

Handheld Motion Controller For Engraving Machine NCH02

User's Manual



1 NCH02 Motion Controller Introduction

1.1 Introduction of Product

Digital Dream has a 10 years history in the numerical control industry, specializing in the research, development and production of various CNC (Computer Numerical Control) systems. DigitalDream aims to combine high quality and high reliability with affordability. We produce 1 axis to 6 axes CNC system.

Thank you for choosing digital dream's motion controllers. With a lots of examples and charts, this manual will describe the features, functions and every operations of our controllers. Pls read this manual carefully before any assembling and using. Incorrect handling can result in injury and damage to persons and engraving machine. Pls keep the manual carefully for convenient to read it at any time in need.

NCH02 is very professional 3-5 Axis CNC Motion Controller which is based on embedded system. NCH02 operates as a standalone system with handheld Pendant without the need of a computer, and with a pendant, it makes users very convenient to operate the machines. Our controller adopts Embedded Operating System, by which the controller will never get virus-infected. And the controller adopts look-ahead algorithm by which the controller can read more ahead 30-lines G-code than the operating. All the features guarantees high precision, accuracy and reliability. And the size is very small, operation is very easy, very suitable for all size of Engraving machines, Milling machines and cutting machines and so on.

1.2 Performance parameter of the **NCH02**

- 1) Max. 5 Axis, 3-5 Axis Optional; Max. 125Khz per axis;
- 2) 2-4 Axis linear interpolation, any 2 axis circular interpolation;
- 3) 5 opto isolated digital outputs, 8 opto isolated digital inputs;
- 4) Analog spindle control 0-10V spindle control (can be modified as PWM output);
- 5) 24VDC power input, minimum 1A;
- 6) 3.5 inches TFT screen, resolution ratio: 480x320; 19 user keys;
- 9) USB flash disk support for G code file input;
- 10) The control system can preview the process path before machining, and it makes the system more steady, working smoothly and precise;
- 11) Support the Standard MPG or the NVMPG which Digital dream made;
- 12) Acceleration/Deceleration Mode: S curve;
- 13) Support un-limited size file for machining;
- 14) Manual/Automatic machining function;
- 15) Support the operation to Start a G code from a specific line;
- 16) Support for "Power Cut" recovery. Data is automatically saved;
- 17) Support time-lock function;
- 18) Automotocally Probe function;
- 19) Supporting Homing, Go to Zero, workpiece origin position saving;
- 20) Supporting downloading and uploading all the parameter setting of the controller.

1.3 Appearance, Structure and Size of Product

The NCH02 motion controller contains the handheld motion controller, wiring board, and HDMI digital high-definition transmission cable.

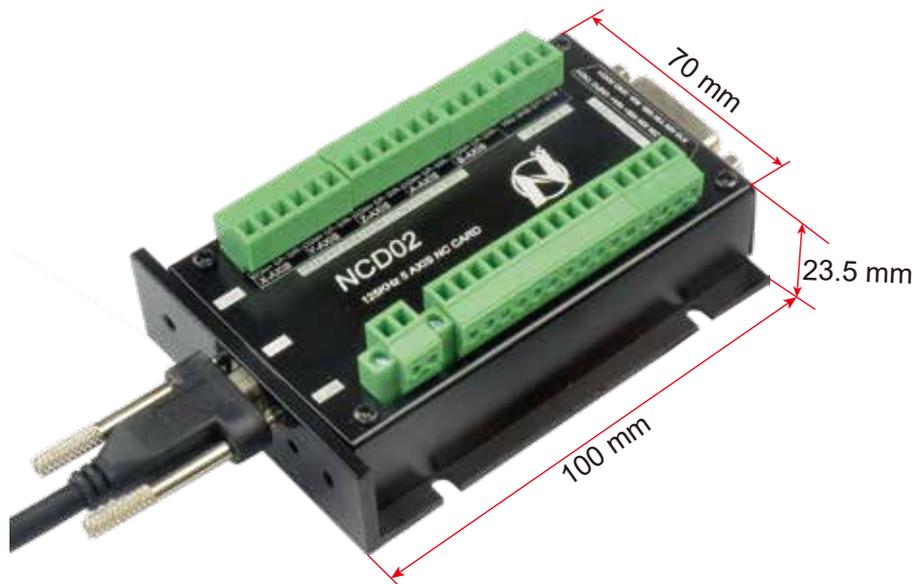
The handheld motion controller and wiring board are communicated by 2 Meter 37 pins HDMI digital high-definition transmission cable which is shielding twisted-pair cable to avoid interference.

Picture 1-1 shows the appearance and size of NCH02 Pendant.

Picture 1-2 shows the appearance and size of NCH02 Wiring Board.



Picture 1-1 NCH02 Pendant Size

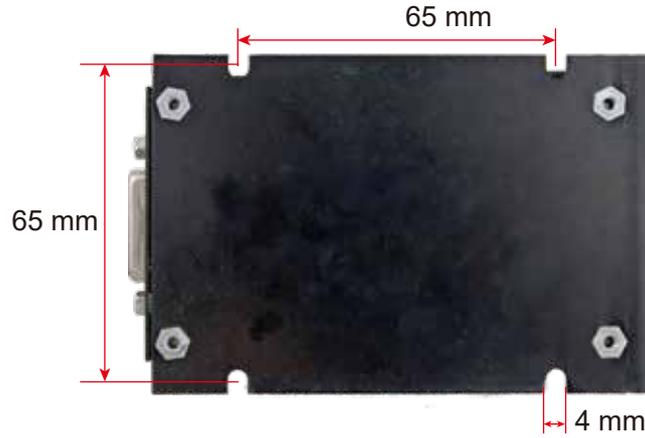


Picture 1-2 The NCH02 wiring board Size

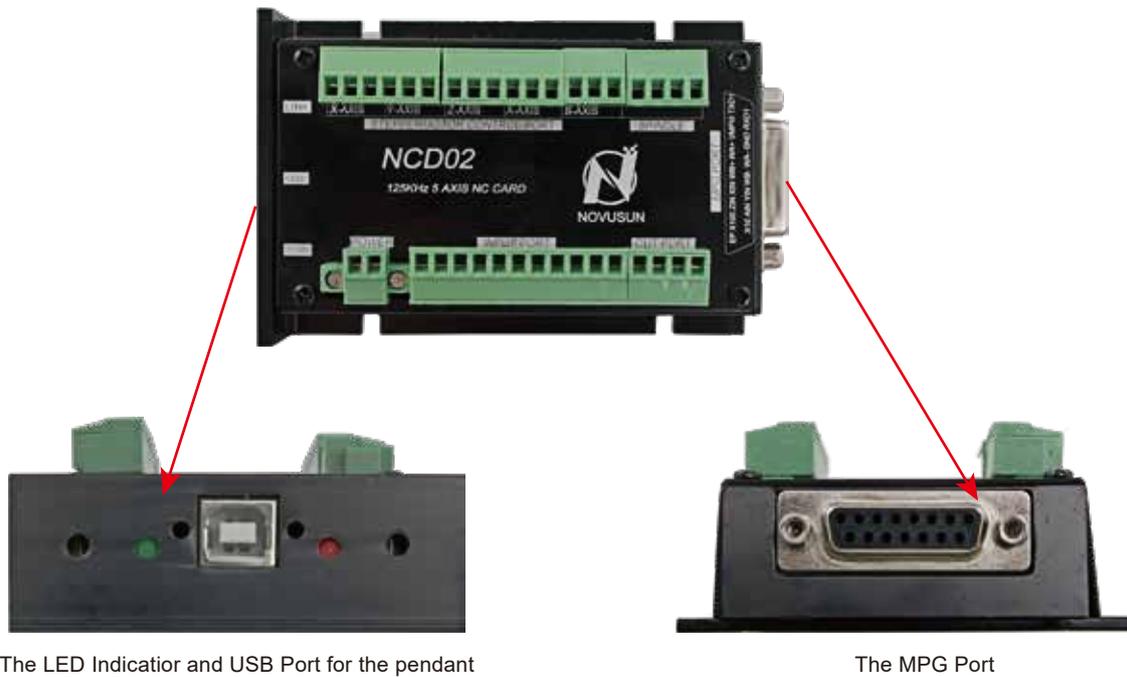
Picture 1-3 shows the Installation size of NCH02 Wiring Board.

Picture 1-4 shows the 2 side pictures of NCH Wiring Board. The one side is for the MPG interface; and the other side is the LED indicators and USB port for the communication with the NCH02 Pendant Controller.

There are two LED indicators, the red one is for the power, the green one is for the communications with the NCH Pendant controller.



Picture 1-3 The NCH02 wiring board Install Size



The LED Indicator and USB Port for the pendant

The MPG Port

Picture 1-4 The NCH02 wiring board 2 Sides Picture

1.4 Explanation of Abbreviations

When operating the NCH02 Controller, the users will come across some English abbreviations. Here a list with explanations:

FRO: Feed Rate Override

SRO: Spindle Rate Override

SRJ: Jog Speed Setting

F: Feed rate, unit is mm/min

S: Spindle Speed, unit rev/min.

X: The coordinate code of the X axis.

Y: The coordinate code of the Y axis.

Z: The coordinate code of the Z axis.

A: The coordinate code of the A axis

BUSY: The system is busy. You still can adjust FRO and SRO

READY: READY mode, any operation can be done

RESET: Reset mode, controller is in “OFF” mode, no operation can be performed

CONT: Continuous mode, each axis can be manually jogged with the arrow keys

Step :Manual Step Mode, each axis can be jogged in defined steps

MPG: MPG mode. Operate the machine with the MPG (Manual Pulse Generator)

AUTO: Run G code. Auto is showing when file is processing

1.5 Notes and Warnings



Keep away from exposure to moisture or water. This product contains sophisticated electronics and must not get wet.

Wiring warning: the IO input terminal of this controller supports equipment with source power (such as Inductive Proximity Switch). When using this kind of equipment, pay attention to the polarity. Avoid the +terminal to be connect with GND. This controllers has analog output for spindle control (0-10V). Please avoid this terminal to ever connect with GND as damage to the controller may occur.



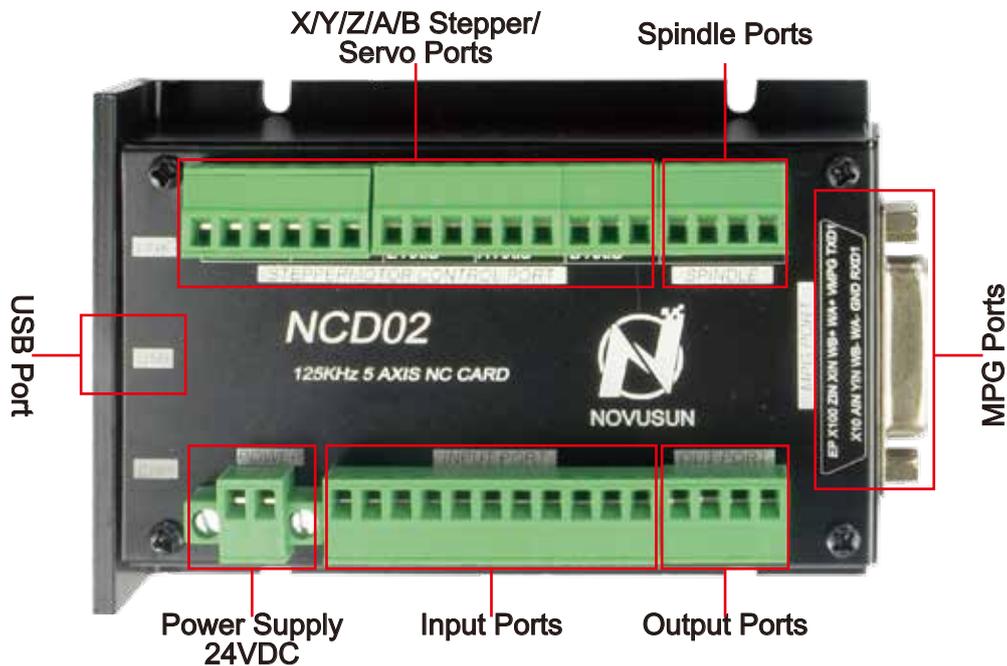
Operation warning. Please observe all security measures when operating the machine. The ESTOP must be connected and properly labelled. In case of a problem, press the E-stop at once to avoid damage to humans, animals and the equipment.



High voltage danger. The NCH02 is connected to 24VDC. Obey and follow the electricity safety rules of your country when connecting this equipment.

2 Wiring Board

The circuit switching wiring board provides screw terminals for power (24VDC), input signals, spindle control, pulse and direction for X/Y/Z/A/B stepper/ servo drives, MPG, input and output ports as well as an USB input. Please see the reference picture 2-1 in detail.

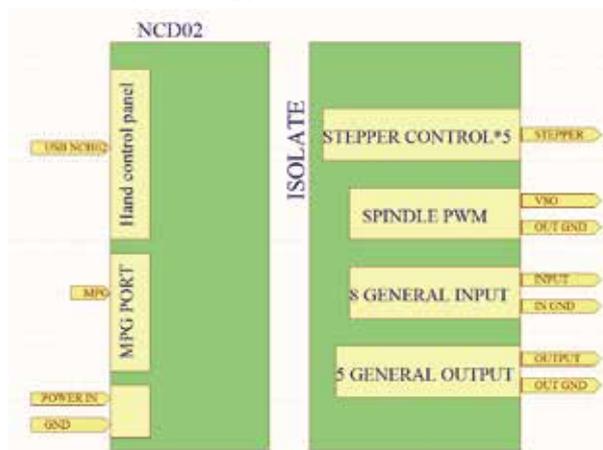


Picture 2-1 Wiring Board Rear view

As the picture shows, the wiring section of the controller has Stepper/Servo Ports, Spindle Control Ports, MPG ports, Output and Input Ports, and Power supply Ports, as well as USB ports.

The inside power solution in the field of industrial automation is always very complicated, there is a lot of GND, now we describe the structure of the power structure as below:

The power structure as the Picture 2-2, main power supply input, MPG module and Power and USB port share common GND, stepper control module and Input&Output module and Spindle control module share common GND, between the two sectors there is photoelectric isolation. Inside of the board, there is GND as common-, no need to connect external power supply.



Picture 2-2 Board Power Structure

2.1 USB Port

As the following picture showed,by the USB terminal block is USB port, you can connect with handheld controller.

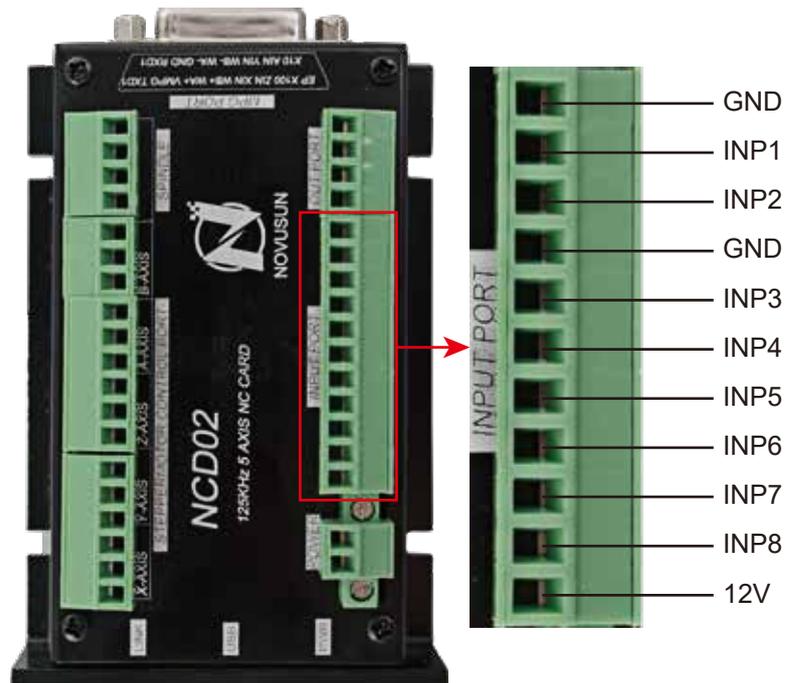


Picture 2-1 USB port

2.2 Main power supply port

As the Picture 2-1 showed, The power supply port. The Input voltage is 24VDC, and the power is not less than 20W. The positive and negative connection of the power supply see as the silk printing.

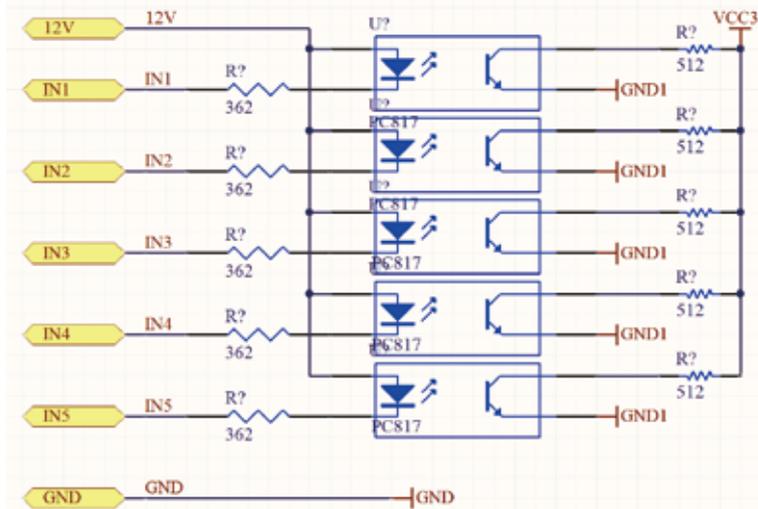
2.3 The Input Ports



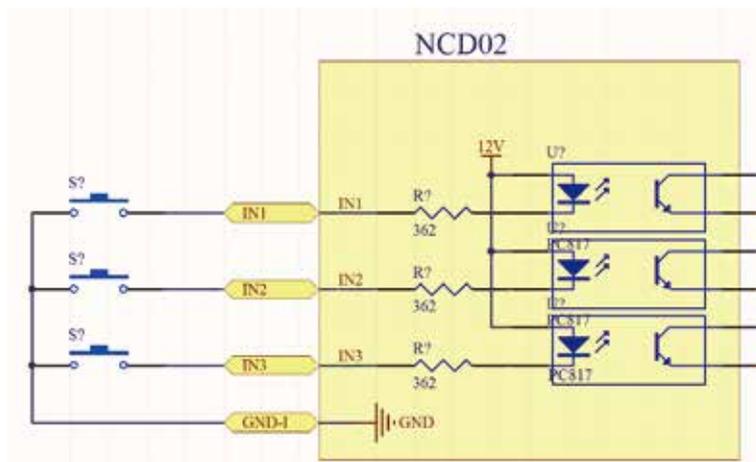
Picture 2-2 The Input Ports definition

As the Picture 2-2 showed,Inputs ports has already defined.The Users can use them as E-stop,Probe,limited/Home functions and so on.The ports is a common negative interface,which can be connected with a micro switch,a 2 line proximity switch or a NPN type 3 line proximity switch.All the ports are isolated.And the internal structure is as following Picture 2-3.

And the E-stop,Micro switch,2 line proximity switch connection methods referred to Picture 2-4.



Picture 2-3 Internal structure diagram of the input port



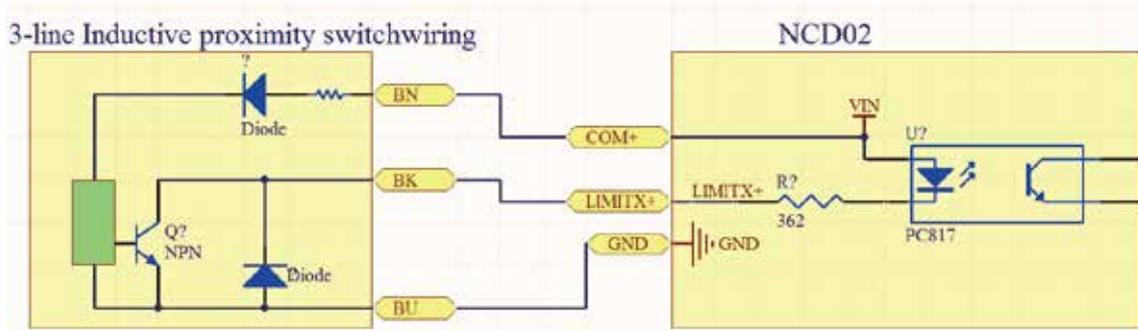
Picture 2-4 Probe/Estop/ ordinary fretting switch input connection



Picture 2-5 2 Lines Proximity Switch Connection Method

3 lines Proximity Switch connection method as following Picture 2-6 shows. Brown cable connect with 12V,Black cable connect channel, blue cable connect with GND1.

3 lines proximity switch only NPN type is available for the NCH02.

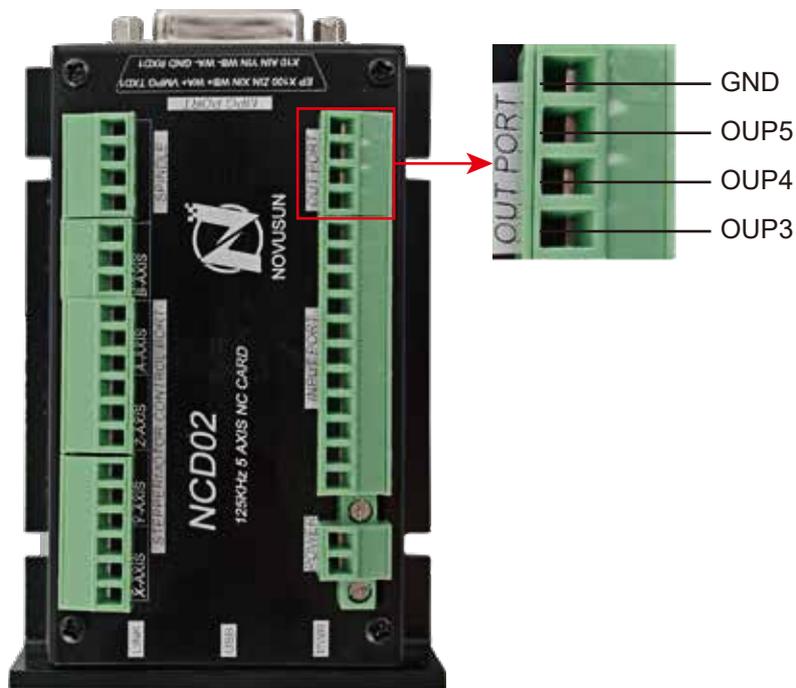


Picture 2-6 NPN 3 lines Proximity Switch connection drawing



Picture 2-7 NPN 3 lines Proximity Switch example

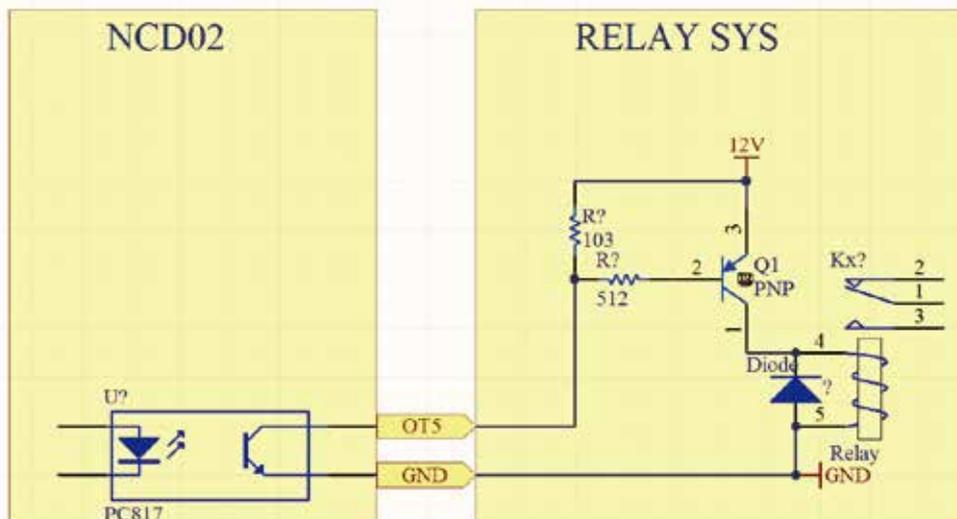
2.3 The Output Ports



Picture 2-8 The Output Ports definition

As the Picture 2-8 shows, the interface is an open-ground interface, which can be absorbed not more than 50mA current. The relay with a absorption current of no more than 50mA can be driven directly. If it's more than 50mA, and it is recommended to use a current amplification, for example ULN2803 chip.

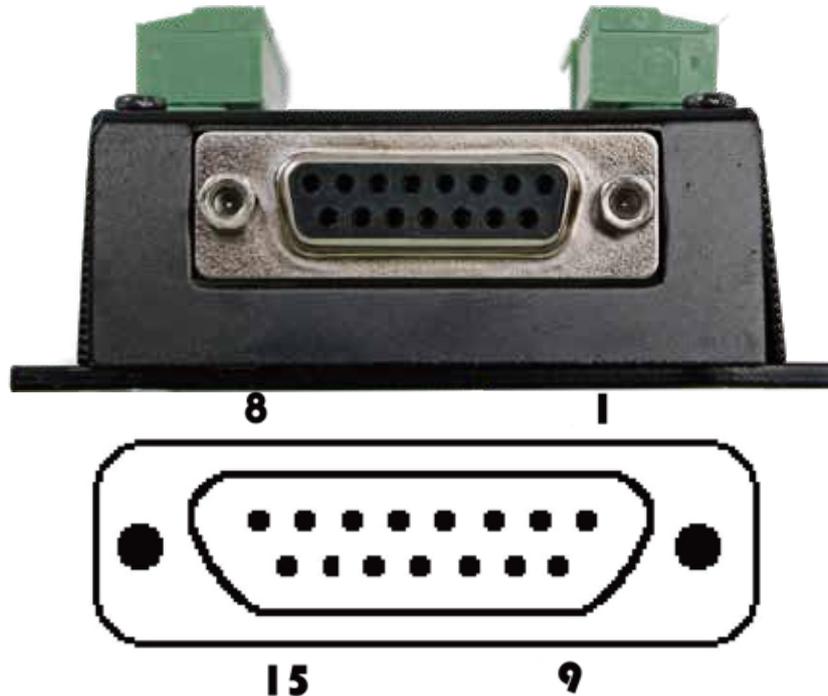
The Picture 2-9 is for external power relay method.



Picture 2-9 General Output Port Connect with a Relay

2.4 The MPG Ports

The MPG interface Pin order as following:

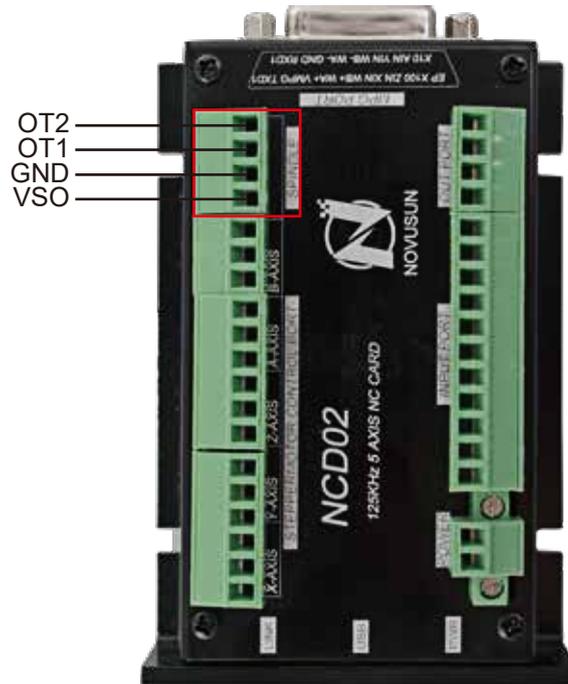


Picture 2-9 The MPG Port

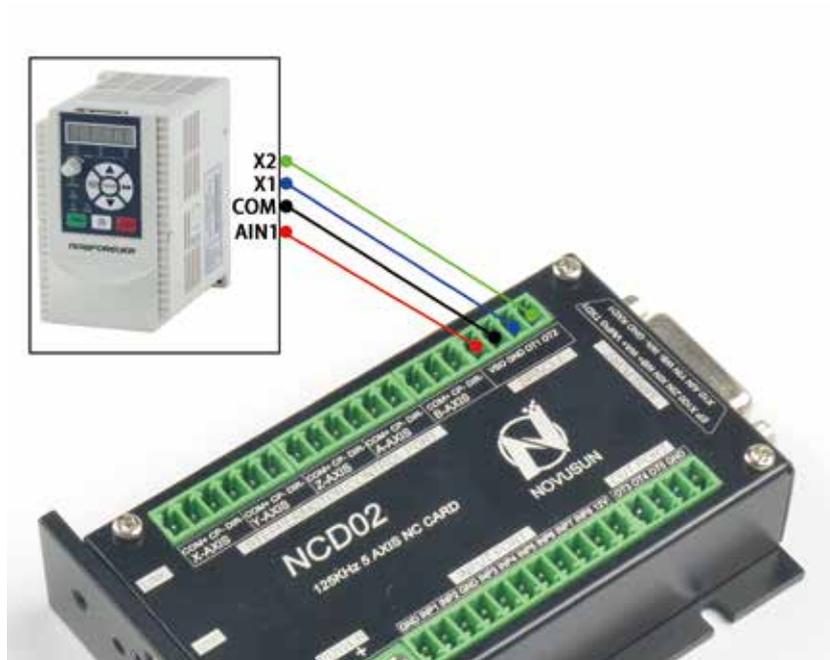
Pin No.	Definition	Notes
1	T1OUT	TXD of Serial Port
2	VMPG	Power supply Positive Terminal (5V)
3	WHA+	MPG A phase differential input positive terminal
4	WHB+	MPG B phase differential input positive terminal
5	XIN	X axis selection input
6	ZIN	Z axis selection input
7	X100IN	100 Rate Selection Input
8	EP	ESTOP port
9	R1IN	RXD of Serial Port
10	GND	Ground and common end
11	WHA-	MPG A phase differential input negative terminal
12	WHB-	MPG B phase differential input negative terminal
13	YIN	Y axis selection input
14	AIN	A axis selection input
15	X10IN	10 Rate Selection Input

2.5 The Spindle Control Port

The Picture 2-10 showed interface definition is VSO/GND/OT1/OT2. The VSO is the 0-10V analog output, OT1/OT2 digital signal output, spindle control output interface and spindle inverter connection methods as Picture 2-11. VSO/GND/OT1/OT2 are respectively connected with the inverter AIN1/COM/X1/X2, where AIN1 is the input speed signal;COM is Common Ground;X1 and X2 are configured to forward and reverse revolution.



Picture 2-10 The Spindle Control Port



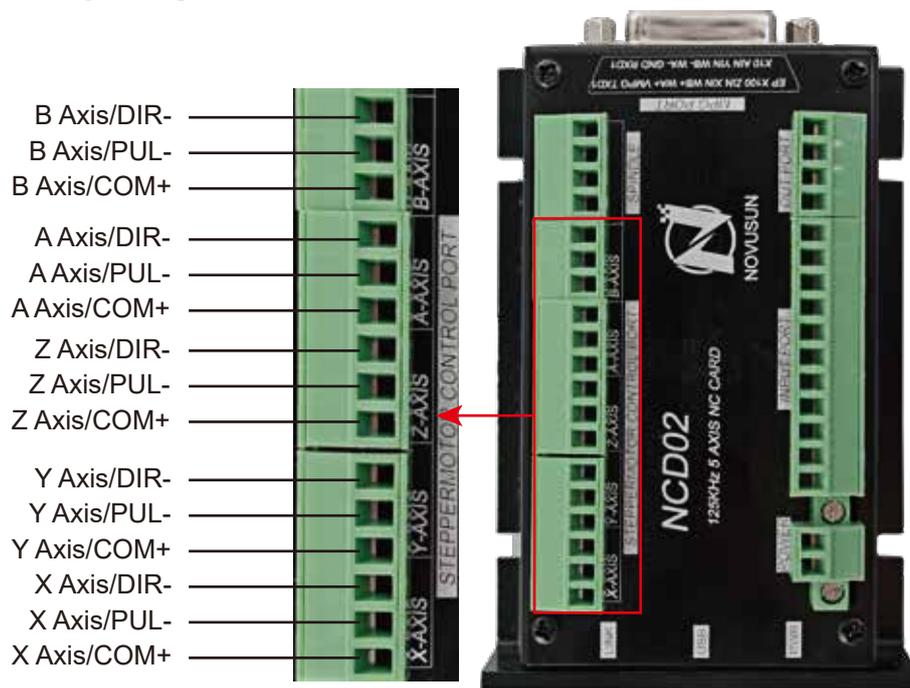
Picture 2-11 The Spindle Control Port definition and wiring

2.6 The Servo/Stepper Port

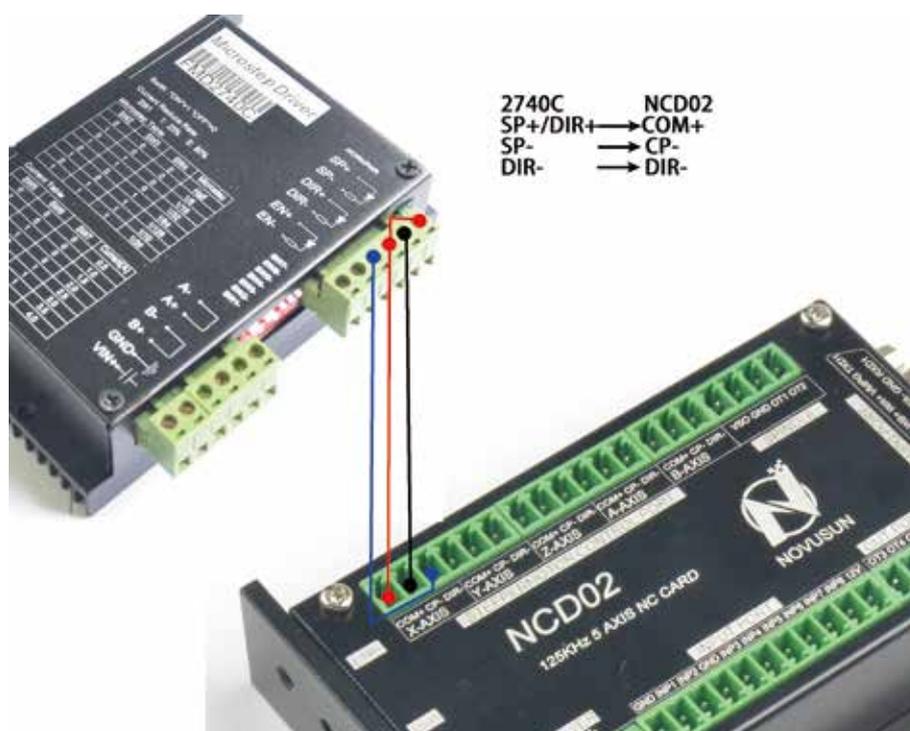
The following Picture 2-12 shows the definition of Servo/Stepper Ports. There are 5 axis X/Y/Z/A/B, each axis connection is common anode. Output signal voltage is 5V.

DIR is Direction Signal Output;

PUL is Pulse Signal Output.



Picture 2-12 Definition of Servo/Step Ports



Picture 2-13 The wiring method with Stepper driver

3 Handheld Controller Keyboard Definition

Keys Icon	Definition	Keys Icon	Definition
	Page Left		1: Z axis Down; 2: Home; 3: Data 6 Input
	Page Right		Spindle manual Start/Close
	1: Cancel; 2: Exit		1: X axis moves left; 2: Probe; 3: Data 1 Input.
	Shift, This key will activate 2nd Mode		1: Y axis moves forward; 2: Y Axis Select 3: Data 2 Input
	1: A axis rotates in forward direction; 2: A axis select; 3: Data 7 Input		1: X axis moves right; 2: X Axis Select 3: Data 3 Input
	1: B axis rotates in forward direction; 2: B axis select; 3: Data 8 Input		Start operation
	1: Z axis Up; 2: Z axis select; 3: Data 9 Input		Pause operation
	RESET		1: Y axis move backward; 2: Data 0 Input
	1: A axis rotates in reserve direction; 2: 0-clearing; 3: Data 4 Input		1: Mode of Step/Continuous/MPG Selection 2: Data . Input
	1: B axis rotates in reserve direction; 2: Go To Zero function; 3: Data 5 Input		1: Increase the number clockwise; 2: Decrease the number Counter-clockwise 3: Push the button to Confirm

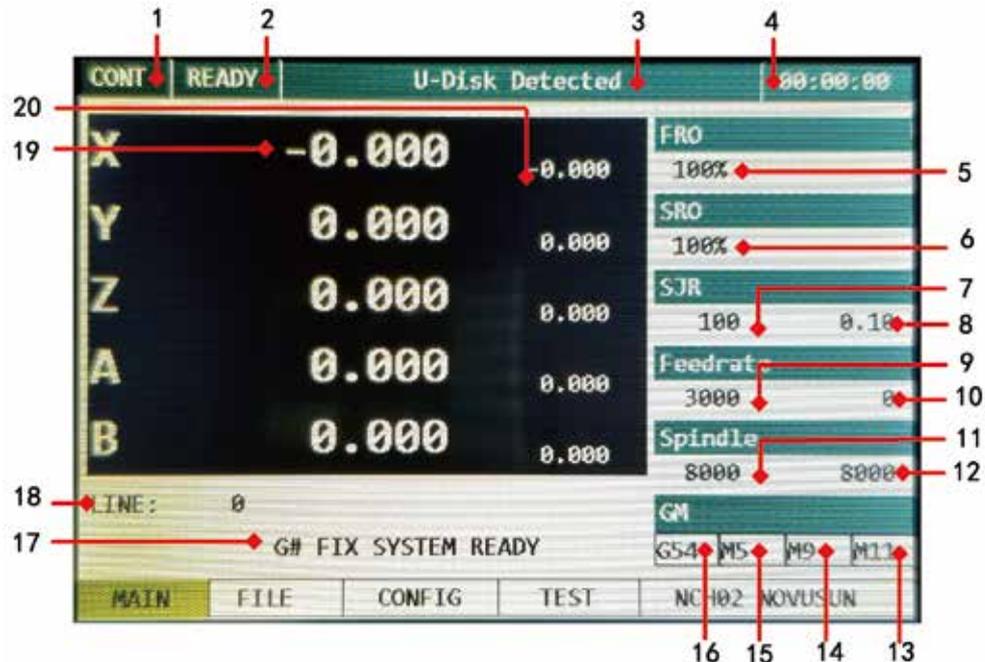
4. Motion Controller Software Description

NCH02 Motion Controller software has 4 main parts: Main Page, File Management, Configuration Page, and Test&Diagnosis Page.

We will describe them one by one as below.

4.1 Main Page Description

The Picture 4-1 shows the Main Page of NCH02. It is divided into status column, coordinate display column, basic parameter column, and notification column. In total, it is divided into 20 sections in detail. Here the detailed description of the 20 sections :



Picture 4-1 Main Page of NCH02

1. Feed status: Manually Position the machine at any position:

The Picture 4-1 shows the main page in CONT mode, which is continuous mode. There are Continuous mode, Step Mode and MPG mode for options by pressing the key  to shift the 3 different mode.

2. Operation Status: It shows the working status of Controller :

The Operation Status column displays the working status of the controller. There are 4 different status: RESET/READY/JOG/RUN

By Pressing , The controller status shift between READY and RESET status;

Only When in READY status, By Pressing , the controller will start to run a G-code, then the status turn to “RUN”. And during the operation by handheld controllers of Jog operation, the status turns to “JOG”MODE.

3. File status:It shows the G-code file information and U-disk

There will be 4 Status at File Status:No file Loaded;U-Disk Detected;U-Disk Removed;G-code file name:

No File Loaded:When the controller cannot detect a U-disk and cannot load a file;

U-Disk Detected:When the U-disk is inserted and controller can detect the U-disk;

U-Disk Removed:When the U-disk is removed;

G-code file name:When the G-code file is selected and the controller is running the G-code file,it will display the name of the G-code file.

4. Time display:This column shows the processing time of the G code operation.

Time keeping is halted during Pause.



Picture 4-2 Rotary&Push Button On Handheld Controller of NCH02

Before the description from No.5,we'd like to explain the Rotary&Push Button.Pls note the Picture 4-2 as above.By this button,it can decrease or increase the values by turning the button,and push it to confirm.

When we need to edit a value,for example,FRO or SRO or SJR value and so on,firstly select it and push the button,we can see the original values color is white and background is black,then we start to edit it by turning the button,the values' background color becomes to Blue.After we edited the value,and we push the button to confirm it,the background turns to black color.Then Push the button again to exit the editing state.

This is the operation method for all the value editing.

5. FRO: FRO controls the Feed Speed.

The adjustment range is 0%~200%.By turning the rotary button,adjust the value in 10% increments by each click.

6. SRO:SRO controls the Spindle Speed.

The adjustment range is 0%~200%.By turning the rotary button,adjust the value in 10% increments by each click.The current spind speed $\#S=SRO*S$ (The fixed Spindle speed value)

7. SJR: SJR controls the jogging of the machine.

The adjustment range is 0%~100%.By turning the rotary button,adjust the value in 10% increments by each click.The Current Jog Speed $\#HF=SJR*HF$ (The fixed Jog Speed)

8: Manual Jog Distance in Step Mode:

Each Axis can be jogged in defined distance. In Step Mode, you can define the increments by 0.01mm, 0.1mm or 1mm. By turning the button, the values can be decrease or increase.

default Spindle Speed. The Default Spindle Speed can be changed, use the A- key to modify.

9: Feedrate: F stands for Feed Speed:

It is the minimum Feed speed value of the controller, can be adjust by Rotary button also.

If there is no F values in G-code file, the controller will run the file at the speed of Feedrate value, if there is F value in G-code file, the controller just run as the G-code file.

10: Real time Feed Speed:

F Real-time Feed Speed Value shows the current feeding speed when running a G-code.

$F \text{ Real-time Feed Speed Value} = FRO * F$ (The Feed speed fixed by G-code or controller)

11: Speed of spindle:

It is the Default Spindle speed value of the controller, can be adjust by Rotary button also.

If there is no S values in G-code file, the controller will run the file at the speed of Feedrate value, if there is S value in G-code file, the controller just run as the G-code file.

12: Real time Spindle Speed:

S Real-time Spindle Speed Value shows the current Spindle speed when running a G-code.

$F \text{ Real-time Feed Speed Value} = SRO * S$ (The Spindle speed fixed by G-code or controller).

13: M10/M11: Start/Stop of Lubrication

M10/M11 can adjust by rotary button, or can run as the directive from G-code file.

14: M8/M9 : Start/Stop of Cooling

M8/M9 can adjust by rotary button, or can run as the directive from G-code file.

15: M3/M4/M5: forward-rotating/Reverse-Rotating/Stop Spindle

M3/M4/M5 can adjust by rotary button, or can run as the directive from G-code file.

16: Coordinate System

The Coordinate System Range is G54-G59, can adjust by rotary button, or can run as the directive from G-code file.

17: Controller System Status

There are 7 different kinds status of the controller. Here we explain them as below:

No.	Display	Definition
1	System Ready	The Controller is Ready for Any Operation.
2	System Reset	Controller is in Reset Status.
3	System is running	The controller is running a G-code file
4	X(Y/Z)++ LIMITED	Positive Limit of X(Y/Z) is Triggered
5	X(Y/Z)-- LIMITED	Negative Limit of X(Y/Z) is Triggered
6	X(Y/Z)++ SOFT LIMITED	Positive soft limit of X(Y/Z) is Triggered
7	X(Y/Z)-- SOFT LIMITED	Negative soft limit of X(Y/Z) is Triggered

18: The G-code Line that the Controller is Running

In the column,it shows the current G-code Line No. and G-code content.To Shift the G-code line,the users can edit Line Value here.

19: The coordinate values of each axis under the current coordinate

The coordinate values of each axis under the current coordinate are displayed here.

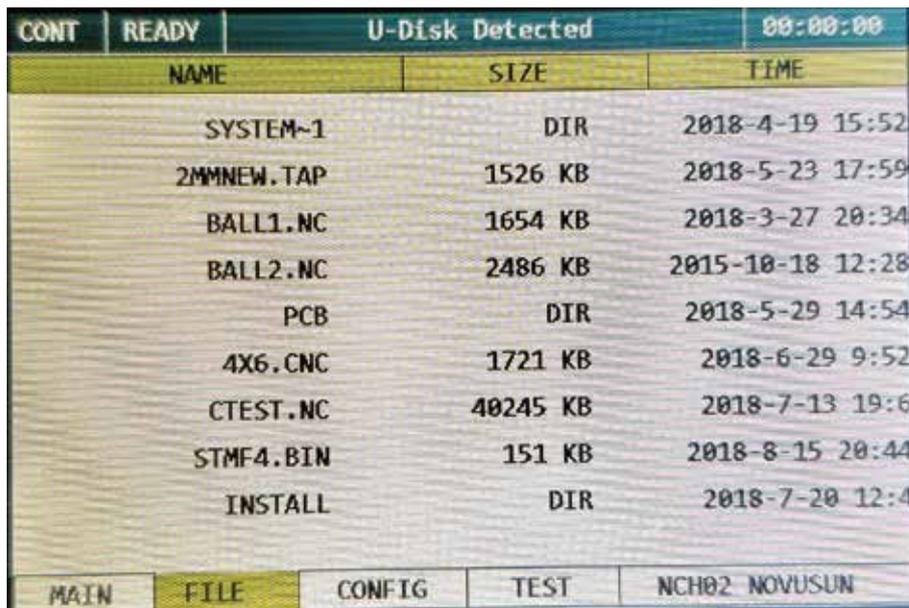
20: The coordinate values of each axis under the mechanical coordinate

The coordinate values of each axis under the mechanical coordinate are displayed here.

4.2 The File Management Page

When the U-disk is inserted in to the controller USB port,The File management page can be entered by

pressing  under the main page. The file management page is shown in Picture 4-3 as below.



CONT	READY	U-Disk Detected		00:00:00
NAME		SIZE	TIME	
	SYSTEM~1	DIR	2018-4-19 15:52	
	2MMNEW.TAP	1526 KB	2018-5-23 17:59	
	BALL1.NC	1654 KB	2018-3-27 20:34	
	BALL2.NC	2486 KB	2015-10-18 12:28	
	PCB	DIR	2018-5-29 14:54	
	4X6.CNC	1721 KB	2018-6-29 9:52	
	CTEST.NC	40245 KB	2018-7-13 19:6	
	STMF4.BIN	151 KB	2018-8-15 20:44	
	INSTALL	DIR	2018-7-20 12:4	

MAIN FILE CONFIG TEST NCH02 NOVUSUN

Picture 4-3 File management page

The displays will show all folders and files in the Root directory. The Name of folders and files, the size of files and the time and date of manipulation. The blue strip indicates the current valid target location.

By turning the rotary&push button to select the G-code file and press it to confirm the selection.Then the controller system will load the selected file.After the loading is finished,the controller software will shift to Main Page Automatically.

4.3 The CONFIG(Configuration) Page

When in the File Management Page,press



to enter into the CONFIG Page.And the CONFIG Page has 4 Sub-Page:

Motor Configuration

Input configuration

Spindle/Output

Other

By Pressing



we can shift between the 4 sub-pages.

4.3.1 Motor Parameter Configuration(Motor)

CONT	READY	U-Disk Detected			00:00:00
MOTOR		INPUT	Spindle/OUT	OTHER	
Axis	Stepsper	Velocity	Accel	Safe-Z	
X	2001.0000	3000.00	500.00	0.00	
Y	2000.0000	3000.00	500.00	BL SPEED	
Z	2000.0000	3000.00	500.00	20%	
A	2000.0000	3000.00	400.00	-	
B	2000.0000	1.00	4.00	-	
Axis	Step Level	Dir Level	BL Enable	BL Length	
X	0	0	0	0.00	
Y	0	0	0	0.00	
Z	0	0	0	0.00	
A	0	0	0	0.00	
B	0	0	0	0.00	
MAIN	FILE	CONFIG	TEST	NCH02	NOVUSUN

Picture 4-4 Motor Parameter Configuration Page(MOTOR)

As Picture 4-4 showed as above,the Motor Parameter configuration Page has a lot of column.There is a lot of the parameter need to set up,also by rotary&push button.We marked the column from 1-17 and will describe them one by one as following table.

No.	Mark	Definition	Range
1	Stepsper	The number of pulses required for each 1mm feeding	100-20000
2	Velocity	The Max. Speed for Manually operation or the G-code file running.The unit is mm/min.	50-20000
3	Accel	The Max. Acceleration for manual operation or G-code file running.The unit is mm/min ² .	50-5000
4	Safe-Z	Z Axis Safety Height.The Unit is mm.	10-200
5	BL SEPPD	Backlash Speed	0-100%
6	Step Level	The Pulse Signal ELeetric Level.0=Low,1=High	1/0
7	Dir Level	The Direction Signal ELeetric Level.0=Low,1=High	1/0
8	BL Enable	Backlash Enable,1=Enabe,0=disable.	1/0
9	BL Length	Backlash Length,The unit is mm.	0-10

4.3.2 Input parameter configuration (INPUT)

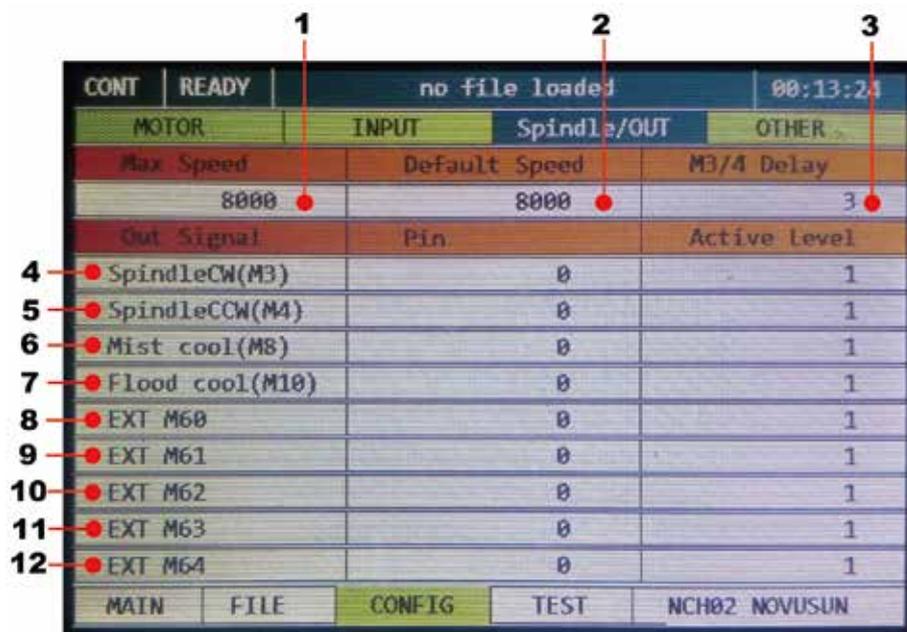


Picture 4-5 Input Parameter Configuration (INPUT)

The Picture 4-5 showed above it is the Input Parameter configuration page. At the chart below we explain each column setting. By turning the rotary & push button, the user can select and edit the values and confirm.

No.	Mark	Definition	Range
1	Limit++	The Hard Limit at forward direction Pin setting. 0=close the limit; 1=IN1, 2=IN2... 8=IN8.	0-8
2	L++ Level	Active Level of forward direction limit. 0=disable, 1=enable	1/0
3	Limit--	The Hard Limit at backward direction Pin setting. 0=close the limit; 1=IN1, 2=IN2... 8=IN8.	0-8
4	L-- Level	Active Level of backward direction limit. 0=disable, 1=enable	1/0
5	Home	Home Pin Setting. 0=Disable; 1=IN1, 2=IN2... 8=IN8.	0-8
6	Home Level	The HOME Signal ELeetric Level. 0=Low, 1=High	1/0
7	Home Dir	HOME direction. 0=Backward, 1=forward.	1/0
8	HKB Length	Back off distance after Home, the unit is mm	0-100

4.3.3 Spindle/Output Parameter configuration (Spindle/OUT)



Picture 4-6 Spindle/Output Parameter configuration (Spindle/OUT)

The Picture 4-6 showed above it is the Spindle/Output configuration page. At the chart below we explain each column setting. By turning the rotary & push button, the user can select and edit the values and confirm.

VSO connects to Speed adjustment which defined by voltage 0-10V.

The relationship Max. Spindle speed and default spindle speed is as below:

$$\text{VSO(Output Voltage)} = 10 * \text{default spindle speed(S)} / \text{Maximum Spindle Speed(Max.S)}$$

For example if we set the Max Speed is 40000, Default speed is 20000, then $\text{VSO} = 10 * 20000 / 40000 = 5\text{V}$.

No.	Mark	Definition	Range
1	Max Speed	The max spindle speed	0-8
2	Default Speed	The default spindle speed	1/0
3	M3/4 Delay	Delay time of M3/4 Directive, Spare enough time for spindle response	0-8

No.	Mark	Pin Selection		Active Level	
		Definition	Range	Definition	Range
4	Spindle CW(M3)	M3 Pin Number Setting	0-5	M3 Active Level	1/0
5	Spindle CCW(M4)	M4 Pin Number Setting	0-5	M4 Active Level	1/0
6	Mist cool(M8)	M8 Pin Number Setting	0-5	M8 Active Level	1/0
7	Flood cool(M10)	M10 Pin Number Setting	0-5	M10 Active Level	1/0
8	0-5	M60 Pin Number Setting	0-5	M60 Active Level	1/0
9	EXT M61	M61 Pin Number Setting	0-5	M61 Active Level	1/0
10	EXT M62	M62 Pin Number Setting	0-5	M62 Active Level	1/0
11	EXT M63	M63 Pin Number Setting	0-5	M63 Active Level	1/0
12	EXT M64	M64 Pin Number Setting	0-5	M64 Active Level	1/0

Note: The Output Pin No. 0 indicates that the output closed, and the output Pin No. 1-5, the Mark No. is OUT1-OUT5.

Output Active Electric Level Setting: 1=Active, 0=Not Active.

4.3.4 Other Parameter Configuration(Others)

MOTOR	U-Disk Detected				00:00:00	
INPUT	Spindle/OUT		OTHER			
Soft Limit++	Soft Limit--	PROBE				
Ena	Value	Ena	Value	PIN	LEVEL	MOD
X	0	0.00	0	0.00	0	1
Y	0	0.00	0	0.00	0	0
Z	0	0.00	0	0.00	0.000	0.000
A	0	0.00	0	0.00	0.000	0.000
B	0	0.00	0	0.00	0.000	0.000
	PIN	LEVEL	P-B-Z		0.000	
ESTOP	0	1	Probe Spd		20%	
START	0	1	Home Spd		20%	
PAUSE	0	1	Language		English	
ZERO	0	1	Buzzer		0	
MAIN	FILE	CONFIG	TEST	NCH02 NOVUSUN		

Configuration of soft limit

No.	Mark	Definition	Range
1	Max Limit++_Ena	Enable of Forward Direction soft limit,1:enable,0:disable	1/0
2	Limit++_Value	Soft limit position limit value at Forward Direction in mechanical coordinate system	0-10000
3	Limit--_Ena	Enable of Backward Direction soft limit,1:enable,0:disable	1/0
4	Limit--_Value	Soft limit position limit value at Backward Direction in mechanical coordinate system	0-10000

Configuration of Probe

No.	Mark	Definition	Range
5	PROBE-PIN	The pin of Probe,0 means close the signal,1=IN1,2=IN2.... 8=IN8.	0-8
6	PROBE-LEVEL	Electrical level of Probe, 1=high, 0=low	1/0
7	PROBE-MOD	Probe mode, 0:fixed-position probe, 1:floating-position probe	1/0
8	P-X	X axis coordinate of Tool sensor in fixed-position mode	±10000
9	P-Y	Y axis coordinate of Tool sensor in fixed-position mode	±10000
10	P-Z	Z axis coordinate of Tool sensor in fixed-position mode	±10000
11	P-B-Z	Back distance of Z axis after Probe in floating-position mode	0-100
12	PROBE SPD	Probe speed ratio according to G0	0-100%

Other parameter setting

No.	Mark	Definition	Range
13	Home Spd	EnabHome speed ratio according to G0	0-100%
14	Language	Language settings (temporary support for English only)	0
15	Buzzer	Button buzzer switch, 0: close, 1: open	1/0
16	EXT SIGNAL LEVEL	Electrical level of Estop, 1=high, 0=low.EXT Signal effective for ESTOP/START/PAUSE/ZERO	1/0
17	EXT SIGNAL PIN	The pin of Estop,0 means close the signal,1=IN1,2=IN2.... 8=IN8.EXT Signal effective for ESTOP/START/PAUSE/ZERO	0-8

4.4 Test and Diagnosis Page

The test and diagnosis page can be entered by pressing



under the parameter configuration page.

The page mainly displays the basic function of test information of the system, including key monitoring, input and output monitoring, spindle monitoring and so on.

The Test and Diagnosis Page pls note the following Picture 4-8.

	CONT	READY	U-Disk Detected		00:00:00
1	Axis TEST1	X	Y	Z	
	VALUE	0.0	0.00	0.00	
2	Axis TEST2	A	B		
	VALUE	0.00	0.00		
3	SPINDLE TEST	Voltage	Speed		KEYBOARD
4	VALUE	0.00	0.00		X Y1
5	INPUT TEST	[Grid of 16 black blocks]			
6	OUTPUT TEST	[Grid of 16 black blocks]			
7	TEST ALL	ALL IS OK			
8	VERSION	v2018.08.13.1			
MAIN		FILE	CONFIG	TEST	NCH02 NOVUSUN

Picture 4-8 Test and Diagnosis Page

No.	Mark	Definition
1	Axis TEST1	X/Y/Z 3 axis testing.Turning the Rotary/Push Button,and select it and push the button to confirm. Then the XYZ axis running at the certain path which already designed..
2	Axis TEST2	A/B 2 axis testing.Turning the Rotary/Push Button,and select it and push the button to confirm. Then the AB axis running at the certain path which already designed..
3	SPINDLE TEST	Spindle testing.Turning the Rotary/Push Button,and select it and push the button to confirm.The spindle output is changed according to the designed voltage,voltage and speed showed in the column.
4	KEYBOARD	Button monitoring can monitor the pressing position of the button in real time.
5	INPUT TEST	The input IO value is displayed in real time. One IO port corresponds to a color block, if the IO port is valid the color block turns red,and if the port is invaid the color block is black.
6	OUTPUT TEST	The input IO value is displayed in real time. One IO port corresponds to a color block, if the IO port is valid the color block turns red,and if the port is invaid the color block is black.
7	TEST ALL	The function can be select by turning the rotary&push button.Select it and push the button the testing start.All modules are running.
8	VERSION	This column display the produts version information.

5. G Code List and M Code List

As the following G code list and M code list shows, these G codes and M codes are supported by NCH02 Motion Controller.

G Code	Definition
G0	Quick positioning
G1	Spindle straightaway cut
G2	Spindle cut along the circle
G3	Spindle cut inversing the circle
G17	XY plane select
G18	ZX plane select
G19	YZ plane select
G28	Home
G31	Probe
G54	G54 coordinate system
G55	G55 coordinate system
G56	G56 coordinate systemh
G57	G57 coordinate system
G58	G58 coordinate system
G59	G59 coordinate system
G81	Drill hole code
G82	Drill hole code
G83	Circulation Drill Hole Code
G90	Absolute size Mode
G91	Increment size Mode
G98	Back to R point
G99	Fixed circulation

M Code	Definition
M3	Quick positioning
M4	Spindle straightaway cut
M5	Spindle cut along the circle
M8	Spindle cut inversing the circle
M9	XY plane select
M10	ZX plane select
M11	YZ plane select
M30	End of G code
M60	Open Switch 1
M61	Open Switch 2
M62	Open Switch 3
M63	Open Switch 4
M64	Open Switch 5
M80	Close Switch 1
M81	Close Switch 2
M82	Close Switch 3
M83	Close Switch 4
M84	Close Switch 5