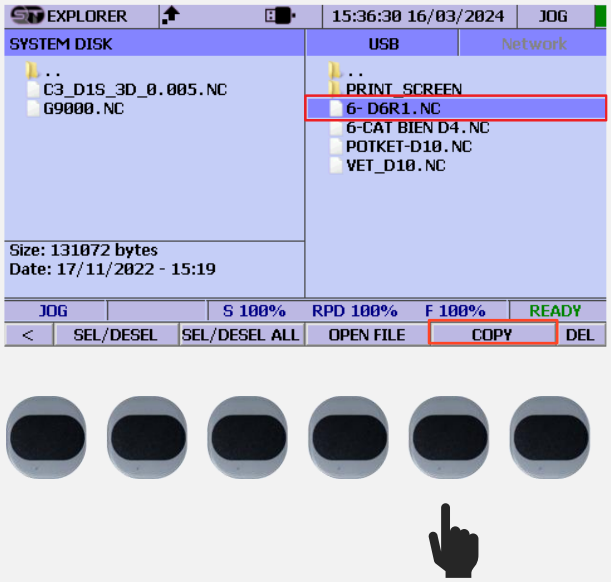


Figure 3-3. Program page

Program page instruction parts:

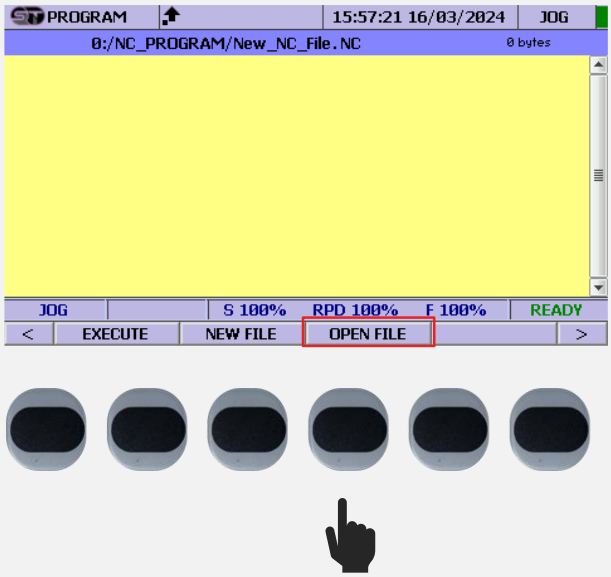
- Copy data from USB to controller **(3.3.1)**
- Execute program **(3.3.2)**
- Go to any command line **(3.3.3)**
- Search for an object in program-replace object **(3.3.4)**
- Delete a command line **(3.3.5)**
- Copy and paste **(3.3.6)**

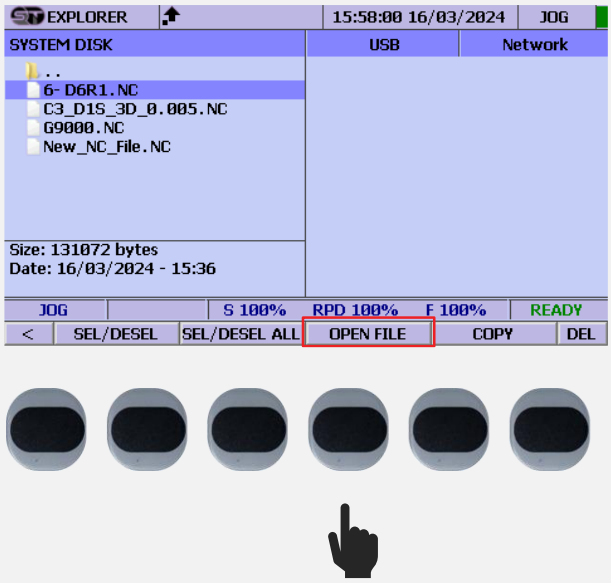
3.3.1 COPY DATA FROM USB TO CONTROLLER

Description Images Model: F54	**Memo** Model: F54
	**Step 1:** Go to program screen and press OPEN FILE button.
	**Step 2:** Plugin USB drive to controller, then select program and press COPY button.

3.3.2 EXECUTE PROGRAM

Description Images
Model: F54





Memo
Model: F54

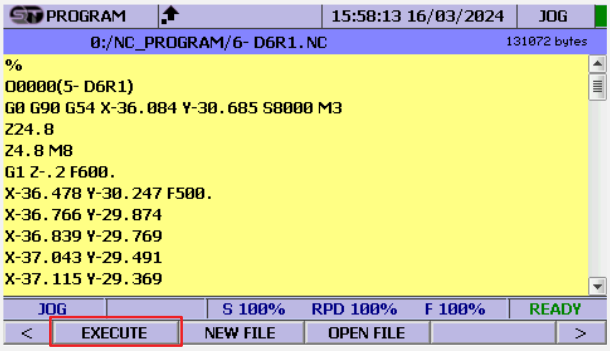
Step 1:

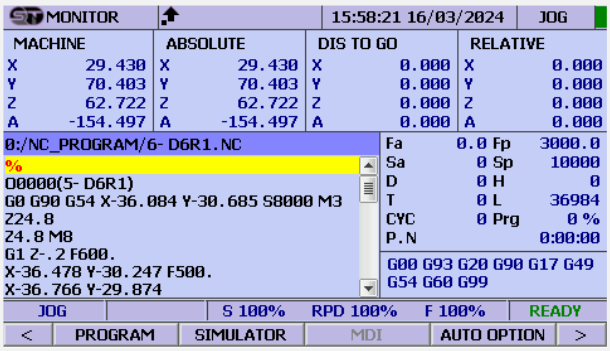
Go to program screen and press OPEN FILE button.

Step 2:

Select program and press OPEN FILE button.

Description Images
Model: F54





Memo
Model: F54

Step 3:

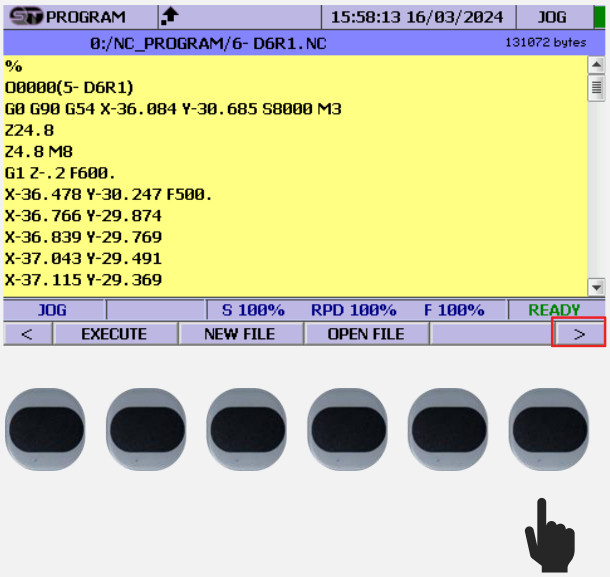
Press EXCECUTE button.

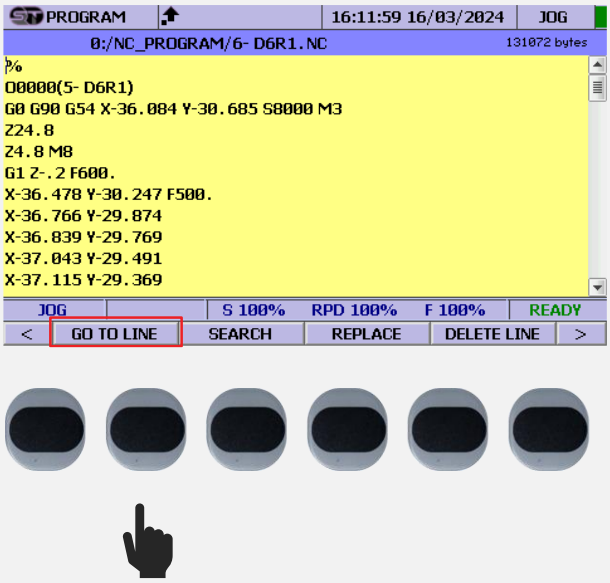
Step 4:

Check program after executed.

3.3.3 GO TO ANY COMMAND LINE

Description Images
Model: F54





Memo
Model: F54

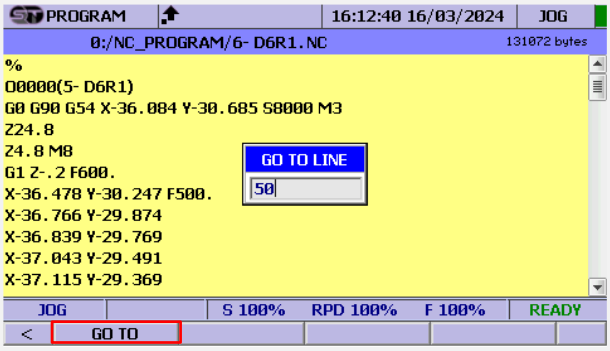
Step 1:

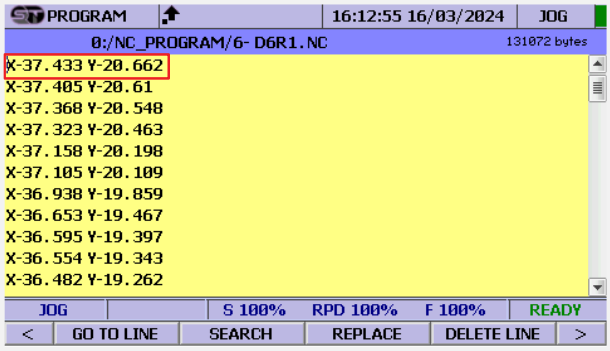
Press the arrow button on the left to change to next page.

Step 2:

Press GO TO LINE button.

Description Images
Model: F54





Memo
Model: F54

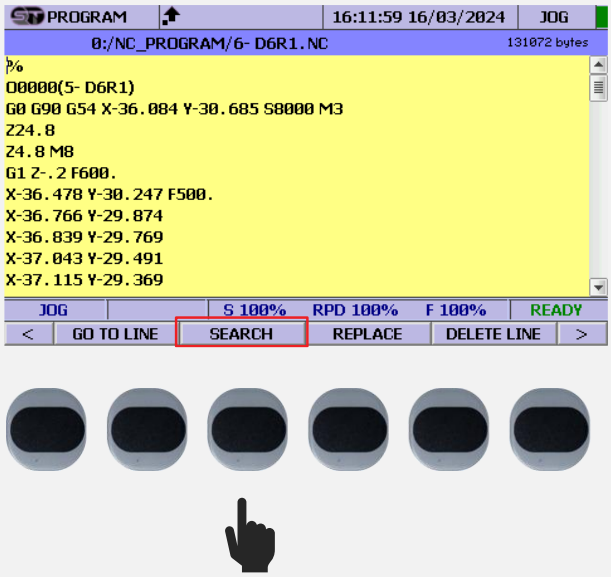
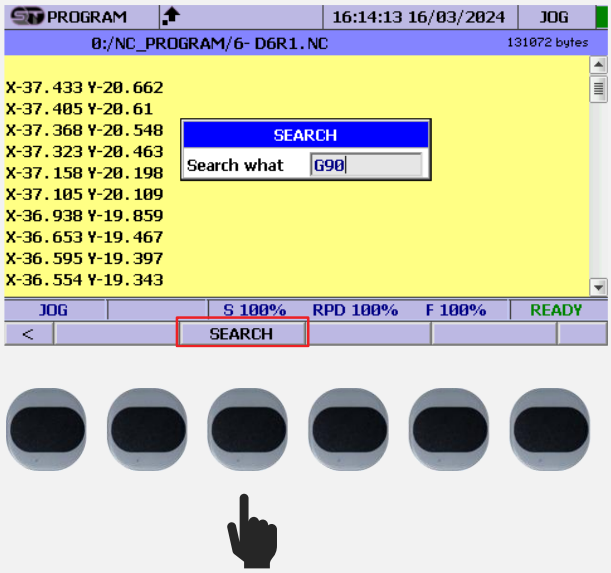
Step 3:

Enter line number you want to go to and press GO TO button.

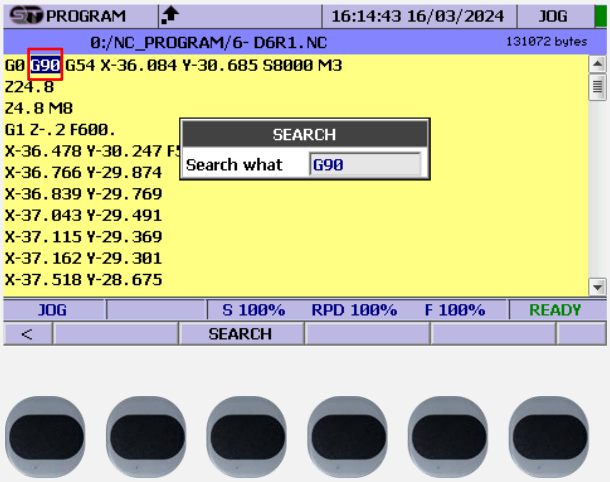
Step 4:

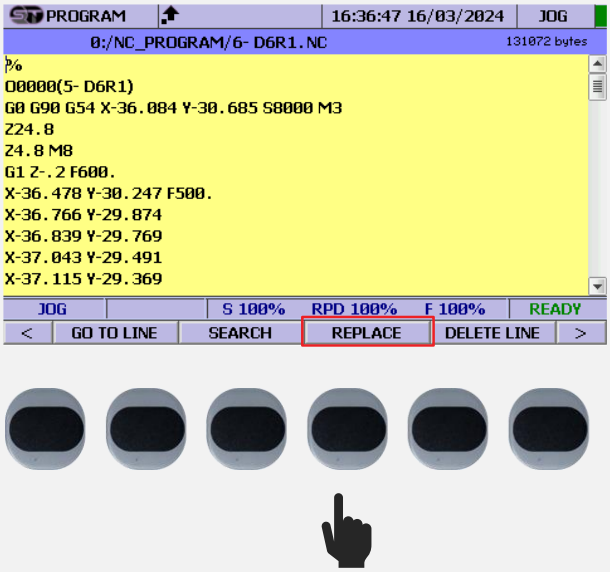
The controller will automatically jump to that command line.

3.3.4 SEARCH FOR AN OBJECT IN PROGRAM AND REPLACE

Description Images Model: F54	Memo Model: F54
	**Step 1:** Press SEARCH button.
	**Step 2:** Enter object name and press SEARCH button.

Description Images
Model: F54





Memo
Model: F54

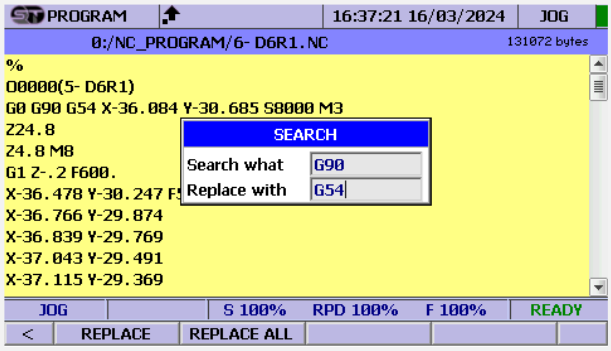
Step 3:

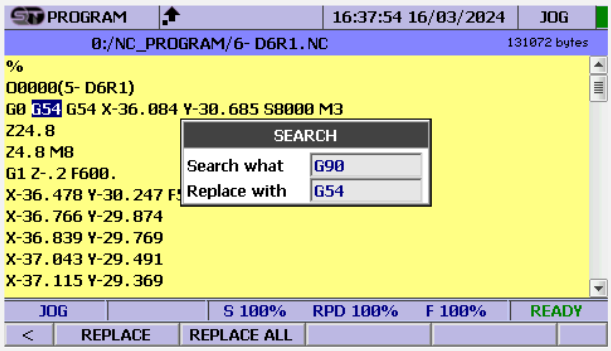
If the object or value is existing in program. The controller will find and give the result.

Step 4 (Find & Replace):

Press REPLACE button.

Description Images
Model: F54





Memo
Model: F54

Step 5:

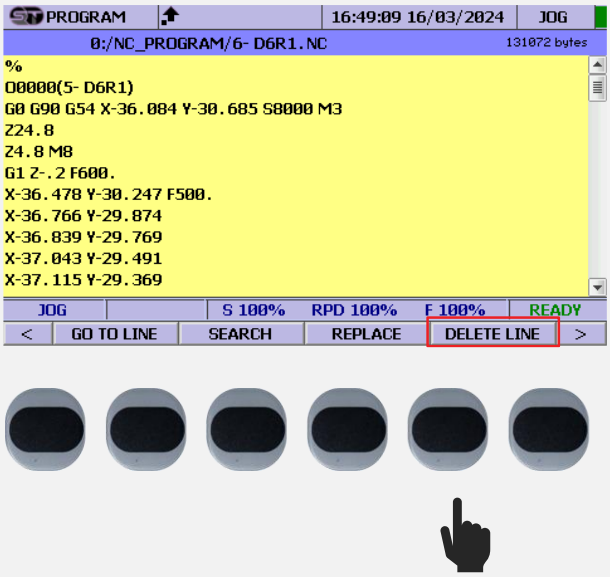
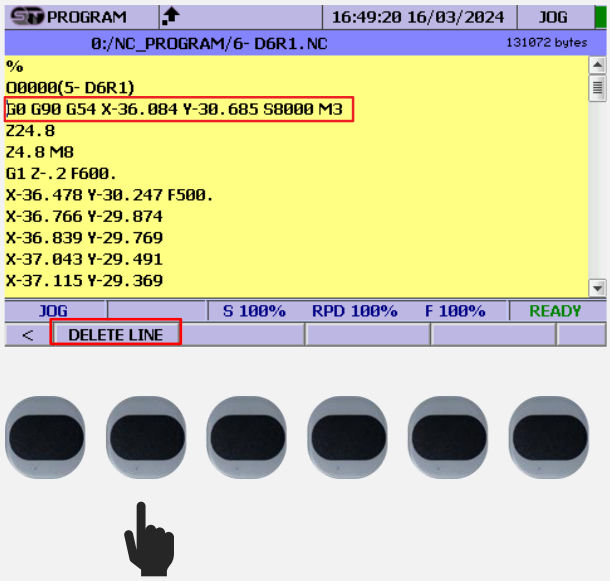
Enter the object name you want to replace, enter the replacement object and press REPLACE or REPLACE ALL.

Note:

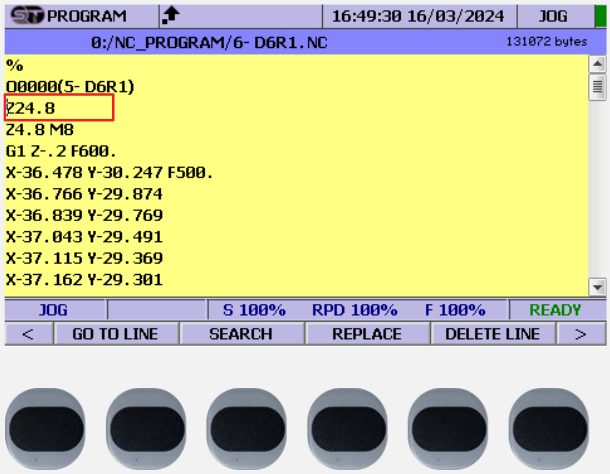
REPLACE: Replace only for one object

REALCE ALL: Replace all object

3.3.5 DELETE A COMMAND LINE

Description Images Model: F54	Memo Model: F54
 	**Step 1:** Press DELETE LINE button.
 	**Step 2:** Select command line you want to delete and press DELETE LINE button.

Description Images
Model: F54

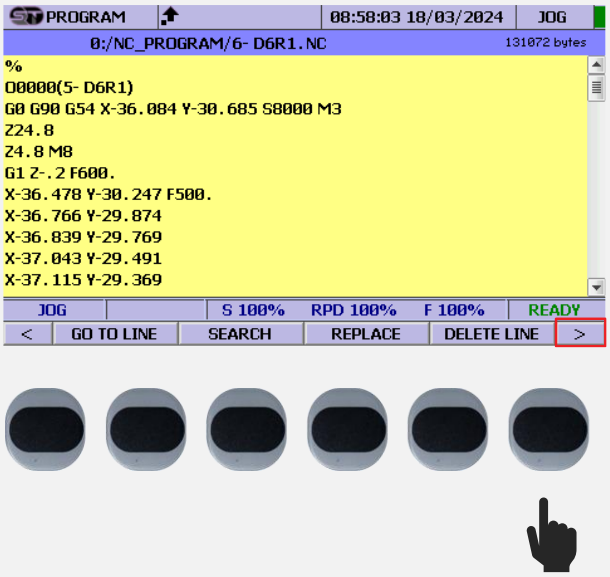
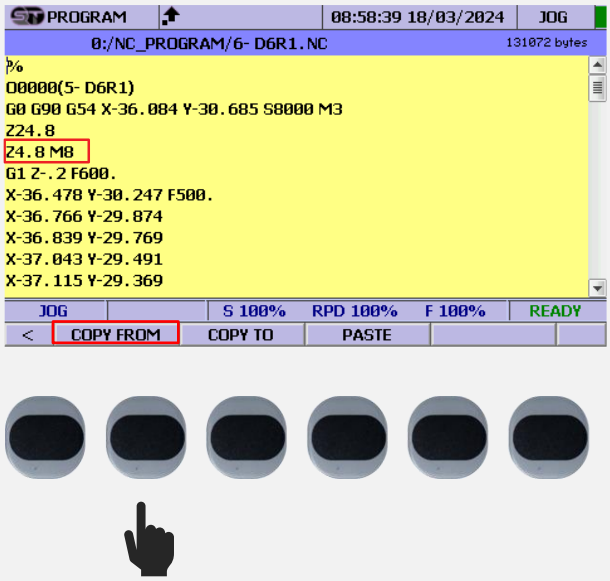


Memo
Model: F54

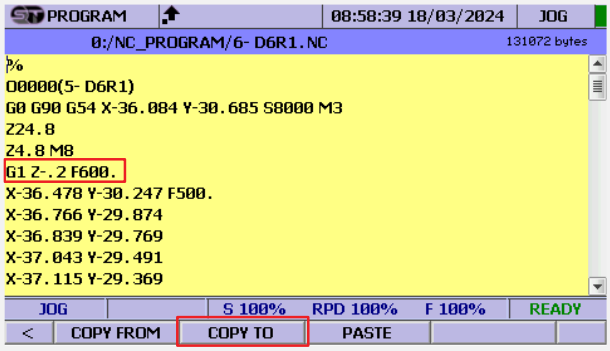
Step 3:

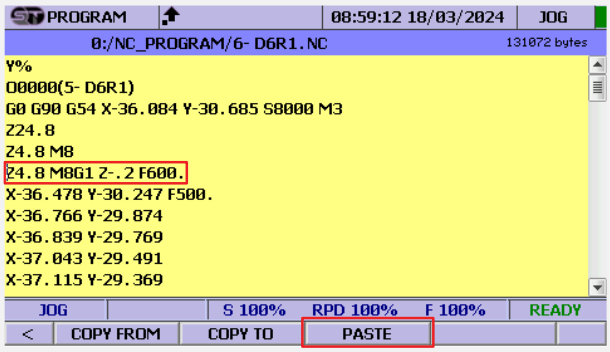
Check the command line after being deleted.

3.3.6 COPY AND PASTE

Description Images Model: F54	Memo Model: F54
	**Step 1:** Press the arrow button on the left to change to next page.
	**Step 2:** Select command line you want to copy and press COPY FROM button.

Description Images
Model: F54





Memo
Model: F54

Step 3:

Select where you want to paste and press COPY TO button.

Step 4:

Press PASTE button.

3.4 OFFSET PAGE

Here is the place for the users establish working values of workpiece as well as the height and diameter of cutting tool.

QS Controllers provide users with 6 coordinate system, including: G54, G55, G57, G58, G59 and 18 extended workpiece coordinate system from G59.1 (G54P7) to G59.12 (G54P18).

Offset features:

- **Work set:** Establish workpiece values
- **Tool set:** Establish the height, diameter of cutting tool
- **Tool NO:** Display table of the current tool in tool magazine
- **Apply AUX:** Assign the coordinate was being calculated in middle function to specified coordinate system
- **Apply MACH:** Assign the machine coordinates to specified coordinate system
- **Middle function:** Calculate the coordinate of the center point by 4 points of rectangle workpiece and 3 points of circle workpiece.

Model: F54 controller

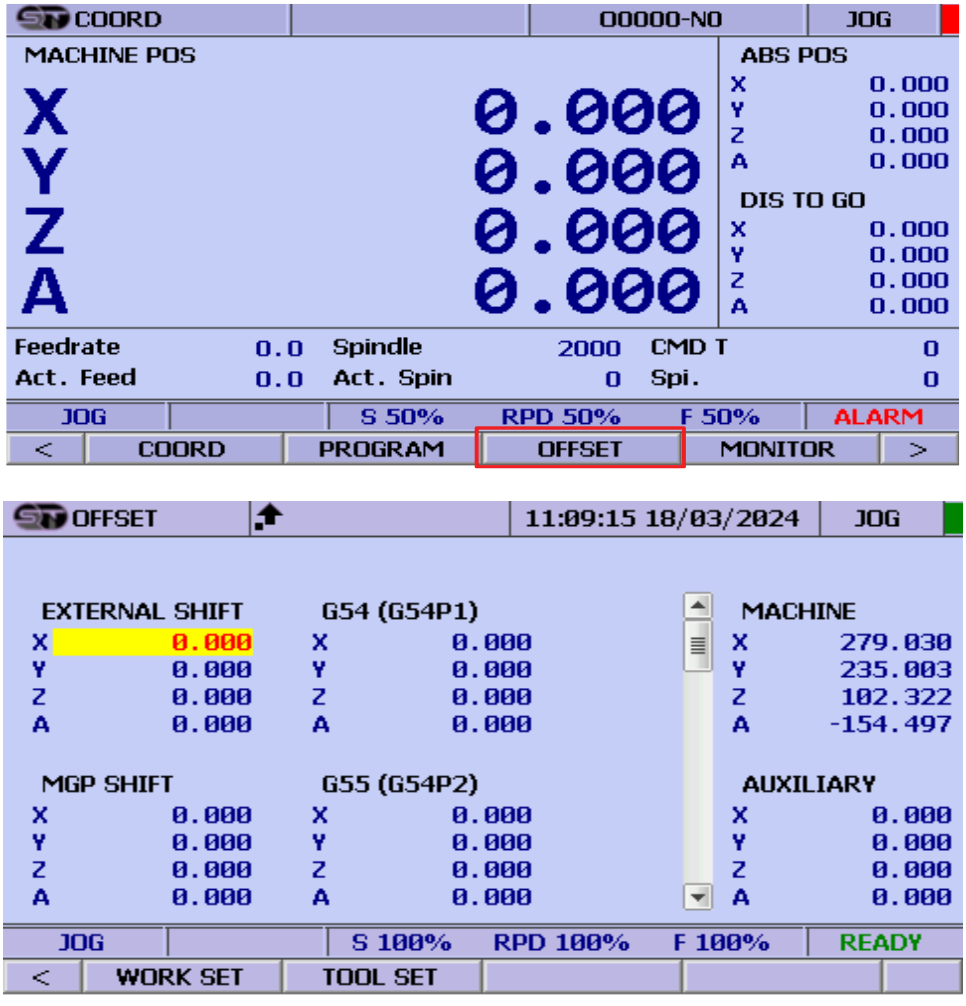
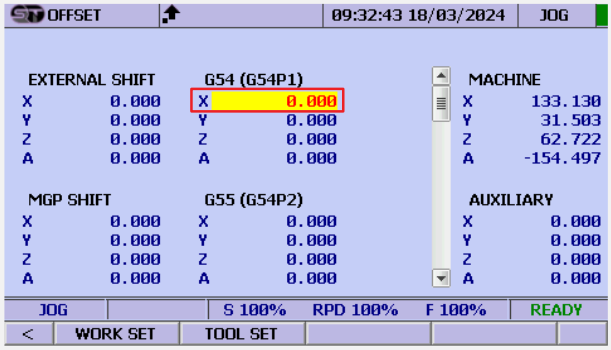
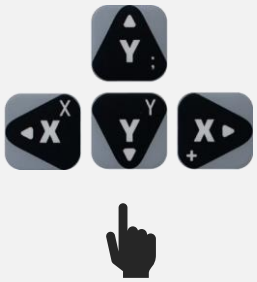
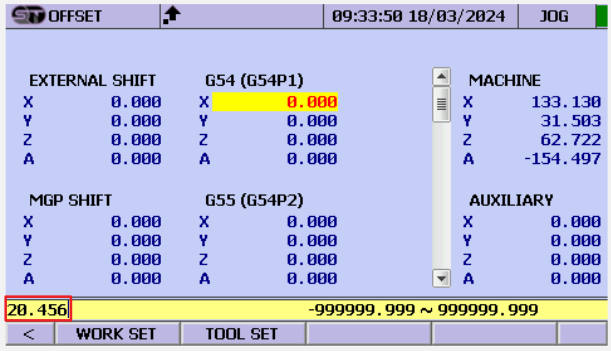


Figure 3-4. Offset page

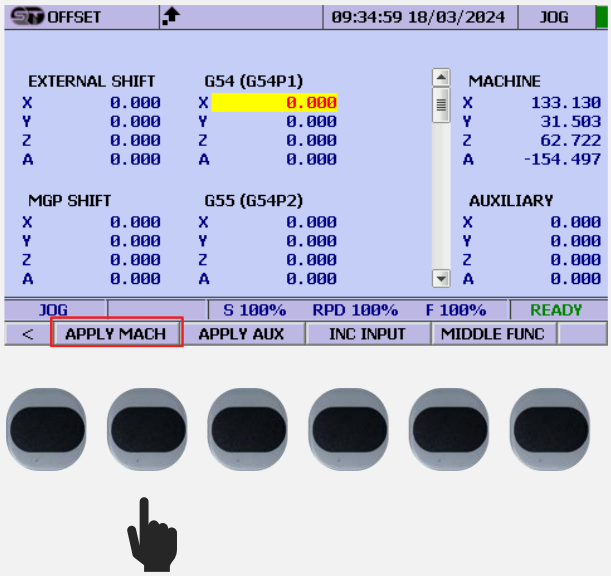
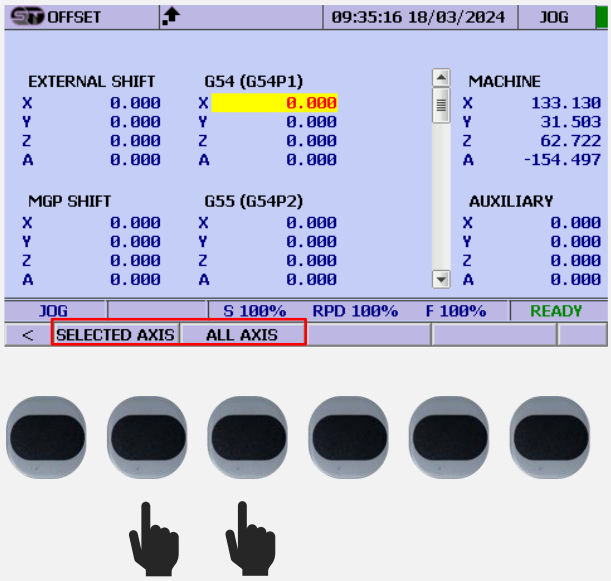
Offset page instruction parts:

- Manual data input **(3.4.1)**
- Assign machine, auxiliary coordinates to specified coordinate system **(3.4.2)**
- Quickly get the center points of 4 points workpiece and 3 points workpiece **(3.4.3)**
- Tool set **(3.4.4)**

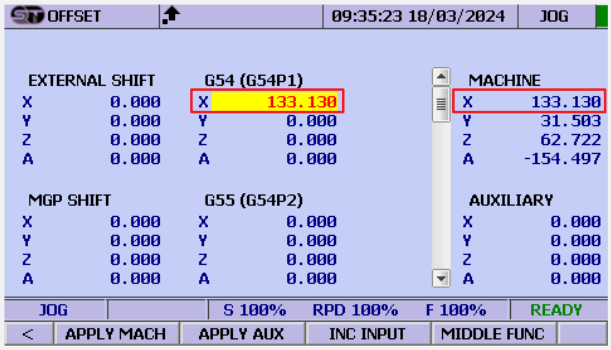
3.4.1 MANUAL DATA INPUT

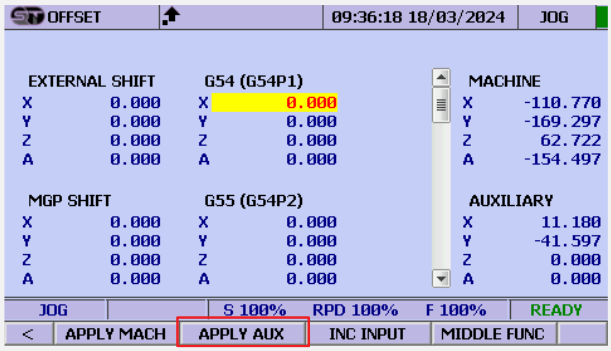
Description Images Model: F54	**Memo** Model: F54
   	**Step 1:** Select the coordinate system(G54) by press the arrow buttons on control panel. **Step 2:** Enter values to the axis and press ENTER button to confirm.

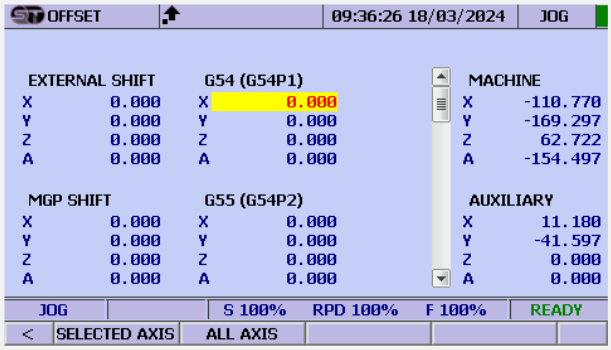
3.4.2 ASSIGN MACHINE, AUXILIARY COORDINATES TO SPECIFIED COORDINATE SYSTEM

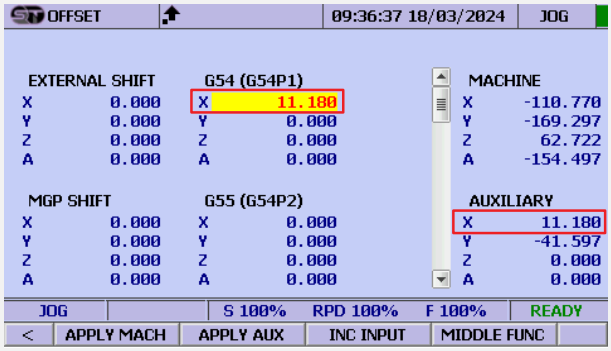
Description Images Model: F54	Memo Model: F54
 	**Step 1:** Select the axis and press APPLY MACH button.
 	**Step 2:** SELECTED AXIS: Assign the coordinate of the corresponding axis to specified axis. ALL AXIS: Assign all the machine coordinates to the specified coordinate system.

Description Images
Model: F54









Memo
Model: F54

Step 3:

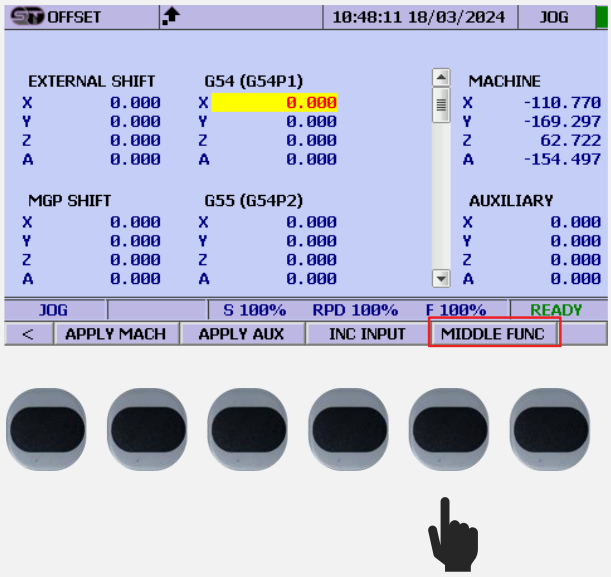
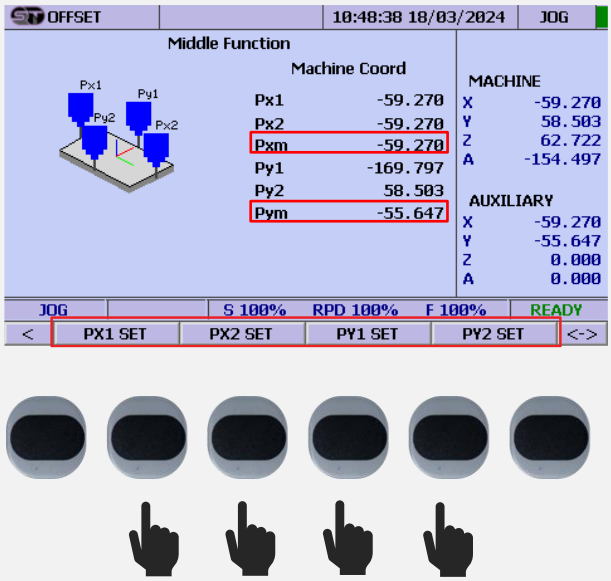
Check the coordinate after being assigned.

Note:

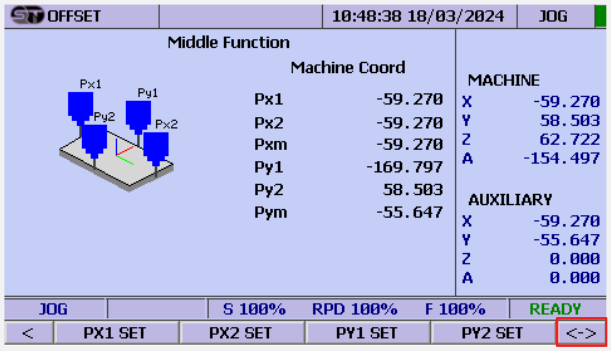
Make the same steps above when assigning auxiliary coordinate (APPLY AUX). Select APPLY AUX instead APPLY MACH

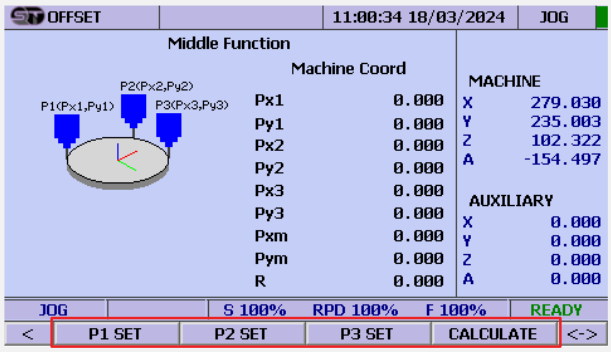
AUX coordinate will be calculated in MIDDLE FUNCTION, refer at **(3.4.3)** below

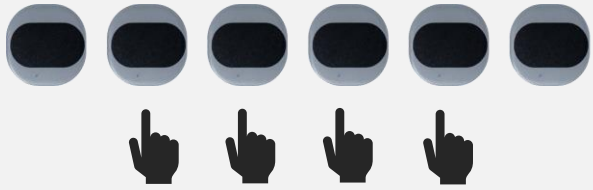
3.4.3 CALCULATE THE CENTER POINT OF WORKPIECE

Description Images Model: F54	Memo Model: F54
	**Four-point workpiece** **Step 1:** Press MIDDLE FUNCTION button.
	**Step 2:** Move to reach 4 edges (Px1,Px2,Py1,Py2). Then establish the position values of the workpiece base on the description image. When you complete the coordinate of the center point will be calculated and displayed at PXM, PYM and Auxiliary coordinate

Description Images
Model: F54







Memo
Model: F54

Three-point workpiece

Step 1:

Press the arrow button on the left to move to next page.

Step 2:

Move to reach 3 points of circle workpiece (P1,P2,P3). Then establish the position values base on the description image. When you complete. Press CALCULATE button. The coordinate of the center point will be displayed at (PXM,PYM,R), R is the radius of workpiece.

3.5 MONITOR PAGE

At the monitor screen, the users can easy get the information, coordinate systems of machine such as: Program name, Operation mode, federate, spindle speed percent....

Monitor features:

- **Program:** quick access to system disk
- **Simulator:** simulate the working program
- **MDI:** manual data input
- **Auto Option:** safety feature
    - Allow to run form any command line in program
    - Continue the working process from the last command line if the machine was suddenly stopped before
    - Automatically create a secondary program to activate all necessary G-code before jumping to the last command that was stopped

Model: F54 controller

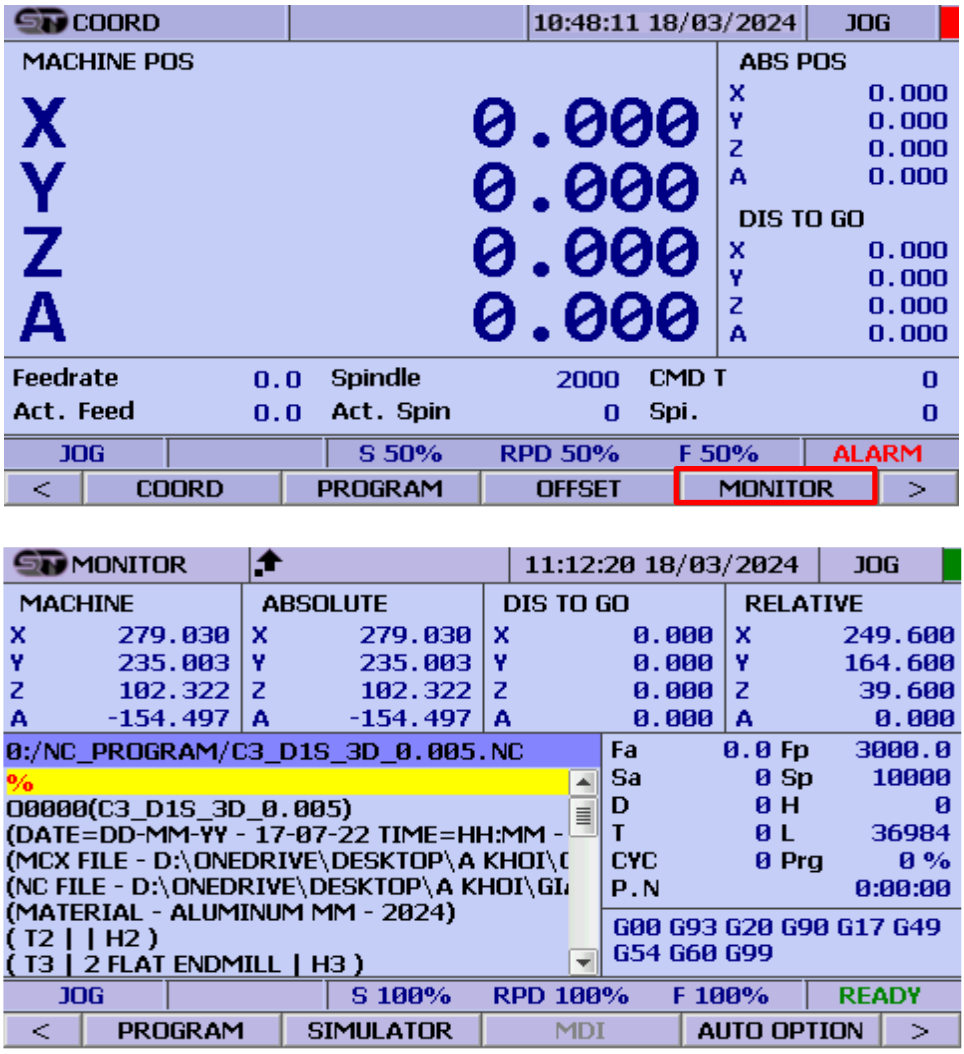
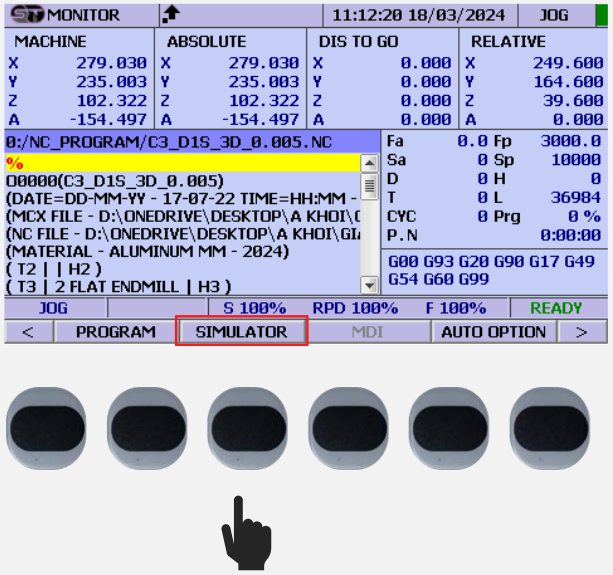
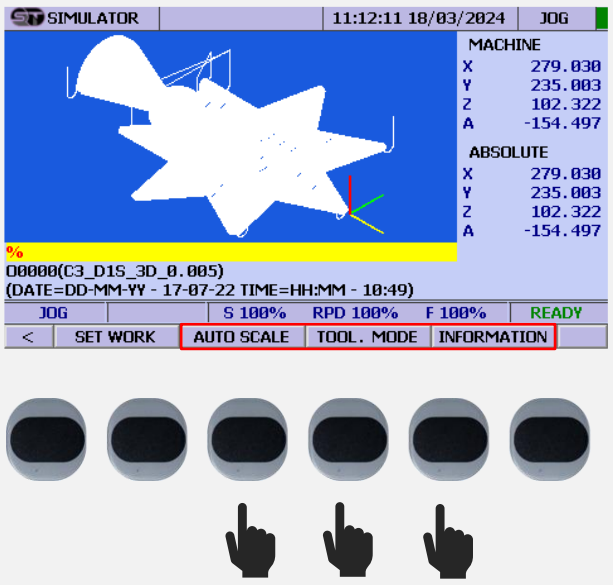


Figure 3-5. Monitor page

Monitor instruction parts:

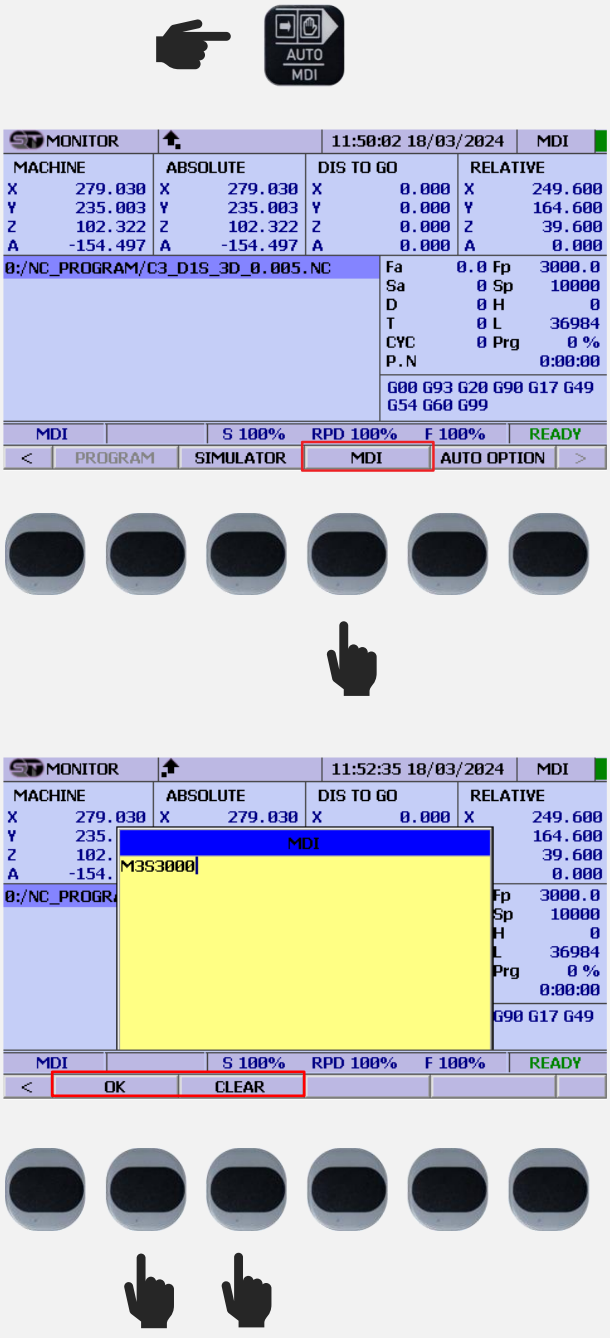
- Toolpath simulation **(3.5.1)**
- MDI mode **(3.5.2)**
- Auto features **(3.5.3)**
    - Start program from any command line **(3.5.3.1)**
    - Continue the working process from the last stopped command **(3.5.3.2)**
- Working history **(3.5.4)**

3.5.1 TOOLPATH SIMULATION

Description Images Model: F54	**Memo** Model: F54
	**Step 1:** After executed the program, at the monitor screen. Press SIMULATOR button.
	**Step 2:** Waiting for the simulation process. AUTO SCALE: scale the shape fit to screen TOOL MODE: simulate the program by many view mode such as: Milling, Engraving 2D – Milling, Engraving 3D. INFORMATION: The maximum and minimum travel of workpiece

3.5.2 MDI MODE

Description Images
Model: F54



Memo
Model: F54

Step 1:

At first press the AUTO button to switch to MDI mode. Then at monitor screen, press MDI button.

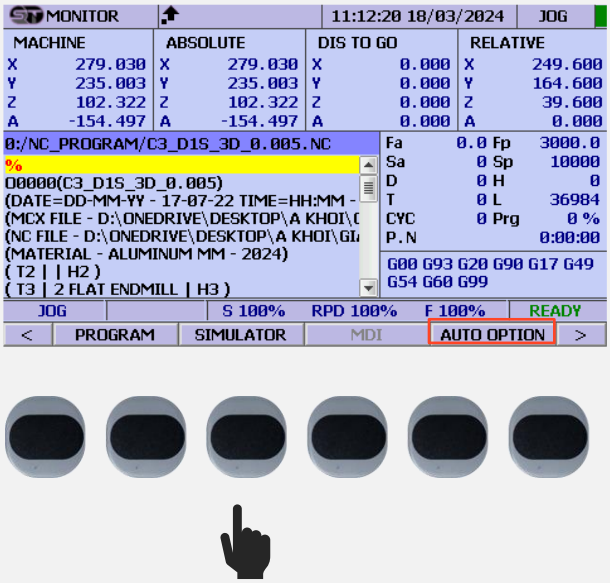
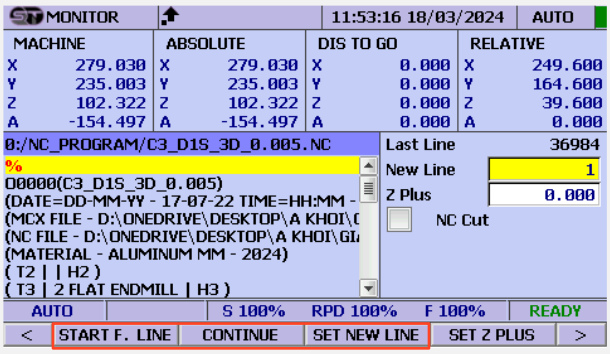
Step 2:

Enter a command for the controller. Press OK to confirm and CLEAR to start again.

Ex: we are entering M8 to activate the water coolant system

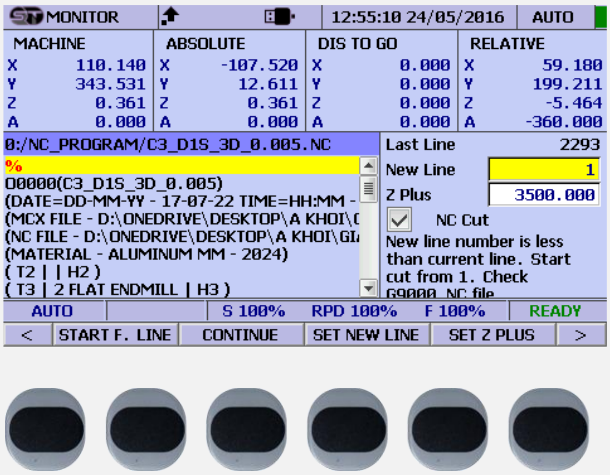
3.5.3 AUTO OPTION MODE

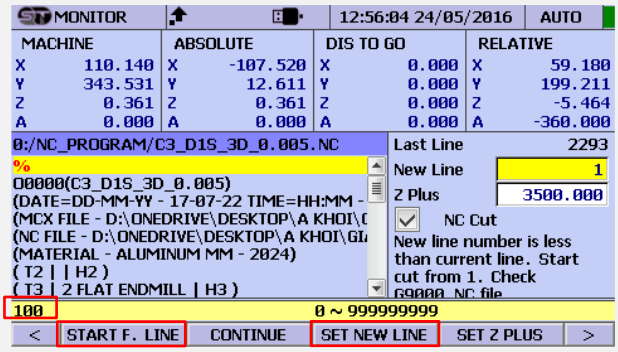
This function assists the users when unexpected issues occur during to the machining process, leading to production interruptions.

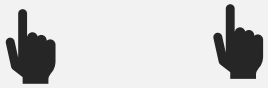
Description Images Model: F54	**Memo** Model: F54
  	**Step 1:** At monitor screen, press AUTO OPTION button. **Step 2:** **START FROM LINE:** run from any command line in program. **CONTINUE:** resume the working process that was stopped before. **SET NEW LINE:** enter the line number then press this button before selecting START FROM LINE button. **NC CUT:** automatically create secondary program to activate all necessary G-code before jumping to the last command feature

3.5.3.1 START PROGRAM FROM ANY COMMAND LINE

Description Images
Model: F54







Memo
Model: F54

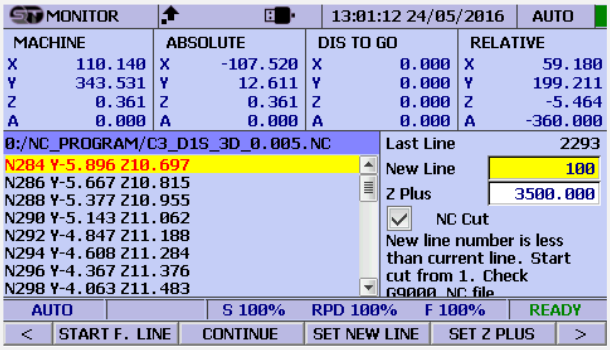
Step 1:

Example, we want to go to command line 100.

Step 2:

Enter 100 from control panel and press SET NEW LINE button. Then press START FROM LINE button.

Description Images
Model: F54



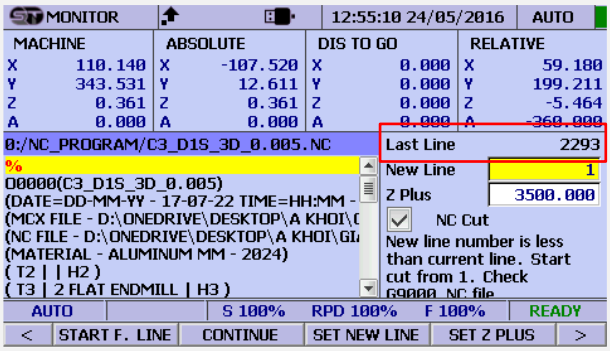
Memo
Model: F54

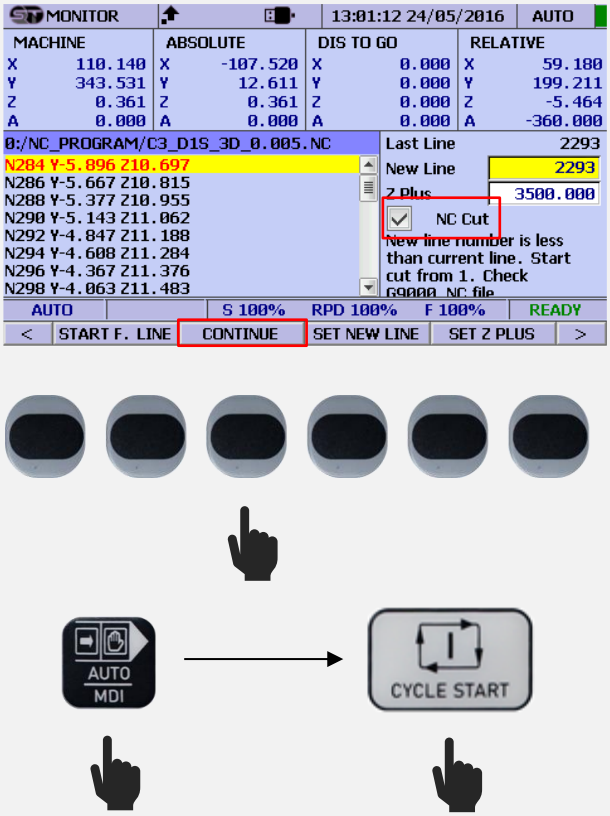
Step 3:

Controller will go to command line 100.

3.5.3.2 CONTINUE THE WORKING PROCESS FROM THE LAST STOPPED COMMAND

Description Images
Model: F54





Memo
Model: F54

Step 1:

Check the last command line on the right.

Step 2:

Press CONTINUE button. After that press switch to AUTO mode by pressing AUTO button on control panel. Final is pressing CYCLE START button.

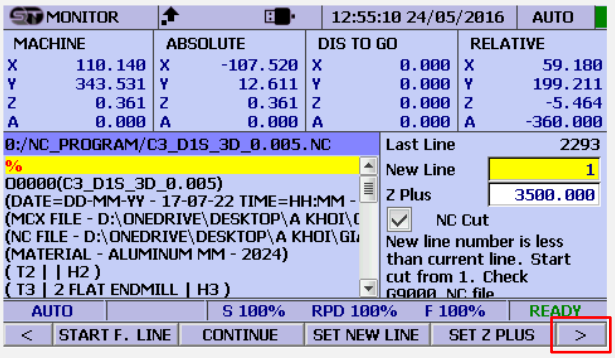
Note:

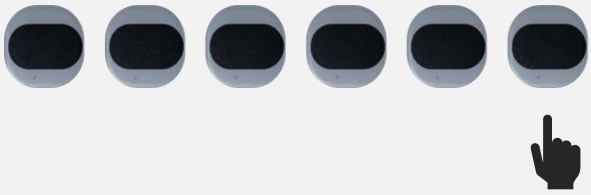
NC CUT enable: When user continue the working process, controller will automatically create a secondary to activate all necessary G-Code before run to the last command line

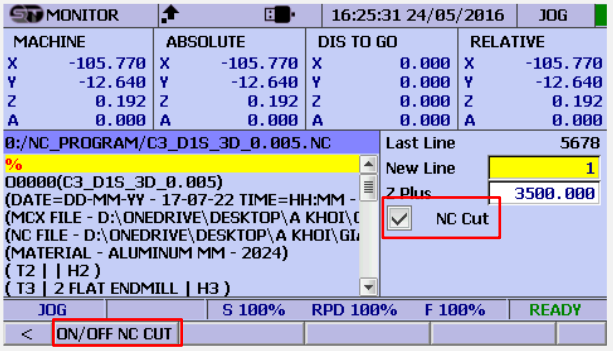
NC CUT disable: When user continue the working process, controller will not create a secondary program to activate all necessary G-Code and jump to the last command directly

Description Images
Model: F54

To enable/disable NC cut feature.







Memo
Model: F54

Step 1:

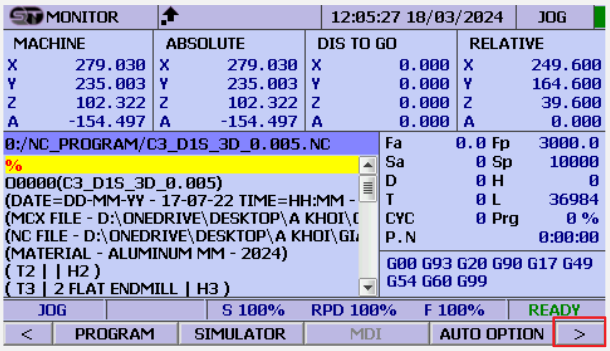
Press the arrow button on the right.

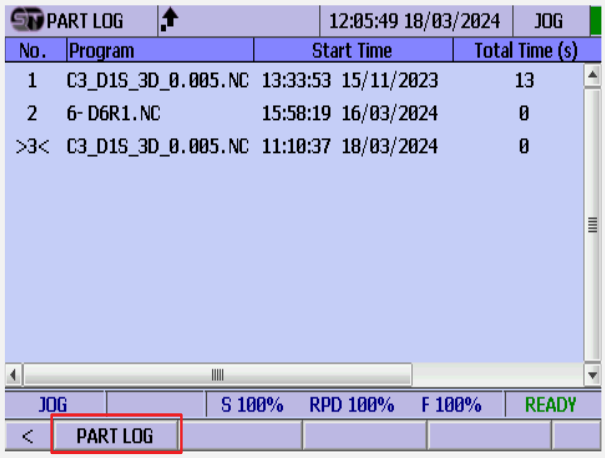
Step 2:

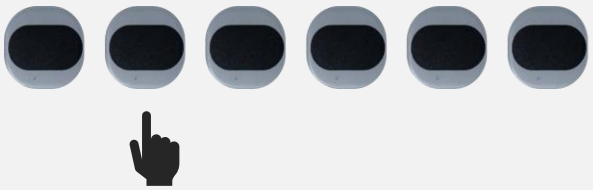
Press ON/OFF NC CUT button to enable or disable feature.

3.5.4 WORKING HISTORY

Description Images
Model: F54







Memo
Model: F54

Step 1:

Press the arrow button on the left to switch to next page.

Step 2:

Press PART LOG button to open the working history table. At this table you would able to see the working history, name of program and the cycle time.

3.6 MAINTENANCE PAGE

Operators can monitor the error log, error notifications, and error alarms of the controller. To access the MESSAGE page, press the MESSAGE button from the main interface. Additionally, operators can save the error history for inspection when needed.

Maintenance features:

- **Alarm:** alarm history
- **Warning:** warning history
- **Operation:** operation history
- **Backup:** plug in the usb drive to controller and press this button to save all the error notifications to usb drive.

Model: F54 controller

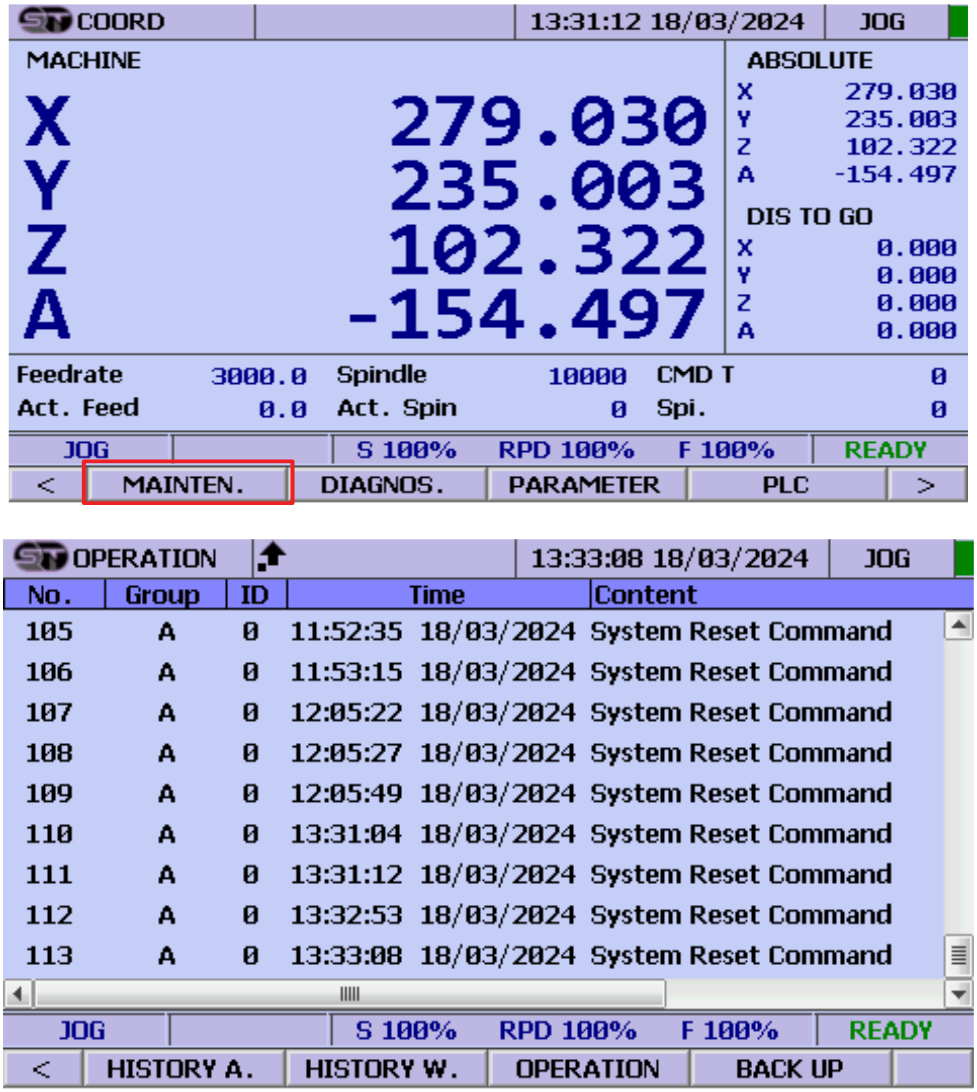


Figure 3-6. Maintenance page

3.7 DIAGNOSTIC PAGE

QS Controllers support users with diagnostic tale. This table will allow users can monitor the system data bits, data registers and macro variables.

Diagnostic features:

- **NC bit:** open data bit page
- **NC register:** open register data page
- **Macro debug:** open macro variable page (local variables & global variables)

Model: F54 controller

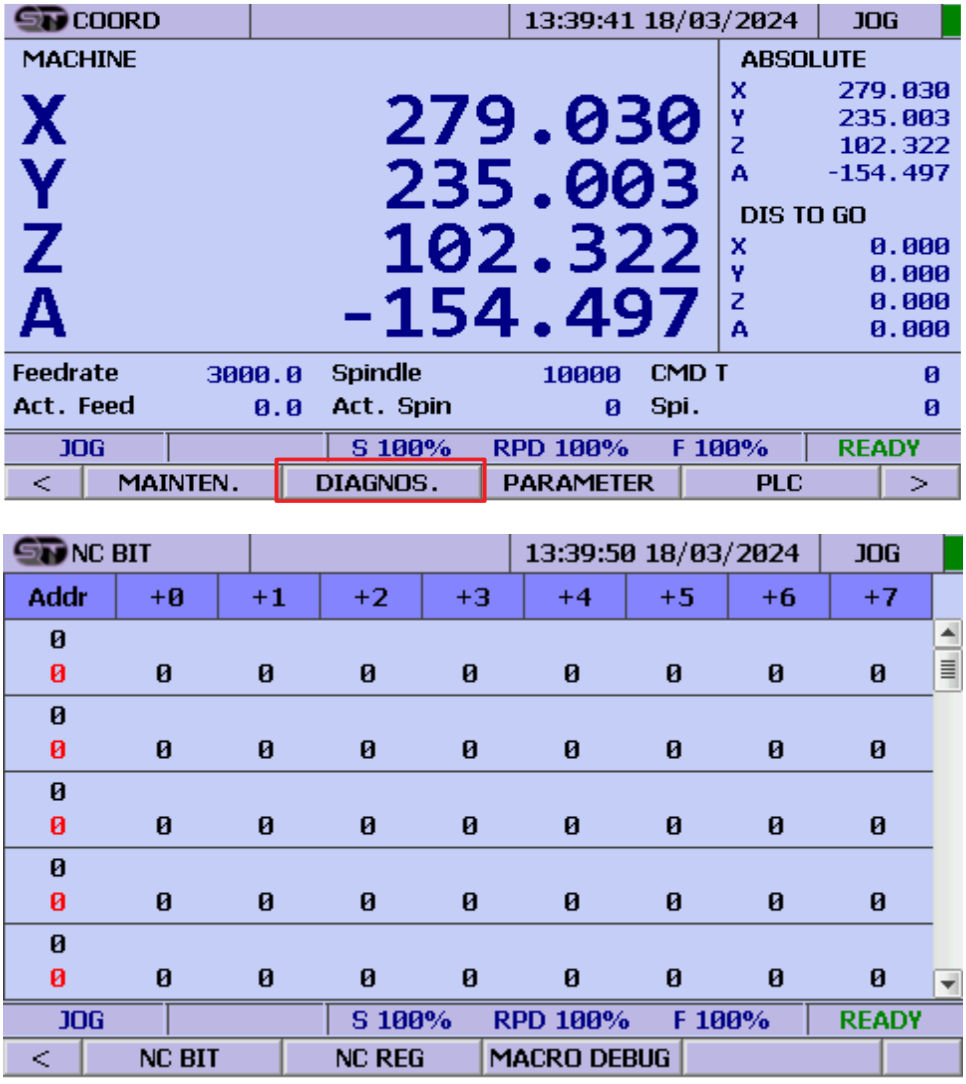


Figure 3-7. Diagnostic page

3.8 PARAMETER PAGE

The controller parameter page is a very important page. The operator needs to understand and know the parameters on the controller and absolutely not change them arbitrarily without fully understanding the function of that parameter. Because if the operator arbitrarily changes the parameters without understanding the function, it will lead to the machine malfunctioning, which can be dangerous, reduce the machine's productivity and affect the processing process.

Parameter feature:

- **General:** back to main page
- **Axis:** go to axis setting part
- **Spindle:** go to spindle setting part
- **Hardware:** go to hardware setting part

Model: F54 controller

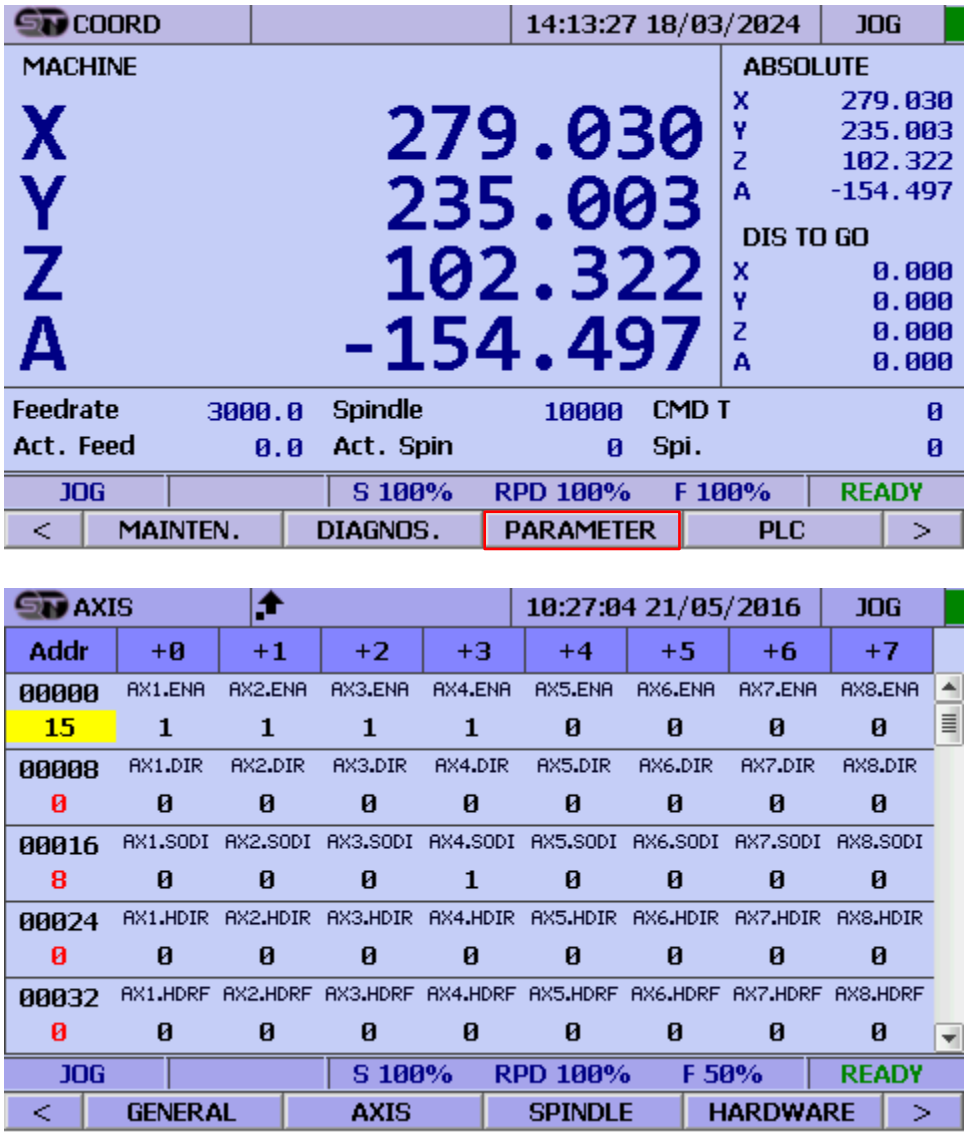
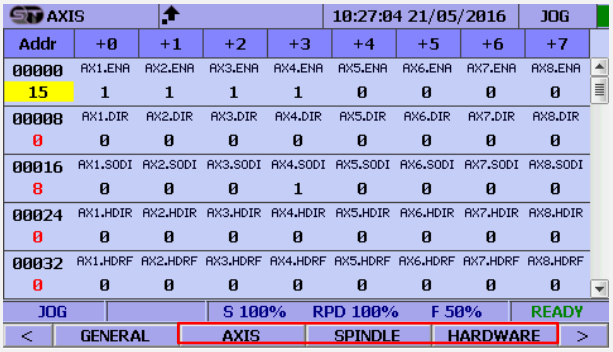
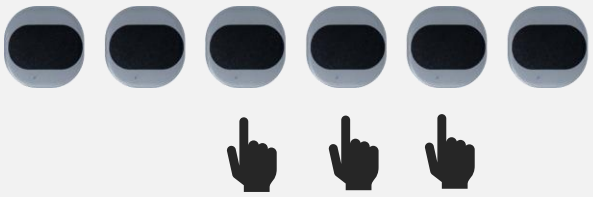
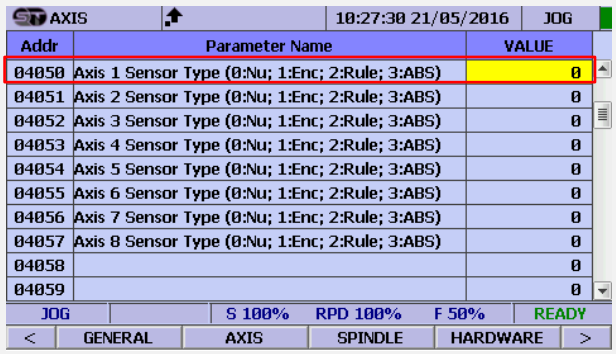


Figure 3-8. Parameter page

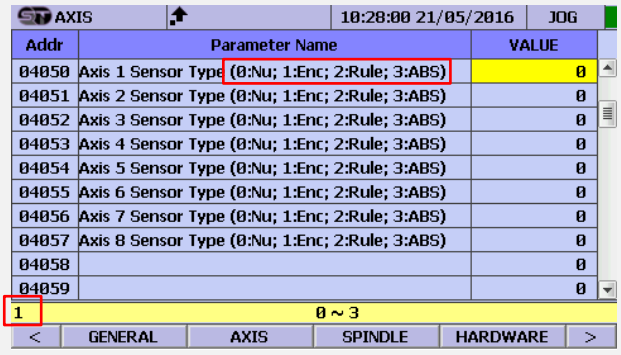
Parameter instruction parts:

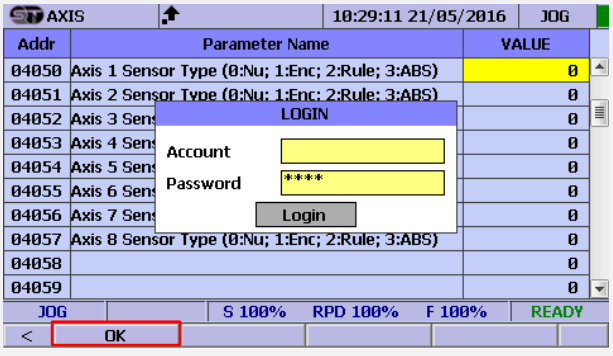
- Parameter setting steps **(3.8.1)**

3.8.1 PARAMETER SETTING STEPS

Description Images Model: F54. F86, Astro 6A, Astro 10i	**Memo** Model: F54, F86, Astro 6A, Astro 10i
   	**Step 1:** Select parameter type such as: Axis, Spindle, Hardware. **Step 2:** Press PAGE DOWN button to scroll the page down and find the parameter you are looking for.

Description Images
Model: F54. F86, Astro 6A, Astro 10i





Memo
Model: F54, F86, Astro 6A, Astro 10i

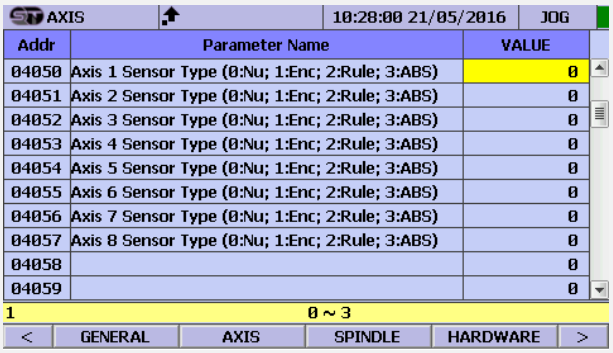
Step 3:

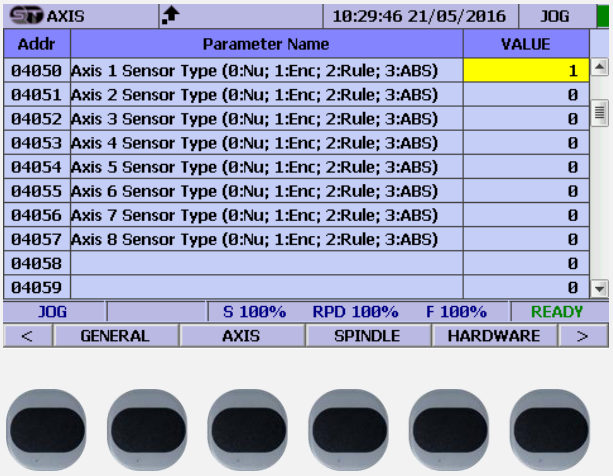
Refer the information on the right of parameter. Then enter the suitable value.

Step 4:

At this time the system will request you to enter the user password. Enter “ 1 4 1 5 “ and press OK button.

Description Images
Model: F54. F86, Astro 6A, Astro 10i





Memo
Model: F54, F86, Astro 6A, Astro 10i

Step 5:

Enter the value again. When you completed enter value, press RESET button on control panel to save data.

Step 6:

Reboot device to activate the new modified value.

3.9 PLC PAGE

QS controllers come with a PLC processor module, allows the users can monitor the operation status of machine. The user can prepare the PLC ladder program then import it to controller to suitable with your applications.

PLC features:

- **SYS BIT:** open system bit page
- **SYS REG:** open system register data page
- **FIND REV:** find previous object in ladder program
- **FIND NEXT:** find next object in ladder program

Model: F54 controller

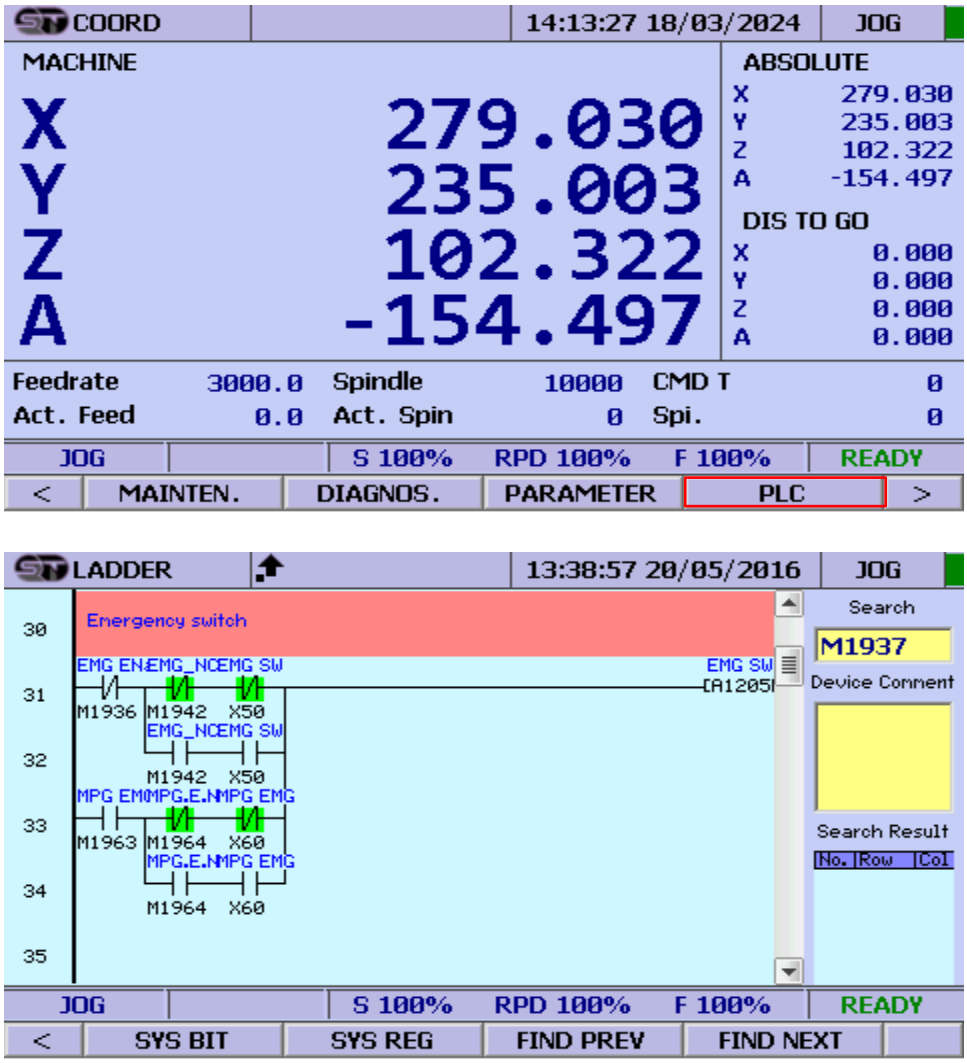
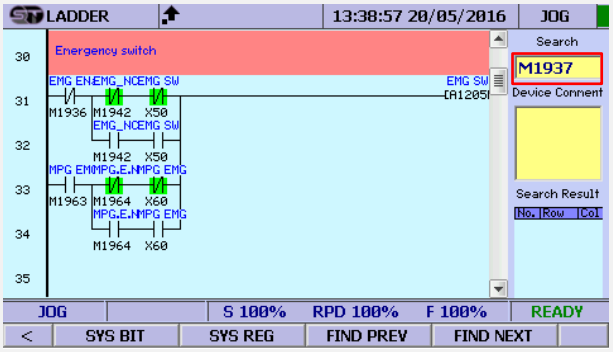
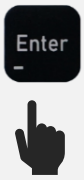
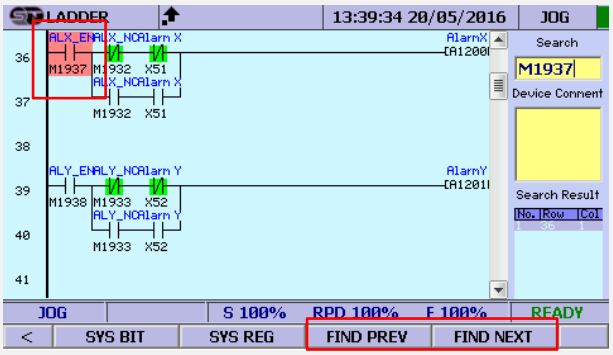
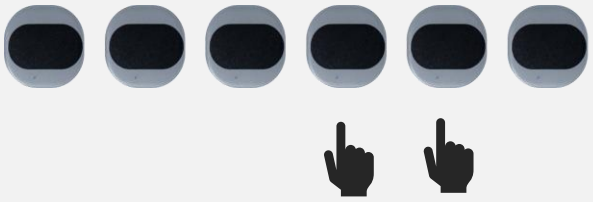


Figure 3-9 PLC page

PLC instruction parts:

- Find an object in ladder program **(3.9.1)**
- Import PLC data **(3.9.2)**

3.9.1 FIND AN OBJECT IN LADDER PROGRAM

Description Images Model: F54. F86, Astro 6A, Astro 10i	**Memo** Model: F54, F86, Astro 6A, Astro 10i
   	**Step 1:** Fill the object name and press ENTER button on control panel. **Step 2:** Controller will find the object if it is existing in program. If you want to check is there any object have the same name, press FIND NEXT and FIND REV button.

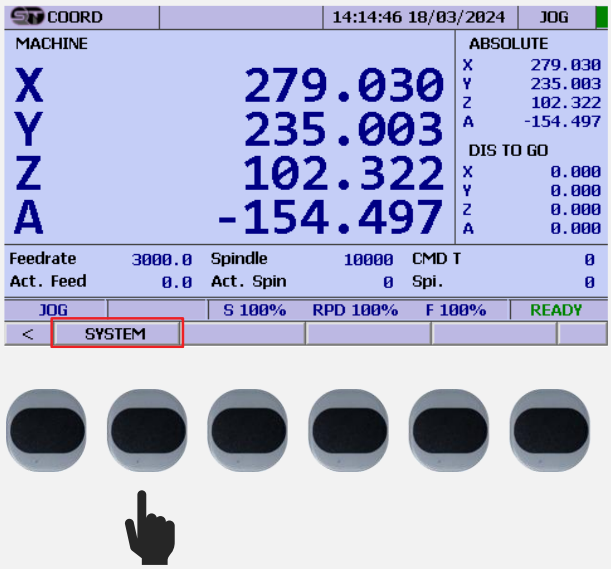
3.9.2 IMPORT PLC DATA

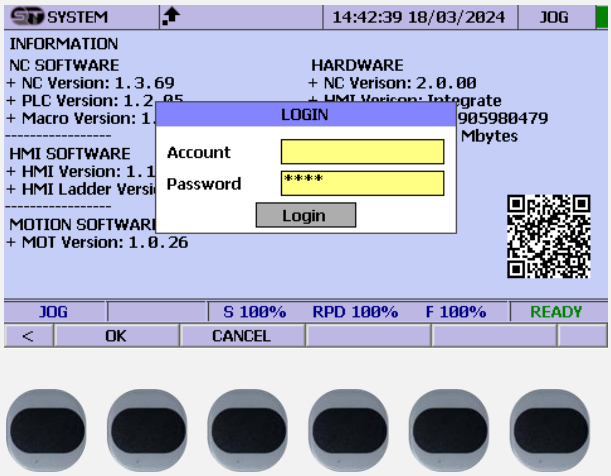
To successfully load data into the controller, operators must understand the directory formats. If the directory names or formats are incorrect, the data will not be loaded.

- Directory Formats on the F54 Controller

Number	Data Type	Standard Name	Standard Format	Final Format
1	PLC	ALM_PLC_USER PLC	.HPL	ALM_PLC_USER.HPL PLC.HPL

Description Images
Model: F54. F86, Astro 6A, Astro 10i





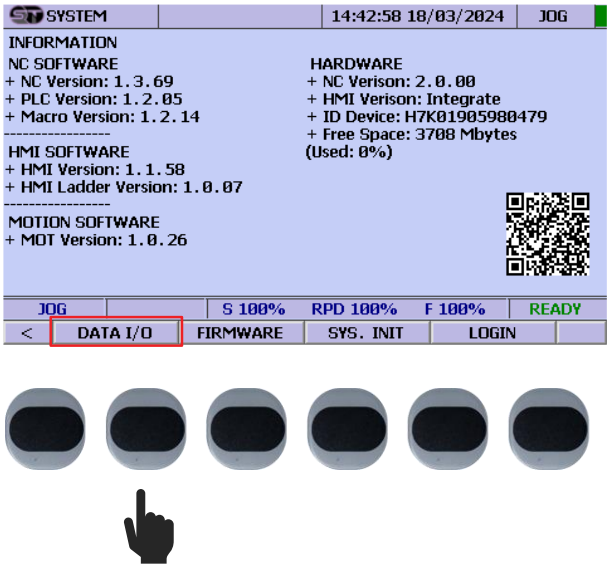
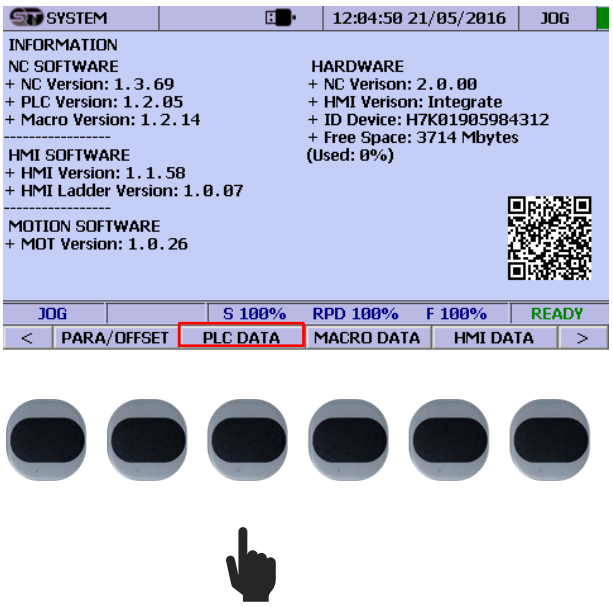
Memo
Model: F54, F86, Astro 6A, Astro 10i

Step 1:

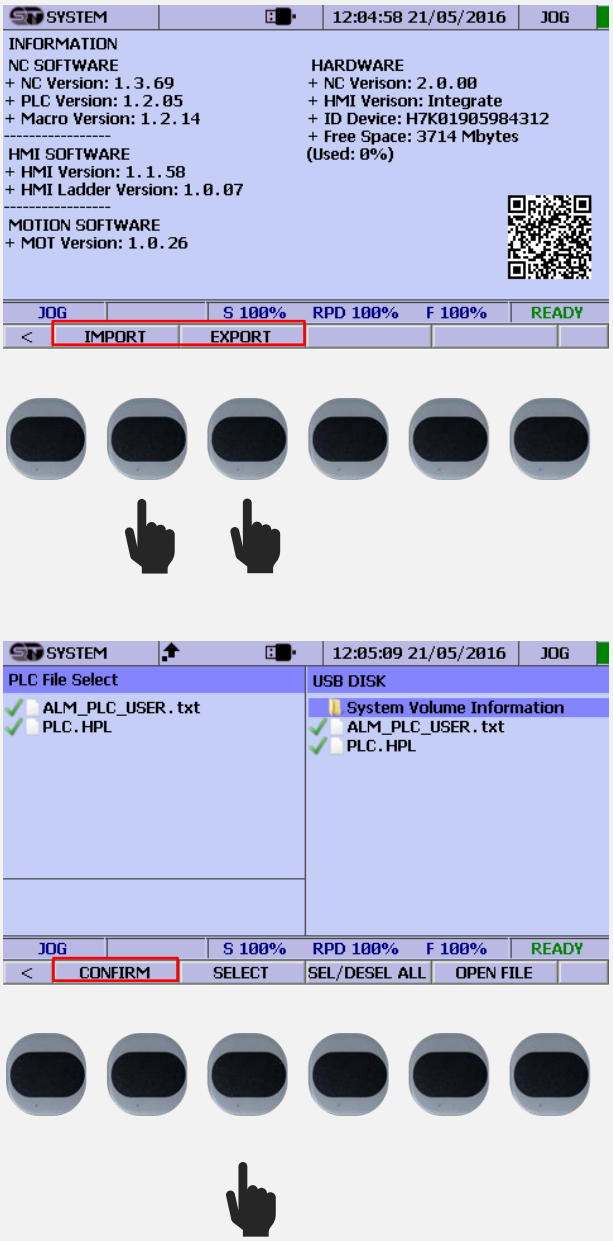
Press SYSTEM button.

Step 2:

Enter user password “1415“.

Description Images Model: F54		Memo Model: F54
	**Step 3:** Press DATA I/O button. You can select to load (Macro/PLC/Parameter/Offset, HMI)
	**Step 4:** Press PLC DATA button.

Description Images
Model: F54



Memo
Model: F54

Step 5:

Select IMPORT or EXPORT

Step 6:

Plug in the USB drive with the PLC data to the controller. At this point, the controller will automatically detect the PLC file. You only need to check it and press the CONFIRM button.

3.10 SYSTEM SETTING

Operators access the SYSTEM page to configure system changes, load, and export controller data.

To successfully load data into the controller, operators must understand the directory formats. If the directory names or formats are incorrect, the data will not be loaded.

- Directory Formats on the F54 Controller

Number	Data Type	Standard Name	Standard Format	Final Format
1	Macro alarm	ALM_MACRO_USER	.txt	ALM_MACRO_USER.txt
2	Parameter	PARAM_NC PARAM_USER	.txt	PARAM_NC.txt PARAM_USER.txt
3	Offset	OFFSET	.txt	OFFSET.txt
4	PLC	ALM_PLC_USER PLC	.HPL	ALM_PLC_USER.HPL PLC.HPL

Notes:

Macro programs are typically created using a text editor such as Notepad and saved with a .txt file extension. Before loading the macro program into the controller, the programmer must remove the .txt file extension.

Example:

A macro program created using Notepad is named "M0100.txt". The operator must remove the .txt file extension before loading the file into the controller.

M0100.txt ⟶ M0100

To load data into the controller, the operator must follow these steps:

SYSTEM Page Features:

- **DATA I/O:** Import and export data such as parameters, offsets, PLC, and HMI.
- **FIRMWARE:** Update and save device firmware versions.
- **SYS.INIT:** Configure other features such as time settings.

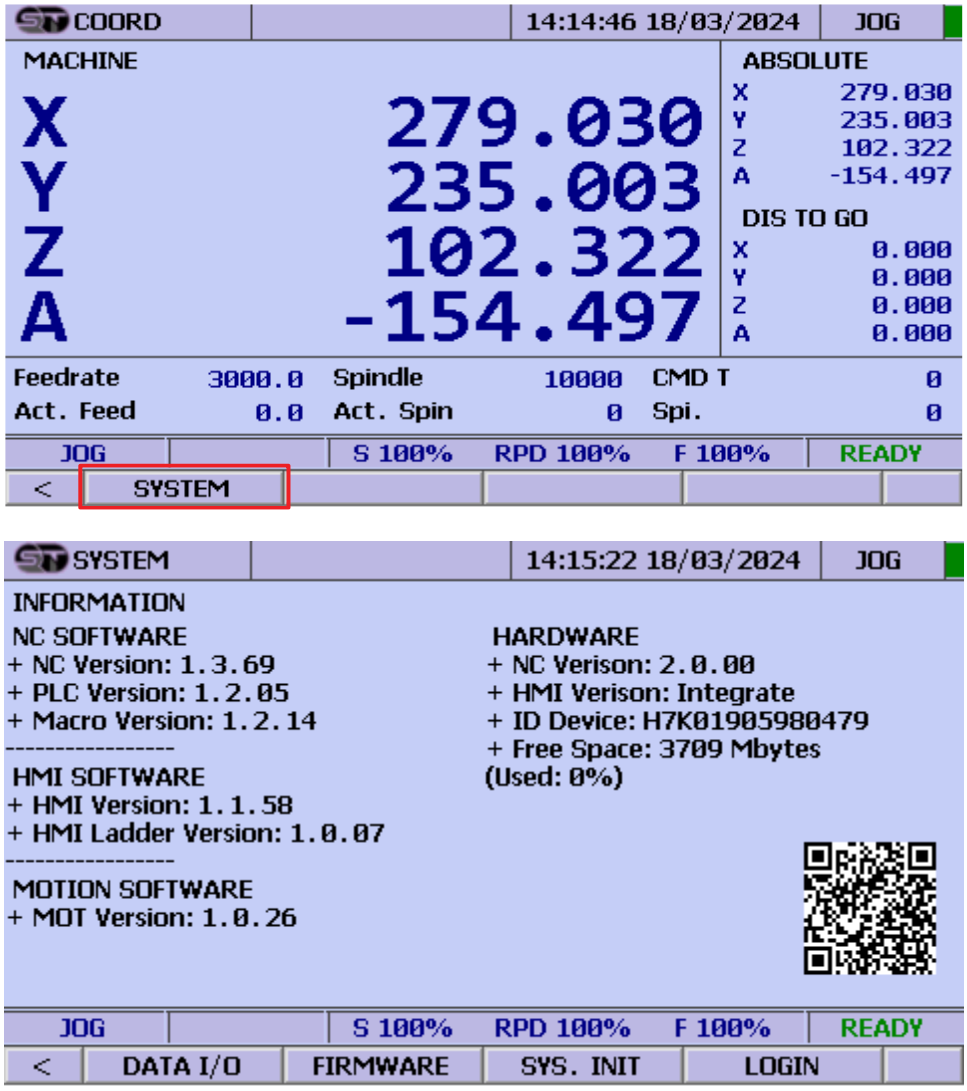
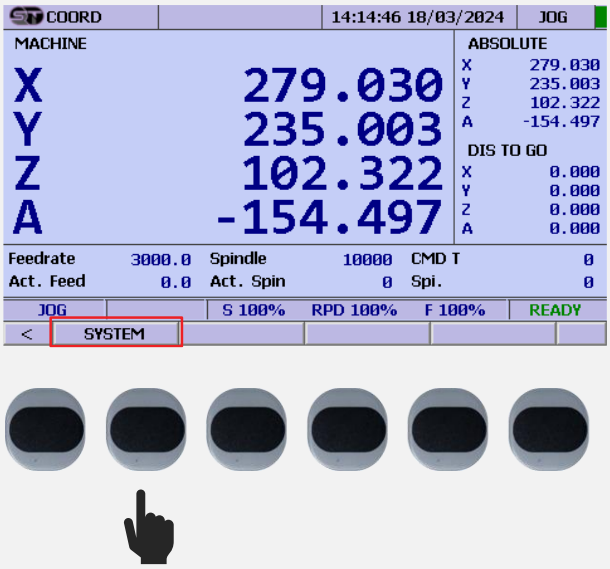
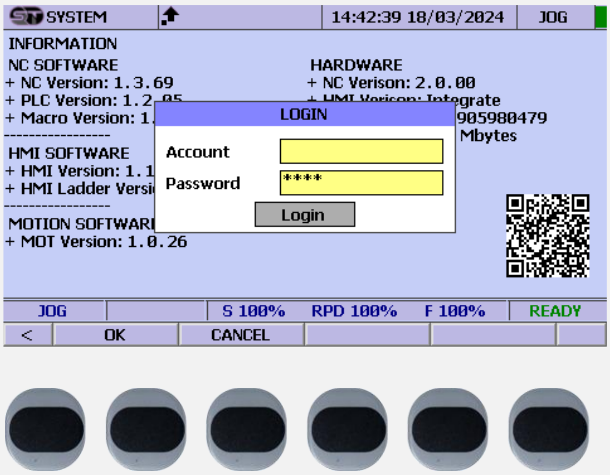


Figure 3-10. System page

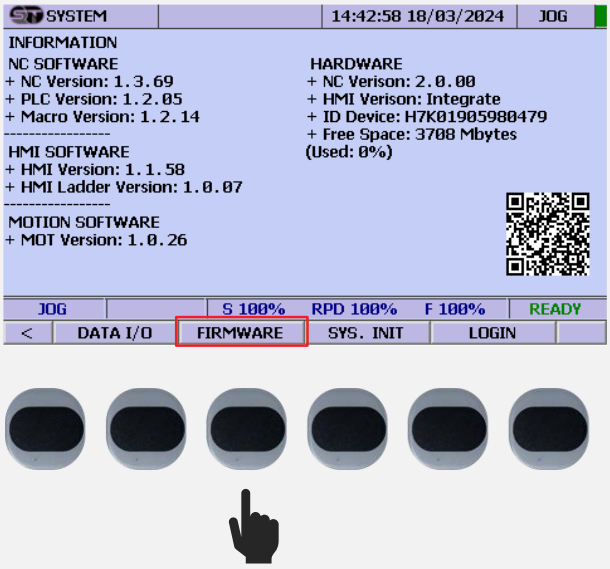
System instruction parts:

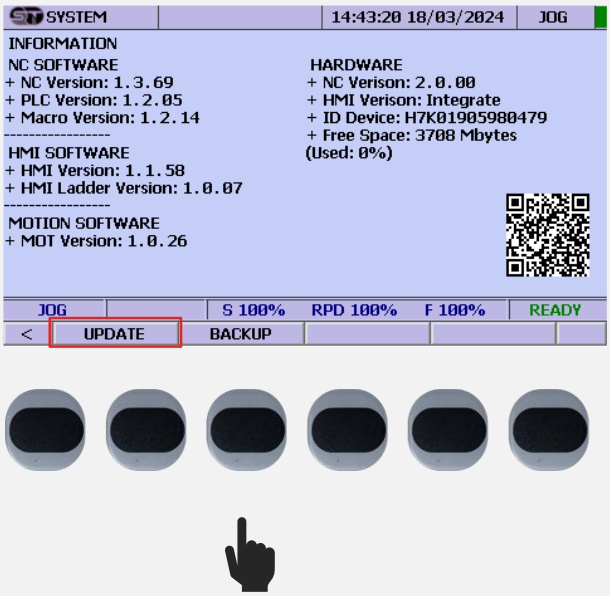
- Firmware update **(3.10.1)**
- Date & Time setting **(3.10.2)**
- Access permission **(3.10.3)**

3.10.1 FIRMWARE UPDATE

Description Images Model: F54	Memo Model: F54
 	**Step 1:** Press SYSTEM button.
 	**Step 2:** Enter user password “1415“.

Description Images
Model: F54





Memo
Model: F54

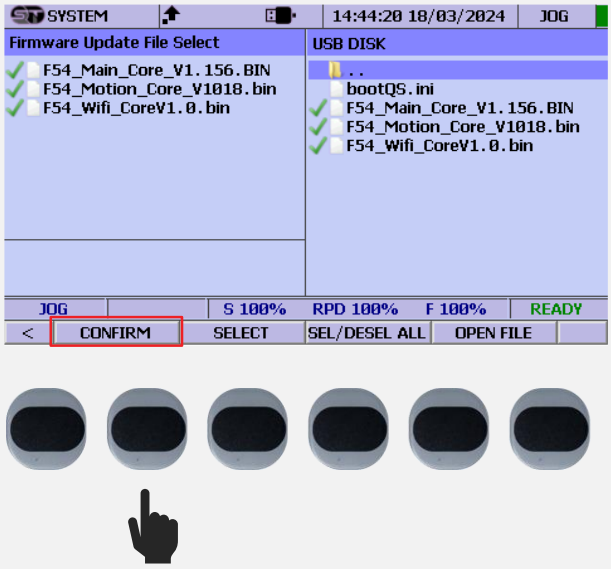
Step 1:

Login to system and select FIRMWARE button.

Step 2:

Press UPDATE button.

Description Images
Model: F54



Memo
Model: F54

Step 3:

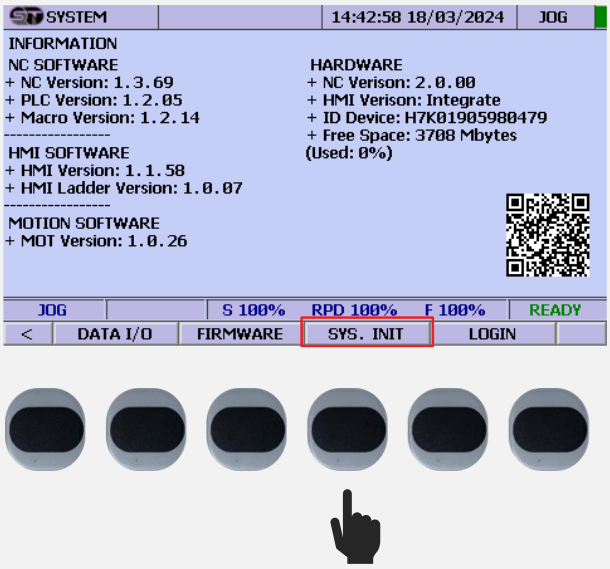
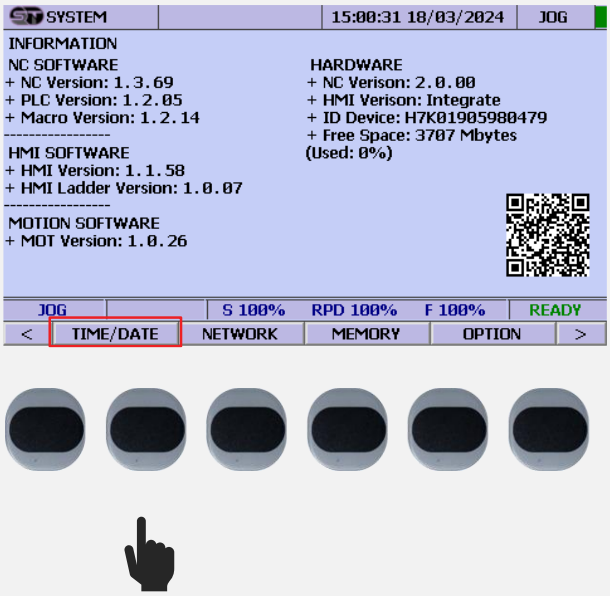
Plug in the USB drive with the firmware data to the controller. At this point, the controller will automatically detect the firmware file. You only need to check it and press the CONFIRM button.

Note:

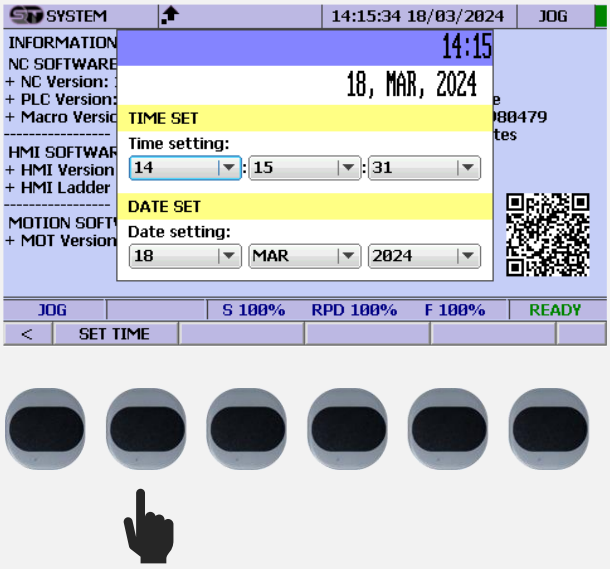
The firmware for the controller is named as follows:

- F54_Main_Core_V1.00.Bin
- F54_Motion_Core_V1061.BIn

3.10.2 DATE & TIME SETTING

Description Images Model: F54	Memo Model: F54
	**Step 1:** Login to system and select SYS.INT button.
	**Step 2:** Press TIME/DATE button.

Description Images
Model: F54. F86, Astro 6A, Astro 10i



Memo
Model: F54, F86, Astro 6A, Astro 10i

Step 3:

Establish date, time value. And press SET TIME button.

3.11 TRANSMIT DATA VIA WI-FI NETWORK

F54 Controller allows the users to transmit the working data from personal computer, laptop to the controller via Wi-Fi network by using the software “QS Explorer”.

User can go to www.qstcnc.com or download the software or scan the QR below to download the software.

Scan this QR code to download “QS Explorer” software.

Scan this QR code to download “QS Editor” software.

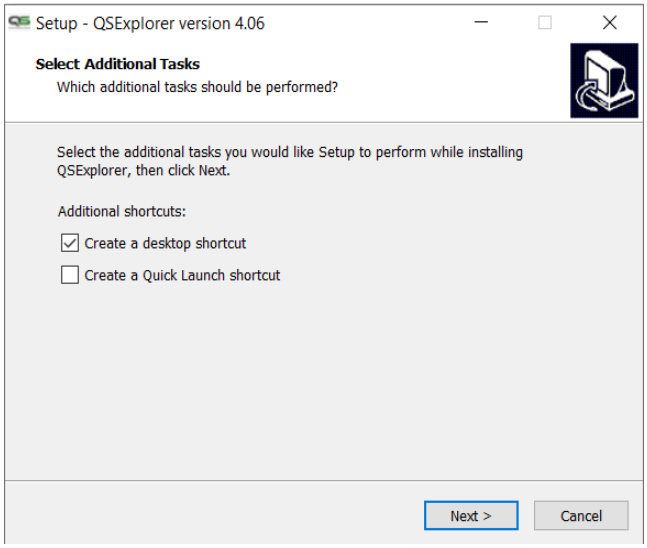
(This software is use for editing PLC ladder)

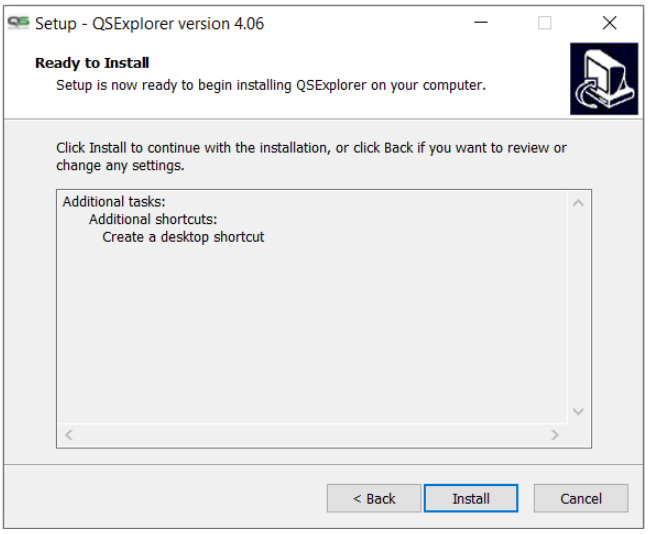
instruction parts:

- Software installation **(3.11.1)**
- Connect device to Wi-Fi network **(3.11.2)**
- Transmit working data from computer to controller via wi-fi network **(3.11.3)**
- Controller status monitoring **(3.11.4)**

3.11.1 SOFTWARE INSTALLATION

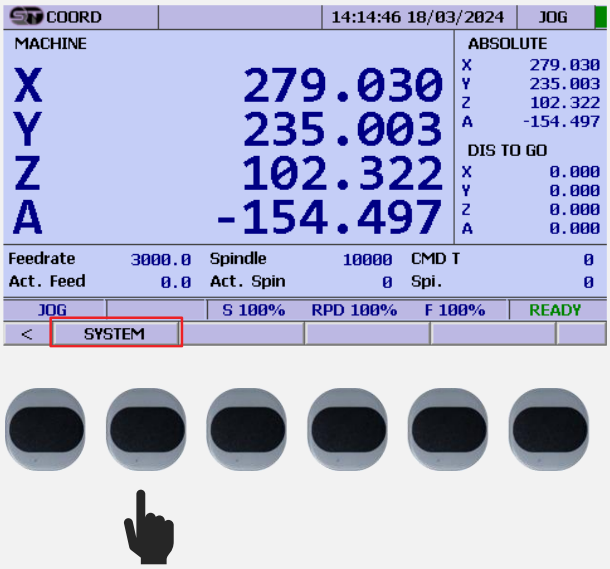
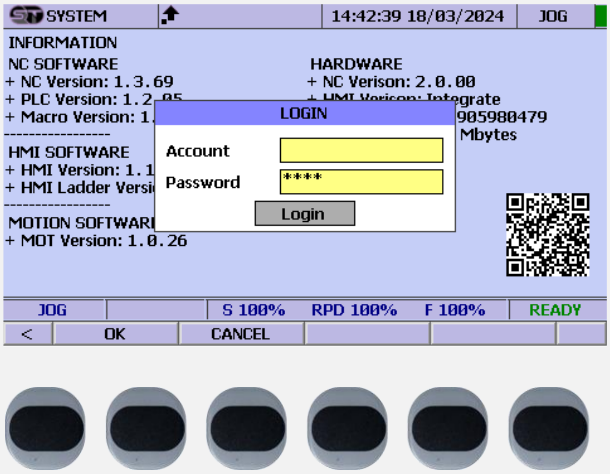
After you downloaded the software from the website www.qstcnc.com. Do the steps below to install the software.



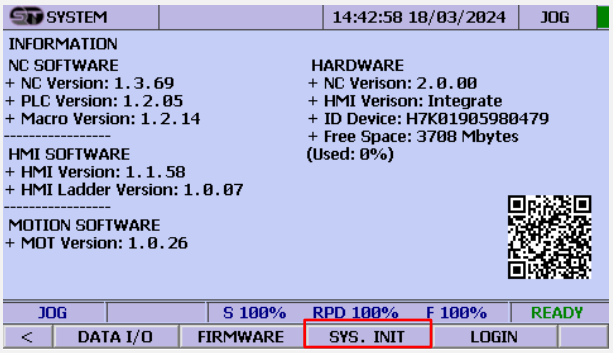


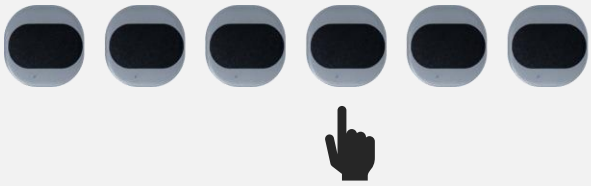
3.11.2 CONNECT DEVICE TO WI-FI NETWORK

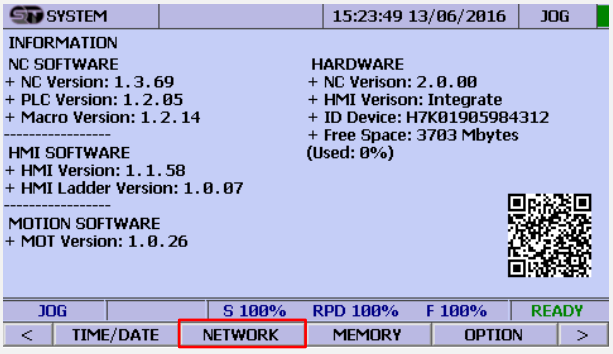
At first the users need to assemble the antenna to the controller

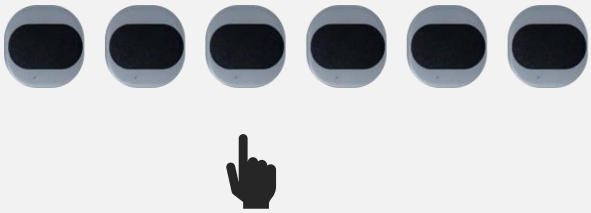
Description Images Model: F54	Memo Model: F54
	**Step 1:** Press SYSTEM button.
	**Step 2:** Enter user password “1415“.

Description Images
Model: F54









Memo
Model: F54

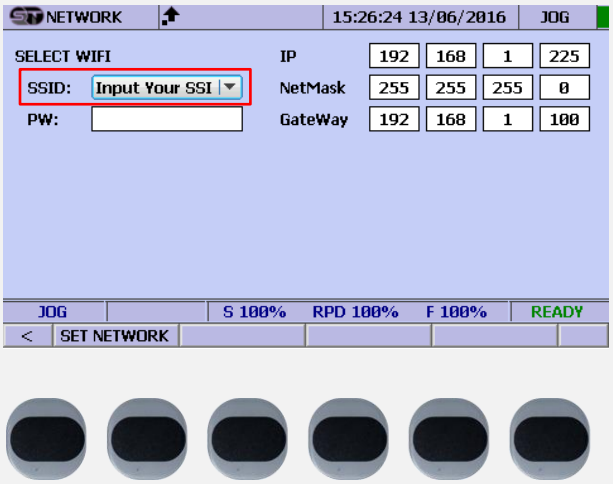
Step 3:

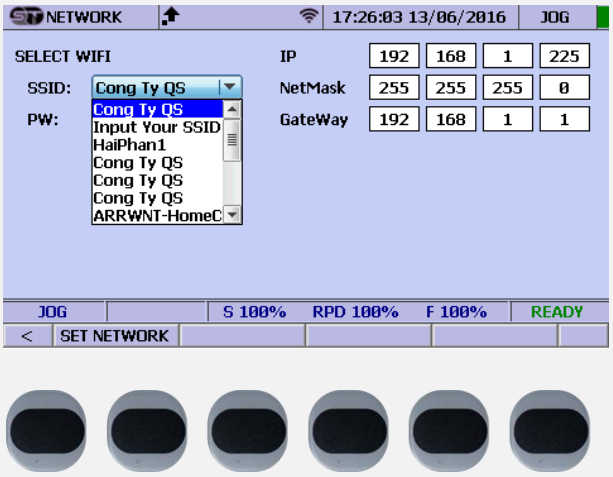
Select SYS.INIT button.

Step 4:

Select NETWORK button.

Description Images
Model: F54





Memo
Model: F54

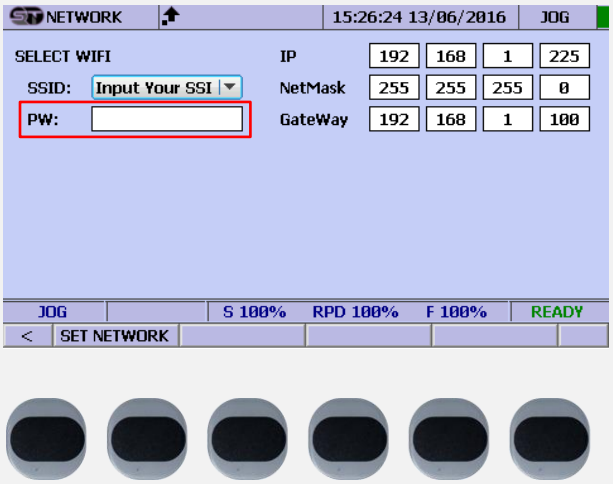
Step 5:

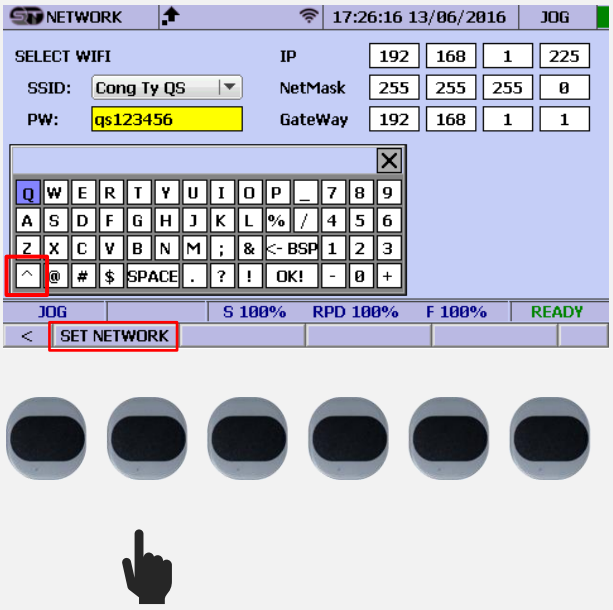
Select SSID by pressing the arrow buttons then press ENTER button.

Step 6:

Select the Wi-fi network that you want to connect.

Description Images
Model: F54





Memo
Model: F54

Step 7:

Select PW to enter the Wi-Fi password.

Step 8:

Press the arrow buttons on control panel to interact with the virtual keyboard and enter the Wi-Fi password. After complete press

SET NETWORK button and reboot the device

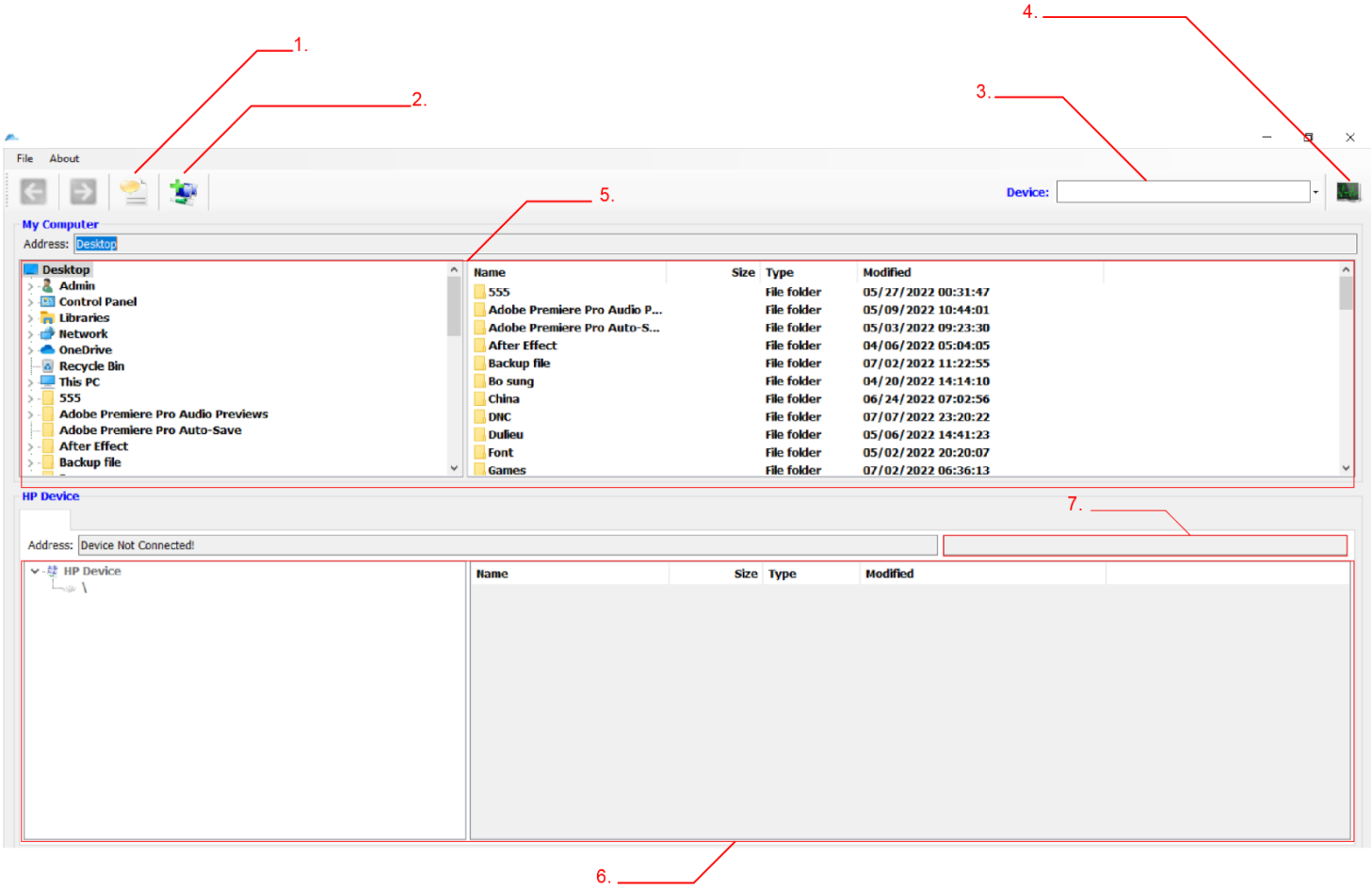
Note:

Select the symbol in the red box to enter capital characters.

3.11.3 DATA TRANSMIT FROM COMPUTER TO CONTROLLER VIA WI-FI NETWORK

Software Icon:

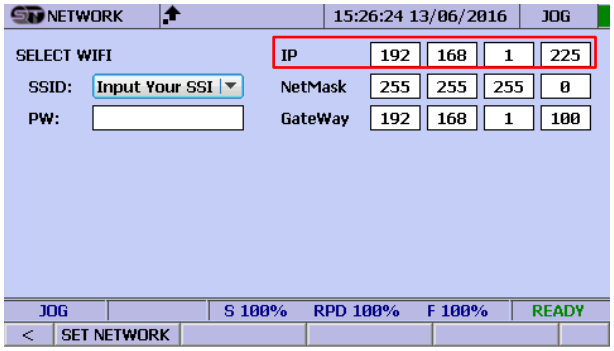
Software interface explanation:



NO.	Name	Description
1	Send MSG	Send message to controller
2	Add Device	Add new controller to transfer data.
3	Device List	Display the device list.
4	Get Device Status	Check the working status of controller
5	Computer	Computer work area.
6	CONTROLLER device	Controller work area.
7	Connection status	Display the device is connected or not.

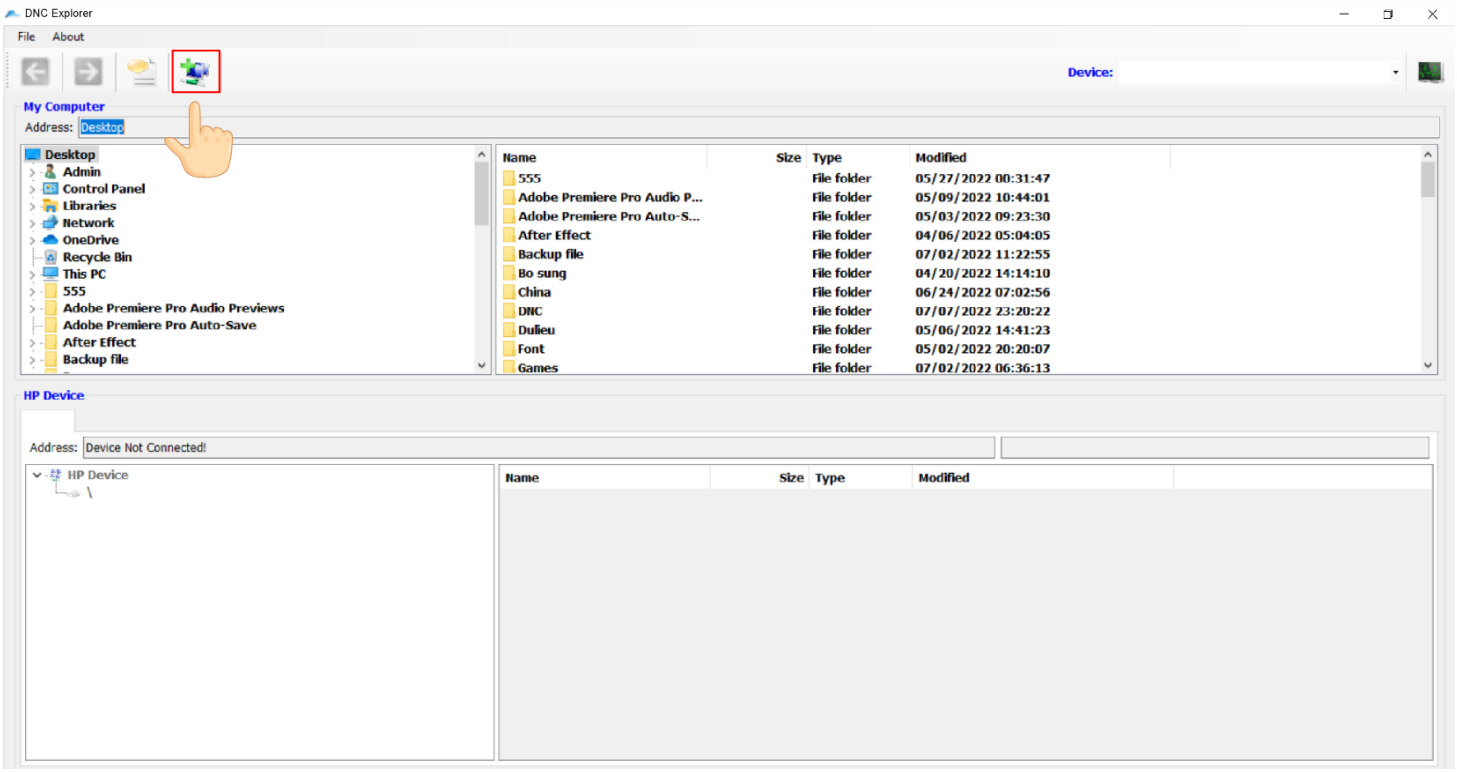
To transmit the working data from computer to the controller, at first the users need to check the IP address of the controller by access to NETWORK page

For examples as you can see in the image below, the IP address of controller is: 192.168.1.225



Step 1:

Open the software then select “ADD DEVICE”

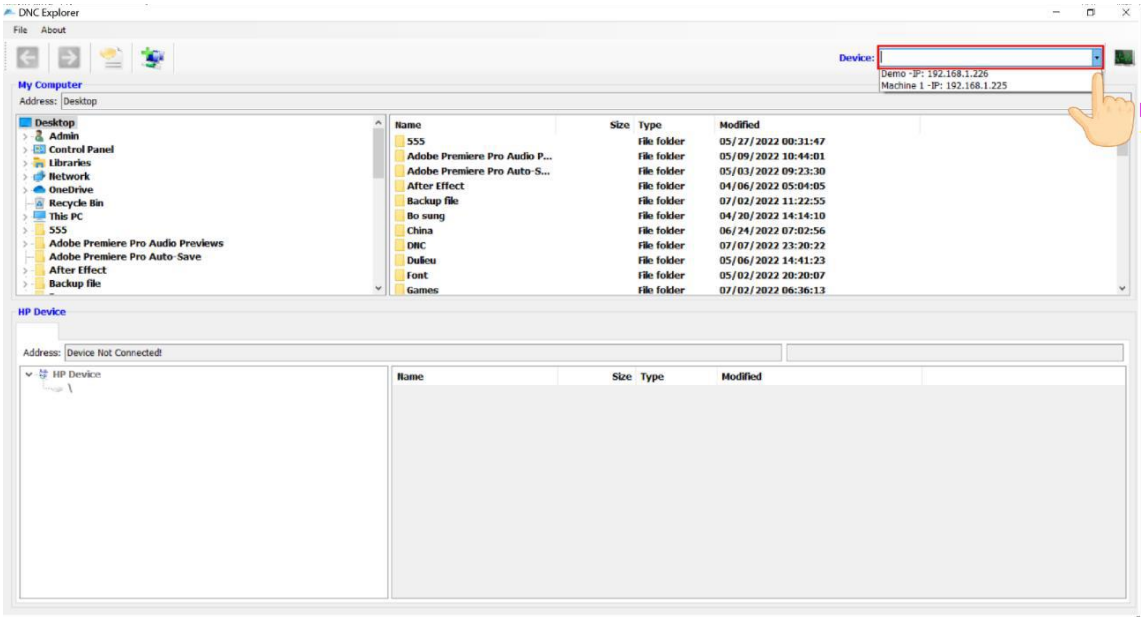


Step 2:

Enter the name and the IP address of controller that you want to connect. Then press ADD NEW button to save device

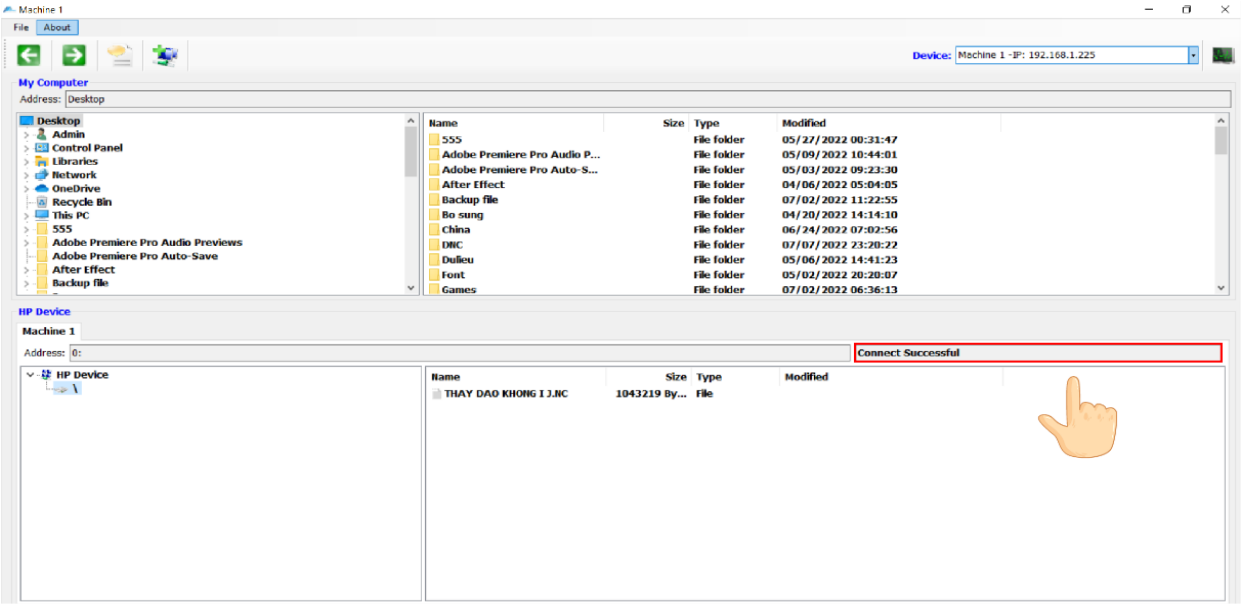
Step 3:

Select DEVICE LIST box to select device



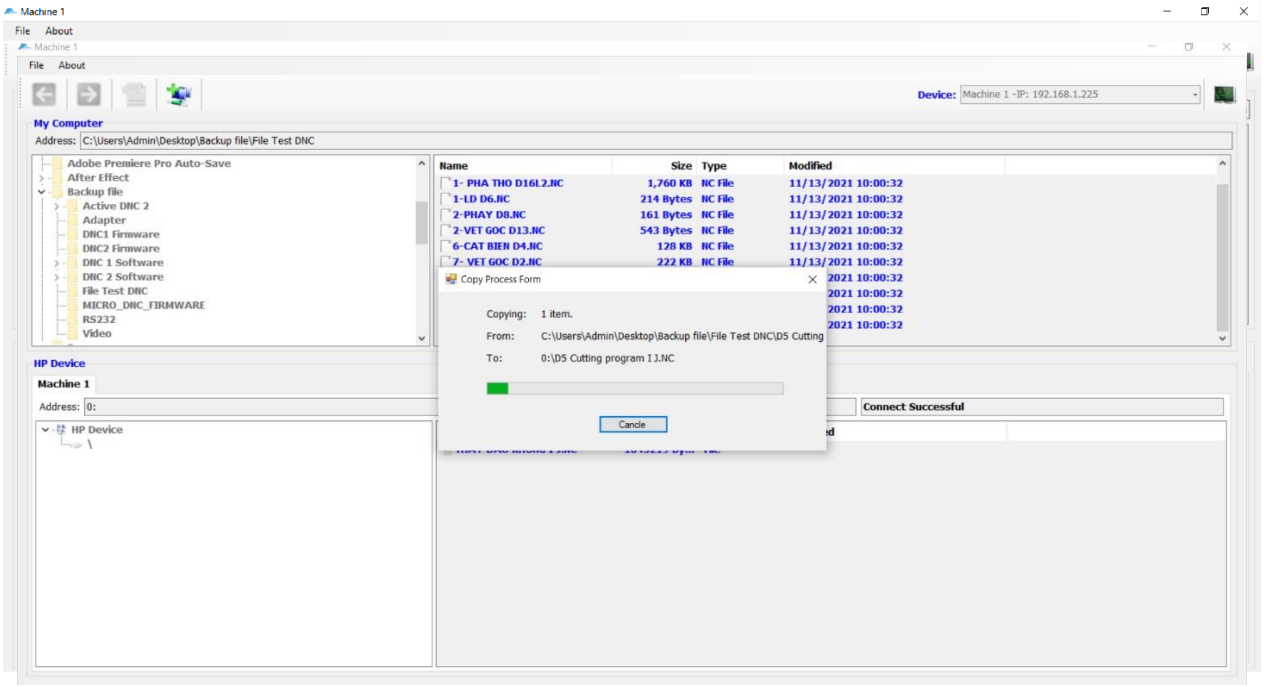
Step 4:

After controller has connected to computer, on the software will display " Connection Successful "



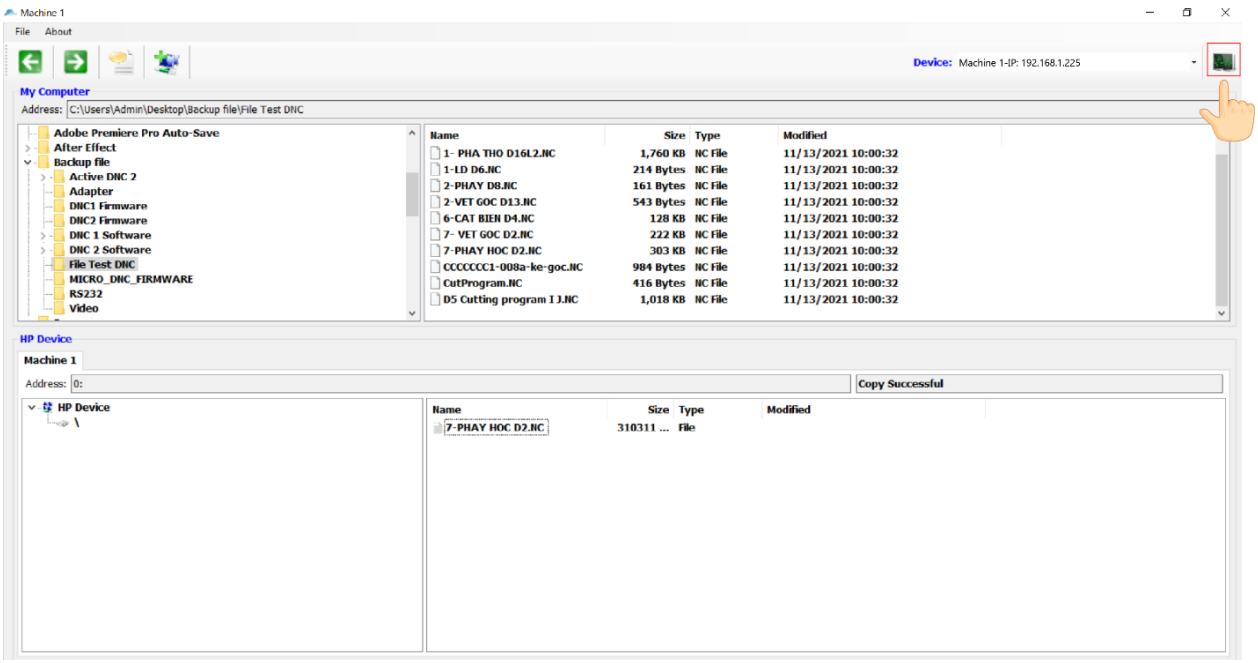
Step 5:

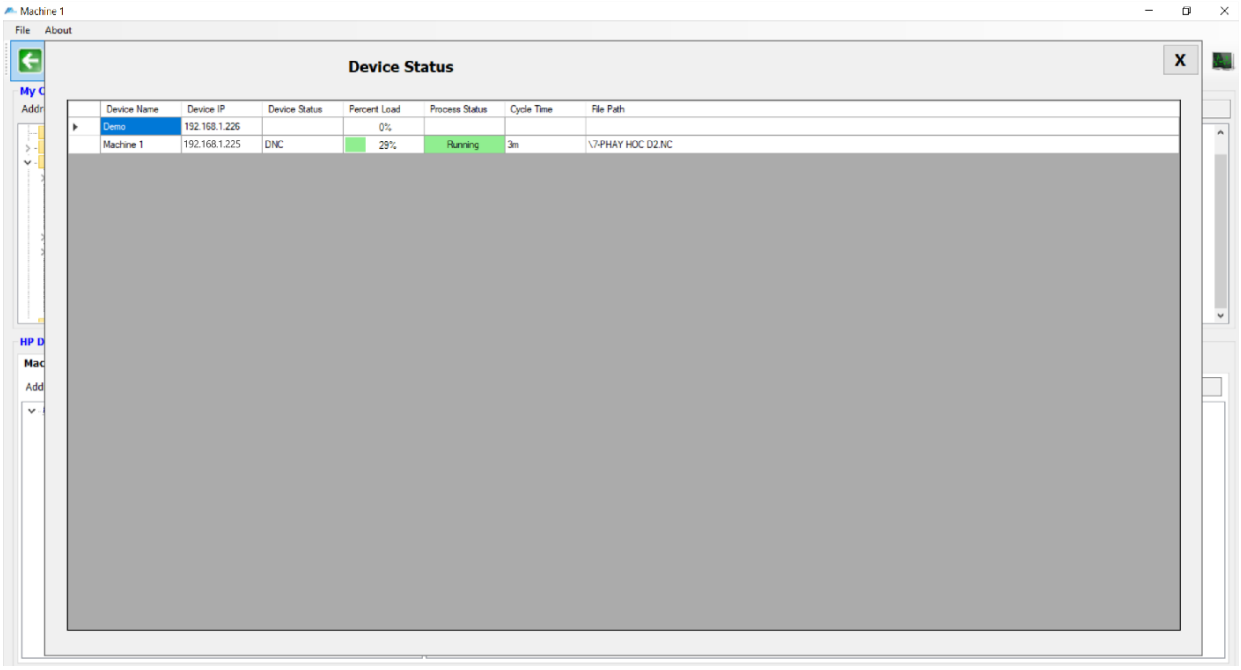
Choose the program from computer then hold left mouse and drag down to controller. Reverse these steps to get the program from controller back to computer

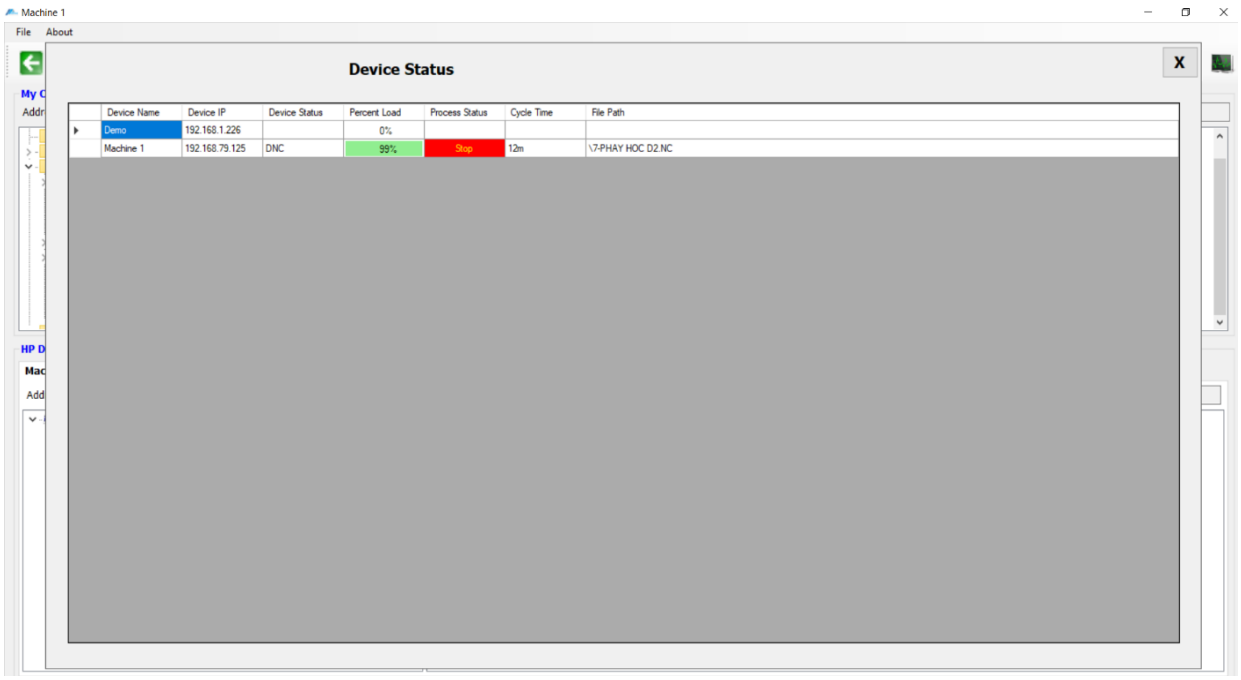


3.11.4 CONTROLLER STATUS MONITORING

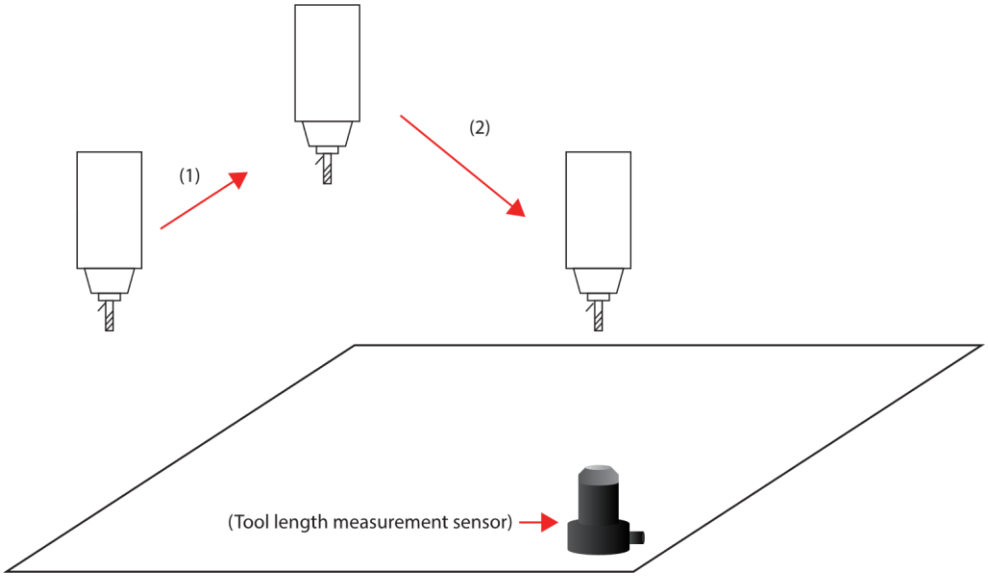
User can monitor the working process of the controller, Click to the icon on the upper right corner to open monitoring window.




Machine 1
File
About
Device Status
X
Device Name
Device IP
Device Status
Percent Load
Process Status
Cycle Time
File Path
Demo
192.168.1.226
0%
Machine 1
192.168.1.225
DNC
29%
Running
3m
\7-PHAY HOC D2.NC


Machine 1
File
About
Device Status
X
Device Name
Device IP
Device Status
Percent Load
Process Status
Cycle Time
File Path
Demo
192.168.1.226
0%
Machine 1
192.168.79.125
DNC
99%
Stop
12m
\7-PHAY HOC D2.NC

3.12 TOOL LENGTH MEASUREMENT SENSOR

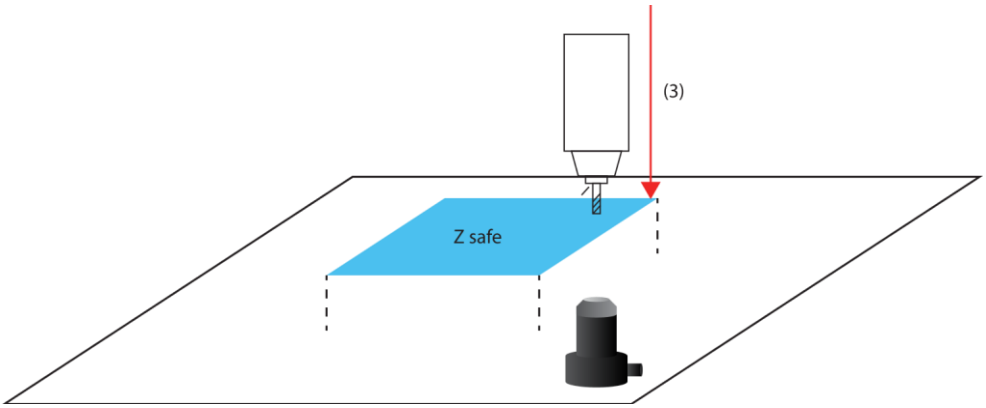


Stage 1:

When M100 is called the coolant system will be turned off, at this time, the Z axis, which is at a random position, will start to return to home position.

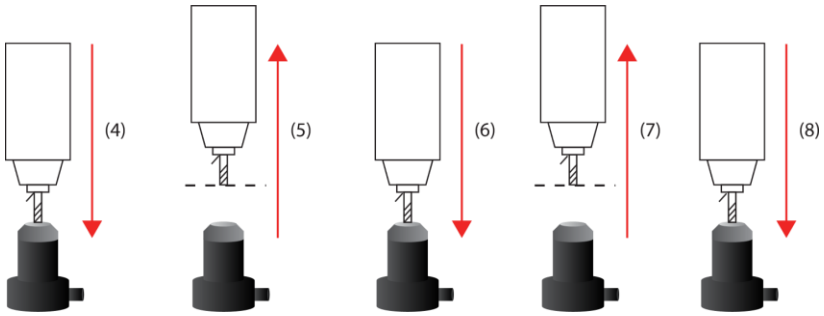
Stage2:

The controller will move X,Y axis and tool head to the measurement point were established in parameter (#14003 & #14004)



Stage 3:

At this time Z axis will quickly move to the safety position (Z safe) established in (#14005)



Stage 4, 5:

Z axis will move and touch to the sensor for the first time by the speed established in **#14007**.

After touch the sensor, Z axis will move up a distance established in **#14008**.

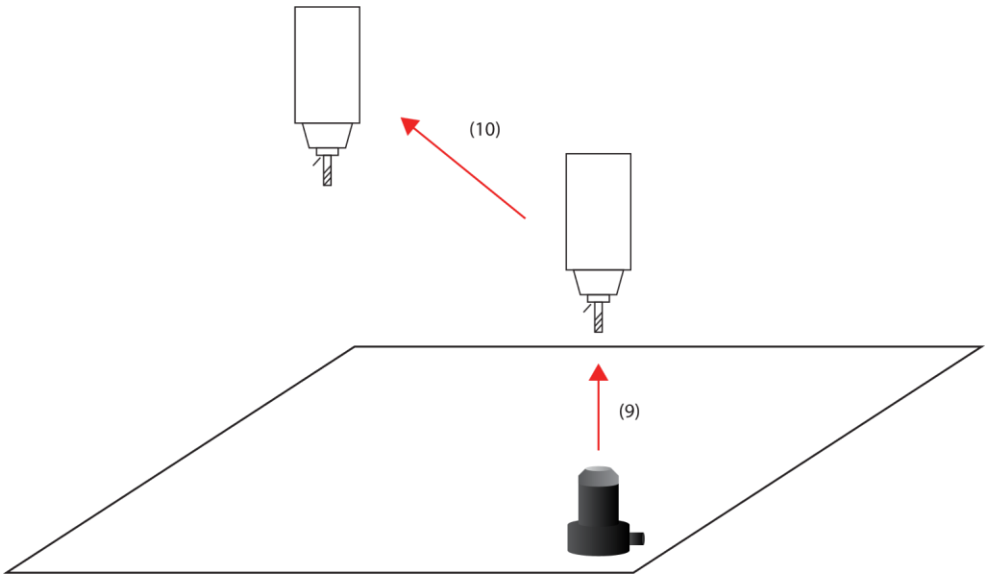
Stage 6, 7:

Z axis will move and touch to the sensor for the second time by the speed established in **#14009**.

After touch the sensor, Z axis will move up a distance established in **#14010**.

Stage 8:

Z axis will move and touch to the sensor for the third time by the speed established in **#14011**.



Stage 9:

After touch the sensor, Z axis will start to return to home position.

Stage 10:

At this time the Macro will use the measurement values of the second and the third time to compare. If the both touch time have the deviation is higher than established value in **#14012**. The controller will announce an error and the value will not be set to the H Offset.

Note:

At stage **(4, 5).** In case Z axis moved the tool head to sensor touch position established in **#14006** but still not touch the sensor. Then the controller will announce an error.

- The issue is the travel limit of #14006 is not correct. The operators need to refer the value established in **#14006**

In case Z axis has raised the tool head by the value established in **#14008** but the probe signal still not disappear. Then the controller will announce an error.

- The issue is the distance to raise the tool head of Z axis is too small or the sensor is having the problem. The operators need to refer the value in **#14008** and the sensor.

At stage **(5, 6).** In case Z axis moved the tool head to sensor touch position established in **#14006** but still not touch the sensor. Then the controller will announce an error.

- The issue is the travel limit of #14006 is not correct. The operators need to refer the value established in **#14010**

In case Z axis has raised the tool head by the value established in **#14010** but the probe signal still not disappear. Then the controller will announce an error.

- The issue is the distance to raise the tool head of Z axis is too small or the sensor is having the problem. The operators need to refer the value in **#14010** and the sensor.

At stage **(7).** In case Z axis moved the tool head to sensor touch position established in **#14006** but still not touch the sensor. Then the controller will announce an error.

- The issue is the travel limit of #14006 is not correct. The operators need to refer the value established in **#14006**

At stage **(10)**

- **Case 1:** Call M100 command
    - The average value will be set to Offset H correspond to the current tool in the spindle
    - Ex: the current tool in the spindle is T5 then the average value will be set to Offset H5
- **Case 2:** Call M100Hxxx command
    - The average value will be set to Offset H correspond to H called before
    - Ex: Call M100H3 then the average value will be set to Offset H3

CHAPTER 4.

PARAMETER INSTRUCTIONS

QS TECHNOLOGY

4.1 AXIS PARAMETER

Parameter	Description	Work range	Default
#0000 - #0007	Axis enable(AX.ENA)	0:Disable – 1:Enable	0
#0008 - #0015	Axis direction(AX.DIR)	0:Disable – 1:Enable	0
#0016 - #0023	Axis soft limit disable feature(AX.SODI)	0:Disable – 1:Enable	0
#0024 - #0031	Axis home direction(AX.HDR)	0: Forward – 1: Reverse	0
#0032 - #0039	Axis home offset(AX.HDRF)	0:Disable – 1:Enable	0
#0040 - #0047	Axis home fast(AX.HFAS)	0:Disable – 1:Enable	1
#0056 - #0063	MPG direction(MPG.DIR)	0: Forward – 1: Reverse	0
#0088 - #0095	Axis pulse logic(AX.PLG)	0: Low level – 1: High level	0
#0128 - #0135	Encoder direction(ENC.DIR)	0:Disable – 1:Enable	0
#4000	Motion corner velocity control model	0 – 5	0
#4001	Motion corner smooth max level	1 - 100	1
#4002	Motion corner smooth min level	1 - 100	1
#4003	Motion ARC refill buffer percent(%)	0 - 50	0
#4010 - #4017	Axis zero digit visible	0 - 99999	0
#4020 - #4027	Axis homing type	0: DOG on 1: DOG off 2: INDEX	0
#4030	Axis home search dog times	0 – 5	0
#4040 - #4047	Axis name	65 – 90	0
#4050 - #4057	Axis sensor type	0: NU type 1: ENC type 2: RULE type 3: ABS type	0
#4060 - #4067	Axis pulse out	0: Pul/Dir type 1: CW/CCW type 2: A/B type	0
#4070 - #4077	Axis backlash	0: Disable 1: Lin GW type 2: Box GW type	0
#4080 - #4087	Axis alarm sensor	0: Disable 1: NC type 2: NO type	0
#4140 - #4147	Axis type	0: Linear 1: Rotary 1 2: Rotary 2	0
#4150 - #4157	Axis encoder port	0: Disable 1: port 1 2: port 2 3: port 3 4: port 4 5: port 5 6: port 6	0
#4160 - #4167	Axis encoder multiply	0: X1 1: X2 2: X4	0
#8010	Init rapid override (%)		3
#8011	Init federate override (%)		5
#8013	Feedrate default (mm/min)		3000
#8080 - #8087	Axis position loop gain (1/sec)		0

#8090 - #8097	Axis dir signal delay (0.1us)		200
#8150, #8152 #8154	Radius minimum limit federate (um) (1st ,2nd ,3rd)		1000/5000/10000
#8151, #8153 #8155	Radius maximum limit federate (um) (1st ,2nd ,3rd)		1000/3000/6000
#8170, #8172 #8174	Segment length limit federate (um) (1st ,2nd ,3rd)		500/2000/6000
#8171, #8173 #8175	Auto interpolation limit rate (mm/min)		2000/4000/6000
#8180 - #8187	Axis short segment acceleration (mm/s/s)		1000
#8190 - #8197	Axis G00 backlash time (ms)		50
#8200 - #8207	Axis G01 backlash time (ms)		50
#12000 - #12007	Axis pitch mount (BLU)		10000
#12010 - #12017	Axis pulse/mm (BLU)		1000
#12020 - #12027	Axis rapid travel acceleration (m/s/s) G00		1000
#12030 - #12037	Axis cutting acceleration (m/s/s) G01		500
#12040 - #12047	Axis max jog rapid (mm/min)		12000
#12050 - #12057	Max jog federate (mm/min)		6000
#12060 - #12067	Axis max auto rapid (mm/min)		12000
#12070 - #12077	Axis max auto federate (mm/min)		12000
#12080 - #12087	Axis loss pulse check window (BLU)		0
#12090 - #12097	Axis homing federate 1st (mm/min)		2000
#12100 - #12107	Axis homing federate 2nd (mm/min)		200
#12110 - #12117	Axis homing federate 3rd (mm/min)		100
#12120 - #12127	Axis home offset (BLU)		0
#12130 - #12137	Axis MPG acceleration (mm/s/s)		1000
#12140 - #12147	Axis MPG max speed (mm/min)		8000
#12150 - #12157	Axis backlash G00 (BLU)		0
#12160 - #12167	Axis backlash G01 (BLU)		0
#12200 - #12207	Axis negative coordinate of stroke limit 1st (BLU)		0
#12210 - #12217	Axis positive coordinate of stroke limit 1st (BLU)		0
#12220 - #12227	Axis negative coordinate of stroke limit 2nd (BLU)		0
#12230 - #12237	Axis positive coordinate of stroke 2nd (BLU)		0
#12240 - #12247	Axis negative coordinate of stroke limit 3rd (BLU)		0
#12250 - #12257	Axis positive coordinate of stroke 3rd (BLU)		0
#12260 - #12267	Axis negative coordinate of stroke 4th (BLU)		0
#12270 - #12277	Axis positive coordinate of stroke 4th (BLU)		0
#12280 - #12287	Axis reference point 2nd (BLU)		0
#12290 - #12297	Axis reference point 3rd (BLU)		0
#12300 - #12307	Axis reference point 4th (BLU)		0
#12310 - #12317	Axis reference point 5th (BLU)		0
#12320 - #12327	Axis reference point 6th (BLU)		0
#12330 - #12337	Axis jogging acceleration (mm/s/s)		1000
#12340 - #12347	Axis gear (Motor side)		1
#12350 - #12357	Axis gear (Screw side)		1
#12360 - #12367	Axis encoder pulse/round		0

4.2 SPINDLE PARAMETER

Parameter	Description	Work range	Default
#0104	RES.CODE	0: Default S.code 1: Last S.code	0
#0120 - #0123	Spindle direction (SPI.DIR)	0: Forward – 1: Reverse	0
#4090 - #4093	Spindle mode	0: Disable 1: 0→10V 2: 0→±10V	0
#8020	Init spindle override (%)	0 → 10	5 (= 50%)
#8030, #8032 #8034, #8036	Spindle(1) – Gear (1,2,3,4) (Motor side)	0 – 999999	1
#8031, #8033 #8035, #8037	Spindle(1) – Gear (1,2,3,4) (Screw side)	0 – 999999	1
#8040, #8042 #8044, #8046	Spindle(2) – Gear (1,2,3,4) (Motor side)	0 – 999999	1
#8041, #8043 #8045, #8047	Spindle(2) – Gear (1,2,3,4) (Screw side)	0 – 999999	1
#8050, #8052 #8054, #8056	Spindle(3) – Gear (1,2,3,4) (Motor side)	0 – 999999	1
#8051, #8053 #8055, #8057	Spindle(3) – Gear (1,2,3,4) (Screw side)	0 – 999999	1
#8060, #8062 #8064, #8066	Spindle(4) – Gear (1,2,3,4) (Motor side)	0 – 999999	1
#8061, #8063 #8065, #8067	Spindle(4) – Gear (1,2,3,4) (Screw side)	0 – 999999	1
#8070 - #8073	Spindle (1,2,3,4) float gear motor speed (rpm)	0 – 999999	1
#12170 - #12173	Spindle (1,2,3,4) min speed (rpm)	0 – 999999	10
#12175 - #12178	Spindle (1,2,3,4) max speed (rpm)	0 – 999999	24000
#12180 - #12183	Spindle (1,2,3,4) motor gain analog mode (rpm/volt)	0 – 999999	1
#12185 - #12188	Spindle (1,2,3,4) init speed (rpm)	0 – 999999	1
#12190 - #12193	Spindle (1,2,3,4) acceleration (ms)	0 – 999999	5000
#12195 - #12198	Spindle (1,2,3,4) deceleration (ms)	0 – 999999	5000
#12370 - #12373	Spindle (1,2,3,4) max frequency pulse mode	0 – 999999	200

4.3 GENERAL PARAMETER

Parameter	Description	Work range	Default
#0064	G54 default (G54.DEF)	0: Disable – 1: Enable	0
#0065	All position clear (POS.CLR)	0: Forward – 1: Reverse	0
#0066	G04 assignment: X(s) – P(ms). (G04.X/P)	0: G04 X 1: G04 P	0
#0072	MTAD.PRO (Available on touch controller)	0: Disable – 1: Enable	0
#0073	MTAD.CRE (Available on touch controller)	0: Disable – 1: Enable	0
#0074	MTAD.MDI (Available on touch controller)	0: Disable – 1: Enable	0
#0080	JOG.ACC	0: Run by cutting speed 1: Run by jog acceleration	1
#0081	CON.FEED		0
#0096	3DP.EAX		0
#0097	NC.CUT	0: Disable – 1: Enable	0
#0098	3DL.FEED		0
#0112	G99/G98	0: Enable G99 & Disable G98 1: Enable G98 & Disable G99	0
#0136	OPK.DISA (Not available on F54 controller)	0: Disable – 1: Enable	0
#4130	Backup battery	0: Disable – 1: Enable	1
#4131	Reset battery alarm	0: Disable – 1: Enable	0
#4132	Touch panel type (Available on touch controller)		
#4133	LCD panel type (Available on touch controller)		
#4134	Touch panel (Available on touch controller)		
#4135	Speaker	0: Disable – 1: Enable	1
#4136	LCD sleep (min)		15
#4137	Wi-Fi function	0: Disable – 1: Enable	0

4.4 USER PARAMETER

Parameter	Description	Work range	Default
#2000 - #2079	User defined 16 bit register		0
#10000 - #10049	User defined 16 bit register		0
#14000 - #14049	User defined 32 bit register		0

4.5 MACRO PARAMETER

Parameter	Description	Work range	Default
#0048	T.Macro	0: Disable – 1: Enable	0
#0049	Macro.M98	0: Disable – 1: Enable	0
#8110 - #8129	M Macro ID	0 – 999 (0: Disable)	0
#8130 - #8149	G Macro ID	0 – 999 (0: Disable)	0