CW40 Milling and Engraving CNC System

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Before using this control system, please read this manual carefully and then carry out the relevant operation. Please check if the wiring is correct before powering on! This manual describes the operation of this product as much as possible. However, it is not possible to explain all the permitted and non-permitted operations. Therefore, in order to ensure the normal use of the product and the equipment, operations not stated in this manual is considered not permitted.

Working environment and protection:

The working environment of the control system is -10 degree-50 degree, when the temperature exceeds this system, the system may be working abnormally or even crash. When the temperature is too low, the LCD display will appear abnormally.

Relative humidity should be controlled at 0-85%.

In the high temperature, high humidity, corrosive gas environment, you must take special protective measures.

Please prevent dust, metal dust and other debris into the control system.

Please protect the LCD screen (fragile): to stay away from sharp objects; prevent objects in the air to hit the screen; when the screen needs to be cleaned of dust, gently wipe using soft paper towels or cotton .

System operation: Use the finger belly to press a button, do not press the button with a nail, otherwise it will cause damage to the button mask, and affect your use. Operators who operate for the first time should understand the correct use of the corresponding function before go into operation. For unfamiliar functions or parameters, it is strictly forbidden to operate. Do not change the system parameters at will.

For the operational problems, please contact jiafengqi.xtf@hotmail.com.

System Warranty: 18 months, man made damages are not included.

The following conditions are not covered by the warranty:

Failures caused by not following the instruction

Bad wiring

Damage caused by natural disasters and other reasons;

4. Unauthorized removal, modification and repair.

other matters: if the system does not match the manual, the system software function shall prevail. Changes of functions or improvements (upgrades) in control system are subject to change without notice.

Chapter One Introduction

1. System Introduction

CW40 engraving and milling CNC system supports boring, drilling, milling and high-speed engraving. Using 32-bit high-performance microprocessors, the use of real-time multi-task control technology and hardware interpolation technology, full linkage, the use of forward-looking small line algorithm, 0.001mm interpolation accuracy, the maximum speed of 12 m / min.

CNC system hardware and software features:

★ Based on 32-bit microprocessor, full linkage, 0.001mm interpolation accuracy, the maximum speed of 12 m / min.

★ 3.5-inch color wide screen LCD, resolution 480*320, Windows interface style. Equipped with five soft function buttons, easy to learn. Provide parameter classification, alarm log, system diagnostics and other rich display interface, easy debugging and maintenance.

★ International standard G instruction, compatible with FANUC system instructions.

★ G codes to support the drilling cycle.
★ Support teach-in function.
★ Support tool setting device.
★ Support conditional input.
★ Support program full-screen editing, built-in 256M massive program space, can store N parts program.
★ USB interface, support U disk file reading and writing, data backup and U disk direct processing (DNC).
★ 24 input points, 24 output points (custom), flexible and convenient.
★ Chinese / English operation interface, complete help information, operation more convenient.
★ Using advanced small line algorithm, processing smoothly.
★ Support the rapid operation of the specified location operation, support multi-coordinates system (power-down automatically saved).
★ Support saving of the break point function (in operation, press the pause button to automatically save or power off to save automatically).
★ Support multilevel operation authority, convenient equipment management, with time limit system lock function.
★ support UG, Mastercam, PowerMill, FeatureCAM, ArtCAM, JDPaint, Wentai and other third-party software G code files.

2. Functions Introduction

Basic Functions	
Control number of axes	3 to 4 axes (X, Y, Z, A)
Number of linkage axes	Full linkage
Analog spindle	1
Spindle magnification	10% to 150%
Minimum instruction unit	0.001 mm
Maximum command value	± 99999999 × minimum instruction unit
Fastest feed rate	12000 mm / min
Rapid feed override	F0, 25%, 50%, 100%
Cutting feed rate	12000 mm / min
Feed rate override	10% to 150%
Electronic gear ratio	1 ~ 65535: 1 ~ 65535
Automatic acceleration and deceleration	Yes
Positioning	G00 (linear interpolation)
Interpolation	Straight line (G01), arc (G02 / G03 / G12), helix interpolation
Return to reference point	Automatic return reference point (G28)
LCD	3.5 inch TFT LCD screen with resolution 480X320
MDI software button	Five
Single feed	X1, x10, x100
Communication Interface	U disk interface
External hand wheel interface	Yes
I / O interface	24/24 (expandable to 96/96)
Pause (s)	Yes
Quasi-stop state	Yes
Quasi-stop	Yes

Storage trip check	Yes
MDI operation	Yes, support multi-segment operation
Reset	Yes
Check off switch	Yes
Single run	Yes
Program protection switch	Yes
Self-diagnostic function	Yes
Emergency stop	Yes
power supply	Single phase AC220V + 10% -15%, 50Hz ± 1Hz. DC24V / 1A
Coordinate System	Machine coordinate system (G53), workpiece coordinate system (G52), coordinate plane designation
Automatic coordinate system	Yes
Decimal point input	Yes
Auxiliary function	M code custom defined, manual / MDI / automatic mode control spindle forward, reverse, stop; control coolant start and stop.
Spindle	
Spindle Function	Analog Spindle 0-10v
Edit	
Edit function	Parameter, diagnostic bit-wise input, program editing, MDI
Storage	256M
Number of stored programs	N
The display of the program name	Chinese, English, numbers, combinations
Look up for program line	Yes
Skip optional program lines	Yes
Program switch	Yes
Display	
display	Chinese/ English
Processing time, number of parts	Yes
Spindle speed, M / S command	Yes

Chapter Two Operation

1. Permission Level

The CNC use hierarchical permissions structure, various types of permissions are required for different user groups. Where Class B is the machine manufacturer's authority, and the machine user's permission category is Class C and F, and the permissions are described as follows:

Operation		Permission	Other Conditions
Data	Parameter modification	C	Edit mode, stop status, parameter switch open
	Parameter backup and restore (system internal	C	Edit mode, stop status, parameter switch open
	Parameter backup and recovery (U disk backup)	C	Edit mode, stop status, parameter switch open
Programs	Open	F	Edit mode or automatic mode, stop state
	Create, edit, delete	C	Edit mode, stop state, program switch open
	Program import	C	Edit mode, stop state, program switch open
	Program export	C	Edit mode, stop state, program switch open

System	The system lock time setting and system lock function turning on	B	
	Boot picture loading	B	

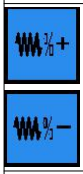
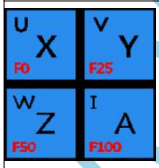
2. Buttons

The upper part are the character number editing buttons.The lower part is editing and axis buttons. In the editing, recording, hand wheel mode, axis selection button is invalid. In home returning, single hand wheel and manual mode, editing buttons are invalid.

2.1 Editing Buttons

	Buttons	Functions
RESET	Reset button	CNC reset, the program ends processing, cancel the alarm, terminate the input and output.
DEL Backspace	Backspace button / delete button	Delete the character behind or in front of the cursor, use shift button to choose.
Insert Modify	Insert / Modify button	Use Shift to choose insert or modify.
ESC	ESC button	Cancel input and close the dialogue box, go back to program interface.
Enter	Enter button	Confirm input and close the dialogue box, go back to program interface. And Program ending mark and new line function.
SHIFT	Shift	Turn on or off Shift function.
	Z axis tool button	Z axis tool setting in manual condition.
	Back to the reference point	Axis go back to reference point manually, Z axis return to safe height. If z axis is higher than safe height, XYA return to reference point first, then z axis return to safe height. If z axis is lower than safe height, z axis return to safe height first, then XYA return to reference point, .
	Set the reference point	Set the reference point of one or all of the axis.
PgUp A+ PgDn Y+	Page up/ page down	In edit or input mode, each press will turn up or down ten program lines. (Shared with the axis function buttons, in the editing and input mode, it is page up and page down, in other modes they are the axis selection buttons)
X+ X- Z+ Z-	Up and down the cursor	Move the cursor to the up, down, right and left.
	Character button	Character input buttons. Press Shift to activate the second functions. The number buttons can control the IO directly in manual mode.

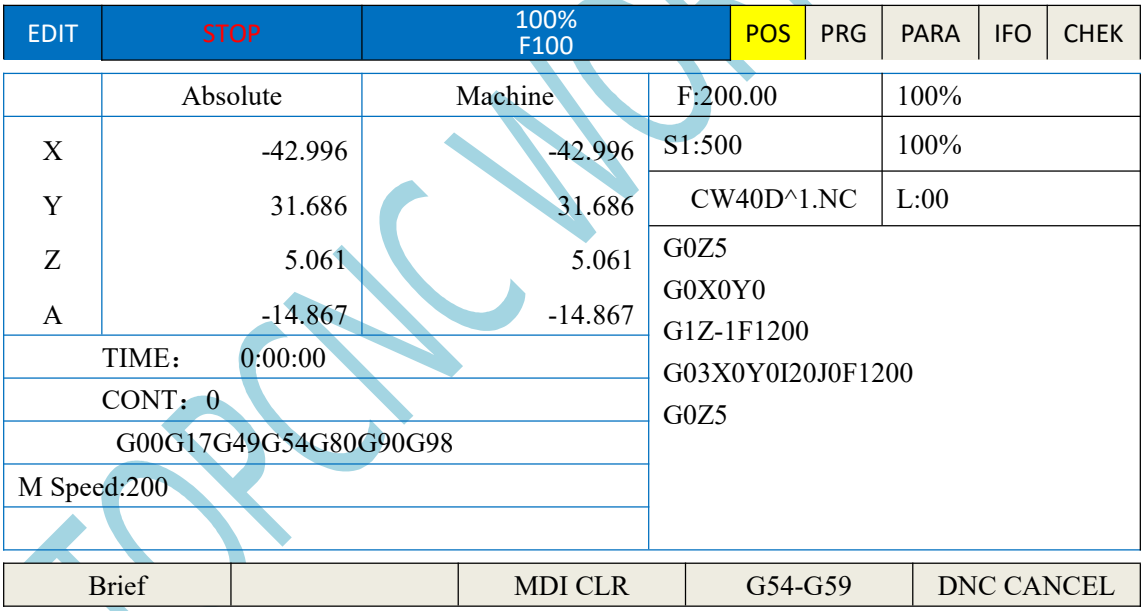
2.2Function Buttons

	Buttons	Functions
	Edit	Editing Mode, press again into teach in mode, the light flashes.
	Auto	Auto mode
	MDI	MDI mode
	Home	Return to Home position
	Single step or hand wheel	Single step or hand wheel mode
	Manual	Manual mode
	Function Switch	Function page switch
	Single Line	In auto mode, the switch for running line by line or run continuously.
	Optional Stop	In auto and MDI mode, when optional stop is activated, the light flashes and M01 will stop the program.
	Clamp	Loosen and clamp fixtures
	Coolant	Turn on and off coolant
	Spindle	Valid in auto, hand wheel or returning to reference point. Switch between spindle clockwise turning and stop.
	Feed Rate	10%--150% 。Manual rate or feed rate, each press will increase or decrease 10%(10%-150%)
	Fast Rate Switch	Change the Feed rate fast(0-100%)
	Spindle Rate	Spindle rate 10%-150%
	Hand Wheel Rate Switch	Manually speed switch. In single hand wheel and single step mode, change between X1,X10 and X100
	Start	Cycle start, auto or MDI program start
	Pause	Feed pause. Auto or MDI program pause

X- X+	X movement or hand wheel selection	In back to reference point, manual and single step mode, axis X move forward or back. In single hand wheel mode, it is the X axis selection button.
Y- PgDn Y+	Y movement or hand wheel selection	In back to reference point, manual and single step mode, axis Y move forward or back. In single hand wheel mode, it is the Y axis selection button.
Z+ Z-	Z movement or hand wheel selection	In back to reference point, manual and single step mode, axis Z move forward or back. In single hand wheel mode, it is the Z axis selection button.
PgUp A+ A-	A movement or hand wheel selection	In back to reference point, manual and single step mode, axis A move forward or back. In single hand wheel mode, it is the A axis selection button.

3. Interfaces

3.1 Main Interface



The main interface shows the absolute coordinates, Machine coordinates, processing time, parts numbers, manual speed, spindle speed and program condition.

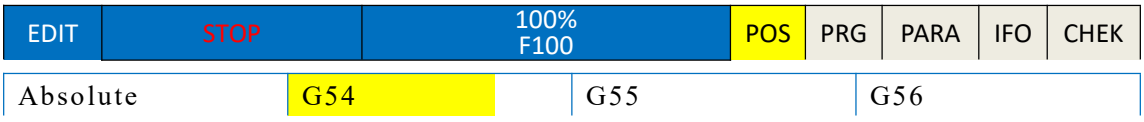
M Speed: manual speed

F: feed rate

S: spindle speed

Use Function key to switch for each function pages.

3.2 Position(POS)



X	-42.996	0.00	0.00	0.00
Y	31.696	0.00	0.00	0.00
Z	5.061	0.00	0.00	0.00
A	-14.867	0.00	0.00	0.00
Machine		G57	G58	G59
X	-42.996	0.00	0.00	0.00
Y	31.696	0.00	0.00	0.00
Z	5.061	0.00	0.00	0.00
A	-14.867	0.00	0.00	0.00

<<	Select	SET ORG	RECT CEN	CIR CEN

Press G54-G59 to enter this interface and set the working coordinates. Press Select to choose and Set ORG to change.

3.2.1 SET ORG

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

	Absolute	Machine
X	-42.996	-42.996
Y	31.696	31.696
Z	5.061	5.061
A	-14.867	-14.867

G54	
X	0.00
Y	0.00
Z	0.00
A	0.00

<<	Select	SET ORG	RECT CEN	CIR CEN

Input: The offset of the coordinate system in machine coordinate.

+Input: Incrementally input the offset of the coordinate system in machine coordinate

Measure: Set the current absolute coordinates(Preferred)

AXIS RD: Read the machine coordinates of the current axis, easy to set the machine zero.

3.2.2 RECT CEN

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

	Absolute	Machine

X	-42.996	-42.996
Y	31.696	31.696
Z	5.061	5.061
A	-14.867	-14.867

G54		
X	0.00	P1X：
Y	0.00	P1Y：
Z	0.00	
A	0.00	P2X：
		P2Y：

<<	X P1	X P2	Y P1	Y P2

3.2.3 CIR. CEN

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

	Absolute	Machine
X	-42.996	-42.996
Y	31.696	31.696
Z	5.061	5.061
A	-14.867	-14.867

G54		
X	0.00	P1X：
Y	0.00	P1Y：
Z	0.00	P2X：
A	0.00	P2Y：
		P3X：
		P3Y：

DNC CANCEL	Line Find	MDI CLR	PRG list	USB List

This page calculates the center of the circle according to three points not in one line in the plane, then set to the work piece coordinate system offset.

3.3 Programs

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

Absolute		F:200.00	100%
X	-42.996	S1:500	100%
Y	31.686	CW40D^1.NC	L:00
Z	5.061	G0Z5 G0X0Y0 G1Z-1F1200	
A-	14.867		

	Machine	G03X0Y0I20J0F1200 G0Z5
X	-42.996	
Y	31.686	
Z	5.061	
A	-14.867	

DNC CANEL	Line Find	MDI CLR	PRG List	USB List

In the program main interface, it shows the current work piece working programs, press PgUp and PgDn to move up or down ten lines.

MDI CLR to clear up all the MDI programs.

Use MDI Board to to make simple MDI program lines for testing. Press 

to move the cursor to the beginning and hit  to run the program. If the cursor is not at the beginning, hitting  will make the programs to run starting from the line where the cursor is at.

Note: if the MDI programs ends with M99, then it will stop but not restart.

3.3.1 PRG List

In this page it shows all the programs stored in the controller. 0000.nc can not be modified or deleted.

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

NC Size

Left Size: 229M PRG:00000.nc

2m/231M

1	00000.nc	0B

<<	New	DEL	SAVE AS	Export

3.3.2 USB List

Press USB DNC to directly run the programs in the USB.

Save2NC to load programs from USB to the controller.

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

USB Size

Left Size: 229M PRG:00000.nc

2m/231M

1	00000.nc	0B

<<	USB DNC	DNC CANCEL	Save2NC	

3.4 Parameters

In this functions, we can set the overall parameters, input, output, direct control configuration and axis parameters.

In parameters, all unit is 0.001, so in G73, 1000 means 1mm.

Press Modify to change parameters.

After changing the language, please reboot the controller.

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

P0001 Buzzer 0:Disable 1:Enable
1 1^1
P0002 Language 0:中文 1:ENGLISH(需要重启)
1 1^1
P0003 Counter save 0:Disable 1:Enable
1 1^1
P0004 Counter Mode 0:Auto 1:Instruction
0 1^1
P0005 Timer Mode 0:Accumulation 1:Single
0 1^1
P0006 Reset OUT Pin 0:Disable 1:Enable
1 1^11

GE PARA	Pin IN	Pin OUT	P2P CTRL	>>

P0001 Buzzer

P0002 Language

P0003 Counter save
P0004 Counter mode
P0005 Timer mode
P0006 Reset OUT Pin
P0007 Program Switch Power On
P0008 Parameter switch Power On
P0009 Access level Power on
P0010 Soft limit before mechanical zero return
P0011 G73 D(0.001)
P0012 G83 d(0.001)
P0013 Z axis Safety Height(0.001)
P0014 Feeler block thickness(0.001)
P0015 Collimation fallback
P0016 Tool collimator position 0 no fixed 1 fixed
P0017 Tool collimator at X axis position(0.001)
P0018 Tool collimator at Y axis position(0.001)
P0019 Tool collimator at Z axis position(0.001)
P0020 Collimation Speed
P0020 Contour Accuracy
P0021 Rapid ACCELERATION(MM/MIN/S)
P0022 Feed ACCELERATION(MM/MIN/S)
P0023 EMS ACCELERATION(MM/MIN/S)
P0024 Feed rate start
P0025 Default feed rate
P0026 F0 of rapid speed
P0027 Hand jog low speed
P0028 0:jog 1: single step
P0029 0: Handle 1: Single hand wheel
P0030 G0 mode 0: Z mode1: Beeline
P0031 G0 delay
P0032 Max center deviation allowed(0.001)
P0033 Clamp short signal time(ms), 0 is long signal time
P0034 Spindle start time(ms)
P0035 Spindle speed at 10V(max speed)
P0036 Spindle default speed

3.4.1 Pin IN

1 ~ 24 input port can be configured as key, limit, alarm, hand wheel axis selection and other functions, 25 ~ 48 is for the expansion of the input port. The expansion of the input port is slow, please do not configure the limit, alarm and other functions need to be promptly detected.

NOPEN means normally open. Press Modify to change into NCLOSE.

Press Modify to change General into other input functions to define the current input port. Such as Emergency stop, reset, start pause, edit, teach in, auto, MDI, return to reference, step, manual coolant, spindle spinning clockwise, spindle spinning counter clockwise, spindle stop, clamp loose, hand wheel, probe protection, spindle alert, axis limit, home switch, and probe input, and Z-CP.

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

P_IN1	General
P_IN2	General
P-IN3	General
P_IN4	General
P_IN5	General
P_IN6	General
P_IN7	General
P_IN8	General
P_IN9	General
P_IN10	General
P_IN11	General
P_IN12	General

GE PARA	Pin IN	Pin OUT	P2P CTRL	>>

3.4.2 Pin OUT

The output port can be configured for spindle cooling, clamping, spindle rotation, the status of three-color lights. Use the key Modify to set the function.

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

P_OUT1	Spindle
P_OUT2	General
P_OUT3	General
P_OUT4	General
P_OUT5	General
P_OUT6	General
P_OUT7	General
P_OUT8	General
P_OUT9	General
P_OUT10	General
P_OUT11	General
P_OUT12	General

GE PARA	Pin IN	Pin OUT	P2P CTRL	>>

3.4.3 P2P CTRL

In this mode, we can set to directly control output in manual mode.

The trigger source can be button or inputs.

Triggering method can be self-locking or jogging.

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

P_OUT1	NO CONTROL	Self-locking

P_OUT2	NO CONTROL	Self-locking
P_OUT3	NO CONTROL	Self-locking
P_OUT4	NO CONTROL	Self-locking
P_OUT5	NO CONTROL	Self-locking
P_OUT6	NO CONTROL	Self-locking
P_OUT7	NO CONTROL	Self-locking
P_OUT8	NO CONTROL	Self-locking
P_OUT9	NO CONTROL	Self-locking
P_OUT10	NO CONTROL	Self-locking
P_OUT11	NO CONTROL	Self-locking
P_OUT12	NO CONTROL	Self-locking

GE PARA	Pin IN	Pin OUT	P2P CTRL	>>

3.4.4 Axis Parameters

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

P0185 X axis motor pulses per rotation circle
1 1~999999999
P0186 x axis length per rotation circle(0.001)
1 1~999999999
P0187 x axis rapid(G0) speed
8000 1~999999
P0188 x axis Feedrate max
8000 1~999999
P0189 x axis JOG fast speed
8000 1~999999
P0190 x axis fast speed of return Reference Point
1000 1~999999

<<	X PARA	Y PARA	Z PARA	>>

Please see the following formula for electric ratio

Example 1/: Screw Transmission.

Stepper motor is 800 ppr, or servo motor is 800 pulses per complete 360 Degree rotation. (=N)

Lead Screw / Ball Screw pitch is 0.2 mm (=P [* 1000])

Reduction ratio is 1:1. (=R)

Formula: Gearing Ratio = N / (P * R)

Then for N = 800 P = (0.2 * 1000), R = 1:1.

800/ (0.2 * 1000 * 1) = 4/ 1

Example 2/: Rack and Pinion.

Stepper motor is 6000 ppr, or servo motor is 6000 pulses per complete 360 Degree rotation. (=N)

Pinion Gear has 20 teeth. (=G) Module(=M) is 2

D = N/ G*M* π *1000, given that D = 6000 / 20*2*3.1415926535898 *1000→ D = 107 / 2241

Example 3/: Rotary Angle

Stepper motor is 5000 ppr, or servo motor is 5000 pulses per complete 360 Degree rotation. (=N)

Reduction ratio of gearbox is 1:30. (=R)

Then: Angle A = N * R / (360 * 1000)

Therefore A = 5000*30 / 360 * 1000 → A = 150000 / 360000 = 15 / 36

Axis Parameters includes(take X axis as example)

P0185 X axis motor pulse per rotation circle

P0186 X axis length per rotation circle(0.001)

P0187 X axis rapid (G0) speed

P0188 X axis feed rate max

P0189 X axis jog fast speed

P0190 X axis fast speed of return reference point

P0191 X axis low speed of return reference point

P0192 X axis DIR 0: Forward 1: Reverse

P0193 X axis backlash compensation(0.001)

P0194 X axis soft limit minimum(0.001)

P0195 X axis soft limit max(0.001)

P0196 X axis shift after return to reference point(0.001)

P0197 X axis return to reference point direction 0: Forward 1: Reverse

P0198 X axis return to home method

0: reference+Z pulse 1: reference 2: limit+ z pulse 3: limit 4: z pulse 5: Dis

3.5 Information

This part will show alarm information, system management, break point information and logo loading function.

Usually press Reset to unlock the alarm, if it does not work, reboot the controller.

EDIT	STOP	100% F100	POS	PRG	PARA	IFO	CHEK

ALARM NO.	Content

ALARM MG	SYS MG	BREAK INFO	LOGO IM	

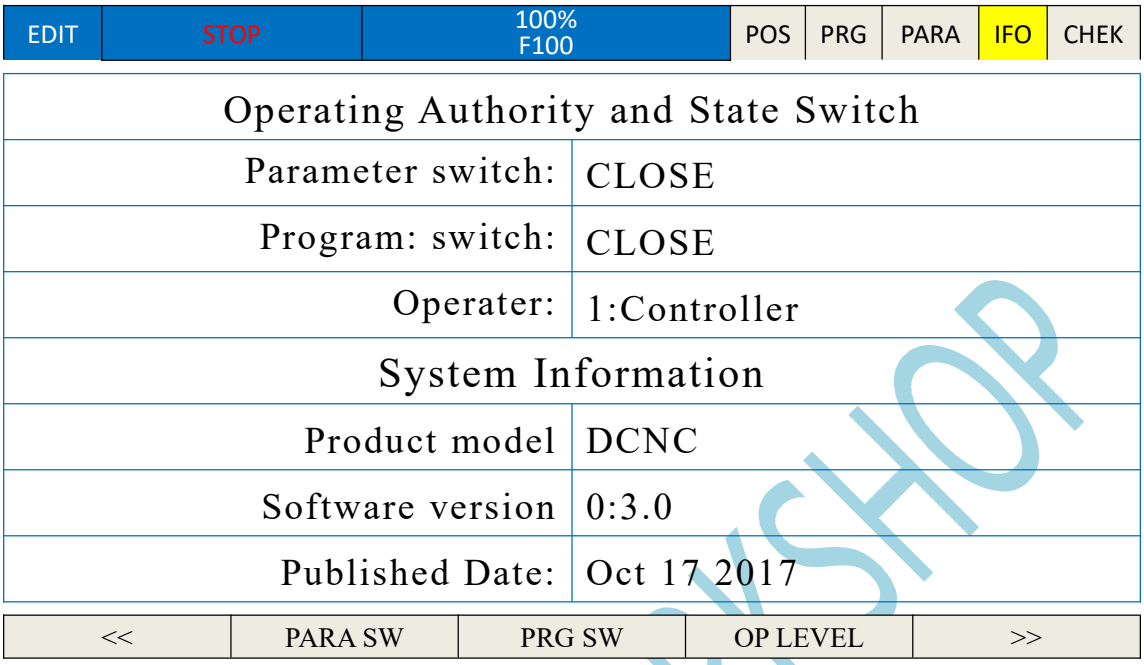
3.5.1 System MG

Parameter and program switch enable user to change parameters and programs.

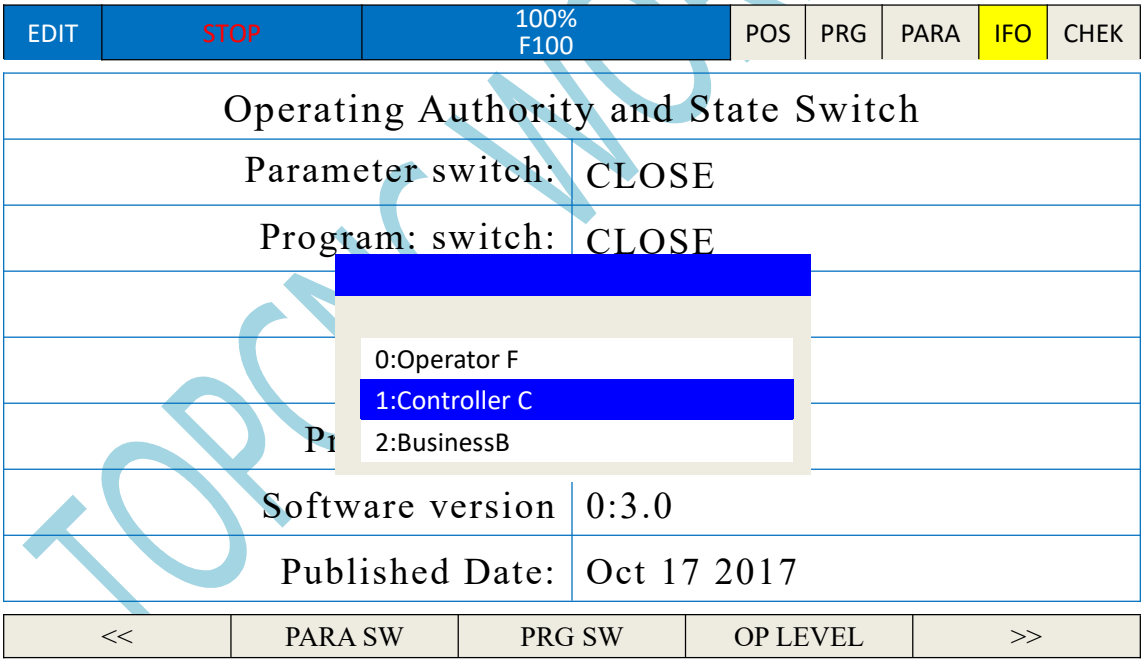
F level does not need code, defaulted code for B and C level is 888888.

Moving to higher level requires the code, while moving to lower level does not need one.

From high to low level is B, C and F.



Press OP LEVEL and to change the operation level.



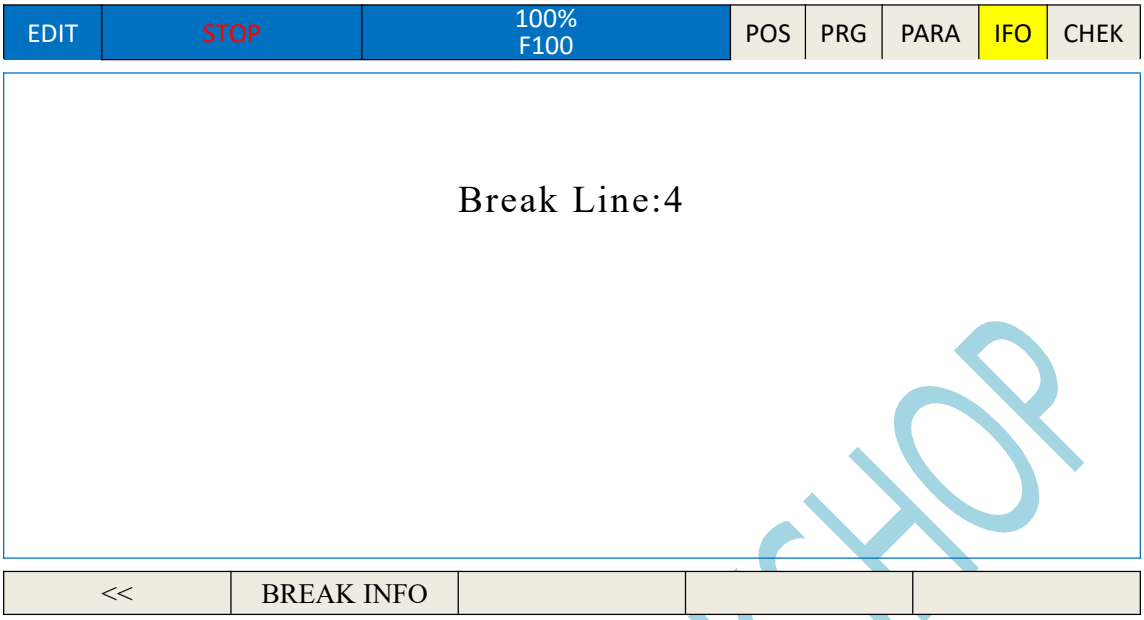
3.5.2 Logo Import

Changing of logo requires B level permission. Make the picture as bmp format, size 480*320. Name it start.bmp and save it in the USB. Press LOGO IM to change the boot picture.

Note: You must always use the right format of picture. if you use the wrong format, the controller will intrigue an self protecting scheme and you will never change the boot picture anymore.

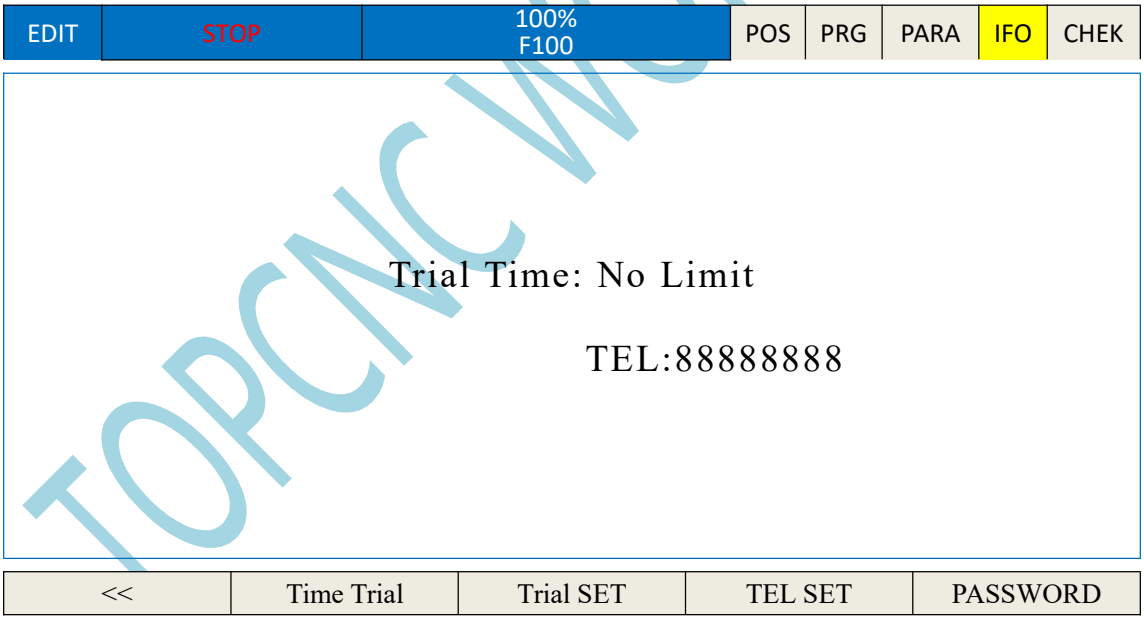
3.5.3 Break Information

Check the program line last operated. Use this to continue the operation if the program is stopped accidentally.



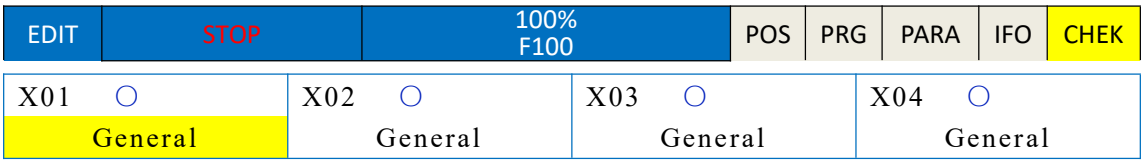
3.5.4 Time Lock

Changing of the test time of the controller will require a B level. Do not forget the B level code once you change it. If the test time is up, contact the seller of yours to give the code.



3.6 Check(Diagnosis)

This part include input and output diagnosis.



X05 ○ General	X06 ○ General	X07 ○ General	X08 ○ General
X09 ○ General	X10 ○ General	X11 ○ General	X12 ○ General
X13 ○ General	X14 ○ General	X15 ○ General	X16 ○ General
X17 ○ General	X18 ○ General	X19 ○ General	X20 ○ General
X21 ○ General	X22 ○ General	X23 ○ General	X24 ○ General

PIN View	POUT View							
EDIT	STOP	100% F100		POS	PRG	PARA	IFO	CHEK

Y01 ○ General	Y02 ○ General	Y03 ○ General	Y04 ○ General
Y05 ○ General	Y06 ○ General	Y07 ○ General	Y08 ○ General
Y09 ○ General	Y10 ○ General	Y11 ○ General	Y12 ○ General
Y13 ○ General	Y14 ○ General	Y15 ○ General	Y16 ○ General
Y17 ○ General	Y18 ○ General	Y19 ○ General	Y20 ○ General
Y21 ○ General	Y22 ○ General	Y23 ○ General	Y24 ○ General

<<	POUT View	SWITCH	CLOSE ALL	

4. Manual Operation

4.1 Machine Zero

Press  and now the system is in home mode. The light is on. Then press X+, X-,Y+,Y-, Z+,Z-, A+,A- to go back to home position. 3 axis at most can do this operation at the same time.

4.2 Manual Mode

Press  and now the system is in manual mode. The light is on.Then press X+, X-,Y+,Y-, Z+,Z-, A+,A- continuously to make the axis move accordingly. Stop press the button and the movement will be stopped immediately. Press 

to switch between manual low speed(set in GE PARA) and high speed. In manual high speed mode, press 

to switch speed rate.

4.3 Single Step or Hand Wheel Mode

Press  to enter single step mode if P0028 parameter is 1; to enter hand wheel mode when P0028 is 0. Then press X+, X-,Y+,Y-, Z+,Z-, A+,A- to make the axis move accordingly. Each press will make the axis to move the smallest programming unit. Press 

to make it multiply by 10, 100 and 100 times, which is X1, X10 and X100.

4.4 Teach-in

Teach in programming can be easily programmed to write some programs that is not necessarily very accurate, you can automatically enter the absolute coordinates.

Press 

and the teach-in lights flashes, and the manual mode will be automatically activated.

You can also press  to switch to hand wheel. Axis choosing and edit dual function buttons act as axis choosing when the manual light is on. If it is single hand wheel mode, then it is also axis choosing button; but if it is hand-held hand wheel, then the buttons serve for editing function. Teach-in programming must be absolutely programming. When hit the character buttons X, Y, Z, A, I, J, K, if the corresponding axis is valid, it will automatically add the current absolute coordinates. If you press [ESC], all valid axis positions are entered at once.

When teach-in programming is used for arc programming, only 3-point circular interpolation code G12 can be used because the increment coordinates can not be entered. During Teach-in, non-effective axis buttons are no difference than they are in the editing mode and can be used like always

4.5 Auto Operation

This controller supports Auto operation and MDI operation.

A program can be edited directly on controller, or import from USB, or use USBDNC to run programs in the USB.

MDI operation is used for test or for running programs only has a few code lines(smaller than 200KB)

▲ How to stop an auto operation

Program the stop codes, including M00, M01 M02/M30

M00: After the line with M00 is executed, auto operation stops and all modal information is saved, Press cycle start to run the program again.

M01: When quasi stop switch is on, then M01 is the same with M02; when the quasi stop switch is off, then M01 is invalid.

M02: After the line with M02 is executed, the main program stops and the cursor stops at the current program lines.

M30: After the line with M30 is executed, the main program stops and the cursor stops at the beginning of the program lines. The spindle and coolant close.

▲M99 of the main programs

When programs are running, if there is M99 in the main programs, after this line is executed, the program will skip to the beginning of the program and keep running. The counter will add one and keeps running the main programs. If number L is set, then the program will be run by L times.

5. G Code and M Code List

5.1 G Code

G Code	Level	Functions
G00 *	01	Fast positioning, the speed according to the speed parameter G0 speed operation.
G01		Linear interpolation, run by given F
G02		Clockwise interpolation, the speed according to the given F, if there is a non-plane axis, according to the spiral interpolation operation
G03		Counterclockwise circular interpolation, the same as above
G12		Over the middle point of the circular interpolation, used in teach in function
G04	00	Delay, parameter X in seconds, parameter P in milliseconds, resolution 5 ms
G17 *	02	Circular interpolation plane selection XY
G18		Circular interpolation plane selection ZX
G19		Circular interpolation plane selection YZ
G28	00	Return to the reference point (back to mechanical zero), involving the parameters of speed, return direction and mode
G52	00	Local coordinate function
G53		Machine coordinate positioning
G54 *	06	Work piece coordinate system 1
G55		Work piece coordinate system 2
G56		Work piece coordinate system 3
G57		Work piece coordinate system 4
G58		Work piece coordinate system 5
G59		Work piece coordinate system 6
G73	07	High speed deep hole machining cycle
G80 *		Fixed cycle is canceled
G81		Drilling cycle (point drilling cycle)
G82		Drilling cycle (boring stepped air circulation)
G83		Deep hole drilling cycle
G85		Boring cycle
G86		Drilling cycle
G89		Boring cycle
G90 *	08	Absolute programming
G91		Incremental value programming
G92	00	Setting work piece coordinate, in the absence of a mechanical return to zero, it will offset all work coordinate

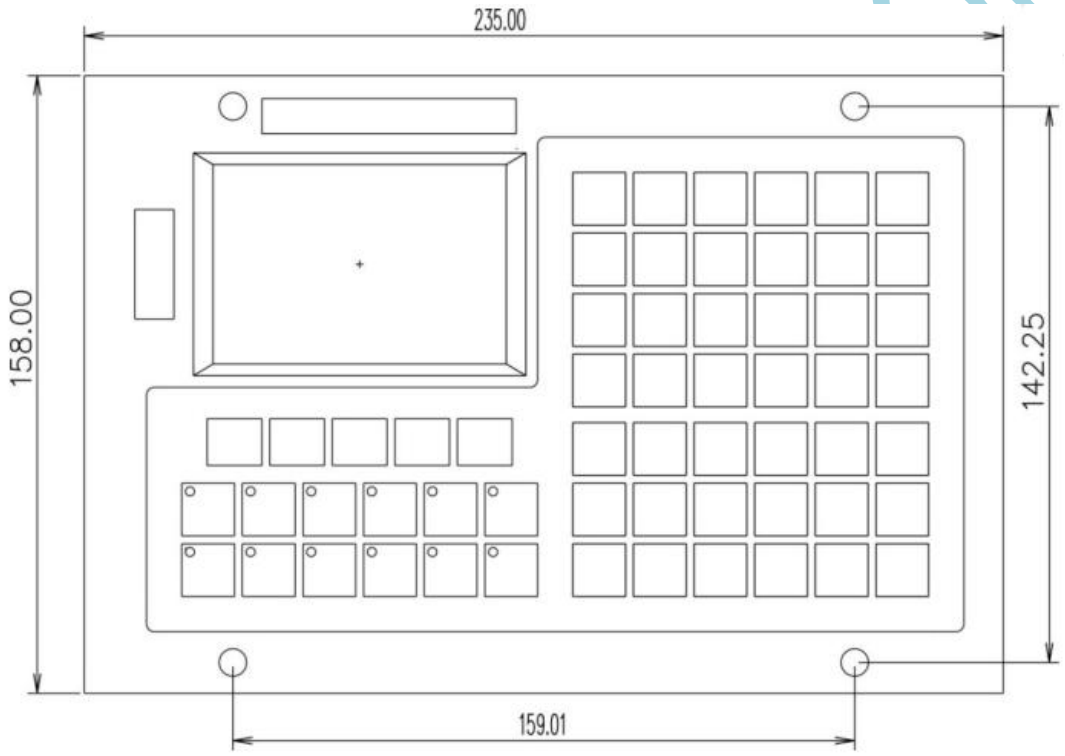
G93		Set the machine coordinates, please use carefully if there is a soft limit
G98 *	9	The fixed cycle returns to the initial plane
G99		The fixed cycle returns to point R

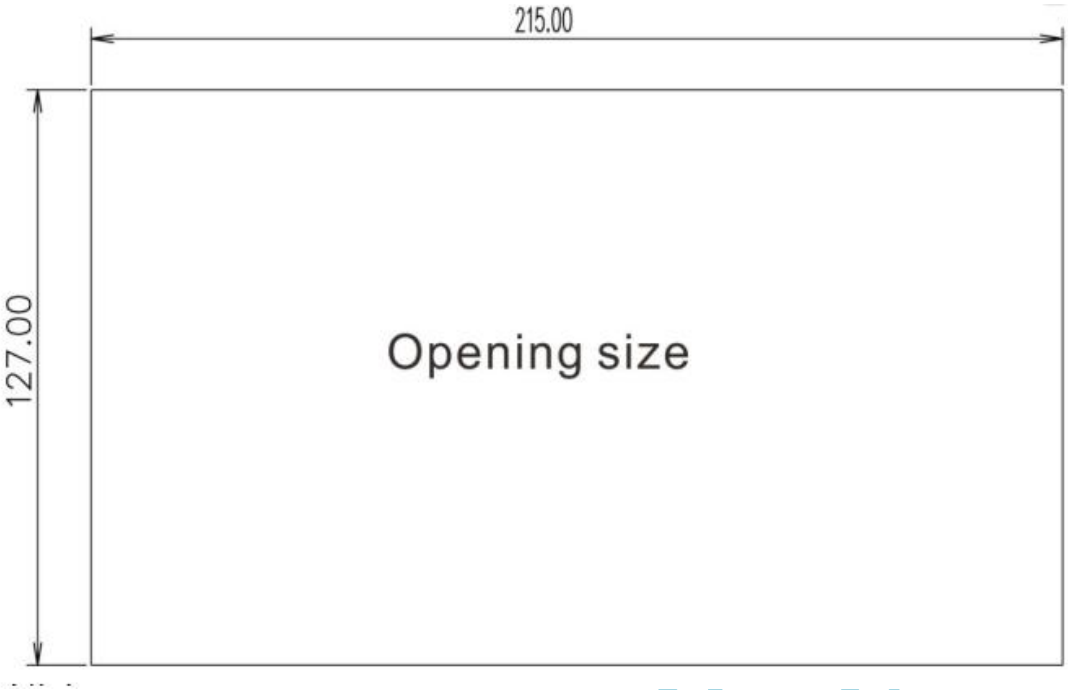
5.2 M-Code

Name	Function
M00	The program is paused and press the "cycle start" program continues
M01	Quasi-stop, if the Quasi stop light is on, the program stops
M02	The program stops
M03	Spindle 1 forward
M04	Spindle 1 reverses
M05	Spindle 1 stops
M08	Coolant open
M09	Coolant off
M10	Clamp
M11	release
M13	Spindle 2 forward
M14	Spindle 2 reverses
M15	Spindle 2 stops
M30	The program ends and the program returns to the beginning
M64	Count plus one
M65	The count is cleared
M70	Wait for input port, output port or auxiliary relay invalid. Example: M70 X12 input port; M70 Y1 output port; M70 Z1 auxiliary relay;
M71	Wait for input port, output port or auxiliary relay Valid. Example: M71 X12 input port; M71 Y1 output port; M71 Z1 auxiliary relay;
M72	Skip when input port, output port or auxiliary relay is invalid. Example:M72 Xxx Pn input port;, M72 Yxx Pn output port; M72 Zxx Pn auxiliary relay;
M73	Skip when input port, output port or auxiliary relay is valid Example:M73 Xxx Pn input port;, M73 Yxx Pn output port; M73 Zxx Pn auxiliary relay;
M74	Waiting for input, output, or auxiliary relay falling edge
M75	Waiting for input, output, or auxiliary relay rising edge
M76	Absolute skip example: M76 P1
M80	Output port or auxiliary relay OFF. example: M80 Y12
M81	Output port or auxiliary relay on. Example: M81 Y12

M82	Output port or auxiliary relay gives output for a period of time then close off. Example: M82 Y12 P1000 (milliseconds)
M83	Output port or auxiliary relay gives output and close off when an input port is valid Example: M83 Y12 X13
M84	Output port or auxiliary relay gives output and close off when an input port is invalid Example: M84 Y12 X13
M98	Call subprogram. Note that the subprogram name format should be Oxxxx.nc and x is the number
M99	Subprogram or macro return. If used in the main program, the program loops from the beginning

6. Installment Size(mm)

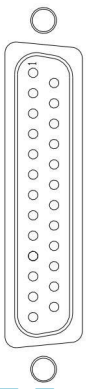




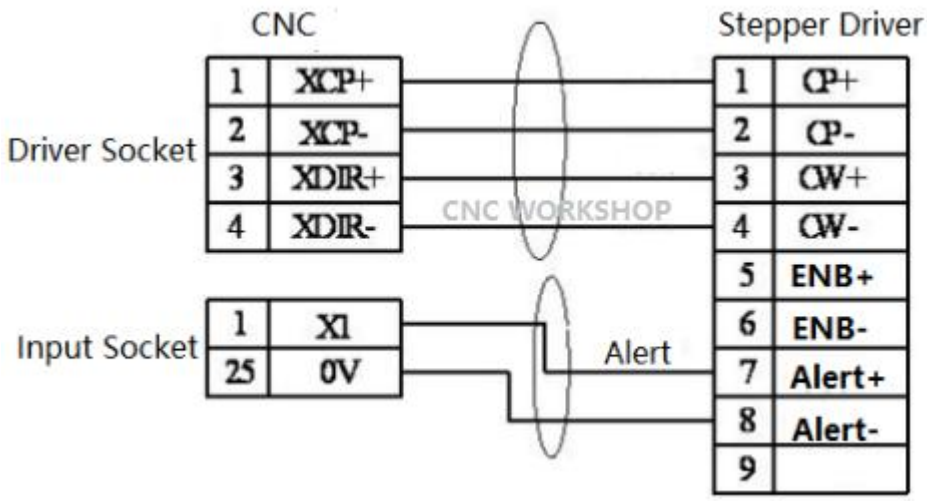
7. Wiring Diagram

7.1 Driver Connection

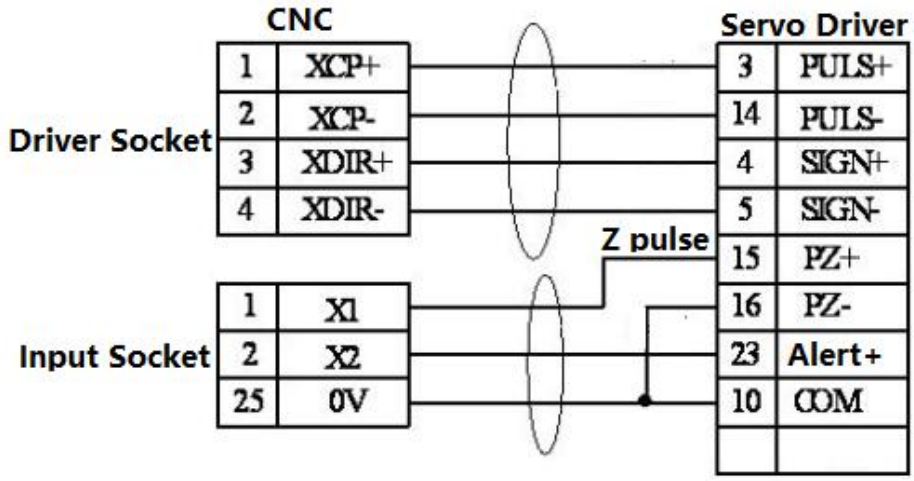
7.1.1 Driver Socket

Socket	Pin	Signal	Functions
 DB type 25 hole socket(driver)	1	XCP+	X Axis Pulse+
	2	XCP-	X Axis Pulse-
	3	XDIR+	X Axis Direction+
	4	XDIR-	X Axis Direction-
	5	YCP+	Y Axis Pulse+
	6	YCP-	Y Axis Pulse-
	7	YDIR+	Y Axis Direction+
	8	YDIR-	Y Axis Direction-
	9	ZCP+	Z Axis Pulse+
	10	ZCP-	Z Axis Pulse-
	11	ZDIR+	Z Axis Direction+
	12	ZDIR-	Z Axis Direction-
	13	ACP+	A Axis Pulse+
	14	ACP-	A Axis Pulse-
	15	ADIR+	A Axis Direction+
	16	ADIR-	A Axis Direction-
	25	5V	backup 5V

8.1.2 Stepper Motor Connection

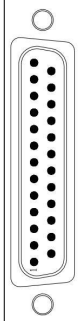


7.1.3 Servo Motor Connection



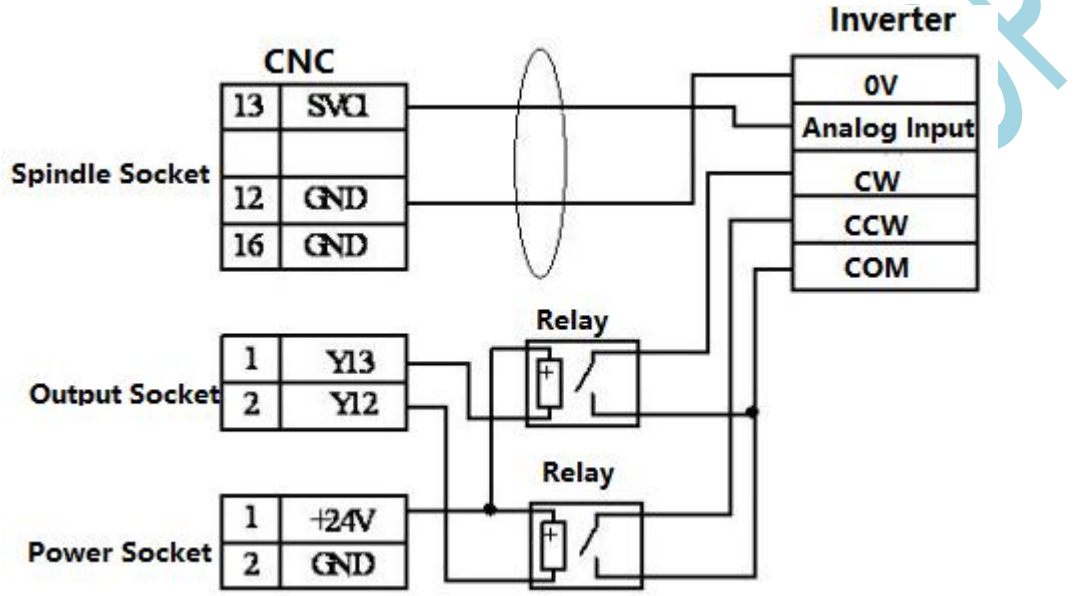
7.2 Spindle Connection

7.2.1 Spindle Socket

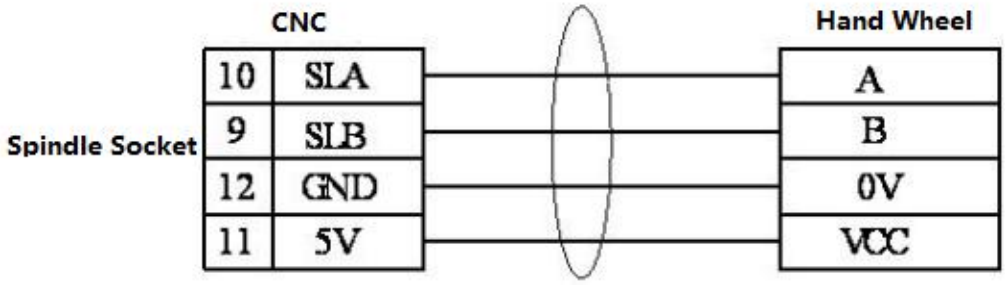
Socket	Pin	Signal	Functions
 DB type 25 hole(Spindle	1	X13	Input 13(Functions can be chosen)
	8	GND	Power Supply -
	9	SLB	Hand wheel B phase pulse input
	10	SLA	Hand wheel A phase pulse input
	11	5V	+5V Power Supply Output
	12	GND	Power Supply -
	13	SVC1	Analog voltage 0-10V output
	14	485A	RS485
	15	485B	RS485
	16	GND	Power Supply -
	17	X22	Input 22 (Functions can be chosen)

and others)			
	18	X21	Input 21(Functions can be chosen)
	19	X20	Input 20(Functions can be chosen)
	20	X19	Input 19(Functions can be chosen)
	21	X18	Input 18(Functions can be chosen)
	22	X17	Input 17(Functions can be chosen)
	23	X16	Input 16(Functions can be chosen)
	24	X15	Input 15(Functions can be chosen)

7.2.2 Spindle Connection



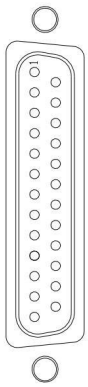
7.2.3 Hand wheel Connection



7.3 Input Connection

7.3.1 Input Socket

Socket	Pin	Signal	Functions
	1	X01	Input 1 (Functions can be chosen)
	2	X02	Input 2 (Functions can be chosen)
	3	X03	Input3 (Functions can be chosen)
	4	X04	Input 4 (Functions can be chosen)

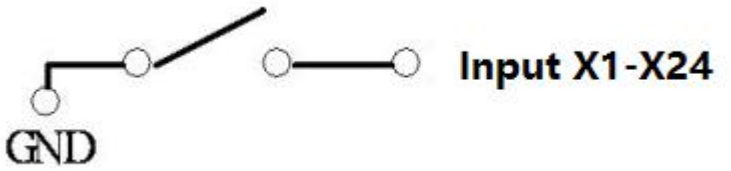


DB type 25 hole (Input)

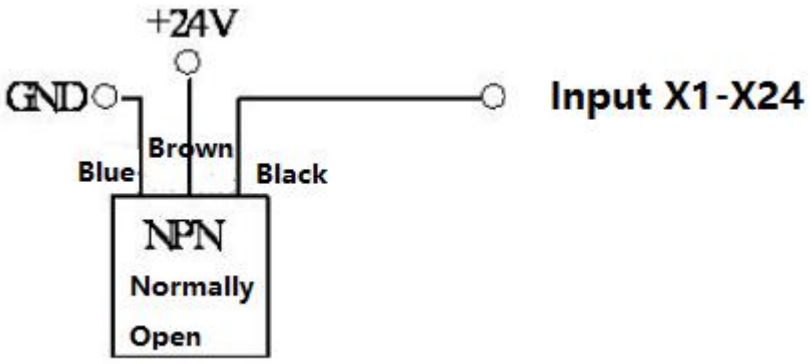
5	X05	Input 5 (Functions can be chosen)
6	X06	Input 6 (Functions can be chosen)
7	X07	Input 7 (Functions can be chosen)
8	X08	Input 8 (Functions can be chosen)
9	X09	Input 9 (Functions can be chosen)
10	X10	Input10 (Functions can be chosen)
11	X11	Input 11 (Functions can be chosen)
12	X12	Input 12 (Functions can be chosen)
13	X13	Input 13(Functions can be chosen)
14	X14	Input 14 (Functions can be chosen)
15	X15	Input 15 (Functions can be chosen)
16	X16	Input 16 (Functions can be chosen)
17	X17	Input 17 (Functions can be chosen)
18	X18	Input 18 (Functions can be chosen)
19	X19	Input 19 (Functions can be chosen)
20	X20	Input 20 (Functions can be chosen)
21	X21	Input 21 (Functions can be chosen)
22	X22	Input 22 (Functions can be chosen)
23	X23	Input 23 (Functions can be chosen)
24	X24	Input 24 (Functions can be chosen)
25	GND	Power Supply Ground

7.3.2 Input Connection

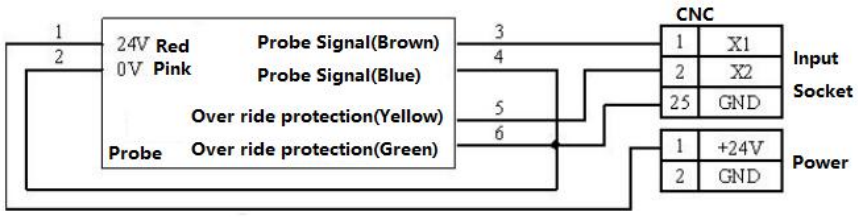
For Mechanical Switch



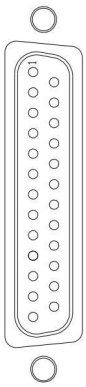
For Photoelectric Switch



For Probe



7.4 Output

Socket	Pin	Signal	Functions
 DB type 25 hole (Output)	1	Y13	Output 13
	2	Y12	Output 12
	3	Y11	Output 11
	4	Y10	Output 10
	5	Y09	Output 9
	6	Y08	Output 8
	7	Y07	Output 7
	8	Y06	Output 6
	9	Y05	Output 5
	10	Y04	Output 4
	11	Y03	Output 3
	12	Y02	Output 2
	13	Y01	Output 1
	14	+24V	+ 24V
	15	Y24	Output 24
	16	Y23	Output 23
	17	Y22	Output 22
	18	Y21	Output 21
	19	Y20	Output 20
	20	Y19	Output 19
	21	Y18	Output 18
	22	Y17	Output 17
	23	Y16	Output 16
	24	Y15	Output 15
	25	Y14	Output 14

Set the functions of output in the output interface.