



EDRIVE MOTION CONTROLLER MODEL : XC607

SAFETY INSTRUCTIONS

★★ Before using this control system, please read this manual carefully before proceeding with related operations. Please check the wiring correctly before powering up.

This manual describes the use and operation of this product as much as possible. However, due to different workloads and different working areas, it is impossible to explain all possible operations. Therefore, in order to ensure this product operates normally, while keeping personal and equipment safety, this manual does not state any permitted operations that are considered dangerous.

- **Working environment and protection:**

1. Working environment temperature of this control system is $-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$. When the temperature exceeds ambient temperature, the system may be malfunctioning or crashing. When the temperature is too low, the LCD display will not show normally.
2. Humidity should be controlled at 0-85%.
3. Special protective measures must be taken when working in high temperature, high humidity, corrosive gas environment.
4. Prevent dust, metal dust and other debris from entering the control system.
5. Protect the LCD screen (fragile): keep it away from sharp objects; prevent objects drop on the screen; when the screen is dusty and need to be cleaned, gently wipe it with a soft tissue or cotton cloth.

- **System operation:**

The system is operated fully by buttons, where each button has its own functionality. Please press the buttons with finger, not pressing with nail. Otherwise, the front panel will be damaged and affect your use.

Any first-time operators should understand the controller's working method and the use of corresponding function in the controller before performing any operation. Any functions or parameters that are unfamiliar is strictly forbidden to use or change any system parameters.



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- **System maintenance:**

Operators who does not have any training by the people authorized by the company is advise for not changing any control system for maintenance operations, otherwise they will be responsible for the consequences.

- **System warranty description:**

Warranty period: This product is within 12 months from the date of delivery.

Warranty scope: Any failures that occur during the required permitted operations.

Within warranty period, failures outside the warranty coverage is chargeable.

After the warranty period, all fault repairs are chargeable.

- The following conditions are not covered by the warranty:
 1. Any malfunction or unexpected failure happened during any operations that violates the permitted operations;
 2. Damage caused by the connecting live wires to the terminals without referring to the manual on how to connect wires;
 3. Damage caused by natural disasters;
 4. Damage caused by unauthorized disassembly, modification, repair, etc. without permission.



Chapter 1: System Overview

1.1 System Introduction

XC607 single-axis motion controller features a 32-bit high-performance microprocessor with real-time multitasking control. The maximum speed is 12 m/min. Equipped with liquid crystal display and fully enclosed operation buttons, the system has the advantages of high reliability, high precision, low noise and simple operation.

1.2 Main Functions

Auto : Run automatically, single step operation.

Manual : Two-way spin, return to zero program, return to zero coordinate, digital single step or handwheel, output control.

Program : Edit, read, delete, save the program.

Parameters: system parameters, speed parameters, IO settings, IO self-test, password management.

Instructions: 22 control commands.

1.3 Technical Indicators

- High performance, high speed 32-bit processor
- LCD display: 192*64 resolution
- Dedicated motion control chip: pulse + direction differential output, 200kHz
- Input output: 18 inputs, 8 outputs, 24V full isolation
- Maximum program line: 480 lines, 30 program spaces
- 28 buttons

1.4 Appearance and Panel

- Panel size: length × width × thickness 174 × 94 × 45 mm.
- Opening size: length × width 162 × 84 mm, front panel thickness 5mm.

Chapter 2: Panel and Wiring Instructions

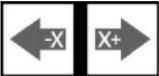
2.1 Front Panel



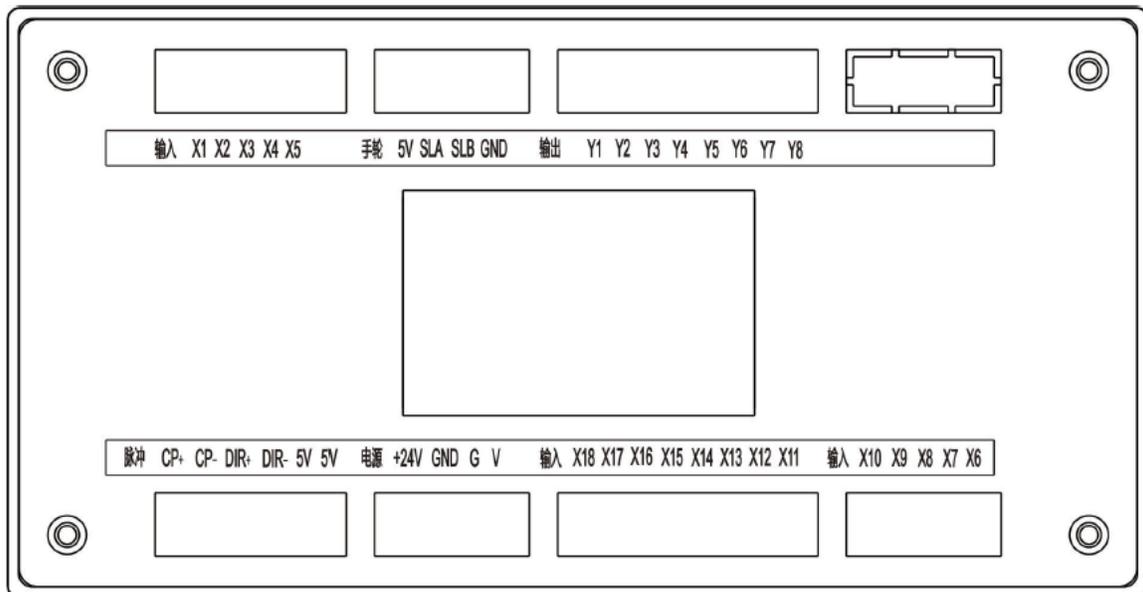
2.2 Button Functions

Button	Description	Remark
	Multiplex key for selecting the corresponding function key to operate	Multi-function button
	Long press for setting the coordinate point is set as the reference point	Multi-function button
	Long press for clearing the workpiece count.	Multi-function button
	Return to the previous interface, the program editing is completed	
	<p>In manual interface: press F key for choosing 1~8 key for controlling output port.</p> <p>In alarm state: Press the F key to clear the alarm.</p> <p>In File Editing: Press and hold the F key to create a new no name empty.</p>	Multi-function button



	<p>The speed can be modified according to percentage under automatic or manual interface.</p> <p>In program editing interface: Switch to another program lines.</p> <p>Quick page turning</p>	
	<p>Controls x-axis movement in manual interface.</p> <p>Moves cursor in other interfaces</p>	
	<p>Moves cursor</p>	
	<p>Clear the number of the item where the cursor is located.</p>	
	<p>Confirming the values in parameter settings and program editor.</p> <p>Confirm some operations</p>	
	<p>Start and pause procedures</p>	

2.3 Back Design



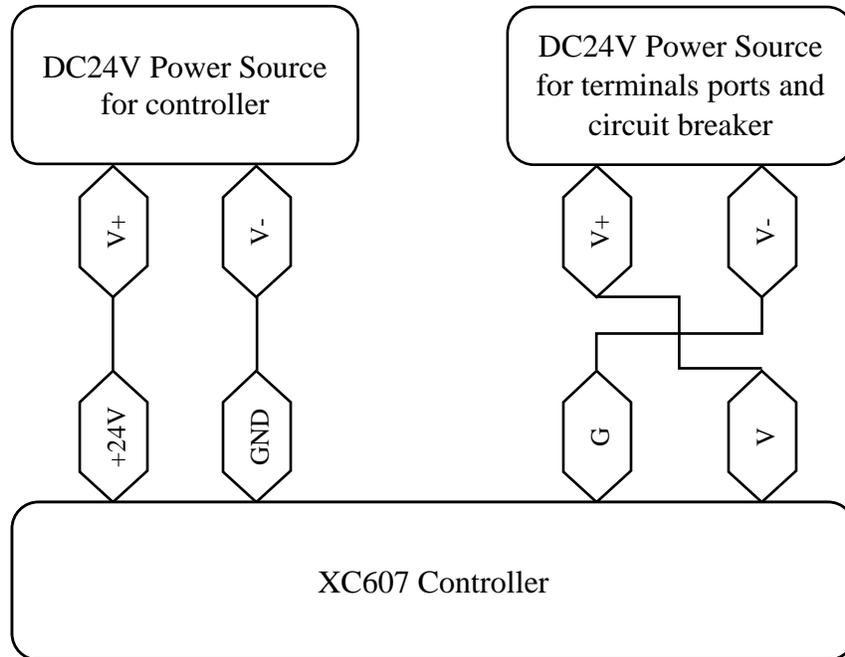


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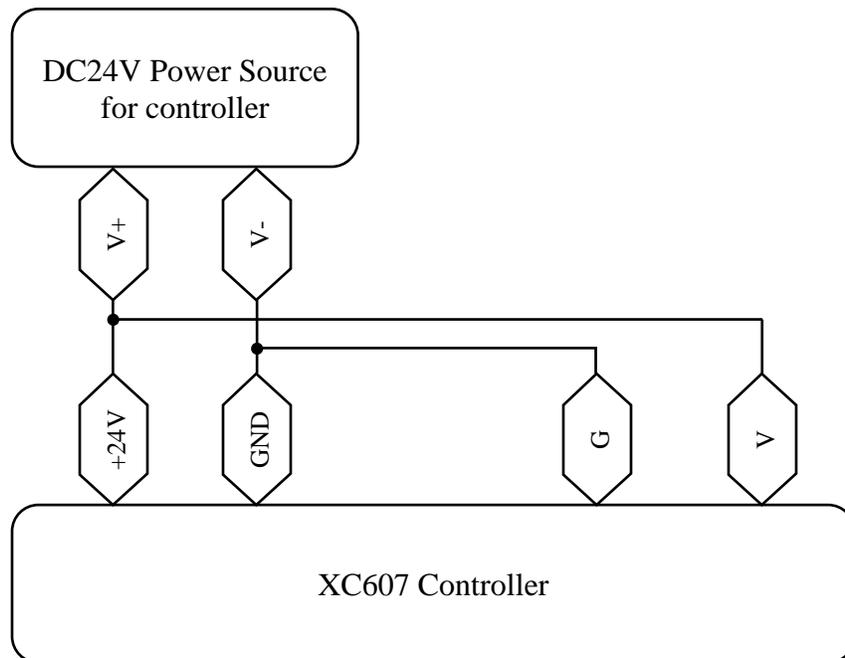
2.4 Terminal Connection

2.4.1 Power Source Connection (+24V, GND, G, V)

Dual Source Connection



Single Source Connection

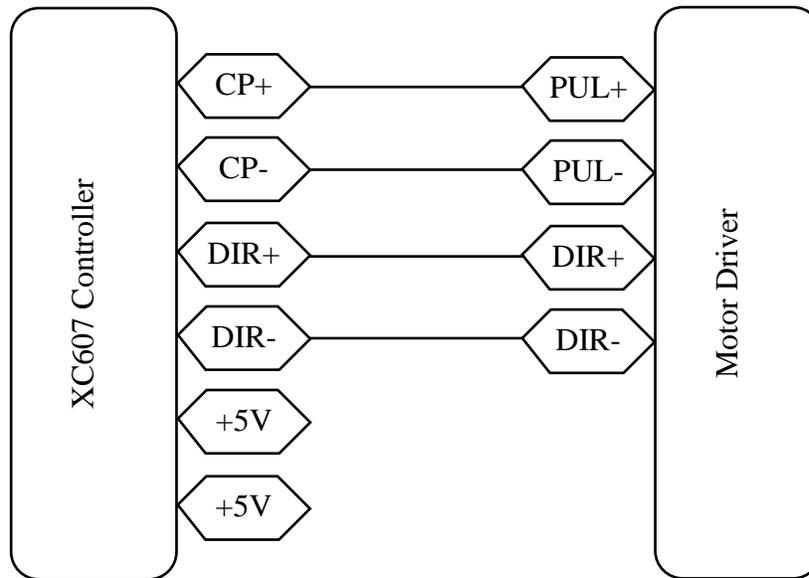




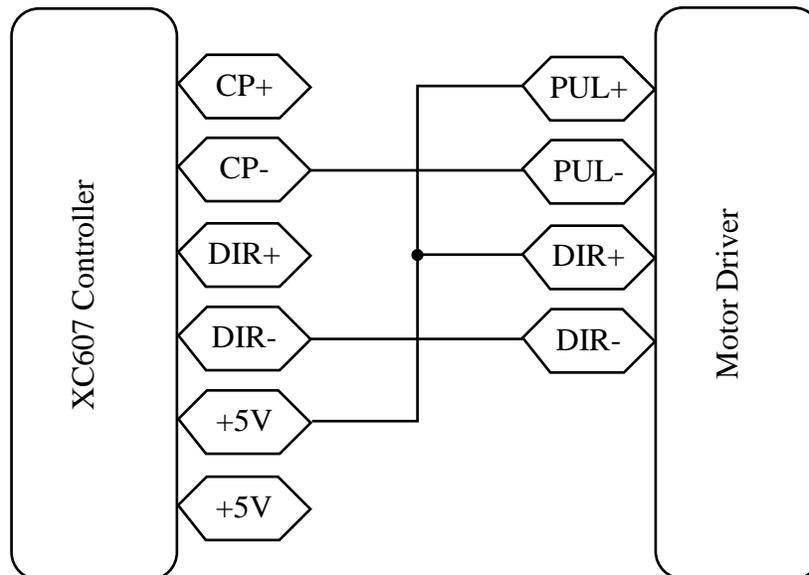
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2.4.2 Motor Driver Connection (+5V, CP+, CP-, DIR+, DIR-)

Different Connections (Recommended)



Common Positive Connection

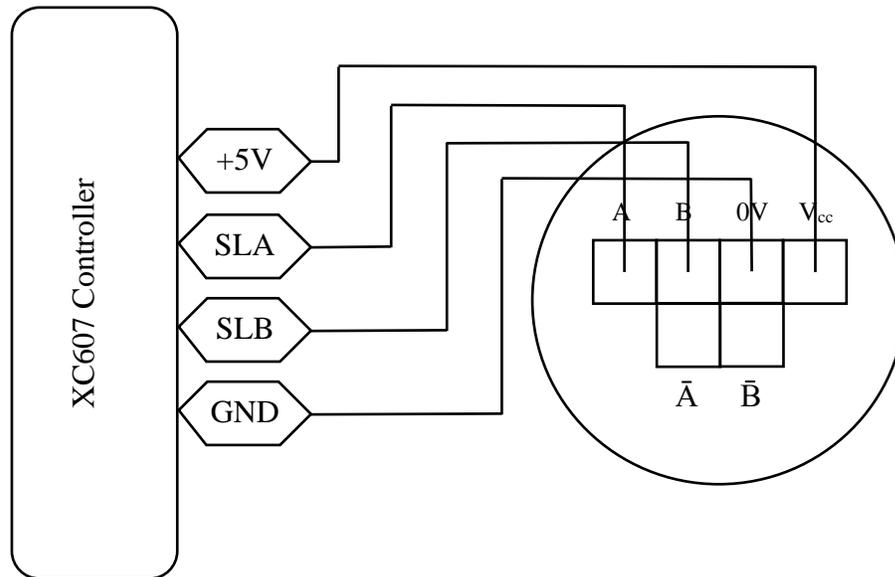




2.4.3 Handwheel Manual Spin

To use handwheel method, open parameter settings > system parameter > control parameter > page down to step handwheel > change step to handwheel.

To control, open jog > step handwheel



2.4.4 Input Terminals (X1 – X18)

Active high input terminals

2.4.5 Output Terminals (Y1 – Y8)

Active low output terminals (single channel maximum output current = 200mA, total output current = 500mA, recommend using external power source to power high power appliances such as solenoid valve)



Chapter 3: Introduction to Operation Interface

3.1 Main Boot Screen

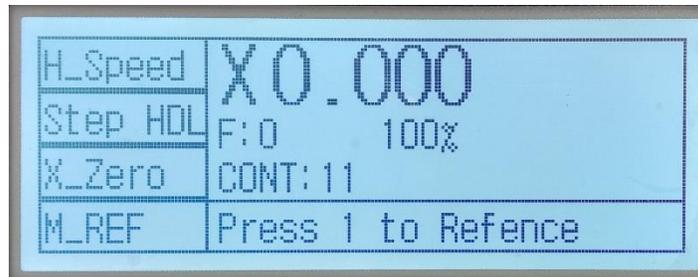
The main interface after powering on the controller.



If the setting is set for automatic return zero when powering, the motor return zero starts.

3.2 Manual Jog Operation

Press **JOG** for entering manual jog interface.



H_Speed: High and low speed switching, both speeds can be set through parameter settings.

Speed HDL: Controls motor jog operation.

X_Zero: Return to saved coordinate point (save current point as zero point) for X axis at high speed.

M_REF: Return to mechanical reference position. After activating this mode, press X+ or X- button to start. (Related parameters: return coordinate zero mode, return coordinate zero direction, return coordinate zero offset. Related control parameters: speed parameter, return coordinate zero high speed, return coordinate zero low speed)



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3.3 Step Handwheel Interface

Press **Step HDL** for entering step handwheel interface. If the parameter is set to step, the motor is set to jog per step, it will enter to this interface.



For controlling the step size, S per jog, press Step+ or Step- for controlling its resolution. Press X+ or X- to run with S as the jog distance.

3.4 Manual Handwheel Operation

For entering manual handwheel interface in **Step HDL**, the parameter needed to be set to handwheel (HDL), where external handwheel setup is installed for manual jog.



Spin the handwheel to jog, press the magnification + or - to increase the resolution.

3.5 Automatic Mode

Press **Auto** for entering automatic execution interface.



In the automatic interface, press **Cycle Start** button to start the program.

Step: Execute one line at once of the program.

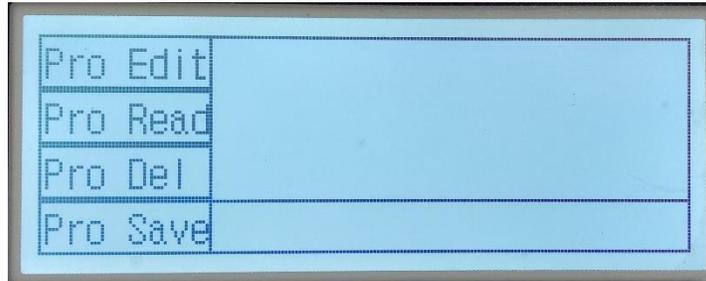
Stop: Stops the program and return to the first line.



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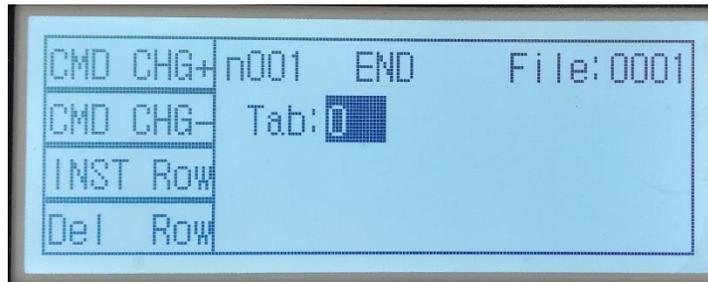
3.6 Program Manager

Press **Program** for entering the program management mode from the main interface.



- Program editor: Create a program input or create a new file (long press button **F** to create a new file).
- Program read: Reads the machining program saved in the controller.
- Delete program: Delete the selected saved program.
- Program Save: Save the current edited file (edited program will not autosave).

3.7 Program Editor



3.7.1 Page explanation

- n001: Current line number, total 480 lines, use **page up** or **page down** to switch to another line
- END: Current program command
- File: Current program name
- Tab: The address of this line, needed for jump, loop and other commands, range: 0 ~ 255



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3.7.2 Program Editing Instructions

CMD CHG+: Switch command instruction in cycle.

CMD CHG-: Reverse switch command instruction in cycle.

INST Row: Insert a command instruction above the current line, the original line is moved to the next line.

Del Row: The current line is deleted, and the following instruction is moved forward.

Pg Dn: Switch to next line of the program.

Pg Up: Switch to previous line of the program.

↑ ↓: Move the cursor. Note that the left and right button does not moves cursor.

Delete: Clear the current parameter value.

Enter: Modify current item that is non-numeric. For example, the output switch is modified by **Enter** button.

After the program is edited, press **Exit** to return to the program management and then use **Program Save** to save the modified program.

F: Press and hold to create a new empty program.

3.8 Parameter Settings

In the main interface, press parameter settings to enter this setting menu.



Before changing any parameter setting, you need to enter the password in [User Login]. The user password: 123456. The parameters cannot be modified without logging in.

Method of operation

Up/Down Arrows used to move the cursor. Use **DELETE** to clear error or incorrect numeric value. Use **ENTER** to change non-numeric value. After modification, save the changes with **SAVE**. Use **EXIT** to exit the interface.



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Parameter settings description

Parameter	Description	Remarks
Language	English, Simplified Chinese	Press ENTER to change
X Plus CCL	The number of subdivision pulses of the stepper motor in one revolution	These two parameters are very important. The numerator / denominator can be approximated.
X Pitch UM	The screw pitch is the length of the motor turns in one revolution, as unit is count in millimeter. If screw pitch is 5mm, the input is 5000. If uses subdivision, the input is set as $360 * 1000 = 360000$	If there is a reducer, the reduction ratio is n/m, the number of pulses is A, and the pitch is B. Numerator/denominator = $(A * n) / (B * m)$
X DIR NG	Modify this parameter if the motor direction is reversed	
X REF Set	Long press button 1 for setting the current coordinates to this parameter	
X Clearance	Backlash value	
Fast MOV	Specify the program command fast motion is relative or absolute, default is set to relative	
Step HDL	Set the Step Handwheel in manual interface on either to jog or manual handwheel mode.	
BMZ POW ON	Set automatically return to position zero after power on	
BMZ Mode	Choose either limit switch, zero position switch for setting as mechanical position zero.	If using limit switch, the position zeroing requires the correct configuration of limit switch. If using zero position switch, the coordinate needs to be set as position zero. The controller will alarm when returning to zero if the input port detected does not match this configuration.



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BMZ DIR	Set return mechanical zero position positive or negative	
BMZ DVT	Set a reverse motion on returning zero position, where the return zero speed is too high, overshoots the preset zero position	If using limit switch as return position zero point, no alarm is heard. Set an offset to make the motor farther away from the limit switch, prevent the limit switch being too close and trigger the alarm
Drill	Drilling command mode G73 or G83 with d parameter	
Drill Delay	Drilling command on stop time after drill until bottom	
SOFT Limit	Disable or enable soft limit detection	
Limit+	If software limit is enabled, alarm is triggered when coordinate is greater than this parameter	
Limit-	If software limit is enabled, alarm is triggered when coordinate is smaller than this parameter	



3.9 Speed parameter



Parameter	Description	Units
Acceleration	Controls acceleration and deceleration. The range is 50 ~ 5000. Reference: 1g=10000 mm/s/s	mm / s ²
X Fast Speed	The speed in automatic program command Fast Move , drilling retraction speed and the maximum speed this system. The maximum speed limits all other speed command and speed multiplier that set higher than this speed.	mm / min
Toggle Speed	The starting speed of motor. If the running speed is lower than this speed, there is no acceleration / deceleration process.	mm / min
Jog H_Speed		mm / min
Jog L_Speed		mm / min
BMZ H_Speed		mm / min
BMZ L_Speed		mm / min

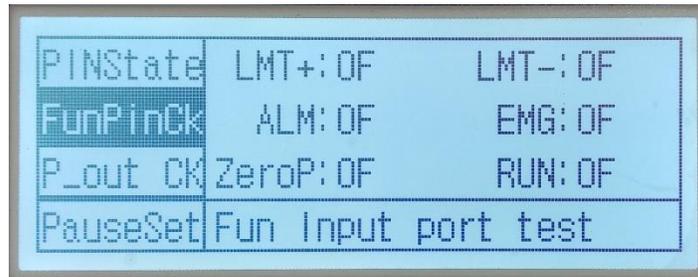
3.10 Input Pin State

Check the status of input port.



3.11 Input Function Settings

Check the status of the input function.



3.12 Output Pin State

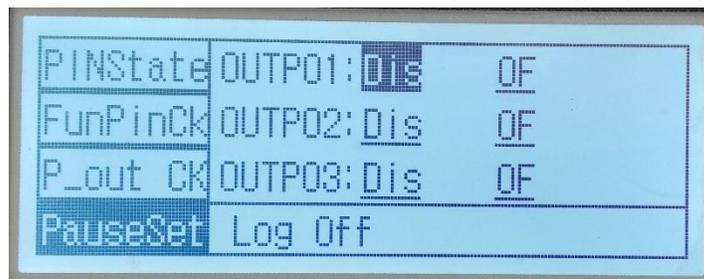
Check the status of output port.



Use the arrow keys and **Enter** key to choose which output port for switching the port status.

3.13 Output Settings

Set output port status when the program is paused.



It is not recommended for not changing the original output, output need to be changed according to the settings state.



3.14 Input Function Settings



Set the input related functions.

Press **Enter** to Enable / Disable function

Press **Enter** to switch Normally open / Normally closed

Input Port XX, range 1~18

Function	Description
P_Limit+	Return zero mode: limit switch. Return zero direction: positive. Thus, the X-axis positive limit must be set
P_Limit-	Return zero mode: limit switch. Return zero direction: negative. Thus, the X-axis negative limit must be set
Zero PI	Return zero mode: zero coordinate switch. Thus, X coordinate position must be set
Alarm PI	Alarm signal for servo drive. Generally, it is normally closed. Servo ALM+ connect to alarm while ALM- connected to ground
Emergency Key	
Reset Key	Used to stop the program
External Run Key	
External Pause Key	
Speed Increment	Used to adjust the speed override multiplier
Speed Decrement	Used to adjust the speed override multiplier
P out 1~8 Jog	Manual jog output
Set Reference Point	Long press 1 for setting a reference point in manual jog interface

3.15 Manual Jog Input Settings



Set the manual jog input related functions. Setting method is the same as 3.14

Function	Description
Jog +	Manual jog forward motion
Jog -	Manual jog backward motion
Jog H+	Manual jog high speed forward motion
Jog H-	Manual jog high speed backward motion
Jog L+	Manual jog low speed forward motion
Jog L-	Manual jog low speed backward motion
BMZ Key	Activate return zero motion
Auto Win*	Change interface to automatic mode
Jog Win*	Change interface to manual mode
BZezo Key	Return to zero position at high speed

*Only can use in **main interface**, **automatic interface** and **manual interface**. Generally, this system uses an external three-position switch, where one of the switch positions can switch to the main interface before switching to program and parameter settings. Do not use normally closed, otherwise it will lock to automatic or manual interface if there is no wire connection.



Chapter 4: Program and Instruction Description

4.1 Program Description

This controller is executed step by step from the first line n001 in automatic mode according to saved program. When the end instruction in the program is executed, the program stops and returns to the first line.

Each program has a maximum of 480 lines and the controller can store 30 programs. The controller automatically enters main interface after powering on.

4.2 Instruction Description

Each instruction contains:

- Line number; e.g. n001 as the first line.
- Tab number; use as the destination line for jumps or loops

e.g. n001 Tab: 10

.....

n008 Jump Tab: 0 Target tab: 10

When program runs until line n008, the controller found tab 10 at line 1, so the program jumps to line n001 to continue the program.

4.3 Command Overview

This controller contains a total of 22 command instructions:

END	Fast MOV	REL MOV	ABS MOV
Set Coor	Delay	Jump	Judg Jump
Loop	Pout OUT	BMZ	Sub Call
Sub Start	Sub END	Speed Mod	Set Cont
Cont INC	Pause	Coor CMP	Drill
Out Wait	Out Delay		



4.4 Detailed Command Instructions

4.4.1 END

Format: nXXX END
Tab: XXX
Function: End of program, and return to the first line.

4.4.2 Fast MOV

Format: nXXX Fast MOV
Tab: XXX X: 1.000
Function: In parameter settings, it can set to relative or absolute.
Relative mode run for X length at high speed on X axis.
Absolute mode run to specified X coordinate at high speed on X axis.

4.4.3 REL MOV

Format: nXXX REL MOV
Tab: XXX X: 1.000 F: 200
Function: Run X length with F speed value, if F is 0, the value remains the same as previous value.

4.4.4 ABS MOV

Format: nXXX ABS MOV
Tab: XXX X: 1.000 F: 200
Function: Run to specified X coordinate with F speed value, if F is 0, the value remains the same as previous value.

4.4.5 Set Coord

Format: nXXX Set Coord
Tab: XXX X: 1.000
Function: Set X to current coordinate. The set coordinate and the difference from mechanical zero are not saved. After returning to machine zero, the coordinates of X are still based on the manually set coordinates.

4.4.6 Delay

Format: nXXX Delay
Tab: XXX Delay: X.XXX
Function: Use to delay the program for a preset time. Unit: seconds



4.4.7 Jump

Format: nXXX Jump
Tab: XXX Targ Tab: NNN

Function: Jump to targeted NNN tab. If the target tab set as 0, proceed to next line of program. If the program needs an infinite loop, jump is programmed in the last line and jumps to the first line.

4.4.8 Judg Jump

Format: nXXX Judg Jump
Tab: XXX Port IN: PN P_in: OFF/ON Targ Tab: NNN

Function: If the input port PN status is specified by the condition P_in, jump to the line where NNN is located. If the condition is not met, continue to run next line instead of waiting. If you need to wait, use pause command. If targeted tab NNN is 0, proceed to next line.

4.4.9 Loop

Format: nXXX Loop
Tab: XXX Loop Cont: C Targ Tab: NNN

Function: The loop is executed C times from the line where tab NNN is located (set 0 for infinite loop), and the line of tab NNN must be in front of the loop instruction. Loop instruction support 4 levels of nesting.

4.4.10 Pout OUT

Format: nXXX Pout OUT
Tab: XXX P_OUT: N1 N2 N3 N4 N5 Status: OFF/ON

Function: Specify the output port status by maximum of 5 output ports at a time. No need to specify 5 at a time, the remaining write 0.

4.4.11 BMZ

Format: nXXX BMZ
Tab: XXX

Function: Return to mechanical coordinate zero according to the direction and mode specified in the parameter, and reset the coordinates

4.4.12 Sub Call



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Format: nXXX Sub Call
Tab: XXX Sub Name: N
Function: Jump to the line where the subroutine starts while the subroutine name is N.

4.4.13 Sub Start

Format: nXXX Sub Start
Tab: XXX Sub Name: N
Function: Entry of the subroutine call.

4.4.14 Sub END

Format: nXXX Sub END
Tab: XXX
Function: Return to subroutine call and continue the next line of subroutine call.

4.4.15 Speed Mod

Format: nXXX Speed Mod
Tab: XXX F: XXX Port IN: PN Stop Judg: OFF/ON
Function: The X axis runs at F speed value, where F is not set and must be entered manually, while this command doesn't change the program's original F speed value. Can be entered with "-" sign for controlling the motor spinning at different direction. If the stop condition is met, the program goes to the next line.

4.4.16 Set Cont

Format: nXXX Set Cont
Tab: XXX Set Value: N
Function: Set counter value to N.

4.4.17 Cont INC

Format: nXXX Cont INC
Tab: XXX Cont DIR Increase/Decrease
Function: Add or subtract one to counter value.

4.4.18 Pause



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Format: nXXX Pause
 Tab: XXX Port IN: PN P_in: OFF/ON Targ Tab: NNN
 Function: Wait for the input port to meet the condition, then jump to the line where tab NNN is located. If it is 0, continue to run the next line.

4.4.19 Coor CMP

Format: nXXX Coor CMP
 Tab: XXX P_in: </==/> AX: X
 VAI: XXX Targ Tab: NNN
 Function: Compare the coordinate values and preset values, if the condition is met, program jump to the line where tab NNN is located. If it is 0, continue to run the next line. If the condition is not met, continue to run the next line.

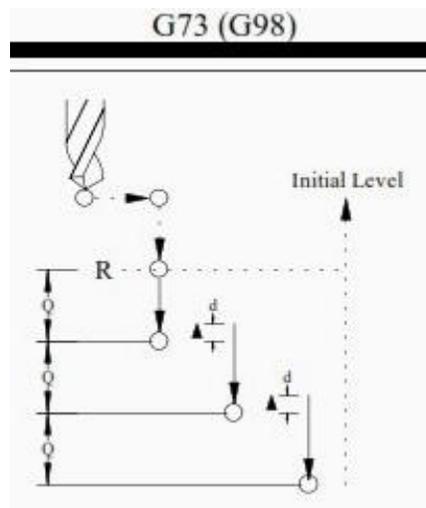
4.4.20 Drill

Format: nXXX Drill
 Tab: XXX MODE: G73/G83/G81 X: XXX
 F: XXX Q: XXX
 Function: Function same as G code G73/G83/G81. X as the bottom hole coordinate, generally set as negative value. F is the processing speed. For Q, in mode G73 G83, the drilling distance of the drill bit is unsigned. If it is 0, the driller drills towards bottom. G81 is ignored.

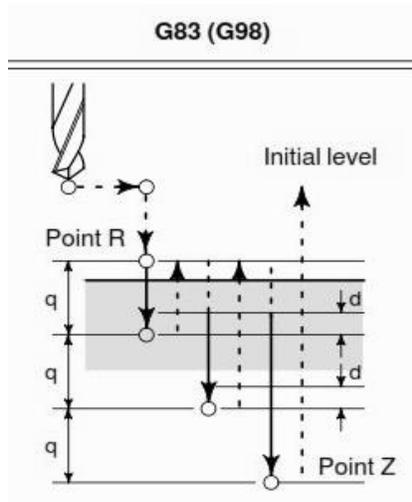
The drilling cycle first moves to the coordinate 0 at high speed, where coordinate 0 must be fixed on the surface of the workpiece.

Processing example. (In the figure d is in the control parameters)

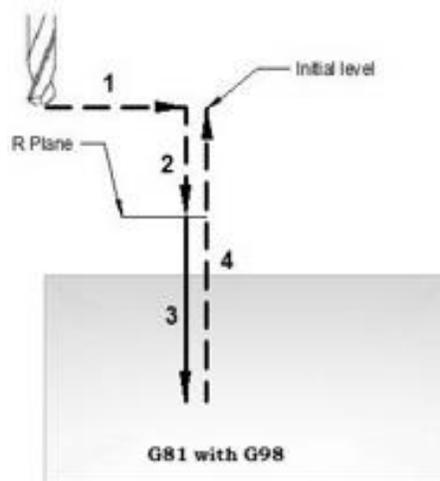
Mode G73



Mode G83



Mode G81



4.4.21 Out Wait

Format: nXXX Out Wait

Tab: XXX P_OUT: PN0 Port IN: PNI WaitP_IN OFF/ON

Function: The output port PN0 is on, waiting for the PNI to meet the condition, When PN0 is off, continue to run the next line.

4.4.22 Out Delay

Format: nXXX Out Delay

Tab: XXX P_OUT: PN0 Delay: T

Function: The output port PN0 is on, waiting for T seconds, PN0 off and continue to run the next line.